

Vulcan Highlights

High performance, scalable, balanced system

- Scalable to Teraflop performance, with matching memory and I/O
 - 128 - 32K processors, with no change in basic rack structure
 - shared, massively parallel DASD, any processor to DASD ratio
- Use state-of-the-art commodities for most h/w
 - best-of-breed single chip microprocessor (and compiler)
 - memory, DASD, ...
- Augment with critical innovative technologies
 - switch technology that scales to large number of nodes and large physical distances
 - 50 MB/sec duplex per processor
 - 1 microsecond latency
 - h/w and s/w support for error detection and isolation = high reliability and continuous availability in very large systems

Vulcan Highlights

Software provides machine capabilities to user

- low-overhead kernel
 - few microseconds overhead per message
 - no context-switching on most kernel calls
 - no buffer copying on most messages
 - interrupts usually avoided
- run-time library of communication and synchronization functions
- loosely synchronous, SPMD programming model, with support to shared objects
- virtual memory support
- shared, parallel file system, with error detection
- advanced programming environment
 - tools for interactive program refinement (data and control partitioning; resource allocation)
 - tools for performance analysis and scaling
 - visualization tools for debugging and monitoring

FIGURE 4

Application Segments – From Problem to Solution

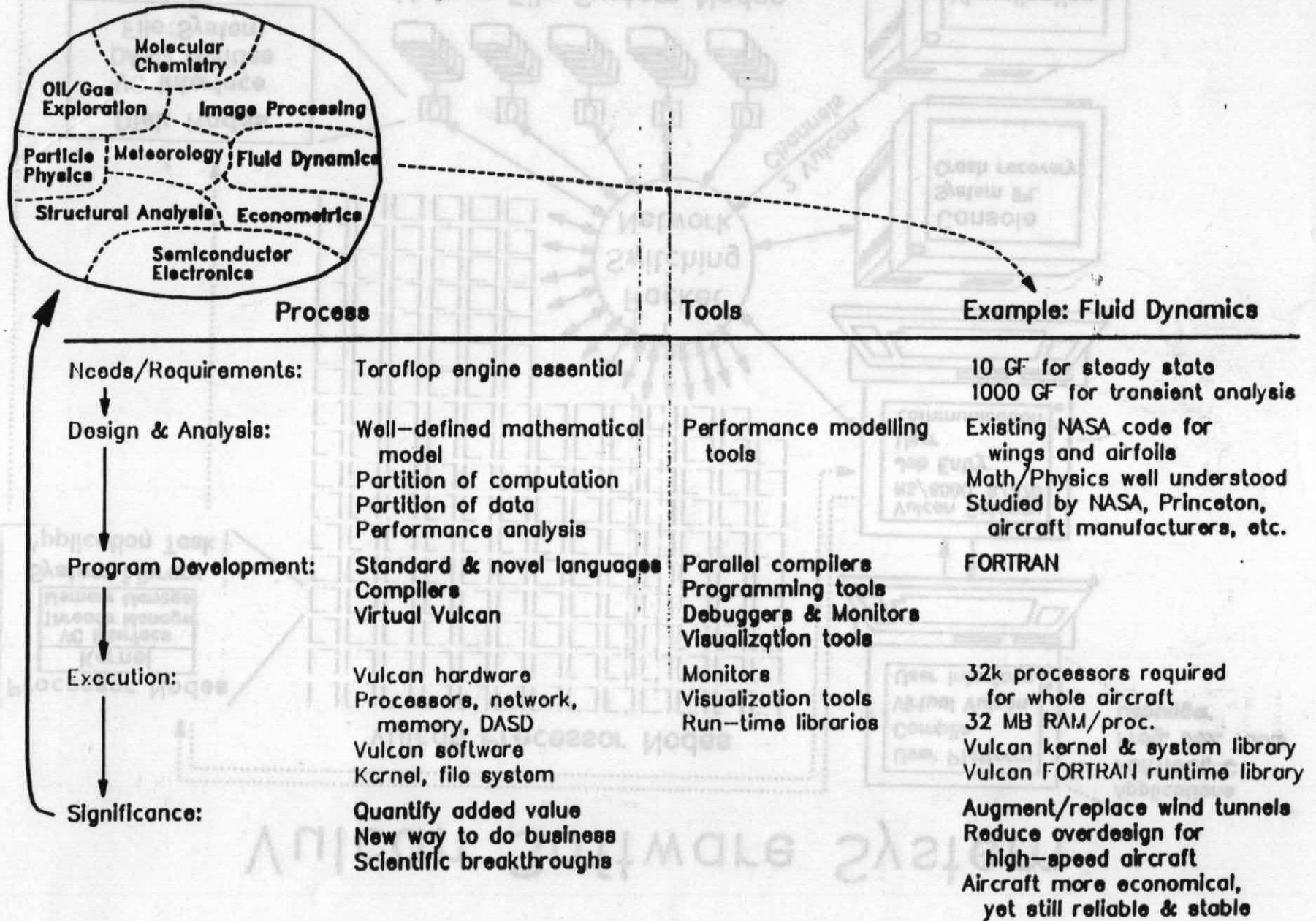


FIGURE 6

Vulcan Software System

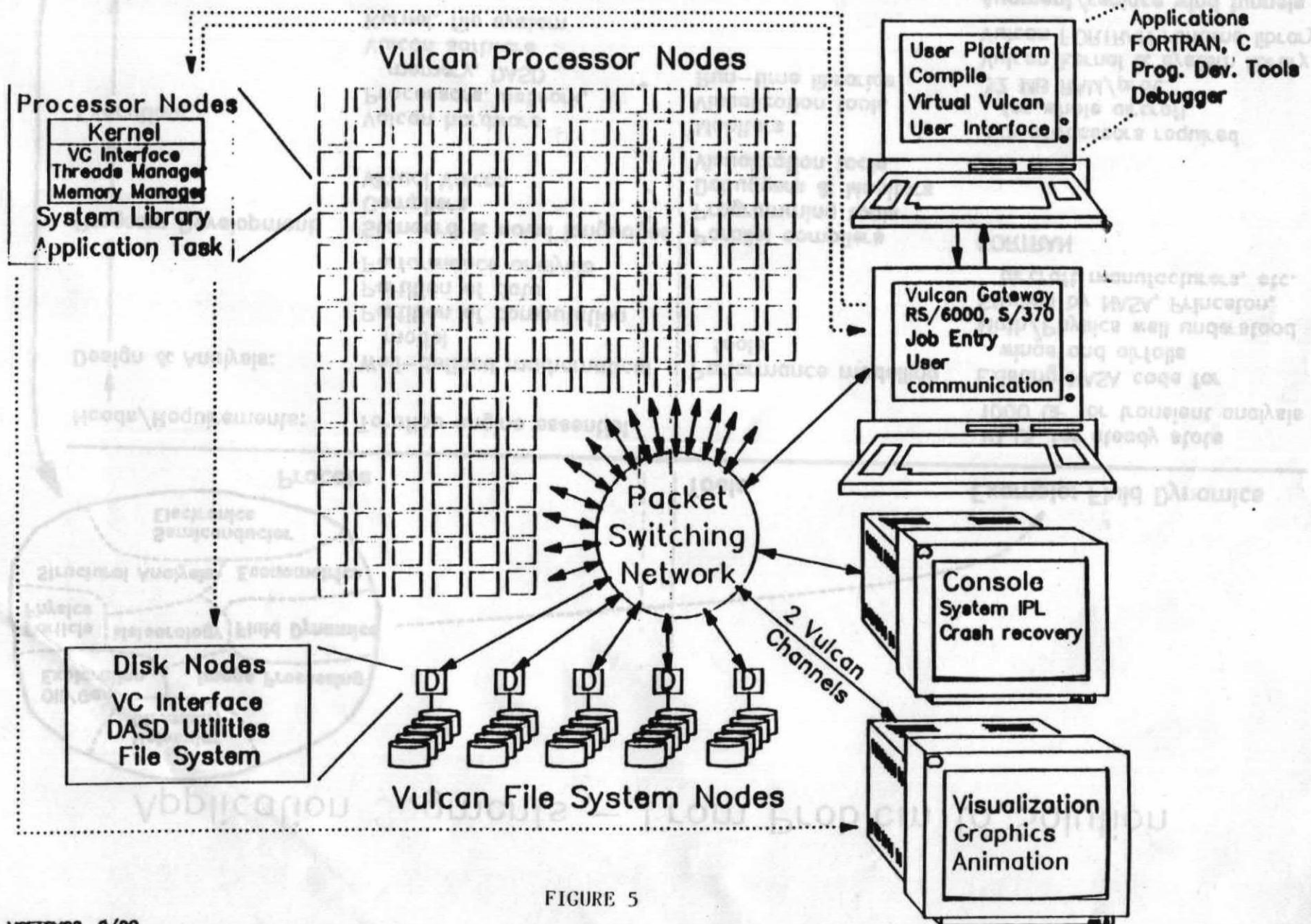


FIGURE 5

FIGURE 7

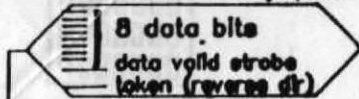
Vulcan Message Switching



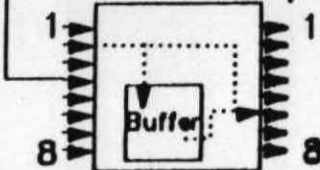
Bandwidth is 50M bytes/sec/processor

Channel

10 wires 50 MByte/Sec

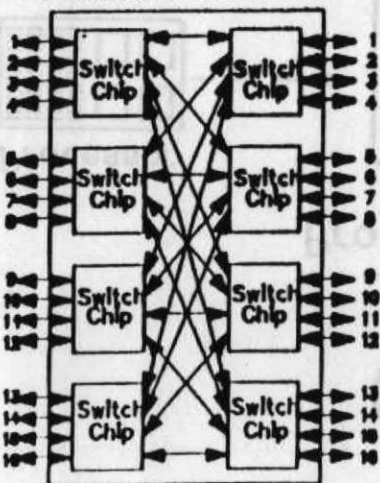


Switch Chip

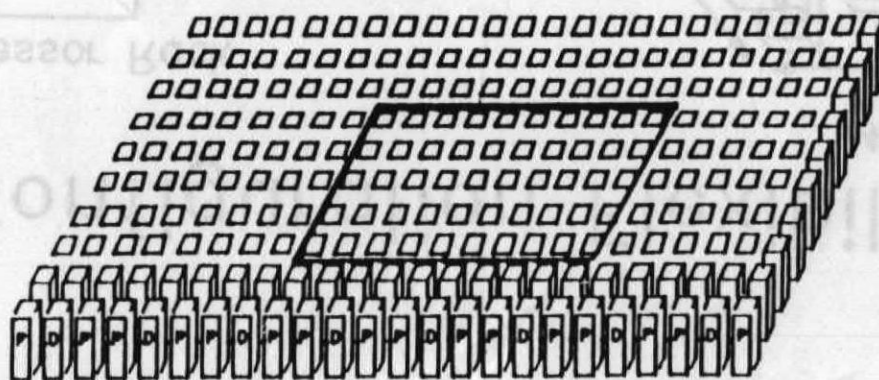


8 Channels x 8 Channels

Switch Board



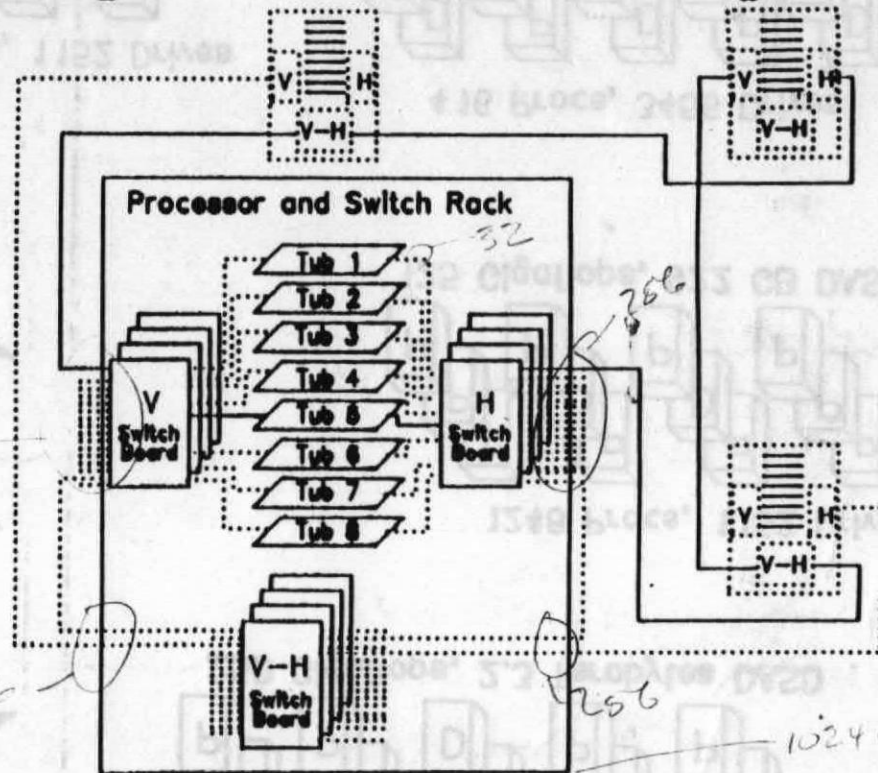
Channels run along columns and rows



20 switch boards per rack

Every message passes through 10 switch chips.

