HTML 5

Lakshman M N
Tech Evangelist / Mentor
Lakshman.mn@gmail.com

What is HTML5?

- Next generation of HTML superseding HTML 4.01, XHTML 1.0, XHTML 1.1
- Standardizes features of the web platform *(window object has never been formally documented)*
- Designed to be cross-platform like its predecessors.
- Latest versions of Safari, Opera, Firefox, Chrome support ***many*** HTML5 features. *(IE 9 will support some HTML5 functionality)*

Design Principles: Compatibility

- Support Existing Content
- Degrade Gracefully
- Don't Reinvent the Wheel
- Evolution, not Revolution

Design Principles: Utility

- Solve Real Problems
- Media Independence
- Universal Access
- Support World Languages
- Secure By Design

Design Principles: Interoperability

- Well-Defined Behaviour
- Avoid Needless Complexity
- Handle Errors

New Features in CSS3

- `E[foo="bar"]`
  - Select an element, E, whose foo attribute contains the string bar
- `E:last-child`
  - Select an element, E, which is the last child of its parent element.
- `E:enabled`
  - Select a user interface element, E, which is enabled.
- `E:checked`
  - Select a user interface element, E which is checked or selected. (a radio button or checkbox)
- `E:first-of-type`
  - Matches an element E that is the first sibling of its type

HTMLPage06.htm

New effects in CSS3

- Some of the new properties in CSS3 include
  - `background`
  - `border-color` (gradient borders)
  - `opacity`
  - `resize`
  - `text-shadow`
  - `word-wrap`

Color - Opacity

- Adjusts the opacity of the selected element's presentation on screen.
- Takes values between 0.0 (fully transparent) and 1.0 (fully opaque)

```
div { background-color:#ff0; opacity:1.0; }
```

```
div { background-color:#ff0; opacity:0.5; }
```

CSS01.htm

RGBA Color

- Like RGB color definitions, but allows a fourth field, defining the alpha value of the color being applied.
- Like opacity, the alpha value is between 0.0 (fully transparent) and 1.0 (fully opaque)

```
div { background-color:rgb(0,255,0); }
```

```
div { background-color:rgba(0,255,0,0.5); }
```

CSS02.htm

HSL/A Color

- HSL color definitions accept three arguments: hue is a degree on a color wheel (0-360), saturation is a percentage, and lightness is a percentage.
- HSLA is like HSL color, but allows a fourth field, defining the alpha value of the color being applied.

```
div { background-color:hsl(240,50%,50%); }
```

```
div { background-color:hsla(240,50%,50%,0.5); }
```

CSS03.htm

border

- border-color
  - Allows for multiple border colors to be specified.
- border-radius
  - Curves the corners of the border using the radius given, often in pixels.

```
div { border:5px; border-style:solid; border-color:#000; border-radius:10px; }
```

CSS04.htm

box-shadow

- Creates a drop shadow beneath the selected element
- The first argument is the horizontal offset, the second is the vertical offset, the third is the blur radius and the final argument is the color to be used as the shadow.

```
div { box-shadow: 10px 10px 10px #333; }
```

CSS05.htm

text-shadow

- Creates a drop shadow beneath the selected text.
- The first argument is the horizontal offset, the second is the vertical offset, the third is the blur radius and the final argument is the color to be used.

```
p { text-shadow: 4px 4px 8px #333; }
```

CSS3 Text shadows

CSS06.htm

background

- Multiple background images for box elements can be specified using a comma-separated list.
- Each value in the list generates a separate "background layer"
- The first value in the list represents the top layer (closest to the user)

```
div.class1
 {
   width: 1024px;
   height: 768px;
   background-image: url(sheep.png), url(stonehenge.jpg);
   background-position: center bottom, left top;
   background-repeat: no-repeat;
 }
```

CSS07.htm

Transitions

- CSS3 helps developers create smooth transitions of CSS properties for elements.
- Basic CSS properties
  - **`transition-property`**
    - The CSS property to animate eg. `background-color`
  - **`transition-duration`**
    - Specified in seconds eg.2s
  - **`transition-delay`**
    - Delay before the transition start, specified in seconds eg. 1s
  - **`transition-timing-function`**
    - Used for appearance of the transition
    - Values include **`ease (default), linear, ease-in, ease-out, ease-in-out`**

CSS08.htm

CSS3 - Columns

- CSS3 allows for the creation of multiple columns for text layout.
- **`column-count`**
  - Specifies the number of columns an element should be divided into
- **`column-gap`**
  - Specifies the gap between the columns
- **`column-rule`**
  - Sets the width, color and style of the rule between columns.

CSS-MulticolumnDemo.htm

UI Properties - appearance

- CSS3 User Interface module introduces several new features that enable web designers to enhance the user experience.

appearance

- Allows changing any element into one of the standard UI elements.
- `appearance: normal | icon | window | button | menu | field`

CSS09.htm

UI Properties – box-sizing

- **box-sizing**
  - Allows defining of certain elements to fit an area in a certain manner.

