

Career Pathways and Skills Analysis



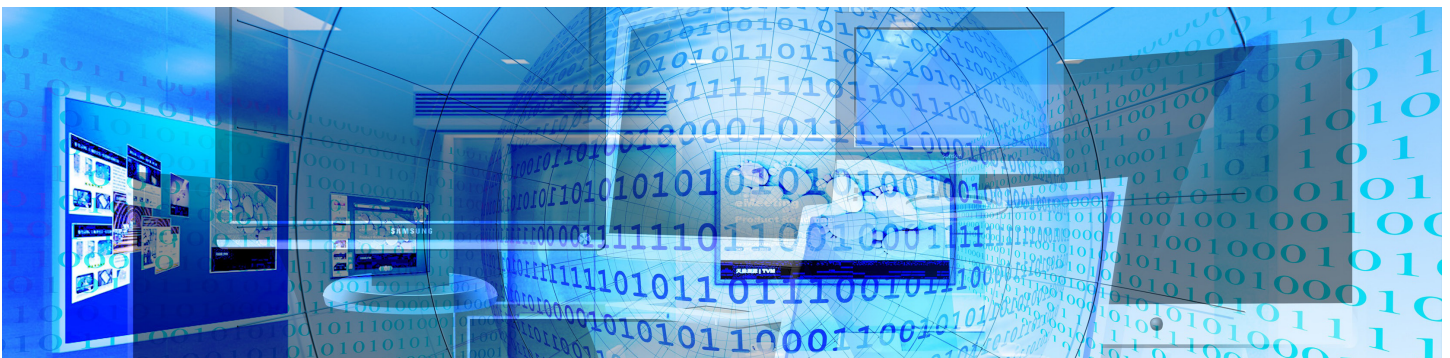
Computer Support

Authored by
CSforMA, Inc
Emsi | Burning Glass

Published
May, 2022

Contents

Introduction	3
Skill Analysis	3
Occupation Profiles	4
Occupation: Computer Support Specialist	5
Career Pathways	7
Methodology	7
Potential Career Paths	8
Computer Systems Engineer / Architect	10
Systems Analyst	13
Security Management Specialist	16
Webmaster / Administrator	19
Telecommunications Engineering Specialist	22
Network / Systems Support Specialist	25
Cyber / Information Security Engineer / Analyst	28
Network Engineer / Architect	31
Network / Systems Administrator	34
Computer Programmer	37
References	40



Introduction

This is the result of an effort to document existing opportunities for individuals to enter the computer science field in the state of Massachusetts. The source of analysis was based on both a thorough review of occupational profiles and an analysis of the skills needed to satisfy the requirements. The analysis resulted in five areas of job opportunity.

Computer Support is one of the five areas identified as viable roles that offer the greatest opportunities in computer science for those individuals with less than a 4-year degree. This report identifies the opportunities available in the computer science field as they pertain to Computer Support. The report identifies the skills and certifications necessary for each career opportunity identified, and maps the potential career pathways that can be realized, and any additional skills or training required for promotion.

Students interested in preparing for the Computer Support role, can learn and develop the requisite skills and can also earn relevant certifications. In the sections that follow, the report identifies the top skills and most relevant certifications. It also indicates the projected employment growth of the alternative career paths suitable for the role as well as estimated salary advancement over 2, 5 and more than 6 years in the role.

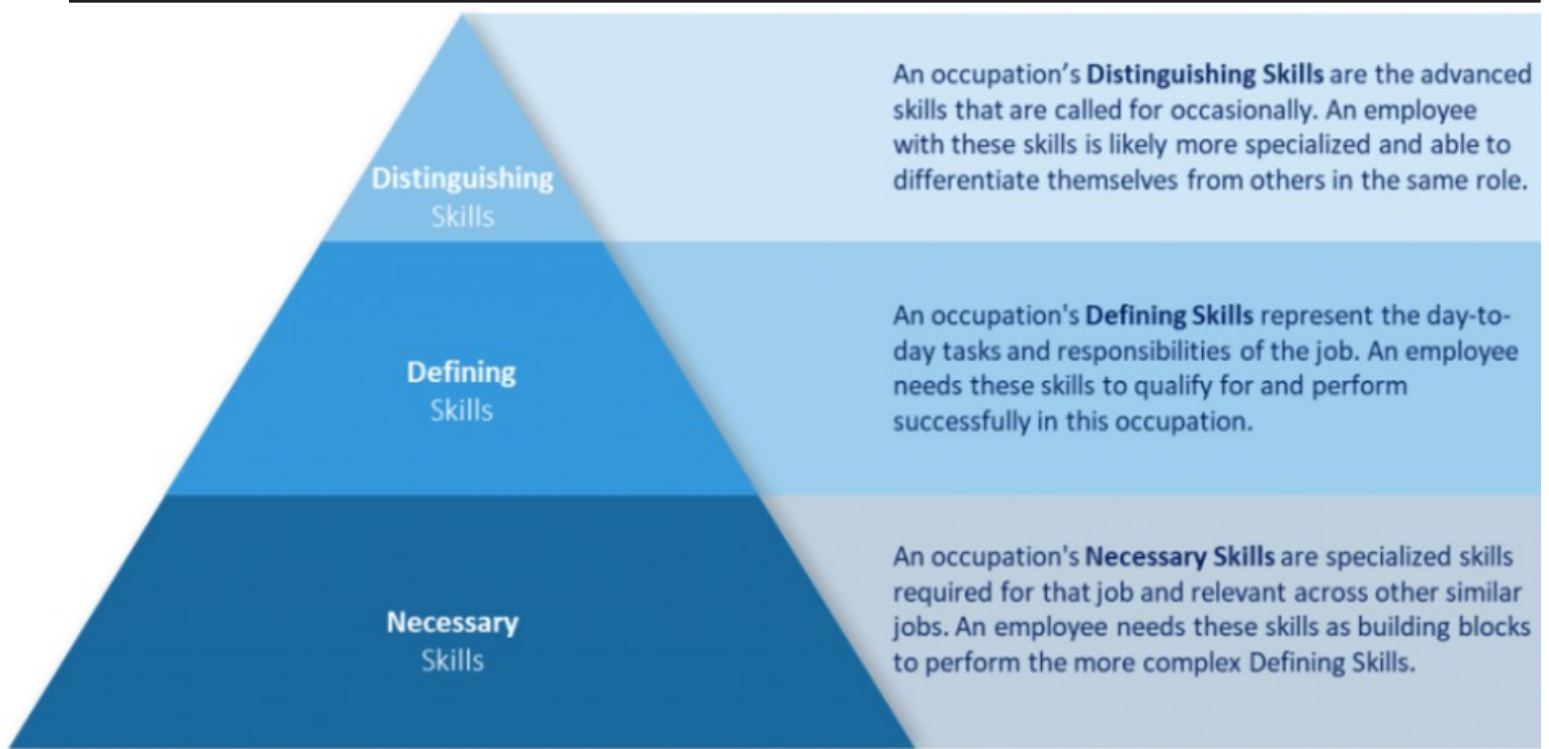
Job Opportunities in Computer Science for individuals with less than a 4-year degree

- Computer Support
- Cybersecurity
- Data Administration
- Networking and Systems
- Programming and Development

Skill Analysis

Skill analysis is done to show the extent of mastery or expertise needed to match the requirements of a job at three levels: necessary, defining, and distinguishing. Necessary skills are the set of technical abilities needed to do the particular job or something similar. Defining skills represent the sets of tasks that define and are particular to the job. Distinguishing skills are the areas of mastery or expertise that allow an individual to excel at a job. These are specialized skills called upon sporadically.





Occupation Profiles

The study of occupation profiles is designed to document the job opportunities for the Computer Support role. For each career path emerging from the computer support role, the report presents salary and career advancement estimates, job openings and projected growth. The report also presents top skills and certifications associated with the job.



