

COMPETENCY-BASED OCCUPATIONAL FRAMEWORK FOR REGISTERED APPRENTICESHIP

Database and Cloud Administrator

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ABOUT THE URBAN INSTITUTE

The nonprofit Urban Institute is dedicated to elevating the debate on social and economic policy. For nearly five decades, Urban scholars have conducted research and offered evidence-based solutions that improve lives and strengthen communities across a rapidly urbanizing world. Their objective research helps expand opportunities for all, reduce hardship among the most vulnerable, and strengthen the effectiveness of the public sector.

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Competency-Based Occupational Frameworks

The Urban Institute, under contract by the U.S. Department of Labor, has worked with employers, subject matter experts, labor unions, trade associations, credentialing organizations and academics to develop Competency-Based Occupational Frameworks (CBOF) for Registered Apprenticeship programs. These frameworks defined the **purpose** of an occupation, the **job functions** that are carried out to fulfill that purpose, the **competencies** that enable the apprentice to execute those job functions well, and the **performance criteria** that define the specific knowledge, skills and personal attributes associated with high performance in the workplace. This organizational hierarchy – Job Purpose – Job Functions – Competencies – Performance Criteria – is designed to illustrate that performing work well requires more than just acquiring discrete knowledge elements or developing a series of manual skills. To perform a job well, the employee must be able to assimilate knowledge and skills learned in various settings, recall and apply that information to the present situation, and carry out work activities using sound professional judgment, demonstrating an appropriate attitude or disposition, and achieving a level of speed and accuracy necessary to meet the employer’s business need.

The table below compares the terminology of Functional Analysis with that of traditional Occupational Task Analysis to illustrate the important similarities and differences. While both identify the key technical elements of an occupation, Functional Analysis includes the identification of behaviors, attributes and characteristics of workers necessary to meet an employer’s expectations.

Framework Terminology	Traditional Task Analysis Terminology
Job Function – the work activities that are carried out to fulfill the job purpose	Job Duties – roles and responsibilities associated with an occupation
Competency – the actions an individual takes and the attitudes he/she displays to complete those activities	Task – a unit of work or set of activities needed to produce some result
Performance Criteria – the specific knowledge, skills, dispositions, attributes, speed and accuracy associated with meeting the employer’s expectations	Sub Task – the independent actions taken to perform a unit of work or a work activity

Although designed for use in competency-based apprenticeship, these Competency-Based Occupational Frameworks also support time-based apprenticeship by defining more clearly and precisely what an apprentice is expected to learn and do during the allocated time-period.

CBOFs are comprehensive to encompass the full range of jobs that may be performed by individuals in the same occupation. As employers or sponsors develop their individual apprenticeship programs, they can extract from or add to the framework to meet their unique organizational needs.

Components of the Competency-Based Occupational Framework

Occupational Overview: This section of the framework provides a description of the occupation including its purpose, the setting in which the job is performed and unique features of the occupation.

Work Process Schedule: This section includes the job functions and competencies that would likely be included in an apprenticeship sponsor's application for registration. These frameworks provide a point of reference that has already been vetted by industry leaders so sponsors can develop new programs knowing that they will meet or exceed the consensus expectations of peers. Sponsors maintain the ability to customize their programs to meet their unique needs, but omission of a significant number of job functions or competencies should raise questions about whether or not the program has correctly identified the occupation of interest.

Cross-cutting Competencies: These competencies are common among all workers, and focus on the underlying knowledge, attitudes, personal attributes and interpersonal skills that are important regardless of the occupation. That said, while these competencies are important to all occupations, the relative importance of some versus others may change from one occupation to the next. These relative differences are illustrated in this part of the CBOF and can be used to design pre-apprenticeship programs or design effective screening tools when recruiting apprentices to the program.

Detailed Job Function Analysis: This portion of the framework includes considerable detail and is designed to support curriculum designers and trainers in developing and administering the program. There is considerable detail in this section, which may be confusing to those seeking a more succinct, higher-level view of the program. For this reason, we recommend that the Work Process Schedule be the focus of program planning activities, leaving the detailed job function analysis sections to instructional designers as they engage in their development work.

- a. **Related Technical Instruction:** Under each job function appears a list of foundational knowledge, skills, tools and technologies that would likely be taught in the classroom to enable the apprentice's on-the-job training safety and success.

