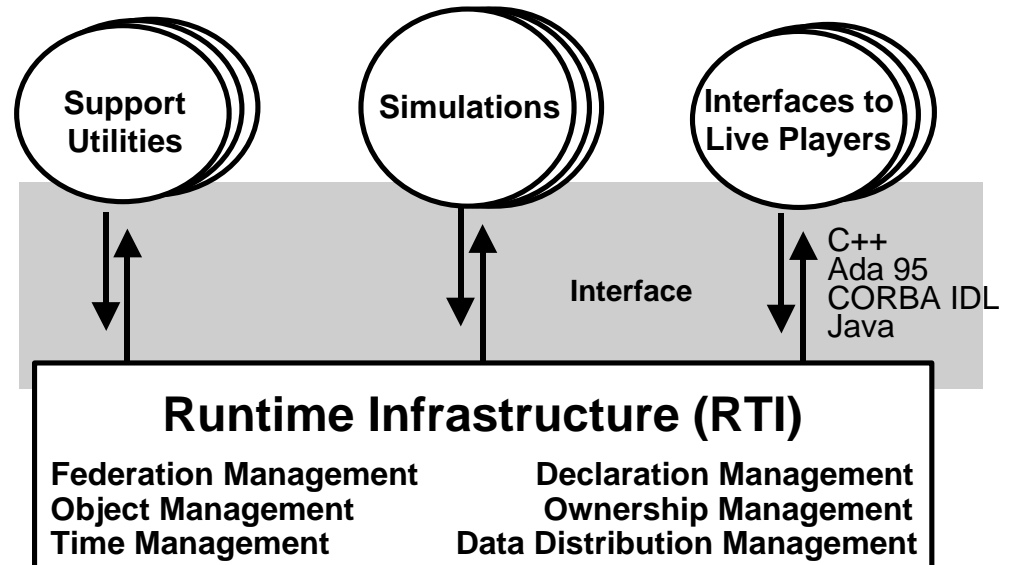# The RTI Verifier

Dr. Richard Weatherly

9 December 1998

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**

Support Utilities

Simulations

Interfaces to Live Players

C++
Ada 95
CORBA IDL
Java

Interface

Runtime Infrastructure (RTI)

Federation Management   Declaration Management
Object Management   Ownership Management
Time Management   Data Distribution Management

