COSC 201 Introduction

Spring 2014
Plan today

- Syllabus Review
- Why you are taking this course
The whole process

101, 102, 122, 302, 304, ...

Problems

Algorithms

High-level Software

Assembly Code

Computer Hardware

Digital Logic Gates

Transistors

201, 301
Who cares?

- Matrix-matrix multiplication example on a modern quad-core Intel processor
  - data courtesy of Steve Lumetta, Saman Amarasinghe, Martin Rinard, Charles Leiserson, ...

<table>
<thead>
<tr>
<th>If you...</th>
<th>You run...</th>
<th>So far...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ignore multicore</td>
<td>3.5x slower</td>
<td>3.5x</td>
</tr>
<tr>
<td>Don’t use Intel’s tuned assembly</td>
<td>2.7x slower</td>
<td>~10x</td>
</tr>
<tr>
<td>Ignore vector instructions</td>
<td>2.8x slower</td>
<td>~25x</td>
</tr>
<tr>
<td>Ignore cache size</td>
<td>1.7x slower</td>
<td>~50x</td>
</tr>
<tr>
<td>Ignore data layout</td>
<td>3.4x slower</td>
<td>~150x</td>
</tr>
<tr>
<td>Use Java</td>
<td>2.1x slower</td>
<td>~300x</td>
</tr>
</tbody>
</table>
Two course learning goals

- There is no magic in computing
- Places to start looking when performance matters