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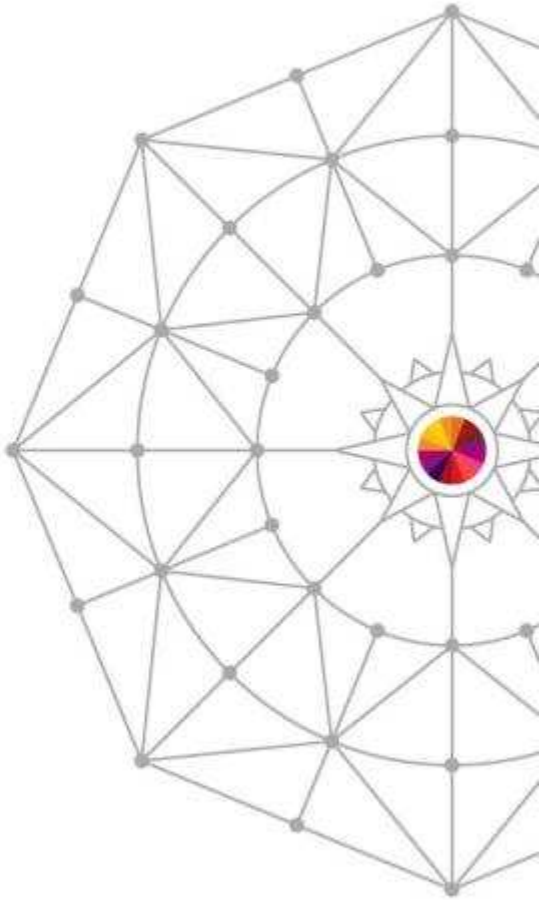
Virtual Security Zones



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IBM Senior Managing z/VM Consultant

March 2014

SHARE in Anaheim

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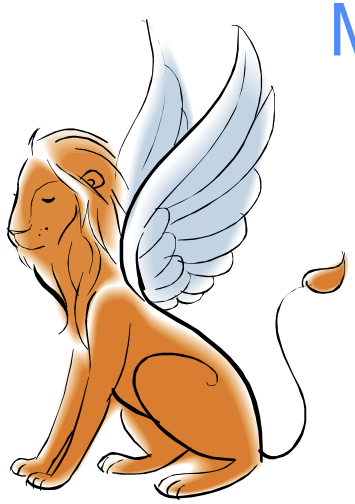
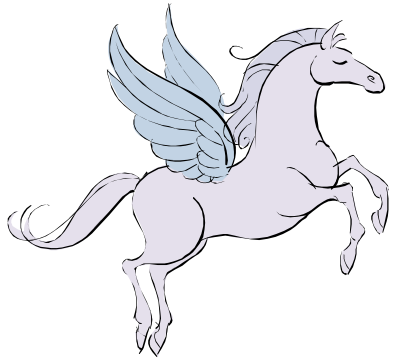
Agenda

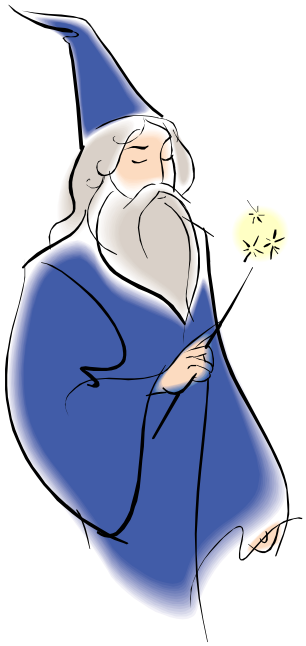
- Introduction
- Securing System z hardware
- A multi-zone network
- VLANs and traffic separation
- Enforcing the rules

