

FREE Special Report:
Job Growth, Salaries
Bright for
Computer-Related
Jobs

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Job Growth, Salaries Bright for Computer-Related Jobs

Labor Department Sees IS, IT Job Prospects Hot; Reports Earnings by Occupational Category

The U.S. Department of Labor has found some of the most common computer-related career fields among the fastest growing occupations in the job market. During the first decade of the 21st century persons in these career fields can expect to be sought after by major corporations and educational institutions, as well as the U.S. government.

In a recent report, DoL said that as organizations acquire more and more sophisticated technology the need will rise for new college grads and experienced technology workers. DoL focused on these broad categories of computer workers: support specialists; programmers; software engineers; operations research analysts; systems analysts, computer scientists and database administrators; computer and information systems managers, and support specialists and system administrators.

There are many thousands of federal employees working in the kinds of jobs DoL surveyed. Often they don't have any idea of what workers in similar jobs on the outside are earning. We took a close look at what the department had to say and culled out information that suggests how fast these jobs are expected to increase during the decade – paying close attention to average salaries.

In addition, DoL found that establishments in many industries, including printing and publishing, wholesale trade, depository institutions, business services, health services and social services industries, are employing computer managers, network administrators, information systems managers and information network managers. They are responsible for overseeing the installation, configuration and maintenance of both software and hardware in a local area network (LAN), wide area network (WAN), or Internet/Intranet system. Computer managers monitor network use to ensure adequate computer services are available to all users. Their duties may include keeping the computer network secure.

Though DoL didn't say so, the news is full of reports that point to computer security as a rapidly growing area post-9/11, as well.

Thus, virtually all computer fields are experiencing increased demand.

This comes as the federal government is looking for ways to contract out its work to the private sector, which could lead to layoffs among civil service workers. It pays to know what's happening on the outside in case the prospect of RIFs rise at your workplace.

We reviewed much of what DoL said about computer-related career fields and focused on two main considerations – Job Outlook and Earnings – the bottom line for most people trying to get ahead in the job market or simply to protect their livelihood in the face of layoffs. To find out what employees in comparable jobs generally are making in private sector occupational groups, see pertinent portions of DoL’s findings below. (Note: The latest earnings information in the report is for the year 2000. There likely has been some upward dollar movement since.)

Computer Support Specialists

Job Outlook

Computer support specialists and systems administrators are projected to be among the fastest growing occupations over the 2000-10 period.

Employment is expected to increase much faster than the average for all occupations as organizations continue to adopt and integrate increasingly sophisticated technology. Job growth will continue to be driven by rapid gains in computer and data processing services, which is projected to be the fastest growing industry in the U.S. economy.

The falling prices of computer hardware and software should help businesses expand their computing applications and integrate new technology into their operations. To maintain a competitive edge and operate more efficiently, firms will continue to demand computer specialists who are knowledgeable about the latest technologies and able to apply them to meet the needs of the organization.

Demand for computer support specialists is expected to increase because of the rapid pace of improved technology. As computers and software become more complex, support specialists will be needed to provide technical assistance to customers and other users. Consulting opportunities for computer support specialists also should continue to grow as businesses increasingly need help managing, upgrading, and customizing more complex computer systems.

Demand for systems administrators will grow as a result of the upsurge in electronic commerce and as computer applications continue to expand. Companies are looking for workers knowledgeable in the function and administration of networks. Such employees have become increasingly hard to find as systems administration has moved from being a separate function within corporations to one which forms a crucial element of business in an increasingly high-technology economy.

The growth of electronic commerce means more establishments use the Internet to conduct their business online. This translates into a need for information technology specialists who can help organizations use technology to communicate with employees, clients, and consumers. Explosive growth in these areas also is expected to fuel demand for specialists knowledgeable about network, data, and communications security.

Job prospects should be best for college graduates who are up to date with the latest skills and technologies, particularly if they have supplemented their formal education with some relevant work experience. Employers will continue to seek computer specialists who possess a strong background in fundamental computer skills

combined with good interpersonal and communication skills. Due to the rapid growth in demand for computer support specialists and systems administrators, those who have strong computer skills but do not have a bachelor's degree should continue to qualify for some entry-level positions. However, certifications and practical experience are essential for persons without degrees.

