z/VSE 4.1 Experiences

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z/VSE Design

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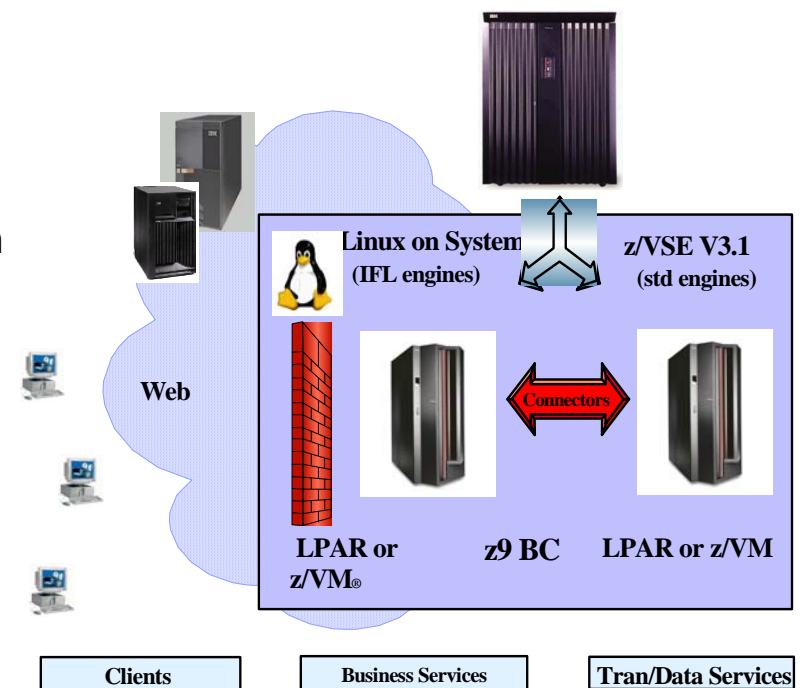
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VSE Strategy

Why Not Think Inside the Box?

- Helps **Protect** your existing investments in core VSE programs, data, equipment, IT skills, *plus* business processes, end user training, etc.
  - modernize, i.e. extend VSE resources to Web
  - exploit IBM servers, storage, and software

- **Integrate** VSE with the rest of your IT based on open and industry standards
  - IBM middleware
  - VSE connectors and web services

- **Extend** with Linux on System z
  - infrastructure consolidation/simplification
  - add new infrastructure and/or line-of-business applications

z/VSE 4.1

- Previewed in 4/2006, announced 1/2007, GA 03/16/2007

- z/VSE 4.1 is designed to
  - Support the new IBM System z9 BC and z9 EC processors
  - Execute in z/Architecture mode only
  - Support 64 bit real addressing
  - Support more than 2 GB real storage (up to 8 GB)

- z/VSE 4.1 provides
  - LPAR- and z/VM guest based sub-capacity monitoring tool
  - Support for selected IBM System z9 features

- Midrange Workload License Charges (MWLC) with sub-capacity mode

- IBM TS1120 Tape data encryption

- FSU from VSE/ESA 2.7 and z/VSE 3.1

- z/VM 5.2 or later required

Sub-capacity monitoring tool

- Tool can be activated on z9 BC or z9 EC models

- z/Architecture mode required -> z/VSE 4.1 only

- z/VSE supported in LPAR mode and as z/VM guest

- Implementation
  - ➤ New system task
    - Will measure CPU usage and calculates MSUs
    - Measurement interval every 30 minutes
    - Calculation of the 4 hour rolling average
    - SMF like (SCRT89) records written to dataset
  - ➤ Dataset is input for the Sub-Capacity Report Tool (SCRT)

- Required for Midrange Workload License Charges (MWLC)
  - ➤ Sub-capacity option

- 12 z/VSE products participate in MWLC

Supported z/VSE Environments

▪z/VSE runs on the following platforms only

➤z/VSE 3.1
- S/390 Multiprise 3000
- S/390 Parallel Enterprise Server G5, G6

➤z/VSE 3.1 and 4.1
- IBM e-server zSeries processors (z800, z900, z890, z990)
- IBM System z9 Business Class (z9 BC)
- IBM System z9 Enterprise Class (z9 EC)

and supports

➤uni- and multiprocessors
➤(Native), as z/VM guest or in LPAR

64 bit real (z/VSE 4.1 only)

- Processor storage > 2 GB, up to 8 GB

- Virtual address/data space size remains at max. 2 GB

- 64 bit virtual addressing not supported

- 64 bit addressing mode not supported for applications or ISVs

- Implementation transparent to user applications

- Performance: 64 bit real can reduce / avoid paging

- In most cases the NOPDS option can be used

64 bit real …

- Implementation details

  ➢ IPL starts in ESA/390 mode and switches to z/Architecture mode during the IPL process

  ➢ Simulation of ESA/390 low core fields

  ➢ Only the z/VSE page manager has access to the area above 2GB

  ➢ Virtual pages can be backed by 64 bit real pages

  ➢ PFIX or TFIX requests will use real page frames below 2 GB

  ➢ Page manager control blocks below 2GB

  ➢ Page out requests will directly go to Page Dataset

System z Exploitation

- OSA Express2 – new generation of System z LAN adapters
  - ➢ 10 Gigabit Ethernet, Gigabit Ethernet

- HiperSockets

- FICON Express 4 - Higher I/O bandwidth

- Adapter interruptions
  - ➢ Performance improvements for OSA Express2 (QDIO mode), FICON Express4 (FCP)

