Blue Cross Blue Shield of Minnesota - Replication and DR for Linux on System z

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SHARE in Boston

Objectives

At the end of this session, you will be able to

- Discuss replication in a Linux on System z environment, including z/VM and z/OS

- Describe managing replication from z/OS for z/VM and Linux as a guest virtual machine

- Understand different backup scenarios for z/VM and Linux on System z

Linux on System z
Disk Attachment Options


SHARE
Technology · Connections · Results
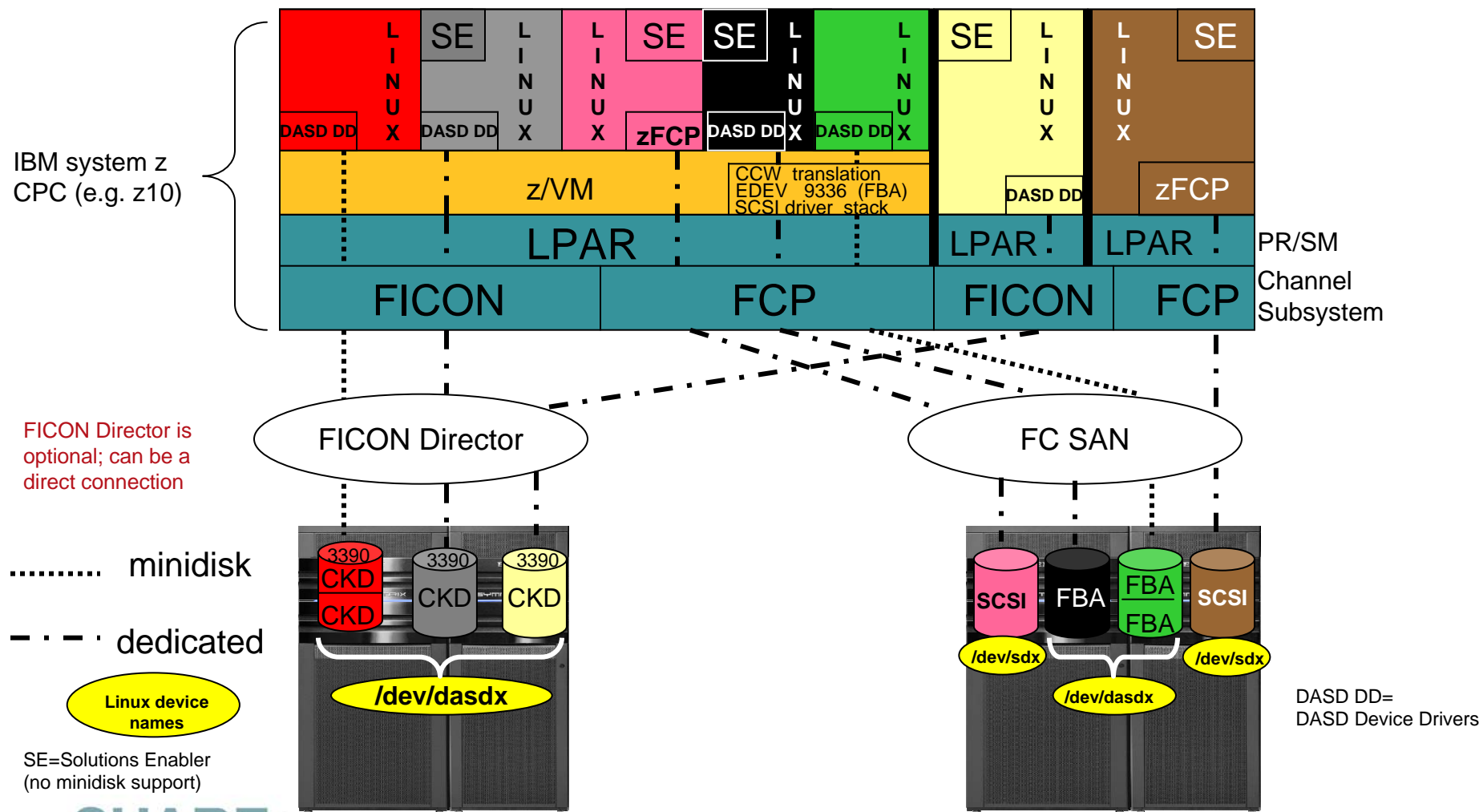
# Linux on System z CKD Device Relationship Path
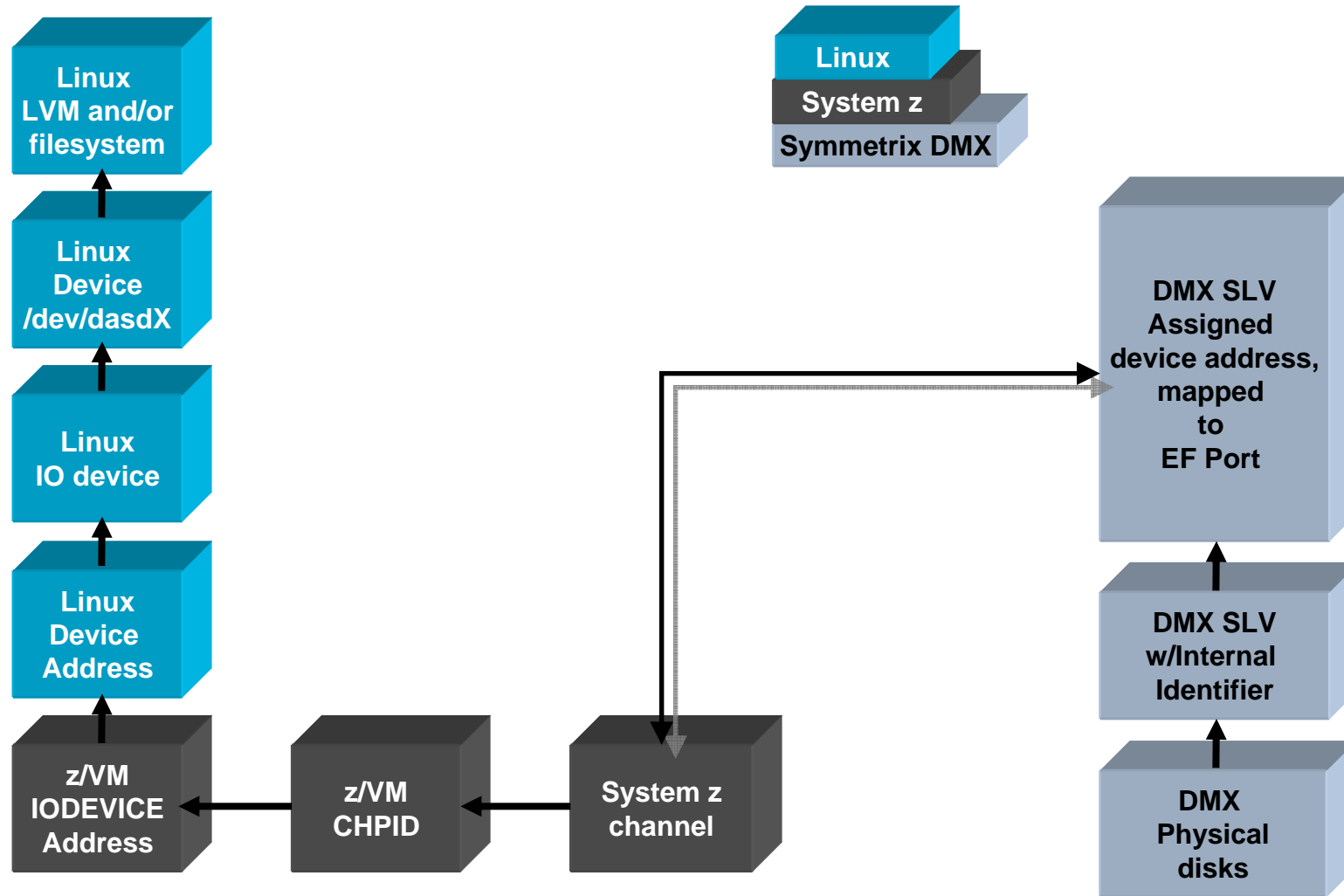
Replication – Business Recovery Tools

