"From Supercomputing to the Grid"

Invited Talk at SGI Booth,
Supercomputing '98
Orlando, Florida,
November 10,1998

Dr. Larry Smarr

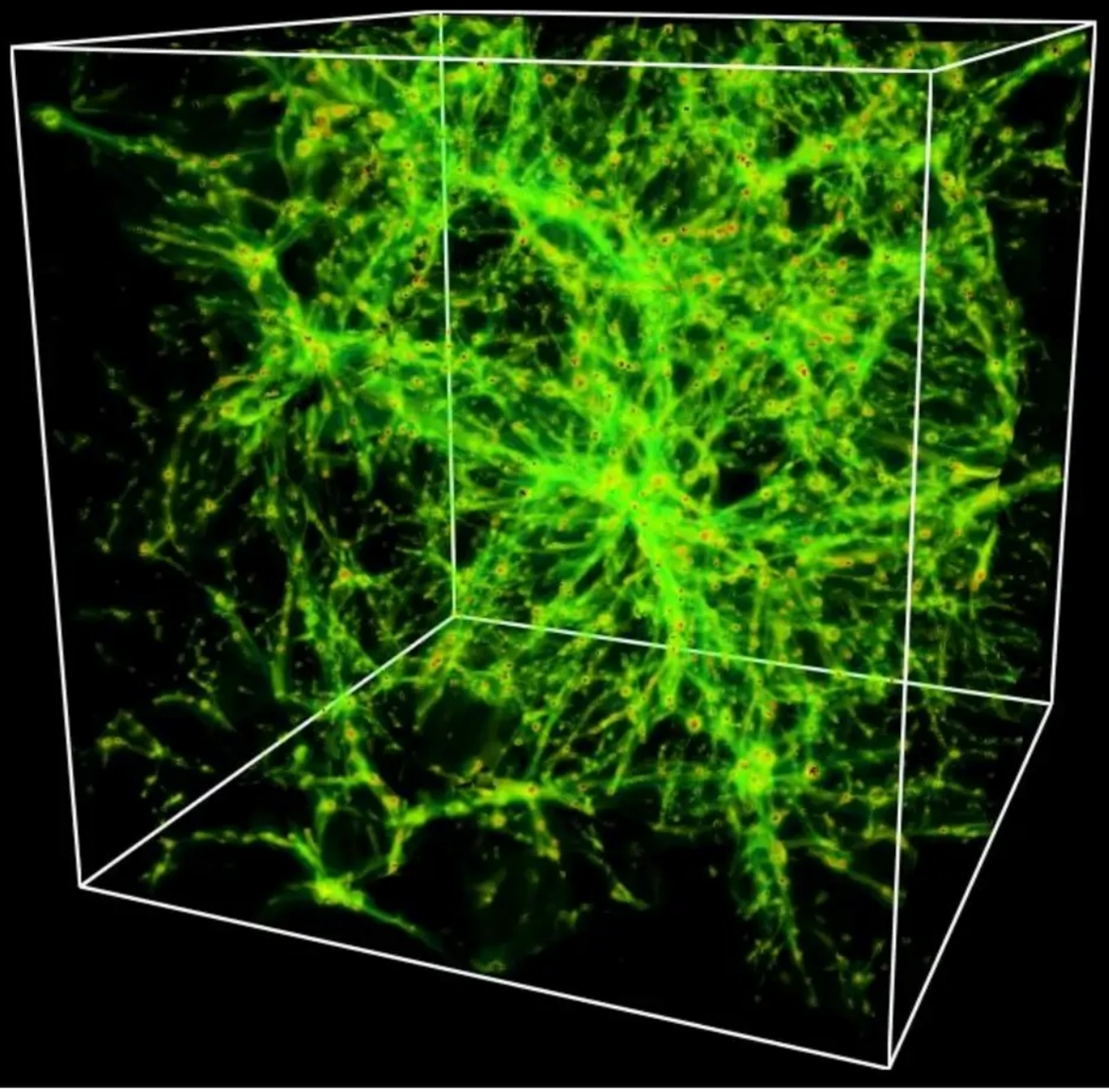
Director, National Computational Science Alliance and the National Center for Supercomputing Applications

Professor in the Departments of Physics and Astronomy

University of Illinois Urbana-Champaign

Discovery Science Using the SGI Origin

Where Are All the Baryons?



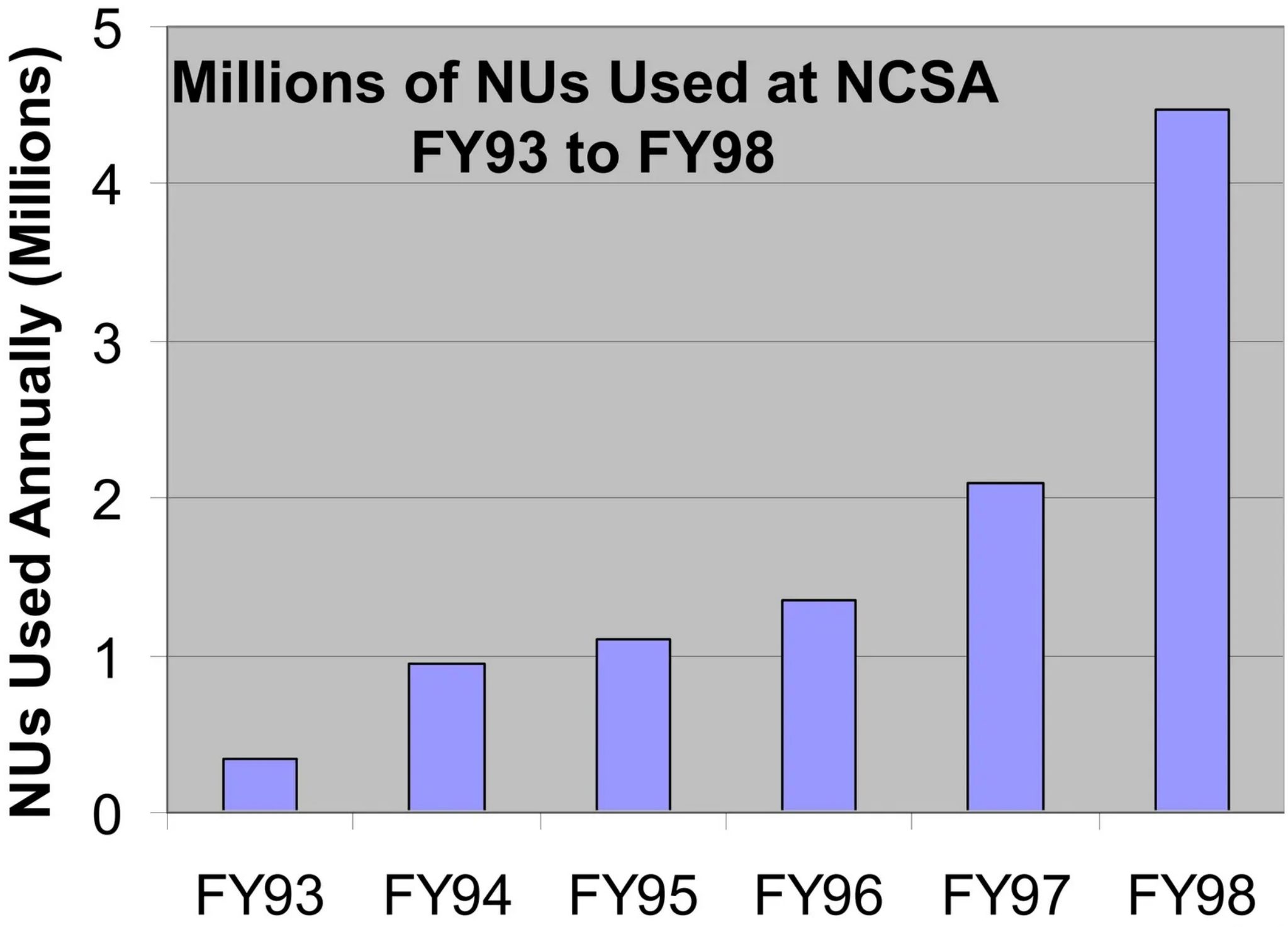
- Ostriker and Cen,Princeton
- Coupled Gaseous Matter and Dark Matter Simulation
- Gas Shocks and Remains at 0.1-10 Million Degrees-50% of Baryons!
- Explains Lyman Alpha Forest Observations
- FY99-
  - Adaptive Grids on Origin
    - Links to CS Teams
  - Create the "Cosmic Web"
    - Simulation Archive
    - Workbench Interface
    - Integration with Observed Data

