

# illumos at 5

Daniel L. McDonald - OmniOS Engineering



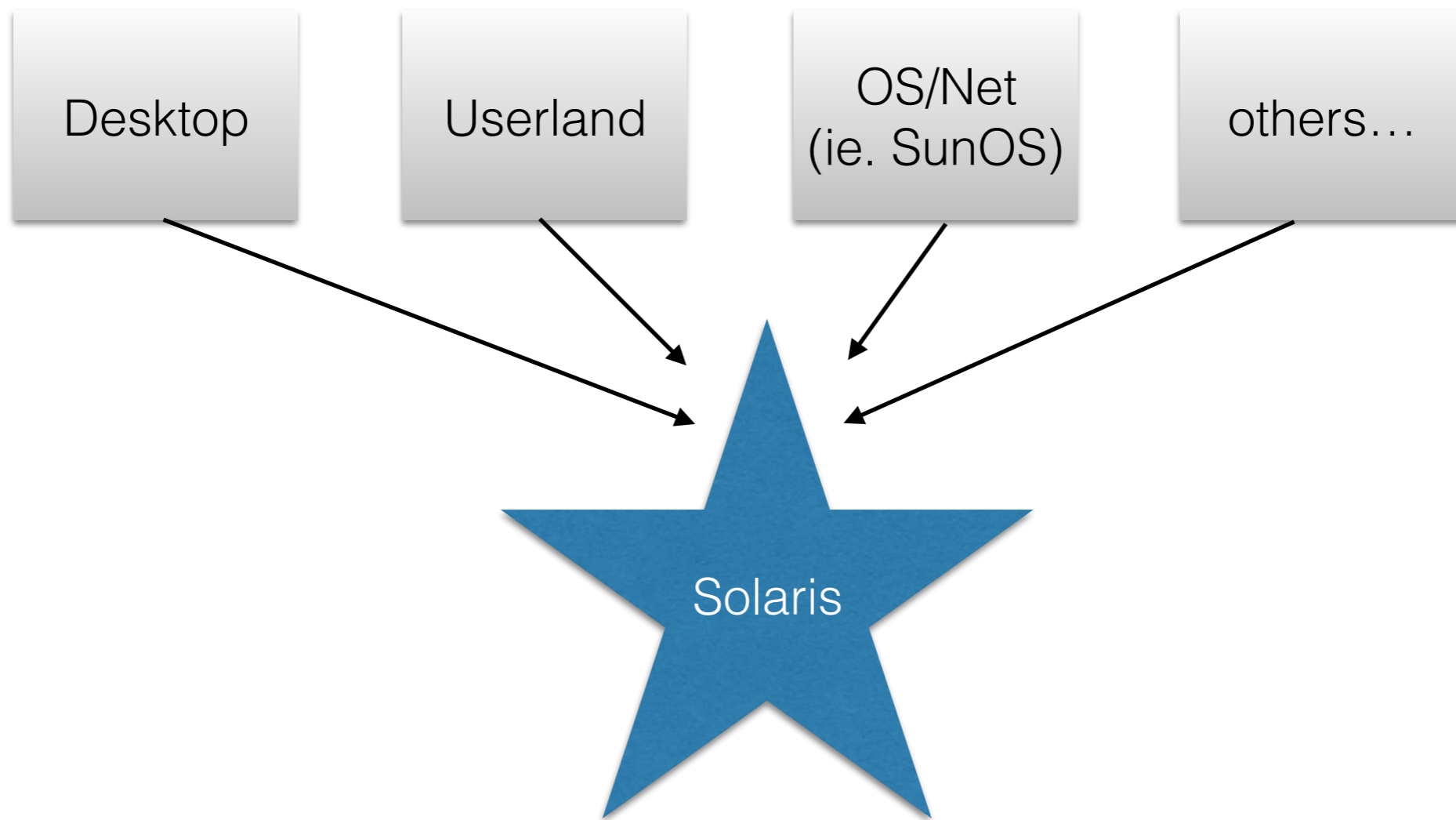
# What Comes to Mind with illumos?

