

CCR User Advisory Board Meeting January 2005

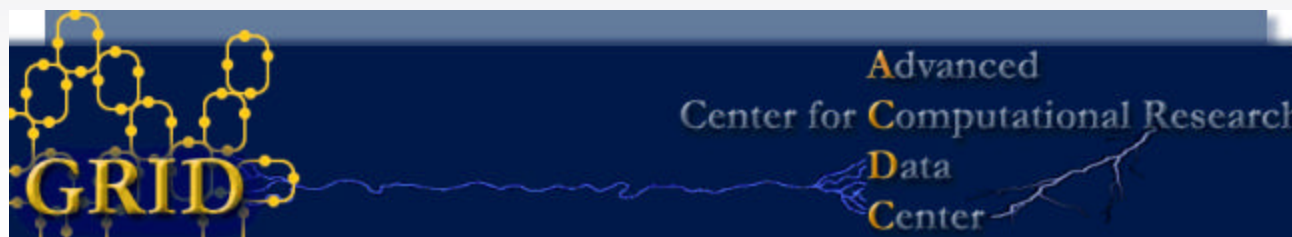
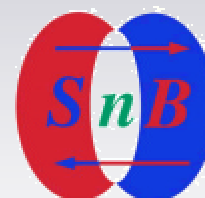
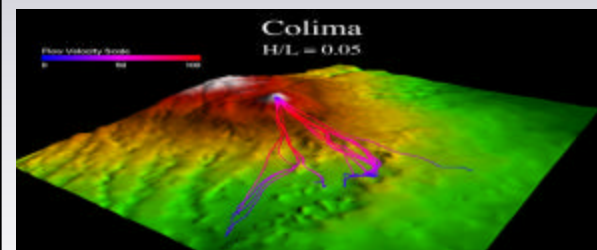
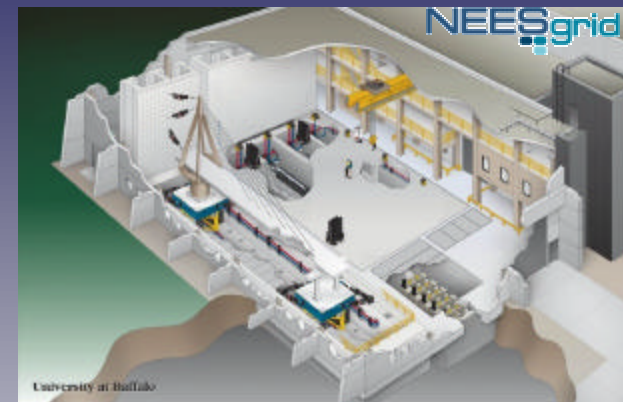
Russ Miller

Center for Computational Research

Computer Science & Engineering

SUNY-Buffalo

Hauptman-Woodward Medical Inst



University at Buffalo

The State University of New York

Organization

- **Internal Advisory Committee**
 - Innus, Nowak, Pitman, Trevisan
- **Education/Outreach**
 - Pitman, Furlani
- **Colloquia, Training, User Services**
 - Patra, Furlani, Hu, Jones, King
- **Allocations**
 - Coppens, Jankovic, Patra
- ***User Advisory Board***
 - Kofke, Bisantz, Bursik, Coppens, DesJardin, Gaile, Halfon, Han, Jain, Jankovic, Lund, Markelz, Patra, Rabideau, Sheridan, Szyperski, Weeks, Yao, Zubrow
 - Includes Visualization Personnel (below)
- **Visualization**
 - Pape, Anstey, Hoffman, Kesavadas, Paley

User Advisory Board

- **Input on Hardware Requirements/Expenditures**
 - ❑ Compute Systems (processors, memory, disk, interconnects)
 - ❑ Storage Systems (latency, throughput, size, backups)
 - ❑ Grid Infrastructure (applications, local/global access)
 - ❑ Visualization (compute, display, storage, frame rates)
- **Input on Software**
 - ❑ General Audience (queueing, compilers, debugging, parallel)
 - ❑ Narrow Audience (domain specific packages)
- **Input on Allocation of Resources**
 - ❑ Hardware (cycles)
 - ❑ Software (floating licenses)
 - ❑ Personnel (time)
- **Input on Allocation of Funds**
- **Acquisition of Funds**
 - ❑ Grants, Contracts, Lobbying

