The Business Partner

- Sirius Computer Solutions
  - No, not the satellite radio people

- IBM Reseller
  - Not a DR vendor

- Most hardware sales are bundled with software services

- My role – z/VM & Linux on System Z
The Story

- Two Companies
  - An Insurance Company
  - A DR Vendor
- Why no company names?
- Their DR test experiences over several years
  - Before Linux on System Z
  - The first couple DR tests
    - What were the problems and how to avoid them
  - The latest DR tests
  - Told from the system programmer perspective

Not Bashing the DR Vendor

- Well respected DR vendor
- Some times Murphy wins
  - “What ever can go wrong, will go wrong.”
- Communication misunderstandings
  - Some inside the customer account
  - Some between the customer and DR vendor
- Story told from the system programmer perspective
  - Might appear differently if told by the DR vendor, or even the customer’s DR coordinator

The Customer

- “An Insurance Company”
- z9 EC with 2 IFLs
  - Now a z10 EC with 3 IFLs
- 2 Production z/OS LPARs
- 1 VM & Linux LPAR
- z/VM 5.2; SLES9 SP3; 20+ Linux Images
  - 8-10 “Production” Linuxes
  - Now z/VM 5.4; SLES10 SP2
- WebSphere; MQ; DB2 Connect
- Fair Isaac – Blaze Advisor
The Customer Setup

Two Part Backups

- Full pack backup from z/OS weekly
  - All Linux apps require z/OS database access
  - z/OS and the databases are already down during a weekly backup window
  - Linux machines shut down briefly on Sunday evenings, FLASHCOPYed, then backed up to tape
  - Less than 10 minutes from when the Linuxes shutdown till they are all restarting
  - z/VM backed up periodically – doesn’t change often

Two Part Backups

- TSM backup for incremental changes and file level restores
  - Server on a Windows box
  - z/OS DR restore gives you a running Linux
    - TSM client already installed and configured
    - Minimal data to restore – in this client environment
  - Similar two part backup setup used at other clients with different backup software
The DR Vendor

- “A Large DR Vendor”
- Large z9
  - Plenty of Memory
  - Lots of Processors
  - All CPUs, no IFLs
  - All “full speed”
  - Now a z10
- z/OS DR “always done under VM in the past”

The Pre-Linux DR Test

- Three years ago, before z/VM and Linux
- Started on a Monday morning
- z/OS LPARs Restored, Up and Running by Monday afternoon
- “Distributed Systems”
  - Mostly up” by the end of Wednesday
  - In fairness, a large hodgepodge of systems
  - Some never made it up in full 4 day test
- “Successful” test, but...
  - “next time needs to be better”

First Year’s Linux DR Test...

- First DR test with z/VM and Linux
- Fall ’07
  - Monday to Thursday
- Customer personnel
  - NOT onsite at DR vendor site
  - NOT at their normal work site
  - Across town with only DR doc
  - Remote access to DR vendor & systems
First Year’s Linux DR Test…

- 2 z/OS LPARs
- 1 z/VM LPAR
- 20+ Linux Guests
  - 4-8 Production
  - “Why not bring them all up”
- Still many “Distributed Systems”
  - Several moved to Linux on Z
  - Fewer unique environments

First Year’s Linux DR Setup…

- Real Processor, all CPs, running z/VM
- Customer’s z/VM
- Linux
- Linux
- Linux
- Linux
- Linux
- Linux
- Linux
- Linux
- OSA
- z/OS
- Guest LAN
- Vswitch
- Guest LAN
- Router
- Customer’s z/VM

First Year’s Linux DR Test…

- Monday morning:
  - Start restoring tapes
- Monday early afternoon:
  - 2 z/OS LPARs – Up and running
  - 1 z/VM LPAR – Up and running
  - 20+ Linux Guests – All Starting
  - Distributed Systems – “Working on it”
First Problem

- Monday late afternoon
- Performance!
- Customer’s VM image only given less than ½ the requested memory, and no Xstor
- VM Paging at thousands of pages per second
- First fix attempt – force off “non-production” Linux guests
- Still slow, still heavy paging
- Shutdown VM, increase VM’s memory, restart

Second Problem

- Tuesday mid-morning
- Performance!
- Memory is now correct, even Xstor
- VM can now see 2 real processors but begin to suspect they aren’t dedicated to our “LPAR”
- Discover VM is NOT in it’s own LPAR, but under the DR vendor’s VM!
- Competing with z/OS for cycles
- Can’t shutdown z/OS systems to reconfigure LPARs

First Year’s Linux DR Real Setup

Real Processor, all CPs, running z/VM

- z/VM
- Linux
- Guest LAN
- Router
- OSA
- Vswitch
- Guest LAN
- Guest LAN
Second Problem – Why?

