

## SUSE on POWER

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# Agenda

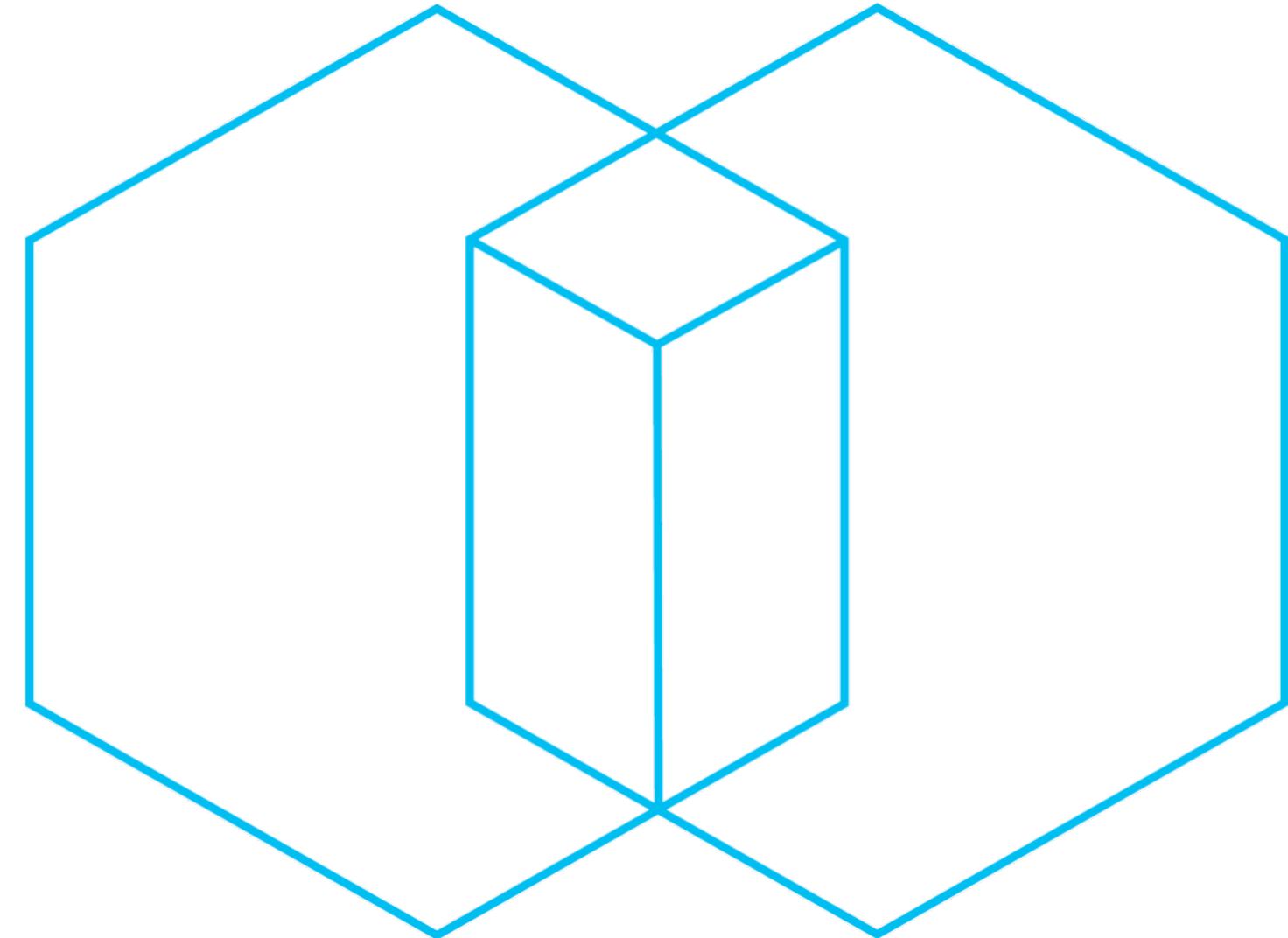
- SUSE Company update & Portfolio
- SUSE + IBM
- SUSE + IBM + Power
- Business continuity: HA + System rollback + Live Patching + Extended Life Cycle
- Systems management: SUSE Manager and SALT



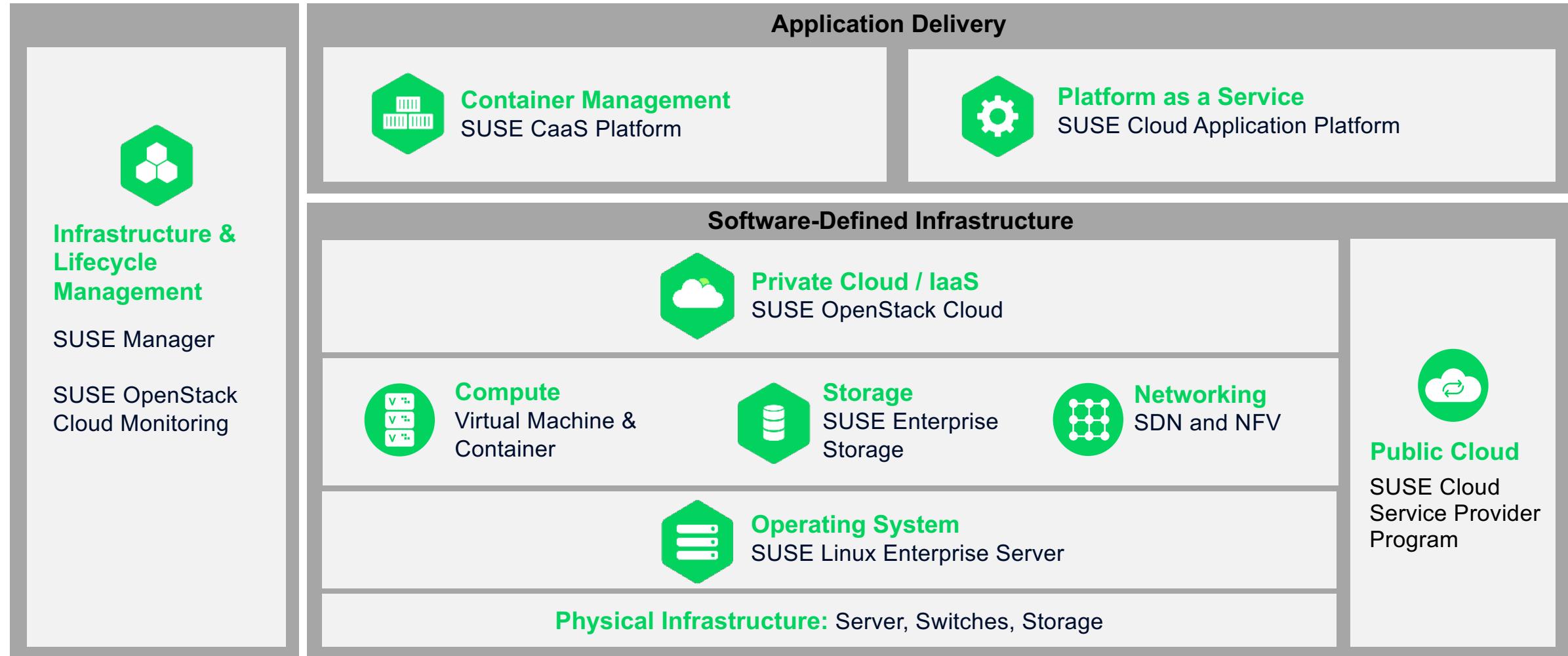


# SUSE Today

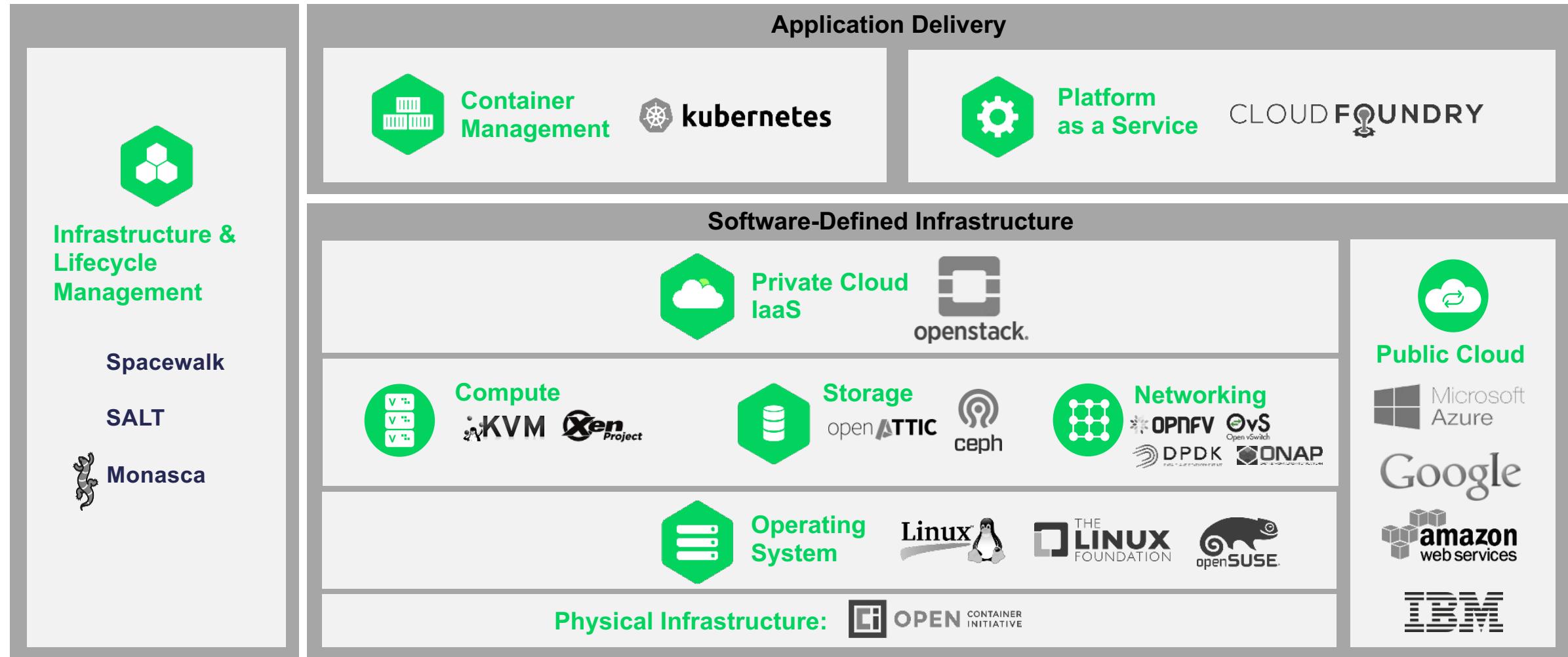
Company update & portfolio



# SUSE Software-defined Infrastructure and Application Delivery Approach



# Open Source at the Heart of Our SDI and Application Delivery Approach



# Product Portfolio

## Server and Desktop

- SUSE Linux Enterprise Server
- SUSE Linux Enterprise Server for System z and LinuxONE
- SUSE Linux Enterprise Server for POWER
- SUSE Linux Enterprise Server for ARM
- SUSE Linux Enterprise Server for SAP Applications
- SUSE Linux Enterprise Server for High Performance Computing
- SUSE Linux Enterprise Real Time
- SUSE Linux Enterprise Server with Expanded Support
- SUSE Linux Enterprise Point of Service
- SUSE Linux Enterprise Desktop

## Server Extensions

- SUSE Linux Enterprise High Availability Extension
- GEO Clustering for SUSE Linux Enterprise High Availability Extension
- SUSE Linux Enterprise Workstation Extension
- SUSE Linux Enterprise Virtual Machine Driver Pack
- Long Term Service Pack Support
- SUSE Linux Enterprise Live Patching

## Cloud, Containers, Storage and Management

- SUSE OpenStack Cloud
- SUSE Enterprise Storage
- SUSE Manager
- SUSE Manager Management Pack for Microsoft System Center
- SUSE Containers as a Service Platform
- SUSE Platform as a Service<sup>1</sup>
- SUSE Studio



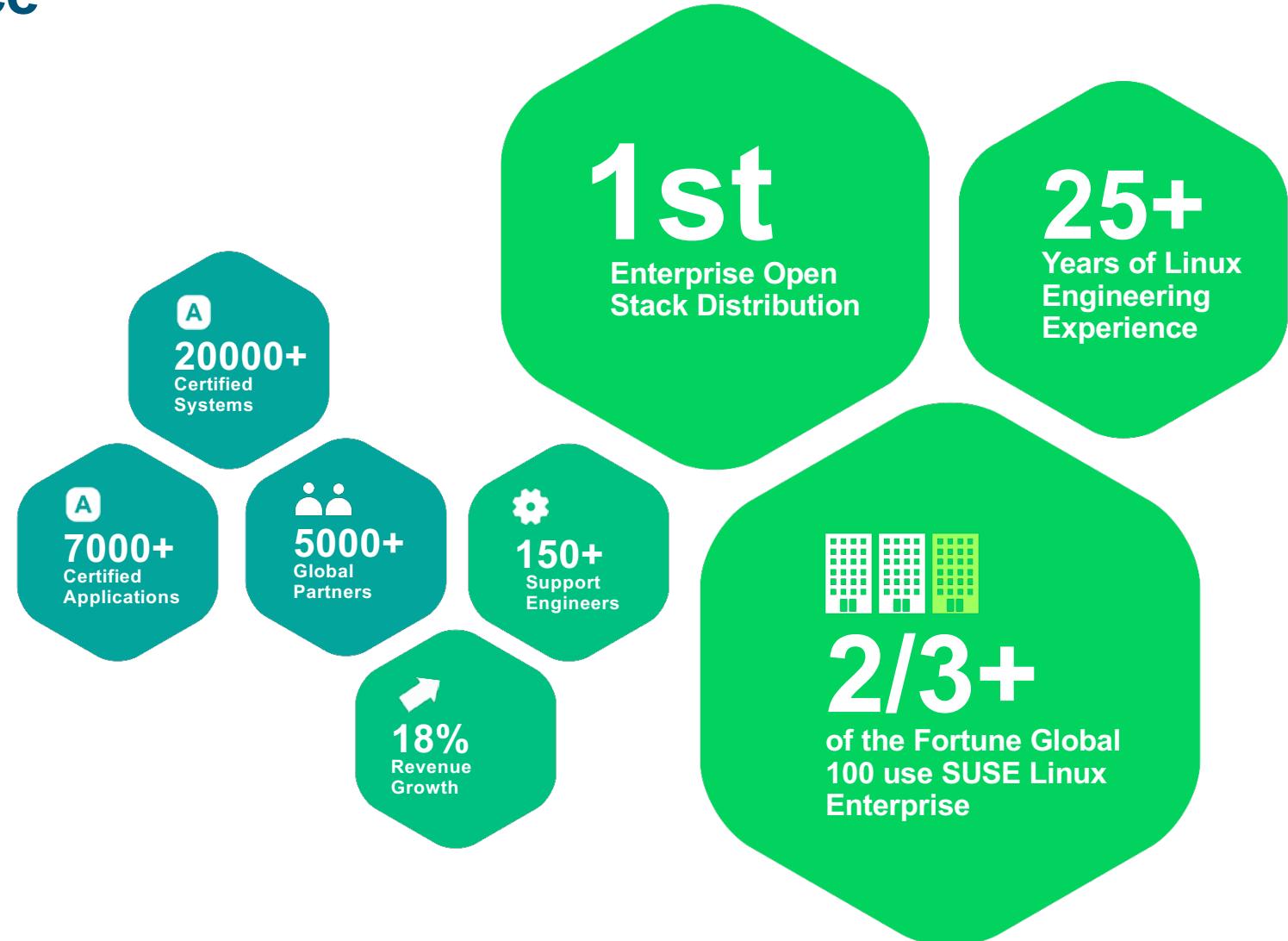
# Leading Technology Innovation

SUSE has been the first to:

- Develop enterprise Linux on SAP HANA, AWS and Azure public cloud
- Lead development of the commercial Linux market by delivering the first commercially supported Linux distribution
- Allow instant rollback of operating system changes
- Pioneer continuous availability through live patching for mission-critical systems, including SAP HANA environments
- Deliver a Linux high availability solution that supports geographic mirroring with a broad set of redundancy configurations
- Champion for simplified single system Linux configuration and management
- Deliver the first commercially supported OpenStack distribution
- Bring an innovative approach to simplify the deployment of configurable infrastructure (OBS)
- Give consistent support on multiple system architectures by using a common code base
- Provide efficient multiple systems software and asset management built on leading open source technology such as Salt
- Facilitate DevOps adoption through inclusion of Docker technology in SUSE Linux Enterprise Server
- Create the Portus project to simplify and secure management of Docker registries



# SUSE at a Glance



# Where SUSE Leads

**70%** 

## SAP on Linux

70% of all SAP applications running on Linux run on SUSE

95% HANA systems based on SUSE

**x10** 

## Linux in Telecom

10 of the largest telecommunications carriers rely on SUSE

**x10** 

## Linux in Automotive

10 of the largest global automobile mfgs. are active SUSE customers

**15+** 

## Mainframe Linux

Over 15 years of mainframe Linux market share leadership

**80%** 

## Linux in Large Enterprise

Over 80% of the Fortune Global 50 are active SUSE Customers

**7/10** 

## Linux in Pharma

7 out of 10 of the largest pharmaceutical companies use SUSE Linux Enterprise

**50%** 

## Linux in HPC

Half of the world's 20 largest super computers run on SUSE

**4/5** 

## Linux in Finance

4 out of 5 of the world's largest banks use SUSE Linux Enterprise

**9/10** 

## Linux in Aerospace

9 out of 10 of the largest aerospace companies rely on SUSE

**7/10** 

## Linux in Retail

7 out of 10 of the largest retailers in the U.S. are active SUSE customers

**7/10** 

## Linux in Manufacturing

7 out of 10 world's largest manufacturers use SUSE Linux Enterprise

# Community Involvement

# Micro Focus International



**7th**

Largest pure-play software company in the world.



