

## Occupational Employment, Training, and Earnings

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### Occupational Employment, Training, and Earnings Search Results

Below are the 7 occupations you selected sorted by **Percent change in total employment, 2006-2016**. (Re-sort this report) -->

Detailed information about the quartile rankings is available at [quartile ranking definitions and data ranges](#). Files containing this data are available for download at <http://ftp.bls.gov/pub/special.requests/ep/optddata/>

Occupation	Total employment (000's)		2006-2016 change in total employment		2006 self-employed Percent	2006-2016 average annual job openings (000's)		Percent		2006 Median annual earnings (Dollars)	Median annual earnings quartile*	Postsecondary-education or training category	Education
	2006	2016	Number (000's)	Percent		Due to growth and total replacement needs	Due to growth and net replacement needs	Part-time workers quartile*	Unemployed workers quartile*				
Network systems and data communications analysts	262	402	140	53.4	17.5	35	19	L	L	64,600	VH	Bachelor's degree	
Computer systems analysts	504	650	146	29.0	5.8	63	28	VL	L	69,760	VH	Bachelor's degree	
Database administrators	119	154	34	28.6	1.3	8	5	VL	VL	64,670	VH	Bachelor's degree	
Network and computer systems administrators	309	393	83	27.0	0.4	37	15	VL	L	62,130	VH	Bachelor's degree	
Computer specialists, all other	136	157	21	15.1	6.6	14	6	VL	L	68,570	VH	Associate's degree	
Computer support specialists	552	624	71	12.9	1.3	97	24	L	L	41,470	H	Associate's degree	
Computer programmers	435	417	-18	-4.1	3.9	28	9	VL	L	65,510	VH	Bachelor's degree	

\* VH = Very High; H = High; L = Low; VL = Very Low; n.a. = not available

The education clusters are presented in the following categories: HS=High school occupations, HS/SC=High school/Some college occupations, SC=Some college occupations, HS/SC/C=High school/Some college/College occupations, SC/C=Some college/college occupations, and C=College occupations. For information about the methodology, see methodological note at the end of table I-1 in Occupational Projections and Training Data, 2004-05 edition, available at <http://www.bls.gov/emp/optd/home.htm>

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## Career Guide to Industries

# Software Publishers

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### Significant Points

- Employment is projected to increase by 32 percent between 2006 and 2016.
- Computer specialists account for 52 percent of all workers.
- Job opportunities will be excellent for most workers, but professional workers should enjoy the best prospects, reflecting continuing demand for higher level skills needed to keep up with changes in technology.

### Nature of the Industry

**Goods and services.** All organizations today rely on computer and information technology to conduct business and operate more efficiently. Computer software is needed to run and protect computer systems and networks. Software publishing establishments are involved in all aspects of producing and distributing computer software, such as designing, providing documentation, assisting in installation, and providing support services to customers. The term "publishing" often implies the production and distribution of information in printed form. The software publishing industry also produces and distributes information, but usually it does so by other methods, such as CD-ROMs, the sale of new computers already preloaded with software, or through distribution over the Internet. Establishments in this industry may design, develop, and publish software, or publish only. Establishments that provide access to software for clients from a central host site, design custom software to meet the needs of specific users, or are involved in the mass duplication of software are classified elsewhere. (For more information, see the section on [computer systems design and related services](#) found elsewhere in the *Career Guide*.)

**Industry organization.** Software is often divided into two main categories—applications software and systems software. Applications software includes individual programs for computer users—such as word processing and spreadsheet packages, games and graphics packages, data storage programs, and Web browsing programs. Systems software, on the other hand, includes operating systems and all of the related programs that enable computers to function. Establishments that design and publish prepackaged software may specialize in one of these areas, or may be involved in both. Some establishments also may install software on a customer's system and provide user support. In 2006, there were approximately 10,000 establishments that were engaged primarily in computer software publishing, or in publishing and reproduction.

