



## What the long-term impacts of the COVID-19 pandemic could mean for the future of IT jobs

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Before the onset of the COVID-19 pandemic in 2020, many IT jobs were already projected to be in high demand over the next decade. The pandemic has made IT workers even more important to the future economy, and the employment projections for these occupations have increased. This **Beyond the Numbers** article gives an overview of the computer occupations that are expected to experience strong employment growth over the 2020–30 decade and explores how the COVID-19 pandemic is expected to contribute to their projected growth.

# Projected employment growth for fastest growing computer occupations

Since the pandemic began, workplaces have increased remote and hybrid work arrangements, e-commerce has surged, and the availability of telemedicine and telehealth services has greatly expanded. These trends require enhanced and sophisticated cybersecurity solutions, and therefore more computer experts.

Computer occupations are projected to grow by 13.4 percent over the 2020–30 decade, which is 5.7 percentage points faster than the 7.7 percent average for all occupations. (See table 1.)<sup>1</sup> Notably, the computer occupational group did not experience a decline in employment during the pandemic.

The U.S. Bureau of Labor Statistics (BLS) 2020–30 employment projections show that the following occupations will be the fastest growing computer occupations: information security analysts; software developers, quality assurance analysts, and testers; computer and information research scientists; and web developers and digital interface designers.<sup>2</sup>

**Table 1. Employment for computer occupations with projected growth faster than the average for all occupations, by percentage, 2020 and projected 2030**

Occupations	Employment		Change	Percent change
	2020	2030	2020–30	2020–30
Total, all occupations	153,533.8	165,413.7	11,879.9	7.7
Computer occupations	4,985.3	5,652.9	667.6	13.4
Information security analysts	141.2	188.3	47.1	33.3
Software developers and software quality assurance analysts and testers	1,847.9	2,257.4	409.5	22.2
Computer and information research scientists	33.0	40.2	7.2	21.9
Web developers and digital interface designers	199.4	224.9	25.5	12.8

Note: Employment numbers in thousands.  
Source: U.S. Bureau of Labor Statistics.

The duties of these highlighted occupations and their projected growth from 2020 to 2030 are discussed below:

[Information security analysts](#) plan and carry out security measures to protect an organization’s computer networks and systems. Their responsibilities are continually expanding as the number of cyberattacks increases. IT security analysts are involved with creating their organization’s disaster recovery plan, a procedure that IT employees follow in case of an emergency. These plans allow for the continued operation of an organization’s IT department. Employment of information security analysts is projected to grow 33.3 percent from 2020 to 2030, much faster than the average for all occupations.

