Itanium 2 Impact Software / Systems **MSC.Software**

Jay Clark

Director, Business Development

High Performance Computing

jay.clark@mscsoftware.com

Agenda

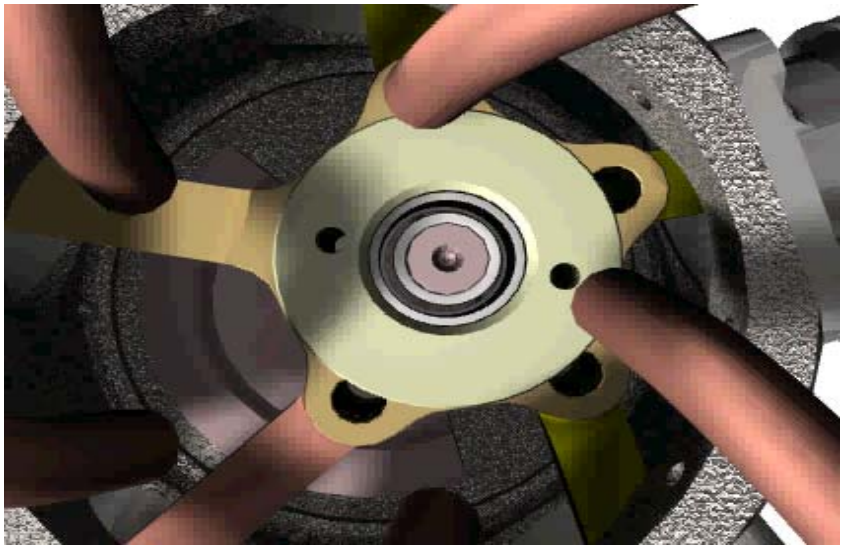
- ***What MSC.Software does***
- ***Software vendor point of view***
  - ***Port Experience***
  - ***Application Availability***
- ***High Performance Computing point of view***
  - ***Building Compute Clusters***
  - ***HP's Itanium 2™ impact on HPC***
- ***PNNL implementation***
- ***Summary***

MSC.Software

- Founded in 1963 producing engineering simulation software, remains market leader
- Strong financial momentum and visibility helping customers with their entire IT needs
- Offers Software, Services, and System through its over 50 offices worldwide
- MSC.Software's customers include BMW, DaimlerChrysler, Fiat, GM, Ford, Nissan, Toyota, Boeing, Airbus, Lockheed Martin, United Technologies, DuPont, Eastman Kodak and Motorola

Leader in simulation technology

- Traditionally provide simulation software
- Now also Integrate design and simulation systems, including complete high performance computing (HPC) systems



- Insight
  - "See" inside my problem
  - Results = Reality (Believe in results)
- Saves Money
  - Don't have to build as many prototypes
- Saves Time
  - Modelling on the computer is faster than testing

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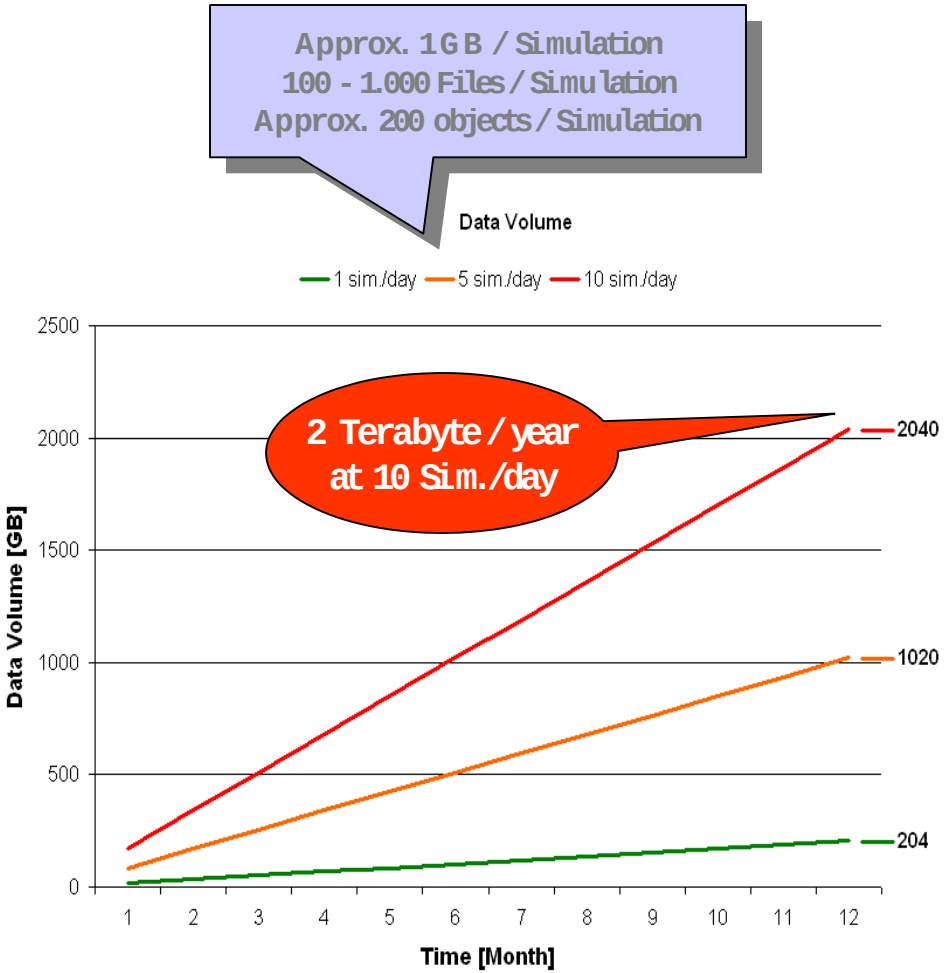
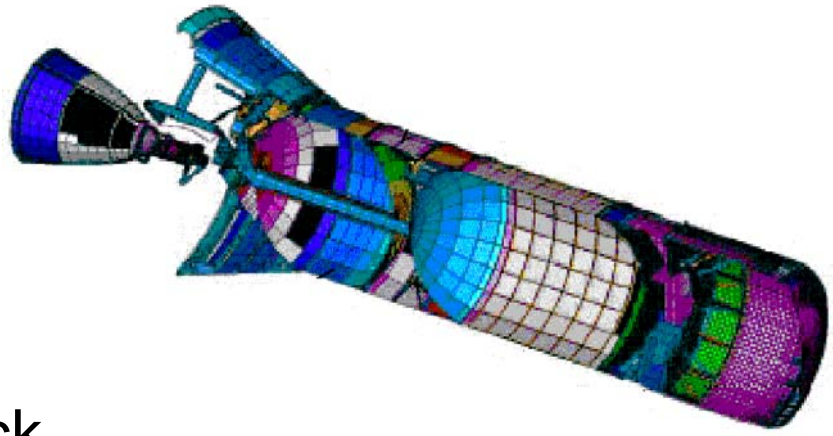
Why Itanium 2™: Large Problems, Scalable

