



**ECONOMIC &
WORKFORCE
DEVELOPMENT**
through the
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COLLEGES

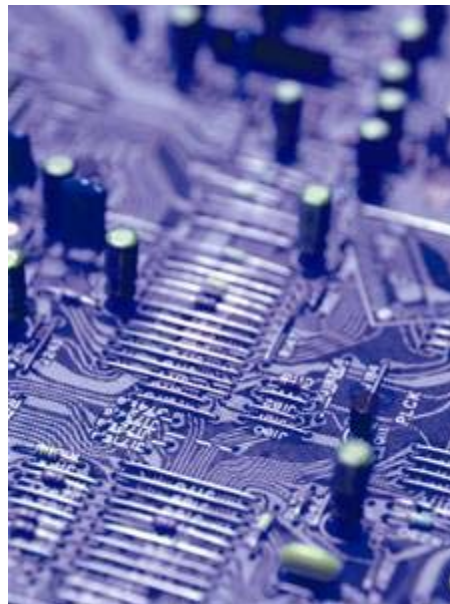
**BUSINESS AND WORKFORCE
PERFORMANCE IMPROVEMENT INITIATIVE**



**Strategic Possibilities Report
Riverside and San Bernardino Counties**

Computer Information Systems (CIS)

At-a-Glance



Center of Excellence, EWDP Region 9

San Bernardino Community College District

July 2006



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Strategic Possibility Report for Inland Empire Community Colleges

Computer Information Systems

July 2006

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THE BUSINESS AND WORKFORCE PERFORMANCE IMPROVEMENT INITIATIVE IS A GRANT-FUNDED PROJECT THROUGH THE ECONOMIC & WORKFORCE DEVELOPMENT PROGRAM OF THE CALIFORNIA COMMUNITY COLLEGES. OUR MISSION IS TO STRENGTHEN CALIFORNIA'S WORKFORCE AND ADVANCE ECONOMIC GROWTH THROUGH EDUCATION, TRAINING AND JOB DEVELOPMENT.

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Computer Information System occupations are projected to grow 38.8% within the Inland Empire by 2012. This will result in 1,447 additional jobs with a median hourly wage of \$29.44. - Source: California State Employment Development Department

Executive Summary

As technology based firms move into San Bernardino and Riverside Counties (aka the Inland Empire) and existing companies implement more advanced technologies, the reliance upon Computer Information Systems (CIS) has increased. The Desert Regional Consortium recognized the potential growth within the CIS industry cluster and funded primary research to study the CIS needs of local employers. This resulted in the "Inland Empire Computer Information Systems Training Needs Study" referenced throughout. This At-a-Glance report highlights the results of their study juxtaposed with labor market information and external data sources to identify how Inland Empire community colleges can best respond to our local employer's workforce needs.

CIS occupations, while offering salaries far above a living-wage, do not classify as a strategic opportunity satisfying the necessary criteria to warrant a regional response. Many of the occupations require bachelor degrees and advanced technical skills beyond the niche and relevance of community colleges. Moreover, home to only 3.7% of the state's CIS companies (389 firms, employing 2,774 persons), the Inland Empire does not have a critical mass of CIS firms compared to the rest of the state - which represents a key criterion for mobilizing a regional response.

There are, however, specific opportunities for a few colleges to offer classes providing software specific "skill-upgrades" to baccalaureate graduates within the region. Current CIS employees are constantly seeking quick, convenient classes to upgrade their software knowledge and programming skills. Because CIS functions can be found across all industries, colleges should continuously seek to partner with local employers to meet local training needs via contract education. Industry employers indicate that many employees need training on integrating MS Office applications (not just the routine usage of specific MS Office programs) for all occupations utilizing technology and CIS skills in the workplace.

The following report provides documentation of the strategic possibility, but does not represent a full environmental scan.

What is a Strategic Possibility?

