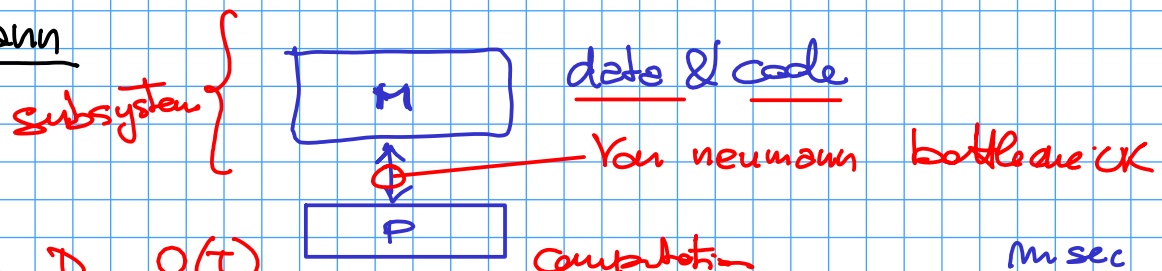
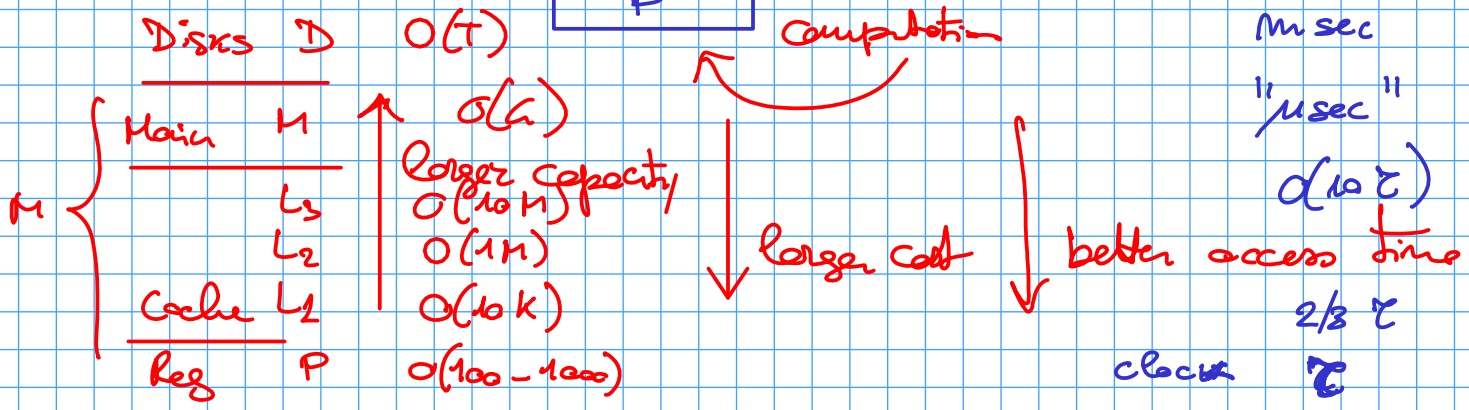
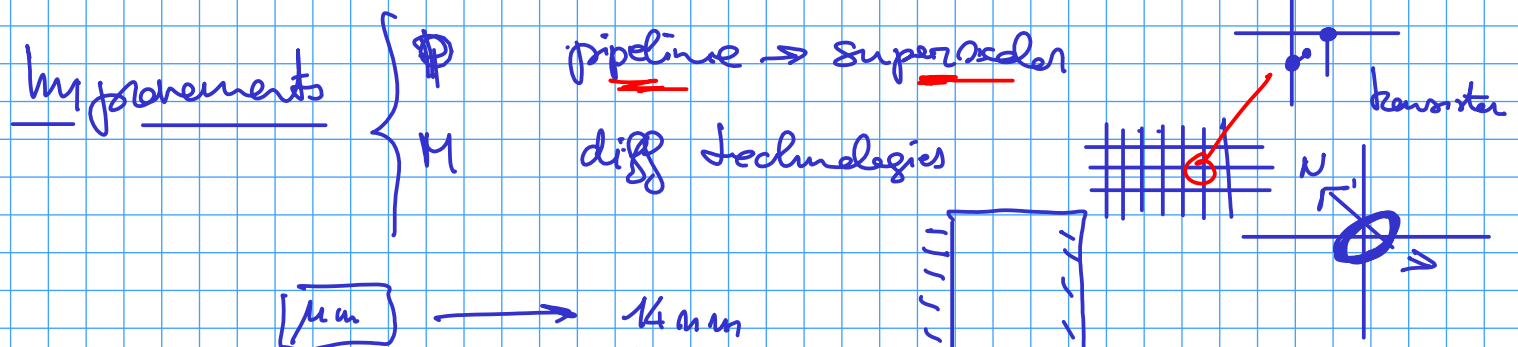
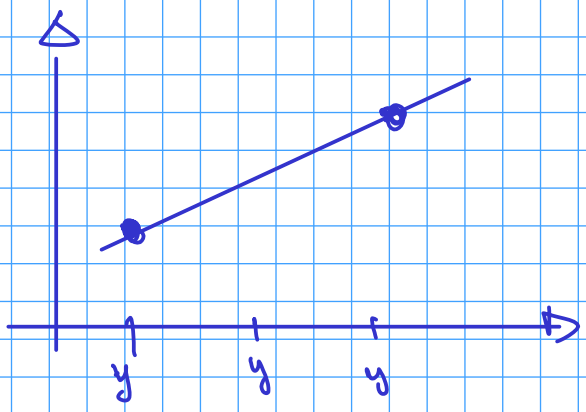
Von Neumann



