

Program Endorsement Brief: Cloud Computing

Los Angeles/Orange County Center of Excellence, December 2020

Summary Analysis

Program Endorsement:	Endorsed: All Criteria Met <input type="checkbox"/>	Endorsed: Some Criteria Met <input checked="" type="checkbox"/>	Not Endorsed <input type="checkbox"/>
Program Endorsement Criteria			
Supply Gap:	Yes <input checked="" type="checkbox"/>		No <input type="checkbox"/>
Living Wage: (Entry-Level, 25th)	Yes <input checked="" type="checkbox"/>		No <input type="checkbox"/>
Education:	Yes <input type="checkbox"/>		No <input checked="" type="checkbox"/>
Emerging Occupation(s)			
	Yes <input type="checkbox"/>		No <input checked="" type="checkbox"/>

The Los Angeles/Orange County Center of Excellence for Labor Market Research (COE) prepared this report to provide Los Angeles/Orange County regional labor market supply and demand data for nine occupations related to cloud computing: *computer systems analysts* (15-1211), *information security analysts* (15-1212), *computer user support specialists* (15-1232), *computer network architects* (15-1241), *network and computer systems administrators* (15-1244), *database administrators and architects* (15-1245), *software developers and software quality assurance analysts and testers* (15-1256), *web developers and digital interface designers* (15-1257), and *computer occupations, all other* (15-1299). This report is intended to help determine whether there is demand in the local labor market that is not being met by the supply from community college programs that align with the relevant occupations.

Based on the available data, there appears to be a supply gap for occupations related to cloud computing in the region. For the purposes of regional pre-approval, the supply gap is large enough that if each college were to create a cloud computing program or expand on their existing program, a supply gap would still exist due to the high demand for these computing occupations. Furthermore, all of the annual openings for the occupations in this report have typical entry-level wages that exceed the living wage in Los Angeles County. However, the majority of annual openings in the region typically require a bachelor's degree. **Therefore, due to some of the criteria being met, the COE endorses this proposed program.** Detailed reasons include:

Demand:

- **Supply Gap Criteria** – Over the next five years, there is projected to be **14,695 jobs available annually** in the region due to new job growth and replacements, **which is more than the 4,261 awards conferred annually** by educational institutions in the region.

- **Living Wage Criteria** –Within Los Angeles County, all of the annual job openings for these nine cloud computing occupations have entry-level wages above the county’s living wage (\$15.04/hour).¹
- **Educational Criteria** –Within the LA/OC region, **the majority (76%) of annual job openings** for occupations related to cloud computing **typically require a bachelor’s degree.**
 - The national-level educational attainment data indicates **between 11.3% and 40.7% of workers in the field have completed some college or an associate degree**, and only three occupations in this report have 30% or more workers in the field that have completed some college or an associate degree as their highest level of education (*computer user support specialists, network and computer systems administrators, and computer network architects*).

Supply:

- **All 28 community colleges** in the LA/OC region issue awards related to IT and/or cloud computing, conferring an average of **1,299 awards annually** between 2016 and 2019.
- Between 2014 and 2017, there was an average of **2,962 awards conferred annually** in related training programs by non-community college institutions throughout the region.

Occupational Demand

Exhibit 1 shows the five-year occupational demand projections for cloud computing-related occupations. In Los Angeles/Orange County, the number of jobs related to these occupations is projected to increase by 7% through 2024. There will be nearly 15,000 job openings per year through 2024 due to job growth and replacements.

This report includes employment projection data by Emsi which uses EDD information. Emsi’s projections are modeled on recorded (historical) employment figures and incorporate several underlying assumptions, including the assumption that the economy, during the projection period, will be at approximately full employment. To the extent that a recession or labor shock, such as the economic effects of COVID-19, can cause long-term structural change, it may impact the projections. At this time, it is not possible to quantify the impact of COVID-19 on projections of industry and occupational employment. Therefore, the projections included in this report do not take the impacts of COVID-19 into account.

¹ Living wage data was pulled from California Family Needs Calculator on 11/20/2020. For more information, visit the California Family Needs Calculator website: <https://insightcced.org/2018-family-needs-calculator/>.