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.");
...
```
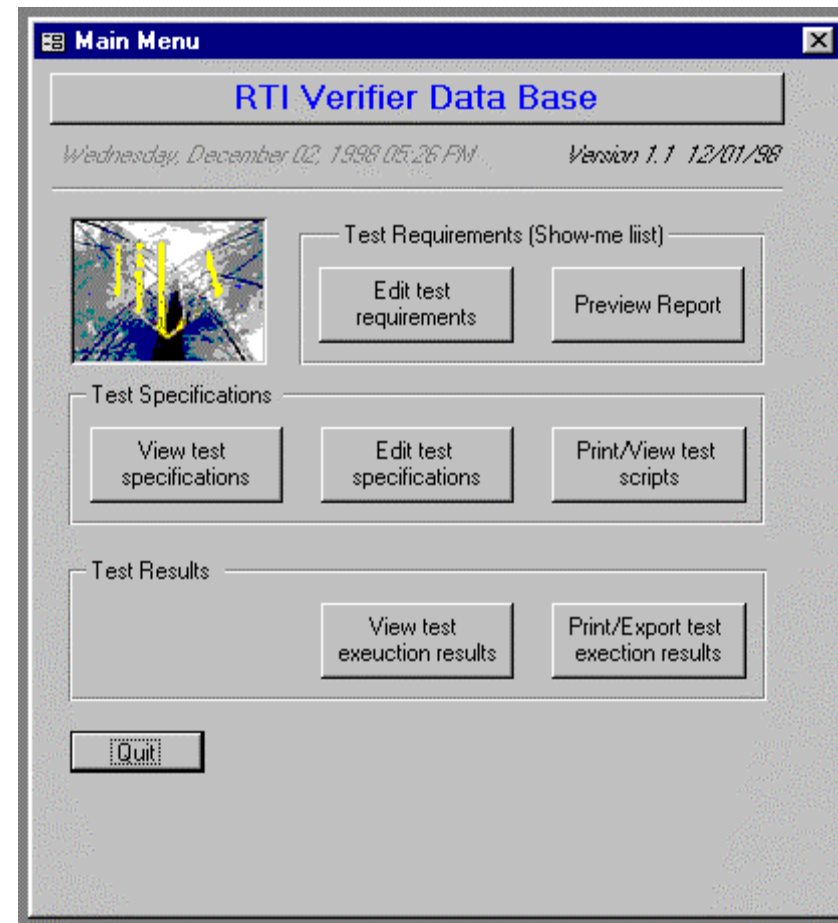
Verifier Overview

Requirement Distiller

HLA Interface Specification
200 Pages
129 Services

Requirements
40 Pages
>980 Items

Test Controller
Java/Swing

RTI Tester

Executive
Java
18336 SLOC

Interpreter
JJTree/JavaCC
9253 SLOC

JDBC

Script Developer

Microsoft Access
21 Forms
18 Tables

Java RMI

AP₁ AP₂ AP₃ AP₄ AP₅

RTI Under Test

Test Reports
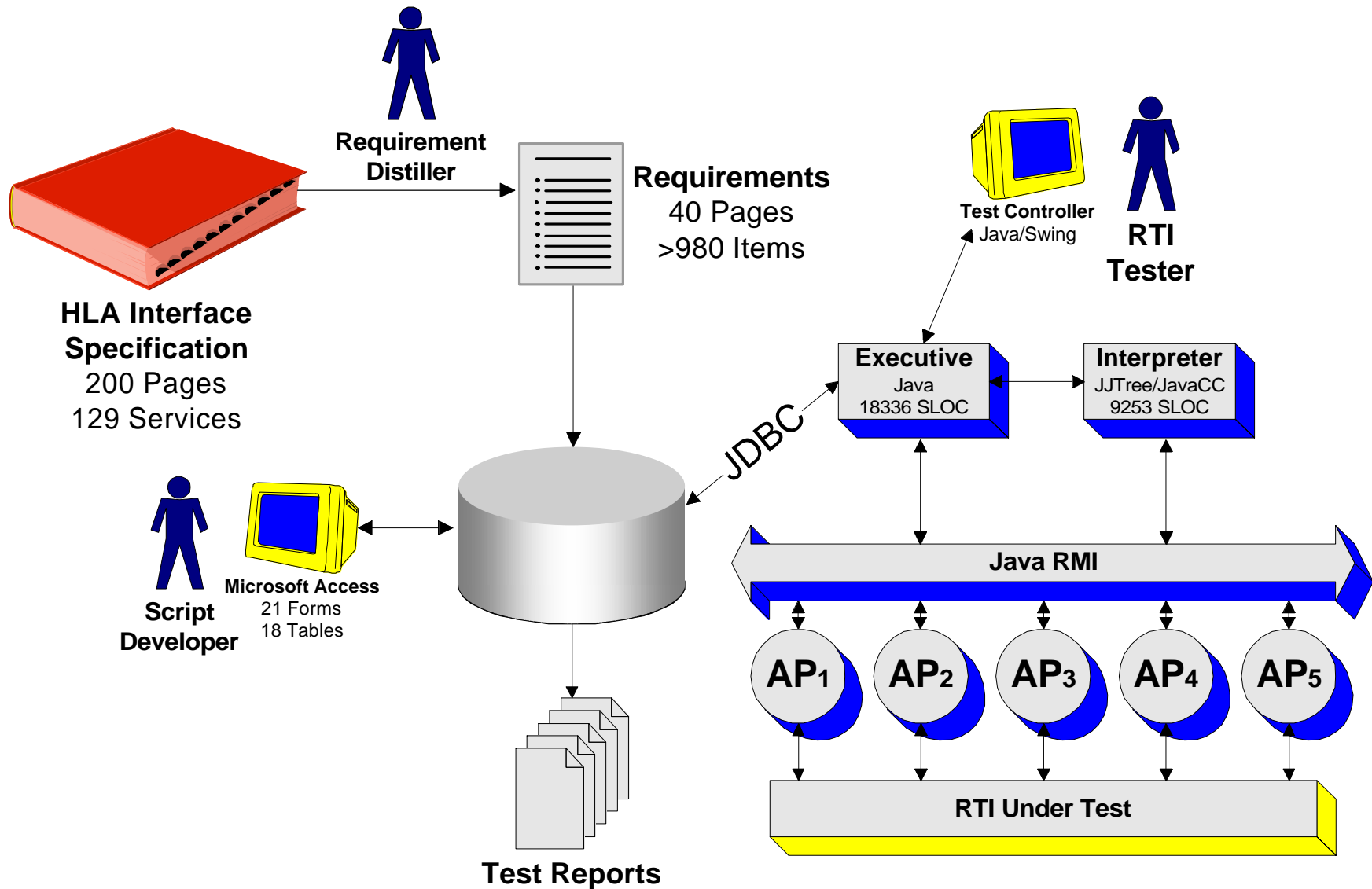
RTI Verifier Data Base

- **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

Script Editor

SDL SCRIPT EDITOR   Wednesday, December 02, 1998 5:37:30 PM

Script Name	Author	Category	Create Date:	11/16/98	1:17:12 PM
4.3.4	John Tufarolo	Federation Management	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 is 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");
```

✎ ✓   ReSort Data   Export Script to a file

Script Writing References

RTI Exceptions | SDL stmts | Data types | **RTI Srvcs** | Fed Srvcs | 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	Annette Wilson
Short Description	SyncPoint: Illegal federate set -
Long Description	This tests that the RTI will not allow a federate to register a synchronization point with a federate set that contains federate

Create Date	24-Nov-98
Change Date	30-Nov-98

Create Time	3:39 PM
Change Time	9:36:42 AM

Change Description: Created

Scripts that are part of this test

Scripts	Script Sequence
setup	1
sync2a	2
cleanup	3
	1

Record: 1 of 3

Requirements met by this test

4.5.2.1.0.0

Record: 1 of 1

Record: 11 of 58

9

Series Editor

Scenario Editor

RTI Verifier Test Controller

RTI Verifier Test Controller