Linux on zSeries: What, Why, Where

Session 9300
Share 99 - Summer 2002

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IBM believes Linux to be game changing technology; as the Internet was to networking, IBM believes Linux will be to application programming. The speaker will cover the Why, What and Where of Linux on zSeries:

- Why IBM is so committed to Linux in general, and on zSeries specifically
- What IBM means by Linux for zSeries (and Linux for S/390) and the zSeries virtualization technology provided by z/VM
- Where Linux on zSeries has come from, where it is now and where IBM sees it going in the future
- IBM and ISV applications available for Linux on zSeries

This session qualifies for the Linux for S/390 certificate track.
Linux and IBM
What is Linux?

- UNIX-like operating system originally developed by Linus Torvalds
- Developed / tested by the Open Source community
  - Highly disciplined / structured process
  - High quality code
  - More secure code, more stable systems
- Packaged and shipped by distributors
  - Caldera, Red Hat, SuSE, Turbolinux
  - Other regional distributors (Conectiva, ESware, Mandrake, Red Flag, ...)
- UnitedLinux is a standards-based Linux operating system targeted at the business user
  - Developed, marketed and sold by Caldera, Conectiva, SuSE and Turbolinux
  - Worldwide language support, standards based (e.g. LSB 1.1, LI18NUX)
IBM Linux Strategy: Executive Overview

Session 9303

- Tue, 9:30am, San Francisco Hilton & Towers, Ballroom Level, Continental Ballroom 5

- Wondering where IBM is going with their Linux strategy? Funny you should ask. Come listen to John Sarsgard, IBM's Vice President of Worldwide Linux Sales, provide an overview of that very topic. John will cover:
  - Linux Overview, Value and Marketplace
  - Linux Misconceptions
  - IBM Strategy and Linux Opportunities
  - IBM Products and Services Overview
Linux for Developers

- developerWorks
  - Dedicated "Linux Zone"
  - ibm.com/developerworks/linux

- Linux Application Tools
  - ibm.com/zseries/os/linux/ldt/

- zSeries Linux Community Development System
  - ibm.com/zseries/os/linux/lcds

- Speed-start your Linux application
  - Linux Software Evaluation Kit
  - No charge for development use
  - Full function, market-available products
  - ibm.com/developerworks/offers/linux-speed-start

Speed-start your Linux app
Linux on zSeries
What is Linux on zSeries?

- A native zSeries operating environment
  - Pure Linux, an ASCII environment
  - Exploits IBM zSeries hardware
  - Linux for S/390 - 32-bit
  - Linux for zSeries - 64-bit
- Not a unique version of Linux or other operating system
- Not a replacement for other IBM zSeries operating systems
Why Linux on zSeries?

1. Increased solutions through Linux application portfolio
2. Large number of highly skilled programmers familiar with Linux
3. Integrated business solutions
   - Data richness from zSeries
   - Wide range of Linux applications
4. Industrial strength environment
   - Flexibility and openness of Linux
   - Qualities of service of zSeries
5. Unique ability to easily consolidate large number of servers
The IBM commitment to z/OS and VSE/ESA is not affected by this Linux strategy.

zSeries customers are offered additional opportunities to leverage their investments through Linux.

New doors are opening for zSeries customers to bring Linux-centric workloads to the platform.

Application sources:
- z/OS and VSE/ESA - Traditional
- z/OS - UNIX System Services
- Linux on zSeries
- WebSphere - Java, Enterprise Java Beans, CORBA
What zSeries Brings to Linux

- The most reliable hardware platform available
  - Redundant processors and memory
  - Error detection and correction
  - Remote Support Facility (RSF)
- Centralized Linux systems are easier to manage
- Scalability
  - Physical - scale to 16 application processors and up to 3 dedicated I/O processors
  - Logical - scale to hundreds of Linux images
  - Non-disruptive capacity upgrade on demand
- Designed to support mixed work loads
  - Allows consolidation while maintaining one server per application
  - Complete work load isolation
  - High speed inter-server connectivity
Value of Linux on zSeries

