# Introduction to Web Programming

## Lecture 19: More Events

### Event-Handling

- **11.1: Event-Handling**
- 11.2: Case Study: Multiplication Quiz

# JavaScript events

| abort | blur | change | click | dblclick | error | focus |
|---|---|---|---|---|---|---|
| keydown | keypress | keyup | load | mousedown | mousemove | mouseout |
| mouseover | mouseup | reset | resize | select | submit | unload |

- the `click` event (`onclick`) is just one of many events that can be handled

# The keyword `this`

```
this.fieldName                  // access field
this.fieldName = value;          // modify field

this.methodName(parameters);     // call method
```

- all JavaScript code actually runs inside of an object
- by default, code runs in the global `window` object (so `this === window`)
  - all global variables and functions you declare become part of `window`
- the `this` keyword refers to the current object

# Event handler binding

```
window.onload = function() {
  document.getElementById("textbox").onmouseout = booyah;
  document.getElementById("submit").onclick = booyah;       // bound to submit button here
};

function booyah() {            // booyah knows what object it was called on
  this.value = "booyah";
}
```

Save

- event handlers attached unobtrusively are **bound** to the element
- inside the handler, that element becomes `this`

# Fixing redundant code with `this`

```
<input id="huey"  type="radio" name="ducks" value="Huey"  /> Huey
<input id="dewey" type="radio" name="ducks" value="Dewey" /> Dewey
<input id="louie" type="radio" name="ducks" value="Louie" /> Louie
```

```
function processDucks() {
  if (document.getElementById("huey").checked) {
    alert("Huey is checked!");
  } else if (document.getElementById("dewey").checked) {
    alert("Dewey is checked!");
  } else {
    alert("Louie is checked!");
  }
  alert(this.value + " is checked!");
}
```

Huey Dewey Louie

- if the same function is assigned to multiple elements, each gets its own bound copy

# The event object

```
function name(event) {
  // an event handler function ...
}
```

- Event handlers can accept an optional parameter to represent the event that is occurring. Event objects have the following properties / methods:

| property name | description |
|---|---|
| type | what kind of event, such as "click" or "mousedown" |
| target | the element on which the event occurred |
| timeStamp | when the event occurred |

# Mouse events

| | |
|---|---|
| click | user presses/releases mouse button on the element |
| dblclick | user presses/releases mouse button twice on the element |
| mousedown | user presses down mouse button on the element |
| mouseup | user releases mouse button on the element |

clicking

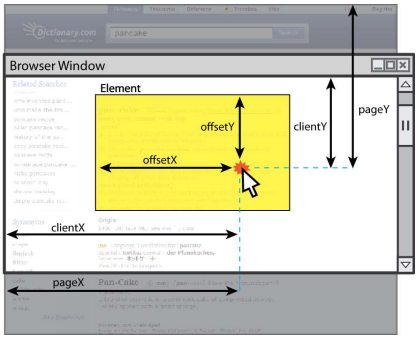
| | |
|---|---|
| mouseover | mouse cursor enters the element's box |
| mouseout | mouse cursor exits the element's box |
| mousemove | mouse cursor moves around within the element's box |

movement

# Mouse event objects

The `event` passed to a mouse handler has these properties:

| property/method | description |
|---|---|
| `clientX`, `clientY` | coordinates in *browser window* |
| `screenX`, `screenY` | coordinates in *screen* |
| `offsetX`, `offsetY` | coordinates in *element* (non-standard) |
| `button` | integer representing which button was pressed (0=Left, 1=Middle, 2=Right) |




# Mouse event example

```
<pre id="target">Move the mouse over me!</pre>
```

```
window.onload = function() {
  var target = document.getElementById("target");
  target.onmousemove = target.onmousedown = showCoords;
};

function showCoords(event) {
  document.getElementById("target").innerHTML =
    + "screen : (" + event.screenX + ", " + event.screenY + ")\n"
    + "client : (" + event.clientX + ", " + event.clientY + ")\n"
    + "button : "  + event.button;
}
```

Move the mouse over me!

