

PTC Inc.
ANNUAL REPORT ON FORM 10-K FOR FISCAL YEAR 2020
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Forward-Looking Statements

Statements in this Annual Report about our anticipated financial results and growth, as well as about the development of our products and markets, are forward-looking statements that are based on our current plans and assumptions. Important information about factors that may cause our actual results to differ materially from these statements is discussed in Item 1A. "Risk Factors" and generally throughout this Annual Report.

Unless otherwise indicated, all references to a year reflect our fiscal year that ends on September 30.

PART I

ITEM 1. Business

PTC is a global software and services company that delivers solutions to power our industrial customers' digital transformations, enabling them to better design, manufacture, operate, and service their products. Our Internet of Things (IoT) and Augmented Reality (AR) solutions enable companies to connect factories and plants, smart products, and enterprise systems to transform their businesses. These products, along with Onshape, are considered our **Growth Products**. The primary products in our **Core Products** portfolio are innovative Computer-Aided Design (CAD) and Product Lifecycle Management (PLM) solutions that enable manufacturers to create, innovate, and service products. Our **Focused Solutions Group (FSG)** is a family of software products that target specific vertical industries where we can deliver unique domain expertise and a competitive advantage with Application Lifecycle Management (ALM) products, Service Lifecycle Management (SLM) products, and other niche tailored solutions. Together, these technologies power the digital thread across industrial enterprises.

We also continue to expand our solution offerings to address the most pressing business problems our customers confront. These solutions are being designed to aggregate technology from across our portfolio as well as from other companies, including our key partners.

Our business is based on a subscription business model, which provides flexibility to customers and increases predictability and consistency of billings for PTC. Our customer success program partners with customers to enable successful deployment and use of our solutions.

We generate revenue through the sale of software subscriptions, which include license access and support (technical support and software updates); support for existing perpetual licenses; professional services (consulting, implementation, and training); and cloud services (hosting for our software and SaaS).

Our Strategy

There are three key elements to our strategy to deliver long-term shareholder value.

Align with market demand to build a strong pipeline. We believe demand for solutions such as ours that enable work from home, global team and supply chain collaboration, remote asset management, and remote frontline worker training and support is strong.

Optimize new and renewal sales and customer success to power top line ARR growth. FY'20 marked the third consecutive year of double-digit ARR growth, despite the extreme volatility of PMIs and the macroeconomic environment that occurred during the same time frame. In the past year, we have accelerated our digital marketing and sales capabilities.

Create an efficient business model and operation that enable us to drive free cash flow growth. As we have completed our subscription transition, we see greater ARR stability and continue to drive operational efficiencies.

Our Principal Products and Services

Growth Products



Our **ThingWorx**® IIoT platform delivers end-to-end capabilities that enable customers to address every facet of their digital transformation journey, enabling them to transform their operations, products, and services—and unlock new business models. ThingWorx enables customers to reduce the time, cost, and risk required to build and deploy IIoT applications; easily and more securely connect devices, systems, and applications; build applications quickly and at enterprise scale; analyze IIoT data to proactively optimize operations; manage connected devices, processes and systems; and create digital and AR experiences. **ThingWorx Solution Central** is a centralized portal in the cloud that allows users of ThingWorx to efficiently discover, deploy, and manage ThingWorx applications across the enterprise from a single location, which allows for cost-effective, efficient, and version-controlled management of applications. Our **ThingWorx Kepware**® product enables users to connect, manage, monitor, and control disparate devices and software applications. ThingWorx also offers sophisticated artificial intelligence and machine learning technology that enables customers to simplify and automate complex analytical processes, enhancing IIoT solutions through real-time insights, predictions and recommendations from information collected from smart, connected things. ThingWorx also includes AR capabilities that superimpose IoT digital information on a human’s view of the physical world, enabling valuable insights. PTC was named a leader in IIoT platforms in Gartner’s 2020 Magic Quadrant, Quadrant Knowledge Solutions’ 2020 SPARK Matrix, and Forrester’s 2019 Wave.



Our **Vuforia**® enterprise AR platform and wide-ranging solution suite enable industrial enterprise customers to address workforce challenges and meet business goals. Our **Vuforia Studio**™ product is a powerful, easy-to-use, cloud-based tool that enables industrial enterprises to rapidly author and publish augmented reality experiences. These augmented reality experiences overlay important digital information from IoT, CAD, and other sources onto the view of the physical things on which users work. Our **Vuforia Expert Capture**™ product chronicles the real-time movements of a person wearing an AR headset by monitoring the individual both audio-visually and spatially in three dimensions. Vuforia Expert Capture supports a variety of industrial use cases, such as creating step-by-step operating or repair instructions, procedural guidance, and hands-on training. The Vuforia suite also includes the **Vuforia Engine**™ technology for application development, **Vuforia Chalk**™ collaboration and remote assistance solution, and **Vuforia Spatial Toolbox**™ technology to accelerate the development of spatial computing prototypes and use cases. PTC was named a leader in AR platforms in ABI Research’s 2019 Competitive Assessment and Teknowlogy’s PAC RADAR assessment.



Our **Onshape**® Software-as-a-Service (SaaS) product development platform unites computer-aided design with data management, collaboration tools, and real-time analytics. A cloud-native multi-tenant solution that can be instantly deployed on virtually any computer or mobile device, Onshape enables teams to work together from anywhere. Real-time design reviews, commenting, and simultaneous editing enable a collaborative workflow where multiple design iterations can be completed in parallel and merged into the final design.

Core Products



Our **Creo**® interoperable suite of product design software provides a scalable set of packages for design engineers to meet a variety of specialized needs. Creo provides capabilities for generative design, real-time simulation (through our collaboration with ANSYS), additive manufacturing, design flexibility, advanced assembly design, piping and cabling design, advanced surfacing, comprehensive virtual prototyping and other essential design functions. Our Creo solutions also include augmented and virtual reality through a native cloud-dependent integration with our Vuforia® augmented reality (AR) solution. With every seat of Creo, our customers can create and publish AR experiences and share their designs instantly to collaborate with anyone across the entire enterprise around the world on virtually any device.



Our **Windchill**® suite of PLM software enables efficient and consistent product data management from inception through design, as well as communication and collaboration across the entire enterprise, including product development, manufacturing and the supply chain. Windchill offers a single repository for product information, thus providing a “single source of truth” for product-related content such as CAD models, documents, technical illustrations, embedded software, calculations, and requirement specifications for all phases of the product lifecycle to help companies streamline enterprise-wide communication and make informed decisions. As the “single source of truth,” Windchill provides the digital thread that connects the full product lifecycle. Windchill also includes augmented reality (AR) capabilities, enabling customers to build a digital product definition and publish the representation of the resulting product in AR. Using AR in the product development process connects the digital model to the physical product to determine real-time behavior, conduct product design reviews in real-world environments, and share the product definition with disparate stakeholders. PTC was named a leader in PLM in Quadrant Knowledge Solutions’ 2019 SPARK Matrix.

Focused Group Products (FSG)

Our **Integrity™** application lifecycle management (ALM) and model-based systems engineering capabilities enable users to manage system models, software configurations, test plans and defects.

Our **Servigistics®** service parts management solution enables customers to effectively manage service parts, improve their products and services, and increase customer satisfaction.

Strategic Alliances

Building an ecosystem of partners is becoming increasingly important as we expand the capabilities of our core solutions and IIoT offerings and expand our addressable markets by leveraging our partner sales and services distribution channels.

We partner with **Rockwell Automation** to align our respective smart factory technologies to address the market for smart, connected operations, with particular focus on the plant and factory setting. The companies' primary joint offering, FactoryTalk InnovationSuite Powered by PTC, is the industry's first comprehensive digital transformation software suite that offers fully integrated IIoT, edge-to-cloud analytics, manufacturing execution systems (MES), and AR. In October 2020, we expanded our strategic alliance with Rockwell Automation to include our PLM and SaaS products to streamline both companies' commercial efforts to extend a comprehensive digital thread solution, from upfront design through operation and maintenance. PTC will also offer Rockwell Automation's virtual machinery simulation and testing software to its own customers and partners. Rockwell Automation has exclusive rights to resell certain of our solutions to certain customers and geographic regions. In connection with this strategic alliance, in 2018 Rockwell Automation made a \$1 billion equity investment in PTC.

We partner with **Microsoft** to make the ThingWorx® Industrial Innovation Platform available on the Microsoft Azure cloud platform as our preferred cloud platform. By partnering with Microsoft, we are able to leverage the two companies' complementary technologies and together pursue opportunities in industrial sectors. This integration enables us to deliver a combined and connected solution for IIoT and digital product lifecycle management that enables companies to bring new products to market faster, enhance customer service, and introduce new revenue streams, while reducing operating costs.

In Q3'20, we expanded our strategic alliances with Microsoft and Rockwell Automation into a three-way alliance to take to market a new class of IIoT solutions called Factory Insights as a Service. Factory Insights as a Service is a turnkey cloud solution that enables manufacturers to achieve significant impact, speed, and scale with their digital transformation initiatives.

We partner with **ANSYS** to embed Ansys' Discovery Live real-time simulation within Creo, enabling us to offer a fully-integrated CAD and real-time simulation solution. We are also working towards integrating Ansys's broader Discovery AIM suite with the Creo suite.

Our Markets and How We Address Them

We compete in the IIoT, AR, CAD and PLM markets. The markets we serve present different growth opportunities for us. We see greater opportunity for market growth for our IIoT and AR solutions for the enterprise, followed by more moderate market growth for our CAD and PLM solutions.

We derive most of our sales from products and services sold directly by our sales force to end-user customers. Approximately 30% to 35% of our sales of products and services are through third-party resellers. Our sales force focuses on large accounts, while our reseller channel provides a cost-effective means of covering the small- and medium-size business market. Our strategic services partners provide service offerings to help customers implement our product offerings. As we grow our IIoT business, we expect that our go-to-market strategy will rely more on selling through partners, including the types of strategic partners described above, and marketing directly to end users and developers.

Additional financial information about our segments and international and domestic operations may be found in *Note 18. Segment and Geographic Information* of Notes to Consolidated Financial Statements in this Form 10-K, which information is incorporated herein by reference.

Competition

We compete with a number of companies whose offerings address one or more specific functional areas covered by our solutions. In our IIoT business, we compete with large established companies such as Amazon, IBM, Oracle, SAP, Siemens AG, Software AG, and GE. There are also a number of smaller companies that compete in the market for IIoT products. For enterprise CAD and PLM solutions, we compete with companies including Autodesk, Dassault Systèmes SA, and Siemens AG. For PLM solutions, we also compete with Oracle and SAP, but we believe our products are more specifically targeted toward the business process challenges of manufacturing companies and offer broader and deeper functionality for those processes than ERP-based solutions. For our AR products, our primary competitors include Microsoft, Upskill, Ubimax, ScopeAR and Re’Flekt.

Proprietary Rights

Our software products and related technical know-how, along with our trademarks, including our company names, product names and logos, are proprietary. We protect our intellectual property rights in these items by relying on copyrights, trademarks, patents and common law safeguards, including trade secret protection. The nature and extent of such legal protection depends in part on the type of intellectual property right and the relevant jurisdiction. In the U.S., we are generally able to maintain our trademark registrations for as long as the trademarks are in use and to maintain our patents for up to 20 years from the earliest effective filing date. We also use license management and other anti-piracy technology measures, as well as contractual restrictions, to curtail the unauthorized use and distribution of our products.

Our proprietary rights are subject to risks and uncertainties described under Item 1A. “Risk Factors” below. You should read that discussion, which is incorporated into this section by reference.

Employees

As of September 30, 2020, we had 6,243 employees, including 1,949 in research and development; 1,679 in customer support, training, consulting, cloud services and product distribution; 1,866 in sales and marketing; and 749 in general and administration. Of these employees, 2,315 were in the United States; 2,218 in the Asia Pacific region, including 1,501 in India; 1,566 in Europe; and 144 in the Americas (excluding the U.S.).

As a software company, our employees are a significant asset and we aim to create an environment that is equitable, inclusive and representative in which our employees can grow and advance their careers, with the overall goal of developing, expanding and retaining our workforce to support our business.

Inclusion and Diversity. We have prioritized inclusion and diversity (I&D) as part of our corporate-wide strategic goals. Strategies we’ve taken to create and sustain a more inclusive and diverse environment include: hiring a dedicated head of I&D; expanding our recruiting efforts at schools and job fairs focused on minorities and other diversity dimensions; and launching, expanding and supporting our Employee Resource Groups—groups of PTC employees that voluntarily join together based on shared characteristics, life experiences, or interest around particular activities.

Workforce Planning and Retention. Our efforts to recruit and retain a diverse and passionate workforce include providing competitive compensation and benefit packages worldwide and ensuring we listen to our employees. To that end, we regularly survey our employees to obtain their views and assess employee satisfaction. We use the views expressed in the surveys to influence our people strategy and policies. We also use employee survey information, headcount data and cost analyses to gain insights into how and where we work.

Website Access to Reports and Code of Business Conduct and Ethics

We make available free of charge on our website at www.ptc.com the following reports as soon as reasonably practicable after electronically filing them with, or furnishing them to, the SEC: our Annual Reports on Form 10-K; our Quarterly Reports on Form 10-Q; our Current Reports on Form 8-K; and amendments to those reports filed or furnished pursuant to Sections 13(a) or 15(d) of the Securities Exchange Act of 1934. Our Proxy Statements for our Annual Meetings and Section 16 trading reports on SEC Forms 3, 4 and 5 also are available on our website. The reference to our website is not intended to incorporate information on our website into this Annual Report by reference.

Our Code of Ethics for Senior Executive Officers is embedded in our Code of Business Conduct and Ethics, which is also available on our website. Additional information about this code and amendments and waivers thereto can be found below in Part III, Item 10 of this Annual Report.

Executive Officers

Information about our executive officers is incorporated by reference from our 2021 Proxy Statement.

Corporate Information

PTC was incorporated in Massachusetts in 1985 and is headquartered in Boston, Massachusetts.

ITEM 1A. Risk Factors

The following are important factors we have identified that could affect our future results and your investment in our securities. You should consider them carefully when evaluating an investment in PTC securities or any forward-looking statements made by us, including those contained in this Annual Report, because these factors could cause actual results to differ materially from historical results or the performance projected in forward-looking statements. The risks described below are not the only risks we face. Additional risks and uncertainties not currently known to us or that we currently deem to be immaterial may also materially adversely affect our business, financial condition and/or operating results.

I. Risks Related to Our Business Operations and Industry

We face significant competition, which may reduce our profitability and limit or reduce our market share.

The markets for our products and solutions are rapidly changing and characterized by intense competition, disruptive technology developments, evolving distribution models and increasingly lower barriers to entry. If we are unable to provide products and solutions that address customers' needs as well as our competitors' products and solutions do, or to align our pricing, licensing and delivery models with customer preferences, we could lose customers and/or fail to attract new customers, which could cause us to lose revenue and market share.

For example, the COVID-19 pandemic has caused companies worldwide to close their offices and their employees to have to work remotely from their homes, which has focused companies on the need for solutions that empower and support remote work by employees. We believe customers and potential customers will increasingly seek software solutions that support remote work by employees. Although many of our solutions support remote work, others are less efficient at doing so. We have embarked on an effort to make our solutions available on a SaaS platform, however, this will require significant effort and investment and we cannot be sure that we will be able to make our solutions available as SaaS solutions as quickly as we expect. If we are unable to compete successfully with competitors offering SaaS solutions, we could lose customers and/or fail to attract new customers, which could cause us to lose revenue and market share, which would adversely affect our business and financial results.

In addition, competitive pressures could cause us to reduce our prices, which could reduce our revenue and margins.

Finally, our current and potential competitors range from large and well-established companies to emerging start-ups. Some of our competitors and potential competitors have greater name recognition in the markets we serve and greater financial, technical, sales and marketing, and other resources, which could limit our ability to gain customer recognition and confidence in our products and solutions and successfully sell our products and solutions, which could adversely affect our ability to grow our business.

A breach of security in our products or computer systems, or those of our third-party service providers, could compromise the integrity of our products, cause loss of data, harm our reputation, create additional liability and adversely impact our financial results.

We have implemented and continue to implement measures intended to maintain the security and integrity of our products, source code and computer systems. The potential for a security breach or system disruption has significantly increased over time as the scope, number, intensity and sophistication of attempted cyberattacks and cyberintrusions have increased. We face cyberattacks and intrusions designed to access and exfiltrate information and to disrupt and lock-up access to systems for the purpose of demanding a ransom payment. Despite efforts to create security barriers to such threats, it is impossible for us to eliminate the risk of a successful cyberattack or intrusion, and, in fact, we deal with security issues on a regular basis and have experienced security incidents from time to time. Accordingly, there is a risk that a cyberattack or intrusion will be successful and that such event will be material.

In addition, we offer cloud services to our customers and some of our products are hosted by third-party service providers, which expose us to additional risks as those repositories of our customers' proprietary data may be targeted and a cyberattack or intrusion may be successful and material.

A significant breach of the security and/or integrity of our products or systems, or those of our third-party service providers, could prevent our products from functioning properly, could enable access to sensitive, proprietary or confidential information, including that of our customers, or could disrupt our business operations or those of our customers. This could require us to incur significant costs of investigation, remediation and/or payment of a ransom; harm our reputation; cause customers to stop buying our products; and cause us to face lawsuits and potential liability, which could have a material adverse effect on our financial condition and results of operations.

We may be unable to hire or retain personnel with the necessary skills to operate and grow our business, which could adversely affect our ability to compete.

Our success depends upon our ability to attract and retain highly skilled managerial, sales and marketing, technical, financial and administrative personnel to operate and grow our business. Competition for such personnel in our industry is intense, particularly in the Boston, Massachusetts area where our global headquarters is located.

The technical personnel required to develop our products and solutions are in high demand, particularly technical personnel with augmented and virtual reality and analytics expertise as there are comparatively fewer persons with those skills. If we are unable to attract and retain technical personnel with the requisite skills, our product and solution development efforts could be delayed, which could adversely affect our ability to compete and thereby adversely affect our revenues and profitability.

The managerial, sales and marketing, financial and administrative personnel necessary to guide our operations, market and sell our solutions and support our business operations are also in high demand due to the intense competition in our industry.

If we are unable to attract and retain the personnel we need to develop compelling products and solutions, and guide, operate and support our business, we may be unable to successfully compete in the marketplace, which would adversely affect our revenues and profitability.

The extent to which the novel coronavirus COVID-19 may impact our business is uncertain and it could materially adversely affect our financial condition and results of operations.

The COVID-19 pandemic has significantly impacted global economic activity and has created macroeconomic uncertainty. Public and private sector policies and initiatives to reduce the transmission of COVID-19, such as the imposition of travel restrictions, temporary closures of businesses, and the adoption of remote working, have significantly changed the way we and our customers work. The effects and duration of this disruption remain uncertain.

While PTC was able to transition to remote working without significant disruption to our day-to-day operations, disruption to our customers' and our prospects' operations and the way we work with them have adversely affected our business.

Demand for our solutions has declined and could decline further due to challenges associated with conducting in-person sales meetings and project scoping and implementation activities while social distancing measures are in place, which has deterred or prevented, and could further deter or prevent, customers from proceeding with new software purchases and deployments. Likewise, temporary plant closures, layoffs and furloughs at our customers and the challenges they face forecasting business needs in this time of global economic uncertainty have caused, and could continue to cause, our customers to delay or reduce new license purchases.

Longer term plant closures and layoffs among our customer base could cause existing subscription customers to renew fewer existing licenses when their subscriptions come up for renewal and could cause existing support customers to discontinue support at the time of renewal. We experienced an increase in churn in FY'20 to 8.6%, versus a churn rate of 7.4% for FY'19. If churn increases in the future, our ARR and financial results and condition could be negatively impacted.

Reductions in new license sales and/or renewals and in professional services delivered could reduce our ARR growth or cause our ARR to decline, and would reduce our professional services revenue, all of

which would adversely affect our revenue, earnings and cash flow. Further prolonged disruption could continue to negatively impact the businesses of our customers and prospective customers and, therefore, our business and financial condition.

The economic uncertainty caused by the COVID-19 pandemic has also caused our customers to focus on their liquidity. This focus on liquidity, or our customers' lack of liquidity, could adversely affect our cash flows if we make concessions in the amount or timing of payments due from customers or if our customers do not pay when or as expected. Moreover, some of our resellers may face liquidity challenges, which could adversely affect our cash flows if they do not pay us when or as expected.

If our business declines due to the above, we could be required to reduce our expenses, which could result in material restructuring charges and/or reduce or delay investments in our business, including hiring. Reductions in our workforce and/or investments in our business could hamper our ability to recover and compete successfully, which could adversely affect our business and results of operations.

Finally, while we expect to have sufficient liquidity with cash on hand, cash generated from operations, and amounts available under our credit facility to meet our working capital and capital expenditure requirements through at least the next twelve months and our known long-term capital requirements, declines in cash flows could adversely affect our liquidity and we may be unable to draw on our credit facility as we expect due to covenants under the credit facility. If our liquidity is significantly impaired, it would significantly adversely affect our business due to our inability to pay our suppliers and our employees. Further, a significant liquidity impairment could cause us to be unable to make the required periodic interest payments due on our outstanding Senior Notes due 2028 and 2025, which would constitute an event of default under the applicable notes, and cause the aggregate principal amount of those notes on which we defaulted to become due and payable.

We depend on sales within the discrete manufacturing sector and our business could be adversely affected if manufacturing activity does not grow, or if it contracts, or if manufacturers are adversely affected by other economic factors.

A large amount of our sales are to customers in the discrete manufacturing sector. The global Manufacturing Purchasing Managers' Index (PMI) declined significantly in the second and third quarters of 2020 due to the impact of COVID-19 and, though it has recovered somewhat, remained approximately at the 50% level in September 2020. Although the volatility in Manufacturing PMI did not have a significant adverse effect on our business in FY'20, if the manufacturing sector does not improve or continues to decline, our customers in this sector may, as they have in the past, reduce or defer purchases of our products and services, which could adversely affect our financial results.

In addition, manufacturers worldwide are facing increasing uncertainty about the global economic climate due to, among other factors, the COVID-19 pandemic, the geopolitical environment and ongoing trade tensions and tariffs. In addition, within the technology industry the U.S. Administration's focus on technology transactions with non-U.S. entities and potential expanded prohibitions has created additional uncertainty. In light of these concerns and challenges, including the potential enactment or expansion of laws that restrict our ability to sell our solutions to customers, customers may delay, reduce or forego purchases of our solutions, which would adversely affect our business and financial results.

If we fail to successfully manage our transition to a subscription-based licensing company, our business and financial results could be adversely affected.

We completed our transition from offering perpetual licenses for our products to offering only subscription-based licenses worldwide in January 2019 (excluding Kepware). While we expect our subscription base, recurring revenue and cash flow to increase over time as a result of this licensing model transition, our ability to achieve these financial objectives is subject to risks and uncertainties. Becoming a subscription-based licensing company requires a considerable investment of technical, financial, legal and sales resources, and a scalable organization. Whether our transition will be successful and will accomplish our business and financial objectives is subject to uncertainties, including but not limited to: customer demand, attach and renewal rates, channel acceptance, our ability to further develop and scale infrastructure, our ability to include functionality and usability in such offerings that address customer

requirements, and our costs. If we are unable to successfully establish these new offerings and navigate our business transition due to the foregoing risks and uncertainties, our business and financial results could be adversely impacted.

Because our sales and operations are globally dispersed, we face additional compliance risks and any compliance risk could adversely affect our business and financial results.

We sell and deliver software and services, and maintain support operations, in many countries whose laws and practices differ from one another and are subject to unexpected changes. Managing these geographically dispersed operations requires significant attention and resources to ensure compliance with laws of those countries and those of the U.S. governing our activities in non-U.S. countries.

Those laws include, but are not limited to, anti-corruption laws and regulations (including the U.S. Foreign Corrupt Practices Act (FCPA) and the U.K. Bribery Act 2010), data privacy laws and regulations (including the European Union's General Data Privacy Regulation), and trade and economic sanctions laws and regulations (including laws administered by the U.S. Department of the Treasury's Office of Foreign Assets Control, the U.S. State Department, the U.S. Department of Commerce, the United Nations Security Council and other relevant sanctions authorities). Our compliance risks are heightened due to the go-to-market approach for our business that relies heavily on a partner ecosystem, the fact that we operate in, and are expanding into, countries with a higher incidence of corruption and fraudulent business practices than others, the fact that we deal with governments and state-owned business enterprises, and the fact that global enforcement of laws has significantly increased.

Accordingly, while we strive to maintain a comprehensive compliance program, we cannot guarantee that an employee, agent or business partner will not act in violation of our policies or U.S. or other applicable laws or that we may inadvertently violate such laws. Investigations of alleged violations of those laws can be expensive and disruptive. Violations of such laws can lead to civil and/or criminal prosecutions, substantial fines and other sanctions, including the revocation of our rights to continue certain operations, and also cause business and reputation loss, which could adversely affect our financial results and/or stock price.

II. Risks Related to Acquisitions and Strategic Relationships

Businesses we acquire may not generate the revenue and earnings we anticipate and may otherwise adversely affect our business.

We have acquired, and intend to continue to acquire, new businesses and technologies. If we fail to successfully integrate and manage the businesses and technologies we acquire, if an acquisition does not further our business strategy as we expect, or if a business we acquire has unexpected legal or financial liabilities, our operating results will be adversely affected.

The types of issues that we may face in integrating and operating the acquired business include:

- difficulties managing an acquired company's technologies or lines of business or entering new markets where we have limited or no prior experience or where competitors may have stronger market positions;
- unanticipated operating difficulties in connection with the acquired entities, including potential declines in revenue of the acquired entity;
- diversion of management and employee attention;
- loss of key personnel; and

- potential incompatibility of business cultures.

Further, if we do not achieve the expected return on our investments it could impair the intangible assets and goodwill that we recorded as part of an acquisition, which could require us to record a reduction to the value of those assets.

We may incur significant debt or issue a material amount of debt or equity securities to finance an acquisition, which could adversely affect our operating flexibility and financial statements.

If we were to incur a significant amount of debt—whether by borrowing funds or issuing new debt securities—to finance an acquisition, our interest expense, debt service requirements and leverage would increase significantly. The increases in these expenses and in our leverage could adversely impact our ability to operate the company as we might otherwise and to borrow additional amounts.

If we were to issue a significant amount of equity securities in connection with an acquisition, existing stockholders would be diluted and earnings per share could decrease.

Our inability to maintain or develop our strategic and technology relationships could adversely affect our business.

We have many strategic and technology relationships with other companies with which we work to offer complementary solutions and services, that market and sell our solutions, and that provide technologies that we embed in our solutions. We may not realize the expected benefits from these relationships and such relationships may be terminated by the other party. If these companies fail to perform or if a company terminates or substantially alters the terms of the relationship, we could suffer delays in product development, reduced sales or other operational difficulties and our business, results of operations and financial condition could be materially adversely affected.

III. Risks Related to Our Intellectual Property

We may be unable to adequately protect our proprietary rights, which could adversely affect our business and our ability to compete effectively.

Our software products are proprietary. We protect our intellectual property rights in these items by relying on copyrights, trademarks, patents and common law safeguards, including trade secret protection, as well as restrictions on disclosures and transferability contained in our agreements with other parties. Despite these measures, the laws of all relevant jurisdictions may not afford adequate protection to our products and other intellectual property. In addition, we frequently encounter attempts by individuals and companies to pirate our software. If our measures to protect our intellectual property rights fail, others may be able to use those rights, which could reduce our competitiveness and revenues.

In addition, any legal action to protect our intellectual property rights that we may bring or be engaged in could be costly, may distract management from day-to-day operations and may lead to additional claims against us, and we may not succeed, all of which would materially adversely affect our operating results.

Intellectual property infringement claims could be asserted against us, which could be expensive to defend and could result in limitations on our use of the claimed intellectual property.

The software industry is characterized by frequent litigation regarding copyright, patent and other intellectual property rights. If a lawsuit of this type is filed, it could result in significant expense to us and divert the efforts of our technical and management personnel. We cannot be sure that we would prevail against any such asserted claims. If we did not prevail, we could be prevented from using the claimed intellectual property or be required to enter into royalty or licensing agreements, which might not be available on terms acceptable to us. In addition to possible claims with respect to our proprietary products, some of our products contain technology developed by and licensed from third parties and we may likewise be susceptible to infringement claims with respect to these third-party technologies.

IV. Risks Related to Our Indebtedness

Our substantial indebtedness could adversely affect our business, financial condition and results of operations, as well as our ability to meet our payment obligations under our debt.

We have a significant amount of indebtedness. As of November 20, 2020, our total debt outstanding was approximately \$1.0 billion, all of which was associated with the 3.625% Senior Notes and 4.000% Senior Notes (together, “Senior Notes”) issued February 2020, which mature in February 2025 and 2028, respectively, and are unsecured. All amounts outstanding under the credit facility and the Senior Notes will be due and payable in full on their respective maturity dates. As of November 20, 2020, we had unused commitments under our credit facility of \$1.0 billion. PTC Inc. and one of our foreign subsidiaries are eligible borrowers under the credit facility and certain other foreign subsidiaries may become borrowers under our credit facility in the future, subject to certain conditions.

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 agreements governing our debt instruments, 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 to fund working capital, capital expenditures, acquisitions and other general corporate purposes and limit our ability to obtain additional financing for these 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; and
- increase our cost of borrowing.

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.

Despite our current level of indebtedness, we and our subsidiaries may still be able to incur substantially more debt and other obligations. This could further exacerbate the risks to our financial condition described above.

We and our subsidiaries may be able to incur significant additional indebtedness and other obligations in the future, including secured debt. Although the credit agreement governing our credit facility contains restrictions on the incurrence of additional indebtedness, these restrictions are subject to a number of qualifications and exceptions. The additional indebtedness incurred in compliance with these restrictions could be substantial. In addition, the credit agreement and the indenture governing the Senior Notes will not prevent us from incurring obligations that do not constitute indebtedness. If new debt is added to our current debt levels, or we incur other obligations, the related risks that we now face could intensify.

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

Our ability to make scheduled payments on or refinance our debt obligations depends on our financial condition and operating performance, which are subject to prevailing economic and competitive conditions and to certain financial, business, legislative, regulatory and other factors, some of which are beyond our control. We may be unable to maintain a level of cash flows from operating activities sufficient to permit us to pay the principal, premium, if any, and interest on our indebtedness.

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

Our inability to generate sufficient cash flows to satisfy our debt obligations, or to refinance our indebtedness on commercially reasonable terms or at all, would materially and adversely affect our financial position and results of operations and our ability to satisfy our debt obligations.

If we cannot make scheduled payments on our debt, we will be in default and the lenders under our credit facility could terminate their commitments to loan money, the lenders could foreclose against the assets securing their borrowings, the holders of our Senior Notes could declare all outstanding principal, premium, if any, and interest to be due and payable, and we could be forced into bankruptcy or liquidation. These events could result in a loss of your investment.

We are required to comply with certain financial and operating covenants under our debt agreements. Any failure to comply with those covenants could cause amounts borrowed to become immediately due and payable and/or prevent us from borrowing under the credit facility.

We are required to comply with specified financial and operating covenants under our debt agreements and to make payments under our debt, which limit our ability to operate our business as we otherwise might operate it. Our failure to comply with any of these covenants or to meet any debt payment obligations could result in an event of default which, if not cured or waived, would result in any amounts outstanding, including any accrued interest and/or unpaid fees, becoming immediately due and payable. We might not have enough working capital or liquidity to satisfy any repayment obligations if those obligations were accelerated. In addition, if we are not in compliance with the financial and operating covenants under the credit facility when we wish to borrow funds, we will be unable to borrow funds.

In addition, the financial and operating covenants under the credit facility may limit our ability to borrow funds, including for strategic acquisitions and share repurchases.

Our credit facility has variable interest tied to LIBOR and we could become subject to higher interest rates if the replacement rate we agree on with our banks is higher.

Borrowings under our revolving credit facility use the London Interbank Offering Rate (LIBOR) as a benchmark for establishing the interest rate. LIBOR is the subject of recent national, international, and other regulatory guidance and proposals for reform. These reforms and other pressures may cause LIBOR to disappear entirely or to perform differently than in the past. Although we believe the recent discussions about alternative rates will not materially increase the interest rates on our credit facility, the final agreed rate may increase the cost of our variable rate indebtedness.

V. Risks Related to Our Common Stock

Our operating results fluctuate from quarter to quarter, making future operating results difficult to predict; failure to meet market expectations could cause the price of our securities to decline.

Our quarterly operating results historically have fluctuated and are likely to continue to fluctuate depending on many factors, including:

- variability in our contracts, including timing of start dates, length of contracts, and mix of on-premises and cloud-based purchases, which would impact our revenue and earnings;
- a high percentage of our orders historically have been generated in the third month of each fiscal quarter and any failure to receive, complete or process orders at the end of any quarter could cause us to fall short of our financial and operating targets;
- our adoption of Accounting Standards Update 2014-09, *Revenue from Contracts with Customers: Topic 606* in 2019 creates significant revenue volatility;
- a significant percentage of our orders comes from transactions with large customers, which tend to have long lead times that are less predictable;
- because our operating expenses are largely fixed in the short term and are based on expected revenues, any failure to achieve our revenue targets could cause us to miss our earnings targets;
- because a significant portion of our revenue and expenses are generated from outside the U.S., shifts in foreign currency exchange rates could adversely affect our reported results; and
- we may incur significant expenses in a quarter in connection with corporate development initiatives, restructuring efforts or the investigation, defense or settlement of legal actions that would increase our operating expenses and reduce our earnings for the quarter in which those expenses are incurred.

Accordingly, our quarterly results are difficult to predict prior to the end of the quarter and we may be unable to confirm or adjust expectations with respect to our operating results for a quarter until that quarter has closed. Any failure to meet our quarterly revenue or earnings expectations could adversely impact the market price of our securities.

Our stock price has been volatile, which may make it harder to resell shares at a favorable time and price.

Market prices for securities of software companies are generally volatile and are subject to significant fluctuations that may be unrelated or disproportionate to the operating performance of these companies. Further, our stock price has been more volatile than that of other software companies. Accordingly, the trading prices and valuations of software companies' stocks, and of ours, may not be predictable. Negative changes in the public's perception of the prospects of software companies, or of PTC or the markets we serve, could depress our stock price regardless of our operating results.

Also, a large percentage of our common stock is held by institutional investors and by Rockwell Automation. Purchases and sales of our common stock by these investors could have a significant impact on the market price of the stock. For more information about those investors, please see our proxy statement with respect to our most recent annual meeting of stockholders and Schedules 13D and 13G filed with the SEC with respect to our common stock.

VI. Risks Related to Our Senior Notes

Our Senior Notes are unsecured and do not limit our ability to incur indebtedness, which could reduce any payments to holders of the Senior Notes in connection with any insolvency, liquidation, reorganization, dissolution or other winding up of PTC.

Unlike the credit facility, which is secured, the Senior Notes are not secured. Although the indenture governing the Senior Notes limits our ability to incur secured debt, the covenant is subject to significant exceptions, and we may incur additional secured debt in the future. The effect of this subordination is that upon a default in payment on, or the acceleration of, any of our secured indebtedness, or in the event of bankruptcy, insolvency, liquidation, dissolution or reorganization of our company (collectively, "Adverse Events"), the proceeds from the sale of assets securing our secured indebtedness will be available to pay obligations on the Senior Notes only after all indebtedness under the credit facility and any other secured debt has been paid in full. As a result, the holders of the Senior Notes may receive less, ratably, than the holders of secured debt if an Adverse Event occurs.

