

# System z Expo

*October 13 – 17, 2008 – Las Vegas, Nevada*



## Systems Management of Linux under z/VM and LPAR

### Session zLP05

Michael MacIsaac – [mikemac@us.ibm.com](mailto:mikemac@us.ibm.com)

Authorized



**Training**

© 2008 IBM Corporation

## Abstract

- This presentation will give an unbiased overview of systems management solutions considering the open source, vendor-supplied and 'roll-your-own' approaches. It will classify products by the aspects of systems that they address such as network management, overall systems management, patch management, provisioning management, etc. Some products, such as Levanta and Aduva, are dead or dying. Another product, 'Provisioning Expert' has been acquired by Mainstar. Given all these variables, a broad survey of z/VM and Linux systems management will be presented.



# Agenda

- Introductions
- Define systems management
- Solutions
  - Vendor-supplied
  - Open source
  - Roll-your-own
- Survey on linux-390
- Summary



# Introductions

## ■ Who am I?

- Mike MacIsaac
- [mikemac@us.ibm.com](mailto:mikemac@us.ibm.com)
- 21 years at IBM in Kingston, Poughkeepsie
- Manager, z/VM, Systems Management development
- zSeries New Technology Center
- Redbook project leader

## ■ Who are you?

- Linux in: Production/Test/Pilot/Not at all?
- Systems Management tool(s)/Roll your own?

## ■ What are you hoping to get out of today's presentation?



# Define Systems Management – first attempt

- Monitoring
  - z/VM
  - Linux
- Provisioning
  - Predefined user IDs
  - Pools of Disks, IP addresses
- Patching
  - z/VM
  - Linux
- Performance management
- Backup/restore



## Define Systems Management: Alan Altmark's append

- Provisioning (real and virtual)
- Human operations (IPL, shutdown, health inquiry, dump processing, ...)
- Automated operations
- Security (authentication, authorization, audit)
- Performance monitoring and management
- Backup/Archive
- Disaster planning and recovery
- Availability management (probably tied with disaster planning)
- Problem determination and Service (patching)
- Software and configuration change control



# Solutions: Vendor-supplied

- Aduva (dying?)
- BMC Patrol (Now BMC Performance Manager)
  - [http://www.bmc.com/products/products\\_services\\_detail/0,,0\\_0\\_0\\_2001,00.html](http://www.bmc.com/products/products_services_detail/0,,0_0_0_2001,00.html)
- CleverView for IP Service Performance
  - <http://www.aesclever.com/pages/current/index.php?f=tcip&page=solutions>
- EMC Smarts - <http://www.emc.com/products/family/smarts-family.htm>
- Innovation FDR/Upstream - <http://www.innovationdp.fdr.com/ups.cfm>
- CSL Wave - <http://www.csl-int.com/product.asp?rec=7>
- IBM Systems Director/IBM Tivoli software stack
  - <http://www-03.ibm.com/systems/virtualization/systemsdirector/>
- Levanta (dead)
- Mainstar Provisioning Expert
  - <http://www.mainstar.com/products/provisioningexpert/index.asp>
- Opsware (now HP SAR) - [www.hp.com](http://www.hp.com)
- Red Hat Network Sattelite Server - [www.redhat.com](http://www.redhat.com)
- Velocity ESALPS - <http://www.velocity-software.com/esalps.html>

Linux





# Solutions: Vendor-supplied

- Veritas Netbackup
- Innovation FDR/Upstream
- TSM





## Solutions - Cleverview

- helps performance analysts, operations personnel, network system programmers, and capacity planners effectively monitor performance, and plan for the future.
- the ultimate choice for large IBM®-hosted data centers undergoing wide scale SNA-TCP/IP migration over to EE, TN3270, FTP, WebSphere, and/or other integral TCP-based Business Services.



# Solutions - Cleverview

Connect Expert - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites RSS Print Mail W Word People

Address <http://137.72.43.114:8080/aes80/jsp/master.jsp?HostName=382e3020486f7374> Go Links

Google Search Options

Host Name: 8.0 Host Host Address: 137.72.43.252 User ID: TCP/IP Logoff Change Host Help

**AES** clever.com

CleverView™ for TCP/IP

SysPoint Connect Expert StackView LinkView Critical Resources PinPoint

Connect Expert January 27, 2006 7:26:06 AM

z/COMM MIB Lookup DNS Lookup

**SessionLog**

- FTP
  - FTP History
  - FTP Server Activity
  - FTP SMF
- TCP
  - MQ SMF
  - TCP SMF
  - WebSphere SMF
- Telnet
  - Telnet SMF

**Alerts**

- Thru24 Report
  - CSM Buffers
  - Critical Resources Available
  - Critical Resources Performance
  - Link
  - Port
  - Session
  - VTAM Buffers
- Thru99 Report
  - CSM Buffers
  - Critical Resources Available
  - Critical Resources Performance
  - Link
  - Port
  - Session
  - VTAM Buffers

**Monitor**

**Listeners:**

| Name     | Port  |
|----------|-------|
| AESTQT80 | 3080  |
| INETD4   | 1023  |
| INETD4   | 513   |
| Telnet   | 23    |
| HTTPD1   | 80    |
| FTPD1    | 21    |
| PORTMAP  | 111   |
| BPXOINIT | 10007 |
| Loopback | 1025  |

List Ports

**Sessions**

| Name | Number of Ports | Bytes In | Percent In | Throughput In (Bytes/Sec) | Bytes Out | Percent Out | Throughput Out (Bytes/Sec) |
|------|-----------------|----------|------------|---------------------------|-----------|-------------|----------------------------|
| EE   | 5               | 264      | 67.3%      | 2                         | 264       | 2.3%        | 2                          |

