UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K

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

For the Fiscal Year Ended: September 30, 2022

OR

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

For the transition period from_ to_

Commission File Number: 0-18059

PTC Inc.
(Exact name of registrant as specified in its charter)

Massachusetts	**04-2866152**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification Number)**

121 Seaport Boulevard, Boston, MA 02210
(Address of principal executive offices, including zip code)
(781) 370-5000
(Registrant's telephone number, including area code)
Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Trading Symbol	Name of each exchange on which registered
Common Stock, $.01 par value per share	**PTC**	**NASDAQ Global Select Market**

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

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

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

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

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

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

Large Accelerated Filer	☑	Accelerated Filer	☐	Non-accelerated Filer	☐	Smaller Reporting Company	☐
						Emerging growth company	☐

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

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

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

The aggregate market value of our voting stock held by non-affiliates was approximately $11,336,087,091 on March 31, 2022 based on the last reported sale price of our common stock on the Nasdaq Global Select Market on that date. There were 116,975,644 shares of our common stock outstanding on that day and 117,471,969 shares of our common stock outstanding on November 14, 2022.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the definitive Proxy Statement in connection with the 2023 Annual Meeting of Stockholders (2023 Proxy Statement) are incorporated by reference into Part III.

PTC Inc.
ANNUAL REPORT ON FORM 10-K FOR FISCAL YEAR 2022
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Cautionary Note About Forward-Looking Statements

This Annual Report contains forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended. We intend such forward-looking statements to be covered by the safe harbor provisions for forward-looking statements contained in the Private Securities Litigation Reform Act of 1995. In particular, statements that are not historical facts, including but not limited to, statements about our anticipated financial results, capital development and growth, as well as about the development of our products, markets and workforce, are forward-looking statements. These forward-looking statements are generally identifiable by use of the words "believe," "expect," "intend," "anticipate," "estimate," "project" or similar expressions, whether in the negative or affirmative. Forward-looking statements are based on our current plans, expectations and assumptions and are not guarantees of future performance. Factors that may cause our actual results to differ materially from these statements include, but are not limited to, the risks and uncertainties discussed in Item 1A. "Risk Factors" and elsewhere throughout this Annual Report. Such factors, among others, could have a material adverse effect upon our business, results of operations and financial condition. We caution readers not to place undue reliance on any forward-looking statements, which only speak as of the date made. We undertake no obligation to update any forward-looking statement to reflect events or circumstances after the date on which such statement is made.

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

PART I

ITEM 1. Business

Our Business

PTC is a global software company that provides a portfolio of innovative digital solutions that work together to transform how physical products are engineered, manufactured, and serviced.

Our software portfolio includes award-winning offerings in the computer-aided design (CAD) and product lifecycle management (PLM) markets. CAD is utilized for product data authoring and PLM is for product data management and process orchestration. Our software can be delivered on premises, in the cloud, or in a hybrid model.

Our customer base includes some of the world's most innovative manufacturers in the aerospace and defense, automotive, electronics and high tech, industrial machinery and equipment, life sciences, retail and consumer products industries.

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

Our Strategy

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

Accelerate Digital Thread Solutions

With our solutions, we enable companies to adopt a “digital thread” strategy to drive innovation and productivity. A digital thread manages product data and makes it accessible and useful to the right people, at the right time, and in the right context. This is particularly relevant for larger businesses pursuing a vertically integrated manufacturing strategy in which the reuse and repurposing of earlier innovations drives next generation product offerings.

Accelerate Product Innovation

We enable companies to upend the product development process with solutions that apply agile concepts, originally focused on software development, to the entire product innovation process, from software to hardware and electronics. By applying agile product development processes across all three disciplines, companies can increase innovation velocity and bring new products to market faster to meet rapidly changing market demand. This is particularly relevant for start-up and upstart businesses focused on technology-centered innovations that commonly leverage contract manufacturers for production of their designs.

Accelerate SaaS Transformation

Manufacturers today face a myriad of business challenges. Macroeconomic forces, such as an ever-evolving workforce, supply chain disruptions, the rise of smart, connected products, and the need to prove sustainability, are all driving the need for change. We enable companies to respond to these challenges with technology that leverages the cloud to transform how, where, and when work gets done. Software-as-a-service (SaaS), which has already reshaped nearly all aspects of business, is poised to transform management of the entire product lifecycle. Anticipating this need, PTC acquired the Onshape and Arena cloud-native product development solutions. In parallel, we are heavily investing to transform our technology portfolio to SaaS.

Strategic Transactions

During FY'22, we completed two strategic transactions. In Q3'22, we acquired the Codebeamer™ application lifecycle management business to broaden and deepen our ALM footprint across safety-critical and regulated industries. In Q3'22, we also sold a portion of our PLM services business to ITC Infotech. The transaction is designed to accelerate customer digital transformation initiatives and adoption of our Windchill+ SaaS solution. Refer to *Note 6. Acquisitions and Disposition of Business* of Notes to Consolidated Financial Statements in this Annual Report for additional discussion regarding these transactions.

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Our Principal Products and Services

In 2022, we reported our business in two product groups: Digital Thread and Velocity. Digital Thread included products focused on customers that are embracing enterprise-wide digital transformation and Velocity included products focused on customers that prioritize agile product development. Beginning in fiscal year 2023, we are reporting our businesses in two new product groups: CAD (Computer-Aided Design) and PLM (Product Lifecycle Management). Products designated as CAD refer to software used for product data authoring. Products designated as PLM refer to software used for product data management and process orchestration.

The new reporting structure aligns better to our strategy, product offerings and industry segments.

		2023 Product Groups	
		PLM	**CAD**
2022 Product Groups	**Digital Thread - Core**	Windchill®	Creo®
	Digital Thread - Growth	ThingWorx®	Vuforia®
	Digital Thread - FSG	Codebeamer™ Integrity™ Servigistics® FlexPLM®	Arbortext®
	Velocity	Arena®	Onshape®

Our **Windchill®** PLM application suite manages all aspects of the product development lifecycle - from concept through service and retirement - by enabling a digital thread of product parts, materials, and configuration information. Windchill provides real-time information sharing, dynamic data visualization, and the ability to collaborate across geographically-distributed teams, enabling manufacturers to elevate their product development process. With its open architecture that integrates with other enterprise systems, Windchill provides a solid foundation for a product-driven digital thread.

Our **Arena®** SaaS PLM solution enables product teams to collaborate virtually anytime and anywhere, making it easier to share the latest product and quality information with internal teams and supply chain partners and help deliver innovative products to customers faster. Our Arena quality management system software connects quality and product designs into a single system to simplify regulatory compliance.

Our **ThingWorx®** platform is flexible and purpose-built for Industrial Internet of Things (IIoT). It offers a rich set of capabilities that enable enterprises to digitally transform every aspect of their business with innovative solutions that are simple to create, easy to implement, scalable to meet future needs, and designed to enable customers to accelerate time to value. Our ThingWorx Digital Performance Management solution enables manufacturers to identify, prioritize, and overcome their most significant production bottlenecks.

Our **Codebeamer™** and **Integrity™** application lifecycle management (ALM) and model-based systems engineering capabilities enable users to accelerate the development of software-intensive products through system modeling, software configuration, and requirements, risk, and test management.

Our **Servigistics®** service parts management solution enables customers to effectively manage their service parts inventory, enabling them to optimize equipment availability and uptime, and increase customer satisfaction.

Our **FlexPLM®** solution provides retailers with a single platform for merchandising and line planning, materials management, sampling, and more.

Our **Creo®** 3D CAD technology enables the digital design, testing, and modification of product models. With its design simulation, additive manufacturing, and generative design innovations, we enable our customers to be first to market with differentiated products. From initial concept to design, simulation, and analysis, Creo provides designers with innovative tools to efficiently create better products, faster.

Our **Onshape®** 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 just about 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.

Our **Vuforia®** augmented reality (AR) technology enables the visualization of digital information in a physical context and the creation of AR and mixed reality experiences to deliver workforce productivity and business results in manufacturing, service, engineering, and operations. Vuforia solutions equip frontline workers with focused and effective step-by-step instructions, procedural guidance, skill development and remote assistance that enable enterprises to reduce errors, increase asset utilization and drive higher profitability.

Our **Arbortext®** dynamic publishing solution streamlines how organizations create, manage, and publish technical documentation.

To meet the increasing demand for SaaS delivered solutions, we expect to introduce a number of new SaaS offerings over time. These service offerings will provide an alternative to our traditional on-premises software products and provide our customers with the benefits of SaaS including accelerated time to value, reduced complexity, lower costs to implement, upgrade and administer, improved user collaboration and mobility, and scalability. We are giving this new generation of offerings a “plus” brand. We launched Windchill+ in the second quarter of 2022.

Our Markets and How We Address Them

The markets we serve present different growth opportunities for us. We see opportunity for further market growth for all our solutions with a new generation of SaaS solutions we are developing to bring to market over the next few years.

We derive most of our sales from products and services sold directly by our sales force to end-user customers. Approximately 25% to 30% 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 alliance partners enable us to increase our market reach, offer broader solutions, and add compelling technology to our offerings. Our strategic services partners provide service offerings to help customers implement our product offerings and transition to SaaS.

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 Annual Report, 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. For enterprise Creo and Windchill solutions, we compete with large established companies including Autodesk, Dassault Systèmes SA, and Siemens AG. In our IIoT business, we compete with large established companies such as Amazon, IBM, Oracle, SAP, Siemens AG, and Software AG as well as customers’ homegrown solutions. There are also a number of smaller companies that compete in the market for IIoT products. For our AR products, our primary competitors include Microsoft, TeamViewer, and ScopeAR. For our ALM products, we compete with IBM and Siemens AG. For our SLM products, we compete with companies that offer point solutions and with customers’ homegrown solutions.

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 the risks and uncertainties described under Item 1A. “Risk Factors” below, which is incorporated into this section by reference.

People and Culture

PTC's commitment to building a diverse, equitable, and inclusive culture is fundamental to our purpose – the Power to Create – and critical to every aspect of our talent strategy. Our approach is focused on sustainable talent practices and core values that promote an agile culture, an increased sense of belonging, engaged work environments, and high-performing teams.

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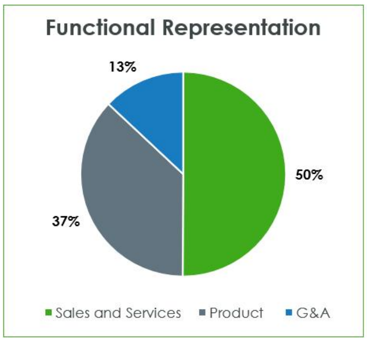
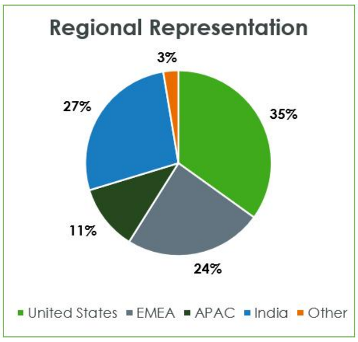
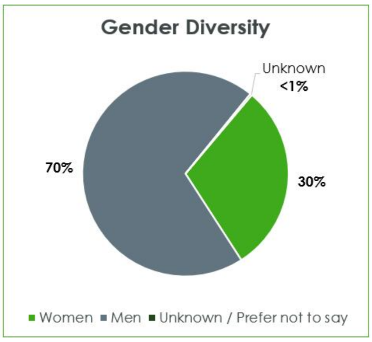
PTC at-a-Glance

As of September 30, 2022, PTC had 6,503 full-time employees. Our employee population is geographically diverse and serves a geographically diverse customer and partner network.

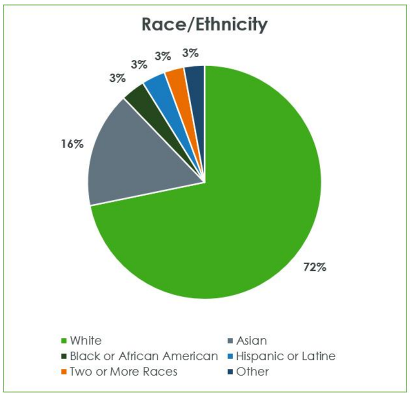
Worldwide Employee Representation

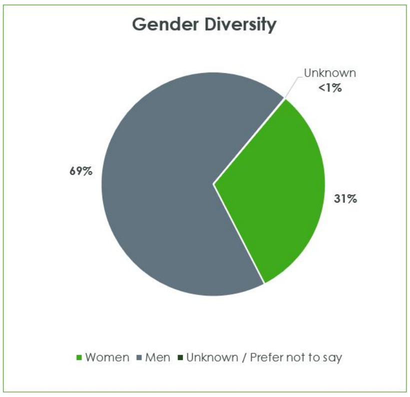






United States Employee Representation





Compensation and Benefits

PTC provides a comprehensive and competitive compensation and benefits package designed to attract, retain, motivate, and engage talent around the world that will drive success and innovation in meeting the goals of our business.

We provide employees with competitive base salaries, incentive compensation and, in many cases, equity compensation.

Our benefits offerings are designed to meet the unique needs of our employees. We believe we provide competitive benefits in each local market we operate in to help our employees care for themselves and their families. Common offerings are health benefits, retirement benefits, life insurance and disability protection, employee assistance, vacation time, holidays and leave benefits. To ensure our employees and families have the support they need as the COVID-19 pandemic begins to ease, PTC has continued its global emergency leave policy, which provides for ten days of paid time off over and above regular sick or other time off to recuperate from or care for a family member recovering from COVID-19.

Employee Development

We invest in our employees, creating meaningful opportunities to learn, grow, develop and advance their careers. We have specific development programs, including our Rotational Leadership Development, Managing at PTC, Leading at PTC, and 360-degree development programs.

Commitment to Diversity, Equity, and Inclusion (DEI)

We are improving our systems and processes to enable us to better track, manage and develop our employees. With these improvements, we are gaining a better understanding of our current demographic population and developing demographic goals, as we strive to create a more demographically diverse, inclusive, and equitable organization.

Starting in FY’22, our Self-Identification program invited U.S. employees to volunteer their personal information across categories such as race/ethnicity, sexual orientation, gender identity, pronouns, disability, veteran and military status, and more. By analyzing this information in aggregate, we can determine what we should adjust in terms of DEI programming, policies, and hiring practices.

Commitment to our values and diversity in our workforce has inspired our top-line company goals. Key milestones include launching leadership development experiences for underrepresented minority and underrepresented group populations, offering learning programs in psychological safety, requiring unconscious bias training for hiring managers, and enhancing our Employee Resource Group (ERG) program and Global DEI Champions Network. PTC currently supports 12 ERGs that span a broad spectrum of identities, experiences, and interests: Asian, Black, Early Career, Energize (Health & Wellness), Family, Green (Sustainability), Hola (Hispanic & Latine), Prism (LGBTQ+), SMART (Neurodiversity), Veterans, Virtual, and Women. In 2021, we introduced a CEO Rotation program that allows our CEO to spend three months with each ERG as a rotational sponsor.

Additional Information About Our Employee Initiatives

You can find more information about our employee initiatives, including our DEI, Training and Career Development, Compensation & Benefits, Employee Engagement, and Employee Health & Safety initiatives, in our Corporate Social Responsibility Report available on PTC.com. The references to our Corporate Social Responsibility Report and our website are not intended to incorporate information in that report or on our website into this Annual Report by reference.

Available Information

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.

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 an investment in our securities. You should consider them carefully when evaluating an investment in PTC securities, because these factors could cause actual results to differ materially from historical results or any 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 caused companies worldwide to close their offices and their employees to have to work remotely from their homes, and there remains uncertainty about the extent to which employees will return to the office in the long term. This 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 or that customers will adopt them 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.

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 IT 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 cyber intrusions have increased – particularly 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. 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, including our SaaS 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. Interception of data transmission, misappropriation or modification of data, corruption of data and attacks against our service providers may adversely affect our products or product and service delivery. Malicious code, viruses or vulnerabilities that are undetected by our service providers may disrupt our business operations generally and may have a disproportionate effect on those of our products that are developed and delivered in the cloud environment.

