

Career Pathways and Skills Analysis



Cybersecurity

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Published
May, 2022

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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 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.

Cybersecurity 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 Cybersecurity. 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 Cybersecurity 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.

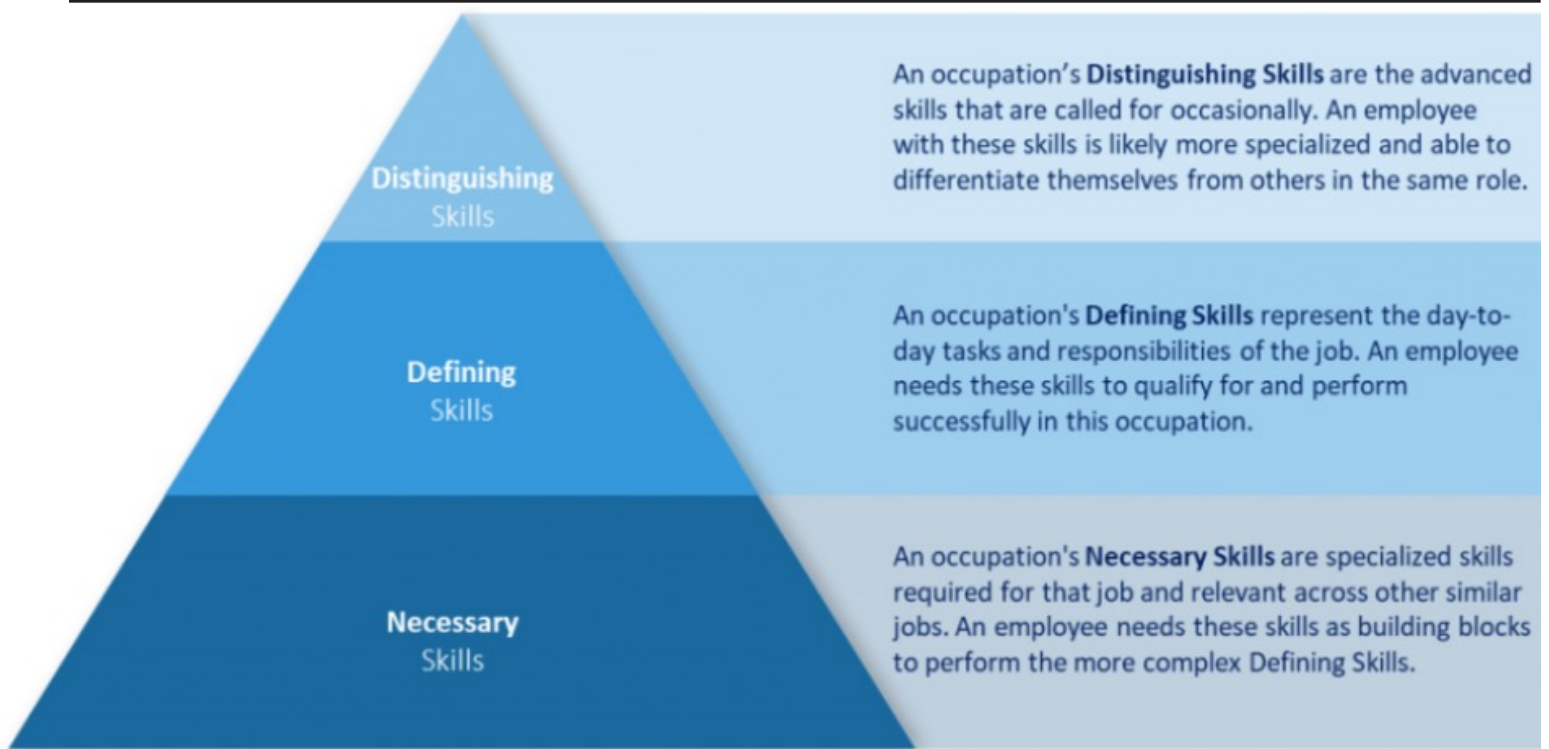
Job Opportunities in Computer Science for individuals with less than a 4-year degree

- 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 Cybersecurity role. For each career path emerging from the cybersecurity role, the report presents salary and career advancement estimates, job openings and projected growth. It also presents top skills and certifications associated with the job.



Occupation Profile: Cybersecurity

Occupation: Cyber / Information Security Engineer / Analyst

Occupation

The occupations identified as Cyber Security Engineer or Analyst or Information Security Engineer or Analyst refer to those occupations responsible for protecting the organization's hardware, software, and networks from cyber threats, that is, the possibility of a malicious attempt to damage or disrupt a computer network or system. The analyst's primary role is to understand the organization's IT infrastructure in detail, monitor it at all times, and evaluate threats that could potentially breach the network and its infrastructure. They investigate incidents and respond to events in real time. They also write detailed incident response reports, and install and operate firewalls, encryption programs, and other security software. People in this role are usually detail-oriented and very organized, and are comfortable working in a structured environment. These individuals also tend to be analytical and intellectual, which means that they are quite inquisitive and curious.

Growth

Cyber Security Engineer or Analyst or Information Security Engineer or Analyst jobs are projected to have a 8.77% growth in employment. The entry level salary for this occupation is \$77,617 with a requirement of less than 2 years of experience. The mid career salary, that is jobs requiring



8.77%

Projected Growth

Estimated five-year growth in employment



\$77,617

Entry Level Salary

Salary for jobs requiring less than 2 years of experience



\$97,641

Mid Career Salary

Salary for jobs requesting 3 to 5 years of experience



\$108,757

Advanced Career Salary

Salary for jobs requesting 6+ years of experience



Occupation Profile: Cybersecurity

Occupation: Cyber / Information Security Engineer / Analyst

3 to 5 years of experience is \$97,641. The advanced career salary which requests six or more years of experience is \$108,757.

