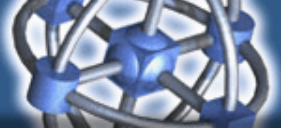
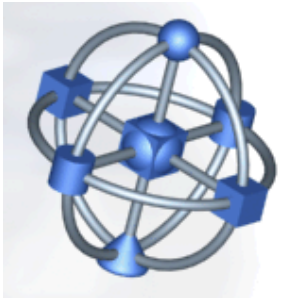
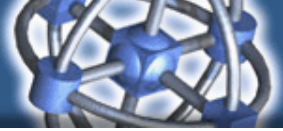


Grid Computing
Getting Down To Business



Tom Hawk



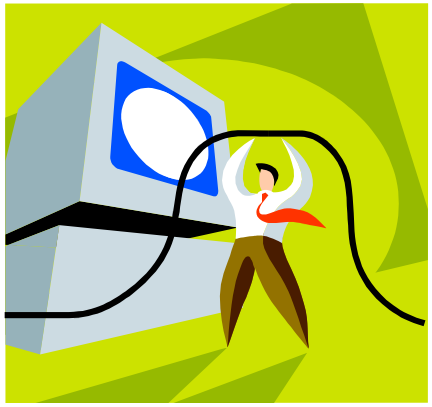
Key Messages

- Grid is about business value/business transformation!
- Grid is creating value for commercial enterprises TODAY!
- Grid functionality is being built on open standards!
- Grid is a great first step toward on demand!

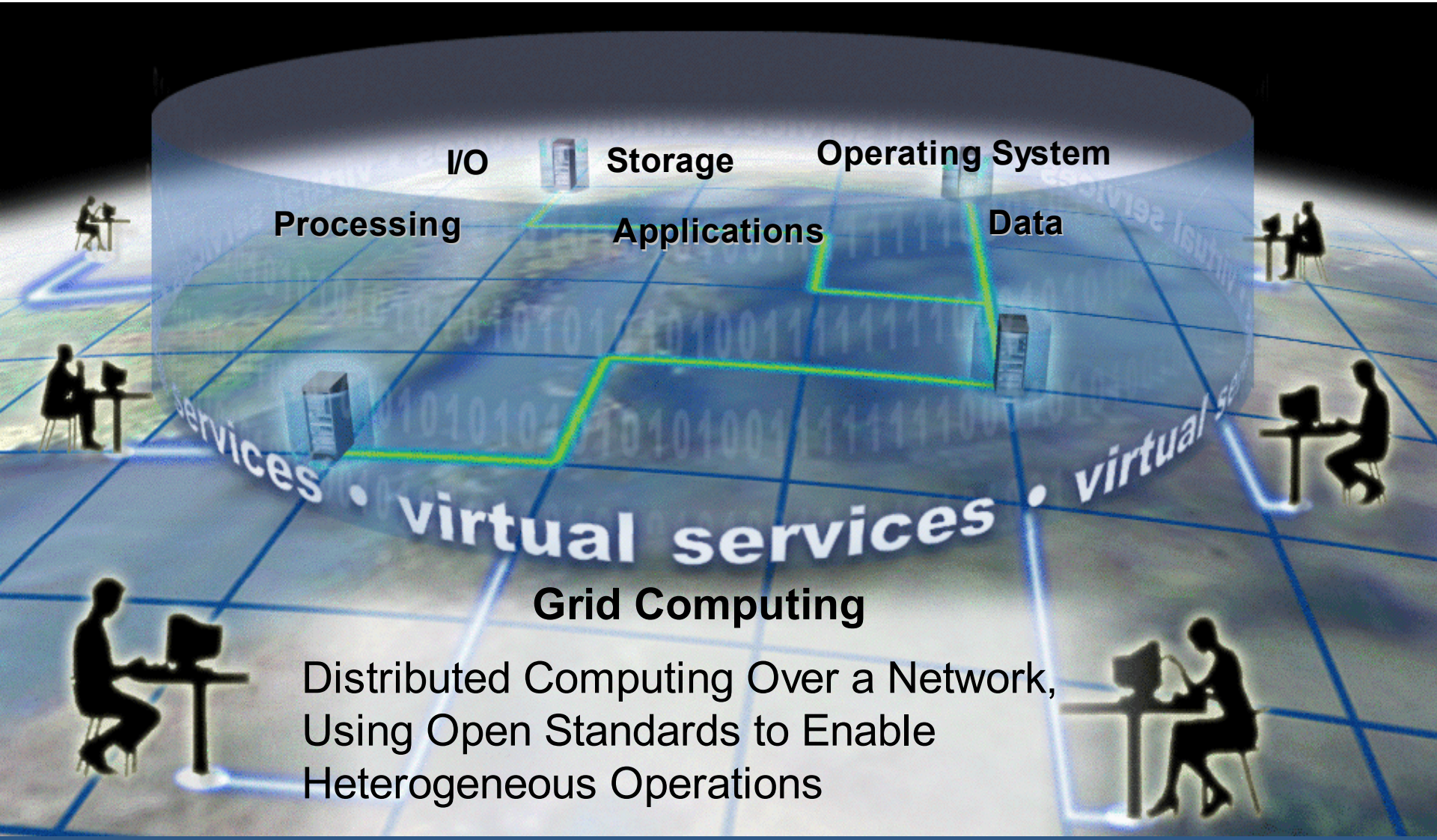
Grid Computing Enables IT and Business Value

IT Value

- Improve Asset Optimization
- Integrate Heterogeneous Resources
- Enable Data Access, Integration and Collaboration
- Strengthen Redundancy and Resiliency
- Quickly Respond to Variable Demands



Grid Computing



Grid Computing

Distributed Computing Over a Network,
Using Open Standards to Enable
Heterogeneous Operations

Grid Adoption Steps – Roadmap to Value

Transaction Management:

- Manage the execution of e-business transactions across distributed resources
- Enable dynamic allocation of resources for transactional and parallel application models

Billing and Metering:

- Enable applications to be set up in a usage-based charging model
- Track usage and bill/chargeback users based on cost models

Automated Provisioning:

- Identify and allocate resources to meet quality of service goals for applications
- Configure and initiate these resources as required

Task Scheduling:

- Manage the execution of parallel, short running tasks across distributed resources
- Provide a programming model to enable applications to leverage this capability

Workload Management:

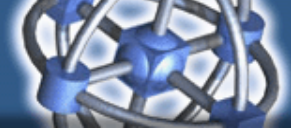
- Monitor and manage resources to help applications achieve quality of service goals
- Manage the prioritization and resource selection for tasks and jobs

Data Virtualization:

- Enable data federation, location, replication, caching, and access
- Data Grids work on block level data, files, or information in databases

Base Grid:

- Machines/Clusters to run workload
- Middleware and agents to make machines/clusters accessible and manageable
- Management functions to distribute and manage tasks and machines/clusters

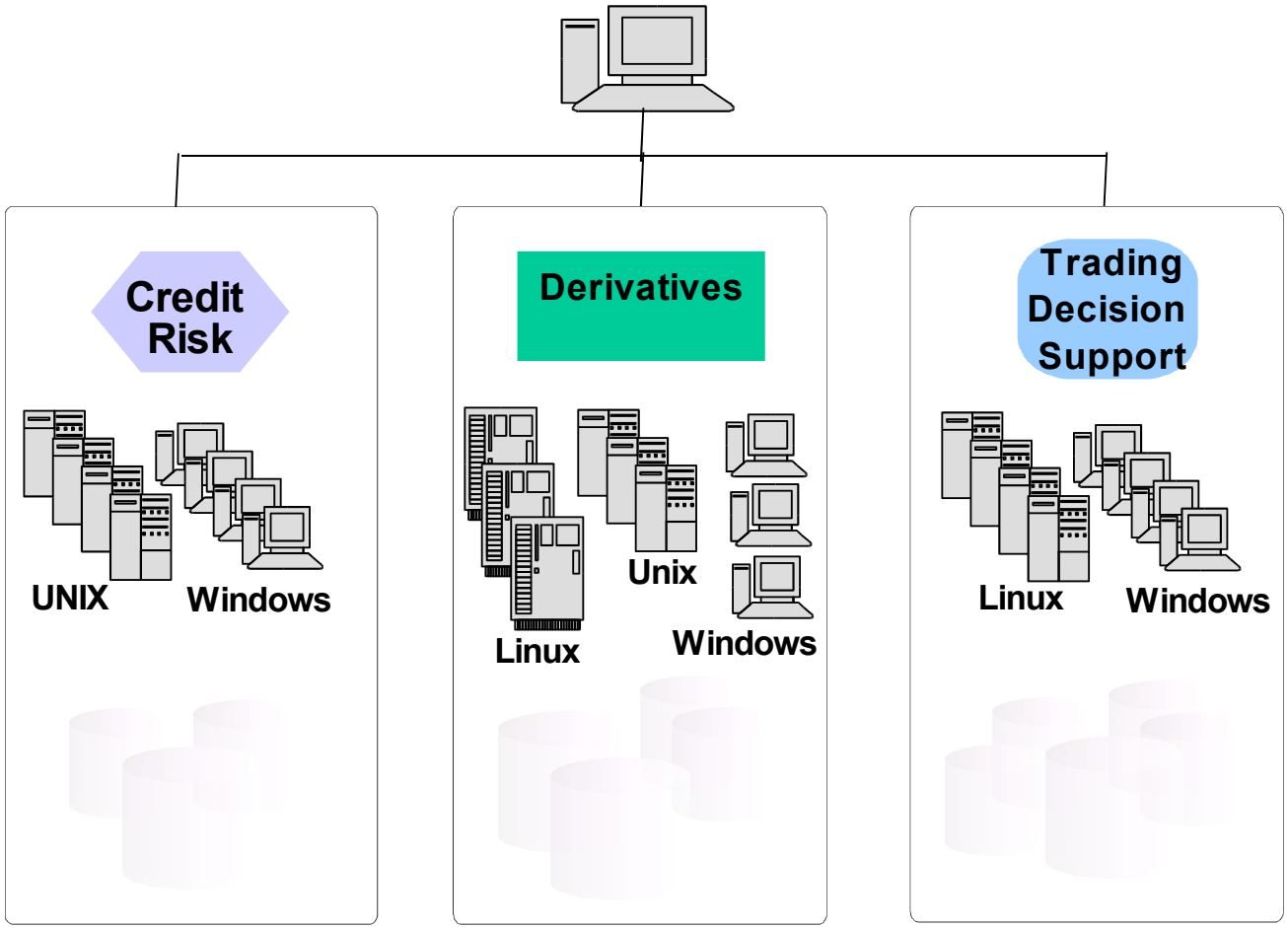


e-business on demand

business on demand

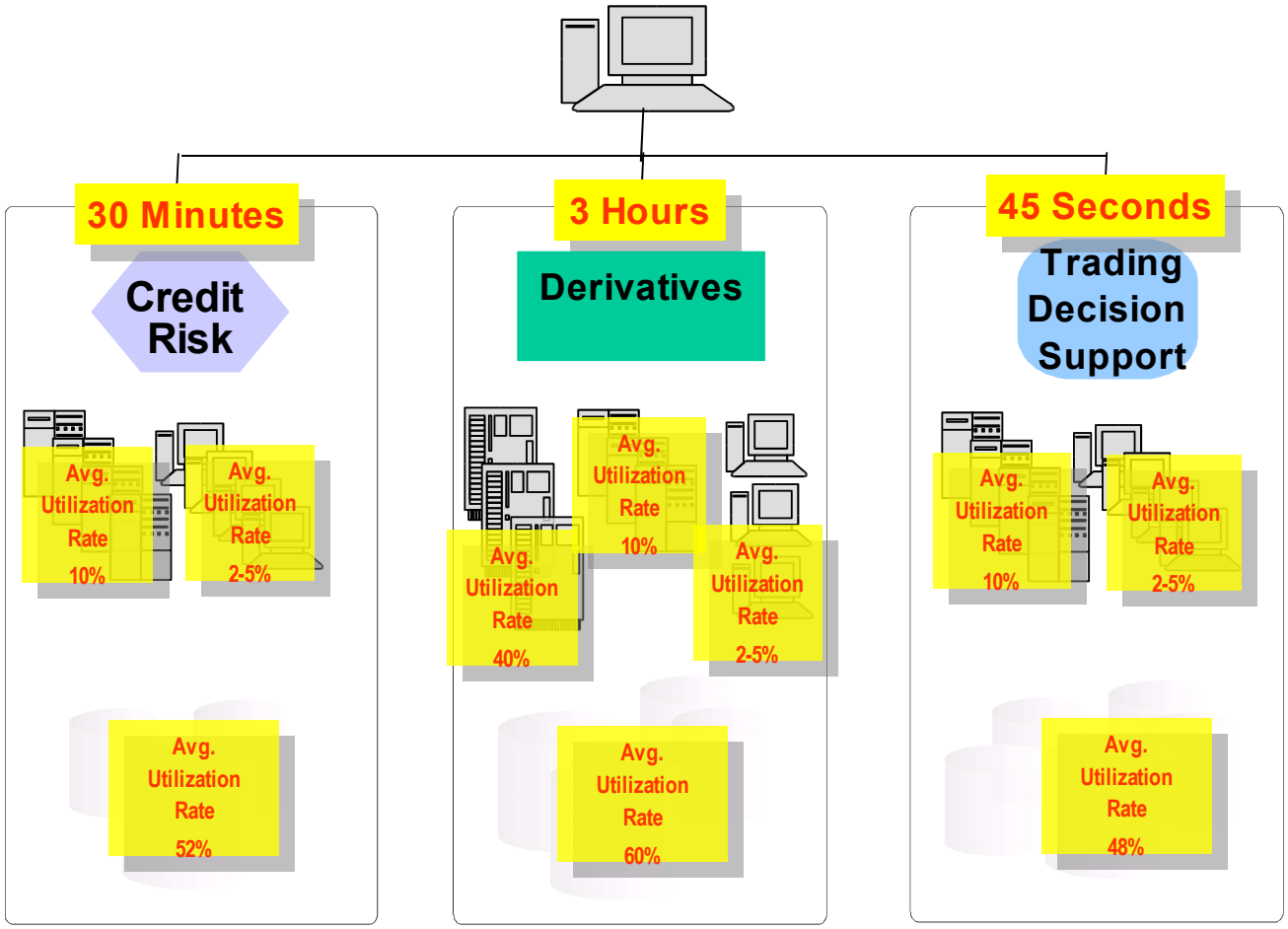
An enterprise whose **business processes** - **integrated end-to-end** across the company and with key partners, suppliers and customers - can **respond with speed** to any **customer demand**, **market opportunity** or **external threat**.

Financial Markets Example:
Heterogeneous, Fragmented View of CPU and Data Resources

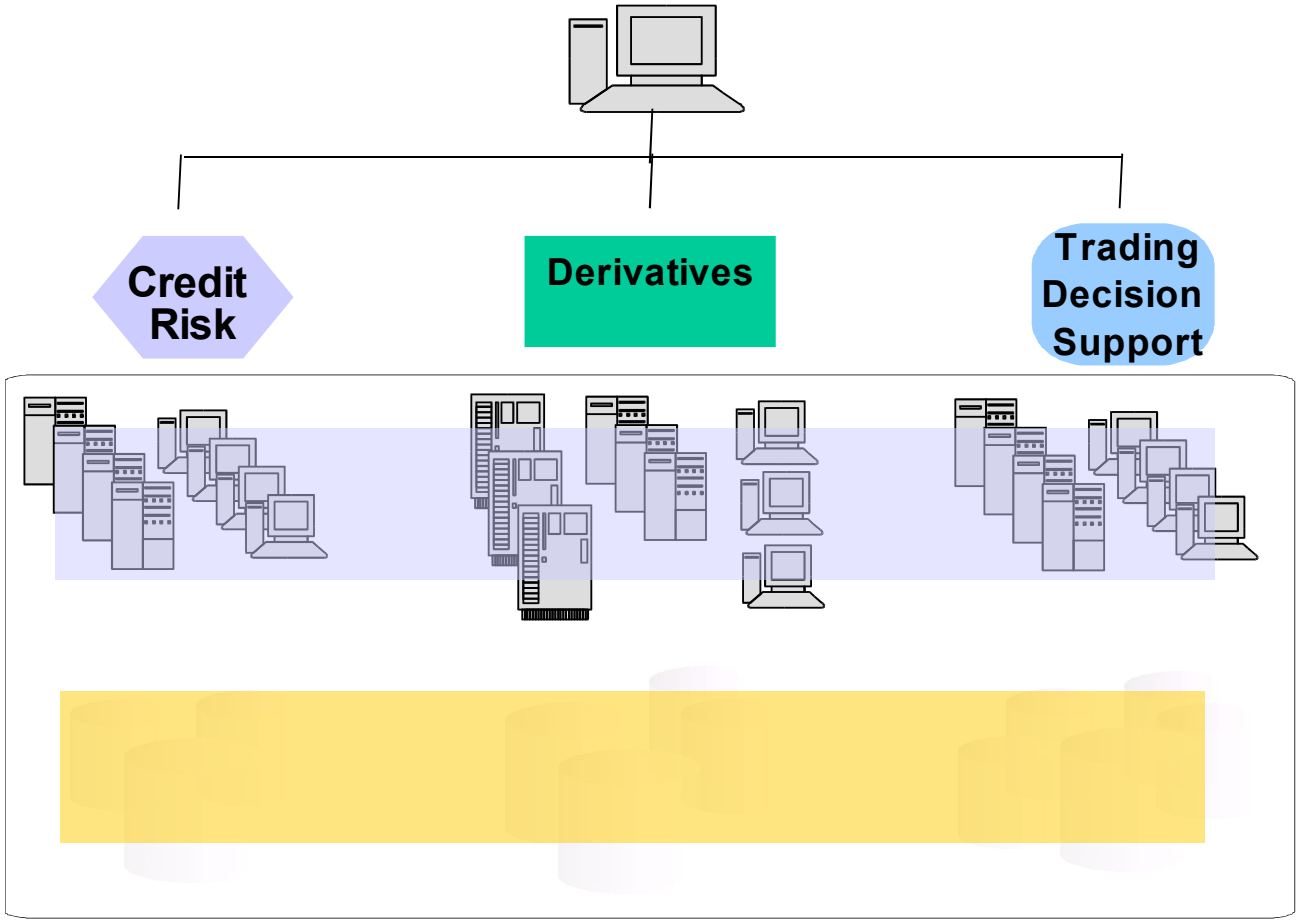


Financial Markets Example:

