

**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, 2020
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: 0-20853

ANSYS, Inc.

(Exact name of registrant as specified in its charter)

Delaware

(State or other jurisdiction of incorporation or organization)

2600 ANSYS Drive, Canonsburg, PA
(Address of Principal Executive Offices)

04-3219960

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

15317

(Zip Code)

844-462-6797

(Registrant's telephone number, including area code)

Securities registered pursuant to Section 12(b) of the Act:

Title of each class
Common Stock, \$0.01 par value per share

Trading Symbol(s)
ANSS

Name of exchange on which registered
Nasdaq Stock Market LLC
(Nasdaq Global Select Market)

Securities registered pursuant to section 12(g) of the Act:

None

(Title of class)

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 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

☒

Accelerated filer

☐

Non-accelerated filer

☐

Smaller reporting company

☐

Emerging growth company

☐

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. ☒

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 stock held by non-affiliates of the registrant, based upon the closing sale price per share of the registrant's common stock on June 30, 2020, as reported on the Nasdaq Global Select Market, was \$20,712,000,000.

The number of shares of the registrant's common stock, par value \$0.01 per share, outstanding as of February 17, 2021 was 86,751,764 shares.

Documents Incorporated By Reference:

Portions of the Proxy Statement for the registrant's 2021 Annual Meeting of Stockholders are incorporated by reference into Part III.

ANSYS, Inc.
ANNUAL REPORT ON FORM 10-K FOR FISCAL YEAR 2020
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Important Factors Regarding Future Results

Information provided by us in this Annual Report on Form 10-K may contain forward-looking statements concerning such matters as projected financial performance, market and industry segment growth, product development and commercialization, acquisitions or other aspects of future operations. Such statements, made pursuant to the safe harbor established by the securities laws, are based on the assumptions and expectations of management at the time such statements are made. We caution investors that our performance (and, therefore, any forward-looking statement) is subject to risks and uncertainties. Various important factors including, but not limited to, those discussed in Item 1A. Risk Factors, may cause our future results to differ materially from those projected in any forward-looking statement. All information presented is as of December 31, 2020, unless otherwise indicated.

Note About Forward-Looking Statements

The following discussion should be read in conjunction with the audited consolidated financial statements and notes thereto included elsewhere in this Annual Report on Form 10-K. Our discussion and analysis of our financial condition and results of operations in Part II, Item 7 of this Annual Report on Form 10-K are based upon our consolidated financial statements, which have been prepared in accordance with accounting principles generally accepted in the United States of America (GAAP). The preparation of these financial statements requires us to make estimates and judgments that affect the reported amounts of assets, liabilities, revenues and expenses, and related disclosure of contingent assets and liabilities. On an ongoing basis, we evaluate our estimates, including those related to fair values of stock awards, bad debts, contract revenue, acquired deferred revenue, the standalone selling prices of our products and services, the valuation of goodwill and other intangible assets, deferred compensation, income taxes, uncertain tax positions, tax valuation reserves, operating lease assets and liabilities, useful lives for depreciation and amortization, and contingencies and litigation. We base our estimates on historical experience, market experience, estimated future cash flows and various other assumptions that management believes are reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates.

This Annual Report on Form 10-K contains forward-looking statements within the meaning of Section 27A of the Securities Act of 1933 and Section 21E of the Securities Exchange Act of 1934, including, but not limited to, the following statements, as well as statements that contain such words as "anticipates," "intends," "believes," "plans" and other similar expressions:

- Our expectations regarding the impacts of the COVID-19 pandemic.
- Our intentions regarding our hybrid sales and distribution model.
- Our intentions related to investments in research and development, particularly as it relates to expanding the ease of use and capabilities of our broad portfolio of simulation software products.
- Our expectations regarding the accelerated development of new and innovative products to the marketplace while lowering design and engineering costs for customers as a result of our acquisitions.
- Our statements regarding the impact of global economic conditions.
- Our expectations regarding the outcome of our service tax audit cases.
- Our belief that, in most geographical locations, our facilities allow for sufficient space to support present and future foreseeable needs, including such expansion and growth as the business may require.
- Our expectation that we can renew existing facility leases as they expire or find alternative facilities without difficulty, as needed.
- Our assessment of the ultimate liabilities arising from various investigations, claims and legal proceedings.
- Our statements regarding the strength of the features, functionality and integrated multiphysics capabilities of our software products.
- Our belief that our overall performance is best measured by fiscal-year results rather than by quarterly results.
- Our expectations regarding increased lease license volatility due to an increased customer preference for time-based licenses.
- Our estimates regarding the expected impact on reported revenue related to the acquisition accounting treatment of deferred revenue.

- Our expectation that we will continue to make targeted investments in our global sales and marketing organizations and our global business infrastructure to enhance and support our revenue-generating activities.
- Our intention to repatriate previously taxed earnings in excess of working capital needs and to reinvest all other earnings of our non-U.S. subsidiaries.
- Our plans related to future capital spending.
- Our expectations of the impact of income tax payment increases on 2021 operating cash flow.
- The sufficiency of existing cash and cash equivalent balances to meet future working capital and capital expenditure requirements.
- Our expectations regarding the stock repurchase program.
- Our belief that the best uses of our excess cash are to invest in the business, acquire or make investments in complementary companies, products, services and technologies, make payments on outstanding debt balances and repurchase stock in order to both offset dilution and return capital, in excess of our requirements, to stockholders with the goal of increasing stockholder value.
- Our intentions related to investments in complementary companies, products, services and technologies.
- Our expectation that changes in currency exchange rates will affect our financial position, results of operations and cash flows.
- Our expectations regarding future claims related to indemnification obligations.
- Our estimates regarding future stock-based compensation.
- Our expectations regarding the impacts of new accounting guidance.
- Our assessment of our ability to realize deferred tax assets.
- Our performance expectations related to our partnerships and strategic alliances.
- Our expectations regarding acquisitions and integrating such acquired companies to realize the benefits of cost reductions and other synergies relating thereto.
- Our statements regarding market opportunity, including the size and growth of addressable markets.

Forward-looking statements should not be unduly relied upon because they involve known and unknown risks, uncertainties and other factors, some of which are beyond our control. Our actual results could differ materially from those set forth in the forward-looking statements. Certain factors that might cause such a difference include risks and uncertainties detailed in Item 1A. Risk Factors.

PART I

ITEM 1. BUSINESS

ANSYS, Inc. (Ansys, we, us, our), a Delaware corporation formed in 1994, develops and globally markets engineering simulation software and services widely used by engineers, designers, researchers and students across a broad spectrum of industries and academia, including aerospace and defense, automotive, electronics, semiconductors, energy, materials and chemical processing, turbomachinery, consumer products, healthcare, and sports. Headquartered south of Pittsburgh, Pennsylvania, we employed approximately 4,800 people as of December 31, 2020. We focus on the development of open and flexible solutions that enable users to analyze designs directly on the desktop, providing a common platform for fast, efficient and cost-conscious product development, from design concept to final-stage testing and validation. We distribute our suite of simulation technologies through direct sales offices in strategic, global locations and a global network of independent resellers and distributors (collectively, channel partners). It is our intention to continue to maintain this hybrid sales and distribution model. We operate and report as one segment.

Our strategy of Pervasive Engineering Simulation™ seeks to deepen the use of simulation in our core, to inject simulation throughout the product lifecycle and to embed simulation into our partners' ecosystems. The engineering software simulation market is strong and growing. Its market growth is driven by customers' need for rapid, quality innovation in a cost efficient

manner, enabling faster time to market of new products and lower warranty costs. While the transition away from physical prototyping toward simulation is prevalent through all industries, its demand is heightened by investments in high-growth solutions, including 5G, electrification, autonomous and the Industrial Internet of Things (IIoT). Our strategy of Pervasive Engineering Simulation is aligned with the market growth.

Our product portfolio consists of the following:

Platform

Ansys Workbench™ is the framework upon which our suite of advanced multiphysics engineering simulation technologies is built. The innovative project schematic view ties together the entire simulation process, guiding the user through complex multiphysics analyses with drag-and-drop simplicity. With bi-directional computer-aided design (CAD) connectivity, powerful highly-automated meshing, a project-level update mechanism, pervasive parameter management and integrated optimization tools, the Ansys Workbench platform enables Pervasive Engineering Simulation.

Our Workbench framework allows engineers and designers to incorporate the compounding effects of multiple physics into a virtual prototype of their design and simulate its operation under real-world conditions. As product architectures become smaller, lighter and more complex, companies must be able to accurately predict how products will behave in real-world environments where multiple types of physics interact in a coupled way. Our multiphysics software enables engineers to simulate the interactions between structures, heat transfer, and fluids and electronics all within a single, unified engineering simulation environment.

Our high-performance computing (HPC) product suite and Cloud solutions enable enhanced insight into product performance and improve the productivity of the design process. The HPC and Cloud offerings provide cross-physics parallel processing capabilities for the full spectrum of our simulation software and support structures, fluids, thermal and electronics simulations. This product suite decreases turnaround time for individual simulations, allowing users to consider multiple design ideas and make the right design decisions early in the design cycle.

Ansys Minerva is a knowledge management application that secures critical simulation data, and provides simulation process and decision support to simulation teams across geographies and functional silos. Available for both on-premise and cloud deployment, Minerva delivers immediate benefits by connecting simulation and optimization to customers' existing ecosystem of tools and processes. Minerva provides integration and automation of chained data flows and design space exploration for optimal performance parameters. With Ansys Minerva, Ansys customers can connect simulation for life cycle traceability and to enable collaboration and decision support.

Structures

Our structural analysis product suite offers simulation tools for product design and optimization that increase productivity, minimize physical prototyping and help to deliver better and more innovative products in less time. These tools tackle real-world analysis problems by making product development less costly and more reliable. In addition, these tools have capabilities that cover a broad range of analysis types, elements, contacts, materials, equation solvers and coupled physics capabilities, all targeted toward understanding and solving complex design problems. We also provide comprehensive topology optimization tools that engineers use to design structural components to meet loading requirements with minimal material and component weight. We offer a complete simulation workflow for additive manufacturing that allows reliable 3D printing by simulating the laser sintering process and delivering compensated CAD geometries that ensure reliable printed parts.

Fluids

Our fluids product suite enables modeling of fluid flow and other related physical phenomena. Fluid flow analysis capabilities provide all the tools needed to design and optimize new fluids equipment and to troubleshoot already existing installations. The suite contains general-purpose computational fluid dynamics software and specialized products to address specific industry applications.

Electronics

Our electronics product suite provides field simulation software for designing high-performance electronic and electromechanical products. The software streamlines the design process and predicts performance of mobile communication and internet-access devices, broadband networking components and systems, integrated circuits (ICs) and printed circuit boards (PCBs), as well as electromechanical systems such as automotive components and power electronics equipment, all prior to building a prototype.

Semiconductors

Advancements in semiconductor design and manufacturing enable smaller electronic architectures. Shrinking geometries, especially in the emerging 3D IC, FinFET and stacked-die architectures, reveal design challenges related to power and reliability. Our power analysis and optimization software suite manages the power budget, power delivery integrity and power-induced noise in an electronic design, from initial prototyping to system sign-off. These solutions deliver accuracy with correlation to silicon measurement; the capacity to handle an entire electronic system, including IC, package and PCB, efficiently for ease-of-debugging and fast turnaround time; and comprehensiveness to facilitate cross-domain communications and electronic ecosystem enablement.

Embedded Software

Our SCADÉ® product suite is a comprehensive solution for embedded software simulation, code production and automated certification. It has been developed specifically for use in critical systems with high dependability requirements, including aerospace, rail transportation, nuclear, industrial and automotive applications. SCADÉ software supports the entire development workflow, from requirements analysis and design, through verification, implementation and deployment. SCADÉ solutions easily integrate with each other and the rest of our product suite, allowing for development optimization and increased communication among team members.

Systems

We deliver a unique and comprehensive system simulation capability that is ideal for the design of today's increasingly automated products. This collaborative environment leverages our multiphysics, multibody dynamics, circuit and embedded software simulation capabilities, enabling users to simulate the complex interactions between components, circuits and control software within a single environment. These technologies provide a complete view into predicted product performance, which creates greater design confidence for engineers.

3D Design

Our Discovery™ product family allows every engineer to benefit from the insight of simulation in their product design. The Discovery products range from early design exploration tools powered by interactive real-time simulation and intuitive geometry editing, to detailed product validation solutions utilizing proven flagship solver technology with easy-to-use guided workflows. These tools allow for design engineers of all levels of expertise to utilize simulation across the entire product design process and to work seamlessly with simulation experts using our flagship products for even more advanced analysis.

Optical

Using optical sensor and closed-loop, real-time simulation, our capabilities now span the simulation of all sensors, including lidar, cameras and radar; the multiphysics simulation of physical and electronic components; the analysis of systems functional safety; as well as the automated development of safety-certified embedded software. This functionality can be integrated into a closed-loop simulation environment that interacts with weather and traffic simulators for automotive applications, enabling thousands of driving scenarios to be executed virtually.

Photonics

Our April 1, 2020 acquisition of Lumerical Inc. (Lumerical), a leading developer of photonic design and simulation tools, adds best-in-class photonic products to our multiphysics portfolio, providing customers with a full set of solutions to solve their next-generation product challenges. Refer to the section titled "New Product Offerings" for additional discussion around our photonics offerings.

Missions

Our December 1, 2020 acquisition of Analytical Graphics, Inc. (AGI), a premier provider of mission-simulation, modeling, testing and analysis software for aerospace, defense and intelligence applications, empowers our users to solve challenges by simulating from the chip level all the way to a customer's entire mission. Refer to the section titled "New Product Offerings" for additional discussion around our missions offerings.

Materials

With our materials technology, our customers benefit from access to the world's premier system for managing corporate material intelligence and the market-leading solution for materials sources, selection and management. Ansys Granta MI is a leading system for materials information management in engineering enterprises. Ansys Granta Selector is the standard tool for

materials selection and graphical analysis of materials properties. A comprehensive materials data library plus unique software tools enable engineers to use materials to innovate and evolve products, quickly identify solutions to material issues, confirm and validate choice of materials, and reduce material and development costs. CES EduPack is a unique set of teaching resources that supports materials education across engineering, design, science and sustainable development. Granta Materials Data for Simulation provides easy access to materials property data from within Ansys Mechanical and the Ansys Electronics Desktop environment.

Academic

Our academic product suite provides a highly scalable portfolio of academic products based on several usage tiers, including associate, research and teaching. Each tier includes various non-commercial products that bundle a broad range of physics and advanced coupled field solver capabilities. The academic product suite provides entry-level tools intended for class demonstrations and hands-on instruction. It includes flexible terms of use and more complex analysis suitable for doctoral and post-doctoral research projects. We also provide a special product at no cost to students that is suitable for use away from the classroom and in non-commercial applications.

PRODUCT DEVELOPMENT

We make significant investments in research and development and emphasize frequent, integrated product releases. Our product development strategy centers on ongoing development and innovation of new technologies to increase productivity and to provide engineering simulation solutions that customers can integrate into enterprise-wide product lifecycle management (PLM) systems. Our product development efforts focus on extensions of the full product line with new functional modules, further integration with CAD, electronic CAD (ECAD) and PLM products, and the development of new products. Our products run on the most widely-used engineering computing platforms and operating systems, including Windows, Linux and most UNIX workstations.

Our total research and development expenses were \$355.4 million, \$298.2 million and \$233.8 million in 2020, 2019 and 2018, respectively, or 21.1%, 19.7% and 18.1% of total revenue, respectively. As of December 31, 2020 and 2019, our product development staff consisted of approximately 1,800 and 1,500 employees, respectively, most of whom hold advanced degrees and have industry experience in engineering, mathematics, computer science or related disciplines. We have traditionally invested significant resources in research and development activities and intend to continue to make investments in expanding the ease of use and capabilities of our broad portfolio of simulation software products.

We recently completed the following major product development activities and releases:

- In January 2021, we released Ansys 2021 R1, which delivers improvements in simulation technology along with the immense compute power of high-performance computing to reimagine what is now possible for global engineering teams. Our simulation solutions offer new levels of collaboration, providing insight into product safety, reliability and performance. The simplified workflows and unique product enhancements in Ansys 2021 R1 create opportunities for engineers to accomplish design and product development goals that were previously thought unattainable.

Ansys 2021 R1 provides advancements for large electromagnetic system simulations that previously were not possible, while including vendor components in those simulations with greater efficiency and scalability. These components can be encrypted, so vendors can share proprietary 3D component designs and create high-fidelity simulations. Ansys 2021 R1 also pushes semiconductor engineering boundaries, delivering comprehensive analysis of signal integrity, power integrity, and thermal and mechanical stress on 3D multi-die systems. While thermo-mechanical stresses and warpage can damage 3D-IC packages, leveraging proven Ansys flagship technology enables users to increase product lifespan and reliability.

- In July 2020, we released Ansys 2020 R2, which brings enhanced solving and collaboration capabilities, key for enabling globally distributed teams to further organization-wide innovation. This release upgrades our HPC resources and platform solutions that reduce costs and speed production. Our newly updated advanced digital engineering tools help engineering teams develop new products, sustain business continuity, improve productivity and win the race to market.

We also released the new Ansys Discovery, a next generation, easy-to-use product design software application. Ansys Discovery is the first simulation-driven design tool to combine instant physics simulation, Ansys' proven high-fidelity simulation and interactive geometry modeling into a single design exploration application. Conducting real-time, rapid iterative design explorations, more engineers can now explore larger design spaces and quickly answer critical design questions earlier in the product design process.

Acquired Technologies

Our 2020 acquisitions, each a leader in their respective fields, are intended to bolster our strategy of Pervasive Engineering Simulation. The acquired technologies significantly enhance our portfolio, providing solutions valuable to our customers.

The acquisition of Lumerical enables our customers to predict light's behavior within complex photonic structures and systems. Silicon photonics is an expanding market and Lumerical provides a comprehensive set of tools for the design and analysis of integrated photonic components and systems, similar to the traditional electronic design automation (EDA) environment. Lumerical complements Ansys SPEOS by serving as a de facto light source for predicting the illumination and optical performance of systems such as interior automobile lighting.

The acquisition of AGI enables our customers to consider the entire mission engineering of a product or system. Engineered products and systems can involve thousands of components, subsystems, systems, and systems of systems that must work together intricately. Our software simulates all these pieces of the puzzle and their functional relationships to each other, and increasingly to their environments.

PRODUCT QUALITY

Our employees generally perform product development tasks according to predefined quality plans, procedures and work instructions. Certain technical support tasks are also subject to a quality process. These plans define, for each project, the methods to be used, the responsibilities of project participants and the quality objectives to be met. The majority of our software products are developed under a quality system that is certified to the ISO 9001:2015 standard. We establish quality plans for our products and services, and subject product designs to multiple levels of testing and verification in accordance with processes established under our quality system.

SALES AND MARKETING

We distribute and support our products through our own direct sales offices, as well as a global network of independent channel partners. This channel partner network provides us with a cost-effective, highly-specialized channel of distribution and technical support. It also enables us to draw on business and technical expertise from a global network, provides relative stability to our operations to help mitigate geography-specific economic trends and provides us with an opportunity to take advantage of new geographic markets or enhance our sales coverage in existing markets.

The channel partners market and sell our products to new customers, expand installations within the existing customer base, offer training and consulting services, and provide the first line of our technical support. Our channel partner certification process helps to ensure that each channel partner has the ongoing capability to adequately represent our expanding product lines and to provide an acceptable level of training, consultation and customer support. We derived 22.2%, 22.9% and 22.4% of our total revenue through the indirect sales channel for the years ended December 31, 2020, 2019 and 2018, respectively.

We also have a direct sales organization to develop an enterprise-wide, focused sales approach and to implement a worldwide go-to-market account strategy. The sales management organization also functions as a focal point for requests from the channel partners and provides additional support in strategic locations through the presence of direct sales offices.

During 2020, we continued to invest in our existing domestic and international strategic sales offices. In total, our direct sales and marketing organization comprised 2,400 and 2,100 employees as of December 31, 2020 and 2019, respectively, who were responsible for the sales, technical support, consulting services, marketing initiatives, and administrative activities designed to support our overall revenue growth and expansion strategies.

Our products are utilized by organizations ranging in size from small consulting firms to the world's largest high-tech and industrial companies. No single customer accounted for more than 5% of our revenue in 2020, 2019 or 2018.

Information with respect to foreign and domestic revenue may be found in Note 17 to the consolidated financial statements in Part IV, Item 15 of this Annual Report on Form 10-K and in the section entitled "Management's Discussion and Analysis of Financial Condition and Results of Operations" in Part II, Item 7 of this Annual Report on Form 10-K.

STRATEGIC ALLIANCES AND MARKETING RELATIONSHIPS

We have established and continued to pursue strategic alliances with advanced technology suppliers, cloud computing providers, hardware vendors, software vendors, specialized application developers, and CAD, ECAD and PLM providers. We believe that these relationships facilitate accelerated incorporation of advanced technology into our products, provide access to new customers, expand our sales channels, develop specialized product applications, and provide direct integration with leading CAD, electronic design automation (EDA), product data management and PLM systems.

We have technical and marketing relationships with leading CAD vendors, such as Autodesk, PTC and Siemens Digital Industries, to provide direct links between products. These links facilitate the transfer of electronic data models between the CAD systems and our products.

We partner with PTC to accelerate product innovation by providing customers a world-class simulation-driven design solution. Working together, we are delivering Ansys Live real-time simulation technology within PTC's Creo® 3D CAD software. The combined solution, Creo Simulation Live, is sold by PTC as part of the Creo product suite. This solution offers customers a unified modeling and simulation environment, removing the boundaries between CAD and simulation and enabling design engineers to gain insight into each of the many design decisions they make throughout the product development process. This insight enables design engineers to create higher quality products, while reducing product and development costs. In November 2020, PTC released Creo Ansys Simulation, which includes a subset of our flagship solver technology integrated into Creo.

We maintain marketing and software development relationships with leading EDA software companies, including Cadence Design Systems, Synopsys, Siemens EDA, and Zuken. These relationships support the transfer of data between electronics design and layout software and our electronics simulation portfolio. We have an integration and distribution agreement with Synopsys to cooperatively integrate Ansys RedHawk technology into an in-design add-on to a Synopsys design tool for the primary purpose of providing customers with direct, in-design access to the RedHawk technology's capabilities. In addition, we continue to focus on customer solutions and are actively working together to build additional products and interoperability workflows.

We have a strategic relationship with Microsoft that spans several Ansys business units and markets. The primary focus of the relationship centers on Ansys Cloud, which is a cloud-based simulation service fully managed by Ansys and hosted on Microsoft's Azure Cloud infrastructure. Ansys Cloud provides on-demand access to HPC directly from within our flagship applications. We continue to expand the licensing options and functionality of Ansys Cloud, often working closely with Microsoft for support and technical advice. The market-specific projects we have in place with Microsoft include: Ansys digital twins' connection with Microsoft Azure IoT solutions; Ansys Autonomy software for autonomous vehicles running on Azure; and co-sponsoring the Indy Autonomous Challenge self-driving car race, in which 30+ universities are building and racing self-driving cars around the iconic speedway in Indianapolis in the fall of 2021.

Our Partner Program actively encourages developers of specialized software solutions to use our technology as a development platform for their applications and provides customers with enhanced functionality related to their use of our software. With more than 200 active solution partnerships, spanning a wide range of technologies, including materials, optimization, electronics, optical, mechanical, fluid and systems simulation, our partner ecosystem extends the depth and breadth of our technology offerings. We also work to democratize HPC to a wider audience through partnerships with cloud computing providers, cloud-hosting partners, HPC hardware manufacturers and supercomputing centers.

COMPETITION

We believe that the principal factors affecting sales of our software include ease of use, breadth and depth of functionality, flexibility, quality, ease of integration with other software systems, file compatibility across computer platforms, range of supported computer platforms, performance, price and total cost of ownership, customer service and support, company reputation and financial viability, and effectiveness of sales and marketing efforts.

We continue to experience competition across all markets for our products and services. Our competitors include large, global, publicly traded companies; small, geographically-focused firms; startup firms; and solutions produced in-house by the end users. Some of our current and possible future competitors have greater financial, technical, marketing and other resources than us, and some have well-established relationships with current and potential customers of ours. Our current and possible future competitors also include firms that have elected, or may in the future elect, to compete by means of open source licensing. These competitive pressures may result in decreased sales volumes, price reductions and/or increased operating costs, and could result in lower revenues, margins and net income.

PROPRIETARY RIGHTS AND LICENSES

We regard our software as proprietary and rely on a combination of trade secret, copyright, patent and trademark laws, license agreements, nondisclosure and other contractual provisions, and technical measures to protect our proprietary rights in our products. We distribute our software products under software license agreements that predominantly grant customers nonexclusive licenses, which are typically nontransferable, for the use of our products. License agreements for our products are generally directly between us and end users. Use of the licensed software product is restricted to specified sites unless the customer obtains a multi-site license for its use of the software product or the software product is by its nature a multi-site use product. Software security measures are also employed to prevent unauthorized use of our software products and the licensed software is subject to terms and conditions prohibiting unauthorized use, distribution, or reproduction. For most products, customers may purchase a perpetual license of the technology with the right to annually purchase ongoing maintenance, technical support and upgrades, or may lease the product on a fixed-term basis for a fee that includes the license, maintenance, technical support and upgrades. For some products, customers purchase an annual subscription for a certain number of named users that includes the license, maintenance, technical support and upgrades or purchase elastic units, which enable the use of any supported product at any time until their licensed volume is met.

We license our software products utilizing a combination of web-based and hard-copy license terms and forms. For certain software products, we primarily rely on "click-wrapped" licenses (i.e. online agreements where the website provider posts terms and conditions, and the user clicks on the "accept" button). The enforceability of these types of agreements under the laws of some jurisdictions is uncertain.

We also seek to protect the source code of our software as a trade secret and as registered unpublished copyrighted work. We have obtained federal trademark registration protection for Ansys and other marks in the U.S. and foreign countries. Additionally, we were awarded numerous patents by the U.S. Patent and Trademark Office or equivalent offices in other jurisdictions and have a number of patent applications pending. To the extent we do not choose to seek patent protection for our intellectual property, we primarily rely on the protection of our source code as a trade secret.

Our employees have signed agreements under which they have agreed not to disclose trade secrets or confidential information. These agreements, where legally permitted, restrict engagement in or connection with any business that is competitive with us anywhere in the world while employed by us (and, in some cases, for specified periods thereafter) and state that any products or technology created by employees during their term of employment are our property. In addition, we require all channel partners to enter into agreements not to disclose our trade secrets and other proprietary information.

Despite these precautions, there can be no assurance that misappropriation of our technology and proprietary information (including source code) will be prevented. Further, there can be no assurance that copyright, trademark, patent and trade secret protection will be available for our products in certain jurisdictions, or that restrictions on the ability of employees and channel partners to engage in activities competitive with us will be enforceable. Costly and time-consuming litigation could be necessary in the future to enforce our rights to our trade secrets and proprietary information or to enforce our patent rights and copyrights, and it is possible that, in the future, our competitors may be able to obtain our trade secrets or to independently develop similar technology.

The software development industry is characterized by rapid technological change. Therefore, we believe that factors such as the technological and creative skills of our personnel, new product developments, frequent product enhancements, name recognition and reliable product maintenance are also important to establishing and maintaining technology leadership in addition to the various available legal protections of our technology.

We do not believe that any of our products infringe upon the proprietary rights of third parties. There can be no assurance, however, that third parties will not claim such infringement by us or our licensors or licensees with respect to current or future products. In addition, there are non-practicing entities (NPEs) and patent assertion entities (PAEs) whose business models are built on not producing any products, but rather extracting payments from revenue-generating companies through patent infringement assertions and/or litigation. We expect that software suppliers will increasingly be subject to the risk of such claims as the number of products and suppliers continues to expand and the functionality of products continues to increase. Any such claims, with or without merit, could be time consuming, result in costly litigation, cause product release delays or require us to enter into royalty or licensing agreements. Such royalty or licensing agreements, if required, may not be available on terms acceptable to us.

SEASONAL VARIATIONS

Our business has experienced seasonality, including quarterly volatility in software sales resulting from slowdowns of customer activities during the summer months, particularly in Europe, as well as from the seasonal purchasing and budgeting patterns of

our global customers. Lease and maintenance contract renewals, as well as our revenue, are typically highest in the fourth quarter.

DEFERRED REVENUE AND BACKLOG

Deferred revenue consists of billings made or payments received in advance of revenue recognition from customer agreements. The deferred revenue on our consolidated balance sheets does not represent the total value of annual or multi-year, noncancellable agreements. Our backlog represents installment billings for periods beyond the current quarterly billing cycle. Our deferred revenue and backlog as of December 31, 2020 and 2019 consisted of the following:

<i>(in thousands)</i>	Balance at December 31, 2020		
	Total	Current	Long-Term
Deferred revenue	\$ 388,810	\$ 372,061	\$ 16,749
Backlog	578,317	234,719	343,598
Total	<u>\$ 967,127</u>	<u>\$ 606,780</u>	<u>\$ 360,347</u>

<i>(in thousands)</i>	Balance at December 31, 2019		
	Total	Current	Long-Term
Deferred revenue	\$ 365,274	\$ 351,353	\$ 13,921
Backlog	505,469	218,398	287,071
Total	<u>\$ 870,743</u>	<u>\$ 569,751</u>	<u>\$ 300,992</u>

Revenue associated with deferred revenue and backlog that will be recognized in the subsequent twelve months is classified as current in the tables above.

HUMAN CAPITAL RESOURCES

At the heart of our culture is a commitment to our people. We believe that our people are one of our most important investments and greatest assets. The success and the growth of our business depend on our ability to attract, develop, incent and retain a diverse population of talented, qualified and highly-skilled employees at all levels of our organization, including our executive officers, and across our global workforce. We have developed key recruitment and retention strategies, objectives and measures that serve as the framework for our human capital management approach. These strategies, objectives and measures are advanced through a number of programs, policies and initiatives, including: promoting diversity, equity and inclusion; employer branding and talent acquisition; ongoing employee development; competitive compensation, including incentives linked to Ansys' and the employee's performance, and competitive benefits programs providing choice and value to our employees; supporting safety and health; and surveying employee satisfaction and engagement.

As of December 31, 2020, we employed approximately 4,800 people, including approximately: 1,800 in product development, 2,400 in sales, support and marketing, and 600 in general and administrative functions. Of these employees, 47% were located in the Americas, 28% were located in Europe, Middle East and Africa (EMEA) and 25% were located in Asia-Pacific (APAC). Certain international employees are subject to collective bargaining agreements or have local work councils.

Diversity, Equity and Inclusion

Diversity, equity and inclusion are key tenets of our culture. We believe diversity at all levels of our organization adds value to our business decision making and innovation by encouraging and incorporating a variety of perspectives and experiences.

As of December 31, 2020, our gender diversity was:

	Male	Female	Other/Not Indicated
Global employees	73 %	22 %	5 %
Senior leadership team ⁽¹⁾	76 %	24 %	— %
Board of Directors	75 %	25 %	— %

⁽¹⁾The senior leadership team consists of leaders in our executive career track that report directly to the chief executive officer or within one additional reporting level of the chief executive officer and those at the highest tier of our management career track who report directly to a leader on our executive track. The senior leaders are responsible for directing strategic plans aligned with our corporate strategy through multiple levels of management.

As of December 31, 2020, our ethnic diversity was:

	White	Asian	Hispanic or Latino	Black or African American	Other*	Not Indicated
United States-based employees	52 %	29 %	2 %	1 %	1 %	15 %
Board of Directors	62 %	25 %	— %	13 %	— %	— %

*Other includes Native Hawaiian, American Indian, Alaskan Native, Pacific Islander, or two or more races.

We have a growing number of employee resource groups dedicated to ensuring a culture of inclusion to support our goals of increasing retention of valuable employees and creating an open culture that fuels innovation, including: Women in Tech at Ansys, Ansys Pride Alliance, Black Employee Network at Ansys, Ansys Military Veterans and Families, and most-recently, a group called Accessibility at Ansys. Additionally, we have committed to training 100% of our people managers on inclusive leadership concepts such as unconscious bias, leading to establish belonging, and making objective talent selection decisions.

Employee Recruitment, Development and Retention

Our talent strategy is focused on (i) attracting diverse high-quality talent, (ii) continually developing and engaging our employee base and (iii) retaining our people by recognizing and rewarding performance. Our commitment to recruiting diverse talent is evidenced in the United States through our dedication to increasing recruiting efforts at historically black colleges and universities, as well as our involvement with minority engineering societies, women in technology groups, veterans' organizations and LGBTQ+A organizations. In addition to targeted outreach, we recruit talent through (i) attending career and networking events aimed towards recruiting diverse audiences, (ii) hiring internally through our Ansys internship/co-op programs for current students and (iii) value partnerships that promote our programs to diverse audiences. Our academic product suite is also widely used in research and teaching settings, which allows students to become familiar with Ansys simulation software and creates opportunities to strengthen our university ties and recruit fresh talent.

We support the development of our employees by providing professional development and tuition assistance, conducting annual individual assessments, and encouraging feedback on performance. We also drive a variety of focused initiatives specifically designed to support employee development. These include our annual talent reviews and succession planning, emotional intelligence trainings, and company-sponsored education programs, such as management essentials to develop front-line leaders in foundational people management skills.

Developing our employees helps keep employees engaged and excited about their future at Ansys. It also helps mitigate risks associated with employee loss and keeping up with rapid technological and social change. For the year ended December 31, 2020, our annual turnover rate was 6%, and of this, 4% was voluntary.