Enterprise Extender

| Name | Number of Ports | Bytes In | Percent In | Throughput In (Bytes/Sec) | Bytes Out | Percent Out | Throughput Out (Bytes/Sec) |
|------|-----------------|----------|------------|---------------------------|-----------|-------------|----------------------------|
| UDP  | 2               | 0        | 0%         | 0                         | 0         | 0%          | 0                          |

UDP (non-EE)

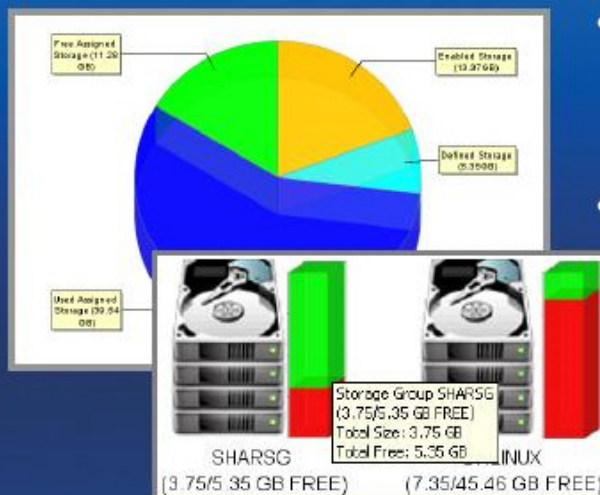
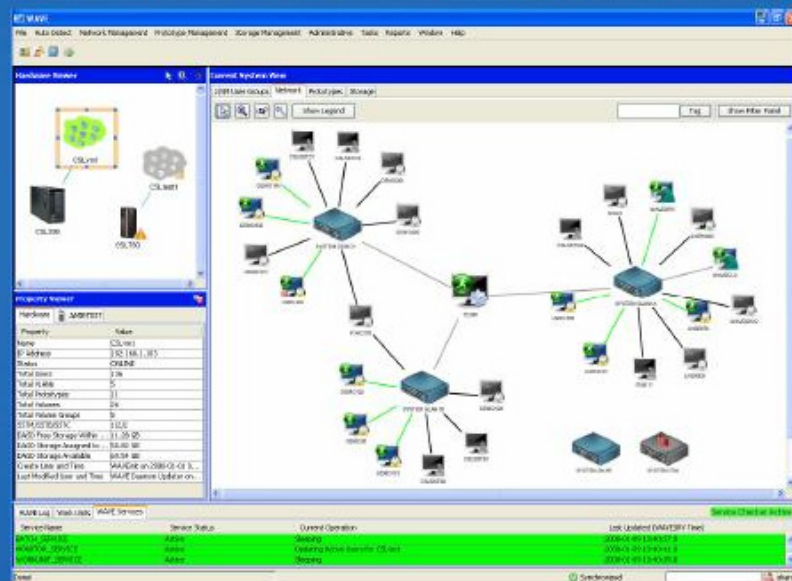
| Name     | Port | Bytes In | Percent In | Bytes Out | Percent Out | Number of Sessions | Session Percent | Sessions Not Established | Sessions Time Wait or Closed |
|----------|------|----------|------------|-----------|-------------|--------------------|-----------------|--------------------------|------------------------------|
| AESTQT80 | 3080 | 128      | 32.7%      | 11,132    | 97.7%       | 7                  | 77.8%           | 6                        | 3                            |
| TCP/IP   | 2432 | 0        | 0%         | 0         | 0%          | 1                  | 11.1%           | 0                        | 0                            |
| Loopback | 1025 | 0        | 0%         | 0         | 0%          | 1                  | 11.1%           | 0                        | 0                            |

# Solutions

## ■ CSL – Wave

# CSL-WAVE: Provisioning for z/VM & z/Linux - *Made Simple*

- State-of-the-art GUI enables effortless provisioning and control for your z/Linux virtual server farm, including: Cloning, Network management, Disk management and much more.
- The underlying z/VM environment is fully abstracted, so no z/VM skills are required for the WAVE user.
- Automation and simplification of all major virtualization and consolidation tasks, as well as day-to-day operations.
- Powerful auto-detect mechanism allows for a quick, simple and efficient detection of your z/VM LPARS.



- Informative GUI provides a single-glance status display for all components.
- Intelligent Security Sub-System enables the WAVE administrator to delegate authorities and define views, actions and scopes for the WAVE users.
- Extensive reporting capabilities allow the WAVE User to generate a variety of helpful reports.





# Solutions: CSL - Wave

- <http://www.csl-int.com/product.asp?rec=7> - Click [here](#) for demo
- Announcement on linux-390 list server:
  - Amir Glaser
  - Sun, 27 Jan 2008 05:40:27 -0800
  - I wanted to take this opportunity and forum to ask if any of you heard about a new product named WAVE. WAVE (or Web Administration of VM Environment) is a new product from CSL International, which enables the zLinux administrator as well as the zVM System Programmer to view and interact with the VM in a very simple and intuitive way. The product is based on a very strong and durable GUI engine, and simplifies most zLinux oriented zVM administrative tasks (Cloning zLinux users, connecting/disconnecting from Guest LANs, adding storage and much more).
  - Please feel very free to contact me for mote information at [PROTECTED] Also, you are more than welcome to visit our website [www.csl-int.com](http://www.csl-int.com).



