

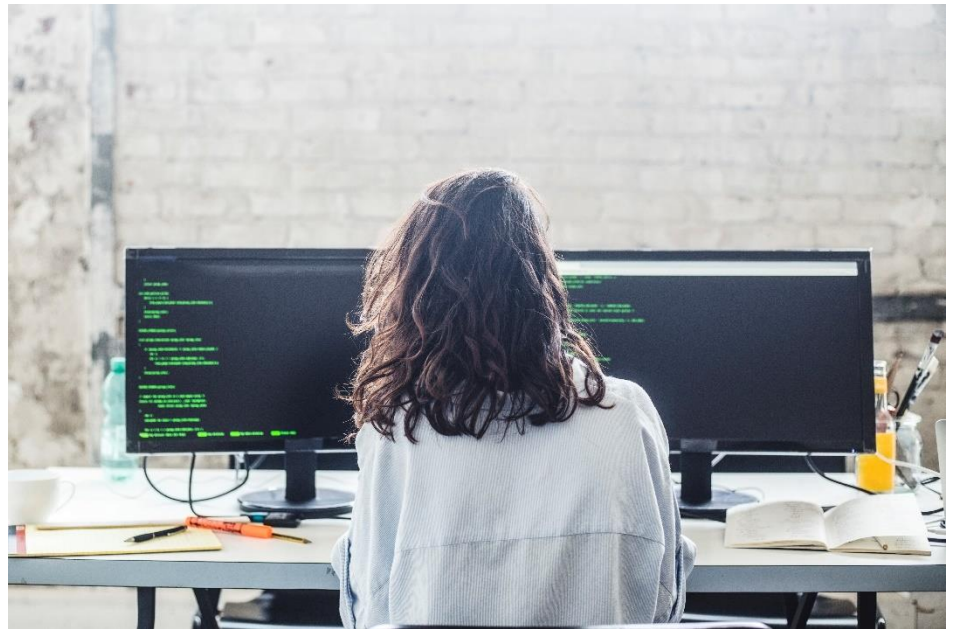
June 2022

Labor Market Analysis

Cloud Computing



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Prepared by the Central Valley/Mother Lode Center of Excellence

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COVID-19 Statement: This report includes employment projection data by Emsi. 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 or potential output. To the extent that a recession or labor shock, such as the economic effects of COVID-19, can cause long-term structural change, they 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. Other measures such as unemployment rates and monthly industry employment estimates will reflect the most recent information on employment and jobs in the state and, in combination with input from local employers, may help validate current and future employment needs as depicted here.

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Summary

Please note the COVID-19 statement on page 2 when considering this report's findings.

This study conducted by the Central Valley/Mother Lode Center of Excellence examines labor market demand, wages, skills, and postsecondary supply for Cloud Computing. Four occupations related to Cloud Computing were identified for Merced College:

- 15-1232, Computer User Support Specialists
- 15-1241, Computer Network Architects
- 15-1244, Network and Computer Systems Administrators
- 15-1256, Software Developers and Software Quality Assurance Analysts and Testers

Key findings:

- **Occupational demand** — Nearly 2,560 workers were employed in jobs related to Cloud Computing in 2021 in the North Central Valley/Northern Mother Lode (NCV/NML) subregion. The largest occupation is software developers and software quality assurance analysts and testers with 952 workers, a projected growth rate of 20% over the next five years, and 113 annual openings.
- **Wages** — Software developers and software quality assurance analysts and testers earn the highest entry-level wage, \$35.14/hour in the subregion.
- **Employers** — Employers with the most job postings in the subregion are Best Buy, Anthem Blue Cross, and Amazon.
- **Occupational titles** — The most common occupational title in job postings in the subregion is Computer User Support Specialists. The most common job title is Help Desk Specialist - Home.
- **Skills and certifications** — The top baseline skill is troubleshooting, the top specialized skill is technical support, and the top software skill is Microsoft Office. The most in-demand certification is a driver's license followed by Cisco Certified Network Associate (CCNA).
- **Education** — Some college, no degree is typically required for computer user support specialists. A bachelor's degree is typically required for the remaining three occupations.
- **Supply** — Analysis of postsecondary completions shows that on average 135 awards were conferred in the Central Valley/Mother Lode region each year.

