

Title: Lessons from Project Athena

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#### ABSTRACT

Project Athena's primary goal is to improve undergraduate education at M.I.T. with the application of networked engineering workstations. To this end, it has deployed 850 such workstations and about 100 servers of various types in a networked client/server architecture. Several technical developments were required in order to deploy this system:

- A window system that hides otherwise incoherent programming interfaces of bit-mapped displays (the X Window System),
- a network authentication system that allows services to identify clients (Kerberos),
- a network naming system that allows clients to locate services (Hesiod),
- a storage model that integrates local disk, remote disk, and remote file system together with an unusual configuration of Berkeley UNIX that minimizes hand-tailoring of individual workstations (unnamed),
- a system that locates users and distributes ephemeral notices (Zephyr),

and

- a service management system that minimizes the effort of administration and coordination of the many servers and services (Moir).

As might be expected, quite a number of interesting problems were encountered in creating this system: debates between proponents of personal computers and proponents of engineering workstations, management of deployment and operation at a large scale, preparing our institution to cope with a new technology, unrealistic expectations, and working around the traditions and perspectives of the supplying industries.

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\* From 1984 to 1988, Prof. Saltzer was Technical Director of Project Athena.