- Reduced Total Cost of Ownership (TCO)
  - Environmental savings - single footprint vs. hundreds of servers
  - Consolidation savings - less storage, less servers, less software licenses, less server management/support

- Improved service level
  - Systems management (single point of control)
  - Reliability, availability, security of zSeries hardware

- Speed to market
  - Capacity-on-demand capability on zSeries
  - Dynamic allocation of on-line users, less than 60 Seconds to add a new Linux server image using z/VM
### Discrete vs. Consolidated

**Driving workload consolidation**

<table>
<thead>
<tr>
<th>Discrete servers</th>
<th>Consolidated solution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Larger support staffs</strong> are required to maintain servers and network gear</td>
<td><strong>Smaller support staffs</strong> are required to maintain 1 or 2 servers</td>
</tr>
<tr>
<td><strong>Disaster recovery very difficult</strong> for large / complex server farms</td>
<td>Disaster recovery <strong>very easy</strong> for virtual server farms</td>
</tr>
<tr>
<td><strong>Lower</strong> hardware reliability</td>
<td><strong>Higher</strong> hardware reliability</td>
</tr>
<tr>
<td>Software resource must be <strong>duplicated</strong> for each server</td>
<td>Software resource <strong>shared</strong> among virtual servers</td>
</tr>
<tr>
<td><strong>Higher</strong> software application cost due to more hardware processors</td>
<td><strong>Lower</strong> software application cost due to fewer hardware processors</td>
</tr>
<tr>
<td>Failover is provided by <strong>additional server hardware</strong> in &quot;hot standby mode&quot;</td>
<td>Failover is provided by <strong>virtual server</strong> in &quot;hot standby mode&quot;</td>
</tr>
<tr>
<td>Discrete servers may require <strong>significant</strong> amounts of power and floor space</td>
<td>Server and disk storage subsystem require <strong>minimal</strong> power and floor space</td>
</tr>
</tbody>
</table>
Logical Partitions (LPAR)

- Hardware partitioning enabling up to 15 "logical partitions" each of which runs a separate operating system, traditional operating system and Linux

Virtual Partitions (z/VM)

- zSeries virtualization technology
- Support for large numbers of Linux images with rich system management capabilities
- Very flexible, great for server consolidation
Integrated Facility for Linux

- Additional engines dedicated to Linux workloads
  - Supports z/VM, Linux for S/390 and Linux for zSeries
  - Available on 9672 G5/G6, Multiprise 3000 and zSeries
- Lower price than for standard engines
- Begin deployment or consolidation of Linux, UNIX and NT workloads to zSeries immediately
- Traditional zSeries software charges unaffected
  - IBM zSeries S/390 software and middleware
  - Independent Software Vendor products
IBM zSeries Virtualization Technology

z/VM Version 4

- Combination of hardware, firmware and software
  - Over 30 years of development experience

- Supports ten to thousands of images, depending on workload

- Supports Linux for S/390 and Linux for zSeries guests

- Complements the zSeries Integrated Facility for Linux with attractive pricing terms and conditions

- z/Architecture exploitation
  - 64-bit real storage support - real storage constraint relief
  - 64-bit virtual support - run 64-bit guest systems on zSeries

- Extensive systems management software from IBM and ISVs
**z/VM in 2001**

- **z/VM V3.1 - February 2001**
  - New processor architecture support
  - Exploitation of larger real/virtual storage - 64 bit
  - TCP/IP enhancements including stack security
- **z/VM V4.1 - July 2001**
  - New terms and conditions
  - Support for Integrated Facility for Linux processors
  - Guest support enhancements for Linux
  - Installation and service enhancements
- **z/VM V4.2 - October 2001**
  - Cryptography enhancements
  - Performance improvements
  - HiperSockets
  - Guest LAN
  - TCP/IP - IMAP and stack improvements
  - Systems administration enhancements
z/VM in 2002

- z/VM V4.3 - May 2002
  - Networking enhancements
    - Multicast support for HiperSockets
    - Guest LAN support of GbE, including broadcast
    - Improved TCP/IP stack security, performance, and configurability
  - Performance enhancements
    - z/VM self-management to achieve guest performance goals
    - Enhanced timer management for improved performance
  - Fibre Channel Protocol support
  - RACF for VM as an optional IPLA feature
The Value of z/VM for Linux

