IBM Software Group

It's How We Put It Together That's Sets Us Apart

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System z: The coolest place in the datacenter!

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Setting the scene: Mainframe Design Philosophy

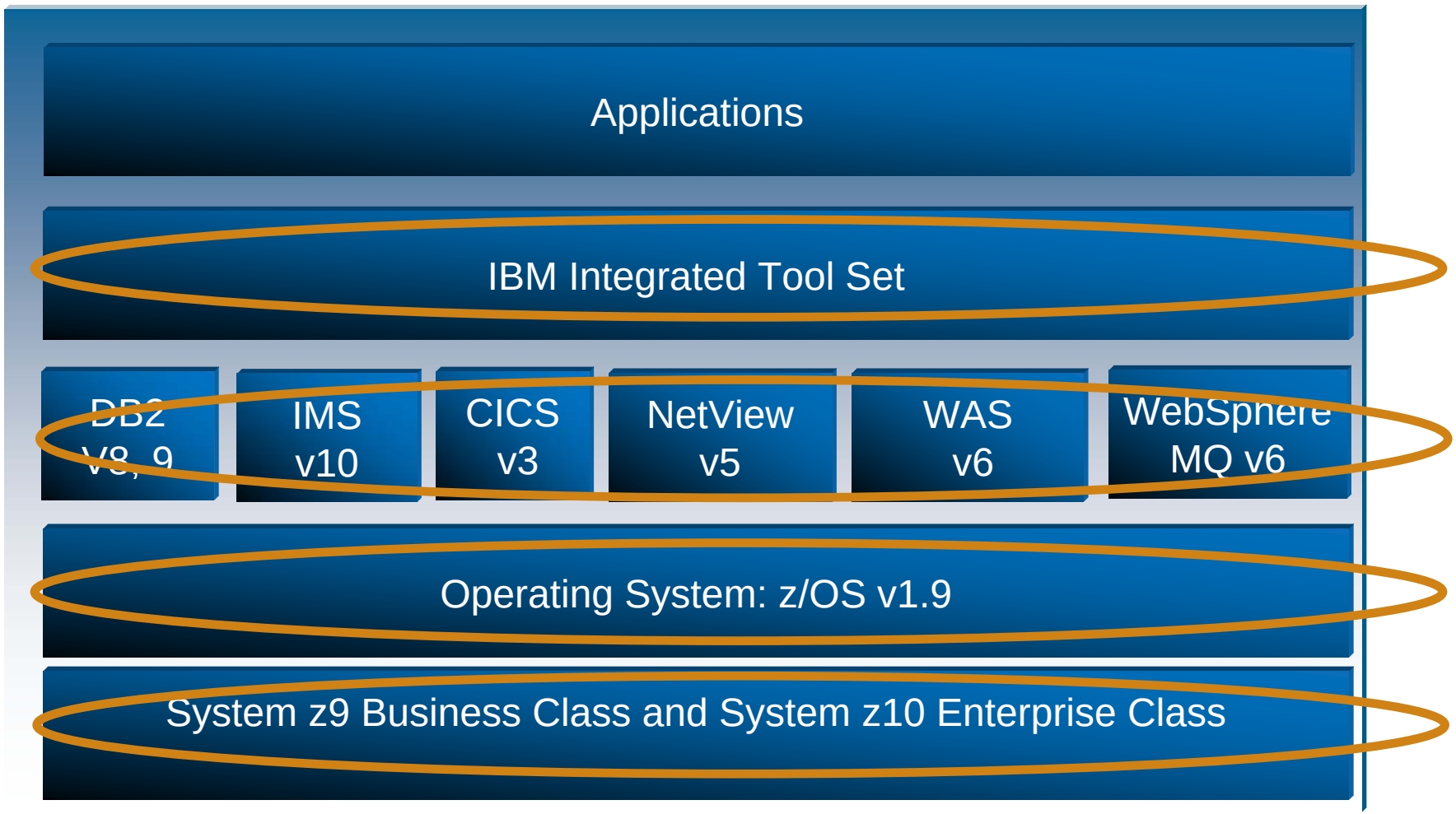
- **General, multi-purpose commercial computer, designed to use *all* resources efficiently**
  - Balanced design, optimized to run “Mixed workloads”

    especially OLTP

    vs Uni- or personal- use
  - Software designed to run together
  - Streamlined labor requirements

    Best practices have evolved
  - The ***more*** workload, the more ***mixed*** the workload, the better

What is System z technology?



Availability – Think of Application Availability!

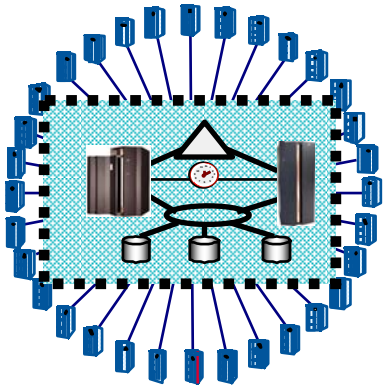
- **99.999% Available (less than 5 minutes a year)**
  - Most People think of Hardware.
- **We talk about application availability**
- **Reduced unplanned availability**
  - Reliability of HW, including executing every instruction 2X
  - Storage Protect keys
  - z/OS architecture of Address Spaces – One program can't bring another one down
  - Automation Tools
- **Planned outage reduction if not elimination**
  - Upgrade z/OS and Middleware without bringing the system down
    - Requires a Sysplex
  - Middleware, you can upgrade the application on the fly

System z Continuous Availability

Single System

- Built In Redundancy
- Capacity Upgrade on Demand
- Capacity Backup
- Hot Pluggable I/O
- Concurrent LIC updates

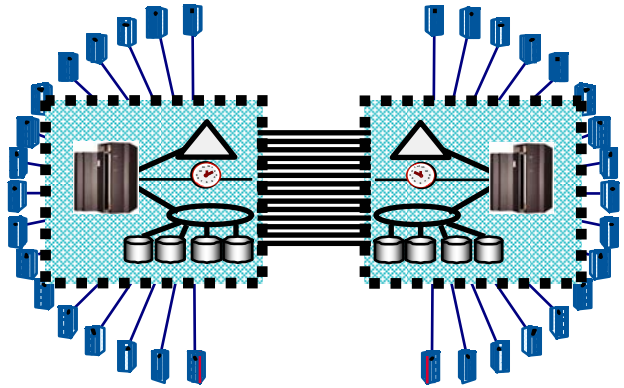
Parallel Sysplex



1 to 32 Systems

- Addresses Planned/Unplanned HW/SW Outages
- Flexible, Nondisruptive Growth
  - Capacity beyond largest CEC
  - Scales better than SMPs
- Dynamic Workload/Resource Management

