HPC Market Update

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Cray's Target Markets

High efficiency computing is a requirement for success!

Government-Classified

Government-Research

Weather/Environmental

Automotive

Life Sciences

Aerospace

Academic Research

Cray Solutions for:
Security
Design Engineering
Environmental
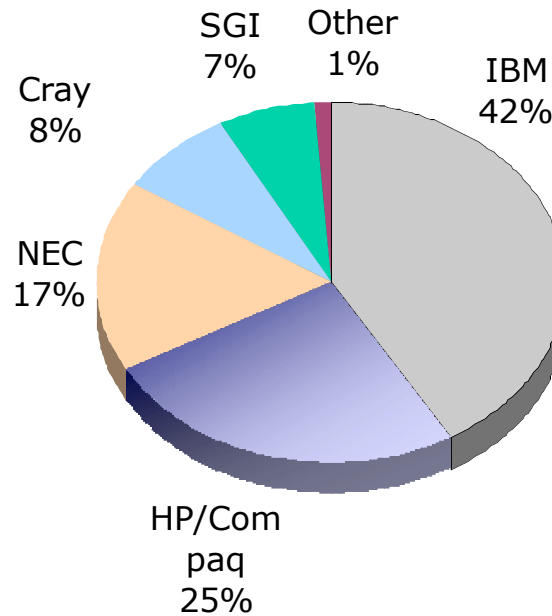**Life Sciences**
Data Management/SAN

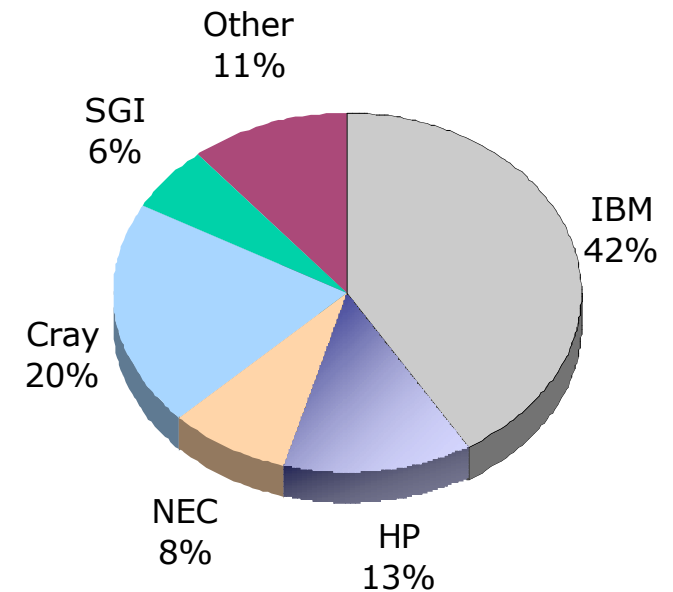CUG 2004
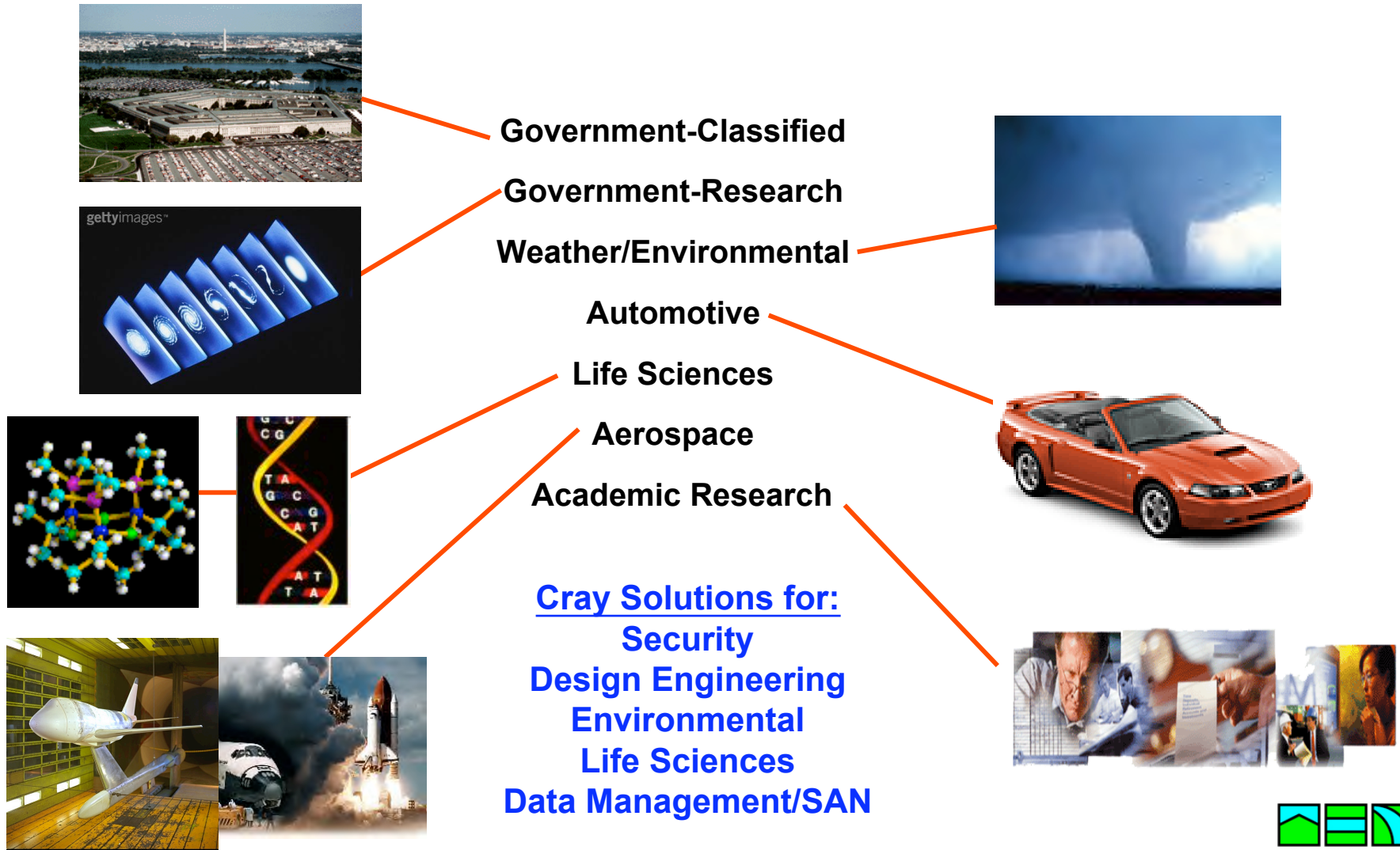
Gaining Market Share