Earnings

Median annual earnings of computer support specialists were \$36,460 in 2000. The middle 50 percent earned between \$27,680 and \$48,440. The lowest 10 percent earned less than \$21,260, and the highest 10 percent earned more than \$63,480. Median annual earnings in the industries employing the largest numbers of computer support specialists in 2000 were:

Professional and commercial equipment	\$42,970
Computer and data processing services	37,860
Personnel supply services	34,080
Colleges and universities	32,830
Miscellaneous business services	21,070

Median annual earnings of network and computer systems administrators were \$51,280 in 2000. The middle 50 percent earned between \$40,450 and \$65,140. The lowest 10 percent earned less than \$32,450, and the highest 10 percent earned more than \$81,150. Median annual earnings in the industries employing the largest number of network and computer systems administrators in 2000 were:

Computer and data processing services	\$54,400
Telephone communication	52,620
Management and public relations	51,340
Elementary and secondary schools	45,450
Colleges and universities	44,010

According to Robert Half International, starting salaries in 2001 ranged from \$30,500 to \$56,000 for help-desk support staff, and from \$48,000 to \$61,000 for more senior technical support specialists. For systems administrators, starting salaries in 2001 ranged from \$50,250 to \$70,750.

Computer Programmers

Job Outlook

Employment of programmers is expected to grow about as fast as the average for all occupations through 2010. Jobs for both systems and applications programmers should be most plentiful in data processing service firms, software houses, and computer consulting businesses. These types of establishments are part of computer and data processing services, which is projected to be the fastest growing industry in

the economy over the 2000-10 period. As organizations attempt to control costs and keep up with changing technology, they will need programmers to assist in conversions to new computer languages and systems. In addition, numerous job openings will result from the need to replace programmers who leave the labor force or transfer to other occupations such as manager or systems analyst.

Employment of programmers, however, is expected to grow much slower than that of other computer specialists. With the rapid gains in technology, sophisticated computer software now has the capability to write basic code, eliminating the need for more programmers to do this routine work. The consolidation and centralization of systems and applications, developments in packaged software, advanced programming languages and tools, and the growing ability of users to design, write, and implement more of their own programs means more of the programming functions can be transferred to other types of workers. As the level of technological innovation and sophistication increases, programmers should continue to face increasing competition from programming businesses overseas where much routine work can be contracted out at a lower cost.

Nevertheless, employers will continue to need programmers who have strong technical skills and who understand an employer's business and its programming needs. This will mean that programmers will need to keep up with changing programming languages and techniques. Given the importance of networking and the expansion of client/server environments and web-based environments, organizations will look for programmers who can support data communications and help implement electronic commerce and intranet strategies. Demand for programmers with strong object-oriented programming capabilities and technical specialization in areas such as client/server programming, multimedia technology, and graphic user interface (GUI), should arise from the expansion of intranets, extranets, and Internet applications. Programmers also will be needed to create and maintain expert systems and embed these technologies in more and more products.

As programming tasks become increasingly sophisticated and an additional level of skill and experience is demanded by employers, graduates of 2-year programs and people with less than a 2-year degree or its equivalent in work experience should face strong competition for programming jobs. Competition for entry-level positions, however, also can affect applicants with a bachelor's degree. Prospects should be best for college graduates with knowledge of, and experience working with, a variety of programming languages and tools—including C++ and other object-oriented languages like Java, as well as newer, domain-specific languages that apply to computer networking, data base management, and Internet application development. Obtaining vendor or language specific certification also can provide a competitive edge. Because demand fluctuates with employers' needs, job seekers should keep up to date with the latest skills and technologies. Individuals who want to become programmers can enhance their prospects by combining the appropriate formal training with practical work experience.

Earnings

Median annual earnings of computer programmers were \$57,590 in 2000. The middle 50 percent earned between \$44,850 and \$74,500 a year. The lowest 10 percent earned less than \$35,020; the highest 10 percent earned more than

\$93,210. Median annual earnings in the industries employing the largest numbers of computer programmers in 2000 were:

Personnel supply services	\$65,780
Professional and commercial equipment	63,780
Computer and data processing services	61,010
Commercial banks	60,180
Management and public relations	57,120

According to the National Association of Colleges and Employers, starting salary offers for graduates with a bachelor's degree in computer programming averaged \$48,602 a year in 2001.

According to Robert Half International, average annual starting salaries in 2001 ranged from \$58,500 to \$90,000 for applications development programmers/developers, and from \$54,000 to \$77,750 for software development programmers/analysts. Average starting salaries for Internet programmers/analysts ranged from \$56,500 to \$84,000.

