# Linus Torvalds

CS3012 Software Engineering

**Assignment: To produce a short (2-4 page) biography of a key software engineer, discussing the work and impact of the individual.**

## Introduction

Linus Torvalds’ office consists primarily of a treadmill desk, a desktop computer and green walls, painted a specific shade to mirror the calming hue of the walls in a mental institution. Though the colour of the walls is merely to ensure a non-stimulating work environment, the treadmill desk is oddly fitting for the man who enabled us to make such strides in software engineering and computing.

Torvalds is known for his creation and lead architect role for the first open-source operating system kernel, Linux and his role in the development of Git. Linus was once asked whether he considers Linux or Git to be his crowning achievement. To which he replied “Why just one crowning achievement. Why not both?”. On top of his already colossal contributions by way of Linux and Git he was also a pioneer of open source.

## Linux

Torvalds started developing the Unix based operating system in 1991. As a self-proclaimed pragmatist Torvalds began programming the Linux kernel because he needed the end result. At the time he was using MINIX and wanted to upgrade to UNIX, but it was too expensive. What developed from what Torvalds originally started to create is now the widely used Linux kernel. The adoption of the Linux kernel in desktop computer operating system is slow however Linux based operating systems dominate nearly every other segment of computing, from mobile devices to main frames. Since November 2017, all of the world’s 500 most powerful supercomputers run Linux. The Android OS for tablets, smartphones and smartwatches also uses of the Linux kernel.

Its success can be attributed to the fact that Linux is incredible customizable, not just applications, such as word processors and web browsers, can be swapped out. Linux users can also choose core components, such as which system displays graphics, and other user-interface components. Thanks to its superb design and ability to move easily between technologies, it’s no surprise that Linux became worldwide.

Another core contributor to its success is the fact that it is open source software. The code used to create Linux is free and available to the public to view, edit and to contribute to. Originally the kernel was made openly available as a way for Torvalds to brag about what he had accomplished. However other software engineers began to give feedback on his project and it was then that a friend of his just introduced him to the open source license. Others began to contribute, and Linux quickly spread.

## Git

Linus also developed Git, which is a software change control and distribution system. “The name comes from the British slang term for stupid, despicable person – arse”. The name perhaps ill-fitting for something that has led to a kind of revolution in software engineering. Git allows developers to control versions and distribute beta and stable versions to end-users. Git keeps strict control of code changes, keeps a log of changes, and lets developers merge versions of their software.

Git was not part of the original plan when Linus first proposed and started developing Linux but rather a means to solve a daunting problem, he and the team of contributors encountered during the growth of Linux. They could no longer use their revision control system BitKeeper and no other Source Control Management (SCMs) met their needs for a distributed system. Linus Torvalds took the problem into his own hands and disappeared over the weekend only to emerge the following week with Git. Today Git is used for thousands of projects and has ushered in a new level of social coding among programmers.

GitHub which was based on Git has reinvented the art of collaborative software development, not to mention the social network. GitHub is a web-based software hosting service which provides opportunity and access to programmers to view, edit and add to code that they normally wouldn’t get the chance to touch. GitHub, where Linux development is now hosted, is changing the way that people approach development. Tom Preston-Werner, the chief technology officer at GitHub claims that change is due to people realizing that “it doesn’t have to be so complex.

## Open source and collaberation

If we go back briefly to his collaborative work on Linux. We can see its success make the case that software develops best when a large number of contributors collaborate continuously within a relatively decentralized organizational structure.

An essay written by Eric S. Raymond entitled ‘The Cathedral and the Bazaar ‘ likens the regulated, centrally organized process of manufacturing software in big companies to the building of a Cathedra and opposes it with Linus Torvalds’ open development method which he relates to a “great babbling bazaar of differing agendas and approaches out of which a coherent and stable system emerge[*s*]”. The essay was written in 1996 and goes on to review the shock of the “commercial Unix cathedrals” such as Sun, DEC, IBM and others to the idea of open development. He explains that to them, the idea of distributing source code to operating systems was unbelievable. Today we can recognize that not only is it believable but very fruitful. Championing that recognition is Linux in its clear demonstration of the reliability and sustainability of open source methods.

As discussed above Linux’s continued development is not Torvalds’ only contribution to the open source culture as GitHub, based on the software Git he built, is at the center of most modern development with Google even paying for Junio Harmano, the man who took over Git from Torvalds, to work on it full time. Despite it becoming a darling of the software engineering world, Linus Torvalds

If we focus on Git itself, we can see how it impacted major changes in the software community’s outlook on open source. Back in the 1990’s when Torvalds first started to develop Linux the majority rule was that forking was bad. Forking, a means of creating a copy of a repository, had led to a lot of incompatible, competing versions of UNIX that has been ultimately unsuccessful. So, when Git provided this element there was a lot of concern that someone would fork Linux, one that wouldn’t run the same programs and would work differently. But in the Git world forking is good! It allows programmers to freely experiment with changes without affecting the original project. Today they are most commonly used to either propose changes to someone’s project or to use another project as a starting point for your own idea. The resolution to the issues that has previously come up with forking was to ensure that improvements people worked out could be shared back with the community. It in a way proves that it’s better to let people fork a project and tinker away with it themselves rather than not let anyone touch the code apart from the trusted authorities.

## Take aways

Although not all the products of Torvalds contribution were direct results of his intentions, the outcome has massively impacted the software community. Not only has he delivered the operating system that powers the top 500 supercomputers today but he opened our eyes to a highly dynamic and effective development method which is widely employed today. He even supplied us with the means to easily adopt that method in the form of Git.

## Bibiliography

* Linux History: Who is Linus Torvalds? – Jennifer Marsh - <https://blog.storagecraft.com/linux-history-linus-torvalds/>
* The Mind Behind Linus – TED - <https://www.ted.com/talks/linus_torvalds_the_mind_behind_linux?language=en>
* 8 Famous Software Engineers - Rebecca Bernstein - <https://online.husson.edu/famous-software-engineers/>
* Linus Torvalds 20 facts - Abhishek Prakash - <https://itsfoss.com/linus-torvalds-facts/>
* The legacy of Linus Torvalds – Robert McMillan - <https://www.wired.com/2012/11/linus-torvalds-isoc/>
* What is Linux – opensource.com - <https://opensource.com/resources/linux>
* The Cathedral and the Bazaar – Eric S Raymond - <http://www.catb.org/esr/writings/cathedral-bazaar/cathedral-bazaar/index.html#catbmain>
* Linux at 25 – Paul Venezia - <https://www.infoworld.com/article/3109204/linux-at-25-how-linux-changed-the-world.html>
* The Impact of Git on Software Engineering – waydev.com - <https://waydev.co/the-impact-of-git-on-software-development/>
* 10 years of git: an interview with Linus Torvalds– the linux foundation - <https://www.linuxfoundation.org/blog/2015/04/10-years-of-git-an-interview-with-git-creator-linus-torvalds/>
* Forking the Code – Bryan Bishop - <https://www.theverge.com/2012/2/24/2820869/forking-the-code-how-github-is-changing-software-development>
* Lord of the files, how github tamed software engineering – Robert McMillan - <https://www.wired.com/2012/02/github-2/>
* Open Source History – Christopher Tozzi - <https://www.channelfutures.com/open-source/open-source-history-why-did-linux-succeed>