

Virtual Security Zones on z/VM

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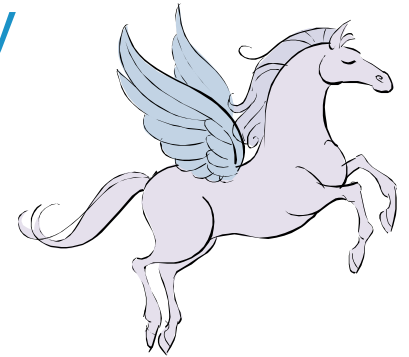
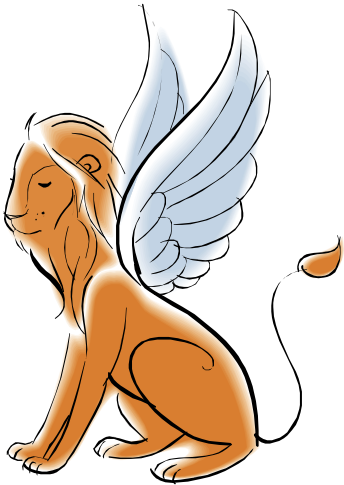
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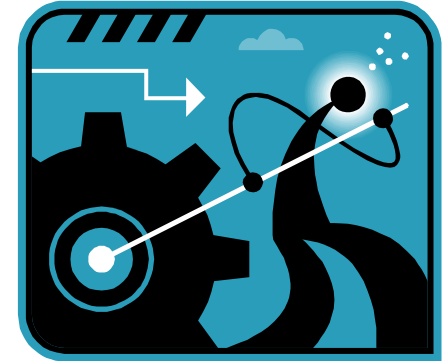
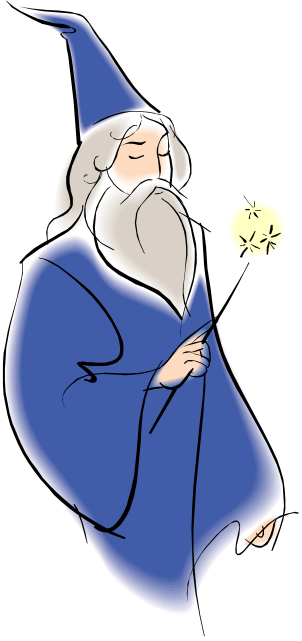
Agenda

