ATHLA – A TOOL COMMAND LANGUAGE BINDING FOR THE HIGH-LEVEL ARCHITECTURE

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DLR

Overview

- Introduction
- Motivation
- Approach
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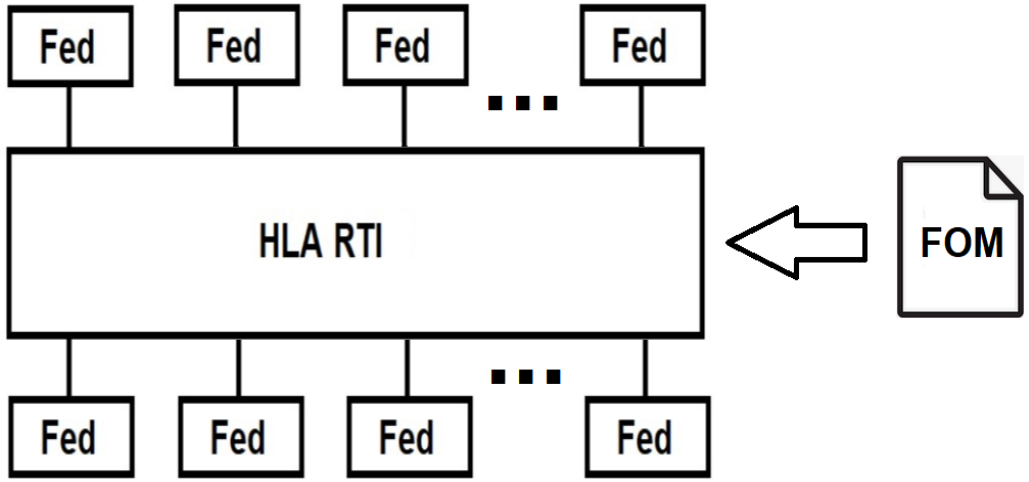
Introduction

- HLA (High Level Architecture)
  - *IEEE standard for distributed simulation*
  - *Purpose → Interoperability and Reuse*
  - *Started in the 1990s → U.S. DoD*
  - *Within NATO → STANAG 4603*
  - *Actual version: HLA 1516-2010*

Introduction

- HLA (High Level Architecture)
  - *Architecture*
    - *Run-time Infrastructure (RTI)*
    - *Federates*
    - *Federation Object Model (FOM)*



Introduction

- HLA (High Level Architecture)
  - *IEEE Std 1516-2010 Framework and Rules*
    - *10 architectural rules*
  - *IEEE Std 1516.1-2010 Federate Interface Specification*
    - *specifies the services (provided **C++, Java APIs and Web Services**)*
  - *IEEE Std 1516.2-2010 Object Model Template Specification*
    - *Format of the FOM*

Motivation

- Succesful Tcl realizations in the past
  - *Interfacer to X-Plane flight simulator*
  - *Apache Kafka consumer and producer*
  - *RabbitMQ sender and receiver*
  - *ActiveMQ sender and receiver*
  - *Different simulation components*

Approach

HLA binding to Tcl built on top of a commercial Java API by usage of the JBlend package.

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Approach

Approach

Important libraries to use in TclHLA_pitch:

- *Provided libraries of the commercial RTI (Pitch)*
- *tclJBlend.jar of the JBlend Tcl package*

Approach

The „root“:

- in TclFederate.java

```
public class TclFederate extends NullFederateAmbassador {
    private RTIambassador _rtiAmbassador;
    private Interp tclInterp;
    private EncoderFactory _encoderFactory;
    …
    ..
    .
}
```

Approach

The „root“:

- in package hlaTcl.tcl

```
oo::class create ::hlaTcl::Hla {
    variable Federate
    constructor {x y} {
        variable JarLocation [file dirname [file normalize [info script]]]
        package require Jblend
        append JarLocation /pitch
        set ::env(TCL_CLASSPATH) $JarLocation
        java::import tclhla.TclFederate
    }
}
```

Approach

Initialization:

- in TclFederate.java

```
public void ini(String rtihost, String federationname, Interp interp) {
    tclInterp = interp;
    String settingsDesignator;
    settingsDesignator = "crcAddress=" + rtihost;
    _rtiAmbassador.createFederationExecution(federationname, urlArray,
                    "HLAfloat64Time");
    …
    ..
    .
}
```

Approach

Initialization:

- in package hlaTcl.tcl

```
method createFederationExecution {targetaddress federationname} {
    set Federate [java::new TclFederate]
    $Federate ini $targetaddress $federationname [java::getinterp]
    …
    ..
    .
}
```

Approach

Function example:

- in TclFederate.java

```
public void enable_TimeConstrained() {
        try {
            _rtiAmbassador.enableTimeConstrained();
        } catch (InTimeAdvancingState | RequestForTimeConstrainedPending |
            TimeConstrainedAlreadyEnabled | SaveInProgress |
            RestoreInProgress | FederateNotExecutionMember |
            NotConnected | RTIinternalError ex) {
            Logger.getLogger(TclFederate.class.getName()).log(Level.SEVERE,
           null, ex);
        }
}
```

