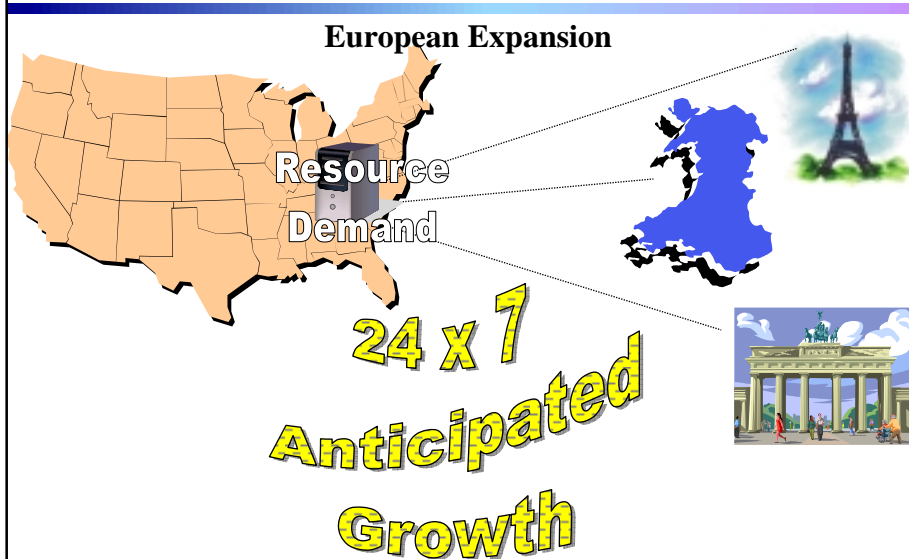


A Fresh Look at the Mainframe

The Mainframe Design Point
Fundamentally Better

ODI's New Applications Will Quickly Gain Momentum



ODI Needs a World Wide Computing Solution

Jobs will be in jeopardy
if outages occur...

Here is my research...



On Demand Insurance
CIO

Lets look...



IBM

06 - Fund_Z_Design v3.5.ppt

3

ODI Determined the Cost of an Outage

Source: Robert Frances Group 2005

The Effect on the Business:

- Escalating costs
- Customer loyalty
- Market competitiveness
- Regulatory compliance
- Business Reputation
- Loss of business

Financial Impact of Downtime (per hour) by Industries

Energy	\$2.8M
Telecommunications	\$2.1M
Manufacturing	\$1.6M
Financial	\$1.5M
Information Technology	\$1.3M
Insurance	\$1.2M

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4

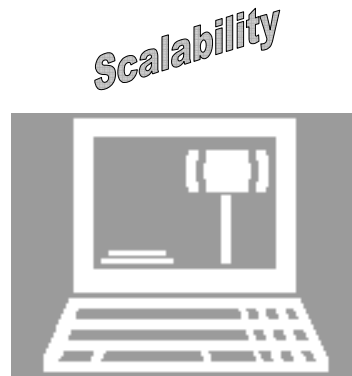
ODI Requires...

- 1) **Easy Scalability**
- 2) Efficient Responsiveness
- 3) Continuous Availability
- 4) Manageability