Compensation and Benefits Program

Our compensation programs provide an opportunity for employees to earn higher compensation by aligning their performance, which may include contributions to our environmental, social and governance objectives, with the overall financial and operational success of Ansys. The program includes three key elements: (i) competitive annual salaries, (ii) annual cash incentives and sales commission programs, with a majority of our employees eligible to earn more or less than the target opportunities based on both Ansys' and the employee's performance and (iii) long-term equity incentives with over half of

employees receiving equity grants each year in the form of time-based restricted stock units and, in the case of senior leadership, time-based restricted stock units and performance stock units that vest, if at all, based on our financial performance and shareholder returns. These grants align the long-term financial interests of our employees with those of our stockholders.

Health and welfare benefit programs include market-competitive benefits comprised of a mix of company-provided and other benefits, including those for medical, dental and vision insurance; life and disability insurance; defined contribution retirement plans; and many different employee assistance programs, such as financial, legal, emotional and social well-being employee assistance programs. Our investments in health and welfare benefits focus on providing choice and value to our employees so they can select market-competitive benefits that support their personal needs.

Local regulations are considered when developing our compensation and benefits packages for employees across the globe.

Safety and Health

The health and safety of our employees and their families, our partners and our broad Ansys community around the world continues to be a high priority. At the onset of the COVID-19 pandemic, we took action to enable our employees to work from home. We closed our offices (including our corporate headquarters), transitioned to a remote work environment, and implemented certain travel restrictions, each of which has changed how we operate our business. While a number of our offices have since reopened, most of our locations have limited access or have few employees working on site. We are continuing to monitor and manage the situation, but as of now remote access remains the primary means of work for the vast majority of our workforce.

We utilize a number of technology platforms to facilitate remote working. Most of these tools were implemented prior to the COVID-19 pandemic and have proven to be instrumental in enabling us to work effectively in this environment. We have also provided our employees with support, including stipends, and in some cases, needed hardware and equipment. In addition, we have implemented many protocols in our offices to keep our employees safe.

Employee Satisfaction and Engagement

Employee feedback and engagement is critical to our success. We conduct global employee engagement surveys with the goal of using the feedback to improve the work environment and employee satisfaction. In 2020, this feedback was critical to understand, as nearly all our employees were required to work remotely due to the COVID-19 pandemic.

Survey results showed that our executive team provided outstanding management and leadership during the pandemic. 96% of employees indicated that they were satisfied with our response to the COVID-19 pandemic and 93% reported feeling supported by their immediate manager and their efforts to adapt to the rapidly changing environment related to the COVID-19 pandemic.

Employee feedback is important in the areas of future vision, recognition, communication, leadership, growth and development. Managers communicate results of the survey to their teams and involve employees in the action planning process. The findings from these surveys help us to continually improve performance and engagement. Our 2020 global engagement survey demonstrated that our employees are highly engaged. Our engagement score results indicated that we improved against past performance and also exceeded external benchmarks.

ACQUISITIONS

We make targeted acquisitions in order to support our long-term strategic direction, accelerate innovation, provide increased capabilities to our existing products, supply new products and services, expand our customer base and enhance our distribution channels. For additional details on our recent acquisitions, refer to "Acquisitions" in Part II, Item 7 of this Annual Report on Form 10-K.

AVAILABLE INFORMATION

Information about our products and services is available on the internet at www.ansys.com. We provide information for investors on our corporate website under "About Ansys – Investor Relations."

We make available, free of charge, the following under "About Ansys – Investor Relations" shortly before or promptly following its first use or release: financially-related press releases, including earnings releases and prepared remarks, various SEC filings, including annual, quarterly and current reports and proxy statements, presentation materials associated with earnings conference calls, and access to live and recorded audio from earnings and other investor conference calls or events. For earnings conference calls, we generally include in our posted materials a cautionary statement regarding forward-looking and non-GAAP financial information, and we provide GAAP reconciliations when we include non-GAAP financial information. Such GAAP reconciliations may be in materials for the applicable presentation, in materials for prior presentations or in our annual, quarterly or current reports. Other information posted on our corporate website that may not be available in our filings

with the SEC includes information relating to our corporate governance. SEC filings may also be obtained on the SEC's website at www.sec.gov.

Where we have included internet addresses in this Report, such as our internet address and the internet address of the SEC, we have included those internet addresses as inactive textual references only. Except as specifically incorporated by reference into this Report, information on those websites is not part hereof.

ITEM 1A. RISK FACTORS

The following are important factors we have identified that could affect our future results and an investment in our securities. In addition, from time to time we provide information, including information contained in this Annual Report on Form 10-K, that contains forward-looking statements concerning, among other things, projected financial performance, total addressable market, market and industry sector growth, product development and commercialization or other aspects of future operations. Such statements are based on the assumptions and expectations of our management at the time such statements are made. We caution investors that our performance and any forward-looking statements are subject to risks and uncertainties, including but not limited to, the following:

COVID-19 Pandemic Risks

The COVID-19 pandemic has had, and is expected to continue to have, an effect on our business, employees, and consolidated financial statements. The uncertainty surrounding the remaining duration and impact of the COVID-19 pandemic limits our ability to accurately forecast expected business results in the near term.

The health and safety of our employees and their families, our partners and our other constituents around the world is a high priority. At the onset of the COVID-19 pandemic, we took action to enable our employees to work from home. We closed our offices (including our corporate headquarters), transitioned to a remote work environment, and implemented certain travel restrictions, each of which has changed how we operate our business. While a number of our offices have since reopened, most of our locations have limited access and few employees working on site. We continue to monitor and manage the situation, but as of now remote access remains the primary means of work for most of our workforce.

The COVID-19 outbreak and preventative measures taken to contain the COVID-19 outbreak continue to cause business slowdowns and shutdowns in affected areas. A majority of our customer events and those of our channel partners are virtual only experiences. These events may not be as successful as customer events prior to COVID-19 because, among other reasons, the limited number of such events, the varying attendance levels and virtual event fatigue.

An extended period of remote work arrangements negatively impacts the sales pipeline due to reduced, delayed, or altered sales and marketing interactions with customers and potential customers, expose us to increased risk of cyber incidents, delay or alter product roadmaps or research and development due to reduced or limited access to technologies, equipment, or services, and delay or disrupt recruitment efforts. Limitations on availability, ease of use or increased cost related to the use of our products in our customers' remote work environments could also result in a decline in demand for our products.

We have experienced, and continue to expect, that our larger customer accounts will perform more strongly than the small- and medium-sized businesses during the pandemic. In addition, the shifting preference from perpetual licenses to time-based licenses was, and is expected to continue to be, elevated as a result of the impacts of COVID-19. There may also be continued lower activity levels in the end markets we service or declining financial performance of our customers and channel partners, which could result in lower rates of renewal, which have historically been stable and high, and cancellations, reductions, or delays for our products and services. Due to our subscription-based business model, the effect of the pandemic may not be fully reflected in our results of operations until future periods and could impact future growth rates.

The situation surrounding COVID-19 remains fluid, and given its inherent uncertainty, we expect the pandemic will continue to have an impact on our business and consolidated financial statements in the near term. The duration and extent of the impact from the COVID-19 pandemic depends on future developments that cannot be accurately predicted at this time, such as the timing and effectiveness of vaccination efforts in the markets where we do business, transmission rates of the virus and the development of virus mutations and variants, the nature and scope of government economic recovery measures and the extent and effectiveness of containment actions. The impact of the COVID-19 pandemic may also have the effect of heightening many of the other risks and uncertainties described in this "Risk Factors" section.

Global Operational Risks

We are subject to trade restrictions that could impact our ability to sell to customers and result in liability for violations.

Due to the global nature of our business, we are subject to trade protection laws, policies, sanctions, and other regulatory requirements affecting trade and investment. For example, we are subject to import and export restrictions and regulations that prohibit the shipment or provision of certain products and services to certain countries, regions and persons targeted by the U.S., including the Export Administration Regulations administered by the U.S. Bureau of Industry and Security (BIS) and economic and trade sanctions administered by the U.S. Treasury Department's Office of Foreign Assets Control (OFAC). During the second quarter of 2019, the BIS placed certain entities on its Entity List. Certain of our existing and prospective customers, including Huawei, were included in this list. At the end of the second quarter of 2020, BIS heightened restrictions relating to certain military end uses impacting the use of our semiconductor and electronics software in China, Russia, and Venezuela.

The Entity List and OFAC restrictions limit our ability to deliver products and services to these customers and, in the absence of a license, our ability to sell products and services to these customers in the future. In addition, restrictions implemented by OFAC restrict our ability to sell to, or transact with, restricted individuals, entities, or countries. The inclusion of companies on the Entity List and subjecting companies to the heightened restrictions may encourage them to seek substitute products from competitors whose products are not subject to these restrictions or to develop their own products. 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 customers. Additionally, other existing and prospective customers may be added to the Entity List and/or be subjected to trade restrictions in the future, and such actions may result in other indirect impacts that cannot be quantified, including the imposition of additional trade restrictions on our business by the U.S., China, or other countries. Restrictions on our ability to sell and ship to customers could have a significant adverse effect on our business and consolidated financial statements.

Our products could be shipped to restricted parties by third parties, including our channel partners. Even though we take measures to ensure that our channel partners comply with all applicable trade restrictions, any failure by channel partners to comply with such restrictions could have negative consequences for us. Violators of trade restrictions may be subject to significant penalties, which may include considerable monetary fines, criminal proceedings against them and their officers and employees, a denial of export privileges, and suspension or debarment from selling products or services to the federal government. Any such penalties could have a significant adverse effect on our business and consolidated financial statements. In addition, the political and media scrutiny surrounding any governmental investigation could cause significant expense and reputational harm and distract senior executives from managing normal day-to-day operations.

Failure to comply with laws and regulations could harm our business.

We develop and sell software and consulting services and maintain support operations in more than 40 countries whose laws and practices differ from one another and are subject to unexpected changes. Furthermore, our business is subject to regulation by various global governmental agencies, including agencies responsible for monitoring and enforcing employment and labor laws, workplace safety, environmental laws, consumer protection laws, anti-bribery laws, import/export controls, securities laws and tax laws and regulations. In certain jurisdictions, these regulatory requirements may be more stringent than those in the United States. Managing these geographically diverse operations requires significant attention and resources to ensure compliance.

Our global reach includes countries considered high-risk environments for public corruption. This exposes us to risks associated with violations of anti-corruption laws and regulations such as the U.S. Foreign Corrupt Practices Act and the U.K. Bribery Act. To promote compliance, we forbid our agents and employees from engaging in corrupt behavior and have implemented a compliance program to prevent and detect violations of anti-corruption laws. There remains, however, a risk that illegal conduct could occur thereby exposing us to the financial and reputational risks associated with a violation of anti-corruption laws.

Non-compliance with applicable regulations or requirements could subject us to investigations, sanctions, enforcement actions, disgorgement of profits, fines, damages, civil and criminal penalties or injunctions and may result in our inability to provide certain products and services to existing or prospective customers. If any governmental sanctions are imposed, or if we do not prevail in any possible civil or criminal litigation, or if customers make claims against us for compensation, our business and consolidated financial statements could be harmed. In addition, responding to any action will likely result in a significant diversion of management's attention and resources and an increase in professional fees and costs. Enforcement actions and sanctions could have a significant adverse effect on our business and consolidated financial statements.

Our business practices with respect to the collection, use and management of personal information could give rise to operational interruption, liabilities or reputational harm as a result of governmental regulation, legal requirements or industry standards relating to consumer privacy and data protection.

We are subject to the laws and regulations of numerous jurisdictions worldwide regarding accessing, processing, sharing, using, storing, transmitting, disclosing and protecting personal data. As regulatory focus on privacy, data and security issues continues to increase and evolve, and as worldwide laws and regulations concerning the handling of personal data expand and become more complex, data protection standards continue to become more strict and potential risks related to data processing within our business may intensify.

The General Data Protection Regulation (GDPR), which went into effect in May 2018 and governs data privacy practices within the European Economic Area (EEA), applies to our data processing activities within the EEA, as well as the processing of EEA citizen data globally, and imposes various compliance obligations related to the handling of personal data in the delivery of our products and services and to business operations involving employee data. Compliance with the GDPR has and will continue to require deployment of substantial resources and increased costs. If we fail to comply with the GDPR, it may lead to regulatory enforcement actions, which can result in monetary penalties of up to 4% of annual worldwide revenue, private lawsuits, extensive and prescriptive consent decrees or judgments that may require additional resources or expenses for compliance and may cause reputational damage. As a result of the expiration of the Brexit transition period, on December 24, 2020, the U.K. and the European Union reached a provisional agreement temporarily permitting the continued flow of personal data between the regions. Anticipated further evolution of European Union regulations on this topic, including the impact of Brexit on these regulations in the U.K. and any related changes to the regulatory framework in the U.K., may increase substantially the penalties to which we could be subject in the event of any non-compliance. We may incur substantial expense in complying with the new obligations to be imposed by new regulations and we may be required to make significant changes to our software applications and expanding business operations, all of which may adversely affect our results of operations.

The GDPR restricts transfers of personal data outside of the EEA to third countries deemed to lack adequate privacy protections, including the U.S., unless an appropriate safeguard specified by the GDPR is implemented, such as the Standard Contractual Clauses ("SCCs") approved by the European Commission, Binding Corporate Rules, and, until July 16, 2020, the Privacy Shield for EU-U.S. data transfers. In July 2020, the Court of Justice of the EU invalidated Privacy Shield, and also opined on compliance obligations for companies relying upon SCCs as their valid basis of transferring personal data outside of the EU. This decision led to uncertainty about the legal basis for personal data transfers out of the EU to the U.S. Potential new rules and restrictions on the transfer of data across borders could increase the cost and complexity of delivering our products and services in some markets. This decision could also give rise to operational interruption in the performance of services for customers and internal processing of employee information, regulatory liabilities or reputational harm.

In addition, California implemented the California Consumer Privacy Act (CCPA) as of January 2020, which requires compliance measures similar to those of the GDPR and establishes the first state standard for a comprehensive set of data privacy rights. The CCPA, among other things, gives California residents expanded rights to access and delete their personal information, opt out of certain personal information sharing, and receive detailed information about how their personal information is used. In November 2020, California voters passed the California Privacy Rights Act (CPRA). The CPRA, which is expected to take effect on January 1, 2023, significantly expands the CCPA, including by introducing additional obligations such as data minimization and storage limitations, granting additional rights to consumers such as correction of personal information and additional opt-out rights, and creates a new agency to implement and enforce the law. Several other states have proposed data privacy laws that would impose obligations on us with respect to how we collect and use personal data, including customer data. To comply with U.S. state laws and any data breach notification laws that vary across states, we may be required to invest in additional resources or tools to manage our data processing activities. If we fail to comply with the requirements of U.S. data privacy and data breach notification laws, we may be subject to state monetary fines, consent decrees issued by the Federal Trade Commission or other regulatory enforcement agencies, and possible reputational damage.

Adverse economic and geopolitical conditions may impact our operations and financial performance.

Our operations and performance depend significantly on global macroeconomic, specific foreign country and U.S. domestic economic conditions. Adverse conditions in the macroeconomic environment may result in a decreased demand for our products and services, constrained credit and liquidity, reduced government spending and volatility in equity and foreign exchange markets. In addition, significant downturns and volatility in the global economy expose us to impairments of certain assets if their values deteriorate. Tighter credit due to economic conditions may diminish our future borrowing ability and increase borrowing costs under our existing credit facilities. Customers' ability to pay for our products and services may also be impaired, which could lead to an increase in our allowance for doubtful accounts and write-offs of accounts receivable.

A majority of our business comes from outside the U.S. and our customers supply a wide array of goods and services to most of the world's major economic regions. International revenue represented 53.8%, 57.9% and 60.9% of our total revenue for the years ended December 31, 2020, 2019 and 2018, respectively. In fiscal year 2020, our largest geographic revenue bases were the U.S., Japan and Germany.

When the significant economies in which we do business deteriorate or suffer a period of uncertainty, our business and financial performance may be impacted through reduced customer and government spending, changes in purchasing cycles or timing and reduced access to credit for our customers, among other events. Furthermore, customer spending levels in any foreign jurisdiction may be adversely impacted by changes in domestic policies, including tax and trade policies.

A substantial portion of our license and maintenance revenue is derived from annual lease and maintenance contracts, which typically have a high rate of customer renewal. When the rate of renewal for these contracts is adversely affected by economic or other factors, our lease license and maintenance growth is adversely affected.

Foreign exchange rate fluctuations may adversely affect our consolidated financial statements.

As a result of our significant international presence, we have revenue, expenses, cash, accounts receivable and payment obligations denominated in foreign currencies, most notably the Euro and Japanese Yen. Our operating results are adversely affected when the U.S. Dollar strengthens relative to foreign currencies and are positively affected when the U.S. Dollar weakens relative to foreign currencies. When the U.S. Dollar strengthens relative to other currencies, certain channel partners who pay us in U.S. Dollars may have trouble paying on time or may have trouble distributing our products due to the impact of the currency exchange fluctuation on their cash flows. This may impact our ability to distribute our products into certain regions and markets.

We seek to reduce our currency exchange transaction risks primarily through our normal operating and treasury activities, including derivative instruments, but there can be no assurance that these activities will be successful in reducing these risks. In addition, we incur transaction fees in the usage of such derivative instruments. Changes in currency exchange rates may adversely affect our consolidated financial statements.

A catastrophic event or infrastructure failure could result in the loss of business and adverse financial consequences.

A significant portion of our personnel, source code and computer equipment is located in each of California, Pennsylvania, British Columbia, India, Japan and throughout Europe. A natural disaster, cyberattack, terrorist act, pandemic, or other unforeseen catastrophe in any of these areas or a breakdown in our business infrastructure, such as an interruption in power supply, telephone system or information technology systems, could cause disruptions to our sales, operations, services and product development activities. As our sales are generally greater at the end of a quarter, the potential adverse effects resulting from any of these events would be accentuated if they occurred at quarter end.

Effective business continuity, disaster recovery and crisis management plans are critical to minimizing the impact of such unplanned or unexpected events. We also face increasing customer certification requirements with respect to such systems. Failure to establish plans that effectively mitigate the impacts of these disruptions or meet customer certification requirements could have a significant adverse effect on our business and consolidated financial statements.

See "The COVID-19 Pandemic" portion of this "Risk Factors" section for a description of the impact of the pandemic on us.

Industry Operational Risks

Our industry is highly competitive, which could result in downward pressure on our prices.

We continue to experience competition across all markets for our products and services. Some of our current and potential competitors have greater financial, technical, marketing and other resources than we do, and some have well-established relationships with our current and potential customers. Our current and potential competitors also include firms that have competed, or may in the future compete, by means of open source licensing. Companies we have, or could have, strategic alliances with could reduce or discontinue technical, software development and marketing relationships with us for competitive purposes.

If our competitors offer deep discounts on certain products or services, or develop products that the marketplace considers more valuable, we may lower prices or offer discounts or other favorable terms to compete successfully. Our maintenance products, which include software license updates and product support fees, are generally priced as a percentage of new software license fees. Our competitors may offer lower percentage pricing on product updates and support. Some competitors may bundle software products for promotional purposes or as a long-term pricing strategy or provide guarantees of prices, product

implementations or wider geographical license usage provisions. Any of these practices could, over time, significantly constrain the prices that we can charge for certain products.

Furthermore, if we do not adapt pricing models to reflect changes in customer usage of our products or changes in customer demand, our software license revenues could decrease. Additionally, increased distribution of applications through application service providers, including software-as-a-service providers, may reduce the average price of our products or adversely affect other sales of our products, reducing new software license revenues unless we can offset price reductions with volume increases.

These competitive pressures may result in decreased sales volumes, price reductions and/or increased operating costs, and could result in lower revenues, margins and net income.

We may not be successful in developing and marketing new products to adequately address the rapidly changing technology industry.

We operate in an industry generally characterized by rapidly changing technology and frequent new product introductions, which can render existing products obsolete or unmarketable. A major factor in our future success will be our ability to anticipate technological changes and to develop and introduce, in a timely manner, new products to meet those changes. Our ability to grow revenue will be dependent on our ability to respond to customer needs in the areas of, among others, 5G, autonomous vehicles, IIoT and electrification, and to leverage cloud computing and new computing platforms. In addition, our future success may depend on our ability to continue to develop a systems integrator ecosystem able to handle integrations and process and application development to address the challenge of the increasingly complex integration of our products' different functionalities to address customers' requirements. In addition, for those customers who authorize a third-party technology partner to access their data, we do not provide any warranty related to the functionality, security and integrity of the data transmission or processing. Despite contract provisions to protect us, customers may look to us to support and provide warranties for the third-party applications, integrations, data and content, even though not developed or sold by us, which may expose us to potential claims, liabilities and obligations, all of which could harm our business.

We devote substantial resources to research and development, which could cause our operating results to decline.

We devote substantial resources to research and development. New competitors, technological advances in the software development industry by us or our competitors, acquisitions, entry into new markets, or other competitive factors may require us to invest significantly greater resources than anticipated. If we are required to invest significantly greater resources than anticipated without a corresponding increase in revenue, operating results could decline. In addition, our periodic research and development expenses may be independent of our level of revenue, which could negatively impact financial results.

There can be no assurance that we will be successful in developing and marketing, on a timely basis, new products or product enhancements or that the new products will adequately address the changing needs of the marketplace or that we will successfully manage the transition from existing products. Software products as complex as those we offer may contain undetected errors, defects or vulnerabilities when first introduced or as new versions are released, and the likelihood of errors, defects or vulnerabilities is increased as a result of our commitment to the frequency of product releases. There can be no assurance that errors, defects or vulnerabilities will not be found in any new or enhanced products after the commencement of commercial shipments. The occurrence of any defects or errors in our products could result in lost or delayed market acceptance and sales of our products, delays in payment to us by customers, loss of customers or market share, product returns, damage to our reputation, diversion of our resources, increased service and warranty expenses or financial concessions, increased insurance costs, and liability for damages.

The price of our common stock is subject to volatility.

The market price of securities of software companies is subject to significant fluctuations. For example, our common stock price ranged from \$200.07 to \$369.82 per share during 2020. The valuation and trading price of our common stock may not be predictable. Factors that may adversely impact our share price include our failure to meet analyst expectations, reduced expectations regarding financial outlook, increases in our debt levels, changes in management or our material announcements or those of our competitors. In addition, volatility could result from causes that are unrelated to our operating performance such as conditions in the financial markets or the software industry generally.

Company Operational Risks

We are dependent upon our channel partners for a significant percentage of our revenue and usage of channel partners presents certain heightened compliance risks.

We distribute our products through a global network of independent channel partners, which accounted for 22.2%, 22.9% and 22.4% of our revenue during the years ended December 31, 2020, 2019 and 2018, respectively. Channel partners sell our software products to new and existing customers, expand installations within the existing customer base, offer consulting services and provide the first line of technical support. In the APAC and EMEA regions, we are highly dependent upon our channel partners. Difficulties in ongoing relationships with channel partners, such as failure to meet performance criteria and differences in handling customer relationships, could adversely affect our performance. Additionally, the loss of any major channel partner, including a channel partner's decision to sell competing products rather than ours, could result in reduced revenue. Moreover, our future success will depend substantially on the ability and willingness of our channel partners to dedicate the resources necessary to understand and promote our expanding portfolio of products and to support a larger installed base within each of our geographic regions. If the channel partners are unable or unwilling to do so, we may be unable to sustain revenue growth.

We have been increasing the number of our channel partners, particularly in international locations. The business relationships with many of our channel partners are recently established and could result in additional compliance burdens for us. In addition, these new channel partners have a less-established payment history and revenue from these channel partners could come with a higher rate of bad debt expense. Where channel partners operate on our behalf to collect and process personal data of customer contacts, failure to comply with relevant data privacy laws in the handling of such personal data could result in liability to us for any fines, civil suits or non-financial performance obligations imposed by regulatory authorities on these partners with respect to our customer data.

Certain products require a higher level of sales and support expertise. Failure of our sales channel, particularly the independent channel partners, to obtain this expertise and to sell the new product offerings effectively could have an adverse impact on our sales in future periods. Any of these problems may result in the loss of or delay in customer acceptance, diversion of development resources, damage to our reputation, or increased service and warranty costs, any of which could have a significant adverse effect on our business and consolidated financial statements.

We may not be able to realize the potential benefit of our acquisitions and such acquisitions could pose risks to our business.

We consummate acquisitions to support our long-term strategic direction. Our 2020 acquisitions included Lumerical and AGI and our 2019 acquisitions included Granta Design, Helic, DfR Solutions, LST and Dynardo.

Each acquisition that we complete may present risks, including: difficulty in integrating the management teams, strategies, cultures and operations of the companies or businesses; failing to achieve anticipated synergies, revenue increases or cost savings; difficulty incorporating and integrating the acquired technologies or products with our existing product lines; difficulty with sales, distribution and marketing functions; failure to develop new products and services that utilize the technologies and resources of the companies; disruption of our ongoing business and diversion of management's attention to transition or integration issues; liabilities that were not identified during the acquisition process; the loss of our key employees, customers, partners and channel partners or those of the acquired companies or businesses; and cybersecurity and data privacy risks.

Where customer contacts and leads are a significant consideration in the purchase price or expected financial outcome of an acquisition, failure to identify or mitigate data privacy concerns with the collection, use and retention of personal data may adversely impact our ability to use this information as anticipated and regulatory obligations may require that we delete all or a portion of the database, or take additional remediation measures before use. This may impact the value of the acquisition or reduce forecasted sales.

Future acquisitions may involve the expenditure of significant cash resources; the incurrence of debt, which increases our interest expense and leverage; or the issuance of equity, which is dilutive to stockholders and may decrease earnings per share.

We allocate a portion of the purchase price to goodwill and intangible assets. If we do not realize all the economic benefits of an acquisition, there could be an impairment of goodwill or intangible assets. Furthermore, impairment charges are generally not tax-deductible and will result in an increased effective income tax rate in the period the impairment is recorded.

If we do not achieve the anticipated benefits of our acquisitions as rapidly or to the extent anticipated by our management or the financial and industry analysts, there could be a significant adverse effect on our stock price, business and consolidated financial statements.

The ongoing implementation of a new functionality to the existing Customer Relationship Management (CRM) system may not achieve the corporate benefits identified.

We are in the process of implementing new functionality in our existing (CRM) system. While this system is anticipated to automate and deliver operational efficiencies across the demand generation, sales cycle, order processing and customer service phases of the customer journey, to date this project has not achieved the anticipated benefits and there is a risk that the benefits could be further substantially delayed. There is also a risk that we will have to write off previously capitalized expenditures if the project is not successful or if implementation decisions regarding the project are modified. Factors that could further delay the timing of benefits realization include:

- changes in leadership and project objectives;
- additional needs for technical expertise and manpower; and
- longer than anticipated time horizon for employee adoption and mastery.

Any of the above could divert efforts of key operational management away from other aspects of the business, including the maintenance of the current CRM platform, and result in increased consulting and software costs. These factors could have a significant negative impact on our business and consolidated financial statements.

If we are unable to attract and retain key talent, our business could be adversely affected.

Our success depends upon the continued service of our senior executives and our key technical and sales employees. Most of these individuals could terminate their relationship with us at any time. The loss of any of them for which there has not been adequate knowledge-sharing and transfer might significantly delay or prevent the achievement of our business objectives and could materially harm our business and customer relationships.

In addition, because of the highly technical nature of our products and services, we must attract and retain highly skilled engineering and development personnel. The market for this talent is highly competitive. We have difficulty filling these roles and our talent has been the subject of recruitment by our competitors. While we have non-competition and non-solicitation agreements with many of these individuals, the enforceability of these agreements may be limited by courts.

While we have historically recruited globally for positions in the U.S., in recent years our ability to do so has been curbed by more restrictive domestic immigration laws. If the immigration laws become even stricter or the processing of immigration requests becomes even more cumbersome or less efficient, or if we have less success in recruiting and retaining key personnel, our business, reputation and operating results could be materially and adversely affected.

We may be subject to proceedings that could harm our business.

We are subject to various investigations, claims and legal proceedings that arise in the ordinary course of business, including commercial disputes, labor and employment matters, tax audits and litigations, alleged infringement of intellectual property rights and other matters. Use or distribution of our products could generate product liability, regulatory infraction, or similar claims by our customers, end users, channel partners, government entities or other third parties. Sales and marketing activities that impact processing of personal data, as well as measures taken to ensure license compliance, may also result in claims by customers and individual employees of customers. Each of these matters is subject to various uncertainties, and it is possible that an unfavorable resolution of one or more of these matters could have a significant adverse effect on our consolidated financial statements as well as cause reputational damage.

We may suffer reputational or financial harm if we have product standard or quality issues.

We have separate quality systems and registrations under the ISO 9001:2015 standard in addition to other governmental and industrial regulations. Our continued compliance with quality standards and favorable outcomes in periodic examinations is important to retain current customers and vital to procure new sales. If it was determined that we were not in compliance with various regulatory or ISO 9001 standards, our certificates of registration could be suspended, requiring remedial action and a time-consuming re-registration process. Product quality issues or failures could result in our reputation becoming diminished, resulting in a material adverse impact on our business and consolidated financial statements.

Our short-term and long-term sales forecast may not be accurate, which could result in an adverse impact on our business and consolidated financial statements.

The software business is generally characterized by long sales cycles. These long sales cycles increase the difficulty of predicting sales for any particular quarter. Many operational and strategic decisions are based upon short- and long-term sales

forecasts. Our sales personnel continually monitor the status of proposals, including the estimated closing date and the value of the sale, in order to forecast quarterly sales. These forecasts are subject to significant estimation and are impacted by many external factors, including global economic conditions and the performance of our customers. The heightened uncertainty resulting from the COVID-19 pandemic results in greater ranges and variability of these forecasts.

A variation in actual sales activity from that forecasted could cause us to plan or budget incorrectly and, therefore, could have a significant adverse effect on our business and consolidated financial statements. Management also forecasts macroeconomic trends and developments and integrates them through long-range planning into budgets, research and development strategies and a wide variety of general management duties. Global economic conditions, and the effect those conditions and any disruptions in global markets have on our customers, may have a significant impact on the accuracy of our sales forecasts. These conditions may increase the likelihood or the magnitude of variations between actual sales activity and our sales forecasts and, as a result, our performance may be hindered because of a failure to properly match corporate strategy with economic conditions. This, in turn, could have a significant adverse effect on our business and consolidated financial statements. To the extent our forecasts are incorrect and, as a result, we fail to meet analyst expectations regarding financial performance or miss or reduce the financial guidance we give to investors, our share price may be adversely impacted.

Intellectual Property Risks

Our success is highly dependent upon the legal protection of our proprietary technology.

We primarily rely upon contracts, copyright, patent, trademark, and trade secrets laws to protect our technology. We maintain intellectual property programs, including applying for patents, registering trademarks and copyrights, protecting trade secrets, entering into confidentiality agreements with our employees and channel partners, and limiting access to and distribution of our software, documentation, and other proprietary information. However, software programs are particularly prone to piracy, which is a global phenomenon, and as a result we may lose revenue from piracy or usage and distribution of unlicensed software. Additionally, patent, copyright, trademark, and trade secret protection do not provide the same coverage in every country in which we sell our products and services. Policing the unauthorized distribution and use of our products is difficult, and software piracy (including online piracy) is a persistent problem. While we continue to develop better mechanisms to detect and report or investigate unauthorized use of our software, we are also constrained by data privacy laws that restrict our ability to collect data about unlawful usage in some countries. We cannot assure that the steps we take to protect our proprietary technology are adequate to prevent misappropriation of our software by third parties, or that third parties will not copy our technology or develop similar technology independently to compete with our products. Despite our efforts to prevent such activities, we may nonetheless lose significant revenue due to illegal use of our software or technology.

Costly and time-consuming litigation would be necessary to enforce and determine the scope of trade secret rights and related confidentiality and nondisclosure provisions across our contractual agreements and partnerships. In addition, third parties may subject us to infringement claims with respect to their intellectual property rights. Any such litigation could be costly to defend, damage our reputation, and distract our employees from their daily work. Any successful infringement claims asserted against us could require us to develop technology workarounds for the impacted technologies, products, or solutions, which could be costly, disrupt product development, and delay go-to-market activities. Such disruption and delay could negatively impact our financial results.

We may not be able to continue to obtain licenses to third-party software and intellectual property on reasonable terms or at all, which may disrupt our business and harm our financial results.

We license third-party software and other intellectual property for use in product research and development and, in several instances, for inclusion in our products. We also license third-party software, including the software of our competitors, to test the interoperability of our products with other industry products and in connection with our solutions and professional services. These licenses may need to be renegotiated or renewed from time to time, or we may need to obtain new licenses in the future. Third parties may stop adequately supporting or maintaining their technology, or they or their technology may be acquired by our competitors who elect to terminate our contractual relationship. If we are unable to obtain licenses to such third-party software and intellectual property on reasonable terms or at all, we may not be able to sell the affected products, our customers' usage of the products may be interrupted, or our product development processes and professional services offerings may be disrupted, which could in turn harm our financial results, our customers' ability to utilize our software, and our reputation.

Cybersecurity Risks

Cyberattacks and security vulnerabilities could lead to reduced revenue, increased costs, liability claims, or harm to our reputation.

