

ISO/IEC 19505-2:2012-04 (E)

Information technology - Object Management Group Unified Modeling Language (OMG UML) - Part 2: Superstructure

Contents		Page
1.	Scope	1
2.	Conformance	1
2.1	Language Units	2
2.2	Compliance Levels	2
2.3	Meaning and Types of Compliance	6
2.4	Compliance Level Contents	8
3.	Normative References	9
4.	Terms and Definitions	10
5.	Notational Conventions	10
5.1	Keywords for Requirement Statements	10
5.2	Annotations on Example Diagrams	10
6.	Additional Information	11
6.1	Architectural Alignment and MDA Support	11
6.2	On the Run-Time Semantics of UML	11
6.2.1	The Basic Premises	11
6.2.2	The Semantics Architecture	11
6.2.3	The Basic Causality Model	12
6.2.4	Semantics Descriptions in the Specification	13
6.3	The UML Metamodel	14
6.3.1	Models and What They Model	14
6.3.2	Semantic Levels and Naming	14
6.4	How to Read this Proceed	15
6.4.1	Specificationformat	15
6.4.2	Diagramformat	18
6.4.3	Contents of Subparts	19
Subpart I - Supplement		23
7.	Classes	25
7.1	Overview	25
7.2	Abstract Syntax	26
7.3	Class Descriptions	39
7.3.1	Abstraction (from Dependencies)	39
7.3.2	AggregationKind (from Kernel)	39
7.3.3	Association (from Kernel)	40
7.3.4	AssociationClass (from AssociationClasses)	48
7.3.5	BehavioralFeature (from Kernel)	51
7.3.6	BehavioredClassifier (from Interfaces)	52
7.3.7	Class (from Kernel)	52
7.3.8	Classifier (from Kernel, Dependencies, PowerTypes, Interfaces)	55
7.3.9	Comment (from Kernel)	60
7.3.10	Constraint (from Kernel)	61
7.3.11	DataType (from Kernel)	64
7.3.12	Dependency (from Dependencies)	65
7.3.13	DirectedRelationship (from Kernel)	67
7.3.14	Element (from Kernel)	68

7.3.15	ElementImport (from Kernel)	69
7.3.16	Enumeration (from Kernel)	71
7.3.17	EnumerationLiteral (from Kernel)	72
7.3.18	Expression (from Kernel)	73
7.3.19	Feature (from Kernel)	74
7.3.20	Generalization (from Kernel, PowerTypes)	75
7.3.21	GeneralizationSet (from PowerTypes)	79
7.3.22	InstanceSpecification (from Kernel)	87
7.3.23	InstanceValue (from Kernel)	90
7.3.24	Interface (from Interfaces)	91
7.3.25	InterfaceRealization (from Interfaces)	94
7.3.26	LiteralBoolean (from Kernel)	94
7.3.27	LiteralInteger (from Kernel)	95
7.3.28	LiteralNull (from Kernel)	96
7.3.29	LiteralReal	97
7.3.30	LiteralSpecification (from Kernel)	98
7.3.31	LiteralString (from Kernel)	99
7.3.32	LiteralUnlimitedNatural (from Kernel)	99
7.3.33	MultiplicityElement (from Kernel)	100
7.3.34	NamedElement (from Kernel, Dependencies)	104
7.3.35	Namespace (from Kernel)	105
7.3.36	OpaqueExpression (from Kernel)	108
7.3.37	Operation (from Kernel, Interfaces)	109
7.3.38	Package (from Kernel)	113
7.3.39	PackageableElement (from Kernel)	116
7.3.40	PackageImport (from Kernel)	117
7.3.41	PackageMerge (from Kernel)	118
7.3.42	Parameter (from Kernel)	127
7.3.43	ParameterDirectionKind (from Kernel)	129
7.3.44	PrimitiveType (from Kernel)	129
7.3.45	Property (from Kernel, AssociationClasses, Interfaces)	130
7.3.46	Realization (from Dependencies)	136
7.3.47	RedefinableElement (from Kernel)	137
7.3.48	Relationship (from Kernel)	139
7.3.49	Slot (from Kernel)	140
7.3.50	StructuralFeature (from Kernel)	140
7.3.51	Substitution (from Dependencies)	141
7.3.52	Type (from Kernel)	142
7.3.53	TypedElement (from Kernel)	143
7.3.54	Usage (from Dependencies)	144
7.3.55	ValueSpecification (from Kernel)	145
7.3.56	VisibilityKind (from Kernel)	146
7.4	Diagrams	147
8.	Components	151
8.1	Overview	151
8.2	Abstract Syntax	151
8.3	Class Descriptions	155
8.3.1	Component (from BasicComponents, PackagingComponents)	155
8.3.2	ComponentRealization (from BasicComponents)	164
8.3.3	ConnectableElement (from BasicComponents)	165
8.3.4	Connector (from BasicComponents)	165
8.3.5	ConnectorEnd (from BasicComponents)	169
8.3.6	ConnectorKind (from BasicComponents)	169
8.4	Diagrams	170
9.	Composite Structures	173
9.1	Overview	173
9.2	Abstract Syntax	173
9.3	Class Descriptions	178
9.3.1	Class (from StructuredClasses, InternalStructures)	178
9.3.2	Classifier (from InternalStructures, Collaborations)	179

