DATABASE ADMINISTRATORS

A DEEP DIVE FOR SKILLS-BASED HIRING

SKILLFUL
A MARKLE INITIATIVE

Occupation Overview: Database Administrators

Foundational Competencies

- **Critical Thinking:** Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions, or approaches to problems.
- **Monitoring:** Monitoring/assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action.
- **Complex Problem Solving:** Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
- **Operations Analysis**: Analyzing needs and product requirements to create a design.
- **Active Listening:** Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- **Programming:** Writing computer programs for various purposes.
- **Systems Analysis:** Determining how a system should work and how changes in conditions, operations, and the environment will affect outcomes.
- **Coordination:** Adjusting actions in relation to others' actions.
- **Systems Evaluation:** Identifying measures or indicators of system performance and the actions needed to improve or correct performance relative to the goals of the system.
- **Instructing:** Teaching others how to do something.

Occupation-Specific Competencies

- **Intermediate General Database:** Demonstrated proficiency with moderately complex SQL (e.g., joining, grouping), the efficient querying and updating of large tables, the ability to review and enhance others' SQL, and the use of multiple database management software applications.
- **Intermediate Database Administration:** Demonstrated ability to manage both new and existing databases, utilizing at least one Database Management System (e.g., Oracle, SQL Server, Mongo) to store and organize data; demonstrated ability to create, delete, and alter tables and indices; familiarity with database design and data modeling techniques such as Unified Modeling Language.
- **Basic Data Storage:** Demonstrated ability to develop, integrate, implement, and maintain data storage solutions in support of business intelligence solutions; familiar with data modeling and data warehousing concepts.
- **Intermediate General Data Techniques:** Demonstrated ability to collect, analyze, manipulate, and manage data; moderate proficiency in converting data between a variety of formats.
- **Intermediate Systems Design and Implementation:** Demonstrated ability to assist customers in the gathering of requirements and design, implement, and support moderately complex technology solutions to existing business problems.
- **Basic Business Intelligence:** Basic familiarity compiling large amounts of data from business operations and early ability to reach meaningful insights on the best relevant business decision.
- **Basic System Administration:** Basic proficiency with the installation and maintenance of system configurations; familiarity with server-based systems, security devices, distributed applications, network storage, and messaging components; some knowledge of managing and maintaining existing computer systems and networks.
- **Basic Microsoft Office:** Familiarity with the use of multiple end-user software packages (which must include a business productivity suite such as MS Office or Google Docs), and some knowledge of how to install, configure, and maintain some of these packages.
- **Basic Testing:** Demonstrated ability to design tests, create test scripts, ensure that test cases mimic user usage, execute and validate unit tests, and use appropriate test tools for their own changes. Familiarity with system and performance testing.
- **Basic Information Security - Database Administration:** Basic familiarity with developing and administering databases that allow for secure storage, query, and utilization of data.

Job Description (Example)

Administer, test, and implement computer databases, applying knowledge of database management systems. Coordinate changes to computer databases. May plan, coordinate, and implement security measures to safeguard computer databases.

- Manage technical projects including involvement from local and global application, infrastructure, governance, and client teams.
- Provide services to application development teams, including database design, database generation, coding, and database production support.
- Provide support with a high degree of customer service, technical expertise, and timeliness.
- Provide accurate and creative solutions to user problems of moderate nature to ensure user productivity.
- Provide development and/or production support; creating primary database storage structures, designing and creating primary objects, modifying database structure as necessary for enhancements or performance, creating documentation, designing interfaces, database objects, and creating plans.
- Monitor and optimize performance of the database, plan for backup of the database, and allocate system storage future storage needs.

Activities (Example List)

- Test programs or databases, correct errors, and make necessary modifications.
- Modify existing databases and database management systems or direct programmers and analysts to make changes.
- Plan, coordinate, and implement security measures to safeguard information in computer files against accidental or unauthorized damage, modification, or disclosure.
- Work as part of a project team to coordinate database development and determine project scope and limitations.
- Specify users and user access levels for each segment of database.
- Analyze and define data requirements and specifications.
- Analyze and plan for anticipated changes in data capacity requirements.
- Design and implement database systems.
- Develop data standards, policies, and procedures.
- Install and configure database management systems software.
- Maintain database management systems software.
- Monitor and maintain databases to ensure optimal performance.
- Perform backup and recovery of databases to ensure data integrity.