While we undertake commercially reasonable efforts to maintain and improve the security and integrity of our products, source code, computer systems and data with respect to the relative sensitivity of such software, systems and data, the number of computer “hackers” developing and deploying destructive software programs that attack our products and computer systems continues to increase. We have incurred and will continue to incur additional costs to enhance our cybersecurity efforts. Because the tactics and tools used to obtain unauthorized access to networks or to sabotage systems are constantly evolving, we may be unable to implement adequate preventive measures. Such an attack could disrupt the proper functioning of our products, cause errors in the output of our customers' work, or allow unauthorized access to and disclosure of our sensitive, proprietary or confidential information or that of our customers and employees. In the event of a serious breach of our products or systems, or where a breach occurs due to our failure to implement reasonable and appropriate safeguards, our reputation may suffer, customers may stop buying products or may terminate current services, we could face lawsuits and potential civil liability, as well as regulatory fines and non-financial penalties for any personal data breach, and our financial performance could be negatively impacted.

There is also a danger of industrial espionage, cyberattacks, misuse, theft of information or assets (including source code), or damage to assets by people who have gained unauthorized access to our facilities, systems or information. This includes access to systems or information through email phishing attacks on our employees which has become a very prevalent technique used against companies, often delaying detection through increasingly complex practices. The objective of these attacks is often to acquire user account credentials in order to access other computer systems through linked accounts or where users have recycled passwords across systems. Additionally, the recent attack against SolarWinds, in which hackers inserted malware into a SolarWinds software update, highlights the growing risk from the infection of software while it is under assembly, known as a supply chain attack. As a software provider, we could become a vector for a similar style attack or could become the subject of one through a supply chain compromise.

Inadequate security practices or inadvertent acts or omissions by our employees and partners may also result in unauthorized access to our data. Employees or third parties may also intentionally compromise our or our customers' security or systems. Such cybersecurity breaches, misuse of data or other disruptions could lead to loss of or unauthorized disclosure of our source code or other confidential information, unlicensed use and distribution of our products without compensation, illegal use of our products that could jeopardize the security of customer information stored in and transmitted through our computer systems, and theft, manipulation and destruction of proprietary data, resulting in defective products, performance downtimes and possible violation of export laws and other regulatory compliance requirements. Although we actively employ measures to combat such activities, preventing unauthorized access to our systems and data is inherently difficult. In addition, litigation to either pursue our legal rights or defend any claims against us could be costly and time-consuming and may divert management's attention and adversely affect the market's perception of us and our products.

We have experienced targeted and non-targeted cybersecurity attacks and incidents in the past that have resulted in unauthorized persons gaining access to our information and systems, and we could in the future experience similar attacks. To date, no cybersecurity incident or attack has had a material impact on our business or consolidated financial statements.

A number of our core processes, such as software development, sales and marketing, customer service and financial transactions, rely on IT infrastructure and applications. We also rely on third-party service providers and products, which are exposed to various security vulnerabilities outside of our control. Malicious software, sabotage and other cybersecurity breaches of the types discussed above could cause an outage of our infrastructure, which could cause short-term disruption in operations or, in the event of a longer disruption, lead to a substantial denial of service to our customers and ultimately to production downtime, recovery costs and customer claims for breach of contract, as well as reputational damage and impact to employee morale and productivity.

We rely on service providers for infrastructure and cloud-based products.

We use a number of third-party service providers, which we do not control, for key components of our infrastructure, particularly with respect to development and delivery of our cloud-based products. The utilization of these service providers gives us greater flexibility in efficiently delivering a more tailored, scalable customer experience, but also exposes us to additional risks and vulnerabilities. Third-party service providers operate their own platforms that we access, and we are, therefore, vulnerable to their service interruptions. We may experience interruptions, delays and outages in service and availability from time to time as a result of problems with our third-party service providers' infrastructure. Lack of availability of this infrastructure could be due to a number of potential causes including technical failures, natural disasters, fraud or security attacks that we cannot predict or prevent. Such outages could lead to the triggering of our service level agreements and

the issuance of credits to our cloud-based product customers, which may impact our business and consolidated financial statements. In addition, those of our products and services that depend upon hosted components are vulnerable to security risks inherent in web-based technologies, including greater risk of unauthorized access to or use of customers' protected data. Interception of data transmission, misappropriation or modification of data, corruption of data and attacks by bad actors against our service providers may also adversely affect our products or product and service delivery. Malicious code, viruses or vulnerabilities that are undetected by our service providers may disrupt our business operations generally and may have a disproportionate effect on those of our products that are developed and delivered in the cloud environment. If our security, or that of any of our third-party service providers, is compromised, our software is unavailable or our customers are unable to use our software within a reasonable amount of time or at all, then our business and financial statements could be adversely affected.

These risks, though largely outside our control, may impact customer perception of our products, service and support, and may damage our brand. While we devote resources to maintaining the security and integrity of our products and systems, as well as ensuring adequate due diligence for our third-party service providers, cloud security and reliability is inherently challenging. In the event of a material breach of data hosted by our service providers or a serious security incident on behalf of, caused by or experienced by a service provider, we may experience significant operational and technical difficulties, loss of data including customer data, diminished competitive position or reputation, and loss of customer engagement, which could result in civil liabilities and a negative impact to financial performance. It is also possible that our customers and potential customers would hold us accountable for any breach of security affecting a third-party service provider's infrastructure and we may incur significant liability from those customers and from third parties with respect to any breach affecting these systems. We may not be able to recover a material portion of our liabilities to our customers and third parties from a third-party cloud provider.

Financial Risks

Our indebtedness could adversely affect our business, financial condition and results of operations.

In connection with our acquisitions of AGI and LST, we have outstanding borrowings of \$375.0 million and \$425.0 million, respectively, under term loan facilities which mature on November 1, 2024. We also have access to a \$500.0 million revolving credit facility, which includes a \$50.0 million sublimit for the issuance of letters of credit. The credit agreements governing these loans contain customary representations and warranties, affirmative and negative covenants and events of default. The credit agreements also contain a financial covenant requiring us to maintain a consolidated leverage ratio of indebtedness to earnings before interest, taxes, depreciation and amortization not exceeding 3.50 to 1.00 as of the end of any fiscal quarter (for the four-quarter period ending on such date) with an opportunity for a temporary increase in such consolidated leverage ratio to 4.00 to 1.00 upon the consummation of certain qualified acquisitions for which the aggregate consideration is at least \$250.0 million.

Notwithstanding the limits contained in the credit agreements governing our term loan facilities and credit facility, we may be able to incur substantial additional debt from time to time to finance working capital, capital expenditures, share repurchases, investments or acquisitions, or for other purposes. If we do so, the risks related to our level of debt could intensify. Specifically, our level of debt could:

- make it more difficult for us to satisfy our debt obligations and other ongoing business obligations, which may result in defaults;
- result in an event of default if we fail to comply with the financial and other covenants contained in the agreement governing our debt, which could result in all of our debt becoming immediately due and payable or require us to negotiate an amendment to financial or other covenants that could cause us to incur additional fees and expenses;
- limit our ability to obtain additional financing to fund future working capital, capital expenditures, acquisitions or other general corporate requirements;
- reduce the availability of our cash flow to fund working capital, capital expenditures, acquisitions and other general corporate purposes;
- increase our vulnerability to the impact of adverse economic and industry conditions;
- expose us to the risk of increased interest rates as certain of our borrowings, including borrowings under the credit facility, are at variable rates of interest;
- limit our flexibility in planning for, or reacting to, and increasing our vulnerability to, changes in our business, the industries in which we operate, and the overall economy;

- place us at a competitive disadvantage compared to other, less leveraged competitors;
- increase our cost of borrowing; and
- increase our effective tax rate as interest expense could become non-deductible

Any of the above-listed factors could have an adverse effect on our business, financial condition and results of operations and our ability to meet our payment obligations under our debt agreements.

Furthermore, borrowings under the credit agreement use the London Interbank Offering Rate (LIBOR) as a benchmark for establishing the interest rate. LIBOR has been the subject of recent national, international and other regulatory guidance and proposals for reform, and the financial industry is currently transitioning away from LIBOR as a benchmark for the interbank lending market. The consequences of these developments cannot be entirely predicted but could include an increase in the cost of our variable rate indebtedness.

Changes to tax laws, variable tax estimates and tax authority audits could impact our financial results and operations.

Our operations are subject to income and transaction taxes in the U.S. and in multiple foreign jurisdictions. A change in the tax law in the jurisdictions in which we do business, including an increase in tax rates, an adverse change in the treatment of an item of income or expense, or a decrease in tax rates in a jurisdiction in which we have significant deferred tax assets, could result in a material increase in tax expense. Furthermore, we have recorded significant deferred tax liabilities related to acquired intangible assets that are not deductible for tax purposes. These deferred tax liabilities are based on future statutory tax rates in the locations in which the intangible assets are recorded. Any future changes in statutory tax rates would be recorded as an adjustment to the deferred tax liabilities in the period the change is announced and could have a material impact on our effective tax rate during that period.

We also make significant estimates in determining our worldwide income tax provision. These estimates involve complex tax regulations in many jurisdictions and are subject to many transactions and calculations in which the ultimate tax outcome is uncertain. The outcome of tax matters could be different than the estimates reflected in the historical income tax provision and related accruals. Such differences could have a material impact on income tax expense and net income in the periods in which such determinations are made.

The amount of income tax we pay is subject to ongoing audits by federal, state and foreign tax authorities. These audits can result in additional assessments, including interest and penalties. Our estimates for liabilities associated with uncertain tax positions is highly judgmental and actual future outcomes may result in favorable or unfavorable adjustments to our estimated tax liabilities, including estimates for uncertain tax positions, in the period the assessments are made or resolved, audits are closed or when statutes of limitation on potential assessments expire. As a result, our effective tax rate may fluctuate significantly on a quarterly or annual basis.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

Our executive offices and those related to certain domestic product development, marketing, production and administration are located in a LEED certified, 186,000 square foot office facility in Canonsburg, Pennsylvania. The lease for this facility was effective as of September 14, 2012 and expires on December 31, 2029, excluding any renewal or termination options.

We own: a 70,000 square foot office facility in Lebanon, New Hampshire; a 62,000 square foot office building near our current Canonsburg headquarters; a 59,000 square foot facility in Pune, India; a 40,000 square foot campus in Livermore, California; and a 5,000 square foot facility in Apex, North Carolina. These properties are used as general office space and/or data centers.

We also lease office space in various locations throughout the world. We own substantially all equipment used in our facilities. Management believes that our facilities generally allow for sufficient space to support present and future foreseeable needs, including such expansion and growth as the business may require.

Our properties and equipment are in good operating condition and are adequate for our current needs. We do not anticipate difficulty in renewing existing leases as they expire or in finding alternative facilities.

ITEM 3. LEGAL PROCEEDINGS

We are subject to various investigations, claims and legal proceedings that arise in the ordinary course of business, including commercial disputes, labor and employment matters, tax audits, alleged infringement of intellectual property rights and other matters. In our opinion, the resolution of pending matters is not expected to have a material adverse effect on our consolidated results of operations, cash flows or financial position. However, each of these matters is subject to various uncertainties and it is possible that an unfavorable resolution of one or more of these proceedings could materially affect our results of operations, cash flows or financial position.

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 trades on the Nasdaq Global Select Market tier of the Nasdaq Stock Market under the symbol: "ANSS".

On February 10, 2021, there were 284 stockholders of record.

We have not historically paid cash dividends on our common stock as we have retained earnings primarily for acquisitions, for future business opportunities, to make payments on outstanding debt balances and to repurchase stock when authorized by the Board of Directors and when such repurchase meets our objectives. We review our policy with respect to the payment of dividends from time to time; however, there can be no assurance that any dividends will be paid in the future.

Performance Graph

Set forth below is a line graph comparing the yearly percentage change in the cumulative total stockholder return of our common stock, based on the market price per share of our common stock, with the total return of companies included within the Nasdaq Composite Stock Market Index, the Nasdaq 100 Stock Market Index, the S&P 500 Stock Index and an industry peer group of seven companies (Autodesk, Inc., PTC Inc., Cadence Design Systems, Inc., Synopsys, Inc., Altair Engineering Inc., Aspen Technology, Inc. and Dassault Systemes SE) for the period commencing December 31, 2015 and ending December 31, 2020. The calculation of total cumulative returns assumes a \$100 investment in our common stock, the Nasdaq Composite Stock Market Index, the Nasdaq 100 Stock Market Index, the S&P 500 Stock Index and the peer group on December 31, 2015, and the reinvestment of all dividends, and accounts for all stock splits. The historical information set forth below is not necessarily indicative of future performance.

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ASSUMES \$100 INVESTED ON DECEMBER 31, 2015

ASSUMES DIVIDENDS REINVESTED

FIVE FISCAL YEARS ENDED DECEMBER 31, 2020

	As of December 31,					
	2015	2016	2017	2018	2019	2020
ANSYS, Inc.	\$100	\$100	\$160	\$155	\$278	\$393
Nasdaq Composite	\$100	\$109	\$141	\$137	\$187	\$272
Nasdaq 100⁽¹⁾	\$100	\$107	\$143	\$143	\$199	\$296
S&P 500 Stock Index	\$100	\$112	\$136	\$130	\$171	\$203
Peer Group	\$100	\$115	\$163	\$186	\$265	\$415

⁽¹⁾ The Nasdaq 100 Stock Market Index was added to the performance graph above as Ansys joined the index in December 2019.

Unregistered Sale of Equity Securities and Use of Proceeds

On December 1, 2020, in connection with our acquisition of AGI, we issued 0.6 million shares of common stock with an aggregate value of \$206.8 million, based on the 30-day volume-weighted average price of our common stock on December 1, 2020 of \$323.72, to the former stockholders of AGI as part of the consideration for the acquisition. The shares were issued in reliance upon an exemption from the registration requirements of the Securities Act of 1933, as amended (the Securities Act), provided by Section 4(a)(2) of the Securities Act and Regulation D promulgated thereunder for an issuance not involving a public offering.

Issuer Purchases of Equity Securities

None.

ITEM 6. SELECTED FINANCIAL DATA

The following table sets forth selected financial data as of and for the year ended December 31 for each of the last five years. This selected financial data should be read in conjunction with the consolidated financial statements and related notes included in Part IV, Item 15 of this Annual Report on Form 10-K.

<i>(in thousands, except per share data)</i>	Year Ended December 31,				
	2020	2019 ⁽¹⁾	2018 ⁽²⁾	2017	2016
Total revenue	\$ 1,681,297	\$ 1,515,892	\$ 1,293,636	\$ 1,095,250	\$ 988,465
Operating income	496,356	515,040	476,574	390,728	376,242
Net income	433,887	451,295	419,375	259,251	265,636
Earnings per share – basic	\$ 5.05	\$ 5.36	\$ 4.99	\$ 3.05	\$ 3.05
Weighted average shares – basic	85,840	84,259	83,973	84,988	87,227
Earnings per share – diluted	\$ 4.97	\$ 5.25	\$ 4.88	\$ 2.98	\$ 2.99
Weighted average shares – diluted	87,288	85,925	85,913	86,854	88,969
Total assets	\$ 5,940,590	\$ 4,838,887	\$ 3,265,964	\$ 2,941,623	\$ 2,800,526
Working capital	990,412	860,340	786,410	661,713	630,301
Long-term liabilities	1,113,893	690,368	91,650	87,239	53,021
Stockholders' equity	4,097,872	3,453,379	2,649,547	2,245,831	2,208,405
Cash provided by operating activities ⁽³⁾	547,310	499,936	484,988	427,660	365,980

⁽¹⁾Effective January 1, 2019, we adopted new guidance on leases. We elected to adopt the change in accounting principle using the modified retrospective approach. Results for reporting periods beginning after January 1, 2019 are presented under the new guidance, while prior period amounts are not adjusted and continue to be reported in accordance with previous guidance.

⁽²⁾Effective January 1, 2018, we adopted new guidance on revenue recognition. We elected to adopt the change in accounting principle using the modified retrospective approach. Results for reporting periods beginning after January 1, 2018 are presented under the new guidance, while prior period amounts are not adjusted and continue to be reported in accordance with previous guidance.

⁽³⁾During fiscal year 2019, we retrospectively adopted new guidance on the accounting for costs incurred to implement a cloud computing arrangement (CCA) that is a service arrangement. As a result of the adoption, operating cash flows decreased with a corresponding increase to investing cash flows by \$1.4 million and \$2.8 million for the years ending December 31, 2018 and 2017, respectively. The adoption had no impact on our consolidated balance sheets or consolidated statements of income. Fiscal year 2016 has not been restated in the table above.

In the table above, the comparability of information among the years presented is impacted by our acquisitions. The operating results of our acquisitions have been included in the results of operations since their respective acquisition dates. For further information, see the “Acquisitions” section of Management's Discussion and Analysis of Financial Condition and Results of Operations in Item 7 and Note 4 to the consolidated financial statements included in Part IV, Item 15 of this Annual Report on Form 10-K.

ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS**Business**

Ansys, a Delaware corporation formed in 1994, develops and globally markets engineering simulation software and services widely used by engineers, designers, researchers and students across a broad spectrum of industries and academia, including aerospace and defense, automotive, electronics, semiconductors, energy, materials and chemical processing, turbomachinery, consumer products, healthcare, and sports. Headquartered south of Pittsburgh, Pennsylvania, we employed approximately 4,800 people as of December 31, 2020. We focus on the development of open and flexible solutions that enable users to analyze designs directly on the desktop, providing a common platform for fast, efficient and cost-conscious product development, from design concept to final-stage testing and validation. We distribute our suite of simulation technologies through direct sales offices in strategic, global locations and a global network of independent resellers and distributors (collectively, channel partners). It is our intention to continue to maintain this hybrid sales and distribution model.

Our strategy of Pervasive Engineering Simulation seeks to deepen the use of simulation in our core, to inject simulation throughout the product lifecycle and to embed simulation into our partners' ecosystems. The engineering software simulation market is strong and growing. Its market growth is driven by customers' need for rapid, quality innovation in a cost efficient manner, enabling faster time to market of new products and lower warranty costs. While the transition away from physical prototyping toward simulation is prevalent through all industries, its demand is heightened by investments in high-growth solutions, including 5G, electrification, autonomous and the IIoT. Our strategy of Pervasive Engineering Simulation is aligned with the market growth.

We license our technology to businesses, educational institutions and governmental agencies. Growth in our revenue is affected by the strength of global economies, general business conditions, currency exchange rate fluctuations, customer budgetary constraints and the competitive position of our products. We believe that the features, functionality and integrated multiphysics capabilities of our software products are as strong as they have ever been. However, the software business is generally characterized by long sales cycles. These long sales cycles increase the difficulty of predicting sales for any particular quarter. We make many operational and strategic decisions based upon short- and long-term sales forecasts that are impacted not only by these long sales cycles, but also by current global economic conditions, including the impact of the current COVID-19 pandemic. As a result, we believe that our overall performance is best measured by fiscal year results rather than by quarterly results. Please see the sub-section entitled "Company Operational Risks" under Part I. Item 1A. of this Annual Report on Form 10-K for additional discussion of the potential impact of our sales forecasts on our financial condition, cash flows and operating results.

Management considers the competition and price pressure that it faces in the short- and long-term by focusing on expanding the breadth, depth, ease of use and quality of the technologies, features, functionality and integrated multiphysics capabilities of our software products as compared to our competitors; investing in research and development to develop new and innovative products and increase the capabilities of our existing products; supplying new products and services; focusing on customer needs, training, consulting and support; and enhancing our distribution channels. We also consider acquisitions to supplement our global engineering talent, product offerings and distribution channels.

Overview*Impact of COVID-19*

We are continuing to closely monitor the spread of COVID-19 and have employed measures to mitigate its potential effects on our business as described in this Annual Report on Form 10-K. The COVID-19 pandemic has had, and is expected to continue to have, an adverse impact on our business and our employees.

The health and safety of our employees and their families, our partners and our broad Ansys community around the world is a high priority. At the onset of the crisis, we took action to enable our employees to work from home. We closed our offices (including our corporate headquarters), transitioned to a remote work environment and implemented certain travel restrictions, each of which have disrupted how we operate our business. We are continuing to monitor the situation, but as of now remote access remains the primary means of work for a majority of our workforce. Remote work arrangements have not adversely affected our ability to maintain effective financial operations, including our financial reporting systems, internal controls over financial reporting and disclosure controls and procedures. We expect to maintain these effective controls as we continue to work remotely during the COVID-19 pandemic.

The impact from the rapidly changing market and economic conditions due to the COVID-19 pandemic has disrupted the business of our customers and partners, and has impacted our business and consolidated results of operations. Our current expectations regarding future performance are subject to significant uncertainty and dependent upon how widespread the virus

becomes, the duration and severity of the outbreak, the geographic markets affected, the actions taken by governmental authorities to contain the spread of the virus, including the shelter-in-place orders, the nature and scope of government economic recovery measures and other factors. The spread of the virus and economic deterioration caused by the virus have had an adverse impact on our business and, in the future, could have a material adverse impact on our business, as well as on our ability to achieve our financial guidance. We continue to adjust our spending to reflect our expectations for the pace at which economic recovery will occur, while balancing the need to invest for the long-term opportunity. We have also maintained and intend to maintain our commitment to invest in our acquisitions, R&D and certain digital transformation projects, in particular our CRM and human resources information system (HRIS) projects, as those projects are critical to our ability to operate efficiently and scale the business for future growth. During 2020, we onboarded our partner community in CRM and we implemented several HRIS modules, including remote on-boarding. In addition, we continue to strategically invest in research and development, enabling us to stay on track with our product release targets.

Please see "Risk Factors" under Part I. Item 1A. of this Annual Report on Form 10-K for discussion on additional business risks, including those associated with the COVID-19 pandemic.

Overall GAAP and Non-GAAP Results

This section includes a discussion of GAAP and Non-GAAP results. For reconciliations of Non-GAAP results to GAAP results, see the section titled "Non-GAAP Results" herein.

Our GAAP and non-GAAP results for the year ended December 31, 2020 as compared to the year ended December 31, 2019 reflected the following variances:

	Year Ended December 31, 2020	
	GAAP	Non-GAAP
Revenue	10.9 %	10.9 %
Operating income	(3.6)%	5.3 %
Diluted earnings per share	(5.3)%	1.8 %

We experienced an increase in revenue during the year ended December 31, 2020 due to growth in lease licenses, maintenance and service revenue and contributions from our recent acquisitions, partially offset by reductions in perpetual license revenue. The COVID-19 pandemic and trade restrictions with China adversely impacted our revenue during the year ended December 31, 2020 with the most pronounced reductions occurring in perpetual licenses. However, due to our diverse customer base, both from a vertical and geographic perspective, as well as the close relationships with customers, we were able to conduct a large amount of business remotely, which partially mitigated the impacts of the COVID-19 outbreak.

We also experienced increased operating expenses primarily due to increased personnel costs, higher stock-based compensation and additional operating expenses related to acquisitions. While our hiring pace was slowed and certain discretionary operational expenses, such as travel, were reduced, the COVID-19 pandemic did not have a material impact on our operating expenses during the year ended December 31, 2020.

The non-GAAP results exclude the income statement effects of the acquisition accounting adjustments to deferred revenue, stock-based compensation, amortization of acquired intangible assets, transaction expenses related to business combinations, and adjustments related to the transition tax associated with the Tax Cuts and Jobs Act.

Impact of Foreign Currency

Our comparative financial results were impacted by fluctuations in the U.S. Dollar during the year ended December 31, 2020 as compared to the year ended December 31, 2019. The net favorable impacts on our GAAP and non-GAAP revenue and operating income as a result of the weakened U.S. Dollar when measured against our primary foreign currencies are reflected in the table below.

(in thousands)	Year Ended December 31, 2020	
	GAAP	Non-GAAP
Revenue	\$ 16,841	\$ 16,775
Operating income	\$ 11,986	\$ 12,211

In constant currency, our variances were as follows:

	Year Ended December 31, 2020	
	GAAP	Non-GAAP
Revenue	9.8 %	9.8 %
Operating income	(6.0)%	3.5 %

Constant currency amounts exclude the effects of foreign currency fluctuations on the reported results. To present this information, the 2020 results for entities whose functional currency is a currency other than the U.S. Dollar were converted to U.S. Dollars at rates that were in effect for the 2019 comparable period, rather than the actual exchange rates in effect for 2020. Constant currency growth rates are calculated by adjusting the 2020 reported revenue and operating income amounts by the 2020 currency fluctuation impacts and comparing to the 2019 comparable period reported revenue and operating income amounts.

Other Key Business Metric

Annual Contract Value (ACV) is one of our key performance metrics and is useful to investors in assessing the strength and trajectory of our business. Given that revenue is variable due to the upfront revenue recognition of multi-year lease license sales, we provide ACV as a supplemental metric to help evaluate the annual performance of the business. Summed over the long term, ACV and revenue lead to similar outcomes. However, there will be years where ACV growth lags revenue growth and other years where ACV growth leads revenue growth. It is used by management in financial and operational decision-making and in setting sales targets used for compensation. ACV should be viewed independently of revenue and deferred revenue as ACV is a performance metric and is not intended to be combined with any of these items. There is no GAAP measure comparable to ACV. ACV is composed of the following:

- the annualized value of maintenance and lease contracts with start dates or anniversary dates during the period, plus
- the value of perpetual license contracts with start dates during the period, plus
- the annualized value of fixed-term services contracts with start dates or anniversary dates during the period, plus
- the value of work performed during the period on fixed-deliverable services contracts.

Our ACV was as follows:

(in thousands, except percentages)	Year Ended December 31,		Change		
	2020	2019	Amount	%	Constant Currency %
ACV	\$ 1,616,301	\$ 1,461,759	\$ 154,542	10.6	9.3
Recurring ACV as a percentage of ACV	82.0 %	77.4 %			

Recurring ACV is composed of both lease licenses and maintenance contracts. The increase in recurring ACV reflected for the year ended December 31, 2020 has been driven by a meaningful reduction in perpetual licenses and an increased preference for lease licenses, due in part to the impacts of COVID-19.

While the resilience of our business is evident in the growth shown above, the economic conditions due to the COVID-19 outbreak have disrupted the business of our customers and partners, and have adversely impacted our business and consolidated results. In addition, trade discussions between the U.S. and China led to certain entities being placed on a restricted entity list. These restrictions limited our ability to deliver products and services to these customers. The 2019 operating results include approximately \$20.0 million of ACV related to transactions that occurred prior to the placement of the restrictions. These restrictions remained in place throughout 2020.

Other Financial Information

Our financial position includes \$913.2 million in cash and short-term investments, and working capital of \$990.4 million as of December 31, 2020.

During the year ended December 31, 2020, we repurchased 0.7 million shares for \$161.0 million at an average price of \$233.48 per share under our stock repurchase program, all of which occurred during the first quarter. As of December 31, 2020, we had 2.8 million shares remaining available for repurchase under our authorized share repurchase program.

Geographic Trends

The following table presents our geographic constant currency revenue growth during the year ended December 31, 2020 as compared to the year ended December 31, 2019:

	Year Ended December 31, 2020
Americas	21.2 %
Europe, Middle East and Africa (EMEA)	3.8 %
Asia-Pacific	(2.1) %
Total	9.8 %

To drive growth, we continue to focus on a number of sales improvement activities across the geographic regions, including sales hiring, pipeline building, productivity initiatives and customer engagement activities.

Continued trade tensions between the U.S. and China, together with the uncertainty around the COVID-19 outbreak, may further restrict our ability to sell and distribute our products to certain customers and our ability to collect against existing trade receivables and could have an adverse effect on our business, results of operations or financial condition. Refer to additional details in "Risk Factors" under Part I. Item 1A. of this Annual Report on Form 10-K

Industry Commentary:

Our three largest industries - high-tech, automotive and aerospace and defense (A&D) - remained strong throughout 2020 as companies accelerate their digital transformation initiatives. The high-tech industry was positively impacted by companies' continued investments in the development of the next generation of increasingly complex chips and technology to support the applications of 5G, autonomy and other high growth areas. The automotive industry maintained its growth through the development of electrification and autonomous technologies. While the commercial aviation sector continues to be significantly impacted by the dramatic reduction in demand for global air travel, the continued needs of national security ensure that the defense segment has remained strong and buoyed our overall performance in the aerospace and defense industry.

Acquisitions

We make targeted acquisitions in order to support our long-term strategic direction, accelerate innovation, provide increased capabilities to our existing products, supply new products and services, expand our customer base and enhance our distribution channels. Our recent acquisitions are as follows:

<u>Date of Closing</u>	<u>Company</u>	<u>Purchase Price</u>	<u>Details</u>
2020 Acquisitions			
December 1, 2020	AGI	\$722.5 million	AGI, a premier provider of mission-simulation, modeling, testing and analysis software for aerospace, defense and intelligence applications, expands the scope of our offerings, empowering users to solve challenges by simulating from the chip level all the way to a customer's entire mission.
April 1, 2020	Lumerical	\$107.5 million	Lumerical, a leading developer of photonic design and simulation tools, adds best-in-class photonic products to our multiphysics portfolio, providing customers with a full set of solutions to solve their next-generation product challenges.
2019 Acquisitions			
November 1, 2019	LST	\$781.5 million	LST, the premier provider of explicit dynamics and other advanced finite element analysis technology, empowers our customers to solve a new class of engineering challenges, including developing safer automobiles, aircraft and trains while reducing or even eliminating the need for costly physical testing.
November 1, 2019	Dynardo	(1)	Dynardo, a leading provider of multidisciplinary analysis and optimization technology, gives our customers access to a full suite of process integration and robust design tools — empowering users to identify optimal product designs faster and more economically.
May 1, 2019	DfR Solutions	(1)	DfR Solutions' electronics reliability technology, combined with our existing comprehensive multiphysics portfolio, gives our customers a complete designer-level solution to analyze for electronics failure earlier in the design cycle.
February 4, 2019	Helic	(1)	Helic, the industry-leading provider of electromagnetic crosstalk solutions for systems on chips, combined with our flagship electromagnetic and semiconductor solvers, provides a comprehensive solution for on-chip, 3D integrated circuit and chip-package-system electromagnetics and noise analysis.
February 1, 2019	Granta Design	\$208.7 million	Granta Design, the premier provider of materials information technology, expands our portfolio into this important area, giving customers access to materials intelligence, including data that is critical to successful simulations.
2018 Acquisition			
May 2, 2018	OPTIS	\$291.0 million	OPTIS, a premier provider of software for scientific simulation of light, human vision and physics-based visualization, extends our portfolio into the area of optical simulation to provide comprehensive sensor solutions, covering visible and infrared light, electromagnetics and acoustics for camera, radar and lidar.

(1) The combined purchase price of these acquisitions was \$138.5 million, each of which was individually insignificant.

For further information on our business combinations during the years ended December 31, 2020, 2019 and 2018, see Note 4 to the consolidated financial statements included in Part IV, Item 15 of this Annual Report on Form 10-K.

Results of Operations

For purposes of the following discussion and analysis, the table below sets forth certain consolidated financial data for the years 2020, 2019 and 2018. The operating results of our acquisitions have been included in the results of operations since their respective acquisition dates.

<i>(in thousands)</i>	Year Ended December 31,		
	2020	2019	2018
Revenue:			
Software licenses	\$ 780,850	\$ 699,630	\$ 576,717
Maintenance and service	900,447	816,262	716,919
Total revenue	1,681,297	1,515,892	1,293,636
Cost of sales:			
Software licenses	30,618	23,944	18,619
Amortization	40,642	21,710	27,034
Maintenance and service	154,004	120,619	110,232
Total cost of sales	225,264	166,273	155,885
Gross profit	1,456,033	1,349,619	1,137,751
Operating expenses:			
Selling, general and administrative	587,707	521,200	413,580
Research and development	355,371	298,210	233,802
Amortization	16,599	15,169	13,795
Total operating expenses	959,677	834,579	661,177
Operating income	496,356	515,040	476,574
Interest income	5,073	12,796	11,419
Interest expense	(10,988)	(3,461)	(59)
Other income (expense), net	3,484	(1,792)	(849)
Income before income tax provision	493,925	522,583	487,085
Income tax provision	60,038	71,288	67,710
Net income	\$ 433,887	\$ 451,295	\$ 419,375

Year Ended December 31, 2020 Compared to Year Ended December 31, 2019

ACV:

(in thousands, except percentages)	Year Ended December 31,		Change		
	2020	2019	Amount	%	Constant Currency %
ACV	\$ 1,616,301	\$ 1,461,759	\$ 154,542	10.6	9.3
Recurring ACV as a percentage of ACV	82.0 %	77.4 %			

Revenue:

(in thousands, except percentages)	Year Ended December 31,		Change		
	2020	2019	Amount	%	Constant Currency %
Revenue:					
Lease licenses	\$ 500,105	\$ 406,043	\$ 94,062	23.2	21.3
Perpetual licenses	280,745	293,587	(12,842)	(4.4)	(5.4)
Software licenses	780,850	699,630	81,220	11.6	10.1
Maintenance	840,597	760,574	80,023	10.5	9.8
Service	59,850	55,688	4,162	7.5	6.8
Maintenance and service	900,447	816,262	84,185	10.3	9.6
Total revenue	\$ 1,681,297	\$ 1,515,892	\$ 165,405	10.9	9.8

Our revenue in the year ended December 31, 2020 increased 10.9% as compared to the year ended December 31, 2019, while revenue grew 9.8% in constant currency. The growth rate was favorably impacted by our continued investments in our global sales, support and marketing organizations, the timing and duration of our multi-year lease contracts, and our 2020 and 2019 acquisitions product sales contributed incremental revenue of \$84.9 million. The growth rate was negatively impacted by the trade restrictions between the United States and China, and the impact of COVID-19. Lease license revenue increased 23.2%, or 21.3% in constant currency, as compared to the year ended December 31, 2019. Annual maintenance contracts that were sold with new perpetual licenses, maintenance contracts for new perpetual licenses sold in previous years and the maintenance portion of lease license contracts collectively contributed to maintenance revenue growth of 10.5%, or 9.8% in constant currency. Service revenue, driven primarily by a focus on service offerings that provide mentorship on simulation best practices, training and expanding simulation adoption, increased 7.5%, or 6.8% in constant currency, as compared to the year ended December 31, 2019. Perpetual license revenue, which is derived primarily from new sales during the year ended December 31, 2020, decreased 4.4%, or 5.4% in constant currency, as compared to the year ended December 31, 2019.

