The background image is a high-resolution aerial photograph of a river system. The river flows from the top right towards the bottom left, creating several sharp bends. The surrounding land is covered in dense green vegetation, likely a mix of deciduous and coniferous trees. The water in the river appears slightly brown or tan. The overall texture is grainy and detailed.

Spatial Data Capture and Analysis

Interactive Visualisation 1: HTML + CSS



Steven Gray



1

Introduction to Databases

2

Introduction to SQL

3

Advanced SQL

4

Data Handling and Cleaning

5

Contextualising Data

6

Clustering and Regression

7

Interactive Viz 1: HTML + CSS

8

Interactive Viz 2: Javascript

9

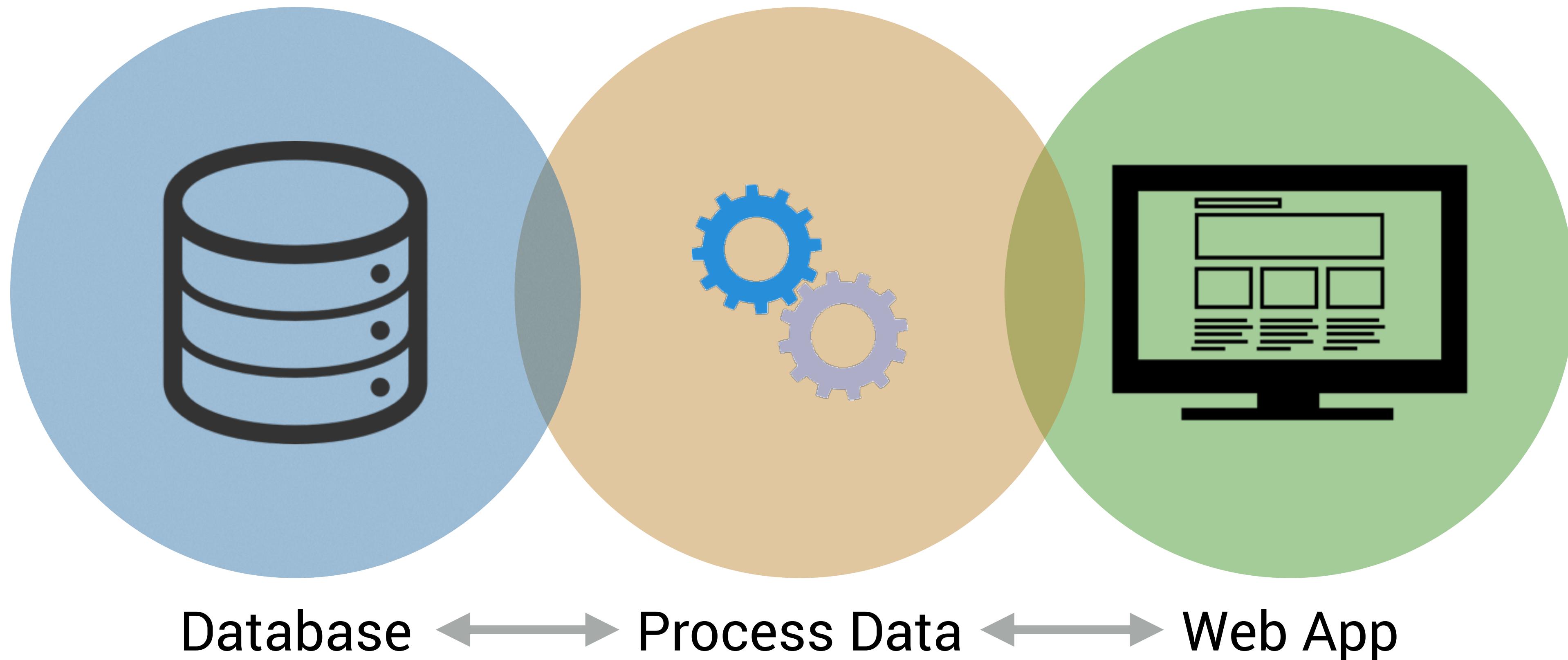
Server Side Coding: Node.JS

10

Real-time data visualisation

Quick Recap

Modern Web Development



Introduction to HTML

What is HTML?

Hypertext Markup Language

- Standard Language that makes up all webpages on the Internet
- Maintained by W3C (World Wide Web Consortium)
- Invented by Sir Tim Berners-Lee (TBL) in 1989 at CERN

Every page on the web is made of HTML pages

- Either Static or Dynamic
- A machine readable way of presenting data (Information Management)
- File Extension is .html

Have you ever wondered what the **http** meant at the start of url's were for?

Internet

Sharing Information - Vague but exciting ...

- Sharing Documents between Machines
- Mainly Text Documents
- Files used another platform (**ftp**)
- Semantically Linked Documents
- Built to server local files around network
- Then extended on back of ARPANET

