



# Labor Market Analysis for Program Recommendation

## Cloud Computing Occupations

### City College of San Francisco College

Prepared by the San Francisco Bay Center of Excellence for Labor Market Research  
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#### Recommendation

Based on all available data, there appears to be an “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, San Mateo counties). There is a projected annual gap of about 7,238 students in the Bay region and 3,083 students in the Mid-Peninsula Sub-Region.

#### Introduction

This report provides student outcomes data on employment and earnings for TOP 0708.10 Computer Networking programs in the state and region. It is recommended that these 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 City College of San Francisco College and in the region.

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

- **Information Security Analysts (15-1212):** Plan, implement, upgrade, or monitor security measures for the protection of computer networks and information. May ensure appropriate security controls are in place that will safeguard digital files and vital electronic infrastructure. May respond to computer security breaches and viruses. Excludes “Computer Network Architects” (15-1143).  
Entry-Level Educational Requirement: Bachelor’s degree  
Training Requirement: None  
Percentage of Community College Award Holders or Some Postsecondary Coursework: 27%
- **Computer Network Support Specialists (15-1231):** Analyze, test, troubleshoot, and evaluate existing network systems, such as local area network (LAN), wide area network (WAN), and Internet systems or a segment of a network system. Perform network maintenance to ensure networks operate correctly with minimal interruption. Excludes “Network and Computer Systems Administrators” (15-1142) and “Computer Network Architects” (15-1143).  
Entry-Level Educational Requirement: Associate’s degree  
Training Requirement: None  
Percentage of Community College Award Holders or Some Postsecondary Coursework: 41%
- **Computer User Support Specialists (15-1232):** Provide technical assistance to computer users. Answer questions or resolve computer problems for clients in person, or via telephone or electronically. May provide assistance concerning the use of computer hardware and software, including printing, installation, word processing, electronic mail, and operating systems. Excludes “Network and Computer Systems Administrators” (15-1142).  
Entry-Level Educational Requirement: Some college, no degree

Training Requirement: None

Percentage of Community College Award Holders or Some Postsecondary Coursework: 41%

- **Network and Computer Systems Administrators (15-1244):** 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: 40%

- **Web Developers and Digital Interface Designers (15-1257):** Design, create, and modify Web sites. Analyze user needs to implement Web site content, graphics, performance, and capacity. May integrate Web sites with other computer applications. May convert written, graphic, audio, and video components to compatible Web formats by using software designed to facilitate the creation of Web and multimedia content. Excludes "Multimedia Artists and Animators" (27-1014).

Entry-Level Educational Requirement: Associate's degree

Training Requirement: None

Percentage of Community College Award Holders or Some Postsecondary Coursework: 26%

## Occupational Demand

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

Occupation	2020 Jobs	2025 Jobs	5-yr Change	5-yr % Change	5-yr Total Openings	Annual Openings	25% Hourly Earning	Median Hourly Wage
Information Security Analysts	4,636	5,992	1,356	29%	3,680	736	\$57	\$93
Computer Network Support Specialists	5,615	6,507	891	16%	3,496	699	\$33	\$66
Computer User Support Specialists	28,162	32,436	4,273	15%	17,236	3,447	\$29	\$61
Network and Computer Systems Administrators	12,368	13,879	1,511	12%	6,352	1,270	\$46	\$80
Web Developers and Digital Interface Designers	11,299	12,887	1,587	14%	6,662	1,332	\$37	\$76
<b>Total</b>	<b>62,080</b>	<b>71,701</b>	<b>9,621</b>	<b>15%</b>	<b>37,426</b>	<b>7,484</b>		

Source: EMSI 2021.3

**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	2020 Jobs	2025 Jobs	5-yr Change	5-yr % Change	5-yr Total Openings	Annual Openings	25% Hourly Earning	Median Hourly Wage
Information Security Analysts	1,643	2,269	625	38%	1,505	301	\$59	\$94
Computer Network Support Specialists	1,910	2,371	461	24%	1,406	281	\$38	\$70

Occupation	2020 Jobs	2025 Jobs	5-yr Change	5-yr % Change	5-yr Total Openings	Annual Openings	25% Hourly Earning	Median Hourly Wage
Computer User Support Specialists	10,655	12,855	2,200	21%	7,322	1,464	\$35	\$65
Network and Computer Systems Administrators	4,237	5,030	793	19%	2,548	510	\$44	\$79
Web Developers and Digital Interface Designers	4,723	5,556	832	18%	3,014	603	\$41	\$81
<b>Total</b>	<b>23,168</b>	<b>28,081</b>	<b>4,913</b>	<b>21%</b>	<b>15,795</b>	<b>3,159</b>		