Exhibit 1: Occupational demand in Los Angeles and Orange Counties²

Geography	2019 Jobs	2024 Jobs	2019-2024 Change	2019-2024 % Change	Annual Openings
Los Angeles	110,536	117,902	7,367	7%	10,129
Orange	50,336	53,501	3,165	6%	4,566
Total	160,872	171,403	10,531	7%	14,695

Wages

The labor market endorsement in this report considers the entry-level hourly wages for all of the cloud computing-related occupations in this report (middle-skill and above middle-skill) in Los Angeles County as they relate to the county’s living wage. Orange County wages are included below in order to provide a complete analysis of the LA/OC region. Detailed wage information, by county, is included in Appendix A.

Los Angeles County—All of the annual openings for these cloud computing-related occupations have entry-level wages above the California Family Needs Calculator hourly wage (living wage) for one adult (\$15.04 in Los Angeles County).³ Typical entry-level hourly wages are in a range between \$21.25 and \$44.48. Experienced workers can expect to earn wages between \$34.00 and \$72.56, which are higher than the living wage estimate.

Orange County— All of the annual openings for these cloud computing-related occupations have entry-level wages above the California Family Needs Calculator hourly wage (living wage) for one adult (\$17.36 in Orange County). Typical entry-level hourly wages are in a range between \$20.32 and \$43.48. Experienced workers can expect to earn wages between \$34.14 and \$70.77, which are higher than the living wage estimate.

Job Postings

There were 136,345 online job postings for cloud computing-related occupations listed in the past 12 months. The highest number of job postings were for software engineers, senior software engineers, DevOps Engineers, data analysts, and systems engineers. The top skills were: SQL, software development, Java, software engineering, and Python. The top employers, by the number of job postings, in the region were: Northrop Grumman, Anthem Blue Cross, and The Boeing Company.

Cloud Computing Skillset: Over the last twelve months, 20,870 of the 136,345 employer job postings (15%) sought candidates with Cloud Computing, Solutions, and Storage skills. The top three occupations, by the number of job postings, were *software developers and software quality*

² Five-year change represents new job additions to the workforce. Annual openings include new jobs and replacement jobs that result from retirements and separations.

³ Living wage data was pulled from California Family Needs Calculator on 11/20/2020. For more information, visit the California Family Needs Calculator website: <https://insightcced.org/2018-family-needs-calculator/>.

assurance analysts and testers, computer occupations, all other, and computer user support specialists.

It is important to note that the job postings data included in this section reflects online job postings listed in the past 12 months and does not yet demonstrate the impact of COVID-19. While employers have generally posted fewer online job postings since the beginning of the pandemic, the long-term effects are currently unknown.

Educational Attainment

The Bureau of Labor Statistics (BLS) lists the following typical entry-level education requirements for the cloud computing-related occupations studied in this report:

- **Bachelor's degree:** *computer systems analysts (15-1211), information security analysts (15-1212), computer network architects (15-1241), network and computer systems administrators (15-1244), database administrators and architects (15-1245), software developers and software quality assurance analysts and testers (15-1256), and computer occupations, all other (15-1299)*
- **Associate degree:** *web developers and digital interface designers (15-1257)*
- **Some college/no degree:** *computer user support specialists (15-1232)*

In the LA/OC region, the majority of annual job openings (76%) typically require a bachelor's degree. While the national-level educational attainment data indicates between 11.3% and 40.7% of workers in the field have completed some college or an associate degree, only three occupations in this report have 30% or more workers in the field that have completed some college or an associate degree as their highest level of education (*computer user support specialists, network and computer systems administrators, and computer network architects*). Of the 56% of cloud computing-related job postings listing a minimum education requirement in Los Angeles/Orange County, 90% (67,863) requested a bachelor's degree, 8% (5,817) requested a high school diploma and 3% (2,131) requested an associate degree.

