



C·O·E

CENTERS OF EXCELLENCE
FOR LABOR MARKET RESEARCH

PROGRAM ENDORSEMENT BRIEF

CLOUD COMPUTING IN THE FAR NORTH

Far North
Center of Excellence

DECEMBER 2021

TABLE OF CONTENTS

Contents

Summary.....	3
Introduction.....	4
Occupational Demand.....	5
Wages	7
Job Postings.....	7
Occupations and Job Titles	8
Employers.....	9
Certifications, Skills, and Experience	9
Education and Training	11
Educational Supply.....	12
Community College Supply	13
Other Postsecondary Supply	14
Findings.....	15
Recommendations	16
Appendix A. Methodology and Sources.....	16

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SUMMARY

The Far North Center of Excellence for Labor Market Research prepared this report to provide a labor market analysis of educational supply and occupational demand for middle-skilled career pathways in the Far North subregion. This report aims to determine if demand in the local labor market is unmet by the supply from existing community college programs and other postsecondary training providers.

This report primarily focuses on training that leads to jobs in middle-skilled occupations - that is, occupations that typically require education beyond a high school diploma but less than a Bachelor's degree - but may include higher-skilled occupations for training pathways that lead to a bachelor's degree. Lowered skilled occupations are rarely considered in this type of analysis due to the lessened barriers for entry-level work, such as no formal education requirements and no requirements for on-the-job training.

Key findings include:

- The Far North subregion held 2,046 cloud computing jobs in 2020, with 1,470 located in the Northern Inland subregion and 576 in the Northern Coastal subregion. Cloud computing jobs are projected to increase by 6% over the next five years, adding 116 new jobs to the Far North by 2025.
- Over the next five years, cloud computing occupations are projected to have 215 annual openings in the Far North, with 152 in the Northern Inland and 63 in the Northern Coastal subregions.
- Wage data shows that cloud computing occupations earn approximately \$3 to \$56 above the subregion's living wage of \$12.74 per hour.
- Awards data analysis shows that Far North training providers conferred an average of 98 awards (certificates and associate degrees) in cloud computing training programs over the last three academic years.

Recommendations include:

- Based on a three-year average of annual awards in Far North region cloud computing training programs and projected yearly openings, the supply gap analysis shows that the region seems to have room for additional training.
- The Far North Center of Excellence recommends that community colleges develop flexible cloud computing pathways so that students have training consistent with the rapidly advancing and broad reaching industry.

INTRODUCTION

The Far North Center of Excellence (COE) was asked to provide labor market information for a proposed program at a regional community college. This report focuses on the following Standard Occupational Classification (SOC) occupations and codes:

- These middle-skill occupations require more education and training beyond a high school diploma but less than a four-year degree:
 - Computer and Information Systems Managers (11-3021)
 - Computer Systems Analysts (15-1211)
 - Information Security Analysts (15-1212)
 - Computer Network Support Specialists (15-1231)
 - Computer Network Architects (15-1241)
 - Network and Computer Systems Administrators (15-1244)
 - Computer Occupations, All Other (15-1299)

A review of related programs revealed the following Taxonomy of Programs (TOP) title(s) and code(s) are appropriate for inclusion in this report:

- Information Technology, General (0701.00)
- Computer Information Systems (0702.00)
- Computer Science - Transfer program (0706.00)
- Computer Systems Analysis (0707.30)*
- Computer Infrastructure and Support (0708.00)
- Computer Network (0708.10)
- Computer Support (0708.20)*
- E-Commerce, technology emphasis (0709.10)*

The corresponding Classification of Instructional Program (CIP) title(s) and code(s) are:

- Computer and Information Sciences, General (11.0101)*
- Information Technology (11.0103)
- Computer Science (11.0701)
- Computer Systems Analysis/Analyst (11.0501)*
- Computer and Information Systems Security/Information Assurance (11.1003)*
- Computer Systems Networking and Telecommunications (11.0901)*
- Computer Support Specialist (11.1006)*

*There were no programs offered in these TOP or CIP codes within the study region.