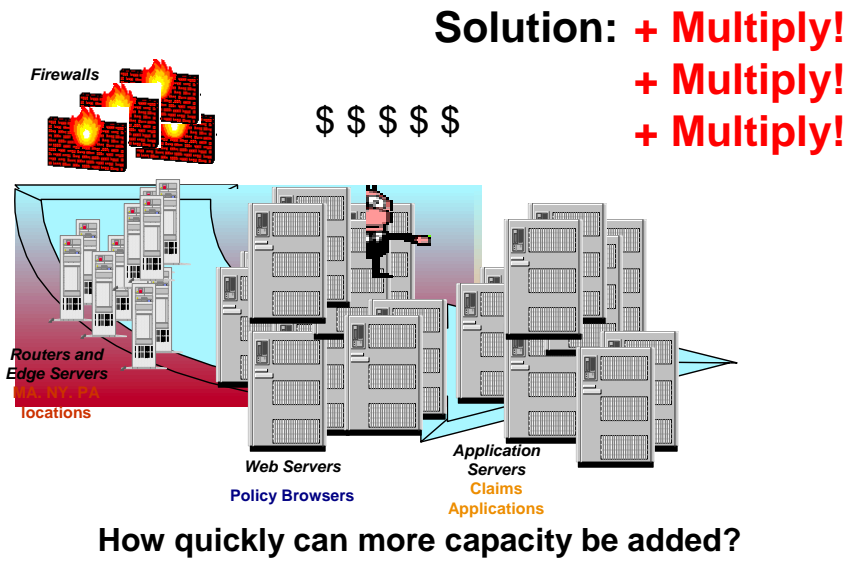
Two Approaches to Scalability

1. **Distributed server scale out**

2. **Mainframe scale up**



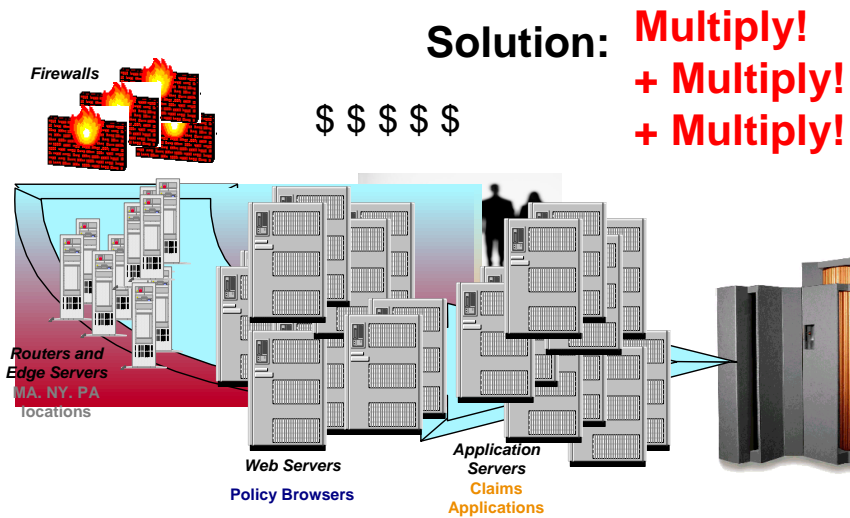
Distributed Server Scale Out



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The Mainframe Solution

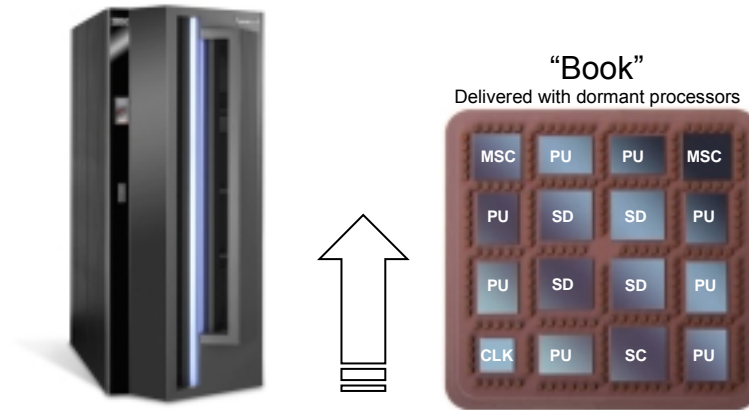


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ODI Wants to Acquire CPU Capacity On Demand

Permanent Growth - Customer Initiated Upgrade (CIU)
 Temporary Growth - Capacity On Demand (COD)
 Nondisruptive addition of General Purpose Processors,
 ICF, IFL, zAAPs, zLIP's, and memory (8 GB memory increments)



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Mainframe Capacity On Demand

Contract



www.ibm.com/servers/resourceink

Use Pre-shipped
Hardware

NO DISRUPTION

Add more
memory too !

Quickly add more capacity

Measurable Benefits using CoD

- Provides extra processing power to meet business demands
- Activate dormant processing capacity
- Quickly scale up non-disruptive without adding more servers
- Enables server consolidation to a single platform to reduce operational cost
- Allows investment in future, paying only for immediate requirements
- Provides a convenient means of testing resources with minimal investment



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ODI Requires...