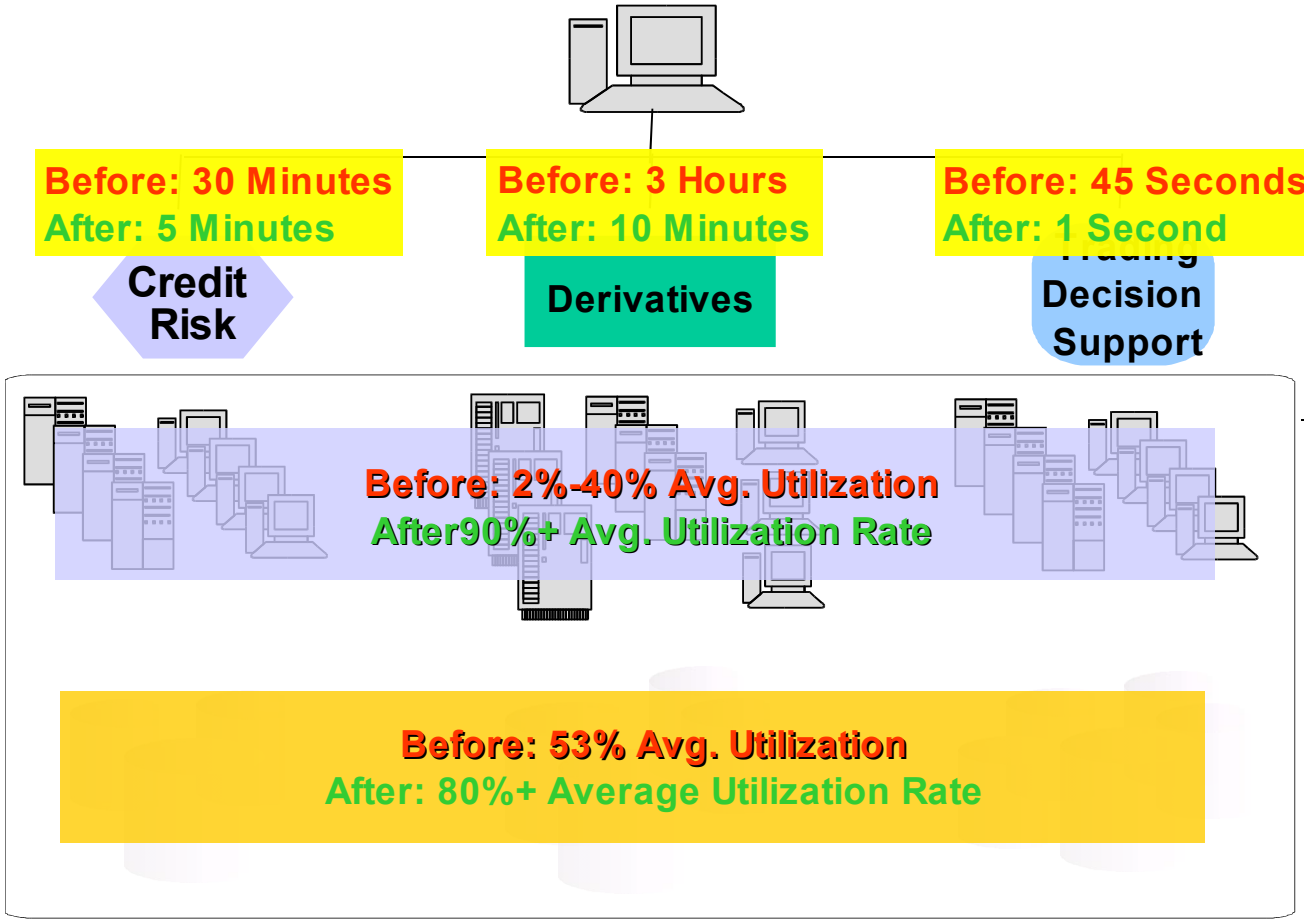
Inefficient Utilization of CPU and Data Resources, Limited Application Performance



Single View of Computing Resources, Data Resources and Central Scheduling Control For All Applications, with Easy Growth Path.