OCCUPATIONAL DEMAND

Exhibit 1 summarizes the five-year projected job growth for middle-skill and high-skill occupations in the Far North selected occupations, North/Far North, and California.

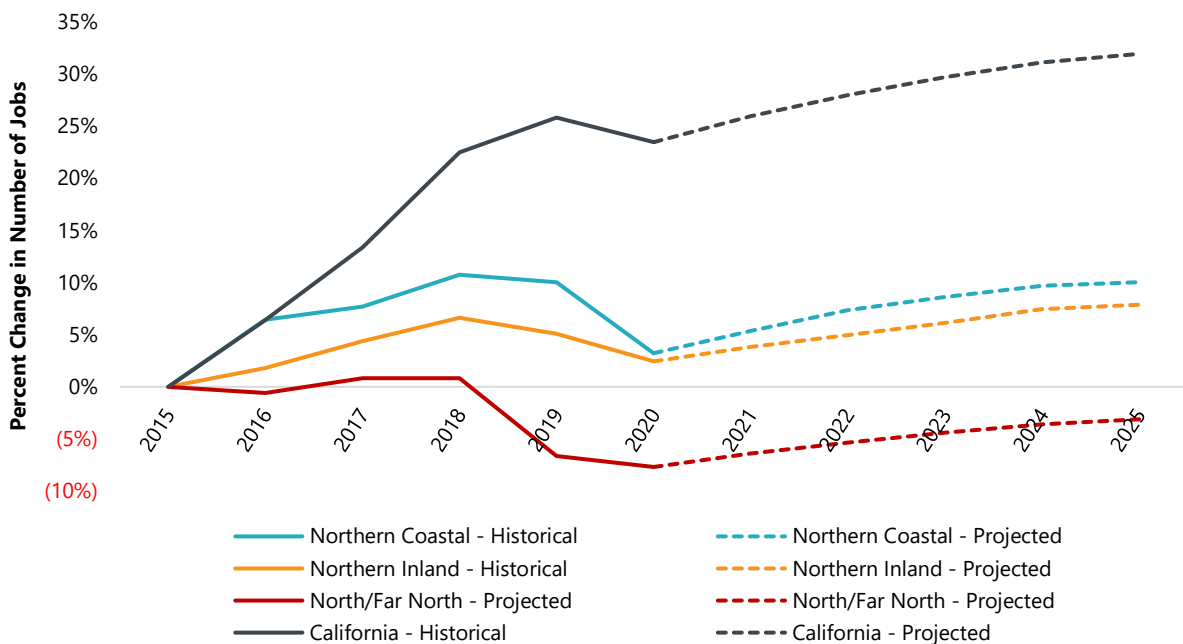
Exhibit 1. Employment and projected demand, 2020-2025

Occupation	2020 Jobs	2025 Jobs	2020-2025 Jobs Change	2020-2025 Jobs % Change	2020-2025 Annual Openings
Computer and Information Systems Managers	106	116	10	9%	12
Computer Systems Analysts	138	144	6	4%	12
Information Security Analysts	28	34	6	21%	4
Computer Network Support Specialists	89	91	2	2%	9
Computer Network Architects	55	57	2	4%	7
Network and Computer Systems Administrators	63	66	3	5%	7
Computer Occupations, All Other	97	106	9	9%	12
Northern Coastal	576	614	38	7%	63
Computer and Information Systems Managers	236	250	14	6%	24
Computer Systems Analysts	362	378	16	4%	31
Information Security Analysts	49	60	11	22%	7
Computer Network Support Specialists	138	141	3	2%	13
Computer Network Architects	95	93	(2)	(2%)	10
Network and Computer Systems Administrators	163	174	11	7%	15
Computer Occupations, All Other	427	452	25	6%	52
Northern Inland	1,470	1,548	78	5%	152
Computer and Information Systems Managers	4,077	4,262	185	5%	432
Computer Systems Analysts	3,658	3,817	159	4%	382
Information Security Analysts	585	692	107	18%	72
Computer Network Support Specialists	1,142	1,199	57	5%	101
Computer Network Architects	835	863	28	3%	72
Network and Computer Systems	1,872	1,968	96	5%	151

