CS3210

Wang Xiyu

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1 Computer architecture

- Concurrency:
  - Multiple tasks can start, run and complete in overlapping time period
  - may not be running or executing at the same instant
  - multiple execution flows make progress at the same time by interleaving their execution OR by the same time
- Parallelism:
  - Multiple tasks running simultaneosuly
  - Not only making progress, but also execute simultaneously
- Single processer:
  - Bit level paralleism:
    - parallelism by increasing the processor word size, e.g. parallel addition of 64 bit numbers on 32 bit machine
  - Instruction level parallelism:
    - pipelining: [time parallelism] number of pipeline stages = maximum achievable speedup
    - superscaling: [space parallelism] Duplicate the pipeline, multiple instruction can be on the same excution stage. Scheduling is challenging. Stronger structural hazard, less cycles per instruction