While we devote resources to maintaining the security and integrity of our products and systems, as well as performing due diligence of our third-party service providers, security breaches that have not had a material effect on our business or that of our customers have occurred, and we will continue to face cybersecurity threats and exposure. A significant breach of the security and/or integrity of our products or systems, or those of our third-party service providers, whether or intentional or by human error by our employees or others, could disrupt our business operations or those of our customers, could prevent our products from functioning properly, could enable access to sensitive, proprietary or confidential information of our customers, or could enable access to our sensitive, proprietary or confidential information. 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, any of which could have a material adverse effect on our business, financial condition and results of operations.

We increasingly rely on third-party providers of cloud infrastructure services to deliver our offerings to users on our platform, and any disruption of or interference with our use of these services could adversely affect our business.

Our continued growth depends in part on the ability of our existing and potential customers to use and access our cloud services or our website in order to download our software or encrypted access keys for our software within an acceptable amount of time. We use a number of third-party service providers that we do not control for key components of our infrastructure, particularly with respect to development and delivery of our cloud-based products. The use of these service providers gives us greater flexibility in efficiently delivering a more tailored, scalable customer experience, but also exposes us to additional risks and vulnerabilities. Third-party service providers operate their own platforms that we access, and we are, therefore, vulnerable to their service interruptions. We may experience interruptions, delays and outages in service and availability from time to time as a result of problems with our third-party service providers' infrastructure. Lack of availability of this infrastructure could be due to a number of potential causes including technical failures, natural disasters, fraud or security attacks that we cannot predict or prevent. Such outages could trigger our service level agreements with customers and require us to issue the issuance of credits to our cloud-based product customers, which could adversely impact our business, financial condition and results of operations.

If we are unable to renew our agreements with our cloud service providers on commercially reasonable terms, or any of our agreements are prematurely terminated, or we need to add new cloud services providers to increase capacity and uptime, we could experience interruptions, downtime, delays, and additional expenses related to transferring to and providing support for these new platforms. Any of the above circumstances or events may harm our reputation and brand, reduce the availability or usage of our platforms and impair our ability to attract new users, any of which could adversely affect our business, 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. 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 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, which would adversely affect our business, financial condition and results of operations.

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 macroeconomic factors.

A large amount of our sales are to customers in the discrete manufacturing sector. Manufacturers worldwide continue to face uncertainty about the global macroeconomic environment due to, among other factors, the effects of earlier and ongoing supply chain disruptions, rising interest rates and inflation, volatile foreign exchange rates and the current relative strength of the U.S. dollar, the effects of the Russia—Ukraine conflict, including on the supply of energy resources in Europe, and the U.S. Government’s focus on technology transactions with non-U.S. entities. In light of these challenges and concerns, 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 SaaS company, our business and financial results could be adversely affected.

Becoming a SaaS company requires considerable additional investment in our 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 adoption, 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 these 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 failure 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 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, an employee, agent or business partner may violate our policies or U.S. or other applicable laws or 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 loss and reputational harm, 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;

- complications relating to the assumption of pre-existing contractual relationships of an acquired company that we would not have otherwise entered into, the termination or modification of which may be costly or disruptive to our business;

- issuing equity awards to, or assuming existing equity awards of, acquired employees, which may more rapidly deplete share reserves available under our shareholder-approved equity incentive plans;

- litigation arising from the transaction, including potential intellectual property claims or disputes following our acquisition;

- diversion of management and employee attention;

- challenges with implementing adequate and appropriate controls, procedures and policies in an acquired business;

- potential loss of key personnel in connection with an acquisition; 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 under our credit facility or otherwise 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 constrain our ability to operate as we might otherwise or 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 15, 2022, our total debt outstanding was approximately $1,359 billion, $1 billion of which was associated with the 3.625% Senior Notes and 4.000% Senior Notes (together, “Senior Notes”) issued in February 2020, which mature in February 2025 and 2028, respectively, and are unsecured, and $359 million of which was borrowed under our credit facility, which matures in February 2025. 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 15, 2022, we had unused commitments under our credit facility of $641 million. 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 adverse economic and industry conditions;
- amplify the risk of increased interest rates as certain of our borrowings, including borrowings under our 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; and
- place us at a competitive disadvantage compared to other, less leveraged competitors.

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 our Senior Notes due 2025 and 2028, 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. On March 5, 2021, the Intercontinental Exchange Benchmark Administration, the U.K. Financial Conduct Authority (FCA) regulated and authorized administrator of LIBOR, announced, and the FCA confirmed, that one week and two-month USD LIBOR settings will cease on December 31, 2021, and that the USD LIBOR panel for all other tenors will cease on June 30, 2023.

The credit facility provides a mechanism pursuant to which we and the administrative agent may agree, under certain circumstances, to transition to an alternate base rate borrowing or amend the credit facility to establish an alternate interest rate to LIBOR that includes consideration of the then-prevailing market convention for determining interest rates for syndicated loans in the United States at that time.

Although we believe the alternative rates will not materially increase the 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:

- our adoption of Accounting Standards Update 2014-09, *Revenue from Contracts with Customers: Topic 606* in 2019 creates significant revenue volatility;

- 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;

- the rate at which our existing contracts renew or churn;

- 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 bookings, any failure to achieve our bookings targets could cause us to miss our near term earnings and cash flow targets;

- because a significant portion of our revenue and expenses are generated from outside the U.S., shifts in foreign currency exchange rates have had and could continue to have an adverse effect on 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.

VI. 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;
- increased financial accounting and reporting burdens and complexities;
- increased regulatory and compliance risks;
- 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, reduce our net income, and increase our tax payment obligations.

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.

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

- changes in tax laws (for example, the introduction of an amendment to Section 174 of the U.S. tax legislation), 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 98 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 1,209,000 square feet of leased facilities used in operations, approximately 484,000 square feet are located in the U.S., including 250,000 square feet at our headquarters facility located in Boston, Massachusetts, and approximately 250,000 square feet are located in India, where a significant amount of our research and development is conducted.

ITEM 3. Legal Proceedings

Information on legal proceedings can be found in *Note 10. Commitments and Contingencies -- Legal Proceedings* of Notes to Consolidated Financial Statements in this Annual Report, 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, 2022, the close of our fiscal year, and on November 14, 2022, our common stock was held by 1,003 and 1,000 shareholders of record, respectively.

ITEM 6. [Reserved]

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

Forward-Looking Statements

Statements in this Annual Report about anticipated financial results, capital developments and growth, as well as about the development of our products, markets and workforce, 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 (Annual Run Rate) 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 7% (16% constant currency) to $1,572 million in FY'22 compared to the end of FY'21. Excluding the impact of Codebeamer, which we acquired in the third quarter of FY'22, organic ARR growth was 6% (15% constant currency) in FY'22 compared to FY'21.

FY'22 revenue of $1.93 billion increased 7% over FY'21 (11% in constant currency). FY'22 operating margin of 23% increased approximately 200 basis points over FY'21 and non-GAAP operating margin of 38% increased approximately 300 basis points. Operating margin improvements are due to higher revenue and continued operating expense discipline. FY'22 diluted EPS was $2.65 compared to $4.03 in FY'21. Diluted EPS in FY'22 included a $35 million non-operating charge associated with the decrease in value of an equity investment in a publicly-traded company, offset by a non-operating $30 million credit associated with the sale of a portion of our PLM services business. Diluted EPS in FY'21 benefited from gains associated with an equity investment in a publicly-traded company, and income tax credits related to a release of a previously held valuation allowance. FY'22 non-GAAP diluted EPS was $4.58, representing a 15% increase over non-GAAP diluted EPS of $3.97 in FY'21.

FY'22 operating cash flow of $435 million grew 18% over FY'21; FY'22 free cash flow of $416 million grew 21% over FY'21. FY'22 operating cash flow and free cash flow included an $11.8 million outflow related to acquisition and transaction-related costs and $40.8 million of restructuring payments. We ended FY'22 with cash and cash equivalents of $272 million and gross debt of $1.36 billion, with an aggregate interest rate of 3.9%.

Results of Operations

The following table shows the 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 our ARR operating measure and 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. Our non-GAAP financial measures exclude the items described in *Non-GAAP Financial Measures* below. Investors should use our non-GAAP financial measures only in conjunction with our GAAP results.

For discussion of our FY'21 results and comparison to our FY'20 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, 2021.

(Dollar amounts in millions, except per share data)	**Year ended September 30,**		**Percent Change**	
	2022	**2021**	**Actual**	**Constant Currency**[1]
ARR as of September 30[2]	$ 1,572.0	$ 1,468.5	7 %	16 %
Total recurring revenue[3]	$ 1,736.2	$ 1,616.3	7 %	12 %
Perpetual license	34.1	33.0	3 %	6 %
Professional services	163.1	157.8	3 %	9 %
Total revenue	1,933.3	1,807.2	7 %	11 %
Total cost of revenue	386.0	371.1	4 %	7 %
Gross margin	1,547.4	1,436.1	8 %	12 %
Operating expenses	1,100.0	1,055.3	4 %	6 %
Operating income	$ 447.4	$ 380.7	17 %	30 %
Non-GAAP operating income[1]	$ 732.2	$ 634.4	15 %	23 %
Operating margin	23.1 %	21.1 %		
Non-GAAP operating margin[1]	37.9 %	35.1 %		
Diluted earnings per share	$ 2.65	$ 4.03		
Non-GAAP diluted earnings per share[1]	$ 4.58	$ 3.97		
Cash flow from operations[4]	$ 435.3	$ 368.8		
Capital expenditure	(19.5)	(24.7)		
Free cash flow	$ 415.8	$ 344.1		

(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)For the September 30, 2021 period, to facilitate comparability, we removed $6.2 million of ARR associated with a Vuforia AR product that we ceased selling as of September 30, 2021 from our ARR operating measure.
(3)Recurring revenue is comprised of on-premises subscription, perpetual support, and SaaS, and cloud revenue.
(4)Cash flow from operations for FY’22 and FY’21 includes $40.8 million and $14.5 million of restructuring payments, respectively. Cash from operations for FY’22 and FY’21 includes $11.8 million and $15.0 million of acquisition and transaction-related payments, respectively. Cash from operations for FY'21 includes $17.9 million in un-forecasted payments related to the prior period tax exposure from a non-U.S. tax dispute.

Impact of Foreign Currency Exchange on Results of Operations

Approximately 55% 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. Changes in foreign currency exchange rates have been a headwind to reported results in FY’22.

The results of operations in the table above, and the tables and discussions below about revenue by line of business, product group, and geographic region present both actual percentage changes year over year and percentage changes on a constant currency basis. Our constant currency disclosures are calculated by multiplying the results in local currency for FY'22 and FY'21 by the exchange rates in effect on September 30, 2021. If FY'22 reported results were converted into U.S. dollars using the rates in effect as of September 30, 2021, ARR as of September 30, 2022 would have been higher by $134 million and operating income in FY'22 would have been $27 million higher.

Revenue

Under ASC 606, the volume, mix, and duration of contract types (support, SaaS, on-premises subscription) starting or renewing in any given period may have a material impact on revenue in the period, and as a result can impact the comparability of reported revenue period-over-period. We recognize revenue for the license portion of on-premises subscription contracts up front when we deliver the licenses to the customer, typically on the start date, and we recognize revenue on the support element of on-premises subscription contracts and stand-alone support contracts ratably over the term. We continue to convert existing support contracts to on-premises subscriptions, resulting in a shift to up-front recognition of on-premises subscription license revenue in the period converted compared to ratable recognition for a perpetual support contract. Revenue from our cloud services (primarily SaaS) contracts is recognized ratably. As we continue to expand our SaaS offerings and release additional cloud functionality into our products, and customers begin to migrate from on-premises subscriptions to SaaS products, we expect that over time a higher portion of our revenue will be recognized ratably. Given the different mix, duration and volume of new and renewing contracts in any period, year-over-year or sequential revenue comparisons can vary significantly.

Revenue by Line of Business

(Dollar amounts in millions)	**Year ended September 30,**		**Percent Change**	
	2022	**2021**	**Actual**	**Constant Currency**
License [1]	$ 782.7	$ 738.1	6 %	10 %
Support [2] and cloud services	987.6	911.3	8 %	13 %
Total software revenue	1,770.3	1,649.3	7 %	12 %
Professional services	163.1	157.8	3 %	9 %
Total revenue	$ 1,933.3	$ 1,807.2	7 %	11 %

(1)Includes perpetual licenses and the license portion of subscription sales.
(2)Includes support on perpetual licenses and the support portion of subscription sales.

The strengthening of the U.S. dollar compared to foreign currencies had a substantial impact on our revenue growth in FY'22. On an actual currency basis, FY'22 revenue increased $126 million (7%), compared to an increase of $202 million (11%) on a constant currency basis.

Software revenue increased in FY’22 compared to FY’21 due to growth of Windchill and Arena revenue in the Americas and contribution from the recently acquired Codebeamer business in Europe, offset by a decline in Creo revenue primarily driven by foreign currency fluctuations in Europe and changes in contract durations. In FY'22, our average durations for on-premises subscriptions starting in the year decreased slightly, resulting in a reduced revenue benefit compared to FY'21, which benefited from significant increases in average contractual durations due to business rule changes.

Professional services revenue in FY’22 compared to FY'21 reflects an increase in revenue associated with large PLM consulting engagements, particularly with automotive, aerospace and defense and consumer electronics customers. Professional services revenue in the first half of FY’21 was negatively impacted by services delivery challenges associated with the COVID-19 pandemic.

Our long-term expectation is that professional services revenue will trend down over time as we migrate more services engagements to our partners and deliver products that require less consulting and training services. As described in Part I, Item 1. Business above, in the second half of FY'22, we accelerated this strategy through the sale of a portion of our PLM services business to ITC Infotech.

Revenue and ARR by Product Group

Software Revenue by Product Group[1]

(Dollar amounts in millions)	Year ended September 30,		Percent Change	
	2022	**2021**	**Actual**	**Constant Currency**
Digital Thread - Core	$ 1,212.1	$ 1,161.7	4 %	9 %
Digital Thread - Growth	249.6	236.7	5 %	9 %
Digital Thread - FSG	227.0	210.2	8 %	12 %
Digital Thread (Total)	1,688.7	1,608.6	5 %	9 %
Velocity	81.6	40.7	101 %	101 %
Software revenue	$ 1,770.3	$ 1,649.3	7 %	12 %
Product lifecycle management (PLM)	$ 980.5	$ 862.9	14 %	18 %
Computer-aided design (CAD)	789.8	786.4	0 %	5 %
Software revenue	$ 1,770.3	$ 1,649.3	7 %	12 %

(1)We describe our Product Groups for FY'22 and FY'21 and the change for FY'23, including the products in each group, in Part I, Item 1. Business above.

Windchill software revenue increased by 12% (16% constant currency), driven by a significant increase in on-premises subscription license revenue and an increase in cloud services revenue. Windchill ARR increased 10% (19% constant currency) in FY'22 compared to FY'21.

Arena software revenue increased by 122% (actual and constant currency), driven by an increase in cloud services revenue and an increase in on-premises subscription license revenue. Arena was acquired in January 2021, so it did not contribute to FY'21 revenue for the full year and purchase accounting adjustments to acquired deferred revenue had a greater impact on FY'21 revenue than FY'22. Arena ARR increased by 27% (actual and constant currency) in FY'22 compared to FY'21.

IIoT software revenue increased by 7% (10% constant currency) driven by an increase in cloud services revenue. IIoT ARR increased 14% (21% constant currency) in FY'22 compared to FY'21.

The Codebeamer business, which we acquired in the third quarter, performed well and added a point of ARR growth, taking constant currency ARR growth to 16% for the fourth quarter and full year. Codebeamer generated $9 million of revenue in FY'22, with $6 million of on-premises subscription revenue and $2 million of perpetual support revenue. Codebeamer ARR as of September 30, 2022 was $16 million ($18 million on a constant currency basis).

