

Management Information Systems

Inland Empire/Desert Region (Riverside and San Bernardino counties combined)

Summary

- Employment for the management information systems occupational group is expected to **increase by 6% between 2018 and 2023** in the Inland Empire/Desert Region. A total of **171 annual job openings** will be available over the five-year timeframe.
- The entry-level wage for each of the occupations in the management information systems occupational group is **above the MIT Living Wage estimate of \$12.39 per hour** for a single adult living.
- There are **152 credentials issued annually** from regional community college training programs.

Introduction

This report provides data on the occupations related to the California Community College computer information systems program (TOP 0702.00). This program prepares students for employment in management information systems by providing instruction on data and information storage and processing, including hardware, software, basic design principles, and user requirements (Taxonomy of Programs, 2012). The management information systems (MIS) occupational group includes the following occupations:

- *Computer Network Architects*
- *Network and Computer Systems Administrators*

There is a special section dedicated to the real-time demand for Security+, Network+, and Linux+ certifications from job postings beginning on page five.

Job Opportunities

In 2018, there were 2,255 jobs in the MIS occupational group in the Inland Empire/Desert region (IEDR). This occupational group is projected to increase employment by 6% by 2023. Employers will need to hire 854 workers over the next five years to fill new jobs and backfill jobs that workers are permanently vacating (includes occupational transfers and retirements). Exhibit 1 displays five-year projected job growth for the MIS occupational group.

Exhibit 1: Five-year projections for the MIS occupational group

Occupation	2018 Jobs	5-Yr % Change (New Jobs)	5-Yr Openings (New + Replacement Jobs)	Annual Openings (New + Replacement Jobs)	% of workers age 55+
Network and Computer Systems Administrators	1,808	6%	682	136	14%
Computer Network Architects	447	5%	171	34	13%
Total	2,255	6%	854	171	13%

Source: EMSI 2019.3

Job Postings

Real-time labor market information from employer job advertisements is used in this report as an additional method to gauge demand for the MIS occupational group. Exhibit 2 displays the number of job ads posted during the last 12 months along with the regional and statewide average time to fill for the MIS occupational group in the IEDR. On average, local employers fill online job postings for the MIS occupational group within 43 days. This regional average is two days longer than the statewide average, indicating that local employers may face slightly more challenges when seeking candidates to fill these positions than California employers outside the IEDR.

Exhibit 2: Job ads and time to fill for the MIS occupational group, Sep 2018 – Aug 2019

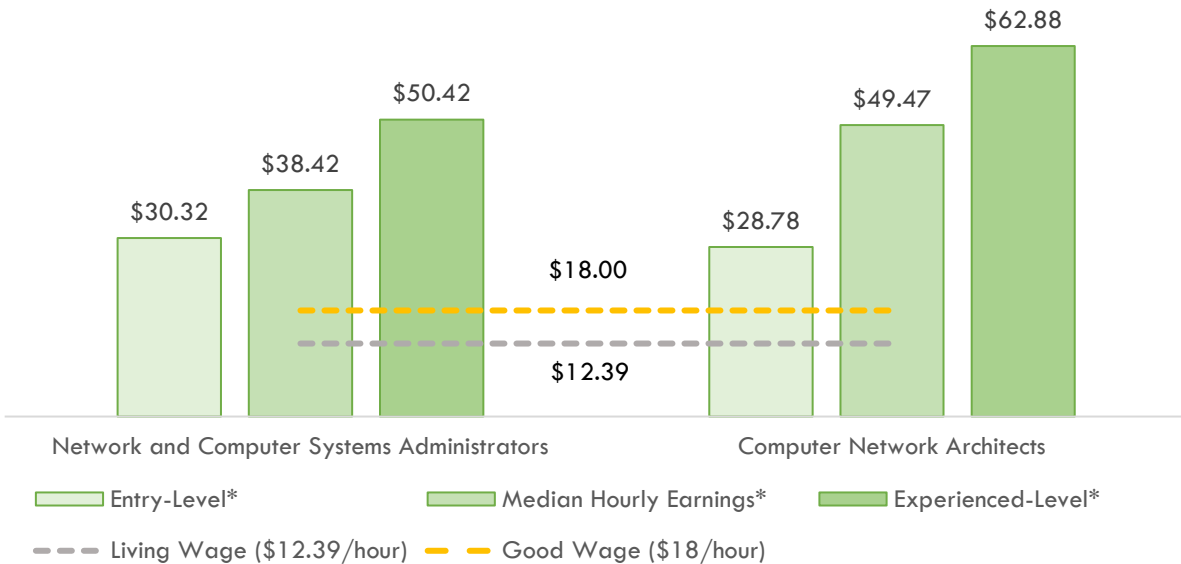
Occupation	Job Ads	Regional Average Time to Fill (Days)	California Average Time to Fill (Days)
Network and Computer Systems Administrators	542	41	39
Computer Network Architects	304	48	44
Total	846	43	41