**Recent developments.** The Internet has vastly altered the complexion of the software industry over the last decade. Much of the applications and system software that is now developed is intended for use on the Internet, and for connections to the Internet.

Organizations are constantly seeking to implement technologies that will improve efficiency. Enterprise resource planning (ERP) software is such an example. ERP, which is typically implemented by large organizations with vast computer networks, consists of cross-industry applications that automate a firm's business processes. Common ERP

applications include human resources, manufacturing, and financial management software. Recently developed ERP applications also manage a firm's customer relations and supply-chain.

Electronic business (e-business) is any process that a business organization conducts over a computer network. Electronic commerce (e-commerce) is the part of e-business that involves the buying and selling of goods and services. With the growth of the Internet and the expansion of e-commerce, there is significant demand for e-commerce software that enables businesses to become as efficient as possible.

This widespread use of the Internet and intranets also has led to greater focus on the need for computer security. Security threats range from damaging computer viruses to online credit card fraud. The robust growth of e-commerce increases this concern, as firms use the internet to exchange sensitive information with an increasing number of clients. As a result, organizations and individual computer users are demanding software, such as firewalls and antivirus software, that secures their computer networks or individual computer environments.

## **Working Conditions**

**Hours.** In 2006, workers in the software publishing industry averaged 37.6 hours per week, compared with 33.9 for all industries combined. Many workers in this industry worked more than the standard 40-hour workweek—about 26 percent worked 50 or more. For some professionals, evening or weekend work may be necessary to meet deadlines or solve problems. Professionals working for large establishments may have less freedom in planning their schedule than do consultants for very small firms, whose work may be more varied. Only about 3 percent of the workers in the software publishing industry worked part time, compared with 15 percent of workers throughout all industries.

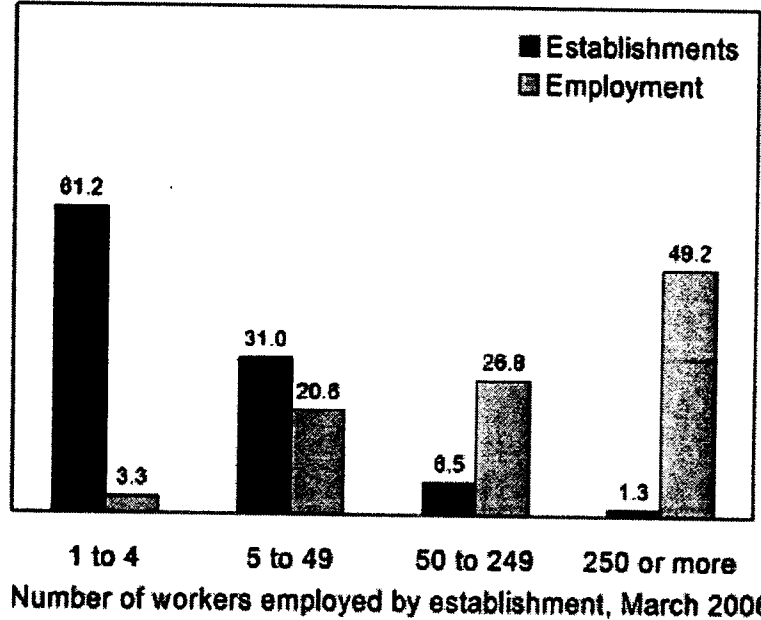
**Work environment.** Most workers in this industry work in clean, quiet offices. Given the technology available today, however, more work can be done from remote locations using fax machines, e-mail, and especially the Internet. Employees who work at video terminals for extended periods may experience musculoskeletal strain, eye problems, stress, or repetitive motion illnesses, such as carpal tunnel syndrome.

## **Employment**

In 2006, there were about 243,000 wage and salary jobs in the software publishing industry. While the industry has both large and small firms, the average establishment in software publishing is relatively small; more than half of the establishments employed fewer than 5 workers. Many of these small establishments are startup firms that hope to capitalize on a market niche. About 76 percent of jobs, however, are found in establishments that employ 50 or more workers (chart 1).