Creo software revenue decreased by 1% primarily driven by the effect of foreign currency headwinds in Europe. Creo software revenue increased 4% on a constant currency basis. Creo ARR was flat (increased 11% in constant currency) in FY'22 compared to FY'21.

Software Revenue & ARR by Geographic Region

A significant portion of our software revenue is generated outside the U.S. In both FY’22 and FY’21, approximately 40% to 45% of software revenue was generated in the Americas, 35% to 40% in Europe, and 15% to 20% in Asia Pacific.

(Dollar amounts in millions)	**Year ended September 30,**		**Percent Change**	
	2022	**2021**	**Actual**	**Constant Currency**
Americas	$ 835.9	$ 710.7	18 %	18 %
Europe	633.4	645.8	(2)%	6 %
Asia Pacific	301.0	292.8	3 %	9 %
Total Software revenue	$ 1,770.3	$ 1,649.3	7 %	12 %

Americas software revenue growth in FY’22 was driven by Windchill revenue growth of 23%, Arena revenue growth of 133%, and IIoT revenue growth of 10%. The increase in revenue from Arena includes the effect of purchase accounting adjustments to reduce acquired deferred revenue. Americas ARR was up 17%.

Europe software revenue declined in FY’22, driven by a $48 million foreign currency impact associated with the strengthening of the U.S. Dollar compared to foreign currencies. Creo revenue decreased 5% (2% increase in constant currency), partially offset by Windchill revenue growth of 4% (12% constant currency) and the addition of Codebeamer revenue. ARR in Europe was up 16% constant currency.

Asia Pacific software revenue growth in FY’22 included a $19 million foreign currency impact associated with the strengthening of the US Dollar compared to foreign currencies. Creo revenue grew 4% (11% constant currency) and Windchill revenue grew 3% (9% constant currency). ARR in Asia Pacific was up 13% constant currency.

Gross Margin

(Dollar amounts in millions)	**Year ended September 30,**		
	2022	**2021**	**Percent Change**
Gross margin:			
License gross margin	$ 733.4	$ 676.3	8 %
License gross margin percentage	94 %	92 %	
Support and cloud services gross margin	$ 802.8	$ 747.2	7 %
Support and cloud services gross margin percentage	81 %	82 %	
Professional services gross margin	$ 11.1	$ 12.6	(11)%
Professional services gross margin percentage	7 %	8 %	
Total gross margin	$ 1,547.4	$ 1,436.1	8 %
Total gross margin percentage	80 %	79 %	
Non-GAAP gross margin[1]	$ 1,595.7	$ 1,485.1	7 %
Non-GAAP gross margin percentage[1]	83 %	82 %	

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

The strengthening of the U.S. dollar compared to foreign currencies had a substantial impact on our gross margin increase in FY'22. On an actual currency basis, FY'22 gross margin increased $111 million (8%), compared to an increase of $176 million (12%) on a constant currency basis.

License gross margin increased in FY’22 compared to FY’21 due to an increase in license revenue of $44.6 million and a decrease in cost of license of $12.5 million, which was driven by lower amortization expense, royalty expense and compensation costs.

Support and cloud services gross margin increased in FY’22 compared to FY’21 due to increases in support and cloud services revenue of $76.3 million, partially offset by increases in cost of support and cloud services of $20.7 million, which were driven by higher compensation, maintenance and hosting costs.

Professional services gross margin decreased in FY’22 compared to FY’21 due to increases in professional services costs of $6.7 million, including $5.1 million of stock-based compensation expense recognized in FY'22 related to the sale of a portion of our PLM services business in Q3'22, partially offset by a $5.3 million increase in revenue.

Operating Expenses

(Dollar amounts in millions)	Year ended September 30,		
	2022	2021	Percent Change
Sales and marketing	$ 485.2	$ 517.8	(6)%
% of total revenue	25 %	29 %	
Research and development	338.8	299.9	13 %
% of total revenue	18 %	17 %	
General and administrative	204.7	206.0	(1)%
% of total revenue	11 %	11 %	
Amortization of acquired intangible assets	35.0	29.4	19 %
% of total revenue	2 %	2 %	
Restructuring and other charges, net	36.2	2.2	1545 %
% of total revenue	2 %	0 %	
Total operating expenses	$ 1,100.0	$ 1,055.3	4 %

The strengthening of the U.S. dollar compared to foreign currencies had a substantial reduction to our operating expense increase in FY'22. On an actual currency basis, FY'22 operating expenses increased $45 million (4%), compared to an increase of $67 million (6%) on a constant currency basis.

Total headcount decreased by 3% in FY'22 to 6,503 from 6,709 at the end of FY'21.

Operating expenses in FY'22 compared to FY'21 increased primarily due to the following:

- a $34 million increase in restructuring charges primarily due to the restructuring plan initiated in Q1’22;
- a $9 million increase in travel expenses;
- a $6 million increase in intangible amortization expense;
- a $6 million increase in software subscriptions; and
- a $5 million increase in internal hosting costs;

partially offset by:

- a $12 million decrease in compensation expense (including benefit costs) due to lower headcount caused by attrition and restructuring actions; and
- a $6 million decrease in stock-based compensation.

Interest Expense

(Dollar amounts in millions)	Year ended September 30, 2022	2021	Percent Change
Interest and debt premium expense	$ (54.3)	$ (50.5)	8 %

Interest expense includes interest under our credit facility and senior notes. Interest expense was higher in FY'22 than FY'21. We had $1,359 million of total debt at September 30, 2022, compared to $1,450 million at September 30, 2021. We repaid $355 million of our revolving credit facility in FY'22, offset by $264 million borrowed at the end of April to fund the acquisition of the Codebeamer business. Loans under the credit facility bear interest at variable rates which reset every 30 to 180 days. As of September 30, 2022, the annual rate for borrowings under the credit facility was 4.1%, which has subsequently increased to 5.7%. 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 3.4% in FY'22 and 3.3% in FY'21.

Other Income (Expense)

(Dollar amounts in millions)	Year ended September 30, 2022	2021	Percent Change
Interest income	$ 2.5	$ 1.8	39 %
Other income (expense), net	1.5	59.7	(97)%
Other income, net	$ 4.0	$ 61.5	(93)%

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

The decrease in Other income, net, in FY’22 over FY’21 was driven by a FY'21 credit of $69 million associated with unrealized gains related to an equity investment in a publicly-traded company. In FY'22, the value of that equity investment decreased, resulting in a $35 million charge. That FY'22 charge was offset by a gain on the sale of a portion of our PLM services business of $30 million and $6 million of gains on the sale of other assets and investments.

Income Taxes

(Dollar amounts in millions)	Year ended September 30, 2022	2021	Percent Change
Income before income taxes	$ 397.1	$ 391.8	1 %
Provision (benefit) for income taxes	84.0	(85.2)	(199)%
Effective income tax rate	21 %	(22)%	

In FY’22 and FY’21, our effective tax rate is impacted by 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 and the Cayman Islands. In FY’22 and FY’21 the foreign rate differential predominantly relates to those earnings. In addition to the foreign rate differential, our tax rate differed from the statutory federal income tax rate due to the net effects of the Global Intangible Low-Taxed Income (GILTI) and Foreign Derived Intangible Income (FDII) regimes (together referred to as U.S. Tax reform), and the excess tax benefit related to stock-based compensation.

Additionally in FY’22, our results include tax expense relating to the book over tax basis difference on goodwill disposed of as part of the sale of a portion of our PLM service business. As a result of the net effect of these items in 2022, our effective tax rate did not differ significantly from the U.S. federal income tax rate.

In FY’21, our tax rate includes a benefit due to the release of the valuation allowance on the majority of our U.S. net deferred tax assets.

Our results for the twelve months ended September 30, 2021, include a charge of $37.3 million related to the effects of a tax matter in the Republic of Korea (South Korea) of $34.4 million, and the resulting impact on U.S. income taxes of $2.9 million. The charge related to an assessment with respect to various tax issues, primarily foreign withholding taxes, in South Korea. We made additional payments of approximately $20 million to the tax authorities in South Korea in FY’21 for the years 2016 to 2021.

Liquidity and Capital Resources

(in millions)	September 30,	
	2022	**2021**
Cash and cash equivalents	$ 272.2	$ 326.5
Restricted cash	0.7	0.5
Total	$ 272.9	$ 327.0
Activity for the year included the following:		
Net cash provided by operating activities	$ 435.3	$ 368.8
Net cash used in investing activities	$ (201.2)	$ (687.9)
Net cash (used in) provided by financing activities	$ (264.1)	$ 370.3

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. At September 30, 2022, cash and cash equivalents totaled $272 million, compared to $327 million at September 30, 2021.

A significant portion of our cash is generated and held outside the U.S. As of September 30, 2022, we had cash and cash equivalents of $11 million in the U.S., $105 million in Europe, $128 million in Asia Pacific (including India) and $28 million in other non-U.S. countries. 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., 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 $435 million in FY'22 compared to $369 million in FY'21. The year-over-year increase is primarily due to approximately $170 million of higher cash collections, offset by $30 million more in salary and salary-related payments, a $57 million increase in disbursements largely related to prepayments made in FY'22, and a $12 million increase in tax-related payments.

Restructuring payments totaled $41 million in FY'22, compared to $15 million in FY'21. Cash paid for income taxes was $55 million in FY'22 compared to $58 million in FY'21.

Cash used in investing activities

(in millions)	Year ended September 30,	
	2022	**2021**
Additions to property and equipment	$ (19.5)	$ (24.7)
Proceeds from short- and long-term marketable securities, net	—	58.4
Acquisitions of businesses, net of cash acquired	(282.9)	(718.0)
Proceeds from sales of investments	46.9	—
Purchases of investments	—	(4.0)
Purchase of intangible assets	(6.5)	(0.6)
Settlement of net investment hedges	24.9	1.0
Divestiture of business, net	32.5	—
Other investing activities	3.4	—
Net cash used in investing activities	$ (201.2)	$ (687.9)

Cash used in investing activities in FY'22 reflects $278 million ($264 million of which we borrowed under our credit facility) used to acquire the Codebeamer business in FY'22, compared to $718 million used in FY’21 for the Arena acquisition, offset by FY'22 proceeds from the sale of a portion of our PLM services business of $33 million and proceeds from the sale of investments of $47 million. For additional detail on our acquisitions, see *Note 6. Acquisitions and Disposition of Business* of Notes to Consolidated Financial Statements in this Annual Report.

Cash (used in) provided by financing activities

(in millions)	**Year ended September 30, 2022**	**2021**
Borrowings (repayments) on debt, net	$ (91.0)	$ 432.0
Repurchases of common stock	(125.0)	(30.0)
Proceeds from issuance of common stock	21.2	21.6
Payments of withholding taxes in connection with stock-based awards	(69.0)	(53.0)
Payments of principal for financing leases	(0.3)	(0.4)
Net cash (used in) provided by financing activities	$ (264.1)	$ 370.3

Cash used in financing activities in FY’22 reflects borrowings of $264 million, offset by repayments of $355 million under our credit facility, repurchases of common stock of $125 million, payments of withholding taxes related to stock-based awards of $69 million and proceeds from the issuance of common stock of $21 million. In FY'21, net borrowings of $600 million were offset by $168 million of repayments under our credit facility, repurchases of common stock of $30 million, and payments of withholding taxes related to stock-based awards of $53 million.

Outstanding Debt

As of September 30, 2022, we had:

(in millions)	**September 30, 2022**
4.000% Senior notes due 2028	$ 500.0
3.625% Senior notes due 2025	500.0
Credit facility revolver	359.0
Total debt	1,359.0
Unamortized debt issuance costs for the Senior notes	(8.4)
Total debt, net of issuance costs	$ 1,350.6
Undrawn under credit facility revolver	$ 641.0
Undrawn under credit facility revolver available for borrowing	$ 625.1

As of September 30, 2022, 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. Loans under the credit facility bear interest at variable rates which reset every 30 to 180 days. As of September 30, 2022, the annual rate for borrowings outstanding was 4.1%, which has subsequently increased to 5.7%.

Our credit facility and our Senior Notes are described in *Note 9. Debt* of Notes to the Consolidated Financial Statements in this Annual Report.

Share Repurchase Authorization

Our Articles of Organization authorize us to issue up to 500 million shares of our common stock. Our Board of Directors has authorized us to repurchase up to $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. All shares of our common stock repurchased are automatically restored to the status of authorized and unissued.

In FY'22 and in FY'21 we repurchased 1.05 million shares for $125 million and approximately 0.23 million shares in the open market for $30 million, respectively.

Our long-term goal is to return approximately 50% of our free cash flow to shareholders via share repurchases, while also taking into consideration the interest rate environment and strategic initiatives and acquisitions, which could cause us to reduce, suspend, or cease repurchases.

Expectations for Fiscal 2023

We believe that existing cash and cash equivalents, together with cash generated from operations and amounts available under the credit facility and otherwise, will be sufficient to meet our working capital and capital expenditure requirements (which we expect to be approximately $20 million in FY’23) 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, our cash position could be reduced, and we could incur additional debt obligations if we engage in strategic transactions, retire debt, or repurchase shares, any of which could be commenced, suspended, or completed at any time. Any share repurchases or debt retirement will depend on prevailing market conditions, our liquidity requirements, contractual restrictions and other factors. Such debt retirement or issuance, share repurchases, or strategic transactions may be material. We regularly borrow under our credit facility to make strategic acquisitions and expect to continue to do so, and may substantially increase our indebtedness to pursue strategic acquisitions, which would increase our debt repayment obligations, including related interest obligations.

Contractual Obligations

At September 30, 2022, our future contractual obligations were related to debt, leases, pension liabilities, unrecognized tax benefits, and purchase obligations. See *Note 9. Debt, Note 19. Leases, Note 14. Pension Plans,* and *Note 8. Income Taxes* of Notes to Consolidated Financial Statements in this Annual Report for information about those obligations, which Notes are incorporated by reference into this section. Our purchase obligations were approximately $161.4 million, with $64.2 million expected to be paid in FY'23 and $97.2 million thereafter. 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 are not included in the purchase obligation amounts above. The purchase obligations included above are in addition to amounts included in Current liabilities and Prepaid expenses recorded on our September 30, 2022 Consolidated Balance Sheet.

As of September 30, 2022, we had letters of credit and bank guarantees outstanding of approximately $15 million (of which $0.5 million was collateralized).

Operating Measure

ARR

ARR (Annual Run Rate) represents the annualized value of our portfolio of active subscription software, cloud, SaaS, and support contracts as of the end of the reporting period.

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 customers. Because this measure represents the annualized value of customer contracts as of a point in time, it 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 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, 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: stock-based compensation expense; amortization of acquired intangible assets; acquisition and transaction-related 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.

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 and transaction-related 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 and transaction-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 and transactions.

Restructuring and other charges, net includes excess facility restructuring charges (credits); 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 and third-party professional consulting fees related to modifications of our business strategy. These costs may vary in size based on our restructuring plan.

Non-operating charges (credits) includes gains or losses associated with sales or changes in value of assets or liabilities which are generally investing or financing in nature, and are inconsistent with our ordinary operating activities. In FY'22, we recorded gains associated with the sale of assets, including the sale of a portion of our PLM services business. Additionally in FY'22, we recorded a loss associated with the reduction in value of an equity investment in a publicly-traded company. In FY'21, we recorded a gain related to the change in value of an equity investment in a publicly-traded company.