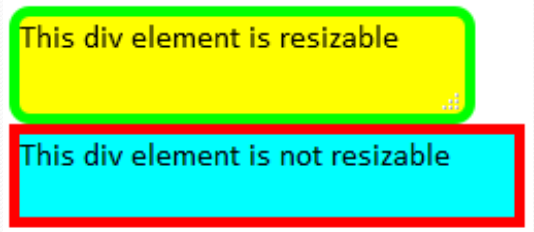
  `box-sizing : content-box | border-box | inherit`
  - **content-box** – default
  - **border-box** – the width specified for the element is the total width of the element including border if any.
  - **inherit** – box-sizing value inherited from the parent element.

CSS10.htm

UI Properties – resize

- The resize property grants users control over the size display of an element on a webpage.

```
resize : none| horizontal | vertical |
  both
```



CSS11.htm

Generated Content Properties

- CSS3 provides properties to insert and move content in a document
- Inserted content can include counters and strings.
- **content**
  - Used in conjunction with the :before or :after pseudo-elements, inserts generated content.
  - The generated content is only rendered, it does not appear in the DOM tree.

```
content:url(bottle.jpeg);
```

CSS13.htm

CSS Media Queries

- Media queries allow styling of elements for specific form factors using attributes like
  - Browser dimensions (width, height, aspect ratio)
  - Device dimensions (device-width, device-height)
  - Browser orientation
  - Color information (color, color index)
  - Device-specific details (resolution)

* Not all these properties are currently supported.

Media Features

- Media features are use to target media with values like "screen"
- **min-width, max-width**
  - This calls for a special stylesheet if the media device is a screen and the max-width of the viewing area is 800 pixels

```
<link rel="stylesheet" media="screen and (max-width: 800px)" href="styles1.css"/>
```

  - CSS declarations in the stylesheet can contain declarations specific to a device or width

```
@media screen and (max-width: 800px) {
body div {width: 760px;}
header nav ul {width: 740px;}
}
```

Media Features…

- Values can be combined by including "**min-width**" and "**max-width**" and are intended to serve different styles

```
@media screen and (min-width: 800px) and
  (max-width: 1200px)
{
    section {width: 100px;}
}
```

Media Features…

- **max-device-width**
  - This value is used to target mobile devices

```
@media screen and (max-device-width:
  480px)
{
.class1
 {
   backckground:#000;
 }
}
```

CSS-Media01.htm
defStyle.css
media-queries.css

Media Queries – Sample Sites

- http://hicksdesign.co.uk/
- http://colly.com/
- http://www.alistapart.com/d/responsive-web-design/ex/ex-site-FINAL.html
- http://teegallery.com/

HTML5 Detection Library

- Modernizr (http://www.modernizr.com)
  - An open source, MIT-licensed JavaScript library
  - Detects support for many HTML5 and CSS3 features
  - Runs automatically
  - Creates a global object called **`Modernizr`** that contains a set of Boolean properties for each feature it can detect.

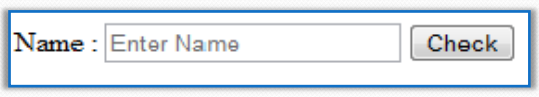
ModernizrDemo.htm

Forms

Placeholder Text

- This provides the ability to set placeholder text in an input field.
- It is displayed in the field as long as the field is empty and not focused.

```
<form>
   <label for="txtName">Name : </label>
   <input id="txtName"
          placeholder="Enter Name"/>
       <input type="submit" value="Check"/>
</form>
```



HTMLForm01.htm

Autofocus Fields

- JavaScript has been the choice to focus an input field on a form.
- HTML5 introduces an autofocus attribute on all form controls.
- Unlike scripts this is markup and therefore will be consistent across all sites.

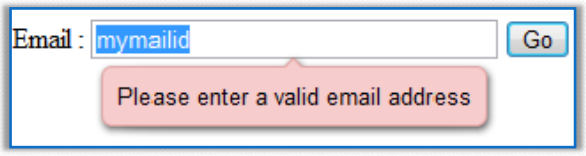
```
<form>
    <label for="txtName">Name : </label>
    <input id="txtName" type="text"
                                    autofocus/>
     <input type="submit" value="Check"/>
</form>
```

HTMLForm02.htm

Email addresses

- "email" is regarded as one the types of input in HTML5.

```
<form>
    <label for="txtEMail">EMail : </label>
    <input id="txtEmail"
                            type="email"/>
    <input type="submit" value="Go"/>
</form>
```



HTMLForm03.htm

Web Addresses

- The syntax of a web address is constrained by relevant Internet standards.
- "url" is one of the additions in HTML5.

