HTML5 with JavaScript APIs

By Vijay Shivakumar

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

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/

What HTML5 is

http://whatwg.org

Web Hypertext Application Technology Working Group

==========

Backward Compatible

Utility

Promote Usage of HTML5

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** ***b*** *c*

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

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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Drag and Drop
Local Storage
Offline
CORS
Web Sockets
Web Workers
Post Message API
Microdata
File API
History API

We shall learn…

Canvas
SVG
Local Storage
Offline API
Web Workers
CORS
Socket API

Less Header code

By Vijay Shivakumar

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

By Vijay Shivakumar

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 :

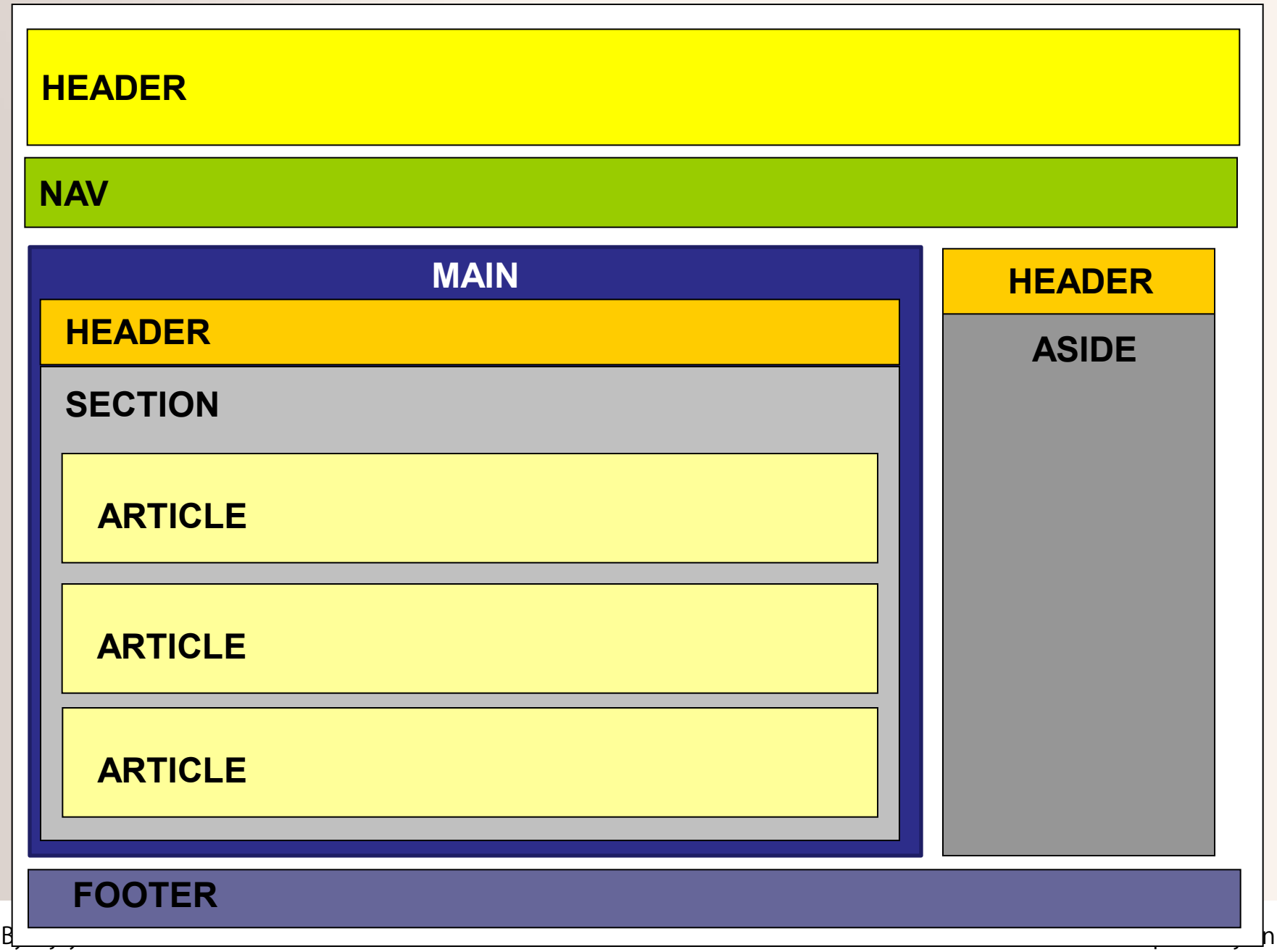
will be in the bottom of the page or the content.

