JavaScript Basics

A First Taste of Programming

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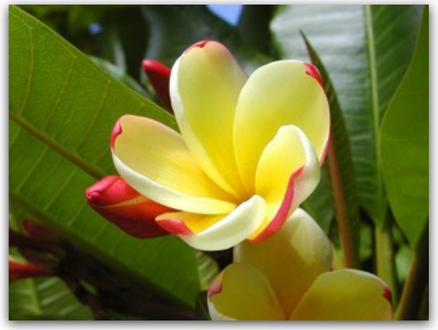
Developing a JavaScript Program

- JavaScript is a programming language

Developing a JavaScript Program

- JavaScript is a programming language
  - Processes input to produce a result



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Developing a JavaScript Program

- JavaScript is a programming language
  - Processes input to produce a result
  - Not related to Java
  - Runs in web browser
- JavaScript is powerful!
  - Dynamic, interactive web pages
  - Illustrates programming concepts
  - Examples that leverage computing power

First JavaScript Program

- Running program below creates black square image from Duke logo image

```
var image = new SimpleImage("duke_blue_devil.png");
for (var pixel of image.values()) {
  pixel.setRed(0);
  pixel.setBlue(0);
  pixel.setGreen(0);
}
print(image);
```

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Simple Program, No Pixels Processed

- Running program displays the Duke Blue Devil image.
  - Creates an image in the program
  - Displays the image created

```
var image = new SimpleImage("duke_blue_devil.png");
print(image);
```

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print(image);
```

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Deconstructing First JavaScript Program

- **`var image`** gets **`new SimpleImage("...");`**
- What code accesses/changes image?
  - Process every pixel, one at a time, stopping when …

```
var image = new SimpleImage("duke_blue_devil.png");
for (var pixel of image.values()) {
  pixel.setRed(0);
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  pixel.setGreen(0);
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```
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for (var pixel of image.values()) {
  pixel.setRed(0);
  pixel.setBlue(0);
  pixel.setGreen(0);
}
print(image);
```

What's in a Name? Variables Have Names

- **`thing`** gets **`new SimpleImage("...");`**
  - How to access all pixels of thing
    - use **`thing.values()`**, print thing
  - Name elements of **`thing.values()`**

```
var thing = new SimpleImage("duke_blue_devil.png");
for (var p of thing.values()) {
  p.setRed(0);
  p.setBlue(0);
  p.setGreen(0);
}
print(thing);
```

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Elements of Programs: Variables

- The JavaScript programs we'll study and you'll write have common elements
  - Variables — have names, types, values
    - Name: thing, image, pixel, p
    - Type: image and pixel (later other types)
    - Value: blue devil image, rgb(,,) in top left

```
var thing = new SimpleImage("duke_blue_devil.png");
for (var p of thing.values()) {
  p.setRed(0);
  p.setBlue(0);
  p.setGreen(0);
}
print(thing);
```

Elements of Programs: Statements

- JavaScript programs are composed from statements
  - Assignment statements
  - For (loop) statements
  - Method call statements
  - Print statements

```
var thing = new SimpleImage("duke_blue_devil.png");
for (var p of thing.values()) {
  p.setRed(0);
  p.setBlue(0);
  p.setGreen(0);
}
print(thing);
```

Playing with JavaScript Programs

- You can change code, run new program, see if you can "predict" output
  - What knowledge needed for prediction?

```
var image = new SimpleImage("duke_blue_devil.png");
for (var pixel of image.values()) {
  pixel.setRed(255);
  pixel.setBlue(255);
  pixel.setGreen(255);
}
print(image);
```

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Playing with JavaScript Programs

- You can change code, run new program, see if you can "predict" output
  - What knowledge needed for prediction?

```
var bb = new SimpleImage("duke_blue_devil.png");
for (var pp of bb.values()) {
  pp.setRed(255);
}
print(bb);
```

Playing with JavaScript Programs

- You can change code, run new program, see if you can "predict" output
  - What knowledge needed for prediction?

```
var bb = new SimpleImage("duke_blue_devil.png");
for (var pp of bb.values()) {
  pp.setRed(255);
  pp.setGreen(255);
}
print(bb);
```

Playing with JavaScript Programs

- RGB values equal in each pixel
  - All zero is black, all 255 is white

```
var flower = new SimpleImage("hippieflower.jpg");
for (var p of flower.values()) {
  var avg = (p.getGreen() + p.getRed() + p.getBlue()) / 3;
  p.setRed(avg);
  p.setBlue(avg);
  p.setGreen(avg);
}
print(flower);
```

Credits

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