Occupation Profile: Computer Support

Occupation: Computer Support Specialist

Occupation

Computer support specialists provide technical support, help and advice to computer users and organizations. They use computer software and equipment to assist them in providing advice and help. People in this role must exhibit excellent listening and communication skills. They need to ask users the right questions to identify the issue at hand, find a solution and sometimes guide them through the resolution to the issue. Depending on their level of skill and expertise, these individuals either support computer networks or they provide technical assistance directly to computer users.

Growth

Computer support specialist jobs are projected to have a 2.35% growth in employment. The entry level salary for this occupation is \$46,405 with a requirement of less than 2 years of experience. The mid career salary, that is jobs requiring 3 to 5 years of experience is \$55,232. The advanced career salary which requests six or more years of experience is \$67,082.

Skills

The skills shown in the table below represent the additional skills likely needed to move from the starting occupation to



2.35%
Projected Growth

*Estimated five-year
growth in employment*



\$46,405
Entry Level Salary

*Salary for jobs requiring less
than 2 years of experience*



\$55,232
Mid Career Salary

*Salary for jobs requesting 3 to 5
years of experience*



\$67,082
Advanced Career Salary

*Salary for jobs requesting 6+ years
of experience*



Occupation Profile: Computer Support

Occupation: Computer Support Specialist

the advancement occupation. Necessary skills are specialized skills required for this job and relevant across other similar jobs. Apart from Customer Contact, most necessary skills involve large technical content. Defining skills represent the day-to-day tasks and responsibilities of the job. They assume an increase level of communication and direct user support. Distinguishing skills set a worker apart and come with a salary premium. Note that in this role, the prospects for growth center around system administration and network support.

Certifications

This occupation commonly requests the following certifications. Certified A+ technician. This is a certification in entry-level PC technology with emphasis on the skills needed to perform computer service and troubleshooting. IT Infrastructure Library (ITIL) Certification. Entry-level certification for IT service management.

Certifications

- **Certified A+ Technician**
- **Driver's License**
- **IT Infrastructure Library (ITIL) Certification**

Necessary Skills		Defining Skills		Distinguishing Skills	
Skill Name	Percent of Postings Requesting Skill	Skill Name	Percent of Postings Requesting Skill	Skill Name	Percent of Postings Requesting Skill
Customer Contact	15%	Technical Support	60%	System Administration	6%
Hardware Troubleshooting	14%	Customer Service	41%	System/Network Configuration	5%
Microsoft Operating Systems	13%	Help Desk Support	32%	Hardware and Software Problem Diagnosis	4%
Troubleshooting Technical Issues	13%	Repair	24%	Break/Fix	4%
Information Systems	12%	Printers	21%	Network Support	4%
Computer Hardware/Software Knowledge	10%	It Support	20%	PC Support	4%

Career Pathways

Career advancement is generally seen as a transition that brings higher compensation and/or responsibility in a role that is similar to that previously held.

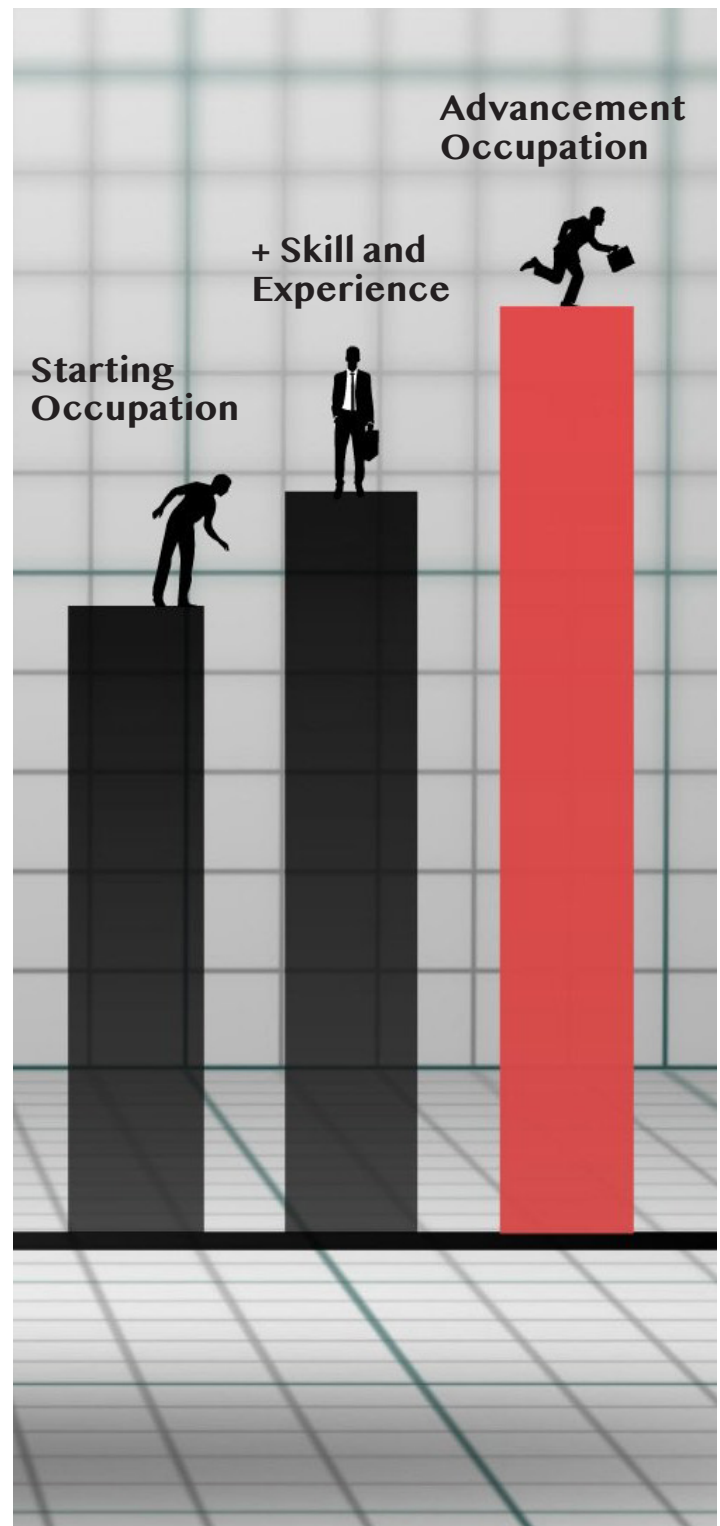
In order to understand likely career pathways for the computer support role, likely advancement occupations were examined. This was done following Emsi | Burning Glass' Career Pathways model as well as by examining actual transitions made by individuals through analysis of Emsi | Burning Glass's resume database.

Each set of origin and destination occupations comes with a predicted salary differential and skill gap between the two occupations.

Methodology

In this analysis, we use an index of similarity or 'similarity scores'. The similarity scores for each pair of occupations have a numeric value between 0 and 1. They can be seen as a proxy measure for the feasibility of transitioning between the two jobs. Job pairs that have a similarity score of 1 can be said to have a perfect fit (and are in fact the same occupation), while job pairs with a similarity score of 0 have the most imperfect fit with no overlapping skills.

Similarity scores only indicate skills overlap and skills gaps, and do not contemplate differentials in educational attainment.