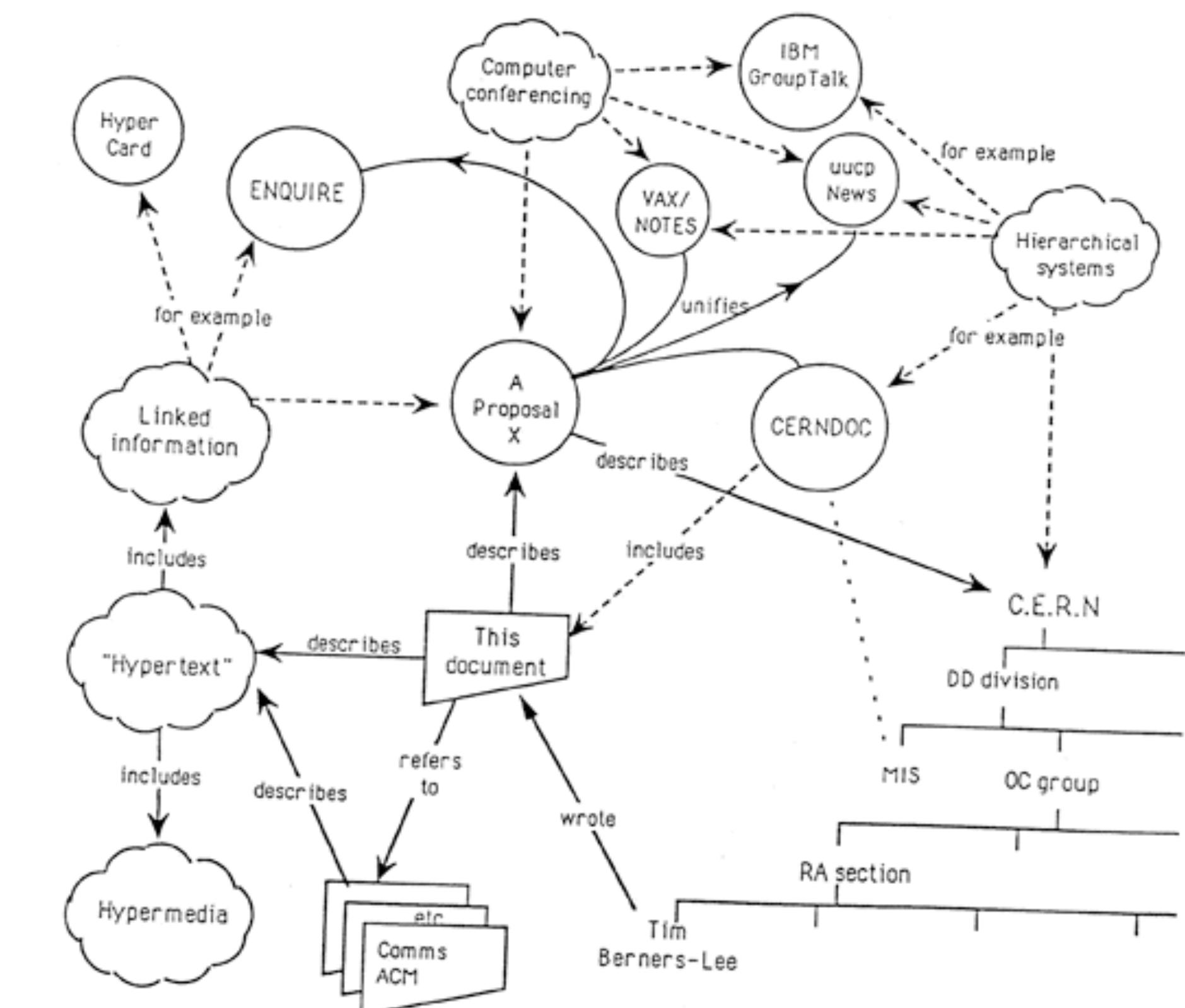
CERN DD/OC
Information Management: A Proposal
March 1989

Information Management: A Proposal

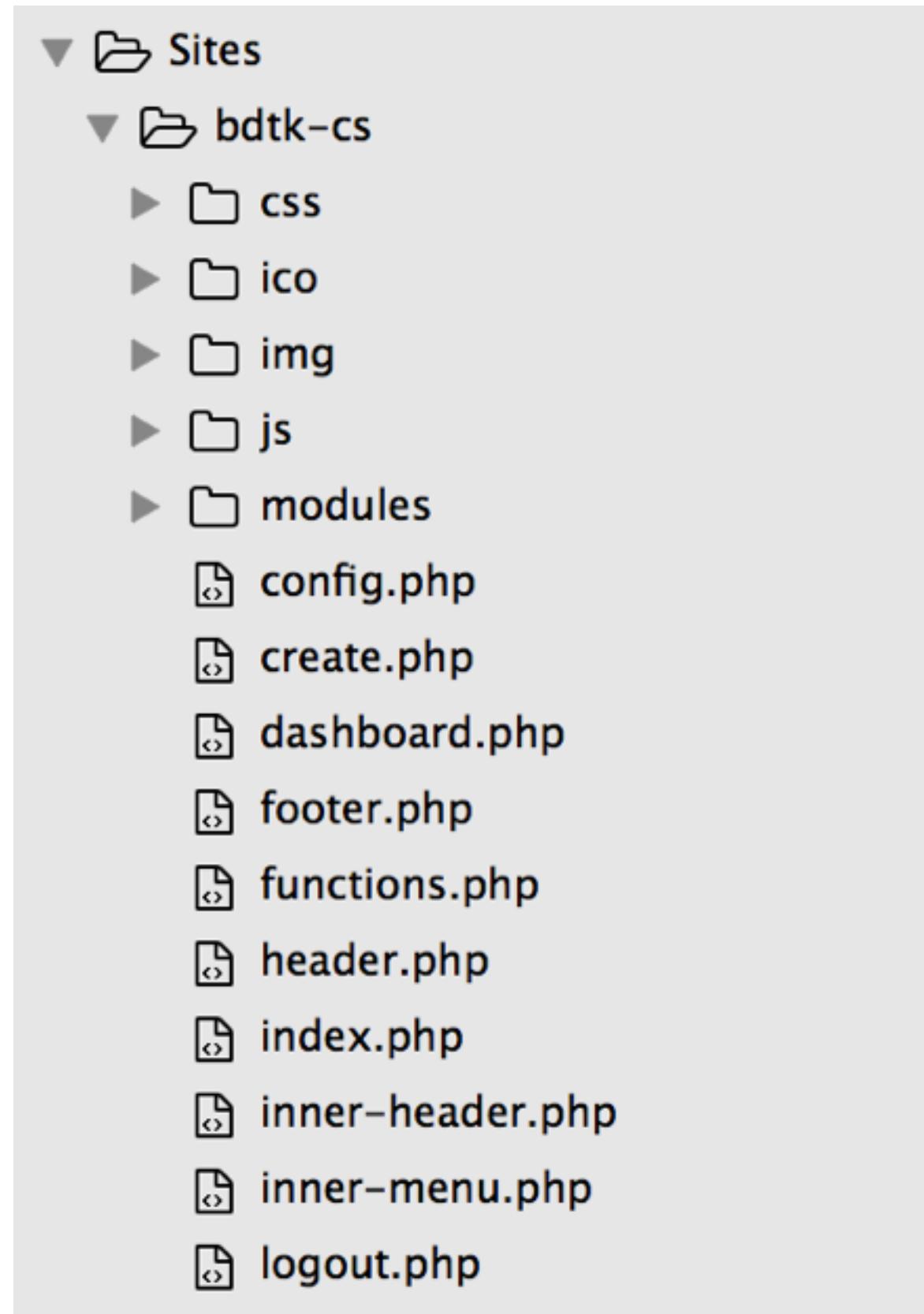
Abstract

This proposal concerns the management of general information about accelerators and experiments at CERN. It discusses the problems of loss of information about complex evolving systems and derives a solution based on a distributed hypertext system.

