Cloud Computing Occupations
Labor Market Information Report
College of San Mateo

Prepared by the San Francisco Bay Center of Excellence
for Labor Market Research
January 2019

Recommendation

Based on all available data, there appears to be a significant undersupply of Cloud Computing workers compared to the demand for this cluster of occupations in the Bay region and in the Mid-Peninsula sub-region (San Francisco and San Mateo Counties). The gap is about 5,541 students annually in the Bay region and 1,812 students annually in the Mid-Peninsula Sub-Region.

This report also provides student outcomes data on employment and earnings for programs on TOP 0707.10 - Computer Programming in the state and region. It is recommended that this data be reviewed to better understand how outcomes for students taking courses on this TOP code compare to potentially similar programs at colleges in the state and region, as well as to outcomes across all CTE programs at College of San Mateo and in the region.

Introduction

This report profiles Cloud Computing Occupations in the 12 county Bay region and in the Mid-Peninsula sub-region for a proposed new program at College of San Mateo.

- **Computer Systems Analysts (SOC 15-1121):** Analyze science, engineering, business, and other data processing problems to implement and improve computer systems. Analyze user requirements, procedures, and problems to automate or improve existing systems and review computer system capabilities, workflow, and scheduling limitations. May analyze or recommend commercially available software.
    Entry-Level Educational Requirement: Bachelor's degree
    Training Requirement: None
    Percentage of Community College Award Holders or Some Postsecondary Coursework: 21%

- **Database Administrators (SOC 15-1141):** Administer, test, and implement computer databases, applying knowledge of database management systems. Coordinate changes to computer databases. May plan, coordinate, and implement security measures to safeguard computer databases. Excludes "Information Security Analysts" (15-1122).
    Entry-Level Educational Requirement: Bachelor's degree
    Training Requirement: None
    Percentage of Community College Award Holders or Some Postsecondary Coursework: 21%

- **Software Developers, Systems Software (SOC 15-1133):** 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. May design embedded systems software. Apply principles and techniques of computer science, engineering, and mathematical analysis.
    Entry-Level Educational Requirement: Bachelor's degree
    Training Requirement: None
    Percentage of Community College Award Holders or Some Postsecondary Coursework: 13%

- **Network and Computer Systems Administrators (SOC 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. Excludes "Information Security Analysts"(15-1122), "Computer User Support Specialists" (15-1151), and "Computer Network Support Specialists" (15-1152).

  Entry-Level Educational Requirement: Bachelor's degree

  Training Requirement: None

  Percentage of Community College Award Holders or Some Postsecondary Coursework: 38%

Occupational Demand

Table 1. Employment Outlook for Cloud Computing Occupations in Bay Region

Occupation	2017 Jobs	2022 Jobs	5-Yr Change	5-Yr % Change	5-Yr Open-ings	Annual Open-ings	10% Hourly Wage	Median Hourly Wage
Computer Systems Analysts	32,292	36,023	3,731	12%	2,888	2,123	$33.25	$53.21
Database Administrators	4,852	5,528	676	14%	458	322	$25.88	$49.62
Software Developers, Systems Software	40,880	44,555	3,675	9%	3,409	2,667	$40.33	$65.52
Network and Computer Systems Administrators	15,697	17,336	1,639	10%	1,334	995	$29.79	$49.09
Total	**93,721**	**103,442**	**9,721**	**10%**	**8,089**	**6,107**	**$35.38**	**$57.70**

Source: EMSI 2018.4
Bay Region includes Alameda, Contra Costa, Marin, Monterey, Napa, San Benito, San Francisco, San Mateo, Santa Clara, Santa Cruz, Solano and Sonoma Counties

Table 2. Employment Outlook for Cloud Computing Occupations in Mid-Peninsula Sub-Region