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

HTML5 Semantics not supported in your browser ?

HTML5SHIV

https://github.com/aFarkas/html5shiv

HTML5 BOILERPLATE

http://html5boilerplate.com

Modernizr

http://modernizr.com

How to use HTML5SHIV

Shiv or Shim ?

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

Form Inputs API

By Vijay Shivakumar

New Input Types

```
<input type="search" />
<input type="color" />
<input type="range" />
<input type="time" />
<input type="date" />
<input type="datetime" />
<input type="week" />
<input type="month" />
<input type="number" />
<input type="datetime-local" />
```

```
<input type="email" />
<input type="tel" />
<input type="url" />
<progress value="0~1"/>
<meter value="0~1"/>
<output value=“” id=“”/>
```

Normal Keypad in IPhone

Modified Keypad in IPhone

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


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

Modified Keypad in IPhone

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


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

New Attributes on Inputs

autofocus
placeholder
required
autocomplete
pattern

Validation API

By Vijay Shivakumar

Validation API

required
min
max
step
pattern

attributes for validation

Validation API

:required
:valid
:in-range
:user-valid
:invalid
:out-of-range
:user-invalid

CSS pseudo classes

Media API

By Vijay Shivakumar

Before Media API

```
<object classid="clsid:d27cdb6e-ae6d-height="344"
   codebase="http://download.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-src=“link"
   allowfullscreen=“>
</embed>
</object>
```

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

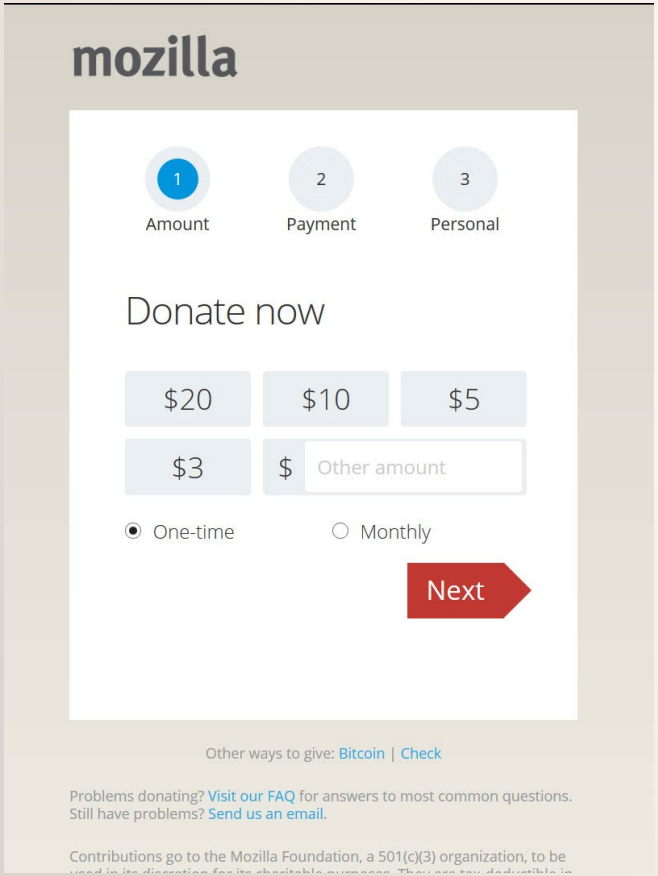
Audio | Video

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



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

Video tag attributes (few)

autoplay
loop
played
preload
controls
muted
poster
src

methods on media API

video.canPlayType();

video.load();

video.pause();

video.play();


HTML
5

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

By Vijay Shivakumar

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

By Vijay Shivakumar

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

By Vijay Shivakumar

https://dotjs.in

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 verical 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 seperated 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

By Vijay Shivakumar

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 is 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: specifie show recently (in milliseconds) location detection needs to have occurred.

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

The Position

position Object

---

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.

Geolocation Fallback

geo.js

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

Offline Browsing API

By Vijay Shivakumar

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.