9.3.3	Collaboration (from Collaborations)	180
9.3.4	CollaborationUse (from Collaborations)	183
9.3.5	ConnectableElement (from InternalStructures)	186
9.3.6	Connector (from InternalStructures)	186
9.3.7	ConnectorEnd (from InternalStructures, Ports)	188
9.3.8	EncapsulatedClassifier (from Ports)	190
9.3.9	Feature (from InternalStructures)	190
9.3.10	InvocationAction (from InvocationActions)	191
9.3.11	Parameter (from Collaborations)	191
9.3.12	Port (from Ports)	192
9.3.13	Property (from InternalStructures)	196
9.3.14	StructuredClassifier (from InternalStructures)	198
9.3.15	Trigger (from InvocationActions)	202
9.3.16	Variable (from StructuredActivities)	203
9.4	Diagrams	203
10.	Deployments	205
10.1	Overview	205
10.2	Abstract Syntax	205
10.3	Class Descriptions	209
10.3.1	Artifact (from Artifacts, Nodes)	209
10.3.2	CommunicationPath (from Nodes)	211
10.3.3	DeployedArtifact (from Nodes)	212
10.3.4	Deployment (from ComponentDeployments, Nodes)	213
10.3.5	DeploymentSpecification (from ComponentDeployments)	215
10.3.6	DeploymentTarget (from Nodes)	217
10.3.7	Device (from Nodes)	218
10.3.8	ExecutionEnvironment (from Nodes)	219
10.3.9	InstanceSpecification (from Nodes)	220
10.3.10	Manifestation (from Artifacts)	221
10.3.11	Node (from Nodes)	222
10.3.12	Property (from Nodes)	224
10.4	Diagrams	225
Subpart II - Behavior		229
11.	Actions	231
11.1	Overview	231
11.2	Abstract Syntax	233
11.3	Class Descriptions	247
11.3.1	AcceptCallAction (from CompleteActions)	247
11.3.2	AcceptEventAction (from CompleteActions)	248
11.3.3	Action (from BasicActions)	250
11.3.4	ActionInputPin (from StructuredActions)	251
11.3.5	AddStructuralFeatureValueAction (from IntermediateActions)	252
11.3.6	AddVariableValueAction (from StructuredActions)	254
11.3.7	BroadcastSignalAction (from IntermediateActions)	255
11.3.8	CallAction (from BasicActions)	257
11.3.9	CallBehaviorAction (from BasicActions)	257
11.3.10	CallOperationAction (from BasicActions)	259
11.3.11	ClearAssociationAction (from IntermediateActions)	260
11.3.12	ClearStructuralFeatureAction (from IntermediateActions)	261
11.3.13	ClearVariableAction (from StructuredActions)	262
11.3.14	CreateLinkAction (from IntermediateActions)	263
11.3.15	CreateLinkObjectAction (from CompleteActions)	265
11.3.16	CreateObjectAction (from IntermediateActions)	266
11.3.17	DestroyLinkAction (from IntermediateActions)	267
11.3.18	DestroyObjectAction (from IntermediateActions)	268
11.3.19	InputPin (from BasicActions)	269
11.3.20	InvocationAction (from BasicActions)	270
11.3.21	LinkAction (from IntermediateActions)	270
11.3.22	LinkEndCreationData (from IntermediateActions)	272

