Linux Beyond PCs

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Who am I?

- Professional technologist
- Humble maintainer of a handful of packages in the Fedora Project
- Contributor and package maintainer for Mageia Linux
- Contributor to Unity Linux
- Contributor to RPM, DNF, and various related projects
- Diligent follower of the telecommunications industry
- Systems Engineer at Datto, Inc.

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Linux’s roots

- In the very beginning, the Linux kernel was designed to operate exclusively on the IBM PC platform.
- It was created so that Linus Torvalds would have an acceptable Unix-like OS for the Intel 386 powered IBM PC he had while in college in Finland.
- Other people utilized the GNU userland system with the Linux kernel to form the full GNU+Linux environment.

Linux through the 90s

- As the popularity for Linux grew by disaffected UNIX people, businesses such as Red Hat and SUSE saw opportunity to replace UNIX in the enterprise.
- This evolved into efforts to make the Linux environment more portable to other architectures. Combined with the concern that the x86 platform might be replaced, a strong focus of architecture portability developed in the Linux community.

The (Linux) world goes mobile...

- After Linux won the server world, embedded systems was next.
- Linux on embedded devices became quite common in the early 2000s. The reputation of having a wide range of hardware and software capabilities was further bolstered by all the applications of Linux-based environments.
- This translated into efforts to bring Linux to mobile devices.
- Over the years, Moblin/Maemo/Tizen, webOS, ACCESS, Android, and many, many other platforms have existed.

Linux ARMs itself...

- Initially, mobile devices used some class of MIPS chips, but ARM became more popular as the architecture was simpler to target and allowed various phone makers to “customize” the chip more for their needs.
- This had a very unfortunate consequence when Linux gained ARM support. Because of all the custom system chips, each ARM environment had to be integrated individually.
- This has made Linus very angry many times.

Linux beyond PCs today...

- Linux is commonly used in set-top boxes, TVs, mobile phones, tablet PCs, single-board computers, and many other non-obvious gadgets.
- With the newest kernel in development (kernel 4.5), the ARM support tree is finally unified, which allows for flexibly supporting any arbitrary ARM based system.
- Android has “won” on mobile devices, powering more than two thirds of all cell phones, tablets, and other mobile devices. “Smart accessories” are the next big battleground.
- Jolla revived MeeGo as Sailfish OS, LG uses webOS for TVs, and Samsung uses Tizen for TVs and smartwatches primarily.

Mobile vs Desktop/Server

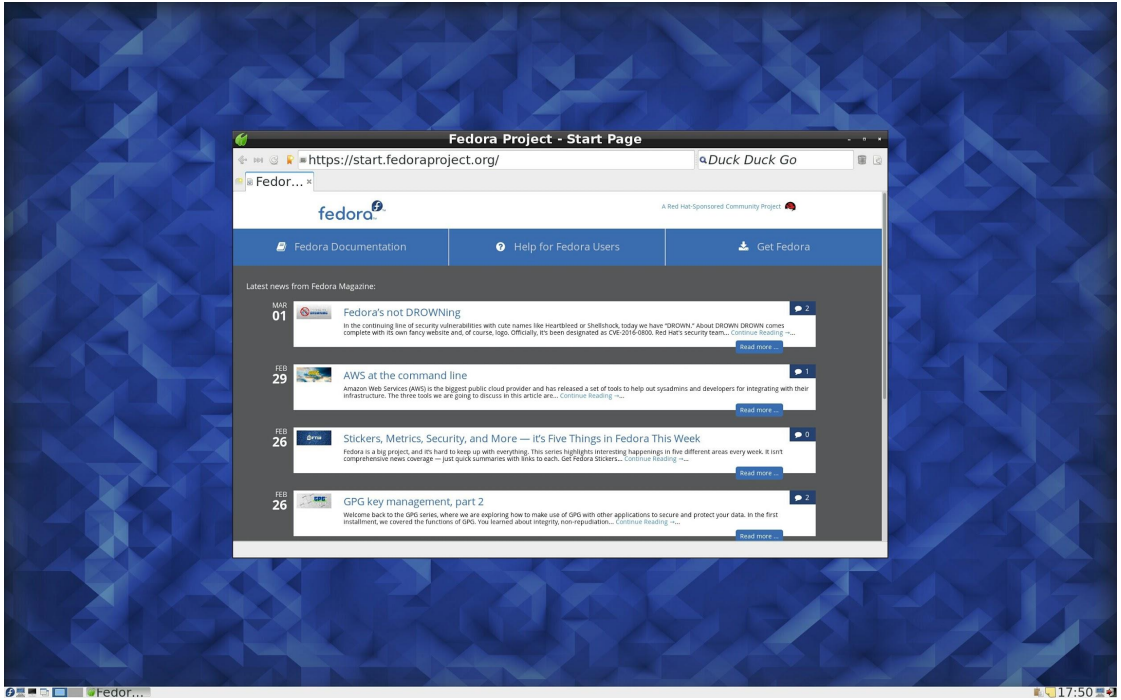
- The primary concern with mobile has been balancing power and performance, favoring power conservation.
- Despite the amount of computing power in modern mobile devices, they don’t typically expose the same level of computing capability in order to survive longer without being recharged.
- Also, with becoming primarily touch-oriented, the UX had to change to adapt to the less-precise means of operating the device.
- Traditional Linux based environments cannot be run reliably in a mobile context.