- TimeFinder – Local Replication
  - Clone – Full Volume copy, Source device size = Target device size
  - Snap - Pointer Based Replication,
    - Target Device is a virtual device housing a collection of pointers between the Source and a reserve area for a point-in-time view
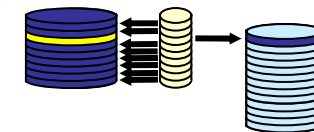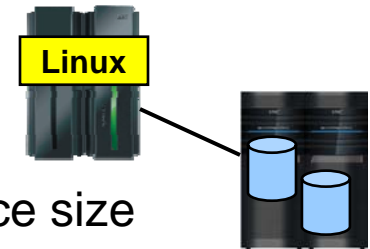
- SRDF – Remote Replication
  - Allows the movement of data between storage systems in the same room, to different buildings located across town, or thousands of miles apart
  - Offers various disaster recovery levels
  - Enables the following operations:
    - Disaster recovery, Disaster restart testing
    - Recovery from planned outages, Remote backup
    - Data center migration, Data replication and mobility
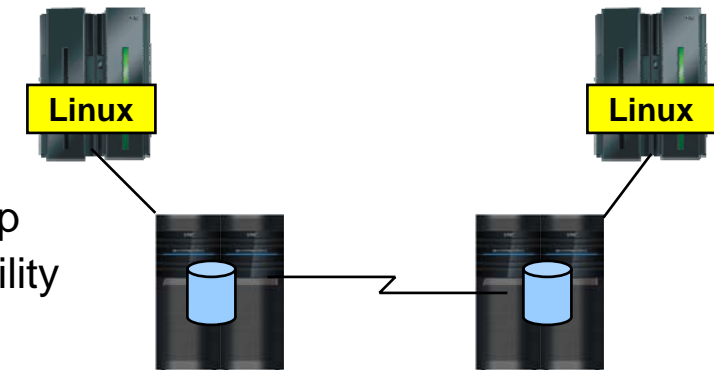
Symmetrix Remote Data Facility:
Two Site Solutions

SRDF/Synchronous

- No data exposure
- Some performance impact
- Limited distance
- Source = Target

Source **Target**

1 **2**

R1 *Limited Distance* **R2**

4 **3**

SRDF/Asynchronous

- Predictable RPO
- No performance impact
- Unlimited distance
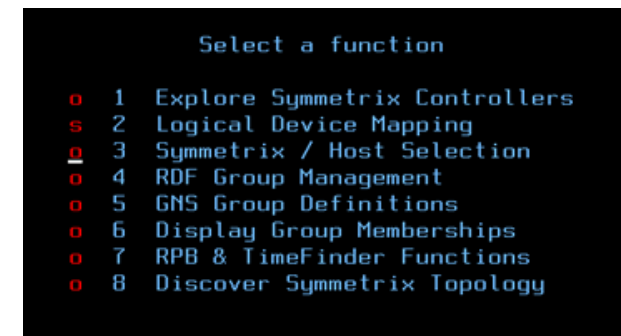- Only two copies of data required
- Source ≅ Target