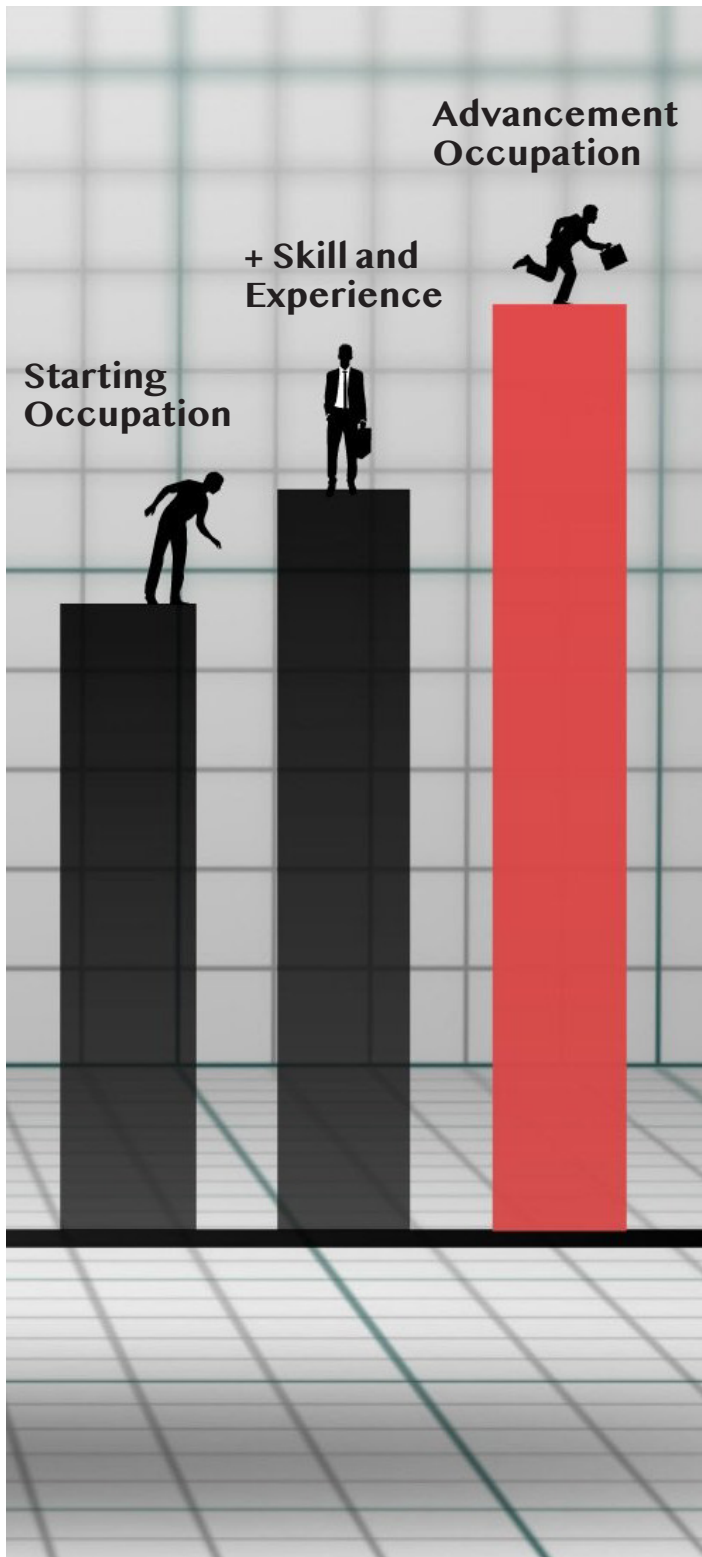
While some occupations always require specific degrees or licenses, many occupations may only prefer certain education levels (however strongly) and can offer greater possibility for direct promotion.

In the pages that follow, we provide for each Advancement Occupation, skill gaps, certifications, salary and workforce information. With this information, students, educators, and policymakers can see the paths a worker could take from the Starting Occupation to the Advancement Occupation.

Potential Career Paths

For the starting occupation of computer support specialist, we identify possible next step occupations. These occupations come with an increase in compensation and require additional skills and in some cases certifications. These skills may be learned on the job at the initial position held or can be learned in advance.





Detailed
Career Pathways:

Computer
Support
Specialist

Computer Support Specialist

Starting Occupation



Computer Systems Engineer / Architect

Advancement Occupation

Advancement Occupation

Computer Systems Engineers or Architects design and develop solutions to complex applications problems, system administration issues, or network concerns. They perform systems management and integration functions. These individuals develop software engineering, system integration, or distributed system architectures. They also collaborate with software developers to select appropriate design solutions and to ensure the compatibility of system components. These individuals are comfortable with paying attention to detail, using analytical skills and working in an atmosphere of innovation.

Growth

The similarity score between computer systems engineers or architects and the starting occupation is 0.432 and the average salary differential is \$58,576. While the projected 5-year employment growth for computer support specialist is 2.35%, computer systems engineer's projected 5-year growth is higher at 2.75%. Average salary for the advancement occupation is \$60,813 for individuals with up to 2 years of experience; \$83,001 for those with 3 to 5 years, and \$99,718 for individuals with 6 or more years. There were 3,259 postings for the advancement occupation.

0.432

Similarity Score

*Measure of relatedness
between occupations on a
scale of 0 to 1*



\$58,576

Average Salary Differential



2.35%

Projected 5-Year Growth

*Projected employment growth for
the Starting Occupation*



2.75%

Projected 5-Year Growth

*Projected employment growth for
the Advancement Occupation*



Computer Support Specialist

Starting Occupation



Computer Systems Engineer / Architect

Advancement Occupation

\$60,813

Average Salary: Advancement

Occupation with 0 - 2 years experience



\$83,001

Average Salary: Advancement

Occupation with 3 - 5 years experience



\$99,718

Average Salary: Advancement

Occupation with 6+ years experience



3,224

Starting Occupation Postings



3,259

Advancement Occupation Postings

Skills

The skills in the following table represent the additional skills likely needed to move from computer support specialist to computer systems engineer / architect. The skill taxonomy used in this analysis classifies skills for a given occupation as necessary, defining or distinguishing. Necessary skills are specialized skills required for this job and relevant across other similar jobs. The necessary skills for computer systems engineer / architect are software engineering and development, Python, SQL and Project Management. Defining skills represent the day-to-day tasks and responsibilities of the job. For this occupation the defining skills include systems engineering, knowledge of Linux, Java DevOps and system architecture. Distinguishing skills set a worker apart and come with a salary or growth premium. For this occupation, the distinguishing skills are knowledge of UNIX, Windows server, Continuous Integration (CI), Firmware and hardware and software configuration.

Certifications

The computer support specialist occupation commonly requests the following certifications. Certified A+ technician. This is a certification in entry-level PC technology with emphasis on the skills needed to perform computer service and troubleshooting. IT Infrastructure Library



Computer Support Specialist

Starting Occupation



Computer Systems Engineer / Architect

Advancement Occupation

Necessary Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Python	19%
Software Development	17%
SQL	14%
Project Management	11%
Software Engineering	11%

Defining Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Systems Engineering	46%
Linux	20%
Java	17%
DevOps	12%
System Architecture	12%

Distinguishing Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
UNIX	8%
Windows Server	6%
Continuous Integration (CI)	5%
Firmware	4%
Hardware and Software Configuration	4%

(ITIL) Certification. This is an entry-level certification for IT service management.

The computer systems engineer or architect occupation commonly requests security clearance, and among others, the following top certifications: CompTIA Security+, a globally trusted, vendor-neutral certification that validates the baseline skills necessary to perform core security functions and pursue an IT security career; and Certified Information Systems Security Professional (CISSP), a certification designed to validate information security work experience and a working knowledge of security principles and practices. CISSP is utilized to demonstrate that a security professional is able to design, engineer, implement, and run an information security program.

Certifications

The source occupation commonly requests the following certifications:

- Certified A+ Technician
- Driver's License
- IT Infrastructure Library (ITIL) Certification

The Advancement occupation commonly requests the following certifications:

- Security Clearance
- CompTIA Security+
- Certified Information Systems Security Professional (CISSP)

Computer Support Specialist

Starting Occupation



Systems Analyst

Advancement Occupation

Advancement Occupation

Systems analysts implement, maintain, and support IT and information systems to meet the business needs of organizations. They analyze and create tests, and develop specifications for developers and programmers to follow. One of the most important duties of systems analysts is collecting and analyzing the requirements for a new system. These individuals are normally responsible for generating documentation of various types, helping in software selection, and monitoring systems once they're in place. Central to their job is the ability to use analytical skills, project management techniques, communication skills and creativity.