Cray's market share exceeded expectations in 2003
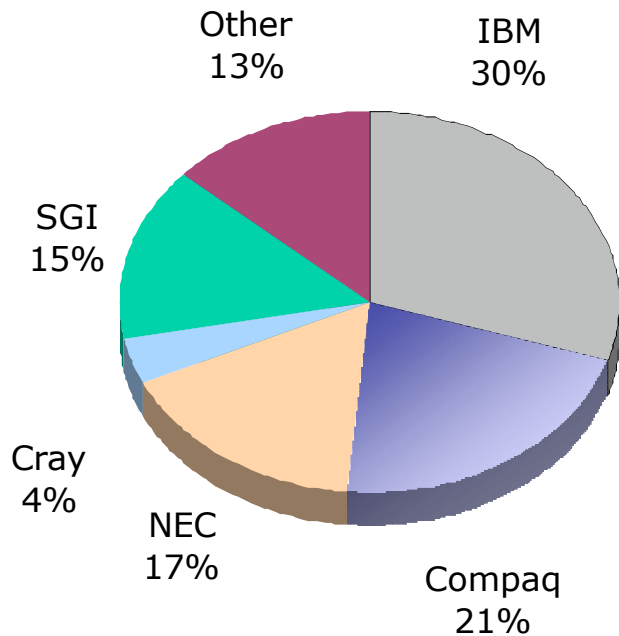
2001 Market: $800M