In addition, the indenture governing the Senior Notes does not limit our ability to incur unsecured indebtedness. If we incur any additional indebtedness that ranks equally with the Senior Notes, subject to collateral arrangements, the holders of that debt will be entitled to share ratably with holders of the Senior Notes in any proceeds distributed in connection with any of the Adverse Events described above. This may reduce the amount of proceeds to holders of the Senior Notes.

Our Senior Notes are not guaranteed by any of our subsidiaries, which could adversely affect our ability to pay interest on or redeem the Senior Notes when due.

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

Our Senior Notes are not listed on any national securities exchange or included in any automated quotation system, which could make it harder to resell the notes at a favorable time and price.

Our Senior Notes are not listed on any national securities exchange or included in any automated quotation system. As a result, an active market for the notes may not exist or be maintained, which would adversely affect the market price and liquidity of the notes. In that case, holders may not be able to sell their notes when they want to or at a favorable price.

The market for non-investment grade debt historically has been subject to severe disruptions that have caused substantial volatility in the prices of securities similar to the notes. The market, if any, for the notes may experience similar disruptions and any such disruptions may adversely affect the liquidity in that market or the prices at which the notes may be sold.

VII. General Risk Factors

Our international businesses present economic and operating risks, which could adversely affect our business and financial results.

We expect that our international operations will continue to expand and to account for a significant portion of our total revenue. Because we transact business in various foreign currencies, the volatility of foreign exchange rates has had and may in the future have a material adverse effect on our revenue, expenses and operating results.

Other risks inherent in our international operations include, but are not limited to, the following:

- difficulties in staffing and managing foreign sales and development operations;
- possible future limitations upon foreign-owned businesses;
- increased financial accounting and reporting burdens and complexities;
- inadequate local infrastructure; and
- greater difficulty in protecting our intellectual property.

We may have exposure to additional tax liabilities and our effective tax rate may increase or fluctuate, which could increase our income tax expense and reduce our net income.

As a multinational organization, we are subject to income taxes as well as non-income based taxes in the U.S. and in various foreign jurisdictions. Significant judgment is required in determining our worldwide income tax provision and other tax liabilities. In the ordinary course of a global business, there are many intercompany transactions and calculations where the ultimate tax determination is uncertain. Our tax returns are subject to review by various taxing authorities. Although we believe that our tax estimates are reasonable, the final determination of tax audits or tax disputes could be different from what is reflected in our historical income tax provisions and accruals. For example, we have an open tax dispute in South Korea with respect to which we paid \$12 million in 2017 to accommodate the potential tax liability through 2015, which we are disputing. If we do not prevail in that challenge, we could be subject to additional liabilities for periods after 2015, which we estimate could be \$17 million.

Our effective tax rate can be adversely affected by several factors, many of which are outside of our control, including:

- changes in tax laws, regulations, and interpretations in multiple jurisdictions in which we operate;
- assessments, and any related tax interest or penalties, by taxing authorities;
- changes in the relative proportions of revenues and income before taxes in the various jurisdictions in which we operate that have differing statutory tax rates;
- changes to the financial accounting rules for income taxes;
- unanticipated changes in tax rates; and
- changes to a valuation allowance on net deferred tax assets, if any.

ITEM 1B. Unresolved Staff Comments

None.

ITEM 2. Properties

We currently have 88 office locations used in operations in the United States and internationally, predominately as sales and/or support offices and for research and development work. Of our total of approximately 1,288,000 square feet of leased facilities used in operations, approximately 521,000 square feet are located in the U.S., including 250,000 square feet at our headquarters facility located in Boston, Massachusetts, and approximately 260,000 square feet are located in India, where a significant amount of our research and development is conducted. In addition, approximately 276,000 feet are associated with facilities that have been restructured, primarily our previous headquarters facility in Needham, Massachusetts. We believe that our facilities are adequate for our present and foreseeable needs.

ITEM 3. Legal Proceedings

Information on legal proceedings can be found in *Note 10. Commitments and Contingencies* of Notes to Consolidated Financial Statements in this Form 10-K, which information is incorporated herein by reference.

ITEM 4. Mine Safety Disclosures

Not applicable.

PART II**ITEM 5. Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities**

Our common stock is traded on the Nasdaq Global Select Market under the symbol "PTC."

On September 30, 2020, the close of our fiscal year, and on November 18, 2020, our common stock was held by 1,072 and 1,070 shareholders of record, respectively.

ITEM 6. Selected Financial Data

Our five-year summary of selected financial data and quarterly financial data for the past two years is located on page A-1 at the end of this Form 10-K and incorporated herein by reference.

Forward-Looking Statements

Statements in this Annual Report about anticipated financial results and growth, as well as about the development of our products and markets, are forward-looking statements that are based on our current plans and assumptions. Important information about the bases for these plans and assumptions and factors that may cause our actual results to differ materially from these statements is contained below and in Item 1A. "Risk Factors" of this Annual Report.

Unless otherwise indicated, all references to a year reflect our fiscal year that ends on September 30.

Operating and Non-GAAP Financial Measures

Our discussion of results includes discussion of our ARR operating measure, non-GAAP financial measures, and disclosure of our results on a constant currency basis. ARR and our non-GAAP financial measures, including the reasons we use those measures, are described below in *Results of Operations - Operating Measure* and *Results of Operations - Non-GAAP Financial Measures*, respectively. The methodology used to calculate constant currency disclosures is described in *Results of Operations - Impact of Foreign Currency Exchange on Results of Operations*. You should read those sections to understand our operating measure, non-GAAP financial measures, and constant currency disclosures.

Executive Overview

ARR increased 14% to \$1,270 million (11% and \$1,236 million constant currency) compared to the end of FY'19. ARR growth was strong in our much larger Core business and accelerated in our Growth business, but declined modestly in our Focused Solutions Group (FSG) business. Churn of 8.6% was slightly higher than expected.

FY'20 revenue of \$1.46 billion increased 16% year over year driven by 26% recurring revenue growth, due in part to the adoption of ASC 606 and related business policy changes. In Q4'20, contract durations were slightly longer than forecasted and we had a higher than anticipated number of conversions, both of which positively impacted the amount of upfront subscription revenue recognized in the quarter. FY'20 operating margin of 14% increased approximately 900 basis points and EPS increased significantly year over year due to the increase in revenue and a decrease in the effective tax rate, primarily due to a reduction of the U.S. valuation allowance.

We generated \$234 million of cash from operations in FY'20 compared to \$285 million in FY'19, primarily due to higher interest and restructuring payments in the year. We ended FY'20 with \$335 million of cash and marketable securities and \$1.0 billion of debt outstanding, including \$1 billion of Senior Notes with a weighted average cost of debt of 3.8%, and \$18 million outstanding under our credit facility, which was paid down subsequent to year end.

Results of Operations

The following table shows the financial measures that we consider the most significant indicators of our business performance. In addition to providing operating income, operating margin, diluted earnings per share and cash from operations as calculated under GAAP, we provide non-GAAP operating income, non-GAAP operating margin, non-GAAP diluted earnings per share, and free cash flow for the reported periods. We also provide a view of our actual results on a constant currency basis. These non-GAAP financial measures exclude the items described in *Non-GAAP Financial Measures* below. Investors should use these non-GAAP financial measures only in conjunction with our GAAP results.

For discussion of FY'19 results and comparison with FY'18 results, refer to *Management's Discussion and Analysis of Financial Conditions and Results of Operations* in our Annual Report on Form 10-K for the fiscal year ended September 30, 2019.

(Dollar amounts in millions, except per share data)

	Year ended September 30,		Percent Change	
	2020	2019	Actual	Constant Currency(1)
Total recurring revenue	\$ 1,281.9	\$ 1,017.4	26%	27%
Perpetual license	32.7	70.7	(54)%	(53)%
Professional services	143.8	167.5	(14)%	(13)%
Total revenue	1,458.4	1,255.6	16%	17%
Total cost of revenue	334.3	325.4	3%	3%
Gross margin	1,124.1	930.3	21%	22%
Operating expenses	913.2	867.2	5%	6%
Operating income	\$ 210.9	\$ 63.0	234%	281%
Non-GAAP operating income(1)	\$ 423.4	\$ 255.3	66%	69%
Operating margin	14.5%	5.0%		
Non-GAAP operating margin(1)	29.0%	20.3%		
Diluted earnings (loss) per share	\$ 1.12	\$ (0.23)		
Non-GAAP diluted earnings per share(1)(2)	\$ 2.57	\$ 1.64		
Cash flow from operations(3)	\$ 233.8	\$ 285.1		
Free cash flow(4)	\$ 213.6	\$ 220.7		

- (1) See *Non-GAAP Financial Measures* below for a reconciliation of our GAAP results to our non-GAAP measures and *Impact of Foreign Currency Exchange on Results of Operations* below for a description of how we calculate our results on a constant currency basis.
- (2) We have a full valuation allowance against our U.S. net deferred tax assets and a valuation allowance against net deferred tax assets in certain foreign jurisdictions. As we are profitable on a non-GAAP basis, the non-GAAP tax provisions are calculated assuming there is no valuation allowance. Income tax adjustments reflect the tax effects of non-GAAP adjustments, which are calculated by applying the applicable tax rate by jurisdiction to the non-GAAP adjustments listed above.
- (3) Cash flow from operations for FY'20 and FY'19 includes \$42 million and \$25 million of restructuring payments, respectively, and \$60.6 million and \$40.8 million of interest payments, respectively. Cash from operations for FY'20 includes \$9.6 million of acquisition-related payments.
- (4) Free cash flow is cash from operations net of capital expenditures of \$20.2 million and \$64.4 million in FY'20 and FY'19, respectively.

Impact of Foreign Currency Exchange on Results of Operations

Approximately 60% of our revenue and 40% of our expenses are transacted in currencies other than the U.S. dollar. Because we report our results of operations in U.S. Dollars, currency translation, particularly changes in the Euro, Yen, Shekel, and Rupee relative to the U.S. Dollar, affects our reported results. Starting in Q1'20, our constant currency disclosures are calculated by multiplying the results in local currency for FY'20 and FY'19 by the exchange rates in effect on September 30, 2019, excluding the effect of any hedging. If FY'20 reported results were converted into U.S. dollars based on this methodology, FY'20 revenue would have been lower by \$12 million and expenses would have been lower by \$4 million. The net impact on year-over-year results would have been a decrease in operating income of \$8 million in FY'20.

The results of operations in the table above and revenue by line of business, product group, and geographic region in the tables that follow present both actual percentage changes year over year and percentage changes on a constant currency basis.

Revenue

Our revenue results period to period are impacted by contract terms, including the duration and start dates of our subscription contracts. Early in Q4'19, we discontinued offering cancellation rights for multi-year subscription contracts, which results in the recognition of the license portion of revenue for all years of the contract at the beginning of the multiyear contract period for our on-premises subscription licenses. The discontinuation of the cancellation clause is expected to have less of an impact in FY'21. We are expanding our SaaS offerings and are releasing additional cloud functionality into our products. As a result, our revenue will be impacted as a higher portion of it will be recognized ratably.

Revenue by Line of Business

(Dollar amounts in millions)

	Year ended September 30,		Percent Change	
	2020	2019	Actual	Constant Currency
License	\$ 509.8	\$ 324.4	57%	58%
Support and cloud services	804.8	763.7	5%	6%
Total software revenue	1,314.6	1,088.1	21%	22%
Professional services	143.8	167.5	(14)%	(13)%
Total revenue	\$ 1,458.4	\$ 1,255.6	16%	17%

Software revenue increased in FY'20 compared to FY'19 due to subscription revenue growth, offset by declines in perpetual license and perpetual support revenue due to conversions of support contracts to subscriptions. In FY'20, subscription license revenue increased 88% (89% constant currency) compared to the year-ago period, due in part to the discontinuation of the annual cancellation right in new multi-year contracts and in part to new conversions in FY'20.

Professional services engagements typically result from sales of new licenses; revenue is recognized over the term of the engagement. Our expectation is that professional services revenue will trend flat-to-down over time due to our strategy to expand margins by migrating more services engagements to our partners and delivering products that require less consulting and training services, and in the near-term will trend down due to the effects of the COVID-19 pandemic.

Professional services revenue declined in FY'20 due to challenges with project scoping and implementation activities and performance due to social distancing measures and facility closures implemented to address the COVID-19 pandemic. Additionally, there was an increase in the estimated costs to complete a large fixed price professional services contract, which led to a corresponding decrease in the estimated percent complete and a related reversal of revenue.

Revenue by Product Group

Software Revenue by Product Group

(Dollar amounts in millions)

	Year ended September 30,		Percent Change	
	2020	2019	Actual	Constant Currency
Core (CAD and PLM)	\$ 947.1	\$ 762.2	24%	25%
Growth (IoT, AR, Onshape)	183.8	140.2	31%	32%
FSG (Focused Solutions Group)	183.7	185.7	(1)%	(1)%
Software revenue	\$ 1,314.6	\$ 1,088.1	21%	22%

Total Revenue by Product Group

(Dollar amounts in millions)

	Year ended September 30,		Percent Change	
	2020	2019	Actual	Constant Currency
Core (CAD and PLM)	\$ 1,025.7	\$ 869.0	18%	19%
Growth (IoT, AR, Onshape)	222.6	167.5	33%	34%
FSG (Focused Solutions Group)	210.1	219.1	(4)%	(4)%
Total revenue	\$ 1,458.4	\$ 1,255.6	16%	17%

Core product software revenue growth in FY'20 compared to FY'19 was driven by subscription revenue growth of 68% (69% constant currency), offset by expected declines in perpetual license and perpetual support revenue due to the end of sales of perpetual licenses at the end of Q1'19 and conversions of support contracts to subscriptions. Total revenue growth was lower than software revenue growth due to a decline in professional services revenue. In FY'20, professional services revenue declined 26% (actual and constant currency) compared to the year-ago period due in part to the impact of the COVID-19 pandemic and the impact of the professional services contract described above. ARR increased 14% (11% constant currency) for FY'20 compared to FY'19, reflecting solid ARR growth for both PLM and CAD.

Growth product software revenue growth in FY'20 was driven by subscription revenue growth of 49% (50% constant currency) compared to the year-ago period, offset by an expected decline in perpetual license revenue due to the end of sales of perpetual licenses at the end of Q1'19. The revenue growth rate has been impacted by a decrease in the proportion of license revenue recognized upfront as we have released additional cloud functionality (for which revenue is recognized ratably) into our IoT products. Growth product ARR increased 34% (32% constant currency) for FY'20 compared to FY'19, including growth from sales of our products through our strategic alliance with Rockwell Automation and reflecting strong growth in all three product lines.

FSG product software revenue declined in FY'20 compared to FY'19, primarily driven by a 13% (actual and constant currency) decrease in perpetual support revenue due to conversions of support contracts to subscriptions. This decline was partially offset by a 12% (13% constant currency) increase in subscription revenue in FY'20 compared to the year-ago period. The total revenue decrease in FY'20 was higher than the decline in software revenue due to a decrease in professional services revenue, which declined 21% (20% constant currency) in FY'20 compared to FY'19 due in part to the impact of the COVID-19 pandemic on our ability to execute professional services projects. FSG product ARR decreased 2% (4% constant currency) for FY'20 compared to FY'19, largely due to the impact of COVID-19 on FSG markets, primarily due to the non-renewal of a government contract which did not receive renewed funding.

Software Revenue by Geographic Region

A significant portion of our software revenue is generated outside the U.S. In both FY'19 and FY'20, approximately 45% of software revenue was generated in the Americas, 35% in Europe, and 20% in Asia Pacific.

(Dollar amounts in millions)

	Year ended September 30,		Percent Change	
	2020	2019	Actual	Constant Currency
Americas	\$ 592.7	\$ 484.1	22%	23%
Europe	482.5	379.9	27%	28%
Asia Pacific	239.4	224.1	7%	7%
Total revenue	\$ 1,314.6	\$ 1,088.1	21%	22%

Americas software revenue growth in FY'20 was driven by growth in subscription revenue of 44% (actual and constant currency) as compared to FY'19, partially offset by a decline of 16% (15% constant currency) in perpetual support revenue, resulting in recurring revenue growth of 24% (25% constant currency).

Europe software revenue growth in FY'20 was driven by growth in subscription revenue of 67% (69% constant currency) as compared to FY'19, partially offset by a decline in perpetual support revenue, resulting in recurring revenue growth of 28% (30% constant currency).

Asia Pacific software revenue growth in FY'20 was driven by growth in subscription revenue of 70% (actual and constant currency) as compared to FY'19, partially offset by declines of 86% (actual and constant currency) and 20% (actual and constant currency) in perpetual license and support revenue, respectively. Recurring revenue growth was 26% (actual and constant currency).

Gross Margin

(Dollar amounts in millions)

	Year ended September 30,		Percent Change
	2020	2019	
Gross margin:			
License gross margin	\$ 456.6	\$ 272.5	68%
License gross margin percentage	90%	84%	
Support and cloud services gross margin	\$ 659.4	\$ 630.2	5%
Support and cloud services gross margin percentage	82%	83%	
Professional services	\$ 8.1	\$ 27.6	(71)%
Professional services gross margin percentage	6%	16%	
Total gross margin	\$ 1,124.1	\$ 930.3	21%
Total gross margin percentage	77%	74%	
Non-GAAP gross margin(1)	\$ 1,165.5	\$ 970.0	20%
Non-GAAP gross margin percentage(1)	80%	77%	

(1) Non-GAAP financial measures are reconciled to GAAP results under *Non-GAAP Financial Measures* below.

License gross margin increased in FY'20 compared to FY'19 due to revenue increasing significantly as a result of ASC 606 and the discontinuation of the cancellation clause, while cost of license expenses increased only slightly. License revenue growth was driven by an 88% (89% constant currency) increase in subscription license revenue year over year, partially offset by a 54% (53% constant currency) decrease in perpetual license revenue.

Support and cloud services gross margin decreased in FY'20 compared to FY'19 due to a decrease in perpetual support revenue and increases in costs associated with our cloud services business due to increased demand for those services, royalty expenses, and outside service costs. This was partially offset by increases in subscription support and cloud services revenue.

Professional services gross margin decreased in FY'20 compared to FY'19 primarily due to a decrease in revenue driven by the impact of the COVID-19 pandemic and a revenue reversal on a fixed price professional services contract due to a change in the estimated cost to complete, partially offset by decreases in outside services and travel costs.

Operating Expenses

(Dollar amounts in millions)

	Year ended September 30,		Percent Change
	2020	2019	
Sales and marketing	\$ 435.5	\$ 417.4	4%
% of total revenue	30%	33%	
Research and development	256.6	246.9	4%
% of total revenue	18%	20%	
General and administrative	159.8	127.9	25%
% of total revenue	11%	10%	
Amortization of acquired intangible assets	28.7	23.8	20%
% of total revenue	2%	2%	
Restructuring and other charges, net	32.7	51.1	(36)%
% of total revenue	2%	4%	
Total operating expenses	\$ 913.3	\$ 867.2	5%

Total headcount increased by 3% in FY'20 to 6,243 from 6,055 at the end of FY'19. Headcount at the end of FY'20 includes approximately 130 people from Onshape and other smaller acquisitions.

Operating expenses in FY'20 compared to FY'19 increased primarily due to the following:

- an increase in general and administrative expenses driven by a \$17.6 million increase in compensation (including benefit costs), primarily related to stock-based compensation; a \$6.1 million increase in professional fees; and a \$5.5 million increase in acquisition-related charges;

- a \$37.3 million increase in sales and marketing compensation (including benefit costs) due to higher salaries related partially to higher headcount, higher commissions due to amortization of capitalized commissions under ASC 606, and higher stock-based compensation;
- an increase in research and development costs primarily related to a \$9.2 million increase in compensation (including benefit costs) primarily due to higher salaries and stock-based compensation; and
- an increase of \$4.9 million in intangible amortization related to the acquisition of Onshape;

partially offset by:

- decreases of \$16.1 million in travel costs and \$8.3 million in event and meeting expenses, both of which primarily impacted sales and marketing, due to the COVID-19 global pandemic; and
- an \$18.4 million decrease in restructuring and other charges.

Restructuring and other charges in FY'20 primarily related to an employee restructuring plan in the first half of the fiscal year to shift resources to support our SaaS initiatives. Restructuring and other charges in FY'19 largely related to the exit of our Needham headquarters facility.

Interest Expense

(Dollar amounts in millions)

	Year ended September 30,		Percent Change
	2020	2019	
Interest expense	\$ (76.4)	\$ (43.0)	78%

Interest expense includes interest under our credit facility and senior notes. Interest expense was higher in FY'20 as compared to FY'19 primarily due to increased debt to complete the Onshape acquisition: we had \$1,018 million of total debt at September 30, 2020, compared to \$673 million at September 30, 2019. Additionally, we recognized \$15 million of expense in FY'20 related to penalties for the early redemption of the 6.000% Senior Notes due 2024. For additional detail on the changes in our debt structure, see *Note 9. Debt*, included in the Notes to Consolidated Financial Statements in this Annual Report.

The average interest rate on our total borrowings was 4.3% in FY'20 and 5.4% in FY'19. Our average interest rate on the \$1.0 billion in Senior Notes will be 3.8% in FY'21.

Other Income (Expense)

(Dollar amounts in millions)

	Year ended September 30,		Percent Change
	2020	2019	
Interest income	\$ 3.8	\$ 4.1	(7)%
Other expense, net	(3.5)	(3.8)	(6)%
Other income (expense), net	\$ 0.3	\$ 0.3	(11)%

Interest income represents earnings on the investment of our available cash and marketable securities.

Other expense, net includes foreign currency gains and losses and other non-operating gains and losses. Foreign currency gains and losses include costs of hedging contracts, certain realized and unrealized foreign currency transaction gains or losses, and foreign exchange gains or losses resulting from the required period-end currency remeasurement of the assets and liabilities of our subsidiaries that use the U.S. dollar as their functional currency.

Income Taxes

(Dollar amounts in millions)

	Year ended September 30,		
	2020	2019	Percent Change
Income before income taxes	\$ 134.7	\$ 20.3	564%
Provision for income taxes	4.0	47.8	(92)%
Effective income tax rate	3%	235%	

In FY'20 and FY'19, our tax rate differed from the U.S. statutory federal income tax rate due to our corporate structure in which our foreign taxes are at a net effective tax rate lower than the U.S. rate. A significant amount of our foreign earnings is generated by our subsidiaries organized in Ireland. In FY'20 and FY'19 the foreign rate differential predominantly relates to these Irish earnings.

In FY'20, in addition to the foreign rate differential, our tax rate differed from the statutory federal income tax rate due to U.S. tax reform, the excess tax benefit related to stock-based compensation and the indirect effects of the adoption of ASC 606. Additionally, we recorded benefits for the reduction of the U.S. valuation allowance as a result of the Onshape acquisition. A further reduction to the valuation allowance was also recorded to reflect the impact from the scheduling of the reversal of existing temporary differences resulting in deferred tax liabilities that cannot be offset against deferred tax assets.

On March 27, 2020, the U.S. Federal government enacted the Coronavirus Aid, Relief, and Economic Security Act (the "CARES ACT"). The CARES Act is an emergency economic stimulus package in response to the COVID-19 pandemic, which among other things contains numerous income tax provisions. We have determined that the impact of the CARES Act was not material to our consolidated financial statements.

In FY'19, our effective tax rate was higher than the statutory federal income tax rate due in large part to the scheduling of the reversal of existing temporary differences resulting in deferred tax liabilities that cannot be offset against deferred tax assets requiring an increase to the U.S. valuation allowance, U.S. tax reform and foreign withholding taxes, an obligation of the U.S. parent. This is offset by foreign rate differences, the excess tax benefit related to stock-based compensation and the indirect effects of the adoption of ASC 606.

In Q4'16, we received an assessment of approximately \$12 million from the tax authorities in South Korea. The assessment relates to various tax issues, primarily foreign withholding taxes. We have appealed and intend to vigorously defend our positions. We believe that upon completion of a multi-level appeal process it is more likely than not that our positions will be sustained. Accordingly, we have not recorded a tax reserve for this matter. We paid this assessment in Q1'17 and have recorded the amount in other assets, pending resolution of the appeal process. If the South Korean tax authorities were to prevail then, in addition to the \$12 million already assessed, the potential additional exposure through FY'20 would be approximately \$17 million. We are continuing to work with our advisors during the court process and still believe our position is sustainable.

In April 2020, we became aware of a potential new interpretation of a withholding tax law in a non-U.S. jurisdiction and its application to certain transactions that was not previously reasonably knowable by us. We have evaluated this new interpretation and made an estimate of the potential tax liability, a reserve for which was recorded in Q3'20 and had an immaterial impact to our consolidated financial statements.

Operating Measure

ARR

ARR (Annual Run Rate) represents the annual value of our portfolio of active renewable customer contracts as of the end of the reporting period, including subscription software, cloud, and support contracts. ARR includes IoT and AR orders placed under our Strategic Alliance Agreement with Rockwell Automation and includes orders placed to satisfy contractual quarterly minimum commitments.

We believe ARR is a valuable operating metric to measure the health of a subscription business because it captures expected subscription and support cash generation from new customers, existing customer renewals and expansions, and includes the impact of churn, which reflects gross churn, offset by the impact of any pricing increases.

Because this measure represents the annual value of renewable customer contracts as of the end of a reporting period, ARR does not represent revenue for any particular period or remaining revenue that will be recognized in future periods.

Non-GAAP Financial Measures

The non-GAAP financial measures presented in the discussion of our results of operations and the respective most directly comparable GAAP measures are:

- free cash flow—cash flow from operations
- non-GAAP revenue—GAAP revenue
- non-GAAP gross margin—GAAP gross margin
- non-GAAP operating income—GAAP operating income
- non-GAAP operating margin—GAAP operating margin
- non-GAAP net income—GAAP net income
- non-GAAP diluted earnings or loss per share—GAAP diluted earnings or loss per share

Free cash flow is cash flow from operations net of capital expenditures, which are expenditures for property and equipment and consist primarily of facility improvements (including our construction expenses for our new Seaport headquarters in FY'19), office equipment, computer equipment, and software. We believe that free cash flow, in conjunction with cash from operations, is a useful measure of liquidity since capital expenditures are a necessary component of ongoing operations.

The non-GAAP financial measures other than free cash flow exclude, as applicable: fair value adjustments related to acquired deferred revenue and deferred costs; stock-based compensation expense; amortization of acquired intangible assets; acquisition-related and other transactional charges included in general and administrative expenses; restructuring and other charges, net; non-operating charges; and income tax adjustments.

The items excluded from these non-GAAP financial measures are normally included in the comparable measures calculated and presented in accordance with GAAP. Our management excludes these items when evaluating our ongoing performance and/or predicting our earnings trends, and therefore excludes them when presenting non-GAAP financial measures. Management uses non-GAAP financial measures in conjunction with our GAAP results, as should investors.

Fair value adjustment of acquired deferred revenue is a purchase accounting adjustment recorded to reduce acquired deferred revenue to the fair value of the remaining obligation, so our GAAP revenue after an acquisition does not reflect the full amount of revenue that would have been reported if the acquired deferred revenue was not written down to fair value. We believe excluding these adjustments to revenue from these contracts (and associated costs in *fair value adjustment of acquired deferred costs*) is useful to investors as an additional means to assess revenue trends of our business.

Stock-based compensation is a non-cash expense relating to stock-based awards issued to executive officers, employees and outside directors, consisting of restricted stock units. We exclude this expense as it is a non-cash expense and we assess our internal operations excluding this expense and believe it facilitates comparisons to the performance of other companies in our industry.

Amortization of acquired intangible assets is a non-cash expense that is impacted by the timing and magnitude of our acquisitions. We believe the assessment of our operations excluding these costs is relevant to our assessment of internal operations and comparisons to the performance of other companies in our industry.

Acquisition-related and other transactional charges included in general and administrative expenses are direct costs of potential and completed acquisitions and expenses related to acquisition integration activities, including transaction fees, due diligence costs, severance and professional fees. Subsequent adjustments to our initial estimated amount of contingent consideration associated with specific acquisitions are also included within acquisition-related charges. Other transactional charges include third-party costs related to structuring unusual transactions. We do not include these costs when reviewing our operating results internally. The occurrence and amount of these costs will vary depending on the timing and size of acquisitions.

Restructuring and other charges, net includes excess facility restructuring charges (credits); headquarters relocation charges; impairment and accretion expense charges related to the lease assets of exited facilities; sublease income from previously impaired facilities; and severance costs resulting from reductions of personnel driven by modifications to our business strategy. Headquarters relocation charges are non-cash accelerated depreciation expense recorded in advance of exiting our prior headquarters facility due to changes in the estimated useful lives of fixed assets and overlapping rental expense for the Needham and Seaport facilities. We do not include these costs when reviewing our operating results internally. These costs may vary in size based on our restructuring plan.

Non-operating charges. In Q2'20, we incurred an early redemption interest penalty and in Q3'20, we wrote off debt issuance costs, both of which were related to the settlement of the 6.000% Senior Notes due 2024 and which are also excluded from our non-GAAP financial measures as they are non-ordinary course in nature and not included in management's review of our results.

Income tax adjustments include the tax impact of the items above and assumes that we are profitable on a non-GAAP basis in the U.S. and one foreign jurisdiction. It also eliminates the effect of the valuation allowance recorded against our net deferred tax assets in those jurisdictions. Additionally, we exclude other material tax items that we do not include when reviewing our operating results internally.

We use these non-GAAP financial measures, and we believe that they assist our investors, to make period-to-period comparisons of our operational performance because they provide a view of our operating results without items that are not, in our view, indicative of our core operating results. We believe that these non-GAAP financial measures help illustrate underlying trends in our business, and we use the measures to establish budgets and operational goals (communicated internally and externally) for managing our business and evaluating our performance. We believe that providing non-GAAP financial measures also affords investors a view of our operating results that may be more easily compared to the results of other companies in our industry that use similar financial measures to supplement their GAAP results.

The items excluded from the non-GAAP financial measures often have a material impact on our financial results and such items often recur. Accordingly, the non-GAAP financial measures included in this Annual Report should be considered in addition to, and not as a substitute for or superior to, the comparable measures prepared in accordance with GAAP. The following tables reconcile each of these non-GAAP financial measures to its most closely comparable GAAP measure on our financial statements.

(in millions, except per share amounts)

	Year ended September 30,	
	2020	2019
GAAP revenue	\$ 1,458.4	\$ 1,255.6
Fair value adjustment of acquired deferred revenue	—	0.8
Non-GAAP revenue	\$ 1,458.4	\$ 1,256.4
GAAP gross margin	\$ 1,124.1	\$ 930.3
Fair value adjustment of acquired deferred revenue	—	0.8
Fair value adjustment to deferred services cost	—	(0.3)
Stock-based compensation	14.0	11.9
Amortization of acquired intangible assets included in cost of revenue	27.4	27.3
Non-GAAP gross margin	\$ 1,165.5	\$ 970.0
GAAP operating income	\$ 210.9	\$ 63.0
Fair value adjustment of acquired deferred revenue	—	0.8
Fair value adjustment to deferred services cost	—	(0.3)
Stock-based compensation	115.1	86.4
Amortization of acquired intangible assets included in cost of revenue	27.4	27.3
Amortization of acquired intangible assets	28.7	23.8
Acquisition-related and other transactional charges included in general and administrative expenses	8.6	3.1
Restructuring and other charges, net	32.7	51.1
Non-GAAP operating income	\$ 423.4	\$ 255.3
GAAP net income (loss)	\$ 130.7	\$ (27.5)
Fair value adjustment of acquired deferred revenue	—	0.8
Fair value adjustment to deferred services cost	—	(0.3)
Stock-based compensation	115.1	86.4
Amortization of acquired intangible assets included in cost of revenue	27.4	27.3
Amortization of acquired intangible assets	28.7	23.8
Acquisition-related and other transactional charges included in general and administrative expenses	8.6	3.1
Restructuring and other charges, net	32.7	51.1
Non-operating charges(1)	18.5	—
Income tax adjustments(2)	(63.3)	29.7
Non-GAAP net income	\$ 298.4	\$ 194.5
GAAP diluted earnings (loss) per share	\$ 1.12	\$ (0.23)
Fair value adjustment of acquired deferred revenue	—	0.01
Stock-based compensation	0.99	0.73
Total amortization of acquired intangible assets	0.48	0.43
Acquisition-related and other transactional charges included in general and administrative expenses	0.07	0.03
Restructuring and other charges, net	0.28	0.43
Non-operating charges(1)	0.16	—
Income tax adjustments(2)	(0.54)	0.25
Non-GAAP diluted earnings per share(3)	\$ 2.57	\$ 1.64

- (1) We recognized \$15 million of expense in Q2'20 related to penalties for the early redemption of the 6.000% Senior Notes due in 2024 and wrote off approximately \$3 million of related debt issuance costs in Q3'20.
- (2) We have recorded a full valuation allowance against our U.S. net deferred tax assets and a valuation allowance against net deferred tax assets in certain foreign jurisdictions. As we are profitable on a non-GAAP basis, the FY'20 and FY'19 non-GAAP tax provisions are being calculated assuming there is no valuation allowance. Income tax adjustments reflect the tax effects of non-GAAP adjustments which are calculated by applying the applicable tax rate by jurisdiction to the non-GAAP adjustments listed above.
- (3) Diluted earnings per share impact of non-GAAP adjustments is calculated by dividing the dollar amount of the non-GAAP adjustment by the non-GAAP diluted weighted average shares outstanding for the respective year. Non-GAAP diluted weighted average shares outstanding is equal to GAAP diluted weighted average shares outstanding unless we have a GAAP net loss and non-GAAP net income.

Reconciliation of GAAP and non-GAAP diluted weighted average shares outstanding:

(in millions)

	Year ended September 30,	
	2020	2019
GAAP diluted weighted average shares outstanding	116.3	117.7
Dilutive effect of stock-based compensation plans	-	1.0
Non-GAAP diluted weighted average shares outstanding	116.3	118.7

Operating margin impact of non-GAAP adjustments:

	Year ended September 30,	
	2020	2019
GAAP operating margin	14.5%	5.0%
Fair value of acquired deferred revenue	—%	0.1%
Stock-based compensation	7.9%	6.9%
Total amortization of acquired intangible assets	3.8%	4.1%
Acquisition-related and other transactional charges included in general and administrative expenses	0.6%	0.2%
Restructuring and other charges, net	2.2%	4.1%
Non-GAAP operating margin	29.0%	20.3%

Critical Accounting Policies and Estimates

We have prepared our consolidated financial statements in accordance with accounting principles generally accepted in the United States of America. In preparing our financial statements, we make estimates, assumptions and judgments that can have a significant impact on our reported revenues, results of operations, and net income, as well as on the value of certain assets and liabilities on our balance sheet. These estimates, assumptions and judgments are made based on our historical experience and on other assumptions that we believe to be reasonable under the circumstances. These estimates may change as new events occur or additional information is obtained, and we may periodically be faced with uncertainties, the outcomes of which are not within our control and may not be known for a prolonged period of time.

The accounting policies, methods and estimates used to prepare our financial statements are described generally in *Note 2. Summary of Significant Accounting Policies* of Notes to Consolidated Financial Statements in this Annual Report. The most important accounting judgments and estimates that we made in preparing the financial statements involved:

- revenue recognition;
- accounting for income taxes; and
- valuation of assets and liabilities acquired in business combinations.

