

**Labor Market Analysis for Program Recommendation**

**Web Applications Development Occupations**

**Foothill College**

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

**August 2022**

## Recommendation

Based on all available data, there appears to be an “undersupply” of Web Applications Development workers compared to the demand for this cluster of occupations in the Bay region and in the Silicon Valley sub-region (Santa Clara county). There is a projected annual gap of about 16,947 students in the Bay region and 8,412 students in the Silicon Valley Sub-Region.

## Introduction

This report provides student outcomes data on employment and earnings for TOP 0707.10 Computer Programming 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 Foothill College and in the region.

This report profiles Web Applications Development Occupations in the 12 county Bay region and in the Silicon Valley sub-region for a proposed new program at Foothill College.

* **Computer Programmers (15-1251):** Create, modify, and test the code, forms, and script that allow computer applications to run. Work from specifications drawn up by software developers or other individuals. May assist software developers by analyzing user needs and designing software solutions. May develop and write computer programs to store, locate, and retrieve specific documents, data, and information.
  Entry-Level Educational Requirement: Bachelor’s degree
  Training Requirement: None
  Percentage of Community College Award Holders or Some Postsecondary Coursework: 20%
* **Software Developers and Software Quality Assurance Analysts and Testers (15-1256):** Develop, create, and modify general computer applications software or specialized utility programs. Analyze user needs and develop software solutions. Design software or customize software for client use with the aim of optimizing operational efficiency. May analyze and design databases within an application area, working individually or coordinating database development as part of a team. May supervise computer programmers.
  Entry-Level Educational Requirement: Bachelor’s degree
  Training Requirement: None
  Percentage of Community College Award Holders or Some Postsecondary Coursework: 11%
* **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 Web Applications Development 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** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Computer Programmers | 10,252 | 10,237 | -15 | 0% | 3,671 | 734 | $43 | $56 |
| Software Developers and Software Quality Assurance Analysts and Testers | 140,249 | 162,499 | 22,250 | 16% | 75,729 | 15,146 | $56 | $72 |
| Web Developers and Digital Interface Designers | 11,548 | 12,950 | 1,402 | 12% | 5,832 | 1,166 | $30 | $48 |
| **Total** | **162,049** | **185,686** | **23,637** | **15%** | **85,231** | **17,046** |  |  |
| Source: EMSI 2022.1 |

**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 Web Applications Development Occupations in Silicon Valley 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** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Computer Programmers | 3,794 | 3,787 | -7 | -0% | 1,325 | 265 | $39 | $51 |
| Software Developers and Software Quality Assurance Analysts and Testers | 74,735 | 85,370 | 10,634 | 14% | 38,920 | 7,784 | $58 | $75 |
| Web Developers and Digital Interface Designers | 3,641 | 4,152 | 512 | 14% | 1,891 | 378 | $32 | $49 |
| **Total** | **82,170** | **93,309** | **11,139** | **14%** | **42,135** | **8,427** |  |  |
| Source: EMSI 2022.1 |

**Silicon Valley Sub-Region includes:** Santa Clara County

### Job Postings in Bay Region and Silicon Valley Sub-Region

**Table 3. Number of Job Postings by Occupation for latest 12 months (Aug 2021 - Jul 2022)**

| **Occupation** | **Bay Region** | **Silicon Valley** |
| --- | --- | --- |
| Software Developers, Applications | 109,492 | 49,474 |
| Web Developers | 22,118 | 8,411 |
| Software Quality Assurance Engineers and Testers | 11,298 | 5,696 |
| Computer Programmers | 4,052 | 1,521 |
| Software Developers, Systems Software | 929 | 500 |
| Source: Burning Glass |

**Table 4a. Top Job Titles for Web Applications Development Occupations for latest 12 months (Aug 2021 - Jul 2022) - Bay Region**

| **Title** | **Bay** | **Title** | **Bay** |
| --- | --- | --- | --- |
| Software Engineer | 3,607 | Ios Developer | 591 |
| Senior Software Engineer | 3,068 | Front End Engineer | 557 |
| Devops Engineer | 1,436 | UX Designer | 537 |
| Java Developer | 1,005 | Staff Software Engineer | 524 |
| Senior Devops Engineer | 813 | Front End Developer | 524 |
| Android Developer | 707 | Senior Backend Engineer | 516 |
| Backend Engineer | 698 | Principal Software Engineer  | 515 |
| Full Stack Developer | 670 | Salesforce Developer | 509 |
| Software Developer | 656 | Python Developer | 497 |
| Source: Burning Glass |

