CMSC 110
Introduction to Computing
Section 01
Dianna Xu

What is Computing?

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

Computing: Productivity...

Computing: Digital Photography

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

Mapping the Epigenome

Computing is important.

Fastest Growing Occupations

Table 1.9 Fastest growing occupations, 2008 and projected 2018
(Numbers in thousands)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Network systems and data communications analysts</td>
<td>292.0</td>
<td>447.8</td>
<td>155.8</td>
</tr>
<tr>
<td>Computer software engineers, applications</td>
<td>514.8</td>
<td>689.9</td>
<td>175.1</td>
</tr>
<tr>
<td>Computer software engineers, systems software</td>
<td>394.8</td>
<td>515.0</td>
<td>120.2</td>
</tr>
</tbody>
</table>


2015 Survey of 50,000 College Grads

- 54.6% of the class of 2014 are unemployed
- Of those that do have jobs...

https://www.looksharp.com/blog/what-50000-students-have-to-say-about-college-recruiting
Percent of Students Expecting Over $65k Starting Salary

US Bureau of Labor Statistics

3 out of 4 New Jobs

3 out of 5 Jobs

The Supply

The Competition

CS Bachelors Degrees Awarded at US PhD-Granting Institutions (Uhlbrich Survey)

Annual Total U.S. STEM Jobs Thru 2022 vs. Recent College Grad

Data Source: Computing Research Association, National Survey of Earned Doctorates; Data Table is in next year report.
What can be programmed?

How do you program?
What is a Computer Program?

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

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!

Why?
Examples

Shepard Fairey

Obamicons
Summertime

Summertime,
And the livin’ is easy
Fish are jumpin’
And the cotton is high
Your daddy’s rich
And your mamma’s good lookin’
So hush little baby
Don’t you cry

One of these mornin’s
You’re goin’ to rise up singing
Then you’ll spread your wings
And you’ll take to the sky
But till that mornin’
There’s a’nothing can harm you
With daddy and mamma standing by

Summertime,
And the livin’ is easy
Fish are jumpin’
And the cotton is high
Your daddy’s rich
And your mamma’s good lookin’
So hush little baby
Don’t you cry

Lyrics by George Gershwin

Who owes how much to whom?

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

Book
Processing: Creative Coding & Generative Art in Processing 2 by Friends of ed, 2013.
Primitive 2D Shapes

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

Anatomy of a Function Call

Function name
Parentheses

Arguments
Statement terminator

line( 10, 10, 50, 80 );

Coordinate System

Pixels

http://processing.org/reference/
Processing Canvas

`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);`

Colors

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

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

```java
fill(gray);
fill(gray, alpha);
fill(red, green, blue);
noFill();
```

Stroke (Line) Color

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

strokeCap()

```java
smooth();
strokeWeight(12.0);
strokeCap(ROUND);
line(20, 30, 80, 30);
strokeCap(SQUARE);
line(20, 50, 80, 50);
strokeCap(PROJECT);
line(20, 70, 80, 70);
```

strokeWeight()

```java
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

```java
ellipseMode(CENTER);
ellipse35, 35, 50, 50);
ellipseMode(CORNER);
fill(102);
```

rectMode

```java
rectMode(CENTER);
rect35, 35, 50, 50);
rectMode(CORNER);
fill(102);
```

 Dropbox

• https://www.dropbox.com/