October 2021

Labor Market Analysis

07 – Information Technology Programs

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

This study conducted by the Central Valley/Mother Lode Center of Excellence examines labor market demand, wages, skills, and postsecondary supply for 07 TOP code related occupations for three counties; Fresno, Kings and Tulare. Eighteen occupations related were identified:

- 11-3011, Administrative Services Managers
- 13-1161, Market Research Analysts and Marketing Specialists
- 15-1121, Computer Systems Analysts
- 15-1122, Information Security Analysts
- 15-1131, Computer Programmers
- 15-1132, Software Developers, Applications
- 15-1133, Software Developers, Systems Software
- 15-1134, Web Developers
- 15-1141, Database Administrators
- 15-1142, Network and Computer Systems Administrators
- 15-1143, Computer Network Architects
- 15-1151, Computer User Support Specialists
- 15-1152, Computer Network Support Specialists
- 15-1199, Computer Occupations, All Other
- 27-1024, Graphic Designers
- 43-1011, First-Line Supervisors of Office and Administrative Support Workers
- 43-9021, Data Entry Keyers
- 43-9022, Word Processors and Typists

Key Findings:
- **Occupational demand —** More than 12,900 workers were employed in jobs related to 07 TOP codes in 2020 in Fresno, Kings and Tulare Counties. The largest occupation is first-line supervisors of office and administrative support workers, with 4,793 workers in 2020, a projected growth rate of 2% over the next five years, and 496 annual openings.

- **Wages —** Network and computer systems administrators, earn the highest entry-level wage, $34.21/hour in Fresno, Kings and Tulare Counties.

- **Employers —** Employers with the most job postings in Fresno, Kings and Tulare Counties are Anthem Blue Cross, Deloitte, and Crowdstrike.

- **Occupational titles —** The most common occupational title in job postings is software developers, applications and computer user support specialists. The most common job title is office manager.

- **Skills and certifications —** The top baseline skill is communication, the top specialized skill is customer service, and the top software skill is Microsoft Excel. The most in-demand certification is a driver's license.

- **Education —** A bachelor's degree is typically required for ten of the occupations related to 07 TOP codes. A high school diploma or equivalent is typically required for first-line supervisors of office

and administrative support workers, data entry keyers, and word processors and typists. An associate's degree is typically required for computer network support specialists and web developers and digital interface designers. Some college, no degree is typically required for computer user support specialists.

- **Supply —** Analysis of postsecondary completions in Fresno, Kings and Tulare Counties shows that on average 430 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 852 trained Information Technology workers across the three targeted counties.

Introduction

The Central Valley/Mother Lode Center of Excellence was asked by West Hills College, Lemoore to provide labor market information for 07 TOP codes. The geographical focus for this report is the Fresno, Kings, and Tulare county subregion, but regional demand and supply data has been included for broader applicability and use. Analysis of the 07 TOP code occupational data resulted in the identification of 18 occupations, but only 10 of them are considered middle-skill. The Standard Occupational Classification (SOC) System codes and titles used in this report are:

- 11-3011, Administrative Services Managers
- 13-1161, Market Research Analysts and Marketing Specialists
- 15-1121, Computer Systems Analysts
- 15-1122, Information Security Analysts
- 15-1131, Computer Programmers
- 15-1132, Software Developers, Applications
- 15-1133, Software Developers, Systems Software
- 15-1134, Web Developers
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- 43-9021, Data Entry Keyers
- 43-9022, Word Processors and Typists

The occupational titles, job descriptions, and knowledge and skills from the Bureau of Labor Statistics and O*NET OnLine are shown below. O*NET data was not available for Software Developers, Applications, Software Developers, Systems Software, Computer Occupations, All Other,

Administrative Services Managers
Job Description: Plan, direct, or coordinate one or more administrative services of an organization, such as records and information management, mail distribution, and other office support services.
Knowledge: Customer and Personal Service, Administration and Management, English Language, Clerical, Computers and Electronics
Skills: Active Listening, Reading Comprehension, Time Management, Speaking, Coordination

Market Research Analysts and Marketing Specialists
Job Description: Research conditions in local, regional, national, or online markets. Gather information to determine potential sales of a product or service, or plan a marketing or advertising campaign. May gather information on competitors, prices, sales, and methods of marketing and distribution. May employ search marketing tactics, analyze web metrics, and develop recommendations to increase search engine ranking and visibility to target markets.
Knowledge: Mechanical, Customer and Personal Service, Computer and Electronics, English Language, Mathematics
Skills: Equipment Maintenance, Repairing, Troubleshooting, Operation and Control, Critical Thinking
Computer Systems Analysts
Job Description: Analyze science, engineering, business, and other data processing problems to develop and

implement solutions to complex applications problems, system administration issues, or network concerns. Perform systems management and integration functions, improve existing computer systems, and review computer system capabilities, workflow, and schedule limitations. May analyze or recommend commercially available software

Knowledge: Computer and Electronics, English Language, Customer and Personal Service, Mathematics, Administration and Management

Skills: Active Listening, Critical Thinking, Reading Comprehension, Speaking, Systems Analysis

Information Security Analysts

Job Description: Plan, implement, upgrade, or monitor security measures for the protection of computer networks and information. Assess system vulnerabilities for security risks and propose and implement risk mitigation strategies. May ensure appropriate security controls are in place that will safeguard digital files and vital electronic infrastructure. May respond to computer security breaches and viruses.

Knowledge: Computer and Electronics, English Language, Administration and Management, Engineering and Technology, Telecommunications

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

Computer Programmers

Job Description: Create, modify, and test the code and scripts that allow computer applications to run. Work from specifications drawn up by software and web developers or other individuals. May develop and write computer programs to store, locate, and retrieve specific documents, data, and information.

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

Skills: Programming, Active Listening, Complex Problem Solving, Critical Thinking, Quality Control Analysis

Web Developers

Job Description: Develop and implement websites, web applications, application databases, and interactive web interfaces. Evaluate code to ensure that it is properly structured, meets industry standards, and is compatible with browsers and devices. Optimize website performance, scalability, and server-side code and processes. May develop website infrastructure and integrate websites with other computer applications.

Knowledge: Computer and Electronics, English Language, Mathematics, Communications and Media

Skills: Programming, Critical Thinking, Complex Problem Solving, Operations Analysis, Reading Comprehension

Database Administrators

Job Description: Administer, test, and implement computer databases, applying knowledge of database management systems. Coordinate changes to computer databases. Identify, investigate, and resolve database performance issues, database capacity, and database scalability. May plan, coordinate, and implement security measures to safeguard computer databases.

Knowledge: Computer and Electronics, English Language, Telecommunication, Mathematics, Clerical

Skills: Critical Thinking, Complex Problem Solving, Active Learning, Active Listening, 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: Computer and Electronics, English Language, Customer and Personal Service, Engineering and Technology, Mathematics

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

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: Computer and Electronics, Telecommunications, Engineering and Technology, English Language, Design
Skills: Critical Thinking, Active Listening, Complex Problem Solving, Reading Comprehension, Judgment and Decision Making

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: Computer 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 Support Specialists
Job Description: Analyze, test, troubleshoot, and evaluate existing network systems, such as local area networks (LAN), wide area networks (WAN), cloud networks, servers, and other data communications networks. Perform network maintenance to ensure networks operate correctly with minimal interruption.
Knowledge: Computer and Electronics, English Language, Customer and Personal Service, Engineering and Technology, Mathematics
Skills: Critical Thinking, Active Listening, Judgement and Decision Making, Reading Comprehension, Active Learning

Graphic Designers
Job Description: Design or create graphics to meet specific commercial or promotional needs, such as packaging, displays, or logos. May use a variety of mediums to achieve artistic or decorative effects
Knowledge: Design, Communication and Media, English Language, Fine arts, Computers and Electronics
Skills: Active Listening, Critical Thinking, Speaking, Reading Comprehension, Active Learning

First-Line Supervisors of Office and Administrative Support Workers
Job Description: Directly supervise and coordinate the activities of clerical and administrative support workers.
Knowledge: Administration and Management, Customer and Personal Service, Clerical, English Language, Computers and Electronics
Skills: Active Listening, Coordination, Monitoring, Reading Comprehension, Social Perceptiveness

Data Entry Keyers
Job Description: Operate data entry device, such as keyboard or photo composing perforator. Duties may include verifying data and preparing materials for printing.
Knowledge: English Language, Clerical, Customer and Personal Service, Law and Government
Skills: Reading Comprehension, Active Listening, Monitoring, Time Management, Writing

Word Processors and Typists
Job Description: Use word processor, computer, or typewriter to type letters, reports, forms, or other

material from rough draft, corrected copy, or voice recording. May perform other clerical duties as assigned.
Knowledge: Clerical, English Language, Customer and Personal Service, Computers and Electronics
Skills: Reading Comprehension, Active Listening, Writing, Monitoring, Speaking

Occupational Demand

The Fresno, Kings, and Tulare counties employed 12,940 workers in 07 TOP code occupations in 2020 (Exhibit 1). The largest occupation is first-line supervisors of office and administrative suport workers, with 4,793 workers in 2020. This occupation is projected to grow by 2% over the next five years and has the greatest number of projected annual openings, 496.

Exhibit 1. 07 TOP codes employment and occupational projections in Fresno, Kings, and Tulare counties

Occupation	2020 Jobs	2025 Jobs	5-Year Change	5-Year % Change	Annual Openings
First-Line Supervisors of Office and Administrative Support Workers	4,793	4,891	97	2%	496
Market Research Analysts and Marketing Specialists	1,127	1,283	156	14%	147
Computer User Support Specialists	1,287	1,358	71	6%	110
Data Entry Keyers	911	830	(81)	(9%)	95
Administrative Services and Facilities Managers	971	1,030	60	6%	94
Computer Occupations, All Other	784	848	64	8%	72
Computer Systems Analysts	689	742	53	8%	60
Graphic Designers	464	481	17	4%	46
Network and Computer Systems Administrators	482	510	29	6%	38
Computer Network Support Specialists	322	339	18	5%	27
Web Developers and Digital Interface Designers	261	284	23	9%	24
Database Administrators and Architects	177	190	14	8%	16
Word Processors and Typists	149	123	(26)	(18%)	16
Computer Programmers	218	211	(8)	(4%)	15
Information Security Analysts	117	138	22	19%	13
Computer Network Architects	189	194	4	2%	12
TOTAL	**12,940**	**13,451**	**512**	**4%**	**1,282**

Wages

Exhibit 2 shows the entry-level hourly wages of 07 TOP codes occupations. Network and computer systems administrators, earn the highest entry-level wage, $34.21/hour in Fresno, Kings, and Tulare county. Entry-level wages are derived from the 25th percentile.

Exhibit 2. 07 TOP code occupations entry-level wages in Fresno, Kings, and Tulare counties

Occupation	Wage
Network and Computer Systems Administrators	$34.21
Computer Systems Analysts	$32.75
Administrative Services and Facilities Managers	$32.54
Information Security Analysts	$30.97
Computer Network Architects	$30.43
Computer Occupations, All Other	$26.54
Computer Programmers	$26.43
Computer Network Support Specialists	$25.15
Database Administrators and Architects	$24.94
First-Line Supervisors of Office and Administrative Support Workers	$21.69
Web Developers and Digital Interface Designers	$18.41
Computer User Support Specialists	$18.06
Market Research Analysts and Marketing Specialists	$17.41
Graphic Designers	$16.01
Data Entry Keyers	$14.93
Word Processors and Typists	$13.87

Dotted line denotes $12.65/hour living wage in the SCV/SML subregion

Job Postings

There were 3,503 job postings for the eieghteen occupations in Fresno, Kings, and Tulare county from April 2021 to September 2021.[1] The employers with the most job postings are listed in Exhibit 3.

Exhibit 3. Top employers of 07 TOP codes workers by number of job postings

Employer	Job Postings	% Job Postings
Anthem Blue Cross	246	6%
Deloitte	242	6%
Crowdstrike	37	1%
Dell	37	1%
County Tulare	25	1%
The Save Mart Companies	25	1%
Community Medical Centers Incorporated	21	1%
Fresno Unified School District	21	1%
Internal Revenue Service	21	1%
Tulare County	21	1%

Exhibit 4 shows how job postings for the targeted occupations in Fresno, Kings, and Tulare county are distributed across 10 O*NET OnLine occupations. The occupational title software developers, applications is listed in 542 job postings. Note how this occupational title dominates the job posting results. Common job titles in postings include office managers in 71 job postings, data entry clerk in 65 job postings, and software developer in 24 job postings.

Exhibit 4. Top occupational titles in job postings for 07 TOP code occupations

Occupational Title	Job Postings	% of Job Postings
Software Developers, Applications	542	15%
Computer User Support Specialists	393	11%
First-Line Supervisors of Office and Administrative Support Workers	361	10%
Market Research Analysts and Marketing Specialists	245	7%
Business Intelligence Analysts	181	5%
Data Entry Keyers	180	5%
Computer Systems Analysts	175	5%
Information Technology Project Managers	165	5%
Web Developers	151	4%
Administrative Services Managers	138	4%

Salaries

Exhibit 5 shows the "Market Salaries" for 07 TOP code occupations that are calculated by Burning Glass which uses a machine learning model built off of millions of job postings every year, and accounts for adjustments based on locations, industry, skills, experience, education requirements, among other variables.

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[1] 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.

Exhibit 5. Salaries for 07 TOP code occupations

Market Salary Percentile	Salary Amount
10th Percentile	$31,036
25th Percentile	$40,203
50th Percentile	$61,041
75th Percentile	$89,589
90th Percentile	$115,441

Education

Of the 3,503 job postings, 2395 listed an education level preferred for the positions being filled. Of those, 72% requested bachelor's degree and 27% requested high school or vocational training (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 07 TOP code occupations

Education Level	Job Postings	% of Job Postings
Bachelor's degree	1,725	72%
High school or vocational training	653	27%
Master's degree	347	14%
Associate's degree	199	8%
Doctoral degree	70	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 communication, 41% of job postings, teamwork/collaboration, 23%, and problem solving, 24%. The top three specialized skills are customer service, 17% of job postings, SQL, 12% and project management, 12%.

