SUSE® Linux Enterprise SP2 Overview

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OSL Technologietage
2012-09-12
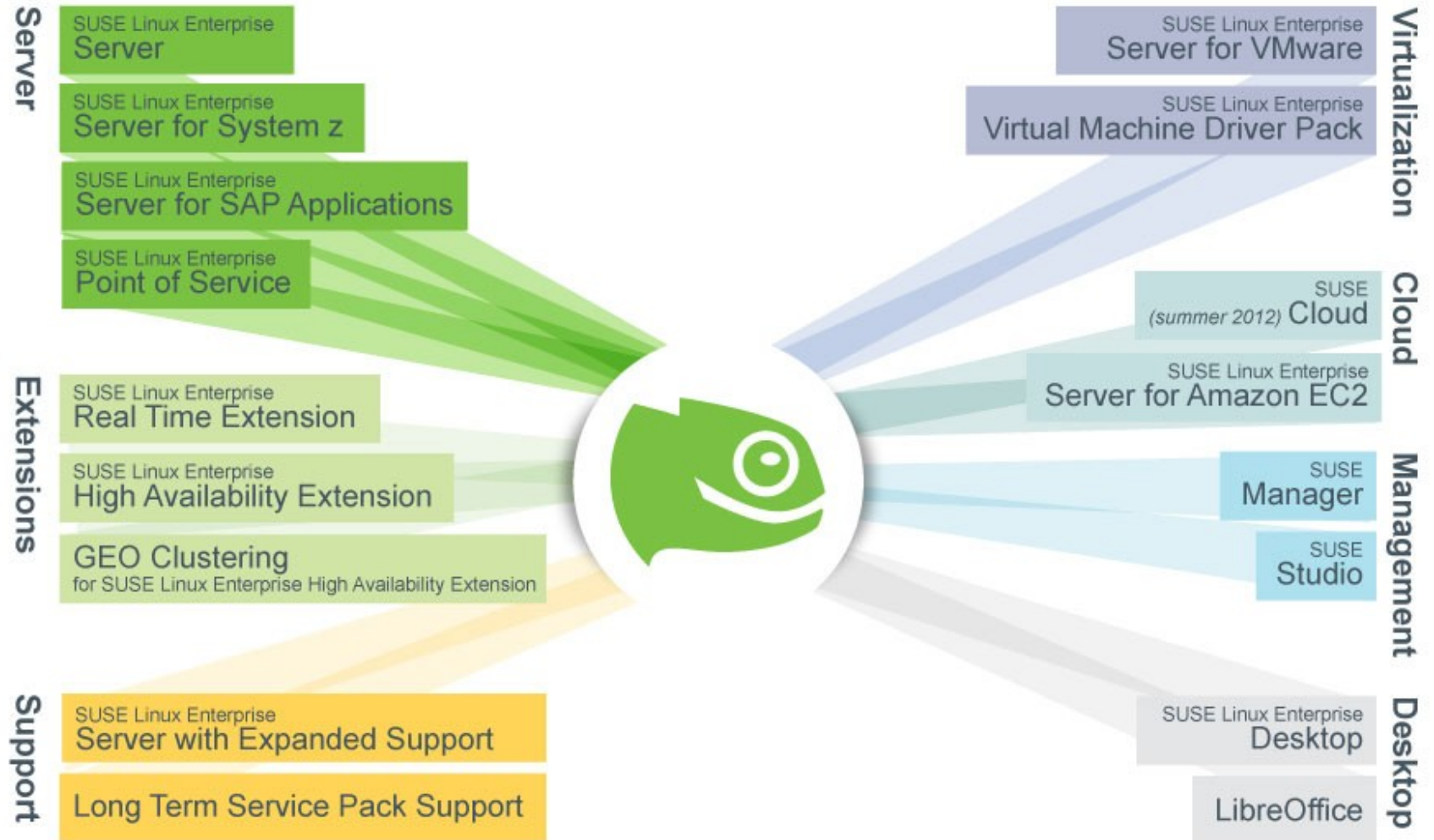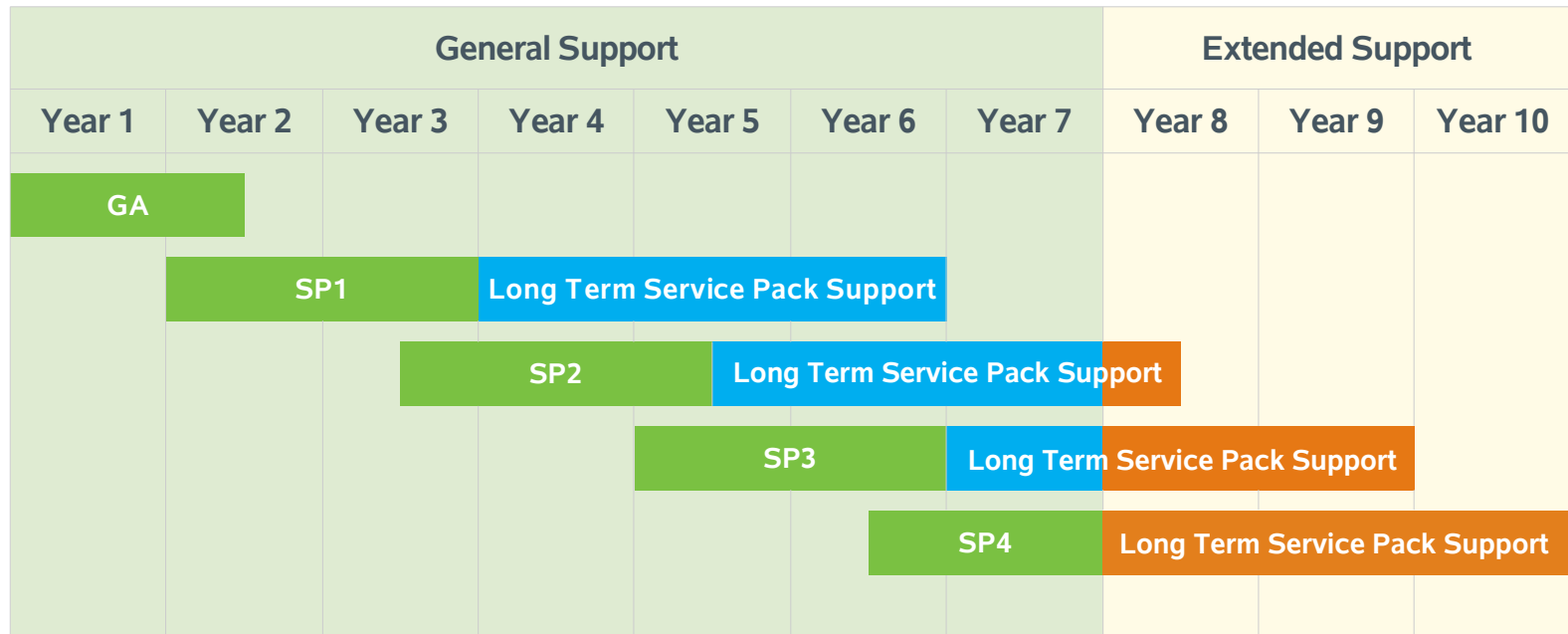
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We adapt. You succeed.