**5,000+**

Partners



**40,000**

Customers

**2nd**

SW company in Europe



**\$4.4B**

Annual Revenue



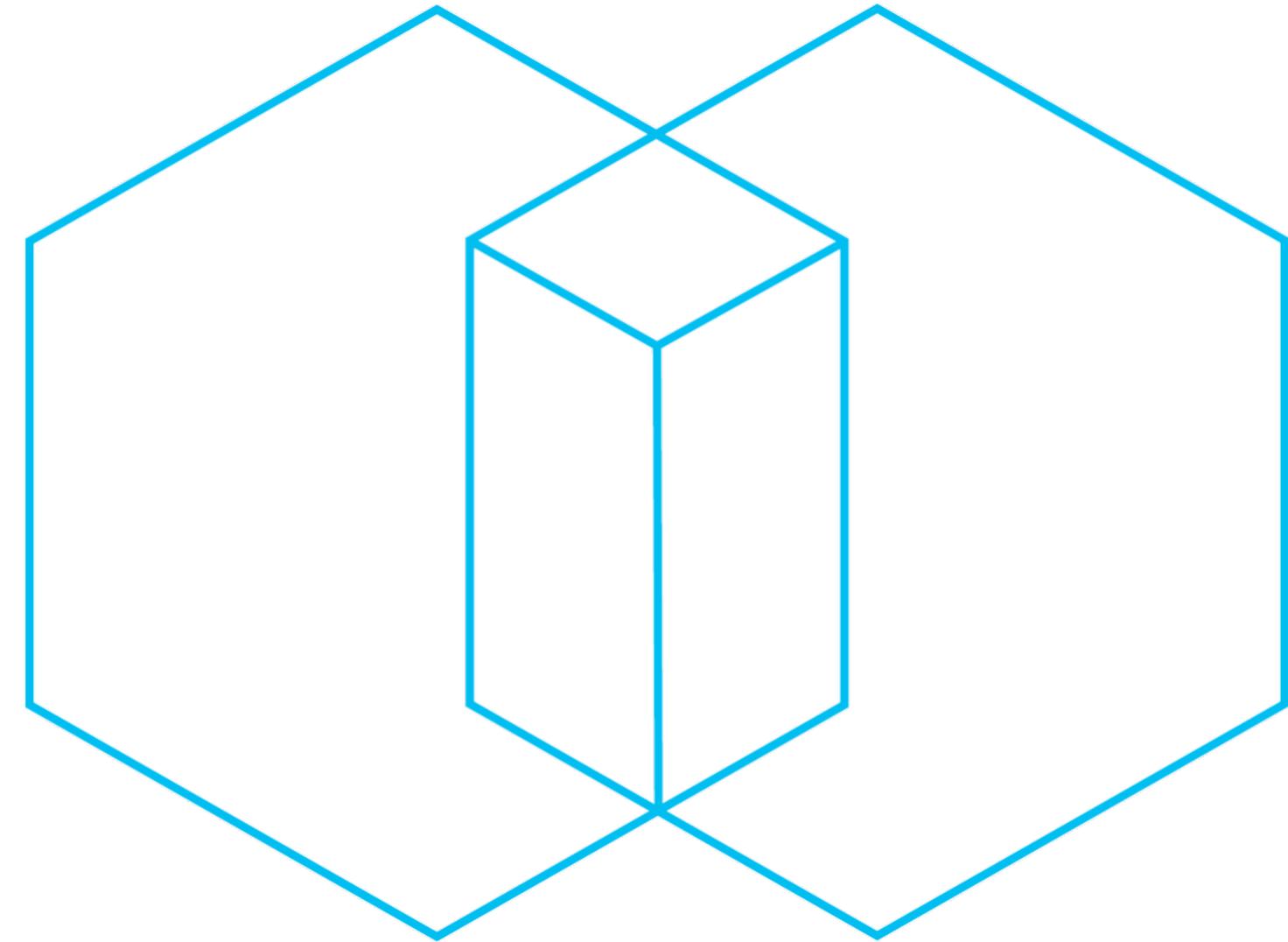
**45+**

Countries



# IBM & SUSE

More than partners!

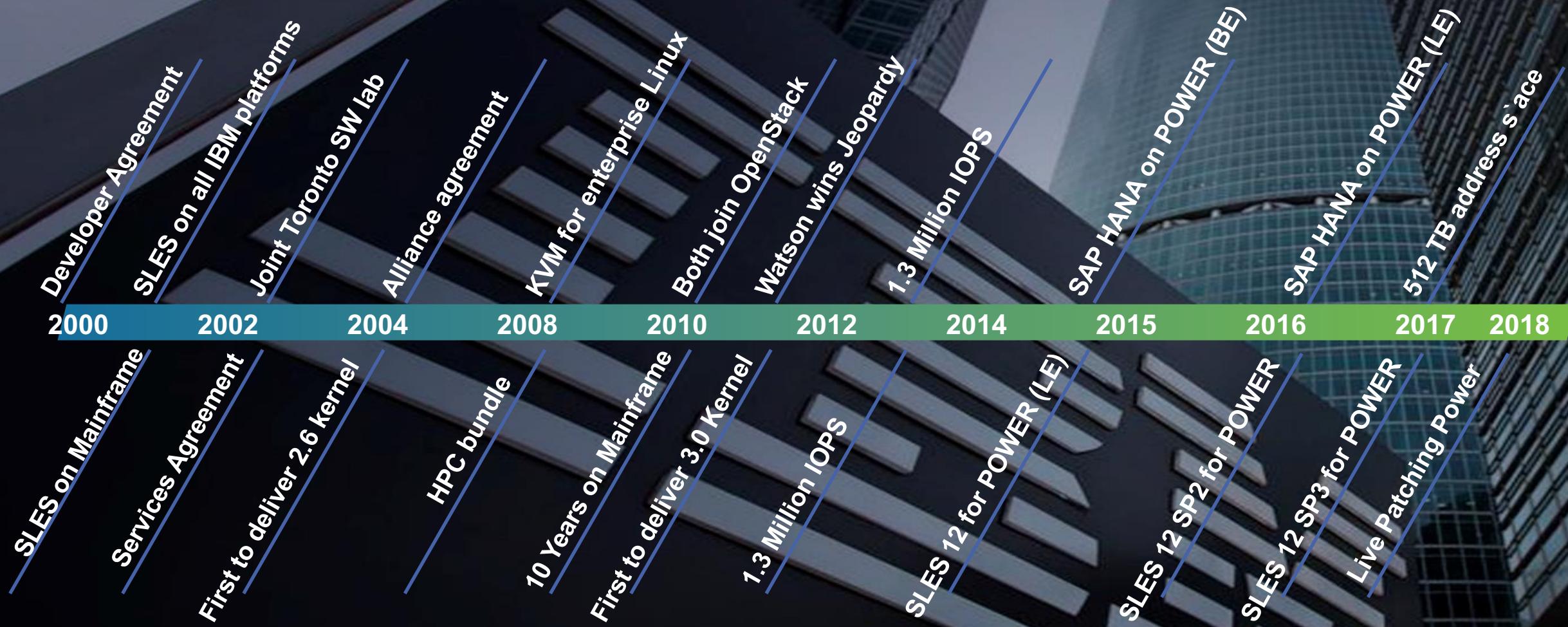




- **Enabling Advanced Data Center Solutions for More Than 20 Years**
  - 20 years of Linux collaboration and leadership for zSystems and LinuxONE
  - First to bring enterprise Linux to Power
  - SUSE Linux Enterprise Server for SAP Applications is the default distribution for SAP HANA and H/4HANA on IBM Power Systems
  - Only distribution with z/VM and KVM support in SUSE OpenStack Cloud
  - Tight integration between IBM and SUSE engineering



- Enabling Advanced Data Center Solutions for More Than 20 Years



# SAP + SUSE beyond x86

## •SUSE and IBM Offer a Solution for Fast and Reliable SAP Architectures



of analytics algorithms with 8 threads per core



with a large, fast memory workspace



with a continuous data load into a large cache

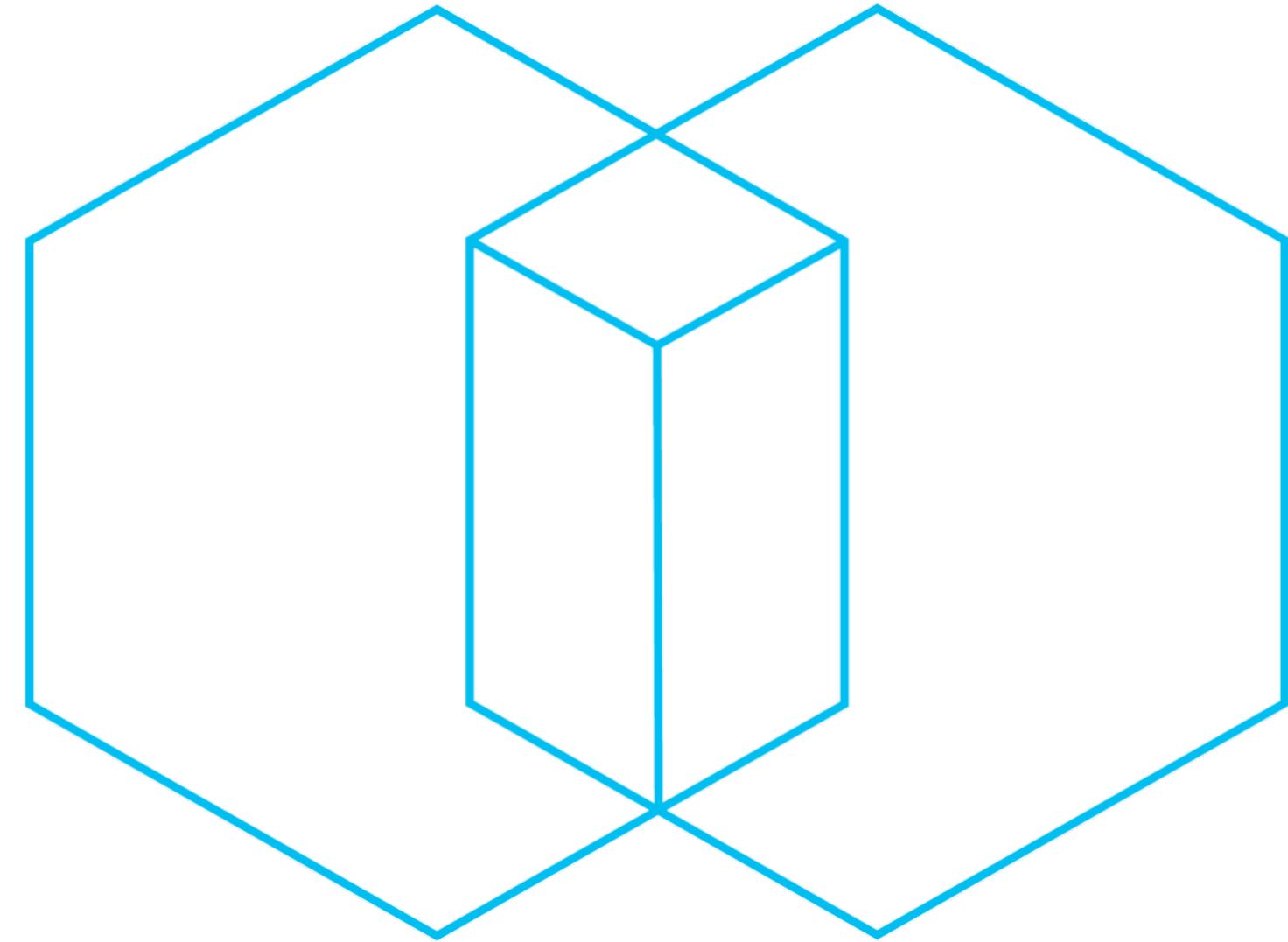


- Consolidate and reduce the number of systems to eliminate complexity, minimize points of failure, reduce latency and simplify management
- Make business decisions faster even for complex analytics
- Maximize performance and response with latest POWER8
- On premise, elastic computing with Capacity on Demand
- Migrate workloads before failures





# SUSE for POWER



# SUSE Linux Enterprise Server for POWER

- Optimized for IBM Power Systems to deliver outstanding reliability, performance and faster innovation for data-intensive, mission-critical workloads.
- **Increase reliability** and reduce costs for mission-critical applications.
- **Deliver a high-performance platform** with improved application performance and instant access to data.
- **Accelerate innovation and improve deployment times** for a broad choice of open source and partner solutions.



**99.999%**

System Availability  
Supporting Smooth  
Operations

**60%**

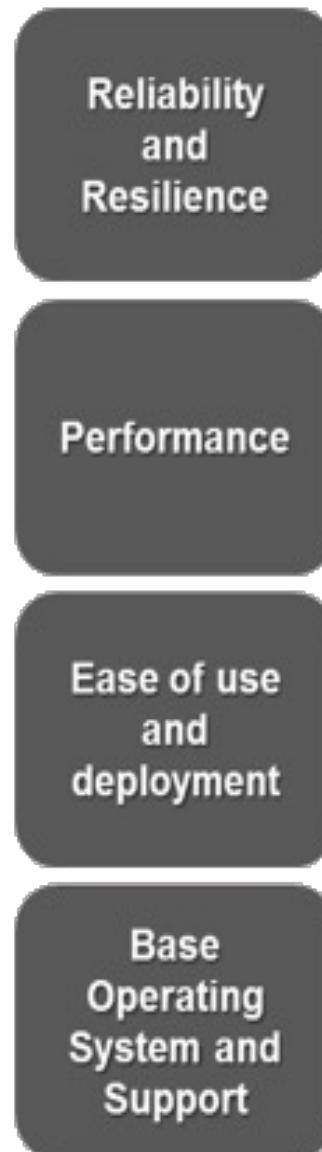
Faster Business  
Processing

**75%**

Shorter  
Development  
Times



# Recent history of SUSE Linux on POWER



- (2016) Bigmem kernel for SLES for SAP Applications 11 SP4
  - Increased memory support to 32TB with up to 2058 processors for SAP HANA
- (2018) Live Patching for Power
- (2016) SUSE Linux Enterprise Server (SLES) 12 SP2 for POWER
  - High Availability Extension
  - Support for Power LC systems
  - Package Hub for SLES for POWER LE
- (2017) SLES for SAP Applications 12 SP3 for POWER
  - 512TB address space
  - POWER9 enablement
- (2017) SUSE Manager server on Power
- (2018) Support for Nutanix Hyperconverged solution
  - CS821 CS822 certified for SLES 11 SP4 and SLES 12 SP3
- (2017) SUSE Manager Server on POWER
- (2016) LTSS for SLES 11 SP4 (big-endian)
  - Extends subscription life to March 2022



# The ideal solution for SAP landscapes

## Run Simple



- One Linux OS for SAP HANA, S/4HANA and NetWeaver
- Automated set-up of SAP landscapes



## Run Fast



- Optimized for faster processing
- Sustained high performance of SAP applications



## Run Smart



- Built-in resilience for mission-critical SAP systems
- Data security

- Make business decisions faster even for complex analytics
- Maximize performance and response with latest POWER8 and enablement for POWER9

- On premise, elastic computing with Capacity on Demand
- Migrate workloads before failures



# POWER9 Exploitation

- POWER9 enabled in SLES 12 SP3
  - Only Linux running in POWER9 mode
- More exploitation planned for SLES 12 SP4 and SLES 15
  - Additional performance and debugging capabilities



## Support for Nutanix Hyperconverged solution for Power

- CS821 CS822 certified for SLES 11 SP4 and SLES 12 SP3



# Increased Process Address Space

- Many SAP HANA customers noticed the system runs out of virtual memory due to virtual memory fragmentation. x86 supports up to 128TB
- Prior to SP3, SLES 12 on POWER only supported 64TB process virtual address space.
- Solution: SLES 12 SP3 increases address space to 512TB

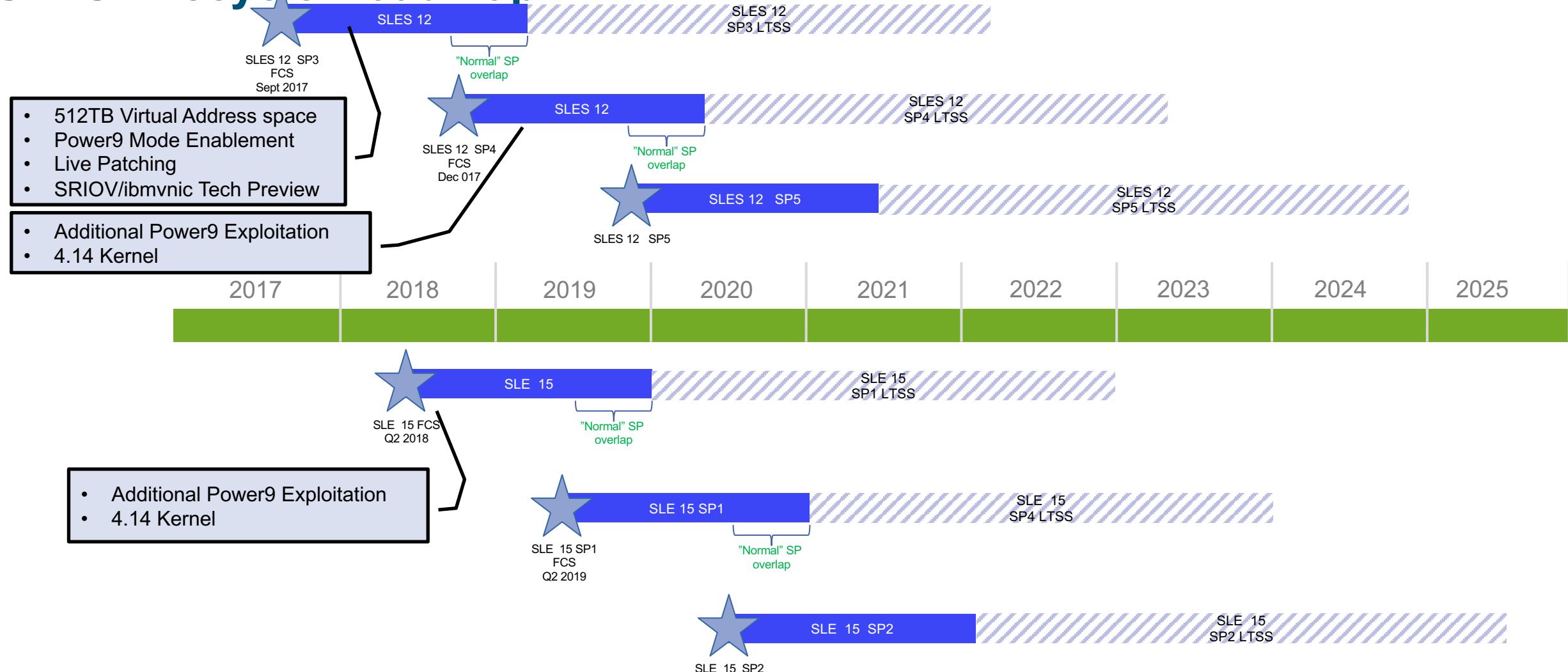
And we increased SLES 11 SP4 to 128TB with the Bigmem kernel

<https://kruemcke.wordpress.com/2018/02/06/sap-hana-on-power-feeling-a-little-cramped-128tb-support-for-sles-11-sp4-can-help/>

<https://www.suse.com/support/kb/doc/?id=7018408>



# SLES Lifecycle Roadmap\*



\*NOTE: All future dates are estimates for illustration purposes and are not intended as committed dates.