Based on a comparison of occupational demand and supply, there is an undersupply of 237 trained workers in the subregion and 571 workers in the region. The Center of Excellence recommends that Merced College work with the regional directors, the college's advisory board, and local industry in the expansion of programs to address the shortage of Cloud Computing workers in the region.

Introduction

The Central Valley/Mother Lode Center of Excellence was asked by Merced College to provide labor market information for Cloud Computing. The geographical focus for this report is the North Central Valley/Northern Mother Lode (NCV/NML) subregion, but regional demand and supply data has been included for broader applicability and use. The average living wage for a single adult in the NCV/NML subregion is \$12.65/hour.¹ Analysis of the program and occupational data related to Cloud Computing resulted in the identification of applicable occupations. The Standard Occupational Classification (SOC) System codes and titles used in this report are:

- 15-1232, Computer User Support Specialists
- 15-1241, Computer Network Architects
- 15-1244, Network and Computer Systems Administrators
- 15-1256, Software Developers and Software Quality Assurance Analysts and Testers

The occupational titles, job descriptions, sample job titles, and knowledge and skills from the Bureau of Labor Statistics and O*NET OnLine are shown below. There was no O*NET data available for software developers and software quality assurance analysts and testers.

Computer User Support Specialists

Job Description: Provide technical assistance to computer users. Answer questions or resolve computer problems for clients in person, via telephone, or electronically. May provide assistance concerning the use of computer hardware and software, including printing, installation, word processing, electronic mail, and operating systems.

Knowledge: Computers and Electronics, Customer and Personal Service, English Language, Telecommunications, Engineering and Technology

Skills: Active Listening, Reading Comprehension, Speaking, Complex Problem Solving, Critical Thinking

Computer Network Architects

Job Description: Design and implement computer and information networks, such as local area networks (LAN), wide area networks (WAN), intranets, extranets, and other data communications networks. Perform network modeling, analysis, and planning, including analysis of capacity needs for network infrastructures. May also design network and computer security measures. May research and recommend network and data communications hardware and software.

Knowledge: Computers and Electronics, Design, English Language, Telecommunications, Engineering and Technology

Skills: Active Listening, Critical Thinking, Reading Comprehension, Speaking, Complex Problem Solving, Judgment and Decision Making

Network and Computer Systems Administrators

Job Description: Install, configure, and maintain an organization's local area network (LAN), wide area network (WAN), data communications network, operating systems, and physical and virtual servers. Perform system monitoring and verify the integrity and availability of hardware, network, and server resources and systems. Review system and application logs and verify completion of scheduled jobs, including system backups. Analyze network and server resource consumption and control user access. Install and upgrade software and maintain software licenses. May assist in network modeling, analysis, planning, and coordination between network and data communications hardware and software.

Knowledge: Computers and Electronics, English Language, Customer and Personal Service, Engineering and Technology, Mathematics

¹ The term "living wage" in Center of Excellence reports is calculated by averaging the self-sufficiency wages from the Insight Center's California Family Needs Calculator for each county in the subregion: <https://insightcced.org/tools-metrics/self-sufficiency-standard-tool-for-california/>.

Skills: Critical Thinking, Judgment and Decision Making, Reading Comprehension, Systems Analysis, Active Listening

Occupational Demand

The NCV/NML subregion employed 2,560 workers in Cloud Computing occupations in 2021 (Exhibit 1). The largest occupation is software developers and software quality assurance analysts and testers with 952 workers. This occupation is projected to grow by 20% over the next five years and has the greatest number of projected annual openings, 113.

