Computer Programming Occupations

Inland Empire/Desert Region (Riverside-San Bernardino-Ontario Metropolitan Statistical Area)

Summary

- Jobs in computer programming occupations are expected to increase by **10% between 2017 and 2022** in the Inland Empire/Desert Region. A total of **2,760 job openings, or 552 annual openings** will be available over the five-year timeframe.
- The entry-level wage for each of the computer programming occupations is **above the MIT Living Wage estimate of $12.30 per hour** for a single adult living in the Inland Empire/Desert Region.
- **There appears to be an opportunity for program growth** based on the average annual number of program completions for the selected community college program in the region **(64 annual average credentials)**, and the annual openings for computer programming occupations in the local region **(552 average annual openings)**.

Introduction

This computer programming occupations report contains two primary sections. The first portion details occupations relevant to the computer programming program. Computer programming prepares individuals for careers in entry-level programming, including methods, procedures, symbols, and rules used in planning and writing instructions in computer language for the solution of a problem. This includes programming for the World Wide Web.[1] The second portion of the report is dedicated to job posting information related to the demand for specific computer programming specialties, such as python programming or augmented and virtual reality development. The occupations in the computer programming occupational group are listed below:

- Computer Network Support Specialists
- Computer Programmers
- Software Developers, Applications
- Software Developers, Systems Software
- Web Developers

[1] The Taxonomy of Programs, 6th Edition, February 2004

Job Opportunities

In 2017, there were 6,188 jobs in the computer programming occupational group in the Inland Empire/Desert Region. Employment in this group is expected to rise by 10% through 2022. Employers will need to hire 2,760 workers over the projected period to fill new jobs and to backfill positions that workers are leaving–including retirements. Appendix A, Table 1 shows the projected job growth, wages, typical education, training, and work experience required for each of the occupations included in this report.

Exhibit 1: Five-year projections for the computer programming occupational group in the Inland Empire/Desert Region

Region	2017 Jobs	5-Yr % Change (New Jobs)	5-Yr Openings (New + Replacement Jobs)	Annual Openings (New + Replacement Jobs)	% of workers age 55+
Inland Empire/Desert	6,188	10%	2,760	552	14%

Source: EMSI 2018.3

Exhibit 2 shows the number of job ads posted during the last 12 months (October 2017 to September 2018) and the average time to fill for each occupation in the region and nationally. On average, open positions for the computer programming occupational group take 45 days to fill in the Inland Empire/Desert Region. This is eight days longer than the national average as a whole, indicating that open positions are harder to fill locally.

Exhibit 2: Job ads and time to fill for the computer programming occupational group in the Inland Empire/Desert during the last 12 months, Oct 2017 – Sep 2018

Occupation	Job Ads	Regional Average Time to Fill (Days)	National Average Time to Fill (Days)
Software Developers, Applications	1,365	47	39
Web Developers	318	47	39
Computer Programmers	226	45	37
Computer Network Support Specialists	59	39	32
Software Developers, Systems Software	14	47	39
Total	**1,982**	**-**	**-**

Source: Burning Glass – Labor Insights

Earnings

The entry-level wage for each of the computer programming occupations in the Inland Empire/Desert Region is above the MIT Living Wage estimate of $12.30 per hour, or $25,586 annually for a single adult living in the area. These wages are also sufficient for two adults and one child living in the region ($30,160 annually for each adult, or $14.50 per hour, per adult).

Exhibit 3: Earnings for the computer programming occupational group in the Inland Empire/Desert Region

Occupation	Entry to Experienced Hourly Earnings Range*	Median Wage*	Average Annual Earnings
Software Developers, Systems Software	$35.67 to $58.60	$46.91	$101,100
Software Developers, Applications	$36.04 to $55.32	$45.08	$95,600
Computer Programmers	$28.02 to $43.93	$34.26	$75,100
Computer Network Support Specialists	$24.74 to $39.94	$29.52	$68,100
Web Developers	$17.53 to $30.09	$20.97	$52,500

Source: EMSI 2018.3
*Entry Hourly is 25th percentile wage, the median is 50th percentile wage, experienced is 75th percentile wage.