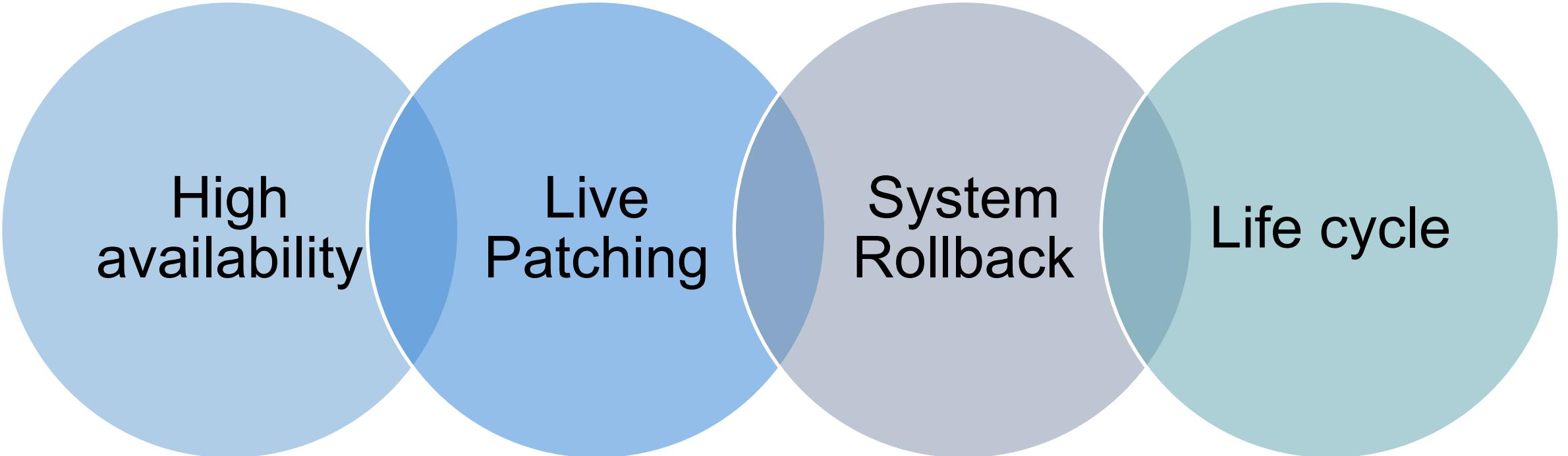


# Business critical

High Availability + LP + System Rollback + SAP



# Enterprise Linux Extensions for Business Critical Workloads



High  
availability

Live  
Patching

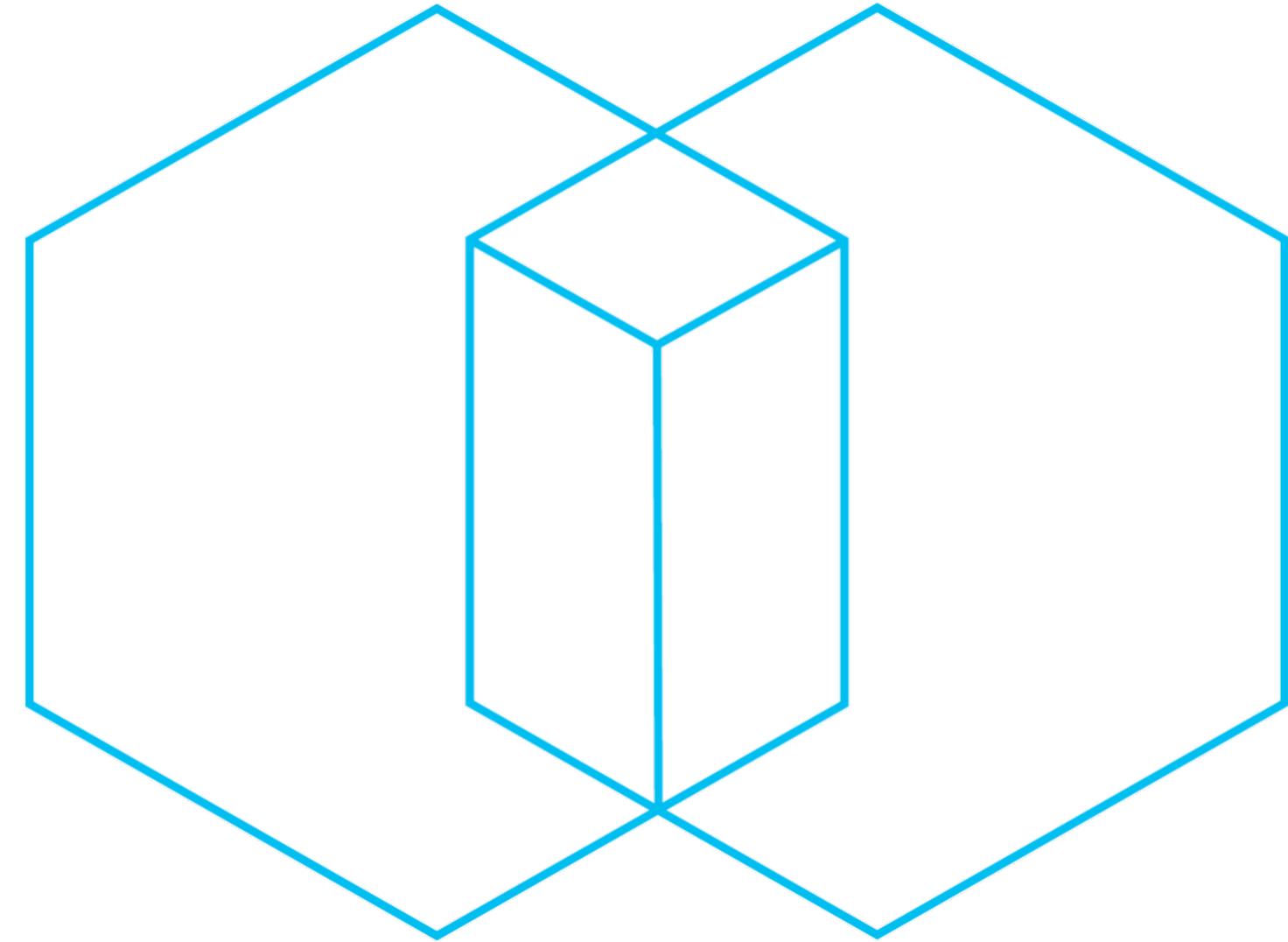
System  
Rollback

Life cycle





# Business Critical High Availability



# SUSE Linux Enterprise High Availability Extension



- Virtually eliminate unplanned downtime with an advanced clustering system that can be deployed in both physical and virtual environments.
- Get near 100% uptime, maximized for your Linux workloads.
- Boost flexibility and maintain continuity by supporting mixed clustering.
- Protect data integrity and minimize data loss with data replication across clusters.

**75%**  
Cost Savings

**100%**  
Server Deployment

**99.999%**  
Uptime

# High Availability Demo

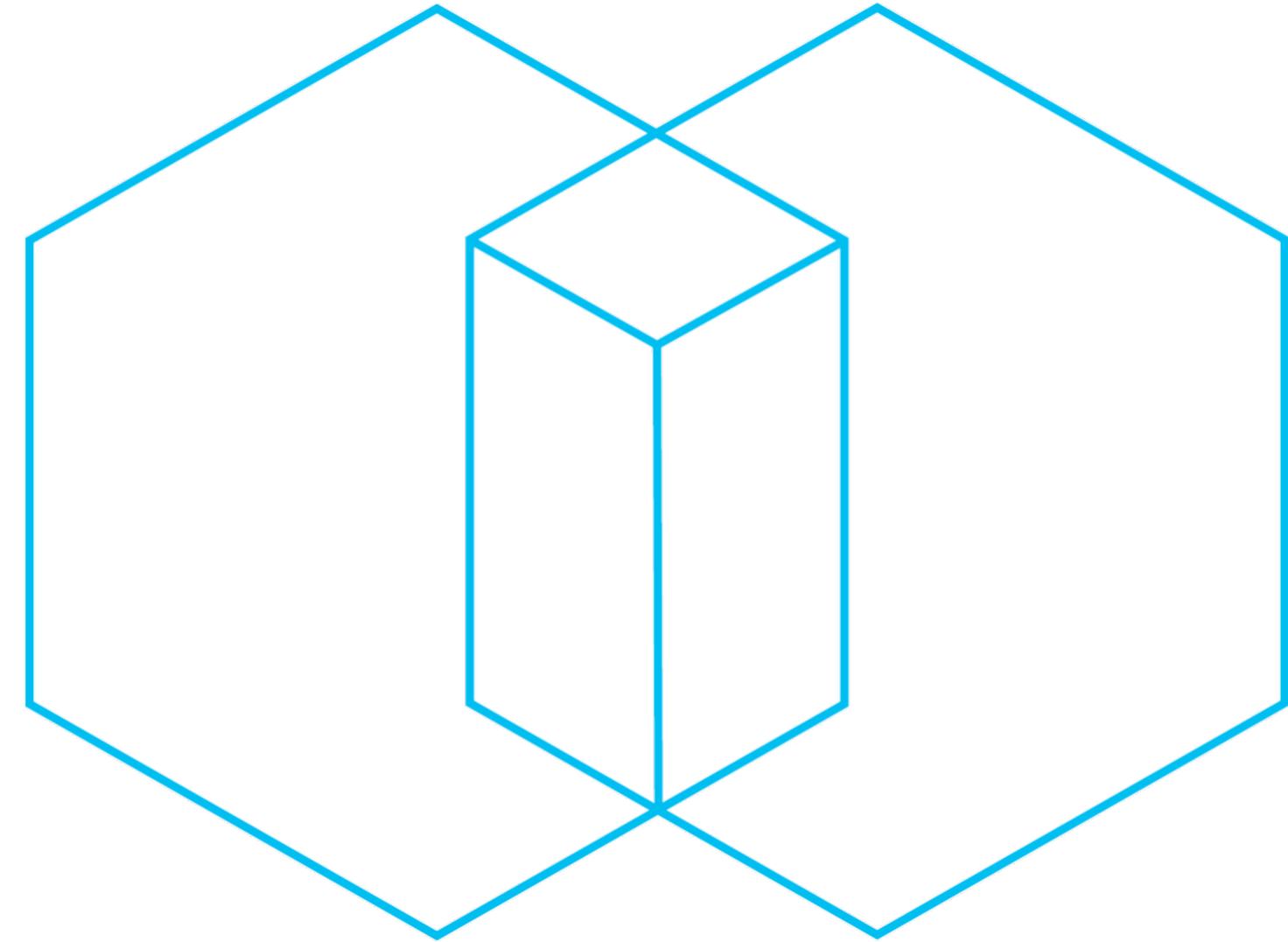
<https://www.youtube.com/watch?v=MyenIdX8k4U&t=278s>

[https://www.youtube.com/watch?v=-BLE0\\_gloHE](https://www.youtube.com/watch?v=-BLE0_gloHE)





# Business Critical Live Patching



## Live Patching for POWER\*

- SUSE Linux Enterprise Live Patching “kGraft”
  - Live-kernel patching without reboot
  - Apply urgent security patches before next service window, reducing the need for planned downtime
- Unique advantages
  - It integrates smoothly into existing package and patch management solutions, as it uses the Enterprise Linux RPM package standard
  - While patching, **there is no need to pause execution**, as is necessary in other technologies

## History

- First released as a SUSE product in 2014
- Supported by SAP in 2016
- Available also for IBM POWER in 2018

\* Separate subscription required for Live Patching for POWER



# Both planned and unplanned downtimes are bad for IT

## Loss of Time

Whether infrastructure or application, 35% of respondents reported time-to-repair of **1 to 12 hours**

## High Costs

On average, infrastructure failure costs large enterprises **\$100,000 per hour**  
Critical application failures can cost **\$500,000 to \$1 million per hour**



## Avoid or minimize downtimes.

*IDC Report: DevOps and the Cost of Downtime: Fortune 1000 Best Practice Metrics Quantified*

# What is Live Patching?

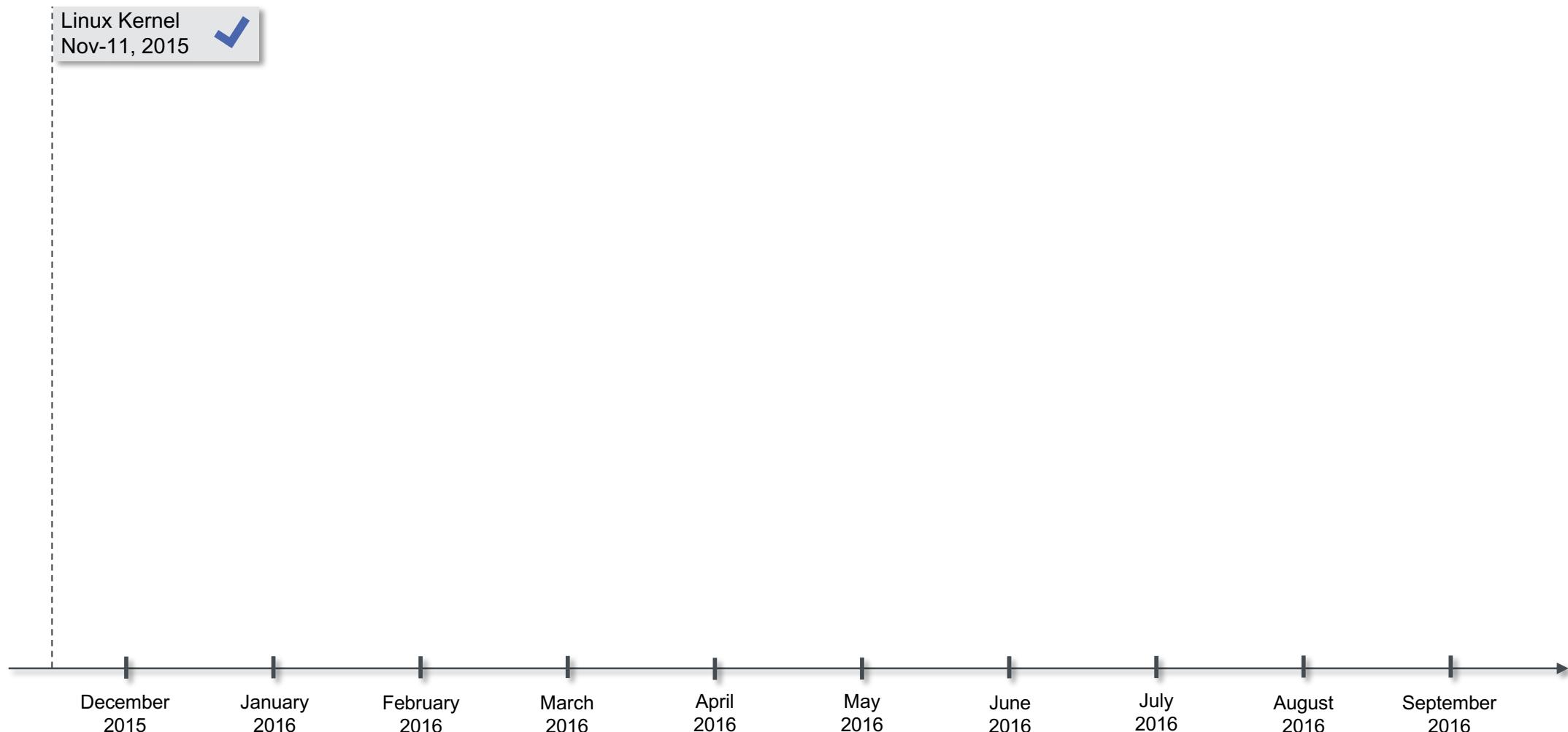
Apply a security patch to Linux kernel without worrying about reboot



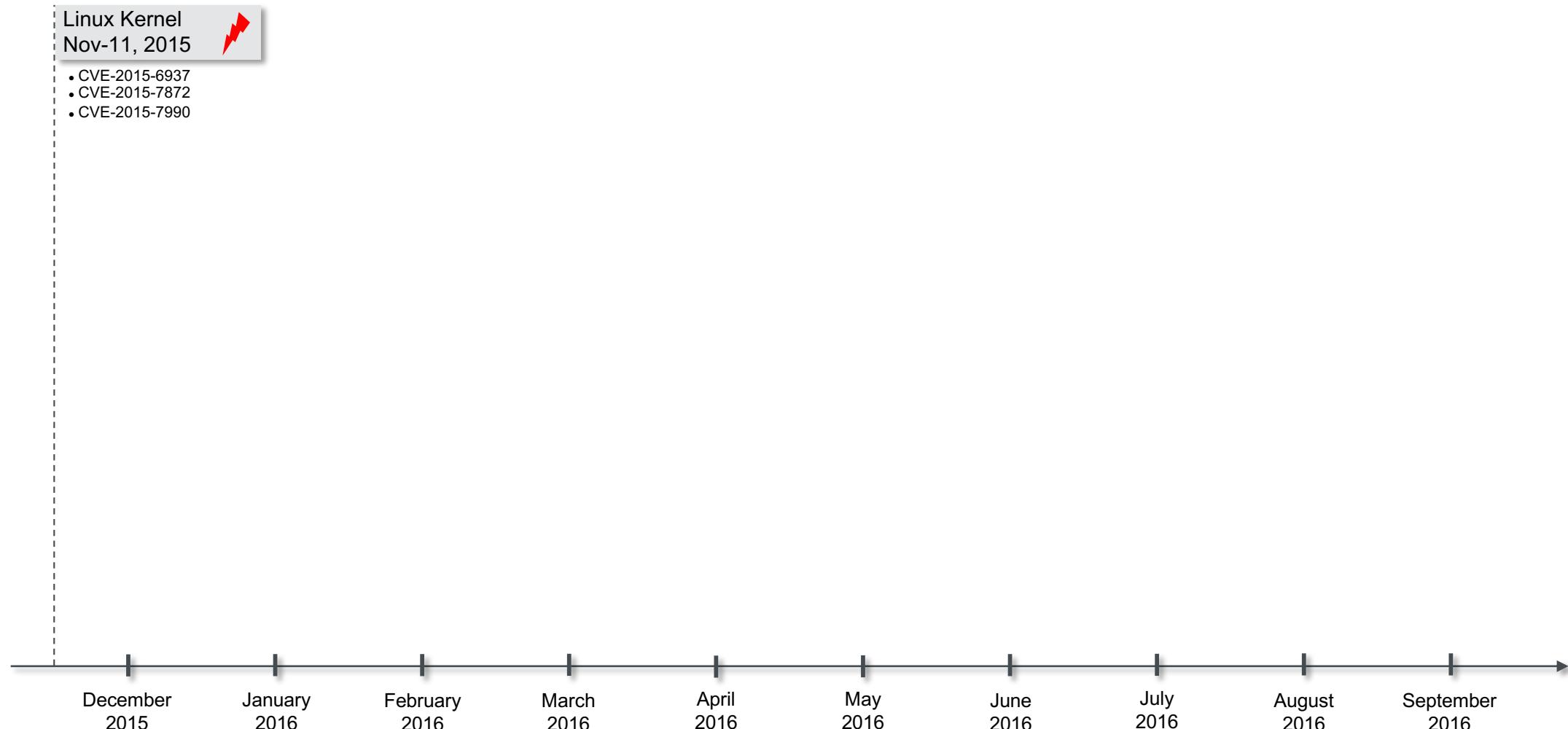
Live Patching has no dependency on applications running on the system.



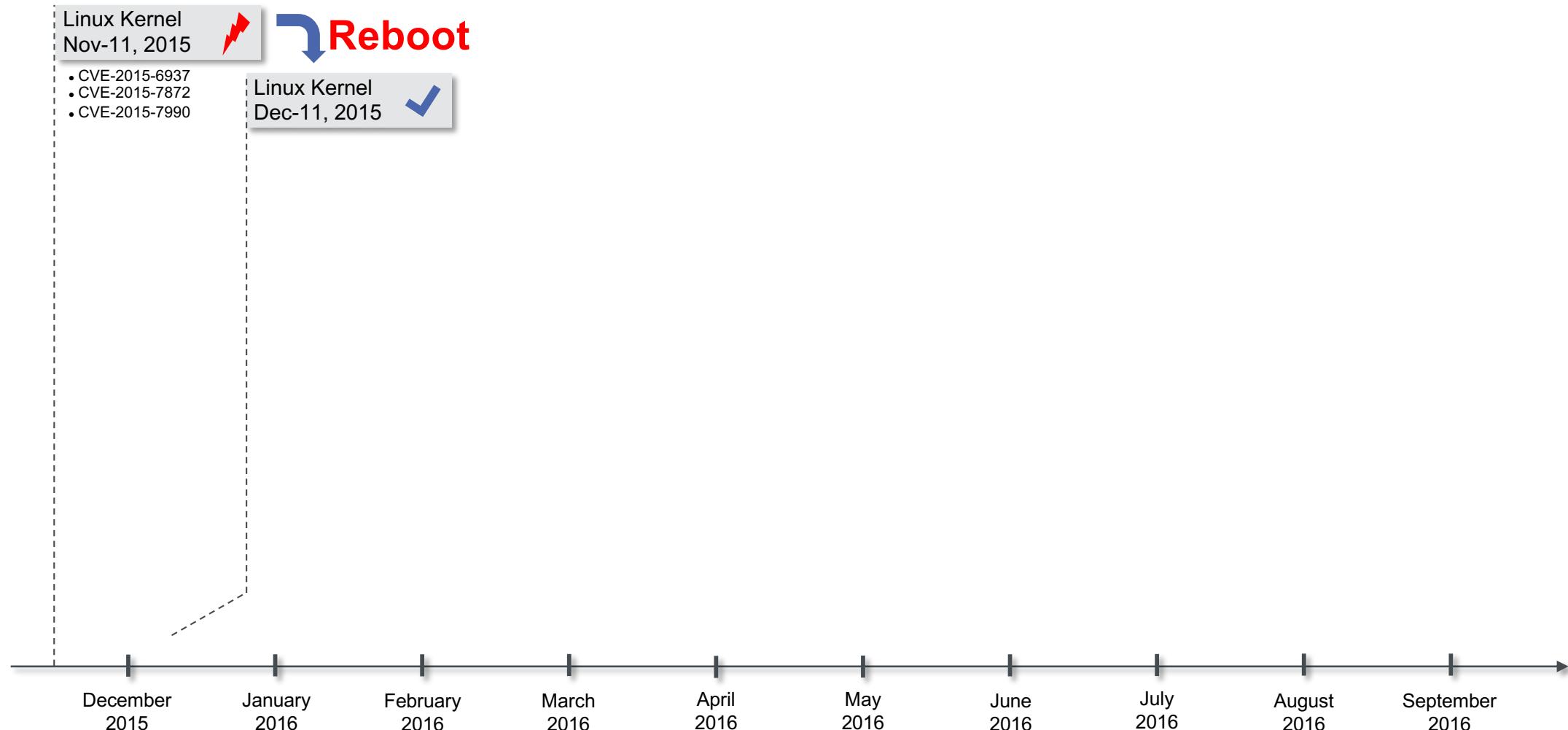
# A Linux setup at a point in time...