## Solutions: CSL - Wave

- CSL-WAVE V1.0 - Jan 08.
- V1.1 – May 08
- V1.2 - Q308 or Q408.
  - Support any size virtual Linux server farm (Multiple CPCs with multiple z/VM instance on each CPC are supported)
  - Auto-detect Wizard for a breeze & bullet proof installation
  - Delegate authority via enhanced Scope and Permissions with a “by Action” resolution and role definitions control
  - Intuitive GUI for every z/VM and Linux provisioning task
  - Groups, display and operations, with full central control
  - Ability to filter the virtual servers’ displays by Site-Defined-Groups, User-Groups, Project Association, Linux Deployment, Guest-LANs,
  - Server Name Mask and status (Active/Inactive) or mixture of above
  - Graphical Management of Guest LANs within z/VM with VSwitch partial support (to be enhanced soon to a full support).



## Solutions: CSL - Wave

### ■ v1.2 - Q308 or Q408 (cont'd)

- Graphical Management of z/VM Disk Storage and allocating storage by quotas to the virtual servers
- User can add storage to a running server just by selecting from the Storage-Group quota
- Enhanced Cloning Wizard (From an offline Server / From Prototype / Definitions only) for easy multiple clones
- LAN-connection Graphic Wizard - Draw a line on the screen from the server to the Guest LAN's switch, and let CSL-WAVE do the rest
- CLC - Full access proprietary terminal session with edit capabilities to any virtual server even when TCP connection is dropped
- Full user/system, activities logging (and review), with filtering by user/system/date-time stamp and severity
- Multiple server selection option to automate most of the administrative actions needed (Start, Stop, Restart, Send messages, Execute scripts Connect/disconnect to/from Guest-LAN and more...)

Linux



## Solutions: CSL - Wave

### ■ v1.2 - Q308 or Q408 (cont'd)

- Automatic Properties view of every selected object
- User/System Background tasks, view and control, directly from GUI
- Comprehensive Report Generator for generating, running and saving private and global reports
- Script Manager and Executor facility to manage private and global scripts that may be run on any selected virtual server or group of virtual servers
- according to any user defined filter directly from the CSL-WAVE's GUI
- Active Directory or CSL-WAVE's own authentication is supported for user's sign-on
- No duplicate CSL-WAVE user's sign-on is allowed for security and logging reasons
- “User Already sign-on” detection with IP identification of the currently signed-on WS to assist the detection of security breach





## Analysis: From intern – College Junior

### ■ **CSL – Wave**

- Interesting GUI, but is it overkill?
- not a webapp; reliance on graphics forces it to be standalone app
- Connected graphs are very intuitive
- Less status oriented, more mgmt/sec/cloning oriented
- Looks windows only
- Requires software install to be useful (making it inherently less useful)
- Some good dynamic visual feedback (re new network dialog/menu). better than pages that need to be refreshed
- Rather unpleasant way of editing files
- Reliance on proprietary/patented code

