comp3370

PERFORMANCE

- We need to measure computer system performance for a number of reasons but doing so is <u>not as simple as it may seem</u>
- There are different types of performance
  - E.g. performance of different components: CPU vs. Memory vs. I/O performance
- Also, sometimes certain kinds of performance matter more than others
  - E.g. think about a stream mining application
    - Highly memory bound so ...

Measuring Performance (cont'd)

- In this section of the course we will begin by thinking about **processor** performance primarily, then discuss overall system performance
  - Always with an interest in making comparisons
- Later, as we discuss memory, I/O and parallelism, we will revisit performance measurement with a focus on those specific aspects
- Always remember that in CS "performance is a business" so we need to use caution

- <u>Processor</u> performance can be measured using a number of metrics, some good, some bad, some just plain ugly
  - Processor metrics give us a sense of very **specific** aspects of performance and are useful primarily to people doing computer design
- <u>System</u> performance is best measured by running **real** programs (or parts thereof)
  - These give us a better sense of general performance and are of broader interest

Measuring Performance (cont'd)

- We must make intelligent choices when measuring performance to get the information we really need

- Performance is also key to understanding organization/ architecture decisions

  - Why is some <u>hardware</u> better for certain programs?

  - What factors of <u>system</u> performance are HW related?

    - E.g. do we need a <u>new machine</u> or a <u>new OS</u> or ...?

  - How does the machine's <u>instruction set</u> affect performance?

- Overall Philosophy: Measure, Report, and Summarize

- Computer designers use performance measurement to drive performance-related design decisions
  - e.g. Should I implement a larger register set?
- But, performance is not the only goal in design
- Computer architecture and implementation choices must consider performance but also **cost (1)**, **software compatibility** (2)and a **number of other factors (3)**
- Designers must manage the tradeoffs between all of these factors to meet a machine's target market requirements