- 1) Easy Scalability
- 2) **Efficient Responsiveness**
- 3) Continuous Availability
- 4) Manageability

Pitfalls with a Distributed Approach

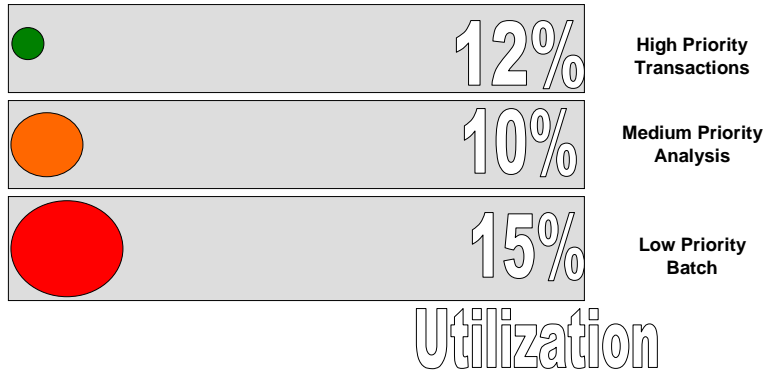


A Distributed I/T Campus



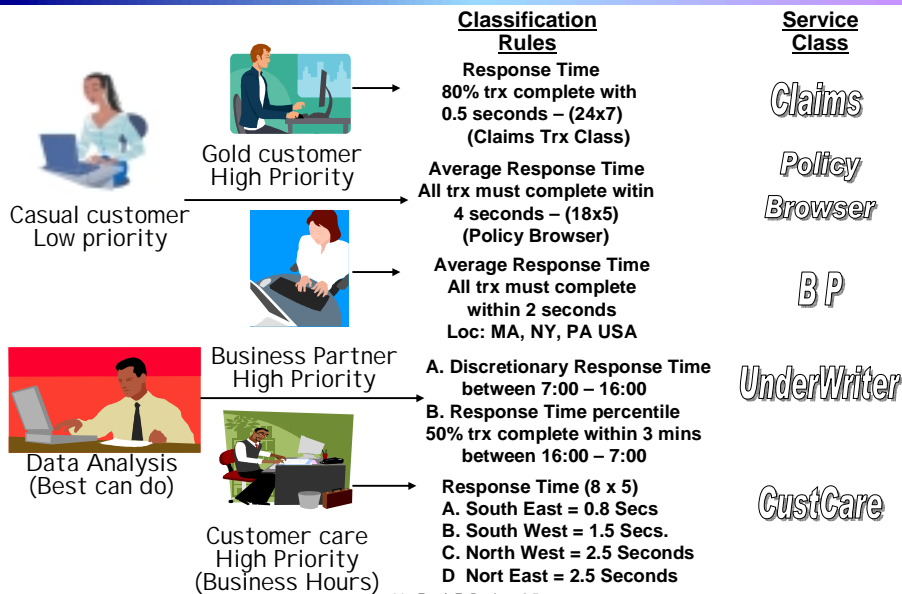
Distributed Servers

Purchased New Machines each running separate workload



- ~~X~~ Purchasing separate machines had higher administration
- ~~X~~ Along with lower utilization
- ~~X~~ Support problems did not go away

Mainframe Policy Driven Workload Management



Mainframe Workload Management

- Monitoring the workloads of various users and applications
- Monitoring system-wide resources to determine whether they are fully utilized
- Inhibiting the creation of new user workloads when certain shortages of resources exist
- Dynamically adjusting resources to meet service level objectives
- Change the priority of users automatically to adjust the consumption of system resources
- Selects the resources to be allocated, if a choice of resources exist to balance the executing workloads



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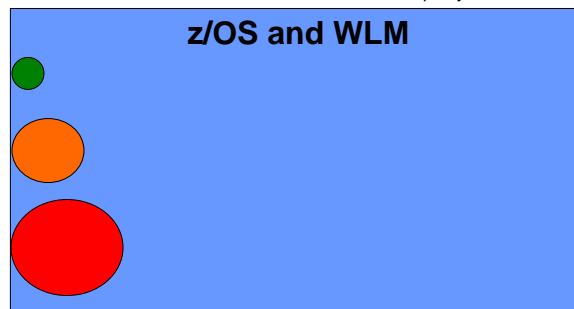
Mainframe Workload Management

Workloads deployed to z/OS can be differentiated and prioritized based on business policy, and managed to meet Service Level Agreements

Resources are automatically allocated, adjusted and reallocated to meet objectives

WLM will manage LPARs, CPUs, channels, I/O subsystems and DASD, TCP/IP connections, servers, etc.

