Australian Government

Department of Education, Employment and Workplace Relations

ICADBS404A Identify and resolve common database performance problems

Release: 1

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Modification History

Version	Comments
ICADBS404A	This version first released with *ICA11 Information and Communications Technology Training Package version 1.0*

Unit Descriptor

This unit describes the performance outcomes, skills and knowledge required to identify and solve common database problems to improve performance.

Application of the Unit

This unit applies to experienced technical support personnel, such as help-desk supervisors, database support technicians, IT support technicians, and user support specialists who are responsible for maintaining good performance from a database.
Resolving database issues can be complex and take considerable time. The core role in this competency is to take part in common database-performance problem solving.
This unit should be flexible enough to allow for the creation of specialised database programs that are poor in performance so that problem-solving processes can be applied.
There are many open-source database offerings that may provide a suitable code base from which to work.

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
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.*

Elements and Performance Criteria

1. Diagnose problems	1.1 Determine appropriate database performance ***diagnostic tool*** to use based on organisational database requirements and vendor recommendations 1.2 Run diagnostic tool to identify issues causing degradation of database ***performance*** 1.3 Determine and record where inappropriate use of database and temporary table spaces occur 1.4 Carry out appropriate fixes based on diagnostic results
2. Configure database	2.1 Adopt a distributed files ***architecture*** to minimise input and output (I/O) contention 2.2 Ensure that database backup procedures are appropriate for method of data storage 2.3 Reconfigure rollback segments 2.4 Configure the database and test its performance
3. Tune database	3.1 Track the module performance according to specifications 3.2 Monitor and tune the efficiency of ***structured query language*** (SQL), as required 3.3 Monitor and measure the performance of shared pool, blocks and buffers 3.4 Detect, identify and resolve contentions that may arise in the real-time operation of the database 3.5 Reconfigure the database according to specifications

Required Skills and Knowledge

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

Required skills

- analytical skills to:
  - detect, identify and resolve contentions in the real-time operation of the database
  - determine appropriate database performance diagnostic tool to use
- literacy skills to record performance test results
- planning and organisational skills to:
  - ensure that database backup procedures are appropriate for the method of data storage
  - set benchmarks
- problem-solving skills to:
  - carry out appropriate fixes based on diagnostic results
  - detect, identify and resolve contentions in the real-time operation of the database
  - determine where inappropriate use of database and temporary table spaces occur
  - identify issues causing degradation of database performance
- technical skills to:
  - configure the database and test its performance
  - monitor and measure the performance of shared pool, blocks and buffers
  - monitor and tune the efficiency of SQL as required
  - track the module performance according to specifications.

Required knowledge

- broad knowledge of:
  - principles of database design
  - SQL
- detailed knowledge of:
  - database administration
  - diagnostic tools
  - tuning methodologies.

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: • correctly identify common database problems • select appropriate solutions to solve the problem • implement such solutions to improve database performance.
Context of and specific resources for assessment	Assessment must ensure access to: • diagnostic tools • database operating on a network • 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: • review of candidate's documentation of problem resolution • direct observation of the candidate using database tools to solve a database problem • evaluation of database after candidate has resolved issues affecting its performance.
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.

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.

Diagnostic tool may include:	• server software or may be inbuilt to the server software • software applications external to the database server.
Database may include:	• commercial off-the-shelf (COTS) database packages • object-relational databases • proprietary databases • relational databases.
Performance may include:	• archiving old records • compacting database files • creating indexes • improvements to response time • latch contention • preventing events causing waits • record or table locking • repairing the database • simultaneous access • splitting database files.

Architecture may include:	• configuration:
	  • large memory model
	  • requests per second
	  • small memory model
	• database software:
	  • DB2
	  • Informix
	  • Ingres
	  • Microsoft SQL (MS SQL) server
	  • Mini SQL (mSQL)
	  • MySQL
	  • Oracle
	  • Sybase
	• operating system:
	  • Linux
	  • Mac

	• multi-user ability • Novell NetWare 5 or above • Windows 2000 or above.

SQL may include:	• ISO/IEC 9075 (1-4,9-11,13,14):2008:
	  • ISO/IEC 9075-1:2008 Framework (SQL/Framework)
	  • ISO/IEC 9075-10:2008 Object Language Bindings (SQL/OLB)
	  • ISO/IEC 9075-11:2008 Information and Definition Schemas (SQL/Schemata)
	  • ISO/IEC 9075-13:2008 SQL Routines and Types Using the Java TM Programming Language (SQL/JRT)
	  • ISO/IEC 9075-14:2008 XML-Related Specifications (SQL/XML)
	  • ISO/IEC 9075-2:2008 Foundation (SQL/Foundation)
	  • ISO/IEC 9075-3:2008 Call-Level Interface (SQL/CLI)
	  • ISO/IEC 9075-4:2008 Persistent Stored Modules (SQL/PSM)
	  • ISO/IEC 9075-9:2008 Management of External Data (SQL/MED)
	• proprietary extensions: AS/NZS 3968.0:1994/Amdt 1:1996 Information technology - database languages - SQL - definition of data structures and basic operations
	• SQL:2008.

Unit Sector(s)

Database