



Grid Computing

Grid Computing

Using Grid Technologies To Create Business Value

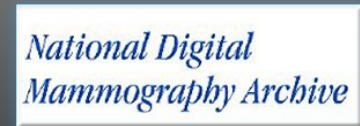
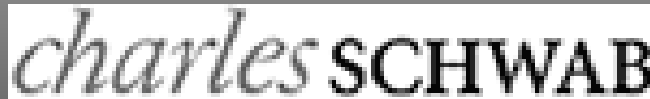
Jim Kambe
IBM Grid Sales
November 4, 2003



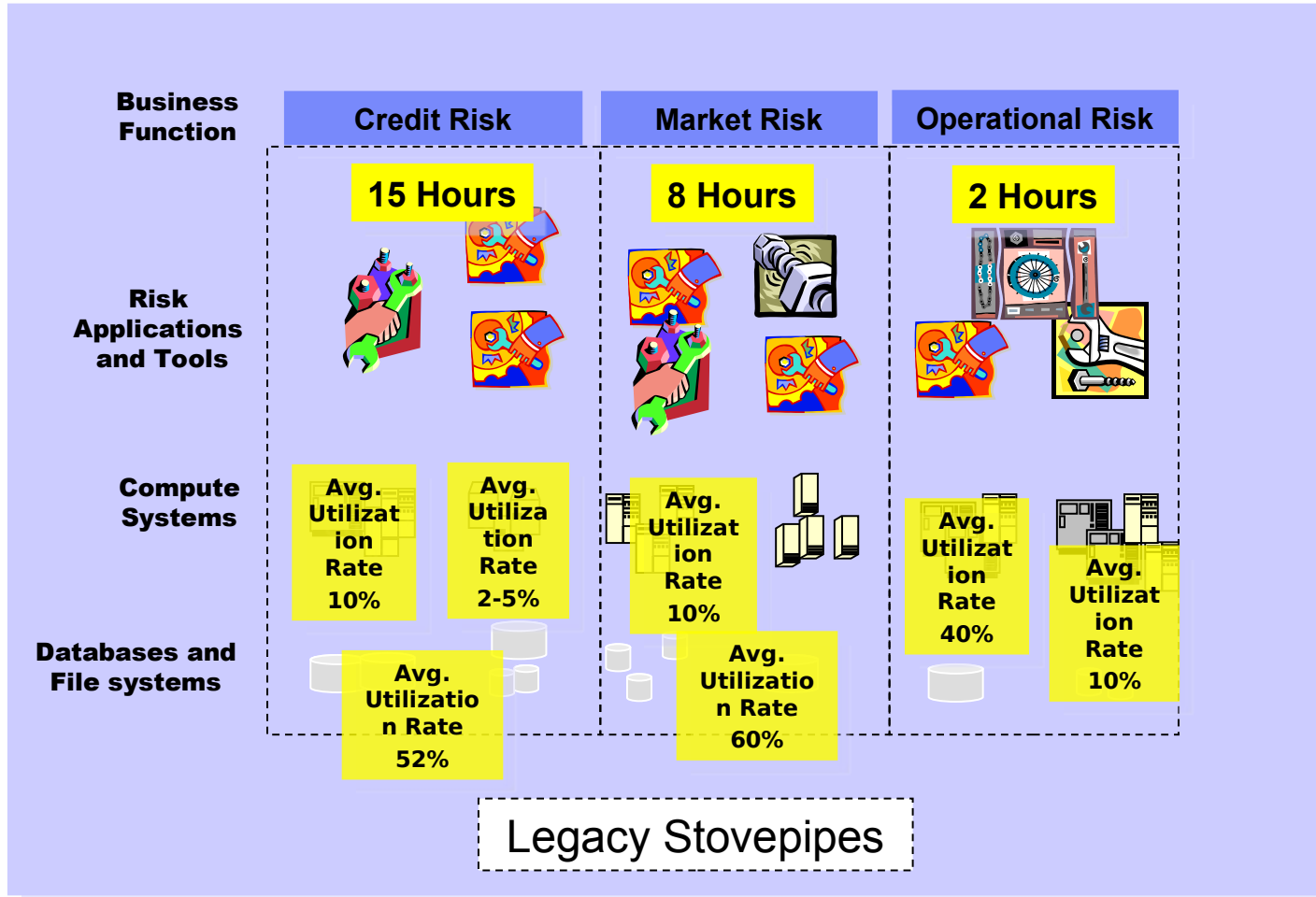
Key messages

- **Grid computing is creating IT and Business value today!**
- **Early adopters are gaining competitive advantage!**
- **Grid computing roadmap is becoming more robust and clear!**
- **Customers are using IBM Grid Offerings to start small and grow!**
- **Grid is a logical first step in the on demand journey!**