Source **Target**
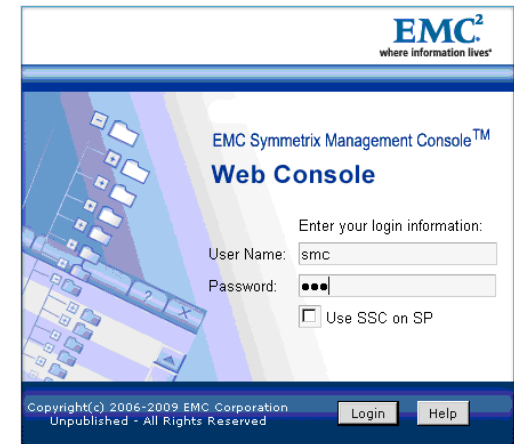
1

R1 *Unlimited Distance* **4** **R2**

2 **3**

SRDF/AR

- Data Movement solution
- No performance impact
- Unlimited distance

Source **Target**

4

1

R1 *Unlimited Distance* **R2**

2 **3**
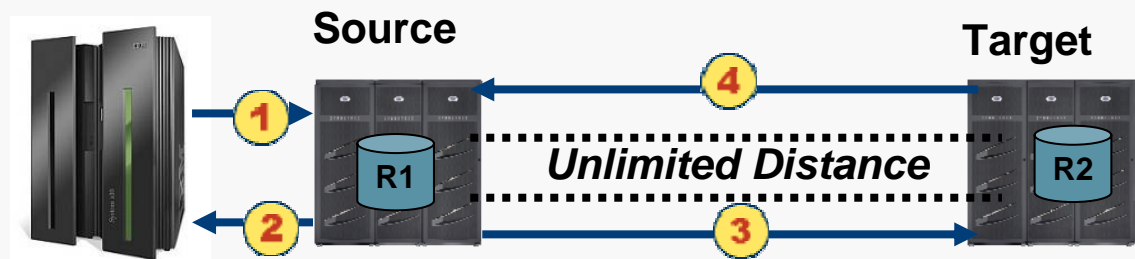
EMC Replication Management Options

- Solutions Enabler – 7.1

    - On Linux on System z – SUSE 10/11 and Red Hat 5.4

    - Open Systems hosts – Windows, Linux, UNIX

- Mainframe Enablers

    - z/OS

- Symmetrix Management Console (SMC)

    - Windows, Linux (x86), UNIX

- EMC z/OS Storage Manager (EzSM)

    - ISPF-like panel menu interface

- EMC products for TPF
    - TimeFinder Controls for TPF
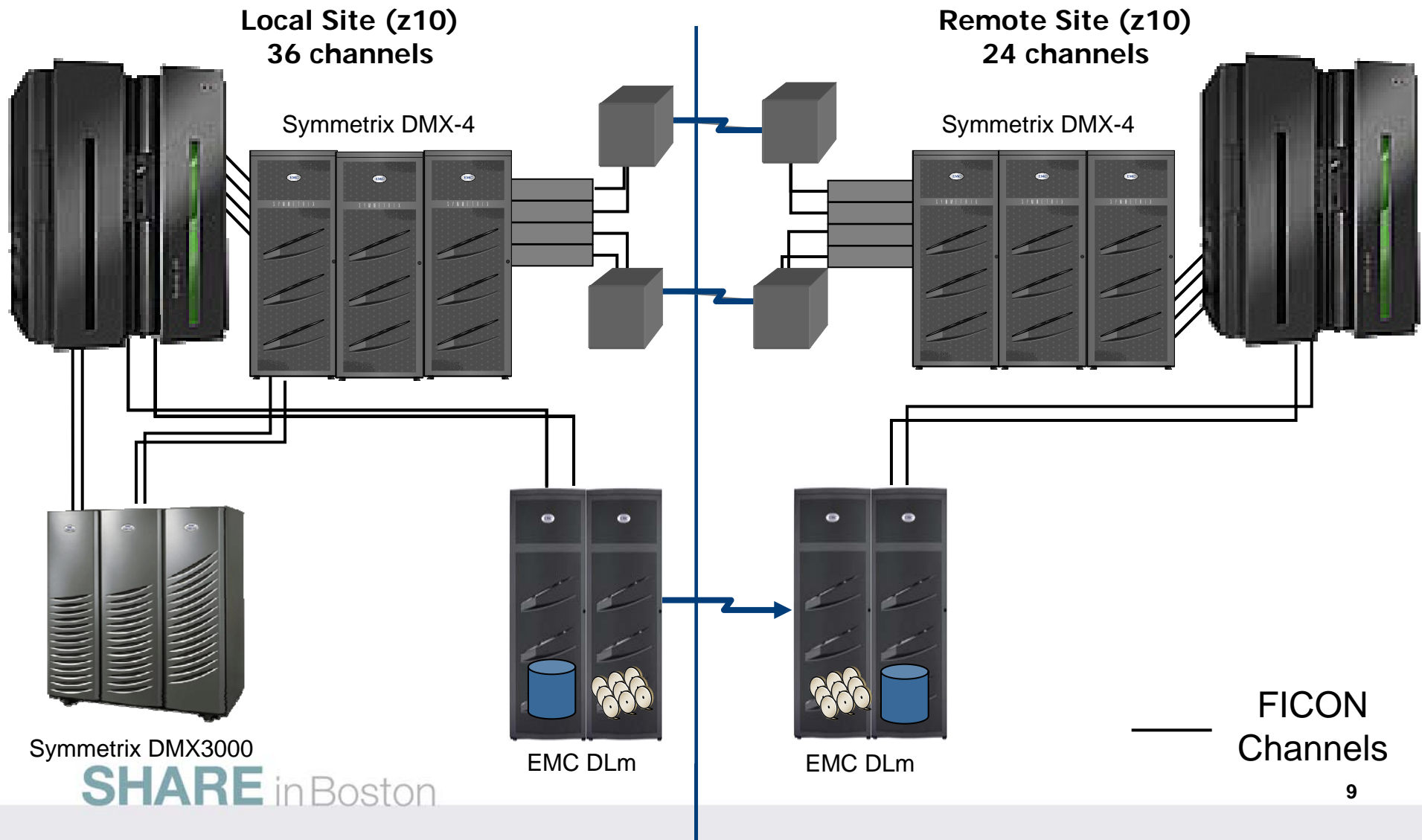   - SRDF Controls for TPF
    - ResourcePak for TPF