Top Employers

Exhibit 4 displays the top employers posting job ads from the last 12 months for the Inland Empire/Desert Region.

Exhibit 4: The top employers posting job ads for computer programming occupations in the Inland Empire/Desert Region, Oct 2017 – Sep 2018

Occupation	Top Employers
Software Developers, Applications *(n=1,016)*	• ESRI • Revature
Web Developers *(n=201)*	• ESRI • Revature
Computer Programmers *(n=185)*	• ESRI • San Bernardino County
Computer Network Support Specialists *(n=47)*	• Cyquest Consulting Group • UnitedHealth Group
Software Developers, Systems Software *(n=12)*	• ESRI • Niagara Bottling LLC

Source: Burning Glass – Labor Insights

Skills

Exhibit 5 lists a sample of in-demand specialized, employability, and software and programming skills that employers are seeking when looking for workers to fill computer programming positions. The skills reported in job postings may be utilized as a helpful guide for curriculum development. Specialized skills are occupation-specific skills employers are requesting for industry or job competency. Baseline skills are foundational skills that transcend industries and occupations; this category is commonly referred to as "soft skills."

Exhibit 5: Sample of in-demand skills from employer job ads for computer programming occupations in the Inland Empire/Desert Region, Oct 2017 – Sep 2018

Occupation	Specialized skills	Employability skills	Software and Programming Skills
Software Developers, Applications *(n=1,278)*	• Software Engineering • .NET Framework • C++ Programming	• Communication Skills • Teamwork/ Collaboration • Problem Solving	• Structured Query Language (SQL) • JavaScript • Microsoft C#
Web Developers *(n=295)*	• Software Development • Web Site Design • Hypertext Preprocessor (PHP)	• Communication Skills • Teamwork/ Collaboration • Problem Solving	• JavaScript • Structured Query Language (SQL) • HTML5
Computer Programmers *(n=197)*	• Software Engineering • Project Management • .NET Framework	• Communication Skills • Problem Solving • Writing	• Structured Query Language (SQL) • JavaScript • Microsoft C#
Computer Network Support Specialists *(n=53)*	• Information Systems • Technical Support • System Network/ Configuration	• Communication Skills • Planning • Microsoft Office	• Cisco Switching • Windows Server • UNIX
Software Developers, Systems Software *(n=13)*	• Client/Server Development • System Architecture • Oracle BI Publisher	• Teamwork/ Collaboration • Troubleshooting • Communication Skills	• Oracle Database • Structured Query Language (SQL) • Microsoft C#

Source: Burning Glass – Labor Insights

Education

Exhibit 6 displays the entry-level education level education typically required to enter these occupations according to the Bureau of Labor Statistics (BLS). This chart also displays educational attainment for incumbent workers with "some college, no degree" and an "associate degree" according to the U.S. Census (2015-16) and the minimum advertised education requirement requested by employers in online job ads.

Exhibit 6: Educational attainment and online job ads with minimum advertised education requirements for computer programming occupations in the Inland Empire/Desert Region, Oct 2017 – Sep 2018

Occupations	Typical Entry-Level Education Requirement	Two-Year Postsecondary Level of Educational Attainment*	Minimum Advertised Education Requirement from Job Ads			
			Number of Job Postings (n=)	High school diploma or vocational training	Associate degree	Bachelor's degree or higher
Software Developers, Applications	Bachelor's degree	13%	*889*	8%	5%	87%
Web Developers	Associate degree	25%	*168*	5%	4%	91%
Computer Programmers	Bachelor's degree	22%	*143*	18%	8%	74%
Computer Network Support Specialists	Associate degree	41%	*38*	47%	11%	42%
Software Developers, Systems Software	Bachelor's degree	13%	*11*	36%	-	64%

Source: EMSI 2018.3, Current Population Survey, Burning Glass – Labor Insights

* Percentage of incumbent workers with a Community College Credential or Some Postsecondary Coursework

Demand for Python Programming in the Region

While the first portion of this report focused on the regional demand for computer programming occupations, this section focuses specifically on demand for python programming skills by local employers posting online job ads. Python programming is a general-purpose programming language used for developing both desktop and web applications. Python programming can be used for many different applications such as web and internet development, scientific and numeric computing, education, desktop GUIs, software development, and business applications.[2] A job posting search for "python programming" in the region yielded 25 job postings. The names of local employers searching for workers with this skillset appear in Exhibit 7.