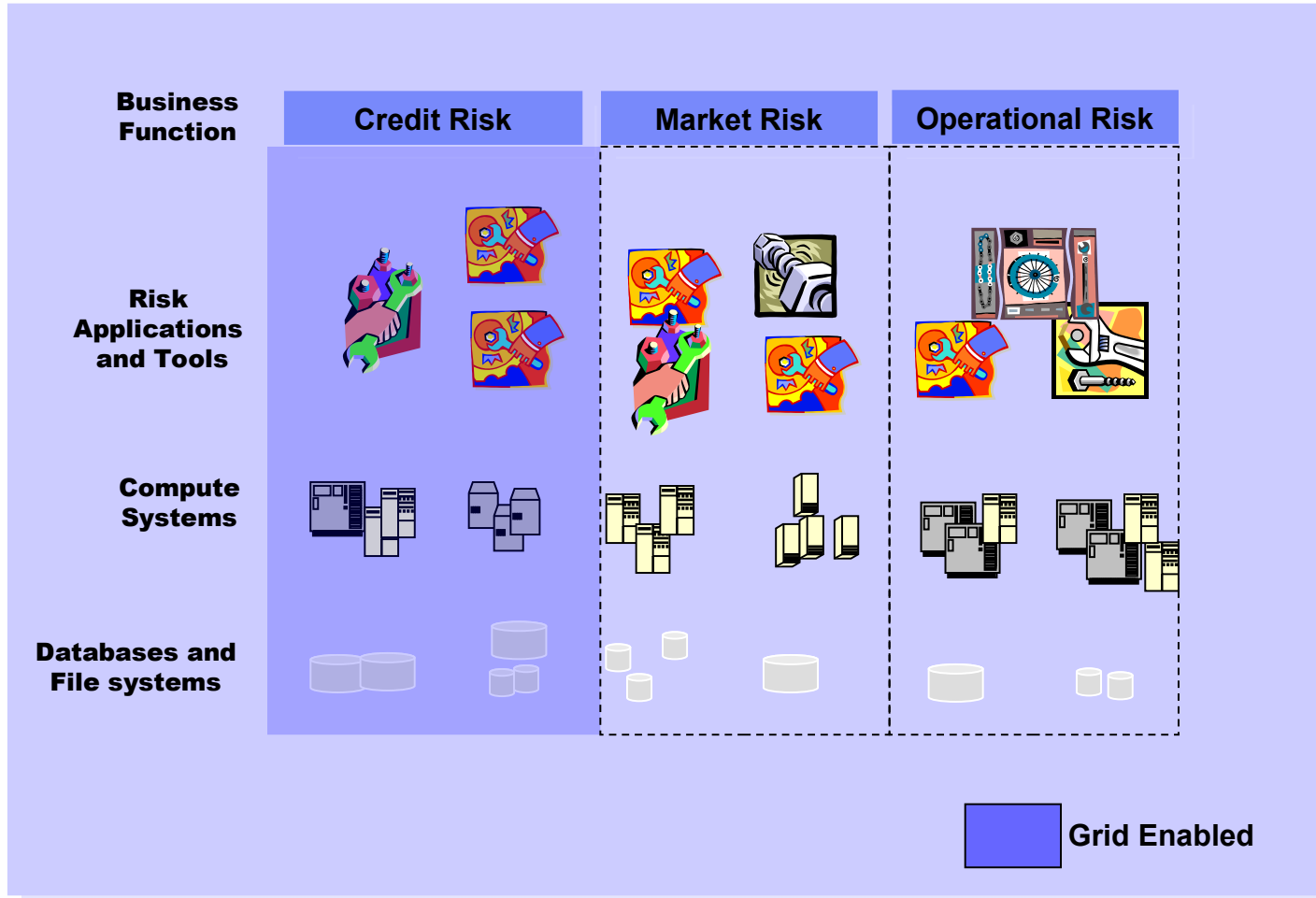
Marketplace Momentum



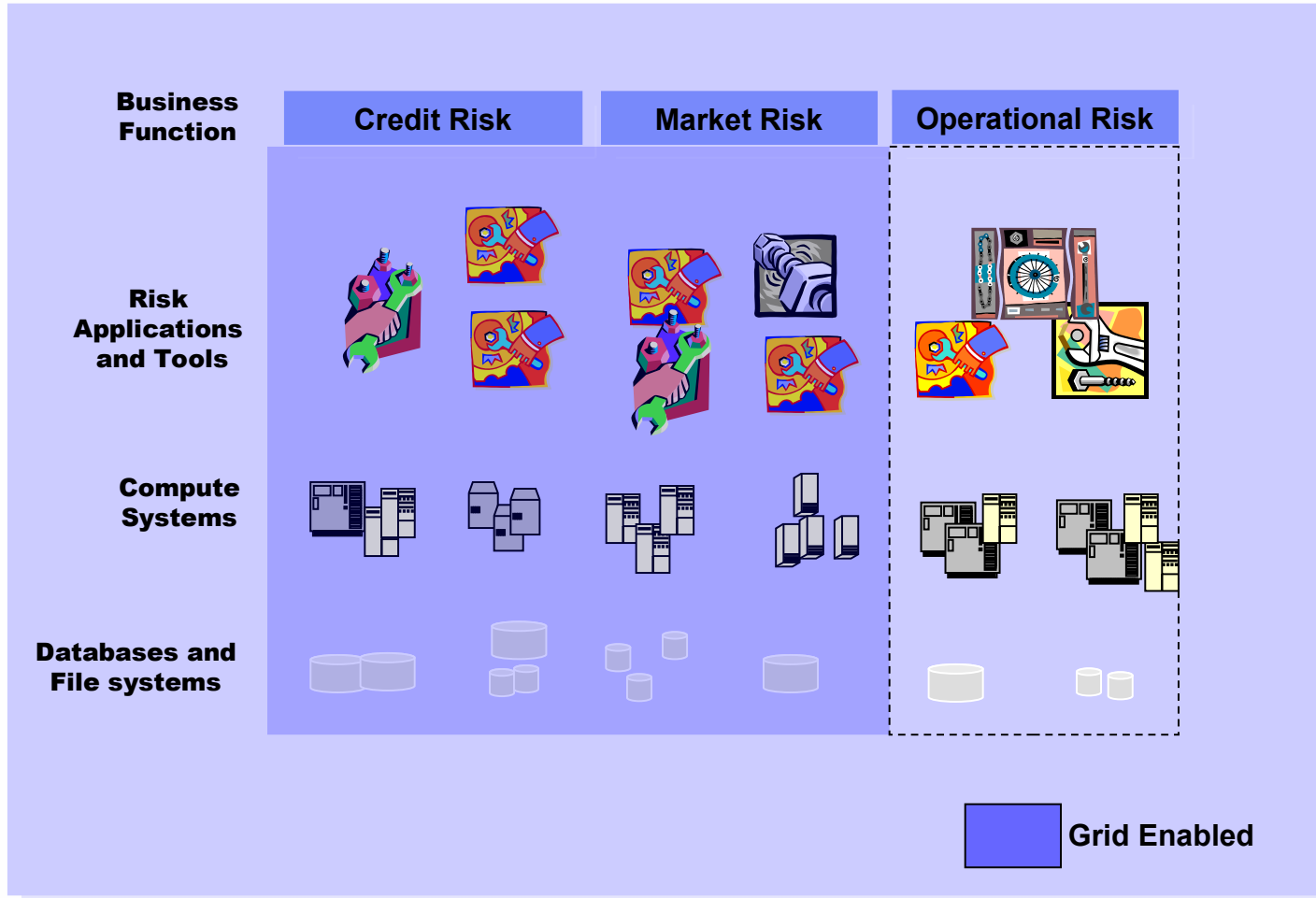
Grid Computing Example: Capital Markets Client