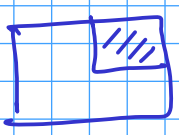






→ 2000

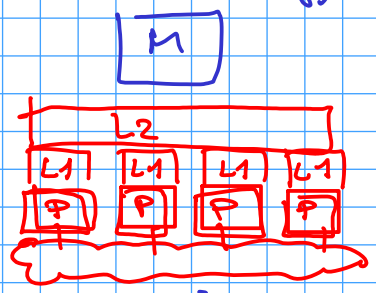
1990



10% area
10% time improvement

DARK SILYCON

multicores (shared memory)

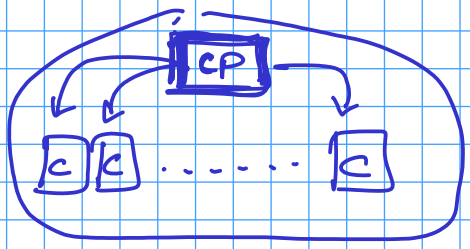


Intel i3 e5
i5 e7
i7

Haswell 16 cores x socket

many core → GPUs (GP-GPUs)

Nvidia AMD



general purpose multicores

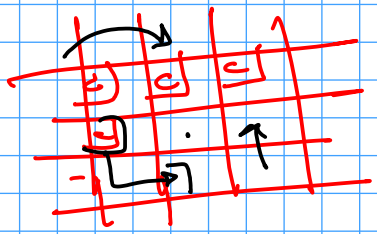
~~(MIC)~~

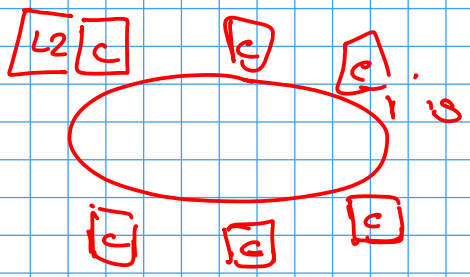
Intel

Xeon PHI

KNC (64) 60 x86 cores 4 way hyperthreading

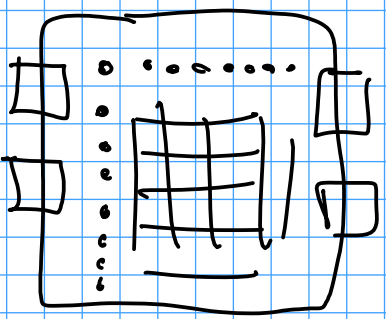
KNL 64 4way

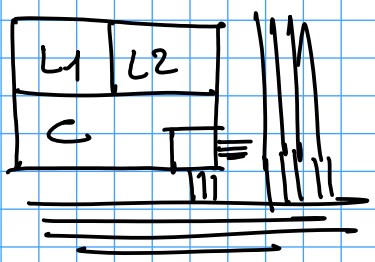




TILERA PRO 64

64 Risc cores
3 x 2D mesh





ACCELERATORS

AAC

#pragma .....

OpenMP

#pragma offload (mic) { }

Altera, Xilinx } OpenCL

FPGA

Field programmable gate array

VERILOG , VHDL