JavaScript, jQuery, and Ajax

JavaScript

- "Language of the web browser"
  - means of interfacing with DOM
- Loosely typed
- Powerful object literal notation (JSON)
- Prototypical inheritance
- Real-time DOM manipulation without HTTP requests
- Can initiate HTTP requests, too...

Just a normal programming language...

- Dynamically typed
  - var answer = "42";
  - var y = "The answer is "+answer;
- JS tries to be smart, sometimes fails
  - console.log(answer - 1) returns "41"
  - console.log(answer + 1) returns "421"
- Remedy with guidance on typing
- var answer = 42;
- console.log(answer - 1) returns 41
- console.log(answer + 1) returns 43

Syntax

- for(var i=0; i<10; i++){...}
- for(var myProp in myObject){...}
- while(condition){...}
- do {...} while(condition);

More syntax

- If, Else If, and Else

```
if(condition){
 ...
}else if(condition) {
  ...
}else {
  ...
}
```

Error handling

```
try {
  doSomething();
} catch (e){
  // Show errors here
} finally {
  // Always do this regardless of above
}
```

Error handling another [global] way

```
window.onerror = function ( message )
{
   document.getElementById("error").innerHTML = "New
   error: " + message;
}
```

Functions

```
function doSomething(theThing, theOtherThing){
  ...
  return "some value!"
}
```

Calling Functions

```
doSomething("something","another");

doSomething("something");

doSomething("something","another","dance!");

function myOtherFunction(){

    console.log(arguments);

}

myOtherFunction("a","b"); produces ["a","b"];

var foo = function(){console.log("bar");}

foo(); //produces "bar"
```

Asynchronous

```
foo();

function foo(){

console.log("bar");

}
```

```
foo(); //this will not work

var function(){

console.log("bar");

}
```

Objects

- var m = {"a": 3, "b": 42, foo: function() {console.log(this.a);}};

m.foo(); //produces 3

- m.b = "hello";

m['a'] = "world";

Namepsaces

- Global object
  - window in browsers
- Sub-namespaces
  - window.document to access DOM in browser

DOM Available onload

```
<html>
<head>
<script>console.log(document.getElementById('foo'));</script>
<!-- Yields null -->
</head>
<body>
  <p id="foo">test</p>
  <script>console.log(document.getElementById('foo'));</script>
  <!-- Yields <p id="foo">test</p> -->
</body>
</html>
```

Triggering with event listeners

```
<html>
<head>
<script>
document.addEventListener("DOMContentLoaded", function(event) {
  console.log(document.getElementById('foo'));
});
</script>
</head>
<body>
  <p id="foo">test</p>
</body>
</html>
```

Triggering with event listeners

```
<html>
<head>
<script>
function doit () {
  console.log(document.getElementById('foo'));
}
</script>
</head>
<body onload=”foo()”>
  <p id="foo">test</p>
</body>
</html>
```

Interacting with the DOM

- document.getElementById(id)
  - recall id is unique
- document.getElementByClassName(className)
  - returns array of all elements match class
- document.getElementById(id).getElementByClassNam e(className)
  - returns only children of element with id matching className
- var myLink = document.getElementsByTagName("a")
- myLink.href or myLink["href"]
- myImage.src = "newImage.png"

Gotcha: Global Variables

- Normally evil, required in JS (global)
- Language provides workarounds
- var myVariables = myValue;
- window.myVariable = myValue;
  - window is the global variable in the browser
- myvariable = myValue
  - use variable without declaration

Gotcha: Scope

- Block syntax but no block scope
  - variable declared in a block is visible everywhere in the containing function
- best to declare variables at top of function
- In most languages, variables should be declared on first use

Gotcha: Auto semi-colon

- JS tries to work with malformed code
- return

  "foo";   //returns undefined
- return "foo"; //returns “foo”
- return

  ["2","3","4"];
- return ["2","3","4"]
- return ["2",

 ["3","4"];

Reserved Words

abstract boolean break byte case catch char class const continue debugger default delete do double else enum export extends false final finally float for function goto if implements import in instanceof int interface long native new null package private protected public return short static super switch synchronized this throw throws transient true try typeof var volatile void while with

