



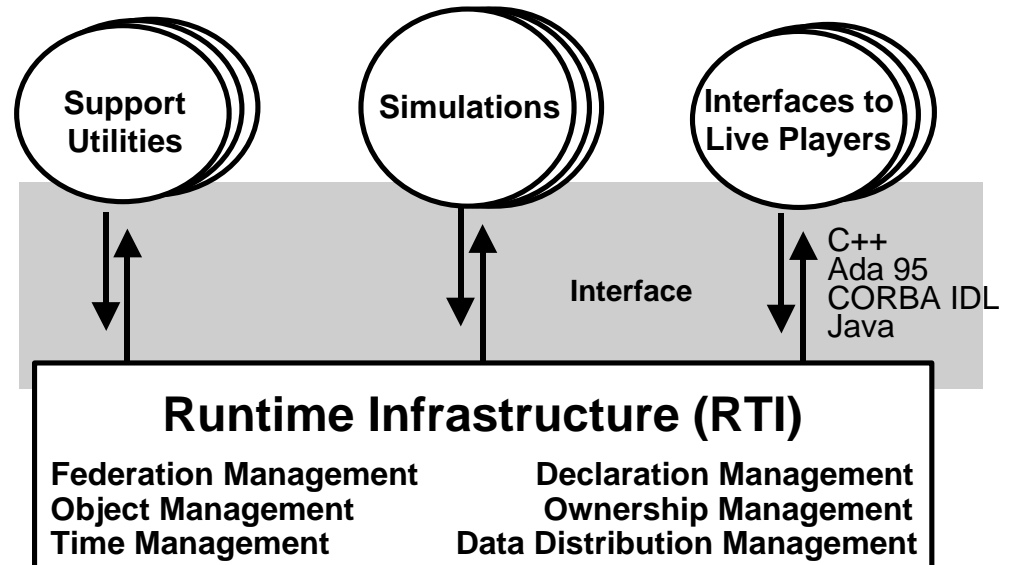
The RTI Verifier

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What Are We Verifying?

- Requirements directly observable in the HLA Interface Specification Version 1.3
- Service invocation sequence
- Service parameter values
- Exceptions
- Only minimal RTI capacity is assumed
 - Federates
 - Federations
 - Objects
 - Spaces and dimensions



What is Our Approach

- **Distill a set of requirements from the HLA I/F Specification**
- **Design a test for each requirement**
- **Express each test in a Script Definition Language (SDL) script**
- **Build a distributed infrastructure that can execute scripts and record the results**

Example SDL Script

```
/* This script tests that a late joiner does not get informed of the synchronization point when a federate set is specified. Federates 1 and 2 are joined. Federate 3 is not. */
```

```
string syncLabel, syncTag;  
syncLabel := "some label"; syncTag := "some tag";  
handleSet participatingFederates;  
participatingFederates := (federate1, federate2);
```

```
invoke ap1 registerFederationSynchronizationPoint(syncLabel, syncTag, participatingFederates);
```

```
accept all  
synchronizationPointRegistrationSucceeded ap1 (theLabel);
```

