Session 17520

Virtual Security Zones on z/VM

Alan Altmark
Senior Managing z/VM Consultant
IBM Systems Lab Services

Trademarks

The following are trademarks of the International Business Machines Corporation in the United States and/or other countries.

IBM*
IBM logo*
System Storage*
System z*
System z9*
System z10*
z9*
z10
z/OS*
z/VM*
zEnterprise*

* Registered trademarks of IBM Corporation

The following are trademarks or registered trademarks of other companies.

Intel is a trademark of Intel Corporation in the United States, other countries, or both.

Java and all Java-related trademarks and logos are trademarks of Sun Microsystems, Inc., in the United States and other countries

Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Microsoft, Windows and Windows NT are registered trademarks of Microsoft Corporation.

Red Hat, the Red Hat "Shadow Man" logo, and all Red Hat-based trademarks and logos are trademarks or registered trademarks of Red Hat, Inc., in the United States and other countries.

* All other products may be trademarks or registered trademarks of their respective companies.

Notes:

All customer examples cited or described in this presentation are presented as illustrations of the manner in which some customers have used IBM products and the results they may have achieved. Actual environmental costs and performance characteristics will vary depending on individual customer configurations and conditions.

This publication was produced in the United States. IBM may not offer the products, services or features discussed in this document in other countries, and the information may be subject to change without notice. Consult your local IBM business contact for information on the product or services available in your area.

All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

Information about non-IBM products is obtained from the manufacturers of those products or their published announcements. IBM has not tested those products and cannot confirm the performance, compatibility, or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

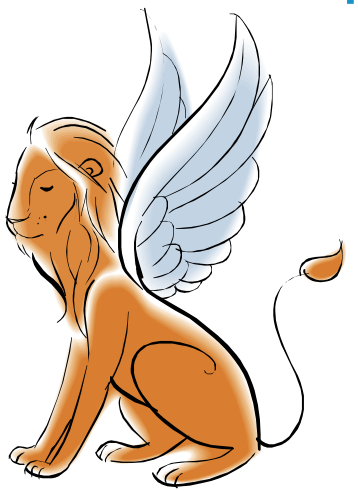
Prices subject to change without notice. Contact your IBM representative or Business Partner for the most current pricing in your geography.

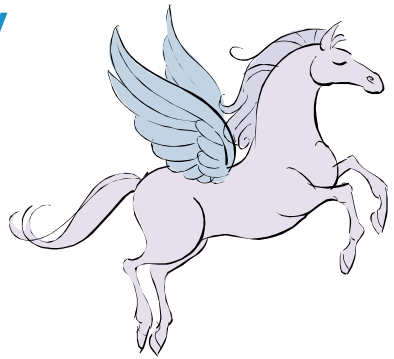
Agenda

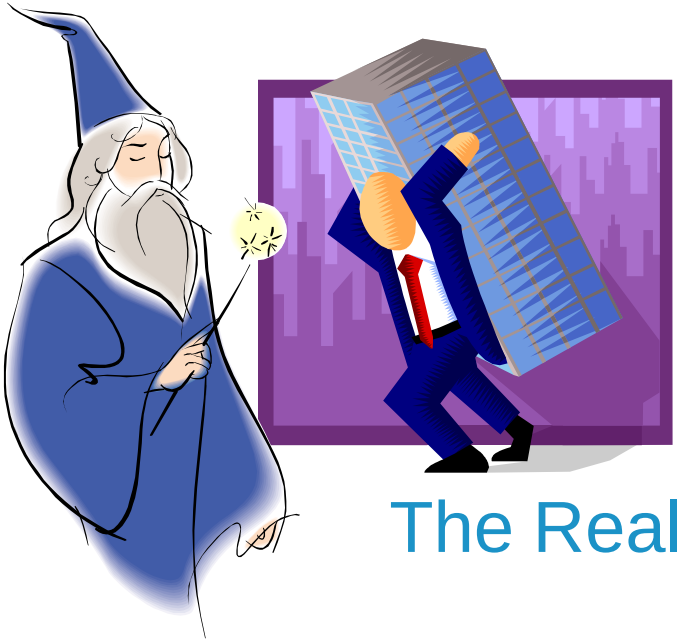
- Introduction
- Securing System z hardware
- A multi-zone network
- VLANs and traffic separation
- Enforcing the rules

