# Enterprise Connection Conference Call Series

**IBM** *e*server zSeries

# *z/VM and TCP/IP for z/VM Overview*

November 15, 2000

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1

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# Speakers

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## Introduction

- Jim Elliott, VM, VSE and Linux Product Manager,
  IBM Enterprise Server Sales, IBM Americas Group

## z/VM Platform Status

- George Madl, z/VM Product and Platform Manager,
  IBM Enterprise Server Development, IBM Server Group

## z/VM Version 3 Release 1 Product Overview

- Romney White, Senior Developer,
  IBM Enterprise Server Development, IBM Server Group

# z/VM Platform Status

*George Madl*
*z/VM Product and Platform Manager*
*IBM Enterprise Server Development*
*Endicott, New York*

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4

# Announcements on October 3, 2000

IBM *e*server zSeries

## Hardware

- IBM *e*server zSeries 900

## VM-related Software Products

- z/VM Version 3 Release 1
- VMPRF Version 1 Release 2.2
- RTM Version 1 Release 5.3

## New Software Pricing

- Workload License Charges for z/VM with z/OS

# VM Product and Technology Focus

IBM **e server** zSeries

## IBM's investment plan for VM focuses on three key areas:

- **New hardware**
  - Processor and I/O architecture
  - Storage Systems
  - Networking
- **Utility support**
  - Exploit VM's unique and powerful virtual server capabilities
  - Increase VM's value for enterprise server solutions
- **Connectivity support**
  - Focus on TCP/IP protocols and applications
  - Improve server and client access to, or from, VM systems

> z/VM offers key technologies for IBM e server zSeries 900 customers looking to maximize their e-business success

# z/VM Version 3 Release 1 Product Overview

*Romney White*
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*IBM Enterprise Server Development*
*Endicott, New York*

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7

# Topics

VM Release Status

z/VM Version 3 Release 1 Overview

Related Products for z/VM

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8

# VM Product Evolution

z/VM

2/2001

VM/ESA Version 2

7/99

3/98

12/96

10/95

VM/ESA Version 1

V3 R1

V2 R4

V2 R3

V2 R2

V2 R1

VM/XA
SP

6/94

3/91

12/91

12/92

7/93

5/94

VM/SP
HPO

R1.0
ESA

R1.1

R2.0

R2.1

R2.2

12/93

12/93

12/94

3/95

10/96

4/99

4/99

1/01

9/90

12/93

VM/SP

R1.0 370 Feature

R1.5 370 Feature

6/94

12/94

10/99

| | No longer serviced | | Withdrawn from marketing | | Currently marketed |
|---|---|---|---|---|---|