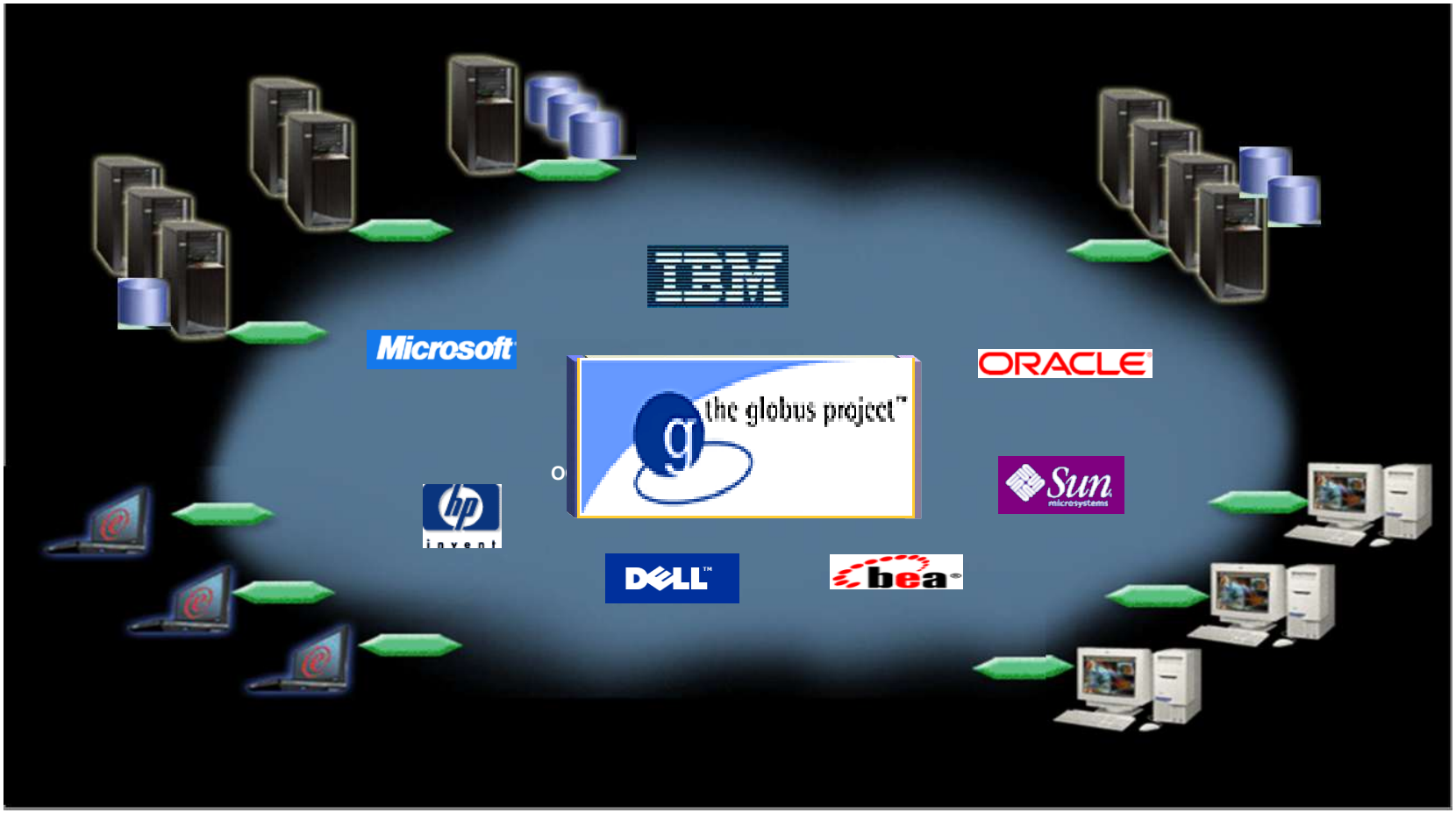
Customer Benefits:
Significant Efficiency & Productivity Gains



Additional Benefits:

- Better Return on Assets
- Facilitates Collaboration
- Improves Resiliency
- Increases and Simplifies Scalability

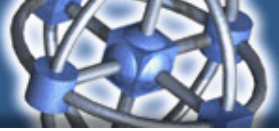
Open Grid Services Architecture (OGSA)



Grid Computing Enables IT and Business Value

Business Value

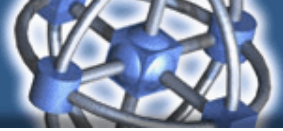
- Improve Operating Efficiency/ROI
- Reduce Capital Expenses
- Accelerate Business Processes
- Enhance Employee Productivity
- Quickly Adapt to Changing Requirements



Imagine the possibilities…

What would it mean if your business could…

- Analyze the value or risk of an investment portfolio in minutes, rather than hours?
- Significantly accelerate the drug discovery process?
- Scale your business to meet cyclical demands – while cutting IT expenditures
- Reduce the design time of your products, while reducing the instances of defects?
- Unite your research teams with others around the world to take advantage of the most up-to-date learnings?



