

ISO/IEC 9594-2:2020-11 (E)

Information technology - Open systems interconnection - Part 2: The Directory: Models

Contents		Page
SECTION 1 – GENERAL		1
1	Scope	1
2	References	2
2.1	Normative references	2
2.2	Non-normative references	3
3	Definitions	3
3.1	Communication definitions	3
3.2	Basic Directory definitions.....	3
3.3	Distributed operation definitions.....	3
3.4	Replication definitions	3
4	Abbreviations	4
5	Conventions.....	5
SECTION 2 – OVERVIEW OF THE DIRECTORY MODELS		6
6	Directory Models.....	6
6.1	Definitions.....	6
6.2	The Directory and its users.....	6
6.3	Directory and DSA Information Models.....	7
6.4	Directory Administrative Authority Model.....	7
SECTION 3 – MODEL OF DIRECTORY USER INFORMATION.....		9
7	Directory Information Base	9
7.1	Definitions.....	9
7.2	Objects	10
7.3	Directory entries.....	10
7.4	Directory Information Tree (DIT).....	10
8	Directory entries	11
8.1	Definitions.....	11
8.2	Overall structure.....	13
8.3	Object classes.....	14
8.4	Attribute types.....	16
8.5	Attribute values	16
8.6	Attribute type hierarchies	16
8.7	Friend attributes	17
8.8	Contexts	17
8.9	Matching rules.....	18
8.10	Entry collections.....	21
8.11	Compound entries and families of entries	22
9	Names.....	23
9.1	Definitions.....	23
9.2	Names in general.....	23
9.3	Relative distinguished name.....	23
9.4	Name matching	24
9.5	Distinguished names	24
9.6	Alias names	25
10	Hierarchical groups	25

10.1	Definitions.....	25
10.2	Hierarchical relationship	26
10.3	Sequential ordering of a hierarchical group	26
SECTION 4 – DIRECTORY ADMINISTRATIVE MODEL.....		28
11	Directory Administrative Authority model	28
11.1	Definitions.....	28
11.2	Overview	28
11.3	Policy	29
11.4	Specific administrative authorities	29
11.5	Administrative areas and administrative points	30
11.6	DIT Domain policies	32
11.7	DMD policies	32
SECTION 5 – MODEL OF DIRECTORY ADMINISTRATIVE AND OPERATIONAL INFORMATION		34
12	Model of Directory Administrative and Operational Information.....	34
12.1	Definitions.....	34
12.2	Overview	34
12.3	Subtrees	35
12.4	Operational attributes	37
12.5	Entries	37
12.6	Subentries.....	38
12.7	Information model for collective attributes.....	39
12.8	Information model for context defaults.....	40
SECTION 6 – THE DIRECTORY SCHEMA		41
13	Directory Schema	41
13.1	Definitions.....	41
13.2	Overview	41
13.3	Object class definition.....	43
13.4	Attribute type definition	45
13.5	Matching rule definition.....	48
13.6	Relaxation and tightening.....	50
13.7	DIT structure definition.....	56
13.8	DIT content rule definition.....	59
13.9	Context type definition.....	60
13.10	DIT Context Use definition.....	61
13.11	Friends definition	62
13.12	Syntax definitions.....	63
14	Directory System Schema	63
14.1	Overview	63
14.2	System schema supporting the administrative and operational information model	63
14.3	System schema supporting the administrative model.....	64
14.4	System schema supporting general administrative and operational requirements	65
14.5	System schema supporting access control.....	67
14.6	System schema supporting the collective attribute model.....	67
14.7	System schema supporting context assertion defaults.....	67
14.8	System schema supporting the service administration model	68
14.9	System schema supporting password administration	68
14.10	System schema supporting hierarchical groups.....	69
14.11	Maintenance of system schema.....	70
14.12	System schema for first-level subordinates	71
15	Directory schema administration	71
15.1	Overview	71
15.2	Policy objects	71
15.3	Policy parameters	71
15.4	Policy procedures	72
15.5	Subschema modification procedures.....	72
15.6	Entry addition and modification procedures	73
15.7	Subschema policy attributes.....	73
SECTION 7 – DIRECTORY SERVICE ADMINISTRATION.....		79
16	Service Administration Model.....	79