Exhibit 7: Employers posting job ads seeking python programming skills in the Inland Empire/Desert Region, Oct 2017 – Sep 2018

Employer	Number of Job Postings
ESRI	14
Niagara Bottling LLC	9
Physical Optics Corporation	1

Source: Burning Glass – Labor Insights

Each of these 25 postings contains a specific job title. Knowing the specific job title that employers are hiring for provides a clearer picture of what they expect from a new employee. The job titles sourced from employer job postings appear in Exhibit 8.

Exhibit 8: Job titles from employer job postings seeking python programming skills in the Inland Empire/Desert Region, Sep 2017 – Aug 2018

Job Title	Number Job Postings
Quality Assurance Engineer	6
Solutions Engineer	5
Automation Engineer	4
Software Development Engineer, Software Developer, & Mining Engineer	2 each
Others: Services Product Engineer, Science Product Engineer: Python, Product Engineer, Localization Product Engineer	4 combined

Source: Burning Glass – Labor Insights

[2] https://www.python.org/about/apps/

Knowing which skills are currently in demand from local employers' posting ads provides some indication as to what those employers value in new hires. These skills also provide potential job applicants with a specific roadmap regarding which skills they can refine or develop in order to make them a stronger candidate for the job they are seeking. The specialized skills requested by employers in these job postings appear in Exhibit 9.

Exhibit 9: Specialized skills from employer postings seeking python programming skills in the Inland Empire/Desert Region, Oct 2017 – Sep 2018

Specialized Skill	Number of Job Postings
Python	25
Software Development	18
ArcGIS	14
Scheduling	12
Software Architecture, SCADA (Supervisory Control and Data Acquisition), Quality Assurance and Control, Predictive/Preventative Maintenance, Oracle Database, Microsoft Visio, Manufacturing Processes, & Programmable Logic Controller (PLC) Programming	9 each

Source: Burning Glass – Labor Insights

Finally, the education level desired by employers informs applicants whether their current level of education is sufficient for the job they are seeking, or if additional schooling would help them land the job. While this is what employers are requesting, it does not necessarily rule out applicants with a lower level of education, provided that they can offer other compelling reasons why they are qualified for the job. All of the postings for a python programming skillset were seeking candidates with a bachelor's degree.

Additional Demand for Python Programming in California

Python programming is not only practiced by the occupations detailed in the first section of this report but is requested by employers of other occupations as well. Due to the limited postings in this region, the search area was expanded to the entire state to provide a clearer understanding of which other occupations would benefit from a python programming skillset. This search revealed 1,837 unique job ads. Exhibit 10 lists the occupations and employers associated with the job postings requesting a python programming skillset throughout California.

Exhibit 10: Other occupations and employers requesting python programming skills in California, Oct 2017 – Sep 2018

Occupation	Employer
Computer Systems Engineers/Architects	NVIDIA
Software Quality Assurance Engineers and Testers	VortalSoft Inc.
Computer and Information Research Scientists	Amazon
Database Administrators	Intel
Operations Research Analysts	Cisco Systems Inc.
Computer Systems Analysts	Dell
Validation Engineers	Apple Inc.
Network and Computer Systems Administrators	Facebook

Source: Burning Glass – Labor Insights

Demand for Full-Stack Developers in the Region

This section of the report will focus on the demand for full-stack developers in the Inland Empire/Desert Region. Full-stack developers are software developers that are capable of front end and back end programming, meaning they can design the website display and develop the code needed to make the website interactive. Full-stack developers possess a wide range of skills that make them desirable candidates to employers. A job posting search for "full-stack" in the region yielded 132 job postings. The names of the top local employers searching for workers with this skillset appear in Exhibit 11.