Enables 100% utilization of capacity



High Priority Transactions

Medium Priority Analysis

Low Priority Batch (Data Analysis)

Transaction type:

- Web "buy" vs "browse"
- B2B
- Batch payroll
- Test

User/user type:

- Top 100 clients
- Typical clients
- Executive
- Design team

Time periods:

- 1AM - 4AM
- Mon - Fri
- Weekends
- End of quarter

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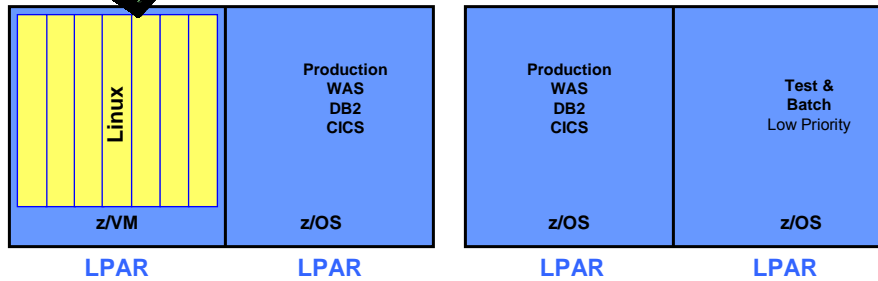
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Workload Management Prioritizing Across Images in a Server

"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

MORE



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

The Mettle Test ...



zSeries_mettle_01232004.exe

Mettle Test Movie

ODI Requires...

- 1) Easy Scalability
- 2) Efficient Responsiveness
- 3) **Continuous Availability**
- 4) Manageability

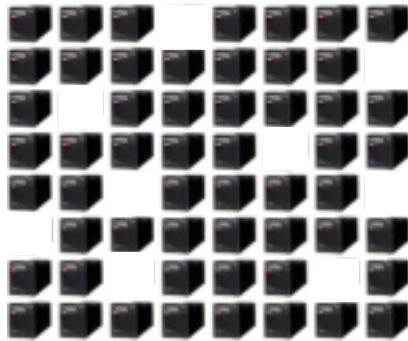
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ODI Needs a World-Wide Reliable 24x7 Solution

- 99.999% Requires Redundancy AND Inherent Reliability
- Higher Reliability means Lower Cost and Lower Risk
- 99.999% Reliability means <5 minutes downtime per year

Distributed Systems have costs



Mainframe offers an answer



Compet - 5/9s
Comp design
Eprec

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Mainframes “Rarely Go Down”

- Component **Reliability**
 - ▶ Use only the best components
 - ▶ Higher test and burn-in standards
- Built-in **redundancy** and sparing
- **Hot pluggable** replacement parts
- **Remote Repair** / Phone Home
- **Failure Prediction** – goes beyond reaction



“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 nonclustered configurations.”

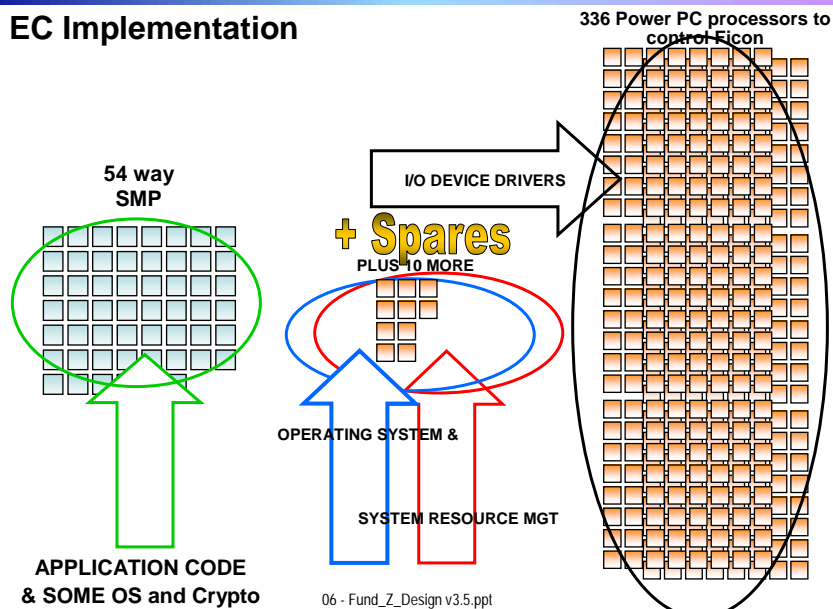
Source: Forrester, 2005 Mainframe Market Outlook, February 4, 2005