Educational Supply

Community College Supply— Exhibit 2 shows the annual and three-year average number of awards conferred by community colleges in the related TOP codes: Information Technology, General (0701.00), Computer Information Systems (0702.00), Software Applications (0702.10), Computer Science (Transfer) (0706.00), Computer Software Development (0707.00), Computer Programming (0707.10), Database Design and Administration (0707.20), Computer Systems Analysis (0707.30), Computer Infrastructure and Support (0708.00), Computer Networking (0708.10), Computer Support (0708.20), World Wide Web Administration (0709.00), and E-Commerce (Technology emphasis) (0709.10), and Other Information Technology (0799.00). The colleges with the most completions in the region are: Mt. San Antonio, Long Beach, and Coastline. Over the past 12 months, there were 28 other IT program recommendation requests from regional community colleges, and three cloud computing requests. All 28 community colleges in the region currently offer programs in at least one of the 14 TOP codes included in this report.

Exhibit 2: Regional community college awards (certificates and degrees), 2016-2019

TOP Code	Program name	College	2016-2017 Awards	2017-2018 Awards	2018-2019 Awards	3-Yr Average
0701.00	Information Technology, General	East LA	8	15	23	15
		LA Harbor	7	6	-	4
		LA Mission	4	1	1	2
		Long Beach	27	25	34	29
		Mt San Antonio	61	79	74	71
		Santa Monica	-	-	39	13
		West LA	3	4	4	4
		LA Subtotal	110	130	175	138
		Cypress	1	-	-	0
		OC Subtotal	1	0	0	0
Supply Subtotal			111	130	175	139
0702.00	Computer Information Systems	Citrus	5	7	5	6
		Compton	1	-	1	1
		East LA	14	16	19	16
		El Camino	15	18	14	16
		Glendale	2	-	-	1
		LA City	3	4	1	3
		LA Mission	3	9	5	6
		LA Trade-Tech	23	14	8	15
		Pasadena	2	1	-	1
		Rio Hondo	10	19	21	17
		West LA	13	6	8	9
		LA Subtotal	91	94	82	89
		Cypress	5	8	5	6
		Fullerton	7	20	15	14
		Orange Coast	-	3	4	2
		Santa Ana	18	6	4	9
		Santiago Canyon	2	2	3	2
		OC Subtotal	32	39	31	34
Supply Subtotal			123	133	113	123
0702.10	Software Applications	Cerritos	4	3	9	5
		LA City	2	-	-	1
		LA Mission	2	7	2	4
		LA Southwest	2	2	1	2
		Mt San Antonio	2	3	1	2
		Pasadena	2	-	-	1
		Santa Monica	17	10	18	15
		LA Subtotal	31	25	31	29

TOP Code	Program name	College	2016-2017 Awards	2017-2018 Awards	2018-2019 Awards	3-Yr Average		
0702.10 (cont.)	Software Applications	Coastline	9	4	9	7		
		Fullerton	1	-	-	0		
		Irvine	28	22	39	30		
		Saddleback	9	3	2	5		
		OC Subtotal	47	29	50	42		
		Supply Subtotal	78	54	81	71		
0706.00	Computer Science (Transfer)	Cerritos	6	15	12	11		
		Compton	-	1	1	1		
		El Camino	28	26	37	30		
		Glendale	2	2	7	4		
		LA City	7	14	6	9		
		LA Mission	-	-	3	1		
		Long Beach	-	7	27	11		
		Santa Monica	22	17	19	19		
		LA Subtotal	65	82	112	86		
		Fullerton	9	18	-	9		
		Golden West	-	-	5	2		
		Irvine	4	26	40	23		
		Orange Coast	10	28	95	44		
		Saddleback	13	19	23	18		
		Santa Ana	10	7	12	10		
		Santiago Canyon	15	17	7	13		
		OC Subtotal	61	115	182	119		
		Supply Subtotal	126	197	294	206		
		0707.00	Computer Software Development	LA City	-	-	1	0
				Pasadena	4	-	-	1
LA Subtotal	4			-	1	2		
Cypress	1			1	1	1		
Golden West	7			3	4	5		
Orange Coast	5			7	7	6		
Saddleback	3			3	13	6		
OC Subtotal	16			14	25	18		
Supply Subtotal	20	14	26	20				
0707.10	Computer Programming	Cerritos	1	4	-	2		
		East LA	5	6	8	6		
		Glendale	1	2	2	2		
		LA City	43	-	-	14		
		LA Mission	2	5	6	4		
		LA Pierce	6	9	18	11		

