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Progress has been made on the partitionable group membership problem in time-free asynchronous distributed systems. It was shown that a property similar to quorum concensus in required for the solution.

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Two students have been funded:

Jeremy Sussman worked on the partitionable group membership problem in time-free asynchronous distributed systems. We have been bothered by the specifications we have seen for such services because they have not been motivated by any reasonable applications. Without such motivation, it is impossible to say whether one specification is preferable to another. So, we took an application specification (having to do with resource allocation) that was originally proposed by Ken Birman as an example of a reasonable parititionable application. We found that the application could not be implemented in a time-free partitionable system without either blocking in the minority partitions or by a static assignment of resources. Hence, we chose a weaker problem, a variant of consensus, that is included in all of the competing specifications. We've come up with results that show that even with this simpler problem, a property similar to quorum consensus is required, which on the face of it is a negative result for the time-free asynchronous approach. We think, however, that the result may not be all that negative (which we are addressing in the continuing research). We're currently writing this result up.

David Morgenthaler worked out the details of how to implement the demand-driven data flow analysis algorithm of Duesterwald on top of his virtual control flow mechanism. The virtual control flow mechanism allows traversing an abstract syntax tree (AST) of a program as though it were a control flow graph, thus saving considerable space and perhaps time. This approach is well-suited to demand-driven data flow analysis because control flow information is computed on-demand as driven by the data flow analysis requirements. The result is that it should now be possible to perform large-scale meaning-preserving restructurings in acceptable time and space. This is significant, because it allows an engineer to remodularize a system without changing its behavior (except for timing). Thus, it is possible to reengineer an aging system without compromising it's reliability.