A critical accounting policy is one that is both material to the presentation of our financial statements and requires us to make subjective or complex judgments that could have a material effect on our financial condition and results of operations. Critical accounting policies require us to make assumptions about matters that are uncertain at the time of the estimate, and different estimates that we could have used, or changes in the estimates that are reasonably likely to occur, may have a material impact on our financial condition or results of operations. Because the use of estimates is inherent in the financial reporting process, actual results could differ from those estimates.

Accounting policies, guidelines and interpretations related to our critical accounting policies and estimates are generally subject to numerous sources of authoritative guidance and are often reexamined by accounting standards rule makers and regulators. These rule makers and/or regulators may promulgate interpretations, guidance or regulations that may result in changes to our accounting policies, which could have a material impact on our financial position and results of operations.

Revenue Recognition

Effective October 1, 2018, we record revenues in accordance with the guidance provided by ASC 606, *Revenue from Contracts with Customers*. For a full description of our revenue accounting policy, please refer to *Note 2. Summary of Significant Accounting Policies*, included in the Notes to Consolidated Financial Statements in this Annual Report.

Our sources of revenue include: (1) subscription, (2) perpetual license, (3) support for perpetual licenses and (4) professional services. Subscriptions include term-based on-premises licenses, Software-as-a-Service (SaaS), and hosting services. Revenue is derived from the licensing of computer software products and from related support and/or professional services contracts.

Judgments and Estimates

Determination of performance obligations. Our subscriptions are frequently sold as a bundle of products and services, typically pairing on-premises term software licenses with support and/or cloud services over the same term. On-premises software is typically determined to be a distinct performance obligation, and is thus recognized separately from the support and/or cloud components. On-premises software revenue is generally recognized at the point in time that the software is made available to the customer, while the support and cloud revenue components are recognized over the term of the contract. In cases where subscriptions include cloud functionality and on-premises software, an assessment has been performed to determine whether the cloud services are distinct from the on-premises software. In the substantial majority of instances, cloud services provide incremental functionality to customers and have been considered distinct and recognized separately from the on-premises software. This assessment could have a significant impact on the timing of revenue recognition and may change as our product offerings evolve.

Allocation of transaction price. We estimate the standalone selling price of each identified performance obligation and use that estimate to allocate the transaction price among said performance obligations. The estimated standalone selling price is determined using all information reasonably available to us, including market conditions and other observable inputs. Significant judgment is used in determining the standalone selling prices of the on-premises license, support, and cloud components of our subscription products. These estimates are subject to change as our product offerings change and could have a significant impact due to the difference in the timing of revenue recognition for on-premises licenses and support and/or cloud.

Right to exchange. Our multi-year, non-cancellable on-premises subscription contracts provide customers with an annual right to exchange software within the original subscription with other software. We account for this right as a refund liability. For most contracts, we use the expected value method to determine the refund liability associated with this right across a portfolio of contracts. Where contracts are outside of the standard portfolio of contracts due to contract size, longer contract duration, or other unique contractual terms, we use the most likely amount method to determine the refund liability for each individual contract. In both circumstances, the transaction price is constrained based on our estimates, which impacts the amount of revenue recognized. Changes in these estimates could significantly impact revenue for any given period.

Accounting for Income Taxes

As part of the process of preparing our consolidated financial statements, we are required to calculate our income tax expense based on taxable income by jurisdiction. There are many transactions and calculations about which the ultimate tax outcome is uncertain; as a result, our calculations involve estimates by management. Some of these uncertainties arise as a consequence of revenue-sharing, cost-reimbursement and transfer pricing arrangements among related entities and the differing tax treatment of revenue and cost items across various jurisdictions. If we were compelled to revise or to account differently for our arrangements, that revision could affect our recorded tax liabilities.

The income tax accounting process also involves estimating our actual current tax liability, together with assessing temporary differences resulting from differing treatment of items for tax and accounting purposes. These differences result in deferred tax assets and liabilities, which are included within our

consolidated balance sheets. We must then assess the likelihood that our deferred tax assets will be recovered from future taxable income and, to the extent we believe that it is more likely than not that all or a portion of our deferred tax assets will not be realized, we must establish a valuation allowance as a charge to income tax expense.

As of September 30, 2020, we have a valuation allowance of \$171.3 million against net deferred tax assets in the U.S. and a valuation allowance of \$34.1 million against net deferred tax assets in certain foreign jurisdictions. We have concluded, based on the weight of available evidence, that a full valuation allowance continues to be required against our U.S. net deferred tax assets as they are not more likely than not to be realized in the future. We will continue to reassess our valuation allowance requirements each financial reporting period.

The valuation allowance recorded against net deferred tax assets of certain foreign jurisdictions is established primarily for our capital loss carryforwards, the majority of which do not expire. However, there are limitations imposed on the utilization of such capital losses that could further restrict the recognition of any tax benefits.

Prior to the passage of the U.S. Tax Act, the Company asserted that substantially all of the undistributed earnings of its foreign subsidiaries were considered indefinitely invested and accordingly, no deferred taxes were provided. Pursuant to the provisions of the U.S. Tax Act, these earnings were subjected to a one-time transition tax and there is therefore no longer a material cumulative basis difference associated with the undistributed earnings. We maintain our assertion to permanently reinvest these earnings outside the U.S. unless repatriation can be done substantially tax-free, with the exception of a foreign holding company formed in 2018 and our Taiwan subsidiary. If we decide to repatriate any additional non-U.S. earnings in the future, we may be required to establish a deferred tax liability on such earnings. The amount of unrecognized deferred tax liability on the undistributed earnings would not be material.

In the normal course of business, PTC and its subsidiaries are examined by various taxing authorities, including the Internal Revenue Service (IRS) in the U.S. We regularly assess the likelihood of additional assessments by tax authorities and provide for these matters as appropriate. We are currently under audit by tax authorities in several jurisdictions. Audits by tax authorities typically involve examination of the deductibility of certain permanent items, transfer pricing, limitations on net operating losses and tax credits. Although we believe our tax estimates are appropriate, the final determination of tax audits and any related litigation could result in material changes in our estimates.

Valuation of Assets and Liabilities Acquired in Business Combinations

In accordance with business combination accounting, we allocate the purchase price of acquired companies to the tangible and intangible assets acquired and liabilities assumed based on their estimated fair values. Determining these fair values requires management to make significant estimates and assumptions, especially with respect to intangible assets.

Our identifiable intangible assets acquired consist of developed technology, core technology, tradenames, customer lists and contracts, and software support agreements and related relationships. Developed technology consists of products that have reached technological feasibility. Core technology represents a combination of processes, inventions and trade secrets related to the design and development of acquired products. Customer lists and contracts and software support agreements and related relationships represent the underlying relationships and agreements with customers of the acquired company's installed base. We have generally valued intangible assets using a discounted cash flow model. Critical estimates in valuing certain of the intangible assets include but are not limited to:

- future expected cash flows from software license sales, customer support agreements, customer contracts and related customer relationships and acquired developed technologies and trademarks and trade names and
- discount rates used to determine the present value of estimated future cash flows.

In addition, we estimate the useful lives of our intangible assets based upon the expected period over which we anticipate generating economic benefits from the related intangible asset.

Net tangible assets consist of the fair values of tangible assets less the fair values of assumed liabilities and obligations. Except for deferred revenues, net tangible assets were generally valued by us at the respective carrying amounts recorded by the acquired company, if we believed that their carrying values approximated their fair values at the acquisition date. The values assigned to deferred revenue reflect an amount equivalent to the estimated cost plus an appropriate profit margin to perform the services related to the acquired company's software support contracts.

In addition, uncertain tax positions and tax-related valuation allowances assumed in connection with a business combination are initially estimated as of the acquisition date and we reevaluate these items quarterly with any adjustments to our preliminary estimates being recorded to goodwill provided that we are within the measurement period (up to one year from the acquisition date) and we continue to collect information in order to determine their estimated values. Subsequent to the measurement period or our final determination of the estimated value of uncertain tax positions or tax-related valuation allowances, whichever comes first, changes to these uncertain tax positions and tax-related valuation allowances will affect our provision for income taxes in our Consolidated Statements of Operations.

Our estimates of fair value are based upon assumptions believed to be reasonable at that time, but which are inherently uncertain and unpredictable. Assumptions may be incomplete or inaccurate, and unanticipated events and circumstances may occur, which may affect the accuracy or validity of such assumptions, estimates or actual results.

When events or changes in circumstances indicate that the carrying value of a finite-lived intangible asset may not be recoverable, we perform an assessment of the asset for potential impairment. This assessment is based on projected undiscounted future cash flows over the asset's remaining life. If the carrying value of the asset exceeds its undiscounted cash flows, we record an impairment loss equal to the excess of the carrying value over the fair value of the asset, determined using projected discounted future cash flows of the asset.

Liquidity and Capital Resources

(in millions)

	September 30,	
	2020	2019
Cash and cash equivalents	\$ 275.5	\$ 269.6
Restricted cash	0.5	1.1
Marketable securities	59.1	57.4
Total	<u>\$ 335.1</u>	<u>\$ 328.1</u>
Activity for the year included the following:		
Cash provided by operating activities	\$ 233.8	\$ 285.1
Cash used in investing activities	(526.0)	(150.0)
Cash provided by (used in) financing activities	297.4	(123.0)

Cash, cash equivalents and restricted cash

We invest our cash with highly rated financial institutions and in diversified domestic and international money market mutual funds. Cash and cash equivalents include highly liquid investments with original maturities of three months or less. In addition, we hold investments in marketable securities totaling approximately \$59 million with an average maturity of 12 months. At September 30, 2020, cash and cash equivalents totaled \$275 million, compared to \$270 million at September 30, 2019.

A significant portion of our cash is generated and held outside the U.S. As of September 30, 2020, we had cash and cash equivalents of \$39 million in the U.S., \$108 million in Europe, \$99 million in Asia Pacific (including India) and \$29 million in other non-U.S. countries. All our marketable securities are held in the U.S. We have substantial cash requirements in the U.S., but we believe that the combination of our existing U.S. cash and cash equivalents, marketable securities, our ability to repatriate cash to the U.S. more cost effectively with the recent U.S. tax law changes, future U.S. operating cash flows and cash available under our credit facility will be sufficient to meet our ongoing U.S. operating expenses and known capital requirements.

Cash provided by operating activities

Cash provided by operating activities was \$234 million in FY'20 compared to \$285 million in FY'19. The year-over-year decrease is primarily due to a \$20 million increase in interest payments, a \$17 million increase in restructuring payments, an \$12 million decrease in tenant improvement reimbursements related to our Seaport facility, and an increase in tax payments, offset by higher cash collections of accounts receivable.

Restructuring payments totaled \$42 million in FY'20, compared to \$25 million in FY'19. Cash paid for income taxes was \$53 million in FY'20 compared to \$39 million in FY'19.

Cash used in investing activities

(in millions)

	Year ended September 30,	
	2020	2019
Additions to property and equipment	\$ (20.2)	\$ (64.4)
Proceeds (purchases) of short- and long-term marketable securities, net	(1.8)	(1.1)
Acquisitions of businesses, net of cash acquired	(483.5)	(86.7)
Purchases of investments	—	(7.5)
Purchase of intangible assets	(11.1)	—
Settlement of net investment hedges	(9.4)	9.7
Net cash used in investing activities	\$ (526.0)	\$ (150.0)

Cash used in investing activities reflects \$483 million used for acquisitions in FY'20 (\$469 million of which related to Onshape), compared to \$87 million in FY'19. For additional detail on our acquisitions, see *Note 6. Acquisitions*, included in the Notes to Consolidated Financial Statements in this Annual Report. Our expenditures for property and equipment consist primarily of facility improvements (including our construction expenses for our new Seaport headquarters in FY'19), office equipment, computer equipment, and software.

Cash provided by financing activities

(in millions)

	Year ended September 30,	
	2020	2019
Borrowings (payments) on debt, net	\$ 344.9	\$ 25.0
Repurchases of common stock	—	(115.0)
Proceeds from issuance of common stock	18.3	13.0
Debt issuance costs	(17.1)	—
Contingent consideration	—	(1.6)
Debt early redemption premium	(15.0)	—
Payments of withholding taxes in connection with stock-based awards	(33.7)	(44.4)
Net cash provided by (used in) financing activities	\$ 297.4	\$ (123.0)

Our net borrowings in FY'20 of \$345 million were primarily used to fund the Onshape acquisition. These net borrowings reflect the issuance of \$1 billion in new notes in February 2020 and the repayment of \$500 million of earlier issued notes in May 2020, as well as net repayments of \$155 million under our revolving credit facility. In FY'19, net borrowings under the credit facility were \$25 million, used to fund working capital requirements and the Frustum acquisition.

Outstanding Debt

As of September 30, 2020, we had:

<i>(in millions)</i>	September 30, 2020	
4.000% Senior notes due 2028	\$	500.0
3.625% Senior notes due 2025		500.0
Credit facility revolver		18.0
Total debt		1,018.0
Unamortized debt issuance costs for the Senior notes		(12.7)
Total debt, net of issuance costs	\$	1,005.3
Undrawn under credit facility revolver	\$	982.0
Undrawn under credit facility revolver available for borrowing	\$	956.5

As of September 30, 2020, we were in compliance with all financial and operating covenants of the credit facility and the note indentures. Any failure to comply with such covenants under the credit facility would prevent us from being able to borrow additional funds under the credit facility, and, as with any failure to comply with such covenants under the note indentures, could constitute a default that could cause all amounts outstanding to become due and payable immediately.

Our credit facility and our Senior Notes are described in *Note 9. Debt* to the Condensed Consolidated Financial Statements in this Form 10-K.

Share Repurchase Authorization

Our Articles of Organization authorize us to issue up to 500 million shares of our common stock. We used cash from operations and borrowings under our credit facility to make such repurchases in FY'19. All shares of our common stock repurchased are automatically restored to the status of authorized and unissued.

On November 13, 2020, the Board of Directors authorized us to repurchase \$1 billion of our common stock through September 30, 2023. We may use cash from operations and borrowings under our credit facility to make any such repurchases.

Expectations for Fiscal 2021

We believe that existing cash and cash equivalents, together with cash generated from operations and amounts available under the credit facility, will be sufficient to meet our working capital and capital expenditure requirements (which we expect to be approximately \$25 million in FY'21) through at least the next twelve months and to meet our known long-term capital requirements.

Our expected uses and sources of cash could change, payments due to us may be delayed due to the COVID-19 pandemic, our cash position could be reduced, and we could incur additional debt obligations if we decide to retire debt, engage in strategic transactions, or repurchase shares, any of which could be commenced, suspended or completed at any time. Any such repurchases or retirement of debt will depend on prevailing market conditions, our liquidity requirements, contractual restrictions and other factors. The amounts involved in any debt retirement or issuance, share repurchases, or strategic transactions may be material.

Contractual Obligations

At September 30, 2020, our contractual obligations were as follows:

(in millions)

	Payments due by period				
	Total	Less than 1 year	1-3 years	3-5 years	More than 5 years
Debt(1)	\$ 1,260.2	\$ 58.6	\$ 81.1	\$ 570.5	\$ 550.0
Operating leases(2)	305.1	44.7	53.3	36.8	170.3
Purchase obligations(3)	100.9	53.4	44.8	2.0	0.7
Pension liabilities(4)	25.8	3.8	8.4	9.5	4.1
Unrecognized tax benefits(5)	16.1				
Total	<u>\$ 1,708.1</u>	<u>\$ 160.5</u>	<u>\$ 187.6</u>	<u>\$ 618.8</u>	<u>\$ 725.1</u>

- (1) Includes required principal repayments and interest and commitment fees on our Senior Notes and our revolving credit facility based on the balance outstanding as of September 30, 2020 and the interest rates in effect as of September 30, 2020 (4.000% and 3.625% for the 2028 and 2025 Senior Notes, respectively, and 1.81% for our revolving credit facility). The credit facility matures on February 13, 2025, when all remaining amounts outstanding will be due and payable in full. Principal and interest on any additional borrowing that may be required to refinance the credit facility upon its maturity are not included in the contractual obligations above.
- (2) The future minimum lease payments above include minimum future lease payments for facilities under non-cancellable operating leases with original terms of greater than 12 months. See *Note 19. Leases* of Notes to Consolidated Financial Statements in this Annual Report for further discussion.
- (3) Purchase obligations represent minimum commitments due to third parties, including royalty contracts, research and development contracts, telecommunication contracts, information technology maintenance contracts in support of internal-use software and hardware, financing leases, operating leases with original terms of less than 12 months, and other marketing and consulting contracts. Contracts for which our commitment is variable, based on volumes, with no fixed minimum quantities, and contracts that can be canceled without payment penalties have been excluded. The purchase obligations included above are in addition to amounts included in current liabilities and prepaid expenses recorded on our September 30, 2020 Consolidated Balance Sheet.
- (4) These obligations relate to our international pension plans and are not subject to fixed payment terms. Payments have been estimated based on the plans' current funded status, planned employer contributions and actuarial assumptions. In addition, we may, at our discretion, make additional voluntary contributions to the plans. See *Note 14. Pension Plans* of Notes to Consolidated Financial Statements in this Annual Report for further discussion.
- (5) This liability, recorded on the Consolidated Balance Sheet, is not subject to fixed payment terms and the amount and timing of payments, if any, which we will make related to this liability, are not known. See *Note 8. Income Taxes* of Notes to Consolidated Financial Statements in this Annual Report for additional information.

As of September 30, 2020, we had letters of credit and bank guarantees outstanding of approximately \$16.4 million (of which \$0.5 million was collateralized).

Off-Balance Sheet Arrangements

We have not created, and are not party to, any special-purpose or off-balance sheet entities for the purpose of raising capital, incurring debt or operating parts of our business that are not consolidated (to the extent of our ownership interest therein) into our financial statements. We have not entered into any transactions with unconsolidated entities whereby we have subordinated retained interests, derivative instruments or other contingent arrangements that expose us to material continuing risks, contingent liabilities, or any other obligation under a variable interest in an unconsolidated entity that provides financing, liquidity, market risk or credit risk support to us.

Recent Accounting Pronouncements

In accordance with recently issued accounting pronouncements, we will be required to comply with certain changes in accounting rules and regulations, none of which are expected to have a material impact on our consolidated financial statements. Refer to *Note 2. Summary of Significant Accounting Policies* to the Condensed Consolidated Financial Statements in this Form 10-K for all recently issued accounting pronouncements, which is incorporated herein by reference.

ITEM 7A. Quantitative and Qualitative Disclosures about Market Risk

We face exposure to financial market risks, including adverse movements in foreign currency exchange rates and changes in interest rates. These exposures may change over time as business practices evolve and could have a material adverse impact on our financial results.

Foreign currency exchange risk

Our earnings and cash flows are subject to fluctuations due to changes in foreign currency exchange rates. Our most significant foreign currency exposures relate to Western European countries, Japan, Israel, China and Canada. We enter into foreign currency forward contracts to manage our exposure to fluctuations in foreign exchange rates that arise from receivables and payables denominated in foreign currencies. We do not enter into or hold foreign currency derivative financial instruments for trading or speculative purposes nor do we enter into derivative financial instruments to hedge future cash flows or forecast transactions.

Our non-U.S. revenues generally are transacted through our non-U.S. subsidiaries and typically are denominated in their local currency. In addition, expenses that are incurred by our non-U.S. subsidiaries typically are denominated in their local currency. Approximately 60% of our revenue and 40% of our expenses were transacted in currencies other than the U.S. dollar. Currency translation affects our reported results because we report our results of operations in U.S. Dollars. Historically, our most significant currency risk has been changes in the Euro and Japanese Yen relative to the U.S. Dollar. Based on current revenue and expense levels (excluding restructuring charges and stock-based compensation), a \$0.10 change in the USD to EUR and a 10 Yen change in the Yen to USD exchange rate would impact operating income by approximately \$19 million and \$9 million, respectively.

Our exposure to foreign currency exchange rate fluctuations arises in part from intercompany transactions, with most intercompany transactions occurring between a U.S. dollar functional currency entity and a foreign currency denominated entity. Intercompany transactions typically are denominated in the local currency of the non-U.S. dollar functional currency subsidiary in order to centralize foreign currency risk. Also, both PTC (the parent company) and our non-U.S. subsidiaries may transact business with our customers and vendors in a currency other than their functional currency (transaction risk). In addition, we are exposed to foreign exchange rate fluctuations as the financial results and balances of our non-U.S. subsidiaries are translated into U.S. dollars (translation risk). If sales to customers outside of the United States increase, our exposure to fluctuations in foreign currency exchange rates will increase.

Our foreign currency risk management strategy is principally designed to mitigate the future potential financial impact of changes in the U.S. dollar value of balances denominated in foreign currency, resulting from changes in foreign currency exchange rates. Our foreign currency hedging program uses forward contracts to manage the foreign currency exposures that exist as part of our ongoing business operations. The contracts are primarily denominated in Japanese Yen and European currencies, and have maturities of less than three months.

Generally, we do not designate foreign currency forward contracts as hedges for accounting purposes, and changes in the fair value of these instruments are recognized immediately in earnings. Because we enter into forward contracts only as an economic hedge, any gain or loss on the underlying foreign-denominated balance would be offset by the loss or gain on the forward contract. Gains and losses on forward contracts and foreign currency denominated receivables and payables are included in foreign currency net losses.

As of September 30, 2020 and 2019, we had outstanding forward contracts for derivatives not designated as hedging instruments with notional amounts equivalent to the following:

Currency Hedged (in thousands)	September 30,			
	2020		2019	
Canadian / U.S. Dollar	\$	6,847	\$	9,408
Euro / U.S. Dollar		390,673		308,282
British Pound / U.S. Dollar		6,328		3,756
Israeli Shekel / U.S. Dollar		9,503		10,272
Japanese Yen / U.S. Dollar		50,379		37,462
Swiss Franc / U.S. Dollar		12,874		12,001
Swedish Krona / U.S. Dollar		18,871		20,636
Singapore Dollar / U.S. Dollar		3,281		34,585
Chinese Renminbi / U.S. Dollar		5,415		52,466
All other		8,291		9,487
Total	\$	512,462	\$	498,355

Debt

In addition to the \$1 billion due under our 2025 and 2028 Senior Notes, as of September 30, 2020, we had \$18 million outstanding under our credit facility. Loans under the credit facility bear interest at variable rates which reset every 30 to 180 days depending on the rate and period selected by us. These loans are subject to interest rate risk as interest rates will be adjusted at each rollover date to the extent such amounts are not repaid. As of September 30, 2020, the annual rate on the credit facility loans was 1.81%. If there was a hypothetical 100 basis point change in interest rates, the annual net impact to earnings and cash flows would be immaterial. This hypothetical change in cash flows and earnings has been calculated based on the borrowings outstanding at September 30, 2020 and a 100 basis point per annum change in interest rate applied over a one-year period.

Cash and cash equivalents

As of September 30, 2020, cash equivalents were invested in highly liquid investments with maturities of three months or less when purchased. We invest our cash with highly rated financial institutions in North America, Europe and Asia Pacific and in diversified domestic and international money market mutual funds. At September 30, 2020, we had cash and cash equivalents of \$39 million in the United States, \$108 million in Europe, \$99 million in Asia Pacific (including India), and \$29 million in other non-U.S. countries. Given the short maturities and investment grade quality of the portfolio holdings at September 30, 2020, a hypothetical 10% change in interest rates would not materially affect the fair value of our cash and cash equivalents.

Our invested cash is subject to interest rate fluctuations and, for non-U.S. operations, foreign currency risk. In a declining interest rate environment, we would experience a decrease in interest income. The opposite holds true in a rising interest rate environment. Over the past several years, the U.S. Federal Reserve Board, European Central Bank and Bank of England have changed certain benchmark interest rates, which has led to declines and increases in market interest rates. These changes in market interest rates have resulted in fluctuations in interest income earned on our cash and cash equivalents. Interest income will continue to fluctuate based on changes in market interest rates and levels of cash available for investment. Changes in foreign currencies relative to the U.S. dollar had an immaterial impact on our consolidated cash balances in 2020 and an unfavorable impact of \$2.6 million and \$7.8 million in 2019 and 2018, respectively, in particular due to changes in the Euro and the Japanese Yen.

ITEM 8. Financial Statements and Supplementary Data

The consolidated financial statements and notes to the consolidated financial statements are attached as APPENDIX A.

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

Our management maintains disclosure controls and procedures as defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as amended (the “Exchange Act”) that are designed to provide reasonable assurance that information required to be disclosed in our reports filed or submitted under the Exchange Act is processed, recorded, summarized and reported within the time periods specified in the SEC’s rules and forms, and that such information is accumulated and communicated to our management, including our Chief Executive Officer and Chief Financial Officer (our principal executive officer and principal financial officer, respectively), as appropriate, to allow for timely decisions regarding required disclosure.

As required by SEC Rule 15d-15(b), we carried out an evaluation, under the supervision and with the participation of management, including our principal executive and principal financial officers, of the effectiveness of the design and operation of our disclosure controls and procedures as of the end of the period covered by this Annual Report. Based on this evaluation, we concluded that our disclosure controls and procedures were effective at the reasonable assurance level as of September 30, 2020.

Management’s Annual Report on Internal Control over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting. Internal control over financial reporting is defined in Rules 13a-15(f) and 15d-15(f) of the Exchange Act as a process designed by, or under the supervision of, our principal executive and principal financial officers and effected by our board of directors, management and other personnel, 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 and includes those policies and procedures that:

- Pertain to the maintenance of records that in reasonable detail accurately and fairly reflect the transactions and dispositions of our assets;
- Provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that our receipts and expenditures are being made only in accordance with authorizations of our management and directors; and
- Provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of our 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. 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.

Our management assessed the effectiveness of our internal control over financial reporting as of September 30, 2020 using the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) in *Internal Control-Integrated Framework (2013)*. Based on this assessment and those criteria, our management concluded that, as of September 30, 2020, our internal control over financial reporting was effective.

The effectiveness of our internal control over financial reporting as of September 30, 2020 has been audited by PricewaterhouseCoopers LLP, an independent registered public accounting firm, as stated in their report, which appears under Item 8.

Change in Internal Control over Financial Reporting

There was no change in our internal control over financial reporting that occurred during the quarter ended September 30, 2020 that has materially affected, or is 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 with respect to our directors and executive officers may be found in the sections captioned “Proposal 1: Election of Directors,” “Corporate Governance,” “Our Executive Officers,” and “Transactions With Related Persons” appearing in our 2021 Proxy Statement. Such information is incorporated into this Item 10 by reference.

Code of Ethics for Senior Executive Officers

We have adopted a Code of Ethics for Senior Executive Officers that applies to our Chief Executive Officer, President, Chief Financial Officer, and Controller, as well as others. The Code is embedded in our Code of Business Conduct and Ethics applicable to all employees. A copy of the Code of Business Conduct and Ethics is publicly available on our website at www.ptc.com. If we make any substantive amendments to, or grant any waiver from, including any implicit waiver, the Code of Ethics for Senior Executive Officers to or for our Chief Executive Officer, President, Chief Financial Officer or Controller, we will disclose the nature of such amendment or waiver in a current report on Form 8-K.

ITEM 11. Executive Compensation

Information with respect to director and executive compensation may be found under the headings “Director Compensation,” “Compensation Discussion and Analysis,” “Executive Compensation,” and “Compensation Committee Report” appearing in our 2021 Proxy Statement. Such information is incorporated herein by reference.

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

Information required by this item may be found under the headings “Information about PTC Common Stock Ownership” in our 2021 Proxy Statement. Such information is incorporated herein by reference.

EQUITY COMPENSATION PLAN INFORMATION as of September 30, 2020

Plan Category	Number of securities to be issued upon exercise of outstanding options, warrants and rights	Weighted-average exercise price of outstanding options, warrants and rights	Number of securities remaining available for future issuance under equity compensation plans
Equity compensation plans approved by security holders:			
2000 Equity Incentive Plan(1)	3,507,317	— (1)	5,282,903
2016 Employee Stock Purchase Plan(2)	—	—	875,488 (2)
Total	<u>3,507,317</u>	—	<u>6,158,391</u>

(1) All of the shares issuable upon vesting are restricted stock units, which have no exercise price.

(2) This amount represents the total number of shares remaining available under the 2016 Employee Stock Purchase Plan, of which 146,691 shares are subject to purchase during the current offering period.

ITEM 13. Certain Relationships and Related Transactions, and Director Independence

Information with respect to this item may be found under the headings “Independence of Our Directors,” “Review of Transactions with Related Persons” and “Transactions with Related Persons” in our 2021 Proxy Statement. Such information is incorporated herein by reference.

ITEM 14. Principal Accounting Fees and Services

Information with respect to this item may be found under the headings “Engagement of Independent Auditor and Approval of Professional Services and Fees” and “PricewaterhouseCoopers LLP Professional Services and Fees” in our 2021 Proxy Statement. Such information is incorporated herein by reference.

ITEM 15. Exhibits and Financial Statement Schedules

(a) Documents Filed as Part of Form 10-K

1. Financial Statements

[Report of Independent Registered Public Accounting Firm](#)

[F-1](#)

[Consolidated Balance Sheets as of September 30, 2020 and 2019](#)

[F-4](#)

[Consolidated Statements of Operations for the years ended September 30, 2020, 2019 and 2018](#)

[F-5](#)

[Consolidated Statements of Comprehensive Income \(Loss\) for the years ended September 30, 2020, 2019 and 2018](#)

[F-6](#)

[Consolidated Statements of Cash Flows for the years ended September 30, 2020, 2019 and 2018](#)

[F-7](#)

[Consolidated Statements of Stockholders' Equity for the years ended September 30, 2020, 2019 and 2018](#)

[F-8](#)

[Notes to Consolidated Financial Statements](#)

[F-9](#)

2. Financial Statement Schedules

Schedules have been omitted since they are either not required, not applicable, or the information is otherwise included in the Financial Statements per Item 15(a)1 above.

3. Exhibits

The list of exhibits in the Exhibit Index is incorporated herein by reference.

(b) Exhibits

We hereby file the exhibits listed in the attached Exhibit Index.

(c) Financial Statement Schedules

None.

ITEM 16. Form 10-K Summary

None.

EXHIBIT INDEX

Exhibit Number	Exhibit
3.1	— Restated Articles of Organization of PTC Inc. adopted August 4, 2015 (filed as exhibit 3.1 to our Annual Report on Form 10-K for the fiscal year ended September 30, 2015 (File No. 0-18059) and incorporated herein by reference).
3.2	— By-Laws, as amended and restated, of PTC Inc. (filed as Exhibit 3.2 to our Quarterly Report on Form 10-Q for the fiscal quarter ended March 29, 2014 (File No. 0-18059) and incorporated herein by reference).
4.1	— Indenture, dated as of February 13, 2020, between PTC Inc. and Wells Fargo Bank, National Association, as trustee (filed as Exhibit 4.1 to our Current Report on Form 8-K filed on February 13, 2020 (File No. 0-18059) and incorporated herein by reference).
4.2	— Form of 3.625% senior unsecured notes due 2025 (filed as Exhibit 4.2 to our Current Report on Form 8-K filed on February 13, 2020 (File No. 0-18059) and incorporated herein by reference).
4.3	— Form of 4.000% senior unsecured notes due 2028 (filed as Exhibit 4.3 to our Current Report on Form 8-K filed on February 13, 2020 (File No. 0-18059) and incorporated herein by reference).
4.4	— Description of Securities Registered under Section 12 of the Securities Exchange Act of 1934 (filed as Exhibit 4.4 to our Annual Report on Form 10-K for the year ended September 30, 2019 (File No. 0-18059) and incorporated herein by reference).
10.1.1*	— 2000 Equity Incentive Plan (filed as Exhibit 10 to our Current Report on Form 8-K filed on March 8, 2019 (File No. 0-18059) and incorporated herein by reference).
10.1.2	— Form of Restricted Stock Unit Certificate (Non-U.S.) (filed as Exhibit 10.4 to our Quarterly Report on Form 10-Q for the fiscal quarter ended July 2, 2005 (File No. 0-18059) and incorporated herein by reference).
10.1.3*	— Form of Restricted Stock Unit Certificate (Non-Employee Director) (filed as Exhibit 10.1.1 to our Quarterly Report on Form 10-Q for the fiscal quarter ended March 30, 2013 (File No. 0-18059) and incorporated herein by reference).
10.1.4	— Form of Restricted Stock Unit Certificate (U.S.) (filed as Exhibit 10.1.9 to our Annual Report on Form 10-K for the fiscal year ended September 30, 2016 (File No. 0-18059) and incorporated herein by reference).
10.1.5	— Form of Restricted Stock Unit Certificate (U.S.) (filed as Exhibit 10.1.10 to our Annual Report on Form 10-K for the fiscal year ended September 30, 2016 (File No. 0-18059) and incorporated herein by reference).
10.1.6	— Form of Restricted Stock Unit Certificate (U.S.) (filed as Exhibit 10.1.11 to our Annual Report on Form 10-K for the fiscal year ended September 30, 2016 (File No. 0-18059) and incorporated herein by reference).
10.1.7	— Form of Restricted Stock Unit Certificate (U.S. EVP) (filed as Exhibit 10.1.12 to our Annual Report on Form 10-K for the fiscal year ended September 30, 2016 (File No. 0-18059) and incorporated herein by reference).
10.1.8*	— Form of Restricted Stock Unit Certificate (U.S. Section 16) (filed as Exhibit 10.1.13 to our Annual Report on Form 10-K for the fiscal year ended September 30, 2016 (File No. 0-18059) and incorporated herein by reference).
10.1.9	— Form of Restricted Stock Unit Certificate (U.S. EVP) (filed as Exhibit 10.1.14 to our Annual Report on Form 10-K for the fiscal year ended September 30, 2016 (File No. 0-18059) and incorporated herein by reference).
10.1.10	— Form of Restricted Stock Unit Certificate (U.S.) (filed as Exhibit 10.1.15 to our Annual Report on Form 10-K for the fiscal year ended September 30, 2016 (File No. 0-18059) and incorporated herein by reference).
10.1.11*	— Form of Restricted Stock Unit Certificate (U.S. Section 16) (filed as Exhibit 10.1.16 to our Annual Report on Form 10-K for the fiscal year ended September 30, 2016 (File No. 0-18059) and incorporated herein by reference).
10.1.12*	— Form of Restricted Stock Unit Certificate (U.S. Section 16) (filed as Exhibit 10.1.17 to our Annual Report on Form 10-K for the fiscal year ended September 30, 2012 (File No. 0-18059) and incorporated herein by reference).
10.2*	— 2016 Employee Stock Purchase Plan (filed as Exhibit 10.1 to our Quarterly Report on Form 10-Q for the fiscal quarter ended December 28, 2019 (File No. 0-18059) and incorporated herein by reference).
10.3*	— Executive Agreement by and between the Company and James Heppelmann, President and Chief Executive Officer, dated September 30, 2020 (filed as Exhibit 10.1 to our Current Report on Form 8-K dated September 30, 2020 (File No. 0-18059) and incorporated herein by reference).
10.4*	— Form of Amended and Restated Executive Agreement between the Company and each of Kristian Talvitie, Kathleen Mitford and Aaron von Staats (filed as Exhibit 10.3 to PTC's Quarterly Report on Form 10-Q for the period ended December 28, 2019 (File. 0-18059) and incorporated herein by reference).