We continue to experience increased interest by some of our larger customers in enterprise agreements that often include longer-term, time-based licenses involving a larger number of our software products. While these arrangements typically involve a higher overall transaction price, the upfront recognition of license revenue related to these larger, multi-year transactions can result in significantly higher lease license revenue volatility. Software products, across a large variety of applications and industries, are increasingly distributed in software-as-a-service, cloud and other subscription environments in which the licensing approach is time-based rather than perpetual, resulting in shifting preferences from perpetual licenses to time-based licenses across a broader spectrum of our customers. This dynamic was elevated in 2020 as a result of the economic impacts of COVID-19, and we expect it to continue into the foreseeable future.

In relation to COVID-19 and our revenue, we currently expect a recovery in the business environment as reliable vaccines become more readily available. Globally, businesses have not resumed full operations and our teams and those of our customers will likely continue working remotely into 2021. As a result of social distancing, our in-person demand generation events and those of our channel partners have been canceled. While we have adjusted to have a stronger digital focus, as evidenced by our hosting of our annual sales conference virtually in January, the absence of certain events has had and is expected to continue to have an adverse impact on our results, especially for certain channel partners. In addition, we have experienced delays in the timing of closing certain transactions, including large enterprise-type deals. These deals are often multi-year leases which have a significant impact on our operating results due to up-front revenue recognition of the license. We expect this trend to continue and anticipate that customers will delay certain purchases, reduce the size of planned purchases or forgo purchases that otherwise were expected to occur. Additional waves or mutated variants of COVID-19 could result in renewed shutdowns that stop or regress economic recovery.

With respect to revenue, on average for the year ended December 31, 2020, the U.S. Dollar was approximately 2.4% weaker, when measured against our primary foreign currencies, than for the year ended December 31, 2019. The table below presents the impacts of currency fluctuations on revenue for the year ended December 31, 2020. Amounts in brackets indicate a net adverse impact from currency fluctuations.

<i>(in thousands)</i>	Year Ended December 31, 2020
Euro	\$ 11,803
Japanese Yen	4,067
Taiwan Dollar	1,376
British Pound	1,078
Indian Rupee	(1,294)
Other	(189)
Total	\$ 16,841

The impacts from currency fluctuations resulted in increased operating income of \$12.0 million for the year ended December 31, 2020 as compared to the year ended December 31, 2019.

As a percentage of revenue, our international and domestic revenues, and our direct and indirect revenues, were as follows:

	Year Ended December 31,	
	2020	2019
International	53.8 %	57.9 %
Domestic	46.2 %	42.1 %
Direct	77.8 %	77.1 %
Indirect	22.2 %	22.9 %

In valuing deferred revenue on the balance sheets of our recent acquisitions as of their respective acquisition dates, we applied the fair value provisions applicable to the accounting for business combinations, resulting in a reduction of deferred revenue as compared to the historical carrying amount. As a result, our post-acquisition revenue will be less than the sum of what would have otherwise been reported by us and each acquiree absent the acquisitions. The impacts on reported revenue were \$14.2 million and \$12.5 million for the years ended December 31, 2020 and 2019, respectively. The expected impacts on reported revenue are \$9.0 million and \$19.5 million for the quarter ending March 31, 2021 and the year ending December 31, 2021, respectively.

Cost of Sales and Operating Expenses:

The tables below reflect our operating results as presented on the consolidated statements of income, which are inclusive of foreign currency translation impacts. Amounts included in the discussions that follow each table are provided in constant currency and are inclusive of costs related to our acquisitions. The impact of foreign exchange translation is discussed separately, where material. The 2020 and 2019 acquisitions contributed \$57.9 million to the overall increase in cost of sales and operating expenses, inclusive of intangible asset amortization, with the most significant contribution from LST (acquired November 1, 2019) of \$37.9 million.

	Year Ended December 31,					
	2020		2019		Change	
(in thousands, except percentages)	Amount	% of Revenue	Amount	% of Revenue	Amount	%
Cost of sales:						
Software licenses	\$ 30,618	1.8	\$ 23,944	1.6	\$ 6,674	27.9
Amortization	40,642	2.4	21,710	1.4	18,932	87.2
Maintenance and service	154,004	9.2	120,619	8.0	33,385	27.7
Total cost of sales	225,264	13.4	166,273	11.0	58,991	35.5
Gross profit	\$ 1,456,033	86.6	\$ 1,349,619	89.0	\$ 106,414	7.9

Software Licenses: The increase in the cost of software licenses was due to increased third-party royalties of \$7.1 million.

Amortization: The increase in amortization expense was due to the amortization of newly acquired intangible assets.

Maintenance and Service: The net increase in maintenance and service costs was primarily due to the following:

- Increased salaries and other headcount-related costs of \$15.8 million.
- Increased third-party technical support of \$7.1 million.
- Increased stock-based compensation of \$5.1 million.
- Increased consulting costs of \$2.7 million.
- Increased IT maintenance and software hosting costs of \$1.5 million.
- Increased costs related to foreign exchange translation of \$1.1 million due to a weaker U.S. Dollar.
- Decreased business travel of \$2.2 million due to COVID-19.

The improvement in gross profit was a result of the increase in revenue, partially offset by the increase in the related cost of sales.

	Year Ended December 31,				Change	
	2020		2019			
(in thousands, except percentages)	Amount	% of Revenue	Amount	% of Revenue	Amount	%
Operating expenses:						
Selling, general and administrative	\$ 587,707	35.0	\$ 521,200	34.4	\$ 66,507	12.8
Research and development	355,371	21.1	298,210	19.7	57,161	19.2
Amortization	16,599	1.0	15,169	1.0	1,430	9.4
Total operating expenses	\$ 959,677	57.1	\$ 834,579	55.1	\$ 125,098	15.0

Selling, General and Administrative: The net increase in selling, general and administrative costs was primarily due to the following:

- Increased salaries, incentive compensation and other headcount-related costs of \$40.3 million.
- Increased stock-based compensation of \$12.9 million.
- Increased third-party commissions of \$8.4 million.
- Increased IT maintenance and software hosting costs of \$5.2 million.
- Increased bad debt expense of \$3.5 million due to expected losses related to COVID-19.
- Increased marketing expenses of \$3.0 million.
- Increased costs related to foreign exchange translation of \$2.8 million due to a weaker U.S. Dollar.
- Decreased business travel of \$16.0 million due to COVID-19.

We anticipate that we will continue to make targeted investments in our global sales and marketing organizations and our global business infrastructure to enhance and support our revenue-generating activities.

Research and Development: The increase in research and development costs was primarily due to the following:

- Increased salaries and other headcount-related costs of \$38.0 million.
- Increased stock-based compensation of \$11.4 million.
- Increased IT maintenance and software hosting costs of \$4.4 million.

We have traditionally invested significant resources in research and development activities and intend to continue to make investments in expanding the ease of use and capabilities of our broad portfolio of simulation software products, even with the on-going COVID-19 pandemic.

Interest Income: Interest income for the year ended December 31, 2020 was \$5.1 million as compared to \$12.8 million for the year ended December 31, 2019. Interest income decreased as a result of a lower interest rate environment and the related decrease in the average rate of return on invested cash balances.

Interest Expense: Interest expense for the year ended December 31, 2020 was \$11.0 million as compared to \$3.5 million for the year ended December 31, 2019. Interest expense increased as a result of the interest incurred on debt financing obtained in connection with the acquisitions of AGI and LST in the fourth quarters of 2020 and 2019, respectively.

Other Income (Expense), net: Our other income (expense) consisted of the following:

	Year Ended December 31,	
	2020	2019
<i>(in thousands)</i>		
Investment gains, net	\$ 3,648	\$ 333
Foreign currency losses, net	(194)	(2,510)
Other	30	385
Total other income (expense), net	\$ 3,484	\$ (1,792)

Income Tax Provision: Our income before income tax provision, income tax provision and effective tax rate were as follows:

<i>(in thousands, except percentages)</i>	Year Ended December 31,	
	2020	2019
Income before income tax provision	\$ 493,925	\$ 522,583
Income tax provision	\$ 60,038	\$ 71,288
Effective tax rate	12.2 %	13.6 %

The decrease in the effective tax rate from the prior year was primarily due to tax benefits of \$7.5 million related to entity structuring activities and increased benefits from research and development credits of \$4.1 million. These benefits were partially offset by decreased benefits of \$6.1 million in the foreign-derived intangible income (FDII) deduction and the decrease in releases of valuation allowance of \$2.6 million.

When compared to the federal and state combined statutory rate for each respective period, the effective tax rates for the years ended December 31, 2020 and 2019 were also favorably impacted by tax benefits from stock-based compensation, the FDII deduction, and research and development credits.

Net Income: Our net income, diluted earnings per share and weighted average shares used in computing diluted earnings per share were as follows:

<i>(in thousands, except per share data)</i>	Year Ended December 31,	
	2020	2019
Net income	\$ 433,887	\$ 451,295
Diluted earnings per share	\$ 4.97	\$ 5.25
Weighted average shares outstanding - diluted	87,288	85,925

Year Ended December 31, 2019 Compared to Year Ended December 31, 2018

ACV:

(in thousands, except percentages)	Year Ended December 31,		Change		
	2019	2018	Amount	%	Constant Currency %
ACV	\$ 1,461,759	\$ 1,325,211	\$ 136,548	10.3	12.0
Recurring ACV as a percentage of ACV	77.4 %	76.9 %			

Revenue:

(in thousands, except percentages)	Year Ended December 31,		Change		
	2019	2018	Amount	%	Constant Currency %
Revenue:					
Lease licenses	\$ 406,043	\$ 275,619	\$ 130,424	47.3	49.4
Perpetual licenses	293,587	301,098	(7,511)	(2.5)	(1.1)
Software licenses	699,630	576,717	122,913	21.3	23.1
Maintenance	760,574	676,883	83,691	12.4	14.3
Service	55,688	40,036	15,652	39.1	41.5
Maintenance and service	816,262	716,919	99,343	13.9	15.8
Total revenue	\$ 1,515,892	\$ 1,293,636	\$ 222,256	17.2	19.0

Our revenue in the year ended December 31, 2019 increased 17.2% as compared to the year ended December 31, 2018, or 19.0% in constant currency. The growth rate was favorably impacted by our continued investments in our global sales, support and marketing organizations, as well as our 2019 and 2018 acquisitions which contributed incremental revenue of \$72.9 million. Lease license revenue increased 47.3%, or 49.4% in constant currency, as compared to the year ended December 31, 2018, driven primarily by an increase in multi-year lease contracts. Annual maintenance contracts that were sold with new perpetual licenses, maintenance contracts for new perpetual licenses sold in previous years and the maintenance portion of lease license contracts each contributed to maintenance revenue growth of 12.4%, or 14.3% in constant currency. Service revenue, driven primarily by a focus on service offerings that provide on-site mentorship on simulation best practices, training and expanding simulation adoption, increased 39.1%, or 41.5% in constant currency, as compared to the year ended December 31, 2018. Perpetual license revenue, which is derived primarily from new sales during the year ended December 31, 2019, decreased 2.5%, or 1.1% in constant currency, as compared to the year ended December 31, 2018.

With respect to revenue, on average for the year ended December 31, 2019, the U.S. Dollar was approximately 3.3% stronger, when measured against our primary foreign currencies, than for the year ended December 31, 2018. The table below presents the impacts of currency fluctuations on revenue for the year ended December 31, 2019. Amounts in brackets indicate an adverse impact from currency fluctuations.

<i>(in thousands)</i>	Year Ended December 31, 2019
Euro	\$ (17,361)
South Korean Won	(5,097)
British Pound	(1,881)
Japanese Yen	1,791
Other	(1,460)
Total	<u>\$ (24,008)</u>

The impacts from currency fluctuations resulted in decreased operating income of \$10.2 million for the year ended December 31, 2019 as compared to the year ended December 31, 2018.

As a percentage of revenue, our international and domestic revenues, and our direct and indirect revenues, were as follows:

	Year Ended December 31,	
	2019	2018
International	57.9 %	60.9 %
Domestic	42.1 %	39.1 %
Direct	77.1 %	77.6 %
Indirect	22.9 %	22.4 %

In valuing deferred revenue on the balance sheets of our recent acquisitions as of their respective acquisition dates, we applied the fair value provisions applicable to the accounting for business combinations, resulting in a reduction of deferred revenue as compared to the historical carrying amount. As a result, our post-acquisition revenue will be less than the sum of what would have otherwise been reported by us and each acquiree absent the acquisitions. The impacts on reported revenue were \$12.5 million and \$9.4 million for the years ended December 31, 2019 and 2018, respectively.

Cost of Sales and Operating Expenses:

The tables below reflect our operating results as presented on the consolidated statements of income, which are inclusive of foreign currency translation impacts. Amounts included in the discussions that follow each table are provided in constant currency and are inclusive of costs related to our acquisitions. The impact of foreign exchange translation is discussed separately, where material. The 2019 and 2018 acquisitions contributed \$54.7 million to the overall increase in cost of sales and operating expenses with the most significant contributions from the OPTIS (May 2, 2018) and Granta Design (February 1, 2019) acquisitions of \$17.3 million and \$18.9 million, respectively.

	Year Ended December 31,					
	2019		2018		Change	
(in thousands, except percentages)	Amount	% of Revenue	Amount	% of Revenue	Amount	%
Cost of sales:						
Software licenses	\$ 23,944	1.6	\$ 18,619	1.4	\$ 5,325	28.6
Amortization	21,710	1.4	27,034	2.1	(5,324)	(19.7)
Maintenance and service	120,619	8.0	110,232	8.5	10,387	9.4
Total cost of sales	166,273	11.0	155,885	12.1	10,388	6.7
Gross profit	\$ 1,349,619	89.0	\$ 1,137,751	87.9	\$ 211,868	18.6

Software Licenses: The increase in the cost of software licenses was primarily due to increased third-party royalties of \$5.6 million.

Amortization: The net decrease in amortization expense was primarily due to a decrease in the amortization of trade names and acquired technology due to assets that became fully amortized, which was partially offset by the amortization of newly acquired intangible assets.

Maintenance and Service: The net increase in maintenance and service costs was primarily due to the following:

- Increased salaries of \$4.0 million.
- Increased stock-based compensation of \$3.3 million.
- Increased consulting costs of \$1.7 million.
- Increased IT maintenance and software hosting costs of \$1.3 million.
- Decreased costs related to foreign exchange translation of \$2.0 million due to a stronger U.S. Dollar.

The improvement in gross profit was a result of the increase in revenue, partially offset by the increase in the related cost of sales.

(in thousands, except percentages)	Year Ended December 31,				Change	
	2019		2018			
	Amount	% of Revenue	Amount	% of Revenue	Amount	%
Operating expenses:						
Selling, general and administrative	\$ 521,200	34.4	\$ 413,580	32.0	\$ 107,620	26.0
Research and development	298,210	19.7	233,802	18.1	64,408	27.5
Amortization	15,169	1.0	13,795	1.1	1,374	10.0
Total operating expenses	\$ 834,579	55.1	\$ 661,177	51.1	\$ 173,402	26.2

Selling, General and Administrative: The net increase in selling, general and administrative costs was primarily due to the following:

- Increased salaries, incentive compensation and other headcount-related costs of \$63.7 million.
- Increased stock-based compensation of \$13.5 million.
- Increased business travel of \$6.5 million.
- Increased marketing expenses of \$5.4 million.
- Increased professional fees of \$4.5 million.
- Increased consulting costs of \$4.2 million.
- Decreased costs related to foreign exchange translation of \$7.1 million due to a stronger U.S. Dollar.

Research and Development: The increase in research and development costs was primarily due to the following:

- Increased salaries, incentive compensation and other headcount-related costs of \$41.1 million.
- Increased stock-based compensation of \$16.0 million.

Interest Income: Interest income for the year ended December 31, 2019 was \$12.8 million as compared to \$11.4 million for the year ended December 31, 2018. Interest income increased as a result of an increase in the average rate of return on invested cash balances.

Interest Expense: Interest expense for the year ended December 31, 2019 was \$3.5 million as compared to \$0.1 million for the year ended December 31, 2018. Interest expense increased as a result of the interest incurred on debt financing obtained in fiscal year 2019.

Other Expense, net: Our other expense consisted of the following:

<i>(in thousands)</i>	Year Ended December 31,	
	2019	2018
Foreign currency losses, net	\$ (2,510)	\$ (3,058)
Investment gains, net	333	2,204
Other	385	5
Total other expense, net	\$ (1,792)	\$ (849)

Income Tax Provision: Our income before income tax provision, income tax provision and effective tax rate were as follows:

<i>(in thousands, except percentages)</i>	Year Ended December 31,	
	2019	2018
Income before income tax provision	\$ 522,583	\$ 487,085
Income tax provision	\$ 71,288	\$ 67,710
Effective tax rate	13.6 %	13.9 %

The decrease in the effective tax rate from the prior year was primarily due to \$6.7 million of benefit related to the release of a valuation allowance in a foreign jurisdiction and \$1.8 million of benefit related to transition tax recorded in 2019. These

benefits are offset by \$6.7 million of benefit recorded in 2018 related to global legal entity restructuring activities that did not recur in 2019.

When compared to the federal and state combined statutory rate for each respective period, the effective tax rates for the years ended December 31, 2019 and 2018 were favorably impacted by tax benefits from stock-based compensation, the foreign-derived intangible income deduction, and research and development credits.

Net Income: Our net income, diluted earnings per share and weighted average shares used in computing diluted earnings per share were as follows:

<i>(in thousands, except per share data)</i>	Year Ended December 31,	
	2019	2018
Net income	\$ 451,295	\$ 419,375
Diluted earnings per share	\$ 5.25	\$ 4.88
Weighted average shares outstanding - diluted	85,925	85,913

Non-GAAP Results

We provide non-GAAP revenue, non-GAAP gross profit, non-GAAP gross profit margin, non-GAAP operating income, non-GAAP operating profit margin, non-GAAP net income and non-GAAP diluted earnings per share as supplemental measures to GAAP regarding our operational performance. These financial measures exclude the impact of certain items and, therefore, have not been calculated in accordance with GAAP. A detailed explanation and a reconciliation of each non-GAAP financial measure to its most comparable GAAP financial measure are included below.

ANSYS, INC. AND SUBSIDIARIES
Reconciliations of GAAP to Non-GAAP Measures
(Unaudited)

Year Ended December 31, 2020

<i>(in thousands, except percentages and per share data)</i>	Revenue	Gross Profit	%	Operating Income	%	Net Income	EPS - Diluted ¹
Total GAAP	\$ 1,681,297	\$ 1,456,033	86.6 %	\$ 496,356	29.5 %	\$ 433,887	\$ 4.97
Acquisition accounting for deferred revenue	14,201	14,201	0.1 %	14,201	0.6 %	14,201	0.16
Stock-based compensation expense	—	13,626	0.8 %	145,615	8.6 %	145,615	1.66
Excess payroll taxes related to stock-based awards	—	813	0.1 %	10,111	0.6 %	10,111	0.12
Amortization of intangible assets from acquisitions	—	40,642	2.4 %	57,241	3.4 %	57,241	0.66
Transaction expenses related to business combinations	—	—	— %	5,129	0.3 %	5,129	0.06
Rabbi trust (income) / expense	—	—	— %	—	— %	(6)	—
Adjustment for income tax effect	—	—	— %	—	— %	(81,574)	(0.93)
Total non-GAAP	\$ 1,695,498	\$ 1,525,315	90.0 %	\$ 728,653	43.0 %	\$ 584,604	\$ 6.70

¹ Diluted weighted average shares were 87,288.

Year Ended December 31, 2019

<i>(in thousands, except percentages and per share data)</i>	Revenue	Gross Profit	%	Operating Income	%	Net Income	EPS - Diluted¹
Total GAAP	\$ 1,515,892	\$ 1,349,619	89.0 %	\$ 515,040	34.0 %	\$ 451,295	\$ 5.25
Acquisition accounting for deferred revenue	12,514	12,514	0.1 %	12,514	0.5 %	12,514	0.15
Stock-based compensation expense	—	8,494	0.5 %	116,190	7.7 %	116,190	1.34
Excess payroll taxes related to stock-based awards	—	518	0.1 %	4,920	0.3 %	4,920	0.06
Amortization of intangible assets from acquisitions	—	21,710	1.4 %	36,879	2.4 %	36,879	0.43
Transaction expenses related to business combinations	—	—	— %	6,590	0.4 %	6,590	0.08
Rabbi trust (income) / expense	—	—	— %	—	— %	(369)	—
Adjustment related to the Tax Cuts and Jobs Act	—	—	— %	—	— %	(1,834)	(0.02)
Adjustment for income tax effect	—	—	— %	—	— %	(61,188)	(0.71)
Total non-GAAP	\$ 1,528,406	\$ 1,392,855	91.1 %	\$ 692,133	45.3 %	\$ 564,997	\$ 6.58

¹ Diluted weighted average shares were 85,925.

Year Ended December 31, 2018

<i>(in thousands, except percentages and per share data)</i>	Revenue	Gross Profit	%	Operating Income	%	Net Income	EPS - Diluted¹
Total GAAP	\$ 1,293,636	\$ 1,137,751	87.9 %	\$ 476,574	36.8 %	\$ 419,375	\$ 4.88
Acquisition accounting for deferred revenue	9,442	9,442	0.1 %	9,442	0.4 %	9,442	0.11
Stock-based compensation expense	—	5,224	0.4 %	83,346	6.4 %	83,346	0.97
Excess payroll taxes related to stock-based awards	—	354	0.1 %	4,299	0.4 %	4,299	0.05
Amortization of intangible assets from acquisitions	—	27,034	2.0 %	40,829	3.1 %	40,829	0.48
Transaction expenses related to business combinations	—	—	— %	3,526	0.3 %	3,526	0.04
Rabbi trust (income) / expense	—	—	— %	—	— %	71	—
Adjustment related to the Tax Cuts and Jobs Act	—	—	— %	—	— %	895	0.01
Adjustment for income tax effect	—	—	— %	—	— %	(47,898)	(0.56)
Total non-GAAP	\$ 1,303,078	\$ 1,179,805	90.5 %	\$ 618,016	47.4 %	\$ 513,885	\$ 5.98

¹ Diluted weighted average shares were 85,913.

We use non-GAAP financial measures (a) to evaluate our historical and prospective financial performance as well as our performance relative to our competitors, (b) to set internal sales targets and spending budgets, (c) to allocate resources, (d) to measure operational profitability and the accuracy of forecasting, (e) to assess financial discipline over operational expenditures and (f) as an important factor in determining variable compensation for management and employees. In addition, many financial analysts that follow us focus on and publish both historical results and future projections based on non-GAAP

financial measures. We believe that it is in the best interest of our investors to provide this information to analysts so that they accurately report the non-GAAP financial information. Moreover, investors have historically requested, and we have historically reported, these non-GAAP financial measures as a means of providing consistent and comparable information with past reports of financial results.

While we believe that these non-GAAP financial measures provide useful supplemental information to investors, there are limitations associated with the use of these non-GAAP financial measures. These non-GAAP financial measures are not prepared in accordance with GAAP, are not reported by all our competitors and may not be directly comparable to similarly titled measures of our competitors due to potential differences in the exact method of calculation. We compensate for these limitations by using these non-GAAP financial measures as supplements to GAAP financial measures and by reviewing the reconciliations of the non-GAAP financial measures to their most comparable GAAP financial measures.

The adjustments to these non-GAAP financial measures, and the basis for such adjustments, are outlined below:

Acquisition accounting for deferred revenue. Historically, we have consummated acquisitions in order to support our strategic and other business objectives. In accordance with the fair value provisions applicable to the accounting for business combinations, acquired deferred revenue is often recorded on the opening balance sheet at an amount that is lower than the historical carrying value. Although this acquisition accounting requirement has no impact on our business or cash flow, it adversely impacts our reported GAAP revenue in the reporting periods following an acquisition. In order to provide investors with financial information that facilitates comparison of both historical and future results, we provide non-GAAP financial measures which exclude the impact of the acquisition accounting adjustment. We believe that this non-GAAP financial adjustment is useful to investors because it allows investors to (a) evaluate the effectiveness of the methodology and information used by us in our financial and operational decision-making, and (b) compare our past and future reports of financial results as the revenue reduction related to acquired deferred revenue will not recur when related lease licenses and software maintenance contracts are renewed in future periods.

Amortization of intangible assets from acquisitions. We incur amortization of intangible assets, included in our GAAP presentation of amortization expense, related to various acquisitions we have made. We exclude these expenses for the purpose of calculating non-GAAP gross profit, non-GAAP gross profit margin, non-GAAP operating income, non-GAAP operating profit margin, non-GAAP net income and non-GAAP diluted earnings per share when we evaluate our continuing operational performance because these costs are fixed at the time of an acquisition, are then amortized over a period of several years after the acquisition and generally cannot be changed or influenced by us after the acquisition. Accordingly, we do not consider these expenses for purposes of evaluating our performance during the applicable time period after the acquisition, and we exclude such expenses when making decisions to allocate resources. We believe that these non-GAAP financial measures are useful to investors because they allow investors to (a) evaluate the effectiveness of the methodology and information used by us in our financial and operational decision-making, and (b) compare our past reports of financial results as we have historically reported these non-GAAP financial measures.

Stock-based compensation expense. We incur expense related to stock-based compensation included in our GAAP presentation of cost of maintenance and service; research and development expense; and selling, general and administrative expense. This non-GAAP adjustment also includes excess payroll tax expense related to stock-based compensation. Stock-based compensation expense (benefit) incurred in connection with our deferred compensation plan held in a rabbi trust includes an offsetting benefit (charge) recorded in other income (expense). Although stock-based compensation is an expense and viewed as a form of compensation, we exclude these expenses for the purpose of calculating non-GAAP gross profit, non-GAAP gross profit margin, non-GAAP operating income, non-GAAP operating profit margin, non-GAAP net income and non-GAAP diluted earnings per share when we evaluate our continuing operational performance. We similarly exclude income (expense) related to assets held in a rabbi trust in connection with our deferred compensation plan. Specifically, we exclude stock-based compensation and income (expense) related to assets held in the deferred compensation plan rabbi trust during our annual budgeting process and our quarterly and annual assessments of our performance. The annual budgeting process is the primary mechanism whereby we allocate resources to various initiatives and operational requirements. Additionally, the annual review by our board of directors during which it compares our historical business model and profitability to the planned business model and profitability for the forthcoming year excludes the impact of stock-based compensation. In evaluating the performance of our senior management and department managers, charges related to stock-based compensation are excluded from expenditure and profitability results. In fact, we record stock-based compensation expense into a stand-alone cost center for which no single operational manager is responsible or accountable. In this way, we can review, on a period-to-period basis, each manager's performance and assess financial discipline over operational expenditures without the effect of stock-based compensation. We believe that these non-GAAP financial measures are useful to investors because they allow investors to (a) evaluate our operating results and the effectiveness of the methodology used by us to review our operating results, and (b) review historical comparability in our financial reporting as well as comparability with competitors' operating results.

Transaction expenses related to business combinations. We incur expenses for professional services rendered in connection with business combinations, which are included in our GAAP presentation of selling, general and administrative expense. These expenses are generally not tax-deductible. We exclude these acquisition-related transaction expenses, derived from announced acquisitions, for the purpose of calculating non-GAAP operating income, non-GAAP operating profit margin, non-GAAP net income and non-GAAP diluted earnings per share when we evaluate our continuing operational performance, as we generally would not have otherwise incurred these expenses in the periods presented as a part of our operations. We believe that these non-GAAP financial measures are useful to investors because they allow investors to (a) evaluate our operating results and the effectiveness of the methodology used by us to review our operating results, and (b) review historical comparability in our financial reporting as well as comparability with competitors' operating results.

Tax Cuts and Jobs Act. We recorded impacts to our income tax provision related to the enactment of the Tax Cuts and Jobs Act of 2017, specifically for the transition tax related to unrepatriated cash. We exclude these impacts for the purpose of calculating non-GAAP net income and non-GAAP diluted earnings per share when we evaluate our continuing operational performance, as (i) the charges are not expected to recur as part of our normal operations and (ii) the charges resulted from the extremely infrequent event of major U.S. tax reform, the last such reform having occurred in 1986. We believe that these non-GAAP financial measures are useful to investors because they allow investors to (a) evaluate our operating results and the effectiveness of the methodology used by us to review our operating results, and (b) review historical comparability in our financial reporting.

Non-GAAP tax provision. We utilize a normalized non-GAAP annual effective tax rate (AETR) to calculate non-GAAP measures. This methodology provides better consistency across interim reporting periods by eliminating the effects of non-recurring items and aligning the non-GAAP tax rate with our expected geographic earnings mix. To project this rate, we analyzed our historic and projected non-GAAP earnings mix by geography along with other factors such as our current tax structure, recurring tax credits and incentives, and expected tax positions. On an annual basis we will re-evaluate this rate for significant items that may materially affect our projections.

Non-GAAP financial measures are not in accordance with, or an alternative for, GAAP. Our non-GAAP financial measures are not meant to be considered in isolation or as a substitute for comparable GAAP financial measures and should be read only in conjunction with our consolidated financial statements prepared in accordance with GAAP.

We have provided a reconciliation of the non-GAAP financial measures to the most directly comparable GAAP financial measures as listed below:

GAAP Reporting Measure

Revenue
Gross Profit
Gross Profit Margin
Operating Income
Operating Profit Margin
Net Income
Diluted Earnings Per Share

Non-GAAP Reporting Measure

Non-GAAP Revenue
Non-GAAP Gross Profit
Non-GAAP Gross Profit Margin
Non-GAAP Operating Income
Non-GAAP Operating Profit Margin
Non-GAAP Net Income
Non-GAAP Diluted Earnings Per Share

Liquidity and Capital Resources

<i>(in thousands, except percentages)</i>	As of December 31,		Change	
	2020	2019	Amount	%
Cash, cash equivalents and short-term investments	\$ 913,151	\$ 872,382	\$ 40,769	4.7
Working capital	\$ 990,412	\$ 860,340	\$ 130,072	15.1

Cash, Cash Equivalents and Short-Term Investments

Cash and cash equivalents consist primarily of highly liquid investments such as money market funds and deposits held at major banks. Short-term investments consist primarily of deposits held by certain of our foreign subsidiaries with original maturities of three months to one year. The following table presents our foreign and domestic holdings of cash, cash equivalents and short-term investments:

<i>(in thousands, except percentages)</i>	As of December 31,			
	2020	% of Total	2019	% of Total
Domestic	\$ 582,882	63.8	\$ 626,433	71.8
Foreign	330,269	36.2	245,949	28.2
Total	\$ 913,151		\$ 872,382	

In general, it is our intention to permanently reinvest all earnings in excess of previously taxed amounts. Substantially all of the pre-2018 earnings of our non-U.S. subsidiaries were taxed through the transition tax and post-2018 current earnings are taxed as part of global intangible low-taxed income tax expense. These taxes increase our previously taxed earnings and allow for the repatriation of the majority of our foreign earnings without any residual U.S. federal tax. While we believe that the financial reporting bases may be greater than the tax bases of investments in foreign subsidiaries for any earnings in excess of previously taxed amounts, such amounts are considered permanently reinvested. The cumulative temporary difference related to such permanently reinvested earnings is approximately \$93.0 million and we would anticipate the tax effect on those earnings to be immaterial.

The amount of cash, cash equivalents and short-term investments held by foreign subsidiaries is subject to translation adjustments caused by changes in foreign currency exchange rates as of the end of each respective reporting period, the offset to which is recorded in accumulated other comprehensive loss on our consolidated balance sheet.

Cash Flows from Operating Activities

<i>(in thousands)</i>	Year Ended December 31,			Change	
	2020	2019	2018	2020 vs. 2019	2019 vs. 2018
Net cash provided by operating activities	\$ 547,310	\$ 499,936	\$ 484,988	\$ 47,374	\$ 14,948

Fiscal year 2020 as compared to fiscal year 2019

Net cash provided by operating activities increased during the current fiscal year due to increased net income (net of non-cash operating adjustments) of \$25.8 million and increased net cash flows from operating assets and liabilities of \$21.6 million. The growth in net cash provided by operating activities was impacted by strong customer receipts in the fourth quarter, including both the recovery of payments delayed from earlier in the year due to COVID-19, as well as the receipt of payments that were scheduled to be received in 2021. The growth was further aided by our ability to delay certain income, employment and indirect tax payments to 2021. Despite the strong cash flow, as the COVID-19 crisis lengthens, we continue to experience longer-term payment requests, particularly related to larger contract commitments.

Fiscal year 2019 as compared to fiscal year 2018

Net cash provided by operating activities increased during the prior fiscal year due to increased net income (net of non-cash operating adjustments) of \$107.4 million, partially offset by decreased net cash flows from operating assets and liabilities of \$92.4 million.