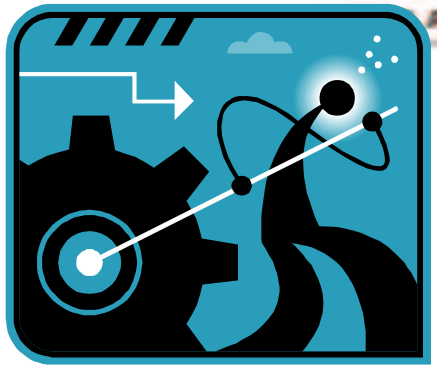



The Myth of Mainframe Security

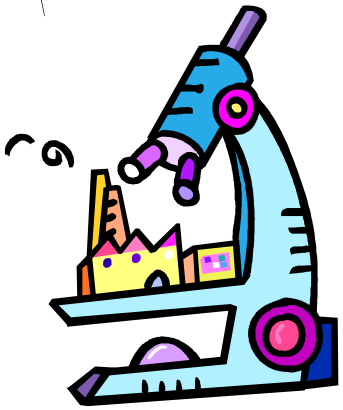






The Reality of Mainframe Security

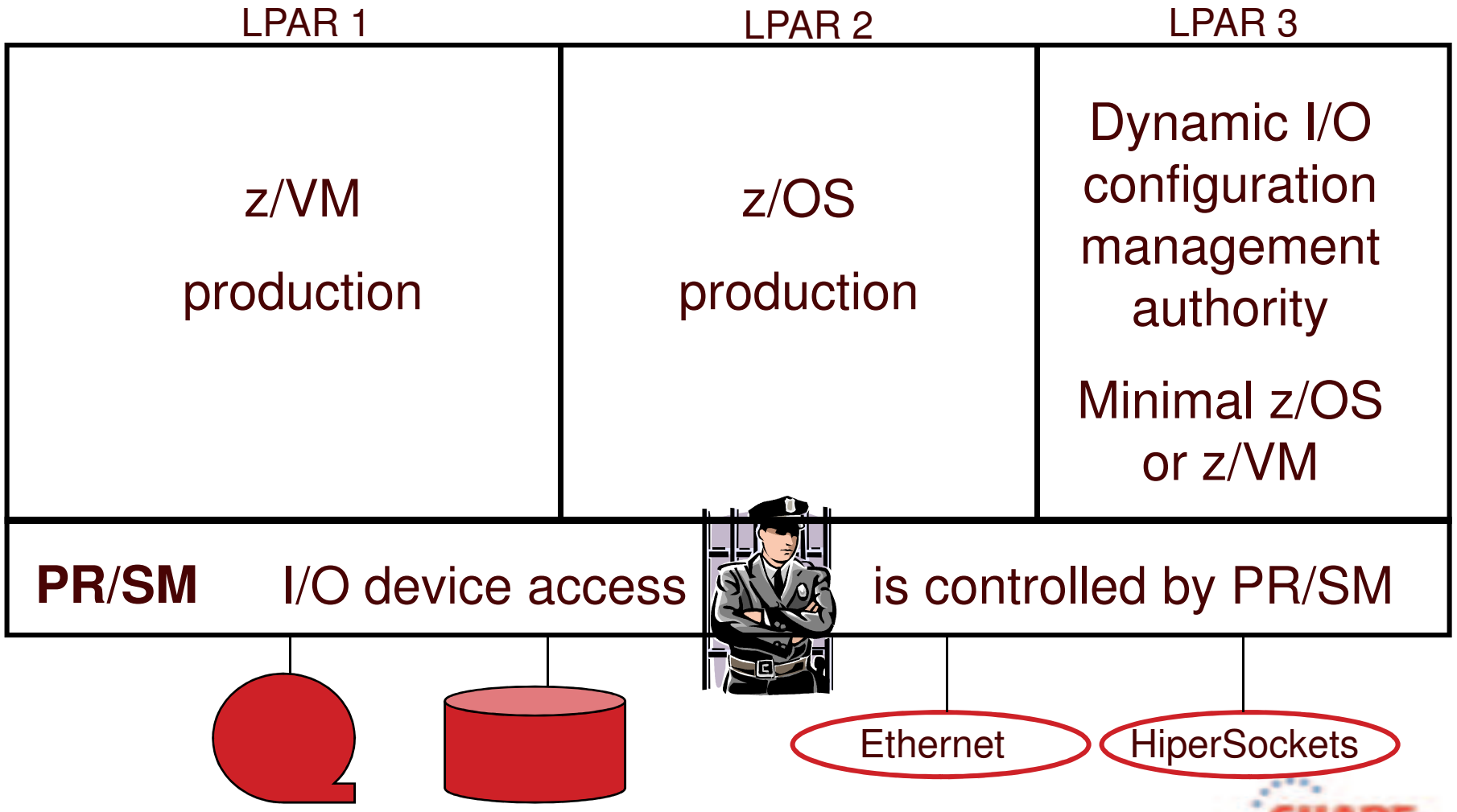


Securing the Hardware

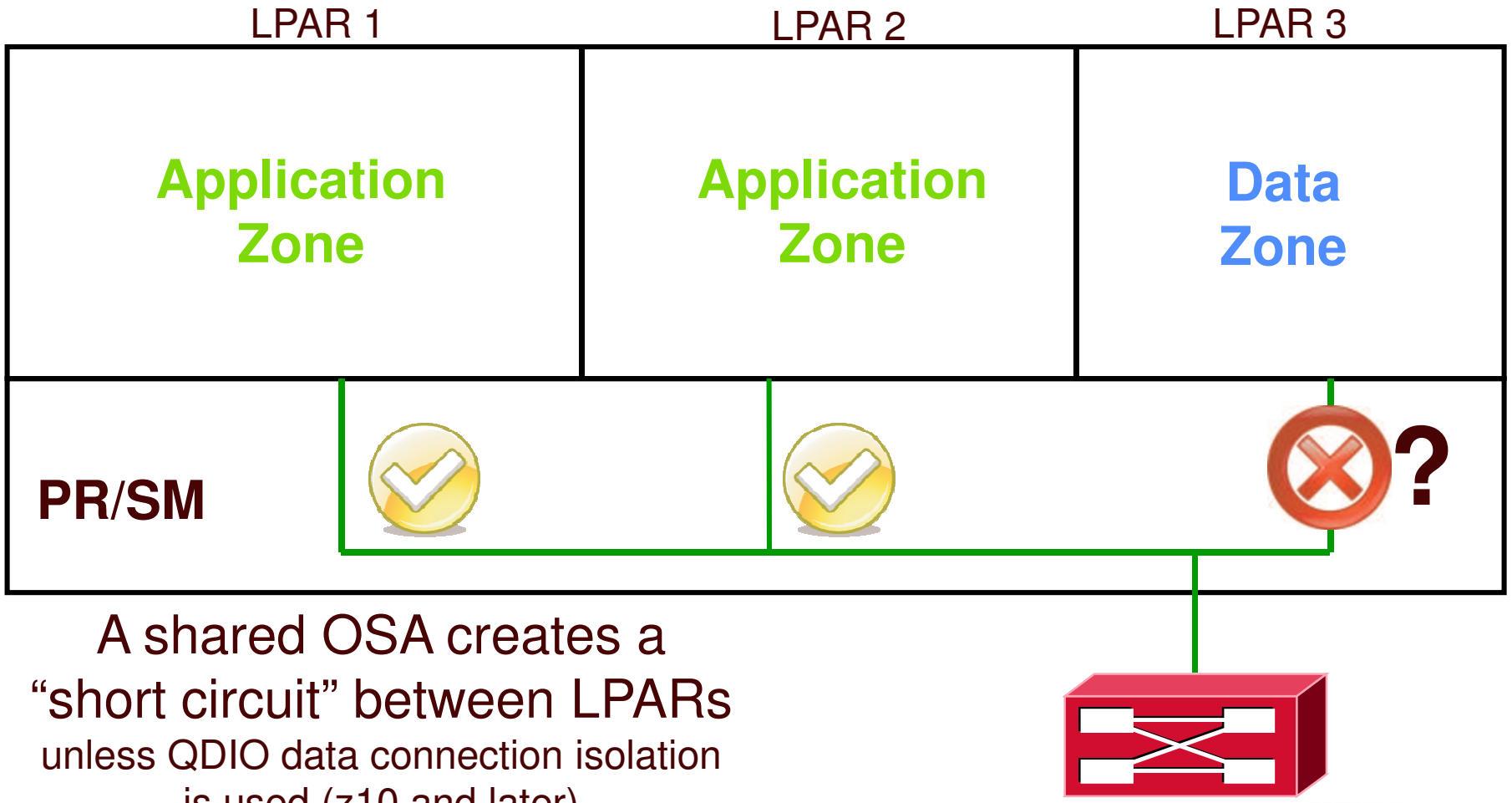
z/VM Security begins with System z security

- Protect the HMC
  - Don’t share user IDs
  - …but don’t be afraid to connect it to your internal network
  - Limit span of control as appropriate; add roles
- Protect the I/O configuration
  - Create a separate LPAR that is authorized to modify the I/O configuration
  - Give partitions access only to devices they require

System z Hardware Security

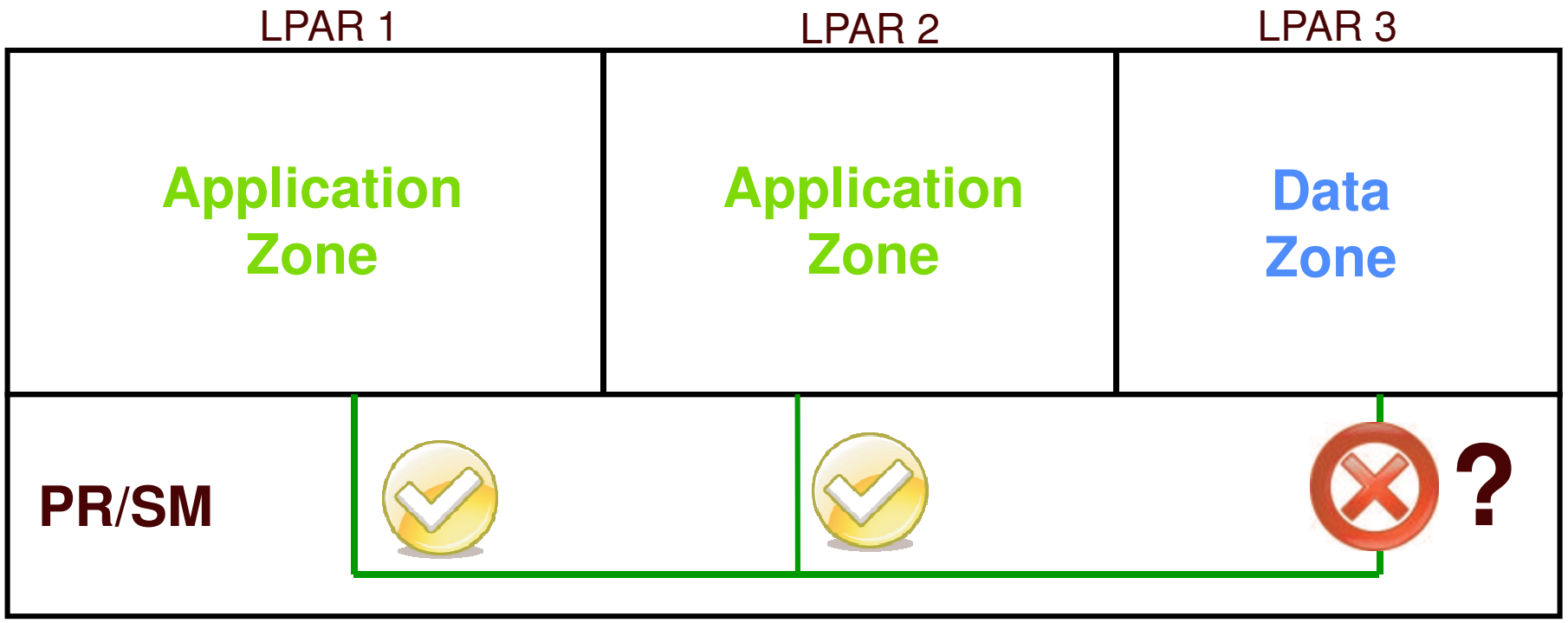


Warning: Shared Open Systems Adapters



A shared OSA creates a "short circuit" between LPARs
unless QDIO data connection isolation is used (z10 and later)