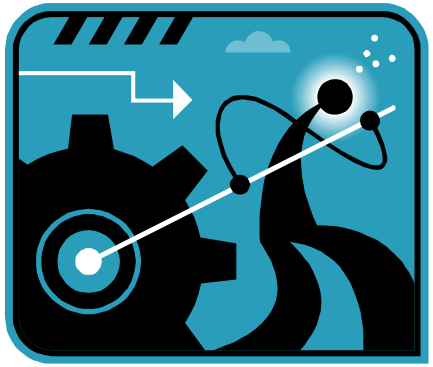



The Myth of Mainframe Security

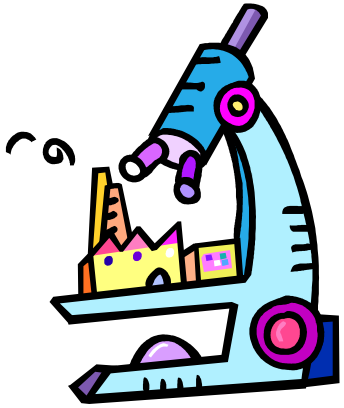






The Reality of Mainframe Security



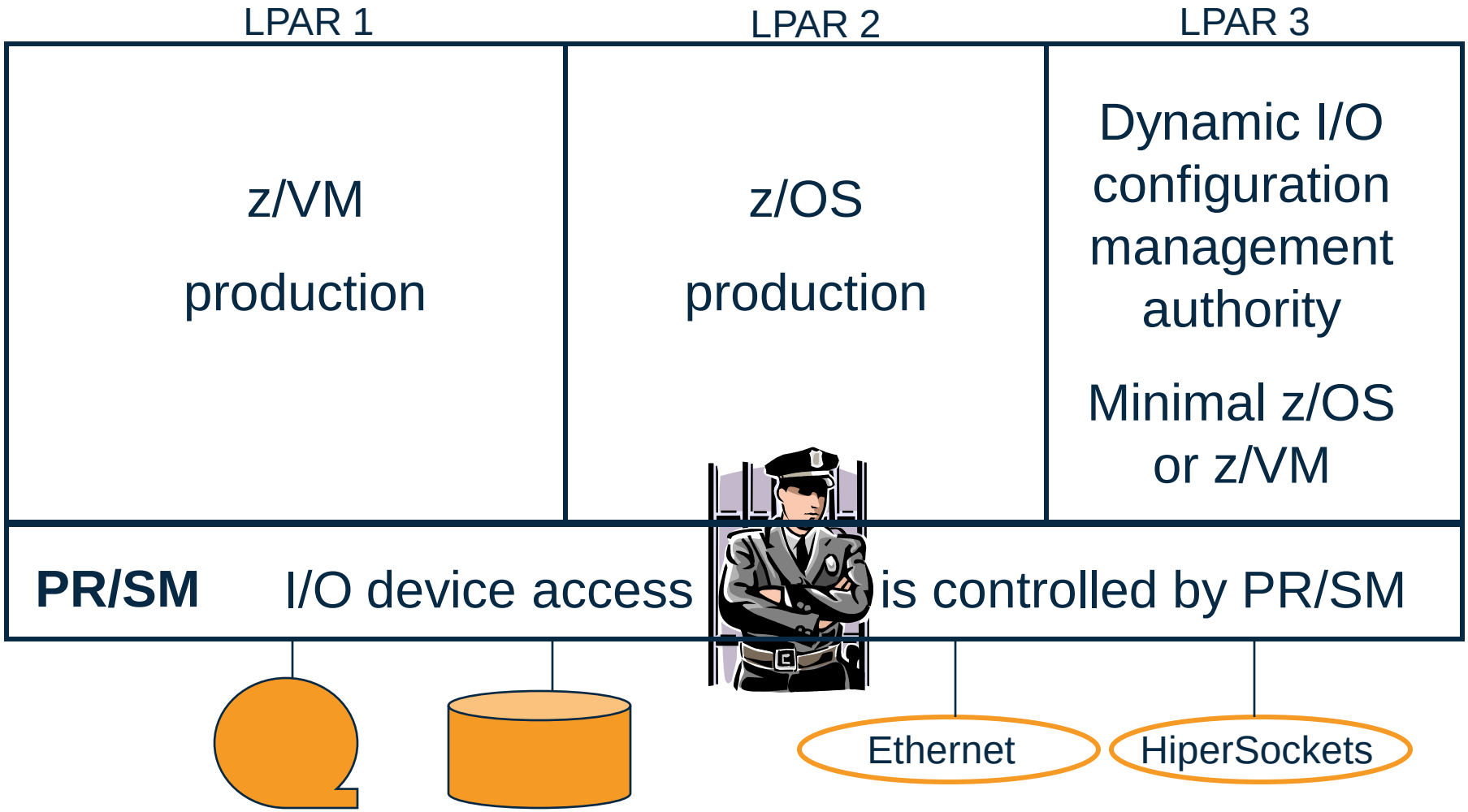
Securing the Hardware

z/VM Security begins with System z security

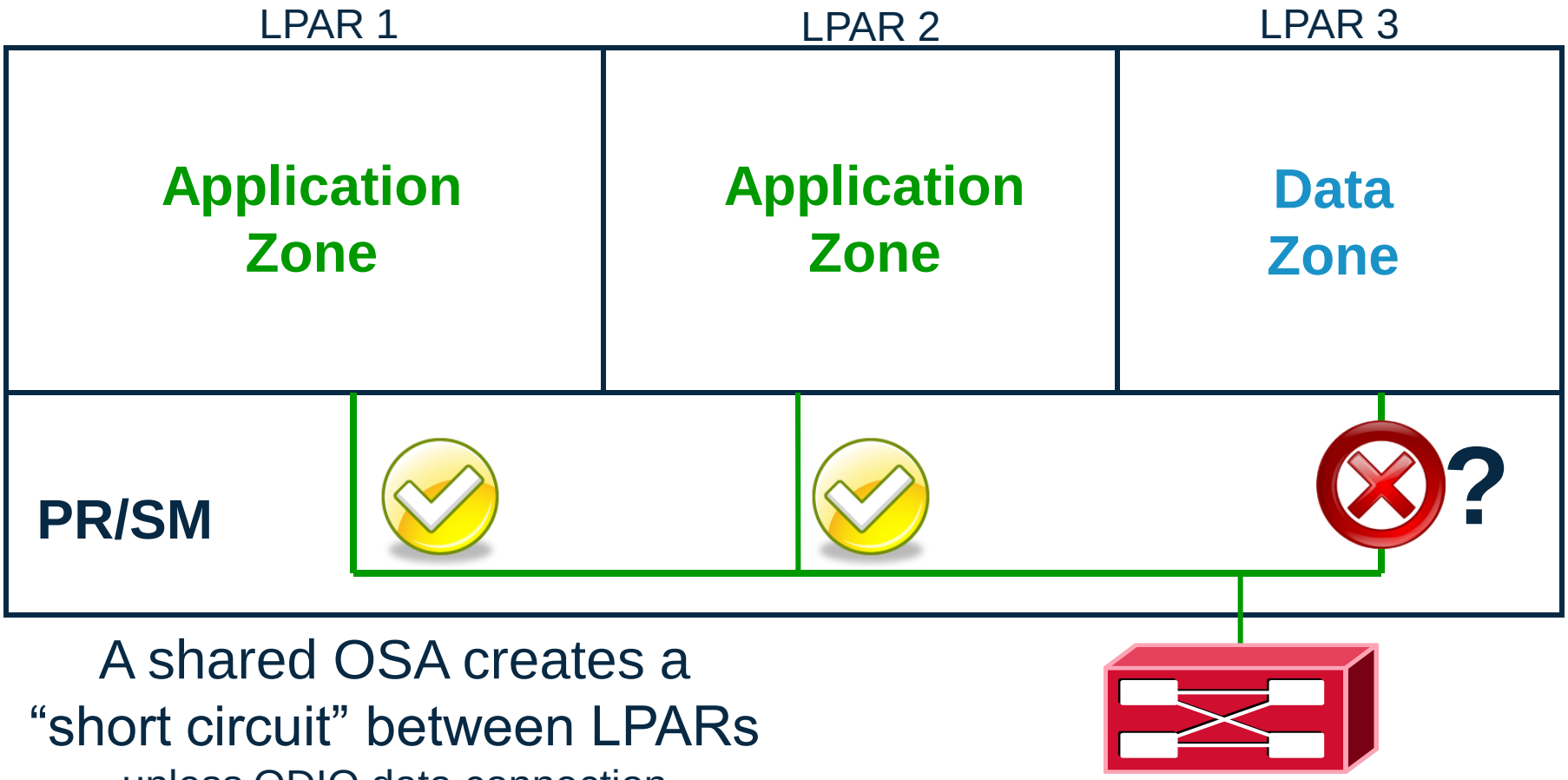
- Protect the HMC
  - Don’t share user IDs
  - …but don’t be afraid to connect it to your internal network
  - Limit span of control as appropriate; add roles

