



Zones Automation In The Real World

With Labs

Immersion Week 2008

Grow the Skills that Help Sun Grow!

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Introduction



Agenda



1. Overview
2. Definitions
3. Introduce Zones & Virtualization Goals
4. Some Great Use Cases
5. Some Open Source Examples
6. Q&A



Definitions

“Real World”

What are the customer's goals for virtualization?

How do customers want a server configured prior to deployment of applications or services?

What pain points could zones address that perhaps the customer has not yet envisioned?

“Automation”

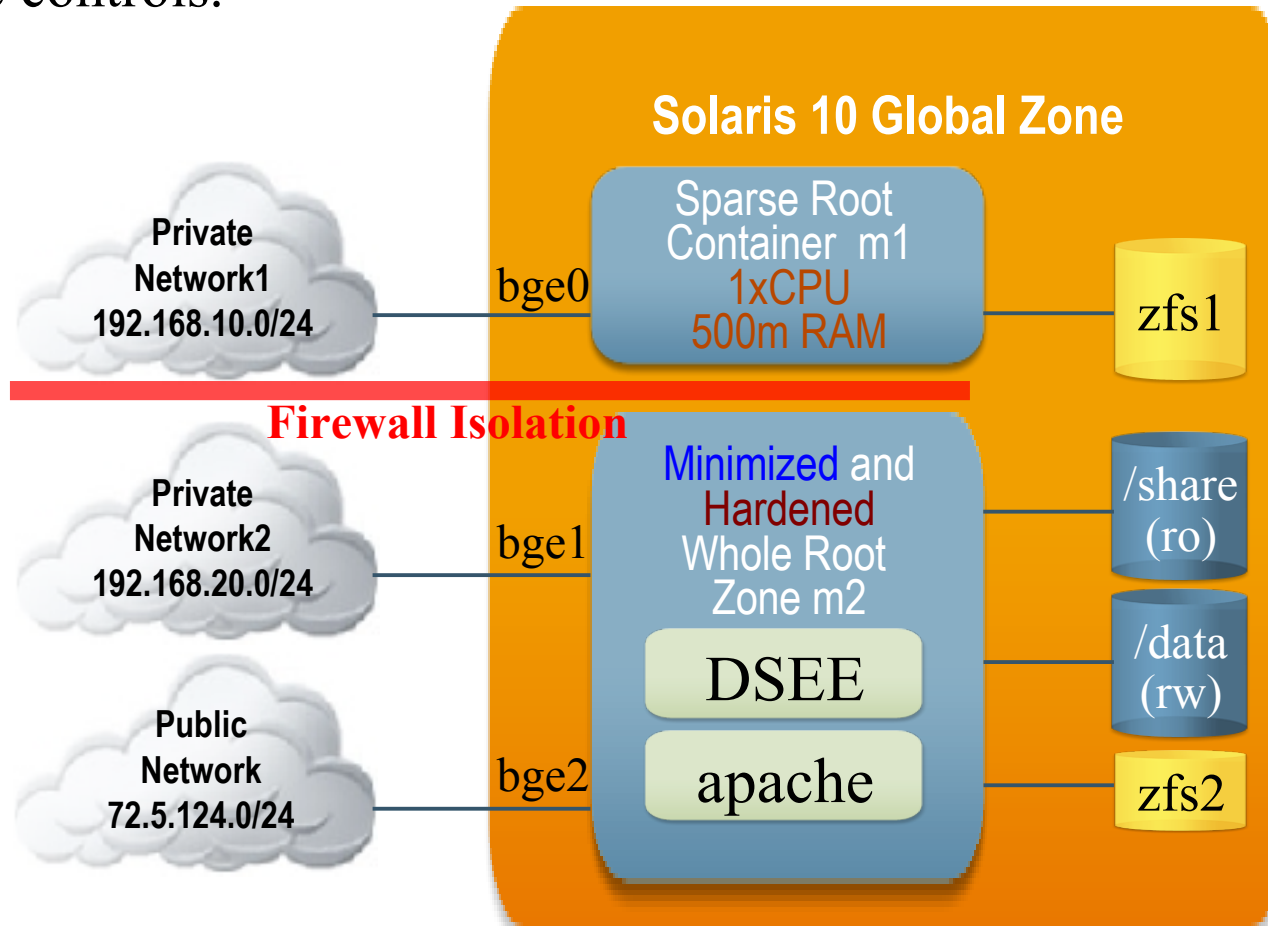
Incorporate as many facets of the Solaris 10 feature set into the construction of a zone in a single operation as possible.

Simplify application provisioning/deprovisioning.

Simplify application migration from one server to another.

Real World: Solaris Container Virtualization

A Solaris container is a virtual operating environment (e.g. a zone) that features a high degree of isolation, flexibility, security and appropriate resource controls.