### ■ Levanta - N/A



Linux

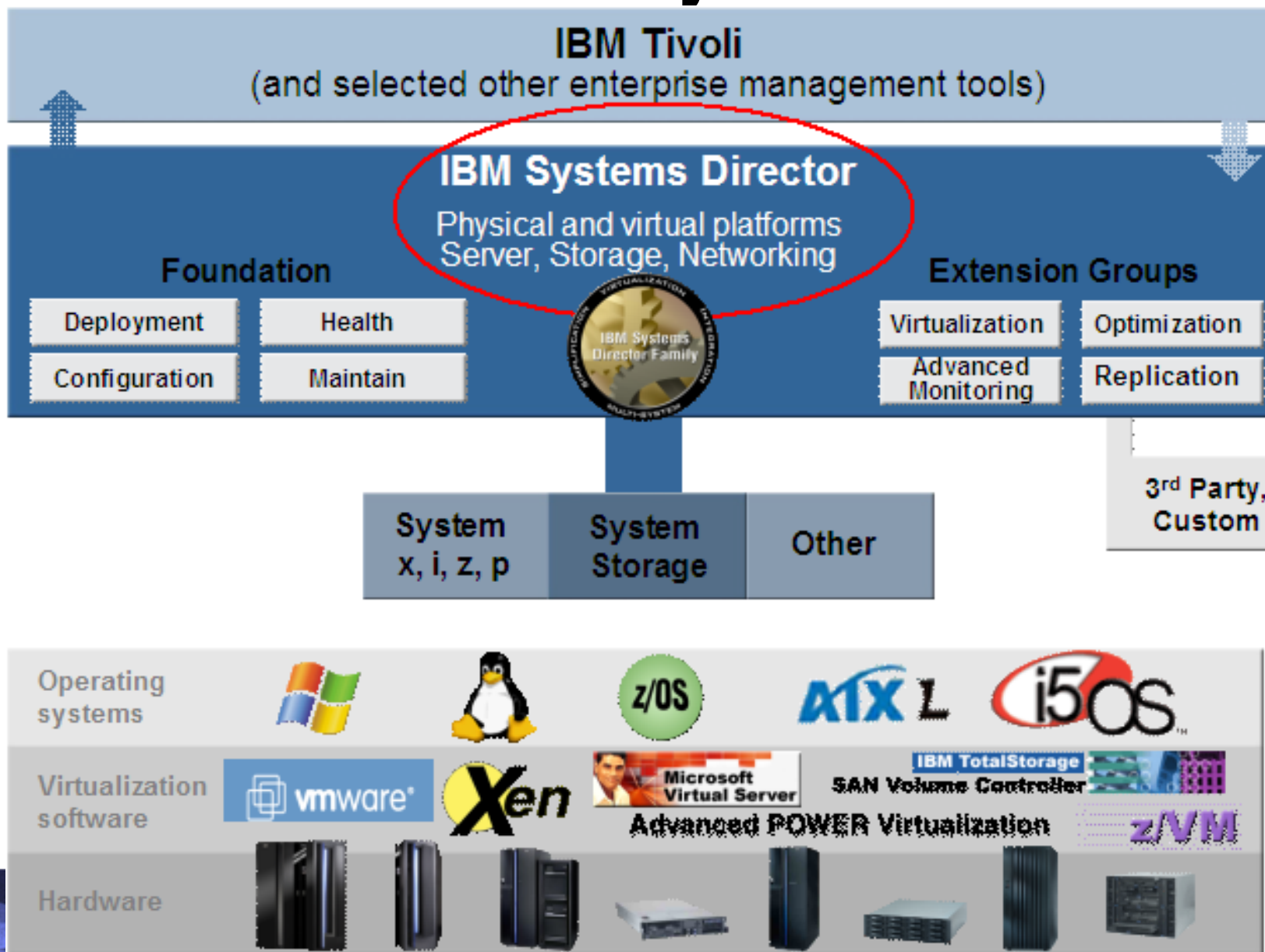
# Solutions: IBM Systems Director

## ■ IBM Systems Director

- Is a management solution for heterogeneous IT environments
- Operating Systems
  - Linux running on System z / i / p / x
  - i5/OS and AIX
  - Windows
- Physical & Virtual resources
  - BladeCenter / Storage Devices
  - z/VM, p HMC/LPAR, Xen, VMWare
- IBM Systems Director provides base platform management ... ..  
and integrates into higher-level Tivoli management stacks e.g.
  - Tivoli Provisioning Manager
  - Tivoli Monitoring (on System z known as OMEGAMON)
  - Tivoli Configuration Manager



# Solutions: IBM Systems Director



## Analysis: From intern – College Junior

### ■ IBM Director

- extensive use of plugins
- two different clients, core services / Agent
- uses a separate app, Console, to actually interact with server/clients (provides gui)
- 'Discovers' resources either automagically, manually, or passively (Agents contact server)
- seems to be focused on management/control, less on monitoring
- not browser based
- reliance on installed software
- customizable events



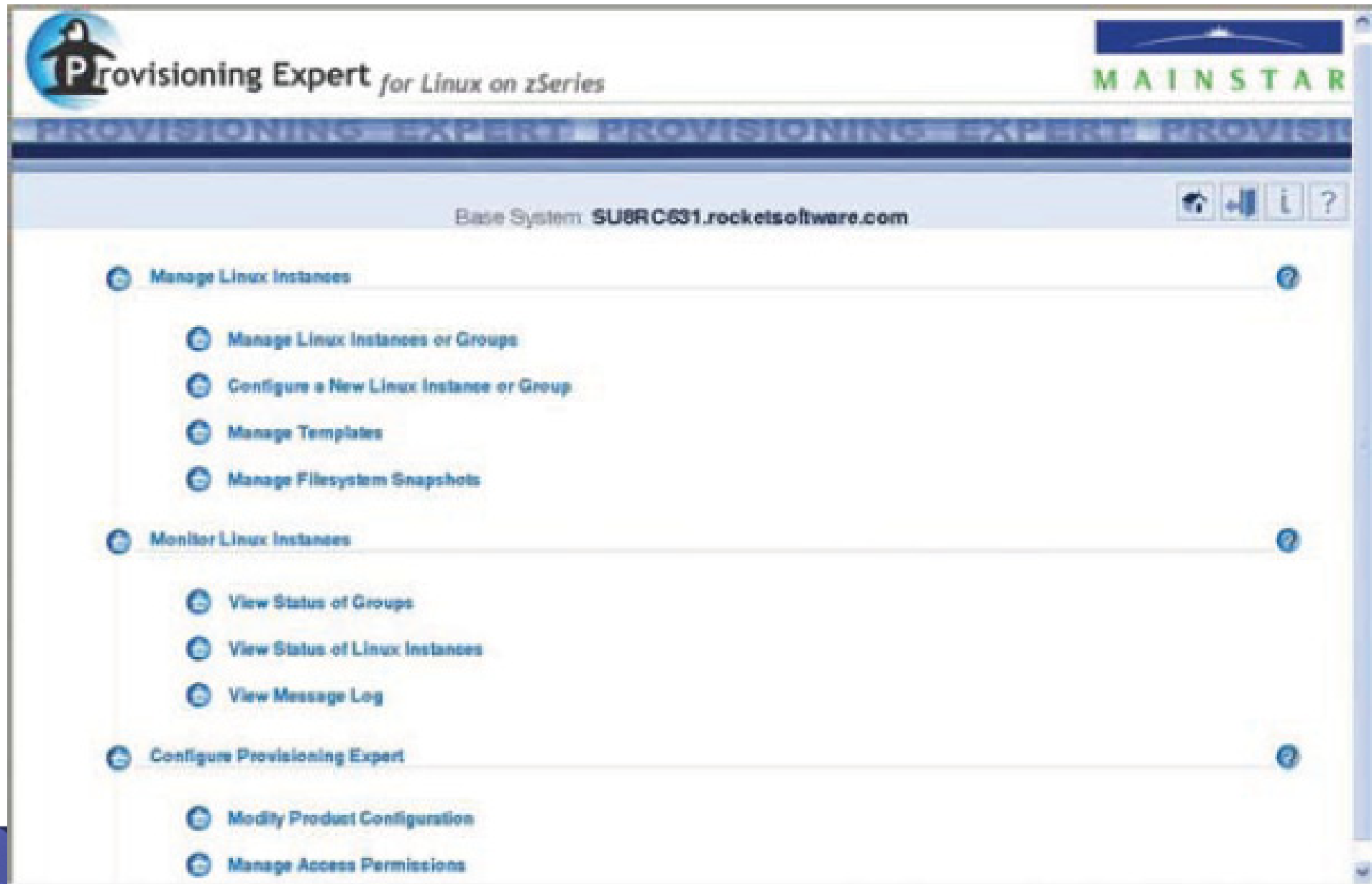
# Solutions: Mainstar Expert Provisioning manager

