

ISO/IEC 15476-4:2005-12 (E)

Information technology - CDIF semantic metamodel - Part 4: Data models

Contents		Page
1	Scope	1
2	Conformance	2
2.1	General	2
2.2	Input conformance	2
2.3	Output conformance	2
2.4	Round-trip conformance	3
3	Normative references	3
4	Terms and definitions	3
4.1	From other International Standards	3
4.1.3	For this International Standard	4
5	Symbols (and abbreviated terms)	4
5.1	Naming, diagramming and definition conventions	4
5.2	Abbreviations	4
5.3	Notation for this subject area	4
6	Data models subject area overview	5
6.1	Introduction	5
6.2	Diagrams	6
6.3	Entities	11
6.4	Relationships	11
6.4.1	Binary relationship	12
6.4.2	N-ary relationship	12
6.4.3	Simple relationship	12
6.4.4	Complex relationship	12
6.5	Roles	14
6.6	Cardinalities	15
6.6.1	Outer cardinalities	16
6.6.2	Inner cardinalities	17
6.7	Multi-player roles	18
6.8	Role constraints	20
6.9	Attributes	22
6.10	Keys and access paths	23
6.11	Referential integrity	27
6.12	Supertypes and subtypes	29
6.12.1	Coverage	30
6.12.2	Exclusivity	31
6.12.3	Orthogonality	32
6.12.4	Inheritance	33
6.13	Refinement of inherited characteristics	34
6.13.1	Refinement of attribute characteristics	34
6.13.2	Refinement of relationship characteristics	35
6.14	Subsets	36
6.15	Clusters	37
6.16	Projections	38
6.17	Computable languages	41
7	Data models subject area summary	43
7.1	AttributableMetaObject hierarchy	43

7.2	MetaEntity summary	45
7.3	MetaRelationship summary	50
8	Data models subject area specification	54
8.1	Introduction	54
8.2	Subject area definition	54
8.3	Meta-entity definitions	55
8.3.1	AccessPath	55
8.3.2	Attribute	56
8.3.3	CandidateKey	58
8.3.4	Cluster	59
8.3.5	ComponentObject	59
8.3.6	DataModel	59
8.3.7	DataModelObject	60
8.3.8	DataModelSubset	61
8.3.9	DefinitionObject	61
8.3.10	Entity	62
8.3.11	ForeignKey	68
8.3.12	InheritableDataModelObject	68
8.3.13	Key	69
8.3.14	ProjectedAttribute	70
8.3.15	ProjectionComponent	71
8.3.16	Relationship	73
8.3.17	Role	74
8.3.18	RoleConstraint	75
8.3.19	RolePlayer	77
8.3.20	SemanticInformationObject	90
8.3.21	SubtypeSet	91
8.3.22	SubtypeSetMembershipCriterion	92
8.4	Meta-relationship definitions	94
8.4.1	AccessPath.Incorporates.Attribute	94
8.4.2	AccessPath.Instantiates.Key	95
8.4.3	Attribute.IsDiscriminatorFor.SubtypeSetMembershipCriterion	96
8.4.4	Attribute.IsInheritedFrom.Attribute	96
8.4.5	CandidateKey.Incorporates.ForeignKey	97
8.4.6	Cluster.Collects.DataModelObject	97
8.4.7	ComponentObject.References.DefinitionObject	97
8.4.8	DataModel.Collects.DataModelObject	98
8.4.9	DataModelObject.ActsAs.RolePlayer	98
8.4.10	DataModelObject.IsMemberOf.DataModelSubset	99
8.4.11	DataModelSubset.Excludes.Attribute	99
8.4.12	DataModelSubset.IsSubsetOf.DataModel	100
8.4.13	DefinitionObject.Contains.ComponentObject	100
8.4.14	DefinitionObject.IsConstructedWith.ProjectionComponent	100
8.4.15	Entity.IsAccessedUsing.AccessPath	101
8.4.16	Entity.IsIdentifiedBy.CandidateKey	101
8.4.17	ForeignKey.Incorporates.RolePlayer	102
8.4.18	ForeignKey.References.CandidateKey	102
8.4.19	InheritableDataModelObject.IsSubtypeIn.SubtypeSet	103
8.4.20	InheritableDataModelObject.IsSupertypeFor.SubtypeSet	104
8.4.21	Key.Incorporates.Attribute	105
8.4.22	Key.Incorporates.SemanticInformationObject	106
8.4.23	ProjectedAttribute.IsProjectionOf.Attribute	107
8.4.24	ProjectionComponent.IsFullProjectionOf.DefinitionObject	107
8.4.25	ProjectionComponent.IsProjectionOf.Attribute	108
8.4.26	Role.BelongsTo.Relationship	109
8.4.27	RoleConstraint.Incorporates.RoleConstraint	109
8.4.28	RoleConstraint.Incorporates.RolePlayer	110
8.4.29	RoleConstraint.Incorporates.SemanticInformationObject	110
8.4.30	RolePlayer.IsSupportedBy.Key	111
8.4.31	RolePlayer.Plays.Role	111
8.4.32	RolePlayer.Refines.RolePlayer	112