Agenda

- Product Family
- SLE 11 SP2
  - Forward Looking Development Model
  - Kernel 3.0 (selected benefits)
  - Hardware enablement
  - Virtualization
  - Storage and Networking
  - Performance, Scalability, Reliability
  - Desktop
  - interoperability
  - High Availability
  - Security
  - Systems Management
  - Match and exceed Solaris

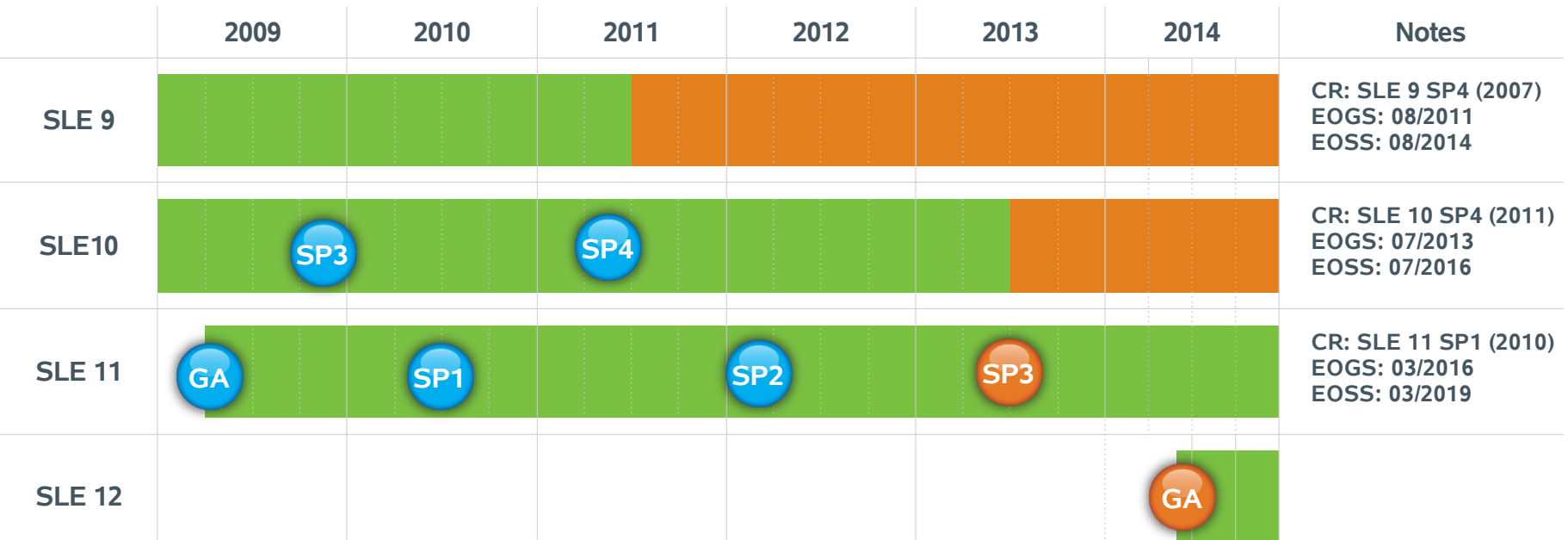# Product Overview

Comprehensive Portfolio

SUSE® Linux Enterprise
Standard Platform Lifecycle

	General Support							Extended Support		
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10