Exhibit 7. In-demand 07 TOP code occupational baseline and specialized skills
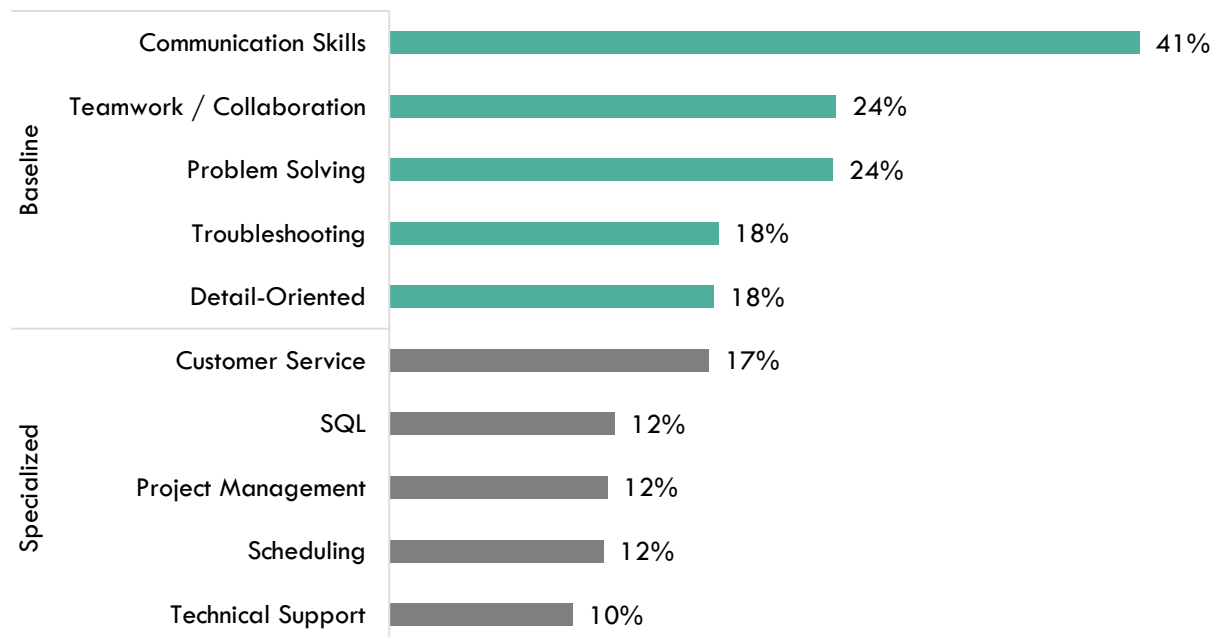
Software Skills

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

Exhibit 8. In-demand 07 TOP code occupational software skills

18%	17%	12%	9%	7%
Microsoft Excel	Microsoft Office	SQL	Software Development	JavaScript
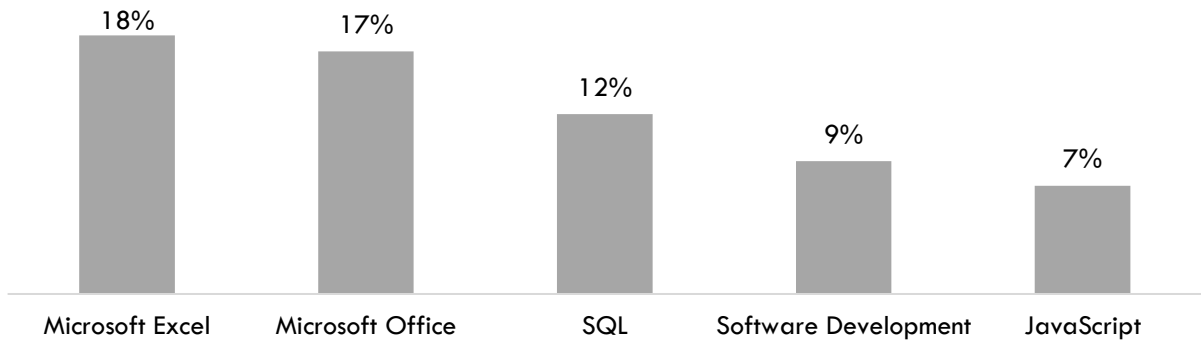
Certifications

Of the 3,503 job postings, 799 contained certification data. Among those, 45% indicated a need for a driver's license. The next top certifications are security clearance and IT infrastructure library (ITIL) (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 07 TOP code occupational certifications requested in job postings

45%	10%	7%	7%	7%
Driver's License	Security Clearance	IT Infrastructure Library (ITIL) Certification	Certified A+ Technician	Cisco Certified Network Associate (CCNA)
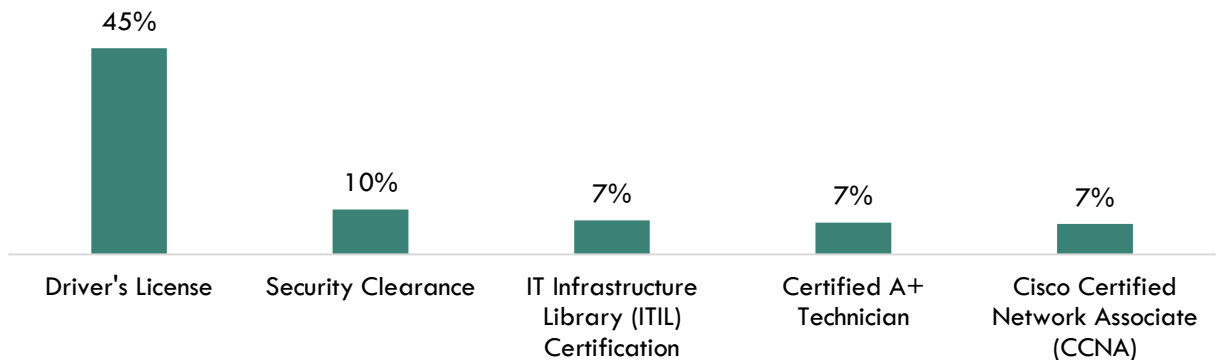
Education, Work Experience & Training

A bachelor's degree is typically required for ten of the occupations related to 07 TOP codes. A high school diploma or equivalent is typically required for first-line supervisors of office and administrative support workers, data entry keyers, and word processors and typists. An associate's degree is typically required for computer network support specialists and web developers and digital interface designers. Some college, no degree is typically required for computer user support specialists

Exhibit 10. Education, work experience, training, and Current Population Survey results for 07 TOP code occupations[2]

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
First-Line Supervisors of Office and Administrative Support Workers	High school diploma or equivalent	Less than 5 years	None	41.4%
Market Research Analysts and Marketing Specialists	Bachelor's degree	None	None	15.5%
Computer Occupations, All Other	Bachelor's degree	None	Moderate-term on-the-job training	27.2%
Computer User Support Specialists	Some college, no degree	None	None	39.2%
Administrative Services and Facilities Managers	Bachelor's degree	Less than 5 years	None	34.8%
Data Entry Keyers	High school diploma or equivalent	None	Short-term on-the-job training	46.0%
Computer Systems Analysts	Bachelor's degree	None	None	20.8%
Graphic Designers	Bachelor's degree	None	None	26.5%
Network and Computer Systems Administrators	Bachelor's degree	None	None	37.4%
Computer Network Support Specialists	Associate's degree	None	None	39.2%
Web Developers and Digital Interface Designers	Associate's degree	None	None	23.4%
Database Administrators and Architects	Bachelor's degree	None	None	18.6%
Computer Programmers	Bachelor's degree	None	None	20.4%
Information Security Analysts	Bachelor's degree	Less than 5 years	None	25.7%
Word Processors and Typists	High school diploma or equivalent	None	Short-term on-the-job training	48.4%
Computer Network Architects	Bachelor's degree	5 years or more	None	37.7%

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[2] "Labor Force Statistics from the Current Population Survey," Bureau of Labor Statistics, https://www.bls.gov/cps/.

Supply

Exhibit 11. Postsecondary supply for 07 TOP code occupations in the region

TOP/CIP Code-Title	College	Associate Degree	Award 1 < 2 Academic Years	Bachelor's 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	Certificate 8 < 16 Semester Units	Subtotal
070100 - Information Technology, General	Modesto	2									2
	Porterville	2							4		6
	Sequoias								0		0
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
070210 - Software Applications	Modesto					1	3				4
	Taft								8		8
	West Hills Coalinga	4					4				8
	West Hills Lemoore	17							15		32
070710 - Computer Programming	Columbia	1									1
	Modesto				7					0	8
	Reedley College	1				4	0				5
	San Joaquin Delta						0	0			1
	West Hills Lemoore						2				2
070800 - Computer Infrastructure and Support	Bakersfield								5		5
	Fresno City				3	1					4
	Sequoias								2		2
070810 - Computer Networking	Cerro Coso	9						10			18
	Clovis	2					1				3

TOP/CIP Code-Title	College	Associate Degree	Award 1 < 2 Academic Years	Bachelor's 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	Certificate 8 < 16 Semester Units	Subtotal
	Fresno City	22						22			45
	Modesto				7					1	8
	Reedley College	4				9	7				20
	San Joaquin Delta	15					18	3			37
	Sequoias	1							5		6
	West Hills Lemoore					0	1				1
070820 - Computer Support	Clovis	0				0					1
	Reedley College	4					4				8
070900 - World Wide Web Administration	Fresno City	2				1	1				3
	San Joaquin Delta							0			0
11.0101 - Computer and Information Sciences, General	Milan Institute-Visalia		6								6
	Santa Barbara Business College-Bakersfield	5									5
11.0103 - Information Technology	California State University-Stanislaus			0							0
	San Joaquin Valley College-Visalia	12	19								31
11.1006 - Computer Support Specialist	San Joaquin Valley College-Visalia	7									7
	Santa Barbara Business College-Bakersfield	0									0
11.9999 - Computer and Information Sciences and Support Services, Other	MTI Business College Inc		2								2
15.1204 - Computer Software Technology/Technician	Fresno Pacific University			5							5
TOTAL		167	27	6	28	38	67	59	37	2	430

There is an undersupply of 852 07 TOP code workers in Fresno, Kings, and Tulare counties (Exhibit 12).

Exhibit 12. Annual demand and supply for 07 TOP codes workers in Fresno, Kings, and Tulare Counties
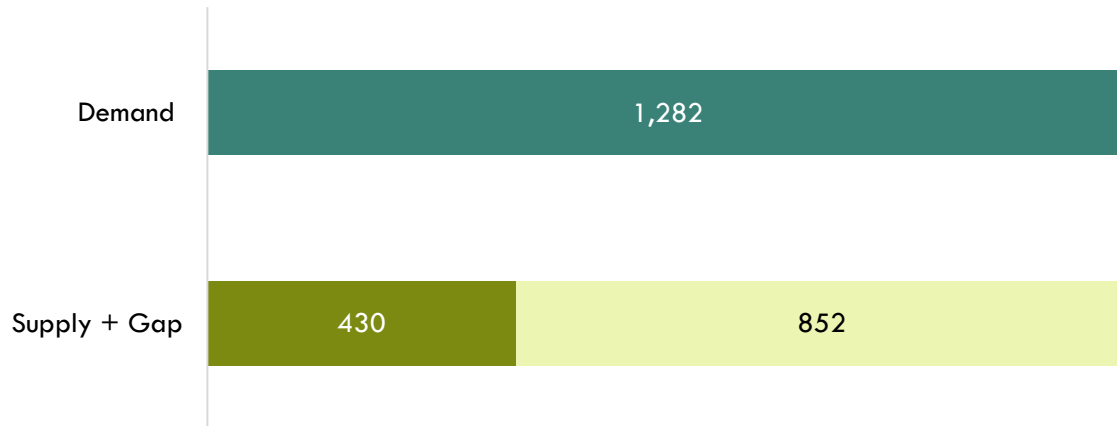
Student Outcomes

Exhibit 13 summarizes employment and wage outcomes from the California Community College Chancellor's Cal-PASS Plus LaunchBoard for the TOP codes.

Exhibit 13. Regional metrics for the TOP codes

Metric	Information Technology, General 070100	Computer Information Systems 070200	Software Applications 070210	Computer Programming 070710	Computer Infrastructure and Support 070800	Computer Networking 070810	Computer Support 070820
Students Who Got a Degree or Certificate or Attained Apprenticeship Journey Status	130	525	207	720	383	623	450
Number of Students Who Transferred	4695	2005	1480	4107	306	387	56
Job Closely Related to Field of Study	66%	65%	68%	65%	71%	68%	70%
Median Change in Earnings	17%	19%	16%	21%	14%	16%	13%
Attained a Living Wage	49%	48%	55%	55%	62%	65%	55%
* denotes data not available.							

Appendix A: Regional 07 TOP Code Occupational and Job Postings Data

Regional Summary

This report prepared by the Central Valley/ Mother Lode Center of Excellence examines labor market demand and postsecondary supply in the Central Valley/ Mother Lode.

This report focuses on occupations in thirteen TOP codes.

The TOP codes included in this report are:
1. 070100- Information Technology, General
2. 070200- Computer Information Systems
3. 070210 - Software Applications
4. 070700 - Computer Software Development
5. 070710 - Computer Programming
6. 070720 - Database Design and Administration
7. 070730 - Computer Systems Analysis
8. 070800 - Computer Infrastructure and Support
9. 070810 - Computer Networking
10. 070820 - Computer Support
11. 070900 - World Wide Web Administration
12. 070910 - E-Commerce (technology emphasis)
13. 079900 - Other Information Technology

Within each TOP code, this analysis focuses on non-middle and middle-skill occupations, those occupations that require more education and training than a high school diploma, but less than a bachelor's degree. For each occupation, data is presented on current employment and projected demand.

Analysis of the program and occupational data related to 07 TOP codes resulted in the identification of applicable occupations. The Standard Occupational Classification (SOC) System codes and titles used in this report are:

- 11-3011, Administrative Services Managers
- 13-1161, Market Research Analysts and Marketing Specialists
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- 43-1011, First-Line Supervisors of Office and Administrative Support Workers
- 43-9021, Data Entry Keyers
- 43-9022, Word Processors and Typists

Please Note: The Central Valley/Mother Lode Center of Excellence is recognizing that students with the proper education can return to a community college to receive skills employers are desperately in search of.

Regional Occupational Skills Findings

The Central Valley/ Mother Lode Center of Excellence was asked to provide skills information for thirteen TOP codes.

The analysis looked at the most common specialized skills occurring in job postings.

Top skills listed in job postings for each occupation related to 07 TOP codes in CML

Occupation	Top 5 Skills
Administrative Services Managers	• Budgeting • Scheduling • Repair • Staff Management • Office Management
Computer Network Architects	• Network Engineering • Telecommunications • Cisco • Project Management • Wide Area Network (WAN)
Computer Network Support Specialists	• Technical Support • Network Support • Network Administration • Customer Service • Cisco
Computer Occupations, All Other	• Project Management • SQL • Data Analysis • Budgeting • Scheduling
Computer Programmers	• SQL • Customer Service • Software Development • Scheduling • Java
Computer Systems Analysts	• Systems Analysis • Information Systems • Project Management • Business Process • Business Systems Analysis

Occupation	Top 5 Skills
Computer User Support Specialists	• Technical Support • Repair • Customer Service • It Support • Hardware and Software Installation
Data Entry Keyers	• Data Entry • Customer Service • Spreadsheets • Administrative Support • Customer Billing
Database Administrators	• SQL • Database Administration • Data Analysis • Scheduling • Python
First-Line Supervisors of Office and Administrative Support Workers	• Customer Service • Office Management • Scheduling • Staff Management • Budgeting
Graphic Designers	• Graphic Design • Adobe Photoshop • Adobe Illustrator • Adobe Indesign • Adobe Acrobat
Information Security Analysts	• Information Security • Information Systems • Information Assurance • Project Management • Risk Management Framework
Market Research Analysts and Marketing Specialists	• Marketing • Social Media • Digital Marketing • Budgeting • Project Management
Network and Computer Systems Administrators	• System Administration • Microsoft Active Directory • Hardware and Software Installation • Network Administration • Scheduling
Software Developers, Applications	• Software Development • Software Engineering • Java

Occupation	Top 5 Skills
	• SQL
	• JavaScript
Software Developers, Systems Software	• Microsoft C#
	• Software Development
	• .NET
	• AC/DC Drives and Motors
	• Actuators
Web Developers	• Front-end Development
	• JavaScript
	• Web Development
	• Software Engineering
	• Ruby
Word Processors and Typists	• Clerical Duties
	• Record Keeping
	• Data Entry
	• Scheduling
	• Secretarial Skills

Across all occupations, specialized skills that were frequently cited in job ads included:
- **Scheduling** (Administrative Services Managers, Computer Occupations, All Other, Computer Programmers, Database Administrators, First-Line Supervisors of Office and Administrative Support Workers, Network and Computer Systems Administrators, and Word Processors and Typists)
- **Project Management** (Computer Network Architects, Computer Occupations, All Other, Computer Systems Analysts, Information Security Analysts, and Market Research Analysts and Marketing Specialists)
- **Budgeting** (Administrative Services Managers, Computer Occupations, All Other, First-Line Supervisors of Office and Administrative Support Workers, and Market Research Analysts and Marketing Specialists)
- **Customer Service** (Computer Network Support Specialists, Computer Programmers, Computer User Support Specialists, and Data Entry Keyers)
- **SQL** (Computer Occupations, All Other, Computer Programmers, Database Administrators, and Software Developers, Applications)

