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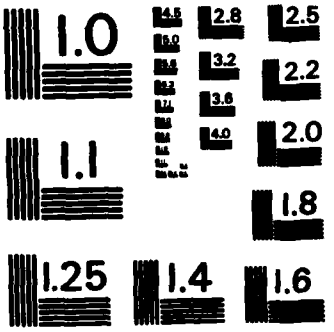

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The progress achieved during the first year of the integrated Saguaro distributed operating system project is presented. The major accomplishments were the completion of the initial design and preliminary implementation of several system components, the subsequent refinement of the user interface and the file system, and the investigation into the use of a universal type system to type data and specify interfaces in the operating system.

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Annual Technical Report

Saguaro: A Distributed Operating System Based on Pools of Servers

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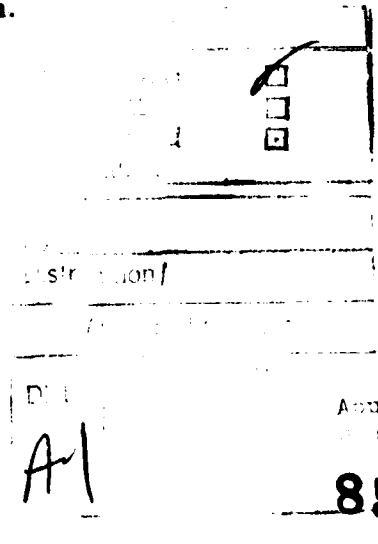
Principal Investigators:	Gregory R. Andrews Richard D. Schlichting Department of Computer Science
AFOSR Program Manager:	Dr. Robert N. Buchal Directorate on Mathematical and Information Sciences

Gregory R. Andrews
March 26, 1985

Richard D. Schlichting
March 26, 1985

Summary

The progress achieved during the first year of the Saguaro distributed operating system project is presented. The major accomplishments were the completion of the initial design and preliminary implementation of several system components, the subsequent refinement of the user interface and the file system, and the investigation into the use of a universal type system to type data and specify interfaces in the operating system.



Status of the Research

This project is concerned with the design and prototype implementation of an integrated distributed operating system called Saguaro. The system will be integrated in the senses that it will appear to its users to be a single interactive system, and will contain many processes that cooperate closely in providing system services. Saguaro will be distributed in that it will execute on several processors connected by a local area communications network. In the course of this project, we also hope to develop mechanisms to take advantage of the underlying architecture, and new techniques for achieving concurrency and robustness. The particular architecture of interest is a collection of Sun workstations that are being financed by a grant from the DoD University Research Instrumentation Program (URIP) that was awarded during 1984 [1].

Over the past year, significant progress have been made toward achieving our goals. The first phase of the project consisted of laying out an initial design of the entire system and performing some preliminary implementations to assess the feasibility of our general approach. Components that were implemented included the command interpreter, the portion of the system that performs the server allocation functions, and parts of the file system. Work on developing concurrent algorithms for a sophisticated window manager was also started in this phase; a report describing one particular algorithm used in the manager is nearing completion [2].

The knowledge gleaned from these experiences led to significant enhancements in the system design. The user interface in particular was refined; the result is an interface that allows commands to be connected to form general graphs of communicating processes, and a template-driven input model integrated with a windowing system. On the file system side, several mechanisms were developed to enable users to exploit the increased data availability made possible by multiple disks. The most novel are clone families and metafiles. The former is a collection of files that the file system attempts to keep identical, while the latter is a special file containing file names such that its opening results in the opening of one if its constituent files. The current state of the system design is described in [3].

Effort was also expended this past year in refining our implementation language Synchronizing Resources (SR). It became clear early in these investigations that many additional features would be necessary to support the creation of a large software system such as a distributed operating system. For example, mechanisms for dynamic process creation and exception handling were lacking. This recognition prompted a reexamination of the entire SR language that has only recently been completed. Two technical reports [4,5] as well as a number of internal working papers chronicle the evolution of SR into a language able to support large-scale distributed implementations. Work has begun on a compiler for this new version of SR; this compiler is being designed to execute under Unix and produce code for a number of different architectures, including our network of Sun workstations.

The other area receiving attention in the past year was the issue of integrating a universal type system into Saguaro to type data and specify interfaces. While much work remains to be done in this area, the use of such a type system appears to have a number of benefits, including simplifying the user interface and facilitating interprocess communication. A report describing the use of such a system in one specific context has been issued [6], and a more general description is in the planning stage.

Finally, a talk on Saguaro was presented at the Oregon Graduate Center in August [7].

References

[1] Equipment grant for Saguaro, DoD-University Research Instrumentation Program, $138,734, 1985. G. Andrews, principal investigator.

[2] Andrews, G., et al. The Saguaro Distributed Operating System. Submitted to the 10th ACM Symposium on Operating Systems Principles, 1985.

[3] Schlichting, R. An Algorithm for Partitioning Rectangles. University of Arizona Technical Report. In preparation.

[4] Olsson, R. and G. Andrews. SuccessoR: Refinements to SR. University of Arizona Technical Report TR 84-3, March 1984.

[5] Olsson, R. and G. Andrews. An Implementation of SuccessoR. University of Arizona Technical Report TR 84-4, March 1984.

[6] Hayes, R. and R. Schlichting. The Application of a Universal Type System to the Problem of Mixed Language Programming. University of Arizona Technical Report TR 84-15, October 1984.

[7] Schlichting, R. "Saguaro—A Distributed Operating System Based on Pools of Servers." Talk presented at the Oregon Graduate Center, Beaverton, Oregon, August 1984.

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