TOP Code	Program name	College	2016-2017 Awards	2017-2018 Awards	2018-2019 Awards	3-Yr Average
0707.10 (cont.)	Computer Programming	LA Southwest	2	1	-	1
		LA Valley	26	10	7	14
		Long Beach	-	2	4	2
		Mt San Antonio	68	62	119	83
		Pasadena	1	8	11	7
		Santa Monica	25	42	44	37
		West LA	-	-	1	0
		LA Subtotal	180	151	220	184
		Cypress	27	18	22	22
		Fullerton	-	-	16	5
		Irvine	16	10	8	11
		Orange Coast	29	29	31	30
		Santa Ana	-	1	13	5
		Santiago Canyon	-	30	9	13
		OC Subtotal	72	88	99	86
Supply Subtotal	252	239	319	270		
0707.20	Database Design and Administration	Citrus	-	-	1	0
		Long Beach	-	1	3	1
		Mt San Antonio	11	4	11	9
		Santa Monica	2	2	1	2
		LA Subtotal	13	7	16	12
		Santa Ana	-	4	1	2
		OC Subtotal	-	4	1	2
Supply Subtotal	13	11	17	14		
0707.30	Computer Systems Analysis	Cerritos	6	4	2	4
		LA Subtotal	6	4	2	4
		Cypress	-	5	2	2
		OC Subtotal	-	5	2	2
Supply Subtotal	6	9	4	6		
0708.00	Computer Infrastructure and Support	LA Harbor	-	1	1	1
		LA Mission	-	-	2	1
		LA Valley	6	8	5	6
		Long Beach	1	1	3	2
		Mt San Antonio	16	20	24	20
		Pasadena	-	-	1	0
		West LA	-	-	4	1
		LA Subtotal	23	30	40	31
		Coastline	67	65	49	60
		Cypress	1	1	2	1
OC Subtotal	68	66	51	62		

TOP Code	Program name	College	2016-2017 Awards	2017-2018 Awards	2018-2019 Awards	3-Yr Average
0708.00 (cont.)	Computer Infrastructure and Support	Supply Subtotal	91	96	91	93
		Cerritos	10	8	11	10
0708.10	Computer Networking	Glendale	-	6	3	3
		LA City	11	37	23	24
		LA Pierce	37	23	39	33
		Long Beach	25	27	55	36
		Mt San Antonio	9	2	8	6
		Rio Hondo	-	-	5	2
		West LA	52	43	77	57
		LA Subtotal	144	146	221	170
		Coastline	20	12	38	23
		Cypress	28	37	70	45
		Irvine	19	12	11	14
		Saddleback	21	17	10	16
		Santa Ana	-	7	14	7
		OC Subtotal	88	85	143	105
Supply Subtotal	232	231	364	276		
0708.20	Computer Support	Glendale	2	3	10	5
		LA Pierce	14	7	9	10
		Long Beach	-	1	8	3
		Pasadena	1	3	7	4
		LA Subtotal	17	14	34	22
		Cypress	3	1	3	2
		Santa Ana	-	10	9	6
		OC Subtotal	3	11	12	9
		Supply Subtotal	20	25	46	30
		0709.00	World Wide Web Administration	Glendale	3	9
LA Pierce	5			5	9	6
Long Beach	5			4	22	10
West LA	8			24	13	15
LA Subtotal	21			42	50	38
Saddleback	5			-	-	2
OC Subtotal	5			0	0	2
Supply Subtotal	26	42	50	39		
0709.10	E-Commerce (Technology emphasis)	East LA	-	-	1	0
		LA Subtotal	0	0	1	0
		Saddleback	-	-	6	2
		OC Subtotal	0	0	6	2
Supply Subtotal	0	0	7	2		

