```
loop: 1  ADD   Ri, #-1, Ri-1
      2  LOAD  Rbase A, Ri-1, R1
      3  LOAD  Rbase A, Ri, R2
      4  ADD   Ri, #1, Ri+1
      5  LOAD  Rbase A, Ri+1, R3
      6  ADD   R2, R3, R4
      7  ADD   R1, R4, R5
      8  DIV   R5, #3, R6
      9  STORE Rbase B, Ri, R6
      10 INC   Ri
      11 JZ    Ri, Rv, loop
```

IU ← EU

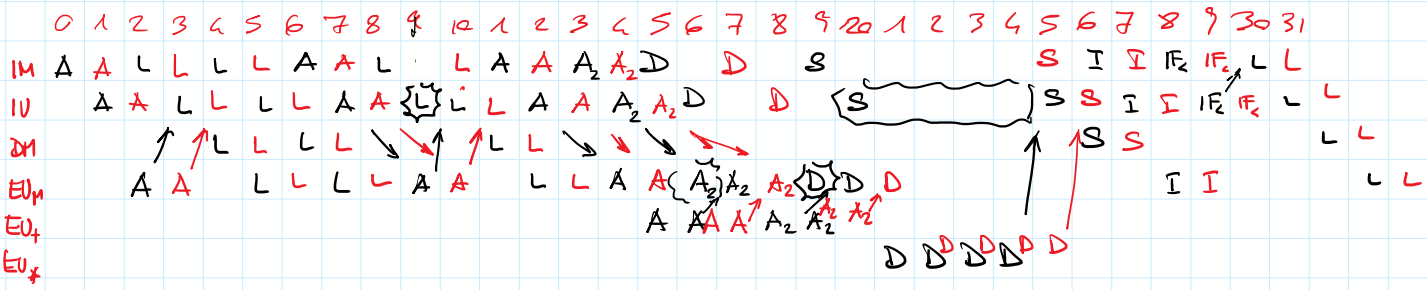
IU EU

EU – EU

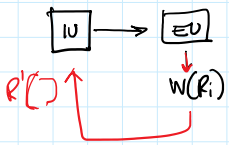
EU – EU

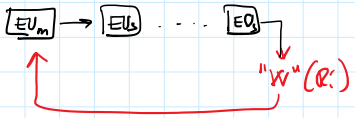
IU EU

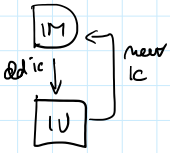
$$T = \frac{3ot}{22}$$



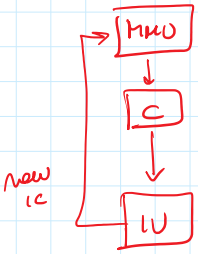
DIP LOGICHE

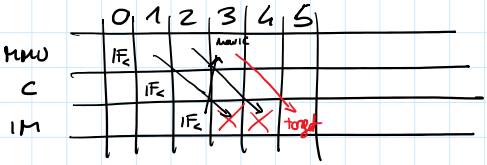






SALTI



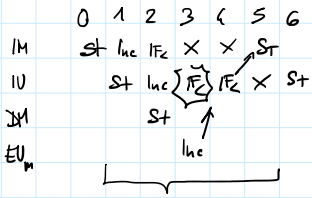



```
for(i=0; i<2N; i++) {
    x[i] = i;
}
```

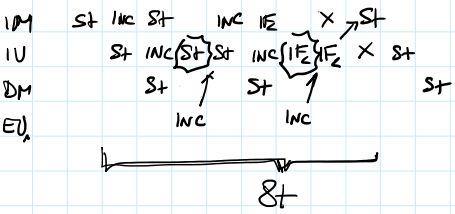
```
for(i=0; i<2N; i++) {
    x[i] = i;
    i++
    x[i] = i;
}
```

```
loop: STORE Rbasex, Ri, Ri
      INC Ri
      STORE Rbasex, Ri, Ri
      INC Ri
      IFc Ri, R2N, loop
```

```
CLEAR Ri
loop: STORE Rbasex, Ri, Ri   <- IU-EU
      INC Ri
      IFc Ri, R2N, loop
```



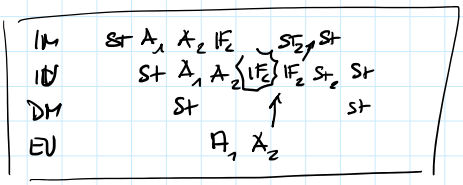
$T = \frac{St}{3}$



$T = \frac{8t}{6}$

~~Loop: STORE Rbasex Ri, Ri~~
~~INC Ri~~
~~INC Ri~~
~~IFc Ri R2N Loop delayed~~
~~STORE Rbasex', Ri, Ri~~

```
loop: STORE Rbasex Ri Ri
      ADD Ri, #1, R1
      ADD Ri, #2, Ri
      IFc Ri R2N, loop, delayed
      STORE Rbasex, R1, R1
```