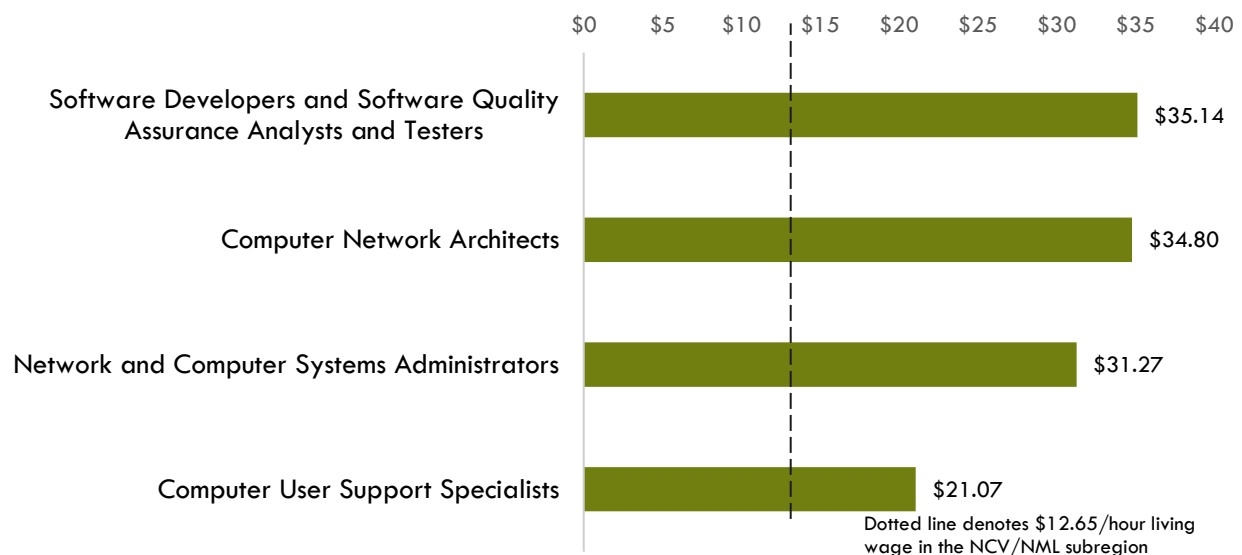
Exhibit 1. Cloud Computing employment and occupational projections in the NCV/NML subregion

Occupation	2021 Jobs	2026 Jobs	5-Year Change	5-Year % Change	Annual Openings
Software Developers and Software Quality Assurance Analysts and Testers	952	1,145	193	20%	113
Computer User Support Specialists	1,041	1,119	78	8%	94
Network and Computer Systems Administrators	431	471	40	9%	37
Computer Network Architects	137	146	9	7%	10
TOTAL	2,560	2,881	321	13%	255

Wages

Exhibit 2 shows the entry-level hourly wages of the Cloud Computing occupations. Software developers and software quality assurance analysts and testers earn the highest entry-level wage, \$35.14/hour in the subregion².

Exhibit 2. Cloud Computing entry-level wages in the NCV/NML subregion



² Entry-level wages are derived from the 25th percentile.

Job Postings

There were 589 job postings for the four occupations in the NCV/NML subregion from December 2021 to May 2022.³ The employers with the most job postings are listed in Exhibit 3.

Exhibit 3. Top employers of Cloud Computing by number of job postings

Employer	Job Postings	% Job Postings
Best Buy	23	6%
Anthem Blue Cross	16	4%
Amazon	7	2%
Yosemite Community College District	7	2%
Organon	6	2%
Tractor Supply Company	6	2%
Central Valley Community Bank	5	1%
Comptech Computer Technologies	5	1%
Fastenal Company	5	1%
Golden Valley Health Centers	5	1%

Exhibit 4 shows how job postings for the targeted occupations in the NCV/NML subregion are distributed across four O*NET OnLine occupations. The occupational title Computer User Support Specialists is listed in 390 job postings. Note how this occupational title dominates the job posting results. Common job titles in postings include Help Desk Specialist – Home in 48 job postings, Desktop Support Analyst in 16 job postings, and Systems Administrator in 15 job postings.

Exhibit 4. Top occupational titles in job postings for Cloud Computing

Occupational Title	Job Postings	% of Job Postings
Computer User Support Specialists	390	66%
Network and Computer Systems Administrators	110	19%
Computer Network Architects	63	11%
Telecommunications Engineering Specialists	26	4%

Salaries

Exhibit 5 shows the “Market Salaries” for Cloud Computing occupations. These are calculated by Burning Glass using a machine learning model built off of millions of job postings every year. This accounts for adjustments based on locations, industry, skills, experience, education requirements, among other variables.

