

## What's wrong with the Good Things in Unix?

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### Abstract:

Three characteristics of the Unix operating system contributed to its technical success: the simplicity, power and coherence of its model of computation: exploitation of the metaphor of the software tool: and portability in a variety of senses. Each of these virtues has inherent drawbacks, which I shall explore. For example, portability to different hardware architectures and to different organisations has led to varying versions of the system, which in turn frustrates portability.

## DISCUSSION

Dr. Ritchie was asked what he would do differently if the design of Unix was started now.

He replied it was hard to say as most of the system is the way that was wanted, but that there were a lot of silly mistakes in the original design which grew. However, right now he would take into account advances such as multiprocessing and distribution, and would also look at the modularity of the kernel. In terms of external behaviour he thought not many changes were necessary.

Professor Whitfield said he thought two things were missing from Unix. The first concerned the concept of access to files via memory mapped i/o, which had been part of MULTICS and would increase efficiency. Was it missing because the original development machines were PDP-11s?

Dr. Ritchie replied that part of the reason was due to the lack of memory management on the early development machines, but also that constraining the system to provide mapped i/o was more restrictive than the i/o scheme originally provided - this would have an effect on the machines capable of running the system. His experience of mapped i/o led him to be unimpressed by it, it wasn't worth the trouble and pain involved, and couldn't deal with large files. Also device independence was difficult to achieve.

Professor Whitfield agreed with some of his comments, and added that he thought a separate concept was needed for interactive i/o. The second thing missing was a scheme for naming other objects in the system, for example pipes and people, particularly when the system is distributed.

Dr. Ritchie asked what operations would you provide on these named people, to which some jokers in the audience replied execute and create! He did admit that the naming scheme for user ids was a problem when distribution was involved, and as a result some systems have added a "logname" which is a trusted string associated with a process, and used for network access. However, he was not sure how to fix this problem. As for pipes, he mentioned that in System V named pipes had been added but were a mess, and Version 8 had the "pt" files.

Dr. Marshall pointed out that he had heard that the MAC system supported mapped files.

Dr. Ritchie described the problems encountered by the 32V release of Unix when mapped files were added.

Professor Coulouris said the unification of devices and files was okay but a different problem arose when 2D interaction occurred, and asked how Unix could deal with this.

Dr. Ritchie replied that their approach to 2D interaction was to use special hardware, and went on to describe the 5620 (Blit) terminals where intelligence was placed in the terminals themselves allowing the host to remain as it was. This was contrasted with the workstation approach embodied, for example, by Sun workstations.