How an Australian IaaS uses FreeBSD
Ruben Schade

FreeBSD Miniconf at Linux.conf.au
Dedication

- NSW Rural Fire Service
Digression #1: Presentation Style
Agenda

- My history with FreeBSD, and introducing OrionVM
- Cloud and VPC storage with FreeBSD, OpenZFS and FreeNAS
- TidalScale for Multi-TiB memory deployments
- Securing cloud and bare metal through PFsense and FreeBSD
- Resources and Thanks
- Q&A
% whoami

• Ruben Schade
  Solutions Architect at OrionVM
  Since 2014

• Role
  Advise clients on cloud deployments
  FreeBSD template maintainer

• shutdown -h now
  Blogger and aspiring author
  Hat and coffee aficionado
  Weeb, and traveller
My BSD background

- Technically was Haruhi, hah
- FreeBSD user since 2006, on servers and workstations
- Originally on 32 and 64-bit Mac PowerPC
- Used FreeBSD professionally since 2015
- Regular AsiaBSDCon, bhyvecon attendee
- Aim to be a FreeBSD contributor
Digression #2: Gnomenclature
Gnomenclature

- **OrionVM**
  Like the constellation, not the Toyota (Aurion vrrrrm)

- **geli(8)**
  You Jelly of our storage subsystem?

- **gnop(8)**
  Gee-Nop, not Gee-Nope!

- **zfs(8), zpool(8)**
  Zed-eff-ess, Zed-pool
Quick OrionVM Overview

Summary

- **FOUNDED**: February 2010
- **OFFICES**: Sydney, Auckland, San Francisco
- **BUSINESS**: Wholesale cloud infrastructure

Locations

- Sydney: SY2, SY3
- Melbourne: ME1
- Santa Clara: SV2
- Virginia: DC1

More PoPs in development.

Features


  VMs, object storage, backups, desktops, hosted voice, hybrid cloud, bare metal as a service, all on the same platform.

  Whitelabel platform with lower rates, greatly simplified interface than other clouds.
OrionVM’s Architecture

InfiniBand Fabric

Xen Dom0
- Storage
- DomU (BSD!*)

Xen Dom0
- Storage
- DomU (BSD!*)

Xen Dom0
- Storage
- DomU (BSD!*)

Xen Dom0
- Storage
- DomU (BSD!*)
Whoops, redacted.
FreeBSD Guests

- OrionVM was the first Australian cloud to offer FreeBSD guests #boom
- First-class template, same as Linux, Windows Server, and network appliances
- Resellers come with it turned on by default
- Thanks to Colin Percival for his AWS EMI work and inspiration. Sorry about the bump
FreeBSD Guests

- RootOnZFS by default
  - https://wiki.freebsd.org/RootOnZFS
- UFS2 version can be enabled by request
- 12.1-RELEASE and 11.3-RELEASE
- Discussed at AsiaBSDCon 2019 WIP session
FreeBSD Guests
AsiaBSDCon 2019 Template Update

- **devd(8)** integrations for live attaching/detaching:
  - Block devices/disks
  - ISO images
  - NICs and sub-interfaces
  - IP addresses, gateways
  - SSH pubkeys

- Future plans
  - Inline ZFS pool expansion
  - More build automation
  - Binary tools
Distraction #3: Why Use It?
Why Use a FreeBSD Guest?

“FreeBSD can do pretty much everything that Linux can do; and most of the things it does better.”

~ Allan Jude

FreeBSD Committer
OpenZFS developer and writer
Chief Architect at Klara Systems
(Un)helpful Advice

• The “Bucket Problem”
  - FreeBSD is for compatibility
  - NetBSD is for portability
  - OpenBSD is for security

• Linux is just a kernel
  - FreeBSD is a complete system
  - GNU/Linux needs a distribution

• Great, what do these mean in practice?
Why I Use and Recommend It

- Technical Reasons
  - System maturity and predictability
  - Toolchain quality (and BSD userland helps)
  - Ease of deployment
  - Documentation

- Squishy Stuff
  - Community and events
  - Transparency

- Benefits from the illumos, NetBSD, OpenBSD, Linux, macOS communities!
FreeBSD for Cloud Storage

- **OpenZFS is the industry standard**
  - Combined effort from ZoL and illumos (see Matthew Ahrens on freebsd-current)
  - Compression, dedupe, snapshots, shipping out of the box
  - Transparent development, join a call!