- Increased performance, growth and scalability
  - Server consolidation enables horizontal growth
  - Three-tier architecture on two tiers of hardware
  - Extensive support for sharing resources
  - Virtual networking
  - Complete isolation of Linux images if required

- Increased productivity
  - Development and testing
  - Production support

- Improved operations
  - Backup and recovery
  - Command and control
Application Serving with Linux

Outside world

Demilitarized Zone (DMZ)

Internal network

z/VM

Collaboration Server

Commerce Server

Web Application Server

Shared File System (HTML, Java, JSPs)

Load Balancer with SSL Acceleration

History Proxy Server w/ HTTP Load Balancing

Public Key Infrastructure

Domain Name Server

User

z/OS

Web Application Server

Directory

Systems Management

Database Server

Application Node

Domain Firewall

Firewall/Load Balancer

Protocol Firewall

Shared File System (HTML, Java, JSPs)

Web Application Server

Commerce Server

Collaboration Server

Shared File System

Chapter 20
Linux on zSeries: Past, Present and Future

Charts in this section from "Mainframe Linux: What's Now, What's Next, Where To" by David Mastrobattista, Giga Information Group, Inc.
Linux Technology Adoption Curve

Enterprise Linux has crossed the “technology chasm”

Development of S/390 enabling for Linux

Early Adopters
Mainstream Users
Three Solution Phases

- **Phase I — Server Consolidation (With z/VM)**
  - 2000: SuSE, Turbolinux distributions released (GA)
  - 2001: Red Hat distribution released (GA)
  - 2002: SuSE 64-bit Linux distribution due (GA)
  - 2003: mySAP.com for Linux on zSeries (GA)

- **Phase II — Linux and z/OS Hybrid**
  - 2003

- **Phase III — Linux App and DB**
  - 2004
  - 2005

- **Early ISV Development**
  - Proof of Concepts
  - Pilots
Server Consolidation

* z/OS.e is exclusive to z800 LPARs running “new workload” middleware and software.
IBM and ISV Applications
Solutions available across all product lines

- WebSphere® - Transaction Integration
- DB2® - Leverage Information
- Lotus® - Leverage Collaboration
- Tivoli® - Systems Management

- Scalable
- Modular
- Flexible
- Standards based
- Reliable

Open is the world's new direction

- Eclipse: An open tool platform contributed by IBM to an independent open source organization

Solutions at lowest TCO
Data Management for Linux

IBM Software for Linux for S/390

- DB2 Universal Database products
  - DB2 Universal Database Enterprise Edition

- Connectors
  - DB2 Connect
  - IMS Connect
  - CICS Transaction Gateway

- DB2 application development
  - DB2 Net Search Extender
  - DB2 Intelligent Miner Scoring

- Informix
  - C-ISAM
  - UniData
  - UniVerse
WebSphere for Linux

IBM Software for Linux for S/390

- **Foundation products**
  - WebSphere Application Server Advanced Edition
  - WebSphere MQ
  - WebSphere MQ Everyplace

- **Foundation extension products**
  - WebSphere Personalization
  - WebSphere Host On-Demand

- **Application accelerators**
  - WebSphere Commerce Suite Pro Edition

- **Other**
  - IBM Developer Kit for Linux, Java 2 Technology Edition
  - IBM Directory Server
  - IBM Object REXX
  - IBM Screen Customizer
Tivoli for Linux

IBM Software for Linux for S/390

- **Security**
  - Tivoli Access Manager for e-business
  - Tivoli Identity Manager (client)
  - Tivoli Risk Manager (client)
  - *Tivoli Access Manager for Operating Systems*

- **Storage**
  - Tivoli Storage Manager (client)

- **Performance and availability**
  - Tivoli Enterprise Console
  - Tivoli Monitoring

- **Configuration and operations**
  - Tivoli Workload Scheduler (client)
  - Tivoli User Admin (client)
  - Tivoli Configuration Manager
  - Tivoli Software Distribution
ISVs for Linux on zSeries