Occupation	2017 Jobs	2022 Jobs	5-Yr Change	5-Yr % Change	5-Yr Open-ings	Annual Open-ings	10% Hourly Wage	Median Hourly Wage
Computer Systems Analysts	11,488	13,364	1,876	16%	1,147	769	$36.72	$56.09
Database Administrators	1,618	1,928	310	19%	172	109	$30.84	$51.41
Software Developers, Systems Software	11,075	12,901	1,826	16%	1,108	743	$42.39	$65.17
Network and Computer Systems Administrators	4,714	5,495	781	17%	463	306	$29.24	$51.19
TOTAL	**28,896**	**33,689**	**4,793**	**17%**	**2,890**	**1,927**	**$37.34**	**$58.51**

Source: EMSI 2018.4
Mid-Peninsula Sub-Region includes San Francisco and San Mateo Counties

Job Postings in Bay Region and Mid-Peninsula Sub-Region

Table 3. Number of Job Postings by Occupation for latest 12 months (Jan 2018 - Dec 2018)

Occupation	Bay Region	Mid-Peninsula
Computer Systems Analysts (15-1121.00)	13,952	5,215
Database Administrators (15-1141.00)	10,647	4,023
Network and Computer Systems Administrators (15-1142.00)	6,864	2,208
Software Developers, Systems Software (15-1133.00)	1,308	416
Informatics Nurse Specialists (15-1121.01)	23	8

Cloud Computing Occupations in 12 County Bay Region and in Mid-Peninsula Sub-Region, 2019

Occupation	Bay Region	Mid-Peninsula
Total	**32,771**	**11,862**

Source: Burning Glass

Table 4. Top Job Titles for Cloud Computing Occupations for latest 12 months (Jan 2018 - Dec 2018)

Common Title	Bay	Mid-Peninsula	Common Title	Bay	Mid-Peninsula
Business Systems Analyst	2,321	948	SQL Developer	301	106
Data Engineer	2,117	895	Senior Systems Administrator	299	107
Systems Administrator	1,541	514	Database Engineer	286	121
Senior Data Engineer	969	503	Information Technology Analyst	277	116
Developer	870	297	Technical Analyst	271	114
Systems Analyst	760	266	Business Analyst	205	
Database Administrator	758	242	Database Developer	196	90
Technical Consultant	523	254	Oracle Consultant	195	58
ETL Developer	456	168	Information Technology Business Analyst	189	88
Software Development Engineer	432	129	Information Technology Administrator	188	87
Linux Administrator	401	59	Database Analyst	184	
Network Administrator	348	87	Information Technology Consultant	180	71
Oracle Database Administrator	337	86	Salesforce Administrator	175	103
Linux Systems Administrator	316	72	Oracle Developer	162	67

Source: Burning Glass

Industry Concentration

Table 5. Industries hiring Cloud Computing Workers in Bay Region

Industry – 6 Digit NAICS (No. American Industry Classification) Codes	Jobs in Industry (2017)	Jobs in Industry (2022)	% Change (2017-22)	% in Industry (2017)
Custom Computer Programming Services (541511)	19,669	19,933	14%	21.1%
Computer Systems Design Services (541512)	12,355	12,357	11%	13.1%
Electronic Computer Manufacturing (334111)	8,720	8,780	4%	9.3%
Software Publishers (511210)	5,467	5,589	18%	5.9%
Internet Publishing and Broadcasting and Web Search Portals (519130)	5,062	5,164	32%	5.5%
Data Processing, Hosting, and Related Services (518210)	3,658	3,808	33%	4.0%
Corporate, Subsidiary, and Regional Managing Offices (551114)	3,277	3,362	6%	3.6%
Other Computer Related Services (541519)	2,707	2,729	19%	2.9%
Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology) (541715)	1,797	1,834	(7%)	1.9%
Semiconductor and Related Device Manufacturing (334413)	1,332	1,325	(7%)	1.4%
Engineering Services (541330)	1,275	1,282	10%	1.4%
Local Government, Excluding Education and Hospitals (903999)	1,060	1,062	3%	1.1%
Computer and Computer Peripheral Equipment and Software Merchant Wholesalers (423430)	1,036	1,036	(4%)	1.1%
Temporary Help Services (561320)	961	956	4%	1.0%
Research and Development in Biotechnology (except Nanobiotechnology) (541714)	922	946	36%	1.0%

Cloud Computing Occupations in 12 County Bay Region and in Mid-Peninsula Sub-Region, 2019