Regional Gap Analysis

Central Valley/Mother Lode demand and supply for all 07 TOP codes
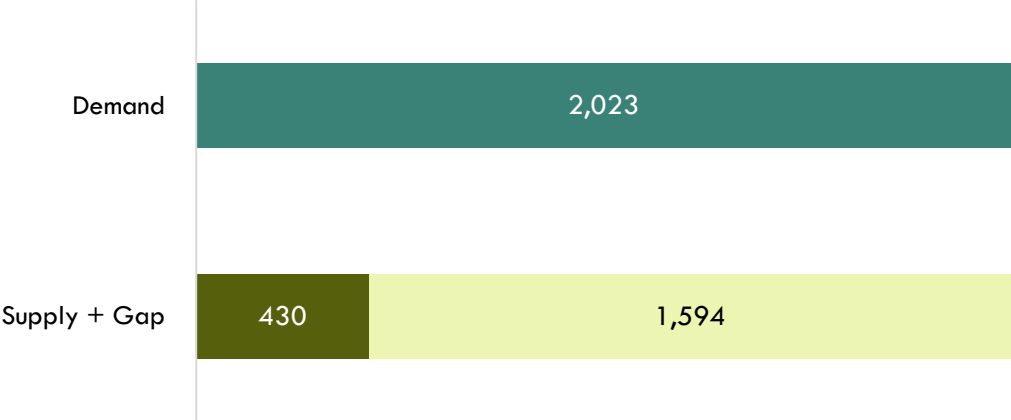
Central Valley/Mother Lode demand and supply for middle-skill for 07 TOP codes
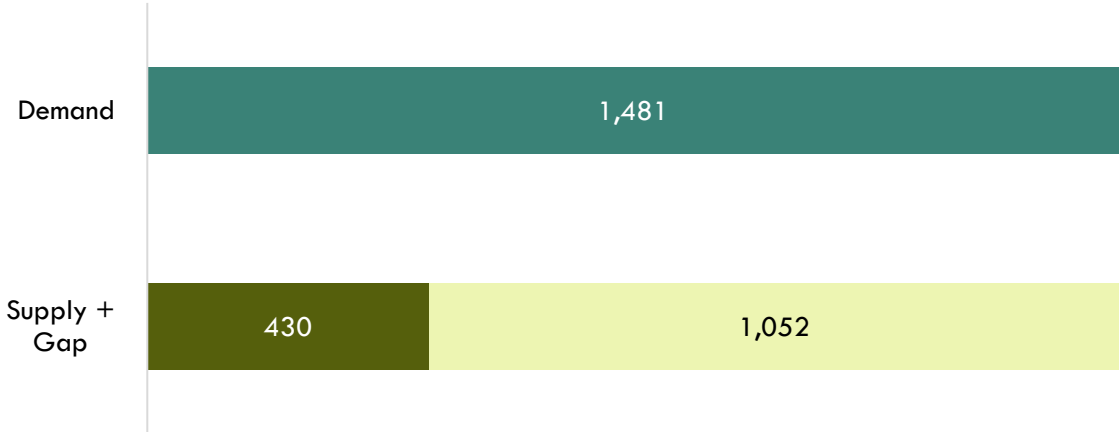
Administrative Services Managers

In-demand Administrative Services Managers baseline and specialized skills

Category	Skill	Percentage
Baseline	Communication Skills	41%
Baseline	Planning	27%
Baseline	Microsoft Excel	23%
Baseline	Microsoft Office	23%
Baseline	Writing	20%
Specialized	Budgeting	31%
Specialized	Scheduling	24%
Specialized	Repair	22%
Specialized	Staff Management	20%
Specialized	Office Management	17%
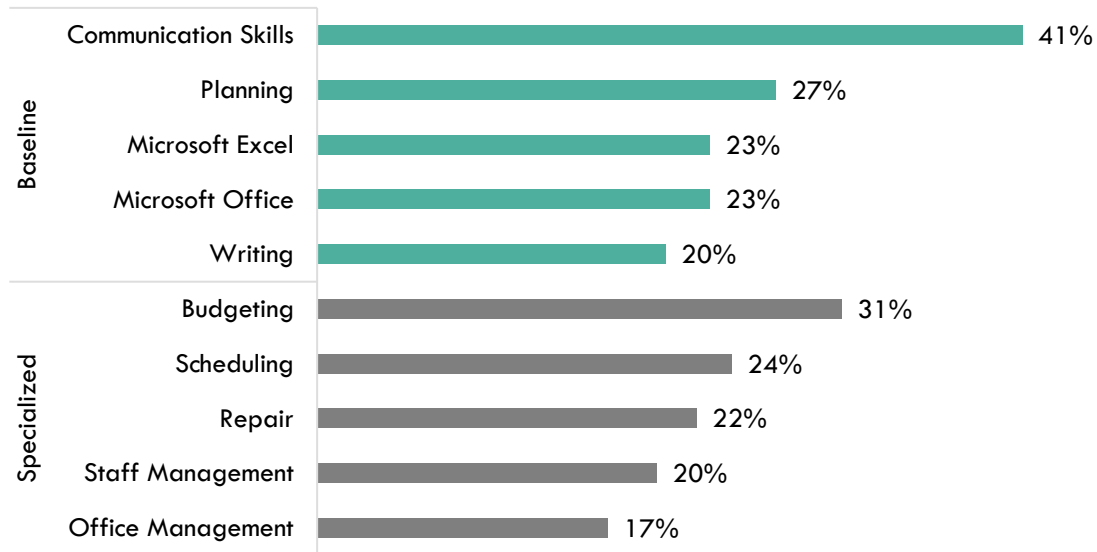
In-demand Administrative Services Managers software skills

Software	Percentage
Microsoft Excel	23%
Microsoft Office	23%
Microsoft Word	10%
Microsoft Powerpoint	9%
Microsoft Outlook	6%
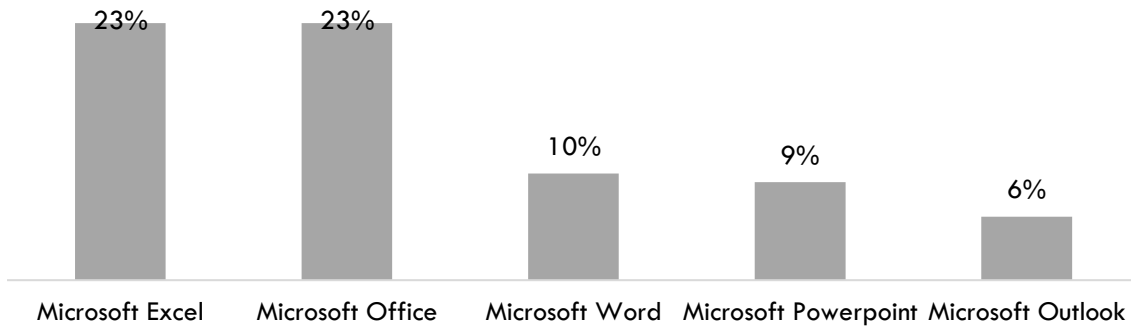
Top Administrative Services Managers certifications requested in job postings

Certification	Percentage
Driver's License	74%
Project Management Certification	8%
First Aid Cpr Aed	7%
Six Sigma Certification	7%
Certified Pool/Spa Operator	5%
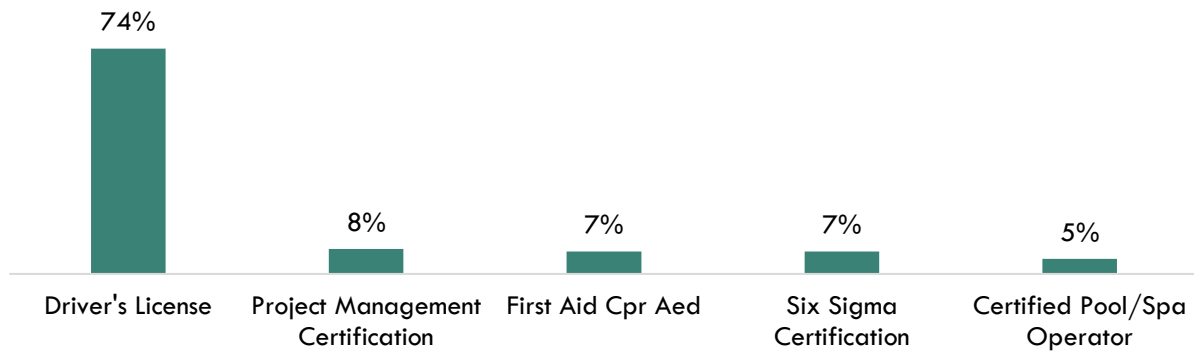
Computer Network Architects

In-demand Computer Network Architects baseline and specialized skills

Baseline	
Troubleshooting	51%
Communication Skills	32%
Planning	21%
Writing	18%
Organizational Skills	15%

Specialized	
Network Engineering	39%
Telecommunications	25%
Cisco	24%
Project Management	24%
Wide Area Network (WAN)	22%
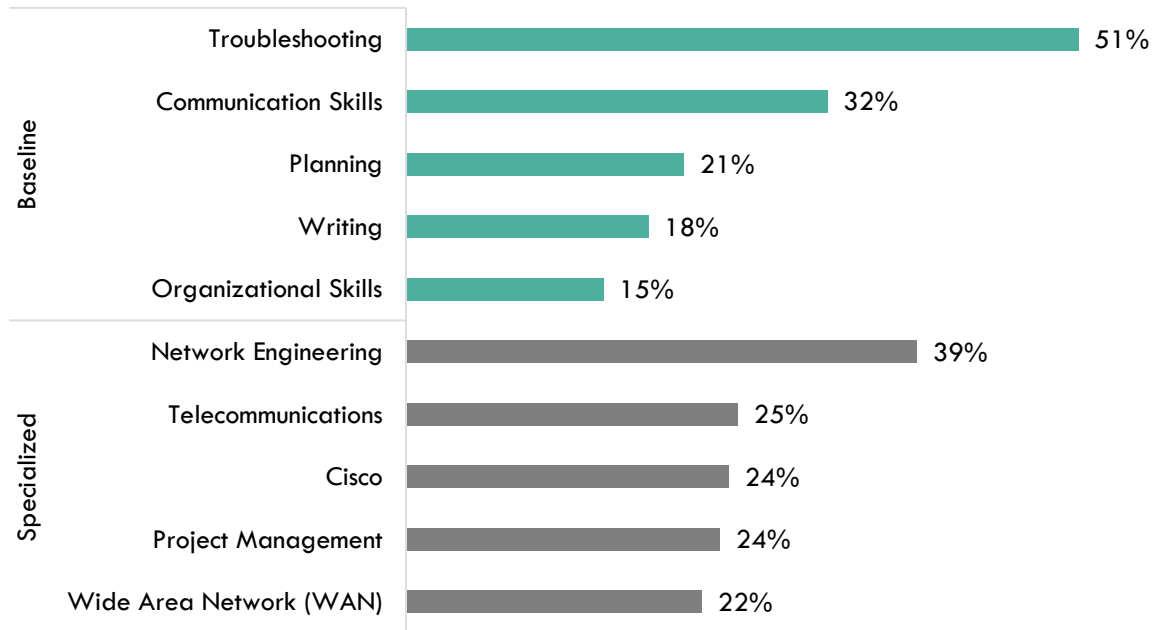
In-demand Computer Network Architects software skills

Microsoft Excel	Voice over IP (VoIP)	Microsoft Office	Python	SCADA
12%	11%	10%	10%	10%
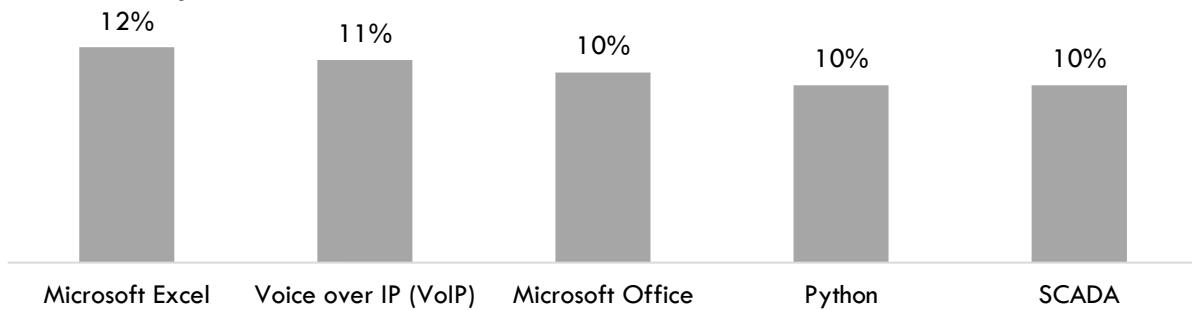
Top Computer Network Architects certifications requested in job postings

Cisco Certified Network Associate (CCNA)	Driver's License	Cisco Certified Network Professional (CCNP)	Security Clearance	CompTIA Security+
41%	36%	29%	15%	11%

Computer Network Support Specialists

In-demand Computer Network Support Specialists baseline and specialized skills

Category	Skill	Percentage
Baseline	Troubleshooting	10%
Baseline	Communication Skills	6%
Baseline	Building Effective Relationships	5%
Baseline	Organizational Skills	5%
Baseline	Planning	5%
Specialized	Technical Support	9%
Specialized	Network Support	6%
Specialized	Network Administration	6%
Specialized	Customer Service	4%
Specialized	Cisco	3%

In-demand Computer Network Support Specialists software skills

Software	Percentage
Microsoft Office	4%
Microsoft Windows	3%
Linux	3%
Microsoft Excel	3%
Microsoft Word	2%

Top Computer Network Support Specialists Certifications requested in job postings

Certification	Percentage
Certified A+ Technician	44%
CompTIA Network+	38%
Cisco Certified Network Associate (CCNA)	34%
Driver's License	31%
Security Clearance	25%

Computer Occupations, All Other

In-demand Computer Occupations, All Other baseline and specialized skills

	Skill	Percentage
Baseline	Communication Skills	35%
	Teamwork / Collaboration	29%
	Planning	25%
	Problem Solving	23%
	Microsoft Excel	22%
Specialized	Project Management	19%
	SQL	18%
	Data Analysis	16%
	Budgeting	13%
	Scheduling	11%
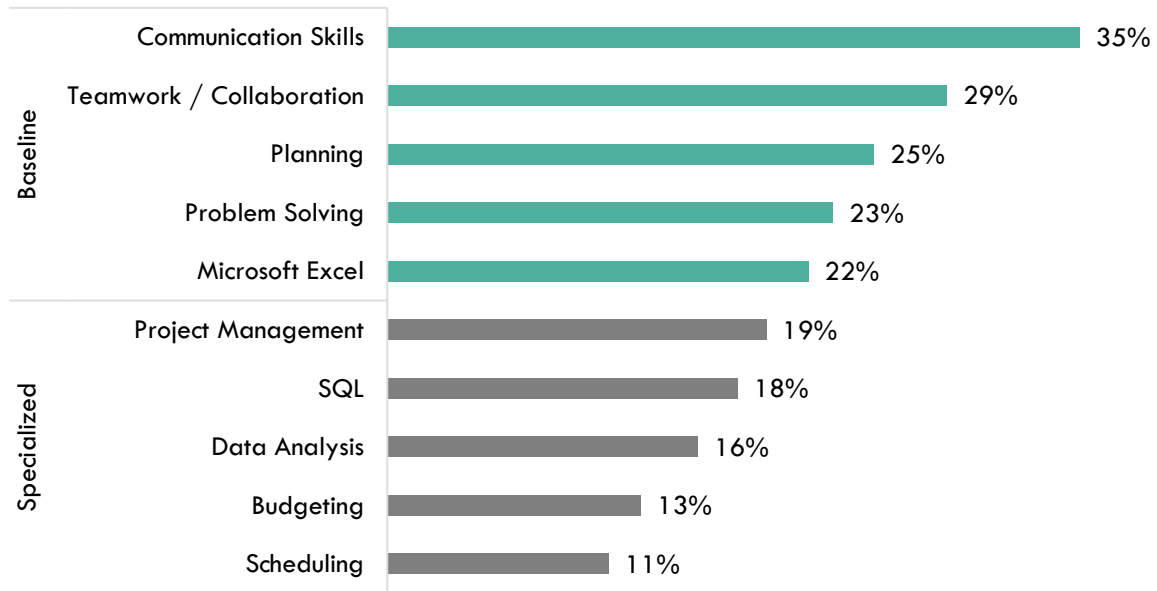
In-demand Computer Occupations, All Other software skills