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, 2022	2021
GAAP gross margin	$ 1,547.4	$ 1,436.1
Stock-based compensation	22.8	19.3
Amortization of acquired intangible assets included in cost of revenue	25.6	29.8
Non-GAAP gross margin	$ 1,595.7	$ 1,485.1
GAAP operating income	$ 447.4	$ 380.7
Stock-based compensation	174.9	177.3
Amortization of acquired intangible assets	60.5	59.2
Acquisition and transaction-related charges	13.2	15.0
Restructuring and other charges, net	36.2	2.2
Non-GAAP operating income	$ 732.2	$ 634.4
GAAP net income	$ 313.1	$ 476.9
Stock-based compensation	174.9	177.3
Amortization of acquired intangible assets	60.5	59.2
Acquisition and transaction-related charges	13.2	15.0
Restructuring and other charges, net	36.2	2.2
Non-operating charges(credits), net[1]	(1.4)	(68.8)
Income tax adjustments[2]	(55.1)	(191.6)
Non-GAAP net income	$ 541.5	$ 470.2
GAAP diluted earnings per share	$ 2.65	$ 4.03
Stock-based compensation	1.48	1.50
Total amortization of acquired intangible assets	0.51	0.50
Acquisition and transaction-related charges	0.11	0.13
Restructuring and other charges, net	0.31	0.02
Non-operating charges(credits), net[1]	(0.01)	(0.58)
Income tax adjustments[2]	(0.47)	(1.62)
Non-GAAP diluted earnings per share	$ 4.58	$ 3.97
Cash flow from operations	$ 435.3	$ 368.8
Capital expenditure	(19.5)	(24.7)
Free cash flow	$ 415.8	$ 344.1

(1)Non-operating net credits for FY'22 include a $29.8 million gain on the sale of a portion of our PLM services business, a $3.4 million gain on sale of an asset, and a $3.0 million gain on sale of an investment, offset by a $34.8 million expense recognized due to the reduction in value of an equity investment in a publicly-traded company. Non-operating credits for FY'21 include a $68.8 million gain associated with an increase in value of an equity investment in a publicly-traded company.
(2)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. In FY'22, adjustments include tax expense of $15.5 million related to the sale of a portion of our PLM services business, of which $8.1 million pertains to the basis difference in goodwill. Our FY'21 GAAP results included benefits of $179.7 million related to the release of the valuation allowance on the majority of our U.S. net deferred tax assets. As we were profitable on a non-GAAP basis, the FY'21 tax provision was calculated assuming there was no valuation allowance. Additionally, our non-GAAP results for FY'21 excluded tax expenses of $34.8 million related to a non-U.S. prior period tax exposure, primarily related to foreign withholding taxes.

Operating margin impact of non-GAAP adjustments:

	Year ended September 30, 2022	2021
GAAP operating margin	23.1 %	21.1 %
Stock-based compensation	9.0 %	9.8 %
Total amortization of acquired intangible assets	3.1 %	3.3 %
Acquisition and transaction-related charges	0.7 %	0.8 %
Restructuring and other charges, net	1.9 %	0.1 %
Non-GAAP operating margin	37.9 %	35.1 %

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

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, 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) subscriptions, (2) perpetual licenses, (3) support for perpetual licenses and (4) professional services. Subscriptions include term-based on-premises licenses, Software-as-a-Service (SaaS), and hosting services.

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 license software revenue is generally recognized at the point in time that the software is made available to the customer, while the support and cloud software 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 liability. For most contracts, we use the expected value method to determine the 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 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, 2022, we have a valuation allowance of $17.8 million against net deferred tax assets in the U.S. and a valuation allowance of $4.5 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 is not required against our U.S. net deferred tax assets as they are 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. For acquisitions completed prior to FY'22, 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. During FY'22, we adopted ASU 2021-08, whereby deferred revenue for acquisitions completed in FY'22 reflect the amounts that would have been deferred as of the acquisition date in accordance with ASC 606.

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.

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* of Notes to the Consolidated Financial Statements in this Annual Report for all recently issued accounting pronouncements, which is incorporated herein by reference.

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.

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 55% 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 exchange rate and a 10 Yen change in the Yen to USD exchange rate would impact operating income by approximately $32 million and $12 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 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 four months.

The majority of our foreign currency forward contracts are not designated 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, 2022 and 2021, 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, 2022**	**2021**
Canadian / U.S. Dollar	$ 2,731	$ 4,894
Euro / U.S. Dollar	316,869	387,466
British Pound / U.S. Dollar	7,368	23,141
Israeli Shekel / U.S. Dollar	12,052	10,475
Japanese Yen / U.S. Dollar	25,566	46,450
Swiss Franc / U.S. Dollar	25,559	18,039
Swedish Krona / U.S. Dollar	35,713	34,196
Singapore Dollar / U.S. Dollar	3,637	3,498
Chinese Renminbi / U.S. Dollar	23,965	23,297
New Taiwan Dollar / U.S. Dollar	13,906	3,369
Russian Ruble/ U.S. Dollar	—	2,614
Korean Won/ U.S. Dollar	4,919	—
Danish Krone/ U.S. Dollar	3,192	2,380
Australian Dollar/ U.S. Dollar	3,269	2,086
All other	4,432	2,016
Total	$ 483,178	$ 563,921

Debt

In addition to the $1 billion due under our 2025 and 2028 Senior Notes, as of September 30, 2022, we had $359 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, 2022, the annual rate on the credit facility loans was 4.14%. If there were a 100 basis point change in interest rates, the annual net impact to earnings and cash flows would be $3.6 million. This change in cash flows and earnings has been calculated based on the borrowings outstanding at September 30, 2022 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, 2022, 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, 2022, we had cash and cash equivalents of $11 million in the United States, $105 million in Europe, $128 million in Asia Pacific (including India), and $28 million in other non-U.S. countries. Given the short maturities and investment grade quality of the portfolio holdings at September 30, 2022, 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 exchange rate 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 unfavorable impact of $24.2 million and $0.1 million on our consolidated cash balances in 2022 and 2021, 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, 2022.

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, 2022 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, 2022, our internal control over financial reporting was effective.

The effectiveness of our internal control over financial reporting as of September 30, 2022 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, 2022 that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

ITEM 9B. Other Information

None.

ITEM 9C. Disclosure Regarding Foreign Jurisdictions that Prevent Inspections

Not applicable.

PART III

ITEM 10. Directors, Executive Officers and Corporate Governance

The information required by this item with respect to our directors and executive officers may be found under the headings “Proposal 1: Election of Directors,” “Corporate Governance,” "Information About Our Executive Officers," and “Transactions with Related Persons” appearing in our 2023 Proxy Statement. Such information is incorporated herein 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 2023 Proxy Statement. Such information is incorporated herein by reference.

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

The information required by this item may be found under the headings “Proposal 2: Approve an Increase in the Number of Shares Available under the 2000 Equity Incentive Plan,” ”Equity Compensation Plan Information,” and “Information about PTC Common Stock Ownership” appearing in our 2023 Proxy Statement. Such information is incorporated herein by reference.

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” appearing in our 2023 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 2023 Proxy Statement. Such information is incorporated herein by reference.

PART IV

ITEM15. Exhibits and Financial Statement Schedules

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

1. Financial Statements

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.

ITEM16. Form 10-K Summary

None.

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EXHIBIT INDEX

Exhibit Number		Exhibit
2.1	—	Share Sale and Purchase Agreement dated as of April 19, 2022, by and among PTC (SSI), Intland Software GmbH, Eger Invest GmbH, Janos Rezso Koppány, Zsolt Koppány, Szabolcs Koppány and Eger Software Holding UG (haftungsbeschränkt) & Co. KG. (filed as Exhibit 1.1 to our Current Report on Form 8-K filed on April 20, 2022 (File No. 0-18059) and incorporated herein by reference).
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	—	Amended and Restated By-Laws of PTC Inc., as amended through June 24, 2021.
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 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 Michael DiTullio (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 Catherine Kniker dated September 23, 2021.
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	—	Amendment No. 1 to Securities Purchase Agreement dated as of May 11, 2021 between PTC Inc. and Rockwell Automation, Inc. filed as Exhibit 10.1 to our Current Report on Form 8-K filed on May 13, 2021 (File No. 0-18059) and incorporated herein by reference).
10.16	—	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, 2022, formatted in Inline XBRL (eXtensible Business Reporting Language): (i) Consolidated Balance Sheets as of September 30, 2022 and 2021; (ii) Consolidated Statements of Operations for the years ended September 30, 2022, 2021 and 2020; (iii) Consolidated Statements of Comprehensive Income for the years ended September 30, 2022, 2021 and 2020; (iv) Consolidated Statements of Cash Flows for the years ended September 30, 2022, 2021 and 2020; (v) Consolidated Statements of Stockholders' Equity for the years ended September 30, 2022, 2021 and 2020; 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 15th day of November, 2022.

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 15th day of November, 2022.

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/ MARK BENJAMIN **Mark Benjamin**	Director
/s/ JANICE CHAFFIN **Janice Chaffin**	Director
/s/ AMAR HANSPAL **Amar Hanspal**	Director
/s/ JAMES HEPPELMANN **James Heppelmann**	Director
/s/ KLAUS HOEHN **Klaus Hoehn**	Director
/s/ MICHAL KATZ **Michal Katz**	Director
/s/ PAUL LACY **Paul Lacy**	Director
/s/ CORINNA LATHAN **Corinna Lathan**	Director
/s/ BLAKE MORET **Blake Moret**	Director

APPENDIX A

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, 2022 and 2021, and the related consolidated statements of operations, of comprehensive income, of stockholders’ equity and of cash flows for each of the three years in the period ended September 30, 2022, 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, 2022, 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, 2022 and 2021, and the results of its operations and its cash flows for each of the three years in the period ended September 30, 2022 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, 2022, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the COSO.

Changes in Accounting Principles

As discussed in Note 2 to the consolidated financial statements, the Company changed the manner in which it accounts for leases in fiscal 2020.

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 matter communicated below is a matter 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 matter below, providing a separate opinion on the critical audit matter or on the accounts or disclosures to which it relates.

Revenue from Contracts with Customers - Identification of Distinct Performance Obligations

As described in Note 2 to the consolidated financial statements, the Company's sources of revenue include: (1) subscriptions, (2) perpetual licenses, (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, 2022, the Company recognized revenue from contracts with customers of $1,933.3 million. The Company's 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. 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, is a critical audit matter are the significant judgment by management in the identification of distinct performance obligations, specifically the determination that the on-premises software is determined to be a distinct performance obligation from support, 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.

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. These procedures also included, among others (i) evaluating the Company’s revenue recognition accounting policy and (ii) testing management’s identification of distinct performance obligations in its contracts with customers by examining revenue contracts on a sample basis and evaluating whether these performance obligations are satisfied at a point in time or satisfied over time.

/s/ PricewaterhouseCoopers LLP
Boston, Massachusetts
November 15, 2022

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

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

	September 30, 2022	September 30, 2021
ASSETS		
Current assets:		
Cash and cash equivalents	$ 272,182	$ 326,532
Accounts receivable, net of allowance for doubtful accounts of $362 and $304 at September 30, 2022 and September 30, 2021, respectively	636,556	541,072
Prepaid expenses	88,854	69,991
Other current assets	71,065	135,415
Total current assets	1,068,657	1,073,010
Property and equipment, net	98,101	100,237
Goodwill	2,353,654	2,191,887
Acquired intangible assets, net	382,718	378,967
Deferred tax assets	256,091	297,789
Operating right-of-use lease assets	137,780	152,337
Other assets	390,267	313,333
Total assets	$ 4,687,268	$ 4,507,560
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	$ 40,153	$ 33,381
Accrued expenses and other current liabilities	117,158	113,067
Accrued compensation and benefits	104,022	117,784
Accrued income taxes	5,142	5,055
Deferred revenue	503,781	482,131
Short-term lease obligations	22,002	27,864
Total current liabilities	792,258	779,282
Long-term debt	1,350,628	1,439,471
Deferred tax liabilities	28,396	4,165
Deferred revenue	16,552	15,546
Long-term lease obligations	167,573	180,935
Other liabilities	35,827	49,693
Total liabilities	2,391,234	2,469,092
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; 117,472 and 117,163 shares issued and outstanding at September 30, 2022 and September 30, 2021, respectively	1,175	1,172
Additional paid-in capital	1,720,580	1,718,504
Retained earnings	727,737	414,656
Accumulated other comprehensive loss	(153,458)	(95,864)
Total stockholders' equity	2,296,034	2,038,468
Total liabilities and stockholders' equity	$ 4,687,268	$ 4,507,560

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, 2022	2021	2020
Revenue:			
License	$ 782,680	$ 738,053	$ 509,792
Support and cloud services	987,573	911,288	804,825
Total software revenue	1,770,253	1,649,341	1,314,617
Professional services	163,094	157,818	143,798
Total revenue	1,933,347	1,807,159	1,458,415
Cost of revenue:			
Cost of license revenue	49,240	61,750	53,195
Cost of support and cloud services revenue	184,789	164,108	145,386
Total cost of software revenue	234,029	225,858	198,581
Cost of professional services revenue	151,951	145,244	135,690
Total cost of revenue	385,980	371,102	334,271
Gross margin	1,547,367	1,436,057	1,124,144
Operating expenses:			
Sales and marketing	485,247	517,779	435,451
Research and development	338,822	299,917	256,575
General and administrative	204,732	206,006	159,826
Amortization of acquired intangible assets	34,970	29,396	28,713
Restructuring and other charges, net	36,234	2,211	32,716
Total operating expenses	1,100,005	1,055,309	913,281
Operating income	447,362	380,748	210,863
Interest and debt premium expense	(54,268)	(50,478)	(76,428)
Other income, net	4,004	61,485	271
Income before income taxes	397,098	391,755	134,706
Provision (benefit) for income taxes	84,017	(85,168)	4,011
Net income	$ 313,081	$ 476,923	$ 130,695
Earnings per share—Basic	$ 2.67	$ 4.08	$ 1.13
Earnings per share—Diluted	$ 2.65	$ 4.03	$ 1.12
Weighted-average shares outstanding—Basic	117,194	116,836	115,663
Weighted-average shares outstanding—Diluted	118,233	118,367	116,267

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

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

	Year ended September 30, 2022	2021	2020
Net income	$ 313,081	$ 476,923	$ 130,695
Other comprehensive income (loss), net of tax:			
Hedge gain (loss) arising during the period, net of tax of $5.8 million, $0.4 million, and $1.7 million in 2022, 2021, and 2020, respectively	17,556	1,248	(13,242)
Foreign currency translation adjustment, net of tax of $0 for each period	(92,768)	1,613	22,076
Unrealized gain (loss) on marketable securities, net of tax of $0 for each period	—	(307)	188
Amortization of net actuarial pension gain included in net income, net of tax of $0.4 million, $1.2 million, and $0.9 million in 2022, 2021, and 2020, respectively	1,010	2,930	2,983
Pension net gain (loss) arising during the period net of tax of $6.1 million, $0.7 million, and $0.7 million in 2022, 2021, and 2020, respectively	15,027	1,891	(2,791)
Change in unamortized pension gain (loss) related to changes in foreign currency, net of tax of $0.6 million, $0.0 million, and $0.7 million in 2022, 2021, and 2020, respectively	1,581	135	(1,878)
Other comprehensive income (loss)	(57,594)	7,510	7,336
Comprehensive income	$ 255,487	$ 484,433	$ 138,031

