



## Careers in the growing field of information technology services

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**C**omputers and information technology (IT) touch nearly every aspect of modern life. Information technology can help with such diverse tasks as driving motor vehicles and diagnosing diseases. IT enables seamless integration and communication between businesses anywhere in the world. To keep IT systems running, a large workforce is needed to maintain networks, create new software, and ensure information security. In addition, the proliferation of smart phones has given rise to a new “app economy,” in which new employment opportunities are available for workers who create the programs that run on mobile devices.<sup>1</sup> Unlike many other sectors of the economy, employment in the computer systems design and related services industry (commonly known as IT services) was not significantly affected by the recession of 2007–2009. The industry lost about 1 percent of its employment in 2009 but regained momentum in 2010, when

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- “Computer and Information Technology Occupations,” *Occupational Outlook Handbook*, <http://www.bls.gov/ooh/computer-and-information-technology/home.htm>.
- “Employment Trends and Training in Information Technology,” *Occupational Outlook Quarterly*, Spring 2009, <http://www.bls.gov/opub/ooq/2009/spring/art04.pdf>.
- “After the Dot-Com Bubble: Silicon Valley High Tech Employment and Wages in 2001 and 2008,” <http://www.bls.gov/opub/btn/archive/after-the-dot-com-bubble-silicon-valley-high-tech-employment-and-wages-in-2001-and-2008-pdf.pdf>.

it surpassed the employment numbers from 2008.<sup>2</sup> The high demand for the services provided by this industry has created a large number of fast-growing and high-paying IT jobs.

## What does the IT industry do?

Establishments in computer systems design and related services provide IT expertise for consumers and firms, often consulting with businesses to help them upgrade their computer systems, networks, or software.<sup>3</sup> The industry is the largest of any computer-related industry, employing more than 1.5 million people in 2011.

Computer systems design and related services can be broken down into four subindustries: custom computer programming services, computer systems design services, computer facilities management services, and other computer related services. (See chart 1.) The first two are the largest, and account for almost 90 percent of all IT services employment. **Custom computer programming services** (NAICS 541511) includes establishments that write, test, and modify software for a particular client. This software includes computer programs, webpage design, and database design. Computer programming services

also provide support to clients after the newly designed software is implemented.<sup>4</sup>

**Computer systems design services** (NAICS 541512) includes establishments that “plan and design computer systems that integrate hardware, software, and communication technology.”<sup>5</sup> Systems design services may provide their own hardware and software or use third-party equipment. Generally, design firms also install new computer systems and train the users. Computer systems design firms also provide support services to clients when the installation and training is finished.

The two remaining subindustries are much smaller.

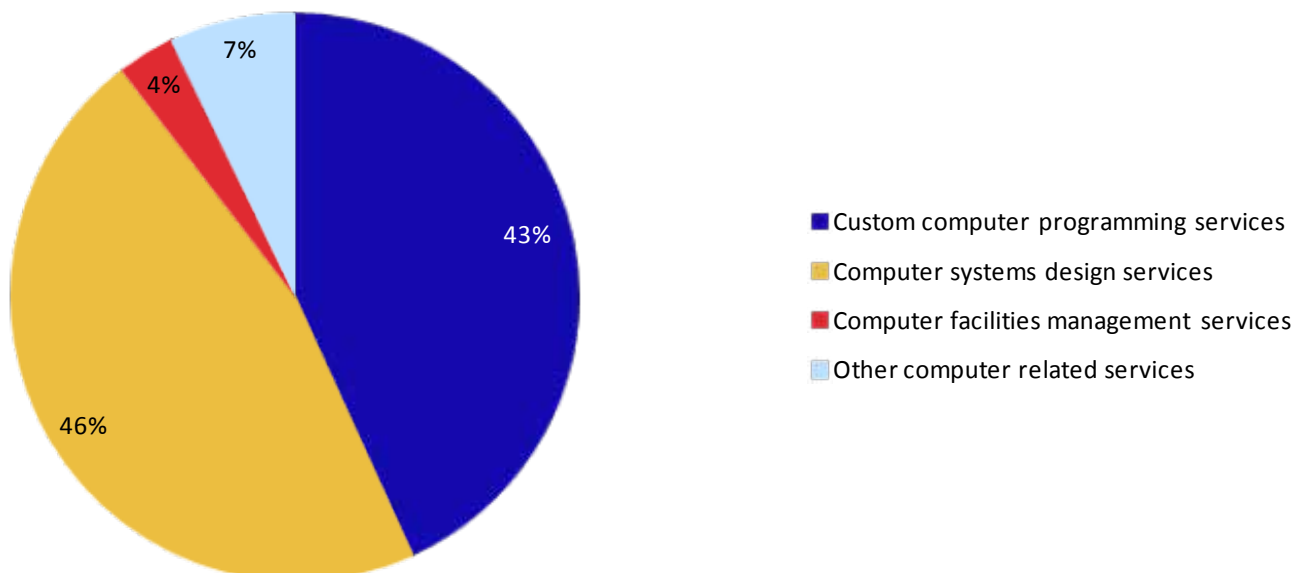
**Computer facilities management services** (NAICS 541513) includes establishments that manage and operate computer systems and data processing facilities. **Other computer related services** (NAICS 541519) includes establishments that provide a wide range of services not included in the other subindustries, such as disaster recovery services or software installation services.