GA

SP1 — Long Term Service Pack Support

SP2 — Long Term Service Pack Support

SP3 — Long Term Service Pack Support

SP4 — Long Term Service Pack Support

- 10-year lifecycle (7 years general support, 3 years extended support)
- Service Packs are released every ~18 months
  - 5 years lifetime with
  - ~2 years general support per Service Pack
  - 6 month upgrade window after release of the next Service Pack
- Long Term Service Pack Support (LTSS)
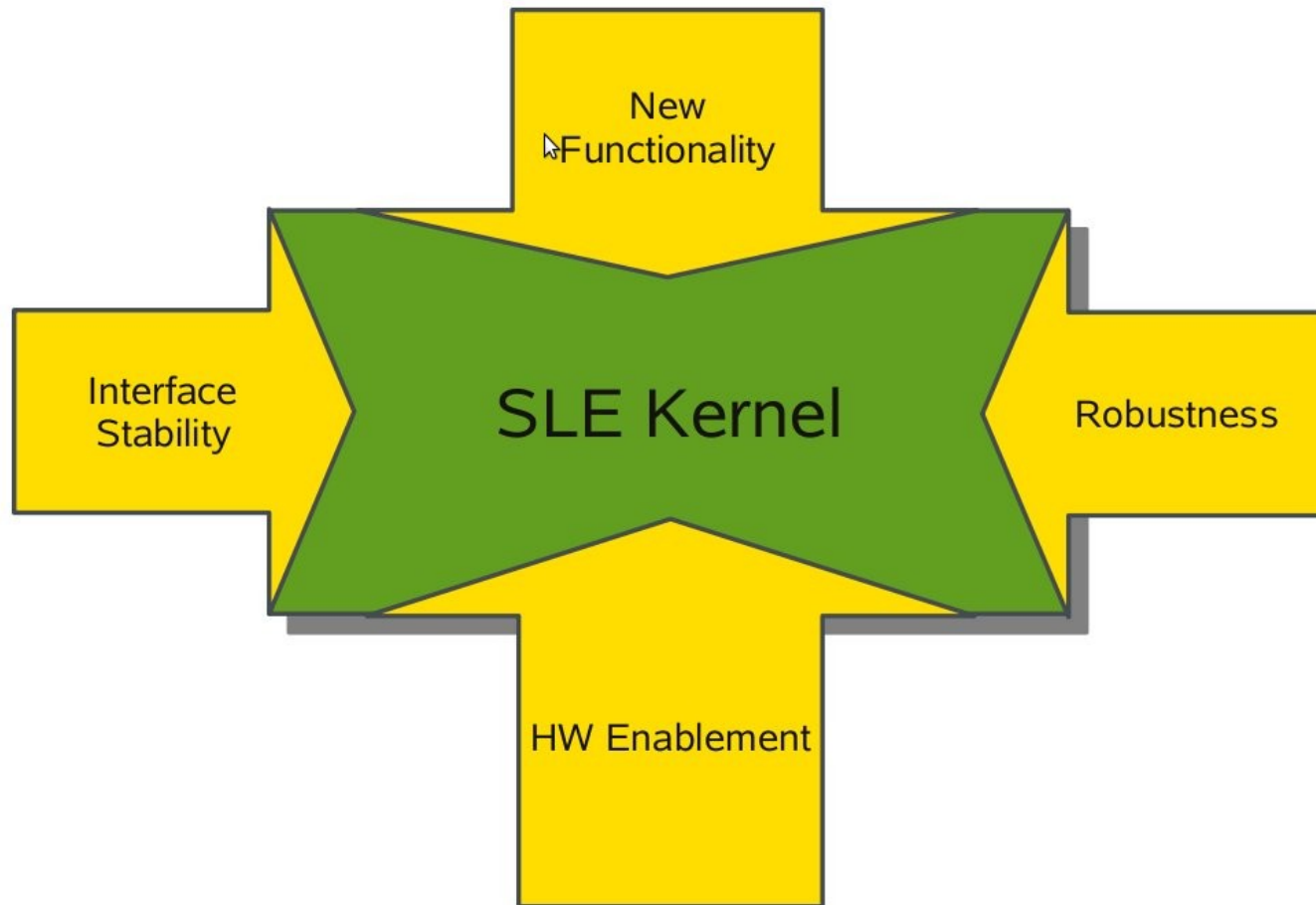 - Extend upgrade window or extend major release lifecycle

SUSE® Linux Enterprise
Current Platform Lifecycle

	2009	2010	2011	2012	2013	2014	Notes
SLE 9							CR: SLE 9 SP4 (2007) EOGS: 08/2011 EOSS: 08/2014
SLE10	SP3	SP4					CR: SLE 10 SP4 (2011) EOGS: 07/2013 EOSS: 07/2016
SLE 11	GA	SP1		SP2	SP3		CR: SLE 11 SP1 (2010) EOGS: 03/2016 EOSS: 03/2019
SLE 12						GA	