Blue Cross Blue Shield of Minnesota

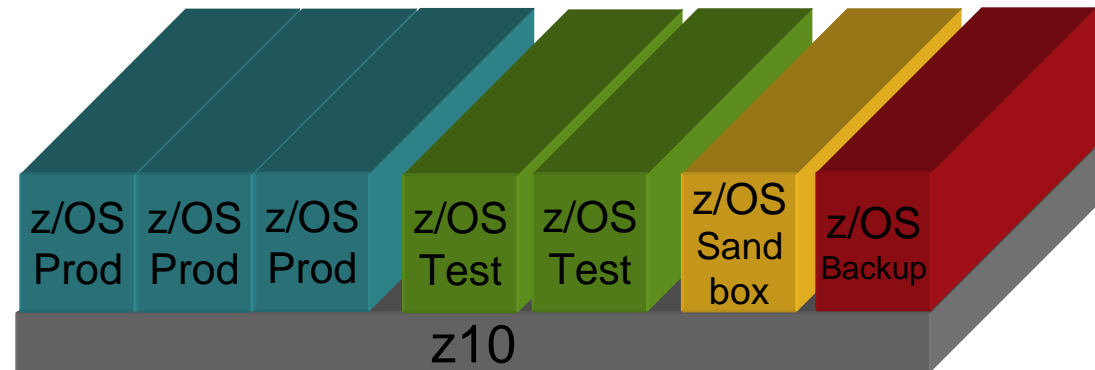# Blue Cross Blue Shield Hardware - Today

Local Site (z10)
36 channels

Symmetrix DMX-4

Remote Site (z10)
24 channels

Symmetrix DMX-4

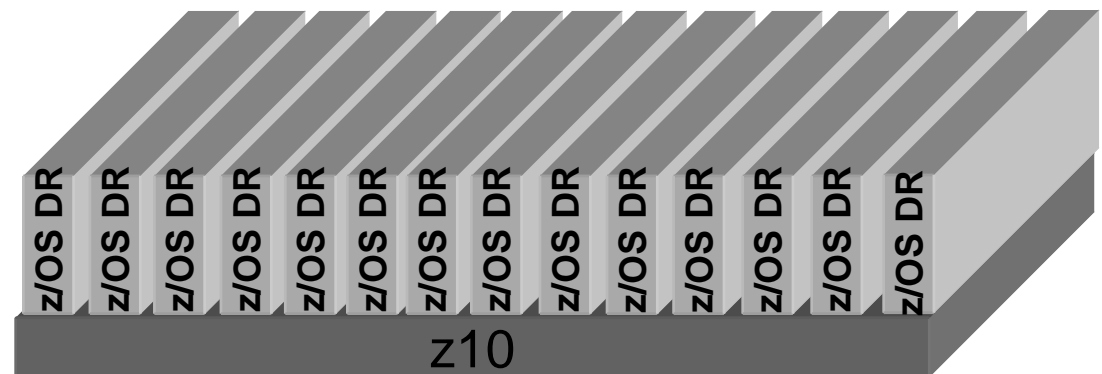Symmetrix DMX3000

EMC DLm

EMC DLm

FICON
Channels

z/OS Environment

- z/OS LPARs – 7 Total
  - Production - 3
  - Test – 2
  - Backup - 1
  - Sandbox - 1
- z/OS 1.10 and 1.11
- CICS, IMS, DB2, SAP
- Symmetrix
  - CKD – mod-3, 9, and 27
- Remote Site
  - 14 z/OS LPARs normally deactivated
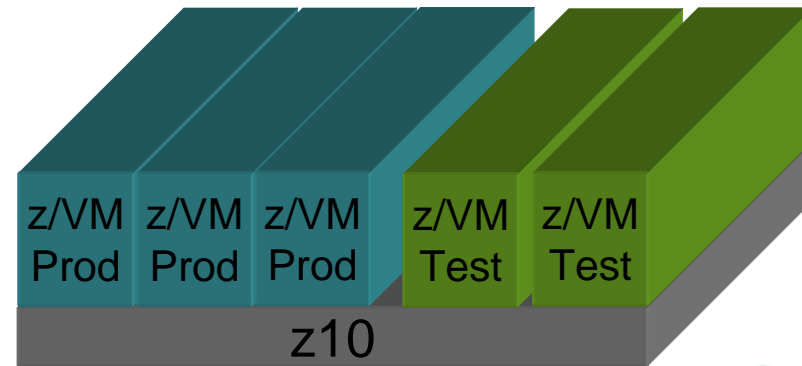

Local

Remote

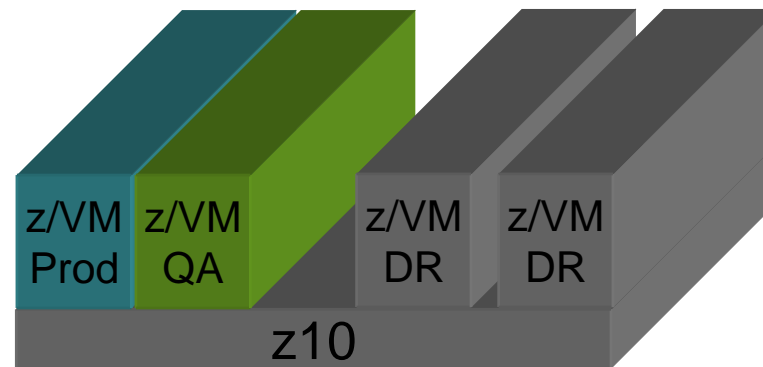# z/VM Environment

- z/VM LPARs – 5 Total
  - Production - 3
  - Test – 2
- z/VM 6.1
- 200 Linux virtual machines across 7 LPARs and 2 sites
- Symmetrix
  - CKD only
  - All minidisks, no dedicated devices to guest virtual machines
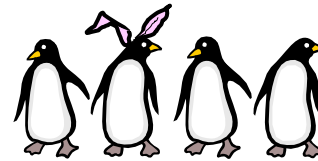- No backup software lives on z/VM

| z/VM Prod | z/VM Prod | z/VM Prod | z/VM Test | z/VM Test |

z10

Local

| z/VM Prod | z/VM QA | z/VM DR | z/VM DR |

z10

Remote

Linux Environment

- All Linux under z/VM
- Linux is on CKD minidisks
  - Full pack
  - Partial pack
- Mostly SLES 10 SP3
  - A few straggler SLES 9 SP3
- Moving to SLES 11
- 200 Linux guests and growing
  - subset of guests are active/active
- TSM backup agents on Linux
- Database communication to z/OS
  - Hipersocket
  - OSA