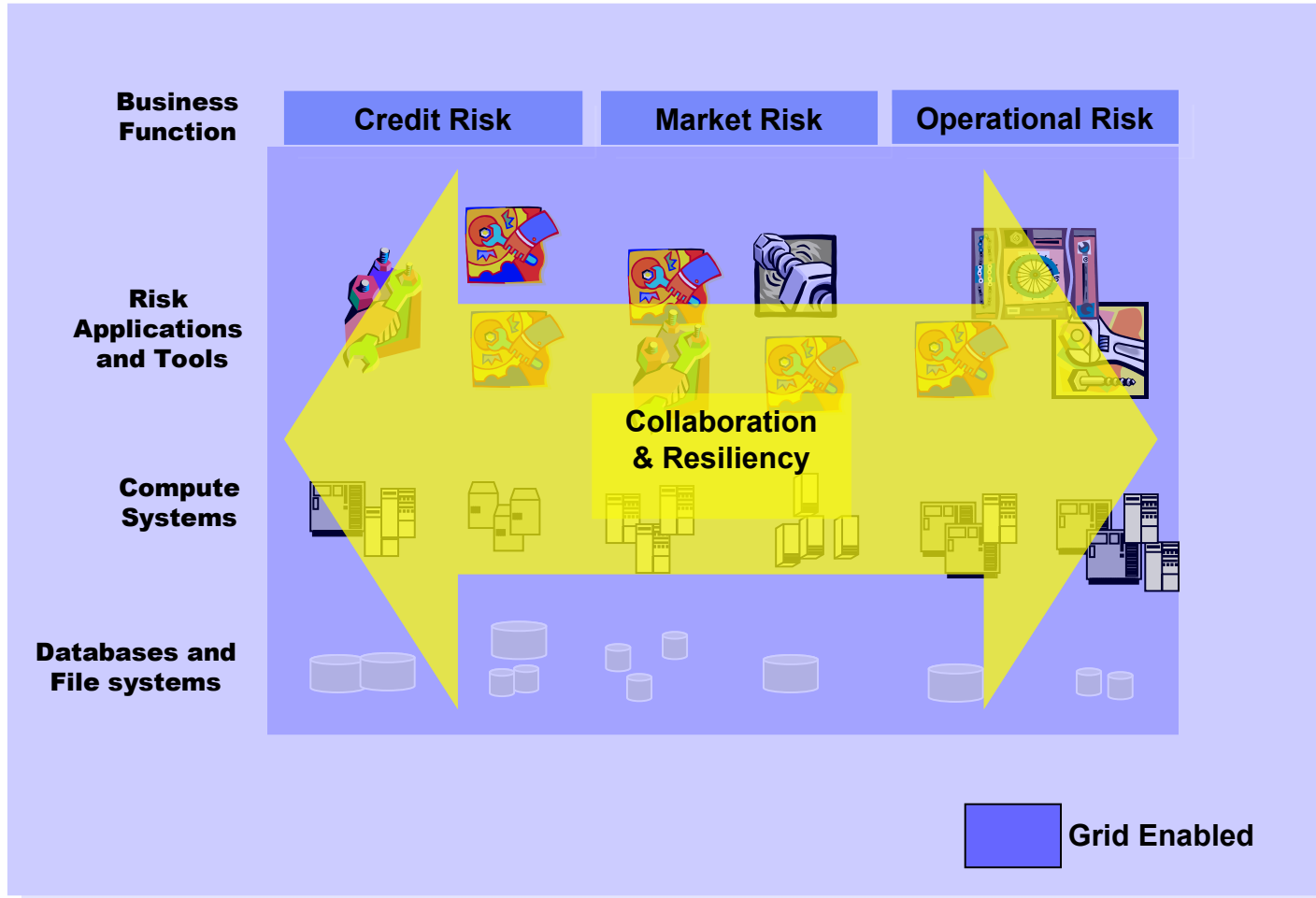
Grid Computing Example: Capital Markets Client



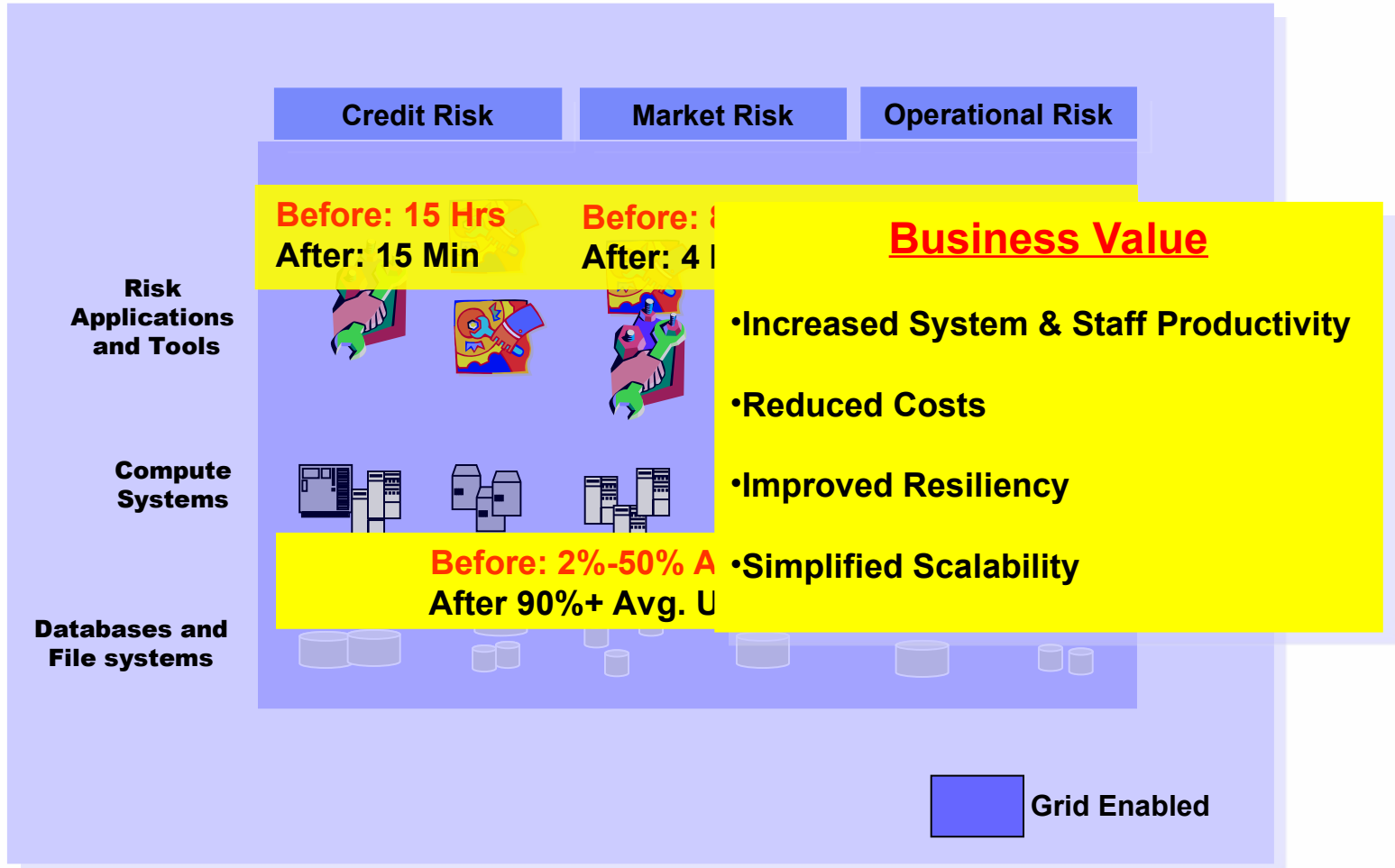
Grid Computing Example: Capital Markets Client