- 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



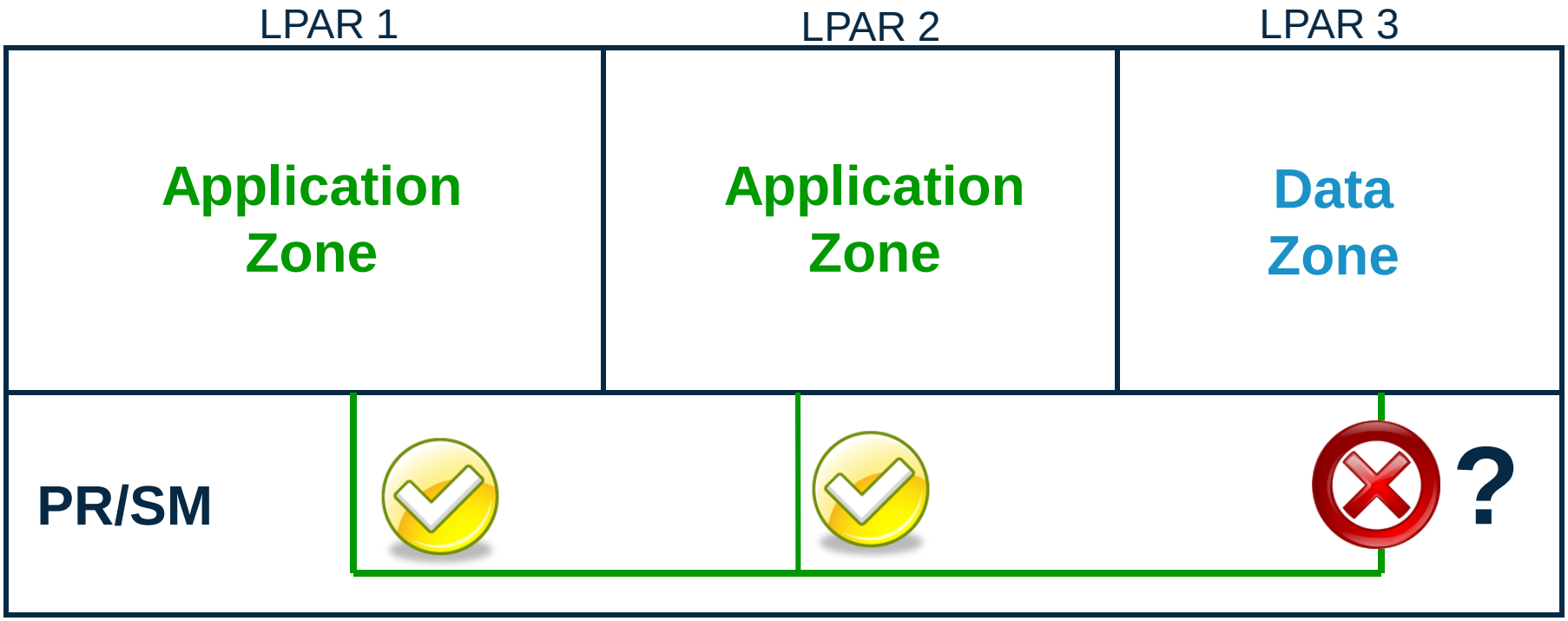
Warning: Shared Open Systems Adapters



A shared OSA creates a "short circuit" between LPARs

unless QDIO data connection isolation is used

Warning: HiperSockets

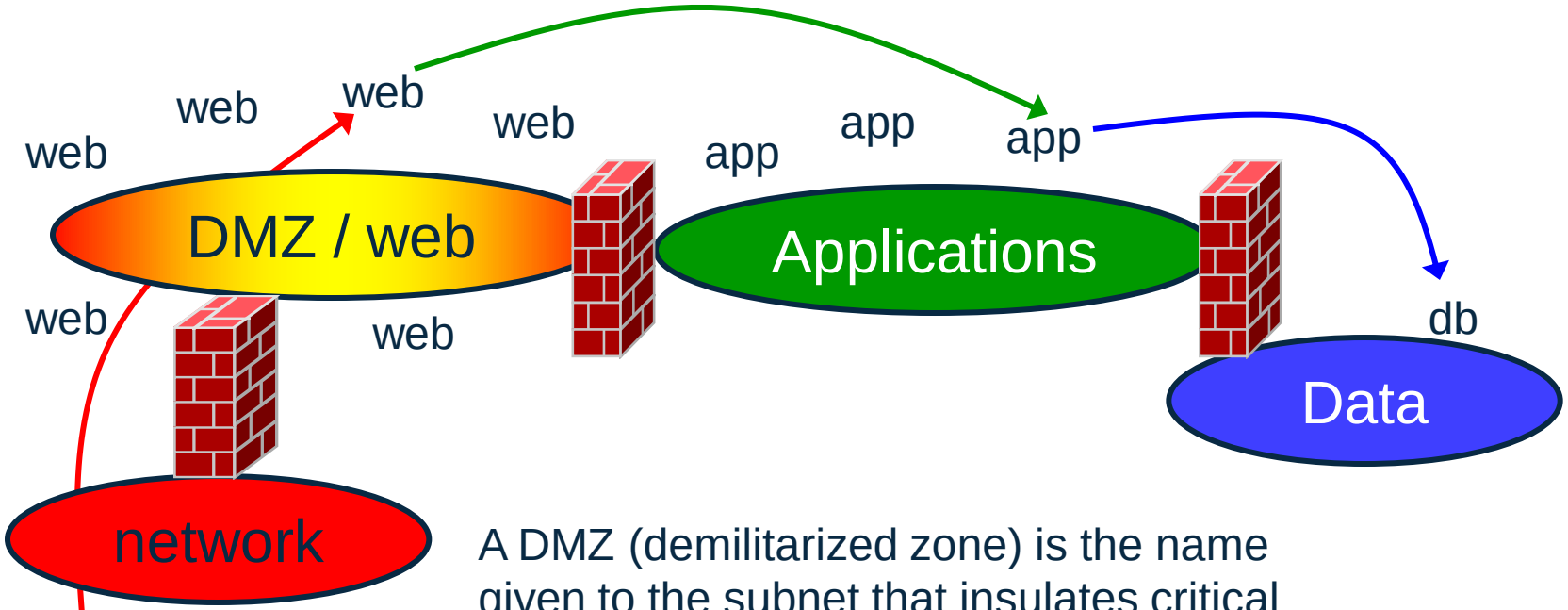


A HiperSocket is a LAN segment.

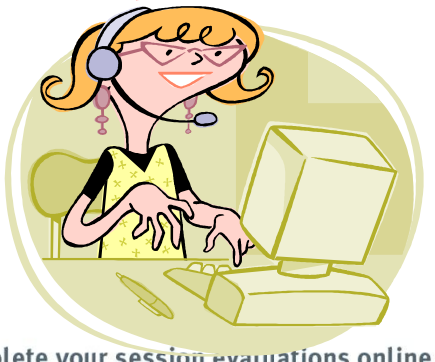
Treat is like one.

