High Level Architecture
Object Model Template (OMT)

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OMT Additions

- New Tables:
  - Datatype Tables
  - Time Representation Table
  - User-Defined Tag Table
  - Synchronization Table
  - Transportation Type Table
  - Switches Table
- New Annexes:
  - Management Object Model
    - Discussed in I/F Spec section

Datatype Tables

- Data Encoding Table
- Basic Data Representation Table
- Simple Datatype Table
- Enumerated Datatype Table
- Array Datatype Table
- Fixed Record Datatype Table
- Variant Record Datatype Table

Data Encoding Table	
Name	**Description**
<name>	<description>
<name>	<description>
<name>	<description>

Name	**Description**
Byte	8 bits written to and read from the network in little-endian order (least significant bit first).
BigEndianBytePair	Two bytes in big-endian order (most significant byte first).
XDRfloatingPoint	The "Floating-point" encoding described in "XDR: External Data Representation Standard" (same as IEEE standard for normalized single-precision floating-point numbers [C1]).
XDRinteger	The "Integer" encoding described in "XDR: External Data Representation Standard" (big-endian, twos-complement, 4-byte scheme).

Provides a mechanism for defining the arrangement of bits and bytes within a data item

Basic Data Representation Table

Basic Data Representation Table			
Name	**Size in Bits**	**Interpretation**	**Encoding**
<name>	<size>	<interpretation>	<encoding>
<name>	<size>	<interpretation>	<encoding>
<name>	<size>	<interpretation>	<encoding>

Basic Data Representation Table			
Name	**Size in Bits**	**Interpretation**	**Encoding**
Octet	8	Bit pattern	Byte
Hextet	16	Bit pattern	BigEndianBytePair
Float	32	Floating point value	XDRfloatingPoint
DPfloat	64	Double precision floating point value	XDRdoublePrecision FloatingPoint
Short	16	2's complement signed integer	BigEndianBytePair
UnsignedShort	16	Binary integer	BigEndianBytePair

Provides a mechanism for defining the fundamental building blocks for all OMT datatypes

Simple Datatype Table

Simple Datatype Table					
Name	**Representation**	**Units**	**Resolution**	**Accuracy**	**Semantics**
<simple type>	<representation>	<units>	<resolution>	<accuracy>	<semantics>
<simple type>	<representation>	<units>	<resolution>	<accuracy>	<semantics>
<simple type>	<representation>	<units>	<resolution>	<accuracy>	<semantics>

Simple Datatype Table					
Name	**Representation**	**Units**	**Resolution**	**Accuracy**	**Semantics**
ASCII	Octet	N/A	N/A	N/A	ANSI standard
Number	Integer	N/A	N/A	N/A	Value used to count
TimeType	Float	Minutes	0.01667	N/A	Time representation
DollarRate	Float	$/hour	0.01	Perfect	Cost per hour
Years	Short	Years	N/A	Perfect	Elapsed time in years
DrinkCount	Short	Cups	N/A	Perfect	Measure of number of drinks

Provides a mechanism for defining the datatype of simple, scalar data items

Enumerated Datatype Table

Enumerated Datatype Table				
Name	**Representation**	**Enumerator**	**Values**	**Semantics**
<enumerated type>	<representation>	<enumerator 1>	<value(s)>	<semantics>
		…	…	
		<enumerator n>	<value(s)>	
<enumerated type>	<representation>	<enumerator 1>	<value(s)>	<semantics>
		…	…	
		<enumerator m>	<value(s)>	

Enumerated Datatype Table				
Name	**Representation**	**Enumerator**	**Values**	**Semantics**
PriorityLevel	Short	Low	0	General three level priority indicator
		Medium	1	
		High	2	
WaiterTasks	Short	TakingOrder	1	Possible activities of waiters
		Serving	2	
		Cleaning	3	
		CalculatingBill	4	
		Other	5	

Provides a mechanism for defining the datatype of data items that can only assume a finite, discrete set of values

Array Datatype Table

Array Datatype Table				
Name	**Element Type**	**Cardinality**	**Encoding**	**Semantics**
<array type>	<type>	<cardinality>	<encoding>	<semantics>
<array type>	<type>	<cardinality>	<encoding>	<semantics>
<array type>	<type>	<cardinality>	<encoding>	<semantics>

