Linux and z/OS Playing Nicely Together:
Two Are Better Than One

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Agenda

- This is not a product pitch!

- Linux can compliment existing z/OS workloads
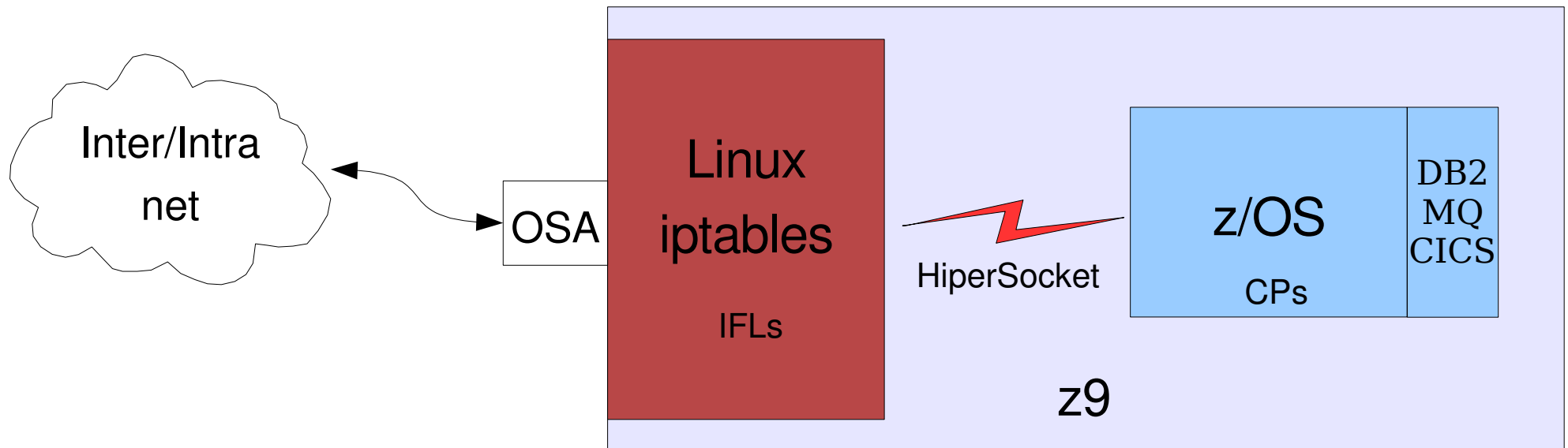
- Some examples

Software Firewall

- Linux software firewalls can protect z/OS systems without using CP MIPS

- Virtual nature allows flexibility

- Exploits HiperSockets for secure connections to z/OS

- Passively benifits from CUoD to meet demand

- Stonegate product features:

    - HA Failover

    - Single console for managing complicated rule sets on multiple systems

Software Firewall

- Usually based on iptables

  - Included as part of all modern Linux distributions (Kernel 2.4 or greater)

