



WLCG Grid Deployment Board

Future Linux Distribution Scenarios update

2021-04-12

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On behalf of CERN IT

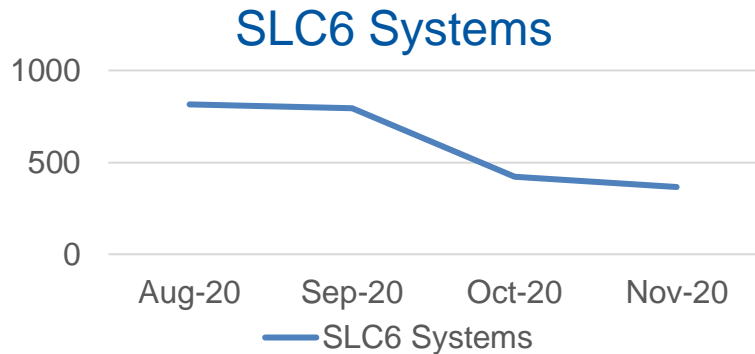
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Agenda

- Situation today
- Recent changes
 - Distribution landscape
 - CentOS Linux 8: change of end-of-life, CentOS Stream 8 and how this affects CERN and WLCG sites
- Next Steps:
 - What we know today
 - “Linux Future” roadmap
 - Distribution landscape: potential future
 - Potential implications
- Summary
- Additional information

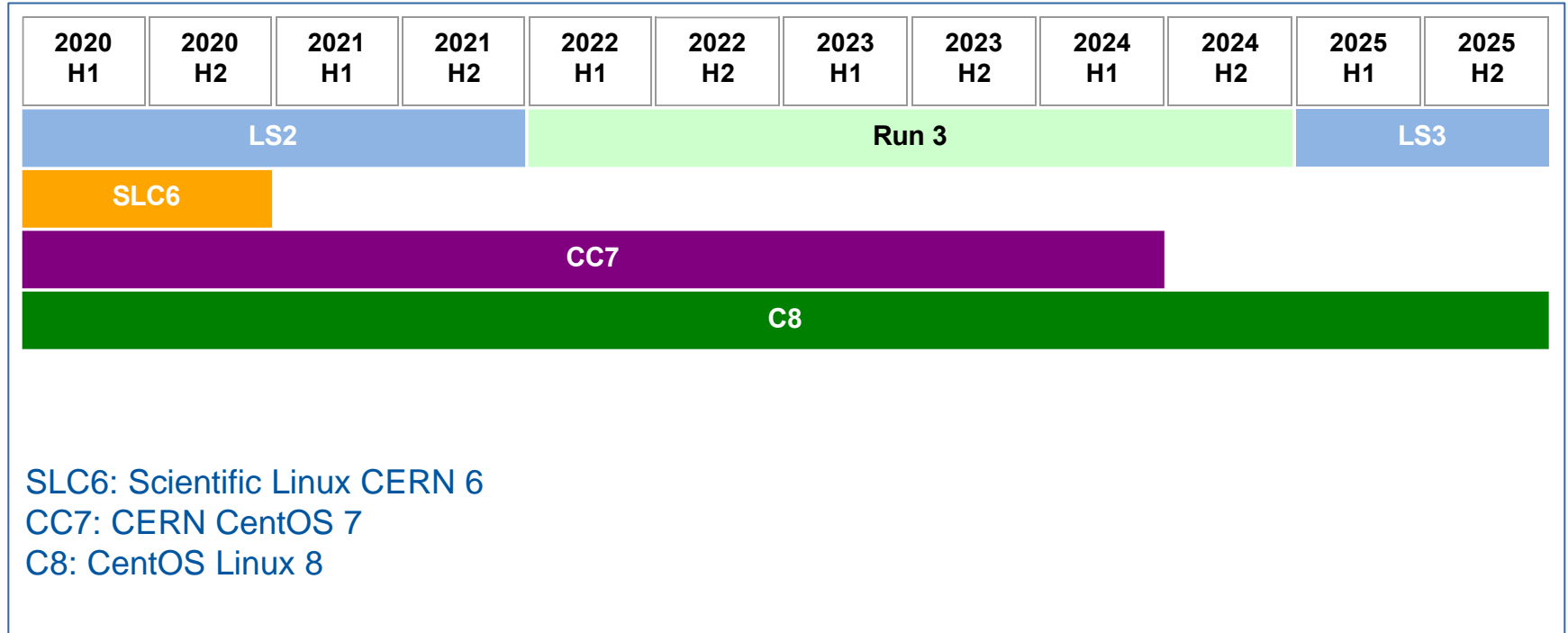
Situation today

- SLC6 (Scientific Linux CERN 6) decommissioned as of 30.11.2020
 - A decommissioning campaign informing the owners of SLC6 hosts* occurred on a monthly basis