## IT industry growth

For most of the past 20 years, employment in computer systems design and related services has grown rapidly.

### Chart 1

Employment distribution of computer systems design and related services, 2011



Source: U.S. Bureau of Labor Statistics, Current Employment Statistics.

From 1990 to 2001, employment in the industry rose quickly, as many businesses began to invest in computer systems. Between 2001 and 2011, employment in computer systems design and related services increased by 232,300 jobs or 18 percent. (See chart 2.) This increase came in spite of the steep decline in employment between 2001 and 2003 that followed the dot-com crash in 2000, when investors sold off their stock in overvalued dot-com companies, resulting in tremendous losses of money and jobs in Internet technology. Since 2003, employment in the IT industry has grown by 37 percent. During the recent recession (December 2007 to June 2009), the industry lost only 1 percent of its workforce in 2009, but otherwise maintained employment. By 2010, employment had recovered and was higher than it had been in 2008.

Industry output also grew quite rapidly, increasing 4.6 percent annually, on average, between 2000 and 2010. Much of the growth in output and employment was due to the adoption of complex computer systems and networks by businesses throughout the economy. The firms in this industry commonly create both computer programs and

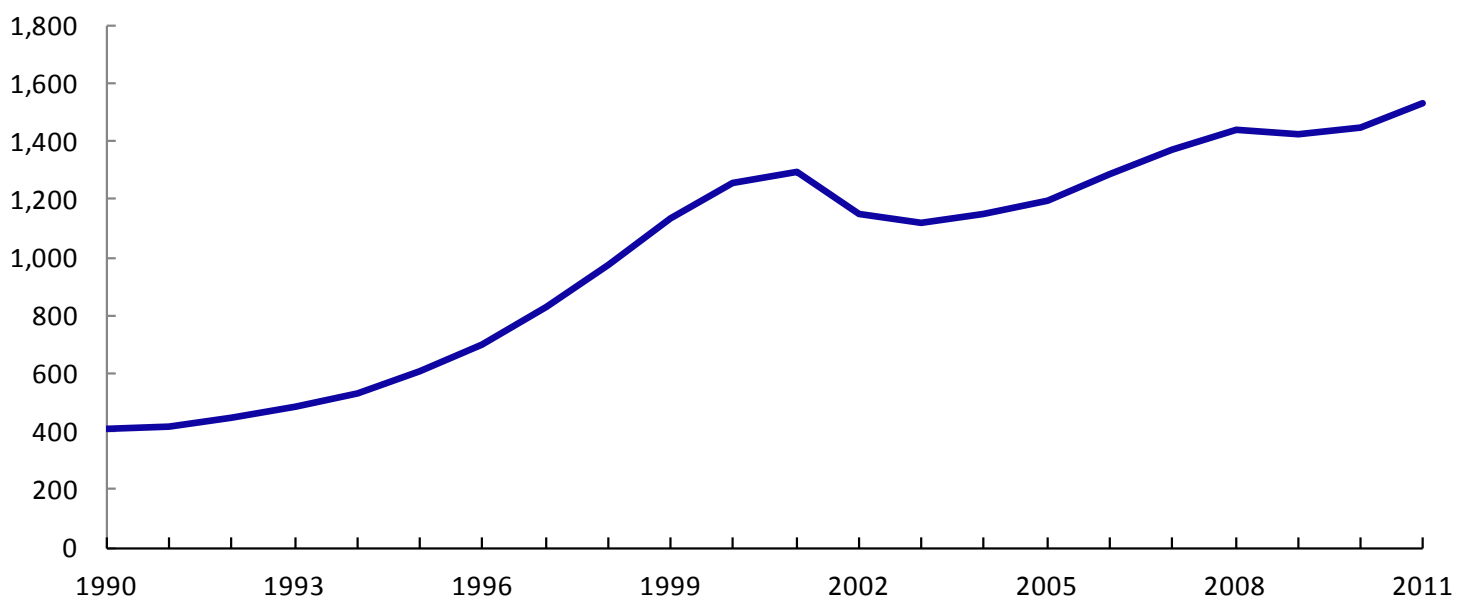
computer systems tailored specifically to meet clients' needs. Recently, the IT industry has devoted significant resources to technologies that are expected to contribute to additional output and employment growth over the next decade, such as cloud computing and mobile applications.