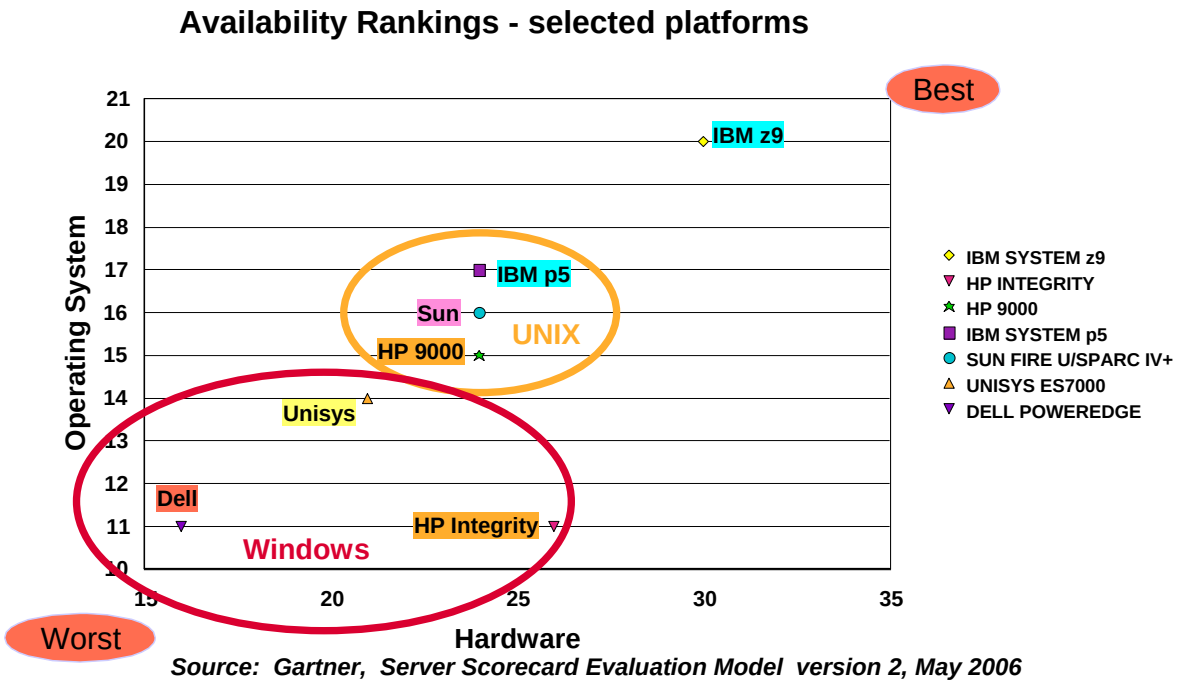
GDPS



Site 1 Site 2

- **Addresses Site Failure/Maintenance**
- **Sync/Async Data Mirroring**
  - Eliminates Tape/Disk SPOF
  - No/Some Data Loss
- **Application Independent**

System z is known for continuous availability



Source: Gartner, Server Scorecard Evaluation Model version 2, May 2006

- System z plus DB2 has the ***lowest requirement for planned outages*** in the industry
- System z with GDPS has the ***best tolerance to disaster outages*** in the industry
- System z has the ***best Application Availability*** in the industry
- System z provides ***Industry leading Reliability***

"The IBM mainframe platform retains industry-leading availability characteristics even for single-system instances. For example, standard service availability commitments from tier one service providers in commercial data center outsourcing agreements suggest that the mainframe is delivering 99.9% to 99.99% scheduled availability versus 99.5% for distributed server platforms in non-clustered configurations."

Source: Forrester, 2005 Mainframe Market Outlook, February 4, 2005

"The Parallel Sysplex zSeries environment was selected as the best way to meet our high demands for reliability, security and availability." **Nikolai Matveev, Chief Engineer, Surgutneftegas**