- CC7 (CERN CentOS 7) continues to be a supported operating system
- C8 (CentOS Linux 8) is available as a supported operating system

Distribution Landscape - November 2020



CentOS Linux 8: change of end-of-life

- On the 8th of December 2020, the CentOS Project announced it was shifting its focus from CentOS Linux to CentOS Stream
- During the same announcement, the end-of-life for CentOS Linux 8 was reduced from being a 10 year supported distribution to being 2 years
- Support for CentOS Linux 8 will end at 31.12.2021

CentOS Stream 8

- CentOS Stream 8 is a rolling updates Linux distribution that will be used by RedHat as the upstream for each RHEL minor release
- There will not be any major 8.x point releases (minor releases)
- Supported for 5 years (End-of-life 31.05.2024)
- Contribution should be easier than contributing to CentOS Linux
- Migration from CentOS Linux 8 to CentOS Stream 8 is trivial

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CentOS
Stream



Red Hat
Enterprise Linux



CentOS



CentOS Stream 8

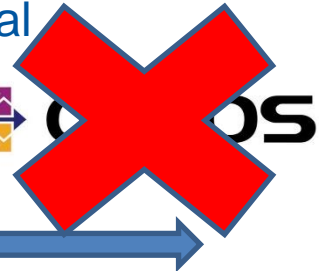
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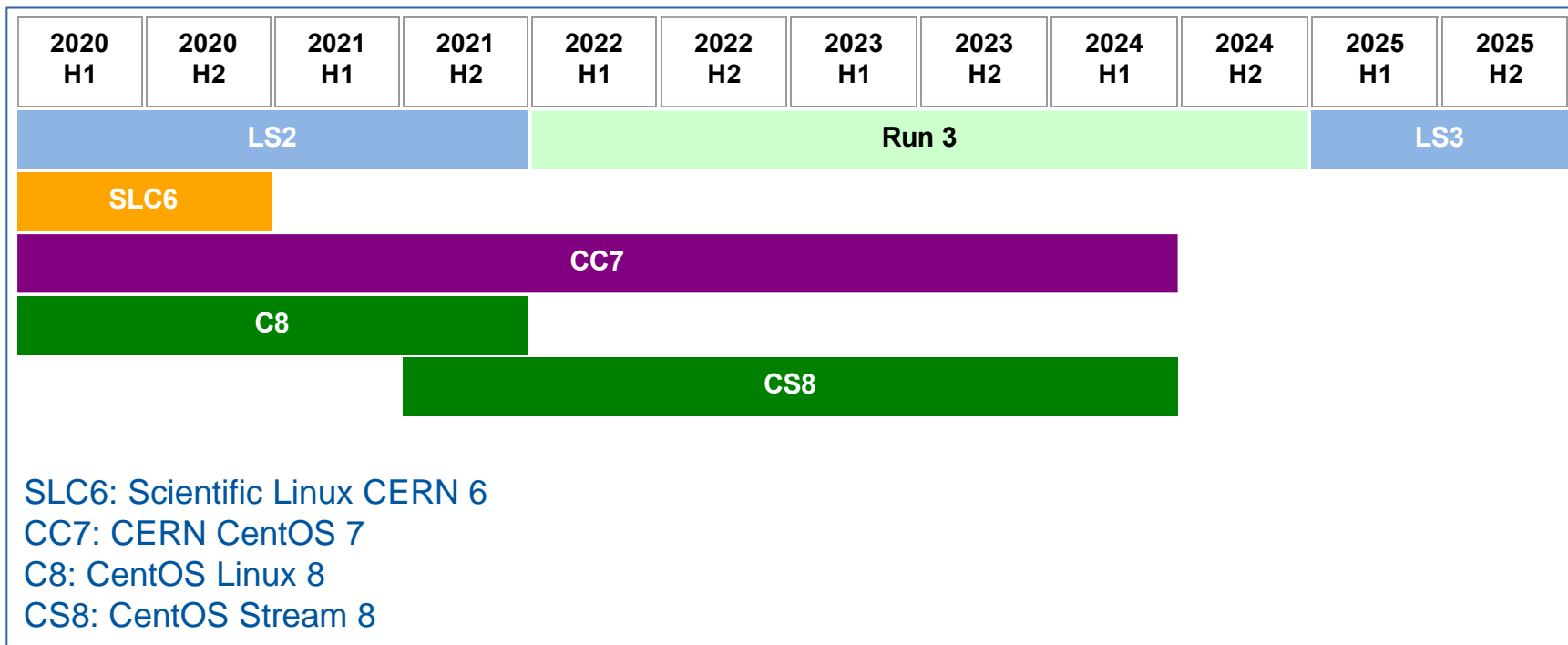
CentOS
Stream