**Sixty percent of the establishments in software publishing employ fewer than 5 workers, but a few large establishments employ almost half of all workers.**

Percent



Relative to the rest of the economy, there are significantly fewer workers 45 years of age and older in software publishing establishments. This industry's workforce remains younger than most, with large proportions of workers in the 25-to-44 age range (table 1). This reflects the industry's explosive growth in employment in the 1980s and 1990s, which afforded opportunities to thousands of young workers who possessed the latest technical skills.

**Table 1. Percent distribution of employment, by age group, 2006**

Age group	Software publishers	All industries
<b>Total</b>	100.0%	100.0%
<b>16-19</b>	0.7	4.3
<b>20-24</b>	4.4	9.6
<b>25-34</b>	28.7	21.5
<b>35-44</b>	36.8	23.9
<b>45-54</b>	19.1	23.6
<b>55-64</b>	8.1	13.4
<b>65 and older</b>	2.2	3.7

### Occupations in the Industry

Providing a wide array of information services to clients requires a diverse and well-educated workforce. The majority of workers in the software publishing industry are professional and related workers, such as computer software engineers and computer programmers (table 2). This major occupational group accounts for about 61 percent of the jobs in the industry, reflecting the emphasis on high-level technical skills and creativity. By 2016, the employment share of professional and related occupations is expected to be even greater, while the employment share of office and administrative support jobs, currently accounting for about 11 percent of industry employment, is projected to fall.

**Professional and related occupations.** Computer specialists make up the vast majority of professional and related occupations among software publishers, and account for about 52 percent of the industry as a whole. Their duties vary substantially, and include such tasks as developing software applications, designing information networks, and assisting computer users.

**Programmers** write, test, and maintain the detailed instructions, called programs or software, that computers must follow to perform their functions. These programs tell the computer what to do—which information to identify and access, how to process it, and what equipment to use. Programmers write these commands by breaking down each operation into a logical sequence of steps, and converting the instructions for those steps into a language that the computer understands. While some still work with traditional programming languages like COBOL, most programmers today work with more sophisticated tools. Object-oriented programming languages, such as C++ and Java, computer-aided software engineering (CASE) tools, and artificial intelligence tools are now widely used to create and maintain programs. These languages and tools allow portions of code to be reused in programs that require similar routines. Many programmers also customize purchased software or create better software to meet a client's specific needs.

**Computer software engineers** design, develop, test, and evaluate software programs and systems. Although programmers write and support programs in new languages, much of the design and development now is the responsibility of software engineers or software developers. Software engineers must possess strong programming skills, but are more concerned with developing algorithms and analyzing and solving programming problems than with actually writing code. These professionals develop many types of software, including operating systems software, network distribution software, and a variety of applications software. Computer systems software engineers coordinate the construction and maintenance of a company's computer systems, and plan their future growth. They develop software systems for control and automation in manufacturing, business, and other areas. They research, design, and test operating system software, compilers—software that converts programs for faster processing—and network distribution software. Computer applications software engineers analyze users' needs and design, create, and modify general computer applications software or specialized utility programs. For example, video game programmers are software engineers who plan and write video game software.

**Computer support specialists** provide technical assistance, support, and advice to customers and users. This group of occupations includes workers with a variety of titles, such as technical support specialists and help-desk technicians. These troubleshooters interpret problems and provide technical support for software and systems. They answer telephone calls, analyze problems using automated diagnostic programs, and resolve difficulties encountered by users. Support specialists may work either within a company or other organization that uses computer software, or directly for a computer software vendor.

Other computer specialists include a wide range of professionals who specialize in operation, analysis, education, application, or design for a particular piece of the system. Many are involved in the design, testing, and evaluation of network systems such as local area networks (LAN), wide area networks (WAN), the Internet, and other data communications systems. Specialty occupations reflect an emphasis on client-server applications and end-user support; however, occupational titles shift rapidly to reflect new developments in technology.

