

Career Pathways and Skills Analysis



Data Administration

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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 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.

Data Administration 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 Data Administration. 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 Data Administration 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.

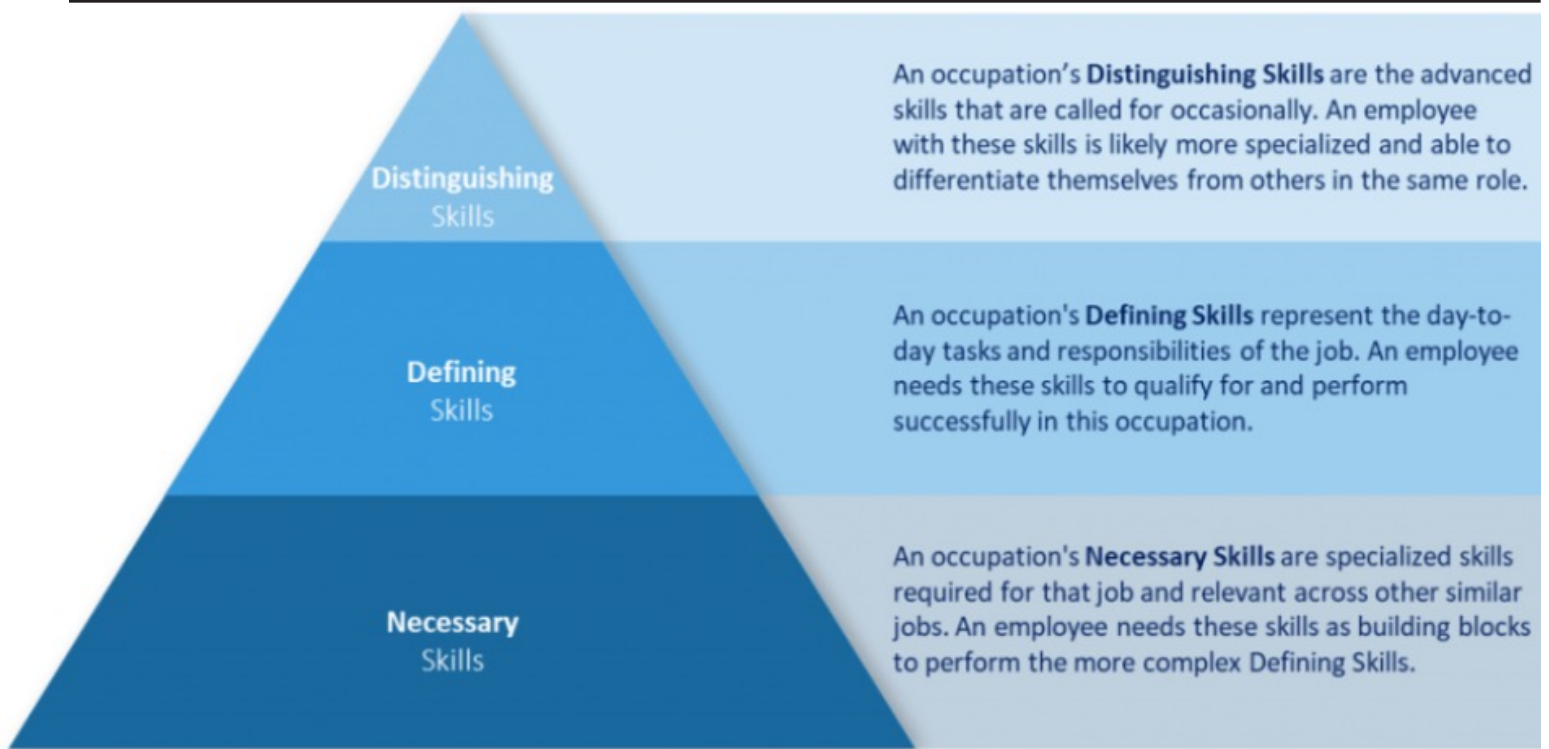
Job Opportunities in Computer Science for individuals with less than a 4-year degree

- 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 Data Administration role. This role has two starting occupations: Data Analyst or Data Mining Analyst, and Database Administrator. For each career path emerging from the Data Analyst/ Data Mining Analyst or Database Administrator occupations, the report presents salary and career advancement estimates, job openings and projected growth. The report also presents top skills and certifications associated with the occupation.

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 each of the two starting occupations of the data administration 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.

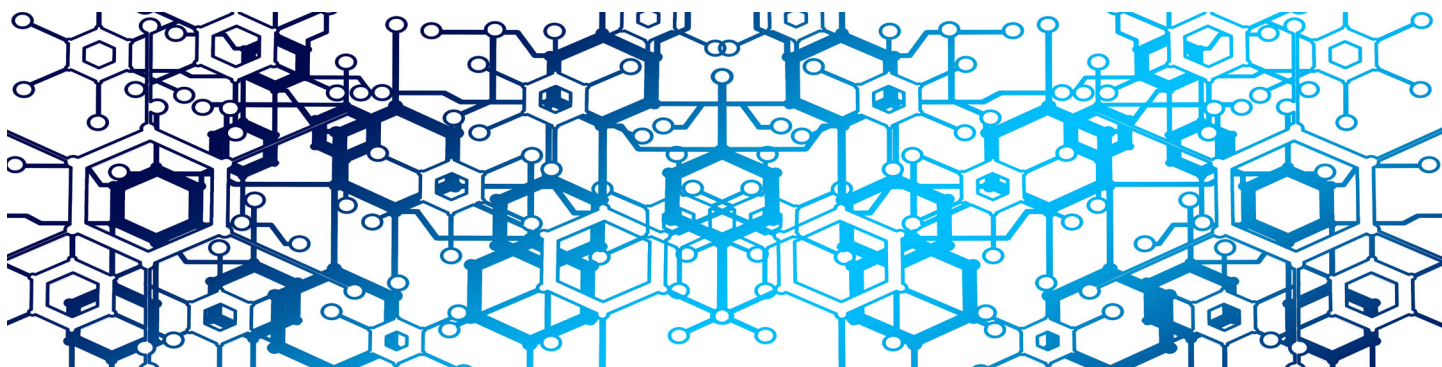
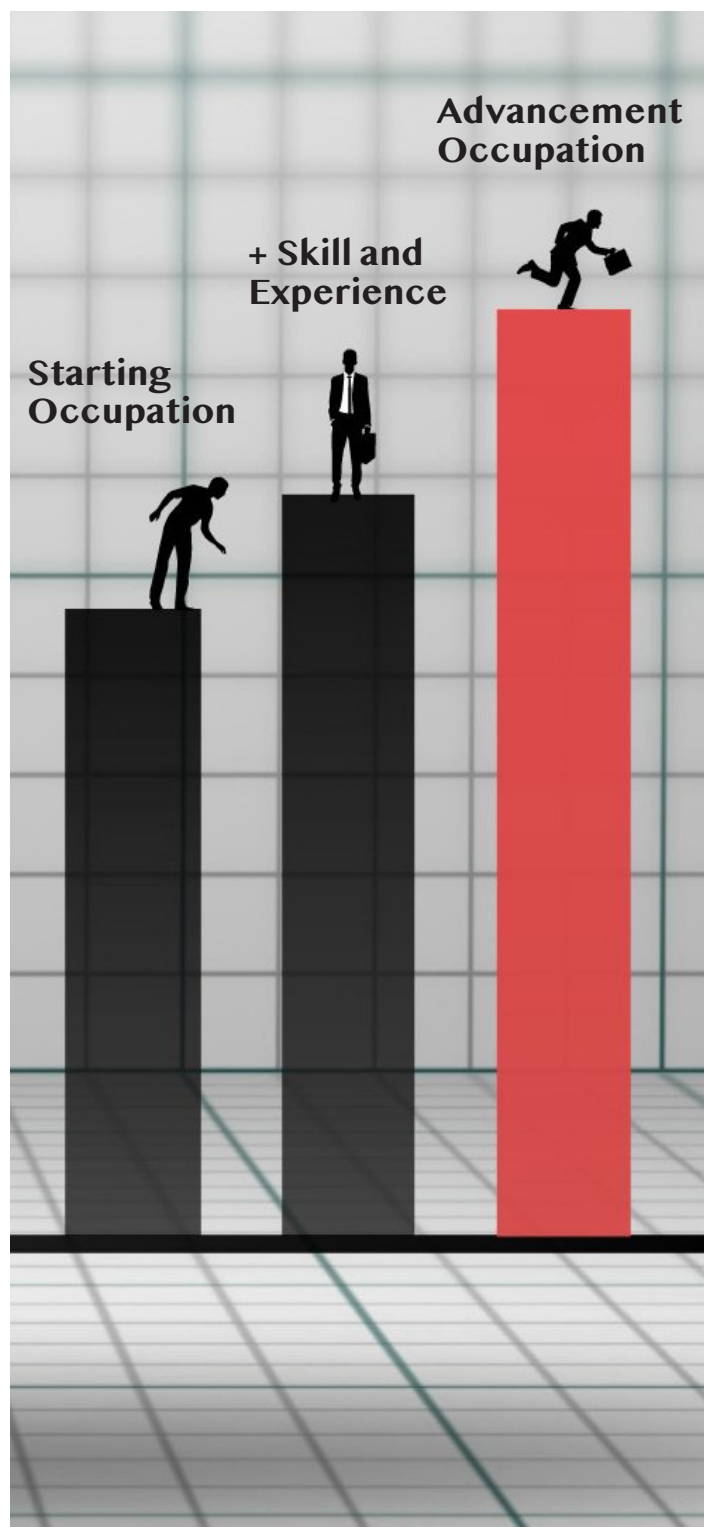
Each set of origin and destination occupations comes with a predicted salary differential and skill gap between the two occupations.



Methodology

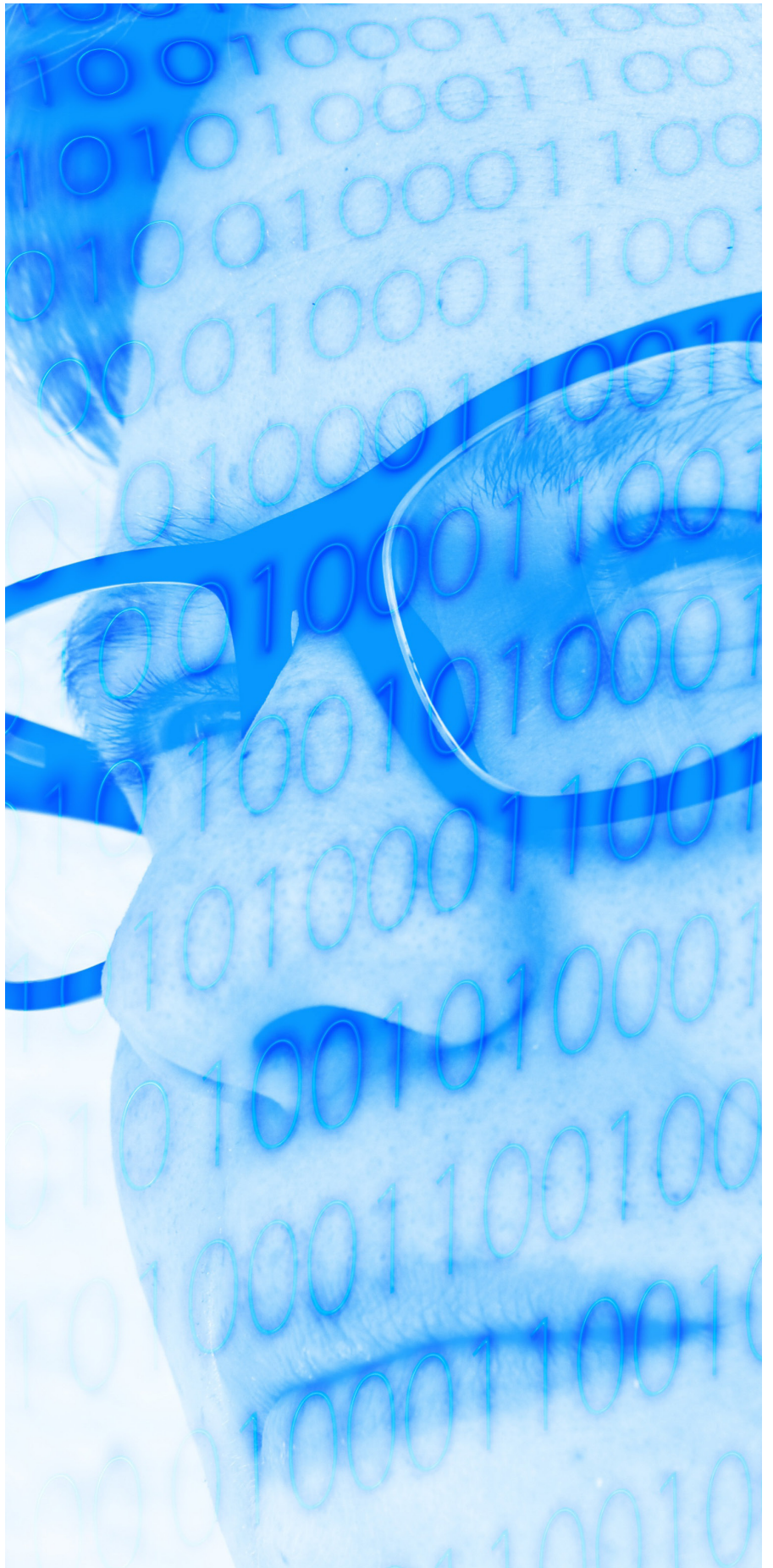
In this analysis, we use an index of similarity or ‘similarity scores’. The similarity scores for each pair of occupations have a numeric value between 0 and 1. They can be seen as a proxy measure for the feasibility of transitioning between the two jobs. Job pairs that have a similarity score of 1 can 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.



Occupation Profile: Data Administration

Occupation:
Data /
Data Mining
Analyst



Occupation Profile: Data Administration

Occupation: Data / Data Mining Analyst

Occupation

Data/ Data Mining Analysts work with data to help their organizations make better business decisions. Using techniques from a range of disciplines, including computer programming, mathematics, and statistics, data analysts draw conclusions from data to describe, predict, and improve business performance. They form the core of any analytics team and tend to be generalists versed in the methods of mathematical and statistical analysis. Data mining analysts are generally considered experts in business intelligence. Because in addition to understanding data, they translate the results of data mining into actionable ideas.

Growth

Data/ Data Mining Analyst jobs are projected to have a 3.31% growth in employment. The entry level salary for this occupation is \$66,647 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 \$80,254. The advanced career salary which requests six or more years of experience is \$90,245.

