

Research, Development and Intellectual Property

Our research and development (R&D) operations differentiate us from our competitors. In 2019, we invested approximately 8 percent of total revenue for R&D, focusing on high-growth, high-value opportunities. IBM Research works with clients and our business units through global labs on near- and mid-term innovations. It delivers many new technologies to our portfolio every year and helps clients address their most difficult challenges. IBM Research scientists are conducting pioneering work in artificial intelligence, quantum computing, security, cloud, systems and more—applying these technologies across industries including financial services, healthcare, manufacturing and automotive.

In 2019, for the 27th consecutive year, IBM was awarded more U.S. patents than any other company. IBM's 9,262 patents awarded in 2019 represent a diverse range of inventions in strategic growth areas for the company, including more than 4,500 patents related to work in artificial intelligence, cloud, cybersecurity and quantum computing.

We actively continue to seek IP protection for our innovations, while increasing emphasis on other initiatives designed to leverage our IP leadership. Some of our technological breakthroughs are used exclusively in IBM products, while others are licensed and may be used in IBM products and/or the products of the licensee. As part of our business model, we license certain of our IP assets, which constitute high-value technology, but may be applicable in more mature markets. The licensee drives the future development of the IP and ultimately expands the customer base. This generates IP income for IBM both upon licensing, and with any ongoing royalty arrangements between it and the licensee. While our various proprietary IP rights are important to our success, we believe our business as a whole is not materially dependent on any particular patent or license, or any particular group of patents or licenses. IBM owns or is licensed under a number of patents, which vary in duration, relating to its products.

Competition

IBM is a globally integrated enterprise that participates in a highly competitive environment, where our competitors vary by industry segment, and range from large multinational enterprises to smaller, more narrowly focused entities. Overall, across our business segments, we recognize hundreds of competitors worldwide.

Our principal methods of competition are: technology innovation; performance; price; quality; brand; our broad range of capabilities, products and services; client relationships; the ability to deliver business value to clients; and service and support. In order to maintain leadership, a corporation must continue to invest, innovate and integrate. Over the last several years, we have been making investments and shifting resources, embedding AI and cloud into our offerings while building new solutions and modernizing our existing platforms. These investments not only drive current performance, but will extend our innovation leadership into the future. Our key differentiators are built around three pillars—innovative technology, industry expertise and trust and security, uniquely delivered through an integrated model. As we execute our strategy, we have entered into new markets, such as hybrid cloud, digital, analytics, AI, blockchain and quantum, and deployed new delivery models, including as-a-Service solutions, each of which expose us to new competitors. Overall, the company is the leader or among the leaders in each of our business segments.

A summary of the competitive environment for each business segment is included below:

Cloud & Cognitive Software:

The depth and breadth of our software offerings, coupled with our global markets, deep industry expertise and technical support infrastructure help differentiate our offerings from our competitors. IBM's research and development capabilities and IP patent portfolio also contribute to differentiation. The principal competitors in this segment include Alphabet Inc. (Google), Amazon.com, Inc. (Amazon), BMC, Cisco Systems, Inc. (Cisco), Microsoft Corporation (Microsoft), Oracle Corporation (Oracle), Salesforce, SAP and VMware. We also compete with smaller, niche competitors in specific geographic or product markets.