Table 6. Top Employers Posting Cloud Computing Occupations in Bay Region and Mid-Peninsula Sub-Region (Jan. 2018 – Dec. 2018)

Employer	Bay	Employer	Bay	Employer	Mid-Peninsula
Google Inc.	278	Wipro	82	Accenture	123
Accenture	244	Capgemini	79	Facebook	115
Apple Inc.	231	Infoobjects Inc	79	Salesforce	93
Cisco Systems Incorporated	166	Mumba Technologies	77	Deloitte	90
Capital Markets Placement	162	Flexton Incorporated	75	Matchpoint Solutions Incorporated	82
Scoop Technologies	150	Codeforce 360	72	Wells Fargo	79
Deloitte	129	University California	67	Oracle	69
IBM	129	Republic Bancorp	66	Capgemini	65
Facebook	125	Vdart, Inc	63	Republic Bancorp	64
Techfetch Com	125	Diverse Lynx	61	IBM	63
Matchpoint Solutions Incorporated	124	Microsoft Corporation	59	Scoop Technologies	60
Wells Fargo	120	Xoriant	59	Google Inc.	52
Vmware Incorporated	104	K Anand Corporation	58	Capital Markets Placement	46
Kaiser Permanente	103	Bio-Rad Laboratories	57	Amazon	44
Oracle	98	Workday, Inc	56	Cisco Systems Incorporated	36
Salesforce	98	Intellipro Incorporated	55	Uber	36
Amazon	95	Intelliswift Software	55	Infoobjects Inc	32
Cynet Systems	94	Nityo Infotech	55	Bitsoft International Incorporated	31
Etouch Systems Corporation	94	Paypal	55	Mumba Technologies	31
Stanford University	82	SAP	54	Autodesk Incorporated	30

Educational Supply

There are 24 colleges in the Bay Region issuing 566 awards annually on the following TOP codes: TOP 0707.10 - Computer Programming, TOP 0702.00 – Computer Information Systems and TOP 0708.10 - Computer Networking. There are three colleges in the Mid-Peninsula Sub-Region issuing115 awards annually on these three TOP codes.

Table 7. Awards on TOP 0707.10 - Computer Programming, TOP 0702.00 – Computer Information Systems and TOP 0708.10 - Computer Networking in the Bay Region

College	Sub-Region	TOP Code	Headcount	Associates	Certificates	Total
Berkeley City College	East Bay	70710	n/a	2	4	6
Cabrillo College	Santa Cruz - Monterey	70710	133	6	20	26
Cañada College	Mid Peninsula	70710	n/a			
Chabot College	East Bay	70710	590			
City College of San Francisco	Mid-Peninsula	70710	24		54	54
College of Alameda	East Bay	70710	105			
College of Marin	North Bay	70710	39			
College of San Mateo	Mid-Peninsula	70710	400	0	2	2
Contra Costa College	East Bay	70710	n/a	1	1	2
De Anza College	Silicon Valley	70710	1,405	8	29	37
Diablo Valley College	East Bay	70710	n/a	43	112	155
Evergreen Valley College	Silicon Valley	70710	678			