Cash Flows from Investing Activities

(in thousands)	Year Ended December 31,			Change	
	2020	2019	2018	2020 vs. 2019	2019 vs. 2018
Net cash used in investing activities	\$ (614,253)	\$ (833,548)	\$ (312,231)	\$ 219,295	\$ (521,317)

Fiscal year 2020 as compared to fiscal year 2019

Net cash used in investing activities decreased during the current fiscal year due primarily to decreased acquisition-related net cash outlays of \$214.9 million and decreased capital expenditures of \$9.6 million. We currently plan capital spending of \$30.0 million to \$40.0 million during fiscal year 2021 as compared to the \$35.4 million that was spent in fiscal year 2020. The level of spending will depend on various factors, including the growth of the business, general economic conditions and the on going impact of COVID-19.

Fiscal year 2019 as compared to fiscal year 2018

Net cash used in investing activities increased during the prior fiscal year due primarily to increased acquisition-related net cash outlays of \$504.2 million and increased capital expenditures of \$23.2 million.

Cash Flows from Financing Activities

(in thousands)	Year Ended December 31,			Change	
	2020	2019	2018	2020 vs. 2019	2019 vs. 2018
Net cash provided by (used in) financing activities	\$ 96,597	\$ 429,409	\$ (262,675)	\$ (332,812)	\$ 692,084

Fiscal year 2020 as compared to fiscal year 2019

Net cash provided by financing activities decreased during the current fiscal year due primarily to \$500.0 million in proceeds from long-term debt incurred in fiscal year 2019 related to the LST acquisition, of which \$75.0 million was repaid in 2020 prior to its maturity date, increased stock repurchases of \$101.9 million, and increased restricted stock withholding taxes paid in lieu of issuing shares of \$28.6 million, partially offset by \$375.0 million in proceeds from long-term debt incurred in fiscal year 2020 related to the AGI acquisition.

Fiscal year 2019 as compared to fiscal year 2018

Net cash provided by financing activities increased during the prior fiscal year due primarily to \$500.0 million in proceeds from long-term debt incurred in fiscal year 2019 related to the LST acquisition and decreased stock repurchases of \$210.7 million, partially offset by increased restricted stock withholding taxes paid in lieu of issuing shares of \$13.6 million.

Other Commitments - Term Loan Facilities and Operating Lease Obligations

As of December 31, 2020, the carrying values of our term loans were \$798.1 million, which is net of \$1.9 million of unamortized debt issuance costs. Borrowings under the term loans accrue interest at the Eurodollar rate plus an applicable margin or at the base rate, at our election. The base rate is the applicable margin plus the highest of (i) the federal funds rate plus 0.500%, (ii) the Bank of America prime rate and (iii) the Eurodollar rate plus 1.000%. The applicable margin for these borrowings is a percentage per annum based on the lower of (1) a pricing level determined by our then-current consolidated leverage ratio and (2) a pricing level determined by our debt ratings (if such debt ratings exist). The scheduled maturities of the term loans are as follows:

<i>(in thousands)</i>	
2021	\$ —
2022	18,750
2023	37,500
2024	743,750
2025	—
Total	<u>\$ 800,000</u>

We previously entered into noncancellable operating lease commitments, primarily for our domestic and international offices as well as certain operating equipment. The commitments related to these operating leases are as follows:

<i>(in thousands)</i>	
2021	\$ 27,311
2022	24,712
2023	21,522
2024	20,264
2025	17,076
Thereafter	50,438
Total	<u>\$ 161,323</u>

Other Cash Flow Information

We believe that existing cash and cash equivalent balances of \$912.7 million, together with cash generated from operations and access to the \$500.0 million revolving credit facility, will be sufficient to meet our working capital and capital expenditure requirements through the next twelve months. Our cash requirements in the future may also be financed through additional equity or debt financings. However, future disruptions in the capital markets could make financing more challenging, and there can be no assurance that such financing can be obtained on commercially reasonable terms, or at all.

We also believe that our liquidity will allow us to manage the anticipated impact of COVID-19 on our business operations for the foreseeable future. However, our 2020 operating cash flow benefited from cash receipts from customer payments originally scheduled to be paid in FY 2021, as well as customer receipts from December transactions that would have traditionally been paid in the following fiscal year. These activities collectively increased our FY 2020 operating cash flow and will decrease our FY 2021 operating cash flow by approximately \$25.0 million. Additionally, FY 2020 operating cash flow benefited from \$31.0 million related to the timing of various tax payments, \$14.0 million of which will be due in 2021, resulting in a further shifting of operating cash flow between these two periods.

Under our stock repurchase program, we repurchased shares as follows:

<i>(in thousands, except per share data)</i>	Year Ended December 31,		
	2020	2019	2018
Number of shares repurchased	690	330	1,674
Average price paid per share	\$ 233.48	\$ 179.41	\$ 161.12
Total cost	\$ 161,029	\$ 59,116	\$ 269,801

All of the shares of common stock repurchased during the year ended December 31, 2020 were repurchased in the first quarter. As of December 31, 2020, 2.8 million shares remained available for repurchase under the program.

The authorized repurchase program does not have an expiration date, and the pace of the repurchase activity will depend on factors such as working capital needs, cash requirements for acquisitions, our stock price, and economic and market conditions. Our stock repurchases may be effected from time to time through open market purchases or pursuant to a Rule 10b5-1 plan.

We continue to generate positive cash flows from operating activities and believe that the best uses of our excess cash are to invest in the business; acquire or make investments in complementary companies, products, services and technologies; and make payments on our outstanding debt balances. Any future acquisitions may be funded by available cash and investments, cash generated from operations, debt financing, or the issuance of additional securities. Additionally, we have in the past, and expect in the future, to repurchase stock in order to both offset dilution and return capital, in excess of our requirements, to stockholders with the goal of increasing stockholder value.

Off-Balance-Sheet Arrangements

We do not have any special-purpose entities or off-balance-sheet arrangements.

Contractual Obligations

Our significant contractual obligations as of December 31, 2020 are summarized below:

(in thousands)	Payments Due by Period				
	Total	Within 1 year	2 – 3 years	4 – 5 years	After 5 years
Long-term debt:					
Principal payments	\$ 800,000	\$ —	\$ 56,250	\$ 743,750	\$ —
Interest payments ⁽¹⁾	45,153	12,198	23,787	9,168	—
Global headquarters operating lease ⁽²⁾	40,735	4,464	8,928	9,130	18,213
Other operating leases ⁽³⁾	120,588	22,847	37,306	28,210	32,225
Unconditional purchase obligations ⁽⁴⁾	74,925	44,865	27,509	2,551	—
Obligations related to uncertain tax positions, including interest and penalties ⁽⁵⁾	—	—	—	—	—
Other long-term obligations ⁽⁶⁾	66,427	34,177	15,132	7,002	10,116
Total contractual obligations	\$ 1,147,828	\$ 118,551	\$ 168,912	\$ 799,811	\$ 60,554

- (1) Interest on the long-term debt is estimated using the interest rate as of December 31, 2020, as the interest rate is variable. For additional information, see Note 10 to the consolidated financial statements included in Part IV, Item 15 of this Annual Report on Form 10-K.
- (2) We previously entered into a lease agreement for 186,000 square feet of rentable space located in an office facility in Canonsburg, Pennsylvania, which serves as our headquarters. The term of the lease is 183 months, beginning on October 1, 2014 and expiring on December 31, 2029. We have a one-time right to terminate the lease on December 31, 2025 by providing the landlord with at least 18 months' prior written notice of such termination.
- (3) Other operating leases primarily include noncancellable lease commitments for our other domestic and international offices as well as certain operating equipment.
- (4) Unconditional purchase obligations primarily include royalties and software licenses and services, which are unrecorded as of December 31, 2020.
- (5) We have \$31.2 million of unrecognized tax benefits, including estimated interest and penalties, that have been recorded as liabilities in accordance with income tax accounting guidance for which we are uncertain as to if or when such amounts may be settled. As a result, such amounts are excluded from the table above.
- (6) Other long-term obligations primarily include third-party commissions and technical support of \$42.3 million; post-employment benefits, including pension obligations, of \$13.9 million for certain foreign locations; deferred employment taxes of \$6.9 million; and office space restoration of \$3.4 million. These amounts include the related current portions when applicable.

Critical Accounting Policies and Estimates

We believe that the following critical accounting policies affect the more significant judgments and estimates used in the preparation of our consolidated financial statements.

Revenue Recognition: Our revenue is derived principally from the licensing of computer software products and from related maintenance contracts. We enter into contracts that include combinations of products, maintenance and services, which are accounted for as separate performance obligations with differing revenue recognition patterns.

Revenue from perpetual licenses is classified as software license revenue. Software license revenue is recognized up front upon delivery of the licensed product and/or the utility that enables the customer to access authorization keys, provided that an enforceable contract has been received. Typically, our perpetual licenses are sold with post-contract support (PCS), which includes unspecified technical enhancements and customer support. We allocate value in bundled perpetual and PCS arrangements based on the standalone selling prices of the perpetual license and PCS. Revenue from PCS is classified as maintenance revenue and is recognized ratably over the term of the contract, as we satisfy the PCS performance obligation over time.

In addition to perpetual licenses, we sell time-based lease licenses. Lease licenses are sold only as a bundled arrangement that includes the rights to a term software license and PCS. Utilizing observable inputs, we determined that 50% of the estimated standalone selling price of the lease license is attributable to the term license and 50% is attributable to the PCS. This determination considered the value relationship for our products between PCS and time-based lease licenses, the value relationship between PCS and perpetual licenses, the average economic life of our products, software renewal rates and the price of the bundled arrangement in relation to the perpetual licensing approach. Consistent with the perpetual sales, the license component is classified as software license revenue and recognized as revenue up front at the commencement of the lease upon delivery of the licensed product and/or utility that enables the customer to access authorization keys. The PCS is classified as maintenance revenue and is recognized ratably over the term of the contract, as we satisfy the PCS performance obligation over time.

Revenue from training, support and other services is recognized as the services are performed. For contracts in which the service consists of a single performance obligation, such as providing a training class to a customer, we recognize revenue upon completion of the performance obligation. For service contracts that are longer in duration and often include multiple performance obligations (for example, both training and consulting), we measure the progress toward completion of the obligations and recognize revenue accordingly. In measuring progress towards the completion of performance obligations, we typically utilize output-based estimates for services with contractual billing arrangements that are not based on time and materials, and estimate output based on the total tasks completed as compared to the total tasks required for each work contract. Input-based estimates are utilized for services that involve general consultations with contractual billing arrangements based on time and materials, utilizing direct labor as the input measure. Proceeds from customers for the purpose of expediting roadmap items, developing new products or creating specific features and functionality for existing products are classified as revenue.

We also execute arrangements through independent channel partners in which the channel partners are authorized to market and distribute our software products to end users of our products and services in specified territories. In sales facilitated by channel partners, the channel partner bears the risk of collection from the end-user customer. We recognize revenue from transactions with channel partners in a manner consistent with the direct sales described above for both perpetual and time-based licenses. Revenue from channel partner transactions is the amount remitted to us by the channel partners. This amount includes a fee for PCS that is compensation for providing technical enhancements and the second level of technical support to the end user, which is recognized over the period that PCS is to be provided.

Non-income related taxes collected from customers and remitted to governmental authorities are recorded on the consolidated balance sheet as accounts receivable and accrued expenses. The collection and payment of these amounts are reported on a net basis in the consolidated statements of income and do not impact reported revenues or expenses.

We do not offer right of return. We warrant to our customers that our software will perform substantially as specified in our current user manuals. We have not experienced significant claims related to software warranties beyond the scope of maintenance support, which we are already obligated to provide. The warranty is not sold, and cannot be purchased, separately. The warranty does not provide any type of additional service to the customer or performance obligation for us.

Our agreements with our customers generally require us to indemnify the customer against claims that our software infringes third-party patent, copyright, trademark or other proprietary rights. Such indemnification obligations are generally limited in a variety of industry-standard respects, including our right to replace an infringing product.

Significant Judgments

Our contracts with customers typically include promises to transfer licenses and services to a customer. Judgment is required to determine if the promises are separate performance obligations, and if so, to allocate the transaction price to each performance obligation. We use the estimated standalone selling price method to allocate the transaction price for each performance obligation. The estimated standalone selling price is determined using all information reasonably available to us, including market conditions and other observable inputs. The corresponding revenues are recognized as the related performance obligations are satisfied.

We apply a practical expedient to expense sales commissions as incurred when the amortization period would have been one year or less. Sales commissions associated with the initial year of multi-year contracts are expensed as incurred due to their immateriality. Sales commissions associated with multi-year contracts beyond the initial year are subject to an employee service requirement and are expensed as incurred as they are not considered incremental costs to obtain a contract.

We are required to adjust promised amounts of consideration for the effects of the time value of money if the timing of the payments provides the customer or us with a significant financing benefit. We consider various factors in assessing whether a financing component exists, including the duration of the contract, market interest rates and the timing of payments. Our contracts do not include a significant financing component requiring adjustment to the transaction price.

Goodwill and Other Intangible Assets: We test goodwill and indefinite-lived intangible assets for impairment at least annually by performing a quantitative assessment of whether the fair value of each reporting unit or asset exceeds its carrying amount. We have one reporting unit. Goodwill is tested at this reporting unit level and indefinite-lived intangible assets are tested at the individual asset level. This requires us to assess and make judgments regarding a variety of factors which impact the fair value of the reporting unit or asset being tested, including business plans, anticipated future cash flows, economic projections and other market data. Because there are inherent uncertainties involved in these factors, significant differences between these estimates and actual results could result in future impairment charges and could materially impact our future financial results.

During the first quarter of 2020, we completed the annual impairment test for goodwill and the indefinite-lived intangible asset and determined that these assets had not been impaired as of the test date, January 1, 2020. Given the adverse economic and market conditions caused by COVID-19, we considered a variety of qualitative factors to determine if an additional quantitative impairment test was required subsequent to our annual impairment test. Based on a variety of factors, including the excess of the fair values over the carrying amounts in the most recent impairment test, we determined it was not more likely than not that an impairment existed as of March 31, 2020. No other events or circumstances changed during the year ended December 31, 2020 that would indicate that the fair values of our reporting unit and indefinite-lived intangible asset are below their carrying amounts.

Intangible assets are recognized apart from goodwill whenever an acquired intangible asset arises from contractual or other legal rights, or whenever it is capable of being separated or divided from the acquired entity and sold, transferred, licensed, rented, or exchanged, either individually or in combination with a related contract, asset or liability. We determined the fair value of our intangible assets using various valuation techniques, including the relief-from-royalty method and the multi-period excess earnings method. These models utilize certain unobservable inputs classified as Level 3 measurements as defined by ASC 820, *Fair Value Measurements and Disclosures*. The determination of fair value requires considerable judgment and is sensitive to changes in underlying assumptions, estimates and market factors. Estimating fair value requires us to make assumptions and estimates regarding our future plans, as well as industry and economic conditions. These assumptions and estimates include, but are not limited to: royalty rate, discount rate and attrition rate. The fair values of the intangible assets will be amortized over their useful lives. Impairment losses are recognized if the carrying amounts of finite-lived intangible assets are both not recoverable and exceed the fair values.

Income Taxes: We account for income taxes under the asset and liability method, which requires the recognition of deferred tax assets and liabilities for the expected future tax consequences of events that have been included in the financial statements. Under this method, deferred tax assets and liabilities are determined based on the differences between the financial statement and tax bases of assets and liabilities using enacted tax rates in effect for the year in which the differences are expected to reverse. The effect of a change in tax rates on deferred tax assets and liabilities is recognized in income in the period of the enactment date.

We record net deferred tax assets to the extent we believe these assets will more likely than not be realized. In making such determination, we consider all available positive and negative evidence, including scheduled reversals of deferred tax liabilities, projected future taxable income, tax planning strategies and recent financial operations. In the event we determine that we will be able to realize deferred tax assets for which a valuation allowance was used to reduce their carrying value, the adjustment to the valuation allowance will be recorded as a reduction to the provision for income taxes.

Tax benefits related to uncertain tax positions taken or expected to be taken on a tax return are recorded when such benefits meet a more-likely-than-not threshold. Otherwise, these tax benefits are recorded when a tax position has been effectively settled, which means that the statute of limitations has expired or the appropriate taxing authority has completed its examination even though the statute of limitations remains open.

We recognize interest and penalties related to income taxes within the income tax expense line in the consolidated statements of income. Accrued interest and penalties are included within the related tax liability line in the consolidated balance sheets.

Stock-Based Compensation: We grant restricted stock units and other stock awards to employees and directors under our equity incentive plan. Eligible employees can also purchase shares of our common stock at a discount under our employee stock purchase plan. The benefits provided under these plans are stock-based payments subject to the provisions of stock-based payment accounting guidance. We use the fair value method to apply the provisions of stock-based payment accounting guidance. Stock-based compensation expense for 2020, 2019 and 2018 was \$145.6 million, \$116.2 million and \$83.3 million, respectively. As of December 31, 2020, total unrecognized estimated compensation expense related to awards granted prior to that date was \$160.7 million, which is expected to be recognized over a weighted average period of 1.4 years.

Prior to 2017, we granted stock option awards. The value of each stock option award was estimated on the date of grant, or date of acquisition for options issued in a business combination, using the Black-Scholes option pricing model (Black-Scholes model). The determination of the fair value of stock-based payment awards using an option pricing model was affected by our stock price as well as assumptions regarding a number of complex and subjective variables. These variables included our stock volatility during the preceding six years, actual and projected employee stock option exercise behaviors, interest rate assumptions using the five-year U.S. Treasury Note yield on the date of grant or acquisition date, and expected dividends. The stock-based compensation expense for options was recorded ratably over the requisite service period. As of December 31, 2020, all stock options are fully vested and all expense has been recognized accordingly.

We issue various restricted stock unit awards which contain either a market condition, a performance condition, a service condition, or certain combinations of the three. Restricted stock unit awards are valued based on the grant-date fair value of the award. Stock-based compensation expense is recognized over the employee's requisite service period for awards with only a service condition.

Awards with performance conditions are granted over three one-year sub-performance periods. Stock-based compensation expense is recognized from the grant date through the end of the three-year performance period contingent upon continued employment and management's estimates concerning the probability of vesting.

At times, the Compensation Committee may grant long-term performance awards. Stock based compensation expense for these awards is recognized over the performance period from the grant date through the end of the performance period contingent upon continued employment and management's estimates concerning the probability of vesting.

Vesting of restricted stock unit awards with a market condition is based on our performance as measured by total stockholder return relative to the appreciation of a specified stock index over the measurement period, subject to each participant's continued employment through the conclusion of the measurement period. The fair value of the restricted stock unit awards with a market condition is estimated using a Monte Carlo simulation model. The determination of the fair value of the awards is affected by the grant date and several variables, each of which has been identified in the chart below. Stock-based compensation expense based on the fair value of the award is recorded from the grant date through the conclusion of the measurement period.

Assumptions used in Monte Carlo lattice pricing model	Year Ended December 31,		
	2020	2019	2018
Risk-free interest rate	0.7%	2.5%	2.4%
Expected dividend yield	—%	—%	—%
Expected volatility—Ansys stock price	25%	23%	21%
Expected volatility—Nasdaq Composite Index	18%	16%	15%
Expected term	2.8 years	2.8 years	2.8 years
Correlation factor	0.77	0.71	0.65
Weighted average fair value per share	\$245.08	\$238.99	\$191.76

We also grant restricted stock units to non-employee Directors, which vest upon the earlier of one year from the date of grant or the date of the next regular annual meeting of stockholders. If a non-employee Director retires prior to the vest date, the non-employee Director receives a pro-rata portion of the restricted stock units.

To the extent we change the terms of our stock-based compensation programs, experience market volatility in the pricing of our common stock that increases the implied volatility assumption used in the pricing models, refine different assumptions, or assume stock awards from acquired companies that are different in nature than our stock award arrangements, among other potential impacts, the stock-based compensation expense recorded in future periods and the related tax benefits may differ significantly from what was recorded in previous reporting periods. Forfeitures of awards are accounted for as they occur.

Estimates of stock-based compensation expense are significant to our financial statements, but this expense is partially based on the aforementioned option valuation and Monte Carlo simulation models and will never result in the payment of cash by us other than through the payment of withholding taxes in lieu of additional share issuance. For this reason, and because we do not view stock-based compensation as related to our operational performance, the Board of Directors and management exclude stock-based compensation expense when evaluating our underlying business performance.

Contingencies: We are involved in various investigations, claims and legal proceedings that arise in the ordinary course of business, including commercial disputes, labor and employment matters, tax audits, alleged infringement of intellectual property rights and other matters. We review the status of these matters, assess our financial exposure and record a related accrual if the potential loss from an investigation, claim or legal proceeding is probable and the amount is reasonably estimable. Significant judgment is involved in the determination of probability and in the determination of whether an exposure is reasonably estimable. As a result of the uncertainties involved in making these estimates, we may have to revise our estimates as facts and circumstances change. The revision of these estimates could have a material impact on our financial position and results of operations.

Recent Accounting Guidance

For information regarding recent accounting guidance and its impact on our consolidated financial statements, see Note 2 to the consolidated financial statements in Part IV, Item 15 of this Annual Report on Form 10-K.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Interest Rate Risk. Changes in the overall level of interest rates affect the interest income that is generated from our cash, cash equivalents and short-term investments and the interest expense that is generated from our outstanding borrowings. For the year ended December 31, 2020, interest income was \$5.1 million and interest expense was \$11.0 million. Cash and cash equivalents consist primarily of highly liquid investments such as money market funds and deposits held at major banks. Short-term investments consist primarily of deposits held by certain foreign subsidiaries with original maturities of three months to one year.

Foreign Currency Transaction Risk. As we operate in international regions, a portion of our revenue, expenses, cash, accounts receivable and payment obligations are denominated in foreign currencies. As a result, changes in currency exchange rates will affect our financial position, results of operations and cash flows. The currency exchange rate volatility due to COVID-19 has increased our foreign currency transaction risk.

With respect to revenue, on average for the year ended December 31, 2020, the U.S. Dollar was approximately 2.4% weaker, when measured against our primary foreign currencies, than for the year ended December 31, 2019. The table below presents the impacts of currency fluctuations on revenue for the year ended December 31, 2020. Amounts in brackets indicate a net adverse impact from currency fluctuations.

(in thousands)		Year Ended December 31, 2020
Euro	\$	11,803
Japanese Yen		4,067
Taiwan Dollar		1,376
British Pound		1,078
Indian Rupee		(1,294)
Other		(189)
Total	\$	16,841

The impacts from currency fluctuations resulted in increased operating income of \$12.0 million for the year ended December 31, 2020 as compared to the year ended December 31, 2019.

The most significant currency impacts on revenue and operating income are typically attributable to U.S. Dollar exchange rate changes against the Euro and Japanese Yen. Historical exchange rates for these currency pairs are reflected in the charts below:

As of	Period End Exchange Rates	
	EUR/USD	USD/JPY
December 31, 2020	1.221	103.274
December 31, 2019	1.121	108.637
December 31, 2018	1.147	109.589
December 31, 2017	1.200	112.701

Year Ended	Average Exchange Rates	
	EUR/USD	USD/JPY
December 31, 2020	1.141	106.761
December 31, 2019	1.119	109.033
December 31, 2018	1.181	110.405

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

The following tables set forth selected unaudited quarterly information. We believe that the amounts stated below present fairly the results of such periods when read in conjunction with the consolidated financial statements and related notes included in Part IV, Item 15 of this Annual Report on Form 10-K.

Other information required by this Item is included in Part IV, Item 15 of this Annual Report on Form 10-K.

<i>(in thousands, except per share data)</i>	Fiscal Quarter Ended			
	December 31, 2020	September 30, 2020	June 30, 2020	March 31, 2020
Total revenue	\$ 623,686	\$ 366,965	\$ 385,661	\$ 304,985
Gross profit	555,783	313,580	331,801	254,869
Operating income	259,391	90,085	112,807	34,073
Net income	215,632	75,627	96,564	46,064
Earnings per share – basic	\$ 2.50	\$ 0.88	\$ 1.13	\$ 0.54
Earnings per share – diluted	\$ 2.46	\$ 0.87	\$ 1.11	\$ 0.53

<i>(in thousands, except per share data)</i>	Fiscal Quarter Ended			
	December 31, 2019	September 30, 2019	June 30, 2019	March 31, 2019
Total revenue	\$ 486,228	\$ 343,899	\$ 368,635	\$ 317,130
Gross profit	436,632	302,534	328,138	282,315
Operating income	185,716	105,047	128,628	95,649
Net income	165,852	89,463	109,750	86,230
Earnings per share – basic	\$ 1.95	\$ 1.06	\$ 1.31	\$ 1.03
Earnings per share – diluted	\$ 1.91	\$ 1.04	\$ 1.28	\$ 1.01

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 Rules 13a-15 and 15d-15 of the Securities Exchange Act of 1934, as amended, or the Exchange Act, we have evaluated, with the participation of management, including the Chief Executive Officer and the Chief Financial Officer, the effectiveness of the design and operation of our disclosure controls and procedures as of the end of the period covered by this report. Based on such evaluation, the Chief Executive Officer and Chief Financial Officer have concluded that such disclosure controls and procedures are effective, as defined in Rule 13a-15(e) of the Exchange Act.

We completed our acquisition of AGI on December 1, 2020 and have not yet included AGI in our assessment of the effectiveness of our internal control over financial reporting. Accordingly, pursuant to the SEC's general guidance that an assessment of a recently acquired business may be omitted from the scope of an assessment in the year of acquisition, the scope of our assessment of the effectiveness of our disclosure controls and procedures does not include AGI. As of and for the year ended December 31, 2020, AGI represented 13.4% of our consolidated assets and accounted for less than 1% of our consolidated revenues.

We believe, based on our knowledge, that the financial statements and other financial information included in this report fairly present, in all material respects, our financial condition, results of operations and cash flows as of and for the periods presented in this report. We are committed to both a sound internal control environment and to good corporate governance.

From time to time, we review the disclosure controls and procedures, and may periodically make changes to enhance their effectiveness and to ensure that our systems evolve with our business.

Management's Annual Report on Internal Control over Financial Reporting. Management is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Exchange Act Rule 13a-15(f). Under the supervision and with the participation of management, including our Chief Executive Officer and Chief Financial Officer, we have conducted an evaluation of the effectiveness of our internal control over financial reporting based upon the *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission.

We completed our acquisition of AGI on December 1, 2020. In conducting our evaluation of the effectiveness of our internal controls over financial reporting as of December 31, 2020, we excluded AGI from our evaluation for the year ended December 31, 2020 as permitted under current Securities and Exchange Commission rules and regulations. As of and for the year ended December 31, 2020, AGI represented 13.4% of consolidated assets and accounted for less than 1% of our consolidated revenues. We are currently in the process of integrating and assessing the internal controls over financial reporting of AGI with the rest of our company. The integration may lead to changes in future periods, but we do not expect these changes to materially affect our internal control over financial reporting. We expect to complete this integration during 2021.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. 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 policies or procedures may deteriorate. Our system of internal control over financial reporting is designed to provide reasonable assurance to management and the Board of Directors regarding the reliability of financial records used in preparation of our published financial statements. As all internal control systems have inherent limitations, even systems determined to be effective can provide only reasonable assurance with respect to financial statement preparation and presentation. Based on this evaluation, our Chief Executive Officer and Chief Financial Officer have concluded that our internal control over financial reporting was effective at December 31, 2020.

Additionally, Deloitte & Touche LLP, an independent registered public accounting firm, has audited the financial statements included in this Annual Report on Form 10-K and has issued an attestation report on our internal control over financial reporting. This report is included in Item 15 of this Annual Report on Form 10-K.

Changes in Internal Controls. There were no changes in our internal control over financial reporting that occurred during the three months ended December 31, 2020 that materially affected, or that are reasonably likely to materially affect, our internal control over financial reporting.

ITEM 9B. OTHER INFORMATION

None.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

The information required by this Item is incorporated by reference to our 2021 Proxy Statement and is set forth under “Corporate Governance at Ansys,” “Director Nominees,” “Continuing Directors Following the 2021 Annual Meeting,” and “Our Executive Officers,” therein.

We adopted a Code of Business Conduct and Ethics that applies to our principal executive officer, principal financial officer and principal accounting officer, and all of our directors and employees. Our Code of Business Conduct and Ethics is posted under the Governance tab of the Investor Relations section of our website at <https://investors.ansys.com>. We will post any amendments to, or waiver of, our Code of Business Conduct and Ethics that apply to our principal executive officer, principal financial officer and principal accounting officer on our website.

ITEM 11. EXECUTIVE COMPENSATION

The information required by this Item is incorporated by reference to our 2021 Proxy Statement and is set forth under “Compensation Discussion and Analysis,” “Compensation Policies and Practices Related to Risk Management,” “Fiscal 2020 Tables,” “2020 CEO Pay Ratio,” “Compensation Committee Report,” “Corporate Governance at Ansys—Compensation Committee Interlocks and Insider Participation,” “Non-Employee Director Compensation” and “Director Compensation Table Fiscal Year 2020” therein.

ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT, AND RELATED STOCKHOLDER MATTERS

We include here by reference the information regarding our compensation plans under which shares of our common stock are authorized for issuance as of December 31, 2020 in the table that appears under the caption “Proposal 3: Approval of ANSYS, Inc. 2021 Equity and Incentive Compensation Plan” and “Ownership of Our Common Stock” in our Proxy Statement to be filed for the 2021 annual meeting of stockholders.

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

The information required by this Item is incorporated by reference to our 2021 Proxy Statement and is set forth under “Corporate Governance at Ansys—Director Independence” and “Corporate Governance at Ansys—Related-Party Transactions” therein.

ITEM 14. PRINCIPAL ACCOUNTANT FEES AND SERVICES

The information required by this Item is incorporated by reference to our 2021 Proxy Statement and is set forth under “Independent Registered Accounting Firm Services and Fees” therein.

PART IV

ITEM 15. EXHIBIT AND FINANCIAL STATEMENT SCHEDULES

(a) Documents Filed as Part of this Annual Report on Form 10-K:

i. *Financial Statements:* The following consolidated financial statements and reports are filed as part of this report:

- Reports of Independent Registered Public Accounting Firm	65
- Consolidated Balance Sheets as of December 31, 2020 and 2019	69
- Consolidated Statements of Income for the years ended December 31, 2020, 2019 and 2018	70
- Consolidated Statements of Comprehensive Income for the years ended December 31, 2020, 2019 and 2018	71
- Consolidated Statements of Cash Flows for the years ended December 31, 2020, 2019 and 2018	72
- Consolidated Statements of Stockholders' Equity for the years ended December 31, 2020, 2019 and 2018	73
- Notes to Consolidated Financial Statements	74

ii. *Financial Statement Schedule:* The following financial statement schedule is filed as part of this report and should be read in conjunction with the consolidated financial statements.

- Schedule II - Valuation and Qualifying Accounts	103
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Schedules not listed above have been omitted because they are not applicable, are not required or the information required to be set forth therein is included in the consolidated financial statements or notes thereto.

iii. *Exhibits:* The exhibits listed in the accompanying Exhibit Index immediately following the financial statement schedule are filed as part of, or incorporated by reference into, this Annual Report on Form 10-K.

(b) Exhibits:

We hereby file as part of this Annual Report on Form 10-K the exhibits listed in the Exhibit Index immediately following the financial statement schedule of this Annual Report on Form 10-K.

(c) Financial Statement Schedule:

We hereby file as part of this Annual Report on Form 10-K the financial statement schedule listed in Item 15(a)(2) as set forth above.

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Stockholders and the Board of Directors of ANSYS, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of ANSYS, Inc. and subsidiaries (the “Company”) as of December 31, 2020 and 2019, the related consolidated statements of income, comprehensive income, stockholders’ equity, and cash flows for each of the three years in the period ended December 31, 2020, and the related notes and the schedule listed in the Index at Item 15 (collectively referred to as the “financial statements”). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2020 and 2019, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2020, in conformity with accounting principles generally accepted in the United States of America.

We have also audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company’s internal control over financial reporting as of December 31, 2020, based on criteria established in *Internal Control—Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission and our report dated February 24, 2021, expressed an unqualified opinion on the Company’s internal control over financial reporting.

Change in Accounting Principle

As discussed in Note 2 to the financial statements, the Company has changed its method of accounting for leases in 2019 due to the adoption of the new leasing standard. The Company adopted the new leasing standard using a modified retrospective approach.

Basis for Opinion

These financial statements are the responsibility of the Company’s management. Our responsibility is to express an opinion on the Company’s financial statements based on our audits. We are a public accounting firm registered with the 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 audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the 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 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 financial statements. We believe that our audits provide a reasonable basis for our opinion.

Critical Audit Matters

The critical audit matters communicated below are matters arising from the current-period audit of the financial statements that were communicated or required to be communicated to the audit committee and that (1) relate to accounts or disclosures that are material to the financial statements and (2) involved our especially challenging, subjective, or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the financial statements, taken as a whole, and we are not, by communicating the critical audit matters below, providing separate opinions on the critical audit matters or on the accounts or disclosures to which they relate.

Revenue—Time-Based Lease Licenses—Refer to Notes 2 and 3 to the financial statements

Critical Audit Matter Description

The Company sells time-based lease (TBL) licenses that are a bundled arrangement that include the rights to a term software license as well as post-contract support (PCS). Revenue is recognized up front at the commencement of the lease for the term software license and recognized ratably over the term of the contract for the PCS in the arrangement. Utilizing observable inputs, the Company determined that 50% of the estimated standalone selling price of the TBL is attributable to the term software license, while 50% is attributable to PCS. This determination involved judgment, particularly as it relates to the value relationship between the Company’s PCS to TBLs, the value relationship between PCS and the Company’s perpetual licenses

and its linkage to the shortened term of a TBL, the average economic life of the Company's software, renewal rates of its customers, and the price of the bundled arrangement in relation to the perpetual licensing approach.

