

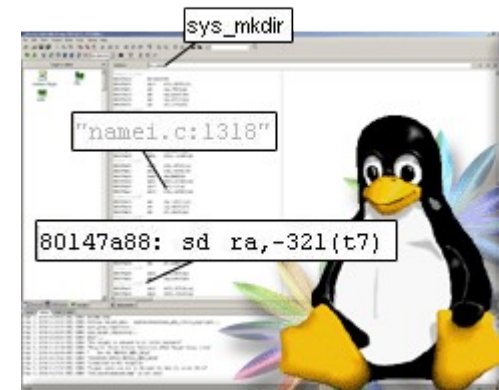
ECE 373 – EMBEDDED OPERATING SYSTEMS AND DEVICE DRIVERS



Spring 2019

Writing SW to control HW

- Linux kernel and driver architecture
- Driver interface to kernel
- Driver interface to hardware
- Writing a new driver
- Debugging in tight spaces
- How to find more information



Instructor

- PJ Waskiewicz
 - ppw@pdx.edu
 - Ex-Intel Software Developer – 14 years
 - SolidFire/NetApp Architect – 3 years



- Plays bass
- Sings occasionally
- Races motorcycles
- Drives over things with his Jeep

Instructor

- Charles Stoll
 - stoll@pdx.edu
 - Intel Software Engineer – 1 year



- Climbs rocks
- Biker (not the gasoline type)
- Taught and lived abroad for 2 years
- Plays board games

Schedule

- Class times
 - Monday/Wednesday 4:40pm – 6:30pm
- Office hours
 - After class, in classroom, or by appt.
 - Email at strange hours
- Lab time
 - Tuesday 6:40pm – 9:30pm
 - Friday 3:00pm – 5:50pm
- TA
 - Peng Gao
 - Ram Bhattarai



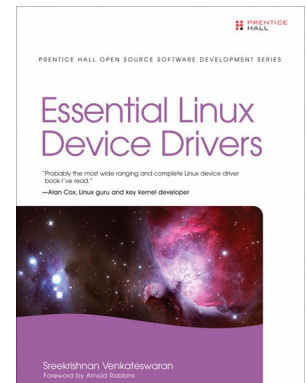
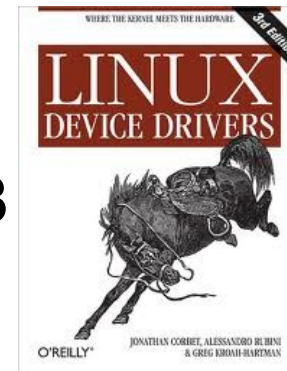
Resources

- Written (required)
 - Linux Device Drivers Development
 - Madieu, Packt, ©2017



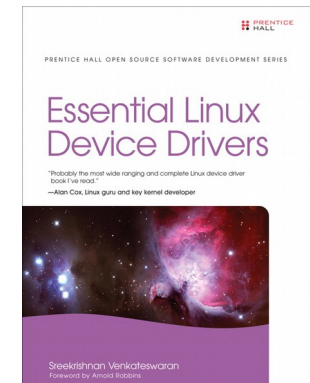
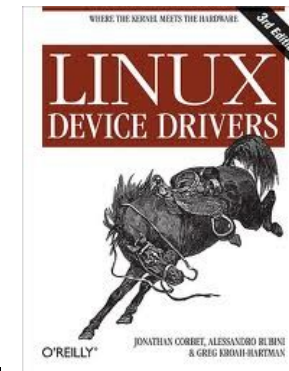
Resources

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 - Linux Device Drivers Development
 - Madieu, Packt, ©2017
- Written (optional)
 - Essential Linux Device Drivers
 - Vankateswaran, Prentice Hall, ©2008
 - <http://elinuxdd.com>
 - Linux Device Drivers, 3rd Edition
 - Corbet, Rubini, and Kroah-Hartman, O'Reilly, ©2005
 - <http://lwn.net/Kernel/LDD3/>



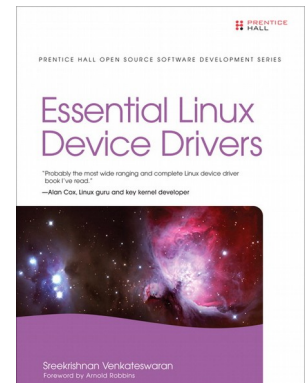
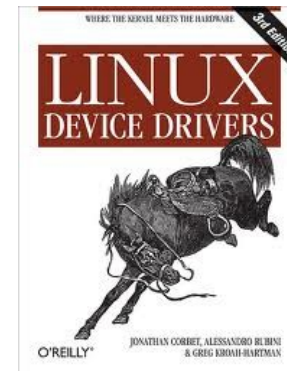
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- Wikipedia
- Lots of others...



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- Wikipedia
- Lots of others...
- Source code – Use the Force, read the source
 - <http://kernel.org>
 - <http://lxr.free-electrons.com>



HW Resources

- Virtual machines
 - "PCIe" bus needed
 - Intel (or other) network device
 - Need full root access



Other stuff...

- Dinner-ish time class
 - Eating allowed, but not aloud
 - Be prepared to clean up a mess
 - Sharing cookies is always a good thing
- Anything else?



Topics

OS review, Linux Internals and Driver Intro

Kernel comm channels

Chardevs

PCI, MMIO, I/O Ports

Datasheets

Timers and Delays

Threads, Completion queues

Debugging techniques

Coding Notes

Review, Midterm

Serial and Block drivers

Userspace drivers

DMA, Descriptor concepts

Network drivers

Linux Build Infrastructure

How to configure and strip

Embedded Linux, Hobby boards

USB drivers

Final Review

