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Building a Legacy

UNIX, AIX improve significantly in 25 years

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The past two years have been major events in the world of UNIX. In 2009 UNIX celebrated 40 years, and last month was the 25th birthday for AIX. In this article, I'll take a brief walk through time and look at the progression UNIX and AIX have taken.

Establishing UNIX

In my mind, 1969 is famous for three events: the moon landing, Woodstock and the birth of UNIX. In August of that year, Ken Thompson created the first flavor of UNIX for the PDP-7; it took him a month to build the operating system and environment. In 1971, text formatting and editing were added and UNIX got ported to the PDP-11. Then, in 1972, Dennis Ritchie created the initial C language, which was based on Thompson's B language. Thompson then rewrote UNIX in C and renamed it to UNICS (Uniplexed Information and Computing Service). I remember studying a textbook in the late 1970s that Brian Kernighan and Ritchie authored. Little did I know how cutting edge it was. Douglas McIlroy added the pipe feature in 1973–a feature that has become critical to anyone who does any kind of scripting.

In 1978 Bill Joy from Berkeley created the Berkeley Software Distribution (BSD) version of UNIX and then in 1980 version 7 included licenses that prohibited universities from using the source for study. In 1982, Bill Joy formed SUN Microsystems and created a version of BSD called SunOS, the precursor to Solaris. In 1983, AT&T released the first version of UNIX System V, which was the foundation for AIX and HP-UX. Thompson and Ritchie also won the A.M. Turing Award for their UNIX work. A citation from that award states, "The genius of the UNIX system is its framework, which enables programmers to stand on the work of others."

In 1987 Andrew Tanenbaum wrote MINIX operating system for the 80286 and in 1991 Linus Torvalds created the first version of Linux. In 1993, the release of Windows NT spurred creation of standards groups. The Open Group was formed and owns the Single UNIX Specification.

AIX Launches

On Jan. 21, 1986, IBM Austin launched AIX (Advanced Interactive eXecutive) for the IBM RT PC. AIX v1 and v2 ran on the RT and showed that IBM was finally paying attention to UNIX. In 1990, the major innovations started with the introduction of AIX v3. This included a management tool (SMIT) that let you use menus to configure and control the system, a logical volume manager (LVM), a dynamic kernel, journalized file system (JFS) and a central configuration database called the Object Data Manager (ODM). My first experience with AIX was v3.2.1, and I have worked on every release and version since then; I'm always amazed at how far it has come.

AIX version 4 added significant functionality to AIX including symmetric multiprocessing (SMP) support, NFS v3, DHCP, lightweight directory access protocol (LDAP) and a number of new tools. A critical addition for most administrators was network installation manager (NIM), which allows the administrator to quickly provision new LPARs. Having used it back in my systems programmer days, I'm very happy to say it's significantly better today and is much easier to install and use. AIX v4.3.3 also included the first implementation of Enterprise workload manager (WLM), which offered both passive and active modes. WLM is now a critical component if you're using workload partitions (WPARs), but it's a robust, well-tested function that almost no one knew about 'till late in AIX v5.

Starting around 2000 to 2006, AIX 5L was the release that heralded the age of virtualization as well as the 64-bit kernel. AIX v5.1 brought in LPARs; v5.2 allowed for dynamic LPARs (DLPARs); v5.3 enabled micropartitions, virtual networking and I/O and simultaneous multithreading (SMT). Additionally WLM had significant enhancements and it did a much better job of managing resources. Other features in v5 included Stack Execution Disable, which helped protect against buffer overflow attacks, and the AIXpert, which came out in AIX v5.3 TL05. AIXpert was used to automatically harden security on the system and to monitor it. In TL06, the File Permissions Manager (fpm) tool was released, which allowed users to set system security to various levels.

In 2007, AIX v6 was made available in an open beta prior to being generally available. This version introduced WPARs along with features like role-based access control (RBAC) and encrypted file system (EFS). Additionally, a new feature called Trusted Execution provides for integrity verification, AIXpert was enhanced to include Control Objectives for Information and related Technology (COBIT) and Sarbanes-Oxley Act of 2001 (SOX) security, and a new secure-by-default installation option was available.

Last year, AIX v7 was released. Again, an open beta was offered to allow users to get a taste of the operating system. It provides significant enhancements to AIX v6 including the capability to run an LPAR with up to 256 cores and 1,024 threads if running on a POWER7 processor-based server. AIX v7–when combined with POWER7 technology-based hardware–can use active memory expansion (AME) to compress memory so more LPARs can be run in the same footprint. Significant work was also done to enhance the addition and removal of paths, and AIX v7 also adds the capability to have solid-state drive (SSD)-only volume groups. Additionally, JFS2 Hot File Detection (HFD) adds the capability to detect JFS2 hot file systems, logical volumes and physical disks. Network Time Protocol (NTP) and Berkeley Internet Named Daemon (BIND) have also finally been updated to more current and improved security versions. There was also a NIM enhancement that allows it to mount

International Organization for Standardization (.iso) images into file systems, which is very useful. Lastly, it should be noted that IBM took many of the new options and put them into AIX v6 TL06 as well.

A Long Road

AIX has come a long way from the initial version for the RT. With the introduction of POWER7, virtualization and editions, it's now possible to have very granular systems and LPARs that range from blades, small 2U form factors all the way up to the 256 core POWER 795 servers. Those who are interested in history the AIX Strength to Strength flier provides details of what changed in each version and technology level. It's fascinating to see all of the changes AIX has packed into its 25 years so far. Happy Birthday AIX!