Skills

The skills shown in the table below represent the additional skills likely needed to move from the starting occupation to the advancement occupation. Necessary skills are specialized skills required for this job and relevant across other similar jobs. Apart from Customer Service, most necessary skills involve strong technical content and some project management exposure. Defining skills represent the day-to-day tasks and responsibilities of the job. They assume a deeper level of knowledge and understanding of security. Distinguishing skills set a worker apart and come with a salary premium. Note that in this role, the prospects for growth center around the individual's mastery of threat and vulnerability assessment and analysis.

Certifications

This occupation commonly requests a se-

Certifications

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

curity clearance and, among others, the following certifications: Certified Information Systems Professional (CISSP), a certification designed to validate information security work experience and a working knowledge of security principles and practices. The second top certification is GIAC certifications by the SANS Institute. GIAC provides a set of vendor-neutral computer security certifications.

Necessary Skills

Skill Name	Percent of Postings Requesting Skill
Linux	20%
Project Management	14%
Python	14%
Cryptography	13%
Customer Service	12%
Software Development	10%

Defining Skills

Skill Name	Percent of Postings Requesting Skill
Information Security	52%
Information Systems	34%
Network Security	19%
NIST Cybersecurity Framework	15%
Information Assurance	14%
Vulnerability assessment	12%

Distinguishing Skills

Skill Name	Percent of Postings Requesting Skill
Nessus	6%
Vulnerability analysis	6%
Federal Information Security Management Act	5%
Cybersecurity Assessment	5%
Threat Intelligence and Analysis	5%
Threat Modeling	5%

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.

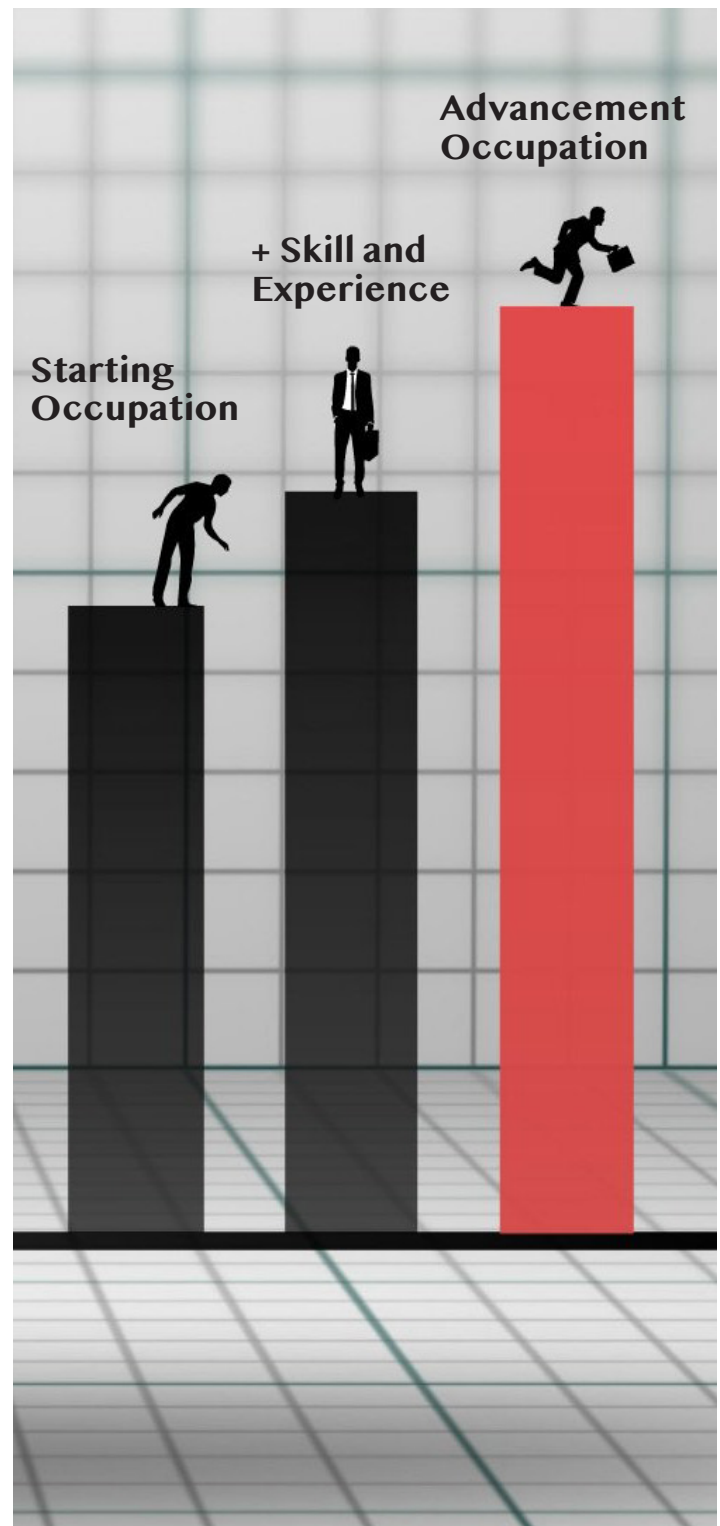
In order to understand likely career pathways for the cybersecurity role, likely advancement occupations were examined. This was done following Emsi | Burning Glass' Career Pathways model as well as by examining actual transitions made by individuals through analysis of Emsi | Burning Glass's resume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