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

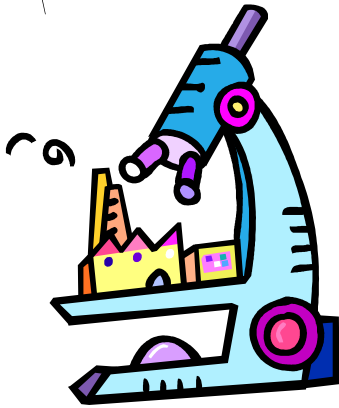


The Myth of Mainframe Security





The Reality of Mainframe Security

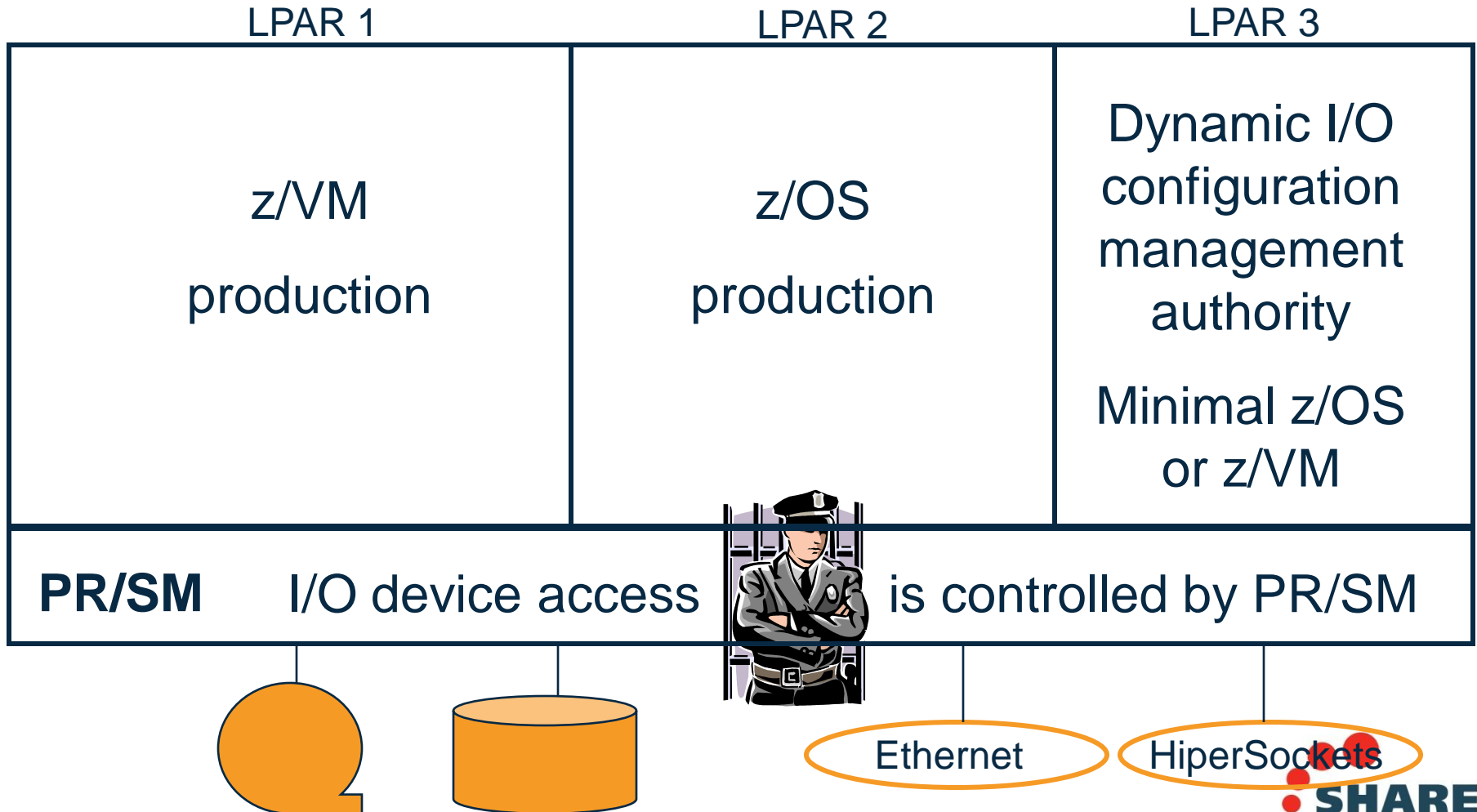


Securing the Hardware

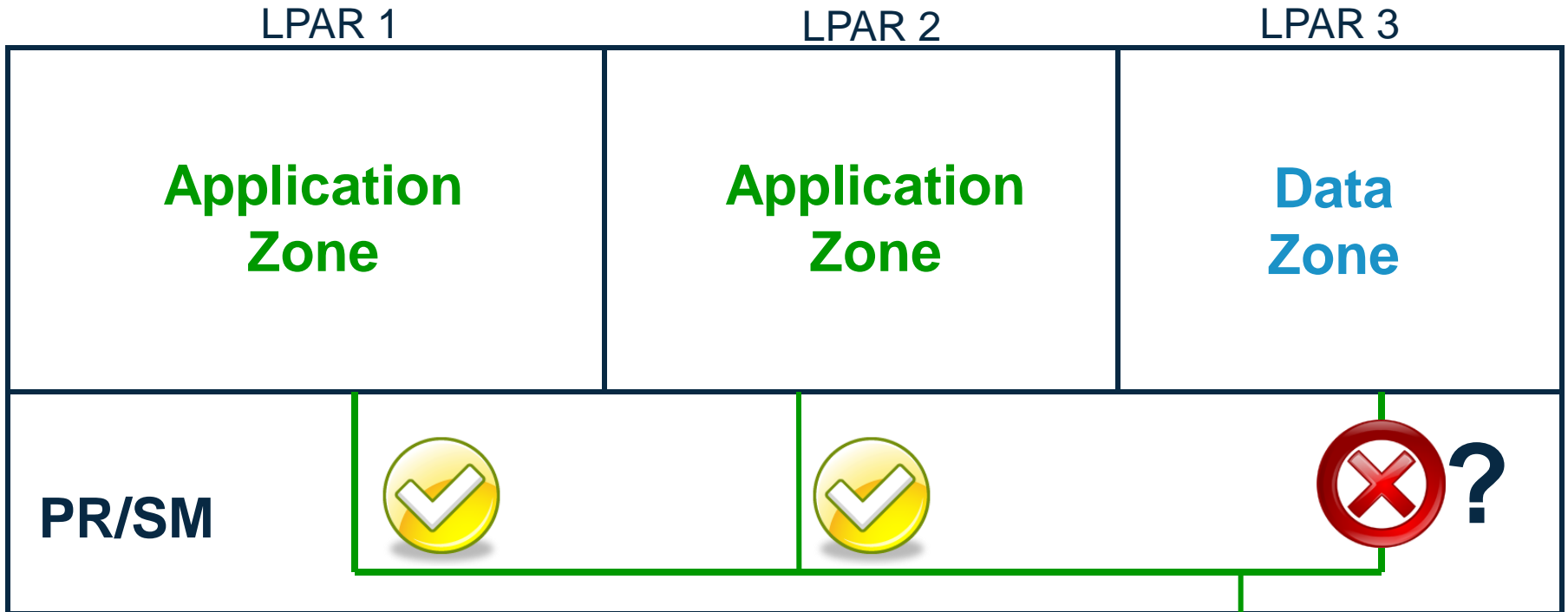
z/VM Security begins with System z security

- 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

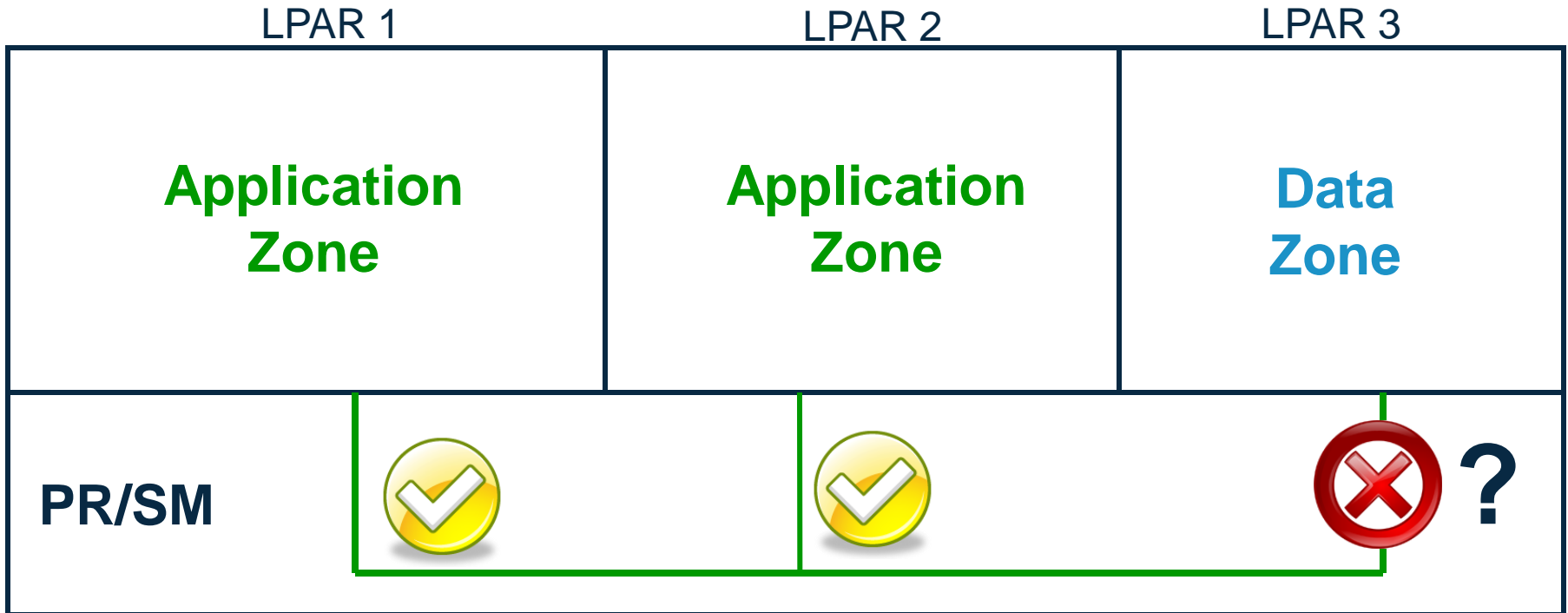


Warning: Shared Open Systems Adapters



A shared OSA creates a “short circuit” between LPARs unless QDIO data connection isolation is used