Science 6/26/98; Science News 6/20/98

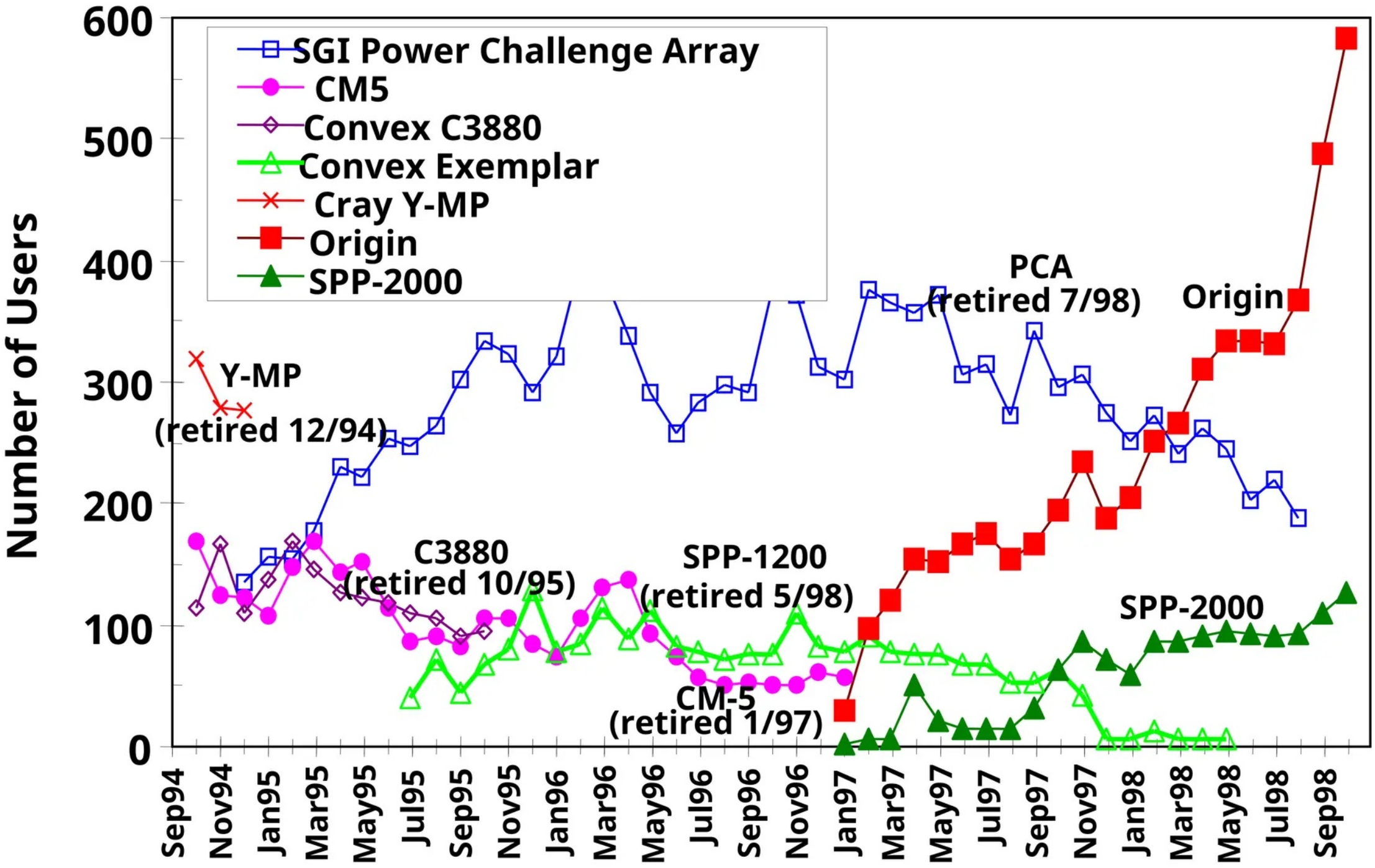
From General Relativity to Global Risk Management - JP Morgan Hero Calculation

- HPC Strategic Business Analysis
- Calculations Used 128-Processor SGI Origin
  - Two Week Period in January 1998
  - NCSA and SGI Doubled Memory in a Week
- Extended JPM's Risk Management Capabilities
- Hundreds of Market Scenarios Simulated
- NCSA, Strategic Vendor, Industrial Partner
  - Existing Relationships Facilitated Quick Startup
  - Win-Win-Win Result

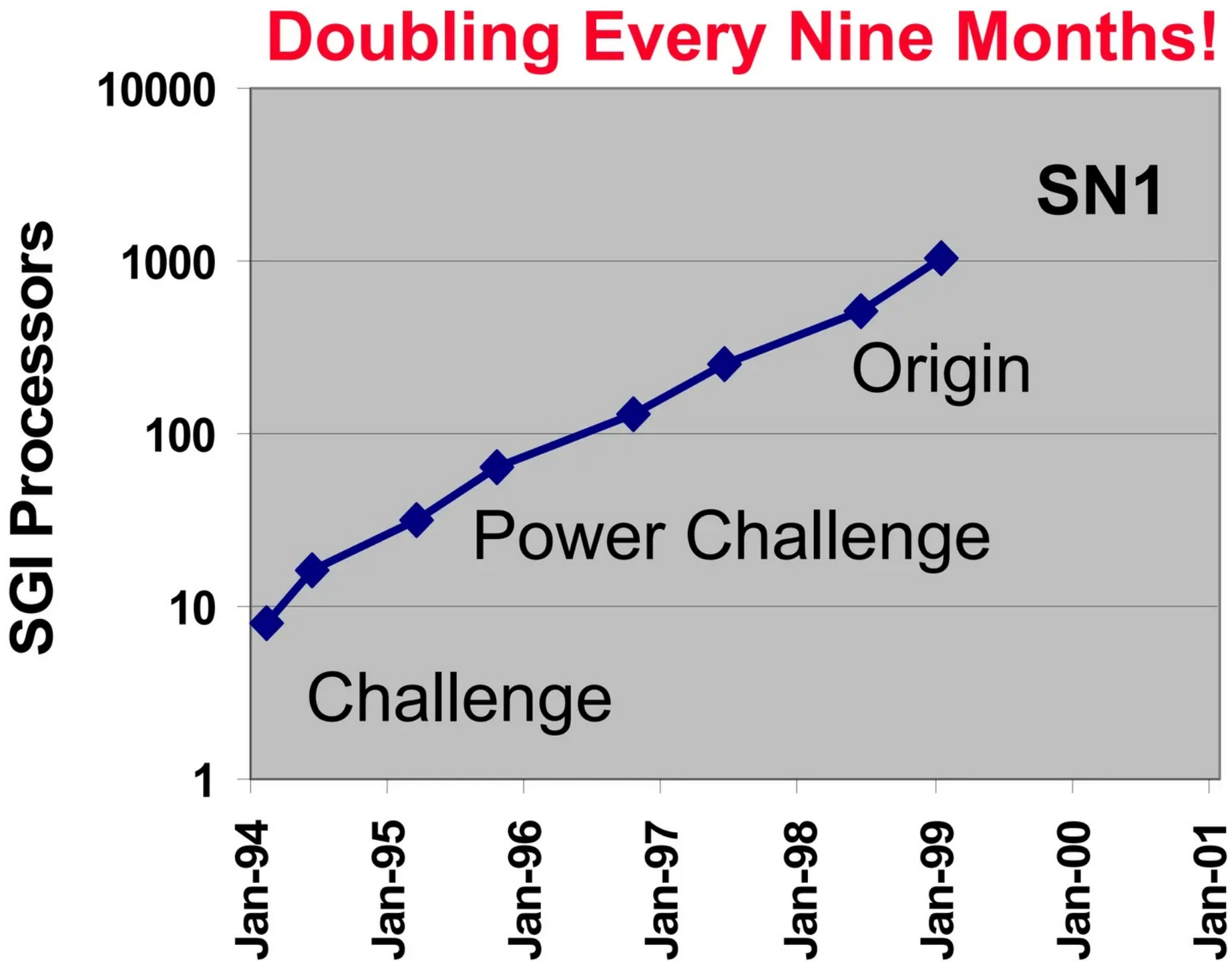
The Rapid Increase in High End Capacity at NCSA



