CMSC B110: Introduction to Computing
Spring 2012 – Section 1

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Lectures
Tues/Thurs 4-5:30 pm in Park 349

Labs
Tues/Thurs 5:30-6:30 pm in Park 231

Office Hours
Tues/Thurs 1-4 pm by arrangement in Park 250

Grading
- 7 Assignments 42%
- 6 Problem Sets 18%
- Exam 1 20%
- Exam 2 20%
Total 100%

What is Computing?

Computing: Web, e-mail, social...

Computing: Productivity...

Computing: Digital Photography

Computing: Entertainment...
Computing: Gaming...

2011 Jeopardy!

- In February 2011, IBM Watson bested Brad Rutter (biggest all-time money winner) and Ken Jennings (longest winning streak)
- IBM is currently applying Watson’s technology to medical diagnosis and legal research

Finding Life-Supporting Planets

“Computer science is no more about computers than astronomy is about telescopes”

- Edsger Dijkstra
Computing is important.

Fastest Growing Occupations

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<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Network systems and data communications analysts</td>
<td>292.0</td>
<td>447.0</td>
<td>155.8</td>
<td>53.36 VH</td>
</tr>
<tr>
<td>Computer software engineers, applications</td>
<td>514.8</td>
<td>689.0</td>
<td>175.1</td>
<td>34.01 VH</td>
</tr>
<tr>
<td>Computer software engineers, systems software</td>
<td>394.8</td>
<td>515.0</td>
<td>120.2</td>
<td>30.44 VH</td>
</tr>
</tbody>
</table>


...many different companies ... need to hire computer scientists. They aren’t tied to one particular industry.

How many of us are studying CS?
United States and Canada

Secondary Schools

| Secondary schools offering introductory or pre-AP Computer Science courses, change from 2005 baseline |
|--------------------------------------------------|--------------------------------------------------|
| 2007 | 2009 |
| Yes | -5% | -10% |

Secondary schools offering AP Computer Science courses, change from 2005 baseline

<table>
<thead>
<tr>
<th>2007</th>
<th>2009</th>
</tr>
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<tbody>
<tr>
<td>Yes</td>
<td>20%</td>
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Source: Computer Science Teachers Association survey data for high schools

Running On Empty: The Failure to Teach K-12 Computer Science in the Digital Age
http://www.acm.org/nwresearcher/
We've turned a corner...

• "Stanford University enrollment for in CS106A (CS1) [in 2010/2011] is 1087, which represents a year-on-year growth of 51%"
• Why?
  1. I'm just curious
  2. Increase my potential to land a good job
  3. I love computing
  4. Need to fill a requirement
  5. Other...


What can be programmed?

http://www.videophoneinsider.com/video-phone-history/

Google’s Autonomous Car

• Nevada made it legal for autonomous cars to drive on roads in June 2011
What is a Computer Program?

A collection of human and machine readable statements that can be translated to instructions executable by a computing device.

A text file.

Creative Introduction to Computing

Our Goal

- Use computing to realize works of art
- Explore new metaphors from computing: images, animation, interactivity, visualizations
- Learn the basics of computing
- Have fun doing all of the above!

Software

Processing
- Already installed in the CS Lab
- Also available for your own computer @ www.processing.org
- Processing == Java

Book

http://www.learningprocessing.com/
Primitive 2D Shapes

- point
- line
- triangle
- rect (rectangle)
- quad (quadrilateral, four-sided polygon)
- ellipse
- arc (section of an ellipse)
- curve (Catmull-Rom spline)
- bezier (Bezier curve)

http://processing.org/reference/

Anatomy of a Function Call

Function name Parentheses Arguments Statement terminator

```
line( 10, 10, 50, 80 );
```

Coordinate System

```
(0, 0) +x
```

Payloads

```
size( width, height );
```

Set the size of the canvas.

```
background( [0..255] );
```

Set the background grayscale color.
Drawing Primitives

point( x, y );
line( x1, y1, x2, y2 );
triangle( x1, y1, x2, y2, x3, y3 );
quad( x1, y1, x2, y2, x3, y3, x4, y4 );
rect( x, y width, height );
ellipse( x, y, width, height );

smooth() vs. noSmooth()

Colors

Composed of four elements:
1. Red
2. Green
3. Blue
4. Alpha (Transparency)

Why 0 .. 255?

Shape Formatting

1. Fill color
2. Line thickness
3. Line color

These are properties of your paintbrush, not of the object you are painting.

Fill Color

fill(gray);
fill(gray, alpha);
fill(red, green, blue);
fill(red, green, blue, alpha);
noFill();
**Stroke (Line) Color**

```javascript
stroke(gray);
stroke(gray, alpha);
stroke(red, green, blue);
stroke(red, green, blue, alpha);
noStroke();
```

**strokeCap()**

```javascript
smooth();
strokeCap(ROUND);
line(20, 30, 80, 30);
strokeCap(SQUARE);
line(20, 50, 80, 50);
strokeCap(PROJECT);
line(20, 70, 80, 70);
```

**strokeWeight()**

```javascript
smooth();
strokeWeight(1); // Default
line(20, 20, 80, 20);
strokeWeight(4); // Thicker
line(20, 40, 80, 40);
strokeWeight(10); // Beastly
line(20, 70, 80, 70);
```

**ellipseMode**

```javascript
ellipseMode(CENTER);
ellipse(35, 35, 50, 50);
ellipseMode(CORNER);
fill(102);
ellipse(35, 35, 50, 50);
```

**rectMode**

```javascript
rectMode(CENTER);
rect(35, 35, 50, 50);
rectMode(CORNER);
fill(102);
rect(35, 35, 50, 50);
```

**Dropbox**

- [https://www.dropbox.com/](https://www.dropbox.com/)

**Processing.JS**

- A Javascript implementation of Processing
- Runs in any modern web browser
  - Does not run well in IEB and under
- Most of Processing is implemented
  - Images are processed slowly
  - No file IO
- [http://processingjs.org](http://processingjs.org)

**Studio Sketchpad**

- Collaboratively edit, run and chat about a Processing.js program
  - [http://sketchpad.cc](http://sketchpad.cc)
  - [http://studio.sketchpad.cc](http://studio.sketchpad.cc)