CSE3026: Web Application Development
Prototype

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Problems with JavaScript

JavaScript is a powerful language, but it has many flaws:

- the DOM can be clunky to use
- the same code doesn't always work the same way in every browser
  - code that works great in Firefox, Safari, … will fail in IE and vice versa
- many developers work around these problems with hacks (checking if browser is IE, etc.)

Prototype framework

```
<script src="prototype.js" type="text/javascript"></script>
```
JS

```
<script src="http://ajax.googleapis.com/ajax/libs/prototype/1.7.3.0/prototype.js"
  type="text/javascript"></script>
```
JS

- the Prototype JavaScript library adds many useful features to JavaScript:
  - many useful extensions to the DOM
  - added methods to String, Array, Date, Number, Object
  - improves event-driven programming
  - many cross-browser compatibility fixes
  - makes Ajax programming easier (seen later)
- In order to use Prototype JavaScript library :
  - download Prototype library from Prototype homepage
  - link to the downloaded Prototype.js in web page or the Google hosted Prototype JavaScript library

The $ function

```
$("id")
```
JS

- returns the DOM object representing the element with the given `id`
- short for `document.getElementById("id")`
- often used to write more concise DOM code:

```
$("footer").innerHTML = $("username").value.toUpperCase();
```
JS

Prototype's DOM element methods

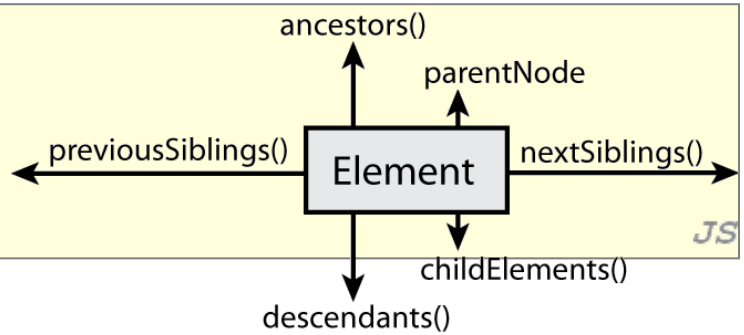
absolutize	**addClassName**	**classNames**	cleanWhitespace	clonePosition
cumulativeOffset	cumulativeScrollOffset	empty	extend	firstDescendant
getDimensions	getHeight	getOffsetParent	**getStyle**	getWidth
hasClassName	**hide**	identify	insert	inspect
makeClipping	makePositioned	match	positionedOffset	readAttribute
recursivelyCollect	relativize	**remove**	**removeClassName**	replace
scrollTo	select	setOpacity	setStyle	**show**
toggle	toggleClassName	undoClipping	undoPositioned	update
viewportOffset	visible	wrap	writeAttribute	

- categories: CSS classes, DOM tree traversal/manipulation, events, styles

Prototype's DOM tree traversal methods

method(s)	description
ancestors, up	elements above this one
childElements, descendants, down	elements below this one (not text nodes)
siblings, next, nextSiblings, previous, previousSiblings, adjacent	elements with same parent as this one (not text nodes)

```
// alter siblings of "main" that do not contain "Sun"
var sibs = $("main").siblings();
for (var i = 0; i < sibs.length; i++) {
    if (sibs[i].innerHTML.indexOf("Sun") < 0) {
        sibs[i].innerHTML += " Sunshine";
    }
}
```



- Prototype strips out the unwanted text nodes
- notice that these are methods, so you need `()`

Selecting groups of DOM objects

- methods in `document` and other DOM objects for accessing descendents:

name	description
`getElementsByTagName`	returns array of descendents with the given tag, such as `"div"`
`getElementsByName`	returns array of descendents with the given `name` attribute (mostly useful for accessing form controls)
`querySelector` *	returns the first element that would be matched by the given CSS selector string
`querySelectorAll` *	returns an array of all elements that would be matched by the given CSS selector string

* = HTML5 : older browsers did not support `querySelectorAll` methods

Prototype's methods for selecting elements

Prototype adds methods to the `document` object (and all DOM element objects) for selecting groups of elements:

`select`	array of descendants that match given CSS selector, such as `"div#sidebar ul.news > li"`
`$$`	equivalent to `document.querySelectorAll`

```
var gameButtons = $("game").select("button.control");
for (var i = 0; i < gameButtons.length; i++) {
    gameButtons[i].style.color = "yellow";
}
```
JS

The $$ function

```
var arrayName = $$("CSS selector");
```
JS

```
// hide all "announcement" paragraphs in the "news" section
var paragraphs = $$("div#news p.announcement");
for (var i = 0; i < paragraphs.length; i++) {
    paragraphs[i].hide();
}
```
JS

- `$$` returns an array of DOM elements that match the given CSS selector
  - like `$` but returns an array instead of a single DOM object
  - a shorthand for `document.select`
  - essentially equivalent to `document.querySelectorAll`
- useful for applying an operation each one of a set of elements

Common $$ issues

- many students forget to write `.` or `#` in front of a `class` or `id`

```
// get all buttons with a class of "control"
var gameButtons = $$("control");
var gameButtons = $$(".control");
```
JS

- `$$` returns an array, not a single element; must loop over the results

```
// set all buttons with a class of "control" to have red text
$$(".control").style.color = "red";
var gameButtons = $$(".control");
for (var i = 0; i < gameButtons.length; i++) {
    gameButtons[i].style.color = "red";
}
```
JS

- Q: Can I still select a group of elements using `$$` even if my CSS file doesn't have any style rule for that same group? (A: Yes!)

Problems with reading/changing styles

```
<button id="clickme">Click Me</button>
```
HTML

```
window.onload = function() {
    $("clickme").onclick = biggerFont;
};
function biggerFont() {
    var size = parseInt($("clickme").style.fontSize);
    size += 4;
    $("clickMe").style.fontSize = size + "pt";
}
```
JS

Click Me

output

- `style` property lets you set any CSS style for an element
- problem: you cannot (usually) read existing styles with it

Accessing styles in Prototype

```
function biggerFont() {
    // turn text yellow and make it bigger
    var size = parseInt($("clickme").getStyle("font-size"));
    $("clickme").style.fontSize = (size + 4) + "pt";
}
```
JS

Click Me

output

- `getStyle` function added to DOM object allows accessing existing styles
- `addClassName`, `removeClassName`, `hasClassName` manipulate CSS classes

Common bug: incorrect usage of existing styles

```
this.style.top = this.getStyle("top") + 100 + "px";          // bad!
```
JS

- the above example computes e.g. `"200px" + 100 + "px"` , which would evaluate to `"200px100px"`
- a corrected version:

```
this.style.top = parseInt(this.getStyle("top")) + 100 + "px";  // correct
```
JS

Setting CSS classes in Prototype

```
function highlightField() {
    // turn text yellow and make it bigger
    if (!$("text").hasClassName("invalid")) {
        $("text").addClassName("highlight");
    }
}
```
JS

- `addClassName`, `removeClassName`, `hasClassName` manipulate CSS classes
- similar to existing `className` DOM property, but don't have to manually split by spaces

Prototype form shortcuts

```JS
$("formID")["name"]
```

- gets parameter with given **name** from form with given **id**

```JS
$F("controlID")
```

- `$F` function returns the **value** of a form control with the given **id**

```JS
if ($F("username").length < 4) {
    $("username").clear();
    $("login").disable();
}
```