Reserved Words

- If used as keys for objects, they must be quotes
- myObject[foo] is valid
- myObject[case] is invalid
- myObject["case"] is valid
- myObject = {foo: 3}; is valid
- myObject = {case: 3}; is invalid
- myObject = {"case": 3} is valid
- var foo is valid
- var case is invalid
- Reserved words cannot be used with dot notation
- myObject.foo is valid
- myObject.case is invalid
- myObject."case" is invalid
- More gotchas (see Appendix A of "JavaScript the Good Parts")

jQuery

- library commonly used to simplify JS operations
- overcomes some cross-browser compatibility issues
- included local library in web page prior to utilizing

```
<script src="jquery.js"></script>
<script>
...your jquery code...
</script>
```

jQuery

- $("#myLink") equivalent to document.getElementById('myLink');
- $(".items") equivalent to document.getElementsByClassName('items');
- Many DOM manipulation functions:
  - $("#myLink").css("color","red"); //sets inline css,
    $("#myLink").css("color"); //gets the already set value
  - $("#myLink").hide() //removes change CSS of element to not be visible
  - $("#myLink").remove() //removes element from DOM
- Large API of DOM manipulation functions

AJAX

- Asynchronous JavaScript And XML
- Fetching content after the page has loaded

AJAX via JS

```
var xhr = new XMLHttpRequest();
xhr.onreadystatechange = function() {
   if (xhr.readyState == XMLHttpRequest.DONE ) {
      if(xhr.status == 200){
         document.getElementById("myText").innerHTML = xhr.responseText;
      }
      else if(xhr.status == 400) {  // HTTP status
         alert('Error 400')
      }
      else {
         alert('Something other than HTTP 200 returned')
      }
   }
}

xhr.open("GET", "anotherURI.html", true); //third value specs synchronicity
xhr.send();
```

AJAX via jQuery

```
$.ajax({
    url: "anotherURI.html",
    done: function(response){
      $("myText").html(response);
    },
    fail: function() {...}
});
```

```
$.ajax({
    url: "changeThatValue.php",
    data: {"whichAttribute": thisAttribute, "toWhat": toThis},
    done: function(response){
      $("#myText").html(response);
    },
    fail: function() {...}
});
```