- b. Performance Criteria: Under each competency, we provide recommended performance criteria that could be used to differentiate between minimally, moderately and highly competent apprentices. These performance criteria are generally skills-based rather than knowledge-based, but may also include dispositional and behavioral competencies.

Using the Competency-Based Occupational Framework to Develop a Registered Apprenticeship Program

When developing a registered apprenticeship program, the Work Process Schedule included in this CBOF provides an overview of the job functions and competencies an expert peer group deemed to be important to this occupation. The Work Process Schedule in this document can be used directly, or modified and used to describe your program content and design as part of your registration application.

When designing the curriculum to support the apprenticeship program – including on the job training and related technical instruction – further information in Detailed Job Functions could be helpful. These more detailed job function documents include recommendations for the key knowledge and skill elements that might be included in the classroom instruction designed to support a given job function, and the performance criteria provided under each competency could be helpful to trainers and mentors in evaluating apprentice performance and insuring inter-rater reliability when multiple mentors are involved.

Database and Cloud Administrator Occupational Overview

Occupational Purpose and Context

The Database and Cloud Administrator implements, supports and maintains the overall database infrastructure and services for an organization. More specifically, a Database and Cloud Administrator manages and configures a company's database including storage, migration, conversion, queries, protection, performance upgrades and cost efficiencies. It is important to note that because of increasing levels of data security concerns and the sensitive nature of data stored, backup, disaster recovery, and securing databases are essential components of a Database and Cloud Administrator's job. Along these lines, the Database and Cloud Administrator oversees access to all database information and stays up to date with new releases. Equally important, the Database and Cloud Administrator must be very knowledgeable about privacy, confidentiality and data protection from both conceptual and legislative perspectives.

Database and Cloud Administrators work closely with a variety of users to ensure internal and external data collection needs are met. Frequently, the Database and Cloud Administrator must move information stored in legacy databases to new ones and collaborate with Network Administrators to ensure databases are secured, properly linked and aligned with a company's computer network. Whenever system maintenance is performed, the Database and Cloud Administrator troubleshoots to locate existing and potential defects. Furthermore, this person is responsible for guaranteeing that stored data comes from reliable sources.

A Database and Cloud Administrator is very similar to a Database Analyst. Many of their responsibilities overlap and, in fact, depending on the size of the organization, the lines may be blurred. For the most part, a Database and Cloud Administrator can do what an Analyst does and then some—dealing with an organization's single or multiple databases. Of note, this framework provides skills and knowledge for an individual to be effective in entry-level administration of IT database systems, with competencies developed through core and elective choices over time.

Potential Job Titles

Database Administrator, Database Engineer, Systems Administrator, SQL Database Administrator, Database Architect, Database Analyst, Database Monitoring Specialist, Database Coordinator and Database Programmer.

Attitudes and Behaviors

Given the significant responsibility of the Database and Cloud Administrator, it is extremely important for the person in this role to have critical and analytical thinking and complex problem solving abilities; demonstrate attention to detail; and be dependable, adaptable and work both collaboratively within a team and independently. Excellent communication skills to ensure effective negotiation and articulation of ideas are necessary. The Database and Cloud Administrator must be able to work under pressure and within tight timeframes.

Apprenticeship Prerequisites

There are no definitive prerequisites for Database and Cloud Administrator, however, the IT Generalist Qualification will be an advantage.

Occupational Pathways

Senior Database Administrator, Information Technology (IT) Manager, IT Director

Certifications, Licensure and Other Credential Requirements

*Note: certifications in one or more popular database management systems are highly recommended.

CREDENTIAL	Offered By	Before, During or After Apprenticeship
Microsoft Technology Associate	Microsoft	During
Microsoft Certified Solutions Associate	Microsoft	During
Microsoft Solutions Expert: Business Intelligence	Microsoft	After
Microsoft Certified Solutions Architect	Microsoft	After
Oracle Certified Associate	Oracle	During
Oracle Certified Professional	Oracle	After
Oracle Certified Master	Oracle	After
MySQL 5.6 Database Administrator	Microsoft	During
IBM Certified Database Associate	IBM	During
IBM Certified Database Administrator	IBM	After
Amazon Web Services Certification	Amazon	During

Job Functions

JOB FUNCTIONS		Core or Optional
1.	Installs and configures database management systems and server software for database usage	Core
2.	Supports maintenance of database management systems and server software	Core
3.	Optimizes hardware and software performance	Core
4.	Plans and coordinates data migration and conversion between in house and cloud services	Core
5.	Secures server and network	Core
6.	Writes SQL statements and subqueries that use functions and selectively retrieve, sort, and calculate data, statistics, and values	Core

Stackable Programs

This occupational framework is designed to link to the following additional framework(s) as part of a career laddering pathway.