xx/9x   Release GA date

xx/9x   End of service date

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9
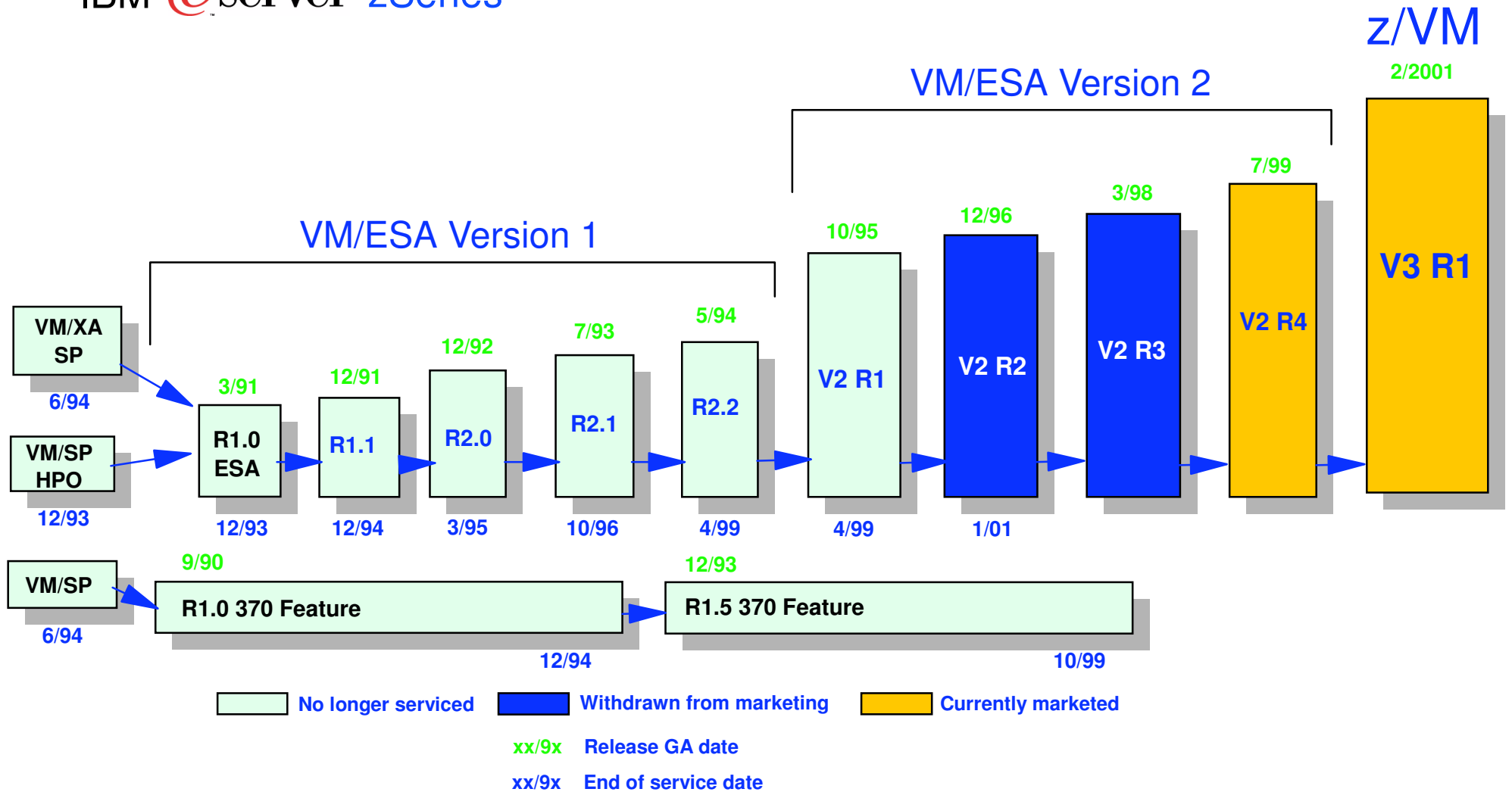
# z/VM Version 3 Release 1

IBM @server zSeries

Generally available February 23, 2001

Supported processors
- IBM @server zSeries 900 (64-bit and 31-bit mode)
- 31-bit mode only:
  - S/390 Parallel Enterprise G3, G4, G5, G6 Servers
  - Multiprise 3000 and Multiprise 2000
  - S/390 Parallel Enterprise R2 and R3 Servers
  - P/390 and R/390
  - S/390 Integrated Server

# z/VM V3R1 New Function

**IBM @server** zSeries
**Cost of Computing and Classic Strengths**
- z/Architecture support
  - 64-bit real and virtual addressing
  - Improved guest Parallel Sysplex support
  - Guest pages and minidisk cache above the 2GB line
  - VM Dump Tool
- Device Support Improvements
  - Native Shark FlashCopy support
  - FICON Tape Subsystem attachment support
  - Guest support for VTS import/export

**Application Support**
- Binder/Loader
- CMS NFS Client
- Converged sockets APIs

**Connectivity Enhancements**
- Native TCP/IP exploitation of QDIO (OSA Direct Express GigaBit Ethernet)
- SSL Server for TCP/IP stack
- IP Multicast
- OSPF
- FTP enhancements

# IBM @server zSeries 900

## 26 Models (1-16 way)
## 64-bit Architecture
- Up to 64 GB of central processor storage
## Up to 15 LPARs
- Maximum 64 GB of storage per LPAR
## Enhanced I/O subsystem supports greater bandwidth
- Up to 256 ESCON, 88 Parallel channels
- Up to 96 FICON Channels
## Multiple clustered LPARs
- CPU management
- Channel subsystem priority queuing
- Dynamic channel management

