

# 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

**January 2022**

## 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 |
| **Total** | **62,080** | **71,701** | **9,621** | **15%** | **37,426** | **7,484** |  |  |
| 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 |
| 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 |
| **Total** | **23,168** | **28,081** | **4,913** | **21%** | **15,795** | **3,159** |  |  |
| 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 |
| 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 |
| **Total** |  | **77** | **167** | **2** | **246** |
| 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 |
| 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 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:

• Leila Jamoosian, Research Analyst, for Bay Area Community College Consortium (BACCC) and Centers of Excellence (CoE), [leila@baccc.net](mailto:leila@baccc.net)

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