Computer Software Engineers

Job Outlook

Computer software engineers are projected to be the fastest growing occupation from 2000 to 2010. Very rapid employment growth in the computer and data processing services industry, which employs the greatest numbers of computer software engineers, should result in very favorable opportunities for those college graduates with at least a bachelor's degree in computer engineering or computer science and practical experience working with computers. Employers will continue to seek computer professionals with strong programming, systems analysis, interpersonal, and business skills.

Employment of computer software engineers is expected to increase much faster than the average for all occupations as businesses and other organizations continue to adopt and integrate new technologies and seek to maximize the efficiency of their computer systems. Competition among businesses will continue to create an incentive for increasingly sophisticated technological innovations, and organizations will need more computer software engineers to implement these new technological changes. In addition to employment growth, many job openings will result annually from the need to replace workers who move into managerial positions, transfer to other occupations, or who leave the labor force.

Demand for computer software engineers will increase as computer networking continues to grow. For example, the expanding integration of Internet technologies and the explosive growth in electronic commerce-doing business on the Internet-have resulted in rising demand for computer software engineers who can develop Internet, intranet, and other web applications. Likewise, expanding electronic data processing systems in business, telecommunications, government, and other settings continue to become more sophisticated and complex. Growing numbers of systems

software engineers will be needed to implement, safeguard, and update systems and resolve problems. Consulting opportunities for computer software engineers also should continue to grow as businesses increasingly need help to manage, upgrade, and customize their increasingly complex computer systems.

Earnings

Median annual earnings of computer software engineers, applications, who worked full time in 2000 were about \$67,670. The middle 50 percent earned between \$53,390 and \$85,490. The lowest 10 percent earned less than \$42,710, and the highest 10 percent earned more than \$106,680. Median annual earnings in the industries employing the largest numbers of computer applications software engineers in 2000 were:

Computer and office equipment	\$74,300
Computer and data processing services	69,520
Engineering and architectural services	68,790
Professional and commercial equipment	64,920
Management and public relations	62,660

Median annual earnings of computer software engineers, systems software, who worked full time in 2000 were about \$69,530. The middle 50 percent earned between \$54,460 and \$86,520. The lowest 10 percent earned less than \$43,600, and the highest 10 percent earned more than \$105,240. Median annual earnings in the industries employing the largest numbers of computer systems software engineers in 2000 were:

Computer and office equipment	\$74,600
Computer and data processing services	70,150
Telephone communication	68,930
Engineering and architectural services	68,030
Commercial banks	65,620

According to the National Association of Colleges and Employers, starting salary offers for graduates with a bachelor's degree in computer engineering averaged \$53,924 in 2001, and those with a master's degree averaged \$58,026. Starting salary offers for graduates with a bachelor's degree in computer science averaged \$52,723.

According to Robert Half International, starting salaries for software engineers in software development ranged from \$62,750 to \$92,000 in 2001.

In addition to typical benefits, computer software engineers may be provided with profit sharing, stock options, and a company car with a mileage allowance.

Operations Research Analyst

Job Outlook

Employment of operations research analysts is expected to grow more slowly than the average for all occupations through 2010, because few job openings in this field are expected to have the title *operations research analyst*. Job opportunities in operations research should be good, however, because of interest in improving productivity, effectiveness, and competitiveness, and because of the extensive availability of data, computers, and software. Many jobs in operations research have other titles such as *operations analyst, management analyst, systems analyst, or policy analyst*. Individuals who hold a master's or Ph.D. degree in operations research, management science, or a closely related field should find good job opportunities as the number of openings generated by employment growth and the need to replace those leaving the occupation is expected to exceed the number of persons graduating with these credentials.

Organizations today face pressure from growing domestic and international competition and must work to make their operations as effective as possible. As a result, businesses will increasingly rely on operations research analysts to optimize profits by improving productivity and reducing costs. As new technology is introduced into the marketplace, operations research analysts will be needed to determine how to utilize the technology in the best way.

Opportunities for operations research analysts exist in almost every industry because of the diversity of applications for their work. However, opportunities should be especially good in highly competitive industries, such as manufacturing, transportation, and telecommunications, and finance. As businesses and government agencies continue to contract out jobs to cut costs, many operations research analysts also will find opportunities as consultants, either working for a consulting firm or setting up their own practice. Opportunities in the military also exist, but will depend on the size of future military budgets. As the military develops new weapons systems and strategies, military leaders will rely on operations research analysts to test and evaluate their accuracy and effectiveness.