# z/VM Support for z/Architecture

Exploit central storage above 2 GB for guest pages and minidisk cache
- Constraint relief for both ESA/390 and z/Architecture mode guests
- CP nucleus and V=R/V=F guests must be below 2 GB

Run 64-bit-capable guests with greater than 2 GB of virtual storage (OS/390 R10, z/OS, Linux for zSeries, z/VM)
- Requires 64-bit-capable processor

Significant changes to CP
- CP nucleus module only - no IPLable nucleus
- Control block fields have moved, changed size

# VM Support for Parallel Sysplex Technology

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VM provides a Parallel Sysplex environment for OS/390 or z/OS

Real coupling links not required or supported
- No connections are provided to any facility outside a single VM image

Real Coupling Facility not required or supported

Synchronizes virtual TOD clocks

Supported on IBM *e*server zSeries 900,
   S/390 9672 G3, G4, G5, G6,
   S/390 Multiprise 2000 and 3000 servers

TPF can also exploit virtual coupling facility

| z/OS or OS/390 | z/OS or OS/390 | z/OS or OS/390 | Coupling Facility |
|---|---|---|---|

Virtual Coupling Links

**z/VM or VM/ESA**
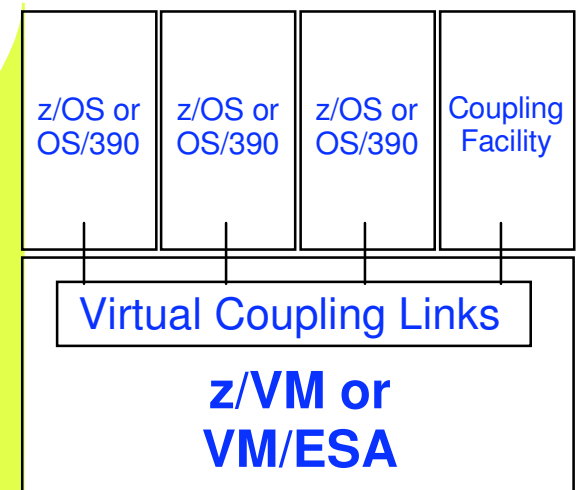
**Cost-effective Support for Parallel Sysplex Technology**

# z/VM Coupling Facility Enhancements

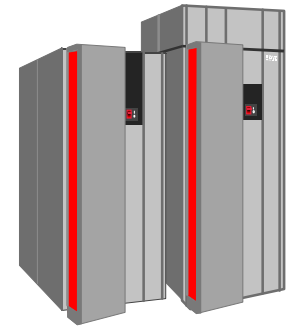z/VM provides support for guest use of new Coupling Facility Control Code on new servers
- Will load either 31-bit or 64-bit versions of CFCC

Larger HSA bit-vector simulation area
- Local-Cache Vector: 557,056 bits (was 65,536)
- List-Notification Vector: 557,056 bits (was 4,096)

QUERY VTOD command
- Display current value of VTOD clock
- List other users using the same VTOD valu

# Native Shark (ESS) FlashCopy Support

## Function

- Instant copy of a volume or range of cylinders
- Copy immediately available after command issued
- Similar to SnapShot on the IBM RVA

## Benefits

- Asynchronous backup
- Test environments
- Checkpoints
- Business Intelligence applications