# Keyboard/text events

| name | description |
|---|---|
| focus | this element gains keyboard **focus** (attention of user's keyboard) |
| blur | this element loses keyboard focus |
| keydown | user presses a key while this element has keyboard focus |
| keyup | user releases a key while this element has keyboard focus |
| keypress | user presses and releases a key while this element has keyboard focus |
| select | this element's text is selected or deselected |

Test key events here:

# Key event objects

| property name | description |
|---|---|
| keyCode | ASCII integer value of key that was pressed (convert to char with String.fromCharCode) |
| altKey, ctrlKey, shiftKey | true if Alt/Ctrl/Shift key is being held |

- issue: if the event you attach your listener to doesn't have the focus, you won't hear the event
  - possible solution: attach key listener to entire page body, document, an outer element, etc.

# Key event example

```
document.getElementById("textbox").onkeydown = textKeyDown;
...
function textKeyDown(event) {
  var key = String.fromCharCode(event.keyCode);
  if (key == 's' && event.altKey) {
    alert("Save the document!");
    this.value = this.value.split("").join("-");
  }
}
```

- each time you push down any key, even a modifier such as Alt or Ctrl, the keydown event fires
- if you hold down the key, the keydown event fires repeatedly
- keypress event is a bit flakier and inconsistent across browsers

# Some useful key codes

| keyboard key | event keyCode |
|---|---|
| Backspace | 8 |
| Tab | 9 |
| Enter | 13 |
| Escape | 27 |
| Page Up, Page Down, End, Home | 33, 34, 35, 36 |
| Left, Up, Right, Down | 37, 38, 39, 40 |
| Insert, Delete | 45, 46 |
| Windows/Command | 91 |
| F1 - F12 | 112 - 123 |

Type a key to see its code:

# Page/window events

| name | description |
|---|---|
| contextmenu | the user right-clicks to pop up a context menu |
| error | an error occurs when loading a document or an image |
| load, unload | the browser loads the page |
| resize | the browser window is resized |
| scroll | the user scrolls the viewable part of the page up/down/left/right |
| unload | the browser exits/leaves the page |

- The above can be handled on the `window` object

# Form events

| event name | description |
|---|---|
| submit | form is being submitted |
| reset | form is being reset |
| change | the text or state of a form control has changed |

Try me to see the events

Name

Vegetarian?

提交 重置

# Stopping an event

| event method name | description |
|---|---|
| `preventDefault` | stops the browser from doing its normal action on an event; for example, stops the browser from following a link when <a> tag is clicked, or stops browser from submitting a form when submit button is clicked |
| `stopPropagation` | stops the browser from showing this event to any other objects that may be listening for it |

- you can also `return false;` from your event handler to stop an event

# Stopping an event, example

```
<form id="exampleform" action="http://foo.com/foo.php">...</form>
```

```
window.onload = function() {
  var form = document.getElementById("exampleform");
  form.onsubmit = checkData;
};

function checkData(event) {
  if (document.getElementById("state").length != 2) {
    alert("Error, invalid city/state.");  // show error message
    event.preventDefault();
    return false;              // stop form submission
  }
}
```

# Multiple listeners to the same event

```
element.addEventListener("event", function);
```

```
var button = document.getElementById("mybutton");
button.addEventListener("click", func1);   // button.onclick = func1;
button.addEventListener("click", func2);   // button.onclick = func2;
```

- if you assign onclick twice, the second one replaces the first
- addEventListener allows multiple listeners to be called for the same event
- *(note that you do not include "on" in the event name!)*

# Multiple window.onload listeners

```
window.onload = function;
window.addEventListener("load", function);
```

- it is considered bad form to directly assign to window.onload
- multiple .js files could be linked to the same page, and if they all need to run code when the page loads, their window.onload statements will override each other
- by calling window.addEventListener instead, all of them can run their code when the page is loaded

window.onload