LINUS BENEDICT TORVALDS

BACKGROUND

Linus Benedict Torvalds was born in Helsinki, Finland in 28th of December 1969. He is well-known for being the key developer of the Linux Kernel and principal designer of the distributed version control system Git and the diving logging and planning software, Subsurface. He first found his passion for computers when he was age 10, writing programs in BASIC on his maternal grandfather's Commodore Vic 20. In 1988, he was enrolled at the University of Helsinki where he studied Computer Programming. During this time, he began writing his own kernel, as he was fascinated by the UNIX operating system that were installed in the college computers. He believed that he had the necessary skills to create a better system from scratch, which lead to the creation of Linux Kernel in 1991. He was awarded with the 2012 Millennium Technology Prize by the Technology Academy Finland, the 2014 IEEE Computer Society Computer Pioneer Award and the 2018 IEEE Masaru Ibuka Consumer Electronics Award.

LINUX KERNEL

The Linux Kernel is a monolithic kernel based on the UNIX operating system. It is primarily written in the programming language C and assembly language. It was initially distributed as a source code only and is now one of the most prominent free open source software available. The kernel, given its size and complexity, is popular for its portability as it can compile to run on large number of processors and platforms with various constraints and needs. It is also a great testing ground for the development and expansion of new protocols. It contains dynamically loadable kernel modules, which can be added to a running system without rebooting the system or rebuilding the kernel, making it quite active. Its architecture consists of 7 major components; the System Call Interface, Process Management, Virtual File System, Memory Management, Network Stack, Architecture-Dependant Code and Device Drivers. The SCI is a multiplexing and demultiplexing service that provides the means to perform function calls from the user space to the kernel. The process management controls the execution of threads where they are created, stopped and synchronised through the API of the SCI, which is provided by the kernel. The kernel also implements a scheduling algorithm that is constantly active, regardless of the number of threads requesting the usage of the CPU. The virtual file system provides a common file system interface abstraction, such as the abstraction and the implementation of the functions, open, close, read and write. It also contains buffer cache which can optimise hardware device accesses. For memory management, the kernel efficiently administers the ability to control the available memory as well as hardware mechanisms for physical and virtual memory mappings. The network stack is modelled after the given protocol and the device drivers are activated by the source codes that are contained in the kernel. Nowadays, many of the bugs that are currently found in the kernel are related to security and as a result, there are frequent releases of new security features to fix the kernel's vulnerability. Discussions on the development of the Linux Kernel are still taking place in the Linux kernel mailing list, which is a high volume list that receives about 1,000 messages a day of kernel code patches.

GIT

Git is a version control system used for supervising any modifications made on a computer file and for coordinating work between a group of people. Its creation in 2005, was evoked by the

breakdown of the commercial company that developed BitKeeper, which caused the tool's free-of-charge status to be revoked, with its design strongly influenced by BitKeeper and Monotone. However, the software aimed to have better speed, a much more simpler design, a strong support for non-linear development, to be fully distributed and capable of handling large projects. As a distributed version control system, Git has many advantages. All operations that are performed are very quick as the tools only need to access the hard drive rather than a remote server. Committing changes to a file can be done locally without modifying anything on the main repository. Set changes can be pushed all at once onto the main repository when they are finalised by the user. Every contributor keeps a copy of the project repository and can share changes with others to receive feedback. Lost data can also be easily restored from any one of the contributor's local repositories.

SUBSURFACE

Subsurface is a free open source software that is designed for tracking scuba dives. It allows the dive data to be downloaded from various makes and models of dive computers and is able to represent the data in a graphical representation or in a tabular format. It contains an interactive dive planner, and a logbook that can be exported into any format to a Git-based cloud storage. Photographs that are taken during the dive can be logged into the system, and the location of the dive is depicted on a map. Other information on the dive such as gas usage and decompression information can also be displayed. The software itself, written using the POSIX API, can be run on many operating systems such as Linux, OS X and Microsoft Windows.

IMPACT

The services the Linux Kernel provides contributed to the development and functionality of the Android Operating System, which is implemented in many touch screen devices today such as smartphones and tablets. Furthermore, the Android OS has been the bestselling operating system on smartphones worldwide in 2011 and on tablets since 2013, resulting a large impact to the technological market. It is also used by every major space programme in the world including NASA and the ESA and private space companies such as SpaceX also leverage it. Since the Linux Kernel is incredibly adaptable, it resulted in many distributions that defines the remainder of an operating system around it and makes it whole. This allows it to grow and develop, granting users the ability to modify it to suit their needs and publicise their results with the community. It is a large project where anyone could discover a performance issue and contribute a fix towards it, leaving changes made to the kernel on an average rate of 7.8 patches per hour.

The creation of Git also had a large impact on the current state of software development. Today, it is one of the most widely adopted version control system out there as it is driven by GitHub, which turns it into a social network community by adding features such as user profiles, public repositories and pull requests and allowing users to collaborate on different projects together. As a result, it became one of the world's leading code sharing platforms.

CONTROVERSIES

There are many controversies currently surrounding Torvalds as he has shown general hostility towards other Linux Developers in the Linux Kernel Mailing List. His behaviour was heavily criticised by the maintainers that were attending the Linux Maintainer Summit, as it drove away other developers from the project completely, leading Torvalds to take a break from his role, to adjust his behaviour. This brought about the Code of Conduct, which sets explicit standards for behaviour, requiring it to be professional, positive, welcoming and inclusive.

SOURCES

https://www.ibm.com/developerworks/library/l-linux-kernel/index.html
https://en.wikipedia.org/wiki/Linux_kernel
https://www.famousinventors.org/linus-torvalds
https://en.wikipedia.org/wiki/Linus_Torvalds
https://git-scm.com/book/en/v2/Getting-Started-A-Short-History-of-Git
https://en.wikipedia.org/wiki/Git#Design
https://en.wikipedia.org/wiki/Subsurface_(software)
https://www.codacy.com/blog/the-impact-of-git-on-software-development/
https://arstechnica.com/gadgets/2018/09/linus-torvalds-apologizes-for-years-of-being-a-jerk-takes-time-off-to-learn-empathy/