### *Projected IT industry growth*

Employment and output in computer systems design and related services are projected to grow rapidly over the next decade, outpacing similar professional, scientific, and technical industries and the economy as a whole. Between 2010 and 2020, output in computer systems design and related services is expected to grow at an average annual rate of 6.1 percent, compared with 3.6 percent for the broad industry category—professional, scientific, and technical services—and 2.9 percent for all industries. (See chart 3.) Employment in computer systems design and related services is projected to grow 3.9 percent annually from 2010 to 2020, compared with 2.6 percent for professional, scientific, and technical services and 1.3 percent for all industries.

## Chart 2

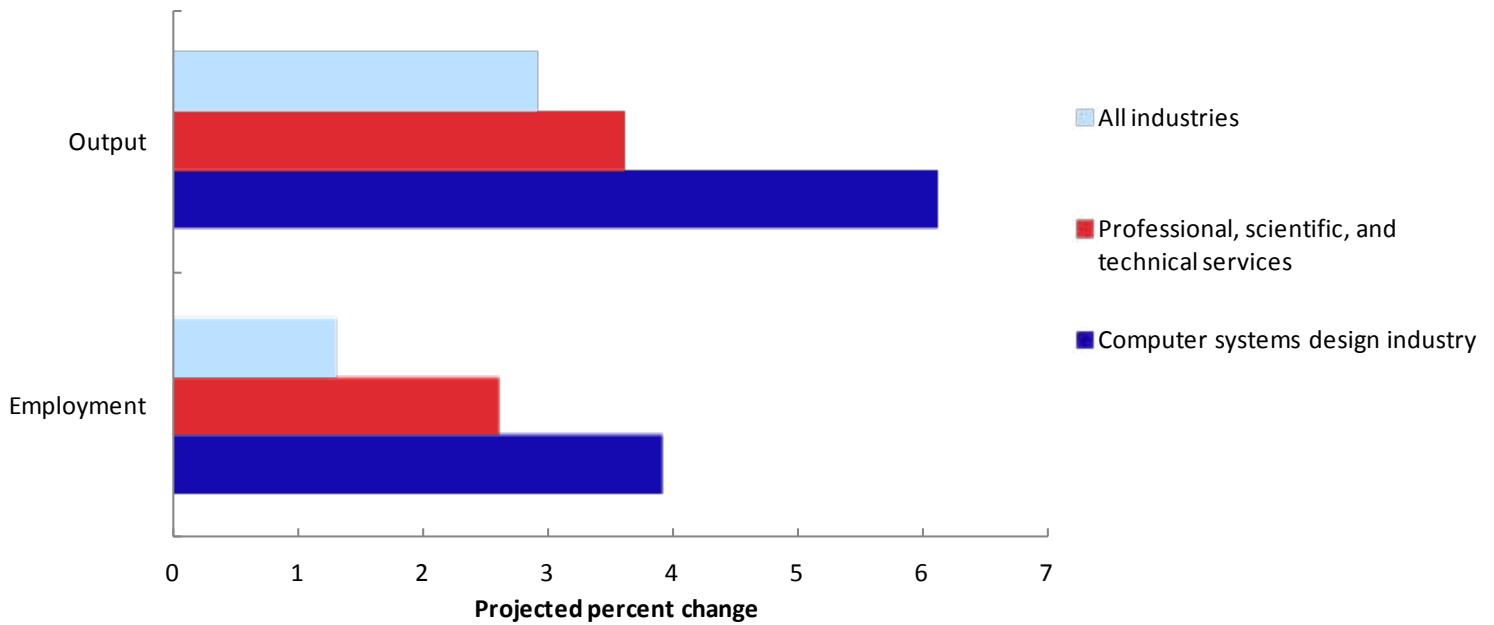
### Employment in the computer systems and design related services industry, in thousands, 1990–2011