Stackable Programs		Base or Higher Level	Stacks on top of
1.	Junior Database Administrator	Base Program	
2.	Senior Database Administrator		
3.	Information Technology Manager		
4.	Information Technology Director		

Options and Specializations

The following options and specializations have been identified for this occupation. The Work Process Schedule and individual job function outlines indicate which job functions and competencies were deemed by industry advisors to be optional. Work Process Schedules for Specializations are included at the end of this document.

Options and Specializations	Option	Specialization
Information Technology Administrator	X	
Information Security and Assurance Administrator	X	
Cloud Administrator	X	
Database Architect	X	
Cloud Engineer	X	
Cloud Architect	X	
Business Intelligence and Data Analyst	X	
Data Warehouse Administrator	X	

Levels

Industry advisors have indicated that individuals in this occupation may function at different levels, based on the nature of their work, the amount of time spent in an apprenticeship, the level of skills or knowledge mastery, the degree of independence in performing the job or supervisory/management responsibilities.

Level	Distinguishing Features	Added Competencies	Added Time Requirements
N/A			

Work Process Schedule

WORK PROCESS SCHEDULE		ONET Code: 15-1141.00	
Database and Cloud Administrator		RAPIDS Code: 1130CB	
JOB TITLE:			
LEVEL:		SPECIALIZATION:	
STACKABLE PROGRAM <input type="checkbox"/> yes <input type="checkbox"/> no			
BASE OCCUPATION NAME:			
Company Contact: Name			
Address:		Phone	Email
Apprenticeship Type:		Prerequisites	
<input type="checkbox"/> Competency-Based <input type="checkbox"/> Time-Based <input type="checkbox"/> Hybrid			

JOB FUNCTION 1: Installs and configures database management systems and server software for database usage			
Competencies	Core or Optional	OJT	RTI
A. Sets adequate user rights	Core		
B. Develops code using modern programming languages that connect DBS and API	Core		
C. Designs data distribution and data availability and backup procedures	Core		
D. Produces entity relationship and dataflow mapping, database normalization schemata and data table models	Core		
E. Plans and implement application and data provisioning	Core		

F. Applies basic security measures to configuring databases and servers including sanitization and counter-injection	Core		
G. Uses Data Definition Language and Data Manipulation Language as needed to establish and configure database and servers	Core		
H. Prioritizes work appropriately to meet deadlines, maintain focus, and solve complex tasks, seeking help as needed to address problems as they arise	Core		
I. Integrates measures to ensure privacy, confidentiality and data protection in adherence with state, federal and international rules and legislation and employers' best practices	Core		
J. Monitors organizational policies and procedures ensuring adherence to federal, state and international legislative requirements in order to implement and manage change	Core		
K. Communicates updates and issues with team members and clients in a professional manner, often in clear and non-technical ways	Core		

JOB FUNCTION 2: Supports maintenance of database management systems and server software

Competencies	Core or Optional	OJT	RTI
A. Designs data distribution and disaster recovery solutions to capture information needed for storage and future troubleshooting	Core		
B. Implements backup and recovery methodologies to enable restoration capability in the event of an interruption or disaster	Core		
C. Documents and disseminates interruption and disaster recovery procedures	Core		
D. Plans and implements application and data provisioning to appropriate users, exercising high levels of customer service and clear forms of communication, as needed	Core		