Skills

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



3.31%

Projected Growth

Estimated five-year growth in employment



\$66,647

Entry Level Salary

Salary for jobs requiring less than 2 years of experience



\$80,254

Mid Career Salary

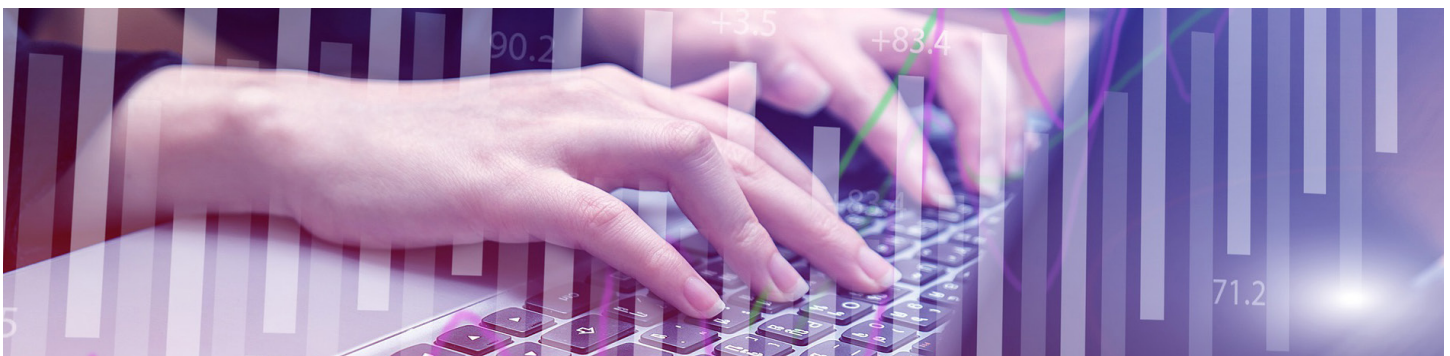
Salary for jobs requesting 3 to 5 years of experience



\$90,245

Advanced Career Salary

Salary for jobs requesting 6+ years of experience



Occupation Profile: Data Administration

Occupation: Data / Data Mining Analyst

the advancement occupation. Necessary skills are specialized skills required for this job and relevant across other similar jobs. Apart from knowledge of Oracle and SAS, most necessary skills involve a broad-based understanding of the business context through economics, business process, project management and information systems. Defining skills represent the day-to-day tasks and responsibilities of the job. They assume an increase level of technical competency. Distinguishing skills set a worker apart and come with a salary premium. Note that in this role, the prospects for growth center around understanding, manipulating big data as well as knowledge of data policies.

Certifications

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

Certifications

This occupation requests in addition to security clearance and a driver's license, a 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.

Necessary Skills

Skill Name	Percent of Postings Requesting Skill
Project Management	16%
SAS	15%
Business Process	12%
Economics	12%
Oracle	11%
Information Systems	11%

Defining Skills

Skill Name	Percent of Postings Requesting Skill
Data Analysis	63%
SQL	52%
Tableau	26%
Python	23%
Data Warehousing	17%
Data Science	16%

Distinguishing Skills

Skill Name	Percent of Postings Requesting Skill
Big Data	7%
R	7%
Data Governance	6%
Data Integration	5%
SAP BusinessObjects	4%
Data Validation	4%

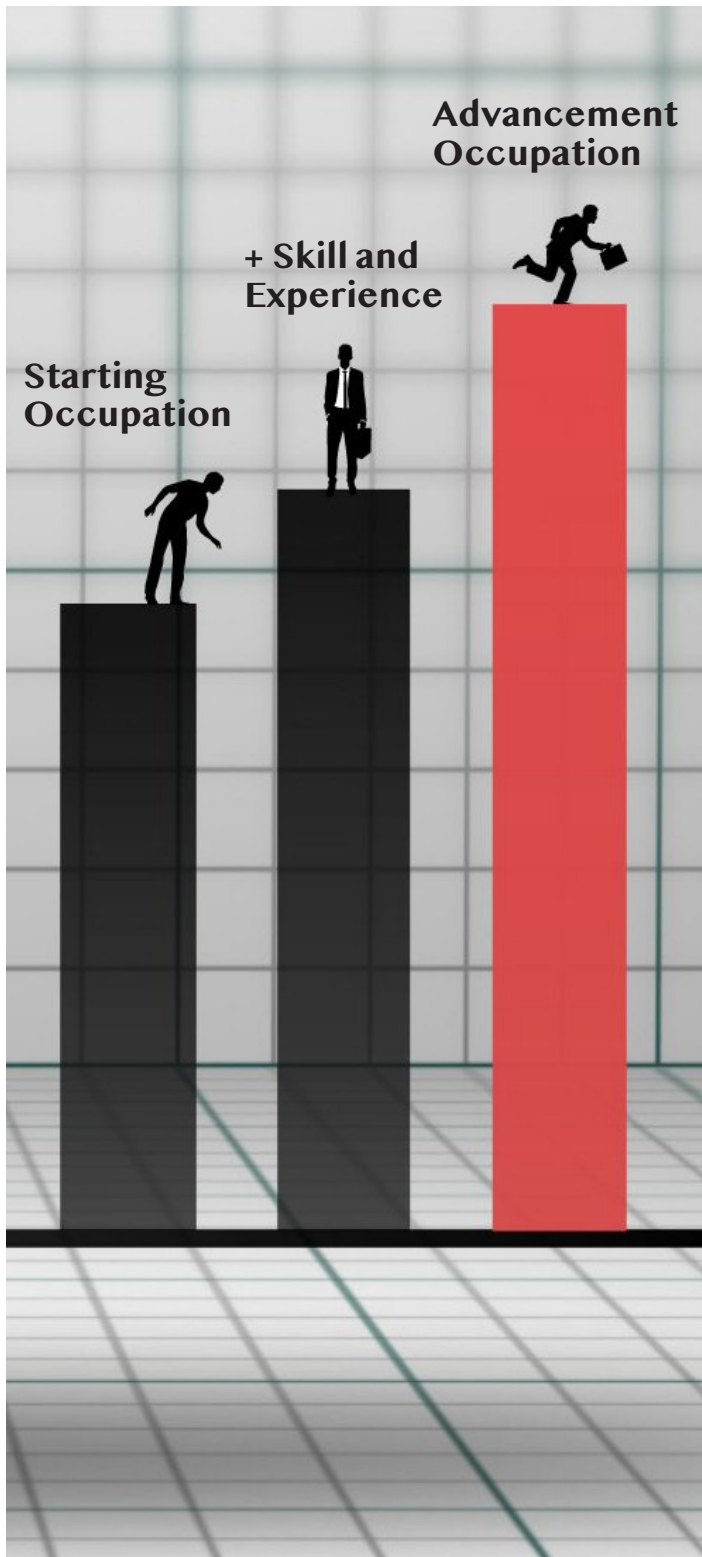
Potential Career Paths for Data / Data Mining Analyst

For the starting occupation of data/ data mining 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.

In the pages that follow, we provide for each Advancement Occupation, skill gaps, certifications, salary and workforce informa-

tion. With this information, students, educators, and policymakers can see the paths a worker could take from the Starting Occupation to the Advancement Occupation.





Detailed
Career Pathways:

Data /
Data Mining
Analyst

Data / Data Mining Analyst

Starting Occupation



Database Architect

Advancement Occupation

Advancement Occupation

Database Architects design strategies for company-wide large databases, data warehouse systems, and multidimensional networks. They set standards for database operations, programming, query processes, and security. Database architects model, design, and construct large relational databases or data warehouses. Create and optimize data models for warehouse infrastructure and workflow. They also integrate new systems with existing warehouse structure and refine system performance and functionality. These individuals are comfortable structuring complex problems through deductive reasoning, and can communicate their recommendations in simple business-like language. But most of all, they expose significant oral and reading comprehension.

Growth

The similarity score between database architect and the starting occupation is 0.635 and the average salary differential is \$25,507. While the projected 5-year employment growth for data/ data mining analyst is 3.31%, database architect's projected 5-year growth is higher at 2.99%. Average salary for the advancement occupation is \$69,185 for individuals with up to 2 years of experience; \$85,231 for those with 3 to 5 years, and \$98,672 for individ-

0.635

Similarity Score

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



\$25,507

Average Salary Differential



3.31%

Projected 5-Year Growth

*Projected employment growth for
the Starting Occupation*



2.99%

Projected 5-Year Growth

*Projected employment growth for
the Advancement Occupation*



Data / Data Mining Analyst

Starting Occupation



Database Architect

Advancement Occupation

\$69,185

Average Salary: Advancement

Occupation with 0 - 2 years experience



\$85,231

Average Salary: Advancement

Occupation with 3 - 5 years experience



\$98,672

Average Salary: Advancement

Occupation with 6+ years experience



1,665

Starting Occupation Postings



870

Advancement Occupation Postings

uals with 6 or more years. There were 870 postings for the advancement occupation.

Skills

The skills in the following table represent the additional skills likely needed to move from data/ data mining analyst to database 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 database architect are data analysis, knowledge of Oracle, data quality, project management and knowledge of SQL Server. Defining skills represent the day-to-day tasks and responsibilities of the job. For this occupation the defining skills include SQL, data architecture, data warehousing, data modeling and knowledge of Extraction, Transformation and Loading (ETL). Distinguishing skills set a worker apart and come with a salary or growth premium. For this occupation, the distinguishing skills are knowledge of ERwin, database architecture, teradata, Master Data Management (MDM), and Virtualization.

Certifications

The data/ data mining analyst occupation commonly requests the following certifications. Security clearance, Driver's license,



Data / Data Mining Analyst

Starting Occupation



Database Architect

Advancement Occupation

Necessary Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Data Analysis	19%
Oracle	18%
Data Quality	16%
Project Management	12%
SQL Server	12%

Defining Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
SQL	43%
Data Architecture	33%
Data Warehousing	26%
Data Modeling	23%
Extraction Transformation and Loading (ETL)	23%

Distinguishing Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
ERwin	6%
Database Architecture	6%
Teradata	6%
Master Data Management (MDM)	5%
Virtualization	5%

and a 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 database architect occupation commonly requests security clearance, and among others, the following top certifications: IT Infrastructure Library (ITIL) Certification. This is an entry-level certification for IT service management. The second is the 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.

Certifications

The source occupation commonly requests the following certifications:

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

The Advancement occupation commonly requests the following certifications:

- Security Clearance
- IT Infrastructure Library (ITIL) Certification
- Certified Scrum Trainer (CST)

Data / Data Mining Analyst

Starting Occupation



Business Intelligence Architect / Developer

Advancement Occupation

Advancement Occupation

Business Intelligence Architects/ 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.

Growth

The similarity score between business intelligence architect / developer and the starting occupation is 0.581 and the average salary differential is \$30,818. While the projected 5-year employment growth for data/ data mining analyst is 3.31%, business intelligence architect / developer's projected 5-year growth is considerably higher at 6.30%. Average salary for the business intel-

0.581

Similarity Score

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



\$30,818

Average Salary Differential



3.31%

Projected 5-Year Growth

*Projected employment growth for
the Starting Occupation*



6.30%

Projected 5-Year Growth

*Projected employment growth for
the Advancement Occupation*



Data / Data Mining 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



1,665

Starting Occupation Postings



855

Advancement Occupation Postings

intelligence architect / 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 data/ data mining analyst to business intelligence architect/ 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/ developer are knowledge of JavaScript, software development, business processes, 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 knowledge of Microsoft SQL Server Integration Services (SSIS), SQL Server Reporting Services (SSRS), Informati-



Data / Data Mining Analyst

Starting Occupation



Business Intelligence Architect / Developer

Advancement Occupation

Necessary Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
JavaScript	18%
Software Development	15%
Business Process	15%
Oracle	13%
Microsoft Power BI	12%

Defining Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Salesforce	49%
Salesforce Development	39%
SQL	34%
Salesforce Visualforce	24%
Salesforce Lightning	19%

Distinguishing Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Microsoft Sql Server Integration Services (SSIS)	5%
SQL Server Reporting Services (SSRS)	5%
Informatica	5%
Data Architecture	5%
Oracle PL/SQL	4%

ca, Data Architecture, and Oracle PL/SQL.

Certifications

The data/ data mining analyst occupation commonly requests the following certifications. Security clearance, Driver's license, and a 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 business intelligence architect/ 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 is the Certified Salesforce Administrator. This certification focuses on the features and functionality used to maintain a Salesforce implementation.

Certifications

The source occupation commonly requests the following certifications:

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

The Advancement occupation commonly requests the following certifications:

- Certified Salesforce Platform Developer
- Certified Salesforce Administrator
- Security clearance

Data / Data Mining Analyst

Starting Occupation



Database Administrator

Advancement Occupation

Advancement Occupation

Database administrators set up databases according to a company's needs and make sure they operate efficiently. They also fine-tune, upgrade and test modifications to the databases as needed. For example, they create or organize systems to store and secure a variety of data, such as financial information and customer shipping records. Individuals in this occupation are comfortable resolving complex issues, so attention to detail is an essential trait in this profession, as is a passion for problem-solving. Communication skills are also important since database administrators often work as part of a team with computer programmers and managers. Ongoing maintenance of a database requires being on call.

Growth

The similarity score between database administrator and the starting occupation is 0.525 and the average salary differential is \$9,570. While the projected 5-year employment growth for data/ data mining analyst is 3.31%, data administrator's projected 5-year growth is considerably lower at 0.17%. Average salary for the data administrator occupation is \$65,432 for individuals with up to 2 years of experience; \$78,590 for those with 3 to 5 years, and \$97,463 for individuals with 6 or more years. There were 1,297

0.525

Similarity Score

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



\$9,570

Average Salary Differential



3.31%

Projected 5-Year Growth

*Projected employment growth for
the Starting Occupation*



0.17%

Projected 5-Year Growth

*Projected employment growth for
the Advancement Occupation*



Data / Data Mining Analyst

Starting Occupation



Database Administrator

Advancement Occupation

\$65,432

Average Salary: Advancement
Occupation with 0 - 2 years experience



\$78,590

Average Salary: Advancement
Occupation with 3 - 5 years experience



\$97,463

Average Salary: Advancement
Occupation with 6+ years experience



1,665

Starting Occupation Postings



1,297

Advancement Occupation Postings

postings for the advancement occupation.

Skills

The skills in the following table represent the additional skills likely needed to move from data/ data mining analyst to database 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 database administrator are knowledge of database design, Linux, Python, UNIX, and database management. Defining skills represent the day-to-day tasks and responsibilities of the job. For this occupation the defining skills include knowledge of SQL, database administration, Oracle, Teradata DBA, and SQL Server. Distinguishing skills set a worker apart and come with a salary or growth premium. For this occupation, the distinguishing skills are knowledge of Informatica, MySQL, database tuning, database upgrade, and Relational Database Management Systems (RDBMS).

Certifications

The data/ data mining analyst occupation commonly requests the following certifications. Security clearance, Driver's license, and a project management certification. The Certified Associate in Project Man-



Data / Data Mining Analyst

Starting Occupation



Database 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
Database Design	14%	SQL	50%	Informatica	7%
Linux	14%	Database Administration	34%	MySQL	6%
Python	11%	Oracle	28%	Database Tuning	6%
UNIX	11%	Teradata DBA	26%	Database Upgrade	5%
Database Management	11%	SQL Server	21%	Relational DataBase Management System (RDBMS)	5%

agement (CAPM) from the Project Management Institute (PMI) and Project+ from CompTIA are the best-known entry-level project management certifications.

