

UNITED STATES SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 10-K

(Mark One)

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the fiscal year ended December 31, 2023

OR

TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the transition period from _____ to _____.

Commission file number 000-15867

cadence

CADENCE DESIGN SYSTEMS, INC.

(Exact name of registrant as specified in its charter)

Delaware

(State or Other Jurisdiction of
Incorporation or Organization)

00-0000000

(I.R.S. Employer
Identification No.)

2655 Seely Avenue, Building 5, San Jose, California
(Address of Principal Executive Offices)

95134
(Zip Code)

(408) 943-1234

(Registrant's Telephone Number, including Area Code)
Securities registered pursuant to Section 12(b) of the Act:

Title of Each Class	Trading Symbol(s)	Name of Each Exchange on which Registered
Common Stock, \$0.01 par value per share	CDNS	Nasdaq Global Select Market

Securities registered pursuant to Section 12(g) of the Act:
None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes No

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes No

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes No

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§ 232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes No

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large Accelerated Filer	<input checked="" type="checkbox"/>	Accelerated Filer	<input type="checkbox"/>
Non-accelerated Filer	<input type="checkbox"/>	Smaller Reporting Company	<input type="checkbox"/>
		Emerging Growth Company	<input type="checkbox"/>

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act.

Indicate by check mark whether the registrant has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report.

If securities are registered pursuant to Section 12(b) of the Act, indicate by check mark whether the financial statements of the registrant included in the filing reflect the correction of an error to previously issued financial statements.

Indicate by check mark whether any of those error corrections are restatements that required a recovery analysis of incentive-based compensation received by any of the registrant's executive officers during the relevant recovery period pursuant to §240.10D-1(b).

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Act). Yes No

The aggregate market value of the voting and non-voting common equity held by non-affiliates computed by reference to the price at which the common equity was last sold as of the last business day of the registrant's most recently completed second fiscal quarter ended June 30, 2023 was approximately \$63,740,000,000.

On January 31, 2024, approximately 272,239,000 shares of the registrant's common stock, \$0.01 par value, were outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the definitive proxy statement for Cadence Design Systems, Inc.'s 2024 Annual Meeting of Stockholders are incorporated by reference into Parts II and III hereof. Such definitive proxy statement will be filed with the Securities and Exchange Commission within 120 days of the registrant's fiscal year ended December 31, 2023.

CADENCE DESIGN SYSTEMS, INC.
ANNUAL REPORT ON FORM 10-K
FOR THE FISCAL YEAR ENDED DECEMBER 31, 2023
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PART I.

Item 1. Business

This Annual Report and the documents incorporated by reference in this Annual Report contain statements that are not historical in nature, are predictive, or that depend upon or refer to future events or conditions or contain other forward-looking statements. Statements including, but not limited to, statements regarding the extent, timing and mix of future revenues and customer demand; the deployment of our products and services; the impact of the macroeconomic and geopolitical environment, including but not limited to, expanded trade control laws and regulations, conflicts in and around Ukraine, the Middle East and other areas of the world, volatility in foreign currency exchange rates, inflation and the rise in interest rates; the impact of government actions; future costs, expenses, tax rates and uses of cash; pending legal, administrative and tax proceedings; restructuring actions and associated charges and benefits; pending acquisitions, accounting for acquisitions and integration of acquired businesses; and other statements using words such as “anticipates,” “believes,” “could,” “estimates,” “expects,” “forecasts,” “intends,” “may,” “plans,” “projects,” “should,” “targets,” “will” and “would,” and words of similar import and the negatives thereof, constitute forward-looking statements. These statements are predictions based upon our current expectations about future events. Actual results could vary materially as a result of certain factors, including but not limited to those expressed in these statements. Important risks and uncertainties that could cause actual results to differ materially from those contained in the forward-looking statements include, but are not limited to, those identified in the “Proprietary Technology,” “Competition,” “Risk Factors,” “Critical Accounting Estimates,” “Results of Operations,” “Quantitative and Qualitative Disclosures About Market Risk” and “Liquidity and Capital Resources” sections contained in this Annual Report and the risks discussed in our other Securities and Exchange Commission (“SEC”) filings.

We urge you to consider these factors carefully in evaluating the forward-looking statements contained in this Annual Report. All subsequent written or oral forward-looking statements attributable to our company or persons acting on our behalf are expressly qualified in their entirety by these cautionary statements. The forward-looking statements included in this Annual Report are made only as of the date of this Annual Report. We do not intend, and undertake no obligation, to update these forward-looking statements.

Overview

Cadence® is a leading pioneer of electronic system design software and intellectual property (“IP”), building upon more than 35 years of computational software expertise. Since our inception, we have been at the forefront of technology innovation, solving highly complex challenges in the semiconductor and electronic systems industries. We are a global company that provides computational software, special-purpose computational hardware, IP and services to multiple vertical sectors including automotive, artificial intelligence (“AI”), aerospace and defense, high-performance and mobile computing, hyperscalers, wireless communication, industrial internet of things (“IIoT”) and life sciences. Our solutions are integrated and used in every stage of design creation, implementation, verification, analysis and signoff from chips to printed circuit boards (“PCBs”) to complete electromechanical systems.

Companies that design semiconductors and other electronic devices use our solutions to design, simulate, verify, signoff and manufacture every major type of semiconductor electronics including analog, mixed-signal, radio frequency (“RF”) and microwave devices, photonics, memory devices and digital chips for high-performance computing and AI, including central processing units (“CPUs”), graphics processing units (“GPUs”), neural processing units (“NPU”), three-dimensional (“3D”) integrated circuit (“3D-IC”) and advanced package devices. These devices are used in multiple vertical sectors.

Companies that design system-level products cover a broad range of vertical sectors including automotive, aerospace and defense systems, networking and communication systems, high-performance computing, cloud infrastructure and data centers, medical systems and health and life sciences. These companies use our solutions to design, simulate, verify and manufacture complete system products with the electronics included.

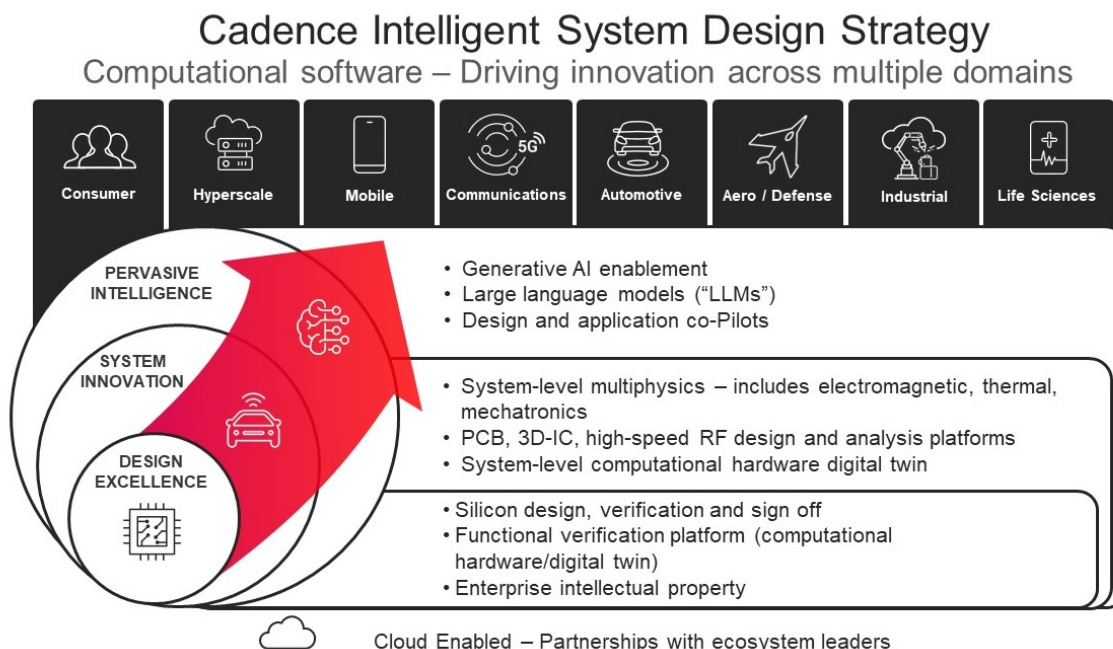
Our offerings include software, hardware, services, and reusable IC design blocks, which are commonly referred to as IP. Our semiconductor customers use our offerings to design, configure, analyze, and verify integrated circuits (“ICs”). Additionally, customers license our IP, which accelerates their product development processes by providing pre-designed and verified circuit blocks for their ICs. Systems customers use our offerings to design, simulate, and verify the electro-thermal and physical functionality of their ICs, PCBs, and systems products. Some of our software offerings are used by pharmaceutical and biotech companies to help accelerate their drug discovery process.

Business Strategy

Our Intelligent System Design™ strategy allows us to deliver essential computational software, hardware and IP that our customers use to turn their design concepts into reality. Our customers include many of the world’s most innovative companies that design and build highly sophisticated semiconductor and electronic systems found in products used in everyday life. Our Intelligent System Design strategy allows us to quickly adapt to our customers’ dynamic design requirements. We develop industry-leading computational software and hardware, generative AI, and digital twin algorithms to help solve their toughest challenges. Our software and services enable our customers to produce products that meet their critical business goals including time-to-market, costs and productivity while meeting growing global environmental concerns including sustainability and carbon emissions.

The creation of even the most seemingly simple electronic systems and products that people use every day is a complex process and requires many highly-trained engineers with various areas of specialized knowledge and skill sets. Our ability to deliver products that keep up with increasing complexity allows our customers to be successful in meeting their business goals and objectives.

Historically, the industry that provided the tools used by IC engineers was referred to as Electronic Design Automation (“EDA”). The pace of technical innovation in EDA has been driven by a concept known as Moore’s Law, which more than 50 years ago predicted that the complexity of ICs would double approximately every 18-24 months. Today, our offerings include and extend beyond EDA to enable computational software for Intelligent System Design across three layers as illustrated below—starting with semiconductor and silicon design excellence, followed by system innovation, and then pervasive intelligence.



The foundation of design excellence for semiconductors is essential for our customers to produce best-in-class technology for custom IC, digital IC design and signoff, simulation and functional verification, and leverages pre-built semiconductor IP. These tools, IP and associated services are specifically designed to meet the growing requirements of engineers designing increasingly complex chips across analog, digital and mixed-signal domains, and perform the associated verification tasks, including validation of low-level software running on a digital twin of the silicon model. This enables design teams to manage complexity and verification throughput without increasing their team size or extending the project schedule, while reducing technical risks.

The second layer of our strategy leverages our computational expertise, expanding our solutions into the physical analysis in system innovation. It includes tools and services used for system design of the packages that encapsulate the ICs, 3D-ICs and PCBs. Our technology covers system simulation analysis, including electromagnetic, electro-thermal, electromechanics, and other multiphysics analysis necessary as part of optimizing the full system’s performance, radio frequency (“RF”) and microwave systems, and embedded software. We also leverage our computational software expertise to life sciences by offering biosimulation solutions.

The third layer of our strategy addresses pervasive intelligence in new electronics. It starts with providing solutions and services to develop AI-enhanced systems and includes machine learning, deep learning and digital twin capabilities being added to the Cadence computational software and computational hardware portfolio to make IP and tools more automated and to produce optimized results faster. It also includes deploying generative AI techniques and LLMs to provide a rich set of co-pilots or design assistants to accelerate the design process.

Our software and special-purpose hardware products also support cloud access to address the growing computational needs of our customers.

Recent Acquisitions

Consistent with our Intelligent System Design strategy, we completed several acquisitions since the beginning of fiscal 2023 that we believe enhance our talent, our technology portfolio and our ability to pursue attractive opportunities in the markets we serve.

During the second quarter of fiscal 2023, we acquired Pulsic, Ltd., a provider of floorplanning, placement and routing of custom IC software. This acquisition enhances our existing generative AI capabilities in Virtuoso® Studio to solve advanced node challenges using intelligent AI-based physical design and virtual prototyping techniques.

During the third quarter of fiscal 2023, we acquired the Rambus SerDes and memory interface PHY IP assets from Rambus Inc. This acquisition broadens our enterprise IP portfolio in the design of AI, data center and hyperscale applications, as well as extends our expertise across multiple vertical sectors including automotive, aerospace and defense and consumer electronics, with the objective of providing broad subsystem solutions that meet the demands of our worldwide customers.

During the fourth quarter of fiscal 2023, we acquired Intrinsic Corporation, a wholly owned subsidiary of CEVA, Inc., and a provider of design engineering solutions focused on the U.S. aerospace and defense industry. This acquisition adds a highly skilled engineering team that has expertise in advanced nodes, radio frequency, mixed signal and security algorithms.

In January 2024, we acquired Invecas, Inc., a leading provider of design engineering, embedded software and system-level solutions. This acquisition adds a skilled system design engineering team with expertise in providing custom solutions across chip design, product engineering, advanced packaging and embedded software.

Business Drivers

Our products and services enable our customers to design complex and innovative semiconductor and electronic systems that are accelerated by the trends of semiconductor companies designing electrical systems, systems companies designing semiconductors, the hyper-convergence between electrical and mechanical systems and generative AI. Demand for our technology and expertise is driven by increasing complexity and our customers' need to invest in new designs and products that are highly differentiated.

We believe the most promising new opportunities for us involve enabling the design of electronic systems for consumers, including digital twin, generative AI, augmented reality ("AR"), virtual reality ("VR"), IIoT, edge computing, hyperscale computing (including data center infrastructure), mobile, communications (including 5G networks), automotive, aerospace and defense, industrial subsystems, as well as the emerging opportunities in life sciences. Large and existing electronics categories, such as data center infrastructure, networking, mobile, smartphones and AI products, continue to provide business opportunities for us as customers initiate new design projects.

Underlying the requirements within any particular vertical sector is the availability of rapidly improving IC manufacturing technology. In order for our customers to take advantage of such advancements, some of our products need to first incorporate new capabilities such that they can exploit new manufacturing capabilities. This dependency means that we must invest significantly in product research and development ("R&D") to keep pace with the latest manufacturing technology. The demand for new IC manufacturing technology directly impacts the demand for our newest products.

Another driver for our business is the differentiation, capabilities and benefits provided to our customers by our products. With the rapid pace of innovation comes the opportunity for our products to address growing key challenges associated with the design of electronic products, such as power consumption, performance, chip area and cost. Our products and services have differentiated attributes that our customers value. In general, these attributes can be grouped into broader categories such as quality of results ("QoR") (in terms of power consumption, performance and chip area), engineering productivity, tool performance, manufacturing, reliability and faster time to market. Many of these attributes contribute to sustainability initiatives by enabling our customers to create innovative products that optimize power, space and energy.

Products and Product Categories

Our Intelligent System Design strategy enables our customers to address a broad range of challenges that arise as they develop electronic products. Our solutions are categorized according to the role they play in the electronic product design process. We group our products into categories related to major design activities, including custom IC design and simulation, digital IC design and signoff, functional verification, IP, and system design and analysis. All of our product categories have generative AI solutions that augment the core product offering.

Custom IC Design and Simulation

Our custom IC design and simulation offerings are used by our customers to create schematic and physical representations of circuits down to the transistor level for analog, mixed-signal, custom digital, memory and RF designs. These representations are verified using simulation tools optimized for each type of design, including the design capture environment, simulation and IC layout within the Virtuoso custom IC design platform. Other tools in the custom IC portfolio are used to prepare the designs for manufacturing.

The Virtuoso Advanced-Node Platform adds functionality to the base Virtuoso package to enable the use of 3D transistors ("FinFETs"), multi-patterning and other technologies required for advanced designs. The Virtuoso RF Solution addresses the challenges of RF design across chip, package and board. The Spectre® Simulation Platform provides large-scale verification simulation. The Virtuoso System Design Platform enables engineers to design and verify concurrently across the chip, package and board. The Virtuoso Studio platform is our generative AI solution for custom IC and mixed-signal design and simulation that enables additional productivity, automation and quality of results throughout the entire design flow.

Digital IC Design and Signoff

Our digital IC design and signoff solutions are used to create logical representations of a digital circuit or an IC that can be verified for correctness prior to implementation (please refer to the discussion under “Functional Verification” below). Once the logic is verified, the design representation is implemented, or converted to a format ready for silicon manufacturing, using additional software tools within this category. The manufacturing representation is also analyzed and verified. Our digital IC design and signoff technology suite provides a full flow to achieve power, performance and area (“PPA”) design targets, and includes three major categories: logic design, physical implementation and signoff.

Our logic design offering is comprised of logic synthesis, test and equivalence checking capabilities and is typically used by customers to create and verify designs in conjunction with our functional verification capabilities. The offering includes the Genus™ Synthesis Solution, a logic synthesis offering that provides fast throughput while also offering high quality results, and the Joules™ RTL Power Solution, which delivers fast power analysis while preserving near-signoff accuracy. We also offer the Cadence Modus DFT Software Solution, which reduces SoC design-for-test time.

Our physical implementation offering comprises tools used near the end of the design process, including place and route, optimization and multi-patterning preparation. The Innovus™ Implementation System is a physical implementation offering that delivers fast design turnaround time while also delivering improved PPA characteristics. This offering enables customers to address the technology challenges of the latest semiconductor advanced-process nodes, create a physical representation of logic models and prepare a design for signoff.

Our signoff offering is comprised of tools used to sign off the design as ready for manufacture by a semiconductor foundry, which provides certification for this step. This offering includes the Tempus™ Timing Signoff Solution, Voltus™ Power Integrity Solution, Quantus™ Extraction Solution and Pegasus™ Physical Verification System. Our design-for-manufacturing products are also included in our signoff offering and are used by customers to address manufacturing and yield issues as early in the product development process as possible.

Cadence Cerebrus™ is our generative AI solution that combines all elements of the full-flow IC through signoff that enables additional productivity, automation and improved quality of results throughout the entire design flow.

Functional Verification

Functional verification products are used by our customers to effectively and efficiently verify that the circuitry or the software they have designed is consistent with the functional specification. Verification is largely done throughout the design process, with the objective of identifying as many potential functional problems as possible before manufacturing the circuitry, thereby significantly reducing the risk of discovering a costly error in the completed product.

Our Verification Suite includes four primary verification engines, starting with the JasperGold® Formal Verification Platform and Xcelium™ Parallel Logic Simulation Platform, which are used in the early stages of design verification, often at the IP and subsystem level. Once the design is more mature, with early formal and simulation verification tasks performed, verification engineers deploy our Palladium® Enterprise Emulation Platform and Protium™ field programmable gate arrays (“FPGA”)-Based Prototyping Platforms for more comprehensive chip verification, often running low-level embedded software on top of a model of the chip, to ensure proper functionality before silicon manufacturing.

These engines are used for early bug detection, verification of block-level functionality, verification acceleration and emulation of system-level functionality, system-level power exploration, analysis and optimization, and system-level prototyping for hardware/software co-verification. Our Palladium platform provides high throughput, capacity, data center reliability and workgroup productivity to enable global design teams to develop advanced hardware-software systems. The Protium platform leverages a common front end with the Palladium environment to move designs rapidly from emulation to the prototyping stage, allowing for software development to begin weeks to months earlier than otherwise possible.

These engines are also supported by other verification tools that provide an environment that allows for effective verification throughput and management, including verification planning and metric tracking, testbench automation, debugging and software-driven tests, enabling our customers to coordinate verification activities across multiple verification engines, teams and locations for effective verification closure. Additionally, Verisium™ is our generative AI solution for multi-run verification that enables additional productivity, automation and quality of results throughout the entire verification flow.

IP

Our IP offerings consist of pre-verified, customizable functional blocks, which customers integrate into their ICs to accelerate the development process and to reduce the risk of errors in the design process. We offer many types of IP, including Tensilica® configurable digital signal processors (“DSPs”), vertically targeted subsystems for AI, audio/voice, baseband and vision/imaging applications, controllers and physical interfaces for standard protocols and analog IP. Our design IP portfolio includes solutions for high speed SerDes, peripheral component interconnect (“PCI”), USB and many other standards.

We also offer a broad range of Verification IP (“VIP”) with memory models, which model the expected behavior of many industry-standard protocols when used with verification solutions and are complementary to our design IP offerings. Our VIP and accelerated VIP are used with our full suite of functional verification engines to emulate and model the expected behavior and interaction of standard industry system interface protocols including DDR, USB and PCI Express® in silicon. Our customers also use our System VIP offerings to perform full system-level chip verification.

System Design and Analysis

Our system design and analysis offerings are used by our customers to develop PCBs and advanced IC packages and to analyze electromagnetic, electro-thermal and other multiphysics effects.

The capabilities in the Allegro® System Design Platform include PCB authoring and implementation, IC package and system-in-package design, signal and power integrity analysis, and PCB library design management and collaboration. The need for compact, high-performance mobile, consumer and automotive design with advanced serial interconnect is driving the technological evolution for our PCB offerings. For mainstream PCB customers, where individual or small team productivity is a focus, we provide the OrCAD® family of offerings, which are primarily marketed worldwide through a network of resellers.

The speed and close proximity of signals on silicon, through packages to boards, and through connectors and cables, exposes these communications to various kinds of interference, generates heat and emits electromagnetic radiation. Careful analysis is required for these systems to work as designed under a wide range of operating conditions and within compliance of standards and laws. The complexity of these devices and signal transmissions requires analysis and simulation throughout the product lifecycle to meet these objectives. Our Clarity™ 3D Solver for electromagnetic and power electronics analysis and simulation, as well as our Celsius™ Thermal Solver, provide the foundation for multiphysics analysis technology, with complete electrical-thermal co-simulation for electronic systems from ICs to physical enclosures.

Our Fidelity™ CFD Software expands our ability to meet the growing design challenges of electronic and systems companies. Fidelity CFD is a physics-based analysis solution for mechanical design and complements the electronic system analysis portfolio. Our comprehensive suite of computational fluid dynamics (“CFD”) solutions enables our customers to extend their multiphysics analysis workflows to address simulation and analysis challenges for applications such as aerodynamics, hydrodynamics, propulsion, turbomachinery, heat transfer and combustion.

Our Millennium™ Multiphysics Enterprise Platform is an industry-first turnkey AI-enabled digital twin. Millennium M1 is the first release and overcomes traditional CFD speed/accuracy and compute resource limitations with a combination of GPU resident CFD solvers such as Fidelity LES for large eddy simulations (“LES”) and scalable high-performance hardware.

Augmenting all our multiphysics analysis solutions is Optimality™ Intelligent System Explorer, an industry-first generative AI-driven multiphysics optimization solution that enables additional productivity, automation and quality of results throughout the entire analysis flow. Optimality Explorer breaks through the limitations of the conventional human-intensive optimization process and is designed to produce the optimal system design solution expeditiously and without compromising accuracy.

An additional AI digital twin solution of our Data Center Design and Insight Platform brings physics-based design and analysis to the data center sector for performance-aware design and operational planning. Data center professionals can future-proof designs and assess operational decisions with this digital twin and empower designers, owners and operators to address the need for reliability, capacity and energy efficiency.

We also offer molecular modeling and simulation solutions obtained through our acquisition of OpenEye Scientific Software in fiscal 2022. These solutions and services are used by a wide range of organizations in the pharmaceutical and biotechnology sectors to accelerate the drug discovery process and make more informed decisions in the development of new therapeutics.

Product Arrangements

We primarily license our software using time-based licenses. Our time-based license arrangements offer customers the right to access and use all of the products delivered at the outset of an arrangement and updates throughout the entire term of the arrangement, which is generally two to three years, with no rights to return. Our updates provide continued access to our evolving technology as our customers’ designs migrate to more advanced nodes. In addition, certain time-based license arrangements include the right for the customer to remix among the products delivered at the outset of the arrangement and use unspecified additional products that become commercially available during the term of the arrangement.

A small portion of our software is licensed under perpetual licenses, which does not include the right to use new technology. Payment terms for time-based licenses generally provide for payments to be made over the license period, and payment terms for perpetual licenses generally are net 30 days.

Our emulation and prototyping hardware products are either sold or leased to our customers. Our emulation hardware can also be accessed remotely via a Cadence-managed cloud arrangement.

We generally license our design IP under nonexclusive license agreements that provide usage rights for specific designs. Some customers enter into non-cancelable commitments, whereby the customer commits to a fixed dollar amount over a specified period of time that can be used to purchase from a list of products or services. In addition, for certain IP license agreements, we collect royalties as our customers ship their product that includes our IP to their customers.

For a further description of our license agreements, our emulation and prototyping hardware sale or lease agreements, revenue recognition policies and results of operations, please refer to the discussion under “Critical Accounting Estimates” under Part II, Item 7, “Management’s Discussion and Analysis of Financial Condition and Results of Operations.”

Technical Support and Maintenance

Customer service and support is critical to the adoption and successful use of our products. We provide our customers with technical support and maintenance to facilitate their use of our software, hardware and IP solutions.

Our education services offerings can be customized and include training programs that are delivered online, app-based, or in a classroom setting. The content of these offerings ranges from the latest design techniques to methodologies for using the most recent features of our products. The primary focus of education services is to accelerate our customers' path to productivity in the use of our products.

Services

We offer a number of services, including services related to methodology, education and hosted design solutions. These services may be sold separately or sold and performed in conjunction with the license, sale or lease of our products. As necessary, specialized design services engineers are assigned to internal R&D projects associated with our design IP business.

As part of our services offerings, we design advanced ICs, develop custom IP and help customers address design challenges. This enables us to target and accelerate the development of new software technology and products to satisfy current and future design requirements.

We offer engineering services to collaborate with our customers in the design of complex ICs and the implementation of key design capabilities, including low power design, IC packaging and board design, functional verification, digital implementation, analog/mixed-signal design and system-level design. The customers for these services primarily consist of semiconductor and systems companies developing products for the consumer, hyperscale computing, 5G communications, mobile, automotive, aerospace and defense, industrial and life science vertical sectors. These ICs range from digital SoCs and analog and RF designs to complex mixed-signal ICs.

The Cadence Cloud portfolio, consisting of Cadence-managed and customer-managed environments for electronic product and life sciences companies using the scalability of the cloud, continues to expand, with additional cloud-based and software as a service ("SaaS") products added or under development in fiscal 2023, including cloud-based platforms for e-commerce and molecular sciences. Contractual arrangements with customers for both environments are generally time-based, similar to the on-premises software license arrangements described above and may also include usage-based terms.

In delivering methodology services, we leverage our experience and knowledge of design techniques, our products, leading practices and different design environments to improve the productivity of our customers' engineering teams. Depending on the customers' projects and needs, we work with customers using outsourced, consultative and collaborative offerings.

Third-Party Programs and Initiatives

In addition to our products, many customers use design tools that are provided by other companies, as well as design IP available from alternative suppliers. We support the use of third-party design products and design IP through our Cadence Connections® program and through our participation in industry groups such as the Silicon Integration Initiative and Accellera System Initiative. We actively contribute to the development and deployment of industry standards.

Product and Maintenance and Services Revenue

Revenue, and revenue as a percentage of total revenue, from our product and maintenance and services offerings for the last three fiscal years were as follows:

	2023		2022		2021	
	(In millions, except percentages)					
Product and maintenance	\$ 3,834	94 %	\$ 3,340	94 %	\$ 2,813	94 %
Services	256	6 %	222	6 %	175	6 %
Total revenue	<u>\$ 4,090</u>		<u>\$ 3,562</u>		<u>\$ 2,988</u>	

Recurring revenue includes revenue recognized over time from our software arrangements, services, royalties, maintenance on IP licenses and hardware, and operating leases of hardware. Recurring revenue also includes revenue recognized at varying points in time over the term of other arrangements with non-cancelable commitments, whereby the customer commits to a fixed dollar amount over a specified period of time that can be used to purchase from a list of products or services. These arrangements do not meet the definition of a revenue contract until the customer executes a separate selection form to identify the products and services that they are purchasing. Each separate selection form under the arrangement is treated as an individual contract and accounted for based on the respective performance obligations.

The remainder of our revenue is recognized at a point in time and is characterized as up-front revenue. Up-front revenue is primarily generated by sales of emulation and prototyping hardware and individual IP licenses. The percentage of our recurring and up-front revenue is impacted by delivery of hardware and IP products to our customers in any single fiscal period.

For additional information and analysis on our revenue, including revenue by geography, see the discussion under “Results of Operations” under Part II, Item 7, “Management’s Discussion and Analysis of Financial Condition and Results of Operations.” For our fiscal 2023 results of operations and our financial position as of December 31, 2023, see Part IV, Item 15, “Exhibits and Financial Statement Schedules.”

Remaining Performance Obligations

Revenue allocated to remaining performance obligations represents the transaction price allocated to the performance obligations that are unsatisfied, or partially unsatisfied, which includes unearned revenue and amounts that will be invoiced and recognized as revenue in future periods. We have elected to exclude the potential future royalty receipts from the remaining performance obligations. Contracted but unsatisfied performance obligations were approximately \$6.0 billion as of December 31, 2023, which included \$0.4 billion of non-cancelable commitments from customers where actual product selection and quantities of specific products or services are to be determined by customers at a later date.

We estimate our remaining performance obligations at a point in time. Actual amounts and timing of revenue recognition may differ from these estimates largely due to changes in actual installation and delivery dates, as well as contract renewals, modifications and terminations. As of December 31, 2023, we expected to recognize 56% of the contracted but unsatisfied performance obligations, excluding non-cancelable commitments, as revenue over the next 12 months, 39% over the next 13 to 36 months and the remainder thereafter.

Marketing and Sales

We generally market our products and provide services to existing and prospective customers through a direct sales force consisting of salespeople and applications engineers. Applications engineers provide technical pre-sales and post-sales support for our products. Due to the complexity of many of our products and the system design process, the sales cycle is generally long, requiring up to six months or longer. During the sales cycle, our direct sales force generally provides technical presentations, product demonstrations and support for on-site customer evaluation of our solutions. We also promote our products and services through advertising, marketing automation, trade shows, public relations and the internet. We selectively utilize value-added resellers to broaden our reach and reduce cost of sales. Our OrCAD products and certain Allegro products are primarily marketed through these channels. With respect to international sales, we generally market and support our products and services through our subsidiaries. We also use a third-party distributor to license our products and services to certain customers in Japan.

Research and Development

Our future performance depends on our ability to innovate, commercialize newly developed solutions and enhance and maintain our current products. The primary areas of our R&D align with our product categories discussed above. We must continuously adapt our products to solve new or increased physics challenges that arise with each successive process node and address the increase in complexity that is introduced by the resulting much larger designs. We must also keep pace with our customers’ technical developments, satisfy industry standards and meet our customers’ increasingly demanding performance, productivity, quality and predictability requirements. Therefore, we expect to continue to make significant investments in R&D.

Hardware Manufacturing and Software Distribution

Our emulation and prototyping hardware, including all individual PCBs, custom ICs and FPGA-based prototyping components, is manufactured, assembled and tested by subcontractors before delivery to our customers. Software and documentation are primarily distributed to customers by secure electronic delivery.

Proprietary Technology

Our success depends, in part, upon our proprietary technology. We generally rely on patents, copyrights, trademarks and trade secret laws, licenses and restrictive agreements to establish and protect our proprietary rights in technology and products. Many of our products include software or other IP licensed from third parties. We may have to seek new licenses or renew existing licenses for third-party software and other IP in the future. As part of performing engineering services for customers, our engineering services business uses certain software and other IP licensed from third parties, including that of our competitors.

Governmental Regulations

We are subject to a variety of federal, state, local and foreign laws and regulations relating to our business and operations. These include, but are not limited to, laws and regulations related to trade controls, anti-corruption and anti-bribery, and data privacy and data protection, as well as antitrust, competition, employment, income taxes and the environment.

- *Trade controls.* We are subject to laws and regulations in the United States and other jurisdictions concerning the sale, shipment and transmission of our products and technology outside the United States and to foreign nationals, including tariffs, trade protection measures, import or export licensing requirements, sanctions and other trade regulations. U.S. Export Administration Regulations include “Entity List” and “Unverified List” restrictions imposed by the Bureau of Industry and Security (“BIS”) of the U.S. Department of Commerce (“DOC”). BIS frequently adds entities to the Entity List and the Unverified List, some of which have been Cadence customers. BIS also issues new rules and regulations from time to time. In 2022, BIS issued new restrictions concerning advanced node IC production in China and other countries and extended controls to additional technologies, including electronic computer-aided design software specially designed for the development of ICs with Gate-All-Around Field-Effect Transistor structure. Trade regulations limiting or banning sales into certain countries or to certain companies have impacted our ability to transact business in certain countries and with certain customers. Future trade regulations may also impact our ability to transact business with certain customers and in certain countries and may restrict certain non-U.S. person employees from performing their duties at Cadence without first obtaining appropriate authorization if their duties involve an export, reexport, or transfer of export-controlled technology.
- *Anti-corruption and anti-bribery.* We are subject to laws and regulations in the United States and other jurisdictions concerning anti-corruption and anti-bribery, including the U.S. Foreign Corrupt Practices Act and the U.K. Bribery Act, which prohibit corrupt payments to governmental officials and bribes to other persons.
- *Data privacy and data protection.* We are subject to laws and regulations in the United States and other jurisdictions governing data privacy and data protection, including the General Data Protection Regulation in the European Union, which regulate our collection, handling and use of personal information.

The laws and regulations to which we are subject are complex and may change or develop over time, sometimes with limited or no advance notice. Developments or other changes in laws or regulations or how they are interpreted or enforced have had, and may continue to have, a negative impact on our business and increase our compliance-related expenditures. For additional information regarding risks related to laws and regulations, including existing restrictions imposed by BIS, as well as international relations, see Item 1A, “Risk Factors.”

Competition

We compete most frequently with Synopsys, Inc., Siemens EDA, and ANSYS, Inc., and also with numerous other tools providers, electronics device manufacturers with their own EDA capabilities, technical or computational software companies, electronics design and consulting companies and other IP companies. These include U.S. based companies such as Keysight Technologies, Inc., Schrödinger, Inc. and CEVA, Inc. and foreign companies such as Altium Limited (Australia) and Zuken Ltd. (Japan) and emerging competitors in China like Huada Empyrean, Xpedic, X-EPIC, Primarius Technologies, Univista and Giga-DA. Some of our competitors have made or may make acquisitions and/or have entered or may enter into partnerships or other strategic relationships which may alter their ability to compete with us.

Certain competitive factors in the engineering services business differ from those of the products businesses. While we compete with other computational software companies in the engineering services business, our principal competitors in this area include independent engineering service businesses. Many of these companies are also customers, and therefore use our product offerings in the delivery of their services or products.

For more information on risks related to competitive factors affecting our business, see the relevant discussions throughout Item 1A, “Risk Factors.”

Human Capital Resource Management

Our future success is inextricably linked to our ability to attract, retain and develop exceptional talent globally. To facilitate talent attraction and retention, we invest in key initiatives including, but not limited to, furthering diversity, equity and inclusion, physical and mental health, and talent development. To measure engagement and collect feedback from our employees, we administer regular employee engagement surveys. Our core cultural tenet is “One Team – One Cadence,” highlighting that seamless teamwork is critical to making Cadence a great place to work for all.

We believe that a high-performing, inclusive culture is a competitive differentiator and crucial to our business' success. Cadence leaders are tasked with creating and sustaining our culture and therefore, they are measured on their contributions to diversity, equity and inclusion, attraction, development and engagement of high-caliber talent, and advancing our sustainability objectives.

Employees

We believe our employees represent the best and brightest in our industry, and the talent we select to be a part of our team defines our culture and success. As of December 31, 2023, we had approximately 11,200 employees. Our global workforce is highly educated, technical and specialized, with a substantial majority of employees working in engineering roles.

Diversity, Equity and Inclusion

We believe that workforce diversity, equity and inclusion advance high performance and innovation. We recognize that gender and racial disparities remain a challenge in the technology field, and with a high proportion of technical employees, we are focused on addressing this issue and have appointed executive sponsors to drive this focus throughout our company. Some of our current programs and initiatives aimed at addressing this issue include:

- Regular monitoring of the diversity of our current workforce and candidate pool, with an aim to identify and address areas where we can improve.
- Partnerships with organizations such as National Society of Black Engineers, Society of Hispanic Professional Engineers, Out in Tech, National GEM Consortium and Society of Women Engineers and similar university programs to advance our efforts in outreach, engagement, and inclusion.
- Development programs at Cadence including our IMPACT mentorship program which gives early career women, and U.S. Black and Latinx employees an opportunity to choose a meaningful mentor based on their career goals.
- Training and resources for managers, such as inclusive leadership training.
- Inclusion groups for Black, Latinx, Asian American and Pacific Islanders, LGBTQ+, veterans, women employees, employees who are neurodivergent or disabled and allies which host networking events to foster dialogue and promote awareness.

Health, Safety and Wellness

We strive to create a safe and rewarding environment to enable our employees to develop the innovations necessary for our sustained success.

With the aim of providing for both the physical and mental health of our employees, we offer a variety of benefits that go beyond traditional health insurance. Our U.S. health and well-being benefits include fertility benefits, coverage for transgender employees undergoing medical treatment, expanded new parent leave, adoption and surrogacy benefits, financial planning and coaching services and legal services. We also provide training and tools for stress management, time management, conflict resolution and emotional well-being.

Compensation and Benefits

To inspire and recognize our employees, we offer what we believe are competitive compensation and benefits programs. Our compensation programs link employee compensation to our business and individual performance. We also offer a semi-annual bonus program, 401(k) match, Employee Stock Purchase Plan and equity compensation. In addition, our employees are eligible to receive monetary awards from their colleagues through our peer-to-peer recognition program.

Talent Development

To help employees succeed in their current roles, pursue their passions and develop the skills necessary for advancement, we provide formal training programs and curriculums in addition to on-the-job training. Our high performance culture platform provides our employees with valuable resources such as a comprehensive online Learning Management program with training and development tools on a broad range of topics and skills. We also offer tuition reimbursement opportunities to employees to further hone their skills.

Social Impact and Community Outreach

We believe it is important to create meaningful opportunities for employees to connect and contribute to their communities. We provide paid volunteer time off, charitable contribution matching, company-wide volunteer campaigns, international service immersion projects and grants to employees who are giving back to their communities.

The Cadence Giving Foundation, established in 2021, is committed to providing Cadence employees and others a means through which to carry out their volunteer activities as well as making an impact on our focus areas of environmental sustainability and climate change, diversity, equity and inclusion, and science, technology, engineering and math ("STEM") education. This is accomplished through various means, including grant making and partnerships with non-profit organizations committed to addressing these issues. We also make charitable contributions consisting of Cadence technology product donations.

Corporate Responsibility

We believe that, in general, the best and brightest talent is inclined to build a career with a responsible organization that positively impacts society. We recognize that climate change is one of the greatest challenges of our time. We are focused on doing our part to contribute to the health of the planet by actively investing in initiatives to reduce our environmental footprint. We encourage you to review our 2022 Environmental, Social, and Governance ("ESG") Report available through our website, and our 2023 ESG Report when released, for more information on our ESG targets, initiatives and progress. The contents of our ESG Reports are not part of or incorporated by reference into this Annual Report.

Corporate Information

Our headquarters is located at 2655 Seely Avenue, San Jose, California 95134. Our telephone number is (408) 943-1234. We use our website at www.cadence.com to communicate important information about our company, including news releases and financial information. Our website permits investors to subscribe to email notification alerts when we post new material information on our website. We also make available on our investor relations webpage, free of charge, copies of our SEC filings and submissions, which can be found at the SEC's website, www.sec.gov, as soon as reasonably practicable after electronically filing or furnishing such documents with the SEC. Stockholders may also request copies of these documents by writing to our Corporate Secretary at the address above. Website references are provided throughout this document for convenience only. The contents of these websites do not constitute a part of this Annual Report and shall not be deemed incorporated by reference into this Annual Report unless expressly noted.

Fiscal Year End

Historically, our fiscal years were 52- or 53-week periods ending on the Saturday closest to December 31. During fiscal 2022, our Board of Directors approved a change in our fiscal year end from the Saturday closest to December 31 of each year to December 31 of each year. The fiscal year change became effective beginning with our 2023 fiscal year, which began on January 1, 2023. Both fiscal year 2022 and 2021, which are included in this report for comparative purposes, represent 52-week periods. Our first three fiscal quarters end on March 31, June 30, and September 30.

INFORMATION ABOUT OUR EXECUTIVE OFFICERS

The following table provides information regarding our executive officers as of February 13, 2024:

Name	Age	Positions and Offices
Anirudh Devgan	54	President and Chief Executive Officer
John M. Wall	53	Senior Vice President and Chief Financial Officer
Thomas P. Beckley	66	Senior Vice President and General Manager of the Custom IC and PCB Group
Paul Cunningham	46	Senior Vice President and General Manager of the System Verification Group
Karna Nisewaner	49	Senior Vice President, General Counsel and Corporate Secretary
Chin-Chi Teng	58	Senior Vice President and General Manager of the Digital and Signoff Group
Neil Zaman	55	Senior Vice President and Chief Revenue Officer

Our executive officers are appointed by our Board of Directors and serve at the discretion of our Board of Directors.

