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The History of Unix and Unix-like Operating Systems

The release of the Multics operating system in 1969 set into a chain of events in which some of the greatest open source projects would be created. The goal of this paper is to explain and educate the reader on the history of Unix and Unix-like operating systems.

In 1964, development of the Multics time-sharing operating system began at Cambridge, Massachusetts. Originally under the project was lead by MIT in partnership with General Electric and Bell Labs, conceived as a commercial product for General Electric (Eventually becoming one for Honeywell), but it wasn't successful due to being only available on proprietary Honeywell mainframes that required the implementation of a real VM with segmented addresses. Bell Labs left the project in 1969 and engineers from that segment of the Multics project history would go onto create the Unix operating system, which will be mentioned later. The project continued development until 1985 at MIT and General Electric, at which point Honeywell ceased system development. The system would eventually be evaluated by the NSA, who would rate it as a B2 level secure operating system, a first to be rated such a level. Continuing, the

distribution of the Multics system was carried out from 1975 to 2000 by Groupe Bell in Europe and Bull HN Information Systems in the United States, but in 2006, Bull SAS Free Softwared Multics versions MR10.2 to MR12.5. A part of the reasoning to make Multics free software was due to it falling out of favor as the last Multics system that was running natively on a Honeywell system was shutdown on October 20th of 2000 at the Canadian Department of National Defense in Halifax, Nova Scotia, Canada.

Out of the Multics project, engineers from Bell labs would eventually come up with the idea for the Unix operating system in 1969 and development would begin that same year. Unix, in contrast to Multics, was a operating system designed for single-tasking systems and was originally written in Assembly but in 1973, Version 4 of Unix was rewritten in C but was left with many PDP-11 dependent codes that where unable to be subjected to porting. The system was more successful than Multics as it was more widely available on minicomputers as opposed to Honeywell's system that was proprietary and somewhat odd-ball. In 1974, the Department of Computer Science at University of New South Wales requested a copy of Unix for their PDP-11/40 minicomputer from Bell Labs which would eventually result in UNSW to become the first university with a Unix system outside of the United States to possess a Unix system. Bell Labs developed several

versions of Unix, which where entitled “Research Unix” and in 1975 the first source license for Unix would be sold to Donald Gillies at the University of Illinois at Urban-Champaign. The deal was finalized and influenced heavily by input from Greg Chesson, who was one of the engineers for the Unix Kernel at Bell Labs. Unix grew drastically in popularity in the academic world from the 1970s to the 1980s and due to this it lead to the creation of large adoptions of the system by commercial startups. This resulted in Unix being cut into several slightly different operating systems that where often not compatible with each other. Following this, AT&T and Sun Microsystems lead development of System V Release 4 (Often abbreviated to SVR4) which would ultimately be adopted into most commercial Unix vendors. Due to Unix and Unix-like operating systems being as useful as they are, they surged in popularity in the 1990s and became he choice of 90% of the top 500 fastest supercomputers as BSD and Linux distributions where developed by large interconnected groups of programmers. The popularity of Unix also lead to the creation of Mac OS X (Eventually renamed to MacOS) which was the first edition of Apple’s proprietary operating system.

Out of the source license purchase in 1974, Professor Bob Farby at University of California Berkeley made a deal with AT&T for the right to the source code of Unix. They eventually would go onto

modify it and create “Berkeley Unix” which was a specialty made system that would also go under the name “Berkeley Software Distribution” or BSD. These modifications and customizations where funded by DARPA who wanted to see the continued improvement of the OS. Following it’s conception in 1976, The BSD Project started to lend out to other users, but because it contained code from AT&T, everyone who wanted to utilize it had to go through them and apply through their system first. The first public release of BSD was in June of 1989 and was entitled “Network Release 1” and was essentially the project that sparked the core idea for Network Release 2. The idea for Network Release 2 was to replace all AT&T code with Berkeley’s own code which would free them from the licensing issues. Work on this began quickly and after 18 months of hard work, all but 6 files containing AT&T code where replaced and Network Release 2 was sent out without those 6 files in 1991. In 1992, several months after the release of Network Release 2, William and Lynne Jolitz wrote replacements for the 6 AT&T files, ported BSD to Intel 80386 processors and called the operating system 386BSD, they also released 386BSD via an anonymous FTP server. The development of 386BSD was slow however and because the OS was getting neglected, a group of 386BSD users decided it may be best to branch off and create a new edition that would become FreeBSD so that they could speed up and

maintain development. In the early days of the production, Walnut Creek CD-ROM came up with the idea of distributing the system on CD-ROM and with this FreeBSD became part of Walnut Creek's operations, running their servers, and Walnut Creek embraced it, sponsoring conferences, books and even endorsed it. FreeBSD became one of their biggest products to date. This success was not without issue though as a lawsuit from AT&T against Berkeley Software Design was in the mix that would eventually be settled for an undisclosed amount outside of court. Following all of this legal turmoil, FreeBSD migrated to 4.4BSD-Lite2 which was within the agreed upon legal parameters and FreeBSD 2.0 was released in November 1994 and was the first FreeBSD version with no AT&T code.

NetBSD, another creation that was sparked from the frustration created by poor development on the side of 386BSD, believed in a more open development model would be greatly beneficial to the creation of a unified, multi-platform, production-quality, BSD based operating system. NetBSD was named after the importance of the growth of the internet at the time of it's creation, which would contribute to it's creation and development due to the adopted open development model. The NetBSD repository was established 21st of March, 1993 and the first release of NetBSD (NetBSD 0.8) was released 19th of April, 1993.

Later in development, NetBSD 1.0 would be the first multi-leveled release that would come out in October 1994, and be updated to 4.4BSD-Lite. The reasoning for this would to avoid the legal conflicts of 4.3BSD Net/2 code. Later, OpenBSD would be born out of NetBSD in 1995 and later in 1998, NetBSD introduced pkgsrc into it's system.

Following the creation of NetBSD, Theo De Raadt decided to create a new project out of the NetBSD Project after getting asked to resign due to his alleged continuous rudeness to the users and developers of the project. This project, OpenBSD, would be forked from NetBSD in December of 1994, and the initial release was in July of 1996, following this timeline, a new release of OpenBSD was to come out every six months and each one would be supported for one year following it's release. On the 25th of July in 2007, the creation of the OpenBSD Foundation was created, a Canadian non-profit that would exist to act as a legal entity for people who required a legal entity before supporting OpenBSD for their own needs. This is one of the "Big Three" BSD types that are some of the most popular with connection to the original Unix Code.

The existence of the Unix operating system also spawned the creation of "Unix-like" operating systems such as Linux, which was created at the University of Helsinki by Linus Torvalds in 1991 and

was born out of frustration with the licensing of MINIX, which limited work with it to educational use, so he began work on his own Kernel which would eventually become the Linux kernel. He created the beginnings of the kernel in MINIX but eventually migrated to Linux systems for Linux development and utilized GNU Applications that would replace all MINIX applications on the system, cutting it off from the MINIX system entirely. Linus also sought to utilize the GNU GPL code license that would, as opposed to his original license, enable him to commercially redistribute the OS and developers eventually would work together to implement new GNU components into the Linux Kernel, making a fully open source operating system.

The birth of the Multics operating system began a domino effect of events that would eventually lead to various BSD distributions and the creation of the Linux kernel, a open source project that exists in roughly 20 million devices and operates 100% of the Top 500 super computers in the world, it is important to remember from whence you came and this paper exists to remind and refresh the memory of those who may have forgotten and to educate those who never new to begin with.

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