A <-> A

```
STORE ——
ADD Ri, #2, Ri
SUB Ri, #1, Ri
IF          del
STORE ——
```

```
for( i=0; i<2N; i++ )
    X[i] = a[i] * b[i] + ...;
```

```
Loop: LOAD  R_baseA, Ri, R1
      LOAD  R_baseB, Ri, R2
      ADD   R1, R2, R3
      ADD   R3, Rx, R4
      STORE R_baseX, Ri, R4
      INC   Ri
      IF<   Ri, R2N, Loop
```

bolle da 2 — IU-EU
bolle da 1
bolle da 1

Loop
LOAD
LOAD
ADD
ADD
STORE
INC
LOAD
LOAD
ADD
ADD
STORE
INC
IF<

Loop
LOAD
LOAD
INC
ADD
ADD
IF<
STORE (delayed) R_baseX', Ri, R4

8t

11t

7t + 2 + 1 + 1

$T_s = \frac{11t}{7}$

20t

$T_s = \frac{19t}{14}$

MULTICORE

mercoledì 13 dicembre 2017 10:15

P_{seq} P_{PIPE} $P_{PIPE\ SUPERSCARE}$

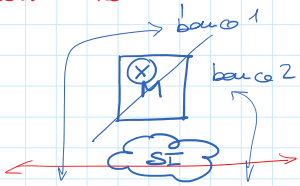
Multithreading

replicazione di componenti del processore

Multicore

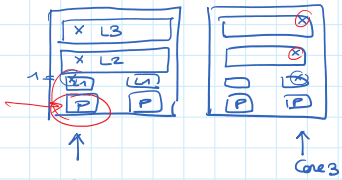
replicazione del P

architettura a memoria condivisa



NUMA

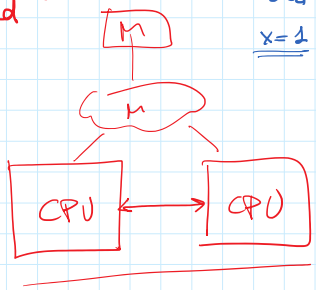
non uniform memory access

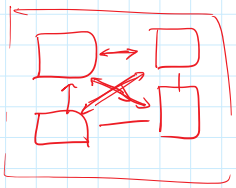


cache coherence

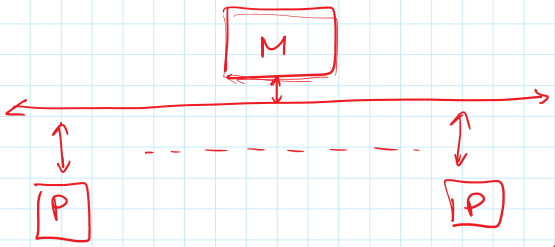
Snoopy based

directory based



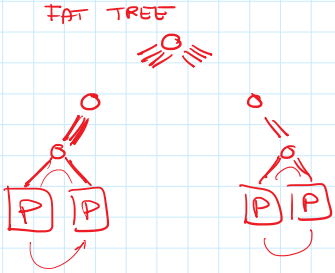


Multiprocessore Simmetrico



cluster

FAT TREE



Xeon Phi

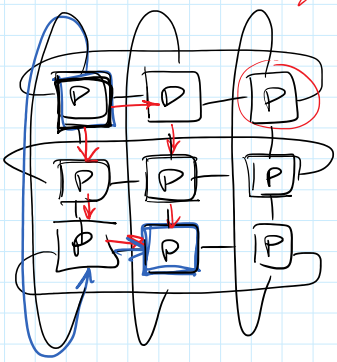
KNC

60 core

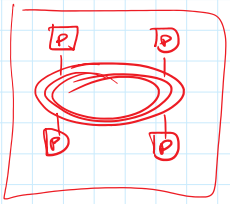
KNL

64/70 core

MESH

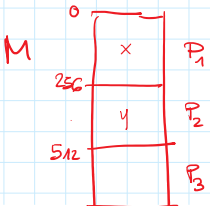


Dark silicon



PGAS

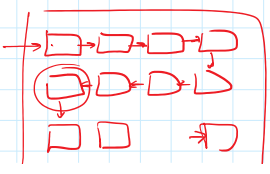
Partitioned Global Address Space

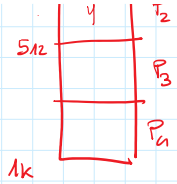


Epiphany V

1024

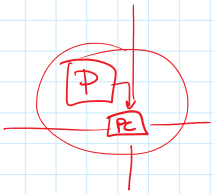
SI Mesh

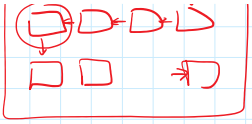




1024

Si Mesh





$\sqrt{n}$

CELL IBM