High Level Architecture
Module 2
Advanced Topics

Roy Crosbie
John Zenor
California State University, Chico
High Level Architecture
Module 2
Basic Concepts

Lesson 2 (a)
FEDEP

[Primarily derived from FEDEP model version 1.4]
FEDEP Purpose

- HLA Federation.
- FEDEP - HLA Federation Development and Execution Process.
- Identify a sequence of basic steps HLA Federations will follow.

A named set of simulations interacting via the services of the HLA Runtime Infrastructure (RTI) and in accordance with a common object model and a common HLA rule set is known as an HLA federation. [FEDEP Manual]

The FEDEP is used to describe a generalized process for building HLA federations. It is intended to provide a high level framework for HLA federation construction into which lower-level development practices native to each individual application area can be easily integrated. Furthermore the HLA FEDEP defines a generic, common sense systems engineering methodology for HLA federations that can and should be tailored to meet the needs of individual applications.
Useful FEDEP Facts

- The FEDEP describes federation development;
  - implicitly assumes availability of HLA-compliant federates
- The FEDEP is not an HLA requirement
- Tools to support FEDEP related activities exist
- The FEDEP Checklist is intended to be used in conjunction with FEDEP providing more details

The FEDEP describes federation development. A corresponding federate development document does not exist but there is a large repository of individually documented federates to help developers. A good starting place when looking for these documents is http://siso.sc.ist.ucf.edu/siw/

The FEDEP is not an HLA requirement; it is just offered as a general guideline to assist the wide variety of needs of the HLA community.

A group of tools to facilitate the automation of the FEDEP is available from DMSO (commercial tools also exist). You can start checking these tools at the hla web site at http://hla.dms.mil

Although the FEDEP simply identifies and describes the activities to be performed in the federation development in a kind of high level manner, the FEDEP Checklist exist to provide more detailed (lower-level) view of each process. As with the FEDEP the Checklists try to be general enough to include every possible federation development while at the same time trying to provide more details and how-to guidelines.
FEDEP Life Cycle

• FEDEP model top view
  – Define Federation Objectives
  – Develop Federation Conceptual Model
  – Design Federation
  – Develop Federation
  – Integrate and Test Federation
  – Execute Federation and Prepare Results

• Six Step process implementation depends on application nature

It should be noted that although the six main steps are listed in a hierarchical way that requires dependancy and completion of previous steps before one can move forward, a rigid implementation of the six-step process is not specified and neither a time frame. It is more of a guideline and steps to follow than a recipe and the actual federation to be considered will dictate in many ways the time, effort and method used for each step.
Six Step Process

1. Define Federation Objectives
2. Develop Federation Conceptual Model
3. Design Federation
4. Develop Federation
5. Integrate and Test Federation
6. Execute Federation and Prepare Results
FEDEP Model Phase Description

- FEDEP Model is a high level Framework and guideline for the development and execution of HLA federations

- The FEDEP defines a generic, systems engineering approach to the development of HLA federations

- To be used as a starting point that is to be modified / augmented by federation developers as needed

Again the intent of the FEDEP Model is to specify a set of guidelines for federation development and execution that federation developers can leverage to achieve the needs of their application. Furthermore it should be noted that the FEDEP is intended to be used throughout the entire HLA community. It is thus intended to provide a wide enough framework to encapsulate all application areas that can potentially benefit from the use of distributed simulation.
Data Flow Diagram (DFD) notation is used in the picture on top and throughout this presentation.

Rounded Rectangles are used to represent federation development activities. Cylinders represent data stores, and Arrows show information flows [SIW98].

The federation development activities shown in this diagram are organized into six vertically aligned groupings, each representing a first-level decomposition of one of the six major federation development steps. A mapping of FEDEP activities to the six-step process is also provided in the Table of the next slide.
# Mapping of FEDEP to Six-Step Process

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Mapping of FEDEP to Six-Step Process
Define Federation Objectives

- Define and document a set of needs to be addressed through the development and execution of an HLA federation
- Transform these needs into more detailed specific federation objectives
Develop Federation Conceptual Model

- Develop representations of the real world domain and the federation scenario
- Transform federation objectives into highly specific federation requirements for use as success criteria during federation testing
Develop Federation Conceptual Model

Scenario Database

Develop Scenario

Perform Conceptual Analysis

Develop Federation Requirements

Federation Conceptual Model

Scenario Database

Federation Scenario

Federation Scenario

Federation Objectives Statement

Federation Requirements

Test Evaluation Criteria

Federation Objectives Statement

Federation Scenario

Scenario Database
Design Federation

- Identify, evaluate, and select all federation participants (federates)
- Allocate required functionality to federates
- Develop a detailed plan for federation development and implementation
Design Federation
Develop Federation

- Develop the Federation Object Model (FOM)
- Modify federates if necessary
- Prepare the federation for integration and test
Develop Federation

- Develop FOM 4.1
- Establish Federation Agreements 4.2
- Implement Federate Modifications 4.3

Supporting Resources
- Object Model Library
- Other Resources

Allocated Federates
- Object Model Data Dictionary
- Federation Development Plan

Data Dictionary Elements
- FOM
- FED File

Federation Conceptual Model
- Federation Scenario
- Scenario Instance

Allocated Federates
- Modified Federates

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Integrate and Test Federation

- Plan the federation execution
- Establish all required interconnectivity between federates
- Test federation prior to execution
Execute Federation and Prepare Results

- Execute the federation
- Process the output data from federation execution
- Report results
- Archive reusable federation products
Execute Federation and Prepare Results
References / Suggested Reading

- Referenced DMSO Websites:
- HLA Federation Development and Execution Process Model (Version 1.4)
- HLA Federation Development and Execution Process Model Checklists (Version 1.4)
- Automation of the HLA Federation Development and Execution Process
- Test and Evaluation Federation Experience and Lessons Learned Using the Federation Development and Execution Process