DevOps –
Development and Operations Automation Occupations
Labor Market Information Report
Merritt 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 Development and Operations Automation (DevOps) workers compared to the demand for this cluster of occupations in the Bay region and in the East Bay sub-region (Alameda and Contra Costa Counties.) There is a projected annual gap of about 6,461 students in the Bay region and 953 students in the East Bay Sub-Region.

This report also provides student outcomes data on employment and earnings for programs on TOP 0707.30 - Computer Systems Analysis and 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 Merritt College and in the region.

Introduction

This report profiles Development and Operations Automation (DevOps) Occupations in the 12 county Bay region and in the East Bay sub-region for a proposed new program at Merritt College. Labor market information (LMI) is not available at the eight-digit SOC Code level for Computer Systems Engineers/Architects (15-1199.02), therefore, the data shown in Tables 1 and 2 is for Computer Occupations, All Other (at the six digit SOC level) and likely overstates demand for Computer Systems Engineers/Architects. Tables 3, 4, 6, 9, 10 and 11 use job postings data from Burning Glass at the eight-digit SOC Code level for Computer Systems Engineers/Architects (15-1199.02).

- **Computer Systems Analysts (SOC 15-1121):** Analyze science, engineering, business, and other data processing problems to implement and improve computer systems. Analyze user requirements, procedures, and problems to automate or improve existing systems and review computer system capabilities, workflow, and scheduling limitations. May analyze or recommend commercially available software.
     Entry-Level Educational Requirement: Bachelor's degree
     Training Requirement: None
     Percentage of Community College Award Holders or Some Postsecondary Coursework: 21%

- **Computer Programmers (SOC 15-1131):** 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: 21%

- **Computer Occupations, All Other (SOC 15-1199):** All computer occupations not listed separately. Excludes "Computer and Information Systems Managers" (11-3021), "Computer Hardware Engineers" (17-2061), "Electrical and Electronics Engineers" (17-2070), "Computer Science Teachers, Postsecondary" (25-1021), "Multimedia Artists and Animators" (27-1014), "Graphic Designers" (27-1024), "Computer Operators" (43-9011), and "Computer, Automated Teller, and Office Machine Repairs" (49-2011).
  Entry-Level Educational Requirement: Bachelor's degree
  Training Requirement: None
  Percentage of Community College Award Holders or Some Postsecondary Coursework: 35%

Occupational Demand

Table 1. Employment Outlook for DevOps Occupations in Bay Region

Occupation	2018 Jobs	2023 Jobs	5-Yr Change	5-Yr % Change	5-Yr Open-ings	Average Annual Open-ings	25% Hourly Wage	Median Hourly Wage
Computer Systems Analysts	29,219	32,865	3,646	12%	13,306	2,661	$43.74	$55.71
Computer Programmers	11,815	12,599	784	7%	4,678	936	$38.06	$49.75
Computer Occupations, All Other	34,144	37,249	3,105	9%	14,791	2,958	$40.95	$55.84
Total	**75,178**	**82,713**	**7,534**	**10%**	**32,775**	**6,555**	**$41.58**	**$54.83**

Source: EMSI 2019.3

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 DevOps Occupations in East Bay Sub-Region

Occupation	2018 Jobs	2023 Jobs	5-Yr Change	5-Yr % Change	5-Yr Open-ings	Average Annual Open-ings	25% Hourly Wage	Median Hourly Wage
Computer Systems Analysts	5,086	5,237	151	3%	1,774	355	$39.69	$49.81
Computer Programmers	2,174	2,117	-57	-3%	685	137	$33.74	$44.58
Computer Occupations, All Other	6,594	6,705	111	2%	2,304	461	$35.23	$46.49
TOTAL	**13,854**	**14,058**	**205**	**1%**	**4,764**	**953**	**$36.63**	**$47.41**

Source: EMSI 2019.3

East Bay Sub-Region includes Alameda and Contra Costa Counties

Job Postings in Bay Region and East Bay Sub-Region
Table 3. Number of Job Postings by Occupation for latest 12 months (January 2019 - December 2019)

Occupation	Bay Region	East Bay
Computer Systems Engineers/Architects	25,378	3,351
Computer Systems Analysts	18,656	3,297
Computer Programmers	5,615	1,029
Informatics Nurse Specialists	11	2
Total	**49,660**	**7,679**

Source: Burning Glass

Table 4a. Top Job Titles for DevOps Occupations for latest 12 months (January 2019 - December 2019) Bay Region