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, 2022	2021	2020
Cash flows from operating activities:			
Net income	$ 313,081	$ 476,923	$ 130,695
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation and amortization	87,694	85,239	80,817
Amortization of right-of-use lease assets	34,346	37,295	38,687
Stock-based compensation	174,863	177,289	115,149
Loss (gain) on investment	31,854	(68,829)	—
Gain on divestiture of business	(29,808)	—	—
Other non-cash items, net	(4,560)	(1,381)	(3,167)
Provision (benefit) from deferred income taxes	42,963	(158,105)	(24,641)
Changes in operating assets and liabilities, excluding the effects of acquisitions:			
Accounts receivable	(165,006)	(119,418)	(32,365)
Accounts payable and accrued expenses	6,957	25,096	(5,135)
Accrued compensation and benefits	(6,645)	16,775	10,282
Deferred revenue	57,586	58,702	17,046
Income taxes	(15,329)	13,979	(26,616)
Other current assets and prepaid expenses	(40,643)	(14,206)	36,189
Operating lease liabilities	(13,610)	(7,129)	(11,110)
Other noncurrent assets and liabilities	(38,417)	(153,421)	(92,023)
Net cash provided by operating activities	435,326	368,809	233,808
Cash flows from investing activities:			
Additions to property and equipment	(19,496)	(24,713)	(20,196)
Purchases of short- and long-term marketable securities	—	(7,562)	(33,869)
Proceeds from sales of short- and long-term marketable securities	—	56,170	1,521
Proceeds from maturities of short- and long-term marketable securities	—	9,861	30,521
Acquisitions of businesses, net of cash acquired	(282,943)	(718,030)	(483,478)
Proceeds from sales of investments	46,906	—	—
Purchases of investments	—	(4,000)	—
Purchase of intangible assets	(6,451)	(550)	(11,050)
Settlement of net investment hedges	24,857	965	(9,421)
Divestiture of business, net	32,518	—	—
Other investing activities	3,408	—	—
Net cash used in investing activities	(201,201)	(687,859)	(525,972)
Cash flows from financing activities:			
Proceeds from issuance of Senior Notes	—	—	1,000,000
Borrowings under credit facility	264,000	600,000	455,000
Repayments of Senior Notes	—	—	(500,000)
Repayments of borrowings under credit facility	(355,000)	(168,000)	(610,125)
Repurchases of common stock	(125,000)	(30,000)	—
Proceeds from issuance of common stock	21,207	21,575	18,382
Debt issuance costs	—	—	(17,107)
Debt early redemption premium	—	—	(15,000)
Payments of withholding taxes in connection with stock-based awards	(68,991)	(52,957)	(33,740)
Payments of principal for financing leases	(297)	(354)	—
Net cash (used in) provided by financing activities	(264,081)	370,264	297,410
Effect of exchange rate changes on cash, cash equivalents and restricted cash	(24,203)	(127)	25
Net change in cash, cash equivalents, and restricted cash	(54,159)	51,087	5,271
Cash, cash equivalents, and restricted cash, beginning of period	327,047	275,960	270,689
Cash, cash equivalents, and restricted cash, end of period	$ 272,888	$ 327,047	$ 275,960
Supplemental disclosure of non-cash financing activities:			
Withholding taxes in connection with stock-based awards, accrued	$ —	$ 120	$ —

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

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

	Common Stock		Additional	Retained Earnings	Accumulated Other	Total Stockholders'
	Shares	Amount	Paid-In Capital	(Accumulated Deficit)	Comprehensive Loss	Equity
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
Common stock issued for employee stock-based awards	1,490	15	(15)	—	—	—
Shares surrendered by employees to pay taxes related to stock-based awards	(466)	(4)	(53,073)	—	—	(53,077)
Common stock issued for employee stock purchase plan	240	2	21,573	—	—	21,575
Compensation expense from stock-based awards	—	—	177,289	—	—	177,289
Net income	—	—	—	476,923	—	476,923
Repurchases of common stock	(226)	(2)	(29,998)	—	—	(30,000)
Unrealized gain on net investment hedges, net of tax	—	—	—	—	1,248	1,248
Foreign currency translation adjustment	—	—	—	—	1,613	1,613
Unrealized loss on available-for-sale securities, net of tax	—	—	—	—	(307)	(307)
Change in pension benefits, net of tax	—	—	—	—	4,956	4,956
Balance as of September 30, 2021	117,163	$ 1,172	$ 1,718,504	$ 414,656	$ (95,864)	$ 2,038,468
Common stock issued for employee stock-based awards	1,737	18	(18)	—	—	—
Shares surrendered by employees to pay taxes related to stock-based awards	(597)	(6)	(68,985)	—	—	(68,991)
Common stock issued for employee stock purchase plan	215	2	21,205	—	—	21,207
Compensation expense from stock-based awards	—	—	174,863	—	—	174,863
Net income	—	—	—	313,081	—	313,081
Repurchases of common stock	(1,046)	(11)	(124,989)	—	—	(125,000)
Unrealized gain on net investment hedges, net of tax	—	—	—	—	17,556	17,556
Foreign currency translation adjustment	—	—	—	—	(92,768)	(92,768)
Change in pension benefits, net of tax	—	—	—	—	17,618	17,618
Balance as of September 30, 2022	117,472	$ 1,175	$ 1,720,580	$ 727,737	$ (153,458)	$ 2,296,034

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 company that provides a portfolio of innovative digital solutions that work together to transform how physical products are engineered, manufactured, and serviced.

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 United States. 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 United States. that require management to make estimates and assumptions that affect the amounts reported and the related disclosures. Actual results could differ from these estimates.

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 Other income, net in the Consolidated Statements of Operations.

Revenue Recognition

Nature of Products and Services

Our sources of revenue include: (1) subscriptions, (2) perpetual licenses, (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. In accordance with ASC 606, *Revenue from Contracts with Customers*, 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 licenses, support and professional services, each of 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 (including SaaS)	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

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 approximately 55% of the estimated standalone selling price for subscriptions is attributable to software licenses and approximately 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 approximately 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, 2022 and 2021, the total liability was $34.2 million and $40.3 million, respectively, primarily associated with the annual right to exchange on-premises subscription software.

Practical Expedients

We have elected certain practical expedients associated with our revenue recognition policy. 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

As of September 30, 2022, our investment portfolio consisted of certificates of deposit, commercial paper, corporate notes/bonds and government securities that had a maximum maturity of three years. In December 2020, we sold all our marketable securities to partially fund the Arena acquisition, resulting in proceeds of $56.2 million. Neither gross realized gains nor gross realized losses related to the sale were material.

Equity Securities

On July 22, 2021, a company in which we were a preferred equity investor, Matterport, Inc., completed a business combination with a public company. The carrying value of our investment, which was classified as a non-marketable equity investment, was approximately $8.7 million prior to the business combination. Our preferred shares were converted into common shares of Matterport. As of September 30, 2022, PTC held no shares in Matterport, as we sold all previously held shares during the three months ended March 31, 2022. The shares sold included those held as of September 30, 2021, as well as additional shares which PTC earned during the second quarter of FY'22 based on contingent earn-outs achieved in January 2022. Shares related to the original investment were restricted from sale until January 2022 (six months after Matterport became a public company). At expiration of this lock-out, we sold all shares held from the original investment for $39.1 million at an average price of $9.1 per share. In February 2022, we sold all remaining shares for $3.6 million at an average share price of $7.6 per share. Due to the decline in the price per share during the first six months of fiscal 2022, we recognized a net loss of $34.8 million in Other income, net on the Consolidated Statements of Operations. No additional gains or losses have been recognized for 2022 and the aggregate realized gain from the original investment of $8.7 million was $34.0 million.

The fair value of the Matterport shares as of September 30, 2021 was $77.5 million and was determined using the closing price of Matterport's common stock as of September 30, 2021, less a temporary discount for lack of marketability. For the year ended September 30, 2021, we recorded an unrealized gain of $68.8 million on the appreciation of the value of the shares in Other income, net on the Consolidated Statement of Operations.

We also have non-marketable equity investments that we account for at cost, less any impairment, plus or minus adjustments resulting from observable price changes in orderly transactions for identical or similar investments off the same issuer. We monitor non-marketable equity investments for events that could indicate that the investments are impaired, such as deterioration in the issuer's financial condition and business forecasts and lower valuation in recent or proposed financings. Changes in fair value of non-marketable equity investments are recorded in Other income, net on the Consolidated Statements of Operations. In the years ended September 30, 2022 and 2021, we did not record any impairment charges for our investments. The carrying value of our non-marketable equity investments is recorded in Other assets on the Consolidated Balance Sheets and totaled $1.0 million and $2.2 million as of September 30, 2022 and 2021, 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, 2022 or 2021 or more than 10% of our revenue for the years ended September 30, 2022, 2021 or 2020.

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. Effective October 1, 2020, we adopted ASC 326, Financial Instruments—Credit Losses, which replaced the incurred loss impairment model with an expected loss model that requires the use of forward-looking information to calculate credit loss estimates. 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 $0.4 million, $0.3 million and $0.5 million as of September 30, 2022, 2021 and 2020, respectively. Uncollectible trade accounts receivable written-off, net of recoveries, were $0.4 million, $0.1 million and $0.2 million in 2022, 2021 and 2020, respectively. Net bad debt expense was $0.5 million in 2022, net bad debt recovery was $0.2 million in 2021 and net bad debt expense was $0.0 million in 2020, 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 India. 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 and options, 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 and net investment 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 four months. The majority of our foreign currency forward contracts are not designated 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 Other income, 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 Unrealized gain (loss) on 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 adopted ASC 842, *Leases* effective October 1, 2019. 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.

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 twelve 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 2022, 2021 or 2020. We purchased software of $6.0 million and $0.6 million in 2022 and 2021, respectively. Additionally, we acquired capitalized software through business combinations (for further detail, see *Note 6. Acquisitions and Disposition of Business*). These assets are included in 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; 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 30, 2022, which consisted of a qualitative assessment of our Software Products segment and a quantitative assessment of our Professional Services segment in conjunction with the sale of a portion of that business to ITC Infotech. Our qualitative assessment for Software Products included company-specific (e.g., financial performance and long-range plans), industry, and macroeconomic factors, as well as consideration of the fair value of each reporting unit relative to its carrying value at the last valuation date (June 27, 2020). Based on our qualitative assessment, we believe it is more likely than not that the fair value of our Software Products reporting unit exceeds its carrying value and no further impairment testing is required. Our quantitative assessment for the Professional Services segment compared the fair value of the reporting unit to its carrying value. We estimated the fair value of the reporting unit using a discounted cash flow valuation model. This model requires estimates of future revenues, profits, capital expenditures, working capital, and a terminal value based on a residual cash flow valuation model. We estimated this amount by evaluating historical trends, current budgets and operating plans, including consideration of the completed transaction with ITC Infotech. Based on a comparison of the estimated fair value to the carrying value of the Professional Services reporting unit as of June 30, 2022, no impairment was required. Through September 30, 2022, 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 13 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 $8.6 million, $7.1 million and $3.8 million in 2022, 2021 and 2020, 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 (benefit) for income taxes in the Consolidated Statements of Operations.

Comprehensive Income

Comprehensive income consists of Net income 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, 2022, was comprised of the following: cumulative translation adjustment losses of $160.2 million, unrecognized actuarial losses related to pension benefits of $5.4 million ($3.9 million net of tax), and accumulated net gains from net investment hedges of $16.9 million ($10.6 million net of tax). As of September 30, 2021, Accumulated other comprehensive loss was comprised of the following: cumulative translation adjustment losses of $67.5 million, unrecognized actuarial losses related to pension benefits of $30.2 million ($21.5 million net of tax), and accumulated net losses from net investment hedges of $6.5 million ($6.5 million net of tax).

Earnings per Share (EPS)

Basic EPS is calculated by dividing net income by the weighted average number of shares outstanding during the period. 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. Anti-dilutive shares excluded from the calculations of diluted EPS were immaterial in the years ended September 30, 2022 and 2021.

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

(in thousands, except per share data)	Year ended September 30, 2022	2021	2020
Net income	$ 313,081	$ 476,923	$ 130,695
Weighted average shares outstanding	117,194	116,836	115,663
Dilutive effect of employee stock options, restricted shares and restricted stock units	1,039	1,531	604
Diluted weighted average shares outstanding	118,233	118,367	116,267
Earnings per share—Basic	$ 2.67	$ 4.08	$ 1.13
Earnings per share—Diluted	$ 2.65	$ 4.03	$ 1.12

Stock-Based Compensation

We measure the compensation cost of employee services received in exchange for an award of equity 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 Plans* for a description of the types of equity awards granted, the compensation expense related to such awards and detail of such 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

Intangibles—Goodwill and Other—Internal-Use Software

In August 2018, the Financial Accounting Standards Board (FASB) issued Accounting Standards Update (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. We adopted the new standard prospectively effective October 1, 2020. As a result, we are required to capitalize certain costs related to the implementation of cloud computing arrangements. Capitalized costs related to cloud computing arrangements, which are included in Other assets on the Consolidated Balance Sheets, were $14.3 million and $2.8 million as of September 30, 2022 and September 30, 2021, respectively,

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 (ASC 326), which, along with subsequent amendments, replaces 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. We adopted the new standard effective October 1, 2020, with no impact on our consolidated financial statements.

Income Taxes

In December 2019, the FASB issued 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 became effective for us in the first quarter of 2022 ending December 31, 2021 and did not have a material impact on our consolidated financial statements.

Business Combinations

In October 2021, the FASB issued ASU 2021-08, Business Combinations (Topic 805) on Accounting for Contract Assets and Contract Liabilities from Contracts with Customers. This ASU is intended to improve the accounting for acquired revenue contracts with customers in a business combination by addressing diversity in practice and inconsistency related to 1) recognition of an acquired contract asset and liability, and 2) payment terms and their effect on subsequent revenue recognized by the acquirer. We adopted ASU 2021-08 early as of the third quarter of 2022 and applied it to our acquisition of Intland Software, which was completed in the quarter. The adoption of ASU 2021-08 did not have a material impact on our consolidated financial statements. Refer to *Note 6. Acquisitions and Disposition of Business* for additional discussion regarding the accounting for the acquisition of Intland Software.

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.

3. Revenue from Contracts with Customers

Contract Assets and Contract Liabilities

(in thousands)	September 30,	
	2022	2021
Contract asset	$ 21,096	$ 12,934
Deferred revenue	$ 520,333	$ 497,677

As of September 30, 2022, $16.9 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 assets and expected to be transferred within the next 24 months. As of September 30, 2021, $8.2 million of our contract asset balance was included in Other current assets.

Approximately $7.0 million of the September 30, 2021 contract asset balance was transferred to receivables during the year ended September 30, 2022 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 increase in contract assets of $8.2 million includes an increase of approximately $15.2 million related to revenue recognized in the period, net of billings.

During the year ended September 30, 2022, we recognized $491.6 million of revenue that was included in Deferred revenue as of September 30, 2021 and there were additional deferrals of $507.3 million, primarily related to new billings. In addition, deferred revenue increased by $6.9 million as a result of the acquisition of Intland Software. For subscription contracts, we generally invoice customers annually. The balance of total short- and long-term receivables as of September 30, 2022 was $871.0 million, compared to $744.6 million as of September 30, 2021.

Costs to Obtain or Fulfill a Contract

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 5 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, 2022 and September 30, 2021, deferred costs of $40.7 million and $40.2 million, respectively, were included in Other current assets and $77.0 million and $81.1 million, respectively, were included in Other assets. Amortization expense related to costs to obtain a contract with a customer was $50.9 million and $46.7 million in the years ended September 30, 2022 and 2021, respectively. There were no impairments of the contract cost asset in the years ended September 30, 2022 and 2021.

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, 2022, the amounts include additional performance obligations of $520.3 million recorded in deferred revenue and $1,092.7 million that are not yet recorded in the Consolidated Balance Sheets. We expect to recognize approximately 57% of the total $1,613.0 million over the next 12 months, with the remaining amount thereafter.

Disaggregation of Revenue

(in thousands)	Year ended September 30,		
	2022	2021	2020
Total recurring revenue	$ 1,736,188	$ 1,616,328	$ 1,281,949
Perpetual license	34,065	33,013	32,668
Professional services	163,094	157,818	143,798
Total revenue	$ 1,933,347	$ 1,807,159	$ 1,458,415

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 related to the lease assets of exited facilities. Refer to *Note 19. Leases* for additional information about exited facilities.

In 2022, Restructuring and other charges, net totaled $36.2 million, of which $32.4 million is attributable to restructuring charges, $5.1 million is attributable to other charges for professional fees included in restructuring related to our SaaS transformation, offset by a $1.3 million credit attributable to sublease income and the reversal of lease liabilities related to exited lease facilities. We made cash payments related to restructuring charges of $40.8 million ($34.0 million related to employee charges, $2.5 million in payments for other professional fees included in restructuring related to our SaaS transformation, and $4.3 million in net payments for variable costs related to restructured facilities).