ANIRUDH DEVGAN has served as Chief Executive Officer of Cadence since December 2021 and President of Cadence since November 2017. From May 2012 to November 2017, Dr. Devgan held several positions at Cadence, most recently as Executive Vice President, Research and Development from March 2017 to November 2017 and Senior Vice President, Research and Development from November 2013 to March 2017. Prior to joining Cadence, from May 2005 to March 2012, Dr. Devgan served as Corporate Vice President and General Manager of the Custom Design Business Unit at Magma Design Automation, Inc., an EDA company. Dr. Devgan has a B.Tech. in electrical engineering from the Indian Institute of Technology, Delhi, and an M.S. and Ph.D. in electrical and computer engineering from Carnegie Mellon University.

JOHN M. WALL has served as Senior Vice President and Chief Financial Officer of Cadence since October 2017. From June 1997 to October 2017, Mr. Wall held several positions at Cadence, most recently as Corporate Vice President and Corporate Controller from April 2016 to October 2017, Vice President, Finance and Operations, Worldwide Revenue Accounting and Sales Finance from 2015 to 2016 and Vice President, Finance and Operations, EMEA and Worldwide Revenue Accounting from 2005 to 2015. Mr. Wall has an NCBS from the Institute of Technology, Tralee and is a Fellow of the Association of Chartered Certified Accountants.

THOMAS P. BECKLEY has served as Senior Vice President and General Manager of the Custom IC and PCB Group of Cadence since 2018. From September 2012 to September 2018, Mr. Beckley served as Senior Vice President, Research and Development of Cadence. From April 2004 to September 2012, Mr. Beckley served as Corporate Vice President, Research and Development of Cadence. Prior to joining Cadence, Mr. Beckley served as President and Chief Executive Officer of Neoliner, Inc., a developer of auto-interactive and automated analog/RF tools and solutions for mixed-signal design that Cadence acquired in April 2004. Mr. Beckley has a B.S. in mathematics and physics from Kalamazoo College and an M.B.A. from Vanderbilt University.

PAUL CUNNINGHAM has served as Senior Vice President and General Manager of the System Verification Group of Cadence since March 2021. From August 2011 to March 2021, Dr. Cunningham held several positions at Cadence, most recently as Corporate Vice President of the System Verification Group beginning January 2018. Prior to joining Cadence, Dr. Cunningham was co-founder and Chief Executive Officer of Azuro, Inc., a clock concurrent optimization company, that Cadence acquired in July 2011. Dr. Cunningham has an M.A. and Ph.D. in computer science from the University of Cambridge in the United Kingdom.

KARNA NISEWANER has served as Senior Vice President, General Counsel and Corporate Secretary of Cadence since February 2024. From May 2011 to February 2024, Ms. Nisewaner held several positions at Cadence, most recently as Corporate Vice President, General Counsel and Corporate Secretary beginning in September 2022. Prior to joining Cadence, Ms. Nisewaner held in-house counsel roles at Intuit from 2007 to 2011 and IBM from 2003 to 2007. Ms. Nisewaner was in private practice focused on IP at Finnegan, Henderson, Farbow, Garrett, and Dunner, LLP from 2001 to 2003. Ms. Nisewaner has a B.S.E. in civil engineering and operations research from Princeton University and a J.D. from UCLA School of Law.

CHIN-CHI TENG has served as Senior Vice President and General Manager of the Digital and Signoff Group of Cadence since September 2018. From January 2002 to September 2018, Dr. Teng held several positions at Cadence, most recently as Corporate Vice President, Research and Development from June 2015 to September 2018, and Vice President, Research and Development from March 2009 to June 2015. Dr. Teng has a B.S. in electrical engineering from the National Taiwan University and a Ph.D. in electrical and computer engineering from the University of Illinois, Urbana-Champaign.

NEIL ZAMAN has served as Chief Revenue Officer of Cadence since October 2020 and as Senior Vice President, Worldwide Field Operations since September 2015. From October 1999 to September 2015, Mr. Zaman held several positions at Cadence, most recently as Corporate Vice President, North America Field Operations. Prior to joining Cadence, Mr. Zaman held positions at Phoenix Technologies Ltd., a developer of core system software, and IBM Corporation, a technology and consulting company. Mr. Zaman has a B.S. in finance from California State University, Hayward.

Item 1A. Risk Factors

Our operations and financial results are subject to various risks and uncertainties, including those described in the sections below, that could adversely affect our business, financial condition, results of operations, cash flows, liquidity, revenue, growth, prospects, demand for our products and services, reputation and the trading price of our common stock, and make an investment in us speculative or risky. The following does not summarize all of the risks that we face, and there may be additional risks or uncertainties that are currently unknown or not believed to be material that occur or become material.

Business and Operational Risks

We have experienced varied operating results, and our operating results for any particular fiscal period are affected by the timing of revenue recognition, particularly for our emulation and prototyping hardware and IP products.

Historical results of operations should not be viewed as reliable indicators of our future performance. Various factors affect our operating results, and some of them are not within our control. Our operating results for any period are affected by the mix of products and services sold in a given period and the timing of revenue recognition, particularly for our emulation and prototyping hardware and IP products. In addition, we have recorded net losses in the past and may record net losses in the future. Also, our cash flows from operating activities have and will continue to fluctuate due to a number of factors, including the timing of our billings, collections, disbursements and tax payments.

A substantial portion of the product revenue related to our hardware business and our IP offerings is recognized upon delivery, and our forecasted revenue results are based, in part, on our expectations of hardware and IP to be delivered in a particular quarter. Therefore, changes in hardware and IP bookings or deliveries relative to expectations will have a more immediate impact on our revenue than changes in software or services bookings, for which revenue is generally recognized over time.

As we continue to expand our IP offerings, a portion of the revenue related to our IP bookings will be deferred until we complete and deliver the licensed IP to our customers. As a result, costs related to the research and development of IP may be incurred prior to the recognition of the related revenue.

Revenue related to our hardware and IP products is inherently difficult to predict because sales of our hardware and IP products depend on the commencement of new projects for the design and development of complex ICs and systems by our customers, our customers' willingness to expend capital to deploy our new and existing hardware or IP products in those projects and the availability of our new and existing hardware or IP products for delivery. Therefore, our hardware or IP sales may be delayed or may decrease if our customers delay or cancel projects because their spending is constrained or if there are problems or delays with the supply, delivery or installation of our hardware or IP products or our hardware suppliers. Moreover, the market environment for hardware and IP is highly competitive, and our customers may choose to purchase a competitor's hardware or IP product based on cost, performance or other factors. These factors may result in lower revenue, which would have an adverse effect on our business, results of operations and cash flows.

A substantial proportion of our software licenses yield revenue recognized over time, which may make it difficult for us to rapidly increase our revenue in future fiscal periods and means that a decrease in orders in a given period would negatively affect our revenue in future periods.

We plan our operating expenses based on forecasted revenue, expected business needs and other factors such as inflation. These expenses and the effect of long-term commitments are relatively fixed in the short term. Bookings and the related revenue are harder to forecast in a difficult economic environment. If we experience a shortfall in bookings, our operating results could differ from our expectations because we may not be able to quickly reduce our expenses in response to short-term business changes. Our operating expenses are also impacted by economic conditions, such as inflation. Unexpected increases in inflation could cause our expenses to increase at a rate faster than our product pricing to recover such increases.

The methods, estimates and judgments that we use in applying our accounting policies have a significant impact on our results of operations (see "Critical Accounting Estimates" under Part II, Item 7, "Management's Discussion and Analysis of Financial Condition and Results of Operations"). Such methods, estimates and judgments are subject to substantial risks, uncertainties and assumptions, and factors may arise over time that may lead us to change our methods, estimates and judgments. Changes in those methods, estimates and judgments could significantly affect our results of operations.

Uncertainty in the global economy and instability within international relations, including changes in governmental policies relating to technology, and any potential downturn in the semiconductor and electronics industries, may negatively impact our business and reduce our bookings levels and revenue.

Purchases of our products and services are dependent upon the commencement of new design projects by IC manufacturers and electronics systems companies. The IC and electronics systems industries are cyclical and are characterized by constant and rapid technological change, rapid product obsolescence and price erosion, evolving standards, short product life cycles and wide fluctuations in product supply and demand.

The IC and electronics systems industries have also experienced significant downturns in connection with, or in anticipation of, maturing product cycles of both these industries' and their customers' products. The current outlook for the global economy is uncertain and may result in a decrease in spending on our products and services despite recent growth.

Uncertainty caused by the recent challenging global political and economic conditions, including the effects of the rise in inflation and interest rates, bank failures, U.S. deficit concerns, the Russian invasion of Ukraine and the conflict in the Middle East, adverse changes to international relationships among countries in which we or our customers operate or do business, protectionist measures or decline in corporate or consumer spending could negatively impact our customers' businesses, reducing the number of new chip designs and their overall research and development spending, including their spending on our products and services, and as a result decrease demand for our products and services. Adverse developments that affect financial institutions, transactional counterparties or other third parties, such as bank failures and protracted U.S. federal debt ceiling negotiations, or concerns or speculation about any similar events or risks, have led and could lead to further credit downgrades and market-wide liquidity problems, which in turn may cause customers and other third parties to become unable to meet their obligations under various types of financial arrangements as well as general disruptions or instability in the financial markets. Public health emergencies, like the COVID-19 pandemic, and reactionary measures by governments and businesses have also had, and could in the future have, the effect of curtailing economic activity and causing substantial volatility and disruption in global markets. Decreased bookings for our products and services, customer bankruptcies, consolidation among our customers, or problems or delays with our hardware suppliers or with the supply or delivery of our hardware products could also adversely affect our ability to grow our business or adversely affect our future revenue and financial results.

There is inherent risk, based on the complex relationships between certain countries and within regions, that political, diplomatic or military events could result in trade disruptions and other disruptions in the markets and industries we serve and our supply chain. A significant disruption in any area where we or our customers operate or do business could reduce customer demand, make our products and services more expensive or unavailable for customers, increase the cost of our products and services, have a negative impact on customer spending, make our products less competitive, or otherwise have a materially adverse impact on our future revenue and profits, our customers' and suppliers' businesses, and our results of operations. For example, the ongoing geopolitical and economic uncertainty between the United States and China, where we have derived an increased percentage of our revenue, the unknown impact of current and future U.S. and Chinese trade regulations, and geopolitical risks with respect to Taiwan, which serves as a central hub for the technology industry supply chain, could, directly or indirectly, materially harm our business, financial condition and results of operations.

Our future business and financial results, including demand for our products and services, are subject to considerable uncertainties that could impact our stock price. If economic conditions or international relationships among countries in which we do business deteriorate, or, in particular, if semiconductor or electronics systems industry revenues do not grow, including as a result of a global semiconductor shortage, the ability to export or import products or services by the semiconductor or electronics systems industry is adversely restricted, or our supplies of hardware components and products are subject to problems or delays, we may be adversely affected. Further, political or economic conflicts between various global actors, and responsive measures that have been or could be taken, have created and can further create significant global economic uncertainty that could prolong or expand such conflicts, which could have a lasting impact on regional and global economies and harm our business and operating results.

We are subject to governmental export and import controls that could subject us to liability or impair our ability to compete in global markets as well as a variety of other laws and regulations.

We must comply with regulations of the United States and of certain other countries in selling or shipping our products and transferring our technology outside the United States, to foreign nationals (including foreign nationals within the United States) or across borders. Changes in these regulations or restrictions due to changes in trade relationships with the United States, including new tariffs, trade protection measures, import or export licensing requirements, sanctions, trade embargoes and other trade barriers, could harm our business, operating results and financial condition.

For example, the BIS maintains and frequently updates the "Entity List," which limits our ability to deliver products and services to these entities, some of which are our customers. When customers are on the Entity List or are subject to new or expanded trade restrictions, such as the recent implementation of controls on advanced computing ICs, computer commodities that contain such ICs, and certain semiconductor manufacturing items, as well as controls on transactions involving items for supercomputer and semiconductor manufacturing end-users, it has a negative effect on our ability to sell products and provide services to these customers. In addition, the issuance of new or expanded trade restrictions, such as the continued expansion of the military end-user and military end-use rule, the foreign-produced direct product rules, or any other rule that prevents a class of commodities, software or technology from export to any specific country or countries without a license, could increase our costs or expenses. Anticipated or actual changes in trade restrictions could also affect customer purchasing behaviors. Entity List restrictions and other trade restrictions may also encourage customers to seek substitute products from our competitors, including a growing class of foreign competitors and open source alternatives, that are not subject to these restrictions or to develop their own solutions, thereby decreasing our long-term competitiveness. In particular, China's stated national policy to be a global leader in all segments of the semiconductor industry by 2030 has resulted in and may continue to cause increased competitive capability in China. In addition, although customers on the Entity List are not prohibited from paying (and we are not restricted from collecting) for products we previously delivered to them (in compliance with applicable law), the credit risks associated with outstanding receivables from customers on the Entity List – including receivables from anti-piracy enforcement efforts and litigation settlements – and other trade restrictions could increase.

We cannot predict whether or when any changes will be made that eliminate or decrease these limitations on our ability to sell products and provide services to these Entity List customers or other customers impacted by other trade restrictions. We are unable to predict the duration of the export restrictions imposed with respect to any particular customer, technology, country or region or the long-term effects on our business or our customers' businesses. In addition, there may be indirect impacts to our

business which we cannot reasonably quantify, including that a country-specific export control may limit or prevent our employees who are nationals of the restricted country from performing their duties unless a license can be obtained. Additionally, our business may also be impacted by other trade restrictions that may be imposed by the United States, China, or other countries. Restrictions on our ability to sell and ship our products to customers on the Entity List have had, and may continue to have, an adverse effect on our business, results of operations or financial condition.

Failure to obtain export licenses when required or restrictions on trade imposed by the United States or other countries could harm our business by rendering us unable to sell or ship products and transfer our technology outside of the United States or across borders. Although we have implemented risk-based policies and procedures that are reasonably designed to comply with all applicable trade restrictions, we and governmental authorities have had and may in the future have reason to inquire into particular sales. Specifically, in February 2021, we received an administrative subpoena from BIS requesting the production of records in connection with certain sales to our customers in China. In November 2023, we received a related subpoena from the U.S. Department of Justice (“DOJ”) that also requested information regarding our business activity in China. We have been and will continue cooperating with BIS and DOJ in responding to the subpoenas and their ongoing reviews. These matters are subject to uncertainties and the outcomes of these and other proceedings that may occur are difficult to predict. The laws and policies of the United States and other countries in this area are evolving and changing, and we have experienced and may continue to experience challenges in complying with new rules as they become effective. The application and interpretation of these laws and policies can also be uncertain and change over time, and we may need to adjust our policies and procedures accordingly. Any failure or alleged failure to comply with these laws and policies could have negative consequences, including significant legal costs, government investigations, penalties, denial of export privileges and debarment from participation in U.S. government contracts, any of which could have a material adverse effect on our operations, reputation and financial condition.

In addition to export control laws, our global operations are subject to numerous U.S. and foreign laws and regulations, including those related to anti-corruption, anti-bribery, tax, corporate governance, financial and other disclosures, competition, antitrust, data privacy, data protection and employment. These laws and regulations are complex and may have differing or conflicting legal standards, making compliance difficult and costly, and changes to these laws may require us to make significant changes to our business operations that may adversely affect our business overall. The policies and procedures we have implemented to assist our compliance with these laws and regulations do not provide complete assurance that our employees, contractors, agents or partners will not violate such laws and regulations. Any violation individually or in the aggregate could have a material adverse effect on our operations, reputation and financial condition.

As we continue to acquire and invest in companies or technologies, we may not realize the expected business or financial benefits and these acquisitions could prove difficult to integrate, disrupt our business, dilute stockholder value and adversely affect our operating results and the market value of our common stock.

As part of our business strategy, we invest in, and acquire complementary businesses, joint ventures, services and technologies and IP rights, some of which may be material to our financial condition and operating results. We continue to engage in investments and acquisitions and evaluate such opportunities and expect to continue to make such investments and acquisitions in the future. There can be no guarantee that we will be able to find and identify desirable investment or acquisition targets, and we may not be successful in entering into an agreement with any particular target.

Acquisitions and other transactions, arrangements and investments involve numerous risks and potential operating difficulties and expenditures, including:

- the failure to realize, or a delay in realizing, anticipated benefits or synergies, including as a result of any conditions placed upon approvals from governmental authorities;
- the failure to complete transactions on a timely basis or at all, including due to a failure to obtain required approvals on a timely basis, or at all, from governmental authorities;
- potential identified or unknown security vulnerabilities in acquired companies, technologies or products that expose us to additional security risks or delay our ability to integrate them into our organization and offerings;
- brand or reputational harm;
- in the case of acquisitions with large greenhouse gas emissions, the failure or perceived failure to achieve our publicly disclosed greenhouse gas emissions reduction target;
- the failure to understand, compete and operate effectively in markets where we have limited experience or where competitors may have stronger market positions;
- the failure to integrate, combine or manage acquired products, infrastructure, technologies and businesses effectively or to obtain customer acceptance of multiple platforms on a temporary or permanent basis;
- difficulties in integrating and assimilating acquired employees, which may lead to retention risk with respect to both acquired and existing employees;
- the need to integrate operations across different cultures and languages and to address the particular economic, currency, political and regulatory risks associated with specific countries;
- diversion of financial resources and management’s attention from day-to-day business;

- overlapping customers and product sets that impact our ability to maintain revenue at historical rates;
- unanticipated costs or assumed liabilities, including those related to an acquired company's disclosure controls and procedures, internal control over financial reporting, cybersecurity and other compliance programs, whether discovered during due diligence or thereafter;
- contingent payments in connection with acquisitions in the future where we may be required to make certain contingent payments without deriving the value we expect to derive from an acquisition in excess of such payments or at all;
- unwillingness of customers, suppliers or other business partners of an acquired business to continue licensing or do business with us, or delays in such activities;
- difficulties managing any strategic investment or collaboration that we do not control or for which we do not have sole decision-making authority;
- impairment charges or other adverse accounting outcomes related to acquisitions or strategic investments;
- the failure or cessation of operations by entities in which we made strategic investments or collaboration agreements;
- the loss of some or all of the value of our investment;
- additional stock-based compensation issued or assumed in connection with the acquisition, including the impact on stockholder dilution and our results of operations; and
- the tax effects of any such acquisitions including related integration and business operation changes, and assessment of the impact on the realizability of our future tax assets or liabilities

Any of these risks could harm our business or negatively impact our results of operations. In addition, to facilitate acquisitions or investments, we may seek additional equity or debt financing, which may not be available on terms favorable to us or at all, which may affect our ability to complete subsequent acquisitions or investments, and which may affect the risks of owning our common stock. For example, if we finance acquisitions or investments by issuing equity or convertible securities, or use such securities as consideration, our existing stockholders may be diluted. If we finance acquisitions or investments through debt financing, we could face constraints related to the terms (including restrictive covenants) of, and repayment obligation related to, the incurrence of indebtedness. Acquisitions or investments may also require the expenditure of substantial cash resources. These arrangements may impact our liquidity, financial position and results of operations or increase dilution of our stockholders' equity interests in the company, all of which could adversely affect the market price of our common stock. Acquisitions are also often dilutive to margins and earnings, at least initially. In addition, in certain cases we may be required to consolidate one or more of our strategic investee's financial results into ours. Fluctuations in any such investee's financial results, due to general market conditions, bank failures or otherwise, could negatively affect our consolidated financial condition, results of operations, cash flows or the price of our common stock.

Our ability to acquire other businesses or technologies, make strategic investments or integrate acquired businesses effectively may be impaired by trade tensions and increased global scrutiny of foreign investments and acquisitions and investments in the technology sector. The United States and several other countries have adopted, or are considering adopting, restrictions on transactions involving foreign investments. Antitrust authorities in the United States and a number of countries have also reviewed acquisitions and investments in the technology industry with increased scrutiny. Governments may continue to adopt or tighten restrictions of this nature, some of which may apply to acquisitions, investments or integrations of businesses by us, and such restrictions or government actions could negatively impact our business and financial results.

We could suffer serious harm to our business because of the infringement or misappropriation of our IP rights by third parties.

There are numerous patents relating to our business and ecosystem. New patents are being issued at a rapid rate and are owned by computational software companies as well as entities and individuals outside the computational software field, including parties whose income is primarily derived from infringement-related licensing and litigation. It is not always practicable or possible to determine in advance whether a product or any of its components infringes the patent rights of others. As a result, from time to time, we have been and may continue to be compelled to respond to IP infringement claims to protect our rights or defend a customer's rights consistent with the terms of our license agreements.

IP infringement and misappropriation claims, including contractual defense reimbursement obligations related to third-party claims against our customers, regardless of merit, could consume valuable management time, result in costly litigation or cause product shipment delays, all of which could seriously harm our business, operating results and financial condition.

IP claims or litigation has compelled and could compel us to do one or more of the following:

- pay damages (including the potential for treble damages), license fees or royalties (including royalties for past periods);
- stop licensing products or providing services that use the challenged IP and potentially refund customers;
- obtain a license to sell or use the relevant technology, which license may not be available on reasonable terms; or
- redesign the challenged technology, which could be time consuming and costly, or impossible.

If we were compelled to take any of these actions, our business, reputation and operating results might suffer.

We rely on our proprietary technology, as well as software and other IP rights licensed to us by third parties, and we cannot assure that the precautions taken to protect our rights will be adequate or that we will continue to be able to adequately secure such IP rights from third parties.

Our success depends, in part, upon our proprietary technology and our ability to secure, protect and enforce our IP rights in our proprietary technology. We generally rely on a combination of patent, copyright and trademark law, trade secret protection and confidentiality or licenses agreements with our employers, contractors, customers, business partners and others to establish and protect our proprietary rights in technology and products. Despite the precautions we may take to protect our IP rights, from time to time third parties challenge, invalidate or circumvent these safeguards. Our patents and other IP rights may not provide us with sufficient competitive advantages. Patents may not be issued on any of our pending applications and our issued patents may not be sufficiently broad to protect every feature of our technology. In addition, we believe that the protection of our trademark rights is an important factor in product recognition, protecting our brand and maintaining goodwill, and if we do not adequately protect our rights in our trademarks from infringement, any goodwill that we have developed in those trademarks could be lost or impaired, which could harm our brand and our business. Furthermore, the laws of foreign countries may not protect our proprietary rights in those countries to the same extent as applicable law protects these rights in the United States, and we may encounter difficulties in our attempts to protect our IP in foreign jurisdictions, particularly with respect to trade secret rights and including as a result of impacts from changes in international trade relationships. The protection of our IP may require the expenditure of significant financial and managerial resources. Moreover, the steps we take to protect our IP may not adequately protect our rights, or deter or prevent third parties from infringing or misappropriating our proprietary rights. Litigation brought to protect and enforce our IP rights could be costly, time consuming and distracting to management. Furthermore, our efforts to enforce our IP rights may be met with defenses, counterclaims and countersuits attacking the validity and enforceability of our IP rights, which could result in the impairment or loss of portions of our IP rights.

Many of our products include software or other IP licensed from third parties. We may have to seek new or renew existing licenses for such software and other IP. Our engineering services business holds licenses to certain software and other IP owned by third parties, including that of our competitors. In addition, we use open source software in our products, and due to uncertainties regarding the interpretation of open source software licenses, there is a risk that our use of open source software is inconsistent with what the copyright owners had intended, which could lead to disputes and enforcement actions, including demands that we release applicable source code, and we may be forced to re-engineer our products or incur additional costs to replace the affected open source software. Our failure to obtain third party software, other IP licenses or other IP rights that are necessary or helpful for our business on favorable terms, or our need to engage in litigation over these licenses or rights, could seriously harm our business, operating results or financial condition. In the case of infringement or misappropriation caused by technology that we obtain from third parties, any indemnification or other contractual protections we obtain from such third parties, if any, may be insufficient to cover the liabilities we incur as a result of such infringement or misappropriation.

We may not realize opportunities presented by AI and may incur reputational and financial harm and liability as a result of issues in the development and use of AI.

We are making significant investments in AI initiatives, including building out our generative AI platform and applications, to enable our customers to optimize their products' performance, increase the productivity of their design teams and workflows and develop AI solutions themselves. AI technologies are complex and rapidly evolving, and we face significant competition from other companies. Moreover, the long-term trajectory of this technological trend is unknown. If we fail to develop and timely offer such products or keep pace with the product offerings of our competitors, or if demand for such products does not grow as anticipated, our business could be adversely affected. We may incur significant costs, resources, investments, delays and not achieve a return on investment or capitalize on opportunities presented by AI.

The introduction of AI technologies into new or existing products may result in new or enhanced governmental or regulatory scrutiny, litigation, confidentiality or security risks, ethical concerns, or other complications that could adversely affect our business, reputation or financial results. Existing laws and regulations may apply to us or our customers in new ways, and new laws and regulations may be instituted, the effects of which are difficult to predict. The IP ownership and license rights, including copyright, surrounding AI technologies has not been fully addressed by U.S. courts or other federal or state laws or regulations, and the use or adoption of AI technologies into our products and services may result in exposure to claims of copyright infringement or other IP misappropriation. In addition, the rapid evolution of AI technologies requires the application of resources to help ensure that AI is implemented responsibly in order to minimize unintended, harmful impact. If the development or use of AI technologies by us or our customers draws controversy due to perceived or actual impact on human rights, IP, privacy, security, employment, the environment or in other social contexts, we may experience brand or reputational harm, competitive harm or legal liability.

Cyberattacks that compromise the confidentiality, integrity or availability of our or our third-party providers' information technology systems or confidential information could materially harm our business, reputation and financial condition.

We rely on hardware, software, digital infrastructure and computing networks for both internal and customer-facing operations that are critical to our business (collectively, "IT Systems"). We own and manage certain IT Systems but also rely on third parties for IT Systems and related products and services, including cloud computing. In addition, we and certain third-party providers collect, maintain and process data about our customers, employees, business partners and others, including personally identifiable information, as well as proprietary data such as trade secrets (collectively, "Confidential Information").

We face numerous, evolving cybersecurity risks that threaten the confidentiality, integrity and availability of our IT Systems, Confidential Information, products and services, including from diverse threat actors, such as state-sponsored organizations, opportunistic hackers and malicious insiders, as well as through diverse attack vectors, such as social engineering (including phishing), malware (including ransomware) and denial-of-service attacks, and due to human or technological error, such as misconfigurations, "bugs" or other vulnerabilities in software or hardware. We have experienced cyberattacks and other security breaches in the past and will continue to experience varying degrees of attacks and incidents in the future.

A significant cyberattack on our or a third-party provider's IT Systems could result in any or all of the following: compromise to our Cadence Cloud portfolio, which includes both our managed and customer-managed environments, and our data centers and those of our customers and end users; corruption or stealing of Confidential Information such as proprietary information related to our business, products, services and infrastructure or personally identifiable information; manipulation or stealing of financial data and assets; and/or disruption of our systems and services and those of our customers and others. Breaches of our security measures and vulnerabilities in our or third-party IT Systems or products or services expose us to a risk of loss or misuse, loss of financial assets, business interruption, regulatory investigations, litigation and other potential liability. There can be no assurance that our cybersecurity risk management strategy, program, policies, processes and controls will be fully implemented, complied with or effective in protecting any systems or information.

Techniques used to obtain unauthorized access or to sabotage information systems change frequently and include zero-day software vulnerabilities that are unknown until exploited by threat actors. Cyberattacks are expected to accelerate on a global basis in frequency and magnitude as threat actors are increasingly sophisticated in using techniques and tools – including artificial intelligence – that circumvent controls, evade detection and remove forensic evidence. As a result, we may be unable to promptly or effectively detect, investigate, remediate or recover from future attacks or incidents, or to avoid a material adverse impact to our IT Systems, Confidential Information or business. Furthermore, we have acquired and continue to acquire companies with cybersecurity vulnerabilities and/or less sophisticated security measures, which exposes us to increased cybersecurity, operational and financial risk. Moreover, hardware, software or applications we develop or procure from third parties or through open source solutions may contain defects in design or manufacture or other vulnerabilities and be susceptible to hacking or misappropriation. In addition, certain of our third-party vendors use cloud storage of information as part of their services and product offerings, creating risk of misappropriation of our Confidential Information by third parties.

In the event of an actual or perceived breach of our security, or a vendor's security, the market perception of the effectiveness of our security measures could be harmed, legal or regulatory actions could be initiated against us and we could suffer damage to our reputation or our business, or lose existing customers and our ability to obtain new customers (including government customers), incur significant restoration, remediation and compliance costs, or suffer harm to our financial condition. The loss, misuse or theft of personal data collected, used, stored or transferred by us, vendors or other third parties in the course of running our business could result in business or financial harm, damage to our reputation and legal or regulatory proceedings. Also, we cannot guarantee that any costs and liabilities incurred in relation to an attack or incident will be covered by our existing insurance policies or that applicable insurance will be available to us in the future on economically reasonable terms or at all.

Risks associated with our international operations could adversely impact our financial condition.

A significant amount of our revenue is derived from our international operations, and we have offices throughout the world, including key research and development facilities outside of the United States. Our international operations are subject to a number of risks, including:

- trade restrictions, including tariffs, export or import regulations, sanctions or other trade barriers, including licensing requirements for exports, which may lengthen sales cycles or restrict or prohibit the sale or licensing of certain products;
- country-specific export controls could impact our employees who are nationals of the restricted country, preventing these foreign nationals from performing their technology-focused roles which may slow our pace of innovation and/or impact our ability to service customers unless an export license is granted;
- limitations on repatriation of earnings and on the conversion of foreign currencies;
- reduced protection of IP rights and heightened exposure to IP theft;
- longer collection periods for receivables and greater difficulty in collecting accounts receivable;
- difficulties in managing foreign operations;
- political and economic conditions, such as global economic downturns or recessions in the regions in which we do business, as well as macroeconomic and policy impacts of political instability and armed conflicts;
- unexpected changes in legal and regulatory requirements;
- differing employment practices and labor issues or inability to continue to offer competitive compensation;
- variations in costs or expenses associated with our international operations, including as a result of changes in foreign tax laws or devaluation of the U.S. dollar relative to other currencies; and
- public health emergencies and related public health measures, such as the COVID-19 pandemic, including restrictions on travel between jurisdictions in which we and our customers and suppliers operate.

Some of our international research and development and other facilities are in parts of the world where there is a greater risk of business interruption as a result of political instability, terrorist acts or military conflicts than businesses located domestically. Damage to or disruptions at our international research and development facilities could have a significant adverse effect on our ability to develop and improve products. We are not insured for losses or interruptions caused by acts of war, among other exclusions. Furthermore, our operations are dependent upon the connectivity of our operations throughout the world. Activities that interfere with our international connectivity or operations, such as cyber hacking, computer system viruses, natural disasters, public health emergencies, civil unrest or terrorism, could significantly harm our business operations.

In addition, internal controls, policies and procedures and employee training and compliance programs that we have implemented to deter prohibited practices may not prevent our employees, contractors or agents from violating or circumventing our policies and the laws and regulations applicable to our worldwide operations.

The effect of foreign exchange rate fluctuations may adversely impact our revenue, expenses, cash flows and financial condition.

We have significant operations outside the United States. Our revenue from international operations as a percentage of total revenue has historically exceeded 50%, and we expect that revenue from our international operations will continue to account for a significant portion of our total revenue. We also transact business in various foreign currencies, although the majority of our revenue contracts worldwide are denominated in U.S. dollars. Approximately one third of our total costs and expenses are transacted in foreign currencies. Volatility of currencies in countries where we conduct business, most notably the U.S. dollar, Chinese renminbi, Japanese yen, European Union euro, British pound and Indian rupee, have had and may in the future have an effect on our revenue or operating results.

Fluctuations in the exchange rate between the U.S. dollar and other currencies could seriously affect our business, operating results and financial condition, including due to inflation, devaluations and currency controls. If we price our products and services in a non-U.S. market in the local currency, we receive fewer U.S. dollars when the local currency declines in value relative to the U.S. dollar. If we price our products and services in a non-U.S. market in U.S. dollars, a decrease in value of the local currency relative to the U.S. dollar could result in our prices being uncompetitive in that market. On the other hand, when a foreign currency increases in value relative to the U.S. dollar, it takes more U.S. dollars to purchase the same amount of the foreign currency, which increases our payroll costs and other operating expenses in that region. Our attempts to reduce the effect of foreign currency fluctuations may be unsuccessful, and exchange rate movements may adversely impact our results of operations as expressed in U.S. dollars.

We depend upon our management team and key employees, and our failure to attract, train, motivate and retain management and key employees may make us less competitive and therefore harm our results of operations.

Our business depends upon the continued services, efforts and abilities of our senior management and other key employees. Competition for highly skilled executive officers and employees can be intense, particularly in geographic areas recognized as high technology centers. In addition, competition for qualified personnel, including software engineers, in the EDA, commercial electronics engineering services and IP industries has intensified. Further, increased uncertainty regarding social, political and immigration policies in the United States and abroad may make it difficult to recruit employees with adequate experience; and governmental policies resulting in increased funding of domestic technology companies, such as China's stated national policy to be a global leader in all segments of the semiconductor industry by 2030, has caused and may continue to cause difficulty in retaining and attracting local talent. We may also experience increased compensation costs that are not offset by either improved productivity or higher sales. We may not be successful in recruiting new personnel and in training, retaining and motivating existing personnel. Our ability to do so also depends on how well we maintain a strong workplace culture that is attractive to employees, particularly as we transition employees back to the office generally three times a week based on our hybrid work model, and hiring and training of new employees may be adversely impacted by global economic uncertainty. From time to time, there may be changes in our management team resulting from the hiring and departure of executive officers, and as a result, we may experience disruption to our business that may harm our operating results and our relationships with our employees, customers and suppliers may be adversely affected.

To attract, retain and motivate individuals with the requisite expertise, we may be required to grant large numbers of stock options or other stock-based incentive awards, which may be dilutive to existing stockholders and increase compensation expense, and pay significant base salaries and cash bonuses, which could harm our operating results. The high cost of training new employees, not fully utilizing these employees, or losing trained employees to competing employers could also reduce our operating margins and harm our business or operating results.

A significant portion of our cash is held and generated outside of the United States, and if our cash available in the United States is insufficient to meet our requirements in the United States, we may be required to raise cash in ways that could negatively affect our financial condition, results of operations and the market price of our common stock.

We have substantial cash requirements in the United States and significant operations outside the United States. As of December 31, 2023, approximately 55% of our cash and cash equivalents balance was held by subsidiaries outside the United States. We cannot accurately predict the full impact that evolving macroeconomic and geopolitical conditions may have on our cash flows. In addition, although the U.S. Tax Cuts and Jobs Act (the "Tax Act") has reduced the tax impact of repatriation of foreign earnings, there are still administrative processes associated with repatriation of foreign earnings that could affect the timing of returning cash to the U.S. from non-U.S. jurisdictions. Accordingly, if our U.S. cash is insufficient to meet our future

funding obligations in the United States, we could be required to seek funding sources on less attractive terms, which could negatively impact our results of operations, financial position and the market price of our common stock.

The long sales cycle of our products and services may cause our operating results to fluctuate unexpectedly.

Generally, we have a long sales cycle that can extend up to six months or longer. The complexity and expense associated with our products and services generally require a lengthy customer education, evaluation and approval process. Consequently, we may incur substantial expenses and devote significant management effort and expense to develop potential relationships that do not result in agreements or revenue and may prevent us from pursuing other opportunities. In addition, sales of our products and services have been and may in the future be delayed if customers delay approval or commencement of projects because of the timing of customers' competitive evaluation processes or customers' budgetary constraints and budget cycles. Long sales cycles for hardware products subject us to a number of significant risks over which we have limited control, including insufficient, excess or obsolete inventory, variations in inventory valuation and fluctuations in quarterly operating results. In addition, if our customers build elevated inventory levels, we could experience a decrease in short-term and/or long-term demand for our hardware products. Further, economic conditions, including economic downturn and rising inflation, may have a delayed impact on our results and financial condition as a result of our long sales cycles. Similarly, such macroeconomic conditions may impact our long sales cycles by making it difficult for our customers to plan future business activities, which could cause customers to limit spending or delay decision-making.

We have incurred, and may in the future incur, substantial costs in connection with restructuring plans, which might not result in the benefits we anticipate, possibly having a negative effect on our future operating results.

From time to time, we initiate restructuring plans in an effort to better align our resources with our business strategy. We incur substantial costs to implement restructuring plans, and our restructuring activities subject us to reputational risks and litigation risks and expenses. Our past restructuring plans do not provide any assurance that we will realize anticipated cost savings or other benefits from any restructuring plans we implement in the future. In addition, restructuring plans may have other consequences, such as attrition beyond our planned reduction in workforce, a negative effect on employee morale and productivity or our ability to attract highly skilled employees. Our competitors may also use any future restructuring plans to seek to gain a competitive advantage over us. As a result, restructuring plans may affect our revenue and other operating results.

The investment of our cash is subject to risks that may cause losses and affect the liquidity of these investments.

Our marketable investments include various money market funds and shares of publicly held companies, and may include other investments as well. Weakened financial markets have at times adversely impacted the general credit, liquidity, market prices and interest rates for these and other types of investments. Additionally, changes in monetary policy by the Federal Open Market Committee or other relevant regulators and concerns about the rising U.S. government debt level may cause a decrease in the purchasing power of the U.S. dollar and adversely affect our investment portfolio. We also invest cash in non-marketable equity securities, including shares of privately held entities. The financial market and monetary risks associated with our investment portfolio may have a material adverse effect on our financial condition, liquidity, results of operations or cash flows.

Our business is subject to the risk of natural disasters and global climate change.

Our corporate headquarters, including certain of our research and development operations and certain of our distribution facilities, and a significant portion of our employees are located in the Silicon Valley area of Northern California, a region known to experience seismic activity and wildfires. Our offices around the world may also be adversely impacted by natural disasters, including those intensified by climate change. Our offices, and those of our customers and suppliers, can be disrupted by droughts, extreme temperatures, fires, flooding and other climate change-related risks, as well as earthquakes, actions by utility providers and other catastrophic events such as an actual or threatened public health emergency. If a catastrophic event occurs at or near our offices or where our employees are located, or utility providers or public health officials take certain actions (e.g., shut off power to our facilities or impose travel restrictions), our operations may be interrupted, which could adversely impact our business and results of operations. If a catastrophic event impacts a significant number of customers, resulting in decreased demand for their and our products, or our ability to provide services and maintenance, our business and results of operations could be adversely impacted.

Risks Related to Customers, Suppliers and Industry Competition

Customer consolidation could affect our operating results.

There has been a trend toward customer consolidation in the semiconductor industry through business combinations, including mergers, asset acquisitions and strategic partnerships. If this trend continues, it could make us more dependent on fewer customers who may be able to exert increased pressure on our prices and other contract terms and could increase the portion of our total sales concentration for any single customer. Customer consolidation activity could also reduce the demand for our products and services if such customers streamline research and development or operations, reduce purchases or delay purchasing decisions. These outcomes could negatively impact our operating results and financial condition.

Our failure to respond quickly to technological developments or customers' increasing technological requirements and to continue to develop or acquire technological capabilities could make our products uncompetitive and obsolete and impede our ability to address the requirements in technology segments that are expected to contribute to our growth.

Our strategy is designed to increase our business among electronic systems companies, which are developing their own ICs and other electronic subsystems. Our strategy is also intended to increase our business among semiconductor companies, which are increasing their contribution to the end products into which their ICs and other electronic subsystems are incorporated. Part of this strategy involves addressing the needs across a variety of vertical sectors including consumer, hyperscale computing, mobile, communications, automotive, aerospace and defense, industrial and life sciences, where increased investment is expected by our customers. Each of these sectors require technologies, expertise, and marketing and operations infrastructure that are application-specific. Our inability to develop or acquire application-specific capabilities could impede our ability to expand our business and ultimately affect our future growth. The following trends may impact the sectors we serve:

- changes in the design and manufacturing of ICs, including migration to advanced-process nodes and 3D transistors, such as FinFETs, present major challenges to the semiconductor industry, particularly in IC design, design automation, design of manufacturing equipment, and the manufacturing process itself. With migration to advanced-process nodes, the industry must adapt to more complex physics and manufacturing challenges. Models of each component's electrical properties and behavior also become more complex as do requisite analysis, design, verification and manufacturing capabilities. Novel design tools and methodologies must be invented and enhanced quickly to remain competitive in the design of electronics in the smallest nanometer ranges;
- with the availability of seemingly endless gate capacity, there is an increase in design reuse, or the combining of off-the-shelf design IP with custom logic to create ICs or SoCs. The unavailability of a broad range of high-quality design IP (including our own) that can be reliably incorporated into a customer's design with our software products and services could lead to reduced demand for our products and services;
- increased technological capability of the FPGA logic chip, which creates an alternative to IC implementation for some companies, could reduce demand for our IC implementation products and services;
- adoption of cloud computing technologies with accompanying new engagement models for an increasing number of software categories may impact our business;
- with Moore's Law slowing, the trend towards more on-chip integration and advanced system level 3D package design may change the requirements for the design, multiphysics analysis and verification of complex systems; and
- changing end-user dynamics in our target technology vertical sectors could advance the need from simple ICs to full-system design and analysis capabilities that require increasingly complex computational software-based solutions.