The California Community Colleges System has charged the Economic & Workforce Development (EWD) Network to strategically identify growing industries and occupations that have partnering potential for the college's programs. The EWD network aims to best serve our local communities by identifying industry sectors with empirically validated projected growth. Additional criteria to establish the value of a Strategic Possibility includes: relevance (to the community colleges), economic impact, the adaptability of colleges to respond, and the ability to build partnerships with workforce and industry leaders to create career paths and upward mobility.

A Strategic Possibility report identifies industries and occupations that meet some, but not all, of the aforementioned criteria. While a response may be appropriate for a specific college, a strategic response from multiple districts is not warranted. A Strategic Possibility that meets all of the stated criteria, thus warranting an organized response from regional community colleges, is then defined as a Strategic Opportunity. A full environmental scan may then be conducted to evaluate and suggest possible actions to ensure market responsiveness. While this report does not present findings which suggest a need for a full environmental scan, we provide these findings for the reader's information and use.

Industry Description

CIS is a broad field encompassing all occupations that create, install, apply, or maintain computer systems, software, hardware, and/or networks. Occupations within the Computer Information Systems (CIS) cluster are charged to harness the organizational knowledge needed to understand how to use technology to achieve business goals and strategies, manage technology resources, and leverage information for competitive advantage. In the Inland Empire (including both San Bernardino and Riverside Counties), there are few (389) companies having computer applications and information technologies as their sole business (See Employment Size, page 6.) Many of these 389 CIS firms are small businesses. However, the vast majority of companies utilize CIS to support their core business; and they do so within a variety of industries.

Validation of the Strategic Possibility

Riverside Community College (RCC) hired the Reille Consulting Group, Inc. to survey employees within the Inland Empire to better understand regional CIS training needs. This survey obtained information on occupations, wages, educational requirements, skills needed, and projected growth to assist college faculty and administrators in updating CIS program offerings to best meet the needs of local employers.

The analysis and findings in the Inland Empire Computer Information Systems Training Needs Survey were based on over 150 responses of Inland Empire companies engaged in CIS activities; of which 57% employed less than 25 employees. Companies were solicited via an internet-based survey collection system. (Occupations specifically evaluated within the scope of the RCC survey included: Secretaries and Administrative Assistants, Clerical Support Staff, Customer Support Specialists, Data Entry & Information Processing Workers, Software

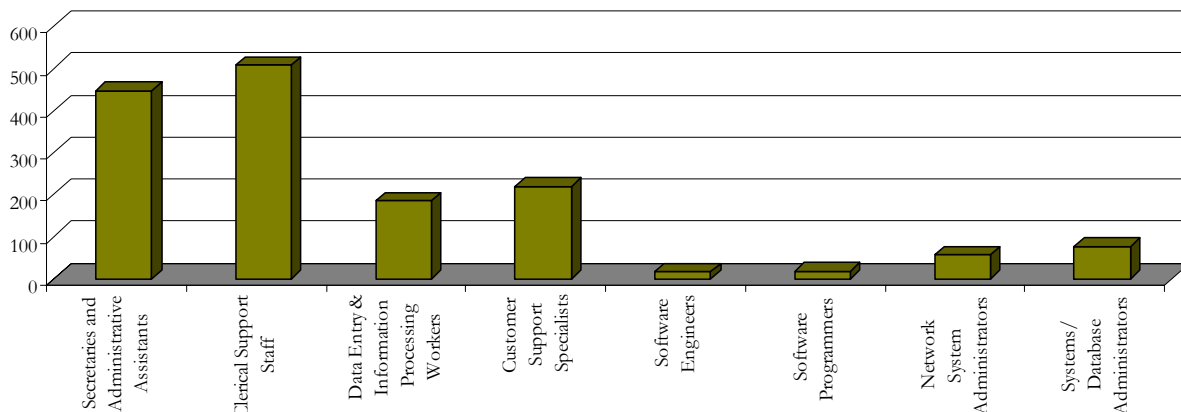
Engineers, Software Programmers, Network Systems Administrators, and Systems Administrators/ Database Administrators).