z/VM Prod | z/VM Prod | z/VM Prod | z/VM Test | z/VM Test

z10

Local

z/VM Prod | z/VM QA | z/VM Prod DR | z/VM Prod DR

z10

Remote
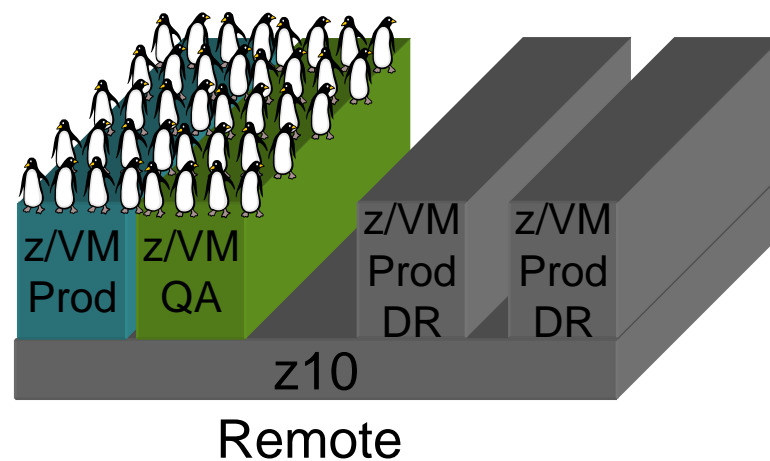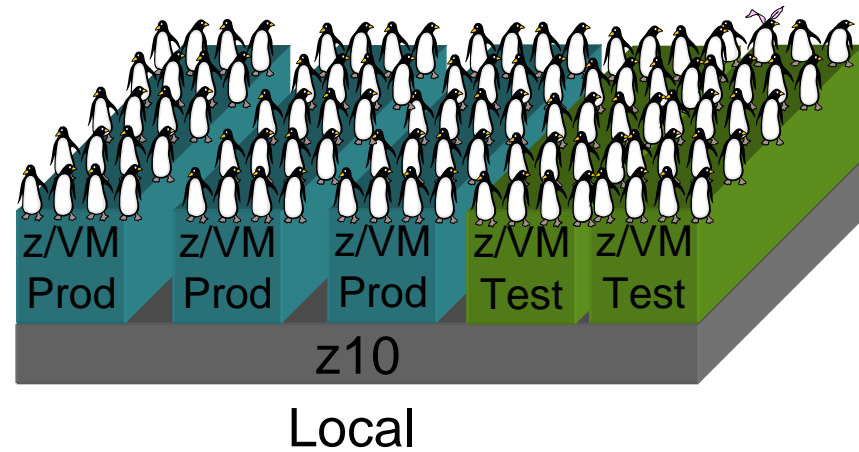
Why Linux on System z?

- Prototyping Linux on System z for years
- Traction took hold 2-3 years ago when refreshing SAP
- Moved it from x86 talking to z/OS DB2 to mostly Linux on z talking to z/OS DB2
- This was our first production scale Linux application implemented
- Very successful!
- Continuing to look at additional workload
  - WAS

Replication

Disaster Recovery Environment - 2005

One Site (z900s)

SRDF Group 0 - 2005

- One RDF Group in 2005 – RDF Group 0
  - Included everything - z/OS, z/VM and Linux on System z
  - Normal operation – SRDF AR from DMX3000 to DMX3000
  - Strictly for Disaster Recovery
- Backups occurred each 24 hour period via a script
  - Switch to SRDF Synchronous mode which enforces consistency across all devices maintaining application interrelationship consistency
  - Once invalid tracks reached zero, performed ConGroup trip, splitting off all R2s
  - RDF Group 0 is suspended
  - Performed backup to tape
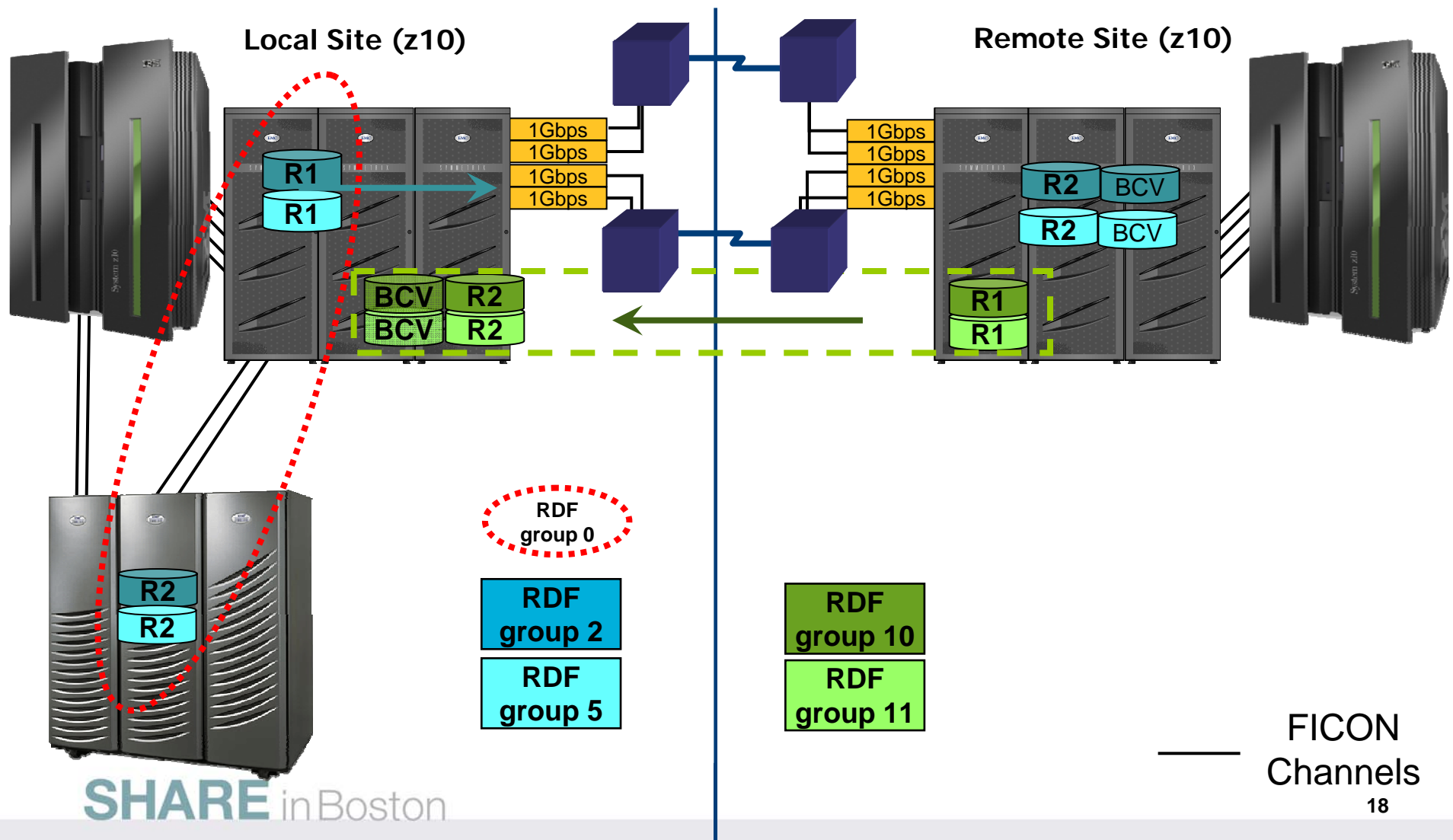 - Switch back to Asynchronous

