2009 Annual Users' Meeting

Texas A&M

Supercomputing Facility

A Commemorative Look

20 years

empowering research & discovery

The Genesis

A Very Brief Look at the Beginnings of the Supercomputing Facility

Founder & Key Supporter

Photograph unavailable

Bahram Nassersharif (BN) in 1989

- 1986 Bahram Nassersharif (BN) is re-cruited as Assistant Professor of Nuclear Engineering;
- 1988 Herb Richardson, Vice Chancellor & Dean of Engineering, supports BN's idea to set up the Supercomputing Facility and A&M to buy a Cray supercomputer;
- 1989 BN becomes the Facility's 1st director

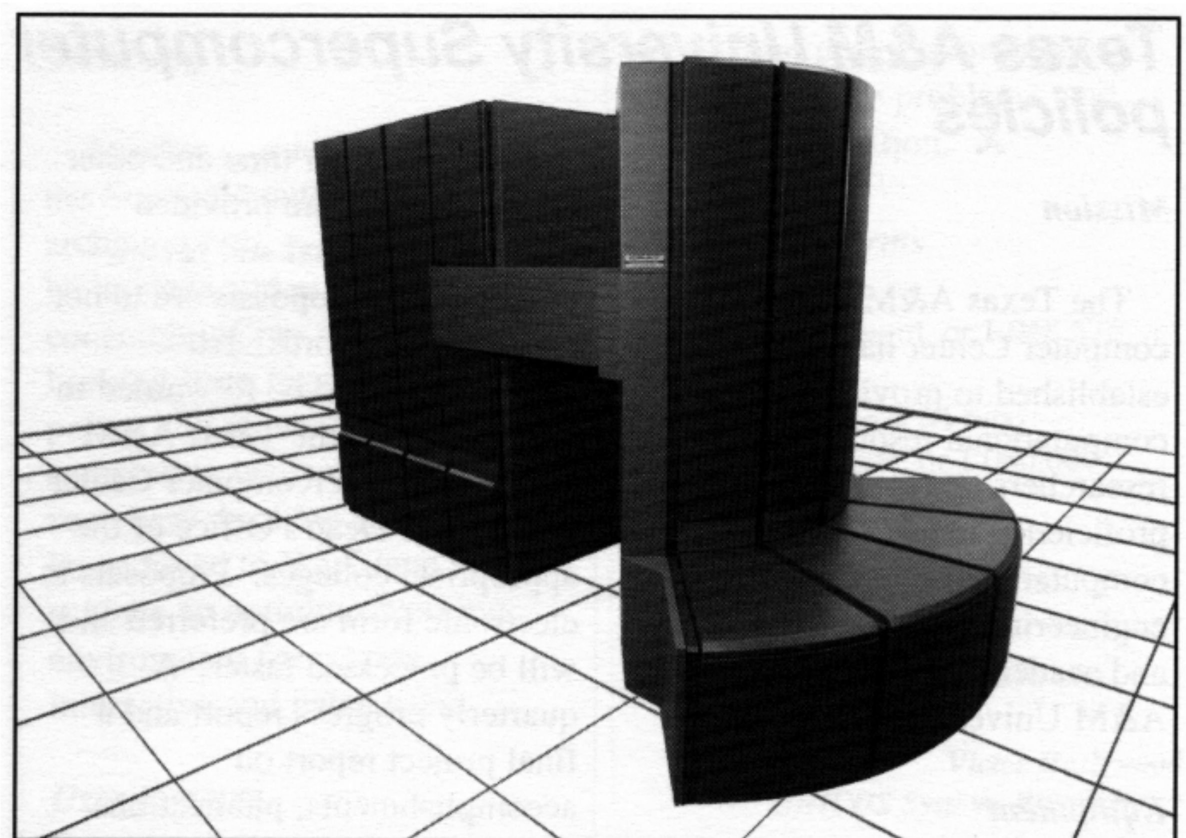
Herb Richardson, Vice Chancellor & Dean of Engineering

Cray Y-MP2/116 Delivery

- 1st University in Texas to install a Cray Y-MP
- July 31, 1989

The Cray Y-MP arrives at Zachry Engineering Center.

Our 1st Machine: The Cray Y-MP2/116



The Cray Y-MP2/116.