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Built-in Error Detection and Redundancy

z9 EC Implementation



95% 2x

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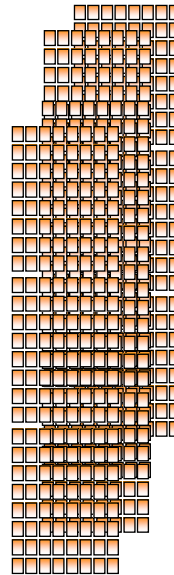
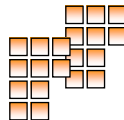
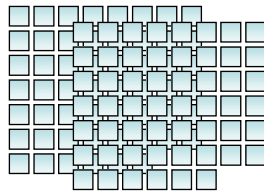
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Built-in Error Detection and Redundancy

z9 EC Implementation

AND THEN,

Add Even More



ASSIGN A DEDICATED "CROSS-CHECK" PROCESSOR TO EVERY EXECUTION UNIT, SUPPORTING BULLETPROOF SYSTEM RELIABILITY, UNPARALLELED APPLICATION STABILITY, AND MATCHLESS DATA INTEGRITY

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Error Detection – System z9 Dual Execution with Compare

Example

- I UNIT: Component to fetch and decode instructions
- E UNIT: instruction – execution element
- R UNIT: ECC-protected

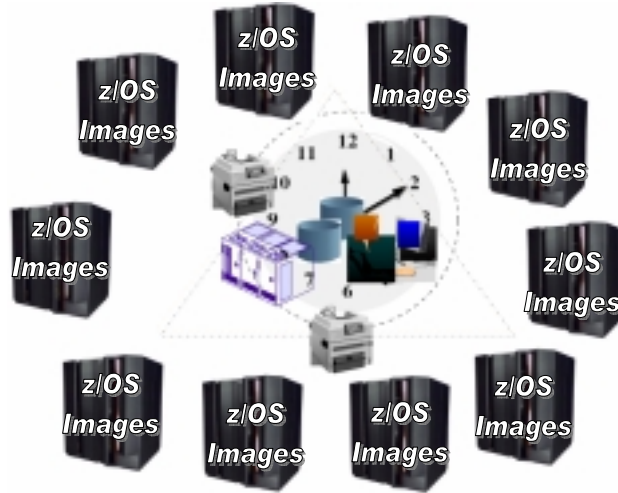


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SYSPLEX = A Cluster of z/OS Images

Provides additional scalability and availability



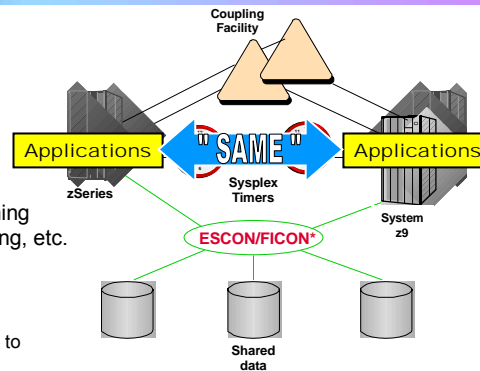
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Horizontal Scaling & High Availability

■ Parallel Sysplex

- ▶ Loosely coupled multiprocessing
- ▶ Hardware/software combination
- ▶ Requires:
 - Data sharing
 - Locking
 - Cross-system workload dispatching
 - Synchronization of time for logging, etc.
 - High-speed system coupling
- ▶ Hardware:
 - Coupling Facility
 - Integrated Cluster Bus and ISC to provide high-speed links to CF
 - Sysplex Timer – Time Of Day clock synchronization
- ▶ Implemented in z/OS* and subsystems
 - Workload Manager in z/OS
 - Compatibility and exploitation in software subsystems, including IMS*, VSAM*, RACF*, VTAM*, JES2*, etc.



