

Programming Language Occupations Labor Market Information Report Foothill 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 a significant undersupply of Programming Language 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 20,665 students in the Bay region and 2,294 students in the Silicon Valley Sub-Region.

This report also provides student outcomes data on employment and earnings for programs on TOP 0707.00 - Computer Software Development 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.

Introduction

This report profiles Programming Language Occupations in the 12 county Bay region and in the Silicon Valley sub-region for the revision to an existing program at Foothill College.

- **Software Developers, Applications (SOC 15-1132):** 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: 13%
- **Computer User Support Specialists (SOC 15-1151):** 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%
- **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%

- Web Developers (SOC 15-1134):** 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: 25%
- Computer and Information Systems Managers (SOC 11-3021):** Plan, direct, or coordinate activities in such fields as electronic data processing, information systems, systems analysis, and computer programming. Excludes “Computer Occupations” (15-1111 through 15-1199).
 Entry-Level Educational Requirement: Bachelor's degree
 Training Requirement: None
 Percentage of Community College Award Holders or Some Postsecondary Coursework: 21%

Occupational Demand

Table 1. Employment Outlook for Programming Language Occupations in Bay Region

Occupation	2017 Jobs	2022 Jobs	5-Yr Change	5-Yr % Change	5-Yr Open-ings	Average Annual Open-ings	10% Hourly Wage	Median Hourly Wage
Software Developers, Applications	89,372	109,872	20,499	23%	51,391	10,278	\$38.68	\$62.13
Computer User Support Specialists	29,393	34,005	4,612	16%	15,944	3,189	\$20.02	\$32.70
Software Developers, Systems Software	40,748	44,919	4,171	10%	17,637	3,527	\$40.21	\$65.42
Web Developers	10,306	12,242	1,937	19%	5,802	1,160	\$20.83	\$38.90
Computer and Information Systems Managers	25,897	29,357	3,461	13%	13,343	2,669	\$55.65	\$86.30
Total	195,716	230,396	34,680	18%	104,118	20,823	\$37.50	\$60.37

Source: EMSI 2019.1

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 Programming Language Occupations in Silicon Valley Sub-Region

Occupation	2017 Jobs	2022 Jobs	5-Yr Change	5-Yr % Change	5-Yr Open-ings	Average Annual Open-ings	10% Hourly Wage	Median Hourly Wage
Software Developers, Applications	10,106	11,375	1,269	13%	4,634	927	\$32.77	\$57.83
Computer User Support Specialists	5,092	5,490	398	8%	2,313	463	\$19.30	\$29.05
Software Developers, Systems Software	4,717	4,966	249	5%	1,807	361	\$33.94	\$61.17
Web Developers	2,177	2,327	150	7%	951	190	\$19.56	\$28.48
Computer and Information Systems Managers	4,172	4,385	213	5%	1,773	355	\$43.76	\$75.74
TOTAL	26,263	28,543	2,279	9%	11,477	2,296	\$31.02	\$53.26

Source: EMSI 2019.1

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 (Feb 2018 - Jan 2018)

Occupation	Bay Region	Silicon Valley
Software Developers, Applications (15-1132.00)	105,796	50,257
Web Developers (15-1134.00)	25,242	10,258
Computer User Support Specialists (15-1151.00)	14,324	5,226
Computer and Information Systems Managers (11-3021.00)	1,956	656
Software Developers, Systems Software (15-1133.00)	1,325	665
Total	148,643	67,062

Source: Burning Glass

Table 4. Top Job Titles for Programming Language Occupations for latest 12 months (Feb 2018 - Jan 2018)

Common Title	Bay	Silicon Valley	Common Title	Bay	Silicon Valley
Software Development Engineer	32,635	15,008	Applications Developer	1,488	546
Java Developer	7,475	4,346	Android Developer	1,445	752
Devops Engineer	3,819	1,774	Principal Software Engineer	1,259	554
Applications Engineer	3,021	1,818	User Interface (UX)/User Experience (UX) Designer	1,199	370
User Experience (UX) Designer	2,789	1,172	Senior Engineer	1,144	401
Software Developer	2,768	1,354	PHP Developer	1,078	203
Java Engineer	2,580	1,415	iOS Developer	1,048	527
Python Developer	1,902	1,215	Senior Devops Engineer	1,031	427
Front End Developer	1,857	893	Desktop Support	1,014	337
Developer	1,693	708	.Net Developer	945	207
Senior Developer	1,648	668	Software Engineering Manager	885	376
User Interface (UI) Developer	1,631	947	Technical Support Engineer	763	430
Web Developer	1,613	613	Software Architect	709	356
Engineer	1,538	840	Full Stack Developer	641	287

