
Chapter - 1 History and standard

1.0 History and standard

- *Linux is a member of the UNIX family of operating systems.*
- *One of the notable features of the UNIX system is that its development was not controlled by a single vendor or organization. Rather, many groups, both commercial and noncommercial, contributed to its evolution. This history resulted in many innovative features being added to UNIX, but also had the negative consequence that UNIX implementations diverged over time, so that writing applications that worked on all UNIX implementations became increasingly difficult.*

1.1 A Brief History of UNIX and C:

- *The first UNIX implementation was developed in 1969 by **Ken Thompson** at Bell Laboratories. It was written in assembler for a Digital PDP-7 minicomputer.*
- *Thompson drew several ideas for his new operating system from **MULTICS**, including a tree-structured file system, separate program for interpreting commands (**the shell**)*
- *In 1970, UNIX was rewritten in assembly language for a newly acquired Digital **PDP-11** minicomputer, then a new and powerful machine.*
- *A short time later, **Dennis Ritchie**, one of Thompson's colleagues at Bell Laboratories and an early collaborator on UNIX, designed and implemented the **C programming language**.*
- *UNIX thus became one of the earliest operating systems to be written in a high-level language.*
- *Ref page 3 for more history of UNIX First through Sixth editions*

1.1.1 The birth of BSD and System V

- 1979 saw the release of Seventh Edition UNIX, which improved the reliability.
- Under the name **Berkeley Software Distribution (BSD)**, this version of UNIX, including its source code, came to be widely distributed.
- The BSD initially led by **Bill Joy** (cofound Sun Microsystems)
- The first full distribution was **3BSD** in December 1979 of the system and provided an enhanced file system.
- In the meantime, US antitrust legislation forced the breakup of AT&T (legal maneuvers began in the mid-1970s, and the breakup became effective in 1982), with the consequence that, since it no longer held a monopoly on the telephone system, the company was permitted to market UNIX.
- The first release of **System V** (five) in 1983 by **AT&T**

Thus, in addition to the various BSD distributions spreading through academia, by the late 1980s, UNIX was available in a range of commercial implementations on various hardware.

1.2 A Brief History of Linux

1.2.1 The GNU Project

- In 1984, **Richard Stallman**, an exceptionally talented programmer who had been working at **MIT**, set to work on creating a “free” UNIX implementation.
- In response of creating a free software, Stallman started the GNU project to develop an entire, freely available, UNIX-like system, consisting of a kernel and all associated software packages, and encouraged others to join him.
- in 1985, Stallman founded the **Free Software Foundation (FSF)**, a nonprofit organization to support the GNU project as well as the development of free software in general.

- One of the important results of the GNU project was the development of the GNU *General Public License (GPL)*.
- The GNU project did not initially produce a working UNIX kernel but did produce a wide range of other programs.
- Among the more well-known programs produced by the GNU project are the *Emacs* text editor, *GCC* (originally the GNU C compiler, but now renamed the GNU compiler collection, comprising compilers for C, C++, and other languages), the bash shell, and glibc (the GNU C library).
- The GNU project had started work on an ambitious *kernel design*, known as the GNU/HURD, based on the Mach microkernel. However, the HURD was far from being in a form that could be released.

1.2.2 The Linux Kernel

- The first released if Linux in 1991 by Linux Torvalds, a student from the university of Helsinki, Finland.
- Ref page 7 for more information (pdf page 50)

1.3 Standardization

- By the late 1980s, the wide variety of available UNIX implementations also had its drawbacks. Some UNIX implementations were based on *BSD*, others were based on *System V*.
- This situation created strong pressure for standardization of the C programming language and the UNIX system, so that applications could more easily be ported from one system to another.

1.3.1 The C Programming Language

- Due to various implementations of the C language in 1989 with the approval of the American National Standards Institute (*ANSI*) C standard (X3.159-1989).
- This version of *C* is usually known as *C89* or (less commonly) ISO C90.

- Historically, C89 was often called ANSI C, and this term is sometimes still used with, but ANSI C is now C99.

1.3.2 The First POSIX Standards

- **POSIX** (Portable Operating System Interface) refers to a group of standards developed under the auspices of the (IEEE).
- The final **X** appears because the names of most UNIX variants end in X.
- **FIPS** is an abbreviation for (Federal Information Processing Standard), the name of a set of standards specified by the US government for the purchase of its computer systems.

1.3.3 X/Open Company and The Open Group

- The x/Open Company produced the X/Open Portability Guide, a series of portability guides based on the POSIX standards. The first important release of this guide was Issue 3 (**XPg3**) in 1989.
- XPG4 version 2 was subsequently repackaged as the **Single UNIX Specification (SUS, or sometimes SUSv1)**,

1.3.4 SUSv3 and POSIX.1-2001

- beginning in 1999, the IEEE, The Open Group, and the ISO/IEC Joint Technical Committee collaborated in the Austin Common Standards Revision Group (CSRG) with the aim of revising and consolidating the POSIX standards and the Single UNIX Specification.
- This standard is also known as the Single UNIX Specification Version 3, or **SUSv3** also called **POSIX.1-2001**.
- The SUSv3 base specifications consists of around 3700 pages, divided into the following four parts:
 - **Base Definitions:**
 - This part contains definitions, terms, concepts, and specifications of the contents of header files. A total of 84 header file specifications are provided.
 - **System Interfaces:**
 - This part begins with various useful background information. It consists of the specification of various functions (which are

implemented as either system calls or library functions).
A total of 1123 system interfaces are included in this part.

- **Shell and Utilities:**

- This specifies the operation of the shell and various UNIX commands. A total of 160 utilities are specified in this part.

- **Rationale:**

- This part includes informative text and justifications relating to the earlier parts.

1.3.5 UNIX Standards Timeline

