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# Transforming XenServer into a proper open-source project

James Bulpin

CTO, XenServer, Citrix

# About the speaker

- James Bulpin
- Head of technology for XenServer group in Citrix; member of the Citrix CTO office
- Oversees XenServer architecture and evolution
- Joined XenSource, the original Xen start-up, in 2005
- Completed a PhD in the *Systems Research Group* at the University of Cambridge



# Talk overview

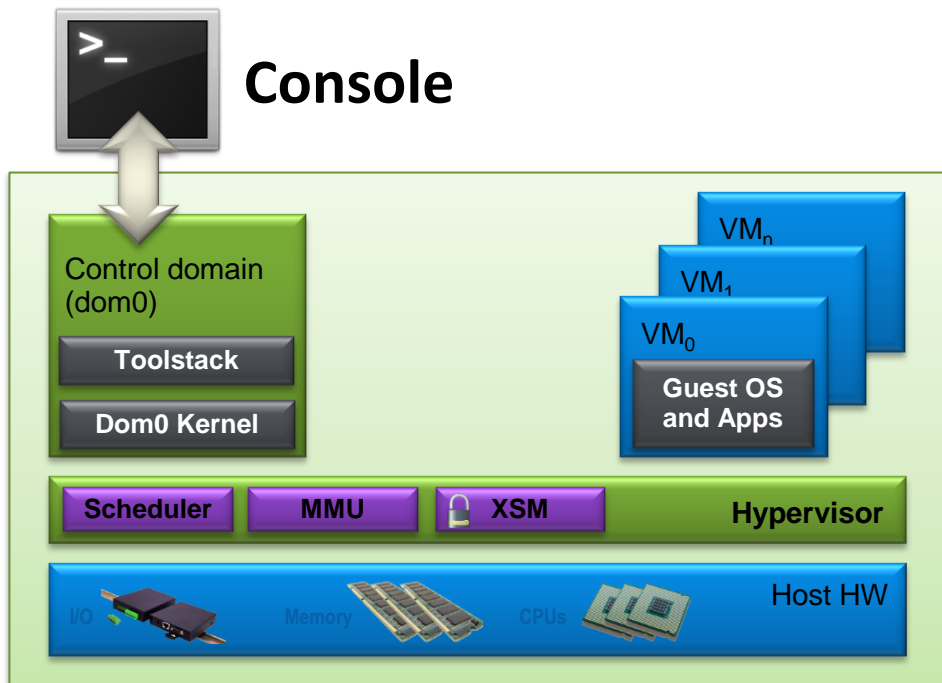
- XenServer's transition from proprietary product to open-source project
- What we're trying to achieve by moving to a more open model
- What we've done so far
- What we've yet to do
- Architectural and packaging changes being made to XenServer
- Some of the challenges we've encountered