- <http://www.mainstar.com/products/provisioningexpert/> - “Download this demo”
- Announcement: Feb 22, 2007
  - Mainstar Software Corporation, is announcing the availability of Provisioning Expert for Linux on zSeries 1.1 automated instance management solution that simplifies the creation, configuration, and maintenance of many virtual Linux instances under z/VM.
  - To cut costs and optimize performance, organizations are increasingly taking advantage of the virtualization under z/VM to run Linux instances. However, creating Linux guests under z/VM can be challenging because Linux administrators don't understand z/VM and most mainframe administrators don't understand Linux.
  - Provisioning Expert simplifies the process of placing Linux within the powerful technology of z/VM. Now you can create multiple instances as needed, tailored to fit your unique environment, and manage the instances from a wizard-like interface that's straightforward for both Linux and mainframe experts.





# Solution: Mainstar Provisioning Expert



# Solutions: Open Source

- Hobbit
- Nagios
- Webmin



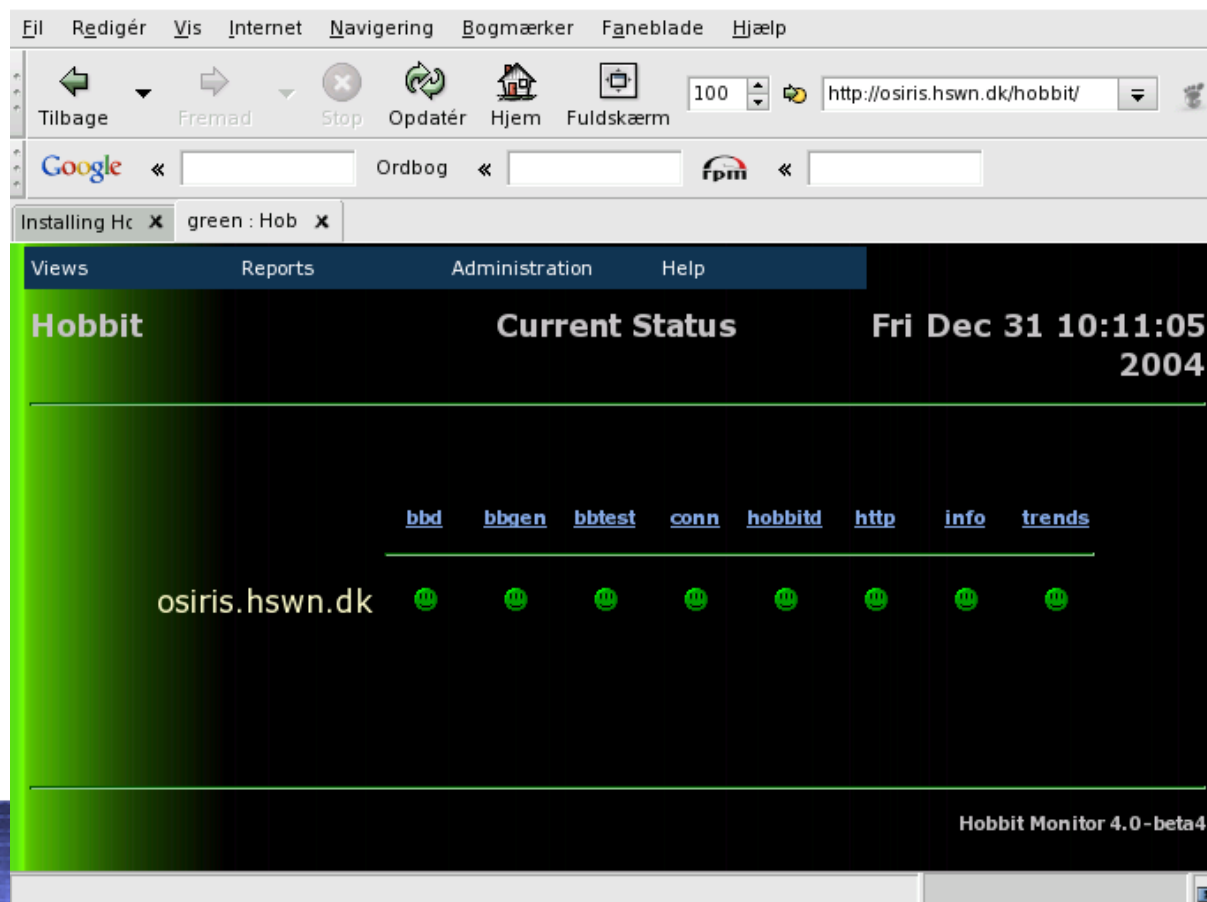
# Solutions: Hobbit

- Hobbit Web site

- <http://hobbitmon.sourceforge.net/>

- Rich Smrcina's "Using Hobbit to Monitor Network Services"

- <http://linuxvm.org/present/SHARE110/S9283rs.pdf>



## Solutions: Hobbit

- Hobbit is a system for monitoring servers and networks.
- It takes its inspiration from the Big Brother monitoring system, but unlike Big Brother it is designed to work well whether you need to monitor a small network with just a handful of hosts, or large networks with thousands of servers and network services.
- Hobbit monitors your hosts, your network services, and anything else you configure it to do via extensions.
- Hobbit can periodically generate requests to network services - http, ftp, smtp and so on - and record if the service is responding as expected.



