Computer Systems Analysts

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Significant Points

- Employers generally prefer applicants who have at least a bachelor's degree in computer science, information science, or management information systems (MIS).
- Employment is expected to increase much faster than the average and more new jobs are expected to arise than in all but a few other occupations.
- Very good job prospects are expected as organizations continue to adopt increasingly sophisticated technologies.

Nature of the Work

All organizations rely on computer and information technology to conduct business and operate efficiently. Computer systems analysts help organizations to use technology effectively and to incorporate rapidly changing technologies into their existing systems. The work of computer systems analysts evolves rapidly, reflecting new areas of specialization and changes in technology.

Computer systems analysts solve computer problems and use computer technology to meet the needs of an organization. They may design and develop new computer systems by choosing and configuring hardware and software. They may also devise ways to apply existing systems' resources to additional tasks. Most systems analysts work with specific types of computer systems—for example, business, accounting, or financial systems or scientific and engineering systems—that vary with the kind of organization. Analysts who specialize in helping an organization select the proper system software and infrastructure are often called *system architects*. Analysts who specialize in developing and fine-tuning systems often are known as *systems designers*.

To begin an assignment, systems analysts consult managers and users to define the goals of the system. Analysts then design a system to meet those goals. They specify the inputs that the system will access, decide how the inputs will be processed, and format the output to meet users' needs. Analysts use techniques such as structured analysis, data modeling, information engineering, mathematical model building, sampling, and cost accounting to make sure their plans are efficient and complete. They also may prepare cost-benefit and return-on-investment analyses to help management decide whether implementing the proposed technology would be financially feasible.

When a system is approved, systems analysts determine what computer hardware and software will be needed to set it up. They coordinate tests and observe the initial use of the system to ensure that it performs as planned. They prepare specifications, flow charts, and process diagrams for computer programmers to follow; then they work with programmers to "debug," or eliminate errors, from the system. Systems analysts who do more in-depth testing may be called *software quality assurance analysts*. In addition to running tests, these workers diagnose

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problems, recommend solutions, and determine whether program requirements have been met.

In some organizations, *programmer-analysts* design and update the software that runs a computer. They also create custom applications tailored to their organization's tasks. Because they are responsible for both programming and systems analysis, these workers must be proficient in both areas. (A separate section on computer programmers appears elsewhere in the *Handbook*.) As this dual proficiency becomes more common, analysts are increasingly working with databases, object-oriented programming languages, client–server applications, and multimedia and Internet technology.

One challenge created by expanding computer use is the need for different computer systems to communicate with each other. Systems analysts work to make the computer systems within an organization, or across organizations, compatible so that information can be shared. Many systems analysts are involved with these "networking" tasks, connecting all the computers internally, in an individual office, department, or establishment, or externally, as when setting up e-commerce networks to facilitate business among companies.

Work environment. Computer systems analysts work in offices or laboratories in comfortable surroundings. They usually work about 40 hours a week—about the same as many other professional or office workers. Evening or weekend work may be necessary, however, to meet deadlines or solve specific problems. Many analysts telecommute, using computers to work from remote locations.

Like other workers who spend long periods typing on a computer, computer systems analysts are susceptible to eyestrain, back discomfort, and hand and wrist problems such as carpal tunnel syndrome or cumulative trauma disorder.

Training, Other Qualifications, and Advancement

Training requirements for computer systems analysts vary depending on the job, but many employers prefer applicants who have a bachelor's degree. Relevant work experience also is very important. Advancement opportunities are good for those with the necessary skills and experience.

Education and training. When hiring computer systems analysts, employers usually prefer applicants who have at least a bachelor's degree. For more technically complex jobs, people with graduate degrees are preferred.

The level and type of education that employers require reflects changes in technology. Employers often scramble to find workers capable of implementing the newest technologies. Workers with formal education or experience in information security, for example, are currently in demand because of the growing use of computer networks, which must be protected from threats.

For jobs in a technical or scientific environment, employers often seek applicants who have at least a bachelor's degree in a technical field, such as computer science, information science, applied mathematics, engineering, or the physical sciences. For jobs in a business environment, employers often seek applicants with at least a bachelor's degree in a business-related field such as management information systems (MIS). Increasingly, employers are seeking individuals who have a master's degree in business administration (MBA) with a concentration in information systems.

Despite the preference for technical degrees, however, people who have degrees in other majors may find employment as systems analysts if they also have technical skills. Courses in computer science or related subjects combined with practical experience can qualify people for some jobs in the occupation.

Employers generally look for people with expertise relevant to the job. For example, systems analysts who wish to work for a bank should have some expertise in finance, and systems analysts who wish to work for a hospital should have some knowledge of health management.

Technological advances come so rapidly in the computer field that continuous study is necessary to remain competitive. Employers, hardware and software vendors, colleges and universities, and private training institutions offer continuing education to help workers attain the latest skills. Additional training may come from professional development seminars offered by professional computing societies.

Other qualifications. Employers usually look for people who have broad knowledge and experience related to computer systems and technologies, strong problemsolving and analytical skills, and the ability to think logically. In addition, because they often deal with a number of tasks simultaneously, the ability to concentrate and pay close attention to detail is important. Although these workers sometimes work independently, they frequently work in teams on large projects. Therefore, they must have good interpersonal skills and be able to communicate effectively with computer personnel, users, and other staff who may have no technical background.