- 10.5* — [Form of Executive Agreement between the Company and each of Eduarda Camacho, Michael DiTullio and Kevin Wrenn \(filed as Exhibit 10.1 to PTC's Quarterly Report on Form 10-Q for the period ended March 28, 2020 \(File No. 0-18059\) and incorporated herein by reference\).](#)
- 10.6* — [Executive Agreement between the Company and Troy Richardson dated November 16, 2020.](#)
- 10.7 — [Lease dated December 14, 1999 by and between PTC Inc. and Boston Properties Limited Partnership \(filed as Exhibit 10.21 to our Annual Report on Form 10-K for the fiscal year ended September 30, 2000 \(File No. 0-18059\) and incorporated herein by reference\).](#)
- 10.8 — [Third Amendment to Lease Agreement dated as of October 27, 2010 by and between Boston Properties Limited Partnership and PTC Inc. \(filed as Exhibit 10.1 to our Current Report on Form 8-K dated November 8, 2010 \(File No. 0-18059\) and incorporated herein by reference\).](#)
- 10.9 — [Fifth Amendment dated April 10, 2020 to Lease dated December 14, 1999 by and between PTC Inc. and Boston Properties Limited Partnership \(filed as Exhibit 10.2 to PTC's Quarterly Report on Form 10-Q for the period ended March 28, 2020 \(File No. 0-18059\) and incorporated herein by reference\).](#)
- 10.10 — [Office Lease Agreement dated as of September 7, 2017 by and between PTC Inc. and SCD L2 Seaport Square LLC \(filed as Exhibit 10 to our Current Report on Form 8-K filed on September 7, 2017 \(File No. 0-18059\) and incorporated herein by reference\).](#)
- 10.11 — [First Amendment to Lease dated as of October 5, 2017 by and between PTC Inc. and SCD L2 Seaport Square LLC \(filed as Exhibit 10.23 to our Annual Report on Form 10-K for the period ended September 30, 2017 \(File No. 0-18059\) and incorporated herein by reference\).](#)
- 10.12*** — [Third Amended and Restated Strategic Alliance Agreement by and between PTC Inc. and Rockwell Automation, Inc. dated as of October 28, 2020 \(filed as Exhibit 10.1 to our Current Report on Form 8-K dated October 28, 2020 \(File No. 0-18059\) and incorporated herein by reference\).](#)
- 10.13 — [Registration Rights Agreement by and between the Company and Rockwell Automation, Inc., dated July 19, 2018 \(filed as Exhibit 10.1 in our Current Report on Form 8-K filed on July 19, 2018 \(File No. 0-18059\) and incorporated herein by reference\).](#)
- 10.14 — [Securities Purchase Agreement by and between PTC Inc. and Rockwell Automation, Inc., dated as of June 11, 2018 \(filed as Exhibit 10.1 to our Current Report on Form 8-K filed on June 11, 2018 \(File No. 0-18059\) and incorporated herein by reference\).](#)
- 10.15 — [Third Amended and Restated Credit Agreement, by and among the Company, PTC \(IFSC\) Limited, the lenders listed thereto and JPMorgan Chase Bank, N.A., as administrative agent \(filed as Exhibit 4.4 to our Current Report on Form 8-K filed on February 13, 2020 \(File No. 0-18059\) and incorporated herein by reference\).](#)
- 21.1 — [Subsidiaries of PTC Inc.](#)
- 23.1 — [Consent of PricewaterhouseCoopers LLP, an independent registered public accounting firm.](#)
- 31.1 — [Certification of the Chief Executive Officer Pursuant to Exchange Act Rules 13\(a\)-14\(a\) and 15d-14\(a\).](#)
- 31.2 — [Certification of the Chief Financial Officer Pursuant to Exchange Act Rules 13\(a\)-14\(a\) and 15d-14\(a\).](#)
- 32** — [Certification of Periodic Financial Report Pursuant to 18 U.S.C. Section 1350.](#)
- 101 — The following materials from PTC Inc.'s Annual Report on Form 10-K for the year ended September 30, 2020, formatted in Inline XBRL (eXtensible Business Reporting Language): (i) Consolidated Balance Sheets as of September 30, 2020 and 2019; (ii) Consolidated Statements of Operations for the years ended September 30, 2020, 2019 and 2018; (iii) Consolidated Statements of Comprehensive Income for the years ended September 30, 2020, 2019 and 2018; (iv) Consolidated Statements of Cash Flows for the years ended September 30, 2020, 2019 and 2018; (v) Consolidated Statements of Stockholders' Equity for the years ended September 30, 2020, 2019 and 2018; and (vi) Notes to Consolidated Financial Statements.
- 104 — The cover page of the Annual Report on Form 10-K formatted in Inline XBRL (included in Exhibit 101).

* Identifies a management contract or compensatory plan or arrangement in which an executive officer or director of PTC participates.

** Indicates that the exhibit is being furnished with this report and is not filed as a part of it.

*** Certain information has been excluded from this exhibit because it is not material and would likely cause competitive harm to the registrant if publicly disclosed.

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 on the 20th day of November, 2020.

PTC Inc.

By: /s/ JAMES HEPPELMANN
James Heppelmann
President and Chief Executive Officer

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the Registrant and in the capacities indicated below, on the 20th day of November, 2020.

Signature

Title

(i) Principal Executive Officer:

/s/ JAMES HEPPELMANN

James Heppelmann

President and Chief Executive Officer

(ii) Principal Financial and Accounting Officer:

/s/ KRISTIAN TALVITIE

Kristian Talvitie

Executive Vice President and Chief Financial Officer

(iii) Board of Directors:

/s/ ROBERT SCHECHTER

Robert Schechter

Chairman of the Board of Directors

/s/ JANICE CHAFFIN

Janice Chaffin

Director

/s/ PHILLIP FERNANDEZ

Phillip Fernandez

Director

/s/ JAMES HEPPELMANN

James Heppelmann

Director

/s/ KLAUS HOEHN

Klaus Hoehn

Director

/s/ PAUL LACY

Paul Lacy

Director

/s/ CORINNA LATHAN

Corinna Lathan

Director

/s/ BLAKE MORET

Blake Moret

Director

Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of PTC Inc.

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheets of PTC Inc. and its subsidiaries (the “Company”) as of September 30, 2020 and 2019, and the related consolidated statements of operations, of comprehensive income (loss), of stockholders’ equity, and of cash flows for each of the three years in the period ended September 30, 2020, including the related notes (collectively referred to as the “consolidated financial statements”). We also have audited the Company’s internal control over financial reporting as of September 30, 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 consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Company as of September 30, 2020 and 2019, and the results of its operations and its cash flows for each of the three years in the period ended September 30, 2020 in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of September 30, 2020, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the COSO.

Changes in Accounting Principles

As discussed in Note 2 and Note 3 to the consolidated financial statements, the Company changed the manner in which it accounts for leases in fiscal 2020 and the manner in which it accounts for revenues from contracts with customers in fiscal 2019.

Basis for Opinions

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

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

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

Definition and Limitations of Internal Control over Financial Reporting

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

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

Critical Audit Matters

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

Revenue from Contracts with Customers - Identification of Distinct Performance Obligations and Estimate of Standalone Selling Price

As described in Note 2 to the consolidated financial statements, the Company's sources of revenue include: (1) subscription, (2) perpetual license, (3) support for perpetual licenses and (4) professional services. Revenue is derived from the licensing of computer software products and from related support and/or professional services contracts. During the year ended September 30, 2020, the Company recognized revenue from contracts with customers of \$1,458.4 million. The Company's contracts with customers for subscriptions typically include commitments to transfer term-based, on-premise software licenses bundled with support and/or cloud services. On-premise software is determined to be a distinct performance obligation from support. Judgment is required by management to allocate the transaction price to each performance obligation. Management uses the estimated standalone selling price method to allocate the transaction price for items that are not sold separately. The estimated standalone selling price is determined using all information reasonably available to management, including market conditions and other observable inputs. The corresponding revenues are recognized as the related performance obligations are satisfied.

The principal considerations for our determination that performing procedures relating to revenue recognition, specifically related to management's identification of distinct performance obligations and their estimate of standalone selling price, is a critical audit matter are the significant judgment by management in both the identification of distinct performance obligations, specifically the determination that the on-premise software is determined to be a distinct performance obligation from support, and in estimating the standalone selling price using market pricing conditions and other observable inputs, such as historical pricing practices for each distinct performance obligation, which in turn led to a high degree of auditor judgment, subjectivity and effort in performing procedures and evaluating audit evidence related to management's identification of distinct performance obligations within contracts with customers and the estimated standalone selling price used to allocate the transaction price to the distinct performance obligations.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included testing the effectiveness of controls relating to the revenue recognition process, including the identification of distinct performance obligations and estimate of standalone selling prices used to allocate transaction price to distinct performance obligations in its contracts with customers. These procedures also included, among others, (i) evaluating the Company's revenue recognition accounting policy; (ii) testing management's identification of distinct performance obligations in its contracts with customers; (iii) testing management's process for estimating standalone selling price which included testing the completeness and accuracy of input data used and evaluating the reasonableness of significant assumptions used by management, principally market and pricing conditions and other observable inputs such as historical pricing practices; and (iv) evaluation of the accuracy of management's allocation of transaction price to the performance obligations contained within a sample of contracts with customers.

Acquisition of Onshape Inc. – Valuation of Customer Relationship and Purchased Software Intangible Assets

As described in Note 6 to the consolidated financial statements, the Company completed its acquisition of Onshape Inc. on November 1, 2019, for purchase consideration of \$469 million, net of cash acquired. The acquisition of Onshape has been accounted for as a business combination. Assets acquired and liabilities assumed have been recorded at their estimated fair values as of the acquisition date. The purchase price allocation resulted in \$56.8 million for customer relationships and \$47.3 million for purchased software being recorded. Management estimated the fair values of intangible assets based on valuations using a discounted cash flow model which included significant judgment and assumptions relating to estimating future revenues and costs.

The principal considerations for our determination that performing procedures relating to the valuation of the acquired customer relationships and purchased software intangible assets in the acquisition of Onshape, LLC is a critical audit matter are the significant judgment by management when estimating the fair value of these intangible assets, which in turn led to a high degree of auditor judgment, subjectivity, and effort in performing procedures and evaluating audit evidence relating to the discounted cash flow model utilized to value the intangibles and management's assumptions for future revenues and costs used to develop cash flow projections. In addition, the audit effort involved the use of professionals with specialized skill and knowledge.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included testing the effectiveness of controls relating to management's determination of the fair value of the customer relationship and purchased software intangible assets. These procedures also included, among others, (i) reading the purchase agreement, (ii) testing management's process for estimating the fair value of the customer relationships and purchased software intangible assets, (iii) evaluating the appropriateness of the discounted cash flow models used by management, (iv) testing the completeness and accuracy of the underlying data used in the valuation, and (v) evaluating the reasonableness of the significant assumptions related to future revenue and costs. Evaluating management's assumptions related to future revenues and costs involved evaluating whether the assumptions used by management were reasonable considering (i) the consistency with external economic and industry data and (ii) whether these assumptions were consistent with evidence obtained in other areas of the audit. Professionals with specialized skill and knowledge were used to assist in the evaluation of management's discounted cash flow model.

/s/ PricewaterhouseCoopers LLP
Boston, Massachusetts
November 20, 2020

We have served as the Company's auditor since 1992.

PTC Inc.
CONSOLIDATED BALANCE SHEETS
(in thousands, except per share data)

	September 30,	
	2020	2019
ASSETS		
Current assets:		
Cash and cash equivalents	\$ 275,458	\$ 269,579
Short-term marketable securities	28,129	27,891
Accounts receivable, net of allowance for doubtful accounts of \$543 and \$744 at September 30, 2020 and 2019, respectively	415,221	372,743
Prepaid expenses	69,408	52,701
Other current assets	45,231	59,707
Total current assets	833,447	782,621
Property and equipment, net	101,499	105,531
Goodwill	1,625,786	1,238,179
Acquired intangible assets, net	237,570	169,949
Long-term marketable securities	30,970	29,544
Deferred tax assets	190,963	198,634
Operating right-of-use lease assets	149,933	—
Other assets	212,570	140,130
Total assets	<u>\$ 3,382,738</u>	<u>\$ 2,664,588</u>
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	\$ 24,910	\$ 42,442
Accrued expenses and other current liabilities	96,313	104,028
Accrued compensation and benefits	101,087	88,769
Accrued income taxes	7,011	17,407
Deferred revenue	416,804	385,509
Short-term lease obligations	34,635	—
Total current liabilities	680,760	638,155
Long-term debt	1,005,314	669,134
Deferred tax liabilities	12,431	41,683
Deferred revenue	9,661	11,123
Long-term lease obligations	180,388	—
Other liabilities	55,936	102,495
Total liabilities	1,944,490	1,462,590
Commitments and contingencies (Note 10)		
Stockholders' equity:		
Preferred stock, \$0.01 par value; 5,000 shares authorized; none issued	—	—
Common stock, \$0.01 par value; 500,000 shares authorized; 116,125 and 114,899 shares issued and outstanding at September 30, 2020 and 2019, respectively	1,161	1,149
Additional paid-in capital	1,602,728	1,502,949
Accumulated deficit	(62,267)	(191,390)
Accumulated other comprehensive loss	(103,374)	(110,710)
Total stockholders' equity	1,438,248	1,201,998
Total liabilities and stockholders' equity	<u>\$ 3,382,738</u>	<u>\$ 2,664,588</u>

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

PTC Inc.
CONSOLIDATED STATEMENTS OF OPERATIONS
(in thousands, except per share data)

	Year ended September 30,		
	2020	2019	2018
Revenue:			
License	\$ 509,792	\$ 324,400	\$ 529,265
Support and cloud services	804,825	763,700	559,222
Total software revenue	1,314,617	1,088,100	1,088,487
Professional services	143,798	167,531	153,337
Total revenue	1,458,415	1,255,631	1,241,824
Cost of revenue:			
Cost of license revenue	53,195	51,936	47,737
Cost of support and cloud services revenue	145,386	133,478	135,106
Total cost of software revenue	198,581	185,414	182,843
Cost of professional services revenue	135,690	139,964	143,659
Total cost of revenue	334,271	325,378	326,502
Gross margin	1,124,144	930,253	915,322
Operating expenses:			
Sales and marketing	435,451	417,449	414,764
Research and development	256,575	246,888	249,786
General and administrative	159,826	127,919	143,045
Amortization of acquired intangible assets	28,713	23,841	31,350
Restructuring and other charges, net	32,716	51,114	3,764
Total operating expenses	913,281	867,211	842,709
Operating income	210,863	63,042	72,613
Interest and debt premium expense	(76,428)	(43,047)	(41,673)
Other income (expense), net	271	305	(2,284)
Income before income taxes	134,706	20,300	28,656
Provision (benefit) for income taxes	4,011	47,760	(23,331)
Net income (loss)	\$ 130,695	\$ (27,460)	\$ 51,987
Earnings (loss) per share—Basic	\$ 1.13	\$ (0.23)	\$ 0.45
Earnings (loss) per share—Diluted	\$ 1.12	\$ (0.23)	\$ 0.44
Weighted-average shares outstanding—Basic	115,663	117,724	116,390
Weighted-average shares outstanding—Diluted	116,267	117,724	118,158

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

PTC Inc.
CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME (LOSS)
(in thousands)

	Year ended September 30,		
	2020	2019	2018
Net income (loss)	\$ 130,695	\$ (27,460)	\$ 51,987
Other comprehensive income (loss), net of tax:			
Hedge gain (loss) arising during the period, net of tax of \$1.7 million, \$1.7 million, and \$0.2 million in 2020, 2019, and 2018, respectively	(13,242)	5,251	1,445
Net hedge gain (loss) reclassified into earnings, net of tax of \$0 million, \$0.1 million, and \$0.1 million in 2020, 2019, and 2018, respectively	—	(549)	483
Realized and unrealized gain (loss) on hedging instruments	(13,242)	4,702	1,928
Foreign currency translation adjustment, net of tax of \$0 for all periods	22,076	(24,755)	(11,767)
Unrealized gain on marketable securities, net of tax of \$0 for all periods	188	530	(269)
Amortization of net actuarial pension gain included in net income, net of tax of \$0.9 million, \$0.7 million, and \$0.7 million in 2020, 2019, and 2018, respectively	2,983	1,691	1,629
Pension net loss arising during the period net of tax of \$0.7 million, \$3.6 million, and \$1.5 million in 2020, 2019, and 2018, respectively	(2,791)	(8,743)	(3,787)
Change in unamortized pension gain (loss) during the period related to changes in foreign currency	(1,878)	1,450	588
Other comprehensive income (loss)	7,336	(25,125)	(11,678)
Comprehensive income (loss)	<u>\$ 138,031</u>	<u>\$ (52,585)</u>	<u>\$ 40,309</u>

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

PTC Inc.
CONSOLIDATED STATEMENTS OF CASH FLOWS
(in thousands)

	Year ended September 30,		
	2020	2019	2018
Cash flows from operating activities:			
Net income (loss)	\$ 130,695	\$ (27,460)	\$ 51,987
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation and amortization	80,817	77,824	87,408
Amortization of right-of-use lease assets	38,687	—	—
Stock-based compensation	115,149	86,400	82,939
Other non-cash items, net	(3,167)	(4,148)	534
Provision (benefit) from deferred income taxes	(24,641)	1,708	(56,556)
Changes in operating assets and liabilities, excluding the effects of acquisitions:			
Accounts receivable	(32,365)	29,446	20,396
Accounts payable and accrued expenses	(5,135)	16,200	5,251
Accrued compensation and benefits	10,282	(12,098)	(6,988)
Deferred revenue	17,046	45,875	56,141
Accrued income taxes	(26,616)	232	10,323
Other current assets and prepaid expenses	36,189	(2,829)	(10,642)
Operating lease liabilities	(11,110)	—	—
Other noncurrent assets and liabilities	(92,023)	73,995	6,959
Net cash provided by operating activities	233,808	285,145	247,752
Cash flows from investing activities:			
Additions to property and equipment	(20,196)	(64,411)	(36,041)
Purchases of short- and long-term marketable securities	(33,869)	(33,027)	(24,311)
Proceeds from sales of short- and long-term marketable securities	1,521	1,507	—
Proceeds from maturities of short- and long-term marketable securities	30,521	30,469	18,140
Acquisitions of businesses, net of cash acquired	(483,478)	(86,737)	(3,000)
Purchases of investments	—	(7,500)	(1,000)
Purchase of intangible assets	(11,050)	—	(3,000)
Settlement of net investment hedges	(9,421)	9,675	—
Net cash used in investing activities	(525,972)	(150,024)	(49,212)
Cash flows from financing activities:			
Proceeds from issuance of Senior Notes	1,000,000	—	—
Borrowings under credit facility	455,000	205,000	250,000
Repayments of Senior Notes	(500,000)	—	—
Repayments of borrowings under credit facility	(610,125)	(180,000)	(320,000)
Repurchases of common stock	—	(114,994)	(1,100,000)
Proceeds from issuance of common stock	18,382	12,975	1,015,654
Debt issuance costs	(17,107)	—	(2,851)
Contingent consideration	—	(1,575)	(8,275)
Debt early redemption premium	(15,000)	—	—
Payments of withholding taxes in connection with stock-based awards	(33,740)	(44,366)	(45,374)
Net cash provided by (used in) financing activities	297,410	(122,960)	(210,846)
Effect of exchange rate changes on cash, cash equivalents and restricted cash	25	(2,565)	(7,810)
Net change in cash, cash equivalents, and restricted cash	5,271	9,596	(20,116)
Cash, cash equivalents, and restricted cash, beginning of period	270,689	261,093	281,209
Cash, cash equivalents, and restricted cash, end of period	<u>\$ 275,960</u>	<u>\$ 270,689</u>	<u>\$ 261,093</u>
Supplemental disclosure of non-cash financing activities:			
Fair value of contingent consideration recorded for acquisition	<u>\$ —</u>	<u>\$ —</u>	<u>\$ 2,100</u>

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

PTC Inc.
CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY
(in thousands)

	Common Stock		Additional Paid-in Capital	Accumulated Deficit	Accumulated Other Comprehensive Loss	Total Stockholders' Equity
	Shares	Amount				
Balance as of September 30, 2017	115,333	\$ 1,153	\$ 1,609,030	\$ (650,840)	\$ (73,907)	\$ 885,436
ASU 2016-09 adoption	—	—	681	(556)	—	125
Common stock issued for employee stock-based awards	1,830	18	(18)	—	—	—
Shares surrendered by employees to pay taxes related to stock-based awards	(664)	(6)	(45,368)	—	—	(45,374)
Common stock issued	10,582	106	995,394	—	—	995,500
Common stock issued for employee stock purchase plan	292	2	15,652	—	—	15,654
Compensation expense from stock-based awards	—	—	82,939	—	—	82,939
Net income	—	—	—	51,987	—	51,987
Repurchases of common stock	(9,392)	(93)	(1,099,907)	—	—	(1,100,000)
Unrealized gain on cash flow hedges, net of tax	—	—	—	—	1,928	1,928
Foreign currency translation adjustment	—	—	—	—	(11,767)	(11,767)
Unrealized loss on available-for-sale securities, net of tax	—	—	—	—	(269)	(269)
Change in pension benefits, net of tax	—	—	—	—	(1,570)	(1,570)
Balance as of September 30, 2018	117,981	\$ 1,180	\$ 1,558,403	\$ (599,409)	\$ (85,585)	\$ 874,589
ASU 2016-16 adoption	—	—	—	72,261	—	72,261
ASC 606 adoption	—	—	—	363,218	—	363,218
Common stock issued for employee stock-based awards	1,495	15	(15)	—	—	—
Shares surrendered by employees to pay taxes related to stock-based awards	(504)	(5)	(44,361)	—	—	(44,366)
Common stock issued	—	—	(140)	—	—	(140)
Common stock issued for employee stock purchase plan	275	3	17,612	—	—	17,615
Compensation expense from stock-based awards	—	—	86,400	—	—	86,400
Net loss	—	—	—	(27,460)	—	(27,460)
Repurchases of common stock	(4,348)	(44)	(114,950)	—	—	(114,994)
Unrealized loss on cash flow hedges, net of tax	—	—	—	—	(385)	(385)
Unrealized gain on net investment hedges, net of tax	—	—	—	—	5,087	5,087
Foreign currency translation adjustment	—	—	—	—	(24,755)	(24,755)
Unrealized gain on available-for-sale securities, net of tax	—	—	—	—	530	530
Change in pension benefits, net of tax	—	—	—	—	(5,602)	(5,602)
Balance as of September 30, 2019	114,899	\$ 1,149	\$ 1,502,949	\$ (191,390)	\$ (110,710)	\$ 1,201,998
ASU 2016-02 (ASC 842) adoption	—	—	—	(1,572)	—	(1,572)
Common stock issued for employee stock-based awards	1,392	14	(14)	—	—	—
Shares surrendered by employees to pay taxes related to stock-based awards	(455)	(4)	(33,736)	—	—	(33,740)
Common stock issued for employee stock purchase plan	289	2	18,380	—	—	18,382
Compensation expense from stock-based awards	—	—	115,149	—	—	115,149
Net income	—	—	—	130,695	—	130,695
Unrealized loss on net investment hedges, net of tax	—	—	—	—	(13,242)	(13,242)
Foreign currency translation adjustment	—	—	—	—	22,076	22,076
Unrealized gain on available-for-sale securities, net of tax	—	—	—	—	188	188
Change in pension benefits, net of tax	—	—	—	—	(1,686)	(1,686)
Balance as of September 30, 2020	116,125	\$ 1,161	\$ 1,602,728	\$ (62,267)	\$ (103,374)	\$ 1,438,248

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

PTC Inc.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

1. Description of Business and Basis of Presentation

Business

PTC Inc. was incorporated in 1985 and is headquartered in Boston, Massachusetts. PTC is a global software and services company that delivers a technology platform and solutions to help companies design, manufacture, operate, and service things for a smart, connected world.

Risks and Uncertainties - COVID-19 Pandemic

In December 2019, the COVID-19 coronavirus surfaced. The virus has spread worldwide, including the United States, and has been declared a pandemic by the World Health Organization. The COVID-19 pandemic has significantly impacted global economic activity and has created macroeconomic uncertainty.

We assessed certain accounting matters that generally require consideration of forecasted financial information in context with the information reasonably available to us and the unknown future impacts of COVID-19 as of September 30, 2020, and through the date of this report. The accounting matters assessed included, but were not limited to, our allowance for doubtful accounts, stock-based compensation, the carrying value of our goodwill and other long-lived assets, financial assets, valuation allowances for tax assets and revenue recognition. While there was not a material impact to our consolidated financial statements as of and for the year ended September 30, 2020, resulting from our assessments, our future assessment of our current expectations at that time of the magnitude and duration of COVID-19, as well as other factors, could result in material impacts to our consolidated financial statements in future reporting periods.

Basis of Presentation

Our fiscal year-end is September 30. The consolidated financial statements include PTC Inc. (the parent company) and its wholly owned subsidiaries, including those operating outside the U.S. All intercompany balances and transactions have been eliminated in the consolidated financial statements.

We prepare our financial statements under generally accepted accounting principles in the U.S. that require management to make estimates and assumptions that affect the amounts reported and the related disclosures. Actual results could differ from these estimates.

Changes in Presentation and Reclassifications

On October 1, 2019, we adopted ASU No. 2016-02, Leases: Topic 842 (ASC 842), which replaced the existing guidance in ASC 840, *Leases*. ASC 842 requires lessees to recognize lease assets and lease liabilities on the balance sheet. Upon the adoption of ASC 842 on October 1, 2019, we recognized an operating lease liability of \$224.0 million and a right-of-use asset in the amount of \$167.9 million. We adopted ASC 842 using a modified retrospective transition method in the period of adoption and did not recast prior periods. Since we adopted ASC 842 using the period of adoption transition method, we are not required to present 2020 comparative disclosures under ASC 842. However, we are required to present annual disclosures under the previous U.S. GAAP lease accounting standard (ASC 840). We also elected an accounting policy not to recognize leases with an initial term of one year or less on the balance sheet.

2. Summary of Significant Accounting Policies

Foreign Currency Translation

For our non-U.S. operations where the functional currency is the local currency, we translate assets and liabilities at exchange rates in effect at the balance sheet date and record translation adjustments in stockholders' equity. For our non-U.S. operations where the U.S. dollar is the functional currency, we remeasure monetary assets and liabilities using exchange rates in effect at the balance sheet date and

non-monetary assets and liabilities at historical rates and record resulting exchange gains or losses in foreign currency net losses in the Consolidated Statements of Operations. We translate income statement amounts at average rates for the period. Transaction gains and losses are recorded in foreign currency net losses in the Consolidated Statements of Operations.

Revenue Recognition

Nature of Products and Services

Our sources of revenue include: (1) subscription, (2) perpetual license, (3) support for perpetual licenses and (4) professional services. Revenue is derived from the licensing of computer software products and from related support and/or professional services contracts. Effective October 1, 2018, we record revenues in accordance with the guidance provided by ASC 606, *Revenue from Contracts with Customers*. In accordance with ASC 606, revenue is recognized when a customer obtains control of promised products or services. The amount of revenue recognized reflects the consideration that we expect to be entitled to receive in exchange for these products or services. To achieve the core principle of this standard, we apply the following five steps:

- (1) identify the contract with the customer,
- (2) identify the performance obligations in the contract,
- (3) determine the transaction price,
- (4) allocate the transaction price to performance obligations in the contract, and
- (5) recognize revenue when or as we satisfy a performance obligation.

We enter into contracts that include combinations of license, support and professional services, which are accounted for as separate performance obligations with differing revenue recognition patterns referenced below.

Performance Obligation	When Performance Obligation is Typically Satisfied
Term-based subscriptions	
On-premises software licenses	Point in Time: Upon the later of when the software is made available or the subscription term commences
Support and cloud-based offerings	Over Time: Ratably over the contractual term; commencing upon the later of when the software is made available or the subscription term commences
Perpetual software licenses	Point in Time: when the software is made available
Support for perpetual software licenses	Over Time: Ratably over the contractual term
Professional services	Over time: As services are provided

Through 2018, we recorded revenues for software-related deliverables in accordance with the guidance provided by ASC 985-605, *Software-Related Revenue Recognition* and revenues for non-software deliverables in accordance with ASC 605-25, *Revenue Recognition, Multiple-Element Arrangements*. Under those standards, revenue was recorded when the following criteria were met: (1) persuasive evidence of an arrangement existed, (2) delivery had occurred (generally, FOB shipping point or electronic distribution), (3) the fee was fixed or determinable, and (4) collection was probable. We exercised judgment and used estimates in connection with determining the amounts of software license and services revenues to be recognized in each accounting period.

Judgments and Estimates

Our contracts with customers for subscriptions typically include commitments to transfer term-based, on-premises software licenses bundled with support and/or cloud services. On-premises software is determined to be a distinct performance obligation from support which is sold for the same term of the subscription. For subscription arrangements which include cloud services and on-premises licenses, we assess whether the cloud component is highly interrelated with the on-premises term-based software licenses. Other than a limited population of subscriptions, the cloud component is not currently deemed to be interrelated with the on-premises term software and, as a result, cloud services are accounted for as a distinct performance obligation from the software and support components of the subscription.

Judgment is required to allocate the transaction price to each performance obligation. We use the estimated standalone selling price method to allocate the transaction price for items that are not sold separately. 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. Where subscriptions include on-premises software and support only, we determined that 55% of the estimated standalone selling price for subscriptions is attributable to software licenses and 45% is attributable to support for those licenses. Some of our subscription offerings include a combination of on-premises and cloud-based technology. In such cases, the cloud-based technology is considered distinct and receives an allocation of 5% to 50% of the estimated standalone selling price of the subscription. The amounts allocated to cloud are based on assessment of the relative value of the cloud functionality in the subscription, with the remaining amounts allocated between software and support.

Our multi-year, non-cancellable on-premises subscription contracts provide customers with an annual right to exchange software within the original subscription with other software. Although the exchange right is limited to software products within a similar product grouping, the exchange right is not limited to products with substantially similar features and functionality as those originally delivered. We determined that this right to exchange previously delivered software for different software represents variable consideration to be accounted for as a liability. We have identified a standard portfolio of contracts with common characteristics and applied the expected value method of determining variable consideration associated with this right. Additionally, where there are isolated situations that are outside of the standard portfolio of contracts due to contract size, longer contract duration, or other unique contractual terms, we use the most likely amount method to determine the amount of variable consideration. In both circumstances, the variable consideration included in the transaction price is constrained to the extent it is probable that a significant reversal in the amount of cumulative revenue recognized will not occur when the uncertainty associated with the variable consideration is subsequently resolved. As of September 30, 2020 and 2019, the total refund liability was \$34.5 million and \$22.9 million, respectively, primarily associated with the annual right to exchange on-premises subscription software.

Practical Expedients

We elected certain practical expedients with the adoption of the new revenue standard. We do not account for significant financing components if the period between revenue recognition and when the customer pays for the products or services is one year or less. Additionally, we recognize revenue equal to the amount we have a right to invoice when the amount corresponds directly with the value to the customer of our performance to date.

Cash Equivalents

Our cash equivalents are invested in money market accounts and time deposits of financial institutions. We have established guidelines relative to credit ratings, diversification and maturities that are intended to maintain safety and liquidity. Cash equivalents include highly liquid investments with maturity periods of three months or less when purchased.

Marketable Securities

Our investment portfolio consists of certificates of deposit, commercial paper, corporate notes/bonds and government securities that have a maximum maturity of three years. The longer the duration of these securities, the more susceptible they are to changes in market interest rates and bond yields. All unrealized losses are primarily due to changes in market interest rates and/or bond yields.

We review our investments to identify and evaluate investments that have an indication of possible impairment. We concluded that, at September 30, 2020, the unrealized losses were temporary.

Non-Marketable Equity Investments

We account for non-marketable equity investments at cost, less any impairment, plus or minus adjustments resulting from observable price changes in orderly transactions for identical or similar investments of the same issuer. We monitor non-marketable equity investments for events that could

indicate that the investments are impaired, such as deterioration in the investee's financial condition and business forecasts and lower valuations in recent or proposed financings. Changes in fair value of non-marketable equity investments are recorded in other income (expense), net on the Consolidated Statements of Operations. In the year ended September 30, 2020, we recorded an impairment charge of \$0.5 million related to one of our investments. The carrying value of our non-marketable equity investments is recorded in other assets on the Consolidated Balance Sheets and totaled \$8.9 million and \$9.4 million as of September 30, 2020 and 2019, respectively.

Concentration of Credit Risk and Fair Value of Financial Instruments

The amounts reflected in the Consolidated Balance Sheets for cash and cash equivalents, accounts receivable and accounts payable approximate their fair value due to their short maturities. Financial instruments that potentially subject us to concentration of credit risk consist primarily of investments, trade accounts receivable and foreign currency derivative instruments. Our cash, cash equivalents, and foreign currency derivatives are placed with financial institutions with high credit standings. Our credit risk for derivatives is also mitigated due to the short-term nature of the contracts. Our customer base consists of many geographically diverse customers dispersed across many industries. No individual customer comprised more than 10% of our trade accounts receivable as of September 30, 2020 or 2019 or more than 10% of our revenue for the years ended September 30, 2020, 2019 or 2018.

Fair Value Measurements

Fair value is defined as the price that would be received from selling an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. When determining the fair value measurements for assets and liabilities required to be recorded at fair value, we consider the principal or most advantageous market in which we would transact and consider assumptions that market participants would use when pricing the asset or liability, such as inherent risk, transfer restrictions, and risk of nonperformance. Generally accepted accounting principles prescribe a fair value hierarchy that requires an entity to maximize the use of observable inputs and minimize the use of unobservable inputs when measuring fair value. A financial instrument's categorization within the fair value hierarchy is based upon the lowest level of input that is significant to the fair value measurement. Three levels of inputs that may be used to measure fair value:

- Level 1: quoted prices (unadjusted) in active markets for identical assets or liabilities;
- Level 2: inputs other than Level 1 that are observable, either directly or indirectly, such as quoted prices in active markets for similar assets or liabilities, quoted prices for identical or similar assets or liabilities in markets that are not active, or other inputs that are observable or can be corroborated by observable market data for substantially the full term of the assets or liabilities; or
- Level 3: unobservable inputs that are supported by little or no market activity and that are significant to the fair value of the assets or liabilities.

A financial instrument's level within the fair value hierarchy is based on the lowest level of any input that is significant to the fair value measurement.

Allowance for Doubtful Accounts

We maintain allowances for doubtful accounts for estimated losses resulting from the inability of our customers to make required payments. In determining the adequacy of the allowance for doubtful accounts, management specifically analyzes individual accounts receivable, historical bad debts, customer concentrations, customer credit-worthiness, current economic conditions, and accounts receivable aging trends. Our allowance for doubtful accounts on trade accounts receivable was \$0.5 million as of September 30, 2020, \$0.7 million as of September 30, 2019, and \$0.6 million as of September 30, 2018. Uncollectible trade accounts receivable written-off, net of recoveries, were \$0.2 million, \$0.2 million and \$1.0 million in 2020, 2019 and 2018, respectively. Bad debt expense was \$0.0 million, \$0.3 million and \$0.5 million in 2020, 2019 and 2018, respectively, and is included in general and administrative expenses in the accompanying Consolidated Statements of Operations.

