



LTSI Project update

Long Term Support Initiative

Tsugikazu SHIBATA, NEC

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Embedded Linux Conference Europe

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Who am I

- Tsugikazu SHIBATA, NEC
- Founder and project lead of Long Term Support Initiative (LTSI) that will help industry people to use Long Term Stable kernel with helpful activities.
- Involved Linux kernel community since 2.4 and also a board member of Linux Foundation

Linux is running everywhere

- Linux is running for ***multiple use cases***
 - NYSE, London, Tokyo Stock Exchange
 - Amazon, Google, Facebook, Twitter
 - Android, TV, Camera, Router, Car navigation
- Supports ***multiple architectures***
 - x86, arm, s390, ia64, mips, parisc, sparc, sh ...
- All those come from ***Single Source code*** tree

Developed by the community



- 1500 developer, 200 companies every release
- Yearly 2.2Mlines of code increased, 4900 files
 - Continue to increase developers
- 25 Years of history
- Maintainers have great skill to manage the subsystem and professional knowledge of its area of technologies

Status of Latest Linux Kernel



- Latest released Kernel : 4.8
 - Released: October 2nd, 2016
 - Lines of code : 22,071,048 (+350,053)
 - Files : 55,476 (+1100)
- Current Stable Kernel: 4.8.1
- Current development kernel: merge window for 4.9-rc1

Linux development policy

- Upstream is only the place to accept the patches
 - Reviewed by skilled maintainer
 - Tested with other proposals to confirm no conflicts
 - Follow the development process

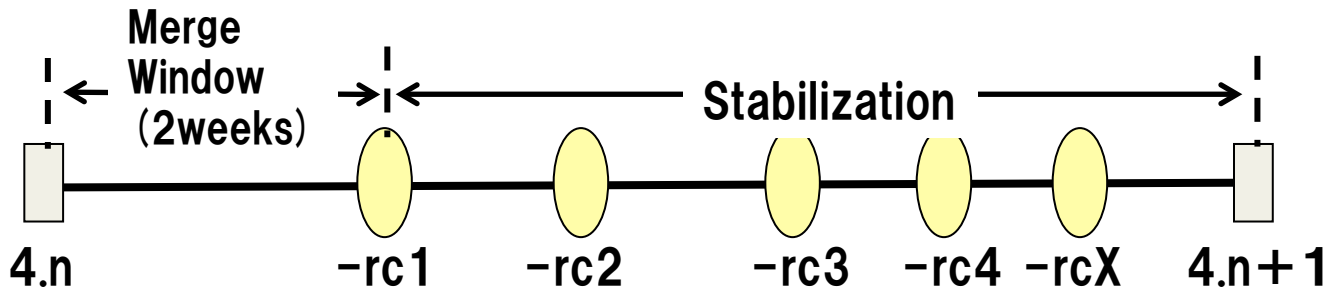
Upstream

New Features

Fixes
(Bug/Security)

Linux Development process

- Just after the release of 4.n, two weeks of merge window will be opened for proposal of new features
- After 2 weeks of merge window, -rc1 will be released and the stabilization will be started
- 4.n+1 will be released when it becomes reasonably stable by some of -rcX released



Kernel release cycle

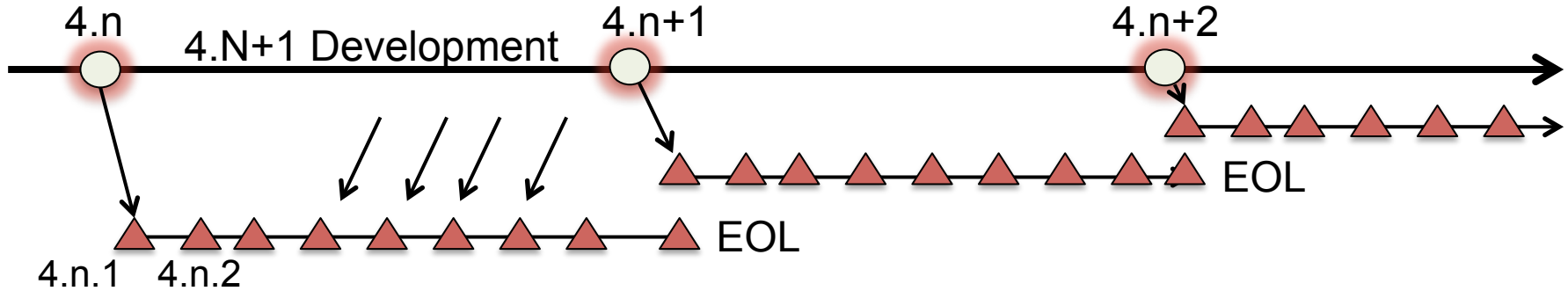
- Release cycle of Linux kernel is about 65days