Common Title	Bay	Common Title	Bay
Systems Engineer	3,924	Java Architect	490
Solutions Architect	3,592	Enterprise Architect	482
Business Systems Analyst	3,245	Automation Engineer	436
Senior Systems Engineer	1,461	Information Technology Analyst	360
Software Development Engineer	1,449	Infrastructure Engineer	351
Developer	1,421	Technical Analyst	345

Firmware Engineer	1,341	Linux Engineer	313
Machine Learning Engineer	1,031	Information Technology Business Analyst	302
Systems Analyst	1,027	Oracle Consultant	299
Technical Consultant	639	Network Engineer	299
Programmer/Analyst	542	Information Technology Consultant	299
Architect	529	Business Analyst	294
Technical Architect	525	Integration Engineer	289
Systems Architect	523	Aem Developer	259

Table 4b. Top Job Titles for DevOps Occupations for latest 12 months (January 2019 - December 2019) East Bay Sub-Region

Common Title	East Bay	Common Title	East Bay
Systems Engineer	686	Java Architect	73
Business Systems Analyst	643	Information Technology Consultant	71
Solutions Architect	432	Automation Engineer	63
Senior Systems Engineer	243	Technical Architect	61
Developer	237	Information Technology Analyst	60
Systems Analyst	214	Machine Learning Engineer	58
Programmer/Analyst	162	Aem Developer	54
Technical Consultant	105	Entry Programmer	50
Firmware Engineer	102	Oracle Consultant	49
Technical Analyst	86	Linux Engineer	49
Architect	81	Computer Programmer	49
Information Technology Business Analyst	79	Programmer	46
Enterprise Architect	79	Network Engineer	46
Software Development Engineer	78	Technical Business Analyst	45

Source: Burning Glass

Industry Concentration

Table 5. Industries hiring DevOps Workers in Bay Region

Industry – 6 Digit NAICS (No. American Industry Classification) Codes	Jobs in Industry (2018)	Jobs in Industry (2022)	% Change (2018-22)	% in Industry (2018)
Custom Computer Programming Services (541511)	18,354	20,680	13%	25%
Computer Systems Design Services (541512)	10,999	11,900	8%	15%
Software Publishers (511210)	4,852	5,814	20%	7%
Internet Publishing and Broadcasting and Web Search Portals (519130)	4,604	5,726	24%	6%
Data Processing, Hosting, and Related Services (518210)	3,241	4,130	27%	4%
Corporate, Subsidiary, and Regional Managing Offices (551114)	3,070	3,209	5%	4%
Other Computer Related Services (541519)	2,628	3,060	16%	4%
Federal Government, Civilian, Excluding Postal Service (901199)	2,095	2,040	-3%	3%
Electronic Computer Manufacturing (334111)	1,896	2,012	6%	3%
Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology) (541715)	1,204	1,274	6%	2%
Local Government, Excluding Education and Hospitals (903999)	937	959	2%	1%
Temporary Help Services (561320)	883	920	4%	1%
Administrative Management and General Management Consulting Services (541611)	813	958	18%	1%

Source: EMSI 2019.3

Table 6. Top Employers Posting DevOps Occupations in Bay Region and East Bay Sub-Region (January 2019 – December 2019)

Employer	Bay	Employer	Bay	Employer	East Bay
Apple Inc.	712	Workday, Inc	122	Kaiser Permanente	104
Amazon	445	Visa	122	Workday, Inc	78
Google Inc.	383	Kaiser Permanente	116	Wells Fargo	71
Cisco Systems Incorporated	383	Lockheed Martin Corporation	114	University Of California Berkeley	59
Nvidia Corporation	293	Genentech	106	Bio-Rad Laboratories	46
Facebook	261	Uber	102	Lucid Motors Inc	45
Accenture	240	Northrop Grumman	101	UC San Diego	42
IBM	227	Adobe Systems	99	Facebook	39
Wipro	213	Verizon Communications Inc	98	Amazon	39
Deloitte	190	Idc Technologies	97	Verizon Communications Inc	36
Wells Fargo	186	University California	96	Lawrence Livermore National Laboratory	35
Microsoft Corporation	186	Splunk, Inc	95	University California	34
Vmware Incorporated	178	Xoriant Incorporated	93	NTT Data	30
Infosys	162	Hewlett-Packard	87	Bank of the West	28
Salesforce	152	Oracle	86	Albertsons	28
Dell	142	Marvell	80	Abbott Laboratories	25
Intel Corporation	138	Samsung America, Inc.	78	University Of California	24

Source: Burning Glass

Educational Supply

There are no community colleges in the Bay Region issuing awards on average annually (last 3 years) on TOP 0707.30 - Computer Systems Analysis. There are three community colleges in the Bay Region issuing 94 awards on average annually (last 3 years) on TOP 0707.00 - Computer Software Development. There are no colleges in the East Bay Sub-Region issuing awards on this TOP code.