Keywords: Hypertext, Computer conferencing, Document retrieval, Information management, Project control



What is a website?



Collection of files in a folder on a server

World Wide Web

The WorldWideWeb (W3) is a wide-area [hypermedia](#) information retrieval initiative aiming to give universal access to a large universe of documents.

Everything there is online about W3 is linked directly or indirectly to this document, including an [executive summary](#) of the project, [Mailing lists](#), [Policy](#), November's [W3 news](#), [Frequently Asked Questions](#).

[What's out there?](#)

Pointers to the world's online information, [subjects](#), [W3 servers](#), etc.

[Help](#)

on the browser you are using

[Software Products](#)

A list of W3 project components and their current state. (e.g. [Line Mode](#), X11 [Viola](#), [NeXTStep](#), [Servers](#), [Tools](#), [Mail robot](#), [Library](#))

[Technical](#)

Details of protocols, formats, program internals etc

[Bibliography](#)

Paper documentation on W3 and references.

[People](#)

A list of some people involved in the project.

[History](#)

A summary of the history of the project.

[How can I help ?](#)

If you would like to support the web..

[Getting code](#)

Getting the code by [anonymous FTP](#), etc.

<http://info.cern.ch/hypertext/WWW/TheProject.html>

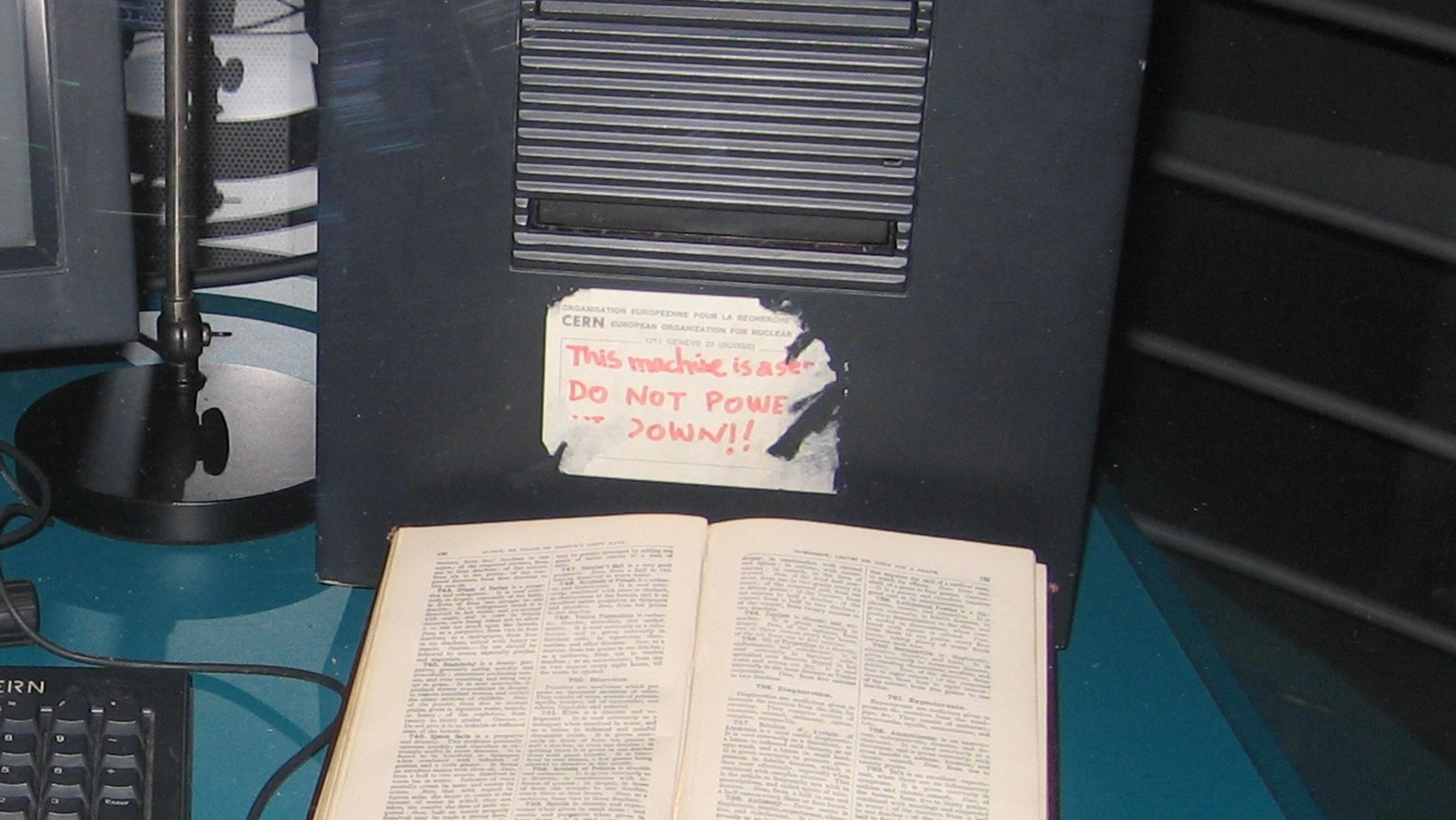


1989 : Première proposition pour le Web de Tim Berners-Lee à son supérieur, Mike Sendall, qui trouva la remarque "vague, mais intéressante".

1989 : Tim's first ideas on the Web were given on his boss Mike Sendall's remark "vague, but interesting".

Une encyclopédie sur tout ! Ce livre a inspiré Tim Berners-Lee dans ses travaux comme il mène au Web. Tout comme il propose, ce livre facilite l'accès à l'information. Il importe aussi d'informations un peu partout. Ce livre importe toutes les informations liées à tous ceux qui sont sur le Web.