Warning: HiperSockets

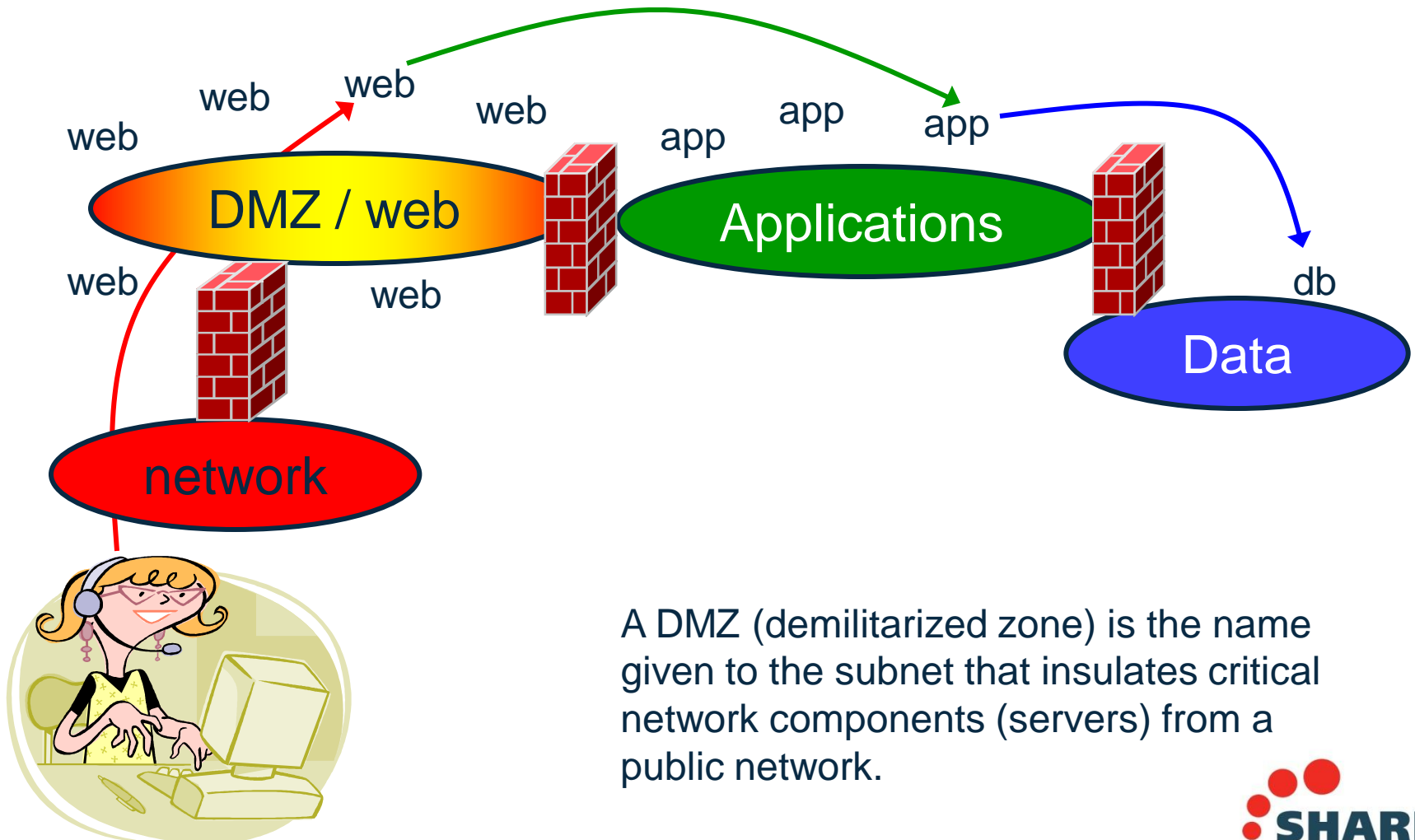


A HiperSocket is a LAN segment.

Treat is like one.

