



HTML5 with JavaScript APIs

By Vijay Shivakumar

By Vijay Shivakumar

<http://www.technicaltrainings.com>



Requirements ...

IDEs

Aptana Studio 3.0 from www.aptana.com

Visual Studio code from <https://code.visualstudio.com>

Atom or WebStorm

Browsers

Chrome, Firefox with firebug, Opera, IE (latest versions)

Web Servers (note : only if you are not using Aptana)

Tomcat or IIS or WAMP



About you...?

Designers

Developers

Content Writers

Business Analysts

Prior Knowledge on HTML or HTML5



Vijay Shivakumar
Designer | Developer | Trainer

Training on web and Adobe products from past 15 years



By Vijay Shivakumar

<http://www.technicaltrainings.com>



What I don not claim...

- To be associated with any of these technologies
- To teach you each and every thing about HTML 5
- That what ever I teach will never change
- That you wont have to learn anything on your own



Introduction to HTML 5

What is HTML 5 ?

New emerging web, mobile… standard

Why do we need it ?

Increasing user demands for enhanced experience.

Who is behind working for it

WHATWG | Web Hypertext Application Technology Working Group

Apple | Mozilla | Opera

Google, Adobe and many more contributing now.



What XHTML2.0 would be.

<http://w3.org/TR/2005/WD-xhtml2-20050527/>

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What HTML5 is

<http://whatwg.org>

Web Hypertext Application Technology Working Group

Backward Compatible
Utility

Promote Usage of HTML5

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General Changes

Support for existing contents

existing html xhtml pages should get similar results as html5

deal with broken markups

e.g. item 1

no corresponding closing tag

 item 2

badly nested elements

e.g. a <i> b c</i>

Graceful degrade

New elements to have fallback option

e.g. <canvas>fallback</canvas>

Use existing user agent specific attributes

Supporting widespread practices

e.g
 for

Evolution not revolution

it is better to evolve an existing design rather than throwing it away.



General Changes

Utility

Address existing problems

Separation of concerns new meaningful tags

Consistent DOM

Promote Usage of HTML5

Well defined behavior across browsers

Avoid complexity

Media independence

Accessibility



NEW APIs in HTML5



Giving meaning to structure, semantics and appropriateness of tags
Microdata offer structures for programs (machines).



Making apps start faster and be available without connection
Offline API, Local Storage, Indexed DB



Accessing the user device which includes. Geolocation API,
Orientation API (accelerometer), getUserMedia (access camera and mic)



Better communication via Web Sockets and Server pushing data
Cross domain communication



NEW APIs in HTML5



Plug-in Free Media



Captivating visuals with SVG, Canvas, WebGL, and CSS3 3D features



Performance Optimization with Web Workers and XMLHttpRequest2

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APIs in HTML5

Header

Semantics

Media Tags

Input Types / Form API

2D Canvas / 3D canvas

Geolocation

Form Validation

GetUserMedia API

Drag and Drop

Local Storage

Offline

CORS

Web Sockets

Web Workers

Microdata

File API

History API



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APIs in HTML5

Drag and Drop
Local Storage
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Web Workers

Microdata
File API
History API

Post Message API



We shall learn...

Canvas

SVG

Local Storage

Offline API

Web Workers

CORS

Socket API

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Less Header code

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Header Code in past

HTML 4.01 Strict
HTML 4.01 Transitional
HTML 4.01 Frameset
XHTML 1.0 Strict
XHTML 1.0 Transitional
XHTML 1.0 Frameset
XHTML 1.1

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01  
Transitional//EN"  
"http://www.w3.org/TR/html4/loose.dtd">
```



Header Code in Future

<!DOCTYPE html>



Header Code in past

```
<html xmlns="http://www.w3.org/1999/xhtml">
```

```
<html>
```

```
<html lang="en"> (optionally)
```

```
<meta http-equiv="Content-Type"  
      content="text/html; charset=utf-8" />
```

```
<meta charset="utf-8">
```



Header Code in past

```
<style type="text/css">  
<style>
```

```
<script type="text/javascript">  
<script>
```

```
<link type="text/css" rel="stylesheet" href="mystyle.css" />  
<link rel="stylesheet" href="mystyle.css" />
```



New Semantics

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DIV for division SPAN for selection

div tags were used to group other tags together



Meaningful Tags

header

hgroup

nav

main

section

article

aside

footer

figure

figcaption

time

mark



New in HTML 5.1

main :

shall be used to mark the main content of a web page, excluding footers, headers, navigation blocks, and sidebars. There shall NOT be more than one <main> element in a document



New Meaningful Tags

header :

will be on the top of page or content if required.

hgroup:

will be used to group h1 to h6 tags together.

nav:

will be used to group any navigation elements like anchors and links.

section:

will be used to declare contents of the page that is complete and full.

article:

will be used to contain the matter / text that is full in itself.



New Meaningful Tags

aside :

will be for contents that are either sides of the page that may not be required to understand the section or the contents of the page
eg. References about the content.

footer :

will be in the bottom of the page or the content.

mark :

will be used to highlight the content

figure :

will be used to group related images together especially the one that needs a caption.

HEADER

NAV

MAIN

HEADER

SECTION

ARTICLE

ARTICLE

ARTICLE

HEADER

ASIDE

FOOTER



HTML5SHIV

<https://github.com/aFarkas/html5shiv>

HTML5 BOILERPLATE

<http://html5boilerplate.com>

Modernizr

<http://modernizr.com>

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How to use HTML5SHIV

Shiv or Shim ?