# A quick XenServer primer

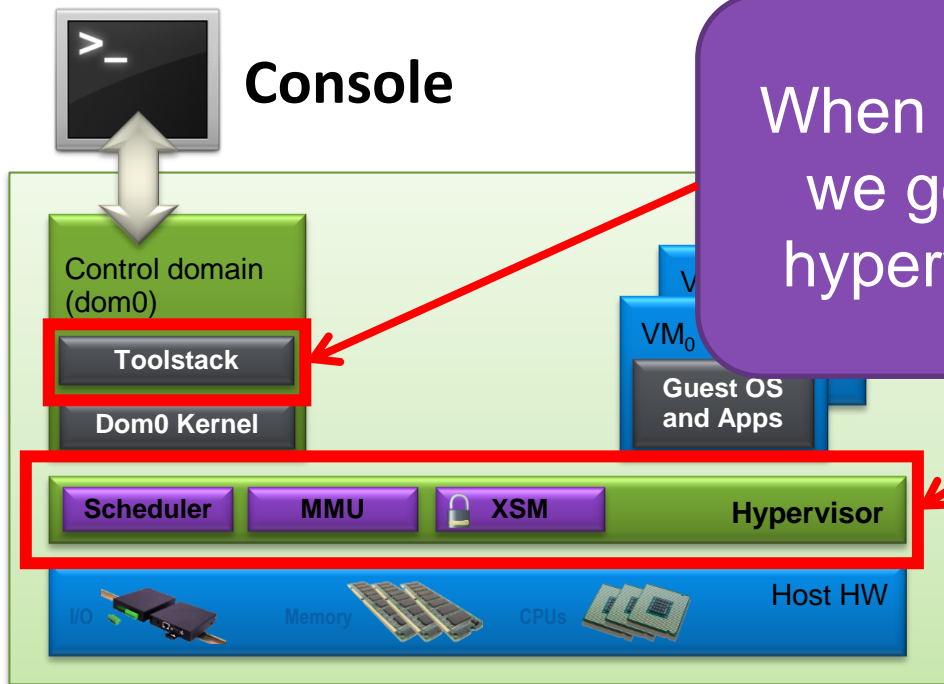


# Anatomy of a Xen system



- Xen is a hypervisor that virtualizes memory and processors, and polices access to devices
- Control Domain, aka Dom0, is a Linux environment
  - Dom0 kernel with drivers
  - Xen Management Toolstack
  - Qemu for emulating non-virtualized bits
  - Virtual device backends

# Anatomy of a Xen system



When we talk about “Xen” we generally mean the hypervisor and toolstack

- Virtualizes and polices
- Dom0, is a
- Dom0 kernel with drivers
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# What is XenServer?

- A *distribution* of Xen, the XAPI toolstack, Linux and other components
- A “shrink-wrapped”, ready to run, virtualization platform
- A CLI and Windows management user interface
- Builds on basic Xen virtualization to provide high level management:

Networking

Storage

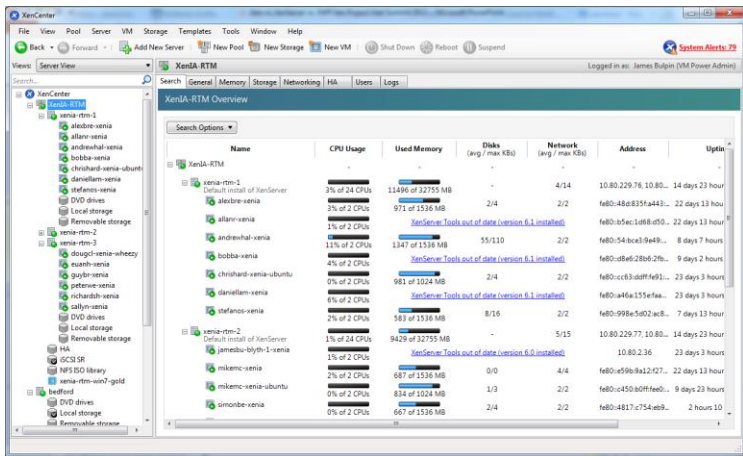
User accounts

High availability

Cluster management

Performance monitoring

# Anatomy of a XenServer system



Console UI

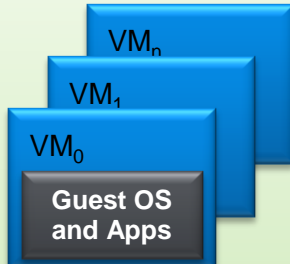


Control domain (dom0)

XAPI Toolstack

Lots of other stuff

Dom0 Kernel



Scheduler

MMU

XSM

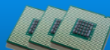
Hypervisor



Memory



CPUs



Host HW



# A quick plug for the Xen Project User Summit

- Co-located here with LinuxCon
- Wednesday 9:00am - 5:00pm
- 11 great talks including:
  - **Xen: This Is Not Your Dad's Hypervisor!** (Demetrious Coulis, CA AppLogic)
  - **Free yourself from the tyranny of your cloud provider!** (Greg Kroah-Hartman, The Linux Foundation)
  - **Xen, XenServer, and XAPI: What's the Difference?** (James Bulpin and Russell Pavlicek, Citrix Systems)





# XenServer history



# XenServer's history – the early days



- First generally available product from XenSource, the start-up formed by the creators of the Xen hypervisor
- Initially released in 2006 as *XenEnterprise* 3.0.0 (based on Xen 3.0.0)
- Initial product was a single-host, Linux guest only (paravirtualized) server virtualization platform with very limited capabilities
- Management stack was a proprietary C daemon talking to the open-source Xen low level tool stack
- Evolved through 2006 and 2007 to add support for fully-virtualized Windows VMs (using Intel VT) and additional storage and network management

