The Penguins Have Landed

Getting Started with Linux on System z
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Shelter Mutual Insurance Company
What’s in a Name?

Or maybe…

- Herding z Penguins
- Hording the Penguins
- Who’s your Penguin?
- Occupy the Penguins
- Spanking the Penguins
- Penguin Spring
- Angry Penguins
- Here Comes Penguin Boo Boo
The Penguins Have Landed

- Why Penguins (Linux)
- Nesting the Penguins
- Feeding the Penguins
- Protecting the Penguins
- Working the Penguins
- Hatching new Penguins

Why Penguins
Why Penguins…

• Linux on System z
  • Ten+ year old technology
  • Linux virtual servers under z/VM or in an LPAR

• Virtualization
  • More with less
  • Extreme Virtualization

...Why Penguins…

• Software Licensing
  • IBM Processor Value Units (PVU)
  • Per “core”
  • Distributed servers
    • Many servers
    • Many cores
  • System z servers
    • Few physical servers, cores
    • Many servers per core

• Power and cooling
Why Penguins

- Really cool Disaster Recovery (DR) Model
- Recover entire system
- IPL Hypervisor (z/VM)
- Customize environment
- IPL Servers
- Faster RTO

Nesting the Penguins
Nesting the Penguins

- System z Hardware
  - z/OS & z/VM support
  - Linux support
- Networking
- Virtualization
  - z/VM Hypervisor
  - CPU
  - DASD
  - Memory

z/VM Hypervisor

- Evolved from IBM's VM/370
- Forty years of evolution
- Other uses
  - Virtualize IBM Virtual Storage Extended (VSE)
  - PROFS / OfficeVision (email of 1980s and 1990s)
  - Application development
  - Run-time environment
  - Predecessor to PR/SM
Feeding the Penguins

Feeding the Penguins...

• SLES 11 Linux for System z
  • Build Template servers
    • Sized by application type
    • Six Gigabyte – basic
    • Thirteen gigabyte – Modest Application
    • Twenty-seven Gigabyte – Larger Application
  • Clone and grow
    • Six or 20 gigabyte increments
…Feeding the Penguins…

- Cloning
  - SERVER FILE – list of servers and unique attributes
  - Copy virtual disks of template server to new server
  - Configure with unique values - name, IP addresses, etc
  - Provision a new virtual server in five to ten minutes

<table>
<thead>
<tr>
<th>NAME</th>
<th>IP-unique-information</th>
</tr>
</thead>
<tbody>
<tr>
<td>xxx1</td>
<td>DR Unique Values</td>
</tr>
<tr>
<td>ABC1</td>
<td></td>
</tr>
<tr>
<td>SYS2</td>
<td></td>
</tr>
<tr>
<td>MMMn</td>
<td></td>
</tr>
<tr>
<td>etc</td>
<td></td>
</tr>
</tbody>
</table>

MY INFO file on EACH server

Copy to Linux

Linux File System
/etc

Configuration files

Build MY INFO

1) Manually Edit File

z/VM
...Feeding the Penguins

- DASD Cloning - *Flash Copy*
  - Define Target disk
  - Issue an OS command to copy one virtual disk to another
  - Disk subsystem
    - Bitmap
    - Completes copy in background
  - OS resumes next step
Protecting the Penguins

- Monitoring
  - z/VM Hypervisor
  - Linux Servers
- Alerts
- Storage Management
- Penguin Security

Monitoring…

- You need a tool
  - You have numerous options
- Choose carefully
  - You do not get what you do not pay for
  - Reconcile the difference between virtual and real
How full is my bucket?

Real Bucket
Actual Available CPU
35% used

Virtual Buckets
Perceived Used CPU

Alerts...

- We need to know when
  - Server is down
  - Server is looping
  - File system is almost full
  - System storage is almost full
  - System is too busy
  - Other bad stuff
Generating an Alert

VM/Linux Monitor
Detect the “out-of-bounds” condition

SNMP
Enterprise Framework
Generate Alert

Incident and Notification

@#$%^&*

Fix if possible

Penguin Storage

• z/OS Management
  • Allocating and Managing DASD volumes
  • Backup
  • Restore
  • Recovery

• z/VM Management
  • Assign DASD volumes to servers
  • Monitor
  • Linux management
  • Logical Volume Manager (LVM)
  • Dynamically enlarge server application storage
Penguin Security

- z/VM Security
  - RACF for VM
  - Independent database
  - Admin use only
  - Logon to 3270 (green screen)