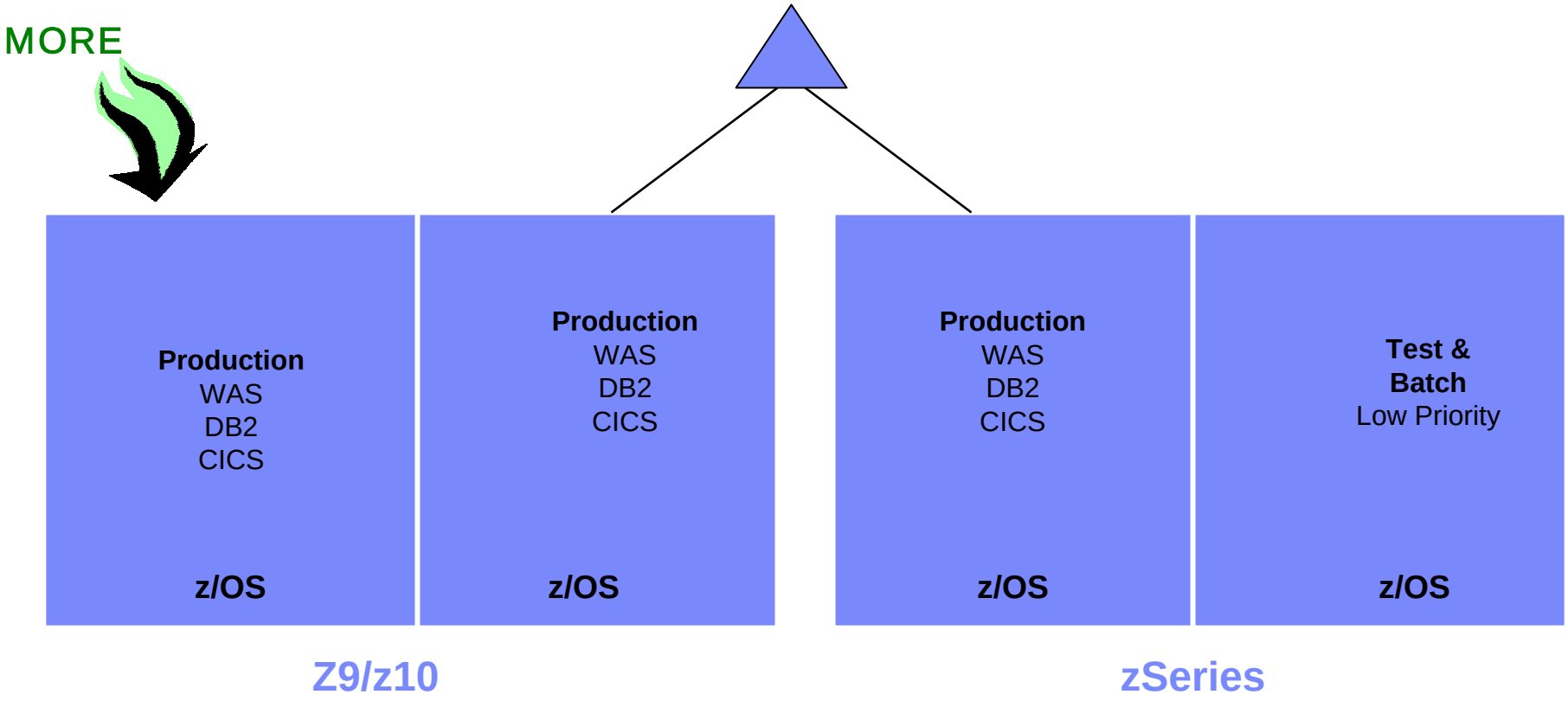
Scalability and Performance

- **Hardware**
  - Growth in capacity from a small BC machine from up to 4 processors to a z10 with 54 availability processors
  - System assist processors for I/O
  - Large memory
  - Intelligent Resource Director
  - Parallel Sysplex – Up to 32 complexes connected
- **z/OS**
  - Intelligent Workload Manager
  - Priority scheduling of workload based on business rules
- **Middleware (IMS, DB2 and CICS)**
  - Priority schedule of transactions based on business rules from WLM
  - Very large buffer pools for data

z/OS: Prioritizing work across images in a server - IRD

"Intelligent Resource Director (IRD)" further differentiates z/OS with its ability to manage resources across multiple partitions in a server

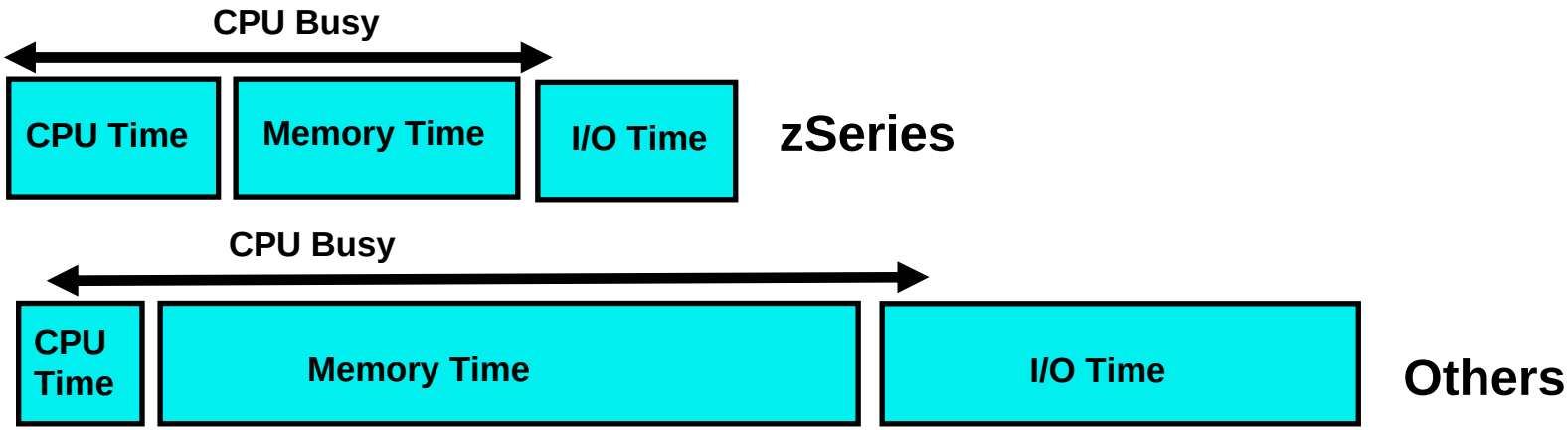
PR/SM, IRD and WLM work together to ensure that the resources of the server are correctly balanced to enable work to complete within stated policy goals



Processor resources, data bandwidth and I/O queueing decisions are perfectly balanced across the server to manage diverse workloads within the parameters of stated business goals

Relative single system capacity

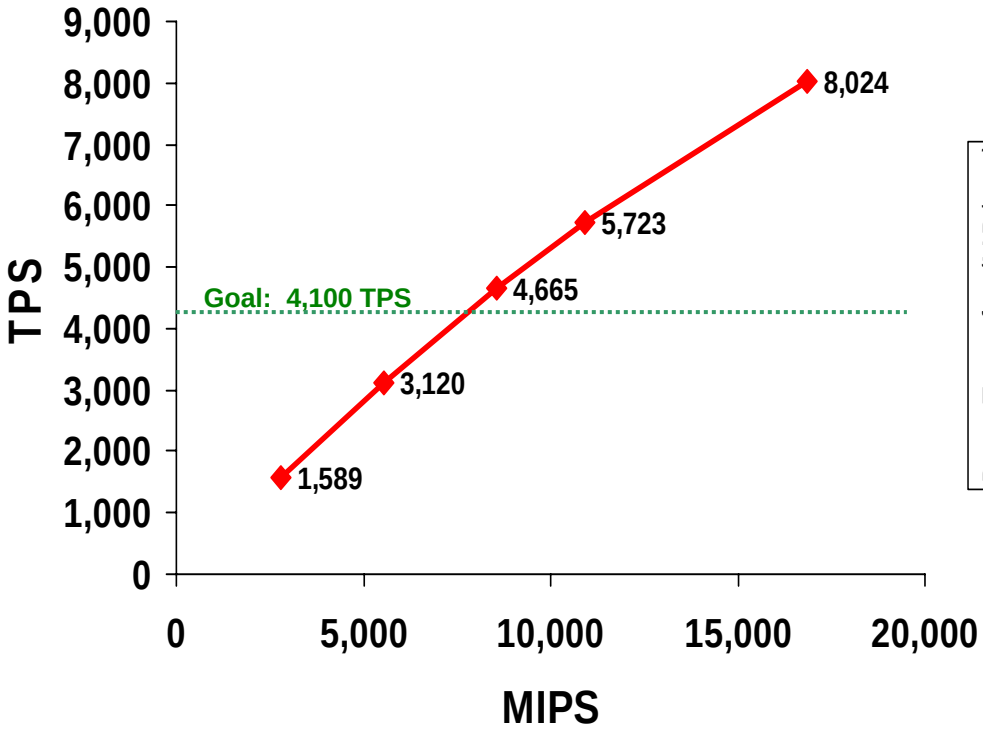
There's more to performance than just processing power