Warning: HiperSockets

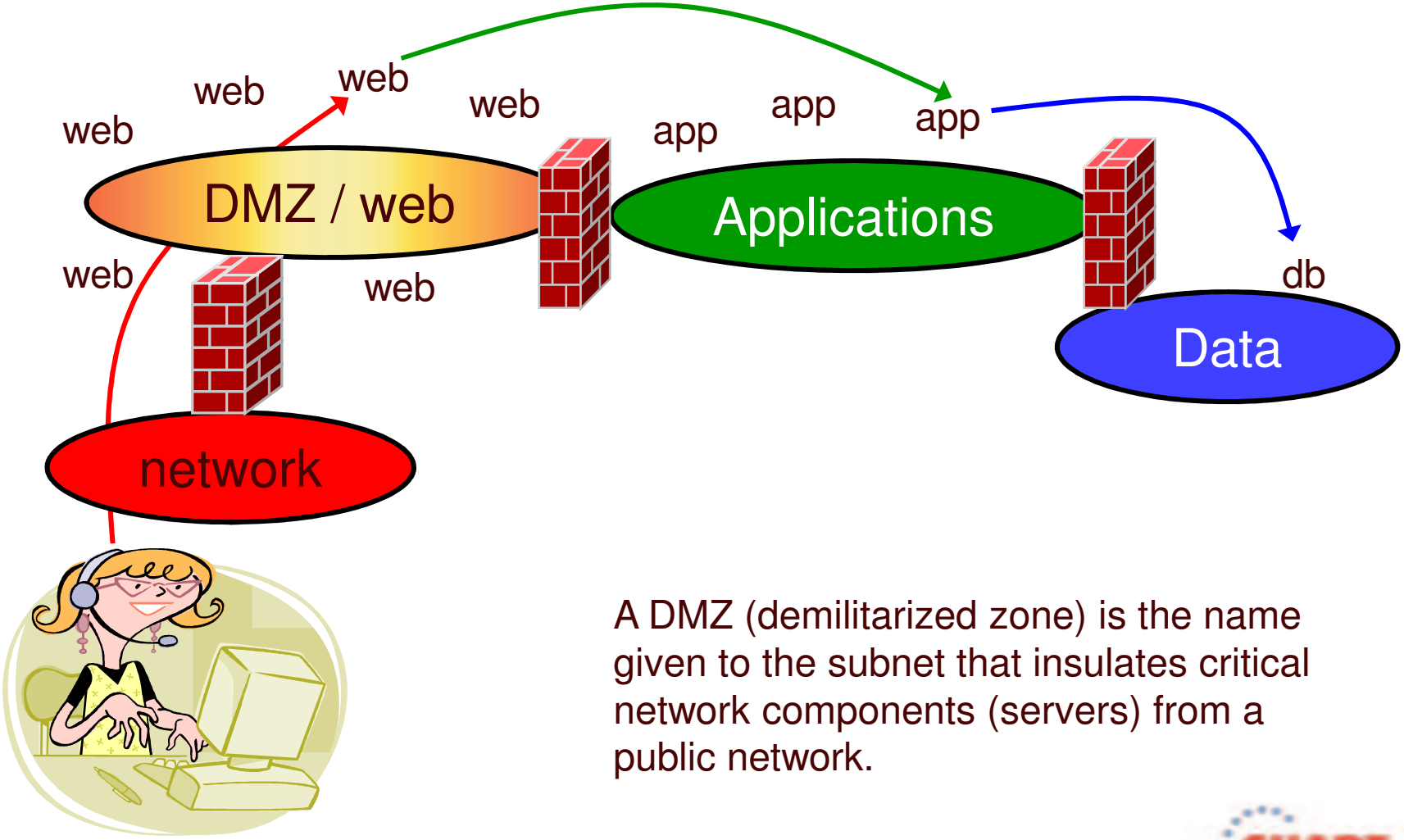


A HiperSocket is a LAN segment.

Treat is like one.

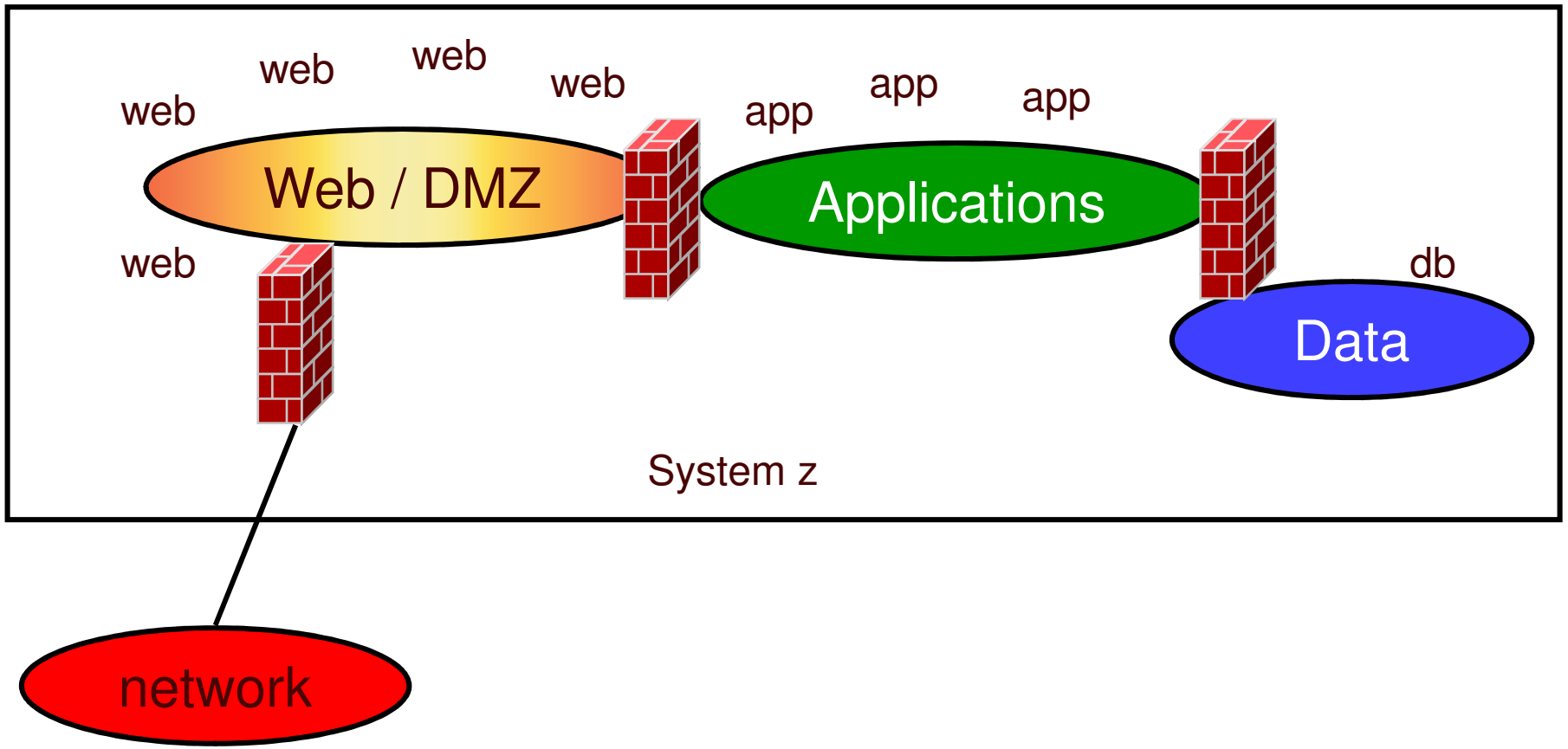
Multi-zone networks

Multi-zone Network



A DMZ (demilitarized zone) is the name given to the subnet that insulates critical network components (servers) from a public network.

