

DUP

Superseded by AS/NZS 3968:1994

AS 3968—1991
ISO/IEC 9075: 1989

Australian Standard®

**Information processing systems—
Database language SQL with
integrity enhancement**



STANDARDS AUSTRALIA 

This Australian Standard was prepared by Committee IT/1, Information Systems—Interconnection. It was approved on behalf of the Council of Standards Australia on 27 May 1991 and published on 9 August 1991.

The following interests are represented on Committee IT/1:

AUSSAT

Australian Association of Permanent Building Societies

Australian Bankers Association

Australian Bureau of Statistics

Australian Committee of Directors and Principals

Australian Computer Society

Australian Computer Users Association

Australian Information Industry Association

Australian Telecommunications Users Group

Australian Vice Chancellors Committee

Confederation of Australian Industries

CSIRO—Institute of Information and Communication Technologies

Department of Defence

Department of Industry, Technology and Commerce

Information Exchange Steering Committee

Life Insurance Federation of Australia

OTC

Telecom Australia

Review of Australian Standards. To keep abreast of progress in industry, Australian Standards are subject to periodic review and are kept up-to-date by the issue of amendments or new editions as necessary. It is important therefore that Standards users ensure that they are in possession of the latest edition, and any amendments thereto.

Full details of all Australian Standards and related publications will be found in the Standards Australia Catalogue of Publications; this information is supplemented each month by the magazine 'The Australian Standard', which subscribing members receive, and which gives details of new publications, new editions and amendments, and of withdrawn Standards.

Suggestions for improvements to Australian Standards, addressed to the head office of Standards Australia, are welcomed. Notification of any inaccuracy or ambiguity found in an Australian Standard should be made without delay in order that the matter may be investigated and appropriate action taken.

Australian Standard®

**Information processing systems—
Database language SQL with
integrity enhancement**

First published as AS 3968—1991.

PUBLISHED BY STANDARDS AUSTRALIA
(STANDARDS ASSOCIATION OF AUSTRALIA)
STANDARDS HOUSE, 80 ARTHUR ST, NORTH SYDNEY NSW

ISBN 0.7262.7031.8

PREFACE

This Standard was prepared by the Standards Australia Committee on Information Systems—Interconnection. It is identical with and has been reproduced from ISO/IEC 9075:1989, *Information processing systems—Database Language SQL with integrity enhancement*.

The Standard is one of a series of Open Systems Interconnection (OSI) Standards which are currently under development. Since OSI Standards are developmental, there may be some minor difficulties encountered in their implementation. For this reason, Standards Australia will be providing, through the OSI Help Desk, a service to coordinate and disseminate information concerning difficulties which are identified in using this Standard.

Under arrangements made between Standards Australia and the international Standards bodies, ISO and IEC, as well as certain other Standards organizations, users of this Australian Standard are advised of the following:

- (a) Copyright is vested in Standards Australia.
- (b) The number of this Standard is not reproduced on each page; its identity is shown only on the cover and title pages.

For the purpose of this Australian Standard, the ISO/IEC text should be modified as follows:

- (i) *Terminology* The words 'Australian Standard' should replace the words 'International Standard' wherever they appear.

- (ii) *References* The references to International Standards should be replaced by references to Australian Standards as follows:

<i>Reference to International Standard</i>	<i>Australian Standard</i>
ISO	AS
1539 Programming Languages—FORTRAN	1486 Programming language FORTRAN
1989 Programming Languages—COBOL	1209 Programming language COBOL
6160 Programming Languages—PL/1	—
7185 Programming Languages—Pascal	2580 Programming language Pascal

© Copyright — STANDARDS AUSTRALIA

Users of Standards are reminded that copyright subsists in all Standards Australia publications and software. Except where the Copyright Act allows and except where provided for below no publications or software produced by Standards Australia may be reproduced, stored in a retrieval system in any form or transmitted by any means without prior permission in writing from Standards Australia. Permission may be conditional on an appropriate royalty payment. Requests for permission and information on commercial software royalties should be directed to the head office of Standards Australia.

Standards Australia will permit up to 10 percent of the technical content pages of a Standard to be copied for use exclusively in-house by purchasers of the Standard without payment of a royalty or advice to Standards Australia.

Standards Australia will also permit the inclusion of its copyright material in computer software programs for no royalty payment provided such programs are used exclusively in-house by the creators of the programs.

Care should be taken to ensure that material used is from the current edition of the Standard and that it is updated whenever the Standard is amended or revised. The number and date of the Standard should therefore be clearly identified.

The use of material in print form or in computer software programs to be used commercially, with or without payment, or in commercial contracts is subject to the payment of a royalty. This policy may be varied by Standards Australia at any time.

