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# PARTICIPATING IN THE FEDORA / RED HAT / FOSS MODEL

Paul W. Frields
Fedora Project Leader, Red Hat
June 24, 2010

# About the Presenter

- Accountable to Red Hat for all things Fedora
- Ensure smooth interface and communication between internal and external parts of the Fedora community
- Background:
  - FPL since February 2008
  - Technical specialist in the US DOJ
  - http://pfrields.fedorapeople.org/

# What you'll know when you leave here

- Why Red Hat cares about the community process
- How that process has helped Red Hat get the right technologies into RHEL
- Time for questions after the slides, but feel free to ask them at any time!

# Code starts in the community

- 1000s of individual projects
- Community is ***upstream***; consumers are ***downstream***
- Red Hat presence in “core” communities
- Mechanics of community development: http://producingoss.com/

# Open source collaboration

- *Small “pet project”*

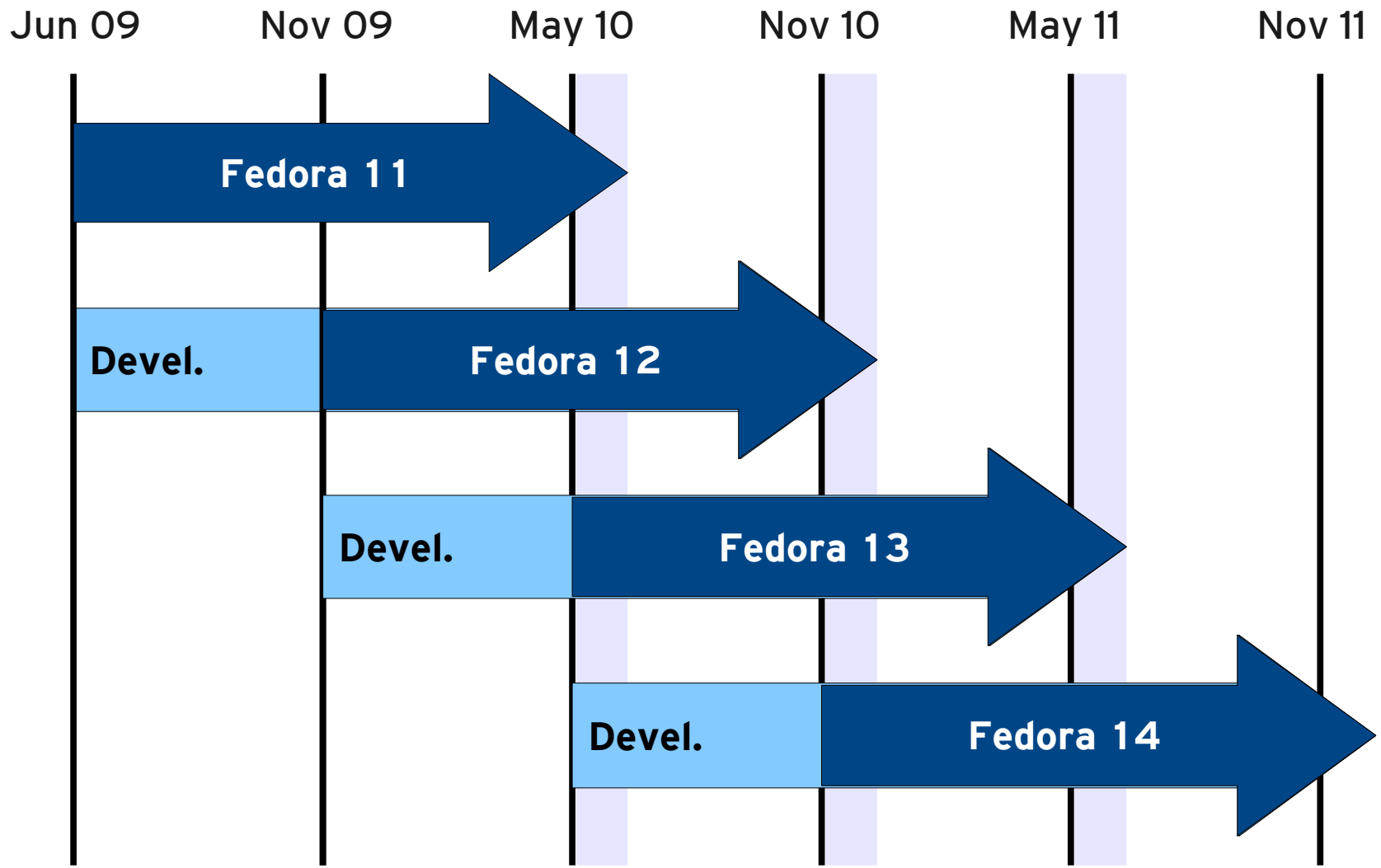
# Open source collaboration

- *Larger distributed project*

Image courtesy of ogimogi via Flickr, CC BY.

Image courtesy of 416style via Flickr, CC BY.

# Six-month release cycle



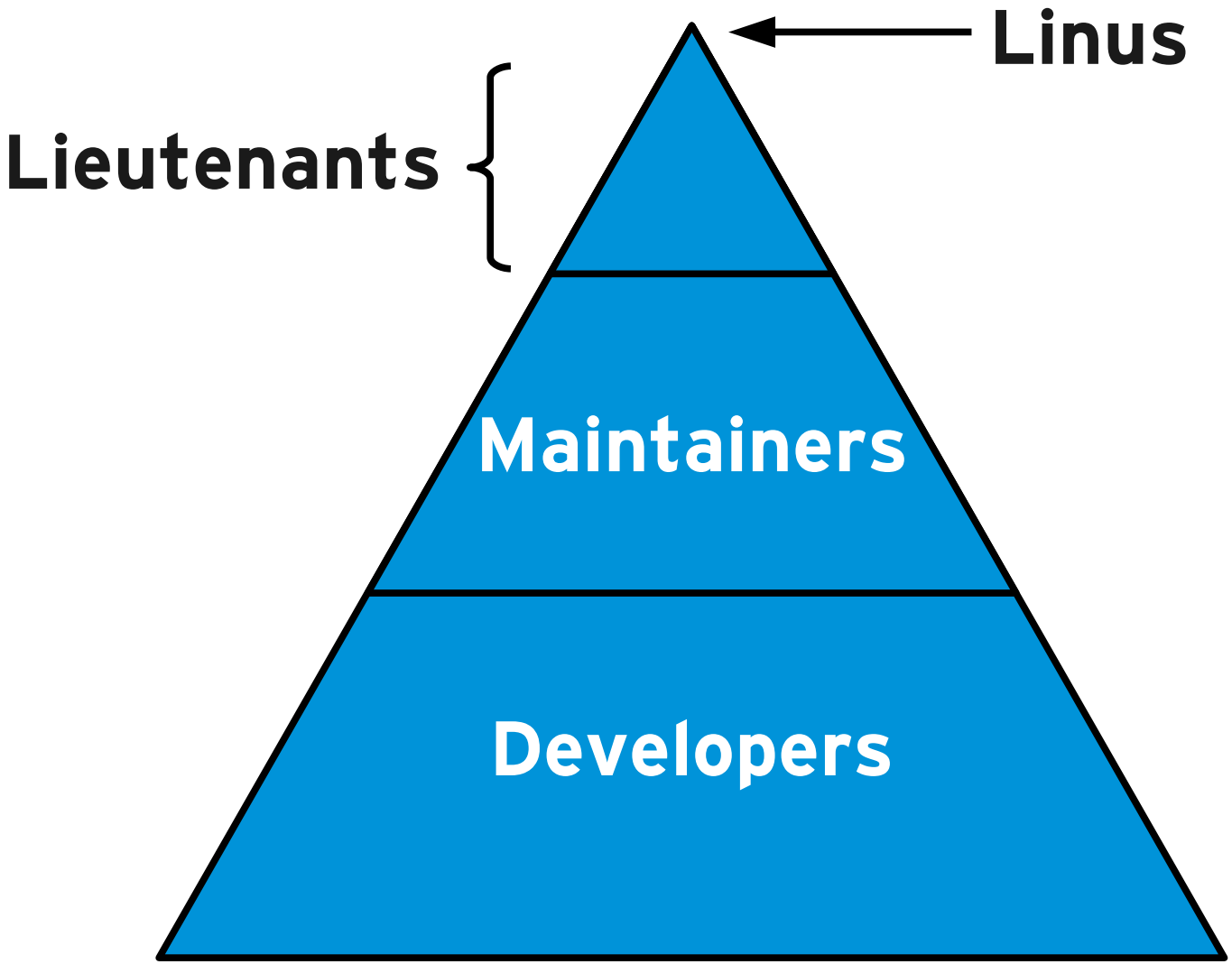
# Feedback loop from community

- “Release early and often” cuts work during RHEL cycle
- Functional and integration testing, bug inflow
- Technology preview of RHEL features
- Grows open source mindshare
- Open door to participation