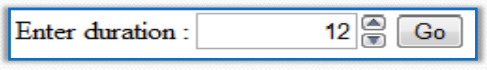
```
<form>
        <label for="txtURL">URL : </label>
        <input name="txtURL" type="url"/>
        <input type="submit" value="Go"/>
</form>
```

HTMLForm04.htm

Dealing with Numbers

- Numbers can be trickier than email or web addresses since we may need them in a range.
- We may need numbers of a certain kind in a range.
- HTML5 caters to these numbering needs!

```
<input type="number" min="0" max="10"
                    step="2" value="4"/>
```



HTMLForm05.htm

Dealing with Numbers…

- Slider controls can be used in forms.
- The type of input is “range”.
- The available attributes are the same as those for type=“number”.
- The difference is in the UI.

```
<input type=“range” min=“0” max=“10”
                step=“2” value=“4”/>
```

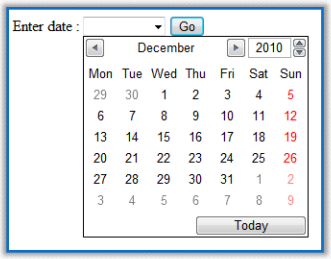
HTMLForm06.htm

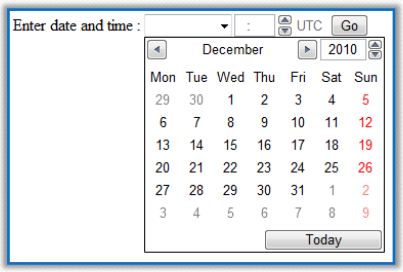
Date Pickers

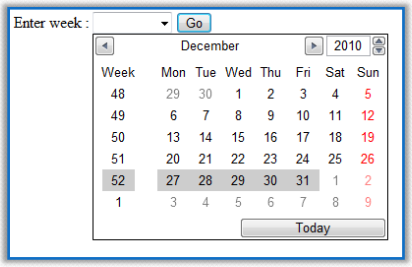
- Date picker control was sorely lacking in HTML4.
  - This was worked around with the help of JavaScript frameworks
- HTML5 defines a way to include a native date picker.
- Options include
  - date, month, week, time, date + time

Date Pickers…

```
<input type="date"/>
<input type="datetime"/>
<input type="week"/>
<input type="time"/>
<input type="month"/>
```







HTMLForm07.htm

Color Picker

- HTML5 defines an <input> element for color.
- It helps pick a color and returns the hexadecimal representation of the chosen color.

```
<input type="color"/>
```

HTMLForm08.htm

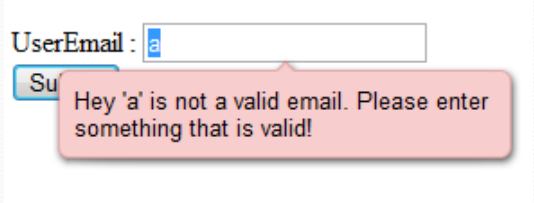
Required

- "required" attribute in HTML5 makes a field mandatory.
- <input type="text" required>

HTMLForm10.htm

Custom Validation Messages

- HTML5 shows validation messages in line with the field which fails validation.
- Custom messages can be shown instead of standard messages using **constraint validation API**
- The validation message can be set using **`element.setCustomValidity(message)`**

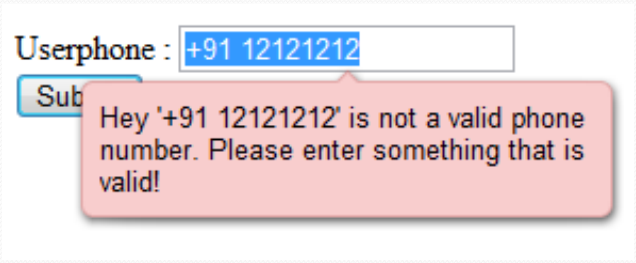


HTMLForm11.htm

Pattern

- The **Pattern** attribute is used for field validation and accepts values if they match a specific format.

```
<input type="text" name="Tel"
  pattern="[+]\d{1,3} \d{3}-\d{8}" />
```



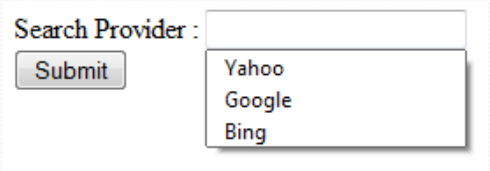
HTMLForm12.htm

DataList

- **<datalist>** specifies a list of pre-defined options for an **<input>** element.
- **<datalist>** can be used to provide a drop down from a text input. (auto-complete)
- The **list** attribute of the **<input>** element can be used to bind it with a **<datalist>** element.

DataList…

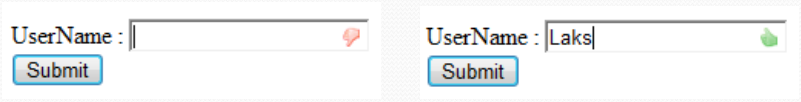
```
<input type="text" list="search_list"/>
<datalist id="search_list">
   <option value="http://www.yahoo.com"
  label="Yahoo"/>
   <option value="http://www.google.com"
  label="Google"/>
   <option value="http://www.bing.com"
  label="Bing"/>
</datalist>
```



HTMLForm13.htm

Styling inputs using CSS

- `input:required:invalid, input:focus:invalid`
  - Apply to inputs that are required but empty or
  - To inputs that have a required format that has not yet been met
- `input:required:valid`
  - Apply to inputs that are both required and valid



HTMLForm14.htm

Communication APIs

Background

- Communication between frames, tabs and windows in a running browser has been restricted due to security concerns.
- It may open up the possibility for malicious attacks.
- Information could be stolen if programmatic access to content across tabs or frames is permitted.

