Rapide Models of the HLA Interface Specification

David Luckham, Francois Guimbretierre, Yung-Hsiang Lu,
Hai-Geng Wang

Rapide-1.0 Status:

- RAPIDE is emerging technology.
  (founded on current event-based simulation technology).
- Toolset is Alpha Status.
  - Can compile and simulate sizeable models like Sparc V9 and X/Open DTP.
  - Tools are fragile and documentation is incomplete.
  - Some very preliminary steps towards commercialization are being taken.

Applicability of Rapide-1.0 to DMSO HLA:

Some questions the AMG might wish to ponder:

- Where can RAPIDE be usefully applied *now* to the DMSO ADS HLA effort?
- What are the short term future RAPIDE applications over the lifetime of the management plan?
- Future applications in support of the HLA in the longer term?

What the Background Handout Contains:

- how models differ from prototypes,
- applying models in the HLA development process,
- exploring the HLA interface specification by simulations,
- animation of simulations (and RTIs) for human understanding,
- constructing and validating HLA test suites,
- experience building HLA models in Rapide,
- reference architectures,
- possible next steps.

Topics in These Demos:

- how to explore the HLA Interface definition by modelling and simulation,
- animation of simulations for human understanding,
- using causal event histories to analyze simulation results:
  - discovering anomalous situations (thereby anticipating some Proto-Federation questions, and suggesting possible solutions),
  - using formal constraints to define preconditions and postconditions, and to detect violations.

The Models:

We have defined HLA models at three levels of abstraction:

1. Level1: Simulates only the HLA Interface calls in any scenario.
2. Level2: HLA interface and a very simple RTI with a database.
   Simulates events at the interface and inside the RTI.
3. Level3: HLA interface with a 2-Level RTI model based on the SAIC architecture. Can be easily converted to an ALSP model.
   Simulates events at the interface and at 2 levels inside an RTI.

Only Levels 1 & 2 are demo-ed today.

Demos: Exploring the HLA Interface Definition:

Three scenarios:

1. *Scenario 1:* A scenario from Federation Join to Federation Resign between two simulations.

    - Shows animation coupled to causal event simulation.
    - Different results under different schedulings allowed by the HLA definition.

2. *Scenario 2: "RTI implementor beware."* Probes a specific RTI architecture. A test scenario between 3 simulations that satisfies HLA interface preconditions but violates a possible RTI golden rule (invariant).

3. *Scenario 3: "HLA IFSpec, beware".* Shows issues about attribute ownership divestiture between 3 simulations.

Possible Next Steps:

- A scenario simulation facility for the IFSpec Committee,
- Validating HLA test suite scenarios,
- ALSP models for "*benchmarking*" RAPIDE models for Latency and Timing.
- STOW′97 RTI architecture models.
- Reference Specifications for the HLA Interface.
- Animation of Proto-Federation configurations?
- Designs for RTI implementations?