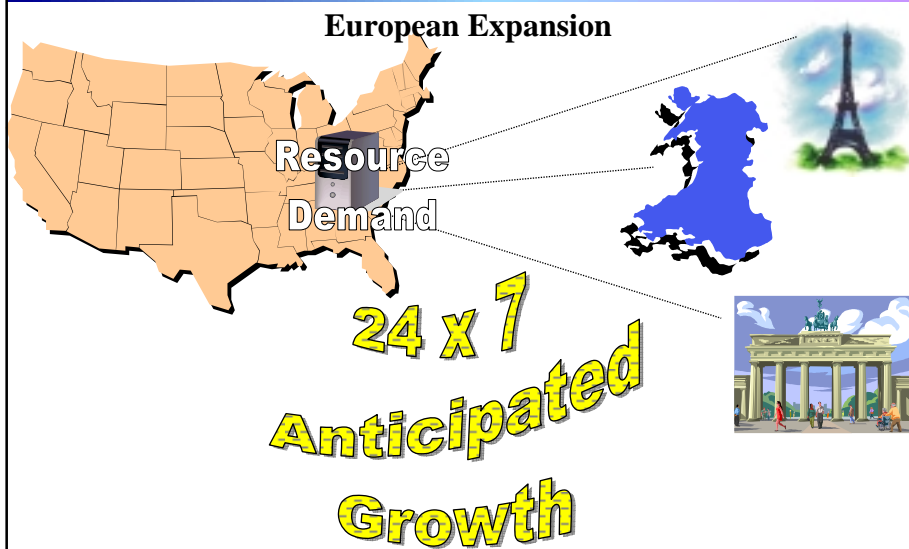


# A Fresh Look at the Mainframe

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

06 - Fund\_Z\_Design v3.5.ppt

4

## ODI Requires...

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

06 - Fund\_Z\_Design v3.5.ppt

6

## Two Approaches to Scalability

1. **Distributed server scale out**
2. **Mainframe scale up**

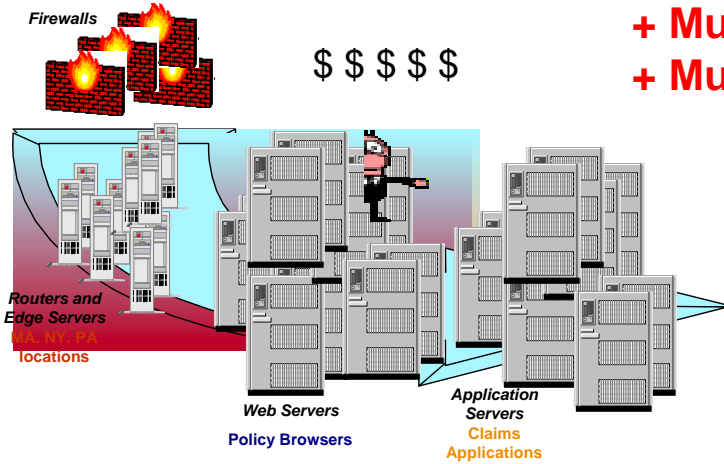


06 - Fund\_Z\_Design v3.5.ppt

7

## Distributed Server Scale Out

**Solution: + Multiply!  
+ Multiply!  
+ Multiply!**



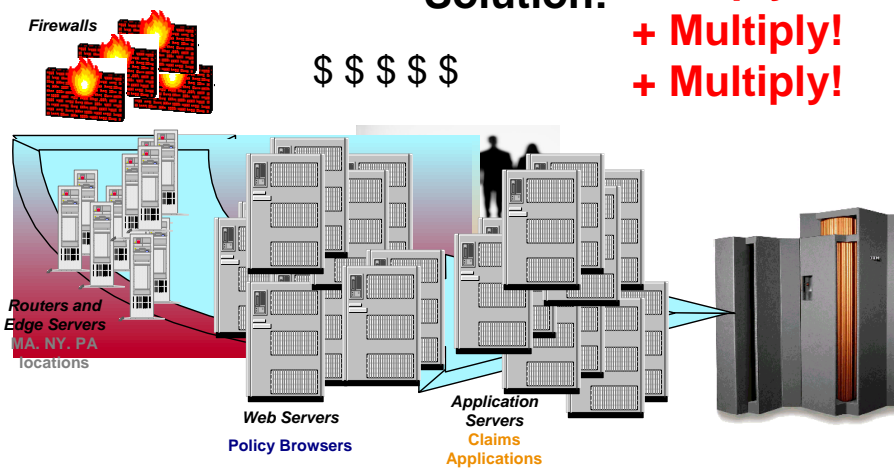
**How quickly can more capacity be added?**