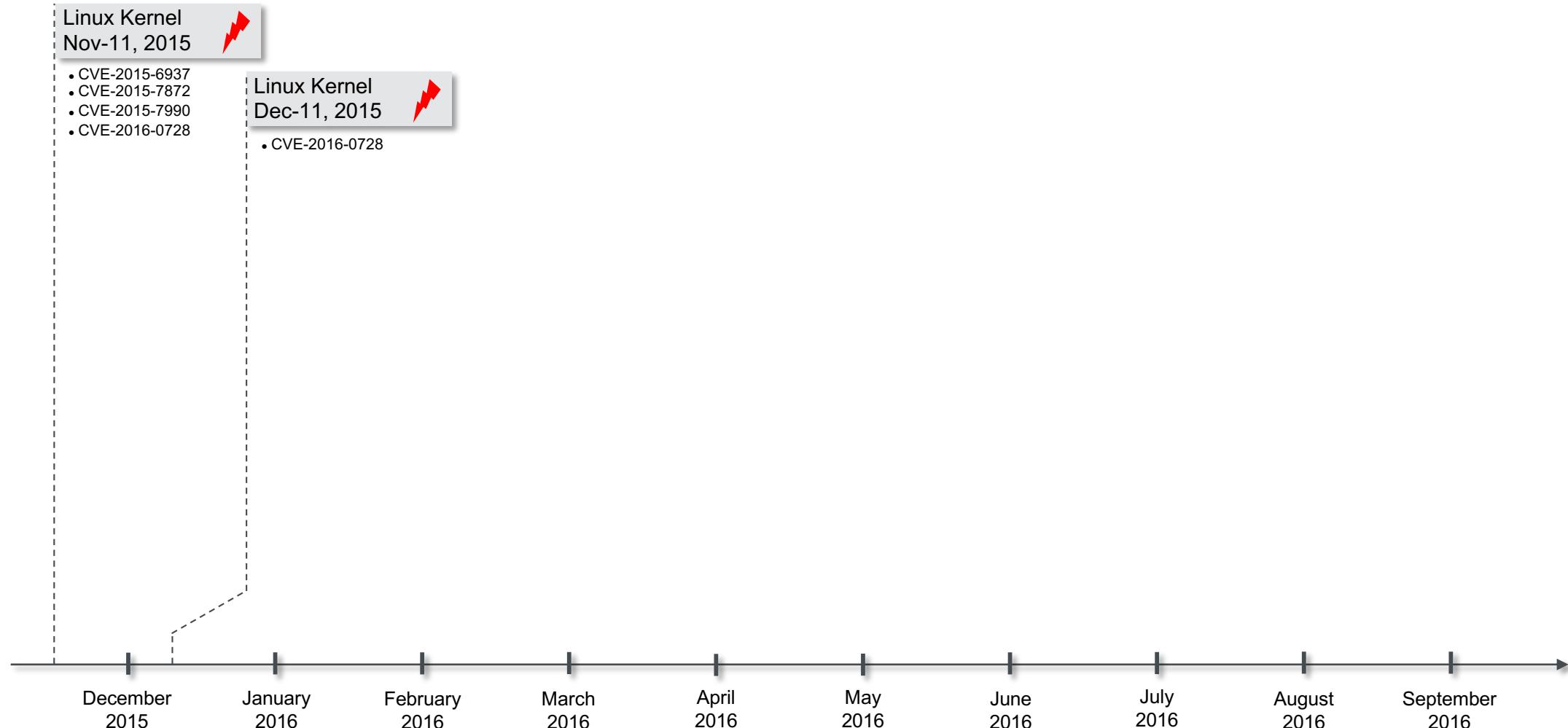
# Security vulnerabilities are discovered



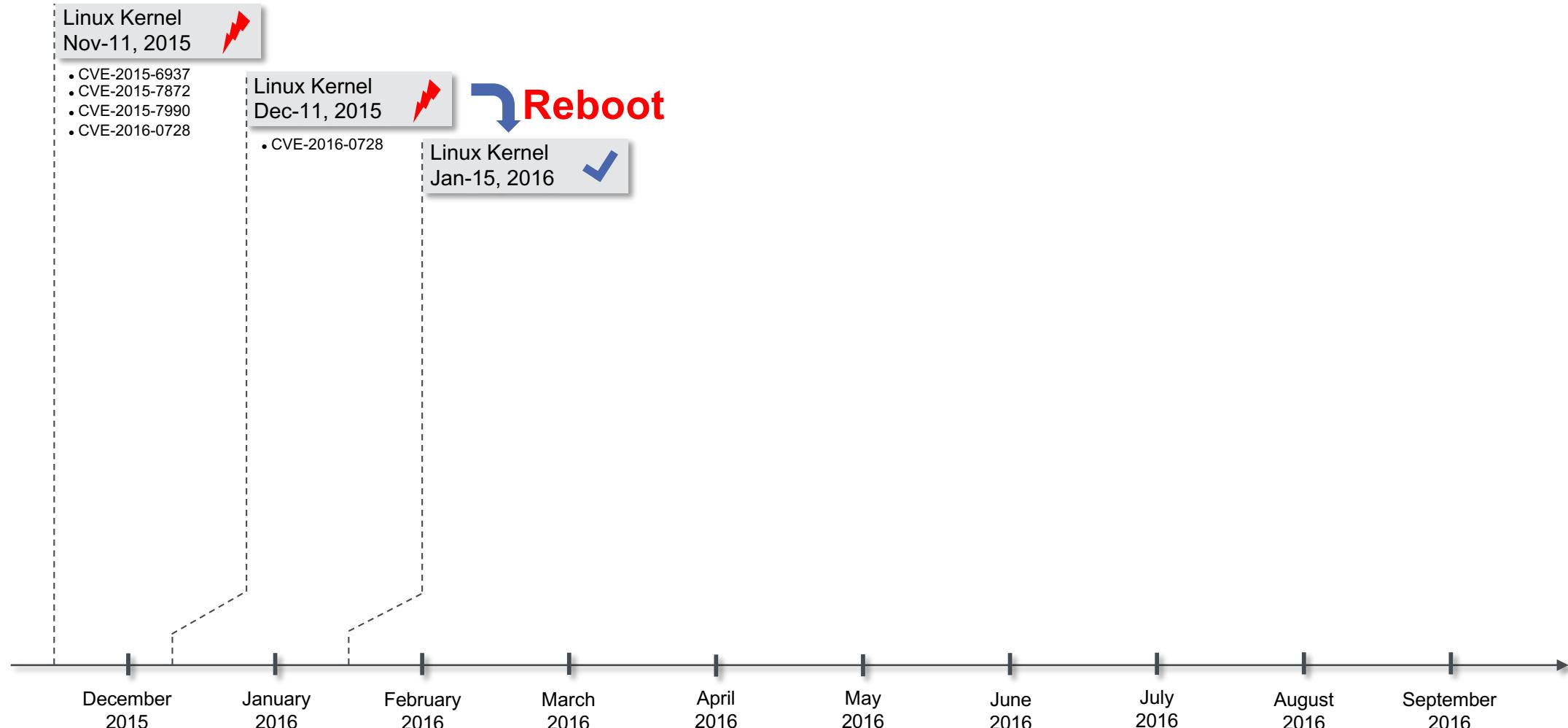
# Patch is applied. System is rebooted.



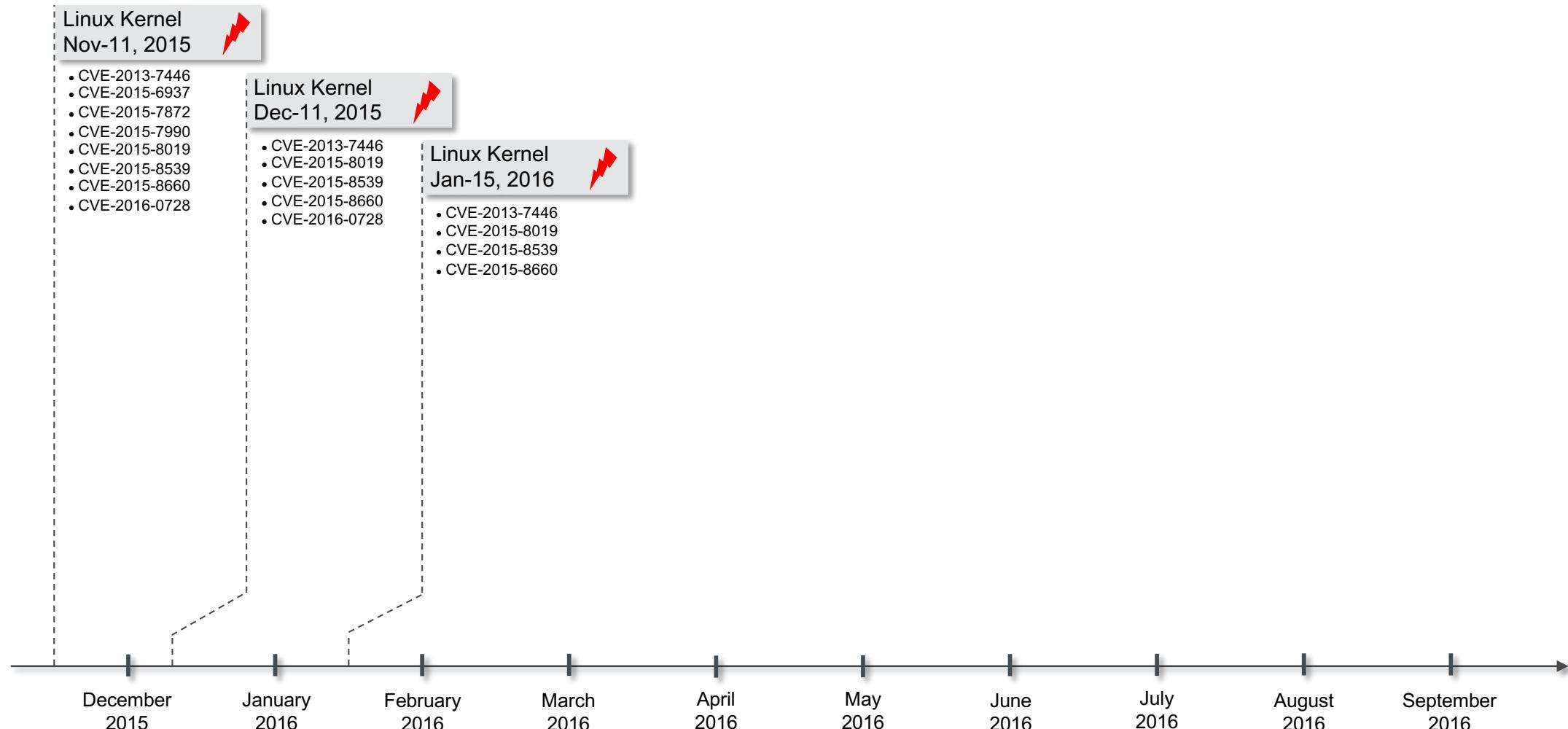
# New Security vulnerabilities are discovered



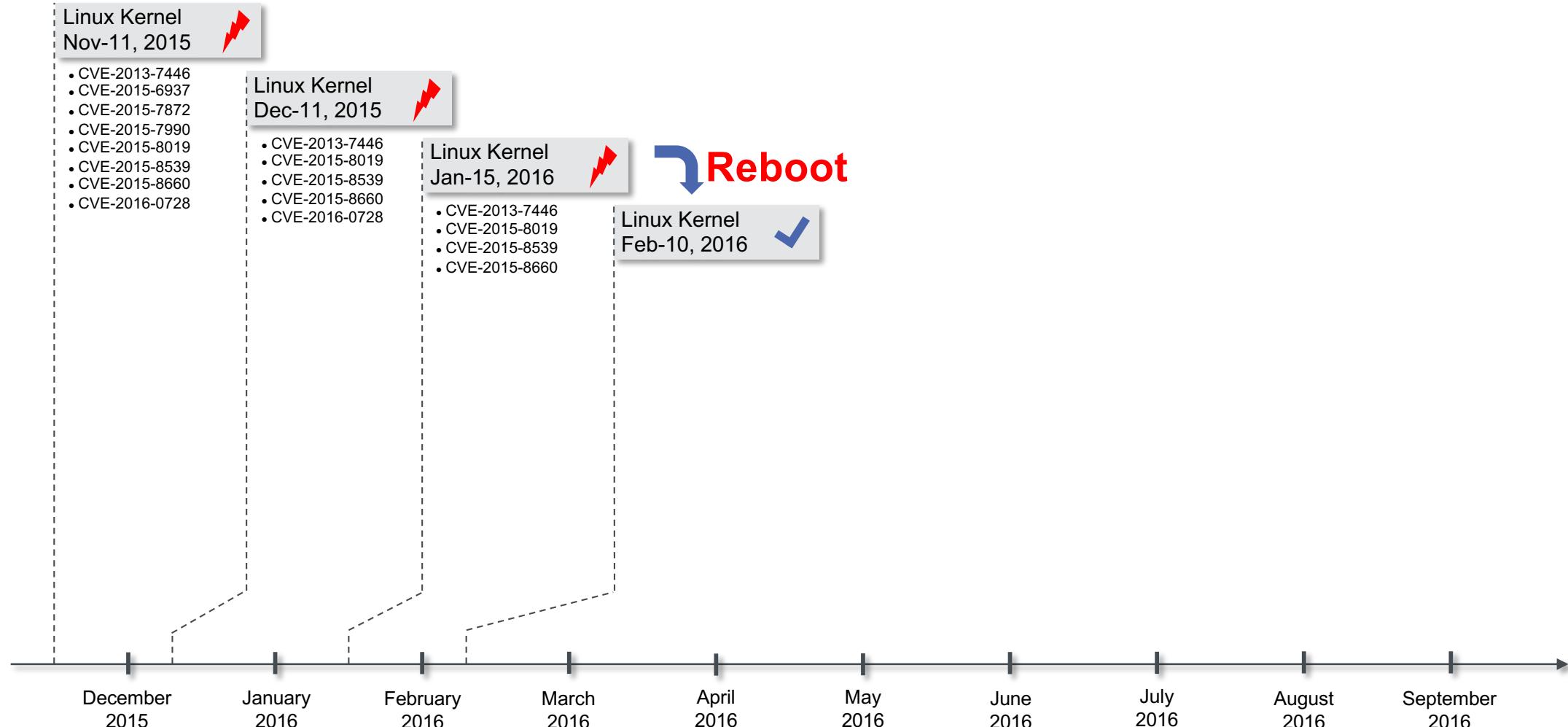
# Again patch is applied. System is rebooted.



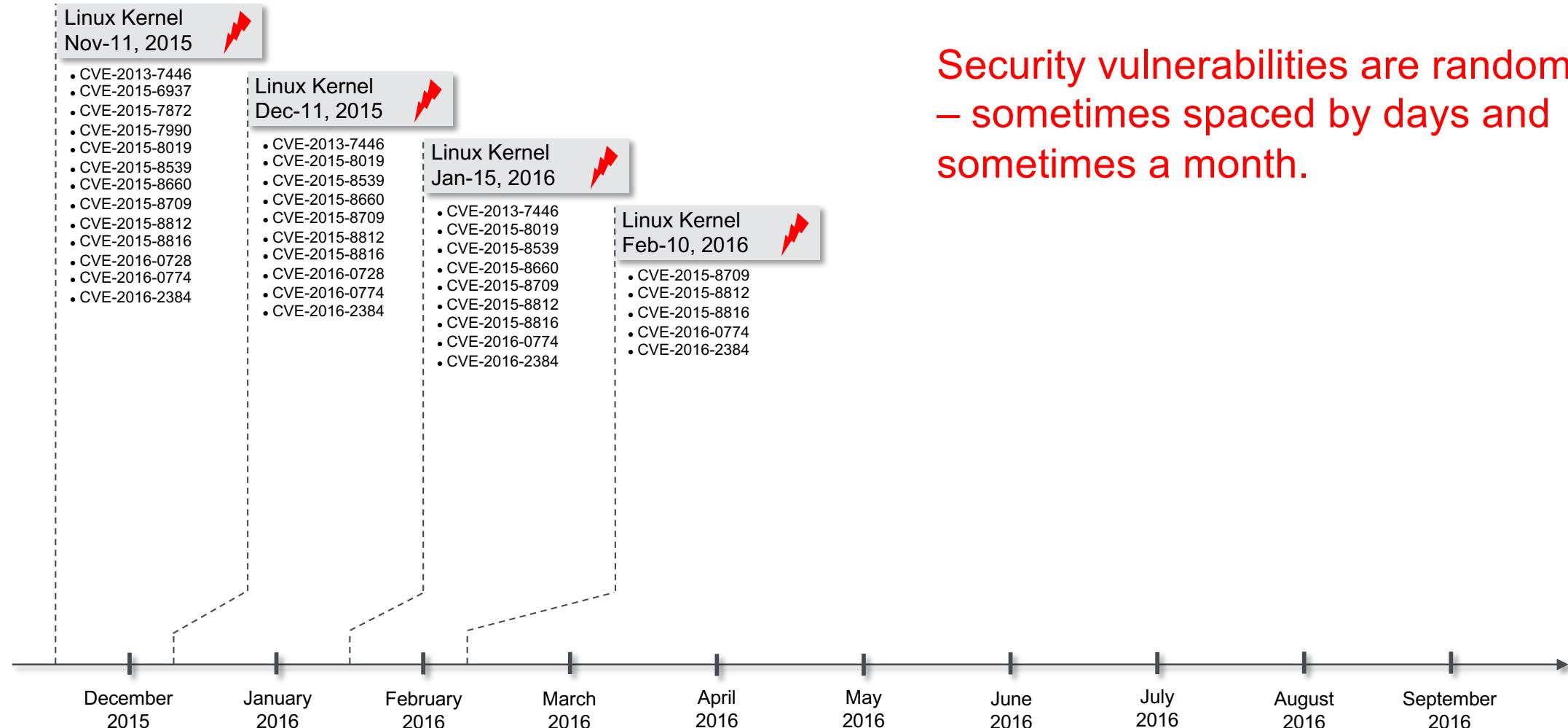
# New Security vulnerabilities are discovered



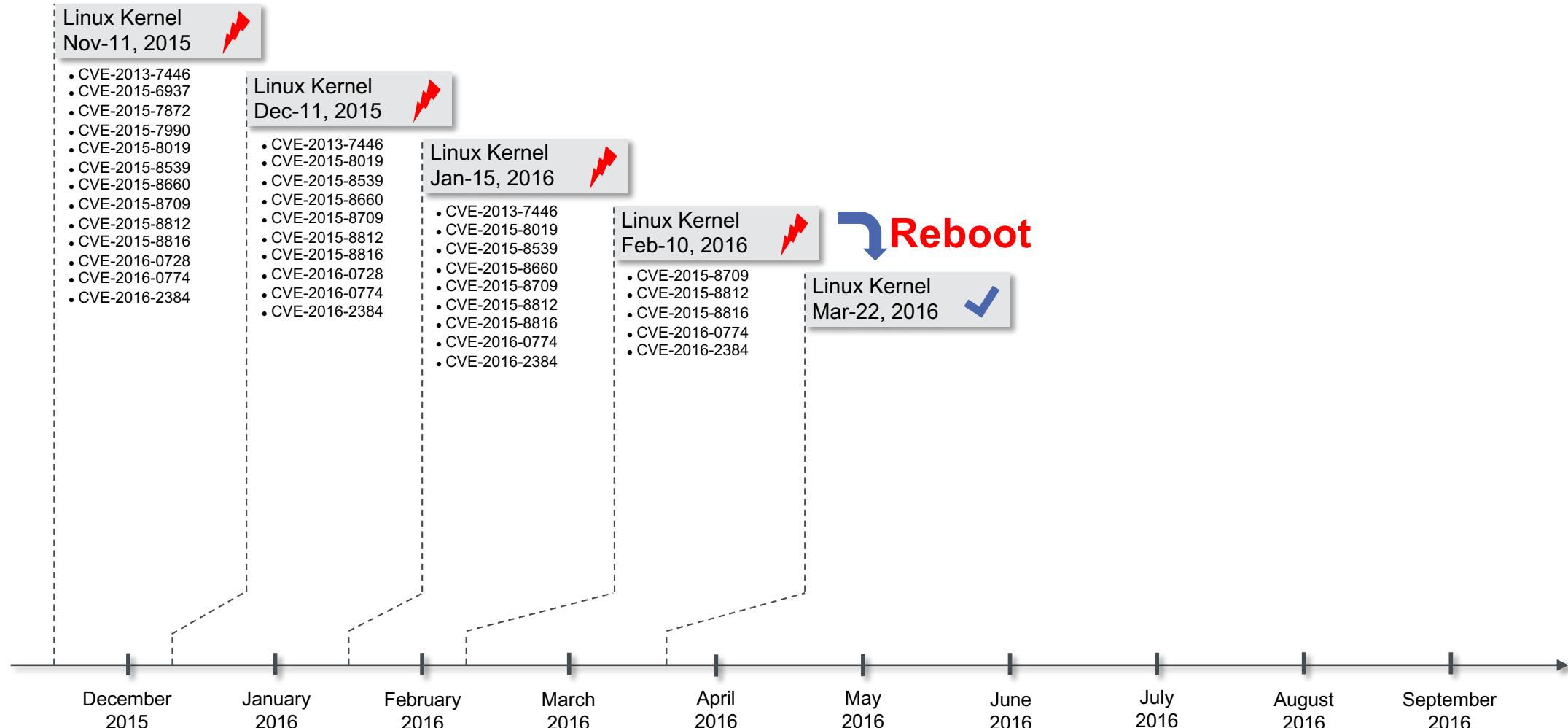
# Once again patch is applied. System is rebooted.