If we are unable to respond quickly and successfully to these trends, we may lose our competitive position, and our products or technologies may become obsolete. To compete successfully, we must develop, acquire or license new products and improve our existing products and processes on a schedule that keeps pace with technological developments and the requirements for products addressing a broad spectrum of designers and designer expertise. We must provide frequent and relevant updates to our software products in order to provide substantial benefit to the customer throughout the license periods because of the rapid changes in our customers' industries. The market must also accept our new and improved products. We must enhance our hardware platforms periodically to reduce the likelihood that a competitor surpasses the capabilities we offer. Our introduction of new products could reduce the demand and revenue of our older products or affect their pricing. We must also be able to support a range of changing computer software, hardware platforms and customer preferences. A transition by our customers to different business models associated with cloud computing technologies could result in reduced revenue. We cannot guarantee that we will be successful in keeping pace with all, or any, of the customer trends.

We invest and expect to continue to invest in research and development efforts for new and existing products and technologies and technical sales support. Such investments may affect our operating results, and, if the return on these investments is lower or develops more slowly than we expect, our revenue and operating results may suffer.

We invest and expect to continue to invest in research and development for new and existing products, technologies and services in response to our customers' increasing technological requirements. Such investments may be in related areas, such as technical sales support, and may include increases in employee headcount. These investments may involve significant time, risks and uncertainties, including the risk that the expenses associated with these investments may affect our margins and operating results and that we may not realize the intended benefits of these investments. We believe that we must continue to invest a significant amount of time and resources in our research and development efforts and technical sales support to maintain and improve our competitive position. If we do not achieve the benefits anticipated from these investments, if the achievement of these benefits is delayed, or if customers reduce or slow the need to upgrade or enhance their computational software products and design flows, our revenue and operating results may be adversely affected.

Our operating results and revenue could be adversely affected by customer payment delays, customer bankruptcies and defaults or modifications of licenses.

Our customers have and may continue to face challenging financial or operating conditions, including due to macroeconomic conditions or catastrophic events, and delay or default on their payment commitments to us, request to modify contract terms, or modify or cancel plans to license our products. Our customers' inability to fulfill payment commitments, in turn, could adversely affect our revenue, operating expenses and cash flow. Additionally, from time to time our customers seek to renegotiate pre-existing contractual commitments. Payment defaults by our customers or significant reductions in existing contractual commitments could have a material adverse effect on our financial condition and operating results.

The competition in our industries is substantial, and we may not be able to continue to compete successfully.

The industries in which we do business, including software, hardware, IP and services for enabling the design of electronic products, are highly competitive and require us to identify and develop or acquire innovative and cost-competitive products, integrate them into platforms and market them in a timely manner. We may not be able to compete successfully in these industries, which could seriously harm our business, operating results and financial condition. Factors that could affect our ability to compete successfully include:

- the development by others of competitive products or platforms and engineering services, possibly resulting in a shift of customer preferences away from our products and services and significantly decreased revenue;
- aggressive pricing competition by our competitors, including through significant discounts, may cause us to reduce the prices of our products, offer terms that are unfavorable to us or lose our competitive position, any of which could result in lower revenue or profitability and could adversely impact our ability to realize the revenue and profitability forecasts for our software or emulation and prototyping hardware systems products and could, over time, significantly constrain the prices that we can charge for our products;
- the challenges of advanced-node design may lead some customers to work with more mature, less risky manufacturing processes that may reduce their need to upgrade or enhance their EDA products and design flows;
- the challenges of developing (or acquiring externally developed) technology solutions that are adequate and competitive in meeting the rapidly evolving requirements of next-generation design challenges;
- intense competition to attract acquisition targets, possibly making it more difficult for us to acquire companies or technologies at an acceptable price, or at all;
- new entrants, including larger electronic systems companies, in our industry;
- the combination of our competitors or collaboration among companies to deliver more comprehensive or different offerings than they could individually;
- our entry into new product categories or technology vertical sectors, including those in which success depends on absolute or relative scale;
- decisions by electronics manufacturers to perform engineering services or IP development internally, rather than purchase these services from outside vendors due to budget constraints or excess engineering capacity;
- actions by regulators to limit the contractual terms that either we or our customers can apply to product and service offerings; and
- events or circumstances that damage the reputation of our company, leadership, products, services or technologies.

For more information about our specific competitors, see "Competition" under Item 1 of Part I of this Annual Report.

Our future revenue is dependent in part upon our installed customer base continuing to license or buy products and purchase services.

Our installed customer base has traditionally generated additional new license, services and maintenance revenues. In future periods, customers may not necessarily license or buy additional products or contract for additional services or maintenance. Our customers, many of which are large semiconductor and systems companies, often have significant bargaining power in negotiations with us. Customer consolidation can reduce the total level of purchases of our software, hardware, IP and services increase customers' bargaining power in negotiations with their suppliers, including us.

We depend on a single supplier or a limited number of suppliers for certain hardware components and contract manufacturers for production of our emulation and prototyping hardware products, making us vulnerable to supply disruption and price fluctuation.

Our reliance on single or a limited number of suppliers and contract manufacturers for certain hardware components and contract manufacturers for production of our emulation and prototyping hardware products has resulted in, and could continue to result in, some product delivery delays and reduced control over contractual terms and quality. In some cases, it may not be practical or feasible to have multiple sources to procure certain key components. We have suffered from, and may continue to suffer from, delays and other disruptions in the supply of certain hardware components and the delivery of products by our

contract manufacturers. Such delays and disruptions may be due to a variety of factors, including bankruptcy, shutdown or upstream supply chain issues, and may prevent us from delivering completed hardware products to customers or from supplying new evaluation units to customers, which could have a negative impact on our revenue and operating results. For example, the global semiconductor shortage since 2021 has negatively impacted and may continue to negatively impact multiple segments of the semiconductor industry, including our company and our customers.

Tax, Regulatory and Litigation Risks

Our results could be adversely affected by an increase in our effective tax rate as a result of U.S. and foreign tax law changes, outcomes of current or future tax examinations, or by material differences between our forecasted and actual effective tax rates.

Tax laws, regulations, and administrative practices in various jurisdictions are evolving and may be subject to significant changes due to economic, political and other conditions. Governments, including the United States, are increasingly focused on ways to increase tax revenues, particularly from multinational corporations, which have led to changes in tax laws, an increase in audit activity and harsher positions taken by tax authorities. We are currently subject to tax audits in various jurisdictions and these jurisdictions have assessed, or may assess, additional tax liabilities against us.

Our operations are subject to income and transaction taxes in the United States and in multiple foreign jurisdictions, with a significant amount of our foreign earnings generated by our subsidiaries organized in Ireland and Hungary. Any significant change in our future effective tax rates could adversely impact our results of operations, cash flows and financial position. Our future effective tax rates could be adversely affected by factors that include, but are not limited to, changes in tax laws or the interpretation of such tax laws in jurisdictions in which we have business activity, earnings being lower than anticipated in jurisdictions with low statutory tax rates, changes in tax benefits from stock-based compensation, changes in the valuation of our deferred tax assets and liabilities, changes in our recognition or measurement of a tax position taken in a prior period, increases to interest or penalty expenses, new accounting standards or interpretations of such standards, or results of examinations by the Internal Revenue Service (“IRS”), state, and foreign tax or other governmental authorities. For example, our fiscal 2022 and fiscal 2023 effective tax rates and cash tax payments increased significantly as compared to fiscal 2021, which primarily resulted from a requirement that we capitalize and amortize R&D costs beginning from fiscal 2022, rather than expense these costs as incurred for U.S. corporate income tax purposes.

The IRS and other tax authorities regularly examine our income tax returns and other non-income tax returns, such as payroll, sales, use, value-added, net worth or franchise, property, goods and services, consumption, import, stamp and excise taxes, in both the United States and foreign jurisdictions. The calculation of our provision for income taxes and our accruals for other taxes requires us to use significant judgment and involves dealing with uncertainties in the application of complex tax laws and regulations. In determining the adequacy of our provision for income taxes, we regularly assess the potential settlement outcomes resulting from income tax examinations. However, the final outcome of tax examinations cannot be estimated with certainty and could be materially different from the amount that is reflected in our historical income tax provisions and accruals for other taxes. Should the IRS or other tax authorities assess additional taxes, penalties or interest as a result of a current or future examination, we may be required to record charges to operations in future periods that could have a material impact on our results of operations, financial position and cash flows in the applicable period or periods.

In August 2022, the United States enacted the Inflation Reduction Act of 2022, which included a new minimum tax on certain large corporations, an excise tax on stock buybacks and significant funding for IRS enforcement efforts. In October 2021, the Organisation for Economic Co-operation and Development (“OECD”) announced an agreement among more than 130 countries to adopt new rules including Pillar Two Model Rules which call for the taxation of large multinational corporations, such as Cadence, at a minimum rate of 15%. Subsequently multiple sets of administrative guidance have been issued. Many non-U.S. tax jurisdictions have either recently enacted legislation to adopt certain components of the Pillar Two Model Rules beginning in 2024 (including the European Union Member States) with the adoption of additional components in later years or announced their plans to enact legislation in future years. Furthermore, many countries have enacted or proposed new laws to tax digital transactions. These and future developments in tax laws and regulations, and related compliance, could have a material adverse effect on our operating results, financial position and cash flows.

Forecasts of our annual effective tax rate do not include the anticipation of future tax law changes and are complex and subject to uncertainty because our income tax position for each year combines the effects of estimating the amount and composition of our annual income or loss in jurisdictions with varying income tax rates, as well as benefits from available deferred tax assets, the impact of various accounting rules, our interpretations of changes in tax laws and results of tax audits. In addition, we account for certain tax benefits from stock-based compensation in the period the stock compensation vests or is settled, which may cause increased variability in our quarterly effective tax rates. If there were a material difference between forecasted and actual tax rates, it could have a material impact on our results of operations.

Litigation, government investigations or regulatory proceedings could adversely affect our financial condition and operations.

From time to time, we or our products or technologies are involved in or subject to disputes and legal proceedings that arise in the ordinary course of business. These include disputes and legal proceedings related to IP, indemnification, mergers and acquisitions, licensing, contracts, customers, products, distribution and other commercial arrangements and employee relations matters. Governments and regulatory agencies in the jurisdictions in which we operate also open or initiate inquiries,

investigations or regulatory proceedings from time to time. For information regarding legal proceedings in which we are currently engaged, please refer to the discussion under Note 18 in the notes to consolidated financial statements. The final outcome of these legal proceedings or any other proceedings that may arise in the future could have an adverse effect on our business, reputation, operating results, financial condition and cash flows. Legal proceedings can be time consuming, expensive and divert management's time and attention from our business, which could adversely affect our revenue and operating results.

Errors or defects in our products and services could expose us to liability and harm our business.

Our customers use our products and services in designing and developing products that involve a high degree of technological complexity, each of which has its own specifications. Because of the complexity of the systems and products with which we work, some of our products and designs can be adequately tested only when put to full use in the marketplace. As a result, from time to time, our customers or their end users discover errors or defects in our software or the systems we design, or the products or systems incorporating our design and IP may not operate as expected. Errors or defects could result in reputational damage, failure to attract new or retain existing customers or market share and acceptance, diversion of development resources to resolve the problem, loss of or delay in revenue or payments and increased service costs and liability.

Our reported financial results may be adversely affected by changes in United States generally accepted accounting principles, and we may incur significant costs to adjust our accounting systems and processes to comply with significant changes.

United States generally accepted accounting principles ("U.S. GAAP") are subject to interpretation by the Financial Accounting Standards Board ("FASB"), the SEC and various bodies formed to promulgate and interpret appropriate accounting principles. We are also subject to evolving rules and regulations of the countries in which we do business. Changes to accounting standards or interpretations thereof may result in different accounting principles under U.S. GAAP that could have a significant effect on our reported financial results.

In addition, we have in the past and may in the future need to significantly change our customer contracts, accounting systems and processes when we adopt future or proposed changes in accounting principles. The cost and effect of these changes may negatively impact our results of operations during the periods of transition.

If we become subject to unfair hiring claims, we could be prevented from hiring needed employees, incur liability for damages and incur substantial costs in defending ourselves.

When companies in our industry lose employees to competitors, they frequently claim that these competitors have engaged in unfair hiring practices or that the employment of these persons would involve the disclosure or use of trade secrets. These claims could prevent us from hiring employees or cause us to incur liability for damages. We could also incur substantial costs in defending ourselves or our employees against these claims, regardless of their merits. Defending ourselves from these claims could also divert the attention of our management away from our operations.

We are subject to evolving corporate governance, environmental and social practices and public disclosure expectations and regulations that impact compliance costs and risks of noncompliance.

We are subject to changing rules and regulations promulgated by a number of governmental and self-regulatory organizations, including the SEC, Nasdaq and the FASB, as well as evolving investor, customer, employee and other stakeholder expectations around corporate governance, executive compensation and environmental and social practices and disclosures, such as climate change, greenhouse gas emissions, water usage, waste management, diversity, equity and inclusion and supply chain management. These rules, regulations and expectations continue to evolve in scope and complexity, and many new requirements have been created in response to laws enacted by U.S. and foreign governments, making compliance more difficult and uncertain. The increase in costs to comply with such evolving expectations, rules and regulations, as well as any risk of noncompliance, could adversely impact us. We expect that rapidly changing laws, regulations, policies, interpretations and expectations related to corporate governance, environmental and social matters, as well as increased enforcement actions by various governmental and regulatory agencies, will continue to increase the cost of our compliance and internal risk management programs, which could adversely affect our business, results of operations and financial condition. Moreover, some stakeholders may disagree with our corporate governance, environmental and social targets and practices and the focus of stakeholders may change and evolve over time. Stakeholders may have different views on where corporate governance, environmental and social focus should be placed. Any disagreement with our targets or strategies could adversely affect our business, reputation, results of operations and financial condition.

We have established corporate governance and environmental and social targets and strategies, including relating to greenhouse gas emissions reduction. If our ESG practices, reporting or disclosure controls do not meet evolving investor, customer, employee or other stakeholder expectations and regulatory standards, or if we are unable to make progress on or achieve our goals and objectives in this area, including our net zero target, then our reputation, our ability to attract or retain employees, and our attractiveness as an investment or business partner could be negatively impacted, which could adversely affect our operating results. Our disclosures and public positions or commitments on these matters may change from time to time, as may corresponding internal controls and external reporting standards, which can expose us to reputational, financial, legal, and other risks, including as a result of a failure or perceived failure to achieve publicly disclosed aspirations, targets, or goals, such as our greenhouse gas emissions reduction target, or a failure to report accurately. Statements about our ESG initiatives and goals, and progress against those goals, may be based on standards for measuring progress that are still

developing, internal controls and processes that continue to evolve, and assumptions that are subject to change. In addition, we could face scrutiny from certain stakeholders for the scope or nature of such initiatives, targets or goals, or for any revisions to these initiatives, targets or goals. If our ESG-related data, processes and reporting are incomplete or inaccurate, or if we fail to achieve progress with respect to our ESG targets or goals on a timely basis, or at all, our business, financial performance and growth could be adversely affected.

Risks Related to Our Securities and Indebtedness

Our stock price has been and may continue to be subject to fluctuations.

Our stock price is subject to changes in recommendations or earnings estimates by financial analysts, changes in investors' or analysts' valuation measures for our stock, our credit ratings and other factors beyond our control such as the COVID-19 pandemic, inflationary pressures, other macroeconomic factors and associated economic downturn. Furthermore, speculation in the press or investment community about our strategic position, financial condition, results of operations, business or security of our products, can cause changes in our stock price. In addition to these factors and industry and general economic and political conditions, our stock price may be adversely impacted by announcements related to financial results or forecasts that fail to meet or are inconsistent with earlier projections or the expectations of our securities analysts or investors, announcements of new products or acquisitions of new technologies by us, our competitors or our customers, or announcements of acquisitions, major transactions, litigation developments or management changes. A significant drop in our stock price could expose us to the risk of securities class action lawsuits, stockholder derivative lawsuits or other actions by stockholders, which may result in substantial costs and divert management's attention and resources, which may adversely affect our business.

Anti-takeover defenses in our certificate of incorporation and bylaws and certain provisions under Delaware law could prevent an acquisition of our company or limit the price that investors might be willing to pay for our common stock.

Our certificate of incorporation and bylaws and certain provisions of the Delaware General Corporation Law (the "DGCL") that apply to us could make it difficult for anyone to acquire control of our company. Our certificate of incorporation allows our Board of Directors to designate and issue, at any time and without stockholder approval, up to 400,000 shares of preferred stock in one or more series. All 400,000 shares of preferred stock are currently designated as Series A Preferred, but because no such shares are outstanding or reserved for issuance, our Board of Directors may reduce the number of shares of preferred stock designated as Series A Preferred to zero. Subject to the DGCL, our Board of Directors may, as to any shares of preferred stock the terms of which have not then been designated, fix the rights, preferences, privileges and restrictions on these shares, fix the number of shares and designation of any series, and increase or decrease the number of shares of any series if not below the number of outstanding shares plus the number of shares reserved for issuance. Our Board of Directors has the power to issue shares of Series A Preferred with dividend, voting and liquidation rights superior to our common stock at a rate of 1,000-to-1 without further vote or action by the common stockholders.

In addition, Section 203 of the DGCL generally prohibits a Delaware corporation from engaging in any business combination with a person owning 15% or more of its voting stock, or who is affiliated with the corporation and owned 15% or more of its voting stock at any time within three years prior to the proposed business combination, for a period of three years from the date the person became a 15% owner, unless specified conditions are met.

All or any one of these factors could limit the price that certain investors would be willing to pay for shares of our common stock and could allow our Board of Directors to resist, delay or prevent an acquisition of our company, even if a proposed transaction were favored by a majority of our independent stockholders.

Our debt obligations expose us to risks that could adversely affect our business, operating results or financial condition, and could prevent us from fulfilling our obligations under such indebtedness.

We have significant outstanding indebtedness, as well as the ability to access additional borrowings under our revolving credit facility. Subject to the limits contained in the credit agreement governing our revolving credit facility, the indenture that governs the 4.375% Senior Notes due October 15, 2024 (the "2024 Notes"), the loan agreement governing our senior non-amortizing term loan facility due September 7, 2025 (the "2025 Term Loan") and our other debt instruments, we may be able to incur substantial additional debt from time to time to finance working capital, capital expenditures, investments or acquisitions, share repurchases or for other purposes. If we do so, the risks related to our level of debt could intensify. As of December 31, 2023, both our 2024 Notes and 2025 Term Loan will mature in the next 22 months, which could require us to consume a significant portion of our liquidity or raise additional financing in adverse capital markets conditions.

Specifically, our level of debt could have important consequences, including the following:

- making it more difficult for us to satisfy our obligations to service our debt as described above;
- limiting our ability to obtain additional financing to fund future working capital, capital expenditures, acquisitions or other general corporate requirements;
- requiring a substantial portion of our cash flows (including U.S. cash) to be dedicated to debt service payments instead of other purposes, thereby reducing the amount of cash flows available for working capital, capital expenditures, acquisitions and other general corporate purposes and potentially requiring repatriation of cash from outside the U.S.;

- increasing our vulnerability to adverse economic and industry conditions;
- exposing us to the risk of increased interest rates as certain of our borrowings are at variable rates of interest;
- limiting our flexibility in planning for and reacting to changes in the industry in which we compete;
- placing us at a disadvantage compared to other, less leveraged competitors and competitors that have greater access to capital resources;
- limiting our interest deductions for U.S. income tax purposes; and
- increasing our cost of borrowing.

In addition, if we incur any additional indebtedness that ranks equally with the 2024 Notes, then subject to any collateral arrangements we may enter into, the holders of that debt will be entitled to share ratably in any proceeds distributed in connection with any insolvency, liquidation, reorganization, dissolution or other winding up of our company.

The amount and frequency of our share repurchases may fluctuate, and we cannot guarantee that we will fully consummate our share repurchase authorization, or that it will enhance long-term stockholder value. Share repurchases could also increase the volatility of the trading price of our common stock and diminish our cash reserves.

We repurchase shares of our common stock from time to time in accordance with authorizations from our Board of Directors. The primary objective of our share repurchase activities is to prevent share dilution associated with our stock compensation plans. The actual timing and amount of our share repurchases are subject to business and market conditions, corporate and regulatory requirements, stock price, acquisition opportunities and other factors and may fluctuate based on such factors. Our repurchase authorization does not obligate us to acquire a minimum amount of shares, does not have an expiration date and may be modified, suspended or terminated without prior notice. We cannot guarantee that the authorization will be fully expended or that our share repurchases will enhance long-term stockholder value. Further, our share repurchase activities could affect our stock price, increase stock price volatility, reduce our cash reserves and may be suspended or terminated at any time, which may result in a decrease in our stock price.

At the option of the holders of our outstanding notes, we may, under certain circumstances, be required to repurchase such notes.

Under the terms of our 2024 Notes, we may be required to repurchase for cash such notes prior to their maturity in connection with the occurrence of certain significant corporate events. Specifically, we are required to offer to repurchase such notes upon a “change of control triggering event” (as defined in the indenture related to such notes), such as a change of control accompanied by certain downgrades in the credit ratings of such notes. The repayment obligations under such notes may have the effect of discouraging, delaying or preventing a takeover of our company. If we were required to pay the 2024 Notes prior to their scheduled maturity, it could have a significant negative impact on our cash and liquidity and could impact our ability to invest financial resources in other strategic initiatives.

The terms of our debt agreements restrict our current and future operations, particularly our ability to respond to changes or to take certain actions.

The agreements governing our revolving credit facility, 2025 Term Loan and 2024 Notes contain a number of restrictive covenants that impose significant operating and financial restrictions on us and may limit our ability to engage in acts that may be in our long-term best interest, including restrictions on our ability to incur liens or additional indebtedness and guarantee indebtedness, enter into transactions with affiliates, alter the businesses we conduct, consolidate, merge or sell all or substantially all of our assets and to enter into sale and leaseback transactions. In addition, the restrictive covenants in the agreements governing our revolving credit facility and 2025 Term Loan require us to maintain specified financial ratios. Our ability to meet those financial ratios can be affected by events beyond our control, and we may be unable to meet them.

A breach of the covenants or restrictions under the agreements governing our revolving credit facility, 2025 Term Loan and 2024 Notes could result in an event of default under the applicable indebtedness. Such a default may allow the creditors to accelerate the related debt and may result in the acceleration of any other debt to which a cross-acceleration or cross-default provision applies. In addition, an event of default under the credit agreement governing our revolving credit facility would permit the lenders under our revolving credit facility to terminate all commitments to extend further credit. In the event our lenders or note holders accelerate the repayment of our borrowings, we may not have sufficient assets to repay that indebtedness.

As a result of these restrictions, we may be limited in how we conduct our business, unable to raise additional debt or equity financing to operate during general economic or business downturns or unable to compete effectively, take advantage of new business opportunities or otherwise grow in accordance with our strategy. In addition, our financial results, our substantial indebtedness and our credit ratings could adversely affect the availability and terms of our financing.

We may not be able to generate sufficient cash to service all of our indebtedness and may be forced to take other actions to satisfy our obligations under our indebtedness, which may not be successful.

Our ability to make scheduled payments on or refinance our debt obligations depends on our financial condition and operating performance, which are subject to prevailing economic and competitive conditions and certain financial, business, legislative, regulatory and other factors beyond our control. We may be unable to maintain a level of cash flows from operating activities sufficient to permit us to pay the principal, premium, if any, and interest on our indebtedness. Our inability to generate sufficient cash flows to satisfy our debt obligations, or to refinance our indebtedness on commercially reasonable terms or at all, would materially and adversely affect our financial position and results of operations.

If our cash flows and capital resources are insufficient to satisfy our debt obligations, we could face substantial liquidity problems and be forced to reduce or delay investments and capital expenditures or dispose of material assets or operations, seek additional debt or equity capital or restructure or refinance our indebtedness. We may not be able to effect any such alternative measures on commercially reasonable terms or at all and, even if successful, those alternative actions may not allow us to meet our debt obligations. Our debt agreements restrict our ability to dispose of assets and use the proceeds from dispositions and may also restrict our ability to raise capital to repay our indebtedness when due. We may not be able to consummate dispositions or obtain proceeds in an amount sufficient to meet any debt obligations then due.

In addition, we conduct a substantial portion of our operations through our subsidiaries, none of which are currently guarantors of our indebtedness. Accordingly, repayment of our indebtedness is dependent on the generation of cash flow by our subsidiaries and their ability to make such cash available to us, by dividend, debt repayment or otherwise. Our subsidiaries do not have any obligation to pay amounts due on our indebtedness or to make funds available for that purpose. Our subsidiaries may not be able to, or may not be permitted to, make distributions to enable us to make payments in respect of our indebtedness. Each subsidiary is a distinct legal entity, and, under certain circumstances, legal and contractual restrictions may limit our ability to obtain cash from our subsidiaries. In the event that we do not receive distributions from our subsidiaries, we may be unable to make required payments on our debt.

If we cannot make scheduled payments on our debt, we will be in default and holders of our debt could declare all outstanding principal and interest to be due and payable, the lenders could terminate their commitments to loan money, and we could be forced into bankruptcy or liquidation. In addition, a material default on our indebtedness could suspend our eligibility to register securities using short form, automatically effective registration statements, potentially hindering our ability to raise capital through the issuance of our securities and increasing our costs.

Our variable rate indebtedness subjects us to interest rate risk, which could cause our debt service obligations to increase significantly.

Borrowings under our revolving credit facility and 2025 Term Loan are at variable rates of interest and expose us to interest rate risk. When interest rates increase, our debt service obligations increase even though the amount borrowed remains the same, and our net income and cash flows, including cash available for servicing our indebtedness, could correspondingly decrease. We may enter into interest rate swaps that involve the exchange of floating for fixed rate interest payments in order to reduce interest rate volatility. However, we may not maintain interest rate swaps with respect to all of our variable rate indebtedness, and any swaps we enter into may not fully mitigate our interest rate risk.

Our revolving credit facility utilizes, at our option, either (1) Term Secured Overnight Financing Rate ("SOFR"), plus a margin between 0.750% and 1.250% per annum, plus a SOFR adjustment of 0.10% or (2) the base rate plus a margin between 0.000% and 0.250% per annum, to calculate the amount of accrued interest on any borrowings. The 2025 Term Loan utilizes, at our option, either (1) Term SOFR, plus a margin between 0.625% and 1.125% per annum, plus a SOFR adjustment of 0.10% or (2) base rate plus a margin between 0.000% and 0.125% per annum, to calculate the amount of accrued interest on borrowings. In each case, the applicable margin within the specified ranges is determined by reference to the credit rating of our unsecured debt. Accordingly, a credit rating downgrade would increase the applicable interest rates. Assuming all loans were fully drawn and we were to fully exercise our right to increase borrowing capacity under our revolving credit facility and we made no prepayments on our 2025 Term Loan, each quarter point change in interest rates would result in a \$3.4 million change in annual interest expense.

Various factors could increase our future borrowing costs or reduce our access to capital, including a lowering or withdrawal of the ratings assigned to us and our 2024 Notes by credit rating agencies.

We may in the future seek additional financing for a variety of reasons, and our future borrowing costs, terms and access to capital could be affected by factors including the condition of the debt and equity markets, the condition of the economy generally, prevailing interest rates, our level of indebtedness, our credit rating and our business and financial condition. In addition, the 2024 Notes currently have an investment grade credit rating, which could be lowered or withdrawn entirely by a credit rating agency based on adverse changes to circumstances relating to the basis of the credit rating. Consequently, real or anticipated changes in our credit ratings will generally affect the market value of the 2024 Notes. Any future lowering of the credit ratings of the 2024 Notes likely would make it more difficult or more expensive for us to obtain additional debt financing.

Item 1B. Unresolved Staff Comments

None.

Item 1C. Cybersecurity

Cybersecurity Risk Management and Strategy

We have developed and implemented a cybersecurity risk management program intended to protect the confidentiality, integrity, and availability of our critical systems and information, including our customers', vendors', partners' and employees' data, including personal information.

Our cybersecurity risk management program is guided by frameworks and standards promulgated by the EU, National Institute of Standards and Technology, Cloud Security Alliance ("CSA") and International Organization for Standardization/International Electrotechnical Commission ("ISO/IEC"). While we seek to maintain ISO/IEC 27001:2013, ISO/IEC 27017 and the SOC 2 Type 1 certifications, this does not imply that we specifically or comprehensively comply with technical specification or requirements, only that we use all the above-mentioned standards and regulations as a guide to help us identify, assess and manage cybersecurity risks relevant to our business.

Our cybersecurity risk management program is integrated into our overall risk oversight strategy and utilizes common reporting channels and governance processes that apply across other risk areas. We have a dedicated Chief Information Security Officer ("CISO"), who leads our Information Security team responsible for managing our cybersecurity processes, strategy and controls. Certain members of our Information Security team hold cybersecurity certifications, including the Certified Information Systems Security Professional ("CISSP") and the Certified Information Systems Auditor ("CISA") designations.

Our cybersecurity risk management program includes:

- a security incident response plan that includes procedures for responding to cybersecurity incidents;
- risk assessment processes designed to help identify cybersecurity risks to our critical systems, information, products, services, and our broader enterprise IT environment;
- our Information Security team, principally responsible for identifying and mitigating cybersecurity risks, and managing our security controls and our response to cybersecurity incidents;
- the use of external service providers, where appropriate, to assess, test or otherwise assist with certain aspects of our security controls and processes;
- implementation of new hire and annual data privacy and cybersecurity training of employees, including senior management, and cybersecurity governance training for our Board of Directors;
- a cybersecurity insurance policy to cover certain types of costs and losses from cybersecurity incidents; and
- a third-party risk management process, including risk assessment and risk rating, for certain service providers, suppliers, and vendors.

We have not identified risks from known cybersecurity threats, including as a result of any prior cybersecurity incidents, that have materially affected or are reasonably likely to materially affect us, including our business strategy, results of operations, or financial condition.

Cybersecurity Governance

Our Board of Directors is responsible for overseeing our enterprise risk management activities in general, and our Board committees assist with certain aspects of risk oversight. With respect to cybersecurity risk, our Board of Directors shares certain of the oversight responsibility and processes with the Audit Committee of the Board of Directors ("Audit Committee").

The Audit Committee, comprised entirely of independent directors, reviews and discusses with management our guidelines, policies and practices regarding risk assessment and risk management as they relate to our financial condition, and oversees our financial risk exposures, including planning regarding business continuity and cybersecurity. In addition, the Audit Committee oversees our annual enterprise business risk assessment, which includes the review of cybersecurity risks we face and our associated risk mitigation measures, and receives semi-annual reports from management on cybersecurity matters, including areas such as threat intelligence, major cybersecurity risk areas, regulations and cybersecurity incidents. In addition, management updates the Audit Committee, as necessary, regarding significant cybersecurity incidents, as well as any incidents with lesser impact potential.

The Audit Committee reports to the Board of Directors regarding its activities related to cybersecurity. In addition, the Board of Directors also directly receives reports from management on our cybersecurity risk profile and on the performance of our data privacy and cybersecurity risk management program, semi-annually in alternating quarters with the Audit Committee.

Our management team, including our Chief Information Officer ("CIO"), CISO and the General Counsel, is responsible for assessing and managing material risks from cybersecurity threats, including supervision of our internal security incident response team and our Disclosure Committee comprised of certain of our employees (including any applicable subcommittees thereof). Our management team has relevant expertise in the following: (i) understanding of cybersecurity risks in enterprise operations, (ii) experience in overseeing risk management and understanding risks faced by enterprise operations and (iii) significant operating experience allowing them to provide insight into developing, implementing and assessing our operating plan. In addition, our CISO has over 25 years of broad cybersecurity and information technology risk management experience, is a Certified Information Security Manager ("CISM") and holds a Master's Degree in computer science and information systems.

Our management team supervises efforts to prevent, detect, mitigate, and remediate cybersecurity risks and incidents, and is responsible for oversight and management of our cybersecurity risk management program. Our management team receives briefings from our internal Information Security team and the Disclosure Committee whenever applicable. Such briefings include information regarding threat intelligence and other information obtained from governmental, public or private sources, including external consultants engaged by us, and alerts and reports produced by security tools deployed in our information technology environment. Our management team also provides quarterly cybersecurity risk management program updates, to the Board of Directors or to the Audit Committee, in alternating quarters.

Item 2. Properties

We own land and buildings at our corporate headquarters located in San Jose, California. We also own properties in New Mexico and India. As of December 31, 2023, the total square footage of our owned buildings was approximately 1,227,000.

We lease additional facilities in the United States and various other countries. We may sublease certain of these facilities where space is not fully utilized.

We believe that these facilities are adequate for our current needs and that suitable additional or substitute space will be available as needed to accommodate any expansion of our operations.

Item 3. Legal Proceedings

For information regarding pending legal proceedings, related matters and associated risks, see Note 18 in the notes to consolidated financial statements under Item 15 of Part IV and the “Risk Factors” section under Item 1A of Part I of this Annual Report.

Item 4. Mine Safety Disclosures

Not applicable.

PART II.

Item 5. Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities

Our common stock is traded on the Nasdaq Global Select Market under the symbol CDNS. As of January 31, 2024, we had 344 registered stockholders. Because many shares of our common stock are held by brokers and other institutions on behalf of stockholders, we are unable to estimate the total number of stockholders that are represented by these record holders.

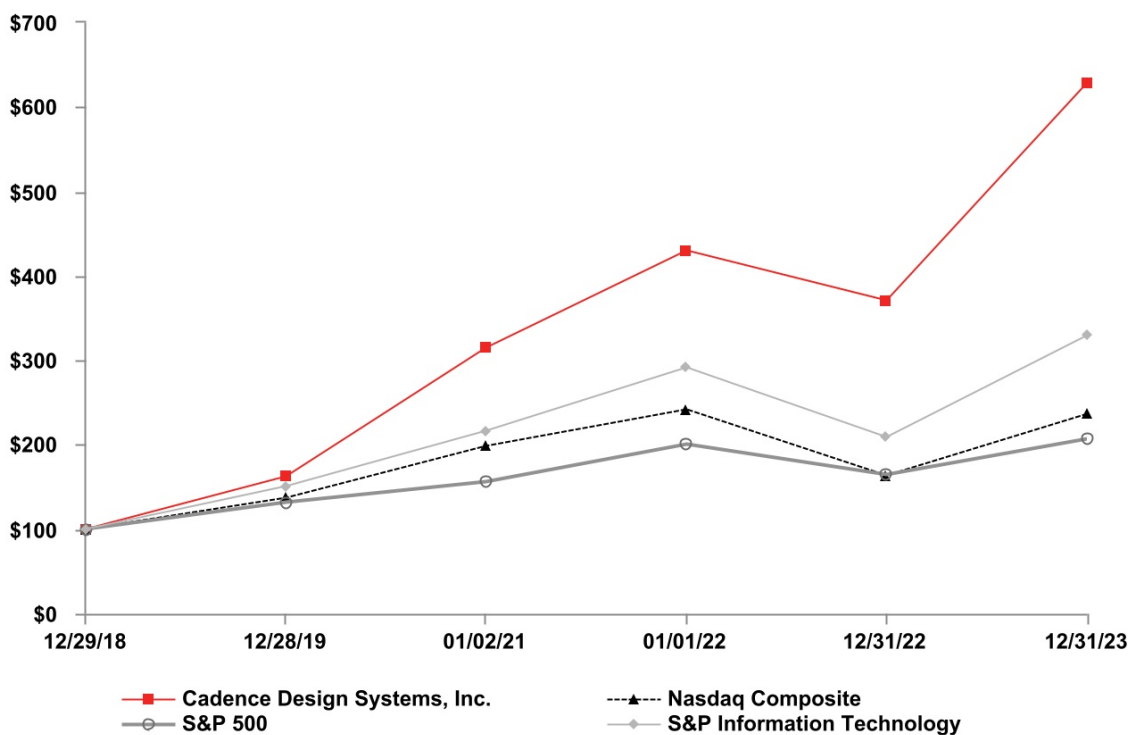
Dividends

We have never declared or paid, and do not anticipate declaring or paying in the foreseeable future, any cash dividends on our common stock. Any future determination as to the declaration and payment of dividends, if any, will be at the discretion of our Board of Directors, subject to applicable laws and will depend on then existing conditions, including our financial condition, operating results, contractual restrictions, capital requirements, business prospects and other factors our Board of Directors may deem relevant.

Stockholder Return Performance Graph

The following graph compares the cumulative 5-year total stockholder return on our common stock relative to the cumulative total return of the Nasdaq Composite Index, the S&P 500 Index and the S&P 500 Information Technology Index. The graph assumes that the value of the investment in our common stock and in each index on December 29, 2018, (including reinvestment of dividends) was \$100 and tracks it each year thereafter on the last day of our fiscal year through December 31, 2023, and for each index on the last day of the calendar year.

**COMPARISON OF 5 YEAR CUMULATIVE TOTAL RETURN*
Among Cadence Design Systems, Inc., the Nasdaq Composite Index,
the S&P 500 Index and the S&P Information Technology Index**



*\$100 invested on 12/29/18 in stock or 12/31/18 index, including reinvestment of dividends. Indexes calculated on a month-end basis.

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	12/29/2018	12/28/2019	1/2/2021	1/1/2022	12/31/2022	12/31/2023
Cadence Design Systems, Inc.	\$ 100.00	\$ 162.18	\$ 314.79	\$ 429.97	\$ 370.65	\$ 628.45
Nasdaq Composite	100.00	136.69	198.10	242.03	163.28	236.17
S&P 500	100.00	131.49	155.68	200.37	164.08	207.21
S&P 500 Information Technology	100.00	150.29	216.25	290.92	208.90	329.73

The stock price performance included in this graph is not necessarily indicative of future stock price performance.

Issuer Purchases of Equity Securities

We are authorized to repurchase shares of our common stock under a publicly announced program most recently increased by our Board of Directors on August 2, 2023. Pursuant to this authorization, we may repurchase shares from time to time through open market repurchases, in privately negotiated transactions or by other means, including accelerated share repurchase transactions or other structured repurchase transactions, block trades or pursuant to trading plans intended to comply with Rule 10b5-1 of the Exchange Act. The actual timing and amount of repurchases are subject to business and market conditions, corporate and regulatory requirements, stock price, acquisition opportunities and other factors.

As of December 31, 2023, approximately \$1.4 billion of the share repurchase authorization remained available to repurchase shares of our common stock. The share repurchase authorization does not obligate us to acquire a minimum amount of shares, does not have an expiration date and may be modified, suspended or terminated without prior notice.

The following table presents repurchases made under our current authorization and shares surrendered by employees to satisfy income tax withholding obligations during the three months ended December 31, 2023:

Period	Total Number of Shares Purchased ⁽¹⁾	Average Price Paid Per Share ⁽²⁾	Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs ⁽³⁾	Maximum Dollar Value of Shares Authorized for Repurchase Under Publicly Announced Plan or Program ⁽¹⁾ (In millions)
October 1, 2023 - October 31, 2023	191,736	\$ 243.07	169,407	\$ 1,461
November 1, 2023 - November 30, 2023	179,388	\$ 259.37	166,508	\$ 1,418
December 1, 2023 - December 31, 2023	160,654	\$ 270.08	151,959	\$ 1,377
Total	531,778	\$ 256.73	487,874	

⁽¹⁾ Shares purchased that were not part of our publicly announced repurchase programs represent employee surrender of shares of restricted stock to satisfy employee income tax withholding obligations due upon vesting, and do not reduce the dollar value that may yet be purchased under our publicly announced repurchase programs.

⁽²⁾ The weighted average price paid per share of common stock does not include the cost of commissions or excise taxes.

⁽³⁾ Our publicly announced share repurchase program was originally announced on February 1, 2017, and most recently increased by an additional \$1.0 billion on August 2, 2023.

Shares Authorized for Issuance under Equity Compensation Plans

The information required by Item 201(d) of Regulation S-K under Item 5 is incorporated herein by reference from the section entitled "Equity Compensation Plan Information" in our definitive proxy statement for our 2024 Annual Meeting of Stockholders.

Item 6. [Reserved]

Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations

The following discussion should be read in conjunction with the consolidated financial statements and notes thereto included elsewhere in this Annual Report and with Part I, Item 1A, "Risk Factors." Please refer to the cautionary language at the beginning of Part I of this Annual Report regarding forward-looking statements.