- 1 (out of 2) vector processor active only;
- 16 MB of vector memory;
- 8 64-word (64-bit) vector registers;
- 6 nanosec clock;
- Peak MFLOP/s 333

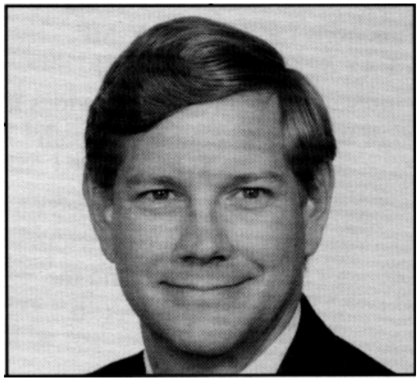
whereabouts

Wisenbaker (WERC) basement, where the facility had its first offices (1989-1994)

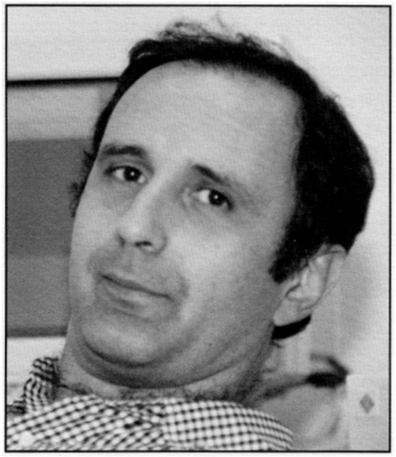
The Zachry Crystal Palace, residence of A&M's Cray Y-MP.

Zachry, 1st floor, where the Cray was installed and located till retirement.

