

## Fedora Electronic Lab in Research & Development environment

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### ABSTRACT

This paper entails how the Fedora Project encourages R&D in advanced electronics design through its Fedora Electronic Laboratory (FEL) platform. Fedora has opted a different approach in the development of such high-end hardware design and simulation platform. This approach focuses mainly on providing opensource EDA solutions to meet several high-end design flows and methodologies, rather than the traditional opensource method: random packaging process.

### INTRODUCTION

There are many opensource Electronic Design Automation tools on the internet. These EDA tools include advanced scientific know-how of the semiconductor industry, brought by many people from various countries. In order to design hardware for the real life, these EDA software should fit into a particular design flow and ensure interoperability. Otherwise, this knowledge is useless for real life situations. On the other hand, this scientific knowledge is incorporated under various software languages. Thereby, it is also very difficult for the end-user to maintain such design flows, along with an EDA Consortium compatible operating system.

FEL strives to lighten the work load of the electronic design community who should only care about their cutting edge technologies rather than wasting time on software deployment. Hence, the Fedora Project incorporates and prepares those opensource EDA tools into its EDA portfolio that meets the current Semiconductor industry's trend along with an EDA Consortium compatible operating system, Fedora.

Fedora Project models a Semiconductor design center as its user base to provide the best portfolio for Micro-Nano Electronic Engineering design flows with opensource software. With such a model, both the Semiconductor industry and R&D facilities have for free and without any registration full access to this electronic engineering portfolio. The latter covers the following fields:

- Verilog code generation.
- Analog/Digital ASIC design and circuit simulations.
- Modeling, PCB design and HDL synthesis.
- Post tape-out chip testing facilities.
- Embedded Systems Development.
- Verification means for hardware description languages (VHDL and Verilog).
- Standard cell libraries supporting up to a feature size of 0.13  $\mu\text{m}$ .
- Extracted spice decks which can be simulated with any spice simulators.
- Interoperability between various packages in order to achieve different design flows.

### RESEARCH & DEVELOPMENT ENVIRONMENT

The Research & Development environment (either academic or industry oriented) has established strong ties with the major EDA vendors. These EDA vendors have resources to improve their software in terms of

- runtime and advanced algorithms (routing, retiming, parasitic capacitance calculations)
- inclusion of a new industry standard
- characterized standard cell libraries of different technologies

Despite those advantages, the end-user experiences 'Vendor Lock Down' whenever the design project requires interfacing with a simulator from a different vendor or even home-made scripts. FEL strives to provide the appropriate design tools which support industry standard data formats in order to eliminate the so-called 'Vendor Lock Down' issue.

Although the Fedora Project is a non-profit organization, FEL shares the same difficulties the big EDA vendors are facing. While many EDA vendors also use opensource tools (GNU Toolchain, Java, Tcl/Tk, Perl,...) to build their software, Fedora as the linux distribution is a perfect ground for their development, since it is an EDA Consortium compatible OS. The researcher thereby has a better design experience by co-hosting opensource EDA tools and commercial EDA tools. Hence, the home-made and project dependent scripts created by the researcher do not suffer from obsolete optimizations and functions of different compilers or interpreters.

Since the last two years, Fedora Electronic Lab has been improved to support hardware design for the following applications:

- Academic and Research
- Automobile
- Defense/Space
- Medical

The user-base is thus expanded to fit different researchers' needs. While the design and simulation tools proposed under the FEL umbrella are used to design vending machines, RISC processors, consumer products, thick film circuits and different types of pixels, FEL is a reliable option for R&D department to consider.

Researchers can use FEL as a testbench for their hardware algorithms. Since the EDA software is opensource, researchers don't have to rewrite the whole simulator in order to verify their specific hardware algorithms. They can also use Fedora as a collaborative development platform with other researchers of different institutions with Fedora's VOIP solutions. Researchers can share, backup and retrieve their measurement data securely together with opensource version control systems.

## AN OPENSOURCE EDA COMMUNITY BUILDER

FEL was spinned from an opensource software community with the same values of the Fedora Project. It bridges both opensource hardware and opensource software communities. Subsequently, maintaining a community around FEL is subjected to deal with culture clashes between the communities being bridged.

Our approach with FEL is to build a community around opensource EDA solutions with opensource software. This differs from the old-fashioned opensource software community's method which proposes only opensource EDA software. This old-fashioned method downplays the value of the opensource EDA community as it does not interface with the field applications. This defeats the purpose of being an EDA provider.

Our approach with FEL though is to find first EDA solutions from field-proven problems. These EDA solutions will eventually lead to a proper set of opensource EDA software that meets the demands of the field-proven problems. Researchers not only receive EDA portfolios from FEL but also a community that can listen to their real-life problems with EDA software.

To build such a community both inside and outside FEL requires a robust infrastructure as a model to follow. Such a model should help the FEL developer-base to fix all the mentioned bottlenecks and to focus on FEL's roadmap alone. Fedora's current infrastructure serves FEL with many facilities in terms of

- marketing
- packaging maintenance and release
- software optimizations and security

The only problem is the targeting userbase is not the same as regular Fedora userbase. FEL's userbase may not visit linux tradeshows and thus the value of the opensource EDA solutions are not properly conveyed to the right userbase. Since FEL holds the responsibilities of doing the marketing of its upstream projects, new ways need to be found. That said, it is imperative to line up FEL marketing with those of big EDA vendors. One of the opensource software community clashes FEL ignores is competition with other linux distributions. Hence we have a clear roadmap for our milestones which in return also helps the userbase achieving the design sign-offs quickly.

## CONCLUSION

Fedora Electronic Lab has proved that advanced electronic design is possible with opensource EDA software. While its userbase focuses on "technology-to-product" transition, the Fedora Project continues to sustain both the opensource EDA community and EDA solutions for the best electronic design experience. The EDA portfolio supported by Fedora Electronic Lab will help its users to achieve their goals. This new approach of EDA software deployment was well greeted by several academic institutions in India, France and United States. The next release Fedora 11 Electronic Lab will push the quality barrier higher than the previous releases.

## ABOUT FEDORA ELECTRONIC LAB

Fedora's Electronic Lab[1] is a sub-project of the Fedora Project[2] dedicated to support the innovation and development of opensource EDA community. This ambitious sub-project provides a complete electronic laboratory setup with reliable open source design tools in order to keep engineers and researchers in pace with current technological race.

## REFERENCES

[1] <http://chitlesh.fedorapeople.org/FEL>

[2] <http://www.fedoraproject.org>