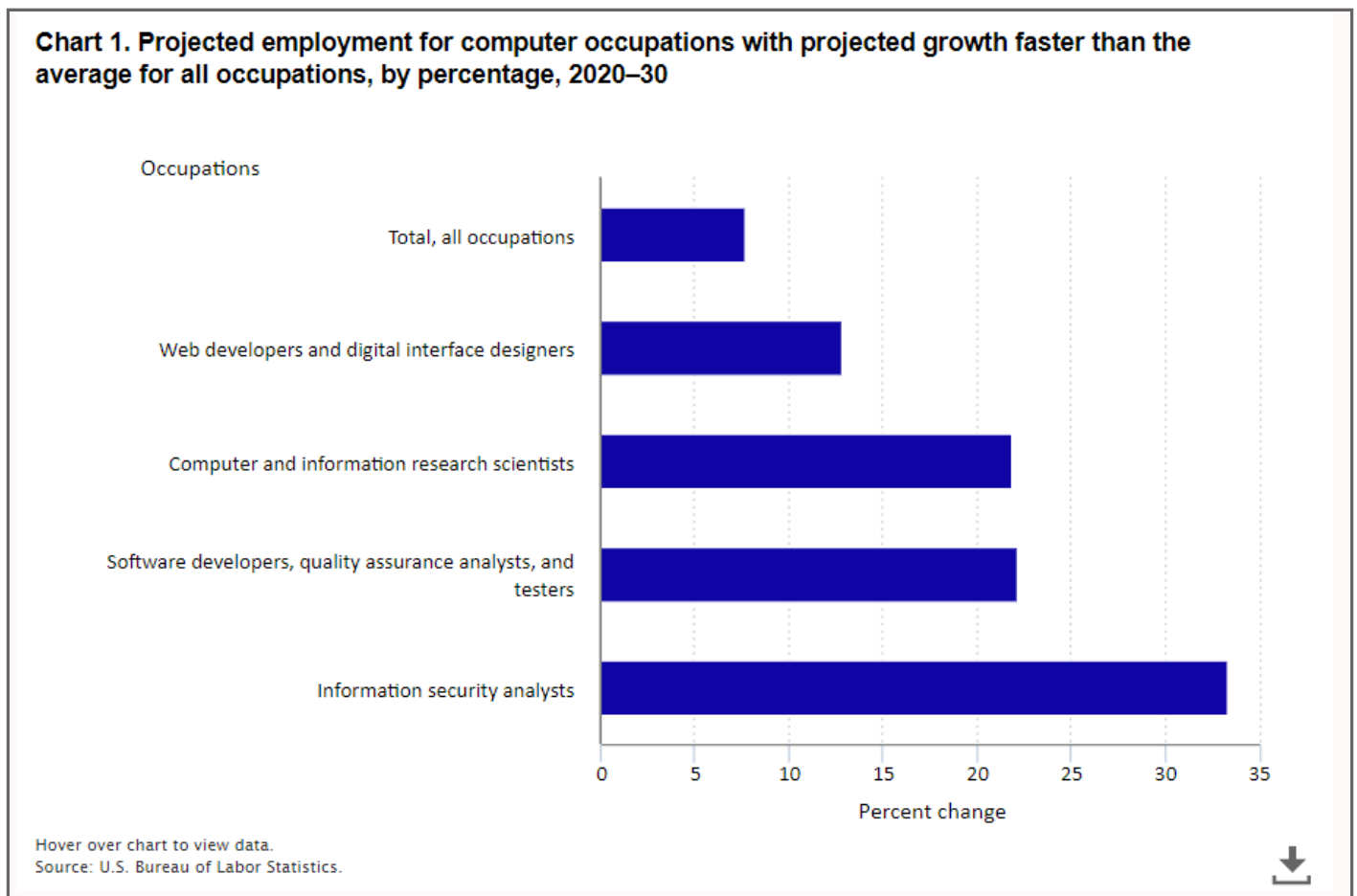
[Software developers, quality assurance analysts, and testers](#) are involved in the entire process of creating a software program. Software developers create the computer applications that allow users to do specific tasks and the underlying systems that run the devices or control networks. Software quality assurance analysts and testers design and execute software tests to identify problems and learn how the software works. Employment of software developers, quality assurance analysts, and testers is projected to grow 22.2 percent from 2020 to 2030, much faster than the average for all occupations.

[Computer and information research scientists](#) design innovative uses for new and existing technology. They study and solve complex problems in computing for business, science, medicine, and other fields. Computer and information research scientists create and improve computer software and hardware architecture. Employment of computer and information research scientists is projected to grow 21.9 percent from 2020 to 2030, much faster than the average for all occupations.

[Web developers and digital interface designers](#) create and maintain websites. They are also responsible for a site’s technical aspects, such as its performance and capacity, which are measures of a website’s speed and how much traffic the site can handle. Digital designers develop, create, and test website or interface layout, functions, and navigation for usability. They are responsible for the look and functionality of the website or interface. Employment of web developers and digital interface designers is projected to grow 12.8 percent from 2020 to 2030, faster than the average for all occupations.

## What is driving growth in these occupations?

Computer occupations are projected to be in high demand over the 2020–30 decade. The increase in remote and hybrid work arrangements, expanded use of telehealth services, and further growth of e-commerce—trends that were accelerated by the COVID-19 pandemic and are expected to continue postpandemic—will increase the need for enhanced cybersecurity measures and generate additional demand for computer occupations. (See chart 1.)