- ZFS
- DTrace
- Crossbow (network Virtualization)
- Zones (sometimes known as Containers...)
  - Lightweight illumos instances
  - KVM zones
  - LX zones
- FMA
- SMF

# illumos Pre-History

- SunOS up to 4.x was a 4BSD derivative.
  - SunOS 4.x came from 4.3BSD
- In 1988, AT&T (who had invested money in Sun) announced System V Release 4 (SVR4).
- This became SunOS 5.0, and marketed as Solaris 2 (with SunOS 4.x retroactively marketed as Solaris 1).

# Consolidations



# Solaris 2.1 through 2.6

- SunOS 5.x was the core of Solaris 2.x for  $0 \leq x \leq 6$ .
- x86 & SPARC kernel codebases were merged into one tree after 1991 acquisition of Interactive UNIX.
- Internal engineering processes matured.
  - Dogfooding on *jurassic* helped stop the Quality Death Spiral.
  - Some (bad) SysV-isms were downplayed or eliminated (e.g. sockfs replaced sockmod in Solaris 2.6).
- Solaris got much better over this stretch.

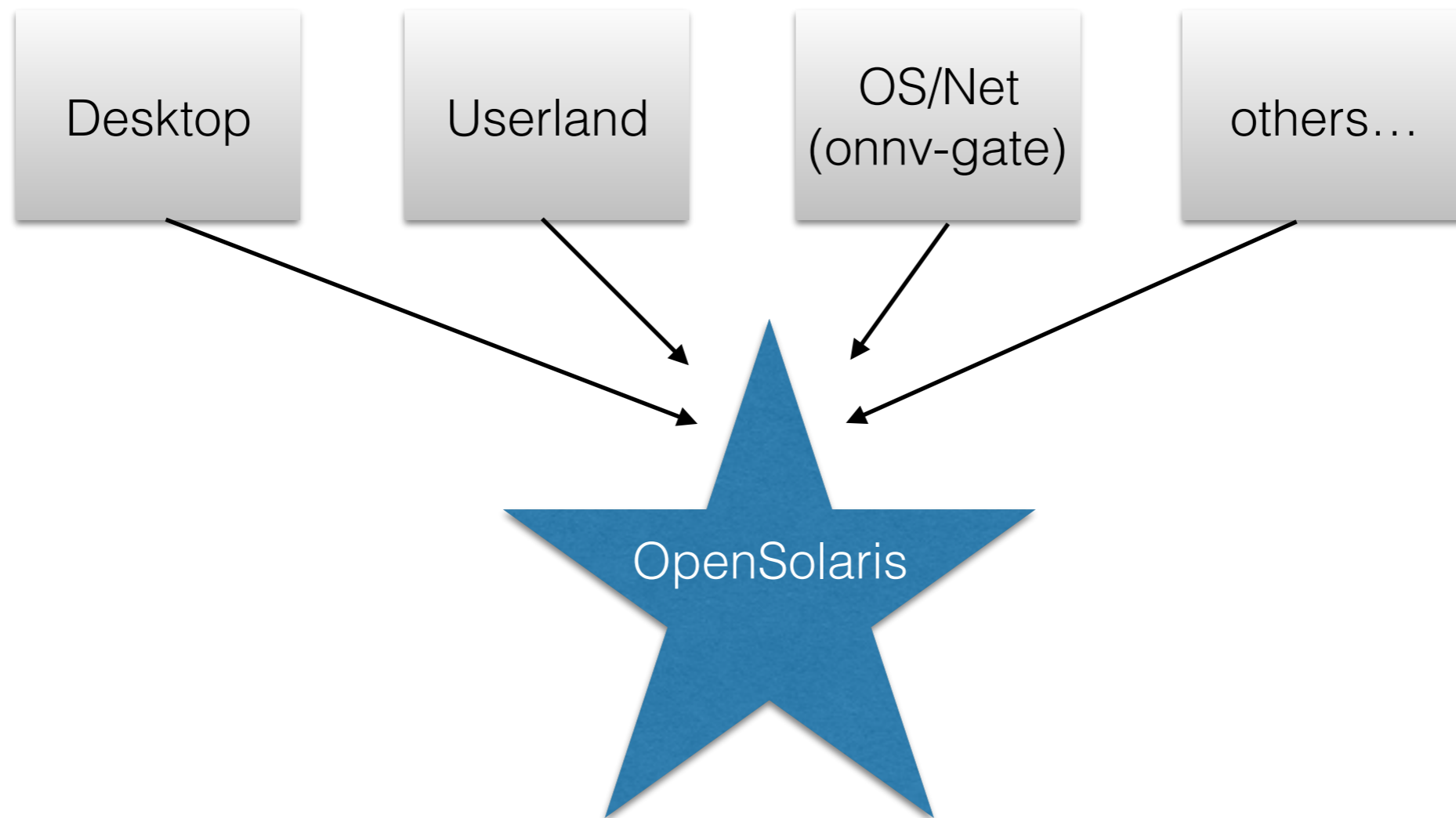
# Solaris 7 through 10

- The initial 64-bit SPARC Solaris 2.7 was rebranded by marketing as Solaris 7.
- SunOS 5.x was the core of Solaris X for  $7 \leq X \leq 10$
- Each release introduced tons of new things, too numerous to mention.
- Solaris 9 had x86 development "suspended".
  - A mistake rectified by internal revolt.
- Solaris 10 introduced amd64 support.

# OpenSolaris

- Starting with a DTrace appetizer in 2004, Sun open-sourced most of the Solaris OS/Net consolidation in 2005.
  - OEM and some HW-specific code exempted.
  - MPL-like CDDL - a weak copyleft license.
- All other consolidations also open-sourced.
- Sun Marketing didn't quite know what to do.
  - "OpenSolaris Missile Crisis"
- Still, a good community formed around OpenSolaris.

# OpenSolaris Consolidations





# Oracle

- In early 2009, takeover rumors swirled around Sun.
- In late 2009, Oracle beat out IBM to purchase Sun.
- I can't speak for anyone else, but as a Sun employee I was hoping Oracle would fix the marketing mistakes (see earlier slides) and keep Sun's engineering culture intact.
- I was wrong.