An encyclopedia of everything! This book inspired Tim Berners-Lee during his work leading up to the Web. Just as he wanted, this book gives users access to a wealth of information about any subject. This book is full of links, enabling users to click



Meet DOM



Meet DOM

What is the DOM?

DOCUMENT OBJECT MODEL

A tree of elements or structure that every website is represented by.

Example

Example a HTML Document

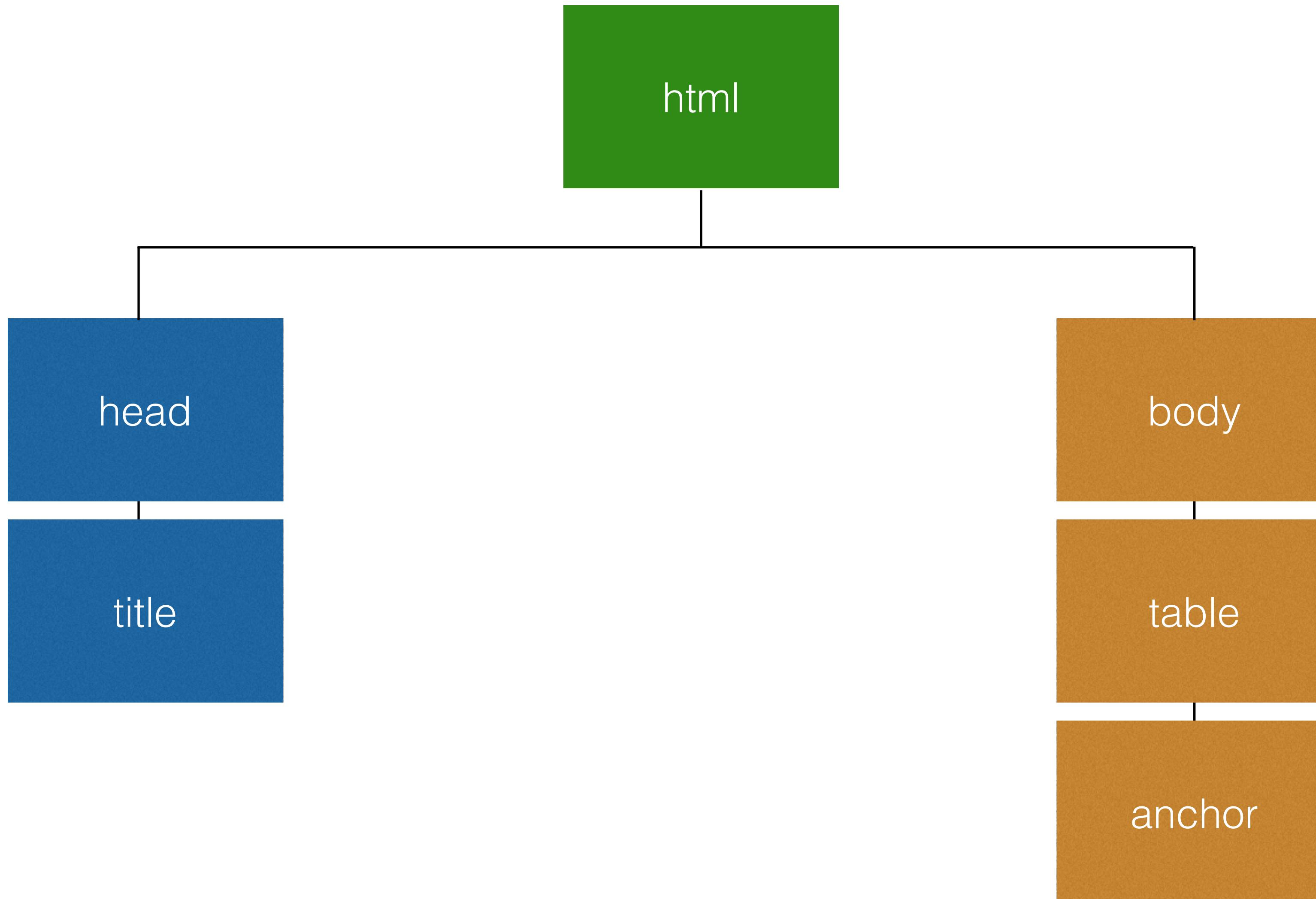
```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN"
  "http://www.w3.org/TR/html4/loose.dtd">
<html>
  <head>
    <meta http-equiv="Content-type" content="text/html; charset=utf-8">
    <title>Test Page</title>
  </head>

  <body>
    <table border="0" cellspacing="5" cellpadding="5">
      <tr><th>Header</th></tr>
      <tr><td>Data</td></tr>
    </table>

    <a href="/css/master%20set.css">Hello World</a>
  </body>
</html>
```

Example

Example of DOM Tree (previous HTML Document)



The Core Element

Everything is built from base tags

<h1></h1>

<p></p>

<hr/>

You open in, you got to close it!

a abbr acronym address applet area article aside audio
base basefont bdi bdo big blockquote body br button
canvas caption centre cite code col clogroup datalist
dd del details dfn dialog dir div dl dt em embed
fieldset figcaption figure font footer form frame
frameset h1..h6 head header hr html i iframe img input
ins kbd keygen label legend li link main map mark menu
menuitem meta meter nav noframes noscript object ol
optgroup option output p param pre progress q rp rt
ruby samp script section select small source span
strike strong style sub summary sub table tbody td
textarea tfoot th thead time title tr tract tt u ul
var video wbr

The Core Element

Everything else is built from tags you declare

```
<div id=""></div>
```



Start Tag



End Tag

DOM's Structure

HTML Document Breakdown

HTML is a standard which has rules!