## ***Increase in remote and hybrid work arrangements***

The rise of remote and hybrid work is one of the most notable changes caused by the COVID-19 pandemic that is expected to continue over the long term. The increase in remote work at the onset of the pandemic was significant. Global Workplace Analytics conducted a survey in the early months of the COVID-19 pandemic, which found that 77 percent of office-based workers were working remotely full time, compared with 9 percent before the start of the pandemic.<sup>3</sup> Although some workers have returned to their workplaces since the height of the pandemic, the percentage of employees who are working remotely either full time or part time remains well above the prepandemic trend. According to a survey of full-time U.S. employees conducted by Gallup, 45 percent of workers worked from home either all or part of the time during September 2021, which was consistent with the 2 months prior.<sup>4</sup> Over the 2020–30 decade, remote and hybrid work arrangements are expected to become more common as they provide flexibility for employees and cost savings for companies.

Both employees and employers have reported benefits of remote or hybrid work. A 2020 survey of business leaders conducted by Gartner, Inc., a research and advisory firm, found that 82 percent of companies plan to let their employees work remotely at least some of the time, while 47 percent intend to let their staff work remotely full time on a permanent basis.<sup>5</sup>

Many U.S. organizations experienced network problems and slowdowns caused by the sudden migration of a significant portion of the workforce to remote or hybrid work and relied on IT workers to help resolve these network issues and improve IT systems.<sup>6</sup> The expected continuation and expansion of remote or hybrid work arrangements will result in a growing need for workers to plan, design, test, implement, and support the infrastructure and services of a remote work environment. Computer and information research scientists play an important role in researching and developing new and improved approaches to solve complex computing challenges. Software developers will be needed to design the applications and software to support remote and hybrid work environments. Other computer occupations will also benefit from an increase in remote work.

Remote work also creates security challenges, as it can create more diverse points for criminals to infiltrate networks, such as insecure VPNs. Cybercriminals and hackers took advantage of the remote work situation during the pandemic to exploit vulnerabilities in IT infrastructure and mobile device networks.<sup>7</sup> The substantial shift in the workforce to remote work and the need for enhanced security measures contributes to the projected 33.3 percent growth of employment of information security analysts from 2020 to 2030.

## ***Expanded telehealth medical services***

During the pandemic many healthcare facilities began to offer more telehealth options, including doctor-patient video chats and no-contact medicine delivery. Compared with prepandemic levels, telehealth visits increased by 50 percent in 2020 in the United States.<sup>8</sup> In 2020, healthcare systems invested millions of dollars in virtual health platforms for virtual care, especially for routine appointments and ongoing care for patients with chronic conditions.<sup>9</sup> The rise in telehealth services should boost demand for IT services for telehealth platforms, remote patient monitoring, and healthcare-related mobile applications. Healthcare providers are adding digital infrastructure and IT support to help them share and access patient information, protect internal systems and databases, and offer 24/7 remote assistance.<sup>10</sup>

Expected growth in telehealth and other personalized digital health services over the 2020–30 decade will boost demand for many computer occupations to develop, test, and support the hardware and software needed to

provide these services. Personalized digital health services extends to mobile sensors and wearable devices that can track users' exercise activity, heart rate, sleep patterns, and other health metrics; experts expect sustained development of these hardware and software platforms,<sup>11</sup> with approximately 21 percent of adults in the United States reporting that they regularly wear a smartwatch or fitness tracker.<sup>12</sup> Growth in these services should increase demand for software developers and web developers and digital designers because they will play a pivotal role in developing the software, telehealth platforms, websites and mobile applications that will be needed for digital healthcare services and devices. In addition, computer and information research scientists will be involved in the research and development of advanced technologies that will underlie new medical devices and wearables.

Strong growth in digital health services and telehealth will also increase data security risks for healthcare providers regarding the protection of patients' personal information and data. According to a Healthcare Information and Management Systems Society (HIMSS) cybersecurity survey conducted in 2020, 70 percent of the health organizations surveyed reported a significant security incident within the last year of when the survey was conducted.<sup>13</sup> Healthcare system data breaches are the most expensive of any industry as well, at an average cost of \$7.1 million per data breach in 2020.<sup>14</sup> Healthcare providers will likely continue to invest in cybersecurity over the 2020–30 decade in order to comply with regulation and to better protect patient information from unwanted hacks. Information security analysts will be one of the main occupations tasked with strengthening the protection of healthcare systems' networks and digital services.