In 2021, Restructuring and other charges, net totaled $2.2 million, of which $2.1 million was attributable to restructuring charges and $0.1 million was attributable to impairment and accretion expense related to exited lease facilities. We made cash payments related to restructuring charges of $6.7 million ($3.9 million related to the 2020 restructuring and $2.8 million in rent payments for the restructured facilities).

In 2020, Restructuring and other charges, net totaled $32.7 million, of which $26.4 million was attributable to restructuring charges, $5.6 million was attributable to impairment and accretion expense related to exited lease facilities, and $0.7 million was 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 a prior restructuring).

Restructuring Charges

In the first quarter of 2022, we committed to a plan to restructure our workforce and consolidate select facilities to align our customer facing and product-related functions with the SaaS industry best practices and accelerate the opportunity for our on-premises customers to move to the cloud. The restructuring plan resulted in charges of $33.1 million in 2022, primarily associated with the termination of benefits for approximately 330 employees.

In 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. The restructuring plan resulted in charges of $30.8 million through fiscal year 2020 for termination benefits associated with approximately 250 employees. In the year ended September 30, 2022 and 2021, we recorded a credit of $0.1 million and a charge of $0.2 million, respectively, related to this restructuring plan.

The following table summarizes restructuring accrual activity for the three years ended September 30, 2022:

(in thousands)	Employee severance and related benefits	Facility closures and other costs	Consolidated total
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	3,992	5,995	9,987
Charges to operations, net	1,887	249	2,136
Cash disbursements	(3,925)	(2,756)	(6,681)
Foreign exchange impact	27	17	44
Balance, September 30, 2021	1,981	3,505	5,486
Charges (credits) to operations, net	32,971	(561)	32,410
Cash disbursements	(34,023)	(2,355)	(36,378)
Foreign exchange impact	(583)	—	(583)
Balance, September 30, 2022	$ 346	$ 589	$ 935

As of September 30, 2022 and 2021, the accrual for employee severance and related benefits was included in Accrued compensation and benefits in the Consolidated Balance Sheets.

As of September 30, 2022, the accrual for facility closures and related costs was included in Accrued expenses and other current liabilities in the Consolidated Balance Sheets and as of September 30, 2021, $2.6 million was included in Accrued expenses and other current liabilities and $0.9 million was included in Other liabilities in the Consolidated Balance Sheets.

5. Property and Equipment

Property and equipment consisted of the following:

(in thousands)	September 30, 2022	September 30, 2021
Computer hardware and software	$ 364,762	$ 352,704
Furniture and fixtures	29,744	30,568
Leasehold improvements	95,383	94,959
Gross property and equipment	489,889	478,231
Accumulated depreciation and amortization	(391,788)	(377,994)
Net property and equipment	$ 98,101	$ 100,237

Depreciation expense was $27.1 million, $26.1 million and $24.7 million in 2022, 2021 and 2020, respectively.

6. Acquisitions and Disposition of Business

Acquisition and transaction-related costs were $13.2 million, $15.0 million and $8.6 million in 2022, 2021 and 2020, respectively. Acquisition and transaction-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 and transaction-related charges. Other transactional charges include third-party costs related to structuring unusual transactions, such as the divestiture of a portion of our business. 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 2022, our results of operations, if presented on a pro forma basis, would not differ materially from our reported results.

Intland Software

On April 29, 2022, we acquired Intland Software, GmbH, and Eger Invest GmbH (together, “Intland Software”) pursuant to a Share Sale and Purchase Agreement. Intland Software developed and marketed the Codebeamer™ Application Lifecycle Management (ALM) family of software products. The purchase price of the acquisition was $278.1 million, net of cash acquired, which was financed with cash on hand and $264 million borrowed under our existing credit facility. Intland Software had approximately 150 employees on the close date.

The acquisition of Intland Software 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 is considered preliminary, and additional adjustments may be recorded during the measurement period as the company receives additional information relevant to the acquisition related to the finalization of working capital adjustments to the purchase price and deferred tax assets and liabilities.

The purchase price allocation resulted in $240.9 million of goodwill, $38.8 million of customer relationships, $19.1 million of purchased software, $1.3 million of trademarks, $20.1 million of deferred tax liabilities, $0.7 million of income tax payables, $6.9 million of deferred revenue, $6.5 million of accounts receivable, and $0.8 million of other net liabilities. The purchase price allocation includes the finalization of measurement period adjustments, which resulted in a $0.9 million increase in goodwill from $240.0 million as of Q3'22, driven by completion of working capital adjustments.

The acquired customer relationships, purchased software, and trademarks are being amortized over useful lives of 11 years, 10 years, and 10 years, respectively, based on the expected economic 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 expanding our ALM offerings, which are complementary to our PLM offerings

Arena

On January 15, 2021, we acquired Arena Holdings, Inc. (“Arena”) pursuant to an Agreement and Plan of Merger dated as of December 12, 2020 by and among PTC, Arena, Astronauts Merger Sub, Inc., and the Representative named therein. We paid approximately $715 million, net of cash acquired of $11.1 million, for Arena, which amount was financed with cash on hand and $600 million borrowed under our existing credit facility. Arena had approximately 170 employees on the close date. The acquisition of Arena added revenue of approximately $29.8 million in FY'21, which was net of approximately $9.1 million in fair value adjustments related to purchase accounting for the acquisition.

The acquisition of Arena was accounted for as a business combination. Assets acquired and liabilities assumed were 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 $562.8 million of goodwill, $155.0 million of customer relationships, $38.3 million of purchased software, $4.2 million of trademarks, $41.3 million of deferred tax liabilities, $15.5 million of deferred revenue, $11.4 million of accounts receivable, and $0.4 million of other net liabilities. The acquired customer relationships, purchased software, and trademarks are being amortized over useful lives of 13 years, 9 years, and 12 years, respectively, based on the expected economic 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 participation in expected future growth of the PLM SaaS market and expansion into the mid-market for PLM, where SaaS solutions are becoming the standard.

PLM Services Business Disposition

On June 1, 2022, we sold a portion of our PLM services business to ITC Infotech India Limited pursuant to a Strategic Partner Agreement dated as of April 20, 2022 by and between PTC and ITC Infotech. Consideration received from ITC Infotech for the sale was approximately $60.4 million, consisting of $32.5 million cash paid on closing and $28.0 million of services to be provided by ITC Infotech to PTC for no additional charge.

We recognized a gain on the sale of $29.8 million, which is included within Other income, net. The recognized gain consists of $60.4 million of consideration received, less net assets of the business of $30.6 million. Net assets include $33.0 million of goodwill allocated to the business, less $2.4 million of liabilities associated with approximately 160 employees who transferred to ITC Infotech. Goodwill was allocated to the sold business based on a relative fair value allocation of total goodwill of the Professional Services segment.

Additional future contingent consideration of up to $20 million may be received by PTC based on certain performance milestones. We have elected to defer the recognition of gains associated with contingent consideration until they become realizable.

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, 2022, goodwill and acquired intangible assets in the aggregate attributable to our Software Products segment was $2,725.2 million and attributable to our Professional Services segment was $11.2 million. As of September 30, 2021, goodwill and acquired intangible assets in the aggregate attributable to our Software Products segment was $2,525.7 million and attributable to our Professional Services segment was $45.2 million.

Goodwill and acquired intangible assets consisted of the following:

(in thousands)	September 30, 2022			September 30, 2021		
	Gross Carrying Amount	Accumulated Amortization	Net Book Value	Gross Carrying Amount	Accumulated Amortization	Net Book Value
Goodwill (not amortized)			$2,353,654			$ 2,191,887
Intangible assets with finite lives (amortized)(1):						
Purchased software	$ 502,859	$ 355,857	$ 147,002	$ 483,771	$ 338,542	$ 145,229
Capitalized software	22,877	22,877	—	22,877	22,877	—
Customer lists and relationships	594,970	369,390	225,580	574,516	350,648	223,868
Trademarks and trade names	27,546	17,410	10,136	26,906	17,036	9,870
Other	3,766	3,766	—	4,000	4,000	—
	$ 1,152,018	$ 769,300	$ 382,718	$ 1,112,070	$ 733,103	$ 378,967
Total goodwill and acquired intangible assets			$2,736,372			$ 2,570,854

(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, 11 years, and 12 years, respectively.

The changes in the carrying amounts of goodwill from September 30, 2021 to September 30, 2022 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:

(in thousands)	Software Products	Professional Services	Total
Balance, September 30, 2020	$ 1,583,316	$ 42,470	$ 1,625,786
Arena acquisition	563,620	—	563,620
Other acquisitions	181	400	581
Foreign currency translation adjustments	1,851	49	1,900
Balance, September 30, 2021	$ 2,148,968	$ 42,919	$ 2,191,887
Intland Software acquisition	240,971	—	240,971
Other acquisitions	691	—	691
Divestiture of business	—	(32,992)	(32,992)
Foreign currency translation adjustments	(46,611)	(292)	(46,903)
Balance, September 30, 2022	$ 2,344,019	$ 9,635	$ 2,353,654

The aggregate amortization expense for intangible assets with finite lives recorded for the years ended September 30, 2022, 2021 and 2020 was reflected in our Consolidated Statements of Operations as follows:

(in thousands)	Year ended September 30,		
	2022	2021	2020
Amortization of acquired intangible assets	$ 34,970	$ 29,396	$ 28,713
Cost of software revenue	25,578	29,769	27,391
Total amortization expense	$ 60,548	$ 59,165	$ 56,104

The estimated aggregate future amortization expense for intangible assets with finite lives remaining as of September 30, 2022 is $56.4 million for 2023, $48.3 million for 2024, $42.1 million for 2025, $38.7 million for 2026, $36.2 million for 2027 and $161.0 million thereafter.

8. Income Taxes

Our income before income taxes consisted of the following:

(in thousands)	Year ended September 30,		
	2022	2021	2020
Domestic	$ 97,460	$ 41,199	$ (73,865)
Foreign	299,638	350,556	208,571
Total income before income taxes	$ 397,098	$ 391,755	$ 134,706

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

(in thousands)	Year ended September 30, 2022	2021	2020
Current:			
Federal	$ 767	$ 4,774	$ 2,187
State	6,675	1,609	1,266
Foreign	33,612	66,554	25,199
	41,054	72,937	28,652
Deferred:			
Federal	25,730	(152,311)	(26,811)
State	(3,177)	(27,228)	(4,063)
Foreign	20,410	21,434	6,233
	42,963	(158,105)	(24,641)
Provision (benefit) for income taxes	$ 84,017	$ (85,168)	$ 4,011

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, 2022		2021		2020	
Statutory federal income tax rate	$ 83,391	21 %	$ 82,268	21 %	$ 28,288	21 %
Change in valuation allowance	—	—	(134,695)	(34)%	(16,489)	(12)%
State income taxes, net of federal tax benefit	6,518	2 %	(28,768)	(8)%	(2,998)	(2)%
Federal research and development credits	(7,477)	(2)%	(5,764)	(2)%	(5,483)	(4)%
Uncertain tax positions	2,418	1 %	3,398	1 %	3,072	2 %
Foreign tax credit	(9,078)	(2)%	(35,368)	(9)%	—	—
Foreign rate differences	(8,982)	(2)%	(34,584)	(9)%	(22,074)	(16)%
Foreign tax on U.S. provision	9,078	2 %	5,931	2 %	4,523	3 %
Excess tax benefits from restricted stock	(8,278)	(2)%	(6,141)	(2)%	(1,743)	(1)%
Audits and settlements	—	—	33,370	9 %	—	—
U.S. permanent items	15,304	3 %	18,389	5 %	6,590	5 %
Base Erosion Anti-Abuse Tax (BEAT)	—	—	2,936	1 %	(1,759)	(1)%
GILTI, net of foreign tax credits	2,705	1 %	18,217	4 %	14,899	11 %
Foreign-Derived Intangible Income (FDII)	(6,848)	(2)%	(4,428)	(1)%	(2,461)	(2)%
Sale of a portion of the PLM services business	6,844	2 %	—	—	—	—
Other, net	(1,578)	(1)%	71	—	(354)	(1)%
Provision (benefit) for income taxes	$ 84,017	21 %	$ (85,168)	(22)%	$ 4,011	3 %

In 2022, 2021, and 2020, our effective tax rate is impacted by 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 and the Cayman Islands. In 2022, 2021, and 2020, the foreign rate differential predominantly relates to these earnings. In addition to the foreign rate differential, our tax rate differed from the U.S. statutory federal income tax due to the net effects of the Global Intangible Low-Taxed Income (GILTI) and Foreign Derived Intangible Income (FDII) regimes (together referred to as U.S. Tax reform), and the excess tax benefit related to stock-based compensation.

Additionally in 2022, our results include tax expense relating to the book over tax basis difference in goodwill disposed of as part of the sale of a portion of the PLM services business. As a result of the net effect of these items in 2022, our effective tax rate did not differ significantly from the U.S. federal income tax rate.

In 2021, our tax rate includes a benefit due to the release of the valuation allowance on the majority of our U.S. net deferred tax assets.

In 2020, 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.

At September 30, 2022 and 2021, income taxes payable and income tax accruals recorded on the accompanying Consolidated Balance Sheets were $17.3 million ($5.1 million in Accrued income taxes, $5.6 million in Other current liabilities and $6.6 million in Other liabilities) and $15.7 million ($5.0 million in Accrued income taxes, $0.8 million in Other current liabilities and $9.9 million in Other liabilities), respectively. At September 30, 2022 and 2021, prepaid taxes recorded in Prepaid expenses on the accompanying Consolidated Balance Sheets were $25.8 million and $15.4 million, respectively. We made net income tax payments of $55.0 million, $56.0 million and $52.6 million in 2022, 2021 and 2020, respectively.

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

(in thousands)	September 30, 2022	2021
Deferred tax assets:		
Net operating loss carryforwards	$ 40,419	$ 65,383
Foreign tax credits	14,527	36,287
Capitalized research and development	23,274	27,546
Pension benefits	7,639	14,097
Prepaid expenses	15,886	12,540
Deferred revenue	2,146	2,274
Stock-based compensation	19,486	15,822
Other reserves not currently deductible	14,689	16,796
Amortization of intangible assets	130,825	147,385
Research and development and other tax credits	78,862	74,846
Lease liabilities	46,672	51,471
Fixed assets	78,249	53,025
Capital loss carryforward	3,955	35,156
Other	1,256	2,269
Gross deferred tax assets	477,885	554,897
Valuation allowance	$ (22,283)	(52,085)
Total deferred tax assets	455,602	502,812
Deferred tax liabilities:		
Acquired intangible assets not deductible	$ (118,360)	(108,746)
Lease assets	(36,940)	(37,273)
Pension prepayments	(2,622)	(2,834)
Deferred revenue	(35,193)	(2,662)
Depreciation	(6,937)	(7,121)
Unbilled accounts receivable	-	(6,391)
Deferred income	(5,991)	(21,744)
Prepaid commissions	(13,356)	(16,990)
Other	(8,508)	(5,427)
Total deferred tax liabilities	(227,907)	(209,188)
Net deferred tax assets	$ 227,695	$ 293,624

We reassess our valuation allowance requirements each financial reporting period. We assess available positive and negative evidence to estimate whether sufficient future taxable income will be generated to use our existing deferred tax assets. In the assessment for the period ended September 30, 2021, we concluded that it was more likely than not that our deferred tax assets related to U.S. federal and state income would be realizable, and therefore, the U.S. federal and the majority of the state valuation allowances were released, which resulted in non-cash federal and state tax benefits of $109.4 million and $24.8 million, respectively, to earnings in 2021. That determination was based, in part, on the Company’s cumulative profits before tax and permanent differences from the past three years, which became profitable during 2021, and projections of profits before tax and permanent differences in future years. In 2022, we continue to maintain this conclusion.