- End of 2001 - 59 ISVs with 114 applications
- End of 2Q2002 - 96 ISVs with 191 applications
- An increase of 63% in ISVs and 68% in applications
- Currently 105 ISVs with 202 applications

Resources for ISVs
- Portal for Linux at ibm.com/servers/enable/linux
- IBM Solution Partnership Centers at www.developer.ibm.com/spc
- Linux on zSeries Developer Relations at www.developer.ibm.com/welcome/s390/eslinux.html

Data current as of August 5, 2002
<table>
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<th>ISVs for Linux on zSeries</th>
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<td>ABK-System</td>
<td>ACTS</td>
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<td>AdminUX</td>
<td>Aduva</td>
<td>Aeonware</td>
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<td>ASDIS Software</td>
<td>AT&amp;T Laboratories</td>
<td>BEA Systems</td>
<td>Beans</td>
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<td>becom Informationssysteme</td>
<td>Beta Systems Software</td>
<td>BMC Software</td>
<td>Bunker Hill</td>
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<td>Bynari</td>
<td>Caldera International</td>
<td>Candle</td>
<td>CIB software</td>
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<td>CommNav</td>
<td>Compuflex International</td>
<td>Computer Associates International</td>
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<td>Cybermation</td>
<td>Dalian Haihui Sci-Tech</td>
<td>DataDirect Technologies</td>
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<td>Dinkumware</td>
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<td>Eontec</td>
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<td>freiheit.com technologies</td>
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<td>gedas deutschland</td>
<td>GlassHouse Systems</td>
<td>GMx Solutions</td>
<td>Grey Zone</td>
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<td>GT Software</td>
<td>H.A. Technical Solutions</td>
<td>HNC Software</td>
<td>Innovation Data Processing</td>
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<td>INTERCOPE</td>
<td>IONA Technologies</td>
<td>Lattwein</td>
<td>LegacyJ</td>
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<td>Legato Systems</td>
<td>Libelle Informatik</td>
<td>limes datentechnik</td>
<td>Linux Business Accounting Systems</td>
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<td>Linuxcare</td>
<td>linuxlink</td>
<td>Logics Software</td>
<td>Macro4</td>
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<td>Merant</td>
<td>Micro Focus</td>
<td>Micro Software Designs</td>
<td>MigraTEC</td>
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<td>NEON Systems</td>
<td>Network Associates</td>
<td>NeuVis Software</td>
<td>Online Insight</td>
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<td>OpenConnect Systems</td>
<td>Oracle Corporation</td>
<td>OwnMail</td>
<td>Pentaprise</td>
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<td>Presence Online</td>
<td>Proventum Solutions</td>
<td>Q-Link Technologies</td>
<td>Quadbase Systems</td>
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<td>RAE Internet</td>
<td>Rational</td>
<td>Ready-to-Run Software</td>
<td>Redwood Software</td>
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<td>Roguewave</td>
<td>Saimaan Tietotekno</td>
<td>Sanchez Computer Associates</td>
<td>SAP</td>
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<td>SEFAS</td>
<td>Sendmail</td>
<td>Serena Software</td>
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<td>SlickEdit</td>
<td>Software</td>
<td>Soliton Associates</td>
<td>Stalker Software</td>
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<td>Stellent</td>
<td>Sterling Commerce</td>
<td>Stonebranch</td>
<td>StorageTek</td>
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<td>Stryon</td>
<td>Tachyon Software</td>
<td>The Workstation Group</td>
<td>TIBCO Software</td>
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<td>Trustix AS</td>
<td>Unenclips Software Systems</td>
<td>UTS Global</td>
<td>Velocity Software</td>
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<td>View22</td>
<td>VIPcom</td>
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Oracle9i Database for Linux for S/390 and Oracle9i Database for Linux on zSeries are already available for free download from Oracle's Technology Network.

Production release of Oracle9i Database for Linux for S/390 will be available soon.