- Active Directory (AD)
  - Integrate Linux servers into existing AD environment
  - Group structure
    - Developer
    - Server Admin
    - System Admin

Samba / Active Directory Integration

Validate access to resources

Linux File System
SAMBA server
/opt
EAR/JAR
Logs
Code
Config

WAS Admin
Developer
Linux Admin

Read
Write
Working the Penguins

Working the Penguins…

- WebSphere Application Server (WAS)
  - Home grown applications
  - Vendor applications
- Provisioning
  - Environments / number of servers
  - Size – depending upon application
  - Clone and Deploy servers
  - Install / verify / implement applications
...Working the Penguins

Shared Pool
DASD
Memory
Virtual Network

12 GB DASD
3 GB Memory

Virtual Servers

50 GB DASD
6 GB Memory

Adjust as necessary

...Penguin Jobs...

• WebSphere Process Server (WPS)
  – IBM application
  – Work Flow management
  – Now IBM BPM
  – Learning experience
    – Install failure – SLES Service Pack
    – Larger servers – more virtual storage (and more…)
    – Numerous environments – WPS cloning
Penguin Jobs…

- “Shelter Search”
  - WAS 6.1 application
  - Locally Developed
  - Insured / Agent search
  - Multiple environments
  - Previously multiple Wintel servers
  - Moved all environments to Linux 2010
Data Flow

Penguin Saves PVUs

- Processor Value Units (PVUs)
- Based on processor type
- IBM - WPS
  - $250,xxx for 360 PVUs
  - $x,xxx,xxx For 3,200 PVUs
Hatching new Penguins

- More workload moving to Linux on z
  - WAS
    - New applications
    - Move from Intel
  - IBM recommendations – other stuff
    - “Best Fit”
    - “Good Fit”
New Penguin Jobs...

- Insurance Verification System (IVS)
  - Internally Developed WebSphere
  - Law Enforcement can verify status of an insured
  - Nevada now, Oklahoma eventually
  - Production 2Q 2011

…New Penguin Jobs

- Common Services (CSA)
  - Home grown service bus
  - WebSphere
  - Customer Access
  - eCommerce

- SOA Enablement
  - WebSphere Registry and Repository (WSRR)
  - WebSphere Enterprise Service Bus (WESB)
  - Prototype environment
Best Fit Application Workloads*

- WebSphere MQ Series
- DB2 Connect
- CICS Transaction Gateway, IMS Connect for Java
- WebSphere and JAVA applications development
- WebSphere - Application Server (WAS), Portal
- Domino
- Network Infrastructure: FTP, NFS, DNS etc..
- Applications requiring top end disaster recovery model
- Virtualization and Security Services
- InfoSphere/Cognos

*Bill Reeder – IBM Linux for System z Sales and Strategy

Good Fit Application Workloads*

- DB2 (LUW)
- Apache web serving
- SAMBA
- TIM/TAM (LDAP Services)
- TSM

*Bill Reeder – IBM Linux for System z Sales and Strategy
Actual Software Stack

- z/VM – IBM
  - Virtualization
  - System management
  - RACF, DIRM, RSCS
- SLES – SUSE
  - Linux servers
- zVPS – Velocity
  - Monitor
  - Alerts
- IBM Tivoli Monitoring
  - Enterprise Framework
- Service Desk – CA
  - Problem and Incident
  - Notification
- FDR on z/OS
  - Backup, restore, recover

Penguins Quality of Service Maturity

- VM:Manager tools
  - Backup, Tape
  - Schedule, Operations
  - Move away from z/OS reliance
- TSM Backups
  - DB2 databases
  - IBM BPM
- z/VM 6.2
  - SSI cluster
  - Two production images
  - App split across both
  - Dev image / Test Image
- SUSE Manager
  - Centralize server configuration and maintenance
Knowing Penguins had Landed

- Annual IS meeting
  - Accomplishments for last year
  - Goals for upcoming year(s)
- “We did it!”
  - Linux on System z
- Team listed this accomplishment
  - Not our team
  - WAS Admin team
  - Deserved it

What we have learned (so far)

- **Nothing** is as easy as it sounds
- There is no substitute for **smart**, **hard** work
- **Experience** is all about knowing what **shortcuts to avoid**
- Don’t underestimate **cultural challenges**
- Do you homework – **never stop learning**
- Start with the **infrastructure**
- **People - Processes - Tools**
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Anything Else?

Complex
Counter-Cultural
Opportunity to Learn

Journey – Not a Destination
“Everyone is a prisoner of his own experiences. No one can eliminate prejudices - just recognize them.”

Edward R. Murrow
Good day and Good luck