



**Australian Government**

**Department of Education, Employment and Workplace Relations**

# **ICAPRG403A Develop data-driven applications**

**Release: 1**

## ICAPRG403A Develop data-driven applications

### Modification History

Release	Comments
Release 1	This Unit first released with <i>ICAI1 Information and Communications Technology Training Package version 1.0</i>

### Unit Descriptor

This unit describes the performance outcomes, skills and knowledge required to create data-driven applications that access data from a range of sources, such as databases, object data sources or eXtensible markup language (XML).

### Application of the Unit

This unit applies to those who work as programmers or database application developers who are responsible for data-access coding.

The context of the unit applies to different types of data-access methods, such as data retrieval and storage, back-end coding, disconnect data management, and reading and writing XML documents.

### 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. Design data-access layer (DAL)	1.1 Design DAL in a <b><i>multi-layer application</i></b> model 1.2 Determine <b><i>data-access application programming interface</i></b> (API) for connecting to various data sources
2. Establish a connection with a data source	2.1 Create and manage connection strings 2.2 Connect to a <b><i>data source</i></b> by using different <b><i>data providers</i></b> 2.3 Create code to handle connection exceptions
3. Execute commands and return results from the data source	3.1 <b><i>Query data</i></b> from the data source 3.2 Retrieve data from the data source as result sets 3.3 Manage result sets 3.4 Manage exceptions when retrieving data
4. Modify data in the data source	4.1 Insert, update or delete data 4.2 Manage <b><i>data integrity</i></b> 4.3 Manage exceptions when modifying data
5. Manage disconnected data	5.1 Research a <b><i>disconnected data</i></b> management strategy 5.2 Ensure that application can deal with disconnected data
6. Document data-access layer	6.1 Document the code 6.2 Document database connectivity

## Required Skills and Knowledge

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

### Required skills

- analytical skills to design complex multi-layer application model
- communication skills to interact with developer to ensure proper implementation
- learning skills to investigate potential new techniques to access data from various resources
- literacy skills to:
  - read and interpret database design document
  - read basic technical data
- problem-solving skills to develop and refine strategies to access data sources
- technical skills to:
  - create code for the data-access layer
  - create structured query language (SQL) commands to select, insert, update or delete data
  - test and debug code.

### Required knowledge

- features of:
  - object-oriented design and multi-layer applications
  - relational database management systems
- object-oriented programming at an intermediate level
- SQL at a basic level.

## 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.*

<b>Overview of assessment</b>	
<b>Critical aspects for assessment and evidence required to demonstrate competency in this unit</b>	<p>Evidence of the ability to:</p> <ul style="list-style-type: none"> <li>• design and code the data-access layer of multi-layer applications</li> <li>• retrieve and update data from various data sources.</li> </ul>
<b>Context of and specific resources for assessment</b>	<p>Assessment must ensure access to:</p> <ul style="list-style-type: none"> <li>• integrated development environment (IDE)</li> <li>• data access APIs</li> <li>• database management system software</li> <li>• database files</li> <li>• coding standard</li> <li>• specific tools and licences, depending on particular data-access API</li> <li>• appropriate learning and assessment support when required</li> <li>• modified equipment for people with special needs.</li> </ul>
<b>Method of assessment</b>	<p>A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit:</p> <ul style="list-style-type: none"> <li>• review of candidate's DAL design</li> <li>• evaluation of candidate's data-access management strategy</li> <li>• verbal or written questioning to assess candidate's knowledge of:             <ul style="list-style-type: none"> <li>• multi-layer applications</li> <li>• database access.</li> </ul> </li> </ul>
<b>Guidance information for assessment</b>	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended, where appropriate.</p> <p>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.</p> <p>Indigenous people and other people from a non-English speaking background may need additional support.</p> <p>In cases where practical assessment is used it should be</p>

	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.

<b><i>Multi-layer application</i></b> may include:	<ul style="list-style-type: none"> <li>• business logic layer (BLL)</li> <li>• data-access layer (DAL)</li> <li>• user interface layer (UI).</li> </ul>
<b><i>Data-access application programming interface</i></b> may relate to:	<ul style="list-style-type: none"> <li>• object-oriented set of libraries used to interact with data sources: <ul style="list-style-type: none"> <li>• active data objects (ADO.NET)</li> <li>• ADO.NET Entity Framework</li> <li>• Java database connectivity (JDBC)</li> <li>• language integrated query (LINQ).</li> </ul> </li> </ul>
<b><i>Data source</i></b> may include:	<ul style="list-style-type: none"> <li>• databases: <ul style="list-style-type: none"> <li>• Microsoft SQL server</li> <li>• MySQL</li> <li>• Oracle</li> <li>• Postgre Structured Query Language (Postgre SQL)</li> </ul> </li> <li>• fat-files database</li> <li>• internal data</li> <li>• object data sources</li> <li>• XML database.</li> </ul>
<b><i>Data providers</i></b> may include:	<ul style="list-style-type: none"> <li>• managed providers</li> <li>• Microsoft object linking and embedding (OLE) DB</li> <li>• native providers</li> <li>• open database connection (ODBC)</li> <li>• SQL client</li> <li>• third-party providers.</li> </ul>
<b><i>Query data</i></b> may include:	<ul style="list-style-type: none"> <li>• access input and output parameters and return values</li> <li>• access stored procedures</li> <li>• create command objects.</li> </ul>
<b><i>Data integrity</i></b> may include:	<ul style="list-style-type: none"> <li>• cascading deletes</li> <li>• cascading updates</li> <li>• constraints.</li> </ul>
<b><i>Disconnected data</i></b> may include:	<ul style="list-style-type: none"> <li>• DataSet</li> <li>• DataTable</li> <li>• service data objects (SDO).</li> </ul>

## **Unit Sector(s)**

Programming and software development