**OME XML File Format Specifications**

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OME makes use of two custom XML files: OME model file (.omem), which contains a model's definition and parameter linkages, and the OME control file (.omec), which contains information pertinent to running a model, linking to external data sources, and displaying results. What follows is some general documentation of the two xml specifications. Please note that OME is still under development, and that the file specification may have changed as of this writing. For a more in-depth description of these XML specifications, see the omem.xsd and omec.xsd XML schema files in the OME source code distribution.

The OME model file contains the declaration of the overall model structure and any interlinkages between components. The root element of the model file is **<ome>**, and the general tag structure is outlined in Figure 11 below.

**<ome>**

*<param\_file>*

*<model>*

*<description>*

*<tables>*

*<table\_data>\**

*<interp\_table\_data>\**

*<enumerations>*

*<enum>\**

*<val>\**

*<variables>*

*<variable>\**

*<description>*

*<vararray>\**

*<description>*

*<varts>\**

*<description>*

*<states>*

*<state>\**

*<description>*

**Figure 1.** . Bold tags are required, while italicized tags are optional. Tags followed by an asterisk (\*) may occur more than once within their positions. The ellipse (…) at the end of the hierarchy represents the recursive nature of the **<model>** tag, as it may contain any number of **<model>** tags within itself.

*<flows>*

*<flow>\**

*<description>*

*<influences>*

*<influence>\**

*<description>*

*<labels>*

*<label>\**

*<description>*

*<iterators>*

*<iterator>\**

*<description>*

*<modelports>*

*<port>*

*<description>*

*<subsources>*

*<src>\**

*<subtargets>*

*<trg>\**

*<outsources>*

*<src>\**

*<outtargets>*

*<trg>\**

*<assocports>*

*<assoc\_port>*

*<description>*

*<subsources>*

*<src>\**

*<subtargets>*

*<trgs>\**

*<outsources>*

*<src>\**

*<outtargets>*

*<trg>\**

*<assocs>*

*<assoc>\**

*<description>*

*<spawners>*

*<spawner>\**

*<description>*

*<aliases>*

*<alias>\**

*<description>*

*<submodels>*

*<model>\**

*…*

**Figure 1 (Continued).**

**<alias>** Object which acts as an alias or ghost to a functional model component. Used to increase readability of model diagram. Attributes are listed in table 1.

|  |  |  |
| --- | --- | --- |
| **Attribute** | **Required** | **Description** |
| alias | Yes | Name to apply as alias. This can be the same as the source's name. |
| extents | No | The width and height in graphical units of the element. |
| id | Yes | Universally unique identifier of model element. |
| internal | No | Denotes element's visibility to external tools; if true, element is hidden from outside tools. |
| label\_origin | No | Origin of label in OME drawing system. |
| last\_modified | No | Informational; date of element's last modification. |
| origin | No | Origin in OME drawing system. |
| source | Yes | ID of the object represented by the EvalAlias. |
| units | No | Units of measure associated with element. |
| version | No | Informational; the current revision number for the element. |

**Table 1.**

**<assoc>** Link which defines the intersecting relationship between two submodels; analogous to Simile's Role arrow. Attributes are listed in table 2.

|  |  |  |
| --- | --- | --- |
| **Attribute** | **Required** | **Description** |
| extents | No | The width and height in graphical units of the element. |
| id | Yes | Universally unique identifier of model element. |
| in\_object | Yes | Source object of the submodel association. |
| internal | No | Denotes element's visibility to external tools; if true, element is hidden from outside tools. |
| label\_origin | No | Origin of label in OME drawing system. |
| last\_modified | No | Informational; date of element's last modification. |
| name | No | Human-readable label of object. |
| origin | No | Origin in OME drawing system. |
| out\_object | Yes | Target object of the submodel association. |
| source | No | ID of link's source object. |
| target | No | ID of link's target object. |
| units | No | Units of measure associated with element. |
| version | No | Informational; the current revision number for the element. |