- Engineering Challenges:
  Increase in
  - numbers of engineers
  - numbers of simulations
  - complexity of simulations
- Life Science Challenge:
  - Data Growth
- Needs:
  - Higher Capacity Systems
  - Scalable systems



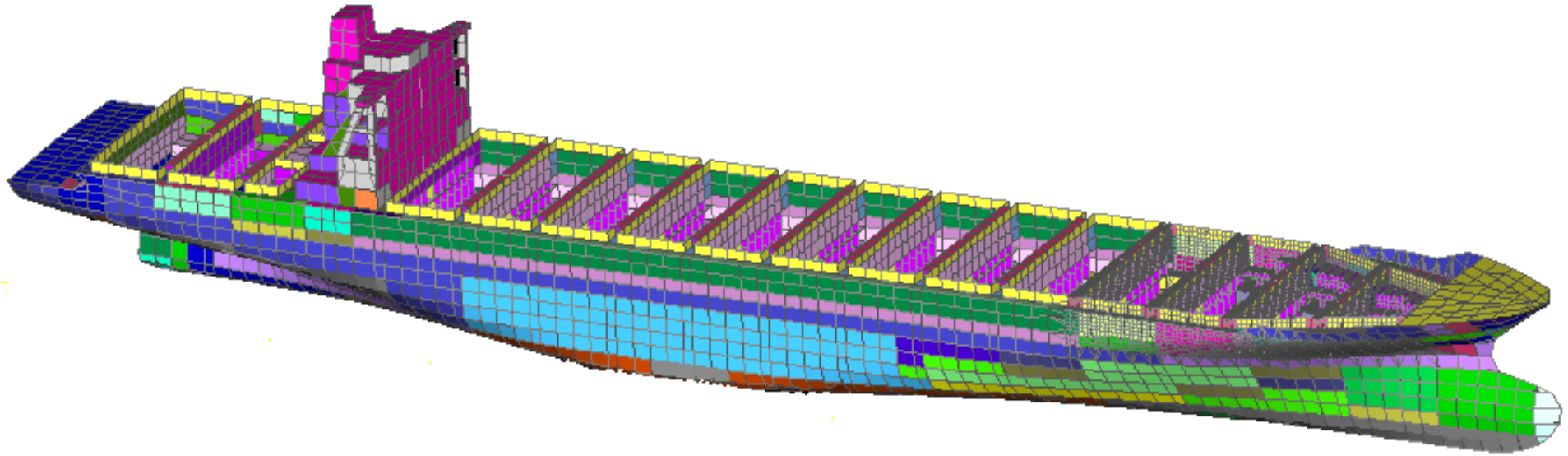
MSC.Nastran

- Leading Finite Element Analysis Code (since 1963)
- Used extensively by hardware manufactures to benchmark new systems
- Demands:
  - CPU speed, FP
  - Memory speed / address
  - I/O speed
  - Scalable solution DMP
  - Any one can be a bottle neck



