

# Web Test Engineering Occupations Labor Market Information Report

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 very significant undersupply of Web Test Engineering workers compared to the demand for this cluster of occupations in the Bay region and in the Silicon Valley (Santa Clara County) sub-region. The annual gap in the Bay region is over 13,961 students annually. In the Silicon Valley sub-region, the annual gap is 6,881. However, it should be noted that two of the three SOC codes selected are for Software Developers (Applications and Systems), occupations which typically require a four-year degree. When the two Software Developer occupations are excluded from the demand calculation, to be more conservative with the estimate for demand, there is still an undersupply of over 1,000 annually in the region and about 365 annually in the Silicon Valley 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 at De Anza College compare to potentially similar programs at colleges in the state and region as well as to outcomes across all CTE programs at De Anza and in the region and sub-region.

## Introduction

This report profiles Web Test Engineering Occupations in the 12 county Bay region and in the Silicon Valley sub-region for a proposed new Web Test Engineering Certificate of Achievement at De Anza 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%*
- Software Developers, Systems (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.

*Entry-Level Educational Requirement: Associate Degree*  
*Training Requirement: None*

Percentage of Community College Award Holders or Some Postsecondary Coursework: 25%

- **Computer Occupations, All Other (SOC 15-1199)** All computer occupations not listed separately.
  - **Software Quality Assurance Engineers and Testers (15-1199.01)** Develop and execute software test plans in order to identify software problems and their causes.  
**NOTE:** While this SOC code appears to be the closest match to the description of the targeted occupations for students and was added to the occupational cluster by CoE, traditional labor market information is not available at the eight-digit level. Therefore, the six-digit SOC code is not included in the table below. However, labor market information from online postings is available at the eight-digit SOC code level.

Entry-Level Educational Requirement: Bachelor's Degree

Training Requirement: None

Percentage of Community College Award Holders or Some Postsecondary Coursework: 37%

## Occupational Demand

**Table 1. Employment Outlook for Web Test Engineering Occupations in Bay Region**

Occupation	2017 Jobs	2022 Jobs	5-Yr Change	5-Yr % Change	5-Year Openings	Annual Openings	10% Hourly Wage	Median Hourly Wage
Software Developers, Applications	82,169	97,071	14,902	18%	43,042	8,608	\$37.31	\$60.35
Software Developers, Systems Software	49,022	54,407	5,385	11%	21,670	4,334	\$43.39	\$66.36
Web Developers	11,299	13,730	2,431	22%	6,727	1,345	\$19.32	\$39.07
<b>Total</b>	<b>142,491</b>	<b>165,208</b>	<b>22,717</b>	<b>16%</b>	<b>71,439</b>	<b>14,288</b>	<b>\$37.98</b>	<b>\$60.73</b>

Source: EMSI 2018.1

**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 Test Engineering Occupations in Silicon Valley Sub-Region**

Occupation	2017 Jobs	2022 Jobs	5-Yr Change	5-Yr % Change	5-Year Openings	Annual Openings	10% Hourly Wage	Median Hourly Wage
Software Developers, Applications	42,763	49,385	6,622	15%	21,104	4,221	\$39.23	\$62.14
Software Developers, Systems Software	28,650	30,750	2,100	7%	11,468	2,294	\$45.22	\$69.04
Web Developers	3,422	4,237	815	24%	2,130	426	\$20.33	\$41.62
<b>Total</b>	<b>74,835</b>	<b>84,371</b>	<b>9,536</b>	<b>13%</b>	<b>34,702</b>	<b>6,940</b>	<b>\$40.66</b>	<b>\$63.84</b>

Source: EMSI 2018.1

**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 (March 2017 – February 2018)**

Occupation	Bay Region	Silicon Valley
Software Developers, Applications (15-1132.00)	70,937	34,203
Web Developers (15-1134.00)	14,887	5,668
Software Quality Assurance Engineers and Testers (15-1199.01)	8,819	4,274
Software Developers, Systems Software (15-1133.00)	997	599
<b>Total</b>	<b>95,640</b>	<b>44,744</b>