Source: EMSI 2021.3

Mid-Peninsula Sub-Region includes: San Francisco, 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 (Dec 2020 - Nov 2021)

Occupation	Bay Region	Mid-Peninsula
Web Developers	19,651	8,234
Computer User Support Specialists	11,498	3,821
Information Security Analysts	7,607	2,833
Network and Computer Systems Administrators	4,441	1,321
Computer Network Support Specialists	1,191	354

Source: Burning Glass

Table 4a. Top Job Titles for Cloud Computing Occupations for latest 12 months (Dec 2020 - Nov 2021)

### Bay Region

Title	Bay	Title	Bay
Backend Engineer	671	Backend Engineer - Remote	297
Front End Engineer	618	Ux Researcher	287
Senior Backend Engineer	596	Front End Engineer - Remote	263
Senior Front End Engineer	581	Senior Ux Designer	262
Ux Designer	479	Ui Developer	256
Front End Developer	476	Technical Support Engineer	223
It Support Specialist	355	Desktop Support Technician	217
Web Developer	335	Desktop Support	201
Systems Administrator	323	Security Engineer	186

Source: Burning Glass

**Table 4b. Top Job Titles for Cloud Computing Occupations for latest 12 months (Dec 2020 - Nov 2021)  
Mid-Peninsula Sub-Region**

Title	Mid-Peninsula	Title	Mid-Peninsula
Senior Backend Engineer	226	Systems Administrator	108
Ux Designer	209	Web Developer	103
Backend Engineer	188	Senior Frontend Engineer	98
Front End Engineer	177	Technical Support Engineer	98
It Support Specialist	175	Security Engineer	89
Ux Researcher	169	Senior Security Engineer	88
Front End Developer	161	Ui/Ux Designer	85
Senior Front End Engineer	159	Ui Developer	76
Senior Ux Designer	133	Frontend Engineer	70

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 (2020)	Jobs in Industry (2025)	% Change (2020-25)	% Occupation Group in Industry (2020)
Custom Computer Programming Services	12,850	15,699	22%	21%
Computer Systems Design Services	6,984	8,065	15%	11%
Software Publishers	5,703	6,875	21%	9%
Internet Publishing and Broadcasting and Web Search Portals	4,888	6,163	26%	8%
Data Processing, Hosting, and Related Services	3,363	4,188	25%	5%
Other Computer Related Services	1,868	2,347	26%	3%
Electronic Computer Manufacturing	1,713	1,945	14%	3%
Corporate, Subsidiary, and Regional Managing Offices	1,817	1,711	-6%	3%
Colleges, Universities, and Professional Schools	1,027	1,097	7%	2%
Local Government, Excluding Education and Hospitals	985	1,024	4%	2%

Source: EMSI 2021.3

**Table 6. Top Employers Posting Cloud Computing Occupations in Bay Region and Mid-Peninsula Sub-Region (Dec 2020 - Nov 2021)**

Employer	Bay	Employer	Mid-Peninsula
Palo Alto Networks	400	Facebook	228

Employer	Bay	Employer	Mid-Peninsula
Google Inc.	359	Wells Fargo	222
Microsoft Corporation	339	Amazon	205
Amazon	339	Uber	164
Cisco Systems Incorporated	325	Splunk	127
Wells Fargo	314	Accenture	116
Apple Inc.	304	Google Inc.	111
Lucid Motors Inc	292	Salesforce	109
Splunk	288	Microsoft Corporation	104
Uber	287	Cisco Systems Incorporated	83

Source: Burning Glass

## Educational Supply

There are 15 community colleges in the Bay Region issuing 246 awards on average annually (last 3 years ending 2018-19) on TOP 0708.10 Computer Networking. In the Mid-Peninsula Sub-Region, there are two (2) community colleges that issued 76 awards on average annually (last 3 years) on this TOP code.