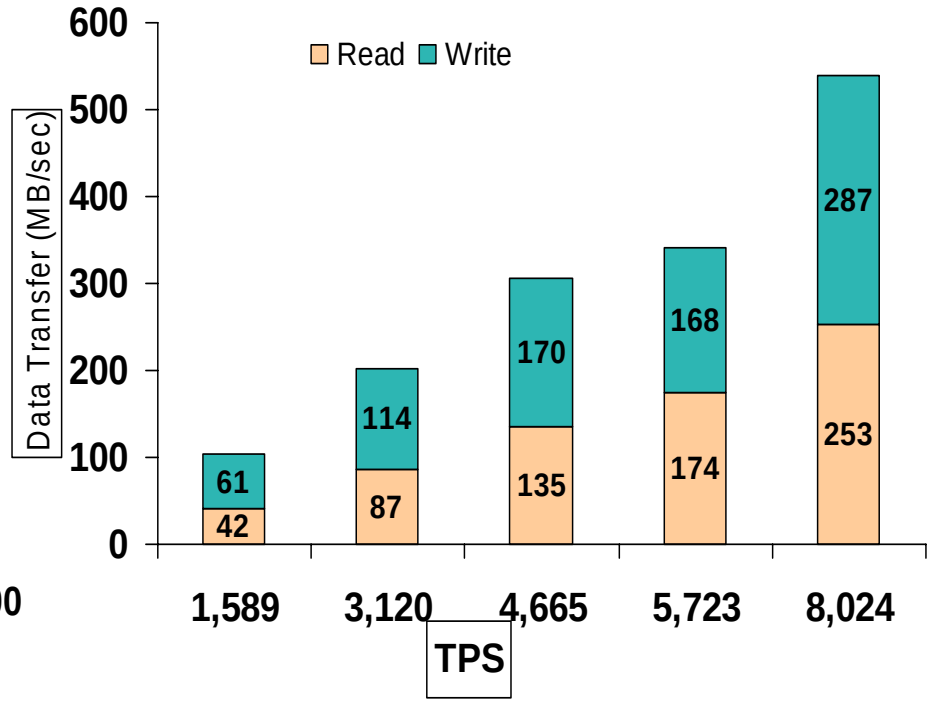


Data intensive workloads like large databases, transaction processing, object-oriented code and context switching potentially run better on zSeries servers.

The largest System z benchmark ever

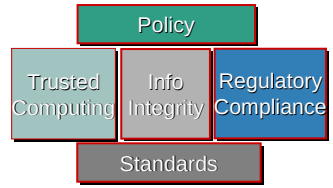
Near-Linear Scalability with DB2 for z/OS with No Partitioning Required