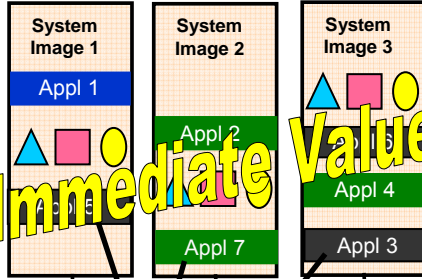
■ Rolling Maintenance System and Application Code

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Sysplex Resource Sharing

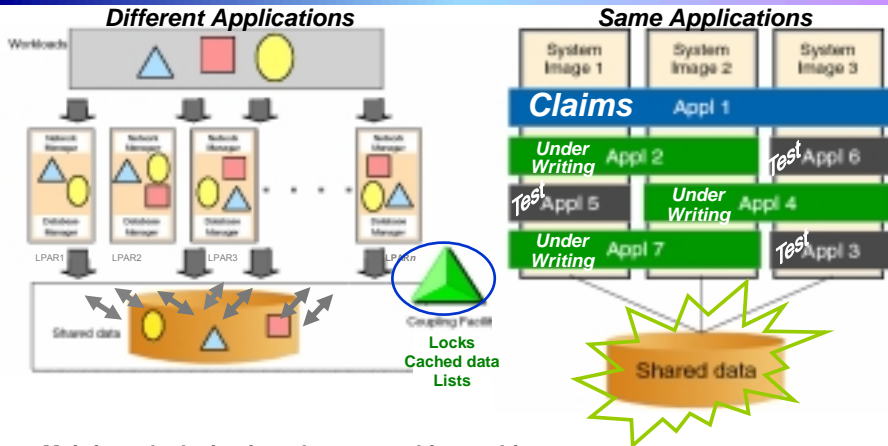
Different Workloads



Immediate Value

- System Management Simplification
- Single Image Management
- Coupling Facility
- Security
- Audit Logger is Policy Based Management
- Simplification (COST CONTROL)
- Elimination of redundant hardware / software components

Sysplex Shared Data Enables Scaling and Failover

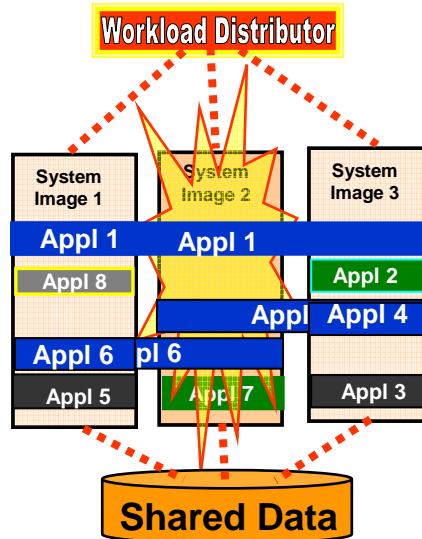


- Mainframe's design is a share-everything architecture
- The Coupling Facility* provides the technology to shared data concurrently amongst different or similar workloads
- Data sharing provides for continuous availability and reliability
- CICS, IMS, DB2, MQ, VSAM, exploit the coupling facility for shared data

* Internal License Code

Sysplex Failover

Cloned Application

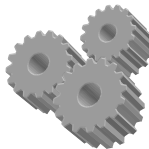


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What a Sysplex Can Do for ODI

- Platform for continuous availability so that applications can be available 24 hours a day, 7 days a week, 365 days a year
- Ability to do more work
 - ▶ Greater capacity
 - ▶ Improved ability to manage response time
 - ▶ Platform for further capacity and response time advances
- Greater flexibility
 - ▶ Ability to mix levels of hardware and software
 - ▶ Ability to dynamically add systems
 - ▶ An easy path for incremental growth
 - ▶ Varied platforms for applications, including parallel, open, and client/server
- Workload balancing



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ODI Requires...

