

High Level Architecture Review

IEEE Standard for Modeling and Simulation

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OVERVIEW

- Background
- High Level Architecture (HLA)
- Definitions
- Architecture
- HLA-Based system standard
- Related issues
- References

BACKGROUND

- Approaches to distribute and interoperate simulations:
 - Distributed Interactive Simulation (DIS)
 - Application protocols
 - Communication Services and Profiles
 - Recommended Practice for DIS
 - IEEE standards
 - From IEEE Std 1278-1993_[1] → IEEE Std 1278.1a-1998

BACKGROUND

- Approaches to distribute and interoperate simulations:
 - Aggregate Level Simulation Protocol (ALSP)
 - ALSP Infrastructure Software (AIS)
 - Message protocols for data exchange (Interface)

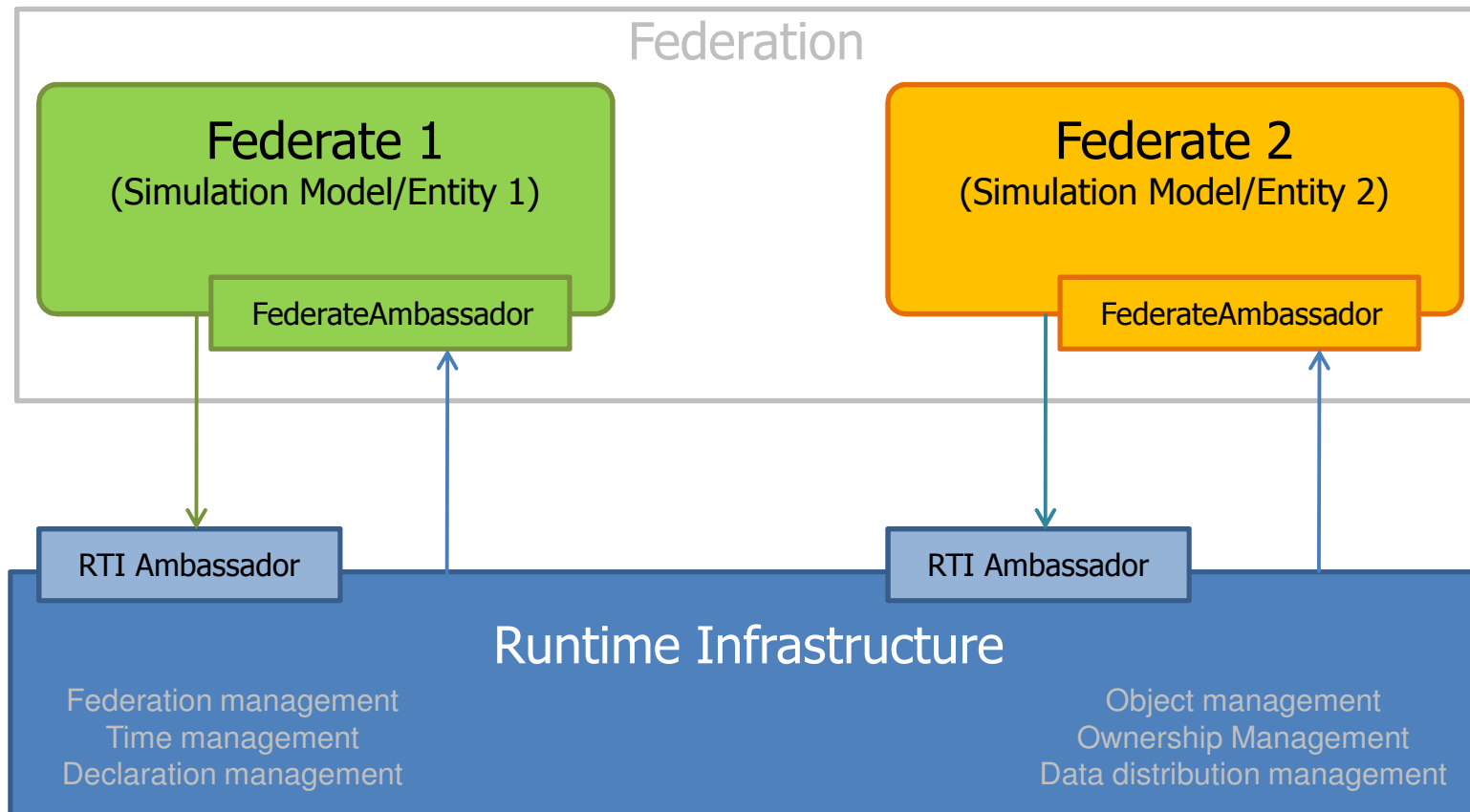
HIGH LEVEL ARCHITECTURE (HLA)

- Standard Specification (1516 - 2000)
 - HLA 1.3 and [IEEE1516](#) (recommended reading ^[8])
 - Defines the format & the syntax
- Designed:
 - to provide a [common architecture](#) for M&S.
 - to provide [reuse and interoperability](#) of simulation components.

DEFINITIONS

- Federates, Federation := simulation componets , collection
- Object Model Template (OMT) : FOM Metamodel
- Federation Object Model (FOM): Common object model for data exchange.
- Runtime Infrastructure (RTI): Services – Synchronization & data exchange.

ARCHITECTURE



HLA-BASED SYSTEM STANDARD

1. HLA Rules [2]
 - Responsibilities
2. Object Model Template – OMT [4]
 - Common object model between federates in a federation
3. Interface specification [3]
 - RTI services
 - Federate function to the federation
4. Federation Development and Execution Process– FDEP [5]
 - How federations must be developed ?

RELATED ISSUES

- Supporting fault tolerance [6]
- Web or Grid enabled architecture

REFERENCES

- [1] ***IEEE standard for information technology - protocols for distributed interactive simulations applications. Entity information and interaction. IEEE Std 1278-1993 , 1993.***
- [2] ***IEEE standard for modeling and simulation (M&S) High Level Architecture (HLA) - framework and rules. IEEE Std 1516-2000, 2000.***
- [3] ***IEEE Standard for Modeling and Simulation (M&S) High Level Architecture (HLA) - Federate Interface Specification. IEEE Std 1516.1-2000, 2000.***
- [4] ***IEEE standard for modeling and simulation (M&S) High Level Architecture (HLA) - Object Model Template (OMT) specification. IEEE Std 1516.2-2000, 2001.***

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- [5] ***IEEE Recommended Practice for High Level Architecture (HLA) Federation Development and Execution Process (FEDEP)***. IEEE Std 1516.3-2003, 2003.
- [6] Dan Chen, Stephen John Turner, Wentong Cai, Muzhou Xiong. ***A decoupled federate architecture for high level architecture-based distributed simulation***. Journal of Parallel and Distributed Computing, vol. 68, no. 11, November 2008, pp. 1487-1503.
- [7] Wentong Cai, Zijiang Yuan, Malcolm Yoke Hean Low, Stephen J Turner. ***Federate migration in HLA-based simulation***. Future Generation Computer Systems, vol. 21, no. 1, January 2005, pp. 87-95.

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- [8] Bjorn Moller, Lennart Olsson. ***Practical experiences from HLA 1.3 to HLA IEEE 1516 Interoperability***. Proceedings of 2004 Fall Simulation Interoperability Workshop, June 2004.