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, 2022, we had U.S. federal tax effected NOL carryforwards from acquisitions of $22.5 million, of which $1.6 million expire in 2023 to 2034. The remaining carryforwards of $20.9 million do not expire. The use 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, 2022, we had federal R&D credit carryforwards of $60.9 million, which expire beginning in 2025 and ending in 2042, and Massachusetts R&D credit carryforwards of $26.1 million, which expire beginning in 2023 and ending in 2037. We also had foreign tax credits of $14.5 million, which expire beginning in 2027 and ending in 2032.

We also have tax effected NOL carryforwards in non-U.S. jurisdictions totaling $7.2 million, the majority of which do not expire, and non-U.S. tax credit carryforwards of $4.0 million that expire beginning in 2030 and ending in 2041. Additionally, we have tax effected amortization carryforwards of $118.5 million in a foreign jurisdiction. There are limitations imposed on the use of such attributes that could restrict the recognition of any tax benefits.

As of September 30, 2022, we have a valuation allowance of $17.8 million against net deferred tax assets in the United States and a valuation allowance of $4.5 million against net deferred tax assets in certain foreign jurisdictions. The $17.8 million U.S. valuation allowance relates to Massachusetts tax credit carryforwards which we do not expect to realize a benefit from prior to expiration. 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, 2022	2021	2020
Valuation allowance, beginning of year	$ 52,085	$ 205,423	$ 177,663
Net release of valuation allowance[1]	—	(134,235)	—
Net increase (decrease) in deferred tax assets with a full valuation allowance[2]	(29,802)	(19,103)	27,760
Valuation allowance, end of year	$ 22,283	$ 52,085	$ 205,423

(1)In 2021, this is attributable to the release in the United States.
(2)In 2022, this change included the loss of foreign attributes upon liquidation of a foreign subsidiary. In 2021, this change includes the loss of state attributes upon merger of two wholly-owned subsidiaries. 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.

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 2022, 2021 and 2020 we recorded interest expense of $0.2 million, $2.2 million and $0.3 million, respectively. In 2022 and 2020 we had no penalty expenses in our income tax provision. In 2021 we had $2.0 million tax penalty expense in our income tax provision. As of September 30, 2022 and 2021, we had accrued $0.9 million and $0.7 million of net estimated interest expense, respectively. We had no accrued tax penalties as of September 30, 2022, 2021 or 2020.

Unrecognized tax benefits *(in thousands)*	Year ended September 30, 2022	2021	2020
Unrecognized tax benefit, beginning of year	$ 21,166	$ 16,107	$ 11,484
Tax positions related to current year:			
Additions	3,144	4,844	2,173
Tax positions related to prior years:			
Additions	785	30,130	2,452
Reductions	(1,172)	(478)	(2)
Settlements	—	(29,437)	—
Unrecognized tax benefit, end of year	$ 23,923	$ 21,166	$ 16,107

If all of our unrecognized tax benefits as of September 30, 2022 were to become recognizable in the future, we would record a benefit to the income tax provision of $23.9 million (which would be partially offset by an increase in the U.S. valuation allowance of $5.2 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 $5 million as audits close and statutes of limitations expire.

Our results for the year ended September 30, 2021 include a charge of $37.3 million related to the effects of a tax matter in the Republic of Korea (South Korea) of $34.4 million, and the resulting impact on U.S. income taxes of $2.9 million, and additional payments of approximately $20 million to South Korea in settlement of the amounts previously accrued.

In the normal course of business, PTC and its subsidiaries are examined by various taxing authorities, including the IRS in the United States. 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, 2022, we remained subject to examination in the following major tax jurisdictions for the tax years indicated:

Major Tax Jurisdiction	**Open Years**
United States	2018 through 2022
Germany	2015 through 2022
France	2019 through 2022
Japan	2017 through 2022
Ireland	2018 through 2022

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 used in later periods.

We incurred expenses related to stock-based compensation in 2022, 2021 and 2020 of $174.9 million, $177.3 million and $115.1 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 $27.1 million, $39.9 million and $13.4 million in 2022, 2021 and 2020, respectively. Upon vesting of the stock-based awards, 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 2022, 2021 and 2020, net windfall tax benefits of $5.2 million, $9.9 million and $1.3 million were recorded to the tax provision.

Prior to the passage of the U.S. Tax Cuts and Jobs Act in December of 2017 (the Tax Act), we asserted that substantially all of the undistributed earnings of our foreign subsidiaries were considered indefinitely reinvested 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 United States 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, 2022 and 2021, we had the following long-term debt obligations:

(in thousands)	September 30, 2022	2021
4.000% Senior notes due 2028	$ 500,000	$ 500,000
3.625% Senior notes due 2025	500,000	500,000
Credit facility revolver(1)	359,000	450,000
Total debt	1,359,000	1,450,000
Unamortized debt issuance costs for the senior notes(2)	(8,372)	(10,529)
Total debt, net of issuance costs(3)	$ 1,350,628	$ 1,439,471

(1)Unamortized debt issuance costs related to the credit facility were $2.7 million and $3.8 million as of September 30, 2022 and 2021, 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 $8.4 million and $10.5 million as of September 30, 2022 and 2021, respectively, and were included in Long-term debt on the Consolidated Balance Sheet.
(3)As of September 30, 2022 and 2021 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).

As of September 30, 2022, the total estimated fair value of the 2028 and 2025 senior notes was approximately $436.3 million and $468.7 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, 2022.

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 2028 and 2025 notes in whole or in part at specified redemption prices. In certain circumstances constituting a change of control, we will 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. We use the credit facility for general corporate purposes, including acquisitions of businesses, share repurchases and working capital requirements.

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, 2022, unused commitments under our credit facility were approximately $641.0 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. As of September 30, 2022, the fair value of our credit facility approximates its book value.

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, 2022, the annual rate for borrowings outstanding was 4.14%. Interest rates on borrowings outstanding under the credit facility range from 1.25% to 1.75% above an adjusted LIBO rate (or an agreed successor rate) 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 LIBO rate plus 1%) for base rate borrowings, in each case based upon 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:

• 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;

• 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

• Interest coverage ratio, defined as the ratio of consolidated trailing four quarters EBITDA to consolidated trailing four 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, 2022, our total leverage ratio was 1.79 to 1.00, our senior secured leverage ratio was 0.49 to 1.00, our interest coverage ratio was 14.21 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.

In 2020, 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 2022, 2021 and 2020, we incurred interest expense of $54.3 million, $50.5 million, and $76.4 million, respectively, and paid $48.5 million, $45.2 million and $60.6 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 2022, 2021 and 2020 was approximately 3.4%, 3.3% and 4.3%, respectively.

10. Commitments and Contingencies

As of September 30, 2022 and 2021, we had letters of credit and bank guarantees outstanding of $15.0 million (of which $0.5 million was collateralized) and $16.3 million (of which $0.5 million was collateralized), respectively, primarily related to our corporate headquarters lease.

Legal and Regulatory Matters

Legal Proceedings

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.

401(k) Plan

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 (the “Plan”), and the PTC Board of Directors (collectively, the “PTC Defendants”) in the U.S. District Court for the District of Massachusetts alleging that the defendants breached their fiduciary duties under the Employee Retirement Income Security Act of 1974 in the oversight of the Plan. On September 22, 2021, the plaintiffs and the PTC Defendants reached an agreement in principle to settle the lawsuit for a gross settlement amount of $1.725 million. The Court issued an Order of final approval of the settlement on October 18, 2022. The settlement amount will be funded by PTC’s insurer and paid into the Qualified Settlement Fund for the benefit of the class members.

Other Legal Proceedings

In addition to the matter listed above, we are subject to legal proceedings and claims against us in the ordinary course of business. As of September 30, 2022, we estimate that the range of possible outcomes for such matters is immaterial and we do not believe that resolving them 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 reporting period could be adversely affected.

Guarantees and Indemnification Obligations

We enter into standard indemnification agreements with our customers and business partners in the ordinary course of our business. Under such agreements, we typically indemnify, hold harmless, and agree to reimburse the indemnified party for losses suffered or incurred by the indemnified party, in connection with patent, copyright or other intellectual property infringement claims by any third party with respect to our products. Indemnification may also cover other types of claims, including claims relating to certain data breaches. Except for intellectual property infringement indemnification, these agreements typically limit our liability with respect to other indemnification claims. 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 during the term of the license/subscription. Additionally, we generally warrant that our consulting services will be performed consistent with generally accepted industry standards and, in the case of fixed price services, the agreed-upon specifications. 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 has authorized us to repurchase up to $1 billion of our common stock in the period October 1, 2020 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.

In 2022 and 2021 we repurchased 1.05 million shares for $125 million and 0.23 million shares for $30 million, respectively. We did not repurchase any shares in 2020.

12. Equity Incentive Plans

We have two equity incentive plans – our 2000 Equity Incentive Plan and our 2016 Employee Stock Purchase Plan (ESPP).

Our 2000 Equity Incentive 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 RSU represents the contingent right to receive one share of our common stock.

Our ESPP 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.

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

(in thousands)	Year ended September 30,		
	2022	**2021**	**2020**
Cost of license revenue	$ 272	$ 100	$ 47
Cost of support and cloud services revenue	11,022	9,900	6,910
Cost of professional services revenue	11,481	9,263	7,012
Sales and marketing	49,467	53,712	37,351
Research and development	41,944	34,272	27,005
General and administrative	60,677	70,042	36,824
Total stock-based compensation expense	$ 174,863	$ 177,289	$ 115,149

Stock-based compensation expense in 2022, 2021 and 2020 includes $6.4 million, $7.3 million, and $5.8 million respectively, related to our ESPP.

2000 Equity Incentive Plan Accounting and Stock-Based Compensation Expense

The fair value of RSUs granted in 2022, 2021 and 2020 was based on the fair market value of our stock on the date of grant for service- and certain performance- based RSUs and based on a Monte Carlo simulation model for relative total shareholder return (rTSR) performance RSUs. The weighted average fair value per share of RSUs granted in 2022, 2021 and 2020 was $114.31, $111.48 and $77.57, respectively.

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

As of September 30, 2022, total unrecognized compensation cost related to unvested RSUs expected to vest was approximately $201.5 million and the weighted average remaining recognition period for unvested RSUs was 17 months.

As of September 30, 2022, 2.8 million shares of common stock were available for grant under the equity incentive plan and 2.8 million shares of common stock were reserved for issuance upon vesting of RSUs granted and outstanding.

Restricted stock unit activity for the year ended September 30, 2022 *(in thousands, except grant date fair value data)*	**Shares**	**Weighted Average Grant Date Fair Value**	**Aggregate Intrinsic Value**
Balance of outstanding RSUs at October 1, 2021	3,217	$ 92.46	
Granted[(1)]	1,659	$ 114.31	
Vested	(1,736)	$ 92.70	
Forfeited or not earned	(386)	$ 100.05	
Balance of outstanding RSUs at September 30, 2022	2,754	$ 105.07	$ 288,068

(1)RSUs granted includes 37 shares from prior period rTSR awards that were earned upon achievement of the performance criteria and vested in November 2021 and 87 shares from prior period performance-based awards that were earned upon achievement of the performance criteria and vested in November 2021.

The following table presents the number of RSU awards granted by award type:

(in thousands)	Twelve months ended September 30, 2022
Performance-based RSUs[1]	106
Service-based RSUs[2]	1,353
Relative Total Shareholder Return RSUs[3]	76

(1)The performance-based RSUs are primarily made up of RSUs granted to our executives and are eligible to vest based upon annual increasing performance measures over a three-year period. To the extent earned, those performance-based RSUs will vest in three substantially equal installments on November 15, 2022, November 15, 2023, and November 15, 2024, 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 (up to a maximum aggregate of 152 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 rTSR RSUs were granted to our executives and are eligible to vest 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 the measurement period ending on September 30, 2024. The RSUs earned will vest on November 15, 2024. Up to a maximum of two times the number of rTSR RSUs eligible to be earned for the period (up to a maximum aggregate of 152 RSUs) may vest. If the return to PTC shareholders is negative for the period but still meets or exceeds the peer group indexed return, a maximum of 100% of the rTSR RSUs may vest.

As of September 30, 2022, weighted average remaining vesting term for outstanding awards is 1.0 year.

The weighted-average fair value of the rTSR RSUs was $136.43 per target RSU on the grant date. The fair value of the rTSR 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 rTSR 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	34.67 %
Risk-free interest rate	0.81 %
Dividend yield	— %

Total value on vest date of RSUs vested are as follows:

(in thousands)	Year ended September 30,		
Value of stock option and stock-based award activity	2022	2021	2020
Total value of restricted stock unit awards at vest	$ 199,738	$ 171,316	$ 103,265

In 2022, shares issued upon vesting of restricted stock units were net of 0.6 million shares retained by us to cover employee tax withholdings of $69.0 million. In 2021, shares issued upon vesting of restricted stock units were net of 0.5 million shares retained by us to cover employee tax withholdings of $53.1 million. In 2020, shares issued upon vesting of restricted stock and restricted stock units were net of 0.5 million shares retained by us to cover employee tax withholdings of $33.7 million.

13. Employee Benefit Plan

We offer a savings plan to eligible U.S. employees. The plan is qualified 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 immediately. We made matching contributions of $7.8 million, $7.8 million and $6.7 million in 2022, 2021 and 2020, 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:

	2022	2021	2020
Weighted average assumptions used to determine benefit obligations at September 30 measurement date:			
Discount rate	3.7%	1.0%	1.1%
Rate of increase in future compensation	3.6%	2.8%	2.8%
Weighted average assumptions used to determine net periodic pension cost for fiscal years ended September 30:			
Discount rate	1.0%	1.1%	0.9%
Rate of increase in future compensation	2.8%	2.8%	2.8%
Rate of return on plan assets	5.0%	5.0%	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, 2022 in the table above, will be used to determine our 2023 net periodic pension income, which we expect to be approximately $0.4 million.

As of September 30, 2022, the weighted average interest crediting rate used in our only cash balance pension plan is 4.1%.

All non-service net periodic pension costs are presented in Other income, 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,		
	2022	2021	2020
Interest cost of projected benefit obligation	$ 550	$ 692	$ 527
Service cost	1,016	1,127	1,426
Expected return on plan assets	(3,712)	(3,643)	(3,878)
Amortization of prior service cost	(4)	(5)	(5)
Recognized actuarial loss	1,425	4,139	3,854
Settlement gain	(82)	—	—
Net periodic pension (benefit) cost	$ (807)	$ 2,310	$ 1,924

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, 2022	2021
Change in benefit obligation:		
Projected benefit obligation, beginning of year	$ 96,512	$ 97,832
Service cost	1,016	1,127
Interest cost	550	692
Actuarial loss (gain)	(22,616)	1,100
Foreign exchange impact	(12,949)	(1,562)
Participant contributions	96	109
Benefits paid	(2,343)	(2,786)
Divestiture of business	(1,184)	—
Settlements	(953)	—
Projected benefit obligation, end of year	$ 58,129	$ 96,512
Change in plan assets and funded status:		
Plan assets at fair value, beginning of year	$ 78,385	$ 72,063
Actual return on plan assets	2,348	7,383
Employer contributions	3,007	3,049
Participant contributions	96	109
Foreign exchange impact	(12,959)	(1,433)
Settlements	(953)	—
Benefits paid	(2,343)	(2,786)
Plan assets at fair value—end of year	67,581	78,385
Projected benefit obligation, end of year	58,129	96,512
Underfunded status	$ (9,782)	$ (18,982)
Overfunded status	$ 19,234	$ 855
Accumulated benefit obligation, end of year	$ 57,310	$ 95,090
Amounts recognized in the balance sheet:		
Non-current asset	$ 19,234	$ 855
Non-current liability	$ (9,434)	$ (18,615)
Current liability	$ (348)	$ (367)
Amounts in accumulated other comprehensive loss:		
Unrecognized actuarial loss	$ 5,408	$ 30,213

As of September 30, 2022 and 2021, two of our pension plans had project benefit obligations and accumulated benefit obligations in excess of plan assets. Three international plans were overfunded.