06 - Fund\_Z\_Design v3.5.ppt

8

## The Mainframe Solution

**Solution: Multiply!  
+ Multiply!  
+ Multiply!**

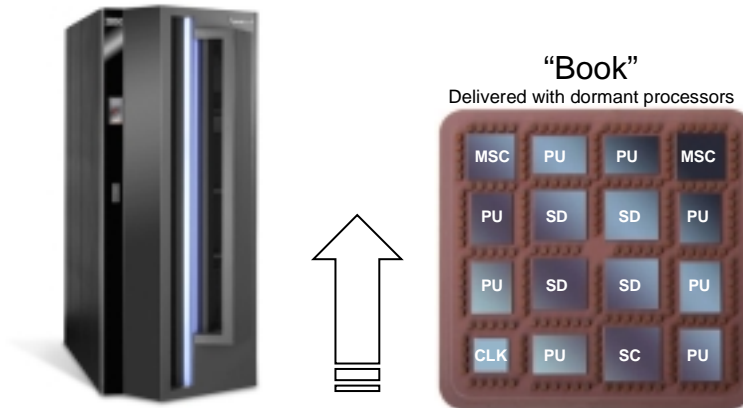


06 - Fund\_Z\_Design v3.5.ppt

9

## 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, zIIP's, and memory (8 GB memory increments)



06 - Fund\_Z\_Design v3.5.ppt

10

## Mainframe Capacity On Demand

Contract



[www.ibm.com/servers/resourceink](http://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



06 - Fund\_Z\_Design v3.5.ppt

11

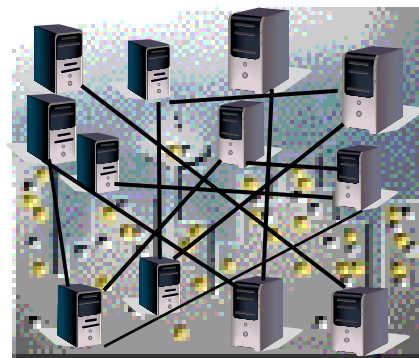
## ODI Requires...