2002 Market: about $1B

2003 Market: $770M

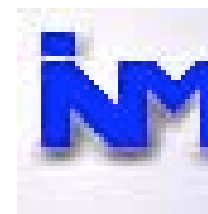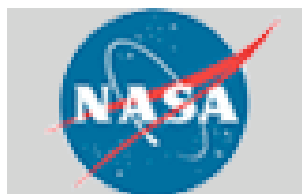**Source: IDC, 2003 Capability Market Census**

Some Cray Customers
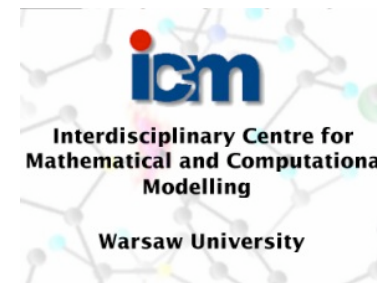
Korea Meteorological Administration

- ## 5 year, $43.5M contract
  - ### Total solution
  - ### Highly competitive procurement
- ## 2 Phase Installation:
  - ### X1 August 2004; >600 KMA Sustained Gflops
  - ### X1E August 2005; >4300 KMA Sustained Gflops
  - ### ADIC SAN and tape silos + pre/post processing
- ## Cooperative agreement
  - ### Establishment of joint atmospheric sciences research center with a mission to promote the advancement of atmospheric modeling over the East Asia Pacific region
- ## Services from start to finish

Cray HPC Services

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Strategy | **Technology Selection** | **Implementation** | **Operation**

HPC Consulting

- Management Consulting
- System Analysis
- Data Center Management
- Technology Evaluation

System Integration

- Storage Solutions
- System Tuning
- Custom Engineering
- Application Porting

Operational Services

- Site Engineering
- Training
- Project Management
- Supercomputing-on-Demand

Cray X1 Systems

- **Widespread adoption**
  - Domestic and international; Government and commercial
- **In leading positions of the most powerful single computers**
  - (International Data Corporation Balanced Ratings – 2003)
  - 12.8 GF CPU with high memory bandwidth and sustained performance
- **Ten Cray X1 systems in TOP500 (November 2003)**
  - Three 256-CPU systems at positions #19, #20, and #21
- **Enabling New Science**
  - Improved weather forecast accuracy – 5km resolution model of entire U.S. in less than 2 hours
  - Parallel Ocean Program (POP) running 50% faster per CPU than the Earth Simulator
  - 1TF Sustained performance on an unstructured finite element method-based fluid dynamics application
  - NASA CFD code run on single cabinet Cray X1 can accomplish work which used to take a week, in a single day.

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X1 System Installation Statistics