Software	Percentage
Microsoft Excel	22%
SQL	18%
Microsoft Office	15%
SAP	9%
Microsoft Powerpoint	8%
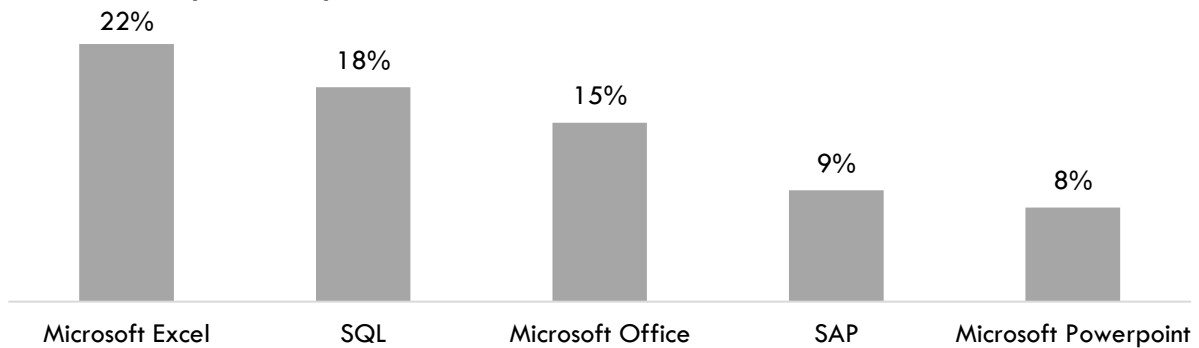
Top Computer Occupations, All Other certifications requested in job postings

Certification	Percentage
Driver's License	32%
Security Clearance	23%
Project Management Certification	14%
Project Management Professional (PMP)	10%
CompTIA Security+	8%
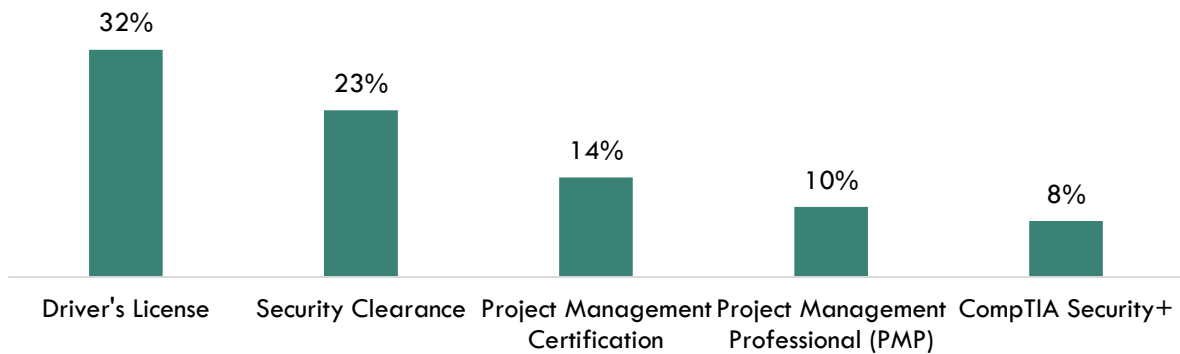
Computer Programmers

In-demand Computer Programmers baseline and specialized skills

Baseline

- Communication Skills — 69%
- Problem Solving — 50%
- Writing — 21%
- Troubleshooting — 21%
- Physical Abilities — 18%

Specialized

- SQL — 25%
- Customer Service — 19%
- Software Development — 16%
- Scheduling — 15%
- Java — 14%
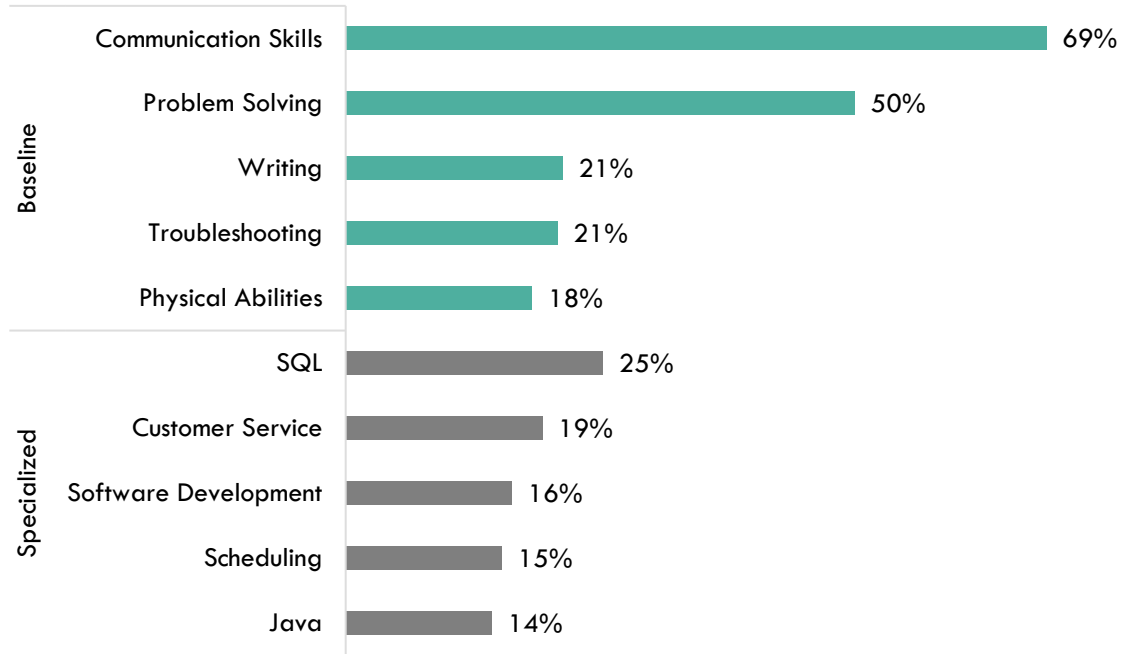
In-demand Computer Programmers software skills

- SQL — 25%
- Software Development — 16%
- Java — 14%
- Microsoft C# — 14%
- Oracle — 13%
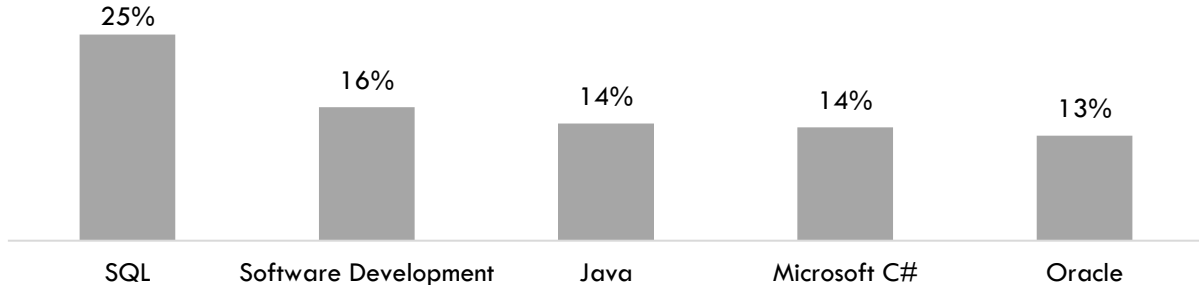
Top Computer Programmers certifications requested in job postings

- Driver's License — 51%
- Security Clearance — 18%
- IT Infrastructure Library (ITIL) Certification — 9%
- CompTIA Security+ — 7%
- OSHA Forklift Certification — 7%
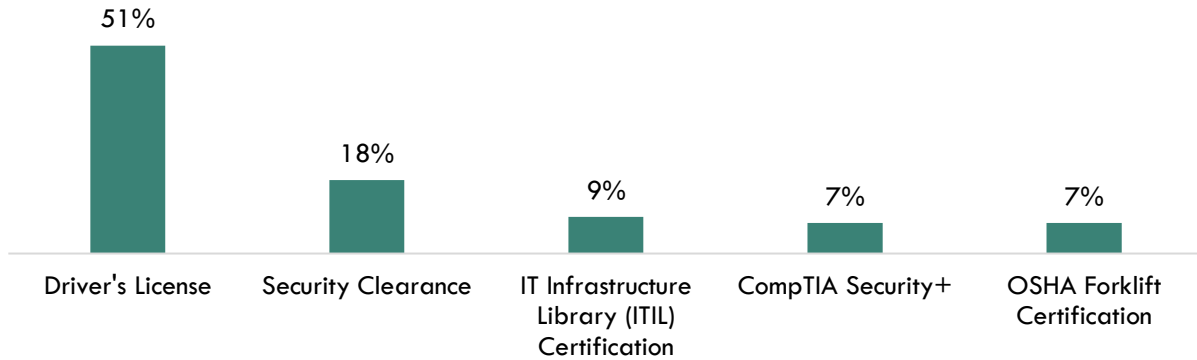
Computer Systems Analysts

In-demand Computer Systems Analysts baseline and specialized skills

Baseline	
Communication Skills	31%
Teamwork / Collaboration	28%
Writing	25%
Problem Solving	24%
Troubleshooting	23%

Specialized	
Systems Analysis	28%
Information Systems	26%
Project Management	23%
Business Process	19%
Business Systems Analysis	18%
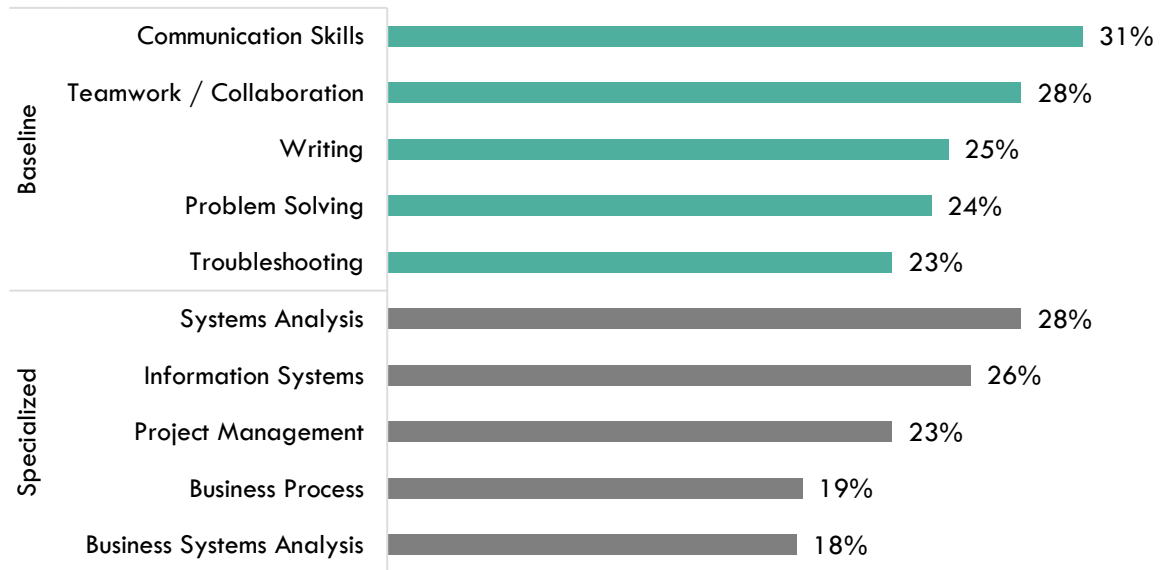
In-demand Computer Systems Analysts software skills

Systems Analysis	SQL	Microsoft Excel	Microsoft Office	Software Development
28%	15%	14%	14%	10%
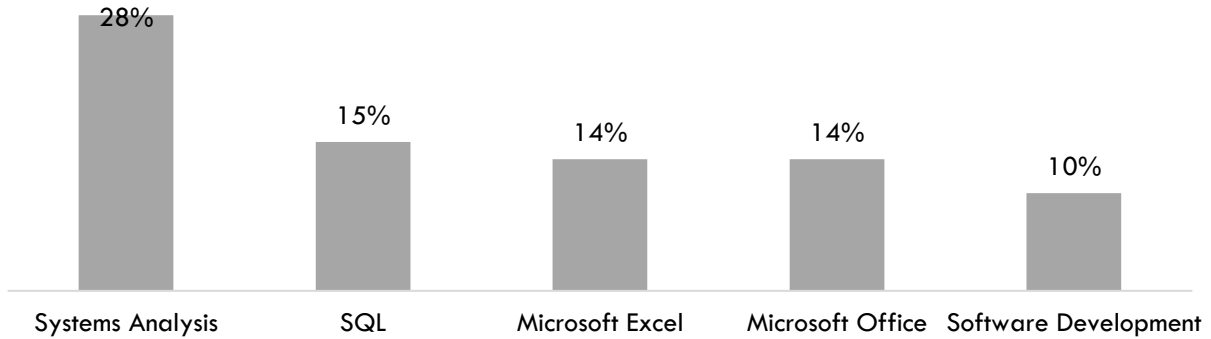
Top Computer Systems Analysts requested in job postings

Driver's License	Security Clearance	Project Management Certification	IT Infrastructure Library (ITIL) Certification	Project Management Professional (PMP)
40%	14%	9%	8%	8%

Computer User Support Specialists

In-demand Computer User Support Specalists baseline and specialized skills

Baseline	
Troubleshooting	53%
Communication Skills	43%
Problem Solving	30%
Detail-Oriented	22%
Microsoft Office	18%

Specialized	
Technical Support	45%
Repair	29%
Customer Service	27%
It Support	24%
Hardware and Software Installation	24%

In-demand Computer User Support Specalists software skills

Software Skill	Percentage
Microsoft Office	18%
Microsoft Windows	14%
Microsoft Operating Systems	9%
Microsoft Excel	8%
SQL	5%

Top Computer User Support Specalists certifications requested in job postings

Certification	Percentage
Driver's License	47%
Certified A+ Technician	29%
CompTIA Network+	13%
IT Infrastructure Library (ITIL) Certification	10%
Cisco Certified Network Associate (CCNA)	8%

Data Entry Keyers

In-demand Data Entry Keyers baseline and specialized skills

Baseline	
Microsoft Excel	52%
Detail-Oriented	39%
Typing	35%
Communication Skills	31%
Computer Literacy	30%