# Example: the Linux kernel

- Based on latest LF publication
- Exemplar for other upstreams
- Representative of how Red Hat contributes to open source communities

# Kernel organization



# Red Hat kernel involvement

# 100+

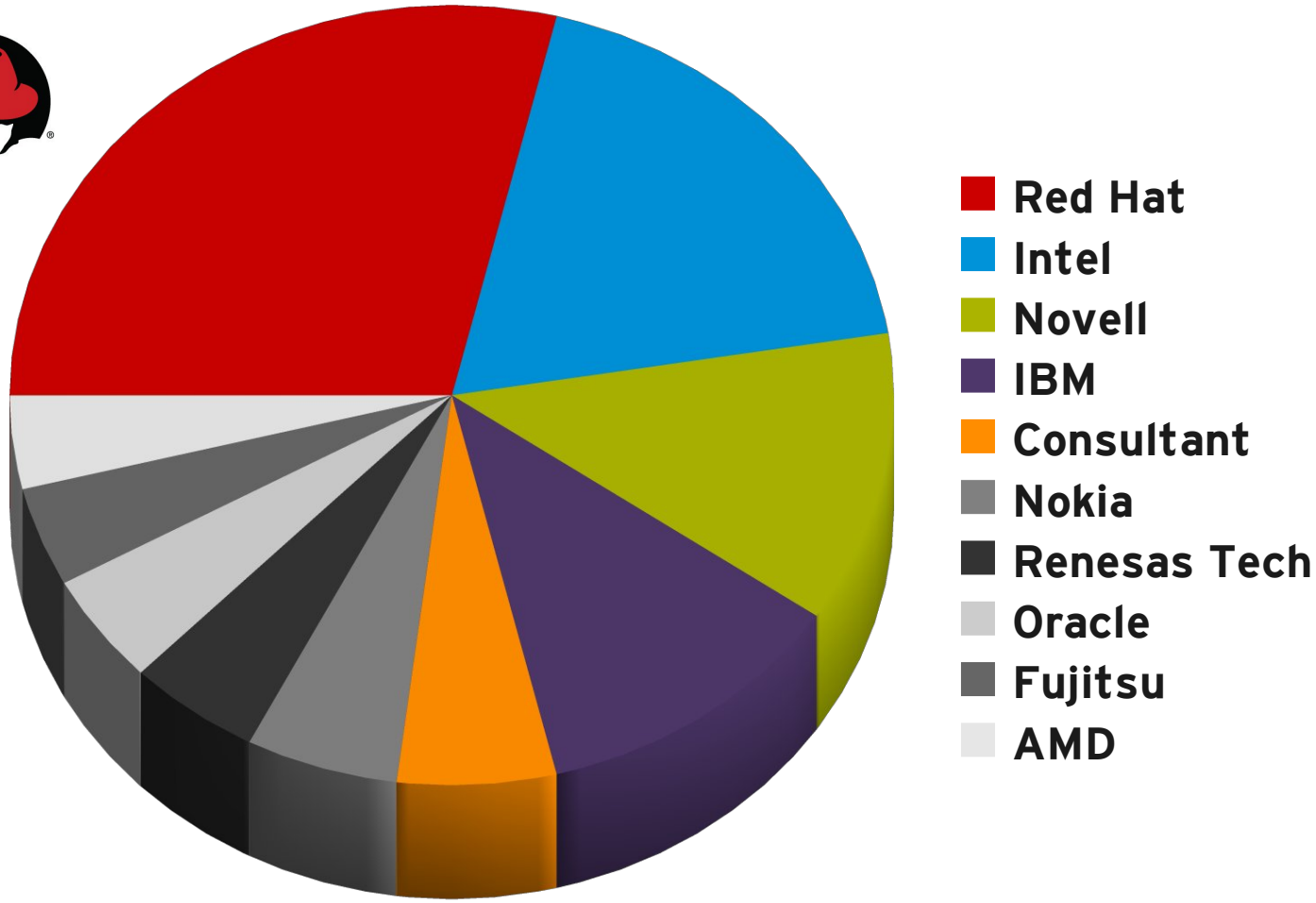
**Includes generalists, specific subsystems, hardware foci**

# Red Hat kernel contributions, 2.6.30 – 2.6.35rc1:

**11.9%**

Source: Linux Foundation, June 2010

# Top 10 commercial kernel contributors:



## Maintainer sign-offs on code:

# 36.4%

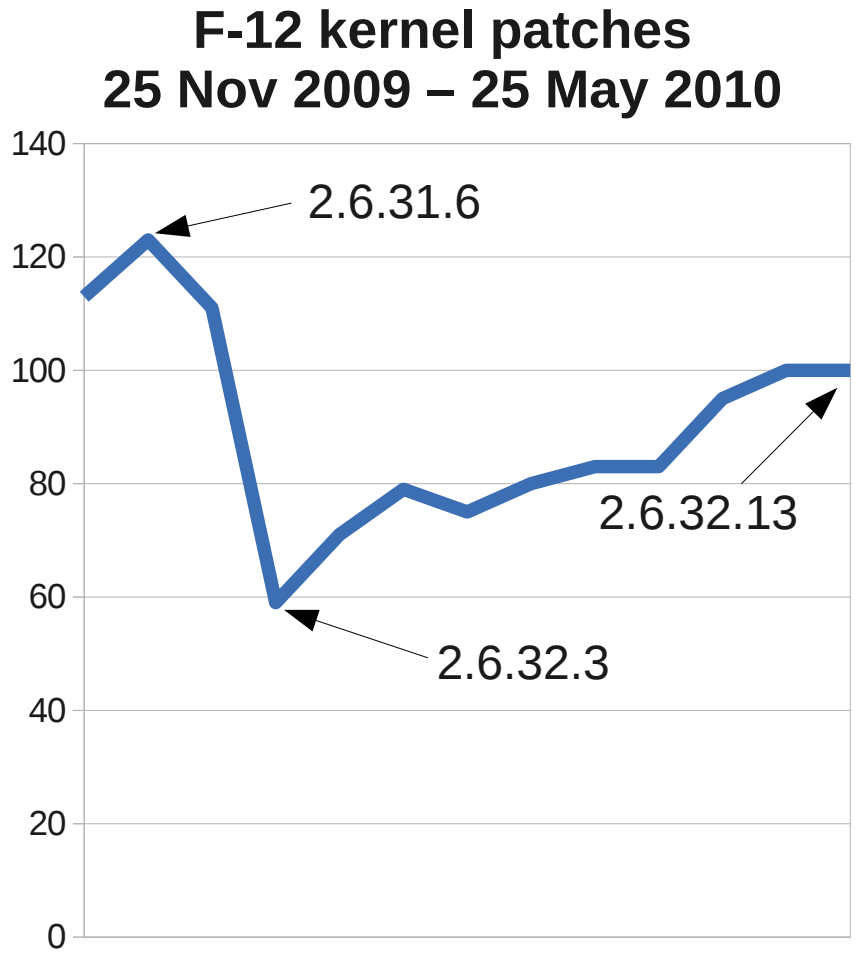
**Source: Linux Foundation, August 2009**

# Fedora *kernel* package

- Slower rate of change than kernel.org
- Fedora mantra: “Upstream!”
  - Collaborative by definition
  - Lower maintenance burden
  - Smoothes out user experience with open source

# Kernel patches in Fedora

- Typically increase over release lifetime, with backports
- Maintainers work with upstream to include changes
- “Current” numbers fall dramatically with updates



# Driving innovation

- Platform bits
  - Virtualization and cloud
  - Fundamental engineering or “plumbing”
  - GNOME and FreeDesktop.org
- Middleware – Jboss.org

# Continuation to RHEL

- Snapshot of package subset
- Refinement through intensive QA/QE, enablements, certifications...
- Commitment to stability, performance, and security through subscriptions

# Laying technology bets

- Robust but quickly evolving
- A failed experiment is only painful for about six months
- Crowdsourcing feature hardening
  - SELinux
  - KVM, libvirt, virt-manager
  - Free video drivers
  - Desktop *Kit, GTK3, GNOME Shell
  - ...and on into the future...

