

January 5, 1971

Research aspects of Multics

Problem: no usable model of presented load for a general-purpose computer utility

Consequence: simulations don't work; must build and test ideas on live users

Technique:

- propose a system with certain properties
- construct a prototype, noting engineering compromises which provide insight
- try it out on live user community; note usability under realistic conditions
- iterate, trying to discover simplifications and underlying structure

Limitations:

- Cannot propose a change so radical that users cannot understand it. (M.I.T. users can swallow fairly radical changes.)
- must keep an economically viable solution in order to attract users
- must control rate of change and avoid experiments destructive of user confidence
- user community may not be representative of broad enough class of users. (M.I.T. is quite broad)

Virtues: Assured contact with reality

Future research directions

Overall research problem being tackled: we hope to turn the fabrication of large scale information-processing systems into routine engineering development projects. This objective requires learning more about the conceptual understructure of such systems, in contrast with a more limited objective of inventing ingenious techniques of fabrication.

Specific topics:

Really large files

now 10^{10} bits. (IBM 3330).
need to understand 10^{12} (100 times as much)
protection (access control/privacy)
reliability
performance

System Interconnection (Networks)

- privacy
- protocol
- sharing at a distance (interlock/ownership)
- bandwidth prediction

Modeling of the virtual memory interface

- presented load models; models of sharing
- predictive page movement schemes
- constructive prediction of memory performance from device characteristics and presented load model

Other areas

- simplification of mechanisms everywhere
- fault/interrupt handling; protection schemes
- mutually suspicious programs
- system implementation language studies
- scale up to 1000 users - what happens?
- information retrieval in the virtual memory environment