Version	Release	Rel. span
3.10	2013-6-30	63
3.11	2013-9-2	64
3.12	2013-11-15	74
3.13	2014-1-21	67
3.14	2014-3-30	68
3.15	2014-6-8	70
3.16	2014-8-3	56
3.17	2014-10-5	63
3.18	2014-12-7	63
3.19	2015-2-9	64

Version	Release	Rel. span
4.0	2015-4-12	62
4.1	2015-6-22	71
4.2	2015-8-30	69
4.3	2015-11-2	64
4.4	2016-1-10	68
4.5	2016-3-14	64
4.6	2016-5-15	63
4.7	2016-7-24	70
4.8	2016-10-2	70

Yearly 5-6 chance to merge

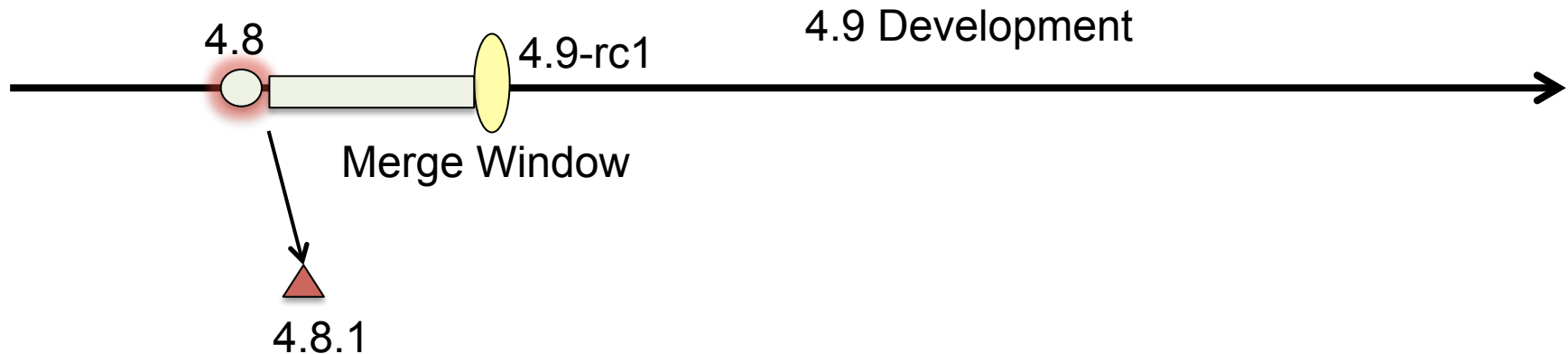
Stable kernel release



- Recommended branch for users who want the most recent stable kernel
- 3 part version like 4.n.m
- Contain small and critical fixes for security problems or significant regressions discovered in a latest development version
- Becomes End Of Life when next stable kernel were released

Status of Latest Linux Kernel Again

- Latest released Kernel : 4.8
- Current Stable Kernel: 4.8.1
- Current development kernel: in the merge window for 4.9-rc1