Derivatives

Generally accepted accounting principles require all derivatives, whether designated in a hedging relationship or not, to be recorded on the balance sheet at fair value. Our earnings and cash flows are subject to fluctuations due to changes in foreign currency exchange rates. Our most significant foreign currency exposures relate to Western European countries, Japan, China and Canada. Our foreign currency risk management strategy is principally designed to mitigate the future potential financial impact of changes in the U.S. dollar value of anticipated transactions and balances denominated in foreign currencies resulting from changes in foreign currency exchange rates. We enter into derivative transactions, specifically foreign currency forward contracts, to manage the exposures to foreign currency exchange risk to reduce earnings volatility. We do not enter into derivatives transactions for trading or speculative purposes. For a description of our non-designated hedge, net investment hedge, and cash flow hedge activity see *Note 17. Derivative Financial Instruments*.

Non-Designated Hedges

We hedge our net foreign currency monetary assets and liabilities primarily resulting from foreign currency denominated receivables and payables with foreign exchange forward contracts to reduce the risk that our earnings and cash flows will be adversely affected by changes in foreign currency exchange rates. These contracts have maturities of up to approximately three months. Generally, we do not designate these foreign currency forward contracts as hedges for accounting purposes and changes in the fair value of these instruments are recognized immediately in earnings. Because we enter into forward contracts only as an economic hedge, any gain or loss on the underlying foreign-denominated balance would be offset by the loss or gain on the forward contract. Gains or losses on the underlying foreign-denominated balance are offset by the loss or gain on the forward contract and are included in foreign currency losses, net.

Net Investment Hedges

We translate balance sheet accounts of subsidiaries with foreign functional currencies into U.S. Dollars using the exchange rate at each balance sheet date. Resulting translation adjustments are reported as a component of accumulated other comprehensive loss on the Consolidated Balance Sheet. We designate certain foreign exchange forward contracts as net investment hedges against exposure on translation of balance sheet accounts of Euro functional subsidiaries. Net investment hedges partially offset the impact of foreign currency translation adjustment recorded in accumulated other comprehensive loss on the Consolidated Balance Sheet. All foreign exchange forward contracts are carried at fair value on the Consolidated Balance Sheet and the maximum duration of foreign exchange forward contracts is approximately three months.

Net investment hedge relationships are designated at inception, and effectiveness is assessed retrospectively on a quarterly basis using the net equity position of Euro functional subsidiaries. As the forward contracts are highly effective in offsetting exchange rate exposure, we record changes in these net investment hedges in accumulated other comprehensive loss and subsequently reclassify them to foreign currency translation adjustment in accumulated other comprehensive loss at the time of forward contract maturity. Changes in the fair value of foreign exchange forward contracts due to changes in time value are excluded from the assessment of effectiveness. Our derivatives are not subject to any credit contingent features. We manage credit risk with counterparties by trading among several counterparties, and we review our counterparties' credit at least quarterly.

Leases

We determine if an arrangement is a lease at inception. Operating leases are included in operating lease right-of-use assets and operating lease obligations on our Consolidated Balance Sheets. Our operating leases are primarily for office space, cars, servers, and office equipment. We made an election not to separate lease components from non-lease components for office space, servers and office equipment. We combine fixed payments for non-lease components with lease payments and account for them together as a single lease component which increases the amount of our lease assets and liabilities. Finance leases are included in property and equipment, accrued expenses and other current liabilities, and other liabilities on our Consolidated Balance Sheets.

Right-of-use assets represent our right to use an underlying asset for the lease term and lease liabilities represent our obligation to make lease payments arising from the leases. Right-of-use assets and liabilities are recognized at the lease commencement date based on the present value of lease payments over the lease term. As most of our leases do not provide an implicit rate, we generally use our incremental borrowing rate based on the estimated rate of interest for collateralized borrowing over a similar term as that of the lease payments at the commencement date. The right-of-use assets include any lease payments made and exclude lease incentives received. Operating lease expense is recognized on a straight-line basis over the lease term.

Our lease terms include periods under options to extend or terminate the lease when it is reasonably certain that we will exercise that option. We generally use the base non-cancellable lease term when determining the lease assets and liabilities.

Certain lease agreements contain variable payments, which are expensed as incurred and not included in the lease assets and liabilities. These variable payments include insurance, taxes, consumer price index payments, and payments for maintenance and utilities.

Our operating leases expire at various dates through 2037.

Property and Equipment

Property and equipment are recorded at cost and depreciated using the straight-line method over their estimated useful lives. Computer hardware and software are typically amortized over three to five years, and furniture and fixtures over three to seven years. Leasehold improvements are amortized over the shorter of their useful lives or the remaining terms of the related leases. Property and equipment under capital leases are amortized over the lesser of the lease term or their estimated useful lives. Maintenance and repairs are charged to expense when incurred; additions and improvements are capitalized. When an item is sold or retired, the cost and related accumulated depreciation is relieved, and the resulting gain or loss, if any, is recognized in income.

Software Development Costs

We incur costs to develop computer software to be licensed or otherwise marketed to customers. Our research and development expenses consist principally of salaries and benefits, costs of computer equipment, and facility expenses. Research and development costs are expensed as incurred, except for costs of internally developed or externally purchased software that qualify for capitalization. Development costs for software to be sold externally incurred subsequent to the establishment of technological feasibility, but prior to the general release of the product, are capitalized and, upon general release, are amortized using the greater of either the straight-line method over the expected life of the related products or based upon the pattern in which economic benefits related to such assets are realized. The straight-line method is used if it approximates the same amount of expense as that calculated using the ratio that current period gross product revenues bear to total anticipated gross product revenues. No development costs for software to be sold externally were capitalized in 2020, 2019 or 2018. In 2020, we purchased software of \$11.5 million. Additionally, we acquired capitalized software through business combinations (for further detail, see *Note 6. Acquisitions*). These assets are included in acquired intangible assets in the accompanying Consolidated Balance Sheets.

Business Combinations

We allocate the purchase price of acquisitions to the tangible and intangible assets acquired and liabilities assumed based on their estimated fair value. Goodwill is measured as the excess of the purchase price over the value of 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. Any adjustments to estimated fair value are recorded to goodwill, provided that we are within the measurement period (up to one year from the acquisition date) and that we continue to collect information to determine estimated fair value. Subsequent to the measurement period or our final determination of estimated fair value, whichever comes first, adjustments are recorded in the Consolidated Statements of Operations.

Goodwill, Acquired Intangible Assets and Long-lived Assets

Goodwill is the amount by which the purchase price in a business acquisition exceeds the fair value of net identifiable assets on the date of purchase.

Goodwill is evaluated for impairment annually as of the end of the third quarter, or more frequently if events or changes in circumstances indicate that the asset might be impaired. Factors we consider important, on an overall company basis and segment basis, when applicable, that could trigger an impairment review include significant under-performance relative to historical or projected future operating results, significant changes in our use of the acquired assets or the strategy for our overall business, significant negative industry or economic trends, a significant decline in our stock price for a sustained period and a reduction of our market capitalization relative to net book value.

Our annual goodwill impairment test is based on either a quantitative or qualitative assessment. A quantitative assessment compares the fair value of the reporting unit to its carrying value. If the reporting unit's carrying value exceeds its fair value, we record an impairment loss equal to the difference between the carrying value of goodwill and its estimated fair value. We estimate the fair values of our reporting units using discounted cash flow valuation models. Those models require estimates of future revenues, profits, capital expenditures, working capital, terminal values based on revenue multiples, and discount rates for each reporting unit. We estimate these amounts by evaluating historical trends; current budgets and operating plans, including consideration of the impact of the COVID-19 pandemic on our future results; and industry data. A qualitative assessment is designed to determine whether we believe it is more likely than not that the fair values of our reporting units exceed their carrying values. Qualitative assessment includes a review of qualitative factors, including company-specific (financial performance and long-range plans), industry, and macroeconomic factors, and a consideration of the fair value of each reporting unit at the last valuation date.

We completed our annual goodwill impairment review as of June 27, 2020, based on a quantitative assessment. The estimated fair value of each reporting unit exceeded its carrying value as of June 27, 2020. Through September 30, 2020, there were no events or changes in circumstances that indicated that the carrying values of goodwill or acquired intangible assets may not be recoverable.

Long-lived assets primarily include property and equipment and acquired intangible assets with finite lives (including purchased software, customer lists and trademarks). Purchased software is amortized over periods up to 16 years, customer lists are amortized over periods up to 12 years and trademarks are amortized over periods up to 12 years. We review long-lived assets for impairment when events or changes in business circumstances indicate that the carrying amount of the assets may not be fully recoverable or that the useful lives of those assets are no longer appropriate. An impairment test is based on a comparison of the undiscounted cash flows to the recorded value of the asset or asset group. If impairment is indicated, the asset is written down to its estimated fair value based on a discounted cash flow analysis.

Advertising Expenses

Advertising costs are expensed as incurred. Total advertising expenses incurred were \$3.8 million, \$3.6 million and \$2.9 million in 2020, 2019 and 2018, respectively and are included in sales and marketing expenses in the accompanying Consolidated Statements of Operations.

Income Taxes

Our income tax expense includes U.S. and international income taxes. Certain items of income and expense are not reported in tax returns and financial statements in the same year. The tax effects of these differences are reported as deferred tax assets and liabilities. Deferred tax assets are recognized for the estimated future tax effects of deductible temporary differences and tax operating loss and credit carryforwards. Changes in deferred tax assets and liabilities are recorded in the provision for income taxes. We assess the likelihood that our deferred tax assets will be recovered from future taxable income and, to the extent we believe that it is more likely than not that all or a portion of deferred tax assets will not be realized, we establish a valuation allowance. To the extent we establish a valuation allowance or increase this allowance in a period, we include an expense within the tax provision in the Consolidated Statements of Operations.

Comprehensive Income (Loss)

Comprehensive income (loss) consists of net income (loss) and other comprehensive income (loss), which includes foreign currency translation adjustments, changes in unrecognized actuarial gains and losses (net of tax) related to pension benefits, unrealized gains and losses on hedging instruments and unrealized gains and losses on marketable securities. We do not record tax provisions or benefits for the net changes in the foreign currency translation adjustment, as we intend to reinvest permanently undistributed earnings of our foreign subsidiaries. Accumulated other comprehensive loss is reported as a component of stockholders' equity and, as of September 30, 2020, comprised the following: cumulative translation adjustment losses of \$69.1 million, unrecognized actuarial losses related to pension benefits of \$37.2 million (\$26.4 million net of tax), unrecognized gains on marketable securities of \$0.3 million (\$0.3 million net of tax), and accumulated net losses from net investment hedges of \$8.2 million (\$8.2 million net of tax). As of September 30, 2019, accumulated other comprehensive loss comprised the following: cumulative translation adjustment losses of \$91.2 million, unrecognized actuarial losses related to pension benefits of \$34.9 million (\$24.8 million net of tax), unrecognized gains on marketable securities of \$0.1 million, and accumulated net gains from net investment hedges of \$6.8 million (\$5.1 million net of tax).

Earnings (Loss) per Share (EPS)

Basic EPS is calculated by dividing net income by the weighted average number of shares outstanding during the period. Unvested restricted shares, although legally issued and outstanding, are not considered outstanding for purposes of calculating basic earnings per share. Diluted EPS is calculated by dividing net income by the weighted average number of shares outstanding plus the dilutive effect, if any, of outstanding stock options, restricted shares and restricted stock units using the treasury stock method. The calculation of the dilutive effect of outstanding equity awards under the treasury stock method includes consideration of proceeds from the assumed exercise of stock options, unrecognized compensation expense and any tax benefits as additional proceeds. Due to the net loss generated in the year ended September 30, 2019, approximately 1.0 million restricted stock units were excluded from the computation of diluted EPS in that year as the effect would have been anti-dilutive. Anti-dilutive shares excluded from the calculations of diluted EPS were immaterial in the years ended September 30, 2020 and 2018.

The following table presents the calculation for both basic and diluted EPS:

(in thousands, except per share data)

	Year ended September 30,		
	2020	2019	2018
Net income (loss)	\$ 130,695	\$ (27,460)	\$ 51,987
Weighted average shares outstanding	115,663	117,724	116,390
Dilutive effect of employee stock options, restricted shares and restricted stock units	604	—	1,768
Diluted weighted average shares outstanding	116,267	117,724	118,158
Basic earnings (loss) per share	\$ 1.13	\$ (0.23)	\$ 0.45
Diluted earnings (loss) per share	\$ 1.12	\$ (0.23)	\$ 0.44

Stock-Based Compensation

We measure the compensation cost of employee services received in exchange for an award of equity instruments based on the grant-date fair value of the award. That cost is recognized over the period during which an employee is required to provide service in exchange for the award. See *Note 12. Equity Incentive Plan* for a description of the types of stock-based awards granted, the compensation expense related to such awards and detail of equity-based awards outstanding. See *Note 8. Income Taxes* for detail of the tax benefit related to stock-based compensation recognized in the Consolidated Statements of Operations.

Recently Adopted Accounting Pronouncements

Leases

In February 2016, the Financial Accounting Standards Board (FASB) issued Accounting Standard Update (ASU) 2016-02, Leases: Topic 842 (ASC 842), which replaced the existing guidance in ASC 840, *Leases*. The updated standard aims to increase transparency and comparability across organizations by requiring lessees to recognize lease assets and lease liabilities on the balance sheet and to disclose important information about leasing arrangements. We adopted ASC 842 effective October 1, 2019 (the effective date). ASC 842 requires a modified retrospective transition method that could either be applied at the earliest comparative period in the financial statements or in the period of adoption. We elected to use the period of adoption (October 1, 2019) transition method and therefore did not recast prior periods. Since we adopted the new standard using the period of adoption transition method, we are not required to present 2020 comparative disclosures under ASC 842. However, we are required to present the required annual disclosures under the previous U.S. GAAP lease accounting standard (ASC 840).

We elected the package of practical expedients as permitted under the transition guidance, which allowed us: (1) to carry forward the historical lease classification; (2) not to reassess whether expired or existing contracts are or contain leases; and (3) not to reassess the treatment of initial direct costs for existing leases. In addition, we elected an accounting policy not to recognize leases with an initial term of one year or less on the balance sheet.

Upon the adoption of this standard on October 1, 2019, we recognized an operating lease liability of \$224.0 million, representing the present value of the minimum lease payments remaining as of the adoption date, and a right-of-use asset in the amount of \$167.9 million. The right-of-use asset reflects adjustments for derecognition of deferred leasing incentives. We also recorded a \$1.6 million decrease to retained earnings as a result of the change in scheduling of reversal of temporary tax differences due to the adoption of ASC 842.

Pension Plans

In August 2018, FASB issued ASU 2018-14, Compensation—Retirement Benefits—Defined Benefit Plans—General (Subtopic 715-20), which amends, adds and removes disclosure requirements for pension and other postretirement plans. We adopted ASU 2018-14 for the year ended September 30, 2020 with no impact on our consolidated financial statements. See *Note 14. Pension Plans* for disclosure changes made.

Pending Accounting Pronouncements

Reference Rate Reform

In March 2020, the FASB issued ASU 2020-04, Reference Rate Reform (Topic 848): Facilitation of the Effects of Reference Rate Reform on Financial Reporting. The ASU provides optional guidance for contract modifications and certain hedging relationships associated with the transition from reference rates that are expected to be discontinued. ASU 2020-04 is effective for all entities upon issuance through December 31, 2022. We are still evaluating the impact, but do not expect the standard to have a material impact on our consolidated financial statements.

Income Taxes

In December 2019, the FASB issued Accounting Standards Update ASU 2019-12, Income Taxes (Topic 740) on Simplifying the Accounting for Income Taxes. The decisions reflected in ASU 2019-12 update specific areas of ASC 740, *Income Taxes*, to reduce complexity while maintaining or improving the usefulness of the information provided to users of financial statements. The new standard will be effective for us in the first quarter of 2022, though early adoption of the amendments is permitted. We are currently evaluating the impact the standard will have on our consolidated financial statements, but at this time we do not expect it to be material.

Goodwill and Other—Internal-Use Software

In August 2018, the FASB issued ASU 2018-15, Intangibles—Goodwill and Other—Internal-Use Software (Subtopic 350-40): Customer's Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement That is a Service Contract, which aligns the requirements for capitalizing implementation costs in cloud computing arrangements with the requirements for capitalizing implementation costs incurred to develop or obtain internal-use software. ASU 2018-15 will be effective for us in the first quarter of 2021. Entities can choose to adopt the new guidance prospectively or retrospectively. We plan to adopt this standard using the prospective adoption approach. We do not expect this accounting standard to have a material impact on our consolidated financial statements.

Fair Value Measurement

In August 2018, the FASB issued ASU 2018-13, Fair Value Measurement (Topic 820): Disclosure Framework—Changes to the Disclosure Requirements for Fair Value Measurement, which eliminates, modifies and adds disclosure requirements for fair value measurements. The new standard will be effective for us in the first quarter of 2021. We do not expect this accounting standard to have a material impact on our consolidated financial statements.

Financial Instruments—Credit Losses

In June 2016, the FASB issued ASU 2016-13, Financial Instruments—Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments, along with subsequent amendments, which replace the incurred loss impairment methodology in current U.S. GAAP with a methodology that reflects expected credit losses and requires consideration of a broader range of reasonable and supportable information when recording credit loss estimates. The new standard will be effective for us in the first quarter of 2021. We are currently evaluating the impact the standard will have on our consolidated financial statements, but at this time we do not expect it to be material.

3. Revenue from Contracts with Customers

We adopted ASC 606, *Revenue from Contracts with Customers*, effective October 1, 2018, using the modified retrospective method. Upon adoption of ASC 606, we recorded a decrease in accumulated deficit of \$432.2 million (\$363.2 million, net of tax) due to the cumulative effect of the ASC 606 adoption, with an impact from revenue adjustments of \$366.8 million primarily derived from acceleration of revenue related to on-premises subscription software licenses. The revenue-related adjustment was reflected on the adjusted opening balance sheet as an increase to unbilled receivables of \$218.5 million, a decrease to deferred revenue of \$143.2 million and an increase to other assets of \$5.1 million.

Contract Assets and Contract Liabilities

(in thousands)

	September 30,	
	2020	2019
Contract asset	\$ 11,984	\$ 21,038
Deferred revenue	\$ 426,465	\$ 396,632

As of September 30, 2020, \$6.9 million of our contract assets are expected to be transferred to receivables within the next 12 months and therefore are included in other current assets. The remainder is included in other long-term assets and expected to be transferred within the next 24 months. As of September 30, 2019, the entire contract asset balance was included in other current assets.

Approximately \$15.1 million of the September 30, 2019 contract asset balance was transferred to receivables during the year ended September 30, 2020 as a result of the right to payment becoming unconditional. The majority of the contract asset balance relates to two large professional services contracts with invoicing terms based on performance milestones. The net decrease in contract assets of \$9.0 million includes an increase of approximately \$6.1 million related to revenue recognized in the period, net of billings.

During the year ended September 30, 2020, we recognized \$379.8 million of revenue that was included in deferred revenue as of September 30, 2019 and there were additional deferrals of \$409.7

million, primarily related to new billings. The additional deferrals include an immaterial amount from the acquisition of Onshape. For subscription contracts, we generally invoice customers annually. The balance of total short- and long-term receivables as of September 30, 2020 was \$511.3 million, compared to \$412.5 million as of September 30, 2019.

Costs to Obtain or Fulfill a Contract

ASC 606 requires the capitalization of certain incremental costs of obtaining a contract, which impacts the period in which we record our commission expense. Prior to our adoption of ASC 606, we recognized commissions expense as incurred. Under ASC 606, we are required to recognize these expenses over the period of benefit associated with these costs. This results in a deferral of certain commission expenses each period. Upon adoption of ASC 606 on October 1, 2018, we recognized a \$70.0 million asset for deferred commission related to contracts that were not completed prior to October 1, 2018. As the revenue recognition pattern has changed under ASC 606, the recognition of costs to fulfill contracts has also changed to match this pattern of recognition. As of October 1, 2018, this resulted in a \$2.8 million increase in our accumulated deficit with recognition of an offsetting current liability.

We recognize an asset for the incremental costs of obtaining a contract with a customer if the benefit of those costs is expected to be longer than one year. These deferred costs (primarily commissions) are amortized proportionately related to revenue over five years, which is generally longer than the term of the initial contract because of anticipated renewals as commissions for renewals are not commensurate with commissions related to our initial contracts. As of September 30, 2020 and September 30, 2019, deferred costs of \$33.9 million and \$27.7 million, respectively, were included in other current assets and \$72.9 million and \$64.8 million, respectively, were included in other assets (non-current). Amortization expense related to costs to obtain a contract with a customer was \$36.2 million and \$30.4 million in the years ended September 30, 2020 and 2019, respectively. There were no impairments of the contract cost asset in the years ended September 30, 2020 and 2019.

Remaining Performance Obligations

Our contracts with customers include amounts allocated to performance obligations that will be satisfied at a later date. As of September 30, 2020, the amounts include additional performance obligations of \$426.5 million recorded in deferred revenue and \$794.4 million that are not yet recorded in the consolidated balance sheets. We expect to recognize approximately 85% of the total \$1,220.9 million over the next 24 months, with the remaining amount thereafter. Some of our multi-year subscription contracts with start dates on or after October 1, 2018 contain a limited annual cancellation right. For such contracts, we consider each annual period a discrete contract. Early in the fourth quarter of 2019, we discontinued offering the cancellation right for substantially all new contracts. Remaining performance obligations do not include the cancellable value for subscriptions which contain this clause.

Disaggregation of Revenue

(in thousands)

	Year ended September 30,			
	As Reported ASC 606	As Reported ASC 606	ASC 605	As Reported ASC 605
	2020	2019	2019	2018
Total recurring revenue	\$ 1,281,949	\$ 1,017,398	\$ 1,078,627	\$ 978,853
Perpetual license	32,668	70,702	72,191	109,634
Professional services	143,798	167,531	160,676	153,337
Total revenue	<u>\$ 1,458,415</u>	<u>\$ 1,255,631</u>	<u>\$ 1,311,494</u>	<u>\$ 1,241,824</u>

For further disaggregation of revenue by geographic region and product group see *Note 18. Segment and Geographic Information*.

4. Restructuring and Other Charges

Restructuring and other charges, net includes restructuring charges (credits), headquarters relocation charges, and impairment and accretion expense charges of \$5.6 million related to the lease assets of exited facilities. Refer to *Note 19. Leases* for additional information about exited facilities.

In 2020, restructuring and other charges, net totaled \$32.7 million, of which \$26.4 million is attributable to restructuring charges, \$5.6 million is attributable to impairment and accretion expense related to exited lease facilities, and \$0.7 million is attributable to accelerated depreciation related to the planned exit of a facility. We made cash payments related to restructuring charges of \$31.5 million (\$27.3 million related to the 2020 restructuring, \$3.9 million related to the 2019 restructuring, and \$0.3 million related to the 2016 restructuring).

In 2019, restructuring and other charges, net totaled \$51.1 million, of which \$48.6 million was attributable to restructuring charges (\$0.2 million of which related to prior facility restructuring actions) and \$2.5 million was attributable to headquarters relocation charges. We made cash payments related to restructuring charges of \$24.7 million (\$23.6 million related to the 2019 restructuring and \$1.1 million related to the 2016 restructuring).

In 2018, restructuring and other charges, net totaled \$1.0 million, all of which was attributable to restructuring charges (of which \$0.2 million related to the 2016 restructuring and \$0.8 million related to the 2015 restructuring). We made cash payments related to restructuring charges of \$2.8 million (\$2.6 million related to the 2016 restructuring and \$0.2 million related to the 2015 restructuring).

Restructuring Charges

During the first quarter of 2020, we initiated a restructuring program as part of a realignment associated with expected synergies and operational efficiencies related to the Onshape acquisition. In the year ended September 30, 2020, we incurred \$30.8 million in connection with this restructuring plan for termination benefits associated with approximately 250 employees.

During the first quarter of 2019, we initiated a restructuring plan to realign our workforce to shift investment to support Industrial Internet of Things and Augmented Reality strategic opportunities. As this was a realignment of resources rather than a cost-savings initiative, it did not result in significant cost savings. The restructuring plan was completed in the first quarter of 2019 and resulted in restructuring charges of \$16.3 million for termination benefits associated with approximately 240 employees, substantially all of which has been paid. In the year ended September 30, 2020, we recorded \$0.1 million of credits related to this restructuring plan.

During the second quarter of 2019, we relocated our worldwide headquarters to the Boston Seaport District. We incurred a restructuring charge for the former headquarters lease, which expires in November 2022. As a result, we bear overlapping rent obligations for those premises and, in 2019, we recorded restructuring charges of approximately \$32.7 million, based on the net present value of remaining lease commitments net of estimated sublease income. Other costs associated with the move were recorded as incurred. In 2020, we recorded a \$4.3 million net credit for accrued variable operating restructuring charges, primarily associated with the exit of a portion of our former headquarters lease under a partial buy-out agreement with the landlord.

The following table summarizes restructuring accrual activity for the three years ended September 30, 2020:

<i>(in thousands)</i>	Employee severance and related benefits	Facility closures and other costs	Consolidated total
Balance, September 30, 2017	\$ 1,736	\$ 4,508	\$ 6,244
Charges (credits) to operations, net	(509)	(494)	(1,003)
Cash disbursements	(1,247)	(1,509)	(2,756)
Foreign exchange impact	20	(90)	(70)
Balance, September 30, 2018	—	2,415	2,415
Charges to operations, net	15,704	32,908	48,612
Cash disbursements	(15,402)	(9,319)	(24,721)
Other non-cash charges	—	4,812	4,812
Foreign exchange impact	(4)	(28)	(32)
Balance, September 30, 2019	298	30,788	31,086
ASC 842 adoption	—	(16,462)	(16,462)
Charges (credits) to operations, net	30,690	(4,263)	26,427
Cash disbursements	(27,256)	(4,246)	(31,502)
Other non-cash	—	164	164
Foreign exchange impact	260	14	274
Balance, September 30, 2020	<u>\$ 3,992</u>	<u>\$ 5,995</u>	<u>\$ 9,987</u>

The accrual for employee severance and related benefits is included in accrued compensation and benefits in the Consolidated Balance Sheets.

Upon adoption of ASC 842, \$16.5 million of accrued expenses and other current liabilities, representing the present value of lease commitments net of estimated sublease income, were reclassified to lease assets and obligations: \$7.6 million to lease assets, \$9.2 million to short-term lease obligations and \$14.9 million to long-term lease obligations.

As of September 30, 2020, the remaining restructuring facility accrual of \$6.0 million relates to variable non-lease costs not subject to ASC 842, of which, \$2.8 million is included in accrued expenses and other current liabilities and \$3.2 million is included in other liabilities in the Consolidated Balance Sheets.

Of the accrual for facility closures and related costs, as of September 30, 2019, \$11.9 million is included in accrued expenses and other current liabilities and \$18.9 million is included in other liabilities in the Consolidated Balance Sheets.

Other - Headquarters Relocation Charges

Headquarters relocation charges represent other expenses associated with exiting our prior Needham headquarters facility and relocating to our new worldwide headquarters in the Boston Seaport District. In 2019 and 2018, we recorded \$1.9 million and \$4.8 million, respectively, of accelerated depreciation expense related to shortening the estimated useful lives of leasehold improvements related to the Needham location. Headquarters relocation charges for 2019 also included \$0.6 million of rental expense for the Needham facility that overlapped with rental expense for the new Seaport headquarters.

5. Property and Equipment

Property and equipment consisted of the following:

<i>(in thousands)</i>	September 30,	
	2020	2019
Computer hardware and software	\$ 330,392	\$ 313,967
Furniture and fixtures	30,251	28,445
Leasehold improvements	99,883	97,657
Gross property and equipment	460,526	440,069
Accumulated depreciation and amortization	(359,027)	(334,538)
Net property and equipment	<u>\$ 101,499</u>	<u>\$ 105,531</u>

Depreciation expense was \$24.7 million, \$26.7 million and \$29.4 million in 2020, 2019 and 2018, respectively.

6. Acquisitions

Acquisition-related costs were \$8.6 million, \$3.1 million and \$0.5 million in 2020, 2019 and 2018, respectively. Acquisition-related costs include direct costs of potential and completed acquisitions (e.g., investment banker fees and professional fees, including legal and valuation services) and expenses related to acquisition integration activities (e.g., professional fees and severance). In addition, subsequent adjustments to our initial estimated amount of contingent consideration associated with specific acquisitions are included within acquisition-related charges. These costs are classified in general and administrative expenses in the accompanying Consolidated Statements of Operations.

Our results of operations include the results of acquired businesses beginning on their respective acquisition date. For all acquisitions made in 2020, our results of operations, if presented on a pro forma basis, would not differ materially from our reported results.

Onshape

On November 1, 2019, we completed our acquisition of Onshape Inc. pursuant to an Agreement and Plan of Merger dated as of October 23, 2019 by and among Onshape Inc., OPAL Acquisition Corporation and the Stockholder Representative named therein, the material terms of which are described in the Form 8-K filed by PTC on October 23, 2019 and which is filed as Exhibit 1.1 to that Form 8-K. PTC paid approximately \$469 million, net of cash acquired of \$7.5 million, for Onshape, which amount we borrowed under our existing credit facility. The acquisition of Onshape did not add material revenue in 2020.

The acquisition of Onshape has been accounted for as a business combination. Assets acquired and liabilities assumed have been recorded at their estimated fair values as of the acquisition date. The fair values of intangible assets were based on valuations using a discounted cash flow model which requires the use of significant judgment and assumptions, including estimating future revenues and costs. The excess of the purchase price over the tangible assets, identifiable intangible assets and assumed liabilities was recorded as goodwill.

The purchase price allocation resulted in \$364.9 million of goodwill, \$56.8 million of customer relationships, \$47.3 million of purchased software, \$3.6 million of trademarks and \$4.1 million of other net liabilities. The acquired customer relationships, purchased software, and trademarks are being amortized over useful lives of 10 years, 16 years, and 15 years, respectively, based on the expected benefit pattern of the assets. The acquired goodwill was allocated to our software products segment and will not be deductible for income tax purposes. The resulting amount of goodwill reflects the expected value that will be created by the expected acceleration of CAD and PLM growth, especially in the low end of the market, and participation in expected future growth of the CAD and PLM SaaS market. In addition, over the longer term, we anticipate building products based on the Onshape SaaS technology platform.

Frustum

On November 19, 2018, we acquired Frustum Inc. for \$69.5 million (net of cash acquired of \$0.7 million). We financed the acquisition with borrowings under our credit facility. Frustum engaged in next-generation computer-aided design, including generative design, an approach that leverages artificial intelligence to generate design options. At the time of the acquisition, Frustum had approximately 12 employees and historical annualized revenues were not material. The acquisition of Frustum did not add material revenue in 2019.

The acquisition of Frustum has been accounted for as a business combination. Assets acquired and liabilities assumed have been recorded at their estimated fair values as of the acquisition date. The fair values of intangible assets were based on valuations using a discounted cash flow model which requires the use of significant estimates and assumptions, including estimating future revenues and costs. The excess of the purchase price over the tangible assets, identifiable intangible assets and assumed liabilities was recorded as goodwill.

The purchase price allocation resulted in \$53.7 million of goodwill, \$17.9 million of purchased software and \$2.1 million of other net liabilities. The acquired technology is being amortized over a useful life of 15 years based on the expected benefit pattern of the assets. The acquired goodwill was allocated to our software products segment and will not be deductible for income tax purposes. The resulting amount of goodwill reflects the expected value that will be created by integrating Frustum generative design technology into our CAD solutions.

Other Acquisitions

In the fourth quarter of 2020, we completed an acquisition for \$15.0 million (net of cash acquired of \$0.1 million). At the time of acquisition, the company had approximately 20 employees and historical annualized revenues were not material. This acquisition did not add material revenue in 2020.

The acquisition was accounted for as a business combination. Assets acquired and liabilities assumed have been recorded at their estimated fair values as of the acquisition dates. The fair values of intangible assets were based on valuations using a discounted cash flow model which requires the use of significant estimates and assumptions, including estimating future revenues and costs. The excess of the purchase price over the tangible assets, identifiable intangible assets and assumed liabilities was recorded as goodwill.

The purchase price allocation resulted in \$12.3 million of goodwill, \$3.4 million of purchased software, \$0.7 of customer relationships and \$1.4 million of other net liabilities. The purchased software and customer relationships are being amortized over useful lives of 7 years and 10 years, respectively, based on the expected benefit pattern of the assets. The acquired goodwill was allocated to our software segment and will not be deductible for income tax purposes.

In the third quarter of 2019, we completed two acquisitions for \$17.3 million (net of cash acquired of \$0.3 million). At the time of acquisitions, the combined companies had approximately 95 employees and historical annualized revenues were not material. These acquisitions did not add material revenue in 2019.

The acquisitions were accounted for as business combinations. Assets acquired and liabilities assumed have been recorded at their estimated fair values as of the acquisition dates. The fair values of intangible assets were based on valuations using a discounted cash flow model which requires the use of significant estimates and assumptions, including estimating future revenues and costs. The excess of the purchase price over the tangible assets, identifiable intangible assets and assumed liabilities was recorded as goodwill.

The purchase price allocation resulted in \$12.6 million of goodwill, \$3.4 million of customer relationships and \$1.3 million of other net assets. The acquired goodwill was allocated to our services segment and will not be deductible for income tax purposes.

7. Goodwill and Acquired Intangible Assets

We have two operating and reportable segments: (1) Software Products and (2) Professional Services. We assess goodwill for impairment at the reporting unit level. Our reporting units are determined based on the components of our operating segments that constitute a business for which discrete financial information is available and for which operating results are regularly reviewed by segment management. Our reporting units are the same as our operating segments.

As of September 30, 2020, goodwill and acquired intangible assets in the aggregate attributable to our Software Products segment was \$1,818.1 million and attributable to our Professional Services segment was \$45.3 million. As of September 30, 2019, goodwill and acquired intangible assets in the aggregate attributable to our Software Products segment was \$1,362.4 million and attributable to our Professional Services segment was \$45.7 million.

Goodwill and acquired intangible assets consisted of the following:

<i>(in thousands)</i>	September 30, 2020			September 30, 2019		
	Gross Carrying Amount	Accumulated Amortization	Net Book Value	Gross Carrying Amount	Accumulated Amortization	Net Book Value
Goodwill (not amortized)			\$ 1,625,786			\$ 1,238,179
Intangible assets with finite lives (amortized)(1):						
Purchased software	\$ 443,275	\$ 309,124	\$ 134,151	\$ 377,359	\$ 278,144	\$ 99,215
Capitalized software	22,877	22,877	—	22,877	22,877	—
Customer lists and relationships	418,953	322,092	96,861	355,931	288,828	67,103
Trademarks and trade names	22,687	16,129	6,558	18,891	15,260	3,631
Other	4,017	4,017	—	3,910	3,910	—
	<u>\$ 911,809</u>	<u>\$ 674,239</u>	<u>\$ 237,570</u>	<u>\$ 778,968</u>	<u>\$ 609,019</u>	<u>\$ 169,949</u>
Total goodwill and acquired intangible assets			<u>\$ 1,863,356</u>			<u>\$ 1,408,128</u>

(1) The weighted-average useful lives of purchased software, customer lists and relationships, and trademarks and trade names with a remaining net book value are 11 years, 10 years, and 11 years, respectively.

The changes in the carrying amounts of goodwill from September 30, 2019 to September 30, 2020 are due to the impact of acquisitions and to foreign currency translation adjustments related to those asset balances that are recorded in non-U.S. currencies.