- Stateful or Stateless Packet Filter

- Also support Network Address Translation, Network Address Port Translation

  - Enables transparent proxies

- Project home page at http://www.netfilter.org/

Software Firewall

Inter/Intra net

OSA

Linux iptables

IFLs

HiperSocket

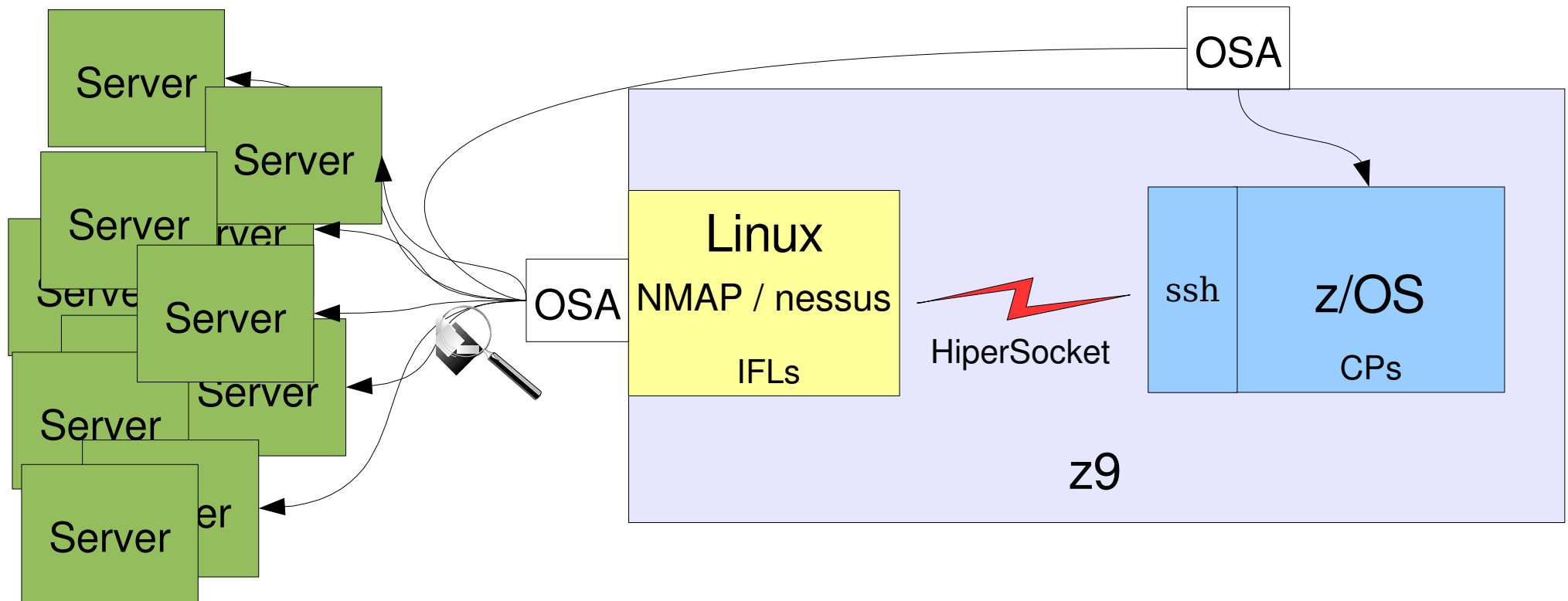z/OS

CPs

DB2
MQ
CICS

z9

Security Scanner

- Secure point to initiate security scans of network

  - Both Host systems and Distributed systems

- Answers the question "What is **actually** running on my systems, and where?"

- Can make use of off-peak MIPS

- Can be automated and controlled from z/OS using ssh

- Assists with regulatory compliance

- Nessus, NMAP

Security Scanner

- Searches IP address ranges for active systems

- Passively or Actively scans open ports on active systems

- Can optionally fingerprint applications running and look for known vulnerabilities

  - This can sometimes disrupt service

- http://www.insecure.org/nmap/

- http://www.nessus.org/

Security Scanner

Server

Server

Server

Server

Server

Server

Server

Server

Server

OSA

OSA

OSA

| Linux		z/OS
NMAP / nessus	ssh	
IFLs		CPs

HiperSocket

z9

Authorization and SSO in a DMZ

- Linux in a DMZ can perform Authorization and SSO before transactions reach z/OS

- Insulates z/OS from unauthenticated requests

- Lowers risk for z/OS applications

- Tivoli WebSeal and Tivoli Access Manager

- http://www-306.ibm.com/software/tivoli/products/access-mgr-e-bus/

Authorization and SSO in a DMZ

- Kerberos and LDAP on Linux can also provide Authorization and Authentication

  - Not full SSO, however

- Kerberos provides Authentication

  - Is this who they say it is?

  - http://web.mit.edu/kerberos/

- LDAP provides Authorization

  - Are they allowed to run this application?