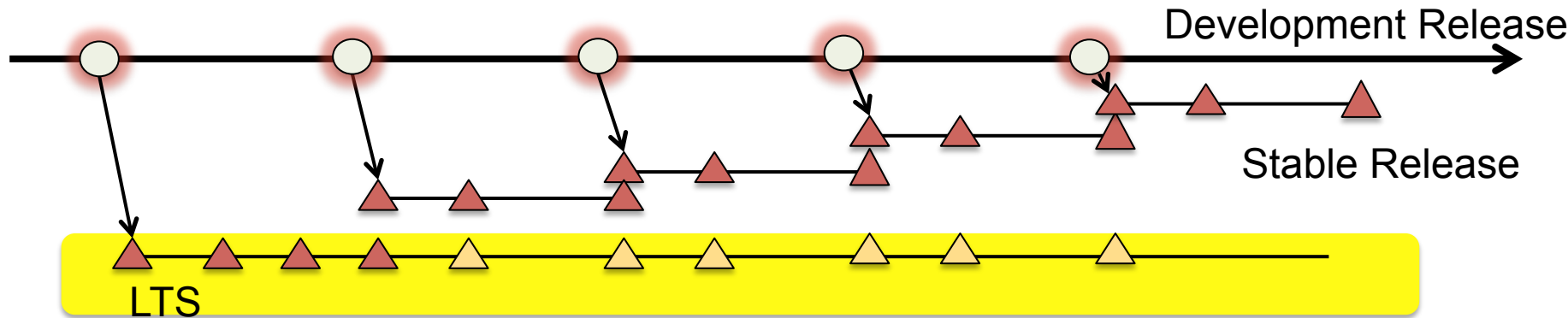
Stable_kernel_rules.txt

- Strict rule to back port from latest version
- Published since 2006. See [Documentation/stable_kernel_rules.txt](#)

- It must be obviously correct and tested.
- It cannot be bigger than 100 lines, with context.
- It must fix only one thing.
- It must fix a real bug that bothers people.
- It must fix a problem that causes a build error, an oops, a hang, data corruption, a real security issue, In short, something critical.
- Serious issues as reported by a user may also be considered.
- New device IDs and quirks are also accepted.
- No "theoretical race condition" issues, unless an explanation of how the race can be exploited is also provided.
- It cannot contain any "trivial" fixes in it .
- It or an equivalent fix must already exist in Linus' tree (upstream).

LTS: LongTerm Stable Kernel

- Kernel tree continue to back port bug and Security fixes
- Extended maintenance period for stable kernel
- Pick one version per year and maintain 2 years



Why LTS?

- Only the tree to get fixes from the community
- In the real use case, tested/confirmed kernel is important, less important for new features
- Fixes will be released # of times and should be applied frequently, Security/Bug fixes are being more important
- Bugs found in LTS should be reported and fixed in upstream

Current LTS versions

Version	Maintainer	Released	Projected EOL
4.9	Greg Kroah-Hartman	Not yet	
4.4	Greg Kroah-Hartman	2016-01-10	Feb, 2018
4.1	Sasha Levin	2015-06-21	Sep, 2017
3.18	Sasha Levin	2014-12-07	Jan, 2017
3.16	Ben Hutchings	2014-08-03	Apr, 2020
3.14	Greg Kroah-Hartman	2014-03-30	Aug, 2016(EOL)
3.12	Jiri Slaby	2013-11-03	Jan, 2017
3.10	Willy Tarreau	2013-06-30	Oct, 2017
3.4	Li Zefan	2012-05-20	Sep, 2016
3.2	Ben Hutchings	2012-01-04	May, 2018

LTS includes large number of fixes

- 600 – 700 fixes included in a Stable release
- LTS include several thousands of fixes

Version		# of commits
From	To	
3.0	3.0.101	3953 (EOL)
3.1	3.1.10	695 (EOL)
3.2	3.2.82	7165
3.3	3.3.8	698 (EOL)
3.4	3.4.112	5797
3.5	3.5.7	816 (EOL)
3.6	3.6.11	757 (EOL)
3.7	3.7.10	718 (EOL)
3.8	3.8.13	996 (EOL)
3.9	3.9.11	746 (EOL)

Version		# of commits
From	To	
3.10	3.10.103	5710
3.11	3.11.10	677 (EOL)
3.12	3.12.64	6777
3.13	3.13.11	903 (EOL)
3.14	3.14.79	4977(EOL)
3.15	3.15.10	703 (EOL)
3.16	3.16.36	5249
3.17	3.17.8	884 (EOL)
3.18	3.18.42	3872
3.19	3.19.8	873

Version		# of commits
From	To	
4.0	4.0.9	757(EOL)
4.1	4.1.33	3231
4.2	4.2.8	903(EOL)
4.3	4.3.6	618(EOL)
4.4	4.4.24	2742
4.5	4.5.7	973(EOL)
4.6	4.6.7	705(EOL)
4.7	4.7.7	831
4.8	4.8.1	11