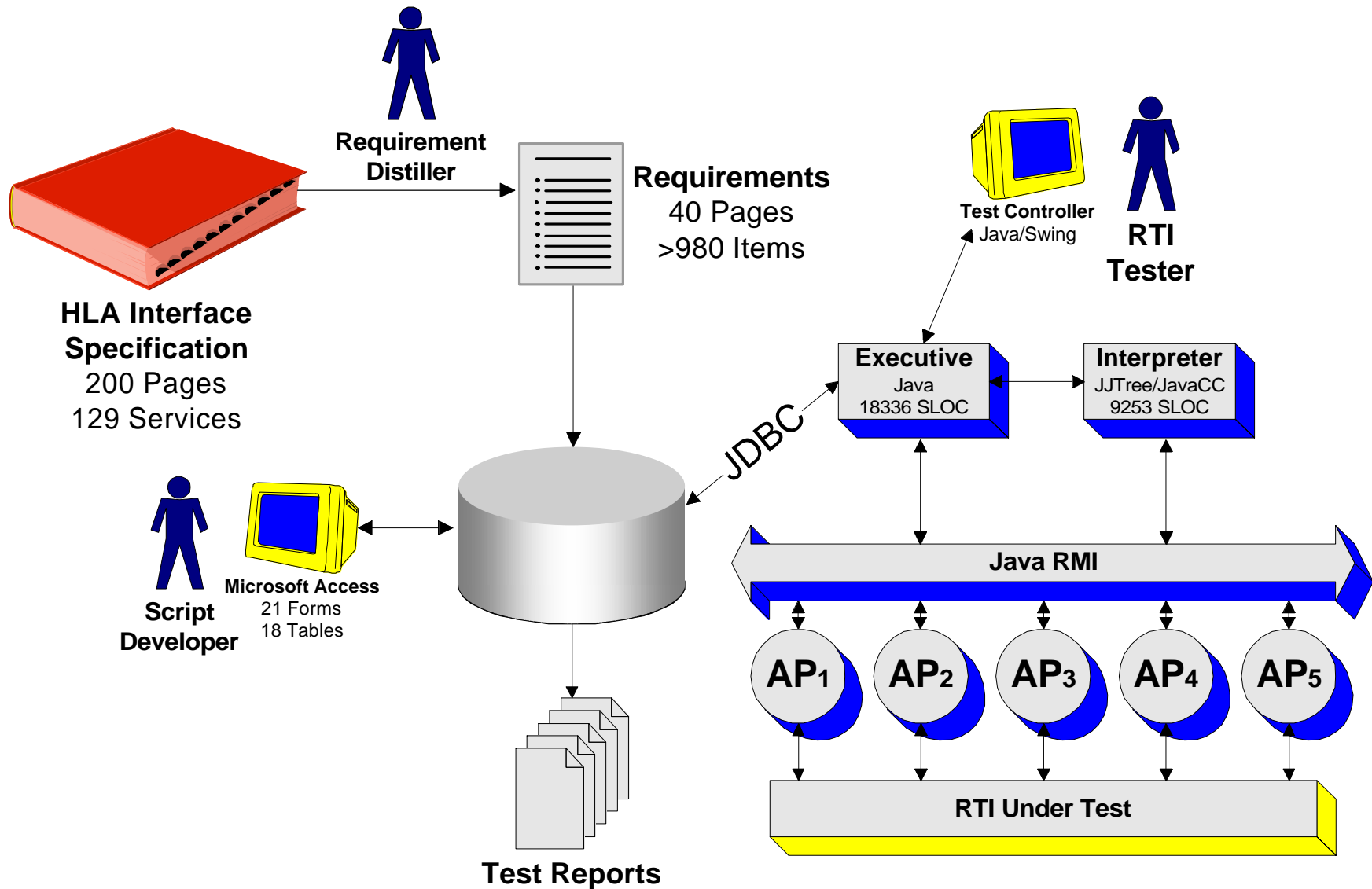
```
accept all  
announceSynchronizationPoint ap1 (theLabel, theTag);  
announceSynchronizationPoint ap2 (theLabel, theTag);
```

```
invoke ap3 joinFederationExecution("type2", federationName)  
return(federate3) println("Federate 3 joined");  
exception(theException) exitFailure("Could not join federation");
```

```
accept all  
announceSynchronizationPoint ap3 (theLabel, theTag)  
exitFailure("Late joiner should not have received announce");  
unsatisfied  
println("Late joiner correctly did not receive announce.");
```