- If LDAP is running on z/OS it can use RACF for its data store

  - RACF as the central repository of identity for the enterprise

  - Distributed systems with centralized user authentication audit logs

Authorization and SSO in a DMZ
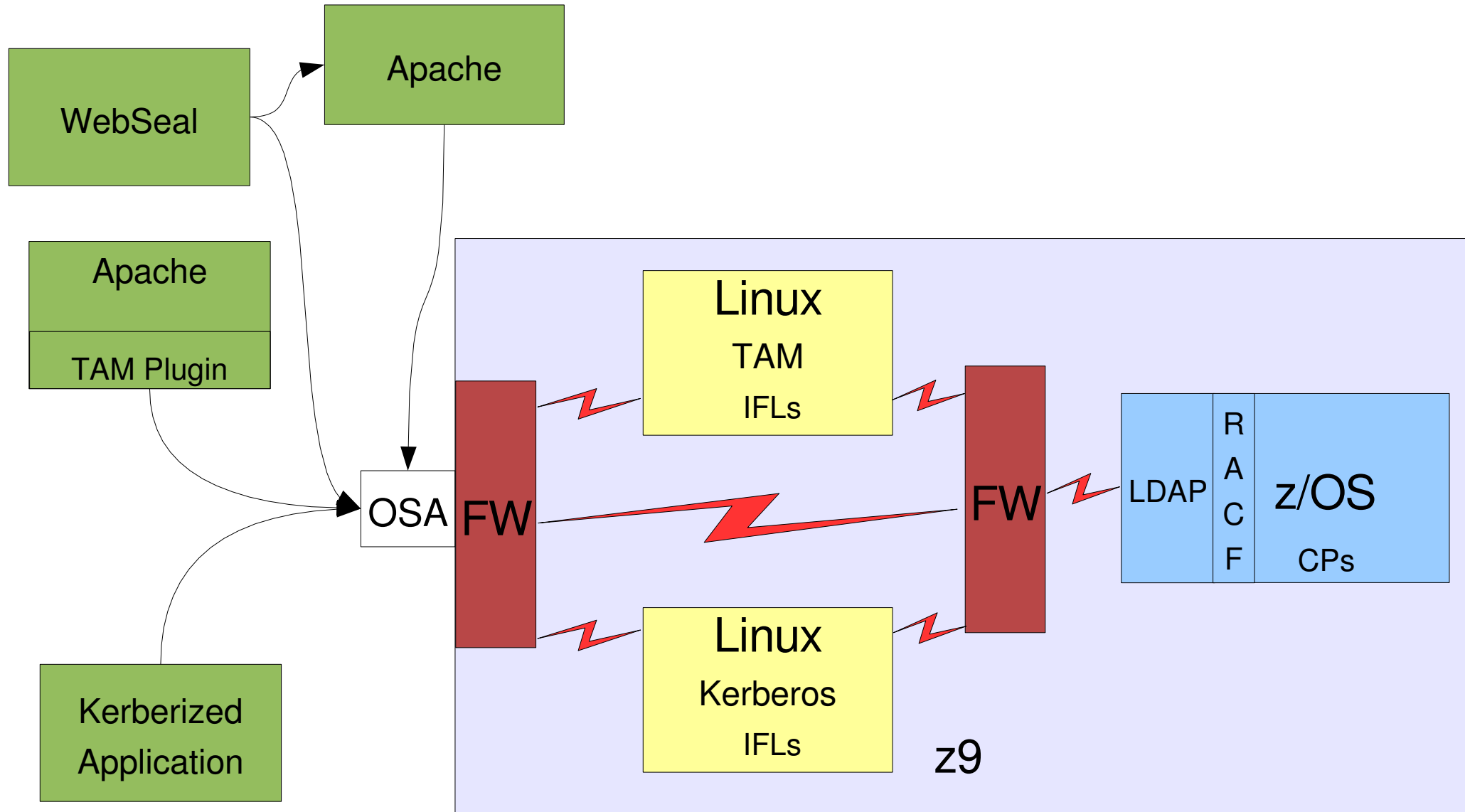
System Monitoring Tools