# Why should I care?

- “Subsidizing development”
- Analogy: Diversified, robust financial portfolio
  - Mutual fund ~= RHEL
  - Picking individual stocks ~= Fedora

# Summary

- Fedora/RHEL synergy is the key to Red Hat's ability to bet wisely on technology
- Fedora offers rapid integration and easy consumption, participation, and contribution – "the best of what works today"
- Red Hat Enterprise Linux offers a steady state optimized for stability and performance – "the best of what will work for seven years"

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- Background:
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Red Hat is not separate from the Fedora community. We're part of it.

Experience includes as a forensic examiner, and a light development of Linux solutions for investigators.

## What you'll know when you leave here

- Why Red Hat cares about the community process
- How that process has helped Red Hat get the right technologies into RHEL
- Time for questions after the slides, but feel free to ask them at any time!

There are literally hundreds of thousands of free and open source software projects in existence. Any of these individual projects can potentially be important to a given entity. The well known projects like the Linux kernel, X.org, GNOME, compilers, tools, are used by hundreds of millions of people every day.

Upstream vs. downstream is a very important concept. The further upstream you are, the more you gain the ability to participate in decision making. You can influence things with your contributions. The further downstream you are, the more you are working with what you get.

Red Hat maintains a presence in core communities so that as growth and change occur, we stay abreast of it to ensure our customers' needs are continually met.

## Open source collaboration

- *Small “pet project”*

## Open source collaboration

- *Larger distributed project*

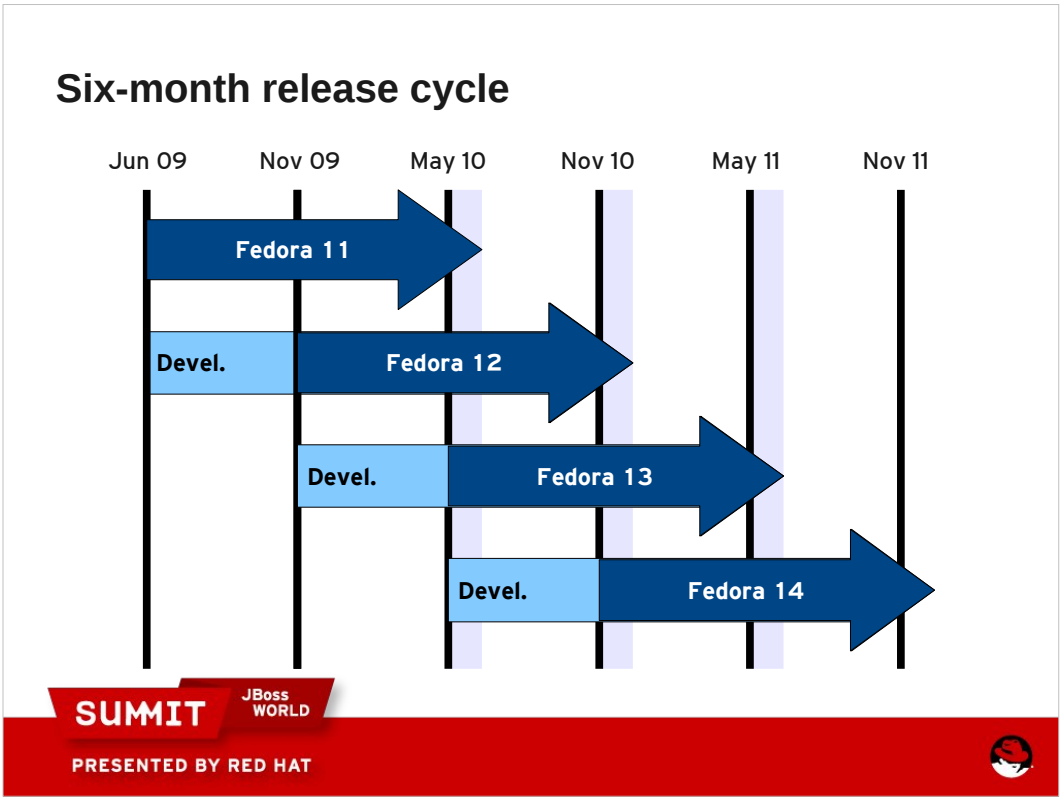
First, that code is often rolled into a numbered release in whatever way the upstream decides is best. Upstream code releases are the Lego blocks of a platform.

Most people don't want to deal with Lego blocks. The less assembly required, the faster you can get to work on building solutions and deployments.

So a software management layer is important. The distribution includes that layer – RPM software packages, which make installation and library dependencies easy to manage. But the distribution still has to serve the needs of an audience.

Red Hat Enterprise Linux’s audience is made of customers who expect a very long support lifetime. So it's not the place where you can try new upstream releases quickly. (NEXT SLIDE)

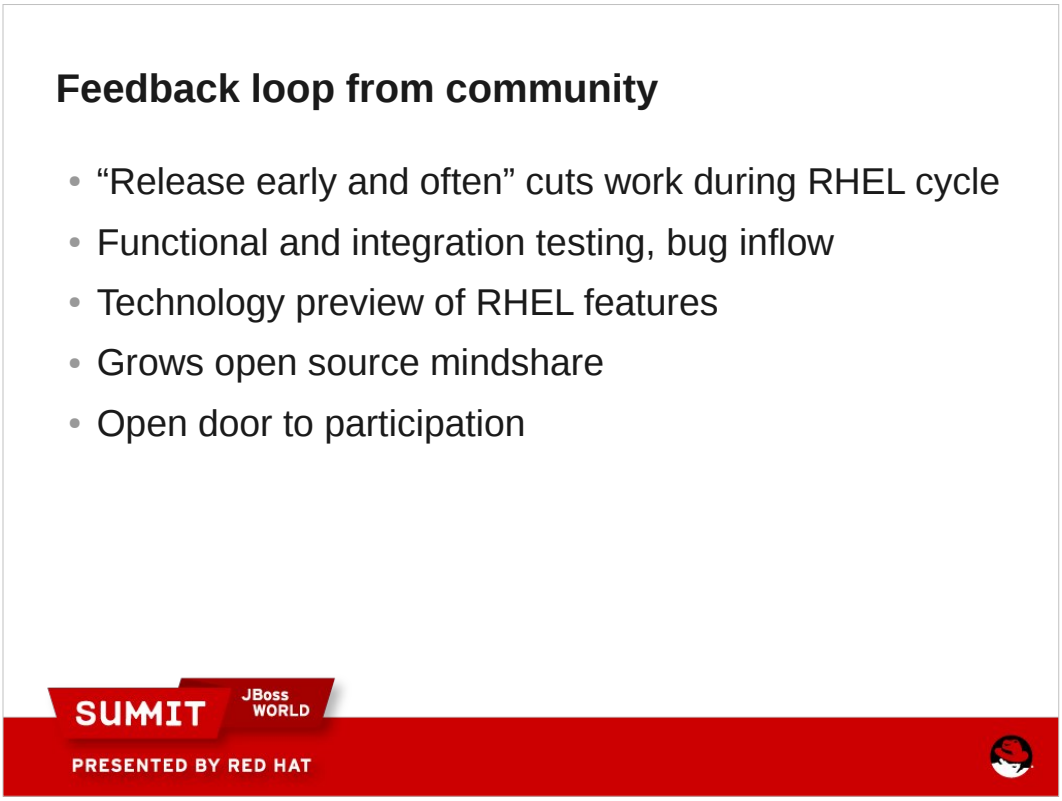
- This is where Fedora fits into the picture. Fedora is where the building blocks are assembled correctly and integrated into something consumable by anyone, free in all senses. Moreover, its rapid cycle of release means technologies are continually elected by a large audience of users and contributors.
- The Fedora community includes a community of software maintainers that is, quite literally, as big as another Red Hat-sized company. These maintainers work together to keep our releases of upstream software current, and to handle bugs reported by Fedora users. They also coordinate these efforts across the Fedora Project to support our release cycle. (NEXT SLIDE)




Releases are made approximately six months apart. Once a release is made, it's maintained by the community for approximately thirteen months – about one month after the second following release. So Fedora 12, released in November 2009, will be maintained until about a month after the release of Fedora 14, or around December 2010.