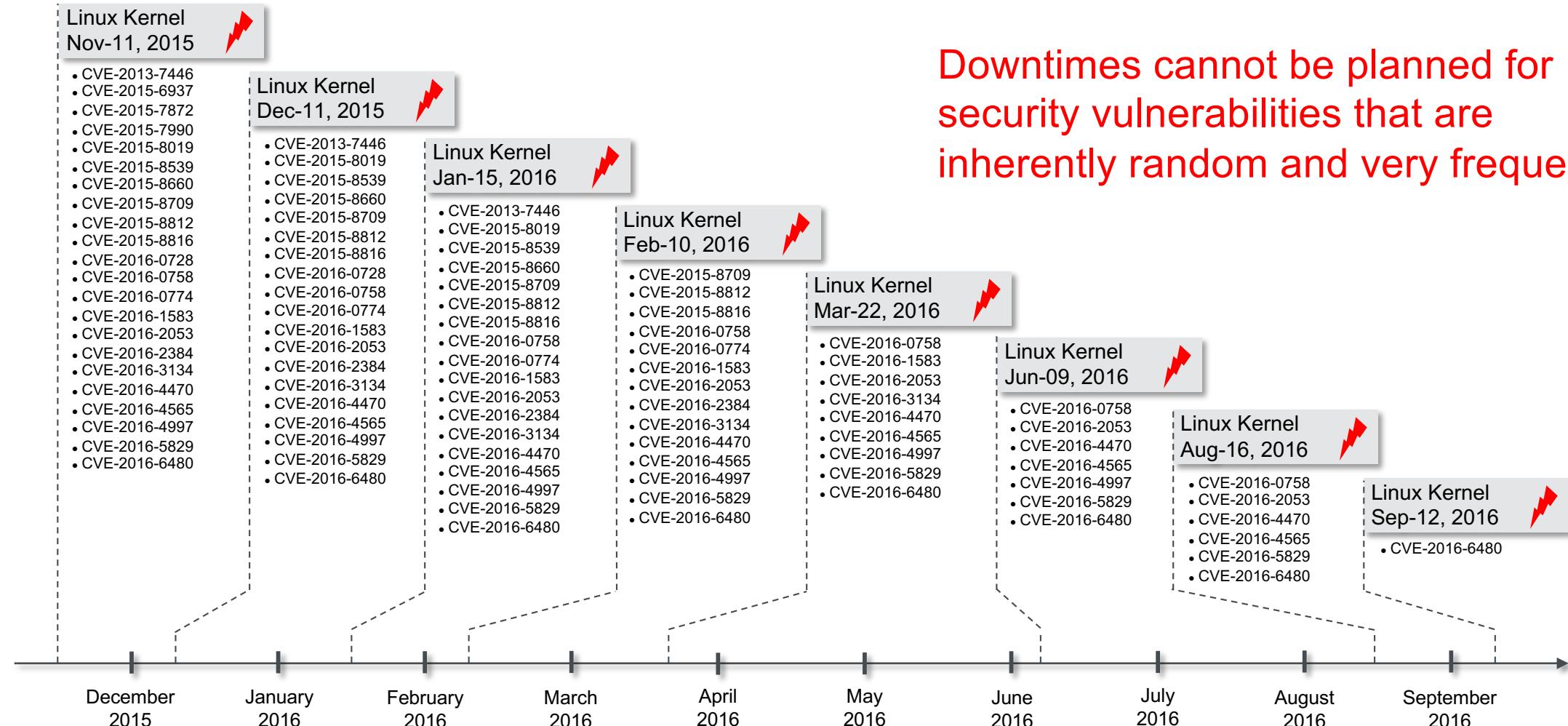
# New Security vulnerabilities keep coming each month...

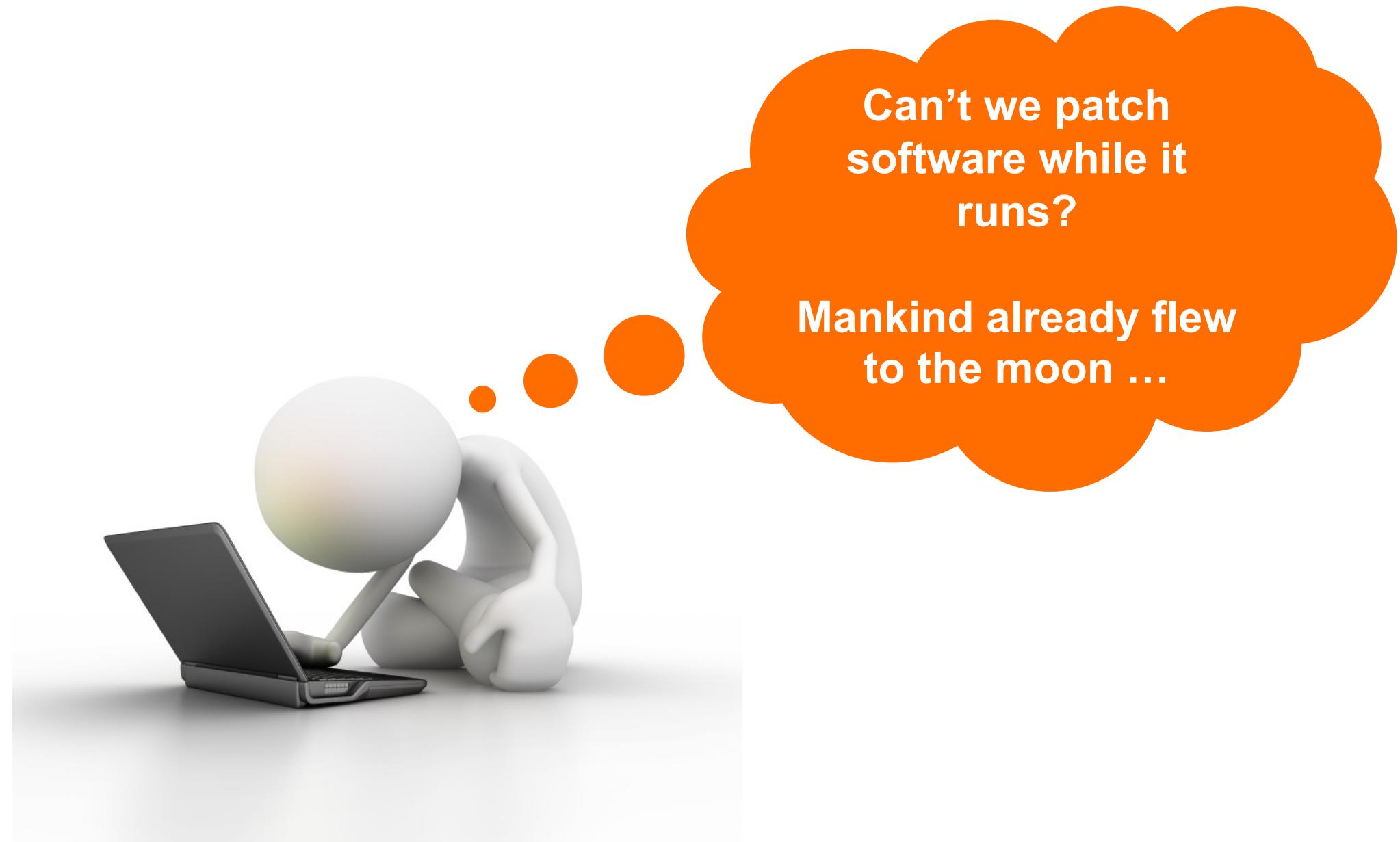


# It is a pain to disrupt the business-critical applications and reboot!



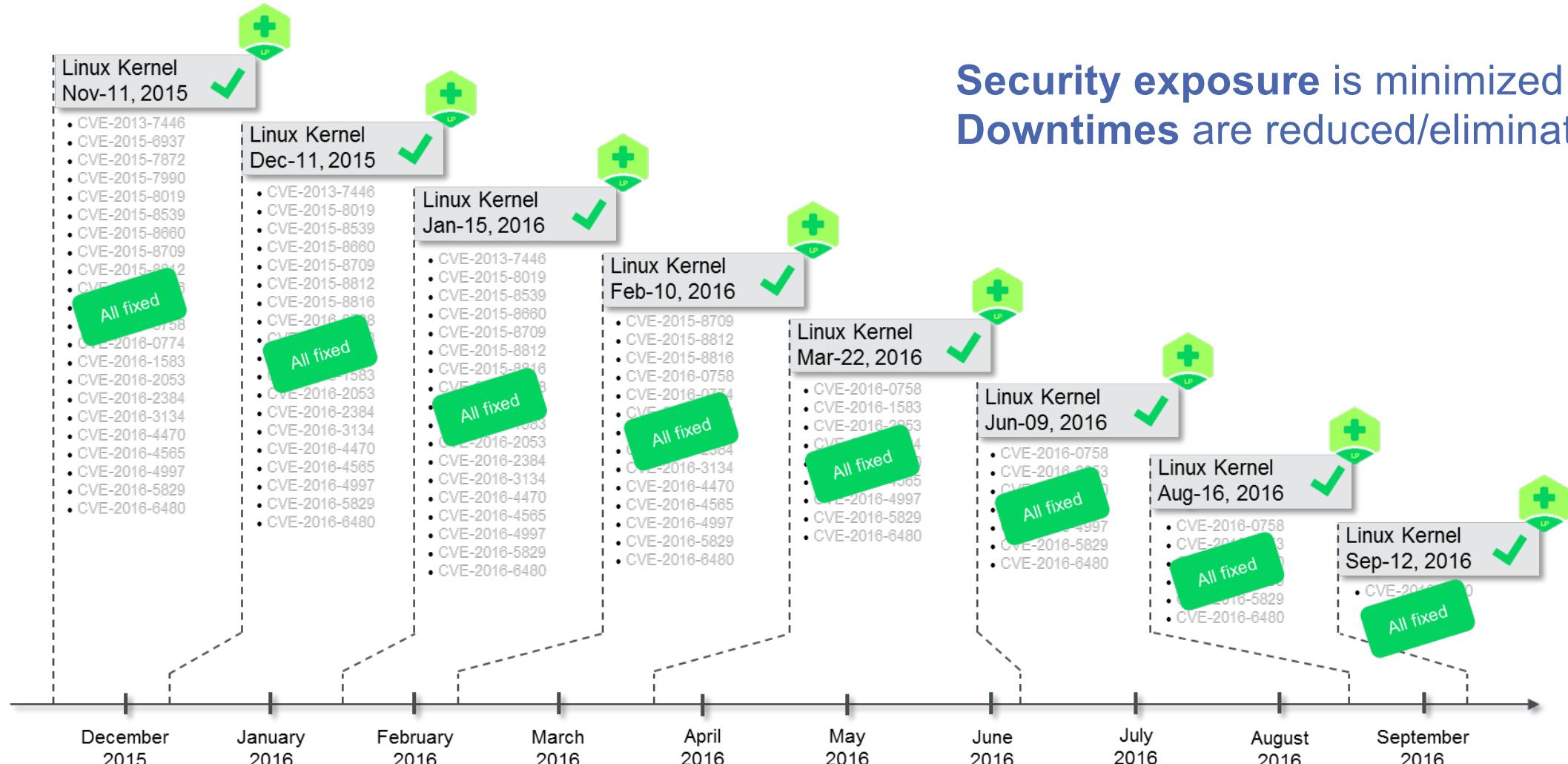
# You don't want to disrupt the business-critical applications and reboot each month, if not more!





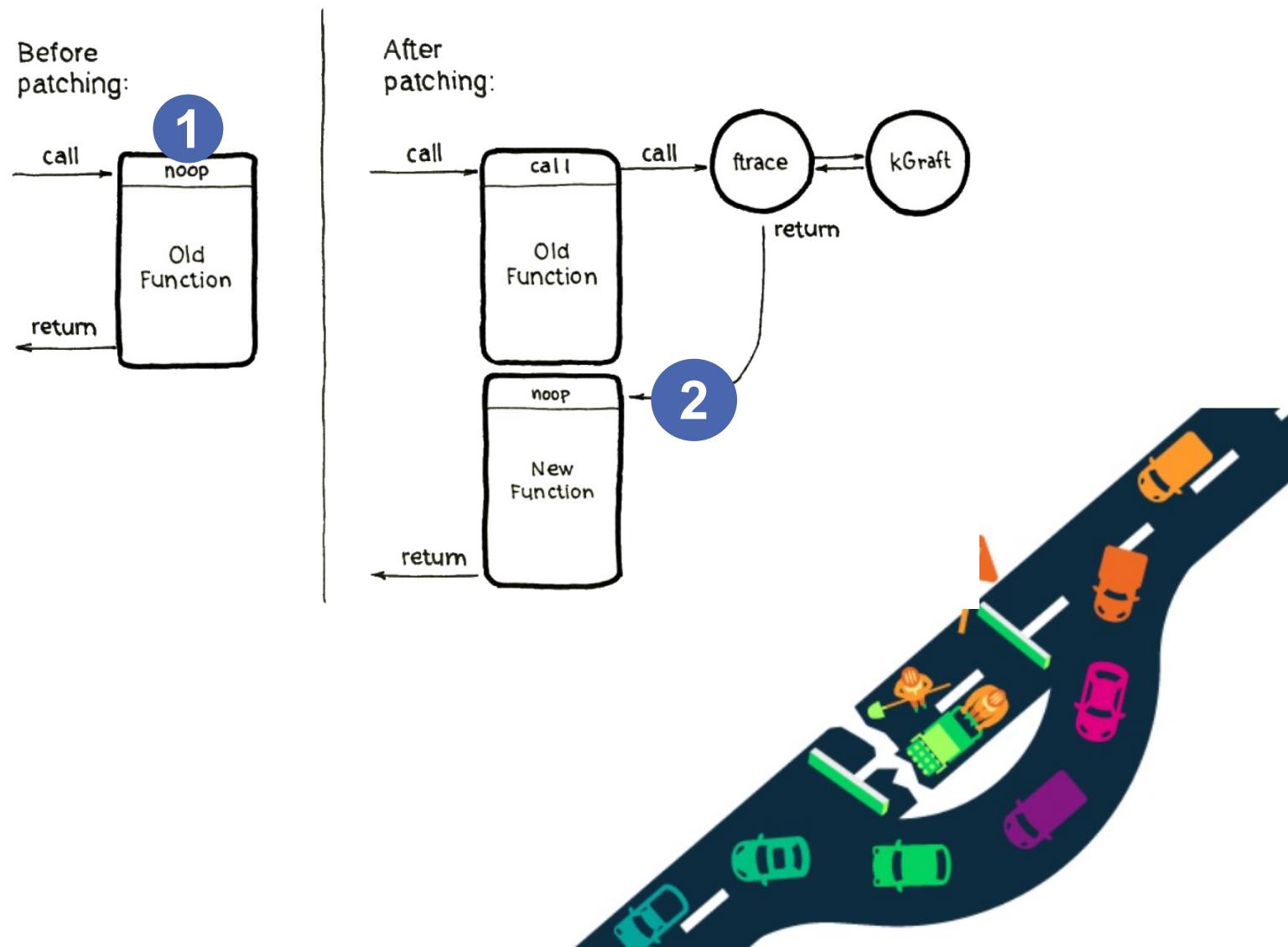
# You can avoid downtime-planning with Live Patching

## Your applications keep running. Zero interruption. Zero Reboots.



**Security exposure is minimized.  
Downtimes are reduced/eliminated.**

# Live Patching is easy to understand



**1** Replace the placeholder “noop” with call to ftrace

**2** ftrace returns execution to new “patched” Function

Old Function is bypassed  
New Function is now in use

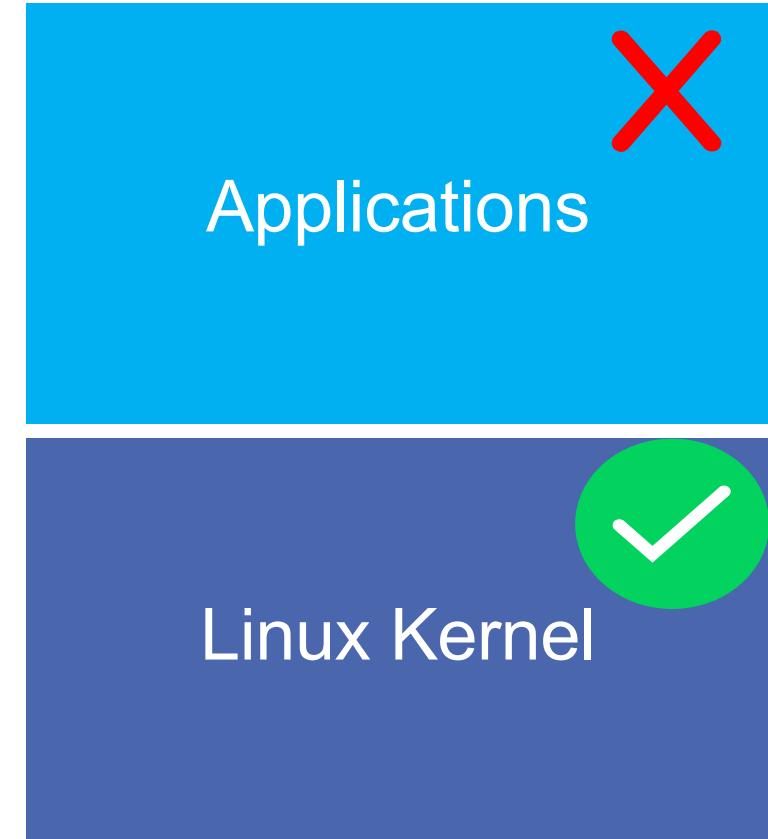
# Can Live Patching patch anything and everything?