Real World: Goals of Virtualization

Flexibility

- Facilitate effortless hardware upgrades
- Re-allocation of Resources
- Preserve ability to run older software (on new hw)
- Simplify horizontal scaling (expansion or contraction)

Compression

- Improve server utilization
- Reduce data center foot print
- Reduce power consumption
- Reduce number of network ports

Security

- Isolation
- Security for non-natively secure systems

Automation: Zones Can Get Complicated

Zone Configuration – sparse, whole root, fs, net, ...

Zones Administration – zonecfg, zoneadm, zlogin, add users, customize root user home, shell, ...

Zone State Management – boot, reboot, shutdown, only X zones, ...

Minimization – pkgrm, pkgadd, ...

Hardening – svcadm, svcs, inetadm, /etc/rcX.d, ...

Filesystems – mount, newfs, zpool, zfs

Containment/Resource Management – pset, rcapd, ...

Privileges – Apply zone specific privilege constraints

brandZ – Linux and Solaris 8 binary compatible zone

Automated Software Installation – Blastwave (pkg-get) and eventually Project Indiana

Automation: ZoneMgr Actions

add – Add a zone

modify – Modify an existing zone

del – Delete a zone

info – Show zone configuration

move – Move a zone from one dir to another

detach/attach – Move a zone from one server to another

clone – Clone the configuration and contents of a zone

boot/reboot/shutdown/halt – Start/Restart/Stop a zone

only – Manage multi-zone state

runcmd – Run a command within a zone



Use Cases

- > DSEE6 DS + DPS + DSCC
 - Security Isolation
 - Resource Management (RM)
 - Software Dependency Isolation
 - Minimization and Hardening

Use Cases

- > University: Student Provisioning
 - User and data isolation (safe root usage)
 - Can add/remove software
 - If zone gets trashed, then just re-provision zone
 - Set upper RM boundaries per student to avoid RM abuse
 - Offer class of service differentiation



Use Cases

- > Clean Slate Software QA
 - Ensure consistent starting point for every QA run
 - Package set
 - System configuration
 - TCP/IP tuning
 - Disable all other services



Use Cases

- > New App/Service Evaluation
 - Ensure the new app/service doesn't touch the packages, tuning, or general configuration of the global zone
 - Independent package resolution per zone
 - Multiple software versions on the same physical server in different zones

Use Cases

- > CMS + n-[Web|App] Servers
 - CMS: Write content into /data in the global zone
 - Put data and [Web|App] configuration in /data of global zone
 - [Web|App] read-only mounts /data over lofs from global zone
 - Mitigates content alteration if [Web|App] server gets compromised



Use Cases

- > Server Consolidation
 - Consolidate many physical servers to a single system with each [App|Service] in its own zone
 - Apply RM constraints according to per zone needs
 - Allow independent [App|Service] versions and dependencies such as different servlet engine version



Use Cases

- > MySQL Co-location
 - Many open source applications require a light weight relational db repository
 - Apply RM constraints to each zone
 - Independent or co-located storage



Use Cases

- > On demand zone provisioning
 - App specific gold zones
 - Zone [and zfs] cloning
 - Zone migration
 - Apply RM at destination server



Use Cases

- > 3-Tier Architecture In A Box
 - 1+ zone for each tier
 - Apply resource constraints
 - Perfect for getting started program
 - Use Dtrace to observe the interactions between tiers from the global zone
 - Migrate tiers to other hardware as budget or performance constraints dictate

OpenSource Examples



MySQL/phpMyAdmin Example

In this example, we install and configure a MySQL and the phpMyAdmin administrative console into a sparse zone that is running only the minimal necessary services to support the MySQL and phpMyAdmin services.

Blog

<http://www.thezonemanager.com/2008/01/zoned-mysql-with-secure-phpmyadmin.html>

MySQL/phpMyAdmin Example

The Old Way (By Hand)

```
# zonecfg -z ms
zonecfg:ms> create
zonecfg:ms> set zonpath=/zone/mysql
zonecfg:ms> set autoboot=true
zonecfg:ms> add net
zonecfg:ms>   set address=192.168.1.11/24
zonecfg:ms>   set physical=bfe0
zonecfg:ms>   end
zonecfg:ms> verify; commit; exit
# zoneadm -z ms install
# zoneadm -z ms boot
# zlogin -C ms
# Manually answer the SysIdCfg questions
# Copy the /mysql.sh script into the non-
  global zone ms.
# Login to the non-global zone (zlogin ms)
```

The New Way (The Zone Manager)

```
# zonemgr -a add -n mysql -z /zones -P pw \
-I "192.168.1.11|bfe0|24|mysql" -s lock \
-G apache2 -G mysql5 -G php5_mysql \
-G phpmyadmin -C /etc/resolv.conf \
-C "/etc/nsswitch.dns|/etc/nsswitch.conf" \
-C /mysql.sh -X /mysql.sh
# Login to your secure MySQL console via
the following URL:
  https://192.168.1.11
```