# XenServer's history - XAPI



- Introduced a new toolstack architecture and API (XAPI/Xen-API) in version 4.0 in late 2007
- Written in OCaml, a statically typed, object-oriented language which allows both functional and imperative programming styles
- Hosts can be clustered to create *resource pools*
- Initially proprietary code
- Interfaced directly to low level library
  - Bypassing “official” Xen toolstack

xe CLI

xm CLI

xapi

xend

libxenctrl

libxenctrl

Xen

Xen

XenServer

open-source Xen



# XenServer's history – Project Kronos

- Getting XAPI packaged for Debian and Ubuntu
- Divergent work from XAPI in XenServer

```
$ apt-get install xcp-xapi
```

# XenServer's history – open-sourcing the rest

The screenshot shows a Twitter thread from June 25, 2013. The tweets are as follows:

- Florent @SCCYUL** (18m): **#openxenserver** is listening. Connect to the community [XenServer.org](http://XenServer.org) and share the feeling... Expand
- ktower @ktower** (19m): Holy crap. XenServer is now completely open source! **#OpenXenServer** Expand
- Sean Bolding @squarejester** (20m): Check out **#openxenserver** website at [XenServer.org](http://XenServer.org), now up and running! Expand
- Aaron Essig @elaarono** (20m): **#openxenserver** bam, citrix opens XenServer to the world... Expand
- Jeff VanSickle @j\_sickle** (23m): Holy cow. **#OpenXenServer** Expand

On the left side of the screenshot, a calendar shows 'Jun 25 2013' and a 'Tweet' button with '14' replies. Below the calendar, there is a snippet of text: 'SANTA CLARA, driving the devel... featured, open-s... introducing a ne... collaboration and ecosystem. Toda... [hypervisor to the Foundation](#) ↗, ac... cloud platforms... A key part of the...'



# Moving to a more open model





# Why do it?

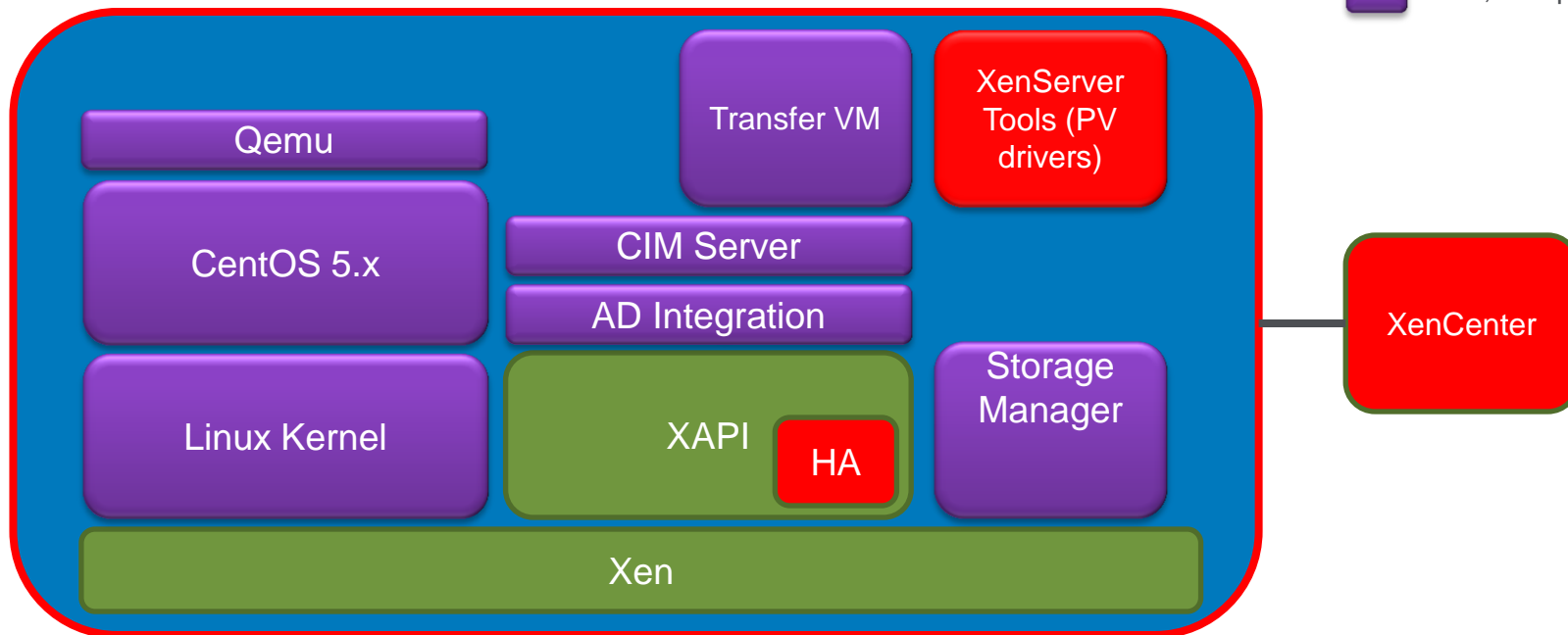
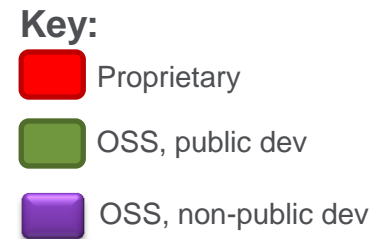
- Remove barriers to collaboration, particularly for partners integrating with XenServer
- Better communication with the user community, not just a product launch time but all the time
- Empower users to share experience and knowledge to help make XenServer the best it can be

