Program Endorsement Brief: 0707.00/Computer Software Development
IoT Developer Certificate
Orange County Center of Excellence, June 2022

Summary Analysis

Program Endorsement:	Endorsed: All Criteria Met	☐	Endorsed: Some Criteria Met	☒	Not Endorsed	☐
Program Endorsement Criteria						
Supply Gap:	Yes ☐			No ☑ (see comments below)		
Living Wage: (Entry-Level, 25th)	Yes ☑			No ☐		
Education:	Yes ☑			No ☐		
Emerging Occupation(s)						
Yes ☐				No ☑		

The 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 related to two middle-skill occupations: *computer network support specialists* (15-1231) and *computer user support specialists* (15-1232) as well as two above middle-skill occupations: *computer systems analysts* (15-1211) and *software developers and software quality assurance analysts and testers* (15-1256). Middle-skill occupations typically require some postsecondary education, but less than a bachelor's degree.[1] Although the occupations *computer systems analysts* and *software developers and software quality assurance analysts and testers* are considered above middle-skill, they are included because they are pathway occupations for the group of middle-skill occupations included in this report and are directly related to internet of things (IoT) development. However, program endorsement will be based solely on the labor market information for the two middle-skill occupations. 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 does not appear to be a supply gap for the included middle-skill computing and networking occupations in the region. However, information technology, computer support, and computer software educational programs train for numerous occupations that are not included in this report; therefore, supply is overstated for these two middle-skill occupations and the COE is unable to quantify the supply solely for these computer and networking occupations. The majority of annual openings for the occupations in this report typically require some college, no degree and 40% of workers in the field have completed some college or an associate degree as their highest level of education. Furthermore, entry-level wages

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[1] The COE classifies middle-skill jobs as the following:
- All occupations that require an educational requirement of some college, associate degree or apprenticeship;
- All occupations that require a bachelor's degree, but also have more than one-third of their existing labor force with an educational attainment of some college or associate degree; or
- All occupations that require a high school diploma or equivalent or no formal education, but also require short- to long-term on-the-job training where multiple community colleges have existing programs.

exceed the living wage in both Los Angeles and Orange counties. **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 **2,329 jobs available annually** in the region due to new job growth and replacement, *which is less than the 3,579 awards conferred annually* by educational institutions in the region.
  - However, the educational programs included in this report train for at least 13 other computing, software development, and networking occupations that are not included in this report. Therefore, **the labor supply for the group of middle-skill computer and networking occupations included in this report is overstated.**
- *Living Wage Criteria –* Within Orange County, **all annual job openings** for the group of middle-skill computer and networking occupations **have entry-level wages above the county's living wage** ($20.63/hour).[2]
- *Educational Criteria –* Within the LA/OC region, **81% of the annual job openings** for occupations related to Computer Software Development **typically require some college, no degree.**
  - Furthermore, the national-level educational attainment data indicates **40% of workers in the field have completed some college or an associate degree** as their highest level of education.

Supply:
- Though information technology, computer support, and computer software educational programs prepare students for employment within these computer and networking occupations, they also train for 13 middle-skill and above middle-skill occupations that are not included in this report. Therefore, **supply for the two middle-skill computer and networking occupations included in this report is overstated.**
  - There are **28 community colleges** in the LA/OC region that issue awards related to Computer Software Development, conferring an average of **1,172 awards annually** between 2017 and 2020.
  - Between 2016 and 2019, there was an average of **2,408 awards conferred annually** in related training programs by non-community college institutions, all of which were generated by **31 individual non-community college institutions throughout** the region.

Occupational Demand
Exhibit 1 shows the five-year occupational demand projections for the two middle-skill computer and networking occupations. In Los Angeles/Orange County, the number of jobs related to these occupations is projected to increase by 3% through 2025. There will be more than 2,300 job openings per year through 2025 due to job growth and replacements.

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[2] Living wage data was pulled from California Family Needs Calculator on 6/10/2022. For more information, visit the California Family Needs Calculator website: https://insightcced.org/family-needs-calculator/.

Exhibit 1: Middle-skill occupational demand in Los Angeles and Orange Counties[3]

Geography	2020 Jobs	2025 Jobs	2020-2025 Change	2020-2025 % Change	Annual Openings
Los Angeles	20,748	21,067	319	2%	1,570
Orange	9,206	9,612	406	4%	759
Total	**29,954**	**30,679**	**724**	**2%**	**2,329**

Exhibit 2 shows the five-year occupational demand projections for the two above middle-skill computer and networking occupations. In Los Angeles/Orange County, the number of jobs related to these occupations is projected to increase by 8% through 2025. There will be more than 7,110 job openings per year through 2025 due to job growth and replacements.