11.3.23	LinkEndData (from IntermediateActions, CompleteActions)	273
11.3.24	LinkEndDestructionData (from IntermediateActions)	275
11.3.25	MultiplicityElement (from BasicActions)	276
11.3.26	OpaqueAction (from BasicActions)	276
11.3.27	OutputPin (from BasicActions)	277
11.3.28	Pin (from BasicActions)	278
11.3.29	QualifierValue (from CompleteActions)	278
11.3.30	RaiseExceptionAction (from StructuredActions)	279
11.3.31	ReadExtentAction (from CompleteActions)	280
11.3.32	ReadIsClassifiedObjectAction (from CompleteActions)	281
11.3.33	ReadLinkAction (from IntermediateActions)	282
11.3.34	ReadLinkObjectEndAction (from CompleteActions)	284
11.3.35	ReadLinkObjectEndQualifierAction (from CompleteActions)	285
11.3.36	ReadSelfAction (from IntermediateActions)	286
11.3.37	ReadStructuralFeatureAction (from IntermediateActions)	288
11.3.38	ReadVariableAction (from StructuredActions)	289
11.3.39	ReclassifyObjectAction (from CompleteActions)	290
11.3.40	ReduceAction (from CompleteActions)	291
11.3.41	RemoveStructuralFeatureValueAction (from IntermediateActions)	292
11.3.42	RemoveVariableValueAction (from StructuredActions)	294
11.3.43	ReplyAction (from CompleteActions)	295
11.3.44	SendObjectAction (from IntermediateActions)	296
11.3.45	SendSignalAction (from BasicActions)	297
11.3.46	StartClassifierBehaviorAction (from CompleteActions)	298
11.3.47	StartObjectBehaviorAction (from CompleteActions)	299
11.3.48	StructuralFeatureAction (from IntermediateActions)	300
11.3.49	TestIdentityAction (from IntermediateActions)	302
11.3.50	UnmarshallAction (from CompleteActions)	303
11.3.51	ValuePin (from BasicActions)	304
11.3.52	ValueSpecificationAction (from IntermediateActions)	305
11.3.53	VariableAction (from StructuredActions)	306
11.3.54	WriteLinkAction (from IntermediateActions)	306
11.3.55	WriteStructuralFeatureAction (from IntermediateActions)	307
11.3.56	WriteVariableAction (from StructuredActions)	308
11.4	Diagrams	309
12.	Activities	311
12.1	Overview	311
12.2	Abstract Syntax	313
12.3	Class Descriptions	325
12.3.1	AcceptEventAction (as specialized)	325
12.3.2	Action (from CompleteActivities, FundamentalActivities, StructuredActivities, CompleteStructuredActivities)	327
12.3.3	ActionInputPin (as specialized)	331
12.3.4	Activity (from BasicActivities, CompleteActivities, FundamentalActivities, StructuredActivities)	332
12.3.5	ActivityEdge (from BasicActivities, CompleteActivities, CompleteStructuredActivities, IntermediateActivities)	342
12.3.6	ActivityFinalNode (from BasicActivities, IntermediateActivities)	347
12.3.7	ActivityGroup (from BasicActivities, FundamentalActivities, IntermediateActivities, StructuredActivities, CompleteActivities, CompleteStructuredActivities)	350
12.3.8	ActivityNode (from BasicActivities, CompleteActivities, FundamentalActivities, IntermediateActivities, CompleteStructuredActivities)	351
12.3.9	ActivityParameterNode (from BasicActivities)	354
12.3.10	ActivityPartition (from IntermediateActivities)	358
12.3.11	AddVariableValueAction (as specialized)	363
12.3.12	Behavior (from CompleteActivities)	364
12.3.13	BehavioralFeature (from CompleteActivities)	365
12.3.14	CallBehaviorAction (as specialized)	366
12.3.15	CallOperationAction (as specialized)	368
12.3.16	CentralBufferNode (from IntermediateActivities)	369
12.3.17	Clause (from CompleteStructuredActivities, StructuredActivities)	370

