

<https://www.multicians.org/thvv/7094.html>

## Terminal Access

By 1963, CTSS provided remote terminal service to dial-up terminals connected by modem to a specialized telecommunications computer, the IBM 7750. Model 35 Teletypes were used at first, followed by IBM 1050 terminals and IBM 2741s. The 7750 and the IBM Selectric terminals were designed for other uses, such as stock trading and airline reservations, and CTSS adapted to the design of these devices. CTSS did specify that certain RPQs had to be added to the 2741, so that its keyboard would not lock up after every line, and also required that remote terminals on CTSS have a "terminal ID" that would be sent at dialup time. CTSS users would look at the output of Noel Morris's `who` command to see where their friends and colleagues were connecting to the system from. Terminal access for Teletype terminals was at 110 baud. The 1050 and 2741 terminals could support 134.5 baud. All of these devices were supported over dial-up modems, accessed via a private phone exchange at MIT.

<https://www.multicians.org/history.html#tag1.3>

## 2.1. Beginnings

### 2.1.1. CTSS

The Compatible Timesharing System (CTSS) was one of the first timesharing systems. It was developed at the MIT Computation Center by a team led by Fernando J. Corbató. CTSS was first demonstrated in November 1961 on the IBM 709, swapping to tape. In its mature form, CTSS ran on a modified IBM 7094 with a second 32K-word bank of memory, using two IBM 2301 drums for swapping, and provided remote access to up to 30 users via an IBM 7750 communications controller connected to dialup modems. Story: 🌐 "The IBM 7094 and CTSS".

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### 2.1.4. MIT, Bell Labs, GE

Bell Laboratories (BTL) joined the Multics software development effort in November of 1964 and decided to obtain a GE-645. GE also agreed to contribute software development manpower as well as hardware system engineering. The three organizations worked out a structure for cooperation. The **Trinity** made major policy decisions. There was one person from each organization:



*C. W. Dix*



*E. E. David*



*R. M. Fano*

- [Robert M. Fano](#) (MIT)
- [Edward E. David](#) (BTL)
- [John Weil](#), then [Eugene White](#), then [C. Walker Dix](#) (GE).

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- GE had serious problems with the GE 600 line in 1966 and 1967. John Weil was replaced by Eugene White; responsibility for 645 development was moved from Phoenix to Syracuse under Walker Dix. See J.A.N Lee's [The Rise and Fall of the General Electric Corporation Computer Department](#). The GE-645 was delivered to Project MAC in January 1967, later than planned. The Bell Labs GE-645 was installed in Murray Hill later in 1967.
- Once the 645 was in place, a revised 645 simulator, still running under GECOS, was used to execute the first major development milestone, "Phase .5," which ran an initial version of the Multics file system. The "[Phase One](#)" milestone demonstrated native boot of Multics on the GE-645 and single-process execution in December 1967, and multi-process execution was demonstrated a few months later. These milestones represented the integration of many software components: memory management including paging, segmentation, and rings; file system including disk management; process creation, scheduling, and interrupt handling; terminal I/O; and user address space organization, command shell, and dynamic linking. Slow performance

and system crashes required us to spend unplanned effort improving the system design during 1968 and 1969.

<https://www.multicians.org/unix.html>

The history of Unix is covered in several books. I have read *A Quarter Century of Unix* by Peter Salus; he is reasonably accurate about the history that I know personally (I sent him a few corrections). I am going to stick to my first-hand knowledge in this note.

When Bell Telephone Laboratories (BTL) joined with MIT MIT Project MAC and General Electric's computer department in 1964 to create the Multics project, BTL contributed some of the finest programmers in the world to the team. I first met Ken Thompson because he had written a slick editor for CTSS called QED. It was descended from QED on the SDS-940, but was quite different because Ken had added regular expressions to it, and made many other changes. (Ken had published a paper on compiling regular expressions into machine code just before joining the Multics project.) Ken worked on the Multics I/O switch design. Dennis Ritchie and Rudd Canaday were BCPL jocks. Joe Ossanna worked on the I/O system design and wrote one of the original six Multics papers; Bob Morris, Doug McIlroy, Dolores Leagus, Dave Farber, and Jim Gimpel worked on EPL, Stu Feldman worked on the I/O switch, Peter Neumann managed the team and worked on file system design, Brian Kernighan worked on the support tools.

Summary of a session of an unidentified conference in 1968 or 1969, apparently a panel discussion in which Joe Ossanna described the status of Multics. (Thanks to Jerry Saltzer.)