```
<!--[if lt IE 9]>
  <script src="script/dist/html5shiv.js"></script>
<![endif]-->
```



Form Inputs API

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New Input Types

```
<input type="search" />           <input type="email" />
<input type="color" />            <input type="tel" />
<input type="range" />             <input type="url" />
<input type="time" />              <progress value="0~1"/>
<input type="date" />              <meter value="0~1"/>
<input type="datetime" />          <output value="" id="" />
<input type="week" />
<input type="month" />
<input type="number" />
<input type="datetime-local" />
```



Normal Keypad in IPhone





<input type= "email" />



<input type= "url" />



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Modified Keypad in iPhone

<input type="number" />



<input type="tel" />



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autofocus

placeholder

required

autocomplete

pattern

New Attributes on Inputs



Validation API

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Validation API

required
min
max
step
pattern

attributes for validation



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Before Media API

```
<object classid="clsid:d27cdb6e-ae6d-4c41-9f8e-0589e05e8080"
       codebase="http://download.macromedia.com/pub/shockwave/cabs/flash/swflash.cab#versio
       n=6,0,40,0">
<param name="allowFullScreen" value="" />
<param name="allowScriptAccess" value="" />
<param name="src" value="" />
<embed type="application/x-shockwave-flash"
       src="link"
       allowfullscreen="true">
</embed>
</object>
```

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Before Media API

Audio | Video

Flash was the most reliable way to play
video and audio on the web.

Roughly 99.97% of all desktops have Flash player.

iPhone/iPad does not.

They do support HTML5 <video>



HTML5 Media API

Audio | Video

H.264 : It is the most widely supported format promoted by MPEG LA a patent pool company.

But licensing costs browser makers \$5 million a year.

Support



Does Not Support





HTML5 Media API

Audio | Video

Ogg : Includes a number of independent open source codec for both audio and video. is patent-free and fully open.

Support



Does Not Support





The Goodnews

mozilla

1 Amount 2 Payment 3 Personal

Amount

Payment

Personal

Donate now

\$20 \$10 \$5

\$3 \$ Other amount

One-time Monthly

Next

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More Goodnews

VP8 : A video compression format by Google in 2010
launched webM under an irrevocable free patent
license

WebM is sponsored and supported by over 40 companies
including mozilla, opera, google, adobe etc...



HTML5 Media API

Audio | Video

webM

Support



Does Not Support



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Video tag attributes (few)

autoplay

controls

loop

muted

played

poster

preload

src



methods on media API

```
video.canPlayType();  
video.load();  
video.pause();  
video.play();
```



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Fallback Options

Flash Player

| Infallible, works on all except apple devices

YouTube link

| use if the content can be made public

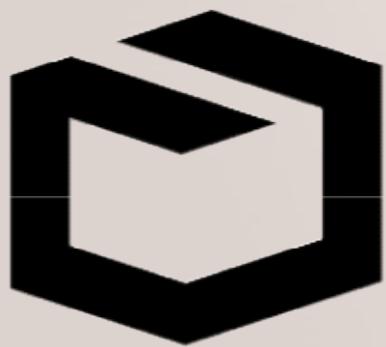
<http://videojs.com>

<http://projekktor.com>

<http://jwplayer.com>

<http://mediaelementjs.com>

Miro video converter (offline and free)



Canvas API

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Canvas | what is it for…?

- Data visualization

<http://raphaeljs.com/> SVG

<http://alteredqualia.com/canvasmol/>

- Animated graphics

<http://www.canvasdemos.com/>

- Web applications

<http://mugtug.com/sketchpad/> | <http://mudcu.be/sketchpad/>)

<http://stars.chromeexperiments.com/>



Canvas | what is it for…?

- Games

<http://www.pirateslovedaisies.com/>

<http://www.google.com/pacman/>

<https://www.google.com/doodles>



Platforms

Supported



Grrr....



Canvas Fundamentals

Dynamic bitmap with JavaScript

- Allow drawing into a bitmap area
- Think about it as a dynamic PNG
- Rectangles, lines, fills, arcs, bézier curve , etc.
- Use Text, Images, Videos and Shapes

Immediate mode : Fire and Forget

- It does not remember what you drew last.
- It's up to you to maintain your objects tree
- This is a black box : content not visible into the DOM
- Beware of accessibility issues
- Simple API: 45 methods, 21 attributes



Few Canvas API properties

data

fillStyle

font

globalAlpha

globalCompositeOperation

height

lineCap

lineJoin

lineWidth

miterLimit

shadowBlur

shadowColor

shadowOffsetX

shadowOffsetY

strokeStyle

textAlign

textBaseline

width



Few Canvas API methods

arc

arcTo

beginPath

bezierCurveTo

clearRect

clip

closePath

fill

fillRect

drawImage

lineTo

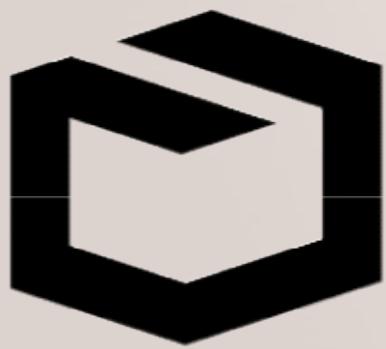
moveTo

quadraticCurve

rect

stroke

strokeRect



SVG API

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What is SVG ?

- Scalable Vector Graphics
- 2d vector based image
- Independent of device and resolution
- Mathematical / Geometrical information
(dots plotted on x and y coordinates)



Raster v/s Vector

Raster

Vector



Raster v/s Vector



The word "Raster" is displayed in a large, bold, black sans-serif font. A red magnifying glass is positioned over the letter "t", highlighting a small cluster of pixels at the top right corner, illustrating the raster nature of the image.

The word "Vector" is partially visible below "Raster", suggesting a comparison between the two types of images.

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SVG ATTRIBUTES

width

height

viewBox="0 0 256 256"

style =

xmlns="http://www.w3.org/2000/svg"

preserveAspectRatio="xMidYMid"



SVG basic shapes | circle