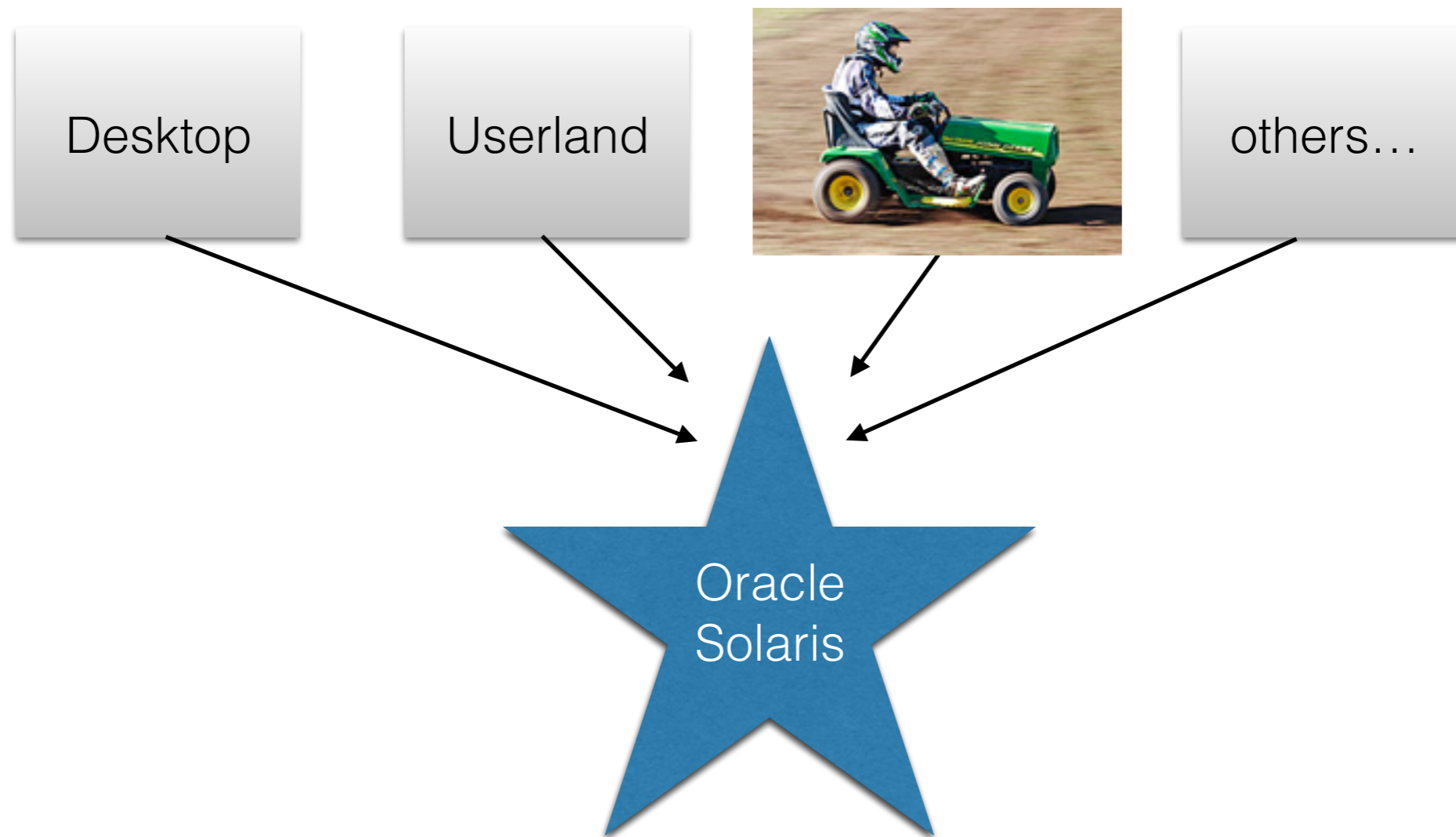
# illumos Begins

- In spite of the OpenSolaris Missile Crisis, people kept using OpenSolaris.
- Some wanted to unshackle closed-source components
  - Sun/Oracle didn't have a strong business case to do so.
- August 3rd, 2010 - Garrett D'Amore announced the culmination of a summer's effort to remove some closed-source: illumos
- illumos was originally a downstream of OpenSolaris's OS/Net. It was not intended to be a replacement, but insurance.

# The Closing of OpenSolaris

- Others have told this story much better than I possibly could.
- Search for "illumos Fork Yeah" on YouTube and move to 33 minutes in:
  - <https://www.youtube.com/watch?v=-zRN7XLCRhc&t=1980>
- Time to cash in the insurance policy...

# August, 2010



Lawnmower picture by "Fir0002/Flagstaffotos" - CC BY-NC  
[https://en.wikipedia.org/wiki/File:2007\\_swifts\\_creek\\_lawnmower\\_races01.jpg](https://en.wikipedia.org/wiki/File:2007_swifts_creek_lawnmower_races01.jpg)