Exhibit 2: Above middle-skill occupational demand in Los Angeles and Orange Counties[4]

Geography	2020 Jobs	2025 Jobs	2020-2025 Change	2020-2025 % Change	Annual Openings
Los Angeles	52,804	57,028	4,224	8%	4,740
Orange	26,140	28,365	2,224	9%	2,376
Total	**78,945**	**85,393**	**6,448**	**8%**	**7,116**

Wages

The labor market endorsement in this report considers the entry-level hourly wages for the group of middle-skill computer and networking occupations in Orange County as they relate to the county's living wage. Los Angeles 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.

Orange County: All annual openings for the group of middle-skill computer and networking occupations have entry-level wages above the living wage for one adult ($20.63 in Orange County). Typical entry-level hourly wages are in a range between $21.17 and $26.33. Experienced workers can expect to earn wages between $35.30 and $39.50, which are higher than the living wage estimate. Orange County's average wages are below the average statewide wage of $34.58 for these occupations.

All annual openings for the group of above middle-skill computer and networking occupations have entry-level wages above the living wage for one adult ($20.63 in Orange County). Typical entry-level hourly wages are in a range between $38.72 and $41.37. Experienced workers can expect to earn wages between $63.60 and $68.87, which are higher than the living wage estimate. Orange County's average wages are below the average statewide wage of $63.88 for these occupations.

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

Los Angeles County: All annual openings for the group of middle-skill computer and networking occupations have entry-level wages above the living wage for one adult ($18.10 in Los Angeles County). Typical entry-level hourly wages are in a range between $22.00 and $26.93. Experienced workers can expect to earn wages between $36.69 and $40.31, which are higher than the living wage estimate. Los Angeles County's average wages are below the average statewide wage of $34.58 for these occupations.

All annual openings for the group of above middle-skill computer and networking occupations have entry-level wages above the living wage for one adult ($18.10 in Los Angeles County). Typical entry-level hourly wages are in a range between $39.87 and $42.92. Experienced workers can expect to earn wages between $65.54 and $71.65, which are higher than the living wage estimate. Los Angeles County's average wages are below the average statewide wage of $56.92 for these occupations.

Job Postings
There were 16,237 online job postings related to the group of middle-skill computer and networking occupations listed in the past 12 months. The highest number of job postings were for IT support specialists, desktop support technicians, IT technicians., and IT support technicians. The top skills were technical support, customer service, help desk support, repair, and Microsoft Active Directory. The top three employers, by number of job postings, in the region were Best Buy Anthem Blue Cross, and Northrop Grumman.

There were 63,292 online job postings related to the group of above middle-skill computer and networking occupations listed in the past 12 months. The highest number of job postings were for senior software engineers., software engineers, software developers, business system analysts, and DevOps engineers. The top skills were software engineering, software development, Java, SQL, and Python. The top three employers, by number of job postings, in the region were Amazon, Anthem Blue Cross, and The Boeing Company.

Educational Attainment
The Bureau of Labor Statistics (BLS) lists an associate degree as the typical entry-level education for *computer network support specialists* and some college, no degree as the typical entry-level education for *computer user support specialists*. In the LA/OC region, the majority of annual middle-skill job openings (81%) typically require some college, no degree. Furthermore, the national-level educational attainment data indicates 40% of workers in the field have completed some college or an associate degree as their highest level of education. Of the 54% of middle-skill computer and networking job postings listing a minimum education requirement in Los Angeles/Orange County, 37.8% (3,341) requested a high school or vocational training, 13.4% (1,183) requested an associate degree, and 48.8% (4,320) requested a bachelor's degree or above.

The Bureau of Labor Statistics (BLS) lists a bachelor's degree as the typical entry-level education for the above middle-skill occupations *computer systems analysts* and *software developers and software quality assurance analysts and testers*. In the LA/OC region, all annual job postings typically require a bachelor's degree. Furthermore, the national-level educational attainment data indicates between 11.6% and 20.7% of workers in the field have completed some college or an associate degree as their highest level of education. Of the 64% of above middle-skill

computer and networking job postings listing a minimum education requirement in Los Angeles/Orange County, 5% (2,017) requested high school or vocational training, 2.7% (1,084) requested an associate degree, and 92.3% (37,289) requested a bachelor's degree or higher.

Educational Supply

Community College Supply—Exhibit 3 shows the three-year average number of awards conferred by community colleges in the related TOP codes: Information Technology, General (0701.00), Computer Information Systems, General (0702.00, Computer Software Development (0707.00), Computer Programming (0707.10), Computer Infrastructure and Support (0708.00), Computer Networking (0708.10), Compute Support (0708.20), and World Wide Web Administration (0709.00). The colleges with the most completions in the region are: Mt San Antonio, Long Beach and Cypress. Over the past 12 months, there were 20 other related program recommendation requests from regional community colleges.