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

Certifications

The source occupation commonly requests the following certifications:

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

The Advancement occupation commonly requests the following certifications:

- Security Clearance
- Driver's license
- CompTIA Security+

Data / Data Mining Analyst

Starting Occupation



Data Engineer

Advancement Occupation

Advancement Occupation

Data engineers are responsible for finding trends in data sets and developing algorithms to help make raw data more useful. This role requires a significant set of technical skills, but data engineers also need communication skills to work across departments to understand what organization leaders want to gain from existing large datasets. These individuals are comfortable with the use of mathematical or statistical skills to develop, test or validate models from available datasets. But they also have the ability to convey the results of their data analysis in visual or summary form. Most importantly, data engineers are skilled database programmers who can develop efficient data pipelines, that is, services or actions to process heterogeneous data in several useful steps.

Growth

The similarity score between data engineer and the starting occupation is 0.514 and the average salary differential is \$37,868. While the projected 5-year employment growth for data/ data mining analyst is 3.31%, 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

0.514

Similarity Score

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



\$37,868

Average Salary Differential



3.31%

Projected 5-Year Growth

*Projected employment growth for
the Starting Occupation*



2.56%

Projected 5-Year Growth

*Projected employment growth for
the Advancement Occupation*



Data / Data Mining 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



1,665

Starting Occupation Postings



731

Advancement Occupation Postings

with 3 to 5 years, and \$109,854 for individuals 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 data/ data mining 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 webserver, relational databases, data quality, and Teradata. 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 knowledge of Amazon Web Services (AWS), Relational Database Management Systems (RDBMS), Data Warehouse Processing, PIG, and AWS Elastic MapReduce.

Certifications

The data/ data mining analyst occupation commonly requests the following certifica-



Data / Data Mining 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%

tions. Security clearance, Driver's license, and a 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 data engineer occupation commonly requests security clearance, and among others, the following two 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. 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.

Certifications

The source occupation commonly requests the following certifications:

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

The Advancement occupation commonly requests the following certifications:

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

Data / Data Mining Analyst

Starting Occupation



Software Developer / Engineer

Advancement Occupation

Advancement Occupation

Software developers/ engineers design, and build computer programs. They identify user needs, develop the programs, test out new software, and make improvements. Some develop new applications for mobile or desktop use, while others build underlying systems software such as operating systems. They design each piece of an application or system and plan how the pieces will work together. Software developers / engineers create a variety of models and diagrams showing programmers the software code needed for an application. Working closely with computer programmers, software developers fill crucial roles not only in the computer systems industry, but also in manufacturing, finance, health services and software publishing industries. These individuals are comfortable with the uncertainties surrounding innovation and creativity. They have an ability to focus and concentrate for prolonged time periods addressing numerous and interlocking pieces. Finally, software developers / engineers are problem solvers, as they are responsible for solving the problems that occur during the development process.

Growth

The similarity score between software developer/ engineer and the start-

0.468

Similarity Score

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



\$26,130

Average Salary Differential



3.31%

Projected 5-Year Growth

*Projected employment growth for
the Starting Occupation*



5.84%

Projected 5-Year Growth

*Projected employment growth for
the Advancement Occupation*



Data / Data Mining Analyst

Starting Occupation



Software Developer / Engineer

Advancement Occupation

\$68,768

Average Salary: Advancement

Occupation with 0 - 2 years experience



\$84,801

Average Salary: Advancement

Occupation with 3 - 5 years experience



\$98,508

Average Salary: Advancement

Occupation with 6+ years experience



1,665

Starting Occupation Postings



16,139

Advancement Occupation Postings

ing occupation is 0.468 and the average salary differential is \$26,130. While the projected 5-year employment growth for data/ data mining analyst is 3.31%, software developer/ engineer's projected 5-year growth is higher at 5.84%. Average salary for the software developer/ engineer occupation is \$68,768 for individuals with up to 2 years of experience; \$84,801 for those with 3 to 5 years, and \$98,508 for individuals with 6 or more years. There were 16,139 postings for the advancement occupation.

Skills

The skills in the following table represent the additional skills likely needed to move from data/ data mining analyst to software developer/ 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 software developer/ engineer are knowledge of Microsoft C#, Linux, .NET, Oracle, and C++. Defining skills represent the day-to-day tasks and responsibilities of the job. For this occupation the defining skills include knowledge of Java, software engineering, software development, SQL, and JavaScript. Distinguishing skills set a worker apart and come with a salary



Data / Data Mining Analyst

Starting Occupation



Software Developer / Engineer

Advancement Occupation

Necessary Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Microsoft C#	16%
Linux	15%
.NET	13%
Oracle	12%
C++	12%

Defining Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Java	40%
Software Engineering	34%
Software Development	33%
SQL	32%
JavaScript	26%

Distinguishing Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
JavaScript Object Notation (JSON)	7%
jQuery	6%
React Javascript	6%
Spring Boot	6%
Ruby	5%

or growth premium. For this occupation, the distinguishing skills are knowledge of JavaScript Object Notation (JSON), JQuery, React JavaScript, Spring Boot, and Ruby.

Certifications

The data/ data mining analyst occupation commonly requests the following certifications. Security clearance, Driver's license, and a 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 software developer/ engineer occupation commonly requests security clearance, and among others, the following certifications: IT Infrastructure Library (ITIL) Certification. Entry-level certification for IT service management. The second certification is 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.

Certifications

The source occupation commonly requests the following certifications:

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

The Advancement occupation commonly requests the following certifications:

- Security Clearance
- IT Infrastructure Library (ITIL) Certification
- CompTIA Security+

Data / Data Mining Analyst

Starting Occupation



Technology Consultant

Advancement Occupation

Advancement Occupation

Technology Consultants advise clients on how to best use information technology (IT) practices to achieve their organizational goals. Traditionally, technology consultants have been engaged by organizations in projects geared towards improving business processes, reducing costs, and maximizing use of technology opportunities. Today, these projects also involve initiatives that range from digital strategy to technology change projects. As technology rapidly evolves, this area of work is becoming increasingly important to ensure the effectiveness and future growth of organizations. These individuals like to be at the forefront of technology developments. They develop a broad-base of knowledge and understanding of key technologies that organizations need and that they are able to support. They are comfortable working under pressure and can provide training on their project deliverables.

0.467

Similarity Score

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



\$15,717

Average Salary Differential



3.31%

Projected 5-Year Growth

*Projected employment growth for
the Starting Occupation*



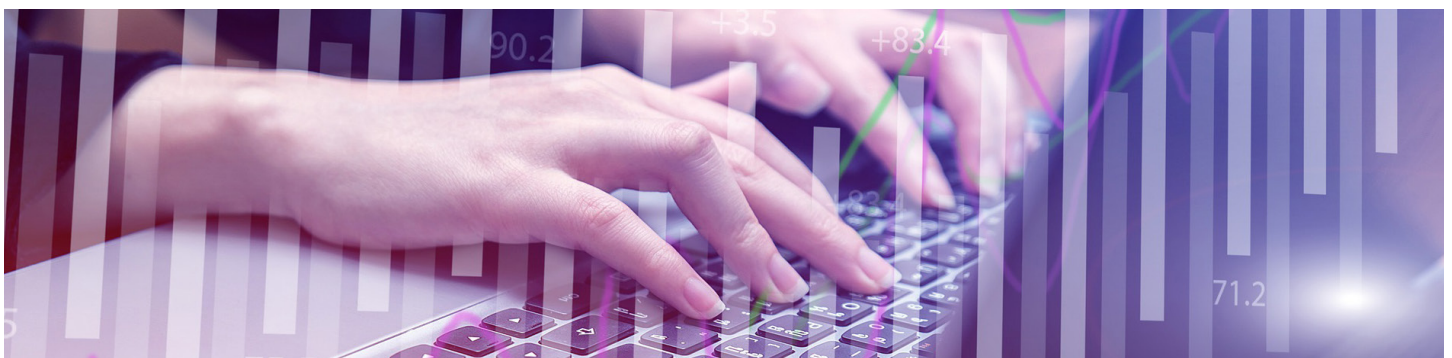
1.86%

Projected 5-Year Growth

*Projected employment growth for
the Advancement Occupation*

Growth

The similarity score between technology consultant and the starting occupation is 0.467 and the average salary differential is \$15,717. While the projected 5-year employment growth for data/data mining analyst is 3.31%, technology consultant's projected 5-year growth is considerably lower at 1.86%.



Data / Data Mining Analyst

Starting Occupation



Technology Consultant

Advancement Occupation

\$70,367

Average Salary: Advancement

Occupation with 0 - 2 years experience



\$84,526

Average Salary: Advancement

Occupation with 3 - 5 years experience



\$100,060

Average Salary: Advancement

Occupation with 6+ years experience



1,665

Starting Occupation Postings



637

Advancement Occupation Postings

Average salary for the technology consultant occupation is \$70,367 for individuals with up to 2 years of experience; \$84,526 for those with 3 to 5 years, and \$100,060 for individuals with 6 or more years. There were 637 postings for the advancement occupation.

Skills

The skills in the following table represent the additional skills likely needed to move from data/ data mining analyst to technology consultant. 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 technology consultant are knowledge of customer service, customer contact, business development, SQL, and Information Systems. Defining skills represent the day-to-day tasks and responsibilities of the job. For this occupation the defining skills include knowledge of SAP, project management, business process, Enterprise Resource Planning (ERP), and business solutions. Distinguishing skills set a worker apart and come with a salary or growth premium. For this occupation, the distinguishing skills are knowledge of SAP Success Factors, SAP Implementation, SAP S/4HANA, Re-engineering, and Full Life Cycle.



Data / Data Mining Analyst

Starting Occupation



Technology Consultant

Advancement Occupation

Necessary Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Customer Service	15%
Customer Contact	13%
Business Development	12%
SQL	12%
Information Systems	11%

Defining Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
SAP	27%
Project Management	24%
Business Process	19%
Enterprise Resource Planning (ERP)	10%
Business Solutions	7%

Distinguishing Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
SAP SuccessFactors	8%
SAP Implementation	8%
SAP S/4HANA	6%
Reengineering	4%
Full Life Cycle	4%

Certifications

The data/ data mining analyst occupation commonly requests the following certifications. Security clearance, Driver's license, and a 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 technology consultant occupation commonly requests, among other, the following certifications: Certified Information Systems Auditor (CISA). This is the standard of achievement from ISACA for those who audit and assess an organization's information technology. The second is 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 third most common certification is Certified Information Systems Security Professional (CISSP), a certification designed to validate information secu-

Certifications

The source occupation commonly requests the following certifications:

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

The Advancement occupation commonly requests the following certifications:

- Certified Information Systems Auditor (CISA)
- Project Management Certification
- Certified Information Systems Security Professional (CISSP)

urity 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.

Data / Data Mining Analyst

Starting Occupation



Financial Quantitative Analyst

Advancement Occupation

Advancement Occupation

Financial quantitative analysts develop quantitative techniques to inform securities investing, equities investing, pricing, or valuation of financial instruments. They develop mathematical or statistical models for risk management, asset optimization, pricing, or relative value analysis. These individuals are comfortable with the use of mathematics and statistics and have good analytical and problem-solving skills. They develop in-depth knowledge of finance and are excellent with computer operation and programming, particularly with data mining and data analysis.

Growth

The similarity score between financial quantitative analyst and the starting occupation is 0.442 and the average salary differential is \$18,337. While the projected 5-year employment growth for data/ data mining analyst is 3.31%, the advancement occupation's projected 5-year growth is lower at 1.93%. Average salary for the advancement occupation is \$66,647 for individuals with up to 2 years of experience; \$80,254 for those with 3 to 5 years, and \$99,245 for individuals with 6 or more years. There were only 54 postings for the advancement occupation.

0.442

Similarity Score

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



\$18,337

Average Salary Differential



3.31%

Projected 5-Year Growth

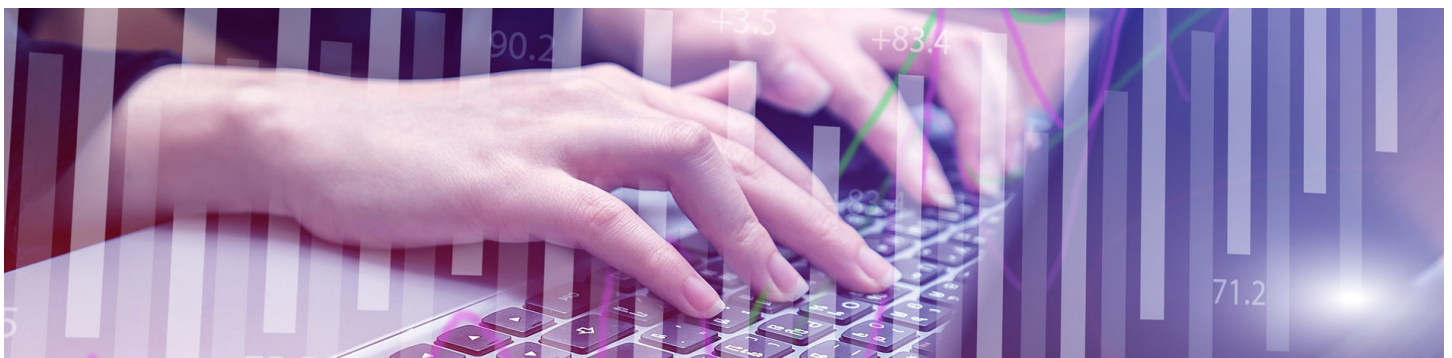
*Projected employment growth for
the Starting Occupation*



1.93%

Projected 5-Year Growth

*Projected employment growth for
the Advancement Occupation*



Data / Data Mining Analyst

Starting Occupation

Financial Quantitative Analyst

Advancement Occupation

\$66,647

Average Salary: Advancement

Occupation with 0 - 2 years experience

\$80,254

Average Salary: Advancement

Occupation with 3 - 5 years experience

\$99,245

Average Salary: Advancement

Occupation with 6+ years experience

1,665

Starting Occupation Postings

54

Advancement Occupation Postings

Skills

The skills in the following table represent the additional skills likely needed to move from data/ data mining analyst to financial quantitative 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 statistics, statistical analysis, machine learning, business process, and data analysis. Defining skills represent the day-to-day tasks and responsibilities of the job. For this occupation the defining skills include knowledge of Python, Risk Management, SQL, Economics, and SAS. Distinguishing skills set a worker apart and come with a salary or growth premium. For this occupation, the distinguishing skills are knowledge of predictive models, capital markets, qualitative research, financial modeling, and Basel.

Certifications

The data/ data mining analyst occupation commonly requests the following certifications. Security clearance, Driver's license, and a project management certification. The Certified Associate in Project Management (CAPM) from the Project Man-



Data / Data Mining Analyst

Starting Occupation



Financial Quantitative Analyst

Advancement Occupation

Necessary Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Statistics	19%
Statistical Analysis	18%
Machine Learning	16%
Business Process	15%
Data Analysis	15%

Defining Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Python	50%
Risk Management	45%
SQL	44%
Economics	38%
SAS	38%

Distinguishing Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Predictive Models	7%
Capital Markets	7%
Quantitative Research	6%
Financial Modeling	6%
Basel	6%

agement Institute (PMI) and Project+ from CompTIA are the best-known entry-level project management certifications.