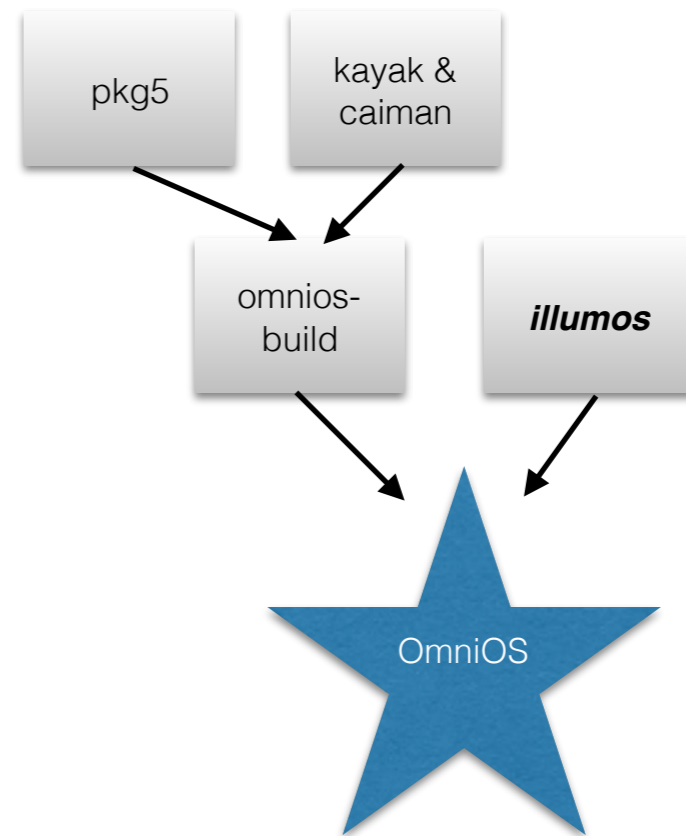
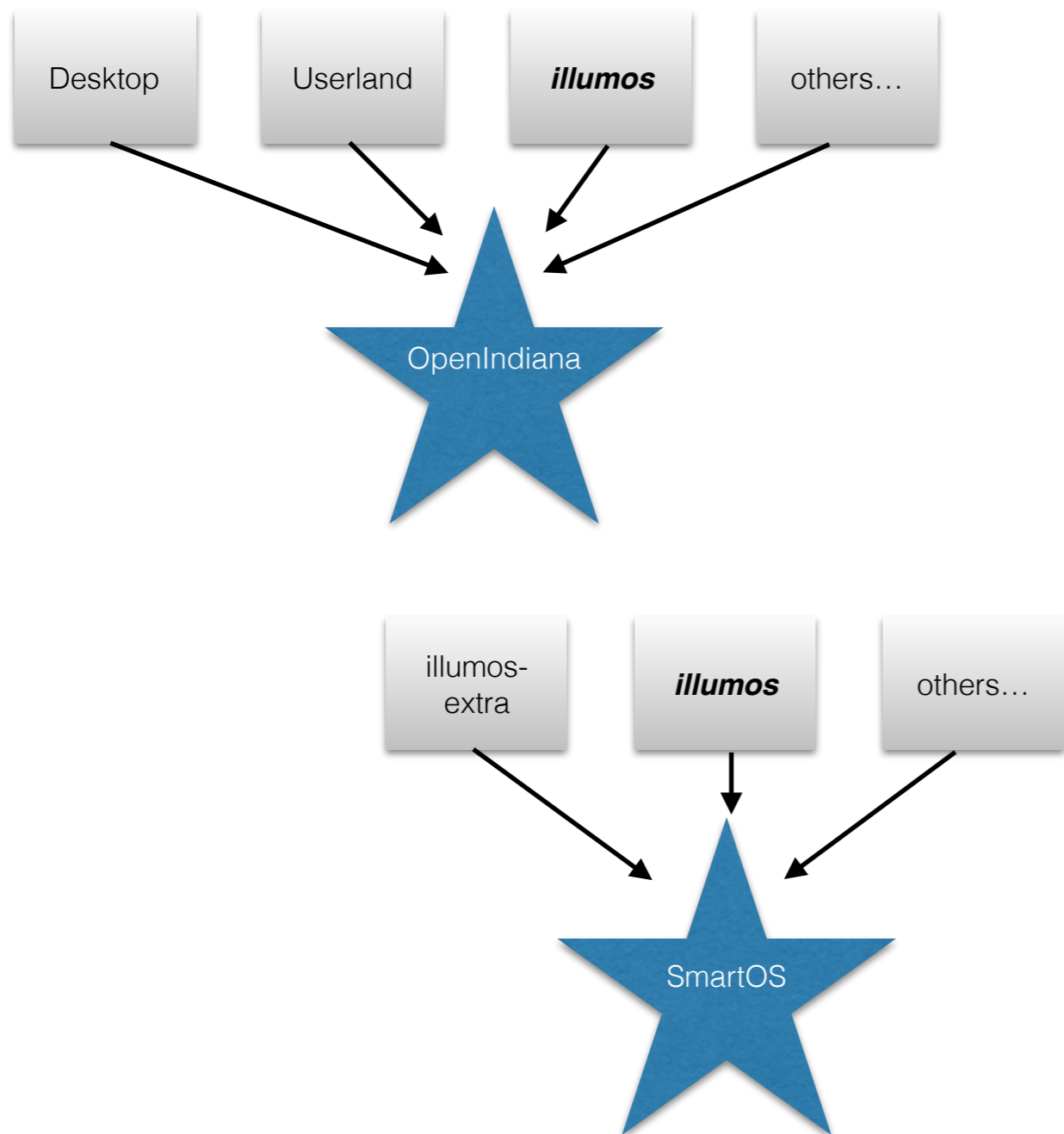
# More about illumos

- **ORACLE IS NOT INVOLVED WITH ILLUMOS AT ALL!!!**
- The term "Solarish" has been used to describe the common properties of both illumos and Oracle Solaris.
- The upstream illumos repository (illumos-gate) contains the kernel, (most) system libraries, and (most) system commands.
- It falls between what FreeBSD is (self-contained) and what Linux is (kernel only).