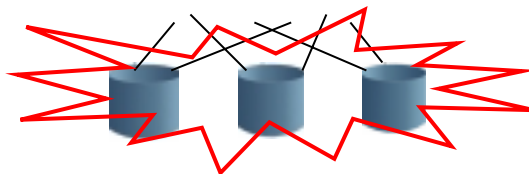
- 1) Easy Scalability
- 2) Efficient Responsiveness
- 3) Continuous Availability
- 4) **Manageability**

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ODI Has Service Level Concerns Managing New Growth of Their Storage

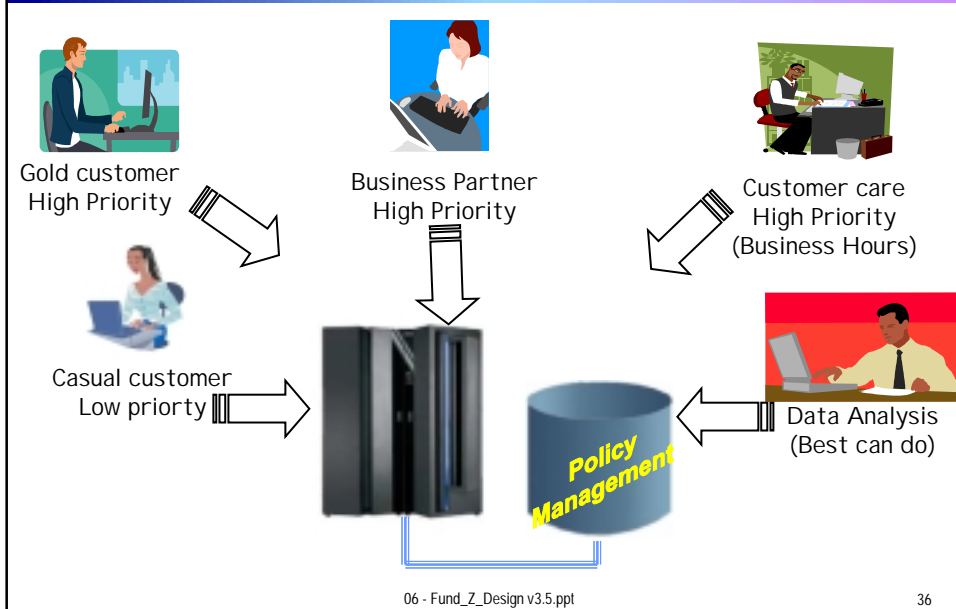
- What performance objectives are required by data
- When and how to backup data
- Whether datasets should be kept available for use during backup or copy
- How to manage backup copies kept for disaster recovery
- What to do with the data that is obsolete or seldom used



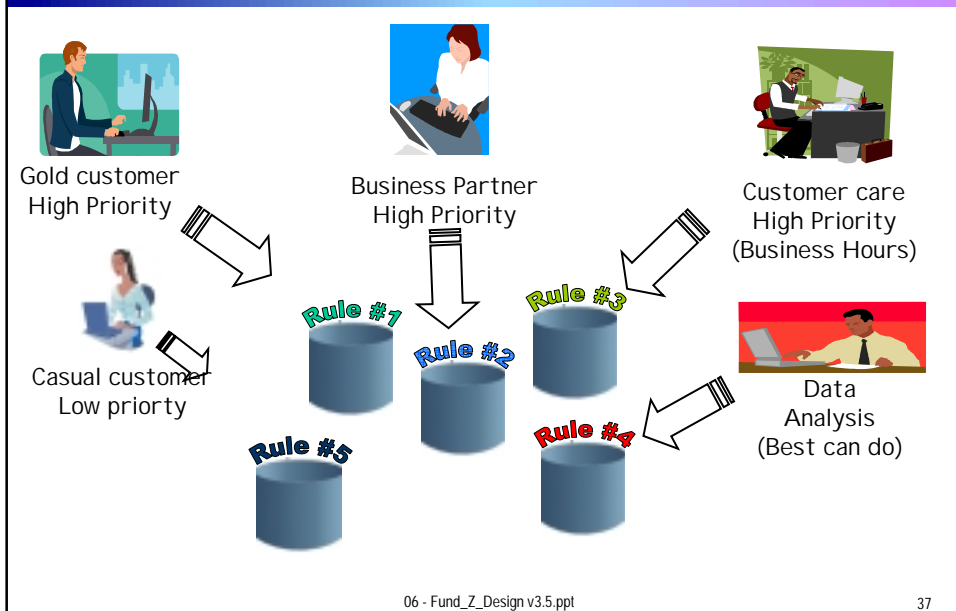
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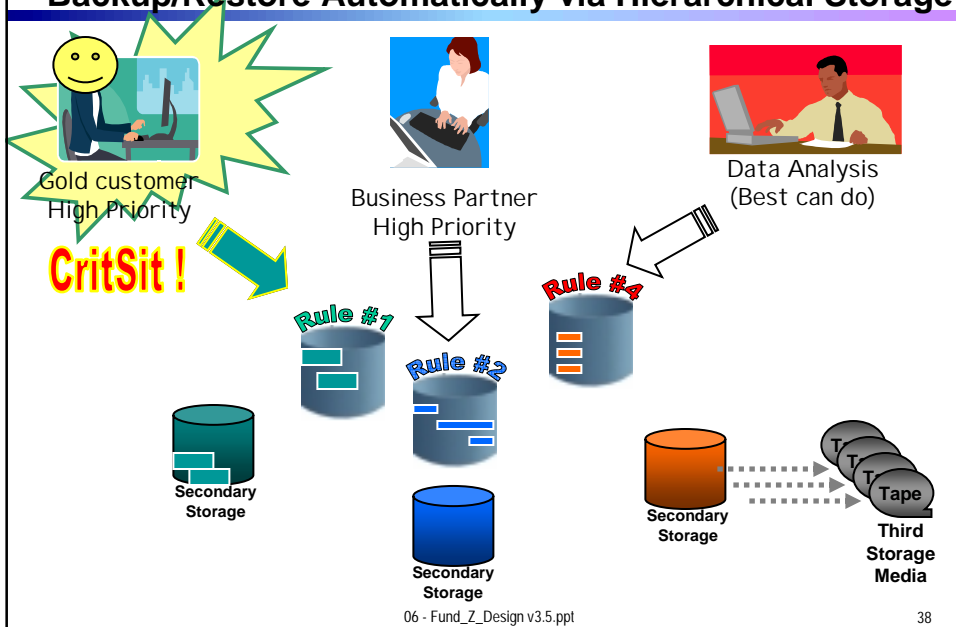
ODI Needs to Automate Storage Management Due to New Application Deployment into Global Regions