Specialized	
Data Entry	105%
Customer Service	33%
Spreadsheets	23%
Administrative Support	18%
Customer Billing	8%
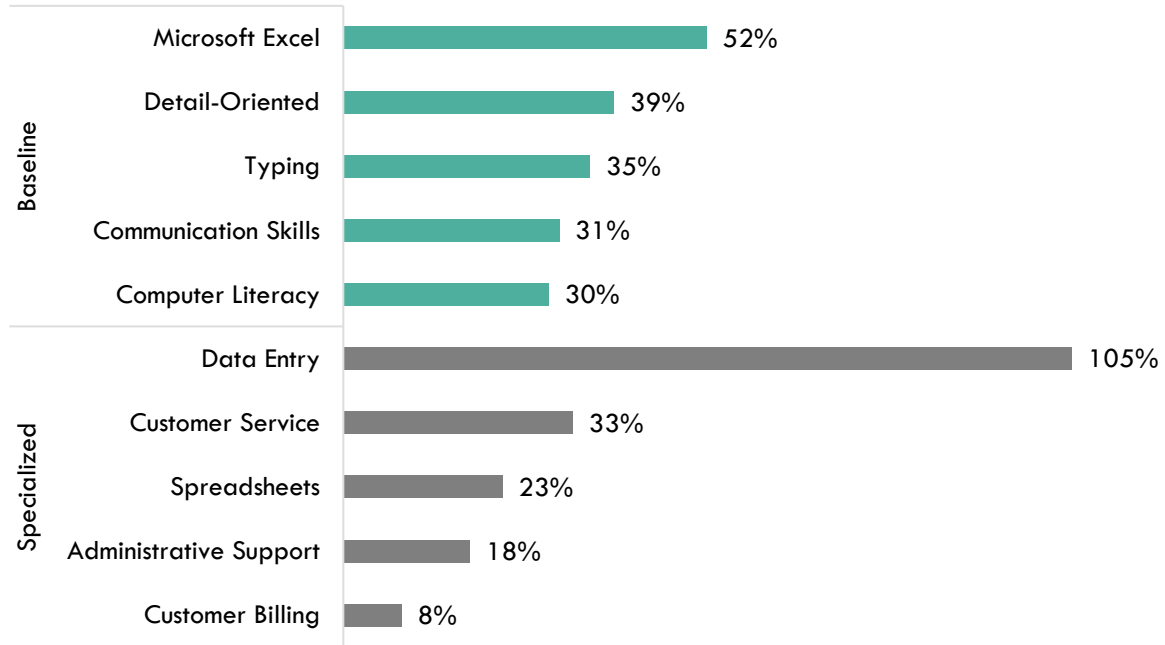
In-demand Data Entry Keyers software skills

Software	Percent
Microsoft Excel	52%
Microsoft Office	25%
Microsoft Word	17%
Word Processing	16%
Enterprise Resource Planning (ERP)	8%
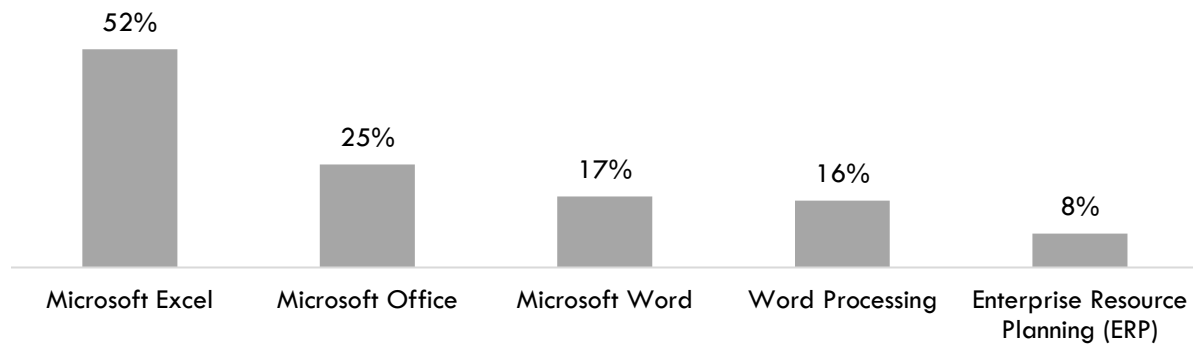
Exhibit 38. Top Data Entry Keyers certifications requested in job postings

Certification	Percent
Driver's License	41%
Certified Arborist	26%
Certified Coding Specialist	9%
Epic Certification	9%
Notary License	9%
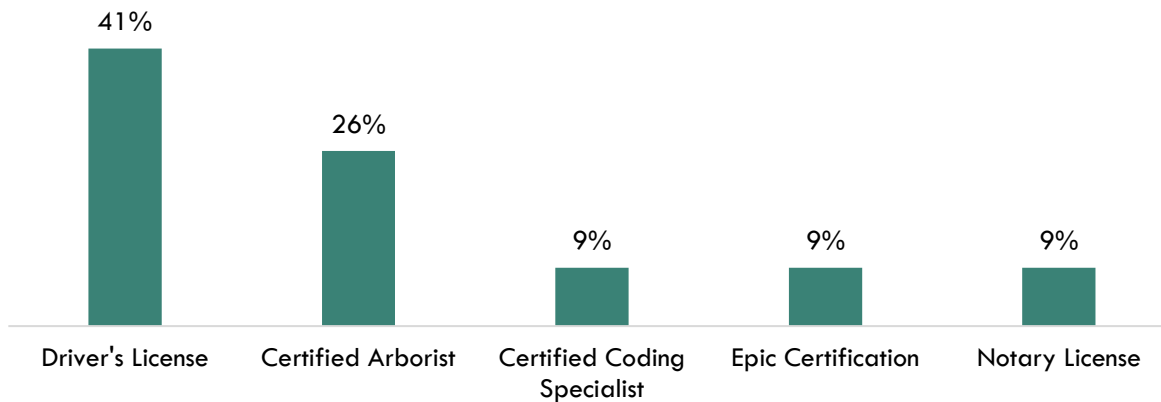
Database Administrators

In-demand Database Administrators baseline and specialized skills
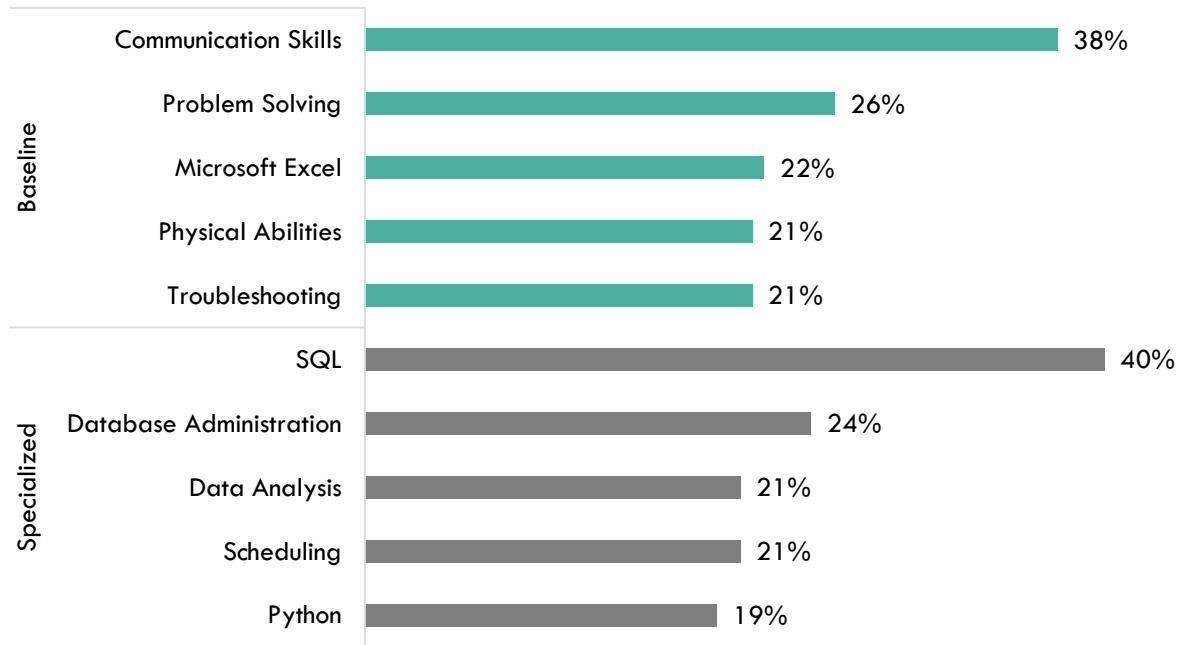
Baseline

Skill	Percentage
Communication Skills	38%
Problem Solving	26%
Microsoft Excel	22%
Physical Abilities	21%
Troubleshooting	21%

Specialized

Skill	Percentage
SQL	40%
Database Administration	24%
Data Analysis	21%
Scheduling	21%
Python	19%

In-demand Database Administrators software skills

Software	Percentage
SQL	40%
Microsoft Excel	22%
Python	19%
Microsoft Office	17%
Teradata DBA	17%

Top Database Administrators certifications requested in job postings

Certification	Percentage
Driver's License	42%
Security Clearance	25%
Cisco Certified Network Associate (CCNA)	15%
CompTIA Security+	15%
IT Infrastructure Library (ITIL) Certification	8%
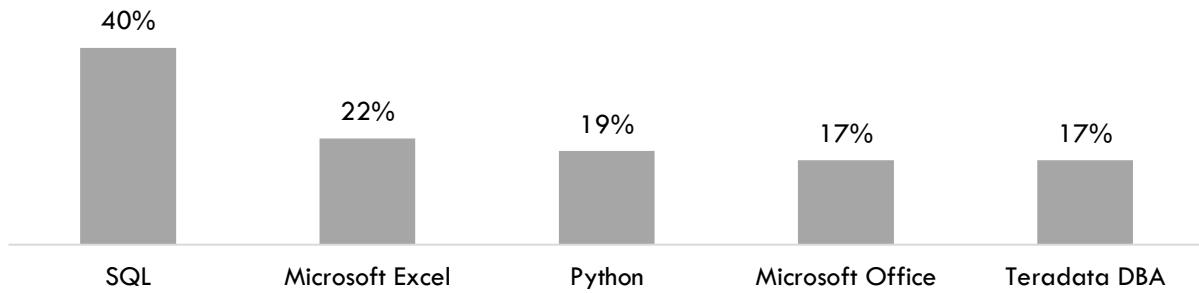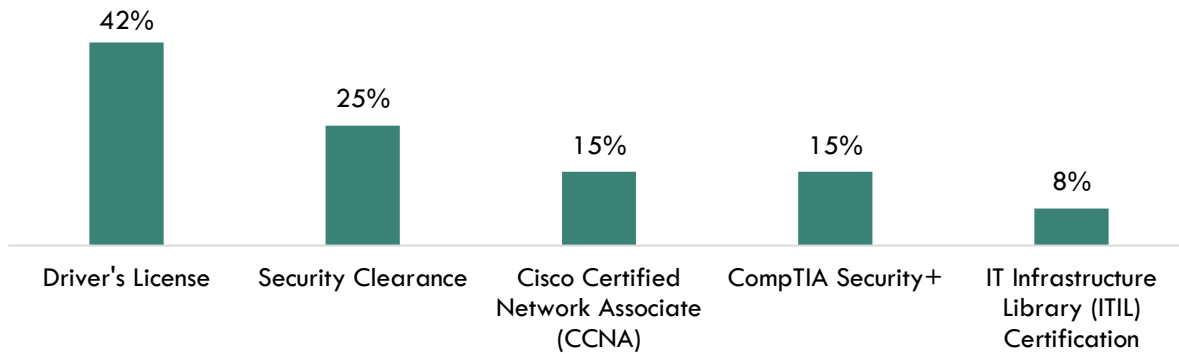
First-Line Supervisors of Office and Administrative Support Workers

In-demand First-Line Supervisors of Office and Administrative Support Workers baseline and specialized skills

Category	Skill	Percentage
Baseline	Communication Skills	43%
Baseline	Organizational Skills	28%
Baseline	Microsoft Excel	27%
Baseline	Microsoft Office	26%
Baseline	Detail-Oriented	24%
Specialized	Customer Service	36%
Specialized	Office Management	36%
Specialized	Scheduling	28%
Specialized	Staff Management	18%
Specialized	Budgeting	17%
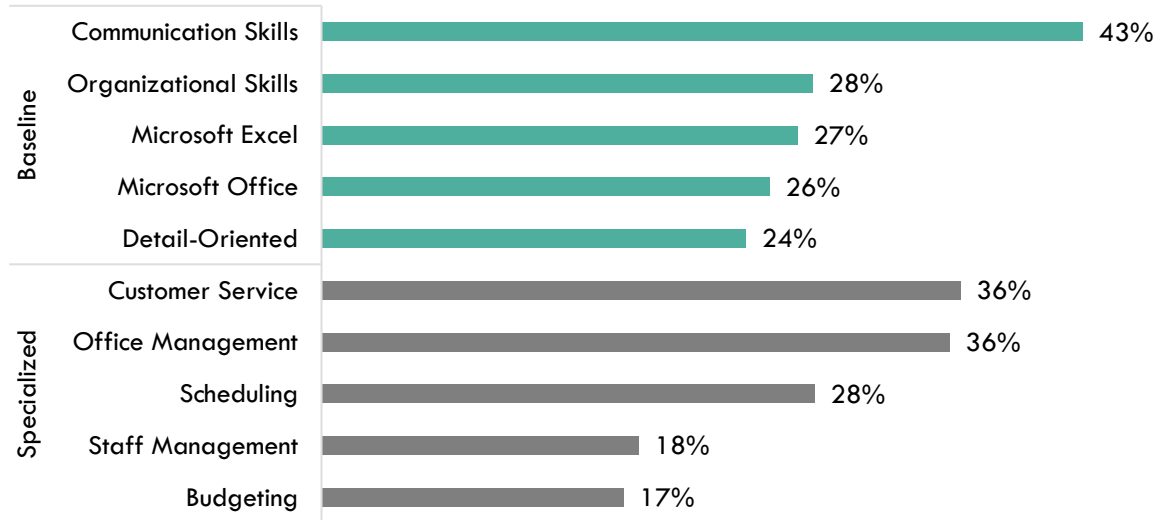
In-demand First-Line Supervisors of Office and Administrative Support Workers software skills

Software	Percentage
Microsoft Excel	27%
Microsoft Office	26%
Microsoft Word	13%
Microsoft Powerpoint	9%
Quickbooks	8%
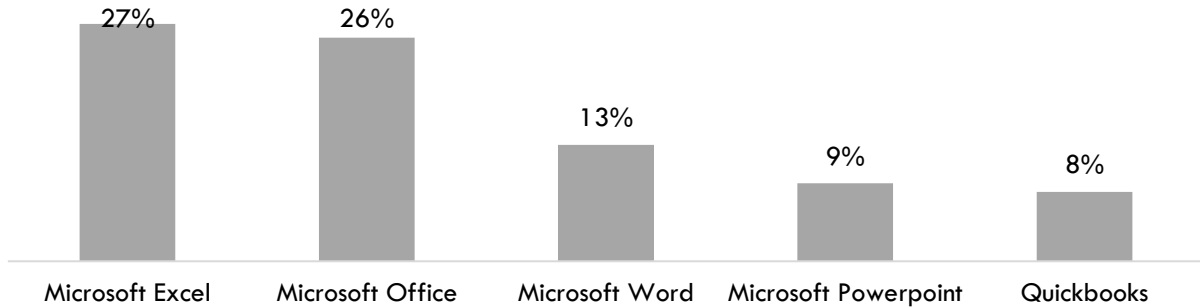
Top First-Line Supervisors of Office and Administrative Support Workers certifications requested in job postings