MySQL/phpMyAdmin Example

The Old Way (By Hand)

```
# Download pkg-get from blastwave.org.  
# Install pkg-get and its requisite software.  
# Install the following packages via pkg-get:  
  apache2, mysql5, php5_mysql, and  
  phpmyadmin  
# Run the /mysql.sh script within the ms zone.  
# Determine what services such as sendmail,  
  autofs, nfs, ... that need to be disabled.  
# Determine each services service name via  
  svcs -a <service_name>  
# Disable all un-necessary services via  
  svcadm disable <svc>  
# Login to your secure MySQL web console  
via the URL:  
  https://192.168.1.11
```

The New Way (The Zone Manager)

Already done!

RoundCube WebMail Example

mysql.sh Script Usage

Usage: mysql.sh [options]

where options include the following:

- m <password> # MySQL root user password. Defaults to pw
- u <user> # Control user. Defaults to myadmin
- p <password> # Control user password. Defaults to pw
- h <zonehost> # Zone host name? Defaults to mysql

RoundCube WebMail Example

In this example, we install and configure a RoundCube WebMail sparse zone that is running only the minimal necessary services to support the WebMail service.

Blog

<http://www.thezonemanager.com/2008/01/put-new-face-on-your-mail-server.html>

RoundCube WebMail Example

The Old Way (By Hand)

```
# zonecfg -z rc
zonecfg:rc> create
zonecfg:rc> set zonepath=/zone/rc
zonecfg:rc> set autoboot=true
zonecfg:rc> add net
zonecfg:rc>   set address=192.168.1.11/32
zonecfg:rc>   set physical=bfe0
zonecfg:rc>   end
zonecfg:rc> verify; commit; exit
# zoneadm -z rc install
# zoneadm -z rc boot
# zlogin -C rc
# Manually answer the SysIdCfg questions
# Copy the /rcmail.sh script into the non-
  global zone rc.
# Login to the non-global zone (zlogin rc)
```

The New Way (The Zone Manager)

```
# zonemgr -a add -n rc -z /zones -P pw \
-I "192.168.1.11|bfe0|32|rc" -s lock \
-G apache -G mysql5 -G mod_php5 \
-G php5_mysql -G pcre -G php5_imap \
-C /etc/resolv.conf \
-C "/etc/nsswitch.dns|etc/nsswitch.conf"
-C /rcmail.sh -X /rcmail.sh
# Login to your webmail server via the
  following URL:
  http://192.168.1.11/
```

RoundCube WebMail Example

The Old Way (By Hand)

```
# Download pkg-get from blastwave.org.
# Install pkg-get and its requisite software.
# Install the following packages via pkg-get:
  apache, mysql5, mod_php5, php5_mysql,
  pcre, and php5_imap
# Run the /rcmail.sh script within the rc zone.
# Determine what services such as sendmail,
  autofs, nfs, ... that need to be disabled.
# Determine each services service name via
  svcs -a <service_name>
# Disable all un-necessary services via
  svcadm disable <svc>
# Login to your secure webmail server via the
URL:
  http://192.168.1.11/
```

The New Way (The Zone Manager)

Already done!

RoundCube WebMail Example

rcmail.sh Script Usage

Usage: /rcmail.sh [options]

where options include the following:

```
-u <downloadurl> # URL to download rcmail. Defaults to:  
http://superb-east.dl.sourceforge.net/sourceforge/roundcubemail/roundcubemail-0.1-rc2.tar.gz  
  
-m <mysqlpw> # Mysql root user password. Defaults to rcpw  
-r <rcmailpw> # Mysql roundcube user password. Defaults to rcpw  
  
-h <imap host> # IMAP server host name. Defaults to localhost  
-p <imap port> # IMAP server port number. Defaults to 993  
-s [true|false] # Enable SSL on IMAP connection? Defaults to true  
  
-H <smtp host> # SMTP server host name. Defaults to localhost  
-P <smtp port> # SMTP server port number. Defaults to 465  
-S [true|false] # Enable SSL on SMTP connection? Defaults to true
```

WordPress Example

In this example, we install and configure a WordPress sparse zone that is running only the minimal necessary services to support the blog service.

