Introduction to Programming

Class 22, 11 November 2016

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- Sit where you want today.

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Goals

Goal 1: You will understand by modularization and abstraction are important programming techniques.
Goal 2: You will know how to implement a function in javascript.

Vocabulary

abstraction
modularization
function
refactor
local variables

Code

```
function name() {}
<script src=""></script>
```

Partners

- Sit where you want today.

- **If you could choose your age forever, what age would you choose and why?**

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BIG IDEAS!

1. Algorithms, self-contained step-by-step set of operations, are used to develop and express solutions to computational problems.
2. Effective computer programs are often the result of a collaborative effort.
3. Computers use a process called **abstraction** which reduces information and detail to facilitat focus on relevant concepts.

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Apps
Files
Typing
prompt()

If the user knows what something does, but doesn't know how it does it, that's abstraction.

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BIG SKILLS!

1. Memory (Variables)
2. Selection (Conditionals, if-statements)
3. Iteration (Repetition, for and while loops)

4. Modularization (.js, functions)

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4. Modularization (.js, functions)

Separating programs into self-contained pieces. Each piece doing a different job.

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Modularization

```
<!doctype html>
<html>
<head>
        <title>Commission</title>
</head>

<body>
        <script>

         var salesTotal = 0;
         var commTotal = 0;

         for (var i=0; i<3; i++) {
                var saleString = prompt("What is the sale amount?");
                var commRateString = prompt("What is the commission rate?");
                sale = parseFloat(saleString);
                commRate = parseFloat(commRateString);
                var comm = sale * (commRate / 100.0);

                salesTotal = salesTotal + sale;
                commTotal = commTotal + comm;
           }

         var message1 = "Total sales: " + salesTotal.toFixed(2);
         var message2 = "Total commission: " + commTotal.toFixed(2);

         var para = document.createElement("p");
         var text = document.createTextNode(message1);
         para.appendChild(text);
         document.body.appendChild(para);

         para = document.createElement("p");
         text = document.createTextNode(message2);
         para.appendChild(text);
         document.body.appendChild(para);

       </script>
</body>
</html>
```

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Modularization

commission.html

```
<!doctype html>
<html>
<head>
	<title>Commission</title>
</head>

<body>
	<script>
	</script>
</body>
</html>
```

commission.js

```
var salesTotal = 0;
var commTotal = 0;

for (var i=0; i<3; i++) {
	var saleString = prompt("What is the sale amount?");
	var commRateString = prompt("What is the commission rate?");
	sale = parseFloat(saleString);
	commRate = parseFloat(commRateString);
	var comm = sale * (commRate / 100.0);

	salesTotal = salesTotal + sale;
	commTotal = commTotal + comm;
}

var message1 = "Total sales: " + salesTotal.toFixed(2);
var message2 = "Total commission: " + commTotal.toFixed(2);

var para = document.createElement("p");
var text = document.createTextNode(message1);
para.appendChild(text);
document.body.appendChild(para);

para = document.createElement("p");
text = document.createTextNode(message2);
para.appendChild(text);
document.body.appendChild(para);
```

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Modularization

commission.html

```
<!doctype html>
<html>
<head>
        <title>Commission</title>
</head>

<body>
        <script src="commission.js>
        </script>
</body>
</html>
```

Must be in same folder

<script src="commission.js"></script>

commission.js

```
var salesTotal = 0;
var commTotal = 0;

for (var i=0; i<3; i++) {
        var saleString = prompt("What is the sale amount?");
        var commRateString = prompt("What is the commission rate?");
        sale = parseFloat(saleString);
        commRate = parseFloat(commRateString);

        var comm = sale * (commRate / 100.0);

        salesTotal = salesTotal + sale;
        commTotal = commTotal + comm;
}

var message1 = "Total sales: " + salesTotal.toFixed(2);
var message2 = "Total commission: " + commTotal.toFixed(2);

var para = document.createElement("p");
var text = document.createTextNode(message1);
para.appendChild(text);
document.body.appendChild(para);

para = document.createElement("p");
text = document.createTextNode(message2);
para.appendChild(text);
document.body.appendChild(para);
```

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DO

With your partner, MODULARIZE some of your progarms by creating separate .js files.

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Functions

commission.js

```
var salesTotal = 0;
var commTotal = 0;

for (var i=0; i<3; i++) {
        var saleString = prompt("What is the sale amount?");
         var commRateString = prompt("What is the commission rate?");
        sale = parseFloat(saleString);
        commRate = parseFloat(commRateString);

         var comm = sale * (commRate / 100.0);

        salesTotal = salesTotal + sale;
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}

var message1 = "Total sales: " + salesTotal.toFixed(2);
var message2 = "Total commission: " + commTotal.toFixed(2);

var para = document.createElement("p");
var text = document.createTextNode(message1);
para.appendChild(text);
document.body.appendChild(para);

para = document.createElement("p");
text = document.createTextNode(message2);
para.appendChild(text);
document.body.appendChild(para);
```

Functions are a way to *abstract* and *modularize* code.