Growth

The similarity score between systems analysts and the starting occupation is 0.468 and the average salary differential is \$34,431. While the projected 5-year employment growth for computer support specialist is 2.35%, systems analyst's projected 5-year growth is considerably lower at 0.79%. Average salary for the systems analyst occupation is \$46,405 for individuals with up to 2 years of experience; \$55,232 for those with 3 to 5 years, and \$67,082 for individuals with 6 or more years. There were 2,694 postings for the advancement occupation.

0.468

Similarity Score

Measure of relatedness between occupations on a scale of 0 to 1



\$34,431

Average Salary Differential



2.35%

Projected 5-Year Growth

Projected employment growth for the Starting Occupation



0.79%

Projected 5-Year Growth

Projected employment growth for the Advancement Occupation



Computer Support Specialist

Starting Occupation



Systems Analyst

Advancement Occupation

\$46,405

Average Salary: Advancement

Occupation with 0 - 2 years experience



\$55,232

Average Salary: Advancement

Occupation with 3 - 5 years experience



\$67,082

Average Salary: Advancement

Occupation with 6+ years experience



3,224

Starting Occupation Postings



2,694

Advancement Occupation Postings

Skills

The skills in the following table represent the additional skills likely needed to move from computer support specialist to systems analyst. The skill taxonomy used in this analysis classifies skills for a given occupation as necessary, defining or distinguishing. Necessary skills are specialized skills required for this job and relevant across other similar jobs. The necessary skills for systems analyst are knowledge of Oracle, software development, informations systems, customer service and technical support. Defining skills represent the day-to-day tasks and responsibilities of the job. For this occupation the defining skills include knowledge of systems analysis, business processes, SQL, project management, and business analysis. Distinguishing skills set a worker apart and come with a salary or growth premium. For this occupation, the distinguishing skills are user acceptance testing (UAT), systems development, hardware and software configuration, systems integration and data mapping.

Certifications

The computer support specialist occupation commonly requests the following certifications. Certified A+ technician. This is a certification in entry-level PC



Computer Support Specialist

Starting Occupation



Systems Analyst

Advancement Occupation

Necessary Skills		Defining Skills		Distinguishing Skills	
Skill Gap	Skill Recall Percentage in Advancement Occupation	Skill Gap	Skill Recall Percentage in Advancement Occupation	Skill Gap	Skill Recall Percentage in Advancement Occupation
Oracle	14%	Systems Analysis	25%	User Acceptance Testing (UAT)	5%
Software Development	14%	Business Process	24%	Systems Development	5%
Information Systems	13%	SQL	24%	Hardware and Software Configuration	4%
Customer Service	12%	Project Management	23%	Systems Integration	4%
Technical Support	10%	Business Analysis	21%	Data Mapping	3%

technology with emphasis on the skills needed to perform computer service and troubleshooting. IT Infrastructure Library (ITIL) Certification. This is an entry-level certification for IT service management.

The systems analyst occupation commonly requests security clearance, and among others, the following certifications: Project management certification. The Certified Associate in Project Management (CAPM) from the Project Management Institute (PMI) and Project+ from CompTIA are the best-known entry-level project management certifications. The second top certification is the IT Infrastructure Library (ITIL) Certification.

Certifications

The source occupation commonly requests the following certifications:

- Certified A+ Technician
- Driver's License
- IT Infrastructure Library (ITIL) Certification

The Advancement occupation commonly requests the following certifications:

- Security Clearance
- Project Management Certification
- IT Infrastructure Library (ITIL) Certification

Computer Support Specialist

Starting Occupation



Security Management Specialist

Advancement Occupation

Advancement Occupation

Security Management Specialists conduct security assessments for organizations, and design security systems and processes. These individuals may specialize in areas such as physical security, personnel security, and information security. They also prepare, maintain, or update security procedures, security system drawings, or related documentation. These individuals recommend improvements in security systems or procedures. They assess the nature and level of threats so that the scope of the problem can be determined. They are comfortable with work activities that include hands-on problems and solutions. They like searching for facts and figuring out problems mentally.

Growth

The similarity score between security management specialists and the starting occupation is 0.447 and the average salary differential is \$19,011. While the projected 5-year employment growth for computer support specialist is 2.35%, security management specialist's projected 5-year growth is considerably higher at 4.16%. Average salary for the security management specialist occupation is \$46,405 for individuals with up to 2 years of experience; \$55,232 for those with 3 to 5

0.447

Similarity Score

Measure of relatedness between occupations on a scale of 0 to 1



\$19,011

Average Salary Differential



2.35%

Projected 5-Year Growth

Projected employment growth for the Starting Occupation



4.16%

Projected 5-Year Growth

Projected employment growth for the Advancement Occupation



Computer Support Specialist

Starting Occupation



Security Management Specialist

Advancement Occupation

\$46,405

Average Salary: Advancement

Occupation with 0 - 2 years experience



\$55,232

Average Salary: Advancement

Occupation with 3 - 5 years experience



\$67,082

Average Salary: Advancement

Occupation with 6+ years experience



3,224

Starting Occupation Postings



119

Advancement Occupation Postings

years, and \$67,082 for individuals with 6 or more years. There were 119 postings for the advancement occupation.

Skills

The skills in the following table represent the additional skills likely needed to move from computer support specialist to security management specialist. The skill taxonomy used in this analysis classifies skills for a given occupation as necessary, defining or distinguishing. Necessary skills are specialized skills required for this job and relevant across other similar jobs. The necessary skills for security management specialist are knowledge of customer service, public health and safety, and personnel management. Defining skills represent the day-to-day tasks and responsibilities of the job. For this occupation the defining skills include knowledge of surveillance, asset protection, information security prevention of criminal activity, and case management. Distinguishing skills set a worker apart and come with a salary or growth premium. For this occupation, the distinguishing skills are knowledge of national industrial security program operating manual, SAP security, threat analysis, and intrusion detection.

Certifications

The computer support specialist occu-



Computer Support Specialist

Starting Occupation



Security Management Specialist

Advancement Occupation

Necessary Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Customer Service	13%
Public Health and Safety	5%
Personnel Management	5%

Defining Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Surveillance	19%
Asset Protection	18%
Information Security	17%
Prevention of Criminal Activity	15%
Case Management	15%

Distinguishing Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
National Industrial Security Program Operating Manual	4%
SAP Security	4%
Threat Analysis	4%
Intrusion detection	4%

pation commonly requests the following certifications. Certified A+ technician. This is a certification in entry-level PC technology with emphasis on the skills needed to perform computer service and troubleshooting. IT Infrastructure Library (ITIL) Certification. This is an entry-level certification for IT service management.

The security management specialist occupation commonly requests security clearance, and among others, the following certifications: Certified Information Systems Security Professional (CISSP), a certification designed to validate information security work experience and a working knowledge of security principles and practices. CISSP is utilized to demonstrate that a security professional is able to design, engineer, implement, and run an information security program. The second top certification is Certified Information Systems Auditor (CISA). This is the standard of achievement from ISACA for those who audit and assess an organization's information technology.

Certifications

The source occupation commonly requests the following certifications:

- Certified A+ Technician
- Driver's License
- IT Infrastructure Library (ITIL) Certification

The Advancement occupation commonly requests the following certifications:

- Security Clearance
- Certified Information Systems Security Professional (CISSP)
- Certified Information Systems Auditor (CISA)

Computer Support Specialist

Starting Occupation



Webmaster / Administrator

Advancement Occupation

Advancement Occupation

Webmasters are responsible for maintaining one or more websites and web servers for an organization. They ensure that the web servers, hardware and software are operating correctly. They also design websites, generate and revise web pages, and examine traffic through the site. The most important part of their job is to ensure a safe and efficient user experience. This may include implementing security protocols, modifying programs, creating backups, resolving software problems, and updating content. These individuals require strong troubleshooting and analytical abilities and are comfortable working independently.

Growth

The similarity score between webmaster / administrator and the starting occupation is 0.455 and the average salary differential is \$18,715. While the projected 5-year employment growth for computer support specialist is 2.35%, webmaster / administrator's projected 5-year growth is lower at 2.00%. Average salary for the systems analyst occupation is \$46,405 for individuals with up to 2 years of experience; \$55,232 for those with 3 to 5 years, and \$67,082 for individuals with 6 or more years. There were 63 postings for the advancement occupation.