- Sometimes Strict
- Sometime Loose

First Line of Every document

`<!DOCTYPE html>`

Validate: <http://validator.w3.org/>



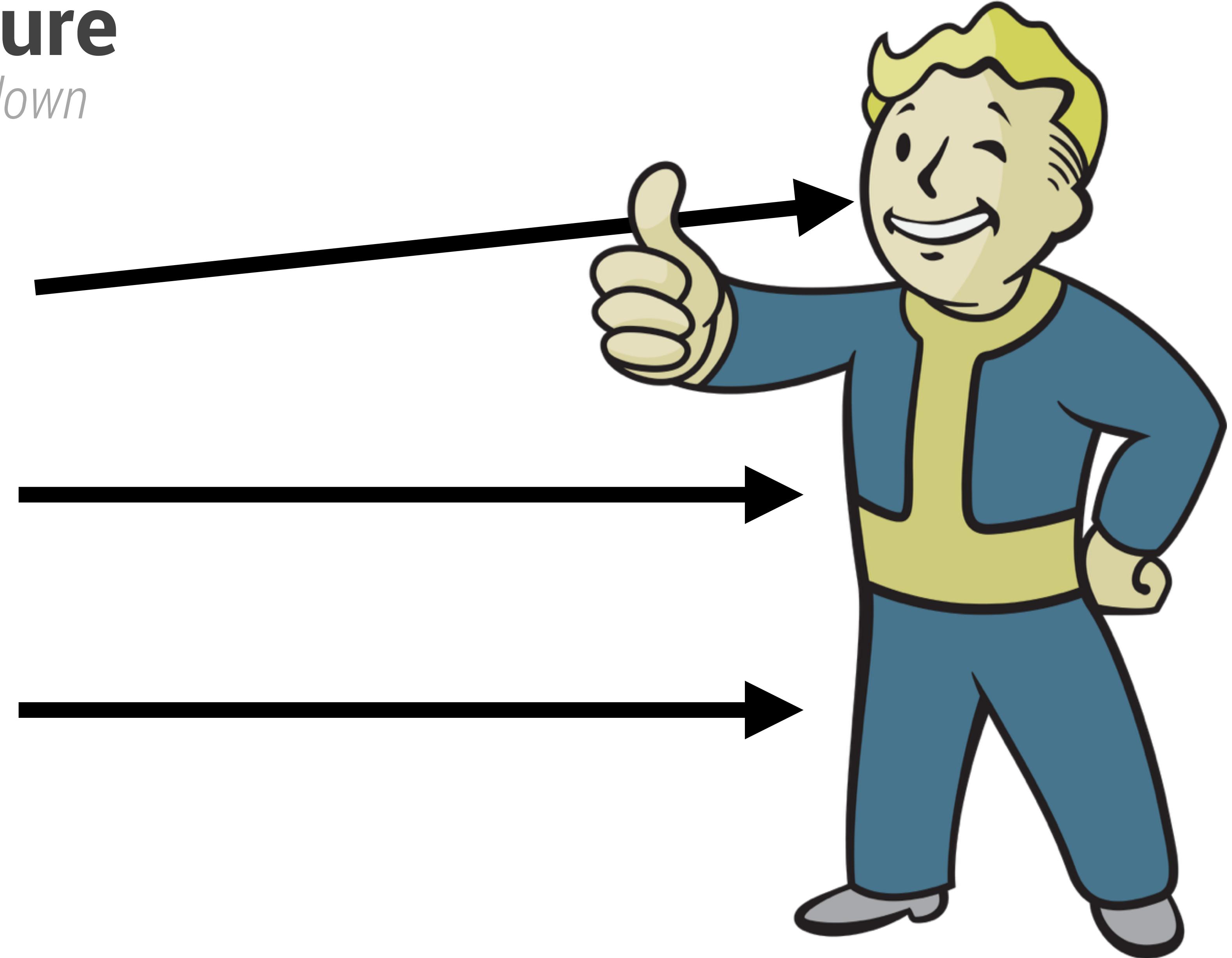
DOM's Structure

HTML Document Breakdown

HEAD

BODY

FOOTER



DOM's Structure

HTML Document Breakdown



Next comes the HEAD

- Metadata
- Title
- Styles (Files and Inline)

```
<head>
  <title> A Fantastic Website </title>
  <meta name="description" content="A search engine uses me to know what the page is about. " >
  <meta name="author" content="Steven Gray">
  <link rel="icon" href="./favicon.ico">
  <link rel="stylesheet" href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.1/css/bootstrap.min.css">
  <link rel="stylesheet" href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.1/css/bootstrap-theme.min.css">
  <link rel="stylesheet" href="./css/style.css">
  <style>
    .....
  </style>
</head>
```