This cycle puts new technologies in front of millions of people. That is in fact the main mission of Fedora – to advance free and open source software. The by-product of that mission is that Fedora is a very effective R&D lab for anyone working in the community, such as Red Hat.

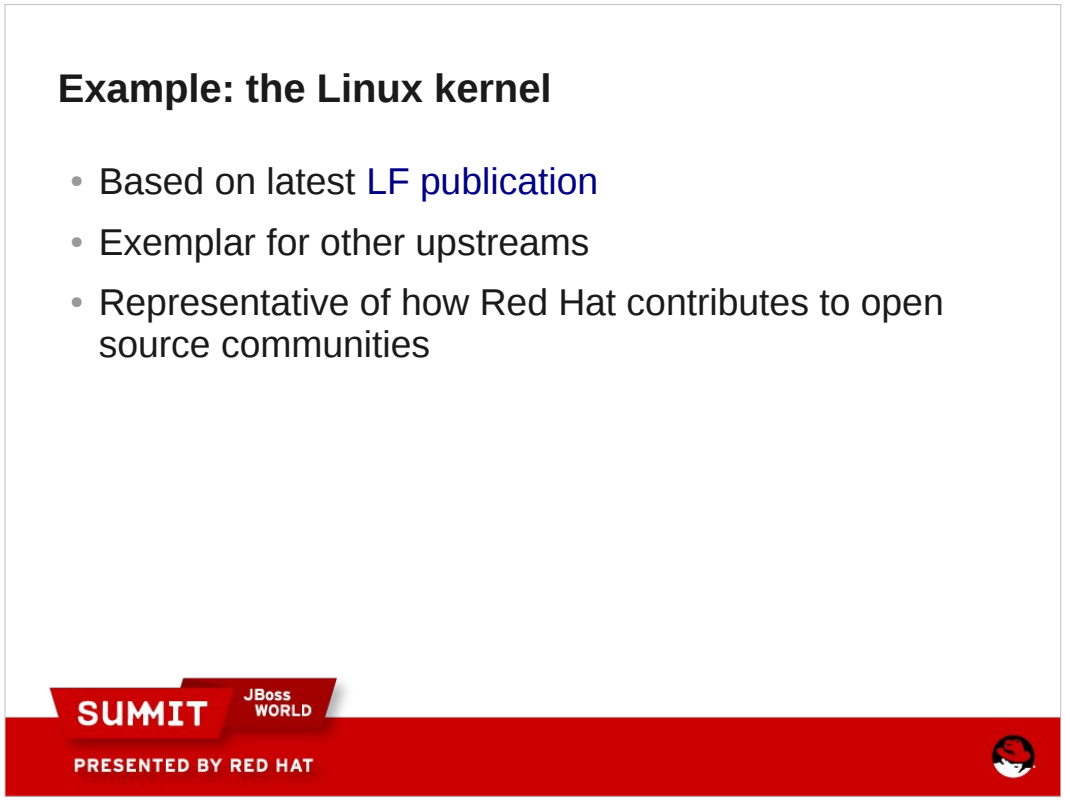
That's the second half of Red Hat's betting strategy – providing resources to the Fedora community so it can continually select the best technologies. (NEXT SLIDE)




By growing a community of contributors, such as in testing and QA, Fedora can serve as sort of an early warning system for functional and integration bugs.

This does not mean that Fedora is a beta for RHEL! RHEL has its own testing program that is distinct and separate from Fedora. However, because functional and integration problems are a shared heritage, fixes in Fedora can help the RHEL product improve faster. To Red Hat, Fedora can serve as part of the collection of RHEL feedback mechanisms, doing its best work well in advance of release.

These are the principles of how code makes the transition from the community to the value of a RHEL subscription. But how does it look in practice? (NEXT SLIDE)




The Linux kernel is used here as an example. Some of the numbers you'll hear come from the Linux Foundation, which does a regular running study of the contributions to the Linux kernel project.

Why the kernel?

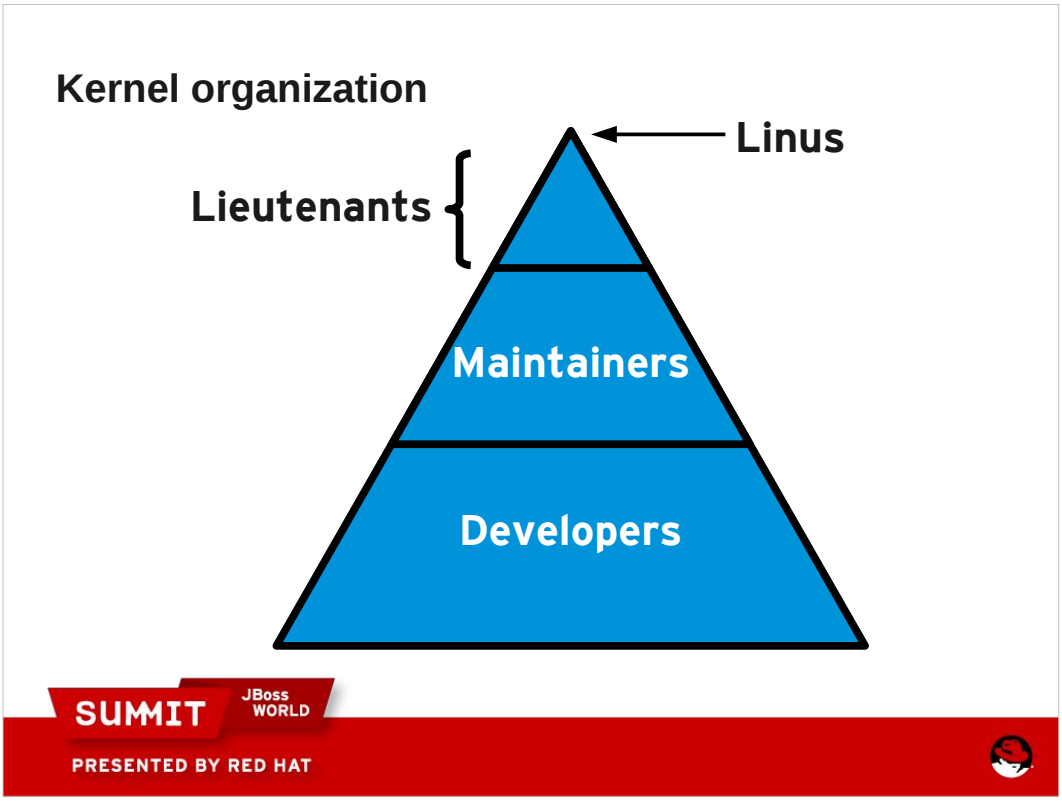
It's one of the most important and longest running open source projects.

It features regular releases every 2-3 months.

It has an open submission process.

It has a very high rate/volume of changes, meaning it's interesting to look at statistically.