- SUSE announces service pack releases and development and product schedules to customers and partners
- Dependable release timing
- Predictability for planning rollouts and migrations
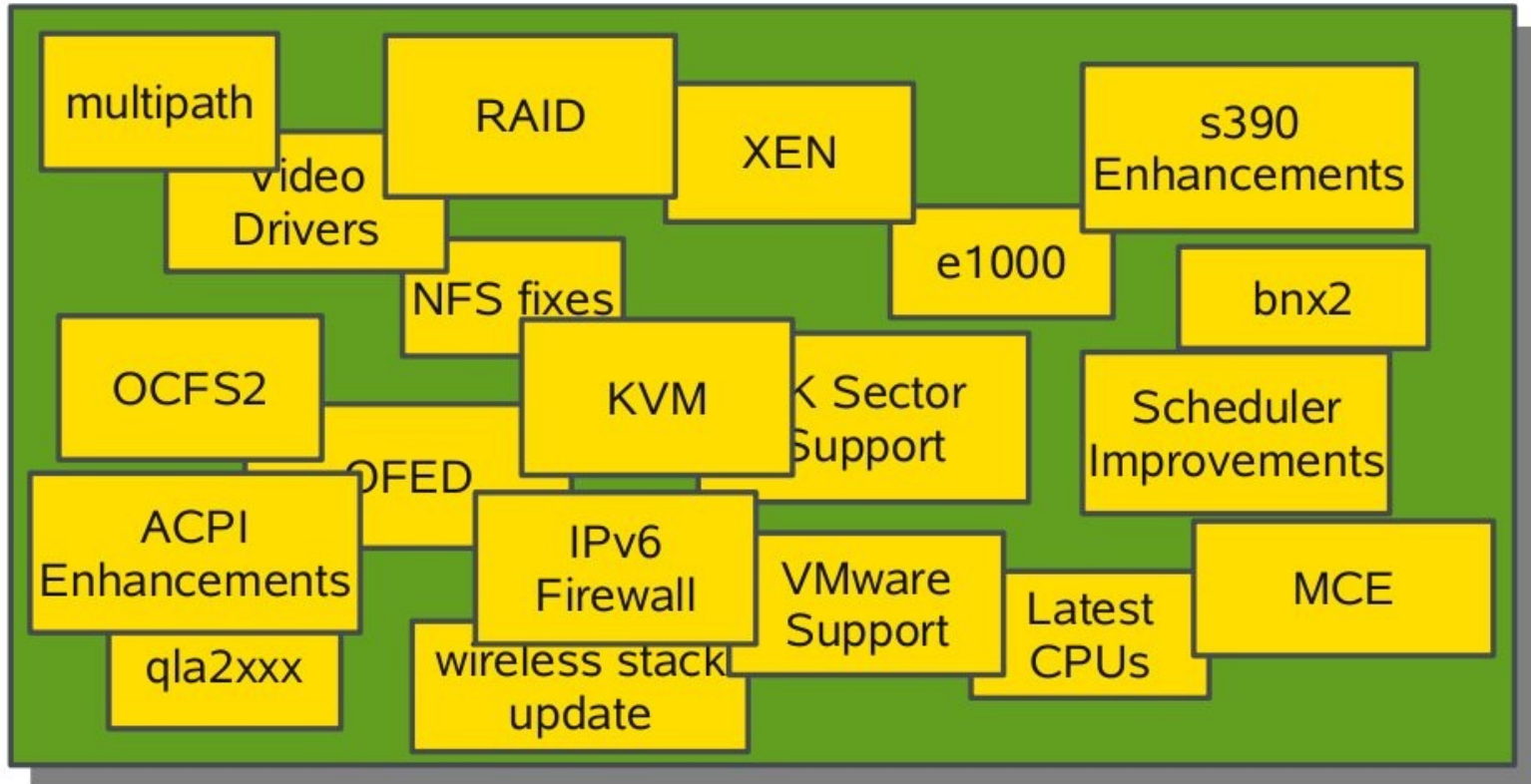- Major releases every 4-5 years.
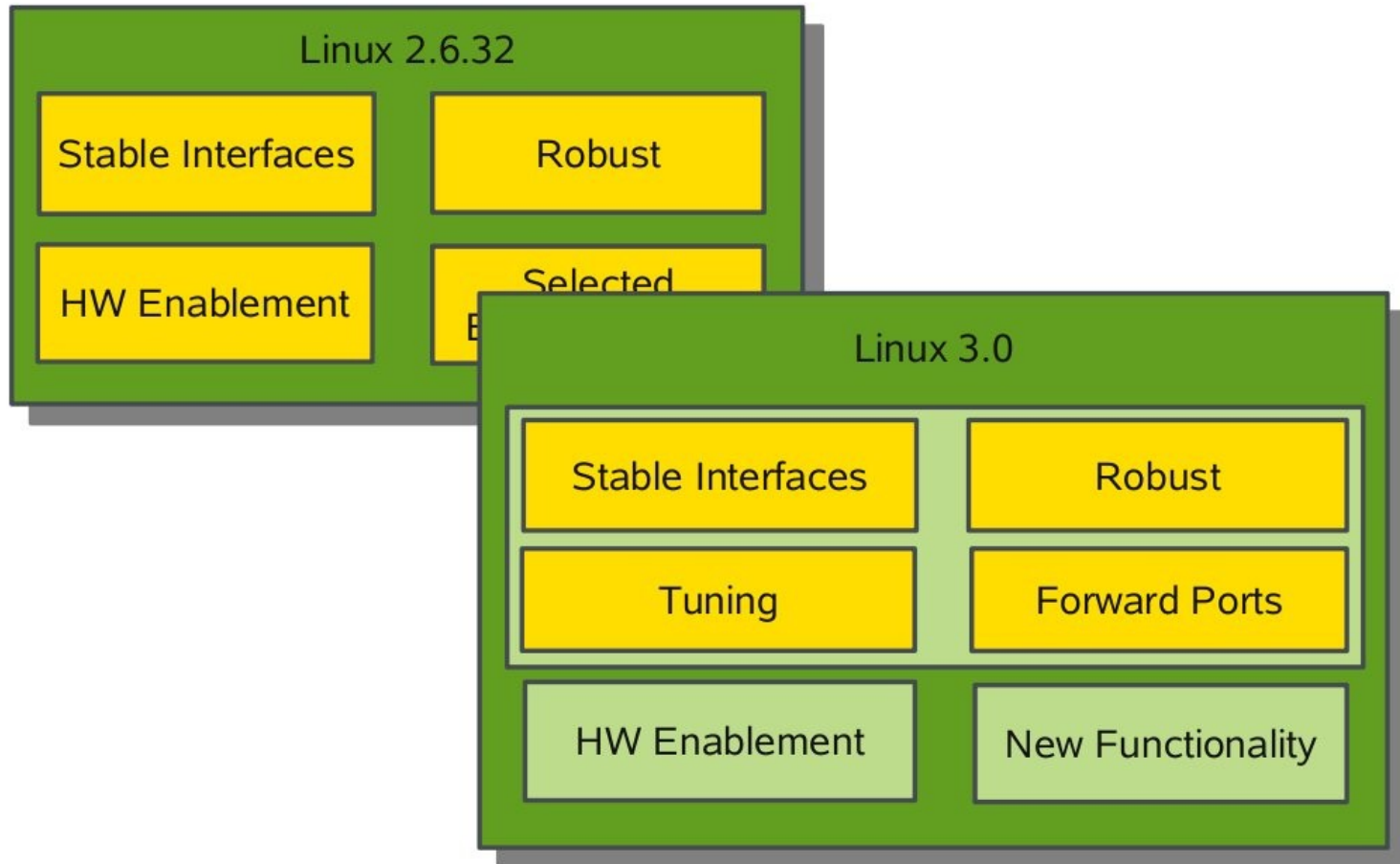
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SUSE Linux Enterprise 11 SP2
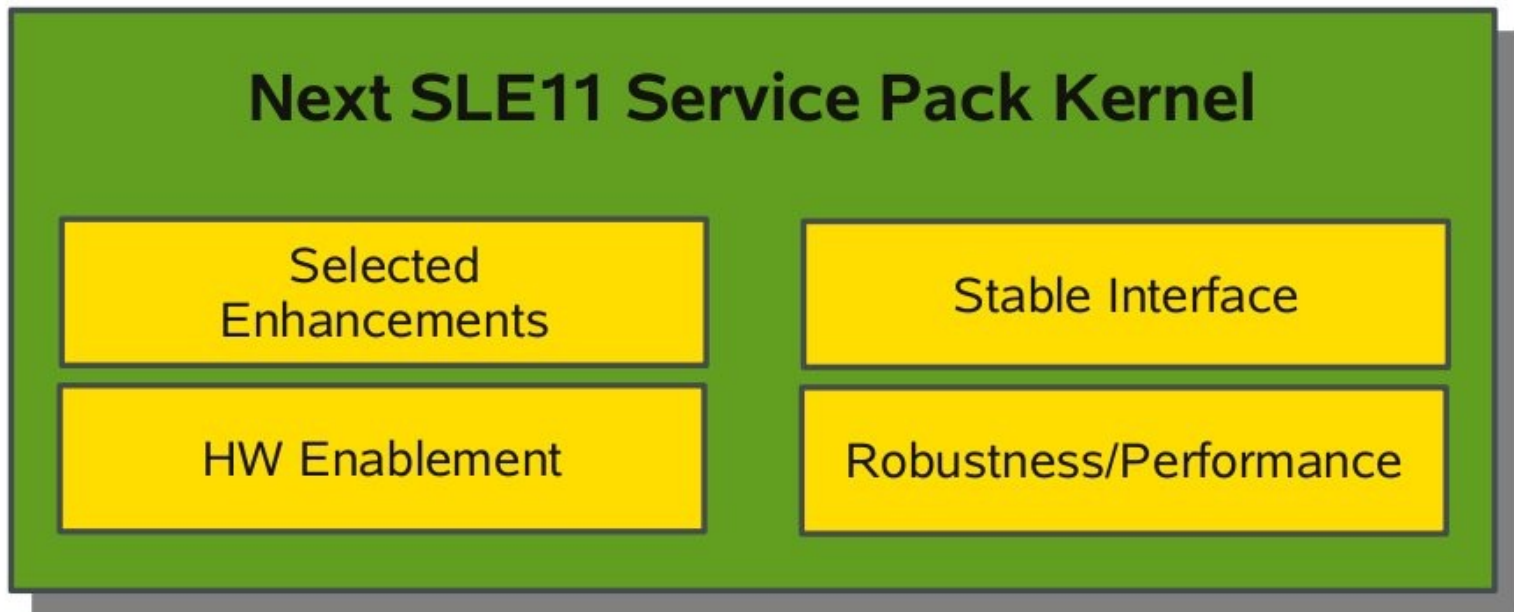
Four Forces of a Service Pack Kernel