CONTENTS

	<i>Page</i>
1. Scope and field of application	5
2. References	6
3. Overview	7
3.1 Organization	7
3.2 Notation	7
3.3 Conventions	8
3.4 Conformance	8
4. Concepts	9
4.1 Sets	10
4.2 Data types	10
4.2.1 Character strings	10
4.2.2 Numbers	10
4.3 Columns	11
4.4 Tables	11
4.5 Integrity constraints	12
4.6 Schemas	12
4.7 The database	12
4.8 Modules	13
4.9 Procedures	13
4.10 Parameters	13
4.10.1 SQLCODE parameter	13
4.10.2 Indicator parameters	13
4.11 Standard programming languages	13
4.12 Cursors	14
4.13 Statements	15
4.14 Embedded syntax	15
4.15 Privileges	15
4.16 Transactions	16
5. Common elements	17
5.1 <character>	17
5.2 <literal>	18
5.3 <token>	20
5.4 Names	22
5.5 <data type>	24
5.6 <value specification> and <target specification>	26
5.7 <column specification>	28
5.8 <set function specification>	29
5.9 <value expression>	31
5.10 <predicate>	33
5.11 <comparison predicate>	34
5.12 <between predicate>	35
5.13 <is predicate>	36
5.14 <like predicate>	37
5.15 <null predicate>	39
5.16 <quantified predicate>	40
5.17 <exists predicate>	41
5.18 <search condition>	42
5.19 <table expression>	44
5.20 <from clause>	45

5.21 < where clause >	47
5.22 < group by clause >	48
5.23 < having clause >	49
5.24 < subquery >	50
5.25 < query specification >	52
6. Schema definition language	54
6.1 < schema >	54
6.2 < table definition >	55
6.3 < column definition >	55
6.4 < default clause >	56
6.5 < table constraint definition >	60
6.6 < unique constraint definition >	61
6.7 < referential constraint definition >	62
6.8 < check constraint definition >	64
6.9 < view definition >	65
6.10 < privilege definition >	67
7. Module language	69
7.1 < module >	69
7.2 < module name clause >	70
7.3 < procedure >	71
8. Data manipulation language	75
8.1 < close statement >	75
8.2 < commit statement >	76
8.3 < declare cursor >	77
8.4 < delete statement: positioned >	81
8.5 < delete statement: searched >	82
8.6 < fetch statement >	83
8.7 < insert statement >	85
8.8 < open statement >	88
8.9 < rollback statement >	89
8.10 < select statement >	90
8.11 < update statement: positioned >	92
8.12 < update statement: searched >	94
9. Levels	96
Annexes	99
Annex A. < embedded SQL host program >	99
Annex B. < embedded exception declaration >	103
Annex C. < embedded SQL COBOL program >	105
Annex D. < embedded SQL FORTRAN program >	107
Annex E. < embedded SQL Pascal program >	109
Annex F. < embedded SQL PL/I program >	111
Index	113

Information processing systems—Database language SQL with integrity enhancement

1. Scope and field of application

This standard specifies the syntax and semantics of two database languages:

- 1) A schema definition language (SQL-DDL), for declaring the structures and integrity constraints of an SQL database.
- 2) A module language and a data manipulation language (SQL-DML), for declaring the database procedures and executable statements of a specific database application program.

This standard defines the logical data structures and basic operations for an SQL database. It provides functional capabilities for designing, accessing, maintaining, controlling and protecting the database.

This standard provides a vehicle for portability of database definitions and application programs between conforming implementations.

This standard specifies two levels and a separate integrity enhancement feature. Level 2 is the complete SQL database language excluding the integrity enhancement feature. Level 1 is the subset of Level 2 defined in clause 9, "Levels" on page 99.

NOTE: *Additional SQL language is planned for later addenda to this standard. Major topics under consideration for such addenda include enhanced transaction management, specification of certain implementor-defined rules, enhanced character handling facilities, and support for national character sets.*

The integrity enhancement feature comprises a means of specifying:

- 1) referential constraints between tables, which have to be satisfied;
- 2) check constraints to be applied to the rows of a table; and,
- 3) a default value for a column when a row is inserted into a table.

Annexes to this standard specify embedded syntax for including SQL data manipulation language statements in an otherwise standard application program. Such embedded syntax is defined to be a shorthand notation for a standard application program in which the embedded SQL statements have been replaced with explicit calls of database procedures that contain the SQL statements.

This standard applies to implementations that exist in an environment that may include application programming languages, end-user query languages, report generator systems, data dictionary systems, program library systems, and distributed communication systems, as well as various tools for database design, data administration, and performance optimization.