0.455

Similarity Score

Measure of relatedness between occupations on a scale of 0 to 1



\$18,715

Average Salary Differential



2.35%

Projected 5-Year Growth

Projected employment growth for the Starting Occupation



2.00%

Projected 5-Year Growth

Projected employment growth for the Advancement Occupation



Computer Support Specialist

Starting Occupation



Webmaster / Administrator

Advancement Occupation

\$46,405

Average Salary: Advancement
Occupation with 0 - 2 years experience



\$55,232

Average Salary: Advancement
Occupation with 3 - 5 years experience



\$67,082

Average Salary: Advancement
Occupation with 6+ years experience



3,224

Starting Occupation Postings



63

Advancement Occupation Postings

Skills

The skills in the following table represent the additional skills likely needed to move from computer support specialist to webmaster / administrator. The skill taxonomy used in this analysis classifies skills for a given occupation as necessary, defining or distinguishing. Necessary skills are specialized skills required for this job and relevant across other similar jobs. The necessary skills for webmaster / administrator are knowledge of project management, SQL, JavaScript, Adobe Photoshop and e-commerce. Defining skills represent the day-to-day tasks and responsibilities of the job. For this occupation the defining skills include knowledge of Web content management, content management, content management systems (CMS) web site design, and website management. Distinguishing skills set a worker apart and come with a salary or growth premium. For this occupation, the distinguishing skills are Web servers, Drupal, WordPress, HyperText Markup Language, and Adobe Experience Manager (AEM).

Certifications

The computer support specialist occupation commonly requests the following certifications. Certified A+ technician. This is a certification in entry-level PC technology with emphasis on the skills needed to perform computer service and



Computer Support Specialist

Starting Occupation



Webmaster / Administrator

Advancement Occupation

Necessary Skills		Defining Skills		Distinguishing Skills	
Skill Gap	Skill Recall Percentage in Advancement Occupation	Skill Gap	Skill Recall Percentage in Advancement Occupation	Skill Gap	Skill Recall Percentage in Advancement Occupation
Project Management	18%	Web Content Management	19%	Web Servers	6%
SQL	17%	Content Management	19%	Drupal	5%
JavaScript	17%	Content Management Systems (CMS)	17%	WordPress	5%
Adobe Photoshop	12%	Web Site Design	16%	HyperText Markup Language	3%
E-Commerce	8%	Website Management	14%	Adobe Experience Manager (AEM)	3%

troubleshooting. IT Infrastructure Library (ITIL) Certification. This is an entry-level certification for IT service management.

The webmaster / administrator occupation commonly requests security clearance, driver's license and the IT Infrastructure Library (ITIL) Certification.

Certifications

The source occupation commonly requests the following certifications:

- Certified A+ Technician
- Driver's License
- IT Infrastructure Library (ITIL) Certification

The Advancement occupation commonly requests the following certifications:

- Security Clearance
- Driver's License
- IT Infrastructure Library (ITIL) Certification

Computer Support Specialist

Starting Occupation



Telecommunications Engineering Specialist

Advancement Occupation

Advancement Occupation

Telecommunications engineering specialists design or configure voice, video, and data communications systems to keep users connected. They supervise installation, and post-installation service and maintenance. They also implement controls to provide security for operating systems, software, and data. These individuals are comfortable with starting up and carrying out projects. They like leading people and making many decisions. Sometimes they require risk taking and often deal with business by providing user support through diagnosing network and device problems and implementing technical or procedural solutions.

Growth

The similarity score between telecommunications engineering specialists and the starting occupation is 0.499 and the average salary differential is \$25,056. While the projected 5-year employment growth for computer support specialist is 2.35%, telecommunications support specialist's projected 5-year growth is slightly lower at 2.00%. Average salary for the telecommunications engineering specialist occupation is \$46,889 for individuals with up to 2 years of experience; \$57,102 for those with 3 to 5 years, and \$71,592 for individuals with 6 or more years. There were 203

0.499

Similarity Score

Measure of relatedness between occupations on a scale of 0 to 1



\$25,056

Average Salary Differential



2.35%

Projected 5-Year Growth

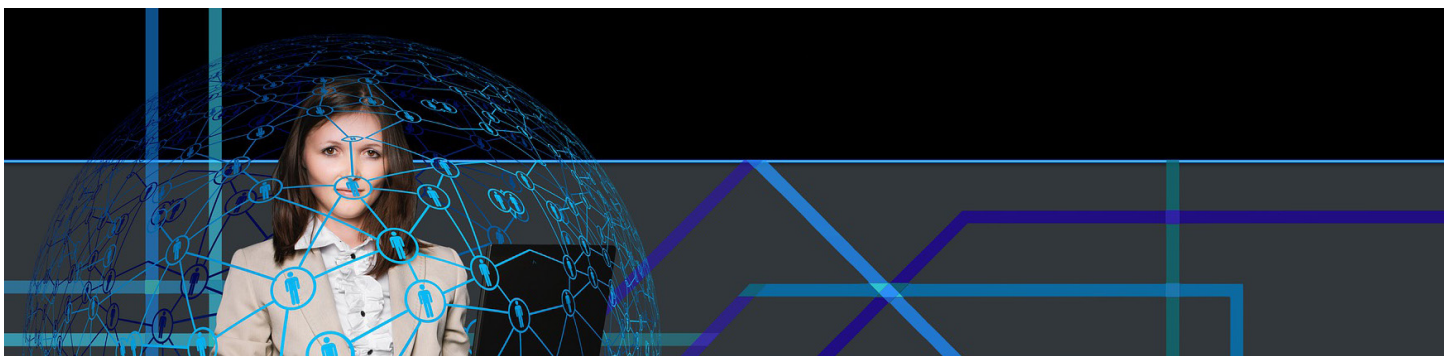
Projected employment growth for the Starting Occupation



2.00%

Projected 5-Year Growth

Projected employment growth for the Advancement Occupation



Computer Support Specialist

Starting Occupation



Telecommunications Engineering Specialist

Advancement Occupation

\$46,889

Average Salary: Advancement

Occupation with 0 - 2 years experience



\$57,102

Average Salary: Advancement

Occupation with 3 - 5 years experience



\$71,592

Average Salary: Advancement

Occupation with 6+ years experience



3,224

Starting Occupation Postings



203

Advancement Occupation Postings

postings for the advancement occupation.

Skills

The skills in the following table represent the additional skills likely needed to move from computer support specialist to telecommunications engineering specialist. The skill taxonomy used in this analysis classifies skills for a given occupation as necessary, defining or distinguishing. Necessary skills are specialized skills required for this job and relevant across other similar jobs. The necessary skills for telecommunications engineering specialist are knowledge of customer service, repair, technical support, project management, and scheduling. Defining skills represent the day-to-day tasks and responsibilities of the job. For this occupation the defining skills include knowledge of telecommunications, Cisco, voice over IP (VoIP), unified communications, and networking engineering. Distinguishing skills set a worker apart and come with a salary or growth premium. For this occupation, the distinguishing skills are network operations and service management, system / network configuration, Cisco switching, data communications, and local area networks (LAN).

Certifications

The computer support specialist occu-



Computer Support Specialist

Starting Occupation



Telecommunications Engineering Specialist

Advancement Occupation

Necessary Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Customer Service	15%
Repair	13%
Technical Support	12%
Project Management	12%
Scheduling	11%

Defining Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Telecommunications	59%
Cisco	29%
Voice over IP (VoIP)	24%
Unified Communications	15%
Network Engineering	12%

Distinguishing Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Network Operations & Service Management	8%
System/Network Configuration	7%
Cisco Switching	5%
Data Communications	4%
Local Area Network (LAN)	4%

pation commonly requests the following certifications. Certified A+ technician. This is a certification in entry-level PC technology with emphasis on the skills needed to perform computer service and troubleshooting. IT Infrastructure Library (ITIL) Certification. This is an entry-level certification for IT service management.