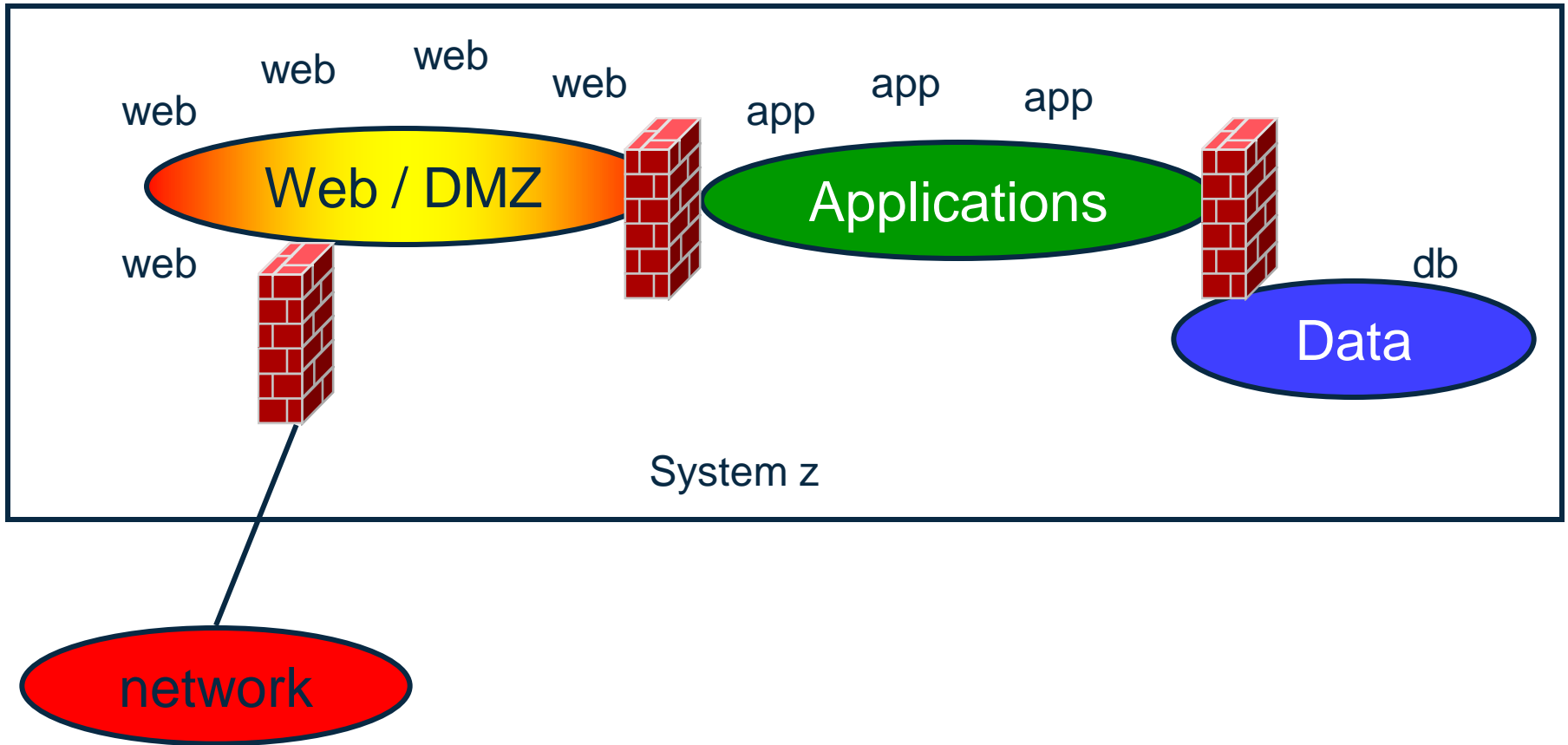
Multi-zone Networks

Multi-zone Network



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

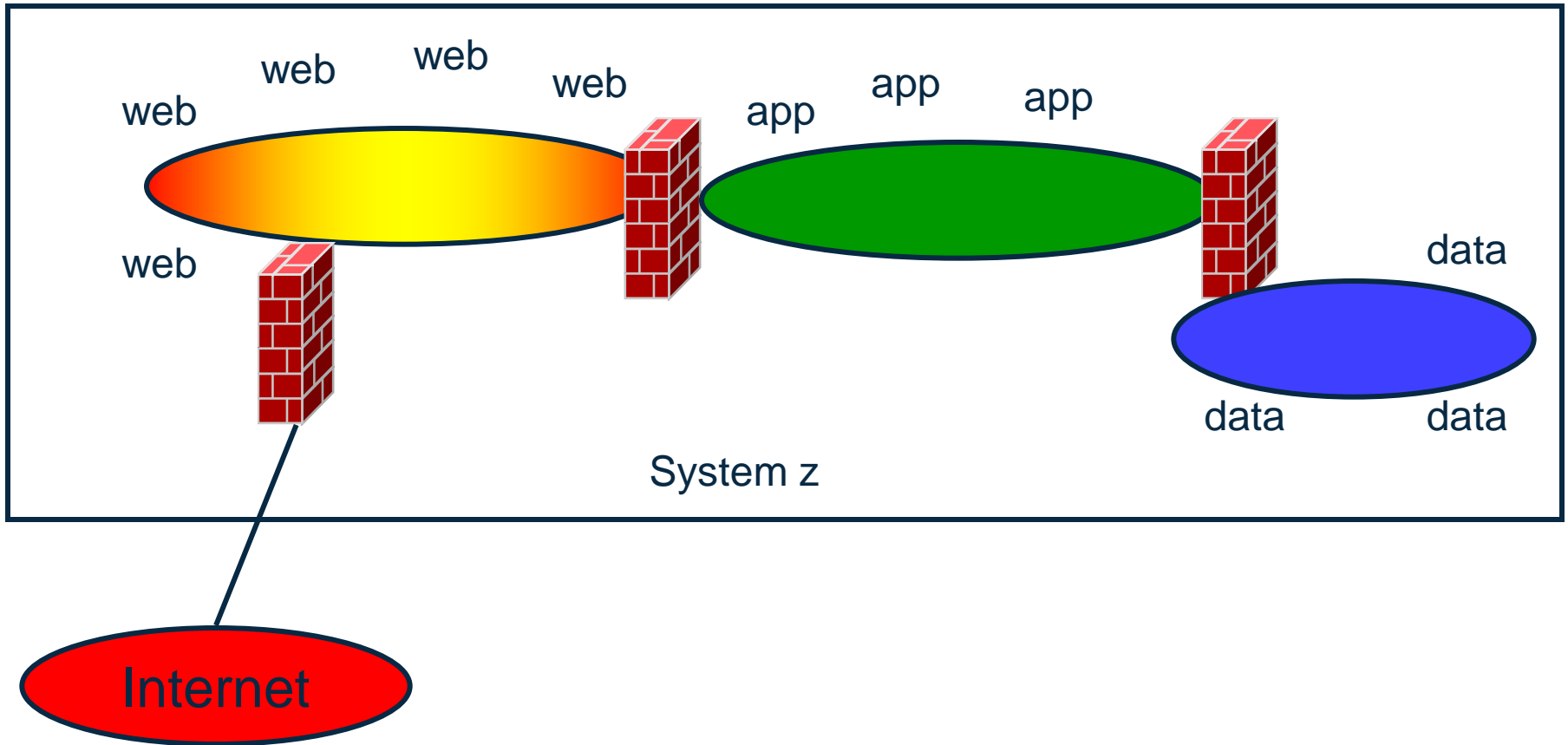
Multi-zone Network on System z



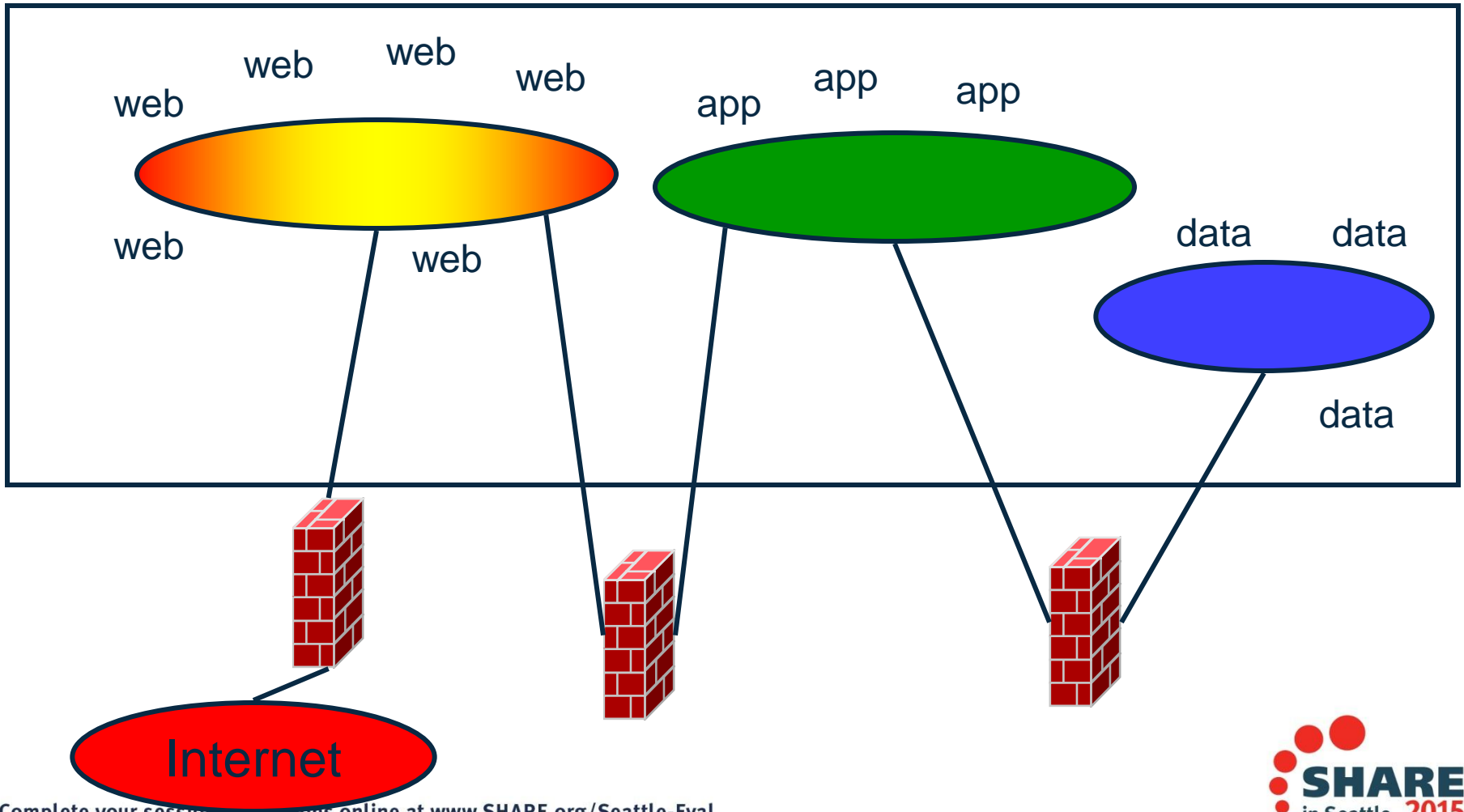