E. Researches and stay current on technology	Core		
JOB FUNCTION 3: Optimizes hardware and software performance			
Competencies	Core or Optional	OJT	RTI
A. Optimizes database instances, partitions, and access for performance	Core		
B. Implements and confirms database replication	Core		
C. Tests system and documents process protocols and results	Core		
D. Implements framework for logging and error handling	Core		
JOB FUNCTION 4: Plans and coordinates data migration and conversion between in house and cloud service			
Competencies	Core or Optional	OJT	RTI
A. Identifies and confirms software, hardware, or environmental prerequisites for database conversion and migration	Core		
B. Plans effective strategies for extraction, conversion and loading pipeline	Core		
C. Prepares and transports data between servers and storage devices	Core		
D. Ensures seamless migration and conversion with minimal disruption	Core		
E. Validates data accuracy and integrity of migrated and converted data	Core		
F. Verifies and documents conversion and migration results	Core		
G. Tests and designs user rights	Core		
H. Manages and supports legacy systems	Core		

I. Monitors and optimizes database usage	Optional		
J. Ensures appropriate security standards during migration and conversation processes	Core		

JOB FUNCTION 5: Secures server and network			
Competencies	Core or Optional	OJT	RTI
A. Assesses network security threats and vulnerabilities	Core		
B. Configures perimeter to secure network	Core		
C. Installs, configures, and tests network security	Core		
D. Reviews logs and audit reports to identify and record security incidents, intrusions, or attempts	Core		
E. Analyzes and monitors server security and implement countermeasures (like patches and fixes) to address existing and potential vulnerabilities and threats	Core		
F. Determines, implements, and monitors encryption	Core		
G. Develops and implements security and confidentiality protocols	Core		
H. Tests and verifies design performance and user permissions	Core		

JOB FUNCTION 6: Writes SQL statements and subqueries that use functions and selectively retrieve, sort, and calculate data, statistics, and values

Competencies	Core	OJT	RTI
A. Reads and comprehends query language SQL and/or NOSQL relational and document storage databases	Core		
B. Writes SQL statements that use functions and selectively retrieve and sort data and values	Core		
C. Writes and executes queries and subqueries	Core		

Related Technical Instruction Plan

COURSE NAME	Course Number
	Hours
LEARNING OBJECTIVES	
COURSE NAME	Course Number
	Hours
LEARNING OBJECTIVES	
COURSE NAME	Course Number
	Hours
LEARNING OBJECTIVES	
COURSE NAME	Course Number
	Hours
LEARNING OBJECTIVES	

LEARNING OBJECTIVES

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COURSE NAME

Course Number

Hours

LEARNING OBJECTIVES

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Cross-Cutting Competencies

		COMPETENCY**								
		0	1	2	3	4	5	6	7	8
Personal Effectiveness	Interpersonal Skills	0	1	2	3	4	5	6	7	8
	Integrity	0	1	2	3	4	5	6	7	8
	Professionalism	0	1	2	3	4	5	6	7	8
	Initiative	0	1	2	3	4	5	6	7	8
	Dependability and Reliability	0	1	2	3	4	5	6	7	8
	Adaptability and Flexibility	0	1	2	3	4	5	6	7	8
	Lifelong Learning	0	1	2	3	4	5	6	7	8
Academic	Reading	0	1	2	3	4	5	6	7	8
	Writing	0	1	2	3	4	5	6	7	8
	Mathematics	0	1	2	3	4	5	6	7	8
	Science and Technology	0	1	2	3	4	5	6	7	8
	Communication	0	1	2	3	4	5	6	7	8
	Critical and Analytical Thinking	0	1	2	3	4	5	6	7	8
	Basic Computer Skills	0	1	2	3	4	5	6	7	8
Workplace	Teamwork	0	1	2	3	4	5	6	7	8
	Customer Focus	0	1	2	3	4	5	6	7	8
	Planning and Organization	0	1	2	3	4	5	6	7	8
	Creative Thinking	0	1	2	3	4	5	6	7	8
	Problem Solving and Decision Making	0	1	2	3	4	5	6	7	8
	Working with Tools and Technology	0	1	2	3	4	5	6	7	8
	Checking, Examining and Recording	0	1	2	3	4	5	6	7	8
	Business Fundamentals	0	1	2	3	4	5	6	7	8
	Sustainable	0	1	2	3	4	5	6	7	8
	Health and Safety	0	1	2	3	4	5	6	7	8

**Cross-Cutting Competencies are defined in the Competency Model Clearinghouse:

<https://www.careeronestop.org/CompetencyModel/competency-models/building-blocks-model.aspx>.