• Customer VM & CMS runs great, Linux runs terrible
• Plenty of real memory, 2 CPs running 100%
• Why? Hardware vs. Software simulation

Second Problem – Why?

• System Z hardware only supports 2 levels of virtualization – 2 levels of SIE
  • LPAR support uses the 1st level SIE to run the LPARs (DR Vendor’s VM system)
  • The DR vendor’s VM system (1st level) uses the 2nd level SIE to run the 2nd level systems (the customer’s z/OS & VM images)
• The customer’s VM system (2nd level) cannot use SIE to manage the Linux guests (3rd level)
• CP must simulate all privops and management tasks
• The Fix? Avoid that 2nd level of VM

Second Problem – The Fix

• Option #1 - Put your VM in an LPAR on the DR vendor’s machine
  • NOT under the vendor’s VM!
  • Recreates more of your environment
  • Easiest if a large number of Linux guests
  • Change the OSA addresses for VM’s TCPIP and Vswitches
  • Usually costs a little more
Second Problem – The Fix

- Option #2 - Run your Linux guests directly under the DR vendor's VM
  - Your Vswitch and guest LANs have to be created by the DR vendor
  - You don’t have “all your stuff” in case
  - Easiest if you are only going to run a couple Linux guests
  - Usually a little cheaper

Second Problem – Bypass

- Customer decides bringing up a single production Linux will be a successful DR test – this time
  - DR vendor dedicates 2 CPUs to the VM userid
  - Kill all but one Linux guest
  - Slow but livable – for testing purposes

Third Problem

- The Linux guest runs ok, but can’t contact z/OS
  - Oh yea… Start the Hipersocket router
  - Slow, but it comes up
  - Guest talks to router ok, but not to z/OS
  - No DR definition for Hipersocket connection
Second Year's DR Test...

- Customer's Linux Under DR Vendor's VM
  - Decided by DR coordinator – for cost reasons
- Monday morning:
  - Start restoring tapes
- Monday early afternoon:
  - 2 z/OS LPARs – Up and running
  - 3 Linux machines – Up and running (under the DR VM)
    - Only the “critical” production machines
  - Distributed Systems – “Working on it”
- One “small” problem
  - Missing Vswitch controller userids

Second Year's Real DR Setup
Third Year’s DR Test

- Customer’s VM in a DR LPAR
  - Cost a little more, but...
  - Only changes were OSA addresses
  - Bring up all the Linux machines
    - 20+ Production, Dev, Q/A and Test

- Monday morning:
  - Start restoring tapes

- Monday early afternoon:
  - 2 z/OS LPARs – Up and running
  - 1 z/VM LPAR – Up and running
  - All 20+ Linux machines – Up and running
  - Distributed Systems – “Working on it”
  - Two IPLs of VM
    - First to change the OSA & Hipersocket addresses
    - Second to bring everything up

Third Year’s DR Test Results

- Customer very pleased with DR speed
  - Customer VM in an LPAR cost a little more, but...
  - Well worth the investment
  - Evaluate migrating remaining non-mainframe workload to Linux on z
    - DR recovery speed is only one benefit
    - A lot of territorial resistance – FUD
      - Fear – Uncertainty – Doubt
  - DR the Development and Test environments also
Lessons Learned

1. Communicate!
   • What we thought was going to be the configuration, wasn’t, more than once!
   • What we thought was being changed, wasn’t
   • Miscommunication all the way around – sysprog, DR coordinator, DR contract, DR sales, DR support

2. Be proactive
   • Don’t just tell your DR coordinator once and leave it all to them
   • Don’t skip out on DR planning meetings
   • You know your systems much better than anyone else
   • Fight for what you need, not just what’s easy or cheap

Lessons Learned

3. Be SURE of your DR configuration
   • For each LPAR, for each VM, for each Linux
   • Hardware – Processors, memory, OSAs
   • Network – all connections, including Hipersockets
   • Know what will be in LPARs and what will be under VM

4. Plan ahead to avoid 3rd level Linux
   • #1 issue: No Linux under VM under VM
   • Your options are:
     1. Run your VM in a DR LPAR
     2. Run your Linux directly under the DR VM

Lessons Learned

5. Check your configuration when you get on the DR machine
   • Hardware, memory, network
   • Don’t assume you have all you asked for
   • Don’t assume it’s set up right
   • Don’t assume you have what you did last time
   • Don’t assume you have all the pieces you need

6. Don’t forget Hipersockets
   • And if running a Hipersocket router, don’t forget that
   • Simulate via a Guest LAN or real OSA if necessary
All Too Easy To Do…

Our Disaster Recovery Plan
Goes Something Like This…

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z/VM and Linux
Disaster Recovery –
A Customer Experience

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Session 9210