The financial quantitative analyst occupation commonly requests among others, the following certifications: Financial Risk Manager (FRM). The FRM is the leading certification for risk managers offered by the Global Association of Risk Professionals (GARP). It is consistently in demand by nearly every major bank and firm in the world, and is awarded only to professionals who demonstrate the knowledge and ability to anticipate, respond, and adapt to critical risk issues. The second certification is Chartered Financial Analyst (CFA). This credential is from the CFA Institute. This global organization promotes education, professionalism, and ethics in the investment industry. The third certification is Certified Public Accountant (CPA). A certified public accountant (CPA) is a designation provided to licensed accounting professionals. The CPA license is provided by the Board of Accountancy for each state.

Certifications

The source occupation commonly requests the following certifications:

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

The Advancement occupation commonly requests the following certifications:

- Financial Risk Manager (FRM)
- Chartered Financial Analyst (CFA)
- Certified Public Accountant (CPA)

Data / Data Mining Analyst

Starting Occupation



Data Warehousing Specialist

Advancement Occupation

Advancement Occupation

Data warehousing specialists design, model, or implement corporate data warehousing activities. They program and configure warehouses of database information and provide support to warehouse users. Data warehousing specialists act as liaison between engineers, programmers, and analysts. They implement and enforce standards and procedures to ensure data is managed consistently and properly integrated. Additionally, data warehousing specialists manipulate and combine data from various sources to enhance the data warehouse. These individuals have great analytical, computer and communication skills. They are comfortable working in large teams and coordinating the work of others.

Growth

The similarity score between data warehousing specialist and the starting occupation is 0.731 and the average salary differential is \$8,892. While the projected 5-year employment growth for data/ data mining analyst is 3.31%, data warehousing specialist's projected 5-year growth is slightly lower at 2.70%. Average salary for the data warehousing specialist occupation is \$66,647 for individuals with up to 2 years of experience; \$80,254 for those with 3 to 5 years, and \$99,245 for indi-

0.731

Similarity Score

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



\$8,892

Average Salary Differential



3.31%

Projected 5-Year Growth

*Projected employment growth for
the Starting Occupation*



2.70%

Projected 5-Year Growth

*Projected employment growth for
the Advancement Occupation*



Data / Data Mining Analyst

Starting Occupation



Data Warehousing Specialist

Advancement Occupation

\$66,647

Average Salary: Advancement

Occupation with 0 - 2 years experience

\$80,254

Average Salary: Advancement

Occupation with 3 - 5 years experience

\$99,245

Average Salary: Advancement

Occupation with 6+ years experience

1,665

Starting Occupation Postings

534

Advancement Occupation Postings

viduals with 6 or more years. There were 534 postings for the advancement occupation.

Skills

The skills in the following table represent the additional skills likely needed to move from data/ data mining analyst to data warehousing 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 data warehousing specialist are knowledge Oracle, project management, Python, data analysis, and business process. Defining skills represent the day-to-day tasks and responsibilities of the job. For this occupation the defining skills include knowledge of SQL, data warehousing, data management, Extraction, Transformation and Loading (ETL), and data quality. Distinguishing skills set a worker apart and come with a salary or growth premium. For this occupation, the distinguishing skills are knowledge of data architecture, big data, Apache Hadoop, Microsoft SQL Server Integration Services (SSIS), and performance tuning.

Certifications

The data/ data mining analyst occupation commonly requests the following certifications. Security clearance, Driver's license,



Data / Data Mining Analyst

Starting Occupation



Data Warehousing Specialist

Advancement Occupation

Necessary Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Oracle	15%
Project Management	14%
Python	12%
Data Analysis	11%
Business Process	10%

Defining Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
SQL	33%
Data Warehousing	28%
Data Management	24%
Extraction Transformation and Loading (ETL)	23%
Data Quality	14%

Distinguishing Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Data Architecture	8%
Big Data	7%
Apache Hadoop	5%
Microsoft Sql Server Integration Services (SSIS)	5%
Performance tuning	5%

and a 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 data warehousing specialist occupation commonly requests security clearance and a 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:

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

The Advancement occupation commonly requests the following certifications:

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

Data / Data Mining Analyst

Starting Occupation



IT Project Manager

Advancement Occupation

Advancement Occupation

IT project managers are individuals charged with overseeing the process of planning, executing and delegating responsibilities around an organization's information technology (IT) pursuits and goals. Specifically, they help determine the systems and technology needed for specific IT projects; create detailed schedules; build a budget; identify staffing needs; and hire and manage the project staff. These individuals are comfortable in both, the technical as well as the organizational environment of the project, making them very effective as liaison between business and technical aspects of projects. They are good communicators and over time, develop an effective sense for negotiation.

Growth

The similarity score between IT project manager and the starting occupation is 0.486 and the average salary differential is \$18,724. While the projected 5-year employment growth for data/ data mining analyst is 3.31%, IT project manager's projected 5-year growth is considerably similar at 3.12%. Average salary for the IT project manager occupation is \$70,136 for individuals with up to 2 years of experience; \$84,972 for those with 3 to 5 years, and \$98,182 for individuals with 6 or more years. There were 3,760

0.486

Similarity Score

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



\$18,724

Average Salary Differential



3.31%

Projected 5-Year Growth

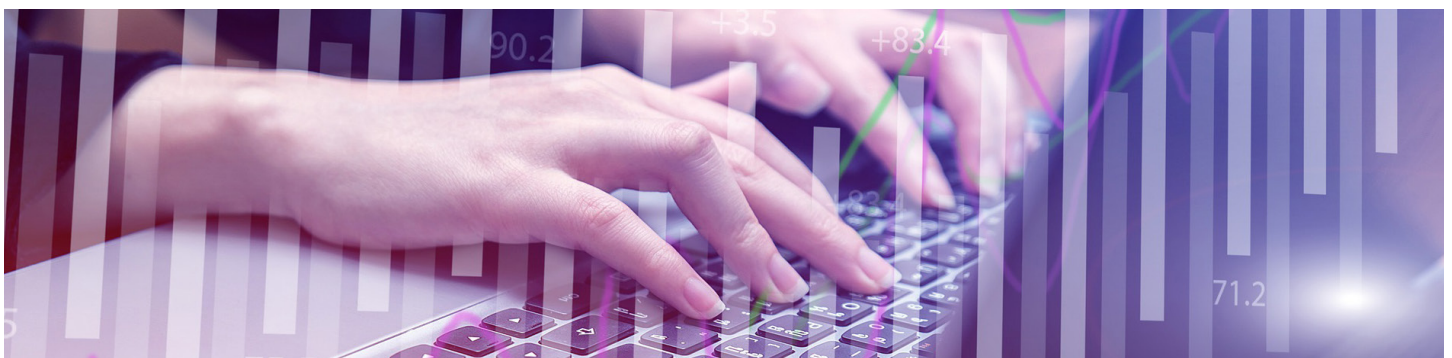
*Projected employment growth for
the Starting Occupation*



3.12%

Projected 5-Year Growth

*Projected employment growth for
the Advancement Occupation*



Data / Data Mining Analyst

Starting Occupation



IT Project Manager

Advancement Occupation

\$70,136

Average Salary: Advancement
Occupation with 0 - 2 years experience

\$84,972

Average Salary: Advancement
Occupation with 3 - 5 years experience

\$98,182

Average Salary: Advancement
Occupation with 6+ years experience

1,665

Starting Occupation Postings

3,760

Advancement Occupation Postings

postings for the advancement occupation.

Skills

The skills in the following table represent the additional skills likely needed to move from data/ data mining analyst to IT project 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 IT project manager are knowledge of Scheduling, project planning and development skills, customer service, SQL, and quality assurance and control. Defining skills represent the day-to-day tasks and responsibilities of the job. For this occupation the defining skills include knowledge of project management, budgeting, Scrum, Software development, and Scrum Master. Distinguishing skills set a worker apart and come with a salary or growth premium. For this occupation, the distinguishing skills are product owner, IT management, DevOps, business analysis, and agile coaching.

Certifications

The data/ data mining analyst occupation commonly requests the following certifications. Security clearance, Driver's license, and a project management certifi-



Data / Data Mining Analyst

Starting Occupation



IT Project Manager

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
Scheduling	19%	Project Management	58%	Product owner	7%
Project Planning and Development Skills	19%	Budgeting	29%	IT Management	6%
Customer Service	9%	Scrum	27%	DevOps	6%
SQL	9%	Software Development	20%	Business Analysis	5%
Quality Assurance and Control	8%	Scrum Master	18%	Agile coaching	5%

cation. 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 certification.

The IT project manager occupation commonly requests among others, the following certifications: The first is Project Management Certification. As indicated above, 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 certification is the Project Management Professional (PMP). This certification offered by the Project Management Institute (PMI) validates the individual's competence to perform in the role of a project manager, leading and directing projects and teams. The third certification is Certified Scrum Master (CSM). The Certified Scrum Master (CSM) certification, available through the Scrum Alliance, is an entry-level certification aimed at providing professionals with an awareness of the methodologies and values of Scrum, including team performance, accountability, and iterative progress.

Certifications

The source occupation commonly requests the following certifications:

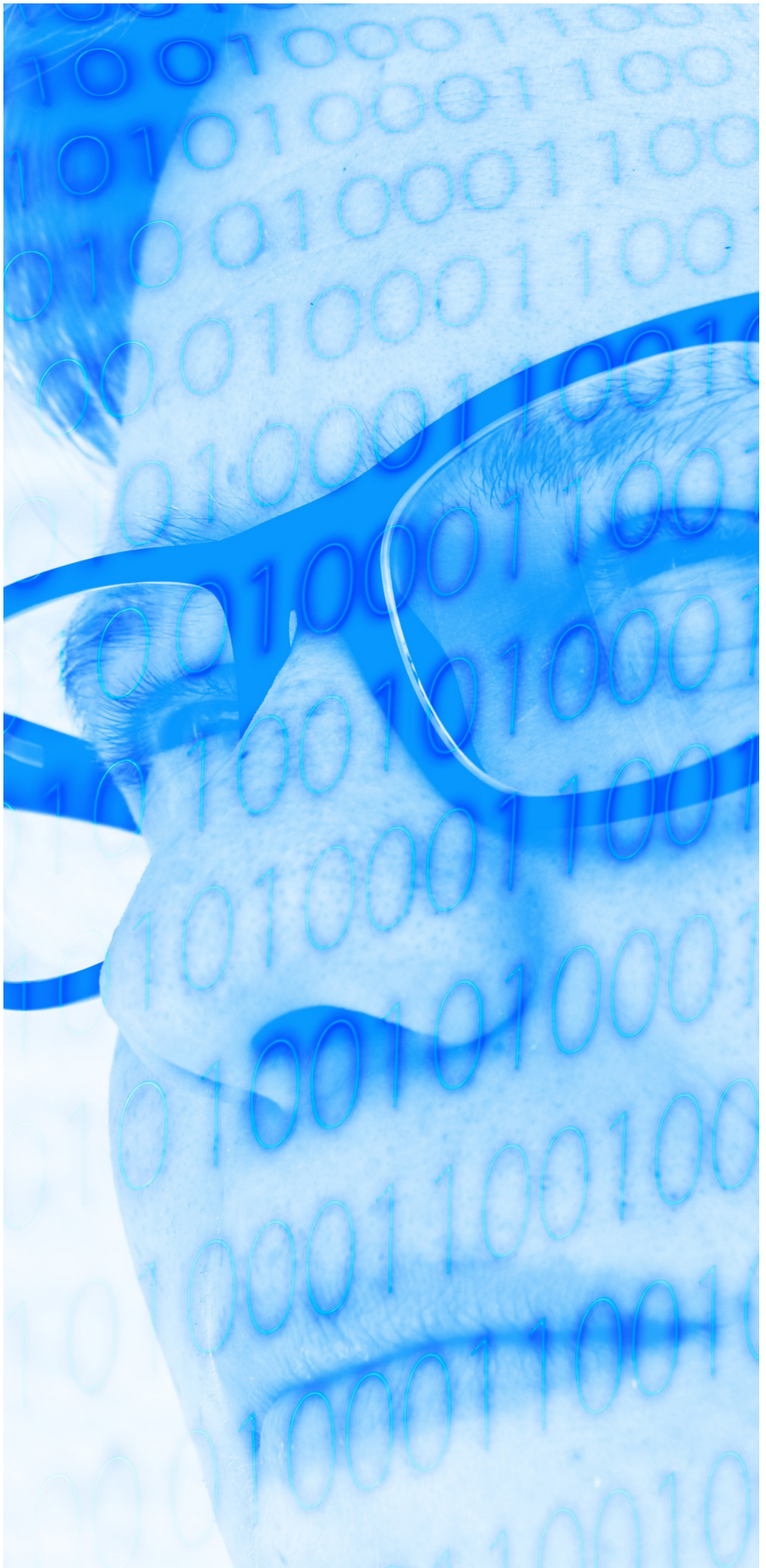
- Security Clearance
- Driver's License
- Project Management Certification

The Advancement occupation commonly requests the following certifications:

- Project Management Certification
- Project Management Professional (PMP)
- Certified Scrum Master (CSM)

Occupation Profile: Data Administration

Occupation:
Database
Administrator



Occupation Profile: Data Administration

Occupation: Database Administrator

Occupation

Database administrators set up databases according to a company's needs and make sure they operate efficiently. They also fine-tune, upgrade and test modifications to the databases as needed. For example, they create or organize systems to store and secure a variety of data, such as financial information and customer shipping records. Individuals in this occupation are comfortable resolving complex issues, so attention to detail is an essential trait in this profession, as is a passion for problem-solving. Communication skills are also important since database administrators often work as part of a team with computer programmers and managers. Ongoing maintenance of a database requires being on call.

Growth

Database administrator jobs are projected to have a 0.17% growth in employment. The entry level salary for this occupation is \$65,389 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 \$89,531. The advanced career salary which requests six or more years of experience is \$103,042.