MSC.Nastran Port

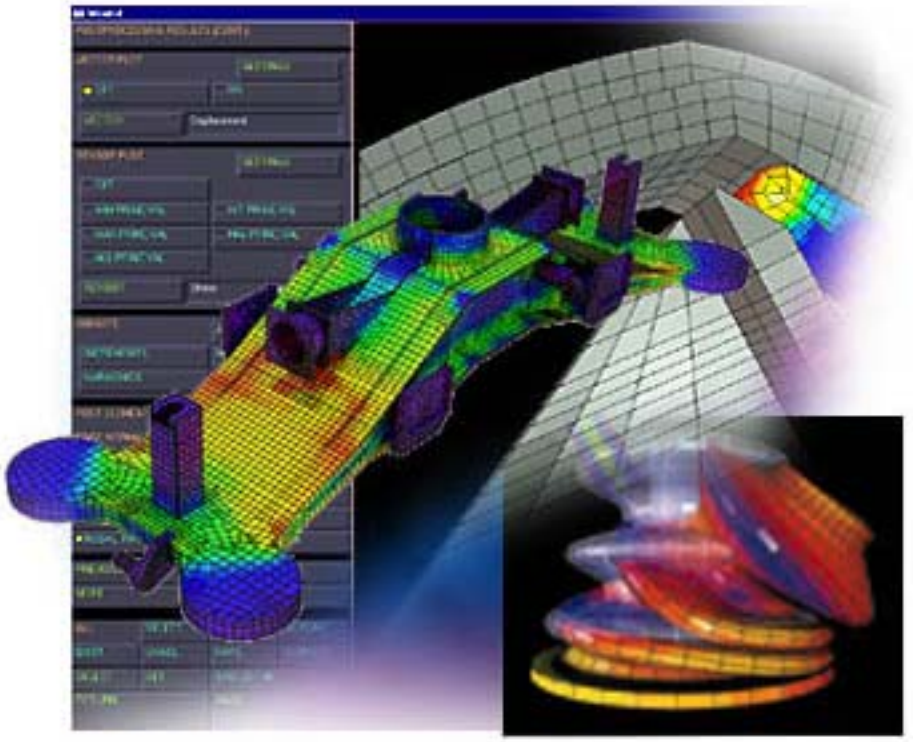
- HP Itanium™ port Available (also on Linux)
- Have Itanium™ systems from HP for over 1 year



- Runs on Itanium 2 ™
- Currently have the largest collection of Itanium 2™ based boxes available

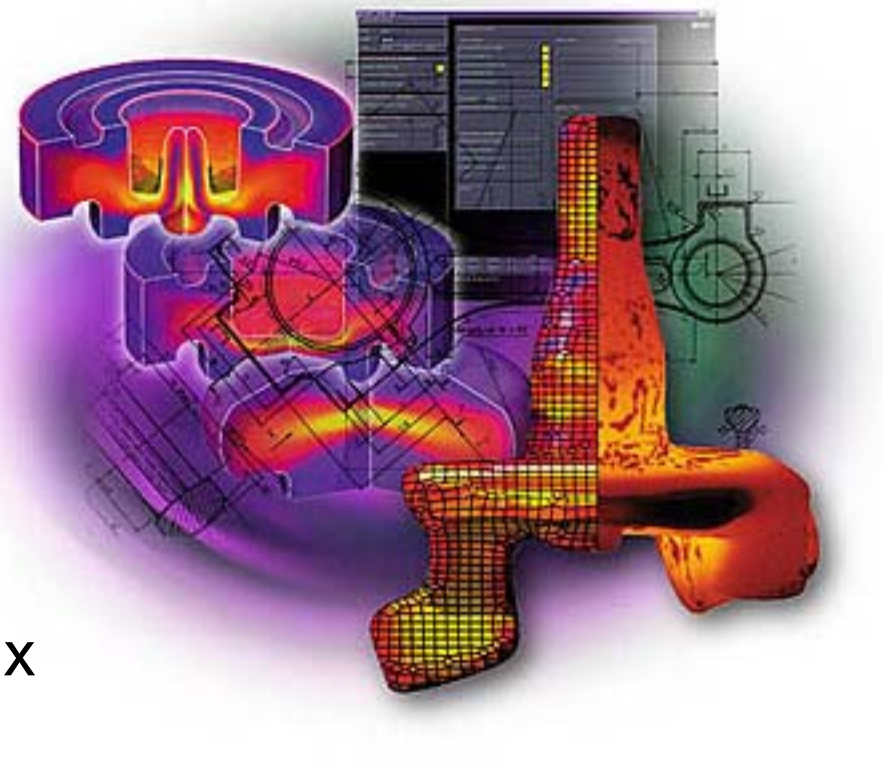
MSC.Marc

- Leading Non-Linear Finite Element Analysis Code
- Demands:
  - CPU speed, FP
  - Memory speed / address
  - I/O speed
  - Scalable solution (DDM)
  - Any one can be a bottle neck



MSC.Marc Port

- HP Itanium™ port built on HPUX 11.2
- HP & MSC.Software currently and continually working to improve performance
- Port was straight forward including DDM
- Have experience with Linux Itanium™ port as well
- Anticipate Itanium 2™ port to be easy



MSC.Linux *Worlds first Commercial Itanium 2 IA-64 Linux*

- Specialized for HPC compute clusters
- Linux IA64 port constantly being worked on by community
- HP & MSC.Software currently working to create easy “out of the box” experience with Linux on Itanium 2™
- Integral part of HPC offering

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High Performance Computing to Accelerate Product Design