**Table 4b. Top Job Titles for Web Applications Development Occupations for latest 12 months (Aug 2021 - Jul 2022) - Silicon Valley Sub-Region**

| **Title** | **Silicon Valley** | **Title** | **Silicon Valley** |
| --- | --- | --- | --- |
| Software Engineer | 1,472 | Frontend Developer | 255 |
| Senior Software Engineer | 1,027 | Senior Java Developer | 247 |
| Devops Engineer | 587 | Ios Developer | 245 |
| Java Developer | 509 | UX Designer | 239 |
| Python Developer | 335 | Full Stack Developer | 236 |
| Senior Devops Engineer | 325 |  Software Engineer III | 217 |
| Android Developer | 311 | Staff Software Engineer | 213 |
| Backend Engineer | 259 | Design Verification Engineer | 204 |
| Software Developer | 255 | Embedded Software Engineer | 203 |
| Source: Burning Glass |

## Industry Concentration

**Table 5. Industries hiring Web Applications Development 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)** |
| --- | --- | --- | --- | --- |
| Computer Systems Design Services | 302,806 | 360,230 | 19% | 16% |
| Custom Computer Programming Services | 292,349 | 350,646 | 20% | 15% |
| Software Publishers | 170,991 | 213,602 | 25% | 9% |
| Corporate, Subsidiary, and Regional Managing Offices | 85,575 | 92,102 | 8% | 4% |
| Data Processing, Hosting, and Related Services | 66,806 | 79,776 | 19% | 4% |
| Internet Publishing and Broadcasting and Web Search Portals | 43,477 | 58,566 | 35% | 2% |
| Engineering Services | 38,428 | 42,045 | 9% | 2% |
| Other Computer Related Services | 37,019 | 43,736 | 18% | 2% |
| Temporary Help Services | 33,560 | 40,998 | 22% | 2% |
| Electronic Shopping and Mail-Order Houses | 32,190 | 43,263 | 34% | 2% |
| Source: EMSI 2022.1 |

**Table 6. Top Employers Posting Web Applications Development Occupations in Bay Region and Silicon Valley Sub-Region (Aug 2021 - Jul 2022)**

| **Employer** | **Bay** | **Employer** | **Silicon Valley** |
| --- | --- | --- | --- |
| Amazon | 3,903 | Amazon | 2,236 |
| Apple Inc. | 1,788 | Apple Inc. | 1,698 |
| Google Inc. | 1,637 | Google Inc. | 1,294 |
| Walmart | 956 | Intel Corporation | 835 |
| Intel Corporation | 843 | Walmart | 792 |
| Capital One | 789 | Nividia Corporation | 694 |
| eBay | 763 | Palo Alto Networks | 513 |
| Nividia Corporation | 695 | Cisco Systems Incorporated | 453 |
| TATA Consultancy Services | 674 | Advanced Micro Devices | 424 |
| Facebook | 667 | Paypal  | 371 |
| Lucid Motors | 663 | Rivian | 355 |
| Source: Burning Glass |

## Educational Supply

There are eight (8) community colleges in the Bay Region issuing 42 awards on average annually (last 3 years ending 2018-19) on TOP 0707.10 Computer Programming. In the Silicon Valley Sub-Region, there are four (4) community colleges that issued eight (8) awards on average annually (last 3 years) on this TOP code.

There are two (2) other CTE educational institutions in the Bay Region issuing 57 awards on average annually (last 3 years ending 2019-20) on TOP 0707.10 Computer Programming. There is one (1) other CTE educational institution in the Silicon Valley Sub-Region issuing seven (7) awards on average annually (last 3 years) on this TOP code.

**Table 7a. Community College Awards on TOP 0707.10 Computer Programming in Bay Region**

| **College** | **Subregion** | **Associate Degree** | **Award < 1 academic yr** | **Postsecondary awards** | **Total** |
| --- | --- | --- | --- | --- | --- |
| Berkeley City College | East Bay | 3 | 2 | 0 | 5 |
| Cabrillo College | SC-Monterey | 4 | 19 | 1 | 24 |
| Canada College | Mid-Peninsula | 0 | 4 | 0 | 4 |
| Foothill College | Silicon Valley | 0 | 1 | 0 | 1 |
| Mission College | Silicon Valley | 0 | 3 | 0 | 3 |
| Ohlone College | East Bay | 0 | 1 | 0 | 1 |
| San Jose City College | Silicon Valley | 0 | 1 | 1 | 2 |
| West Valley College | Silicon Valley | 0 | 1 | 1 | 2 |
| **Total** |  | **7** | **32** | **3** | **42** |
| Source: Data Mart |