Background…

- There are legitimate cases for communication.
- "Mashups" are a combination of different applications such as messaging and news from different sites.
- These applications can be combined together to form a new meta-application.
- These applications would be served by direct communication channels inside the browser.

Cross Document Messaging

- A new feature, Cross Document Messaging enables secure cross-origin communication across
  - iframes
  - Tabs
  - Windows
- It defines the **`postMessage`** API as a standard way to send messages.

postMessage

```
otherWindow.postMessage(message,targetOrigin);
```

- **otherWindow**
  - A reference to another window; such a reference may be obtained
    - Using the **contentWindow** property of an iframe element
    - The object returned by **window.open**
    - By named or numeric index on **window.frames**
- **message**
  - String data to be sent to the other window.
- **targetOrigin**
  - Specifies what the origin of the **otherWindow** must be for the event to be dispatched, either as
    - a literal string "*" (indicating no preference)
    - Or a URI

The dispatched event

- **otherWindow** can listen for dispatched messages by executing a script

```
window.addEventListener("message",receiveMessage,true);
function receiverMessage(event)
{
  if (event.origin != "http://mysite.org")
  return;
}
```

- **data**
  - A string holding the message passed from the other window
- **origin**
  - The origin of the window that sent the message at the time **postMessage** was called.
- **source**
  - A reference to the window object that sent the message
    - Used to establish two-way communication between the two windows.

http://localhost/cdm/postmessage_main.htm
http://localhost/cdm/postmessage_rcv.htm

Origin Security

- An origin is a subset of an address used for modeling trust relationships on the web.
- Origins are made up of a scheme, a host and a port.
- Example
  - A page at https://www.mysite.com has a different origin than one at http://www.mysite.com because the scheme differs (https vs http)
- The path is not considered in the origin value.
  - A page at http://www.mysite.com/index.htm has the same origin as a page at http://www.mysite.com/page2.htm as only the paths differ.

Origin Security…

- Security rules for `postMessage` ensure that messages cannot be delivered to pages with unexpected origins.
- When sending a message, the sender specifies the receiver's origin.
- When receiving a message, the sender's origin is included as a part of the message.
  - The message's origin is provided by the browser and cannot be spoofed.
- This allows the receiver to decide which messages to process and which ones to ignore.

XMLHttpRequest

- XMLHttpRequest is the API that made Ajax possible.
- It is a JavaScript object that interacts with a Web server in order to submit or retrieve information in the background.

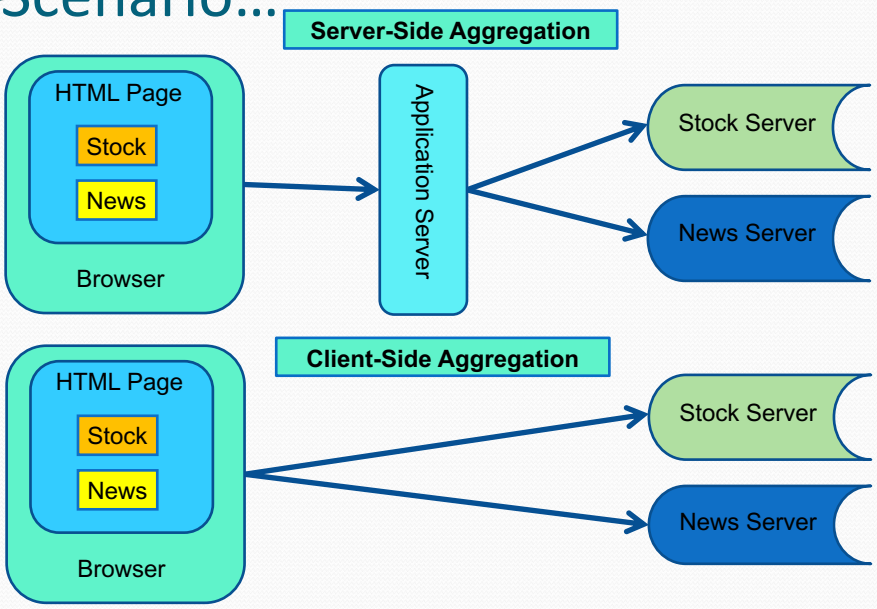
Limitations

- The lack of cross-browser solutions that enables retrieval of multiple responses from the HTTP server for the same AJAX request.
- XMLHttpRequest cannot upload files or communicate with different domain names.

Cross Origin XMLHttpRequest

- XMLHttpRequest Level 2 allows for cross-origin XMLHttpRequests using Cross Origin Resource Sharing (CORS)
- CORS uses the origin concept as in Cross Document Messaging.
- Cross-origin HTTP requests have an Origin header.
- The header provides the server with the request's origin.
  - The header is protected by the browser and cannot be changed.