# Non-goals

- Getting the world to do unpaid coding for Citrix
- Build a Linux- or Apache-like development community

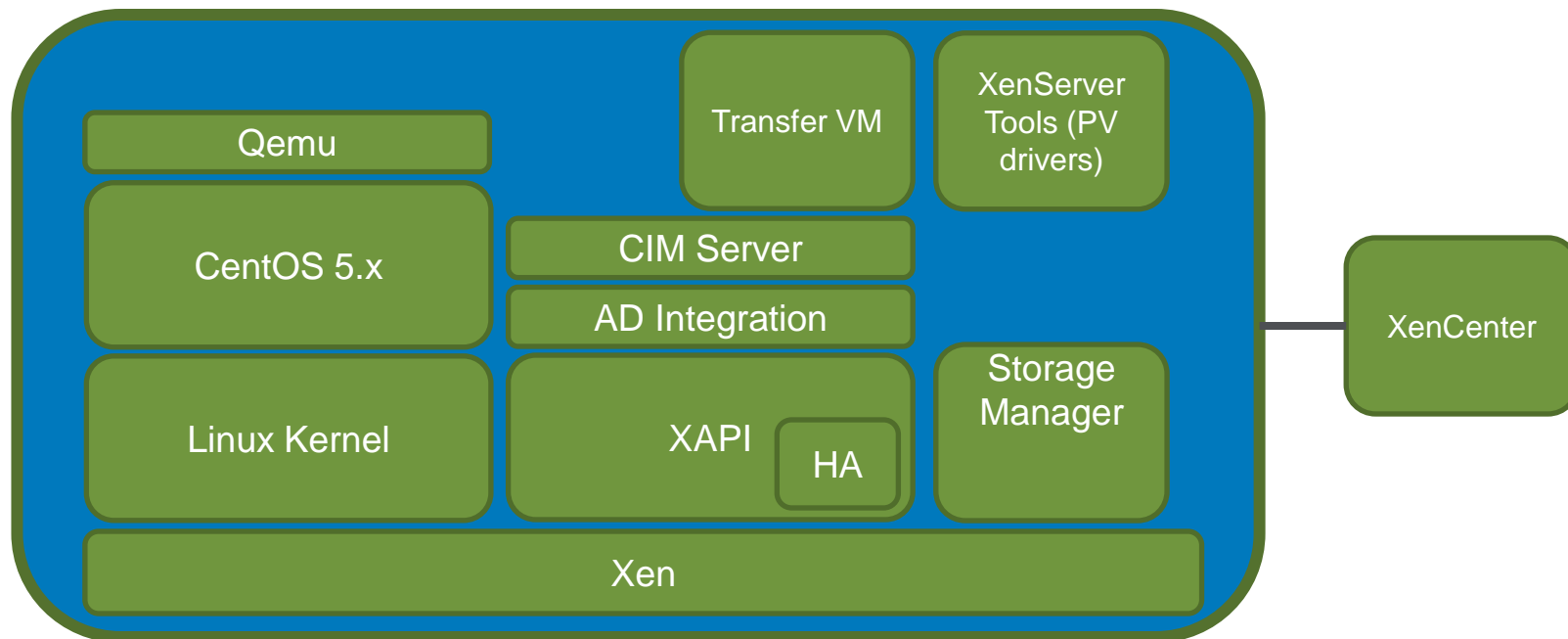
90+% of XenServer was based on open-source code before, so what's really changed?