Source: U.S. Bureau of Labor Statistics, Current Employment Survey.

## Chart 3

## Projected average annual percent change in output and employment in selected industries, 2010–2020



Source: U.S. Bureau of Labor Statistics, Employment Projections Program

### Reasons for projected growth

Employment and output in the computer systems design and related services industry is expected to grow rapidly as firms and individual consumers continue to increase their use of information technology services. Cloud computing is one area that is expected to contribute to growth in this industry. Many organizations have already adopted cloud computing and multiple studies project cloud computing will grow rapidly over the next several years.<sup>6</sup> Cloud computing is a way to replace computer products with services, such as storage space or software, delivered over the Internet.<sup>7</sup> Cloud computing service providers manage IT infrastructure and platforms, and provide businesses with access to remote data storage and software packages. With cloud computing, firms can rent services from a vendor as they need them, helping them to avoid huge upfront investments in IT services.

Cloud vendors who employ software developers and computer systems analysts are located in the computer systems design and related services industry. An increase in the demand for cloud computing services should lead to increased output and employment growth in this industry. On the other hand, cloud computing may do some of the

work previously done by certain onsite IT services and workers. Network administrators and computer support specialists in other industries may experience employment declines as their companies switch to cloud computing and fewer employees are needed to maintain and support their company's network. For example, if a bank adopted cloud computing, it would result in employment growth for the cloud vendor, but there would likely be decreased employment in the bank's own IT department.

In recent years, the number of cyberattacks has increased dramatically and is expected to continue to threaten information systems. Recent data point to a 17-fold increase in the number of cyberattacks on U.S. infrastructure between 2009 and 2011.<sup>8</sup> Security companies also have produced reports that show large increases in cyberattacks on private businesses in 2011.<sup>9</sup> Antivirus programs, improved firewalls, and other intrusion detection systems are common solutions to cyberattacks.<sup>10</sup> These services are often provided by third-party security firms in the computer systems design and related services industry. Demand for security firms that help businesses protect their data and intellectual property is rising, a major factor in the employment growth in computer systems design and related services.

Cloud computing and cybersecurity are only two areas that are expected to lead employment increases in the computer systems design and related services industry; health care IT, mobile networking, and data management also may contribute to employment growth over the next decade.

## Careers in IT

Like most industries, computer systems design and related services is made up of many different occupations. Computer occupations make up more than half the industry, but a large number of managers, business and financial workers, and administrative employees work in the industry as well. These workers are included in occupations such as accountants and auditors, general office managers, and customer service representatives. Although these occupations do not involve computer systems design work directly, they do help to keep the IT companies running smoothly. Because of the high demand for computer systems design and related services, all the occupations in this industry have fast growth rates and high wages relative to the same occupations across all industries. (See table 1.)