Source: Burning Glass – Labor Insights

Earnings

The entry-level wage for each of the MIS occupations is above the MIT Living Wage estimate of \$12.39 per hour for a single adult living in the IEDR (Glasmeier, 2019). These wages are also sufficient for two working adults and one child (\$14.75 per hour, per adult, or \$30,680 annually for each adult). The Metropolitan Policy Program at Brookings would classify MIS positions as “good jobs” because they provide a wage that allows workers to become economically independent and secure, above \$18.00 per hour (\$37,440 per year), with employer-sponsored health insurance (Shearer, Shah, Gootman, 2019, pg. 25). MIS occupations generally receive employer medical insurance in the IEDR, according to occupational guides developed by the California Labor Market Information Division (“Detailed Guide,” 2019). Exhibit 3 displays hourly earnings for the MIS occupational group.

Exhibit 3: Hourly earnings for the MIS occupational group



Source: EMSI 2019.3

*Entry is 25th percentile wage, the median is 50th percentile wage, and experienced is 75th percentile wage.

An alternative way to determine what wages workers can expect to earn is by extracting wage information from online job postings. Exhibit 4 displays advertised salary data from real-time job postings for the MIS occupational group over the last 12 months. This information should be viewed with caution, as the majority of job postings do not contain salary information. Please note that salary figures are prorated to reflect full-time, annual wage status.

Exhibit 4: Advertised salary information from job ads, Sep 2018 – Aug 2019

Occupation	Number of job postings	Less than \$35,000	\$35,000 to \$49,999	\$50,000 to \$74,999	More than \$75,000	Average Annual Earnings
Network and Computer Systems Administrators	134	6%	14%	37%	43%	\$70,000
Computer Network Architects	32	12%	22%	13%	53%	\$78,000

Source: Burning Glass – Labor Insights

Employers, Skills, and Education

Exhibit 5 displays the employers posting the most job ads for the MIS occupational group during the last 12 months in the IEDR.

Exhibit 5: Employers posting the most job ads for the MIS occupational group, Sep 2018 – Aug 2019

Occupation	Employers	
Network and Computer Systems Administrators (n=323)	<ul style="list-style-type: none"> San Bernardino County San Manuel Band of Mission Indians Booz Allen Hamilton, Inc. VSolvit, LLC. 	<ul style="list-style-type: none"> Esri Loma Linda University Health Mt. San Jacinto College Agua Caliente Resort Casino Spa
Computer Network Architects (n=106)	<ul style="list-style-type: none"> Esri Niagara Bottling CO-OP Financial Services San Manuel Band of Mission Indians 	<ul style="list-style-type: none"> OnDek Solutions Aztecs Telecom Infinite Resource Solutions

Source: Burning Glass – Labor Insights

Exhibit 6 displays a sample of specialized, employability, and software and programming skills that employers are seeking when looking for workers to fill positions in the MIS occupational group. Specialized skills are occupation-specific skills that employers are requesting for industry or job competency. Employability skills are foundational skills that transcend industries and occupations; this category is commonly referred to as “soft skills.” The skills requested in job postings may be utilized as a helpful guide for curriculum development.

Exhibit 6: Sample of in-demand skills from employer job ads for the MIS occupational group, Sep 2018 – Aug 2019

Occupation	Specialized Skills	Employability Skills	Software and Programming Skills
Network and Computer Systems Administrators (n=509)	<ul style="list-style-type: none"> Project Management System/Network Configuration Hardware and Software Installation 	<ul style="list-style-type: none"> Troubleshooting Communication Skills Planning 	<ul style="list-style-type: none"> VMware Linux Windows Server
Computer Network Architects (n=271)	<ul style="list-style-type: none"> Network Engineering Telecommunications Project Management 	<ul style="list-style-type: none"> Communication Skills Troubleshooting Teamwork/ Collaboration 	<ul style="list-style-type: none"> Python Voice over IP (VoIP) Virtual Private Networking (VPN)

Source: Burning Glass – Labor Insights

Exhibit 7 displays the work experience and entry-level education typically required to enter each occupation according to the Bureau of Labor Statistics (BLS), educational attainment for incumbent workers with “some college, no degree” and an “associate degree” according to the U.S. Census (2016-17), and the minimum advertised education requirement from employer job ads. Most employers are looking for a candidate with a bachelor’s degree or higher. A notable share of employers looking for network and computer systems administrators were looking for a candidate with an associate degree or less, 32%.