Oracle sessions at this SHARE:
- Oracle9i in your Mainframe Environment (z/OS and Linux)
  - Session 0960, Wed, 8:00am, 4th Floor, Union Square 1 & 2
- Installing and Managing Oracle9i on Linux for S/390
  - Session 0961, Wed, 9:30am, 4th Floor, Union Square 1 & 2
- Experiences Using Real Applications Clusters with Oracle 9i on the Mainframe
  - Session 0962, Wed, 11:00am, 4th Floor, Union Square 1 & 2
Systems Management

- **AdminUX**
  - www.adminux.com
  - Remote Synchronous Server Shutdown
  - Enterprise Management Console Option
  - DataArchiver

- **BMC Software**
  - www.bmc.com
  - Server Management for Linux
    - MAINVIEW for Linux Servers
    - PATROL for Linux Enterprise Server
  - Patrol for BEA WebLogic
  - Patrol for WebSphere
  - Patrol for Internet Server Manager
  - Control M
  - Deployment Manager for Linux
Systems Management ...

- Computer Associates International
  - www.ca.com
  - CA's Complete Suite for Linux for zSeries and S/390
  - CA's VM Management Suite
  - Unicenter Network and Systems Management
  - Unicenter Management for Web Servers (Apache Agent)
  - Unicenter Universal Job Management Agent
  - eTrust Access Control
  - BrightStor Enterprise Backup
  - Advantage EDBC
  - Advantage Ingres Enterprise Relational Database

- GeCAD Software and RAE Internet
  - www.ravantivirus.com
  - RAV AntiVirus for Mail Servers
Systems Management ...

- Network Associates
  - www.mcafeesecurity.com
  - McAfee E-Business Server 7
  - McAfee scan engine API for SuSE Linux on S/390

- Legato Systems
  - www.legato.com
  - NetWorker Server
  - NetWorker Client

- Linuxcare
  - www.linuxcare.com
  - Levanta
Systems Management ...

- StorageTek
  - www.storagetek.com
  - SnapVantage

- UTS Global
  - www.utsglobal.com
  - TSS-TMS tape management system
  - TSS-BAR backup and restore
  - TSS-TSF tape silo feature
  - TSS-DTS distributed tape system
  - Enhanced CLAW Driver
  - NED full screen text editor
Web Applications

- BEA Systems
  - www.bea.com
  - BEA WebLogic Server
  - BEA WebLogic Integration for Linux on S/390 and zSeries

- Ready-to-Run Software
  - www.rtr.com
  - Microsoft FrontPage 2002 Server Extensions for Linux on IBM zSeries

- Stryon
  - www.stryon.com
  - iASP - Java-based implementation of the Microsoft Active Server Pages framework
  - iNET - Java-based implementation of the Microsoft .NET framework
  - iHUB - enables remote objects on disparate frameworks to interact with each other
Linux Distribution Partners

- **Red Hat**
  - Red Hat Linux 7.2 for S/390
    - www.redhat.com/software/linux/s390
  - Red Hat Linux 7.1 for zSeries
    - www.redhat.com/software/linux/ibmseries/z.html

- **SuSE**
  - SuSE Linux Enterprise Server 7 for S/390 and zSeries
    - www.suse.com/us/products/suse_business/sles/sles_s390
  - SuSE Linux Enterprise Server 7 for IBM zSeries
    - www.suse.com/us/products/suse_business/sles/sles_zseries

- **Turbolinux**
  - Turbolinux Server 6.5 for zSeries and S/390
    - www.turbolinux.com/products/s390/
The point of consolidation - where Linux ascends to the mainframe

- Flexible design
- IBM support and services
- Distribution Alliances
- IBM middleware
- ISV applications
- Open Source applications
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ibm.com/vm/devpages/jelliott/
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- Language Environment®
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- MVS
- NetRexx
- OpenEdition®
- OpenExtensions
- OS/390®
- Parallel Sysplex®
- PR/SM
- QMF
- RACF®
- RAMAC®
- S/390®
- S/390 Parallel Enterprise Server
- VisualAge®
- VisualGen®
- VM/ESA®
- VSE/ESA
- VTAM®
- z/Architecture
- z/OS
- z/VM
- zSeries

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