LTSI Status

What is LTSI

- Open Source community to create and maintain Linux kernel for long term
 - Based on LTS
 - Add another chance to include further patches on top of LTS
 - Same lifetime with LTS (yearly release and 2 years life time)
- Industry party to share practice and experience among the companies

LTSI includes LTS

LTSI

- ❑ Add vendor required features
- ❑ Share status, info, problem among industry people
- ❑ Huge testing by contributors
- ❑ Auto test frame work
- ❑ Provide help to developer for upstream

LTS

- ❑ Release 1 version / year, Maintain 2 years
- ❑ Frequently and large number of bug /security fixes

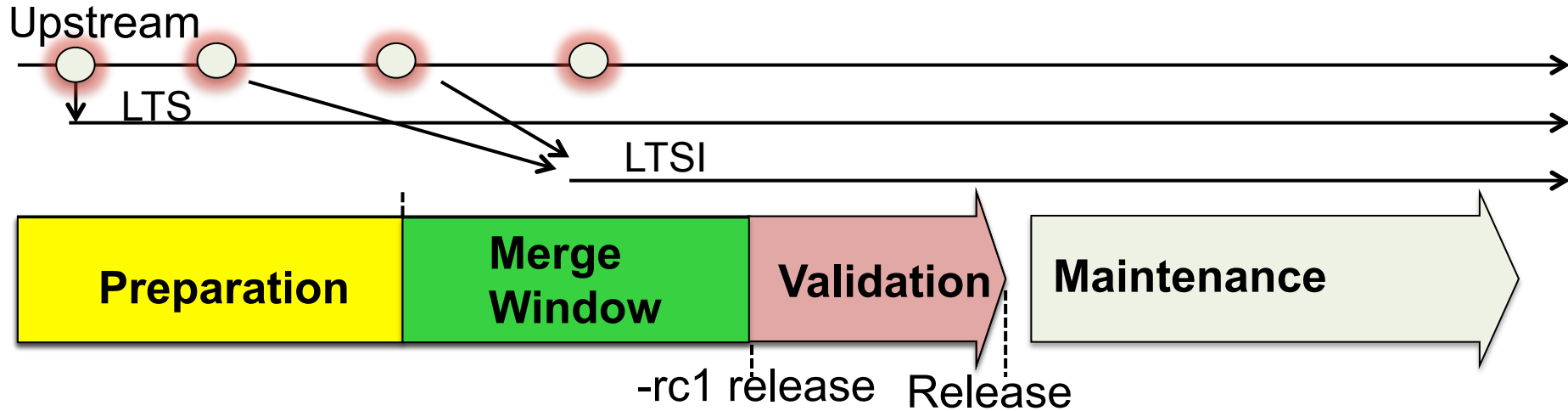
History of LTSI

- Established 2011 – 5 years now
 - Started for stable Kernel for Android
- Integrated by Yocto (2012, May)
- Have had a workshop/session to share information and discuss issue among industry people
- Released yearly basis; 3.0, 3.4, 3.10, 3.14, 4.1

Shape of LTSI Project

- Small staff to coordinate workshop , session at LF conference
- Maintainer: Greg Kroah-Hartman , Fellow of Linux Foundation
- Working with upstream Linux Community
- Keeping neutral position to be able to use for variety of use case

LTSI development process



- Preparation: 4-5 month (~2 of upstream release)
- Merge window: 2 month to propose additional patches. Self contained or later upstream features
- Validation: a month or more. All the contributor must validate and report back

LTSI as a part of Distro

- Yocto project has a normal option to use LTSI
 - You can create your own distribution with LTSI
 - Yocto is doing their own tests for the distribution with LTSI. Both build distro and run it.
- Many of report/blog in the internet using Yocto and LTSI

Fuego: Auto test package



- Jenkins based auto test packages (using Docker)
 - Distributed under 3-clause BSD license
 - Over 50 test packages included with Web based monitor
- Got nice new name “Fuego” by the community
- Already used by number of users
- This is a referenced implementation but works good

Use Case: Automotive Grade Linux



- Developing reference implementation called UCB (Unified Code Base) distribution v1.0 using LTSI 3.14 kernel
 - AGL/UCB is using Yocto and LTSI
- Have had a demonstration at CES 2016 Las Vegas with announcement
- V2.0 Brilliant Blowfish was released July 12
- V3.0 is planned to be released Jan. 2017