How is it managed? Hierarchical organization. (NEXT SLIDE)




Developers – thousands of people, from professionals to talented hobbyists

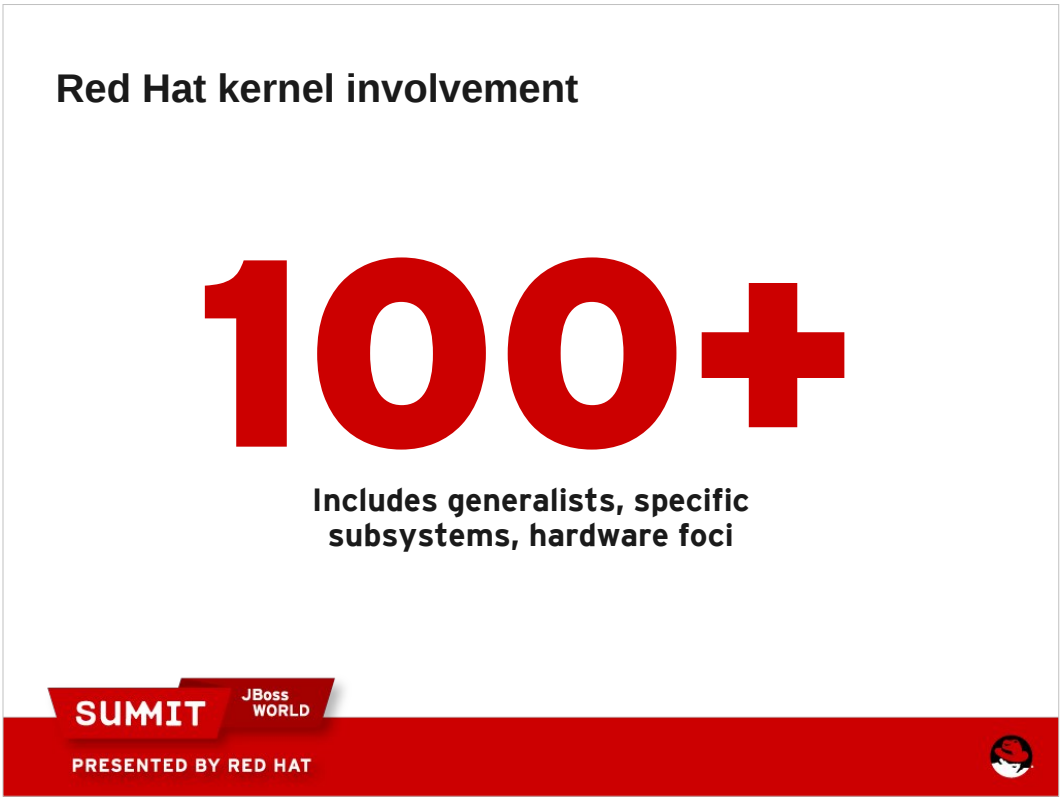
Maintainers – responsible for a specific area, usually one or more drivers, often related... trusted to keep code in good shape

Lieutenants – broadly responsible for large areas

Linus – semi-benevolent dictator for life

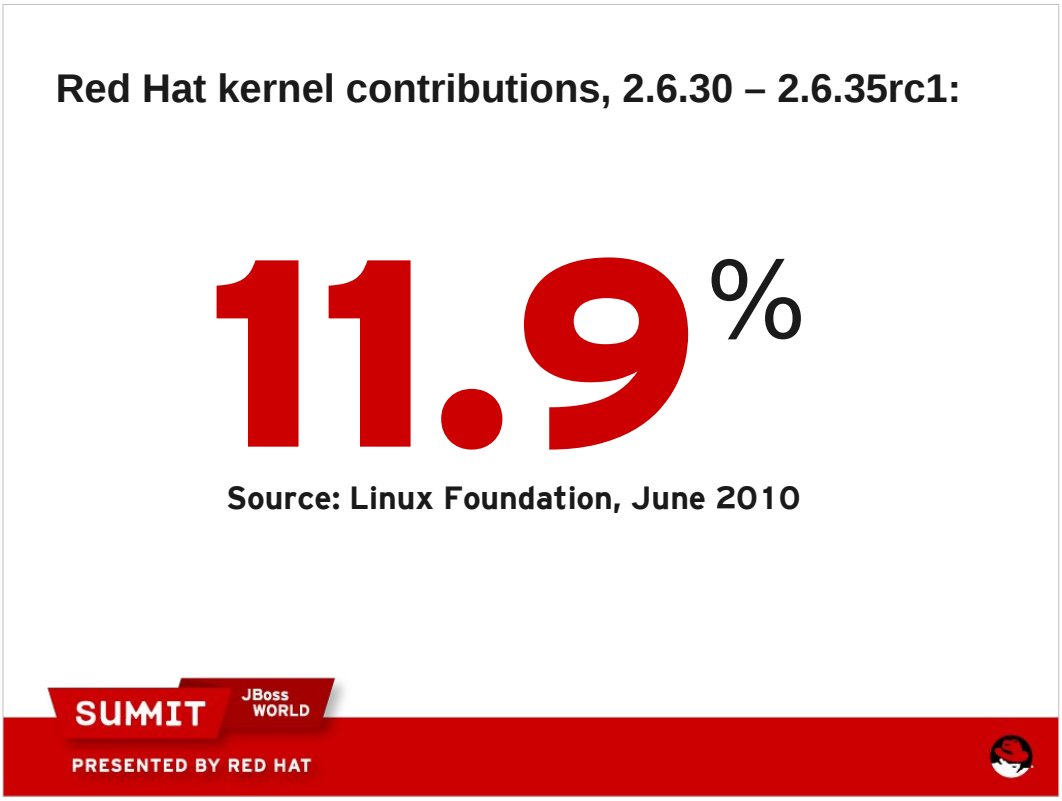
Red Hat lays bets on technologies by getting involved in upstream communities – in the daily code production, discussions, and review processes used by the community. What does that involvement look like in the case of the kernel?

**Note: The next four slides move quickly!** (NEXT SLIDE)




Dozens of these people are maintainers of drivers or large subsystems in the kernel. That's not accidental.

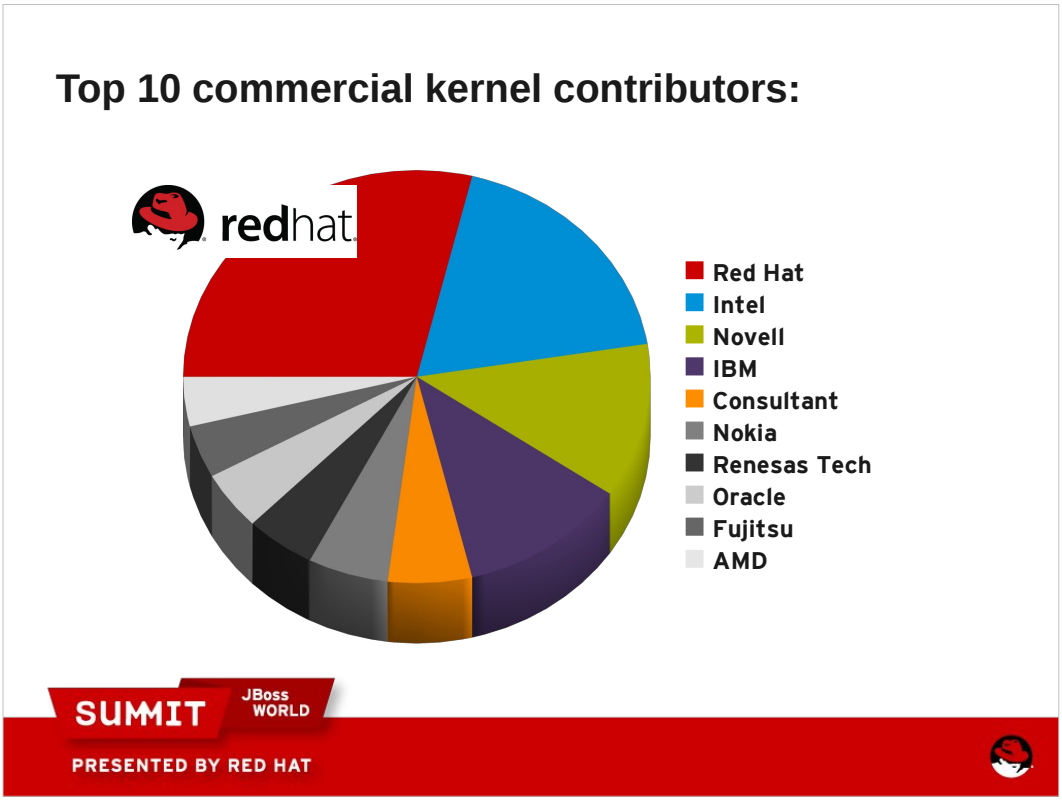
People are an important resource, and Red Hat pays attention to the engineering work done by individuals in upstream communities. We've hired people based on those contributions because their experience makes us better equipped to represent or handle customer needs.




This number is almost twice that of the next highest single contributor.

Red Hat's roster of “who's who” in the kernel is more than a score of names, influential people who maintain specific sets of functionality in the kernel, like CPU frequency scaling, wireless drivers, rendering, hardware buses, and so on.