Kernel Components Changed in a Service Pack

What does this change mean?

Linux 2.6.32
- Stable Interfaces
- Robust
- HW Enablement
- Selected Backports

Linux 3.0
- Stable Interfaces
- Robust
- Tuning
- Forward Ports
- HW Enablement
- New Functionality

How do we make this all work?

Next SLE11 Service Pack Kernel

- Selected Enhancements
- HW Enablement
- Stable Interface
- Robustness/Performance

Forward Looking Development Model
Benefits

New Features and Functionality Faster	Improved RAS, Scalability and Security

More Hardware Choice (especially newer)	Application Compatibility

Smart Innovation, Enterprise Quality and Investment Protection

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Example 1: Kernel / Process Scheduler

- Kernel needs to know about HW architectures and their internals
    - Optimize process-CPU-scheduling
    - Optimize use of L2/L3 caches
- Examples: AMD "Bulldozer", Intel "Sandybridge"
- Customer benefits
    - Fully exploit most recent hardware development
    - Higher performance / less power consumption

→ SUSE Linux Enterprise 11 SP2 automatically gets this with Kernel 3.0

Example 2: Interoperability / samba

- SUSE Linux Enterprise 11 SP1: Samba 3.4
- SUSE Linux Enterprise 11 SP2: Samba 3.6
  Benefits of Samba 3.6:
  - Support for SMB2 protocol
  - Changed ID Mapping algorithms
  - Changed security defaults

Changes introduce risk of breaking existing installations

→ Samba 3.6 only available in SLE 11 SP2

Example 3: Certifications / openssl

- OpenSSL is a base library of every Linux system
- SUSE Linux Enterprise 11 SP1: OpenSSL-0.9.8i
- Latest upstream version: OpenSSL-1.0.0
- Issue: OpenSSL-1.0.0 highly incompatible to 0.9.8
- Requirements
  – Implement infrastructure needed for upcoming FIPS 140-2 certification
  – Do not change API or ABI
- Approach
  – Start with OpenSSL-0.9.8j
  – Adopt ABI to become fully backward compatible
→ Maintenance Update to SUSE Linux Enterprise 11 SP1 (and SP2 respectively): OpenSSL-0.9.8j