Array Datatype Table				
Name	**Element Type**	**Cardinality**	**Encoding**	**Semantics**
StringC	ASCII	[1..255]	NullTerminatedArray	C string representation
StringP	ASCII	[0..65535]	XDRvariableLengthArray	Pascal-like string representation
Employees	EmplId	10	XDRfixedLengthArray	Identifiers of employees currently working
AddressBook	AddressType	[1..10]	SparseArray	Collection of all employee addresses

Provides a mechanism for defining indexed, homogenous collections of datatypes

Fixed Record Datatype Table

Fixed Record Datatype Table					
Record Name	**Field**			**Encoding**	**Semantics**
	Name	**Type**	**Semantics**		
<record type>	<field 1>	<type 1>	<semantics>	<encoding>	<semantics>
	…	…	…		
	<field n>	<type n>	<semantics>		
<record type>	<field 1>	<type 1>	<semantics>	<encoding>	<semantics>

Fixed Record Datatype Table					
Record Name	**Field**			**Encoding**	**Semantics**
	Name	**Type**	**Semantics**		
ServiceStat	EntréeOk	Boolean	Entrée status	XDR structure	Check-off on whether the server performed properly on elements of the meal
	VeggyOk	Boolean	Vegetable 1 status		
AddressType	Name	StringC	Employee name	XDR structure	Mailing address
	Street	StringC	Street address		
	City	StringC	City name		
	State	StringC	State abbreviation		

Provides a mechanism for defining fixed, heterogenous collections of datatypes

Variant Record Datatype Table

Variant Record Datatype Table								
Record Name	**Discriminant**			**Alternative**			**Encoding**	**Semantics**
	Name	**Type**	**Enumerator**	**Name**	**Type**	**Semantics**		
<variant type>	<name>	<type>	<set 1>	<name 1>	<type 1>	<semantics>	<encoding>	<semantics>
			…	…	…	…		
			<set n>	<name n>	<type n>	<semantics>		

Variant Record Datatype Table								
Record Name	**Discriminant**			**Alternative**			**Encoding**	**Semantics**
	Name	**Type**	**Enumerator**	**Name**	**Type**	**Semantics**		
Waiter Value	Val Index	Experience Level	Trainee	Coarse Passed	Boolean	Ratings scale for employees under training	XDR Discriminated Union	Datatype for waiter performance rating value
			[Apprentice .. Senior], Master	Rating	RateScale	Ratings scale for permanent employees		
			HLAother	N/A	N/A	All others		

Provides a mechanism for defining discriminated unions of different datatypes

Time Representation Table

Time Representation Table		
Category	**Datatype**	**Semantics**
Time	<type>	<semantics>
Lookahead	<type>	<semantics>

Time Representation Table		
Category	**Datatype**	**Semantics**
Time	TimeType	Floating point value expressed in minutes
Lookahead	TimeType	Floating point value expressed in minutes

Provides a mechanism for defining the datatype of federation time and lookahead

User Defined Tag Table

User-defined Tag Table		
Category	**Datatype**	**Semantics**
Update/Reflect	<type>	<semantics>
Send/Receive	<type>	<semantics>
Delete/Remove	<type>	<semantics>
Ownership	<type>	<semantics>
Request Update	<type>	<semantics>

User-defined Tag Table		
Category	**Datatype**	**Semantics**
Update/Reflect	N/A	N/A
Send/Receive	N/A	N/A
Delete/Remove	StringC	Reason for deletion
Ownership	PriorityLevel	High value for transfer to Manager
Request Update	N/A	N/A

Provides a mechanism for defining the datatype of tags that can be associated with certain HLA services

Synchronization Table

Synchronization Table			
Label	**Tag Datatype**	**Capability**	**Semantics**
<label>	<type>	<capability>	<semantics>
<label>	<type>	<capability>	<semantics>
<label>	<type>	<capability>	<semantics>

Synchronization Table			
Label	**Tag Datatype**	**Capability**	**Semantics**
InitialPublish	N/A	Achieve	Achieved when all classes are published and subscribed, and all initially present objects are registered
BeginTimeAdvance	N/A	Achieve	Achieved when time management services are invoked
PauseExecution	TimeType	Register Achieve	Achieved when the time advance after the time in the user-supplied tag is attained; time advance requests should then cease

