rescheduled on different machines. Although the latency of such rescheduling may be greater than the rescheduling of an aborted transaction that stays on the same machine, the correctness of the system will be the same. At most, the user of the system (the game player or virtual world inhabitant) will notice a momentary lag in response time. Such a lag may be irritating, but it is far less extreme than the current impact of a server crash in game or virtual world environments, where the crash at least results in logging out the player, with the possibility of losing a considerable amount of game play state.

Thoughts on the Architecture

Perhaps the first question anyone asks of an architecture and its implementation is how well it performs. Although optimizing an architecture prematurely is the source of a multitude of sins, it is also possible to design an architecture that cannot be implemented in a way that performs well. Due to one of the basic choices in the Darkstar architecture, this worry is quite real. And because of the nature of the game industry, determining the performance of a server infrastructure is difficult to do.

The difficulty in determining the performance of a game or world server infrastructure is an outgrowth of the simple fact that there are no benchmarks or commonly accepted examples for a large-scale MMO or virtual world. The lack of benchmarks is not surprising, given that the server components of most games or virtual worlds are built from the ground up for a particular instance of the game or virtual world. There are only a few general infrastructures that are offered as reusable building blocks, and these are generally extracted from a particular game or world after the fact and offered to others who are building similar games. Whether it is the relative youth of the game industry or an accident of the historical emergence of the technology from the entertainment industry, no commonly accepted benchmarks are available to test a new infrastructure or to allow the comparison of different infrastructures.

There is also little or no information available concerning the expected computation, data manipulation, and communication loads for a game or virtual world server that would allow for the construction of benchmarks or performance tests. This is partly an outgrowth of the custom nature of the servers that have been produced. Each of these is built for a particular game or virtual world and thus is specialized for the particular workload characteristics of that game or world. Even more, it is an outgrowth of the intensely secretive nature of the game industry, in which any information about a game in development is jealously guarded, and information about the way in which a released game was implemented is both tightly guarded and, to many in the industry, considered uninteresting. Much more thought and discussion is given to the artwork, the storyline, or the player interaction patterns that make a new game interesting or fun than is given to the way in which the server for the game was designed or to the mechanisms used to scale the game to its current population of players (a statistic that is also closely guarded). So just getting information about the kinds of loads that current games or virtual worlds place on a server is difficult.