```
<circle cx="100" cy="100" r="100" />
```

cx—the centre “x” coordinate.

cy—the centre “y” coordinate.

r—the radius of the circle (half its width)



SVG basic shapes | ellipse

```
<ellipse cx="100" cy="100" rx="100" ry="50" />
```

cx—the centre “x” coordinate.

cy—the centre “y” coordinate.

rx—the horizontal radius of the oval (half its width).

ry—the vertical radius of the oval (half its height).



SVG basic shape | rectangle

```
<rect x="0" y="0" width="256" height="64" rx="5"  
      ry="5" />
```



SVG basic shape | polygon

```
<polygon points="150,0 300,300 0,300" />
```

// triangle

```
<polygon points="60,20 100,40 100,80 60,100  
20,80 20,40" />
```

// hexagon

points—defines the coordinates of each of the corners of the shape—the format is: x,y x,y each x,y is separated with a space



SVG basic shape | line

```
<line x1="0" y1="0" x2="256" y2="256" />
```

x1—the line's starting “x” coordinate

y1—the line's starting “y” coordinate

x2—the line's ending “x” coordinate

y2—the line's ending “y” coordinate



SVG basic shape | polyline

```
<polyline points="0,256 50,150 100,100 150,50" />
```

points—defines the coordinates of each position of the line—the format is: x,y x,y



SVG basic shape | path

Usually written with UI softwares like illustrator

```
<path d="M100,160 Q128,190 156,160" />
```

multiple anchors with handles which are quadratic curves



SVG basic shape | group

```
<g>
<circle cx="100" cy="100" r="100" />
<rect x="0" y="0" width="256" height="64" />
<polyline points="0,256 50,150 100,100 150,50" />
</g>
```

Use the `<g>` tag to group elements together.

Groups can have class or id attributes similar to css



SVG basic shape | symbols

```
<symbol id="icon-smiley" viewBox="0 0 256 256">
<circle cx="128" cy="128" r="120" />
<circle cx="100" cy="104" r="12" />
<circle cx="156" cy="104" r="12" />
<path d="M100,160 Q128,190 156,160" />
<rect x="97" y="66" width="6" height="32" rx="4" ry="4" />
<rect x="153" y="66" width="6" height="32" rx="4" ry="4" />
</symbol>
<use xlink:href="#icon-smiley" />
```



SVG basic shape | defs

```
<defs>
<linearGradient id="the-gradient">
<stop offset="0%" stop-color="orange" />
<stop offset="100%" stop-color="red" />
</linearGradient>
</defs>
<circle fill="url(#the-gradient)" cx="100" cy="100" r="100" />
```



SVG basic shape | fill & opacity

fill - used to set the color of a shape. Can use any colour format: keywords, # hex, rgb(), rgba() or none

Can be put on any element including the <svg> element

opacity - is a value between 0 and 1



SVG basic shape | gradients

Adds a line around the outside of a shape or along a path.

`stroke="orange"`
`stroke-width="10"`
`stroke-opacity=".5"`
`stroke-linecap="round"`
`stroke-linejoin="bevel"`



SVG basic shape | strokes

```
<defs>
```

```
  <linearGradient id="the-gradient">
    <stop offset="0%" stop-color="orange" />
    <stop offset="100%" stop-color="red" />
  </linearGradient>
```

```
</defs>
```

```
<circle fill="url(#the-gradient)" cx="100" cy="100" r="100" />
```



Geolocation

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Geolocation API

Works on

| Firefox | IE | Chrome | Safari | Opera | iPhone | Android | Blackberry |
|---------|-----|--------|--------|-------|--------|---------|------------|
| 3.5 | 9.0 | 5 | 5 | 10.63 | 3.2 | 2.1 | 6.0 |

Sources for Geolocation

IP address / ISP – not very accurate

Wi Fi spots – will give you block and street level accuracy

GPS – will deliver accurate location of the user



Using Geolocation API

`navigator.geolocation` : will return true if supported on device

`getCurrentPosition()`

attempts to get the current location of the user asynchronously

`watchPosition()`

starts monitoring the location of a user at an interval.

`clearWatch()`

stops monitoring the location of a user



Methods of Geolocation

```
getCurrentPosition( successFunction, failureFunction,  
    {enableHighAccuracy: true, timeout:5000, maximumAge:6000} );  
watchPosition( same as above );
```

enableHighAccuracy: Is a Boolean setting that allows you to use accurate GPS detection (when available).

maximumAge: specifies how recently (in milliseconds) location detection needs to have occurred.

timeout : specifies when (in milliseconds) an attempt to get a user location needs to timeout.



position Object

The Position

timestamp: returns the time when the location was detected.

coords.latitude: returns the latitude in degrees.

coords.longitude: returns the longitude in degrees.

coords.accuracy: returns how accurate the location is, in meters.

coords.altitude: returns the altitude , if available.

coords.altitudeAccuracy: gives altitude accuracy, in meters, if available.

coords.speed: returns speed (based on previous detected position),
in meters/second.

coords.heading: returns the angle, in degrees clockwise from true
north.



Error Object

1 : PERMISSION_DENIED

the user disallowed sharing his or her location

2 : POSITION_UNAVAILABLE

the position can't be found, the network is down, or GPS is unavailable.

3 : TIMEOUT

timeout occurred ,as it took too long to get the user's location.

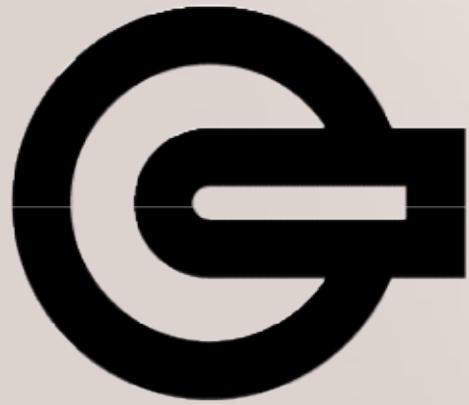


geo.js

<http://code.google.com/p/geo-location-javascript/>

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Offline Browsing API

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Offline Browsing API

applicationCache