Computer and mathematical occupations make up about 56 percent of the computer systems design and related services industry. **Software developers** is the largest

occupation in the industry, making up a 20-percent share. Software developers create computer programs and oversee the entire design process, from planning stages to future upgrades. There are two different types of developers: applications software developers and systems software developers. Applications software developers design a wide range of programs, from spreadsheets used by accountants, to electronic maps that help give people directions, to increasingly popular mobile games. Applications developers often design software that is offered through cloud computing. Employment of this occupation in the computer systems design and related services industry is projected to grow 57 percent from 2010 to 2020. (See table 2 for employment and wages of computer occupations.)

Systems software developers create and upgrade operating systems, the software that supports a computer's basic functions, such as scheduling tasks, executing applications, and controlling peripherals. Employment of systems software developers in this industry is projected to grow 72 percent between 2010 and 2020.

The rapid increase in both types of software developers is attributable to an increased demand for new and updated software. Many consumer electronics include their own computers that need operating systems. Mobile

**Table 1**

### Occupational growth and wages in computer systems design and related services, 2010–2020

Occupation group	Employment in 2010 (in thousands)	Projected employment growth 2010–2020 (percent change)		Median annual wage 2011	
		Computer systems design and related services	All industries	Computer systems design and related services	All industries
Management occupations	144.7	39.5	7.0	\$130,760	\$92,880
Business and financial operations occupations	130.7	48.5	17.3	73,050	61,700
Computer and mathematical occupations	802.6	49.3	22.0	78,320	75,080
Office and administrative support occupations	161.0	39.3	10.3	36,230	31,250

Source: U.S. Bureau of Labor Statistics.



computing and health care IT also require new software applications. The need for stronger cybersecurity will drive the demand for developers to design new software to detect, contain, and prevent viruses.

**Computer programmers** make up 8 percent of the computer systems design and related services industry. By writing computer code, they turn the designs created by software developers into instructions a computer can follow. Employment of programmers in computer systems design and related services is projected to grow 29 percent from 2010 to 2020. The projected growth in employment of computer programmers is attributable to increased demand for new and updated software. However, computer programming jobs are expected to be increasingly outsourced to countries with lower production costs, resulting in a slower projected growth rate over the next decade.

**Computer systems analysts** make up 9 percent of the industry. These workers serve as a link between IT departments and management. They analyze an organization's computer systems and recommend ways to make the business run more efficiently. Computer systems analysts employed in this industry often serve as consultants. For example, a university that wants to upgrade its computer systems might hire a firm from this industry. The firm has computer systems analysts on staff to study the systems the university is currently using and recommend areas for improvement. Computer systems analysts also assist organizations that want to switch all or part of their systems to cloud computing. From 2010 to 2020, employment of computer systems analysts in computer systems design and related services is projected to grow 43 percent. In general, they will be hired by businesses to reorganize IT departments to operate more efficiently.

**Computer support specialists** make up 8 percent of the computer systems design and related services industry. They provide help and advice to consumers or organizations that are using computer software or equipment. Some assist customers who call the company to speak to a specialist when they are having trouble with

a software program or networking device. Other computer support specialists work in a company's IT department and provide support for other company employees who are having computer problems. Employment of computer support specialists in computer systems design and related services is projected to grow 43 percent from 2010 to 2020. They will be needed as organizations continue to upgrade to increasingly complex computer systems and equipment.