Given the judgments necessary to determine the allocation between the term software license and PCS, auditing this estimate involved a high degree of auditor judgment.

How the Critical Audit Matter Was Addressed in the Audit

Our audit procedures related to management's estimate of the allocation between the term software license and PCS in a TBL included the following, among others:

- We tested the effectiveness of controls over TBL revenue, including those over the determination of the estimated standalone selling price of the Company's licenses and services, as well as the allocation of this standalone selling price within the arrangement.
- We evaluated the pricing relationship between PCS and perpetual licenses on the net licensing fee of the arrangement, as well as the Company's renewal rate of PCS sales on perpetual licenses through those arrangements selected for testing that contained both elements as a consideration point of the value relationship between the term software license and PCS when a customer purchases a bundled TBL.
- We evaluated the estimated economic life of the Company's software through observable data points.
- Through our current and historical audit procedures, we confirmed that the term software license portion and PCS portion of an arrangement are not sold separately from one another.
- We selected a sample of arrangements and performed the following:
 - Compared the list price of the TBL to the consideration received from the customer and recalculated the discount from list price for each arrangement
 - Evaluated whether management appropriately calculated the estimated standalone selling price for the TBL
 - Tested management's identification of distinct performance obligations
 - Tested the mathematical accuracy of revenue recognized at a point in time or over time based upon the identification of TBLs within the arrangement

Acquisitions — Analytical Graphics, Inc. — Developed Technology Intangible Asset — Refer to Notes 2 and 4 to the financial statements

Critical Audit Matter Description

The Company completed the acquisition of Analytical Graphics, Inc. for \$722.5 million on December 1, 2020. The Company accounted for the acquisition under the acquisition method of accounting for business combinations. Accordingly, the purchase price was allocated to the assets acquired and liabilities assumed based on their respective fair values, including the developed technology intangible asset of \$184.1 million. Management estimated the fair value of the developed technology intangible asset using the relief from royalty method. The fair value determination of the developed technology intangible asset required management to make significant estimates and assumptions related to the selection of the valuation method, royalty rate, revenue growth rate, and the selection of the discount rate.

Given the fair value determination of the developed technology intangible asset requires management to use judgment in the selection of the valuation method, as well as make significant estimates and assumptions related to the forecasts of future revenue growth, the selection of the royalty rate and the selection of the discount rate, performing audit procedures to evaluate the reasonableness of these estimates and assumptions required a high degree of auditor judgment and an increased extent of effort, including the need to involve our fair value specialists.

How the Critical Audit Matter Was Addressed in the Audit

Our audit procedures related to the forecasts of future revenue growth, the selection of the royalty rate, and the selection of the discount rate for the developed technology intangible asset included the following, among others:

- We tested the effectiveness of controls over the valuation of the developed technology asset, including management's controls over forecasts of future revenue growth, the selection of the royalty rate and the selection of the discount rate.
- We assessed the reasonableness of management's forecasts of future revenue growth by comparing the projections to historical results and certain industry data.
- With the assistance of our fair value specialists, we evaluated the reasonableness of the (1) valuation methodology, (2) royalty rate, and (3) discount rate by:
 - Evaluating the selected royalty rate against market observations of comparable licensing agreements.
 - Testing the source information underlying the determination of the discount rate and testing the mathematical accuracy of the calculation.
 - Developing a range of independent estimates and comparing those to the discount rate selected by management.

/s/ Deloitte & Touche LLP
Pittsburgh, Pennsylvania
February 24, 2021

We have served as the Company's auditor since 2002.

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Stockholders and the Board of Directors of ANSYS, Inc.

Opinion on Internal Control over Financial Reporting

We have audited the internal control over financial reporting of ANSYS, Inc. and subsidiaries (the “Company”) as of December 31, 2020, 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 Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2020, based on criteria established in *Internal Control — Integrated Framework (2013)* issued by COSO.

We have also audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated financial statements as of and for the year ended December 31, 2020, of the Company and our report dated February 24, 2021, expressed an unqualified opinion on those financial statements.

As described in Management’s Report on Internal Control over Financial Reporting, management excluded from its assessment the internal control over financial reporting at Analytical Graphics, Inc. (“AGI”), which was acquired on December 1, 2020, and whose financial statements constitute 13.4% of total consolidated assets and less than 1% of revenues of the consolidated financial statement amounts as of and for the year ended December 31, 2020. Accordingly, our audit did not include the internal control over financial reporting at AGI.

Basis for Opinion

The Company’s management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management’s Report on Internal Control over Financial Reporting. Our responsibility is to express an opinion on the Company’s internal control over financial reporting based on our audit. We are a public accounting firm registered with the 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 audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

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 (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) 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 (3) 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.

/s/ Deloitte & Touche LLP
Pittsburgh, Pennsylvania

February 24, 2021

ANSYS, INC. AND SUBSIDIARIES
CONSOLIDATED BALANCE SHEETS

	December 31,	
	2020	2019
<i>(in thousands, except share and per share data)</i>		
ASSETS		
Current assets:		
Cash and cash equivalents	\$ 912,672	\$ 872,094
Short-term investments	479	288
Accounts receivable, less allowance for doubtful accounts of \$14,000 and \$8,700, respectively	537,564	433,479
Other receivables and current assets	268,522	249,619
Total current assets	1,719,237	1,555,480
Long-term assets:		
Property and equipment, net	96,503	83,636
Operating lease right-of-use assets	137,730	105,671
Goodwill	3,038,306	2,413,280
Other intangible assets, net	694,865	476,711
Other long-term assets	225,119	180,032
Deferred income taxes	28,830	24,077
Total long-term assets	4,221,353	3,283,407
Total assets	\$ 5,940,590	\$ 4,838,887
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	\$ 18,691	\$ 14,298
Accrued bonuses and commissions	112,491	101,546
Accrued income taxes	26,116	9,996
Current portion of long-term debt	—	75,000
Other accrued expenses and liabilities	199,466	142,947
Deferred revenue	372,061	351,353
Total current liabilities	728,825	695,140
Long-term liabilities:		
Deferred income taxes	110,321	78,643
Long-term operating lease liabilities	120,940	91,768
Long-term debt	798,118	423,531
Other long-term liabilities	84,514	96,426
Total long-term liabilities	1,113,893	690,368
Commitments and contingencies		
Stockholders' equity:		
Preferred stock, \$0.01 par value; 2,000,000 shares authorized; zero shares issued or outstanding	—	—
Common stock, \$0.01 par value; 300,000,000 shares authorized; 95,266,320 and 94,627,585 shares issued, respectively	953	946
Additional paid-in capital	1,434,203	1,188,939
Retained earnings	3,804,593	3,370,706
Treasury stock, at cost; 8,693,809 and 8,893,177 shares, respectively	(1,124,102)	(1,041,831)
Accumulated other comprehensive loss	(17,775)	(65,381)
Total stockholders' equity	4,097,872	3,453,379
Total liabilities and stockholders' equity	\$ 5,940,590	\$ 4,838,887

The accompanying notes are an integral part of the consolidated financial statements.

ANSYS, INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF INCOME

<i>(in thousands, except per share data)</i>	Year Ended December 31,		
	2020	2019	2018
Revenue:			
Software licenses	\$ 780,850	\$ 699,630	\$ 576,717
Maintenance and service	900,447	816,262	716,919
Total revenue	<u>1,681,297</u>	<u>1,515,892</u>	<u>1,293,636</u>
Cost of sales:			
Software licenses	30,618	23,944	18,619
Amortization	40,642	21,710	27,034
Maintenance and service	154,004	120,619	110,232
Total cost of sales	<u>225,264</u>	<u>166,273</u>	<u>155,885</u>
Gross profit	<u>1,456,033</u>	<u>1,349,619</u>	<u>1,137,751</u>
Operating expenses:			
Selling, general and administrative	587,707	521,200	413,580
Research and development	355,371	298,210	233,802
Amortization	16,599	15,169	13,795
Total operating expenses	<u>959,677</u>	<u>834,579</u>	<u>661,177</u>
Operating income	<u>496,356</u>	<u>515,040</u>	<u>476,574</u>
Interest income	5,073	12,796	11,419
Interest expense	(10,988)	(3,461)	(59)
Other income (expense), net	3,484	(1,792)	(849)
Income before income tax provision	<u>493,925</u>	<u>522,583</u>	<u>487,085</u>
Income tax provision	<u>60,038</u>	<u>71,288</u>	<u>67,710</u>
Net income	<u>\$ 433,887</u>	<u>\$ 451,295</u>	<u>\$ 419,375</u>
Earnings per share – basic:			
Earnings per share	<u>\$ 5.05</u>	<u>\$ 5.36</u>	<u>\$ 4.99</u>
Weighted average shares	<u>85,840</u>	<u>84,259</u>	<u>83,973</u>
Earnings per share – diluted:			
Earnings per share	<u>\$ 4.97</u>	<u>\$ 5.25</u>	<u>\$ 4.88</u>
Weighted average shares	<u>87,288</u>	<u>85,925</u>	<u>85,913</u>

The accompanying notes are an integral part of the consolidated financial statements.

ANSYS, INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME

<i>(in thousands)</i>	Year Ended December 31,		
	2020	2019	2018
Net income	\$ 433,887	\$ 451,295	\$ 419,375
Other comprehensive income (loss):			
Foreign currency translation adjustments	47,606	(3,002)	(24,535)
Comprehensive income	<u>\$ 481,493</u>	<u>\$ 448,293</u>	<u>\$ 394,840</u>

The accompanying notes are an integral part of the consolidated financial statements.

ANSYS, INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF CASH FLOWS

<i>(in thousands)</i>	Year Ended December 31,		
	2020	2019	2018
Cash flows from operating activities:			
Net income	\$ 433,887	\$ 451,295	\$ 419,375
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation and amortization	85,275	60,516	59,255
Operating lease right-of-use assets amortization	20,971	18,459	—
Deferred income tax benefit	(30,932)	(14,511)	(33,675)
Provision for bad debts	6,438	2,928	1,577
Stock-based compensation expense	145,615	116,190	83,346
Other	2,180	2,778	410
Changes in operating assets and liabilities:			
Accounts receivable	(160,319)	(154,403)	(74,455)
Other receivables and current assets	(2,312)	(26,182)	(30,241)
Other long-term assets	(14,818)	(5,622)	1,839
Accounts payable, accrued expenses and current liabilities	21,362	38,543	19,920
Accrued income taxes	19,713	575	1,086
Deferred revenue	5,448	17,245	56,213
Other long-term liabilities	14,802	(7,875)	(19,662)
Net cash provided by operating activities	547,310	499,936	484,988
Cash flows from investing activities:			
Acquisitions, net of cash acquired	(572,328)	(787,196)	(283,026)
Capital expenditures	(35,370)	(44,940)	(21,762)
Other investing activities	(6,555)	(1,412)	(7,443)
Net cash used in investing activities	(614,253)	(833,548)	(312,231)
Cash flows from financing activities:			
Proceeds from long-term debt	375,000	500,000	—
Principal payments on long-term debt	(75,000)	—	—
Purchase of treasury stock	(161,029)	(59,116)	(269,801)
Restricted stock withholding taxes paid in lieu of issued shares	(71,019)	(42,431)	(28,879)
Proceeds from shares issued for stock-based compensation	29,560	34,093	41,019
Other financing activities	(915)	(3,137)	(5,014)
Net cash provided by (used in) financing activities	96,597	429,409	(262,675)
Effect of exchange rate fluctuations on cash and cash equivalents	10,924	(842)	(14,444)
Net increase (decrease) in cash and cash equivalents	40,578	94,955	(104,362)
Cash and cash equivalents, beginning of period	872,094	777,139	881,501
Cash and cash equivalents, end of period	\$ 912,672	\$ 872,094	\$ 777,139
Supplemental disclosures of cash flow information:			
Income taxes paid	\$ 54,174	\$ 86,770	\$ 87,244
Interest paid	\$ 11,941	\$ 787	\$ 114
Fair value of common stock issued and unpaid consideration in connection with acquisitions	\$ 232,690	\$ 307,173	\$ —

The accompanying notes are an integral part of the consolidated financial statements.

ANSYS, INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY

<i>(in thousands)</i>	Common Stock		Additional Paid-In Capital	Retained Earnings	Treasury Stock		Accumulated Other Comprehensive (Loss)/Income	Total Stockholders' Equity
	Shares	Amount			Shares	Amount		
Balance, January 1, 2018	93,236	\$ 932	\$ 873,357	\$ 2,316,916	9,044	\$ (907,530)	\$ (37,844)	\$ 2,245,831
Cumulative effect of the ASC 606 adoption				183,120				183,120
Treasury shares acquired					1,674	(269,801)		(269,801)
Stock-based compensation activity			(5,895)		(1,116)	101,452		95,557
Other comprehensive loss							(24,535)	(24,535)
Net income for the year				419,375				419,375
Balance, December 31, 2018	93,236	932	867,462	2,919,411	9,602	(1,075,879)	(62,379)	2,649,547
Acquisition of Livermore Software Technology, LLC	1,392	14	307,159					307,173
Treasury shares acquired					330	(59,116)		(59,116)
Stock-based compensation activity			14,318		(1,039)	93,164		107,482
Other comprehensive loss							(3,002)	(3,002)
Net income for the year				451,295				451,295
Balance, December 31, 2019	94,628	946	1,188,939	3,370,706	8,893	(1,041,831)	(65,381)	3,453,379
Acquisition of Livermore Software Technology, LLC			1,030		(6)	501		1,531
Acquisition of Analytical Graphics Inc.	638	7	218,108		(3)	233		218,348
Treasury shares acquired					690	(161,029)		(161,029)
Stock-based compensation activity			26,126		(880)	78,024		104,150
Other comprehensive income							47,606	47,606
Net income for the year				433,887				433,887
Balance, December 31, 2020	95,266	\$ 953	\$ 1,434,203	\$ 3,804,593	8,694	\$ (1,124,102)	\$ (17,775)	\$ 4,097,872

The accompanying notes are an integral part of the consolidated financial statements.

ANSYS, INC. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
December 31, 2020

1. Organization

We develop and globally market engineering simulation software and services widely used by engineers, designers, researchers and students across a broad spectrum of industries and academia, including aerospace and defense, automotive, electronics, semiconductors, energy, materials and chemical processing, turbomachinery, consumer products, healthcare, and sports.

As defined by the accounting guidance for segment reporting, we operate as one segment.

Given the integrated approach to the multi-discipline problem-solving needs of our customers, a single sale of software may contain components from multiple product areas and include combined technologies. We also have a multi-year product and integration strategy that will result in new, combined products or changes to the historical product offerings. As a result, it is impracticable for us to provide accurate historical or current reporting among our various product lines.

We are closely monitoring the spread of COVID-19 and continually mitigating its potential effects on our business. The COVID-19 pandemic has had, and is expected to continue to have, an adverse impact on our business and our employees.

2. Accounting Policies

Accounting Principles

The financial statements and accompanying notes are prepared in accordance with accounting principles generally accepted in the United States. Certain items in the consolidated financial statements and the notes to the consolidated financial statements of prior years have been reclassified to conform to the current year's presentation. These reclassifications had no effect on reported net income, comprehensive income, cash flows, total assets or total liabilities and stockholders' equity.

Principles of Consolidation

The accompanying consolidated financial statements include our accounts and those of our wholly owned subsidiaries. All intercompany accounts and transactions have been eliminated.

Recently Adopted Accounting Guidance

Leases: In February 2016, the Financial Accounting Standards Board (FASB) issued Accounting Standards Update (ASU) No. 2016-02, *Leases (Topic 842)* (ASU 2016-02). We adopted ASU 2016-02 and its related amendments (collectively known as Accounting Standards Codification (ASC) 842) on January 1, 2019 using the modified retrospective approach. Results for reporting periods beginning after January 1, 2019 are presented under ASC 842, while prior period amounts are not adjusted and continue to be reported in accordance with ASC 840, *Leases*. ASC 842 requires virtually all leases, other than leases of intangible assets, to be recorded on the balance sheet with a right-of-use (ROU) asset and a corresponding lease liability.

We elected the package of practical expedients permitted under the transition guidance within the new standard, which allowed us to carry forward our historical assessments of whether a contract contains a lease, lease classification and initial direct costs. In addition, we elected the accounting policy to combine the lease and nonlease components as a single component for all asset classes.

We determine if an arrangement is a lease at inception. Leases are classified as either operating or finance leases based on certain criteria. This classification determines the timing and presentation of expenses on the income statement, as well as the presentation of the related cash flows and balance sheet. Operating leases are recorded on the balance sheet as operating lease right-of-use assets, other accrued expenses and liabilities, and long-term operating lease liabilities. We currently have no finance leases.

ROU assets and related liabilities are recorded at lease commencement based on the present value of the lease payments over the expected lease term. Lease payments include future increases unless the increases are based on changes in an index or rate. As our leases do not usually provide an implicit rate, our incremental borrowing rate is used to calculate ROU assets and related liabilities. The incremental borrowing rate is determined based on our estimated credit rating, the term of the lease, the economic environment where the asset resides and full collateralization. The ROU assets and related lease liabilities include

optional renewals for which we are reasonably certain to exercise; whereas, optional terminations are included unless it is reasonably certain not to be elected.

The adoption of the new standard resulted in the recognition of ROU assets of \$90.9 million and lease liabilities of \$92.5 million, and corresponding deferred tax assets and liabilities, on our consolidated balance sheet as of January 1, 2019. The adoption had no impact on our consolidated statements of income or cash flows.

Credit losses: In June 2016, the FASB issued ASU No. 2016-13, *Financial Instruments - Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments* (ASU 2016-13), which modifies the measurement of expected credit losses of certain financial instruments. We adopted ASU 2016-13 on January 1, 2020 with no material impact to our condensed consolidated financial statements. Previous guidance required the allowance for doubtful accounts to be estimated based on an incurred loss model, which considered past and current conditions. ASU 2016-13 requires us to use an expected loss model that also considers reasonable and supportable forecasts of future conditions, referred to as the current expected credit loss (CECL) methodology.

Under ASU 2016-13, we make judgments as to our ability to collect outstanding receivables and provide allowances for a portion of receivables over the lifetime of the receivables. Provisions are made based upon a specific review of all significant outstanding invoices from both value and delinquency perspectives. For those invoices not specifically reviewed, provisions are estimated at differing rates based upon the age of the receivable. In determining these percentages, we consider our historical loss experience, current economic trends and future conditions.

Accounting Guidance Issued and Not Yet Adopted

Income taxes: In December 2019, the FASB issued ASU No. 2019-12, *Income Taxes (Topic 740): Simplifying the Accounting for Income Taxes* (ASU 2019-12), as part of its initiative to reduce complexity in the accounting standards. The amendments in ASU 2019-12 eliminate certain exceptions related to the approach for intraperiod tax allocation, the methodology for calculating income taxes in an interim period and the recognition of deferred tax liabilities for outside basis differences. ASU 2019-12 also clarifies and simplifies other aspects of the accounting for income taxes. ASU 2019-12 is effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2020. Early adoption is permitted, including adoption in any interim period. We do not expect the adoption of the new standard to have a material effect on our consolidated financial statements.

Use of Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States 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 financial statements. Estimates also affect the amounts of revenue and expenses during the reported periods. Significant estimates included in these consolidated financial statements include:

- Allowances for doubtful accounts receivable
- Income tax accruals
- Uncertain tax positions
- Tax valuation reserves
- Fair value of stock-based compensation and probabilities of performance award attainment
- Contract revenue
- Standalone selling prices of our products and services
- Acquired deferred revenue
- Useful lives for depreciation and amortization
- Valuations of goodwill and other intangible assets
- Deferred compensation
- Loss contingencies
- Operating lease assets and liabilities

Actual results could differ from these estimates. Changes in estimates are recorded in the results of operations in the period that the changes occur.

Revenue Recognition

Our revenue is derived principally from the licensing of computer software products and from related maintenance contracts. We enter into contracts that include combinations of products, maintenance and services, which are accounted for as separate performance obligations with differing revenue recognition patterns.

Revenue from perpetual licenses is classified as software license revenue. Software license revenue is recognized up front upon delivery of the licensed product and/or the utility that enables the customer to access authorization keys, provided that an enforceable contract has been received. Typically, our perpetual licenses are sold with post-contract support (PCS), which includes unspecified technical enhancements and customer support. We allocate value in bundled perpetual and PCS arrangements based on the standalone selling prices of the perpetual license and PCS. Revenue from PCS is classified as maintenance revenue and is recognized ratably over the term of the contract, as we satisfy the PCS performance obligation over time.

In addition to perpetual licenses, we sell time-based lease licenses. Lease licenses are sold only as a bundled arrangement that includes the rights to a term software license and PCS. Utilizing observable inputs, we determined that 50% of the estimated standalone selling price of the lease license is attributable to the term license and 50% is attributable to the PCS. This determination considered the value relationship for our products between PCS and time-based lease licenses, the value relationship between PCS and perpetual licenses, the average economic life of our products, software renewal rates and the price of the bundled arrangement in relation to the perpetual licensing approach. Consistent with the perpetual sales, the license component is classified as software license revenue and recognized as revenue up front at the commencement of the lease upon delivery of the licensed product and/or utility that enables the customer to access authorization keys. The PCS is classified as maintenance revenue and is recognized ratably over the term of the contract, as we satisfy the PCS performance obligation over time.

Revenue from training, support and other services is recognized as the services are performed. For contracts in which the service consists of a single performance obligation, such as providing a training class to a customer, we recognize revenue upon completion of the performance obligation. For service contracts that are longer in duration and often include multiple performance obligations (for example, both training and consulting), we measure the progress toward completion of the obligations and recognize revenue accordingly. In measuring progress towards the completion of performance obligations, we typically utilize output-based estimates for services with contractual billing arrangements that are not based on time and materials, and estimate output based on the total tasks completed as compared to the total tasks required for each work contract. Input-based estimates are utilized for services that involve general consultations with contractual billing arrangements based on time and materials, utilizing direct labor as the input measure. Proceeds from customers for the purpose of expediting roadmap items, developing new products or creating specific features and functionality for existing products is classified as revenue.

We also execute arrangements through independent channel partners in which the channel partners are authorized to market and distribute our software products to end users of our products and services in specified territories. In sales facilitated by channel partners, the channel partner bears the risk of collection from the end-user customer. We recognize revenue from transactions with channel partners in a manner consistent with the direct sales described above for both perpetual and time-based licenses. Revenue from channel partner transactions is the amount remitted to us by the channel partners. This amount includes a fee for PCS that is compensation for providing technical enhancements and the second level of technical support to the end user, which is recognized over the period that PCS is to be provided.

Non-income related taxes collected from customers and remitted to governmental authorities are recorded on the consolidated balance sheet as accounts receivable and accrued expenses. The collection and payment of these amounts are reported on a net basis in the consolidated statements of income and do not impact reported revenues or expenses.

We do not offer right of return. We warrant to our customers that our software will perform substantially as specified in our current user manuals. We have not experienced significant claims related to software warranties beyond the scope of maintenance support, which we are already obligated to provide. The warranty is not sold, and cannot be purchased, separately.

The warranty does not provide any type of additional service to the customer or performance obligation for us.

Our agreements with our customers generally require us to indemnify the customer against claims that our software infringes third-party patent, copyright, trademark or other proprietary rights. Such indemnification obligations are generally limited in a variety of industry-standard respects, including our right to replace an infringing product.

Significant Judgments

Our contracts with customers typically include promises to transfer licenses and services to a customer. Judgment is required to determine if the promises are separate performance obligations, and if so, to allocate the transaction price to each performance obligation. We use the estimated standalone selling price method to allocate the transaction price for each performance obligation. The estimated standalone selling price is determined using all information reasonably available to us, including market conditions and other observable inputs. The corresponding revenues are recognized as the related performance obligations are satisfied.

We apply a practical expedient to expense sales commissions as incurred when the amortization period would have been one year or less. Sales commissions associated with the initial year of multi-year contracts are expensed as incurred due to their immateriality. Sales commissions associated with multi-year contracts beyond the initial year are subject to an employee service requirement and are expensed as incurred as they are not considered incremental costs to obtain a contract.

We are required to adjust promised amounts of consideration for the effects of the time value of money if the timing of the payments provides the customer or us with a significant financing benefit. We consider various factors in assessing whether a financing component exists, including the duration of the contract, market interest rates and the timing of payments. Our contracts do not include a significant financing component requiring adjustment to the transaction price.

Cash and Cash Equivalents

Cash and cash equivalents consist primarily of highly liquid investments such as deposits held at major banks and money market funds. Cash equivalents are carried at cost, which approximates fair value. Our cash and cash equivalents balances comprise the following:

(in thousands, except percentages)	December 31, 2020		December 31, 2019	
	Amount	% of Total	Amount	% of Total
Cash accounts	\$ 571,587	62.6	\$ 549,639	63.0
Money market funds	341,085	37.4	322,455	37.0
Total	<u>\$ 912,672</u>		<u>\$ 872,094</u>	

Our money market fund balances are held in various funds of two issuers.

Property and Equipment

Property and equipment is stated at cost. Depreciation is computed using the straight-line method over the estimated useful lives of the various classes of assets, which range from one year to forty years. Repairs and maintenance are charged to expense as incurred. Gains or losses from the sale or retirement of property and equipment are included in operating income.

Research and Development

Research and development costs are expensed as incurred. Internally developed software costs required to be capitalized as defined by the accounting guidance are not material to our consolidated financial statements.

Business Combinations

When we consummate an acquisition, the assets acquired and the liabilities assumed are recognized separately from goodwill at their acquisition date fair values. Goodwill as of the acquisition date is measured as the excess of the fair value of consideration transferred over the acquisition date fair value of the net identifiable assets acquired. While best estimates and assumptions are used to accurately value assets acquired and liabilities assumed at the acquisition date as well as contingent consideration, where applicable, our estimates are inherently uncertain and subject to refinement. As a result, during the measurement period, which may be up to one year from the acquisition date, we record adjustments to the assets acquired and liabilities assumed with the corresponding offset to goodwill as we obtain new information about facts and circumstances that existed as of the acquisition date that, if known, would have affected the measurement of the amounts recognized as of that date. Upon the earlier of the conclusion of the measurement period or final determination of the values of assets acquired or liabilities assumed, any subsequent adjustments are recorded in the consolidated statements of income.

Goodwill and Other Intangible Assets

Goodwill represents the excess of the fair value of consideration transferred over the fair value of net identifiable assets acquired. Other intangible assets consist of trade names, customer lists, contract backlog and acquired software and technology. Intangible assets that are not considered to have an indefinite useful life are amortized over their useful lives, which range from two years to seventeen years. Amortization expense for intangible assets was \$57.2 million, \$36.9 million and \$40.8 million for the years ended December 31, 2020, 2019 and 2018, respectively.

We test goodwill and indefinite-lived intangible assets for impairment at least annually by performing a quantitative assessment of whether the fair value of each reporting unit or asset exceeds its carrying amount. We have one reporting unit. Goodwill is tested at this reporting unit level and indefinite-lived intangible assets are tested at the individual asset level. This requires us to assess and make judgments regarding a variety of factors which impact the fair value of the reporting unit or asset being tested, including business plans, anticipated future cash flows, economic projections and other market data.

During the first quarter of 2020, we completed the annual impairment test for goodwill and the indefinite-lived intangible asset and determined that these assets had not been impaired as of the test date, January 1, 2020. Given the adverse economic and market conditions caused by COVID-19, we considered a variety of qualitative factors to determine if an additional quantitative impairment test was required subsequent to our annual impairment test. Based on a variety of factors, including the excess of the fair values over the carrying amounts in the most recent impairment test, we determined it was not more likely than not that an impairment existed as of March 31, 2020. No other events or circumstances changed during the year ended December 31, 2020 that would indicate that the fair values of our reporting unit and indefinite-lived intangible asset are below their carrying amounts.

Concentrations of Credit Risk

We have a concentration of credit risk with respect to revenue and trade receivables due to the use of certain significant channel partners to market and sell our products. We perform periodic credit evaluations of our customers' financial condition and generally do not require collateral. The following table outlines concentrations of risk with respect to our revenue:

(as a % of revenue)	Year Ended December 31,		
	2020	2019	2018
Revenue from channel partners	22 %	23 %	22 %
Largest channel partner	3 %	4 %	4 %
2 nd largest channel partner	2 %	2 %	2 %

No single customer accounted for more than 5% of our revenue in 2020, 2019 or 2018.

In addition to the concentration of credit risk with respect to trade receivables, our cash and cash equivalents are also exposed to concentration risk. Our cash and cash equivalent accounts are insured through various public and private bank deposit insurance programs, foreign and domestic; however, a significant portion of our funds are not insured. The following table outlines concentrations of risk with respect to our cash and cash equivalents:

(in thousands)	As of December 31,	
	2020	2019
Cash and cash equivalents held domestically	\$ 582,882	\$ 626,433
Cash and cash equivalents held by foreign subsidiaries	329,790	245,661
Cash and cash equivalents held in excess of deposit insurance, foreign and domestic	887,886	855,721
Largest balance of cash and cash equivalents held with one financial institution, foreign and domestic	396,430	330,551

Allowance for Doubtful Accounts

Allowance for Doubtful Accounts Policy 2020

We adopted ASU 2016-13 on January 1, 2020. ASU 2016-13 requires us to use the CECL methodology to make judgments as to our ability to collect outstanding receivables and provide allowances for a portion of receivables over the lifetime of the receivables. Provisions are made based upon a specific review of all significant outstanding invoices from both value and delinquency perspectives. For those invoices not specifically reviewed, provisions are estimated at differing rates based upon the age of the receivable. In determining these percentages, we consider our historical loss experience, current economic trends and future conditions.

The changes in the allowance for doubtful accounts during the year ended December 31, 2020 were as follows:

<i>(in thousands)</i>	Year Ended December 31, 2020
Beginning balance – January 1	\$ 8,700
Additions: Charges to costs and expenses	6,438
Deductions: Write-offs	(1,138)
Ending balance – December 31	\$ 14,000

The increase in the allowance for doubtful accounts was driven by expected losses related to COVID-19.

Allowance for Doubtful Accounts Policy 2019 and 2018

Under previous guidance, we made judgments as to our ability to collect outstanding receivables and provided allowances for a portion of receivables when collection became doubtful. Provisions were made based upon a specific review of all significant outstanding invoices from both value and delinquency perspectives. For those invoices not specifically reviewed, provisions were estimated at differing rates based upon the age of the receivable and the geographic area of origin. In determining these percentages, we considered our historical collection experience and current economic trends in the customer's industry and geographic region.

We recorded provisions for bad debts of \$6.4 million, \$2.9 million and \$1.6 million for the years ended December 31, 2020, 2019 and 2018, respectively.

Income Taxes

We account for income taxes under the asset and liability method, which requires the recognition of deferred tax assets and liabilities for the expected future tax consequences of events that have been included in the financial statements. Under this method, deferred tax assets and liabilities are determined based on the differences between the financial statement and tax bases of assets and liabilities using enacted tax rates in effect for the year in which the differences are expected to reverse. The effect of a change in tax rates on deferred tax assets and liabilities is recognized in income in the period of the enactment date.

We record net deferred tax assets to the extent we believe these assets will more likely than not be realized. In making such determination, we consider all available positive and negative evidence, including scheduled reversals of deferred tax liabilities, projected future taxable income, tax planning strategies and recent financial operations. In the event we determine that we will be able to realize deferred tax assets for which a valuation allowance was used to reduce their carrying value, the adjustment to the valuation allowance will be recorded as a reduction to the provision for income taxes.

Tax benefits related to uncertain tax positions taken or expected to be taken on a tax return are recorded when such benefits meet a more-likely-than-not threshold. Otherwise, these tax benefits are recorded when a tax position has been effectively settled, which means that the statute of limitations has expired or the appropriate taxing authority has completed its examination even though the statute of limitations remains open.

We recognize interest and penalties related to income taxes within the income tax expense line in the consolidated statements of income. Accrued interest and penalties are included within the related tax liability line in the consolidated balance sheets.

Foreign Currencies

Certain of our sales and intercompany transactions are denominated in foreign currencies. These transactions are translated to the functional currency at the exchange rate on the transaction date. Assets and liabilities denominated in a currency other than

our functional currency or our subsidiaries' functional currencies are translated at the effective exchange rate on the balance sheet date. Gains and losses resulting from foreign exchange transactions are included in other income (expense), net. We recorded net foreign exchange losses of \$0.2 million, \$2.5 million and \$3.1 million for the years ended December 31, 2020, 2019 and 2018, respectively.

The financial statements of our foreign subsidiaries are translated from the functional (local) currency to U.S. Dollars. Assets and liabilities are translated at the exchange rates on the balance sheet date. Results of operations are translated at average exchange rates, which approximate rates in effect when the underlying transactions occurred.

Accumulated Other Comprehensive Loss

Accumulated other comprehensive loss is composed entirely of foreign currency translation adjustments.

Earnings Per Share

Basic earnings per share (EPS) amounts are computed by dividing earnings by the weighted average number of common shares outstanding during the period. Diluted EPS amounts assume the issuance of common stock for all potentially dilutive equivalents outstanding. To the extent stock awards are anti-dilutive, they are excluded from the calculation of diluted EPS.