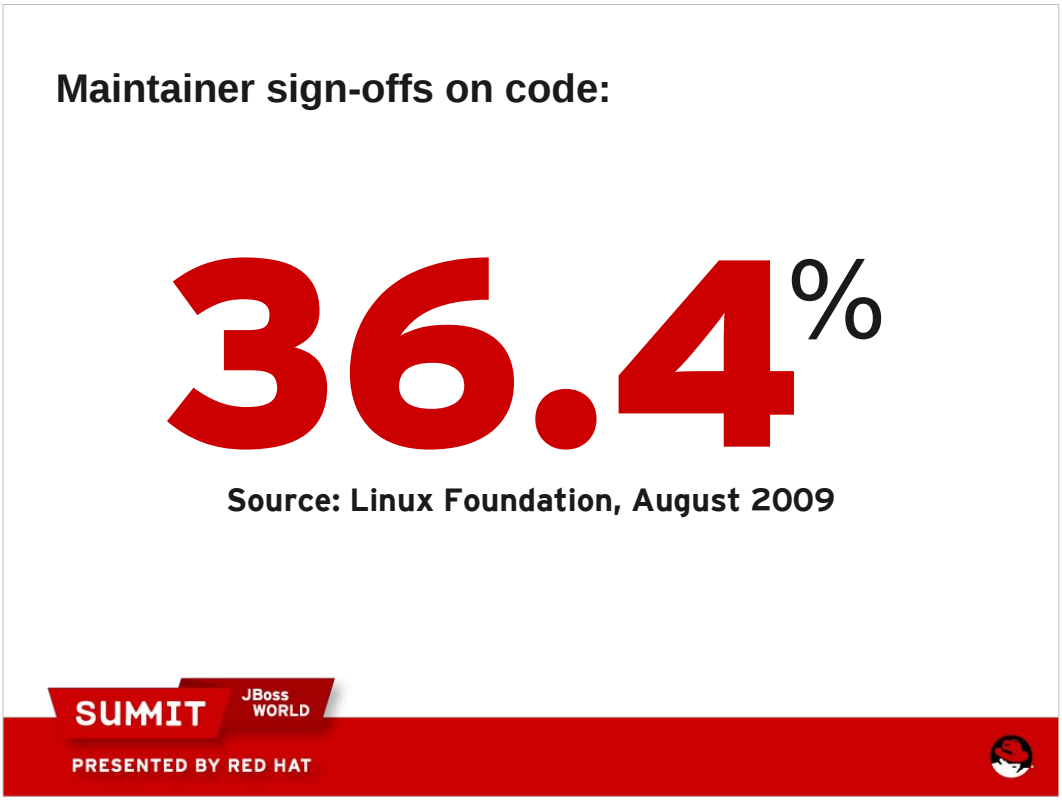
Let’s put this number in perspective. (NEXT SLIDE)



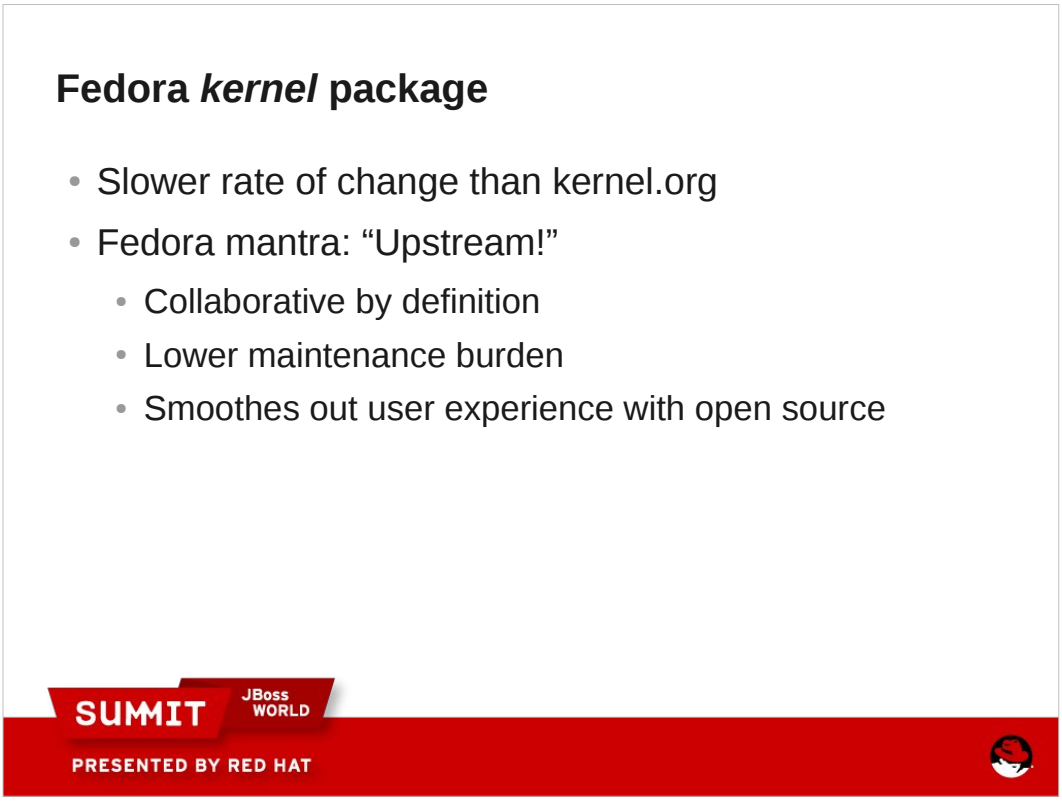

To put 12.3% in perspective, this graphic shows you the ten largest commercial kernel contributors. There is a very long tail of contributions from unaffiliated people such as hobbyists and independent developers, but this chart concentrates on just the known paid contributors.

The segment in red with Shadowman looking on is our portion.

Here's another way of looking at our participation in the kernel upstream through the kernel community's approval process. (NEXT SLIDE)




- Patches enter the kernel through signoff by a subsystem maintainer. A subsystem is dedicated to a specific function, such as wireless or a specific bus type, and is assigned to a maintainer. That maintainer provides a signoff to authorize the patch for incorporation.
- Red Hat employs a very significant number of subsystem maintainers, and signoffs by these maintainers represent over a third of all the signoffs in the kernel from 2.6.12 on.
- Your involvement with Red Hat as a customer means your needs are a priority to the largest commercial contributor to the kernel.
- So far we've been talking strictly about raw code. But how does that code get to Fedora -- becoming consumable so the technology can be experienced and selected by the crowd? (NEXT SLIDE)



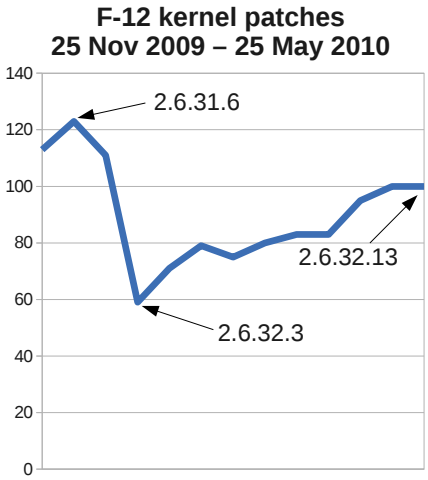

The reason for Fedora's upstream mantra is very clear if you understand open source development. Divergence equals difficulty. The more patches you carry, or differences you artificially induce from the upstream, the harder it is to maintain your product. The resources you use to maintain customizations are resources you can't use to solve problems in your domain.

And then there’s the “juke” factor. If Fedora were to serve primarily as a venue for patching or polishing the upstream **separately**, it would be a failure from the Red Hat perspective. It would no longer be an effective selection mechanism because we’d be juking the numbers.