- Just One MSC.Software HPC Solution Offering
- Business Challenge: Improving time-to-market through optimized product simulation using high-performance computing
- Technical Solution: Design Chain Accelerator
- Enterprise Hardware Platform: Scaleable Intel® -based Hewlett-Packard servers and workstations

DESIGN CHAIN ACCELERATOR
DCA

DCA Architects

Intel ® Based HP Clusters for High Performance Computing

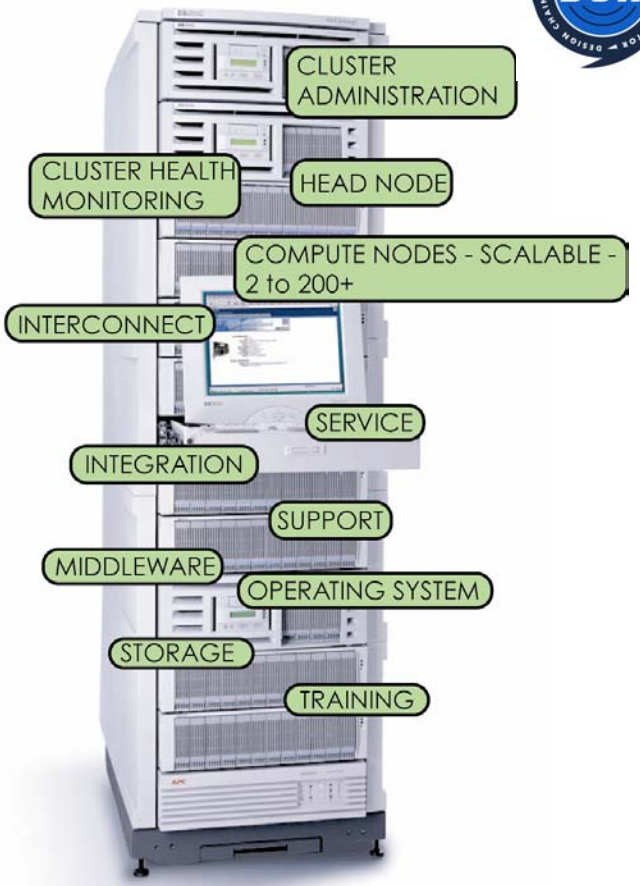
MSC SOFTWARE
HIGH PERFORMANCE COMPUTING

hp

intel

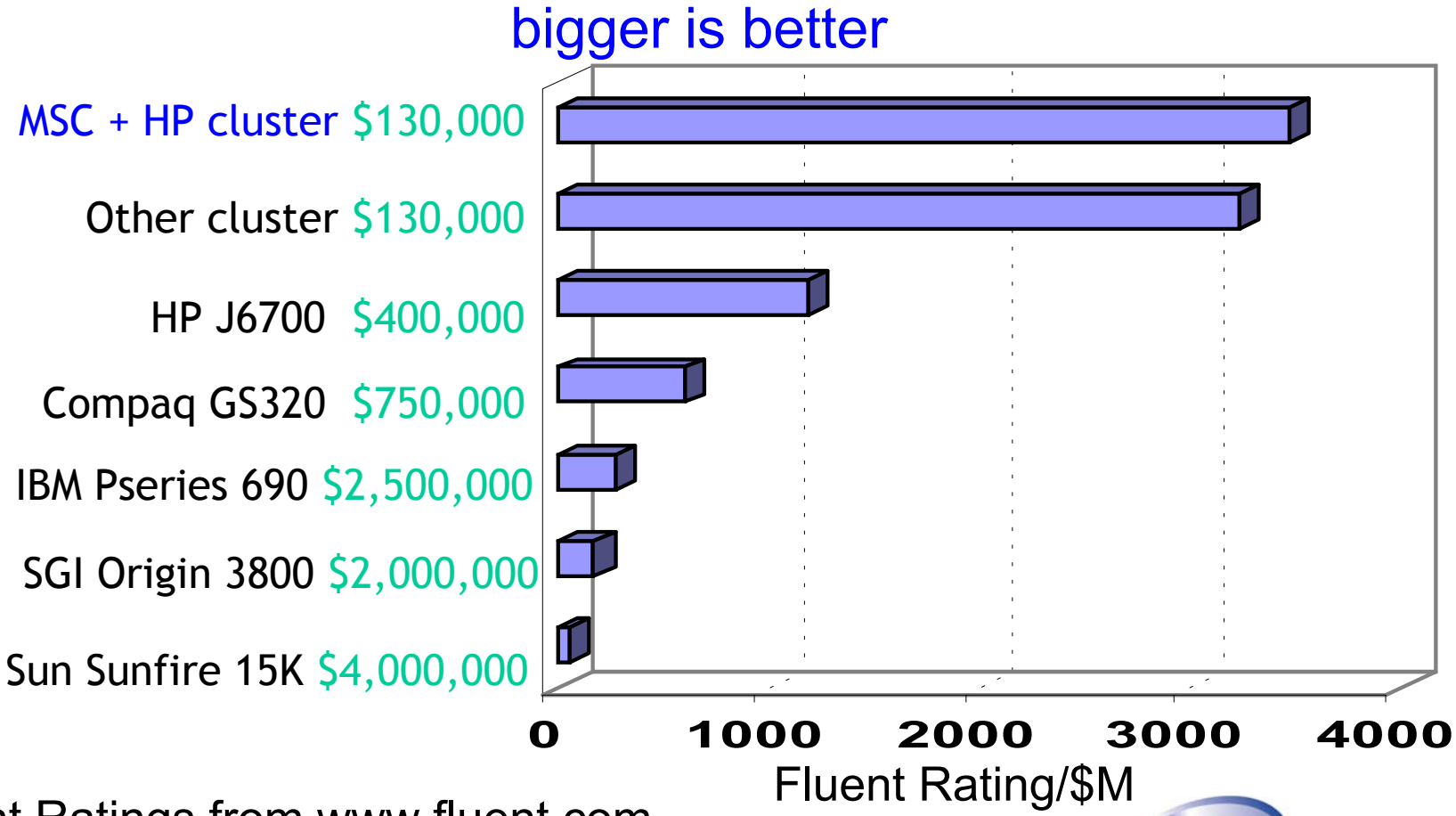
Technology: Design Chain Accelerator