Source: Burning Glass

**Table 4. Top Job Titles for Web Test Engineering Occupations for latest 12 months (March 2017 – February 2018)**

Common Title	Bay	Silicon Valley	Common Title	Bay	Silicon Valley
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Software Development Engineer	25,065	12,515	User Interface (UX)/User Experience (UX) Designer	507	158
Java Software Developer	4,529	2,536	Full Stack Developer	498	227
Quality Assurance Engineer	2,309	1,163	Software Quality Engineer	447	320
Applications Engineer	2,198	1,444	Salesforce Developer	428	132
Software Developer	1,962	933	Quality Engineer	417	161
Web Developer	1,463	545	Quality Assurance Tester	411	160
User Experience (UX) Designer	1,430	529	Front End Engineer	388	143
Devops Engineer	1,338	460	Software Test Engineer	384	276
IOS Developer	1,269	500	Web Engineer	373	120
Front End Developer	1,216	519	Software Development Manager	340	192
Java Software Engineer	1,208	531	Oracle Developer	304	127
Android Developer	992	361	Mobile App Developer	301	62
Principal Software Engineer	980	419	Senior Front End Engineer	301	88
User Interface (UI) Developer	972	530	C++ Developer	277	194
Applications Developer	889	377	Software Quality Assurance Engineer	263	216
Python Developer	867	556	Senior Frontend Engineer	243	21
.Net Developer	770	196	Senior .Net Developer	242	21
Senior Devops Engineer	673	204	ios Engineer	233	55
Quality Assurance Analyst	643	96	Java Software Architect	232	111
Java Engineer	606	374	Ruby on Rails Developer	231	85
Software Architect	577	304	PHP Developer	228	93
Software Engineering Manager	549	258	Senior Android Engineer	220	68

Source: Burning Glass

## Industry Concentration

**Table 5. Industries hiring Web Test Engineering Workers in Bay Region**

Industry – 4 Digit NAICS (No. American Industry Classification) Codes	Jobs in Industry (2017)	Jobs in Industry (2022)	% Change (2017-22)	% in Industry (2017)
Computer Systems Design and Related Services (5415)	52,591	63,221	20%	36.9%
Other Information Services (5191)	17,670	23,124	31%	12.4%
Software Publishers (5112)	15,450	18,016	17%	10.8%
Computer and Peripheral Equipment Manufacturing (3341)	13,863	14,790	7%	9.7%
Data Processing, Hosting, and Related Services (5182)	4,787	6,456	35%	3.4%
Scientific Research and Development Services (5417)	4,124	4,596	11%	2.9%
Management of Companies and Enterprises (5511)	3,017	3,086	2%	2.1%
Navigational, Measuring, Electromedical, and Control Instruments Manufacturing (3345)	2,788	2,624	(6%)	2.0%
Semiconductor and Other Electronic Component Manufacturing (3344)	2,579	2,277	(12%)	1.8%
Management, Scientific, and Technical Consulting Services (5416)	2,395	2,664	11%	1.7%
Professional and Commercial Equipment and Supplies Merchant Wholesalers (4234)	2,029	2,079	2%	1.4%
Architectural, Engineering, and Related Services (5413)	1,747	1,908	9%	1.2%
Employment Services (5613)	1,547	1,696	10%	1.1%
Communications Equipment Manufacturing (3342)	1,134	964	(15%)	0.8%

Source: EMSI 2018.1

**Table 6. Top Employers Posting Web Test Engineering Occupations in Bay Region and Silicon Valley Sub-Region for latest 12 months (March 2017 – February 2018)**

Employer	Bay	Employer	Bay	Employer	Silicon Valley
Apple Inc.	2,865	SAP	259	Apple Inc.	2,838
Amazon.com	1,264	Okaya Infocom	254	Amazon.com	895
Cisco Systems Incorporated	840	General Electric Company	234	Cisco Systems Inc	715
Oracle	698	California Interviews	228	Google Inc.	412
Salesforce.Com	623	Autodesk Incorporated	225	Intel Corporation	405
Google Inc.	517	Palo Alto Networks	221	Nvidia Corporation	380
Facebook	466	Khosla Ventures	214	Vmware	340
Hired	428	Linkedin Limited	202	eBay	271
Infoobjects Inc	424	Etouch Systems Corporation	201	Infoobjects Inc	260
Intel Corporation	406	Intuit	200	Walmart / Sam's	250
Tesla Motors	384	Visa	199	Paypal	248
Nvidia Corporation	380	Uber Technologies Inc	197	Yahoo	231
Walmart / Sam's	356	Nityo Infotech	195	Palo Alto Networks	221
Accenture	345	Hewlett-Packard	191	Oracle	209
eBay	345	Deloitte	189	Tesla Motors	197
Vmware	341	Redolent, Inc	185	Hewlett-Packard	176
Paypal	293	Microsoft Corporation	182	SAP	175
Xoriant Incorporated	278	Flexton Incorporated	181	Xilinx Incorporated	171
Yahoo	260	Redpoint Ventures	174	Lab126	168

Source: Burning Glass

## Educational Supply

There are 14 colleges in the Bay Region issuing 327 awards annually on 0701.00 - Computer Programming. Three of these colleges are in the Silicon Valley sub-region, issuing 59 awards annually.