This is not to say that Fedora always has zero patches, although we do try to minimize them. (NEXT SLIDE)

## Kernel patches in Fedora

- Typically increase over release lifetime, with backports
- Maintainers work with upstream to include changes
- “Current” numbers fall dramatically with updates

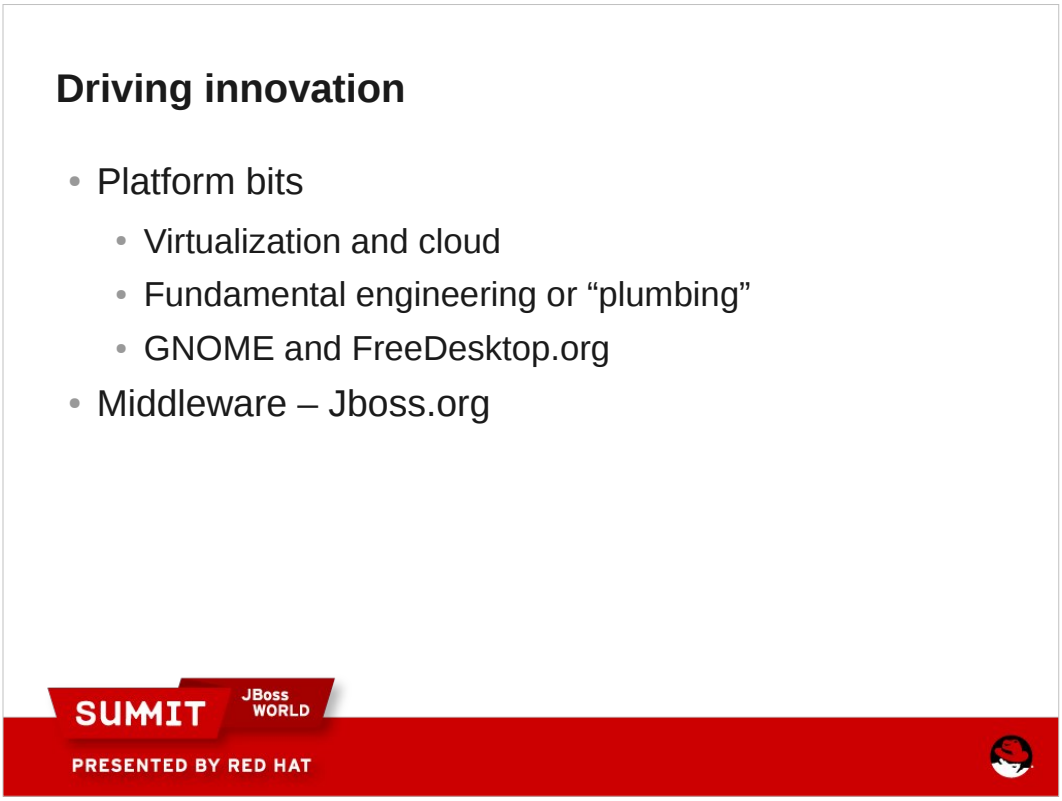





Ultimately, maintaining good upstream collaboration is about managing tension. During a given release, typically patches tend to increase. Not every user wants to move to the latest and greatest, but as changes like bug fixes and new functionality are included upstream, there's desire to backport them. Over time we try to resynchronize with official releases as closely as possible.

Here youcan see backports, as patches, piling up into Fedora 12's 2.6.31 kernel, until an official 2.6.32 release in January 2010.

Fedora offers WiP and pending fixes because of the nature of its audience – early adopters, developers, home users, and people who generally demand the latest and greatest hardware support. But we work on a lot more than just the kernel. (NEXT SLIDE)

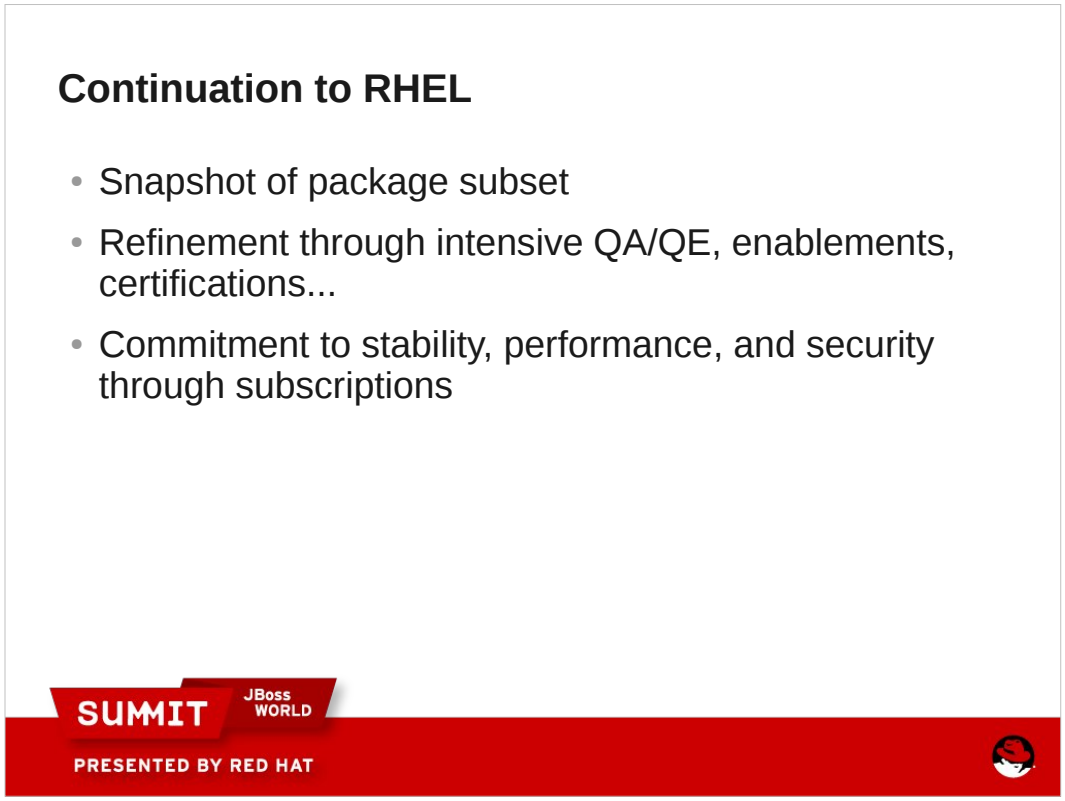



There are many other communities where Red Hat drives a heavy proportion of the innovation. Fedora (in the case of computing platform) and Jboss.org (in the case of middleware) contribute by integrating the technologies first.

Participants and people who watch these projects carefully benefit from seeing work in progress, and providing constructive feedback in the form of bugs, enhancement requests, and other critique.

Because all this work is done transparently, Red Hat customers and partners can be part of the process. When we talk about catalyzing community, we mean that we make it possible to do more than simply consume solutions we provide.

So in the case of the computing platform, how does this process feed into RHEL? (NEXT SLIDE)

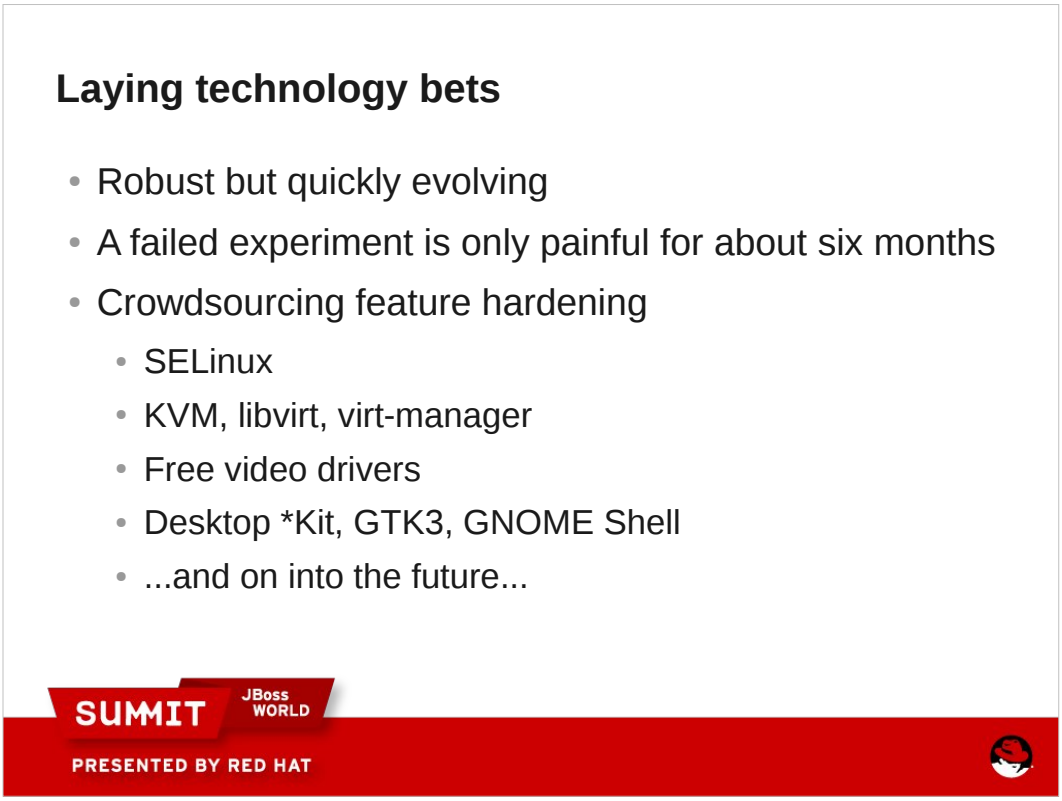



If Red Hat ships it, we support it. So we pick a subset of packages most in demand by our customers. Fedora has about 15,000 software packages available, and some of the differences are carried in the Extra Packages for Enterprise Linux (EPEL) repositories, which is not supported by Red Hat.