Exhibit 5. Salaries for Cloud Computing occupations

Market Salary Percentile	Salary Amount
10th Percentile	\$30,149
25th Percentile	\$34,095
50th Percentile	\$42,614
75th Percentile	\$65,270
90th Percentile	\$88,928

³ Other than occupation titles and job titles, the categories below can be counted one or multiple times per job posting, and across several areas in a single posting. For example, a skill can be counted in two different skill types, and an employer can indicate more than one education level.

Education

Of the 589 job postings, 310 listed an education level preferred for the positions being filled. Among those, 55% requested a bachelor's degree, 46% requested high school or vocational training, and 26% requested an associate degree (Exhibit 6). A job posting can indicate more than one education level. Hence, the percentages shown in the chart below may total more than 100%.

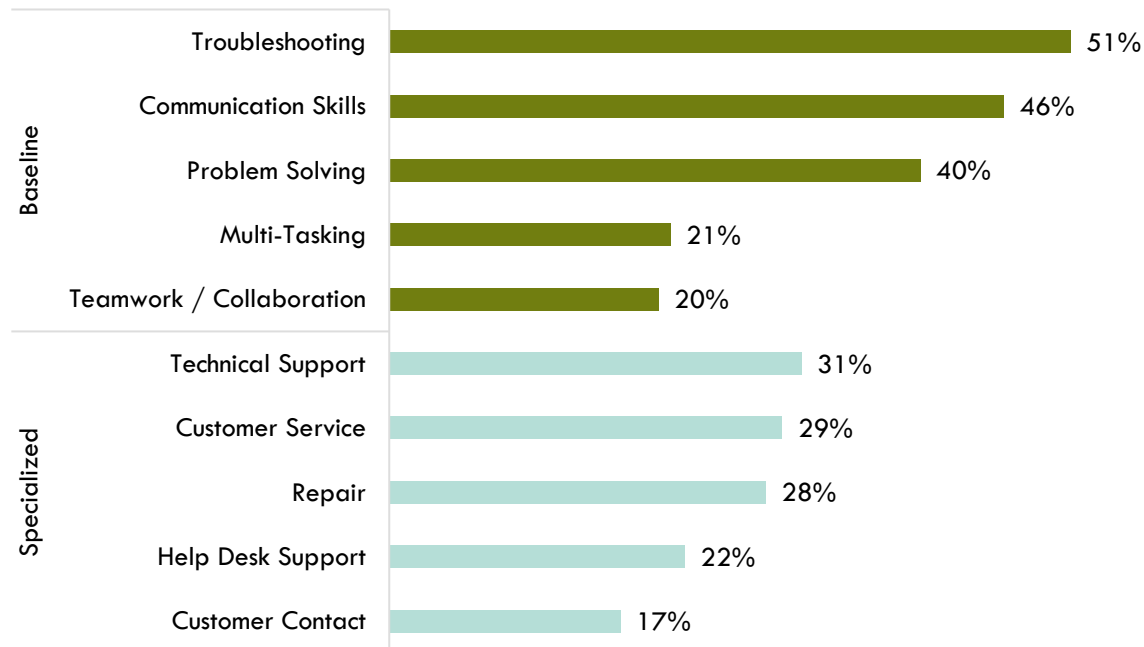
Exhibit 6. Education levels requested in job postings for Cloud Computing

Education Level	Job Postings	% of Job Postings
Bachelor's degree	171	55%
High school or vocational training	144	46%
Associate's degree	81	26%
Master's degree	24	8%
Doctoral degree	9	3%

Baseline and Specialized Skills

Exhibit 7 depicts the top baseline and specialized skills for the targeted occupations. The three most important baseline skills are troubleshooting, 51% of job postings, communication skills, 46%, and problem solving, 40%. The top three specialized skills are technical support, 31% of job postings, customer service, 29%, and repair, 28%.