Changes in goodwill presented by reportable segment were as follows:

<i>(in thousands)</i>	Software Products	Professional Services	Total
Balance, September 30, 2018	\$ 1,152,720	\$ 29,737	\$ 1,182,457
Frustum acquisition	53,673	—	53,673
Other acquisitions	—	12,645	12,645
Foreign currency translation adjustments	(10,329)	(267)	(10,596)
Balance, September 30, 2019	<u>\$ 1,196,064</u>	<u>\$ 42,115</u>	<u>\$ 1,238,179</u>
Onshape Acquisition	364,910	—	364,910
Other acquisitions	12,262	—	12,262
Foreign currency translation adjustments	10,080	355	10,435
Balance, September 30, 2020	<u>\$ 1,583,316</u>	<u>\$ 42,470</u>	<u>\$ 1,625,786</u>

The aggregate amortization expense for intangible assets with finite lives recorded for the years ended September 30, 2020, 2019 and 2018 was reflected in our Consolidated Statements of Operations as follows:

<i>(in thousands)</i>	Year ended September 30,		
	2020	2019	2018
Amortization of acquired intangible assets	\$ 28,713	\$ 23,841	\$ 31,350
Cost of software revenue	27,391	27,307	26,706
Total amortization expense	<u>\$ 56,104</u>	<u>\$ 51,148</u>	<u>\$ 58,056</u>

The estimated aggregate future amortization expense for intangible assets with finite lives remaining as of September 30, 2020 is \$52.9 million for 2021, \$39.1 million for 2022, \$29.0 million for 2023, \$20.3 million for 2024, \$17.3 million for 2025 and \$79.0 million thereafter.

8. Income Taxes

Our income (loss) before income taxes consisted of the following:

<i>(in thousands)</i>	Year ended September 30,		
	2020	2019	2018
Domestic	\$ (73,865)	\$ (112,077)	\$ (114,591)
Foreign	208,571	132,377	143,247
Total income before income taxes	<u>\$ 134,706</u>	<u>\$ 20,300</u>	<u>\$ 28,656</u>

Our provision (benefit) for income taxes consisted of the following:

(in thousands)

	Year ended September 30,		
	2020	2019	2018
Current:			
Federal	\$ 2,187	\$ 13,130	\$ 3,009
State	1,266	(945)	2,003
Foreign	25,199	33,867	28,213
	28,652	46,052	33,225
Deferred:			
Federal	(26,811)	22,911	(12,594)
State	(4,063)	1,759	(445)
Foreign	6,233	(22,962)	(43,517)
	(24,641)	1,708	(56,556)
Total provision (benefit) for income taxes	\$ 4,011	\$ 47,760	\$ (23,331)

Taxes computed at the statutory federal income tax rates are reconciled to the provision (benefit) for income taxes as follows:

(in thousands)

	Year ended September 30,					
	2020		2019		2018	
Statutory federal income tax rate	\$ 28,288	21%	\$ 4,263	21%	\$ 7,021	25%
Change in valuation allowance	(16,489)	(12)%	66,417	327%	(181,047)	(632)%
Transition impact of U.S. Tax Act	—	—%	—	—%	126,122	440%
Federal rate change	—	—%	—	—%	69,648	243%
State income taxes, net of federal tax benefit	(2,998)	(2)%	607	3%	2,401	8%
Federal research and development credits	(5,483)	(4)%	(3,731)	(18)%	(3,058)	(11)%
Uncertain tax positions	3,072	2%	2,611	13%	(4,646)	(16)%
Foreign rate differences	(22,074)	(16)%	(26,952)	(133)%	(38,743)	(135)%
Foreign tax on U.S. provision	4,523	3%	6,547	32%	2,736	10%
Excess tax benefits from restricted stock	(1,743)	(1)%	(5,940)	(29)%	(11,641)	(41)%
Audits and settlements	—	—%	51	—%	2,352	8%
U.S. permanent items	6,590	5%	2,483	12%	5,408	19%
BEAT	(1,759)	(1)%	1,759	9%	—	—%
GILTI, net of foreign tax credits	14,899	11%	6,170	31%	—	—%
Foreign-Derived Intangible Income (FDII)	(2,461)	(2)%	(6,409)	(32)%	—	—%
Other, net	(354)	(1)%	(116)	(1)%	116	1%
Provision (benefit) for income taxes	\$ 4,011	3%	\$ 47,760	235%	\$ (23,331)	(81)%

In 2020, 2019, and 2018, our tax rate differed from the U.S. statutory federal income tax rate due to our corporate structure in which our foreign taxes are at a net effective tax rate lower than the U.S. rate. A significant amount of our foreign earnings is generated by our subsidiaries organized in Ireland. In 2020, 2019, and 2018, the foreign rate differential predominantly relates to these Irish earnings.

In 2020, in addition to the foreign rate differential, our tax rate differed from the statutory federal income tax rate due to U.S. tax reform, the excess tax benefit related to stock-based compensation and the indirect effects of the adoption of ASC 606. Additionally, we recorded benefits for the reduction of the U.S. valuation allowance as a result of the Onshape acquisition. A further reduction to the valuation allowance was also recorded to reflect the impact from the scheduling of the reversal of existing temporary differences resulting in deferred tax liabilities that cannot be offset against deferred tax assets.

On March 27, 2020, the U.S. Federal government enacted the Coronavirus Aid, Relief, and Economic Security Act (the “CARES ACT”). The CARES Act is an emergency economic stimulus package in response to the COVID-19 pandemic, which among other things contains numerous income tax provisions. We have determined that the impact of the CARES Act was not material to our consolidated financial statements.

In 2019, our effective tax rate was higher than the statutory federal income tax rate due in large part to the scheduling of the reversal of existing temporary differences resulting in deferred tax liabilities that cannot be offset against deferred tax assets requiring an increase to the U.S. valuation allowance, U.S. tax reform (as described below) and foreign withholding taxes, an obligation of the U.S. parent. This is offset by foreign rate differences, the excess tax benefit related to stock-based compensation and the indirect effects of the adoption of ASC 606.

In 2018, our effective tax rate was lower than the statutory federal income tax rate due to U.S. tax reform, as described below. Additionally, we have a full valuation allowance against deferred tax assets in the U.S., primarily related to net operating losses, tax credit carryforwards, capitalized research and development and deferred revenue. As a result, we have not recorded a benefit related to ongoing U.S. losses. Our foreign rate differential in 2018 includes the continuing rate benefit from a business realignment completed on September 30, 2014 in which intellectual property was transferred between two wholly-owned foreign subsidiaries. The realignment allows us to more efficiently manage the distribution of our products to European customers. In 2018, this realignment resulted in a tax benefit of approximately \$24 million. We recorded foreign withholding taxes, an obligation of the U.S. parent, of \$2.7 million in 2018.

On December 22, 2017, the United States enacted tax reform legislation through the Tax Cuts and Jobs Act, (the "Tax Act"), which significantly changed existing U.S. tax laws by a reduction of the corporate tax rate, the implementation of a new system of taxation for non-U.S. earnings, the imposition of a one-time tax on the deemed repatriation of undistributed earnings of non-U.S. subsidiaries, and the expansion of the limitations on the deductibility of executive compensation and interest expense. As we have a September 30 fiscal year-end, a blended U.S. statutory federal rate of approximately 24.5% applied for our fiscal year ended September 30, 2018 and 21% for subsequent fiscal years. The Tax Act also provides that net operating losses generated in years ending after December 31, 2017 (our fiscal 2018) will be carried forward indefinitely and can no longer be carried back, and that net operating losses generated in years beginning after December 31, 2017 (our fiscal 2019) can only reduce taxable income by up to 80% when utilized in a future period. The Tax Act includes a provision to tax global intangible low-tax income (GILTI) of foreign subsidiaries, a deduction for Foreign-Derived Intangible Income (FDII), and the base erosion anti-abuse tax (BEAT) measure that taxes certain payments between a U.S. corporation and its foreign subsidiaries. The GILTI, FDII and BEAT provisions were effective for us beginning October 1, 2018. Our accounting policy is to treat tax on GILTI as a current period cost included in tax expense in the year incurred.

In 2018, we provided no federal income taxes payable as a result of the deemed repatriation of undistributed earnings as the tax was offset by a combination of current year losses and existing attributes which had a full valuation allowance recorded against the related deferred tax assets. In 2018, we recorded state income taxes payable on the deemed repatriation of \$1.7 million. We also recorded a deferred tax benefit of \$14.1 million for the impact of the Tax Act on our net U.S. deferred income tax balances. This was primarily attributable to the reduction of the federal tax rate on the net deferred tax liability in the U.S., and the ability to realize net operating losses from the reversal of existing deferred tax assets which can now be carried forward indefinitely and can therefore be netted against deferred tax liabilities for indefinite-lived intangible assets.

The U.S. Securities and Exchange Commission issued rules that allow for a period of up to one year after the enactment date of the Tax Act to finalize the recording of the related tax impacts. We finalized recording the impacts of the Tax Act in the quarter ended December 29, 2018 and did not record any significant adjustments.

At September 30, 2020 and 2019, income taxes payable and income tax accruals recorded on the accompanying Consolidated Balance Sheets were \$15.4 million (\$7.0 million in accrued income taxes, \$1.0 million in other current liabilities and \$7.4 million in other liabilities) and \$23.4 million (\$17.4 million in accrued income taxes, \$0.4 million in other current liabilities and \$5.6 million in other liabilities), respectively. At September 30, 2020 and 2019, prepaid taxes recorded in prepaid expenses on the accompanying Consolidated Balance Sheets were \$17.3 million and \$5.3 million, respectively. We made net income tax payments of \$52.6 million, \$38.9 million and \$22.6 million in 2020, 2019 and 2018, respectively.

The significant temporary differences that created deferred tax assets and liabilities are shown below:

(in thousands)

	September 30,	
	2020	2019
Deferred tax assets:		
Net operating loss carryforwards	\$ 61,495	\$ 26,462
Foreign tax credits	8,074	—
Capitalized research and development	30,109	34,560
Pension benefits	14,370	14,838
Prepaid expenses	13,579	41,739
Deferred revenue	6,021	9,899
Stock-based compensation	13,630	12,306
Other reserves not currently deductible	15,130	20,986
Amortization of intangible assets	162,426	168,376
Research and development and other tax credits	70,695	49,995
Lease liabilities	52,224	—
Fixed assets	47,457	45,450
Capital loss carryforward	35,851	31,248
Deferred interest	—	10,864
Other	1,849	1,623
Gross deferred tax assets	532,910	468,346
Valuation allowance	(205,423)	(177,663)
Total deferred tax assets	327,487	290,683
Deferred tax liabilities:		
Acquired intangible assets not deductible	(65,894)	(42,554)
Lease assets	(35,885)	—
Pension prepayments	(1,155)	(2,532)
Deferred revenue	(594)	(19,312)
Depreciation	(7,481)	—
Unbilled accounts receivable	(12,699)	(31,005)
Deferred income	(5,821)	(19,040)
Prepaid commissions	(17,124)	(17,423)
Other	(2,302)	(1,866)
Total deferred tax liabilities	(148,955)	(133,732)
Net deferred tax assets	\$ 178,532	\$ 156,951

In October 2016, the Financial Accounting Standards Board (FASB) issued Accounting Standards Update (ASU) 2016-16, Income Taxes (Topic 740): Intra-Entity Transfers of Assets Other Than Inventory. The purpose of ASU 2016-16 is to simplify the income tax accounting of an intra-entity transfer of an asset other than inventory and to record its effect when the transfer occurs. We adopted this standard beginning in the first quarter of 2019 using the modified retrospective method with a cumulative effect adjustment to accumulated deficit of \$72.3 million, with a corresponding increase of \$75.3 million to deferred tax assets, a \$6.0 million decrease to income tax assets and a \$3.0 million decrease to income tax liabilities. The adjustment primarily relates to deductible amortization of intangible assets in Ireland. Post adoption, our effective tax rate no longer includes the benefit of this amortization.

We have concluded, based on the weight of available evidence, that a full valuation allowance continues to be required against our U.S. net deferred tax assets as they are not more likely than not to be realized in the future. We will continue to reassess our valuation allowance requirements each financial reporting period.

For U.S. tax return purposes, net operating loss (NOL) carryforwards and tax credits are generally available to be carried forward to future years, subject to certain limitations. At September 30, 2020, we had U.S. federal NOL carryforwards from acquisitions of \$128.7 million, of which \$53.2 million expire in 2021 to 2037. The remaining carryforwards of \$75.5 million do not expire. The utilization of these NOL carryforwards is limited as a result of the change in ownership rules under Internal Revenue Code Section 382.

As of September 30, 2020, we had Federal R&D credit carryforwards of \$42.2 million, which expire beginning in 2030 and ending in 2040, and Massachusetts R&D credit carryforwards of \$26.9 million, which expire beginning in 2021 and ending in 2035. We also had foreign tax credits of \$8.1 million, which expire in 2030. A full valuation allowance is recorded against the carryforwards.

We also have NOL carryforwards in non-U.S. jurisdictions totaling \$58.4 million, the majority of which do not expire, and non-U.S. tax credit carryforwards of \$4.4 million that expire beginning in 2030 and ending in 2035. Additionally, we have amortization carryforwards of \$907.4 million in a foreign jurisdiction. There are limitations imposed on the utilization of such attributes that could restrict the recognition of any tax benefits.

As of September 30, 2020, we have a valuation allowance of \$171.3 million against net deferred tax assets in the U.S. and a valuation allowance of \$34.1 million against net deferred tax assets in certain foreign jurisdictions. The valuation allowance recorded against net deferred tax assets of certain foreign jurisdictions is established primarily for our capital loss carryforwards, the majority of which do not expire. However, there are limitations imposed on the utilization of such capital losses that could restrict the recognition of any tax benefits.

The changes to the valuation allowance were primarily due to the following:

(in thousands)

	Year ended September 30,		
	2020	2019	2018
Valuation allowance, beginning of year	\$ 177,663	\$ 141,950	\$ 279,683
Net release of valuation allowance(1)	—	(1,772)	(2,791)
Net increase (decrease) in deferred tax assets with a full valuation allowance(2)	27,760	37,485	(134,942)
Valuation allowance, end of year	\$ 205,423	\$ 177,663	\$ 141,950

(1) In 2019 and 2018 this is attributable to the release in foreign jurisdictions.

(2) In 2020, this change is largely attributed to the Onshape acquisition, the adoption of ASC 842 and the impact to the change in scheduling of the reversal of existing temporary differences. In 2019, this is due in large part to a change in method of accounting for federal income tax purposes resulting in deferred tax liabilities that cannot be offset against available tax attributes in the scheduling of the reversal of existing temporary differences, and by the adoption of ASC 606. In 2018, this is primarily attributable to U.S. tax reform: the utilization of tax attributes used to offset the transition tax, the revaluation of the U.S. net deferred tax assets and liabilities, the ability to realize net operating losses from the reversal of existing deferred tax assets which can now be carried forward indefinitely and can therefore be netted against deferred tax liabilities for indefinite-lived intangibles.

Our policy is to record estimated interest and penalties related to the underpayment of income taxes as a component of our income tax provision. In 2020 and 2019, we recorded interest expense of \$0.3 million and \$0.1 million, respectively, and in 2018 we reduced interest expense by \$0.6 million. In 2020, 2019 and 2018, we had no tax penalty expense in our income tax provision. As of September 30, 2020 and 2019, we had accrued \$0.6 million and \$0.5 million of net estimated interest expense related to income tax accruals, respectively. We had no accrued tax penalties as of September 30, 2020, 2019 or 2018.

Unrecognized tax benefits (in thousands)	Year ended September 30,		
	2020	2019	2018
Unrecognized tax benefit, beginning of year	\$ 11,484	\$ 9,812	\$ 14,752
Tax positions related to current year:			
Additions	2,173	1,466	1,456
Tax positions related to prior years:			
Additions	2,452	1,375	—
Reductions	(2)	(9)	(4,631)
Settlements	—	(1,160)	—
Statute expirations	—	—	(1,765)
Unrecognized tax benefit, end of year	\$ 16,107	\$ 11,484	\$ 9,812

If all of our unrecognized tax benefits as of September 30, 2020 were to become recognizable in the future, we would record a benefit to the income tax provision of \$16.1 million (which would be partially offset by an increase in the U.S. valuation allowance of \$7.7 million). Although we believe our tax estimates are appropriate, the final determination of tax audits and any related litigation could result in favorable or unfavorable changes in our estimates. We believe it is reasonably possible that within the

next 12 months the amount of unrecognized tax benefits related to the resolution of multi-jurisdictional tax positions could be reduced by up to \$1 million as audits close and statutes of limitations expire.

In the fourth quarter of 2016, we received an assessment of approximately \$12 million from the tax authorities in South Korea. The assessment relates to various tax issues, primarily foreign withholding taxes. We have appealed and intend to vigorously defend our positions. We believe that upon completion of a multi-level appeal process it is more likely than not that our positions will be sustained. Accordingly, we have not recorded a tax reserve for this matter. We paid this assessment in the first quarter of 2017 and have recorded the amount in other assets, pending resolution of the appeal process. If the South Korean tax authorities were to prevail then, in addition to the \$12 million already assessed, the potential additional exposure through 2020 would be approximately \$17 million. We are continuing to work with our advisors during the court process and still believe our position is sustainable.

In the normal course of business, PTC and its subsidiaries are examined by various taxing authorities, including the IRS in the U.S. We regularly assess the likelihood of additional assessments by tax authorities and provide for these matters as appropriate. We are currently under audit by tax authorities in several jurisdictions. Audits by tax authorities typically involve examination of the deductibility of certain permanent items, transfer pricing, limitations on net operating losses and tax credits. Although we believe our tax estimates are appropriate, the final determination of tax audits and any related litigation could result in material changes in our estimates. As of September 30, 2020, we remained subject to examination in the following major tax jurisdictions for the tax years indicated:

Major Tax Jurisdiction	Open Years
United States	2016 through 2020
Germany	2015 through 2020
France	2017 through 2020
Japan	2015 through 2020
Ireland	2016 through 2020

Additionally, net operating loss and tax credit carryforwards from certain earlier periods in these jurisdictions may be subject to examination to the extent they are utilized in later periods.

We incurred expenses related to stock-based compensation in 2020, 2019 and 2018 of \$115.1 million, \$86.4 million and \$82.9 million, respectively. Accounting for the tax effects of stock-based awards requires that we establish a deferred tax asset as the compensation is recognized for financial reporting prior to recognizing the tax deductions. The tax benefit recognized in the Consolidated Statements of Operations related to stock-based compensation totaled \$13.4 million, \$16.6 million and \$28.3 million in 2020, 2019 and 2018, respectively. Upon the settlement of the stock-based awards (i.e., exercise or vesting), the actual tax deduction is compared with the cumulative financial reporting compensation cost and any excess tax deduction is considered a windfall tax benefit and is recorded to the tax provision. In 2020, 2019 and 2018, windfall tax benefits of \$1.3 million, \$6.7 million and \$13.2 million were recorded to the tax provision. Prior to the adoption of ASU 2016-09, windfall tax benefits were recorded to APIC when they resulted in a reduction in taxes payable.

In the first quarter of 2018, as a result of the adoption of ASU 2016-09, we recognized previously unrecognized tax benefits of \$37.0 million as increases in deferred tax assets for tax loss carryovers and tax credits, primarily in the U.S. A corresponding increase to the valuation allowance of \$36.9 million was recorded because it was not more likely than not that these benefits would be realized.

In April 2020, we became aware of a potential new interpretation of a withholding tax law in a non-U.S. jurisdiction and its application to certain transactions that was not previously reasonably knowable by us. We have evaluated this new interpretation and made an estimate of the potential tax liability, a reserve for which was recorded in the third quarter of 2020 and had an immaterial impact to our consolidated financial statements.

In July 2015, the U.S. Tax Court issued an opinion in *Altera Corp. v. Commissioner* related to the treatment of stock-based compensation expense in an intercompany cost-sharing arrangement. The Company follows the 2015 Tax Court opinion, which was subsequently overturned by the Ninth Circuit Court of Appeals. All appeals have now been exhausted and the *Altera* decision is considered to be final in the Ninth Circuit. Because the Company does not reside in the Ninth Circuit and is therefore not bound by this decision, we have determined no adjustment is required to the consolidated financial statements as a result of this ruling.

Prior to the passage of the U.S. Tax Act, the Company asserted that substantially all of the undistributed earnings of its foreign subsidiaries were considered indefinitely invested and accordingly, no deferred taxes were provided. Pursuant to the provisions of the U.S. Tax Act, these earnings were subjected to U.S. federal taxation via a one-time transition tax, and there is therefore no longer a material cumulative basis difference associated with the undistributed earnings. We maintain our assertion of our intention to permanently reinvest these earnings outside the U.S. unless repatriation can be done substantially tax-free, with the exception of a foreign holding company formed in 2018 and our Taiwan subsidiary. If we decide to repatriate any additional non-U.S. earnings in the future, we may be required to establish a deferred tax liability on such earnings. The amount of unrecognized deferred tax liability on the undistributed earnings would not be material.

9. Debt

As of September 30, 2020 and 2019, we had the following long-term borrowing obligations:

<i>(in thousands)</i>	September 30,	
	2020	2019
4.000% Senior notes due 2028	\$ 500,000	\$ —
3.625% Senior notes due 2025	500,000	—
6.000% Senior notes due 2024	—	500,000
Credit facility revolver ⁽¹⁾	18,000	173,125
Total debt	1,018,000	673,125
Unamortized debt issuance costs for the Senior notes ⁽²⁾	(12,686)	(3,991)
Total debt, net of issuance costs⁽³⁾	\$ 1,005,314	\$ 669,134

- (1) Unamortized debt issuance costs related to the credit facility were \$4.9 million and \$3.1 million as of September 30, 2020 and 2019, respectively, and were included in other assets on the Consolidated Balance Sheets.
- (2) Of the \$14.1 million in financing costs incurred in connection with the issuance of the 2028 and 2025 notes, unamortized debt issuance costs were \$12.7 million as of September 30, 2020 and were included in long-term debt on the Consolidated Balance Sheet. Unamortized debt issuance costs as of September 30, 2019 related to the 2024 notes and were included in long-term debt on the Consolidated Balance Sheet.
- (3) As of September 30, 2020 and 2019, all debt was classified as long term.

Senior Unsecured Notes

In February 2020, we issued \$500 million in aggregate principal amount of 4.0% senior, unsecured long-term debt at par value, due in 2028 (the 2028 notes) and \$500 million in aggregate principal amount of 3.625% senior, unsecured long-term debt at par value, due in 2025 (the 2025 notes). In the second quarter of 2020, we used \$460 million of the net proceeds from the sale of the notes to repay a portion of the outstanding revolving loan under our credit facility. In the third quarter of 2020, we used the remaining net proceeds from the sale of the notes to redeem the \$500 million aggregate principal amount of our outstanding 6.0% senior notes due in 2024 (the 2024 notes). The redemption price for the 2024 notes was 103% of the aggregate principal amount of the notes, plus accrued and unpaid interest.

As of September 30, 2020, the total estimated fair value of the 2028 and 2025 senior notes was approximately \$515.1 million and \$507.5 million respectively, based on quoted prices for the notes on that date.

We were in compliance with all the covenants for all of our senior notes as of September 30, 2020.

Terms of the 2028 and 2025 Notes

Interest on the 2028 and 2025 notes is payable semi-annually on February 15 and August 15. The debt indenture for the 2028 and 2025 notes includes covenants that limit our ability to, among other things, incur additional debt, grant liens on our properties or capital stock, enter into sale and leaseback transactions or asset sales, and make capital distributions.

We may, on one or more occasions, redeem the 2025 and 2028 notes in whole or in part at specified redemption prices. In certain circumstances constituting a change of control, we would be required to make an offer to repurchase the notes at a purchase price equal to 101% of the aggregate principal amount of the notes, plus accrued and unpaid interest. Our ability to repurchase the notes upon such event may be limited by law, by the indenture associated with the notes, by our then-available financial resources or by the terms of other agreements to which we may be party at such time. If we fail to repurchase the notes as required by the indenture, it would constitute an event of default under the indenture which, in turn, may also constitute an event of default under other obligations.

Credit Agreement

In February 2020, we entered into a Third Amended and Restated Credit Agreement with JPMorgan Chase Bank, N.A., as Administrative Agent, for a new secured multi-currency bank credit facility with a syndicate of banks. The new credit facility replaced our prior credit facility. As with the prior credit facility, we expect to use the new credit facility for general corporate purposes, including acquisitions of businesses, share repurchases and working capital requirements. As of September 30, 2020, the fair value of our credit facility approximates its book value.

The credit facility consists of a \$1 billion revolving credit facility, which may be increased by up to an additional \$500 million in the aggregate if the existing or additional lenders are willing to make such increased commitments. As of September 30, 2020, unused commitments under our credit facility were approximately \$982.0 million. The maturity date of the credit facility is February 13, 2025, when all remaining amounts outstanding will be due and payable. The revolving loan commitment does not require amortization of principal and may be repaid in whole or in part prior to the scheduled maturity date at our option without penalty or premium.

PTC and certain eligible foreign subsidiaries are eligible borrowers under the credit facility. Any borrowings by PTC Inc. under the credit facility would be guaranteed by PTC Inc.'s material domestic subsidiaries that become parties to the subsidiary guaranty, if any. As of the filing of this Form 10-K, there are no subsidiary guarantors of the obligations under the credit facility. Any borrowings by eligible foreign subsidiary borrowers would be guaranteed by PTC Inc. and any subsidiary guarantors. As of the filing of this Form 10-K, no funds were borrowed by an eligible foreign subsidiary borrower. In addition, owned property (including equity interests) of PTC and certain of its material domestic subsidiaries' owned property is subject to first priority perfected liens in favor of the lenders under this credit facility. 100% of the voting equity interests of certain of PTC's domestic subsidiaries and 65% of its material first-tier foreign subsidiaries are pledged as collateral for the obligations under the credit facility.

Loans under the credit facility bear interest at variable rates which reset every 30 to 180 days depending on the rate and period selected by PTC as described below. As of September 30, 2020, the annual rate for borrowing outstanding was 1.81%. Interest rates on borrowings outstanding under the credit facility range from 1.25% to 1.75% above an adjusted London Interbank Offering Rate (LIBOR) for Euro currency borrowings or range from 0.25% to 0.75% above the defined base rate (the greater of the Prime Rate, the NYFRB rate plus 0.5%, or an adjusted LIBOR plus 1%) for base rate borrowings, in each case based upon PTC's total leverage ratio. Additionally, PTC may borrow certain foreign currencies at rates set in the same range above the respective LIBOR for those currencies, based on PTC's total leverage ratio. A quarterly commitment fee on the undrawn portion of the credit facility is required, ranging from 0.175% to 0.30% per annum, based upon PTC's total leverage ratio.

The credit facility limits PTC's and its subsidiaries' ability to, among other things: incur additional indebtedness; incur liens or guarantee obligations; pay dividends (other than to PTC) and make other distributions; make investments and enter into joint ventures; dispose of assets; and engage in transactions with affiliates, except on an arms-length basis. Under the credit facility, PTC and its material domestic

subsidiaries may not invest cash or property in, or loan to, PTC's foreign subsidiaries in aggregate amounts exceeding \$100 million for any purpose and an additional \$200 million for acquisitions of businesses. In addition, under the credit facility, PTC and its subsidiaries must maintain the following financial ratios:

- a total leverage ratio, defined as consolidated funded indebtedness to consolidated trailing four quarters EBITDA, not to exceed 4.50 to 1.00 as of the last day of any fiscal quarter;
- a senior secured leverage ratio, defined as senior consolidated total indebtedness (which excludes unsecured indebtedness) to the consolidated trailing four quarters EBITDA, not to exceed 3.00 to 1.00 as of the last day of any fiscal quarter; and
- an interest coverage ratio, defined as the ratio of consolidated trailing four quarters EBITDA to consolidated trailing our quarters of cash basis interest expense, of not less than 3.00 to 1.00 as of the last day of any fiscal quarter.

As of September 30, 2020, our total leverage ratio was 2.34 to 1.00, our senior secured leverage ratio was 0.08 to 1.00 and our interest coverage ratio was 5.85 to 1.00 and we were in compliance with all financial and operating covenants of the credit facility.

Any failure to comply with the financial or operating covenants of the credit facility would prevent PTC from being able to borrow additional funds, and would constitute a default, permitting the lenders to, among other things, accelerate the amounts outstanding, including all accrued interest and unpaid fees, under the credit facility and to terminate the credit facility. A change in control of PTC, as defined in the agreement, also constitutes an event of default, permitting the lenders to accelerate the indebtedness and terminate the credit facility.

We incurred \$2.0 million in financing costs in connection with the February 2020 credit facility and \$1.0 million in connection with a November 2019 amendment to our prior credit facility. These origination costs are recorded as deferred debt issuance costs and are included in other assets. Financing costs are expensed over the remaining term of the obligations.

In 2020, 2019 and 2018, we incurred interest expense of \$76.4 million, \$43.0 million, and \$41.7 million, respectively, and paid \$60.6 million, \$40.8 million and \$39.8 million, respectively, of interest on our debt. Additionally, in the third quarter of 2020, we paid \$15.0 million in penalties for the early redemption of the 2024 notes. The average interest rate on borrowings outstanding during 2020, 2019 and 2018 was approximately 4.3%, 5.4% and 5.2%, respectively.

10. Commitments and Contingencies

As of September 30, 2020 and 2019, we had letters of credit and bank guarantees outstanding of \$16.4 million (of which \$0.5 million was collateralized) and \$15.1 million (of which \$1.1 million was collateralized), respectively, primarily related to our corporate headquarters lease.

Legal and Regulatory Matters

Korean Tax Audit

In July 2016, we received an assessment from the tax authorities in Korea related to an ongoing tax audit of approximately \$12 million. We estimate potential additional exposure of \$17 million through 2020. See *Note 8. Income Taxes* for additional information.

Legal Proceedings

On September 17, 2020, three individual plaintiffs filed a putative class action lawsuit against PTC, the Investment Committee for the PTC Inc. 401(k) Plan ("Plan"), and the Board of Directors in the U.S. District Court for the District of Massachusetts alleging claims regarding the Plan. The case alleges that the defendants breached their fiduciary duties under the Employee Retirement Income Security Act of 1974 ("ERISA") in the oversight of the Plan, principally by selecting and retaining certain investment options despite their higher fees and costs than other available investment options, causing participants in the Plan to pay excessive recordkeeping fees and suffer lower returns on their investments, and by failing to

monitor other fiduciaries. The plaintiffs seek unspecified damages on behalf of a class of Plan participants from September 17, 2014 through the date of any judgment. PTC has not yet responded to the complaint, but we believe that defenses are available to us and will defend the case vigorously. We are currently unable to reasonably estimate what effect the ultimate outcome might have, if any, on our financial position, results of operations or cash flows.

We are subject to various legal proceedings and claims that arise in the ordinary course of business. We do not believe that resolving the legal proceedings and claims that we are currently subject to will have a material adverse impact on our financial condition, results of operations or cash flows. However, the results of legal proceedings cannot be predicted with certainty. Should any of these legal proceedings and claims be resolved against us, the operating results for a particular reporting period could be adversely affected.

Accruals

With respect to legal proceedings and claims, we record an accrual for a contingency when it is probable that a liability has been incurred and the amount of the loss can be reasonably estimated. For legal proceedings and claims for which the likelihood that a liability has been incurred is more than remote but less than probable, we estimate the range of possible outcomes. As of September 30, 2020, we estimate that the range of possible outcomes in legal proceedings and claims is immaterial.

Guarantees and Indemnification Obligations

We enter into standard indemnification agreements in the ordinary course of our business. Under such agreements with our business partners or customers, we indemnify, hold harmless, and agree to reimburse the indemnified party for losses suffered or incurred by the indemnified party, generally in connection with patent, copyright or other intellectual property infringement claims by any third party with respect to our products, claims relating to property damage or personal injury resulting from the performance of services by us or our subcontractors and data breaches. The maximum potential amount of future payments we could be required to make under indemnification agreements for intellectual property and damage and injury claims is unlimited; in most cases the maximum potential amount for indemnification for data breaches is capped in those contracts. Historically, our costs to defend lawsuits or settle claims relating to such indemnity agreements have been minimal and, accordingly, we believe the estimated fair value of liabilities under these agreements is immaterial.

We warrant that our software products will perform in all material respects in accordance with our standard published specifications in effect at the time of delivery of the licensed products for a specified period of time. Additionally, we generally warrant that our consulting services will be performed consistent with generally accepted industry standards. In most cases, liability for these warranties is capped. If necessary, we would provide for the estimated cost of product and service warranties based on specific warranty claims and claim history; however, we have not incurred significant cost under our product or services warranties. As a result, we believe the estimated fair value of these liabilities is immaterial.

11. Stockholders' Equity

Preferred Stock

We may issue up to 5.0 million shares of our preferred stock in one or more series. 0.5 million of these shares are designated as Series A Junior Participating Preferred Stock. Our Board of Directors is authorized to fix the rights and terms for any series of preferred stock without additional shareholder approval.

Common Stock

Our Articles of Organization authorize us to issue up to 500 million shares of our common stock. Our Board of Directors authorized us to repurchase up to \$1.5 billion of our common stock for the period October 1, 2017 through September 30, 2020. On November 13, 2020, the Board of Directors authorized us to repurchase \$1 billion of our common stock through September 30, 2023. We use cash from operations and borrowings under our credit facility to make such repurchases. All shares of our common stock repurchased are automatically restored to the status of authorized and unissued.

We did not repurchase any shares in 2020. In 2019, we repurchased 1.4 million shares for \$115 million. In addition, in 2019 and 2018, we repurchased 3.0 million and 8.2 million shares, respectively, under an accelerated share repurchase ("ASR") agreement. On July 20, 2018, we entered into an ASR agreement with a major financial institution ("Bank"). The ASR allowed us to buy a large number of shares immediately at a purchase price determined by an average market price over a period of time. Under the ASR, we agreed to purchase \$1 billion of our common stock, in total, with an initial delivery to us in July 2018 of 8.2 million shares ("Initial Shares"), which represented the number of shares at the current market price equal to 80% of the total fixed purchase price of \$1 billion. The remainder of the total purchase price of \$200 million reflected the value of the stock held by the Bank pending final settlement and, accordingly, was recorded as a reduction to additional paid-in capital in 2018. In addition, we initiated and completed an ASR repurchase of 1.2 million shares for \$100 million in the third quarter of 2018.

As part of a strategic alliance, in the fourth quarter of 2018, Rockwell Automation made a \$1 billion equity investment in PTC, by acquiring 10,582,010 shares at a price of \$94.50 per share.

12. Equity Incentive Plan

Our 2000 Equity Incentive Plan (2000 Plan) provides for grants of nonqualified and incentive stock options, common stock, restricted stock, restricted stock units and stock appreciation rights to employees, directors, officers and consultants. We award restricted stock units (RSUs) as the principal equity incentive awards, including certain performance-based awards that are earned based on achieving performance criteria established by the Compensation Committee of our Board of Directors on or prior to the grant date. Each restricted stock unit represents the contingent right to receive one share of our common stock.

In the fourth quarter of 2020, we modified certain performance-based awards for executives by adjusting the performance criteria for the current and future periods, as well as removing certain provisions for catch up of unearned awards. There was not a material impact in 2020 due to the timing of the modifications, but there is expected to be an increase in stock-based compensation in 2021 and 2022.

The fair value of RSUs granted in 2020, 2019 and 2018 was based on the fair market value of our stock on the date of grant for performance- and service-based RSUs and based on Monte Carlo simulation model for total shareholder return (TSR) RSUs. The weighted average fair value per share of restricted stock units granted in 2020, 2019 and 2018 was \$77.57, \$82.77 and \$76.17, respectively.