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

Storage API

By Vijay Shivakumar

Types of Storage API

Cookies
Window Storage
Local Storage
Session Storage
Browser Databases (Indexed DB / Web SQL)

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

File API

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

History API

By Vijay Shivakumar

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 hander

title : can be any string

- currently unused by major browsers

url : can be any string

- that gets displayed in address bar (this wont create links)

Communication API

By Vijay Shivakumar

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

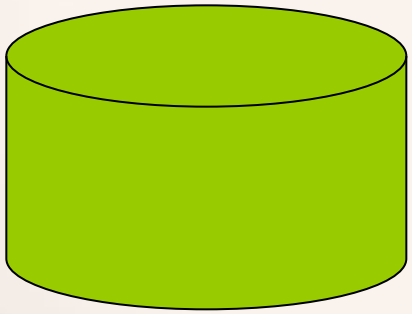
Cross Document Messaging

Applications from different domains can communicate safely

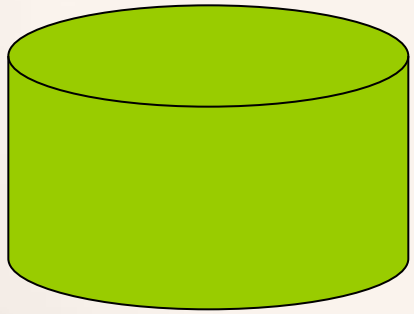
Communication between IFrames, and Windows

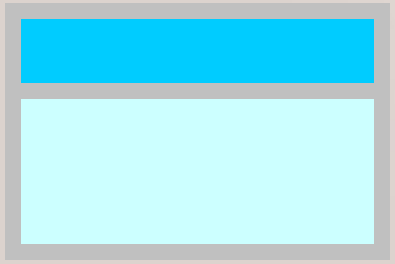
Communication is enabled via PostMessage API