Or can it...?

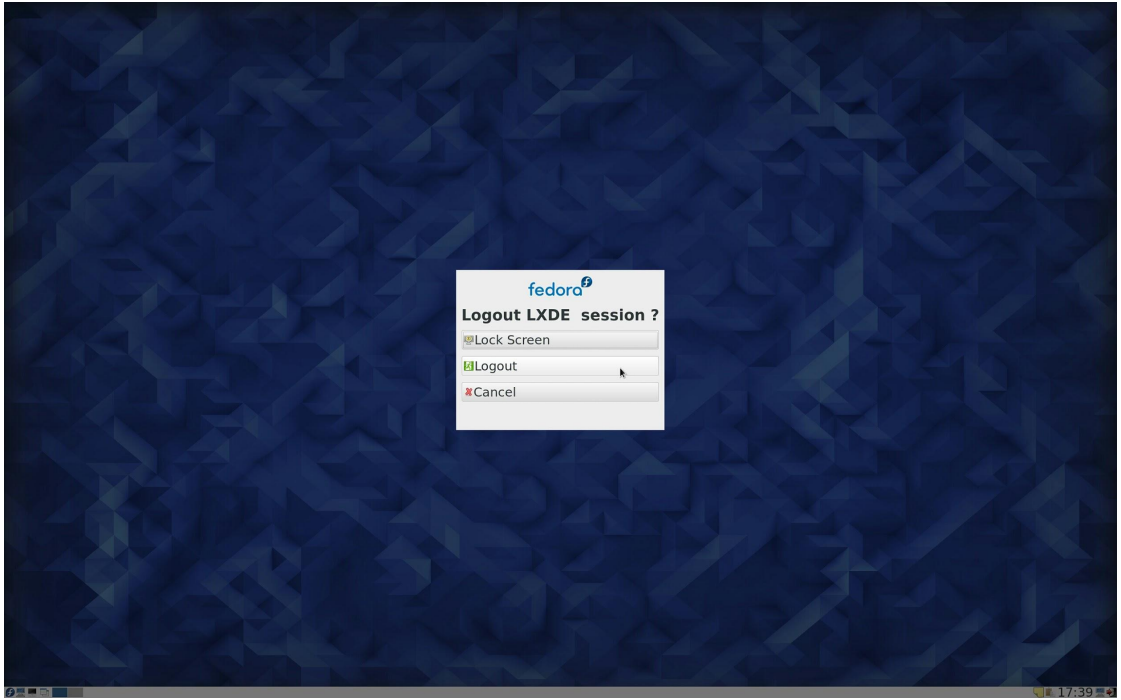
Installing Fedora 23's LXDE environment on an Android tablet

Linux and containers!

- Linux (and most UNIX based systems) have the capability to run independent execution environments that (theoretically) can't see each other.
- This functionality has been popularized in Linux with LXC and later Docker.
- The most basic level of functionality is often called *chroot*, after the *chroot()* system call.
- Android still has this functionality, but it's somewhat restricted, and requires more effort.
- Applications like GNURoot automate this work.



Running Fedora 23's LXDE using GNURoot and XServer XSDL on Android



Logging out from Fedora 23’s LXDE environment on an Android tablet

Links to resources

- ***GNURoot*** from the Google Play Store: https://play.google.com/store/apps/details?id=champion.gnuroot
- ***GNURoot Fedora Remix*** from the Google Play Store: https://play.google.com/store/apps/details?id=champion.gnuroot.fedora
- ***XServer XSDL*** from the Google Play Store: https://play.google.com/store/apps/details?id=x.org.server
- Nemanja Milosevic: *Fedora on non-rooted Android phones - 2016 another update!* http://nmilosev.svbtle.com/fedora-on-nonrooted-android-phones-2016-another-update
- Fedora ARM main site: https://arm.fedoraproject.org/
- Fedora ARM wiki portal: https://fedoraproject.org/wiki/Architectures/ARM

The End

Any Questions?