- z/OS system monitor tools running on Linux on zSeries

- Proximity to z/OS allows better monitoring

- Monitor tool should have similar RAS to systems it monitors

- Does not expose monitor data streams between z/OS and tool if HiperSockets are used
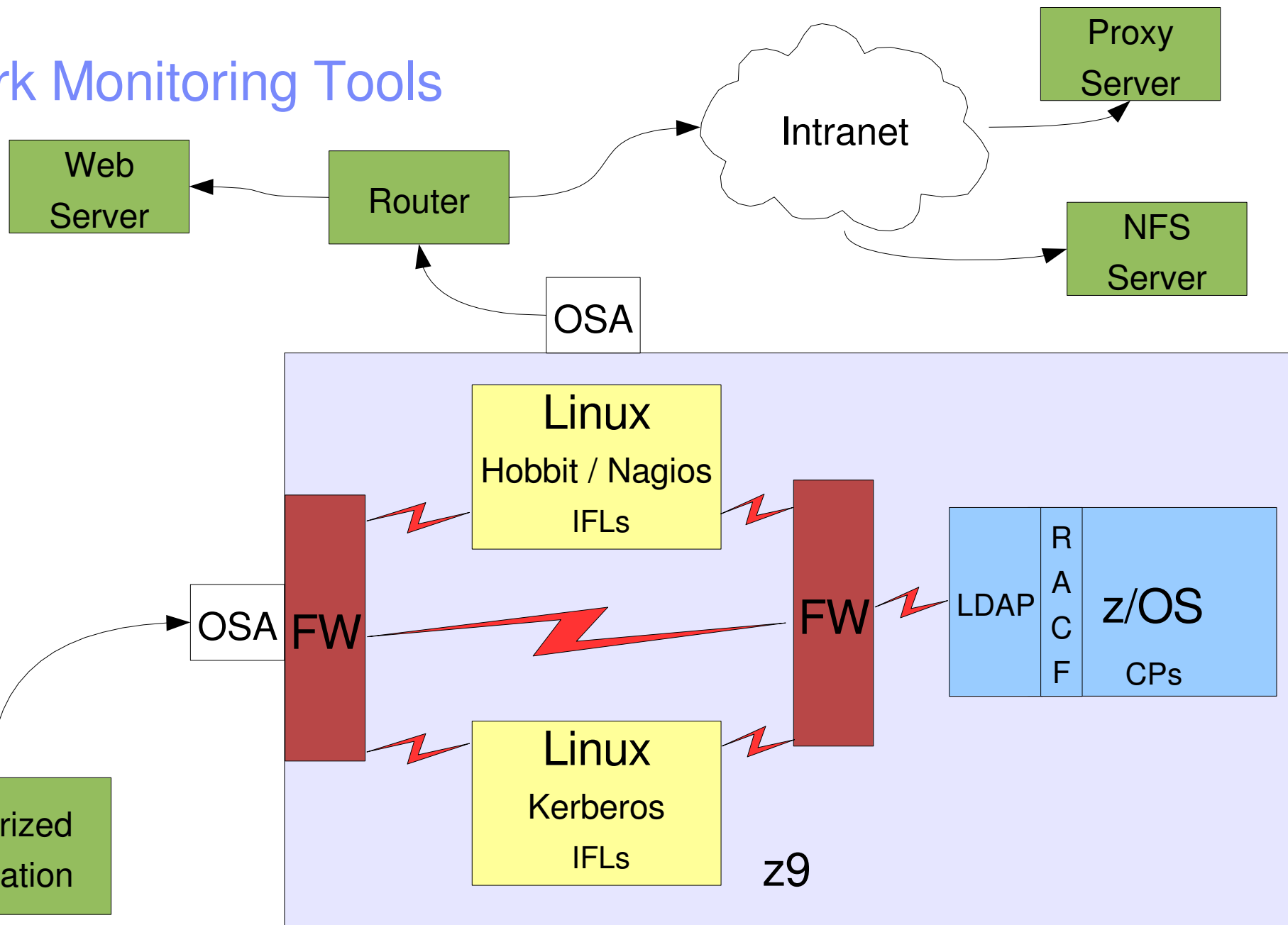
- Various Tivoli/Candle products

Network Monitoring Tools

- Monitor the network inside the z/Series system and outside

- Can also monitor network services (ftp, http, etc)

- Sends alerts when things go awry

  - Email, SNMP, SMS text message, pager

- Nagios

  - http://www.nagios.org/

- Hobbit

  - http://hobbitmon.sourceforge.net/

Network Monitoring Tools

- Periodically connect to service

- Logs connect response time

- Keeps history for performance analysis

- Nagios will also guess what is causing a network outage

    - Requires manually defined network topology

    - Can indicate whether a down link is causing problems downstream

- Web Interface with color coded system and service states

Network Monitoring Tools

Proxy Server

Intranet

Web Server

Router

NFS Server

OSA

Linux
Hobbit / Nagios
IFLs

FW

FW

LDAP | R A C F | z/OS
CPs

OSA FW

Linux
Kerberos
IFLs

z9

Kerberized Application

Workload Manager aware

- Current VE release allows z/OS WLM to be monitored along with Linux eWLM workloads

- ARM enabled distributed workloads can be moved to z/Series Linux

- Provides unified view of Applications with both distributed components and z/OS components

- Workloads can then benefit from:

 - Proximity to z/OS data

  - z/Series RAS

Workload Manager aware
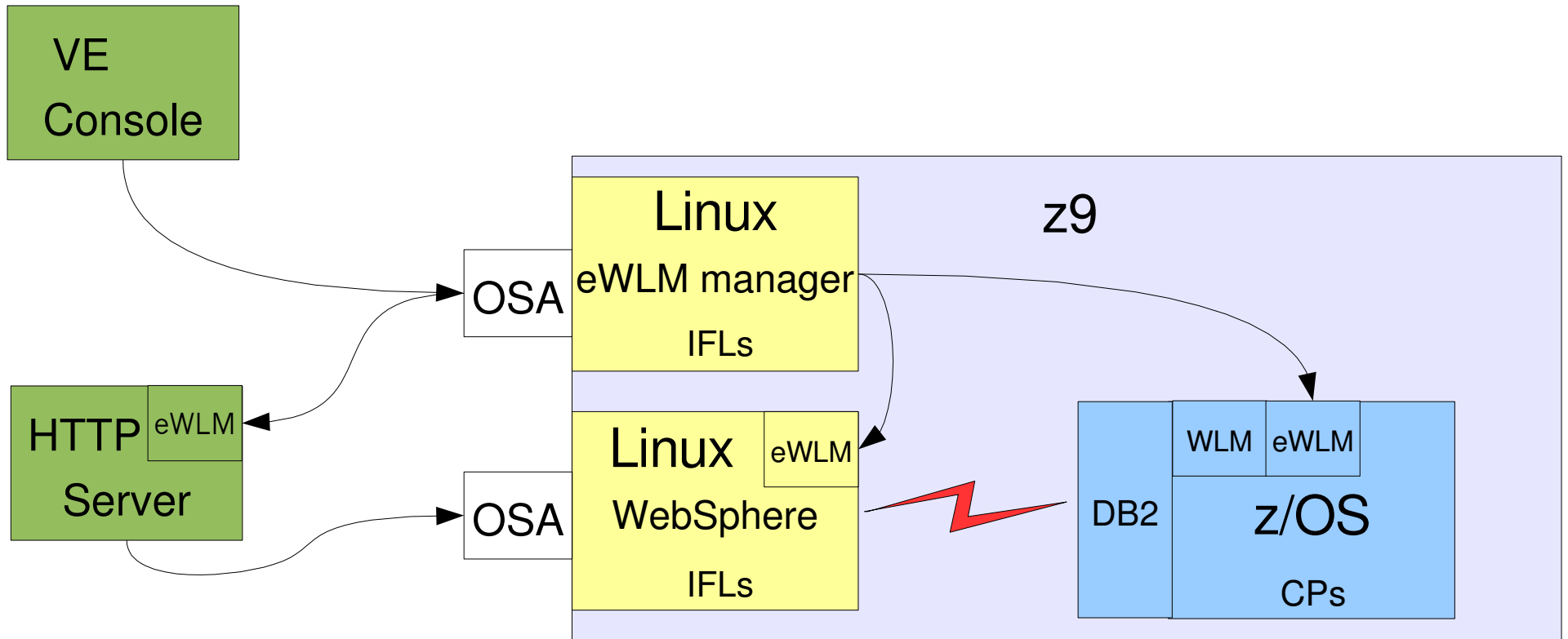
DB2 Datasharing Group entry point

- DB2 Connect EE or JDBC type4 drivers can distribute connections across all DB2 systems in a SysPlex

- Provides higher availability than connecting to one DB2 subsystem

- Provides benifit to external distributed platforms as well when they connect through this entry point

- Get handouts from Scott Loveland's HA presentation

  - Session 9276: High Availability for Linux on IBM System z Servers

DB2 Datasharing Group entry point

- DB2 Connect EE provides finer transaction distribution across members than JDBC type4 driver
- JDBC type4 driver requires DB2 Connect EE licence to talk to z/OS anyway
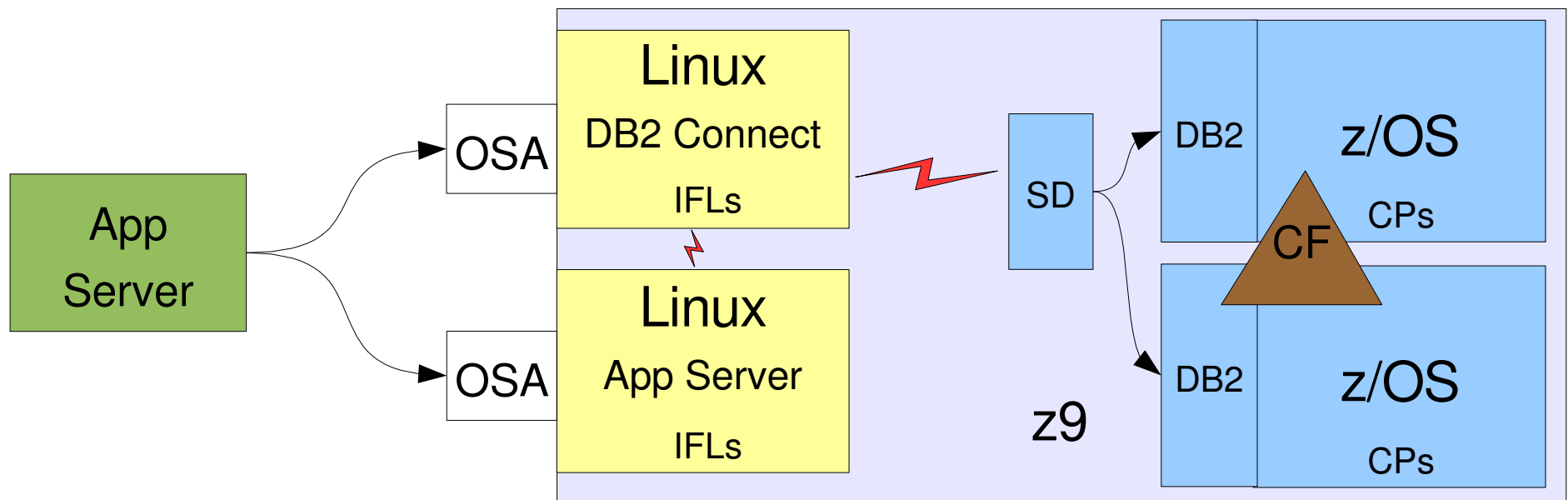
Communications Subsystem