Business Overview

Cadence is a leading pioneer in electronic system design software and IP, building upon more than 35 years of computational software expertise. Since our inception, we have been at the forefront of technology innovation, solving highly complex challenges in the semiconductor and electronic systems industries. We are a global company that provides computational software, special-purpose computational hardware, IP and services to multiple vertical sectors including automotive, AI, aerospace and defense, high-performance and mobile computing, hyperscalers, wireless communications, IIoT and medical equipment.

Our strategy allows us to deliver essential computational software, hardware and IP that our customers use to turn their design concepts into reality. Our customers include many of the world's most innovative companies that design and build highly sophisticated semiconductor and electronic systems found in products used in everyday life. Our Intelligent System Design strategy allows us to quickly adapt to our customers' dynamic design requirements. Our products and services enable our customers to develop complex and innovative semiconductor and electronic systems, so demand for our technology and expertise is driven by increasing complexity and our customers' need to invest in new designs and products that are highly differentiated. Historically, the industry that provided the tools used by IC engineers was referred to as Electronic Design Automation ("EDA"). Today, our offerings include and extend beyond EDA.

We group our products into categories related to major design activities:

- Custom IC Design and Simulation;
- Digital IC Design and Signoff;
- Functional Verification;
- IP; and
- System Design and Analysis.

For additional information about our products, see the discussion in Item 1, "Business," under the heading "Products and Product Categories."

Consistent with our Intelligent System Design strategy, we completed several acquisitions since the beginning of fiscal 2023 that we believe enhance our talent, our technology portfolio and our ability to pursue attractive opportunities in the markets we serve. During fiscal 2023, these acquisitions increased expenses, including amortization of acquired intangible assets, more than revenue.

Management uses certain performance indicators to manage our business, including revenue, certain elements of operating expenses and cash flow from operations, and we describe these items further below under the headings "Results of Operations" and "Liquidity and Capital Resources."

Fiscal Year End

Historically, our fiscal years were 52- or 53-week periods ending on the Saturday closest to December 31. During fiscal 2022, our Board of Directors approved a change in our fiscal year end from the Saturday closest to December 31 of each year to December 31 of each year. The fiscal year change became effective beginning with our fiscal year 2023, which began on January 1, 2023. Fiscal year 2022, which is included in "Management's Discussion and Analysis of Financial Condition and Results of Operations" for comparative purposes, represents a 52-week period.

Our first three fiscal quarters end on March 31, June 30, and September 30. No transition report was required in connection with this change.

Macroeconomic and Geopolitical Environment

Because we operate globally, our business is subject to the effects of expanded trade control laws and regulations, geopolitical conflict in and around Ukraine, the Middle East, and other areas of the world, volatility in foreign currency exchange rates relative to the U.S. dollar and the rise in interest rates.

We have been impacted by the continued expansion of trade control laws and regulations, including certain export control restrictions concerning advanced node IC production in China, the inclusion of additional Chinese technology companies on the Bureau of Industry and Security ("BIS") "Entity List" and regulations governing the sale of certain technologies. Based on our current assessments, we expect the impact of these expanded trade control laws and regulations on our business to be limited.

We also continuously monitor geopolitical conflicts around the world and their effects on our business. During the first half of fiscal 2022, due to the ongoing conflict between Russia and Ukraine and the corresponding sanctions imposed by the United States and other countries, we terminated our operations in Russia. The termination of our operations in Russia has not materially limited our ability to develop or support our products and has not had a material impact on our results of operations, financial condition, liquidity or cash flows. We do not have operations or employees in Ukraine.

More recently, the conflict in the Middle East has had an impact on our employees and our customers in that region of the world. Our assessment of the potential impact that this conflict could have on our business and our operations is ongoing.

While our business model provides some resilience against these factors, we will continue to monitor the direct and indirect impacts of these or similar circumstances on our business and financial results. For additional information on the potential impact of macroeconomic conditions on our business, see Part I, Item 1A, "Risk Factors."

Results of Operations

The discussion of our fiscal 2023 consolidated results of operations includes year-over-year comparisons to fiscal 2022 for revenue, cost of revenue, operating expenses, operating margin, other non-operating expenses, income taxes and cash flows. For a discussion of the fiscal 2022 changes compared to fiscal 2021, see the discussion in Item 7, "Management's Discussion and Analysis of Financial Condition and Results of Operations" in our Annual Report on Form 10-K for the fiscal year ended December 31, 2022, filed with the SEC on February 13, 2023.

Results of operations for fiscal 2023, as compared to fiscal 2022, reflect the following:

- Increased revenue in each of our five product categories, primarily driven by growth in revenue from our software and emulation and prototyping hardware offerings;
- Continued investment in research and development activities and technical sales support;
- Incremental costs resulting from integration of acquired businesses; and
- Gains from our investments in equity securities.

Revenue

We primarily generate revenue from licensing our software and IP, selling or leasing our emulation and prototyping hardware technology, providing maintenance for our software, hardware and IP, providing engineering and cloud services and earning royalties generated from the use of our IP. The timing of our revenue is significantly affected by the mix of software, hardware and IP products generating revenue in any given period, whether the revenue is recognized over time, or recognized at a point in time upon completion of delivery.

Recurring revenue includes revenue recognized over time from our software arrangements, services, royalties, maintenance on IP licenses and hardware, and operating leases of hardware. Recurring revenue also includes revenue recognized at varying points in time over the term of other arrangements with non-cancelable commitments, whereby the customer commits to a fixed dollar amount over a specified period of time that can be used to purchase from a list of products or services.

The remainder of our revenue is recognized at a point in time and is characterized as up-front revenue. Up-front revenue is primarily generated by our sales of emulation and prototyping hardware and individual IP licenses. The percentage of our recurring and up-front revenue and fluctuations in revenue within our geographies are impacted by delivery of hardware and IP products to our customers in any single fiscal period.

The following table shows the percentage of our revenue that is classified as recurring or up-front for fiscal 2023 and 2022:

	2023	2022
Revenue recognized over time	81 %	83 %
Revenue from arrangements with non-cancelable commitments	3 %	2 %
Recurring revenue	84 %	85 %
Up-front revenue	16 %	15 %
Total	100 %	100 %

Up-front revenue as a percentage of total revenue increased during fiscal 2023, as compared to fiscal 2022, primarily due to growth in our emulation and prototyping hardware offerings. This growth was driven by increased production capacity during fiscal 2023 to address demand for our emulation and prototyping hardware offerings.

While the percentage of revenue characterized as recurring compared to revenue characterized as up-front may vary between fiscal quarters, the overall mix of revenue was relatively consistent over the course of twelve consecutive months during both fiscal 2023 and fiscal 2022. The following table shows the percentage of recurring revenue for the twelve-month periods ended concurrently with our five most recent fiscal quarters:

	Trailing Twelve Months Ended				
	December 31, 2023	September 30, 2023	June 30, 2023	March 31, 2023	December 31, 2022
Recurring revenue	84 %	84 %	84 %	84 %	85 %
Up-front revenue	16 %	16 %	16 %	16 %	15 %
Total	100 %	100 %	100 %	100 %	100 %

Revenue by Year

The following table shows our revenue for fiscal 2023 and 2022 and the change in revenue between years:

	2023	2022	Change	
			2023 vs. 2022	
	(In millions, except percentages)			
Product and maintenance	\$ 3,834.4	\$ 3,340.2	\$ 494.2	15 %
Services	255.6	221.5	34.1	15 %
Total revenue	\$ 4,090.0	\$ 3,561.7	\$ 528.3	15 %

Product and maintenance revenue increased during fiscal 2023, as compared to fiscal 2022, primarily due to increased demand across our five product categories. This growth was driven by our customers investing in new, complex designs for their products that included the design of electronic systems for consumer, hyperscale computing, mobile, 5G communications, automotive, aerospace and defense, industrial and healthcare.

Services revenue increased during fiscal 2023, as compared to fiscal 2022, primarily due to increased revenue from our Cadence-managed cloud-based offerings, including our computational molecular modeling and simulation solution associated with our acquisition of OpenEye. Services revenue may fluctuate from period to period based on the timing of fulfillment of our services and IP performance obligations.

No one customer accounted for 10% or more of total revenue during fiscal 2023 or 2022.

Revenue by Product Category

The following table shows the percentage of product and related maintenance revenue contributed by each of our five product categories and services during fiscal 2023 and 2022:

	2023	2022
Custom IC Design and Simulation	22 %	22 %
Digital IC Design and Signoff	27 %	28 %
Functional Verification, including Emulation and Prototyping Hardware	27 %	26 %
IP	12 %	12 %
System Design and Analysis	12 %	12 %
Total	100 %	100 %

Revenue by product category fluctuates from period to period based on demand for our products and services, our available resources and our ability to deliver and support them. Certain of our licensing arrangements allow customers the ability to remix among software products. Additionally, we have arrangements with customers that include a combination of our products, with the actual product selection and number of licensed users to be determined at a later date. For these arrangements, we estimate the allocation of the revenue to product categories based upon the expected usage of our products. The actual usage of our products by these customers may differ and, if that proves to be the case, the revenue allocation in the table above would differ.

Revenue by Geography

	2023	2022	Change	
			2023 vs. 2022	
(In millions, except percentages)				
United States	\$ 1,694.5	\$ 1,577.9	\$ 116.6	7 %
Other Americas	65.3	53.1	12.2	23 %
China	679.5	521.5	158.0	30 %
Other Asia	766.4	629.5	136.9	22 %
Europe, Middle East and Africa (“EMEA”)	655.1	582.4	72.7	12 %
Japan	229.2	197.3	31.9	16 %
Total revenue	<u>\$ 4,090.0</u>	<u>\$ 3,561.7</u>	<u>\$ 528.3</u>	15 %

Revenue in each of the six geographies presented in the table above increased during fiscal 2023, as compared to fiscal 2022, primarily due to increased revenue from our software offerings, resulting from our customers’ continued investment in new, complex designs for their products. Also, during fiscal 2023, as compared to fiscal 2022, revenue growth from our emulation and prototyping hardware offerings contributed to the growth experienced in each geography, except the United States. This growth was driven by increased production capacity during fiscal 2023 to address continued demand from our customers.

Revenue by Geography as a Percent of Total Revenue

	2023	2022
United States	41 %	44 %
Other Americas	2 %	2 %
China	17 %	15 %
Other Asia	19 %	18 %
Europe, Middle East and Africa	16 %	16 %
Japan	5 %	5 %
Total	<u>100 %</u>	<u>100 %</u>

Most of our revenue is transacted in the U.S. dollar. However, certain revenue transactions are denominated in foreign currencies. For an additional description of how changes in foreign exchange rates affect our consolidated financial statements, see the discussion under Item 7A, “Quantitative and Qualitative Disclosures About Market Risk – Foreign Currency Risk.”

Cost of Revenue

	2023	2022	Change	
			2023 vs. 2022	
(In millions, except percentages)				
Cost of product and maintenance	\$ 331.8	\$ 273.6	\$ 58.2	21 %
Cost of services	103.3	98.0	5.3	5 %
Total cost of revenue	<u>\$ 435.1</u>	<u>\$ 371.6</u>	<u>\$ 63.5</u>	17 %

The following table shows cost of revenue as a percentage of related revenue for fiscal 2023 and 2022:

	2023	2022
Cost of product and maintenance	9 %	8 %
Cost of services	40 %	44 %

Cost of Product and Maintenance

Cost of product and maintenance includes costs associated with the sale and lease of our emulation and prototyping hardware and licensing of our software and IP products, certain employee salary and benefits and other employee-related costs, cost of our customer support services, amortization of technology-related and maintenance-related acquired intangibles, costs of technical documentation and royalties payable to third-party vendors. Cost of product and maintenance depends primarily on our hardware product sales in any given period, but is also affected by employee salary and benefits and other employee-related costs, reserves for inventory, and the timing and extent to which we acquire intangible assets, license third-party technology or IP, and sell our products that include such acquired or licensed assets, technology or IP.

A summary of cost of product and maintenance for fiscal 2023 and 2022 is as follows:

	2023	2022	Change	
			2023 vs. 2022	
	(In millions, except percentages)			
Product and maintenance-related costs	\$ 288.0	\$ 232.3	\$ 55.7	24 %
Amortization of acquired intangibles	43.8	41.3	2.5	6 %
Total cost of product and maintenance	\$ 331.8	\$ 273.6	\$ 58.2	21 %

Product and maintenance-related costs increased during fiscal 2023, when compared to fiscal 2022, due to the following:

	Change
	2023 vs. 2022
	(In millions)
Emulation and prototyping hardware costs	\$ 49.1
Salary, benefits and other employee-related costs	4.4
Other items	2.2
Total change in product and maintenance-related costs	\$ 55.7

Costs associated with our emulation and prototyping hardware products include components, assembly, testing, applicable reserves and overhead. These costs make our cost of emulation and prototyping hardware products higher, as a percentage of revenue, than our cost of software and IP products. The increase in emulation and prototyping hardware costs during fiscal 2023, as compared to fiscal 2022, was primarily due to increased revenue from emulation and prototyping hardware products.

Amortization of acquired intangibles included in cost of product and maintenance may fluctuate from period to period depending on the timing of newly acquired assets relative to assets becoming fully amortized in any given period.

Cost of Services

Cost of services primarily includes employee salary, benefits and other employee-related costs to perform work on revenue-generating projects and costs to maintain the infrastructure necessary to manage a services organization. Cost of services may fluctuate from period to period based on our utilization of design services engineers on revenue-generating projects rather than internal development projects.

Operating Expenses

Our operating expenses include marketing and sales, research and development, and general and administrative expenses. Factors that tend to cause our operating expenses to fluctuate include changes in the number of employees due to hiring and acquisitions, our annual mid-year promotion and pay raise cycle, stock-based compensation, foreign exchange rate movements, acquisition-related costs, volatility in variable compensation programs that are driven by operating results, and charitable donations.

Many of our operating expenses are transacted in various foreign currencies. We recognize lower expenses in periods when the U.S. dollar strengthens in value against other currencies, and we recognize higher expenses when the U.S. dollar weakens against other currencies. For an additional description of how changes in foreign exchange rates affect our consolidated financial statements, see the discussion in Item 7A, "Quantitative and Qualitative Disclosures About Market Risk – Foreign Currency Risk."

Our operating expenses for fiscal 2023 and 2022 were as follows:

	2023	2022	Change	
			2023 vs. 2022	
(In millions, except percentages)				
Marketing and sales	\$ 690.3	\$ 604.2	\$ 86.1	14 %
Research and development	1,441.8	1,251.6	190.2	15 %
General and administrative	242.4	242.1	0.3	— %
Total operating expenses	<u>\$ 2,374.5</u>	<u>\$ 2,097.9</u>	<u>\$ 276.6</u>	<u>13 %</u>

Our operating expenses, as a percentage of total revenue, for fiscal 2023 and 2022 were as follows:

	2023	2022
Marketing and sales	17 %	17 %
Research and development	35 %	35 %
General and administrative	6 %	7 %
Total operating expenses	<u>58 %</u>	<u>59 %</u>

Marketing and Sales

The changes in marketing and sales expense were due to the following:

	Change 2023 vs. 2022 (In millions)
Salary, benefits and other employee-related costs	\$ 49.4
Stock-based compensation	11.5
Facilities and other infrastructure costs	8.8
Marketing programs and events	8.5
Travel and sales meetings	6.6
Various individually insignificant items	1.3
Total change in marketing and sales expense	<u>\$ 86.1</u>

Salary, benefits and other employee-related costs and stock-based compensation included in marketing and sales expense increased during fiscal 2023, as compared to fiscal 2022, primarily due to our continued investment in attracting and retaining talent dedicated to technical sales support, including additional headcount from the acquisitions completed in both fiscal 2022 and fiscal 2023. Facilities and other infrastructure costs included in marketing and sales expense increased during fiscal 2023, as compared to fiscal 2022, primarily due to our growing workforce. Costs related to marketing programs and events, travel and sales meetings increased during fiscal 2023, as compared to fiscal 2022, primarily due to an increased number of in-person meetings and events. We expect to continue attracting and retaining talent dedicated to technical sales support through hiring and acquisitions.

Research and Development

The changes in research and development expense were due to the following:

	Change 2023 vs. 2022 (In millions)
Salary, benefits and other employee-related costs	\$ 121.9
Stock-based compensation	35.8
Facilities and other infrastructure costs	17.2
Materials and other pre-production costs	6.6
Professional services	6.4
Various individually insignificant items	2.3
Total change in research and development expense	\$ 190.2

Salary, benefits and other employee-related costs and stock-based compensation included in research and development expense increased during fiscal 2023, as compared to fiscal 2022, primarily due to our continued investment in attracting and retaining talent for research and development activities, including additional headcount from the acquisitions completed in both fiscal 2022 and fiscal 2023. Facilities and other infrastructure costs increased during fiscal 2023, as compared to fiscal 2022, primarily due to an increase in costs associated with our acquisitions and our growing work force. We expect to continue attracting and retaining talent dedicated to research and development activities through hiring and acquisitions.

General and Administrative

The changes in general and administrative expense were due to the following:

	Change 2023 vs. 2022 (In millions)
Salary, benefits and other employee-related costs	\$ 10.6
Foreign service tax	8.5
Stock-based compensation	6.3
Contributions to non-profit organizations	(15.1)
Legal fees and related costs	(15.6)
Various individually insignificant items	5.6
Total change in general and administrative expense	\$ 0.3

Salary, benefits and other employee-related costs and stock-based compensation included in general and administrative expense increased during fiscal 2023, as compared to fiscal 2022, primarily due to additional headcount. Also, during fiscal 2023, as compared to fiscal 2022, we experienced an increase in foreign service tax, primarily because we did not benefit from any foreign service tax refunds as we did during fiscal 2022.

During fiscal 2023, as compared to fiscal 2022, contributions to non-profit organizations decreased, primarily due to the timing of our periodic contributions to support charitable initiatives, including the Cadence Giving Foundation. Also, during fiscal 2023, as compared to fiscal 2022, we experienced a decrease in legal fees and related costs primarily due to non-recurring legal services and legal matters that were active during fiscal 2022 and are now resolved.

Amortization of Acquired Intangibles

Amortization of acquired intangibles consists primarily of amortization of customer relationships, acquired backlog, trade names, trademarks and patents. Amortization in any given period depends primarily on the timing and extent to which we acquire intangible assets.

	2023	2022	Change 2023 vs. 2022
	(In millions, except percentages)		
Amortization of acquired intangibles	\$ 18.2	\$ 18.5	\$ (0.3) (2)%

Amortization of acquired intangibles decreased during fiscal 2023, as compared to fiscal 2022, primarily due to certain intangible assets becoming fully amortized, partially offset by amortization from intangible assets acquired with our fiscal 2023 and fiscal 2022 acquisitions.

Restructuring and Other Charges

We have initiated restructuring plans in recent years, most recently in fiscal 2023, to better align our resources with our business strategy. Because the restructuring charges and related benefits are derived from management's estimates made during the formulation of the restructuring plans, based on then-currently available information, our restructuring plans may not achieve the benefits anticipated on the timetable or at the level contemplated. Additional actions, including further restructuring of our operations, may be required in the future. For additional information about our restructuring plans, see Note 11 in the notes to consolidated financial statements.

Operating margin

Operating margin represents income from operations as a percentage of total revenue. Our operating margin for fiscal 2023 and 2022 was as follows:

	2023	2022
Operating margin	31 %	30 %

Operating margin increased during fiscal 2023, as compared to fiscal 2022, primarily because revenue growth in each of our five product categories exceeded growth in operating expenses.

Interest Expense

Interest expense for fiscal 2023 and 2022 was comprised of the following:

	2023	2022
	(In millions)	
Contractual cash interest expense:		
2024 Notes	\$ 15.3	\$ 15.3
2025 Term Loan	17.7	4.1
Revolving credit facility	2.0	2.8
Amortization of debt discount:		
2024 Notes	0.9	0.9
2025 Term Loan	0.2	—
Other	0.1	(0.2)
Total interest expense	\$ 36.2	\$ 22.9

Interest expense increased during fiscal 2023, as compared to fiscal 2022, primarily due to the fact that borrowings under our 2025 Term Loan were outstanding for the full year during fiscal 2023, and only a partial year during fiscal 2022. For an additional description of our debt arrangements, including our 2025 Term Loan, see Note 5 in the notes to consolidated financial statements.

Other Income (Expense), Net

Other income (expense), net consists primarily of interest earned on cash, cash equivalents and investments in debt securities, realized and unrealized gains and losses from our investments in equity securities of other companies and foreign exchange gains and losses. Other income (expense), net increased during fiscal 2023, as compared to fiscal 2022, primarily due to unrealized gains from our investments in equity securities of publicly held companies and increased interest earned from deposits. For additional information about other income (expense), net, see Note 12 in the notes to consolidated financial statements.

Income Taxes

The following table presents the provision for income taxes and the effective tax rate for fiscal 2023 and 2022:

	2023	2022
	(In millions, except percentages)	
Provision for income taxes	\$ 240.8	\$ 196.4
Effective tax rate	18.8 %	18.8 %

The United States enacted the Tax Cuts and Jobs Act in December 2017, which requires companies to capitalize all of their R&D costs, including software development costs, incurred in tax years beginning after December 31, 2021. Beginning in fiscal 2022, we began capitalizing and amortizing R&D costs over five years for domestic research and fifteen years for international research rather than expensing these costs as incurred. As a result, our fiscal 2023 and 2022 effective tax rates and our cash tax payments increased significantly as compared to fiscal 2021. We also recognized increases to our deferred tax assets as we begin to capitalize domestic research costs.

Our provision for income taxes for fiscal 2023 was primarily attributable to federal, state and foreign income taxes on our fiscal 2023 income, partially offset by the tax benefit of \$54.0 million related to stock-based compensation that vested or was exercised during the period. We also recognized a tax benefit of \$24.8 million due to the recognition of previously unrecognized federal tax benefits from the expiration of the applicable statute of limitations and a tax benefit of \$14.0 million primarily related to a change in R&D expenses that were capitalized in fiscal 2022.

Our provision for income taxes for fiscal 2022 was primarily attributable to federal, state and foreign income taxes on our fiscal 2022 income, partially offset by the tax benefit of \$42.1 million related to stock-based compensation that vested or was exercised during the period. We also recognized a tax benefit of \$68.7 million related to the release of the valuation allowance on our California R&D tax credits because we expect to utilize these tax credits based on strong current earnings and future taxable income projections.

In 2021, the OECD announced Pillar Two Model Rules which call for the taxation of large multinational corporations, such as Cadence, at a minimum rate of 15%. Many non-U.S. tax jurisdictions have either recently enacted legislation to adopt certain components of the Pillar Two Model Rules beginning in 2024 (including the European Union Member States such as Ireland and Hungary) with the adoption of additional components in later years or announced their plans to enact legislation in future years. We are continuing to evaluate the impacts of enacted legislation and pending legislation to enact Pillar Two Model Rules in the non-U.S. tax jurisdictions in which we operate.

Our future effective tax rates may also be materially impacted by tax amounts associated with our foreign earnings at rates different from the United States federal statutory rate, research credits, the tax impact of stock-based compensation, accounting for uncertain tax positions, business combinations, closure of statutes of limitations or settlement of tax audits and changes in tax law. A significant amount of our foreign earnings is generated by our subsidiaries organized in Ireland and Hungary. Our future effective tax rates may be adversely affected if our earnings were to be lower in countries where we have lower statutory tax rates. We currently expect that our fiscal 2024 effective tax rate will be approximately 23.0%. We expect that our quarterly effective tax rates will vary from our fiscal 2024 effective tax rate as a result of recognizing the income tax effects of stock-based awards in the quarterly periods that the awards vest or are settled and other items that we cannot anticipate. For additional discussion about how our effective tax rate could be affected by various risks, see Part I, Item 1A, "Risk Factors." For further discussion regarding our income taxes, see Note 8 in the notes to consolidated financial statements.

Liquidity and Capital Resources

	As of		Change
	December 31, 2023	December 31, 2022	2023 vs. 2022
	(In millions)		
Cash and cash equivalents	\$ 1,008.2	\$ 882.3	\$ 125.9
Net working capital	385.4	359.1	26.3

Cash and Cash Equivalents

As of December 31, 2023, our principal sources of liquidity consisted of \$1,008.2 million of cash and cash equivalents as compared to \$882.3 million as of December 31, 2022.

Our primary sources of cash and cash equivalents during fiscal 2023 were cash generated from operations, proceeds from the issuance of common stock resulting from stock purchases under our employee stock purchase plan and stock options exercised during the year, proceeds from the sale of investments, and proceeds from our revolving credit facility.

Our primary uses of cash and cash equivalents during fiscal 2023 were payments related to employee salaries and benefits, operating expenses, repurchases of our common stock, purchases of inventory, payments for income taxes, cash paid for acquired businesses, payments on our revolving credit facility, purchases of investments, payment of employee taxes on vesting of restricted stock and purchases of property, plant and equipment.

Approximately 55% of our cash and cash equivalents was held by our foreign subsidiaries as of December 31, 2023. Our cash and cash equivalents held by our foreign subsidiaries may vary from period to period due to the timing of collections and repatriation of foreign earnings. We expect that current cash and cash equivalent balances and cash flows that are generated from operations and financing activities will be sufficient to meet the needs of our domestic and international operating activities and other capital and liquidity requirements, including acquisitions, investments and share repurchases, for at least the next 12 months and thereafter for the foreseeable future.

Net Working Capital

Net working capital is comprised of current assets less current liabilities, as shown on our consolidated balance sheets. The increase in our net working capital as of December 31, 2023, as compared to December 31, 2022, is primarily due to the timing of cash receipts from customers and disbursements made for operating and financing activities, offset by our 2024 Notes being classified as current liabilities as of December 31, 2023.

Cash Flows from Operating Activities

Cash flows from operating activities during fiscal 2023 and 2022 were as follows:

	2023	2022	Change 2023 vs. 2022
	(In millions)		
Cash provided by operating activities	\$ 1,349.2	\$ 1,241.9	\$ 107.3

Cash flows provided by operating activities include net income, adjusted for certain non-cash items, as well as changes in the balances of certain assets and liabilities. Our cash flows from operating activities are significantly influenced by business levels and the payment terms set forth in our customer agreements. The increase in cash flows from operating activities during fiscal 2023, as compared to fiscal 2022, was primarily due to improved results from operations, the timing of cash receipts from customers and the timing of cash disbursements.

Cash Flows Used for Investing Activities

Cash flows used for investing activities during fiscal 2023 and 2022 were as follows:

	2023	2022	Change 2023 vs. 2022
	(In millions)		
Cash used for investing activities	\$ (412.2)	\$ (738.6)	\$ 326.4

Cash used for investing activities decreased during fiscal 2023, as compared to fiscal 2022, primarily due to a decrease in cash used for business combinations, partially offset by an increase in cash used for investments in equity and debt securities. We expect to continue our investing activities, including purchasing property, plant and equipment, purchasing intangible assets, acquiring other companies and businesses, and making investments.

Cash Flows Used for Financing Activities

Cash flows used for financing activities during fiscal 2023 and 2022 were as follows:

	2023	2022	Change 2023 vs. 2022
	(In millions)		
Cash used for financing activities	\$ (803.6)	\$ (657.0)	\$ (146.6)

Cash used for financing activities increased during fiscal 2023, as compared to fiscal 2022, primarily due to a decrease in proceeds from debt, partially offset by a decrease in payments for repurchases of our common stock.

Other Factors Affecting Liquidity and Capital Resources

Stock Repurchase Program

In August 2023, our Board of Directors increased the prior authorization to repurchase shares of our common stock by authorizing an additional \$1.0 billion. The actual timing and amount of repurchases are subject to business and market conditions, corporate and regulatory requirements, stock price, acquisition opportunities and other factors. As of December 31, 2023, approximately \$1.4 billion of the share repurchase authorization remained available to repurchase shares of our common stock. See Part II, Item 5, "Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities" for additional information on share repurchases.

Revolving Credit Facility

In June 2021, we entered into a five-year senior unsecured revolving credit facility with a group of lenders led by Bank of America, N.A., as administrative agent, as amended in September 2022 (the “2021 Credit Facility”). The 2021 Credit Facility provides for borrowings up to \$700.0 million, with the right to request increased capacity up to an additional \$350.0 million upon receipt of lender commitments, for total maximum borrowings of \$1.05 billion. The 2021 Credit Facility expires on June 30, 2026. Any outstanding loans drawn under the 2021 Credit Facility are due at maturity on June 30, 2026, subject to an option to extend the maturity date. Outstanding borrowings may be repaid at any time prior to maturity. Interest rates associated with the 2021 Credit Facility are variable, so interest expense is impacted by changes in the interest rates, particularly for periods when there are outstanding borrowings under the revolving credit facility. Interest is payable quarterly. As of December 31, 2023, there were no borrowings outstanding under the 2021 Credit Facility, and we were in compliance with all financial covenants associated with such credit facility.

2024 Notes

In October 2014, we issued \$350.0 million aggregate principal amount of 4.375% Senior Notes due October 15, 2024 (the “2024 Notes”). We received net proceeds of \$342.4 million from the issuance of the 2024 Notes, net of a discount of \$1.4 million and issuance costs of \$6.2 million. Interest is payable in cash semi-annually. The 2024 Notes are unsecured and rank equal in right of payment to all of our existing and future senior indebtedness. As of December 31, 2023, the net balance of the 2024 Notes of \$349.3 million was classified as a current liability on our consolidated balance sheet.

2025 Term Loan

In September 2022, we entered into a \$300.0 million three-year senior non-amortizing term loan facility due on September 7, 2025, with a group of lenders led by Bank of America, N.A., as administrative agent (the “2025 Term Loan”). The 2025 Term Loan is unsecured and ranks equal in right of payment to all of our unsecured indebtedness. Interest rates associated with the 2025 Term Loan are variable, so interest expense is impacted by changes in interest rates. Interest is payable quarterly. As of December 31, 2023, we were in compliance with all financial covenants associated with the 2025 Term Loan.

For additional information relating to our debt arrangements, see Note 5 in the notes to consolidated financial statements.

Other Liquidity Requirements

A summary of other capital and liquidity requirements as of December 31, 2023, is as follows:

	Total	Due in Less Than 1 Year
	(In millions)	
Operating lease obligations	\$ 177.4	\$ 45.3
Purchase obligations	107.4	68.7
Contractual interest payments ⁽¹⁾	48.3	34.6
Income tax payable	24.5	24.5
Other long-term contractual obligations ⁽²⁾	69.5	—
Total	<u>\$ 427.1</u>	<u>\$ 173.1</u>

⁽¹⁾ Contractual interest payments on our variable rate indebtedness were calculated based on outstanding borrowings and the weighted average interest rates as of December 31, 2023.

⁽²⁾ Included in other long-term contractual obligations are long-term income tax liabilities of \$38.6 million related to unrecognized tax benefits. The remaining portion of other long-term contractual obligations is primarily liabilities associated with defined benefit retirement plans and acquisitions.

We expect that current cash and cash equivalent balances, cash flows that are generated from operations and financing activities will be sufficient to meet the needs of our domestic and international operating activities, and other capital and liquidity requirements, including acquisitions, payments on our 2024 Notes and share repurchases for at least the next 12 months and thereafter for the foreseeable future.

As of December 31, 2023, we did not have any significant off-balance sheet arrangements that are reasonably likely to have a material current or future effect on our operating results or financial condition.

Critical Accounting Estimates

In preparing our consolidated financial statements, we make assumptions, judgments and estimates that can have a significant impact on our revenue, operating income and net income, as well as on the value of certain assets and liabilities on our consolidated balance sheets. We base our assumptions, judgments and estimates on historical experience and various other factors that we believe to be reasonable under the circumstances. Actual results could differ materially from these estimates under different assumptions or conditions. At least quarterly, we evaluate our assumptions, judgments and estimates, and make changes as deemed necessary.

We believe that the assumptions, judgments and estimates involved in revenue recognition, the accounting for income taxes and business combinations have the greatest potential impact on our consolidated financial statements; therefore, we consider these to be our critical accounting estimates. For information on our significant accounting policies, see Note 2 in the notes to consolidated financial statements.

Revenue Recognition

Our contracts with customers often include promises to transfer multiple software and/or IP licenses, hardware and services, including professional services, technical support services, and rights to unspecified updates to a customer. These contracts require us to apply judgment in identifying and evaluating any terms and conditions in contracts which may impact revenue recognition. Determining whether licenses and services are distinct performance obligations that should be accounted for separately, or not distinct and thus accounted for together, requires significant judgment. In some arrangements, such as most of our IP license arrangements, we have concluded that the licenses and associated services are distinct from each other. In other arrangements, like our time-based software arrangements, the licenses and certain services are not distinct from each other. Our time-based software arrangements include multiple software licenses and updates to the licensed software products, as well as technical support, and we have concluded that these promised goods and services are a single, combined performance obligation.

Judgment is required to determine the stand-alone selling prices ("SSPs") for each distinct performance obligation. We rarely license or sell products on a standalone basis, so we are required to estimate the SSP for each performance obligation. In instances where the SSP is not directly observable because we do not sell the license, product or service separately, we determine the SSP using information that may include market conditions and other observable inputs. We typically have more than one SSP for individual performance obligations due to the stratification of those items by classes of customers and circumstances. In these instances, we may use information such as the size of the customer and geographic region of the customer in determining the SSP.

Revenue is recognized over time for our combined performance obligations that include software licenses, updates, and technical support as well as for maintenance and professional services that are separate performance obligations. For our professional services, revenue is recognized over time, generally using costs incurred or hours expended to measure progress. Judgment is required in estimating project status and the costs necessary to complete projects. A number of internal and external factors can affect these estimates, including labor rates, utilization and efficiency variances and specification and testing requirement changes. For our other performance obligations recognized over time, revenue is generally recognized using a time-based measure of progress reflecting generally consistent efforts to satisfy those performance obligations throughout the arrangement term.

If a group of agreements are so closely related that they are, in effect, part of a single arrangement, such agreements are deemed to be one arrangement for revenue recognition purposes. We exercise significant judgment to evaluate the relevant facts and circumstances in determining whether the separate agreements should be accounted for separately or as, in substance, a single arrangement. Our judgments about whether a group of contracts comprise a single arrangement can affect the allocation of consideration to the distinct performance obligations, which could have an effect on results of operations for the periods involved.

We are required to estimate the total consideration expected to be received from contracts with customers. In some circumstances, the consideration expected to be received is variable based on the specific terms of the contract or based on our expectations of the term of the contract. Generally, we have not experienced significant returns or refunds to customers. These estimates require significant judgment and the change in these estimates could have an effect on our results of operations during the periods involved.

Accounting for Income Taxes

We are subject to income taxes in the United States and numerous foreign jurisdictions. Significant judgment is required in evaluating and estimating our provision for these taxes. There are many transactions that occur during the ordinary course of business for which the ultimate tax determination is uncertain. Our provision for income taxes could be adversely affected by our earnings being lower than anticipated in countries where we have lower statutory rates and higher than anticipated in countries where we have higher statutory rates, losses incurred in jurisdictions for which we are not able to realize the related tax benefit, changes in foreign currency exchange rates, entry into new businesses and geographies and changes to our existing businesses, acquisitions and investments, changes in our deferred tax assets and liabilities including changes in our assessment of valuation allowances, changes in the relevant tax laws or interpretations of these tax laws, and developments in current and future tax examinations.

We only recognize the tax benefit of an income tax position if we judge that it is more likely than not that the tax position will be sustained, solely on its technical merits, in a tax audit including resolution of any related appeals or litigation processes. To make this judgment, we must interpret complex and sometimes ambiguous tax laws, regulations and administrative practices. If we judge that an income tax position meets this recognition threshold, then we must measure the amount of the tax benefit to be recognized by estimating the largest amount of tax benefit that has a greater than 50% cumulative probability of being realized upon settlement with a taxing authority that has full knowledge of all of the relevant facts. It is inherently difficult and subjective to estimate such amounts, as this requires us to determine the probability of various possible settlement outcomes. We must reevaluate our income tax positions on a quarterly basis to consider factors such as changes in facts or circumstances, changes in tax law, effectively settled issues under audit, the lapse of applicable statute of limitations, and new audit activity. Such a change in recognition or measurement would result in recognition of a tax benefit or an additional charge to the tax provision. For a more detailed description of our unrecognized tax benefits, see Note 8 in the notes to consolidated financial statements.

Business Combinations

When we acquire businesses, we allocate the purchase price to the acquired tangible assets and assumed liabilities, including deferred revenue, liabilities associated with the fair value of contingent consideration and acquired identifiable intangible assets. Any residual purchase price is recorded as goodwill. The allocation of the purchase price requires us to make significant estimates in determining the fair values of these acquired assets and assumed liabilities, especially with respect to intangible assets and goodwill. These estimates are based on information obtained from management of the acquired companies, our assessment of this information, and historical experience. These estimates can include, but are not limited to, the cash flows that an acquired business is expected to generate in the future, the cash flows that specific assets acquired with that business are expected to generate in the future, the appropriate weighted average cost of capital, and the cost savings expected to be derived from acquiring an asset. These estimates are inherently uncertain and unpredictable, and if different estimates were used, the purchase price for the acquisition could be allocated to the acquired assets and assumed liabilities differently from the allocation that we have made to the acquired assets and assumed liabilities. In addition, unanticipated events and circumstances may occur that may affect the accuracy or validity of such estimates, and if such events occur, we may be required to adjust the value allocated to acquired assets or assumed liabilities.

We also make significant judgments and estimates when we assign useful lives to the definite-lived intangible assets identified as part of our acquisitions. These estimates are inherently uncertain and if we used different estimates, the useful life over which we amortize intangible assets would be different. In addition, unanticipated events and circumstances may occur that may impact the useful life assigned to our intangible assets, which would impact our amortization of intangible assets expense and our results of operations.

During fiscal 2023, we acquired intangible assets of \$41.0 million. The fair value of the intangible assets acquired was determined using variations of the income approach that utilizes unobservable inputs classified as Level 3 measurements.

For existing technology, the fair value was determined by applying the relief-from-royalty method. This method is based on the application of a royalty rate to forecasted revenue to quantify the benefit of owning the intangible asset rather than paying a royalty for use of the asset. To estimate royalty savings over time, we projected revenue from the acquired existing technology over the estimated remaining life of the technology, including the effect of assumed technological obsolescence, before applying an assumed royalty rate. We assumed technological obsolescence at rates between 10% and 13% annually, before applying an assumed royalty rate between 25% and 30%.

For agreements and relationships, the fair value was determined by using the multi-period excess earnings method. This method reflects the present value of the projected cash flows that are expected to be generated from existing customers, less charges representing the contribution of other assets to those cash flows. Projected income from existing customer relationships was determined using customer retention rates between 70% and 90%. The present value of operating cash flows from existing customers was determined using discount rates between 12% and 15%.

We believe that our estimates and assumptions related to the fair value of our acquired intangible assets are reasonable, but significant judgment is involved.

New Accounting Standards

For additional information about the adoption of new accounting standards, see Note 2 in the notes to consolidated financial statements.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk

Foreign Currency Risk

A material portion of our revenue, expenses and business activities are transacted in the U.S. dollar. In certain foreign countries where we price our products and services in U.S. dollars, a decrease in value of the local currency relative to the U.S. dollar results in an increase in the prices for our products and services compared to those products of our competitors that are priced in local currency. This could result in our prices being uncompetitive in certain markets.

In certain countries where we may invoice customers in the local currency, our revenue benefits from a weaker dollar and is adversely affected by a stronger dollar. The opposite impact occurs in countries where we record expenses in local currencies. In those cases, our costs and expenses benefit from a stronger dollar and are adversely affected by a weaker dollar. The fluctuations in our operating expenses outside the United States resulting from volatility in foreign exchange rates are not generally moderated by corresponding fluctuations in revenue from existing contracts.

We enter into foreign currency forward exchange contracts to protect against currency exchange risks associated with existing assets and liabilities. A foreign currency forward exchange contract acts as a hedge by increasing in value when underlying assets decrease in value or underlying liabilities increase in value due to changes in foreign exchange rates. Conversely, a foreign currency forward exchange contract decreases in value when underlying assets increase in value or underlying liabilities decrease in value due to changes in foreign exchange rates. These forward contracts are not designated as accounting hedges, so the unrealized gains and losses are recognized in other income (expense), net, in advance of the actual foreign currency cash flows with the fair value of these forward contracts being recorded as accrued liabilities or other current assets.

We do not use forward contracts for trading purposes. Our forward contracts generally have maturities of 90 days or less. We enter into foreign currency forward exchange contracts based on estimated future asset and liability exposures, and the effectiveness of our hedging program depends on our ability to estimate these future asset and liability exposures. Recognized gains and losses with respect to our current hedging activities will ultimately depend on how accurately we are able to match the amount of foreign currency forward exchange contracts with actual underlying asset and liability exposures.