2. Backup 202 to tape

1. FLASHCOPY 201 202

201    202

## Invocation

- CP FLASHCOPY command
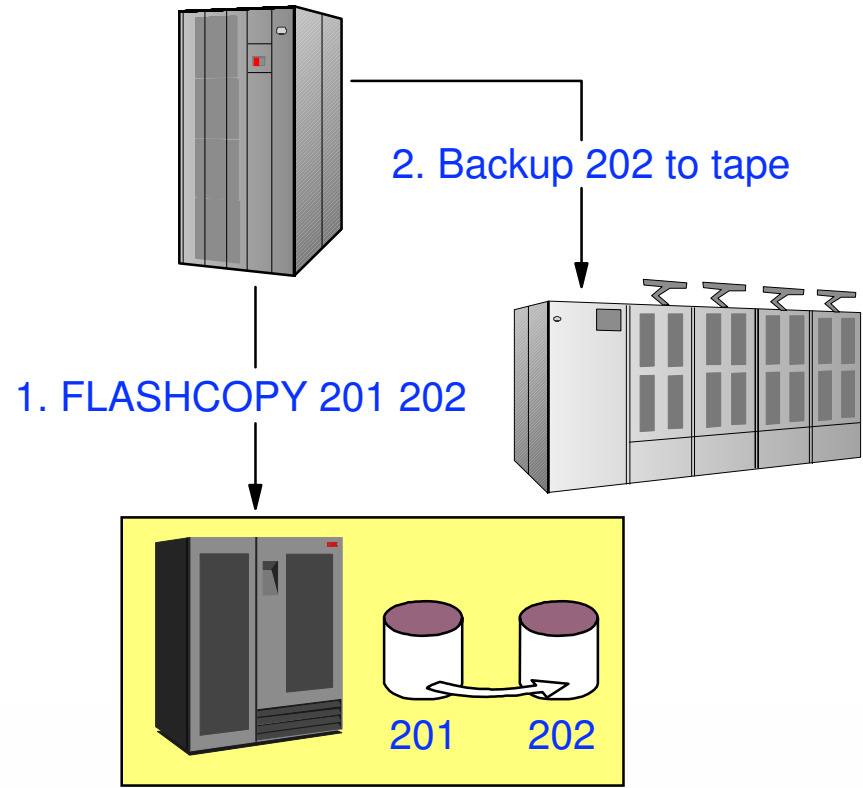
# Tape Support Enhancements

## Guest Virtual Tape Server (VTS) Enhancements

- Import/Export capabilities available on 3494 models B16 and B18
- Allows physical tapes to be inserted/removed from logical tape library
- Improved error recovery and new error messages

## Guest Support for 3494 Peer-to-Peer VTS

- Second VTS maintains duplexed copy of the first
- Improved error recovery and new error messages

## Guest support for 3590 A60 tape controller including FICON attachment
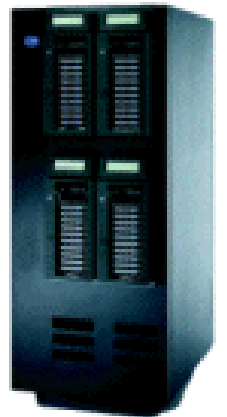
# VM Dump Tool

## Evolved from CP Dump Tool

- Supplied as sample in previous releases
- New macros and subcommands
- Responses from macros and subcommands have changed

## VM Dump Tool is the only supported tool for CP dumps

- Supports z/VM control block and logic changes

## Dump Viewing Facility (DVF) still used for non-CP dumps

# Application Support

OS/390 Binder/Loader

CMS NFS Client

Converged Sockets API

VMLINK Rewrite
- Improved serviceability and documentation
- Minor functional changes

# OS/390 Binder/Loader Support

DFSMS/MVS Program Management Binder runs under CMS

- Native implementation of corresponding program object loader functions

Allows ready transportability of executable files between z/VM and OS/390 or z/OS

- Enhances CMS-OS/390 (and CMS-z/OS) application affinity

Positions CMS to exploit new programming language technologies (e.g. C++ compiler)

# CMS NFS Client

Allows CMS users remote access to data residing on any system with an NFS server

- OS/390, Windows, UNIX, Linux, z/VM, others

Supports NFS V2 or V3 (RFCs 1094 and 1813)

Remote data is mounted in the Byte File System

Data can be accessed with:

- POSIX APIs
- OpenExtensions Shell and Utilities
- OPENVM commands
- XEDIT
- CMS Pipelines

**CMS** NFS Network Files

# TCP/IP Feature (Level 3A0) Enhancements

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FTP enhancements

IP Multicasting

OSPF Routing

QDIO (Queued Direct I/O) exploitation

Secure Socket Layer (SSL) server

# FTP Enhancements

Improved operation with web browser clients

FTP server can supply ...

