

Market Highlight Report

Computer Software Engineers Winter 2011

General Overview

Computer software engineers design and develop software. They apply the theories and principles of computer science and mathematical analysis to create, test, and evaluate the software applications and systems that make computers work. The tasks performed by these workers evolve quickly, reflecting changes in technology and new areas of specialization, as well as the changing practices of employers.

Software engineers design and develop many types of software, including computer games, business applications, operating systems, network control systems, and middleware (an intermediate software that connects various computerized components and their applications). They must be experts in the theory of computing systems, the structure of software, and the nature and limitations of hardware to ensure that the underlying systems will work properly.

Computer software engineers begin by analyzing users' needs, and then design, test, and develop software to meet those needs. During this process they create flowcharts, diagrams, and other documentation, and may also create the detailed sets of instructions, called algorithms, that actually tell the computer what to do.

Computer software engineers can generally be divided into two categories: applications engineers and systems engineers. Computer applications software engineers analyze end users' needs and design, construct, deploy, and maintain general computer applications software or specialized utility programs. These workers use different programming languages, depending on the purpose of the program and the environment in which the program runs. The programming languages most often used are C, C++, Java, and Python. Some software engineers develop packaged computer applications, but most create or adapt customized applications for business and other organizations. Some of these workers also develop databases.

Computer systems software engineers coordinate the construction, maintenance, and expansion of an organization's computer systems. Working with the organization, they coordinate each department's computer needs—ordering, inventory, billing, and payroll recordkeeping, for example—and make suggestions about its technical direction. They also might set up the organization's intranets—networks that link computers within the organization and ease communication among various departments. Often, they are also responsible for the design and implementation of system security and data assurance.

Systems software engineers also work for companies that configure, implement, and install the computer systems of other organizations. These workers may be members of the marketing or sales staff, serving as the primary technical resource for sales workers, or providing logistical and technical support. Since the selling of complex computer systems often requires substantial customization to meet the needs of the purchaser, software engineers help to identify and explain needed changes. In addition, systems software engineers are responsible for ensuring security across the systems they are configuring.

Education and Training

For software engineering positions, most employers prefer applicants who have at least a bachelor's degree and broad knowledge of, and experience with, a variety of computer systems and technologies. The usual college majors for applications software engineers are computer science, software engineering, or mathematics. Systems software engineers often study computer science or computer information systems. Graduate degrees are preferred for some of the more complex jobs.

Many programmers require a bachelor's degree, but a 2-year degree or certificate may be adequate for some positions. Some computer programmers hold a college degree in computer science, mathematics, or information systems, whereas others have taken special courses in computer programming to supplement their degree in a field such as accounting, finance, or another area of business.

Employers who use computers for scientific or engineering applications usually prefer college graduates who have a degree in computer or information science, mathematics, engineering, or the physical sciences. Employers who use computers for business applications prefer to hire people who have had college courses in management information systems and business, and who possess strong programming skills. A graduate degree in a related field is required for some jobs.

Growth

Overall, employment of computer software engineers and computer programmers is projected to increase by 21% from 2008 to 2018, much faster than the average for all occupations. This will be the result of rapid growth among computer software engineers, as employment of computer programmers is expected to decline.

Employment of, specifically, computer software engineers is expected to increase by 32% from 2008-2018, which is much faster than average for all occupations. In addition, this occupation will see a large number of new jobs, with more than 295,000 created between 2008 and 2018. Demand for computer software engineers will increase as computer networking continues to grow. For example, expanding Internet technologies have spurred demand for computer software engineers who can develop Internet, intranet, and World Wide Web applications. Likewise, electronic data-processing systems in business, telecommunications, healthcare, government, and other settings continue to become more sophisticated and complex. Implementing, safeguarding, and updating computer systems and resolving problems will fuel the demand for growing numbers of systems software engineers.

