Parallel Computing

1. Concept of Sequential Versus Parallel

2. Parallel Computer Architecture
   a) multiple processors (4 ... 32K)
   b) connected with an internal network
   c) share data and program

3. Multi-processors versus multi-computers
   a) multi-processors ... one program ... multiple data
   b) multi-computers ... multiple programs ... multiple data
      ▪ master slave (MPI, PVM)

4. Languages
   a) need new languages to express parallel algorithms
   b) usually machine dependent (ugh!)
      ▪ HPF, C*, Sequent-C, Occam, Parallaxis, Modula-P

5. Algorithms
   a) addition
   b) min/max
   c) others ...

6. Applications
   a) large "number crunching" problems
      ▪ global weather prediction / climatic change
      ▪ human genome mapping
      ▪ molecular modeling

7. The Future ...
   a) research topic
   b) programming is difficult ... programmers need retraining to think in parallel algorithms
   c) machines are $$$
   d) interconnected small machines may be the future (MPI, PVM)