Red Hat
Enterprise Linux



Distribution Landscape - December 2020



Factors affecting WLCG sites for LHC Run3

- Both CC7 and CS8 distributions stop being supported mid Run3
 - CERN IT Security will permit a small subset of firewalled hosts to utilise CC7 or CS8 until the end of Run3
 - Run3 could potentially be extended into 2025?
- Partially upgrading some resources to CS9 during the Run or during one of the “end of year stops” may be feasible for some WLCG sites
- A decision on the successor of CC7/C8/CS8 needs to be made as soon as possible to allow experiments adequate time to plan for Run3

Linux Future Committee

“To provide a structured working group with the focus of:

- *Reviewing scenarios*
- *Understanding impact on current Linux usage*
- *Providing input on future roadmaps*

for a Linux operating system that satisfies the needs of the CERN community”

- Membership is internally comprised of representatives of key business units of CERN
- The goal of the committee is not to make decisions, however, to provide a platform for discussion with the output being recommendations to decision makers
- <https://indico.cern.ch/category/13390>

“Linux Future”: What we know today

- Future Linux distributions will be RPM based
 - Efforts required for retraining and retooling are too high to move away from RPM
- Future Linux distributions will need to support both x86_64 and aarch64
 - Many (several thousand) SoC systems will soon come online with aarch64
- Multiple Linux distributions are probably inevitable to support all use cases
 - CentOS Stream will be used for SIGs, however the life cycle of Stream does not fit all use cases
- CERN, Fermilab and other scientific sites are strongly interested in common roadmap(s)

“Linux Future”: Roadmap short-term

- Short-term: **Now (21.01.2021)** to **Soon**
 - Chair “Linux Future committee” meetings
 - Support CentOS Linux 8
 - Move to supporting CentOS Stream 8
 - Provide CentOS Stream 8 repositories:
 - <http://linuxsoft.cern.ch/cern/centos/{s8,s8-testing,s8-snapshots}>
 - Daily automated snapshots of CentOS Stream (upstream)
 - Daily snapshot promotion for ‘testing’ (s8-testing)
 - Weekly snapshot promotion for ‘production’ (c8)
 - Provide OpenStack and Docker images
 - Work in progress: Provide an upgrade path from CentOS Linux 8 to CentOS Stream 8

“Linux Future”: Roadmap medium-term

- Medium-term: **Soon to 31.12.2021**
 - Support both CentOS Linux 8 **and** CentOS Stream 8
 - Continue chairing the “Linux Future committee” which will be responsible for ensuring that CERN scenarios are covered by future Linux operating systems
 - Based on the analysis from the Linux Future committee, collaboration with Fermilab and other HEP communities, as well as the WLCG - decide on the path forward
 - Support “Next” Linux Operating system ?