Earnings

Median annual earnings of operations research analysts were \$53,420 in 2000. The middle 50 percent earned between \$40,530 and \$70,790. The lowest 10 percent had earnings of less than \$31,860, while the highest 10 percent earned more than \$88,870. In 2000, median annual earnings in the industries employing the largest numbers of operations research analysts were:

Computer and data processing services	\$65,420
Federal Government	62,990
Aircraft and parts	52,960
Engineering and architectural services	47,480

The average annual salary for operations research analysts in the Federal Government in nonsupervisory, supervisory, and managerial positions was \$77,730 in 2001.

Systems Analysts, Computer Scientists, and Database Administrators

Job Outlook

Systems analysts, computers scientists, and database administrators are expected to be the among the fastest growing occupations through 2010. Employment of these computer specialists is expected to increase much faster than the average for all occupations as organizations continue to adopt and integrate increasingly sophisticated technologies. Growth will be driven by very rapid growth in computer and data processing services, which is projected to be the fastest growing industry in the U.S. economy. In addition, many job openings will arise annually from the need to replace workers who move into managerial positions or other occupations or who leave the labor force.

The demand for networking to facilitate the sharing of information, the expansion of client/server environments, and the need for computer specialists to use their knowledge and skills in a problem-solving capacity will be major factors in the rising demand for systems analysts, computer scientists, and database administrators. Moreover, falling prices of computer hardware and software should continue to induce more businesses to expand computerized operations and integrate new technologies. In order to maintain a competitive edge and operate more efficiently, firms will continue to demand computer specialists who are knowledgeable about the latest technologies and are able to apply them to meet the needs of businesses.

Increasingly, more sophisticated and complex technology is being implemented across all organizations, which should fuel the demand for these computer occupations. There is a growing demand for system analysts to help firms maximize their efficiency using available technology. The explosive growth in electronic commerce-doing business on the Internet-and the continuing need to build and maintain databases that store critical information on customers, inventory, and projects is fueling demand for database administrators familiar with the latest technology.

The development of new technologies usually leads to demand for various workers. The expanding integration of Internet technologies by businesses, for example, has resulted in a growing need for specialists who can develop and support Internet and intranet applications. The growth of electronic commerce means more establishments use the Internet to conduct their business online. This translates into a need for information technology professionals who can help organizations use technology to communicate with employees, clients, and consumers. Explosive growth in these areas also is expected to fuel demand for specialists knowledgeable about network, data, and communications security.

As technology becomes more sophisticated and complex, employers demand a higher level of skill and expertise. Individuals with an advanced degree in computer science, computer engineering, or an MBA with a concentration in information

systems should enjoy very favorable employment prospects. College graduates with a bachelor's degree in computer science, computer engineering, information science, or management information systems also should enjoy favorable prospects for employment, particularly if they have supplemented their formal education with practical experience. Because employers continue to seek computer specialists who can combine strong technical skills with good interpersonal and business skills, graduates with non-computer science degrees but who have had courses in computer programming, systems analysis, and other information technology areas, also should continue to find jobs in these computer fields. In fact, individuals with the right experience and training can work in these computer occupations regardless of their college major or level of formal education.

Earnings

Median annual earnings of computer systems analysts were \$59,330 in 2000. The middle 50 percent earned between \$46,980 and \$73,210 a year. The lowest 10 percent earned less than \$37,460, and the highest 10 percent earned more than \$89,040. Median annual earnings in the industries employing the largest numbers of computer systems analysts in 2000 were:

Computer and data processing services	\$64,110
Professional and commercial equipment	63,530
Federal Government	59,470
Local Government	52,490
State Government	51,230

Median annual earnings of database administrators were \$51,990 in 2000. The middle 50 percent earned between \$38,210 and \$71,440. The lowest 10 percent earned less than \$29,400, and the highest 10 percent earned more than \$89,320. In 2000, median annual earnings of database administrators employed in computer and data processing services were \$63,710, and in telephone communication, \$52,230.