# XenServer – previously



# XenServer – after open sourcing

Key:  
Proprietary  
OSS



# Not just about the code..

- Open roadmap
- Open test harnesses
- Open defect tracking
- Open build



# XenServer.org

## Interactive Community Portal for engaging with Citrix and other users

- Source Code
- Road Maps
- License Data
- Live QA
- Partner Directory
- Forums (migrating soon)
- Developer Resources
- Mailing Lists

The screenshot displays the XenServer.org community portal. The header includes the XenServer logo and navigation links for HOME, SOFTWARE, DISCUSS, PARTNERS, ABOUT, and a search icon. Below the header is a user profile bar with options for Profile, Friends, Groups, Photos, Videos, and Events. A search bar is prominently featured with the text "Looking for something?" and a "Search" button, alongside a "or Ask a Question" link. A main content area shows a forum post titled "What is XenServer?" by Mark E. Hinkle, with 1 reply, 6 views, and 0 votes. To the right, there are sections for "Testimonials" featuring a quote from Michael Markl, "Commercial Support" with a description of professional support services, "Latest Twitter Updates" with two tweets, "Latest Blogs" with a post titled "Introducing XenServer the Project", and "Events" with a calendar view for ITCON in Portland, OR. A "Get Support" button is visible in the bottom right corner. At the bottom of the page, there is a section for "CA Technologies" with the text: "CA Nimsoft Monitor dramatically improves service quality and reduces the costs of IT service delivery by utilizing a single, unified IT monitoring solution spanning both traditional data centers and newer virtualization and cloud environments. CA Nimsoft Monitor allows you to proactively monitor the quality of service delivered by your entire IT environment including applications, servers, networks, databases and end user experience. CA Technologies is a Citrix partner."

# What does this mean for XCP users?

- XCP (the ISO) and XenServer will merge
- XCP ISO users of XCP v1.6 will be able to upgrade to XenServer (which is now equivalent)
- xapi development will be done within auspices of the Xen Project in the Linux Foundation
- XCP users will be getting a better deal than they had before :
  - No more delays to XCP releases
  - Timely hotfixes that can be easily installed,
  - A product that's even more open than it was before.





# Progress – done so far

- Key proprietary components open-sourced on github:
  - XenCenter UI, Windows PV drivers, HA daemon
- Some patch queues against upstream components published:
  - qemu-xen traditional, openvswitch
- XenRT automated test harness published
- xenserver.org portal created
- xs-devel@lists.xenserver.org mailing list created and seeing some use

# Progress – still to do

- Get all Citrix-internal technical discussions onto xs-devel list
- Get an external wiki and populate with current architectural plans, designs, roadmaps etc.
- Get the roadmap published
- Get the remaining patch queues published
- Define a release model for the project
- Produce a new build system that's usable outside of Citrix
- Up the level of community engagement



# Architectural and packaging changes

# Problems with the current architecture

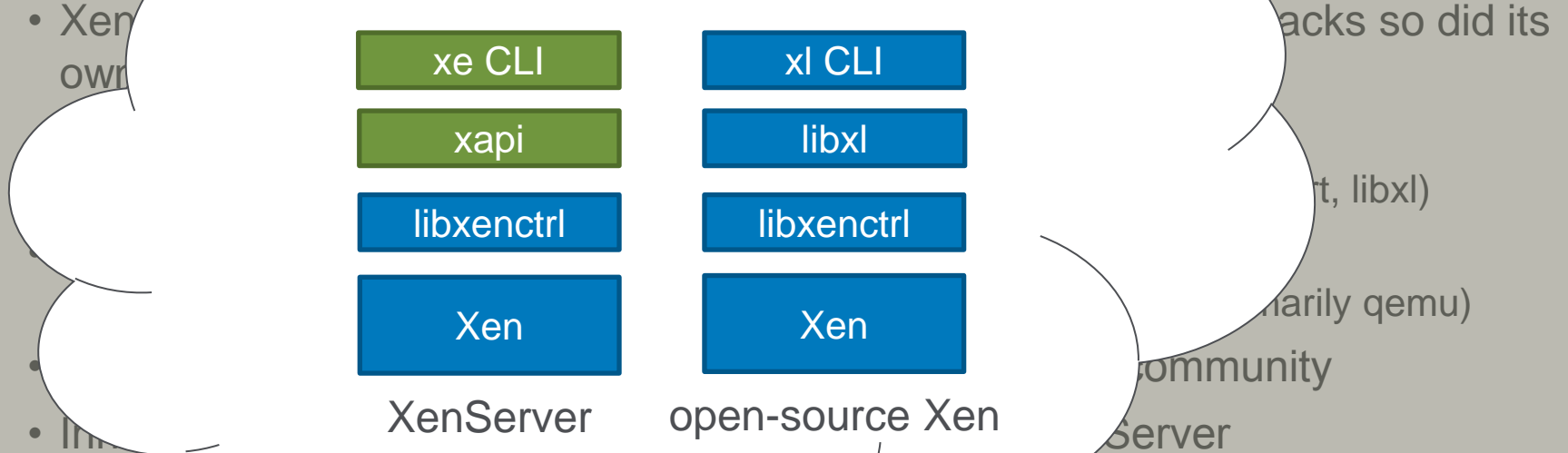
- XenServer predates the existence of decent virtualization toolstacks so did its own thing
- XenServer has its own management stack
  - Requires reimplementation of functionality present in other stacks (libvirt, libxl)
- XenServer has its own storage data plane (blktap2ish)
  - Requires reimplementation of storage datapaths in other stacks (primarily qemu)
- Innovation around XenServer doesn't benefit the wider community
- Innovation in the wider community doesn't benefit XenServer