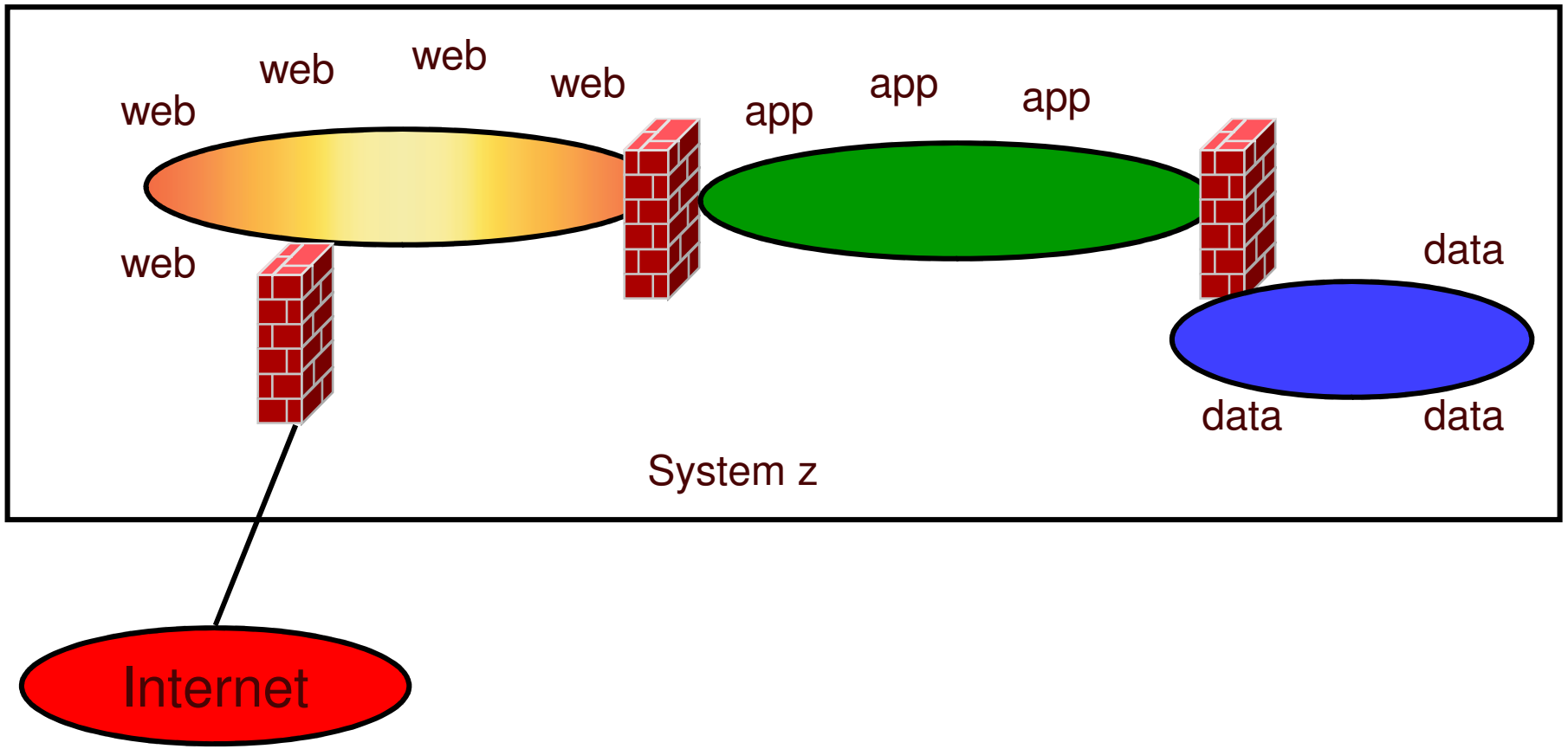
Multi-zone Network on System z



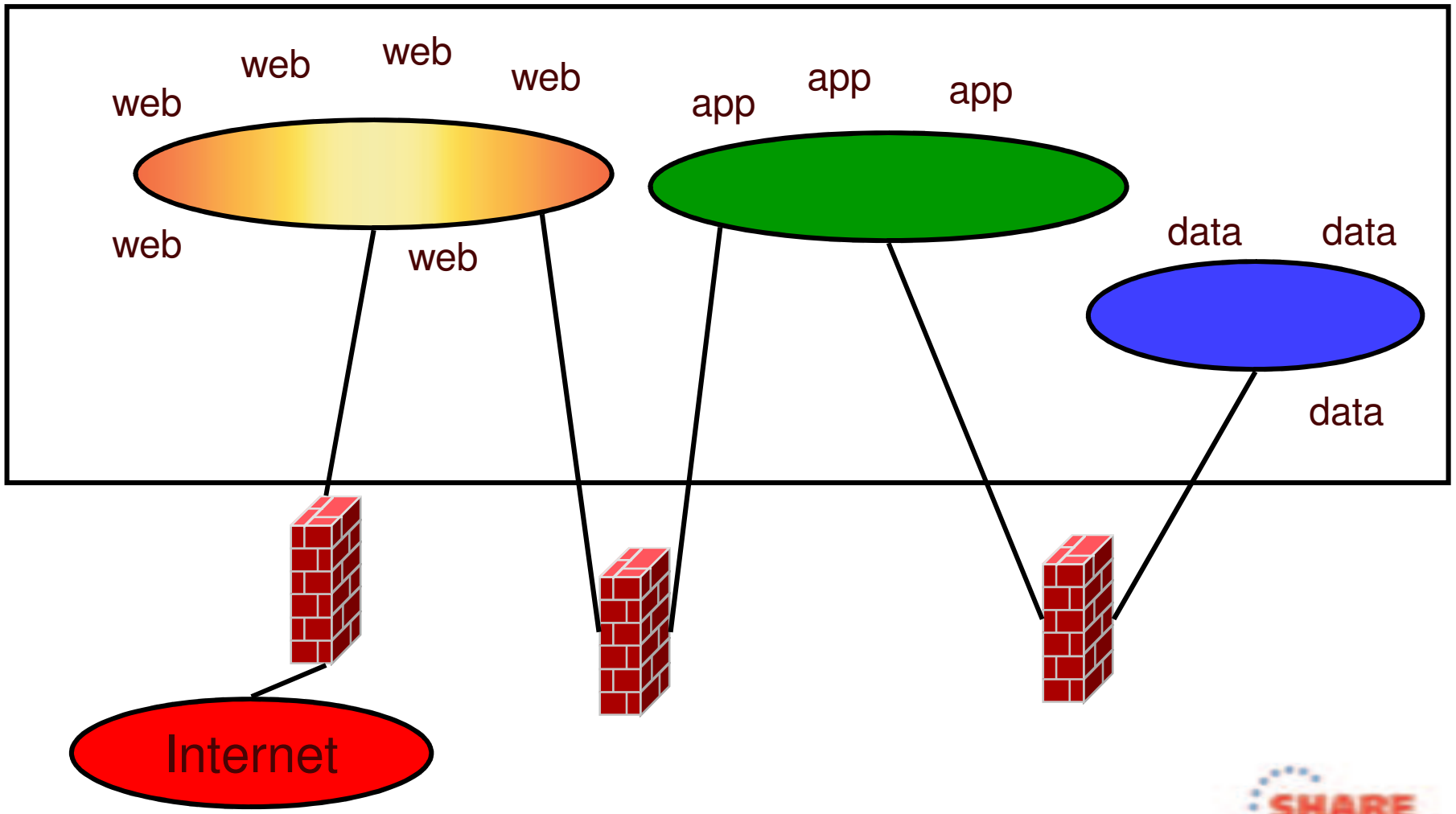
Firewalls

“Where, oh, where has my firewall gone?”