TOP Code	Program name	College	2016-2017 Awards	2017-2018 Awards	2018-2019 Awards	3-Yr Average
0799.00	Other Information Technology	LA Harbor	1	1	-	1
		Mt San Antonio	9	5	13	9
		LA Subtotal	10	6	13	10
		Supply Subtotal	11	13	10	11
		Grand Total/Average	1,108	1,187	1,600	1,299

Non-Community College Supply—For a comprehensive supply analysis, it is important to consider the supply from non-community college institutions in the region that provide training programs for computer programming occupations. Exhibit 3 shows the annual and three-year average number of awards conferred by these institutions in the related Classification of Instructional Programs (CIP) Codes: Computer and Information Sciences, General (11.0101), Information Technology (11.0103), Computer and Information Sciences, Other (11.0199), Computer Programming/Programmer, General (11.0201), Computer Programming, Other (11.0299), Computer Systems Analysis/Analyst (11.0501), Computer Science (11.0701), Web Page, Digital/Multimedia and Information Resources Design (11.0801), Data Modeling/Warehousing and Database Administration (11.0802), Computer Software and Media Applications, Other (11.0899), Computer systems Network and Telecommunications (11.0901), Network and System Administration/Administrator (11.1001), Computer and Information Systems Security/Information Assurance (11.1003), Web/Multimedia Management and Webmaster (11.1004), Computer Support Specialist (11.1006), Computer and Information Sciences and Support Services, Other (11.9999), Computer technology/Computer Systems Technology (15.1202), and E-Commerce/Electronic Commerce (52.0208). Due to different data collection periods, the most recent three-year period of available data is from 2014 to 2017. Between 2014 and 2017, non-community college institutions in the region conferred an average of 2,962 awards annually in related training programs.

Exhibit 3: Regional non-community college awards, 2014-2017

CIP Code	Program	Institution	2014-15 Awards	2015-16 Awards	2016-17 Awards	3-Year Award Average
11.0101	Computer and Information Sciences, General	ABCO Technology	15	0	0	5
		Azusa Pacific University	10	20	19	16
		Brand College	1	2	0	1
		Brandman University	19	14	26	20
		California Institute of Technology	48	56	0	35
		Chapman University	6	7	5	6
		Loyola Marymount University	15	16	19	17
		Pacific States University	0	2	1	1
		University of California-Irvine	31	3	1	12
		University of La Verne	14	21	19	18
		University of the People	0	36	57	31
		11.0103	Information Technology	Argosy University-Orange County	0	1
Bethesda University	1			1	0	1
Brand College	55			42	28	42
California Intercontinental University	0			0	1	0
California State University-Los Angeles	102			92	117	104
California State University-Northridge	49			48	43	47
Stanbridge University	29			21	25	25
Trident University International	96			77	74	82
University of Phoenix-California	2			3	16	7
11.0199	Computer and Information Sciences, Other			Antioch University-Los Angeles	0	0
		Brand College	1	4	2	2
		California State University-Dominguez Hills	32	36	66	45
		California State University-Northridge	30	50	77	52
		Learnet Academy Inc	40	0	0	13
		Pitzer College	1	0	0	0
		11.0201	Computer Programming/Programmer, General	ABCO Technology	6	12
ITT Technical Institute-San Dimas	5			0	0	2
University of Phoenix-California	68			62	43	58
11.0299	Computer Programming, Other	Advanced Computing Institute	52	48	1	34