## Analysis: From intern – College Junior

### ■ **hobbit**

- cluttered (default) display
- graphics not intuitive (a `:/` means nothing without the legend)
- neat take on drop down menus
- good notion of 'events'; things just aren't 'wrong', they went from good->bad at a certain time for a certain reason
- includes status report on itself (daemon's server)
- graphs are sharp
- style/color of site reflects statuses...neat idea but a bit tacky
- can put in date and get snapshot of state of all reports
- configging through web forms
- can't report on z/VM storage..?
- daemon works in memory b/c disk i/o too costly.
- extensive use of plugins





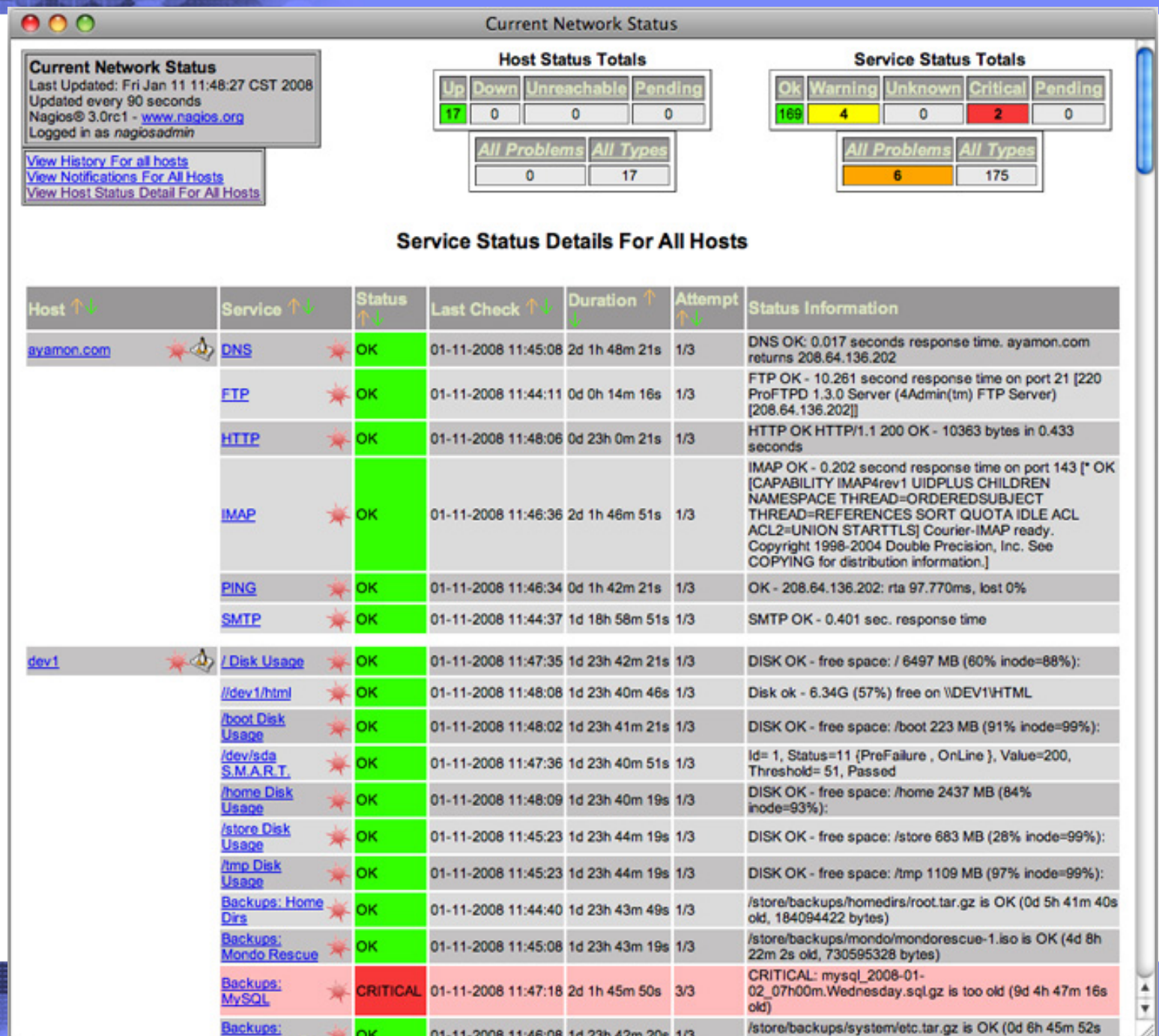
## Solutions: Nagios

- Nagios® is an Open Source host, service and network monitoring program.
  - <http://www.nagios.org/>
- Nagios is a host and service monitor designed to inform you of network problems before your clients or managers do.
- It has been designed to run under the Linux operating system, but works fine under most \*NIX variants as well.
- The monitoring daemon runs intermittent checks on hosts and services you specify using external "plugins" which return status information to Nagios.
- When problems are encountered, the daemon can send notifications out to administrative contacts.
- Current status information, historical logs, and reports can all be accessed via a web browser.