## ***Continued rise in e-commerce and app-based services***

During the pandemic, consumers shopped online more than ever before and tried new services, such as ordering groceries and food deliveries through an app or buying items online and picking-up in store (BOPIS). The share of e-commerce in retail is estimated to have grown two to five times faster in 2020 than before the pandemic.<sup>15</sup> According to the U.S. Census Bureau of the Department of Commerce, consumers spent \$792 billion online in 2020 compared with \$598 billion in 2019, an increase of 32.4 percent.<sup>16</sup> Although some of this strong demand for e-commerce may dissipate when the pandemic ends, online shopping is expected to continue to grow faster than traditional retail over the 2020–30 projections period. Indeed, industry experts forecast the share of e-commerce in retail to reach nearly 24 percent by 2025 from 11 percent in 2019.<sup>17</sup>

In addition to mobile shopping apps, demand for mobile fitness apps, games, and video streaming apps also surged in 2020.<sup>18</sup> In the next 10 years, consumers are expected to continue to use apps for shopping, ordering groceries and food deliveries, entertainment, education, exercise, banking, and other activities, creating strong demand for mobile application development.

Expected sustained growth in e-commerce and BOPIS options in retail, in addition to the rise in app-based services, should boost demand for web development, IT support, and application testing and development over the 2020–30 decade. As a result, web developers and digital interface designers will be needed to write the code used to design websites and applications, create and test new applications, manage site's technical aspects, and perform other tasks related to the look and functionality of websites and mobile applications.

The pandemic and the subsequent increase in use of online retail channels has made many businesses more susceptible to cybersecurity risks as virtual platforms were quickly adopted or expanded during the onset of the



COVID-19 pandemic. As businesses are focused on enhancing their cybersecurity measures, information security analysts will be needed to ensure that new technologies are secure from outside threats or hacks.

## Conclusion

The COVID-19 pandemic has changed how people work, receive healthcare, and shop, and these changes will drive more demand for computer occupations. A growing digital economy, consumers and businesses demanding more connectivity to and services from the internet, and an overall increased focus on data security are all expected to contribute to robust long-run demand for these workers.<sup>19</sup> As workers rely even more upon IT infrastructures to do their work, developers and testers will be in demand to enhance platforms and systems. Likewise, as systems become more sophisticated, so do cybercriminals and hackers. IT professionals will be in high demand to secure increasingly valuable and private information.

If you are interested in learning more about these and other computer occupations, please visit the [computer and information technology occupations](#) page on the Occupational Outlook Handbook (OOH), which provides information on job responsibilities, pay, typical education and training requirements, job outlook, and more.

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This **Beyond the Numbers** article was prepared by the Office of Employment and Unemployment Statistics, U.S. Bureau of Labor Statistics. For more information, contact by telephone: 202-691-5700.

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### NOTES

<sup>1</sup> This is especially notable when excluding cyclical economic recovery from the COVID-19 recession in 2020, a significant source of growth for many occupations. Total employment for all occupations is projected to grow by only 1.7 percent when pandemic recovery growth is excluded. The projected growth for computer occupations does not include any cyclical recovery, making them one of only 3 of the 22 occupational groups with this pattern of employment. For more information on categorizing projected growth rates in the 2020–30 projections as cyclically or structurally driven, see the “Effects of the COVID-19 pandemic on the 2020–30 projections” section in “Projections overview and highlights, 2020–30,” *Monthly Labor Review*, <https://www.bls.gov/opub/mlr/2021/article/projections-overview-and-highlights-2020-30.htm>.

<sup>2</sup> See “Table 1.2 Employment by detailed occupation, 2020 and projected 2030,” (U.S. Bureau of Labor Statistics, September 2021), <https://www.bls.gov/emp/tables/emp-by-detailed-occupation.htm>.