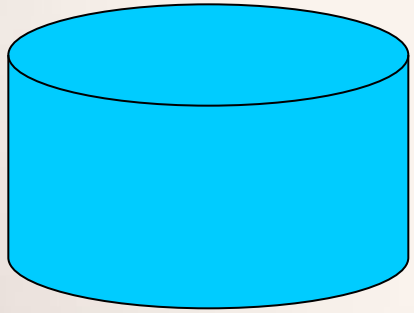

HTML



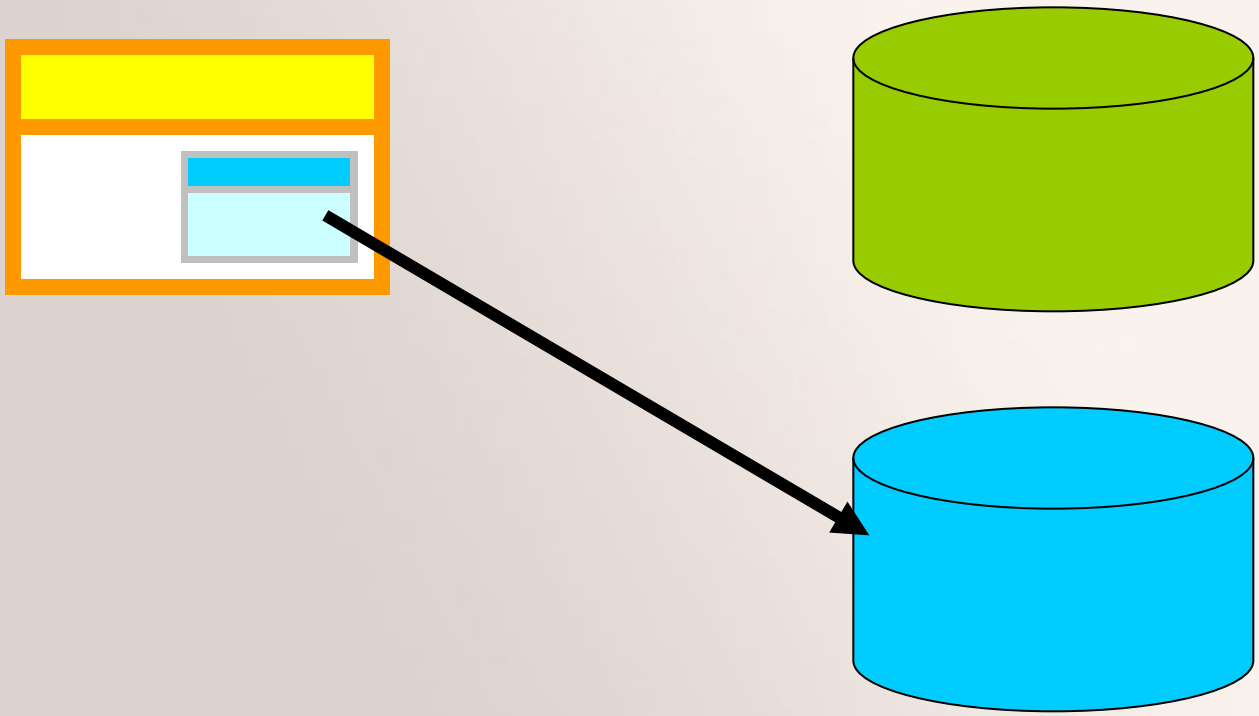

HTML



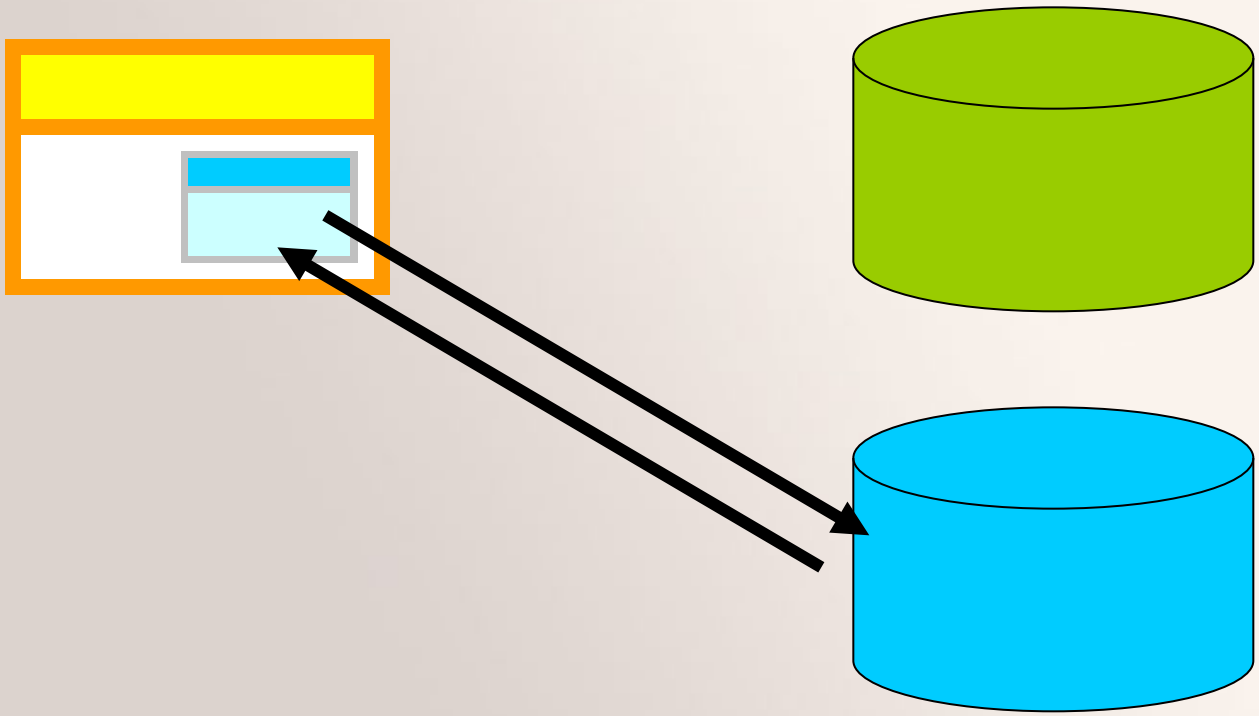




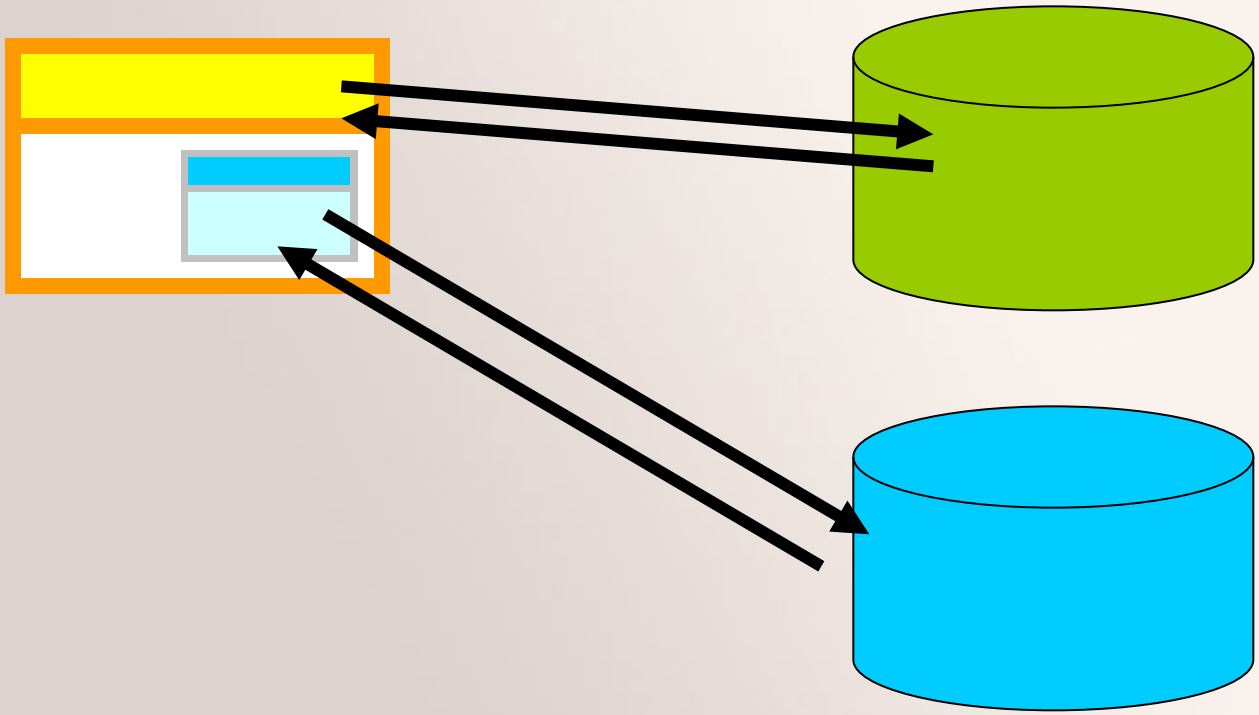

HTML



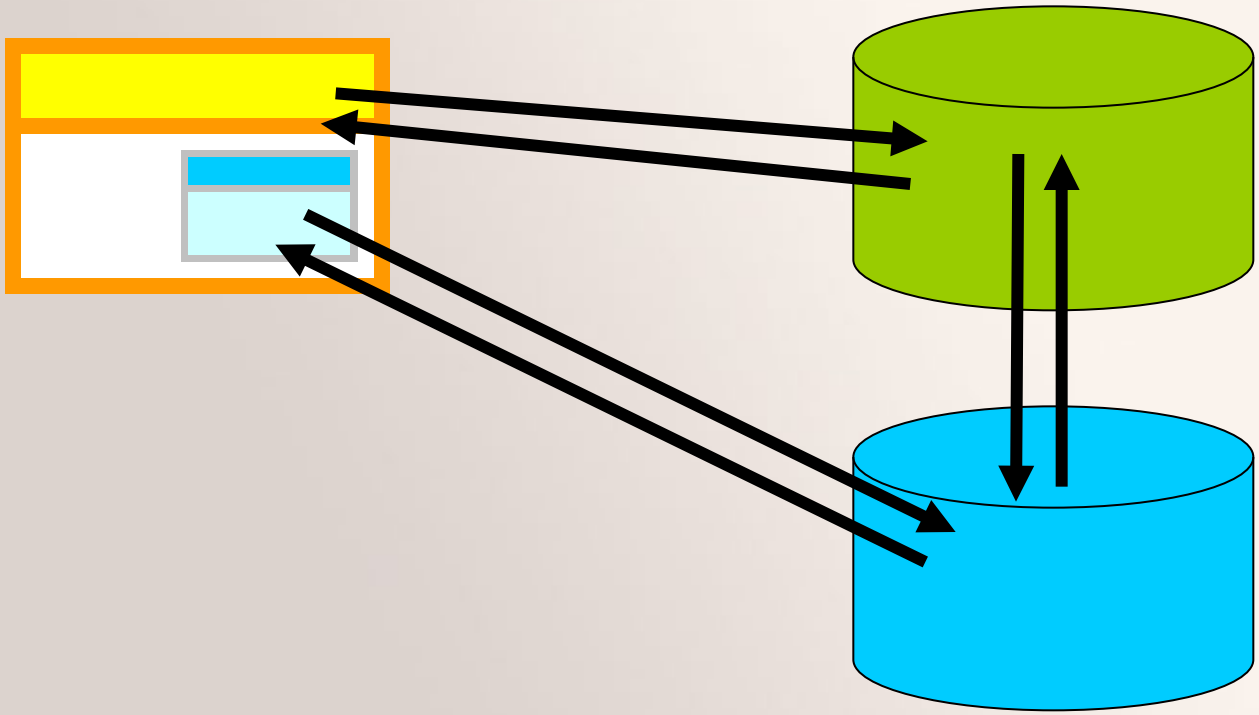

HTML



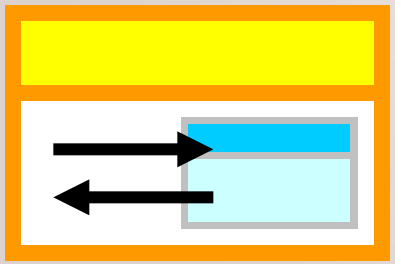

HTML