12.3.18	ConditionalNode (from CompleteStructuredActivities, StructuredActivities)	371
12.3.19	ControlFlow (from BasicActivities)	374
12.3.20	ControlNode (from BasicActivities)	375
12.3.21	DataStoreNode (from CompleteActivities)	377
12.3.22	DecisionNode (from IntermediateActivities)	378
12.3.23	ExceptionHandler (from ExtraStructuredActivities)	381
12.3.24	ExecutableNode (from ExtraStructuredActivities, StructuredActivities)	384
12.3.25	ExpansionKind (from ExtraStructuredActivities)	385
12.3.26	ExpansionNode (from ExtraStructuredActivities)	385
12.3.27	ExpansionRegion (from ExtraStructuredActivities)	386
12.3.28	FinalNode (from IntermediateActivities)	392
12.3.29	FlowFinalNode (from IntermediateActivities)	394
12.3.30	ForkNode (from IntermediateActivities)	395
12.3.31	InitialNode (from BasicActivities)	397
12.3.32	InputPin (from CompleteStructuredActivities)	398
12.3.33	InterruptibleActivityRegion (from CompleteActivities)	399
12.3.34	JoinNode (from CompleteActivities, IntermediateActivities)	401
12.3.35	LoopNode (from CompleteStructuredActivities, StructuredActivities)	404
12.3.36	MergeNode (from IntermediateActivities)	406
12.3.37	ObjectFlow (from BasicActivities, CompleteActivities)	408
12.3.38	ObjectNode (from BasicActivities, CompleteActivities)	413
12.3.39	ObjectNodeOrderingKind (from CompleteActivities)	416
12.3.40	OutputPin (from CompleteStructuredActivities, StructuredActivities)	417
12.3.41	Parameter (from CompleteActivities)	417
12.3.42	ParameterEffectKind (from CompleteActivities)	419
12.3.43	ParameterSet (from CompleteActivities)	419
12.3.44	Pin (from BasicActivities, CompleteActivities)	421
12.3.45	SendObjectAction (as specialized)	428
12.3.46	SendSignalAction (as specialized)	429
12.3.47	SequenceNode (from StructuredActivities)	430
12.3.48	StructuredActivityNode (from CompleteStructuredActivities, StructuredActivities)	431
12.3.49	UnmarshallAction (as specialized)	434
12.3.50	ValuePin (as specialized)	435
12.3.51	ValueSpecificationAction (as specialized)	435
12.3.52	Variable (from StructuredActivities)	436
12.4	Diagrams	438
13.	Common Behaviors	443
13.1	Overview	443
13.2	Abstract Syntax	447
13.3	Class Descriptions	452
13.3.1	AnyReceiveEvent (from Communications)	452
13.3.2	Behavior (from BasicBehaviors)	453
13.3.3	BehavioralFeature (from BasicBehaviors, Communications)	456
13.3.4	BehavioredClassifier (from BasicBehaviors, Communications)	457
13.3.5	CallConcurrencyKind (from Communications)	458
13.3.6	CallEvent (from Communications)	459
13.3.7	ChangeEvent (from Communications)	460
13.3.8	Class (from Communications)	461
13.3.9	Duration (from SimpleTime)	462
13.3.10	DurationConstraint (from SimpleTime)	462
13.3.11	DurationInterval (from SimpleTime)	464
13.3.12	DurationObservation (from SimpleTime)	465
13.3.13	Event (from Communications)	465
13.3.14	FunctionBehavior (from BasicBehaviors)	466
13.3.15	Interface (from Communications)	467
13.3.16	Interval (from SimpleTime)	467
13.3.17	IntervalConstraint (from SimpleTime)	468
13.3.18	MessageEvent (from Communications)	469
13.3.19	Observation (from SimpleTime)	469
13.3.20	OpaqueBehavior (from BasicBehaviors)	470
13.3.21	OpaqueExpression (from BasicBehaviors)	471

13.3.22	Operation (from Communications)	471
13.3.23	Reception (from Communications)	472
13.3.24	Signal (from Communications)	473
13.3.25	SignalEvent (from Communications)	474
13.3.26	TimeConstraint (from SimpleTime)	475
13.3.27	TimeEvent (from SimpleTime)	476
13.3.28	TimeExpression (from SimpleTime)	477
13.3.29	TimeInterval (from SimpleTime)	478
13.3.30	TimeObservation (from SimpleTime)	479
13.3.31	Trigger (from Communications)	479
14.	Interactions	481
14.1	Overview	481
14.2	Abstract Syntax	482
14.3	Class Descriptions	488
14.3.1	ActionExecutionSpecification (from BasicInteractions)	488
14.3.2	BehaviorExecutionSpecification (from BasicInteractions)	489
14.3.3	CombinedFragment (from Fragments)	490
14.3.4	ConsiderIgnoreFragment (from Fragments)	495
14.3.5	Continuation (from Fragments)	496
14.3.6	DestructionOccurrenceSpecification(fromBasicInteractions)	499
14.3.7	ExecutionOccurrenceSpecification (from BasicInteractions)	499
14.3.8	ExecutionSpecification (from BasicInteractions)	500
14.3.9	Gate (from Fragments)	501
14.3.10	GeneralOrdering (from BasicInteractions)	502
14.3.11	Interaction (from BasicInteraction, Fragments)	503
14.3.12	InteractionConstraint (from Fragments)	506
14.3.13	InteractionFragment (from BasicInteractions, Fragments)	507
14.3.14	InteractionOperand (from Fragments)	507
14.3.15	InteractionOperatorKind (from Fragments)	508
14.3.16	InteractionUse (from Fragments)	509
14.3.17	Lifeline (from BasicInteractions, Fragments)	512
14.3.18	Message (from BasicInteractions)	513
14.3.19	MessageEnd (from BasicInteractions)	516
14.3.20	MessageKind (from BasicInteractions)	516
14.3.21	MessageOccurrenceSpecification (from BasicInteractions)	517
14.3.22	MessageSort (from BasicInteractions)	518
14.3.23	OccurrenceSpecification (from BasicInteractions)	518
14.3.24	PartDecomposition (from Fragments)	519
14.3.25	StateInvariant (from BasicInteractions)	522
14.4	Diagrams	523
15.	State Machines	543
15.1	Overview	543
15.2	Abstract Syntax	543
15.3	Class Descriptions	546
15.3.1	ConnectionPointReference (from BehaviorStateMachines)	546
15.3.2	FinalState (from BehaviorStateMachines)	549
15.3.3	Interface (from ProtocolStateMachines)	550
15.3.4	Port (from ProtocolStateMachines)	551
15.3.5	ProtocolConformance (from ProtocolStateMachines)	551
15.3.6	ProtocolStateMachine (from ProtocolStateMachines)	552
15.3.7	ProtocolTransition (from ProtocolStateMachines)	554
15.3.8	Pseudostate (from BehaviorStateMachines)	557
15.3.9	PseudostateKind (from BehaviorStateMachines)	564
15.3.10	Region (from BehaviorStateMachines)	565
15.3.11	State (from BehaviorStateMachines, ProtocolStateMachines)	567
15.3.12	StateMachine (from BehaviorStateMachines)	581
15.3.13	TimeEvent (from BehaviorStateMachines)	588
15.3.14	Transition (from BehaviorStateMachines)	589
15.3.15	TransitionKind (from BehaviorStateMachines)	597
15.3.16	Vertex (from BehaviorStateMachines)	600