The following table provides information about our foreign currency forward exchange contracts as of December 31, 2023. The information is provided in U.S. dollar equivalent amounts. The table presents the notional amounts, at contract exchange rates, and the weighted average contractual foreign currency exchange rates expressed as units of the foreign currency per U.S. dollar, which in some cases may not be the market convention for quoting a particular currency. All of these forward contracts mature during February 2024.

	Notional Principal (In millions)	Weighted Average Contract Rate
Forward Contracts:		
European Union euro	\$ 162.1	0.92
British pound	158.2	0.80
Japanese yen	111.2	146.46
Swedish krona	69.9	10.72
Israeli shekel	57.6	3.73
South Korean won	40.6	1,304.45
Indian rupee	34.4	83.47
Canadian dollar	34.1	1.37
Chinese renminbi	16.3	7.12
Taiwan dollar	11.8	30.95
Singapore dollar	1.7	1.33
Total	<u>\$ 697.9</u>	
Estimated fair value	<u>\$ 9.3</u>	

As of December 31, 2022, our foreign currency exchange contracts had an aggregate principal amount of \$489.0 million, and an estimated fair value of \$5.3 million.

We have performed sensitivity analyses as of December 31, 2023, and December 31, 2022, using a modeling technique that measures the change in the fair values arising from a hypothetical 10% change in the value of the U.S. dollar relative to applicable foreign currency exchange rates, with all other variables held constant. The foreign currency exchange rates we used in performing the sensitivity analysis were based on market rates in effect at each respective date. The sensitivity analyses indicated that a hypothetical 10% decrease in the value of the U.S. dollar would result in a decrease to the fair value of our foreign currency forward exchange contracts of \$18.4 million and \$4.2 million as of December 31, 2023 and December 31, 2022, respectively, while a hypothetical 10% increase in the value of the U.S. dollar would result in an increase to the fair value of our foreign currency forward exchange contracts of \$20.4 million and \$7.2 million as of December 31, 2023 and December 31, 2022, respectively.

We actively monitor our foreign currency risks, but our foreign currency hedging activities may not substantially offset the impact of fluctuations in currency exchange rates on our results of operations, cash flows and financial position.

Interest Rate Risk

Our exposure to market risk for changes in interest rates relates primarily to our portfolio of cash, cash equivalents, investments in debt securities and any balances outstanding on our 2021 Credit Facility and 2025 Term Loan. We are exposed to interest rate fluctuations in many of the world's leading industrialized countries, but our interest income and expense is most sensitive to fluctuations in the general level of United States interest rates. In this regard, changes in United States interest rates affect the interest earned on our cash and cash equivalents and the costs associated with foreign currency hedges.

Our investments in debt securities had a fair value of approximately \$49.8 million as of December 31, 2023, which may decline in value if market interest rates rise. Such variability in market interest rates may result in a negative impact on the results of our investment activities. As of December 31, 2023, an increase in the market rates of interest of 1% would result in a decrease in the fair values of our marketable debt securities by approximately \$2.6 million. As of December 31, 2022, we did not hold investments in debt securities.

Interest rates under our 2021 Credit Facility and 2025 Term Loan are variable, so interest expense could be adversely affected by changes in interest rates, particularly for periods when we maintain a balance outstanding under the revolving credit facility. As of December 31, 2023, there were no borrowings outstanding under our 2021 Credit Facility and \$300.0 million of borrowings outstanding under our 2025 Term Loan.

Interest rates for our 2021 Credit Facility and 2025 Term Loan can fluctuate based on changes in market interest rates and in interest rate margins that vary based on the credit ratings of our unsecured debt. Assuming all loans were fully drawn and we were to fully exercise our right to increase borrowing capacity under our 2021 Credit Facility and made no prepayments on our 2025 Term Loan, each quarter point change in interest rates would result in a \$3.4 million change in annual interest expense on our indebtedness under our 2021 Credit Facility and 2025 Term Loan. For an additional description of the 2021 Credit Facility and 2025 Term Loan, see Note 5 in the notes to consolidated financial statements.

Equity Price Risk

Equity Investments

We have a portfolio of equity investments that includes marketable equity securities and non-marketable investments. Our equity investments are made primarily in connection with our strategic investment program. Under our strategic investment program, from time to time, we make cash investments in companies with technologies that are potentially strategically important to us. See Note 14 in the notes to consolidated financial statements for an additional description of these investments.

Item 8. Financial Statements and Supplementary Data

The financial statements required by Item 8 are submitted as a separate section of this Annual Report. See Part IV, Item 15, "Exhibits and Financial Statement Schedules."

Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure

None.

Item 9A. Controls and Procedures

Evaluation of Disclosure Controls and Procedures

As required by Rule 13a-15 of the Securities Exchange Act of 1934, as amended (the "Exchange Act") under the supervision and with the participation of our management, including our Chief Executive Officer ("CEO") and our Chief Financial Officer ("CFO"), we evaluated the effectiveness of the design and operation of our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act) as of December 31, 2023.

Based on their evaluation our CEO and CFO have concluded that, as of December 31, 2023, our disclosure controls and procedures were effective to provide reasonable assurance that the information required to be disclosed by us in our reports filed or submitted under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms and is accumulated and communicated to our management, including the CEO and CFO, as appropriate to allow timely decisions regarding required disclosure.

Changes in Internal Control Over Financial Reporting

There were no changes in our internal control over financial reporting during the fiscal quarter ended December 31, 2023, that materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Inherent Limitations on Effectiveness of Controls

Our management, including our CEO and CFO, does not expect that our disclosure controls and procedures or our internal control over financial reporting will prevent or detect all errors and all fraud. Internal control over financial reporting, no matter how well conceived and operated, can provide only reasonable, not absolute, assurance that the objectives of internal control are met. Further, the design of internal control must reflect the fact that there are resource constraints, and the benefits of the control must be considered relative to their costs. While our disclosure controls and procedures and internal control over financial reporting are designed to provide reasonable assurance of their effectiveness, because of the inherent limitations in all control systems, no evaluation of controls can provide absolute assurance that all control issues and instances of fraud, if any, within Cadence, have been detected.

Management's Report on Internal Control Over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting (as defined in Rule 13a-15(f) under the Exchange Act). Our management assessed the effectiveness of our internal control over financial reporting as of December 31, 2023. In making this assessment, our management used the criteria established in *Internal Control-Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission ("COSO"). Our management has concluded that, as of December 31, 2023, our internal control over financial reporting is effective based on these criteria. Our independent registered public accounting firm, PricewaterhouseCoopers LLP, has issued an attestation report on our internal control over financial reporting, which is included in Part IV, Item 15, "Exhibits and Financial Statement Schedules."

Item 9B. Other Information

Insider Trading Arrangements

During the fiscal quarter ended December 31, 2023, our directors and officers (as defined in Rule 16a-1(f) under the Exchange Act) adopted or terminated the contracts, instructions or written plans for the purchase or sale of our securities set forth in the table below.

Name and Position	Action	Adoption/ Termination Date	Type of Trading Arrangement	Total Shares of Common Stock to be Sold	Expiration Date
			Rule 10b5-1*		
Thomas P. Beckley, Senior Vice President and General Manager of the Custom IC and PCB Group	Adoption	10/26/2023	X	Up to 65,615	2/14/2025

* Contract, instruction or written plan intended to satisfy the affirmative defense conditions of Rule 10b5-1(c) under the Exchange Act.

Item 9C. Disclosure Regarding Foreign Jurisdictions that Prevent Inspections

Not applicable.

PART III.

Item 10. Directors, Executive Officers and Corporate Governance

The information required by Item 10 as to directors is incorporated herein by reference from the sections entitled “Proposal 1 - Election of Directors” and, as applicable, “Security Ownership of Certain Beneficial Owners and Management - Delinquent Section 16(a) Reports” in Cadence’s definitive proxy statement for its 2024 Annual Meeting of Stockholders. The executive officers of Cadence are listed at the end of Item 1 of Part I of this Annual Report.

The information required by Item 10 as to Cadence’s code of ethics is incorporated herein by reference from the section entitled “Corporate Governance - Code of Business Conduct” in Cadence’s definitive proxy statement for its 2024 Annual Meeting of Stockholders.

The information required by Item 10 as to the director nomination process and Cadence’s Audit Committee is incorporated by reference from the section entitled “Board of Directors - Committees of the Board” in Cadence’s definitive proxy statement for its 2024 Annual Meeting of Stockholders.

Item 11. Executive Compensation

The information required by Item 11 is incorporated herein by reference from the sections entitled “Board of Directors - Components of Director Compensation,” “Board of Directors - Director Compensation for Fiscal 2023,” “Compensation Discussion and Analysis,” “Compensation Committee Report,” “Compensation Committee Interlocks and Insider Participation,” “Compensation of Executive Officers,” “Potential Payments Upon Termination or Change In Control” and “Pay Ratio Disclosure” in Cadence’s definitive proxy statement for its 2024 Annual Meeting of Stockholders.

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters

The information required by Item 12 is incorporated herein by reference from the sections entitled “Security Ownership of Certain Beneficial Owners and Management” and “Equity Compensation Plan Information” in Cadence’s definitive proxy statement for its 2024 Annual Meeting of Stockholders.

Item 13. Certain Relationships and Related Transactions and Director Independence

The information required by Item 13 is incorporated herein by reference from the sections entitled “Certain Transactions” and “Board of Directors - Director Independence” in Cadence’s definitive proxy statement for its 2024 Annual Meeting of Stockholders.

Item 14. Principal Accountant Fees and Services

The information required by Item 14 is incorporated herein by reference from the section entitled “Fees Billed to Cadence by the Independent Registered Public Accounting Firm During Fiscal 2023 and 2022” in Cadence’s definitive proxy statement for its 2024 Annual Meeting of Stockholders.

PART IV.

Item 15. Exhibits and Financial Statement Schedules

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(a) 2. Financial Statement Schedules	
All financial statement schedules are omitted because they are not applicable, not required or the required information is shown in the consolidated financial statements or notes thereto.	
(a) 3. Exhibits	91

The exhibits listed in the accompanying Exhibit Index are filed or incorporated by reference as part of this Annual Report.

The exhibits filed or incorporated by reference as part of this Annual Report contain agreements to which Cadence is a party. These agreements are included to provide information regarding their terms and are not intended to provide any other factual or disclosure information about Cadence or the other parties to the agreements. Certain of the agreements contain representations and warranties by each of the parties to the applicable agreement, and any such representations and warranties have been made solely for the benefit of the other parties to the applicable agreement as of specified dates, may apply materiality standards that are different than those applied by investors, and may be subject to important qualifications and limitations that are not necessarily reflected in the agreement. Accordingly, these representations and warranties may not describe the actual state of affairs as of the date they were made or at any other time and should not be relied upon as statements of factual information.

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Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of Cadence Design Systems, Inc.

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheets of Cadence Design Systems, Inc. and its subsidiaries (the "Company") as of December 31, 2023 and 2022, and the related consolidated statements of income, of comprehensive income, of stockholders' equity and of cash flows for each of the three years in the period ended December 31, 2023, including the related notes (collectively referred to as the "consolidated financial statements"). We also have audited the Company's internal control over financial reporting as of December 31, 2023, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Company as of December 31, 2023 and 2022, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2023 in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2023, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the COSO.

Basis for Opinions

The Company's management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in Management's Report on Internal Control Over Financial Reporting appearing under Item 9A. Our responsibility is to express opinions on the Company's consolidated financial statements and on the Company's internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

Our audits of the consolidated financial statements included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

Definition and Limitations of Internal Control over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Critical Audit Matters

The critical audit matter communicated below is a matter arising from the current period audit of the consolidated financial statements that was communicated or required to be communicated to the audit committee and that (i) relates to accounts or disclosures that are material to the consolidated financial statements and (ii) involved our especially challenging, subjective, or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matter below, providing a separate opinion on the critical audit matter or on the accounts or disclosures to which it relates.

Revenue Recognition – Identifying and Evaluating Terms and Conditions in Contracts

As described in Note 2 and Note 3 to the consolidated financial statements, the Company enters into contracts that can include various combinations of licenses, products, and services, some of which are distinct and are accounted for as separate performance obligations. For contracts with multiple performance obligations, management allocates the transaction price of the contract to each performance obligation and recognizes revenue upon transfer of control of promised products or services to customers. Management applies judgment in identifying and evaluating any terms and conditions in contracts which may impact revenue recognition. For the year ended December 31, 2023, the Company's total revenue was \$4.090 billion.

The principal considerations for our determination that performing procedures relating to revenue recognition, specifically the identification and evaluation of terms and conditions in contracts, is a critical audit matter are the significant judgment by management in identifying and evaluating terms and conditions in contracts that impact revenue recognition, which in turn led to a high degree of auditor judgment, subjectivity and effort in performing procedures and evaluating whether terms and conditions in contracts were appropriately identified and evaluated by management.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included testing the effectiveness of controls relating to the revenue recognition process, including controls related to the identification and evaluation of terms and conditions in contracts that impact revenue recognition. These procedures also included, among others (i) testing management's process of identifying and evaluating the terms and conditions in contracts, including management's determination of the impact of those terms and conditions on revenue recognition and (ii) testing the completeness and accuracy of management's identification and evaluation of the terms and conditions in contracts by examining revenue arrangements on a test basis.

/s/ PricewaterhouseCoopers LLP

San Jose, California
February 13, 2024

We have served as the Company's auditor since 2020.

CADENCE DESIGN SYSTEMS, INC.
CONSOLIDATED BALANCE SHEETS
December 31, 2023 and December 31, 2022
(In thousands, except par value)

	As of	
	December 31, 2023	December 31, 2022
ASSETS		
Current assets:		
Cash and cash equivalents	\$ 1,008,152	\$ 882,325
Receivables, net	489,224	486,710
Inventories	181,661	128,005
Prepaid expenses and other	297,180	209,727
Total current assets	1,976,217	1,706,767
Property, plant and equipment, net	403,213	371,451
Goodwill	1,535,845	1,374,268
Acquired intangibles, net	336,843	354,617
Deferred taxes	880,001	853,691
Other assets	537,372	476,277
Total assets	\$ 5,669,491	\$ 5,137,071
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Revolving credit facility	\$ —	\$ 100,000
Current portion of long-term debt	349,285	—
Accounts payable and accrued liabilities	576,558	557,158
Current portion of deferred revenue	665,024	690,538
Total current liabilities	1,590,867	1,347,696
Long-term liabilities:		
Long-term portion of deferred revenue	98,931	91,524
Long-term debt	299,771	648,078
Other long-term liabilities	275,651	304,660
Total long-term liabilities	674,353	1,044,262
Commitments and contingencies (Notes 8, 17 and 18)		
Stockholders' equity:		
Preferred stock – \$0.01 par value; authorized 400 shares, none issued or outstanding	—	—
Common stock – \$0.01 par value; authorized 600,000 shares; issued and outstanding shares: 271,706 and 272,675, respectively	3,166,964	2,765,673
Treasury stock, at cost; 57,453 shares and 56,485 shares, respectively	(4,604,323)	(3,824,163)
Retained earnings	4,936,384	3,895,240
Accumulated other comprehensive loss	(94,754)	(91,637)
Total stockholders' equity	3,404,271	2,745,113
Total liabilities and stockholders' equity	\$ 5,669,491	\$ 5,137,071

See notes to consolidated financial statements.

CADENCE DESIGN SYSTEMS, INC.
CONSOLIDATED INCOME STATEMENTS
For the three fiscal years ended December 31, 2023
(In thousands, except per share amounts)

	2023	2022	2021
Revenue:			
Product and maintenance	\$ 3,834,359	\$ 3,340,197	\$ 2,812,947
Services	255,627	221,521	175,297
Total revenue	4,089,986	3,561,718	2,988,244
Costs and expenses:			
Cost of product and maintenance	331,760	273,565	222,647
Cost of services	103,281	98,058	84,359
Marketing and sales	690,319	604,224	560,262
Research and development	1,441,796	1,251,544	1,134,277
General and administrative	242,430	242,116	189,018
Amortization of acquired intangibles	18,162	18,470	19,640
Restructuring	11,013	55	(1,048)
Total costs and expenses	2,838,761	2,488,032	2,209,155
Income from operations	1,251,225	1,073,686	779,089
Interest expense	(36,185)	(22,934)	(16,980)
Other income (expense), net	66,886	(5,389)	6,326
Income before provision for income taxes	1,281,926	1,045,363	768,435
Provision for income taxes	240,782	196,411	72,480
Net income	\$ 1,041,144	\$ 848,952	\$ 695,955
Net income per share – basic	\$ 3.86	\$ 3.13	\$ 2.54
Net income per share – diluted	\$ 3.82	\$ 3.09	\$ 2.50
Weighted average common shares outstanding – basic	269,381	271,198	273,504
Weighted average common shares outstanding – diluted	272,748	275,011	278,858

See notes to consolidated financial statements.

CADENCE DESIGN SYSTEMS, INC.
CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME
For the three fiscal years ended December 31, 2023
(In thousands)

	2023	2022	2021
Net income	\$ 1,041,144	\$ 848,952	\$ 695,955
Other comprehensive income (loss), net of tax effects:			
Foreign currency translation adjustments	(4,815)	(59,310)	(15,423)
Changes in defined benefit plan liabilities	1,566	984	(463)
Unrealized gains on investments	132	—	—
Total other comprehensive loss, net of tax effects	(3,117)	(58,326)	(15,886)
Comprehensive income	<u>\$ 1,038,027</u>	<u>\$ 790,626</u>	<u>\$ 680,069</u>

See notes to consolidated financial statements.

CADENCE DESIGN SYSTEMS, INC.
CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY
For the three fiscal years ended December 31, 2023
(In thousands)

	Common Stock		Treasury Stock	Retained Earnings	Accumulated Other Comprehensive Income (Loss)	Total
	Shares	Par Value and Capital in Excess of Par				
Balance, January 2, 2021	278,941	\$ 2,217,939	\$ (2,057,829)	\$ 2,350,333	\$ (17,425)	\$ 2,493,018
Net income	—	—	—	695,955	—	\$ 695,955
Other comprehensive loss, net of taxes	—	—	—	—	(15,886)	\$ (15,886)
Purchase of treasury stock	(4,401)	—	(612,297)	—	—	\$ (612,297)
Issuance of common stock and reissuance of treasury stock under equity incentive plans, net of forfeitures	2,978	55,505	32,272	—	—	\$ 87,777
Stock received for payment of employee taxes on vesting of restricted stock	(722)	(15,833)	(102,149)	—	—	\$ (117,982)
Stock-based compensation expense	—	210,090	—	—	—	\$ 210,090
Balance, January 1, 2022	<u>276,796</u>	<u>\$ 2,467,701</u>	<u>\$ (2,740,003)</u>	<u>\$ 3,046,288</u>	<u>\$ (33,311)</u>	<u>\$ 2,740,675</u>
Net income	—	—	—	848,952	—	\$ 848,952
Other comprehensive loss, net of taxes	—	—	—	—	(58,326)	\$ (58,326)
Purchase of treasury stock	(6,602)	—	(1,020,091)	—	—	\$ (1,020,091)
Equity forward contract	—	(12,035)	(17,965)	—	—	\$ (30,000)
Issuance of common stock and reissuance of treasury stock under equity incentive plans, net of forfeitures	3,079	56,708	48,620	—	—	\$ 105,328
Stock received for payment of employee taxes on vesting of restricted stock	(598)	(17,140)	(94,724)	—	—	\$ (111,864)
Stock-based compensation expense	—	270,439	—	—	—	\$ 270,439
Balance, December 31, 2022	<u>272,675</u>	<u>\$ 2,765,673</u>	<u>\$ (3,824,163)</u>	<u>\$ 3,895,240</u>	<u>\$ (91,637)</u>	<u>\$ 2,745,113</u>
Net income	—	—	—	1,041,144	—	\$ 1,041,144
Other comprehensive loss, net of taxes	—	—	—	—	(3,117)	\$ (3,117)
Purchase of treasury stock, including excise tax	(3,145)	—	(641,041)	—	—	\$ (641,041)
Equity forward contract	—	1,688	(61,688)	—	—	\$ (60,000)
Issuance of common stock and reissuance of treasury stock under equity incentive plans, net of forfeitures	2,704	97,050	35,907	—	—	\$ 132,957
Stock received for payment of employee taxes on vesting of restricted stock	(528)	(23,058)	(113,338)	—	—	\$ (136,396)
Stock-based compensation expense	—	325,611	—	—	—	\$ 325,611
Balance, December 31, 2023	<u>271,706</u>	<u>\$ 3,166,964</u>	<u>\$ (4,604,323)</u>	<u>\$ 4,936,384</u>	<u>\$ (94,754)</u>	<u>\$ 3,404,271</u>

See notes to consolidated financial statements.

CADENCE DESIGN SYSTEMS, INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS
For the three fiscal years ended December 31, 2023
(In thousands)

	2023	2022	2021
Cash and cash equivalents at beginning of year	\$ 882,325	\$ 1,088,940	\$ 928,432
Cash flows from operating activities:			
Net income	1,041,144	848,952	695,955
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation and amortization	145,292	132,088	142,308
Amortization of debt discount and fees	1,262	1,134	1,219
Stock-based compensation	325,611	270,439	210,090
(Gain) loss on investments, net	(34,602)	5,425	(580)
Deferred income taxes	(36,512)	(107,606)	(43,178)
Provisions for losses on receivables	3,325	204	525
ROU asset amortization and change in operating lease liabilities	451	3,342	(11,606)
Other non-cash items	1,983	371	427
Changes in operating assets and liabilities, net of effect of acquired businesses:			
Receivables	(11,748)	(138,471)	2,014
Inventories	(65,895)	(23,073)	(39,027)
Prepaid expenses and other	39,015	(38,927)	(34,342)
Other assets	(45,784)	(933)	(7,133)
Accounts payable and accrued liabilities	5,415	113,945	67,356
Deferred revenue	(21,583)	131,462	100,731
Other long-term liabilities	1,802	43,542	16,199
Net cash provided by operating activities	<u>1,349,176</u>	<u>1,241,894</u>	<u>1,100,958</u>
Cash flows from investing activities:			
Purchases of investments	(176,170)	(1,000)	—
Proceeds from the sale and maturity of investments	64,775	366	128
Purchases of property, plant and equipment	(102,337)	(123,215)	(65,298)
Purchases of intangible assets	(166)	(1,000)	(1,583)
Cash paid in business combinations, net of cash acquired	(198,351)	(613,785)	(226,201)
Net cash used for investing activities	<u>(412,249)</u>	<u>(738,634)</u>	<u>(292,954)</u>
Cash flows from financing activities:			
Proceeds from revolving credit facility	50,000	585,000	—
Payments on revolving credit facility	(150,000)	(485,000)	—
Proceeds from term loan	—	300,000	—
Payment of debt issuance costs	—	(425)	(1,285)
Proceeds from issuance of common stock	132,957	105,331	87,772
Stock received for payment of employee taxes on vesting of restricted stock	(136,396)	(111,864)	(117,982)
Payments for repurchases of common stock	(700,134)	(1,050,091)	(612,297)
Net cash used for financing activities	<u>(803,573)</u>	<u>(657,049)</u>	<u>(643,792)</u>
Effect of exchange rate changes on cash and cash equivalents	(7,527)	(52,826)	(3,704)
Increase (decrease) in cash and cash equivalents	125,827	(206,615)	160,508
Cash and cash equivalents at end of year	<u>\$ 1,008,152</u>	<u>\$ 882,325</u>	<u>\$ 1,088,940</u>
Supplemental cash flow information:			
Cash paid for interest	\$ 34,934	\$ 21,122	\$ 15,950
Cash paid for income taxes, net	253,700	233,235	146,424

See notes to consolidated financial statements.

CADENCE DESIGN SYSTEMS, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
For the three fiscal years ended December 31, 2023

NOTE 1. BUSINESS OVERVIEW

Cadence Design Systems, Inc. (“Cadence”) is an innovation leader in electronic system design that delivers essential computational software, hardware, and IP that its customers use to turn their design concepts into reality. Many of Cadence’s customers design semiconductors and electronic systems. Semiconductor companies focus on the design of all types of semiconductor devices including integrated circuits (“ICs”), analog, mixed-signal, memory, 3D-IC, processor chips for computing (“CPUs”), graphics (“GPUs”), and AI. These customers will then use the semiconductor devices in the design of printed circuit boards (“PCBs”). Cadence’s electronic systems customers design and create products for consumer and business needs, such as smartphones, laptop computers, gaming and entertainment systems, automobiles and autonomous driving systems, aerospace and defense systems, communication systems, networking products, compute servers, cloud data center infrastructure, artificial intelligence (“AI”) systems, medical equipment, and a much longer list of consumer products used in everyday life. These systems companies internally develop, or externally purchase, the sub-components for their products, including ICs and PCBs, which connect all the hardware components, and software at various levels that run on the hardware.

NOTE 2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Principles of Consolidation and Basis of Presentation

The consolidated financial statements include the accounts of Cadence and its subsidiaries after elimination of intercompany accounts and transactions. All consolidated subsidiaries are wholly owned by Cadence.

Historically, Cadence’s fiscal years were 52- or 53-week periods ending on the Saturday closest to December 31. During fiscal 2022, Cadence’s Board of Directors approved a change in its fiscal year end from the Saturday closest to December 31 of each year to December 31 of each year. The fiscal year change became effective beginning with Cadence’s 2023 fiscal year, which began on January 1, 2023. Both fiscal year 2022 and 2021, which are included in this report for comparative purposes, represent 52-week periods.

Cadence’s first three fiscal quarters end on March 31, June 30, and September 30. No transition report was required in connection with this change.

Use of Estimates

Preparation of the consolidated financial statements in conformity with United States generally accepted accounting principles requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the consolidated financial statements and the reported amounts of revenue and expenses during the reporting period. Actual results could differ from those estimates.

Recently Adopted Accounting Standards

Cadence has not recently adopted any accounting standard updates that are material or potentially material to its consolidated financial statements.

New Accounting Standards Not Yet Adopted

Segment Reporting

In November 2023, the Financial Accounting Standards Board (“FASB”), issued Accounting Standards Update (“ASU”) No. 2023-07, “Segment Reporting (Topic 280): Improvements to Reportable Segment Disclosures,” intended to improve reportable segment disclosure requirements, primarily through enhanced annual and interim disclosures about significant segment expenses. This standard is effective for fiscal years beginning after December 15, 2023, and interim periods within fiscal years beginning after December 15, 2024. Early adoption is permitted. Cadence is currently evaluating the impact of this standard on its financial statement disclosures.

Income Taxes

In December 2023, the FASB issued ASU No. 2023-09, “Income Taxes (Topic 740): Improvements to Income Tax Disclosures,” which requires disclosure of disaggregated income taxes paid, prescribes standard categories for the components of the effective tax rate reconciliation, and modifies other income tax-related disclosures. This standard is effective for fiscal years beginning after December 15, 2024, and may be applied on a retrospective or prospective basis. Cadence is currently evaluating the impact of adopting this ASU on its consolidated financial statements and disclosures.

Foreign Operations

Cadence transacts business in various foreign currencies. The United States dollar is the functional currency of Cadence's consolidated entities operating in the United States and certain of its consolidated subsidiaries operating outside the United States. The functional currency for Cadence's other consolidated entities operating outside of the United States is generally the country's local currency.

Cadence translates the financial statements of consolidated entities whose functional currency is not the United States dollar into United States dollars. Cadence translates assets and liabilities at the exchange rate in effect as of the financial statement date and translates income statement accounts using an average exchange rate for the period. Cadence includes adjustments from translating assets and liabilities into United States dollars, and the effect of exchange rate changes on intercompany transactions of a long-term investment nature in stockholders' equity as a component of accumulated other comprehensive income. Cadence reports gains and losses from foreign exchange rate changes related to intercompany receivables and payables that are not of a long-term investment nature, as well as gains and losses from foreign currency transactions of a monetary nature in other income (expense), net, in the consolidated income statements.

Concentrations of Credit Risk

Financial instruments, including derivative financial instruments, that may potentially subject Cadence to concentrations of credit risk, consist principally of cash and cash equivalents, accounts receivable, investments and forward contracts. Credit exposure related to Cadence's foreign currency forward contracts is limited to the realized and unrealized gains on these contracts.

Cash and Cash Equivalents

Cadence considers all highly liquid investments with original maturities of three months or less on the date of purchase to be cash equivalents.

Receivables

Cadence's receivables, net includes invoiced accounts receivable and the current portion of unbilled receivables. Unbilled receivables represent amounts Cadence has recorded as revenue for which payments from a customer are due over time and Cadence has an unconditional right to the payment. Cadence's accounts receivable and unbilled receivables were initially recorded at the transaction value. Cadence's long-term receivables balance includes receivable balances to be invoiced more than one year after each balance sheet date.

Allowances for Doubtful Accounts

Cadence assesses its ability to collect outstanding receivables and provides customer-specific allowances, allowances for credit losses and general allowances for the portion of its receivables that are estimated to be uncollectible. The allowances are based on the current creditworthiness of its customers, historical experience, expected credit losses, changes in customer demand and the overall economic climate in the industries that Cadence serves. Provisions for these allowances are recorded in general and administrative expense in Cadence's consolidated income statements.

Inventories

Inventories are computed at standard costs which approximate actual costs and are valued at the lower of cost or net realizable value based on the first-in, first-out method. Cadence's inventories include high technology parts and components for complex emulation and prototyping hardware systems. These parts and components are specialized in nature and may be subject to rapid technological obsolescence. While Cadence has programs to manage the required inventories on hand and considers technological obsolescence when estimating required reserves to reduce recorded amounts to market values, it is reasonably possible that such estimates could change in the near term. Cadence's policy is to reserve for inventory in excess of 12-month demand or for other known obsolescence or realization issues.

Property, Plant and Equipment

Property, plant and equipment is stated at historical cost. Depreciation and amortization are generally provided over the estimated useful lives, using the straight-line method, as follows:

Equipment and internal-use software	2-7 years
Buildings	25-32 years
Leasehold improvements	Shorter of the lease term or the estimated useful life
Building improvements and land improvements	Up to 32 years
Furniture and fixtures	3-5 years

Cadence capitalizes certain costs of software developed for internal use. Capitalization of software developed for internal use begins at the application development phase of the project. Amortization begins when the computer software is substantially complete and ready for its intended use. Amortization is recorded on a straight-line basis over the estimated useful life. Capitalized costs were not material during fiscal 2023, 2022 or 2021.

Cadence recorded depreciation and amortization expense of \$78.4 million, \$69.1 million and \$71.2 million during fiscal 2023, 2022 and 2021, respectively, for property, plant and equipment.

Software Development Costs

Software development costs are capitalized beginning when a product's technological feasibility has been established by completion of a working model of the product and amortization begins when a product is available for general release to customers. The period between the achievement of technological feasibility and the general release of Cadence's products has typically been of short duration. Costs incurred during fiscal 2023, 2022 and 2021 were not material.

Deferred Sales Commissions

Cadence records an asset for the incremental costs of obtaining a contract with a customer, including direct sales commissions that are earned upon execution of the contract. Cadence uses the portfolio method to recognize the amortization expense related to these capitalized costs related to initial contracts and renewals and such expense is recognized over a period associated with the revenue of the related portfolio, which is generally two to three years for Cadence's software arrangements and upon delivery for its hardware and IP arrangements. Incremental costs related to initial contracts and renewals are amortized over the period of the arrangement in each case because Cadence pays the same commission rate for both new contracts and renewals. Deferred sales commissions are tested for impairment on an ongoing basis when events or changes in circumstances indicate that the carrying amount may not be recoverable. An impairment is recognized to the extent that the amount of deferred sales commission exceeds the remaining expected gross margin (remaining revenue less remaining direct costs) on the goods and services to which the deferred sales commission relates. Total capitalized costs were \$47.6 million and \$41.7 million as of December 31, 2023, and December 31, 2022, respectively, and are included in other assets in Cadence's consolidated balance sheet. Amortization of these assets was \$41.4 million, \$40.5 million and \$40.1 million during fiscal 2023, 2022 and 2021, respectively, and is included in sales and marketing expense in Cadence's consolidated income statement.

Goodwill

Cadence conducts a goodwill impairment analysis annually and as necessary if changes in facts and circumstances indicate that the fair value of Cadence's single reporting unit may be less than its carrying amount. To assess for impairment, Cadence compares the estimated fair value of its single reporting unit to the carrying value of the reporting unit's net assets, including goodwill. If the fair value of the reporting unit is greater than the carrying value of its net assets, goodwill is not considered to be impaired, and no further analysis is required. If the fair value of the reporting unit is less than the carrying value of its net assets, Cadence would be required to record an impairment charge.

Long-Lived Assets, Including Acquired Intangibles

Cadence's long-lived assets consist of property, plant and equipment, and acquired intangibles. Acquired intangibles consist of acquired technology, certain contract rights, customer relationships, trademarks and trade names, capitalized software, and in-process research and development. These acquired intangibles are acquired through business combinations or direct purchases. Acquired intangibles with definite lives are amortized on a straight-line basis over the estimated economic life of the underlying products and technologies, which range from three years to fifteen years. Acquired intangibles with indefinite lives, or in-process technology, consists of projects that had not reached technological feasibility by the date of acquisition. Upon completion of the project, the assets are amortized over their estimated useful lives. If the project is abandoned rather than completed, the asset is written off. In-process technology is tested for impairment annually and as necessary if changes in facts and circumstances indicate that the assets might be impaired.

Cadence reviews its long-lived assets, including acquired intangibles, for impairment whenever events or changes in circumstances indicate that the carrying amount of a long-lived asset or asset group may not be recoverable. Recoverability of an asset or asset group is measured by comparison of its carrying amount to the expected future undiscounted cash flows that the asset or asset group is expected to generate. If it is determined that the carrying amount of an asset group is not recoverable, an impairment loss is recorded in the amount by which the carrying amount of the asset or asset group exceeds its fair value.

Leases

Lessee Considerations

Cadence has operating leases primarily consisting of facilities with remaining lease terms of approximately one year to fifteen years. Cadence has options to terminate many of its leases early. The lease term represents the period up to the early termination date unless it is reasonably certain that Cadence will not exercise the early termination option. For certain leases, Cadence has options to extend the lease term for additional periods ranging from one year to ten years. Renewal options are not considered in the remaining lease term unless it is reasonably certain that Cadence will exercise such options.

At inception of a contract, Cadence determines an arrangement contains a lease if the arrangement conveys the right to use an identified asset and Cadence obtains substantially all of the economic benefits from the asset and has the ability to direct the use of the asset. Leases with an initial term of twelve months or less are not recorded on the balance sheet. For lease agreements entered into or reassessed after the adoption of Topic 842, Cadence combines the lease and non-lease components in determining the lease liabilities and right-of-use ("ROU") assets. Non-lease components primarily include common-area maintenance and other management fees.

Operating lease expense is generally recognized evenly over the term of the lease. Payments under Cadence's lease agreements are primarily fixed; however, certain agreements contain rental payments that are adjusted periodically based on changes in consumer price and other indices. Changes to payments resulting from changes in indices are expensed as incurred and not included in the measurement of lease liabilities and ROU assets. Cadence's lease agreements do not provide an implicit borrowing rate, therefore an internal incremental borrowing rate is determined based on information available at lease commencement date for purposes of determining the present value of lease payments. The incremental borrowing rate represents a comparable rate to borrow on a collateralized basis over a similar term and in the economic environment where the leased asset is located.

Lessor Considerations

Although most of Cadence's revenue from its hardware business comes from sales of hardware, Cadence also leases its hardware products to some customers. Cadence determines the existence of a lease when the customer controls the use of the identified hardware for a period of time defined in the lease agreement.

Cadence's leases range in duration up to three years with payments generally collected in equal quarterly installments. Cadence's leases do not include termination rights or variable pricing and typically do not include purchase rights at the end of the lease. Short-term leases are usually less than two years and are classified as operating leases with revenue recognized and depreciation expensed on a straight-line basis over the term of the lease. Long-term leases are typically for three years and are classified as sales-type leases with revenue and cost of sales recognized upon installation.

Cadence's operating leases and sales-type leases contain both lease and non-lease components. Because the pattern of revenue recognition is the same for both the lease and non-lease components in Cadence's operating leases, Cadence has elected the practical expedient to not separate lease and related non-lease components and accounts for both components under Topic 842. Cadence allocates value to the lease and non-lease components in its sales-type leases using standalone selling prices ("SSPs") similar to those used under ASU 2014-09, "Revenue from Contracts with Customers (Topic 606)," the current accounting standard governing revenue recognition. When Cadence leases its hardware in the same arrangement as software or IP, Cadence allocates value to each performance obligation using SSPs.

Investments in Equity Securities

Cadence's investments in marketable equity securities are carried at fair value as a component of prepaid expenses and other in the consolidated balance sheets. Cadence records realized and unrealized holding gains or losses as part of other income (expense), net in the consolidated income statements.

Cadence's non-marketable investments include its investments in privately held companies. These investments are initially recorded at cost and are included in other assets in the consolidated balance sheets. Cadence accounts for these investments using the measurement alternative when the fair value of the investment is not readily determinable, and Cadence does not have the ability to exercise significant influence, or the equity method of accounting when it is determined that Cadence has the ability to exercise significant influence. For investments accounted for using the equity method of accounting, Cadence records its proportionate share of the investee's income or loss, net of the effects of any basis differences, to other income (expense), net on a one-quarter lag in Cadence's consolidated income statements.

Cadence reviews its non-marketable investments for impairment on a regular basis by considering investee financial performance and other information received from the investee companies that indicates a decline in value has occurred. For non-marketable equity investments accounted for using the measurement alternative, the carrying amount may also be adjusted based on observable price changes from orderly transactions for identical or similar investments of the same issuer. Adjustments to the carrying amounts of non-marketable investments are recorded in other income (expense), net in the consolidated income statements. There were no material events or circumstances impacting the carrying amount of our non-marketable investments during the periods presented.

Investments in Debt Securities

Cadence's investments in debt securities are comprised of investments in mortgage-backed and asset backed-securities and are carried at fair value as a component of prepaid expenses and other in the consolidated balance sheets. Cadence classifies its investment in debt securities as available-for-sale, and gross unrealized gains and losses are recorded as a component of accumulated other comprehensive loss on its consolidated balance sheets.

Cadence assesses its portfolio of debt securities for impairment at least quarterly. Cadence records an allowance for credit losses on debt securities when the fair value of a debt security is below its amortized cost, and it is more likely than not that Cadence will either sell the impaired security before recovery of its amortized basis or has the intention to sell the security. Provisions for credit losses on impaired debt securities are recorded as a component of other income (expense), net in the consolidated income statements.

Derivative Financial Instruments

Cadence enters into foreign currency forward exchange contracts with financial institutions to protect against currency exchange risks associated with existing assets and liabilities. A foreign currency forward exchange contract acts as a hedge by increasing in value when underlying assets decrease in value or underlying liabilities increase in value due to changes in foreign exchange rates. Conversely, a foreign currency forward exchange contract decreases in value when underlying assets increase in value or underlying liabilities decrease in value due to changes in foreign exchange rates. The forward contracts are not designated as accounting hedges and, therefore, the unrealized gains and losses are recognized in other income (expense), net, in advance of the actual foreign currency cash flows. The fair value of these forward contracts is recorded in accrued liabilities or in other current assets. These forward contracts generally have maturities of 90 days or less.

Nonqualified Deferred Compensation Trust

Executive officers, senior management and members of Cadence's Board of Directors may elect to defer compensation payable to them under Cadence's Nonqualified Deferred Compensation Plan ("NQDC"). Deferred compensation payments are held in investment accounts and the values of the accounts are adjusted each quarter based on the fair value of the investments held in the NQDC.

The selected investments held in the NQDC accounts are carried at fair value, with the unrealized gains and losses recognized in the consolidated income statements as other income (expense), net. These securities are classified in other assets in the consolidated balance sheets because they are not available for Cadence's use in its operations.

Cadence's obligation with respect to the NQDC trust is recorded in other long-term liabilities on the consolidated balance sheets. Increases and decreases in the NQDC trust liability are recorded as compensation expense in the consolidated income statements.

Treasury Stock

Cadence generally issues shares related to its stock-based compensation plans from shares held in treasury. When treasury stock is reissued at an amount higher than its cost, the difference is recorded as a component of capital in excess of par in the consolidated statements of stockholders' equity. When treasury stock is reissued at an amount lower than its cost, the difference is recorded as a component of capital in excess of par to the extent that gains exist to offset the losses. If there are no accumulated treasury stock gains in capital in excess of par, the losses upon reissuance of treasury stock are recorded as a component of retained earnings in the consolidated statements of stockholders' equity. There were no losses recorded as a component of retained earnings by Cadence on the reissuance of treasury stock during fiscal 2023, 2022 or 2021.

The Inflation Reduction Act of 2022, which was enacted into law on August 16, 2022, imposed a nondeductible 1% excise tax on the net value of certain stock repurchases made after December 31, 2022. During fiscal 2023, Cadence recorded excise tax of \$0.9 million as a component of treasury stock to account for the incremental cost of the shares repurchased. A corresponding liability for the excise tax payable was recorded as a component of accounts payable and accrued liabilities on Cadence's consolidated balance sheet as of December 31, 2023.