CIP Code	Program	Institution	2014-15 Awards	2015-16 Awards	2016-17 Awards	3-Year Award Average		
11.0501	Computer Systems Analysis/Analyst	Brand College	1	2	4	2		
		DeVry University-California	110	103	94	102		
		University of Phoenix-California	9	8	4	7		
		Biola University	6	10	17	11		
		California Institute of Technology	0	0	67	22		
		California State Polytechnic University-Pomona	113	166	198	159		
		California State University-Dominguez Hills	15	22	23	20		
		California State University-Fullerton	77	121	139	112		
		California State University-Long Beach	81	93	140	105		
		California State University-Los Angeles	23	42	58	41		
		California State University-Northridge	68	69	95	77		
		Chapman University	11	27	23	20		
		Claremont McKenna College	6	10	13	10		
		11.0701	Computer Science	East San Gabriel Valley Regional Occupational Program	41	26	5	24
Harvey Mudd College	57			44	27	43		
Occidental College	1			0	0	0		
Pitzer College	4			1	4	3		
Pomona College	24			33	39	32		
Scripps College	5			2	5	4		
Southern California Institute of Technology	3			14	1	6		
Trident University International	28			43	59	43		
University of California-Irvine	212			280	425	306		
University of California-Los Angeles	141			179	183	168		
University of Southern California	87			159	174	140		
11.0801	Web Page, Digital/Multimedia and Information Resources Design			Advanced Computing Institute	73	46	57	59

CIP Code	Program	Institution	2014-15 Awards	2015-16 Awards	2016-17 Awards	3-Year Award Average
11.0801 (cont.)	Web Page, Digital/Multimedia and Information Resources Design	Argosy University-The Art Institute of California-Hollywood	22	20	24	22
		Argosy University-The Art Institute of California-Los Angeles	15	23	24	21
		Argosy University-The Art Institute of California-Orange County	19	15	33	22
		DeVry University-California	91	69	36	65
		Fremont College	8	1	0	3
		University of Phoenix-California	5	6	1	4
11.0802	Data Modeling/Warehousing and Database Administration	ABCO Technology	6	3	3	4
		University of Phoenix-California	12	8	8	9
11.0899	Computer Software and Media Applications, Other	Art Center College of Design	0	5	7	4
		Learnet Academy Inc	59	45	41	48
11.0901	Computer Systems Networking and Telecommunications	Advanced Computing Institute	6	5	98	36
		Brand College	0	1	2	1
		DeVry University-California	166	154	135	152
		ITT Technical Institute-Sylmar	1	0	0	0
		Mt Sierra College	8	6	5	6
		PCI College	1	0	0	0
		University of Phoenix-California	51	55	27	44
11.1001	Network and System Administration/Administrator	Brand College	16	22	2	13
		University of Phoenix-California	12	2	1	5
11.1003	Computer and Information Systems Security/Information Assurance	Azusa Pacific University	8	4	3	5
		ITT Technical Institute-Orange	37	0	0	12
		ITT Technical Institute-San Dimas	23	0	0	8
		ITT Technical Institute-Sylmar	19	0	0	6
		ITT Technical Institute-Torrance	6	0	0	2
		Learnet Academy Inc	0	39	48	29
		Mt Sierra College	14	9	8	10
University of Phoenix-California	111	74	71	85		

CIP Code	Program	Institution	2014-15 Awards	2015-16 Awards	2016-17 Awards	3-Year Award Average
11.1004	Web/Multimedia Management and Webmaster	ABCO Technology	7	9	12	9
		Pepperdine University	0	1	0	0
		University of Phoenix-California	7	5	4	5
11.1006	Computer Support Specialist	Palladium Technical Academy	6	0	0	2
		Southern California Institute of Technology	13	32	16	20
		University of Phoenix-California	0	0	1	0
11.9999	Computer and Information Sciences and Support Services, Other	Brand College	1	0	1	1
		Mt Sierra College	9	4	2	5
		Pitzer College	0	0	1	0
15.1202	Computer Technology/Computer Systems Technology	Advanced Computing Institute	67	74	92	78
		Learnet Academy Inc	0	13	11	8
52.0208	E-Commerce/Electronic Commerce	University of La Verne	5	3	0	3
		University of Phoenix-California	1	1	0	1
Grand Total			2,756	2,882	3,249	2,962