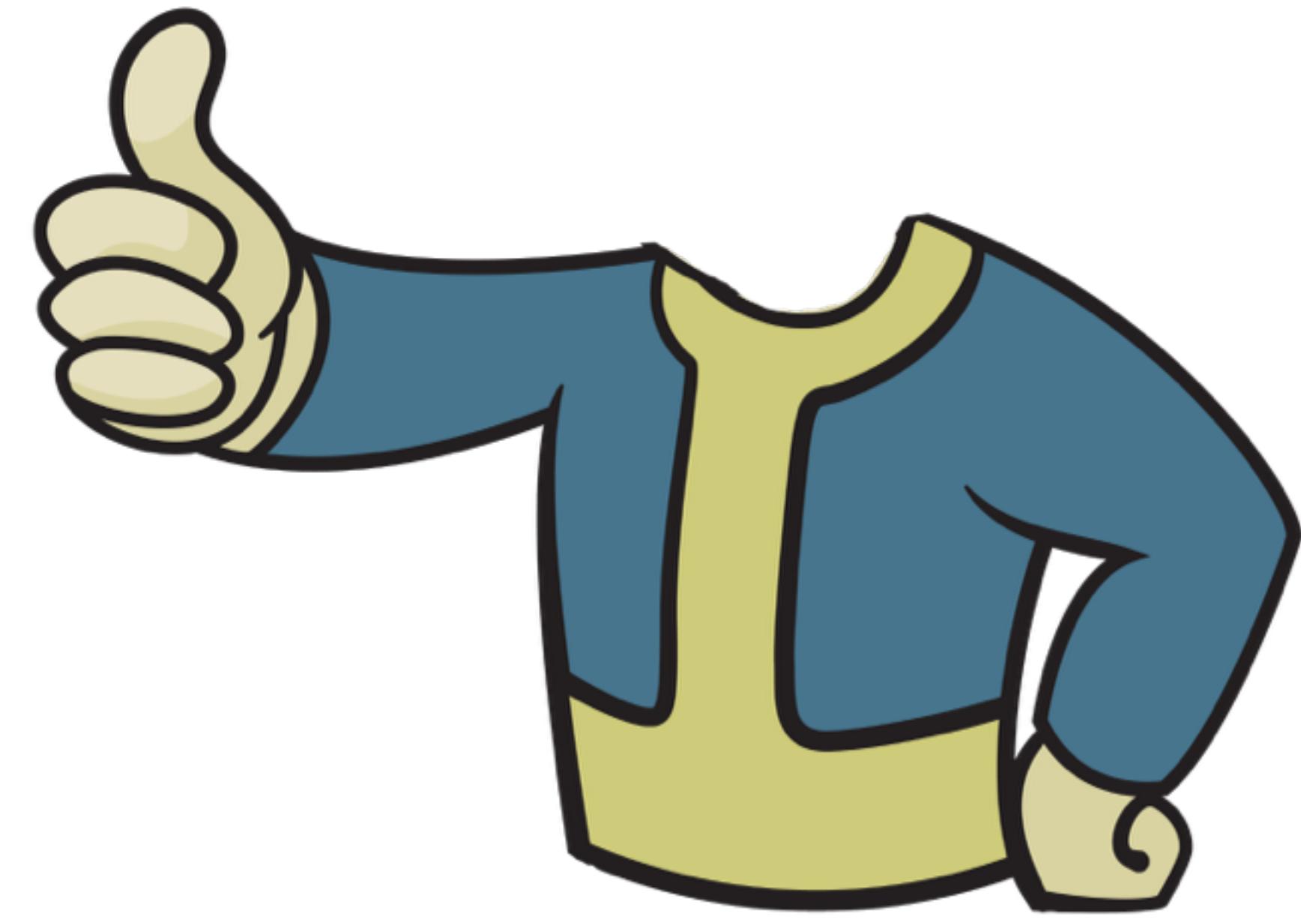
DOM's Structure

HTML Document Breakdown

The BODY - Main content of the file

- Headings
- Text / Paragraphs
- Images / Video

```
<body>
  <h1> A Title </h1>
  <p>
    Some text that appears on the page
  </p>
  
  .....
</body>
```



DOM's Structure

HTML Document Breakdown

Footer - Note not same as footer tag
– Scripts appear before </body>

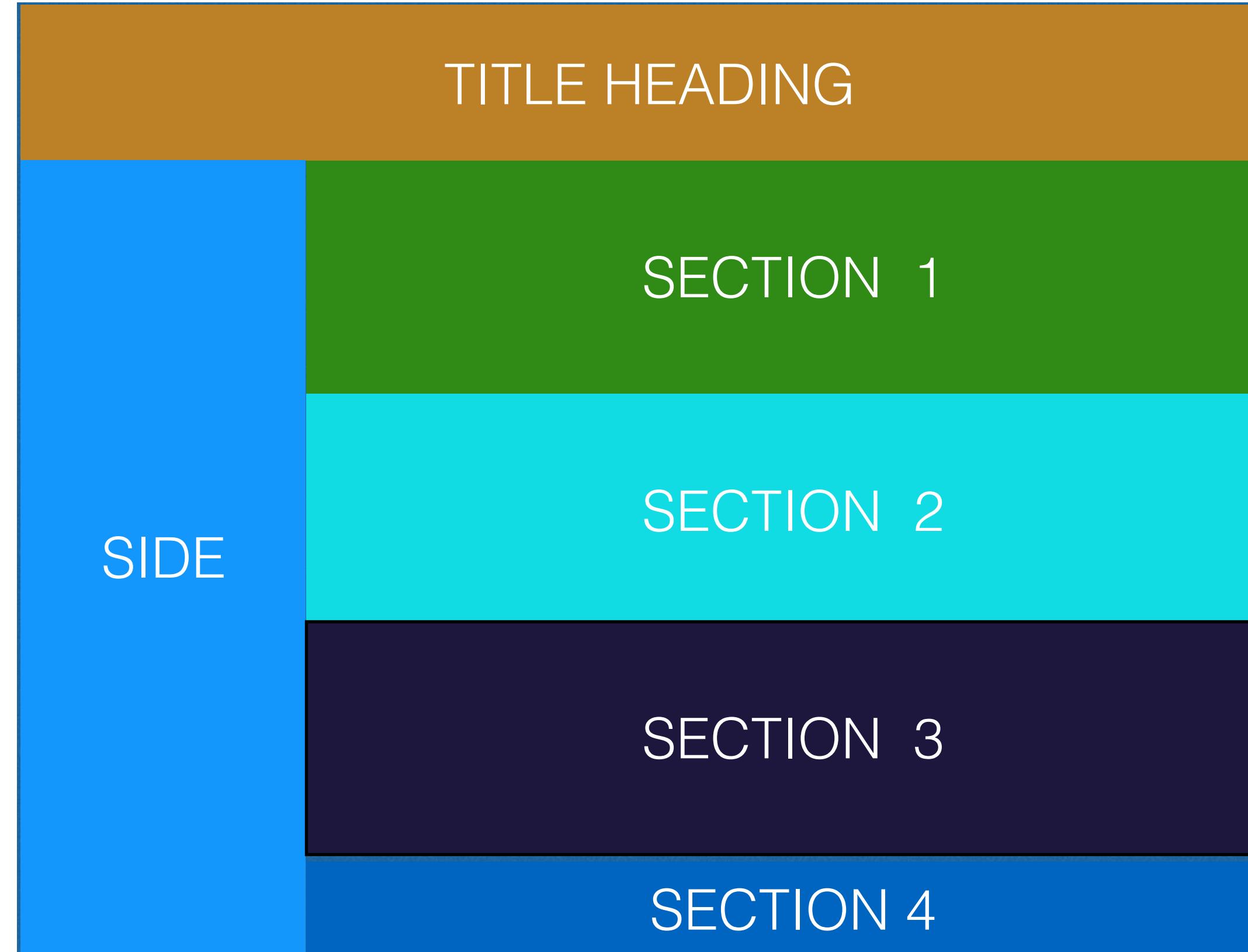
.....

```
<script src="//code.jquery.com/jquery-1.10.2.min.js"></script>
<script src="//maxcdn.bootstrapcdn.com/bootstrap/3.2.0/js/bootstrap.min.js"></script>
<script src="./js/ripples.min.js"></script>
<script src="./js/material.min.js"></script>
<script src="http://d3js.org/d3.v3.min.js"></script>
<script>
  var fb = new Firebase("https://cloudmetrics.firebaseio.com/");
  var firstLoad = 1;
  var platform = "mac";
</script>
</body>
</html>
```



