The Linux Development Process
How Who Does What When and Why...

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NCSU Seminar

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Red Hat Internship Job Fair

Red Hat is looking for interns!

- Thursday March 19, 2009
- 3:00PM until 7:00PM
- 1801 Varsity Drive
- 1st Floor Meeting Hall

Who am I?

Why is this interesting?

Why is this talk worth an hour of my life?

- Linux is a huge project...and it works!
- Are you (or might you be) a user with problems?
- ...a commercial developer?
- ...a community developer?
    - Scratch an itch...
    - Save the world?
    - Resume builder!

What is so different?

What makes Linux development different from traditional software development?

- Profit not (necessarily) the main motive
- No inherent authority (not even Linus!)
- Meritocracy
  - Market for usefulness
  - Code talks!

People

The Linux community is comprised of people from all over the world...

- Wide variety of motivations
- A number of different roles

Motivations

Why do people get involved?

- Personal “itch” to scratch
- Internal/commercial project
- Work for hire
- Sponsorship
- Altruism

Roles

What jobs do people perform in the community?

- Bug reporter
- Tester
- Coder
- Reviewer
- Maintainer
- Technical Writer
- Journalist

Tools

A variety of tools make things possible...

- Communications tools facilitate information flow
- Development tools manage changesets and code distribution

Communications Tools

Communication is key!

- E-mail
- Bugzilla, etc.
- IRC
- Wikis, etc.
- Gitweb
- Patchwork
- What is missing...?

Development Tools

Preparing and posting patches...

- mutt (or other non-braindead MUA)
- checkpatch.pl
- Sparse
- Git

Git

Git is a distributed revision control system

- Distributed means no central repository
  - No central authority!
  - Easier offline usage
  - Easy to fork a project
- Really good at merging
  - Coordination only needed "after the fact"
  - Easier to rejoin (or refresh) forked projects
- Structured around commits (i.e. patches)
  - Tools for identifying problem commits (i.e. git bisect)
  - Tools for restructuring branches w/ specific commits

Patches

Fundamental unit of work is the patch...

- Identifies your exact set of changes
- Encapsulates changes to all modified files
- Resilient across changes to underlying files

Patch Example

```
diff --git a/drivers/net/wireless/airo.c b/drivers/net/wireless/airo.c
index fc4322c..0c7aa61 100644
--- a/drivers/net/wireless/airo.c
+++ b/drivers/net/wireless/airo.c
@@ -4686,7 +4686,7 @@ static int proc_stats_rid_open( struct inode *inode,
  StatsRid stats;
  int i, j;
  __le32 *vals = stats.vals;
- int len = le16_to_cpu(stats.len);
+ int len;

  if ((file->private_data = kzalloc(sizeof(struct proc_data ), GFP_KERNEL)) == NULL)
  return -ENOMEM;
@@ -4697,6 +4697,7 @@ static int proc_stats_rid_open( struct inode *inode,
  }

  readStatsRid(apriv, &stats, rid, 1);
+ len = le16_to_cpu(stats.len);

         j = 0;
  for(i=0; statsLabels[i]!=(char *)-1 && i*4<len; i++) {
```

Identify A Need

Identifying a development need...

- Bug report
  - Mailing list
  - Bugzilla
  - IRC
- External project requirement
- Some other OS is doing it...
- “Wouldn’t it be cool if...?”

Development Cycle

Iterative process once real development begins...

- Post
- Review
- Revise
- Repeat

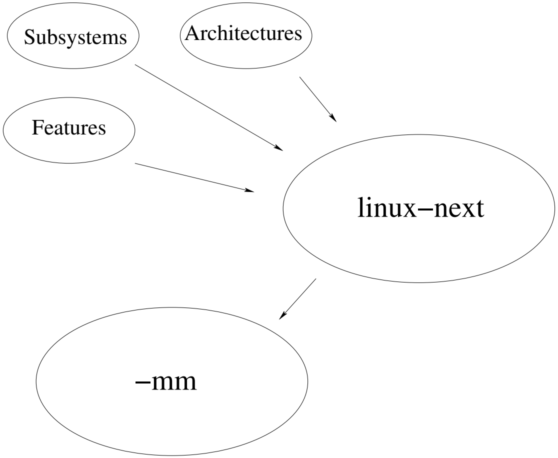
Above is unavoidable, so don't develop in a cave!

Source Trees

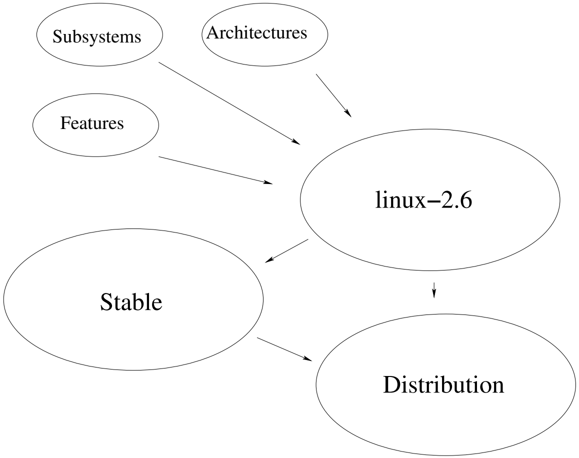
Once a patch is acceptable, it moves through a sequence of source trees...

- Maintainers
  - Subsystems (e.g. networking, SCSI, PCI, etc)
  - Features (e.g. realtime, SELinux, etc)
  - Architectures (e.g. MIPS, SPARC, Blackfin, etc)
- linux-next / -mm
- linux-2.6
- Stable
- Distribution

Development Cycle



Release Cycle



Distributions

Distribution kernel processes have different influences than upstream

- Community distros (Fedora, Debian, Gentoo, etc.)
    - Less review – trusted committers
    - Emphasis on bug fixing and stability, but...
    - Some willingness for experimental features
- Enterprise distros (RHEL, SLES, etc.)
    - Enable customer-driven features
    - Priorities driven by sales and marketing concerns
    - Long-term stability is foremost importance

The Staging Tree

"It's too hard to get code into Linux!"

- Looser standards for inclusion (i.e. must compile)
- Limited community support
- Intended to provide reference material and/or base for porting
- Not the end goal!

How do you get involved?

Join our community!

- Kernel Newbies (http://kernelnewbies.org/)
- The Linux Driver Project (http://www.linuxdriverproject.org/)
- Just jump in! (i.e Shut-up and code!)
    - Linux Device Drivers (http://lwn.net/Kernel/LDD3/)
    - Understanding The Linux Kernel

Questions?

Contact

Feel free to contact me!

- Email linville@tuxdriver.com
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    - ...@kernel.org
- IRC linville on FreeNode, OFTC, and LinuxNET
- Facebook as “John W. Linville”

Slides available:
http://www.kernel.org/pub/linux/kernel/people/linville/ncsu2009/