It is important to note that the information technology, computer support, and computer software educational programs listed in Exhibit 3 may provide students with adequate training to obtain employment within the occupations included in this report. However, these programs also train for 13 other middle-skill and above middle-skill occupations not included in this report. For these reasons, supply for the middle-skill computer and networking occupations in this report is overstated.

Exhibit 3: Regional community college awards (certificates and degrees), 2017-2020

TOP Code	Program	College	2017-2018 Awards	2018-2019 Awards	2019-2020 Awards	3-Year Award Average
0701.00	Information Technology, General	East LA	15	23	10	16
		LA Harbor	6	-	-	2
		LA Mission	1	1	3	2
		Long Beach	25	34	64	41
		Mt San Antonio	79	74	90	81
		Santa Monica	-	39	-	13
		West LA	4	4	5	4
		LA Subtotal	**130**	**175**	**172**	**159**
	Supply Subtotal/Average		**130**	**175**	**172**	**159**
0702.00	Computer Information Systems	Citrus	7	5	8	7
		Compton	-	1	-	0
		East LA	16	19	15	17
		El Camino	18	14	21	18
		Glendale	-	-	5	2
		LA City	4	1	1	2
		LA Mission	9	5	1	5
		LA Trade	14	8	20	14

TOP Code	Program	College	2017-2018 Awards	2018-2019 Awards	2019-2020 Awards	3-Year Award Average
		Mt San Antonio	-	-	79	26
		Pasadena	1	-	-	0
		Rio Hondo	19	21	10	17
		West LA	6	8	10	8
		LA Subtotal	**94**	**82**	**170**	**115**
		Cypress	8	5	4	6
		Fullerton	20	15	11	15
		Irvine	-	-	2	1
		Orange Coast	3	4	2	3
		Santa Ana	6	4	2	4
		Santiago Canyon	2	3	4	3
		OC Subtotal	**39**	**31**	**25**	**32**
	Supply Subtotal/Average		**133**	**113**	**195**	**147**
0707.00	Computer Software Development	LA City	-	1	-	0
		LA Subtotal	**0**	**1**	**0**	**0**
		Cypress	1	1	1	1
		Golden West	3	4	2	3
		Orange Coast	7	7	2	5
		Saddleback	3	13	3	6
		OC Subtotal	**14**	**26**	**8**	**16**
	Supply Subtotal/Average		**14**	**26**	**8**	**16**
0707.10	Computer Programming	Cerritos	4	-	2	2
		Citrus	-	-	1	0
		East LA	6	8	4	6
		Glendale	2	2	3	2
		LA City	-	-	6	2
		LA Mission	5	6	4	5
		LA Pierce	9	18	4	10
		LA Southwest	1	-	1	1
		LA Valley	10	7	6	8
		Long Beach	2	4	5	4
		Mt San Antonio	62	119	114	98
		Pasadena	8	11	21	13
		Santa Monica	42	44	46	44

TOP Code	Program	College	2017-2018 Awards	2018-2019 Awards	2019-2020 Awards	3-Year Award Average
		West LA	-	1	-	0
		LA Subtotal	**151**	**220**	**217**	**196**
		Cypress	18	22	20	20
		Fullerton	-	16	28	15
		Irvine	10	8	4	7
		Orange Coast	29	31	157	72
		Santa Ana	1	13	1	5
		Santiago Canyon	30	9	3	14
		OC Subtotal	**88**	**99**	**213**	**133**
		Supply Subtotal/Average	**239**	**319**	**430**	**329**
0707.30	Computer Systems Analysis	Cerritos	4	2	3	3
		East LA	-	-	1	0
		LA Mission	-	-	1	0
		LA Subtotal	**4**	**2**	**5**	**4**
		Cypress	5	2	-	2
		OC Subtotal	**5**	**2**	**-**	**2**
		Supply Subtotal/Average	**9**	**4**	**5**	**6**
0708.00	Computer Infrastructure and Support	Cerritos	-	-	4	1
		Glendale	-	-	3	1
		LA City	-	-	3	1
		LA Harbor	1	1	1	1
		LA Mission	-	2	12	5
		LA Valley	8	5	2	5
		Long Beach	1	3	8	4
		Mt San Antonio	20	24	24	23
		Pasadena	-	1	1	1
		Rio Hondo	-	-	9	3
		West LA	-	4	15	6
		LA Subtotal	**30**	**40**	**82**	**51**
		Coastline	65	49	46	53
		Cypress	1	2	3	2
		Orange Coast	-	-	7	2
		OC Subtotal	**66**	**51**	**56**	**58**
		Supply Subtotal/Average	**96**	**91**	**138**	**108**