- Linux can enhance z/OS communication with both Open and Legacy systems

- Communications Controller for Linux

  - Replaces the 3745 & family

- Communications Server for Linux
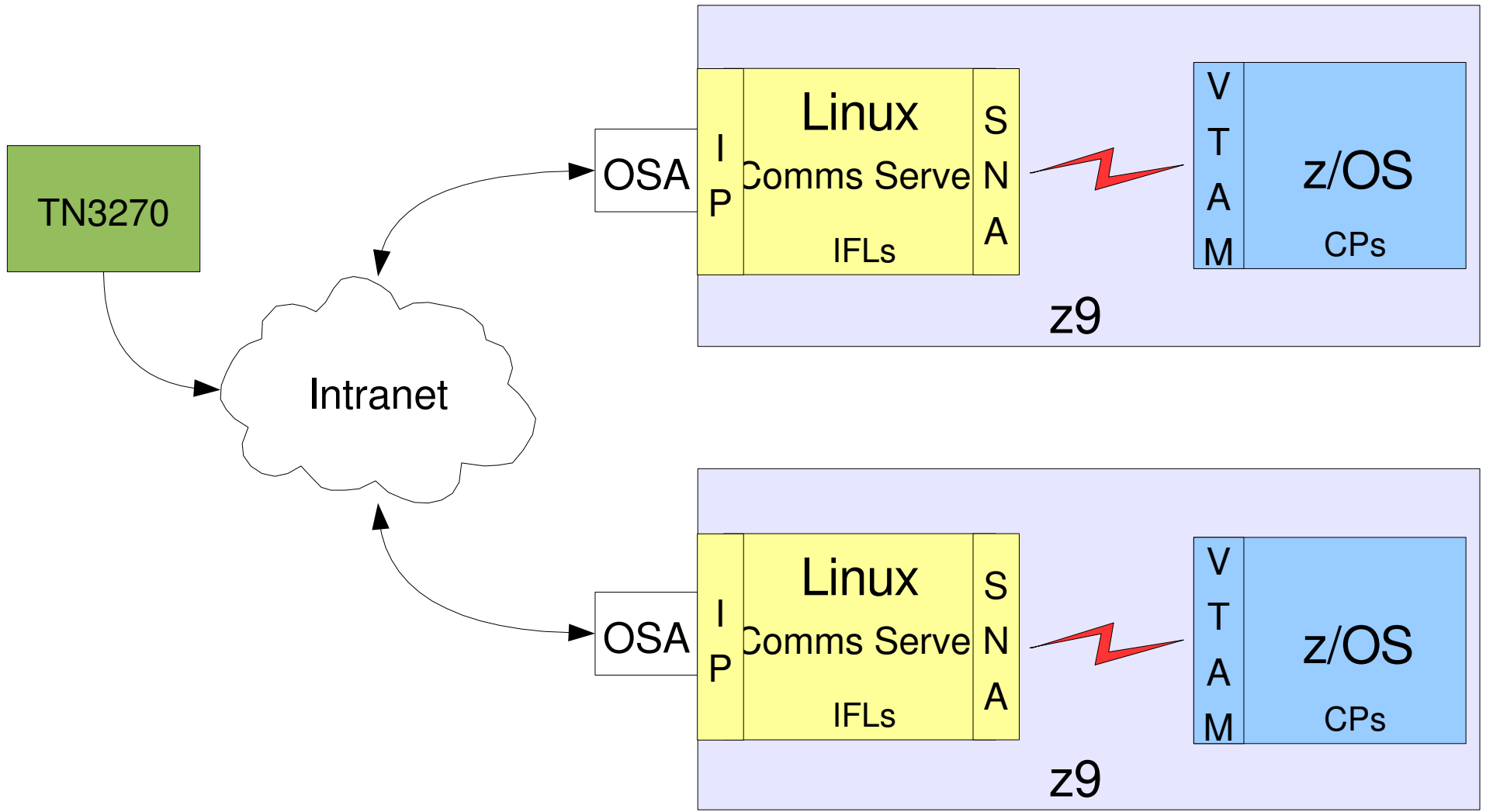
- Open Systems translator for z/OS