Occupation	2020 Jobs	2025 Jobs	2020-2025 Jobs Change	2020-2025 Jobs % Change	2020-2025 Annual Openings
Administrators					
Computer Occupations, All Other	4,548	4,745	197	4%	576
North/Far North	16,717	17,546	829	5%	1,786
Computer and Information Systems Managers	84,111	89,514	5,403	6%	9,086
Computer Systems Analysts	67,202	72,147	4,945	7%	5,847
Information Security Analysts	11,391	13,927	2,536	22%	1,385
Computer Network Support Specialists	16,831	18,275	1,444	9%	1,529
Computer Network Architects	20,108	21,285	1,177	6%	1,762
Network and Computer Systems Administrators	33,707	35,929	2,222	7%	2,687
Computer Occupations, All Other	89,275	93,683	4,408	5%	11,730
California	322,625	344,760	22,135	7%	34,026

Exhibit 2 compares the percent change in jobs between 2015 through 2020 and the projected changes through 2025. The rate of change is indexed to the total number of jobs in 2015.

Exhibit 2. Changes in employment, 2015-2025



WAGES

Exhibit 3 compares the entry-level, median, and experienced wages for the selected occupations to the Far North living wage for a single adult - \$12.74 per hour.¹

Exhibit 3. Comparison of wages by occupation, 2020



JOB POSTINGS

This section of the report analyzes recent data from online job postings (real-time LMI). Online job postings may provide additional insight into recent changes in the labor market that are not captured by historical trends.

The Far North COE identified 453 online job postings for the selected occupations in the Far North subregion. Job postings data comes from Burning Glass Labor Insights and represents new listings posted online within the last year, from November 1, 2020, to October 31, 2021.

¹ Living wage is defined as the level of income a single adult with no children must earn to meet basic needs, including food, housing, transportation, healthcare, taxes, and other miscellaneous basic needs. The 25th-percentile and 75th-percentile hourly wages are used as proxy for entry-level and experienced-level wages.

Occupations and Job Titles

Exhibit 4 details the number of online job postings for the selected occupations.

Exhibit 4. Number of job postings by occupation

Occupation	Northern Coastal		Northern Inland	
	Job Postings	Share of Job Postings	Job Postings	Share of Job Postings
Computer and Information Systems Managers	7	6%	21	6%
Computer Systems Analysts	16	13%	31	9%
Information Security Analysts	10	8%	21	6%
Computer Network Support Specialists	0	0%	3	1%
Computer Network Architects	8	7%	16	5%
Network and Computer Systems Administrators	9	7%	31	9%
Computer Occupations, All Other	71	59%	209	63%
Total Job Postings	121	100%	332	100%

Exhibit 5 shows the top 10 job titles with the most job postings and the share of job postings. All job postings included a job title.

Exhibit 5. Top jobs titles

Job Title	Job Postings	Share of Job Postings
Home Product Tester	31	7%
In - Home Usage Tester	12	3%
Data Analyst	9	2%
Tienes Telefono Android - Minutos	6	1%
Gis Analyst	4	1%
Information Systems Specialist II	4	1%

Job Title	Job Postings	Share of Job Postings
Mrc - Gis Technician	4	1%
Quality Assurance Engineer	4	1%
Senior Project Lead	4	1%
Senior Technical Architect	4	1%

Employers

Exhibit 6 shows the top 10 employers with the most job postings for the selected occupations. Twenty-six percent (n = 116) of job postings did not include an employer.

Exhibit 6. Employers with the most job postings

Employer	Job Postings	Share of Job Postings	Sub-Region
Hcl Technologies	17	5%	Northern Inland
California State University	12	4%	Northern Inland
Tehama County	11	3%	Northern Inland
The Save Mart Companies	11	3%	Northern Inland
Tetra Tech	9	3%	Northern Inland
AbbVie	8	2%	Northern Coastal
Crowdstrike	8	2%	Coastal and Inland
Enloe Medical Center	8	2%	Northern Inland
Shasta County	7	2%	Northern Inland
Adventist Health	6	2%	Northern Coastal

Skills and Experience

Exhibit 8 shows the specialized skills most requested by employers for the selected occupations. Thirteen percent (n = 58) of job postings did not include a skill.