Blog:

<http://www.thezonemanager.com/2008/01/wordpress-2-step.html>

WordPress Example

The Old Way (By Hand)

```
# zonecfg -z wp
zonecfg:rc> create
zonecfg:rc> set zonepath=/zone/wp
zonecfg:rc> set autoboot=true
zonecfg:rc> add net
zonecfg:rc>   set address=192.168.1.11/32
zonecfg:rc>   set physical=bfe0
zonecfg:rc>   end
zonecfg:rc> verify; commit; exit
# zoneadm -z wp install
# zoneadm -z wp boot
# zlogin -C wp
# Manually answer the SysIdCfg questions
# Copy the /wordpress.sh script into the non-
  global zone wp.
# Login to the non-global zone (zlogin wp)
```

The New Way (The Zone Manager)

```
# zonemgr -a add -n wp -z /zones -P pw \
-I "192.168.1.11|bfe0|32|wp" -s lock \
-G apache -G mysql4 -G mod_php \
-G php4_mysql -C /etc/resolv.conf \
-C "/etc/nsswitch.dns|/etc/nsswitch.conf"
-C /wordpress.sh -X /wordpress.sh
# Login to your blog server via the
  following URL:
  http://192.168.1.11/wordpress/
```

WordPress Example

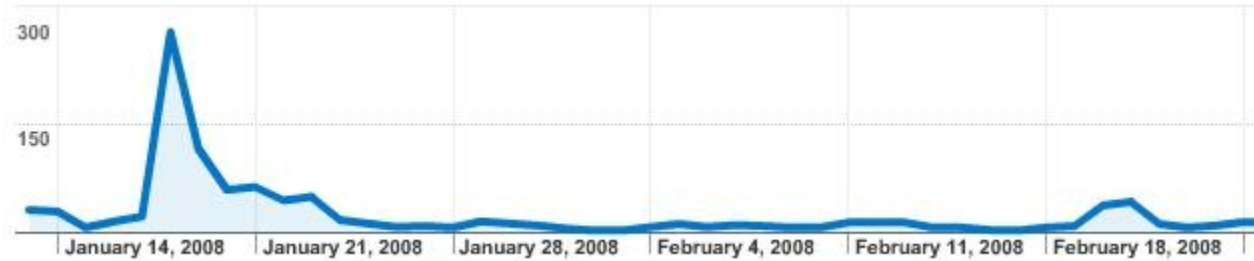
The Old Way (By Hand)

```
# Download pkg-get from blastwave.org.  
# Install pkg-get and its requisite software.  
# Install the following packages via pkg-get:  
    apache, mysql4, mod_php, php4_mysql  
# Run the /wordpress.sh script in the wp zone.  
# Determine what services such as sendmail,  
    autofs, nfs, ... that need to be disabled.  
# Determine each services service name via  
    svcs -a <service_name>  
# Disable all un-necessary services via  
    svcadm disable <svc>  
# Login to your blog server via the URL:  
    http://192.168.1.11/wordpress/
```

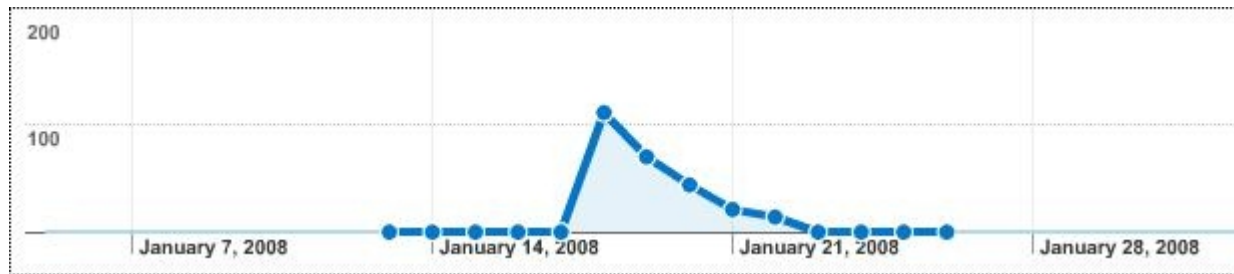
The New Way (The Zone Manager)

Already done!

WordPress Example



Total Page Views of The Zone Manager Blog



Page Views Just From Matt's WordPress Blog

ZoneMgr RoadMap

ZoneMgr 2.0

- Unify all filesystem and device mounting syntax
- Add support for new Solaris 10 Update 4 features.
 - Resource Management
 - Full IP stack network interfaces
- Simplify CLI option assumptions. e.g. zone path and name resolution

ZoneMgr 2.[1-n]

- Expand and unify naming service configuration (e.g. files, dns, nis, nis+, and ldap)
- Add support for informational (man, output, and error) messages in other languages.
- Make SUNWzonemgr package.
- Add support for input configuration file.

ZoneMgr 3.0

- Add support for xVM (hvm and pvm)
- If possible, add support for LDOMs

Resources

My Blog: My Virtualization Pilgrimage

<http://TheZoneManager.com>

Zone Manager Open Source Page

<http://OpenSolaris.org/os/project/zonemgr>

Zones and Zone Manager Discussions

<http://OpenSolaris.org/jive/forum.jspa?forumID=6>

Contacting Me

ZoneMgr@Sun.COM



Q & A





Thanks

for your attention – any questions ?

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