Exhibit 7: Work experience required, typical entry-level education, educational attainment, and minimum advertised education requirements for the MIS occupational group, Sep 2018 – Aug 2019

Occupation	Work Experience Required	Typical Entry-Level Education Requirement	Educational Attainment*	Minimum Advertised Education Requirement from Job Ads			
				Number of job postings	High school diploma or vocational training	Associate degree	Bachelor's degree or higher
Network and Computer Systems Administrators	None	Bachelor's degree	38%	355	25%	7%	68%
Computer Network Architects	5 years or more	Bachelor's degree	35%	148	8%	7%	85%

Source: EMSI 2019.3, Burning Glass – Labor Insights

*Percentage of incumbent workers with a Community College Credential or Some Postsecondary Coursework

Real-time demand for Security+, Network+, and Linux+ Certifications

CompTIA offers four major groups of certifications: Core, Infrastructure, Cybersecurity, and Additional Professional certifications (CompTIA, 2019). Their Network+ and Security+ certifications fall under their Core category, while their Linux+ certification is classified as an infrastructure certification. The job posting search engine, Burning Glass, designed a feature that allows the user to search for job postings that mention these certifications. CompTIA's Security+ and Network+ certifications appear to be in high demand from local employers, with 286 and 182 unique postings mentioning these certifications during the last 12 months, respectively. Their Linux+ certification appears to be less prevalent in the IEDR, which is only mentioned in seven job postings during the same timeframe. This section details the results of that search, with a section dedicated to each unique certification.

Security+

CompTIA's Security+ certification “provides a global benchmark for best practices in IT network and operational security,” (CompTIA, 2019) and appears to be the most popular of the three in the IEDR, with 286 job postings mentioning it over the last 12 months. Of these 286 postings, 57% were seeking candidates with a bachelor’s degree or higher. The other 43% (96 postings) were seeking candidates with

a high school diploma or associate degree. Exhibit 8 displays the occupations associated with these 96 employer job postings. The occupations listed below account for 60% of all job postings.

Exhibit 8: Occupations associated with job postings mentioning Security+ certification, Sep 2018 – Aug 2019

Occupation	Job Ads
Computer User Support Specialists	26
Network and Computer Systems Administrators	12
Information Security Analysts	12
Industrial Machinery Mechanics	8
<i>Other Occupations</i>	38
Total	96

Source: Burning Glass – Labor Insights

The employers posting the majority of these job ads are displayed in Exhibit 9. The employers listed below account for 38% of job postings.

Exhibit 9: Employers associated with job postings mentioning Security+ certification, Sep 2018 – Aug 2019

Occupation	Job Ads
Booz Allen Hamilton Inc.	11
San Manuel Band Of Mission Indians/Casino	7
General Dynamics	5
Kros-Wise Inc	4
Arrowhead Regional Medical Center	3
CGI Group	3
County of San Bernardino	3
<i>Other Employers</i>	60
Total	96

Source: Burning Glass – Labor Insights

Network+

CompTIA’s Network+ “certifies the essential skills needed to confidently design, configure, manage and troubleshoot any wired and wireless device” (CompTIA, 2019). There were 182 job postings mentioning this certification during the last 12 months, and only 22% were seeking candidates with a bachelor’s degree. The majority of postings mentioning the Network+ certification were seeking candidates with a high school diploma or associate degree (78% or 97 job ads). Exhibit 10 displays the occupations associated with these 97 employer job postings. The occupations listed below account for 67% of all job postings.

Exhibit 10: Occupations associated with job postings mentioning Network+ certification, Sep 2018 – Aug 2019

Occupation	Job Ads
Computer User Support Specialists	40
Computer Occupations, All Other	8
Computer Network Support Specialists	6
Computer Systems Analysts	6
Network and Computer Systems Administrators	5
Other Occupations	32
Total	97

Source: Burning Glass – Labor Insights

The employers posting the majority of these job ads are displayed in Exhibit 11. The employers listed below account for 31% of job postings.