# Remove toolstack divergence vs. Xen Project

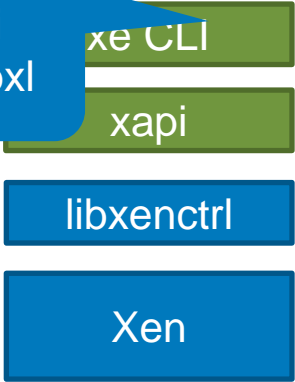




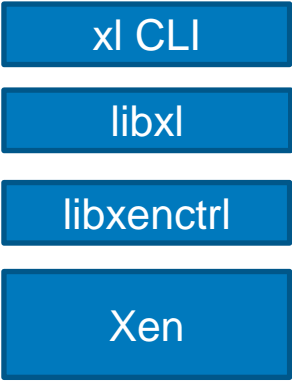
# Problems with the current architecture



Port xapi stack to libxl



XenServer

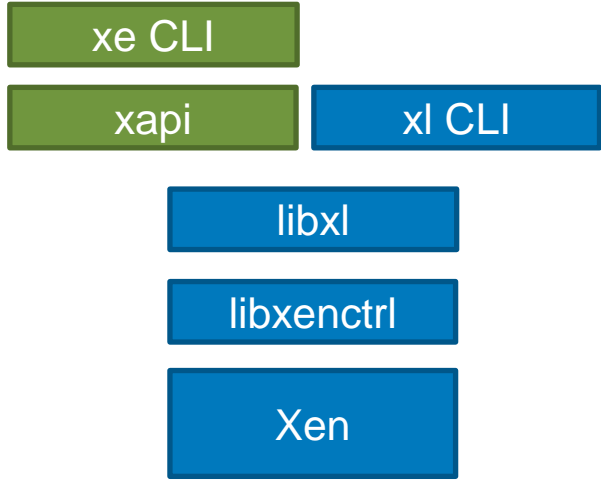


open-source Xen



# XenServer

Port xapi stack to libxl



open-source Xen

Move to upstream  
qemu and leverage  
stuff developed  
within it



# Problems with the current architecture

- XenServer is its own Linux distribution loosely based on packages from CentOS 5.x
  - High cost to maintain this distribution
  - Incompatible with tools used to manage distribution installation etc.
  - Providing packages for any other distribution is a side show so costs more
  - On a very old base – newer package versions often needed
- Lack of build and packaging modularity and hygiene
  - Builds take a very long time
  - Makes it hard to rebuild just one piece (not community friendly)
  - Easy to make mistakes, especially related package uninstall and upgrade

XenServer = base  
Linux distribution +  
set of packages



# Remove OSS divergence and package properly



# XenServer packages buildable by all

MyBuildBox:~ \$ ./configure && make && make install



# XenServer packages integrated in distros

myDebianBox:~ \$ apt-get install xenserver-core

...

myCentOSBox: ~ \$ yum-install xenserver-core

...

etc.



# www.xenserver.org

## Join the community!

- Create a XenServer.org login
- Share your knowledge

## Tell the world!