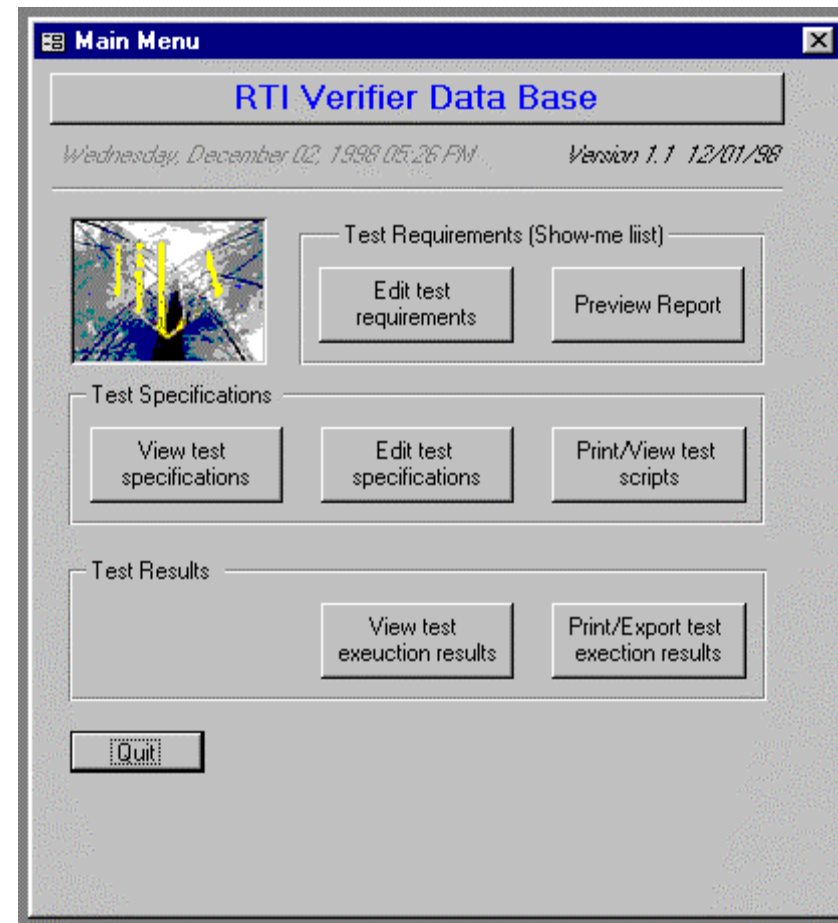
```
...
```

Verifier Overview



RTI Verifier Data Base

- **Test Requirement**
 - Derived from the I/F Spec
- **Script**
 - SDL to drive the Verifier
- **Test**
 - Collections of scripts that test a particular requirement
- **Series**
 - Collection of Tests
- **Scenario**
 - Collection of Series



Test Requirement Editor

TestRequirementsEntry : Form

Editing RTI Test Requirements

List of Existing Test Requirements	
ID	Name
4 5 9 4 0 0	if a specified set is provided, make sure federate
4 6 0 0 0 0	Save:
4 6 1 0 0 0	make sure other services (including a new save)
4 6 2 0 0 0	request a save while another (a timed save or ar
4 6 2 1 0 0	A second timed save while the first timed save is
4 6 2 2 0 0	A second timed save while the first timed save is
4 6 2 3 0 0	A second immediate save while the first save is
4 6 2 4 0 0	A second immediate save while the first save is p
4 6 3 0 0 0	make sure that the save label is preserved across
4 6 3 1 0 0	Save label is preserved for immediate saves
4 6 3 2 0 0	Save label is preserved for timed saves
4 6 4 0 0 0	make sure time constrained federates only get in
4 6 4 1 0 0	Time constrained federates only get initiate save

Current Data for the selected Test Requirement

Selected Requirement: 4. 6. 2. 3. Is this a leaf node ? True

A second immediate save while the first save is pending (no constrained federate has attempted to advance). scheduled by the same federate, should replace the previously scheduled immediate save.

Comment:

These buttons act on the selected requirement above

Add New Subordinate	Add New (same level)
Split Requirement	Delete Selected

INSTRUCTIONS:

Editing: First select the requirement on the left. Then edit using the above windows. The changes will be saved automatically.

Adding: First select the parent requirement on the left. Pressing the "Add New Subordinate" button will add a subordinate to the selected requirement. It will automatically pick the next available number for the subordinate.

Splitting: First select the requirement to be split. Pressing the "Split Requirement" button will copy the selected requirement into two subordinates for further editing.

Note: You can "double-click" in the leaf-node box above to toggle whether the requirement is a leaf node or not. You can also renumber by clicking in the number fields.

Script Editor

SDL SCRIPT EDITOR

Wednesday, December 02, 1998 5:37:30 PM

Script Name	Author	Category
4.3.4	John Tufarolo	Federation Management

Create Date:	11/16/98	1:17:12 PM
Last Modified:	11/23/98	1:30:11 PM



Script Description

This script attempts to invoke all services on ap2. In addition it invokes services to get handles, etc on ap1 which is assumed to be joined.

Some of the services are commented it. This is either because they were legal for an unjoined federate or an exception other than FederateNotExecutionMember was thrown. This appears to be a problem with the Java cap on some of the time management services.

Change history

Change Date	Change Time	Modification

SDL Script Usage of this script

```
handle ACD, X, Z, W;

invoke ap1 getObjectClassHandle("A.C.D") return(ACD);
invoke ap1 getAttributeHandle("X", ACD) return(X);
invoke ap1 getAttributeHandle("Z", ACD) return(Z);
invoke ap1 getAttributeHandle("W", ACD) return(W);

handleSet theAttrs;
theAttrs := {X, Z, W};

invoke ap2 publishObjectClass(ACD, theAttrs)
  exitFailure("Unjoined federate was allowed to invoke service");
FederateNotExecutionMember(theException)
  println("Unjoined federate was not allowed to invoke service");
exception(theException) {
  println("Caught unexpected exception");
  exitFailure(theException);
}

invoke ap2 unpublishObjectClass(ACD)
  exitFailure("Unjoined federate was allowed to invoke service");
```



Script Writing References

RTI Exceptions | SDL stmts | Data types | RTI Svcs | Fed Svcs | Other

ServiceName [<parameters>] return [<parameters>] <statement>
ServiceName [<parameters>] <statement>