Firewalls

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

Inboard (internal) firewalls



Outboard (external) firewalls



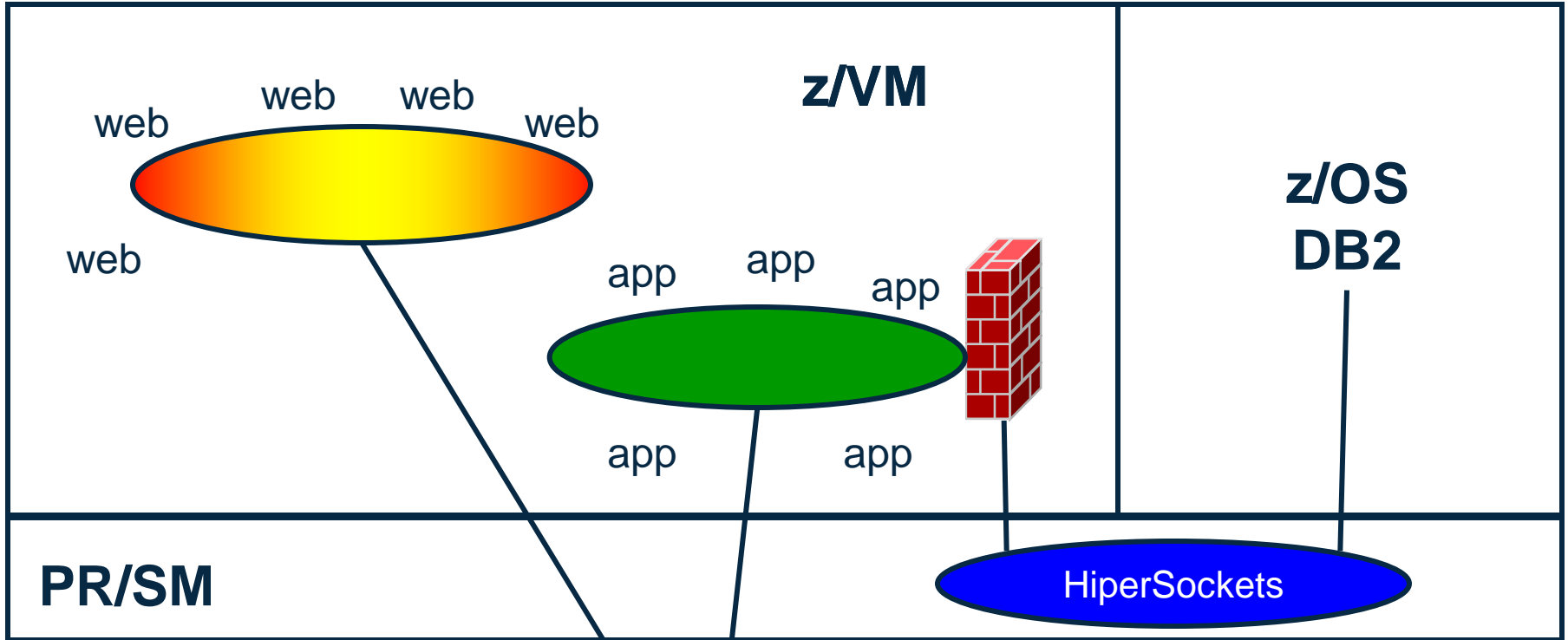
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Guest LANs with HiperSockets