- **Applications:** Crash, Structural Analysis, CFD
- **Processors:** Intel Xeon processors and Intel Itanium processor family
- **Servers:** HP-clustered compute servers based on Netservers or HP workstations
- **Operating System:** MSC.Linux and Microsoft Windows 2000-based operating systems
- **Middleware:** Middleware provided with the MSC.Linux distribution
- **Support:** on-site system integration & (IT) service and support



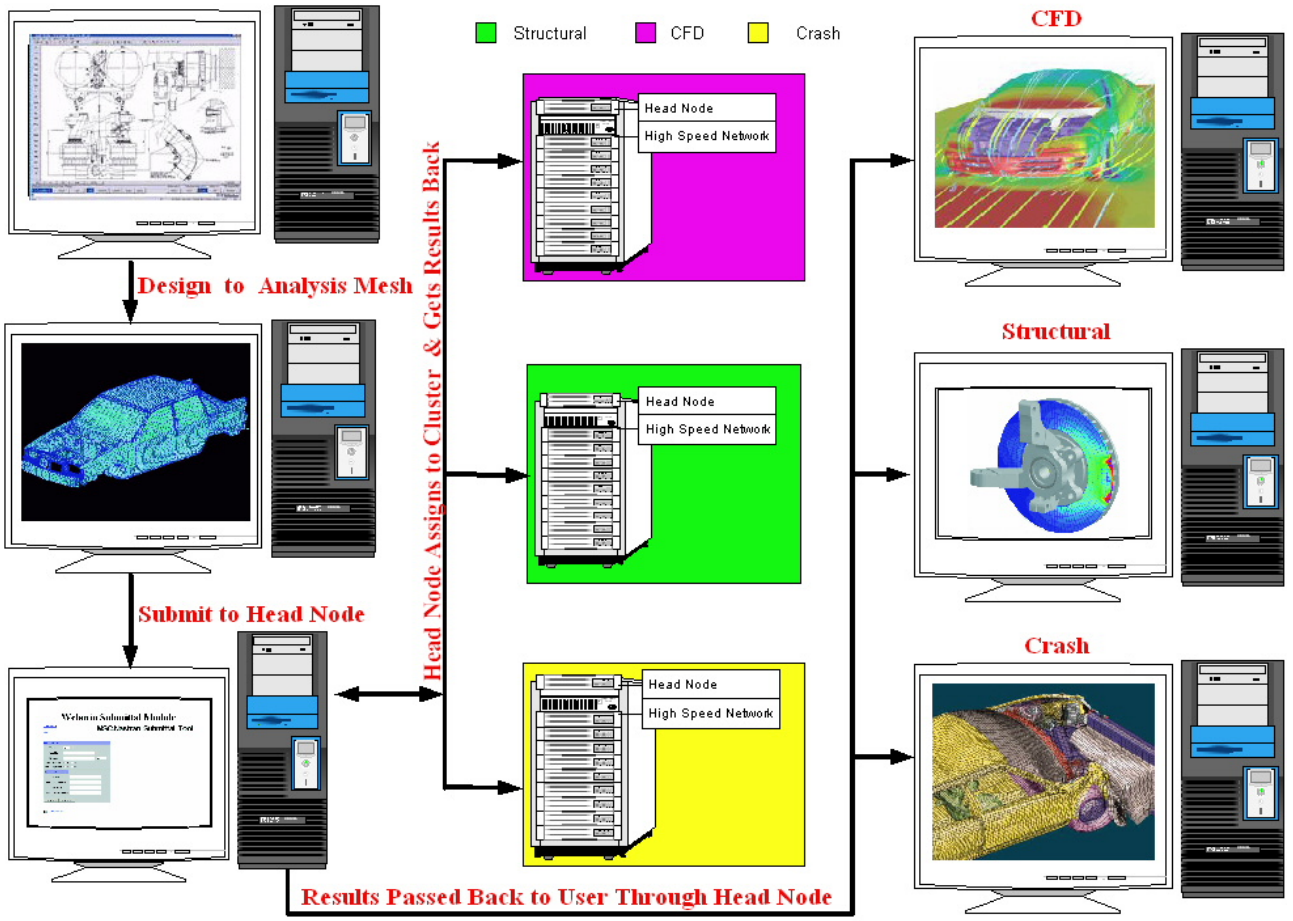
Benefits: Price – Performance

Fluent Ratings on Large Problem (16 Node Cluster)