```
<html manifest="myapp.manifest">
```

Files with extension .manifest and .appache are common

Can also be a an absolute location of a file on the same domain (crossdomain files wont work)

Set the mime type to support old browsers



Offline Browsing API

CACHE MANIFEST

Has 3 sections

CACHE:

NETWORK:

FALLBACK:

These sections can be listed in any order and each section can appear more than once in a single manifest.

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Offline Browsing API

CACHE MANIFEST

The only required line in the file



Offline Browsing API

CACHE:

The default section declares all the files that will be stored for offline usage.

Each file needs to be mentioned in a separate line
Once cached the files will always be fetched from browser cache not from the server.



Offline Browsing API

NETWORK:

Shows all the files that need network access to work.

Can take wildcards to represent multiple files and directories. (*)

otherwise the network isn't used, even if the user is online



Offline Browsing API

FALLBACK:

A list of files that can be used in place of requested files

You can use wildcards (/) to create a fallback for any file that you asked if now cached



Offline Browsing API

#Comment / version 001

Needs to be updated with there is any change in
the file



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Cookies

Window Storage

Local Storage

Session Storage

Browser Databases (Indexed DB / Web SQL)

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Support

| Firefox | IE | Chrome | Safari | Opera | iPhone | Android | Blackberry |
|---------|-----|--------|--------|-------|--------|---------|------------|
| 3.0 | 8.0 | 3.0 | 4 | 10.5 | 3.0 | 2.0 | 6.0 |



Properties and Methods

length

Number of stored strings

getItem()

read the value of the key (name)

setItem()

add / modify the value of the key (name)

removeItem()

remove the name and value

clear()

removes all name values of your domain

key()

will return the stored name in that index



Storage Event