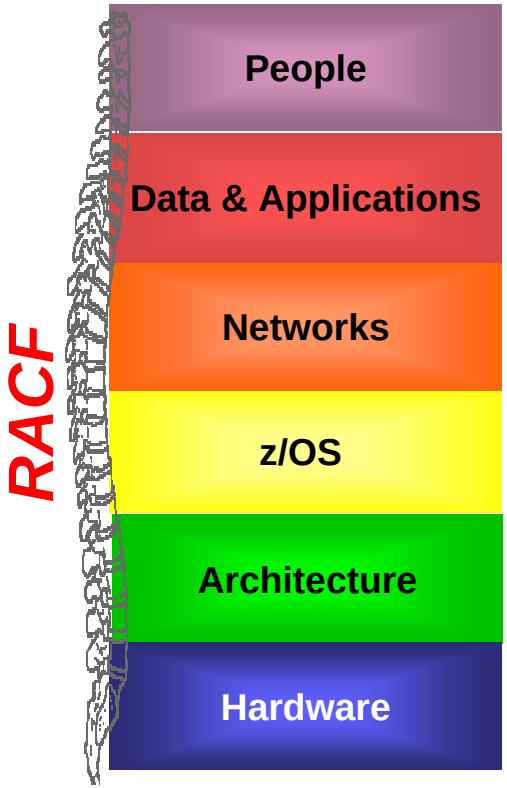




BANK OF CHINA

Rock solid Security, best in industry! Begins with RACF

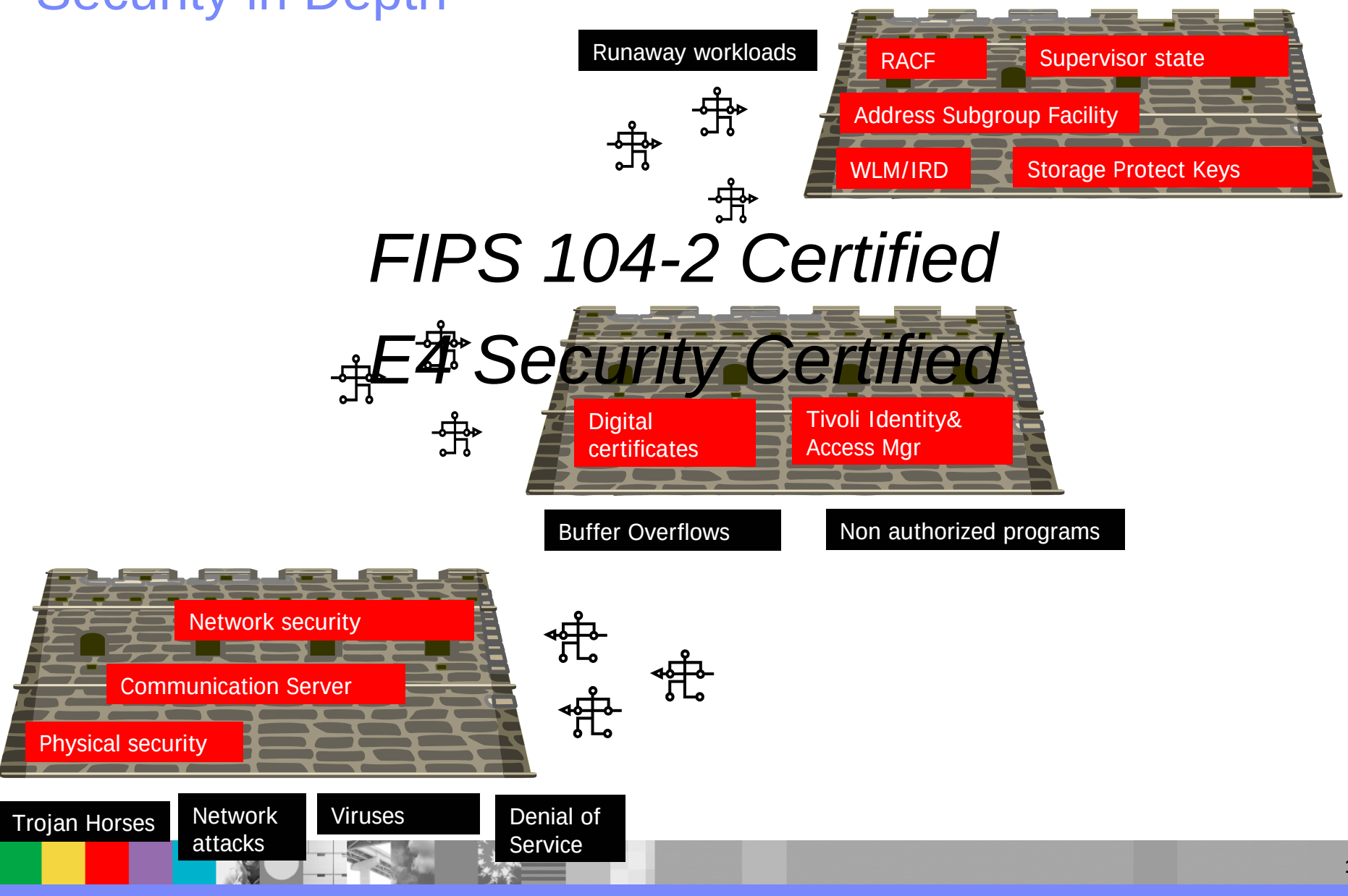




- Identity management, privacy,
- Application and database security through RACF
- CICS, MQ, IMS,WAS secured transactions
- RACF, Secured communications, PKI support
- Storage protect key, workload isolation, hipersockets, error recovery
- Hardware assisted encryption, Geographically Dispersed Parallel Sysplex (GDPS)

Proven security, integrated throughout the stack

Security in Depth



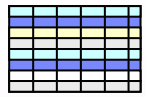
Strong Security Needs Many Elements

Crypto Cards

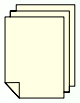
Tape encryption

TS1120

Multilevel security



System z SMF



Consul Insight

Consul System z Tools

DB2 Audit Management Expert

Data Privacy

Compliance and Audit

Extended Enterprise

Tivoli Identity Manager

Tivoli Federated Identity Mgr

Platform Infrastructure

Common Criteria Ratings

Support for standards

RACF

Provides audit, authorization, authentication and access

Communications Server

Network intrusion detection

System z virtualization leads the industry

- Virtualization creates the illusion that each user has their own private machine
  - Technology in z/VM, PR/SM, concept of LPARs, MVS address-spaces
- Virtualization enables the OS to maximize utilization
  - z/VM significantly reduces costs by reducing the total hardware (less memory and CPU) needed for any workload and also simplifying operation
- These 2 advantages enable massive ***Server consolidation***
  - And also quick and easy provisioning
- LPARs enable sub-capacity pricing

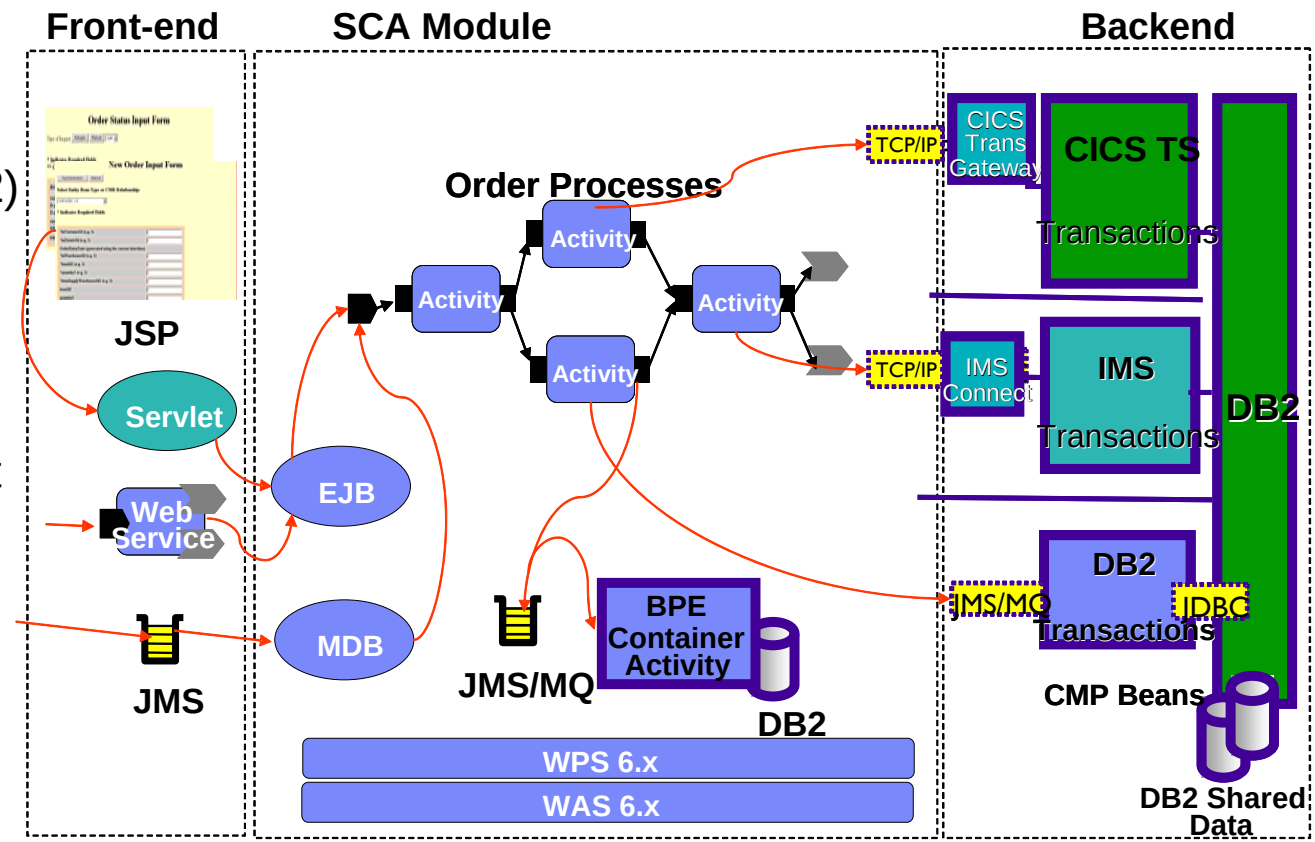
Other platforms are way behind: E.g. compared with VMWare