Cross-Cutting Competencies identify transferable skills – sometimes called “soft skills” or “employability skills” – that are important for workplace success, regardless of a person’s occupation. Still, the relative importance of specific Cross-Cutting Competencies differs from occupation to occupation. The Cross-Cutting Competencies table, above, provides information about which of these competencies is most important to be successful in a particular occupation. This information can be useful to employers or intermediaries in screening and selecting candidates for apprenticeship programs, or to pre-apprenticeship providers that seek to prepare individuals for successful entry into an apprenticeship program.

The names of the Cross-Cutting Competencies come from the U.S. Department of Labor’s Competency Model Clearinghouse and definitions for each can be viewed at <https://www.careeronestop.org/CompetencyModel/competency-models/building-blocks-model.aspx>.

The scoring system utilized to evaluate the level of competency required in each cross cutting skill aligns with the recommendations of the Lumina Foundation’s Connecting Credentials Framework. The framework can be found at: <http://connectingcredentials.org/wp-content/uploads/2015/05/Connectingtials-4-29-30.pdf>.

Detailed Job Functions

JOB FUNCTION 1: Installs and configures database management systems and server software for database usage

Related Technical Instruction		
KNOWLEDGE	SKILLS	TOOLS & TECHNOLOGIES
<ul style="list-style-type: none"> • Programming languages • Data Definition Language and Data Manipulation Language • Understands how DBS and API connections • Disaster recovery procedures • Dataflow mapping • Basic security measures • State and federal privacy legislation 	<ul style="list-style-type: none"> • Basic coding • Logic and problem solving • Clear communication • Time management • Detailed written communication and documentation 	<ul style="list-style-type: none"> • Computer

Competency A: Sets adequate user rights	Core or Optional
PERFORMANCE CRITERIA	
1. Controls privileges and permissions to database users	Core
2. Communicates with team members and supervisors about individuals' privileges and permission needs	Core
3. Documents and regularly updates user rights as needed	Core
Competency B: Develops code using modern programming languages that connect DBS and API	Core or Optional
PERFORMANCE CRITERIA	
1. Develops code to connect the database system and application programming interface using the appropriate programming language	Core
2. Uses most current coding practices that align with both internal and external standards	Core
3. Uses comments and clear documentation within code to ensure clear communication	Core

Competency C: Designs data distribution and data availability and backup procedures	Core or Optional
PERFORMANCE CRITERIA	
1. Plans backup and disaster recovery procedures	Core
2. Designs data distribution and availability procedures using both internal and external standards	Core
3. Writes detailed plans for data procedures that ensures standardization	Core
Competency D: Produces entity relationship and dataflow mapping, database normalization schemata and data table models	Core or Optional
PERFORMANCE CRITERIA	
1. Establishes database system flows	Core
2. Documents database system flows using mapping, schema, and models	Core
3. Produces database normalization plans to ensure cohesion between entity types	Core
4. Creates data table models	Core
Competency E: Plans and implements application and data provisioning	Core or Optional
PERFORMANCE CRITERIA	
1. Plans application and data provisioning processes including creating, preparing, and enabling a network to provide applications and data to users	Core
2. Implements application and data provisioning ensuring user accessibility	Core
3. Documents provision implementation procedures	Core
Competency F: Applies basic security measures to configuring databases and servers including sanitization and counter-injection	Core or Optional
PERFORMANCE CRITERIA	
1. Plans and organizes database security activities	Core
2. Implements required security controls	Core
3. Applies appropriate data sanitization processes when preparing databases	Core

4. Configures databases using basic security measures to establish counter-injection processes	Core
Competency G: Uses Data Definition Language and Data Manipulation Language as needed to establish and configure database and servers	Core or Optional
PERFORMANCE CRITERIA	
1. Uses Data Definition Language and Data Manipulation Language when appropriate	Core
2. Establishes and configures database and servers using the appropriate programming language	Core
Competency H: Prioritizes work appropriately to meet deadlines, maintain focus, and solve complex tasks, seeking help as needed to address problems as they arise	Core or Optional
PERFORMANCE CRITERIA	
1. Communicates clearly and regularly with coworkers and supervisors	Core
2. Manages time effectively to meet deadlines	Core
3. Uses appropriate and clear documentation and record keeping methods	Core
Competency I: Integrates measures to ensure privacy, confidentiality and data protection in adherence with state, federal and international rules and legislation and employers' best practices	Core or Optional
PERFORMANCE CRITERIA	
1. Integrates security measures to ensure privacy, confidentiality, and data protection	Core
2. Ensures measures meet state, federal, and international rules and legislation	Core
3. Applies employer's best practices to ensure privacy, confidentiality, and data protection	Core
Competency J: Monitors organizational policies and procedures ensuring adherence to federal, state and international legislative requirements in order to implement and manage change	Core or Optional
PERFORMANCE CRITERIA	
1. Monitors and clearly tracks changes to federal, state, and international legislative requirements	Core