TOP Code	Program	College	2017-2018 Awards	2018-2019 Awards	2019-2020 Awards	3-Year Award Average
0708.10	Computer Networking	Cerritos	8	11	9	9
		Glendale	6	3	3	4
		LA City	37	23	-	20
		LA Pierce	23	39	20	27
		Long Beach	27	55	47	43
		Mt San Antonio	2	8	11	7
		Rio Hondo	-	5	7	4
		West LA	43	77	48	56
		LA Subtotal	**146**	**221**	**145**	**171**
		Coastline	12	38	59	36
		Cypress	37	70	95	67
		Irvine	12	11	21	15
		Saddleback	17	10	21	16
		Santa Ana	7	14	12	11
		OC Subtotal	**85**	**143**	**208**	**145**
	Supply Subtotal/Average		**231**	**364**	**353**	**316**
0708.20	Computer Support	Citrus	-	-	1	0
		Glendale	3	10	7	7
		LA Pierce	7	9	8	8
		Long Beach	1	8	14	8
		Pasadena	3	7	30	13
		LA Subtotal	**14**	**34**	**60**	**36**
		Cypress	1	3	5	3
		Santa Ana	10	9	-	6
		OC Subtotal	**11**	**12**	**5**	**9**
	Supply Subtotal/Average		**25**	**46**	**65**	**45**
0709.00	World Wide Web Administration	Glendale	9	6	7	7
		LA Pierce	5	9	-	5
		Long Beach	4	22	24	17
		West LA	24	13	9	15
		LA Subtotal	**42**	**50**	**40**	**44**
		Saddleback	-	-	2	1
		OC Subtotal	**0**	**0**	**2**	**1**
	Supply Subtotal/Average		**42**	**50**	**42**	**45**
	Supply Total/Average		**919**	**1,188**	**1,408**	**1,172**

Non-Community College Supply—For a comprehensive regional supply analysis, it is also important to consider the supply from other institutions in the region that provide training programs for Computer Software Development. Exhibit 4 shows the annual and three-year average number of awards conferred by these institutions in the related Classification of Instructional Programs (CIP) Codes: Computer Programming/Programmer(11.0201), Computer Systems Analysis/Analyst (11.0501) Computer Science (11.0701) Computer Systems Networking and Telecommunications (11.0901), Network and Systems Administration/Administrator (11.1001) Computer and information Security/Information Assurance (11.1003) Computer Support Specialist (11.10.06). Due to different data collection periods, the most recent three-year period of available data is from 2016 to 2019. Between 2016 and 2019, non-community college institutions in the region conferred an average of 2,408 awards annually in related training programs.

It is important to note that the information technology, computer support, and computer software educational programs listed in Exhibit 4 may provide students with adequate training to obtain employment within the occupations included in this report. However, these programs also train for 13 other middle-skill and above middle-skill occupations not included in this report. For these reasons, supply for the computer and networking occupations in this report is overstated.

Exhibit 4: Regional non-community college awards, 2016-2019

CIP Code	Program	College	2016-2017 Awards	2017-2018 Awards	2018-2019 Awards	3-Year Award Average
11.0201	Computer Programming/ Programmer, General	ABCO Technology	18	23	29	23
		Platt College-Anaheim	-	4	4	3
		University of Phoenix-California	43	27	5	25
	Supply Subtotal/Average		**61**	**54**	**38**	**51**
11.0501	Computer Systems Analysis/Analyst	Brand College	4	2	-	2
		DeVry University-California	94	55	49	66
		University of Phoenix-California	4	4	-	3
	Supply Subtotal/Average		**102**	**61**	**49**	**71**
11.0701	Computer Science	Biola University	17	21	20	19
		California Institute of Technology	67	57	64	63
		California State Polytechnic University-Pomona	198	207	186	197
		California State University-Dominguez Hills	23	33	38	31