**Table 2.** .

**<assoc\_port>** Point at which a submodel association links to a submodel. Used for when a submodel association links two submodels that are separated by several nested submodels. Attributes are listed in table 3.

|  |  |  |
| --- | --- | --- |
| **Attribute** | **Required** | **Description** |
| extents | No | The width and height in graphical units of the element. |
| id | Yes | Universally unique identifier of model element. |
| in\_object | Yes | Source object of the submodel association. |
| internal | No | Denotes element's visibility to external tools; if true, element is hidden from outside tools. |
| label\_origin | No | Origin of label in OME drawing system. |
| last\_modified | No | Informational; date of element's last modification. |
| name | No | Human-readable label of object. |
| out\_object | Yes | Target object of the submodel association. |
| source | No | ID of link's source object. |
| target | No | ID of link's target object. |
| units | No | Units of measure associated with element. |
| version | No | Informational; the current revision number for the element. |

**Table 3.** .

**<assocports>** Collection of **<assoc\_port>** tags in a submodel. No attributes.

**<assocs>** Collection of **<assoc>** tags in a submodel. No attributes.

**<description>** Human readable annotation of model object. No attributes.

**<enum>** An enumerated collection type within the containing submodel. Attributes are listed in table 4

**OLE-objectTable 4.**

**<enumerations>** Collection of **<enum>** tags in a submodel. No attributes.

**<flow>** Element representing a System Dynamics model Flow arrow. Attributes are listed in table 5.

|  |  |  |
| --- | --- | --- |
| **Attribute** | **Required** | **Description** |
| ctrl\_pt1 | No | Control point influencing shape of curve. |
| ctrl\_pt2 | No | Control point influencing shape of curve. |
| id | Yes | Universally unique identifier of model element. |
| internal | No | Denotes element's visibility to external tools; if true, element is hidden from outside tools. |
| label\_origin | No | Origin of label in OME drawing system. |
| last\_modified | No | Informational; date of element's last modification. |
| name | No | Human-readable label of object. |
| source | No | ID of link's source object. |
| target | No | ID of link's target object. |
| units | No | Units of measure associated with element. |
| version | No | Informational; the current revision number for the element. |

**Table 5.** .

**<flows>** Collection of **<flow>** tags in a submodel. No attributes.

**<influence>** Element representing a System Dynamics model influence arrow. Attributes are listed in table 6.

|  |  |  |
| --- | --- | --- |
| **Attribute** | **Required** | **Description** |
| ctrl\_pt1 | No | Control point influencing shape of curve. |
| ctrl\_pt2 | No | Control point influencing shape of curve. |
| id | Yes | Universally unique identifier of model element. |
| internal | No | Denotes element's visibility to external tools; if true, element is hidden from outside tools. |
| label\_origin | No | Origin of label in OME drawing system. |
| last\_modified | No | Informational; date of element's last modification. |
| name | No | Human-readable label of object. |
| source | No | ID of link's source object. |
| target | No | ID of link's target object. |
| units | No | Units of measure associated with element. |
| use\_curr\_val | No | If true, retrieve the value from the source object before it updates, rather than after. |
| version | No | Informational; the current revision number for the element. |

**Table 6.** .

**<influences>** Collection of **<influence>** tags in a submodel. No attributes.

**<interp\_table\_data>** Instance of table data which defines ranges for interpolation; analogous to Simile's graph construct. Attributes are listed in table 7.

**OLE-objectTable 7.** .

**<iterator>** Stand in for Simile's Alarm component; presently only partially implemented. Attributes are listed in table 8.