21st Century University

- **Embrace digital data-driven society**
- **Empower students to compete in knowledge-based economy**
- **Support research, scholarship, education, and community outreach**
- **Deliver *high-end cyberinfrastructure* to enable efficient**
 - **Collection of data**
 - **Management/Organization of data**
 - **Analysis of data**
 - **Visualization of data**

CCR Mission Statement

- In areas that require high-end computing, storage, networking (grid), and visualization:
 - *Enable* Research and Scholarship
 - *Provide* Education, Outreach and Training
 - *Provide* Technology Transfer to WNY community

- In order to *enable* and *provide* critical high-end infrastructure
 - CCR staff must be knowledgeable of HPC
 - CCR staff must be involved with the HPC community
 - CCR staff must work at the leading edge of HPC

Center for Computational Research 1999-2005 Snapshot

■ High-Performance Computing and High-End Visualization

- ❑ ~100 Research Groups in 37 Depts
- ❑ 13 Local Companies
- ❑ 10 Local Institutions

■ External Funding (\$300M+)

- ❑ \$169M External Funding
 - \$18M as lead
 - \$151M in support
- ❑ \$144M Vendor Donations

■ Total Leveraged WNY: \$0.5B

■ Deliverables

- ❑ 400+ Publications 1/2003
- ❑ Software, Media, Algorithms, Consulting, Training, CPU Cycles...

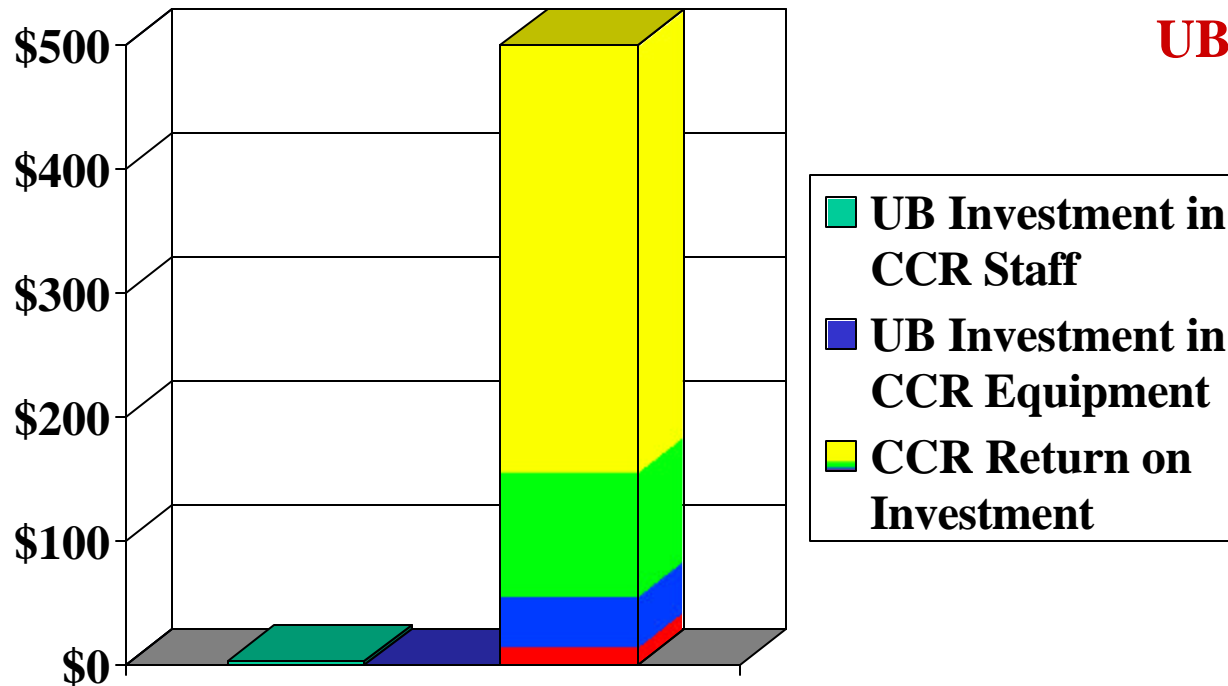


Return on Investment 1998-2005

Millions

UB's total investment in CCR: \$7M

UB's ROI: \$300M



White House: "Give HPC Priority"

"While the importance of each networking and IT research and development program areas continues, **high-end computing and cyberinfrastructure R&D should be given higher relative priority due to the potential of each in furthering progress across a broad range of scientific and technological application areas...**"