Certification	Percentage
Driver's License	53%
First Aid Cpr Aed	15%
Typing Certification	11%
Certified Payroll Professional (CPP)	5%
Certified Protection Professional (CPP)	4%
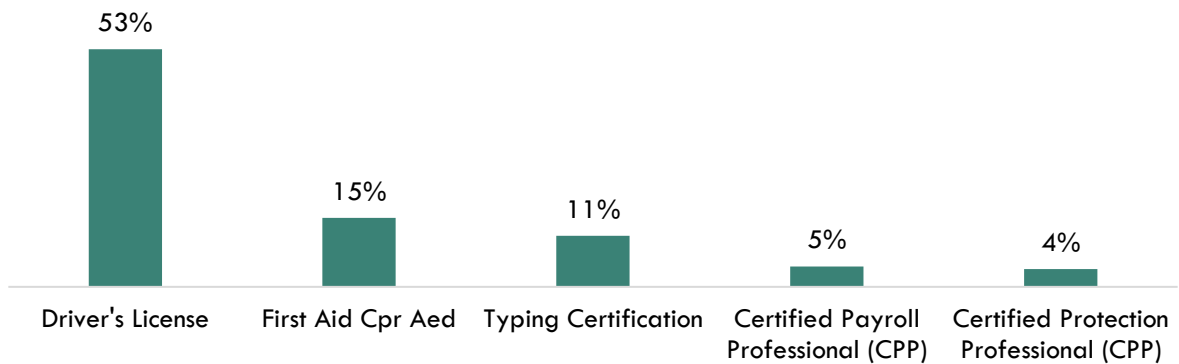
Graphic Designers

In-demand Graphic Designers baseline and specialized skills

Baseline	
Creativity	73%
Communication Skills	39%
Detail-Oriented	38%
Teamwork / Collaboration	33%
Time Management	25%

Specialized	
Graphic Design	93%
Adobe Photoshop	73%
Adobe Illustrator	66%
Adobe Indesign	60%
Adobe Acrobat	48%
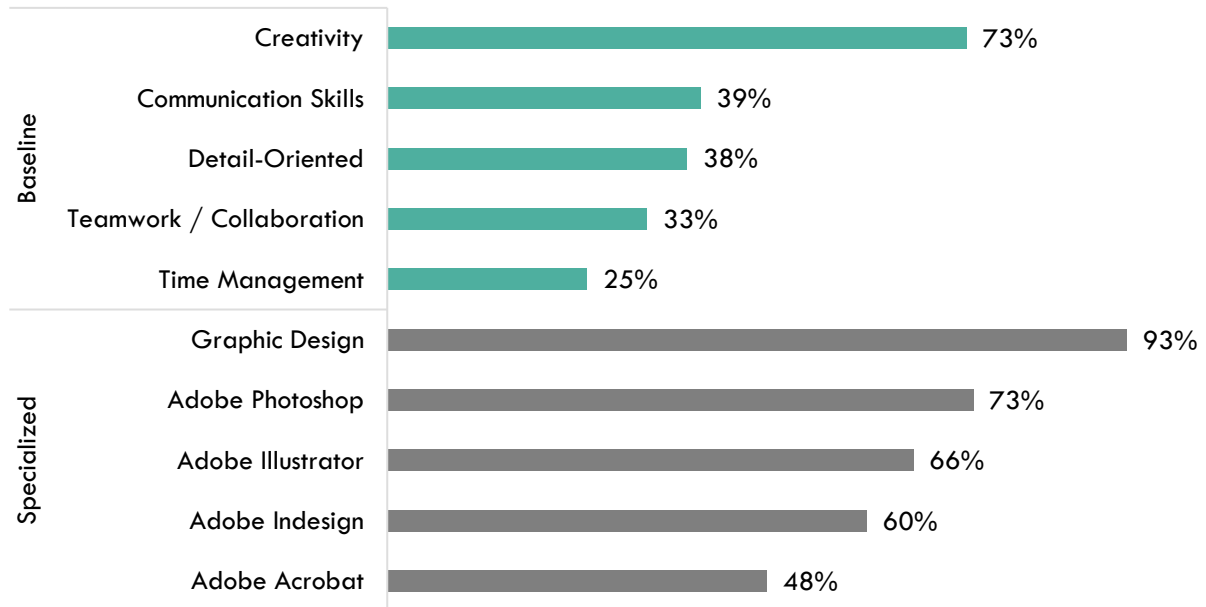
In-demand Graphic Designers software skills

Adobe Photoshop	Adobe Illustrator	Adobe Indesign	Adobe Acrobat	Adobe Creative Suite
73%	66%	60%	48%	46%
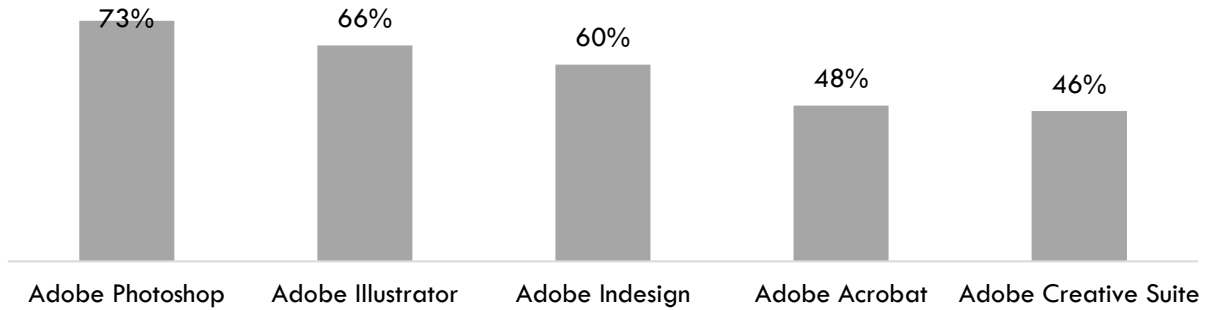
Top Graphic Designers' certifications requested in job postings

Driver's License	Contractors License	Adobe Illustrator Certification
75%	25%	8%
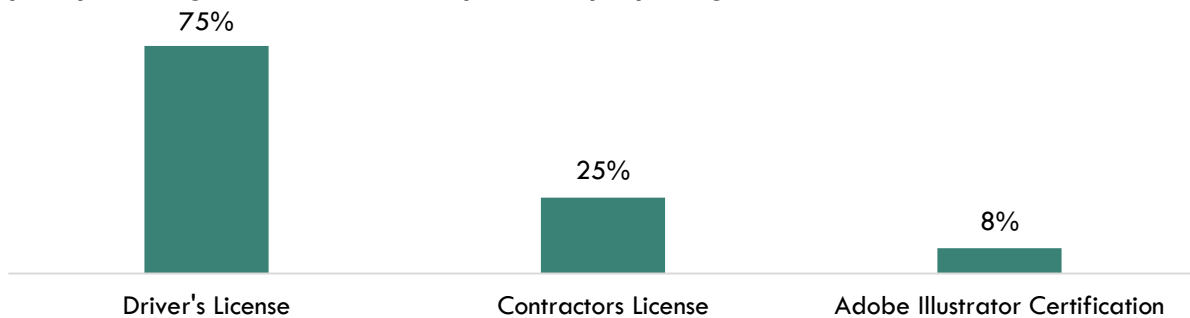
Information Security Analysts

In-demand Information Security Analysts baseline and specialized skills

Baseline	
Communication Skills	51%
Problem Solving	34%
Writing	30%
Planning	27%
Teamwork / Collaboration	26%

Specialized	
Information Security	41%
Information Systems	33%
Information Assurance	15%
Project Management	15%
Risk Management Framework	13%
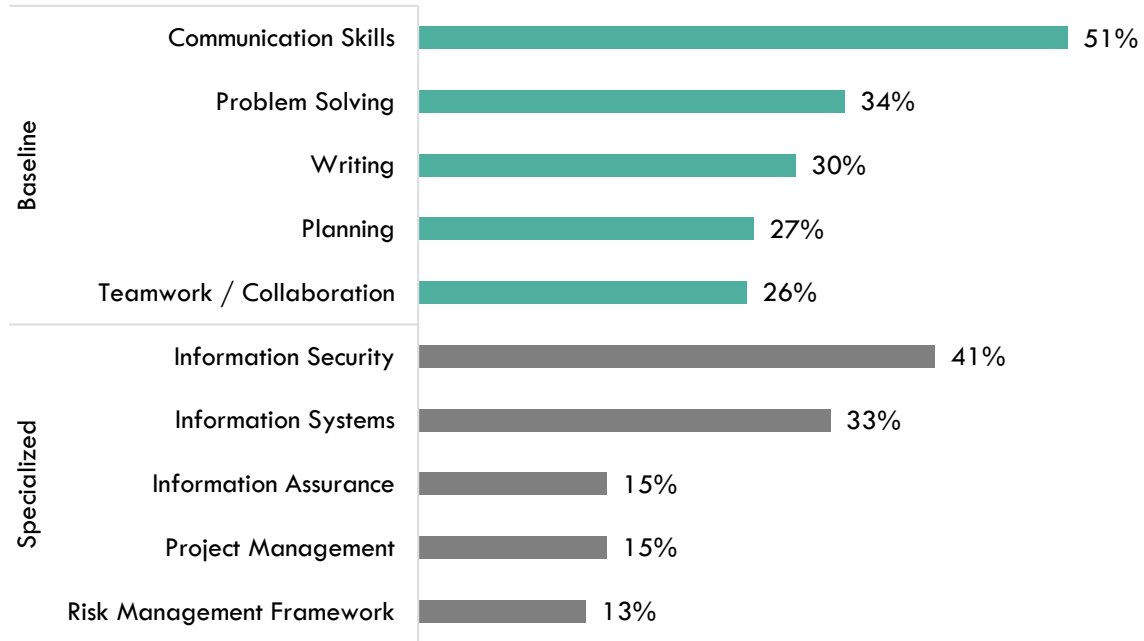
In-demand Information Security Analysts software skills

Microsoft Office	Microsoft Excel	Vulnerability assessment	SAP	Linux
20%	15%	13%	13%	12%
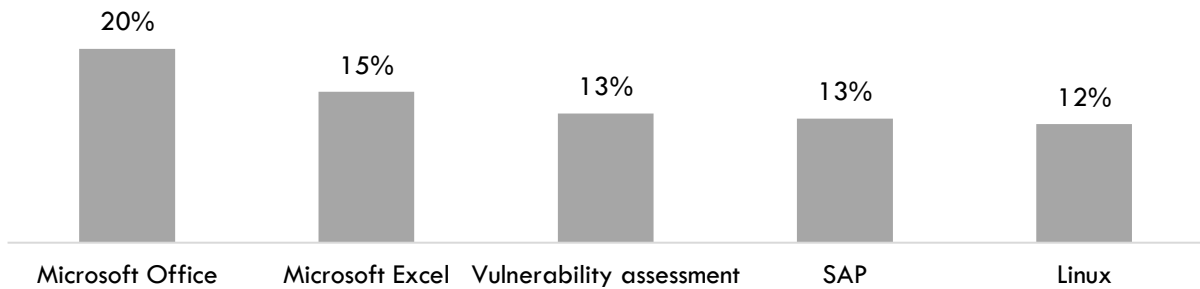
Top Information Security Analysts certifications requested in job postings

Certified Information Systems Security Professional (CISSP)	Security Clearance	Certified Information Security Manager (CISM)	CompTIA Security+	SANS/GIAC Certification
43%	38%	22%	22%	21%
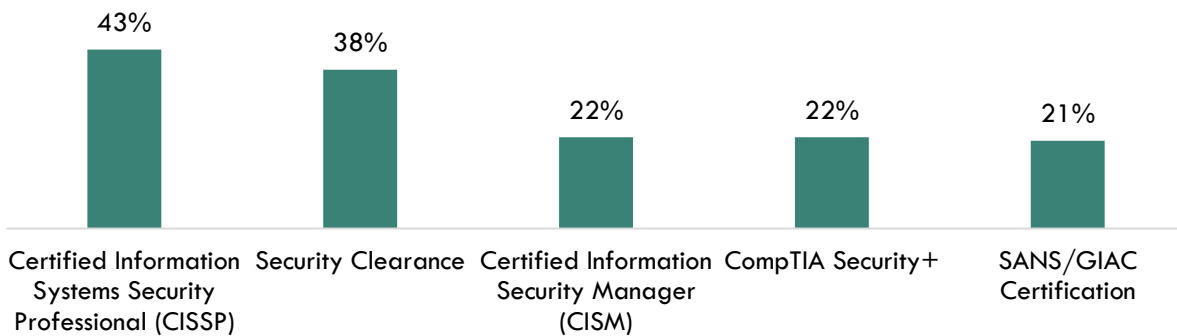
Market Research Analysts and Marketing Specialists

In-demand Market Research Analysts and Marketing Specialists baseline and specialized skills
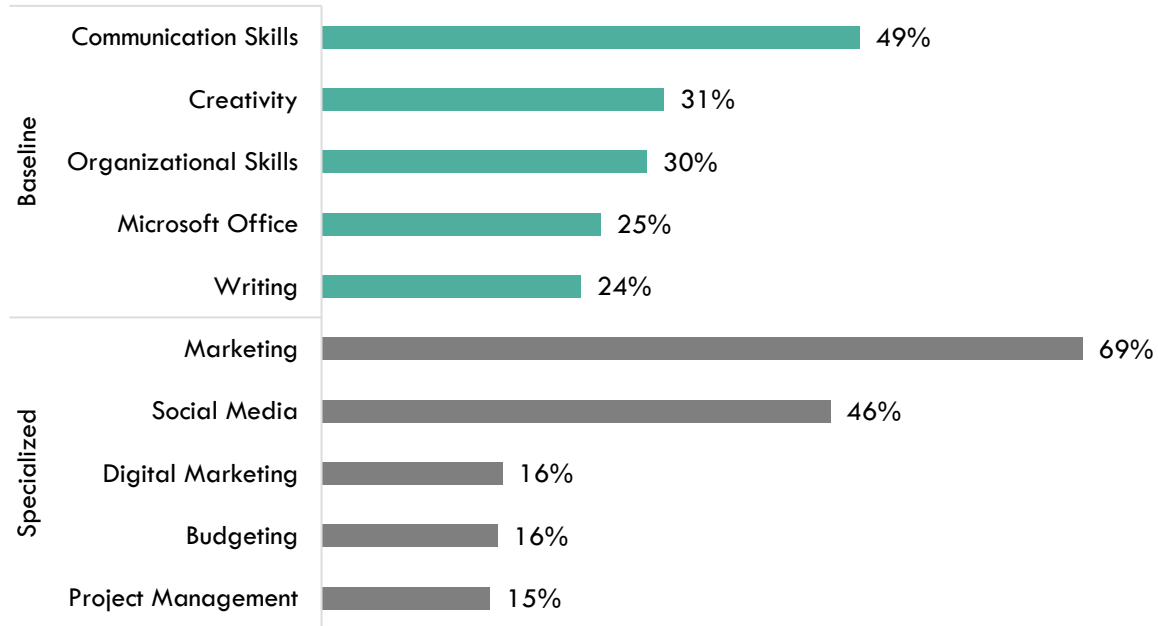
Baseline	
Communication Skills	49%
Creativity	31%
Organizational Skills	30%
Microsoft Office	25%
Writing	24%

Specialized	
Marketing	69%
Social Media	46%
Digital Marketing	16%
Budgeting	16%
Project Management	15%

In-demand Market Research Analysts and Marketing Specialists software skills

Microsoft Office	Microsoft Excel	Microsoft Powerpoint	Adobe Photoshop	Social Media Platforms
25%	23%	14%	14%	14%
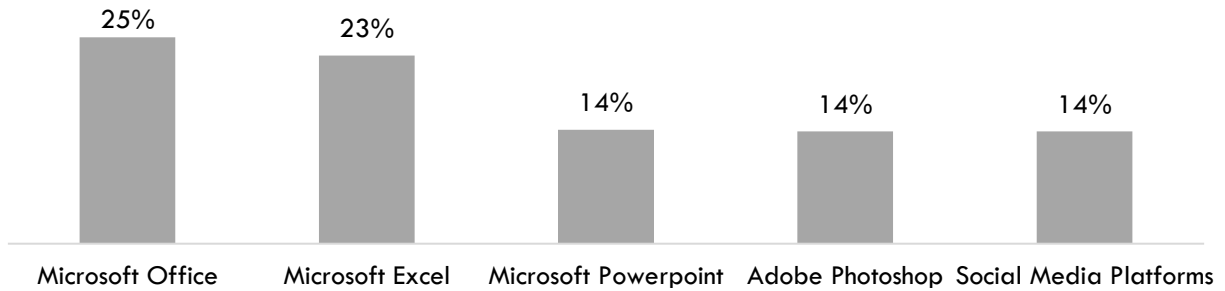
Top Market Research Analysts and Marketing Specialists certifications requested in job postings