Table 7. Awards on TOP 0707.00 - Computer Software Development in the Bay Region

College	Sub-Region	Associates	Certificate 18+ units	Certificate Low unit	Total
City College of San Francisco	Mid-Peninsula			1	1
College of San Mateo	Mid-Peninsula	8	10	72	90
Solano College	North Bay			3	3
Total Bay Region		**8**	**10**	**76**	**94**
Total East Bay Sub-Region		**0**	**0**	**0**	**0**

Source: Data Mart

Note: The annual average for awards is 2015-16 to 2017-18.

Gap Analysis

Based on the data included in this report, there is a large labor market gap in the Bay region with 6,555 annual openings for the DevOps occupational cluster and 94 annual (3-year average) awards for an annual undersupply of 6,461 students. In the East Bay Sub-Region, there is also a gap with 953 annual openings and no annual (3-year average) awards for an annual undersupply of 953 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)	Merritt College (All CTE Programs)	State (0707.00)	Bay (0707.00)	East Bay (0707.00)	Merritt College (0707.00)
% Employed Four Quarters After Exit	74%	71%	62%	59%	n/a	n/a
Median Quarterly Earnings Two Quarters After Exit	$10,550	$9,306	$12,500	$14,169	n/a	n/a
Median % Change in Earnings	46%	43%	54%	37%	n/a	n/a
% of Students Earning a Living Wage	63%	60%	67%	68%	n/a	n/a

Source: Launchboard Pipeline (version available on 1/24/20)

Skills, Certifications and Education

Table 9. Top Skills for DevOps Occupations in Bay Region (January 2019 - December 2019)

Skill	Postings	Skill	Postings	Skill	Postings
Python	9,856	Customer Service	3,395	Enterprise Resource Planning	2,456
Java	9,832	Systems Analysis	3,329	Scrum	2,424
SQL	8,441	Debugging	3,270	Scheduling	2,360
Linux	7,370	Quality Assurance & Control	3,112	System Design	2,276
Software Development	7,067	SAP	3,027	Big Data	2,240
Oracle	6,053	Machine Learning	2,999	Atlassian JIRA	2,215
Project Management	5,727	UNIX	2,871	Virtualization	2,215
Systems Engineering	5,631	Business Analysis	2,861	Product Management	2,171
Software Engineering	5,120	Salesforce	2,836	Data Analysis	2,168
Business Process	5,011	Technical Support	2,781	Firmware	2,160
JavaScript	4,895	Git	2,770	Product Development	2,160
C++	4,793	Information Systems	2,717	Extensible Markup Language	2,111
Business Systems Analysis	3,923	Kubernetes	2,564	System Architecture	2,072
Business Systems	3,550	Software as a Service (SaaS)	2,511	Budgeting	2,033
DevOps	3,519	VMware	2,465	Ansible	1,965

Source: Burning Glass

Table 10. Certifications for DevOps Occupations in Bay Region (January 2019 - December 2019)

Note: 89% 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
IT Infrastructure Library (ITIL) Certification	875	TOGAF Certification	135
Security Clearance	736	CompTIA Security+	135
Driver's License	494	SANS/GIAC Certification	130
Project Management Certification	451	Certified Information Systems Auditor (CISA)	123
Certified Information Systems Security Professional (CISSP)	424	Microsoft Certified Professional (MCP)	113
Cisco Certified Internetwork Expert (CCIE)	408	Certified A+ Technician	110
Cisco Certified Network Associate (CCNA)	361	Red Hat Certified Engineer (RHCE)	106

Cisco Certified Network Professional (CCNP)	336	SAP Certification	98
Microsoft Certified Solutions Expert (MCSE)	228	Certified Salesforce Administrator	94
ITIL Certification	220	Certified Information Security Manager (CISM)	77
Microsoft Certified Solutions Associate (MCSA)	218	CompTIA Network+	69
Project Management Professional (PMP)	148	Vmware Certified Professional (VCP)	68

Source: Burning Glass

Table 11. Education Requirements for DevOps Occupations in Bay Region

Note: 46% 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	Percent 12 Mos. Postings
High school or vocational training	698	3%
Associate Degree	471	2%
Bachelor's Degree or Higher	23,370	95%

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/
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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