Qualifying the Strategic Possibility

Employment Size

One criteria for the community colleges to consider an industry sector or occupation as a strategic opportunity is size. Community Colleges want to ensure that the industry workforce needs are substantial enough to warrant an organized response. CIS as an industry sector does not satisfy this criteria for the Inland Empire. According to Info USA (April 2005 Data), there are only 389 firms with the sole business of CIS in the Inland Empire within NAICS Code 5415. These companies collectively employ 2,774 employees within the region. (For context, these 389 CIS firms represent only 3.7% of the 10,361 CIS firms in California when the region boasted 8.3% of the state's non-farm employment in May 2006). Relative to other regions within the state and total non-farm employment, the Inland Empire has a rather small concentration of CIS firms.

CIS Current Employment



Source: IE CIS Training Needs Survey

Moreover, while the employment projections for CIS jobs within the Inland Empire are at a staggering 38.8%, this will only amount to 1,447 new jobs by 2012. From these 1,447 positions, 376 are replacement positions leaving only 1,021 net new jobs created.¹ The Inland Empire Computer Information Systems Training Needs Survey indicates that most of these projected Inland Empire CIS jobs will be classified as Secretarial or Clerical support positions. Collectively, Inland Empire respondents plan to hire less than 100 high-wage positions (such as Software Engineers) within the next 12 months.² Were we to extrapolate this sample data to the rest of the region, the projection is consistent with LMID employment projections for the region. A large growth percentage exists, but a sizable number of openings warranting a regional response are not projected within CIS occupations.

¹ California State EDD, LMID

² Inland Empire Computer Information Systems Training Needs Study

Relevance

Relevance is another criterion for the Community Colleges to identify a strategic opportunity. Naturally, programs must fit with the projected niche and core competencies as local training/education providers. Most occupations within the CIS cluster require bachelor degrees and advanced training (see Appendix C). Only Computer Support Specialists are the exception to this rule. Therefore, while a strategic regional response is not warranted due to the educational requirements within this industry sector, there is relevance to respond locally to specific employers that need upgraded skills and training.

It is important to note the distinction between “CIS occupations” such as Software Engineers, and occupations that require CIS skills. While there is not a strategic opportunity for the colleges to focus on “CIS occupations,” there is an ongoing need for colleges to train and upgrade CIS skills within all industries.

Economic Impact

A recent report from the Tomas Rivera Policy Institute evaluated the Inland Empire’s economic make-up compared to other regions and the state of California. They concluded that occupations within the CIS Industry (Professional, Scientific & Technical; NAICS 541) are grossly underpaid compared to the national and other regional averages. Their comparative analysis of wage structures indicated that the Inland Empire pays less (\$35,227 annual salary) than all other regions evaluated (for example, San Diego - \$63,509; Salt Lake County - \$51,112; Research Triangle Park - \$51,829).³

Yet, in analyzing the wages and related occupations specifically within the sector, many do provide a high living wage within the Inland Empire. The average hourly wage within the CIS occupations is \$29.44 (see Appendix).⁴ However, high wages are only afforded to those with bachelor degrees and advanced technical skills. Secretaries & Administrative Assistants as well as Clerical Support Staff employees are currently employed by over 74% of CIS businesses surveyed and they comprise the vast majority of CIS employees while earning the least (Candidates with no or limited work experience can expect a starting hourly wage of only \$9.00-\$11.99 from a majority of Inland Empire businesses. Experienced workers may expect a starting wage of \$12.00 - \$15.99.)⁵

Furthermore, the educational levels in the Appendix C illustrate that the highest wages (correlated with high economic impact) within this sector is afforded to those with advanced degrees. CIS occupations requiring a higher level of knowledge and skills in information technology pay higher wages in the range of \$16.00-\$29.99 for workers with no or limited experience, and \$22.00-\$39.99 for experienced employees. However, those jobs often require 4 years or more of higher education.