New growth areas will also continue to arise from rapidly evolving technologies. The increasing uses of the Internet, the proliferation of Web sites, and mobile technology such as the wireless Internet have created a demand for a wide variety of new products. As more software is offered over the Internet, and as businesses demand customized software to meet their specific needs, applications and systems software engineers will be needed in greater numbers. In addition, the growing use of handheld computers will create demand for new mobile applications and software systems. As these devices become a larger part of the business environment, it will be necessary to integrate current computer systems with this new, more mobile technology.

In addition, information security concerns have given rise to new software needs. Concerns over "cyber security" should result in the continued investment in software that protects computer networks and electronic infrastructure. The expansion of this technology over the next 10 years

will lead to an increased need for software engineers to design and develop secure applications and systems, and to integrate them into older systems.

As with other information technology jobs, offshore outsourcing may temper employment growth of computer software engineers. Firms may look to cut costs by shifting operations to foreign countries with lower prevailing wages and highly educated workers. Jobs in software engineering are less prone to being off-shored than are jobs in computer programming, however, because software engineering requires innovation and intense research and development.

Source: Occupational Outlook Handbook, 2010-11 Edition. Bureau of Labor Statistics. 15 November 2010 <<http://www.bls.gov/oco/ocos303.htm>>.

Software Engineers in Today's Economy

Computer software engineers and computer programmers held about 1.3 million jobs in 2008. Approximately 514,800 were computer applications software engineers, about 394,800 were computer systems software engineers, and about 426,700 were computer programmers. Although computer software engineers and computer programmers can be found in a wide range of industries about 32% were employed in computer systems design and related services. Many also worked for software publishers, manufacturers of computers and related electronic equipment, financial institutions, and insurance providers. About 48,200 computer software engineers and computer programmers were self-employed in 2008.

As a result of rapid employment growth over the 2008 to 2018 decade, job prospects for computer software engineers should be excellent. Those with practical experience and at least a bachelor's degree in a computer-related field should have the best opportunities. Employers will continue to seek computer professionals with strong programming, systems analysis, interpersonal, and business skills. In addition to jobs created through employment growth, many job openings will result from the need to replace workers who move into managerial positions, transfer to other occupations, or leave the labor force. Consulting opportunities for computer software engineers also should continue to grow as businesses seek help to manage, upgrade, and customize their increasingly complicated computer systems.

Source: Occupational Outlook Handbook, 2010-11 Edition. Bureau of Labor Statistics. 15 November 2010 <<http://www.bls.gov/oco/ocos303.htm>>.

Salaries for Software Engineers

Software Engineers with 1-4 years of experience earn:	\$49K – 69K
5-9 years of experience earn:	\$59K – \$80K
10-19 years of experience earn:	\$67K - \$92K
20+ years of experience:	\$69K – \$98K

- Software Engineers who are self-employed earn between \$41K-\$75K annually.
- Software Engineers who work in the non-profit sector earn approximately \$53K-\$75K annually.
- Software Engineers in New York, California, Washington and Virginia are generally the highest paid.

Source: Payscale.com. 16 June 2010. Payscale.com. 16 November 2010. <
http://www.payscale.com/research/US/Job=Software_Engineer_%2F_Developer_%2F_Programmer/Salary>.

USNews.com Names Software Engineer the 4th Best Career for 2010

The reason why the demand for software engineers is growing can be illustrated when one looks to society's demand for the virtual world. If there's an app for something, there's a software engineer behind it. From video games to missile systems to the iPhone, almost every big idea in modern business is supported by software. The work of designing, building, maintaining, and integrating those increasingly complex systems continues to be one of the fastest-growing corners of the job market. Engineers are involved at all levels of that process, from writing code, to debugging programs, to overseeing new software launches from start to finish—or just consulting on highly specialized programs they know best.

As companies continually integrate new technologies and design their own, software engineers are in constant demand. The fastest growth in the sector is happening among engineers working on highly specific applications, with investments increasing in areas like cyber-security and mobile technologies.

Source: Baden, Ben. "Best Careers 2011: Computer Software Engineers." US News & World Report. <http://money.usnews.com/money/careers/articles/2010/12/06/best-careers-2011-computer-software-engineer.html>.

