

# ISO/IEC TR 10032:2003-11 (E)

## Information technology - Reference Model of Data Management

---

<b>Contents</b>		<b>Page</b>
Foreword .....		vi
Introduction .....		vii
<b>1</b>	<b>Scope .....</b>	<b>1</b>
<b>2</b>	<b>Terms and definitions .....</b>	<b>1</b>
<b>3</b>	<b>Symbols and abbreviations .....</b>	<b>7</b>
<b>3.1</b>	<b>Symbols .....</b>	<b>7</b>
<b>3.1.1</b>	<b>Persistent data .....</b>	<b>7</b>
<b>3.1.2</b>	<b>Communications linkage .....</b>	<b>7</b>
<b>3.1.3</b>	<b>Processing linkage .....</b>	<b>7</b>
<b>3.1.4</b>	<b>Process class .....</b>	<b>7</b>
<b>3.1.5</b>	<b>Processor class .....</b>	<b>8</b>
<b>3.1.6</b>	<b>Processor class with service interface .....</b>	<b>8</b>
<b>3.1.7</b>	<b>Class names .....</b>	<b>8</b>
<b>3.2</b>	<b>Abbreviations .....</b>	<b>8</b>
<b>4</b>	<b>Data Management Requirements .....</b>	<b>9</b>
<b>4.1</b>	<b>Purpose .....</b>	<b>9</b>
<b>4.2</b>	<b>Information systems .....</b>	<b>9</b>
<b>4.2.1</b>	<b>Context of Data Management in an Information System .....</b>	<b>9</b>
<b>4.3</b>	<b>Database and schema .....</b>	<b>10</b>
<b>4.4</b>	<b>Data Modelling Facility .....</b>	<b>11</b>
<b>4.5</b>	<b>Data independence .....</b>	<b>11</b>
<b>4.6</b>	<b>Data management services .....</b>	<b>11</b>
<b>4.7</b>	<b>Processors and interfaces .....</b>	<b>12</b>
<b>4.8</b>	<b>Access control .....</b>	<b>12</b>
<b>4.8.1</b>	<b>Definition and modification of access control privileges .....</b>	<b>12</b>
<b>4.8.2</b>	<b>Enforcement of access control .....</b>	<b>12</b>
<b>4.8.3</b>	<b>Security external to data management .....</b>	<b>13</b>
<b>4.9</b>	<b>Operational requirements to support data management .....</b>	<b>13</b>
<b>4.9.1</b>	<b>Information systems life cycle support .....</b>	<b>13</b>
<b>4.9.2</b>	<b>Configuration management, version control and variants .....</b>	<b>14</b>
<b>4.9.3</b>	<b>Concurrent processing .....</b>	<b>14</b>
<b>4.9.4</b>	<b>Database transaction management .....</b>	<b>14</b>
<b>4.9.5</b>	<b>Performance engineering .....</b>	<b>15</b>
<b>4.9.6</b>	<b>Referencing data .....</b>	<b>15</b>
<b>4.9.7</b>	<b>Extensible Data Modelling Facility .....</b>	<b>15</b>
<b>4.9.8</b>	<b>Support for different Data Modelling Facilities at user interface .....</b>	<b>15</b>
<b>4.9.9</b>	<b>Audit trails .....</b>	<b>15</b>
<b>4.9.10</b>	<b>Recovery .....</b>	<b>15</b>
<b>4.9.11</b>	<b>Logical data restructuring .....</b>	<b>15</b>
<b>4.9.12</b>	<b>Physical storage reorganization .....</b>	<b>16</b>
<b>4.10</b>	<b>Additional operational requirements to support data management in a distributed information system .....</b>	<b>16</b>
<b>4.10.1</b>	<b>Distribution control .....</b>	<b>17</b>
<b>4.10.2</b>	<b>Database transaction management .....</b>	<b>18</b>
<b>4.10.3</b>	<b>Communications .....</b>	<b>18</b>
<b>4.10.4</b>	<b>Export/import .....</b>	<b>18</b>
<b>4.10.5</b>	<b>Distribution independence .....</b>	<b>18</b>

4.10.6	System autonomy .....	18
4.10.7	Recovery of a distributed database .....	18
4.11	Dictionary systems .....	18
5	Concepts for data level pairs and related processes .....	19
5.1	Purpose .....	19
5.2	Level pairs .....	19
5.2.1	Interlocking level pairs .....	19
5.2.2	Recursive use of level pairs .....	20
5.2.3	Operations on level pairs .....	21
5.3	Dependence of level pairs on a Data Modelling Facility .....	21
5.3.1	Level pairs and data structuring rules .....	21
5.3.2	Level pairs and data manipulation rules .....	21
5.4	Level pairs and associated processes .....	22
5.5	Access control for level pairs .....	24
5.6	Schema modification .....	24
6	Architectural model .....	24
6.1	Purpose .....	24
6.2	Modelling concepts .....	24
6.2.1	Characteristics of Reference Model processors .....	25
6.2.2	Levels of abstraction .....	25
6.2.3	Notation for processors .....	25
6.3	The generic model of data management .....	26
6.3.1	Generic Database Controller .....	27
6.3.2	User Processor .....	27
6.3.3	User .....	28
6.4	Specialization of the model in different environments .....	28
6.5	Database environment .....	28
6.6	Distributed data management .....	29
6.6.1	Distribution Controller .....	31
6.6.2	Role of Distribution Controller and level pairs .....	31
6.7	Export/Import model .....	31
6.8	Access Control for Data Management .....	32
7	Objectives and principles for data management standardization .....	33
7.1	Purpose .....	33
7.2	Technical objectives associated with data management standardization .....	34
7.2.1	Support for all distributed scenarios .....	34
7.2.2	Location independence .....	34
7.2.3	Standardized database transaction management .....	35
7.2.4	Export and import of databases .....	35
7.2.5	Reduced complexity of handling data .....	36
7.2.6	Overall performance in distributed scenarios .....	36
7.2.7	Data independence .....	36
7.2.8	Application portability .....	36
7.2.9	Extensible Data Modelling Facility .....	36
7.2.10	Flexible presentation of data to users .....	36
7.3	Means of achieving objectives .....	36
7.3.1	Same data modelling facility for each level pair .....	37
7.3.2	Same interchange mechanism for all level pairs .....	37
7.3.3	Same processors usable for all level pairs .....	37
7.3.4	Standardized services at Database Controller interface .....	38
7.3.5	Standardized approach to access control .....	38
7.3.6	Standardized representation of data needed to facilitate interoperability .....	38
7.3.7	Support data fragmentation .....	38
7.3.8	Separation of logical and physical structures .....	38
7.3.9	Access to schema during execution .....	38
7.3.10	User data modelling facility different from interchange data modelling facility .....	39
7.4	Aspects of data management standards .....	39
7.4.1	Categories of data management standard .....	39
7.4.2	Role of a data modelling facility in standardization .....	40

**7.4.3 Standardization styles ..... 40**

**Annex A (informative) Related International Standards ..... 41**

**Annex B (informative) Relationship of existing and developing database standards to the  
architecture of the Reference Model of Data Management ..... 42**