```
addEventListener("storage ", callBack)
```

```
window.onstorage = function(){}
```

- event properties
 - key : string the named key that was CUD
 - oldValue : previous value (now overwritten), or null
 - newValue : new value, or null if an item was removed
 - url : string the page which called a method that triggered this change



Storage Error

`QUOTA_EXCEEDED_ERR`

when the app exceeds the allowed storage



Working With IndexedDB

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File API

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File API

- Until html5 we had to use server side programs to handle files
- HTML5 File API provides ways to access and read local files
- Latest updates <http://www.w3.org/TR/FileAPI/>
- Use <input type="file" /> or drag n drop



File API | Features

Has 3 major sections

file reader

file writer (not currently implemented)

file system (not currently implemented)



File API | File Reader

- Select files to upload on the client side
- Restrict kinds of file from being uploaded
- Generate thumbnails for uploads
- Check the modified date to match on server
- Parse and get detailed file info
- Modify and send to server



File API | 4 types of file data

Text Data

- `readAsText()`

data:// URL

- `readAsDataURL()`

Binary Data

- `readAsBinaryString()`

Array Buffer



History API

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History API | Why ?

The url on the browser modifies when making an ajax call

No reference to go back in the async call

History API allows us to make changes to url text

Can not work with local files needs a web server



History API | How ?

Use the `pushState()` to create a new history
takes 3 properties

`state` : can be any JSON data

- It is passed back to the `popstate` event handler

`title` : can be any string

- currently unused by major browsers

`url` : can be any string

- that gets displayed in address bar (this won't create links)



Communication API

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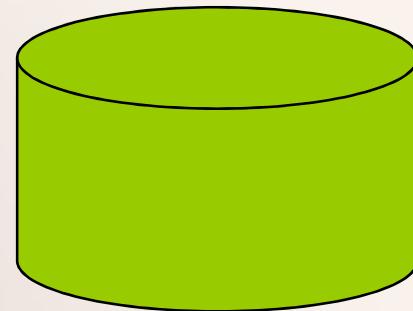


What is it ?

| Firefox | IE | Chrome | Safari | Opera | iPhone | Android | Blackberry |
|---------|-----|--------|--------|-------|--------|---------|------------|
| 3.0 | 8.0 | 2 | 4 | 9.6 | 3.0 | 2.0 | 6.0 |

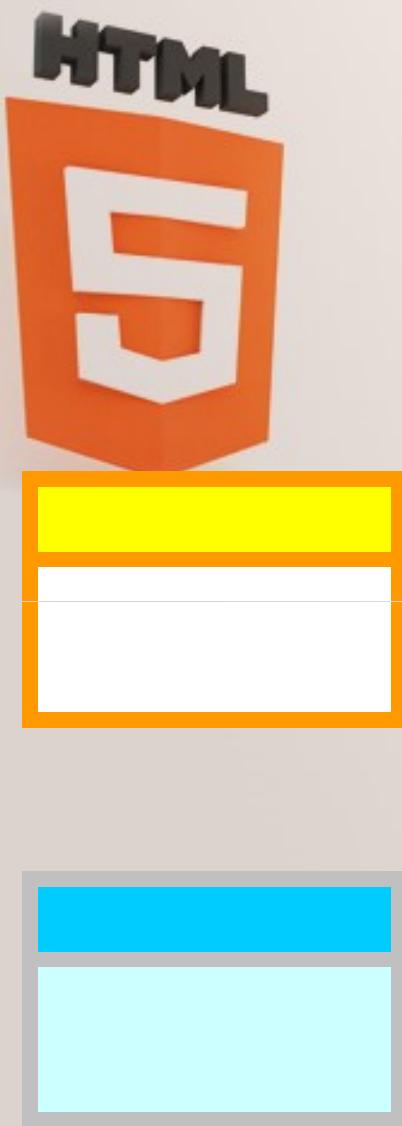
Cross Document Messaging

Applications from different domains can communicate safely
Communication between IFrames, and Windows
Communication is enabled via PostMessage API



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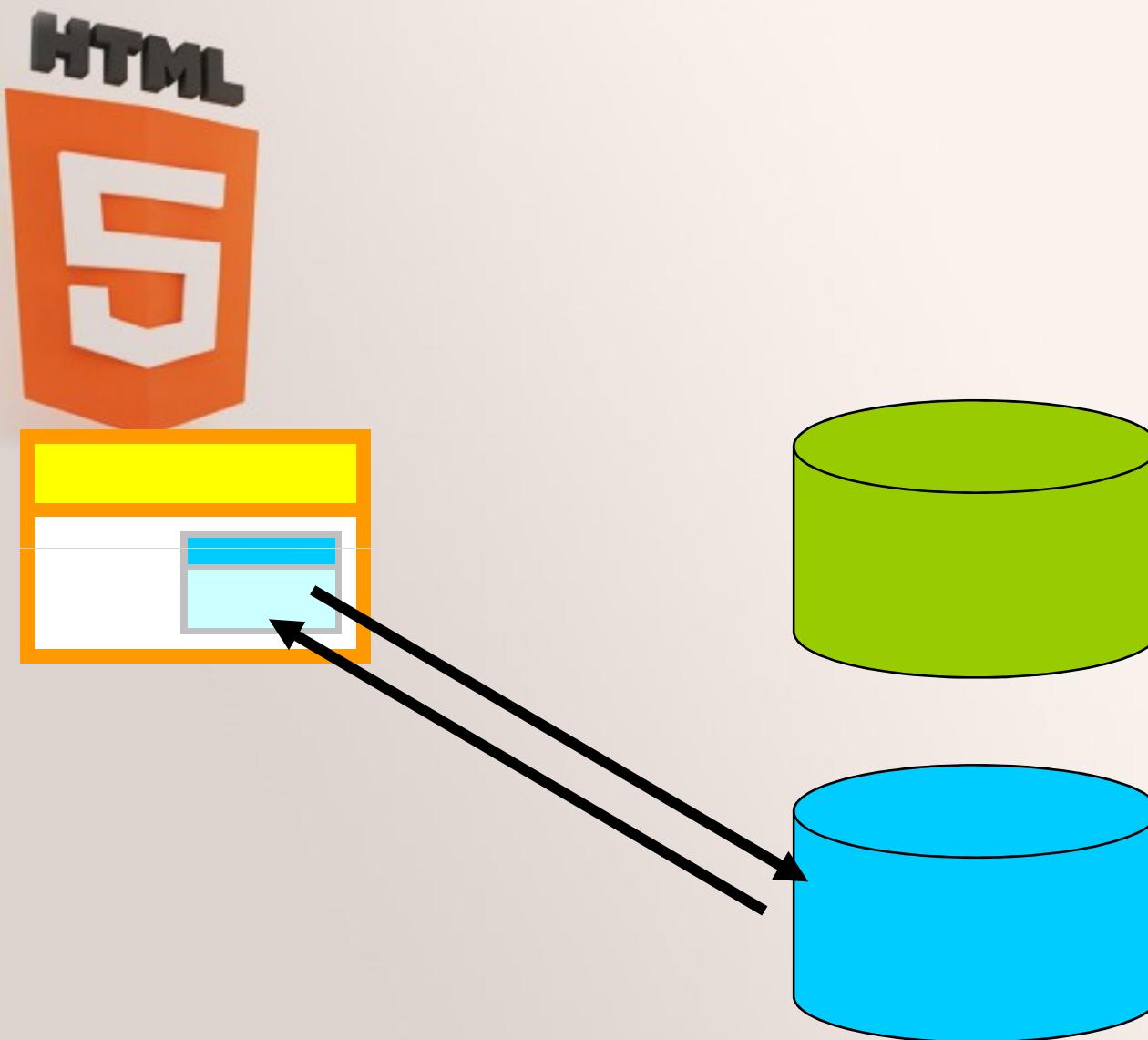