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

## Pitfalls with a Distributed Approach

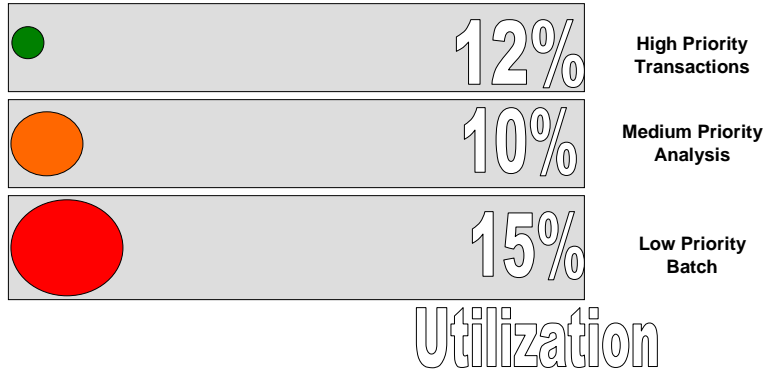


### A Distributed I/T Campus



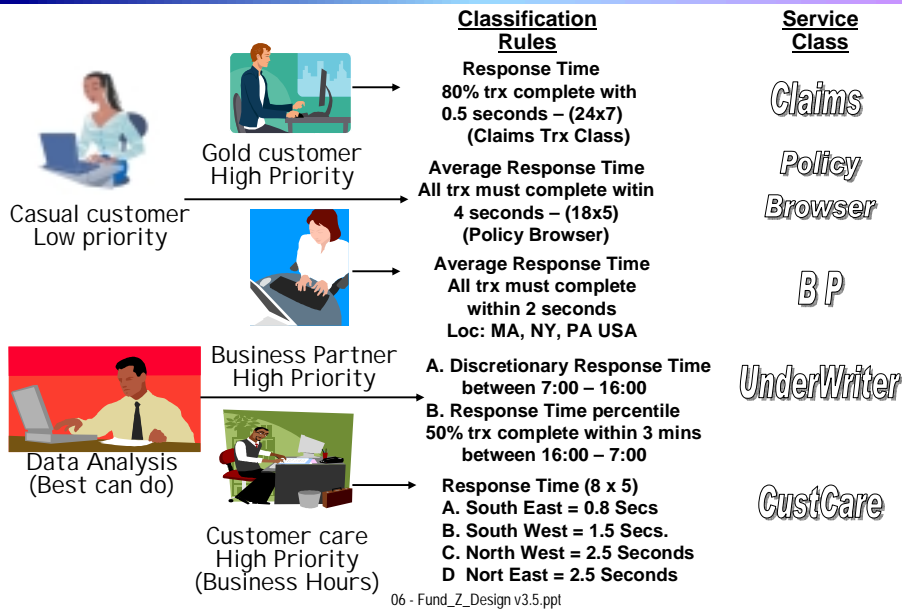
# Distributed Servers

**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



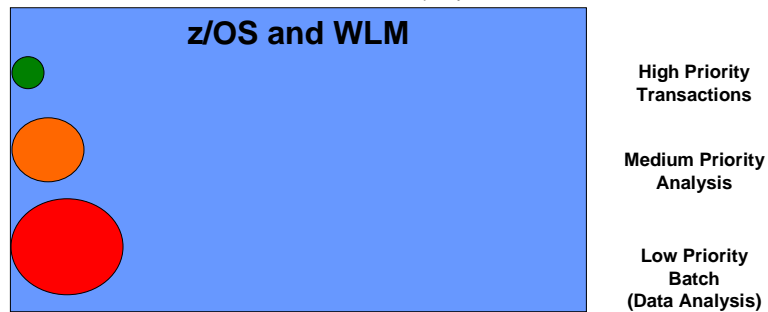
# Mainframe Workload Management

*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*



**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

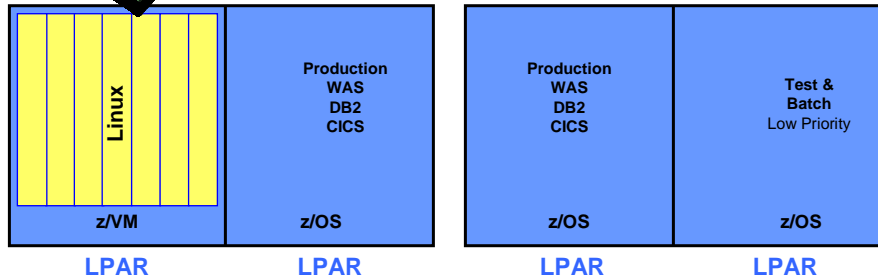


# Workload Management Prioritizing Across Images in a Server

*"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

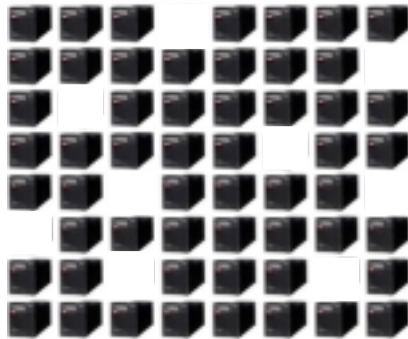
06 - Fund\_Z\_Design v3.5.ppt

20

## 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  
Ep/rec

06 - Fund\_Z\_Design v3.5.ppt

21

## 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

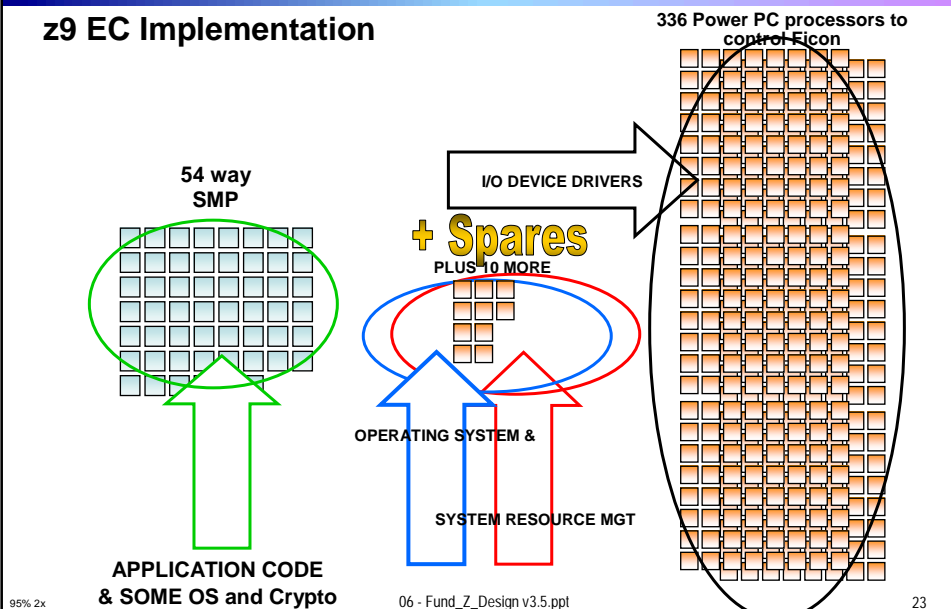