Multi-zone Networks

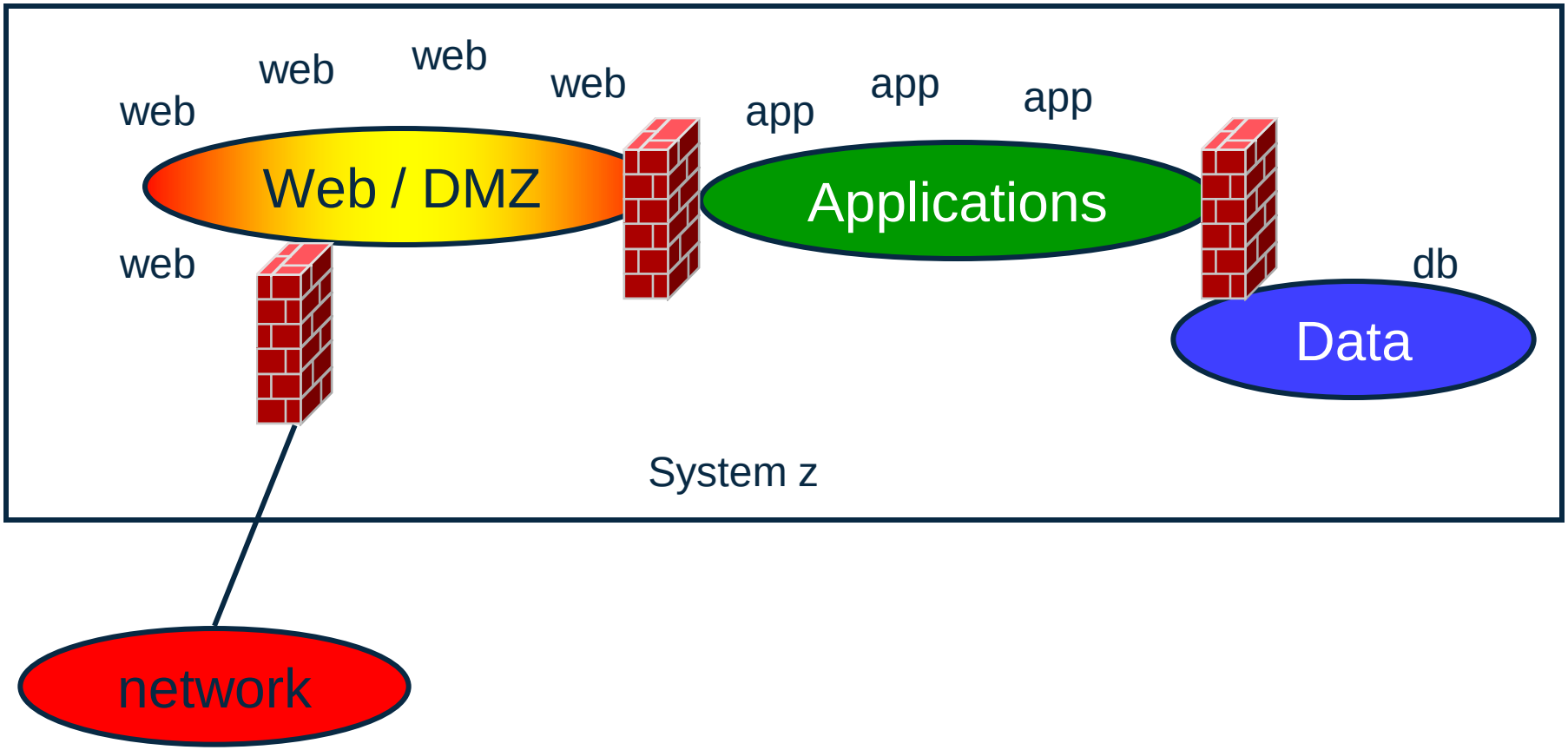
Multi-zone Network



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



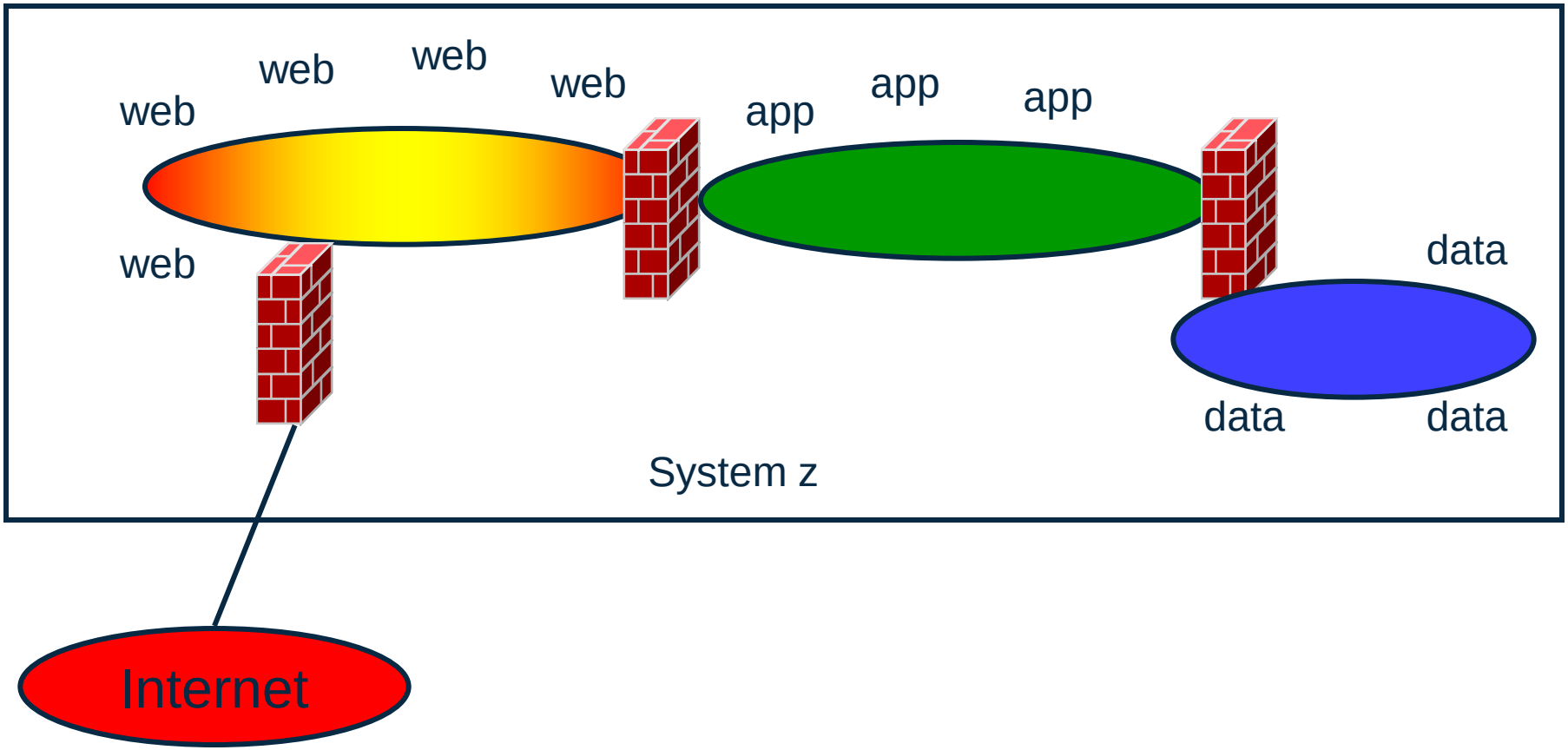
Multi-zone Network on System z



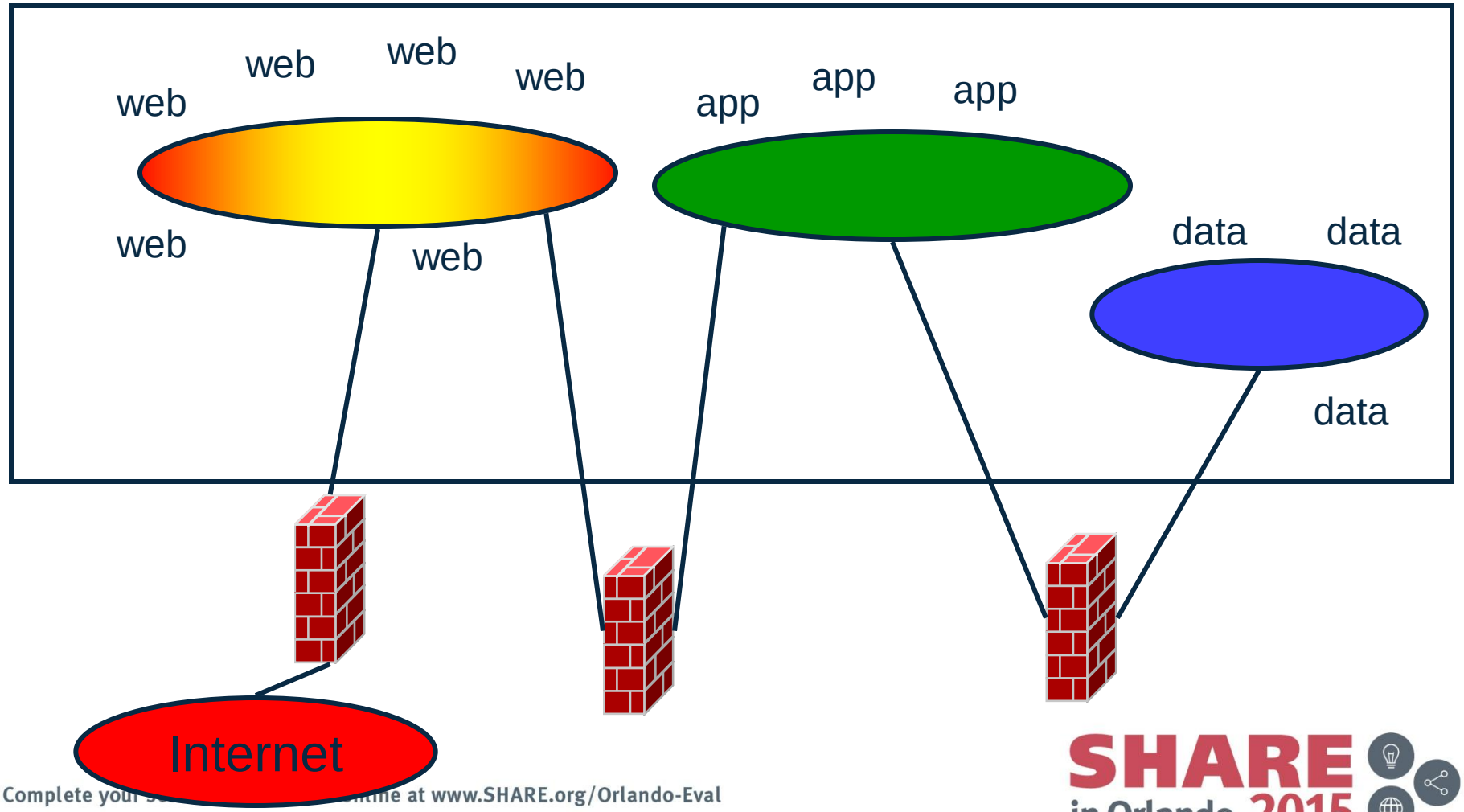
Firewalls

"Where, oh, where has my firewall gone?"