16.1	Definitions.....	79
16.2	Service-type/user-class model.....	79
16.3	Service-specific administrative areas	80
16.4	Introduction to search-rules.....	81
16.5	Subfilters	81
16.6	Filter requirements	82
16.7	Attribute information selection based on search-rules	82
16.8	Access control aspects of search-rules	83
16.9	Contexts aspects of search-rules.....	83
16.10	Search-rule specification	83
16.11	Matching restriction definition.....	91
16.12	Search-validation function	91
SECTION 8 – SECURITY.....		93
17	Security model.....	93
17.1	Definitions.....	93
17.2	Security policies	93
17.3	Protection of Directory operations	94
18	Basic Access Control.....	95
18.1	Scope and application.....	95
18.2	Basic Access Control model	95
18.3	Access control administrative areas	98
18.4	Representation of Access Control Information	100
18.5	ACI operational attributes	105
18.6	Protecting the ACI.....	106
18.7	Access control and Directory operations.....	106
18.8	Access Control Decision Function	106
18.9	Simplified Access Control	108
19	Rule-based Access Control.....	108
19.1	Scope and application.....	108
19.2	Rule-based Access Control model	108
19.3	Access control administrative areas	109
19.4	Security Label	109
19.5	Clearance.....	110
19.6	Access Control and Directory operations.....	111
19.7	Access Control Decision Function	111
19.8	Use of Rule-based and Basic Access Control	112
20	Data Integrity in Storage	112
20.1	Introduction.....	112
20.2	Protection of an Entry or Selected Attribute Types.....	112
20.3	Context for Protection of a Single Attribute Value.....	114
SECTION 9 – DSA MODELS		115
21	DSA Models	115
21.1	Definitions.....	115
21.2	Directory Functional Model	115
21.3	Directory Distribution Model.....	116
SECTION 10 – DSA INFORMATION MODEL.....		118
22	Knowledge.....	118
22.1	Definitions.....	118
22.2	Introduction	118
22.3	Knowledge References.....	119
22.4	Minimum Knowledge	121
22.5	First Level DSAs.....	121
22.6	Knowledge references to LDAP servers	122

23	Basic Elements of the DSA Information Model.....	122
23.1	Definitions.....	122
23.2	Introduction.....	122
23.3	DSA Specific Entries and their Names.....	123
23.4	Basic Elements.....	124
24	Representation of DSA Information.....	125
24.1	Representation of Directory User and Operational Information.....	126
24.2	Representation of Knowledge References.....	126
24.3	Representation of Names and Naming Contexts.....	133
SECTION 11 – DSA OPERATIONAL FRAMEWORK.....		135
25	Overview.....	135
25.1	Definitions.....	135
25.2	Introduction.....	135
26	Operational bindings.....	135
26.1	General.....	135
26.2	Application of the operational framework.....	136
26.3	States of cooperation.....	137
27	Operational binding specification and management.....	138
27.1	Operational binding type specification.....	138
27.2	Operational binding management.....	139
27.3	Operational binding specification templates.....	139
28	Operations for operational binding management.....	141
28.1	Application-context definition.....	141
28.2	Establish Operational Binding operation.....	142
28.3	Modify Operational Binding operation.....	145
28.4	Terminate Operational Binding operation.....	147
28.5	Operational Binding Error.....	148
28.6	Operational Binding Management Bind and Unbind.....	149
SECTION 12 – INTERWORKING WITH LDAP.....		151
29	Overview.....	151
29.1	Definitions.....	151
29.2	Introduction.....	151
30	LDAP interworking model.....	151
30.1	LDAP interworking scenarios.....	151
30.2	Overview of bound DSA handling LDAP operations.....	152
30.3	General LDAP requestor characteristics.....	152
30.4	LDAP extension mechanisms.....	153
31	LDAP specific system schema.....	153
31.1	Operational Attribute types from IETF RFC 4512.....	153
Annex A – Object identifier usage.....		156
Annex B – Information framework in ASN.1.....		159
Annex C – Subschema administration in ASN.1.....		170
Annex D – Service administration in ASN.1.....		175
Annex E – Basic Access Control in ASN.1.....		179
Annex F – DSA operational attribute types in ASN.1.....		183
Annex G – Operational binding management in ASN.1.....		186
Annex H – Enhanced security in ASN.1.....		191
Annex I – LDAP system schema.....		194
Annex J – The mathematics of trees.....		196
Annex K – Name design criteria.....		197

Annex L – Examples of various aspects of schema	199
L.1 Example of an attribute hierarchy	199
L.2 Example of a subtree specification.....	199
L.3 Schema specification.....	200
L.4 DIT content rules.....	201
L.5 DIT context use	202
Annex M – Overview of basic access control permissions.....	203
M.1 Introduction	203
M.2 Permissions required for operations	203
M.3 Permissions affecting error.....	204
M.4 Entry level permissions	204
M.5 Entry level permissions	205
Annex N – Examples of access control	206
N.1 Introduction	206
N.2 Design principles for Basic Access Control.....	206
N.3 Introduction to example	207
N.4 Policy affecting the definition of specific and inner areas	208
N.5 Policy affecting the definition of Directory Access Control Domains (DACDs)	209
N.6 Policy expressed in prescriptiveACI attributes	212
N.7 Policy expressed in subentryACI attributes	216
N.8 Policy expressed in entryACI attributes.....	217
N.9 ACDF examples	218
N.10 Rule-based access control	220
Annex O – DSE type combinations	221
Annex P – Modelling of knowledge	223
Annex Q – Subfilters	227
Annex R – Compound entry name patterns and their use.....	228
Annex S – Naming concepts and considerations	230
S.1 History tells us	230
S.2 A new look at name resolution.....	230
Annex T – Alphabetical index of definitions.....	236
Annex U – Amendments and corrigenda.....	238