*Note: The annual average for awards is 2017-18 to 2019-20.*

**Table 7b. Other CTE Institutions Awards on TOP 0707.10 Computer Programming in Bay Region**

| **College** | **Subregion** | **Associate Degree** | **Bachelor's degree** | **Total** |
| --- | --- | --- | --- | --- |
| Academy of Art University | Mid-Peninsula | 6 | 44 | 50 |
| Santa Clara University | Silicon Valley | 0 | 7 | 7 |
| **Total** |  | **6** | **51** | **57** |

*Note: The annual average for awards is 2017-18 to 2019-20.*

## Gap Analysis

Based on the data included in this report, there is a large labor market gap in the Bay region with 17,046 annual openings for the Web Applications Development occupational cluster and 99 annual (3-year average) awards for an annual undersupply of 16,947 students. In the Silicon Valley Sub-Region, there is also a gap with 8,427 annual openings and 15 annual (3-year average) awards for an annual undersupply of 8,412 students.

## Student Outcomes

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

| **Metric Outcomes** | **Bay All CTE Programs** | **Foothill All CTE Programs** | **State 0707.10** | **Bay 0707.10** | **Silicon Valley 0707.10** | **Foothill 0707.10** |
| --- | --- | --- | --- | --- | --- | --- |
| Students with a Job Closely Related to Their Field of Study | 74% | 91% | 65% | 66% | 63% | 100% |
| Median Annual Earnings for SWP Exiting Students | $47,419 | $66,288 | $39,896 | $55,772 | $58,498 | $81,566 |
| Median Change in Earnings for SWP Exiting Students | 23% | 43% | 21% | 20% | 18% | 21% |
| Exiting Students Who Attained the Living Wage | 52% | 64% | 54% | 55% | 56% | 71% |
| Source: Launchboard Strong Workforce Program Median of 2017 to 2020. |

## Skills, Certifications and Education

**Table 9. Top Skills for Web Applications Development Occupations in Bay Region (Aug 2021 - Jul 2022)**

| **Skill** | **Posting** | **Skill** | **Posting** |
| --- | --- | --- | --- |
| JavaScript | 10,855 | Linux | 3,262 |
| Software Engineering | 8,720 | Scrum | 3,040 |
| Java | 8,361 | Ruby | 3,031 |
| Python | 8,255 | Ruby on Rails | 2,976 |
| Quality Assurance and Control | 8,113 | Adobe Photoshop | 2,972 |
| Software Development | 7,184 | AngularJS | 2,877 |
| SQL | 5,900 | Atlassian JIRA | 2,849 |
| React Javascript | 4,821 | Selenium | 2,814 |
| Git | 4,516 | Project Management | 2,775 |
| Front-end Development | 4,500 | HTML5 | 2,659 |
| Web Development | 4,088 | Product Management | 2,641 |
| Web Application Development | 3,915 | Docker Software | 2,633 |
| Unit Testing | 3,424 | TypeScript | 2,630 |
| Debugging | 3,310 | Product Development | 2,622 |
| Source: Burning Glass |

**Table 10. Certifications for Web Applications Development Occupations in Bay Region (Aug 2021 - Jul 2022)**

| **Certification** | **Posting** | **Certification** | **Posting** |
| --- | --- | --- | --- |
| Driver's License | 227 | Cisco Certified Security Professional | 56 |
| Security Clearance | 184 | Six Sigma Certification | 48 |
| Project Management Certification | 161 | First Aid Cpr Aed | 38 |
| Certified Scrum Trainer (CST) | 131 | Certified Software Quality Engineer (CSQE) | 36 |
| Project Management Professional (PMP) | 124 | Certified Novell Administrator | 36 |
| Certified Salesforce Platform Developer | 76 | ISTQB Certified | 32 |
| Certified Quality Engineer (CQE) | 74 | Certified ScrumMaster (CSM) | 32 |
| American Society For Quality (ASQ) Certification | 73 | Certified Quality Auditor (CQA) | 32 |
| IT Infrastructure Library (ITIL) Certification | 66 | Cisco Certified Network Associate (CCNA) | 30 |
| Automation Certification | 60 | Certified Medical Assistant | 28 |
| Source: Burning Glass |

Note: 96% 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 Web Applications Development Occupations in Bay Region**

| **Education (minimum advertised)** | **Latest 12 Mos. Postings** | **Percent 12 Mos. Postings** |
| --- | --- | --- |
| High school or vocational training | 1,110 | 5% |
| Associate's degree | 286 | 1% |
| Bachelor's degree and higher | 21,169 | 94% |
| Source: Burning Glass |

*Note: 41% 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:

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