Provides a mechanism to identify and define federation synchronization points

Transportation Type Table

Transportation Type Table	
Name	**Description**
HLAreliable	Provide reliable delivery of data in the sense that TCP/IP delivers its data reliably
HLAbestEffort	Make an effort to deliver data in the sense that UDP provides best-effort delivery
<name>	<description>

Transportation Type Table	
Name	**Description**
HLAreliable	Provide reliable delivery of data in the sense that TCP/IP delivers its data reliably
HLAbestEffort	Make an effort to deliver data in the sense that UDP provides best-effort delivery
LowLatency	Choose the delivery mechanism that results in the lowest latency from service initiation to callback invocation at the receiving federate

Provides a mechanism for defining the federation options for transportation of object attributes and interactions

Switches Table

Switches Table	
Switch	**Setting**
Auto Provide	<auto provide>
Convey Region Sets	<convey region sets>
Attribute Scope Advisory	<attribute scope advisory>
Attribute Relevance Advisory	<attribute relevance advisory>
Object Class Relevance Advisory	<object class relevance advisory>
Interaction Relevance Advisory	<interaction relevance advisory>

Switches Table	
Switch	**Setting**
Auto Provide	Disabled
Convey Region Sets	Disabled
Attribute Scope Advisory	Enabled
Attribute Relevance Advisory	Enabled
Object Class Relevance Advisory	Enabled
Interaction Relevance Advisory	Enabled

Provides a mechanism for indicating the initial setting (enable/disable) of certain RTI capabilities

OMT Modifications

- Modified Tables:
  - Object Model Identification Table
  - Object Class Structure Table
  - Interaction Class Structure table
  - Attribute Table
  - Parameter Table
  - Routing Space Table
- Modified Annexes:
  - Common Normalization functions (Annex B)
  - OMT DIF (Annex D)

Object Model Identification Table

Object Model Identification Table	
Category	**Information**
Name	RestaurantExample
Type	SOM
Version	1.0 Alpha
Modification Date	1/1/98
Purpose	Example of an object model for a restaurant federate
Application Domain	Restaurant operations
Sponsor	Federated foods
POC	Mr. Joseph Smith
POC Organization	Joe's Place
POC Telephone	977-555-1234
POC Email	Smithj@fedfoods.com
References	www.fedfoods.com/restsim.html
Other	See Mobil International Restaurant Guide for more information

Note: Deletions from existing OMT tables illustrated in red, additions to existing OMT tables illustrated in blue

Object Class Structure Table

OMT V1.3

Object Class Structure Table				
<class> (<p/s>)	[<class> (<p/s>)]	[<class> (<p/s>)]	…	[<class> (<p/s>)]* [<ref>]
	[<class> (<p/s>)]	[<class> (<p/s>)]	…	[<class> (<p/s>)]* [<ref>]
		⋮	…	⋮
		[<class> (<p/s>)]	…	[<class> (<p/s>)]* [<ref>]
	[<class> (<p/s>)]	[<class> (<p/s>)]	…	[<class> (<p/s>)]* [<ref>]
		⋮	…	⋮
		[<class> (<p/s>)]	…	[<class> (<p/s>)]* [<ref>]

OMT P1516.2

Object Class Structure Table					
HLAobject Root (<p/s>)	[<class> (<p/s>)]	[<class> (<p/s>)]	[<class> (<p/s>)]	…	[<class> (<p/s>)]
		[<class> (<p/s>)]	[<class> (<p/s>)]	…	[<class> (<p/s>)]
			⋮	…	⋮
			[<class> (<p/s>)]	…	[<class> (<p/s>)]
		[<class> (<p/s>)]	[<class> (<p/s>)]	…	[<class> (<p/s>)]
			⋮	…	⋮
			[<class> (<p/s>)]	…	[<class> (<p/s>)]

Interaction Class Structure Table

OMT V1.3

Interaction Class Structure Table				
<class> (<isr>)	[<class> (<isr>)]	[<class> (<isr>)]	…	[<class> (<isr>)]* [<ref>]
	[<class> (<isr>)]	[<class> (<isr>)]	…	[<class> (<isr>)]* [<ref>]
		⋮	…	⋮
		[<class> (<isr>)]	…	[<class> (<isr>)]* [<ref>]
	⋮	⋮	…	⋮
<class> (<isr>)	[<class> (<isr>)]	[<class> (<isr>)]	…	[<class> (<isr>)]* [<ref>]
		[<class> (<isr>)]	…	[<class> (<isr>)]* [<ref>]
		⋮	…	⋮