Skills

The skills shown in the table below represent the additional skills likely needed



0.17%
Projected Growth

*Estimated five-year
growth in employment*



\$65,389
Entry Level Salary

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



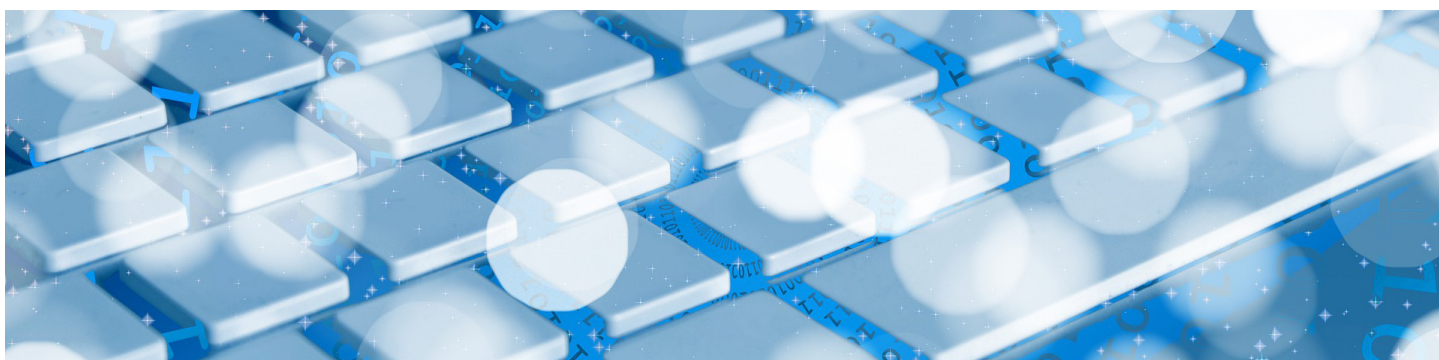
\$89,531
Mid Career Salary

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



\$103,042
Advanced Career Salary

*Salary for jobs requesting 6+ years
of experience*



Occupation Profile: Data Administration

Occupation: Database Administrator

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. The necessary skills for database administrator include knowledge of database design, Linux, database management, information systems, Python, and project management. Defining skills represent the day-to-day tasks and responsibilities of the job. They assume an increase level of communication and direct user support. For this occupation the defining skills include knowledge of SQL, database administration, Teradata DBA, Oracle, SQL Server, and Extraction, Transformation and Loading (ETL). Distinguishing skills set a worker apart and come with a salary premium. In this occupation, the distinguishing skills are knowledge of MySQL, database tuning, Informatica, database upgrade, Relational Database Management Systems (RDBMS), and database schemas.

Certifications

- Security Clearance
- Driver's License
- CompTIA Security+

vendor-neutral certification that validates the baseline skills necessary to perform core security functions and pursue an IT security career.

Certifications

This occupation commonly requests in addition to security clearance and driver's license, the following certification: CompTIA Security+, a globally trusted,

Necessary Skills

Skill Name	Percent of Postings Requesting Skill
Database Design	16%
Linux	15%
Database Management	14%
Information Systems	14%
Python	13%
Project Management	13%

Defining Skills

Skill Name	Percent of Postings Requesting Skill
SQL	50%
Database Administration	35%
Teradata DBA	30%
Oracle	28%
SQL Server	22%
Extraction Transformation and Loading (ETL)	18%

Distinguishing Skills

Skill Name	Percent of Postings Requesting Skill
MySQL	7%
Database Tuning	6%
Informatica	6%
Database Upgrade	6%
Relational DataBase Management System (RDBMS)	6%
Database Schemas	5%

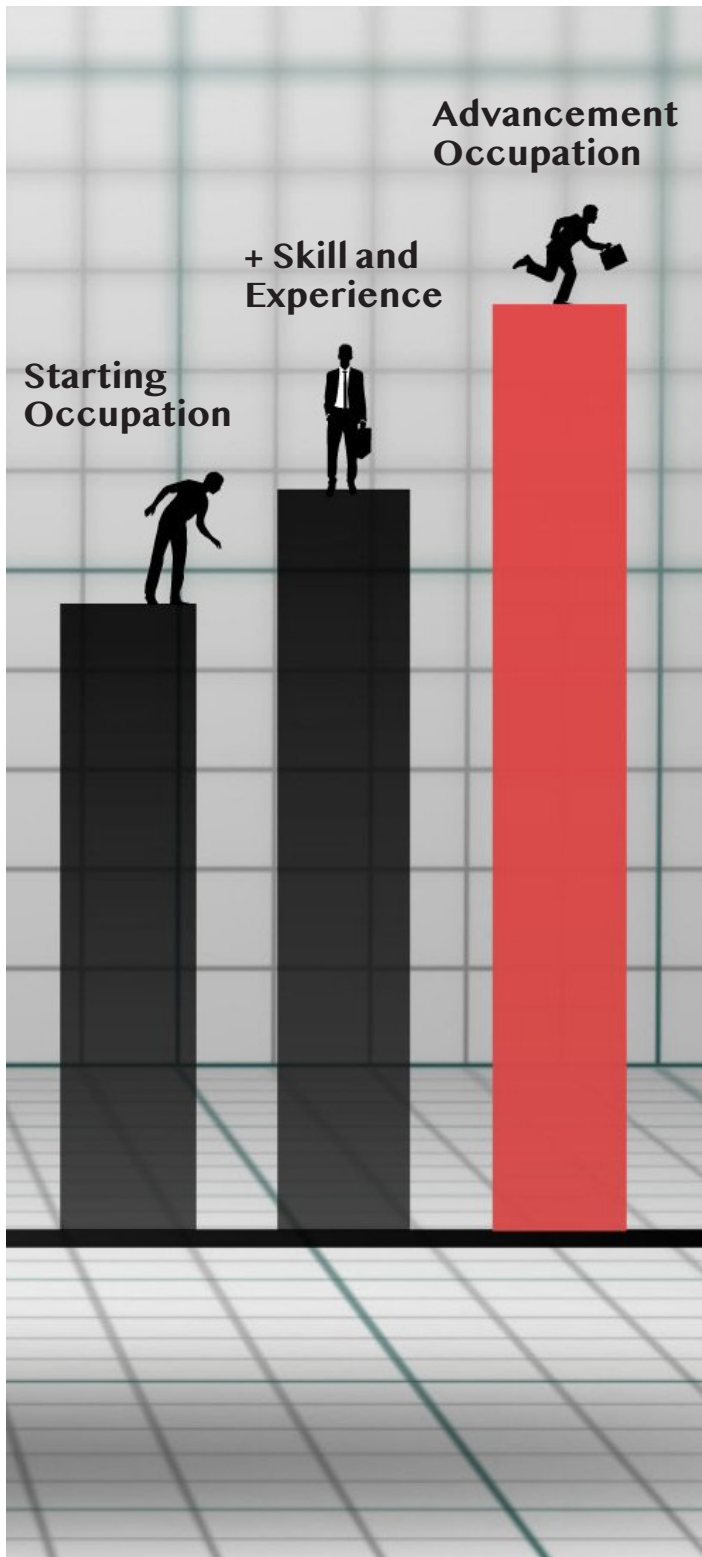
Potential Career Paths for Database Administrator

For the starting occupation of database administrator, 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.

In the pages that follow, we provide for each Advancement Occupation, skill gaps, certifications, salary and workforce information. With this information, students, educa-

tors, and policymakers can see the paths a worker could take from the Starting Occupation to the Advancement Occupation.





Detailed
Career Pathways:

Database
Administrator

Database Administrator

Starting Occupation



Business Intelligence Architect / Developer

Advancement Occupation

Advancement Occupation

Business Intelligence Architects/ 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.

Growth

The similarity score between business intelligence architect/ developer and the starting occupation is 0.64 and the average salary differential is \$21,248. While the projected 5-year employment growth for database administrator is 0.17%, business intelligence architect/ developer's projected 5-year growth is considerably higher at 6.30%. Average salary for the business intelligence

0.64

Similarity Score

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



\$21,248

Average Salary Differential



0.17%

Projected 5-Year Growth

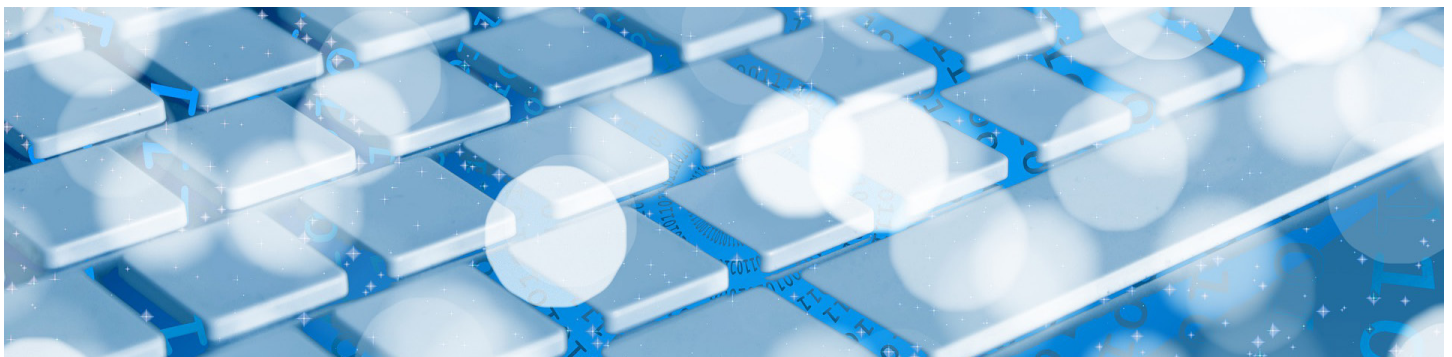
Projected employment growth for the Starting Occupation



6.30%

Projected 5-Year Growth

Projected employment growth for the Advancement Occupation



Database Administrator

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

1,297

Starting Occupation Postings

855

Advancement Occupation Postings

architect/ 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 database administrator to business intelligence architect/ 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/ 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 knowledge of Microsoft SQL Server Integration Services (SSIS), SQL Server Reporting Services (SSRS), Informati-



Database Administrator

Starting Occupation



Business Intelligence Architect / Developer

Advancement Occupation

Necessary Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
JavaScript	18%
Software Development	15%
Business Process	15%
Oracle	13%
Microsoft Power BI	12%

Defining Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Salesforce	49%
Salesforce Development	39%
SQL	34%
Salesforce Visualforce	24%
Salesforce Lightning	19%

Distinguishing Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Microsoft Sql Server Integration Services (SSIS)	5%
SQL Server Reporting Services (SSRS)	5%
Informatica	5%
Data Architecture	5%
Oracle PL/SQL	4%

ca, Data Architecture, and Oracle PL/SQL.

Certifications

The database administrator occupation commonly requests in addition to security clearance and driver's license, the following certification: 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 business intelligence architect/ 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 is the Certified Salesforce Administrator. This certification focuses on the features and functionality used to maintain a Salesforce implementation.

Certifications

The source occupation commonly requests the following certifications:

- Security Clearance
- Driver's License
- CompTIA Security+

The Advancement occupation commonly requests the following certifications:

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

Database Administrator

Starting Occupation

Database Architect

Advancement Occupation



Advancement Occupation

Database Architects design strategies for company-wide large databases, data warehouse systems, and multidimensional networks. They set standards for database operations, programming, query processes, and security. Database architects model, design, and construct large relational databases or data warehouses. Create and optimize data models for warehouse infrastructure and workflow. They also integrate new systems with existing warehouse structure and refine system performance and functionality. These individuals are comfortable structuring complex problems through deductive reasoning, and can communicate their recommendations in simple business-like language. But most of all, they expose significant oral and reading comprehension.

Growth

The similarity score between database architect and the starting occupation is 0.67 and the average salary differential is \$15,937. While the projected 5-year employment growth for database administrator is 0.17%, database architect's projected 5-year growth is higher at 2.99%. Average salary for the database architect occupation is \$69,185 for individuals with up to 2 years of experience; \$85,231 for

0.67

Similarity Score

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



\$15,937

Average Salary Differential



0.17%

Projected 5-Year Growth

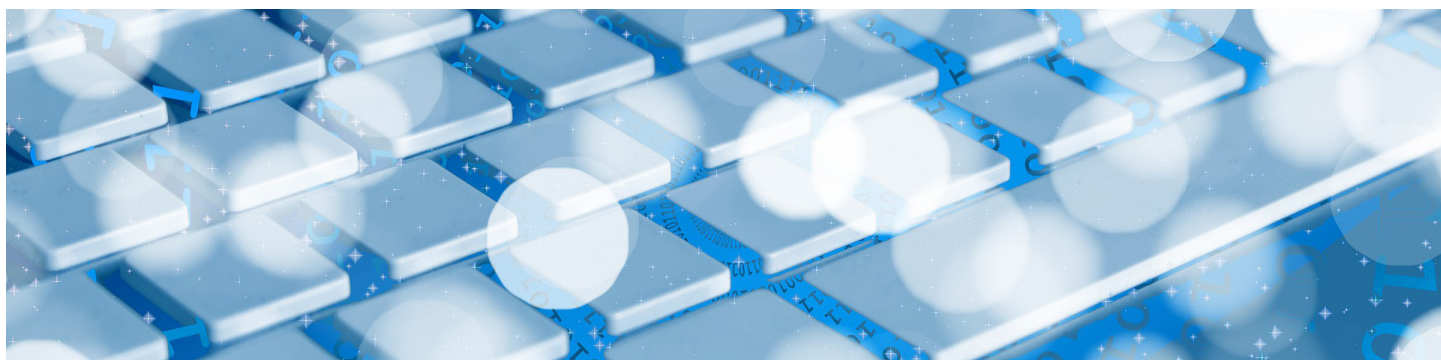
Projected employment growth for the Starting Occupation



2.99%

Projected 5-Year Growth

Projected employment growth for the Advancement Occupation



Database Administrator

Starting Occupation

\$69,185

Average Salary: Advancement

Occupation with 0 - 2 years experience

\$85,231

Average Salary: Advancement

Occupation with 3 - 5 years experience

\$98,672

Average Salary: Advancement

Occupation with 6+ years experience

1,297

Starting Occupation Postings

870

Advancement Occupation Postings

Database Architect

Advancement Occupation

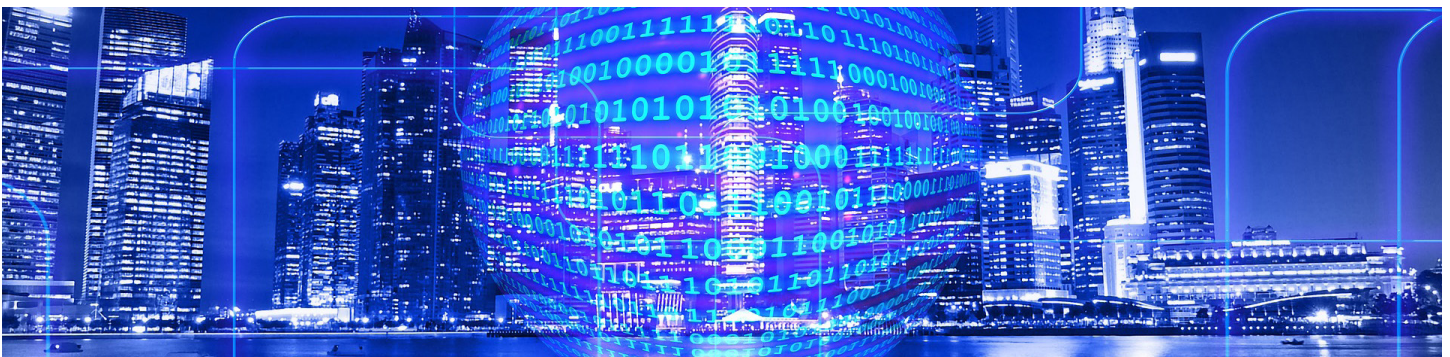
those with 3 to 5 years, and \$98,672 for individuals with 6 or more years. There were 870 postings for the advancement occupation.