We account for forfeitures as they occur, rather than estimate expected forfeitures.

The following table shows total stock-based compensation expense recorded from our stock-based awards as reflected in our Consolidated Statements of Operations:

(in thousands)

	Year ended September 30,		
	2020	2019	2018
Cost of license revenue	\$ 47	\$ 509	\$ 144
Cost of support and cloud services revenue	6,910	5,004	4,302
Cost of professional services revenue	7,012	6,426	7,079
Sales and marketing	37,351	32,026	24,893
Research and development	27,005	22,019	13,488
General and administrative	36,824	20,416	33,033
Total stock-based compensation expense	<u>\$ 115,149</u>	<u>\$ 86,400</u>	<u>\$ 82,939</u>

Stock-based compensation expense in 2020, 2019 and 2018 includes \$5.8 million, \$6.2 million, and \$4.3 million respectively, related to our employee stock purchase plan (ESPP).

As of September 30, 2020, total unrecognized compensation cost related to unvested restricted stock units expected to vest was approximately \$213.5 million and the weighted average remaining recognition period for unvested awards was 19 months.

As of September 30, 2020, 5.3 million shares of common stock were available for grant under the 2000 Plan and 3.5 million shares of common stock were reserved for issuance upon the exercise of stock options and vesting of restricted stock units granted and outstanding.

Our ESPP, initiated in the fourth quarter of 2016, allows eligible employees to contribute up to 10% of their base salary, up to a maximum of \$25,000 per year and subject to any other plan limitations, toward the purchase of our common stock at a discounted price. The purchase price of the shares on each purchase date is equal to 85% of the lower of the fair market value of our common stock on the first and last trading days of each offering period. The ESPP is qualified under Section 423 of the Internal Revenue Code. We estimate the fair value of each purchase right under the ESPP on the date of grant using the Black-Scholes option valuation model and use the straight-line attribution approach to record the expense over the six-month offering period.

Restricted stock unit activity for the year ended September 30, 2020 <i>(in thousands, except grant date fair value data)</i>	Shares	Weighted Average Grant Date Fair Value	Aggregate Intrinsic Value
Balance of outstanding restricted stock units, October 1, 2019	3,232	\$ 80.52	
Granted	2,770	\$ 77.57	
Vested	(1,391)	\$ 71.55	
Forfeited or not earned	(1,102)	\$ 89.09	
Balance of outstanding restricted stock units, September 30, 2020	<u>3,509</u>	<u>\$ 79.13</u>	<u>\$ 290,227</u>

Grant period	Restricted Stock Units		
Year ended September 30, 2020	Performance- based RSUs(1)	Service-based RSUs(2)	Total Shareholder Return RSUs(3)
Year ended September 30, 2020	501	2,168	101

- (1) The performance-based RSUs were granted to our executive officers and are eligible to vest based upon annual increasing performance measures, measured over a three-year period. To the extent earned, those performance-based RSUs will vest in three substantially equal installments. Approximately 101 thousand RSUs are eligible to vest on November 15, 2020, 2021 and 2022, or the date the Compensation Committee determines the extent to which the applicable performance criteria have been achieved for each performance period. Up to a maximum of two times the number of RSUs can be earned (a maximum aggregate of 202 thousand RSUs). An additional 400 thousand RSUs are eligible to vest on November 15, 2021, 2022 and 2023, or the date the Compensation Committee determines the extent to which the applicable performance criteria have been achieved for each performance period. Up to a maximum of 110% of the number of RSUs can be earned (a maximum aggregate of 440 thousand RSUs).
- (2) The service-based RSUs were granted to employees, including our executive officers. Substantially all service-based RSUs will vest in three substantially equal annual installments on or about the anniversary of the date of grant.
- (3) The Total Shareholder Return RSUs (TSR RSUs) were granted to our executives pursuant to the terms described below.

As of September 30, 2020, weighted average remaining vesting term for outstanding awards is 1.3 years.

The number of TSR RSUs that vest over the three-year period will be determined based on the performance of PTC stock relative to the stock performance of an index of PTC peer companies established as of the grant date, as determined at the end of three measurement periods ending on September 30, 2020, 2021 and 2022, respectively. The RSUs earned for each period will vest on November 15 following each measurement period, up to a maximum of two times the number of TSR RSUs eligible to be earned for the period (up to a maximum aggregate of 202 thousand RSUs). No vesting will occur in a period unless an annual threshold requirement is achieved. If the return to PTC shareholders is negative but still meets or exceeds the peer group indexed return, a maximum of 100% of the TSR RSUs will vest for the measurement period. TSR RSUs not earned in either of the first two measurement periods are eligible to be earned in the third measurement period.

The weighted-average fair value of the TSR RSUs was \$106.69 per target RSU on the grant date. The fair value of the TSR RSUs was determined using a Monte Carlo simulation model, a generally accepted statistical technique used to simulate a range of possible future stock prices for PTC and the peer group. The method uses a risk-neutral framework to model future stock price movements based upon the risk-free rate of return, the historical volatility of each entity, and the pairwise correlations of each entity being modeled. The fair value for each simulation is the product of the payout percentage determined by PTC's TSR rank against the peer group, the projected price of PTC stock, and a discount factor based on the risk-free rate.

The significant assumptions used in the Monte Carlo simulation model were as follows:

Average volatility of peer group	28.0%
Risk-free interest rate	1.59%
Dividend yield	—%

Total fair value of RSUs vested are as follows:

<i>(in thousands)</i>	Year ended September 30,		
Value of stock option and stock-based award activity	2020	2019	2018
Total fair value of restricted stock unit awards vested	\$ 103,265	\$ 131,659	\$ 127,525

In 2020, shares issued upon vesting of restricted stock units were net of 0.5 million shares retained by us to cover employee tax withholdings of \$33.7 million. In 2019, shares issued upon vesting of restricted stock units were net of 0.5 million shares retained by us to cover employee tax withholdings of \$44.4 million. In 2018, shares issued upon vesting of restricted stock and restricted stock units were net of 0.7 million shares retained by us to cover employee tax withholdings of \$45.4 million.

13. Employee Benefit Plan

We offer a savings plan to eligible U.S. employees. The plan is intended to qualify under Section 401(k) of the Internal Revenue Code. Participating employees may defer a portion of their pre-tax compensation, as defined, but not more than statutory limits. We contribute 50% of the amount contributed by the employee, up to a maximum of 3% of the employee's earnings. Our matching contributions vest at a rate of 25% per year of service, with full vesting after 4 years of service. We made matching contributions of \$6.7 million, \$6.0 million, and \$5.8 million in 2020, 2019 and 2018, respectively.

14. Pension Plans

We maintain several international defined benefit pension plans primarily covering certain employees of Computervision, which we acquired in 1998, and CoCreate, which we acquired in 2008, and covering employees in Japan. Benefits are based upon length of service and average compensation with vesting after one to five years of service. The pension cost was actuarially computed using assumptions applicable to each subsidiary plan and economic environment. We adjust our pension liability related to our plans due to changes in actuarial assumptions and performance of plan investments, as shown below. Effective in 1998, benefits under one of the international plans were frozen indefinitely.

The following table presents the actuarial assumptions used in accounting for the pension plans:

	2020	2019	2018
Weighted average assumptions used to determine benefit obligations at September 30 measurement date:			
Discount rate	1.1%	0.9%	1.9%
Rate of increase in future compensation	2.8%	2.8%	3.0%
Weighted average assumptions used to determine net periodic pension cost for fiscal years ended September 30:			
Discount rate	0.9%	1.9%	1.8%
Rate of increase in future compensation	2.8%	3.0%	2.8%
Rate of return on plan assets	5.4%	5.4%	5.4%

In selecting the expected long-term rate of return on assets, we considered the current investment portfolio and the investment return goals in the plans' investment policy statements. We, with input from the plans' professional investment managers and actuaries, also considered the average rate of earnings expected on the funds invested or to be invested to provide plan benefits. This process included determining expected returns for the various asset classes that comprise the plans' target asset allocation. This basis for selecting the long-term asset return assumptions is consistent with the prior year. Using generally accepted diversification techniques, the plans' assets, in aggregate and at the individual portfolio level, are invested so that the total portfolio risk exposure and risk-adjusted returns best meet the plans' long-term liabilities to employees. Plan asset allocations are reviewed periodically and rebalanced to achieve target allocation among the asset categories when necessary. The discount rate is based on yield curves for highly rated corporate fixed income securities matched against cash flows for each future year.

The weighted long-term rate of return assumption, together with the assumptions used to determine the benefit obligations as of September 30, 2020 in the table above, will be used to determine our 2021 net periodic pension cost, which we expect to be approximately \$2.3 million.

As of September 30, 2020, the weighted average interest crediting rate used in our only cash balance pension plan is 6%.

All non-service net periodic pension costs are presented in other income (expense), net on the Consolidated Statement of Operations. The actuarially computed components of net periodic pension cost recognized in our Consolidated Statements of Operations for each year are shown below:

(in thousands)

	Year ended September 30,		
	2020	2019	2018
Interest cost of projected benefit obligation	\$ 527	\$ 1,199	\$ 1,260
Service cost	1,426	1,372	1,535
Expected return on plan assets	(3,878)	(3,728)	(4,180)
Amortization of prior service cost	(5)	(5)	(5)
Recognized actuarial loss	3,854	2,390	2,293
Settlement loss	—	(30)	9
Net periodic pension cost	\$ 1,924	\$ 1,198	\$ 912

The following tables display the change in benefit obligation and the change in the plan assets and funded status of the plans as well as the amounts recognized in our Consolidated Balance Sheets:

(in thousands)

	Year ended September 30,	
	2020	2019
Change in benefit obligation:		
Projected benefit obligation, beginning of year	\$ 94,983	\$ 87,864
Service cost	1,426	1,372
Interest cost	527	1,199
Actuarial (gain) loss	(2,835)	12,059
Foreign exchange impact	6,452	(4,674)
Participant contributions	86	154
Benefits paid	(2,234)	(1,836)
Curtailments	(573)	—
Settlements	—	(1,155)
Projected benefit obligation, end of year	\$ 97,832	\$ 94,983
Change in plan assets and funded status:		
Plan assets at fair value, beginning of year	\$ 69,879	\$ 70,141
Actual return on plan assets	(2,990)	3,512
Employer contributions	2,622	2,576
Participant contributions	86	154
Foreign exchange impact	4,700	(3,513)
Settlements	—	(1,155)
Benefits paid	(2,234)	(1,836)
Plan assets at fair value—end of year	72,063	69,879
Projected benefit obligation, end of year	97,832	94,983
Underfunded status	\$ (25,769)	\$ (25,104)
Accumulated benefit obligation, end of year	\$ 96,270	\$ 92,280
Amounts recognized in the balance sheet:		
Non-current liability	\$ (25,437)	\$ (24,868)
Current liability	\$ (332)	\$ (236)
Amounts in accumulated other comprehensive loss:		
Unrecognized actuarial loss	\$ 37,175	\$ 34,920

As of September 30, 2020 and 2019 all of our pension plans had project benefit obligations and accumulated benefit obligations in excess of plan assets.

The following table shows the change in accumulated other comprehensive loss:

(in thousands)

	Year ended September 30,	
	2020	2019
Accumulated other comprehensive loss, beginning of year	\$ 34,920	\$ 27,027
Recognized during year - net actuarial losses	(3,850)	(2,385)
Occurring during year - settlement loss	—	30
Occurring during year - net actuarial losses	3,460	12,274
Foreign exchange impact	2,645	(2,026)
Accumulated other comprehensive loss, end of year	\$ 37,175	\$ 34,920

In 2020 our net actuarial losses occurring during the year were primarily driven by poor asset performance due to COVID-19 pandemic, offset by favorable impact on liabilities due primarily to a higher assumed discount rate.

The following table shows the percentage of total plan assets for each major category of plan assets:

Asset category	September 30,	
	2020	2019
Equity securities	33%	32%
Fixed income securities	34%	46%
Commodities	11%	2%
Insurance company funds	13%	12%
Options	1%	—%
Cash	8%	8%
	100%	100%

We periodically review the pension plans' investments in the various asset classes. For the CoCreate plan in Germany, assets are actively allocated between equity and fixed income securities to achieve target return. For the other international plans, assets are allocated 100% to fixed income securities. The fixed income securities for the other international plans primarily include investments held with insurance companies with fixed returns. The plans' investment managers are provided specific guidelines under which they are to invest the assets assigned to them. In general, investment managers are expected to remain fully invested in their asset class with further limitations on risk as related to investments in a single security, portfolio turnover and credit quality.

The German CoCreate plan's investment policy prohibits the use of derivatives associated with leverage and speculation or investments in securities issued by PTC, except through index-related strategies and/or commingled funds. An investment committee oversees management of the pension plans' assets. Plan assets consist primarily of investments in equity and fixed income securities.

In 2020, 2019 and 2018 our actual return on plan assets was \$(3.0) million, \$3.5 million and \$1.0 million, respectively.

Based on actuarial valuations and additional voluntary contributions, we contributed \$2.6 million, \$2.6 million, and \$2.5 million in 2020, 2019 and 2018, respectively, to the plans. We expect to pay \$3.5 million in contributions in 2021, of which \$0.8 million will be paid directly to the plans.

As of September 30, 2020, benefit payments expected to be paid over the next ten years are as follows:

(in thousands)

	Future Benefit Payments	
2021	\$	3,813
2022		4,321
2023		4,133
2024		4,822
2025		4,651
2026 to 2030		23,538

Fair Value of Plan Assets

The international plan assets are comprised primarily of investments in a trust and an insurance company. The underlying investments in the trust are primarily publicly-traded equities and governmental fixed income securities. They are classified as Level 1 because the underlying units of the trust are traded in open public markets. The fair value of the underlying investments in equity securities and fixed income are based upon publicly-traded exchange prices.

(in thousands)

	September 30, 2020			
	Level 1	Level 2	Level 3	Total
Fixed income securities:				
Government	\$ 20,663	\$ —	\$ —	\$ 20,663
Corporate investment grade	3,599	—	—	3,599
Large capitalization stocks	23,878	—	—	23,878
Commodities	7,750	—	—	7,750
Insurance company funds(1)	—	9,131	—	9,131
Options	1,126	—	—	1,126
Cash	5,916	—	—	5,916
Total plan assets	\$ 62,932	\$ 9,131	\$ —	\$ 72,063

(in thousands)

	September 30, 2019			
	Level 1	Level 2	Level 3	Total
Fixed income securities:				
Government	\$ 26,996	\$ —	\$ —	\$ 26,996
Corporate investment grade	4,816	—	—	4,816
Large capitalization stocks	22,648	—	—	22,648
Commodities	1,086	—	—	1,086
Insurance company funds(1)	—	8,494	—	8,494
Cash	5,839	—	—	5,839
Total plan assets	\$ 61,385	\$ 8,494	\$ —	\$ 69,879

(1) These investments are comprised primarily of funds invested with an insurance company in Japan with a guaranteed rate of return. The insurance company invests these assets primarily in government and corporate bonds.

15. Fair Value Measurements

Money market funds, time deposits and corporate notes/bonds are classified within Level 1 of the fair value hierarchy because they are valued based on quoted market prices in active markets.

Certificates of deposit, commercial paper and certain U.S. government agency securities are classified within Level 2 of the fair value hierarchy. These instruments are valued based on quoted prices in markets that are not active or based on other observable inputs consisting of market yields, reported trades and broker/dealer quotes.

The principal market in which we execute our foreign currency forward contracts is the institutional market in an over-the-counter environment with a relatively high level of price transparency. The market participants usually are large financial institutions. Our foreign currency forward contracts' valuation inputs are based on quoted prices and quoted pricing intervals from public data sources and do not involve management judgment. These contracts are typically classified within Level 2 of the fair value hierarchy.

Our significant financial assets and liabilities measured at fair value on a recurring basis as of September 30, 2020 and 2019 were as follows:

(in thousands)

	September 30, 2020			
	Level 1	Level 2	Level 3	Total
Financial assets:				
Cash equivalents(1)	\$ 105,299	\$ —	\$ —	\$ 105,299
Marketable securities:				
Corporate notes/bonds	59,099	—	—	59,099
Forward contracts	—	903	—	903
	<u>\$ 164,398</u>	<u>\$ 903</u>	<u>\$ —</u>	<u>\$ 165,301</u>
Financial liabilities:				
Forward contracts	—	1,073	—	1,073
	<u>\$ —</u>	<u>\$ 1,073</u>	<u>\$ —</u>	<u>\$ 1,073</u>

(in thousands)

	September 30, 2019			
	Level 1	Level 2	Level 3	Total
Financial assets:				
Cash equivalents(1)	\$ 108,020	\$ —	\$ —	\$ 108,020
Marketable securities:				
Commercial paper	—	999	—	999
Corporate notes/bonds	56,436	—	—	56,436
Forward contracts	—	3,064	—	3,064
	<u>\$ 164,456</u>	<u>\$ 4,063</u>	<u>\$ —</u>	<u>\$ 168,519</u>
Financial liabilities:				
Forward contracts	—	2,771	—	2,771
	<u>\$ —</u>	<u>\$ 2,771</u>	<u>\$ —</u>	<u>\$ 2,771</u>

(1) Money market funds and time deposits.

16. Marketable Securities

The amortized cost and fair value of marketable securities as of September 30, 2020 and 2019 were as follows:

(in thousands)

	September 30, 2020			
	Amortized cost	Gross unrealized gains	Gross unrealized losses	Fair value
Corporate notes/bonds	\$ 58,793	\$ 323	\$ (17)	\$ 59,099

(in thousands)

	September 30, 2019			
	Amortized cost	Gross unrealized gains	Gross unrealized losses	Fair value
Commercial paper	\$ 999	\$ —	\$ —	\$ 999
Corporate notes/bonds	56,318	146	(28)	56,436
	<u>\$ 57,317</u>	<u>\$ 146</u>	<u>\$ (28)</u>	<u>\$ 57,435</u>

The following tables summarize the fair value and gross unrealized losses aggregated by category and the length of time that individual securities have been in a continuous unrealized loss position as of September 30, 2020 and 2019.

(in thousands)

	September 30, 2020					
	Less than twelve months		Greater than twelve months		Total	
	Fair value	Gross unrealized loss	Fair value	Gross unrealized loss	Fair value	Gross unrealized loss
Corporate notes/bonds	\$ 9,841	\$ (17)	\$ —	\$ —	\$ 9,841	\$ (17)

(in thousands)

	September 30, 2019					
	Less than twelve months		Greater than twelve months		Total	
	Fair value	Gross unrealized loss	Fair value	Gross unrealized loss	Fair value	Gross unrealized loss
Corporate notes/bonds	\$ 12,419	\$ (14)	\$ 16,369	\$ (14)	\$ 28,788	\$ (28)

The following table presents our available-for-sale marketable securities by contractual maturity date as of September 30, 2020 and 2019.

(in thousands)

	September 30, 2020		September 30, 2019	
	Amortized cost	Fair value	Amortized cost	Fair value
Due in one year or less	\$ 27,727	\$ 27,899	\$ 27,725	\$ 27,735
Due after one year through three years	31,066	31,200	29,592	29,700
	\$ 58,793	\$ 59,099	\$ 57,317	\$ 57,435

17. Derivative Financial Instruments

Non-Designated Hedges

As of September 30, 2020 and 2019, we had outstanding forward contracts for derivatives not designated as hedging instruments with notional amounts equivalent to the following:

Currency Hedged (in thousands)	September 30,	
	2020	2019
Canadian / U.S. Dollar	\$ 6,847	\$ 9,408
Euro / U.S. Dollar	390,673	308,282
British Pound / U.S. Dollar	6,328	3,756
Israeli Shekel / U.S. Dollar	9,503	10,272
Japanese Yen / U.S. Dollar	50,379	37,462
Swiss Franc / U.S. Dollar	12,874	12,001
Swedish Krona / U.S. Dollar	18,871	20,636
Singapore Dollar / U.S. Dollar	3,281	34,585
Chinese Renminbi / U.S. Dollar	5,415	52,466
All other	8,291	9,487
Total	\$ 512,462	\$ 498,355

The following table shows the effect of our non-designated hedges, all of which were forward contracts, on the Consolidated Statements of Operations for the years ended September 30, 2020, 2019 and 2018:

(in thousands)

	Location of gain (loss)	Year ended September 30,		
		2020	2019	2018
Net realized and unrealized gain (loss), excluding the underlying foreign currency exposure being hedged	Other income (expense), net	\$ 3,518	\$ (11,314)	\$ (9,720)

Cash Flow Hedges

We stopped entering into cash flow hedges in the first quarter of 2019. We had no outstanding forward contracts designated as cash flow hedges as of either September 30, 2020 or 2019.

The following table shows the effect of our derivative instruments designated as cash flow hedges, all of which were forward contracts, in the Consolidated Statements of Operations for the years ended September 30, 2020, 2019, and 2018:

<i>(in thousands)</i>	Location of gain (loss)	Year ended September 30,		
		2020	2019	2018
Gain (loss) recognized in OCI—effective portion	OCI	\$ -	\$ 187	\$ 1,652
Gain (loss) reclassified from OCI into income—effective portion	Software revenue	\$ -	\$ 627	\$ (552)
Gain (loss) recognized—ineffective portion	Other income (expense), net	\$ -	\$ -	\$ 21

In the event the underlying forecast transaction does not occur, or it becomes probable that it will not occur, the related hedge gains and losses on the cash flow hedge would be immediately reclassified to other income (expense), net on the Consolidated Statements of Operations. For the years ended September 30, 2020, 2019 and 2018, there were no such gains or losses.

Net Investment Hedges

As of September 30, 2020 and 2019, we had outstanding forward contracts designated as net investment hedges with notional amounts equivalent to the following:

Currency Hedged <i>(in thousands)</i>	September 30,	
	2020	2019
Euro / U.S. Dollar	\$ 164,885	\$ 183,396

The following table shows the effect of our derivative instruments designated as net investment hedges, all of which were forward contracts, on the Consolidated Statements of Operations for the years ended September 30, 2020, 2019, and 2018:

<i>(in thousands)</i>	Location of gain (loss)	Year ended September 30,		
		2020	2019	2018
Gain (loss) recognized in OCI—effective portion	OCI	\$ (5,483)	\$ (2,925)	\$ -
Gain (loss) reclassified from OCI—effective portion	OCI	\$ 109	\$ (7,630)	\$ -
Gain (loss) recognized—portion excluded from effectiveness testing	Other income (expense), net	\$ 3,506	\$ 4,598	\$ -

As of September 30, 2020, we estimate that all amounts reported in accumulated other comprehensive loss will be applied against exposed balance sheet accounts upon translation within the next three months.

The following table shows our derivative instruments measured at gross fair value as reflected in the Consolidated Balance Sheets:

<i>(in thousands)</i>	Fair Value of Derivatives Designated As Hedging Instruments		Fair Value of Derivatives Not Designated As Hedging Instruments	
	September 30,			
	2020	2019	2020	2019
Derivative assets:(1)				
Forward contracts	\$ 3	\$ 1,674	\$ 900	\$ 1,390
Derivative liabilities:(2)				
Forward contracts	\$ 306	\$ —	\$ 767	\$ 2,771

- (1) As of September 30, 2020 and 2019, current derivative assets of \$0.9 million and \$3.1 million, respectively, are recorded in other current assets on the Consolidated Balance Sheets.
(2) As of September 30, 2020 and 2019, current derivative liabilities of \$1.1 million and \$2.8 million, respectively, are recorded in accrued expenses and other current liabilities on the Consolidated Balance Sheets.

Offsetting Derivative Assets and Liabilities

We have entered into master netting arrangements which allow net settlements under certain conditions. Although netting is permitted, it is currently our policy and practice to record all derivative assets and liabilities on a gross basis in the Consolidated Balance Sheets.

The following table sets forth the offsetting of derivative assets as of September 30, 2020:

<i>(in thousands)</i>	<u>Gross Amounts Offset in the Consolidated Balance Sheets</u>			<u>Gross Amounts Not Offset in the Consolidated Balance Sheets</u>		
	<u>Gross Amount of Recognized Assets</u>	<u>Gross Amounts Offset in the Consolidated Balance Sheets</u>	<u>Net Amounts of Assets Presented in the Consolidated Balance Sheets</u>	<u>Financial Instruments</u>	<u>Cash Collateral Received</u>	<u>Net Amount</u>
As of September 30, 2020						
Forward Contracts	\$ 903	\$ —	\$ 903	\$ (903)	\$ —	\$ —

The following table sets forth the offsetting of derivative liabilities as of September 30, 2020:

<i>(in thousands)</i>	<u>Gross Amounts Offset in the Consolidated Balance Sheets</u>			<u>Gross Amounts Not Offset in the Consolidated Balance Sheets</u>		
	<u>Gross Amount of Recognized Liabilities</u>	<u>Gross Amounts Offset in the Consolidated Balance Sheets</u>	<u>Net Amounts of Liabilities Presented in the Consolidated Balance Sheets</u>	<u>Financial Instruments</u>	<u>Cash Collateral Pledged</u>	<u>Net Amount</u>
As of September 30, 2020						
Forward Contracts	\$ 1,073	\$ —	\$ 1,073	\$ (903)	\$ —	\$ 170

Net gains and losses on foreign currency exposures, including realized and unrealized gains and losses on forward contracts, included in foreign currency net losses, were net losses of \$1.7 million, \$3.2 million and \$7.0 million in 2020, 2019 and 2018, respectively. Net realized and unrealized gains and losses on forward contracts included in foreign currency net losses were a net gain of \$7.0 million in 2020 and net losses of \$8.4 million and \$7.5 million in 2019 and 2018, respectively.

18. Segment and Geographic Information

We operate within a single industry segment—computer software and related services. Operating segments as defined under GAAP are components of an enterprise about which separate financial information is available that is evaluated regularly by the chief operating decision maker, or decision-making group, in deciding how to allocate resources and in assessing performance. Our chief operating decision maker is our President and Chief Executive Officer. We have two operating and reportable segments: (1) Software Products, which includes license, subscription and related support revenue (including updates and technical support) for all our products; and (2) Professional Services, which includes consulting, implementation and training services. We do not allocate sales and marketing or general and administrative expense to our operating segments as these activities are managed on a consolidated basis. Additionally, segment profit does not include stock-based compensation, amortization of intangible assets, restructuring charges and certain other identified costs that we do not allocate to the segments for purposes of evaluating their operational performance.

The revenue and profit attributable to our operating segments are summarized below. We do not produce asset information by reportable segment; therefore, it is not reported.

(in thousands)

	Year ended September 30,			
	As reported ASC 606	As reported ASC 606	ASC 605	As reported ASC 605
	2020	2019	2019	2018
Software Products				
Revenue	\$ 1,314,617	\$ 1,088,100	\$ 1,150,818	\$ 1,088,487
Operating costs(1)	393,803	377,464	375,268	387,989
Profit	920,814	710,636	775,550	700,498
Professional Services				
Revenue	143,798	167,531	160,676	153,337
Operating costs(2)	128,678	133,846	128,818	136,964
Profit	15,120	33,685	31,858	16,373
Total segment revenue	1,458,415	1,255,631	1,311,494	1,241,824
Total segment costs	522,481	511,310	504,086	524,953
Total segment profit	935,934	744,321	807,408	716,871
Unallocated operating expenses:(3)				
Sales and marketing expenses	398,100	385,423	409,932	389,871
General and administrative expenses	114,386	104,393	104,393	108,159
Intangibles amortization	56,104	51,147	51,147	58,056
Restructuring and other charges, net	32,716	51,114	51,114	3,764
Stock-based compensation	115,149	86,400	86,400	82,939
Other unallocated operating expenses(4)	8,616	2,802	2,802	1,469
Total operating income	210,863	63,042	101,620	72,613
Interest expense	(76,428)	(43,047)	(43,047)	(41,673)
Other income (expense), net	271	305	131	(2,284)
Income before income taxes	\$ 134,706	\$ 20,300	\$ 58,704	\$ 28,656

- (1) Operating costs for the Software Products segment include all costs of software revenue and research and development costs, excluding stock-based compensation and intangible amortization. Operating costs for the Software Products segment include depreciation of \$4.2 million, \$4.6 million and \$5.1 million in 2020, 2019 and 2018, respectively.
- (2) Operating costs for the Professional Services segment include all costs of professional services revenue, excluding stock-based compensation, intangible amortization, and fair value adjustments for deferred services costs. The Professional Services segment includes depreciation of \$1.1 million, \$1.4 million and \$1.6 million in 2020, 2019 and 2018, respectively.
- (3) Unallocated departments include depreciation of \$19.4 million, \$20.6 million and \$22.7 million in 2020, 2019 and 2018, respectively.
- (4) Other unallocated operating expenses include acquisition-related and other transactional costs and fair value adjustments for deferred services costs.

We report revenue by the following three product groups:

(in thousands)

	Year ended September 30,			
	As reported ASC 606	As reported ASC 606	ASC 605	As reported ASC 605
	2020	2019	2019	2018
Core	\$ 1,025,668	\$ 868,970	\$ 921,386	\$ 895,149
Growth	222,646	167,544	175,619	139,278
Focused Solutions Group (FSG)	210,101	219,117	214,489	207,397
Total revenue	\$ 1,458,415	\$ 1,255,631	\$ 1,311,494	\$ 1,241,824

We license products to customers worldwide. Our sales and marketing operations outside the United States are conducted principally through our international sales subsidiaries throughout Europe and the Asia Pacific region. Intercompany sales and transfers between geographic areas are accounted for at prices that are designed to be representative of unaffiliated party transactions. Our international revenue is presented based on the location of our customer. Revenue for the geographic regions in which we operate is presented below.

(in thousands)

	Year ended September 30,			
	As reported ASC 606	As reported ASC 606	ASC 605	As reported ASC 605
	2020	2019	2019	2018
Revenue:				
Americas(1)	\$ 649,383	\$ 537,548	\$ 565,362	\$ 511,237
Europe(2)	543,779	464,666	494,864	485,851
Asia Pacific	265,253	253,417	251,268	244,736
Total revenue	<u>\$ 1,458,415</u>	<u>\$ 1,255,631</u>	<u>\$ 1,311,494</u>	<u>\$ 1,241,824</u>

(1) Includes revenue in the United States totaling \$621.8 million, \$514.4 million (ASC 606) and \$541.7 million (ASC 605), and \$487.3 million for 2020, 2019 and 2018, respectively.

(2) Includes revenue in Germany totaling \$198.7 million, \$185.4 million (ASC 606) and \$197.2 million (ASC 605), and \$193.3 million for 2020, 2019 and 2018, respectively.

19. Leases

Our headquarters are located at 121 Seaport Boulevard, Boston, Massachusetts (the Boston lease). The Boston lease is for approximately 250,000 square feet and runs from January 1, 2019 through June 30, 2037. Base rent for the first year of the lease is \$11.0 million and will increase by \$1 per square foot per year thereafter (\$0.3 million per year). Base rent first became payable on July 1, 2020. In addition to the base rent, we are required to pay our pro rata portions of building operating costs and real estate taxes (together, "Additional Rent"). Annual Additional Rent is estimated to be approximately \$7.1 million. The lease provides for \$25 million in landlord funding for leasehold improvements (\$100 per square foot). The leasehold improvement funding provision was fully utilized by us and was reflected as a derecognition adjustment to the right-of-use asset.

The components of lease cost reflected in the Consolidated Statement of Operations for the year ended September 30, 2020 were as follows:

(in thousands)

	Year ended September 30, 2020
Operating lease cost	\$ 38,687
Short-term lease cost	4,430
Variable lease cost	5,247
Sublease income	(4,267)
Total lease cost	<u>\$ 44,097</u>

Supplemental cash flow and right-of use assets information for the year ended September 30, 2020 was as follows:

(in thousands)

	Year ended September 30, 2020
Cash paid for amounts included in the measurement of lease liabilities	
Operating cash flows from operating leases	\$ 38,553
Right-of-use assets obtained in exchange for new operating lease liabilities	\$ 7,632
Right-of-use assets obtained in exchange for new financing lease liabilities	\$ 1,500

Supplemental balance sheet information related to the leases as of September 30, 2020 was as follows:

	As of September 30, 2020
Weighted-average remaining lease term - operating leases	12.41 years
Weighted-average remaining lease term - financing leases	5 years
Weighted-average discount rate - operating leases	5.5%
Weighted-average discount rate - financing leases	3.0%

Maturities of lease liabilities as of September 30, 2020 are as follows:

<i>(in thousands)</i>	Operating Leases	
2021	\$	44,710
2022		30,993
2023		22,326
2024		19,686
2025		17,051
Thereafter		170,303
Total future lease payments		305,069
Less: imputed interest		(90,046)
Total	\$	215,023

Under the prior lease standard (ASC 840), as of September 30, 2019 future minimum lease payments under non-cancellable operating leases were as follows:

<i>(in thousands)</i>	Operating Leases	
2020	\$	31,868
2021		33,094
2022		25,624
2023		19,279
2024		16,909
Thereafter		186,037
Total minimum lease payments	\$	312,811

Exited (Restructured) Facilities

As of September 30, 2020, we have net liabilities of \$11.3 million related to excess facilities (compared to \$16.5 million at September 30, 2019), representing \$3.2 million of right-of-use assets and \$14.5 million of lease obligations, of which \$9.7 million is classified as short term and \$4.8 million is classified as long term.

In determining the amount of right-of-use assets for restructured facilities, we are required to estimate such factors as future vacancy rates, the time required to sublet properties, and sublease rates. Updates to these estimates may result in revisions to the value of right-of-use assets recorded. The amounts recorded are based on the net present value of estimated sublease income. As of September 30, 2020, the right-of-use assets for exited facilities reflect discounted committed sublease income of approximately \$2.8 million and uncommitted sublease income of approximately \$0.4 million. As a result of changes in our sublease income assumptions and an incremental obligation to exit a portion of our former headquarters facility early, in the year ended September 30, 2020, we recorded a facility impairment charge of \$4.4 million. In addition, in the year ended September 30, 2020, we exited the former Onshape headquarters lease and recorded a related \$1.2 million impairment charge.

In the year ended September 30, 2020, we made payments of \$10.5 million related to lease costs for exited facilities.

20. Subsequent Events

Credit Facility Revolving Loan Repayment

On October 27, 2020, we repaid the \$18 million outstanding balance on our revolving credit facility.

Stock Repurchase Authorization

On November 13, 2020, the Board of Directors authorized us to repurchase \$1 billion of our common stock through September 30, 2023.

Equity Grants

In November 2020, we granted shares valued at approximately \$14.0 million to our employees, including our executive officers (\$2.6 million), in payment of amounts earned under our annual Corporate Incentive Plan.

In November 2020, we granted service-based restricted stock units (RSUs) valued at approximately \$53.0 million to employees, including our executive officers (\$19.6 million). The service-based RSUs will generally vest in three substantially equal annual installments on November 15, 2021, 2022 and 2023.

In November 2020, we granted performance-based restricted stock units (RSUs) valued at approximately \$17.0 million to executive officers. The performance-based RSUs will generally vest in three substantially equal annual installments on November 15, 2021, 2022 and 2023.

SELECTED CONSOLIDATED FINANCIAL DATA

You should read the following selected consolidated financial data in conjunction with Item 7. “Management’s Discussion and Analysis of Financial Condition and Results of Operations” and our consolidated financial statements and the related notes appearing elsewhere in this Annual Report.