|  |  |  |
| --- | --- | --- |
| **Attribute** | **Required** | **Description** |
| as\_int | No | If true, value is to be treated as an integer instead of a floating point number. |
| ask\_val | No | If true, element will request a parameter value before constructing its own. |
| expr | Yes | Expression used to update element value. |
| extents | No | The width and height in graphical units of the element. |
| external\_init | No | If true, element expect an initial value from an external source (such as a parameter file). |
| id | Yes | Universally unique identifier of model element. |
| init\_only | No | If true, element is only evaluated during the initialization processes. |
| internal | No | Denotes element's visibility to external tools; if true, element is hidden from outside tools. |
| label\_origin | No | Origin of label in OME drawing system. |
| last\_modified | No | Informational; date of element's last modification. |
| max\_value | No | Maximum expected value of element. |
| min\_value | No | Minimum expected value of element. |
| name | Yes | Human-readable label of object. |
| origin | No | Origin in OME drawing system. |
| table | No | ID of associated EvalTable or EvalInterpTable. |
| units | No | Units of measure associated with element. |
| version | No | Informational; the current revision number for the element. |

**Table 8.**

**<iterators>** Collection of **<iterator>** tags in a submodel. No attributes.

**<label>** Simple label object to annotate visual representations of model. Attributes are listed in table 9.

|  |  |  |
| --- | --- | --- |
| **Attribute** | **Required** | **Description** |
| extents | No | The width and height in graphical units of the element. |
| id | Yes | Universally unique identifier of model element. |
| internal | No | Denotes element's visibility to external tools; if true, element is hidden from outside tools. |
| label\_origin | No | Origin of label in OME drawing system. |
| last\_modified | No | Informational; date of element's last modification. |
| name | No | Human-readable label of object. |
| origin | No | Origin in OME drawing system. |
| text | No | Text to apply to label (Deprecate and move from attribute to element?). |
| units | No | Units of measure associated with element. |
| version | No | Informational; the current revision number for the element. |

**Table 9.**

**<labels>** Collection of **<iterator>** tags in a submodel. No attributes.

**<model>** Component that represents a discrete unit of encapsulation of model components. Models can optionally represent multiple instances. Attributes are listed in table 10.

|  |  |  |
| --- | --- | --- |
| **Attribute** | **Required** | **Description** |
| expects\_spatial | No | Hint to OME tools that a submodel expects to have its initial number of instances set by a Spatial Data Provider. |
| extents | No | The width and height in graphical units of the element. |
| id | Yes | Universally unique identifier of model element. |
| init\_instances | No | The submodel's initial number of instances. |
| inner\_box | No | The bounding scale within which to draw OME submodel components. |
| int\_method | No | The submodel's preferred integration method. |
| internal | No | Denotes element's visibility to external tools; if true, element is hidden from outside tools. |
| label\_origin | No | Origin of label in OME drawing system. |
| last\_modified | No | Informational; date of element's last modification. |
| name | No | Human-readable label of object. |
| origin | No | Origin in OME drawing system. |
| step\_size | Yes | The submodel's preferred temporal step size. |
| units | No | Units of measure associated with element. |
| version | No | Informational; the current revision number for the element. |

**Table 10.**

**<modelports>** Collection of **<port>** tags in a submodel. No attributes.

**<ome>** Root element of the .omem file. No attributes.

**<outsources>** Collection of links that point into a **<port>** or **<assoc\_port>** from outside of its parent submodel. No attributes.

**<outtargets>** Collection of links that point away from a **<port>** or **<assoc\_port>** from outside of its parent submodel. No attributes.

**<param\_file>** Identical to the **<param\_file>** tag in the .omec file, and can be used to override parameter mappings in the linked model file. Attributes are listed in table 11.

**OLE-objectTable 11.**

**<port>** Interface between model components that exist on either side of a submodel boundary. Attributes are listed in table 12.

|  |  |  |
| --- | --- | --- |
| **Attribute** | **Required** | **Description** |
| extents | No | The width and height in graphical units of the element. |
| id | Yes | Universally unique identifier of model element. |
| internal | No | Denotes element's visibility to external tools; if true, element is hidden from outside tools. |
| label\_origin | No | Origin of label in OME drawing system. |
| last\_modified | No | Informational; date of element's last modification. |
| name | No | Human-readable label of object. |
| origin | No | Origin in OME drawing system. |
| source | No | ID of link's source object. |
| target | No | ID of link's target object. |
| units | No | Units of measure associated with element. |
| version | No | Informational; the current revision number for the element. |