- **FreeBSD has excellent tooling and integration**
  - Jails, Capsicum, HAST, RoZ
  - Keep ports, DBs, logs, etc in their own datastore
FreeBSD for Cloud Storage

- FreeBSD’s Integrations with ZFS
  - Poudriere uses for building ports for `pkg(8)` by creating an isolated pool that can be blown away
  - `iocage(8)` uses it by default, `ezjail-*`(8) can too
  - Allan Jude demonstrated using for atomic upgrades at AsiaBSDCon 2019
FreeBSD for Cloud Storage

- FreeBSD, FreeNAS officially supported templates
  - Live-attach disks for expanding ZFS pools
  - Use GPT to have appear in `/dev/gpt`
- **Can easily export** NFS, Samba to other VMs for free over private network interface
- `hastd(8)`, `hastctl(8)`, and ZFS send/receive for multi-site replication depending on SLA
FreeBSD for Cloud Storage

OrionVM Private, Live Attachable, Unmetered Network – NFS, Samba, et.al

- FreeBSD Guest
  - OpenZFS
  - GELI
  - HAST

- pfSense Guest: SY3

- Linux Bare Metal

- Windows Server Guest

- pfSense Guest: ME1

- VMware ESXi Bare Metal
FreeBSD for VPC Storage: FreeNAS

- Perfect for VPC (Virtual Private Cloud) deployments
- For people who don’t require specific SAN hardware (HP 2050s, etc)
- Can be dedicated SAN per deployment, or our multi-tenant cluster
- All the data integrity, snapshotting, and shipping benefits of ZFS
- `geli(8)` for encryption, `hastd(8)` for replication

Virtual Compute
bhyve, Xen, KVM, VMware, HyperV

iSCSI (or NFS, et.al.)

FreeNAS
Multi-TiB Memory Deployments

- TidalScale on OrionVM launched 2017
- Originally based on bhyve to consolidate multiple hypervisors into one large guest over 10G
- Used by big data, analytics, in-memory databases, and former mainframe workloads
- 1.3 TiB to 13 TiB memory, 100+ vCPUs
FreeBSD for Securing Deployments

- OrionVM meshes workloads over Layer 2. Guests, collocated hardware, bare metal cluster, MPLS, X-Connects...

- No double NATting like other clouds. NICs get Internet routable addresses directly

- `pfSense` routers sit on the cloud, and protects assets *without extra routers!*

- Can also directly use FreeBSD’s excellent `ipfw(8)` in a dedicated guest
FreeBSD for Cloud Storage

OrionVM Private, Live Attachable, Unmetered Network

- PFSense
- FreeBSD OrionVM Guest
- Linux Bare Metal Cluster
- Windows Colo Server

Public Internet
Summary

- You should try FreeBSD, you might like it
- OrionVM’s cloud supports FreeBSD, FreeNAS, and pfSense... and Ruben recommends their use
- OpenZFS and FreeNAS perfect for cloud and VPC storage
- FreeBSD lets OrionVM’s TidalScale cluster scale to multi TiBs of memory
- pfSense and FreeBSD protects critical client workloads through the cloud, even on dedis
Resources and Thanks

- FreeBSD Foundation and Linux.conf.au organisers
- BSDNow.tv with allanjude@ and bcr@
- bhyve.org and BSDFund.org, Michael Dexter tirelessly coordinating bhyve and other BSD virtualisation efforts
- OpenZFS.org
- PFSense.org
- Get a reseller demo account! OrionVM.com/contact-us
Legals

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Thanks!
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