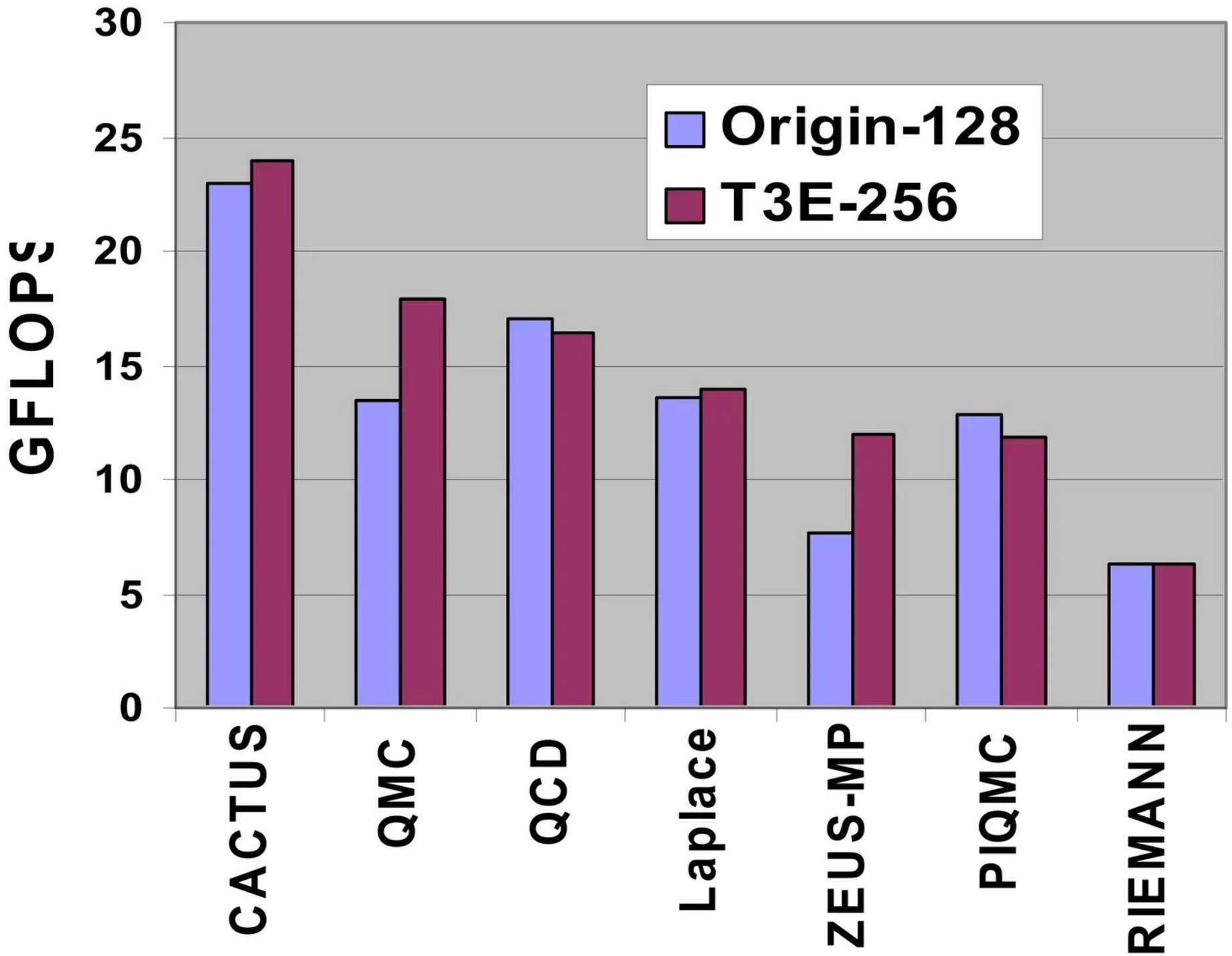
The Takeoff in Origin Users at NCSA



NCSA is Combining Shared Memory Programming with Massive Parallelism

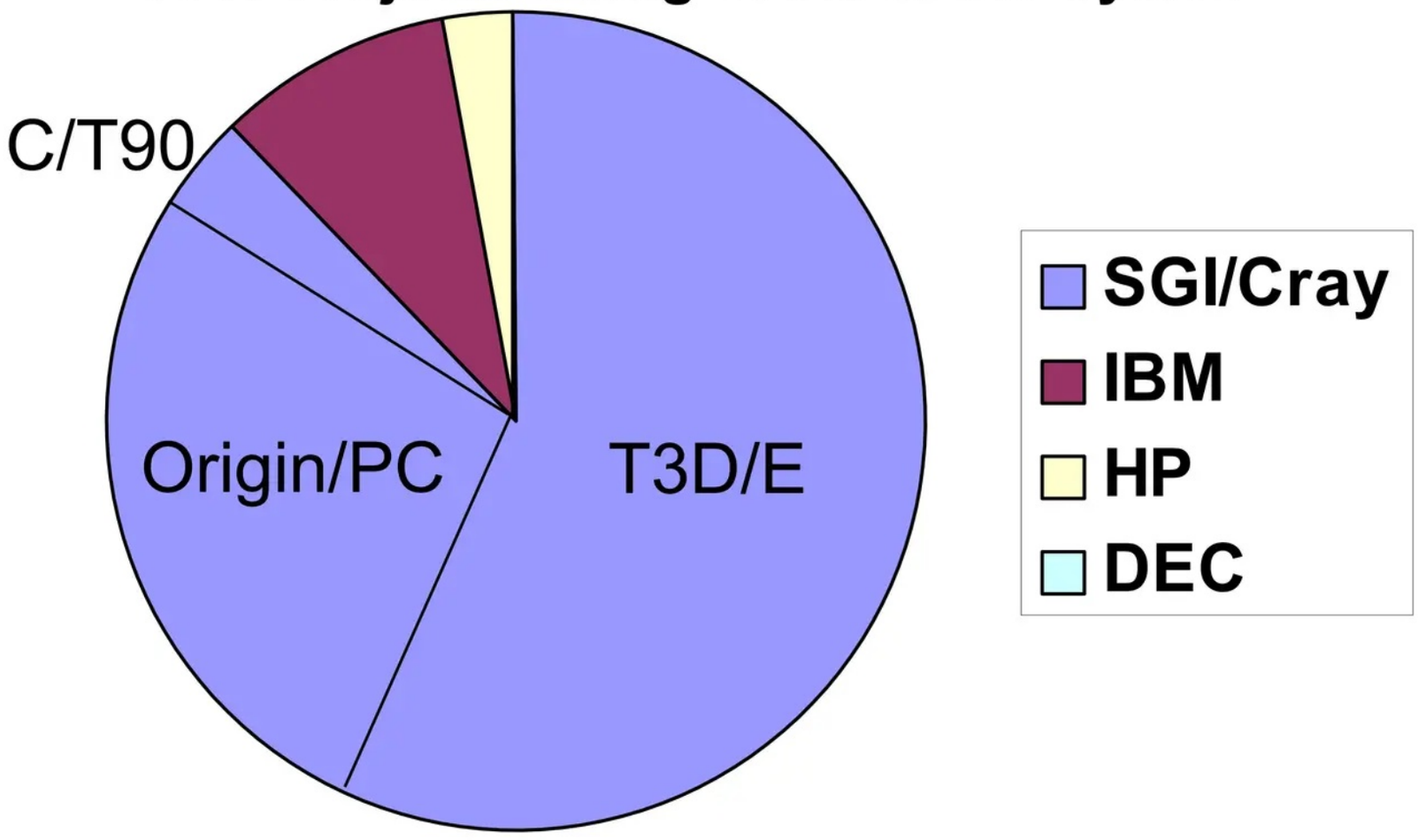


Preparing for the Migration From T3E and Origin to SGI SN1



Cycles Used by NSF Community at the NSF Supercomputer Centers by Vendor

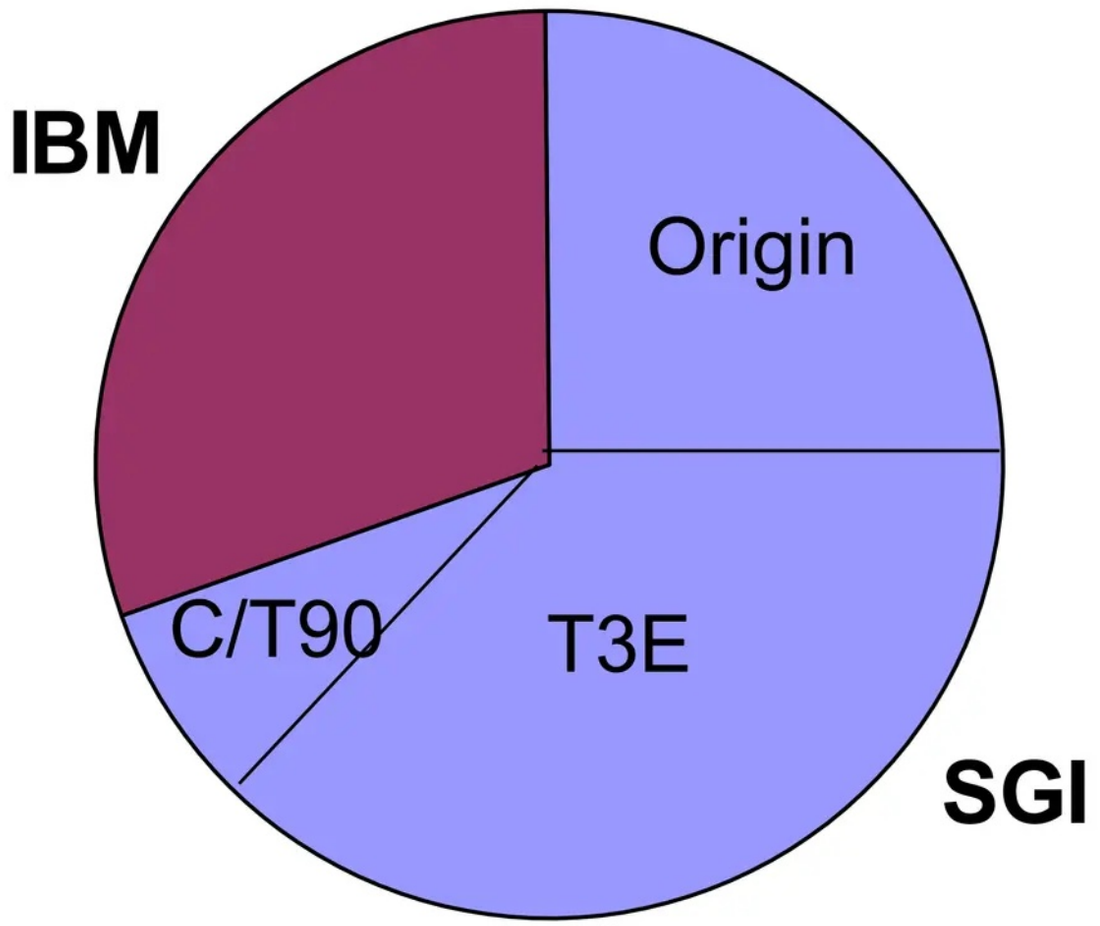
June 1, 1997 through May 31, 1998
CTC, NCSA, PSC, SDSC
1019 Projects Using 100% of the Cycles



SGI SN1 is the Natural Upgrade for 84% of Cycles!

SGI Dominates High End Computing

Resources Available in the DOD Modernization Major Shared Resource Centers



Unclassified Access
Normalized Units

SGI Partners with NCSA as a Leading Edge Origin Development Site

- First Origin Delivered 10/2/96
- First Metarouter at Customer Site
- First 64 and 128 Single Memory Image
- First Multiple 64 Single Application
- First Linpack Over Multiple 128 Origin
- First IRIX 6.5 Alpha
- First WAN LSF Job Sharing

On to the SN1 -- Both MIPS and IA-64 Versions!

Alliance Boston University Origin Repository

BOSTON UNIVERSITY

SGI-Cray Origin2000 Supercomputer Repository

This web page is established and maintained by the Scientific Computing and Visualization Group, Office of Information Technology, Boston University, to serve as a repository for information pertaining to the Silicon Graphics' Origin2000 parallel supercomputer that was first unveiled in October, 1996. The objectives of this repository are to aid in the dissemination of information, provision of training material, as well as to serve as a forum for idea-exchange and experience-sharing amongst users of all levels. Readers who feel that they have experiences on the Origin 2000 that could benefit others are encouraged to *contribute to this Page* .



