

comp3370

PERFORMANCE

Sep15-Sep24

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Measuring Performance

- We need to measure computer system performance for a number of reasons but doing so is not as simple as it may seem
- 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 ...

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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

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Measuring Performance (cont'd)

- Processor 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
- System 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

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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 hardware better for certain programs?
 - What factors of system performance are HW related?
 - E.g. do we need a new machine or a new OS or ...?
 - How does the machine's instruction set affect performance?
- **Overall Philosophy:** Measure, Report, and Summarize

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Measuring Performance (cont'd)

- 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

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