

where the investment should be in memory cost versus processor cost. I'm trying to keep them equal not knowing anything better. That's where we are in the CRAY-3 and I expect will be in the CRAY-4 too. Half the cost will be in the processors even though the numbers are vastly different. The other half will be in the memory and let's get some feedback here. What's the balance? Are we way off or not? It has a lot to do with software. If we're going to do multi-processing execution of codes as run of the mill stuff, then a lot of things will change and won't that be interesting? We have a real opportunity here.

Q: In your early days of computer designing, were you familiar with Dr. Eckert and Dr. Mockley?

A: Yes, I worked with both of them. They were a few years older than I, and Eckert particularly was a very strong individual who knew exactly what everything should be. I kind of admired him for that, but I disagreed completely with everything he did so I was glad I was in St. Paul and he was on the East Coast. They did some amazing early work, but they didn't follow through. They really did just 2 machines--a very early prototype and then the Univac. There were a lot of interesting characters in the early days. I shouldn't say a lot--there weren't that many--there were perhaps a dozen all told because that's all there was going on in the world.

Q: Do you have any plans beyond the CRAY-4?

A: Yes, I want to keep doing what I'm doing as long as I can, but I don't know the name of it yet.

Q: AT&T has recently used a digital circuit based on protons. How long do you think it would take to bring that circuit to a Cray computer?

A: Do you take Science News? I was reading about it and I wondered about it, but I didn't understand it. What I did read, and this is not fair because I'm taking advantage of your question to go into another area, was that AT&T developed a tunnel junction transistor. It's a junction so close together that electrons move across the barrier even though it's a perfect insulator. They did it with E-beams which is amazing. I thought they'd have to use X-rays, but this is a transistor they made which switched in one picosecond. That seems pretty amazing. The more amazing thing is the gate of the transistor will switch it completely with one electron. The charge of one electron will switch it from cutoff to connection. I don't know if I'm ready for that, but that's very impressive.