# illumos has Distributions

- What people use when they use illumos is a distribution.
- <2010 - NexentaStor (storage appliance, commercial beyond a size limit)
- <2010 - Delphix (database appliance - commercial)
- 2010 - OpenIndiana (desktop and direct inheritor of OpenSolaris)
- 2011 - SmartOS (hypervisor-focused for clouds w/optional-paid-support)
- 2012 - OmniOS (stripped down for traditional servers w/optional-paid-support)
- There are more (DilOS, OpenSXCE, Tribblix, XStreamOS, etc.)

# Fork Yeah!



These aren't the only ones!

# Meet The Distros

- One slide for every distro who offered.
- Where to get it.
- What it does.
- How best to engage.
- In approximate chronological order.



# OpenIndiana

- Website: <http://www.openindiana.org/>
- Wiki: <http://wiki.openindiana.org/>
- Download ISO: <http://dlc.openindiana.org/isos/hipster/>
- The most direct inheritor of OpenSolaris.
- "Hipster" is a codename for the rapidly moving development branch.
- User Support: openindiana-discuss (<http://openindiana.org/mailman/listinfo>)
- Developer Support: oi-dev on freenode

(Thanks Ken Mays & Alexander Pyhalov)



# SmartOS

- Home page: <https://smartos.org/>
- A distribution created specifically for servers in data centers.
- Geared toward all forms of virtualization.
  - Linux and illumos containers
  - KVM for arbitrary guests
- Boots on a small read-only ramdisk.
- #smartos on freenode and smartos-discuss list  
<https://smartos.org/smartos-mailing-list/>

(Thanks folks at Joyent)



**SmartOS**

# OmniOS

- Home page --> <http://omnios.omniti.com/>.
- Installation --> <http://omnios.omniti.com/wiki.php/Installation>
- OmniOS is a server-focused, IPS-packaged distro.
- Stable releases every six months (014, 016...), every fourth stable is LTS (006, 014...).
- #omnios on freenode, and omnios-discuss mailing list:

<http://lists.omniti.com/mailman/listinfo/omnios-discuss>



# DilOS

- Home page: <http://www.dilos.org/>
- illumos base with Debian packaging (dpkg/apt-get).
- Working on Intel and SPARC (older models).
- Desktop not working yet.
- Works as Xen 3.4 dom0 with PV and HVN guests.
- LX Zone port from SmartOS in progress.

(Thanks Igor Kozhukhov)



# Sonicle XStreamOS

- Company website: <http://www.sonicle.com/>
- ISO Releases: <https://sourceforge.net/projects/xstreamos/>
- illumos source: <https://github.com/sonicle/xstreamos-illumos-gate/>
- Supported Enterprise releases of XStream Storage and XStream Server.
- XStreamOS: A slim and straightforward server distro
- XStreamOS Desktop: light and modern desktop featuring a good set of selected applications
- IPS packaged, with a common repo with latest LibreOffice, Firefox, Thunderbird, Gimp...
- Mailing lists: <http://lists.sonicle.com/>

(Thanks Gabriele Bulfon of Sonicle)



# Tribblix

- Home page: <http://www.tribblix.org/>
- Ethos: Retro styling, modern components
- SVR4 packaging underneath, modern tooling on top
- Cut straight from illumos-gate, not a separate fork
- General purpose, strong on desktop and zones
- Works on both x86 and (limited) SPARC
- Based on personal and opinionated choices

(Thanks Peter Tribble)

# Appliance Distros

- Not all illumos derivatives are suitable for hacking.
- NexentaStor - Network Storage appliance based on illumos - ZFS, NFS, CIFS, and COMSTAR work.
- Delphix - Database Storage appliance based on illumos, with *especially* strong ZFS use.

# Extra Software

- pkgsrc
  - Joyent now employs Jonathan Perkin of pkgsrc fame.
  - pkgsrc is available for all illumos distros
- OpenCSW
  - An older, but well-maintained, Solaris software initiative.
  - Uses SysV packaging. Works on anything with SysV packaging tools.
- SFE: spec-files-extra IPS repository --> <http://sfe.opencsw.org>
  - Community supported on OpenIndiana, OmniOS, and even Oracle Solaris 11.
  - Open for other distros (IPS & SVR4).
- [ms.omniti.com](http://pkg.omniti.com/omniti-ms/) IPS repository (<http://pkg.omniti.com/omniti-ms/>)
  - Publicly unsupported, but we at OmniTI use these tools for our internal use.