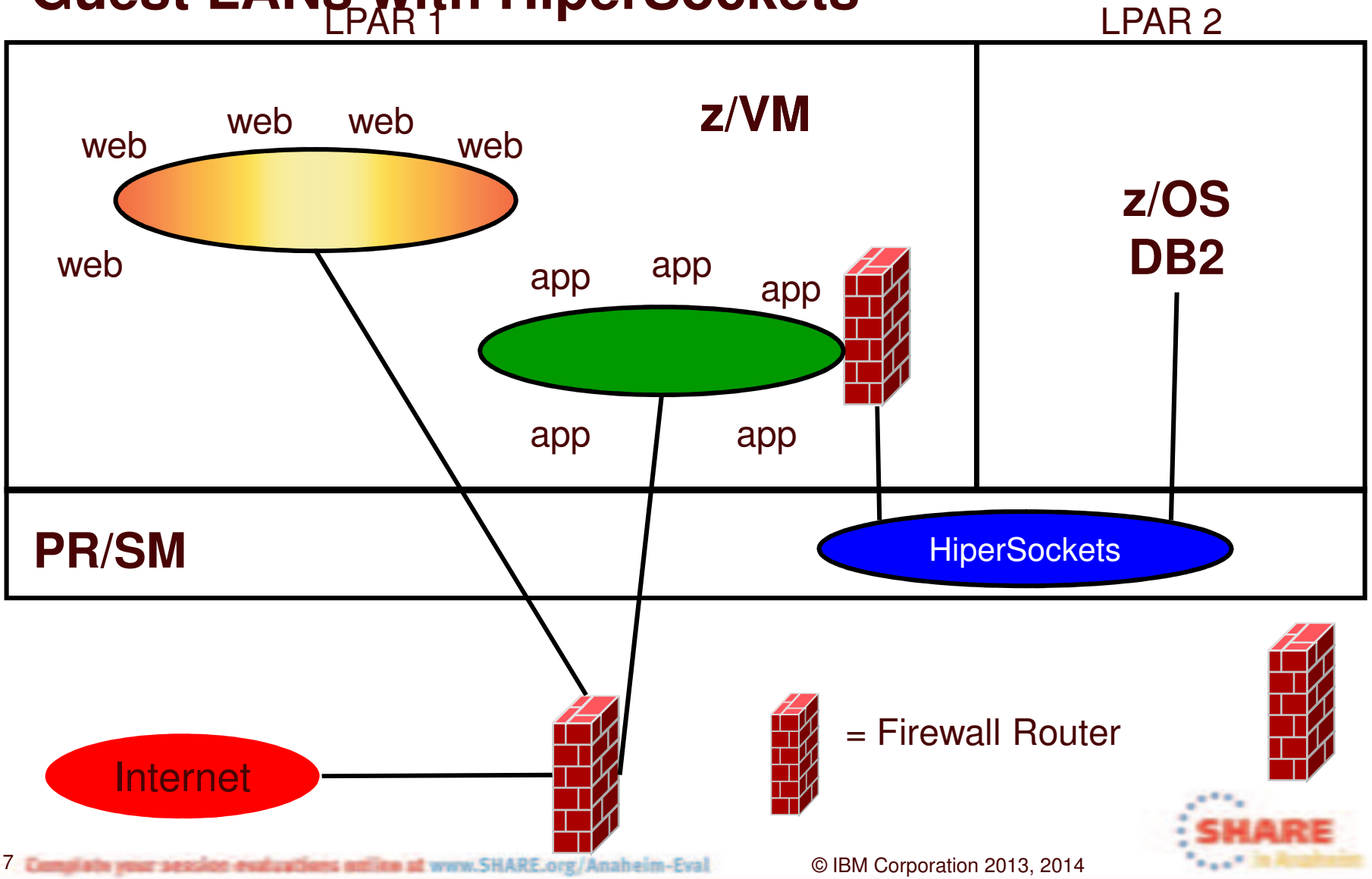
Inboard (internal) firewalls



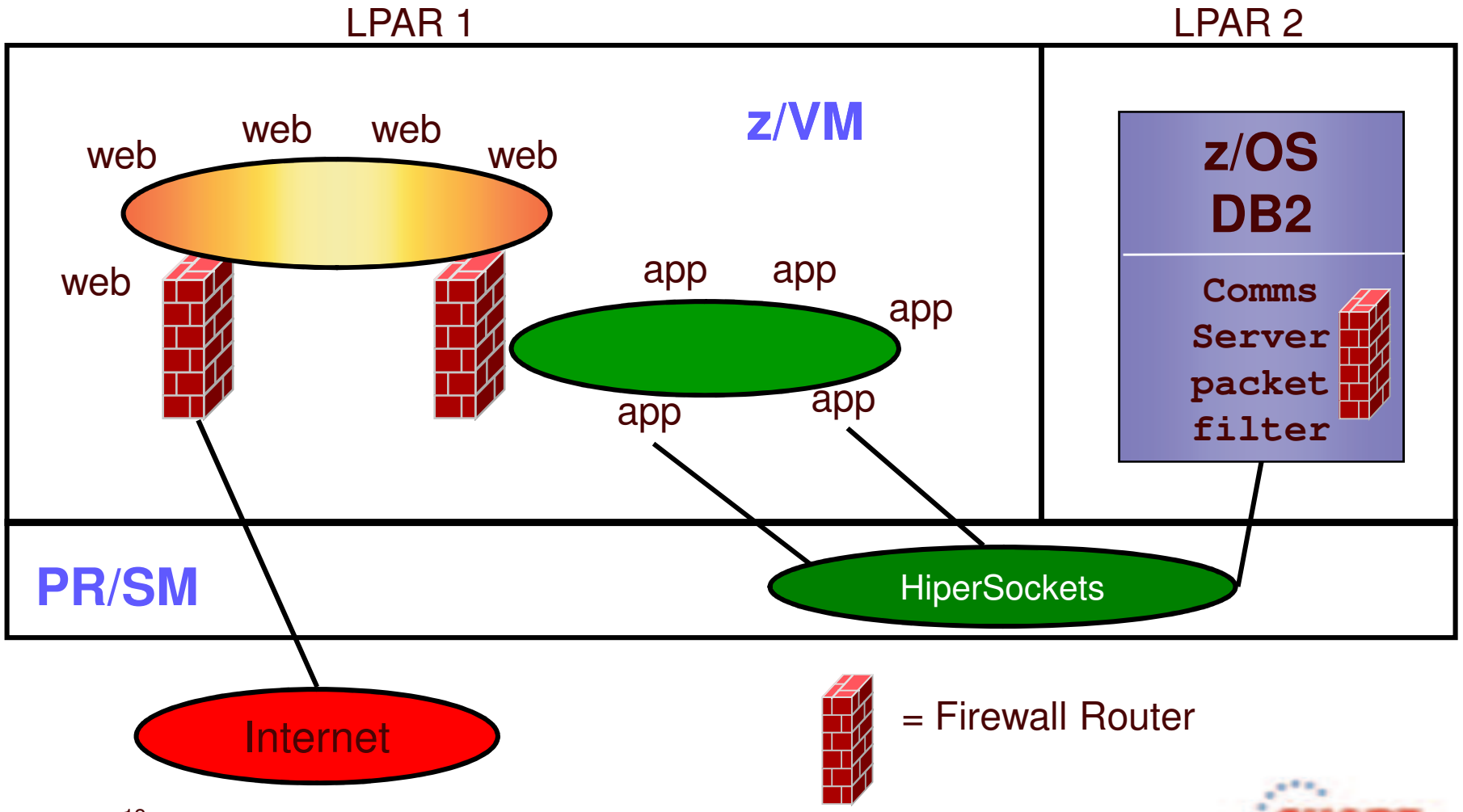
Outboard (external) firewalls

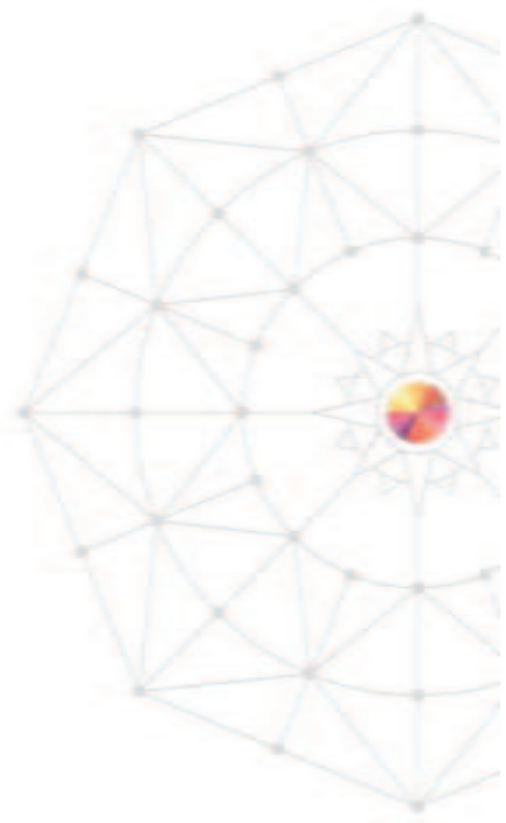


Guest LANs with HiperSockets



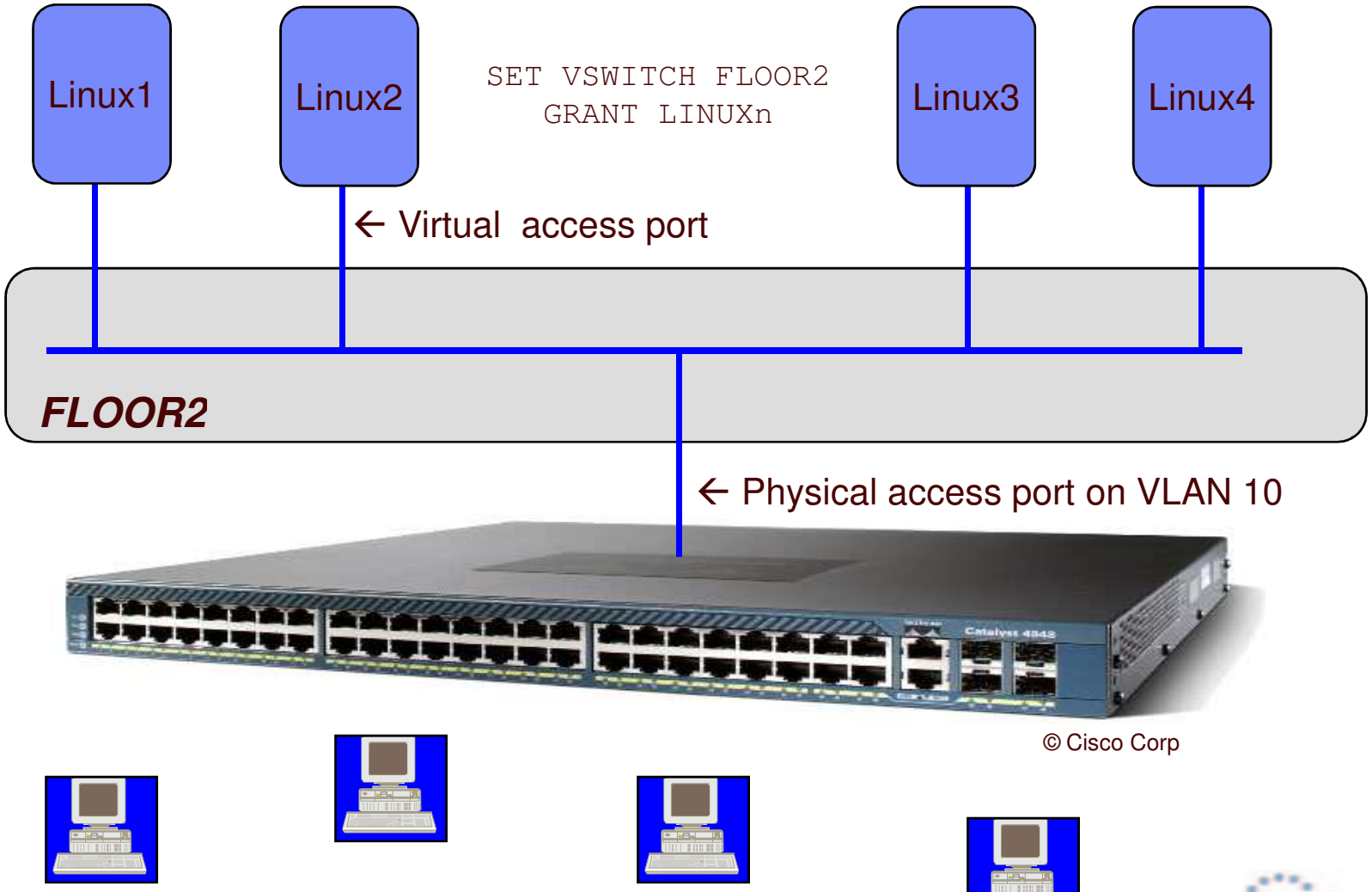
HiperSockets & z/OS packet filters



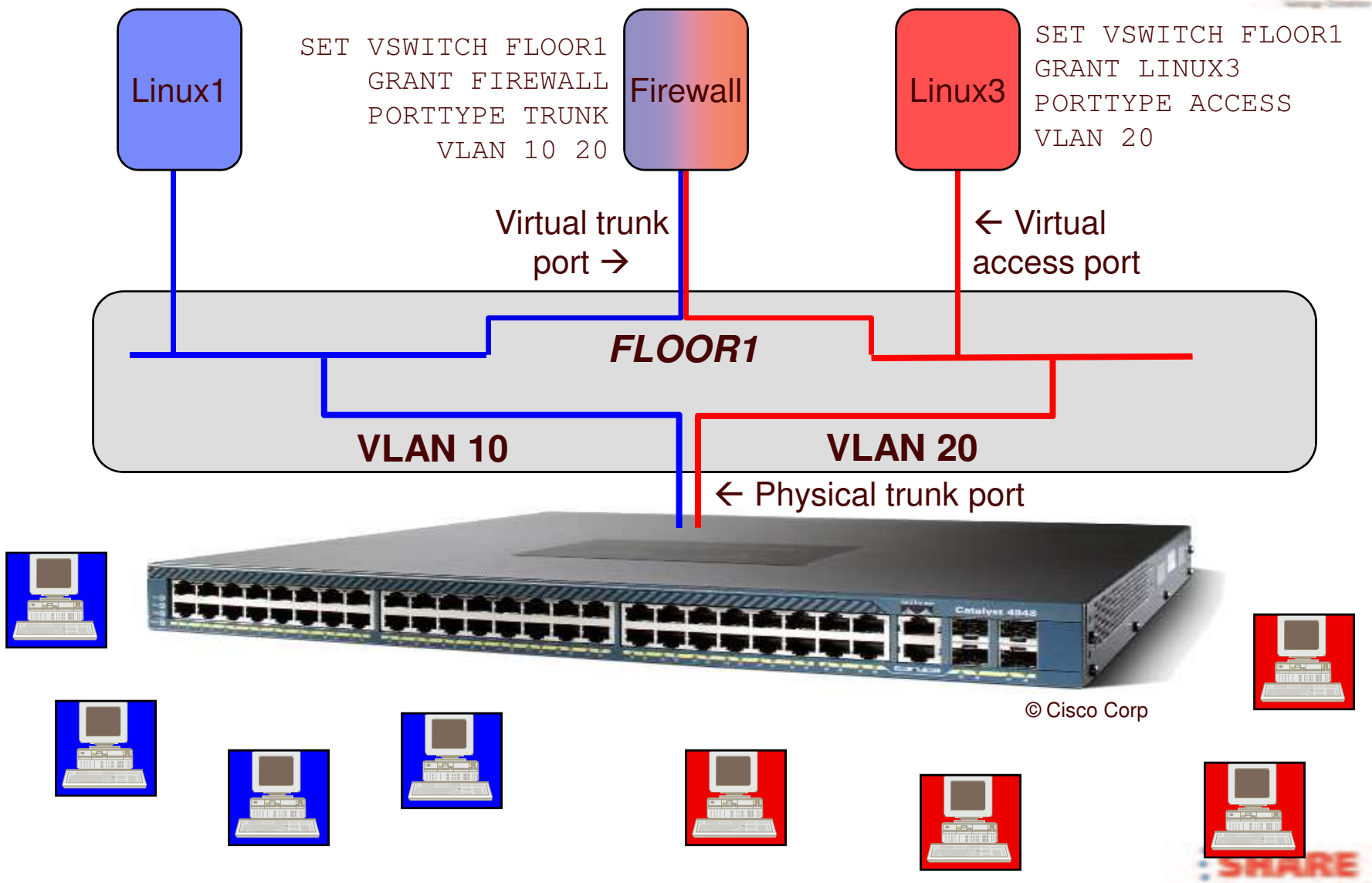


Virtual Switches and VLAN Separation

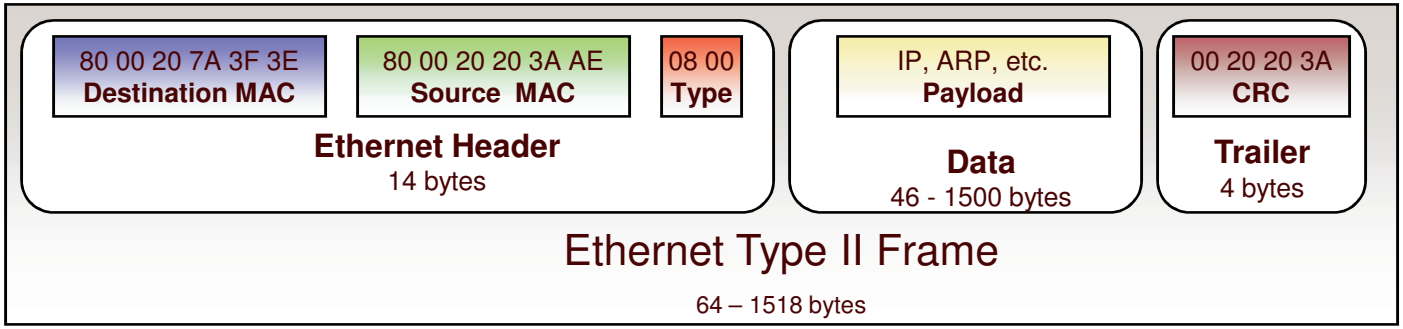
VLAN-unaware VSWITCH