CIP Code	Program	College	2016-2017 Awards	2017-2018 Awards	2018-2019 Awards	3-Year Award Average
		California State University-Fullerton	139	195	246	193
		California State University-Long Beach	140	180	201	174
		California State University-Los Angeles	58	101	123	94
		California State University-Northridge	95	141	120	119
		Chapman University	23	32	31	29
		Claremont McKenna College	13	12	15	13
		East San Gabriel Valley Regional Occupational Program	5	16	12	11
		Harvey Mudd College	27	45	42	38
		Occidental College	-	3	20	8
		Pitzer College	4	3	5	4
		Pomona College	39	50	36	42
		Scripps College	5	2	12	6
		Southern California Institute of Technology	1	4	2	2
		Trident University International	59	62	76	66
		University of California-Irvine	425	526	568	506
		University of California-Los Angeles	183	213	242	213
		University of Southern California	174	202	228	201
	Supply Subtotal/Average		**1,695**	**2,105**	**2,287**	**2,029**
11.0901	Computer Systems Networking and Telecommunications	Brand College	2	-	2	1
		DeVry University-California	135	106	86	109
		Mt Sierra College	5	4	-	3
		University of Phoenix-California	27	18	3	16
	Supply Subtotal/Average		**169**	**128**	**91**	**129**

CIP Code	Program	College	2016-2017 Awards	2017-2018 Awards	2018-2019 Awards	3-Year Award Average
11.1001	Network and Systems Administration/Administrator	ABCO Technology	-	13	5	6
		Brand College	2	6	23	10
		California Intercontinental University	-	1	3	1
		University of Phoenix-California	1	12	13	9
	Supply Subtotal/Average		**3**	**32**	**44**	**26**
11.1003	Computer and Information Systems Security/Information Assurance	Azusa Pacific University	3	-	-	1
		Learnet Academy Inc	48	17	-	22
		Mt Sierra College	8	13	-	7
		University of Phoenix-California	71	42	32	48
	Supply Subtotal/Average		**130**	**72**	**32**	**78**
11.1006	Computer Support Specialist	Southern California Institute of Technology	16	26	25	22
		University of Phoenix-California	1	2	-	1
	Supply Subtotal/Average		**17**	**28**	**25**	**23**
	Supply Total/Average		**2,177**	**2,480**	**2,566**	**2,408**

Appendix A: Occupational demand and wage data by county

Exhibit 5. Orange County

Occupation (SOC)	2020 Jobs	2025 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	Entry-Level Hourly Earnings (25th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75th Percentile)
Computer Network Support Specialists (15-1231)	1,696	1,762	67	4%	138	$26.33	$31.80	$39.50
Computer User Support Specialists (15-1232)	7,511	7,850	339	5%	621	$21.17	$27.10	$35.30
Middle Skill Total	**9,206**	**9,612**	**406**	**4%**	**759**			
Computer Systems Analysts (15-1211)	5,798	5,983	185	3%	443	$38.72	$50.84	$63.60

Occupation (SOC)	2020 Jobs	2025 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	Entry-Level Hourly Earnings (25th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75th Percentile)
Software Developers and Software Quality Assurance Analysts and Testers (15-1256)	20,342	22,382	2,040	10%	1,933	$41.37	$55.51	$68.87
Above Middle Skill Total	**26,140**	**28,365**	**2,224**	**9%**	**2,376**			

Exhibit 6. Los Angeles County

Occupation (SOC)	2020 Jobs	2025 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	Entry-Level Hourly Earnings (25th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75th Percentile)
Computer Network Support Specialists (15-1231)	4,029	4,087	58	1%	305	$26.93	$32.50	$40.31
Computer User Support Specialists (15-1232)	16,719	16,980	261	2%	1,266	$22.00	$28.17	$36.69
Middle Skill Total	**20,748**	**21,067**	**319**	**2%**	**1,570**			
Computer Systems Analysts (15-1211)	12,666	12,816	150	1%	909	$39.87	$52.38	$65.54
Software Developers and Software Quality Assurance Analysts and Testers (15-1256)	40,138	44,212	4,074	10%	3,830	$42.92	$57.70	$71.65
Above Middle Skill Total	**52,804**	**57,028**	**4,224**	**8%**	**4,740**			

Exhibit 7. Los Angeles and Orange Counties

Occupation (SOC)	2020 Jobs	2025 Jobs	5-Yr Change	5-Yr % Change	Annual Openings
Computer Network Support Specialists	5,725	5,849	124	2%	442

Occupation (SOC)	2020 Jobs	2025 Jobs	5-Yr Change	5-Yr % Change	Annual Openings
(15-1231)					
Computer User Support Specialists (15-1232)	24,230	24,830	600	2%	1,887
Middle Skill Total	**29,954**	**30,679**	**724**	**2%**	**2,329**
Computer Systems Analysts (15-1211)	18,464	18,799	335	2%	1,353
Software Developers and Software Quality Assurance Analysts and Testers (15-1256)	60,481	66,594	6,113	10%	5,764
Above Middle Skill Total	**78,945**	**85,393**	**6,448**	**8%**	**7,116**

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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