- **Over 20 Cray X1 systems installed in all major geographies**

- **System size ranges from 16-256 MSPs with an average of 64**

- **System types:**
  Liquid Cooled: 14
  Air Cooled: 7

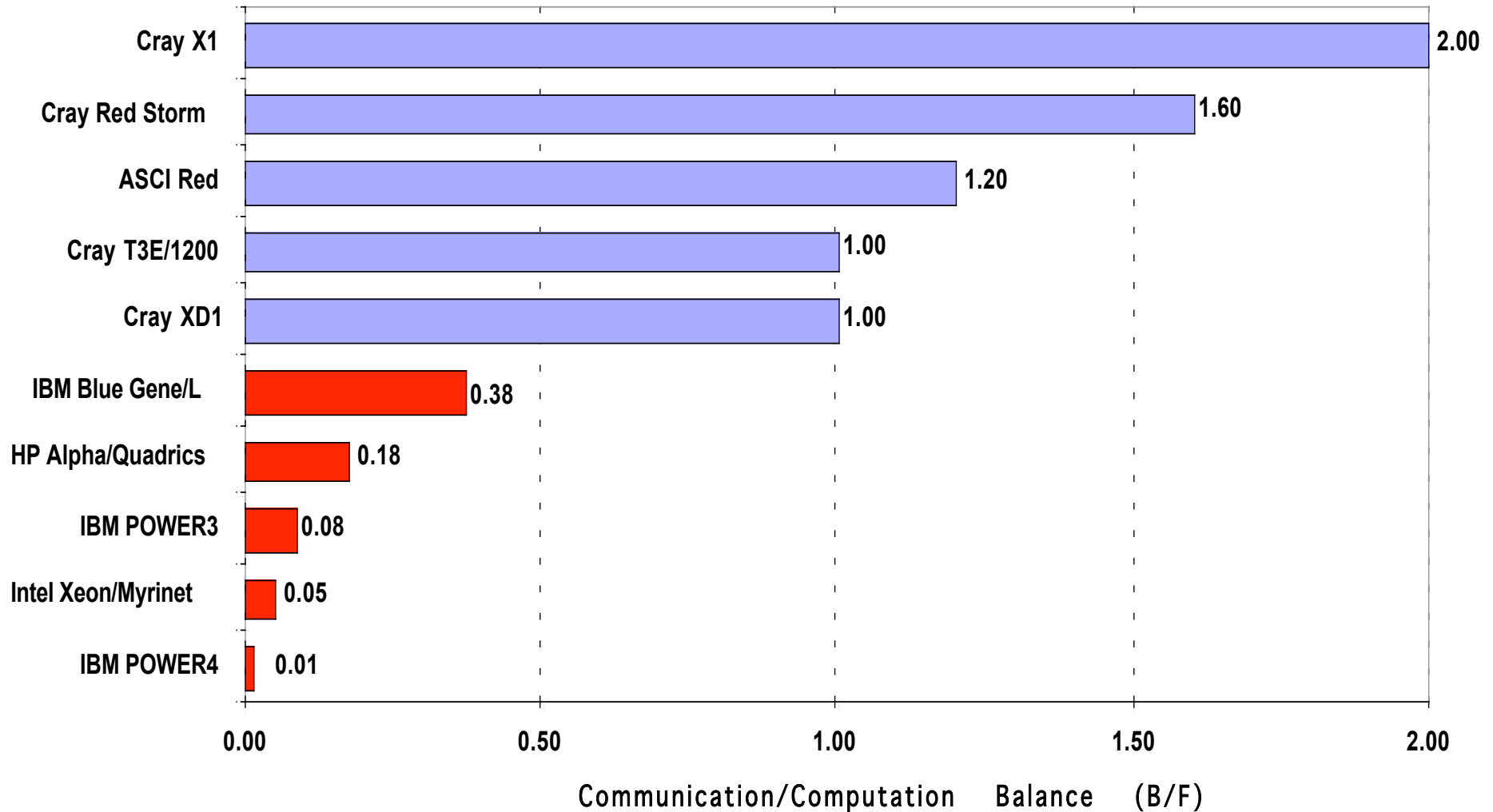- **Geographic:**
  Americas: 15
  EMEA: 4
  Asia/Pacific: 2

*** Data based on systems installed at customer sites and which have passed acceptance as of April 28, 2004.*

Diverging Market Approaches

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Differentiated Products

Cray RS/Strider

Cray X1

Cray XD1

High Performance Computing

NEC SX-series

Intel Itanium

Sun SPARC

IBM POWER

Intel IA-32-based

AMD Opteron-based

Commodity Clusters

Market centering around two philosophies with different goals

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High Bandwidth Computing

Interconnect Balance Ratio

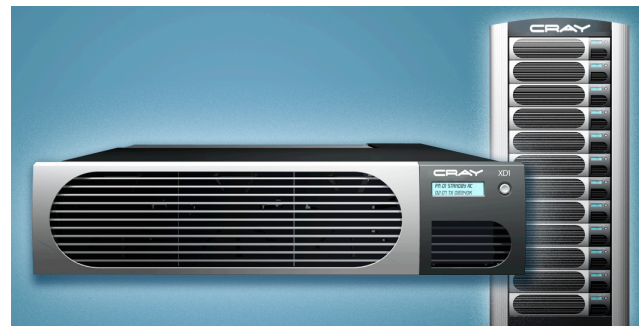| System	Ratio
Cray X1	2.00
Cray Red Storm	1.60
ASCI Red	1.20
Cray T3E/1200	1.00
Cray XD1	1.00
IBM Blue Gene/L	0.38
HP Alpha/Quadrics	0.18
IBM POWER3	0.08
Intel Xeon/Myrinet	0.05
IBM POWER4	0.01

