

WebApp development

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Outline

1. Fundamentals of a web app / website
2. Necessary steps before publishing
3. Demo of example website using Firebase

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Web “app” structure

Back-end:

- Web server
- Database / data storage

Front-end:

- HTML page
- CSS
- JavaScript code

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HTML basics

HyperText Markup Language

- Uses tags to define structured elements and content
- Is what's rendered by a browser
- Is viewed one document at a time
- Can be written, generated, and modified
- Can reference CSS and JavaScript files to use

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“Dynamic” HTML

Different HTML can be sent for the same URL

- Generated by server before sent over
- Created from templates
- Often mixed with server API for full functionality

HTML can change on a page by running code on the user’s machine

- Elements modified, removed, added by JavaScript
- Browser reflects changes immediately

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CSS basics

Cascading Style Sheets

- Defines how HTML elements are rendered and displayed
- Defines elements by item, class, or type level
- Can be in the HTML or in separate .css file
- Can be extended by SASS (adds variables and rules)

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CSS frameworks

- Bootstrap: large, many features, JS plug-ins, theme libraries, verbose
- Foundation: very extensive, customizable, templates and plugins
- Bulma: simple, many features, preset design
- Materialize: Material Design themed, preset themes
- Pure.css: small and simple, allows easy customization
- Skeleton: very small and simple; basic features

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JavaScript basics

Object-oriented programming language (not really related to Java)

- Allows control of the HTML DOM (Document Object Model)
- Is natively supported by all browsers but has limitations
- Has weakly-types variables of type number, string, array, and Object
- Has functions as first-class objects and Closures

<https://www.w3schools.com/js/default.asp>

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When JavaScript functions run

Concept of multithreading doesn't really exist

1. If a function is running, it will run to completion
2. When an asynchronous function is called, it's added to a queue
3. When no functions are running, one is taken from the queue if it exists

Callback functions are used after an asynchronous function runs

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Asynchronous requests

```
function httpGetAsync(theUrl, callbackHandler)
{
    var xmlHttp = new XMLHttpRequest();
    xmlHttp.onreadystatechange = function() {
        if (xmlHttp.readyState == 4 && xmlHttp.status == 200)
            callbackHandler(xmlHttp.responseText);
    }
    xmlHttp.open("GET", theUrl, true); // true for asynchronous
    xmlHttp.send(null);
}
```

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jQuery

Popular JavaScript library used by many third-party apps

<https://jquery.com> / <http://api.jquery.com>

- Can be used via source code download or accessed via CDN
- Makes certain things in JS easier and shorter to write

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Basic website security practices

- Permission web pages differently for different users
- Verify/sanitize all form/data inputs
- Don't allow users to post and run own JavaScript code
- Use (third-party) authentication services for logins
- Don't store or transmit important information unencrypted

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Cookies

- Temporarily store data on the user's browser
- Automatically sent to server with every request
- Can apply to certain URL paths and up to a certain datetime
- Can be read and written by the browser with JavaScript
- Are generally used to save user sessions

```
document.cookie = "username=John Doe; expires=Thu, 18 Dec 2013 12:00:00 UTC;  
path=/";
```

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Domain names

Custom domain names are paid for in subscription service

1. Purchase domain name
2. Set-up domain name on server (follow their instructions)
3. Configure the DNS provider to point to the DNS target (your app)

<https://www.namecheap.com>

<https://domains.google/#/>

<https://www.godaddy.com>

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HTTPS protocol

HTTPS uses HTTP over TLS; encrypted data sent to/from server

- Need Certificate Authority to verify website to use HTTPS
- Server must support HTTPS over a different port

Let's Encrypt

(Published by research group of J. Alex Halderman)

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React Native

Open-sourced software to build mobile apps from (mostly) JavaScript

- Works in JavaScript and allows UI components to be added
- Allows use of native (Swift/Java) code when necessary
- Can reload a preview of the app without recompiling
- Compiles to iOS and Android applications through Xcode and Android Studio

<https://facebook.github.io/react-native/>

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Resources

- [Bootstrap](#), [Foundation](#), [Bulma](#), [Materialize](#), [Pure.css](#), [Skeleton](#)
- [W3 JavaScript tutorial](#)
- [jQuery](#) and [API documentation](#)
- [Namecheap](#), [Google Domains](#), [GoDaddy](#)
- [Let's Encrypt](#)
- [React Native](#)

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