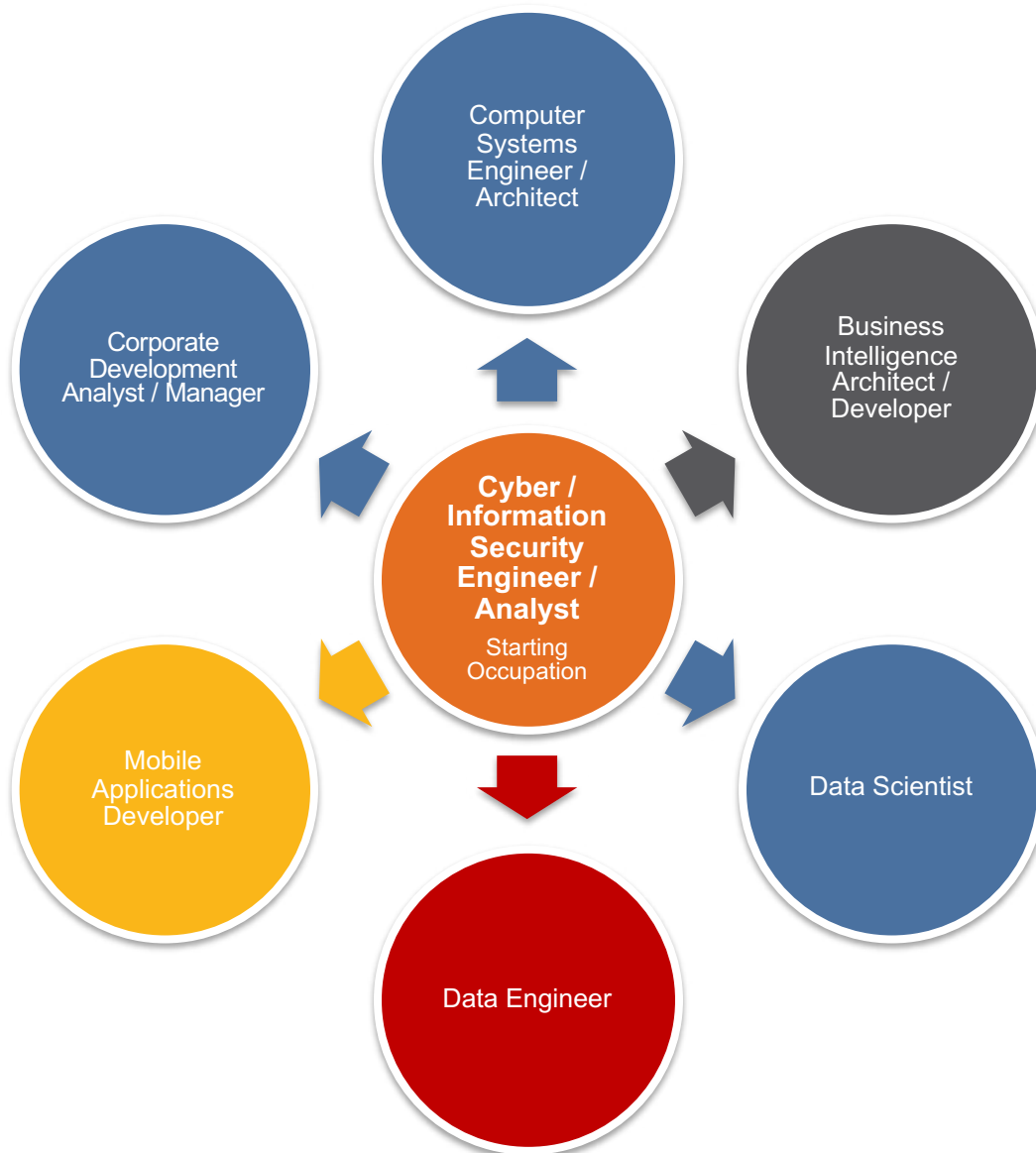


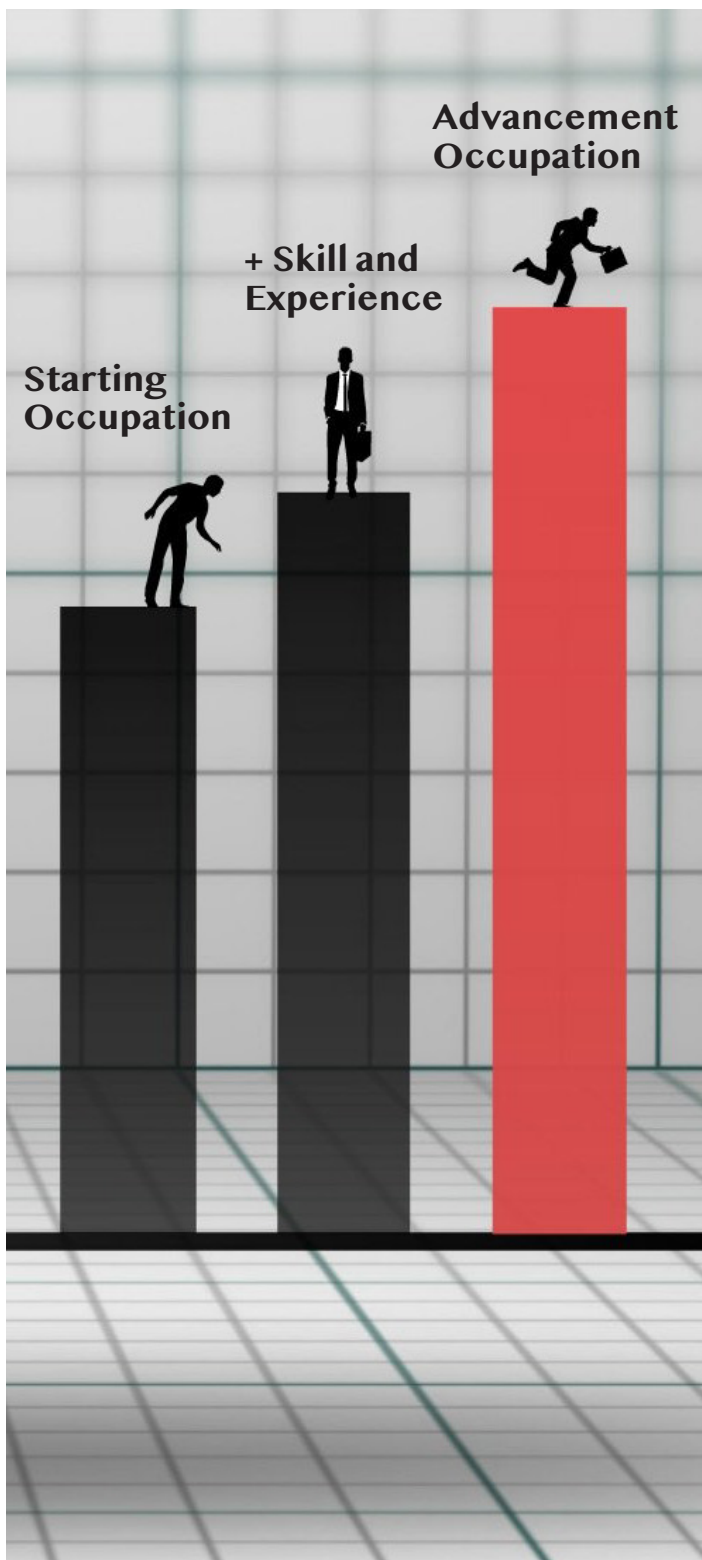
While some occupations always require specific degrees or licenses, many occupations may only prefer certain education levels (however strongly) and can offer greater possibility for direct promotion.