Approach

Initialization:

- in package hlaTcl.tcl

method enableTimeConstrained {} {
$Federate ***enable_TimeConstrained***
}

Approach

Callback example:

- in TclFederate.java

```
@Override
   public final void objectInstanceNameReservationSucceeded(String
      objectName) {
                  synchronized (_reservationSemaphore) {
                        _reservationComplete = true;
                        _reservationSucceeded = true;
                        _reservationSemaphore.notifyAll();
                        successfullyReservedObject = objectName;
                        Notifier n = tclInterp.getNotifier();
                        TclEvent t = new EvalObjectInstanceNameReservationSucceededEvent();
                        n.queueEvent(t,TCL.QUEUE_TAIL);
                        t.sync();
                  }
   }
```

Approach

Callback example:

- in TclFederate.java

```
class EvalObjectInstanceNameReservationSucceededEvent extends TclEvent {
        @Override
        public int processEvent (int flags) {
            try {

       tclInterp.eval(tclObjectInstanceNameReservationSucceededScript);
            }
            catch (TclException x) {}
            return 1;
        }
 }
```

Approach

Callback example:

- in TclFederate.java

```
public void set_objectInstanceNameReservationSucceededScript(String
        objectinstancenamereservationsucceededscript) {
        tclObjectInstanceNameReservationSucceededScript =
        objectinstancenamereservationsucceededscript;
}
```

Approach

Callback example:

- in package hlaTcl.tcl

```
method setobjectInstanceNameReservationSucceededScript {thescript} {
        $Federate set_objectInstanceNameReservationSucceededScript \
                $thescript
}
```

Approach

Callback example:

- in tcl file using package hlaTcl.tcl

```
proc objectInstanceNameReservationSucceededCallbackReceive {} {
    global reservationComplete
    set reservationComplete 1
    puts "CALLBACK: Object instance name reservation succeeded!“
    return
}

$obj setobjectInstanceNameReservationSucceededScript \
    objectInstanceNameReservationSucceededCallbackReceive
```

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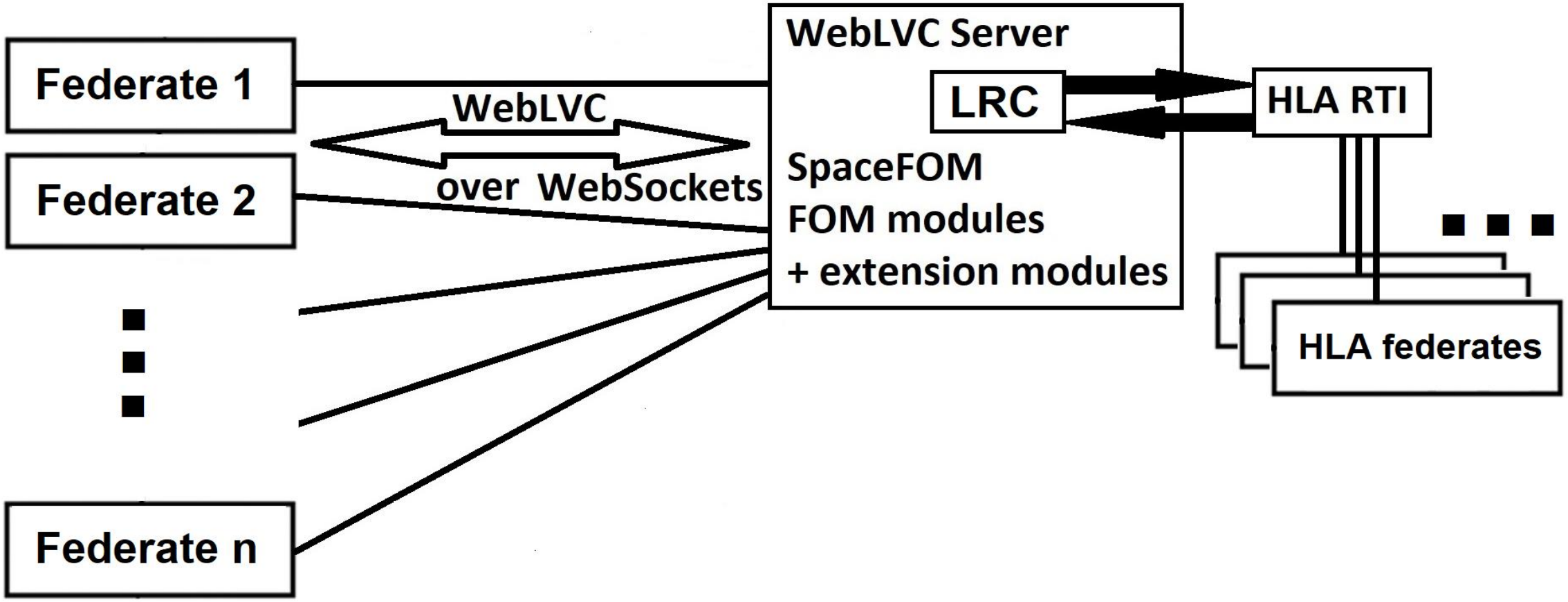
Use Case



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Outlook