**Table 12.** .

**<spawner>** Model element used to spawn or kill submodel instances; analogous to Simile's channel model components. Attributes are listed in table 13.

|  |  |  |
| --- | --- | --- |
| **Attribute** | **Required** | **Description** |
| as\_int | No | If true, value is to be treated as an integer instead of a floating point number. |
| ask\_val | No | If true, element will request a parameter value before constructing its own. |
| expr | Yes | Expression used to update element value. |
| extents | No | The width and height in graphical units of the element. |
| id | Yes | Universally unique identifier of model element. |
| init\_only | No | If true, only evaluated on initialization. |
| internal | No | Denotes element's visibility to external tools; if true, element is hidden from outside tools. |
| is\_conditional | No | If true, Spawner is evaluated to determine whether a given submodel instance should be evaluated at a given timestep. |
| is\_loss | No | If true, Spawner subtracts instances rather than adding them. |
| label\_origin | No | Origin of label in OME drawing system. |
| last\_modified | No | Informational; date of element's last modification. |
| name | Yes | Human-readable label of object. |
| origin | No | Origin in OME drawing system. |
| per\_instance | No | If true, Spawner is evaluated for each submodel instance; otherwise it is only evaluated once per update. |
| stochastic | No | If true, a degree of randomness is applied to the Spawner's value accumulation process. |
| table | No | ID of associated EvalTable or EvalInterpTable. |
| units | No | Units of measure associated with element. |
| version | No | Informational; the current revision number for the element. |

**Table 13.** .

**<spawners>** Collection of **<spawner>** tags in a submodel. No attributes.

**<src>** Reference to source object pointing to the containing **<port>** or **<assoc\_port>**. Attributes are listed in table 14.

**OLE-object**

**Table 14.** .

**<state>** Represents a State Variable/Compartment/Stock in a System Dynamics model; analogous to Simile's Compartment. Attributes are listed in table 15.

|  |  |  |
| --- | --- | --- |
| **Attribute** | **Required** | **Description** |
| as\_int | No | If true, value is to be treated as an integer instead of a floating point number. |
| ask\_val | No | If true, element will request a parameter value before constructing its own. |
| expr | Yes | Expression used to update element value. |
| extents | No | The width and height in graphical units of the element. |
| id | Yes | Universally unique identifier of model element. |
| init\_condition | No | The starting value of the State Variable.This is necessary if no influence is used to retrieve an initialization value. |
| internal | No | Denotes element's visibility to external tools; if true, element is hidden from outside tools. |
| label\_origin | No | Origin of label in OME drawing system. |
| last\_modified | No | Informational; date of element's last modification. |
| name | Yes | Human-readable label of object. |
| origin | No | Origin in OME drawing system. |
| table | No | ID of associated EvalTable or EvalInterpTable. |
| units | No | Units of measure associated with element. |
| version | No | Informational; the current revision number for the element. |

**Table 15.** .

**<states>** Collection of **<state>** tags in a submodel. No attributes.

**<submodels>**Collection of **<model>** tags in a submodel. This results in a recursive tree of submodels, each defined by a **<model>** tag. No attributes.

**<subsources>** Collection of links that point into a **<port>** or **<assoc\_port>** from inside of its parent submodel. No attributes.

**<subtargets>** Collection of links that point away from a **<port>** or **<assoc\_port>** from inside of its parent submodel. No attributes.

**<table\_data>** Instance of table data to be linked with an Evaluable model element. Attributes are listed in table 16.

**OLE-object**

**Table 16.**

**<tables>** Collection of **<table\_data>** and **<interp\_table\_data>** tags in a submodel. No attributes.

**<trg>** Reference to target object pointing away from the containing **<port>** or **<assoc\_port>**. Attributes are listed in table 17.