While the CIS sector indicates an average wage far greater than the state’s \$6.75 minimum wage, the San Bernardino County’s Economic Development Agency has identified a living

³ The Tomas Rivera Policy Institute: Economic Development and the Knowledge Economy in California’s Inland Empire

⁴ California State EDD, LMID

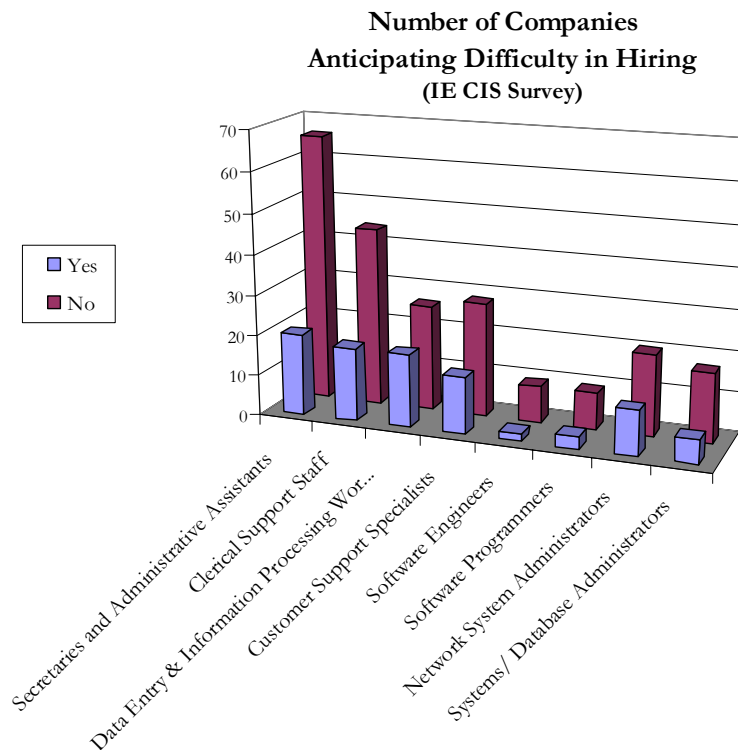
⁵ Inland Empire Computer Information Systems Training Needs Study

wage of \$13.00 per/hour necessary for the Inland Empire.⁶ A majority of employees within the CIS industry (Secretaries and Clerical Support Staff) simply do not make over \$13.00 per hour.

Industry Training Needs & Challenges

Firms of all sizes, and from all industries, employ staff required to have basic CIS skills. However, few companies employ highly skilled CIS professionals such as Software Programmers or Network System Administrators. Survey respondents indicated that an overwhelming majority of companies employ office staff that utilizes technology to perform their jobs, such as Secretaries or Clerical Support Staff. Both the survey and the EDD report that a large majority of these secretarial and clerical positions do not require a college education; while most computer specific occupations require additional education beyond an Associates Degree. However, there is still a need for community colleges to provide training within the CIS cluster. Industry validation shows that basic skills and soft skills continue to be the most important factors in evaluating a candidate for employment.

Interestingly, most skills considered to be “Very Important” when considering CIS job applicants are not technical or job specific. Rather, employers are seeking basic or soft skills including conscientious work ethic and positive attitude (79% of survey respondents), ability to follow directions (79%), interpersonal and communication skills (72%), ability to work independently (66%), and creative problem-solving skills (56%).⁷ Basic technical competence specific to each position was also rated very important when considering job applicants by 62 % of respondents, MS Word by 52%, MS Excel by 49% and MS Outlook by 43% of respondents. A minority of firms anticipate challenges in filling future open CIS positions.



⁶ LMID projections using experienced wage data

⁷ Inland Empire Computer Information Systems Training Needs Study

The employees surveyed cited that ongoing education and specific training to upgrade programming and software skills is an ongoing need. However, offerings must be convenient for those presently employed and are often very specific to a given industry of software application. Thus, for-credit courses may not be the ideal delivery method to meet the CIS training needs of Inland Empire employers.