2. Ensures organizational policies and procedures adhere to federal, state, and international legislative requirements	Core
3. Establishes and uses clear record keeping to track changes	Core
Competency K: Communicates updates and issues with team members and clients in a professional manner, often in clear and non-technical ways	Core or Optional
PERFORMANCE CRITERIA	
1. Communicates effectively with team members, clients, and other external partners	Core
2. Establishes and uses clear record keeping to track updates and issues	Core
3. Communicates updates and issues in a non-technical, easily understood manner	Core

JOB FUNCTION 2: Supports maintenance of database management systems and server software

Related Technical Instruction		
KNOWLEDGE	SKILLS	TOOLS & TECHNOLOGIES
<ul style="list-style-type: none"> • Programming languages • Disaster recovery methods 	<ul style="list-style-type: none"> • Problem solving • Basic coding • Clear written communication • Customer service 	<ul style="list-style-type: none"> • Computer

Competency A: Designs data distribution and disaster recovery solutions to capture information needed for storage and future troubleshooting	Core or Optional
PERFORMANCE CRITERIA	
1. Creates data distribution and disaster recovery solutions	Core
2. Designs plans to capture information for storage and future troubleshooting	Core
Competency B: Implements backup and recovery methodologies to enable restoration capability in the event of an interruption or disaster	Core or Optional
PERFORMANCE CRITERIA	
1. Implements database backup and recovery procedures	Core
2. Ensures recovery methods include efficient restoration capabilities	Core
Competency C: Documents and disseminates interruption and disaster recovery procedures	Core or Optional
PERFORMANCE CRITERIA	
1. Documents interruption and recovery procedures using clear notation	Core
2. Communicates clearly with team members to distribute procedures	Core
3. Ensures all necessary team members understand interruption and disaster recovery procedures	Core

Competency D: Plans and implements application and data provisioning to appropriate users, exercising high levels of customer service and clear forms of communication, as needed	Core or Optional
PERFORMANCE CRITERIA	
1. Communicates with team members and supervisors to ensure user rights and needs are accurate and up-to-date	Core
2. Designs plans for application and data provisioning	Core
3. Implements application and data provisioning	Core
4. Responds promptly and clearly to requests from users	Core
Competency E: Researches and stay current on technology	Core or Optional
PERFORMANCE CRITERIA	
1. Researches new technologies and potential upgrades to current systems	Core
2. Communicates with team members about potential new technologies	Optional

JOB FUNCTION 3: Optimizes hardware and software performance

Related Technical Instruction		
KNOWLEDGE	SKILLS	TOOLS & TECHNOLOGIES
<ul style="list-style-type: none"> • Programming languages • Basic error handling • Database replication procedures 	<ul style="list-style-type: none"> • Basic coding • Problem solving and logic • Clear documentation and record keeping 	<ul style="list-style-type: none"> • Computer

Competency A: Optimizes database instances, partitions, and access for performance	Core or Optional
PERFORMANCE CRITERIA	
1. Adjusts the database management system parameters as needed to ensure optimal performance and availability	Core
2. Implements changes to improve system performance and reliability	Core
3. Improves database memory structures for optimal performance	Core
4. Uses database partitioning to improve query speeds	Core
Competency B: Implements and confirms database replication	Core or Optional
PERFORMANCE CRITERIA	
1. Maintains data replication primary and secondary databases	Core
2. Implements database replication as requested	Core
Competency C: Tests system and documents process protocols and results	Core or Optional
PERFORMANCE CRITERIA	
1. Monitors utilization for capacity planning	Core
2. Analyzes database performance	Core
3. Maintains development, production, and multiple testing environments	Core
4. Documents procedures and outcomes using clear and detailed notation	Core