Communications Subsystem

- Communications Controller for Linux

    - Consolidate several 3745 units into one CCL image

    - Almost a drop in replacement

    - Supported 3745 features include:

        - Network Control Program

        - Extended Recovery Facility (XRF)

        - X.25 NCP Packet Switching Interface

        - Network Routing Facility

    - Make use of higher speed interconnects (Gigabit Ethernet)

    - For vastly more information:

        - IBM Communication Controller Migration Guide
          http://www.redbooks.ibm.com/redbooks/pdfs/sg246298.pdf

Communications Subsystem

- Communications Server for Linux

    - Provides SNA support for Linux

    - Moves SNA traffic across IP networks with Enterprise Extender

    - Supports both Host Mediated and APPN networks

    - SNA API support

        - OS/2 SNA apps can be readily ported to Linux

    - TN3270 server
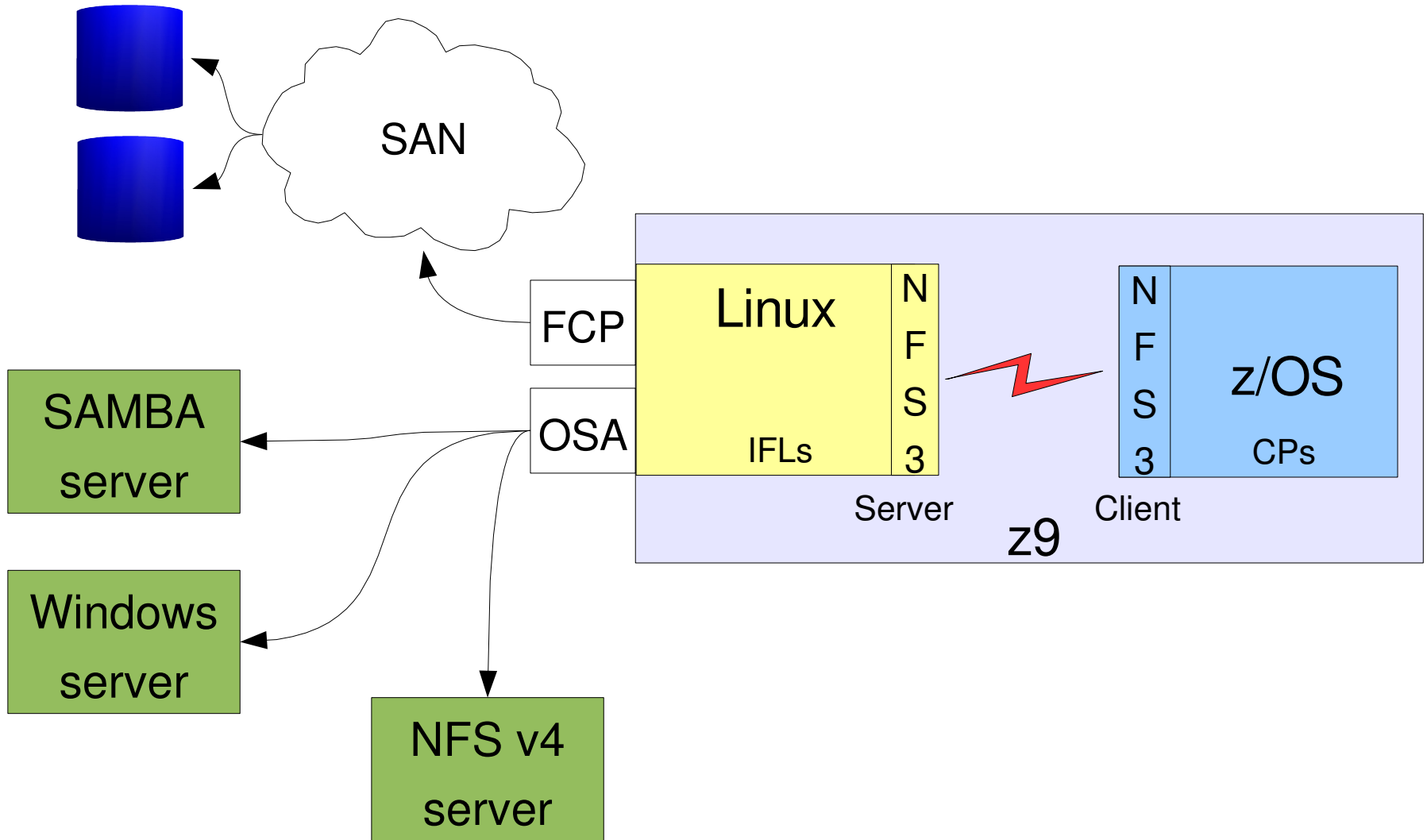
Communications Subsystem