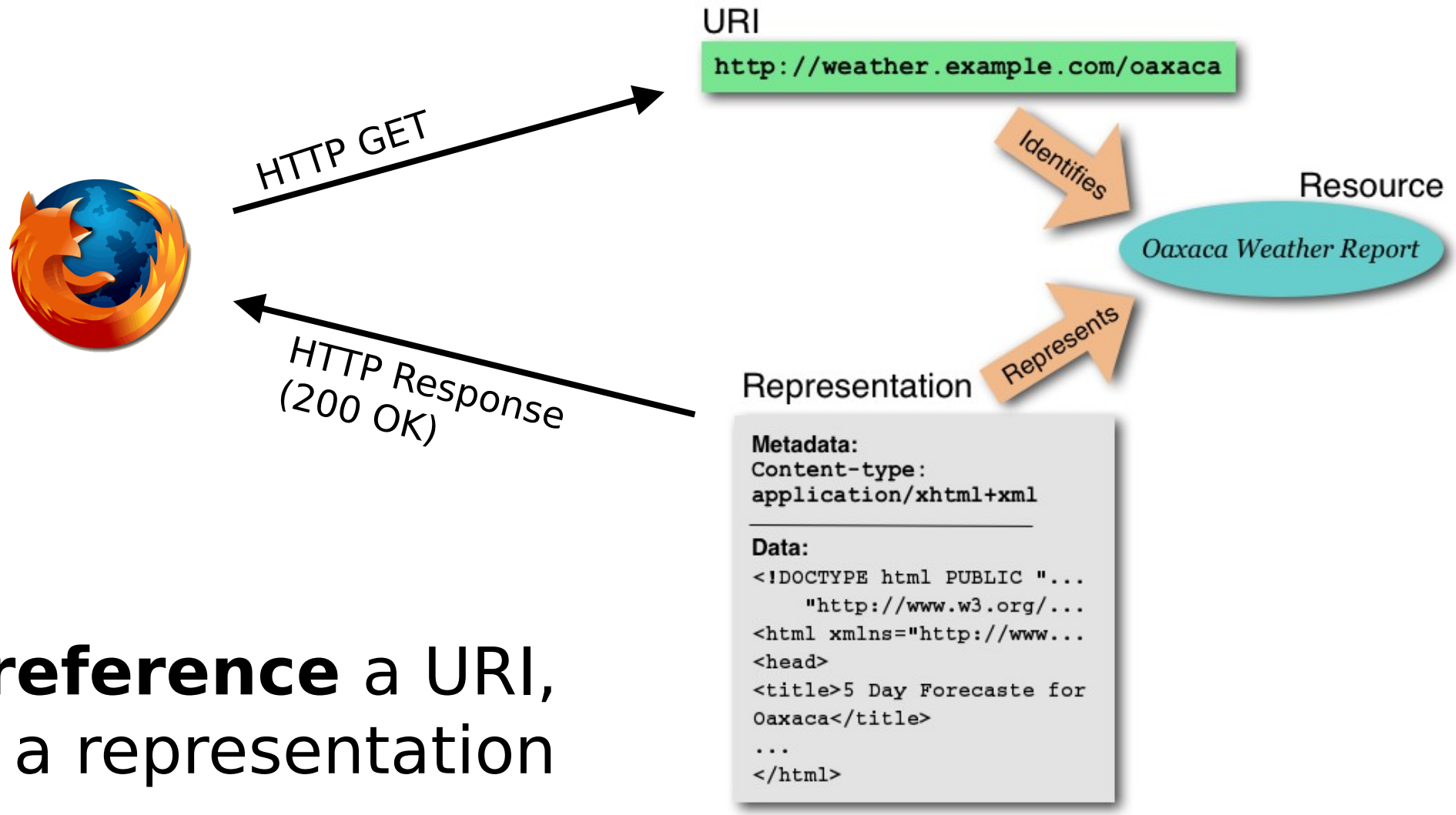
Code Practice

- JSLint - http://www.jslint.com/
- JSHint - http://jshint.com/

Node.js

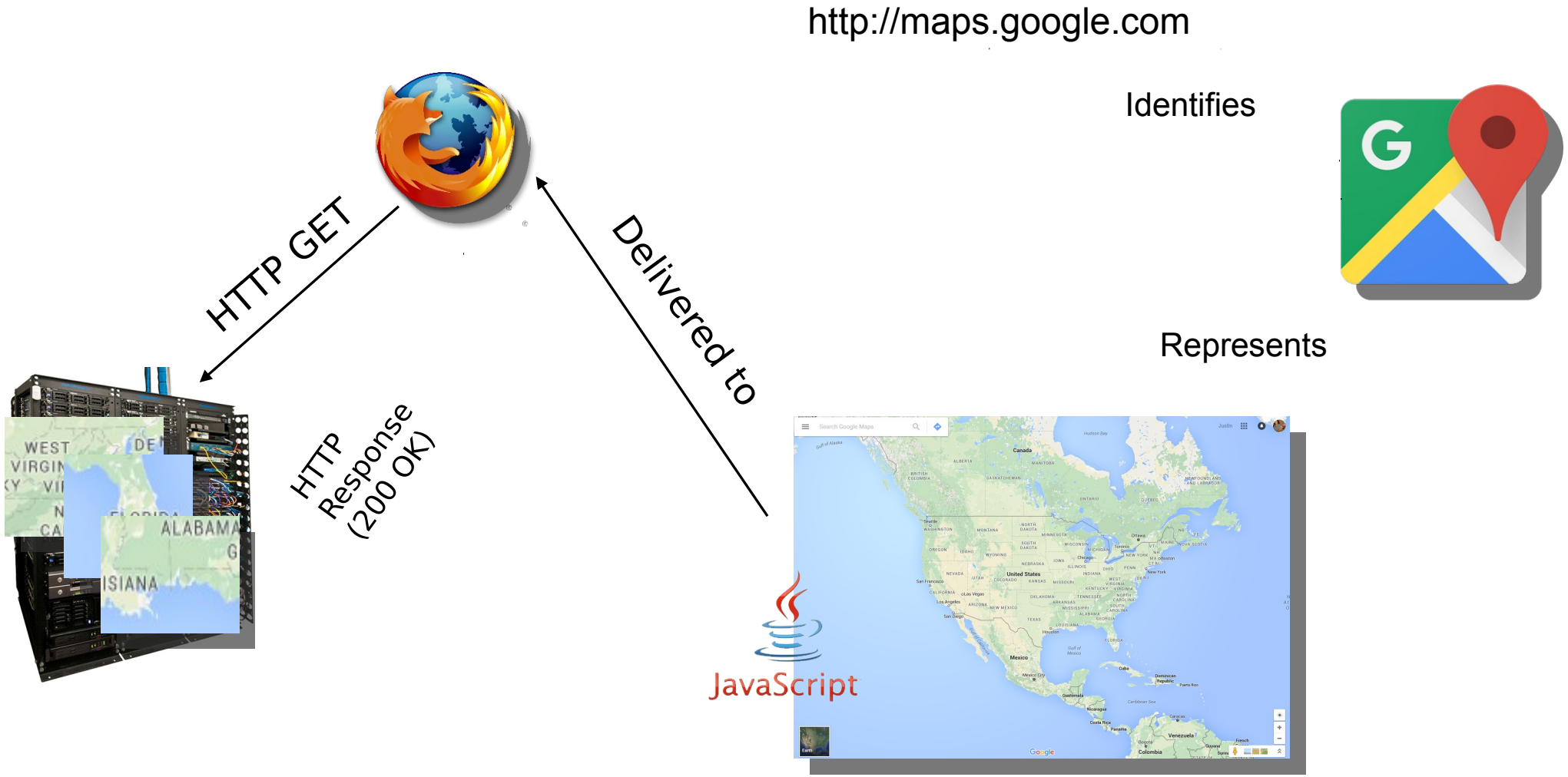
- Server-side JavaScript
- System independent of the browser
- global score is not window
- Intended for web services handling many asynchronous requests
- JavaScript code not dependent on the DOM is portable to Node.js