- UNIX long-list format file lists
- VM-format file lists
- Defaults for server and individual users

Clients can change list format for a given session

FTP server will automatically change directory when processing file commands that contain directory information

FTP server will automatically translate files based on file type

- Specified in TCPDATA file

FTP server will supply file size in bytes in response to an FTP SIZE command

# IP Multicasting

Defined in RFC 1112

Enables an IP datagram to be sent to a group of hosts

TCP/IP supports both sending and receiving of multicast datagrams

Implementation of Internet Group Management Protocol (IGMP) version 1

- Allows hosts to communicate their multicast group membership information to multicast routers

RouteD also updated to exploit multicasting

# OSPF Routing

Open Shortest Path First

Defined in RFC 1583

Routers exchange link state information instead of distance
  vectors

Addresses some shortcomings of RIP
- Faster convergence
- No network size limit
- Supports subnetworks
- Enables load balancing
- Less routing protocol network traffic

# QDIO Exploitation

QDIO is a new data transfer architecture available on G5/G6 and IBM @server zSeries 900 servers

- Direct exchange of data between program and Ethernet Adapter Card through memory queues
- Dramatically reduces system overhead and improves throughput

z/VM's TCP/IP will support the following protocols:

- Fast Ethernet
- GigaBit Ethernet (GbE)
- ATM (Ethernet LAN emulation)

# Secure Socket Layer (SSL) Server

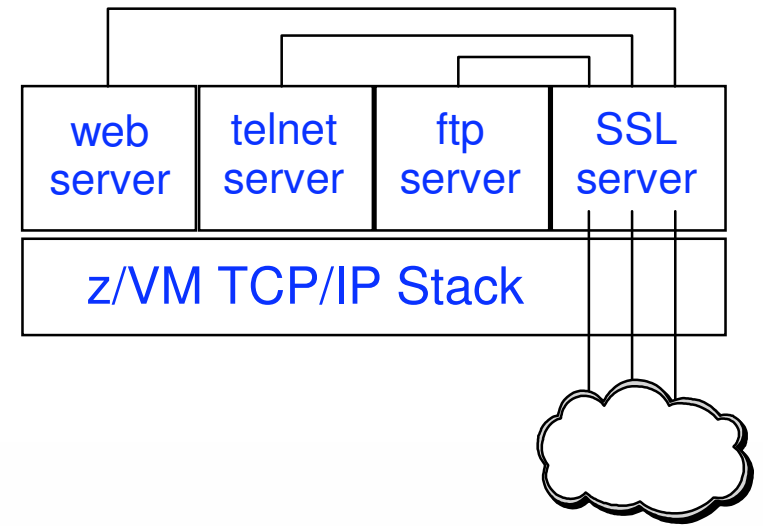## Provides privacy between TCP/IP client and server

- Defined by RFC 2246 (Transport Layer Security)
- Can be used for all TCP/IP servers (e.g., Telnet, FTP, HTTP)

## Implemented in a server virtual machine

- Stack notifies server when a connection is received for a secure port
- Server handles the handshake with client to establish cryptographic parameters
- Server encrypts and decrypts data to and from the client
- 128-bit encryption provided

## CMS-based administration

## No server code changes required*!*

| web server | telnet server | ftp server | SSL server |
|---|---|---|---|
| z/VM TCP/IP Stack | | | |

# VMPRF Version 1 Release 2.2

Supports new and changed monitor records in z/VM
- ESA/390 and z/Architecture

Tolerates new and changed monitor records in VM/ESA not already included with VMPRF 1.2.0

Reports storage sizes in:
- Kilobytes (K)
- Megabytes (M)
- Gigabytes (G)
- Terabytes (T)
- Petabytes (P)
- Exabytes (E)

Installation and service via VMSES/E

Supports both z/VM and VM/ESA

# RTM Version 1 Release 5.3

Performance monitoring for z/VM only
- ESA/390 or z/Architecture mode
- Reports storage sizes in K, M, G, T, P, and E

Internal trace table improvements

Improved initialization with an external configuration file

Elimination of 370 Accommodation requirement

New Queries
- Service level of executable parts
- System Configuration
- Internal table locations