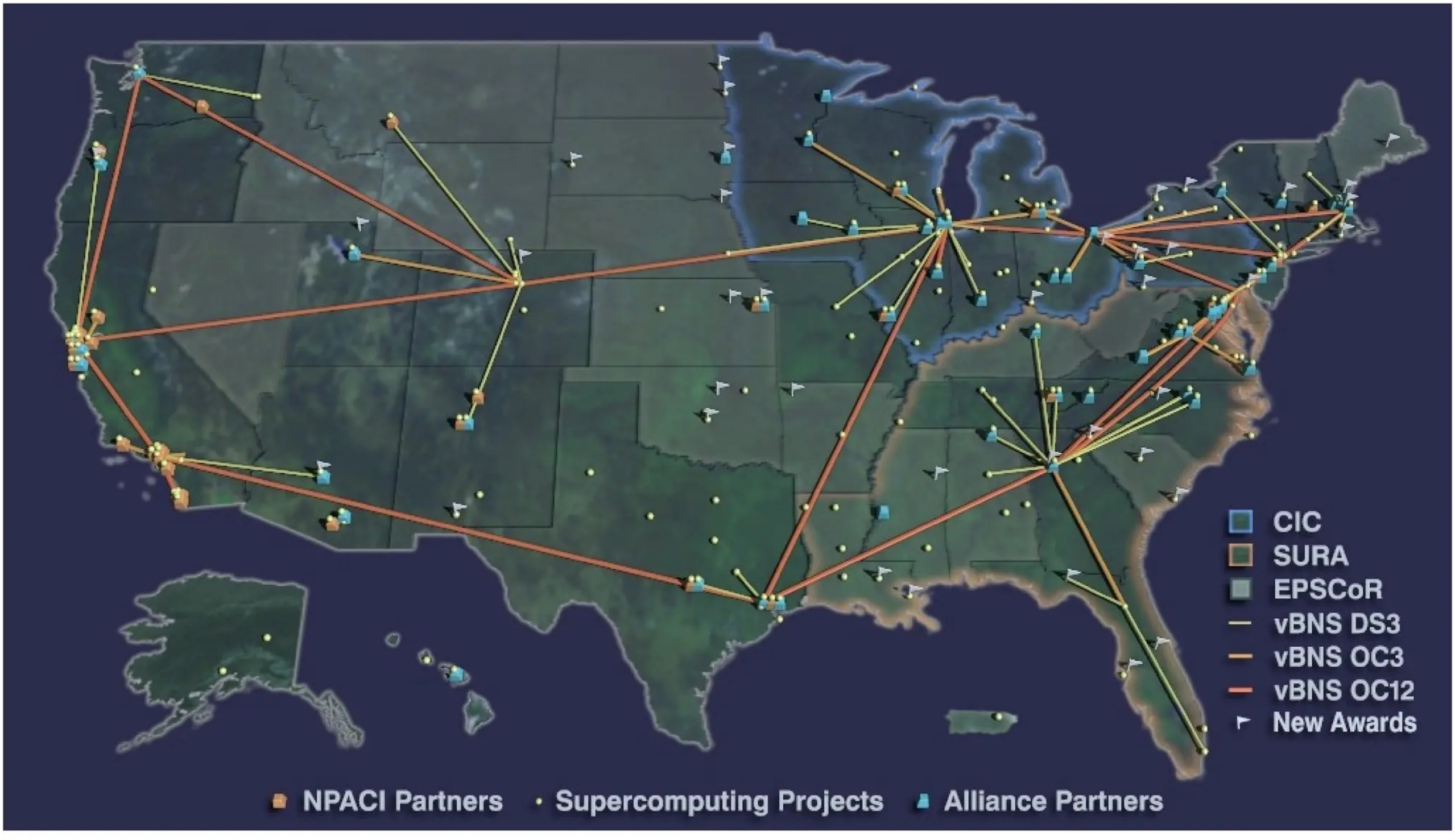
Please feel free to *send* comments, suggestions, as well as post/answer questions pertaining to the Origin 2000 software and hardware to the Cocoboards.

ANNOUNCEMENTS:

The second Cray User Group Origin2000 Workshop will be held in Denver, Colorado beginning on Sunday, October 11 and ending at noon on Tuesday, October 13, 1998.

NCSA™
National Computational Science Alliance

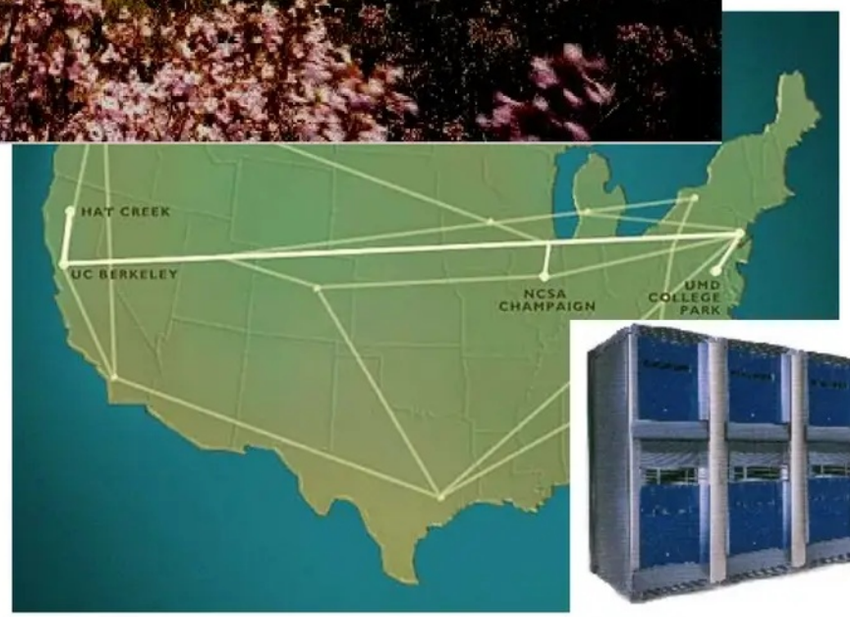
NSF PACI Program
Prototyping the 21st Century Grid



