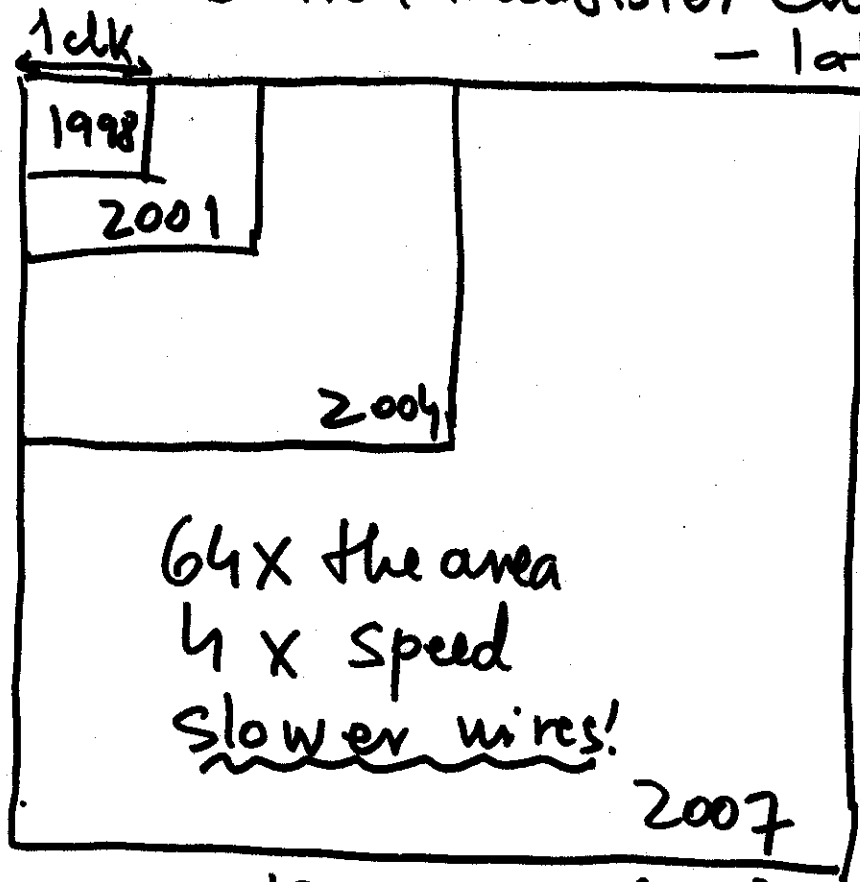


ECE 669, Moritz Lecture 1 9/6/01
Billion transistor chips

- latency clk



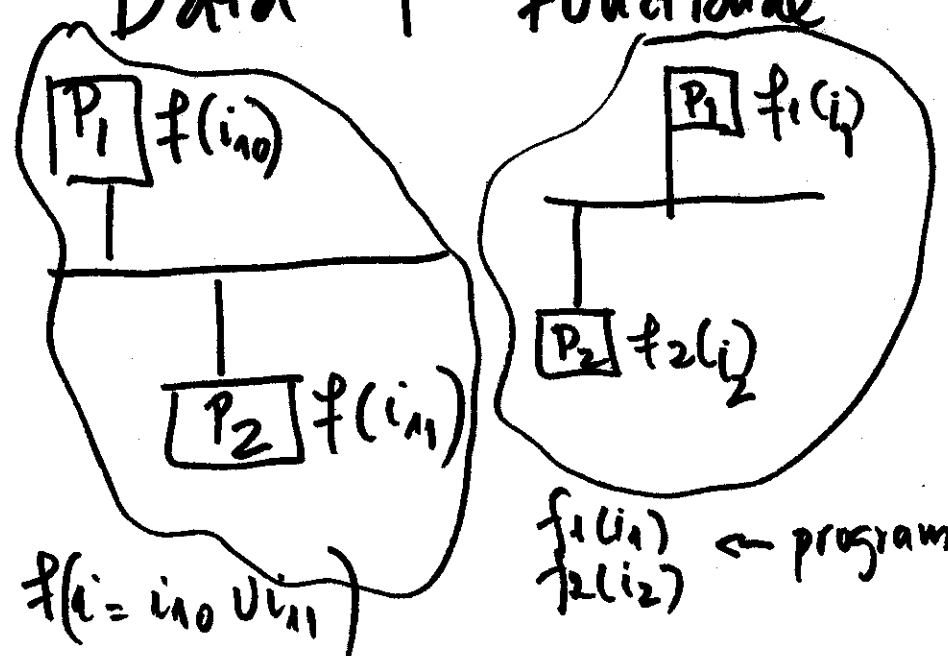
10, 16, 20 clks?