Revenue Recognition

Revenue is recognized upon transfer of control of promised products or services to customers in an amount that reflects the consideration to which Cadence expects to be entitled in exchange for promised goods or services. Cadence's performance obligations are satisfied either over time or at a point in time.

Product and maintenance revenue includes Cadence's licenses of software and IP, sales of emulation hardware and the related maintenance on these licenses and sales.

Services revenue includes revenue received for performing engineering services (which are generally not related to the functionality of other licensed products), customized IP on a fixed fee basis, and sales from cloud-based solutions that provide customers with software, hardware and services over a period of time.

Cadence enters into contracts that can include various combinations of licenses, products and services, some of which are distinct and are accounted for as separate performance obligations. For contracts with multiple performance obligations, Cadence allocates the transaction price of the contract to each performance obligation, generally on a relative basis using its SSP. Cadence generates revenue from contracts with customers and applies judgment in identifying and evaluating any terms and conditions in contracts which may impact revenue recognition. Revenue is recognized net of any taxes collected from customers that are subsequently remitted to governmental authorities.

Some customers enter into non-cancelable commitments whereby the customer commits to a fixed dollar amount over a specified period of time that can be used to purchase from a list of products or services. These arrangements do not meet the definition of a revenue contract until the customer executes a separate selection form to identify the products and services that they are purchasing. Each separate selection form under the arrangement is treated as an individual contract and accounted for based on the respective performance obligations. Cadence records a customer deposit liability for amounts received from customers prior to the arrangement meeting the definition of a revenue contract.

Software Revenue Recognition

Cadence's time-based license arrangements grant customers the right to access and use all of the licensed products at the outset of an arrangement and updates are generally made available throughout the entire term of the arrangement, which is generally two to three years. Cadence's updates provide continued access to evolving technology as customers' designs migrate to more advanced nodes and as its customers' technological requirements evolve. In addition, certain time-based license arrangements include remix rights and unspecified additional products that become commercially available during the term of the agreement. Payments are generally received in equal or near equal installments over the term of the agreement.

Multiple software licenses, related updates, and technical support in these time-based arrangements constitute a single, combined performance obligation and revenue is recognized over the term of the license, commencing upon the later of the effective date of the arrangement or transfer of the software license. Remix rights are not an additional promised good or service in the contract, and where unspecified additional software product rights are part of the contract with the customer, such rights are accounted for as part of the single performance obligation that includes the licenses, updates, and technical support because such rights are provided for the same period of time and have the same time-based pattern of transfer to the customer.

Hardware Revenue Recognition

Cadence generally has two performance obligations in arrangements involving the sale or lease of hardware products. The first performance obligation is to transfer the hardware product (which includes software integral to the functionality of the hardware product). The second performance obligation is to provide maintenance on hardware and its embedded software, which includes rights to technical support, hardware repairs and software updates that are all provided over the same term and have the same time-based pattern of transfer to the customer. The transaction price allocated to the hardware product is generally recognized as revenue at the time of delivery because the customer obtains control of the product at that point in time. Cadence has concluded that control generally transfers at that point in time because the customer has title to the hardware, physical possession, and a present obligation to pay for the hardware. The transaction price allocated to maintenance is recognized as revenue ratably over the maintenance term. Payments for hardware contracts are generally received upon delivery of the hardware product. Shipping and handling costs are considered fulfillment costs and are included in cost of product and maintenance in Cadence's consolidated income statements.

IP Revenue Recognition

Cadence generally licenses IP under nonexclusive license agreements that provide usage rights for specific designs. In addition, for certain of Cadence's IP license agreements, royalties are collected as customers ship their own products that incorporate Cadence IP. These arrangements generally have two performance obligations—transferring the licensed IP and associated maintenance, which includes rights to technical support, and software updates that are all provided over the maintenance term and have a time-based pattern of transfer to the customer.

Revenue allocated to the IP license is recognized at a point in time upon the later of the delivery of the IP or the beginning of the license period and revenue allocated to the maintenance is recognized over the maintenance term. Royalties are recognized as revenue in the quarter in which the applicable Cadence customer ships its products that incorporate Cadence IP. Payments for IP contracts are generally received upon delivery of the IP. Cadence customizes certain IP and revenue related to this customization is recognized as services revenue as described below.

Services Revenue Recognition

Revenue from service contracts is recognized over time, generally using costs incurred or hours expended to measure progress. Cadence has a history of accurately estimating project status and the costs necessary to complete projects. A number of internal and external factors can affect these estimates, including labor rates, utilization and efficiency variances and specification and testing requirement changes. Payments for services are generally due upon milestones in the contract or upon consumption of the hourly resources.

Stock-Based Compensation

Cadence recognizes the cost of awards of equity instruments granted to employees in exchange for their services as stock-based compensation expense. Stock-based compensation expense is measured at the grant date based on the value of the award and is recognized as expense over the requisite service period, which is typically the vesting period. Cadence recognizes stock-based compensation expense on the straight-line method for awards that only contain a service condition and on the graded-vesting method for awards that contain both a service and performance condition. Cadence recognizes the impact of forfeitures on stock-based compensation expense as they occur.

The fair value of stock options and purchase rights issued under Cadence's Employee Stock Purchase Plan ("ESPP") are calculated using the Black-Scholes option pricing model. The computation of the expected volatility assumption used for new awards is based on a weighting of historical and implied volatilities. When determining the expected term, Cadence reviews historical employee exercise behavior from options having similar vesting periods. The risk-free interest rate for the period within the expected term of the option is based on the yield of United States Treasury notes for the comparable term in effect at the time of grant. The expected dividend yield used in the calculation is zero because Cadence has not historically paid and currently does not expect to pay dividends in the foreseeable future.

The fair value of market-based performance stock awards is calculated using a Monte Carlo simulation model and takes into account the same input assumptions as the Black-Scholes model, as well as the possibility that the market conditions may not be satisfied. Cadence recognizes stock-based compensation expense on the graded-vesting method for market-based performance stock awards.

Advertising

Cadence expenses the costs of advertising as incurred. Total advertising expense, including marketing programs and events, was \$21.7 million, \$17.0 million and \$7.5 million during fiscal 2023, 2022 and 2021, respectively, and is included in marketing and sales in the consolidated income statements.

Restructuring

Cadence records personnel-related restructuring charges with termination benefits when the costs are both probable and estimable. Cadence records personnel-related restructuring charges with non-customary termination benefits when the plan has been communicated to the affected employees. Cadence generally begins recording facilities-related restructuring charges in the period in which a formal plan to vacate an affected facility is established. In connection with facilities-related restructuring plans, Cadence has made certain assumptions and estimates related to facilities, particularly the timing of exit and the ability to sublease. Facility closure costs in restructuring charges primarily includes accelerated ROU asset amortization, lease buyout costs and certain contractual costs to maintain facilities during the period after abandonment.

Cadence records estimated provisions for termination benefits and outplacement costs along with other personnel-related restructuring costs, asset impairments related to abandoned assets and other costs associated with the restructuring plan. Cadence regularly evaluates the adequacy of its restructuring liabilities and adjusts the balances based on actual costs incurred or changes in estimates and assumptions. Subsequent adjustments to restructuring accruals are classified as restructuring in the consolidated income statements.

Accounting for Income Taxes

Cadence accounts for the effect of income taxes in its consolidated financial statements using the asset and liability method. This process involves estimating actual current tax liabilities together with assessing carryforwards and temporary differences resulting from differing treatment of items, such as depreciation, for tax and accounting purposes. These differences result in deferred tax assets and liabilities, measured using enacted tax rates expected to apply to taxable income in the years when those temporary differences are expected to be recovered or settled. Cadence accounts for the United States global intangible low-taxed income as a period expense.

Cadence then records a valuation allowance to reduce the deferred tax assets to the amount that Cadence believes is more likely than not to be realized based on its judgment of all available positive and negative evidence. The weight given to the potential effect of negative and positive evidence is commensurate with the extent to which the strength of the evidence can be objectively verified. This assessment, which is completed on a taxing jurisdiction basis, takes into account a number of types of evidence, including the following:

- the nature and history of current or cumulative financial reporting income or losses;
- sources of future taxable income;
- the anticipated reversal or expiration dates of the deferred tax assets; and
- tax planning strategies.

Cadence takes a two-step approach to recognizing and measuring the financial statement benefit of uncertain tax positions. The first step is to evaluate the tax position for recognition by determining whether the weight of available evidence indicates that it is more likely than not that the tax position will be sustained on audit, including resolution of any related appeals or litigation processes. The second step is to measure the tax benefit as the largest amount that is more than 50% likely of being realized upon settlement of the audit. Cadence classifies interest and penalties on unrecognized tax benefits as income tax expense or benefit.

For additional discussion of income taxes, see Note 8 in the notes to the consolidated financial statements.

NOTE 3. REVENUE

Cadence groups its products and services into five categories related to major design activities. The following table shows the percentage of revenue contributed by each of Cadence's five product categories for fiscal 2023, 2022 and 2021:

	2023	2022	2021
Custom IC Design and Simulation	22 %	22 %	23 %
Digital IC Design and Signoff	27 %	28 %	29 %
Functional Verification, including Emulation and Prototyping Hardware*	27 %	26 %	24 %
IP	12 %	12 %	13 %
System Design and Analysis	12 %	12 %	11 %
Total	100 %	100 %	100 %

* Includes immaterial amount of revenue accounted for under leasing arrangements.

Cadence generates revenue from contracts with customers and applies judgment in identifying and evaluating any terms and conditions in contracts which may impact revenue recognition. Certain of Cadence's licensing arrangements allow customers the ability to remix among software products. Cadence also has arrangements with customers that include a combination of products, with the actual product selection and number of licensed users to be determined at a later date. For these arrangements, Cadence estimates the allocation of the revenue to product categories based upon the expected usage of products. Revenue by product category fluctuates from period to period based on demand for products and services, and Cadence's available resources to deliver them. No single customer accounted for 10% or more of total revenue during fiscal 2023, 2022 or 2021.

Recurring revenue includes revenue recognized over time from Cadence's software arrangements, services, royalties, maintenance on IP licenses and hardware, and operating leases of hardware. Recurring revenue also includes revenue recognized at varying points in time over the term of other arrangements with non-cancelable commitments, whereby the customer commits to a fixed dollar amount over a specified period of time that can be used to purchase from a list of products or services. These arrangements do not meet the definition of a revenue contract until the customer executes a separate selection form to identify the products and services that they are purchasing. Each separate selection form under the arrangement is treated as an individual contract and accounted for based on the respective performance obligations.

The remainder of Cadence's revenue is recognized at a point in time and is characterized as up-front revenue. Up-front revenue is primarily generated by sales of emulation and prototyping hardware and individual IP licenses. The percentage of Cadence's recurring and up-front revenue is impacted by delivery of hardware and IP products to its customers in any single fiscal period.

The following table shows the percentage of Cadence's revenue that is classified as recurring or up-front for fiscal 2023, 2022 and 2021:

	2023	2022	2021
Revenue recognized over time	81 %	83 %	85 %
Revenue from arrangements with non-cancelable commitments	3 %	2 %	3 %
Recurring revenue	84 %	85 %	88 %
Up-front revenue	16 %	15 %	12 %
Total	100 %	100 %	100 %

Significant Judgments

Cadence's contracts with customers often include promises to transfer to a customer multiple software and/or IP licenses and services, including professional services, technical support services, and rights to unspecified updates. Determining whether licenses and services are distinct performance obligations that should be accounted for separately, or not distinct and thus accounted for together, requires significant judgment. In some arrangements, such as most of Cadence's IP license arrangements, Cadence has concluded that the licenses and associated services are distinct from each other. In others, like Cadence's time-based software arrangements, the licenses and certain services are not distinct from each other. Cadence's time-based software arrangements include multiple software licenses and updates to the licensed software products, as well as technical support, and Cadence has concluded that these promised goods and services are a single, combined performance obligation.

The accounting for contracts with multiple performance obligations requires the contract's transaction price to be allocated to each distinct performance obligation based on relative SSP. Judgment is required to determine the SSP for each distinct performance obligation because Cadence rarely licenses or sells products on a standalone basis. In instances where the SSP is not directly observable because Cadence does not sell the license, product or service separately, Cadence determines the SSP using information that maximizes the use of observable inputs and may include market conditions. Cadence typically has more than one SSP for individual performance obligations due to the stratification of those items by classes of customers and circumstances. In these instances, Cadence may use information such as the size of the customer and geographic region of the customer in determining the SSP.

Revenue is recognized over time for Cadence's combined performance obligations that include software licenses, updates, technical support and maintenance that are separate performance obligations with the same term. For Cadence's professional services, revenue is recognized over time, generally using costs incurred or hours expended to measure progress. Judgment is required in estimating project status and the costs necessary to complete projects. A number of internal and external factors can affect these estimates, including labor rates, utilization and efficiency variances and specification and testing requirement changes. For Cadence's other performance obligations recognized over time, revenue is generally recognized using a time-based measure of progress reflecting generally consistent efforts to satisfy those performance obligations throughout the arrangement term.

If a group of agreements are so closely related that they are, in effect, part of a single arrangement, such agreements are deemed to be one arrangement for revenue recognition purposes. Cadence exercises significant judgment to evaluate the relevant facts and circumstances in determining whether the separate agreements should be accounted for separately or as, in substance, a single arrangement. Cadence's judgments about whether a group of contracts comprise a single arrangement can affect the allocation of consideration to the distinct performance obligations, which could have an effect on results of operations for the periods involved.

Cadence is required to estimate the total consideration expected to be received from contracts with customers. In limited circumstances, the consideration expected to be received is variable based on the specific terms of the contract or based on Cadence's expectations of the term of the contract. Generally, Cadence has not experienced significant returns or refunds to customers. These estimates require significant judgment and a change in these estimates could have an effect on its results of operations during the periods involved.

Contract Balances

The timing of revenue recognition may differ from the timing of invoicing to customers, and these timing differences result in receivables, contract assets, or contract liabilities (deferred revenue) on Cadence's consolidated balance sheets. For certain software, hardware and IP agreements with payment plans, Cadence records an unbilled receivable related to revenue recognized upon transfer of control because it has an unconditional right to invoice and receive payment in the future related to those transferred products or services. Cadence records a contract asset when revenue is recognized prior to invoicing and Cadence does not have the unconditional right to invoice or retains performance risk with respect to that performance obligation. Cadence records deferred revenue when revenue is recognized subsequent to invoicing. For Cadence's time-based software agreements, customers are generally invoiced in equal, quarterly amounts, although some customers prefer to be invoiced in single or annual amounts.

The contract assets indicated below are included in prepaid expenses and other in the consolidated balance sheets and primarily relate to Cadence's rights to consideration for work completed but not billed as of the balance sheet date on services and customized IP contracts. The contract assets are transferred to receivables when the rights become unconditional, usually upon completion of a milestone.

Cadence's contract balances as of December 31, 2023, and December 31, 2022, were as follows:

	As of	
	December 31, 2023	December 31, 2022
	(In thousands)	
Contract assets	\$ 17,554	\$ 22,766
Deferred revenue	763,955	782,062

Cadence recognized revenue of \$689.7 million, \$540.7 million and \$430.2 million during fiscal 2023, 2022 and 2021, respectively, that was included in the deferred revenue balance at the beginning of each fiscal year. All other activity in deferred revenue, with the exception of deferred revenue assumed from acquisitions, is due to the timing of invoices in relation to the timing of revenue as described above.

Payment terms and conditions vary by contract type, although terms generally include a requirement of payment within 30 to 60 days. In instances where the timing of revenue recognition differs from the timing of invoicing, Cadence has determined that its contracts generally do not include a significant financing component. The primary purpose of invoicing terms is to provide customers with simplified and predictable ways of purchasing Cadence's products and services, and not to facilitate financing arrangements.

Remaining Performance Obligations

Revenue allocated to remaining performance obligations represents the transaction price allocated to the performance obligations that are unsatisfied, or partially unsatisfied, which includes unearned revenue and amounts that will be invoiced and recognized as revenue in future periods. Cadence has elected to exclude the potential future royalty receipts from the remaining performance obligations. Contracted but unsatisfied performance obligations were approximately \$6.0 billion as of December 31, 2023, which included \$0.4 billion of non-cancelable commitments from customers where actual product selection and quantities of specific products or services are to be determined by customers at a later date.

Cadence estimates its remaining performance obligations at a point in time. Actual amounts and timing of revenue recognition may differ from these estimates largely due to changes in actual installation and delivery dates, as well as contract renewals, modifications and terminations. As of December 31, 2023, Cadence expected to recognize 56% of the contracted but unsatisfied performance obligations, excluding non-cancelable commitments, as revenue over the next 12 months, 39% over the next 13 to 36 months and the remainder thereafter.

Cadence recognized revenue of \$55.0 million, \$52.8 million and \$47.1 million during fiscal 2023, 2022 and 2021, respectively, from performance obligations satisfied in previous periods. These amounts represent royalties earned during the period and exclude contracts with nonrefundable prepaid royalties. Nonrefundable prepaid royalties are recognized upon delivery of the IP because Cadence's right to the consideration is not contingent upon customers' future shipments.

NOTE 4. RECEIVABLES, NET

Cadence's current and long-term receivables balances as of December 31, 2023, and December 31, 2022, were as follows:

	As of	
	December 31, 2023	December 31, 2022
	(In thousands)	
Accounts receivable	\$ 299,814	\$ 314,666
Unbilled accounts receivable	193,963	174,334
Long-term receivables	10,755	2,735
Total receivables	504,532	491,735
Less allowance for doubtful accounts	(4,553)	(2,290)
Total receivables, net	<u>\$ 499,979</u>	<u>\$ 489,445</u>

Cadence's customers are primarily concentrated within the semiconductor and electronics systems industries. As of December 31, 2023, and December 31, 2022, no single customer accounted for 10% or more of Cadence's total receivables.

Allowance for doubtful accounts

Cadence's provisions for losses on its accounts receivable during fiscal 2023, 2022 and 2021 were as follows:

	Balance at Beginning of Period	Charged to Costs and Expenses	Charged to Other Accounts	Uncollectible Accounts Written Off, Net	Balance at End of Period
Year ended December 31, 2023	\$ 2,290	\$ 3,325	\$ —	\$ (1,062)	\$ 4,553
Year ended December 31, 2022	3,692	204	—	(1,606)	2,290
Year ended January 1, 2022	\$ 2,867	\$ 525	\$ 780	\$ (480)	\$ 3,692

NOTE 5. DEBT

Cadence's outstanding debt as of December 31, 2023, and December 31, 2022, was as follows:

	December 31, 2023			December 31, 2022		
	Principal	Unamortized Discount	Carrying Value	Principal	Unamortized Discount	Carrying Value
	(In thousands)					
Revolving Credit Facility	\$ —	\$ —	\$ —	\$ 100,000	\$ —	\$ 100,000
2024 Notes	350,000	(715)	349,285	350,000	(1,581)	348,419
2025 Term Loan	300,000	(229)	299,771	300,000	(341)	299,659
Total outstanding debt	\$ 650,000	\$ (944)	\$ 649,056	\$ 750,000	\$ (1,922)	\$ 748,078

Revolving Credit Facility

In June 2021, Cadence entered into a five-year senior unsecured revolving credit facility with a group of lenders led by Bank of America, N.A., as administrative agent (the "2021 Credit Facility"). In September 2022, Cadence amended the 2021 Credit Facility to, among other things, allow Cadence to change its fiscal year to match the calendar year commencing in 2023 and change the interest rate benchmark for loans under the 2021 Credit Facility from the London Inter-Bank Offered Rate ("LIBOR") to Term Secured Overnight Financing Rate ("SOFR"). The material terms of the 2021 Credit Facility otherwise remain unchanged.

The 2021 Credit Facility provides for borrowings up to \$700 million, with the right to request increased capacity up to an additional \$350 million upon the receipt of lender commitments, for total maximum borrowings of \$1.05 billion. The 2021 Credit Facility expires on June 30, 2026. Any outstanding loans drawn under the 2021 Credit Facility are due at maturity on June 30, 2026, subject to an option to extend the maturity date. Outstanding borrowings may be repaid at any time prior to maturity. Debt issuance costs of \$1.3 million were recorded to other assets in Cadence's consolidated balance sheet at the inception of the agreement and are being amortized to interest expense over the term of the 2021 Credit Facility.

Interest accrues on borrowings under the 2021 Credit Facility at a rate equal to, at Cadence's option, either (1) SOFR plus a margin between 0.750% and 1.250% per annum, determined by reference to the credit rating of Cadence's unsecured debt, plus a SOFR adjustment of 0.10% or (2) the base rate plus a margin between 0.000% and 0.250% per annum, determined by reference to the credit rating of Cadence's unsecured debt. Interest is payable quarterly. A commitment fee ranging from 0.070% to 0.175% is assessed on the daily average undrawn portion of revolving commitments. Borrowings bear interest at what is estimated to be current market rates of interest. Accordingly, the carrying value of the 2021 Credit Facility approximates fair value.

The 2021 Credit Facility contains customary negative covenants that, among other things, restrict Cadence's ability to incur additional indebtedness, grant liens and make certain asset dispositions. In addition, the 2021 Credit Facility contains financial covenants that require Cadence to maintain a funded debt to EBITDA ratio not greater than 3.25 to 1, with a step up to 3.75 to 1 for one year following an acquisition by Cadence of at least \$250 million that results in a pro forma leverage ratio between 3.00 to 1 and 3.50 to 1. As of December 31, 2023, Cadence was in compliance with all financial covenants associated with the 2021 Credit Facility.

2024 Notes

In October 2014, Cadence issued a \$350.0 million aggregate principal amount of 4.375% Senior Notes due October 15, 2024 (the "2024 Notes"). Cadence received net proceeds of \$342.4 million from the issuance of the 2024 Notes, net of a discount of \$1.4 million and issuance costs of \$6.2 million. Both the discount and issuance costs are being amortized to interest expense over the term of the 2024 Notes using the effective interest method. The net balance of the 2024 notes of \$349.3 million was classified as a current liability on Cadence's consolidated balance sheet as of December 31, 2023.

Interest is payable in cash semi-annually in April and October. The 2024 Notes are unsecured and rank equal in right of payment to all of Cadence's existing and future senior indebtedness. The fair value of the 2024 Notes was approximately \$347.2 million as of December 31, 2023.

Cadence may redeem the 2024 Notes, in whole or in part, at a redemption price equal to the greater of (a) 100% of the principal amount of the notes to be redeemed and (b) the sum of the present values of the remaining scheduled payments of principal and interest, plus any accrued and unpaid interest, as more particularly described in the indenture governing the 2024 Notes.

The indenture governing the 2024 Notes includes customary representations, warranties and restrictive covenants, including, but not limited to, restrictions on Cadence's ability to grant liens on assets, enter into sale and lease-back transactions, or merge, consolidate or sell assets, and also includes customary events of default.

2025 Term Loan

In September 2022, Cadence entered into a \$300.0 million three-year senior non-amortizing term loan facility due on September 7, 2025, with a group of lenders led by Bank of America, N.A., as administrative agent (the "2025 Term Loan"). The 2025 Term Loan is unsecured and ranks equal in right of payment to all of Cadence's unsecured indebtedness. Proceeds from the loan were used to fund Cadence's acquisition of OpenEye Scientific Software, Inc. ("OpenEye"). Debt issuance costs associated with the 2025 Term Loan were not material.

Amounts outstanding under the 2025 Term Loan accrue interest at a rate equal to, at Cadence's option, either (1) Term SOFR plus a margin between 0.625% and 1.125% per annum, determined by reference to the credit rating of Cadence's unsecured debt, plus a SOFR adjustment of 0.10% or (2) base rate plus a margin between 0.000% and 0.125% per annum, determined by reference to the credit rating of Cadence's unsecured debt. As of December 31, 2023, the interest rate on the 2025 Term Loan was 6.21%. Interest is payable quarterly. Borrowings bear interest at what is estimated to be current market rates of interest. Accordingly, the carrying value of the 2025 Term Loan approximates fair value.

The 2025 Term Loan contains customary negative covenants that, among other things, restrict Cadence's ability to incur additional indebtedness, grant liens and make certain asset dispositions. In addition, the 2025 Term Loan contains a financial covenant that requires Cadence to maintain a funded debt to EBITDA ratio not greater than 3.25 to 1, with a step-up to 3.75 to 1 for one year following an acquisition by Cadence of at least \$250 million that results in a pro forma leverage ratio between 3.00 to 1 and 3.50 to 1. As of December 31, 2023, Cadence was in compliance with all financial covenants associated with the 2025 Term Loan.

NOTE 6. ACQUISITIONS

2023 Acquisitions

Acquisition of IP Assets from Rambus Inc.

On September 6, 2023, Cadence acquired the serializer/deserializer ("SerDes") and memory interface physical layer ("Memory") IP business from Rambus Inc. ("Rambus") for an aggregate cash consideration of \$108.6 million. Memory and SerDes IP design and integration continues to be integral to the design of artificial intelligence, data center and hyperscale applications, CPU architectures and networking devices. The addition of the Rambus IP and seasoned team accelerates Cadence's Intelligent System Design strategy and strengthens Cadence's IP technology portfolio.

The total purchase consideration was allocated to the assets acquired and liabilities assumed based on their respective fair values on the acquisition date as follows:

	Fair Value (In thousands)
Current assets	\$ 1,460
Goodwill	80,999
Acquired intangibles	26,000
Other long-term assets	2,798
Total assets acquired	111,257
Current liabilities	2,531
Long-term liabilities	142
Total liabilities assumed	2,673
Total purchase consideration	\$ 108,584

Cadence will continue to evaluate certain estimates and assumptions, primarily related to assumed liabilities, during the measurement period (up to one year from the acquisition date). The recorded goodwill is attributed to intangible assets that do not qualify for separate recognition, including the acquired assembled workforce, and will be deductible for tax purposes.

Definite-lived intangible assets acquired with Cadence's acquisition of the SerDes and Memory business from Rambus were as follows:

	Fair Value (In thousands)	Weighted Average Amortization Period (in years)
Existing technology	\$ 16,700	5.0 years
Agreements and relationships	9,300	7.0 years
Total acquired intangibles with definite lives	\$ 26,000	5.7 years

Acquisition of Pulsic, Ltd.

On May 4, 2023, Cadence acquired all of the outstanding equity of Pulsic, Ltd. (“Pulsic”), a longtime provider of production-proven technology for floor-planning, placement, and routing of custom ICs. The addition of Pulsic’s technologies and experienced team supports Cadence’s Intelligent System Design strategy and strengthens Cadence’s Custom IC Design and Simulation technology portfolio. The aggregate cash consideration for Cadence’s acquisition of Pulsic, net of cash acquired of \$3.8 million, was \$56.1 million. Subject to service and other conditions, Cadence expects to recognize expense for consideration paid to certain former Pulsic shareholders, now employed by Cadence, through the second quarter of fiscal 2025.

The total purchase consideration was allocated to the assets acquired and liabilities assumed with Cadence’s acquisition of Pulsic based on their respective fair values on the acquisition date as follows:

	Fair Value (In thousands)
Current assets	\$ 4,369
Goodwill	47,448
Acquired intangibles	12,400
Other long-term assets	89
Total assets acquired	64,306
Current liabilities	1,553
Long-term liabilities	2,885
Total liabilities assumed	4,438
Total purchase consideration	\$ 59,868

The recorded goodwill is attributed to intangible assets that do not qualify for separate recognition, including the acquired assembled workforce, and is not deductible for tax purposes.

Definite-lived intangible assets acquired with Cadence’s acquisition of Pulsic were as follows:

	Fair Value (In thousands)	Weighted Average Amortization Period (in years)
Existing technology	\$ 8,000	6.2 years
Agreements and relationships	4,100	8.0 years
Tradenames, trademarks and patents	300	6.0 years
Total acquired intangibles with definite lives	\$ 12,400	6.8 years

Acquisition of Intrinsic Corporation

On October 2, 2023, Cadence acquired all of the outstanding equity of Intrinsic Corporation (“Intrinsic”) from CEVA, Inc. The acquisition enhances Cadence’s system and IC design services resources with the addition of a team with expertise in advanced nodes, radio frequency, mixed-signal and security algorithms. The acquisition also expands Cadence’s reach in key high-growth vertical sectors, including aerospace and defense. The aggregate cash consideration for Cadence’s acquisition of Intrinsic was \$34.6 million, net of cash acquired of \$0.5 million. With its acquisition of Intrinsic, Cadence recorded \$2.6 million of definite-lived intangible assets, \$31.6 million of goodwill and \$0.9 million net assets. The weighted average amortization period for the definite-lived intangible assets acquired with Cadence’s acquisition of Intrinsic was 5.0 years. The recorded goodwill is attributed to intangible assets that do not qualify for separate recognition, including the acquired assembled workforce, and is not deductible for tax purposes.

2022 Acquisitions

Acquisition of OpenEye Scientific Software, Inc.

On August 31, 2022, Cadence acquired all of the outstanding equity of OpenEye, a leading provider of computational molecular modeling and simulation software used by pharmaceutical and biotechnology companies for drug discovery. The addition of OpenEye’s technologies and experienced team with its deep scientific expertise is expected to accelerate Cadence’s Intelligent System Design strategy and broadens Cadence’s System Design and Analysis technology portfolio. The acquisition expands Cadence’s total addressable market, bringing Cadence’s computational software expertise to apply proven algorithmic, simulation and solver advances to life sciences. The aggregate cash consideration for Cadence’s acquisition of OpenEye, net of cash acquired of \$13.2 million, was \$461.3 million. Subject to service and other conditions, Cadence expects to recognize expense for consideration paid to certain former OpenEye shareholders, now employed by Cadence, through the first quarter of fiscal 2026.

The total purchase consideration was allocated to the assets acquired and liabilities assumed with Cadence's acquisition of OpenEye based on their respective estimated fair values on the acquisition date as follows:

	Fair Value (In thousands)
Current assets	\$ 24,890
Goodwill	359,580
Acquired intangibles	117,400
Other long-term assets	6,542
Total assets acquired	508,412
Current liabilities	15,489
Long-term liabilities	18,456
Total liabilities assumed	33,945
Total purchase consideration	\$ 474,467

The recorded goodwill is attributed to intangible assets that do not qualify for separate recognition, including the acquired assembled workforce, and is not deductible for tax purposes.

Definite-lived intangible assets acquired with Cadence's acquisition of OpenEye were as follows:

	Fair Value (In thousands)	Weighted Average Amortization Period (in years)
Existing technology	\$ 53,900	7.0 years
Agreements and relationships	61,400	12.3 years
Tradenames, trademarks and patents	2,100	7.0 years
Total acquired intangibles with definite lives	\$ 117,400	9.8 years

Acquisition of FFG Holdings Limited

On July 14, 2022, Cadence acquired all of the outstanding equity of FFG Holdings Limited ("Future Facilities"), a provider of electronics cooling analysis and energy performance optimization solutions for data center design and operations using physics-based 3D digital twins. The addition of Future Facilities' technologies and expertise supports Cadence's Intelligent System Design strategy and broadens its System Design and Analysis technology portfolio with the addition of solutions that enable companies to make informed business decisions about data center design, operations and lifecycle management that reduce their carbon footprint. The aggregate cash consideration for Cadence's acquisition of Future Facilities, net of cash acquired of \$2.8 million, was \$100.1 million. Subject to service and other conditions, Cadence expects to recognize expense for consideration paid to certain former Future Facilities shareholders, now employed by Cadence, subject to service and other conditions, through the third quarter of fiscal 2025.

The total purchase consideration was allocated to the assets acquired and liabilities assumed with Cadence's acquisition of Future Facilities based on their respective estimated fair values on the acquisition date as follows:

	Fair Value (In thousands)
Current assets	\$ 7,992
Goodwill	67,219
Acquired intangibles	38,100
Other long-term assets	2,708
Total assets acquired	116,019
Current liabilities	4,952
Long-term liabilities	8,167
Total liabilities assumed	13,119
Total purchase consideration	\$ 102,900

The recorded goodwill is attributed to intangible assets that do not qualify for separate recognition, including the acquired assembled workforce and expected synergies from combining operations of Future Facilities with Cadence. The goodwill will not be deductible for tax purposes.

Definite-lived intangible assets acquired with Cadence's acquisition of Future Facilities were as follows:

	Fair Value	Weighted Average Amortization Period
	(In thousands)	(in years)
Existing technology	\$ 20,900	6.0 years
Agreements and relationships	15,600	9.0 years
Tradenames, trademarks and patents	1,600	8.0 years
Total acquired intangibles with definite lives	<u>\$ 38,100</u>	7.3 years

Other 2022 Acquisitions

During fiscal 2022, Cadence completed three other business combinations for aggregate cash consideration of \$53.6 million, net of cash acquired. The total purchase consideration was allocated to assets acquired based on their respective estimated fair values on the acquisition dates. Cadence recorded \$23.1 million of acquired intangible assets, which consisted of \$13.1 million of existing technology, \$3.1 million of agreements and relationships, \$0.1 million of tradenames, trademarks and patents, and \$6.8 million of in-process technology. The weighted average amortization period for the definite-lived intangible assets acquired with these business combinations was 6.9 years. Cadence also recognized \$29.5 million of goodwill, which is primarily attributed to the assembled workforce of the acquired businesses. Of the goodwill recognized with these acquisitions, \$27.8 million is expected to be deductible for tax purposes.

2021 Acquisitions

On February 23, 2021, Cadence acquired all of the outstanding equity of Belgium-based Numerical Mechanics Applications International SA ("NUMECA"). The addition of NUMECA's technologies and talent supports Cadence's Intelligent System Design strategy, servicing the computational fluid dynamics ("CFD") space as part of System Design and Analysis. The aggregate cash consideration for Cadence's acquisition of NUMECA, net of cash acquired of \$9.6 million, was \$188.6 million. Cadence recognized expense for consideration paid to certain former NUMECA shareholders that was subject to service and other conditions, through the first quarter of fiscal 2023.

The total purchase consideration was allocated to the assets acquired and liabilities assumed with Cadence's acquisition of NUMECA based on their respective estimated fair values on the acquisition date as follows:

	Acquisition Date Fair Value
	(In thousands)
Current assets	\$ 16,423
Goodwill	133,077
Acquired intangibles	72,200
Other long-term assets	6,928
Total assets acquired	<u>228,628</u>
Current liabilities	9,951
Long-term liabilities	20,475
Total liabilities assumed	<u>30,426</u>
Total purchase consideration	<u>\$ 198,202</u>

The recorded goodwill is attributed to intangible assets that do not qualify for separate recognition, including the acquired assembled workforce and expected synergies from combining operations of NUMECA with Cadence. Cadence expects all of the goodwill related to the acquisition of NUMECA to be deductible for tax purposes.

On April 14, 2021, Cadence acquired all of the outstanding equity of Pointwise, Inc. ("Pointwise"), a leader in mesh generation for CFD for cash consideration of approximately \$31.4 million, net of cash acquired. The addition of Pointwise's technologies and experienced team supports Cadence's Intelligent System Design strategy and further broadens its System Design and Analysis portfolio, complementing its acquisition of NUMECA. The total purchase consideration was allocated to the assets acquired and liabilities assumed based on their respective estimated fair values on the acquisition dates. Cadence recorded \$16.7 million of definite-lived intangible assets and \$16.7 million of goodwill with its acquisition of Pointwise. All of the goodwill related to Cadence's acquisition of Pointwise is expected to be deductible for tax purposes.

Cadence completed two additional acquisitions during fiscal 2021. These acquisitions are not material to the consolidated financial statements.

Definite-lived intangible assets acquired with Cadence's fiscal 2021 acquisitions were as follows:

	Acquisition Date Fair Value	Weighted Average Amortization Period
	(In thousands)	(in years)
Existing technology	\$ 59,100	13.7 years
Agreements and relationships	28,900	13.7 years
Tradenames, trademarks and patents	4,600	14.3 years
Total acquired intangibles with definite lives	<u>\$ 92,600</u>	13.7 years

Pro Forma Financial Information

Cadence has not presented pro forma financial information for any of the businesses it acquired during fiscal 2023, 2022 and fiscal 2021 because the results of operations for these businesses are not material to Cadence's consolidated financial statements.

Acquisition-Related Transaction Costs

Transaction costs associated with acquisitions, which consist of professional fees and administrative costs, are expensed as incurred and are included in general and administrative expense in Cadence's consolidated income statement. During fiscal 2023, 2022 or 2021, transaction costs associated with acquisitions were \$12.1 million, \$10.1 million and \$2.6 million, respectively.

NOTE 7. GOODWILL AND ACQUIRED INTANGIBLES

Goodwill

The changes in the carrying amount of goodwill during fiscal 2023 and 2022 were as follows:

	Gross Carrying Amount
	(In thousands)
Balance as of January 1, 2022	\$ 928,358
Goodwill resulting from acquisitions	456,323
Effect of foreign currency translation	(10,413)
Balance as of December 31, 2022	1,374,268
Goodwill resulting from acquisitions	160,083
Effect of foreign currency translation	1,494
Balance as of December 31, 2023	<u>\$ 1,535,845</u>

Cadence completed its annual goodwill impairment test during the third quarter of fiscal 2023 and determined that the fair value of Cadence's single reporting unit exceeded the carrying amount of its net assets and that no impairment existed.

Acquired Intangibles, Net

Acquired intangibles as of December 31, 2023, were as follows, excluding intangibles that were fully amortized as of December 31, 2022:

	Gross Carrying Amount	Accumulated Amortization	Acquired Intangibles, Net
	(In thousands)		
Existing technology	\$ 325,710	\$ (141,659)	\$ 184,051
Agreements and relationships	198,259	(61,395)	136,864
Tradenames, trademarks and patents	13,460	(4,332)	9,128
Total acquired intangibles with definite lives	<u>\$ 537,429</u>	<u>\$ (207,386)</u>	<u>\$ 330,043</u>
In-process technology	6,800	—	6,800
Total acquired intangibles	<u>\$ 544,229</u>	<u>\$ (207,386)</u>	<u>\$ 336,843</u>

In-process technology as of December 31, 2023, consisted of acquired projects that, if completed, will contribute to Cadence's existing product offerings. As of December 31, 2023, these projects were expected to be completed during the first quarter of fiscal 2024. During fiscal 2023, there were no transfers from in-process technology to existing technology.

Acquired intangibles as of December 31, 2022, were as follows, excluding intangibles that were fully amortized as of January 1, 2022:

	Gross Carrying Amount	Accumulated Amortization	Acquired Intangibles, Net
	(In thousands)		
Existing technology	\$ 479,796	\$ (278,851)	\$ 200,945
Agreements and relationships	274,624	(137,847)	136,777
Tradenames, trademarks and patents	12,979	(2,884)	10,095
Total acquired intangibles with definite lives	\$ 767,399	\$ (419,582)	\$ 347,817
In-process technology	6,800	—	6,800
Total acquired intangibles	\$ 774,199	\$ (419,582)	\$ 354,617

Amortization expense from existing technology and maintenance agreements is included in cost of product and maintenance. Amortization expense for fiscal 2023, 2022 and 2021, by consolidated income statement caption, was as follows:

	2023	2022	2021
	(In thousands)		
Cost of product and maintenance	\$ 43,808	\$ 41,348	\$ 47,576
Amortization of acquired intangibles	18,162	18,470	19,640
Total amortization of acquired intangibles	\$ 61,970	\$ 59,818	\$ 67,216

As of December 31, 2023, the estimated amortization expense for intangible assets with definite lives was as follows for the following five fiscal years and thereafter:

	(In thousands)
2024	\$ 64,006
2025	51,277
2026	45,698
2027	43,184
2028	39,015
Thereafter	86,863
Total estimated amortization expense	\$ 330,043

NOTE 8. INCOME TAXES

The United States enacted the Tax Cuts and Jobs Act in December 2017, which required companies to capitalize all of their research and development (“R&D”) costs, including software development costs, incurred in tax years beginning after December 31, 2021. Beginning in fiscal 2022, Cadence began capitalizing and amortizing R&D costs over five years for domestic research and fifteen years for international research rather than expensing these costs as incurred. The mandatory capitalization requirement increased Cadence’s fiscal 2023 and 2022 effective tax rates, deferred tax assets, and cash tax payments.