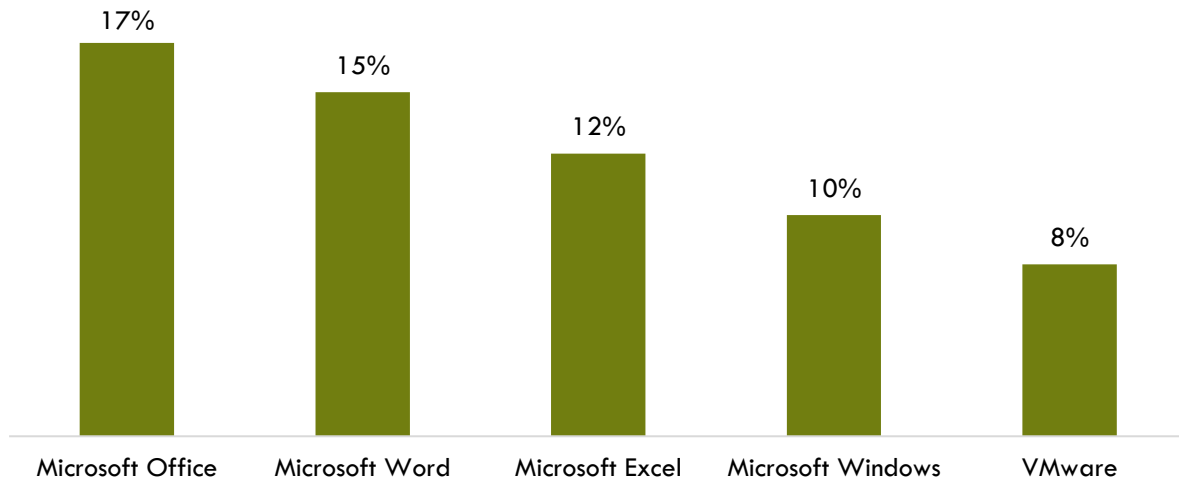
Exhibit 7. In-demand Cloud Computing baseline and specialized skills



Software Skills

Analysis also included the software skills most in demand by employers. Microsoft Office and Excel were the top two software skills identified in job postings (Exhibit 8).

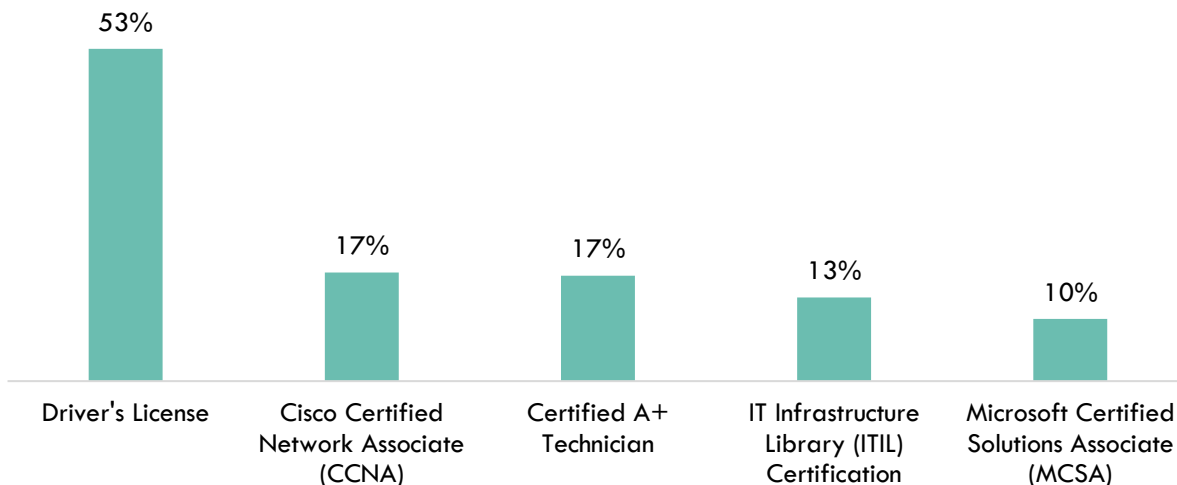
Exhibit 8. In-demand Cloud Computing software skills



Certifications

Of the 589 job postings, 202 contained certification data. Among those, 53% indicated a need for a driver's license. The next top certifications are Cisco Certified Network Associate (CCNA) and certified A+ technician (Exhibit 9). (Due to the low number of job postings with certifications listed, the chart below may not be representative of the full sample.)