OMT P1516.2

Interaction Class Structure Table					
HLAinteraction Root (<p/s>)	[<class> (<p/s>)]	[<class> (<p/s>)]	[<class> (<p/s>)]	…	[<class> (<p/s>)]
		[<class> (<p/s>)]	[<class> (<p/s>)]	…	[<class> (<p/s>)]
			⋮	…	⋮
			[<class> (<p/s>)]	…	[<class> (<p/s>)]
		⋮	⋮	…	⋮
	[<class> (<p/s>)]	[<class> (<p/s>)]	[<class> (<p/s>)]	…	[<class> (<p/s>)]
			[<class> (<p/s>)]	…	[<class> (<p/s>)]
			⋮	…	⋮

Attribute Table

OMT V1.3

Attribute Table												
Object	**Attribute**	**Datatype**	**Cardi-nality**	**Units**	**Resolution**	**Accuracy**	**Accuracy Condition**	**Update Type**	**Update Condition**	**T/A**	**U/R**	**Routing Space**
<object class>	<attri-bute>	<datatype>	[<size>]	<units>	<resol>	<accur>	<condit>	<update type>	<update condition>	<t/a>	<u/r>	<r_space>
<object class>	<attri-bute>	<datatype>	[<size>]	<units>	<resol>	<accur>	<condit>	<update type>	<update condition>	<t/a>	<u/r>	<r_space>
	<attri-bute>	<datatype>	[<size>]	<units>	<resol>	<accur>	<condit>	<update type>	<update condition>	<t/a>	<u/r>	<r_space>
	<attri-bute>	<datatype>	[<size>]	<units>	<resol>	<accur>	<condit>	<update type>	<update condition>	<t/a>	<u/r>	<r_space>

OMT P1516.2

Attribute Table									
Object	**Attribute**	**Datatype**	**Update Type**	**Update Condition**	**T/A**	**P/S**	**Available Dimensions**	**Transport**	**Order**
HLA object Root	HLA privilege ToDelete Object	<datatype>	<update type>	<update condition>	<t/a>	<p/s>	<dimensions>	<trans-port>	<order>
<object class>	<attri-bute>	<datatype>	<update type>	<update condition>	<t/a>	<p/s>	<dimensions>	<trans-port>	<order>
	<attri-bute>	<datatype>	<update type>	<update condition>	<t/a>	<p/s>	<dimensions>	<trans-port>	<order>
	<attri-bute>	<datatype>	<update type>	<update condition>	<t/a>	<p/s>	<dimensions>	<trans-port>	<order>

Parameter Table

OMT V1.3

Parameter Table								
Interaction	**Parameter**	**Datatype**	**Cardinality**	**Units**	**Resolution**	**Accuracy**	**Accuracy Condition**	**Routing Space**
<interaction class>	<parameter>	<datatype>	[<size>]	<units>	<resol>	<accur>	<condit>	<r_space>
	<parameter>	<datatype>	[<size>]	<units>	<resol>	<accur>	<condit>	
	<parameter>	<datatype>	[<size>]	<units>	<resol>	<accur>	<condit>	
<interaction class>	<parameter>	<datatype>	[<size>]	<units>	<resol>	<accur>	<condit>	<r_space>
	<parameter>	<datatype>	[<size>]	<units>	<resol>	<accur>	<condit>	
	<parameter>	<datatype>	[<size>]	<units>	<resol>	<accur>	<condit>	

OMT P1516.2

Parameter Table					
Interaction	**Parameter**	**Datatype**	**Available Dimensions**	**Transport**	**Order**
<interaction class>	<parameter>	<datatype>	<dimensions>	<transport>	<order>
	<parameter>	<datatype>			
	<parameter>	<datatype>			
<interaction class>	<parameter>	<datatype>	<dimensions>	<transport>	<order>
	<parameter>	<datatype>			
	<parameter>	<datatype>			

OMT DIF

- Current OMT DIF specification uses BNF
- New OMT DIF specification uses XML (e**X**tensible **M**arkup **L**anguage)
  - Technical feasibility and business case well established
    - Leverage the collective ideas of industry beyond our community
    - Lower costs of maintenance
    - Access to a trained work force
    - Access to free and commercial supporting software
  - OMT and FED DIFs can be combined into single DIF