Building Blocks

HTML Fundamentals

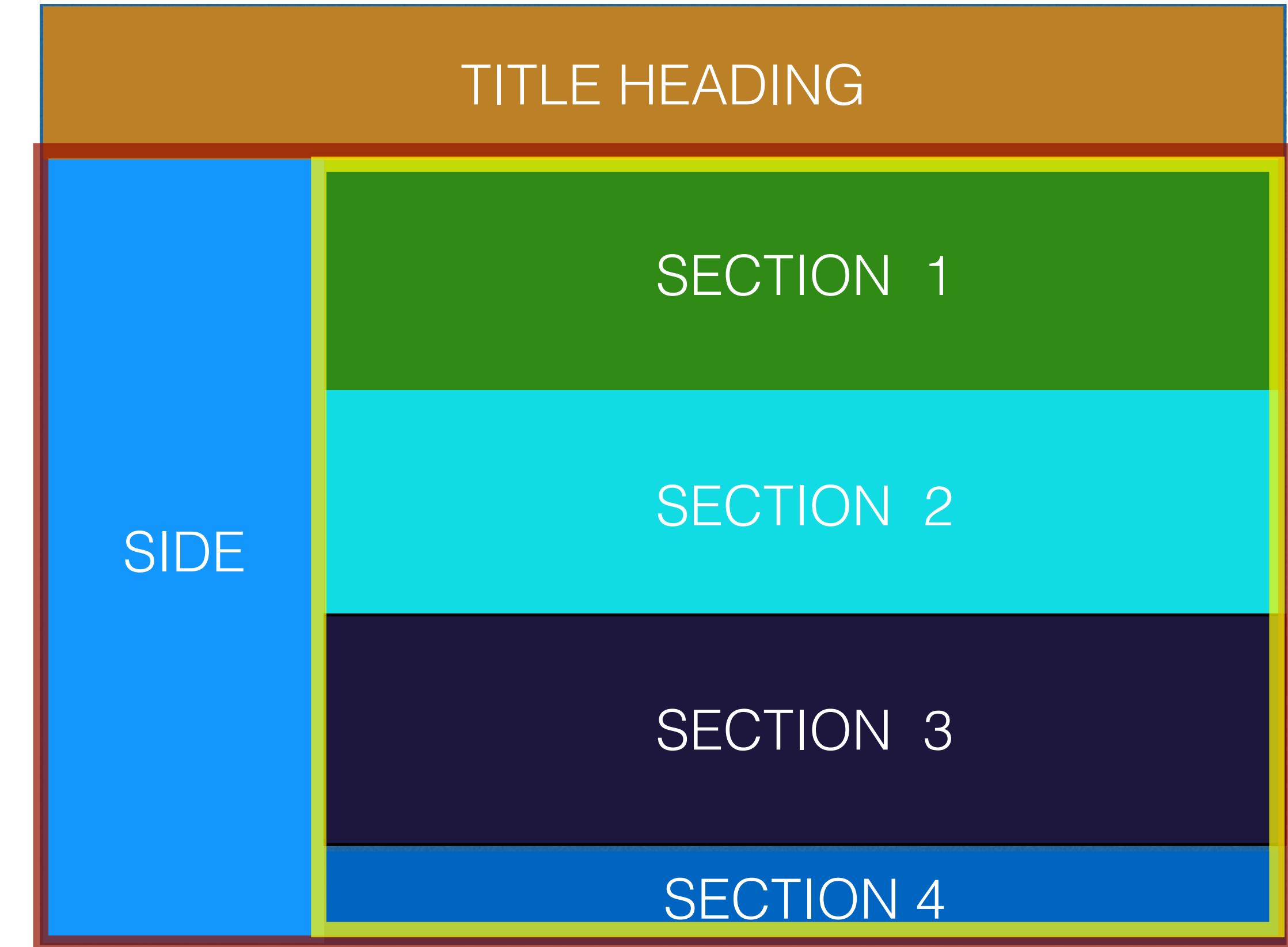


Every page is build of boxes - size defaults to 100% of it's container

HTML Fundamentals

Building Blocks

```
<head>
  <title> An Example Page </title>
</head>
<body>
  <div id="heading"> TITLE HEADING </div>
  <div id="container">
    <div id="side">SIDE</div>
    <div id="inner">
      <div class="section">SECTION 1</div>
      <div class="section">SECTION 2</div>
      <div class="section">SECTION 3</div>
      <div class="section">SECTION 4</div>
    </div>
  </div>
</body>
```