Advancement. With experience, systems analysts may be promoted to senior or lead systems analyst. Those who possess leadership ability and good business skills also can become computer and information systems managers or can advance into other management positions such as manager of information systems or chief information officer. Those with work experience and considerable expertise in a particular subject or application may find lucrative opportunities as independent consultants, or may choose to start their own computer consulting firms.

Employment

Computer systems analysts held about 504,000 jobs in 2006. Although they are increasingly employed in every sector of the economy, the greatest concentration of these workers is in the computer systems design and related services industry. Computer systems analysts are also employed by governments; insurance companies; financial institutions; hospitals; management, scientific, and technical consulting services firms; data processing services firms; professional and commercial equipment wholesalers; universities; and management of companies and enterprises.

A growing number of systems analysts are employed on a temporary or contract basis; many of these individuals are self-employed, working independently as contractors or consultants. About 29,000 computer systems analysts were self-employed in 2006.

Job Outlook

Employment is expected to grow much faster than the average for all occupations. As a result of this rapid growth, job prospects should be very good.

Employment change. Employment of computer systems analysts is expected to grow by 29 percent from 2006 to 2016, which is much faster than the average for all occupations. In addition, the 146,000 new jobs that are expected to arise over the projections decade will be substantial. Demand for these workers will increase as organizations continue to adopt and integrate increasingly sophisticated technologies. Job growth will not be as rapid as during the preceding decade, however, as the information technology sector matures and as routine work is increasingly outsourced offshore to foreign countries with lower prevailing wages.

The growth of electronic commerce and the integration of Internet technologies into business have resulted in a growing need for specialists who can develop and support Internet and intranet applications. Moreover, falling prices of computer hardware and software should continue to induce more businesses to expand their computerized operations and incorporate new technologies.

The demand for computer networking within organizations will also drive demand for computer systems analysts. The introduction of the wireless Internet, known as WiFi, and of personal mobile computers has created a need for new systems that can integrate these technologies into existing networks. Explosive growth in these areas is expected to fuel demand for analysts who are knowledgeable about systems integration and network, data, and communications security.

Projections data from the National Employment Matrix

Occupational Title	SOC Code	Employment, 2006	Projected employment, 2016	Change, 2006-2016	
				Number	Percent
Computer systems analysts	15-1051	504,000	650,000	146,000	29

NOTE: Data in this table are rounded. See the discussion of the employment projections table in the *Handbook* introductory chapter on *Occupational Information Included in the Handbook*.

As more sophisticated and complex technology is implemented across all organizations, demand for systems analysts will remain strong. These workers will be called upon to solve problems and to integrate new technologies with existing ones. Also, the increasing importance being placed on "cyber-security"—the protection of electronic information—will result in a need for workers skilled in information security.

As with other information technology jobs, employment growth may be tempered somewhat as some computer systems analyst jobs are outsourced offshore. Firms may look to cut costs by shifting operations to foreign countries with lower prevailing wages and highly educated workers who have strong technical skills.

Job prospects. Job prospects should be very good. Job openings will occur as a result of strong job growth and from the need to replace workers who move into managerial positions or other occupations, or who leave the labor force. As technology becomes more sophisticated and complex, employers demand a higher level of skill and expertise from their employees. Individuals with an advanced degree in computer science or computer engineering or with an MBA with a concentration in information systems should have the best prospects. College graduates with a bachelor's degree in computer science, computer engineering, information science, or management information systems also should enjoy very good prospects, 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 who have had courses in computer programming, systems analysis, and other information technology subjects also should continue to find jobs in computer fields.

Earnings

Median annual earnings of wage-and-salary computer systems analysts were $69,760 in May 2006. The middle 50 percent earned between $54,320 and $87,600 a year. The lowest 10 percent earned less than $42,780, and the highest 10 percent earned more than $106,820. Median annual earnings in the industries employing the largest numbers of computer systems analysts in May 2006 were:

Professional and commercial equipment and supplies merchant wholesalers	$81,080
Computer systems design and related services	71,680
Management of companies and enterprises	71,090
Insurance carriers	69,990
State government	61,340

According to the National Association of Colleges and Employers, starting offers for graduates with a bachelor's degree in computer science averaged $53,396. Starting offers for graduates with a bachelor's degree in information sciences and systems averaged $50,852. For those with a degree in management information systems/business data processing, starting offers averaged $47,648.

According to Robert Half Technology, starting salaries for systems analysts ranged from $64,000 to $87,000 in 2007. Starting salaries for business systems analysts ranged from $61,250 to $86,500. Starting salaries for developer/programmer analysts ranged from $55,250 to $90,250.

Related Occupations

Other workers who use computers extensively and who use logic and creativity to solve business and technical problems include computer programmers, computer software engineers, computer and information systems managers, engineers, mathematicians, statisticians, operations research analysts, management analysts, and actuaries.

Sources of Additional Information

Further information about computer careers is available from:

➤ Association for Computing Machinery (ACM), 2 Penn Plaza, Suite 701,New York, NY 10121-0701.
Internet: **http://www.acm.org**

➤ Institute of Electrical and Electronics Engineers Computer Society, Headquarters Office, 1730 Massachusetts Ave. NW., Washington, DC 20036-1992.
Internet: **http://www.computer.org**

➤ National Workforce Center for Emerging Technologies, 3000 Landerholm Circle SE., Bellevue, WA 98007.
Internet: **http://www.nwcet.org**

➤ 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**