USING MESSAGE ORIENTED MIDDLEWARE TO INTEGRATE LEGACY APPLICATIONS AND COMMERCIAL OFF-THE-SHELF PRODUCTS: THE RADIUM CASE STUDY

Jared Stallings
jdstallings@raytheon.com
16800 E. CentreTech Pkwy
Aurora, CO 80011
Agenda

What we’re doing.
- Open Standards Interoperability Framework (OSIF) IRAD
  - Raytheon Ground System Toolset Integration
  - Modeling and Simulation Toolset Integration
  - OSIF IRAD – 2003 Conclusions
  - OSIF IRAD - Plans for 2004
- Current and projected MOM usage

What’s the future?
- Reuse, COTS and standards
- Space Systems’ Ground System Architecture vision
- Standards?
In 2003, IRAD funds were allocated to investigate use of MOM technologies for ground system software.

- Surveyed existing technologies, standards, COTS solutions.
- JMS (Java Message Service) – common among COTS and open MOM products.
- Constructed a prototype JMS provider (called Radium) with Java and native C++ messaging interface.
- Tested the prototype in 2 scenarios
  - Raytheon Ground System tool scenario
  - Modeling and Simulation scenario
Raytheon Ground System Toolset Integration

- NOVA: Ephemeris, Attitude and Target Server
  - Radium JMS Messaging IF
- Equinox: Planning and Scheduling Tool
  - Radium JMS Messaging IF
- Java Map: Displays Constellation Viewer
  - Radium JMS Messaging IF
- VISTA: Satellite Visualization Tool
  - Radium JMS Messaging IF

Radium Communications Router

- Statistical Plotter: Plots vehicle attitude
  - Radium JMS Messaging IF
Modeling and Simulation Toolset Integration

- Custom Scheduler
  - Radiuss to Scheduler IF
  - Radiuss
  - Radium JMS Messaging IF

- STK
  - STK Connect API
  - Radiuss
  - Radium JMS Messaging IF

- Radiuss Co-Simulation Controller
  - Radium JMS Messaging IF

- Radium Communications Router

- Microsoft Access

- Java Logging Client
  - JDBC-ODBC Bridge
  - Radiuss
  - Radium JMS Messaging IF

- Opnet Modeler
  - Opnet ESA Interface API
  - Radiuss
  - Radium JMS Messaging IF

- Matlab
  - Matlab External Interface API
  - Radiuss
  - Radium JMS Messaging IF
OSIF IRAD – 2003 Conclusions

MOM technologies are not only feasible, but a desirable technology for Ground System architectures:

- Increase flexibility of the overall architecture
- Increase reusability of components
- Increase agility of components
- Provides for interoperability between new, COTS, legacy and other applications
- Simplifies interfaces within a system
- Provides Application Programming Interface (API) for application developers
The OSIF IRAD was continued this year to investigate MOM requirements within an enterprise architectures, separate from the JMS messaging interface.

- Load Balancing
- Fail Over/Error Recovery
- Performance
- Security
Current and Projected MOM Usage

- Limited Radium usage in NPOESS ground system software.
- Eclipse (Raytheon Aurora TT&C product) uses Talarian SmartSockets MOM tool. Investigating making a change to a standards based (JMS) messaging middleware. (Radium or COTS)
- Modeling and Simulation using Radium to create distributed simulations that leverage COTS, and custom models.
- Multiple IRAD projects are using MOM software as a framework for horizontal integration activities.
- Multiple proprietary programs are prototyping the partial or complete replacement of existing messaging frameworks (CORBA, sockets, etc.) with MOM technologies.
- Future programs investigating messaging requirements and how MOM technologies could provide their customers better solutions:
  - SBR
  - GPS III
  - ORCA
“The two truly transforming things might be information technology and information operations and networking, connecting things in ways that they function totally differently than they have previously.”

Hon. Donald Rumsfeld
In order to stay competitive, we must provide our customers the most cost-effective solutions available.

- Reuse means less cost, and more robust solutions
- COTS tools provide functionality quickly and easily
- Standards means anyone can come play in the sandbox

MOM technologies enable integration of reused components, allows for the creation of reusable components, simplifies COTS integration and guides new development:

- More opportunities for reuse, reuse is less painful
- Many COTS tools already working with MOM technologies.
- With components built to messaging standards, can more easily swap components in and out.

Industry is already investigating and utilizing MOM or similar technologies in order to provide their customers better, cost-effective solutions to stay competitive.
Use Message Oriented Middle to Integrate Legacy Applications, COTS, and new development

- Reduce the amount of unique software to software interfaces required by establishing well defined interfaces to each major component
- Provide for seamless interoperability between components
  - Well defined interfaces provides for a “plug-n-play” environment for swapping in and out components providing similar capabilities

- Products adhere to standards
Questions?

Jared Stallings
jdstallings@raytheon.com
16800 E. CentreTech Pkwy
Aurora, CO 80011