The Future Beckons…

What is the right path for our Disaster Recovery ?
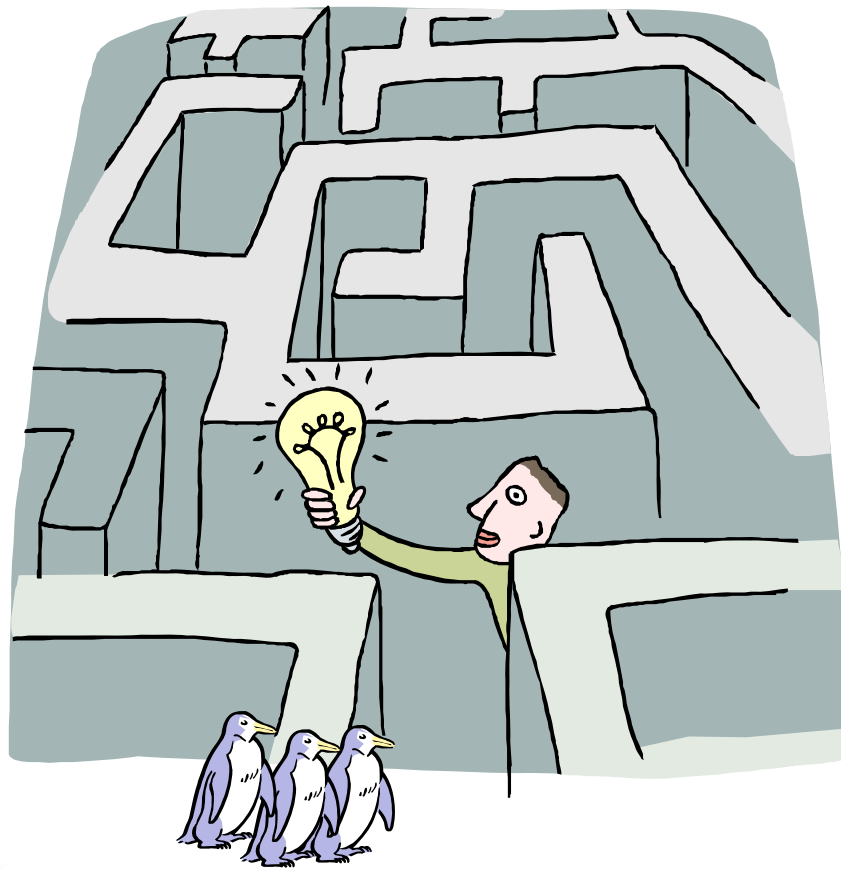
Remote Replication Environment - 2010

SRDF Groups – Local to Remote Site Setup

- RDF Group 2
    - SRDF/A (asynchronous) from Local to Remote Site
    - Includes z/OS, z/VM and Linux on System z
    - Consistency maintained across application environment
    - ~53TB

- RDF Group 5
    - Normally suspended
    - Includes z/OS, z/VM, Linux "Work" devices – page, swap, etc.
    - Data structures of volumes required, but not day-to-day data
    - Synchronized when changes are made
    - Data Distribution mode from Local to Remote Site
   - ~ 2TB
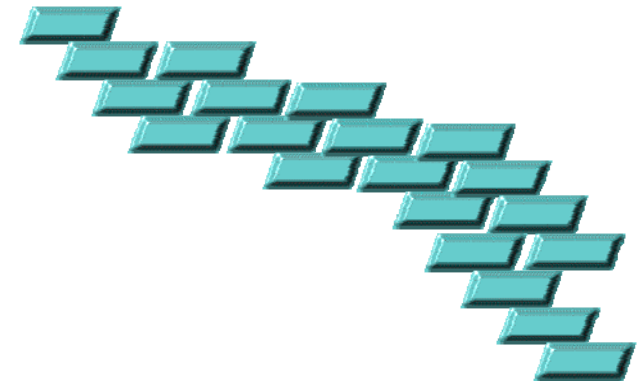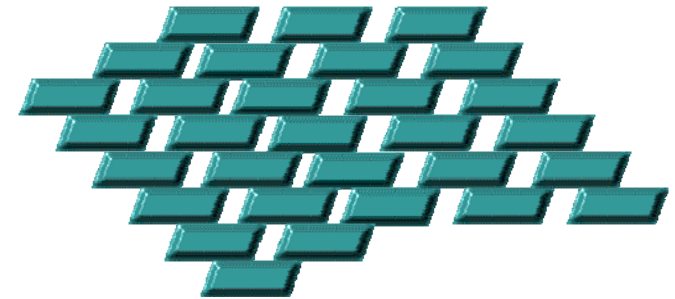
SRDF Groups – Remote to Local Site Setup

- RDF Group 10
    - SRDF/A (asynchronous) from Local to Remote Site
    - z/VM and Linux on System z
    - Consistency maintained across application environment
    - ~4TB