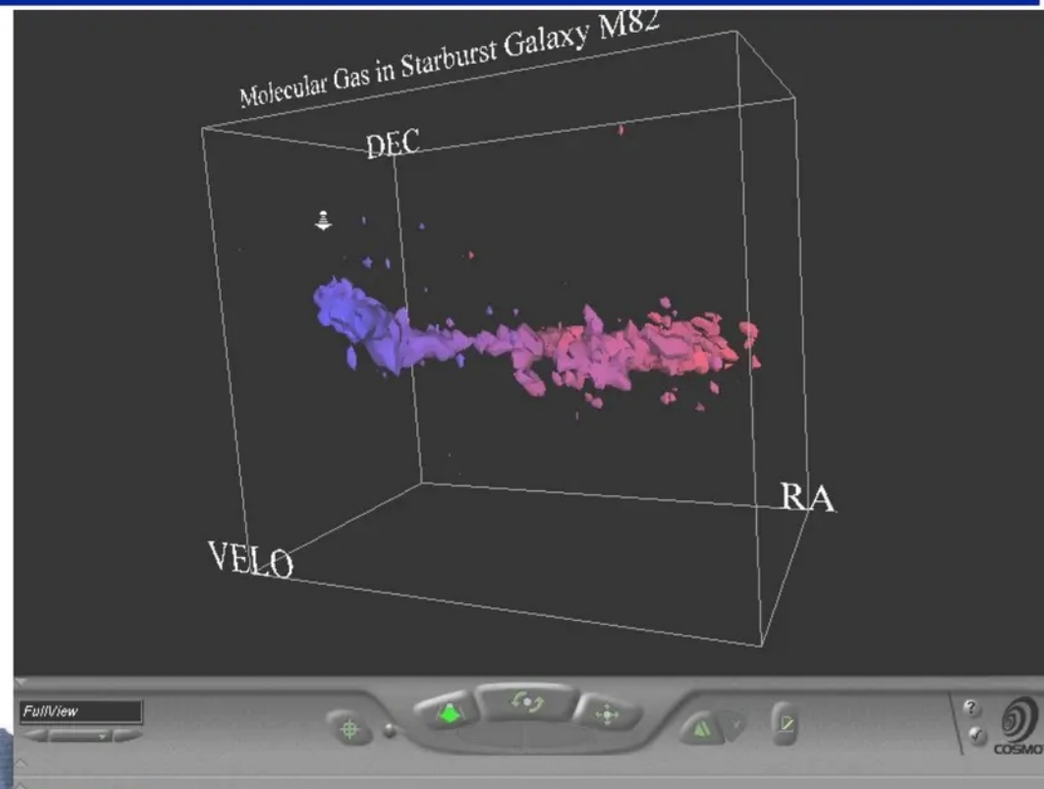
National Computational Science Alliance

The Grid Links Remote Sensors With Supercomputers, Controls, & Digital Archives







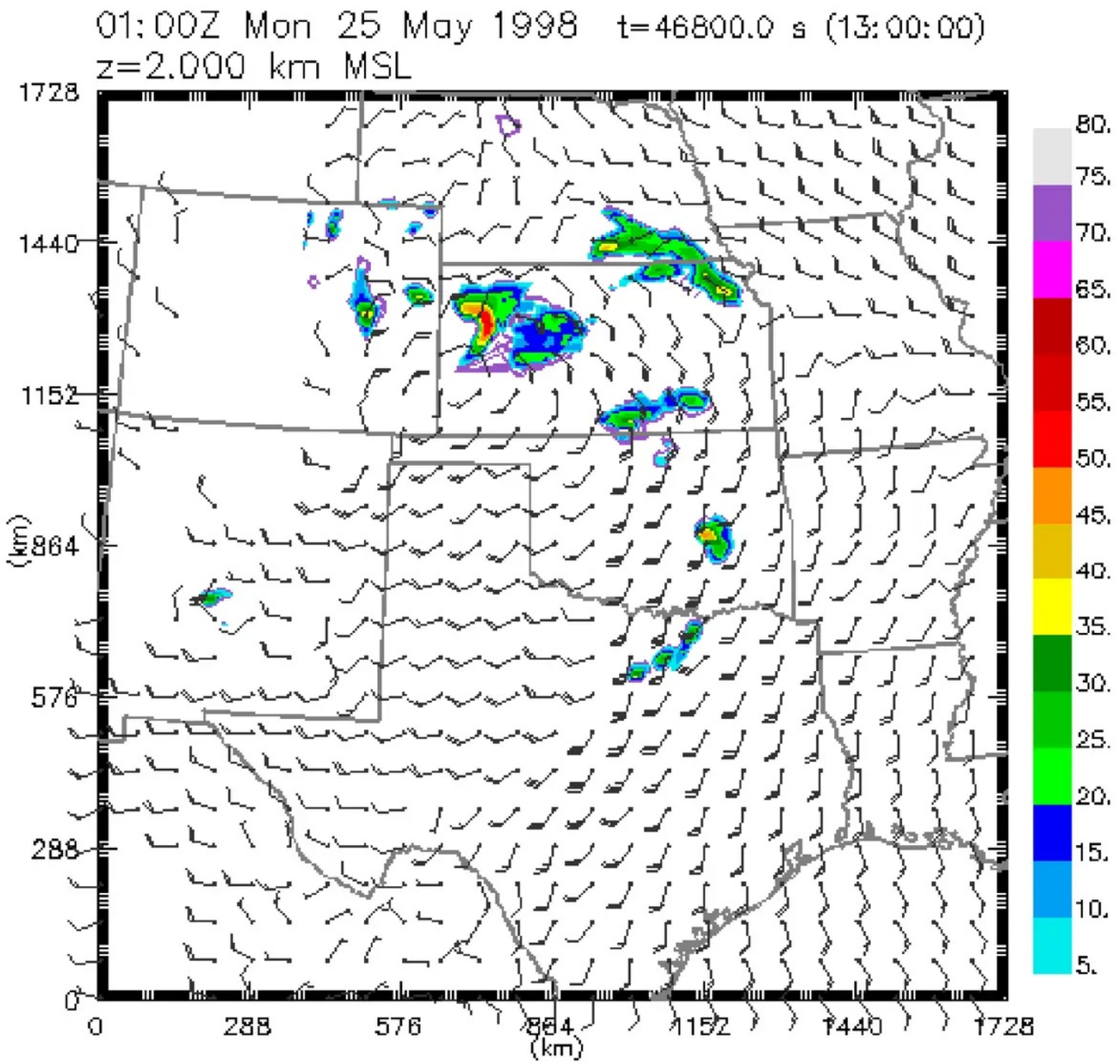


Starburst Galaxy M82

- Creating Remote Super Telescopes
  - BIMA and NRAO
  - Collaborative Web Interface
  - Real Time Control and Steering

Storm and Mesoscale Ensemble Experiment 1998 - Center for Analysis and Prediction of Storms

Kelvin Droegemeier, Director, CAPS



CAPS Collaborators:
NCAR
NSSL
AFWA
NCEP

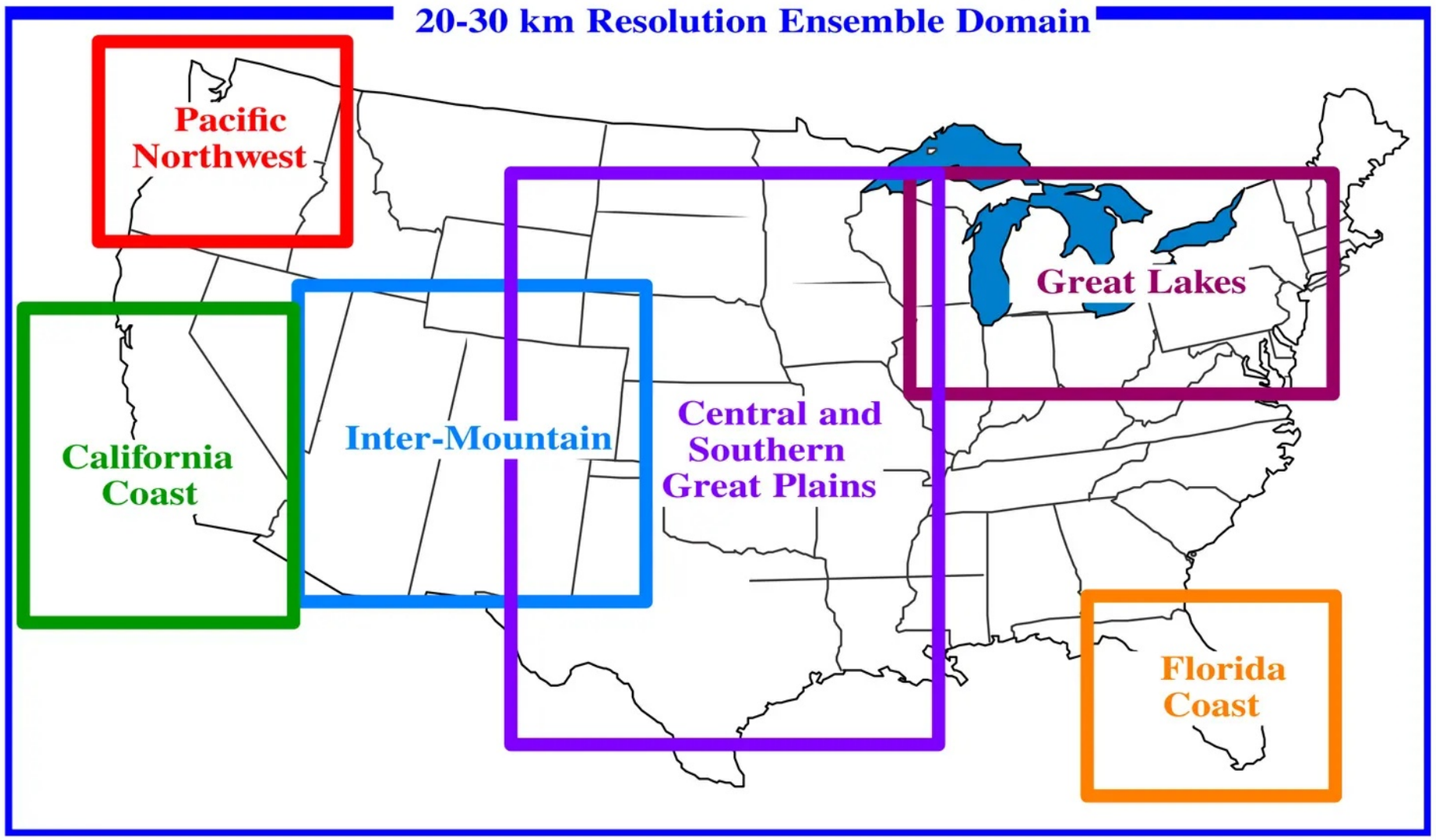
Ran on PSC T3D-512

http://origin.caps.ou.edu/~samex/arps/19980524/12Z_nc9/13h/refl-2km.gif

SAMEX 1999 and Beyond -- A Grid Based Computational Science Experiment

- LES and Regional Models Running Concurrently
- Local NEXRAD Doppler Radars to Initialize Models
- Models Accessed Over Web by Airlines, Agencies