SUSE Linux Enterprise 11
Maintenance Delivery Evolution
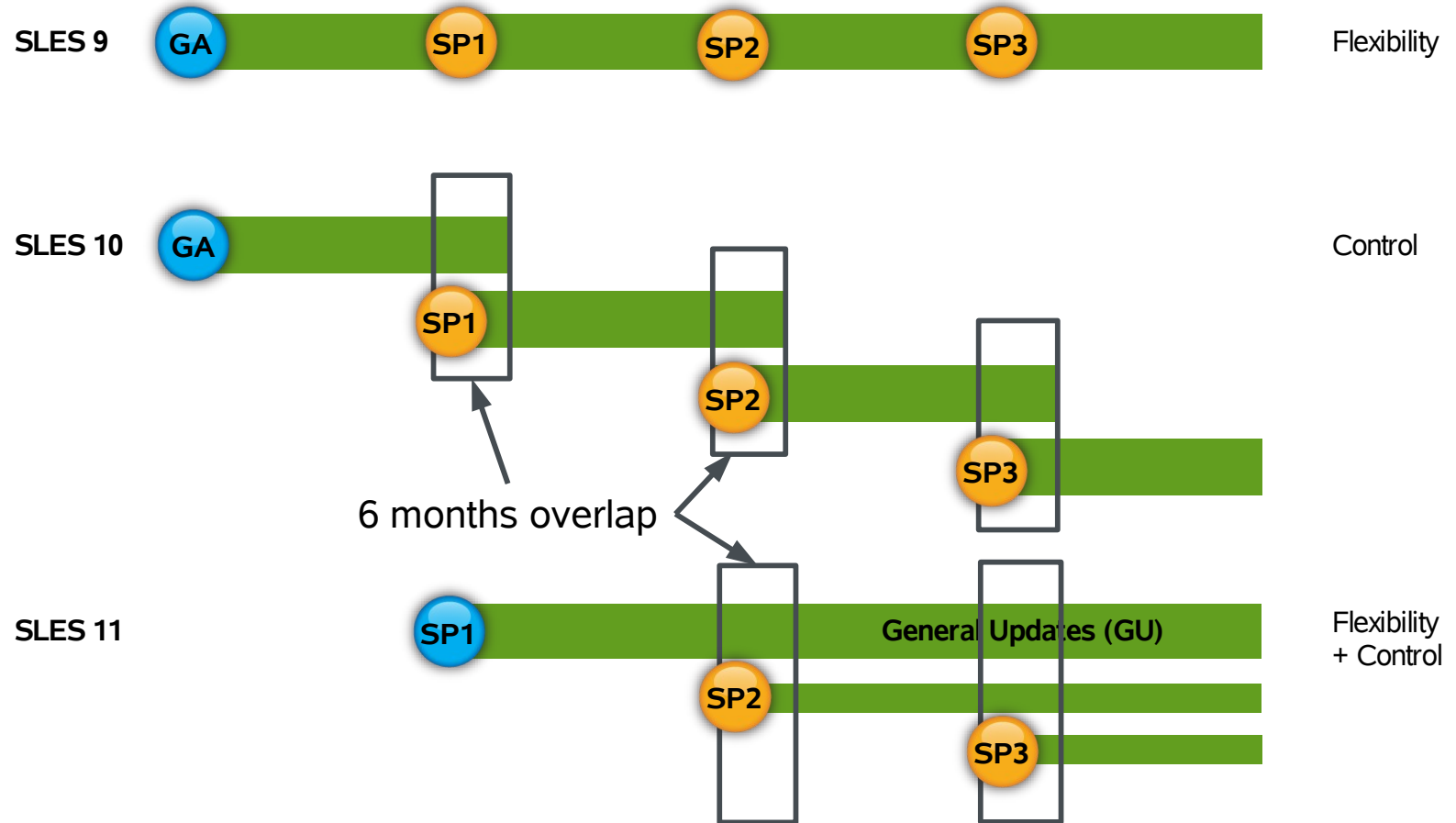
SUSE® Linux Enterprise
Phases of Flexible Lifecycle

Feature	General Support for most recent Service Pack		General Support for former Service Pack with LTSS option	Extended Support with LTSS option
	Year 1-5	Year 6-7		Year 8-10
Technical Support	yes	yes	yes	yes
Access to Patches and Fixes	yes	yes	yes	yes
Access to Documentation and Knowledgebase	yes	yes	yes	yes
Support for existing stacks and workloads	yes	yes	yes	yes
Support for new deployments	yes	limited (1)	limited (1)	no
Enhancement Requests	yes	limited (1)	no	no
Hardware Enablement/Optimization	yes	no	no	no
Driver Updates via PLDP	yes	limited (1)	limited (1)	no
Backport of fixes from more recent Service Pack	yes	n/a	limited (2)	n/a
Critical Security Updates	yes	yes	yes	yes
Defect Resolution	yes	limited (2)	limited (2)	limited (2)
(1) Based on partner and customer requests.				
(2) Severity Level 1 and 2 defects only.				

SUSE® Linux Enterprise 11
SUSE Maintenance Model Benefits

- **Deliver new functionalities in between Service Packs**
  - Starting with SLES 11 SP1, new features can be delivered anytime, making the SLES products competive
- **Usage of older version of packages**
  - Customers can pick and use any compatible package available in the SP 1 Updates repository
  - The update of a package in SP1 update repositories might trigger the installation of other packages within this repository or in the SP2 repository.
- **Lightweight Service Packs**
  - Customers can choose between a minimal and a full migration
    - Minimal migration = install all the packages available in SP2 Updates repository
    - Full migration = install all the packages available in SP2 and SP1 Updates repository

Partner Linux Driver Process (PLDP)

- What?

  - Allow partners to package and provide kernel device drivers for SUSE Linux Enterprise – independent of SUSE releases

  - Fully supported due to mutual support agreements

- Why?

  - Quick hardware enablement

- How?