Skills

The skills in the following table represent the additional skills likely needed to move from database administrator to database 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 database architect are knowledge of data analysis, Oracle, data quality, project management, and SQL Server. Defining skills represent the day-to-day tasks and responsibilities of the job. For this occupation the defining skills include knowledge of SQL, data architecture, data warehousing, data modeling, and Extraction, Transformation and Loading (ETL). Distinguishing skills set a worker apart and come with a salary or growth premium. For this occupation, the distinguishing skills are knowledge of ERwin, database architecture, Teradata, Master Data Management (MDM), and Virtualization.

Certifications

The database administrator occupation commonly requests in addition to securi-



Database Administrator

Starting Occupation



Database Architect

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
Data Analysis	19%	SQL	43%	ERwin	6%
Oracle	18%	Data Architecture	33%	Database Architecture	6%
Data Quality	16%	Data Warehousing	26%	Teradata	6%
Project Management	12%	Data Modeling	23%	Master Data Management (MDM)	5%
SQL Server	12%	Extraction Transformation and Loading (ETL)	23%	Virtualization	5%

ty clearance and driver's license, the following certification: 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 database architect occupation commonly requests security clearance, and, among other, the following certifications: IT Infrastructure Library (ITIL) Certification. This is an entry-level certification for IT service management. The second is the 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.

Certifications

The source occupation commonly requests the following certifications:

- Security Clearance
- Driver's License
- CompTIA Security+

The Advancement occupation commonly requests the following certifications:

- Security Clearance
- IT Infrastructure Library (ITIL) Certification
- Certified Scrum Trainer (CST)

Database Administrator

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/architect and the starting occupation is 0.534 and the average salary differential is \$17,351. While the projected 5-year employment growth for database administrator is 0.17%, network engineer/architect's projected 5-year growth is higher at 2.86%. Average salary for the network engineer/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 6 or more years. There were 2,525 post-

0.534

Similarity Score

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



\$17,351

Average Salary Differential



0.17%

Projected 5-Year Growth

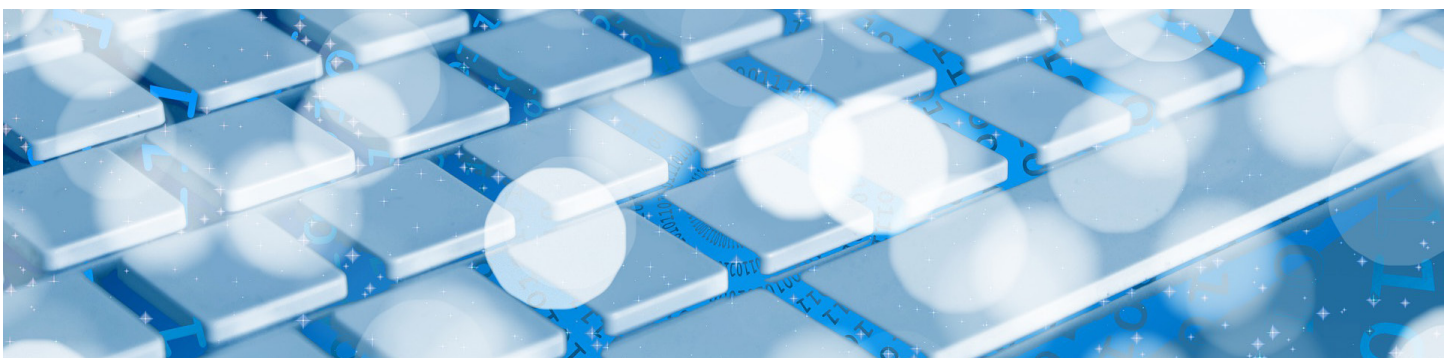
Projected employment growth for the Starting Occupation



2.86%

Projected 5-Year Growth

Projected employment growth for the Advancement Occupation



Database Administrator

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

1,297

Starting Occupation Postings

2,525

Advancement Occupation Postings

ings for the advancement occupation.

Skills

The skills in the following table represent the additional skills likely needed to move from database administrator 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 Networks (WAN), 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 database administrator occupation commonly requests in addition to security clearance and driver's license, the following certification: CompTIA Security+,



Database Administrator

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%

a globally trusted, vendor-neutral certification that validates the baseline skills necessary to perform core security functions and pursue an IT security career.

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:

- Security Clearance
- Driver's License
- CompTIA Security+

The Advancement occupation commonly requests the following certifications:

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

Database Administrator

Starting Occupation

Data Engineer

Advancement Occupation



Advancement Occupation

Data engineers are responsible for finding trends in data sets and developing algorithms to help make raw data more useful. This role requires a significant set of technical skills, but data engineers also need communication skills to work across departments to understand what organization leaders want to gain from existing large datasets. These individuals are comfortable with the use of mathematical or statistical skills to develop, test or validate models from available datasets. But they also have the ability to convey the results of their data analysis in visual or summary form. Most importantly, data engineers are skilled database programmers who can develop efficient data pipelines, that is, services or actions to process heterogeneous data in several useful steps.

Growth

The similarity score between data engineer and the starting occupation is 0.612 and the average salary differential is \$28,298. While the projected 5-year employment growth for database administrator is 0.17%, data engineer's projected 5-year growth is higher 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 individuals

0.612

Similarity Score

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



\$28,298

Average Salary Differential



0.17%

Projected 5-Year Growth

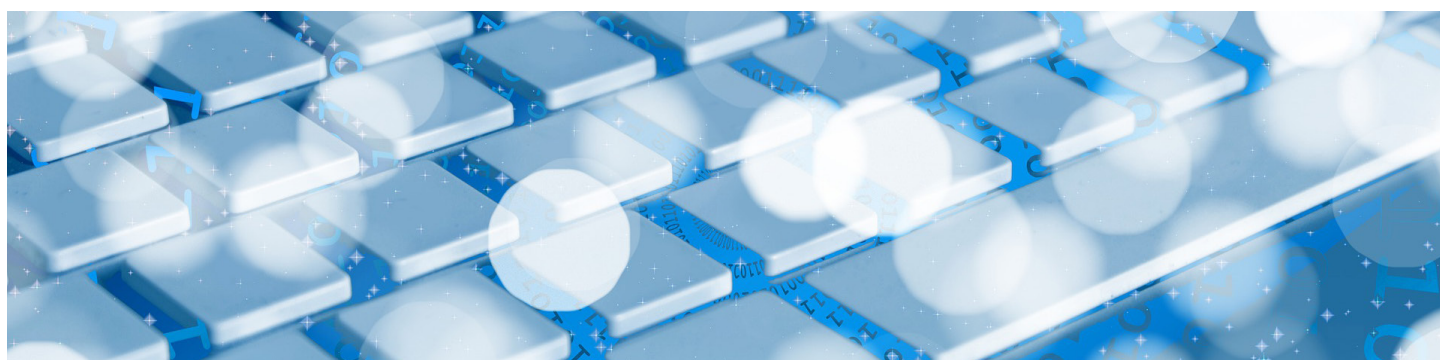
Projected employment growth for the Starting Occupation



2.56%

Projected 5-Year Growth

Projected employment growth for the Advancement Occupation



Database Administrator

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

1,297

Starting Occupation Postings

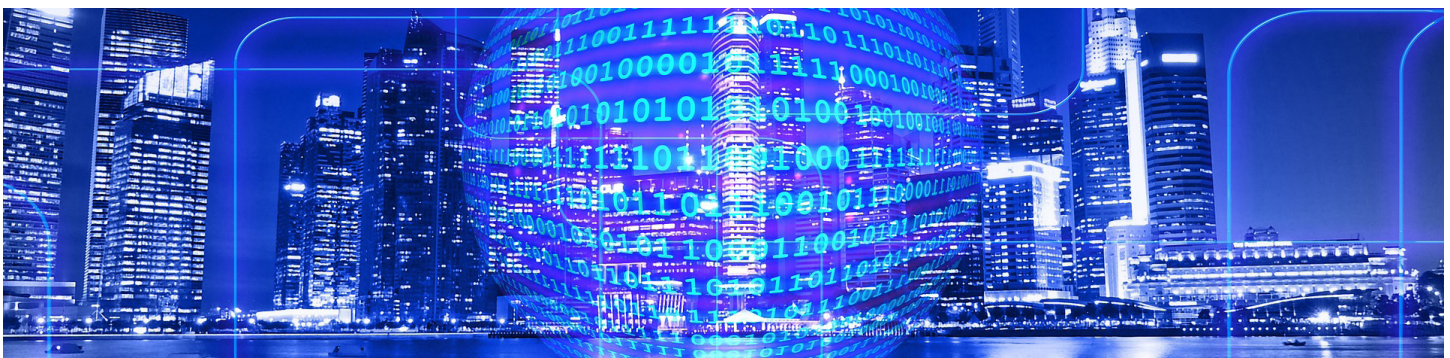
731

Advancement Occupation Postings

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 database administrator 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 webserver, relational databases, data quality, and Teradata. 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 knowledge of Amazon Web Services (AWS), Relational Database Management Systems (RDBMS), data warehouse processing, PIG, and AWS Elastic MapReduce (EMR).



Database Administrator

Starting Occupation



Data Engineer

Advancement Occupation

Necessary Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Software Development	17%
Apache Webserver	16%
Relational Databases	15%
Data Quality	14%
Tableau	13%

Defining Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Python	67%
SQL	66%
Big Data	47%
Extraction Transformation and Loading (ETL)	43%
Pipeline (Computing)	38%

Distinguishing Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Amazon Web Services (AWS)	7%
Relational DataBase Management System (RDBMS)	6%
Data Warehouse Processing	6%
PIG	6%
AWS Elastic MapReduce (EMR)	5%

Certifications

The database administrator occupation commonly requests in addition to security clearance and driver's license, the following certification: 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 data engineer occupation commonly requests security clearance and, among others, the following certifications: the 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. 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.

Certifications

The source occupation commonly requests the following certifications:

- Security Clearance
- Driver's License
- CompTIA Security+

The Advancement occupation commonly requests the following certifications:

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

Database Administrator

Starting Occupation

Web Developer

Advancement Occupation



Advancement Occupation

Web developers create and maintain websites. They are also responsible for the site's technical aspects, such as its performance and capacity, which are measures of a website's speed and how much traffic the site can handle. In addition, web developers may create content for the site. They evaluate code to ensure that it is properly structured, meets industry standards, and is compatible with browsers and devices. These developers optimize website performance, scalability, and server-side code and processes. They may develop website infrastructure and integrate websites with other computer applications. These individuals are comfortable working with technology as the core of their responsibilities, but over time, must develop a good understanding of consumer behavior, as well as collaboration skills and project management.

Growth

The similarity score between web developer and the starting occupation is 0.488 and the average salary differential is \$14,353. While the projected 5-year employment growth for database administrator is 0.17%, web developer's projected 5-year growth is higher at 2.18%. Average salary for the web developer occupation is \$70,021 for individuals with up

0.488

Similarity Score

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



\$14,353

Average Salary Differential



0.17%

Projected 5-Year Growth

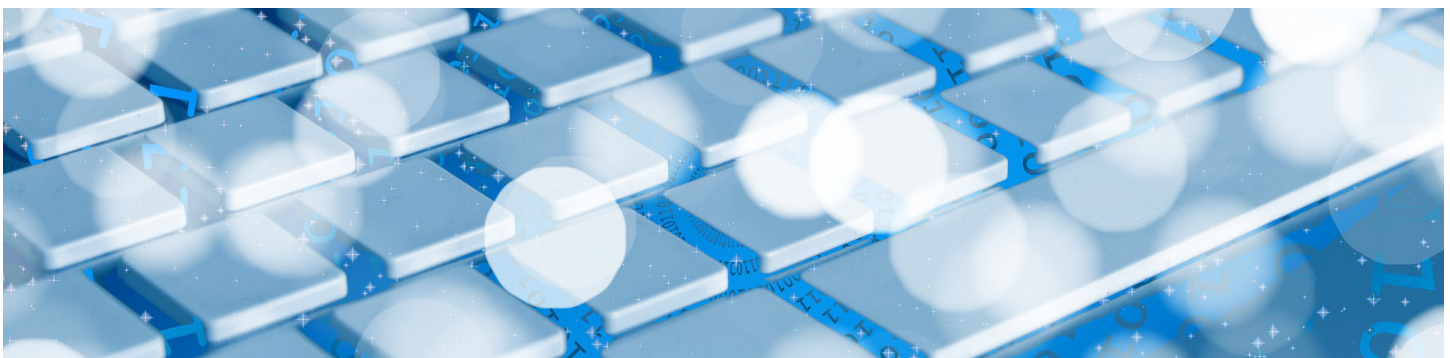
Projected employment growth for the Starting Occupation



2.18%

Projected 5-Year Growth

Projected employment growth for the Advancement Occupation



Database Administrator



Web Developer

Starting Occupation

Advancement Occupation

\$70,021

Average Salary: Advancement

Occupation with 0 - 2 years experience

\$86,093

Average Salary: Advancement

Occupation with 3 - 5 years experience

\$98,621

Average Salary: Advancement

Occupation with 6+ years experience

1,297

Starting Occupation Postings

2,947

Advancement Occupation Postings

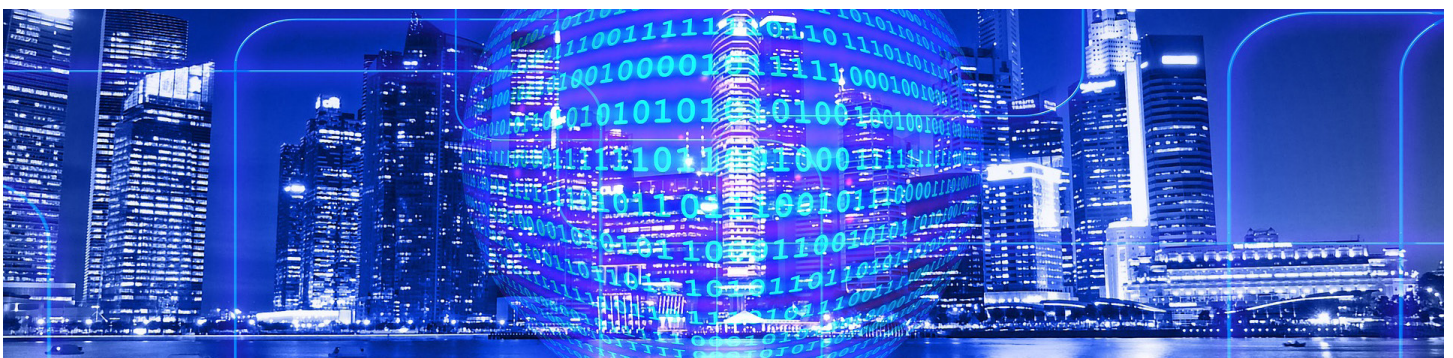
to 2 years of experience; \$86,093 for those with 3 to 5 years, and \$98,621 for individuals with 6 or more years. There were 2,947 postings for the advancement occupation.