Cadence’s income before provision for income taxes included income from the United States and from foreign subsidiaries for fiscal 2023, 2022 and 2021, was as follows:

	2023	2022	2021
	(In thousands)		
United States	\$ 533,442	\$ 402,083	\$ 376,037
Foreign subsidiaries	748,484	643,280	392,398
Total income before provision for income taxes	\$ 1,281,926	\$ 1,045,363	\$ 768,435

Cadence's provision for income taxes was comprised of the following items for fiscal 2023, 2022 and 2021:

	2023	2022	2021
	(In thousands)		
Current:			
Federal	\$ 156,495	\$ 212,380	\$ 19,957
State and local	15,933	7,280	25,246
Foreign	104,866	84,357	70,455
Total current	<u>277,294</u>	<u>304,017</u>	<u>115,658</u>
Deferred:			
Federal	(87,851)	(79,170)	(16,415)
State and local	25,440	(50,640)	(30,406)
Foreign	25,899	22,204	3,643
Total deferred	<u>(36,512)</u>	<u>(107,606)</u>	<u>(43,178)</u>
Total provision for income taxes	<u>\$ 240,782</u>	<u>\$ 196,411</u>	<u>\$ 72,480</u>

During fiscal 2023, Cadence recognized a tax benefit of approximately \$24.8 million due to the recognition of previously unrecognized tax benefits from the expiration of the applicable statute of limitations and a tax benefit of approximately \$14.0 million primarily related to a change in R&D expenses that were capitalized in fiscal 2022.

During fiscal 2022, Cadence recognized a tax benefit of approximately \$68.7 million due to a release of the valuation allowance on its California research and development tax credit deferred tax assets. In evaluating its ability to realize its deferred tax assets, Cadence considered all available positive and negative evidence, including its past operating results, forecasted earnings, future taxable income, and prudent and feasible tax planning strategies. Cadence expects to utilize these tax credits based on current earnings and future taxable income projections.

During fiscal 2021, Cadence recognized a tax benefit of approximately \$10.5 million due to a release of the valuation allowance on its Massachusetts research and development tax credit deferred tax assets. Cadence expects to utilize these tax credits prior to expiration based on current earnings and future taxable income projections.

The provision for income taxes differs from the amount estimated by applying the United States statutory federal income tax rates of 21% to income before provision for income taxes for fiscal 2023, 2022, and 2021 as follows:

	2023	2022	2021
	(In thousands)		
Provision computed at federal statutory income tax rate	\$ 269,205	\$ 219,526	\$ 161,880
State and local income tax, net of federal tax effect	40,304	29,622	24,640
Intercompany transfers of intangible property rights	23,826	—	—
Foreign income tax rate differential	(54,210)	(49,949)	(26,887)
Foreign-derived intangible income deduction	(14,253)	(2,335)	(22,050)
U.S. tax on foreign entities	113,011	132,563	51,112
Stock-based compensation	(26,805)	(17,023)	(55,091)
Change in deferred tax asset valuation allowance	9,077	(38,073)	(8,262)
Tax credits	(130,383)	(105,366)	(90,054)
Non-deductible research and development expense	—	—	4,443
Withholding taxes	15,300	17,459	23,495
Tax settlements, foreign	4,034	—	—
Increase (decrease) in unrecognized tax benefits	(19,660)	2,354	1,511
Other	11,336	7,633	7,743
Provision for income taxes	<u>\$ 240,782</u>	<u>\$ 196,411</u>	<u>\$ 72,480</u>
Effective tax rate	19 %	19 %	9 %

The components of deferred tax assets and liabilities consisted of the following as of December 31, 2023, and December 31, 2022:

	As of	
	December 31, 2023	December 31, 2022
(In thousands)		
Deferred tax assets:		
Tax credit carryforwards	\$ 129,513	\$ 142,374
Reserves and accruals	78,993	75,543
Intangible assets	506,398	538,424
Capitalized research and development expense for income tax purposes	242,465	149,625
Operating loss carryforwards	9,598	11,081
Deferred income	77,066	64,897
Capital loss carryforwards	16,483	16,777
Stock-based compensation costs	27,409	22,830
Depreciation and amortization	10,671	9,176
Investments	15,949	9,016
Lease liability	33,639	37,758
Prepaid expenses	3,253	14,699
Total deferred tax assets	<u>1,151,437</u>	<u>1,092,200</u>
Valuation allowance	<u>(79,162)</u>	<u>(70,085)</u>
Net deferred tax assets	<u>1,072,275</u>	<u>1,022,115</u>
Deferred tax liabilities:		
Intangible assets	(83,308)	(82,971)
Undistributed foreign earnings	(64,371)	(51,394)
ROU assets	(33,639)	(37,758)
Investments	(6,318)	—
Other	(13,455)	(11,060)
Total deferred tax liabilities	<u>(201,091)</u>	<u>(183,183)</u>
Total net deferred tax assets	<u>\$ 871,184</u>	<u>\$ 838,932</u>

During fiscal 2023, 2022 and 2021 Cadence maintained valuation allowances of \$79.2 million, \$70.1 million, and \$108.2 million, respectively, on certain federal, state and foreign deferred tax assets because the realization of these deferred tax assets requires future income of a specific character or amount that Cadence considered uncertain. The valuation allowance primarily relates to the following:

- Tax credits in certain states that are accumulating at a rate greater than Cadence's capacity to utilize the credits and tax credits in certain states where it is likely the credits will expire unused;
- Federal, state and foreign deferred tax assets related to investments and capital losses that can only be utilized against gains that are capital in nature; and
- Foreign tax credits that can only be fully utilized if Cadence has sufficient income of a specific character in the future.

The valuation allowance increased by \$9.1 million during fiscal 2023, and decreased by \$38.1 million and \$8.3 million during fiscal 2022 and fiscal 2021, respectively. The valuation allowance activity was primarily related to state research and development tax credits and certain foreign tax credits.

As of December 31, 2023, Cadence's operating loss carryforwards were as follows:

	Amount (In thousands)	Expiration Periods
Federal	\$ 167	from 2027 through 2033
California	28,437	from 2025 through 2041
Other states (tax effected, net of federal benefit)	762	from 2024 through indefinite
Foreign (tax effected)	6,719	indefinite

As of December 31, 2023, Cadence had tax credit carryforwards of:

	Amount (In thousands)	Expiration Periods
Federal*	\$ 42,905	from 2031
California	33,542	indefinite
Other states	11,065	from 2031 through indefinite
Foreign	42,002	from 2042 through indefinite

*Certain of Cadence's foreign tax credits have yet to be realized and as a result do not yet have an expiration period.

Examinations by Tax Authorities

Taxing authorities regularly examine Cadence's income tax returns. As of December 31, 2023, Cadence's earliest tax years that remain open to examination and the assessment of additional tax include:

Jurisdiction	Earliest Tax Year Open to Examination
United States – Federal	2017
United States – California	2019
Ireland	2019
Israel	2017
Korea	2019

Unrecognized Tax Benefits

The changes in Cadence's gross amount of unrecognized tax benefits during fiscal 2023, 2022 and 2021 are as follows:

	2023	2022	2021
	(In thousands)		
Unrecognized tax benefits at the beginning of the fiscal year	\$ 126,073	\$ 130,530	\$ 113,021
Gross amount of the increase (decrease) in unrecognized tax benefits of tax positions taken during a prior year*	(1,401)	2,152	15,414
Gross amount of the increases in unrecognized tax benefits as a result of tax positions taken during the current year	2,565	2,660	5,100
Amount of decreases in unrecognized tax benefits relating to settlements with taxing authorities, including the utilization of tax attributes	(8,000)	—	(270)
Reductions to unrecognized tax benefits resulting from the lapse of the applicable statute of limitations	(24,768)	(7,430)	(2,778)
Effect of foreign currency translation	(158)	(1,839)	43
Unrecognized tax benefits at the end of the fiscal year	<u>\$ 94,311</u>	<u>\$ 126,073</u>	<u>\$ 130,530</u>
Total amounts of unrecognized tax benefits that, if upon resolution of the uncertain tax positions would reduce Cadence's effective tax rate	\$ 93,398	\$ 121,415	\$ 79,654

* Includes unrecognized tax benefits of tax positions recorded in connection with acquisitions

Cadence is currently under examination or contesting proposed adjustments by various domestic and international taxing authorities. It is reasonably possible that the amount of unrecognized tax positions could decrease by approximately \$4.9 million during the next 12 months. The potential decrease could be a combination of settlements with tax authorities and expiration of statute of limitations. The actual amount could vary significantly depending on the ultimate timing and nature of any settlements or examinations in advance of statute of limitation expirations.

The total amounts of interest, net of tax, and penalties recognized in the consolidated income statements as provision for income taxes for fiscal 2023, 2022 and 2021 were as follows:

	2023	2022	2021
	(In thousands)		
Interest	\$ 2,282	\$ 434	\$ 1,171
Penalties	267	7	(11)

The total amounts of gross accrued interest and penalties recognized in the consolidated balance sheets as of December 31, 2023, and December 31, 2022, were as follows:

	As of	
	December 31, 2023	December 31, 2022
	(In thousands)	
Interest	\$ 4,813	\$ 5,133
Penalties	—	—

NOTE 9. STOCK COMPENSATION PLANS AND STOCK-BASED COMPENSATION

Equity Incentive Plans

Cadence's Omnibus Plan provides for the issuance of both incentive and non-qualified options, restricted stock awards, restricted stock units, stock bonuses and the rights to acquire restricted stock to both executive and non-executive employees. During fiscal 2023, Cadence's stockholders approved an amendment to the Omnibus Plan to increase the number of shares of common stock authorized for issuance by 6.5 million. As of December 31, 2023, the total number of shares available for future issuance under the Omnibus Plan was 15.5 million. Options granted under the Omnibus Plan have an exercise price not less than the fair market value of the stock on the date of grant. Options and restricted stock generally vest over a period of three years to four years. Options granted under the Omnibus Plan expire seven years from the date of grant. Vesting of restricted stock awards granted under the Omnibus Plan may require the attainment of specified performance criteria.

Cadence's 1995 Directors Stock Incentive Plan (the "Directors Plan") provides for the issuance of non-qualified options, restricted stock awards and restricted stock units to its non-employee directors. Options granted under the Directors Plan have an exercise price not less than the fair market value of the stock on the date of grant. As of December 31, 2023, the total number of shares available for future issuance under the Directors Plan was 0.4 million. Options granted under the Directors Plan expire after ten years, and options, restricted stock awards and restricted stock units vest one year from the date of grant.

Cadence has assumed certain options granted to employees of acquired companies ("Acquired Options"). The Acquired Options were assumed by Cadence outside of its stock option plans, and each option is administered under the terms of the respective original plans of the acquired companies. All of the Acquired Options have been adjusted for the price conversion under the terms of the acquisition agreement between Cadence and the relevant acquired company. If the Acquired Options are canceled, forfeited or expire, they do not become available for future grant.

Stock-Based Compensation

Stock-based compensation expense and the related income tax benefit recognized in connection with stock options, restricted stock and the ESPP during fiscal 2023, 2022 and 2021 were as follows:

	2023	2022	2021
	(In thousands)		
Stock options	\$ 15,939	\$ 14,597	\$ 9,051
Restricted stock	278,567	224,887	181,946
ESPP	31,105	30,955	19,093
Total stock-based compensation expense	<u>\$ 325,611</u>	<u>\$ 270,439</u>	<u>\$ 210,090</u>
Income tax benefit	\$ 50,994	\$ 40,612	\$ 33,958

Stock-based compensation expense is reflected in Cadence's consolidated income statements during fiscal 2023, 2022 and 2021 as follows:

	2023	2022	2021
	(In thousands)		
Cost of product and maintenance	\$ 4,500	\$ 3,818	\$ 3,375
Cost of services	5,728	4,851	4,161
Marketing and sales	66,304	54,771	43,264
Research and development	194,709	158,937	131,247
General and administrative	54,370	48,062	28,043
Total stock-based compensation expense	<u>\$ 325,611</u>	<u>\$ 270,439</u>	<u>\$ 210,090</u>

Stock Options

The exercise price of each stock option granted under Cadence's employee equity incentive plans is equal to or greater than the closing price of Cadence's common stock on the date of grant. The fair value of each option grant is estimated on the date of grant using the Black-Scholes option pricing model. The weighted average grant date fair value of options granted, and the weighted average assumptions used in the model for fiscal 2023, 2022 and 2021 were as follows:

	2023	2022	2021
Dividend yield	None	None	None
Expected volatility	32.6 %	36.0 %	31.7 %
Risk-free interest rate	3.62 %	2.14 %	1.02 %
Expected term (in years)	5.0	4.8	4.8
Weighted average fair value of options granted	\$ 71.83	\$ 49.16	\$ 46.10

A summary of the changes in stock options outstanding under Cadence's equity incentive plans during fiscal 2023 is presented below:

	Shares (In thousands)	Weighted Average Exercise Price	Weighted Average Remaining Contractual Terms (Years)	Aggregate Intrinsic Value (In thousands)
Options outstanding as of December 31, 2022	2,915	\$ 80.35		
Granted	262	205.87		
Exercised	(797)	38.82		
Forfeited	(13)	131.94		
Options outstanding as of December 31, 2023	<u>2,367</u>	\$ 107.93	3.5	\$ 389,178
Options vested as of December 31, 2023	<u>1,763</u>	\$ 85.79	2.8	\$ 328,927

Cadence had total unrecognized compensation expense related to stock option grants of \$32.9 million as of December 31, 2023, which will be recognized over the remaining vesting period. The remaining weighted average vesting period of unvested awards is 2.3 years.

The total intrinsic value of and cash received from options exercised during fiscal 2023, 2022 and 2021 was:

	2023	2022	2021
	(In thousands)		
Intrinsic value of options exercised	\$ 139,125	\$ 105,242	\$ 129,403
Cash received from options exercised	30,940	16,014	23,844

Restricted Stock

Generally, restricted stock, which includes restricted stock awards and restricted stock units, vests over three years to four years and is subject to the employee's continuing service to Cadence. Stock-based compensation expense is recognized ratably over the vesting term. The vesting of certain restricted stock grants is subject to attainment of specified performance criteria. Each fiscal quarter, Cadence estimates the probability of the achievement of these performance goals and recognizes any related stock-based compensation expense using the graded-vesting method. The amount of stock-based compensation expense recognized in any one period can vary based on the attainment or expected attainment of the various performance goals. If such performance goals are not ultimately met, no compensation expense is recognized and any previously recognized compensation expense is reversed.

Certain long-term, market-based stock awards granted to executives vest over three to five years and are subject to certain market conditions and the executive's continuing service to Cadence. Vesting of the market-based awards is contingent upon achieving market conditions of total shareholder return relative to a peer index. Stock-based compensation expense is recognized using the graded-vesting method over the vesting term. If the market-based conditions are not ultimately met, compensation expense previously recognized is not reversed. As of December 31, 2023, Cadence had 2.4 million shares of unvested long-term, market-based stock awards outstanding.

Cadence granted market-based awards in fiscal 2023 and fiscal 2022. No market-based awards were granted in fiscal 2021. Compensation expense is calculated using the fair value of the market-based stock awards under Monte Carlo simulation model. The weighted average assumptions used in the model for fiscal 2023 and fiscal 2022 were as follows:

	2023	2022
Dividend yield	None	None
Expected volatility	33.6 %	29.1 %
Risk-free interest rate	3.64 %	1.98 %
Expected term (in years)	3.8	5.1
Weighted average fair value of market-based awards granted	\$ 132.20	\$ 51.34

Stock-based compensation expense related to performance-based restricted stock grants and market-based restricted stock grants for fiscal 2023, 2022 and 2021 was as follows:

	2023	2022	2021
	(In thousands)		
Stock-based compensation expense related to performance-based restricted stock	\$ 22,922	\$ 17,753	\$ 16,225
Stock-based compensation expense related to market-based stock awards	30,095	25,259	6,453

A summary of the changes in restricted stock outstanding under Cadence's equity incentive plans during fiscal 2023 is presented below:

	Shares (In thousands)	Weighted Average Grant Date Fair Value	Aggregate Intrinsic Value (In thousands)
Unvested shares as of December 31, 2022	6,371	\$ 99.03	
Granted	1,546	233.78	
Vested	(2,052)	115.26	
Forfeited	(268)	118.97	
Unvested shares as of December 31, 2023	<u>5,597</u>	<u>\$ 129.35</u>	<u>\$ 1,138,797</u>

As of December 31, 2023, Cadence had total unrecognized compensation expense related to restricted stock grants of \$547.2 million, which will be recognized over a weighted average vesting period of 1.8 years.

The total fair value realized by employees upon vesting of restricted stock during fiscal 2023, 2022 and 2021 was:

	2023	2022	2021
	(In thousands)		
Fair value of restricted stock realized upon vesting	\$ 442,556	\$ 346,003	\$ 365,298

Employee Stock Purchase Plan

Cadence provides an ESPP that enables eligible employees to purchase shares of its common stock. Offering periods under the plan last a duration of six months beginning on either February 1 or August 1, with the purchase dates falling on the last day of the six-month offering period. For the offering periods commencing after February 1, 2022, eligible employees may purchase Cadence's common stock at a price equal to 85% of the lower of the fair market value at the beginning or the end of the applicable offering period, in an amount not to exceed 15% of their annual base earnings plus bonuses and commissions, and subject to a limit in any calendar year of \$25,000. The ESPP may be amended from time to time. As of December 31, 2023, the total number of shares available for future issuance under the ESPP was 3.3 million.

Compensation expense is calculated using the fair value of the employees' purchase rights under the Black-Scholes option pricing model. The weighted average grant date fair value of purchase rights granted under the ESPP and the weighted average assumptions used in the model for fiscal 2023, 2022 and 2021 were as follows:

	2023	2022	2021
Dividend yield	None	None	None
Expected volatility	29.9 %	37.2 %	31.5 %
Risk-free interest rate	4.50 %	1.71 %	0.07 %
Expected term (in years)	0.5	0.5	0.5
Weighted average fair value of options granted	\$ 50.95	\$ 43.41	\$ 33.77

Shares of common stock issued under the ESPP for fiscal 2023, 2022 and 2021 were as follows:

	2023	2022	2021
	(In thousands, except per share amounts)		
Cadence shares purchased under the ESPP	647	703	624
Cash received for the purchase of shares under the ESPP	\$ 102,017	\$ 89,314	\$ 63,932
Weighted average purchase price per share	\$ 157.70	\$ 127.12	\$ 102.41

Reserved for Future Issuance

As of December 31, 2023, Cadence had reserved the following shares of authorized but unissued common stock for future issuance:

	Shares (In thousands)
Employee equity incentive plans*	21,028
Employee stock purchase plans	3,280
Directors stock plans*	458
Total	24,766

*Includes shares reserved for: (i) issuance upon exercise of future option grants, (ii) issuance upon vesting of future restricted stock grants, (iii) outstanding but unexercised options to purchase common stock, or (iv) unvested restricted stock units.

NOTE 10. STOCK REPURCHASE PROGRAMS

In August 2023, Cadence's Board of Directors increased the prior authorization to repurchase shares of Cadence common stock by authorizing an additional \$1.0 billion. The actual timing and amount of repurchases are subject to business and market conditions, corporate and regulatory requirements, stock price, acquisition opportunities and other factors.

During fiscal 2023, Cadence repurchased approximately 2.3 million shares on the open market, for an aggregate purchase price of 500.0 million.

In June 2023, Cadence also entered into an accelerated share repurchase ("ASR") agreement with HSBC Bank USA, National Association ("HSBC") to repurchase an aggregate of \$200.0 million of Cadence common stock. The ASR agreement was accounted for as two separate transactions (1) a repurchase of common stock and (2) an equity-linked contract on Cadence's own stock. In June 2023, Cadence received an initial share delivery of approximately 0.6 million shares, which represented the number of shares at a market price equal to \$140.0 million. An equity-linked contract for \$60 million, representing the remaining shares to be delivered by HSBC under the ASR agreement, was recorded to stockholders' equity as of June 30, 2023. In August 2023, the ASR agreement settled and resulted in a delivery of approximately 0.3 million additional shares to Cadence. In total, Cadence received approximately 0.9 million shares under the ASR agreement at an average price per share of \$228.26. The shares received were treated as repurchased common stock for purposes of calculating earnings per share.

As of December 31, 2023, approximately \$1.4 billion of the share repurchase authorization remained available to repurchase shares of Cadence common stock.

In June 2022, Cadence also entered into an ASR agreement with Royal Bank of Canada to repurchase an aggregate of \$100.0 million of Cadence common stock. The ASR agreement was accounted for as two separate transactions (1) a repurchase of common stock and (2) an equity-linked contract on Cadence's own stock. In June 2022, Cadence received an initial share delivery of approximately 0.5 million shares, which represented the number of shares at a market price equal to \$70.0 million. An equity-linked contract for \$30.0 million, representing the remaining shares to be delivered by Royal Bank of Canada under the ASR agreement, was recorded to stockholders' equity. In September 2022, the ASR agreement settled and resulted in a delivery to Cadence of approximately 0.1 million additional shares. In total, approximately 0.6 million shares were repurchased under the ASR agreement at an average price per share of \$167.07. The shares received were treated as a repurchase of common stock for purposes of calculating earnings per share.

The shares repurchased under Cadence's repurchase authorizations and the total cost of repurchased shares, including commissions, during fiscal 2023, 2022 and 2021 were as follows:

	2023*	2022**	2021
	(In thousands)		
Shares repurchased	3,145	6,602	4,401
Total cost of repurchased shares	\$ 700,134	\$ 1,050,091	\$ 612,297

*Includes 276 thousand shares and \$60 million equity forward contract from the June 2023 ASR settled in August 2023, and excludes \$0.9 million of excise tax.

**Includes 109 thousand shares and \$30 million equity forward contract from the June 2022 ASR settled in September 2022.

NOTE 11. RESTRUCTURING AND OTHER CHARGES

Cadence has initiated various restructuring plans in recent years in an effort to better align its resources with its business strategy. Most recently, in August 2023, Cadence initiated a restructuring plan (the “2023 Restructuring Plan”) and incurred costs comprised of severance payments and termination benefits related to headcount reductions and costs related to impacted facilities. Cadence expects to incur facility-related restructuring charges in future periods until all affected leases are terminated. These facility-related charges are not expected to be material. These costs are included in restructuring on Cadence’s consolidated income statements.

The following table presents activity for Cadence’s restructuring plans during fiscal 2023, 2022 and 2021:

	Severance and Benefits	Excess Facilities	Total
	(In thousands)		
Balance, January 2, 2021	\$ 7,321	\$ 1,372	\$ 8,693
Restructuring	(1,480)	432	(1,048)
Cash payments	(5,774)	(1,761)	(7,535)
Effect of foreign currency translation	(67)	—	(67)
Balance, January 1, 2022	\$ —	\$ 43	\$ 43
Restructuring	—	55	55
Cash payments	—	(98)	(98)
Effect of foreign currency translation	—	—	—
Balance, December 31, 2022	\$ —	\$ —	\$ —
Restructuring	10,935	78	11,013
Non-cash changes	—	(78)	(78)
Cash payments	(8,211)	—	(8,211)
Effect of foreign currency translation	(121)	—	(121)
Balance, December 31, 2023	\$ 2,603	\$ —	\$ 2,603

All liabilities for severance and related benefits under the 2023 Restructuring Plan are included in accounts payable and accrued liabilities on Cadence’s consolidated balance sheet as of December 31, 2023. Cadence expects to make cash payments to settle these liabilities through fiscal 2024.

Other Termination Benefits

During fiscal 2021, Cadence offered a voluntary retirement program to eligible employees in the United States. This program resulted in a one-time charge of \$26.8 million for voluntary termination and post-employment benefits. These charges were included in cost of revenue and each of the operating expense categories included in Cadence’s consolidated income statements. As of December 31, 2023, there were no remaining liabilities related to the voluntary retirement program on Cadence’s consolidated balance sheet.

NOTE 12. OTHER INCOME (EXPENSE), NET

Cadence’s other income (expense), net, for fiscal 2023, 2022 and 2021 was as follows:

	2023	2022	2021
	(In thousands)		
Interest income	\$ 29,637	\$ 10,099	\$ 2,634
Gains (losses) on investments	34,602	(5,425)	580
Gains (losses) on securities in NQDC trust	10,851	(8,744)	6,163
Losses on foreign exchange	(5,490)	(459)	(2,789)
Other expense, net	(2,714)	(860)	(262)
Total other income (expense), net	\$ 66,886	\$ (5,389)	\$ 6,326

NOTE 13. NET INCOME PER SHARE

Basic net income per share is computed by dividing net income during the period by the weighted average number of shares of common stock outstanding during that period, less unvested restricted stock awards. Diluted net income per share is impacted by equity instruments considered to be potential common shares, if dilutive, computed using the treasury stock method of accounting.

The calculations for basic and diluted net income per share for fiscal 2023, 2022 and 2021 are as follows:

	2023	2022	2021
	(In thousands, except per share amounts)		
Net income	\$ 1,041,144	\$ 848,952	\$ 695,955
Weighted average common shares used to calculate basic net income per share	269,381	271,198	273,504
Stock-based awards	3,367	3,813	5,354
Weighted average common shares used to calculate diluted net income per share	272,748	275,011	278,858
Net income per share – basic	\$ 3.86	\$ 3.13	\$ 2.54
Net income per share – diluted	\$ 3.82	\$ 3.09	\$ 2.50

The following table presents shares of Cadence's common stock outstanding for fiscal 2023, 2022 and 2021 that were excluded from the computation of diluted net income per share because the effect of including these shares in the computation of diluted net income per share would have been anti-dilutive:

	2023	2022	2021
	(In thousands)		
Long-term market-based awards	1,381	1,565	—
Options to purchase shares of common stock	345	716	214
Non-vested shares of restricted stock	232	88	41
Total potential common shares excluded	1,958	2,369	255

NOTE 14. INVESTMENTS
Marketable Equity Investments

Cadence's investments in marketable equity securities consist of purchased shares of publicly held companies and are included in prepaid expenses and other in Cadence's consolidated balance sheets. Changes in the fair value of these investments are recorded to other income (expense), net in Cadence's consolidated income statements. The carrying value of marketable equity investments was \$80.6 million and \$4.5 million as of December 31, 2023, and December 31, 2022, respectively.

Marketable Debt Securities

The following is a summary of Cadence's available-for-sale debt securities recorded within prepaid expenses and other on the consolidated balance sheet as of December 31, 2023:

	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Estimated Fair Value
	(In thousands)			
<u>Available-for-sale securities</u>				
Mortgage-backed and asset-backed securities	\$ 49,653	\$ 375	\$ (243)	\$ 49,785
Total available-for-sale securities	\$ 49,653	\$ 375	\$ (243)	\$ 49,785

Gross unrealized gains and losses are recorded as a component of accumulated other comprehensive loss on Cadence's consolidated balance sheets.

As of December 31, 2023, the fair values of available-for-sale debt securities, by remaining contractual maturity, were as follows:

	(In thousands)
Due within 1 year	\$ —
Due after 1 year through 5 years	10,027
Due after 5 years through 10 years	16,180
Due after 10 years	23,578
Total	<u>\$ 49,785</u>

As of December 31, 2023, Cadence does not intend to sell any of its available-for-sale securities in an unrealized loss position, and it is more likely than not that Cadence will hold the securities until maturity or a recovery of the cost basis.

Non-Marketable Equity Investments

Cadence's investments in non-marketable equity securities generally consist of stock or other instruments of privately held entities and are included in other assets on Cadence's consolidated balance sheets. Cadence holds a 16% interest in a privately held company that is accounted for using the equity method of accounting. The carrying value of this investment was \$111.1 million and \$117.7 million as of December 31, 2023, and December 31, 2022, respectively. Cadence records its proportionate share of net income from the investee, offset by amortization of basis differences, to other income (expense), net in Cadence's consolidated income statements. During fiscal 2023, 2022 and 2021, Cadence recorded losses of \$2.7 million, \$3.6 million and \$1.1 million respectively.

Cadence also holds other non-marketable investments in privately held companies where Cadence does not have the ability to exercise significant influence and the fair value of the investments is not readily determinable. The carrying value of these investments was \$27.2 million and \$2.3 million as of December 31, 2023, and December 31, 2022, respectively. There were no material upward or downward adjustments to non-marketable investments held or sold by Cadence during the periods presented.

NOTE 15. FAIR VALUE

Inputs to valuation techniques are observable or unobservable. Observable inputs reflect market data obtained from independent sources, while unobservable inputs reflect Cadence's market assumptions. These two types of inputs have created the following fair value hierarchy:

- Level 1 – Quoted prices for identical instruments in active markets;
- Level 2 – Quoted prices for similar instruments in active markets, quoted prices for identical or similar instruments in markets that are not active, and model-derived valuations in which all significant inputs and significant value drivers are observable in active markets; and
- Level 3 – Valuations derived from valuation techniques in which one or more significant inputs or significant value drivers are unobservable.

This hierarchy requires Cadence to minimize the use of unobservable inputs and to use observable market data, if available, when determining fair value. Cadence recognizes transfers between levels of the hierarchy based on the fair values of the respective financial instruments at the end of the reporting period in which the transfer occurred. There were no transfers between levels of the fair value hierarchy during the fiscal years presented.

On a quarterly basis, Cadence measures at fair value certain financial assets and liabilities. The fair value of financial assets and liabilities was determined using the following levels of inputs as of December 31, 2023, and December 31, 2022:

	Fair Value Measurements as of December 31, 2023			
	Total	Level 1	Level 2	Level 3
	(In thousands)			
Assets				
Cash equivalents:				
Money market funds	\$ 490,983	\$ 490,983	\$ —	\$ —
Marketable equity securities:				
Marketable equity securities	80,575	80,575	—	—
Mortgage-backed and asset-backed securities	49,785	—	49,785	—
Securities held in NQDC trust	75,671	75,671	—	—
Foreign currency exchange contracts	9,327	—	9,327	—
Total Assets	<u>\$ 706,341</u>	<u>\$ 647,229</u>	<u>\$ 59,112</u>	<u>\$ —</u>

As of December 31, 2023, Cadence did not have any financial liabilities requiring a recurring fair value measurement.

	Fair Value Measurements as of December 31, 2022:			
	Total	Level 1	Level 2	Level 3
	(In thousands)			
Assets				
Cash equivalents:				
Money market funds	\$ 548,373	\$ 548,373	\$ —	\$ —
Marketable equity securities	4,490	4,490	—	—
Securities held in NQDC trust	55,605	55,605	—	—
Foreign currency exchange contracts	5,306	—	5,306	—
Total Assets	<u>\$ 613,774</u>	<u>\$ 608,468</u>	<u>\$ 5,306</u>	<u>\$ —</u>

As of December 31, 2022, Cadence did not have any financial liabilities requiring a recurring fair value measurement.

Level 1 Measurements

Cadence's cash equivalents held in money market funds, marketable equity securities and the trading securities held in Cadence's NQDC trust are measured at fair value using Level 1 inputs.

Level 2 Measurements

The valuation techniques used to determine the fair value of Cadence's investments in marketable debt securities, foreign currency forward exchange contracts, the 2024 Notes and the 2025 Term Loan are classified within Level 2 of the fair value hierarchy. For additional information relating to Cadence's debt arrangements, see Note 5 in the notes to consolidated financial statements.

Level 3 Measurements

During fiscal 2023, Cadence acquired intangible assets of \$41.0 million. The fair value of the intangible assets acquired was determined using variations of the income approach that utilizes unobservable inputs classified as Level 3 measurements.

For existing technology, the fair value was determined by applying the relief-from-royalty method. This method is based on the application of a royalty rate to forecasted revenue to quantify the benefit of owning the intangible asset rather than paying a royalty for use of the asset. To estimate royalty savings over time, Cadence projected revenue from the acquired existing technology over the estimated remaining life of the technology, including the effect of assumed technological obsolescence, before applying an assumed royalty rate. Cadence assumed technological obsolescence at rates between 10% and 13% annually, before applying an assumed royalty rate between 25% and 30%.

For agreements and relationships, the fair value was determined by using the multi-period excess earnings method. This method reflects the present value of the projected cash flows that are expected to be generated from existing customers, less charges representing the contribution of other assets to those cash flows. Projected income from existing customer relationships was determined using customer retention rates between 70% and 90%. The present value of operating cash flows from existing customers was determined using discount rates between 12% and 15%.

During fiscal 2022, Cadence acquired intangible assets of \$178.6 million. The fair value of the intangible assets acquired was determined using variations of the income approach that utilizes unobservable inputs classified as Level 3 measurements.

With its acquisitions of OpenEye and Future Facilities, Cadence acquired combined intangible assets of \$155.5 million. For existing technology acquired with OpenEye and Future Facilities, the fair value was determined by applying the relief-from-royalty method. This method is based on the application of a royalty rate to forecasted revenue to quantify the benefit of owning the intangible asset rather than paying a royalty for use of the asset. To estimate royalty savings over time, Cadence projected revenue from the acquired existing technology over the estimated remaining life of the technology, including the effect of assumed technological obsolescence, before applying an assumed royalty rate. For both OpenEye and Future Facilities, Cadence assumed technological obsolescence at a rate of 10% annually, before applying an assumed royalty rate of 25%.

The fair value for agreements and relationships acquired with its acquisitions of OpenEye and Future Facilities was determined by using the multi-period excess earnings method. This method reflects the present value of the projected cash flows that are expected to be generated from existing customers, less charges representing the contribution of other assets to those cash flows. Projected income from existing customer relationships was determined using customer retention rates between 95% and 100% for OpenEye and 95% for Future Facilities. The present value of operating cash flows from existing customers was determined using discount rates ranging from 10% to 11%.

Cadence also completed three other business combinations during fiscal 2022, with combined intangible assets of \$23.1 million. The fair value of certain intangible assets acquired was determined using the multi-period excess earnings method, a variation of the income approach that utilizes unobservable inputs classified as Level 3 measurements. This method estimates the revenue and cash flows derived from the acquired assets, net of investment in supporting assets. The resulting cash flow, which is attributable solely to the assets acquired, is then discounted at a rate of return commensurate with the associated risk of the asset to calculate the present value. Cadence assumed discount rates ranging from 11.5% to 24.5%. The fair value of the remaining intangible assets acquired was determined using the relief-from-royalty method using a technological obsolescence rate of approximately 12% annually, before applying a royalty rate of 25%.

Cadence believes that its estimates and assumptions related to the fair value of its acquired intangible assets and assumed liabilities are reasonable, but significant judgment is involved.

NOTE 16. BALANCE SHEET COMPONENTS

A summary of certain balance sheet components as of December 31, 2023, and December 31, 2022, is as follows:

	As of	
	December 31, 2023	December 31, 2022
(In thousands)		
Inventories:		
Raw materials	\$ 162,754	\$ 113,982
Finished goods	18,907	14,023
Inventories	<u>\$ 181,661</u>	<u>\$ 128,005</u>
Prepaid expenses and other:		
Prepaid income taxes	\$ 24,905	\$ 69,498
Short-term investments	130,359	4,490
Other prepaid expenses and other assets	141,916	135,739
Prepaid expenses and other	<u>\$ 297,180</u>	<u>\$ 209,727</u>
Property, plant and equipment:		
Equipment and internal-use software	\$ 781,683	\$ 727,415
Buildings	131,882	131,949
Land	56,641	56,611
Leasehold, building and land improvements	211,854	176,413
Furniture and fixtures	39,998	34,330
In-process capital assets	17,937	21,670
Total cost	1,239,995	1,148,388
Less: Accumulated depreciation and amortization	<u>(836,782)</u>	<u>(776,937)</u>
Property, plant and equipment, net	<u>\$ 403,213</u>	<u>\$ 371,451</u>
Other assets:		
Non-marketable investments	\$ 138,321	\$ 119,997
ROU lease assets	150,797	170,379
Other long-term assets	248,254	185,901
Other assets	<u>\$ 537,372</u>	<u>\$ 476,277</u>
Accounts payable and accrued liabilities:		
Trade accounts payable	\$ 91,194	\$ 47,113
Payroll and payroll-related accruals	294,108	294,620
Customer deposits	18,790	54,568
Other accrued operating liabilities	172,466	160,857
Accounts payable and accrued liabilities	<u>\$ 576,558</u>	<u>\$ 557,158</u>
Other long-term liabilities:		
Operating lease liabilities	\$ 115,358	\$ 139,337
Other accrued liabilities	160,293	165,323
Other long-term liabilities	<u>\$ 275,651</u>	<u>\$ 304,660</u>

NOTE 17. LEASES

Operating lease expense, which includes immaterial amounts of short-term leases, variable lease costs and sublease income, was as follows during fiscal 2023, 2022 and 2021:

	2023	2022	2021
	(In thousands)		
Operating lease expense	\$ 56,805	\$ 49,165	\$ 43,210

Additional activity related to Cadence's leases during fiscal 2023, 2022 and 2021 was as follows:

	2023	2022	2021
	(In thousands)		
Cash paid for amounts included in the measurement of operating lease liabilities	\$ 46,069	\$ 34,334	\$ 50,151
ROU assets obtained in exchange for operating lease obligations	32,597	83,758	31,813

ROU lease assets and lease liabilities for Cadence's operating leases were recorded in the consolidated balance sheets as follows:

	As of	
	December 31, 2023	December 31, 2022
	(In thousands)	
Other assets	\$ 150,797	\$ 170,379
Accounts payable and accrued liabilities	41,619	36,737
Other long-term liabilities	115,358	139,337
Total lease liabilities	<u>\$ 156,977</u>	<u>\$ 176,074</u>
Weighted average remaining lease term (in years)	5.7	6.3
Weighted average discount rate	4 %	4 %

Future lease payments included in the measurement of lease liabilities on the consolidated balance sheet as of December 31, 2023, for the following five fiscal years and thereafter were as follows:

	Operating Leases
	(In thousands)
2024	\$ 45,304
2025	36,433
2026	27,054
2027	16,785
2028	13,122
Thereafter	38,693
Total future lease payments	<u>177,391</u>
Less imputed interest	(20,414)
Total lease liability balance	<u>\$ 156,977</u>

NOTE 18. COMMITMENTS AND CONTINGENCIES
Purchase Obligations

Cadence had purchase obligations of \$107.4 million as of December 31, 2023, that were associated with agreements or commitments for purchases of goods or services. Cadence expects to settle \$68.7 million of these obligations within the next 12 months.

Legal Proceedings

From time to time, Cadence is involved in various disputes and litigation that arise in the ordinary course of business. These include disputes and legal proceedings related to IP, indemnification obligations, mergers and acquisitions, licensing, contracts, customers, products, distribution and other commercial arrangements and employee relations matters. Cadence is also subject from time to time to inquiries, investigations and regulatory proceedings involving governments and regulatory agencies in the jurisdictions in which Cadence operates. At least quarterly, Cadence reviews the status of each significant matter and assesses its potential financial exposure. If the potential loss from any claim or legal proceeding is considered probable and the amount or the range of loss can be estimated, Cadence accrues a liability for the estimated loss. Legal proceedings are subject to uncertainties, and the outcomes are difficult to predict. Because of such uncertainties, accruals are based on Cadence's judgments using the best information available at the time. As additional information becomes available, Cadence reassesses the potential liability related to pending claims and litigation matters and may revise estimates.

Tax Proceedings

In December 2022, Cadence received a tax audit assessment of approximately \$49 million from the Korea taxing authorities for years 2017-2019. The tax audit assessment is primarily related to value-added taxes. Cadence was required to pay these assessed taxes, prior to being allowed to contest or litigate the assessment in administrative and judicial proceedings. The assessment was paid by Cadence in January 2023 and recorded as a component of other assets in the consolidated balance sheets. Payment of this amount is not an admission that Cadence is subject to such taxes, and Cadence continues to defend its position vigorously. Cadence did not record a reserve for this contingency as of December 31, 2023 or December 31, 2022 as Cadence does not believe a loss is probable because it believes it will ultimately prevail in full. The entire dispute resolution process may take up to eight years.

Other Contingencies

Cadence provides its customers with a warranty on sales of hardware products, generally for a 90-day period. Cadence did not incur any significant costs related to warranty obligations during fiscal 2023, 2022 or 2021.

Cadence's product license and services agreements typically include a limited indemnification provision for claims from third parties relating to Cadence's IP. If the potential loss from any indemnification claim is considered probable and the amount or the range of loss can be estimated, Cadence accrues a liability for the estimated loss.

In connection with a litigation campaign launched in April 2022 by Bell Semiconductor LLC ("Bell Semi"), a patent monetization entity, some customers sought defense and indemnification against claims of patent infringement asserted by Bell Semi in various district court litigation and at the U.S. International Trade Commission. Bell Semi alleged that the customers' use of one or more features of certain Cadence products infringed one or more of six patents held by Bell Semi. Cadence offered to defend some of its customers consistent with the terms of the applicable license agreements. On July 25, 2023, Cadence and Bell Semi reached a settlement agreement involving the six patents-in-suit. The settlement amount was not material to Cadence.

Cadence did not incur any material losses from indemnification claims during fiscal 2023, 2022 or 2021.