Skill Gaps

Inland Empire CIS firms stated that both job applicants and current employees were most deficient or very deficient in creative problem-solving skills (58%), integrating MS Office applications (57%), MS Access (55%), MS Excel (54%), web design (54%), web programming (52%), MS PowerPoint (50%), conscientious work ethic and positive attitude (49%), network troubleshooting (49%) and desktop publishing (47%).⁸

Implications for Community Colleges

An inventory of all CIS, and CIS related programs, offered by the Inland empire community colleges is a logical following to this report. Given the flexible nature of computer technology and the various CIS processes involved, the regional consortium may consider establishing a CIS Advisory Board to review existing programs and make suggestions for future curriculum enhancements and preferred delivery methods. There are many CIS programs currently offered through the 11 regional community colleges, but not all are offered at convenient times for current employees, nor are they content specific enough to upgrade existing skills.

For the community colleges to continue providing value to businesses requiring CIS skills, training programs should be offered at both ends of one's CIS career - entry level workers and experienced employees in need of specific retraining. CIS skills are pervasive in nature; a basic understanding and computer literacy is required in virtually all industries in order to be successful. Therefore, basic software application curriculum should be infused into all existing program offerings for entry level workers in the form of individual courses or short certificate programs. Most regional colleges already have these in place. What can be added, however, are highly technical designing and troubleshooting classes (as stand alone modules or a certificate program) for employees within the industry that already have earned a bachelors degree but are in need of continuously upgrading their software/networking skills and knowledge. These courses should be offered at convenient times for the working adult and/or through contract education.

As true for all industry training programs, the completion of any CIS offering should result in soft skill competencies including: a demonstrated ability to follow directions, conscientious work ethic and positive attitude, interpersonal and communication skills, and the ability to work independently. Technical training should include MS Office for administrative staff, and web programming and designing, network troubleshooting, network security, graphics, desktop publishing, and help desk support for CIS specialists.

⁸ Inland Empire Computer Information Systems Training Needs Study

Conclusion

The Inland Empire Computer Information Systems Training Needs Study highlights opportunities for Community Colleges to contribute to the skill training and general educational requirements for employment within the CIS field. By sheer numbers, focusing upon the software skills and content knowledge required for Secretaries, Administrative Assistants and Clerical Support Staff positions, provide the greatest impact - followed by Data Entry & Information Processing workers and Customer Support Specialists. However, these are the lowest paid occupations within the cluster requiring minimal education for employment. As mentioned, the highest paid occupations within the profession require specific technical abilities and predominantly require over 4 years of higher education.

There exists opportunities for community colleges to provide value via ongoing training to highly skilled CIS employees, as well as providing a broad understanding of CIS skills to entry-level workers and potential employees.

References

California Regional Economies Project: Southern California Economic Base Report

California State EDD LMID (<http://www.labormarketinfo.edd.ca.gov>)

Computer Software Industry Cluster (January 2005). Conducted by Godbe Research for the Orange County Workforce Investment Board.

Computer Support Specialist Strategic Possibility Report (December 2005). Prepared by the Orange County Center of Excellence, Economic & Workforce Development Network.

ERISS job information and training (www.usworks.com/sbeta).

Inland Empire Computer Information Systems Training Needs Survey (April 2006). Prepared by Reille Consulting Group, Inc. for Riverside Community College. Permission granted to use content within this report.

Inland Empire Quarterly Economic Report (July 2005) Inland Empire Economic Partnership (IEEP)

Internet System for Education and Employment Knowledge (www.iseek.org)

Occupational Information Network (O*NET) On-line. <http://online.onetcenter.org>

The Tomas Rivera Policy Institute (2004) Economic Development and the Knowledge Economy in California's Inland Empire: Process or Stagnation?

US Department of Labor ETA – Occupational Outlook (www.doleta.gov)

APPENDIX A: How to Utilize this Report

About Us - Description of BWPI

The Business and Workforce Performance Improvement (BWPI) initiative is focused on building the capacity of the colleges in the area of economic and workforce development to enhance their ability to deliver education and training services to businesses and workers in high growth industries, new technologies, and other clusters of opportunities.