Use Case: Civil Infrastructure Platform



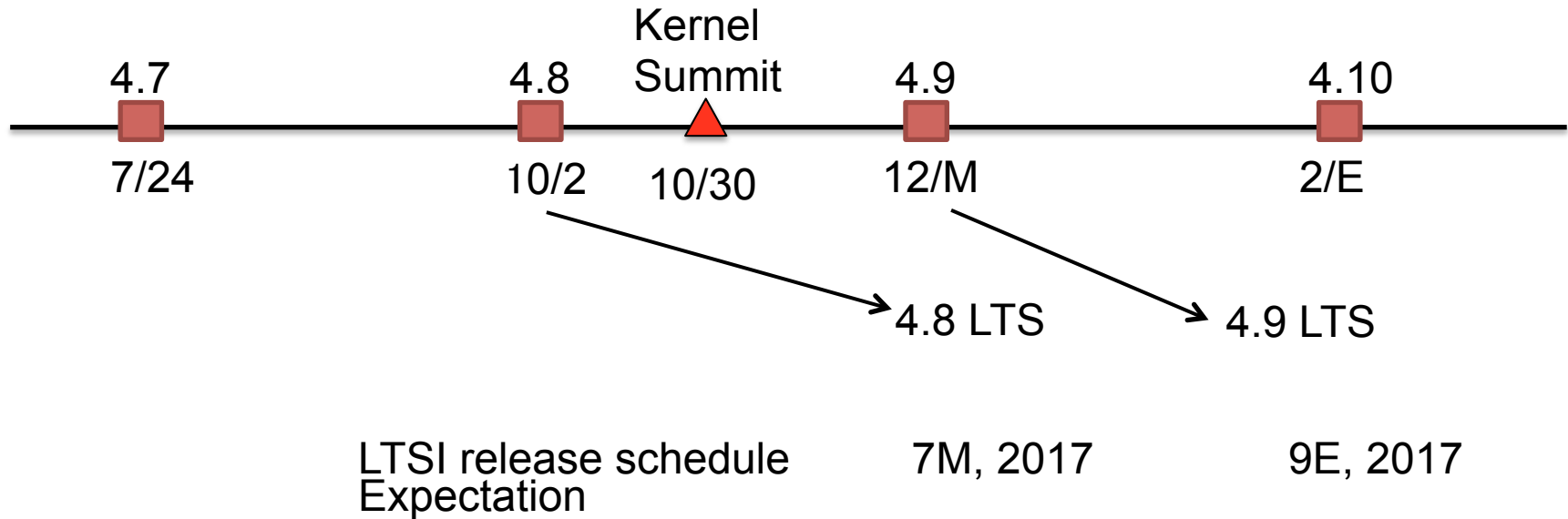
- Established Feb 2016, by Toshiba, Hitachi, Siemens and others to create reference distribution for Civil infrastructure
- One of major requirement includes Super Long Term Support: 10-15 years
- Planning to take over maintenance of LTSI after EOL

Q: Plan of this year's LTSI?

- Kernel Summit 2015 had discussion about LTS and decided to be 4.4
- Greg stated that 4.9 will be this year's LTS
- There were number of discussion at K-summit ML and maybe move to 4.8 or 4.10 if people send unready patches to upstream
- Also, Discussion about upstream first happened

LTSI Schedule expectation

- Kernel Summit 2016 will be the time to decide LTS version



Conclusion

- LTSI was started to fill the gap between community and industry but still there is the gap
 - We will continue our activity to discuss both side to better align each other
- Well Eco system support : Yocto and Fuego
- Strong use case is on going
- Why don't you join LTSI?
 - By joining the community, you will be able to share best practice
 - To get useful information for stable kernel

THANK YOU

LTSI Workshop :
Wednesday October 12, 10AM- @Salon 17, Riga

You can participate LTSI

- Follow on Twitter account:

@LinuxLTSI



LinuxLTSI

@LinuxLTSI

LTSI stands for Long-Term Support Initiative. A group of Core Working Group of the Linux Foundation to provide Long-Term and stable Linux for Industry

- Web:

<http://ltsi.linuxfoundation.org>

- Mailing list:

<https://lists.linuxfoundation.org/mailman/listinfo/ltsi-dev>

- Git tree :

<http://git.linuxfoundation.org/?p=ltsi-ernel.git;a=summary>