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 Cyber Security Engineer or Analyst or Information Security Engineer or Analyst, 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:

Cybersecurity

Cyber / Information Security Engineer / Analyst

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 engineer or architect and the starting occupation is 0.678 and the average salary differential is \$11,870. While the projected 5-year employment growth for cyber security engineer or analyst, or information security engineer or analyst is 8.77%, computer systems engineer's projected 5-year growth is lower 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.

0.678

Similarity Score

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



\$11,870

Average Salary Differential



8.77%

Projected 5-Year Growth

*Projected employment growth for
the Starting Occupation*



2.75%

Projected 5-Year Growth

*Projected employment growth for
the Advancement Occupation*



Cyber / Information Security Engineer / Analyst

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



3,137

Starting Occupation Postings



3,259

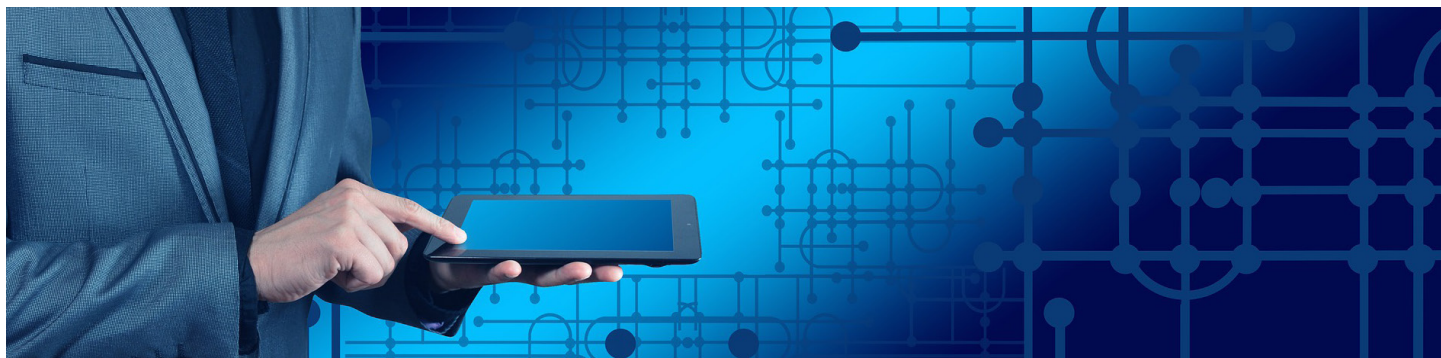
Advancement Occupation Postings

Skills

The skills in the following table represent the additional skills likely needed to move from cyber security engineer or analyst, or information security engineer or analyst to computer systems engineer or 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 cyber security engineer or analyst, or information security engineer or analyst occupation commonly requests a security clearance and, among others, the follow-



Cyber / Information Security Engineer / Analyst

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%

ing certifications.: Certified Information Systems Professional (CISSP), a certification designed to validate information security work experience and a working knowledge of security principles and practices. The second top certification is GIAC certifications by the SANS Institute. GIAC provides a set of vendor-neutral computer security certifications.

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

The Advancement occupation commonly requests the following certifications:

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

Cyber / Information Security Engineer / Analyst

Starting Occupation



Business Intelligence Architect / Developer

Advancement Occupation

Advancement Occupation

Business intelligence architects or developers are responsible for designing and developing BI solutions, overseeing the implementation of these types of systems and also their ongoing maintenance. They are in charge of developing, deploying, and maintaining BI interfaces. Those include query tools, data visualization and interactive dashboards, ad hoc reporting, and data modeling tools. These individuals are comfortable working with large amounts of data and deriving insights from their analysis. Some individuals may be more comfortable presenting and communicating results to others. But in either case, they are good at examining multiple sources of data and then making accurate conclusions about them. These individuals are naturally inquisitive and over time, develop a great deal of forward-thinking vision.

0.387

Similarity Score

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



\$12,088

Average Salary Differential



8.77%

Projected 5-Year Growth

Projected employment growth for the Starting Occupation



6.30%

Projected 5-Year Growth

Projected employment growth for the Advancement Occupation

Growth

The similarity score between business intelligence architects or developers and the starting occupation is 0.387 and the average salary differential is \$12,088. While the projected 5-year employment growth for cyber security engineer or analyst, or information security engineer or analyst is 8.77%, business intelligence architect or developer's projected 5-year growth is lower at 6.30%. Average salary for the business intelli-