NCSA Requirement: 5 Hr./day on Origin 128 for 2 Months Spring '99

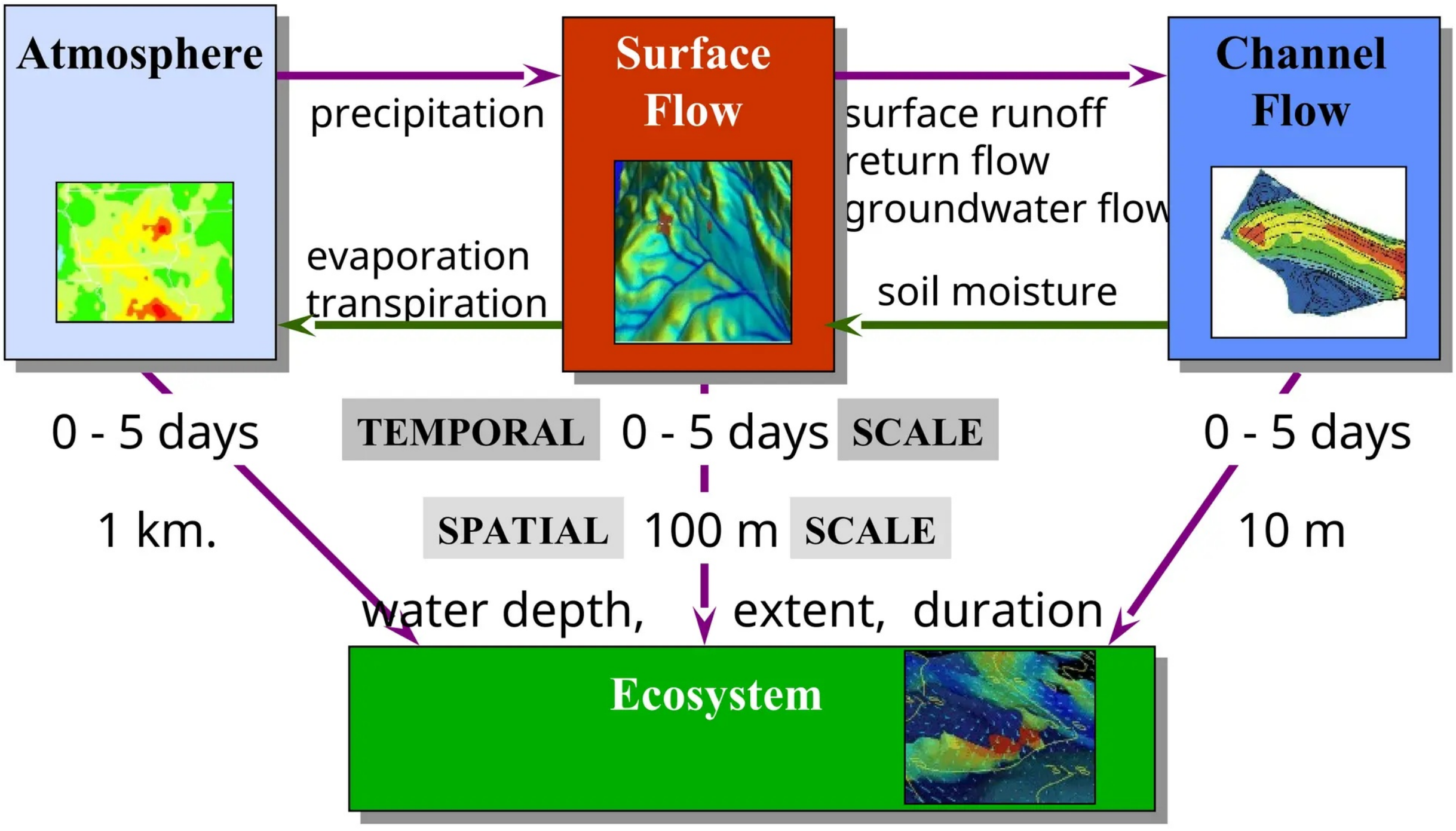


CAPS

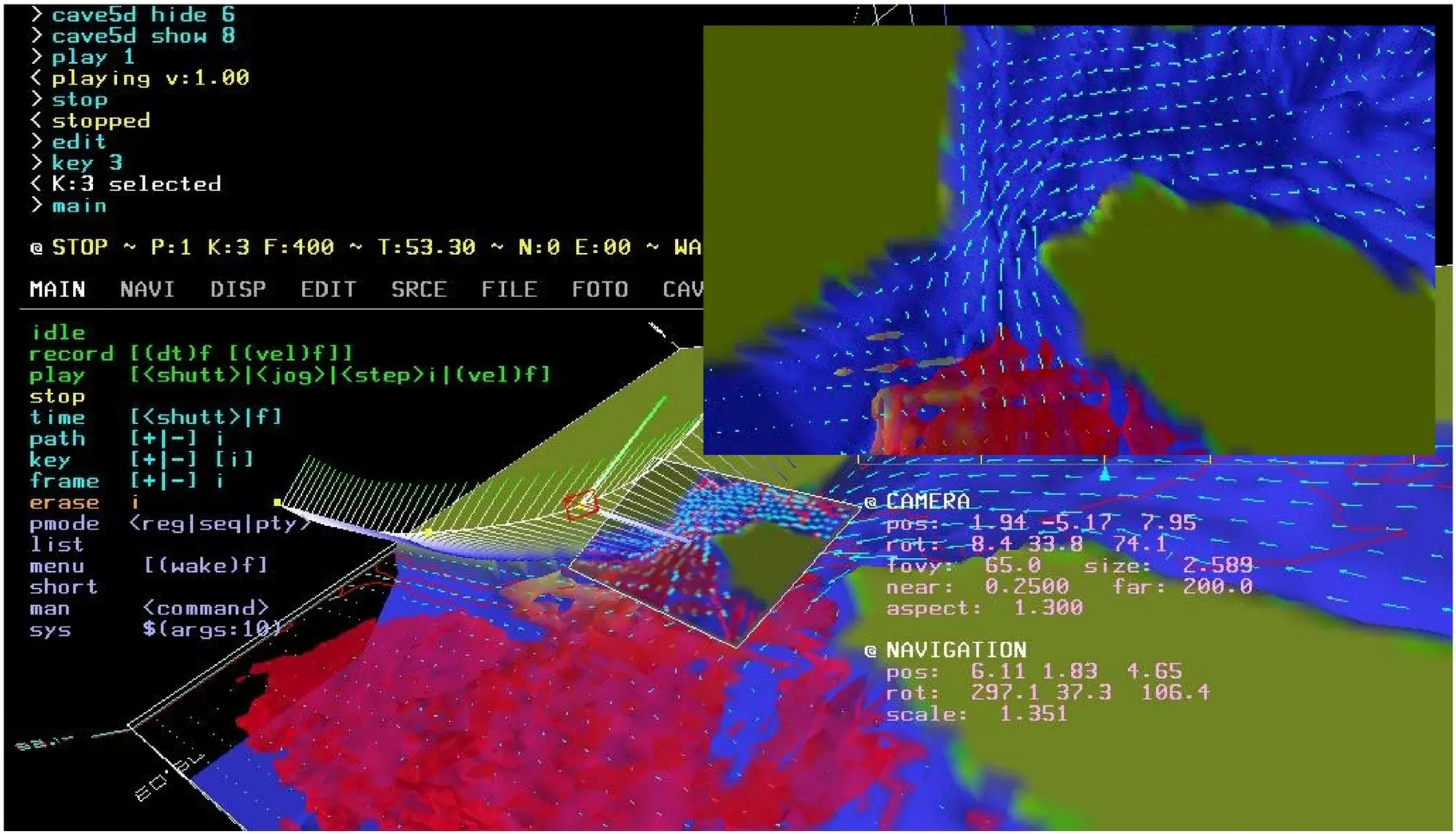
Kelvin Droegemeier, Director CAPS, Univ. Oklahoma

NCSA™ National Computational Science Alliance

Alliance Environmental Hydrology Goal - Linking Hydrologic Interactions



Goal-Analyze and Record Complex Data sets Using Interactive Virtual Environments

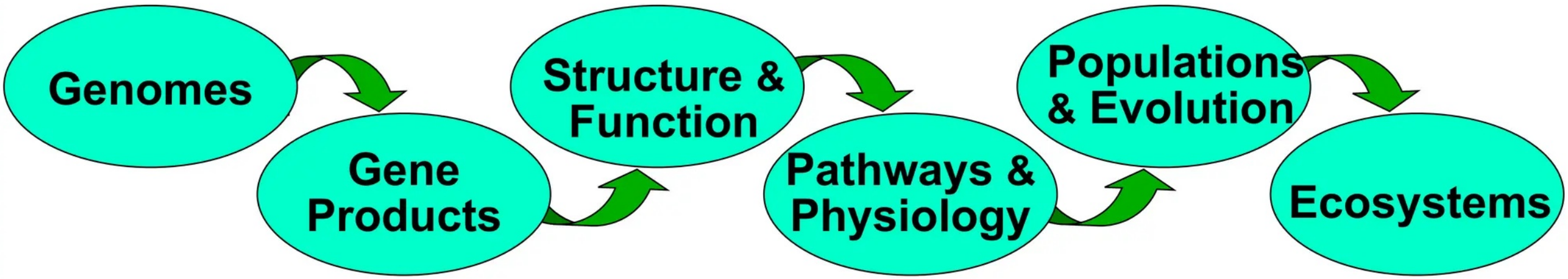


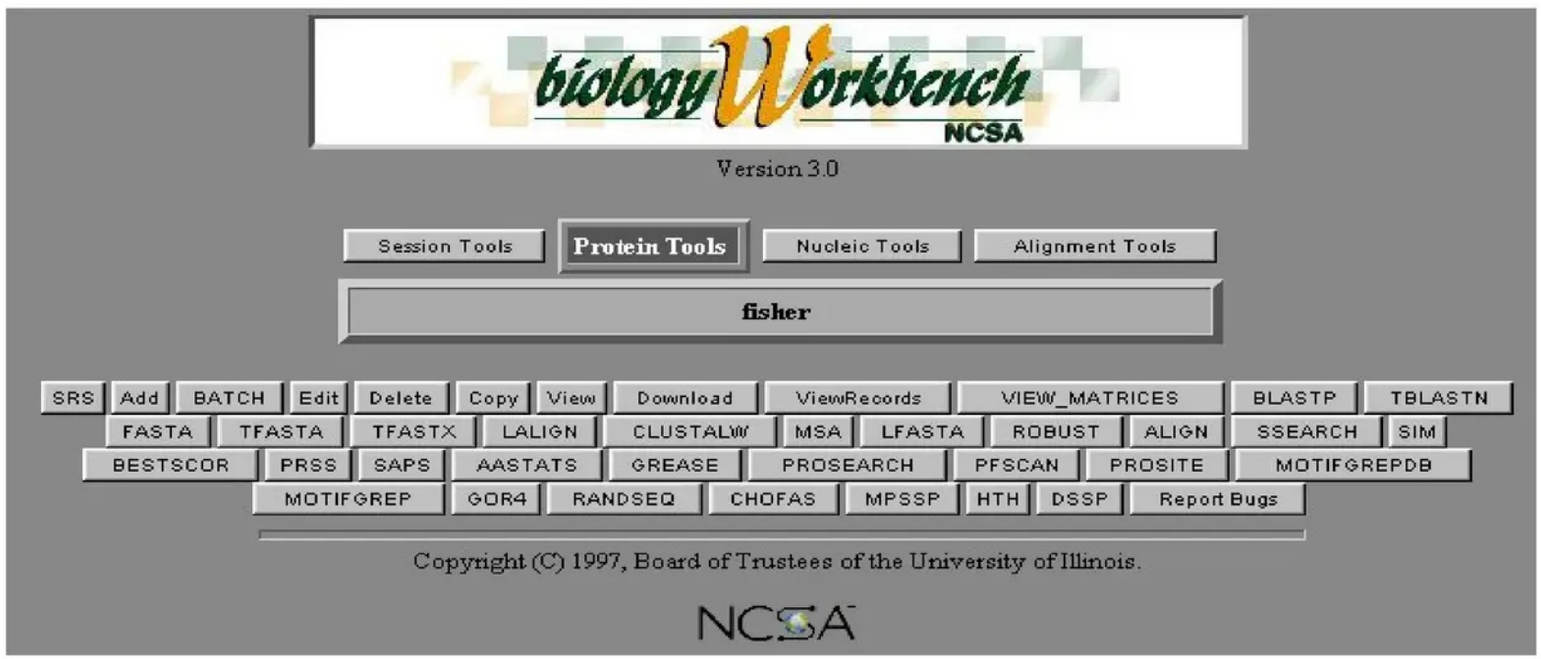
Cave5d Enables Interactive Visualizations of Time-Varying, 3-Dimensional Vis5d Data Sets in CAVE Environments

Donna Cox, Robert Patterson, Stuart Levy, Marcus Thiebaux, Virtual Director Team
Glenn Wheless, Cathy Lascara, Old Dominion Univ.