Scenario...



Headers

- ***Request header***

```
POST /main HTTP/1.1
Host: www.mysite.com
User-Agent: Mozilla 5.0
Referer: http://www.mysite.com/
Origin: http://www.mysite.com
Cache-Control: no-cache
```

- ***Response header***

```
HTTP 1.1 201 Created
Transfer-Encoding: chunked
Date: Mon, 24 Jan 2011 07:00:00 GMT
Content-type: text/plain
Access-Control-Allow-Origin: http://www.mysite.com
Access-Control-Allow-credentials: true
```

Progress Events

- Previously XMLHttpRequest supported only a **`readystatechanged`** event.
- XMLHttpRequest Level 2 introduces progress events with meaningful nomenclature
  - **`loadstart`**
  - **`progress`**
  - **`abort`**
  - **`error`**
  - **`load`**
  - **`loadend`**
- The old **`readyState`** property and the **`readystatechange`** events will be retained for backward compatibility.

http://localhost/CDM/XHR-ProgressEvents.htm

Checking for Browser support

- XMLHttpRequest Level 2 has varying levels of browser support.
- It is good to check for XMLHttpRequest Level 2 support before using its functionality.
- Accomplished by checking whether the new **`withCredentials`** property is available on an XMLHttpRequest object.

Checking Browser support

```
var xhr = new XMLHttpRequest();
if (typeof xhr.withCredentials === undefined)
 {
   document.getElementById("support").innerHTML  =
  "Your browser <b>does not</b> support cross-origin
  XMLHttpRequest";
 }
else
{
  document.getElementById("support").innerHTML =
  "Your browser <b>does</b> support cross-origin
  XMLHttpRequest";
}
```

CheckXHR-Support.htm
http://localhost/CDM/CrossOriginXHR.htm
http://localhost/CDM/CrossOriginXHR-Events.htm

Server Sent Events

Polling

- A traditional technique used by a majority of AJAX applications.
- The application repeatedly polls a server for data.
- Fetching data revolves around a request/response format.
- Client makes a request and waits for the server to respond with data.
- In case of no data an empty response is returned.
- *Extra polling creates HTTP overhead.*

Long Polling

- A variation of polling in which if the server does not have data available, it holds the request open until new data is available.
- This technique is also known as “Hanging GET”.
- When information is available, the server responds, closes the connection.
- The effect is that the server is constantly responding with new data as it becomes available.

Server-Sent Events

- Server-Sent Events have been designed from scratch.
- When communicating using SSEs, a server can push data to the application whenever it wants.
- This does not require an initial request.
- Updates can be streamed from the server to the client as they happen.
- SSEs open a uni-directional channel between the server and client.
- Unlike long-polling, SSEs are handled directly by the browser.

The API

- To subscribe to a new event stream, start by creating a new EventSource object and pass in the entrypoint

```
var source = new
  EventSource("myEvents.php");
```

The API…

```
source.addEventListener("message",getData,false);

 function getData(e)
 {
   var data = e.data;
 }
```

- Information sent back from the server is returned via **`event.data`** as a string.
- The **`EventSource`** object will attempt to keep the connection alive with the server.
- The object can be forced to disconnect immediately by calling the **`close`**() method.

```
source.close();
```

The event stream

- Server events are sent along a long-lasting HTTP request with a MIME type of **`text/event-stream`**
- The format of the response is plain text.
- It is made up of the prefix **`data`**: followed by text.
- When there are two or more consecutive lines beginning with data:
  - it is interpreted as a multiline piece of data
  - The values are concatenated with a newline character.

```
data: sometext
data: somemoretext
```

The event stream

- The message event is never fired until a blank line is encountered after a line containing **`data`**:
- An ID can be associated with a particular event by including and **`id`**: line before or after the **`data`**:
- With the ID, the **`EventSource`** object keeps track of the last event fired.
- If the connection is dropped
  - A special HTTP header called **`Last-Event-ID`** is sent along with the request
  - The server can determine which event is appropriate to fire next.

http://localhost/CDM/ServerEvents.htm
http://localhost/CDM/myEvents.php

Summary

- SSEs are sent over traditional HTTP.
- SSEs are handled directly by the browser.
- SSEs provide features such as automatic reconnection, eventIDs and the ability to send arbitrary events.

HTML5 Web Sockets

Today's Requirements

- Today's Web applications demand reliable, real-time communications with near-zero latency
- Not just broadcast, but bi-directional communication
- Examples:
  - Financial applications
  - Social networking applications
  - Online games
  - Smart power grid

About HTTP

- HTTP was originally designed for document transfer
- Until now, it has been cumbersome to achieve real-time, bi-directional web communication due to the limitations of HTTP
- HTTP is half-duplex (traffic flows in only one direction at a time)
- Header information is sent with each HTTP request and response, which can be an unnecessary overhead.