Cyber / Information Security Engineer / Analyst

Starting Occupation

Business Intelligence Architect / Developer

Advancement Occupation

\$70,639

Average Salary: Advancement

Occupation with 0 - 2 years experience

\$87,647

Average Salary: Advancement

Occupation with 3 - 5 years experience

\$101,639

Average Salary: Advancement

Occupation with 6+ years experience

3,137

Starting Occupation Postings

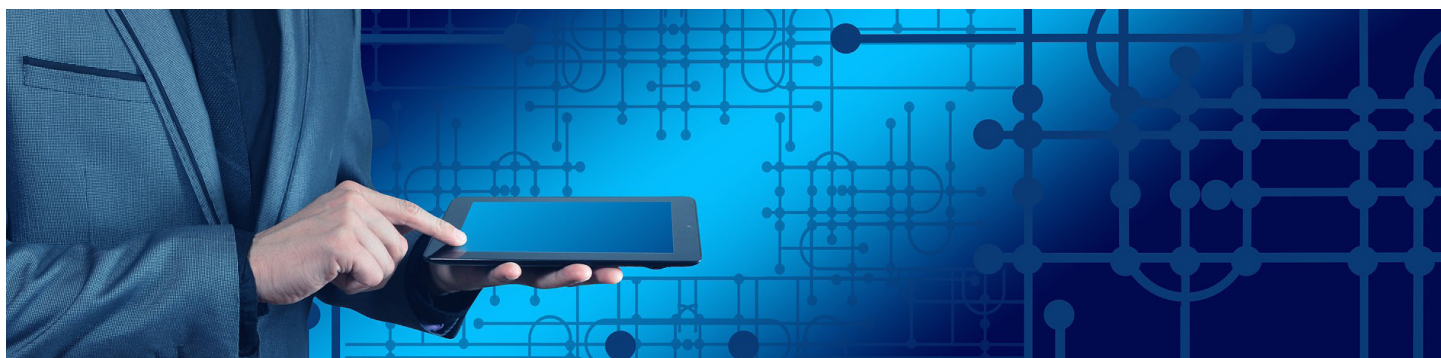
855

Advancement Occupation Postings

gence architect or developer occupation is \$70,639 for individuals with up to 2 years of experience; \$87,647 for those with 3 to 5 years, and \$101,639 for individuals with 6 or more years. There were 855 postings for the advancement occupation.

Skills

The skills in the following table represent the additional skills likely needed to move from cyber security engineer or analyst, or information security engineer or analyst to business intelligence architect or developer. 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 business intelligence architect or developer are knowledge of JavaScript, Software development, business process, Oracle and Microsoft Power BI. Defining skills represent the day-to-day tasks and responsibilities of the job. For this occupation the defining skills include knowledge of Salesforce, Salesforce development, SQL, Salesforce Visualforce and Salesforce Lightning. Distinguishing skills set a worker apart and come with a salary or growth premium. For this occupation, the distinguishing skills are Microsoft SQL Server Integration Services (SSIS), SQL Server Reporting, SQL



Cyber / Information Security Engineer / Analyst

Starting Occupation



Business Intelligence Architect / Developer

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
JavaScript	18%	Salesforce	49%	Microsoft Sql Server Integration Services (SSIS)	5%
Software Development	15%	Salesforce Development	39%	SQL Server Reporting Services (SSRS)	5%
Business Process	15%	SQL	34%	Informatica	5%
Oracle	13%	Salesforce Visualforce	24%	Data Architecture	5%
Microsoft Power BI	12%	Salesforce Lightning	19%	Oracle PL/SQL	4%

Server Reporting Services (SSRS) Informatica, Data Architecture, and Oracle PL/SQL.

Certifications

The cyber security engineer or analyst, or information security engineer or analyst occupation commonly requests a security clearance and, among others, the following certifications: Certified Information Systems Professional (CISSP), a certification designed to validate information security work experience and a working knowledge of security principles and practices. The second top certification is GIAC certifications by the SANS Institute. GIAC provides a set of vendor-neutral computer security certifications.

The business intelligence architect or developer occupation commonly requests security clearance, and among others, the following certifications: Certified Salesforce Platform Developer. With this credential, individuals use programmatic and declarative skills to extend and customize Salesforce applications. The second certification is Certified Salesforce Administrator.

Certifications

The source occupation commonly requests the following certifications:

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

The Advancement occupation commonly requests the following certifications:

- Certified Salesforce Platform Developer
- Certified Salesforce Administrator
- Security Clearance

This certification focuses on the features and functionality used to maintain a Salesforce implementation.

Cyber / Information Security Engineer / Analyst

Starting Occupation



Data Scientist

Advancement Occupation

Advancement Occupation

Data Scientists utilize their analytical, statistical, and programming skills to collect, analyze, and interpret large data sets. They then use this information to develop data-driven solutions to difficult business or other organizational challenges. These individuals know how to extract meaning from and interpret data, which requires both tools and methods from statistics and machine learning. They perform exploratory analysis through modeling or experimentation and produce visualizations or summaries of their findings. Data scientists are predominantly investigative individuals, which means that they are curious people that often like to spend time alone with their thoughts. These individuals are comfortable communicating the results of their analysis to other members of their team as well as to other stakeholders who need to be able to quickly understand the key findings and insights from their analysis.

0.338

Similarity Score

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



\$17,708

Average Salary Differential



8.77%

Projected 5-Year Growth

Projected employment growth for the Starting Occupation



5.01%

Projected 5-Year Growth

Projected employment growth for the Advancement Occupation

Growth

The similarity score between data scientists and the starting occupation is 0.338 and the average salary differential is \$17,708. While the projected 5-year employment growth for cyber security engineer or analyst, or information security engineer or analyst is 8.77%, data scientist's