NCSA™
National Computational Science Alliance

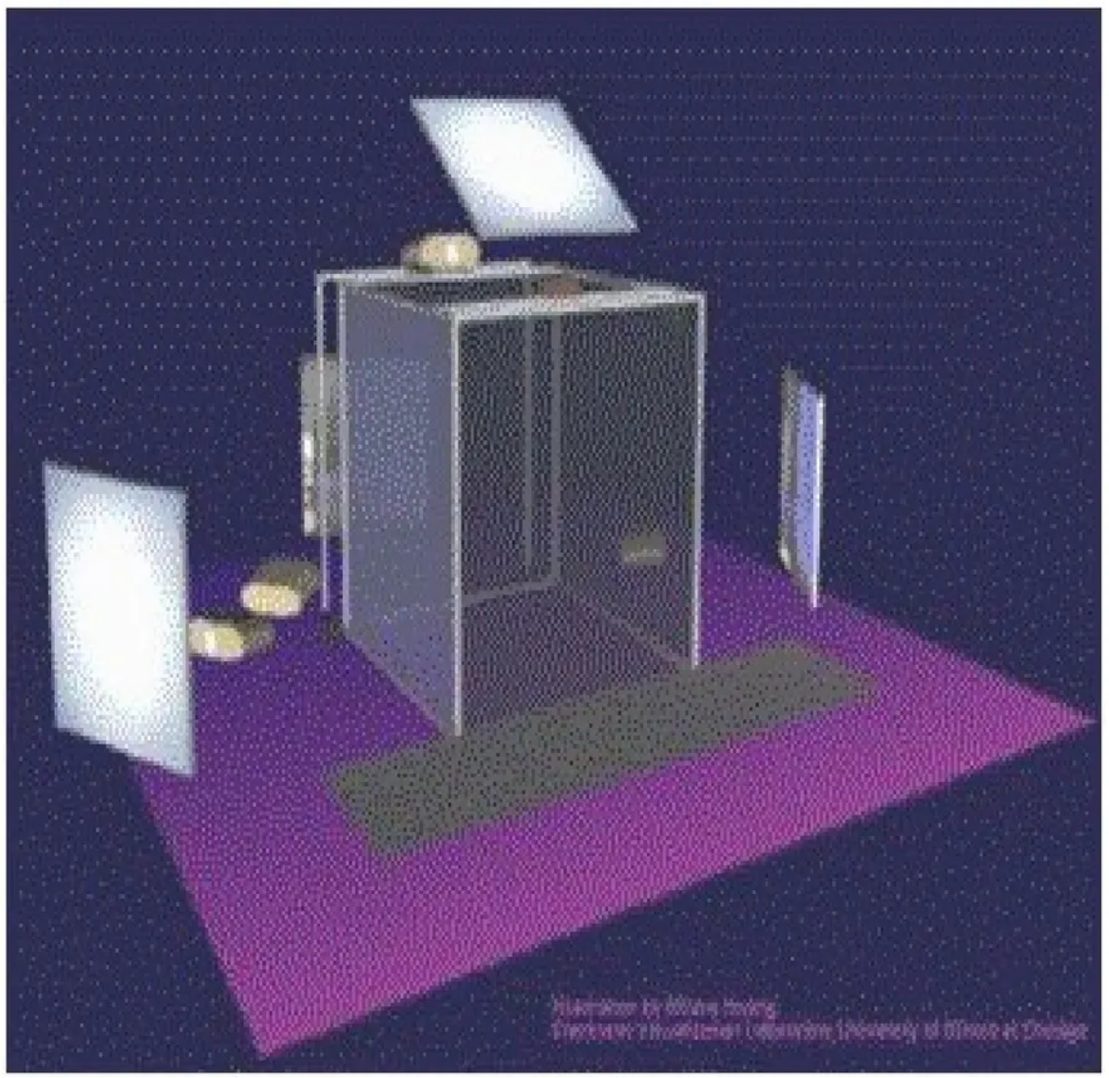
Computational Biology Requires Intricate Linking of Functions and Data



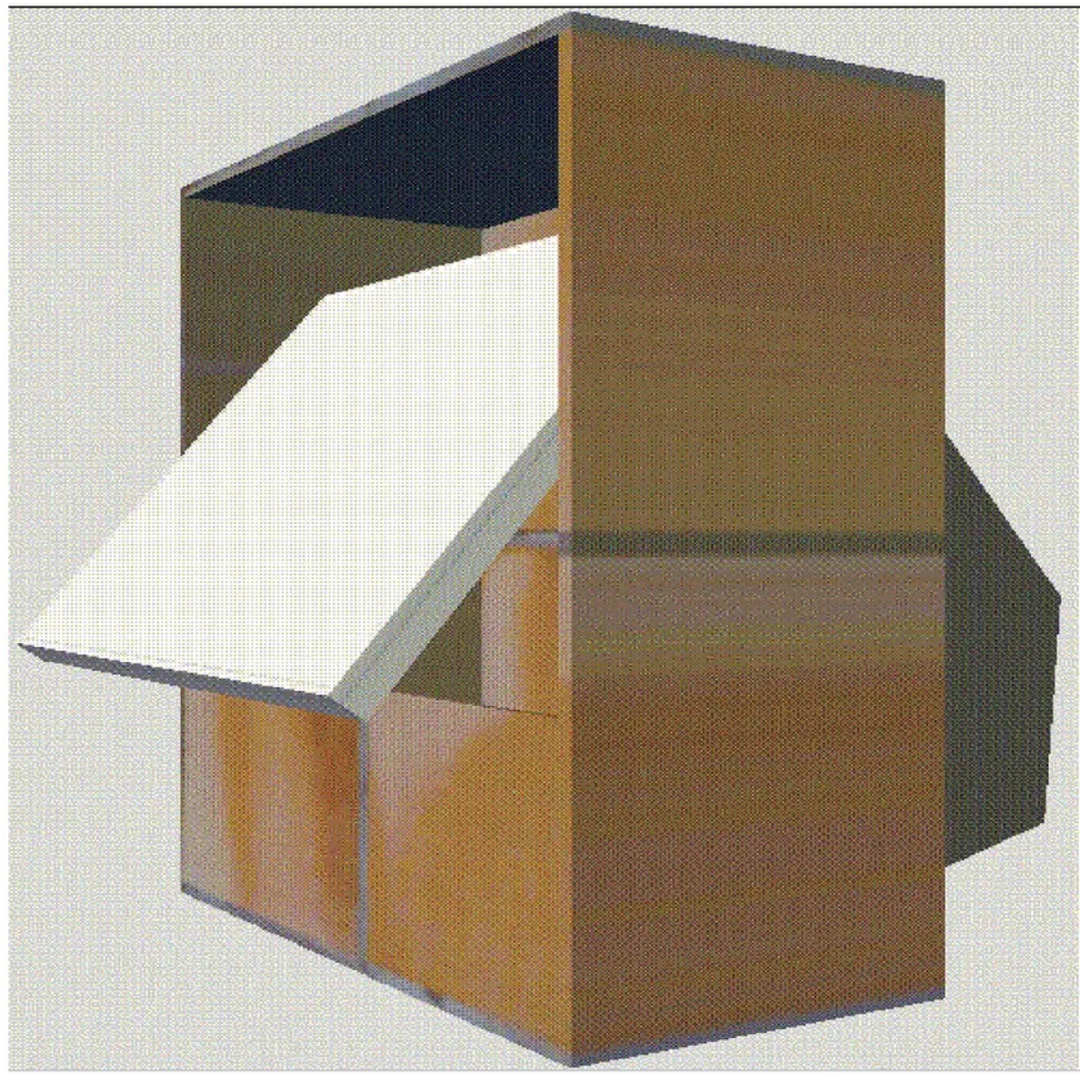


Alliance Biology Workbench Links Programs and Data Through Web Browser
Over 6,000 Users From Over 20 Countries
Powered by SGI Power Challenge