**Sales and related occupations.** A growing number of marketing and sales workers also are employed in this industry. In order to compete successfully in the online world, the presentation and features of software and other content related to information technology becomes increasingly important. For example, publishers of software that provides connections to the Internet must be able to differentiate their products from those of their competitors. Marketing and sales workers are responsible for promoting and selling the products and services produced by the industry.

**Table 2. Employment of wage and salary workers in software publishers by occupation, 2006 and projected change, 2006-2016. (Employment in thousands)**

Occupation	Employment, 2006		Percent change, 2006-16
	Number	Percent	
All occupations	243	100.0	32.0
Management, business, and financial occupations	45	18.6	28.6

<b>General and operations managers</b>	5	2.1	15.9
<b>Marketing managers</b>	4	1.5	28.8
<b>Sales managers</b>	3	1.1	28.8
<b>Computer and information systems managers</b>	8	3.2	28.8
<b>Financial managers</b>	2	0.8	28.8
<b>Human resources, training, and labor relations specialists</b>	3	1.1	33.9
<b>Management analysts</b>	4	1.7	28.8
<b>Accountants and auditors</b>	4	1.6	28.8
<b>Professional and related occupations</b>	148	60.8	35.2
<b>Computer and information scientists, research</b>	3	1.2	41.6
<b>Computer programmers</b>	19	7.6	30.0
<b>Computer software engineers, applications</b>	37	15.2	54.5
<b>Computer software engineers, systems software</b>	21	8.8	41.6
<b>Computer support specialists</b>	21	8.6	15.9
<b>Computer systems analysts</b>	12	5.0	41.6
<b>Database administrators</b>	2	1.0	41.6
<b>Network and computer systems administrators</b>	5	2.1	41.6
<b>Network systems and data communications analysts</b>	3	1.2	73.8
<b>Engineers</b>	2	0.8	35.1
<b>Market research analysts</b>	5	2.2	28.8
<b>Multi-media artists and animators</b>	2	0.9	45.7
<b>Graphic designers</b>	1	0.5	28.8
<b>Public relations specialists</b>	1	0.5	28.8
<b>Technical writers</b>	3	1.3	28.8
<b>Sales and related occupations</b>	21	8.5	28.4
<b>Sales representatives, services</b>	3	1.2	42.1
<b>Sales representatives, wholesale and manufacturing, technical and scientific products</b>	9	3.7	28.8
<b>Sales representatives, wholesale and manufacturing, except technical and scientific products</b>	4	1.7	28.8
<b>Sales engineers</b>	1	0.4	28.8
<b>Telemarketers</b>	1	0.6	3.0
<b>Office and administrative support occupations</b>	26	10.6	24.2
<b>Bookkeeping, accounting, and auditing clerks</b>	3	1.2	28.8
<b>Customer service representatives</b>	5	1.9	41.6
<b>Executive secretaries and administrative assistants</b>	4	1.6	28.8
<b>Office clerks, general</b>	3	1.3	26.8

Note: Columns may not add to totals due to omission of occupations with small employment

## Training and Advancement

Occupations in the software publishing industry require varying levels of education, but in 2006, more than 8 in 10

workers held college degrees. The level of education and type of training required depend on the employer's needs, which often are affected by such things as local demand for workers, project timelines, and changes in technology and business conditions.

**Professional and related occupations.** Although there are no universal educational requirements for computer programmers, workers in this occupation commonly hold a bachelor's degree. Some hold a degree in computer science, mathematics, or information systems. Others have taken special courses in computer programming to supplement their study in fields such as accounting, inventory control, or other areas of business. Because employers' needs are varied, a 2-year degree or certificate may be sufficient for some positions so long as applicants possess the right technical skills. In addition, some employers seek applicants with technical or professional certification. Certification can be obtained independently through a number of organizations, although many vendors now assist employees in becoming certified.