The Consolidated Statements of Operations data for the years ended September 30, 2020, 2019, and 2018 and the Consolidated Balance Sheets data as of September 30, 2020 and 2019 are derived from our audited consolidated financial statements appearing elsewhere in this Annual Report. The Consolidated Statements of Operations data for the years ended September 30, 2017 and 2016 and the Consolidated Balance Sheets data as of September 30, 2018, 2017, and 2016 are derived from our audited consolidated financial statements that are not included in this Annual Report. The historical results are not necessarily indicative of results in any future period.

FIVE-YEAR SUMMARY OF SELECTED FINANCIAL DATA⁽¹⁾

(in thousands, except per share data)

	2020	2019	2019	2018	2017	2016
	As reported ASC 606	As reported ASC 606	ASC 605	As reported ASC 605	As reported ASC 605	As reported ASC 605
Revenue	\$ 1,458,415	\$ 1,255,631	\$ 1,311,494	\$ 1,241,824	\$ 1,164,039	\$ 1,140,533
Gross margin	1,124,144	930,253	993,340	915,322	835,537	814,868
Operating income (loss) ⁽²⁾	210,863	63,042	101,620	72,613	41,766	(37,014)
Net income (loss) ⁽²⁾	130,695	(27,460)	2,979	51,987	6,239	(54,465)
Earnings (loss) per share—Basic ⁽²⁾	1.13	(0.23)	0.03	0.45	0.05	(0.48)
Earnings (loss) per share—Diluted ⁽²⁾	1.12	(0.23)	0.03	0.44	0.05	(0.48)
Total assets	3,382,738	2,664,588	2,471,908	2,329,022	2,360,384	2,345,729
Working capital (deficit)	152,687	144,466	(140,437)	(101,495)	(12,353)	(11,930)
Long-term liabilities	1,263,730	824,435	795,850	719,154	796,039	848,544
Stockholders’ equity	1,438,248	1,201,998	876,333	874,589	885,436	842,666

- (1) The consolidated financial position and results of operations data reflect our acquisitions of Onshape on November 1, 2019 for \$468.5 million in cash, Frustum on November 19, 2018 for \$69.5 million in cash, Kepware on January 12, 2016 for \$99.4 million in cash, and Vuforia on November 3, 2015 for \$64.8 million in cash, as well as certain other less significant businesses during these periods. Results of operations for the acquired businesses have been included in the Consolidated Statements of Operations since their acquisition dates.
- (2) Operating income and net income in 2020, 2019, 2018, 2017, and 2016 includes pre-tax restructuring and other charges of \$32.7 million, \$51.1 million, \$1.0 million, \$7.9 million, and \$76.3 million, respectively.

QUARTERLY FINANCIAL INFORMATION (UNAUDITED)

(in thousands, except per share data)

	September 30, 2020	June 27, 2020	March 28, 2020	December 28, 2019
Revenue	\$ 390,981	\$ 351,721	\$ 359,603	\$ 356,110
Gross margin	306,366	272,497	276,576	268,705
Operating income	67,012	63,401	50,025	30,425
Net income	53,406	34,678	7,156	35,455
Earnings per share:				
Basic	\$ 0.46	\$ 0.30	\$ 0.06	\$ 0.31
Diluted	\$ 0.46	\$ 0.30	\$ 0.06	\$ 0.31

(in thousands, except per share data)

	September 30, 2019	June 29, 2019	March 30, 2019	December 29, 2018
Revenue	\$ 335,004	\$ 295,486	\$ 290,451	\$ 334,689
Gross margin	249,587	212,781	210,547	257,337
Operating income (loss)	46,551	9,305	(22,858)	30,044
Net income (loss)	9,826	(14,758)	(45,513)	20,985
Earnings (loss) per share:				
Basic	\$ 0.09	\$ (0.13)	\$ (0.37)	\$ 0.18
Diluted	\$ 0.08	\$ (0.13)	\$ (0.37)	\$ 0.18

EXECUTIVE AGREEMENT

This Executive Agreement (“Agreement”) dated as of [Date] is by and between PTC Inc., a Massachusetts corporation (the “Company”), and [Executive] (the “Executive”).

WHEREAS, the Executive is the Executive Vice President, [Title]; and

WHEREAS, the Company wishes to make the following arrangements with the Executive concerning certain payments and benefits to be provided to the Executive if the Executive’s employment with the Company is terminated without Cause or if certain other events specified herein occur;

NOW, THEREFORE, the Company and the Executive hereby agree as follows:

1. Definitions.

For the purposes of this Agreement:

(a) “Board” means the Company’s board of directors.

(b) “Code” means the U.S. Internal Revenue Code of 1986, as amended.

(c) “Cause” means

(i) the Executive’s willful and continued failure to substantially perform the Executive’s duties to the Company (other than any such failure resulting from the Employee’s incapacity due to physical or mental illness), provided that the Company has delivered a written demand for performance to the Executive specifically identifying the manner in which the Company believes that the Executive has not substantially performed the Executive’s duties and the Executive does not cure such failure within thirty (30) days after such demand;

(ii) willful conduct by the Executive which is demonstrably and materially injurious to the Company;

(iii) the Executive’s conviction of, or pleading of guilty or nolo contendere to, a felony;

(iv) the Executive’s entry in the Executive’s personal capacity into a consent decree relating to the business of the Company with any government body; or

(v) the Executive’s willful violation of any material provision of the Executive’s Non-Disclosure, Non-Competition and Invention Agreement with the Company; provided that, if such violation can be cured, the Executive has not, within thirty (30) days after written demand by the Company, cured such violation.

For purposes of this definition, no act or failure to act on the Executive’s part shall be deemed “willful” unless done or omitted to be done by the Executive not in good faith and without reasonable belief that the Executive’s action or omission was in the best interests of the Company.

(d) “Change in Control” means the occurrence of any of the following events:

(i) any “person,” as such term is used in Sections 13(d) and 14(d) of the Securities Exchange Act of 1934, as amended (the “Exchange Act”) (other than the Company, any trustee or other fiduciary holding securities under an employee benefit plan of the Company, or any corporation owned directly or indirectly by the stockholders of the Company in substantially the same proportion as their ownership of stock in the Company) is or becomes the “beneficial owner” (as defined in Rule 13d-3 under the Exchange Act), directly or indirectly, of securities of the Company representing fifty percent (50%) or more of the combined voting power of the Company’s then outstanding securities (other than as a result of acquisitions of such securities from the Company);

(ii) individuals who, as of the date hereof, constitute the Board (the “Incumbent Board”) cease for any reason to constitute at least a majority of the Board, provided that any person becoming a director subsequent to the date hereof whose election, or nomination for election by the Company’s stockholders, was approved by a vote

of at least a majority of the directors then comprising the Incumbent Board (other than an election or nomination of an individual whose initial assumption of office is in connection with an actual or threatened election contest relating to the election of the directors of the Company) shall be, for purposes of this Agreement, considered to be a member of the Incumbent Board;

(iii) the consummation of a merger, share exchange or consolidation of the Company or any subsidiary of the Company with any other entity (each a "Business Combination"), other than (A) a Business Combination that would result in the voting securities of the Company outstanding immediately prior thereto continuing to represent (either by remaining outstanding or by being converted into voting securities of another entity) beneficial ownership, directly or indirectly, of a majority of the combined voting power of the Company or the surviving entity (including any person that, as a result of such transaction, owns all or substantially all of the Company's assets either directly or through one or more subsidiaries) outstanding immediately after such Business Combination or (B) a merger, share exchange or consolidation effected to implement a recapitalization of the Company (or similar transaction) in which no "person" (as defined above) is or becomes the beneficial owner of fifty percent (50%) or more of the combined voting power of the Company's then outstanding securities; or

(iv) the stockholders of the Company approve (A) a plan of complete liquidation of the Company; or (B) an agreement for the sale or disposition by the Company of all or substantially all of the Company's assets but excluding a sale or spin-off of a product line, business unit or line of business of the Company if the remaining business is significant as determined by the Company's board of directors in its sole discretion.

(e) "Change in Control Termination" means any of the following terminations of the Executive's employment:

(i) termination of the Executive's employment by the Company during the period from the date of a Change in Control through the second anniversary thereof, other than for Cause or as a result of the Executive's Disability;

(ii) resignation by the Executive for Good Reason during the period from the date of a Change in Control through the second anniversary thereof; or

(iii) termination of the Executive's employment by the Company within one hundred eighty (180) days prior to a Change in Control, other than for Cause or as a result of the Executive's Disability, if it is reasonably demonstrated by the Executive that such termination of employment (A) was at the request of a third party that has taken steps reasonably calculated to effect the Change in Control or (B) was otherwise related to or in anticipation of the Change in Control. A Change in Control Termination under this Section 1(e)(iii) shall be deemed to have occurred when the Change in Control occurs.

(f) "Disability" means such physical or mental incapacity as to make the Executive unable to perform the essential functions of the Executive's employment duties for a period of at least sixty (60) consecutive days with or without reasonable accommodation. If any question shall arise as to whether during any period the Executive is so disabled as to be unable to perform the essential functions of the Executive's employment duties with or without reasonable accommodation, the Executive may, and at the request of the Company shall, submit to the Company a certification in reasonable detail by a physician selected by the Company to whom the Executive or the Executive's guardian has no reasonable objection as to whether the Executive is so disabled or how long such disability is expected to continue, and such certification shall for the purposes of this Agreement be conclusive of the issue. The Executive shall cooperate with any reasonable request of the physician in connection with such certification. If such question shall arise and the Executive shall fail to submit such certification, the Company's determination of such issue shall be binding on the Executive.

(g) "Equity Award" means any stock option, stock appreciation right, restricted stock unit, restricted stock or other equity award issued under any Stock Plan, but excludes any Target Annual Incentive Bonus that may be payable in the form of equity.

(h) "Good Reason" means the occurrence, without the Executive's consent and without Cause, of any of the following events after or in connection with a Change in Control (provided that the Executive shall have given

the Company written notice describing such event within ninety (90) days of its initial existence and the matter shall not have been fully remedied by the Company within thirty (30) days after receipt of such notice):

(i) any reduction of the Executive's annual base salary or target bonus as in effect at the date of the Change in Control; provided that any such reduction (not exceeding fifteen percent (15%) of either (A) such base salary or (B) the sum of such base salary and such target bonus) that is consistent with similar actions taken with respect to the base salaries and/or target bonuses of the other senior executives of the Company shall not constitute Good Reason;

(ii) any material reduction in the aggregate benefits for which the Executive is eligible under the Company's benefit plans, including medical, dental, vision, basic life insurance, retirement, paid time off, long-term disability and short-term disability plans; provided that any such reduction or other action that is consistent with similar actions taken with respect to comparable benefits of the Company employees generally shall not constitute Good Reason;

(iii) a material diminution in the substantive responsibilities or the scope of the Executive's position, taking into consideration, without limitation, the dollar amount of the budget and the number of employees for which the Executive has responsibility (and a reduction of more than ten percent (10%) in such dollar amount or such number from that which was applicable at the date of the Change in Control shall be deemed a "material diminution" unless it is comparable to similar reductions then applicable to the Company's executive officers generally);

(iv) any breach by the Company of its material obligations under this Agreement;

(v) any failure by the Company to obtain the assumption of this Agreement by any successor or assign of the Company; or

(vi) any requirement that the Executive relocate to a primary work site that would increase the Executive's one-way commute distance by more than fifty (50) miles from the Executive's then principal residence.

(i) "Stock Plan" means any stock option or equity compensation plan of the Company in effect at any time, including without limitation the 2000 Equity Incentive Plan.

(j) "Target Annual Incentive Bonus" means an Annual Incentive Bonus (stated as a cash amount even if it may be payable in the form of equity) payable under a Corporate Incentive Plan of the Company for achievement of performance measure(s) at the Target Level. "Corporate Incentive Plan" means any incentive program of the Company in effect at the respective time to the extent it provides for compensation upon achievement of one or more performance measures with a performance period of one year or less and service-based vesting with a vesting term of less than fifteen (15) months ("Annual Incentive Bonus"). "Target Level" means the level at which 100% of a Target Annual Incentive Bonus becomes payable. Any upside bonus or other amounts that may be earned for achievement of performance measures beyond the Target Level under the Corporate Incentive Plan and any discretionary or other bonus are not considered part of the Target Annual Incentive Bonus. "Bonus Equity" means any Equity Award granted to the Executive under the Corporate Incentive Plan that may be earned upon achievement of one or more performance measures.

2. Termination of Employment without Cause.

If the Company terminates the Executive's employment without Cause, other than a termination constituting a Change in Control Termination or a termination due to the Executive's Disability, the Executive shall be entitled to the following:

(a) a lump sum payment in an amount equal to one times the highest annual base salary in effect with respect to the Executive during the six-month period immediately preceding the termination date, payable within forty-five (45) days after the termination date;

(b) a lump sum payment in an amount equal to one times the Target Annual Incentive Bonus, if any, for which the Executive is eligible for the fiscal year in which the termination date occurs, payable within forty-five (45) days after the termination date; and

(c) continued participation in the Company's medical, dental, vision and basic life insurance benefit plans (the "Benefit Plans"), subject to the terms and conditions of the respective plans and applicable law, for a period of one year following the termination date; provided that, to the extent that any of the Benefit Plans does not permit such continuation of the Executive's participation following the Executive's termination or any such plan is terminated, the Company shall pay the Executive an amount which is sufficient for the Executive to purchase equivalent benefits, such amount to be paid quarterly in advance; provided further, however, that to the extent the Executive becomes eligible to receive medical, dental, vision and/or basic life insurance benefits under a plan provided by another employer, the Executive's entitlement to participate in the corresponding Benefit Plans or to receive such corresponding alternate payments shall cease as of the date the Executive is eligible to participate in such other plan, and the Executive shall promptly notify the Company of the Executive's eligibility under such plan.

3. Change in Control.

(a) Equity Awards. Effective upon a Change in Control that occurs during the Executive's employment, and except as provided in any Equity Award documentation that explicitly or implicitly excludes such Equity Award from the effects of this Section 3, the following shall occur:

(i) any performance measure(s) applicable to any outstanding Equity Award held by the Executive shall be deemed to have been met at the Target Level (which deemed performance will not affect any service-based vesting schedule for such Equity Award); and

(ii) each outstanding Equity Award held by the Executive shall be deemed amended automatically to provide that, notwithstanding any provision of any Stock Plan, such Equity Award may not be terminated or forfeited without the Executive's written consent (provided that this shall not prevent termination of (A) any unvested portion thereof that is terminated or forfeited upon termination of the Executive's employment as provided in the respective Stock Plan or in any agreement or certificate executed in connection with such Equity Award, (B) a stock option the termination of which is covered by Section 8(i) of the Company's 2000 Equity Incentive Plan, or (C) an Equity Award upon payment of a cash payment with a Fair Market Value (as defined in the applicable Stock Plan) equal to the amount that would have been received upon the exercise or payment of the Equity Award had the Equity Award been exercised or paid upon the Change in Control).

The foregoing notwithstanding, this Section 3(a) shall not apply to any Bonus Equity held by the Executive, which shall be treated as provided in Section 3(b)(ii).

(b) Annual Incentive Bonus. Effective upon (x) a Change in Control that occurs during the Executive's employment or (y) a Change in Control Termination under Section 1(e)(iii):

(i) the Executive shall be entitled to payment of a pro-rata portion of the Target Annual Incentive Bonus, if any, for which the Executive is eligible for the fiscal year in which the Change in Control occurs, based on the percentage of the performance period completed through the date of the Change in Control, for the purposes of which any performance measure(s) applicable to such Target Annual Incentive Bonus shall be deemed to have been met at the Target Level, which payment shall be made in one lump sum within forty-five (45) days of the date of the Change in Control; provided, however, that this Section 3(b)(i) shall not apply if the Executive holds Bonus Equity for the applicable fiscal year performance period and Section 3(b)(ii) shall apply instead; or

(ii) a pro-rata portion of any Bonus Equity held by the Executive, having performance measures applicable to the fiscal year, or any portion thereof, in which the Change in Control occurs, that could be earned at the Target Level, based on the percentage of the applicable fiscal year or applicable portion completed through the date of the Change in Control, shall thereupon be vested and subject to no further restrictions, exercisable or distributable, as the case may be, and the portion not so vested shall thereupon automatically be cancelled and forfeited to the Company.

(c) Change in Control Termination Benefits.

(i) Equity Awards. Effective upon a Change in Control Termination, the following shall occur:

(A) all outstanding Equity Awards held by the Executive (other than any Bonus Equity) shall immediately become vested and exercisable or distributable in full; and

(B) all restrictions applicable to restricted stock issued under any Stock Plan and held by the Executive (other than any Bonus Equity) shall immediately lapse.

(ii) Make-Up Payment. Effective upon a Change in Control Termination under Section 1(e)(iii), the Company shall pay the Executive in a lump sum the amount equal to the sum of:

(x) the excess, if any, of (A) the product of (1) the number of additional shares of the Company's Common Stock that were subject to Equity Awards that would have become vested and exercisable and/or as to which the restrictions would have lapsed, in each case solely as a result of Section 3(c)(i), and for which the Executive would have been entitled to receive consideration in the Change in Control (on the same basis as other holders of Common Stock), had the Executive remained employed on the date of the Change in Control and was deemed to have exercised all the stock options that would then have become exercisable under Section 3(c)(i)(A) times (2) the amount per share of the Company's Common Stock (if any) received by the Company's stockholders generally pursuant to the Change in Control (the "Shareholder Price") over (B) the aggregate exercise price of all such additional stock options that the Executive would then have become able to exercise upon the Change in Control as a result of Section 3(c)(i)(A) (whereupon all such Equity Awards shall terminate and shall no longer be exercisable); and

(y) the excess, if any, of (A) the product of (1) the number of shares of the Company's Common Stock that the Executive (a) held on the date of termination of the Executive's employment or acquired upon exercise of stock options held on such date and (b) sold before the consummation of the Change in Control (the "Pre-Sold Shares") times (2) the Shareholder Price over (B) the aggregate amount received by the Executive in the sale(s) of the Pre-Sold Shares.

The Company shall pay this lump sum payment within forty-five (45) days following the Executive's termination date.

(iii) Salary, Annual Incentive Bonus and Benefits. Effective upon a Change in Control Termination, the Executive shall be entitled to the following:

(A) a lump sum payment in an amount equal to one times the Executive's base salary plus the Executive's Target Annual Incentive Bonus, such base salary to be the highest annual base salary in effect with respect to the Executive during the six-month period immediately preceding the Executive's termination and such Target Annual Incentive Bonus to be the highest Target Annual Incentive Bonus in effect with respect to the Executive for (1) the fiscal year in which the Change in Control occurs, (2) the fiscal year following the year in which the Change in Control occurs, or (3) the fiscal year in which the Change in Control Termination occurs, whichever is highest, payable within forty-five (45) days after the termination date; and

(B) continued participation in the Benefit Plans, subject to the terms and conditions of the respective plans and applicable law, for a period of one year following the termination date; provided that, to the extent that any of the Benefit Plans does not permit such continuation of the Executive's participation following the Executive's termination or any such plan is terminated, the Company shall pay the Executive an amount which is sufficient for the Executive to purchase equivalent benefits, such amount to be paid quarterly in advance; provided, further, however, that to the extent the Executive becomes eligible to receive medical, dental, vision and/or basic life insurance benefits under a plan provided by another employer, the Executive's entitlement to participate in the corresponding Benefit Plans or to receive such corresponding alternate payments shall cease as of the date the

Executive is eligible to participate in such other plan, and the Executive shall promptly notify the Company of the Executive's eligibility under such plan.

(iv) **No Duplication.** Payments and benefits under this Section 3(c) shall be in lieu and without duplication of any amounts or benefits under Section 2, and the Executive shall be entitled to any such payments and benefits for no more than one year even if both such sections apply. If, in the event of a Change in Control Termination under Section 1(e)(iii), the Executive becomes entitled to payments under this Section 3(c) after the Executive has begun to receive payments under Section 2, the Executive shall be entitled to a make-up payment to ensure that the Executive receives the higher amount payable hereunder, with such make-up payment being made within forty-five (45) days following the Change in Control Termination.

(d) **Deemed Amendment of Equity Awards.** The Company and the Executive hereby agree that the agreements evidencing any (i) Equity Awards to the Executive are hereby and will be deemed amended to give effect to the provisions of Sections 3 and 4 of this Agreement, and (ii) Bonus Equity are hereby and will be deemed amended to give effect to the provisions of Section 3(b)(ii) of this Agreement.

4. Death or Disability.

Effective upon a termination of the Executive's employment due to Executive's death or by the Company due to the Executive's Disability, except as provided in any Equity Award documentation that explicitly or implicitly excludes such Equity Award from the effects of this section, all performance measures applicable to any Equity Awards held by the Executive shall be deemed to have been met at the Target Level and all Equity Awards held by the Executive shall immediately become vested, unrestricted and exercisable or distributable at the Target Level; provided that this Section 4 shall not apply to any Bonus Equity.

5. Certain Payments to Specified Employees.

Notwithstanding anything to the contrary in this Agreement, if the Executive is a "specified employee" within the meaning of Code Section 409A(a)(2)(B)(i) at the time of the Executive's separation from service with the Company (in connection with a Change in Control Termination or otherwise), no payment or benefit payable or provided to the Executive pursuant to this Agreement that constitutes an item of deferred compensation under Code Section 409A and becomes payable by reason of the Executive's termination of employment with the Company will be paid or provided to the Executive prior to the earlier of (i) the expiration of the six (6) month period following the date of the Executive's "separation from service" (as such term is defined by Code Section 409A and the regulations promulgated thereunder), or (ii) the date of the Executive's death, but only to the extent such delayed commencement is otherwise required in order to avoid a prohibited distribution under Code Section 409A(a)(2). The payments and benefits to which the Executive would otherwise be entitled during the first six (6) months following the Executive's separation from service shall be accumulated and paid or provided, as applicable, in a lump sum, on the date that is six (6) months and one day following the Executive's separation from service (or if such date does not fall on a business day of the Company, the next following business day) and any remaining payments or benefits will be paid in accordance with the normal payment dates specified for them herein.

6. Taxes.

(a) **Withholding.** All payments to be made to the Executive under this Agreement will be subject to any required withholding of federal, state and local income and employment taxes. In addition, the Company may withhold from any payments hereunder any amounts attributable to withholding taxes applicable to the vesting of or lapse of restrictions on restricted stock or restricted stock units held by the Executive or the exercise of any nonqualified stock options held by the Executive, including, in its discretion withholding from any shares deliverable to the Executive such number of shares as the Company determines is necessary to satisfy such tax obligations, valued at their fair market value (determined pursuant to the respective Company equity compensation plan) as of the date of such vesting or lapse of restrictions.

(b) **Limitations on Payments.**

(i) If it is determined that any payment, benefit or distribution provided for in this Agreement or otherwise (for the purposes of this Section 6(b), each, a "Payment" and collectively, the "Payments") from the

Company to or for the benefit of the Executive (x) constitutes a “parachute payment” within the meaning of Section 280G of the Code and (y) but for this subsection (b), would be subject to the excise tax imposed by Section 4999 of the Code (the “Excise Tax”), such Payments shall be either:

(A) delivered in full, or

(B) delivered to such lesser extent that would result in no portion of the Payments being subject to the Excise Tax, whichever of the foregoing amounts, taking into account the applicable federal, state and local income taxes and the Excise Tax, results in the receipt by the Executive on an after-tax basis, of the greatest amount of Payments, notwithstanding that all or some portion of the Payments may be taxable under Section 4999 of the Code. Unless the Company and Executive otherwise agree in writing, any determination required under this Section 6(b)(i) shall be made in writing in good faith by an independent accounting firm selected by the Company, whose determinations shall be binding upon the Company and the Executive (the “Accountants”), in good faith consultation with the Executive.

(ii) In the event a reduction in the Payments is required hereunder, the Company shall promptly give the Executive notice to that effect and the Executive may then determine, in the Executive’s sole discretion, which and how much of the Payments shall be eliminated or reduced (as long as, after such election, none of the Payments are subject to the Excise Tax), and shall advise the Company in writing of the Executive’s election within ten (10) days of the Executive’s receipt of the Company’s notice. If no such election is made by the Executive within such period, the Company may determine which and how much of the Payments shall be eliminated or reduced (as long as, after such determination, none of the Payments are subject to the Excise Tax) and shall notify the Executive promptly of such determination.

(iii) For purposes of making the determinations and calculations required by this Section 6(b), the Accountants:

(A) shall take into account the value of any reasonable compensation for services to be rendered by the Executive before or after the Change in Control within the meaning of Section 280G(b)(2) of the Code and the regulations thereunder, including without limitation, the Executive’s agreeing to refrain from performing services pursuant to a covenant not to compete or similar covenant, whether set forth in this Agreement or otherwise (a “Noncompete Covenant”), and the Company shall cooperate in good faith in connection with any such valuations and reasonable compensation positions. Without limiting the generality of the foregoing, for purposes of this provision, the Company agrees to allocate as consideration for any Noncompete Covenant the maximum amount of compensation and benefits payable under this Agreement reasonably allocable thereto so as to avoid, to the extent possible, subjecting any Payments to tax under Section 4999 of the Code; and

(B) may make reasonable assumptions and approximations concerning the application of taxes and may rely on reasonable good faith interpretations concerning the application of Sections 280G and 4999 of the Code.

The Company and the Executive shall furnish to the Accountants such information and documents as the Accountants may reasonably request in order to make a determination under this Section 6(b). The Company shall bear all costs the Accountants may reasonably incur in connection with any calculations contemplated by this Section 6(b).

(iv) If the Payments are reduced to avoid the Excise Tax pursuant to Section 6(b)(i) hereof and notwithstanding such reduction, the IRS determines that the Executive is liable for the Excise Tax as a result of the receipt of Payments from the Company, then the Executive shall be obligated to pay to the Company (the “Repayment Obligation”) an amount of money equal to the “Repayment Amount.” The Repayment Amount shall be the smallest such amount, if any, as shall be required to be paid to the Company so that the Executive’s net proceeds with respect to the Payments (after taking into account the payment of the Excise Tax imposed on such benefits) shall be maximized. Notwithstanding the foregoing, the Repayment Amount shall be zero if a Repayment Amount of more than zero would not eliminate the Excise Tax in accordance with the principles of Section 6(b)(i). If the Excise Tax is not eliminated through the performance of the Repayment Obligation, the Executive shall pay the Excise Tax. The Repayment Obligation shall be discharged within 30 days of either (A) the Executive’s entering into a binding

agreement with the IRS as to the amount of Excise Tax liability, or (B) a final determination by the IRS or a court decision requiring the Executive to pay the Excise Tax from which no appeal is available or is timely taken.

7. Term.

Unless the Executive's employment is earlier terminated, this Agreement shall continue in effect until 11:59 p.m. on September 30, 2020 and shall automatically renew thereafter on an annual basis for additional twelve-month terms unless either party provides written notice to the other party of non-renewal at least ninety (90) days prior to the expiration of the then current term. If a Change in Control occurs while this Agreement is in effect, the term of this Agreement shall automatically be extended to the second anniversary of the Change in Control. Upon the termination of this Agreement, the respective rights and obligations of the parties shall survive to the extent necessary to carry out the intentions of the parties as embodied herein.

8. Successors and Assigns.

(a) This Agreement is personal to the Executive and is not assignable by the Executive, other than by will or the laws of descent and distribution, without the prior written consent of the Company.

(b) This Agreement shall inure to the benefit of and be binding upon the Company and its successors and assigns.

(c) The Company will require any successor or acquirer (whether direct or indirect, by purchase, merger, consolidation or otherwise) to all or substantially all of the business and/or assets of the Company to assume expressly and agree to perform this Agreement in the same manner and to the same extent that the Company would be required to perform it if no such succession had taken place. As used in this Agreement, "Company" shall mean the Company as defined above and any successor to or acquirer of its business and/or assets that assumes and agrees to perform this Agreement.

9. No Duty to Mitigate.

In no event shall the Executive be obligated to seek other employment or take any other action by way of mitigation of the amounts payable to the Executive under any of the provisions of this Agreement and, except as contemplated by Sections 2(b) and 3(c)(iii)(B) hereof, any benefits payable to the Executive hereunder shall not be subject to reduction for any compensation received from other employment.

10. Conditions to Payment of Severance.

Notwithstanding any other provision of this Agreement, the Executive's entitlement to receive any of the payments and other benefits contemplated by Sections 2, 3 or 4 (with respect to Disability) hereof shall be contingent upon:

(a) execution by the Executive within forty-five (45) days of the termination of a general release in substantially the form of Appendix A hereto (such applicable form depending on my age at the time of termination, the "Release"), which has not subsequently been revoked, and the Executive hereby acknowledges and agrees that the Company's entering into this Agreement and agreement to make such payments are and shall be good and sufficient consideration for such Release; and

(b) the Executive's continued compliance with the material terms of this Agreement, as applicable, and those of the Executive's Non-Disclosure, Non-Competition and Invention Agreement with the Company.

11. Miscellaneous.

(a) Governing Law. This Agreement shall be governed by and construed in accordance with the laws of the Commonwealth of Massachusetts, except any such laws that would render such choice of law ineffective.

(b) Compliance with Section 409A. This Agreement is intended, to the extent applicable, to constitute good faith compliance with the requirements of Section 409A of the Code. The Company and the Executive agree

that they shall cooperate in good faith to amend any provision hereof to the extent required to maintain compliance with the provisions of Section 409A of the Code as they may be modified hereafter (including by subsequent regulations or other guidance of the Internal Revenue Service).

(c) Amendment. This Agreement may not be amended or modified otherwise than by a written agreement executed by the parties hereto or their respective successors and legal representatives.

(d) Partial Invalidity. If any provision in this Agreement is held by a court of competent jurisdiction to be invalid, void, or unenforceable, the remaining provisions will nevertheless continue in full force without being impaired or invalidated in any way.

(e) Entire Agreement; Effect of Current Agreement. This Agreement constitutes the entire understanding and agreement between the parties hereto regarding the compensation and benefits payable to the Executive in the respective circumstances described herein, superseding all prior understandings and agreements, whether oral or written.

(f) Expenses. The Company agrees to pay as incurred and within twenty (20) days after submission of supporting documentation, to the full extent permitted by law, all legal fees and expenses the Executive may reasonably incur as a result of any contest by the Company, the Executive or others of the validity or enforceability of, or liability under, any provision of this Agreement (including as a result of any contest by the Executive about the amount of any payment pursuant to this Agreement) with respect to which the Executive is successful on the merits, plus, in each case, interest on any delayed payment at the applicable Federal rate provided for in Section 7872(f)(2)(A) of the Code. The Company's payment of any eligible expenses must be made no later than December 31 of the year after the year in which the expense was incurred.

(g) Notices. All notices and other communications hereunder shall be in writing and shall be delivered by hand delivery, by a reputable overnight courier service, or by registered or certified mail, return receipt requested, postage prepaid. Notice to the Executive shall be addressed to the Executive at the Executive's last address contained in the records of the Company, and notice to the Company shall be addressed to:

PTC Inc.
121 Seaport Boulevard
Boston, MA 02210
Attention: General Counsel

Notice shall be addressed to such other address as either party shall have furnished to the other in writing in accordance herewith. Any notice or communication shall be deemed to be delivered upon the date of hand delivery, one day following delivery to an overnight courier service, or three days following mailing by registered or certified mail.

EXECUTED as of the date first written above.

PTC INC.

[EXECUTIVE NAME]

By: /s/Jill Larsen

/s/Troy Richardson

[Name]

[Title] EVP/CHRO

11/16/20

Troy Richardson

11/16/2020

PTC Inc.	
Subsidiaries	
Jurisdiction	Name
Delaware	Parametric Technology International, Inc.
Delaware	PTC Benelux LLC
Massachusetts	PTC Foundation Inc.
Massachusetts	PTC International, Inc.
Massachusetts	PTC Seaport Holdings Inc.
Australia	Parametric Technology Australia Pty. Limited
Austria	Parametric Technology Gesellschaft, m.b.H.
Belgium	Parametric Technology (Belgium) b.v.b.a.
Brazil	Parametric Technology Brasil Ltda.
Canada	Factora Solutions Inc.
Canada	PTC (Canada) Inc.
Cayman Islands	PTC Seaport (Cayman) Ltd.
Cayman Islands	Parametric Technology (Cayman) Ltd.
Cayman Islands	Seaport Holdings (Cayman) Ltd.
China	Parametric Technology (Shanghai) Software Co. Ltd.
Denmark	Parametric Technology (Denmark) A/S
France	Parametric Technology S.A.
Germany	IOXP GmbH
Germany	Parametric Technology GmbH
Germany	Parametric Technology Holding Germany GmbH
Hong Kong	Parametric Technology (Hong Kong) Ltd.
India	Onshape India Private Limited
India	Parametric Technology (India) Private Ltd.
India	PTC Software (India) Private Limited
Ireland	PTC (IFSC) Limited
Ireland	PTC (SSI) dac
Israel	Parametric Technology Israel Ltd.
Italy	Parametric Technology Italia S.r.l.
Japan	PTC Japan KK
Korea	PTC Korea Co., Ltd.
Malaysia	Parametric Technology Corporation (Malaysia) Sdn. Bhd.
Mauritius	CV Holding (Mauritius) Ltd.
Mexico	Parametric Technology Mexico, S.A. de C.V.
Netherlands	Parametric Technology Europe B.V.
Netherlands	Parametric Technology Nederland B.V.
Netherlands	PTC Holdings (Europe) B.V.
Netherlands	PTC Holdings (NL) B.V.
Romania	PTC Eastern Europe Limited S.R.L.
Russia	PTC International Limited Liability Company
Serbia	Plugin76 d.o.o. R&D za razvoj softvera Subotica
Singapore	Parametric Technology Singapore Pte. Ltd.

South Africa	Parametric Technology South Africa (Proprietary) Limited
Spain	Parametric Technology España, S.A.
Sweden	Plugin76 AB Sweden
Sweden	PTC Sweden AB
Switzerland	Parametric Technology (Schweiz) AG
Taiwan	Parametric Technology Taiwan Ltd.
United Kingdom	Parametric Holdings (Ireland) Ltd.
United Kingdom	Parametric Holdings (UK) Limited
United Kingdom	Parametric Technology (UK) Limited

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the incorporation by reference in the Registration Statements on Form S-8 (No. 333-187083, 333-211750, 333-211751 and 333-231992) and on Form S-3 (Nos. 333-211049 and 333-228565) of PTC Inc. of our report dated November 20, 2020 relating to the financial statements and the effectiveness of internal control over financial reporting, which appears in this Form 10-K.

/s/ PricewaterhouseCoopers LLP
Boston, Massachusetts
November 20, 2020

CERTIFICATION

I, James Heppelmann, certify that:

1. I have reviewed this annual report on Form 10-K of PTC Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: November 20, 2020

/S/ JAMES HEPPELMANN

James Heppelmann
President and Chief Executive Officer

CERTIFICATION

I, Kristian Talvitie, certify that:

1. I have reviewed this annual report on Form 10-K of PTC Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: November 20, 2020

/S/ KRISTIAN TALVITIE

Kristian Talvitie

Executive Vice President and Chief Financial Officer

Certification of Periodic Financial Report**Pursuant to 18 U.S.C. Section 1350**

Pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, each of the undersigned officers of PTC Inc. (the "Company") certifies that, to his knowledge, the Annual Report on Form 10-K of the Company for the year ended September 30, 2020 fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934 and information contained in that Form 10-K fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: November 20, 2020

/S/ JAMES HEPPELMANN

James Heppelmann
President and Chief Executive Officer

Date: November 20, 2020

/S/ KRISTIAN TALVITIE

Kristian Talvitie
Executive Vice President and Chief Financial Officer