Exhibit 9. Top Cloud Computing certifications requested in job postings



Education, Work Experience & Training

Some college, no degree is typically required for computer user support specialists. A bachelor's degree is typically required for the remaining three occupations (Exhibit 10).

Exhibit 10. Education, work experience, training, and Current Population Survey results for Cloud Computing occupations⁴

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
Software Developers and Software Quality Assurance Analysts and Testers	Bachelor's degree	None	None	11.7%
Computer User Support Specialists	Some college, no degree	None	None	39.2%
Network and Computer Systems Administrators	Bachelor's degree	None	None	37.4%
Computer Network Architects	Bachelor's degree	5 years or more	None	37.7%

Supply

Analysis of program data from the Integrated Postsecondary Education Data System (IPEDS) included the TOP code and title: 070200 - Computer Information Systems. Analysis of the last three years of data shows that, on average, 135 awards were conferred in the Central Valley/Mother Lode region each year (Exhibit 11).

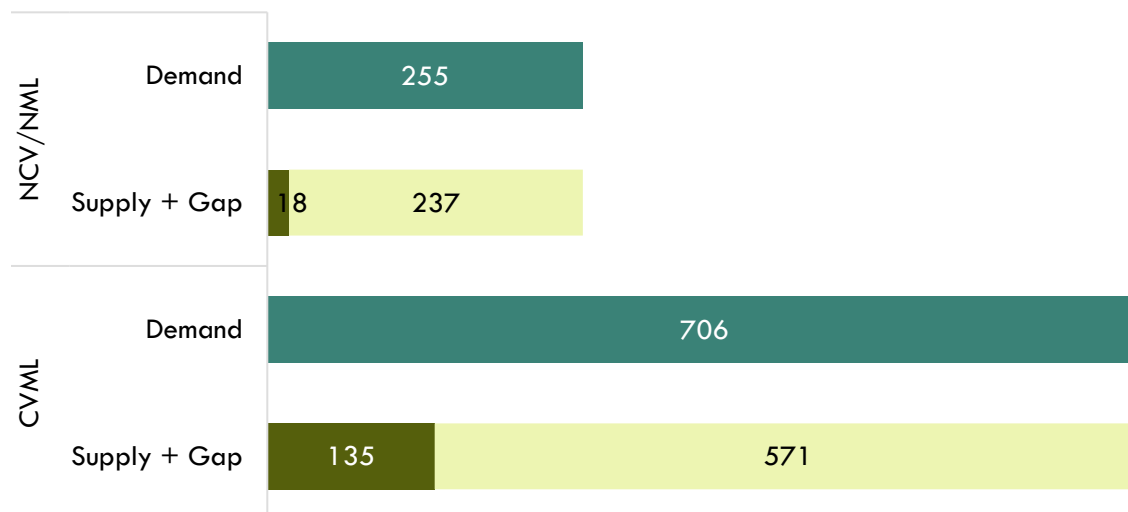
Exhibit 11. Postsecondary supply for Cloud Computing occupations in the region

TOP/ CIP Code- Title	College	Associate Degree	Certificate 12 < 18 Semester Units	Certificate 16 < 30 Semester Units	Certificate 18 < 30 Semester Units	Certificate 30 < 60 Semester units	Certificate 6 < 18 Semester Units	Subtotal
070200 - Computer Information Systems	Bakersfield	1						1
	Cerro Coso	16		7	18	15		55
	Clovis			0	1			1
	Columbia	1						1
	Fresno City	7		1				8
	Merced	2						2
	Porterville	11				1		12
	Reedley College			10	15	7		32
	San Joaquin Delta	15						15
	Sequoias	5				2		7
	Taft						2	2
TOTAL		57	10	23	26	18	2	135

There is an undersupply of 237 Cloud Computing workers in the NCV/NML subregion and 571 workers in the region (Exhibit 12).

⁴ "Labor Force Statistics from the Current Population Survey," Bureau of Labor Statistics, <https://www.bls.gov/cps/>.

