



Contribution ID: 38

Type: **not specified**

FPGAs 101: A Software Engineer's Adventure into Hardware Development

FPGAs are becoming more pervasive because they've gone down in price, and process improvements allow substantial designs to fit on commoditized hardware. Furthermore, processors are shipping with embedded FPGAs, making it an interesting target for scaled deployments and hobbyists alike. It's likely that in the foreseeable future, many platforms you use daily will have an FPGA embedded. As such, it's important for open source, and in particular, the Linux community at large to really start to treat these platforms like all other readily available hardware.

As a professional software developer for the last 14 years, I found the toolchain to be surprisingly complex, and the design process extremely obtuse. This talk is aimed at people who want to learn more about the process and possibly contribute to making an open source toolchain that can work on a variety of platforms.

The talk will start with some basic information about what an FPGA is, and an overview of the tooling pipeline as it exists today. Following that, we will explore what's currently available for hackers who want to begin exploring designs on FPGAs. I will go on to discuss my experience with proprietary tools vs. open tools and attempt to provide a quantitative comparison of what's currently available in open source with the proprietary tools provided by vendors. I will then go on to detail the current challenges, and what will be needed to have a robust FPGA ecosystem available within Linux.

As the title states, by the end of the talk, you should have a fairly decent 101 level understanding of FPGA development on Linux.

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Session Classification: LPC Refereed Track