Driver's License	Project Management Certification	Real Estate Certification	Google AdWords Training	Six Sigma Certification
71%	6%	6%	4%	4%
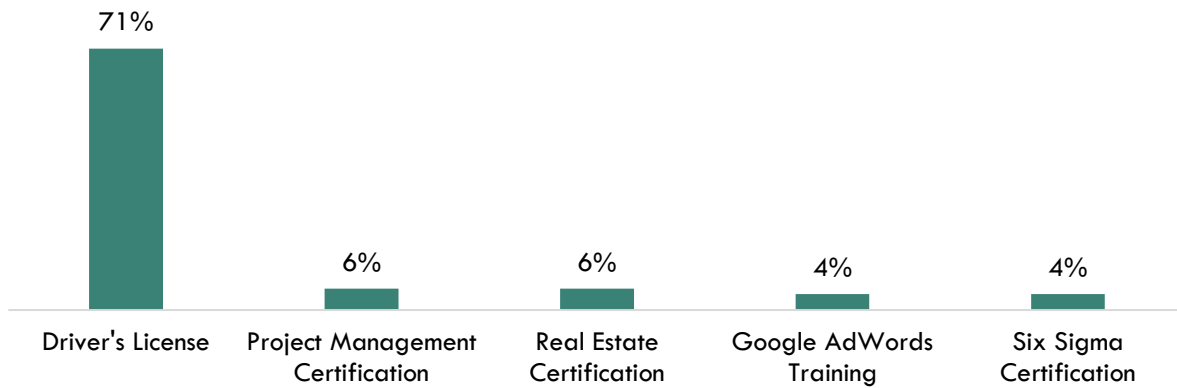
Network and Computer Systems Administrators

In-demand Network and Computer Systems Administrators baseline and specialized skills
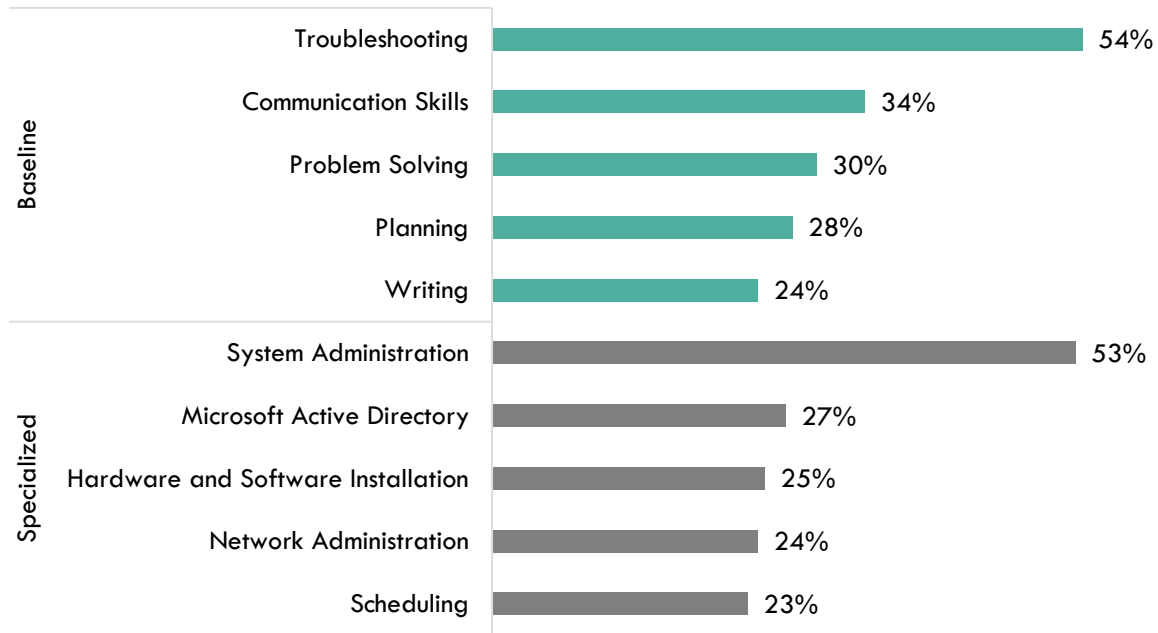
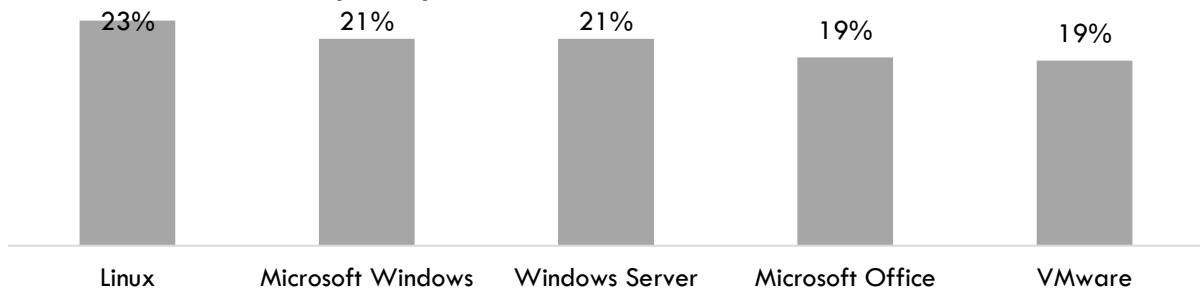| Category	Skill	Percentage
Baseline	Troubleshooting	54%
Baseline	Communication Skills	34%
Baseline	Problem Solving	30%
Baseline	Planning	28%
Baseline	Writing	24%
Specialized	System Administration	53%
Specialized	Microsoft Active Directory	27%
Specialized	Hardware and Software Installation	25%
Specialized	Network Administration	24%
Specialized	Scheduling	23%

In-demand Network and Computer Systems Administrators software skills

Linux	Microsoft Windows	Windows Server	Microsoft Office	VMware
23%	21%	21%	19%	19%

Top Network and Computer Systems Administrators certifications requested in job postings

CompTIA Security+	Security Clearance	Driver's License	Cisco Certified Network Associate (CCNA)	Microsoft Certified Solutions Associate (MCSA)
39%	37%	34%	28%	11%
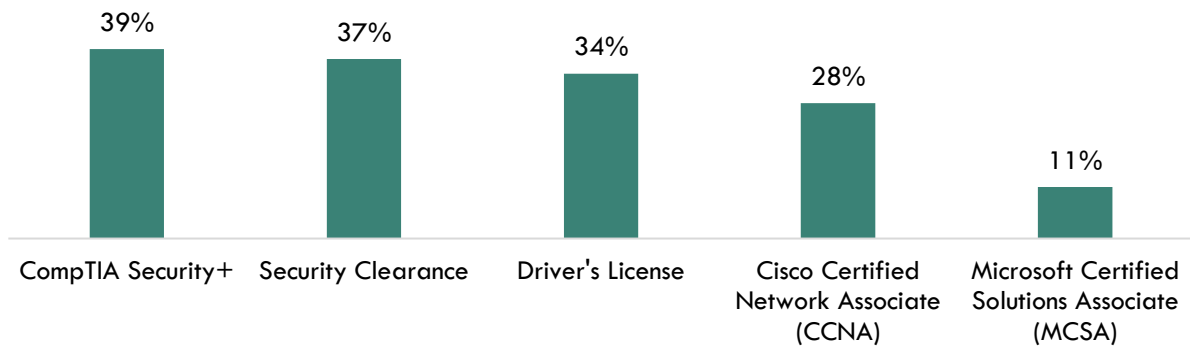
Software Developers, Applications

In-demand Software Developers, Applications baseline and specialized skills

Skill	Category	Percentage
Troubleshooting	Baseline	54%
Communication Skills	Baseline	34%
Problem Solving	Baseline	30%
Planning	Baseline	28%
Writing	Baseline	24%
System Administration	Specialized	53%
Microsoft Active Directory	Specialized	27%
Hardware and Software Installation	Specialized	25%
Network Administration	Specialized	24%
Scheduling	Specialized	23%
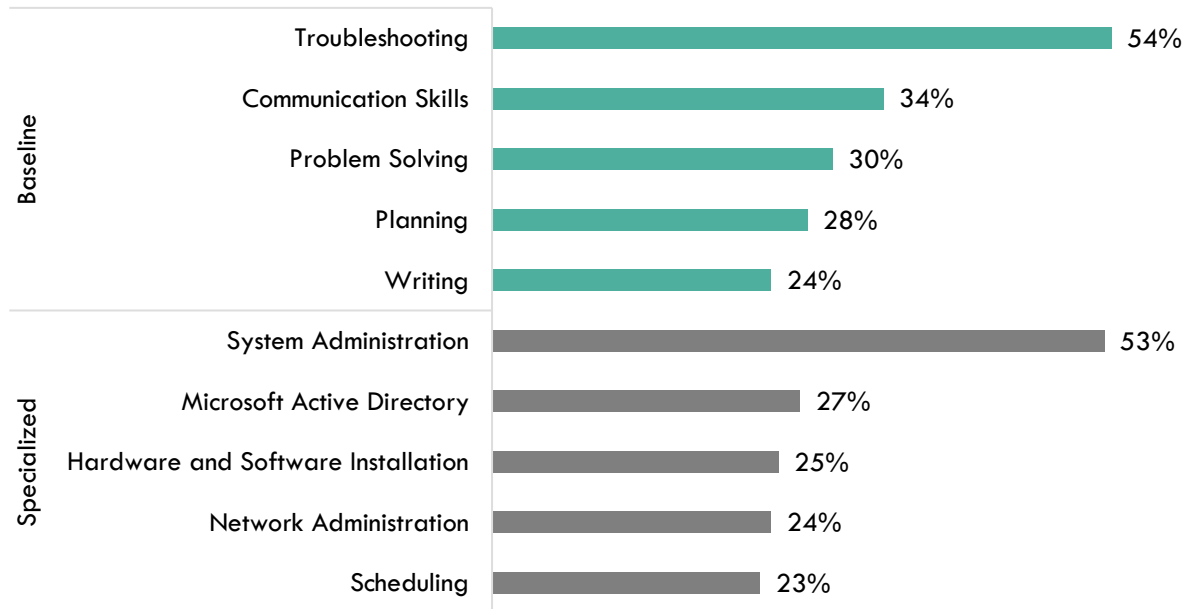
In-demand Software Developers, Applications software skills

Linux	Microsoft Windows	Windows Server	Microsoft Office	VMware
23%	21%	21%	19%	19%
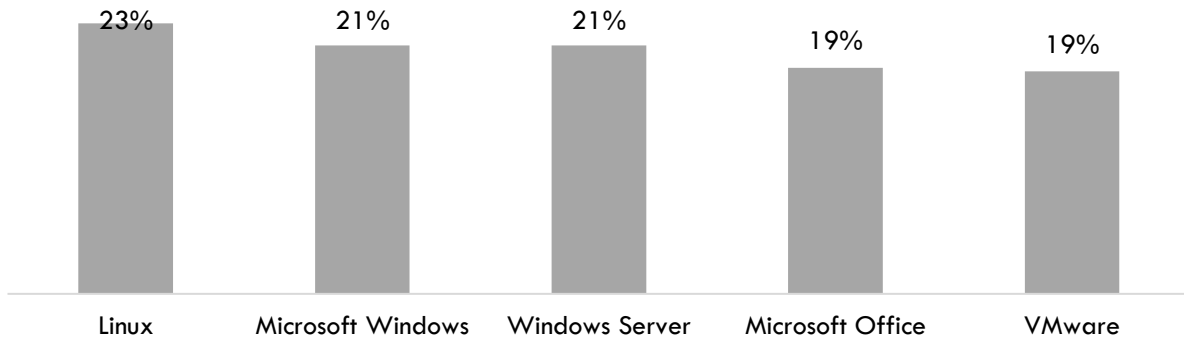
Top Software Developers, Applications certifications requested in job postings

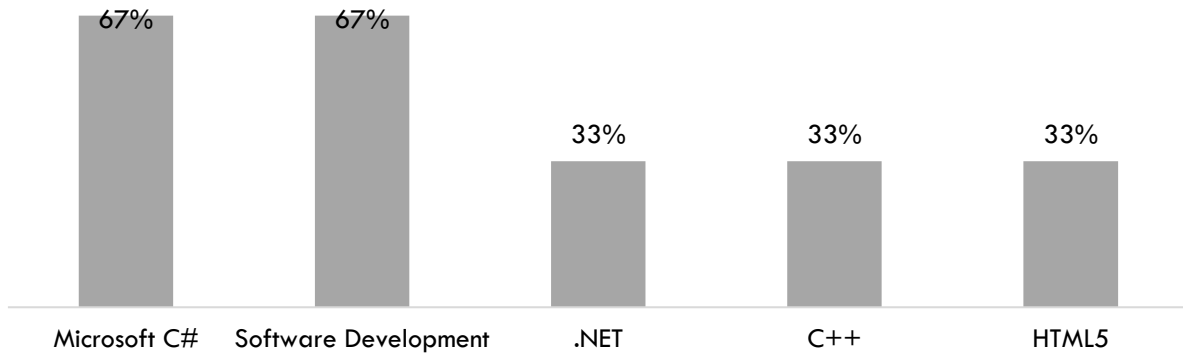| CompTIA Security+	Security Clearance	Driver's License	Cisco Certified Network Associate (CCNA)	Microsoft Certified Solutions Associate (MCSA)
39%	37%	34%	28%	11%
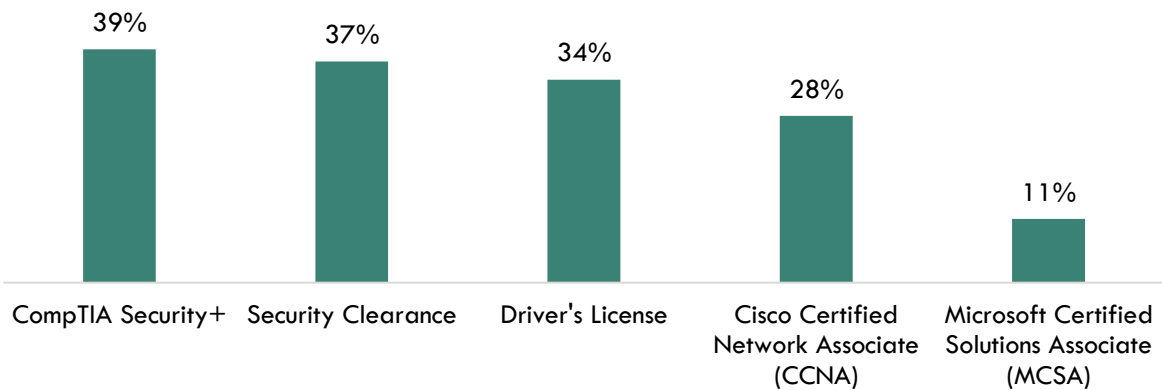
Software Developers, Systems Software