College	Region	Code				
Foothill College	Silicon Valley	70710	n/a			
Gavilan College	Santa Cruz - Monterey	70710	414	8	3	11
Hartnell College	Santa Cruz - Monterey	70710	662	11	1	12
Laney College	East Bay	70710	108	1	0	1
Las Positas College	East Bay	70710	471	0	1	1
Los Medanos College	East Bay	70710	921			
Merritt College	East Bay	70710	315			
Mission College	Silicon Valley	70710	30			
Monterey Peninsula College	Santa Cruz - Monterey	70710	n/a			
Napa Valley College	North Bay	70710	145			
Ohlone College	East Bay	70710	504	1	0	1
San Jose City College	Silicon Valley	70710	459	6	6	12
Santa Rosa Junior College	North Bay	70710	606			
Skyline College	Mid-Peninsula	70710	n/a			
Solano College	North Bay	70710	n/a	4	0	4
West Valley College	Silicon Valley	70710	n/a			
Alameda	East Bay	70200	512	4	3	7
Berkeley	East Bay	70200	146			
Chabot	East Bay	70200	221	2		2
Diablo Valley	East Bay	70200	741			
Evergreen Valley	Silicon Valley	70200	n/a	1		1
Gavilan	Silicon Valley	70200	n/a	0		0
Laney	East Bay	70200	294			
Las Positas	East Bay	70200	368	3		3
Los Medanos	East Bay	70200	n/a		1	1
Marin	North Bay	70200	181	0	1	1
Merritt	East Bay	70200	390	2	3	6
Mission	Silicon Valley	70200	211	6		6
Monterey	Santa Cruz & Monterey	70200	35			
Napa	North Bay	70200	161	3	0	3
San Francisco	Mid-Peninsula	70200	220			
Santa Rosa	North Bay	70200	77			
Skyline	Mid-Peninsula	70200	n/a	3	1	3
Contra Costa	East Bay	70810	n/a	3	12	15
Contra Costa	East Bay	70810	216			
Deanza	Silicon Valley	70810	151	10	10	19
Diablo Valley	North Bay	70810	167	5	1	6
Foothill	Silicon Valley	70810	n/a	1		1
Gavilan	Silicon Valley	70810	24	4	1	5
Las Positas	East Bay	70810	n/a	4	1	5
Los Medanos	East Bay	70810	n/a	7	8	15
Mission	Silicon Valley	70810	230	12	20	32
Monterey	Santa Cruz - Monterey	70810	97		1	1
Ohlone	East Bay	70810	495	3	17	20
San Francisco	Mid-Peninsula	70810	1,289		50	50
San Jose City	Silicon Valley	70810	154	6	7	13
San Mateo	Mid-Peninsula	70810	38			
Santa Rosa	North Bay	70810	39		20	20
Skyline	Mid-Peninsula	70810	n/a	4	1	5
Total Bay Region			**13,954**	**175**	**391**	**566**
Total Mid-Peninsula Sub-Region			**2,748**	**7**	**108**	**115**

Source: IPEDS, Data Mart and Launchboard

NOTE: Headcount of students who took one or more courses is for 2016-17. The annual average for awards is 2014-17 unless there are only awards in 2016-17. The annual average for other postsecondary is for 2013-16.

Cloud Computing Occupations in 12 County Bay Region and in Mid-Peninsula Sub-Region, 2019

Gap Analysis

Based on the data included in this report, there is a large labor market gap in the Bay region with 6,107 annual openings for the Cloud Computing occupational cluster and 566 annual awards for an annual undersupply of 5,541 students. In the Mid-Peninsula Sub-Region, there is also a gap with 1,927 annual openings and 115 annual awards for an annual undersupply of 1,812 students.

Student Outcomes

Table 8. Four Employment Outcomes Metrics for Students Who Took Courses on TOP 0707.10 - Computer Programming

2015-16	Bay (All CTE Programs)	College of San Mateo (All CTE Programs)	State (0707.10)	Bay (0707.10)	Mid-Peninsula (0707.10)	College of San Mateo (0707.10)
% Employed Four Quarters After Exit	74%	73%	63%	65%	67%	68%
Median Quarterly Earnings Two Quarters After Exit	$10,550	$24,257	$21,930	$27,905	$32,263	$41,564
Median % Change in Earnings	46%	57%	51%	55%	59%	44%
% of Students Earning a Living Wage	63%	57%	58%	63%	63%	65%

Source: Launchboard Pipeline (version available on 1/9/19)

Skills, Certifications and Education

Table 9. Top Skills for Cloud Computing Occupations in Bay Region (Jan 2018 - Dec 2018)