CCR-Supported Research at UB

■ Physical Sciences

- ❑ Autschbach (Chem), Coppens (Chem), Errington (CBE), Furlani (CCR), Han (Physics), Jones (CCR), King (Chem), Kinney (Physics), Kofke (CBE), Lund (CBE), Markelz (Physics), Ruckenstein (CBE), Sen (Physics), Swihart (CBE), Szyperski (Chem)

■ Life Sciences

- ❑ Almon (Biology), Andreadis (Chem Eng), Beal (CSE), DeTitta (Structural Biology), Halfon (Biochemistry), Gaile (Biostatistics), Hu (CCR), Hauptman (Structural Biology), Koffas (Chem Eng), Miller (CSE), Murphy (Medicine), Nowak (RPCI), Sullivan (Ophthalmology), Szyperski (Chem), Trevisan (Public Health), Weeks (Structural Biology), Willsky (Biochemistry), Zhang (CSE), Zhou (Physiology and Biophysics)

■ Engineering

- ❑ Atkinson (CSEE), Aref (CSEE), Bisantz (IE), Becker (Geology), Bucher (CCR), Bursik (Geology), Cartwright (EE), Dargush (CSEE), DesJardin (MAE), Flewelling (Geography), Green (CCR), Jankovic (CSEE), Jayaraman (CSE), Jones (CCR), Llinas (IE), Madnia (MAE), Nagi (IE), Patra (MAE), Pitman (Math), Qiao (CSE), Rabideau (CSEE), Reinhorn (CSEE), Sheridan (Geology), Singh (MAE), Upadhyaya (CSE), Zubrow (Anthropology)

■ Scientific Visualization, Medical Imaging, Virtual Reality

- ❑ Ansty (Media), Baker (Nuclear Med), Evans (Oral Bio), Geffan (Oral Bio), Hoffmann (Nuclear Med), Innus (CCR), Jones (CCR), Kesavadas (MAE), Lockwood (Neurology, Nuclear Med), Miletich (Nuclear Med), Pape (Media), Paley (Classics), Yao (Nuclear Med)



Major Compute/Storage Resources

- **Dell Linux Cluster (Joplin)**
 - ❑ #22® #25® #38® #95® #123
 - ❑ 600 P4 Processors (2.4 GHz)
 - ❑ 600 GB RAM; 40 TB Disk; Myrinet
 - ❑ *Maintenance Expires 9/2005*
- **SGI Altix3700 (Lennon/McCartney)**
 - ❑ 64 Processors (1.3GHz ITF2)
 - ❑ 256 GB RAM
 - ❑ 2.5 TB Disk
- **SGI Intel Linux Cluster (Nash)**
 - ❑ 150 PIII Processors (1 GHz)
 - ❑ Myrinet
- **SGI Origin3800 (Hillman)**
 - ❑ 64 Processors (400 MHz)
 - ❑ 32 GB RAM; 400 GB Disk
- **IBM RS/6000 SP (Stills): 78 Processors**
- **Sun Cluster (Young): 80 Processors**
- **Apex Bioinformatics System**
 - ❑ Sun V880 (3), Sun 6800
 - ❑ Sun 280R (2)
 - ❑ Intel PIIIs
 - ❑ Sun 3960: 7 TB Disk Storage
 - ❑ *UB: Off Maint & Mng Srv*
- **HP/Compaq SAN**
 - ❑ 75 TB Disk; 190 TB Tape
 - ❑ 64 Alpha Processors (400 MHz)
 - ❑ 32 GB RAM; 400 GB Disk
 - ❑ *UB: Outyear Costs not Covered*
- **Dell Linux Cluster: #187® #368® off**
 - ❑ 4036 Processors (PIII 1.2 GHz)
 - ❑ 2TB RAM; 160TB Disk; 16TB SAN
- **IBM BladeCenter Cluster: #106® #152**
 - ❑ 532 P4 Processors (2.8 GHz)
 - ❑ 5TB SAN