The telecommunications engineering specialist occupation commonly requests security clearance, and among others, the following certifications: Cisco Certified Network Associate (CCNA), an associate-level Cisco Career certification. The second top certification is Cisco Certified Network Professional (CCNP), a certification for individuals in the IT industry who have achieved the professional level of Cisco Career Certification. Both certifications are from Cisco Systems.

Certifications

The source occupation commonly requests the following certifications:

- Certified A+ Technician
- Driver's License
- IT Infrastructure Library (ITIL) Certification

The Advancement occupation commonly requests the following certifications:

- Security Clearance
- Cisco Certified Network Associate (CCNA)
- Cisco Certified Network Professional (CCNP)

Computer Support Specialist

Starting Occupation



Network / Systems Support Specialist

Advancement Occupation

Advancement Occupation

Network / Systems support specialists analyze, troubleshoot, and evaluate computer network problems. They provide help and advice to computer users and organizations. These specialists either support computer networks or they provide technical assistance directly to computer users. They play an important role in maintaining an organization's network and keeping them safe and secure through both hardware configuration and end-user training. These individuals require expertise in diagnostic and security software as well as in-depth knowledge of networking equipment and infrastructure devices. They are comfortable in problem solving, customer service and prioritizing.

Growth

The similarity score between network / systems support specialists and the starting occupation is 0.614 and the average salary differential is \$16,149. While the projected 5-year employment growth for computer support specialist is 2.35%, network / systems support specialist's projected 5-year growth is considerably lower at 0.96%. Average salary for the network / systems support specialist occupation is \$46,405 for individuals with up to 2 years of experience; \$55,232 for those with 3 to

0.614

Similarity Score

Measure of relatedness between occupations on a scale of 0 to 1



\$16,149

Average Salary Differential



2.35%

Projected 5-Year Growth

Projected employment growth for the Starting Occupation



0.96%

Projected 5-Year Growth

Projected employment growth for the Advancement Occupation



Computer Support Specialist

Starting Occupation



Network / Systems Support Specialist

Advancement Occupation

\$46,405

Average Salary: Advancement

Occupation with 0 - 2 years experience



\$55,232

Average Salary: Advancement

Occupation with 3 - 5 years experience



\$67,082

Average Salary: Advancement

Occupation with 6+ years experience



3,224

Starting Occupation Postings



279

Advancement Occupation Postings

5 years, and \$67,082 for individuals with 6 or more years. There were 279 postings for the advancement occupation.

Skills

The skills in the following table represent the additional skills likely needed to move from computer support specialist to network / systems support specialist. The skill taxonomy used in this analysis classifies skills for a given occupation as necessary, defining or distinguishing. Necessary skills are specialized skills required for this job and relevant across other similar jobs. The necessary skills for network / systems support specialist are knowledge of project management, Linux, Scheduling, Information Systems, and customer contact. Defining skills represent the day-to-day tasks and responsibilities of the job. For this occupation the defining skills include knowledge of technical support, customer service, network support, Cisco, and repair. Distinguishing skills set a worker apart and come with a salary or growth premium. For this occupation, the distinguishing skills are network operations and service management, Windows Server, local area networks (LAN), IT support, Open Shortest Path First (OSPF).

Certifications

The computer support specialist occu-



Computer Support Specialist

Starting Occupation



Network / Systems Support Specialist

Advancement Occupation

Necessary Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Project Management	14%
Linux	12%
Scheduling	9%
Information Systems	9%
Customer Contact	8%

Defining Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Technical Support	27%
Customer Service	26%
Network Support	15%
Cisco	15%
Repair	13%

Distinguishing Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Network Operations & Service Management	7%
Windows Server	6%
Local Area Network (LAN)	4%
It Support	4%
Open Shortest Path First (OSPF)	3%

pation commonly requests the following certifications. Certified A+ technician. This is a certification in entry-level PC technology with emphasis on the skills needed to perform computer service and troubleshooting. IT Infrastructure Library (ITIL) Certification. This is an entry-level certification for IT service management.

The Network / systems support specialist occupation commonly requests security clearance, driver's license and , among others, the following certification: Cisco Certified Network Associate (CCNA), an associate-level Cisco Career certification from Cisco Systems.

Certifications

The source occupation commonly requests the following certifications:

- Certified A+ Technician
- Driver's License
- IT Infrastructure Library (ITIL) Certification

The Advancement occupation commonly requests the following certifications:

- Security Clearance
- Driver's License
- Cisco Certified Network Associate (CCNA)

Computer Support Specialist

Starting Occupation



Cyber / Information Security Engineer / Analyst

Advancement Occupation

Advancement Occupation

Cyber/ Information security engineers/ analysts specialize in network and IT infrastructure security. They understand cyberattacks, malware, and the behavior of cybercriminals, and actively seeks to anticipate and prevent these attacks. Their primary role is to understand company IT infrastructure in detail, monitor it at all times, and evaluate threats that could potentially breach the network, and the access to information assets. They continuously look for ways to enhance company information systems and network security and protect its sensitive information. These individuals are comfortable staying up-to-date with the changing technology world, and are very detailed oriented.

Growth

The similarity score between cyber / information security engineer / analyst and the starting occupation is 0.55 and the average salary differential is \$46,706. While the projected 5-year employment growth for computer support specialist is 2.35%, the advancement occupation's projected 5-year growth is considerably higher at 8.77%. Average salary for the advancement occupation is \$58,383 for individuals with up to 2 years of experience; \$79,154 for those with 3 to 5 years, and \$95,250 for individu-

0.55

Similarity Score

Measure of relatedness between occupations on a scale of 0 to 1



\$46,706

Average Salary Differential



2.35%

Projected 5-Year Growth

Projected employment growth for the Starting Occupation



8.77%

Projected 5-Year Growth

Projected employment growth for the Advancement Occupation



Computer Support Specialist

Starting Occupation



Cyber / Information Security Engineer / Analyst

Advancement Occupation

\$58,383

Average Salary: Advancement

Occupation with 0 - 2 years experience



\$79,154

Average Salary: Advancement

Occupation with 3 - 5 years experience



\$95,250

Average Salary: Advancement

Occupation with 6+ years experience



3,224

Starting Occupation Postings



3,137

Advancement Occupation Postings

als with 6 or more years. There were 3,137 postings for the advancement occupation.

Skills

The skills in the following table represent the additional skills likely needed to move from computer support specialist to cyber / information security engineer / analyst. The skill taxonomy used in this analysis classifies skills for a given occupation as necessary, defining or distinguishing. Necessary skills are specialized skills required for this job and relevant across other similar jobs. The necessary skills for this occupation are knowledge of Linux, Python, Cryptography, project management, and customer service. Defining skills represent the day-to-day tasks and responsibilities of the job. For this occupation the defining skills include knowledge of information systems and security, network security, NIST cybersecurity framework, and information assurance. Distinguishing skills set a worker apart and come with a salary or growth premium. For this occupation, the distinguishing skills are vulnerability analysis, Nessus, threat intelligence and analysis, threat modeling, and cybersecurity assessment.

Certifications

The computer support specialist occupation commonly requests the following



Computer Support Specialist

Starting Occupation



Cyber / Information Security Engineer / Analyst

Advancement Occupation

Necessary Skills		Defining Skills		Distinguishing Skills	
Skill Gap	Skill Recall Percentage in Advancement Occupation	Skill Gap	Skill Recall Percentage in Advancement Occupation	Skill Gap	Skill Recall Percentage in Advancement Occupation
Linux	19%	Information Security	49%	Vulnerability analysis	5%
Python	14%	Information Systems	27%	Nessus	5%
Cryptography	13%	Network Security	18%	Threat Intelligence and Analysis	5%
Project Management	12%	NIST Cybersecurity Framework	12%	Threat Modeling	5%
Customer Service	11%	Information Assurance	12%	Cybersecurity Assessment	4%

certifications. Certified A+ technician. This is a certification in entry-level PC technology with emphasis on the skills needed to perform computer service and troubleshooting. IT Infrastructure Library (ITIL) Certification. This is an entry-level certification for IT service management.