Rti_services

cancelAttributeOwnershipAcquisition	
(<identifier> ,<identifier>)	// obj, attrs
Return	

Record: 4 of 86

Record: 16 of 115

Test Editor

Tests Wednesday, December 02, 1998 5:54:17 PM

Author: Create Date: Create Time:
Short Description: Change Date: Change Time:
Long Description: Change Description:

Scripts that are part of this test

Scripts	Script Sequence
<input type="text" value="setup"/>	<input type="text" value="1"/>
<input type="text" value="sync2a"/>	<input type="text" value="2"/>
<input type="text" value="cleanup"/>	<input type="text" value="3"/>
* <input type="text" value=""/>	<input type="text" value="1"/>

Record: of 3

Requirements met by this test

<input type="text" value="4.5.2.1.0.0"/>
* <input type="text" value=""/>

Record: of 1

Record: of 58

Series Editor

The screenshot shows a Windows-style application window titled "Series". The title bar includes standard minimize, maximize, and close buttons. The window content is organized into several sections:

- Metadata Section:** Contains fields for Author (Timothy C. Hyon), Short Description (series-7-1), Long Description (This series verifies Unconditional Attribute Ownership Divestiture), Create Date (01-Dec-98), Change Date (02-Dec-98), Create Time (5:05:21 PM), and Change Time (2:50:50 PM). There is also a Change Description field containing the text "Created".
- Tests Section:** A table with two columns: "Tests" and "Test Sequence". It lists five tests in sequence.
- Navigation Section:** Two sets of navigation controls. The first set is labeled "Record:" and shows "1 of 5". The second set is labeled "Record:" and shows "3 of 3".

Tests	Test Sequence
test-7-1-1	1
test-7-1-2	2
test-7-1-3	3
test-7-1-4	4
test-7-1-5	5

Scenario Editor

Scenarios Wednesday, December 02, 1998 6:10:44 PM

Author: Timothy C. Hyon Create Date: 23-Nov-98 Create Time: 2:11 PM
Short Description: scenario-4-5-9c Change Date: 11/23/98 Change Time: 2:12:15 PM
Long Description: This scenario runs series-4-5-9c Change Description: Created

SequenceOfSeries

Series	Series Sequence
▶ Series-4-5-9c	0
* [Empty]	0

Record: [Navigation icons] 1 of 1

Record: [Navigation icons] 1 of 1

RTI Verifier Test Controller

Attachment Point (AP) Federation

AP	Status	Host	Callback
1	Joined	voyager	Not Pending
2	Joined	rockies	Not Pending
3	Joined	rockies	Not Pending
4	Disconnected	N/A	Not Pending
5	Disconnected	N/A	Not Pending

Database Execution Status

DB Status: **Connected**

Database: hla_if13

Server: hla-pc

Get Scripts Get Tests

Get Series Get Scenario

Verifier Output Area

System Output API Services Script Execution

```
To AP 1: destroyFederationExecution
  Name: Verification
Done.
End Script Execution: cleanup
End Test Execution: 4-6-8-1
Retrieving Tests from Database...
Done.
**** TEST Execution
**** Tester : aw
**** Date : Thu Dec 03 12:44:12 EST 1998
**** Comment : save with advance beyond save time
Begin Test Execution: 4-6-8-2
Retrieving scripts from DB for: 4-6-8-2 ...
Begin Script Execution: setup
To AP 1: createFederationExecution
  Name: Verification
  FED : verifier.fed
Done.
```

RTI Verifier Test Controller

Attachment Point (AP) Federation

AP	Status	Host	Callback
1	Joined	voyager	Not Pending
2	Joined	rockies	Not Pending
3	Joined	rockies	Not Pending
4	Disconnected	N/A	Not Pending
5	Disconnected	N/A	Not Pending

Database Execution Status

Scenario:

Series:

Test: 4-6-8-2

Script: setup

ScriptStatus: Running

Log File:

Verifier Output Area

System Output | **API Services** | **Script Execution**

```

**** Tester : aw
**** Date   : Thu Dec 03 12:57:23 EST 1998
**** Comment : advance beyond save time
Begin Test Execution: 4-6-8-2
Retrieving scripts from DB for: 4-6-8-2 ...
Begin Script Execution: setup
To AP 1: createFederationExecution
  Name: Verification
  FED : verifier.fed
Done.
Federation successfully created
To AP 1: joinFederationExecution
  FedType: type1
  FedEx  : Verification
To AP 1: joinFederationExecution
  FedType: type1
  FedEx  : Verification
To AP 1: joinFederationExecution
  
```