Communications Subsystem

- Open Systems translator for z/OS

- Provide z/OS access to data that resides on:

    - SAMBA or Windows Shares

    - NFS V4 Servers

    - FCP storage network access

Communications Subsystem

SAN

FCP

OSA

SAMBA server

Windows server

NFS v4 server

Linux

N F S 3

IFLs

Server

z/OS

N F S 3

CPs

Client

z9

Backup/Recovery access point

- Open and Distributed systems can benefit from z/OS backup and recovery capabilities

- Bacula on Linux on zSeries

    - Clients for almost every UNIX type system

    - Clients for Windows systems also

- Makes use of existing z/OS backup and recovery infrastructure, procedures, offsite vaulting, etc

- http://www.bacula.org/

Backup/Recovery Access Point

- Bacula Server running on Linux on z/Series

- Configured to use files for backup media, not tapes

- Files are stored on z/OS via NFS mount

  - Use a HiperSocket here

- HSM migrates files as needed

- HSM recalls files automatically on restore

- Contact dboyes@sinenomine.net for details

Backup/Recovery Access Point

Bacula client → OSA → Linux Bacula server (IFLs) → HiperSocket → NFS | z/OS (CPs) | HSM

File

z9
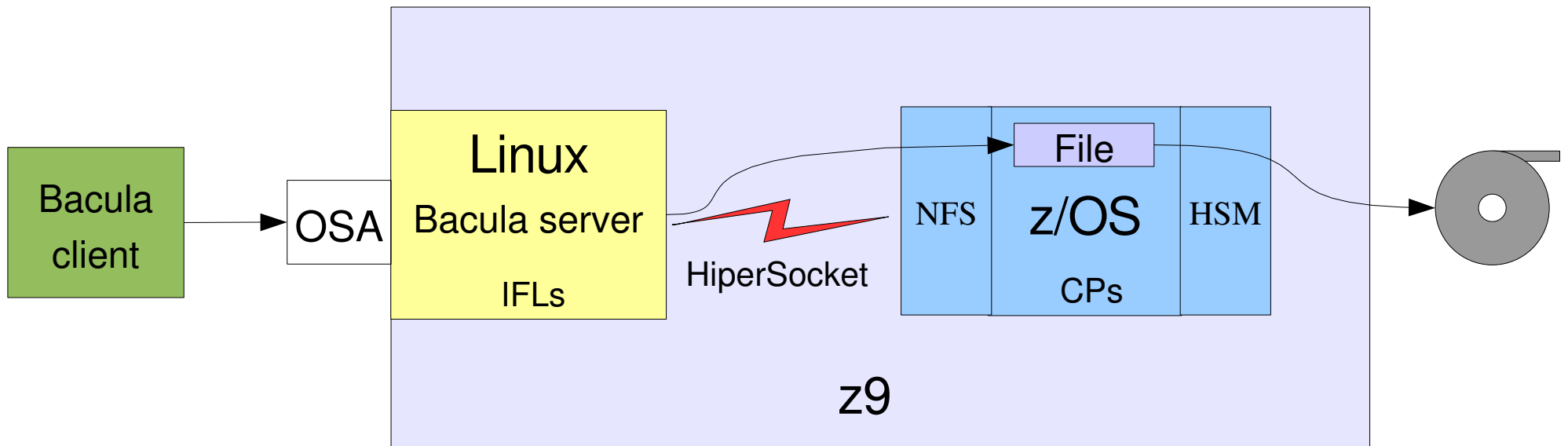
Application on Linux uses DB2 on z/OS

- And then theres all the other possible combinations

- Hybrid applications which reside partly on Linux, partly on z/OS

- Any possible combination of:

  - Workload Balancer

  - HTTP server

  - Java App Server

  - Database Server

  - Message Queue

  - LDAP

  - And others...

Application on Linux uses DB2 on z/OS

- But why would you want to bring distributed workloads onto the Mainframe? MIPS are expensive!
- Look again - It's cheaper than the alternatives in many cases
  - IFL Cycles are much cheaper
  - Software licence charges
- Stop by at the friendly SHARE Linux/VM project office!