①

ILP thread process
Parallelism

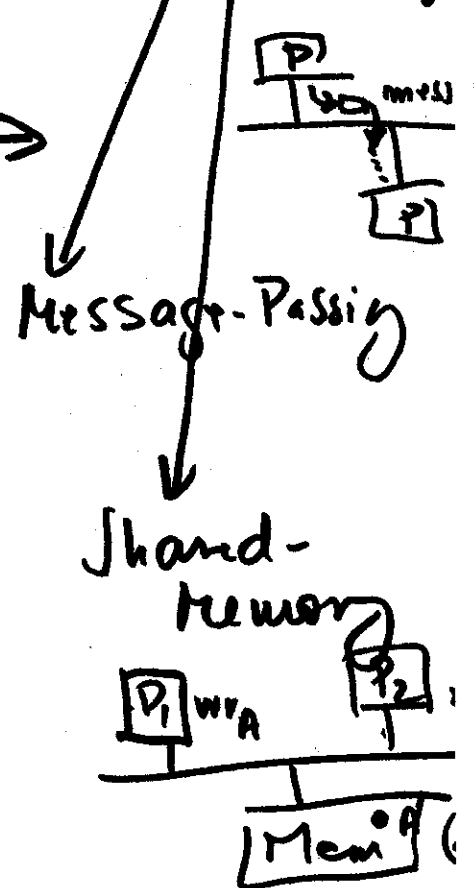
(bit, word, sum, vector)

Data + Functional



MAP:

System Design



Example 1

tpm C

- Speedup?

Proc	IBM RS6000	Himalaya
1	735	11000
4	1,438	
8	3,119	
16		3,043
32		6,067
64		12,021
112		20,918

Beowulf - off-the-shelf computers + Linux

- Price / performance records

\$7 MFlop vs. \$135 MFlop
"Beowulf" "commercial"

- 1996 - 16 Pentium Pro 200 - 2 GFlop
- "The Hive" 128 Pentium Pro 200 MHz
30% faster than Cray T3E
- Price / performance champion: C&P Alpha
"Avalon"

Problem for home for L1:

a, Which computer in the world has highest "peak" FLOP?

b, Which has highest FLOP achieved?

c, Which is fastest per processor flops/proc?

"use the web"

⑤

The 1997 National Technology Roadmap

Year of 1 st shipment	1997	1999	2001	2003	2006	2012
Local clock GHz	0.75	1.25	1.5	2.1	3.6	10
Across chip GHz	0.75	1.2	1.4	1.6	2	3
Chip size (mm ²)	300	390	315	430	520	750
Feature size (nm)	250	180	150	130	100	50
Number of chip i/o	1450	2000	2400	3000	4000	7300
Transistors / chip	11M	21M	40M	76M	200M	1.4B