Fluent Ratings from www.fluent.com

Implementation: Design Chain Accelerator



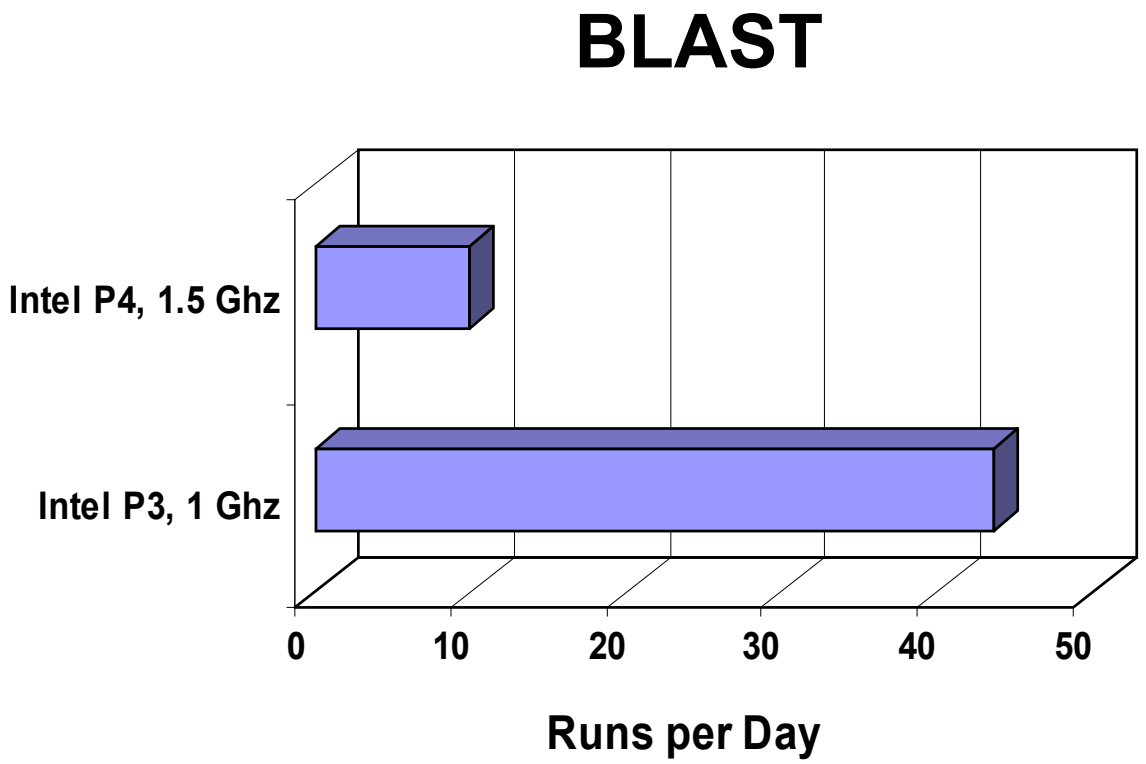
All master nodes are interconnected via fiber for SAN connection & Fast Ethernet for administration

Why HP's Itanium 2™ is a big deal

- Fastest Access to Memory! Not even offered by Intel™
- Scalable Solutions
  - DMP vs SMP Architecture
  - 1, 2, 4 Way Systems Packages
  - Form Factor (rack)
- Larger Problem Size (in Memory)
- Floating Point Performance

Clock speed isn't everything

- Clock speed is not only factor affecting Performance
  - Bandwidth (memory)
  - Instruction set
  - Compilers
  - Application
  - Physics