The details of basic and diluted EPS are as follows:

<i>(in thousands, except per share data)</i>	Year Ended December 31,		
	2020	2019	2018
Net income	\$ 433,887	\$ 451,295	\$ 419,375
Weighted average shares outstanding – basic	85,840	84,259	83,973
Dilutive effect of stock plans	1,448	1,666	1,940
Weighted average shares outstanding – diluted	87,288	85,925	85,913
Basic earnings per share	\$ 5.05	\$ 5.36	\$ 4.99
Diluted earnings per share	\$ 4.97	\$ 5.25	\$ 4.88
Anti-dilutive shares	23	14	7

Stock-Based Compensation

We account for stock-based compensation in accordance with share-based payment accounting guidance. The guidance requires an entity to measure the cost of employee services received in exchange for an award of equity instruments based on the grant-date fair value of the award. The cost is recognized over the period during which an employee is required to provide services in exchange for the award, typically the vesting period.

Fair Value of Financial Instruments

We account for certain assets and liabilities at fair value in accordance with the accounting guidance applicable to fair value measurements and disclosures. The carrying values of cash, cash equivalents, short-term investments, accounts receivable, accounts payable, accrued expenses, other accrued liabilities and short-term obligations are deemed to be reasonable estimates of their fair values because of their short-term nature. Our term loans are variable rate debt obligations and, therefore, the carrying amounts approximate the fair values.

3. Revenue from Contracts with Customers

Disaggregation of Revenue

The following table summarizes revenue:

<i>(in thousands)</i>	Year Ended December 31,		
	2020	2019	2018
Revenue:			
Lease licenses	\$ 500,105	\$ 406,043	\$ 275,619
Perpetual licenses	280,745	293,587	301,098
Software licenses	780,850	699,630	576,717
Maintenance	840,597	760,574	676,883
Service	59,850	55,688	40,036
Maintenance and service	900,447	816,262	716,919
Total revenue	\$ 1,681,297	\$ 1,515,892	\$ 1,293,636
Direct revenue, as a percentage of total revenue	77.8 %	77.1 %	77.6 %
Indirect revenue, as a percentage of total revenue	22.2 %	22.9 %	22.4 %

Our software licenses revenue is recognized up front, while maintenance and service revenue is generally recognized over the term of the contract.

Deferred Revenue

Deferred revenue consists of billings made or payments received in advance of revenue recognition from customer agreements. The timing of revenue recognition may differ from the timing of billings to customers. Payment terms vary by the type and location of customer and the products or services offered. The time between invoicing and when payment is due is not significant.

The changes in deferred revenue, inclusive of both current and long-term deferred revenue, during the years ended December 31, 2020 and 2019 were as follows:

<i>(in thousands)</i>	2020	2019
Beginning balance – January 1	\$ 365,274	\$ 343,174
Acquired deferred revenue	6,872	6,880
Deferral of revenue	1,687,907	1,532,549
Recognition of deferred revenue	(1,681,297)	(1,515,892)
Currency translation	10,054	(1,437)
Ending balance – December 31	\$ 388,810	\$ 365,274

Total revenue allocated to remaining performance obligations as of December 31, 2020 will be recognized as revenue as follows:

<i>(in thousands)</i>	
Next 12 months	\$ 606,780
Months 13-24	199,909
Months 25-36	80,304
Thereafter	80,134
Total revenue allocated to remaining performance obligations	\$ 967,127

Revenue allocated to remaining performance obligations represents contracted revenue that has not yet been recognized, which includes both deferred revenue and backlog. Our backlog represents installment billings for periods beyond the current

quarterly billing cycle. Revenue recognized during the years ended December 31, 2020 and 2019 included amounts in deferred revenue and backlog at the beginning of the period of \$569.8 million and \$475.9 million, respectively.

4. Acquisitions

2020 Acquisitions

On December 1, 2020, we acquired 100% of the shares of AGI, a premier provider of mission-simulation, modeling, testing and analysis software for aerospace, defense and intelligence applications. The acquisition expands the scope of our offerings, empowering users to solve challenges by simulating from the chip level all the way to a customer's entire mission. The transaction closed with a purchase price of \$722.5 million.

On April 1, 2020, we acquired 100% of the shares of Lumerical, a leading developer of photonic design and simulation tools, for a purchase price of approximately \$107.5 million, paid in cash. The acquisition adds best-in-class photonic products to our multiphysics portfolio, providing customers with a full set of solutions to solve their next-generation product challenges.

During the year ended December 31, 2020, we incurred \$5.1 million in acquisition-related expenses, recognized as selling, general and administrative expense on the consolidated statements of income.

The assets and liabilities of AGI and Lumerical have been recorded based upon management's estimates of their fair market values as of each respective date of acquisition. The following tables summarize the fair value of consideration transferred and the fair values of identified assets acquired and liabilities assumed at each respective date of acquisition:

Fair Value of Consideration Transferred:

<i>(in thousands)</i>	AGI	Lumerical	Total
Cash	\$ 489,797	\$ 107,545	\$ 597,342
Ansys common stock ⁽¹⁾	218,348	—	218,348
Consideration not yet paid	14,342	—	14,342
Total consideration transferred at fair value	<u>\$ 722,487</u>	<u>\$ 107,545</u>	<u>\$ 830,032</u>

⁽¹⁾We issued 0.6 million shares of our common stock in an unregistered offering to the prior owners of AGI with a fair value of \$217.4 million, and we issued \$0.9 million from shares held in treasury.

Recognized Amounts of Identifiable Assets Acquired and Liabilities Assumed:

<i>(in thousands)</i>	AGI	Lumerical	Total
Cash	\$ 17,663	\$ 11,844	\$ 29,507
Accounts receivable and other tangible assets	29,456	4,244	33,700
Developed software and core technologies	184,100	31,614	215,714
Customer lists	25,400	1,616	27,016
Trade names	18,200	1,756	19,956
Accounts payable and other liabilities	(23,279)	(1,106)	(24,385)
Deferred revenue	(5,467)	(1,405)	(6,872)
Net deferred tax liabilities	(50,207)	(7,452)	(57,659)
Total identifiable net assets	<u>\$ 195,866</u>	<u>\$ 41,111</u>	<u>\$ 236,977</u>
Goodwill	<u>\$ 526,621</u>	<u>\$ 66,434</u>	<u>\$ 593,055</u>

The goodwill, which is generally not tax-deductible, is attributed to intangible assets that do not qualify for separate recognition, including the assembled workforce of the acquired business and the synergies expected to arise as a result of the acquisitions.

The fair values of the assets acquired and liabilities assumed are based on preliminary calculations. The estimates and assumptions for these items are subject to change as additional information about what was known and knowable at the acquisition date is obtained during the measurement period (up to one year from the acquisition date).

We determined the fair value of our intangible assets using various valuation techniques, including the relief-from-royalty method and the multi-period excess earnings method. These models utilize certain unobservable inputs classified as Level 3 measurements as defined by ASC 820, *Fair Value Measurements and Disclosures*. The determination of fair value requires considerable judgment and is sensitive to changes in underlying assumptions, estimates and market factors. Estimating fair value requires us to make assumptions and estimates regarding our future plans, as well as industry and economic conditions. These assumptions and estimates include, but are not limited to: selection of a valuation methodology, royalty rate, discount rate and attrition rate.

The weighted-average useful life, valuation method and assumptions used to determine the fair value of the intangible assets acquired with the AGL acquisition are as follows:

Intangible Asset	Weighted-Average Useful Life	Valuation Method	Assumptions
Developed software and core technologies	10 years	Relief-from-royalty	Royalty rate: 40.0% Discount rate: 11.0%
Trade names	9 years	Relief-from-royalty	Royalty rate: 1.0% - 2.0% Discount rate: 11.0%
Customer lists	15 years	Multi-period excess earnings	Attrition rate: 10.0% Discount rate: 12.0%

The weighted-average useful life, valuation method and assumptions used to determine the fair value of the intangible assets acquired with the Lumerical acquisition are as follows:

Intangible Asset	Weighted-Average Useful Life	Valuation Method	Assumptions
Developed software and core technologies	10 years	Multi-period excess earnings	Discount rate: 16.5%
Trade names	6 years	Relief-from-royalty	Royalty rate: 2.0% Discount rate: 16.5%
Customer lists	10 years	Multi-period excess earnings	Attrition rate: 10.0% Discount rate: 12.5%

The operating results of each acquisition have been included in our consolidated financial statements since each respective date of acquisition. The effects of the business combinations were not material to our consolidated results of operations individually or in the aggregate.

2019 Acquisitions

On November 1, 2019, we completed the acquisition of 100% of the shares of LST, the premier provider of explicit dynamics and other advanced finite element analysis technology, for a purchase price of \$781.5 million, inclusive of final net working capital adjustments. The acquisition empowers our customers to solve a new class of engineering challenges, including developing safer automobiles, aircraft and trains while reducing or even eliminating the need for costly physical testing. The purchase price was paid with \$472.8 million in cash and 1.4 million shares of our common stock valued at \$308.7 million. We issued \$307.2 million of common stock in an unregistered offering to the prior owners of LST and the remaining \$1.5 million was issued from shares held in treasury.

On February 1, 2019, we completed the acquisition of 100% of the shares of Granta Design for a purchase price of \$208.7 million, paid in cash and inclusive of final net working capital adjustments. The acquisition of Granta Design, the premier provider of materials information technology, expands our portfolio into this important area, giving customers access to materials intelligence, including data that is critical to successful simulations.

Additionally, during the year ended December 31, 2019, we acquired Dynardo, Helic and DfR Solutions to combine the acquired technologies with our existing comprehensive multiphysics portfolio. These acquisitions were not individually significant. The combined purchase price of these other acquisitions was \$138.5 million, paid in cash and inclusive of final net working capital adjustments.

During the year ended December 31, 2019, we incurred \$6.6 million in acquisition-related expenses, recognized as selling, general and administrative expense on the consolidated statements of income.

The assets and liabilities of the acquisitions have been recorded based upon management's estimates of their fair market values as of each respective date of acquisition. The following tables summarize the fair values of consideration transferred and the fair values of identified assets acquired and liabilities assumed at each respective date of acquisition:

Fair Value of Consideration Transferred:

<i>(in thousands)</i>	LST	Granta Design	Other Acquisitions	Total
Cash	\$ 472,800	\$ 208,736	\$ 138,548	\$ 820,084
Ansys common stock	308,704	—	—	308,704
Total consideration transferred at fair value	<u>\$ 781,504</u>	<u>\$ 208,736</u>	<u>\$ 138,548</u>	<u>\$ 1,128,788</u>

Recognized Amounts of Identifiable Assets Acquired and Liabilities Assumed:

<i>(in thousands)</i>	LST	Granta Design	Other Acquisitions	Total
Cash	\$ 8,520	\$ 13,644	\$ 6,231	\$ 28,395
Accounts receivable and other tangible assets	20,569	6,941	10,734	38,244
Developed software and core technologies (10-year weighted-average life)	167,700	32,445	25,018	225,163
Customer lists (15-year weighted-average life)	25,900	20,016	15,743	61,659
Trade names (10-year weighted-average life)	10,600	4,579	2,051	17,230
Accounts payable and other liabilities	(3,887)	(5,164)	(5,946)	(14,997)
Deferred revenue	(3,565)	(1,426)	(1,889)	(6,880)
Uncertain tax positions	—	—	(257)	(257)
Net deferred tax liabilities	(47,412)	(8,976)	(8,151)	(64,539)
Total identifiable net assets	<u>\$ 178,425</u>	<u>\$ 62,059</u>	<u>\$ 43,534</u>	<u>\$ 284,018</u>
Goodwill	<u>\$ 603,079</u>	<u>\$ 146,677</u>	<u>\$ 95,014</u>	<u>\$ 844,770</u>

At the closing of the transaction, LST had uncertain tax positions inclusive of interest and penalties of \$34.0 million and a corresponding indemnification asset. The uncertain tax positions reflected potential federal and state tax liabilities associated with tax years 2016 to 2019. As all tax positions have been resolved, the uncertain tax positions and the corresponding indemnification asset recorded at closing have been removed.

The goodwill, which is generally not tax-deductible, is attributed to intangible assets that do not qualify for separate recognition, including the assembled workforce of the acquired business and the synergies expected to arise as a result of the acquisitions.

The valuation method and assumptions used to determine the fair value of the significant intangible assets acquired in 2019 are as follows:

Intangible Asset	Valuation Method	LST Assumptions	Granta Design Assumptions
Developed software and core technologies	Relief-from-royalty	Royalty rate: 50.0% Discount rate: 10.0%	Royalty rate: 8.0% - 10.0% Discount rate: 12.5%
Trade names	Relief-from-royalty	Royalty rate: 2.0% Discount rate: 10.0%	Royalty rate: 2.0% Discount rate: 14.0%
Customer lists	Multi-period excess earnings	Attrition rate: 10.0% Discount rate: 11.0%	Attrition rate: 10.0% Discount rate: 12.5%

The operating results of each acquisition have been included in our consolidated financial statements since each respective date of acquisition. The effects of the business combinations were not material to our consolidated results of operations individually. The table presented below reflects the aggregate impact on our results of operations of the 2019 acquisitions from the date of acquisition to December 31, 2019. The operating income does not include integration costs borne directly by us and our non-acquired subsidiaries as a result of the acquisitions.

<i>(in thousands)</i>	Year Ended December 31, 2019
Revenue	\$ 44,079
Operating income	\$ 6,733

2018 Acquisition

On May 2, 2018, we completed the acquisition of 100% of the shares of OPTIS, a premier provider of software for scientific simulation of light, human vision and physics-based visualization, for a purchase price of \$291.0 million, paid in cash. The acquisition extends our portfolio into the area of optical simulation to provide comprehensive sensor solutions, covering visible and infrared light, electromagnetics and acoustics for camera, radar and lidar.

The operating results of OPTIS have been included in our consolidated financial statements since May 2, 2018, the date of acquisition.

During the year ended December 31, 2018, we incurred \$3.5 million in acquisition-related expenses, recognized as selling, general and administrative expense on the consolidated statements of income.

The assets and liabilities of OPTIS have been recorded based upon management's estimates of their fair market values as of the acquisition date. The following tables summarize the fair value of consideration transferred and the fair values of identified assets acquired and liabilities assumed at the acquisition date:

Fair Value of Consideration Transferred:

<i>(in thousands)</i>	OPTIS
Cash	\$ 290,983

Recognized Amounts of Identifiable Assets Acquired and Liabilities Assumed:

<i>(in thousands)</i>	OPTIS
Cash	\$ 7,957
Accounts receivable and other tangible assets	15,910
Developed software and core technologies (10-year weighted-average life)	47,597
Customer lists (12-year weighted-average life)	41,303
Trade names (9-year weighted-average life)	10,749
Accounts payable and other liabilities	(11,941)
Deferred revenue	(2,470)
Net deferred tax liabilities	(23,438)
Total identifiable net assets	\$ 85,667
Goodwill	\$ 205,316

The goodwill, which is generally not tax-deductible, is attributed to intangible assets that do not qualify for separate recognition, including the assembled workforce of the acquired business and the synergies expected to arise as a result of the acquisition of OPTIS.

During the one-year measurement period since the OPTIS acquisition date, we adjusted the fair values of the assets acquired and liabilities assumed, with the offset recorded as a \$2.6 million increase to goodwill. These adjustments were made as we obtained new information about facts and circumstances that existed as of the acquisition date that, if known, would have affected the measurement of the amounts recognized as of that date.

Full pro forma results of operations have not been presented as the effects of the OPTIS business combination were not material to our consolidated results of operations. The table presented below reflects the impact of OPTIS from the date of acquisition to December 31, 2018. The operating loss does not include integration costs borne directly by us and our non-OPTIS subsidiaries as a result of the acquisition.

<i>(in thousands)</i>	Year Ended December 31, 2018
Revenue	\$ 18,532
Operating loss	\$ (5,462)

5. Other Receivables and Current Assets and Other Accrued Expenses and Liabilities

Our other receivables and current assets, and other accrued expenses and liabilities, comprise the following balances:

<i>(in thousands)</i>	December 31,	
	2020	2019
Receivables related to unrecognized revenue	\$ 192,154	\$ 177,679
Income taxes receivable, including overpayments and refunds	31,628	26,672
Prepaid expenses and other current assets	44,740	45,268
Total other receivables and current assets	\$ 268,522	\$ 249,619
Consumption, sales and VAT tax liabilities	\$ 45,156	\$ 36,398
Accrued expenses and other current liabilities	154,310	106,549
Total other accrued expenses and liabilities	\$ 199,466	\$ 142,947

Receivables related to unrecognized revenue represent the current portion of billings made for customer contracts that have not yet been recognized as revenue.

6. Property and Equipment

Property and equipment consists of the following:

<i>(in thousands)</i>	Estimated Useful Lives	December 31,	
		2020	2019
Equipment	1-15 years	\$ 123,139	\$ 105,428
Computer software	1-5 years	34,469	33,878
Buildings and improvements	2-40 years	38,332	38,095
Leasehold improvements	1-17 years	25,237	19,876
Furniture	1-13 years	14,902	12,766
Land		2,696	2,696
Property and equipment, gross		238,775	212,739
Less: Accumulated depreciation		(142,272)	(129,103)
Property and equipment, net		\$ 96,503	\$ 83,636

Depreciation expense related to property and equipment was \$28.0 million, \$23.6 million and \$18.4 million for the years ended December 31, 2020, 2019 and 2018, respectively.

7. Goodwill and Intangible Assets

Goodwill represents the excess of the fair value of consideration transferred over the fair value of net identifiable assets acquired. Identifiable intangible assets acquired in business combinations are recorded based on their fair values on the date of acquisition.

Intangible assets are classified as follows:

	December 31, 2020		December 31, 2019	
	Gross Carrying Amount	Accumulated Amortization	Gross Carrying Amount	Accumulated Amortization
<i>(in thousands)</i>				
Finite-lived intangible assets:				
Developed software and core technologies	\$ 859,620	\$ (370,338)	\$ 635,063	\$ (332,622)
Customer lists and contract backlog	288,085	(136,093)	269,629	(132,596)
Trade names	175,626	(122,392)	154,259	(117,379)
Total	<u>\$ 1,323,331</u>	<u>\$ (628,823)</u>	<u>\$ 1,058,951</u>	<u>\$ (582,597)</u>
Indefinite-lived intangible asset:				
Trade name	<u>\$ 357</u>		<u>\$ 357</u>	

Finite-lived intangible assets are amortized over their estimated useful lives of two years to seventeen years. Amortization expense for the intangible assets reflected above was \$57.2 million, \$36.9 million and \$40.8 million for the years ended December 31, 2020, 2019 and 2018, respectively.

As of December 31, 2020, estimated future amortization expense for the intangible assets reflected above is as follows:

<i>(in thousands)</i>	
2021	\$ 74,981
2022	77,300
2023	78,426
2024	77,399
2025	74,805
Thereafter	311,597
Total intangible assets subject to amortization, net	<u>694,508</u>
Indefinite-lived trade name	357
Other intangible assets, net	<u>\$ 694,865</u>

The changes in goodwill during the years ended December 31, 2020 and 2019 were as follows:

<i>(in thousands)</i>	2020	2019
Beginning balance - January 1	\$ 2,413,280	\$ 1,572,455
Acquisitions and adjustments ⁽¹⁾	596,054	842,588
Currency translation	28,972	(1,763)
Ending balance - December 31	<u>\$ 3,038,306</u>	<u>\$ 2,413,280</u>

⁽¹⁾ In accordance with the accounting for business combinations, we recorded adjustments to goodwill for the effect of changes in the provisional fair values of the assets acquired and liabilities assumed during the measurement period (up to one year from the acquisition date) as we obtained new information about facts and circumstances that existed as of the acquisition date that, if known, would have affected the measurement of the amounts recognized as of that date. Such adjustments are not material to our consolidated financial statements.

During the first quarter of 2020, we completed the annual impairment test for goodwill and the indefinite-lived intangible asset and determined that these assets had not been impaired as of the test date, January 1, 2020. Given the adverse economic and market conditions caused by COVID-19, we considered a variety of qualitative factors to determine if an additional quantitative impairment test was required subsequent to our annual impairment test. Based on a variety of factors, including the excess of the fair values over the carrying amounts in the most recent impairment test, we determined it was not more likely than not that an impairment existed as of March 31, 2020. No other events or circumstances changed during the year ended December 31, 2020 that would indicate that the fair values of our reporting unit and indefinite-lived intangible asset are below their carrying amounts.

8. Fair Value Measurement

The valuation hierarchy for disclosure of assets and liabilities reported at fair value prioritizes the inputs for such valuations into three broad levels:

- Level 1: quoted prices (unadjusted) in active markets for identical assets or liabilities;
- Level 2: quoted prices for similar assets and liabilities in active markets or inputs that are observable for the asset or liability, either directly or indirectly through market corroboration, for substantially the full term of the financial instrument; or
- Level 3: unobservable inputs based on our own assumptions used to measure assets and liabilities at fair value.

A financial asset's or liability's classification within the hierarchy is determined based on the lowest level input that is significant to the fair value measurement.

Our current and long-term debt is classified within Level 2 of the fair value hierarchy because these borrowings are not actively traded and have a variable interest rate structure based upon market rates. The carrying amount of our current and long-term debt approximates the estimated fair value. See Note 10, "Debt", for additional information on these borrowings.

The following tables provide the assets carried at fair value and measured on a recurring basis:

		Fair Value Measurements at Reporting Date Using:		
		Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
(in thousands)	December 31, 2020			
Assets				
Cash equivalents	\$ 341,085	\$ 341,085	\$ —	\$ —
Short-term investments	\$ 479	\$ —	\$ 479	\$ —
Deferred compensation plan investments	\$ 1,602	\$ 1,602	\$ —	\$ —

		Fair Value Measurements at Reporting Date Using:		
		Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
(in thousands)	December 31, 2019			
Assets				
Cash equivalents	\$ 322,455	\$ 322,455	\$ —	\$ —
Short-term investments	\$ 288	\$ —	\$ 288	\$ —
Deferred compensation plan investments	\$ 1,110	\$ 1,110	\$ —	\$ —

The cash equivalents in the preceding tables represent money market funds, valued at net asset value, with carrying values which approximate their fair values because of their short-term nature.

The short-term investments in the preceding tables represent deposits held by certain foreign subsidiaries. The deposits have fixed interest rates with original maturities ranging from three months to one year.

The deferred compensation plan investments in the preceding tables represent trading securities held in a rabbi trust for the benefit of the non-employee directors. These securities consist of mutual funds traded in an active market with quoted prices. As a result, the plan assets are classified as Level 1 in the fair value hierarchy. The plan assets are recorded within other long-term assets on our consolidated balance sheets.

9. Leases

We primarily have operating leases for office space included in our ROU assets and lease liabilities. Our executive offices and those related to certain domestic product development, marketing, production and administration are located in a 186,000 square foot office facility in Canonsburg, Pennsylvania. The term of the lease is 183 months, which began on October 1, 2014 and expires on December 31, 2029. The lease agreement includes options to renew the contract through August 2044, an option to lease additional space in January 2025 and an option to terminate the lease in December 2025. No options are included in the

lease liability as renewal is not reasonably certain. In addition, we are reasonably certain we will not terminate the lease agreement. Absent the exercise of options in the lease, our remaining base rent (inclusive of property taxes and certain operating costs) is \$4.5 million per annum through 2024 and \$4.7 million per annum for 2025 - 2029.

The components of our global lease cost reflected in the consolidated statements of income for the years ended December 31, 2020 and 2019 are as follows:

<i>(in thousands)</i>	2020	2019
Lease liability cost	\$ 24,818	\$ 22,507
Variable lease cost not included in the lease liability ⁽¹⁾	5,067	3,754
Total lease cost	<u>\$ 29,885</u>	<u>\$ 26,261</u>

⁽¹⁾ Variable lease cost includes common area maintenance, property taxes, utilities and fluctuations in rent due to a change in an index or rate.

For the year ended December 31, 2018, lease cost totaled \$21.3 million.

Other information related to operating leases for the years ended December 31, 2020 and 2019 is as follows:

<i>(in thousands)</i>	2020	2019
Cash paid for amounts included in the measurement of the lease liability:		
Operating cash flows from operating leases	\$ (22,470)	\$ (20,031)
Right-of-use assets obtained in exchange for new operating lease liabilities	\$ 48,248	\$ 35,191

	As of December 31,	
	2020	2019
Weighted-average remaining lease term of operating leases	7.3 years	7.7 years
Weighted-average discount rate of operating leases	2.9 %	3.7 %

The maturity schedule of the operating lease liabilities as of December 31, 2020 is as follows:

<i>(in thousands)</i>	
2021	\$ 27,311
2022	24,712
2023	21,522
2024	20,264
2025	17,076
Thereafter	50,438
Total future lease payments	<u>161,323</u>
Less: Present value adjustment	<u>(16,792)</u>
Present value of future lease payments ⁽¹⁾	<u>\$ 144,531</u>

⁽¹⁾ Includes the current portion of operating lease liabilities of \$23.6 million, which is reflected in other accrued expenses and liabilities in the consolidated balance sheets.

There were no material leases that have been signed but not yet commenced as of December 31, 2020.

10. Debt

In February 2019, we entered into a credit agreement for a \$500.0 million unsecured revolving credit facility, which includes a \$50.0 million sublimit for the issuance of letters of credit (Revolving Credit Facility), with Bank of America, N.A. as the Administrative Agent. The Revolving Credit Facility becomes payable in full on February 22, 2024 and is available for general corporate purposes, including, among others, to finance acquisitions and capital expenditures. The Revolving Credit Facility was not utilized in 2020 or 2019.

In connection with the acquisition of LST, we amended our credit agreement (Amended Credit Agreement) on October 16, 2019. The amendment provided for a new \$500.0 million unsecured term loan facility to finance the acquisition. The term loan was funded on November 1, 2019 and matures on November 1, 2024. Principal on the term loan will be payable on the last business day of each fiscal quarter commencing with the ninth full fiscal quarter after the funding date at a rate of 1.25% per quarter, increasing to 2.50% per quarter after the next four fiscal quarters. We repaid \$75.0 million of the unsecured term loan balance in January 2020 prior to the scheduled maturity dates in 2022 (\$25.0 million) and 2023 (\$50.0 million).

In connection with the acquisition of AGI, we entered into a credit agreement (AGI Credit Agreement) on November 9, 2020, with Bank of America, N.A. as the Administrative Agent. The AGI Credit Agreement provided for a new \$375.0 million unsecured term loan facility to finance a portion of the cash consideration for the acquisition. The term loan was funded on December 1, 2020 and matures on November 1, 2024. Principal on the term loan will be payable on the last business day of each fiscal quarter commencing with the fifth full fiscal quarter after the funding date at a rate of 1.25% per quarter, increasing to 2.50% per quarter after the next four fiscal quarters.

Borrowings under the Amended Credit Agreement and the AGI Credit Agreement (Credit Agreements) accrue interest at the Eurodollar rate plus an applicable margin or at the base rate, at our election. For the quarter ended December 31, 2020, we elected to apply the Eurodollar rate. The base rate is the applicable margin plus the highest of (i) the federal funds rate plus 0.500%, (ii) the Bank of America prime rate and (iii) the Eurodollar rate plus 1.000%. The applicable margin for these borrowings is a percentage per annum based on the lower of (1) a pricing level determined by our then-current consolidated leverage ratio and (2) a pricing level determined by our debt ratings (if such debt ratings exist). This results in a margin ranging from 1.125% to 1.750% and 0.125% to 0.750% for the Eurodollar rate and base rate, respectively.

The weighted-average interest rates in effect for the years ended December 31, 2020 and 2019 were 2.09% and 2.96%, respectively. As of December 31, 2020, the rates in effect for the Amended Credit Agreement and the AGI Credit Agreement were 1.38% and 1.50%, respectively.

The Credit Agreements contain language in the event the Eurodollar rate is not available due to LIBOR changes. If this occurs, the base rate will be used for borrowings. However, we may work with the Administrative Agent to amend the Credit Agreements to replace the Eurodollar rate with (i) one or more rates based on the Secured Overnight Financing Rate (SOFR); or (ii) another alternative benchmark rate, subject to the lenders' approval.

The Credit Agreements contain customary representations and warranties, affirmative and negative covenants and events of default. The Credit Agreements also each contain a financial covenant requiring us to maintain a consolidated leverage ratio of indebtedness to earnings before interest, taxes, depreciation and amortization not exceeding 3.50 to 1.00 as of the end of any fiscal quarter (for the four-quarter period ending on such date) with an opportunity for a temporary increase in such consolidated leverage ratio to 4.00 to 1.00 upon the consummation of certain qualified acquisitions for which the aggregate consideration is at least \$250.0 million.

As of December 31, 2020 and December 31, 2019, there were no outstanding borrowings under the unsecured Revolving Credit Facility, and the carrying values of the term loans were \$798.1 million, which is net of \$1.9 million of unamortized debt issuance costs, and \$498.5 million, which is net of \$1.5 million of unamortized debt issuance costs, respectively. We were in compliance with all covenants as of December 31, 2020 and December 31, 2019.

As of December 31, 2020, scheduled maturities of total debt for each of the five succeeding fiscal years are as follows:

<i>(in thousands)</i>	
2021	\$ —
2022	18,750
2023	37,500
2024	743,750
2025	—
Total	<u>\$ 800,000</u>

11. Income Taxes

Income before income taxes included the following components:

<i>(in thousands)</i>	Year Ended December 31,		
	2020	2019	2018
Domestic	\$ 465,382	\$ 448,271	\$ 455,478
Foreign	28,543	74,312	31,607
Total	<u>\$ 493,925</u>	<u>\$ 522,583</u>	<u>\$ 487,085</u>

The provision for income taxes was composed of the following:

<i>(in thousands)</i>	Year Ended December 31,		
	2020	2019	2018
Current:			
Federal	\$ 26,855	\$ 44,824	\$ 58,138
State	12,738	9,554	12,888
Foreign	51,377	31,421	30,359
Deferred:			
Federal	(12,203)	(8,833)	(20,764)
State	(2,119)	(965)	(2,901)
Foreign	(16,610)	(4,713)	(10,010)
Total	<u>\$ 60,038</u>	<u>\$ 71,288</u>	<u>\$ 67,710</u>

The reconciliation of the U.S. federal statutory tax rate to the consolidated effective tax rate was as follows:

	Year Ended December 31,		
	2020	2019	2018
Federal statutory tax rate	21.0 %	21.0 %	21.0 %
State income taxes, net of federal benefit	1.6	1.5	1.5
Foreign rate differential	0.4	0.8	0.8
Uncertain tax positions	0.1	(0.2)	0.5
Valuation allowance release	(0.8)	(1.3)	—
Benefit from entity structuring activities	(1.5)	—	(1.4)
Foreign-derived intangible income deduction	(2.8)	(3.8)	(3.9)
Research and development credits	(3.2)	(2.2)	(2.3)
Stock-based compensation	(3.6)	(3.1)	(3.3)
Other	1.0	0.9	1.0
	<u>12.2 %</u>	<u>13.6 %</u>	<u>13.9 %</u>

The components of deferred tax assets and liabilities are as follows:

(in thousands)	December 31,	
	2020	2019
Deferred tax assets:		
Net operating loss carryforwards	\$ 47,551	\$ 35,044
Operating lease liabilities	34,803	26,628
Stock-based compensation	24,738	24,254
Uncertain tax positions	18,565	19,227
Employee benefits	13,290	9,392
Research and development credits	9,847	5,865
Allowance for doubtful accounts	3,193	1,841
Other	6,856	4,468
Valuation allowance	(15,398)	(17,524)
Total deferred tax assets	143,445	109,195
Deferred tax liabilities:		
Other intangible assets	(147,960)	(99,193)
Operating lease right-of-use assets	(33,304)	(25,648)
Deferred revenue	(26,839)	(13,744)
Accounting method change	(10,781)	(21,396)
Property and equipment	(6,052)	(3,780)
Total deferred tax liabilities	(224,936)	(163,761)
Net deferred tax liabilities	\$ (81,491)	\$ (54,566)

The valuation allowance decreased by \$2.1 million for the year ended December 31, 2020. Intercompany debt restructuring resulted in the ability to utilize losses in a foreign jurisdiction where we previously determined that utilization was remote, resulting in the release of \$2.3 million of valuation allowance. In addition, a favorable tax ruling in a foreign jurisdiction resulted in the release of \$1.8 million of valuation allowance recorded against losses where we previously determined that utilization was remote. These decreases in the valuation allowance are offset by other increases in unrealizable tax assets. As of each reporting date, management considers new evidence, both positive and negative, that could affect the future realization of deferred tax assets. If management determines it is more likely than not that an asset, or a portion of an asset, will not be realized, a valuation allowance is recorded.

As of December 31, 2020, we had federal net operating loss carryforwards of \$28.3 million, which are subject to limitations of their utilization. Losses totaling \$25.6 million are not currently subject to expiration dates, while the remaining \$2.7 million of losses expire between 2025 - 2037. Deferred tax assets of \$1.9 million have been recorded for state operating loss carryforwards. These losses expire between 2030 - 2042, and are subject to limitations on their utilization. We had total foreign net operating loss carryforwards of \$166.1 million, of which \$141.7 million are not currently subject to expiration dates. The remainder, \$24.4 million, expires between 2025 - 2036. We had tax credit carryforwards of \$11.2 million, of which \$6.9 million are subject to limitations on their utilization. Approximately \$0.7 million of these tax credit carryforwards are not currently subject to expiration dates. The remainder, \$10.5 million, expires in various years between 2021 - 2040.