Median annual earnings of network systems and data communication analysts were \$54,510 in 2000. The middle 50 percent earned between \$42,310 and \$69,970. The lowest 10 percent earned less than \$33,360, and the highest 10 percent earned more than \$88,620. Median annual earnings in the industries employing the largest numbers of network systems and data communications analysts in 2000 were:

Management and public relations	\$60,260
Commercial banks	59,910
Computer and data processing services	59,160
Telephone communications	51,780
State Government	42,000

Median annual earnings of computer and information scientists, research, were \$70,590 in 2000. The middle 50 percent earned between \$54,700 and \$89,990. The lowest 10 percent earned less than \$41,390, and the highest 10 percent earned

more than \$113,510. Median annual earnings of computer and information scientists employed in computer and data processing services in 2000 were \$71,940.

Median annual earnings of all other computer specialists were \$50,590 in 2000. Median annual earnings of all other computer specialists employed in computer and data processing services were \$51,970, and in professional and commercial equipment, \$80,270 in 2000.

According to the National Association of Colleges and Employers, starting offers for graduates with a master's degree in computer science averaged \$61,453 in 2001. Starting offers for graduates with a bachelor's degree in computer science averaged \$52,723; in computer programming, \$48,602; in computer systems analysis, \$45,643; in information sciences and systems, \$45,182; and in management information systems, \$45,585.

According to Robert Half International, starting salaries in 2001 ranged from \$72,500 to \$105,750 for database administrators. Salaries for Internet-related occupations ranged from \$58,000 to \$82,500 for webmasters and \$56,250 to \$76,750 for Internet/Intranet developers.

Computer and Information Systems Managers

Job Outlook

Employment of computer and information systems managers is expected to **increase much faster than the average** for all occupations through the year 2010. Technological advancements will increase the employment of computer-related workers; as a result, the demand for managers to direct these workers also will increase. In addition, job openings will result from the need to replace managers who retire or move into other occupations. Opportunities for obtaining a management position will be best for workers possessing an MBA with technology as a core component, advanced technical knowledge, and strong communication and administrative skills.

Rapid growth in employment can be attributed to the explosion in information technology and the fast-paced expansion of the computer and data processing services industry. In order to remain competitive, firms will continue to install sophisticated computer networks and set up more complex Internet and intranet sites. Keeping a computer network running smoothly is essential to almost every organization. Firms will be more willing to hire managers who can accomplish that.

The security of computer networks will continue to increase in importance as more business is conducted over the Internet. Organizations need to understand how their systems are vulnerable and how to protect their infrastructure and Internet sites from hackers, viruses, and other acts of cyber-terrorism. As a result, there will be a high demand for managers proficient in computer security issues.

Due to the explosive growth of electronic commerce and the ability of the Internet to create new relationships with customers, the role of computer and information systems managers will continue to evolve in the future. They will continue to become more vital to their companies and the environments in which they work. The

expansion of e-commerce will spur the need for computer and information systems managers with both business savvy and technical proficiency.

Opportunities for those who wish to become computer and information systems managers should be closely related to the growth of the occupations they supervise and the industries in which they are found.

Earnings

Earnings for computer and information systems managers vary by specialty and level of responsibility. Median annual earnings of these managers in 2000 were \$78,830. The middle 50 percent earned between \$59,640 and \$100,820. The lowest 10 percent earned less than \$44,090, and the highest 10 percent earned more than \$127,460. Median annual earnings in the industries employing the largest numbers of computer and information systems managers in 2000 were:

Professional and commercial equipment	\$92,270
Computer and data processing services	88,410
Commercial banks	82,490
Management and public relations	73,930
Colleges and universities	64,460

According to Robert Half International Consulting, average starting salaries in 2001 for high-level information technology managers ranged from \$92,250 to \$152,500. According to a 2001 survey by the National Association of Colleges and Employers, starting salary offers for those with an MBA, a technical undergraduate degree, and 1 year or less of experience averaged \$61,196; for those with a master's degree in management information systems/business data processing, \$57,225.

In addition, computer and information systems managers, especially those at higher levels, often receive more benefits-such as expense accounts, stock option plans, and bonuses-than do nonmanagerial workers in their organizations.

Computer Support Specialists and Systems Administrators

Job Outlook

Computer support specialists and systems administrators are projected to be among the fastest growing occupations over the 2000-10 period.

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maintain a competitive edge and operate more efficiently, firms will continue to demand computer specialists who are knowledgeable about the latest technologies and able to apply them to meet the needs of the organization.

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