Exhibit 7. Most in-demand specialized skills

Specialized Skill	Skill Postings	Share of Skill Postings
Scheduling	93	2%
Budgeting	74	2%
Information Systems	72	2%
Project Management	62	1%
Data Entry	55	1%
Teaching	55	1%
Technical Support	53	1%
Quality Assurance and Control	52	1%
Customer Service	50	1%
Sales	49	1%

Exhibit 8 shows the minimum level of education required by employers for job postings for the selected occupations. Thirty-six percent (n = 164) of job postings did not include a preferred education level.

Exhibit 8. Employer-preferred minimum education levels

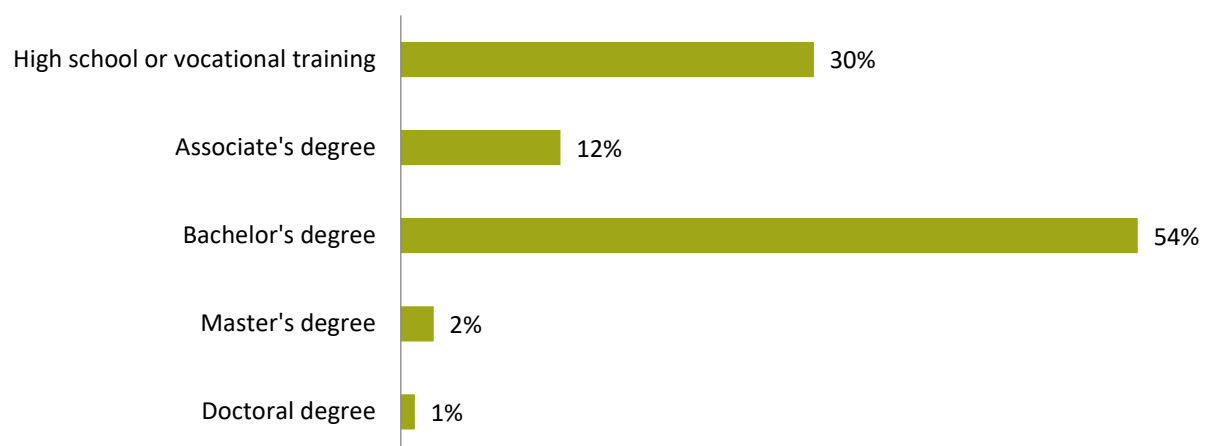
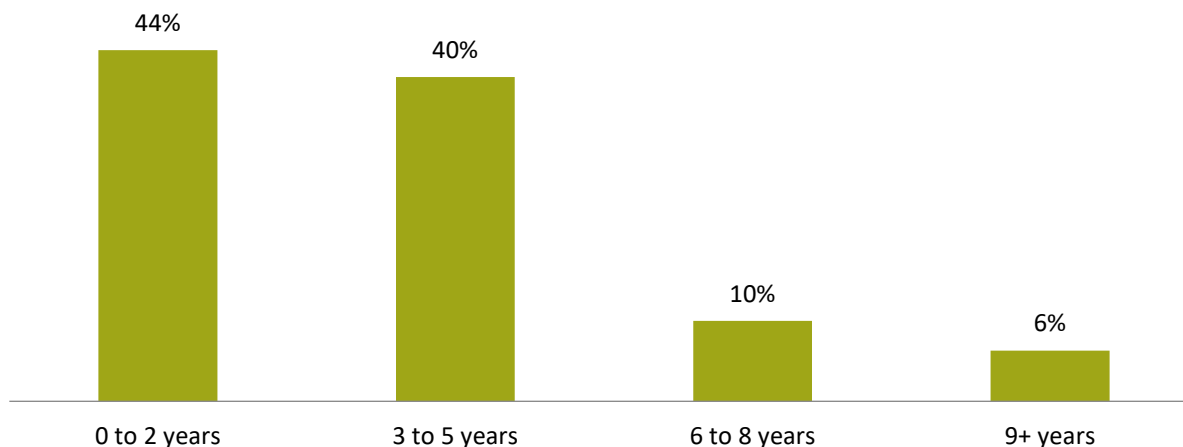


Exhibit 9 shows the experience levels required by employers for job postings for the selected occupations. Forty percent (n = 182) of job postings did not include a preferred education level.

