Steven Giovenco

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Implementing a Distributed Database Using High Level Architecture (HLA)

I began this summer project with a vague idea of studying HLA. So naturally I began the project with a lot of research on HLA. I researched the structure of a running HLA implementation and various things that could be done with HLA. I found that HLA was more a standard for communications than a programming language. The implementation of the system is largely left up to the Run-Time Infrastructure, so long as it adhered to the rules of HLA. I decided to download and use the pRTI v1.3 LE (no-cost, limited version) produced by Pitch Kunskapsutveckling AB (http://www.pitch.se), which implements the HLA 1.3 standard (as opposed to the more recent IEEE HLA 1516 standard), as this was the standard I had researched at the Defense Modeling and Simulation Office's website (http://www.dmso.mil). I chose to use the Java implementation of the pRTI to facilitate learning about HLA. I plan in the future to port my code to C++.

I then perused the Chat sample provided with the pRTI and explored different aspects of HLA and the pitch pRTI using that sample. About this time I decided to use HLA to test its viability in gaming. So I began working on a distributed database to use in the gaming environment. While I was writing small programs using HLA to familiarize myself with the HLA interface, I began writing a database to extend into a distributed database. I based my database on the specifications for the third assignment for the Spring 2002 CDA 4932 Distributed Systems and Applications class at the University of Central Florida. Eventually I plan to expand the database to be able to set

up a mutable schema as opposed to a hard-coded one. But for now the hard-coded one will suffice for research.

I should note that during the phase of my research where I was writing small programs to familiarize myself with HLA, I became aware of updates to the pRTI interfaces, so I downloaded them in order to better use the software. Upon installation I found that my pRTI no longer worked properly and did not interface properly with the SDK for Java. After a few days of troubleshooting, I realized that my SDK version and RTI version were different and incompatible. Upon updating the pRTI.jar file used by my code, the program integrated seamlessly into the updated pRTI.

I was somewhat dismayed by the lack of object-orientation involved with the pRTI and as such decided to write a wrapper class in Java. The fact that Federation Execution Data (*.FED) files need be written pre-execution quickly evaporated my hopes of a quick wrapper class. I think that future versions of HLA would do well to include some sort of dynamic FED file generation. Perhaps my continuing research will address this. Using the sample Chat.fed file, however, I could study how objects and interactions were specified in the FED file and then referenced in federates being executed. As of yet, I do not have FED file creation program such as I have to edit FED files manually. Because of this, I have not done much work that has involved new Interaction or Object classes. I plan, however, to make extensive use of interaction classes and objects in the distributed database.

I am now working on extending my database class to use HLA without a wrapper class encapsulating the HLA functions. Once this is finished, I expect that a class encapsulating the HLA functionality would be much easier to write, and so I probably

will try again then. Another subject I would like to address in my further research is routing spaces made available by the RTI. I am not yet certain of how these routing spaces differ from simply choosing which Interaction Classes a federate decides to subscribe or publish to.

I will continue working on the distributed database and its implementation in gaming. I wish to further study the network utilization and speed of HLA, but will eventually need a non-limited version of an RTI. Upon completion of the database project, I plan to create two sets of games. One set would involve a group of two-player games, similar to an online checkers game environment. The other would involve a single large multi-player game with all players interacting simultaneously. I plan to use these gaming environments to test the viability of HLA as a gaming medium. I feel it could decrease development time and increase efficiency of communication in network games, and possibly Internet games as well.