

Survey Paper # 1

Unix

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1. Introduction

Unix today is a mature operating system, and is used heavily in a large variety of scientific, engineering, and mission critical applications. Interest in Unix has grown substantially in recent years because of the proliferation of the Linux (a Unix look-alike) operating system. This section briefly describes the history of Unix and the goals of UNIX.

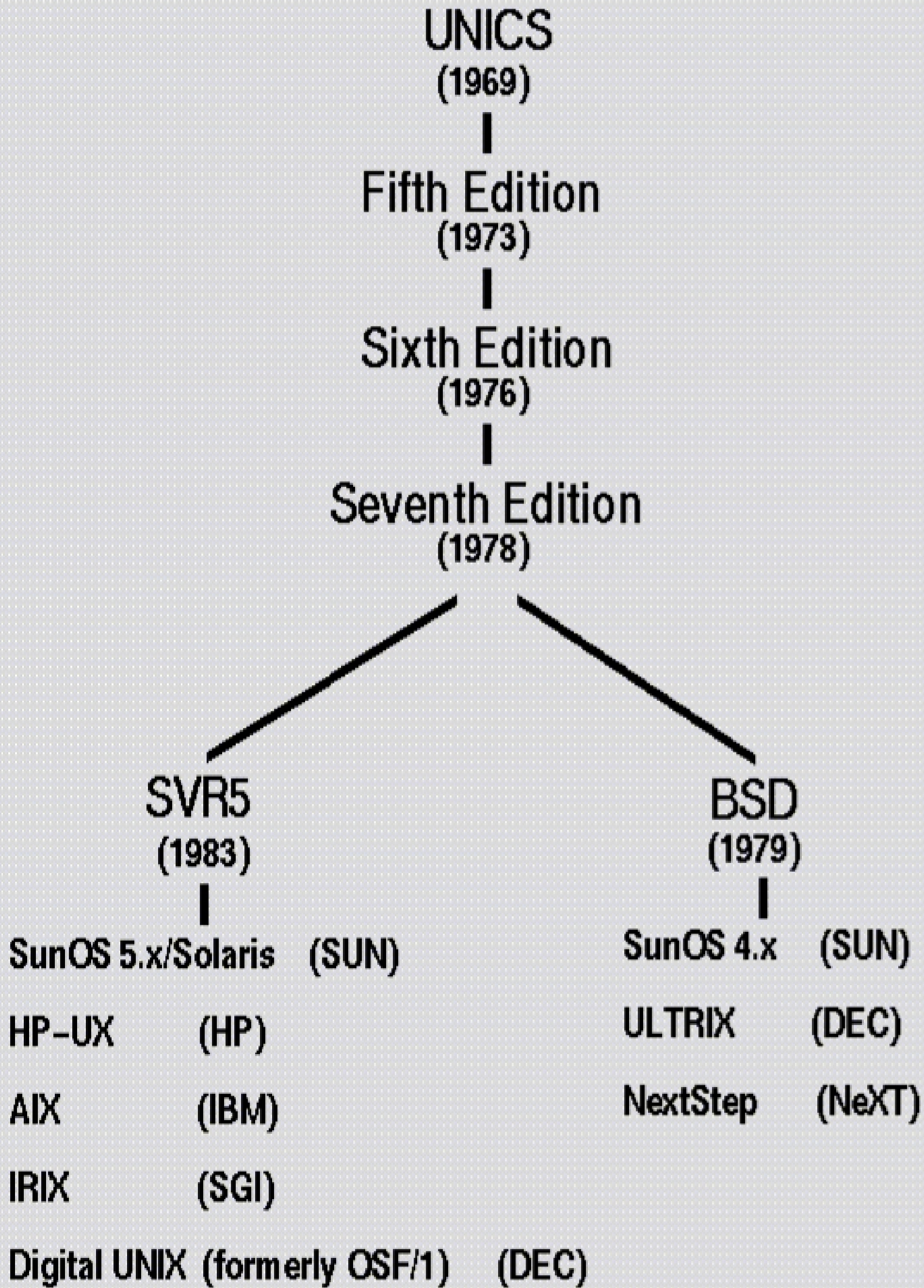
1.1. History of Unix

Unix operating system found its beginnings in MULTICS (Multiplexed Operating and Computing System). The MULTICS project began in the mid 1960s as a joint effort by General Electric, Massachusetts Institute for Technology and Bell Laboratories. In 1969 Bell Laboratories pulled out of the project.

Ken Thompson was one of Bell Laboratories people who get involved in the project. He liked the potential MULTICS had, but felt it was too complex and that the same thing could be done in simpler way. In 1969 he wrote the first version of Unix, called UNICS. UNICS stood for Uniplexed Operating and Computing System. Although the operating system has changed, the name stuck and was finally shortened to Unix. Ken Thompson teamed up with Dennis Ritchie, who wrote the first C compiler. In 1973 they rewrote the Unix kernel in C. The following year a version of Unix known, as the Fifth Edition was first licensed to universities. The Seventh Edition, released in 1978, served as a dividing point for two divergent lines of Unix development. These two branches are known as SVR4 (System V) and BSD. Ken Thompson spent a year's sabbatical with the University of California at Berkeley. While there he and two graduate students, Bill Joy and Chuck Haley, wrote the first Berkeley version of Unix, which was distributed to students. This resulted in the source code being worked on and developed by many different people. The Berkeley version of Unix is known as BSD, Berkeley Software Distribution. From BSD came the VI editor, C shell, virtual memory, Send mail, and support for TCP/IP. For several years SVR4 was the more conservative, commercial, and well supported. Today SVR4 and BSD look very much alike. Probably the biggest cosmetic difference between them is the way the *ps* command functions.

The Linux operating system was developed as a Unix look alike and borrows from both BSD and SVR4.

The Unix Family Tree



1.2. Features of UNIX:

UNIX is an operating system made by programmers to programmers.

- Multitasking capability
- Multi-user capability
- Portability
- Easy to understand
- The open systems philosophy
- Written in high-Level language rather than in Assembly language.
- Universally used for high-end number crunching applications
- Wide use in CAD/CAM arena
- Ideally suited for scientific visualization
- Preferred OS platform for running Internet services such as WWW, DNS, DHCP, Netnews, Mail, etc. due to networking being in the kernel for a long time now.
- Easy access to the core of the OS (the kernel) via C, C++, perl, etc.
- Stability of the operating environment
- The availability of a network extensible window system (X11)

2. Process Management in UNIX

2.1 Basic Concepts about Processes

Processes: Processes carry out tasks within the operating system. A program is a set of machine code instructions and data stored in an executable image on disk and is a passive entity; a process can be thought of as a computer program in action.

Process Components:

A process contains all of the state for a program in execution.

- An address space.
- The code for the executing program.
- The data for the executing program.
- An executing stack encapsulating the state of procedure calls.
- The program counter (PC) indicating the next instruction.
- A set of general-purpose registers with current value.
- Operating system resources like open file, n/w connections etc.

Identifiers: Every process in the system has a process identifier. It is simply a number. Each process also has User and group identifiers, these are used to control this processes access to the files and devices in the system.

States:

Running: The process is either running (it is the current process in the system) or it is ready to run (it is waiting to be assigned to one of the system's CPUs).

Waiting: The process is waiting for an event or for a resource. Linux differentiates between two types of waiting process; *interruptible* and *uninterruptible*. Interruptible waiting processes can be interrupted by signals whereas uninterruptible waiting processes are waiting directly on hardware conditions and cannot be interrupted under any circumstances.