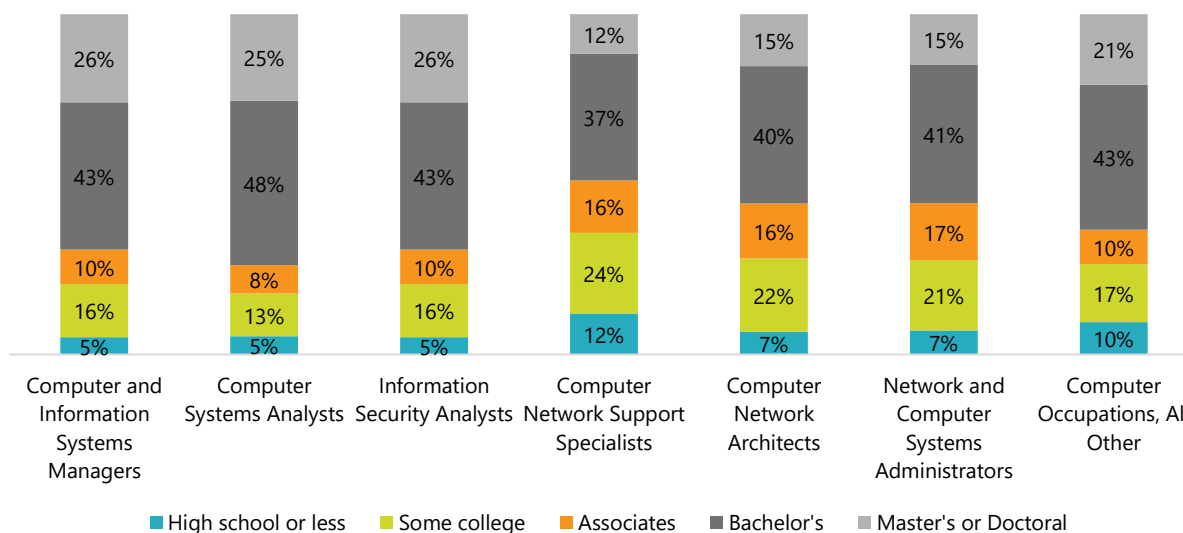
Exhibit 9. Employer-preferred experience levels



EDUCATION AND TRAINING

The U.S. Census Bureau and Bureau of Labor Statistics collects data on education achieved by workers employed in occupations. Exhibit 10 shows the national-level educational attainment of the current workforce in the selected occupations.

Exhibit 10. National worker educational attainment for selected occupations, 2019



The Bureau of Labor Statistics (BLS) uses a system to assign categories for entry-level education, work experience in a related occupation, and typical on-the-job training to each occupation for which the BLS publishes projections data. Exhibit 11 shows the skill level and entry-level job requirements for the selected occupations.

Exhibit 11. Typical education, work experience, and on-the-job training requirements

Occupation	Typical Entry-level Education	Work Experience Required	On-the-job Training Required
Computer and Information Systems Managers	Bachelor's degree	5 years or more	None
Computer Systems Analysts	Bachelor's degree	None	None
Information Security Analysts	Bachelor's degree	Less than 5 years	None
Computer Network Support Specialists	Associate's degree	None	None
Computer Network Architects	Bachelor's degree	5 years or more	None
Network and Computer Systems Administrators	Bachelor's degree	None	None
Computer Occupations, All Other	Bachelor's degree	None	Moderate-term on-the-job training

EDUCATIONAL SUPPLY

Educational supply for an occupation can be estimated by analyzing the number of awards issued in related Taxonomy of Programs (TOP) or Classification of Instructional Programs (CIP) codes. Exhibit 12 shows the TOP and CIP codes for educational programs related to the selected occupations.