**OLE-object**

**Table 17.**

**<val>** A value representation belonging to an enumerated (**<enum>**) type. Attributes are listed in table 18.

**OLE-object**

**Table 18.**

**<vararray>** Special variable that defines an n-dimensional array of values across a single instance. Attributes are listed in table 19.

|  |  |  |
| --- | --- | --- |
| **Attribute** | **Required** | **Description** |
| as\_int | No | If true, value is to be treated as an integer instead of a floating point number. |
| ask\_val | No | If true, element will request a parameter value before constructing its own. |
| expr | Yes | Expression used to update element value. |
| extents | No | The width and height in graphical units of the element. |
| id | Yes | Universally unique identifier of model element. |
| init\_condition | No | The starting value of the State Variable.This is necessary if no influence is used to retrieve an initialization value. |
| internal | No | Denotes element's visibility to external tools; if true, element is hidden from outside tools. |
| label\_origin | No | Origin of label in OME drawing system. |
| last\_modified | No | Informational; date of element's last modification. |
| name | Yes | Human-readable label of object. |
| origin | No | Origin in OME drawing system. |
| table | No | ID of associated EvalTable or EvalInterpTable. |
| units | No | Units of measure associated with element. |
| version | No | Informational; the current revision number for the element. |

**Table 19.**

**<variable>** Represents an intermediate value which affects model dynamics. Attributes are listed in table 20.

|  |  |  |
| --- | --- | --- |
| **Attribute** | **Required** | **Description** |
| as\_int | No | If true, value is to be treated as an integer instead of a floating point number. |
| ask\_val | No | If true, element will request a parameter value before constructing its own. |
| expr | Yes | Expression used to update element value. |
| extents | No | The width and height in graphical units of the element. |
| external\_init | No | If true, element expect an initial value from an external source (such as a parameter file). |
| id | Yes | Universally unique identifier of model element. |
| init\_only | No | If true, element is only evaluated during the initialization processes. |
| internal | No | Denotes element's visibility to external tools; if true, element is hidden from outside tools. |
| label\_origin | No | Origin of label in OME drawing system. |
| last\_modified | No | Informational; date of element's last modification. |
| max\_value | No | Maximum expected value of element. |
| min\_value | No | Minimum expected value of element. |
| name | Yes | Human-readable label of object. |
| origin | No | Origin in OME drawing system. |
| table | No | ID of associated EvalTable or EvalInterpTable. |
| units | No | Units of measure associated with element. |
| version | No | Informational; the current revision number for the element. |

**Table 20.**

**<variables>** Collection of **<variable>**, **<vararray>**,and **<varts>** tags in a submodel. No attributes.

**<varts>** Special variable that updates its value over time instead of using an equation. Attributes are listed in table 21.

|  |  |  |
| --- | --- | --- |
| **Attribute** | **Required** | **Description** |
| as\_int | No | If true, value is to be treated as an integer instead of a floating point number. |
| ask\_val | No | If true, element will request a parameter value before constructing its own. |
| extents | No | The width and height in graphical units of the element. |
| external\_init | No | If true, element expect an initial value from an external source (such as a parameter file). |
| fixed\_val | No | Value to use with the "fixed" mode. |
| id | Yes | Universally unique identifier of model element. |
| init\_only | No | If true, element is only evaluated during the initialization processes. |
| internal | No | Denotes element's visibility to external tools; if true, element is hidden from outside tools. |
| interval | No | The time series update interval. |
| label\_origin | No | Origin of label in OME drawing system. |
| last\_modified | No | Informational; date of element's last modification. |
| max\_value | No | Maximum expected value of element. |
| min\_value | No | Minimum expected value of element. |
| mode | No | Method by which to resolve values between interval steps. Allowed values are “nearest”, “interpolate”, “last”, and “fixed”. |
| name | Yes | Human-readable label of object. |
| origin | No | Origin in OME drawing system. |
| table | No | ID of associated EvalTable or EvalInterpTable. |
| units | No | Units of measure associated with element. |
| version | No | Informational; the current revision number for the element. |

**Table 21.**

The OME control file is responsible for details pertaining to setting up and executing a model declared in a .omem file. The general tag structure is outlined in Figure 12 below.