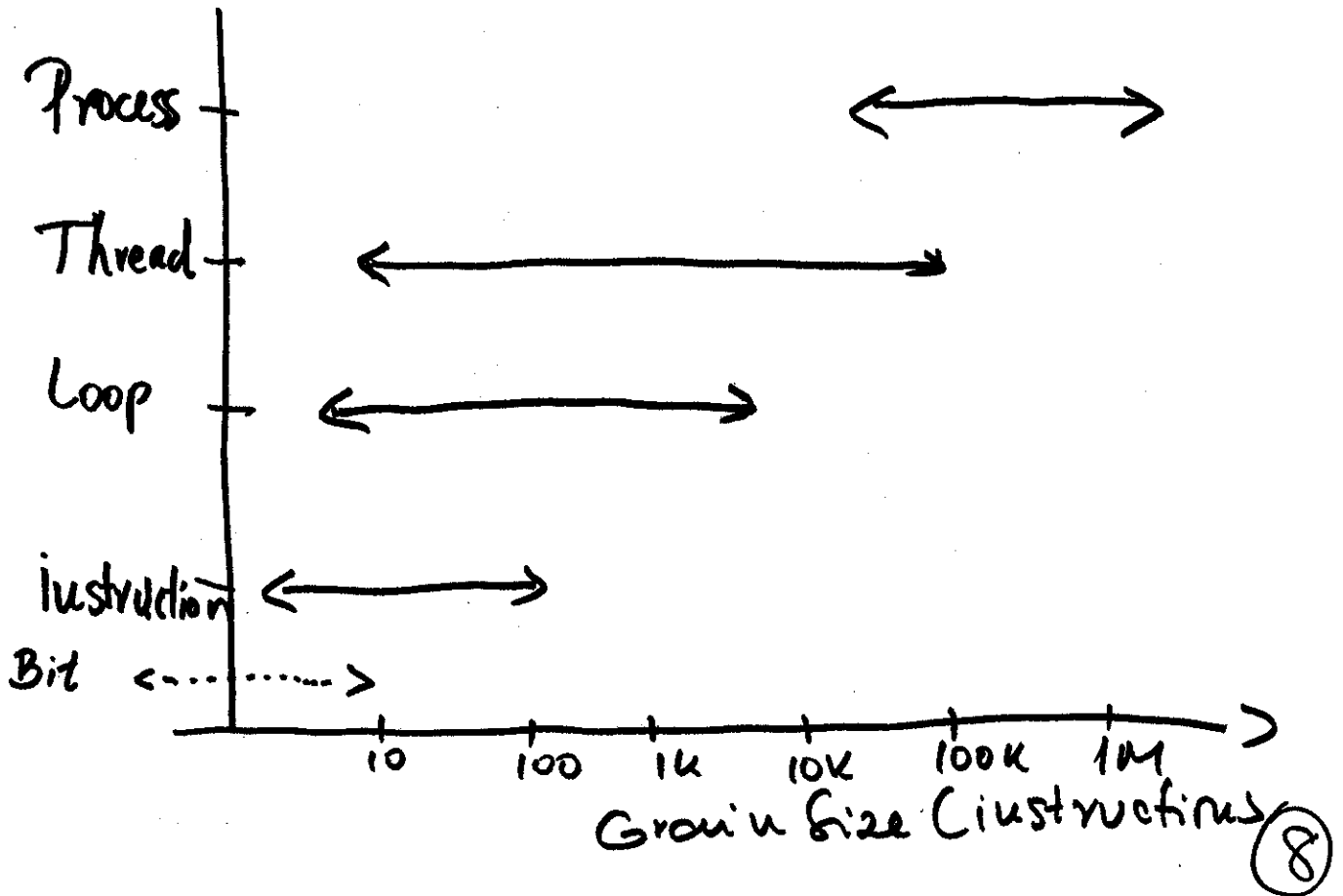
FLOPS rating? Value?

- really depends on your application how applicable it is
- Linpack - FLOPS not saying too much
 - benchmark to test ability to perform linear algebra
 - 100×100 only requires 320 KB \Rightarrow fits in cache (L2) of Pentium P, III
 - Rmax - highest "FLOP" achieved
 - Peak - you can't go higher

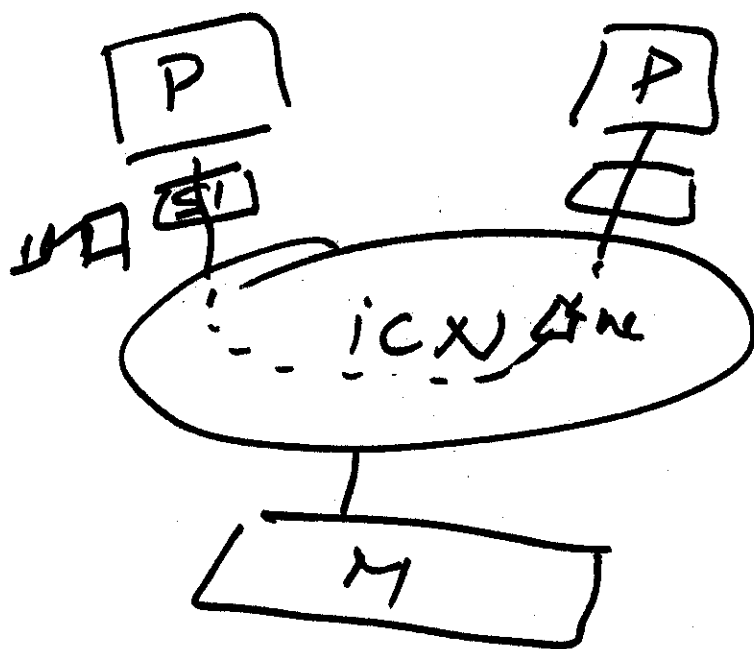
Conclusion: find benchmark similar to application to get a feeling



Exploiting (Program) Parallelism



<http://www.ecs.umass.edu/ece/andras/courses/ECE60>



NVMA -
Alewife
NURA -
Raw

⑨