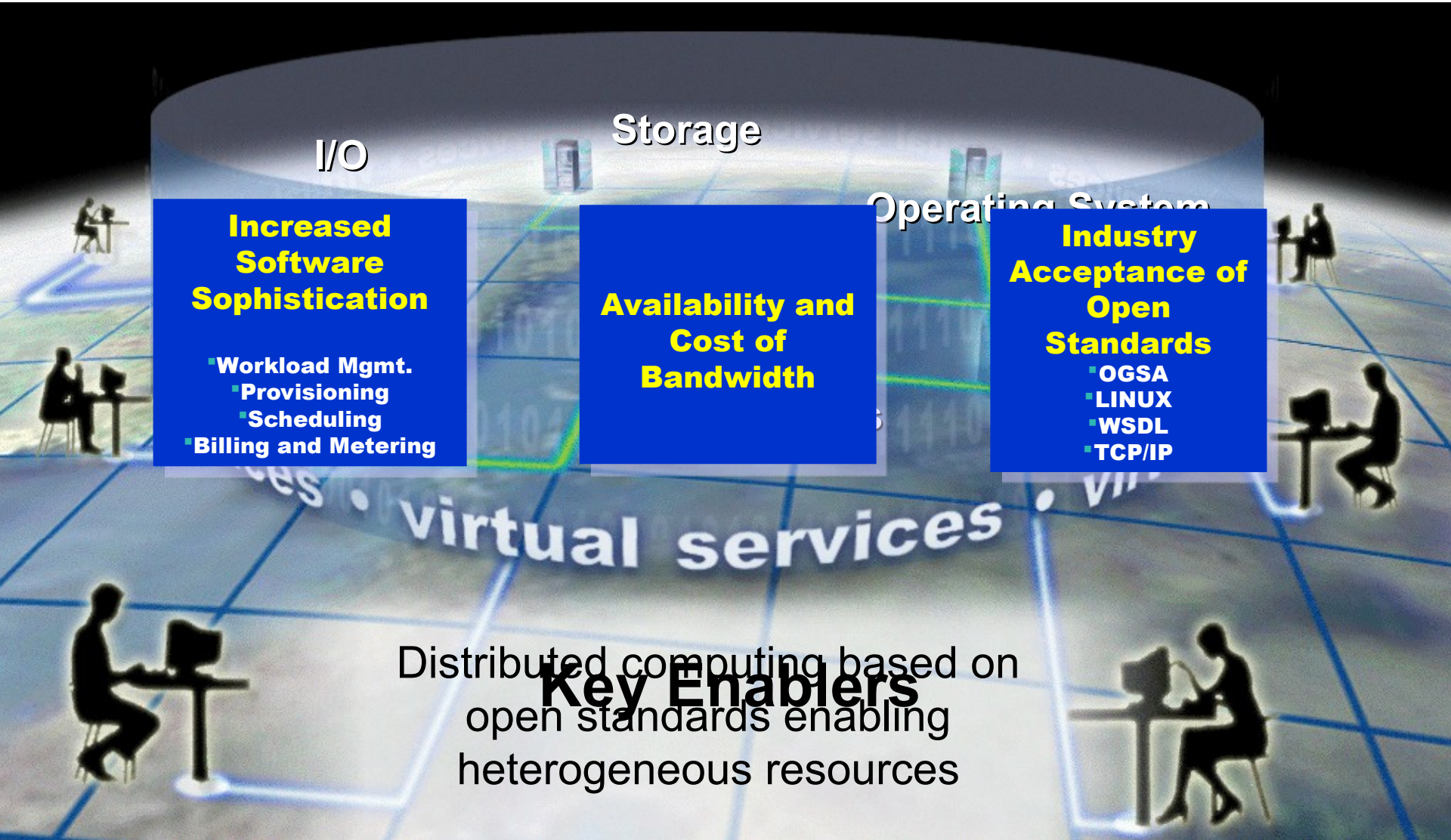
Grid Computing Example: Capital Markets Client