Cyber / Information Security Engineer / Analyst

Starting Occupation



Data Scientist

Advancement Occupation

\$71,660

Average Salary: Advancement

Occupation with 0 - 2 years experience



\$91,049

Average Salary: Advancement

Occupation with 3 - 5 years experience



\$107,216

Average Salary: Advancement

Occupation with 6+ years experience



3,137

Starting Occupation Postings



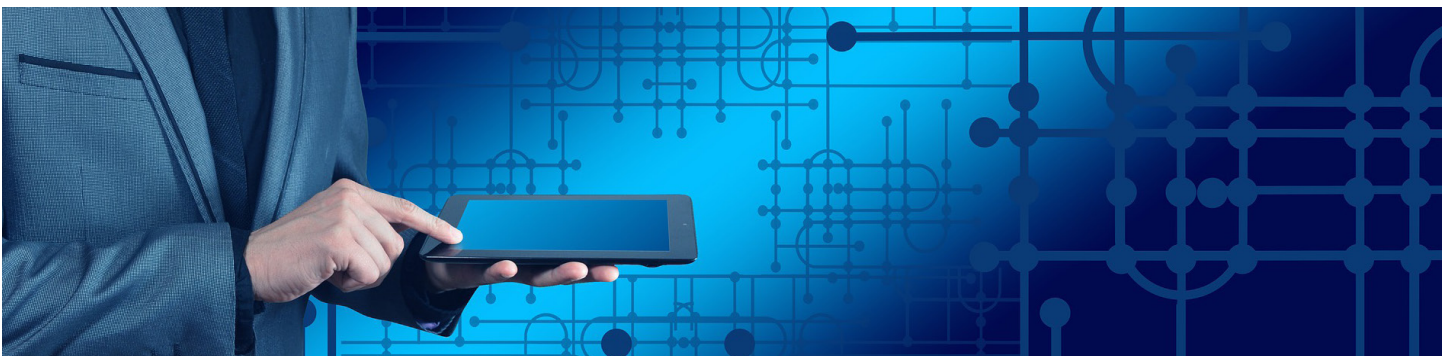
724

Advancement Occupation Postings

projected 5-year growth is lower at 5.01%. Average salary for the data scientist occupation is \$71,660 for individuals with up to 2 years of experience; \$91,049 for those with 3 to 5 years, and \$107,216 for individuals with 6 or more years. There were 724 postings for the advancement occupation.

Skills

The skills in the following table represent the additional skills likely needed to move from cyber security engineer or analyst, or information security engineer or analyst to data scientist. 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 data scientist are knowledge of Java, Tableau, SAS, Economics and Experiments. Defining skills represent the day-to-day tasks and responsibilities of the job. For this occupation the defining skills include knowledge of Data Science, Python, Machine Learning, SQL, and Data Analysis. Distinguishing skills set a worker apart and come with a salary or growth premium. For this occupation, the distinguishing skills are knowledge of Big Data Analytics, Classification Algorithms, Keras, Unsupervised Learning, and Model Building.



Cyber / Information Security Engineer / Analyst

Starting Occupation



Data Scientist

Advancement Occupation

Necessary Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Java	20%
Tableau	19%
SAS	18%
Economics	16%
Experiments	15%

Defining Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Data Science	96%
Python	73%
Machine Learning	66%
SQL	50%
Data Analysis	28%

Distinguishing Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Big Data Analytics	7%
Classification Algorithms	6%
Keras	6%
Unsupervised Learning	6%
Model Building	6%

Certifications

The cyber security engineer or analyst, or information security engineer or analyst occupation commonly requests a security clearance and, among others, the following certifications: Certified Information Systems Professional (CISSP), a certification designed to validate information security work experience and a working knowledge of security principles and practices. The second top certification is GIAC certifications by the SANS Institute. GIAC provides a set of vendor-neutral computer security certifications.

The data scientist occupation commonly requests security clearance, driver's license and among others, the following certification: 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.

Certifications

The source occupation commonly requests the following certifications:

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

The Advancement occupation commonly requests the following certifications:

- Security Clearance
- Project Management Certification
- Driver's License

Cyber / Information Security Engineer / Analyst

Starting Occupation



Data Engineer

Advancement Occupation

Advancement Occupation

Data engineers work in a variety of settings to build systems that collect, manage, and convert raw data into usable information for data scientists and business analysts to interpret. Their ultimate goal is to make data accessible so that organizations can use it to evaluate and optimize their performance. Data engineers are technical individuals in charge of architecting, building, testing, and maintaining the data platform as a whole. They are mainly tasked with transforming data into a format that can be easily analyzed. These individuals are skilled problem-solvers who are comfortable building things that are useful to others. Their soft skills center around creativity and detail orientation.

Growth

The similarity score between data engineer and the starting occupation is 0.305 and the average salary differential is \$19,137. While the projected 5-year employment growth for cyber security engineer or analyst, or information security engineer or analyst is 8.77%, data engineer's projected 5-year growth is lower at 2.56%. Average salary for the data engineer occupation is \$80,464 for individuals with up to 2 years of experience; \$97,186 for those with 3 to 5 years, and \$109,854 for individ-

0.305

Similarity Score

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



\$19,137

Average Salary Differential



8.77%

Projected 5-Year Growth

Projected employment growth for the Starting Occupation



2.56%

Projected 5-Year Growth

Projected employment growth for the Advancement Occupation



Cyber / Information Security Engineer / Analyst

Starting Occupation



Data Engineer

Advancement Occupation

\$80,464

Average Salary: Advancement

Occupation with 0 - 2 years experience



\$97,186

Average Salary: Advancement

Occupation with 3 - 5 years experience



\$109,854

Average Salary: Advancement

Occupation with 6+ years experience



3,137

Starting Occupation Postings



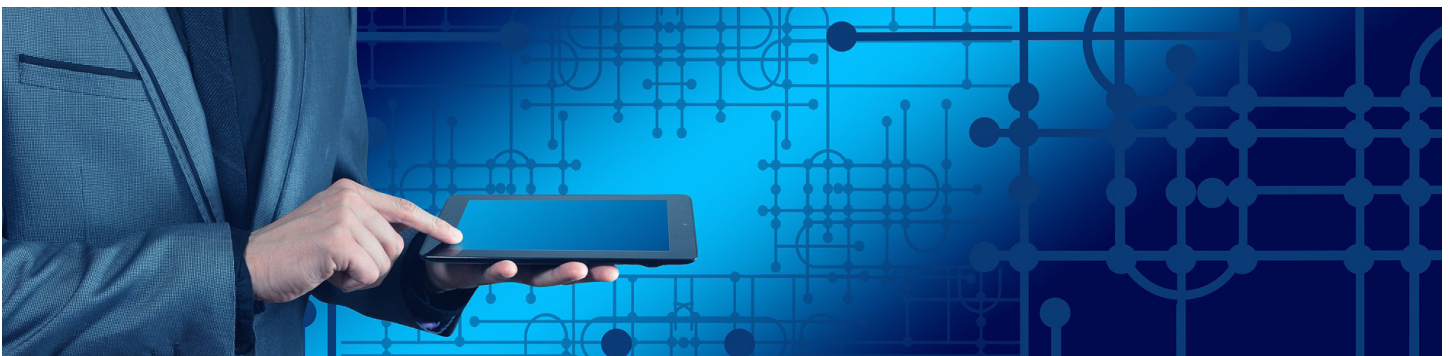
731

Advancement Occupation Postings

uals with 6 or more years. There were 731 postings for the advancement occupation.