Exhibit 12. TOP and CIP codes for training programs related to the selected occupations

TOP Programs and Codes	Aligned CIP Programs and Codes
Information Technology, General (0701.00)	Information Technology (11.0103)
Computer Information Systems (0702.00)	Computer Science (11.0701)
Computer Science - Transfer program (0706.00)	
Computer Infrastructure and Support (0708.00)	
Computer Network (0708.10)	

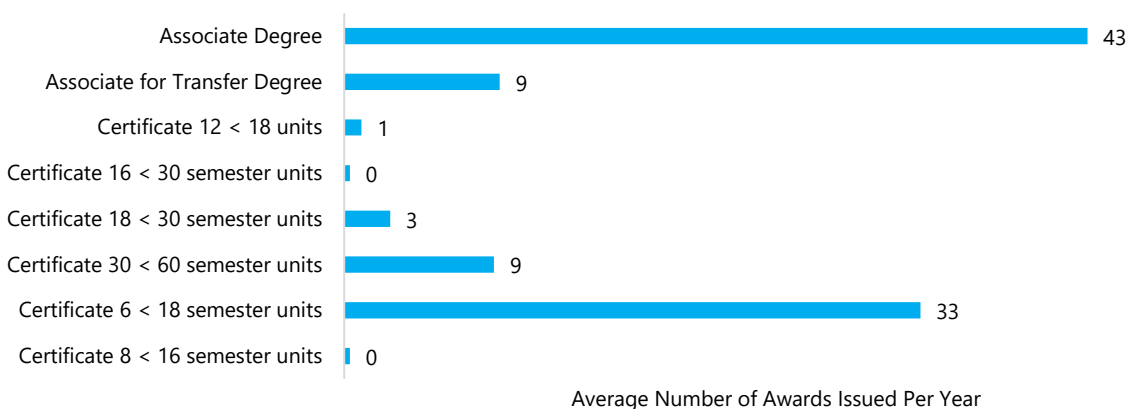
Community College Supply

Exhibits 13 and 14 compare the average number of certificates and degrees conferred in selected community college programs over the last three academic years.

Exhibit 13. Annual average community college awards by program, 2017-18 through 2019-20

Program - TOP Code	College	Annual Awards 2017-18	Annual Awards 2018-19	Annual Awards 2019-20	3-Yr Annual Awards Average
Information Technology, General (0701.00)	Mendocino	3	0	3	2
	Subtotal	3	0	3	3
Computer Information Systems (0702.00)	Butte	26	55	21	34
	Mendocino	0	1	1	1
	Shasta	8	8	4	7
	Subtotal	34	64	26	42
Computer Infrastructure and Support (0708.00)	Shasta	2	2	0	1
	Subtotal	2	2	0	1
Computer Networking (0708.10)	Mendocino	0	3	1	1
	Redwood	13	17	39	23
	Shasta	14	4	9	9
	Subtotal	27	24	49	33
Computer Science (Transfer) (0706.00)	Butte	14	10	16	13
	Mendocino	1	2	2	2
	Siskiyou	6	5	5	5
	Subtotal	21	17	23	20
	Total	87	107	101	98

Exhibit 14. Annual average community college awards by type, 2017-18 through 2019-20



Other Postsecondary Supply

Exhibit 15 compares the average number of degrees conferred by non-community college training providers in the Far North over the last three academic years. Please note that non-community college data lags by one year.

Exhibit 15. Other postsecondary awards by program, 2016-17 through 2018-19

Program - CIP Code	College	Annual Awards 2016-17	Annual Awards 2017-18	Annual Awards 2018-19	3-Yr Annual Awards Average
Information Technology (11.0103)	California State University-Chico	70	95	96	87
	Humboldt State University	0	0	1	0
	Subtotal	70	95	97	87
Computer Science (11.0701)	California State University-Chico	77	56	53	62
	Humboldt State University	33	34	38	35
	William Jessup University	0	0	4	1
	Subtotal	110	90	95	98
Grand Total		180	185	192	186

FINDINGS

This report focuses on seven occupations with relevant career pathways related to cloud computing. Please note that workers in these occupations may work in various information technology settings beyond cloud computing. However, the occupational group is referred to as "cloud computing" jobs in this report.