# Solutions

## - Nagios



## Analysis: From intern – College Junior

### ■ Nagios

- customizable alerts
- more service (ie httpd, pop3) oriented
- app + 'optional' web interface
- 'state stalking' - normally logs only if state has changed
- focus on overall network status (geared to fixing outages)
- 'active' checks - checks performed by nagios and 'passive' checks - checks performed by external apps who send their results to nagios for processing
- lots of tabular data; but well colored...otherwise most of the data would be unparseable
- looks like lots of manual configging -cell phone reports
  - does standard OS stuff (mem, proc, etc)



## Solutions – Open Source - Webmin

- Webmin is a web-based system administration tool for Unix servers and services.
- Configure OS internals, such as users, disk quotas, services, configuration files etc., as well as modify and control many open source apps, such as the Apache HTTP Server, PHP, MySQL etc.
- Written in Perl, running as its own process and web server.
- Can be configured to use SSL if OpenSSL is installed with additional required Perl Modules.
- Built around modules, which have an interface to the configuration files and the Webmin server.
- Easy to add new functionality without much work.





# Solutions - Webmin

Webmin sponsored by  OpenCountry [Feedback](#) [Log Out](#)

Webmin System Servers Networking Hardware Cluster Others

## Servers

|                                                                                                                   |                                                                                                                          |                                                                                                                          |                                                                                                                            |
|-------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| <br><u>Apache Webserver</u>      | <br><u>BIND DNS Server</u>              | <br><u>DHCP Server</u>                | <br><u>Jabber IM Server</u>             |
| <br><u>MySQL Database Server</u> | <br><u>Postfix Configuration</u>        | <br><u>Procmail Mail Filter</u>       | <br><u>Read User Mail</u>               |
| <br><u>SSH Server</u>          | <br><u>Samba Windows File Sharing</u> | <br><u>SpamAssassin Mail Filter</u> | <br><u>Webalizer Logfile Analysis</u> |
| <br><u>vsftpd</u>              |                                                                                                                          |                                                                                                                          |                                                                                                                            |



# Solutions - issues

- Challenge areas for z/VM and Linux
  - Automatic creation and deletion of user IDs
  - Automatic creation of VSWITCH
  - IEEE VLANs – trunk ports
  - FCP/SCSI
  - VDISK
  - Unique performance problems – e.g. “double-paging”
  - Interfacing with ESMs
  - Need for root password
  - Cross-CEC support



## Solutions – questions about “Roll your own”

- If you ask 100 system administrators to create a systems management solution for z/VM and Linux, how many solutions will be created?
- What are the eighth and ninth layers of the OSI stack?



# Solutions: Roll your own

## ■ Redbooks:

- *Linux on IBM eServer zSeries and S/390: Large Scale Linux Deployment*
  - <http://www.redbooks.ibm.com/abstracts/sg246824.html?Open>
- *z/VM and Linux on IBM System z: The Virtualization Cookbook for SLES 10 SP2*
  - <http://www.redbooks.ibm.com/redpieces/abstracts/sg247493.html>
  - Also SLES 10 vanilla, RHEL 5.0 books: <http://linuxvm.org/present/>
- RHEL 5.2 book will be coming:
  - <http://www.redbooks.ibm.com/redpieces/abstracts/sg247492.html>

## ■ Redpaper

- *Sharing and maintaining Linux under z/VM*
  - <http://www.redbooks.ibm.com/abstracts/redp4322.html>



# Survey: linux-390, July 7, 2008

- Start of thread: <http://www2.marist.edu/htbin/wlvtype?LINUX-VM.72340>
- I'm preparing for a SHARE presentation (week of Aug 11, San Jose, CA) on z/VM and Linux systems management. If you use Linux and z/VM on System z, do you have time for a quick survey?
- I tried to categorize what's available today into 4 main areas (I apologize if I your software is not on the list, or if it listed as "Dead or dying" but is not. I do not also plan to address performance management). Here is the survey:
- Systems management software used:
  - 1) Open source software:
    - \_ Hobbit
    - \_ Nagios
    - \_ Other \_\_\_\_\_
  - 2) Priced software:
    - \_ CSL-Wave
    - \_ IBM Systems Director/Tivoli Provisioning Manager
    - \_ Mainstar Provisioning Expert (formerly Rocket Software)
    - \_ Other \_\_\_\_\_
  - 3) Dead or dying (??):
    - \_ Aduva OnStage/Director
    - \_ Levanta \_ Other \_\_\_\_\_
  - 4) Roll your own systems management - comments:
- What is your greatest need in z/VM and Linux systems management? :
- Comments on z/VM and Linux systems management in general:



# Survey – biggest challenge

- Generating interest in Linux on Z so that we can build up enough servers to justify buying automated tools
- Bare metal provisioning. I'd like to provision Linux guests entirely through the web -- allocate all resources (hipersockets, DASD, everything), have it update z/VM, kickstart the machine, then IPL it. Right now I'm aware of utilities that can re-provision existing VMs, but nothing from scratch. A large amount of my customers provide for-fee hosting services and want to spin up VMs on the fly, through a GUI. I've done alot of this through in-house rexx scripting (nod to Scott R. on that one) that I've been using for a few years now, but would like official productization(sp?)





# Survey – biggest challenge

- Training in Linux scripting, training in best practices used by the UNIX/Linux community.
- Comments on z/VM and Linux systems management in general:
- -) IMHO, the VM systems programmer should be part of the open systems group if they only manage VM for Linux.