Skills

The skills in the following table represent the additional skills likely needed to move from cyber security engineer or analyst, or information security engineer or analyst to data engineer. 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 data engineer are knowledge of Software Development, Apache Web-server, Relational Databases, Data Quality and Tableau. Defining skills represent the day-to-day tasks and responsibilities of the job. For this occupation the defining skills include knowledge of Python, SQL, Big Data, Extraction, Transformation and Loading (ETL), and Pipeline (Computing). Distinguishing skills set a worker apart and come with a salary or growth premium. For this occupation, the distinguishing skills are Amazon Web Services (AWS), Relational Database Management Systems (RDBMS), Data Warehouse Processing, PIG, and AWS Elastic MapReduce (EMR).



Cyber / Information Security Engineer / Analyst

Starting Occupation



Data Engineer

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	17%	Python	67%	Amazon Web Services (AWS)	7%
Apache Webserver	16%	SQL	66%	Relational DataBase Management System (RDBMS)	6%
Relational Databases	15%	Big Data	47%	Data Warehouse Processing	6%
Data Quality	14%	Extraction Transformation and Loading (ETL)	43%	PIG	6%
Tableau	13%	Pipeline (Computing)	38%	AWS Elastic MapReduce (EMR)	5%

Certifications

The cyber security engineer or analyst, or information security engineer or analyst occupation commonly requests a security clearance and, among others, the following certifications: Certified Information Systems Professional (CISSP), a certification designed to validate information security work experience and a working knowledge of security principles and practices. The second top certification is GIAC certifications by the SANS Institute. GIAC provides a set of vendor-neutral computer security certifications.

The data engineer occupation commonly requests security clearance, and among others, the following two top certifications: Certified Scrum Trainer (CST), a certification offered by the Scrum Alliance that enables people to teach CSM (Certified Scrum Master) and CSPO (Certified Scrum Product Owner) courses. The second certification is the Microsoft Certified Solutions Associate (MCSA). This is a certification program intended for people who seek entry-level jobs in an information technology (IT) environment.

Certifications

The source occupation commonly requests the following certifications:

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

The Advancement occupation commonly requests the following certifications:

- Security Clearance
- Certified Scrum Trainer (CST)
- Microsoft Certified Solutions Associate (MCSA)

Microsoft retired the MCSA program on January 31, 2021 in favor of role-based training and certifications. However, MCSA holders will be allowed to keep it.

Cyber / Information Security Engineer / Analyst

Starting Occupation



Mobile Applications Developer

Advancement Occupation

Advancement Occupation

A mobile applications developer is a software engineer who works primarily with mobile devices, creating, programming, testing, and maintaining apps and mobile platforms across devices like smartphones, tablets and laptops. Mobile developers write programs inside of a mobile development environment using a specific programming language such as Objective C or Java. A mobile app developer will typically develop an app for a specific operating system, such as Google Android or Apple iOS, and apply the programming languages and software development environment for that platform. These individuals are usually curious, imaginative, and value variety. They are methodical, reliable and generally plan things in advance. These individuals are comfortable with the fast pace of change in the underlying development technologies.

Growth

The similarity score between mobile applications developer and the starting occupation is 0.299 and the average salary differential is \$13,774. While the projected 5-year employment growth for cyber security engineer or analyst, or information security engineer or analyst is 8.77%, mobile applications developer's projected 5-year growth is lower at 5.63%.

0.299

Similarity Score

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



\$13,774

Average Salary Differential



8.77%

Projected 5-Year Growth

Projected employment growth for the Starting Occupation



5.63%

Projected 5-Year Growth

Projected employment growth for the Advancement Occupation



Cyber / Information Security Engineer / Analyst

Starting Occupation



Mobile Applications Developer

Advancement Occupation

\$70,826

Average Salary: Advancement

Occupation with 0 - 2 years experience



\$89,272

Average Salary: Advancement

Occupation with 3 - 5 years experience



\$102,130

Average Salary: Advancement

Occupation with 6+ years experience



3,137

Starting Occupation Postings



558

Advancement Occupation Postings

Average salary for the mobile applications developer occupation is \$70,826 for individuals with up to 2 years of experience; \$89,272 for those with 3 to 5 years, and \$102,130 for individuals with 6 or more years. There were 558 postings for the advancement occupation.

Skills

The skills in the following table represent the additional skills likely needed to move from cyber security engineer or analyst, or information security engineer or analyst to mobile applications developer. 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 mobile applications developer are knowledge of unit testing, Object-oriented Analysis and Design (OOAD), JavaScript Object Notation (JSON), Debugging, and Scrum. Defining skills represent the day-to-day tasks and responsibilities of the job. For this occupation the defining skills include knowledge of Java, Swift (Programming Language), Android Development Studio, Software Development, and Objective C. Distinguishing skills set a worker apart and come with a salary or growth premium. For this occupation, the distinguish-



Cyber / Information Security Engineer / Analyst

Starting Occupation



Mobile Applications Developer

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
Unit Testing	17%	Java	43%	Test Driven Development (TDD)	7%
Object-Oriented Analysis and Design (OOAD)	14%	Swift (Programming Language)	38%	User Interface (UI) Design	7%
JavaScript Object Notation (JSON)	14%	Android	36%	Gradle	6%
Debugging	14%	Software Development	31%	React Javascript	6%
Scrum	12%	Objective C	29%	Microsoft Xamarin	6%

ing skills are Test Driven Development (TDD), User Interface (UI) Design, Gradle, React Javascript, and Microsoft Xamarian.

Certifications

The cyber security engineer or analyst, or information security engineer or analyst occupation commonly requests a security clearance and, among others, the following certifications: Certified Information Systems Professional (CISSP), a certification designed to validate information security work experience and a working knowledge of security principles and practices. The second top certification is GIAC certifications by the SANS Institute. GIAC provides a set of vendor-neutral computer security certifications.