Exhibit 11: Employers associated with job postings mentioning Network+ certification, Sep 2018 – Aug 2019

Occupation	Job Ads
San Manuel Band Of Mission Indians/Casino	10
Amazon	7
Kros-Wise Inc	4
Abacus Solutions Group	3

Occupation	Job Ads
Arrowhead Regional Medical Center	3
H&R Block	3
<i>Other Employers</i>	67
Total	97

Source: Burning Glass – Labor Insights

Linux+

CompTIA’s Linux+ certification “is an internationally recognized credential validating technical competencies required for junior-level Linux administrators” (CompTIA, 2019). This certification was only mentioned in seven regional job ads over the last 12 months, four of which were seeking a candidate with a bachelor’s degree. The three remaining postings did not specify which level of education they desired.

With such few postings, the question becomes why employers are not seeking this specific certification, and if they are merely interested in candidates with Linux skills. During the same timeframe, there were 1,032 job postings seeking candidates with a Linux skillset. However, 85% of these job ads were seeking candidates with a bachelor’s degree or higher, indicating that employers associate the Linux skillset with candidates that possess a higher level of education than what is available at the community colleges.

Student Completions and Program Outcomes

Exhibit 12 displays the average annual regional California Community College (CCC) credentials conferred during the three academic years between 2015 and 2018, from the California Community Colleges Chancellor’s Office Management Information Systems (MIS) Data Mart, along with the enrollments from the most recent year available on LaunchBoard. Credentials are the combined total of associate degrees and certificates issued during the timeframe, divided by three in this case in order to calculate an annual average. This is done to minimize the effect of atypical variation that might be present in a single year. Enrollments are the count of enrollments in courses assigned to the TOP code in the selected year. The relevant TOP code is from the Taxonomy of Programs manual, and the corresponding program titles used at each college (in *italics*) are sourced from the Chancellor’s Office Curriculum Inventory (COCI). Please note, a credential is not always equal to a single person in search of a job opening since a student may earn more than one credential, such as an associate degree in addition to a certificate.

Exhibit 12: Annual average community college credentials and enrollments for the office technology/office computer applications programs in the IEDR

0702.00 – Computer Information Systems	CCC Enrollments, Academic Year 2016-17	CCC Annual Average Credentials, Academic Years 2015-18
Barstow – <i>Information Systems Management/Computer Information Systems/Computer Science</i>	351	
Associate of Science (A.S.) degree		1
Chaffey – <i>Computer Information Systems</i>	1,841	
Associate of Science (A.S.) degree		24
Certificate requiring 30 to < 60-semester units		8
Copper Mountain – <i>Computer Information Systems</i>		
Associate of Science (A.S.) degree		5
Crafton Hills – <i>Computer Information Systems</i>		
Associate of Science (A.S.) degree		7
Certificate requiring 18 to < 30-semester units		1
Certificate requiring 6 to < 18-semester units		1
Desert – <i>Computer Information Systems</i>	1,658	
Associate of Science (A.S.) degree		5
Certificate requiring 30 to < 60-semester units		2
Moreno Valley	587	
Mt. San Jacinto – <i>Computer Information Systems</i>	606	
Associate of Science (A.S.) degree		21
Certificate requiring 30 to < 60-semester units		2
Norco	665	
Palo Verde – <i>Computer Information Systems</i>		
Associate of Science (A.S.) degree		1
Certificate requiring 6 to < 18-semester units		50
Riverside	1,506	
San Bernardino – <i>CIT - Management Information Systems/Information Systems and Technology/Information Security and Cyber Defense</i>	140	
Associate of Arts (A.A.) degree		8
Associate of Science (A.S.) degree		2
Certificate requiring 18 to < 30-semester units		1*
Victor Valley – <i>Computer Information Systems</i>	35	
Associate of Science (A.S.) degree		17

0702.00 – Computer Information Systems	CCC Enrollments, Academic Year 2016-17	CCC Annual Average Credentials, Academic Years 2015-18
Total CCC Enrollments, Academic Year 2016-17	7,389	
Total Annual Average CCC Credentials, Academic Years 2015-18		152

Source: LaunchBoard, MIS Data Mart, COCI

*San Bernardino issued one certificate in 2015-16.

Community college student outcome information is from LaunchBoard and based on the selected TOP code and region. These metrics are based on records submitted to the California Community Colleges Chancellor's Office Management Information Systems (MIS) by community colleges, which come from self-reported student information from CCC Apply and the National Student Clearinghouse. Employment and earnings metrics are sourced from records provided by California's Employment Development Department's Unemployment Insurance database. When available, outcomes for completers are reported to demonstrate the impact that earning a degree or certificate can have on employment and earnings. For more information on the types of students included for each metric, please see the web link for LaunchBoard's Strong Workforce Program Metrics Data Element Dictionary in the References section (LaunchBoard, 2019a). Finally, employment in a job closely related to the field of study comes from self-reported student responses on the CTE Employment Outcomes Survey (CTEOS), administered by Santa Rosa Junior College (LaunchBoard, 2017). Data from the latest academic year for each metric is provided in Exhibit 13.