HTML5 WebSocket

- W3C API and IETF Protocol
- Full-duplex text-based socket
- Enables web pages to communicate with a remote host
- Traverses firewalls, proxies, and routers seamlessly
- Leverages Cross-Origin Resource Sharing (CORS)
- Share port with existing HTTP content (80/443)

WebSockets

- WebSockets provide bi-directional, full-duplex communication channels over a single TCP socket.
- HTML5 WebSockets provide an enormous reduction in unnecessary network traffic and latency.
- WebSockets account for network hazards like proxies and firewalls, making streaming possible over any connection.
- WebSocket-based applications place less-burden on servers .

Basic WebSocket-based architecture

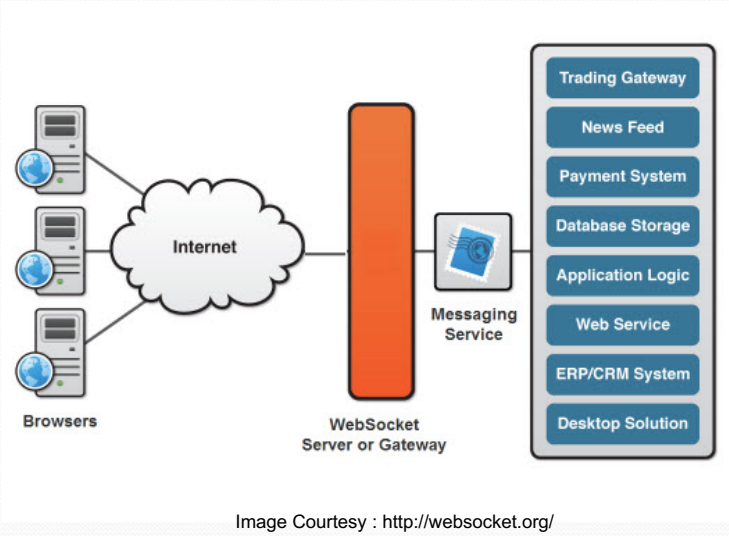


Image Courtesy : http://websocket.org/

The WebSocket API

In order to use the WebSocket interface,

- Create a new WebSocket instance providing the new object with a URL representing the end-point

```
var myWebSocket = new
            WebSocket("ws://example.com");
```

- URL Scheme
  - The WebSocket protocol specifications defines two URI schemes
    - **ws:** - for unencrypted connections
    - **wss:** - for encrypted connections

Check for Browser Support

- In order to use the HTML5 WebSocket API, browser support needs to be ensured.

```
if(window.WebSocket)
{
"supported"
}
else
{
"Not Supported"
}
```

CheckWebSocket-Support.htm

Sending Messages

- To send a message to the server, call the **`send()`** method and provide the content as the argument.
- After sending the message, optionally invoke the **`close()`** to terminate the connection.

```
myWebSocket.send("Hello WebSocket World");
myWebSocket.close();
```

WebSocket.htm

Server-Sent Events vs. WebSockets

- WebSockets are bi-directional while Server-Sent Events are not.
- Server-Sent Events are sent over plain old HTTP without any modification.
- WebSockets require new WebSocket servers to handle the protocol.
- SSEs have features such as automatic reconnection, event IDs that WebSockets lack.

SSEs vs. WebSockets

- A two-way channel as in a WebSocket is more useful for applications like games, messaging apps etc.
- Cases where data does not need to be sent from the client as in SSEs include friend's status updates, stock tickers, news feeds etc.

Summary

- WebSockets simplify authoring interactive real-time web applications.
- WebSocket API is simple to understand and use.
- WebSockets fit well into the existing infrastructure as they use the same ports as standard HTTP.
- The default port for WebSocket is 81 and the default port for secure WebSocket is 815.

Web Workers

JavaScript

- A number of limitations prevent interesting applications from being ported to client-side JavaScript.
- Some of these constraints include
  - Browser compatibility
  - Accessibility
  - Performance

JavaScript Concurrency

- One significant hindrance for JavaScript is the single-threaded environment.
  - Multiple scripts cannot run concurrently
- "Concurrency" is mimicked by using techniques like setTimeout() and event handlers.
- Asynchronous events are processed after the current executing script has yielded.

Web Workers

- HTML5 Web Workers provide background processing capabilities to web applications.
- They typically run on separate threads so that JavaScript applications can take advantage of multi-core CPUs.
- Web Workers can be used to handle computationally intensive tasks without blocking the UI.
- They are ideal for UI related tasks, performant and responsive to users.