LPAR 1

LPAR 2



PR/SM

z/VM

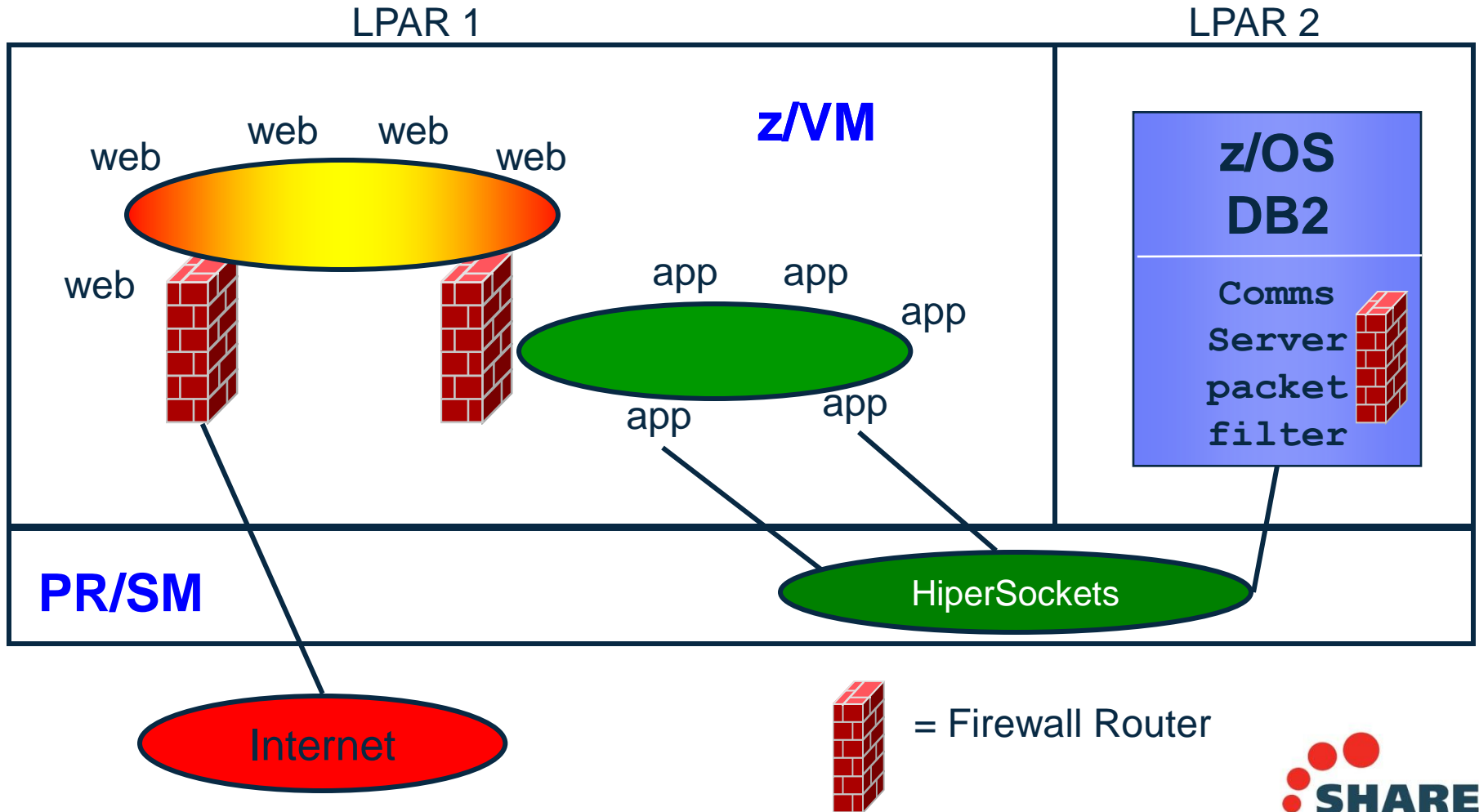
z/OS
DB2

HiperSockets

Internet

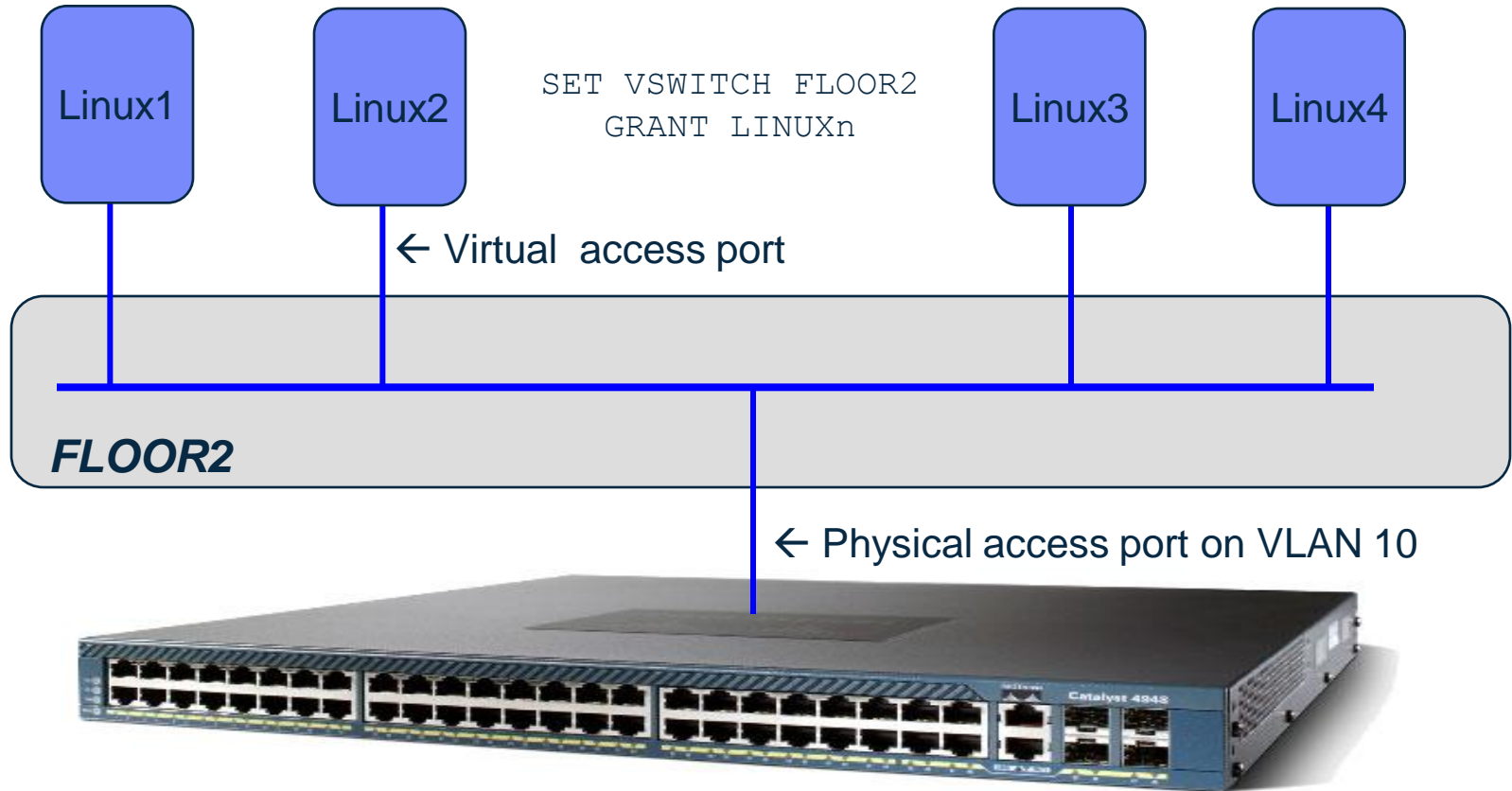
= Firewall Router

HiperSockets & z/OS packet filters



VLAN Separation

VLAN-unaware VSWITCH



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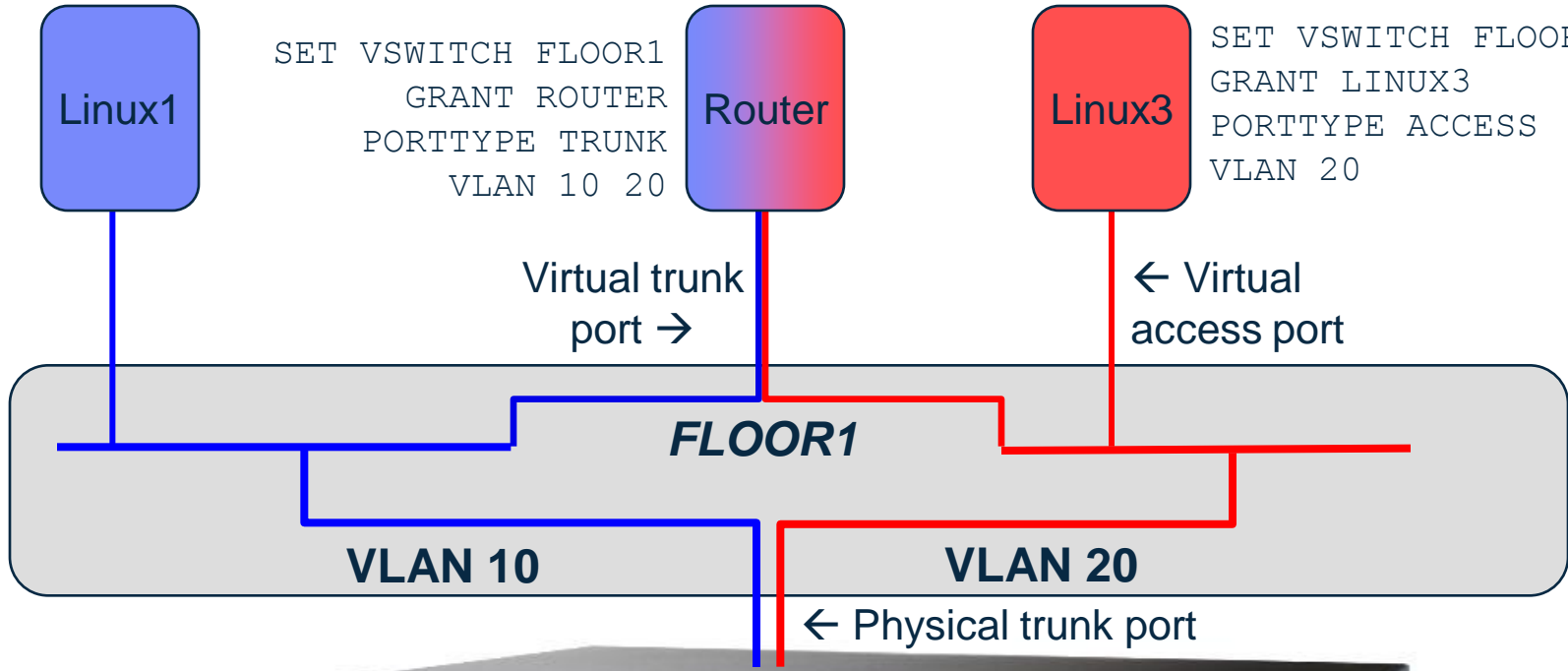
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VLAN-aware VSWITCH

```
SET VSWITCH FLOOR1
GRANT ROUTER
PORTTYPE TRUNK
VLAN 10 20
```