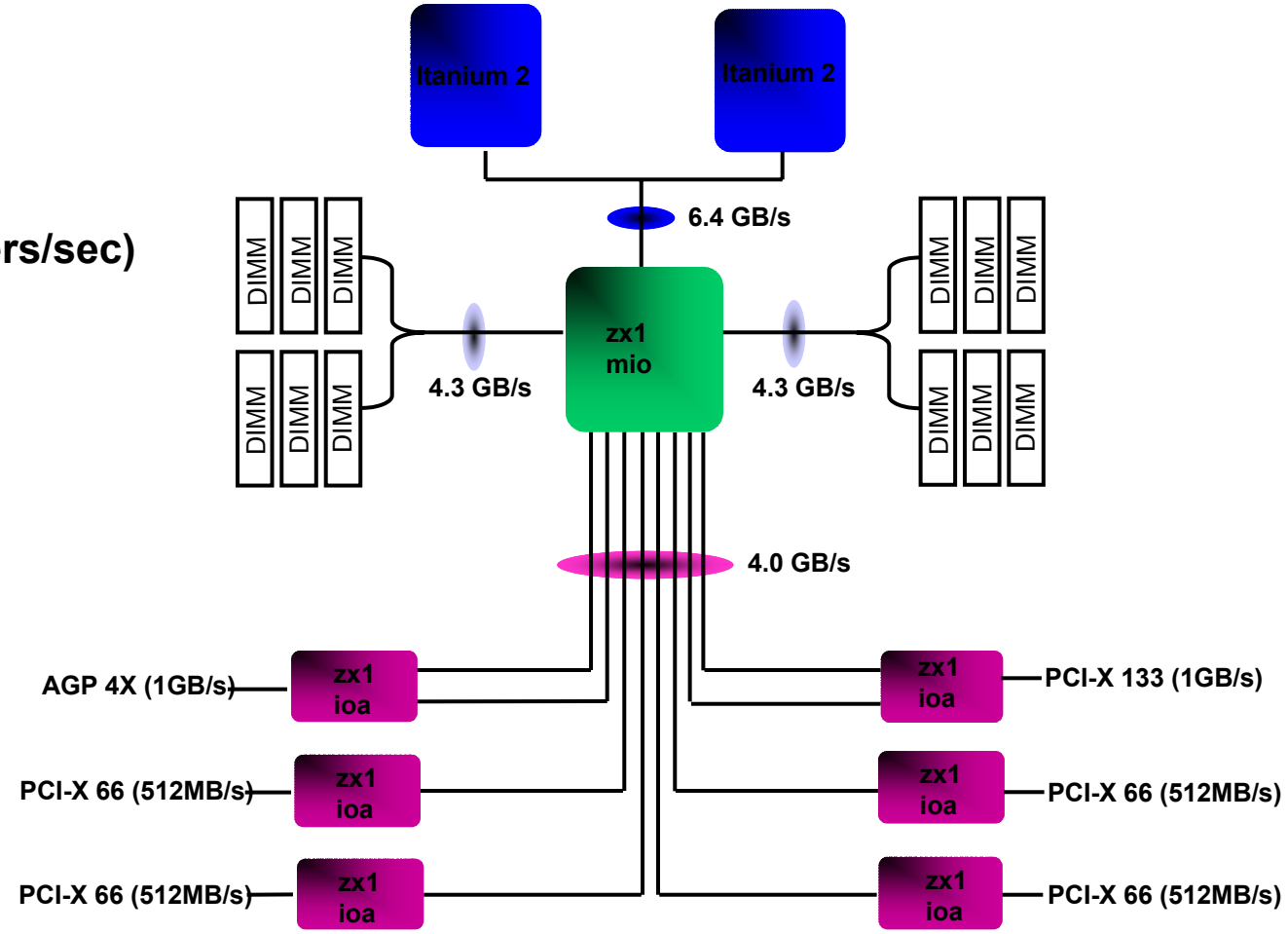
- HP's Itanium 2 ™ significantly improves memory access

The Secret? hp zx1 chipset

System Bus
128 bits wide
400 MT/s (MegaTransfers/sec)
6.4 GB/s

Memory
266 MHz DDR
Lowest Latency
12 DIMMs
8.5 GB/s

IO
4 GB/s
PCI-X/AGP Support



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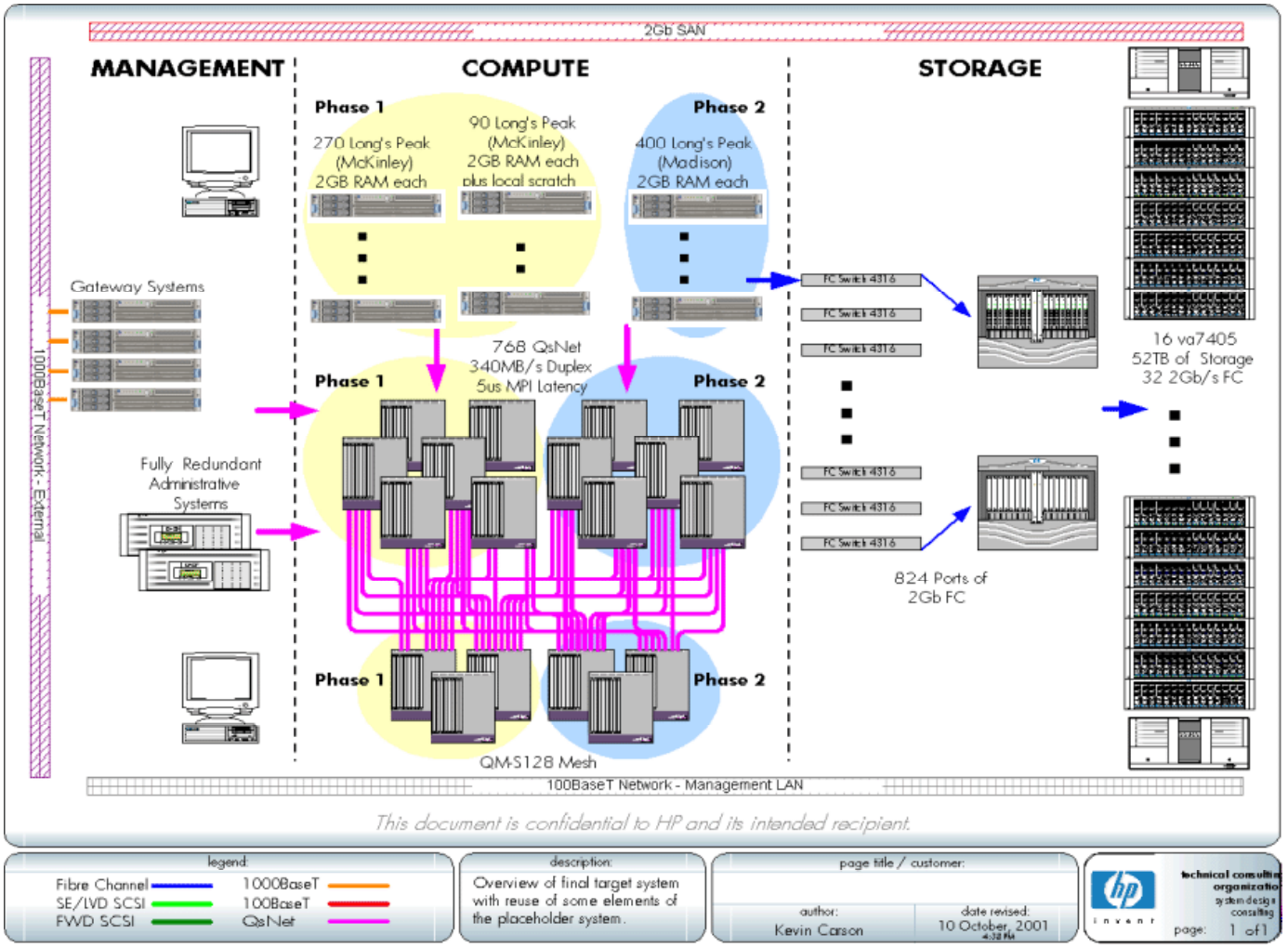
Pacific Northwest National Lab