Stepping In

- Web Workers run in an isolated thread.
- The code they execute needs to be contained in a separate file.
- Create a new Worker object in the main page.

```
var worker = new
             Worker("task1.js");
```

Stepping In…

- If the specified file exists, the browser will spawn a new worker thread.
  - The file is downloaded asynchronously
  - The worker will not begin execution until the file has completely downloaded.
  - If the path to the worker returns 404, the worker will fail silently.
- The worker is started by calling the **`postMessage`**() method

```
worker.postMessage();
```

Check for browser support

- Before using the Web Workers API functions, browser support for the same needs to be ascertained.

```
function loadDemo()
{
  if (typeof(Worker) != "undefined")
  {
     "Supports Web Workers";
  }
}
```

WebWorker01.htm

Communicating with a Worker

- Communication between a worker and its parent is accomplished using an event model and the **`postMessage()`** method.

```
myworker.postMessage("Hello Web Worker!");
```

- An event listener is added to listen for messages from the Web Worker.

```
myworker.addEventListener("message",workerMsg,false);
function workerMsg(e)
 {
   document.getElementById("divInfo").innerHTML +=
                        "Worker said : " + e.data;
 }
```

Communicating with a Worker

- The Web Worker JavaScript file must be setup to process incoming messages.

```
self.addEventListener("message",handler,true
 )
```

- *Messages passed between the main page and workers are copied, not shared.*
- The handler for the event

```
function handler(e)
{
  self.postMessage("worker says : " +
 e.data);
}
```

WebWorker02.htm
dotask.js

Stopping Web Workers

- Web Workers don't stop by themselves; but the page that started them can stop them.
- Calling **`worker.terminate()`** stops the Web Worker.
- A terminated Web Worker will no longer respond to messages.
- A Web Worker cannot be restarted.

WebWorker03.htm
dotask1.js

Features available to Workers

- Due to their multi-threaded behaviour, Web Workers only have access to a subset of JavaScript's features
  - **`navigator`** object
  - **`location`** object (read-only)
  - **`XMLHttpRequest`**
  - **`setTimeout() / clearTimeout()`**

Features not available to Workers

- Workers do NOT have access to
  - The DOM (it's not thread-safe)
  - **`window`** object
  - **`document`** object
  - **`parent`** object

Summary

- Web Workers can be used to create Web applications with background processing.
- Web Worker APIs help create new workers and facilitate communication between the worker and its context.

HTML5 Geolocation

You are Here!

- Geolocation is the art of figuring out our position in the world and optionally sharing that information.
- HTML5 Geolocation is an API that allows users to share their location with web applications.
- This facilitates location-aware services.

Location Information…

- HTML5 Geolocation API does not specify the underlying technology a device has to use to locate the user.
- It simply exposes an API for retrieving location information.
- The level of accuracy with which the location is pinpointed, is exposed by the API.

Location Information - Sources

- A device can use any of the following sources
  - IP address
  - Coordinate triangulation
    - GPS
    - Wi-Fi with MAC addresses from RFID, Bluetooth
    - GSM or CDMA cell IDs
  - User defined

IP Address Geolocation Data

- Previously, IP address-based geolocation was the only way to get a possible location.
- IP address-based geolocation works by looking up a user's IP address and then retrieving the registrant's physical address.
- **Pros**
  - Available everywhere
  - Processed on the server side
- **Cons**
  - Not very accurate
  - Costly operation

GPS Geolocation Data

- GPS provides accurate location as long as there is line of sight with the satellites.
- A GPS fix is acquired by acquiring the signal from multiple GPS satellites.
- It can take a while to get a fix, therefore this task can be asynchronous
- **Pros**
  - Very accurate
- **Cons**
  - Takes a while and consumes power
  - Does not work well indoors
  - Additional hardware

Wi-Fi Geolocation Data

- The information is acquired by triangulating the location based on the user's distance from a number of known Wi-Fi access points.
- **Pros**
  - Accurate
  - Works indoors
  - Can get a fix quickly
- **Cons**
  - Not good in rural areas

Cell Phone Geolocation Data

- Information is acquired by triangulating the location based on user's distance from a number of cell phone towers.
- The location result is fairly accurate.
- This method is used in combination with Wi-Fi and GPS based geolocation information.
- **Pros**
  - Fairly accurate
  - Works indoors
- **Cons**
  - Requires a device with access to cell phone
  - Not good in rural areas.

Privacy

- Geolocation is completely opt-in.
- HTML5 Geolocation specification mandates that location information should not be made available without user's consent.
- The browser can never automatically find the user's location.

Check for Browser Support

- In order to use HTML5 Geolocation API functions browser support needs to be checked for.

```
if(navigator.geolocation)
  {
    "Geolocation supported";
  }
else
  {
    "Geolocation not supported";
  }
```

Geolocation01.htm

Position Requests

- There are two types of position requests
- One-Shot Position Request
  - Retrieve the user's location only once or only by request.
- Repeated Position Request
  - Request and retrieve the user location at repeated intervals.

Optional Geolocation Request Attributes

- There are three optional attributes that can be provided to the HTML5 Geolocation service in order to fine-tune its data gathering approach
- **`enableHighAccuracy`**
  - A message to the browser that, if available, use a higher accuracy detection mode.
- **`timeout`**
  - Provided in milliseconds, telling the browser the maximum amount of time it is allowed to calculate the current position
- **`maximumAge`**
  - Indicates how old a location value can be before the browser must attempt to recalculate.

```
navigator.geolocation.getCurrentPosition(updateLoc
  ation
            ,handleLocationError,{timeout:10000});
```

Geolocation02.htm

Repeated Position Updates

- This will cause the Geolocation service to call the **`updateLocation`** handler repeatedly as the user's location changes

```
watchId =
  navigator.geolocation.watchPosition(
     updateLocation, handleLocationError);
```

- Turning off updates requires a call to the **`clearWatch()`** function

```
navigator.geolocation.clearWatch(watchId);
```

Geolocation03.htm

Share Me on a Google Map

- One extremely common request for geolocation data is to show a user's position on a map, such as the Google Maps service.
- The Google Map API has been designed to take decimal latitude and longitude locations.
- Hence the results of the position lookup can be passed to the Google Map API.