Rule-based Policy Management to Manage the Storage Process



Rule-based Policy Management to Manage Backup/Restore Automatically via Hierarchical Storage



While Rule-based Administration was Occurring Transparently...

What did the Hierarchical Storage Manager just do?

- Seamless Storage Management
- Space Management
- Tape Mount Management
- Availability Management

Disk administrator went for coffee



Simply The Best Qualities of Service!

OK, you sold me on the quality of System z



ODI's CIO

How ODI Can Run the New Workload on the Server

Production-A 24 hour online Claims

Production-C Online

Production E-Network

TEST-A Claims

Development

Production-Special Batch

Happy CIO



SAP-A LPAR

Production-B Batch

Production-Linux
VM Print Servers VM VM VM

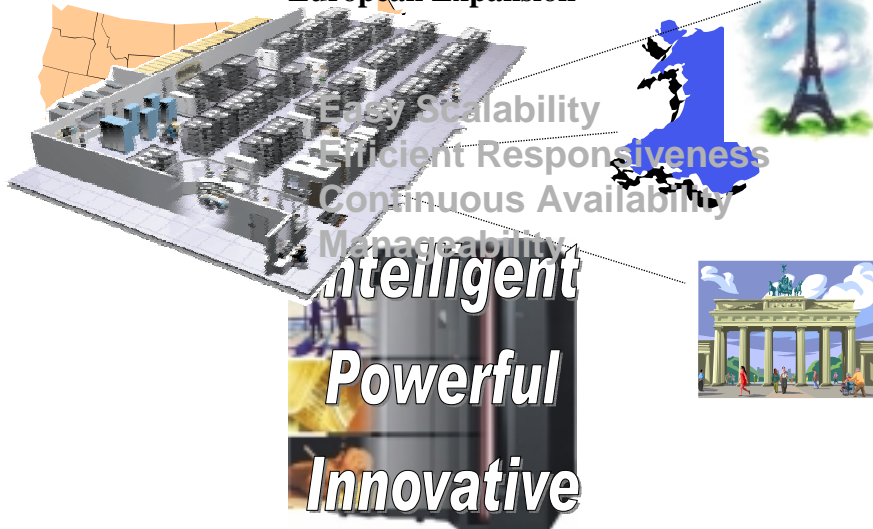
Quality Assurance-B

VM TEST-Linux VM VM

TEST Web & App Servers

A More Stable Environment

European Expansion



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