Source: Burning Glass

Industry Concentration

Table 5. Industries hiring Programming Language 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)	34,646	35,722	20%	20.0%
Computer Systems Design Services (541512)	21,607	22,034	17%	12.4%
Internet Publishing and Broadcasting and Web Search Portals (519130)	18,979	20,125	42%	11.3%
Software Publishers (511210)	17,817	18,859	27%	10.6%
Electronic Computer Manufacturing (334111)	15,341	15,856	10%	8.9%
Data Processing, Hosting, and Related Services (518210)	6,219	6,758	41%	3.8%
Other Computer Related Services (541519)	4,720	4,841	24%	2.7%
Corporate, Subsidiary, and Regional Managing Offices (551114)	3,685	3,925	15%	2.2%
Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology) (541715)	3,019	3,165	(1%)	1.8%

Semiconductor and Related Device Manufacturing (334413)	2,077	2,076	(5%)	1.2%
Research and Development in Biotechnology (except Nanobiotechnology) (541714)	1,641	1,738	44%	1.0%
Colleges, Universities, and Professional Schools (State Government) (902612)	1,667	1,730	11%	1.0%
Temporary Help Services (561320)	1,703	1,707	7%	1.0%

Source: EMSI 2019.1

Table 6. Top Employers Posting Programming Language Occupations in Bay Region and Silicon Valley Sub-Region (Feb 2018 - Jan 2018)

Employer	Bay	Employer	Bay	Employer	Silicon Valley
Capital Markets Placement	2,245	Redolent, Inc	340	Apple Inc.	2,175
Apple Inc.	2,233	Techfetch Com	334	Cisco Systems Inc	1,170
Amazon	1,504	eBay	330	Amazon	916
Cisco Systems Incorporated	1,325	Splunk	317	Google Inc.	886
Google Inc.	1,139	Adobe Systems	311	Vmware Incorporated	452
Scoop Technologies	1,053	Amazon Lab126	310	Paypal	390
Facebook	784	Best Buy	289	Intel Corporation	370
IBM	639	Bayone Solutions	277	IBM	342
Oracle	621	Twitter	274	Walmart / Sam's	301
Workday, Inc	554	Etouch Systems Corp	270	Redolent, Inc	273
Microsoft Corporation	526	Linkedin Limited	257	eBay	253
Vmware Incorporated	475	Wipro	257	SAP	247
Salesforce	459	Xoriant Incorporated	250	Amazon Lab126	245
Paypal	428	Palo Alto Networks	244	Palo Alto Networks	243
SAP	427	Revature	243	Nvidia Corporation	238
Walmart / Sam's	425	Infoobjects Inc	241	Dell	217
Intel Corporation	372	Accenture	238	Fortinet Incorporated	215
Redolent, Inc	340	Nvidia Corporation	238	Linkedin Limited	212
Techfetch Com	334	Uber	234	Techfetch Com	205
Capital Markets Placement	2,245	Sony Electronics Inc	228	Splunk	191
Apple Inc.	2,233	Deloitte	227	Xilinx Incorporated	189

Source: Burning Glass

Educational Supply

There are 10 community colleges in the Bay Region issuing 158 awards on average annually (last 3 years) on TOP 0707.00 - Computer Software Development and TOP 0708.00 - Computer Infrastructure and Support. Foothill College is the only college in the Silicon Valley Sub-Region issuing awards on these TOP codes, issuing 2 awards on average annually (last 3 years) on Computer Software Development.

Table 7. Awards on TOP 0707.00 - Computer Software Development and TOP 0708.00 - Computer Infrastructure and Support in the Bay Region

College	Sub-Region	TOP	Headcount	Associates	Certificates	Total
Cabrillo	Santa Cruz & Monterey	70800	335			
Contra Costa	East Bay	70800	n/a		1	1
DeAnza	Silicon Valley	70800	312			
Diablo Valley	East Bay	70800	125			
Foothill	Silicon Valley	70800	304			
Gavilan	Santa Cruz & Monterey	70800	95	1		1
Las Positas	East Bay	70800	184			
Los Medanos	East Bay	70800	n/a	4	4	8

Mission	Silicon Valley	70800	43			
Ohlone	East Bay	70800	64		1	1
San Francisco	Mid-Peninsula	70800	345	39	9	48
San Mateo	Mid-Peninsula	70800	n/a	1	2	3
Santa Rosa	North Bay	70800	205			
Slyline	Mid-Peninsula	70800	112			
Foothill	Silicon Valley	70700	2,518		2	2
San Francisco	Mid-Peninsula	70700	n/a		2	2
San Mateo	Mid-Peninsula	70700	n/a	6	85	91
Solano	North Bay	70700	1,401		2	2
Total Bay Region			6,043	51	107	158
Total Silicon Valley Sub-Region			3,177	0	2	2

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.