Market Challenge

Although software engineers by training, and often by nature, are analytical, prospecting to them can be a great opportunity because it means you must be at the top of your game. Software engineers will expect you to be competent in your knowledge and they'll also expect your company to do an excellent job with the basics of your products and services. Beyond that, one way you may distinguish your services is through demonstrating excellent communication skills. Be sure to come to any meeting with a software engineer with a prepared, written agenda that asks at the top, "Your 3 Objectives for this Meeting," even if one of the objectives is just getting to know a little more about each other's areas of expertise. Be sure to test for understanding often throughout the meeting, in other words, ask open ended questions, listen carefully to the response and then repeat back the highlights of what you heard. Be sure to summarize each meeting with a checklist of what you heard and any follow up items. Computer software engineers are often up against tight deadlines so they respect other professionals who acknowledge their limited time and come through with a solid plan that is delivered in a timely manner. Be patient if more information is needed in pursuit of a sale, as it is a software engineer's job to understand minute details and to look at problems and solutions from multiple angles.

Networking with Computer Software Engineers

Computer software engineers tend to work 50 hours a week or more but, thanks to the nature of their work, many are able to work from home occasionally or even full-time. As with any market, it's helpful to have a natural fit in approaching these professionals, such as having majored in some form of engineering yourself in college. However, if this is not the case but you're still interested in becoming a specialist in this market, be sure you have detailed information about the professionals in your network that are in the market and what areas they specialize in. In

this way you may be able to bring up their experience and credentials, as appropriate, in casual conversations that will add an element of, albeit, “borrowed” credibility to your approach. At the very least, your natural interest in their profession will show through.

Software engineers often work with diverse cultures and sometimes need to be available at odd hours to work with teams in distant locations. With this in mind, using convenient state-of-the-art technology as much as possible, preferably with 24/7 access, such as The Living Balance Sheet^{®1}, would be of interest to many of these professionals and should be leveraged.

Become familiar with the schools and universities that have excellent engineering programs in your area and explore their alumni clubs and other activities. If you offer an event to encourage networking with engineers, steer clear of typical venues such as golf tournaments unless you know, for a fact, there’s an interest. Generally speaking, engineers tend to have divergent interests than what typical sales people might like to do in their free time, such as pursuing musical interests or nature-related activities such as hiking or rock-climbing.

Because these professionals are at the top of the tech-savvy pyramid, you may have more success networking with them online than through traditional methods. Attempting to effectively cultivate them through a combination of both channels is recommended. In a quick “Linkedin.com” search by “company with” the search phrase “computer software engineers,” 286 companies surfaced in the link below:
<http://www.linkedin.com/companyDir?results=&sik=1291676104031&pplSearchOrigin=GLHD&keywords=computer+software+engineers>.

Be sure to research the active associations catering to software engineers in your local area. Below is a list of several national organizations that support the profession.

National Associations

International Association of Science and Technology for Development

<http://www.iasted.org/>

The IASTED is a non-profit organization devoted to promoting economic and cultural advancement. Established in 1977, IASTED organizes multidisciplinary conferences for academics and professionals, mainly in the fields of engineering, science, and education. IASTED holds conferences and courses in both industrialized and developing nations. For details of upcoming conferences please view the following link:

<http://www.iasted.org/conferences/>.

International Association of Engineers

<http://www.iaeng.org/ISSE.html>

The IAENG Society of Software Engineering (ISSE) is organized for the engineers and the scholars in the software engineering discipline. Through regularly scheduled conferences and workshops on Software Engineering, the IAENG Society of Software Engineering serves as a forum for networking, information sharing, idea exchange and problem solving for the software engineering community.

For upcoming shows, please view the following link: <http://www.iaeng.org/conferences.html>

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IEEE – Advancing Technology for Humanity

http://www.ieee.org/index.html?WT.mc_id=hpf_logo

IEEE is the world's largest professional association dedicated to advancing technological innovation and excellence for the benefit of humanity. IEEE and its members inspire a global community through IEEE's highly cited publications, conferences, technology standards, and professional and educational activities.