**Table 7a. Community College Awards on TOP 0708.10 Computer Networking in Bay Region**

College	Subregion	Associate	Certificate Low	Noncredit	Total
Cabrillo	SC-Monterey	6	1	0	7
Contra Costa	East Bay	2	13	0	15
De Anza	Silicon Valley	17	14	0	31
Diablo Valley	East Bay	7	2	0	9
Foothill	Silicon Valley	1	0	0	1
Gavilan	Silicon Valley	3	2	0	5
Las Positas	East Bay	3	1	1	5
Los Medanos	East Bay	8	6	0	14
Mission	Silicon Valley	10	15	0	25
Monterey	SC-Monterey	0	2	1	3
Ohlone	East Bay	4	14	0	18
San Francisco	Mid-Peninsula	0	66	0	66
San Jose City	Silicon Valley	8	10	0	18
Santa Rosa	North Bay	0	19	0	19
Skyline	Mid-Peninsula	8	2	0	10

College	Subregion	Associate	Certificate Low	Noncredit	Total
<b>Total</b>		<b>77</b>	<b>167</b>	<b>2</b>	<b>246</b>

Source: Data Mart; Note: The annual average for awards is 2016-17 to 2018-19.

## Gap Analysis

Based on the data included in this report, there is a large labor market gap in the Bay region with 7,484 annual openings for the Cloud Computing occupational cluster and 246 annual (3-year average) awards for an annual undersupply of 7,238 students. In the Mid-Peninsula Sub-Region, there is also a gap with 3,159 annual openings and 76 annual (3-year average) awards for an annual undersupply of 3,083 students.

## Student Outcomes

**Table 8. Four Employment Outcomes Metrics for Students Who Took Courses on TOP 0708.10 Computer Networking**

Metric Outcomes	Bay All CTE Programs	CCSF All CTE Programs	State 0708.10	Bay 0708.10	Mid-Peninsula 0708.10	CCSF 0708.10
Students with a Job Closely Related to Their Field of Study	75%	75%	69%	68%	63%	63%
Median Annual Earnings for SWP Exiting Students	\$44,575	\$45,125	\$48,706	\$56,159	\$56,044	\$56,207
Median Change in Earnings for SWP Exiting Students	31%	31%	17%	20%	23%	23%
Exiting Students Who Attained the Living Wage	52%	50%	63%	58%	49%	49%

Source: Launchboard Strong Workforce Program Median of 2016-18.

## Skills, Certifications and Education

**Table 9. Top Skills for Cloud Computing Occupations in Bay Region (Dec 2020 - Nov 2021)**

Skill	Posting	Skill	Posting
JavaScript	9,324	Ruby	3,305
Python	7,031	Git	3,290
Software Engineering	6,811	Web Application Development	3,234
Technical Support	6,681	Ruby on Rails	3,047
Java	6,471	AngularJS	2,990
Customer Service	5,766	Repair	2,975
SQL	5,043	Adobe Photoshop	2,944
Software Development	4,879	Microsoft Active Directory	2,901
Linux	4,741	System Administration	2,773
React Javascript	4,636	Unit Testing	2,694

Skill	Posting	Skill	Posting
Front-end Development	4,518	HTML5	2,559
Information Security	3,953	Information Systems	2,502
Web Development	3,937	Software as a Service (SaaS)	2,500
Project Management	3,662	MySQL	2,456

Source: Burning Glass

**Table 10. Certifications for Cloud Computing Occupations in the Bay Region (Dec 2020 - Nov 2021)**

Certification	Posting	Certification	Posting
Certified Information Systems Security Professional (CISSP)	1,855	CompTIA Network+	456
Driver's License	1,247	Information Systems Certification	414
IT Infrastructure Library (ITIL) Certification	1,081	Microsoft Certified Professional (MCP)	342
Certified A+ Technician	884	Microsoft Certified Solutions Expert (MCSE)	329
Certified Information Systems Auditor (CISA)	815	Certified in Risk and Information Systems Control	327
Certified Information Security Manager (CISM)	768	Microsoft Certified Solutions Associate (MCSA)	294
SANS/GIAC Certification	761	Cisco Certified Network Professional (CCNP)	280
Cisco Certified Network Associate (CCNA)	611	Project Management Certification	275
Security Clearance	566	Cisco Certified Security Professional	240
CompTIA Security+	521	GIAC Certified Incident Handler (GCIH)	193

Source: Burning Glass

Note: 84% of records have been excluded because they do not include a certification. As a result, the chart above may not be representative of the full sample.

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

Education (minimum advertised)	Latest 12 Mos. Postings	Percent 12 Mos. Postings
High school or vocational training	2,651	10%
Associate's degree	1,071	4%
Bachelor's degree and higher	22,049	86%

Source: Burning Glass

Note: 42% of records have been excluded because they do not include a degree level. As a result, the chart above may not be representative of the full sample.

## 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 CCCCCO Data Mart.

## Sources

O\*Net Online

Labor Insight/Jobs (Burning Glass)

Economic Modeling Specialists International (EMSI)

CTE LaunchBoard [www.calpassplus.org/Launchboard/](http://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

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