30 route bits



9(32²) cables wires per bundle cross section

$\frac{2 \cdot 512}{2} = 6144$ channels

Configuration Flexibility

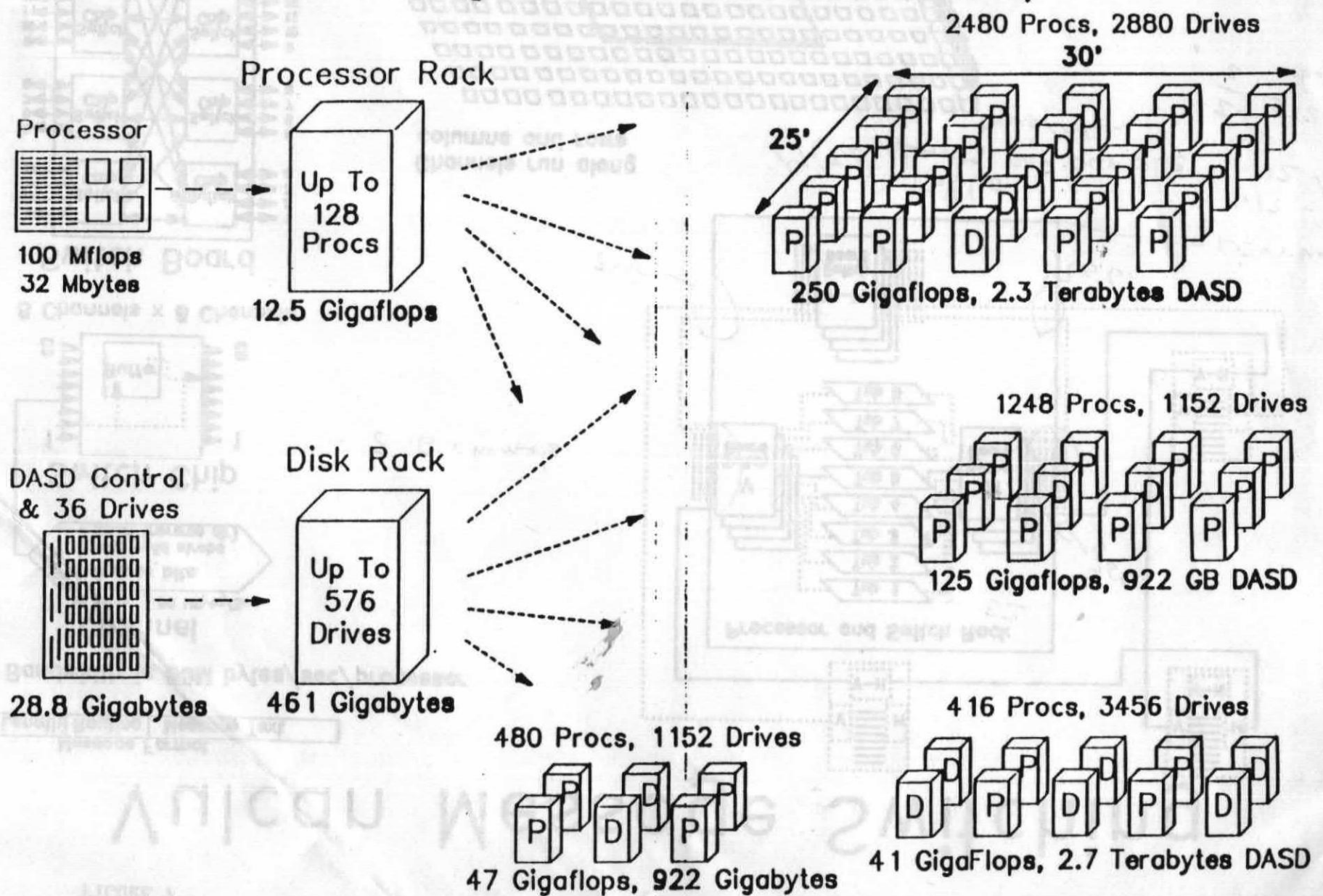


FIGURE 8