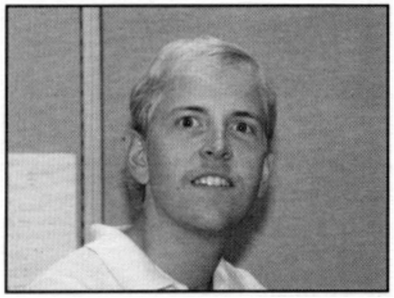
The Original Staff



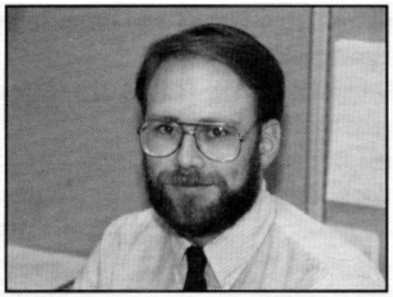
Michael Bolton
Manager



Spiros Vellas
Sr. Systems Analyst



Victor Hazlewood
UNICOS Systems Programmer



Don Curtis
UNICOS Systems Administrator

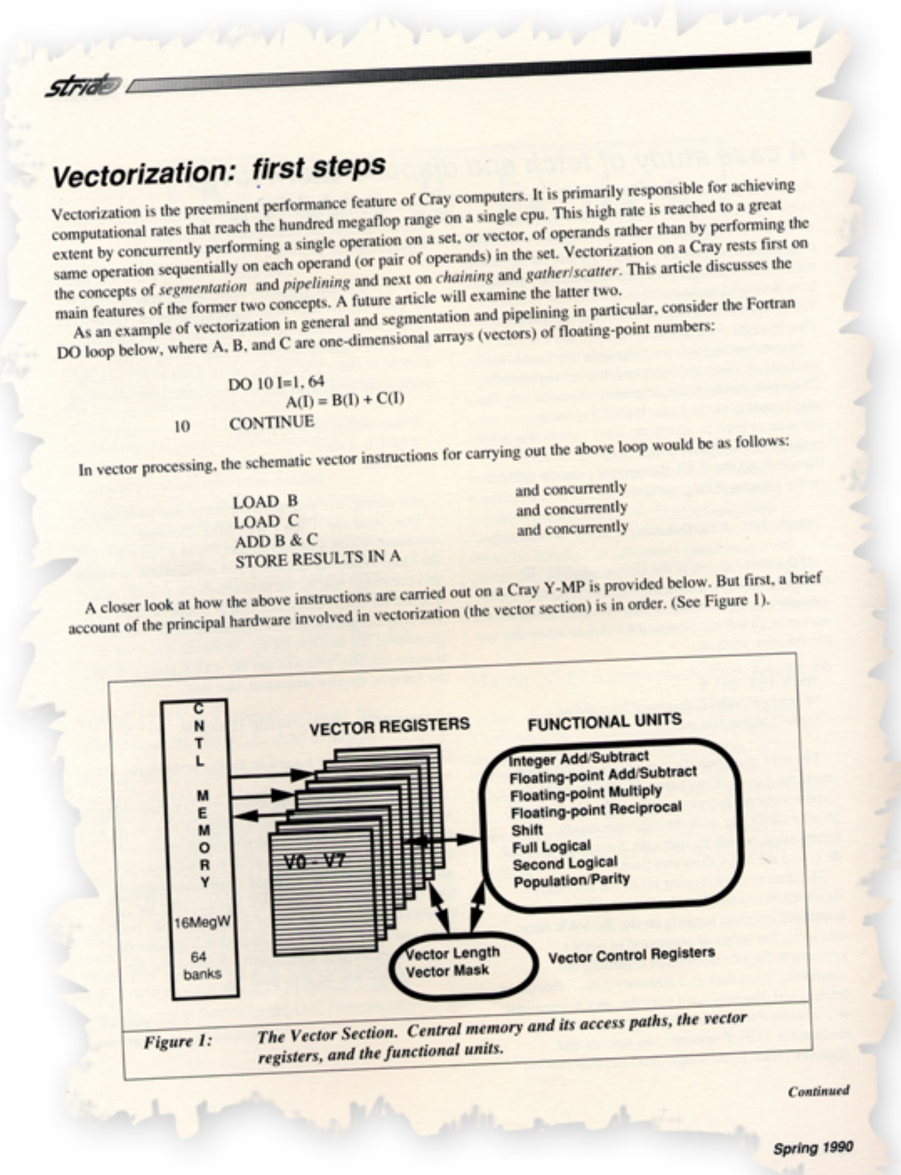
Some of the Earliest Research Users

The original recipients of Cray Research Grants were (first row, left to right) R. Lee Panetta (Meteorology), Ralph White (Chemical Engineering), Gerald North (Meteorology), (second row, left to right) John C. Slattery (Chemical Engineering), Edward Mascorro (Civil Engineering), Photios Papados (Civil Engineering), Roland Allen (Physics), Jan Gryko (Physics), Gamal Akabani for John W. Poston (Nuclear Engineering), Bahram Nassersharif (Nuclear Engineering), Darrell Fannin (Rural Sociology), and Michael Hall (Chemistry). The individuals with red names are still active at the university.

A Sample of Research Using the Cray

Name (blue -> still active)	Department	Project Title
Roland Allen	Physics	Theoretical Studies of Real Materials
Ping Chang	Oceanography	Ageostrophic Wave-mean Flow Interaction: Equatroial Layer Dynamics
Siu Chin	Physics	Hamiltonian Lattice Calculations & Microscopic Nuclear Many-Body Problems
Michael Hall	Chemistry	Theoretical Inorganic & Organometallic Chemistry
Yassin Hassan	Nuclear Engineering	Turbulence Modeling using the Finite Element Method
George Kattawar	Physics	A Theoretical Study for Obtaining the Speed of Sound, Temperature & Salinity Remotely in the Open Ocean by Brillouin & Raman Scattering
Robert Lucchese	Chemistry	Studies of Electron-Molecule Collisions
Bahbram Nassersharif	Nuclear Engineering	Visual Neutron Particle Transport Using Cellular Automata
Gerald North	Meteorology & Oceanography	Application of Information Theory in Climate Predictability Using a General Circulation Model
Lee Panetta	Meteorology	Numerical Investigation of Jets in Quasi-Geostrophic Turbulence
Theodore Parish	Nuclear Engineering	A Fuel Scoping Program for Boiling Water Reactors
Paul Roschke	Civil Engineering	Failure Prediction of Thin Beryllium Sheets Used in Spacecraft Structures
John Slattery	Chemical Engineering	The Physics of Spreading Films
Ralf White	Chemical Engineering	Mathematical Modeling of Electrochemical Systems & Simulation of Batteries

The Stride Newsletter 1989-1994



stride

Vectorization: *first steps*

Vectorization is the preeminent performance feature of Cray computers. It is primarily responsible for achieving computational rates that reach the hundred megaflop range on a single cpu. This high rate is reached to a great extent by concurrently performing a single operation on a set, or vector, of operands rather than by performing the same operation sequentially on each operand (or pair of operands) in the set. Vectorization on a Cray rests first on the concepts of *segmentation* and *pipelining* and next on *chaining* and *gather/scatter*. This article discusses the main features of the former two concepts. A future article will examine the latter two.

As an example of vectorization in general and segmentation and pipelining in particular, consider the Fortran DO loop below, where A, B, and C are one-dimensional arrays (vectors) of floating-point numbers:

```
      DO 10 I=1, 64
         A(I) = B(I) + C(I)
10    CONTINUE
```

In vector processing, the schematic vector instructions for carrying out the above loop would be as follows:

```
LOAD B                          and concurrently
LOAD C                          and concurrently
ADD B & C                       and concurrently
STORE RESULTS IN A
```

A closer look at how the above instructions are carried out on a Cray Y-MP is provided below. But first, a brief account of the principal hardware involved in vectorization (the vector section) is in order. (See Figure 1).

Figure 1: *The Vector Section. Central memory and its access paths, the vector registers, and the functional units.*

Continued

A cutout from Spiros's first article on vectorization that appeared in the Stride newsletter, spring 1990