The mobile applications development occupation commonly requests security clearance, driver's license, and among others, the following certification: TOGAF certification. The Open Group Architecture Framework (TOGAF) is a certification for IT professionals and architects that verifies their ability to simplify complex technical

Certifications

The source occupation commonly requests the following certifications:

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

The Advancement occupation commonly requests the following certifications:

- Security Clearance
- Driver's License
- TOGAF Certification

processes in four architecture domains: business, data, applications and technical.

Cyber / Information Security Engineer / Analyst

Starting Occupation



Corporate Development Analyst / Manager

Advancement Occupation

Advancement Occupation

Corporate development analysts or managers research business decisions and information to determine how to improve these decisions in a way that supports corporate development. They monitor business information, conduct data interpretation, and produce recommendations for improving business processes that help grow the business and expand its reach into new opportunities. Corporate development analysts or managers are normally part of a team charged with applying creativity, rigor, and collaboration to help plan and execute business growth initiatives. These individuals have interest in developing business acumen. They are self-starters with the ability to work under pressure independently and as part of a team. They develop the ability to think strategically and act proactively to create strong trust and confidence with business units.

Growth

The similarity score between corporate development analyst or manager and the starting occupation is 0.27 and the average salary differential is \$11,048. While the projected 5-year employment growth for cyber security engineer or analyst, or information security engineer or analyst is 8.77%, corporate development analyst or manager's

0.27

Similarity Score

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



\$11,048

Average Salary Differential



8.77%

Projected 5-Year Growth

Projected employment growth for the Starting Occupation



4.13%

Projected 5-Year Growth

Projected employment growth for the Advancement Occupation



Cyber / Information Security Engineer / Analyst

Starting Occupation

Corporate Development Analyst / Manager

Advancement Occupation

\$77,617

Average Salary: Advancement

Occupation with 0 - 2 years experience

\$97,641

Average Salary: Advancement

Occupation with 3 - 5 years experience

\$108,757

Average Salary: Advancement

Occupation with 6+ years experience

3,137

Starting Occupation Postings

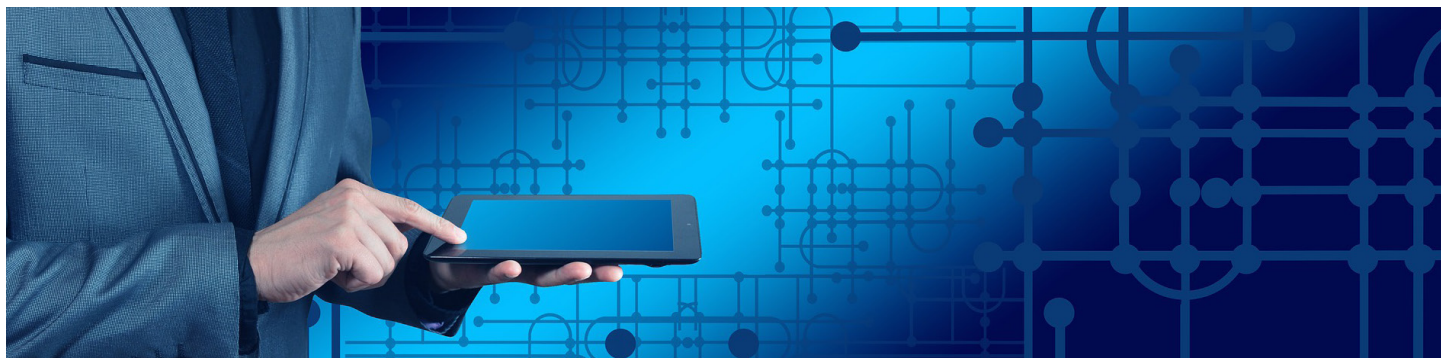
598

Advancement Occupation Postings

projected 5-year growth is lower at 4.13%. Average salary for the corporate development analyst or manager occupation is \$77,617 for individuals with up to 2 years of experience; \$97,641 for those with 3 to 5 years, and \$108,757 for individuals with 6 or more years. There were 598 postings for the advancement occupation.

Skills

The skills in the following table represent the additional skills likely needed to move from cyber security engineer or analyst, or information security engineer or analyst to corporate development analyst or manager. 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 corporate development analyst or manager are knowledge of project management, budgeting, business planning, customer service, and prospective clients. Defining skills represent the day-to-day tasks and responsibilities of the job. For this occupation the defining skills include knowledge of business development, mergers and acquisitions, sales, due diligence, and financial modeling. Distinguishing skills set a worker apart and come with a salary or growth premium. For this occupation, the distinguishing skills are knowledge



Cyber / Information Security Engineer / Analyst

Starting Occupation



Corporate Development Analyst / Manager

Advancement Occupation

Necessary Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Project Management	18%
Budgeting	17%
Business Planning	13%
Customer Service	12%
Prospective Clients	11%

Defining Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Business Development	68%
Mergers and Acquisitions	32%
Sales	31%
Due Diligence	19%
Financial Modeling	9%

Distinguishing Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Sales Strategy	7%
New Business Development	5%
Management Consulting	5%
Account Management	5%
Investment Banking	5%

of sales strategy, new business development, management consulting, account management, and investment banking.

Certifications

The cyber security engineer or analyst, or information security engineer or analyst occupation commonly requests a security clearance and, among others, the following certifications: Certified Information Systems Professional (CISSP), a certification designed to validate information security work experience and a working knowledge of security principles and practices. The second top certification is GIAC certifications by the SANS Institute. GIAC provides a set of vendor-neutral computer security certifications

The corporate development analyst or manager occupation commonly requests security clearance, driver's license and, among others, the following certification: Project Management Certification. The Certified Associate in Project Management (CAPM) from the Project Management Institute (PMI) and Project+ from

Certifications

The source occupation commonly requests the following certifications:

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

The Advancement occupation commonly requests the following certifications:

- Security Clearance
- Driver's License
- Project Management Certification

CompTIA are the best-known entry-level project management certifications.

References

For Occupation Profiles

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

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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)

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

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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)

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