

foreground processor, then work through a peripheral processor of some kind, and write diagnostics which hopefully will reduce the uncertainty of the failure to a die. It sounds hard. There are 1,024 die in a module and there are 4 modules so you have 4,000 die to choose from. They're quite bit-oriented so as you find the failure, I believe we've got a good chance of using the foreground processor in a CRAY-3 system to identify the bad die. I think it's going to take a while to get all the diagnostics in place, but as the module count goes down, as the die get high level integration, this gets easier and easier. The customer engineering job is going to be all software. He isn't going to have much chance to wheel up things and plug them in.

Q: Are you examining new architecture?

A: For myself, I'm stuck with architecture for a CRAY-4, then maybe I can look again. The Chippewa Falls group has a real opportunity now for a wholly new architecture. They could try to do artificial intelligence, or they could try to have a 150 bit word. All of these things are up in the air, but they've got to satisfy customers. Yes, I think new architecture should be explored in the next 6 months in Chippewa. This new group has a new charter and I wish them well. I want to see something different happen. I want to see some new leaders come out too. I'm not going to be here forever.

Q: Will the memory be bottleneck on the CRAY-4?

A: I think so. We are attempting to match the bandwidth of the CRAY-4 with that of the CRAY-3. In other words, if you have all 64 processors in a CRAY-4 running with odd stride, and you have reading and writing going on in each of them, it will work. That is, you would be able to strain vectors that way, but you would saturate the system. That's true of the CRAY-3 also. So that says as you start making random references with even strides there's going to be a bottleneck. In that sense we have too many processors for our memory. The reason we're putting in so many processors is the cost of the processor is going way down. I mean, what's a processor? In the CRAY-3 it's 3% of manufacturing costs. In a CRAY-4 it's going to be less than 1%. It's a temptation to have the processors there because maybe they're doing some scalar work in their local memories, and we need to explore this. We don't have all that much experience with double digit numbers, but we're going to get some now. It will be interesting to see