VLAN-aware VSWITCH

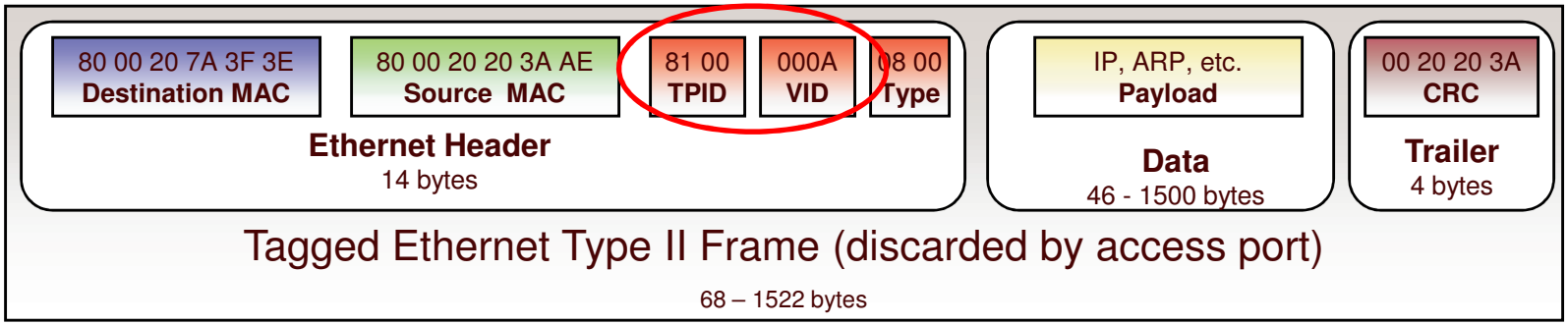


Access vs. Trunk



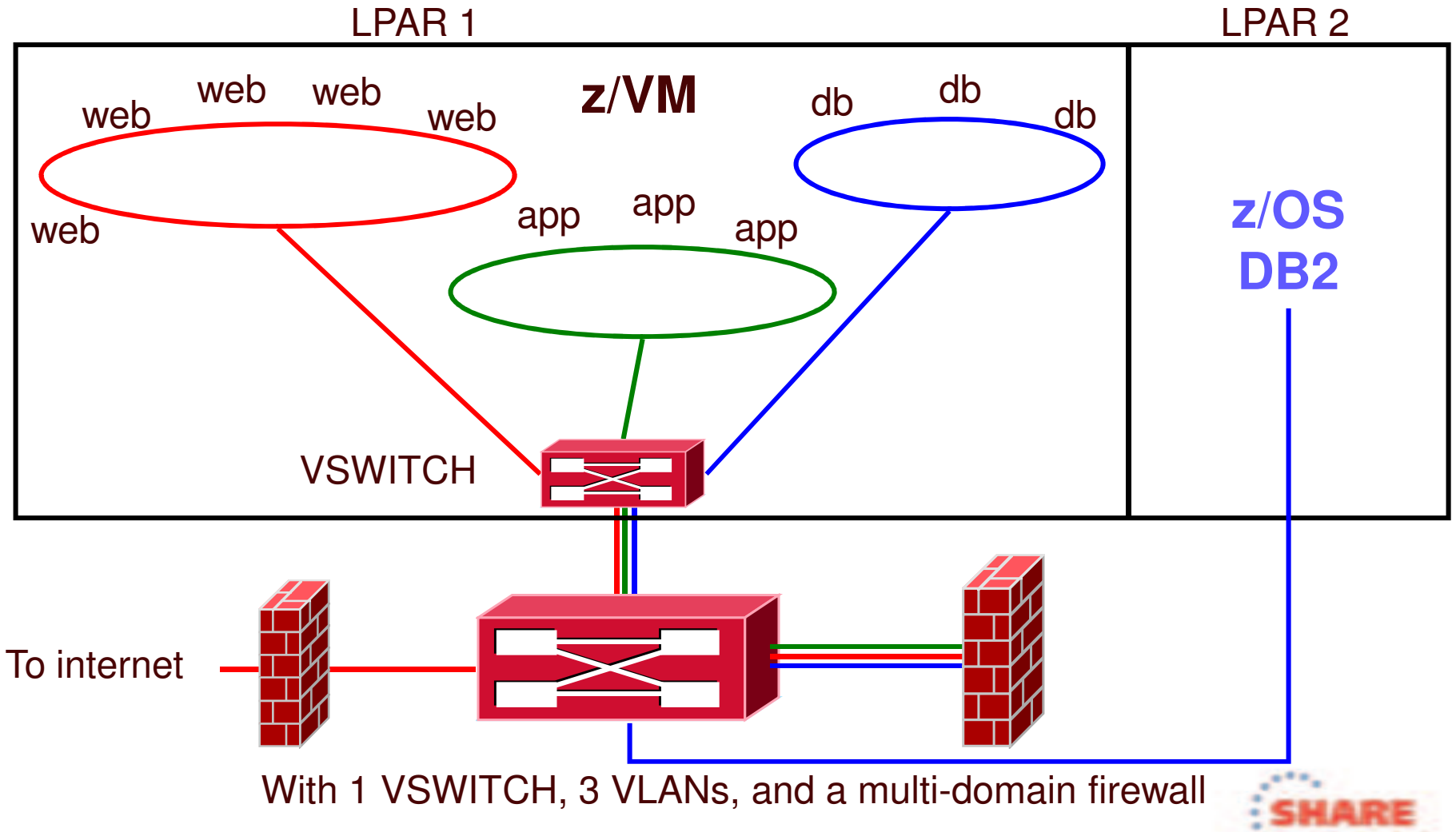
Access port and Trunk port

When used on a trunk port, the switch will associate it with the **native** VLAN ID (VID)



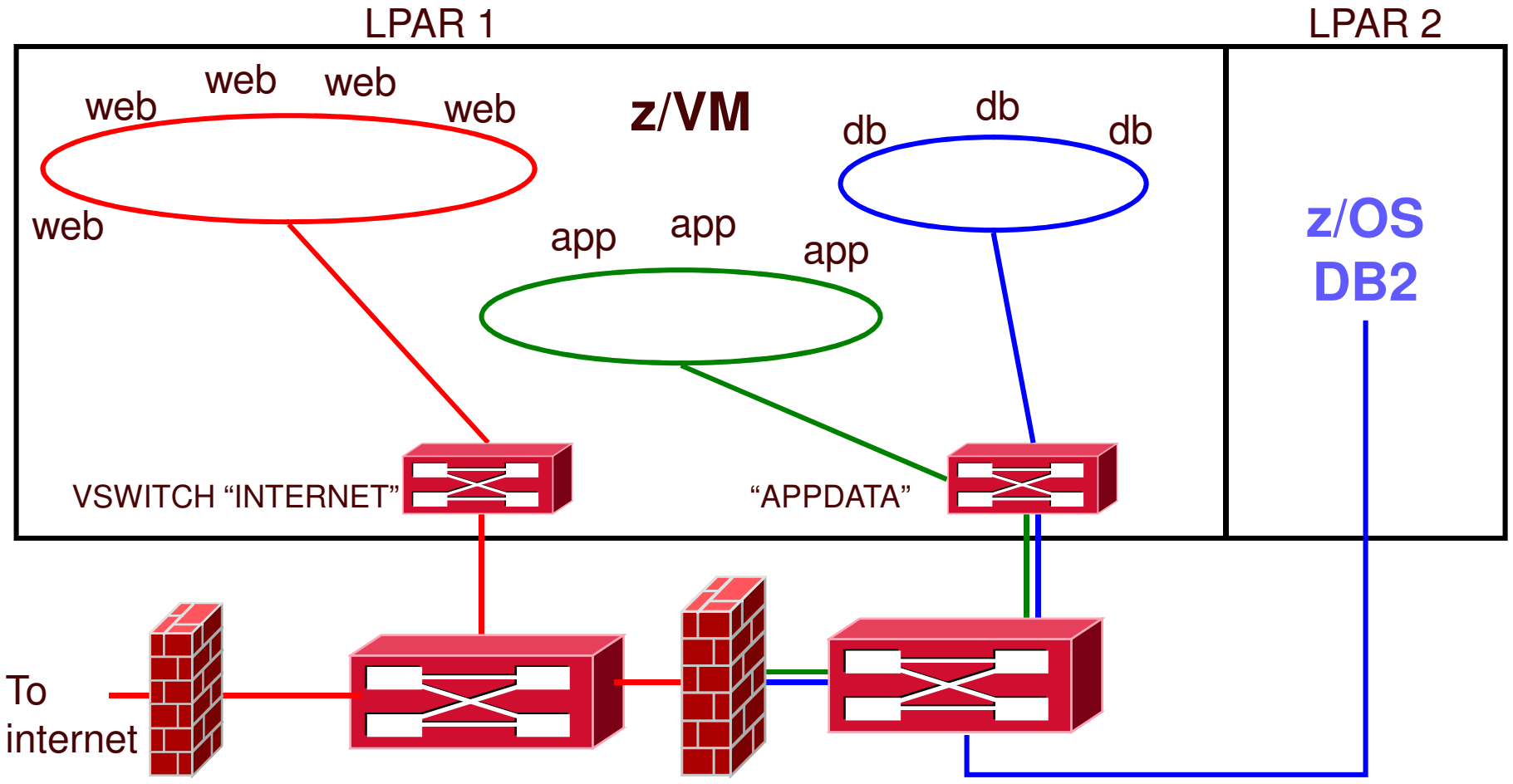
Trunk port

Network with VSWITCH (fully shared)



With 1 VSWITCH, 3 VLANs, and a multi-domain firewall

Multi-zone Network with VSWITCH (red zone physical isolation)



With 2 VSWITCHes, 3 VLANs, and a multi-domain firewall

Enforcing the Separation

Turn off backchannel communications

- No user-defined Guest LANs
  - VMLAN LIMIT TRANSIENT 0
- No virtual CTC
  - MODIFY COMMAND DEFINE IBMCLASS G PRIVCLASS M
- No IUCV
  - Use explicit IUCV authorization in the directory, not IUCV ALLOW or IUCV ANY
- No secondary consoles
  - MODIFY COMMAND SET SUBCMD SECUSER IBMCLASS G PRIVCLASS M
- But what else might there be?