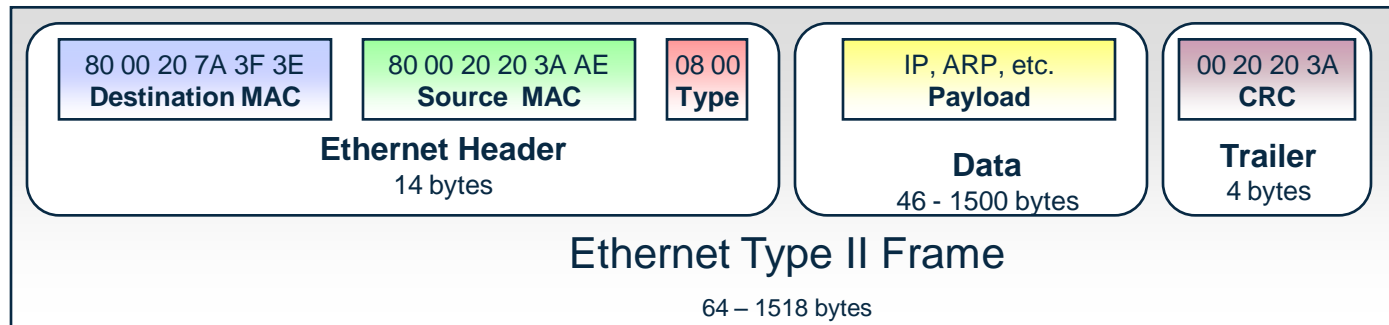
```
SET VSWITCH FLOOR1
GRANT LINUX3
PORTTYPE ACCESS
VLAN 20
```



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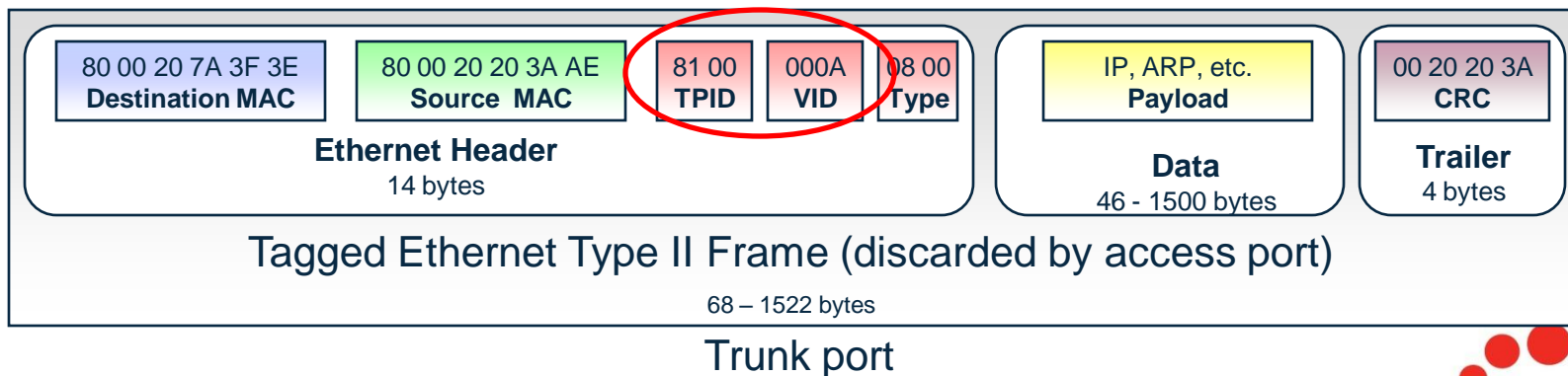


Access vs. Trunk

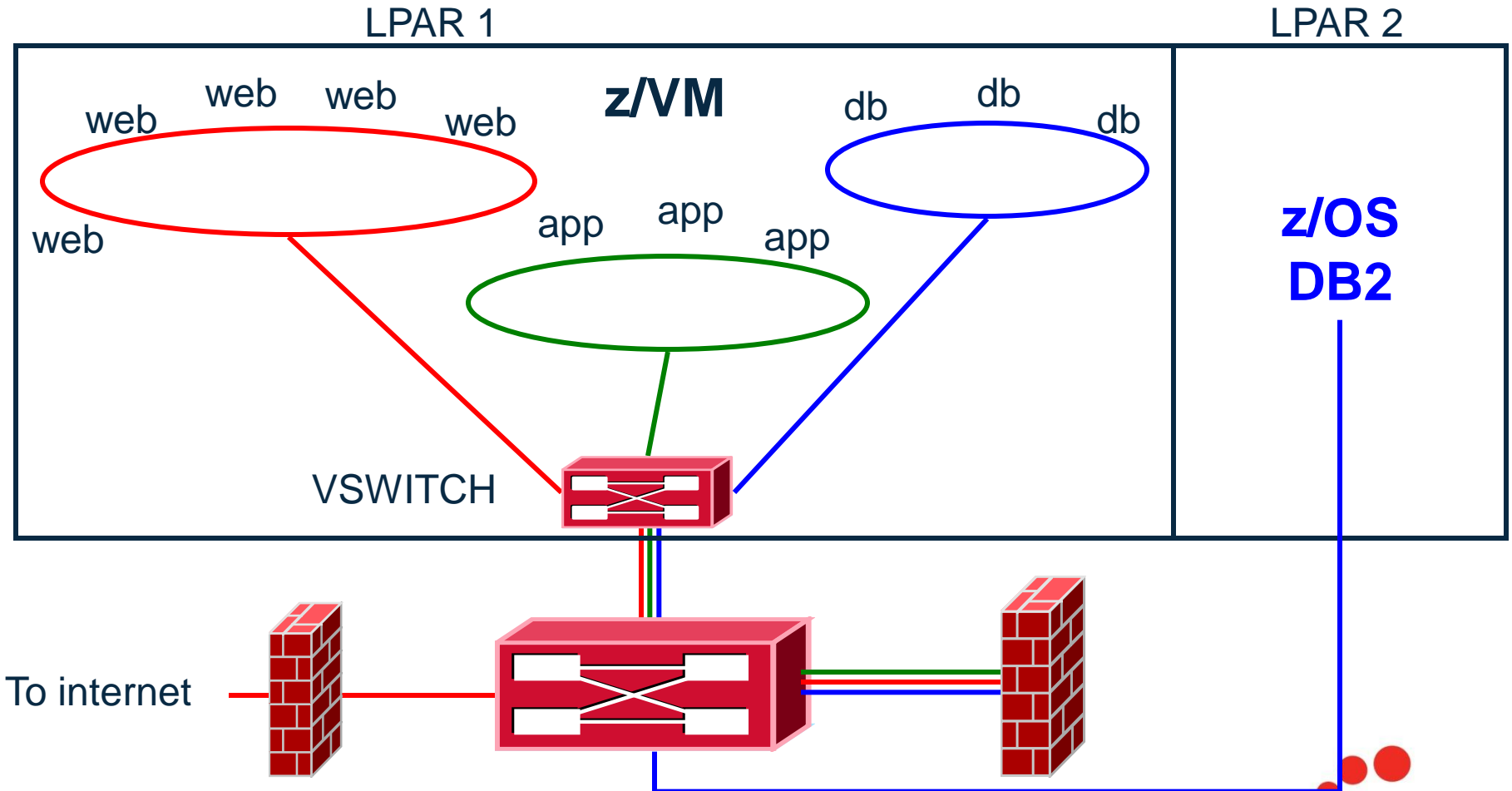


Access port and Trunk port

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



Network with VSWITCH (fully shared)