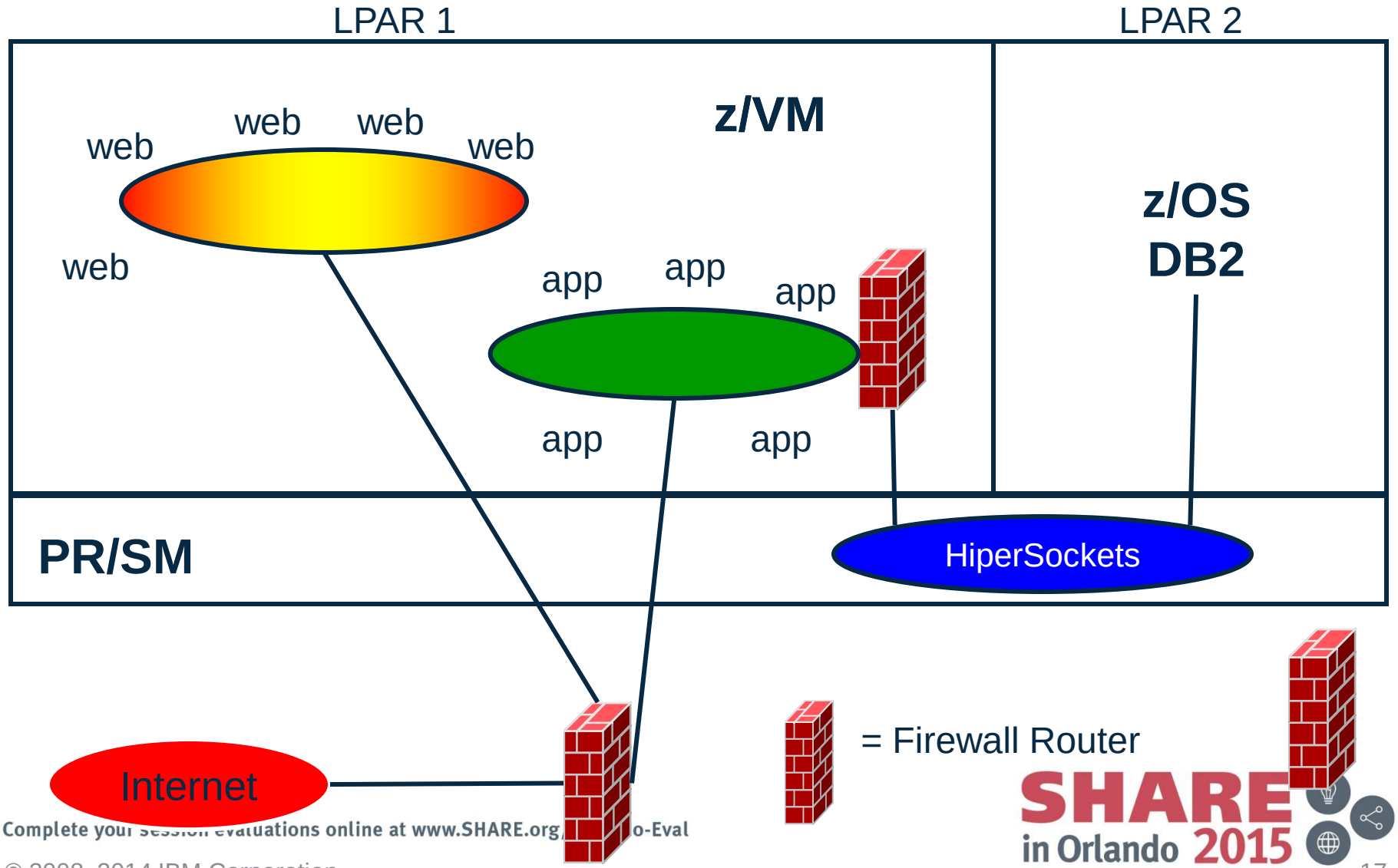
Inboard (internal) firewalls



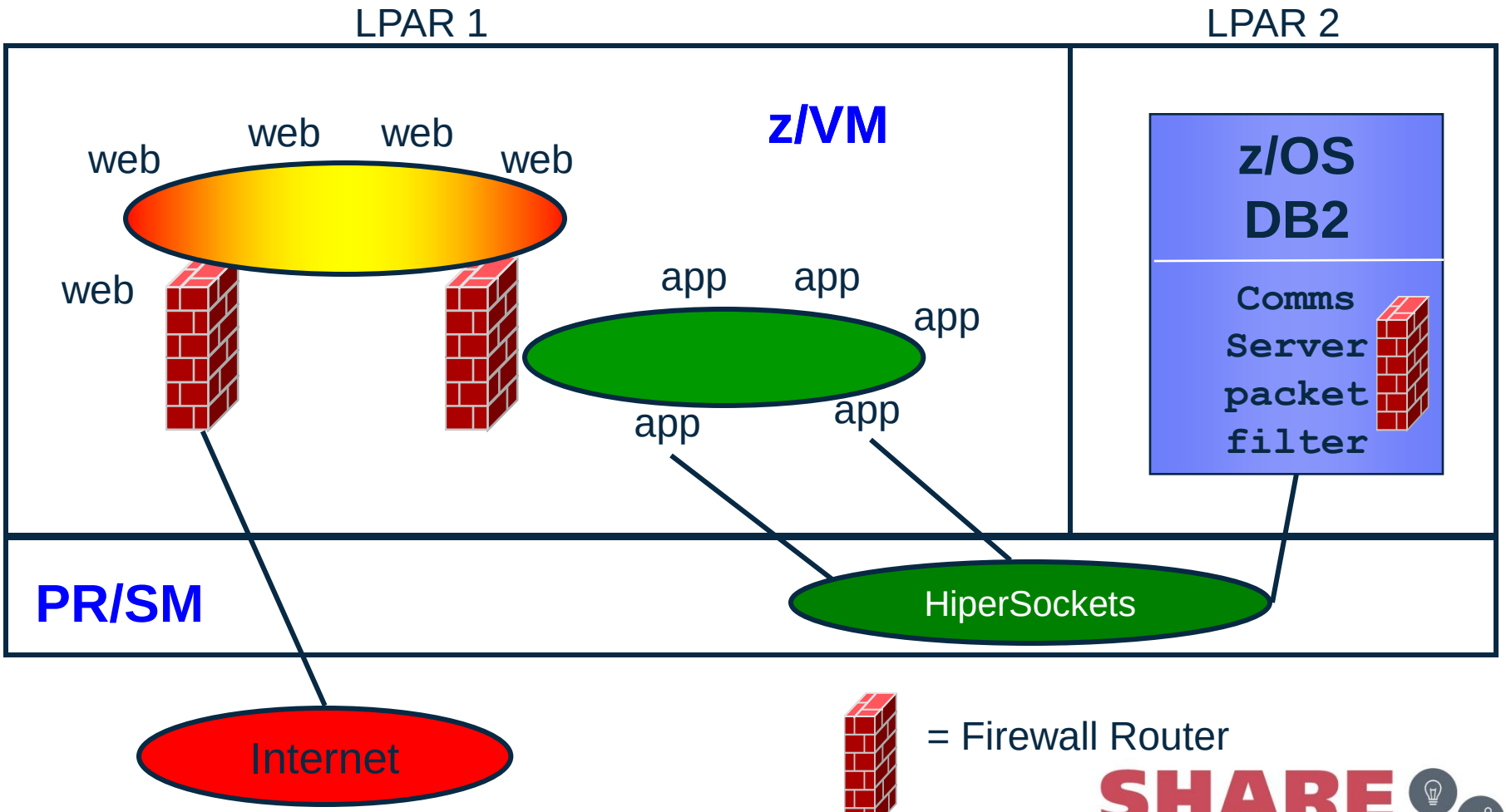
Outboard (external) firewalls



Guest LANs with HiperSockets

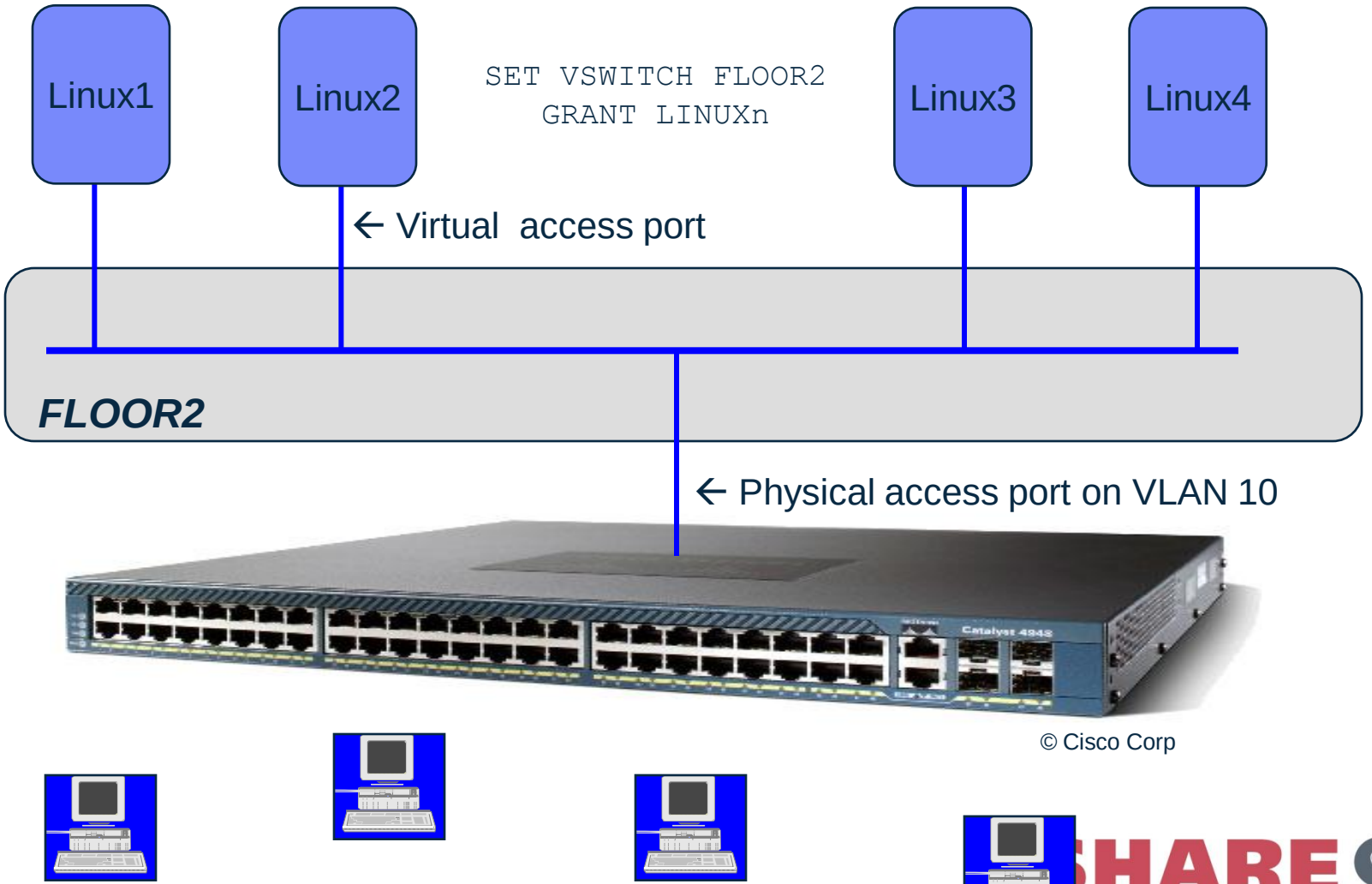


HiperSockets & z/OS packet filters

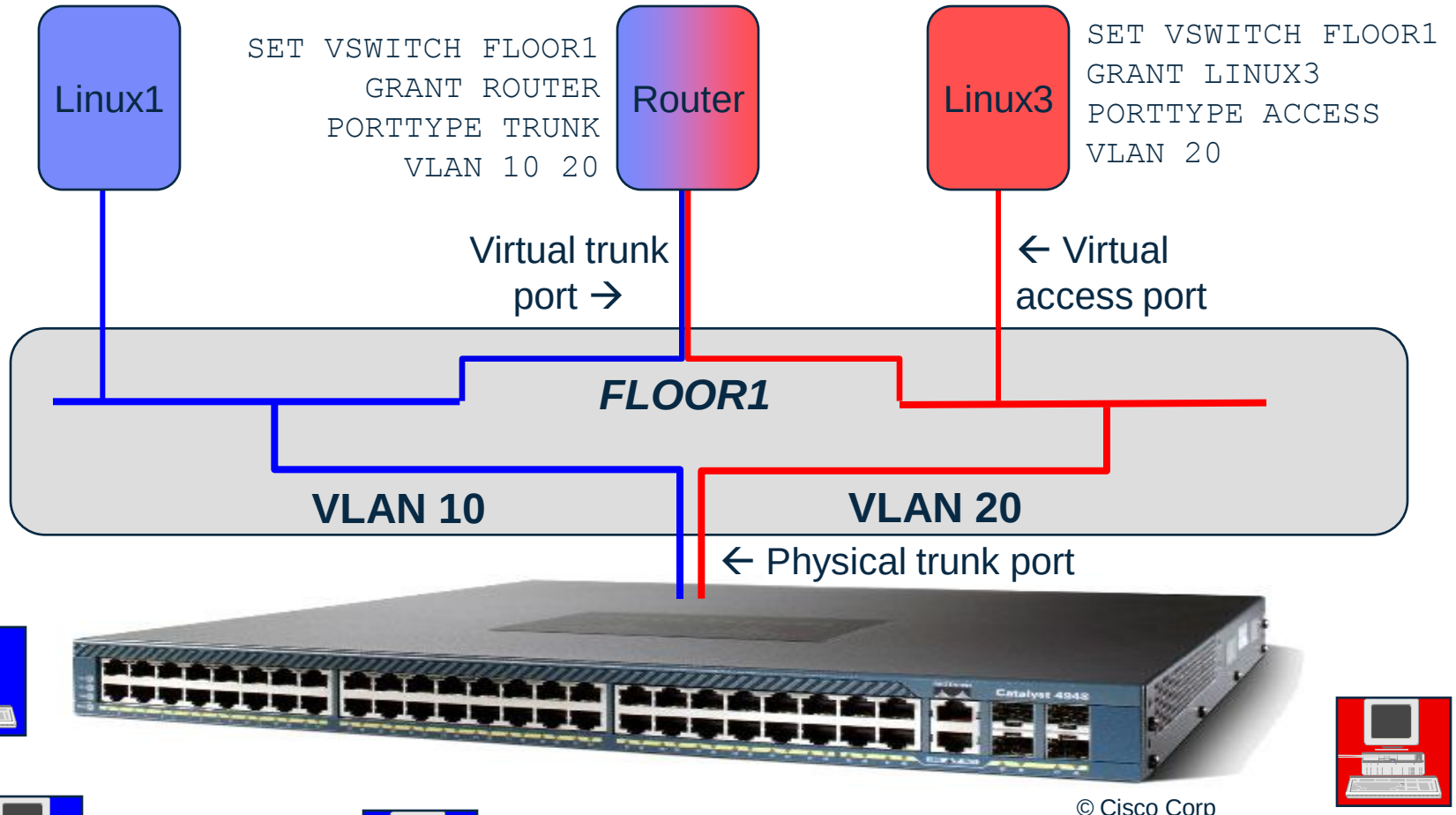


VLAN Separation

VLAN-unaware VSWITCH

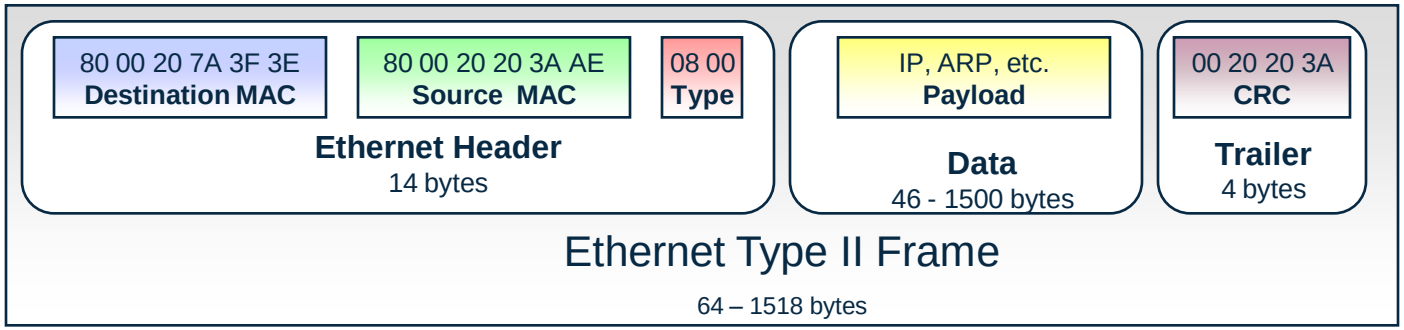


