Simultaneous Multithreading

Hyperthreading (HT) is another name for SMT

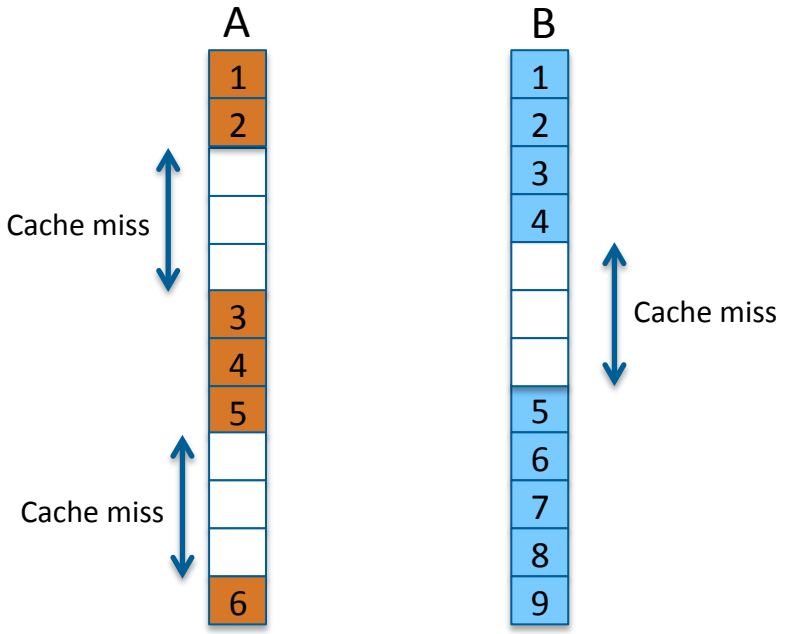
- Intel first used HT in its Xeon processor
- HT is also used in the Pentium 4 & Core i7

- HT provides two logical processors for each physical processor
- Increased Xeon's performance by 30%
- The cost in increased chip area was about 5%

- Requires reproducing registers:
  - Architectural, machine state and control registers

- All other resources are shared by logical processors including:
  - caches, execute units, branch predictors, control logic & buses

Throughput and Latency



12 cycles total
6 stall cycles due to cache misses
Efficiency = 6/12

12 cycles total
3 stall cycles due to cache misses
Efficiency = 9/12

17 cycles total
2 stall cycles due to cache misses
Efficiency = 15/17
Latency for B increases
Now 17 rather than 12