The Centers of Excellence (COE) within BWPI provide information regarding workforce trends, increasing awareness and visibility about the colleges economic and workforce development programs and services, and building partnerships with business and industry.

The difference this will make to the colleges is that it will position them as THE workforce partners of choice to business and industry and ensure that college programs are current and responsive. This will contribute to the overall economic vitality of the communities in which they serve.

How to Use This Strategic Possibility Report

The Centers of Excellence within the Business and Workforce Performance Improvement Initiative of the California Community College Economic and Workforce Development Program have undertaken Industry Scanning to provide targeted and valuable information to community colleges on high growth industries and occupations.

This report, while not a full industry scan, is intended to assist the decision-making process of California community college administrators and planners in addressing local and regional workforce needs and emerging job opportunities in the workplace as they relate to college programs. The information contained in this report can be used to guide program offerings, strengthen grant applications, and support other economic and workforce development efforts.

This report is designed to provide current industry data that will:

- Define potential strategic opportunities relative to an industry's emerging trends and workforce needs;
- Influence and inform local college program planning and resource development; and
- Promote a future-oriented and market responsive way of thinking among stakeholders.

This Industry Scan included a review of the California Regional Economies Project reports and Employment Development Department (EDD) Labor Market Information (LMID) projections that cover the communities in this region, as well as many other sources as listed.

Important Disclaimer:

All representations included in this Environmental Scan product/study have been produced from a secondary review of publicly and/or privately available data and/or research reports. Efforts have been made to qualify and validate the accuracy of the data and the reported findings. The purpose of the Environmental Scan is to assist the California Community Colleges to respond to emerging market needs for workforce performance improvement. However, neither the Business and Workforce Performance Improvement, Centers of Excellence, host college or California Community Colleges Chancellor's Office are responsible for applications or decisions made by recipient community colleges or their representatives based upon this study including components or recommendations.

APPENDIX B: Industry Related Associations

- Association for Computing Machinery (ACM) www.acm.org
- Association of Computer Support Specialists www.acss.org
- Association for Information Technology Professionals (AITP)
- Association of Shareware Professionals
- Association of Support Professionals, 122 Barnard Ave., Watertown, MA 02472
- Cisco Systems User Groups (Orange County) www.occug.org
- Computer & Communications Industry Association
- Computer Society
- Computing Technology Industry Association www.comptia.org
- Computing Research Association
- Independent Computer Consultants Association
- Information Technology Association of America www.ita.org
- Institute of Electronic and Electrical Engineer Computer Society www.computer.org
- Programmers Guild
- Society of Computer Professionals
- Software & Information Industry Association (SIIA)
- Software council of Southern California
- US Internet Industry Association (USIIA)
- Usability Professionals Association
- Women in Technology International

APPENDIX C: Occupational Employment Projections*

2002-2012

Riverside-San Bernardino Metropolitan Statistical Area

Riverside and San Bernardino Counties

SOC Code	Occupational Title	Annual Average Employment		Employment Change		Average Annual Job Openings			Median Hourly Wage (3)	Education & Training Levels [6]
		2002	2012	Numerical	Percent	New Jobs	Net Replacements (1)	Total (2)		
15-0000	Computer and Mathematical Occupations	9,400	13,000	3,600	38.3%	360	132	492	\$27.77	
15-1000	Computer Specialists	9,130	12,680	3,550	38.9%	355	122	477		
15-1021	Computer Programmers	1,640	2,270	630	38.4%	63	39	102	\$32.90	BA/BS DEGREE (5)
15-1031	Computer Software Engineers, Applications	1,410	2,060	650	46.1%	65	14	79	\$34.67	BA/BS DEGREE (5)
15-1032	Computer Software Engineers, Systems Software	540	810	270	50.0%	27	5	32	\$31.77	BA/BS DEGREE (5)
15-1041	Computer Support Specialists	2,160	2,910	750	34.7%	75	27	102	\$20.33	AA DEGREE (6)
15-1051	Computer Systems Analysts	970	1,270	300	30.9%	30	11	41	\$31.69	BA/BS DEGREE (5)
15-1061	Database Administrators	430	630	200	46.5%	20	4	24	\$30.56	BA/BS DEGREE (5)
15-1071	Network and Computer Systems Administrators	1,050	1,450	400	38.1%	40	12	52	\$28.91	BA/BS DEGREE (5)
15-1081	Network Systems and Data Communications Analysts	450	670	220	48.9%	22	5	27	\$27.28	BA/BS DEGREE (5)
15-1099	Computer Specialists, All Other	430	570	140	32.6%	14	5	19	\$28.50	AA DEGREE (6)
Totals		27,610	38,320	10,710	38.79%	1,071	376	1,447	\$29.44	