Skills

The skills in the following table represent the additional skills likely needed to move from database administrator to web 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 web developer are knowledge of Microsoft C#, Python, MySQL, Ruby, and unit testing. Defining skills represent the day-to-day tasks and responsibilities of the job. For this occupation the defining skills include knowledge of JavaScript, web development, front-end development, Java, SQL. Distinguishing skills set a worker apart and come with a salary or growth premium. For this occupation, the distinguishing skills are knowledge of Flask, Joomla, AJAX, User Interface (UI) Design, and Objective C.

Certifications

The database administrator occupation commonly requests in addition to security clearance and driver's license, the fol-



Database Administrator

Starting Occupation



Web Developer

Advancement Occupation

Necessary Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Microsoft C#	18%
Python	17%
MySQL	16%
Ruby	16%
Unit Testing	16%

Defining Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
JavaScript	59%
Web Development	39%
Front-end Development	32%
Java	28%
SQL	28%

Distinguishing Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Flask	7%
Joomla	6%
AJAX	6%
User Interface (UI) Design	6%
Objective C	6%

lowing certification: 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 web developer occupation commonly requests security clearance, driver's license and the following certification: CompTIA Security+ as described in the above paragraph.

Certifications

The source occupation commonly requests the following certifications:

- Security Clearance
- Driver's License
- CompTIA Security+

The Advancement occupation commonly requests the following certifications:

- Security Clearance
- Driver's License
- CompTIA Security+

Database Administrator

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 0.448 and the average salary differential is \$21,031. While the projected 5-year employment growth for database administrator is 0.17%, computer systems engineer or architect's projected 5-year growth is higher at 2.75%. Average salary for the computer systems engineer or architect 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 post-

0.448

Similarity Score

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



\$21,031

Average Salary Differential



0.17%

Projected 5-Year Growth

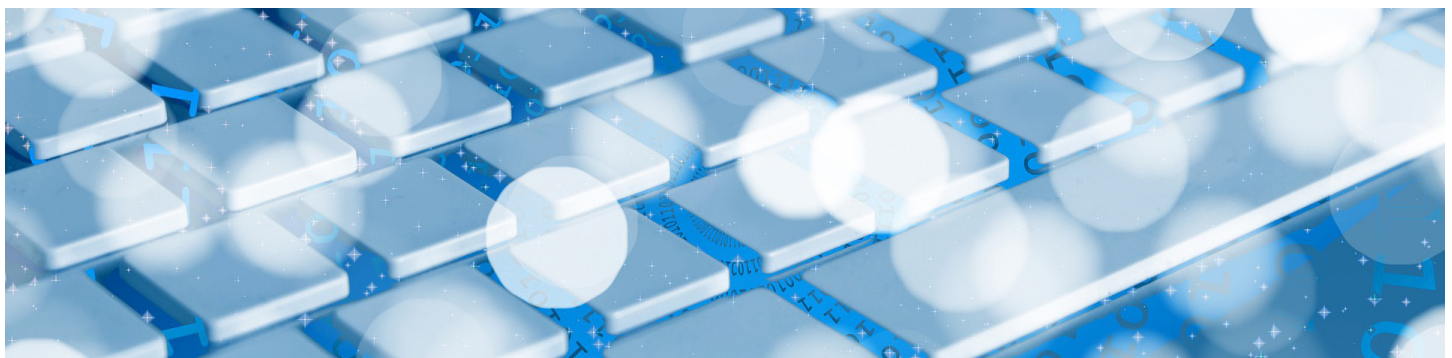
Projected employment growth for the Starting Occupation



2.75%

Projected 5-Year Growth

Projected employment growth for the Advancement Occupation



Database Administrator

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

1,297

Starting Occupation Postings

3,259

Advancement Occupation Postings

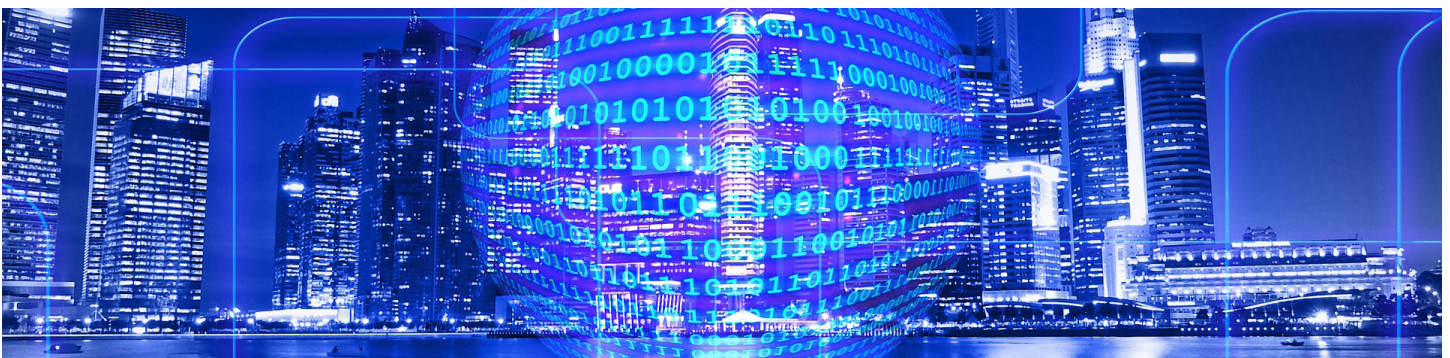
ings for the advancement occupation.

Skills

The skills in the following table represent the additional skills likely needed to move from database administrator 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 engineer or architect are knowledge of Python, software development, SQL, project management, and software engineering. Defining skills represent the day-to-day tasks and responsibilities of the job. For this occupation the defining skills include knowledge of systems engineering, 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 Sever, Continuous Integration (CI), firmware, and hardware and software configuration.

Certifications

The database administrator occupation commonly requests in addition to security clearance and driver's license, the fol-



Database Administrator

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%

lowing certification: 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 computer systems engineer or architect 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 certification is 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:

- Security Clearance
- Driver's License
- CompTIA Security+

The Advancement occupation commonly requests the following certifications:

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

Database Administrator

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 0.42 and the average salary differential is \$22,934. While the projected 5-year employment growth for database administrator is 0.17%, mobile applications developer's projected 5-year growth is considerably higher at 5.63%. Average salary for the mobile applica-

0.42

Similarity Score

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



\$22,934

Average Salary Differential



0.17%

Projected 5-Year Growth

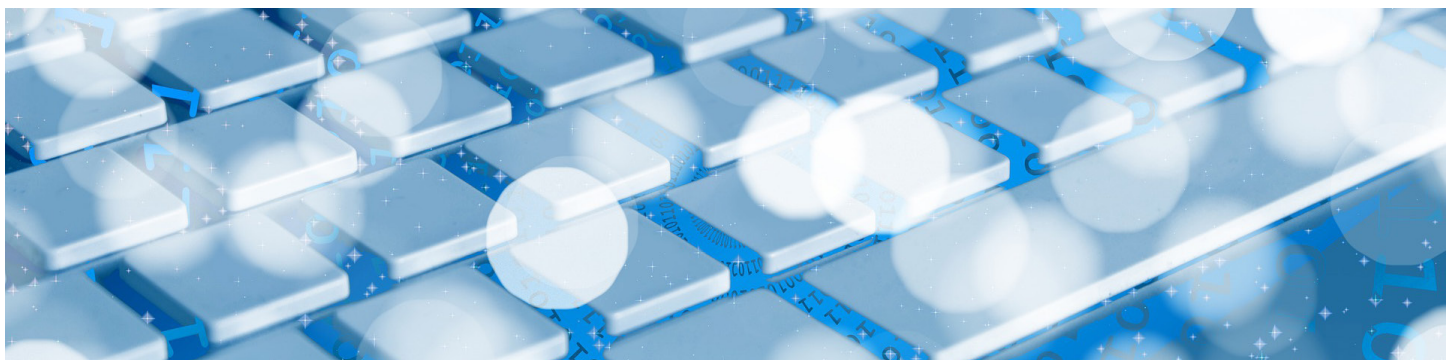
Projected employment growth for the Starting Occupation



5.63%

Projected 5-Year Growth

Projected employment growth for the Advancement Occupation



Database Administrator

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

1,297

Starting Occupation Postings

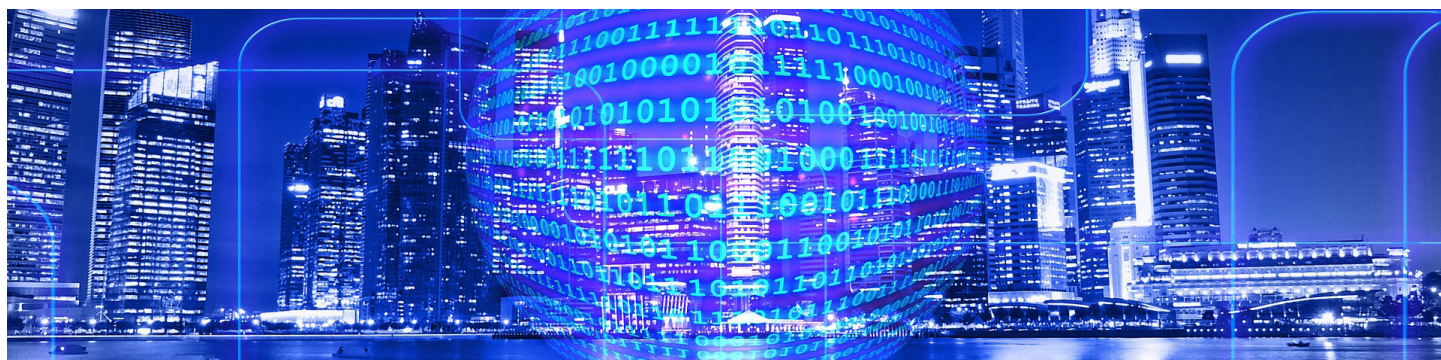
558

Advancement Occupation Postings

tions 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 database administrator 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, software development, and Objective C. Distinguishing skills set a worker apart and come with a salary or growth premium. For this occupation, the distinguishing skills are knowledge of Test Driven Development (TDD), User Interface (UI) Design, Gradle, React JavaScript, and Microsoft Xamarin.



Database Administrator

Starting Occupation



Mobile Applications Developer

Advancement Occupation

Necessary Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Unit Testing	17%
Object-Oriented Analysis and Design (OOAD)	14%
JavaScript Object Notation (JSON)	14%
Debugging	14%
Scrum	12%

Defining Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Java	43%
Swift (Programming Language)	38%
Android	36%
Software Development	31%
Objective C	29%

Distinguishing Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Test Driven Development (TDD)	7%
User Interface (UI) Design	7%
Gradle	6%
React Javascript	6%
Microsoft Xamarin	6%

Certifications

The database administrator occupation commonly requests in addition to security clearance and driver's license, the following certification: 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 mobile applications developer occupation commonly requests security clearance, driver's license and 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 processes in four architecture domains: business, data, applications and technical.

Certifications

The source occupation commonly requests the following certifications:

- Security Clearance
- Driver's License
- CompTIA Security+

The Advancement occupation commonly requests the following certifications:

- Security Clearance
- Driver's License
- TOGAF Certification

Database Administrator

Starting Occupation

IT Project Manager

Advancement Occupation



Advancement Occupation

IT project managers are individuals charged with overseeing the process of planning, executing and delegating responsibilities around an organization's information technology (IT) pursuits and goals. Specifically, they help determine the systems and technology needed for specific IT projects; create detailed schedules; build a budget; identify staffing needs; and hire and manage the project staff. These individuals are comfortable in both, the technical as well as the organizational environment of the project, making them very effective as liaison between business and technical aspects of projects. They are good communicators and over time, develop an effective sense for negotiation.

Growth

The similarity score between IT project manager and the starting occupation is 0.393 and the average salary differential is \$9,154. While the projected 5-year employment growth for database administrator is 0.17%, IT project manager's projected 5-year growth is considerably higher at 3.12%. Average salary for the IT project manager occupation is \$70,136 for individuals with up to 2 years of experience; \$84,972 for those with 3 to 5 years, and \$98,182 for individuals with 6 or more years. There were 3,760 post-

0.393

Similarity Score

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



\$9,154

Average Salary Differential



0.17%

Projected 5-Year Growth

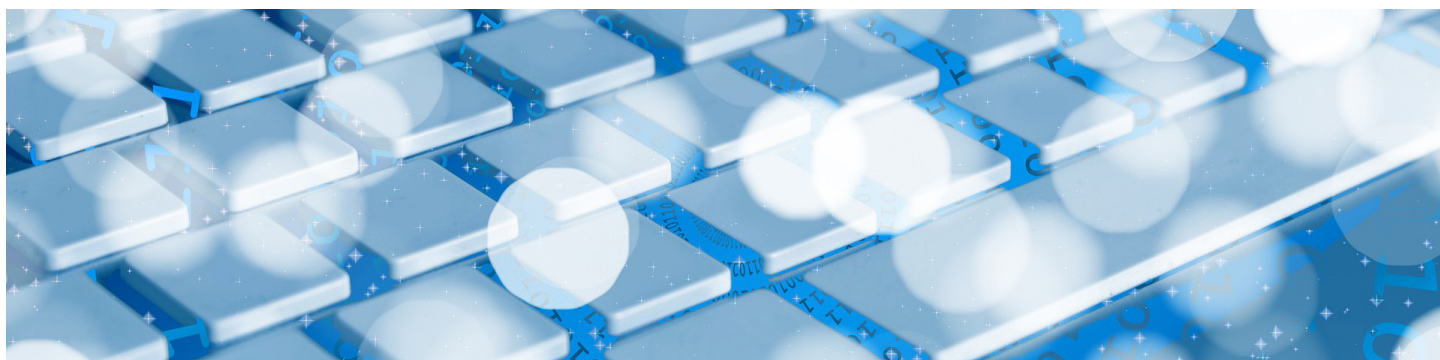
Projected employment growth for the Starting Occupation



3.12%

Projected 5-Year Growth

Projected employment growth for the Advancement Occupation



Database Administrator

Starting Occupation

IT Project Manager

Advancement Occupation

\$70,136

Average Salary: Advancement
Occupation with 0 - 2 years experience

\$84,972

Average Salary: Advancement
Occupation with 3 - 5 years experience

\$98,182

Average Salary: Advancement
Occupation with 6+ years experience

1,297

Starting Occupation Postings

3,760

Advancement Occupation Postings

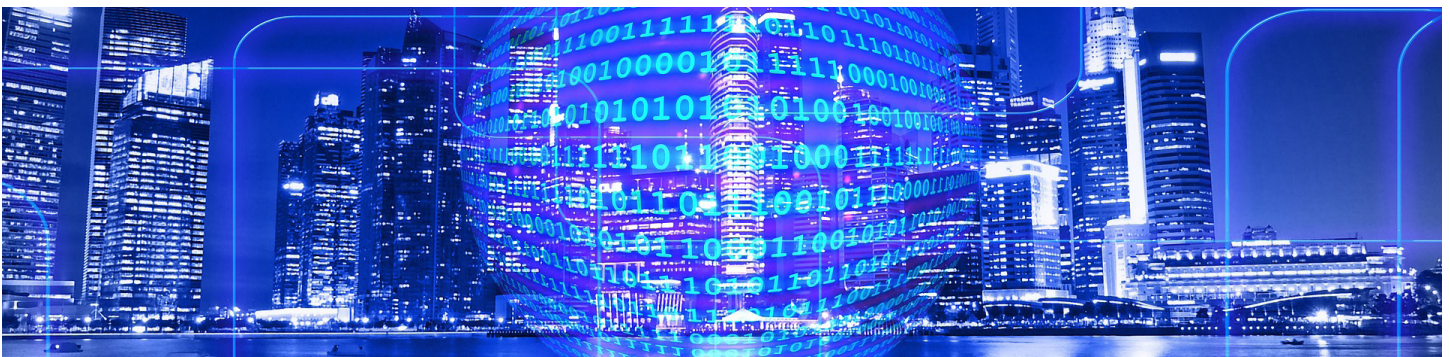
ings for the advancement occupation.