**<ome\_ctrl>**

*<debug>*

*<dump\_init\_batch>*

*<dump\_eval\_batch>*

*<init\_break>*

*<bp>\**

*<eval\_break>*

*<bp>\**

*<spatial\_provider>*

*<coverage\_mapping>*

**<submodel>***\**

*<var>\**

*<inst\_map>\**

*<solver>*

*<param\_file>\**

**<ome\_model>**

*<results\_views>*

*<tree\_view>\**

*<fields>*

*<field>\**

*<multival\_view>\**

*<fields>*

*<field>\**

**Figure 2.** . Bold tags are required, while italicized tags are optional. Tags followed by an asterisk (\*) may occur more than once within their positions.

*Detailed Element descriptions*

**<bp>** An entry for a single break point when running a model using interpreted expressions. Attributes are listed in table 22.

**OLE-objectTable 22.**

**<coverage\_mapping>** Provides details on how to map the targeted model's components to a spatial coverage's fields/columns. This entry can still be present when **<spatial\_provider>** when OME is operating as a plugin to another model simulation tool since it is expected that the parent tool will take care of any coverage linkages. No attributes.

**<debug>** This section contains information for dumping evaluation scripts and breakpoints to activation throughout a run. Only applies to simulation runs in interpretive mode; compiled model runs are not supported. No attributes.

**<dump\_eval\_batch>** Dump the update script generated during an interpretive model run. The default path is “evalBatch.lua”. Attributes are listed in table 23.

**OLE-object**

**Table 23.** .

**<dump\_init\_batch>** Dump the initialization script generated during an interpretive model run. The default path is “initBatch.lua”. Attributes are listed in table 24.

**OLE-object**

**Table 24.** .

**<eval\_break>** Breakpoints to apply to generated update script during interpretive model run. Break points can either be specified in a separate file or directly in the element using the **<bp>** tag. Attributes are listed in table 25.

**OLE-object**

**Table 25.** .

**<field>** Individual entry for a represented results view field. Attributes are listed in table 26.

**OLE-object**

**Table 26.** .

**<fields>** A collection of **<field>** elements. No attributes.

**<init\_break>** Breakpoints to apply to generated initialization script during interpretive model run. Break points can either be specified in a separate file or directly in the element using the **<bp>** tag. Attributes are listed in table 27.

**OLE-object**

**Table 27.**

**<inst\_map>** The mapping of a specific instance of the parent **<var>** value to a Spatial coverage column. Attributes are listed in table 28.

**OLE-objectTable 28.** .

**<multival\_view>** View type which shows all values for a single component. No attributes.

**<ome\_ctrl>** The root element. No attributes.

**<ome\_model>** Provides path to .omem file to execute, as well as overrides for start time, stop time, time step, and report interval. This tag also optionally provides a path to the compiled version of the model, if it exists. Attributes are listed in table 29.

**OLE-objectTable 29.** .

**<param\_file>** Identical to the **<param\_file>** tag in the .omem file, and can be used to override parameter mappings in the linked model file. Attributes are listed in table 30.

**OLE-objectTable 30.** .

**<results\_views>** A collection of sub-elements which outline details for different output views. This section is typically only used by environments that have advanced methods for displaying results (such as OMESimRunner). Attributes are listed in table 31.

**OLE-object**

**Table 31.** .

**<solver>** Provides details on preferred solving method and the preferred solver variant. Attributes are listed in table 32.

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**Table 32.** .

**<spatial\_provider>** Provides a path to an SDP's dynamic library and provide additional initialization arguments to be passed on to the SDP module, if necessary. Attributes are listed in table 33.

**OLE-object**

**Table 33.** .

**<submodel>** Identifies any relationships that exist between the submodel and any SDP fields within the **<coverage\_mapping>** tag. Attributes are listed in table 34.

**OLE-object**

**Table 34.** .

**<tree\_view>** Details for an instance of a tree results view, which lays out the included fields in a structure that reflects the model hierarchy. Attributes are listed in table 35.

**OLE-object**

**Table 35.** .

**<var>** Mapping between SDP field and submodel component. Attributes are listed in table 36.

**OLE-object**

**Table 36.** .