Exhibit 13: 0702.00 – Computer information systems strong workforce program outcomes

Strong Workforce Program Metrics: 0702.00 – Computer Information Systems Academic Year 2015-16, unless noted otherwise	Inland Empire/Desert region	California Median
Course enrollments (2016-17)	7,389	293
Completed 12+ units in one year (2016-17)	897	43
Economically disadvantaged students* (2016-17)	73%	75%
Transferred to a four-year institution* (transfers)	547	48
Employed in the fourth fiscal quarter after exit* (completers)	53%	68%
Median annual earnings* (completers)	\$27,906	\$29,465
Job closely related to the field of study (2014-15)	72%	73%
Median change in earnings* (completers)	65%	111%
Attained a living wage (completers and skills-builders)	48%	57%

Source: LaunchBoard, Community College Pipeline, Strong Program Workforce Metrics



Recommendation

The community college computer information systems program prepares students for employment in management information systems by providing instruction on data and information storage and processing, including hardware, software, basic design principles, and user requirements. Jobs in this occupational group are projected to have 171 annual job openings over the next five years. The hourly earning exceed the “good” hourly wage of \$18.00 that was established by the Brookings Institute for the Inland Empire region. Most employers indicated a need for a bachelor’s degree or higher for the occupations in this group. Colleges offering computer information systems programs should inform students that further education, a bachelor’s degree or higher, may be required to find gainful employment. A notable number of students are continuing their education at a four-year institution compared to the California median according to Strong Workforce Metrics. The COE recommends that colleges partner with local employers to discuss their future hiring needs and training and certification requirements for their computer information systems workforce.

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Appendix: Occupation definitions, sample job titles, five-year projections for management information systems occupations

Occupation Definitions (SOC) code), Education and Training Requirement, Community College Educational Attainment

Network and Computer Systems Administrators (15-1142)

Install, configure, and support an organization's local area network (LAN), wide area network (WAN), and Internet systems or a segment of a network system. Monitor network to ensure network availability to all system users and may perform necessary maintenance to support network availability. May monitor and test Web site performance to ensure Web sites operate correctly and without interruption. May assist in network modeling, analysis, planning, and coordination between network and data communications hardware and software. May supervise computer user support specialists and computer network support specialists. May administer network security measures.

Sample job titles: Information Analyst, Information Systems Manager (IS Manager), Information Technology Specialist (IT Specialist), LAN Specialist (Local Area Network Specialist), Local Area Network Administrator (LAN Administrator), Network Administrator, Network Coordinator, Network Manager, Network Specialist, Systems Administrator

Entry-Level Educational Requirement: Bachelor's degree

Training Requirement: None

Incumbent workers with a Community College Award or Some Postsecondary Coursework: 38%

Computer Network Architects (15-1143)

Design and implement computer and information networks, such as local area networks (LAN), wide area networks (WAN), intranets, extranets, and other data communications networks. Perform network modeling, analysis, and planning. May also design network and computer security measures. May research and recommend network and data communications hardware and software.

Sample job titles: Design Engineer, Network Analyst, Network and Security Engineer, Network Consultant, Network Systems Consultant, Networking Systems and Distributed Systems Engineer, Solutions Architect, Telecommunications Analyst

Entry-Level Educational Requirement: Bachelor's degree

Training Requirement: None

Percentage of incumbent workers with a Community College Credential or Some Postsecondary Coursework: 35%

Table 1: 2018 to 2023 job growth, wages, education, training, and work experience required for the management information systems occupational group, Inland Empire/Desert region

Occupation (SOC)	2018 Jobs	5-Yr Change (New Jobs)	5-Yr % Change (New Jobs)	Annual Openings (New + Replacement Jobs)	Entry-Experienced Hourly Wage (25 th to 75 th percentile)	Median Hourly Wage (50 th percentile)	Average Annual Earnings	Typical Entry-Level Education & On-The-Job Training Required	Work Experience Required
Network and Computer Systems Administrators (15-1142)	1,808	111	6%	136	\$30.32 to \$50.42	\$38.42	\$84,600	Bachelor's degree & None	None
Computer Network Architects (15-1143)	447	24	5%	34	\$28.78 to \$62.88	\$49.47	\$101,200	Bachelor's degree & None	5 years or more
Total	2,255	135	6%	171	-	-	-	-	-

Source: EMSI 2019.3