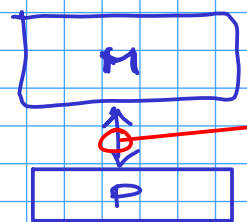


Von Neumann

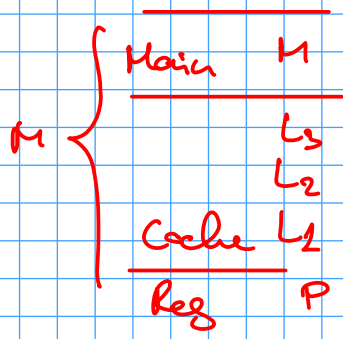
subsystem



data & code

Von Neumann bottleneck

Disks D $O(T)$



$O(A)$
 larger capacity
 $O(10M)$
 $O(1M)$
 $O(10K)$
 $O(100-1000)$

computation

larger cost

better access time

ms sec

"µsec"

$O(10^8)$

$2/3 \tau$

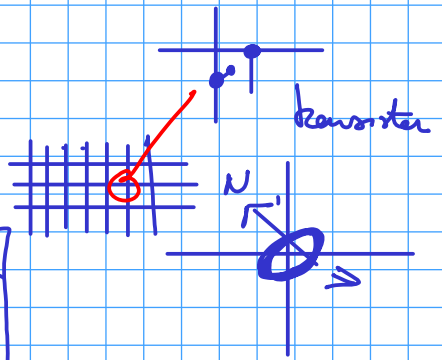
clock τ

improvements



pipeline → superorder

diff technologies



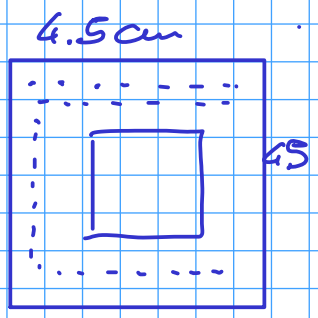
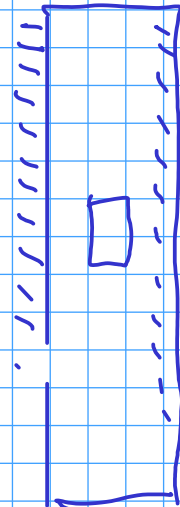
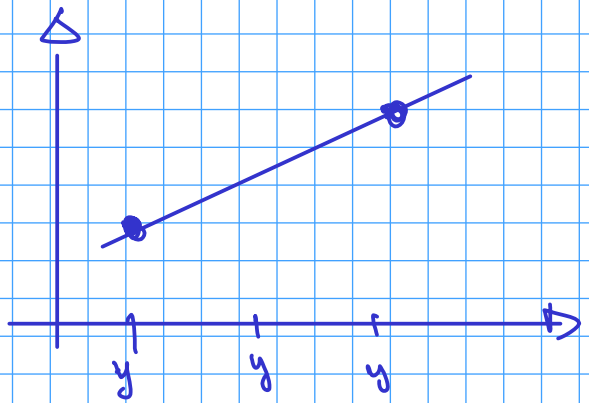
µm

14 nm

10 nm

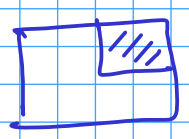
1 MHz
 $\geq 8 \phi$

16 bit



→ 2000


1990



10% area
 10% time
 improvement

DARK SILICON

multicores
(shared memory)



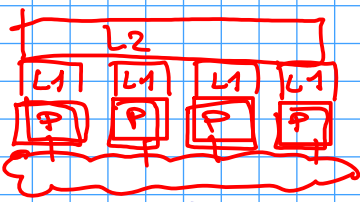
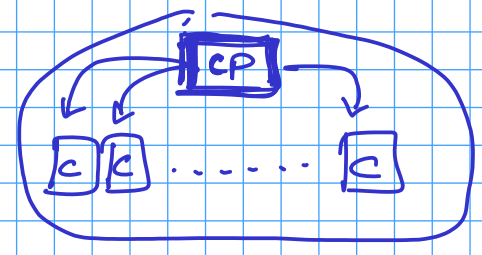
many core

GPUs
(GP-CPU)

Nvidia
AMD

general purpose
multicores

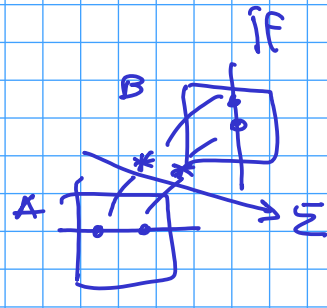
~~(PIC)~~



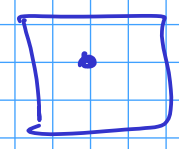
Intel
i3 e5
i5 e7
i7

Haswell 16
Cores x socket

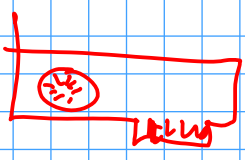
Intel



TTFFTF



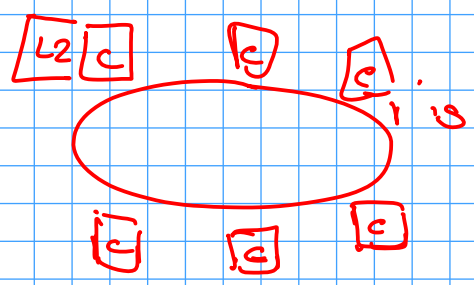
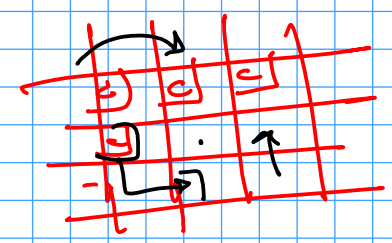
Xeon Phi



KNC
(64)
x86
Cores
4 way hyperthreading

KNL

64
4 way



TILERA PRO 64

64 Bisc Cores
3 x 2D mesh