**SUSE Linux Enterprise Live Patching  
is used to patch Linux kernel.**

The user applications cannot be patched using Live Patching.

**What does a Live Patch contain?**

Security vulnerabilities rated “High” or “Critical” (CVSS v3 score  $\geq 7.0$ ) qualify to be included in a Live Patch.



# Live Patching – Key Benefits



Reduce Downtime



Keep Your Business  
Up and Running



Enhance Security  
and Compliance



# Reduce Downtime

## IT Systems benefit

Eliminate unplanned  
downtimes

No need to plan for a downtime to apply patches,  
apply security patches to kernel as soon as  
available.

Reduce planned  
downtimes

No need to reboot system when applying kernel  
patches, save time required for planned  
downtime.



# Keep Your Business Up and Running

Applications benefit

Maintain continuity of service at all times

Increase service availability by applying critical kernel patches with zero interruption of user applications.

Save hours of reboot downtime

Avoid long time to reboot needed for memory database applications such as SAP HANA  
Increase uptime for the virtualization layer  
**SVHW** saved 24 days in a year (2 days per month) in administration time! [Case Study Link](#)



# Enhance Security and Compliance

## Security benefit

### Enhance Security

Reduce exposure to security vulnerabilities by applying security patches as soon as possible.

### Help compliance efforts

Audit applied patches using Live Patching's unique ability to review the source code when applying patches. **(No other product offers this capability)**

Stay compliant by keeping systems always up-to-date with patches.



## Live patching demo

- Patch Dirty Cow (CVE-2016-5195) permissions escalation vulnerability live patching without server reboot

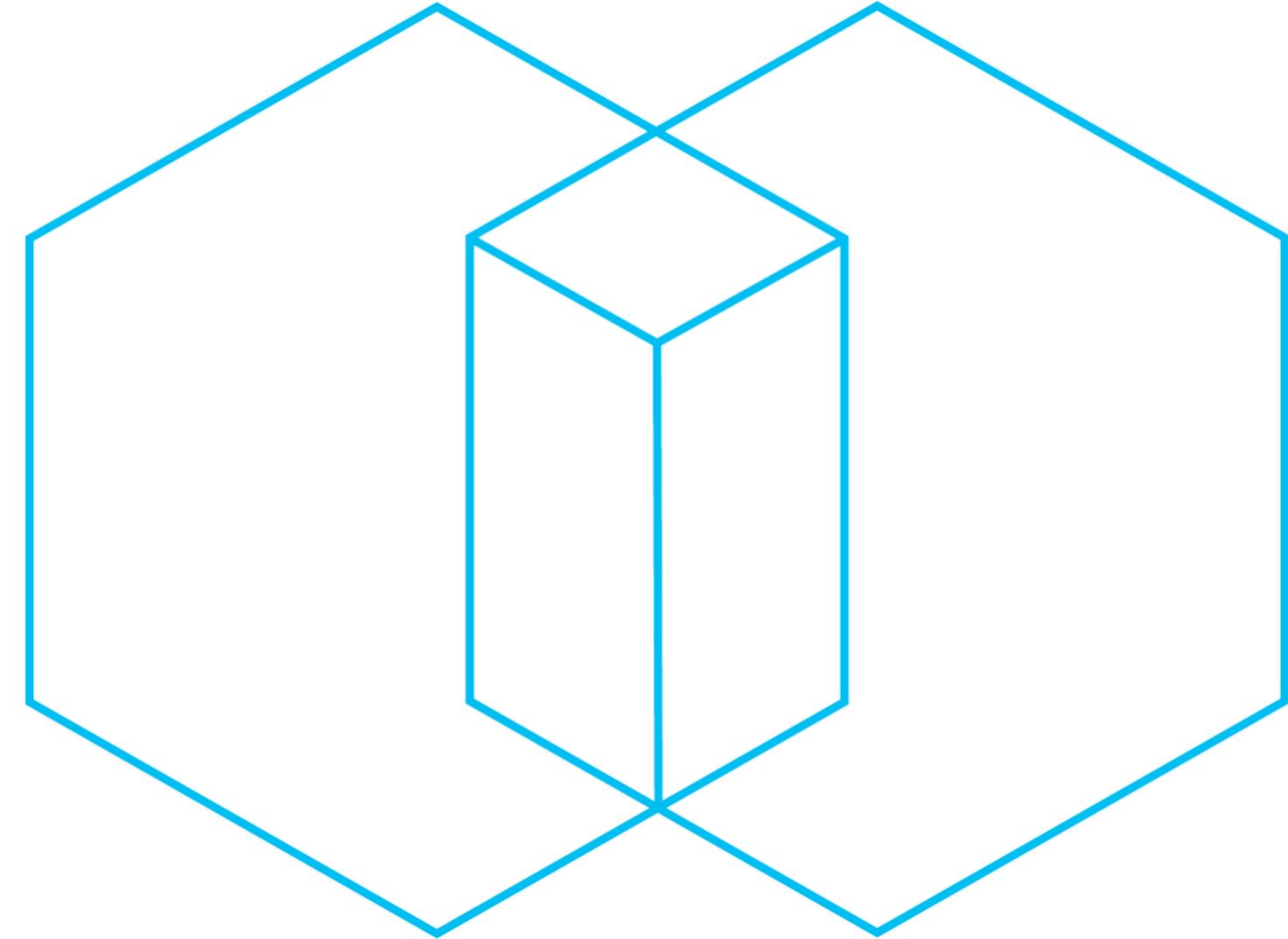
<https://www.youtube.com/watch?v=jJnRm-wkHi4&t=76s>



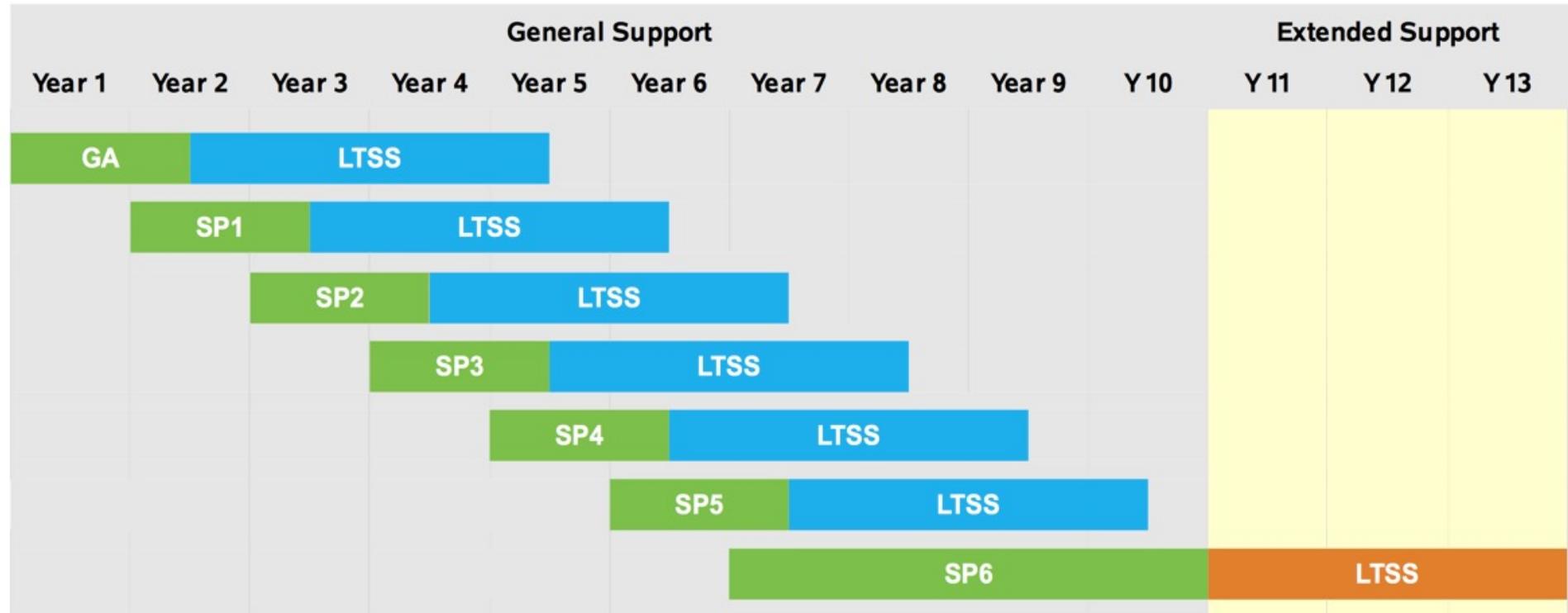


# Life Cycle

For Business Critical Workloads



# Life Cycle model



## 13-year lifecycle

- 10 years general support
- 3 years extended support

## Long Term Service Pack Support (LTSS)

- Available for all versions, including GA
- Up to 3 years extended support
- Different Lifecycle for Desktop and Modules



# Why a long lifecycle matters?

- **Easier to maintain applications**
  - Apply a patch doesn't mean to upgrade a SP for years
  - ABI and API 100% compatibility
- **Complex deployment often are larger in time than the OS lifecycle**
  - Most companies adopt a SP months later than it is released and most times so close to the upgrade window
- **Assure the stability of the systems**
  - Most customers apply the maxima "If it is working don't touch it"
- **Some critical systems can't be upgraded**
  - Some application are binded to a version/SP
- **Security**
  - Security patches and bugs are released for a long period



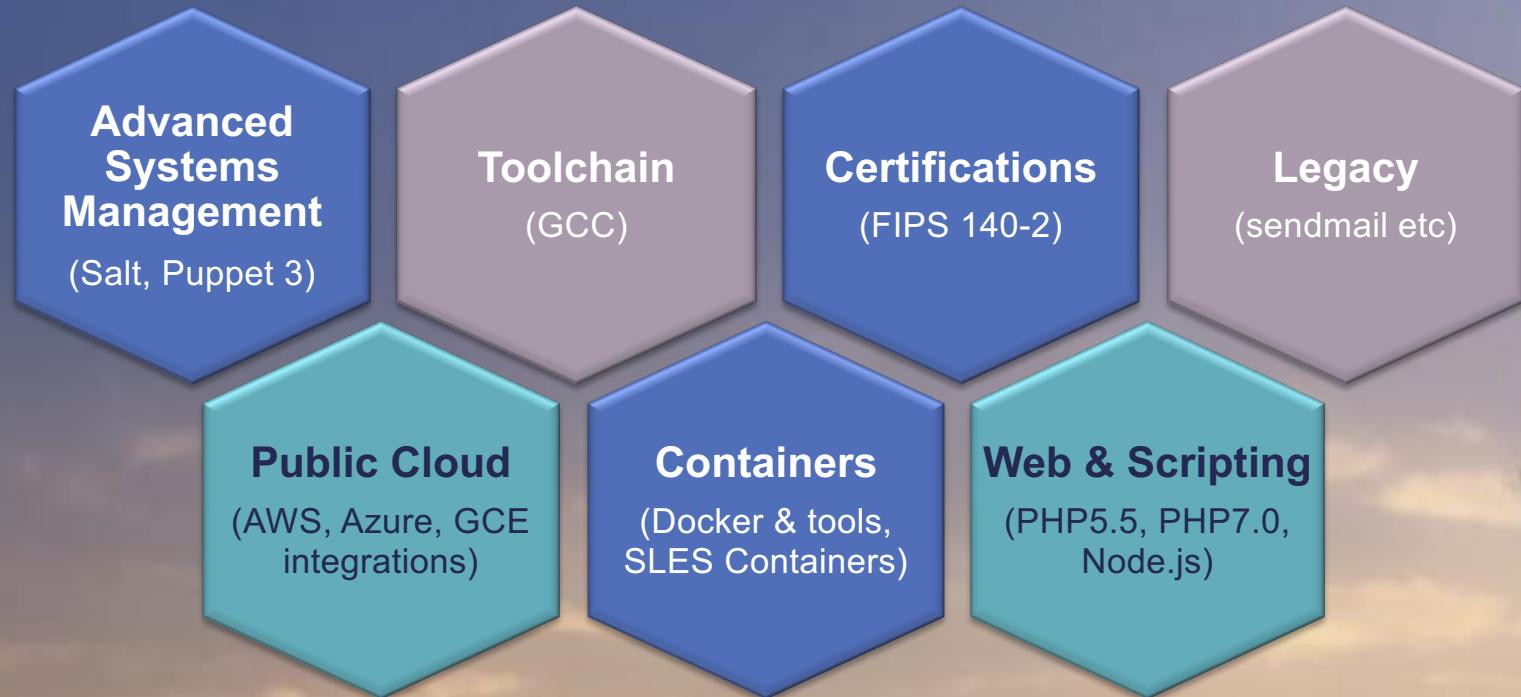
# Modules

**Modules provide the way to have different components with a different life cycle to speed up innovation**

- Web and Scripting Module
  - PHP, Python, Ruby, ...
- Legacy Module
- Public Cloud Module
  - Amazon, Azure, Google, OpenStack, ...
- Toolchain Module
  - GCC, ...
- Advanced Systems Management Module
  - Configuration Management Tools: Machinery, CFEngine, Puppet, ...
- Certification Module
  - FIPS 140-2
- Containers Module
  - Docker