In general, it is our intention to permanently reinvest all earnings in excess of previously taxed amounts. Substantially all of the pre-2018 earnings of our non-U.S. subsidiaries were taxed through the transition tax and post-2018 current earnings are taxed as part of global intangible low-taxed income tax expense. These taxes increase our previously taxed earnings and allow for the repatriation of the majority of our foreign earnings without any residual U.S. federal tax. While we believe that the financial reporting bases may be greater than the tax bases of investments in foreign subsidiaries for any earnings in excess of previously taxed amounts, such amounts are considered permanently reinvested. The cumulative temporary difference related to such permanently reinvested earnings is approximately \$93.0 million and we would anticipate the tax effect on those earnings to be immaterial.

The following is a reconciliation of the total amounts of unrecognized tax benefits:

(in thousands)	Year Ended December 31,		
	2020	2019	2018
Unrecognized tax benefit as of January 1	\$ 49,085	\$ 22,827	\$ 19,657
Gross changes—acquisitions	(24,963)	26,914	—
Gross increases—tax positions in prior period	1,572	207	1,229
Gross decreases—tax positions in prior period	—	(1,743)	(376)
Gross increases—tax positions in current period	1,281	3,563	4,014
Reductions due to a lapse of the applicable statute of limitations	(3,502)	(2,230)	(994)
Changes due to currency fluctuation	994	(453)	(703)
Settlements	(392)	—	—
Unrecognized tax benefit as of December 31	\$ 24,075	\$ 49,085	\$ 22,827

We believe that it is reasonably possible that approximately \$5.0 million of uncertain tax positions included in the table above may be resolved within the next twelve months as a result of settlement with a taxing authority or a lapse of the statute of limitations. If the unrecognized tax benefit as of December 31, 2020 were to be recognized, a benefit of \$16.3 million would impact the effective tax rate.

We recognize interest and penalties related to income taxes as income tax expense. We recorded penalty expense of \$0.2 million, \$0.5 million and \$0.8 million for the years ended December 31, 2020, 2019 and 2018, respectively. We recorded interest expense of \$0.3 million and less than \$0.1 million for the years ended December 31, 2020 and 2019, respectively, and interest income of \$0.1 million for the year ended December 31, 2018. As of December 31, 2020, we accrued a liability for penalties of \$5.5 million and interest of \$5.4 million. As of December 31, 2019, we accrued a liability for penalties of \$11.7 million and interest of \$6.6 million.

We are subject to taxation in the U.S. and various states and foreign jurisdictions. In the U.S., our only major tax jurisdiction, the 2017 - 2020 tax years are open to examination by the Internal Revenue Service.

12. Pension and Profit-Sharing Plans

We have a 401(k) plan for all qualifying domestic employees that permits participants to defer a portion of their pay pursuant to Section 401(k) of the Internal Revenue Code. We make matching contributions on behalf of each eligible participant in an amount equal to 100% of the first 3% and an additional 25% of the next 5%, for a maximum total of 4.25% of the employee's eligible compensation. We may make discretionary matching contributions. We may also make discretionary nonelective contributions in an amount to be determined by the Board of Directors for each Plan Year, provided the employee is employed at the end of the year and has worked at least 1,000 hours. We also maintain and contribute to various defined contribution and defined benefit pension arrangements for our international employees. We meet the minimum statutory funding requirements for our foreign plans. As of December 31, 2020 and 2019, the total unfunded portions of the defined benefit obligations were \$13.5 million and \$11.2 million, respectively.

Expenses related to our retirement programs were \$18.7 million in 2020, \$16.3 million in 2019 and \$12.4 million in 2018.

13. Non-Compete and Employment Agreements

Our employees have signed agreements under which they have agreed not to disclose trade secrets or confidential information that, where legally permitted, restrict engagement in or connection with any business that is competitive with us anywhere in the world while employed by us (and, in some cases, for specified periods thereafter in relevant geographic areas), and that any products or technology created by them during their term of employment are our property. In addition, we require all channel partners to enter into agreements not to disclose our trade secrets and other proprietary information.

We have an employment agreement with our Chief Executive Officer. This agreement provides for, among other things, in the case of termination by us other than for Cause (as defined therein) or by the Chief Executive Officer for Good Reason (as defined therein) and subject to his execution and delivery of a release of claims against us, he will receive minimum severance payments equal to the sum of two times his base salary and target bonus to be paid out over two years from the date of termination and up to two years of COBRA payments for health care coverage after termination. During his employment with

us and for two years thereafter, following termination of employment under certain circumstances described in the contract, he will be subject to non-competition and non-solicitation obligations.

We also have employment agreements with several other employees, primarily in foreign jurisdictions. The terms of these employment agreements generally include annual compensation and non-compete clauses.

14. Stock-Based Compensation

We have an equity incentive plan - the Fifth Amended and Restated ANSYS, Inc. 1996 Stock Option and Grant Plan (Stock Plan). The Stock Plan, as amended, authorizes the grant of approximately 39.8 million shares of our common stock in the form of: (i) incentive stock options (ISOs), (ii) nonqualified stock options, (iii) common stock with or without vesting or other restrictions, (iv) common stock upon the attainment of specified performance goals, (v) restricted stock awards, (vi) the right to receive cash dividends with the holders of the common stock as if the recipient held a specified number of shares of the common stock, (vii) deferred stock awards, (viii) restricted stock unit awards, (ix) stock appreciation rights and (x) cash-based awards.

The Stock Plan provides that: (i) the exercise price of any stock option must be no less than the fair value of the stock at the date of grant and (ii) the exercise price of an ISO held by an optionee who possesses more than 10% of the total combined voting power of all classes of stock must be no less than 110% of the fair market value of the stock at the time of grant. The Compensation Committee of the Board of Directors has the authority to set expiration dates that are no later than ten years from the date of grant (or five years for an optionee who meets the 10% criterion), payment terms, and other provisions for each grant. Shares associated with unexercised options or reacquired shares of common stock (except those shares withheld as a result of tax withholding, shares used to pay an option exercise price or pursuant to a net issuance) become available again for option grants and common stock-related awards under the Stock Plan.

The Compensation Committee of the Board of Directors may, at its sole discretion, accelerate the date or dates on which an award granted under the Stock Plan may vest or extend, in the case of a stock option, the exercise period up to the expiration date of the option, subject to the terms and conditions of the Stock Plan. Upon termination of service of a participant due to the participant's death or disability, the vesting of restricted stock units held by the participant accelerates (in case of performance-based vesting, subject to the attainment of the performance requirement).

In the event of a "sale event," defined in the Stock Plan as a "Transaction," all outstanding awards will be assumed or continued by the successor entity, with appropriate adjustment in the awards to reflect the transaction. In such event, except as the Compensation Committee may otherwise specify with respect to particular awards in the award agreements, if the service relationship of the holder of an award is terminated without cause on or within 18 months after the sale event, then all awards held by such holder will become fully vested and exercisable at that time. If there is a sale event in which the successor entity refuses to assume or continue outstanding awards, then subject to the consummation of the sale event, all awards with time-based vesting conditions will become fully vested and exercisable at the effective time of the sale event and all awards with performance-based vesting conditions may become vested at the discretion of the Compensation Committee and then all such awards will terminate at the time of the sale event. In the event of the termination of stock options or stock appreciation rights in connection with a sale event, the Compensation Committee may either make or provide for a cash payment to the holders of such awards equal to the difference between the per share transaction consideration and the exercise price of such awards or permit each holder to have at least a 15-day period to exercise such awards prior to their termination.

We currently issue shares related to exercised stock options or vested awards from our existing pool of treasury shares and have no specific policy to repurchase treasury shares as stock options are exercised or as awards vest. If the treasury pool is depleted, we will issue new shares.

Total stock-based compensation expense recognized for the years ended December 31, 2020, 2019 and 2018 is as follows:

<i>(in thousands, except per share amounts)</i>	Year Ended December 31,		
	2020	2019	2018
Cost of sales:			
Maintenance and service	13,626	8,494	5,224
Operating expenses:			
Selling, general and administrative	73,491	60,639	47,099
Research and development	58,498	47,057	31,023
Stock-based compensation expense before taxes	145,615	116,190	83,346
Related income tax benefits	(56,485)	(47,454)	(34,518)
Stock-based compensation expense, net of taxes	\$ 89,130	\$ 68,736	\$ 48,828
Net impact on earnings per share:			
Basic earnings per share	\$ (1.04)	\$ (0.82)	\$ (0.58)
Diluted earnings per share	\$ (1.02)	\$ (0.80)	\$ (0.57)

As of December 31, 2020, total unrecognized estimated compensation expense related to awards granted prior to that date was \$160.7 million, which is expected to be recognized over a weighted average period of 1.4 years. Forfeitures of awards are accounted for as they occur.

Stock Options

Prior to 2017, we granted stock option awards. The value of each stock option award was estimated on the date of grant, or date of acquisition for options issued in a business combination, using the Black-Scholes option pricing model (Black-Scholes model). The determination of the fair value of stock-based payment awards using an option pricing model was affected by our stock price as well as assumptions regarding a number of complex and subjective variables. These variables included our stock volatility during the preceding six years, actual and projected employee stock option exercise behaviors, interest rate assumptions using the five-year U.S. Treasury Note yield on the date of grant or acquisition date, and expected dividends. The stock-based compensation expense for options was recorded ratably over the requisite service period.

As of December 31, 2020, there is no unrecognized estimated compensation cost related to unvested stock options.

Information regarding stock option transactions is summarized below:

<i>(options in thousands)</i>	Year Ended December 31,					
	2020		2019		2018	
	Options	Weighted-Average Exercise Price	Options	Weighted-Average Exercise Price	Options	Weighted-Average Exercise Price
Outstanding, beginning of year	984	\$ 67.49	1,484	\$ 62.80	2,170	\$ 59.17
Granted	—	\$ —	—	\$ —	—	\$ —
Exercised	(336)	\$ 54.43	(495)	\$ 53.53	(679)	\$ 50.92
Forfeited	—	\$ —	(5)	\$ 64.21	(7)	\$ 86.28
Outstanding, end of year	648	\$ 74.26	984	\$ 67.49	1,484	\$ 62.80
Vested and Exercisable, end of year	648	\$ 74.26	924	\$ 65.71	1,347	\$ 59.69
Nonvested	—	\$ —	60	\$ 94.77	137	\$ 93.44

	2020	2019	2018
Weighted Average Remaining Contractual Term <i>(in years)</i>			
Outstanding	2.93	3.18	3.55
Vested and Exercisable	2.93	2.95	3.14
Nonvested	0.00	6.71	7.60
Aggregate Intrinsic Value <i>(in thousands)</i>			
Exercised	\$ 78,269	\$ 72,098	\$ 78,648
Outstanding	\$ 187,679	\$ 186,926	\$ 118,908
Vested and Exercisable	\$ 187,679	\$ 177,111	\$ 112,133
Nonvested	\$ —	\$ 9,815	\$ 6,775
Compensation Expense - Stock Options <i>(in thousands)</i>	\$ 1,030	\$ 1,709	\$ 2,006

Information regarding stock options outstanding as of December 31, 2020 is summarized below:

(options in thousands)

Range of Exercise Prices	Options Outstanding & Exercisable		
	Options	Weighted-Average Remaining Contractual Life (years)	Weighted-Average Exercise Price
\$12.26 - \$24.42	13	0.40	\$ 22.10
\$58.67	167	0.86	\$ 58.67
\$67.44	226	1.85	\$ 67.44
\$78.56 - \$95.09	242	5.48	\$ 94.15

There were no unvested stock options as of December 31, 2020.

Restricted Stock Units

Under the terms of the Fifth Amended and Restated ANSYS, Inc. 1996 Stock Option and Grant Plan, we issue various restricted stock unit awards. The following table summarizes the types of awards and vesting conditions:

Award	Vesting Period	Vesting Condition
Restricted stock units with a service condition only	Three years	Continued employment through the vesting period. One third vests annually.
Restricted stock units with an operating performance and service condition	Three years	Operating performance metrics as defined at the beginning of each sub-performance period and subject to continued employment.
Restricted stock units with a market and service condition	Three years	Our performance measured by total stockholder return relative to the Nasdaq Composite Index for the performance period and subject to continued employment through the vesting period.

The fair value of RSUs with only a service condition is based on the fair market value of our stock on the date of the grant and is recognized over the vesting period.

The fair value of RSUs with operating performance metrics is based on the fair market value of our stock on the date of the grant and is recognized from the grant date through the conclusion of the performance period associated with each operating performance metric based on management's estimates concerning the probability of vesting.

The fair values of restricted stock units (RSUs) with a market condition were estimated using a Monte Carlo simulation model and are recognized over the vesting period. The determination of the fair values of the awards was affected by the grant date and several variables, each of which has been identified in the chart below:

Assumptions used in Monte Carlo lattice pricing model	Year Ended December 31,		
	2020	2019	2018
Risk-free interest rate	0.7%	2.5%	2.4%
Expected dividend yield	—%	—%	—%
Expected volatility—Ansys stock price	25%	23%	21%
Expected volatility—Nasdaq Composite Index	18%	16%	15%
Expected term	2.8 years	2.8 years	2.8 years
Correlation factor	0.77	0.71	0.65
Weighted average fair value per share	\$245.08	\$238.99	\$191.76

Total compensation expense for employee RSU awards recorded for the years ended December 31, 2020, 2019 and 2018 was \$138.3 million, \$109.9 million and \$77.4 million, respectively.

Information regarding all employee RSU transactions is summarized below:

	Year Ended December 31,					
	2020		2019		2018	
(RSUs in thousands)	RSUs	Weighted-Average Grant Date Fair Value	RSUs	Weighted-Average Grant Date Fair Value	RSUs	Weighted-Average Grant Date Fair Value
Nonvested, beginning of year	1,618	\$ 165.26	1,522	\$ 129.96	1,361	\$ 100.66
Granted ⁽¹⁾	501	\$ 256.47	843	\$ 192.37	681	\$ 163.67
Performance adjustment - awards with market condition ⁽²⁾	18	\$ 191.76	12	\$ 120.96	10	\$ 78.71
Performance adjustment - awards with performance condition ⁽²⁾	(10)	\$ 279.08	62	\$ 176.89	66	\$ 162.64
Vested	(742)	\$ 158.13	(704)	\$ 125.84	(524)	\$ 101.38
Forfeited	(62)	\$ 193.28	(117)	\$ 140.43	(72)	\$ 125.29
Nonvested, end of year	1,323	\$ 201.98	1,618	\$ 165.26	1,522	\$ 129.96

⁽¹⁾ Includes all RSUs granted during the year. RSUs with operating performance conditions are issued annually and have one performance cycle or three sub-performance cycles. Performance conditions are assigned near the beginning of each performance cycle or sub-performance cycle, as applicable, and awards are reflected as grants at the target number of units at that time.

⁽²⁾ RSUs with a market or performance condition are granted at target and vest based on achievement of the market or operating performance and service conditions. The actual number of RSUs issued may be more or less than the target RSUs depending on the achievement of the market or operating performance conditions.

Board of Directors

During and prior to 2015, we granted deferred stock awards to non-employee Directors, which are rights to receive shares of common stock upon termination of service as a Director. Associated with these awards, we established a non-qualified 409(a) deferred compensation plan with assets held under a rabbi trust to provide Directors an opportunity to diversify their vested awards. During open trading windows and at their elective option, the Directors may convert their Ansys shares into a variety of non-Ansys-stock investment options in order to diversify a portion of their holdings, subject to meeting ownership guidelines.

Information regarding deferred stock awards to non-employee Directors is summarized below:

	Year Ended December 31, 2020		
	Diversified	Undiversified	Total
Deferred Awards Outstanding, beginning of year	5,598	60,081	65,679
Shares Diversified	1,400	(1,400)	—
Deferred Awards Outstanding, end of year	6,998	58,681	65,679

	Year Ended December 31, 2019		
	Diversified	Undiversified	Total
Deferred Awards Outstanding, beginning of year	12,250	120,449	132,699
Shares Diversified	13,348	(13,348)	—
Shares Issued Upon Retirement	(20,000)	(47,020)	(67,020)
Deferred Awards Outstanding, end of year	5,598	60,081	65,679

	Year Ended December 31, 2018		
	Diversified	Undiversified	Total
Deferred Awards Outstanding, beginning of year	29,500	159,599	189,099
Shares Diversified	6,105	(6,105)	—
Shares Issued Upon Retirement	(23,355)	(33,045)	(56,400)
Deferred Awards Outstanding, end of year	12,250	120,449	132,699

Information regarding RSU awards to non-employee Directors is summarized below:

	Year Ended December 31,					
	2020		2019		2018	
	BOD RSUs	Weighted-Average Grant Date Fair Value	BOD RSUs	Weighted-Average Grant Date Fair Value	BOD RSUs	Weighted-Average Grant Date Fair Value
(RSUs in thousands)						
Nonvested, beginning of year	9,688	\$ 187.53	13,632	\$ 165.71	18,018	\$ 123.38
Granted	9,664	\$ 253.40	11,259	\$ 187.53	13,632	\$ 165.71
Vested	(10,704)	\$ 193.35	(14,287)	\$ 166.71	(18,018)	\$ 123.38
Forfeited	(577)	\$ 253.93	(916)	\$ 187.53	—	\$ —
Nonvested, end of year	8,071	\$ 253.93	9,688	\$ 187.53	13,632	\$ 165.71

The RSUs to non-employee Directors vest in full upon the earlier of one year from the date of grant or the date of the next regular meeting of stockholders. If a non-employee Director retires prior to the vest date, the non-employee Director receives a pro-rata portion of the RSUs. Total compensation expense associated with the awards recorded for the years ended December 31, 2020, 2019 and 2018 was \$2.2 million, \$2.5 million and \$2.3 million, respectively.

Employee Stock Purchase Plan

Our 1996 Employee Stock Purchase Plan (the “Purchase Plan”) was adopted by the Board of Directors on April 19, 1996 and was subsequently approved by our stockholders. The stockholders approved an amendment to the Purchase Plan in May 2016 to increase the number of shares available for offerings to 1.8 million shares of which 0.1 million shares are available for future purchases as of December 31, 2020. The Purchase Plan is administered by the Compensation Committee. Offerings under the Purchase Plan commence on each February 1 and August 1, and have a duration of six months. An employee who owns or is deemed to own shares of stock representing in excess of 5% of the combined voting power of all classes of our stock may not participate in the Purchase Plan.

During each offering, an eligible employee may purchase shares under the Purchase Plan by authorizing payroll deductions of up to 10% of his or her cash compensation during the offering period. The maximum number of shares that may be purchased by any participating employee during any offering period is limited to 3,840 shares (as adjusted by the Compensation Committee from time to time). Unless the employee has previously withdrawn from the offering, his or her accumulated payroll

deductions will be used to purchase common stock on the last business day of the period at a price equal to 90% of the fair market value of the common stock on the first or last day of the offering period, whichever is lower. Under applicable tax rules, an employee may not accrue the right to purchase more than \$25,000 of common stock, based on the grant-date fair value, in any calendar year in which the option is outstanding at any time. As of December 31, 2020, 1.7 million shares of common stock had been issued under the Purchase Plan. The total compensation expense recorded under the Purchase Plan during the years ended December 31, 2020, 2019 and 2018 was \$4.1 million, \$2.0 million and \$1.8 million, respectively.

15. Stock Repurchase Program

Under our stock repurchase program, we repurchased shares as follows:

<i>(in thousands, except per share data)</i>	Year Ended December 31,		
	2020	2019	2018
Number of shares repurchased	690	330	1,674
Average price paid per share	\$ 233.48	\$ 179.41	\$ 161.12
Total cost	\$ 161,029	\$ 59,116	\$ 269,801

All of the shares of common stock repurchased during the year ended December 31, 2020 were repurchased in the first quarter of 2020. As of December 31, 2020, 2.8 million shares remained available for repurchase under the program.

16. Royalty Agreements

We have entered into various renewable license agreements under which we have been granted access to the licensor's technology and the right to sell the technology in our product line. Royalties are payable to developers of the software at various rates and amounts, which generally are based upon unit sales, revenue or flat fees. Royalty fees are reported in cost of software licenses and were \$29.6 million, \$22.4 million and \$16.9 million for the years ended December 31, 2020, 2019 and 2018, respectively.

17. Geographic Information

Revenue to external customers is attributed to individual countries based upon the location of the customer. Revenue by geographic area was as follows:

<i>(in thousands)</i>	Year Ended December 31,		
	2020	2019	2018
United States	\$ 776,716	\$ 637,916	\$ 506,335
Japan	183,117	162,154	145,951
Germany	160,771	158,809	140,506
South Korea	74,953	90,082	72,724
France	71,255	68,551	67,657
Other EMEA	236,678	211,193	193,317
Other international	177,807	187,187	167,146
Total revenue	\$ 1,681,297	\$ 1,515,892	\$ 1,293,636

Property and equipment by geographic area was as follows:

(in thousands)	December 31,	
	2020	2019
United States	\$ 65,633	\$ 59,473
India	7,408	5,660
France	5,749	3,657
Germany	5,277	4,237
United Kingdom	3,765	4,194
Other EMEA	2,082	1,875
Other international	6,589	4,540
Total property and equipment, net	\$ 96,503	\$ 83,636

18. Unconditional Purchase Obligations

We have entered into various unconditional purchase obligations which primarily include royalties and software licenses and services. We expended \$37.2 million, \$24.2 million and \$22.4 million related to unconditional purchase obligations that existed as of the beginning of each year for the years ended December 31, 2020, 2019 and 2018, respectively. Future expenditures under unconditional purchase obligations in effect as of December 31, 2020 are as follows:

(in thousands)	
2021	\$ 44,865
2022	20,751
2023	6,758
2024	2,525
2025	26
Total	\$ 74,925

19. Contingencies and Commitments

We are subject to various investigations, claims and legal proceedings that arise in the ordinary course of business, including commercial disputes, labor and employment matters, tax audits, alleged infringement of intellectual property rights and other matters. In our opinion, the resolution of pending matters is not expected to have a material adverse effect on our consolidated results of operations, cash flows or financial position. However, each of these matters is subject to various uncertainties and it is possible that an unfavorable resolution of one or more of these proceedings could materially affect our results of operations, cash flows or financial position.

Our Indian subsidiary has several service tax audits pending that have resulted in formal inquiries being received on transactions through mid-2012. We could incur tax charges and related liabilities of approximately \$7.3 million. As such charges are not probable at this time, a reserve has not been recorded on the condensed consolidated balance sheet as of December 31, 2020. The service tax issues raised in our notices and inquiries are very similar to the case, M/s Microsoft Corporation (I) (P) Ltd. Vs. Commissioner of Service Tax, New Delhi, wherein the Delhi Customs, Excise and Service Tax Appellate Tribunal (CESTAT) issued a favorable ruling to Microsoft. The Microsoft ruling was subsequently challenged in the Supreme Court by the Indian tax authority and a decision is still pending. We can provide no assurances on the impact that the present Microsoft case's decision will have on our cases, however, an unfavorable ruling in the Microsoft case may impact our assessment of probability and result in the recording of a \$7.3 million reserve. We are uncertain as to when these service tax matters will be concluded.

We sell software licenses and services to our customers under contractual agreements. Such agreements generally include certain provisions indemnifying the customer against claims of intellectual property infringement or non-compliance to contractual terms and conditions by third parties arising from such customer's usage of our products or services. To date, payments related to these indemnification provisions have been immaterial. For several reasons, including the lack of prior

material indemnification claims, we cannot determine the maximum amount of potential future payments, if any, related to such indemnification provisions.

SCHEDULE II

ANSYS, INC. AND SUBSIDIARIES
Valuation and Qualifying Accounts

<i>(in thousands)</i>	Description	Balance at Beginning of Year	Additions: Charges to Costs and Expenses	Deductions: Write-Offs	Balance at End of Year
Year ended December 31, 2020	Allowance for doubtful accounts	\$ 8,700	\$ 6,438	\$ 1,138	\$ 14,000
Year ended December 31, 2019	Allowance for doubtful accounts	\$ 8,000	\$ 2,928	\$ 2,228	\$ 8,700
Year ended December 31, 2018	Allowance for doubtful accounts	\$ 6,800	\$ 1,577	\$ 377	\$ 8,000

<u>Exhibit No.</u>	<u>Exhibit</u>
3.1	<u>Restated Certificate of Incorporation of the Company (filed as Exhibit 3.1 to the Company's Annual Report on Form 10-K, filed February 27, 2020, and incorporated herein by reference).</u>
3.2	<u>Third Amended and Restated By-laws of the Company (filed as Exhibit 3.1 to the Company's Current Report on Form 8-K, filed January 19, 2018, and incorporated herein by reference).</u>
4.1	<u>Description of Securities (filed as Exhibit 4.1 to the Company's Annual Report on Form 10-K, filed February 27, 2020, and incorporated herein by reference).</u>
10.1	<u>Form of Indemnification Agreement between ANSYS, Inc. and Non-Employee Directors (filed as Exhibit 10.1 to the Company's Current Report on Form 8-K, filed March 20, 2013, and incorporated herein by reference).*</u>
10.2	<u>Non-Employee Director Deferred Compensation Plan (filed as Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q, filed November 7, 2019, and incorporated herein by reference).*</u>
10.3	<u>Executive Severance Plan, as amended and restated, dated July 29, 2014 (filed as Exhibit 10.3 to the Company's Annual Report on Form 10-K, filed February 27, 2020, and incorporated herein by reference).*</u>
10.4	<u>Fourth Amended and Restated ANSYS, Inc. 1996 Stock Option and Grant Plan (filed as Exhibit 10.1 to the Company's Current Report on Form 8-K, filed May 17, 2011, and incorporated herein by reference).*</u>
10.5	<u>Form of Deferred Stock Unit Agreement under the Fourth Amended and Restated ANSYS, Inc. 1996 Stock Option and Grant Plan (filed as Exhibit 10.5 to the Company's Annual Report on Form 10-K, filed February 27, 2020, and incorporated herein by reference).*</u>
10.6	<u>Form of Employee Non-Qualified Stock Option Agreement under the Fourth Amended and Restated ANSYS, Inc. 1996 Stock Option and Grant Plan (filed as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q, filed May 2, 2013, and incorporated herein by reference).*</u>
10.7	<u>Fifth Amended and Restated ANSYS, Inc. 1996 Stock Option and Grant Plan (filed as Appendix 1 to the registrant's Definitive Proxy Statement on Schedule 14A filed with the SEC on March 31, 2016 and incorporated herein by reference).*</u>
10.8	<u>Form of Non-Qualified Stock Option Agreement under the Fifth Amended and Restated ANSYS, Inc. 1996 Stock Option and Grant Plan (filed as Exhibit 10.36 to the Company's Annual Report on Form 10-K, filed February 23, 2017, and incorporated herein by reference).*</u>
10.9	<u>2017 Form of Restricted Stock Unit Agreement under the Fifth Amended and Restated ANSYS, Inc. 1996 Stock Option and Grant Plan (filed as Exhibit 10.35 to the Company's Annual Report on Form 10-K, filed February 23, 2017, and incorporated herein by reference).*</u>
10.10	<u>2018 Form of Restricted Stock Unit Agreement under the Fifth Amended and Restated ANSYS, Inc. 1996 Stock Option and Grant Plan (filed as Exhibit 10.11 to the Company's Annual Report on Form 10-K, filed February 27, 2020, and incorporated herein by reference).*</u>
10.11	<u>2019 Form of Restricted Stock Unit Agreement under the Fifth Amended and Restated ANSYS, Inc. 1996 Stock Option and Grant Plan (filed as Exhibit 10.12 to the Company's Annual Report on Form 10-K, filed February 27, 2020, and incorporated herein by reference).*</u>
10.12	<u>Form of Restricted Stock Unit Award Agreement (Non-Employee Directors) under the Fifth Amended and Restated ANSYS, Inc. 1996 Stock Option and Grant Plan (filed as Exhibit 10.13 to the Company's Annual Report on Form 10-K, filed February 27, 2020, and incorporated herein by reference).*</u>
10.13	<u>2019 Form of Award Notice (Annual Contract Value) under the Fifth Amended and Restated ANSYS, Inc. 1996 Stock Option and Grant Plan (filed as Exhibit 10.16 to the Company's Annual Report on Form 10-K, filed February 27, 2020, and incorporated herein by reference).*</u>
10.14	<u>2019 Form of Award Notice (Total Shareholder Return) under the Fifth Amended and Restated ANSYS, Inc. 1996 Stock Option and Grant Plan.*</u>
10.15	<u>2019 Form of Special Performance Stock Unit Agreement under the Fifth Amended and Restated ANSYS, Inc. 1996 Stock Option and Grant Plan (filed as Exhibit 10.18 to the Company's Annual Report on Form 10-K, filed February 27, 2020, and incorporated herein by reference).*</u>
10.16	<u>2020 Form of Award Notice (Total Shareholder Return) under the Fifth Amended and Restated ANSYS, Inc. 1996 Stock Option and Grant Plan (filed as Exhibit 10.24 to the Company's Quarterly Report on Form 10-Q, filed May 6, 2020, and incorporated herein by reference).*</u>

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10.17	<u>2020 Form of Award Notice (Annual Contract Value) under the Fifth Amended and Restated ANSYS, Inc. 1996 Stock Option and Grant Plan.*</u>
10.18	<u>Employment Agreement between ANSYS, Inc. and Ajei S. Gopal, dated August 29, 2016 (filed as Exhibit 10.1 to the Company's Current Report on Form 8-K, filed August 29, 2016, and incorporated herein by reference).*</u>
10.19	<u>Form of Non-Qualified Stock Option Agreement with Ajei S. Gopal (filed as Exhibit 10.3 to the Company's Current Report on Form 8-K, filed August 29, 2016, and incorporated herein by reference).*</u>
10.20	<u>Lease by and between ANSYS, Inc. and Quattro Investment Group, L.P., dated as of September 14, 2012 (filed as Exhibit 10.1 to the Company's Current Report on Form 8-K, filed September 18, 2012, and incorporated herein by reference).</u>
10.21	<u>Credit Agreement, dated as of February 22, 2019, among ANSYS, Inc. as borrower, Bank of America, N.A. as Administrative Agent, Swing Line Lender and an L/C issuer, the lenders party thereto, and the other L/C Issuers party thereto (filed as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q, filed May 2, 2019, and incorporated herein by reference).</u>
10.22	<u>First Amendment to Credit Agreement dated October 16, 2019, among ANSYS, Inc., as borrower, Bank of America, N.A., as Administrative Agent, and the lenders party thereto (filed as Exhibit 10.1 to the Company's Current Report on Form 8-K, filed October 21, 2019, and incorporated herein by reference).</u>
10.23	<u>Credit Agreement, dated as of November 9, 2020, among ANSYS, Inc., as borrower, Bank of America, N.A., as Administrative Agent, and the lenders party thereto (filed as Exhibit 10.1 to the Company's Current Report on Form 8-K, filed November 12, 2020, and incorporated herein by reference).</u>
21.1	<u>Subsidiaries of the Registrant.</u>
23.1	<u>Consent of Deloitte & Touche LLP, independent registered public accounting firm</u>
24.1	<u>Powers of Attorney. Contained on the Signatures page of the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2020 and incorporated herein by reference.</u>
31.1	<u>Certification of Chief Executive Officer pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.</u>
31.2	<u>Certification of Chief Financial Officer pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.</u>
32.1	<u>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.</u>
32.2	<u>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.</u>
101.INS	Inline XBRL Instance Document (the instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document)
101.SCH	Inline XBRL Taxonomy Extension Schema
101.CAL	Inline XBRL Taxonomy Extension Calculation Linkbase
101.DEF	Inline XBRL Taxonomy Extension Definition Linkbase
101.LAB	Inline XBRL Taxonomy Extension Label Linkbase
101.PRE	Inline XBRL Taxonomy Extension Presentation Linkbase
104	Cover Page Interactive Data File (formatted as Inline XBRL and contained in Exhibit 101)

* Indicates management contract or compensatory plan, contract or arrangement.

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.

ANSYS, Inc.

Date: February 24, 2021

By: /s/ AJEI S. GOPAL

Ajei S. Gopal
President and Chief Executive Officer
(Principal Executive Officer)

Date: February 24, 2021

By: /s/ MARIA T. SHIELDS

Maria T. Shields
Chief Financial Officer
(Principal Financial Officer and Principal Accounting Officer)

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints Ajei S. Gopal, his or her attorney-in-fact, with the power of substitution, for such person in any and all capacities, to sign any amendments to this Report on Form 10-K, and to file the same, with exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, hereby ratifying and confirming all that said attorney-in-fact, or substitute or substitutes, may do or cause to be done by virtue hereof.

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

<u>Signature</u>	<u>Title</u>	<u>Date</u>
<u>/s/ AJEI S. GOPAL</u> Ajei S. Gopal	President, Chief Executive Officer and Director (Principal Executive Officer)	February 24, 2021
<u>/s/ MARIA T. SHIELDS</u> Maria T. Shields	Chief Financial Officer (Principal Financial Officer and Principal Accounting Officer)	February 24, 2021
<u>/s/ GLENDA M. DORCHAK</u> Glenda M. Dorchak	Director	February 24, 2021
<u>/s/ GUY E. DUBOIS</u> Guy E. Dubois	Director	February 24, 2021
<u>/s/ DR. ALEC D. GALLIMORE</u> Dr. Alec D. Gallimore	Director	February 24, 2021
<u>/s/ RONALD W. HOVSEPIAN</u> Ronald W. Hovsepian	Chairman of the Board of Directors	February 24, 2021
<u>/s/ BARBARA V. SCHERER</u> Barbara V. Scherer	Director	February 24, 2021
<u>/s/ ROBERT M. CALDERONI</u> Robert M. Calderoni	Director	February 24, 2021
<u>/s/ RAVI K. VIJAYARAGHAVAN</u> Ravi K. Vijayaraghavan	Director	February 24, 2021