



Australian Government

Department of Education, Employment and Workplace Relations

ICAPRG425A Use structured query language

Release: 1

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Modification History

Release	Comments
Release 1	This Unit first released with <i>ICA11 Information and Communications Technology Training Package version 1.0</i>

Unit Descriptor

This unit describes the performance outcomes, skills and knowledge required to use a structured query language (SQL) to define, create and manipulate database structures and associated data in a relational database.

Application of the Unit

This unit applies to a wide variety of information technology (IT) roles where relational databases and SQL are being used. SQL database functions are in place for most organisations and have become integral to internet-based data provision and data retrieval.

Examples of job roles where this unit applies would be:

- IT generalists who work in environments in which relational databases and SQL are part of an overall solution
- systems administrators or network engineers who install and manage systems that run on an SQL server
- developers who build applications that use SQL
- IT professionals who work with third-party applications that are built using SQL databases
- database administrators who manage the relational database environment
- advanced users who write queries to extract data from a relational database.

Licensing/Regulatory Information

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of endorsement but users should confirm requirements with the relevant federal, state or territory authority.

Pre-Requisites

Not applicable.

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Element	Performance Criteria
<i>Elements describe the essential outcomes of a unit of competency.</i>	<i>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.</i>

Elements and 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 6.3 Use correlated sub-queries to retrieve required data 6.4 Write sub-queries that use aggregates
7. Create and manipulate tables	7.1 Identify required columns, data types, keys, relationships, indexes and constraints 7.2 Use relevant naming conventions for database elements 7.3 Create tables that implement required elements 7.4 Manipulate tables to meet specific requirements
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

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

Required skills

- analytical skills to evaluate business requirements to determine:
 - report and view requirements
 - required data objects and data structures
- numeracy skills to use arithmetical operators and mathematical functions
- planning and organisational skills to analyse and organise data according to business query and reporting requirements
- problem-solving skills to:
 - troubleshoot SQL syntax errors
 - understand typical warnings and errors
- technical skills to:
 - run data modelling, particularly during the design and development phases
 - write SQL queries.

Required knowledge

- client-server concepts
- data-integrity concepts
- data-modelling structures
- databases and database objects, including data types, data structures, identifiers and metadata
- programming concepts
- query design
- relational database design
- SQL client environment
- SQL server architecture.

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 ability to: • design a simple relational database • use SQL to create database structures, and store, retrieve and manipulate data in a relational database • create a variety of SQL queries to match client requirements • create and use views and stored procedures.
Context of and specific resources for assessment	Assessment must ensure access to: • client requirements • functionality and scope requirements • naming standards • SQL server and client software • networked computers • appropriate learning and assessment support when required • modified equipment for people with special needs.
Method of assessment	A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit: • verbal or written questioning of required skills and knowledge • evaluation of an existing database created by the candidate. Assessment needs to ensure that the database and queries were created by the candidate using SQL statements as outlined in this unit. It would not be appropriate for the candidate to create the database or queries using graphical tools that generate the required SQL statements.
Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended, where appropriate. Assessment processes and techniques must be culturally appropriate, and suitable to the communication skill level, language, literacy and numeracy capacity of the candidate and the work being performed. Indigenous people and other people from a non-English speaking

	background may need additional support. In cases where practical assessment is used it should be combined with targeted questioning to assess required knowledge.
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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 • greater than • greater than or equal to • less than • less than or equal to • not equal to.
Boolean operators may include the use of:	• AND • NOT • OR.
Arithmetical operators may include:	• addition • modulus division • multiplication • subtraction.
Mathematical functions may include:	• cos • log • power • sin • square root.
Database may include:	• Informix • Ingres • Microsoft SQL server • MySQLDB2 • Oracle • Postgre Structured Query Language (Postgre SQL) • Sybase.
Manipulating tables may include:	• inserting rows into a table • updating some or all of the data in a table • adding columns to a table • modifying a column within a table • deleting a column from a table • deleting rows from a table • viewing detailed information regarding a table • deleting tables with regard to referential integrity rules.

<i>Information requirements</i> may include:	• letters • other business documents required by the organisation • reports • summaries.
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Unit Sector(s)

Programming and software development