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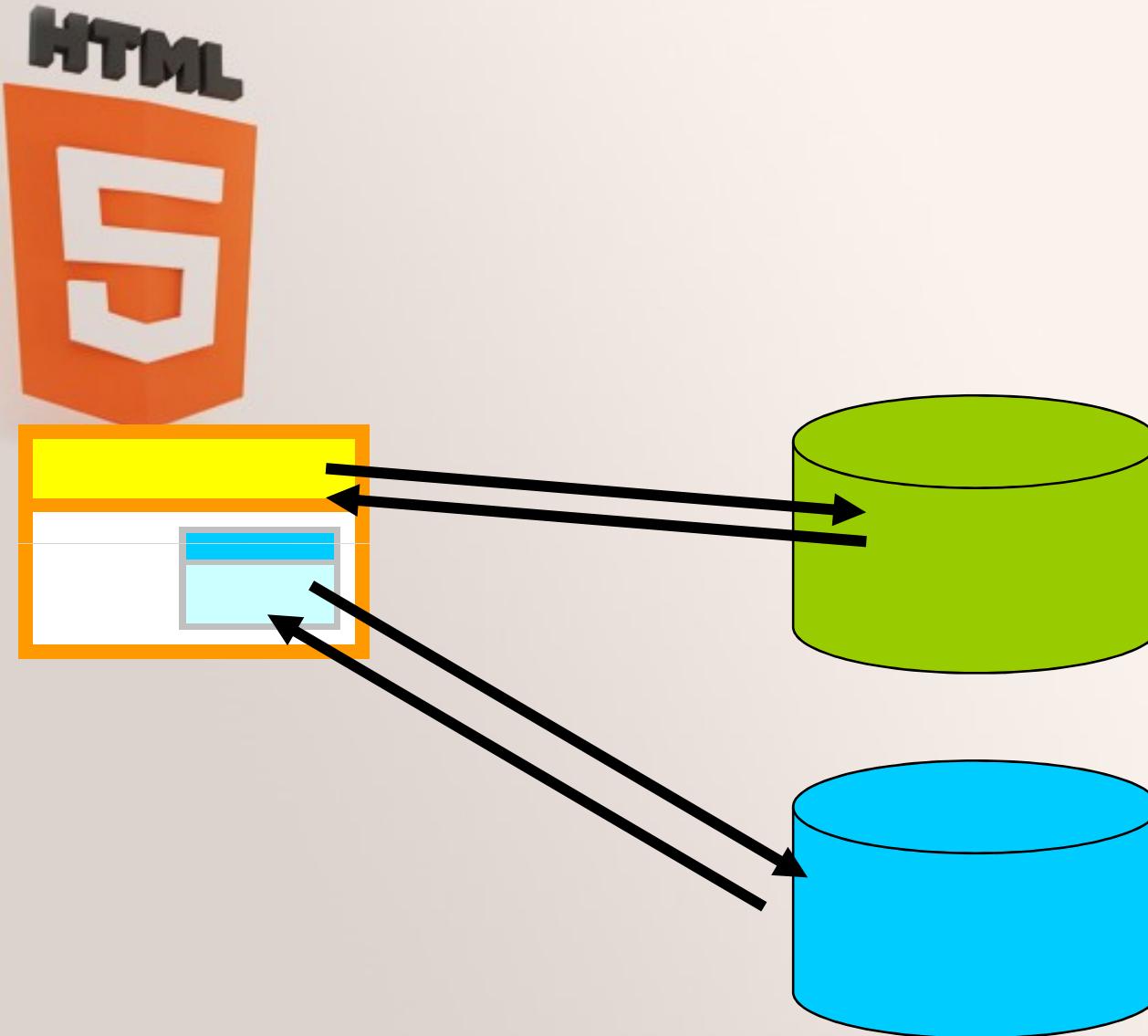
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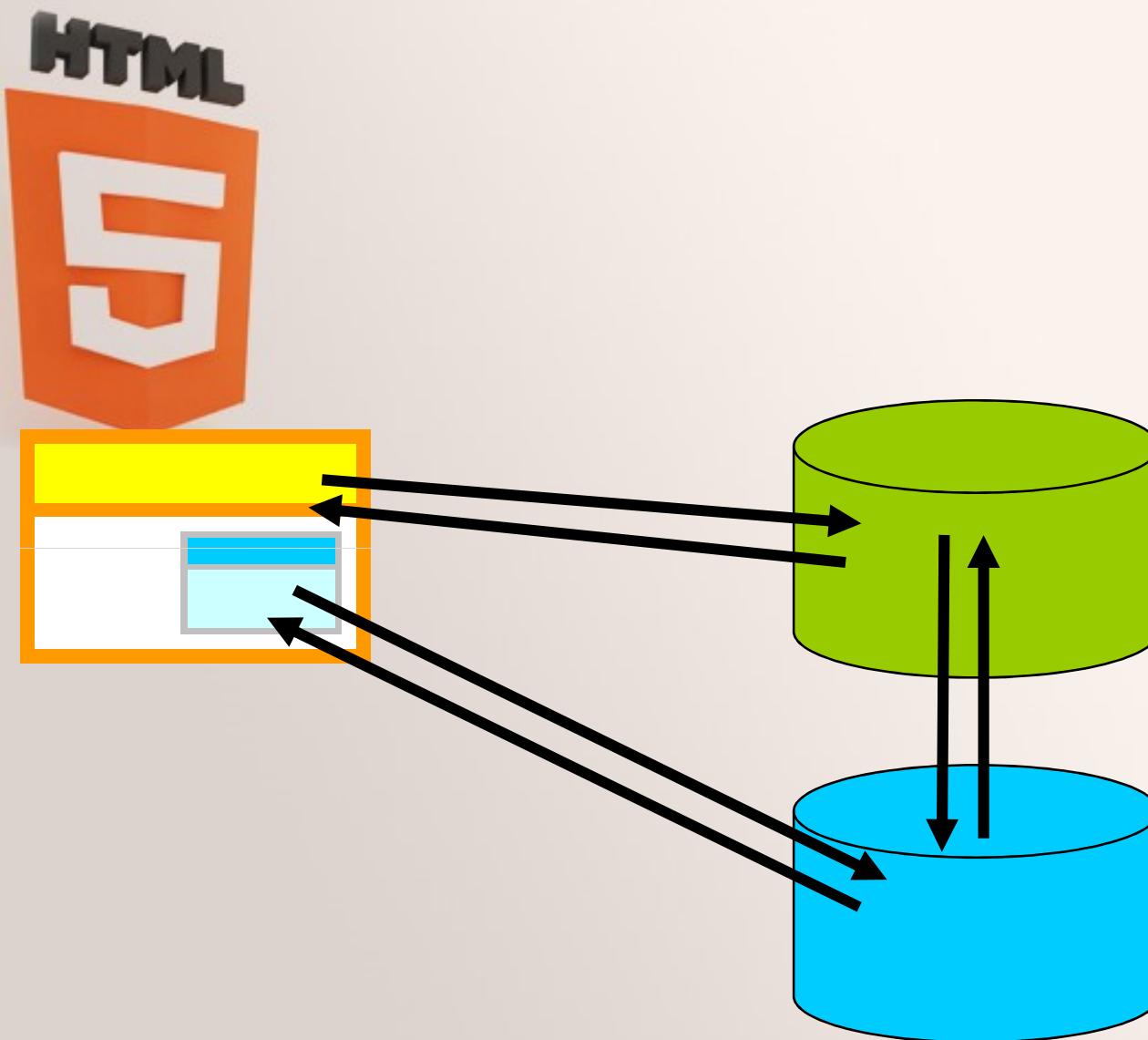
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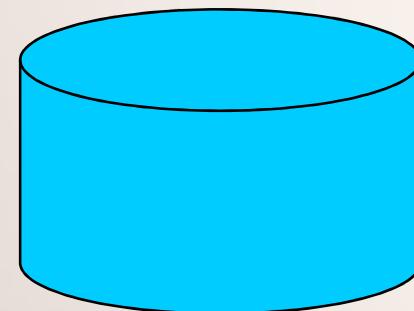
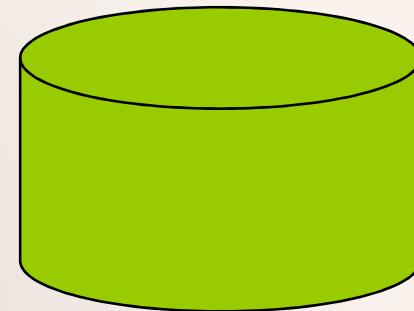
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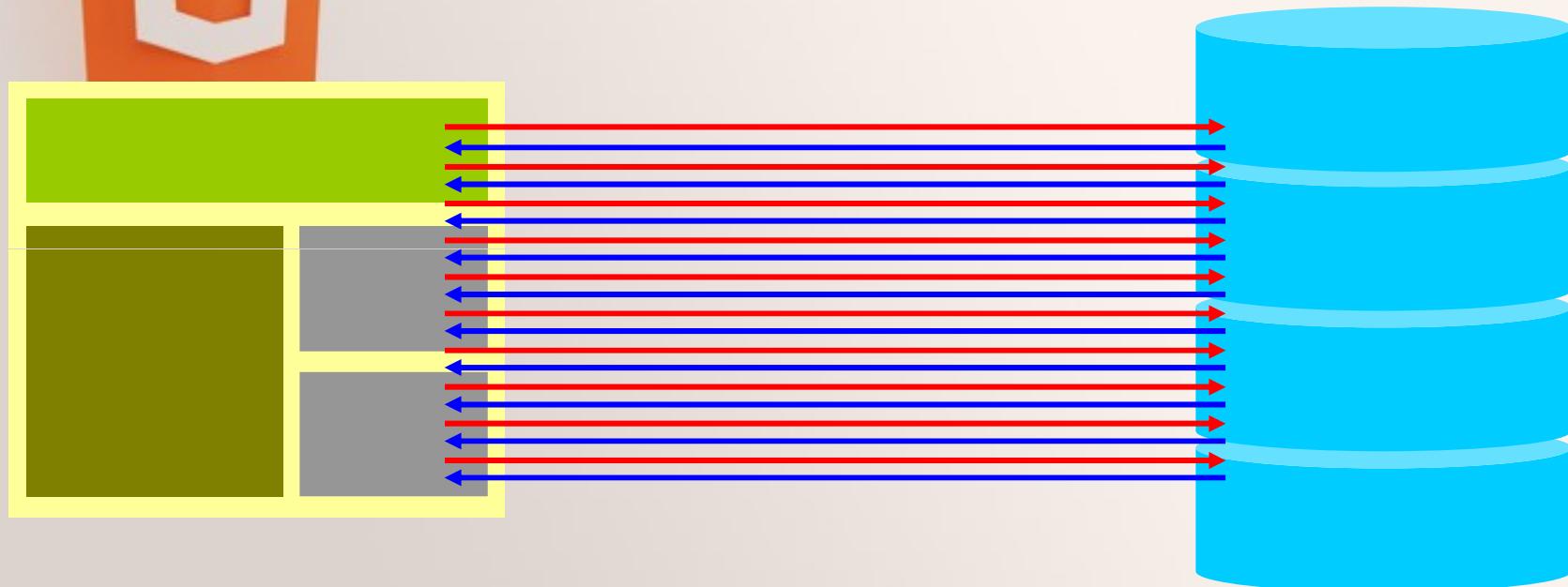
Socket API

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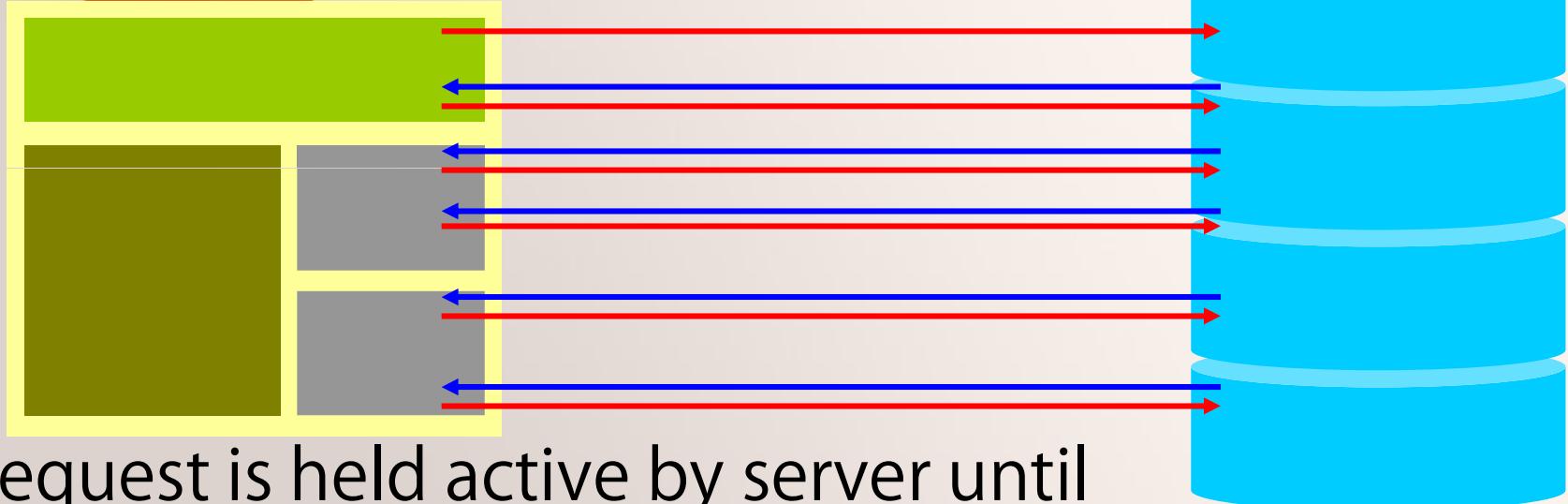
Polling (Ajax)



Every request has a response even if it is empty.



Comet / Server Push (Ajax 2)



Request is held active by server until
there is an update and then responds
For every response the client will send a new request



Disadvantages

Large sequence of http requests, more than one a second

Huge amount of server load as for each request

Overhead of HTTP headers

User authentication



Existing scenarios

HTTP a request and response protocol.

Designed to request text files

Poor for real time data on server

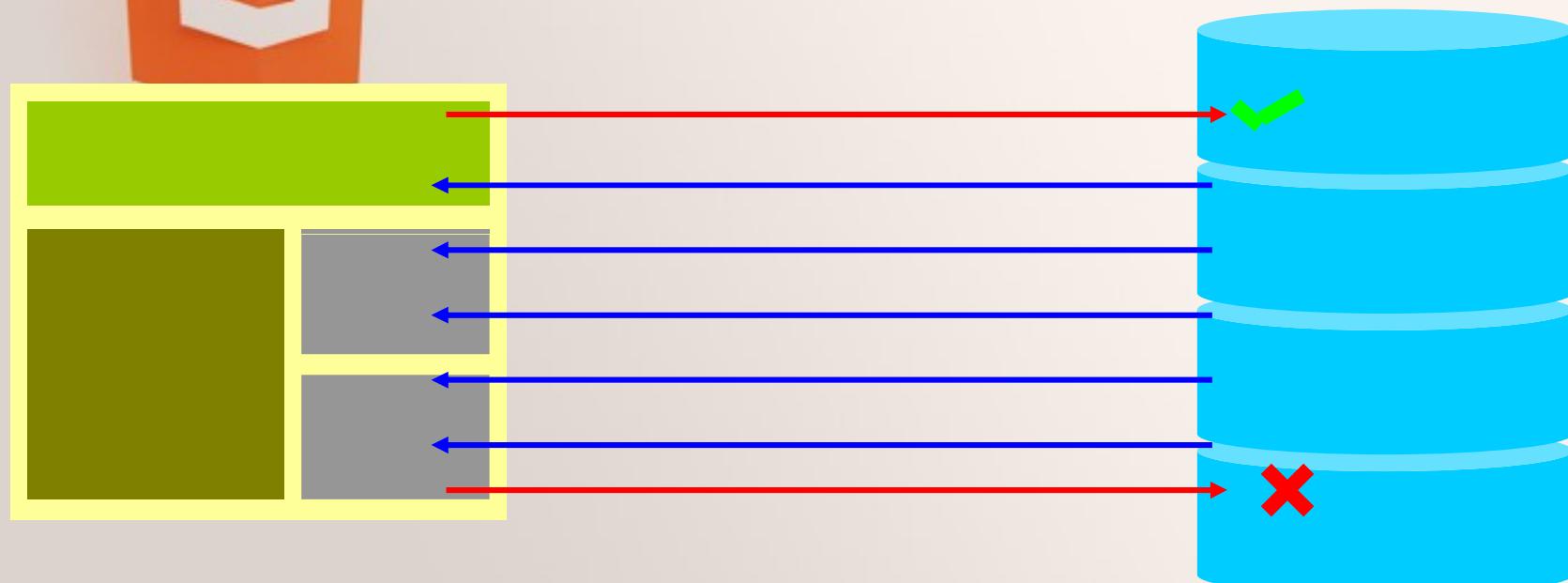
- (Chat, Dashboard, Games etc..)

So we adopted

- Recursive Client Request (Polling)
- Server Push



Socket



Request once (open a socket) , Response for every
server updates , Until you choose to close socket



Socket Methods

```
var ws = new WebSocket("url")
ws.send("message");
ws.close(); terminate the socket connection
```

```
ws.onopen = openFun;
ws.onclose = closeFun;
ws.onmessage = messageFun;
ws.onerror = errorFun;
```



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Web Workers methods and events

- postMessage()
- terminate()
- -----
- onmessage
- onerror



Web Workers can't access

- The navigator object
- The location object (read-only)
- XMLHttpRequest
- setTimeout()/clearTimeout() and setInterval()/ clearInterval()
- The Application Cache
- Importing external scripts using the importScripts() method to create subworkers



Web Workers

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- XMLHttpRequest
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Drag N Drop API

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Why do we need it ?

HTML, CSS, and JS stay fairly consistent

Native browser caching is unreliable

Caching resources creates faster apps!

Decent mobile support



New APIs

Battery Status API

Vibrate API

Tab Focus API / Page

Visibility API

FullScreen API

getUserMedia API

High Resolution Time API

User Timing API

Navigation Timing API

Network Information API

Document Edit API

File Reader / Writer File API

History API

Contacts API



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