**Table 7. Award on TOP 0701.00 Computer Programming in the Bay Region**

College	Sub-Region	CC Headcount	No. of Transfer Students	Associate Degrees	Certificates or Other Credit Awards	Total Awards
Berkeley City	East Bay	289	51	2	4	6
Cabrillo	SC-Monterey	on another TOP	0	6	20	26
Canada	Mid-Peninsula	399	89	0	0	0
Chabot	East Bay	802	161	0	0	0
Contra Costa	East Bay	18	0	2	0	2
De Anza	Silicon Valley	3,247	537	7	29	36
Diablo Valley	East Bay	1,386	169	43	112	155
Evergreen	Silicon Valley	20	10	0	0	0
Foothill	Silicon Valley	161	13	0	0	0
Gavilan	Silicon Valley	323	50	8	3	11
Hartnell	SC-Monterey	245	86	11	1	12
Laney	East Bay	455	108	1	1	2
Las Positas	East Bay	548	32	1	2	3
Marin	North Bay	107	0	0	0	0
Merritt	East Bay	133	0	0	0	0
Mission	Silicon Valley	717	158	0	0	0
Monterey	SC-Monterey	248	38	0	0	0
Napa	North Bay	156	31	0	0	0
Ohlone	East Bay	771	101	1	0	1
San Francisco	Mid-Peninsula	2,004	338	0	54	54

San Jose	Silicon Valley	369	80	6	6	12
San Mateo	Mid-Peninsula	682	76	1	2	3
Santa Rosa	North Bay	39	14	0	0	0
Skyline	Mid-Peninsula	121	39	0	0	0
Solano	North Bay	on another TOP	0	4	0	4
West Valley	Silicon Valley	318	90	0	0	0
<b>Total Bay Region</b>		<b>13,558</b>	<b>2,271</b>	<b>93</b>	<b>234</b>	<b>327</b>
<b>Total Silicon Valley Sub-Region</b>		<b>5,155</b>	<b>938</b>	<b>21</b>	<b>38</b>	<b>59</b>

Source: IPEDS, Data Mart and Launchboard

NOTE: Headcount of students who took one or more courses is for 2016-17. The annual average for Associate Degrees and Certificates is 2014-17 unless there are only awards in 2016-17. No. of transfer students is for 2015-16. There are no other Postsecondary issuing awards on a CIP code that has been crosswalked to 0707.10 in the Bay region.

## Gap Analysis

Based on the data included in this report, there is a very significant labor market gap in the Bay region with 14,288 annual openings for the Web Test Engineering occupational cluster and 327 annual awards for a gap of 13,961. In the Silicon Valley sub-region, there is also a large gap with 6,920 annual openings and 59 annual awards for a gap of 6,881.

However, 70% of the annual openings in the region and 67% of the annual openings in the sub-region are for Software Developers (Applications and Systems) occupations which typically require a four-year degree. When the two Software Developer occupations are excluded from the demand calculation, to be more conservative with the estimate for demand, there is still an undersupply of over 1,000 annually in the region and about 365 annually in the Silicon Valley sub-region.

There are a significant number of transfer students on TOP code 0707.10 - Computer Programming in the region and sub-region. 2,271 students transferred in 2015-16 to four-year programs out of 12,824 for a transfer rate of 18% in the Bay region (compared to an 8% transfer rate for all CTE programs in the same year).