Prioritized Foundational Competencies: Database Administrators

	Most Common Required Competencies
1	**Critical Thinking:** Identifying a set of ways to solve a problem when it arises and then picking the best option given key criteria including cost, risks to the data and environment and other systems, and time; identify ways to preclude problems before they occur; efficiently troubleshoot when problems arise.
2	**Monitoring:** Monitoring/assessing performance of the IT system and its performance (e.g., up or not, processing speed, resource reserves including storage); ensuring data integrity (the data going in is correct, verified by checks and the system); preclude problems by spotting warning signs and reacting before problems arise.
3	**Systems Analysis:** Determining how a system should work and how changes in conditions, operations, and the environment will affect outcomes; having a full system view and understanding the key links and dependencies; knowing how different servers and databases affect other components and the system as a whole; understanding the risks to internal staff and customers if problems occur.

	Most Common Break Point Competencies
1	**Critical Thinking:** *See previous.*
2	**Coordination:** Moving databases and codes from environment to environment (development, QA testing, staging environment and production); coordinate across teams as you move data and code from environment to environment; coordinate components (web servers, authentication servers, cloud servers); communicate via email, phone and, in-person to enable successful coordination.
3	**Systems Analysis:** *See previous.*

	Most Preferred Competencies
1	**Complex Problem Solving:** Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions; creating alternative solutions to problems and selecting the one that best balances key considerations (e.g., requirements, ease of support, cost); bringing an independent perspective and creativity ("do not just copy and paste solutions").
2	**Systems Evaluation:** Identifying measures or indicators of system performance and the actions needed to improve (e.g., wait time on a server, wait time on a query) or correct performance (e.g., system settings), particularly relative to databases and database management; evaluate systems proactively; creating and applying measures to monitor system performance with warning triggers.
3	**Operations Analysis:** Analyzing requirements to create a database design, including database architecture, data types, and storage.

	Most Hard-to-Find Competencies
1	**Complex Problem Solving:** *See previous.*
2	**Systems Evaluation:** *See previous.*
3	**Critical Thinking:** *See previous.*

	Most Evolving Competencies
1	**Systems Analysis:** Evolution driven by technology enabling larger, more sophisticated systems with more independent connections and data; these changes make it more valuable to have a full system view and understanding how a system can be built from scratch and updated given the potential options; also increasingly important to understand a system's links and dependencies.
2	**Operations Analysis:** Evolution driven by technology enabling larger, more sophisticated systems with more independent connections and data; these changes expand the possible database architectures and expand the number of possible data types – making it more important to be able to analyze requirements and create custom designs to fit that need given the options available.
3	**Complex Problem Solving:** Evolution driven by technology enabling larger, more sophisticated systems with more independent connections and data; the technology has made the environment more complex; this change makes it more important to bring a fresh perspective and not simply apply a past solution; ideally, someone would seek out the opportunities created by all these changes.

Prioritized Occupation-Specific Competencies: Database Administrators

Most Common Required Competencies

1	**Intermediate General Database:** Demonstrated proficiency with moderately complex SQL (e.g., joining, grouping), the efficient querying and updating of large tables, the ability to review and enhance others' SQL, and the use of multiple database management software applications.
2	**Intermediate Database Administration:** Demonstrated ability to manage both new and existing databases, utilizing at least one Database Management System (e.g., Oracle, SQL Server, Mongo) to store and organize data; demonstrated ability to create, delete, and alter tables and indices; familiarity with database design and data modeling techniques such as Unified Modeling Language.
3	**Basic Data Storage:** Demonstrated ability to develop, integrate, implement, and maintain data storage solutions in support of Business Intelligence solutions; familiar with data modeling and data warehousing concepts.