# SUSE Modules





**Advanced  
Systems  
Management**  
**(Salt, Puppet 3)**

**It's all about  
management and  
automation in the data  
center and the cloud!**



## Toolchain (GCC)

**It's the programming tools developers need to leverage all the new stuff!**



## Certifications (FIPS 140-2)

**It keeps what  
shouldn't change  
from changing when  
we update the OS.**



**Legacy**  
(`sendmail` etc)

**It helps customers  
make the move from  
legacy to Modern.**



**Public Cloud**  
(AWS, Azure, GCE  
integrations)

**It helps your  
customers keep up  
with the cloud.**



**Containers**  
(docker & tools,  
SLES Containers)

**Provides the  
packages that enable  
next-gen containerized  
app delivery.**



**Web &  
Scripting**  
(PHP5.5, PHP7.0,  
Node.js)

**Create stable modern  
web apps as quickly as  
business demands or as  
slowly as stability dictates.**



# Modular Updates



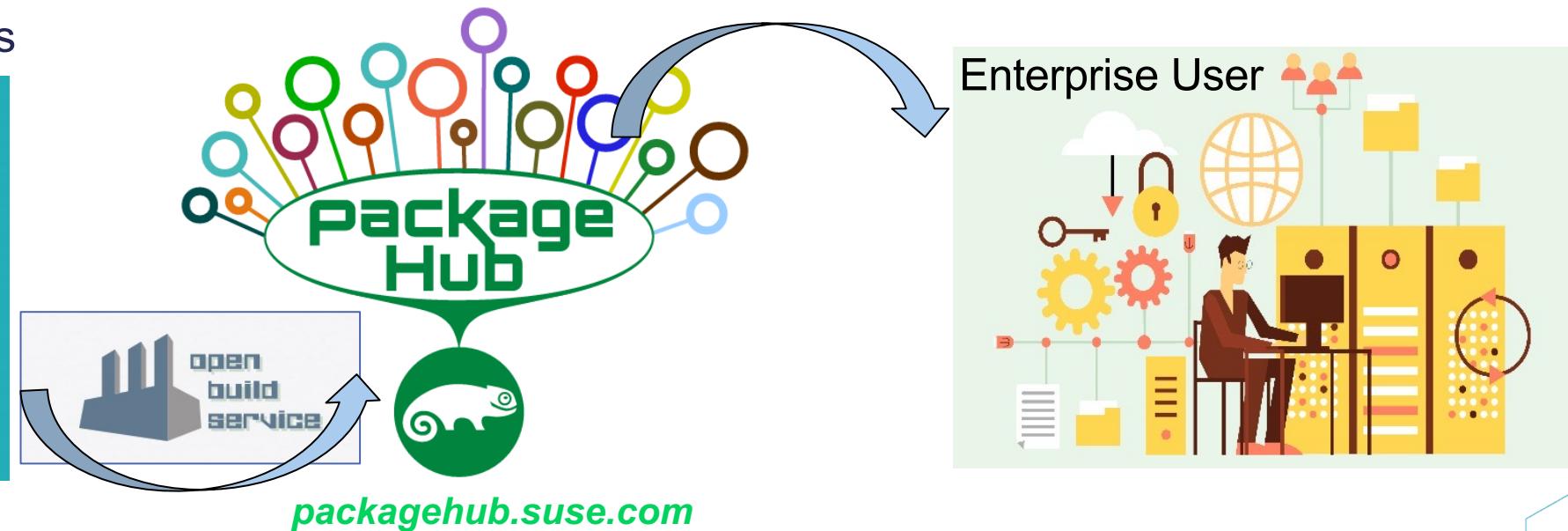
# SUSE Package Hub

Broaden the software choices for enterprise users

Open Source Software  
For SLES 12/15

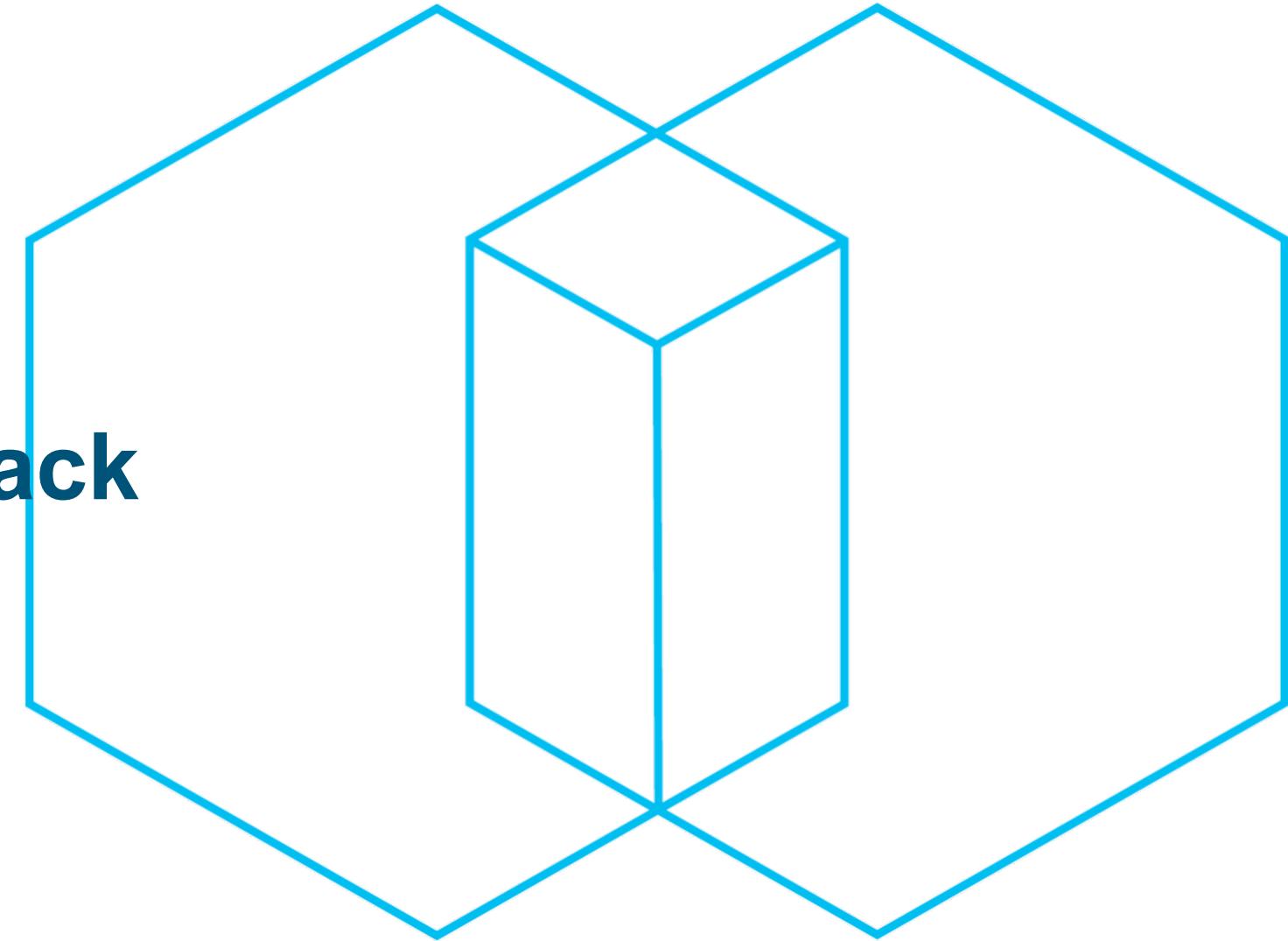
Community built  
SUSE approved

**25,000+**  
Upstream Packages



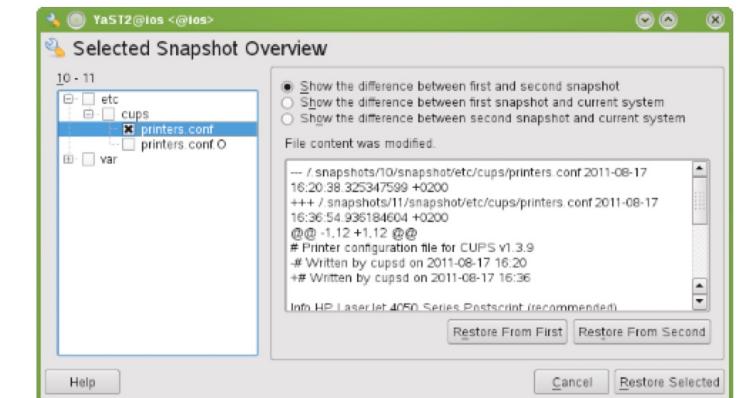
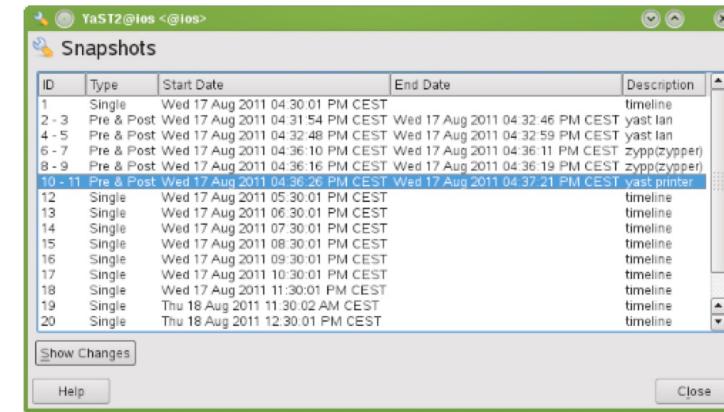


# Business Critical Full System Rollback



# Snapshot / Rollback Overview

- Managed snapshots using Snapper
- Full rollback for SLE12/15
  - RPM package updates
  - Service pack updates
  - Admin changes
  - Kernel / initrd (initramfs)
- No rollback of
  - Customer data: “/home,” if on own partition (default)
  - System data (/var/log) (independently snapshotted subvolumes)

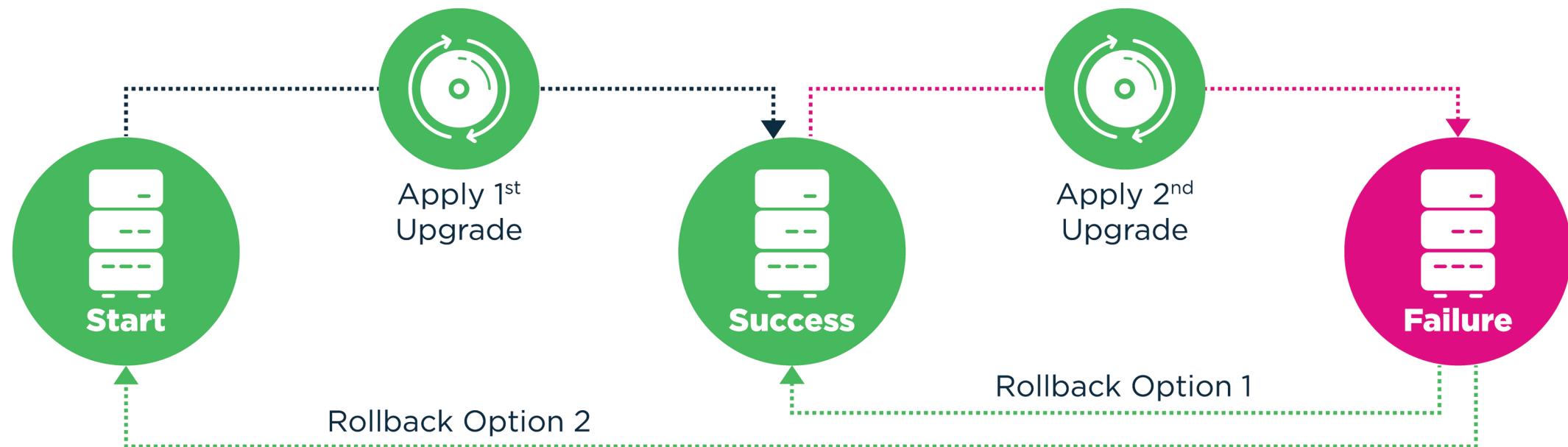


[www.snapper.io](http://www.snapper.io)

# Full-systems Rollback

Rollback to a good state  
with one click

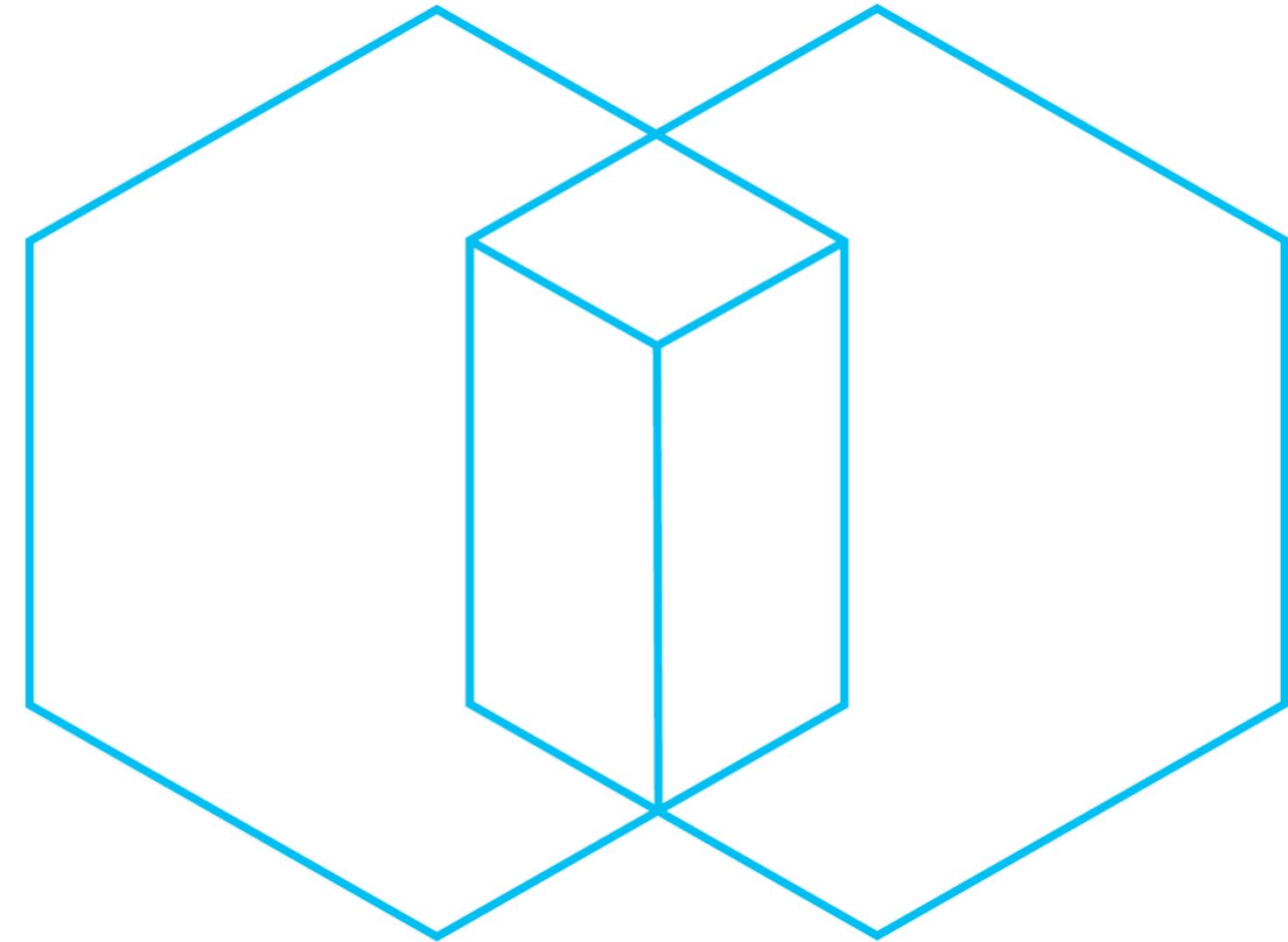
- ✓ Service Pack
- ✓ Kernel Upgrade





# SUSE Manager

IT Management

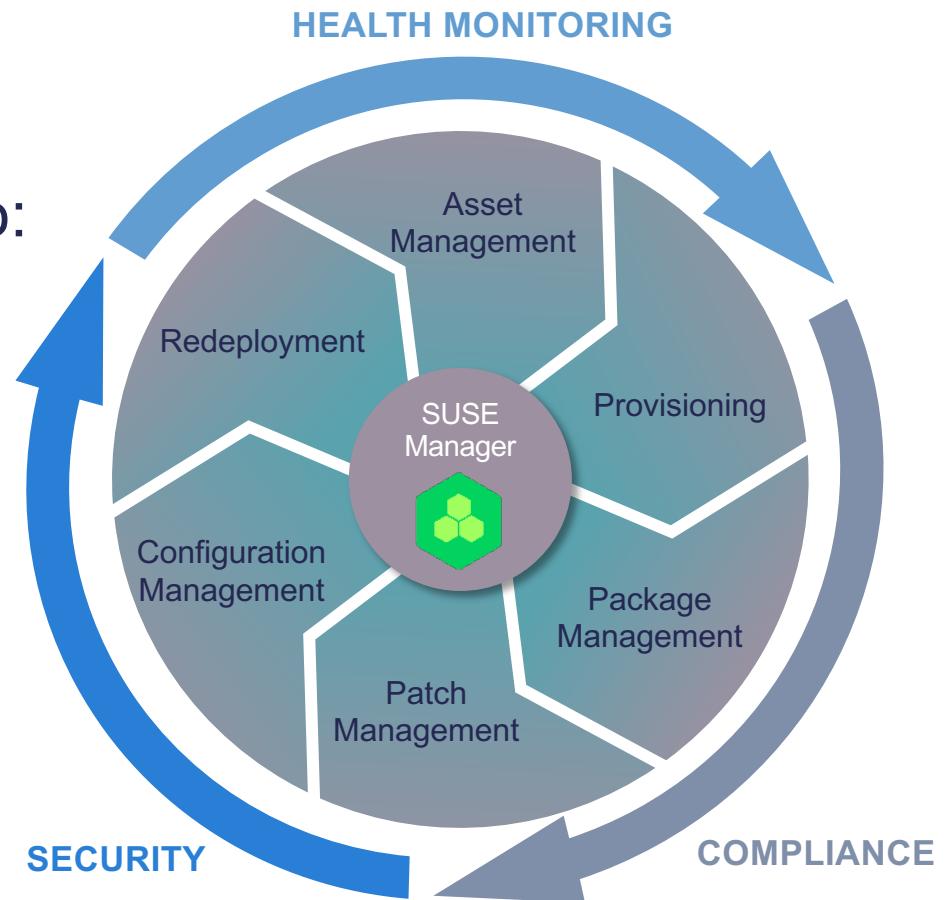


# SUSE Manager

Available  
on the Public  
Cloud

**Best-in-class open source infrastructure management solution** designed to help your enterprise DevOps and IT Operations teams to:

- Optimize operations while reducing **costs**
- Reduce **complexity** and regain control of IT assets
- Ensure **compliance** with internal security policies and external regulations



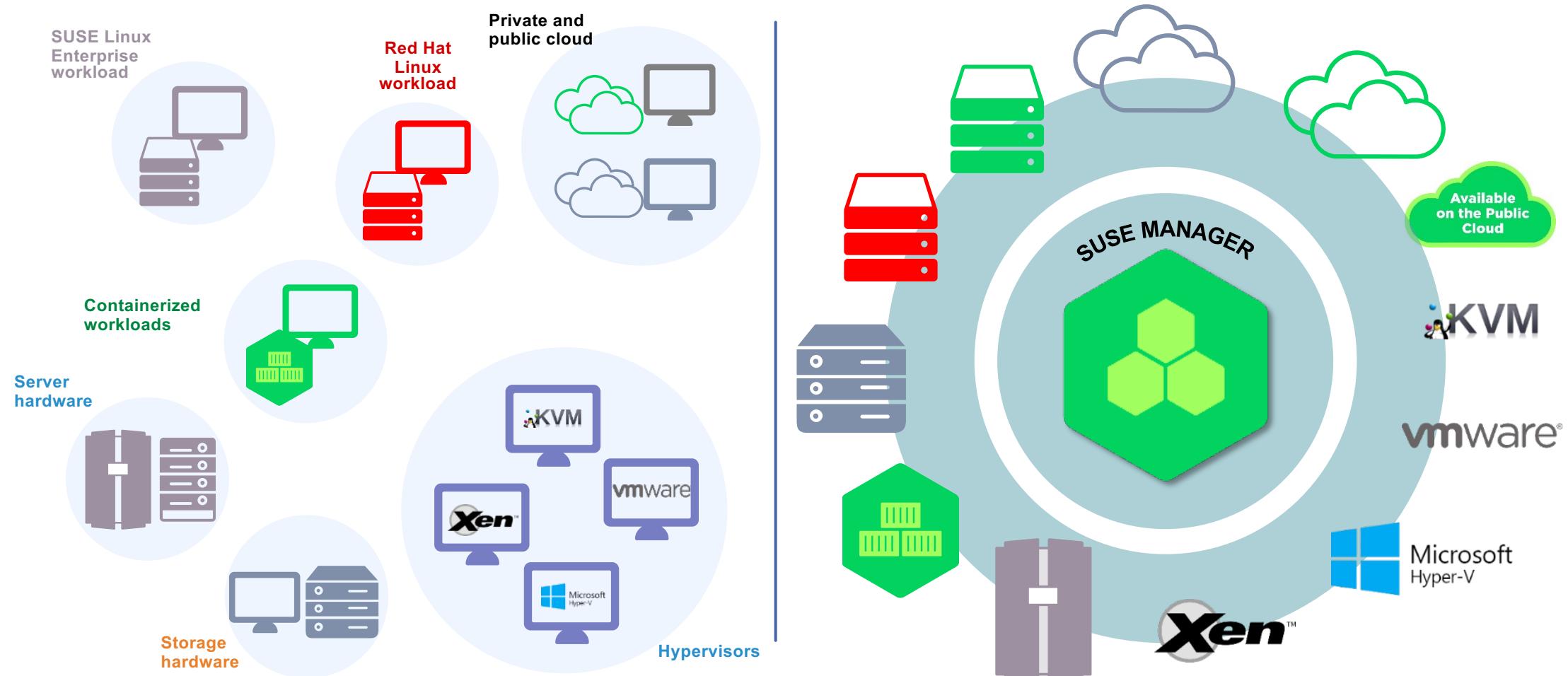
# Cost Reduction Details with SUSE Manager

Feature	Benefit
Deploy and manage physical, virtual, container and cloud workloads from a single console	Cuts OpEx: No need for parallel or manual management
Automate audit and reporting capabilities for server-patch status as well as HW/SW inventories	Cuts OpEx with automated inventory
Automatically maintain standard configurations that conform to security specifications	Avoid compliance/security fines
Optimize usage across your organization	Cut CapEx: Easily identify over- and under-utilized subscriptions



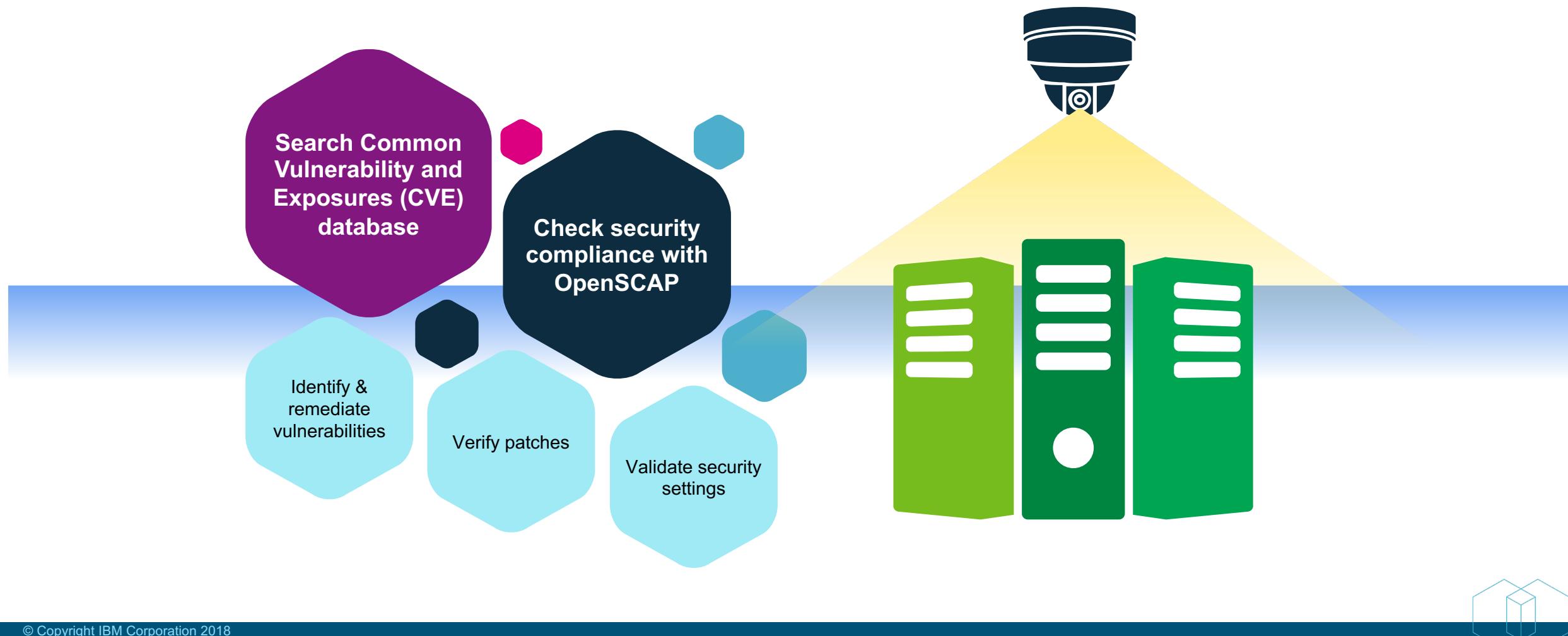
# Reduce Complexity and Regain Control of Your IT