Web Architecture

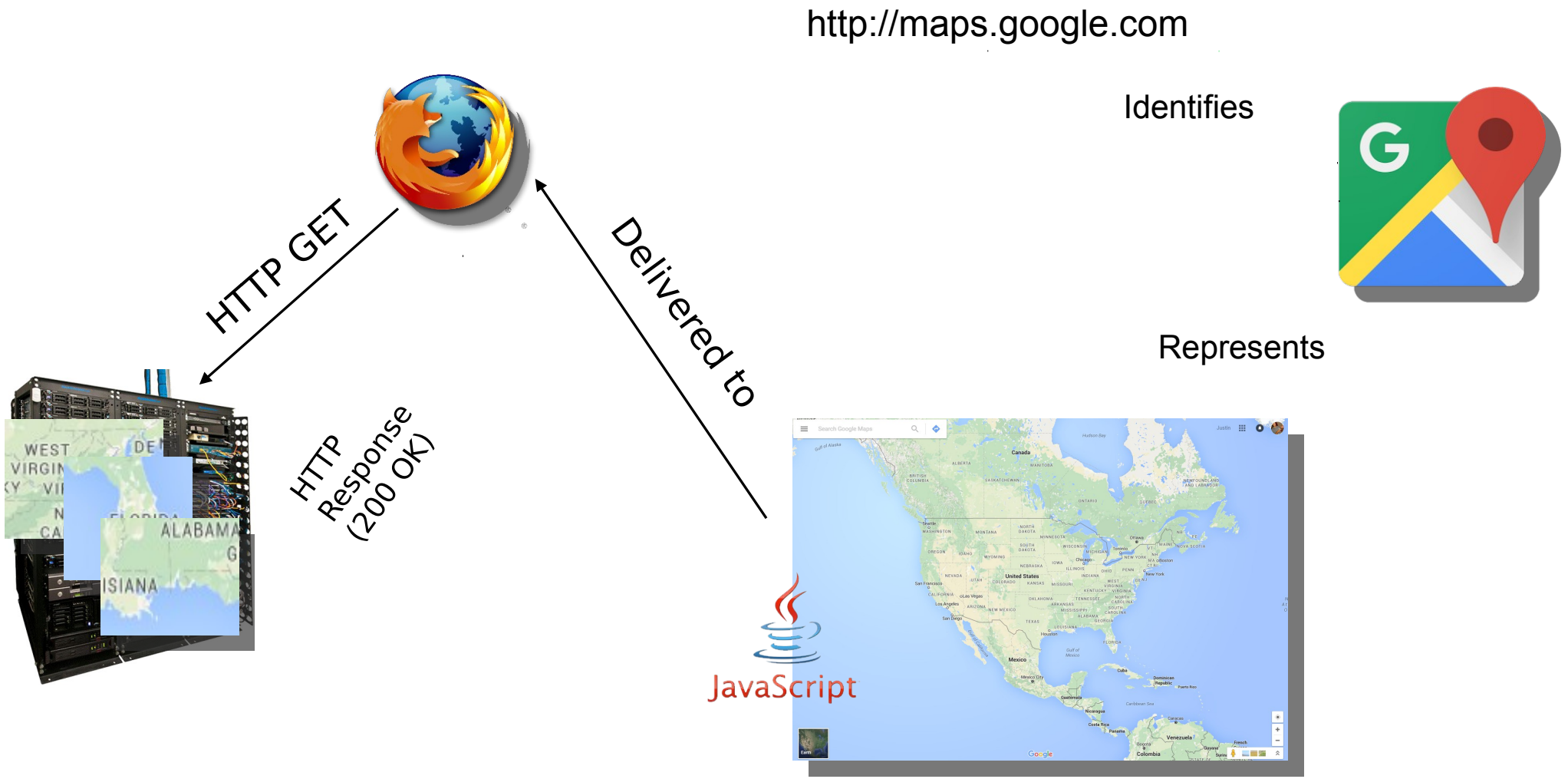


Dereference a URI,
get a representation

JavaScript makes requests for new resources after the initial page load



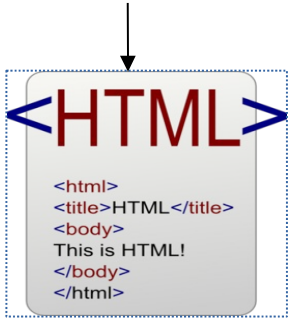
Deferred Representation



JavaScript != Deferred

Nondeferred

HTTP GET



HTTP GET

Contact Information:

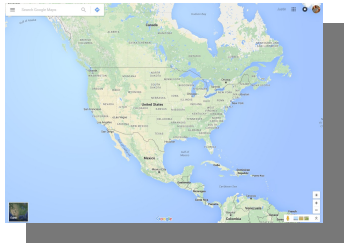
Office: (757) 683-6393
Email: mln@cs.odu.edu

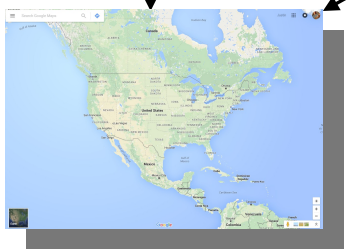
Show Phone Numbers Show E-Mail Address

Deferred

HTTP GET

HTTP GET





HTTP GET

200 OK

JavaScript Standards/quality

- JSHint.com
  - http://jshint.com/
  - JavaScript code quality
- JSLint.com
  - http://www.jslint.com/
  - JavaScript & JSON code quality

JavaScript Code Error Checking

- Check/enforce your own standards:
  - https://github.com/feross/standard
- Has automatic standards checker
- Error Checker
- Standards enforcer
- Standards changer

JavaScript Security

- Frequent topic of debate
- Example: “target=_blank”
  - New page can gain control of the opener
  - e.g., window.opener.location

https://www.jitbit.com/alexblog/256-targetblank---the-most-underestimated-vulnerability-ever/