*“The IBM mainframe platform retains industry-leading availability characteristics even for single-system instances. For example, standard service availability commitments from tier one service providers in commercial data center outsourcing agreements suggest that the mainframe is delivering 99.9% to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

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

## Built-in Error Detection and Redundancy

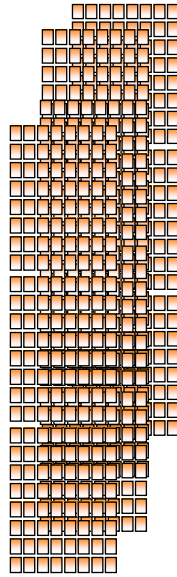
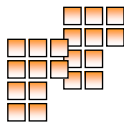
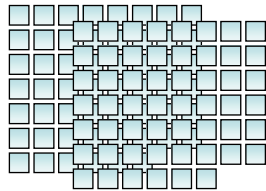
### z9 EC Implementation



# Built-in Error Detection and Redundancy

## z9 EC Implementation

AND THEN,



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

# Error Detection – System z9 Dual Execution with Compare

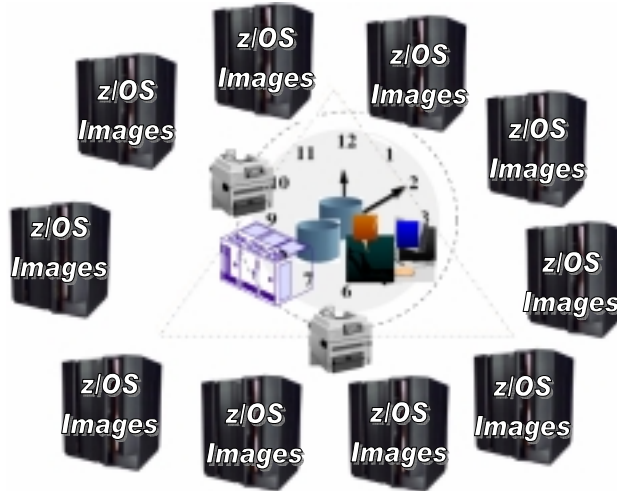
Example

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



## SYSPLEX = A Cluster of z/OS Images

Provides additional scalability and availability



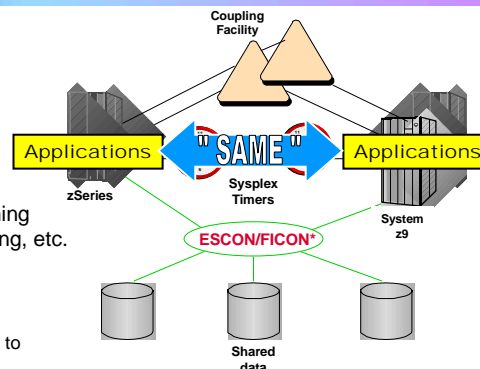
06 - Fund\_Z\_Design v3.5.ppt

26

## 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.



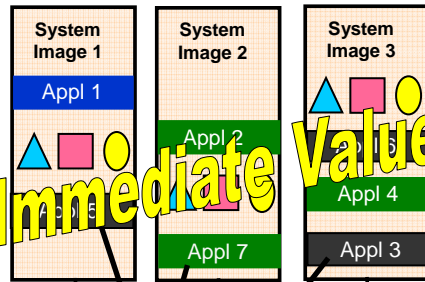
### ■ Rolling Maintenance System and Application Code