Entry-level computer programmers usually start working with an experienced programmer to update existing code, generate lines of one portion of a larger program, or write relatively simple programs. They then advance to more difficult programming assignments, and may become project supervisors. With continued experience, they may move into management positions within their organizations. Many programmers who work closely with systems analysts advance to systems analyst positions.

Most computer software engineers have at least a bachelor's degree, in addition to broad knowledge and experience with computer systems and technologies. Common degree concentrations for applications software engineers include computer science and software engineering, and common degree concentrations for systems software engineers include computer science and computer information systems. Graduate degrees are preferred for some of the more complex software engineering jobs. Some employers also are seeking workers with additional knowledge and experience. For example, a computer software engineer interested in developing e-commerce applications should have some expertise in sales or finance. In addition, some employers are seeking applicants with technical or professional certification.

Computer software engineers who show leadership ability can become project managers or advance into management positions, such as manager of information systems or even chief information officer.

Persons interested in becoming a computer support specialist generally need only an associate's degree in a computer-related field, as well as significant hands-on experience with computers. They also must possess strong problem-solving, analytical, and communication skills, because troubleshooting and helping others are their main job functions. As technology continues to improve, computer support specialists must constantly strive to stay up to date and acquire new skills if they wish to remain in the field. One way to achieve this is through technical or professional certification.

Computer support specialists who develop expertise in a particular program or type of software can advance to a position as a programmer or software engineer.

**Sales and related occupations.** Many marketing and sales workers are able to secure entry-level jobs with little technical experience, and acquire knowledge of their company's products and services through on-the-job training. Computer specialists also have opportunities to move into sales positions as they gain knowledge of specific products and services. Computer programmers who write accounting software, for example, may use their specialized knowledge to sell such products to similar firms. Also, computer support specialists providing technical support for an operating system may eventually market that product, based on their experience and knowledge of the system.

## Outlook

Employment in the software publishing industry has more than doubled since 1990. As firms continue to invest heavily in information technology, and as the demand for specialized software rises, employment in software publishing is projected to increase by 32 percent from 2006 to 2016.

**Employment change.** Wage and salary jobs in software publishing are expected to increase by 32 percent between 2006 and 2016, nearly three times as fast as the 11 percent growth projected for all industries combined. Growth will not be as rapid as it was during the technology boom of the 1990s, however, as the software industry begins to mature



and as routine work is increasingly outsourced to workers in other countries.

Demand for software publishing services will grow as a result of an increasing reliance on information technology, combined with falling prices of computers and related hardware. Individuals and organizations will continue to invest in applications and systems software to maximize the return on their investments in equipment, and to fulfill their growing computing needs. Also, such investments usually continue even during economic downturns, because improved software boosts productivity, increases efficiency, and, in some cases, reduces the need for workers.

The growing reliance on the Internet will be a major driver of job growth. The way the Internet is used is constantly changing, and so is the software required to run the new and emerging computer applications. Electronic commerce, for example, has changed the way companies transact business. E-commerce is automating many steps in the transaction of business between companies, allowing firms to operate more efficiently. Businesses also are moving their supply networks online and developing online marketplaces. The sustained growth of electronic commerce, as well as the growing uses of intranets and extranets, will drive demand for increasingly sophisticated software tools geared towards these technologies. And, as the amount of electronic information stored and accessed continues to grow, new applications and security needs will increase demand for database software.

The proliferation of "mobile" technologies also has created demand for a wide variety of new products and services. For example, the expansion of the wireless Internet, known as WiFi, brings a new aspect of mobility to information technology by allowing people to stay connected to the Internet anywhere, anytime. As businesses and individuals become more dependent on this new technology, there will be an increased need for new software applications in order to maximize the potential of wireless products.

Another significant factor contributing to growth in software is computer security. Organizations invest heavily in software to protect their information and secure their systems from attack. And, as more individuals and organizations are conducting business electronically, the importance of maintaining computer system and network security will increase, leading to greater demand for security software.