- z/VM supports many more virtual CPUs and has no theoretical limit for number of guests
- z/VM supports virtual machines with 128 GB of memory
- z/VM customers over-commits memory 200-400% in production
- z/VM environment maximizes and balances utilization of memory, CPU and I/O to reduce the amount of hardware required

Hub for Data and SOA

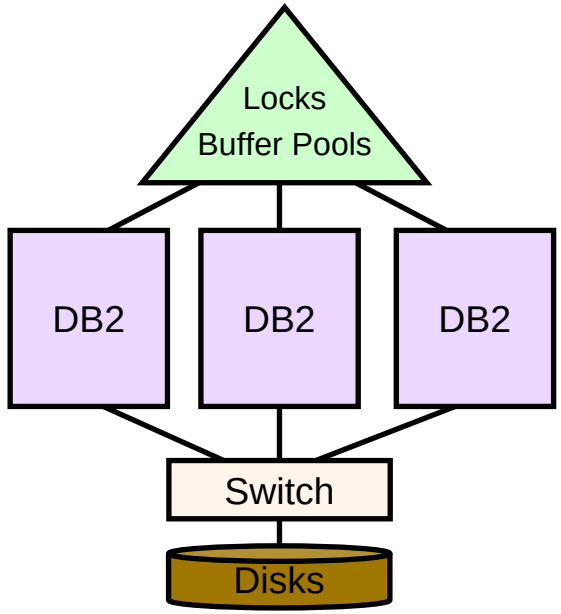
"Co-location" has many major technical benefits

- Transactional Capabilities
  - (2PC, Compensation)
- State Management (DB2)
- Performance
  - Network bandwidth/latency
- Work Load Management
- Policy Management
- Problem Determination
- Deployment & Version Control
- Logging/Audit
- Scale/Clustering
- TCO



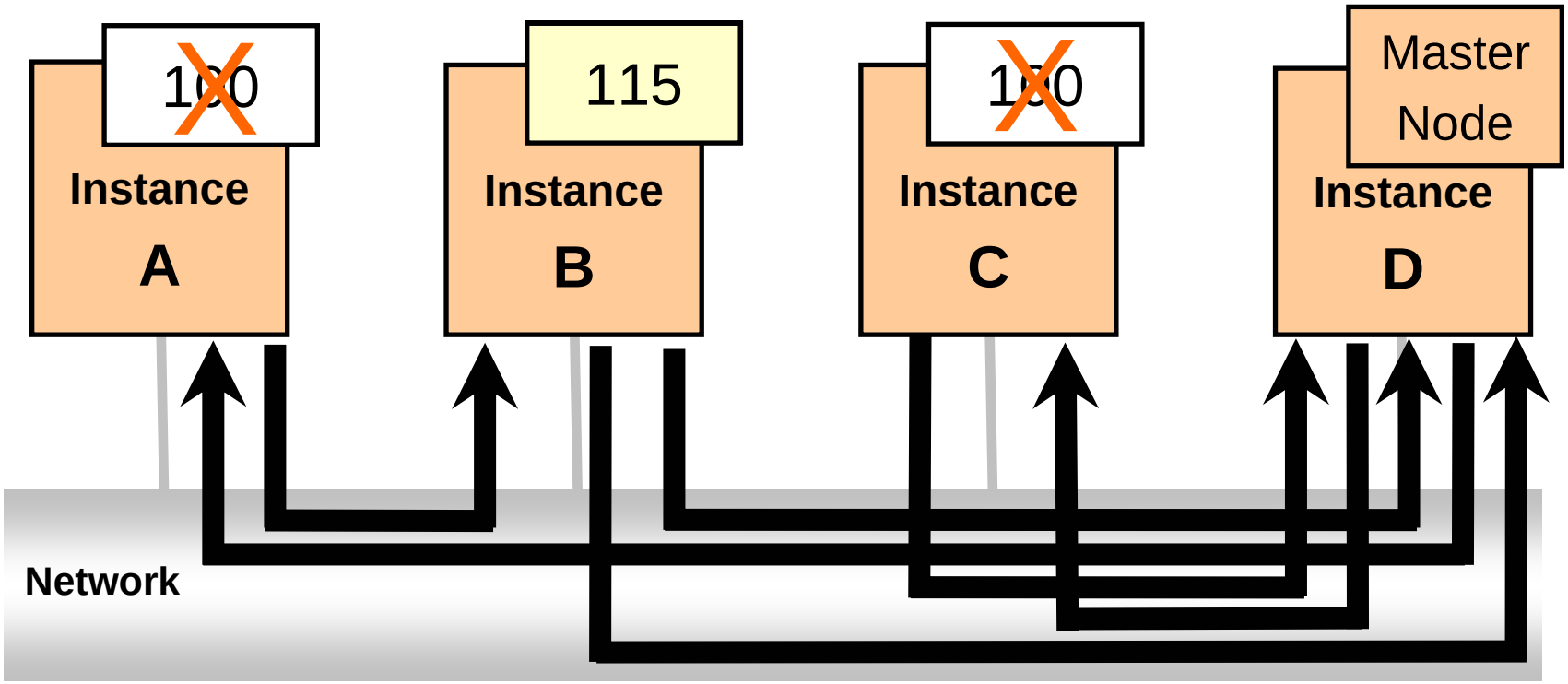
Why centralize the DB on the mainframe?

