Toward Predictive Models of Federation Performance: Essential Instrumentation

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Keywords:
Federation Performance, Federation Planning, Federation Testing, RTI Performance, RTI Wrapper, FEPW, FMT, FVT, DCT

ABSTRACT: *With support from DMSO, MIT Lincoln Laboratory is developing tools and techniques for measuring and characterizing the performance of HLA federations operating with various RTIs. These tools and techniques are intended for use by federation developers to study, understand, and enhance the performance of their federations. They are intended for application across many types of federations, from time-managed, analysis-oriented federations interested in maximizing the number of executions possible within a fixed time interval to hardware-in-the-loop federations interested in minimizing end-to-end latency.*

An essential initial step in this effort is the development of instrumentation to capture interactions between the federates and the RTI, as well as data flows among the federates. This paper will describe a generic RTI "wrapper" that can capture call patterns (federate-to-RTI and RTI-to-federate) to generate statistical descriptions of service invocations, including histograms of time patterns in these invocations, etc. This instrumentation software will begin to address performance measures and concepts discussed in previous SIW papers by various members of the M&S community with distinctly different concepts of which aspects of overall federation performance are most critical.

In subsequent phases of this effort, data from federations who agree to use these tools and to share their collected performance data will be used to develop predictive models of federation performance. As they mature, these models can be used in conjunction with other tools and test federates for federation planning, development, testing, diagnosis, troubleshooting, and optimization.