- RDF Group 11
    - Normally suspended
    - Includes z/VM, Linux "Work" devices – page, swap, etc.
    - Data structures of volumes required, but not day-to-day data
    - Synchronized when changes are made
    - Data Distribution mode from Local to Remote Site
   - ~ 0.5 TB
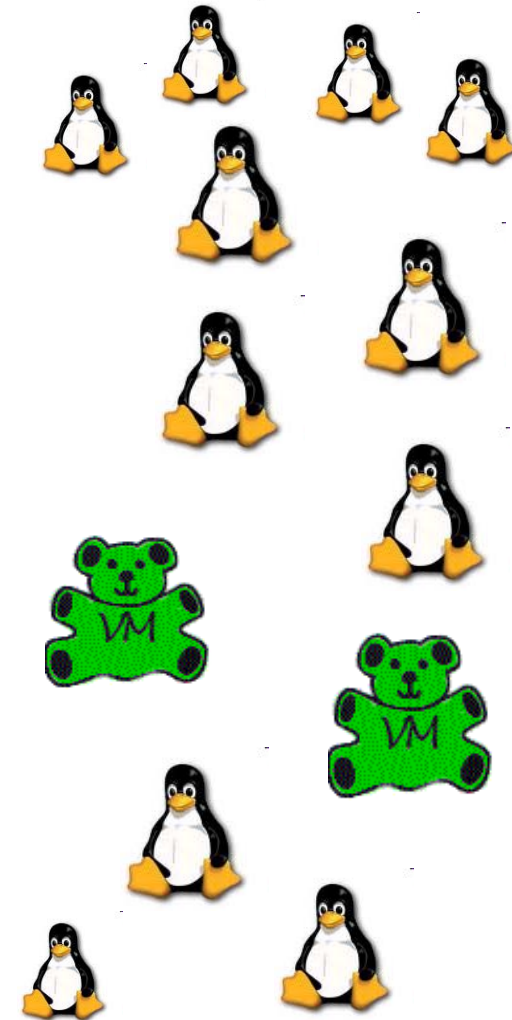
Recovery Objectives

- RPO and RTO in 2005
  - RPO was 3-4 days
  - RTO was ~ 72 hours
- RPO and RTO in 2008
  - RPO 30-60 seconds normally
    - 2-3 minutes, worst case
  - RTO 2-4 hours
- Includes z/OS, z/VM, Linux
- How often it's tested?
  - Reduced Test Set
    - Test at will –when changes occur with minimal personnel
  - Corporate Participation
    - Two times a year

Recovery Considerations

- z/OS and Linux considerations
  - SAP – distributed application across z/OS and Linux
  - Application environment can be spread across many Linux instances
  - Consistency maintained via SRDF group
  - z/VM environment is also maintained
- Currently manual failover and reintegration between site
- Exploring GDDR for future automation
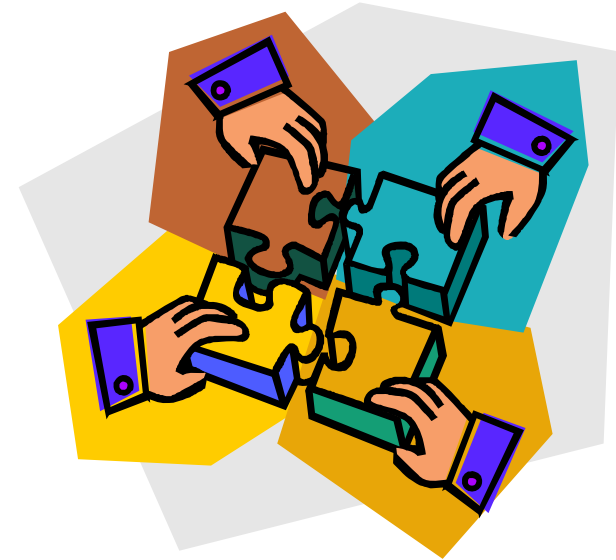
Backups for z/OS, z/VM and Linux on System z

Backups from z/OS

- RDF Group 0, R2 devices facilitate backups from the DMX3000
- Point in Time backups done nightly from z/OS which includes
  - z/OS
  - z/VM
  - Linux on System z – contained in z/VM minidisks
- All z/VM R2 devices are seen from the z/OS backup LPAR
  - Seen as 100% allocated, no free space
  - No datasets
- Backup products
  - DFDSS
    - use CPVOLUME option to backup z/VM DASD
  - DBS – DASD Backup Supervisor from OpenTech Systems
- 3592 tape drives
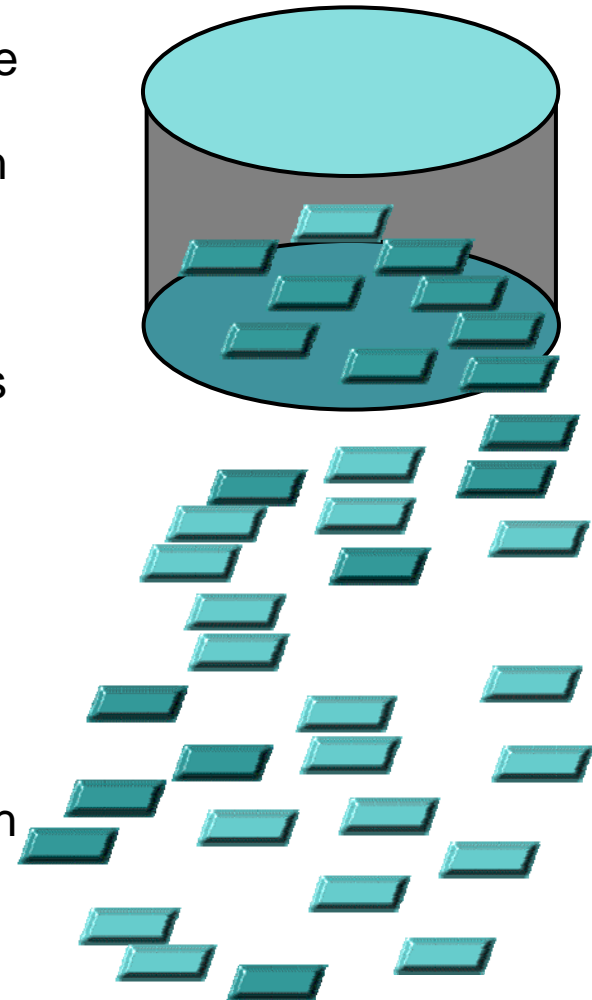
SRDF Group 0 – Backup Use