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Functions

commission.js

```
var salesTotal = 0;
var commTotal = 0;

for (var i=0; i<3; i++) {
    var saleString = prompt("What is the sale amount?");
          var commRateString = prompt("What is the commission rate?");
    sale = parseFloat(saleString);
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          var comm = sale * (commRate / 100.0);

          salesTotal = salesTotal + sale;
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var para = document.createElement("p");
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para = document.createElement("p");
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```

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Functions

```
var para = document.createElement("p");
var text = document.createTextNode(message1);
para.appendChild(text);
document.body.appendChild(para);
```

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Functions

```
var para = document.createElement("p");
var text = document.createTextNode(message1);
para.appendChild(text);
document.body.appendChild(para);
```

```
function displaySales() {
  var para = document.createElement("p");
  var text = document.createTextNode(message1);
  para.appendChild(text);
  document.body.appendChild(para);
}
```

Function Definition

keyword **function**

function name

parentheses

```
function displaySales() {
  var para = document.createElement("p");
  var text = document.createTextNode(message1);
  para.appendChild(text);
  document.body.appendChild(para);
}
```

code block

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Functions

commission.js

```
var salesTotal = 0;
var commTotal = 0;

for (var i=0; i<3; i++) {
    var saleString = prompt("What is the sale amount?");
          var commRateString = prompt("What is the commission rate?");
    sale = parseFloat(saleString);
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          var comm = sale * (commRate / 100.0);

          salesTotal = salesTotal + sale;
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para = document.createElement("p");
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```
function displaySales() {
  var para = document.createElement("p");
  var text = document.createTextNode(message1);
  para.appendChild(text);
  document.body.appendChild(para);
}
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Functions

commission.js

```
var salesTotal = 0;
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for (var i=0; i<3; i++) {
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    sale = parseFloat(saleString);
    commRate = parseFloat(commRateString);

          var comm = sale * (commRate / 100.0);

          salesTotal = salesTotal + sale;
          commTotal = commTotal + comm;
}

var message1 = "Total sales: " + salesTotal.toFixed(2);
var message2 = "Total commission: " + commTotal.toFixed(2);
displaySales();
para = document.createElement("p");
text = document.createTextNode(message2);
para.appendChild(text);
document.body.appendChild(para);
```

```
function displaySales() {
  var para = document.createElement("p");
  var text = document.createTextNode(message1);
  para.appendChild(text);
  document.body.appendChild(para);
}
```

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Functions

commission.js

```
var salesTotal = 0;
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for (var i=0; i<3; i++) {
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    sale = parseFloat(saleString);
    commRate = parseFloat(commRateString);
          var comm = sale * (commRate / 100.0);

          salesTotal = salesTotal + sale;
          commTotal = commTotal + comm;
}

var message1 = "Total sales: " + salesTotal.toFixed(2);
var message2 = "Total commission: " + commTotal.toFixed(2);
displaySales();
para = document.createElement("p");
text = document.createTextNode(message2);
para.appendChild(text);
document.body.appendChild(para);
function displaySales() {
  var para = document.createElement("p");
  var text = document.createTextNode(message1);
  para.appendChild(text);
  document.body.appendChild(para);
}
```

Calling the function

Defining the function

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DO

With your partner, write a program that:

1. **Asks for a name and then displays a welcome message to that name. The program should do this THREE times.**

2. **Define and call a function greeting(), that modularizes your code.**

3. **Use a for loop.**

greeting.js

```
// Ask for name and greet

var name = prompt("What is your name?");
alert("Welcome, " + name);

name = prompt("What is your name?");
alert("Welcome, " + name);
```

```
name = prompt("What is your name?");
alert("Welcome, " + name);
```

greeting.js

```
// Main program
greeting();
greeting();
greeting();

// greeting will prompt user and welcome t
function greeting() {
  var name = prompt("What is your name?");
  alert("Welcome, " + name);
}
```

greeting.js

```
// Ask for name and greet
for(var i=0;i<3;i++) {
   greeting();
}

function greeting() {
   var name = prompt("What is your name?");
   alert("Welcome, " + name);
}
```

greeting.js

```
// Main program
main();

// Prompt user for name and display output
function greeting() {
   var name = prompt("What is your name?");
   alert("Welcome, " + name);
}

// Call greeting three times
function main() {
   for(var i=0;i<3;i++) {
      greeting();
   }
}
```

greeting.js

```
// Main program
main();
```

The actual program

```
// Prompt user for name and display output
function greeting() {
   var name = prompt("What is your name?");
   alert("Welcome, " + name);
}

// Call greeting three times
function main() {
   for(var i=0;i<3;i++) {
      greeting();
   }
}
```

greeting.js

```
// Main program
main();
```

```
// Prompt user for name and display output
function greeting() {
   var name = prompt("What is your name?");
   alert("Welcome, " + name);
}
```

Function Definition for greeting()

```
// Call greeting three times
function main() {
   for(var i=0;i<3;i++) {
      greeting();
   }
}
```

greeting.js

```
// Main program
main();

// Prompt user for name and display output
function greeting() {
   var name = prompt("What is your name?");
   alert("Welcome, " + name);
}

// Call greeting three times
function main() {
   for(var i=0;i<3;i++) {
      greeting();
   }
}
```

Function Definition for main()

Running `greeting.js`

```
// Main program
main();                                                    current line

// Prompt user for name and display output
function greeting() {
   var name = prompt("What is your name?");
   alert("Welcome, " + name);
}

// Call greeting three times
function main() {
   for(var i=0;i<3;i++) {
      greeting();
   }
}
```

greeting.js

```
// Main program
main();

// Prompt user for name and display output
function greeting() {
   var name = prompt("What is your name?");
   alert("Welcome, " + name);
}

// Call greeting three times
function main() {
   for(var i=0;i<3;i++) {
      greeting();
   }
}
```

Local Variable

Local variables

* Declared in function
* Can't be used outside of function

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DISCUSS

Why are functions useful?

1. Simpler Code
2. Code Reuse
3. Better Testing
4. Faster Development
5. Easier Facilitation of Teamwork

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DO

With your partner, take the code that you modularized and refactor using functions.

Take turns being the driver.

Refactor: rewrite code using a different structure but without changing the functionality.

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Goals

Goal 1: You will understand by modularization and abstraction are important programming techniques.
Goal 2: You will know how to implement a function in javascript.

Vocabulary

abstraction
modularization
function
refactor
local variables

Code

```
function name() {}
<script src=""></script>
```