1. scalability
   - high data throughput
   - very large DB size
2. availability
   - 24 by 7
   - real-time update
   - resiliency
3. security and protection



- Single system image
- High speed centralized lock manager in coupling facility
- Shared data, not partitioned
- Easy to add more processors

Oracle RAC: Lock Management Overhead



Lock Assume

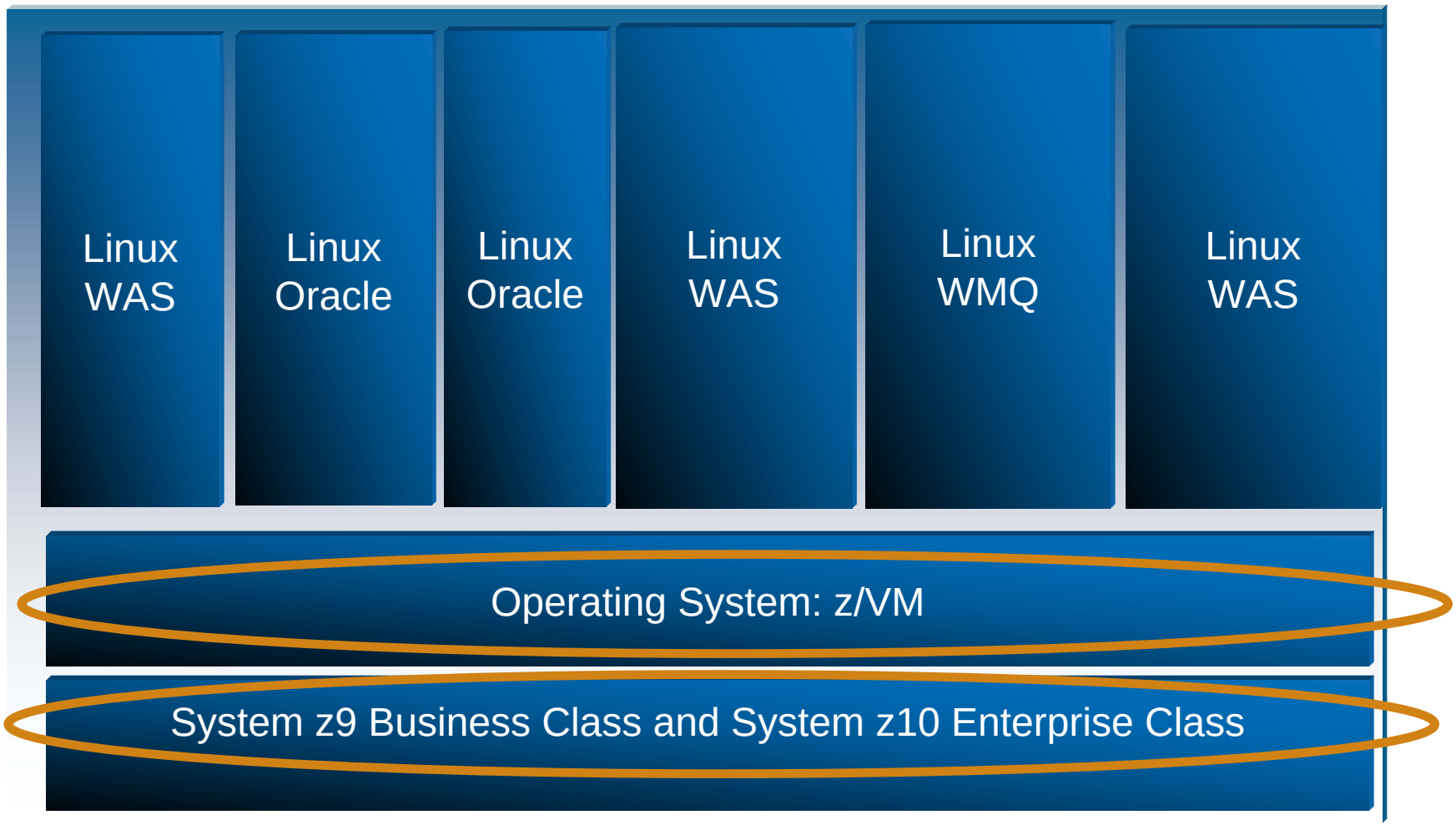
7. B Updates local copy

Inter-node connections: 6

In a cluster with 4 nodes, an update operation may need 6 network connections and two in-memory calls (not shown).

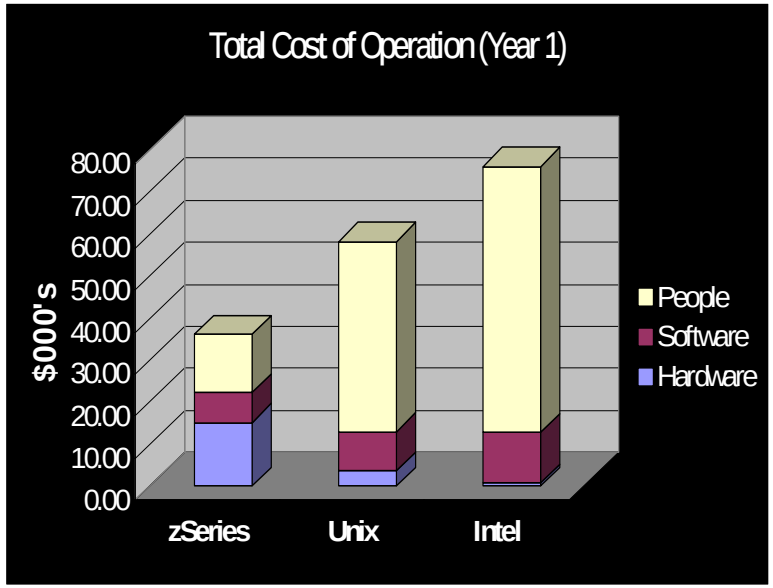
Example based on Oracle's US Patent 7,107,319 B2.

What is System z technology?