# Progress with illumos

- illumos KVM support (KVM Zones in SmartOS)
- COMSTAR improvements (esp. in NexentaStor)
- OpenZFS inspiration and reference implementation
  - Too much to mention here
- LX Zones back from the dead
- And more!

# In the Past year

- In no particular order...
- EFI-partition/GPT booting.
- Able to build stock illumos-gate on other, non-OI distros.
- Various drivers: e.g. NVMe 1.0, open-source bnxe, more bge, e1000g/igb, and more.
- Integrated, open-source dmake and libm.
- Lots of OpenZFS forward progress.
- And more I'm forgetting.

# Works in Progress

- OpenZFS Developer Summit held in October.
  - OpenZFS itself is now downstream from illumos.  
(To ease non-illumos OpenZFS contributions.)
  - <http://open-zfs.org/>
- Virtual Networking improvements brewing in SmartOS.
- More drivers: NVMe beyond 1.0, Intel XL710 (i40e)
  - Some help from vendors, but could use more.

# How to Contribute?

- Start by **using** your favorite distribution(s).
  - Most distros have easy downloads (ISO, USB-dd, PXE)
  - Joyent Public Cloud
  - OmniOS has AWS images
  - Recent email thread shows more cloud providers
    - Bytemark
    - CloudSigma
    - OVH

# Share Your Experiences

- Social Media (we have a strong twitter presence)
- Visit `#illumos` on Freenode (IRC).
  - Distros have channels too: e.g. `#smartos` `#omnios` `#openindiana`
- Blogs
- Tell your co-workers, IT folks, and management
- Let software projects you use know you're using illumos (e.g. PTPd).
- Let hardware vendors know you're using illumos.
- See something broken? File a bug!
  - <https://www.illumos.org/issues/>

# How to Contribute Code?

- illumos repositories are on github.
  - <https://github.com/illumos/illumos-gate/>
- You can compile stock illumos-gate on at least OmniOS (new for 2015) and OpenIndiana.
- For small changes or independent modules, libraries, or commands, you can merely build components and replace them.
- Anything mentioned is *shrink-to-fit*, meaning a small spelling mistake needs a lot less scrutiny than, say, a driver rewrite.
- Sun's engineering culture lives on in illumos requirements.

# More on How to Contribute

- Subscribe to the developers' mailing list:
  - <https://www.listbox.com/subscribe/?listname=developer@lists.illumos.org>
- Get peer review ("code review") on the developers' mailing list.
- Submit to illumos RTI Advocates, who will integrate your bits upon approval.
- Distro-specific repos (e.g. omnios-build) may have different procedures.

# A Good Contribution

- Has an analysis in the bug report (inclusive-) or the code's block-comments itself.
- If it's a bug fix, finds when the bug was introduced (especially if it was post-OpenSolaris).
- Has been tested, AND has its testing documented, if not dropped into `usr/src/test/`.
- Any of the above is, again, *shrink-to-fit*. Use epic block-comments for epic code, e.g.



# No Formal Organization

- We lack:
  - Bounties
  - Governance
  - Ownership
  - Marketing
  - Legal presence
  - Harassment Policy/Code-of-Conduct
- We would like to mature into **all** of these.

# A Request to HW OEMs

- Do illumos-first development.
- I mentioned *Solarish* earlier. If you write for Oracle Solaris first, you lock out any/all illumos distros.
- If you write for illumos first, you can release and test that code, and THEN make modifications for Oracle Solaris without shutting out anyone.
- The community is ready to help. Especially those whose commercial success is dependent on a flourishing HW ecosystem.

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The logo for OmniTi features the word "OmniTi" in a dark grey, sans-serif font. The letter "O" is stylized with a flame-like effect, transitioning from a dark red at the bottom to a bright orange at the top. The "i" has a small dark dot above it. The "T" is a simple, bold, dark grey letter. A small "TM" trademark symbol is located at the bottom right of the logo.

OmniTi™