Given the increasingly widespread use of information technology and the overall rate of growth expected for the industry, most occupations should grow very rapidly, although some faster than others. The most rapid job growth will occur among computer specialists—especially computer software engineers—as organizations continue to rely on software to maximize the return on their investments in equipment, and as individuals continue to use new and increasing amounts of software applications. Employment of computer programmers should continue to expand, but more slowly than that of other occupations, as more routine programming functions are automated, and as more programming services are outsourced offshore.

**Job prospects.** Job opportunities in software publishing should be excellent for most workers, given the rate at which the industry is expected to grow, and the increasing integration and application of software in all sectors of the economy. Professional workers should enjoy the best opportunities, reflecting employers' continuing demand for higher level skills to keep up with changes in technology. In addition, as individuals and organizations continue to conduct business electronically, the importance of maintaining system and network security will increase. Employment opportunities should be excellent for individuals involved in the development of security software

## Earnings

**Industry earnings.** Employees in the software publishing industry generally command higher earnings than the national average. All production or nonsupervisory workers in the industry averaged \$1,444 a week in 2006, significantly higher than the average of \$568 for all industries. This reflects the concentration of professionals and specialists who often are highly compensated for their skills or expertise. Given the pace at which technology advances in this industry, earnings can be driven by demand for specific skills or experience. Earnings in the occupations with the largest employment in software publishing appear in table 3.

**Table 3. Median hourly earnings of the largest occupations in software publishers, May 2006**

Occupation	Software publishers	All industries
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General and operations managers	\$61.09	\$40.97
Computer and information systems managers	54.26	48.84
Market research analysts	43.08	28.28
Computer software engineers, systems software	42.04	42.04
Computer software engineers, applications	40.66	38.36
Computer programmers	38.11	38.59
Computer systems analysts	35.45	33.54
Sales representatives, wholesale and manufacturing, technical and scientific products	34.39	30.98
Network and computer systems administrators	33.05	29.87
Computer support specialists	22.24	19.94

As one might expect, education and experience influence earnings as well. For example, hourly earnings of computer software engineers, applications ranged from less than \$25.17 for the lowest 10 percent to more than \$59.78 for the highest 10 percent in May 2006. Managers usually earn more because they have been on the job longer and are more experienced than their staffs, but their salaries also can vary by level and experience. For example, hourly earnings of computer and information systems managers ranged from less than \$35.30 for the lowest 10 percent to more than \$70.00 for the highest 10 percent in May 2006. Earnings also may be affected by size, location, and type of establishment, hours and responsibilities of the employee, and level of sales.

**Benefits and union membership.** Workers generally receive standard benefits, including health insurance, paid vacation and sick leave, and pension plans. Unionization is rare in the software publishing industry. In 2006, virtually no workers were union members or covered by union contracts, compared with 13 percent of workers throughout private industry.

### Sources of Additional Information

#### Disclaimer:

Links to non-BLS Internet sites are provided for your convenience and do not constitute an endorsement.

Further information about computer careers is available from:

- Association for Computing Machinery, 2 Penn Plaza, Suite 701, New York, NY 10121-0701. Internet: <http://www.acm.org>
- National Workforce Center for Emerging Technologies, 3000 Landerholm Circle SE., Bellevue, WA 98007. Internet: <http://www.nwcet.org>

Information on the certified software development professional program can be found at:

- Institute of Electrical and Electronics Engineers Computer Society, Headquarters Office, 1730 Massachusetts Ave. NW., Washington, DC 20036-1992. Internet: <http://www.computer.org/certification>
- University of Washington Computer Science and Engineering Department, AC101 Paul G. Allen Center, Box 352350, 185 Stevens Way, Seattle, WA 98195-2350. Internet: <http://www.cs.washington.edu/WhyCSE/>

Information on the following occupations can be found in the 2008-09 *Occupational Outlook Handbook*:

- [Computer and information systems managers](#)
- [Computer programmers](#)
- [Computer scientists and database administrators](#)
- [Computer software engineers](#)
- [Computer support specialists and systems administrators](#)

- Computer systems analysts

## NAICS Codes

5112

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