Gap Analysis

Based on the data included in this report, there is a large labor market gap in the Bay region with 20,823 annual openings for Programming Language Occupations and 158 annual (3-year average) awards for an annual undersupply of 20,665 students. In the Silicon Valley Sub-Region, there is also a large gap with 2,296 annual openings and 2 annual (3-year average) awards for an annual undersupply of 2,294 students.

Student Outcomes

Table 8. Four Employment Outcomes Metrics for Students Who Took Courses on TOP 0707.00 - Computer Software Development

2015-16	Bay (All CTE Programs)	Foothill College (All CTE Programs)	State (0707.00)	Bay (0707.00)	Silicon Valley (0707.00)	Foothill College (0707.00)
% Employed Four Quarters After Exit	74%	77%	62%	59%	n/a	n/a
Median Quarterly Earnings Two Quarters After Exit	\$10,550	\$15,310	\$12,500	\$14,169	n/a	n/a
Median % Change in Earnings	46%	82%	54%	37%	n/a	n/a
% of Students Earning a Living Wage	63%	76%	67%	68%	n/a	n/a

Source: Launchboard Pipeline (version available on 3/6/19)

Skills, Certifications and Education

Table 9. Top Skills for Programming Language Occupations in Bay Region (Feb 2018 - Jan 2018)

Skill	Postings	Skill	Postings	Skill	Postings
Java	50,519	AngularJS	11,311	Ruby	8,481
Software Engineering	47,854	UNIX	11,180	Microsoft C#	8,293
Python	34,810	React Javascript	10,163	JavaScript Object Notation (JSON)	8,059
JavaScript	34,741	Continuous Integration (CI)	10,026	Docker Software	7,894
Software Development	34,128	HTML5	10,023	Kubernetes	7,826
SQL	24,742	MySQL	10,000	Product Management	7,811
Linux	23,148	NoSQL	9,851	Software Architecture	7,768

C++	19,882	Technical Support	9,835	Extensible Markup Language (XML)	7,728
Git	16,159	Scrum	9,731	Node.js	7,625
Web Application Development	14,319	Quality Assurance and Control	9,690	Web Development	7,594
Object-Oriented Analysis and Design (OOAD)	13,976	Data Structures	9,400	Machine Learning	7,580
Debugging	13,331	Agile Development	9,396	Project Management	7,578
DevOps	13,111	Customer Service	9,038	Big Data	7,556
Oracle	12,280	jQuery	8,884	Apache Hadoop	7,495
Unit Testing	12,233	Scalability Design	8,860	Hypertext Preprocessor (PHP)	7,442

Source: Burning Glass

Table 10. Certifications for Programming Language Occupations in the Bay Region (Feb 2018 - Jan 2018)

Note: 95% 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
Driver's License	1,245	Certified Scrum Trainer (CST)	195
IT Infrastructure Library (ITIL) Certification	1,188	Certified Salesforce Administrator	177
Certified A+ Technician	1,065	Apple Certified Macintosh Technician	146
Security Clearance	850	Project Management Professional (PMP)	144
Cisco Certified Network Associate (CCNA)	452	SANS/GIAC Certification	140
Microsoft Certified Professional (MCP)	432	Certified Information Systems Auditor (CISA)	126
Project Management Certification	397	ITIL Foundation	118
ITIL Certification	379	Certified ScrumMaster (CSM)	109
CompTIA Network+	373	Certified Information Security Manager (CISM)	106
Certified Information Systems Security Professional (CISSP)	322	Capability Model Maturity Integration (CMMI) Certification	103
Cisco Certified Internetwork Expert (CCIE)	277	Computer Science Certification	94
Cisco Certified Network Professional (CCNP)	253	Certified Salesforce Platform Developer II	89
Salesforce Developer	229	Certified Scrum Professional (CSP)	86
Microsoft Certified Solutions Associate (MCSA)	220	Java Certification	83
Certified Salesforce Platform Developer	214	Microsoft Certified Desktop Support Technician (Legacy)	82
Microsoft Certified Solutions Expert (MCSE)	213	Certified Novell Administrator	78
CompTIA Security+	206	Microsoft Certified Technology Specialist (MCTS)	78

Source: Burning Glass

Table 11. Education Requirements for Programming Language Occupations in Bay Region

Note: 49% 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	1,789 (2%)
Associate Degree	1,350 (2%)
Bachelor's Degree or Higher	72,094 (96%)

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 CCCCCO 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

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