- The Far North subregion held 2,046 cloud computing jobs in 2020, with 1,470 located in the Northern Inland subregion and 576 in the Northern Coastal subregion. Cloud computing jobs are projected to increase by 6% over the next five years, adding 116 new jobs to the Far North by 2025. This rate is in-line with projected increases for similar jobs throughout the State.
- Over the next five years, cloud computing occupations are projected to have 215 annual openings in the Far North, with 152 in the Northern Inland and 63 in the Northern Coastal subregions.
- Wage data shows that cloud computing occupations earn approximately \$3 to \$56 above the subregion's living wage of \$12.74 per hour. Entry-level wages are highest for Information Security Analysts at \$41.56 per hour and the lowest for Computer Occupations, All Other at \$26.83 per hour.
- According to real-time labor market information, there were 453 online job postings for cloud computing occupations between November 1, 2020, and October 31, 2021. Top job titles and employers hint at the wide variety of settings that demand cloud computing skills. In addition to technology companies, cloud computing skills were in demand for a variety of industries including education and healthcare.
- Although many cloud computing jobs require minimal work experience, the typical entry level education was a bachelor's degree for all but one occupation (Computer Networking Support Specialist). Approximately 20-40% of incumbent workers in cloud computing have an education consistent with community college offerings.
- Five Far North community colleges offer degrees and certificates in programs related to cloud computing. Together, these programs conferred an average of 98 awards (certificates and associate degrees) cloud computing programs over the last three academic years (2017-18 through 2019-20).
- Local non-community college postsecondary training providers also offer training related to the studied occupations. Between 2016-17 and 2018-19, non-community college training providers conferred an average of 186 bachelor's or master's degrees in cloud computing related programs over the last three years. Please note that non-community college awards data lags by one year.

RECOMMENDATIONS

- Based on a three-year average of annual awards in Far North region cloud computing training programs and projected yearly openings, the supply gap analysis shows that the region seems to have room for additional training.
 - Together, community colleges and other postsecondary training providers issued an average of 284 awards over the last three years.
 - There are 215 projected annual openings for cloud computing occupations between 2020-2025 and 453 online job postings as of the date of this report.
- The Far North Center of Excellence recommends that community colleges develop flexible cloud computing pathways so that students have training consistent with the rapidly advancing and broad reaching industry.
- The Far North Center of Excellence recommends moving forward with the program.

COE Recommendation		
Move forward with the program	Proceed with caution	Program is not recommended
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

APPENDIX A. METHODOLOGY AND SOURCES

Occupations in this report were identified using the Center of Excellence TOP-to-CIP-to-SOC crosswalk and O*Net OnLine. This report's findings were determined using labor market data from the Bureau of Labor Statistics (BLS), U.S. Census Bureau data from Emsi, and jobs posting data from Burning Glass.

Cal-PASS Plus LaunchBoard. California Community Colleges Chancellor's Office.

<https://www.calpassplus.org/LaunchBoard/Home.aspx>.

Emsi. <https://www.economicmodeling.com/>. 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).

Educational Attainment for Workers 25 Years and Older by Detailed Occupation, 2016-2017. Bureau of Labor Statistics. <https://www.bls.gov/emp/tables/educational-attainment.htm#>.

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"TOP-CIP-SOC Crosswalk." Centers of Excellence for Labor Market Research. November 2015 Edition. <http://coeccc.net/>

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.

Important Disclaimer: All representations included in this report have been produced from primary research and/or secondary review of publicly and/or privately available data and/or research reports. Efforts have been made to qualify and validate the accuracy of the data and the reported findings; however, neither the Centers of Excellence, COE host District, nor California Community Colleges Chancellor's Office are responsible for applications or decisions made by recipient community colleges or their representatives based upon components or recommendations contained in this study.

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Centers of Excellence for Labor Market Research, Economic and
Workforce Development Program



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FOR LABOR MARKET RESEARCH

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