Skill	Postings	Skill	Postings	Skill	Postings
SQL	8,870	Data Warehousing	2,390	Performance tuning	1,857
Python	6,880	Customer Service	2,349	VMware	1,856
Oracle	5,734	Software Engineering	2,240	Scala	1,841
Java	5,528	Database Administration	2,211	MySQL	1,827
Linux	5,421	Systems Analysis	2,202	Apache Kafka	1,823
Project Management	3,872	Salesforce	2,160	Quality Assurance and Control	1,784
System Administration	3,794	Technical Support	2,131	Scheduling	1,762
Apache Hadoop	3,574	Business Analysis	2,098	PERL Scripting Language	1,748
Business Process	3,524	JavaScript	2,060	Shell Scripting	1,722
Software Development	3,423	Information Systems	2,011	Data Modeling	1,660
Extraction Transformation and Loading (ETL)	3,356	Apache Hive	2,005	Relational Databases	1,630
Big Data	3,141	Pipeline (Computing)	1,996	C++	1,599
UNIX	2,908	SAP	1,982	NoSQL	1,529
Business Systems Analysis	2,719	Data Analysis	1,978	Machine Learning	1,516
Business Systems	2,602	Data Science	1,879	Tableau	1,487

Source: Burning Glass

Table 10. Certifications for Cloud Computing Occupations in the Bay Region (Jan 2018 - Dec 2018)

Note: 90% of records have been excluded because they do not include a certification. As a result, the chart below may not be representative of the full sample.

Certification	Postings	Certification	Postings
IT Infrastructure Library (ITIL) Certification	663	Oracle Certification	89
Driver's License	452	Microsoft Certified Professional (MCP)	78

Project Management Certification	304	Vmware Certified Professional (VCP)	71
Cisco Certified Network Associate (CCNA)	284	Certified Information Systems Auditor (CISA)	67
Security Clearance	263	Six Sigma Certification	63
ITIL Certification	210	Microsoft Certified Technology Specialist (MCTS)	62
Certified Salesforce Administrator	198	Certified Salesforce Advanced Administrator	48
Microsoft Certified Solutions Expert (MCSE)	197	SANS/GIAC Certification	46
Microsoft Certified Solutions Associate (MCSA)	182	ITIL Foundation	43
CompTIA Security+	164	Certified Scrum Trainer (CST)	42
Cisco Certified Network Professional (CCNP)	141	Certified Administrator	37
Certified Information Systems Security Professional (CISSP)	138	Epic Certification	35
Certified A+ Technician	128	SAP Certification	34
Project Management Professional (PMP)	124	Red Hat Certified System Adminstrator (RHCSA)	33
CompTIA Network+	105	Salesforce Developer	32
Cisco Certified Internetwork Expert (CCIE)	96	Certified Business Analysis Professional (CBAP)	29
Red Hat Certified Engineer (RHCE)	94	Microsoft Certified Systems Administrator (Legacy)	27

Source: Burning Glass

Table 11. Education Requirements for Cloud Computing Occupations in Bay Region

Note: 52% of records have been excluded because they do not include a degree level. As a result, the chart below may not be representative of the full sample.

Education (minimum advertised)	Latest 12 Mos. Postings
High school or vocational training	825 (5%)
Associate Degree	455 (3%)
Bachelor's Degree or Higher	13,974 (92%)

Source: Burning Glass

Methodology

Occupations for this report were identified by use of skills listed in O*Net descriptions and job descriptions in Burning Glass. Labor demand data is sourced from Economic Modeling Specialists International (EMSI) occupation data and Burning Glass job postings data. Educational supply and student outcomes data is retrieved from multiple sources, including CTE Launchboard and CCCCO Data Mart.

Sources

O*Net Online
Labor Insight/Jobs (Burning Glass)
Economic Modeling Specialists International (EMSI)
CTE LaunchBoard www.calpassplus.org/Launchboard/
Statewide CTE Outcomes Survey
Employment Development Department Unemployment Insurance Dataset
Living Insight Center for Community Economic Development
Chancellor's Office MIS system

Contacts

For more information, please contact:

- Doreen O'Donovan, Data Research Analyst, for Bay Area Community College Consortium (BACCC) and Centers of Excellence (CoE), doreen@baccc.net or (831) 479-6481

Cloud Computing Occupations in 12 County Bay Region and in Mid-Peninsula Sub-Region, 2019

- John Carrese, Director, San Francisco Bay Center of Excellence for Labor Market Research, jcarrese@ccsf.edu or (415) 267-6544