The Cyber / information security engineer / analyst occupation commonly requests security clearance, and among others, the following certifications: Certified Information Systems Security Professional (CISSP), a certification designed to validate information security work experience and a working knowledge of security principles and practices. CISSP is utilized to demonstrate that a security professional is able to design, engineer, implement, and run an information security program. The second top certification is GIAC certifications by the SANS Institute. GIAC provides a set of vendor-neutral computer security certifications.

Certifications

The source occupation commonly requests the following certifications:

- Certified A+ Technician
- Driver's License
- IT Infrastructure Library (ITIL) Certification

The Advancement occupation commonly requests the following certifications:

- Security Clearance
- SANS/GIAC Certification
- Certified Information Systems Security Professional (CISSP)

Computer Support Specialist

Starting Occupation



Network Engineer / Architect

Advancement Occupation

Advancement Occupation

Network Engineers / Architects take care of communication networks, such as local area networks (LANs), wide area networks (WANs), and intranets. They design and implement network configurations, troubleshoot performance issues, carry out network monitoring and configure security systems such as firewalls. Among the major skills that these individuals should possess include analytical, problem-solving and communication skills. They should be team-building, detail-oriented leaders with extensive knowledge of various types of computer operating, security and wireless systems.

Growth

The similarity score between network engineer or architect and the starting occupation is 0.615 and the average salary differential is \$54,897. While the projected 5-year employment growth for computer support specialist is 2.35%, network engineer or architect's projected 5-year growth is slightly higher at 2.86%. Average salary for the network engineer or architect occupation is \$58,383 for individuals with up to 2 years of experience; \$79,154 for those with 3 to 5 years, and \$95,250 for individuals with

0.615

Similarity Score

Measure of relatedness between occupations on a scale of 0 to 1



\$54,897

Average Salary Differential



2.35%

Projected 5-Year Growth

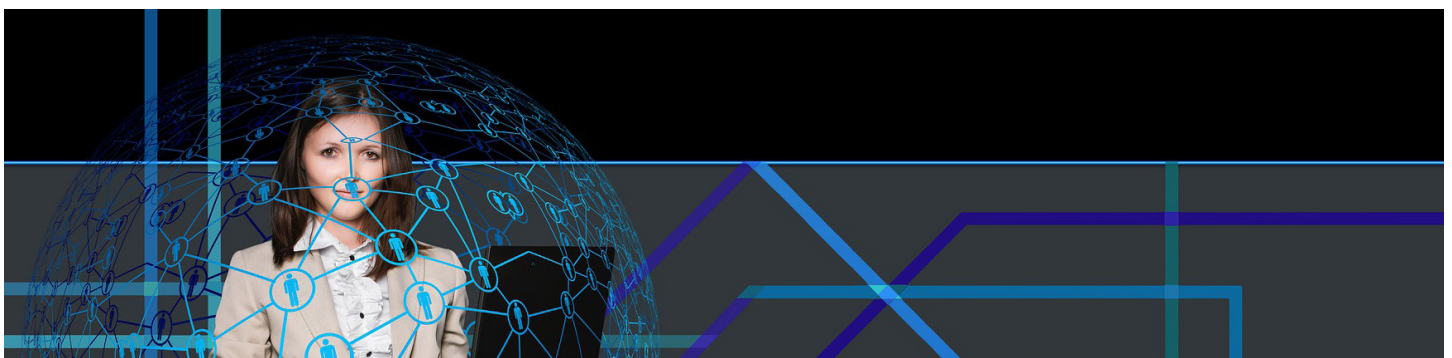
Projected employment growth for the Starting Occupation



2.86%

Projected 5-Year Growth

Projected employment growth for the Advancement Occupation



Computer Support Specialist

Starting Occupation



Network Engineer / Architect

Advancement Occupation

\$58,383

Average Salary: Advancement

Occupation with 0 - 2 years experience



\$79,154

Average Salary: Advancement

Occupation with 3 - 5 years experience



\$95,250

Average Salary: Advancement

Occupation with 6+ years experience



3,224

Starting Occupation Postings



2,525

Advancement Occupation Postings

6 or more years. There were 2,525 postings for the advancement occupation.

Skills

The skills in the following table represent the additional skills likely needed to move from computer support specialist to network engineer / architect. The skill taxonomy used in this analysis classifies skills for a given occupation as necessary, defining or distinguishing. Necessary skills are specialized skills required for this job and relevant across other similar jobs. The necessary skills for network engineer / architect are knowledge of Python, routers, project management, Java, and software development. Defining skills represent the day-to-day tasks and responsibilities of the job. For this occupation the defining skills include knowledge of network engineering, Cisco, Linux, wide area network, and VMware. Distinguishing skills set a worker apart and come with a salary or growth premium. For this occupation, the distinguishing skills are Microsoft active directory, Voice over IP (VoIP), network testing, network hardware, and Citrix.

Certifications

The computer support specialist occupation commonly requests the following certifications. Certified A+ technician. This is a certification in entry-level PC



Computer Support Specialist

Starting Occupation



Network Engineer / Architect

Advancement Occupation

Necessary Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Python	17%
Routers	14%
Project Management	13%
Java	12%
Software Development	12%

Defining Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Network Engineering	28%
Cisco	24%
Linux	16%
Wide Area Network (WAN)	14%
VMware	11%

Distinguishing Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Microsoft Active Directory	7%
Voice over IP (VoIP)	5%
Network Testing	4%
Network Hardware	4%
Citrix	3%

technology with emphasis on the skills needed to perform computer service and troubleshooting. IT Infrastructure Library (ITIL) Certification. This is an entry-level certification for IT service management.

The network engineer / architect occupation commonly requests security clearance and, among others, the following certifications: Cisco Certified Network Associate (CCNA), an associate-level Cisco Career certification. The second top certification is Cisco Certified Network Professional (CCNP), a certification for individuals in the IT industry who have achieved the professional level of Cisco Career Certification. Both certifications are from Cisco Systems.

Certifications

The source occupation commonly requests the following certifications:

- Certified A+ Technician
- Driver's License
- IT Infrastructure Library (ITIL) Certification

The Advancement occupation commonly requests the following certifications:

- Security Clearance
- Cisco Certified Network Associate (CCNA)
- Cisco Certified Network Professional (CCNP)

Computer Support Specialist

Starting Occupation



Network / Systems Administrator

Advancement Occupation

Advancement Occupation

Network or systems administrators are responsible for the day-to-day operation of computer networks. They organize, install, and support an organization's computer systems, including local area networks (LANs), wide area networks (WANs), network segments, intranets, and other data communication systems. Central to their role is the responsibility for maintaining the a functioning network at all times. Since organizations depend on their networks for so much of their work, problems must be corrected quickly. In addition, these individuals make updates to all equipment and software to maintain them current. These individuals are comfortable collaborating with teams, acting as both a team player and a leader, interacting effectively with multiple levels of the organization, and communicating with colleagues.

Growth

The similarity score between network or systems administrator and the starting occupation is 0.64 and the average salary differential is \$32,166. While the projected 5-year employment growth for computer support specialist is 2.35%, network or systems administrator's projected 5-year growth is considerably lower at -0.60%. Average salary for the network or sys-

0.64

Similarity Score

Measure of relatedness between occupations on a scale of 0 to 1



\$32,166

Average Salary Differential



2.35%

Projected 5-Year Growth

Projected employment growth for the Starting Occupation



-0.60%

Projected 5-Year Growth

Projected employment growth for the Advancement Occupation



Computer Support Specialist

Starting Occupation



Network / Systems Administrator

Advancement Occupation

\$46,889

Average Salary: Advancement

Occupation with 0 - 2 years experience



\$57,102

Average Salary: Advancement

Occupation with 3 - 5 years experience



\$71,592

Average Salary: Advancement

Occupation with 6+ years experience



3,224

Starting Occupation Postings



1,704

Advancement Occupation Postings

tems administrator occupation is \$46,889 for individuals with up to 2 years of experience; \$57,102 for those with 3 to 5 years, and \$71,592 for individuals with 6 or more years. There were 1,704 postings for the advancement occupation.

