

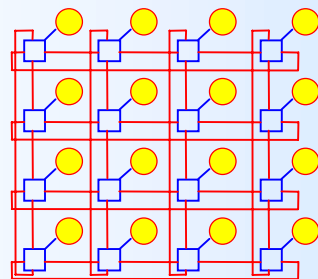
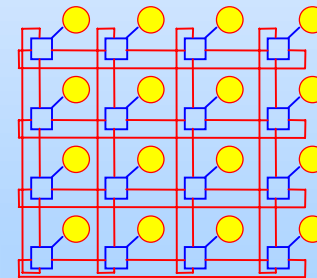
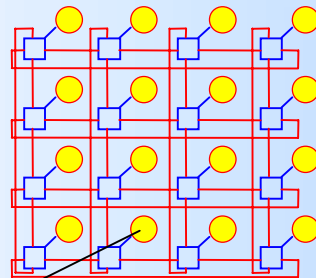
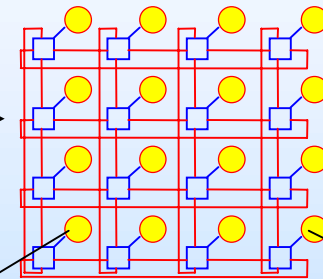
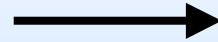


System Software for Petaflops

Petaflops II
February 18, 1999



What is the problem?



Psychologists tell us that humans can handle only 4-7 concurrent tasks - means trouble if not SPMD



Just SPMD?

- We can assume SPMD if we can assume just finer and finer grids ...
- But we can't
 - irregular, adaptive codes
 - large coupled codes
 - multi-language



SPMD led to

- Current MPP system software tries to get out of the way of the programmer, e.g., PUMA
- Application programmer manages communication, scheduling, synchronization, load balancing, etc.
- This will not work with thousands to millions of processors and highly irregular codes



What's needed?

- System software to deal with complex issues in resource management, synchronization, etc.
 - let experts do it once and make it part of the system software, much as I/O was done once in early operating systems
 - means letting go and accepting a performance hit from hand-optimized
 - how many times can you afford to hand-optimize?



Radical proposition

- Programming languages are not the way to solve this problem—let's not do it with really good Fortran compilers
- Application-type-specific environments and tool-sets are the way to go
- They can interact directly with “OS” primitives