Exhibit 11: Employers posting job ads seeking full-stack developer skills in the Inland Empire/Desert Region, Oct 2017 – Sep 2018

Employer	Number of Job Postings
P. Murphy & Associates	5
CoStar Realty Information, Inc.	4
Niagara Bottling LLC, ERSI, & CGI Group	3 each

Source: Burning Glass – Labor Insights

Each of these 132 postings contains a specific job title. Knowing the specific job title that employers are hiring for provides a clearer picture of what they expect from a new employee. The job titles sourced from employer job postings appear in Exhibit 12.

Exhibit 12: Top job titles from employer job postings seeking full-stack developer skills in the Inland Empire/Desert Region, Sep 2017 – Aug 2018

Job Title	Number Job Postings
.Net Developer	20
Senior Developer	14
Full Stack Developer	7
Web Developer, Software Development Engineering, & Software Developer	6 each
Ruby Developer	5
Python Developer, Desktop Support, & ASP .NET Developer	4 each

Source: Burning Glass – Labor Insights

The specialized skills requested by employers in these job postings appear in Exhibit 13.

Exhibit 13: Specialized skills from employer postings seeking full-stack developer skills in the Inland Empire/Desert Region, Oct 2017 – Sep 2018

Specialized Skill	Number of Job Postings
SQL	69
JavaScript	59
Microsoft C#	56
.NET	43
Web Application Development and Software Development	39 Each
Angular JS	38
SQL Server	35
jQuery	34
Hypertext Preprocessor (PHP)	32
Python	31

Source: Burning Glass – Labor Insights

Finally, all of the postings for full-stack developers were seeking candidates with a bachelor's degree or higher, except for 5% of ads, which sought candidates with associate degrees.

Demand for Augmented and Virtual Reality Developers in the Region

This section of the report will focus on the demand for augmented reality and virtual reality (AR & VR) developers in the Inland Empire/Desert Region[3]. VR is an artificial environment created by a computer in which a user experiences the environment through sensory stimuli, while AR is an enhanced version of reality created by technology to overlay digital information on an individual's visual field.[4] Demand for these skills is projected to increase in the coming years, as this technology develops and is adopted by a larger user-base. A job-posting search for "augmented reality" and "virtual reality" in the region yielded 42 job postings. These job postings indicate that AR & VR skills are desirable for some occupations, but only as secondary or tertiary skills. The majority of these postings are seeking sales representatives and managers to sell AR & VR products (mostly Samsung), while a smaller portion are seeking instructional designers to assist

[3] https://www.augment.com/blog/virtual-reality-vs-augmented-reality/
[4] https://www.merriam-webster.com/dictionary/augmented%20reality

college faculty with the delivery of online course materials. There were no postings seeking developers for AR & VR in the region.

Additional Demand for Augmented and Virtual Reality in California

Due to the limited postings in this region, the search area was expanded to the entire state to provide a clearer understanding of which other occupations would benefit from AR & VR skillsets. This search revealed 2,682 unique job ads. Sales and marketing jobs are still prominent in the results, but there is demand for AR & VR development positions outside of the localized region. Exhibit 15 lists the occupations and employers associated with the job postings requesting AR & VR skills throughout California.

Exhibit 14: Other occupations and employers requesting AR & VR skills in California, Oct 2017 – Sep 2018

Occupation	Employer
Marketing Managers	Facebook
Computer Systems Engineers/Architects	NVIDIA
Computer Hardware Engineers	Udacity
Managers, All Other	Apple, Inc.
Operations Research Analysts	Google, Inc.
Sales Managers	Redpoint Ventures

Source: Burning Glass – Labor Insights

Demand for Internet of Things (IoT) in the Region

This section details relevant occupations to the Internet of Things (IoT). The IoT is defined as any stand-alone internet-connected device that can be monitored and controlled from a remote location.[5] While the first portion of this report focused on the regional demand for computer programming occupations, this section focuses specifically on demand for the IoT skills by local employers posting online job postings. A job posting search for "internet of things" in the region yielded 91 job postings. The names of top local employers searching for workers with this skillset appear in Exhibit 16.