Most Common Break Point Competencies

1	**Intermediate General Database:** *See previous.*
2	**Intermediate Database Administration:** *See previous.*
3	**Basic Data Storage:** *See previous.*

Most Preferred Competencies

1	**Intermediate Systems Design and Implementation:** Demonstrated ability to assist business analysts and SMEs in the gathering of requirements and design, implement, and support moderately complex technology solutions to existing business problems.
2	**Basic Business Intelligence:** Basic familiarity compiling large amounts of data from business operations and early ability to reach meaningful insights on the best relevant business decision given requests from internal decision makers.
3	**Intermediate General Data Techniques:** Demonstrated ability to collect, analyze, manipulate, and manage data; moderate proficiency in converting data between a variety of formats; basic familiarity with ETL (extract, transform and load).

Most Hard-to-Find Competencies

1	**Intermediate Systems Design and Implementation:** *See previous.*
2	**Basic Business Intelligence:** *See previous.*
3	**Intermediate General Data Techniques:** *See previous.*

Most Evolving Competencies

1	**Basic Business Intelligence:** Evolution driven by big data (more data, more readily available) and smarter systems managing data more effectively and efficiently combined with more opportunities to use data to capture value; changes make familiarity compiling data, particularly from various sources, to reach insights on the best decision given needs of stakeholders more critical.
2	**Basic Testing:** Evolution driven by larger, more critical systems requiring more testing and safeguarding combined with an expansion in the tools available to use at lower prices; changes make it more valuable to have a basic familiarity with security protocols including the ability to design tests, create test scripts, and execute and validate performance tests particularly ones related to security.
3	**Intermediate Systems Design and Implementation:** Evolution driven by technology enabling larger, more sophisticated systems with more independent connections and data; changes make it more valuable to question and help shape requirements gathered from customers given the options; ideally, able to understand the various technical solutions to a given business requirement or problem.

Occupation Deep Dive: Database Administrators

Job Titles Within This Occupation

- Database Administrator
- Oracle Database Administrator
- ETL Developer
- SQL Developer
- SQL Database Administrator
- Database Developer
- Data Modeler
- Oracle Developer
- SQL Server Database Administrator
- MySQL Database Administrator
- Database Engineer
- Data Entry Specialist

- Database Analyst
- Oracle PL/SQL Developer
- SQL Database Developer

Certification and Education Preferences (Example)

- Microsoft Certified Solutions Associate (MCSA)
- Microsoft Certified Systems Engineer (MCSE)
- Oracle Database Administrator Certified Associate
- Oracle Database Administrator Certified Professional
- Information Technology Information Library (ITIL)

Tools Used (Example List)

- SQL
- Oracle
- SQL Server
- LINUX/UNIX
- Oracle PL/SQL
- JAVA
- T SQL
- PL SQL
- Data Modeling
- Source Control
- Red Gate
- Monitoring Tools
- Query Analyzer
- SQL Profiler
- SSIS

Other Relevant Foundational Competencies

#	
1	Active Learning
2	Reading Comprehension
3	Speaking
4	Judgement and Decision Making
5	Time Management
6	Writing
7	Social Perceptiveness
8	Mathematics
9	Learning Strategies
10	Management of Personnel Resources
11	Persuasion
12	Troubleshooting
13	Operation Monitoring
14	Service Orientation
15	Quality Control Analysis
16	Negotiation
17	Technology Design
18	Management of Financial Resources
19	Management of Material Resources
20	Science
21	Equipment Selection
22	Operation and Control
23	Installation
24	Repairing
25	Equipment Maintenance

Other Relevant Occupation-Specific Competencies

#	
1	Microsoft Office
2	Software Development
3	Core Coding Languages
4	Core Operating Systems
5	Back-end Web Tools and Frameworks
6	Business Process and Analysis
7	Basic Web Development Languages
8	IT/Hardware
9	Scripting
10	Server Administration
11	Operations Analysis
12	Advanced JAVA for Web Development
13	Big Data
14	Administrative Support
15	Business Solutions
16	General Networking Tools and Concepts
17	Business Software
18	Microsoft Project Management Tools
19	Network Protocols
20	Mathematics
21	Information Security
22	Financial Reporting
23	Legacy
24	Office Management
25	