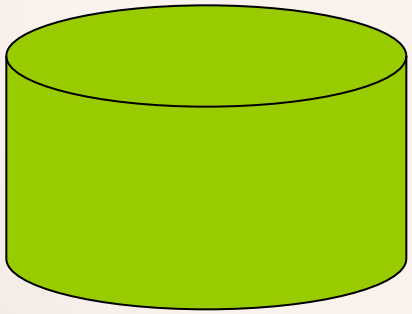


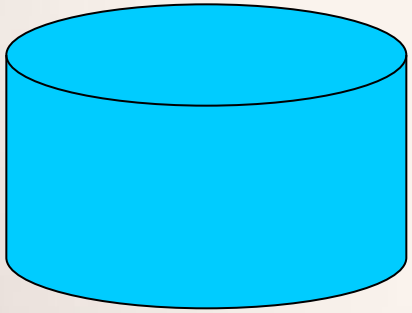

HTML




HTML



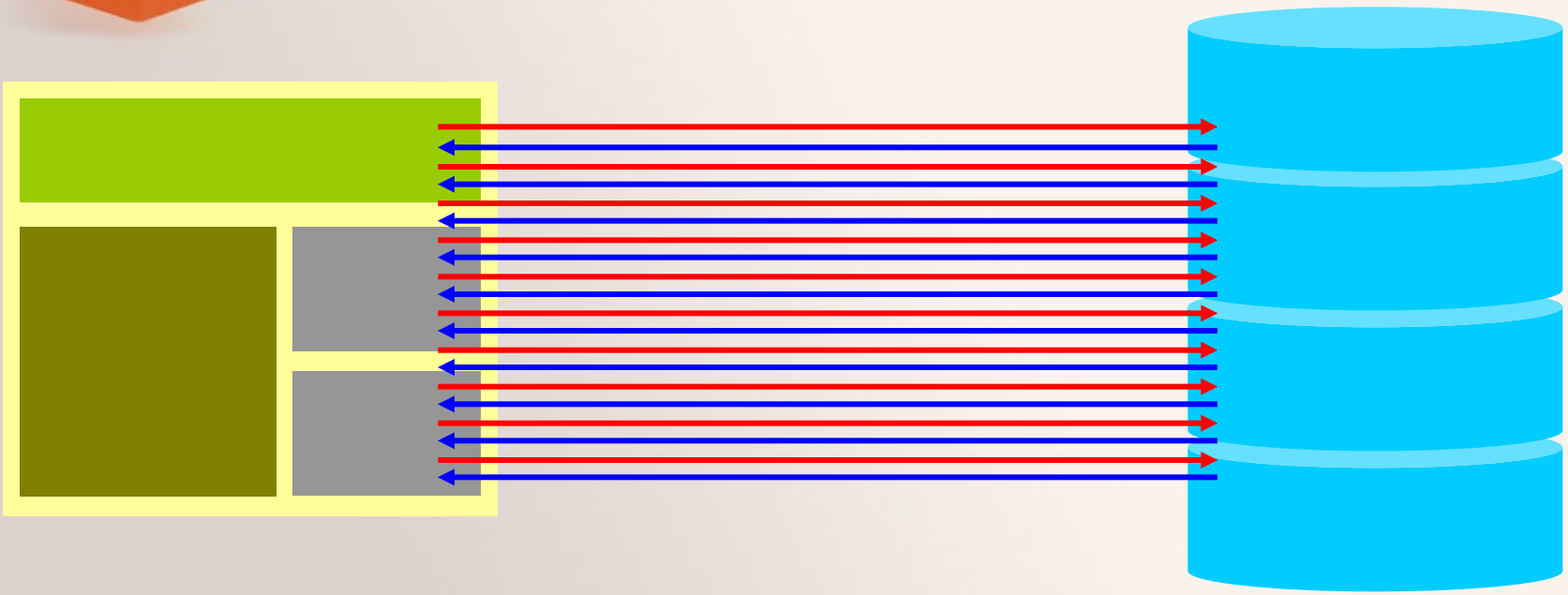




Socket API

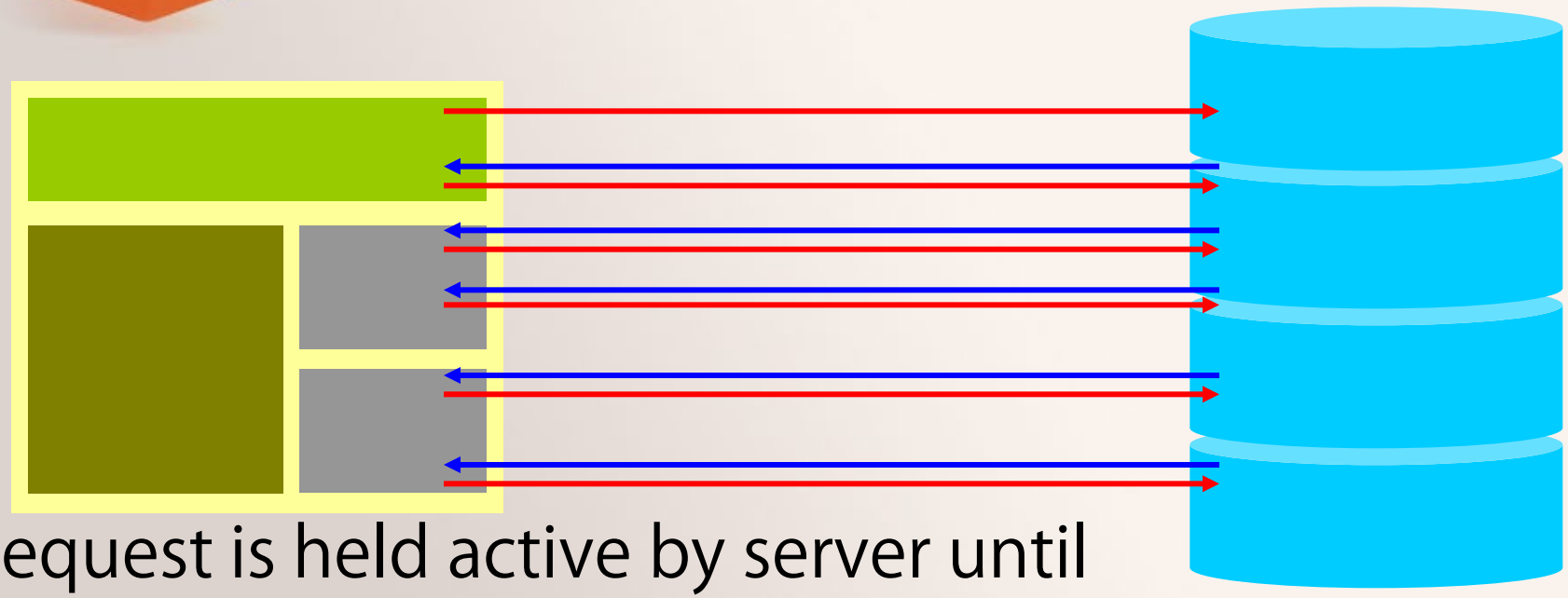
By Vijay Shivakumar

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

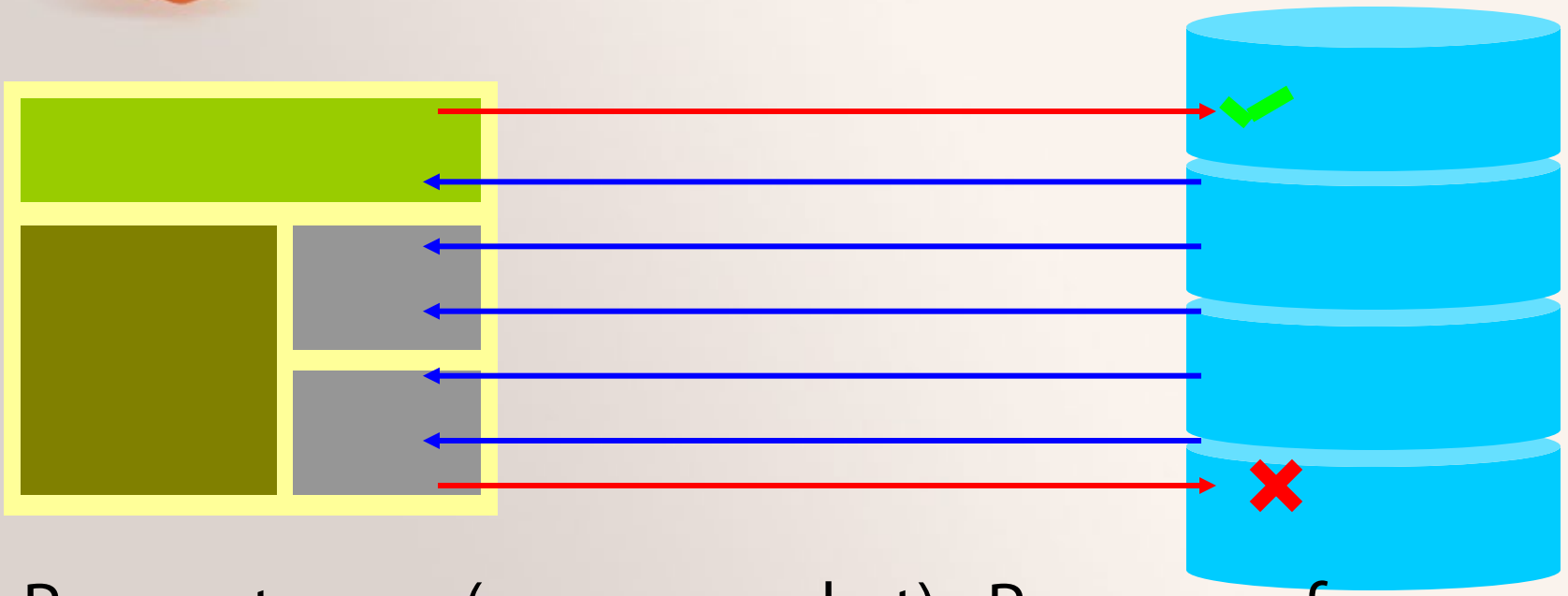
Poor for real time data on server

- (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;

Web Workers API

By Vijay Shivakumar

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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Drag N Drop API

By Vijay Shivakumar

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Offline API

By Vijay Shivakumar

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

Browser Engines

WEBKIT - https://webkit.org/

Safari - Webkit : Developed by Apple and open sourced

Microsoft Edge - Blink : Forked from Webkit

Chrome - Blink : Forked from Webkit

Opera - Blink : Forked from Webkit

WebKit is also used by : PlayStation 3 consoles (PS3), Nintendo consoles, Tizen mobile OS, Amazon Kindle e-book reader, BlackBerry Browser

Firefox – Gecko : Developed by Mozilla and open sourced

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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