Using a single tool to manage Linux system configuration and compliance across a variety of hardware architectures, hypervisors and cloud platforms

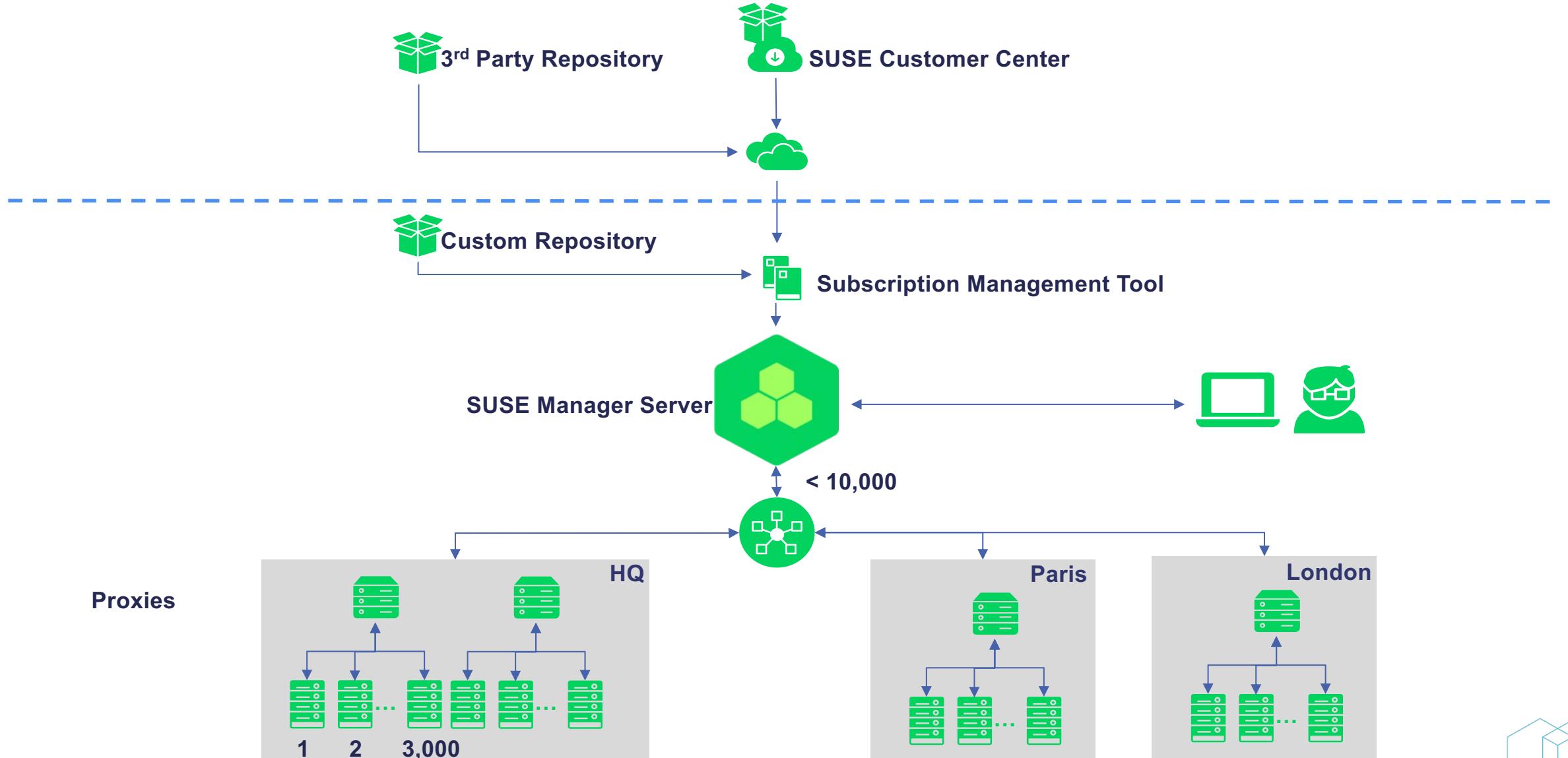


# Ensure Compliance

- With internal security policies and external regulations with automated monitoring, tracking, auditing and reporting



# SUSE Manager – Reference Architecture



# SUSE Manager – Supported\* Client Systems

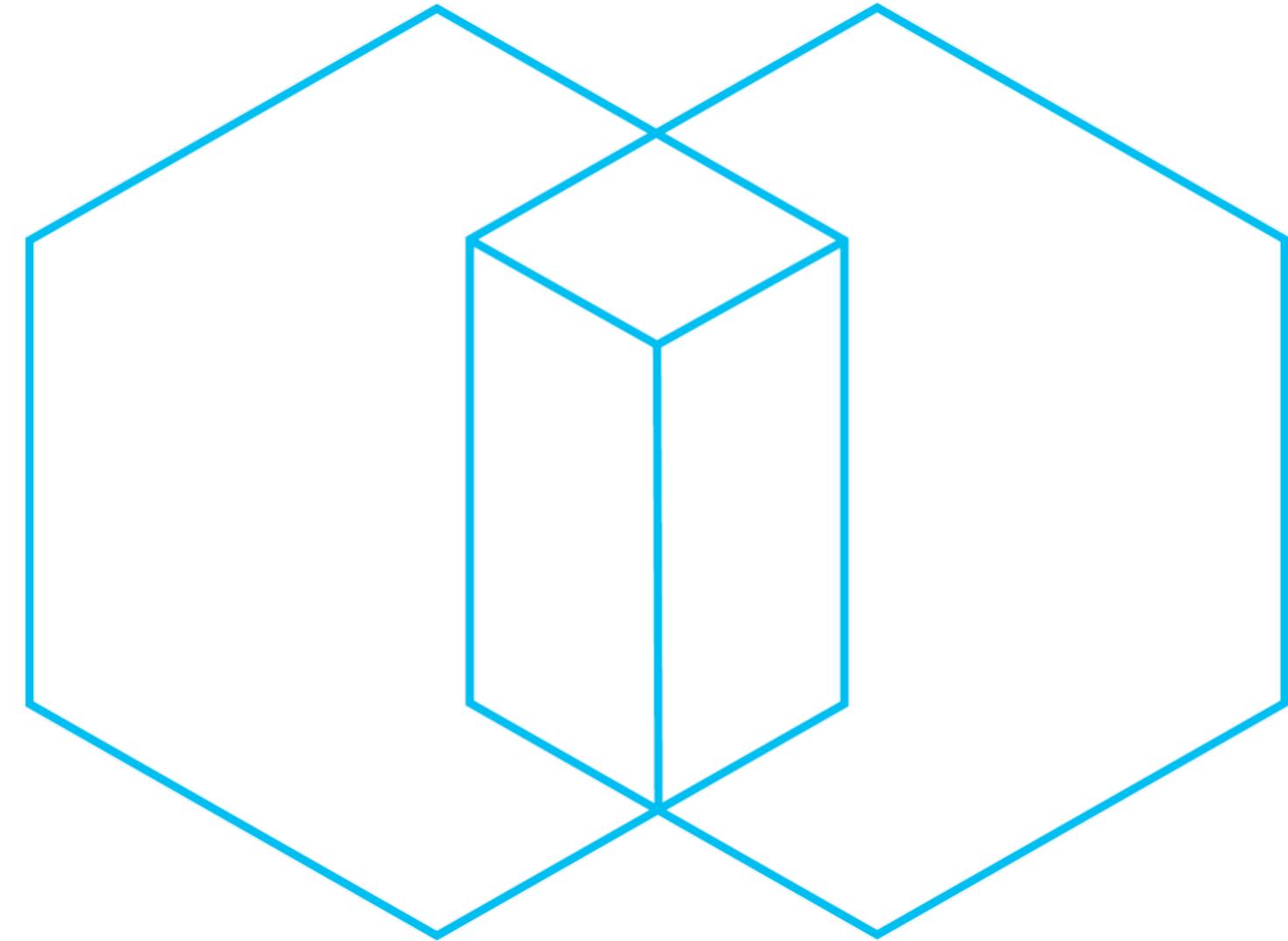
Operating System	Architecture	Traditional Clients	Salt Clients
SUSE Linux Enterprise 11 SP3 and SP4	x86, x86-64, Itanium, IBM Power Systems, IBM z Systems	Supported	Supported
SUSE Linux Enterprise 12, SP1 and SP2	x86-64, IBM Power Systems (ppc64le), IBM z Systems, ARM64 (aarch64)	Supported	Supported
Red Hat Enterprise Linux / CentOS 6	x86, x86-64	Supported	Supported
Red Hat Enterprise Linux / CentOS 7	x86-64	Supported	Supported
Novell Open Enterprise Server 11, SP1, SP2 and SP3	x86, x86-64	Supported	Supported
Novell Open Enterprise Server 2015 and SP1	x86, x86-64	Supported	Supported

\* .deb based distros supported by services if needed / Windows servers supported only for inventory



# SUSE Manager

Salt

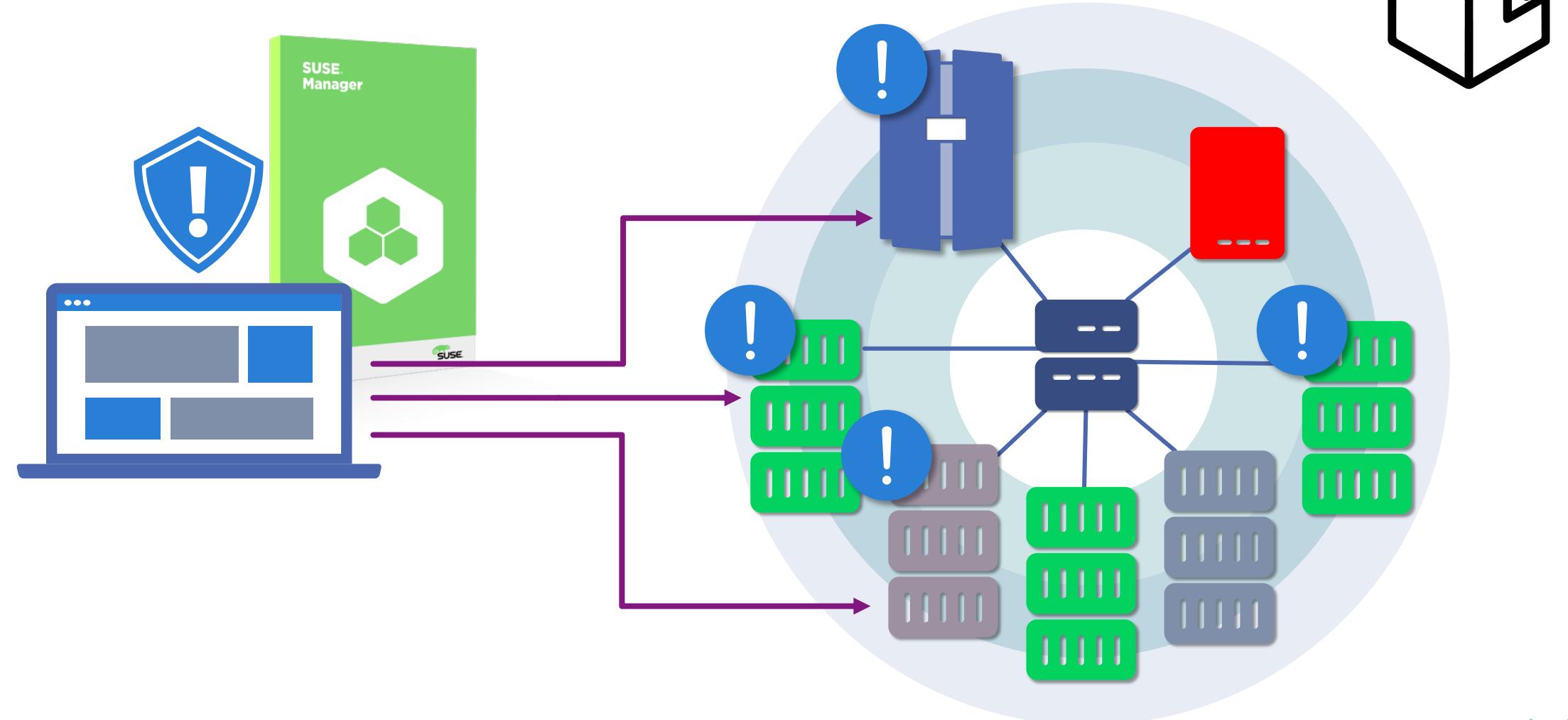


# Why Salt?

- Key Strengths:
- Master and minion, or master-less architecture
- Agent (minion) or agentless (salt-ssh)
- Permanent, encrypted and authenticated connection (ZeroMQ/AES)
- Open API for third-party cloud and software integration
- Asynchronous data collection and command execution
- Lightweight and efficient
- Imperative and Declarative state design
- Strong developer/user community
- Integrates with existing configuration management frameworks

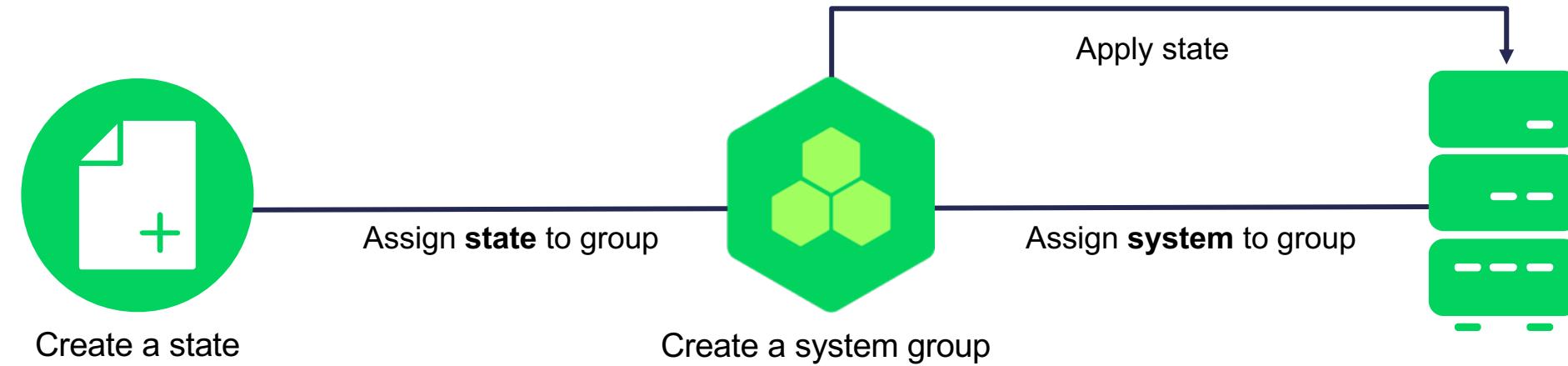


# Gestión de la configuración imperativa con SALT



# SUSE Manager and Salt Together

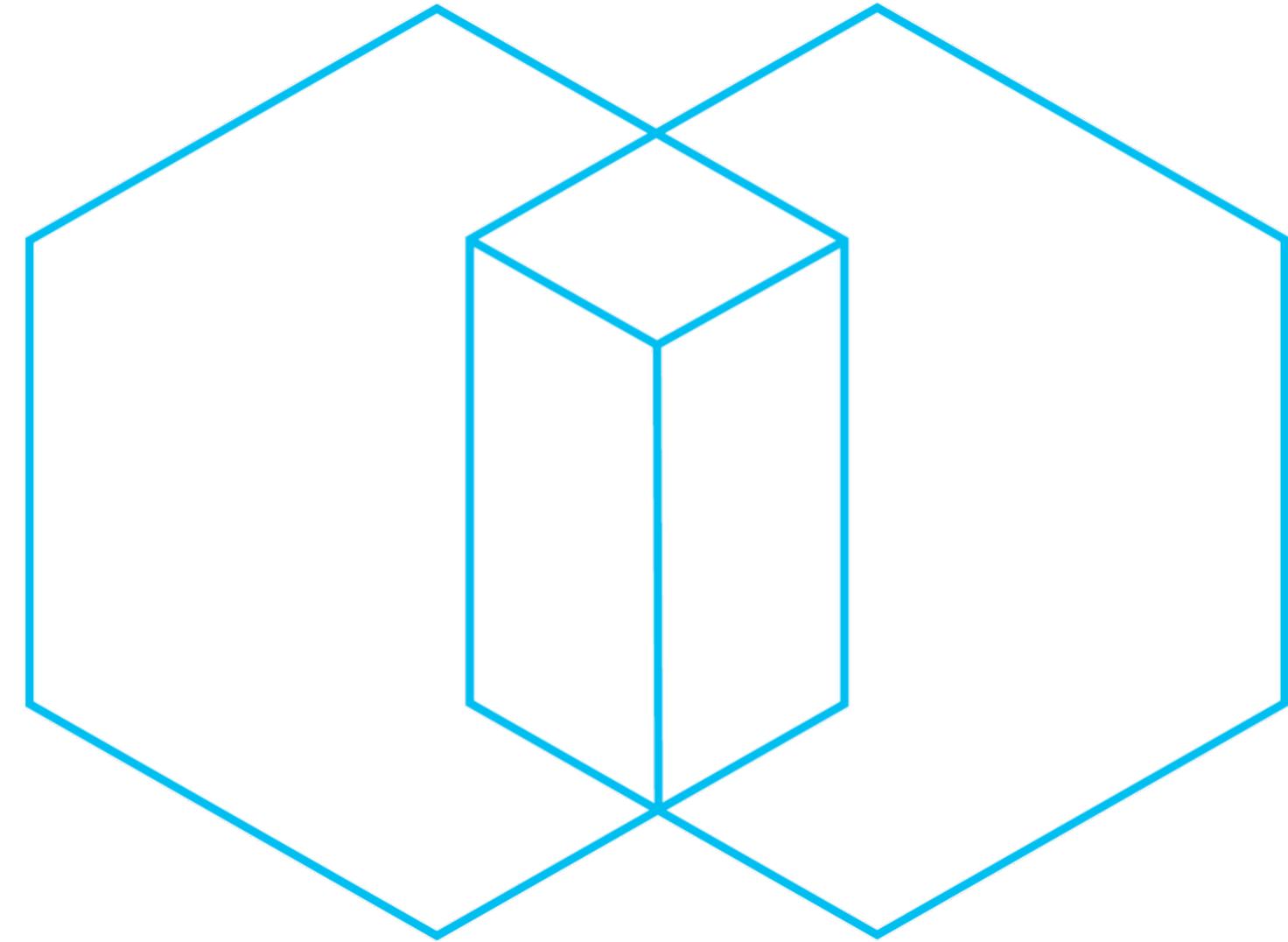
## System Groups and States





# SUSE Manager

Demo



# SUSE Manager demo overview

- General UI overview
- Software channels
- Patching
- Audit
- Salt
- Images and containers
- Visualization
- Multitenant



# SUSE Manager demo videos

- <https://www.youtube.com/watch?v=SPwMRhBZsiQ&t=>
- <https://www.youtube.com/watch?v=c5CUY3yWD4g&t=>
- <https://www.youtube.com/watch?v=U4gsIFW3vog>
- <https://www.youtube.com/watch?v=P19zcCEqmPs&t=>



## Summary

- **SUSE** is the best foundation for Business Critical workloads on Linux
- Joint & Aligned **strategy** with IBM on POWER and zSystem
- Invested on IBM **POWER** support for:
  - System availability: clusters, live patching, system rollback, ...
  - Virtualization support
  - Systems Management



**GRACIAS** **THANK**  
**ARIGATO** **YOU**  
**SHUKURIA** **BOLZIN MERCI**

THANK YOU

THANK YOU