Exhibit 16: Employers posting job postings seeking an internet of things skillset in the Inland Empire/Desert Region, Oct 2017 – Sep 2018

Employer	Number of Job Postings
ESRI	14
T Mobile USA Incorporated	9
Curacao	7
Best Buy	5
Synopsys, Incorporated	4
Infineon Technologies Americas Corporation, Niagara Bottling, LLC, and Opto 22	3 each
Others: Lockheed Martin Corporation, City of Riverside, Toro Company, Booz Allen Hamilton Inc., Advantech, California Baptist University	11 combined

Source: Burning Glass – Labor Insights

[5] Accessed from http://www.businessinsider.com/internet-of-things-definition on June 12, 2018.

Each of these 91 postings contains a specific job title. Knowing the specific job title that employers are hiring for provides a clearer picture of what they expect from a new employee. The top job titles sourced from employer job postings appear in Exhibit 17.

Exhibit 17: Job titles from employer job postings *seeking an internet of things skillset in the Inland Empire/Desert Region, Oct 2017 – Sep 2018*

Job Title	Number Job Postings
DevOps (Development and Operations) Engineer	11
Product Demonstrator & AWS (Amazon Web Services) DevOps (Development and Operations) Engineer	7 each
Sales Associate and Smart Home Expert	5 each
AWS (Amazon Web Services) Developer & DevOps (Development and Operations) Lead – Real Time and Big Data & Software Developer	4 each
Software Development Engineer & Technology Manager	3 each
Other: Operations Research Data Scientist, Infrastructure Architect, Principle Systems Engineer, Engineer, Applications Engineer, Sales Manager, Senior Analog Design Engineer, Information Security Officer	16 combined

Source: Burning Glass – Labor Insights

Knowing which skills are currently in demand from local employers' posting ads provides some indication as to what those employers value in new hires. These skills also provide potential job applicants with a specific roadmap regarding which skills they can refine or develop in order to make them a stronger candidate for the job they are seeking. The top specialized skills requested by employers for these postings appear in Exhibit 18.

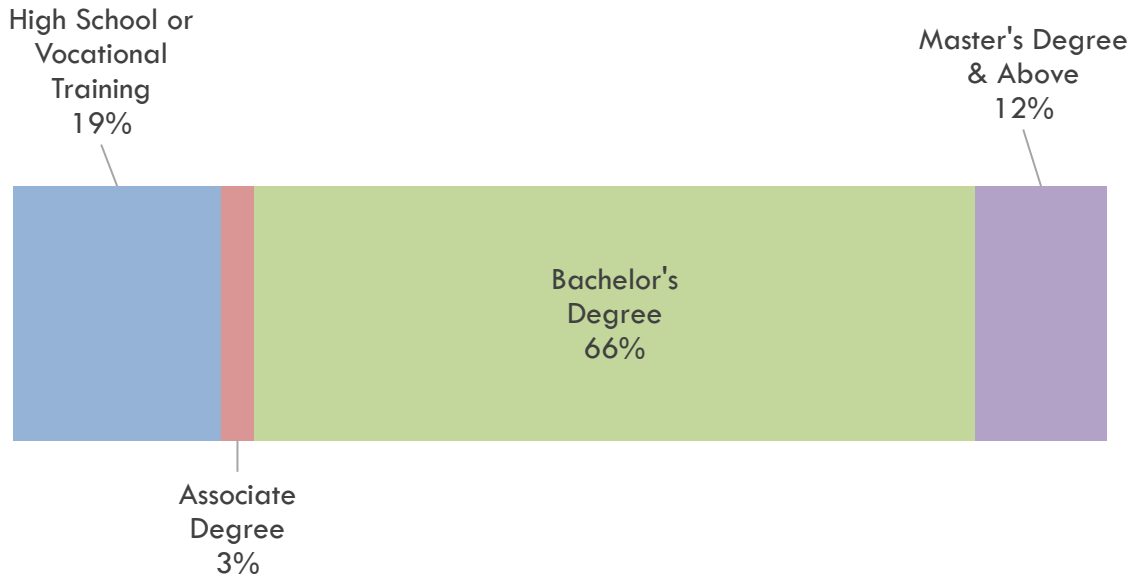
Exhibit 18: Specialized skills from employer postings seeking an internet of things skillset in the Inland Empire/Desert Region, Oct 2017 – Sep 2018