Competency D: Implements framework for logging and error handling	Core or Optional
PERFORMANCE CRITERIA	
1. Sets improvement standards to reduce errors	Core
2. Creates systems to monitor and detect errors and problems	Optional
3. Documents monitoring procedures and results using detailed and clear notation	Core

JOB FUNCTION 4: Plans and coordinates data migration and conversion between in house and cloud services

Related Technical Instruction		
KNOWLEDGE	SKILLS	TOOLS & TECHNOLOGIES
<ul style="list-style-type: none"> Programming languages Database migration Data pipelining 	<ul style="list-style-type: none"> Basic coding Clear documentation and record keeping Communication 	<ul style="list-style-type: none"> Computer

Competency A: Identifies and confirms software, hardware, or environmental prerequisites for database conversion and migration	Core or Optional
PERFORMANCE CRITERIA	
1. Plans and implements the migration of databases	Core
2. Determines prerequisites for database conversion and migration	Core
Competency B: Plans effective strategies for extraction, conversion and loading pipeline	Core or Optional
PERFORMANCE CRITERIA	
1. Plans extraction, conversion, and loading pipeline to optimize loops	Core
2. Documents plans for pipelining using clear notation	Core
Competency C: Prepares and transports data between servers and storage devices	Core or Optional
PERFORMANCE CRITERIA	
1. Prepares data for storage	Core
2. Implements data transfers between servers and storage devices	Core
3. Documents data transfer occurrences	Core

Competency D: Ensures seamless migration and conversion with minimal disruption	Core or Optional
PERFORMANCE CRITERIA	
1. Implements the migration of databases using best practices to ensure consistency	Core
2. Converts databases as needed ensuring minimal disruption	Core
Competency E: Validates data accuracy and integrity of migrated and converted data	Core or Optional
PERFORMANCE CRITERIA	
1. Maintains and monitors integrity of migrated and converted databases	Core
2. Implements procedures to verify data accuracy after it is migrated or converted	Core
3. Recommends and implements database solutions to support data integrity efforts	Core
4. Documents data validation activities using clear notation	Core
Competency F: Verifies and documents conversion and migration results	Core or Optional
PERFORMANCE CRITERIA	
1. Monitors database conversion and migration activities	Core
2. Documents progress using clear notation during database conversion and migration activities	Core
3. Communicates results of conversion and migration activities to team members and other appropriate stakeholders	Optional
Competency G: Tests and designs user rights	Core or Optional
PERFORMANCE CRITERIA	
1. Designs implementation of appropriate user rights for each database user	Core
2. Documents appropriate user rights and any changes to these rights using clear notation	Core
3. Tests the application of user rights to ensure appropriate access by all database users	Core
4. Communicates with team members and other appropriate stakeholders to update user rights as needed	Core

Competency H: Manages and supports legacy systems	Core or Optional
PERFORMANCE CRITERIA	
1. Manages legacy systems to ensure they continue functioning appropriately	Core
2. Implements changes as needed to maintain legacy systems	Core
3. Provides support to legacy system maintenance	Core
Competency I: Monitors and optimizes database usage	Core or Optional
PERFORMANCE CRITERIA	
1. Monitors database usage	Core
2. Documents database usage with appropriate record keeping notation	Core
3. Implements changes to ensure optimal database usage	Optional
Competency J: Ensures appropriate security standards during migration and conversion processes	Core or Optional
PERFORMANCE CRITERIA	
1. Applies the appropriate security standards during database migration and conversion processes	Core
2. Monitors database migration and conversion processes	Core
3. Documents and communicates instances during migration and conversion processes when security is threatened	Core
4. Implements changes as needed to maintain security standards	Core

JOB FUNCTION 5: Secures server and network

Related Technical Instruction		
KNOWLEDGE	SKILLS	TOOLS & TECHNOLOGIES
<ul style="list-style-type: none"> Programming languages Basic database security measures Encryption methods 	<ul style="list-style-type: none"> Basic coding Written communication 	<ul style="list-style-type: none"> Computer