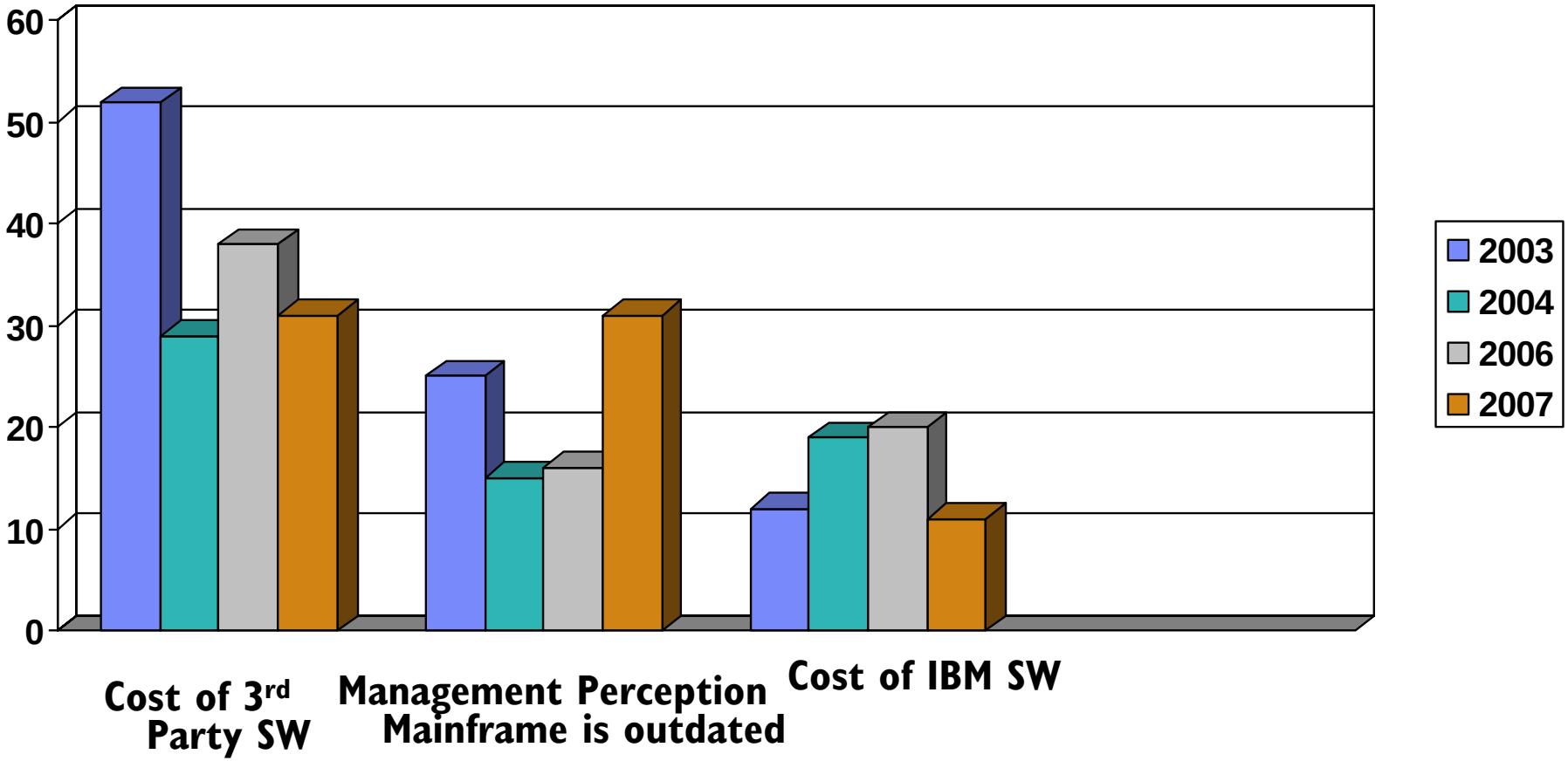
How does the Mainframe do it (drive TCO down) ?

- **Hardware**
  - Specialty processors (IFL, zAAP and zIIP) discounted 90%
  - Disaster Recovery processors discounted 98%
  - Growing customers may upgrade installed MIPS without cost
  - Up to 336 I/O offload processors at feature prices
  - Requires less power, cooling and floor space
- **Software**
  - MLC per incremental MIP / MSU goes down as system gets larger
  - One-time charges are per processor for IFL (at Intel rate)
  - No charge for software on zIIP and zAAP
  - Sub-capacity pricing, Sysplex aggregation, zNALC, technology dividend
- **People**
  - Requires significantly less operational staff to manage the installation



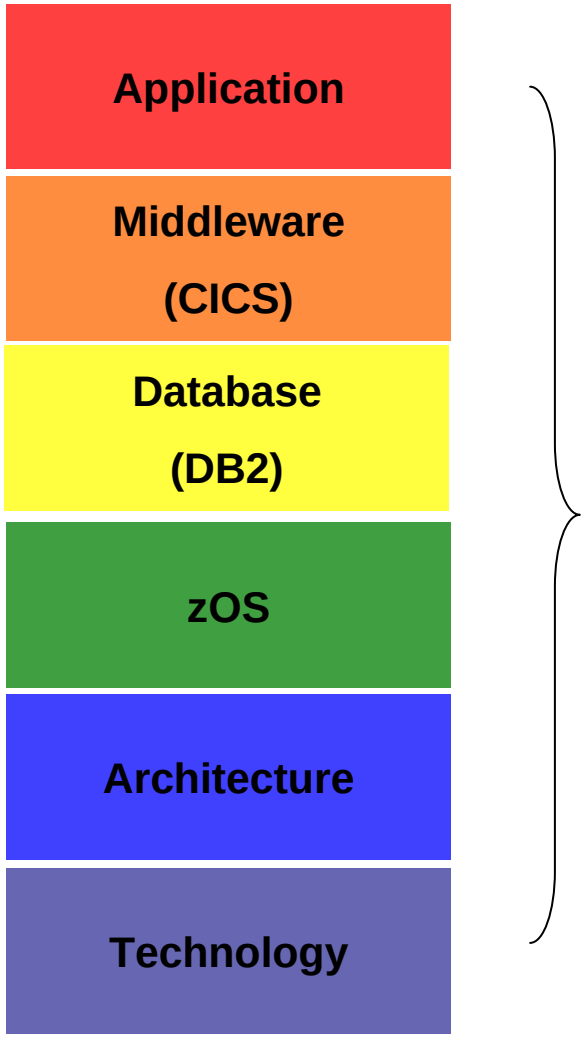
Top 3 Pains for Customers with Mainframes*

Question: What is the largest inhibitor to the growth in usage of the mainframe in your organization?



* Gartner Data Center Conference survey - January 2007

The Value is in the zStack



- It's not just a collection of technologies
- It's $100 Billion+ dollar investment in an integrated stack …
- Designed to achieve business objectives in demanding customer environments


Thank
You