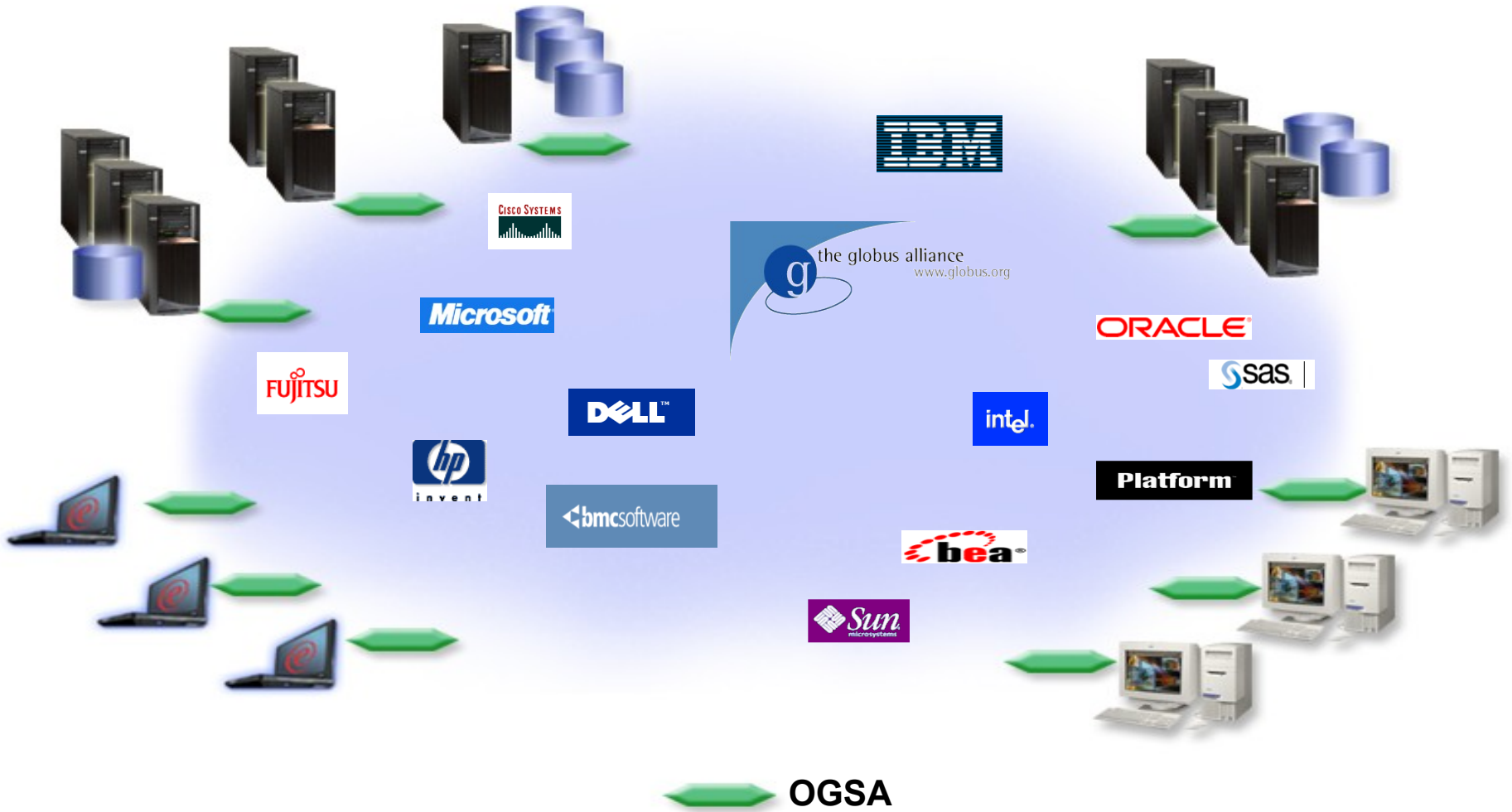
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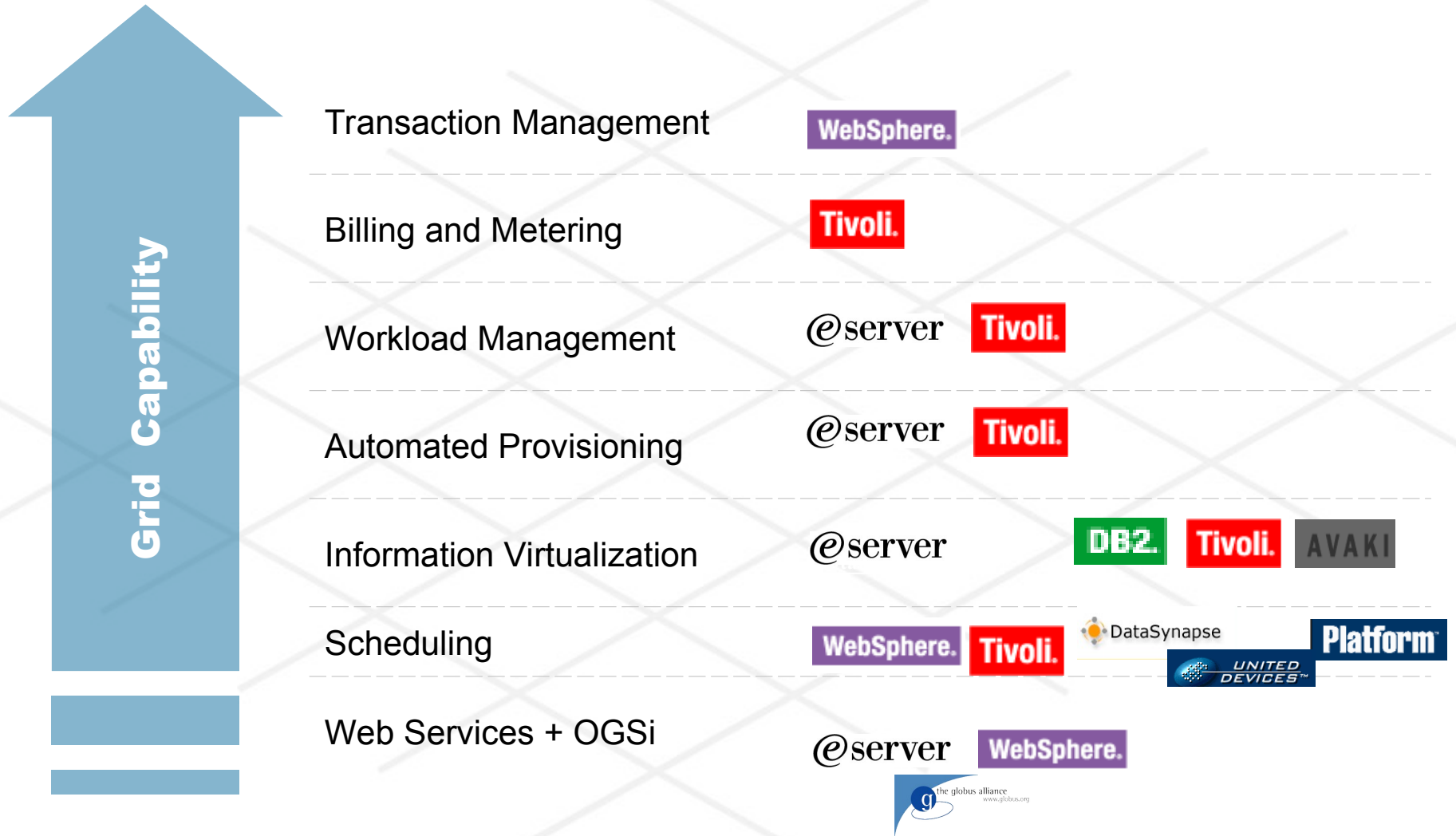
Grid Computing...The Ultimate Objective



Open Grid Services Architecture (OGSA)








Grid Adoption Steps – Roadmap to Value



What would it mean if your business could...

- Analyze the value of an investment portfolio in minutes, rather than hours?
- Significantly accelerate the drug discovery process?
- Cut the design time of products in half, while reducing the instances of defects?
- Efficiently expand and contract capacity to meet cyclical demand?
- Unite research teams around the world to take advantage of the most up-to-date learnings?

Grid Focus Areas & Value Propositions

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

- Better Decision Making
- Time to Solution
- Reduced Costs

- Improved Product Design
- Time to Solution
- Reduced Costs

- Improved Collaboration
- Time to Solution
- Reduced Costs

- Better Decision Making
- Improve Collaboration
- Stimulate Economic Development

- Improved:
 - Resiliency
 - Productivity
- Reduced:
 - Costs
 - Complexity

Hewitt Associates LLC

Business Analytics

Challenge

- Create Grid Computing environment to:
- Contain expenses for CalcEngine valuations
- Maintain or improve availability, response time & scalability
- Insure personal-data security
- Capitalize on existing application code
- Cooperate with z/OS Sysplex CICS Calling Environment
- Enable smooth and orderly migration to change

Solution

- IBM eServer™ zSeries® server
- IBM eServer BladeCenter™ servers
- Linux Red Hat v8.0
- Business Partner: DataSynapse GridServer

Hewitt a global HR outsourcing and consulting firm

Benefits:

- Efficiently uses of the combined processing power of their heterogeneous environment
- Experienced an immediate 10% faster response time with the first application deployment
- Open architecture enables Hewitt to easily deploy additional applications
- Increased processing speed reduced cost per transaction
- Reduced operational costs improves competitiveness in their industry segment

RBC Insurance

Challenge

Dramatically improve compute services to Valuation Actuaries.