- <sup>3</sup> See “Telework and the Future of Economic and Social Prosperity,” *Local Government Commission*, June 2021, <https://civicwell.org/wp-content/uploads/2022/01/Telework-factsheet.pdf>.
- <sup>4</sup> See Lydia Saad and Ben Wigert, “Remote Work Persisting and Trending Permanent,” *Gallup*, October 13, 2021, <https://news.gallup.com/poll/355907/remote-work-persisting-trending-permanent.aspx>.
- <sup>5</sup> See Mary Baker, “Gartner Survey Reveals 82% of Company Leaders Plan to Allow Employees to Work Remotely Some of the Time,” *Gartner*, July 14, 2020, <https://www.gartner.com/en/newsroom/press-releases/2020-07-14-gartner-survey-reveals-82-percent-of-company-leaders-plan-to-allow-employees-to-work-remotely-some-of-the-time>.
- <sup>6</sup> See Bhaskar Chakravorti and Ravi Shankar Chaturvedi, “Which Countries Were (And Weren’t) Ready for Remote Work?,” *Harvard Business Review*, April 29, 2020, <https://hbr.org/2020/04/which-countries-were-and-werent-ready-for-remote-work>.
- <sup>7</sup> See “25 Alarming Cyberattacks and Stats,” *CompTIA*, <https://www.comptia.org/content/articles/cyberattack-stats/>.
- <sup>8</sup> See Anis Uzzaman, “Top Business and Technology Trends in 2021,” *Inc.*, December 15, 2020, <https://www.inc.com/anis-uzzaman/top-business-technology-trends-in-2021.html>.
- <sup>9</sup> See Makenzie Holland, “Virtual visits to mature in 2021,” *TechTarget*, December 28, 2020, <https://searchunifiedcommunications.techtarget.com/feature/Virtual-visits-to-mature>.
- <sup>10</sup> See “Leveraging Managed Services and IT Support Partners for the Healthcare Industry,” *Netrix*, June 28 2021, <https://netrixllc.com/blog/leveraging-managed-services-and-it-support-partners-for-the-healthcare-industry/>.
- <sup>11</sup> See Sarah Silbert, “All the Things You Can Track With Wearables,” *Lifewire*, December 2, 2020, <https://www.lifewire.com/what-wearables-can-track-4121040>.
- <sup>12</sup> See Emily A. Vogels, “About one-in-five Americans use a smart watch or fitness tracker,” *Pew Research Center*, January 9, 2020, <https://www.pewresearch.org/fact-tank/2020/01/09/about-one-in-five-americans-use-a-smart-watch-or-fitness-tracker/>.
- <sup>13</sup> See “2020 HIMSS Cybersecurity Survey,” HIMSS, November 16, 2020, p. 5, [https://www.himss.org/sites/hde/files/media/file/2020/11/16/2020\\_himss\\_cybersecurity\\_survey\\_final.pdf](https://www.himss.org/sites/hde/files/media/file/2020/11/16/2020_himss_cybersecurity_survey_final.pdf).
- <sup>14</sup> See “Cost of a Data Breach Report 2020,” IBM, p. 25, <https://www.ibm.com/downloads/cas/RZAX14GX>.
- <sup>15</sup> See Susan Lund, Anu Madgavkar, James Manyika, Sven Smit, Kweilin Ellingrud, and Olivia Robinson, “The future of work after COVID-19,” *McKinsey Global Institute*, February 18, 2021, <https://www.mckinsey.com/featured-insights/future-of-work/the-future-of-work-after-covid-19>.
- <sup>16</sup> See “Quarterly Retail E-Commerce Sales 4th Quarter 2020,” (U.S. Census Bureau, U.S. Department of Commerce, February 19, 2021), <https://www2.census.gov/retail/releases/historical/ecommm/20q4.pdf>.
- <sup>17</sup> See Suzy Davidkhanian, “US Ecommerce Forecast 2021,” *Insider Intelligence*, July 8, 2021, <https://www.emarketer.com/content/us-ecommerce-forecast-2021>.
- <sup>18</sup> See Lexi Sydow, “The New Normal in 2021: Five Things You Need to Know in Mobile,” *App Annie*, <https://www.appannie.com/en/insights/market-data/2021-five-things-you-need-to-know-in-mobile/>.
- <sup>19</sup> See Alan Zilberman and Lindsey Ice, “Why computer occupations are behind strong STEM employment growth in the 2019–29 decade,” *Beyond the Numbers: Employment & Unemployment*, vol. 10, no. 1 (U.S. Bureau of Labor Statistics, January 2021), <https://www.bls.gov/opub/btn/volume-10/why-computer-occupations-are-behind-strong-stem-employment-growth.htm>.

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