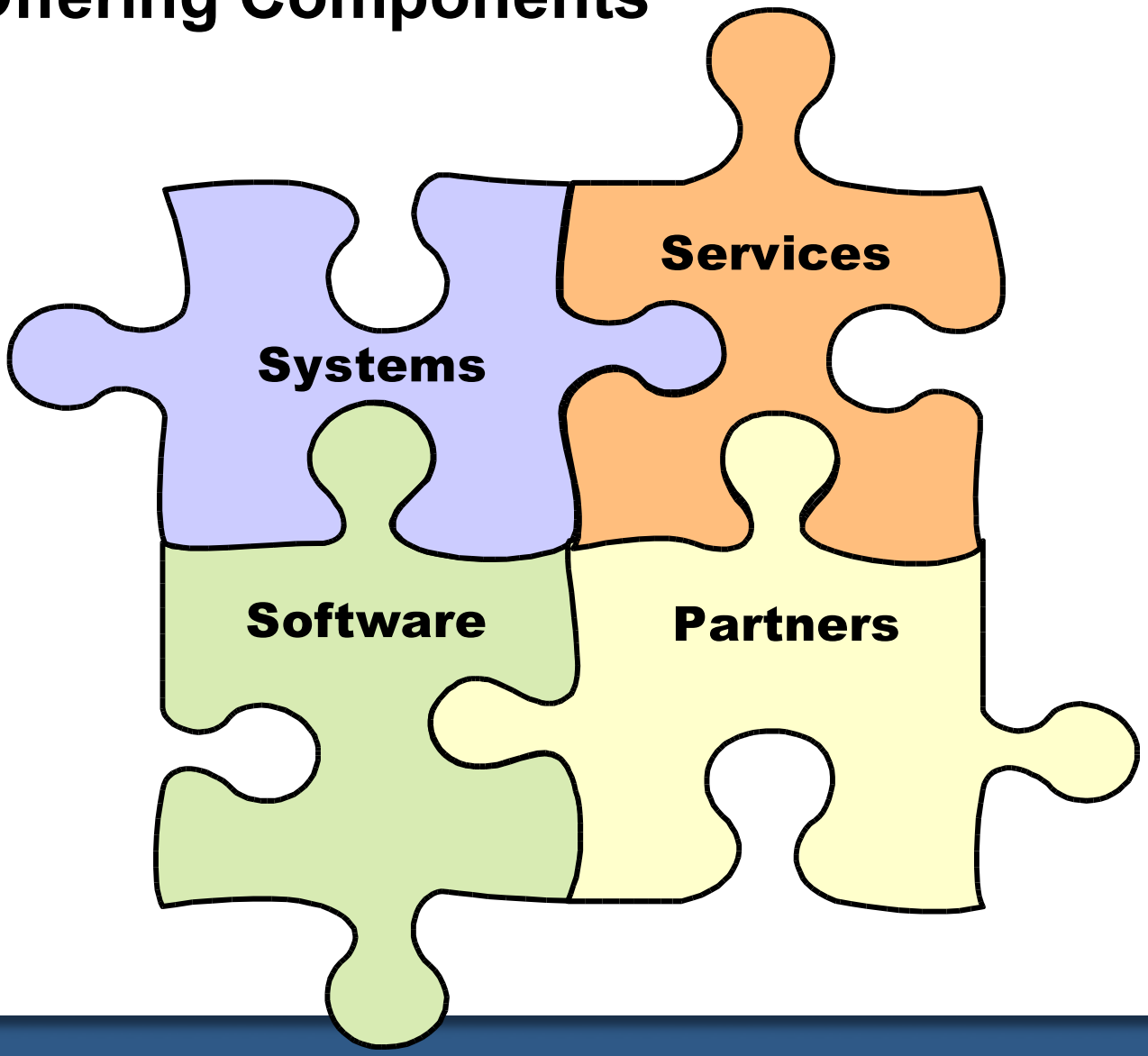
Grid Focus Areas

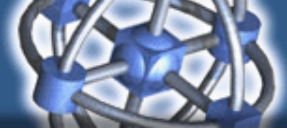
	Research & Development Grid	Engineering & Design Grid	Business Analytics Grid	Enterprise Optimization Grid	Government Development Grid
Description	Accelerate and enhance the R&D process by enabling the sharing data and computing power seamlessly for research intensive applications	Share data and computing power, for computing intensive engineering and scientific applications, to accelerate product design	Enable faster and more comprehensive business planning and analysis through the sharing of data and computing power	Optimize computing and data assets to improve utilization, efficiency and business continuity	Create large-scale IT infrastructures to drive economic development and/or enable new government services
Priority Sectors	Public, Industrial	Industrial	Financial Services, Public, Industrial	Financial Services, Public, Industrial	Public

Grid Offerings

Research & Development	Engineering & Design	Business Analytics	Enterprise Optimization	Government Development
• Life Sciences: IBM Grid Offering for Information Accessibility • Higher Education: IBM Grid Offering for University Research Collaboration • Agricultural Chemical: IBM Grid Offering for Information Access • Grid Innovation Workshop/Modules	▪ Aerospace: IBM Grid Offering for Engineering Design ▪ Aerospace: IBM Grid Offering for Design Collaboration ▪ Automotive: IBM Grid Offering for Design Collaboration ▪ Automotive: IBM Grid Offering for Engineering Design ▪ Electronics: IBM Grid Offering for Engineering Design ▪ Electronics: IBM Grid Offering for Design Collaboration • Grid Innovation Workshop/Modules	▪ Financial Services: IBM Grid Offering for Analytics Acceleration • Life Sciences: IBM Grid Offering for Analytics Acceleration • Petroleum: IBM Grid Offering for Geophysical Analysis: Upstream Petroleum • Agricultural Chemical: IBM Grid Offering for Analytics Acceleration • Grid Innovation Workshop/ Modules	▪ Financial: IBM Grid Offering for IT Optimization ▪ Petroleum: IBM Grid Offering for IT Optimization • Grid Innovation Workshop/ Modules	▪ Government: IBM Grid Offering for Information Access • Grid Innovation Workshop/ Modules

Grid Offering Components





Grid Ecosystem

Research & Development	Engineering & Design	Business Analytics	Enterprise Optimization	Government Development
• Accelrys • Dassault • Landmark Graphics • Japan Research Institute • NTT-DATA • Moasys Corp. • Northgate • TBC • C.a.r.u.s Info. Tech. • Anterio Consult & Research • SCC • Cisco • Globus • Avaki • Platform Computing • United Devices	• Cadence • MSC Software • PCPC Inc • Kobelco Systems • Science + Computing • Cisco • Globus • Platform Computing • Avaki	• Accelrys • Cornerstone Systems • Morse • Anix • Cisco • Globus • Platform Computing • DataSynapse	• Mercury Interactive • Force 10 • MSI • Beacon Information Technology • Malaysia Debt Ventures • CC Compunet • Comparex Informationsysteme GmbH • Bechtle Logistik und Service GmbH • Cisco • Globus • Platform Computing • United Devices	• Cornerstone Systems • Esteem Systems • Italtech • CIS Sud-Quest • Cisco • Globus • Platform Computing

Aventis

Challenge

- Distributed, diverse data sources across continents
- Limited ability to consolidate, construct and analyze data sets

Solution

- **Linux**
- **IBM @server**
- **IBM Discovery Link**

Aventis

Technology Benefits:

- Using IBM DiscoveryLink to bring together data sources in one coherent view

Business Benefits:

- Significant increase in researcher productivity due to improve collaboration
- Better data quality and currency

Royal Dutch/Shell

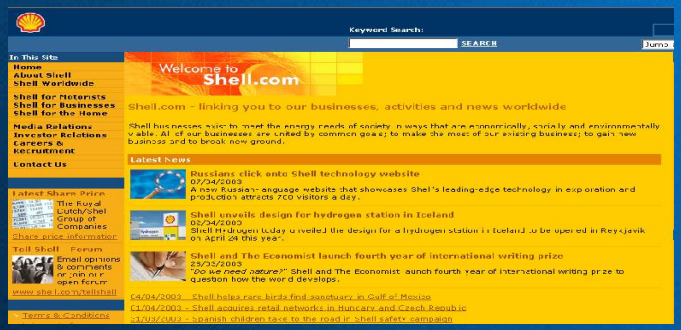
Engineering & Design

Challenge

- Improve accuracy and speed of summarization and scientific modeling applications

Solution

- **IBM @server**
- **Linux**
- **Globus Toolkit**



Technology Benefits:

- More robust, scalable IT infrastructure that adjusts as volumes fluctuate
- Open standards permit easy integration of existing software

Business Benefits:

- Cut processing time of seismic data, while improving the quality of the output
- Focus employees on key scientific, not IT problems

"Grid computing is important to Shell because it offers the potential to create a truly unlimited resource, with a uniform interface to a variety of services. This is a significant opportunity for Shell to engage its independent companies in closer cooperation." J.N. Buur, Principal Research Physicist, Shell International Exploration and Production B.V.