# Survey – definition of Sys. Mgmt.

- In preparing some z/VM course material, I found myself having to define "z/VM system management":
  - Provisioning (real and virtual)
  - Human operations (IPL, shutdown, health inquiry, dumps, ...)
  - Automated operations
  - Security (authentication, authorization, audit)
  - Performance monitoring and management
  - Backup/Archive
  - Disaster planning and recovery
  - Availability management (probably tied with disaster planning)
  - Problem determination and Service (patching)
  - Software and configuration change control
    - Some require more in-depth knowledge than others, but all are required to have an industrial-grade system. If you ignore one or more areas, then you will waste time or money (usually both).

Linux



# Survey – one reply

- > - Provisioning (real and virtual)
  - Typically inhouse scripting - with RH Linux - using kickstart. DIRMAINT or VMDIRECT (CA) or manual directory edit for provisioning
- > - Human operations (IPL, shutdown, health inquiry, dump processing, ...)
  - inhouse scripting
- > - Automated operations
  - PROP, inhouse scripting
- > - Security (authentication, authorization, audit)
  - Directory (no ESM), RACF, ACF2, VMSECURE (CA)
- > - Performance monitoring and management
  - PTK, Velocity, Omegamon (green screen and XE)
- > - Backup/Archive
  - TSM for Linux guests, VTAPE, Flashcopy SE, in house scripts
- > - Disaster planning and recovery
  - Lots of data mirroring going on - PPRC, XRC, etc - various solutions
- > - Availability management (probably tied with disaster planning)
  - Nagios (groundworks), Omegamon, Prognosis
- > - Problem determination and Service (patching)
  - Inhouse scripting (usually revolving around ssh) , Aduva



# Survey – another reply

- > Provisioning (real and virtual)
  - We are utilizing Shared-Root, therefore we picked up various scripts and modified as needed ( if any ).
- > Human operations (IPL, shutdown, health inquiry, dump processing, ...)
  - IPL - by hand
  - no dump processing - haven't seen one yet. KNOCK WOOD!!!!!!!
  - health inquiry - sys admins
- > Automated operations
  - We utilize our z/OS packages of CA-7 and FDR/Upstream for backups and job scheduling
  - Inhouse scripting for automated FTP's.
- > Security (authentication, authorization, audit)
  - Directory only.
- > Performance monitoring and management
  - Perf Tool Kit, RMFDDS ( green and web), Omegamon XE for VM and Linux )
- > Backup/Archive
  - FDR/Upstream using CA-7, VTAPE, CA-1.



# Survey – another reply (cont'd)

- > Disaster planning and recovery
  - PPRC and backups
  - VSWITCH fail over
  - ANYBODY have any ideas on how to share FCP dasd between two physical systems?  
We have one frame for test z/VM and MFL and one frame for prod z/VM and MFL. Our current thought would be to take down our test z/VM and MFL's and boot our prod z/VM and MFL's if needed. BUT, we loose our FCP dasd. This is an 8300 with SVC.
- > Availability management (probably tied with disaster planning)
  - zilch, nada
- > Problem determination and Service (patching)
  - we sys admins
  - patching on a 1/4ly basis unless deemed a big risk
- > Software and configuration change control
  - Subversion for Apps.





## Survey – one more

- We use Velocity for monitoring
- For provisioning and patching, we do everything manually.
- My biggest challenge is generating interest in Linux on Z so that we can build up enough servers to justify buying automated tools.



# Survey

- Thread was temporarily hijacked re: SCSI/FCP and NPIV
- Next post:
  - I use RHN Satellite for my re-provisioning, patching and monitoring.
  - I've had great success with Nagios as well, from a monitoring perspective.
- Also, my post:
  - I did get a note off-list that Aduva does still support System z:
  - >Yes, we do still have a version that
  - >supports Z - but most of our growth is really in the distributed Linux
  - >and Solaris space.
  - Then a follow-up:
    - Perhaps, but try finding any mention of that on their web site.



# Survey long append

- One should ask some really tough questions :)
  - When was your last release for this platform?
  - What date is the next planned update?
  - How does that compare to the other platform? Are they on the same level?
  - How many other z customers do you have?
  - Can you give me references?
  - Quiz the marketing rep--- who else is he/she marketing too at the moment? Can we have some joint discussions/presentations?
  - (once bitten twice shy :)



## Survey long append (cont'd)

- I kinda feel for the vendors. This is a very tough and really super educated crowd. (what other computer internet list can you get on and not get ripped apart for being clueless ? :) While that it is good, that just means fewer vendors are going to tread into the z linux space without a good sized handful of customers with checkbooks (unless they are IBM - but hey, not even all their stuff runs on z linux :) Even CA hasn't made good progress in z Linux things and their pockets are probably deep and they do understand the z customers. We've had some success in getting together with other large customers and pressuring the vendors to deliver z linux agents for their stuff (we're not even asking for the servers -- just the darn agents so we can fall in line with the company choices -- choices made by the distributed world czars).
- Levanta did really help with a lot of the systems management issues that Mike asked about. The interface to the VM directory (whether it be VM:secure, Dirmaint/RACF, or xedit the big file) - call that 'virtual bare metal' if you will, was flawless. They solved the DASD sharing problem transparently to the server with their mapfs filesystem. Being venture capitalist funded... They ran outta time (but imploded way way after the rest of those who came on the map in 2000 :)



# Summary

- Systems management of z/VM and Linux is not easy.
- There are many aspects of systems management
- There are many good tools both vendor-supplied and open-source
- There is no single tool today that can manage all aspects of z/VM and Linux
  - (perhaps some are getting close)
- With good systems management tools, z/VM and many, many Linux systems can be well managed by a small number of sysadmins