VLAN-aware VSWITCH



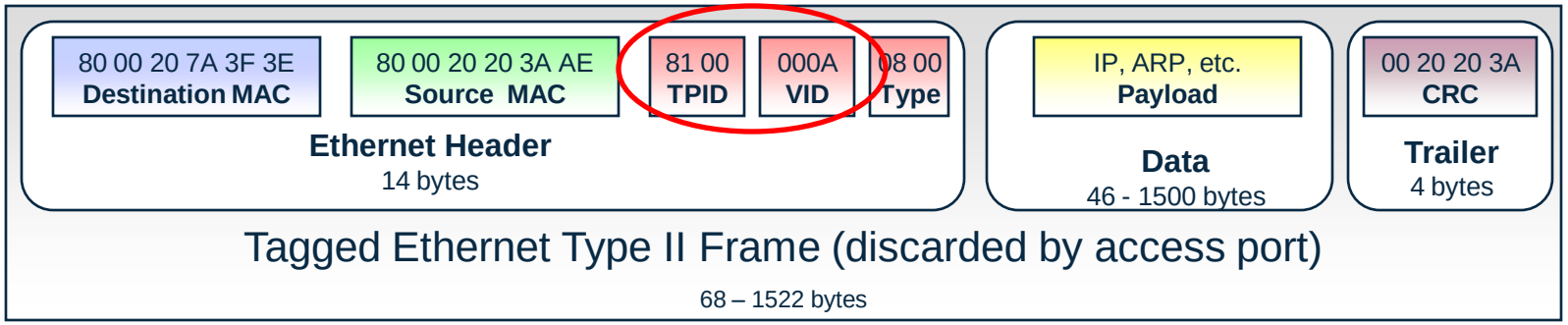
© Cisco Corp

Access vs. Trunk



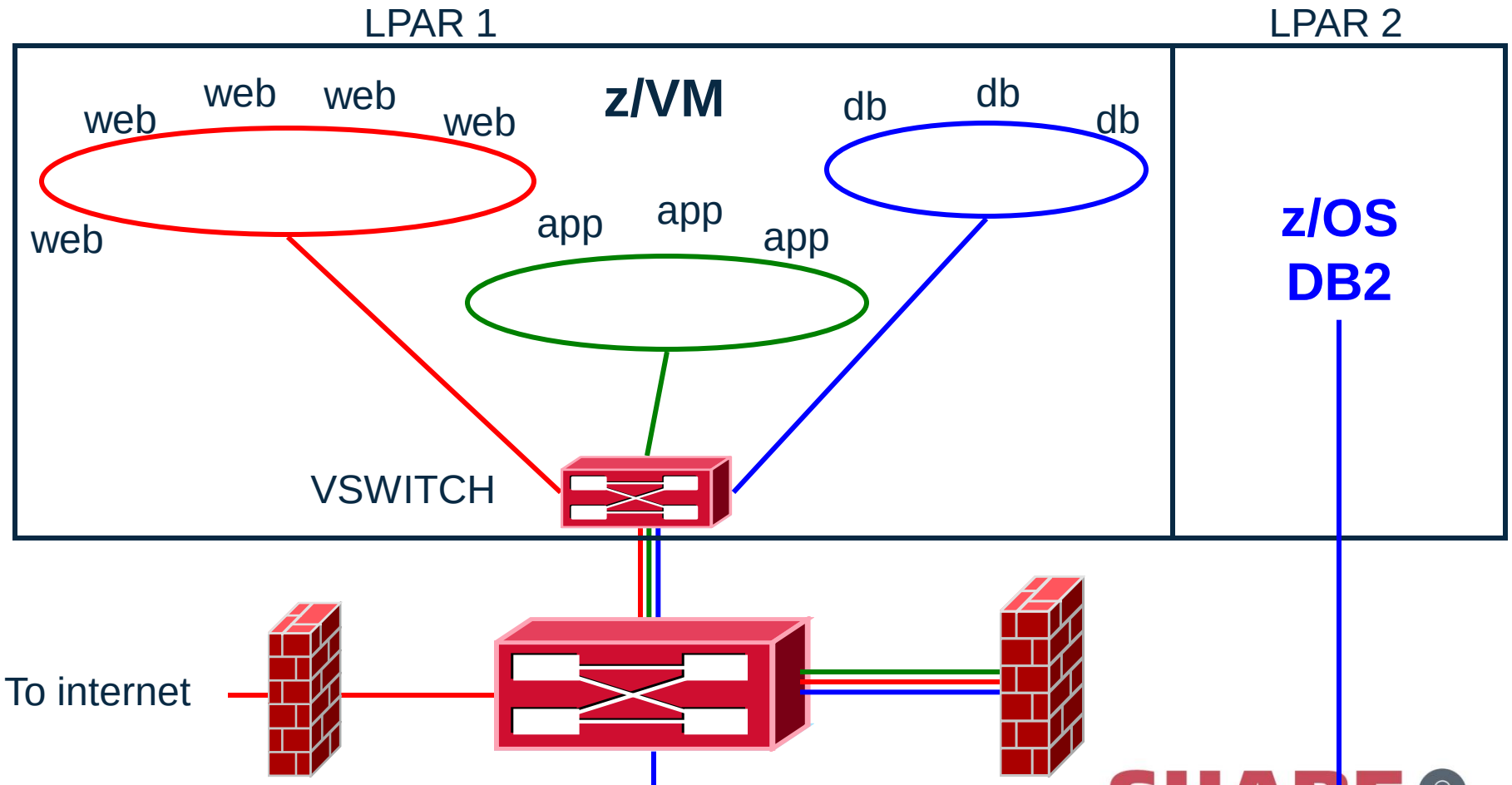
Access port and Trunk port

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



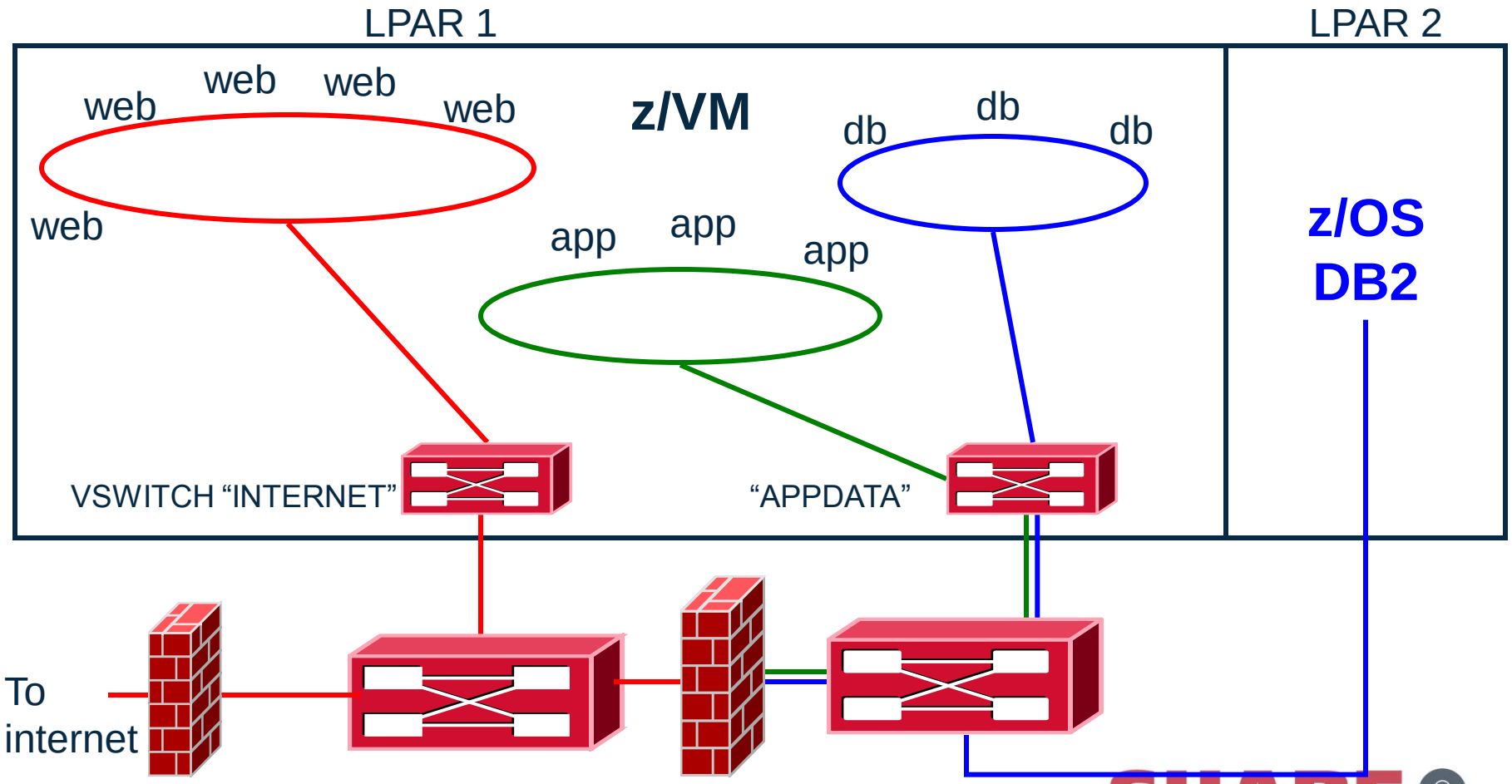
Trunk port

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