8.4.33	RolePlayer.RefinesForSubtype.DataModelObject	112
8.4.34	SubtypeSet.Specifies.SubtypeSetMembershipCriterion	113
8.4.35	SubtypeSetMembershipCriterion.Selects.InheritableDataModelObject	113
Table of Illustrations Figure 1 - CDIF family of International Standards		1
Figure 2 - Diagrammatic Conventions - Keys		5
Figure 3 - Data Models subject area overview		6
Figure 4 - Partitioning/View mechanisms		7
Figure 5 - Keys and AccessPath		8
Figure 6 - Roles, RolePlayers and RoleConstraints		9
Figure 7 - Connection between Data Models and Common subject areas		10
Figure 8 - Connection between Data Models and Data Definition subject areas		11
Figure 9 - Binary Relationship		12
Figure 10 - Ternary Relationship		12
Figure 11 - Complex Binary Relationship		13
Figure 12 - Instance Diagram showing a Complex Relationship		14
Figure 13 - Roles		14
Figure 14 - Reflexive or Recursive Relationship		15
Figure 15 - Examples of Types of Binary Relationships		16
Figure 16 - Outer Cardinalities		16
Figure 17 - Inner Cardinalities		17
Figure 18 - Inner Cardinalities and Attributed Binary Relationships		18
Figure 19 - Multi-player Roles and Heterogeneous Collections		19
Figure 20 - Multi-player Roles and Common Outer Cardinality		20
Figure 21 - Role Constraint Network		21
Figure 22 - Constraints on Role Participation		21
Figure 23 - Instance Diagram showing Role Constraints		22
Figure 24 - Attributed Relationships, Roles and RolePlayers		23
Figure 25 - Foreign Keys		24
Figure 26 - RolePlayer as a component of a ForeignKey		25
Figure 27 - Key support of RolePlayer		26
Figure 28 - Key support for RolePlayer in a Reflexive Relationship		27
Figure 29 - Subtype Set Discriminator		30

Figure 30 - Abstract Supertype	31
Figure 31 - Concrete Supertype	31
Figure 32 - Non-exclusive Subtype Set	32
Figure 33 - Orthogonal Subtype Sets	32
Figure 34 - Instance Diagram showing Orthogonal Subtype Sets	33
Figure 35 - Overlapping Subtype Sets	33
Figure 36 - Inheritance	34
Figure 37 - Refinement of Cardinalities	35
Figure 38 - Instance Diagram showing refinement of Cardinalities	36
Figure 39 - Subsets	37
Figure 40 - Clusters	38
Figure 41 - Instance Diagram showing Simple Projection	39
Figure 42 - Instance Diagram showing Complex Projection	40
Figure 43 - Instance Diagram showing Attribute Renaming	41