- HP & MSC Currently Implementing Itanium 2 ™ Solution (largest collection of Longspeaks in the world)
- Largest Itanium 2 ™ cluster initially based on Longspeak Machines
- Already scheduled to add Madison machines early next year
- Total cluster of over 700 systems

Customer Implementation



Summary

- ***As a software vendor***
  - ***Major Applications Ported***
  - ***HP & MSC.Software working close to improve performance and optimize on IPF***
- ***As a HPC cluster solution provider***
  - ***HP's Itanium 2™ memory access***
  - ***Packaging***
  - ***State-of-the-art Supercomputing***

Thank You

Design Chain Accelerator: Benefits

- ***High-performance and exceptional value***
- ***Faster design cycles and time-to-market***
- ***Reduced product development and warranty costs***
- ***Timely return on investment—typical production systems are up and running within one day of delivery***
- ***Scaleable—DCA can easily grow as customers' needs grow***

DCA: Production Success

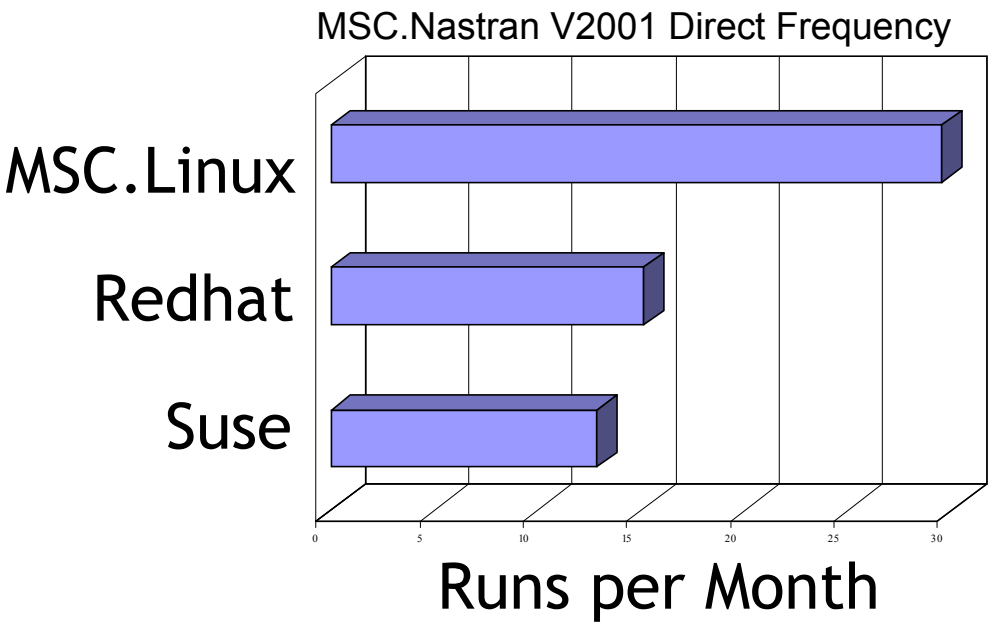
- *400% Performance Gain @ 1/3 the Cost*
- *CFD (Overflow + CFL3D)*
- *Allows Boeing to increase aerodynamic performance and reduce weight*
- *Just Implemented another DCA Solution*
  - *"I recognized that Linux was the way to go… and that MSC.Software provided a stable, fully supported kernel grounded by their interest in supporting their existing software products and customers."*
  - *"I am very happy with the products and the direction MSC.Software is taking."*

Michael Mills, Senior Technical Specialist

Boeing Space and Communications

Technology: MSC.Linux, Cluster Distribution

- ***Faster with MSC.Linux***
- ***Easier installation & administration***



Benefits: Optimized with Intel® Architecture

Fluent Ratings on Large-Class Problems (16 Node Cluster) – bigger is better