Turn off backchannel communications

- VMCF
  - MODIFY DIAGNOSE DIAG068 IBMCLASS G PRIVCLASS M
- ESA/XC mode address space sharing
- DCSS
- And we can add new interfaces in an APAR
- Google “less than class g” by Rob van der Heij
- Too hard for some folks

- Consider RACF Mandatory Access Controls instead
  - AppArmor and SELinux provide the same capabilities for Linux

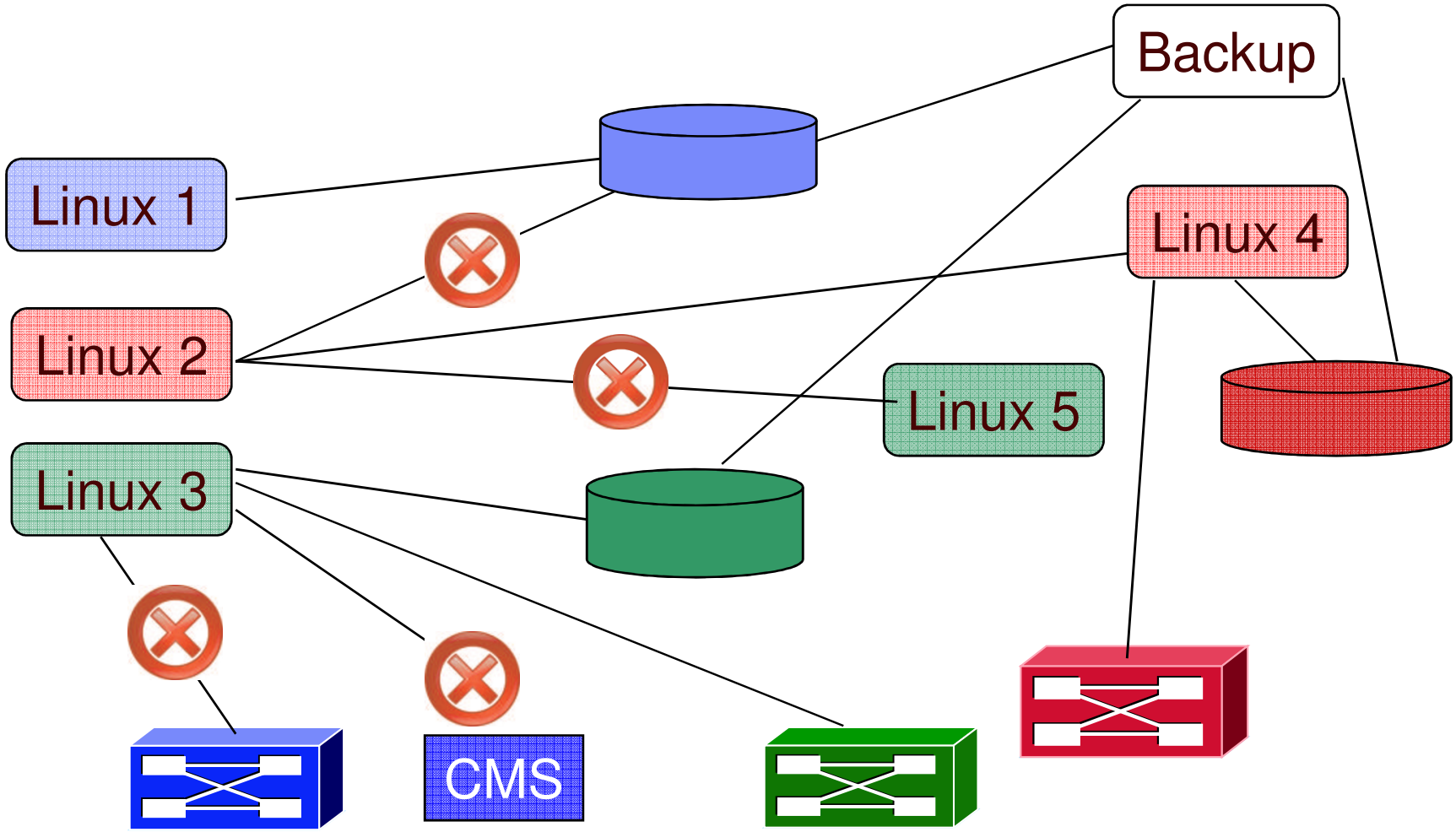
Multi-Zoning with RACF

- Mandatory access controls override end user controls
  - Users are assigned to one or more named projects
  - Minidisks, guest LANs, VSWITCHes, and VLAN IDs, NSSes, DCSSes, spool files
    - all represent data in those same projects
  - Users can only access data in their assigned projects
  - Overrides user- or admin-given permissions

Multi-Zoning with RACF

- A Security Label combines the concepts of
  - Security clearance (secret, top secret, eyes only)
  - Information zones
- Information zones apply to any place data may exist
  - disks, networks, and other users
- Security clearance
  - Ensures servers cannot see extra-sensitive data in their information zone
  - Prevents copying of data to medium that is readable by servers with lower security clearance (“No write down”)
  - Not prevalent since there is no equivalent in distributed networking solutions
- Label “dominance” is established based on intersection of zones and security clearance
  - Not just a simple string comparison

Multi-zone z/VM LPAR with RACF Security Label Enforcement



Multi-Zoning with RACF

- Create security levels and data partitions

```
RDEFINE SECDATA SECLEVEL ADDMEM(DEFAULT/100)
RDEFINE SECDATA CATEGORY ADDMEM(DMZ APPS DATA)

RDEFINE SECLABEL RED   SECLEVEL(DEFAULT) ADDCATEGORY(DMZ)  UACC(NONE)
RDEFINE SECLABEL GREEN SECLEVEL(DEFAULT) ADDCATEGORY(APPS) UACC(NONE)
RDEFINE SECLABEL BLUE  SECLEVEL(DEFAULT) ADDCATEGORY(DATA) UACC(NONE)
```

Multi-Zoning with RACF

Assign virtual machines their SECLABELs

```
PERMIT BLUE CLASS(SECLABEL) ID(LINUX1) ACCESS(READ)
ALTUSER LINUX1 SECLABEL(BLUE)

PERMIT RED CLASS(SECLABEL) ID(LINUX2) ACCESS(READ)
ALTUSER LINUX2 SECLABEL(RED)
```

Multi-Zoning with RACF

- But sometimes a server serves the Greater Good, providing services to all users
- Exempt server from label checking
- Assign predefined label SYSNONE

```
PERMIT SYSNONE CLASS(SECLABEL) ID(TCPIP) ACCESS(READE)

ALTUSER TCPIP SECLABEL(SYSNONE)
```

Multi-Zoning with RACF

- Example: Assign labels to resources
  - VMMDISK: Minidisk
  - VMLAN: Guest LANs and Virtual Switches

```
RALTER VMMDISK LXHTTP01.191 SECLABEL(RED)
RALTER VMMDISK LXHTTP01.201 SECLABEL(RED)

RALTER VMLAN SYSTEM.INTERNET SECLABEL(RED)

RALTER VMLAN SYSTEM.APPDATA SECLABEL(SYSNONE)
RALTER VMLAN SYSTEM.APPDATA.0010 SECLABEL(BLUE)
RALTER VMLAN SYSTEM.APPDATA.0020 SECLABEL(RED)

PERMIT SYSTEM.APPDATA.0010 CL(VMLAN) ID(LINUX1) ACC(UPDATE)
PERMIT SYSTEM.APPDATA.0020 CL(VMLAN) ID(LINUX2) ACC(UPDATE)
```

Multi-Zoning with RACF

- Activate RACF protection
  - SETROPTS CLASSACT(SECLABEL VMMDISK VMLAN)
  - SETROPTS RACLIST(SECLABEL)
  - SETROPTS MLACTIVE(WARNINGS)
    - If resource doesn't have a seclabel, message is issued and seclabels are ignored.

  Or

  - SETROPTS MLACTIVE(FAILURES)
    - If resource doesn't have a seclabel, command fails.
      - *This is more secure!*

Summary

- Check network design with network architect
- Place firewalls where the network security team wants them to go
- Use common sense
  - Protect the hardware
  - Protect your data
  - Protect your servers
  - Protect your company
  - Protect yourself!!

Reference Information

- This presentation
  - http://www.VM.ibm.com/devpages/altmarka/present.html
- z/VM Security resources
  - http://www.VM.ibm.com/security
- z/VM Secure Configuration Guide
  - http://publibz.boulder.ibm.com/epubs/pdf/hcss0b30.pdf
- System z Security
  - http://www.ibm.com/systems/z/advantages/security/
- z/VM Home Page
  - http://www.VM.ibm.com

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