Communication/Computation Balance (B/F)

Cray offers purpose-built, balanced HPC solutions

Cray XD1 Systems

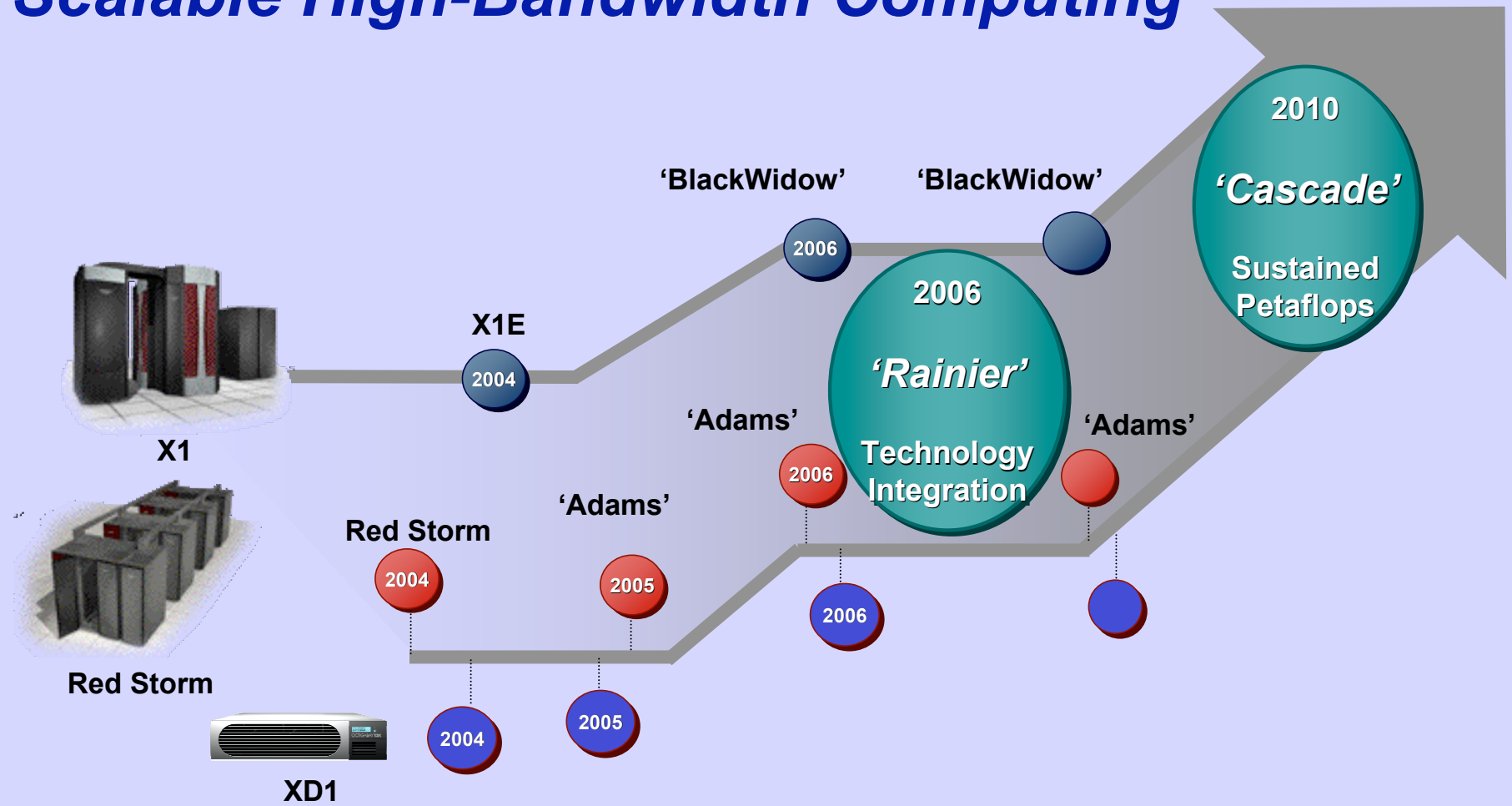- ## First Alpha-level system shipped!
  - First set of applications being run now