  - Build infrastructure (Open Build Service)
  - Developer support
  - http://drivers.suse.com/

SUSE® Linux Enterprise
Long Term Service Pack Support (LTSS)

Use Cases

I want to run my software stack unchanged for a very long time

- Updating OS does not improve my business process

- Updates can be very expensive to deploy

- Any change may impose additional risk

I need more time to move to the next Service Pack

- Approval process from stake holders

- QA processes

- Very large and/or distributed environment

Kernel 3.0 (selected benefits)

- Most recent hardware enablement
  - including USB 3.0
- Removal of BKL (Big Kernel Lock)
- Transparent Huge Pages (THP)
- Control Groups enhancements
  - I/O throttling support for process groups
  - memory cgroup controller optimization
- Upstream Integration of AppArmor
- Network:
  - Transparent per-CPU network load balancing on multiqueue devices (up to 20% performance increase)
  - initcwnd/initrwnd
  - More powerful firewalls based on faster packet filtering
- Support for fanotify, allowing clean antivirus solutions

Hardware enablement

- Intel Sandybridge and "Romley"
- AMD Bulldozer …
- AVX support (GCC 4.6 in SLE SDK 11 SP2)
- IBM System z and POWER exploitation for new hardware and systems
- General RAS enhancements in AMD64/Intel64 architecture, e.g.:
  - CPU offlining
  - Memory Offlining

SUSE® Linux Enterprise 11 SP2
Virtualization

- KVM 0.15
  - I/O improvements, storage and network device hotplugging
  - Microsoft Windows support
- Xen 4.1
  - Latency improvements, flexible partitioning
  - Better fault handling, improved scalability and performance
- Perfect Guest strategy, tuned to run great as a guest on all major hypervisors, including:
  - Microsoft Hyper-V
  - VMware ESX
  - Citrix XenServer
  - SUSE Linux Enterprise with Xen and KVM
  - LPAR and z/VM for IBM System z

SUSE® Linux Enterprise 11 SP2
Virtualization

- Virtual machine driver pack: paravirtualized drivers
  - Increase performance, improve reliability and stability
- SUSE Appliance Program and SUSE Studio™ for easy building, testing, distributing and managing of stacks
- Unique cost efficiency – unlimited number of virtual machines per physical server with one subscription
- Container technology / soft partitioning
  - Kernel resource management (control groups, LXC)

SUSE® Linux Enterprise
Virtualization Future

- Virtualization host

  - Improve interoperability and establish virtual machine migration between Xen and KVM for smooth migration

  - KVM inherits from the Linux kernel

    - Power saving capabilities and

    - Scalability improvements

- Container technology:

  - More detailed control and tuning for single processes and process groups

KVM - tuning

- high performance networking: switch to a bridged setup
- Storage:
  - raw partition instead of raw and qcow2
  - Avoid IDE, use if=virtio
  - Avoid btrfs on host for image files(low IO performance)
- Networking:
  - avoid caching mode(reduce data copies and bus traffic)
- Snapshots
- Derived images qcow2
- KSM: /usr/src/linux/Documentation/vm/ksm.txt
  - /sys/kernel/mm/ksm/

Storage and Networking

- Maintain existing capabilities (e.g. XFS)
- FCoE integration
- iSCSI improvements
- IPv6 readiness and certification
  - IPv6 ready logo 2 / USGv6 v.10
  - Achieved for SLES 11 SP1, refresh planned for SP2
  - incl. IPv6 IPSECv 1.2 , IKE v1.1 & v2.0
- pNFS client support (delivery in 2012)
- Update to OFED 1.5.2, including
  - Better hardware support
  - More features in the Infiniband stack
  - Improved support for 10G networks

Performance, Scalability, Reliability

- Keep and extend high level of scalability in terms of
  - Number of CPUs (4096)
  - Filesystem and Storage: XFS (8 EiB), BTRFS (16 EiB)
  - Memory (16 TiB and beyond)
- Improve support for hardware based RAS capabilities
- Scheduler and Memory management optimizations
- Faster and more powerful control groups, which allow for resource isolation between process groups.
- Linux Container support for soft partitioning of large physical systems (LXC)

Interoperability

- Remote Desktop Protocol (RDP, Windows environments)
  - Support xrdp server on AMD64/Intel64 (SLES)
  - Introduce FreeRDP client: better Performance and Compatibility (SLED only)
- CIFS (also known as SMB)
  - Samba 3.6: SMB2 protocol support
  - Improve CIFS kernel module
- IPv6
  - Improve DHCP server and client (ISC dhcp)
  - IPv6 support in NFS
  - IPv6 capable Squid proxy (most other network daemons are IPv6 ready since SLE 10 times)
  - Ensure IPv6 capabilities with UEFI network boot

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High Availability

- GEO Cluster
- Management
  - Guided wizard / Templates
  - HA boot strap
  - Cluster Test Drive
  - Granular Cluster Access, Map customer organization to access roles
  - Enhanced scalability for the web based cluster management
- Supportability
  - History Explorer
- Cloud Integration
  - Automatic discovery for CPU & memory requirements of VMs
  - Load limiting for concurrent live migrations

SUSE® Linux Enterprise High Availability Extension 11 SP1
Key Capabilities Today

- Service Availability 24/7
  - Policy driven clustering
  - OpenAIS messaging and membership layer
  - Pacemaker cluster resource manager
- Sharing and Scaling Data-access by Multiple Nodes
  - OCFS2 Clusterfile system
  - Clustered logical volume manager
- Disaster Tolerance
  - Continuous data replication via IP
  - Improved Distributed replicated block device (DRBD) capabilities
- Scale Network Services
  - IP load-balancing
- User-friendly Tools
  - Graphical user interface / Unified command line interface

Key Capabilities Today

- Storage Quorum Coverage
  - Enabling the use of a storage device as a quorum instance to match
    traditional Unix setups and to prevent split brain scenarios