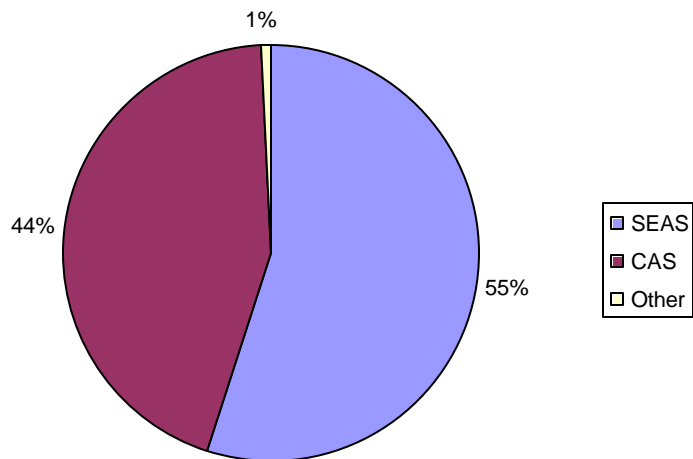
CCR Visualization Resources

- **Fakespace ImmersaDesk R2**
 - Portable 3D Device
- **Tiled-Display Wall**
 - 20 NEC projectors: 15.7M pixels
 - Screen is 11' ´ 7'
 - Dell PCs with Myrinet2000
- **Access Grid Nodes (2)**
 - Group-to-Group Communication
 - Commodity components
- **SGI Reality Center 3300W**
 - Dual Barco's on 8' ´ 4' screen