NOTE 19. EMPLOYEE AND DIRECTOR BENEFIT PLANS

Cadence maintains various defined contribution plans for its eligible U.S. and non-U.S. employees. For employees in the United States, Cadence maintains a 401(k) savings plan to provide retirement benefits through tax-deferred salary deductions and may make discretionary contributions, as determined by the Board of Directors, which cannot exceed a specified percentage of the annual aggregate salaries of those employees eligible to participate. Cadence's total contributions made to these plans during fiscal 2023, 2022 and 2021 were as follows:

	2023	2022	2021
	(In thousands)		
Contributions to defined contribution plans	\$ 39,651	\$ 35,464	\$ 33,029

Executive Officers and Directors may also elect to defer compensation payable to them under Cadence's NQDC. Deferred compensation payments are held in investment accounts and the values of the accounts are adjusted each quarter based on the fair value of the investments held in the NQDC. These investments are classified in other assets in the consolidated balance sheets and gains and losses are recognized as other income (expense), net in the consolidated income statements.

Certain of Cadence's international subsidiaries sponsor defined benefit retirement plans. The unfunded projected benefit obligation for Cadence's defined benefit retirement plans is recorded in other long-term liabilities in the consolidated balance sheets.

NOTE 20. ACCUMULATED OTHER COMPREHENSIVE LOSS

Cadence's accumulated other comprehensive loss is comprised of the aggregate impact of foreign currency translation gains and losses, changes in defined benefit plan liabilities and unrealized gains and losses on investments and is presented in Cadence's consolidated statements of comprehensive income.

Accumulated other comprehensive loss was comprised of the following as of December 31, 2023, and December 31, 2022:

	As of	
	December 31, 2023	December 31, 2022
	(In thousands)	
Foreign currency translation loss	\$ (90,678)	\$ (85,863)
Changes in defined benefit plan liabilities	(4,208)	(5,774)
Unrealized gains on investments	132	—
Total accumulated other comprehensive loss	<u>\$ (94,754)</u>	<u>\$ (91,637)</u>

For fiscal 2023, 2022 and 2021, there were no significant amounts related to foreign currency translation loss or changes in defined benefit plan liabilities reclassified to net income from accumulated other comprehensive loss.

NOTE 21. SEGMENT REPORTING

Segment reporting is based on the "management approach," following the method that management organizes the company's reportable segments for which separate financial information is made available to, and evaluated regularly by, the chief operating decision maker in allocating resources and in assessing performance. Cadence's chief operating decision maker is its CEO, who reviews Cadence's consolidated results as one operating segment. In making operating decisions, the CEO primarily considers consolidated financial information, accompanied by disaggregated information about revenues by geographic region.

Outside the United States, Cadence markets and supports its products and services primarily through its subsidiaries. Revenue is attributed to geography based upon the country in which the product is used, or services are delivered. Long-lived assets are attributed to geography based on the country where the assets are located.

The following table presents a summary of revenue by geography for fiscal 2023, 2022 and 2021:

	2023	2022	2021
	(In thousands)		
Americas:			
United States	\$ 1,694,529	\$ 1,577,881	\$ 1,292,980
Other Americas	65,259	53,123	42,141
Total Americas	<u>1,759,788</u>	<u>1,631,004</u>	<u>1,335,121</u>
Asia:			
China	679,538	521,509	378,160
Other Asia	766,409	629,533	566,772
Total Asia	<u>1,445,947</u>	<u>1,151,042</u>	<u>944,932</u>
Europe, Middle East and Africa	655,078	582,350	523,390
Japan	229,173	197,322	184,801
Total	<u>\$ 4,089,986</u>	<u>\$ 3,561,718</u>	<u>\$ 2,988,244</u>

The following table presents a summary of long-lived assets by geography as of December 31, 2023, December 31, 2022, and January 1, 2022:

	As of		
	December 31, 2023	December 31, 2022	January 1, 2022
	(In thousands)		
Americas:			
United States	\$ 383,807	\$ 347,822	\$ 267,202
Other Americas	10,219	7,548	975
Total Americas	394,026	355,370	268,177
Asia:			
China	29,598	51,667	56,403
Other Asia	71,365	73,329	54,677
Total Asia	100,963	124,996	111,080
Europe, Middle East and Africa	56,449	56,959	53,748
Japan	2,572	4,505	3,030
Total	\$ 554,010	\$ 541,830	\$ 436,035

NOTE 22. SUBSEQUENT EVENT

On January 8, 2024, Cadence acquired all of the outstanding equity of Invecas, Inc. ("Invecas"), a leading provider of design engineering, embedded software and system-level solutions. The acquisition adds a skilled system design engineering team to Cadence, with expertise in providing customers with custom solutions across chip design, product engineering, advanced packaging and embedded software. The aggregate cash consideration of approximately \$95 million will be allocated to the assets acquired and liabilities assumed based on their estimated fair values on the acquisition date. Cadence expects to complete the initial accounting for its acquisition of Invecas during the first quarter of fiscal 2024.

EXHIBIT INDEX

Exhibit Number	Exhibit Title	Form	Incorporated by Reference			Provided Herewith
			File No.	Exhibit No.	Filing Date	
3.01	The Registrant's Restated Certificate of Incorporation, as filed with the Secretary of State of the State of Delaware on May 3, 2019.	10-Q	000-15867	3.01	7/22/2019	
3.02	The Registrant's Amended and Restated Bylaws, effective as of November 2, 2023.	8-K	000-15867	3.01	11/3/2023	
4.01	Specimen Certificate of the Registrant's Common Stock.	S-4	033-43400	4.01	10/17/1991	
4.02	Base Indenture, dated October 9, 2014, between the Registrant and Wells Fargo Bank, N.A., as trustee.	8-K	000-15867	4.01	10/9/2014	
4.03	First Supplemental Indenture, dated October 9, 2014, between the Registrant and Wells Fargo Bank, N.A., as trustee (including the Form of 4.375% Senior Notes due 2024).	8-K	000-15867	4.02	10/9/2014	
4.04	Description of the Registrant's Securities Registered Pursuant to Section 12 of the Securities Exchange Act of 1934.					X
10.01*	The Registrant's 1995 Directors Stock Incentive Plan.	10-Q	001-15867	10.01	7/26/2012	
10.02*	Form of Stock Option Agreement, as currently in effect under the Registrant's 1995 Directors Stock Incentive Plan.	10-K	000-15867	10.76	2/21/2013	
10.03*	Form of Incentive Stock Award Agreement, as currently in effect under the Registrant's 1995 Directors Stock Incentive Plan.	10-K	000-15867	10.77	2/21/2013	
10.04*	The Registrant's Omnibus Equity Incentive Plan, as amended and restated.	S-8	333-275140	99.01	10/23/2023	
10.05*	Form of Incentive Stock Award Agreement for Non-Executive Employees and Consultants, as currently in effect under the Registrant's Omnibus Equity Incentive Plan.	10-Q	000-15867	10.01	10/23/2023	
10.06*	Form of Restricted Stock Unit Agreement for Non-Executive Employees and Consultants, as currently in effect under the Registrant's Omnibus Equity Incentive Plan.	10-Q	000-15867	10.02	10/23/2023	
10.07*	Form of Stock Option Agreement for Non-Executive Employees and Consultants, as currently in effect under the Registrant's Omnibus Equity Incentive Plan.	S-8	333-195771	99.04	5/7/2014	
10.08*	Form of Incentive Stock Award Agreement for Executives, as currently in effect under the Registrant's Omnibus Equity Incentive Plan.	S-8	333-195771	99.05	5/7/2014	
10.09*	Form of Restricted Stock Unit Agreement for Executives, as currently in effect under the Registrant's Omnibus Equity Incentive Plan.	S-8	333-195771	99.06	5/7/2014	
10.10*	Form of Stock Option Agreement for Executives, as currently in effect under the Registrant's Omnibus Equity Incentive Plan.	S-8	333-195771	99.07	5/7/2014	
10.11*	nusemi inc. 2015 Equity Incentive Plan.	S-8	333-226294	99.01	7/23/2018	
10.12*	The Registrant's Amended and Restated Employee Stock Purchase Plan.	S-8	333-226293	99.01	7/23/2018	
10.13*	The Registrant's 2009 Deferred Compensation Plan, as amended and restated on February 5, 2019.	10-K	000-15867	10.26	2/24/2020	
10.14*	The Registrant's Senior Executive Bonus Plan.	8-K	000-15867	10.01	2/8/2019	
10.15*	The Registrant's Executive Severance Plan.	8-K	001-15867	10.01	5/11/2016	
10.16*	The Registrant's Director Medical and Prescription Benefits Coverage Reimbursement Plan.	10-Q	001-10606	10.02	4/29/2011	

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10.17*	Form of Indemnity Agreement between the Registrant and its directors and executive officers, as amended and restated.	10-Q	000-15867	10.01	7/25/2016	
10.18*	Employment Agreement, effective as of January 8, 2009, between the Registrant and Lip-Bu Tan.	10-K	001-10606	10.93	3/2/2009	
10.19*	Employment Agreement, effective as of February 23, 2009, between the Registrant and Nimish H. Modi.	10-K	001-10606	10.96	3/2/2009	
10.20*	Form of First Amendment to Employment Agreement between the Registrant and the Registrant's named executive officers.	10-Q	001-10606	10.02	7/31/2009	
10.21*	Form of Second Amendment to Employment Agreement between the Registrant and the Registrant's named executive officers.	10-K	001-10606	10.94	2/26/2010	
10.22*	Second Amendment to Employment Agreement, effective as of March 1, 2010, between the Registrant and Lip-Bu Tan.	10-K	001-10606	10.95	2/26/2010	
10.23*	Third Amendment to Employment Agreement, effective as of March 22, 2018, between the Registrant and Lip-Bu Tan.	10-Q	000-15867	10.01	4/25/2018	
10.24*	Employment Agreement, effective as of September 20, 2012, between the Registrant and Thomas P. Beckley.	10-K	000-15867	10.44	2/20/2014	
10.25*	Letter, dated September 1, 2015, between the Registrant and Neil Zaman.	10-K	000-15867	10.49	2/18/2016	
10.26*	Amended and Restated Employment Agreement, effective as of December 15, 2021, between the Registrant and Anirudh Devgan.	8-K/A	000-15867	10.01	12/17/2021	
10.27*	Executive Chairman Agreement, effective as of December 15, 2021, between the Registrant and Lip-Bu Tan.	8-K/A	000-15867	10.02	12/17/2021	
10.28	Credit Agreement, dated as of June 30, 2021, by and among the Registrant, Bank of America, N.A., and other lenders party thereto.	8-K	000-15867	10.01	7/1/2021	
10.29	First Amendment to Credit Agreement, dated September 7, 2022, by and among the Registrant, Bank of America, N.A., and other lenders party thereto.	8-K	000-15867	10.02	9/8/2022	
10.30	Loan Agreement, dated September 7, 2022, by and among the Registrant, Bank of America, N.A., and other lenders party thereto.	8-K	000-15867	10.01	9/8/2022	
21.01	Subsidiaries of the Registrant.					X
23.01	Consent of PricewaterhouseCoopers LLP, Independent Registered Public Accounting Firm.					X
24.01	Power of Attorney (incorporated by reference to the signature page to this Annual Report on Form 10-K).					
31.01	Certification of the Registrant's Chief Executive Officer, Anirudh Devgan, pursuant to Rule 13a-14 of the Securities Exchange Act of 1934.					X
31.02	Certification of the Registrant's Chief Financial Officer, John M. Wall, pursuant to Rule 13a-14 of the Securities Exchange Act of 1934.					X
32.01†	Certification of the Registrant's Chief Executive Officer, Anirudh Devgan, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.					X
32.02†	Certification of the Registrant's Chief Financial Officer, John M. Wall, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.					X

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97.01	The Registrant's Policy for Recovery of Erroneously Awarded Compensation	X
101.INS	Inline XBRL Instance Document.	X
101.SCH	Inline XBRL Taxonomy Extension Schema Document.	X
101.CAL	Inline XBRL Taxonomy Extension Calculation Linkbase Document.	X
101.DEF	Inline XBRL Taxonomy Extension Definition Linkbase Document.	X
101.LAB	Inline XBRL Taxonomy Extension Label Linkbase Document.	X
101.PRE	Inline XBRL Taxonomy Extension Presentation Linkbase Document.	X
104	Cover Page Interactive Data File - The cover page from this Annual Report on Form 10-K is formatted in iXBRL.	

* Indicates management contract or compensatory plan or arrangement covering executive officers or directors of the Registrant.

† In accordance with Item 601(b)(32)(ii) of Regulation S-K, the certifications furnished in Exhibits 32.01 and 32.02 hereto will not be deemed "filed" for purposes of Section 18 of the Exchange Act or incorporated by reference into any filings under the Securities Act or the Exchange Act (except to the extent that the registrant specifically incorporates it by reference).

Item 16. Form 10-K Summary

None.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

CADENCE DESIGN SYSTEMS, INC.

/s/ Anirudh Devgan

Anirudh Devgan
President and Chief Executive Officer
Dated: February 13, 2024

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated.

/s/ Anirudh Devgan DATE: February 13, 2024
Anirudh Devgan
President and Chief Executive Officer

/s/ John M. Wall DATE: February 13, 2024
John M. Wall
Senior Vice President and Chief Financial Officer

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints Anirudh Devgan, John M. Wall and Karna Nisewaner, and each of them, as his or her true and lawful attorneys-in-fact and agents, with full power of substitution and resubstitution, for him or her and in his or her name, place and stead, in any and all capacities, to sign any and all amendments (including post-effective amendments) to this Report on Form 10-K, and to file the same, with all exhibits thereto, and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith, as fully to all intents and purposes as he or she might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents, or any of them, or their, his or her substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated:

<u>/s/ Mary Louise Krakauer</u> Mary Louise Krakauer, Chair	February 13, 2024
<u>/s/ Mark W. Adams</u> Mark W. Adams, Director	February 13, 2024
<u>/s/ Ita Brennan</u> Ita Brennan, Director	February 13, 2024
<u>/s/ Lewis Chew</u> Lewis Chew, Director	February 13, 2024
<u>/s/ Julia Liuson</u> Julia Liuson, Director	February 13, 2024
<u>/s/ Dr. James D. Plummer</u> Dr. James D. Plummer, Director	February 13, 2024
<u>/s/ Dr. Alberto Sangiovanni-Vincentelli</u> Dr. Alberto Sangiovanni-Vincentelli, Director	February 13, 2024
<u>/s/ Dr. John B. Shoven</u> Dr. John B. Shoven, Director	February 13, 2024
<u>/s/ Young K. Sohn</u> Young K. Sohn, Director	February 13, 2024

**DESCRIPTION OF THE REGISTRANT'S SECURITIES
REGISTERED PURSUANT TO SECTION 12 OF THE
SECURITIES EXCHANGE ACT OF 1934**

The following description of the common stock of Cadence Design Systems, Inc. ("Cadence," "we," "us" or "our") is based upon our restated certificate of incorporation ("Restated Certificate of Incorporation"), our amended and restated bylaws ("Amended and Restated Bylaws") and applicable provisions of law. This description is qualified in its entirety by, and should be read in conjunction with, our Restated Certificate of Incorporation and our Amended and Restated Bylaws, each of which is incorporated by reference as an exhibit to the Annual Report on Form 10-K of which this exhibit is a part.

General

Our authorized capital stock consists of 600,000,000 shares of common stock, par value \$0.01 per share, and 400,000 shares of preferred stock, par value \$0.01 per share. We have one class of securities registered under Section 12 of the Securities Exchange Act of 1934, as amended, our common stock, which is listed on the Nasdaq Global Select Market under the symbol "CDNS." All of the shares of preferred stock have been designated as Series A junior participating preferred stock ("Series A Preferred"), but there are no shares of Series A Preferred outstanding.

Common Stock

Dividends. Holders of common stock are entitled to receive ratably such dividends, if any, as may be declared from time to time by the board of directors out of funds legally available for dividend payments.

Voting. Holders of common stock are entitled to one vote for each share held on all matters submitted to a vote of stockholders, including the election of directors. Cadence stockholders are not authorized by our Restated Certificate of Incorporation or our Amended and Restated Bylaws to cumulate votes for the election of directors. Directors are elected by the affirmative vote of a majority of the votes cast (except that in a contested election, directors are elected by a plurality of the shares represented in person or by proxy at the relevant meeting of stockholders and entitled to vote on the election of directors). The affirmative vote of the holders of a majority of the voting power of the stock entitled to vote thereon present in person or represented by proxy at the relevant meeting of stockholders is generally required for Cadence stockholders to take action on all other matters, except as otherwise provided in our Restated Certificate of Incorporation or Amended and Restated Bylaws or as otherwise required by law.

Preemptive Rights, Conversion and Redemption. The common stock is not entitled to preemptive or conversion rights and is not subject to redemption or sinking fund provisions.

Liquidation, Dissolution and Winding-Up. Upon our liquidation, dissolution or winding-up, the holders of common stock are entitled to share ratably in all assets remaining after payment of liabilities and any preferences on preferred stock we may issue in the future.

Our common stock is subject and subordinate to the rights and preferences of any shares of Series A Preferred or other preferred stock that the board of directors may issue from time to time.

Anti-Takeover Provisions

Delaware Takeover Statute. We are governed by Section 203 of the Delaware General Corporation Law ("Section 203"), which prohibits a Delaware corporation from engaging in any business combination with any interested stockholder for a period of three years after the time that the stockholder became an interested stockholder, unless:

- before that time, the board of directors of the corporation approved either the business combination or the transaction that resulted in the stockholder becoming an interested stockholder;
- upon completion of the transaction that resulted in the stockholder becoming an interested stockholder, the interested stockholder owned at least 85% of the voting stock of the corporation outstanding at the time the transaction began, excluding for purposes of determining the number of shares outstanding those shares owned by persons who are directors and also officers and shares issued under employee stock plans in which employee participants do not have the right to determine confidentially whether shares held subject to the plan will be tendered in a tender or exchange offer; or
- on or after that time, the business combination is approved by the board of directors and authorized at an annual or special meeting of stockholders, and not by written consent, by the affirmative vote of at least sixty-six and two-thirds percent (66 2/3%) of the outstanding voting stock that is not owned by the interested stockholder.

In general, Section 203 defines an interested stockholder as any entity or person who, with affiliates and associates, owns, or within the three-year period immediately prior to the business combination, beneficially owned 15% or more of the outstanding voting stock of the corporation. Section 203 defines business combination to include:

- any merger or consolidation involving the corporation and the interested stockholder;
- any sale, transfer, pledge or other disposition of 10% or more of the assets of the corporation involving the interested stockholder;
- subject to specified exceptions, any transaction that results in the issuance or transfer by the corporation of any stock of the corporation to the interested stockholder;
- any transaction involving the corporation that increases the proportionate share of the stock of any class or series of the corporation beneficially owned by the interested stockholder; or
- the receipt by the interested stockholder of the benefit of any loans, advances, guarantees, pledges or other financial benefits provided by or through the corporation.

Preferred Stock. Under our Restated Certificate of Incorporation, the board of directors has the power, without action by the stockholders, to designate and issue up to 400,000 shares of preferred stock in one or more series. All 400,000 shares of preferred stock are designated as Series A Preferred as of the date of the Annual Report on Form 10-K of which this exhibit is a part, but because no such shares are outstanding or reserved for issuance, the board of directors may reduce the number of shares of preferred stock designated

as Series A Preferred to zero. Subject to the Delaware General Corporation Law, the board of directors may, as to any shares of preferred stock the terms of which have not then been designated:

- fix the rights, preferences, privileges and restrictions on these shares;
- fix the number of shares and designation of any series; and
- increase or decrease the number of shares of any series if not below the number of outstanding shares plus the number of shares reserved for issuance.

The board of directors has the power to issue shares of Series A Preferred with dividend, voting and liquidation rights superior to our common stock at a rate of 1,000-to-1 without further vote or action by the common stockholders. As a result, the issuance of Series A Preferred (or other preferred stock that the board of directors may designate and issue from time to time) may:

- delay, defer or prevent a change in control;
- adversely affect the voting and other rights of the holders of our common stock; and
- discourage acquisition proposals or tender offers for our shares and, as a consequence, inhibit increases in the market price of our shares that could result from actual or rumored takeover attempts.

Advance Notice Provisions. Our Amended and Restated Bylaws establish advance notice procedures for stockholder proposals and nominations of candidates for election as directors other than nominations made by or at the direction of the board of directors.

Special Meeting Requirements. Our Amended and Restated Bylaws provide that special meetings of stockholders may be called at the request of (a) the board of directors, (b) the chairman of the board of directors, (c) the chief executive officer, or (d) the secretary upon the written request of stockholders who have “owned” (as defined in our Amended and Restated Bylaws) at least 15% of Cadence’s outstanding common stock for at least one year and satisfy the other requirements specified in our Amended and Restated Bylaws.

Cumulative Voting. Neither our Restated Certificate of Incorporation nor our Amended and Restated Bylaws provides for cumulative voting in the election of directors.

These provisions may deter a hostile takeover or delay a change in control or management of Cadence.

Proxy Access

Our Amended and Restated Bylaws provide that a stockholder or a group of up to 20 stockholders who have continuously “owned” (as defined in our Amended and Restated Bylaws) at least 3% of our common stock for three years or more may nominate a director and have that nominee included in our proxy materials for our annual meeting of stockholders, provided that the stockholder or stockholders and nominee satisfy the requirements specified in our Amended and Restated Bylaws.

Choice of Forum

Our Amended and Restated Bylaws provide that unless a majority of the board of directors consents in writing to the selection of an alternative forum, the sole and exclusive forum (i) for (a) any derivative action or proceeding brought on behalf of Cadence, (b) any action that is based upon a breach of a fiduciary duty owed by any current or former director, officer, other employee or stockholder of Cadence to Cadence or our stockholders, (c) any action asserting a claim against Cadence or any of its current or former directors, officers or other employees arising pursuant to any provision of the Delaware General Corporation Law, our Restated Certificate of Incorporation or our Amended and Restated Bylaws, (d) any action asserting a claim against Cadence or any of its current or former directors, officers or other employees governed by the internal affairs doctrine of the State of Delaware, or (e) any other action asserting an internal corporate claim, as defined in Section 115 of the Delaware General Corporation Law shall be the Court of Chancery of the State of Delaware (or, if the Court of Chancery does not have jurisdiction, another state court located within the State of Delaware or, if no court located within the State of Delaware has jurisdiction, the federal district court for the District of Delaware), and (ii) for any complaint asserting a cause of action under the Securities Act of 1933, as amended, shall be the federal district courts of the United States of America, in all cases subject to such court's having personal jurisdiction over all indispensable parties named as defendants.

**CADENCE DESIGN SYSTEMS, INC.
SUBSIDIARIES OF THE REGISTRANT**

The Registrant's subsidiaries as of January 30, 2024, and the state or country in which each is incorporated or organized are as follows:

Applied Wave Research Limited	United Kingdom
AWR LLC	Delaware, U.S.A.
Beijing Cadence Information Technology Co., Ltd.	People's Republic of China
Cadence Design (Israel) II, Ltd.	Israel
Cadence Design Systems (Canada) Limited	Canada
Cadence Design Systems (Cyprus) Limited	Cyprus
Cadence Design Systems (Finland) Oy	Finland
Cadence Design Systems (India) Private Limited	India
Cadence Design Systems (Ireland) Limited	Ireland
Cadence Design Systems (Israel) Ltd.	Israel
Cadence Design Systems (Japan) B.V.	The Netherlands
Cadence Design Systems (S) Pte Ltd.	Singapore
Cadence Design Systems (Sales) India Private Limited	India
Cadence Design Systems A.B.	Sweden
Cadence Design Systems B.V.	The Netherlands
Cadence Design Systems Belgium SA	Belgium
Cadence Design Systems do Brasil Microeletronica Ltda.	Brazil
Cadence Design Systems GmbH	Germany
Cadence Design Systems I B.V.	The Netherlands
Cadence Design Systems Kft.	Hungary
Cadence Design Systems Limited	United Kingdom
Cadence Design Systems LLC	Russia
Cadence Design Systems Malaysia Sdn. Bhd.	Malaysia
Cadence Design Systems Management (Shanghai) Co., Ltd.	People's Republic of China
Cadence Design Systems S.A.S.	France
Cadence Design Systems S.r.l.	Italy
Cadence Design Systems Vietnam Company Limited	Vietnam
Cadence Global Holdings, Inc.	Delaware, U.S.A.
Cadence Group Unlimited Company	Ireland
Cadence International Ltd.	Ireland
Cadence Korea Ltd.	The Republic of Korea
Cadence Taiwan, Inc.	Taiwan
Cadence Technology Limited	Ireland
Cadence U.S., Inc.	Delaware, U.S.A.
Cascade Technologies, LLC	Delaware, U.S.A.
Castlewilder Global Unlimited Company	Ireland
Castlewilder Unlimited Company	Ireland
coupledNumerics GmbH	Switzerland
CréVinn Teoranta	Ireland
Denali Software Kabushiki Kaisha	Japan
Denali Software, LLC	California, U.S.A.
FFG Holdings Limited	United Kingdom
Future Facilities Incorporated	California, U.S.A.
Future Facilities KK	Japan
Future Facilities Limited	United Kingdom
Intrinsic Corp.	Massachusetts, U.S.A.
Invecas, Inc.	Delaware, U.S.A.

Invecas Technologies Private Limited	India
Jasper Holdings Ltd.	Cayman Islands
Nanjing Kai Ding Electronics Technology Co., Ltd.	People's Republic of China
Numeca (Beijing) Software Limited	People's Republic of China
Numeca USA, Inc.	Arizona, U.S.A.
Numeca-HK Limited	Hong Kong
NUMFLO SA	Belgium
OpenEye Scientific Software Deutschland GmbH	Germany
OpenEye Scientific Software, Inc.	Delaware, U.S.A.
Pointwise, Inc.	Texas, U.S.A.
Pulsic Inc.	Delaware, U.S.A.
Pulsic Japan Limited	United Kingdom
Pulsic Limited	United Kingdom
Rocketick Inc.	Delaware, U.S.A.
Shanghai Cadence Electronics Technology Co., Ltd.	People's Republic of China
Tundra Holdings, Inc.	Delaware, U.S.A.
Verifyter AB	Sweden
Verifyter Inc.	Delaware, U.S.A.
6SIGMADC Limited	United Kingdom

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the incorporation by reference in the Registration Statements on Form S-8 (Nos. 333-275140, 333-240302, 333-232761, 333-226294, 333-226293, 333-226292, 333-219432, 333-212669, 333-204278, 333-197579, 333-195771, 333-188449, 333-184595, 333-159486, 333-150948, 333-149877, 333-145891, 333-135003, 333-132754, 333-132753, 333-124025, 333-119335, 333-116681, 333-115351, 333-115349, 333-108251, 333-105492, 333-105481, 333-104720, 333-103657, 333-103250, 333-102648, 333-101693, 333-88390, 333-87674, 333-85080, 333-82044, 333-75874, 333-65116, 333-56898, 333-69589, 333-33330, 333-93609, 333-85591, 333-71717, 333-65529, 333-34599, 333-27109, and 333-18963) of Cadence Design Systems, Inc. of our report dated February 13, 2024 relating to the financial statements and the effectiveness of internal control over financial reporting, which appears in this Form 10-K.

/s/ PricewaterhouseCoopers LLP

San Jose, California
February 13, 2024

**CERTIFICATION OF CHIEF EXECUTIVE OFFICER
PURSUANT TO SECTION 302 OF
THE SARBANES-OXLEY ACT OF 2002**

I, Anirudh Devgan, certify that:

1. I have reviewed this Annual Report on Form 10-K of Cadence Design Systems, Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

By: /s/ Anirudh Devgan

Anirudh Devgan
President and Chief Executive Officer
(Principal Executive Officer)

Date: February 13, 2024

**CERTIFICATION OF CHIEF FINANCIAL OFFICER
PURSUANT TO SECTION 302 OF
THE SARBANES-OXLEY ACT OF 2002**

I, John M. Wall, certify that:

1. I have reviewed this Annual Report on Form 10-K of Cadence Design Systems, Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

By: /s/ John M. Wall
John M. Wall
Senior Vice President and Chief Financial Officer
(Principal Accounting and Financial Officer)

Date: February 13, 2024

**CERTIFICATION OF CHIEF EXECUTIVE OFFICER
PURSUANT TO 18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO SECTION 906
OF THE SARBANES-OXLEY ACT OF 2002**

In connection with the Annual Report on Form 10-K for the fiscal year ended December 31, 2023 of Cadence Design Systems, Inc. (the "Company") as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Anirudh Devgan, President and Chief Executive Officer of the Company, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that:

1. The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and
2. The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

/s/ Anirudh Devgan

Anirudh Devgan
President and Chief Executive Officer
(Principal Executive Officer)
Date: February 13, 2024

A signed original of this written statement required by Section 906 has been provided to Cadence Design Systems, Inc. and will be retained by Cadence and furnished to the Securities and Exchange Commission or its staff upon request.

**CERTIFICATION OF CHIEF FINANCIAL OFFICER
PURSUANT TO 18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO SECTION 906
OF THE SARBANES-OXLEY ACT OF 2002**

In connection with the Annual Report on Form 10-K for the fiscal year ended December 31, 2023 of Cadence Design Systems, Inc. (the "Company") as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, John M. Wall, Senior Vice President and Chief Financial Officer of the Company, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that:

1. The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and
2. The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

/s/ John M. Wall

John M. Wall

Senior Vice President and Chief Financial Officer
(Principal Accounting and Financial Officer)

Date: February 13, 2024

A signed original of this written statement required by Section 906 has been provided to Cadence Design Systems, Inc. and will be retained by Cadence and furnished to the Securities and Exchange Commission or its staff upon request.

CADENCE DESIGN SYSTEMS, INC. POLICY FOR RECOVERY OF ERRONEOUSLY AWARDED COMPENSATION

Cadence Design Systems, Inc. (the “*Company*”) has adopted this Policy for Recovery of Erroneously Awarded Compensation (the “*Policy*”), effective as of October 2, 2023 (the “*Effective Date*”). Capitalized terms used in this Policy but not otherwise defined herein are defined in Section 11.

1. Persons Subject to Policy

This Policy shall apply to current and former Officers of the Company. Each Officer shall be required to sign an Acknowledgement Agreement pursuant to which such Officer will agree to be bound by the terms of, and comply with, this Policy; however, any Officer’s failure to sign any such Acknowledgement Agreement shall not negate the application of this Policy to the Officer.

2. Compensation Subject to Policy

This Policy shall apply to Incentive-Based Compensation received on or after the Effective Date. For purposes of this Policy, the date on which Incentive-Based Compensation is “received” shall be determined under the Applicable Rules, which generally provide that Incentive-Based Compensation is “received” in the Company’s fiscal period during which the relevant Financial Reporting Measure is attained or satisfied, without regard to whether the grant, vesting or payment of the Incentive-Based Compensation occurs prior to or after the end of that period.

3. Recovery of Compensation

In the event that the Company is required to prepare a Restatement, the Company shall recover, reasonably promptly, the portion of any Incentive-Based Compensation that is Erroneously Awarded Compensation, unless the Committee has determined that recovery would be impracticable, and one or more of the Impracticability Conditions has been met. Recovery shall be required in accordance with the preceding sentence regardless of whether the applicable Officer engaged in misconduct or otherwise caused or contributed to the requirement for the Restatement and regardless of whether or when restated financial statements are filed by the Company. For clarity, the recovery of Erroneously Awarded Compensation under this Policy will not give rise to any person’s right to voluntarily terminate employment for “good reason,” or due to a “constructive termination” (or any similar term of like effect) under any plan, program or policy of or agreement with the Company or any of its affiliates or to constitute a breach of a contract or other arrangement to which such person is party.

4. Manner of Recovery; Limitation on Duplicative Recovery

The Committee shall, in its sole discretion, determine the manner of recovery of any Erroneously Awarded Compensation, which may include, without limitation, reduction or cancellation by the Company or an affiliate of the Company of Incentive-Based Compensation or Erroneously Awarded Compensation, reimbursement or repayment by any person subject to this Policy of the Erroneously Awarded Compensation, and, to the extent permitted by law, an offset of the Erroneously Awarded Compensation against other compensation payable by the Company or an affiliate of the Company to such person. Notwithstanding the foregoing, unless otherwise prohibited by the Applicable Rules, to the extent this Policy provides for recovery of Erroneously

Awarded Compensation already recovered by the Company pursuant to Section 304 of the Sarbanes-Oxley Act of 2002 or Other Recovery Arrangements, the amount of Erroneously Awarded Compensation already recovered by the Company from the recipient of such Erroneously Awarded Compensation will be credited to the amount of Erroneously Awarded Compensation required to be recovered pursuant to this Policy from such person.

5. Administration

This Policy shall be administered, interpreted and construed by the Committee, which is authorized to make all determinations necessary, appropriate or advisable for such purpose. The Board of Directors of the Company (the “**Board**”) may vest in itself the authority to administer, interpret and construe this Policy in accordance with applicable law, and in such event references herein to the “Committee” shall be deemed to be references to the Board. Subject to any permitted review by the applicable national securities exchange or association pursuant to the Applicable Rules, all determinations and decisions made by the Committee pursuant to the provisions of this Policy shall be final, conclusive and binding on all persons, including the Company and its affiliates, equityholders and employees. The Committee may delegate administrative duties with respect to this Policy to one or more directors or employees of the Company, as permitted under applicable law, including any Applicable Rules.

6. Interpretation

This Policy will be interpreted and applied in a manner that is consistent with the requirements of the Applicable Rules, and to the extent this Policy is inconsistent with such Applicable Rules, it shall be deemed amended to the minimum extent necessary to ensure compliance therewith.

7. No Indemnification; No Personal Liability

Notwithstanding the terms of any insurance policy or any contractual or other arrangement with any Officer that may be interpreted to the contrary, the Company shall not indemnify or insure any person against the loss of any Erroneously Awarded Compensation pursuant to this Policy, nor shall the Company directly or indirectly pay or reimburse any person for any premiums for third-party insurance policies that such person may elect to purchase to fund such person’s potential obligations under this Policy. No member of the Committee or the Board shall have any personal liability to any person as a result of actions taken under this Policy and each member of the Committee and the Board shall be fully indemnified by the Company to the fullest extent under applicable law and Company policy with respect to any actions taken under this Policy. The foregoing sentence shall not limit any other rights to indemnification of the members of the Board under applicable law or Company policy.

8. Application; Enforceability

Except as otherwise determined by the Committee or the Board, the adoption of this Policy does not limit, and is intended to apply in addition to, any other clawback, recoupment, forfeiture or similar policies or provisions of the Company or its affiliates, including any such policies or provisions of such effect contained in any employment agreement, bonus plan, incentive plan, equity-based plan or award agreement thereunder or similar plan, program or agreement of the Company or an affiliate or required under applicable law (the “**Other Recovery Arrangements**”). The remedy specified in this Policy shall not be exclusive and shall be in

addition to every other right or remedy at law or in equity that may be available to the Company or an affiliate of the Company.

9. Severability

The provisions in this Policy are intended to be applied to the fullest extent of the law; provided, however, to the extent that any provision of this Policy is found to be unenforceable or invalid under any applicable law, such provision will be applied to the maximum extent permitted, and shall automatically be deemed amended in a manner consistent with its objectives to the extent necessary to conform to any limitations required under applicable law.

10. Amendment and Termination

The Board or the Committee may amend, modify or terminate this Policy in whole or in part at any time and from time to time in its sole discretion. This Policy will terminate automatically when the Company does not have a class of securities listed on a national securities exchange or association.

11. Definitions

“Applicable Rules” means Section 10D of the Exchange Act, Rule 10D-1 promulgated thereunder, the listing rules of the national securities exchange or association on which the Company’s securities are listed, and any applicable rules, standards or other guidance adopted by the Securities and Exchange Commission or any national securities exchange or association on which the Company’s securities are listed.

“Committee” means the committee of the Board responsible for executive compensation decisions comprised solely of independent directors (as determined under the Applicable Rules), or in the absence of such a committee, a majority of the independent directors serving on the Board.

“Erroneously Awarded Compensation” means the amount of Incentive-Based Compensation received by a current or former Officer that exceeds the amount of Incentive-Based Compensation that would have been received by such current or former Officer based on a restated Financial Reporting Measure, as determined on a pre-tax basis in accordance with the Applicable Rules.

“Exchange Act” means the Securities Exchange Act of 1934, as amended.

“Financial Reporting Measure” means any measure determined and presented in accordance with the accounting principles used in preparing the Company’s financial statements, and any measures derived wholly or in part from such measures, including GAAP, IFRS and non-GAAP/IFRS financial measures, as well as stock or share price and total equityholder return.

“GAAP” means United States generally accepted accounting principles.

“IFRS” means international financial reporting standards as adopted by the International Accounting Standards Board.

“Impracticability Conditions” means (a) the direct costs paid to third parties to assist in enforcing recovery would exceed the Erroneously Awarded Compensation; provided that the

Company (i) has made reasonable attempts to recover the Erroneously Awarded Compensation, (ii) documented such attempt(s), and (iii) provided such documentation to the relevant listing exchange or association, (b) to the extent permitted by the Applicable Rules, the recovery would violate the Company's home country laws pursuant to an opinion of home country counsel; provided that the Company has (i) obtained an opinion of home country counsel, acceptable to the relevant listing exchange or association, that recovery would result in such violation, and (ii) provided such opinion to the relevant listing exchange or association, or (c) recovery would likely cause an otherwise tax-qualified retirement plan, under which benefits are broadly available to employees of the Company, to fail to meet the requirements of 26 U.S.C. 401(a)(13) or 26 U.S.C. 411(a) and the regulations thereunder.

"Incentive-Based Compensation" means, with respect to a Restatement, any compensation that is granted, earned, or vested based wholly or in part upon the attainment of one or more Financial Reporting Measures and received by a person: (a) after beginning service as an Officer; (b) who served as an Officer at any time during the performance period for that compensation; (c) while the issuer has a class of its securities listed on a national securities exchange or association; and (d) during the applicable Three-Year Period.

"Officer" means each person who serves as an executive officer of the Company, as defined in Rule 10D-1(d) under the Exchange Act.

"Restatement" means an accounting restatement to correct the Company's material noncompliance with any financial reporting requirement under securities laws, including restatements that correct an error in previously issued financial statements (a) that is material to the previously issued financial statements or (b) that would result in a material misstatement if the error were corrected in the current period or left uncorrected in the current period.

"Three-Year Period" means, with respect to a Restatement, the three completed fiscal years immediately preceding the date that the Board, a committee of the Board, or the officer or officers of the Company authorized to take such action if Board action is not required, concludes, or reasonably should have concluded, that the Company is required to prepare such Restatement, or, if earlier, the date on which a court, regulator or other legally authorized body directs the Company to prepare such Restatement. The "Three-Year Period" also includes any transition period (that results from a change in the Company's fiscal year) within or immediately following the three completed fiscal years identified in the preceding sentence. However, a transition period between the last day of the Company's previous fiscal year end and the first day of its new fiscal year that comprises a period of nine to 12 months shall be deemed a completed fiscal year.

FORM OF ACKNOWLEDGEMENT AGREEMENT

PERTAINING TO THE CADENCE DESIGN SYSTEMS, INC. POLICY FOR RECOVERY OF ERRONEOUSLY AWARDED COMPENSATION

In consideration of, and as a condition to, the receipt of future cash and equity incentive compensation from Cadence Design Systems, Inc. (the “*Company*”), _____ (“*Executive*”) and the Company are entering into this Acknowledgement Agreement.

1. Executive agrees that compensation payable to Executive may be subject to reduction, cancellation, forfeiture and/or recoupment to the extent necessary to comply with (a) the Policy for Recovery of Erroneously Awarded Compensation adopted by the Board of Directors of the Company (as amended from time to time, the “*Policy*”), and (b) any Other Recovery Arrangements (as defined in the Policy). Executive acknowledges that Executive has received and has had an opportunity to review the Policy and any Other Recover Arrangements applicable to Executive.
2. Executive acknowledges and agrees to the terms of the Policy and any Other Recovery Arrangements, including that any compensation received by Executive shall be subject to and conditioned upon the provisions of the Policy and any Other Recovery Arrangements applicable to Executive.
3. Executive further acknowledges and agrees that Executive is not entitled to indemnification in connection with any enforcement of the Policy or any Other Recovery Arrangements applicable to Executive and expressly waives any rights to such indemnification under the Company’s organizational documents or otherwise.
4. Executive agrees to take all actions requested by the Company in order to enable or facilitate the enforcement of the Policy and any Other Recovery Arrangements applicable to Executive (including, without limitation, any reduction, cancellation, forfeiture or recoupment of any compensation that Executive has received or to which Executive may become entitled).
5. To the extent any recovery right under the Policy and any Other Recovery Arrangements applicable to Executive conflicts with any other contractual rights Executive may have with the Company or any affiliate, Executive understands that the terms of the Policy and the Other Recovery Arrangements shall supersede any such contractual rights. Executive agrees that no recovery of compensation under the Policy and the Other Recovery Arrangements will be an event that triggers or contributes to any right of Executive to resign for “good reason” or “constructive termination” (or similar term) under any agreement with the Company or any affiliate.

EXECUTIVE

(Signature)

(Print Name)

(Title)

CADENCE DESIGN SYSTEMS, INC.

(Signature)

(Print Name)

(Title)