Northeastern University – Silicon Valley

CS6650 Scalable Distributed Systems

Project Proposal Assigned: 2/29/20 Due: 3/20/20 [50 points]

Please submit your work online as a single PDF and a Python notebook or code file.

It is time to prepare a project proposal, to think about and define your final projects.
We will have groups of 4 students each. TA team finalized this already.
For this project, you will design, implement, and thoroughly test a distributed system, implementing some application, such as a multi-player game, a collaboration tool, or a transaction system.

Requirements

Since this is a course in distributed systems, we want it to have "interesting" features from a systems perspective. Here are some important properties your system should have:

1. The system must support multiple, autonomous agents (either human or automated) contending for shared resources and performing real-time updates to some form of shared state.
2. **KEY Req:** Implementation must include at least 4 significant algorithms of Dist Systems: Time and Clocks; Distributed Mutual Exclusion; Distributed Graphs Algorithms; Fault-tolerance; PAXOS; Distributed Transactions; Distributed Consensus; Group Communication; Replicated data management; Self-stabilization; Peer-to-peer networks.
3. The state of the system should be distributed across multiple client or server nodes.
4. The only centralized service should be one that supports users logging on, adding or removing clients or servers, and other housekeeping tasks.
5. The system should be robust. It should be able to continue operation even if one of the participant nodes crashes.
6. It should be possible to recover the state of a node following a crash, to resume operation.

You can choose your own application, in the overall and the detailed design of your implementation.
With this understanding, try to come up with a basic, useful implementation use case.
Here is an example of ideas for implementation: Build a multi-agent chat and notes exchange system.
Additional examples – http://www.cs.cornell.edu/courses/cs5412/2012sp/projects.htm

Please prepare a 3-5 page proposal with the following sections:

1. summary description of the project usecase
2. architecture overview diagram (AOD) and design description
3. implementation approach (high-level design)
    a. what libraries will use and how will you implement the project
4. key algorithms involved (must include at least 4 significant algorithms we covered.)

5. expected results

Submit your proposal as a 3-5 pages PDF by 3/20/20.