Solution

- IBM [^] TM xSeries[®] servers
- IBM Global Services
- Platform Computing Inc. Software and Services

“IBM and Platform Grid enabled our valuation application and supporting infrastructure for immediate results. With the integrated solution, we have been able to reduce a 2.5 hour job to 10 minutes, and an 18 hour job to 32 minutes. We are now looking to move to a production environment. By virtualizing applications and infrastructure, we anticipate being able to deliver higher quality services to our clients faster than ever before, which will significantly impact our competitive edge”

Keith Medley, Head of Insurance Technology, RBC Insurance

Business Analytics



Technology Benefits:

- **Reduced application processing time**
- **Increased ability to run multiple valuation scenarios to reduce risk**

Business Benefits:

- **75% reduction of time spent on manual job scheduling**
- **97% reduction in application processing time**

NLI Research (Nippon Life Insurance)

Business Analytics

Challenge

Improve the performance of Financial Risk Management Application (developed by NLI) for business needs including new regulations (Basel II and audits) and competitive process.

Solution

- By adopting the Grid Job Scheduler, performance is improved with minimum investment.
- IBM Tokyo Research Laboratory joined a customer project in applying Grid technology for this application.
- Key middleware for security and data integrity to be developed through this joint research.



Technology Benefits:

- **Reduced processing time for financial risk calculation from around 10 hours to about 49 minutes – an approximate 12-fold increase in speed.**
- **Automated job-scheduling**

Business Benefits:

- **Can run more complex scenarios to reduce risk exposure**

"Grid technology enables us to realize faster risk management calculations for complex financial derivatives. In addition, we expect that we will be able to analyze factors from a variety of angles and explore new financial businesses that take risk into consideration."

-- Shuji Tanaka, Executive Research Fellow at the NLI Research Institute

Wachovia

Business Analytics

Challenge

- Create an infrastructure that can support significant increases in trading volume.
- Reduce the time to results of risk reports in fixed income and capital markets and

Solutions

- IBM eServer™ xSeries® Blade servers
- Linux
- DataSynapse GridServer

“We haven’t scratched the surface yet for how we envisage using Grid Computing to meet our ongoing product development and trading activity “

--Andy Cook, Head Exotics Trader, Wachovia



Business Benefits:

- P&L Risk report turnaround improved...from as much as 15 hours to minutes on a real-time intraday basis
- Solution enables 4x more volume and 25x more modeling simulations
- Platform supports the trading of more complex financial products

Technology Benefits:

- Improved resiliency of application and jobs
- Improved utilization of supporting HW assets
- Reduces cost of ownership of infrastructure

Royal Dutch Shell

Business Analytics

Challenge

Improve accuracy and speed of summarization and scientific modeling applications

Solution

- IBM [^] TM
- Linux
- Globus Toolkit

"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.



The screenshot shows the Shell.com website interface. At the top, there is a search bar with the text 'Keyword Search' and a 'SEARCH' button. Below the search bar, the website header includes 'Welcome to Shell.com' and a navigation menu with links like 'Home', 'About Shell', 'Shell Worldwide', etc. The main content area features a 'Latest News' section with several articles, including 'Russians click onto Shell technology website' and 'Shell unveils design for hydrogen station in Iceland'. The website has a clean, professional layout with a blue and yellow color scheme.

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

European Aeronautic Defense and Space Company

Engineering & Design

Challenge

EADS wanted to build an “on demand computing” model for the simulation tools used by their engineers to shorten analysis completion time and provide a single image of computer resources.

Solution

Shorten the product design cycle with a Grid Computing platform based on:

- IBM [^] _{TM}
- Linux
- Globus Toolkit
- GridXpert technology



Technology Benefits:

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

Business Benefits:

- Cut analysis and simulation time, while improving the quality of the output
- Improve the productivity of the Design Office

IBM

Engineering & Design

Challenge

- Microprocessor Design
- Benchmarking & Testing
- Server Design

Solution

- IBM [^] _{TM}
- 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

AIST (National Institute of Advanced Industrial Science & Technology)

Research & Development

Challenge

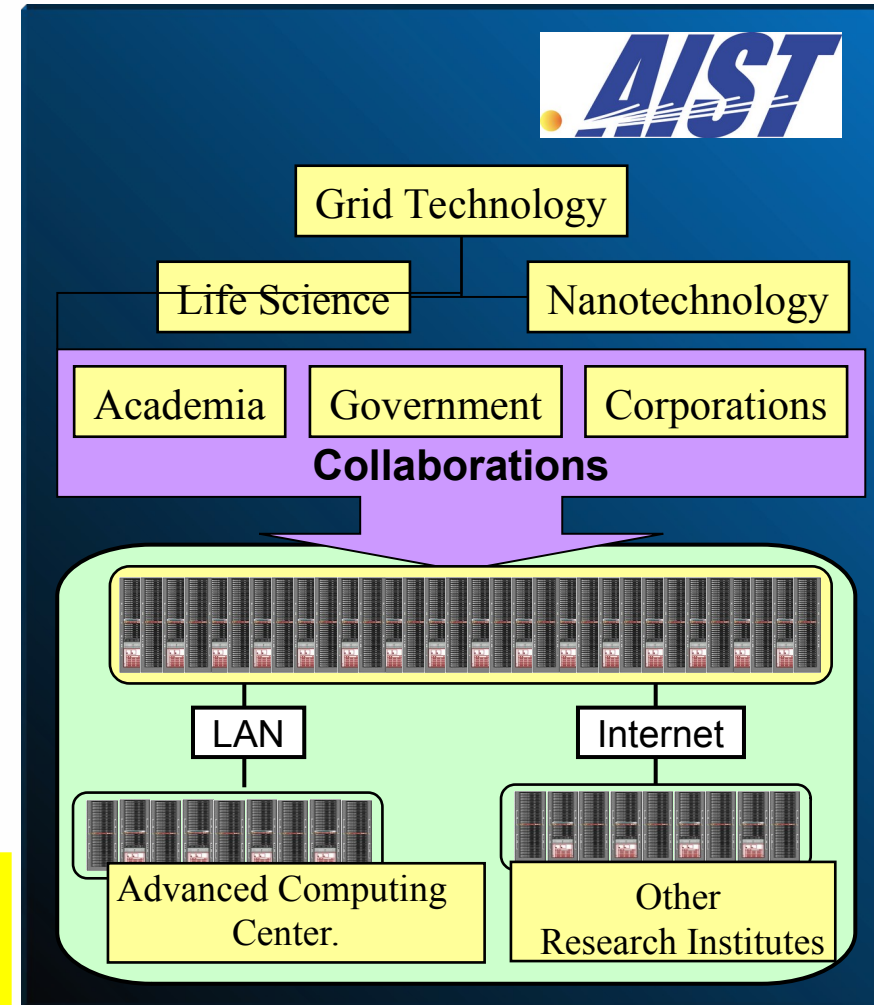
AIST, Japan's largest national research organization needed to provide an on-demand computing infrastructure which dynamically adapts to support various research requirements of its collaborators focusing in areas of grids, life science, and nanotechnology.