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

(in thousands)	Year ended September 30, 2022	2021
Accumulated other comprehensive loss, beginning of year	$ 30,213	$ 37,175
Recognized during year - net actuarial losses	(1,421)	(4,135)
Occurring during year - settlement gain	82	—
Occurring during year - net actuarial gains	(21,253)	(2,640)
Foreign exchange impact	(2,213)	(187)
Accumulated other comprehensive loss, end of year	$ 5,408	$ 30,213

In 2022 our actuarial gains were impacted by the change in discount rate from 1.0% in 2021 to 3.7% in 2022. In 2021, our net actuarial gains were driven by the asset performance.

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

Asset category	**September 30, 2022**	**2021**
Equity securities	33 %	35 %
Fixed income securities	33 %	34 %
Commodities	1 %	11 %
Insurance company funds	10 %	12 %
Options	2 %	1 %
Cash	21 %	7 %
	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 2022, 2021 and 2020 our actual return on plan assets was $2.3 million, $7.4 million and $(3.0) million, respectively.

Based on actuarial valuations and additional voluntary contributions, we contributed $3.0 million, $3.0 million and $2.6 million in 2022, 2021 and 2020, respectively, to the plans. We expect to pay $3.1 million in contributions in 2023, of which $0.6 million will be paid directly to the plans.

As of September 30, 2022, benefit payments expected to be paid over the next ten years are as follows:

(in thousands)	**Future Benefit Payments**
2023	$ 3,410
2024	4,068
2025	3,793
2026	3,830
2027	4,216
2028 to 2032	20,680

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, 2022**			
	Level 1	**Level 2**	**Level 3**	**Total**
Fixed income securities:				
Government	$ 20,430	$ —	$ —	$ 20,430
Corporate investment grade	2,038	—	—	2,038
Large capitalization stocks	22,379	—	—	22,379
Commodities	599	—	—	599
Insurance company funds[1]	—	6,823	—	6,823
Options	1,430	—	—	1,430
Cash	13,882	—	—	13,882
Total plan assets	$ 60,758	$ 6,823	$ —	$ 67,581

(in thousands)	September 30, 2021			
	Level 1	Level 2	Level 3	Total
Fixed income securities:				
Government	$ 24,013	$ —	$ —	$ 24,013
Corporate investment grade	2,924	—	—	2,924
Large capitalization stocks	27,078	—	—	27,078
Commodities	8,558	—	—	8,558
Insurance company funds[(1)]	—	9,105	—	9,105
Options	1,122	—	—	1,122
Cash	5,585	—	—	5,585
Total plan assets	$ 69,280	$ 9,105	$ —	$ 78,385

(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, 2022 and 2021 were as follows:

(in thousands)	September 30, 2022			
	Level 1	Level 2	Level 3	Total
Financial assets:				
Cash equivalents[(1)]	$ 102,313	$ —	$ —	$ 102,313
Convertible note	—	—	2,000	2,000
Forward contracts	—	9,058	—	9,058
	$ 102,313	$ 9,058	$ 2,000	$ 113,371
Financial liabilities:				
Forward contracts	—	2,908	—	2,908
	$ —	$ 2,908	$ —	$ 2,908

(in thousands)	September 30, 2021			
	Level 1	Level 2	Level 3	Total
Financial assets:				
Cash equivalents[(1)]	$ 114,375	$ —	$ —	$ 114,375
Convertible note	—	—	2,000	2,000
Equity securities	—	—	77,540	77,540
Forward contracts	—	5,363	—	5,363
	$ 114,375	$ 5,363	$ 79,540	$ 199,278
Financial liabilities:				
Forward contracts	—	3,318	—	3,318
	$ —	$ 3,318	$ —	$ 3,318

(1)Money market funds and time deposits.

Level 3 Investments

Convertible Note

In the fourth quarter of 2021, we invested $2.0 million in a non-marketable convertible note. This debt security is classified as available-for-sale and is included in Other assets on the Consolidated Balance Sheet. There were no changes in the fair value of this level 3 investment in the twelve months ended September 30, 2022.

Non-Marketable Equity Investments

The carrying value of our non-marketable equity investments is recorded in Other assets on the Consolidated Balance Sheets and totaled $1.0 million as of September 30, 2022 and $2.2 million as of September 30, 2021. In 2022, PTC sold a non-marketable equity investment for $4.2 million, which had been held at a cost of $1.2 million. The $3.0 million gain recognized on the sale is included in Other income, net for the twelve months ended September 30, 2022

Equity Securities

As of September 30, 2022, PTC held no remaining shares in Matterport, Inc., a publicly traded company, as we sold all previously held shares during the three months ended March 31, 2022. The shares sold included those held as of September 30, 2021, as well as additional shares which PTC earned during the second quarter of FY'22 based on contingent earn-outs achieved in January 2022. Shares related to the original investment were restricted from sale until January 2022 (six months after Matterport became a public company). At expiration of this lock-out, we sold all shares held from the original investment for $39.1 million at an average price of $9.1 per share. In February 2022, we sold all remaining shares held for $3.6 million at an average share price of $7.6 per share. Due to the decline in the price per share during the first six months of fiscal 2022, we recognized a loss of $34.8 million in Other income, net on the Consolidated Statements of Operations. No additional gains or losses were recognized in 2022 and the aggregate realized gain from the original investment of $8.7 million was $34.0 million.

The following table presents changes in fair value of our Level 3 investment in the Matterport, Inc. shares from October 1, 2021 to September 30, 2022:

(in thousands)	September 30, 2022
	Fair Values
Balance, October 1, 2021	$ 77,540
Realized loss	(38,468)
Sale of investment	(39,072)
Balance, September 30, 2022	$ —

16. Marketable Securities

We did not hold any marketable securities as of September 30, 2022 or 2021. In December 2020, we sold all our marketable securities to partially fund the Arena acquisition, resulting in proceeds of $56.2 million. Neither gross realized gains nor gross realized losses related to the sale were material.

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17. Derivative Financial Instruments

Non-Designated Hedges

As of September 30, 2022 and 2021, 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, 2022**	**2021**
Canadian / U.S. Dollar	$ 2,731	$ 4,894
Euro / U.S. Dollar	316,869	387,466
British Pound / U.S. Dollar	7,368	23,141
Israeli Shekel / U.S. Dollar	12,052	10,475
Japanese Yen / U.S. Dollar	25,566	46,450
Swiss Franc / U.S. Dollar	25,559	18,039
Swedish Krona / U.S. Dollar	35,713	34,196
Singapore Dollar / U.S. Dollar	3,637	3,498
Chinese Renminbi / U.S. Dollar	23,965	23,297
New Taiwan Dollar / U.S. Dollar	13,906	3,369
Russian Ruble/ U.S. Dollar	—	2,614
Korean Won/ U.S. Dollar	4,919	—
Danish Krone/ U.S. Dollar	3,192	2,380
Australian Dollar/ U.S. Dollar	3,269	2,086
All other	4,432	2,016
Total	$ 483,178	$ 563,921

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, 2022, 2021 and 2020:

(in thousands)	**Location of gain (loss)**	**Year ended September 30, 2022**	**2021**	**2020**
Net realized and unrealized gain (loss), excluding the underlying foreign currency exposure being hedged	Other income, net	$ 11,950	$ (3,758)	$ 3,518

Net Investment Hedges

As of September 30, 2022 and 2021, we had outstanding forward contracts designated as net investment hedges with notional amounts equivalent to the following:

Currency Hedged *(in thousands)*	**September 30, 2022**	**2021**
Euro / U.S. Dollar	$ 110,466	$ 128,103

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, 2022, 2021, and 2020:

(in thousands)	**Location of gain (loss)**	**Year ended September 30, 2022**	**2021**	**2020**
Gain (loss) recognized in OCI—effective portion	OCI	$ (1,478)	$ 695	$ (5,483)
Gain (loss) reclassified from OCI—effective portion	OCI	$ (17,466)	$ 2,723	$ 109
Gain recognized—portion excluded from effectiveness testing	Other income, net	$ 1,862	$ 1,249	$ 3,506

As of September 30, 2022, 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:

(in thousands)	Fair Value of Derivatives Designated As Hedging Instruments		Fair Value of Derivatives Not Designated As Hedging Instruments	
	September 30,			
	2022	2021	2022	2021
Derivative assets:[1]				
Forward contracts	$ 1,960	$ 1,641	$ 7,098	$ 3,722
Derivative liabilities:[2]				
Forward contracts	$ —	$ —	$ 2,908	$ 3,318

(1)As of September 30, 2022 and 2021, current derivative assets of $9.1 million and $5.4 million, respectively, are recorded in Other current assets on the Consolidated Balance Sheets.
(2)As of September 30, 2022 and 2021, current derivative liabilities of $2.9 million and $3.3 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 that 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, 2022:

(in thousands)	Gross Amounts Offset in the Consolidated Balance Sheets			Gross Amounts Not Offset in the Consolidated Balance Sheets		
As of September 30, 2022	Gross Amount of Recognized Assets	Gross Amounts Offset in the Consolidated Balance Sheets	Net Amounts of Assets Presented in the Consolidated Balance Sheets	Financial Instruments	Cash Collateral Received	Net Amount
Forward Contracts	$ 9,058	$ —	$ 9,058	$ (2,908)	$ —	$ 6,150

The following table sets forth the offsetting of derivative liabilities as of September 30, 2022:

(in thousands)	Gross Amounts Offset in the Consolidated Balance Sheets			Gross Amounts Not Offset in the Consolidated Balance Sheets		
As of September 30, 2022	Gross Amount of Recognized Liabilities	Gross Amounts Offset in the Consolidated Balance Sheets	Net Amounts of Liabilities Presented in the Consolidated Balance Sheets	Financial Instruments	Cash Collateral Pledged	Net Amount
Forward Contracts	$ 2,908	$ —	$ 2,908	$ (2,908)	$ —	$ —

Net gains and losses on foreign currency exposures, including realized and unrealized gains and losses on forward contracts, included in Other income, net, were net losses of $0.9 million, $8.0 million and $1.7 million in 2022, 2021 and 2020, respectively. Net realized and unrealized gains and losses on forward contracts included in Other income, net were a net gain of $16.4 million and $7.0 million in 2022 and 2020, and net loss of $4.9 million in 2021.

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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 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 or report asset information by reportable segment.

(in thousands)	Year ended September 30,		
	2022	**2021**	**2020**
Software Products			
Revenue	$ 1,770,253	$ 1,649,341	$ 1,314,617
Operating costs[1]	494,035	451,734	393,803
Profit	1,276,218	1,197,607	920,814
Professional Services			
Revenue	163,094	157,818	143,798
Operating costs[2]	140,470	135,981	128,678
Profit	22,624	21,837	15,120
Total segment revenue	1,933,347	1,807,159	1,458,415
Total segment costs	634,505	587,715	522,481
Total segment profit	1,298,842	1,219,444	935,934
Unallocated operating expenses:[3]			
Sales and marketing expenses	435,780	464,067	398,100
General and administrative expenses	130,870	120,954	114,386
Intangibles amortization	60,548	59,165	56,104
Restructuring and other charges, net	36,234	2,211	32,716
Stock-based compensation	174,863	177,289	115,149
Other unallocated operating expenses[4]	13,185	15,010	8,616
Total operating income	447,362	380,748	210,863
Interest expense	(54,268)	(50,478)	(76,428)
Other income, net	4,004	61,485	271
Income before income taxes	$ 397,098	$ 391,755	$ 134,706

(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 $4.9 million, $4.0 million and $4.2 million in 2022, 2021 and 2020, respectively.
(2)Operating costs for the Professional Services segment include all costs of professional services revenue, excluding stock-based compensation, and intangible amortization. The Professional Services segment includes depreciation of $0.9 million, $1.1 million and $1.1 million in 2022, 2021 and 2020, respectively.
(3)Unallocated departments include depreciation of $21.4 million, $21.0 million and $19.4 million in 2022, 2021 and 2020, respectively.
(4)Other unallocated operating expenses include acquisition and transaction-related costs.

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For 2022, 2021 and 2020, we reported revenue by the following three product groups:

(in thousands)	Year ended September 30,		
	2022	**2021**	**2020**
Digital Thread - Core	$ 1,318,857	$ 1,257,817	$ 1,025,709
Digital Thread - Growth	279,566	273,949	215,353
Digital Thread - FSG	251,621	233,268	210,101
Digital Thread (Total)	1,850,044	1,765,034	1,451,163
Velocity	83,303	42,125	7,252
Total revenue	$ 1,933,347	$ 1,807,159	$ 1,458,415
Product lifecycle management (PLM)	1,137,016	1,012,120	807,016
Computer-aided design (CAD)	796,331	795,039	651,399
Total revenue	$ 1,933,347	$ 1,807,159	$ 1,458,415

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 material long-lived assets primarily reside in the United States in 2022, 2021 and 2020. 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,		
	2022	**2021**	**2020**
Revenue:			
Americas(1)	$ 895,095	$ 766,021	$ 649,383
Europe(2)	714,216	722,977	543,779
Asia Pacific	324,036	318,161	265,253
Total revenue	$ 1,933,347	$ 1,807,159	$ 1,458,415

(1)Includes revenue in the United States totaling $864.7 million, $741.3 million, and $621.8 million for 2022, 2021 and 2020, respectively.
(2)Includes revenue in Germany totaling $318.5 million, $290.7 million, and $198.7 million for 2022, 2021 and 2020, respectively.

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19. Leases

Our operating leases expire at various dates through 2037 and are primarily for office space, automobiles, servers, and office equipment.

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 through June 30, 2037. Base rent for the first year of the lease was $11.0 million and increases 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.

In February 2019, we subleased a portion of the Boston location through June 30, 2022, and received approximately $9.1 million in sublease income over the term of the sublease. In March 2022, we extended the sublease through June 30, 2023 and we will receive $2.9 million in sublease income over the term of the extension.

The components of lease cost reflected in the Consolidated Statement of Operations for the year ended September 30, 2022 were as follows:

(in thousands)	**Year ended September 30, 2022**
Operating lease cost	$ 34,346
Short-term lease cost	2,653
Variable lease cost	10,095
Sublease income	(4,600)
Total lease cost	$ 42,494

Supplemental cash flow and right-of use assets information for the year ended September 30, 2022 was as follows:

(in thousands)	**Year ended September 30, 2022**
Cash paid for amounts included in the measurement of lease liabilities:	
Operating cash flows from operating leases	$ 38,709
Financing cash flows from operating leases	$ 297
Right-of-use assets obtained in exchange for new lease obligations:	
Operating leases	$ 15,431
Financing leases	$ —

Supplemental balance sheet information related to the leases as of September 30, 2022 was as follows:

	As of September 30, 2022
Weighted-average remaining lease term - operating leases	11.8 years
Weighted-average remaining lease term - financing leases	2 years
Weighted-average discount rate - operating leases	5.4%
Weighted-average discount rate - financing leases	3.0%

Maturities of lease liabilities as of September 30, 2022 are as follows:

(in thousands)	**Operating Leases**
2022	$ 31,612
2023	26,907
2024	23,495
2025	19,487
2026	16,662
Thereafter	143,236
Total future lease payments	261,399
Less: imputed interest	(71,824)
Total	$ 189,575

As of September 30, 2022 we had operating leases that had not yet commenced. The leases will commence in FY'23 with a lease term of 10 years and we will make future lease payments of approximately $11.6 million.

Exited (Restructured) Facilities

As of September 30, 2022, we have net liabilities of $0.3 million related to excess facilities (compared to $3.6 million at September 30, 2021), representing lease obligations classified as short 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, 2022, There was no committed sublease income included in the right-of-use assets for exited facilities and there was no uncommitted sublease income. 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, 2022, we recorded a facility impairment charge of $1.3 million.

In the year ended September 30, 2022, we made payments of $2.0 million related to lease costs for exited facilities.