15.4	Diagrams	600
16.	Use Cases	605
16.1	Overview	605
16.2	Abstract Syntax	605
16.3	Class Descriptions	606
16.3.1	Actor (from UseCases)	606
16.3.2	Classifier (from UseCases)	608
16.3.3	Extend (from UseCases)	609
16.3.4	ExtensionPoint (from UseCases)	611
16.3.5	Include (from UseCases)	612
16.3.6	UseCase (from UseCases)	614
16.4	Diagrams	619
Subpart III - Supplement		625
17.	Auxiliary Constructs	627
17.1	Overview	627
17.2	InformationFlows	627
17.2.1	InformationFlow (from InformationFlows)	628
17.2.2	InformationItem (from InformationFlows)	630
17.3	Models	633
17.3.1	Model (from Models)	633
17.4	Templates	635
17.4.1	ParameterableElement (from Templates)	637
17.4.2	TemplateableElement (from Templates)	639
17.4.3	TemplateBinding (from Templates)	641
17.4.4	TemplateParameter (from Templates)	642
17.4.5	TemplateParameterSubstitution (from Templates)	644
17.4.6	TemplateSignature (from Templates)	644
17.4.7	Classifier (from Templates)	646
17.4.8	ClassifierTemplateParameter (from Templates)	651
17.4.9	RedefinableTemplateSignature (from Templates)	652
17.4.10	Package (from Templates)	653
17.4.11	PackageableElement (from Templates)	655
17.4.12	NamedElement (from Templates)	656
17.4.13	StringExpression (from Templates)	658
17.4.14	Operation (from Templates)	659
17.4.15	Operation (from Templates)	661
17.4.16	OperationTemplateParameter (from Templates)	661
17.4.17	ConnectableElement (from Templates)	662
17.4.18	ConnectableElementTemplateParameter (from Templates)	663
17.4.19	Property (from Templates)	664
17.4.20	ValueSpecification (from Templates)	665
18.	Profiles	667
18.1	Overview	667
18.1.1	Positioning profiles versus metamodels, MOF and UML	667
18.1.2	Profiles History and design requirements	667
18.2	Abstract Syntax	669
18.3	Class Descriptions	670
18.3.1	Class (from Profiles)	670
18.3.2	Extension (from Profiles)	671
18.3.3	ExtensionEnd (from Profiles)	674
18.3.4	Image (from Profiles)	675
18.3.5	Package (from Profiles)	676
18.3.6	PackageableElement (from Profiles)	677
18.3.7	Profile (from Profiles)	678
18.3.8	ProfileApplication (from Profiles)	685
18.3.9	Stereotype (from Profiles)	687
18.4	Diagrams	694

Subpart IV - Annexes	697
Annex A: Diagrams	699
Annex B: Keywords	705
Annex C: Standard Stereotypes	711
Annex D: Component Profile Examples	719
Annex E: Tabular Notations	723
Annex F: Classifiers Taxonomy	727
Annex G: XMI Serialization and Schema	729
Annex H: UML Compliance Level XMI Documents	731
INDEX	733