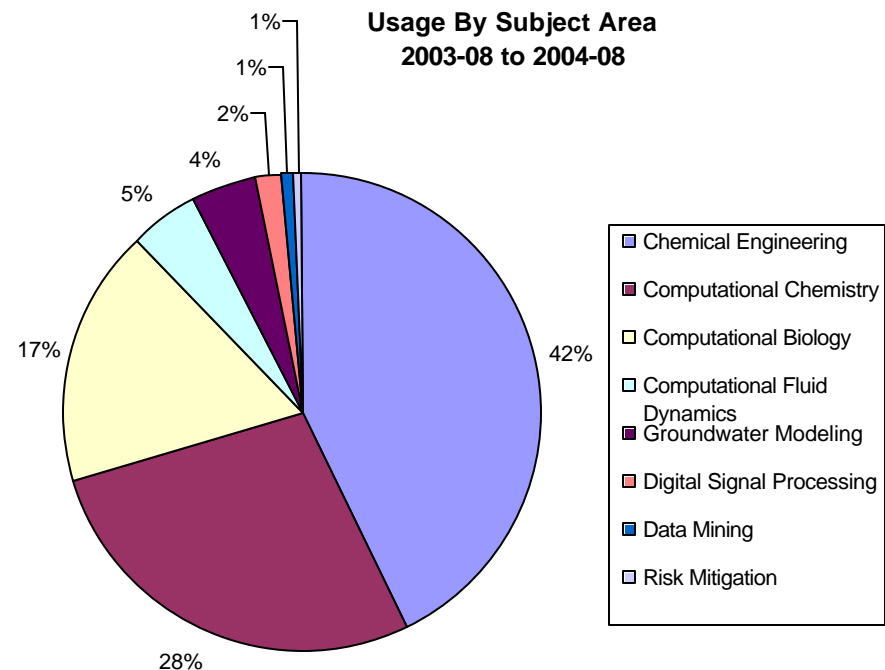


Machine Utilization

Usage By Decanal Unit
2003-08 to 2004-08



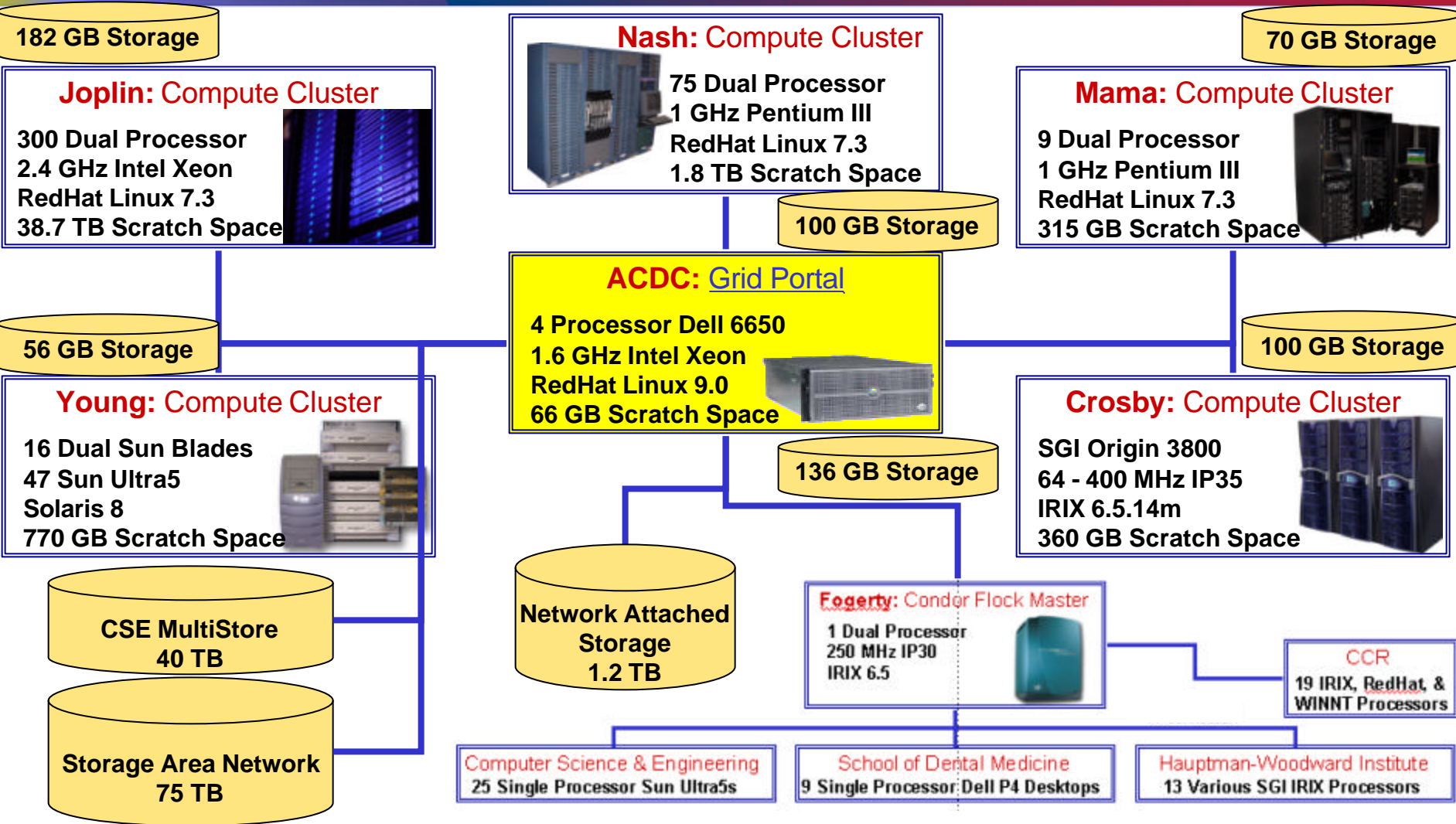
Usage By Subject Area
2003-08 to 2004-08



100 User Groups in 37 Departments

ACDC Data Grid Overview

(Grid-Available Data Repositories)



ACDC-Grid Collaborations

- **Grid3+ Collaboration / iVDGL Member**
- **Open Science Grid Founding Participant**
 - **Monitoring & Information Services, co-chair**
 - **Security, Tech Working Group Participant**
- **WNY Grid Initiative**
- **Grid-Lite**
 - **HP Labs Collaboration**
- **Innovative Laboratory Prototype**
 - **Dell Collaboration**
- **NE Bio-Grid**
 - **IBM Research Collaboration**
 - **MIT, Harvard**
- **Grid-Based Visualization**
 - **SGI Collaboration**



CCR by the Numbers

■ 15 ® 13? Technical Staff

- ❑ Associate Director
- ❑ Computational Scientist (4)
- ❑ Database Administrator
- ❑ Scientific Visualization
- ❑ System Administration (5)
- ❑ Storage Area Network Admin
- ❑ Programmer
- ❑ Multimedia

■ 3 Support Staff

- ❑ Financial/Contracts (2)
- ❑ Receptionist

■ Annual Personnel: \$1.2M

■ Annual Operating: \$0.1M

■ Annual Expend: ~\$2.4M

■ Opportunistic Funding Model

■ Decommissioned

- ❑ Crosby, Stills, Young

■ Joplin/Nash Upgrades due 7/2003

- ❑ \$2.3M funds avail; not allocated

■ SGI Altix installed 5/2004

■ Visualization Equipment

- ❑ \$0.8M+ from NYS; not allocated

■ BioACE off maintenance

■ HP SAN available

- ❑ Users responsible for outyear costs

■ Space for Viz available

- ❑ not allocated