Solution

- Linux Cluster
 - 2116 CPU AMD Opteron Cluster
 - 520 CPU Intel Madison Cluster
- Globus Toolkit 3.0 (OGSA)

World's most powerful Linux-based supercomputer

- More than 11 trillion calculations per second
- More powerful than the current third most powerful supercomputer in the world



University of Florida

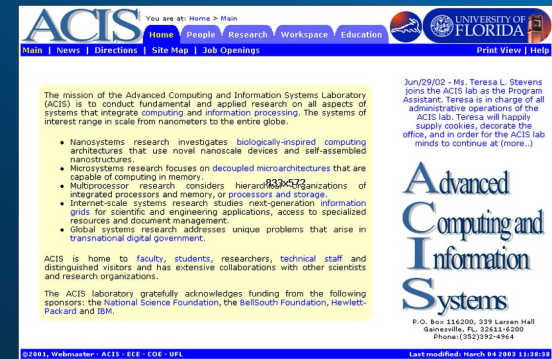
Challenge

U.S.-based research university's Advanced Computing and Information Systems (ACIS) lab sought to respond to the needs of scientists, in multiple geographic locations, for a high-performance, secure and reliable infrastructure for grid computing research

Solution

Create a virtual, secure grid computing environment for collaboration based on:

- IBM [^] TM zSeries® server
- Linux and z/VMTM
- IBM virtualization software
- IBM TotalStorage® Enterprise Storage Server®
- IBM [^] TM xSeries® server in an 8-node cluster



Business Benefits:

- Enables scientific and design collaboration, using ACIS-developed software (In-VIGO), In Virtual Grid Organizations

Technology Benefits:

- Virtualization allows multiple researchers, each with separate and distinct applications, to use a single mainframe solution

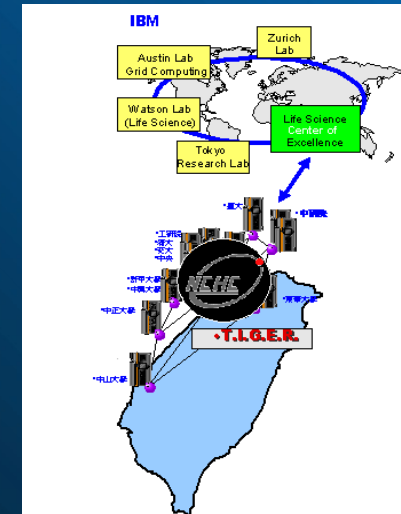
TIGER

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

Kansai Electric Power Co.

Enterprise Optimization

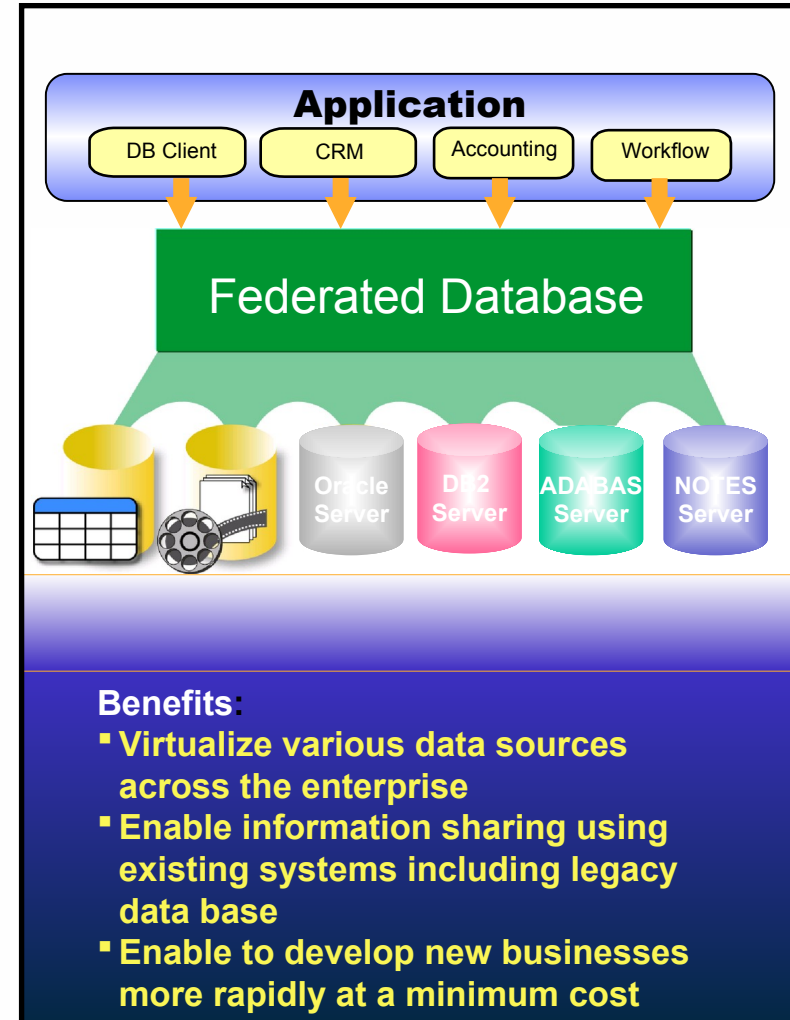
Challenge

Japan's second largest electric utility company has various information on heterogeneous data base environment distributed across multiple departments. KEPCO wanted to integrate information beyond departments and affiliated companies to enable information sharing.

Solution

Create virtual data base federated from heterogeneous data base environment
Data Grid technology enables to federate various data source distributed across multiple departments.

- IBM DB2 Data Federation Technology
- Wrapper to access other RDBs including legacy data base



Marist College

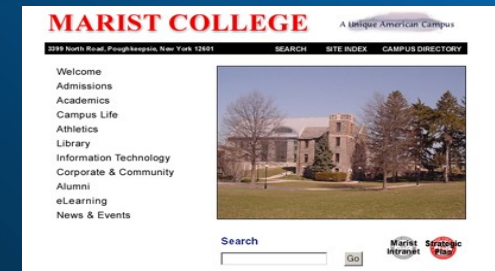
Challenge

Medium-sized U.S. college needed a more stable, resilient and powerful platform for internal IT operations and computer science student labs, to respond to demands for classes in Linux and grid computing

Solution

Increase and improve educational IT resources. Consolidate servers onto a mainframe partitioned into hundreds of virtual machines to enable the creation of a grid environment for instructional purposes, based on:

- IBM eServer™ zSeries® server
- Red Hat Linux
- Z/VM V4.3
- Globus Grid Computing toolkit



Technology Benefits:

- Quick and easy to add new virtual servers when needed
- More stable, robust and secure environment

Business Benefit:

- Stronger Linux skills and greater satisfaction for students
- Lower cost due to server consolidation, lower license fees, less maintenance

19 Grid Offerings in 10 Industries

Research & Development	Engineering & Design	Business Analytics	Enterprise Optimization	Government Development
<ul style="list-style-type: none"> •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 	<ul style="list-style-type: none"> ▪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 	<ul style="list-style-type: none"> ▪Financial Services: IBM Grid Offering for Analytics Acceleration ▪Financial Services: Grid Offering for Analytics Acceleration: Risk and Compliance ▪Financial Services: Grid Offering for Analytics Acceleration: Customer Insight •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 	<ul style="list-style-type: none"> ▪Financial: IBM Grid Offering for IT Optimization ▪Petroleum: IBM Grid Offering for IT Optimization •Grid Innovation Workshop/Modules 	<ul style="list-style-type: none"> ▪Government: IBM Grid Offering for Information Access •Grid Innovation Workshop/Modules

Grid Ecosystem

Business Analytics	Engineering & Design	Research & Development	Government Development	Enterprise Optimization
<ul style="list-style-type: none"> • SunGard • FairIsaac • SAS • Algorithmics • Moody's KMV • Globus • DataSynapse • Platform Computing • Gridsystems • Cornerstone Systems • Morse • Anix • Cisco 	<ul style="list-style-type: none"> • Cadence • MSC Software • Dassault • ESI • Engineous • Synopsis • Globus • Platform Computing • Avaki • GridXpert • Gridsystems • PCPC Inc • Kobelco Systems • Science + Computing • Cisco • CIS Sud-Quest 	<ul style="list-style-type: none"> • Accelrys • Dassault • Landmark Graphics • Japan Research Institute • Globus • Unicore • Avaki • Platform Computing • United Devices • GridXpert • Gridsystems • NTT-DATA • Moasys Corp. • Northgate • TBC • C.a.r.u.s Info. Tech. • Anterio Consult & Research • SCC • Cisco 	<ul style="list-style-type: none"> • Globus • Platform Computing • United Devices • Avaki • Cornerstone Systems • Esteem Systems • Italtch • CIS Sud-Quest • Cisco 	<ul style="list-style-type: none"> • Mercury Interactive • Rational • Globus • Platform Computing • United Devices • DataSynapse • GridXpert • Gridsystems • Force 10 • MSI • Beacon Information Technology • Malaysia Debt Ventures • CC Compunet • Comparex Informationsysteme GmbH • Bechtle Logistik und Service GmbH • Cisco

Application ISV
Grid ISV
Business Partner

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**
- **Building an ecosystem**
- **Implementing grids for commercial and public organizations**
- **Integrated solutions: Software, Services, Hardware and Partners**

Getting Started

- **IBM can tailor and implement one of the Grid offerings to meet your specific needs**
- **IBM has skilled professionals and partners to help you best exploit Grid technologies**
- **Start the journey today...**
 - **Visit the Grid Website: www.ibm.com/grid**
 - **Dedicated Grid teams throughout the world**
 - **Grid Design Centers in Montpellier, Poughkeepsie, Austin, Silicon Valley and Tokyo**



Grid Computing

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www.ibm.com/grid



Appendix

CIO Perspective

Grid Value Tool

Architectural Framework

High Level Customer Pain Points

Offering Example

The CIO Perspective

“With Grid computing we can integrate data on a single customer from dozens, if not hundreds, of applications and platforms. That will allow Schwab to offer better integrated, more targeted service and product offerings to our customers...” EVP, Schwab Technology Services

“Grid will optimize the number of applications I can run on my servers and allow me to reduce my licensing, server, and maintenance costs, translating into at least \$1M savings.”
CIO, Engineering Professional Services

“Grid allowed us to marry these technologies (Linux, Mainframe and Blades) in a cooperative model that delivers significant business benefit for Hewitt and our customers.”
CIO, Hewitt Associates

“Our corporate CIO has been involved to spread Grid to other divisions that have similar compute-intensive simulation environments.” LOB IT, Aerospace

“Grid is about cutting headcount and admin costs and enabling a shared IT infrastructure.”
CIO, Financial Services

IBM Grid Value at Work

Business Case Measures:

Accounting Income Based:

Pre-tax ROC	166%
After-tax ROC	116%
Economic Value Added	37,028

Cash Flow Based:

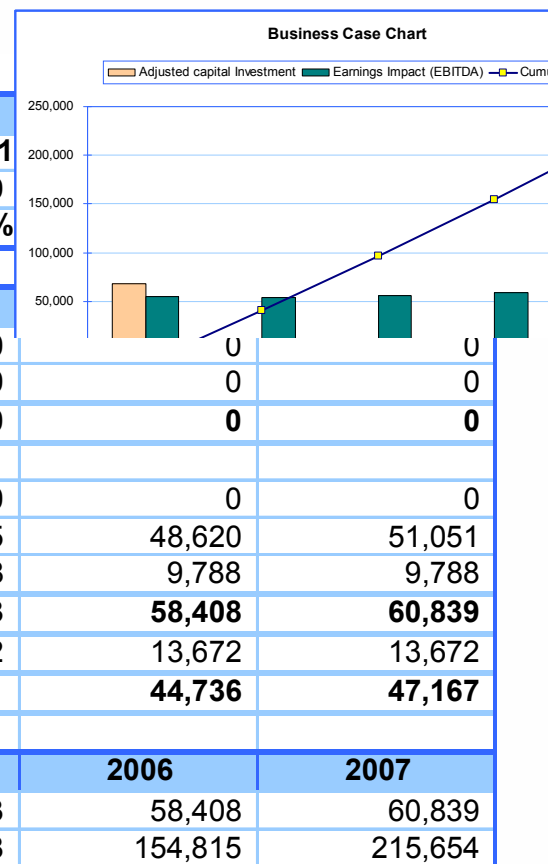
Payback Period	1
NPV	152,009
IRR	400%

Income Statement Impact:

	2003	2004	2005	2006	2007
Capital Investment	68,360	0	0	0	0
Avoided capital expense	0	0	0	0	0
Adjusted capital Investment	68,360	0	0	0	0
Revenue gain	0	0	0	0	0
Business cost savings	42,000	44,100	46,305	48,620	51,051
IT operating cost savings	12,788	9,788	9,788	9,788	9,788
Earnings Impact (EBITDA)	54,788	53,888	56,093	58,408	60,839
Depreciation	13,672	13,672	13,672	13,672	13,672
Earnings Impact (EBIT)	41,116	40,216	42,421	44,736	47,167

Cash Flow Impact:

	2003	2004	2005	2006	2007
Free Cash Flow to Firm	(13,572)	53,888	56,093	58,408	60,839
Cumulative Cash Flow	(13,572)	40,315	96,408	154,815	215,654



Architecture Framework