IEEE is comprised of a variety of groups, active in publications, conferences, and building technical communities. These units involve member outreach at both the local and global level.

For information on the more than 1000 annual conferences, please view the following link:

http://www.ieee.org/conferences_events/index.html.

Additionally, for access to IEEE's other sites, by specialty or locale, please view:

http://www.ieee.org/sitemap.html?WT.mc_id=mn_smap

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IEEE Computer Society

<http://www.computer.org/portal/web/about>

With nearly 85,000 members, the IEEE Computer Society is the world's leading organization of computing professionals. Founded in 1946, and the largest of IEEE's 38 societies, the Computer Society is dedicated to advancing the theory and application of computing and information technology.

The Computer Society's Certified Software Development Professional (CSDP) program for mid-career professionals and Certified Software Development Associate (CSDA) credential for recent college graduates confirm the skill and knowledge of those working in the field. The Computer Society is also the producer of the Guide to the Software Engineering Body of Knowledge. For information about local chapters and local activities, view the following link:

<http://www.computer.org/portal/web/chapters>

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Learn more about Association marketing by reading [About Association Marketing](#) which includes tips for vetting an association, becoming a resource, and surveys for the association leadership and members.

Marketing Checklist

- Narrow niches within the market to a reasonable size and scope.
- Visit websites and flag the best ones for ongoing reference.
- “Follow” companies and associations of interest on LinkedIn.com and join market-related groups.
- Identify at least 15 individuals that would be good Centers of Influence in the market.
- Conduct informational interviews and/or networking appointments
 - with potential strategic alliances also active in the market.
 - ask for “personal introductions” to others in the market.
- Subscribe to market-related blogs and magazines, note calendar dates, editors names and sponsorship or advertising opportunities.
- Determine which association(s) is most worthwhile and attend networking events; obtain meeting with Association Director and be sure to “ask” more rather than “tell.”
- Determine a Unique Value Statement that appeals to the market and sets you apart from the competition.
- Announce your presence in the market through social media, letters, ads, and press releases.
- Obtain membership lists for cultivation and look into targeted list buying if needed.
- Organize a mix of cultivation pieces. For ex., avoid sending all email or all snail mail. Aim for a minimum of six to twelve touch-points per year.
- Explore what types of seminar topics and/or guest speakers are of interest to this market.
- Contact local business journals and find out if they plan on dedicating a special issue to the market where you can advertise and/or get an article published.

SAMPLE One Page 90-Day Strategic Planning Template
Target Market Focus: Computer Software Engineers (Region)

Three Year Vision: 50 software engineer clients in database; Receive X number of leads per mo.;
 Conduct min. of 2 Workshops per year and 3 C. of I. Appreciation Events

One Year Vision: 15 new software-engineer-based clients in database with a min. of 5 who will provide ongoing introductions

90 Day Objectives/Tactics	Challenges	Action Items	Person	Date
1. Continue Research & Build Top 15 List		<ul style="list-style-type: none"> - Obtain local research & dig deep into links in report; define profile of best client. - Identify 5 C of I's who work w/ software engineers - Drill down to find out more about individuals and create a file. - Determine which associations to join or volunteer - Become active on LinkedIn.com. - Ask for introductions 		
2. Create Unique Value Proposition and Brand Statement		<ul style="list-style-type: none"> - Find out needs/wants - Come up with unique characteristics of product line and hone approach - Create brand statement; get approved by Compliance - Test out w/ Advisors 		
3. Build Cultivation Program		<ul style="list-style-type: none"> - Vet communication materials - Select best approved pieces (2 or 3) - Create Approach letter - Get approved - Set up first mailing program 		
4. Conduct 5 Center of Influence Surveys; goal is min. of 5 per month.		<ul style="list-style-type: none"> - Modify interview as appropriate - Send hand written thank you's & follow up on any tasks/requests - Get responses from surveys into database - Schedule more appts. 		
5. Set up database/admin. needs		<ul style="list-style-type: none"> - Make sure database can manage cultivation process for follow up, etc. 		