- New interfaces added by APAR or new releases
- Google “less than class g” by Rob van der Heij
- Too hard for some folks

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

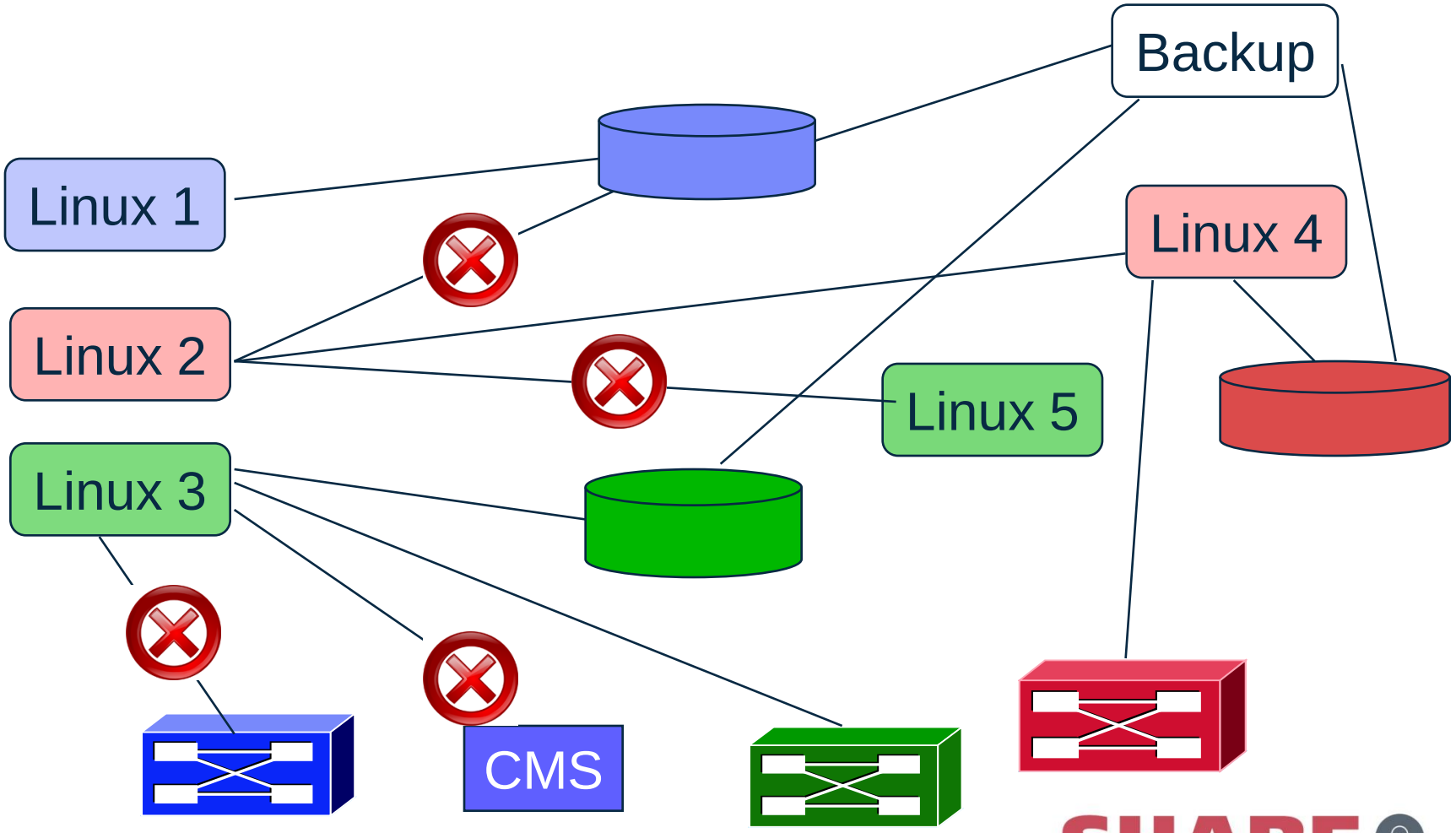
Multi-Zoning with RACF

- 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(READ)

  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

Contact Information

Alan C. Altmark

Senior Managing z/VM Consultant

z Systems Delivery Practice
IBM Systems Lab Services

IBM

1701 North Street

Endicott, NY 13760

Mobile 607 321 7556

Fax 607 429 3323

Email: alan_altmark@us.ibm.com

Mailing lists: IBMTCP-L@vm.marist.edu
IBMVM@listserv.uark.edu
LINUX-390@vm.marist.edu

See http://ibm.com/vm/techinfo/listserv.html for details.