- Runs normally in Adaptive Copy disk mode from DMX-4 to DMX3000
- Backup process performed once a day via a script
  - NADCOPY   (synchronous mode)
  - Process to count invalids until zero
  - EMCCGRP,RESUME XXX   (enable consistency group)
  - SUSP-CGRP   (suspends congroup)
  - RDY,ALL   (ready R2s)
  - VARY ONLINE   (vary R2s online)
  - Run Backup jobs
  - VARY OFFLINE   (vary R2s offline)
  - NRDY,ALL   (Not ready R2s)
  - ADCOPY-DISK, ALL   (prepares data)
  - RDF-RSUM,ALL   (data flow)
- Consistency inherent in RDF because all devices of RDF Group 2 and group 5 exist in the RDF Group 0 relationship
- ~ 55TB backed up daily

Restoration Options from z/OS

- z/OS
  - Full volume
  - Datasets
- z/VM and Linux on System z
  - Full volume
  - Minidisk - restoration via specific cylinder range
- Restores full volumes encompassing Linux environment
  - Ability to access minidisk, restart Linux and pull information if necessary
- Advantage of RDF Group 0 backup from z/OS
  - Entire site backed up once a day
  - Tapes held per regulatory compliance and other specific needs

Backups from Linux on System z

- Tivoli Storage Manager agents live on Linux

- Incremental file level backups performed nightly

- Tivoli Storage Manager Server lives external to the mainframe environment
  - Current Tivoli Storage Manager 5.4.4
  - Converting to TSM 5.5.4.1
  - Investigating moving to Linux on System z

- Advantage of Linux backups
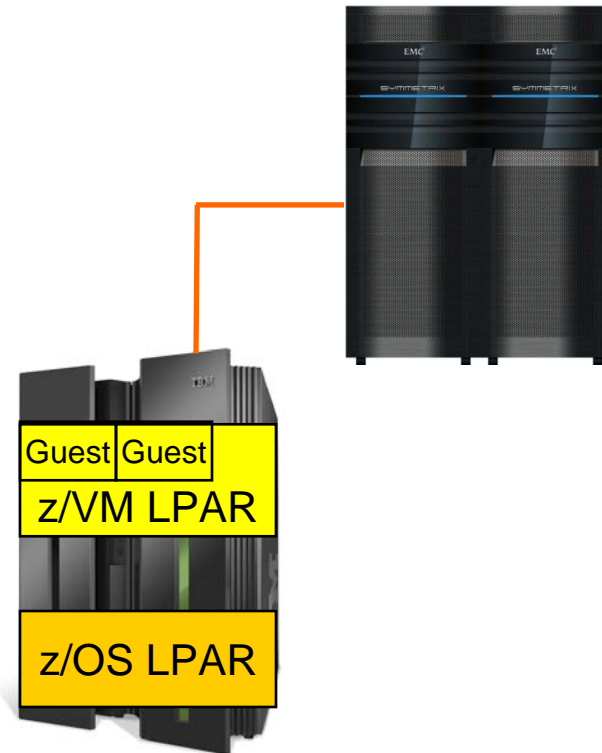 - Ability of Linux administrators to restore individual files
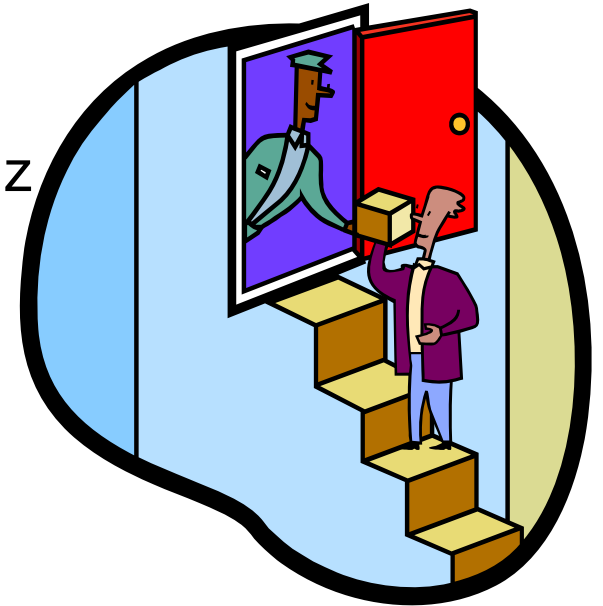
Replication Management

Replication Management from z/OS

- z/OS using EMC Software:
  - ResourcePak Base 5.8
  - ConGroup 6.4
  - SRDF 5.6
  - TimeFinder/Clone Snap 5.8
  - TimeFinder Mirror 5.6
  - TimeFinder Utilities 5.4

- Migrating to Mainframe Enablers 2H 2010

Guest Guest
z/VM LPAR

z/OS LPAR

Future Plans

- EMC GDDR
- Mainframe Enablers
- Upgrading Linux production to SLES 11
- Upgrading production to z/OS 1.11
- Investigating other applications to move to Linux
- Symmetrix VMAX

Summary and Questions

- Discussed replication at Blue Cross Blue Shield of Minnesota including Linux on System z, z/VM and z/OS

- Reviewed managing replication for backups from z/OS via an automated script

- Discussed why different backup scenarios are used for the Blue Cross Blue Shield environment

Related EMC Technical Documentation

- *White paper: Configuring EMC Symmetrix arrays for Linux-on-System z*

- *Linux on IBM System z: RHEL 5.x and SLES 10.x Installation and Configuration Guide, P/N 300-007-955, REV A01*

- *EMC Solutions Enabler, Version 7.1.1 Installation Guide P/N 300-008-918 REV A03*

- *Native Multipath Failover Based on DM-MPIO for v2.6x Linux Kernel and EMC Storage Arrays, Red Hat Enterprise Linux 4 - U3 and SuSE Linux Enterprise Server 9 - SP3, Configuration Guide*