Appendix A: Occupational demand and wage data by county

Exhibit 4. Los Angeles County

Occupation (SOC)	2019 Jobs	2024 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	Entry-Level Hourly Earnings (25th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75th Percentile)
Computer Systems Analysts (15-1211)	12,075	12,641	566	5%	990	\$38.07	\$49.24	\$62.18
Information Security Analysts (15-1212)	1,946	2,254	308	16%	208	\$37.45	\$50.53	\$62.67
Computer User Support Specialists (15-1232)	19,080	20,408	1,327	7%	1,866	\$21.25	\$26.76	\$34.00
Computer Network Architects (15-1241)	3,823	3,877	54	1%	282	\$38.60	\$54.62	\$70.20
Network and Computer Systems Administrators (15-1244)	8,479	8,685	207	2%	636	\$34.14	\$43.88	\$55.12
Database Administrators and Architects (15-1245)	2,955	3,124	169	6%	246	\$33.46	\$45.01	\$60.70
Software Developers and Software Quality Assurance Analysts and Testers (15-1256)	37,605	41,228	3,624	10%	3,738	\$44.48	\$58.13	\$72.56
Web Developers and Digital Interface Designers (15-1257)	6,916	7,488	572	8%	655	\$21.50	\$33.13	\$46.71
Computer Occupations, All Other (15-1299)	17,657	18,196	540	3%	1,508	\$27.02	\$38.12	\$53.50
Total	110,536	117,902	7,367	7%	10,129			

Exhibit 5. Orange County

Occupation (SOC)	2019 Jobs	2024 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	Entry-Level Hourly Earnings (25th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75th Percentile)
Computer Systems Analysts (15-1211)	5,554	5,843	289	5%	461	\$37.02	\$47.85	\$60.44
Information Security Analysts (15-1212)	924	1,088	164	18%	103	\$36.28	\$48.94	\$60.72
Computer User Support Specialists (15-1232)	8,160	8,650	490	6%	779	\$21.34	\$26.86	\$34.14
Computer Network Architects (15-1241)	1,781	1,814	33	2%	132	\$37.57	\$53.11	\$68.24
Network and Computer Systems Administrators (15-1244)	3,481	3,599	118	3%	268	\$33.30	\$42.81	\$53.76
Database Administrators and Architects (15-1245)	1,222	1,292	69	6%	102	\$32.23	\$43.35	\$58.47
Software Developers and Software Quality Assurance Analysts and Testers (15-1256)	19,046	20,658	1,612	8%	1,842	\$43.48	\$56.74	\$70.77
Web Developers and Digital Interface Designers (15-1257)	2,710	2,897	187	7%	248	\$20.32	\$31.41	\$44.33
Computer Occupations, All Other (15-1299)	7,456	7,660	203	3%	631	\$26.44	\$37.29	\$52.34
Total	50,336	53,501	3,165	6%	4,566			

Exhibit 6. Los Angeles and Orange Counties

Occupation (SOC)	2019 Jobs	2024 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	Typical Entry Level Education
Computer Systems Analysts (15-1211)	17,629	18,484	854	5%	1,451	Bachelor's degree
Information Security Analysts (15-1212)	2,870	3,342	472	16%	310	Bachelor's degree
Computer User Support Specialists (15-1232)	27,240	29,058	1,818	7%	2,645	Some college, no degree
Computer Network Architects (15-1241)	5,604	5,691	87	2%	414	Bachelor's degree
Network and Computer Systems Administrators (15-1244)	11,959	12,284	325	3%	904	Bachelor's degree
Database Administrators and Architects (15-1245)	4,178	4,416	238	6%	348	Bachelor's degree
Software Developers and Software Quality Assurance Analysts and Testers (15-1256)	56,651	61,886	5,235	9%	5,580	Bachelor's degree
Web Developers and Digital Interface Designers (15-1257)	9,626	10,385	759	8%	903	Associate's degree
Computer Occupations, All Other (15-1299)	25,113	25,856	743	3%	2,139	Bachelor's degree
Total	160,872	171,403	10,531	7%	14,695	

Appendix B: Sources

- O*NET Online
- Labor Insight/Jobs (Burning Glass)
- Economic Modeling Specialists, International (Emsi)
- Bureau of Labor Statistics (BLS)
- Employment Development Department, Labor Market Information Division, OES
- California Community Colleges Chancellor's Office Management Information Systems (MIS)
- California Family Needs Calculator, Insight Center for Community Economic Development
- Chancellor's Office Curriculum Inventory (COCI 2.0)

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