“Linux Future”: Roadmap long-term

- Long-term: **31.12.2021 onwards**
 - Drop support for CentOS Linux 8
 - Support CentOS Stream 8 (until end-of-life 31.05.2024)
 - Support “Next” Linux Operating system
 - Linux Future committee continues, providing impact analysis and review of potential new scenarios
 - Based on the analysis from the Linux Future committee, collaboration with Fermilab and other HEP communities, as well as the WLCG - decide on the path forward

“Linux Future”: Potential options

- CentOS Stream 9
- ELC (Enterprise Linux Clone)
 - RHEL rebuilds (Rocky Linux, Alma Linux, Springdale Linux) with CERN being a contributor
 - RHEL8/RHEL9 – if RedHat releases a no cost/low cost academic license that is of interest to CERN/HEP

Distribution landscape – Potential options: Legend

Distribution	Description
CC7	CERN CentOS 7
CC7	CERN CentOS 7 (outside of maintenance)
C8	CentOS Linux 8
CS8	CentOS Stream 8
CS8	CentOS Stream 8 (outside of maintenance)
CS9	CentOS Stream 9
ELC8	Enterprise Linux Clone 8 RHEL (RedHat Enterprise Linux) / RHEL rebuild (Rocky, Alma, Springdale, etc)
ELC9	Enterprise Linux Clone 9 RHEL (RedHat Enterprise Linux) / RHEL rebuild (Rocky, Alma, Springdale, etc)
	A major Operating System change that would be disruptive (implying a reinstall)

Distribution landscape - Potential options: 7 Upgrade path

	2021 H1	2021 H2	2022 H1	2022 H2	2023 H1	2023 H2	2024 H1	2024 H2	2025 H1	2025 H2	2026 H1	2026 H2	2027 H1
LHC Schedule	LS2		Run 3						LS3				
Fermilab Schedule	Run												LS
1. CC7 → ELC8	CC7			CC7				CC7	ELC8				
									ELC8				
2. CC7 → ELC9	CC7				CC7			CC7	ELC9				
									ELC9				
3. CC7 → CS9	CC7				CC7			CC7	CS9				
									CS9				

Distribution landscape - Potential options: 8 Upgrade path

	2021 H1	2021 H2	2022 H1	2022 H2	2023 H1	2023 H2	2024 H1	2024 H2	2025 H1	2025 H2	2026 H1	2026 H2	2027 H1
LHC Schedule	LS2		Run 3						LS3				
Fermilab Schedule	Run											LS	
4. C8 → CS8 → ELC8	C8	C8	CS8	CS8			CS8	ELC8					
		CS8		ELC8									
5. C8 → CS8 → ELC9	C8	C8	CS8	CS8		CS8	CS8	CS8	ELC9				
		CS8				ELC9							
6. C8 → CS8 → CS9	C8	C8	CS8	CS8		CS8	CS8	CS8	CS9				
		CS8				CS9							

- 8 family transitions (C8->CS8 / C8->ELC8 / CS8->ELC8) can in theory can be performed without a reinstall

Potential implications

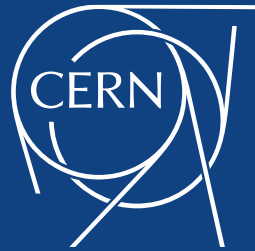
- WLCG Security concerns will need to be evaluated on running WLCG workers until the end of Run 3
- Some long running analysis will continue beyond the end of Run 3 and will need a compatible environment
- Further workload migration into containers such as Singularity would significantly reduce impact
- Middleware build and distribution may need to become more dynamic
- Need to plan on a transition for grid workers and services from 7 before end of Run 3, e.g. during 2023 EYETS
 - Moving to CS9 or ELC9 seems to be the most likely option

Summary

- CentOS Linux 8 end-of-life has changed from 10 years to 2 years, ending on 31.12.2021
- CentOS Linux 8 systems will be provided an upgrade path to CentOS Stream 8 (5-year life cycle)
- Linux Future Committee has been created to provide a platform of discussion for the future of Linux distributions at CERN
- A decision has not yet been made on future Linux distributions

Additional information

- CERN Linux information: <https://linux.web.cern.ch/centos8/>
- Linux Future committee: <https://indico.cern.ch/category/13390/>
- Upstream announcement: <https://blog.centos.org/2020/12/future-is-centos-stream/>
- Upstream frequently asked questions: <https://centos.org/distro-faq/>
- RedHat announcement on low cost / zero cost programs:
 - <https://www.redhat.com/en/blog/new-year-new-red-hat-enterprise-linux-programs-easier-ways-access-rhel>
 - <https://www.redhat.com/en/blog/extending-no-cost-red-hat-enterprise-linux-open-source-organizations>



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