Skills

The skills in the following table represent the additional skills likely needed to move from computer support specialist to network / systems administrator. The skill taxonomy used in this analysis classifies skills for a given occupation as necessary, defining or distinguishing. Necessary skills are specialized skills required for this job and relevant across other similar jobs. The necessary skills for network / systems administrator are knowledge of technical support, Cisco, hardware and software installation, SQL, and software installation. Defining skills represent the day-to-day tasks and responsibilities of the job. For this occupation the defining skills include knowledge of systems administration, Linux, Microsoft active directory, VMware, and Windows Server. Distinguishing skills set a worker apart and come with a salary or growth premium. For this occupation, the distinguishing skills are network infrastructure (Edge POE devices) group policy, virtual private networking (VPN), network security, and lightweight Directory Access Protocol (LDAP).



Computer Support Specialist

Starting Occupation



Network / Systems Administrator

Advancement Occupation

Necessary Skills		Defining Skills		Distinguishing Skills	
Skill Gap	Skill Recall Percentage in Advancement Occupation	Skill Gap	Skill Recall Percentage in Advancement Occupation	Skill Gap	Skill Recall Percentage in Advancement Occupation
Technical Support	19%	System Administration	59%	Network Infrastructure (Edge POE Devices)	6%
Cisco	16%	Linux	32%	Group policy	6%
Hardware and Software Installation	16%	Microsoft Active Directory	26%	Virtual Private Networking (VPN)	6%
SQL	14%	VMware	25%	Network Security	6%
Software Installation	13%	Windows Server	18%	Lightweight Directory Access Protocol (LDAP)	6%

Certifications

The computer support specialist occupation commonly requests the following certifications. Certified A+ technician. This is a certification in entry-level PC technology with emphasis on the skills needed to perform computer service and troubleshooting. IT Infrastructure Library (ITIL) Certification. This is an entry-level certification for IT service management.

The network / systems administrator occupation commonly requests security clearance, and among others, the following certifications: CompTIA Security+, a globally trusted, vendor-neutral certification that validates the baseline skills necessary to perform core security functions and pursue an IT security career. The second top certification is Cisco Certified Network Associate (CCNA), an associate-level Cisco Career certification from Cisco Systems.

Certifications

The source occupation commonly requests the following certifications:

- Certified A+ Technician
- Driver's License
- IT Infrastructure Library (ITIL) Certification

The Advancement occupation commonly requests the following certifications:

- Security Clearance
- CompTIA Security+
- Cisco Certified Network Associate (CCNA)

Computer Support Specialist

Starting Occupation



Computer Programmer

Advancement Occupation

Advancement Occupation

Computer programmers write and test code that allows computer applications and software programs to function properly. They turn the program designs created by analysts, software developers and engineers into instructions that a computer can follow. Computer programmers also design a graphical user interface (GUI) for an application so that non-technical users can use the software through easy, point-and-click menu options. These individuals tend to be investigative, which means they're intellectual, introspective, and inquisitive. They are curious, methodical, rational, analytical, and logical.

Growth

The similarity score between computer programmers and the starting occupation is 0.462 and the average salary differential is \$31,826. While the projected 5-year employment growth for computer support specialist is 2.35%, computer programmer's projected 5-year growth is considerably lower at -3.93%. Average salary for the telecommunications engineering specialist occupation is \$46,889 for individuals with up to 2 years of experience; \$57,102 for those with 3 to 5 years, and \$71,592 for individuals with 6 or more years. There were 892

0.462

Similarity Score

Measure of relatedness between occupations on a scale of 0 to 1



\$31,826

Average Salary Differential



2.35%

Projected 5-Year Growth

Projected employment growth for the Starting Occupation



-3.93%

Projected 5-Year Growth

Projected employment growth for the Advancement Occupation



Computer Support Specialist

Starting Occupation



Computer Programmer

Advancement Occupation

\$46,889

Average Salary: Advancement
Occupation with 0 - 2 years experience



\$57,102

Average Salary: Advancement
Occupation with 3 - 5 years experience



\$71,592

Average Salary: Advancement
Occupation with 6+ years experience



3,224

Starting Occupation Postings



892

Advancement Occupation Postings

postings for the advancement occupation.

Skills

The skills in the following table represent the additional skills likely needed to move from computer support specialist to computer programmer. The skill taxonomy used in this analysis classifies skills for a given occupation as necessary, defining or distinguishing. Necessary skills are specialized skills required for this job and relevant across other similar jobs. The necessary skills for computer programmer are knowledge of software development, Microsoft C#, project management, Oracle, and customer service. Defining skills represent the day-to-day tasks and responsibilities of the job. For this occupation the defining skills include knowledge of SQL, Java, JavaScript, .NET, and Python. Distinguishing skills set a worker apart and come with a salary or growth premium. For this occupation, the distinguishing skills are SQL Server, Extensible Markup Language (XML), unit testing, debugging, and C++.

Certifications

The computer support specialist occupation commonly requests the following certifications. Certified A+ technician. This is a certification in entry-level PC technology with emphasis on the skills



Computer Support Specialist

Starting Occupation



Computer Programmer

Advancement Occupation

Necessary Skills		Defining Skills		Distinguishing Skills	
Skill Gap	Skill Recall Percentage in Advancement Occupation	Skill Gap	Skill Recall Percentage in Advancement Occupation	Skill Gap	Skill Recall Percentage in Advancement Occupation
Software Development	16%	SQL	25%	SQL Server	8%
Microsoft C#	11%	Java	23%	Extensible Markup Language (XML)	7%
Project Management	11%	JavaScript	14%	Unit Testing	6%
Oracle	11%	.NET	10%	Debugging	6%
Customer Service	8%	Python	9%	C++	6%

needed to perform computer service and troubleshooting. IT Infrastructure Library (ITIL) Certification. This is an entry-level certification for IT service management.

The computer programmer occupation commonly requests security clearance, driver's license and the following certification: Project Management Professional (PMP) certification. This certification validates the individual's competence to perform in the role of a project manager, leading and directing projects and teams.

Certifications

The source occupation commonly requests the following certifications:

- Certified A+ Technician
- Driver's License
- IT Infrastructure Library (ITIL) Certification

The Advancement occupation commonly requests the following certifications:

- Security Clearance
- Driver's License
- Project Management Professional (PMP)

References

For Occupation Profiles

U.S. Bureau of Labor statistics (bls.gov)

O*NET Online (onetonline.org)

Artisantalent.com

Betterteam.com

Careerexplorer.com

CIO Magazine (cio.com)

Fieldengineering.com

Glassdor.com

Indeed.com

MastersinDataScience.org

Springboard.com

StudentScholarships.org

TheBalanceCareers.com

Workable.com

ZipRecruiter.com

For Certifications

Accounting Education (accounting-education.org/cpa-requirements/Massachusetts/)

American Society for Quality (<https://asq.org/cert/catalog>)

Axelos (axelos.com/certifications/itil-service-management)

CFA Institute (cfainstitute.org/en/programs/cfa)

Cisco Systems (cisco.com/c/en/us/training-events/training-certifications/certifications.ht)

CIW Career Academy (ciwcerified.com/ciw-certifications)

Computer Technology Industry Association (CompTIA.org/certifications)

Global Association of Risk Professionals (garp.org/frm)

Information Systems Audit and Control Association (isaca.org/credentialing/cisa)

International Information System Security Certification Consortium (ISC)2 (isc2.org)

Microsoft (docs.microsoft.com/en-us/learn/certifications/)

Project Management Institute (pmi.org/certifications)

Salesforce (trailhead.salesforce.com/en/credentials/administratoroverview/)

SANS Institute (sans.org/cyber-security-certifications/?msc=main-nav)

SAS Institute Inc (https://www.sas.com/en_us/certification.html)

ScrumAlliance (scrumalliance.org/get-certified)

The Open Group (opengroup.org/certifications/togaf)