06 - Fund\_Z\_Design v3.5.ppt

27

# Sysplex Resource Sharing

Different Workloads

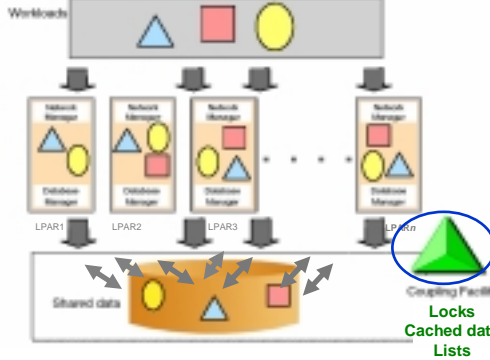


**Immediate Value**

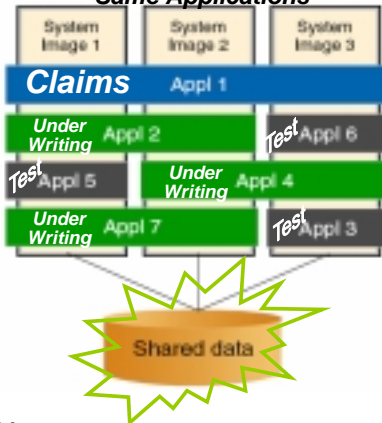
- System Management Simplification
  - Single Image Management
  - Regulatory Management Simplification
  - Elimination of redundant hardware / software components
- Security**  
**APRAC**  
**APPL Logger is Policy Based Management**  
**Coupling Facility**

# Sysplex Shared Data Enables Scaling and Failover

Different Applications



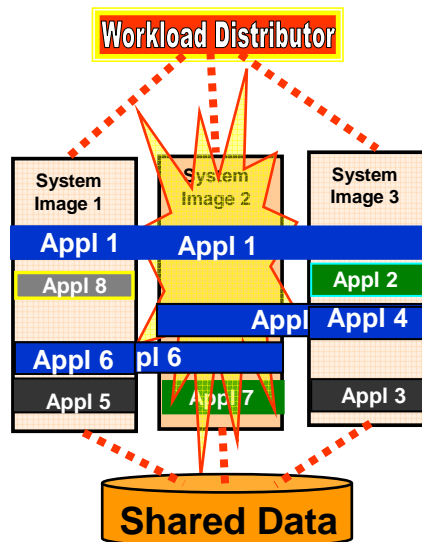
Same Applications



- 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

## Sysplex Failover

Cloned Application

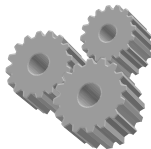


06 - Fund\_Z\_Design v3.5.ppt

30

## 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**



06 - Fund\_Z\_Design v3.5.ppt

31

## ODI Requires...

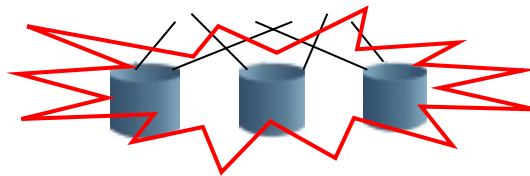
- 1) Easy Scalability
- 2) Efficient Responsiveness
- 3) Continuous Availability
- 4) **Manageability**