Specialized Skill	Number of Job Postings
Internet of Things (IoT)	78
AWS (Amazon Web Services) Elastic Cloud (EC2)	33
ElasticSearch	29
DevOps (Development and Operations) & Kubernetes System	28 each
Description and Demonstration of Products	26
Customer Service	25
Machine Learning	21
PostgreSQL System, Atlassian Bamboo, and Couchbase Server	19 each

Source: Burning Glass – Labor Insights

Finally, the education level desired by employers informs applicants whether their current level of education is sufficient for the job they are seeking, or if additional schooling would help them land the job. While this is what employers are requesting, it does not necessarily rule out applicants with a lower level of education, provided that they can provide other compelling reasons why they are qualified for the job. The majority of the employers' job postings in the region seeking individuals with the internet of things skillset are asking for individuals with a bachelor's degree or above. The minimum advertised education level from job postings appears in Exhibit 19.

Exhibit 19: Percentage of job postings seeking each level of education for the internet of things skillset in the Inland Empire/Desert Region, Oct 2017 – Sep 2018



Source: Burning Glass – Labor Insights

Student Completions

Exhibit 20 shows the annual average regional community college credentials (associate degrees and certificates) conferred during the three academic years between 2014 and 2017, with the relevant TOP code as well as the program titles used at each college, sourced from the Chancellor's Office Curriculum Inventory (COCI). Please note, a credential is not equivalent to a single person in search of a job opening since a student may earn more than one credential, such as an associate degree in addition to a certificate. Community College student outcome information is from the CTE LaunchBoard based on the selected TOP code(s) and region.

Exhibit 20: Annual average community college student completions and headcount for computer programming programs in the Inland Empire/Desert Region

0707.10 – Computer Programming – *Local Program Titles*	**Community College Headcount (2016-17)**	**Community College Annual Average Credentials (2014-17)**
Barstow	10	
Chaffey – *Programming Foundations, Computer Game Development*	326	
Copper Mountain	23	
Associate Degree		5
Certificate 30 to < 60 semester units		3
Crafton Hills	21	
Moreno Valley – *Computer Programming*	299	
Associate Degree		3
Certificate 18 to < 30 semester units		3
Mt. San Jacinto – *CIS: Programming*	854	
Certificate 30 to < 60 semester units		5
Norco – *Computer Programming, Game Programming*	437	
Associate Degree		7
Certificate 30 to < 60 semester units		3
Certificate 18 to < 30 semester units		4
Certificate 6 to < 18 semester units		7
Riverside – *Computer Programming, C++ Programming, Java Programming*	428	
Associate Degree		6
Certificate 18 to < 30 semester units		5
Certificate 6 to < 18 semester units		11
San Bernardino – *Computer Science*	133	
Associate Degree		2
Victor Valley – *Programming I, Programming II*	208	
Certificate 18 to < 30 semester units		1*
Total community college headcount (2016-17)	**2,637**	
Total annual average community college credentials		**64**

Source: LaunchBoard, IPEDS

*Victor Valley awarded one Certificate 18 to <30-semester units in 2014-15

0707.10– Computer programming program Strong Workforce outcomes in the Inland Empire/Desert Region in the academic year 2015-16 [unless noted otherwise]:

- Number of course enrollments: 3,746 (California median: 323) [2016-17]
- Number of students who transferred to a 4-year institution: 292 (CA: 50)
- Employed in the second fiscal quarter after exit: 60% (CA: 66%)
- Median earnings in the second fiscal quarter after exit: $7,026 (CA: $10,653)
- Employed in the fourth fiscal quarter after exit: 62% (CA: 66%)
- Median annual earnings: $23,381 (CA: $34,018)
- The percentage in a job closely related to the field of study: 60% (CA: 79%) [2014-15]
- Median change in earnings: 61% (CA: 51%)
- The proportion of students who attained a living wage: 42% (CA: 62%)

Sources

California Community Colleges Chancellor's Office Management Information Systems (MIS)
CTE LaunchBoard
Center of Excellence TOP to SOC Crosswalk
Chancellor's Office Curriculum Inventory (COCI 2.0)
Economic Modeling Specialists International (EMSI)
Labor Insight/Jobs (Burning Glass)
MIT Living Wage Calculator
O*Net Online
Taxonomy of Programs, 6th edition

Michael Goss, Director
Center of Excellence, Inland Empire/Desert Region
michael.goss@chaffey.edu
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Appendix A: Occupation definitions, five-year projections, and earnings for computer programming occupations

Occupation Definitions* (SOC code), *Education and Training Requirement, Community College Education Attainment

Computer Programmers (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.