The snapshot is then refined through intensive quality engineering processes. We also certify thousands of ISV applications and hardware platforms.

The subscription model means we don't sell bits. We sell the solutions around them, including a trusted source for timely security updates, interface stability, consistency across platforms, and training and support options.

This is where the technologies elected in the Fedora community culminate in a product that is supportable on the very long timelines required by the enterprise.

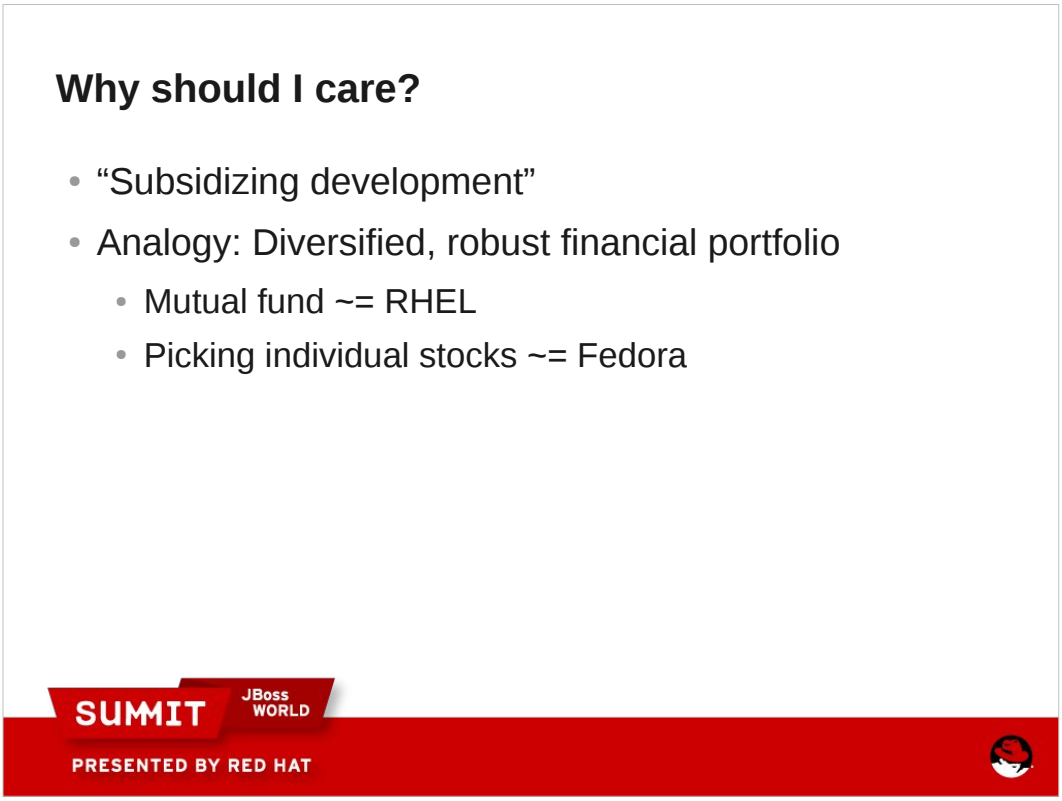



To be effective, Fedora must be both robust enough for normal use, and yet able to evolve quickly. That way, experiments can wither quickly, or if successful they can be built upon continually with additional features.

SELinux was an early technology bet which heavily influenced the readiness of RHEL for very secure environments, and our ability to effectively deliver more subscription value.

Virtualization through KVM and more powerful tools like libvirt, virt-manager, guestfish, and others, is a more recent example.

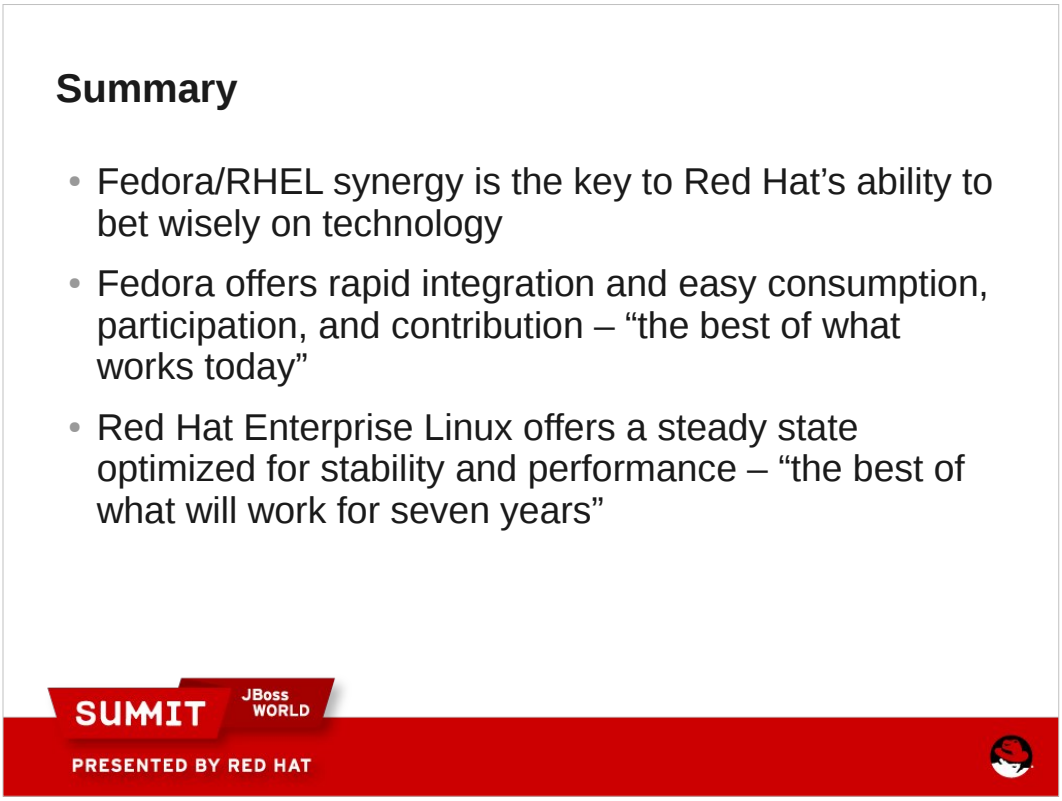
One of our current technology bets is on truly free and open source video drivers. Being able to debug and improve the code in free 3D drivers will help us build the next generation free desktop environment.




In a way, RHEL subscription is an investment that subsidizes development across open source. The return is a continually more powerful platform on the investor/customer’s schedule, without lock in.

This development model accommodates a variety of customer needs. For a flexible, ready-to-deploy platform with guaranteed long-term performance and stability, RHEL is the obvious choice. People who want to dig deeper, collaborate on platform development, and consume the results, can use Fedora to enhance Red Hat subscription value.

Note the resemblance to other proven models – where the customer has a choice of the level at which to engage with a provider. In this analogy, RHEL is like the mutual fund, where you let someone make informed choices for you based on your goals, while Fedora is more like picking your own stocks.




Hopefully you can come away from this presentation with an appreciation for how Red Hat and the Fedora Project have worked together to produce sustainable commercial value.

By continually electing the best technical solutions, Fedora ensures that Red Hat can keep customers at the forefront of open source technology. By cultivating a community of contributors, we have been continually advancing open source for seven years, and (almost) 14 releases and counting.

The proof is in not just those releases, but also in the careful optimization and refinement of RHEL, and our success at producing long-term technology value for our customers.

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