IBM

Engineering & Design

Challenge

- Microprocessor Design
- Benchmarking & Testing
- Server Design

Solution

- **IBM @server**
- **Globus Toolkit**
- **IBM Global Services**

Microprocessor Design Grid

- Chip simulation driving 80% resource utilization
- Lower error rates in microprocessor designs
- Reduced development cycle, improved ROI and design engineer productivity

Benchmarking/Testing Grid

- Allows for larger scaling tests at lower costs by pooling all the servers across multiple sites

Z Series Design Grid

- Production environment is adjusted to average workload, lowering fixed cost
- Increased computing power for HW simulations
- 40% increase in productivity of hardware engineers

Charles Schwab

Business Analytics

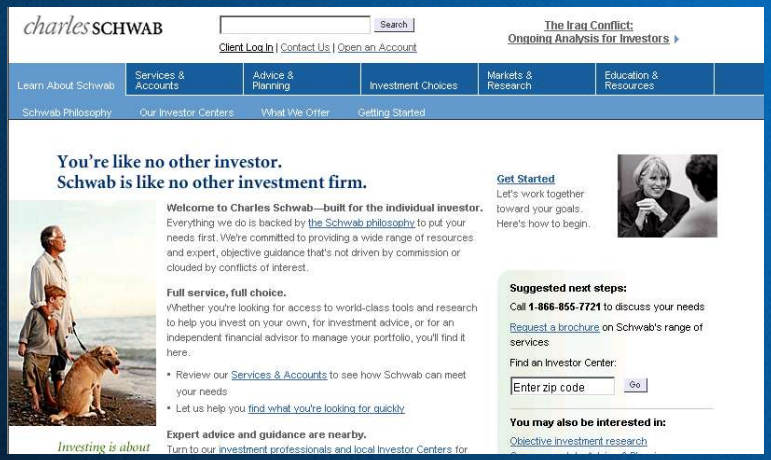
Challenge

- Reduce the processing time on an existing wealth management application to improve customer service.

Solution

- **IBM @server**
- **Linux**
- **Globus Toolkit**
- **IBM Infrastructure Technology Services**
- **IBM Research**

"We believe that Grid computing … has the potential to greatly improve our quality of service and be a truly disruptive technology."
Oren Leiman, Managing Director, Charles Schwab



Technology Benefits:

- Reduced processing time from four minutes to fifteen seconds…
- Leverages existing infrastructure…
- Grid enabling many more applications

Business Benefits:

- Increase customer satisfaction by responding to inquiries in real time…
- Enabling Schwab to move from a low cost transactional broker to an advice based wealth manager

Business Analytics

RBC Insurance

Challenge

- Reduce the time it takes for an insurance policy valuation application to run

Solution

- **IBM @server**
- **IBM Infrastructure Technology Services**
- **Platform Computing (ISV)**

RBC Royal Bank

Technology Benefits:

- Reduced processing time from eighteen hours to thirty-four minutes
- Automated job-scheduling
- Expanding implementation

Business Benefits:

- Can run more complex scenarios to reduce risk exposure
- Actuaries can spend less time scheduling application

Enterprise Optimization

Kansai Electric Power

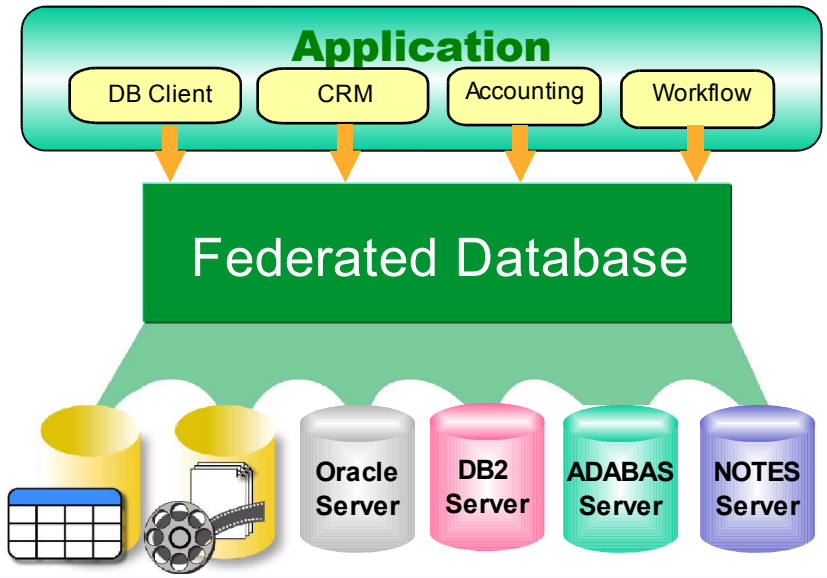
Challenge

- Japan's second largest electric utility company has various information in a heterogeneous, distributed database environment
- Integrate information beyond departments and affiliated companies to enable information sharing

Solution

- **Create virtual database federated from heterogeneous database environment**
- **IBM DB2 Data Federation Technology**
- **Wrapper to access other RDBs including legacy database**

"KEPCO has been working very closely with IBM and IBM's Grid computing technologies to develop an information based grid that will allow KEPCO to federate and virtualize their various data sources across the enterprise"



Technology Benefits:

- Virtualize various data sources across the enterprise
- Enable information sharing using existing systems including legacy data base
- Enable to develop new businesses more rapidly at a minimum cost