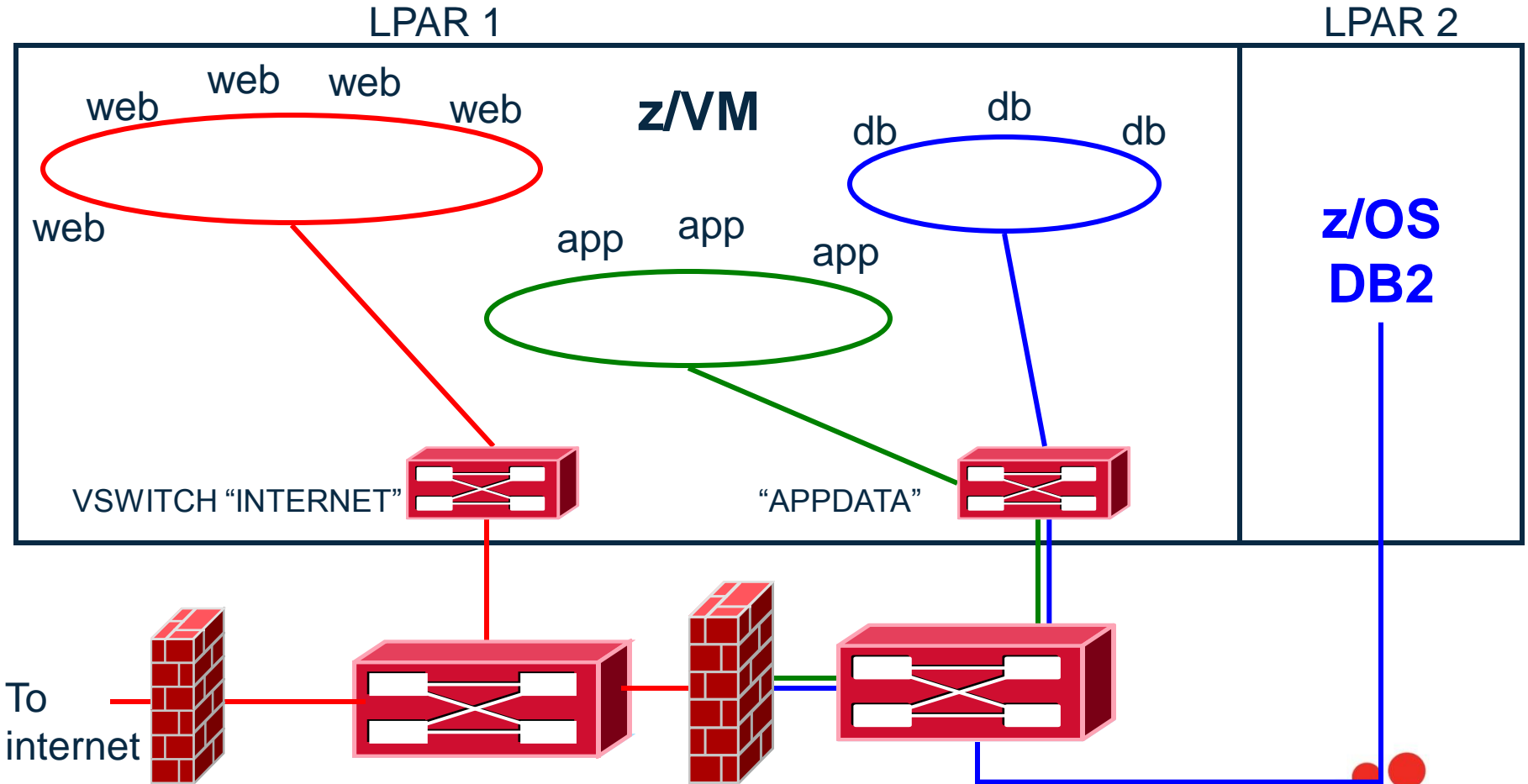


With 1 VSWITCH, 3 VLANs, and a multi-domain firewall

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



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

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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

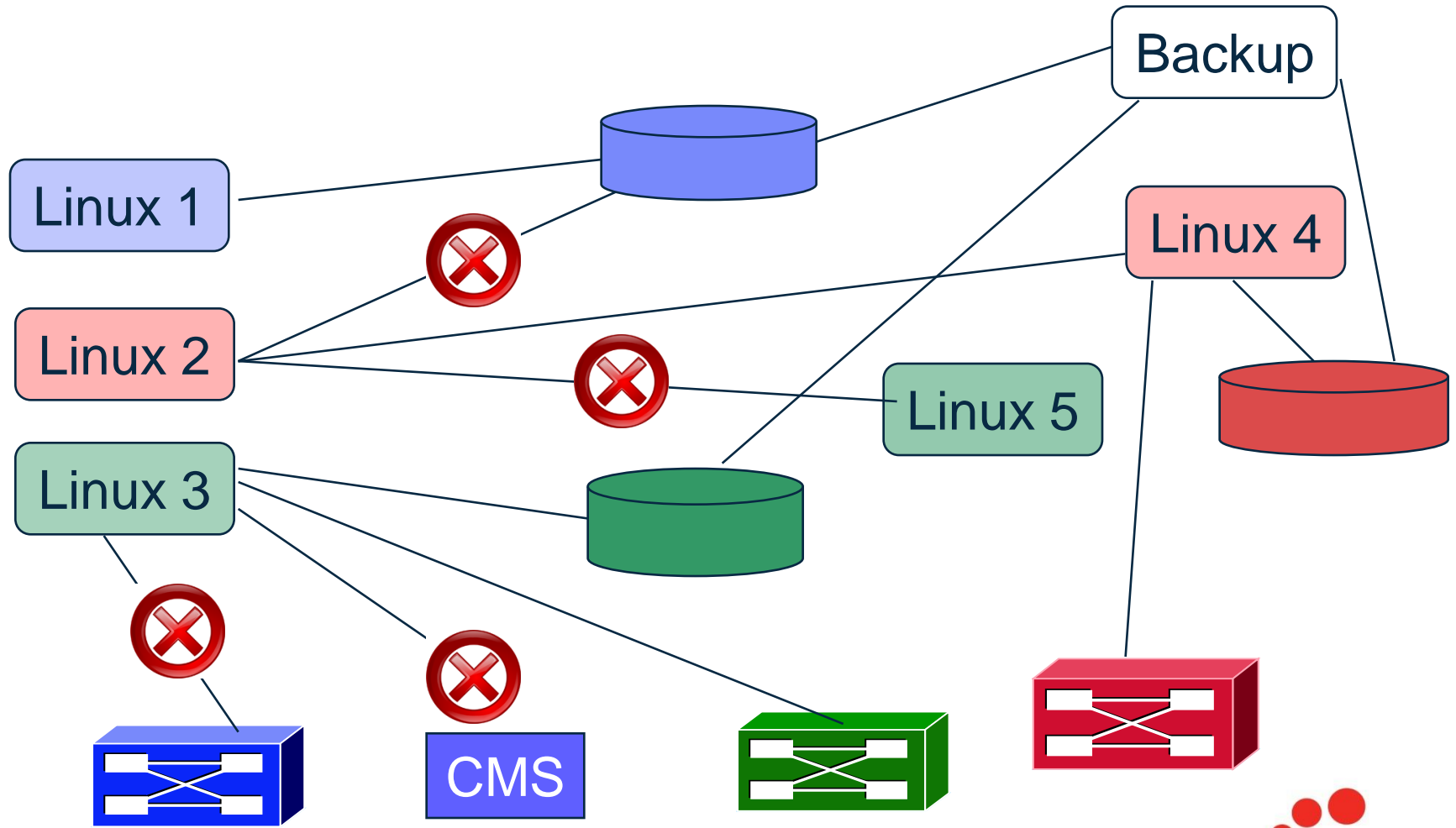
Multi-Zoning with RACF

- 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>

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