- Integrated Samba Clustering
  - Integration of Samba with OCFS2 for higher throughput and scale out of SMB access

- Metro-Area Clusters
  - Supporting clustering between different data center locations

- DR Framework
  - A tool set (ReaR) for node recovery

Security

- Answer customer demand for security certifications: SUSE Linux Enterprise Server is in evaluation for a Common Criteria Certification in Evaluation Assurance Level 4 with augmentation according to the BSI OSPP (CC/OSPP EAL 4+)
- Enhanced Hardening Guide

Security and Certifications Tomorrow

- Common Criteria Certification
  in Evaluation Assurance Level 4 with augmentation
  according to the BSI OSPP (CC/OSPP EAL 4+)

- FIPS 140-2 Certification
  - "libopenssl" module
  - tentative/future modules based on customer demand

- Trusted Execution Technology (TXT)
  - Enhances Trusted Computing with processor-based
    separation functions on a page-level in memory
  - Keep systems in consistent and proven ("measured") state
  - in virtual environments and cloud

Systems Management

- Unattended upgrade from SUSE Linux Enterprise 10 to SUSE Linux Enterprise 11

  This is a key differentiator: other Enterprise Linux distributions do not support this, not even manually

- SUSE developed open source "snapper" tool to manage btrfs snapshots – including:

- YaST2 and zypper integration with snapper:

  Rollback changes to the system, which have been unwanted (administrator error) or did show unwanted results or side effects

- Allow to work with several kernels installed in parallel

  implemented in ZYpp

Match and exceed Solaris (1)

- Tracing
  - LTTng
    - to be delivered after SLES 11 SP2 in an extra Extension
- LXC - Linux Container support
  - So called "OS Level virtualization"
  - Use Cases
    - Hosting buiness
    - Datacenter use
    - Oursourcing business
  - Built upon Linux Kernel Control Groups and specific settings
  - Build "System Containers" for SLES 11 SP2 on SLES 11 SP2
  - Support for "Application Containers" planned for a later release
- SWAP over NFS (since SLES 11 SP1)
  - SLES is the only Enterprise Linux offering this functionality

Match and exceed Solaris (2) – btrfs

- btrfs
  - Support for Copy on Write
  - Integrated Volume Management
  - Powerful Snapshot capabilities
  - Scalability (16 EiB) including effective shrink
  - Supports offline in-place migration from ext2+
  - Other Capabilities:
    - Compression
    - Data integrity (checksums)
    - SSD optimization
  - Btrfs builds the foundation for the Ceph distributed filesystem and its RADOS object store layer → Cloud
- snapper
  - Single file rollback ("undochange")
  - User interface: cmdline and YaST2 integration
  - Snapshots for YaST2 and zypper activities
  - Automated snapshots (time based) and snapshot cleanup

SUSE Linux Enterprise Server for SAP Applications Key Capabilities

- Installation Wizard for OS and SAP installation
  - Simplified installation of Operating System and SAP solution with minimized manual interaction
- "Vanilla" Operating System installation
  - For custom deployments of SAP solutions
- Configuration and package selection based on SAP requirements
- Supported Page Cache Feature
  - Allows for better performance of memory intensive applications with rarely accessed memory pages
- Extended Service Pack Overlap Support
  - Extends service pack upgrade window to 18 months

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Appendix

snapper – example

```
2011-08-18 12:33 (0) ~
ios root (0)  # snapper list
Type    | #  | Pre # | Date                            | Cleanup  | Description
--------+----+-------+---------------------------------+----------+-------------
single  | 0  |       |                                 |          | current
single  | 1  |       | Wed 17 Aug 2011 04:30:01 PM CEST | timeline | timeline
pre     | 2  |       | Wed 17 Aug 2011 04:31:54 PM CEST | number   | yast lan
post    | 3  | 2     | Wed 17 Aug 2011 04:32:46 PM CEST | number   |
pre     | 4  |       | Wed 17 Aug 2011 04:32:48 PM CEST | number   | yast lan
post    | 5  | 4     | Wed 17 Aug 2011 04:32:59 PM CEST | number   |
pre     | 6  |       | Wed 17 Aug 2011 04:36:10 PM CEST | number   | zypp(zypper)
post    | 7  | 6     | Wed 17 Aug 2011 04:36:11 PM CEST | number   |
pre     | 8  |       | Wed 17 Aug 2011 04:36:16 PM CEST | number   | zypp(zypper)
post    | 9  | 8     | Wed 17 Aug 2011 04:36:19 PM CEST | number   |
pre     | 10 |       | Wed 17 Aug 2011 04:36:26 PM CEST | number   | yast printer
post    | 11 | 10    | Wed 17 Aug 2011 04:37:21 PM CEST | number   |
single  | 12 |       | Wed 17 Aug 2011 05:30:01 PM CEST | timeline | timeline
single  | 13 |       | Wed 17 Aug 2011 06:30:01 PM CEST | timeline | timeline
single  | 14 |       | Wed 17 Aug 2011 07:30:01 PM CEST | timeline | timeline
single  | 15 |       | Wed 17 Aug 2011 08:30:01 PM CEST | timeline | timeline
single  | 16 |       | Wed 17 Aug 2011 09:30:01 PM CEST | timeline | timeline
single  | 17 |       | Wed 17 Aug 2011 10:30:01 PM CEST | timeline | timeline
single  | 18 |       | Wed 17 Aug 2011 11:30:01 PM CEST | timeline | timeline
single  | 19 |       | Thu 18 Aug 2011 11:30:02 AM CEST | timeline | timeline
single  | 20 |       | Thu 18 Aug 2011 12:30:01 PM CEST | timeline | timeline
```

Snapshotting "/" – Partitions/Subvolumes

Your Thoughts?

Thank you.

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