Exhibit 12. Cloud Computing workforce demand (annual job openings), postsecondary supply of students (awards), and additional students needed to fill gap in the NCV/NML subregion and region



Student Outcomes

Exhibit 13 summarizes employment and wage outcomes from the California Community College Chancellor’s Cal-PASS Plus LaunchBoard for the TOP code related to Cloud Computing. Of note, 15 computer information systems students received a degree or certificate or attained apprenticeship journey status.

Exhibit 13. Regional metrics for the TOP code related to Cloud Computing

Metric	Computer Information Systems 070200
Students Who Got a Degree or Certificate or Attained Apprenticeship Journey Status	15
Number of Students Who Transferred	*
Job Closely Related to Field of Study	*
Median Change in Earnings	*
Attained a Living Wage	*
* denotes data not available.	

Conclusion

The entry-level wages of the four occupations exceed the NCV/NML subregion’s average living wage. There were 589 job postings in the past six months for occupations related to Cloud Computing in the subregion. Analysis of skills and certification requirements in job postings indicates:

- The top baseline skill is troubleshooting, and the top specialized skill is technical support.
- The top software skill is Microsoft Office.
- The top certification is a driver's license.

There is an undersupply of trained workers, a shortage of 237 in the NCV/NML subregion and 571 in the region.

Recommendation

Based on these findings, it is recommended that Merced College work with the regional directors, the college's advisory board, and local industry in the expansion of programs to address the shortage of Cloud Computing workers in the region.

Appendix A: Methodology & Data Sources

Data Sources

Labor market and educational supply data compiled in this report derive from a variety of sources. Data were drawn from external sources, including the Economic Modeling Specialists, Inc., the California Community Colleges Chancellor’s Office Management Information Systems Data Mart and the National Center for Educational Statistics (NCES) Integrated Postsecondary Education Data System (IPEDS). Below is the summary of the data sources found in this study.

Data Type	Source
Labor Market Information/Population Estimates and Projections/Educational Attainment	Economic Modeling Specialists, Intl. (EMSI). EMSI occupational employment data are based on final EMSI industry data and final EMSI staffing patterns. Wage estimates are based on Occupational Employment Statistics (QCEW and Non-QCEW Employees classes of worker) and the American Community Survey (Self-Employed and Extended Proprietors). Occupational wage estimates also affected by county-level EMSI earnings by industry: economicmodeling.com .
Typical Education Level and On-the-job Training	Bureau of Labor Statistics (BLS) uses a system to assign categories for entry-level education and typical on-the-job training to each occupation for which BLS publishes projections data: https://www.bls.gov/emp/tables/educational-attainment.htm .
Labor Force, Employment and Unemployment Estimates	California Employment Development Department, Labor Market Information Division: labormarketinfo.edd.ca.gov .
Job Posting and Skills Data	Burning Glass: burning-glass.com/ .
Additional Education Requirements/ Employer Preferences	The O*NET Job Zone database includes over 900 occupations as well as information on skills, abilities, knowledge, work activities and interests associated with specific occupations: onetonline.org .

Key Terms and Concepts

Annual Job Openings: Annual openings are calculated by dividing the number of years in the projection period by total job openings.

Education Attainment Level: The highest education attainment level of workers age 25 years or older.

Employment Estimate: The total number of workers currently employed.

Employment Projections: Projections of employment are calculated by a proprietary Economic Modeling Specialists, Intl. (EMSI) formula that includes historical employment and economic indicators along with national, state and local trends.

Living Wage: The cost of living in a specific community or region for one adult and no children. The cost increases with the addition of children.

Occupation: An occupation is a grouping of job titles that have a similar set of activities or tasks that employees perform.

Percent Change: Rate of growth or decline in the occupation for the projected period; this does not factor in replacement openings.

Replacements: Estimate of job openings resulting from workers retiring or otherwise permanently leaving an occupation. Workers entering an occupation often need training. These replacement needs, added to job openings due to growth, may be used to assess the minimum number of workers who will need to be trained for an occupation.

Total Job Openings (New + Replacements): Sum of projected growth (new jobs) and replacement needs. When an occupation is expected to lose jobs, or retain the current employment level, number of openings will equal replacements.

Typical Education Requirement: represents the typical education level most workers need to enter an occupation.

Typical On-The-Job Training: indicates the typical on-the-job training needed to attain competency in the skills needed in the occupation.