- ## Beta-site Program
  - First few customers signed up
  - Wide set of disciplines from science to finance
  - Shipments starting in June/July
  - FPGA beta support expected in late summer

- ## Formal product announcement and general availability targeted for the second half of 2004

Cray's Vision…

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Scalable High-Bandwidth Computing

X1

Red Storm

XD1

X1E
2004

Red Storm
2004

'Adams'
2005

2004

2005

'BlackWidow'
2006

'Adams'
2006

2006
'Rainier'
Technology Integration

2006

'BlackWidow'

'Adams'

2010
'Cascade'
Sustained Petaflops

"Rainier" Project

- **Common platform for Cray products**
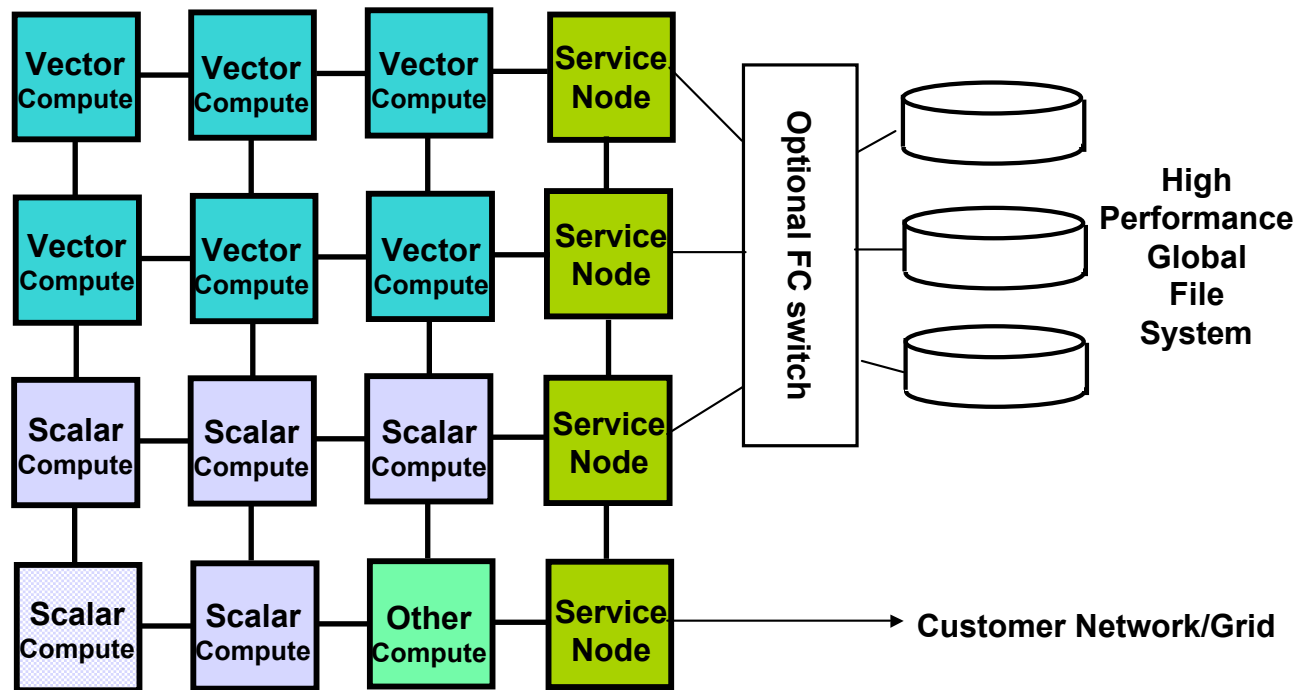

"Highest peak on the Cascade Mountain Range"

"Rainier" Project

- **Common platform for Cray products**
  - Common software environment on a linux-based operating system
  - Unified hardware infrastructure with heterogeneous compute resources
  - High speed interconnect network
  - Single interface for both users and admin's (ease of use)
  - Single global address space

Cray….We're Back!!

- Dedicated solely to the high-performance computing market

- Leader in HPC performance and innovation

- Well defined, integrated product roadmap purpose-built for HPC and high bandwidth

- World-class service and support organization

- Over 30 years experience in the supercomputing industry