



Australian Government

Department of Education, Employment and Workplace Relations

ICAB4136B Use structured query language to create database structures and manipulate data

Release: 1

ICAB4136B Use structured query language to create database structures and manipulate data

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit defines the competency required to use a structured query language (SQL) to define, create and manipulate database structures and associated data in a relational database. The following units are linked and form an appropriate cluster: • ICAB4060B Identify physical database requirements • ICAB4061B Monitor physical database implementation No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.
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Application of the Unit

Application of the unit	
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Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Prerequisite units		
	ICAB4225B	Automate processes

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Write a simple SQL statement to retrieve and sort data	1.1.Retrieve all the data from a single table 1.2.Retrieve data from specific columns in a single table 1.3.Use 'order by' to sort query output
2. Write an SQL statement that selectively retrieves data	2.1.Restrict the number of rows retrieved by placing criteria in the 'where' clause 2.2.Restrict the number of rows retrieved by placing specific criteria in the select statement 2.3.Use comparison operators in the 'where' clause to compare numeric, character, string, date and time data 2.4.Use Boolean operators with the correct precedence 2.5.Use criteria in the 'where' clause to check for a range of values, to select values from a list, and to check for values that match a pattern 2.6.Use SQL syntax to suppress duplicate values from query results 2.7.Take action to exclude null values from a query result
3. Write SQL statements that use functions	3.1.Use arithmetical operators with the correct precedence 3.2.Use string functions and operators to obtain the required query output 3.3.Use mathematical functions to obtain the required output, where required 3.4.Use date functions to obtain the required output 3.5.Use SQL aggregate functions to obtain the required output
4. Write SQL statements that use aggregation and filtering	4.1.Use 'group by' to aggregate data by multiple columns 4.2.Sort aggregated data in the query output 4.3.Filter aggregated data using the 'having' clause
5. Write SQL statements that retrieve data from multiple tables	5.1.Employ the inner join syntax to retrieve data from two or more tables 5.2.Use 'left outer', 'right outer' and 'full outer' syntax to join tables in the select statement 5.3.Use correct syntax in the 'where' clause to retrieve data from multiple tables 5.4.Write a union query that retrieves data from more than one table
6. Write and execute SQL sub-queries	6.1.Construct single and nested sub-queries 6.2.Construct sub-queries that return a single row, and multiple rows

ELEMENT	PERFORMANCE CRITERIA
	6.3. Use correlated sub-queries to retrieve required data 6.4. Write sub-queries that use aggregates

ELEMENT	PERFORMANCE CRITERIA
7. Create and manipulate tables	7.1. Identify required columns, data types, keys, relationships, indexes and constraints 7.2. Use relevant naming conventions for all database elements 7.3. Create tables that implement all required elements 7.4. Insert rows into tables 7.5. Update some or all of the data in a table 7.6. Add columns to a table 7.7. Modify a column within a table 7.8. Delete a column from a table 7.9. Delete rows from a table 7.10. View detailed information regarding a table 7.11. Delete tables with regard to referential integrity rules
8. Create and use views	8.1. Create views that satisfy information requirements 8.2. Use check constraints in a view 8.3. Retrieve, insert, update and delete data using a view 8.4. Drop a view from a database
9. Create and use stored procedures	9.1. Create and execute stored procedures that use SQL to retrieve, insert or modify data according to information requirements 9.2. Create and execute stored procedures that use one or more parameters 9.3. Drop a stored procedure from the database 9.4. Create and test database triggers that automate data management or perform specific required data-related functions

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- Analysis skills to determine data objects required, data structures and business requirements
- Data modelling skills, particularly during the design and development phases
- Report queries and view development using analytical and evaluation skills

Required knowledge

REQUIRED SKILLS AND KNOWLEDGE
• Broad knowledge of data modelling structures • Data analysis, particularly in determining data types, data structures and to query and report design • Run time facilities in relation to implementing live database • DBMS fundamentals

Evidence Guide

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Overview of assessment

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Assessment must confirm the ability to use a structured query language to create database structures, and store, retrieve and manipulate data in a relational database.

To demonstrate competency in this unit the person will require access to:

- Client requirements
- Functionality and scope requirements
- Access requirements and policy
- Security policy
- Naming standards

Context of and specific resources for assessment

SQL database functions are in place for most organisations and have become integral to internet-based data provision and data retrieval.

Any assessment of this unit of competency will usually include observation of real or simulated SQL code development and processes data engineering.

The breadth, depth and complexity of knowledge and skills in this competency would cover a broad range of varied activities or application in a wider variety of contexts most of which are complex and non-routine. Leadership and guidance would be involved when organising activities of self and others as well as contributing to technical solutions of a non-routine or contingency nature.

Assessment must ensure:

- Performance of a broad range of skilled applications including the requirement to evaluate and analyse current practices, develop new criteria and procedures for performing current practices and

EVIDENCE GUIDE	
	provision of some leadership and guidance to others in the application and planning of the skills would be characteristic. • Applications may involve responsibility for, and limited organisation of, others. • Applications involve responsibility for SQL code structures and manipulation of data.
Method of assessment	The purpose of this unit is to define the standard of performance to be achieved in the workplace. In undertaking training and assessment activities related to this unit, consideration should be given to the implementation of appropriate diversity and accessibility practices in order to accommodate people who may have special needs. Additional guidance on these and related matters is provided in ICA05 Section 1. • Competency in this unit should be assessed using summative assessment to ensure consistency of performance in a range of contexts. This unit can be assessed either in the workplace or in a simulated environment. However, simulated activities must closely reflect the workplace to enable full demonstration of competency. • Assessment will usually include observation of real or simulated work processes and procedures and/or performance in a project context as well as questioning on underpinning knowledge and skills. The questioning of team members, supervisors, subordinates, peers and clients where appropriate may provide valuable input to the assessment process. The interdependence of units for assessment purposes may vary with the particular project or scenario.
Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended, for example: • ICAB4060B Identify physical database requirements • ICAB4061B Monitor physical database implementation

EVIDENCE GUIDE

	An individual demonstrating this competency would be able to: • Demonstrate understanding of a broad knowledge base incorporating some theoretical concepts • Apply solutions to a defined range of unpredictable problems • Identify and apply skill and knowledge areas to a wide variety of contexts, with depth in some areas • Identify, analyse and evaluate information from a variety of sources • Take responsibility for own outputs in relation to specified quality standards • Take limited responsibility for the quantity and quality of the output of others • Demonstrate understanding of broad database structures incorporating some theoretical concepts • Manipulate data and provide solutions to a defined range of unpredictable problems • Take limited responsibility for the quantity and quality of database data • Maintain knowledge of industry products and services
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Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Comparison operators may include:

- equal to
- not equal to
- greater than
- less than
- greater than or equal to
- less than or equal to

Boolean operators may include

- AND

RANGE STATEMENT	
the use of:	• OR • NOT
Database may include but are not limited to:	• Oracle • Sybase • Microsoft SQL Server • Ingres • DB2 • Informix • mSQL • MySQL • SQL Server PostgreSQL
Arithmetical operators may include:	• addition • subtraction • multiplication • modulus division
Mathematical functions may include:	• cos • log • power • sin • square root
Information requirements may include:	• reports • summaries • letters • other business documents required by the organisation

Unit Sector(s)

Unit sector	Build
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Co-requisite units

Co-requisite units		

Co-requisite units		

Competency field

Competency field	
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