The Killer Application for the Grid - Collaborative Tele-Immersion



CAVE



ImmersaDesk

Different Physical Implementations of the Alliance CAVE Software Libraries

Image courtesy: Electronic Visualization Laboratory, UIUC

NCSA™
National Computational Science Alliance

Grid Enabled
Workshop and Training Facilities

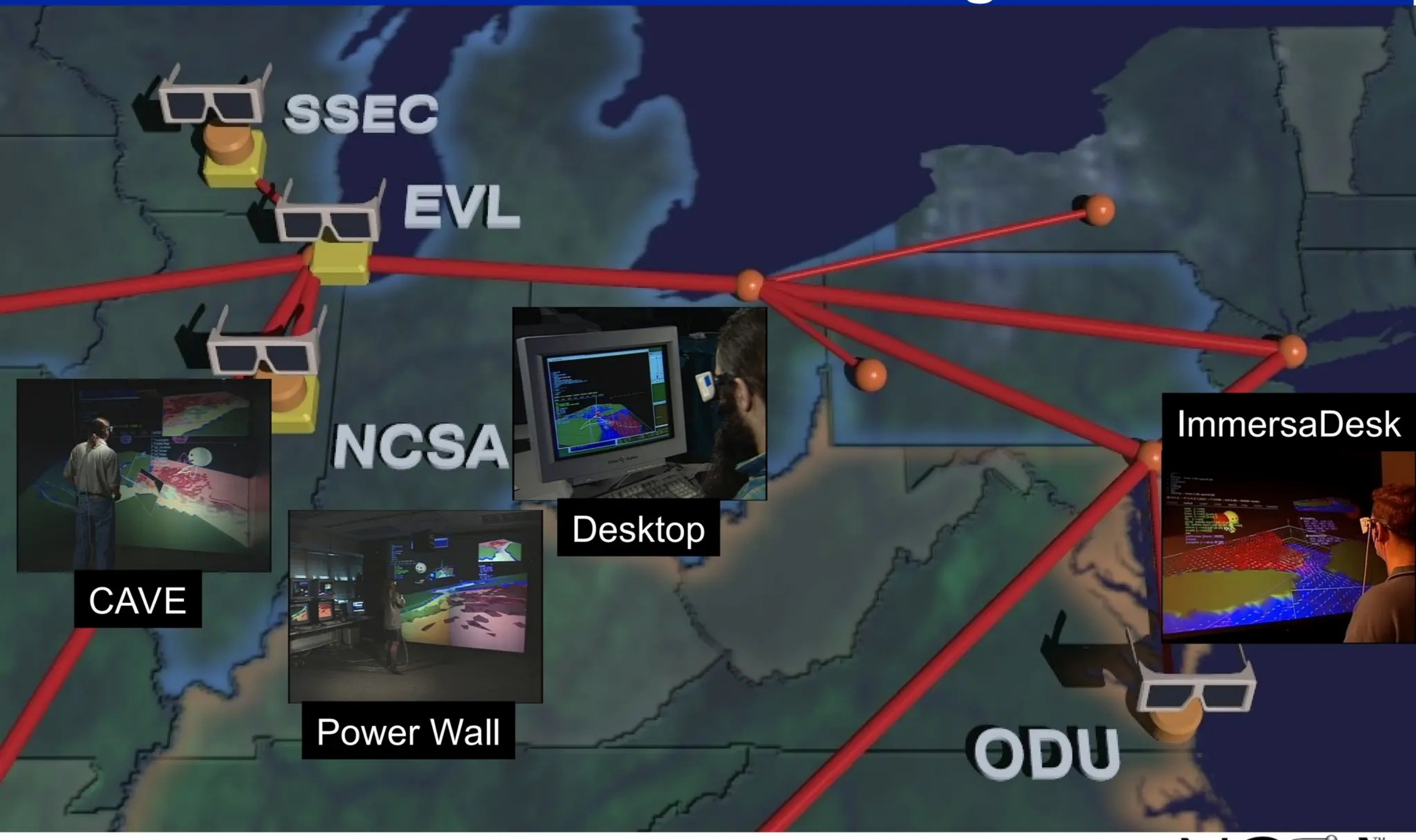


Being Deployed Across the Alliance

Jason Leigh and Tom DeFanti, EVL; Rick Stevens, ANL

NCSA™ National Computational Science Alliance

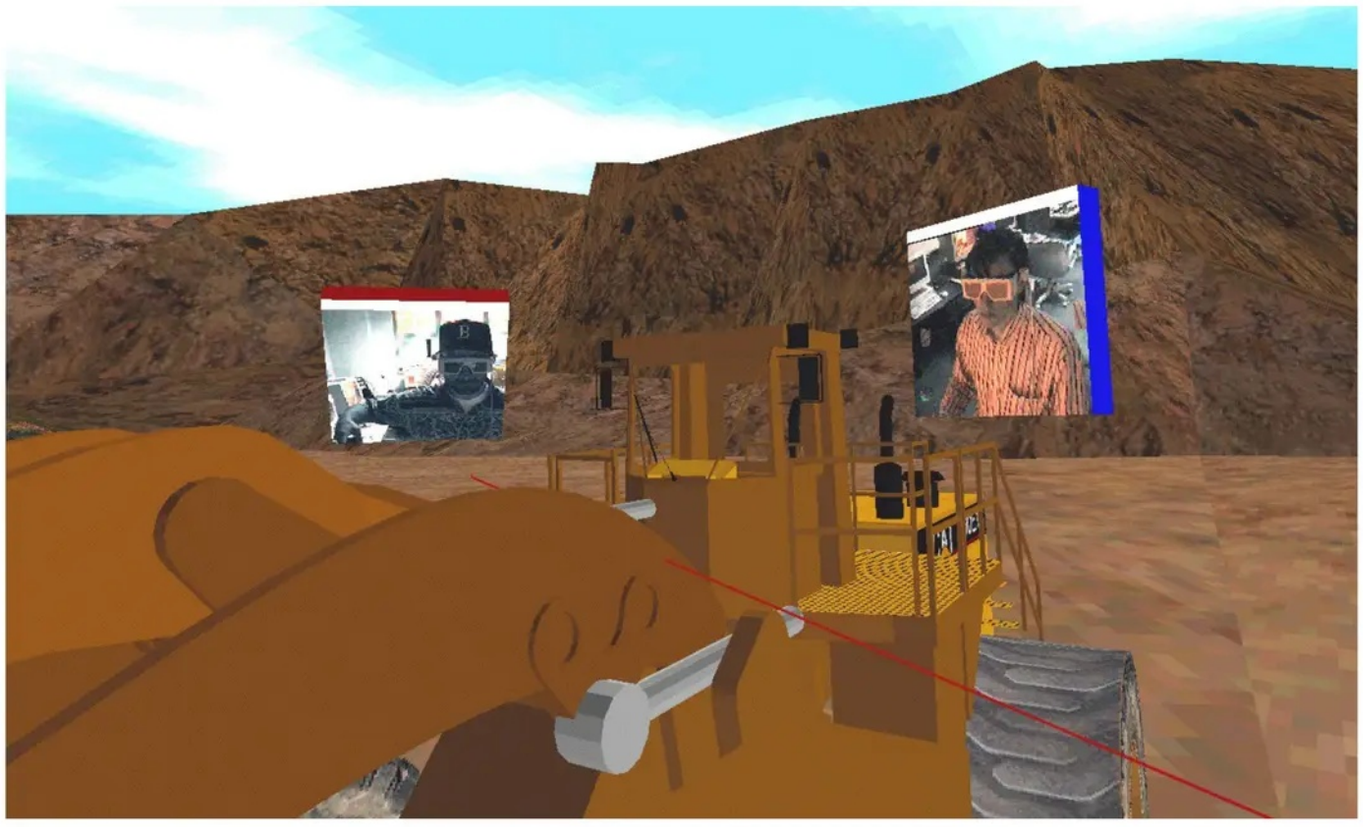
Collaborative Virtual Director -- Environmental Modeling FY98

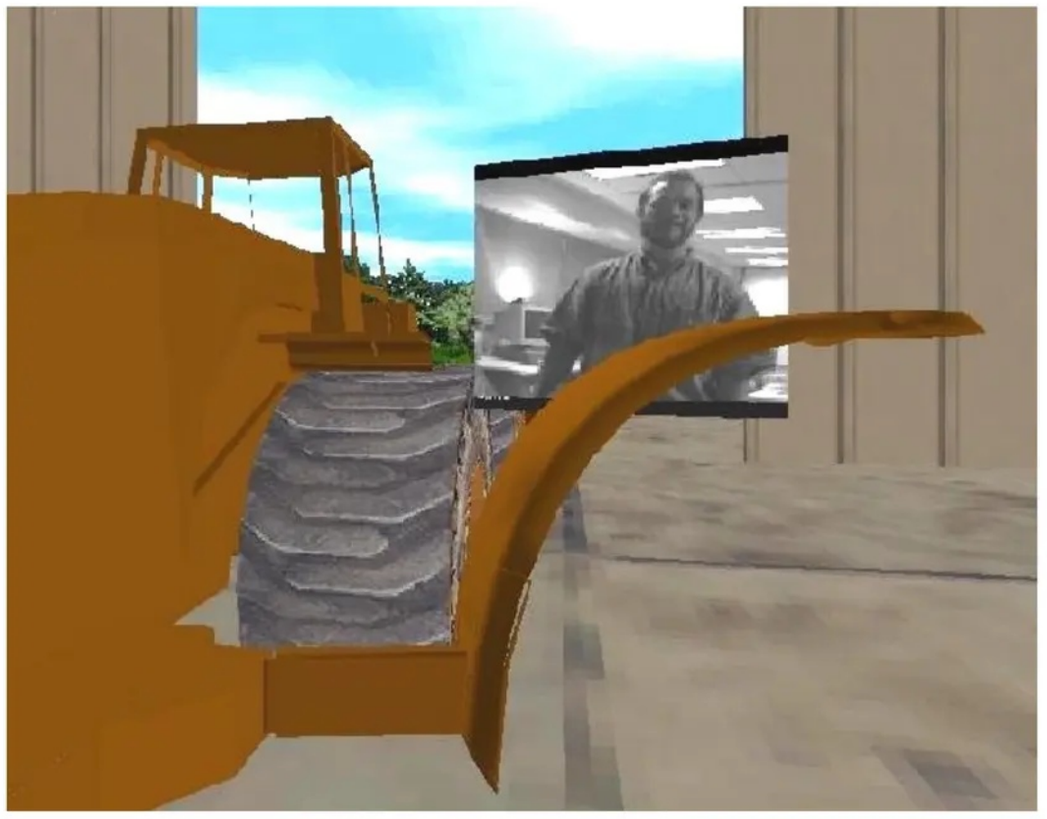


Donna Cox, Robert Patterson, Stuart Levy, NCSAVirtual Director Team
Glenn Wheless, Old Dominion Univ.

NCSA™
National Computational Science Alliance

A Working Model-Caterpillar's Collaborative Virtual Prototyping Environment





Real Time Linked VR and Audio-Video Between NCSA and Germany Using SGI Indy/Onyx and HP Workstations

Data courtesy of Valerie Lehner, NCSA

NCSA™ National Computational Science Alliance