Geolocation04.htm

Summary

- Geolocation has gained in popularity over the last few years.
- Many web services add location into their apps.
- HTML5 Geolocation APIs can be used to create compelling, location-aware web applications.
- Privacy concerns however need to be considered.

HTML5 Web Storage

Background

- Browser cookies have been a way of sending text values back and forth from server to client.
- Servers can use the values in these cookies to track user information across web pages.
- Cookie values are transmitted back and forth every time a user visits a domain.
- Cookies can also be used for targeted advertising.

Background…

- Cookies have some well-known drawbacks:
  - Extremely limited in size. (generally about 4KB)
  - Cookies are transmitted back and forth from the server to browser. This implies
    - Cookie data is visible on the network
    - Data persisted as cookies will consume network bandwidth

The Need and the Solution

- In many cases data need not be transmitted repeatedly over a network to a remote server.
- HTML5 Web Storage provides API that
  - allows developers to store values in easily retrievable JavaScript objects that persist across page loads.
  - store large values as high as a few megabytes.
- Stored data is not transmitted across the network and is accessed on return visits to a page.
- Using **`sessionStorage`** or **`localStorage`**, data can survive across page loads or across browser restarts respectively.

Check for Browser Support

- The storage database for a given domain is accessed directly from the window object.

```
function checkStorageSupport()
 {
    if(window.sessionStorage)
    {
       "Browser supports sessionStorage"
    }
    else
    {
       "Browser does not support sessionStorage"
    }
 }
```

Check for Browser Support

```
if(window.localStorage)
{
    "Browser supports localStorage"
}
else
{
    "Browser does not support
localStorage"
}
```

WebStorage01.htm

Setting and Retrieving Values

- **`setItem()`** method associated with **`window.sessionStorage`** takes a key string and a value string.

```
window.sessionStorage.setItem("myFirstKey",
                              "myFirstValue");
```

- **`getItem()`** method helps retrieve the value for a particular key string.

```
alert(window.sessionStorage.getItem("myFirstKey"));
```

WebStorage02.htm

sessionStorage Characteristics

- All pages served from the same origin (scheme + host + port) can retrieve values set on **`sessionStorage`** using the same keys.
- Objects set into **`sessionStorage`** will persist as long as the browser window/tab is not closed.
- The **`sessionStorage`** API solves the problem of scoping of values.
  - For example, a shopping application that allows users to purchase air tickets.
  - The preference data such as the departure date and return date can be persisted instead of using cookies and still be accessible across pages.

Other Web Storage API Attributes

- Both **`sessionStorage`** and **`localStorage`** implement the **`Storage`** interface.
- Properties include
  - **`length`** – specifies how many key-value pairs are currently stored in the session object.
    - Storage objects are specific to their origin
  - **`key(index)`** – function allows retrieval of a given key.
    - Keys are zero-based.
    - Once a key is retrieved, it can be used to fetch its corresponding value
  - **`removeItem(key)`** – function that removes a value currently in storage under the specified key.

Summary

- HTML5 Web Storage can be used as an alternative to browser cookies
- Network traffic is reduced
  - User information is stored locally in the browser.
- Transient Storage
  - Data that is not required for a longer period of time can be stored in **`sessionStorage`**.
- Persistence
  - Data can be stored across browser restarts in **`localStorage`**.

WebStorage04.htm

Session Summary

- HTML5 is based on various design principles
  - Compatibility
  - Utility
  - Interoperability
  - Universal Access

Strategies for implementing HTML5 today

- Progressive enhancement
- Accessibility > validation
- Detect support for HTML5
- When can I use .... http://caniuse.com

HTML5 Gallery

- Apple-HTML5 Showcase
- Latest HTML5:: websites worldwide showcase gallery for HTML5 websites
- HTML5 Mania
- HTML5 Showcase
- HTML5 Rocks
- 101 Best HTML5 Sites
- 30 Extremely Useful HTML5 Tutorials and Tricks

HTML5 WYSIWYG Editor / Tools

- Adobe Dreamweaver CS5 +
- NetBeans 7.3 +
- Aptana Studio
  - Its available as stand-alone application and also available as eclipse IDE plug-in.
- Sublime Text
- WebStorm
- Maqetta
  - Maqetta is a browser based online development tool.
- Topstyle 4
  - Top style4 is also a good, powerful and rich functionality based tool for developing HTML5 and CSS3.
- Aloha Editor
  - The Aloha Editor is a browser-based rich text editor framework that was created in JavaScript.