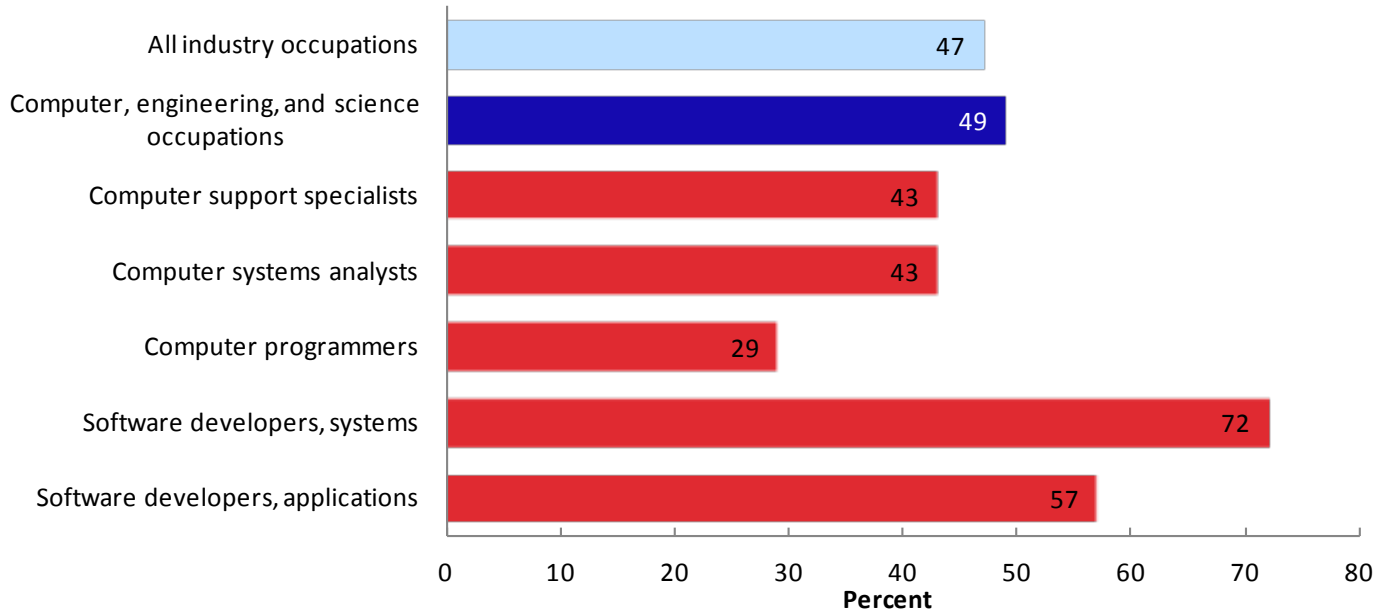
Chart 4 shows the employment growth rates of the largest occupations in this industry, compared with all occupations in the industry and with a broader category of computer, engineering, and science occupations in the same industry. Employment of both systems and applications software developers is expected to grow the fastest; employment of most of the other occupations is projected to grow at a rate similar to the industry as a whole. The only exception is computer programmers, which is projected to have slower employment growth than the rest of the industry. However, employment in the industry, including its key computer occupations, is expected to grow much faster than the 14-percent average growth for all occupations across all industries.

Table 2 details the employment, projected growth rate, wage, and typical entry-level education requirement for the largest computer occupations within this industry. In May 2011, all of the computer occupations had a higher median wage than the median wage for all occupations, \$34,460. Computer support specialist is the only computer occupation that does not typically require a bachelor's degree for entry. Although employers may prefer a degree for more technical support positions, many help desk and call center positions only require an associate's degree or some postsecondary classes.

The work done in the computer systems design and related services industry is varied and often on the cutting edge of technology. Overall employment in this industry has grown rapidly in recent years and is projected to continue to do so. Employment estimates for nearly all of the computer occupations in this industry are projected to grow much faster than the 14-percent average growth rate for all occupations. Workers in the major occupation

**Chart 4**

**Projected percent change in employment in selected occupations in computer systems design and related services, 2010–2020**



Source: U.S. Bureau of Labor Statistics, Employment Projections Program

**Table 2**

Employment and employment growth, projected 2010–2020, wages and required education for selected occupations in computer systems design and related services in 2011				
Occupation	Employment in 2010 (in thousands)	Projected growth 2010–2020 (percent)	Median annual wage 2011	Typical education needed for entry
Computer systems analysts	135.3	43.1	\$82,160	Bachelor's degree
Computer programmers	116.8	28.8	72,100	Bachelor's degree
Software developers, applications	174.0	57.4	88,120	Bachelor's degree
Software developers, systems	117.8	71.7	94,570	Bachelor's degree
Computer support specialists	107.4	43.1	48,800	Some college, no degree

Source: U.S. Bureau of Labor Statistics.

groups in this industry earn high wages, and most workers have at least a bachelor’s degree. From building cloud computing networks to creating security applications, the services provided by computer systems design and related services are constantly evolving and in high demand. ■

This **BEYOND THE NUMBERS** article was prepared by Lauren Csorny, an economist in the Office of Occupational

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**Notes**

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