- Up to 60 LPARs

- Cryptographic assists
  - – Crypto Express 2 and CPACF enhancements
  - – Exploited by TCP/IP SSL support transparently

System z Exploitation …

- SCSI enhancements
  - Support point-to-point connections for FCP-attached SCSI disks
  - N-Port ID Virtualization

- OSA Express2 1000BASE-T Ethernet (4 modes of operation)
  - ICC (Integrated Console Controller)
  - QDIO (Queued Direct I/O) for TCP/IP traffic
  - Non-QDIO for TCP/IP and SNA traffic
  - OSN (Open System Adapter for NCP) works with IBM Communication Controller for Linux on System z

Exploitation of IBM TotalStorage Products

- IBM System Storage TS1120 Tape Controller, IBM Virtualization Engine TS7700, IBM System Storage TS3500 Tape Library

- IBM System Storage DS8000/DS6000 64K cylinder support
  - Supported by BAM and VSE/VSAM

- VSAM supports more than 1,500 clusters per catalog

- VSAM FAT-BIG DASD support
  - **Small DASD** (normal): smaller than 64k tracks per volume
    - 3390 in LISTCAT
  - Large DASD with two subtypes:
    - **Big DASD**: more than 64k tracks per volume
      - BIG-3390 in LISTCAT
      - Support of up to 10017 cylinders
    - **Fat DASD**: up to 64k cylinders
      - FAT-3390 in LISTCAT
      - New type of volume

- All volumes of volume list must have the same DASD type and cannot be mixed

VSAM Redirector

- VSAM Redirector provides
  - ➢ Access to remote data
    - – on Java capable platform (e.g.Linux on zSeries)
    - – transparent to z/VSE program (batch or online)
  - ➢ Samples to access flat files and DB2 UDB
  - ➢ Interfaces to include other data
  - ➢ Communication to other platform via TCP/IP
  - ➢ VSAM capture exit – new in z/VSE 4.1
    - – captures changes to a specific VSAM cluster

- ➔ z/VSE as a client

Virtual Tape

- File or dataset containing a tape image, that is
  - ➢ VSE/VSAM ESDS file on z/VSE
  - ➢ Remote file on Java-capable server platform (Windows, Linux, ...)
- Has most functions of physical tape
  - ➢ Some functions not supported
    e.g. SDAID to tape, Ditto Erase function
- "virtual tape" device need to be ADDed at IPL
- VTAPE command to manage virtual tapes

- VTAPE enhancements in z/VSE 4.1
  - ➢ Allow user labels for VSAM ESDS
  - ➢ New VTAPE QUERY command

  - ➢ Back up VSE data using Tivoli Storage Manager (TSM)

z/VSE Enhancements …

- Single Supervisor generation

- Language Environment (LE/VSE)
  - ➢ Display CICS default runtime options via AR command

- SDAID enhancements
  - ➢ OSAX trace to trace requests against OSA Express link

- VSE/POWER enhancements
  - ➢ Allow batch jobs to create duplicate and master queue entries by new $$LST/$$PUN statements
  - ➢ Deletion of queue entries after specified time period
  - ➢ Output of POFFLOAD can be appended to output of previous POFFLOAD

- Secure FTP (z/VSE 4.1 + PTF)

Data Encryption

- Support for TS1120 Tape Drive encryption feature

  ➤ z/VSE support will require the Encryption Key Manager component running on another operating system other than z/VSE using an out-of-band connection.

  ➤ The IBM System Storage TS1120 Tape Drive encryption feature support is now available for z/VSE 4.1.

  ➤ Following APARs/PTFs must be installed to activate the support:

    - z/VSE: DY46682 (UD53141 and UD53142)
    - z/VM: VM64062 (UM32012)
    - DITTO: PK44172 - With this Apar, DITTO/ESA for VSE supports tape encryption interactively and via standard VSE JCL in BATCH mode

- For a detailed description please see the updated chapter Implementing Hardware-Based Tape Encryption (PDF, 231KB) in the z/VSE V4R1 Administration guide.

Data Encryption …

- TS1120 tape drive is successor to 3592 tape drive model J1A and 3590 Enterprise Tape drive

- Data encryption is transparent to z/VSE applications

- IBM Encryption Key Manager (EKM) for supported Java platforms
  - Generation and communication of encryption keys for tape drive
  - TCP/IP connection between EKM and the tape controller

- Data encryption
  - Data will be encrypted and compressed, when specified
  - Default: encryption disabled

- Implementation in z/VSE
  - VSE JCL enhancements
    - For encryption setting (via ASSGN)
    - Key Encryption Key Label (KEKL) may be specified
  - I/O Supervisor
    - retrieves encryption information, activates encryption and transfers KEKL

Cryptographic support

- System z hardware cryptographic support - Enhances Internet security

  - Cryptographic assists - Exploited by TCP/IP SSL support transparently

    - CPACF – for symmetric encryption
      - AES for 128-bit keys

    - Crypto Express2 (crypto card) – for asymmetric encryption
      - Only PCICA (PCI Cryptographic Accelerator) function supported
      - Encryption hardware assist for increased SSL throughput
        Supports SSL handshaking only
        for applications that use the SSL crypto API
      - Exploit 2048-bit RSA keys with Crypto Express2 and z/VSE 4.1
      - Configurable Crypto Express2
        - Dynamically configurable in coprocessor or accelerator mode

    - Transparent for TCP/IP applications
      (VSE connector server, CWS, VSE/Power PNET)

    - No definition necessary

More Information

- **… on VSE home page:**

   http://ibm.com/vse