Competency A: Assesses network security threats and vulnerabilities	Core or Optional
PERFORMANCE CRITERIA	
1. Implements tests to determine security threats and vulnerabilities	Core
2. Documents potential threats using clear notation and standard record keeping	Core
3. Communicates potential threats and vulnerabilities to team members, supervisors, and potentially impacted data users	Core
Competency B: Configures perimeter to secure network	Core or Optional
PERFORMANCE CRITERIA	
1. Implements required security controls	Core
2. Develops tools to ensure database is a secure environment	Core
3. Configures database perimeter using internal and external standards to ensure a secure network	Core
Competency C: Installs, configures, and tests network security	Core or Optional
PERFORMANCE CRITERIA	
1. Identifies potential network security upgrades	Core
2. Installs improvements or changes to network securities to ensure the network is a secure environment	Core
3. Documents changes and improvements to network security	Core
4. Uses appropriate tests to maintain network security	Core

5. Documents and communicates results of network security tests to appropriate team members, supervisors, and network users	Core
Competency D: Reviews logs and audit reports to identify and record security incidents, intrusions, or attempts	Core or Optional
PERFORMANCE CRITERIA	
1. Uses audit trails to identify potential security violations	Core
2. Investigates potential security threats as needed	Core
3. Documents results of audit reports and potential security threats in clear, standard notation	Core
4. Reviews logs and reports results regularly to ensure the network remains a secure environment	Core
5. Works with team members to review and suggests improvements when potential security threats are identified	Core
Competency E: Analyzes and monitors server security and implements countermeasures (like patches and fixes) to address existing and potential vulnerabilities and threats	Core or Optional
PERFORMANCE CRITERIA	
1. Monitors database security, integrity, and access controls	Core
2. Plans and implements security improvements as needed	Core
3. Uses countermeasures as needed when potential security threats are identified	Core
4. Works with team members to review potential security threats and plan the appropriate improvements	Core
5. Keeps records of improvements and communicates them with appropriate network users as needed	Core
Competency F: Determines, implements, and monitors encryption	Core or Optional
PERFORMANCE CRITERIA	
1. Determines the appropriate use of encryption methods to ensure network security	Core
2. Implements encryption methods as needed	Core
3. Communicates the use of encryption methods to appropriate network users	Core
4. Monitors the integrity of encryption methods to ensure the network remains a secure environment	Core
5. Uses appropriate tests to measure the ongoing effectiveness of encryption security methods	Core

6. Documents results of tests using clear notation	Core
Competency G: Develops and implements security and confidentiality protocols	Core or Optional
PERFORMANCE CRITERIA	
1. Plans and organizes database security activities	Core
2. Applies appropriate information security to all tasks	Core
3. Works with team members to develop security and confidentiality protocols	Core
4. Documents security and confidentiality protocols using detailed record keeping	Core
5. Communicates security and confidentiality protocols to the appropriate network users	Core
Competency H: Tests and verifies design performance and user permissions	Core or Optional
PERFORMANCE CRITERIA	
1. Controls database user permissions and privileges	Core
2. Tests user permissions to ensure adequate access to and security of the network	Core
3. Communicates with team members, supervisors, and appropriate network users to verify user permissions	Core
4. Monitors user permissions to ensure a positive user experience	Core

JOB FUNCTION 6: Writes SQL statements and subqueries that use functions and selectively retrieve, sort, and calculate data, statistics, and values

Related Technical Instruction		
KNOWLEDGE	SKILLS	TOOLS & TECHNOLOGIES
<ul style="list-style-type: none"> Programming languages SQL 	<ul style="list-style-type: none"> Basic coding 	<ul style="list-style-type: none"> Computer

Competency A: Reads and comprehends query language SQL and/or NOSQL relational and document storage databases	Core or Optional
PERFORMANCE CRITERIA	
1. Designs highly available and redundant storage networks	Core
2. Uses query languages to design relational and document storage databases	Core
Competency B: Writes SQL statements that use functions and selectively retrieve and sort data and values	Core or Optional
PERFORMANCE CRITERIA	
1. Develops functions for selective retrieval and sorting using SQL statements	Core
2. Researches and uses the most up-to-date coding practices for SQL statements	Core
Competency C: Writes and executes queries and subqueries	Core or Optional
PERFORMANCE CRITERIA	
1. Uses SQL statements to execute queries and subqueries	Core

STATEMENT OF INDEPENDENCE

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