## Student Outcomes

**Table 8. Four Employment Outcomes Metrics for Students Who Took Courses on TOP 0707.10 - Computer Programming in 2015-16**

2015-16	Bay (All CTE Programs)	De Anza (All CTE Programs)	State (0707.10)	Bay (0707.10)	Silicon Valley (0707.10)	De Anza (0707.10)	Top College in Bay Region on 0707.10	
% Employed Four Quarters After Exit	74%	69%	64%	65%	69%	60%	Mission & West Valley	76%
Median Earnings Two Quarters After Exit	\$10,310	\$10,440	\$8,970	\$11,350	\$11,325	\$11,970	Ohlone	\$19,865
Median % Change in Earnings	46%	61%	50%	50%	59%	79%	Berkeley City	178%
% of Students Earning a Living Wage	63%	60%	58%	63%	69%	63%	San Jose	76%

Source: Launchboard (version available on 3/9/18)

## Skills, Certificates and Education

**Table 9. Top Skills for Web Test Engineering Occupations in Bay Region (March 2017 – February 2018)**

Skill	Postings	Skill	Postings	Skill	Postings
JAVA	33,661			Bash	2,851
Software Engineering	32,415	Optimization	4,909	Shell Scripting	2,839

Software Development	25,985	Relational Databases	4,874	Version Control	2,781
JavaScript	22,938	Product Development	4,850	JUnit	2,725
Python	22,533	Apache Hadoop	4,667	Puppet	2,681
LINUX	16,640	CSS	4,440	Adobe Photoshop	2,656
SQL	16,308	Big Data	4,263	Swift	2,642
C++	14,771	Hypertext Preprocessor (PHP)	4,258	MongoDB	2,624
Git	11,506	Computer Engineering	4,207	SQL Server	2,607
Object-Oriented Analysis and Design (OOAD)	9,895	Node.js	4,115	Prototyping	2,606
Debugging	9,407	User Interface (UI) Design	3,943	Software Testing	2,477
UNIX	8,526	Machine Learning	3,650	Ruby on Rails	2,474
Web Application Development	8,424	AJAX	3,597	Network Hardware/Software Maintenance	2,394
Oracle	8,009	Objective C	3,568	Software Quality Assurance	2,391
HTML5	7,111	Apache Webserver	3,499	Tomcat	2,390
Scrum	6,570	Atlassian JIRA	3,412	Transmission Control Protocol / Internet Protocol (TCP / IP)	2,383
Microsoft C#	6,408	Data Management	3,308	Apache Subversion (SVN)	2,376
Agile Development	6,376	E-Commerce	3,299	Business Process	2,361
MySQL	6,244	Electrical Engineering	3,165	Technical Support	2,342
jQuery	6,003	Selenium	3,150	Automation Tools	2,165
NoSQL	5,957	.NET Programming	3,111	Scaling	2,079
PERL	5,803	Salesforce	3,100	Microsoft Excel	2,059
Ruby	5,656	Configuration Management	2,992	Android	2,039
Data Structures	5,560	Scheduling	2,984	Extraction Transformation and Loading (ETL)	2,017
AngularJS	5,529	Chef	2,950	Amazon Web Services (AWS)	2,007
Web Development	5,522	Validation	2,937	Customer Contact	1,993
Software Architecture	5,352	Customer Service	2,895	UNIX Shell	1,920
JSON	5,332	Systems Development Life Cycle (SDLC)	2,876	Data Analysis	1,883
Product Management	5,289	Front-end Development	2,868	UX Wireframes	1,882

Source: *Burning Glass*

**Table 10. Top Certifications for Web Test Engineering Occupations in Bay Region**

Note: 97% 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
Security Clearance	380	It Infrastructure Library	85
Project Management Certification (e.g. PMP)	223	Certified Scrum Professional	73
Salesforce.Com Developer	182	Java Certification (e.g. Sun Certified Java Assoc)	66
Cisco Certified Network Associate	173	Scrum	62
Certified Information Systems Security Professional (CISSP)	154	Certified Quality Engineer	56
Cisco Certified Internetwork Expert (CCIE)	154	Capability Model Maturity Integration (CMMI) Certification	55
Cisco Certified Network Professional (CCNP)	123	Microsoft Certified Solution Developer (MCSD)	54
Certified Ambulatory Perianesthesia Nurse	103	Certified Information Systems Auditor (CISA)	51
Welding Certification (e.g. AWS Certified Welder)	91	Microsoft Certified Professional (MCP)	50
Certified Novell Administrator	90	Salesforce.Com Administrator	50

Source: *Burning Glass*

**Table 11. Education Requirements for Web Test Engineering Occupations in Bay Region**

Note: 47% 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	586 (1%)
Associate Degree	590 (1%)
Bachelor's Degree	46,299 (92%)
Master's Degree	1,996 (4%)
Doctoral Degree	1,024 (2%)

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/](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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