TIGER

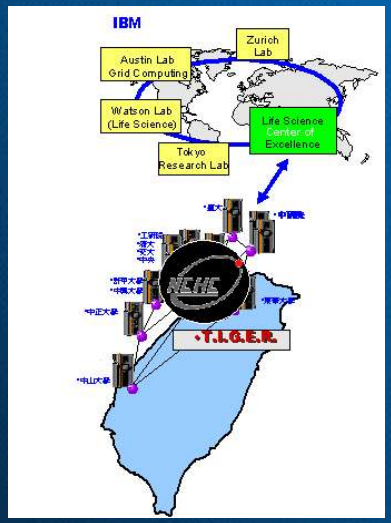
Government Development

Challenge

- The Taiwanese government is building a grid between their leading academic and research institutions for research and collaboration in the areas nanotechnology and life sciences

Solution

- **IBM and NCHC building National Grid Test Bed**
- **IBM is assisting in the planning and implementation of the grid infrastructure.**

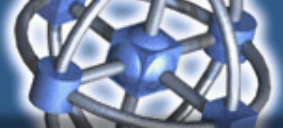


Technology Benefits

- Integrate in-country academic and research computing resources
- Test implementations and investigations into billing and provisioning systems will take place

Business Benefits

- Stimulate research in Life Sciences and Nanotech



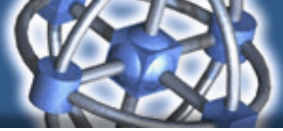
IBM Commitment & Focus

Commitment

- Open standards
- R&D and investments in grid and related technologies
- Industry-leading partners
- Multiplatform experience and expertise
- Worldwide grid strategy, design, implementation and integration services

Focus

- Industry-specific offerings
- Product development roadmaps
- Ecosystem build-out
- Implementing grids in commercial and public organizations
- Integrated solutions: HW, SW, Services and Partners



Getting Started

- Get educated
- Determine the value of Grid to your organization
- Identify the right grid offering(s) for your business
- Develop and prioritize a list of Grid pilot implementations
- Architect and implement grid solution(s)

Make Grid a part of your competitive strategy

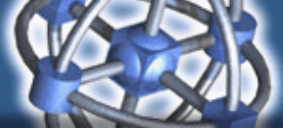
Higher Quality of Service

Increased Efficiency

Increased Productivity

Reduced Complexity

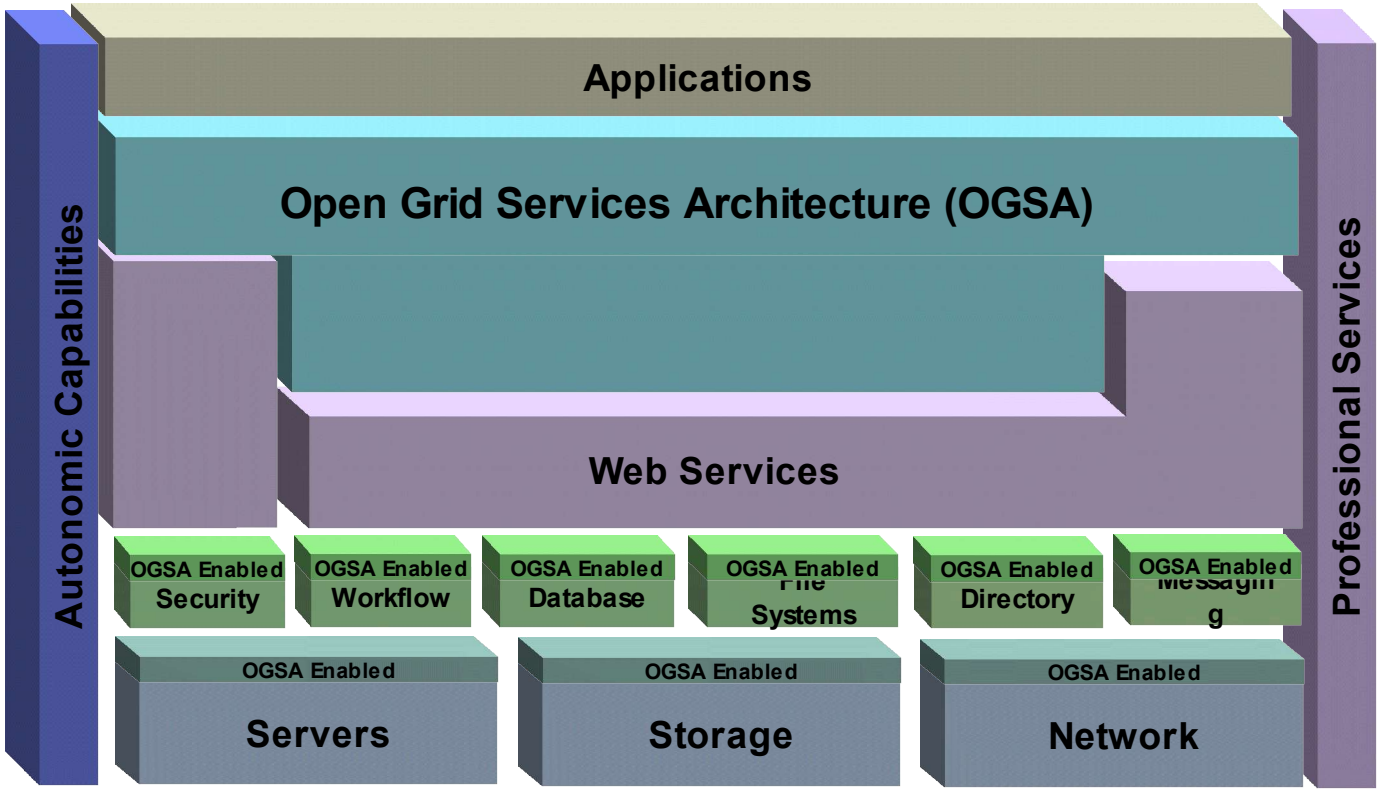
Improved Resiliency



www.ibm.com/grid

thawk@us.ibm.com

Architecture Framework



Architecture Framework