Sample job titles: Analyst Programmer, Application Programmer Analyst, Computer Programmer, Computer Programmer Analyst, Internet Programmer, Java Developer, Programmer, Programmer Analyst, Web Applications Programmer, Web Programmer

Entry-Level Educational Requirement: Bachelor's degree
Training Requirement: None
Percentage of incumbent workers with a Community College Credential or Some Postsecondary Coursework: 22%

Software Developers, Applications (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.

Sample job titles: Application Developer, Application Integration Engineer, Applications Developer, Computer Consultant, Information Technology Analyst (IT Analyst), Software Architect, Software Developer, Software Development Engineer, Software Engineer, Technical Consultant

Entry-Level Educational Requirement: Bachelor's degree
Training Requirement: None
Percentage of incumbent workers with a Community College Credential or Some Postsecondary Coursework: 13%

Software Developers, Systems Software (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.

***Sample job titles**:* Developer, Infrastructure Engineer, Network Engineer, Publishing Systems Analyst, Senior Software Engineer, Software Architect, Software Developer, Software Engineer, Systems Coordinator, Systems Engineer

Entry-Level Educational Requirement: Bachelor's degree
Training Requirement: None
Percentage of incumbent workers with a Community College Credential or Some Postsecondary Coursework: 13%

Web Developers (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.

***Sample job titles**:* Designer, Technology Applications Engineer, Web Architect, Web Design Specialist, Web Designer, Web Developer, Web Development Director, Web Development Instructor, Webmaster

Entry-Level Educational Requirement: Associate degree
Training Requirement: None
Percentage of incumbent workers with a Community College Credential or Some Postsecondary Coursework: 25%

Computer Network Support Specialists (15-1152)

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.

***Sample job titles**:* Computer Network Specialist, IT Consultant (Information Technology Consultant), Network Engineer, Network Specialist, Network Support Specialist, Network Technical Analyst, Network Technician, Personal Computer Network Analyst, Senior IT Assistant (Senior Information Technology Assistant), Systems Specialist

Entry-Level Educational Requirement: Associate degree
Training Requirement: None
Percentage of incumbent workers with a Community College Credential or Some Postsecondary Coursework: 41%

Table 1. 2017 to 2022 job growth, wages, typical education, training, and work experience required for the computer programming occupational group, Inland Empire/Desert Region

Occupation (SOC)	2017 Jobs	5-Yr Change	5-Yr % Change	Annual Openings (New + Replacement Jobs)	Entry-level to Experienced Wage*	Median Wage*	Average Annual Earnings	Entry-Level Education & On-The-Job Training	Work Experience Required
Software Developers, Applications (15-1132)	1,870	332	18%	194	$36.04 to $55.32	$45.08	$95,600	Bachelor's degree & none	None
Computer Network Support Specialists (15-1152)	1,110	95	9%	102	$24.74 to $39.94	$29.52	$68,100	Associate degree & none	None
Software Developers, Systems Software (15-1133)	1,096	114	10%	95	$35.67 to $58.60	$46.91	$101,100	Bachelor's degree & none	None
Web Developers (15-1134)	1,071	87	8%	94	$17.53 to $30.09	$20.97	$52,500	Associate degree & none	None
Computer Programmers (15-1131)	1,041	(4)	(0%)	66	$28.02 to $43.93	$34.26	$75,100	Bachelor's degree & none	None
Total	**6,188**	**625**	**10%**	**552**	**-**	**-**	**-**	**-**	**-**

Source: EMSI 2018.3

*Entry Hourly is 25th percentile wage, the median is 50th percentile wage, experienced is 75th percentile wage.