Improved use of VMSES/E

RTM Version 1 Release 5.3 will only run on z/VM

RTM Version 1 Release 5.2 will *not* run on z/VM

# z/VM Product Packaging

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## TCP/IP
- Priced optional feature (Level 3A0) of z/VM; pre-installed on base DDRs
- Kerberos Data Encryption Standard (DES) feature is integrated in base

## TCP/IP NFS
- Priced optional feature of z/VM; pre-installed on base DDRs
- NFS Client integrated into TCP/IP Feature and CMS
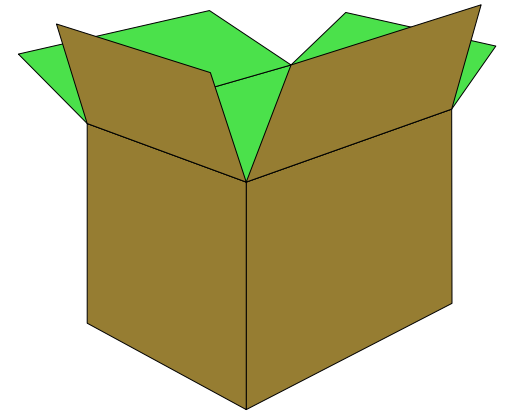
## OpenEdition Shell and Utilities
- Integrated into CMS (no charge)
- Renamed to OpenExtensions Shell and Utilities

## RSCS
- Priced product; pre-installed on base DDRs

## Tivoli Storage Manager (TSM) for VM, Version 4.1
- Priced optional feature of z/VM; pre-installed on base DDRs
- Functionally equivalent to Tivoli ADSM for VM/ESA, Version 3.1

# Other Product Changes

## Lan File Services/ESA (LFS/ESA) Feature

- Withdrawn from marketing and is not available with z/VM

## VM Graphical User Interface Clients

- Available from the VM Download library

## Publications

- All basic publications available in hardcopy and supplied with order
- All updated publications are available in PDF format from the IBM Publication Ordering System (fee), VM Web site, or VM Collection CD-ROM
- Publications available in BookManager format are available from VM Collection CD-ROM or VM Web site
- Publications are *not* orderable from IBM distribution centers

# Summary

z/VM is the next step in VM's evolution

We are investing in key areas
- Architecture
- Device support
- Application support
- Connectivity

VM and VM technology continue to be important

# Polling Questions

A. Please describe your level of satisfaction with today's program:
  1. Very satisfied
  2. Satisfied
  3. Not satisfied

B. What is the highest level of VM you are currently using:
  1. VM/ESA 2.1.0 or earlier (including previous versions)
  2. VM/ESA 2.2.0
  3. VM/ESA 2.3.0
  4. VM/ESA 2.4.0
  5. Other
  6. Not using VM today

# Polling Questions ...

C. What is the highest level of processor you are running VM on:

1. 9672 G5 or G6
2. Multiprise 3000
3. 9672 G2 (models Rn2 or Rn3), 9672 G3-G4, Multiprise 2000, P/390, R/390 or Integrated Server
4. 9672 G1 (models Rn1, En1 or Pn1), 9221, 9121 or 9021
5. 43xx, 308x or 3090
6. Non-IBM processor

D. Would you like to recieve additional information on z/VM and related products?

1. Yes, please send me addtional materials
2. No thanks, I'll check the website for additional information

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Announcing the 2001 Technical Conferences, choose the dates and location most convenient for you:

- May 7-10, 2001 in Jacksonville, Florida will be the z/VM, VSE, and Linux for zSeries conference.
- May 28-June 1 in Berlin, Germany will be the z/VM and VSE conference, in conjunction with z/OS and Storage Systems

Visit the VM events calendar at **ibm.com**/s390/vm/events/ for conferences  and other  z/VM-related  educational opportunities in 2001 and beyond.

# S/390 VM and VSE Solutions Journal

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The S/390 VM and VSE Solutions Journal contains articles on real customer solutions to business problems using S/390 Servers and software.

Included in Issue 5 (available November 2000):
- SunGard Recovery Services, Mobil Gas, Central Missouri State University, Garanti Bank of Turkey and much more...

To receive the latest issue and subscribe:
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# How to Contact VM Development

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