Skills

The skills in the following table represent the additional skills likely needed to move from database administrator to IT project 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 IT project manager are knowledge of scheduling, project planning and development skills, customer service, SQL, and quality assurance and control. Defining skills represent the day-to-day tasks and responsibilities of the job. For this occupation the defining skills include knowledge of project management, budgeting, Scrum, software development, and Scrum Master. Distinguishing skills set a worker apart and come with a salary or growth premium. For this occupation, the distinguishing skills are product owner, IT management, DevOps, business analysis, and agile coaching.

Certifications

The database administrator occupation commonly requests in addition to security clearance and driver's license, the following certification: CompTIA Security+,



Database Administrator

Starting Occupation



IT Project Manager

Advancement Occupation

Necessary Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Scheduling	19%
Project Planning and Development Skills	19%
Customer Service	9%
SQL	9%
Quality Assurance and Control	8%

Defining Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Project Management	58%
Budgeting	29%
Scrum	27%
Software Development	20%
Scrum Master	18%

Distinguishing Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Product owner	7%
IT Management	6%
DevOps	6%
Business Analysis	5%
Agile coaching	5%

a globally trusted, vendor-neutral certification that validates the baseline skills necessary to perform core security functions and pursue an IT security career.

The IT project manager occupation commonly requests among others, the following certifications: The first is 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 certification is the Project Management Professional (PMP). This certification offered by the Project Management Institute (PMI) validates the individual's competence to perform in the role of a project manager, leading and directing projects and teams. The third certification is Certified Scrum Master (CSM). The Certified Scrum Master (CSM) certification, available through the Scrum Alliance, is an entry-level certification aimed at providing professionals with an awareness of the methodologies and values of Scrum, including team performance, accountability, and iterative progress.

Certifications

The source occupation commonly requests the following certifications:

- Security Clearance
- Driver's License
- CompTIA Security+

The Advancement occupation commonly requests the following certifications:

- Project Management Certification
- Project Management Professional (PMP)
- Certified ScrumMaster (CSM)

Database Administrator

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 engineers/ analysts and the starting occupation is 0.363 and the average salary differential is \$9,160. While the projected 5-year employment growth for database administrator is 0.17%, cyber/ Information security engineer/ analyst's projected 5-year growth is considerably higher at 8.77%. Average salary for the cyber/ Information security engineer/ analyst occupation is \$58,383 for individuals with up to 2 years

0.363

Similarity Score

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



\$9,160

Average Salary Differential



0.17%

Projected 5-Year Growth

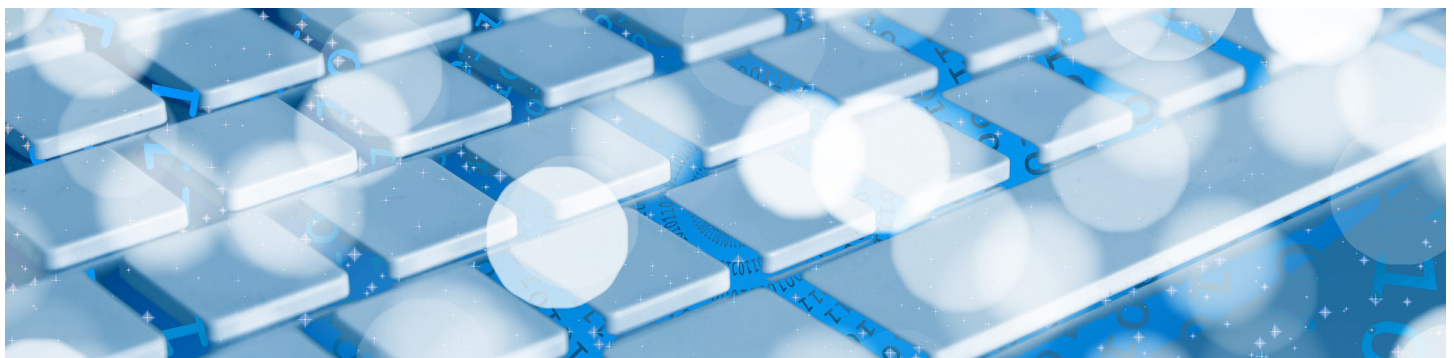
Projected employment growth for the Starting Occupation



8.77%

Projected 5-Year Growth

Projected employment growth for the Advancement Occupation



Database Administrator

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

1,297

Starting Occupation Postings

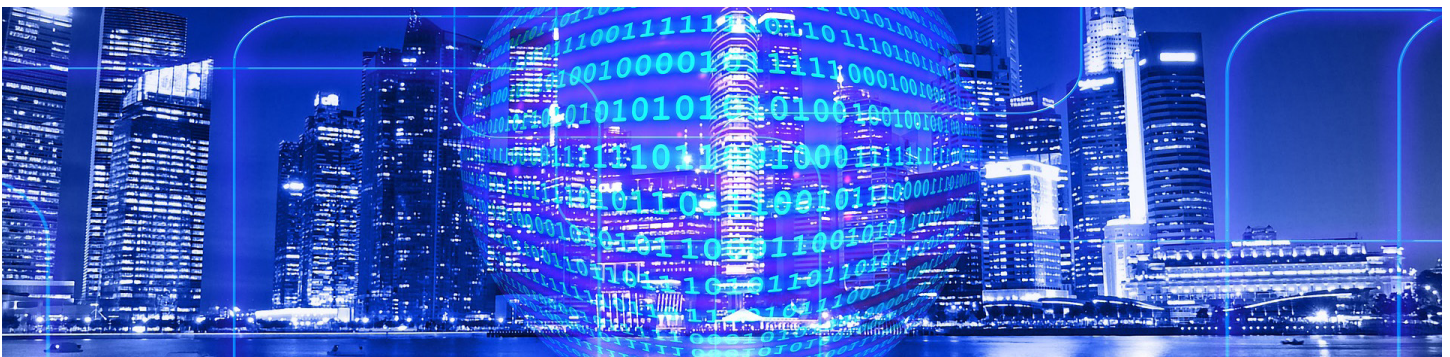
3,137

Advancement Occupation Postings

of experience; \$79,154 for those with 3 to 5 years, and \$95,250 for individuals 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 database administrator 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 cyber/ Information security engineer/ analyst are knowledge of Unix, 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 security, information systems, 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 knowledge of vulnerability analysis, Nessus, threat intelligence and analysis, threat modeling, and cybersecurity assessment.



Database Administrator

Starting Occupation



Cyber / Information Security Engineer / Analyst

Advancement Occupation

Necessary Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Linux	19%
Python	14%
Cryptography	13%
Project Management	12%
Customer Service	11%

Defining Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Information Security	49%
Information Systems	27%
Network Security	18%
NIST Cybersecurity Framework	12%
Information Assurance	12%

Distinguishing Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Vulnerability analysis	5%
Nessus	5%
Threat Intelligence and Analysis	5%
Threat Modeling	5%
Cybersecurity Assessment	4%

Certifications

The database administrator occupation commonly requests in addition to security clearance and driver's license, the following certification: 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 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:

- Security Clearance
- Driver's License
- CompTIA Security+

The Advancement occupation commonly requests the following certifications:

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

Database Administrator

Starting Occupation

Software Developer / Engineer

Advancement Occupation



Advancement Occupation

Software developers/ engineers design, and build computer programs. They identify user needs, develop the programs, test out new software, and make improvements. Some develop new applications for mobile or desktop use, while others build underlying systems software such as operating systems. They design each piece of an application or system and plan how the pieces will work together. Software developers / engineers create a variety of models and diagrams showing programmers the software code needed for an application. Working closely with computer programmers, software developers fill crucial roles not only in the computer systems industry, but also in manufacturing, finance, health services and software publishing industries. These individuals are comfortable with the uncertainties surrounding innovation and creativity. They have an ability to focus and concentrate for prolonged time periods addressing numerous and interlocking pieces. Finally, software developers / engineers are problem solvers, as they are responsible for solving the problems that occur during the development process.

Growth

The similarity score between software developer or engineer and the starting occupation is 0.576 and the average sal-

0.576

Similarity Score

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



\$16,560

Average Salary Differential



0.17%

Projected 5-Year Growth

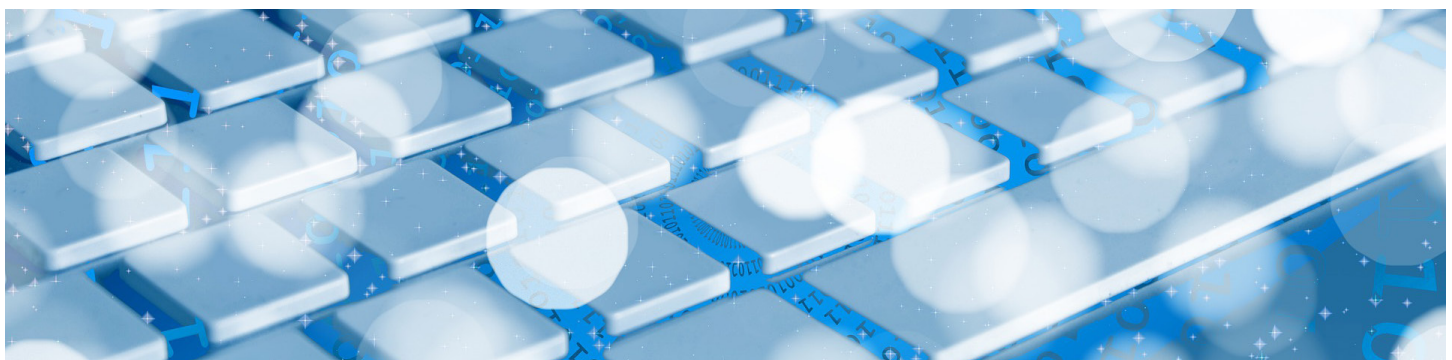
Projected employment growth for the Starting Occupation



5.84%

Projected 5-Year Growth

Projected employment growth for the Advancement Occupation



Database Administrator



Software Developer / Engineer

Starting Occupation

Advancement Occupation

\$68,768

Average Salary: Advancement

Occupation with 0 - 2 years experience

\$84,801

Average Salary: Advancement

Occupation with 3 - 5 years experience

\$98,508

Average Salary: Advancement

Occupation with 6+ years experience

1,297

Starting Occupation Postings

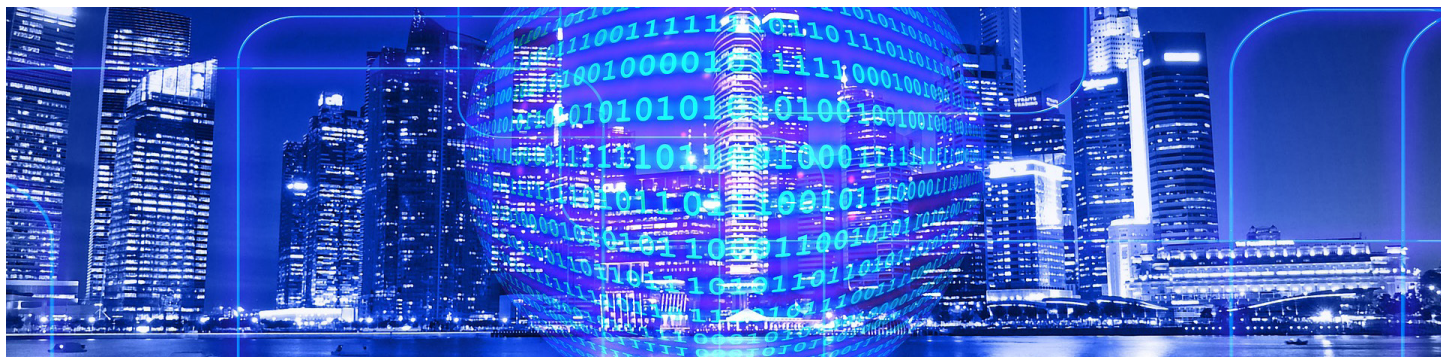
16,139

Advancement Occupation Postings

ary differential is \$16,560. While the projected 5-year employment growth for database administrator is 0.17%, software developer/ engineer's projected 5-year growth is considerably higher at 5.84%. Average salary for the software developer/ engineer occupation is \$68,768 for individuals with up to 2 years of experience; \$84,801 for those with 3 to 5 years, and \$98,508 for individuals with 6 or more years. There were 16,139 postings for the advancement occupation.

Skills

The skills in the following table represent the additional skills likely needed to move from database administrator to software developer/ 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 software developer/ engineer are knowledge of Microsoft C#, Linux, .NET, Oracle, and C++. Defining skills represent the day-to-day tasks and responsibilities of the job. For this occupation the defining skills include knowledge of Java, software engineering, software development, SQL, JavaScript. Distinguishing skills set a worker apart and come with a salary or growth premium.



Database Administrator

Starting Occupation



Software Developer / Engineer

Advancement Occupation

Necessary Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Microsoft C#	16%
Linux	15%
.NET	13%
Oracle	12%
C++	12%

Defining Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
Java	40%
Software Engineering	34%
Software Development	33%
SQL	32%
JavaScript	26%

Distinguishing Skills

Skill Gap	Skill Recall Percentage in Advancement Occupation
JavaScript Object Notation (JSON)	7%
jQuery	6%
React Javascript	6%
Spring Boot	6%
Ruby	5%

For this occupation, the distinguishing skills are knowledge of JavaScript Object Notation (JSON), jQuery, React Javascript, Spring Boot, and Ruby.

Certifications

The database administrator occupation commonly requests in addition to security clearance and driver's license, the following certification: 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 software developer/ engineer occupation commonly requests security clearance, and among others, the following certifications: IT Infrastructure Library (ITIL) Certification. Entry-level certification for IT service management. The second certification is 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.

Certifications

The source occupation commonly requests the following certifications:

- Security Clearance
- Driver's License
- CompTIA Security+

The Advancement occupation commonly requests the following certifications:

- Security Clearance
- IT Infrastructure Library (ITIL) Certification
- CompTIA Security+

References

For Occupation Profiles

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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/)

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

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