06 - Fund\_Z\_Design v3.5.ppt

32

## 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

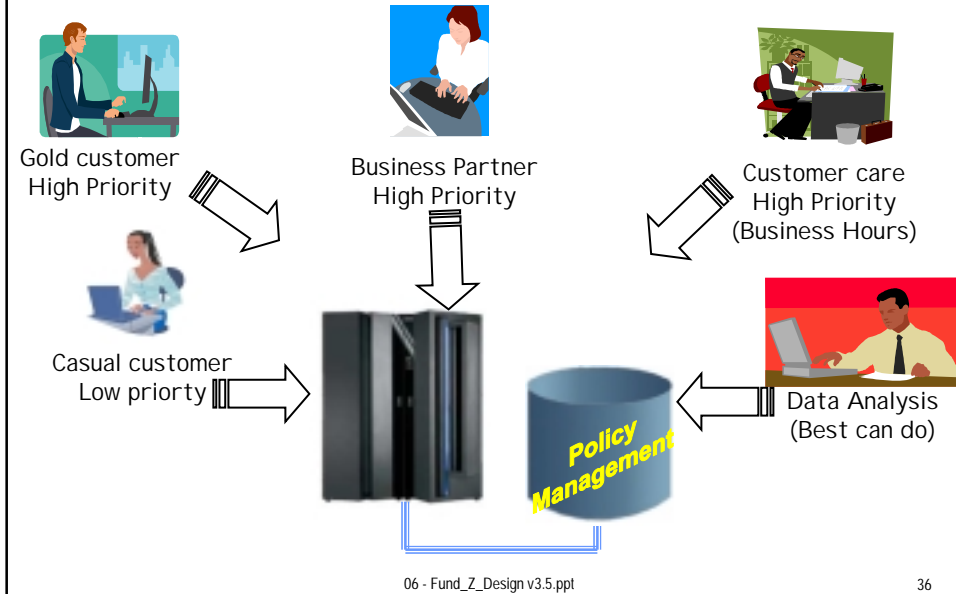


06 - Fund\_Z\_Design v3.5.ppt

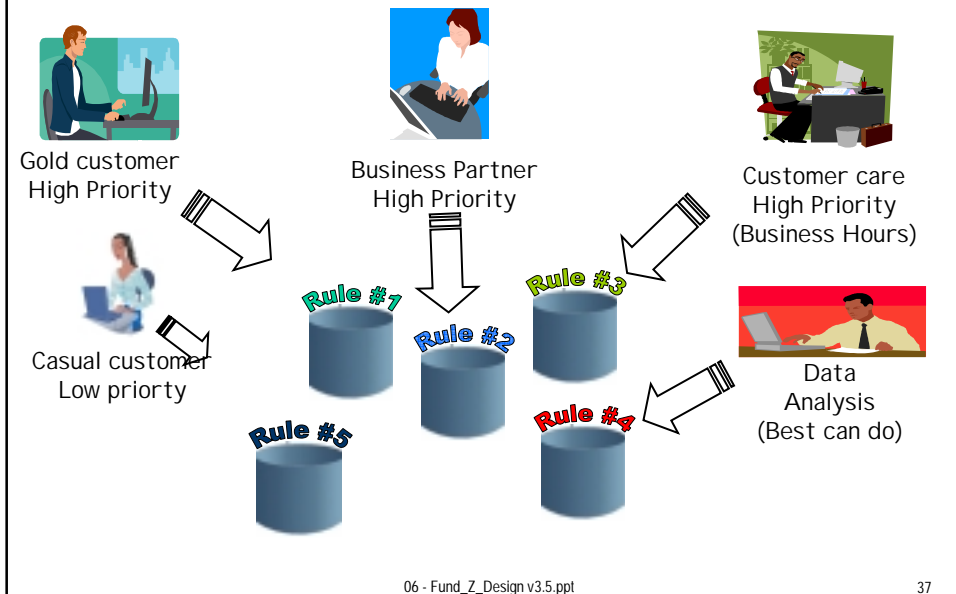
35



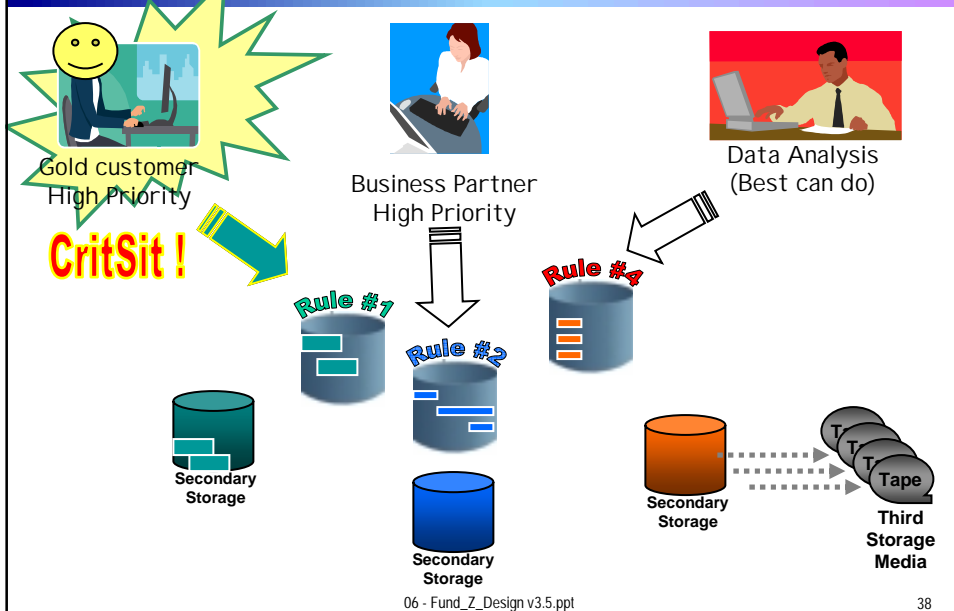
## ODI Needs to Automate Storage Management Due to New Application Deployment into Global Regions



## 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



06 - Fund\_Z\_Design v3.5.ppt

42