* March 2003 Benchmark

Occupations with employment below 100 are excluded.

Occupation subtotals may not add to the totals due to rounding and the suppression of data.

Source: California State EDD labor market information

Appendix D: CIS Related Occupational Descriptions

Computer Applications Software Engineers and Web Developers

Develop, create, and modify general computer applications software or specialized utility programs. Analyze user needs and develop software solutions for clients.

Computer and Information Research Scientists

Conduct research into fundamental computer and information science as theorists, designers, or inventors. Solve or develop solutions to problems in the field of computer hardware and software.

Computer and Information Systems Managers

Plan, direct, or coordinate activities in such fields as electronic data processing, information systems, systems analysis, and computer programming.

Computer Hardware Engineers

Research, design, develop, and test computer or computer-related equipment for commercial, industrial, military, or scientific use. May supervise the manufacturing and installation of computer or computer-related equipment and components.

Computer Programmers

Convert project specifications and statements of problems and procedures to detailed logical flow charts for coding into computer language. Develop and write computer programs to store, locate, and retrieve specific documents, data, and information. May program web sites.

Computer Security Specialists

Plan, coordinate, and implement security measures for information systems to regulate access to computer data files and prevent unauthorized modification, destruction, or disclosure of information.

Computer Systems Analysts

Analyze science, engineering, business, and all other data processing problems for application to electronic data processing systems. Also review, analyze user requirements, procedures, and problems to automate or improve existing systems and review computer system capabilities and limitations. May supervise computer programmers.

Computer Systems Software Engineers.

Research, design, develop, and test operating systems-level software, compilers, and network distribution software for medical, industrial, military, communications, aerospace, business, scientific, and general computing applications. Set operational specifications and formulate and analyze software requirements. Apply principles and techniques of computer science, engineering, and mathematical analysis.

Customer Support Specialists

Provide technical assistance and training to computer system users. Investigate and resolve computer software and hardware problems of users. Answers clients' inquiries in person and via telephone.

Data Entry & Information Processing Worker

Data entry and information processing workers help ensure the smooth and efficient handling of information. By keying in text, entering data into a computer, operating a variety of office machines, and performing other clerical duties, these workers help organizations keep up with the rapid changes that are characteristic of today's "Information Age."

Network Systems Administrators

Analyze data processing requirements to plan EDP system to provide system capabilities required for projected workloads.

Secretary and administrative assistant

Secretaries and administrative assistants are responsible for a variety of administrative and clerical duties necessary to run an organization efficiently. They serve as information and communication managers for an office; plan and schedule meetings and appointments; organize and maintain paper and electronic files; manage projects; conduct research; and disseminate information by using the telephone, mail services, Web sites, and e-mail. They also may handle travel and guest arrangements.

Software Engineers

Develop, create, and modify general computer applications software or specialized utility programs. May analyze and design databases within an application area, working individually or coordinating as part of a team.

Software Programmers

Convert project specifications and statements of problems and procedures to detailed logical flow charts for coding into computer language. Develop and write computer programs to store, locate, and retrieve specific documents, data, and information. May program web sites.

Systems Administrators/ Database Administrators

Includes database administrators and network administrators. Plan layout and installation of new systems or modifications of existing systems; may set up and control computer systems to solve scientific and engineering problems.