In-demand Software Developers, Systems Software baseline and specialized skills

Category	Skill	Percentage
Baseline	Creativity	33%
Baseline	Planning	33%
Baseline	Troubleshooting	33%
Specialized	Microsoft C#	67%
Specialized	Software Development	67%
Specialized	.NET	33%
Specialized	AC/DC Drives and Motors	33%
Specialized	Actuators	33%
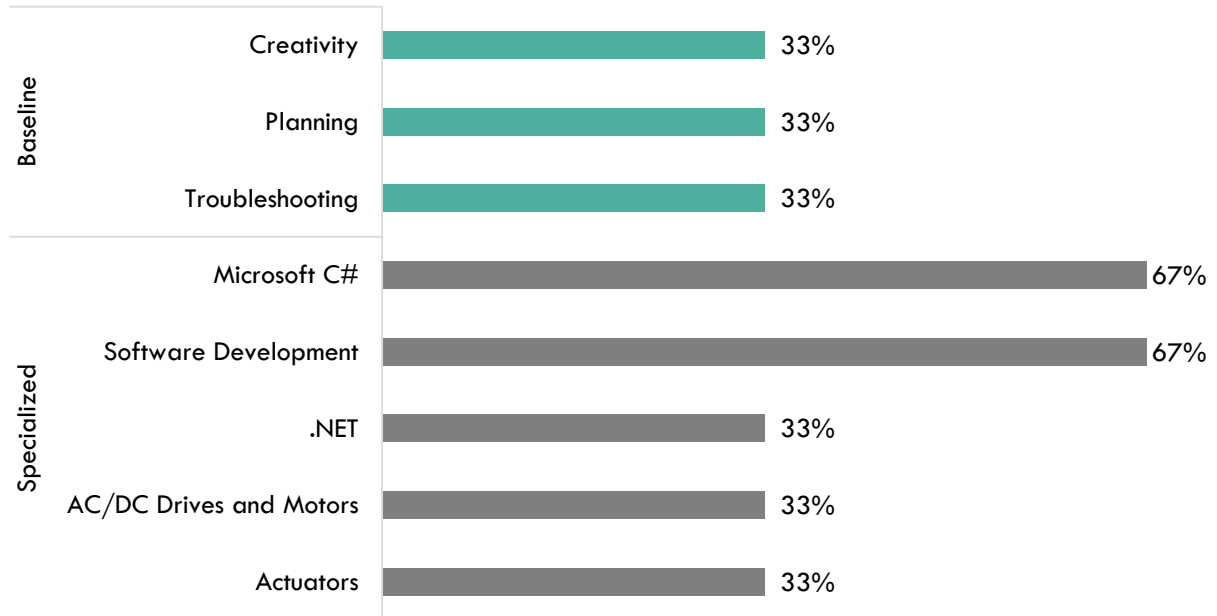
In-demand Software Developers, Systems Software skills

Skill	Percentage
Microsoft C#	67%
Software Development	67%
.NET	33%
C++	33%
HTML5	33%

Top Software Developers, Systems Software certifications requested in job postings

Certification	Percentage
Security Clearance	67%
American Board for Engineering and Technology (ABET) Accredited	33%
Driver's License	33%
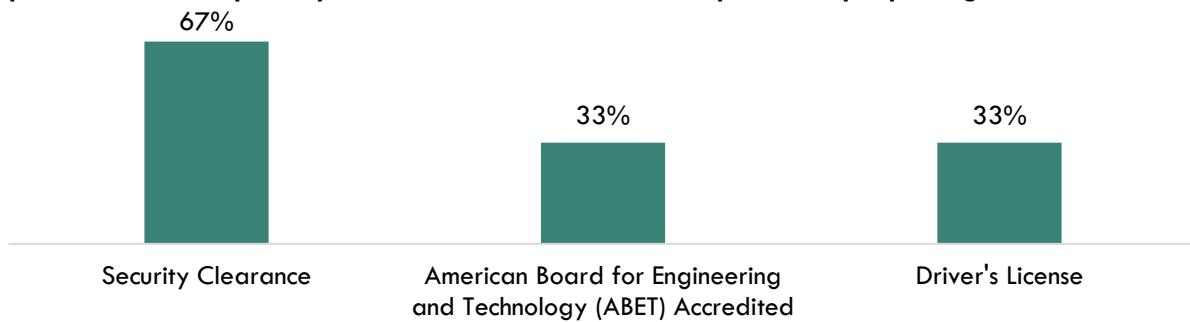
Web Developers

In-demand Web Developers baseline and specialized skills

Category	Skill	Percentage
Baseline	Communication Skills	53%
Baseline	Writing	43%
Baseline	Teamwork / Collaboration	35%
Baseline	Problem Solving	30%
Baseline	Creativity	24%
Specialized	Front-end Development	51%
Specialized	JavaScript	46%
Specialized	Web Development	45%
Specialized	Software Engineering	32%
Specialized	Ruby	29%
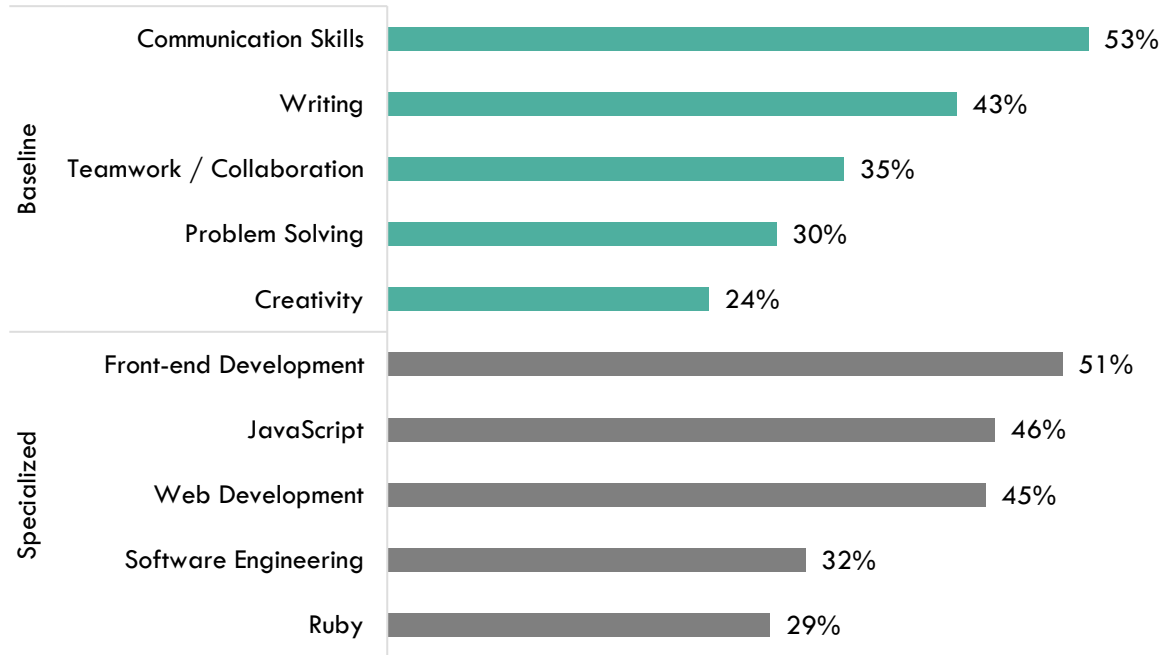
In-demand Web Developers software skills

Skill	Percentage
JavaScript	46%
Software Engineering	32%
Ruby	29%
Ruby on Rails	29%
AngularJS	26%
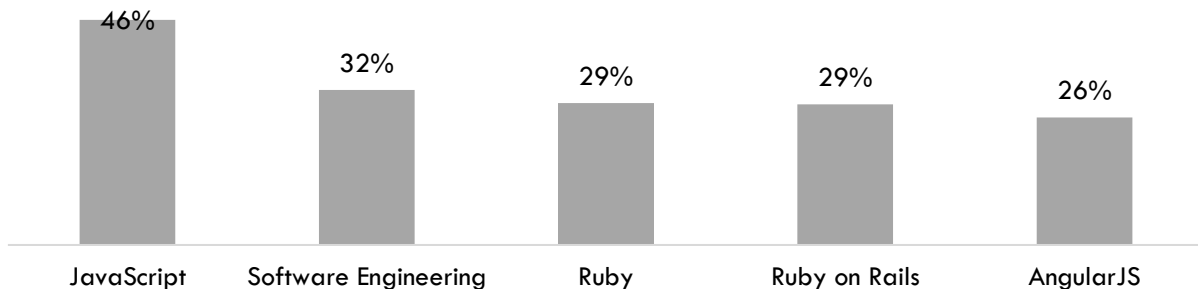
Top Web Developers certifications requested in job postings

Driver's License	33%
Security Clearance	33%
Cisco Certified Network Associate (CCNA)	11%
Civil Engineering Certificate	11%
CompTIA Linux+	11%
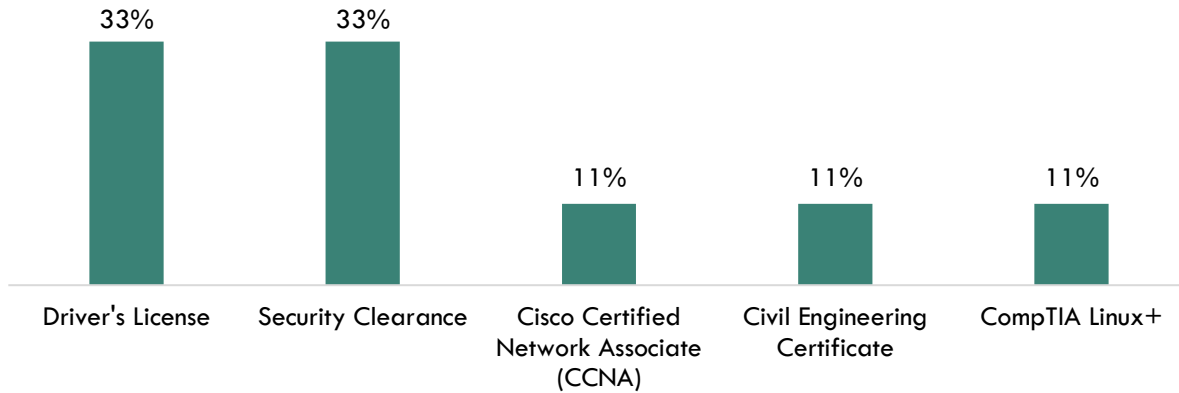
Word Processors and Typists

In-demand Word Processors and Typists' baseline and specialized skills

Baseline	
Typing	105%
Building Effective Relationships	30%
Communication Skills	30%
Bilingual	25%
Writing	19%

Specialized	
Clerical Duties	39%
Record Keeping	23%
Data Entry	22%
Scheduling	22%
Secretarial Skills	19%
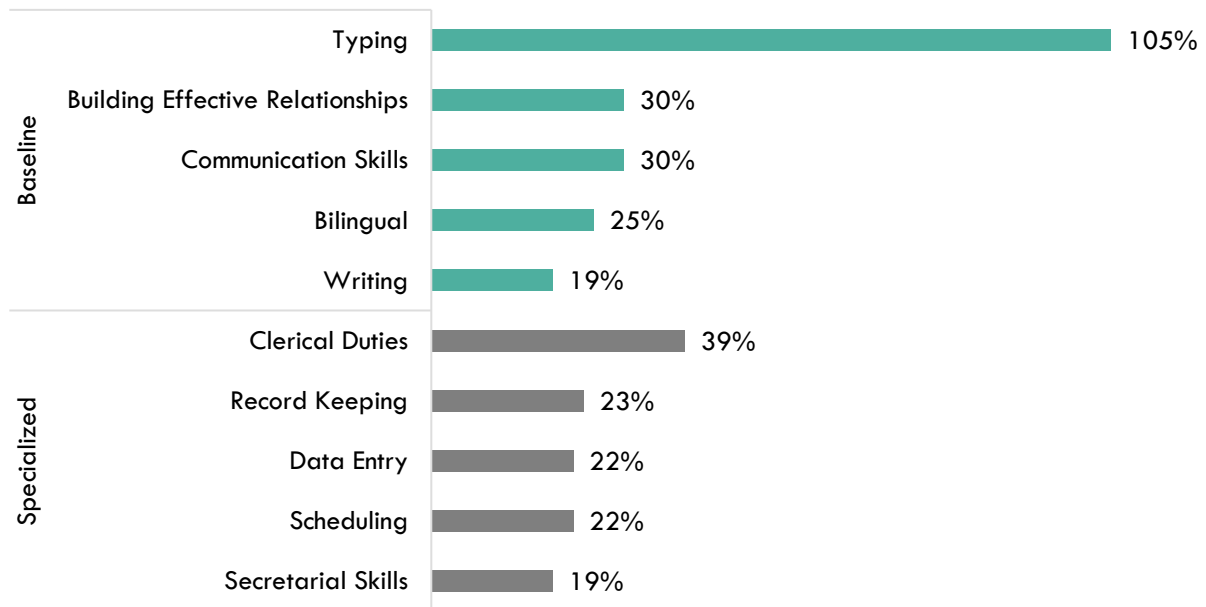
In-demand Word Processors and Typists software skills

Microsoft Office	14%
Word Processing	14%
Microsoft Excel	8%
Microsoft Word	8%
SAP	8%
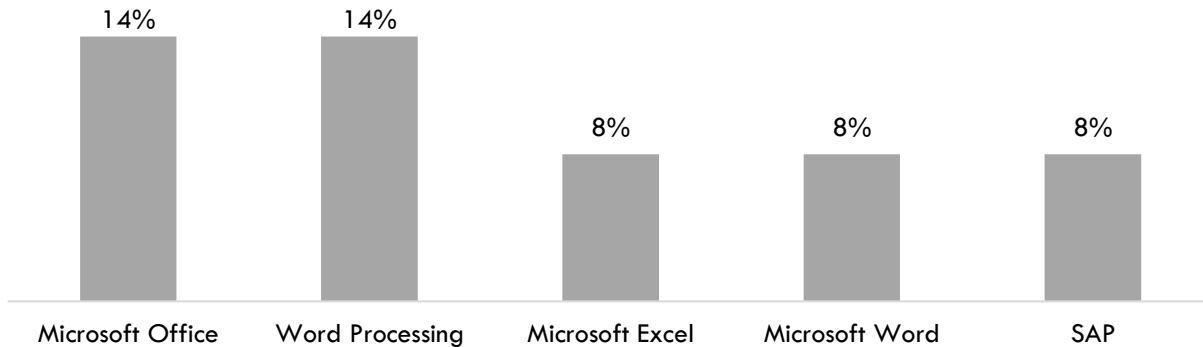
Top Word Processors and Typists certifications requested in job postings

Driver's License	Typing Certification	Certified Shorthand Reporter	Certified Court Reporter	First Aid Cpr Aed
64%	48%	21%	12%	9%
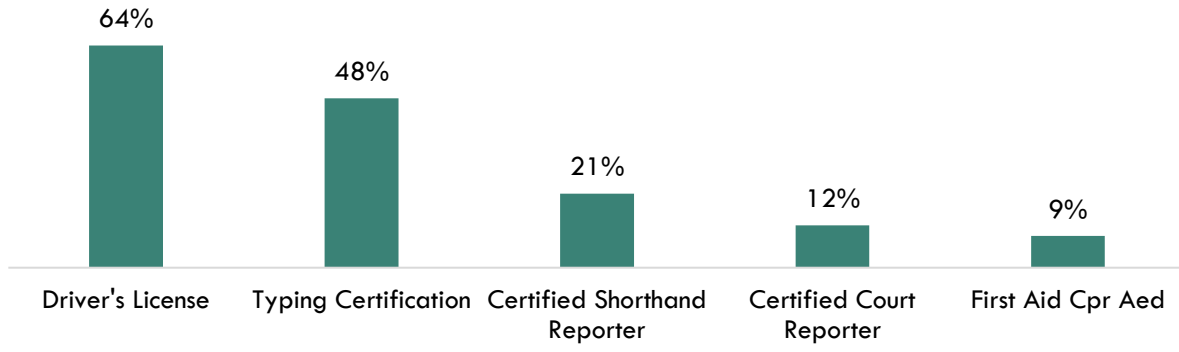
Appendix B: Methodology & Data Sources

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.