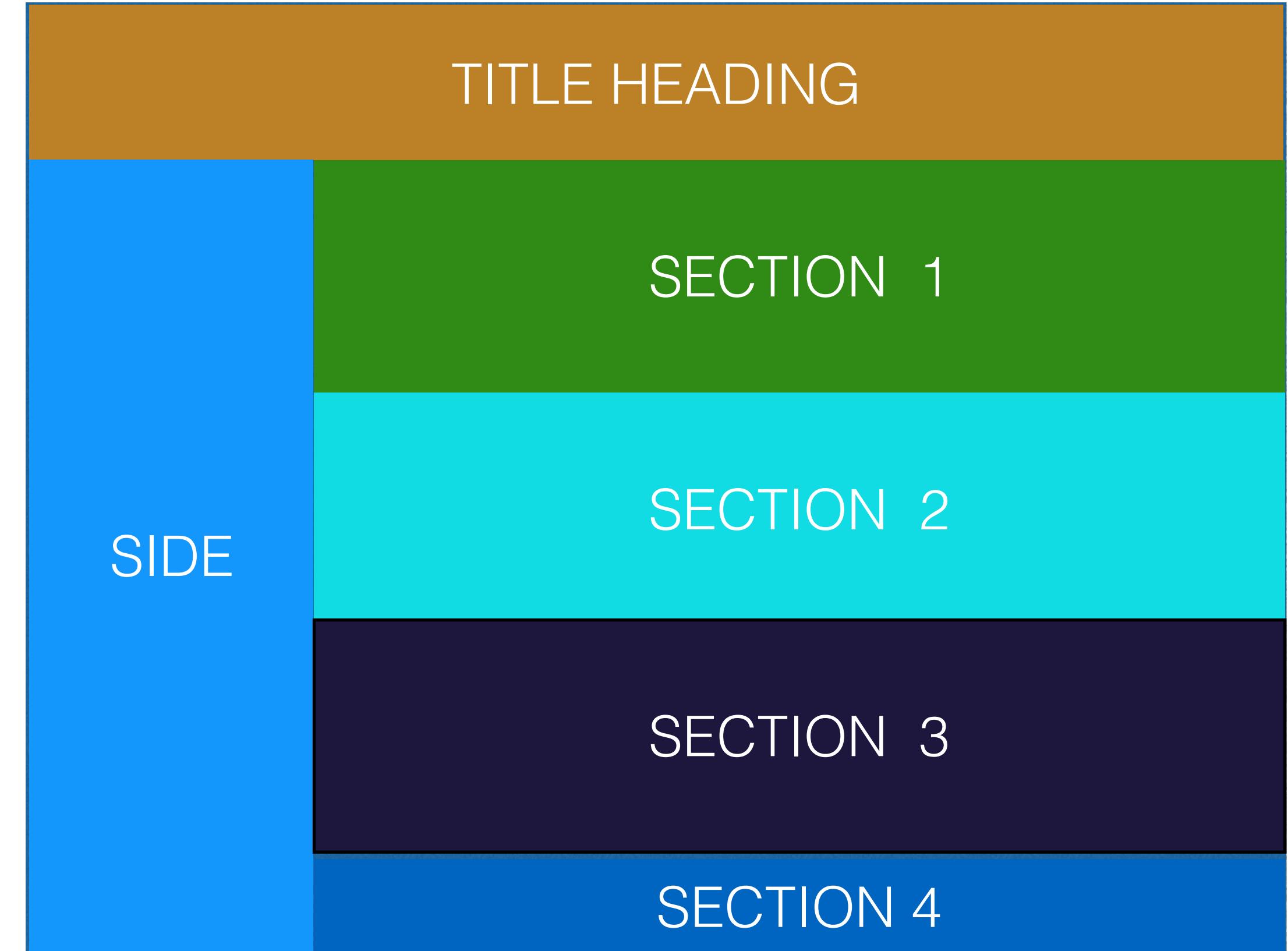


DIV (Dividers) split the page into blocks

HTML Fundamentals

Building Blocks

```
<!DOCTYPE html>
<head>
  <title> An Example Page </title>
</head>
<body>
  <div id="heading"> TITLE HEADING </div>
  <div id="container">
    <div id="side">SIDE</div>
    <div id="inner">
      <div class="section">SECTION 1</div>
      <div class="section">SECTION 2</div>
      <div class="section">SECTION 3</div>
      <div class="section">SECTION 4</div>
    </div>
  </div>
</body>
</html>
```



id's are used for unique elements
class's are repeating elements

HTML Fundamentals

Text Headings

```
<!DOCTYPE html>
<head>
  <title> Headings Example </title>
</head>
<body>
  <h1>Heading 1</h1>
  <h2>Heading 2</h2>
  <h3>Heading 3</h3>
  <h4>Heading 4</h4>
  <h5>Heading 5</h5>
  <h6>Heading 6</h6>
</body>
</html>
```

Heading 1

Heading 2

Heading 3

Heading 4

Heading 5

Heading 6

HTML Fundamentals

Text Formatting

```
<!DOCTYPE html>
<head>
  <title>Text Formatting Examples</title>
</head>
<body>
  <div id="heading"> TITLE HEADING </div>
  <div id="container">
    <div id="side">SIDE</div>
    <div id="inner">
      <div class="section">
        <p>
          This is some text that I'm using to
          <u>describe</u> how the <b>browser</b> will render
          text <i>on the</i> screen. <u>No matter the <small>size</small></u>
        </p>
      </div>
      <div class="section">SECTION 2</div>
      <div class="section">SECTION 3</div>
      <div class="section">SECTION 4</div>
    </div>
  </div>
</body>
</html>
```

<p></p> - Paragraph of text as a single Block

<i></i> - Italic Text

 - Bold Text

<u></u> - Underline Text

<code></code> - Formatted Code (fixed-width font)

<small></small> - Slightly smaller font size

HTML Fundamentals

Lists

```
<!DOCTYPE html>
<head>
    <title> A Unordered List Example Page </title>
</head>
<body>
    <div id="heading"> TITLE HEADING </div>
    <div id="container">
        <div id="side">SIDE</div>
        <div id="inner">
            <div class="section">
                <p>An Unordered List</p>
                <ul>
                    <li> Item 1</li>
                    <li> Item 2</li>
                    <li> Item 3</li>
                    <li> Item 4</li>
                </ul>
            </div>
            <div class="section">SECTION 2</div>
            <div class="section">SECTION 3</div>
            <div class="section">SECTION 4</div>
        </div>
    </div>
</body>
</html>
```

An Unordered List

- Item 1
- Item 2
- Item 3
- Item 4

HTML Fundamentals

Lists

```
<!DOCTYPE html>
<head>
    <title> A Ordered List Example Page </title>
</head>
<body>
    <div id="heading"> TITLE HEADING </div>
    <div id="container">
        <div id="side">SIDE</div>
        <div id="inner">
            <div class="section">
                <p>An Unordered List</p>
                <ol>
                    <li> Item 1</li>
                    <li> Item 2</li>
                    <li> Item 3</li>
                    <li> Item 4</li>
                </ol>
            </div>
            <div class="section">SECTION 2</div>
            <div class="section">SECTION 3</div>
            <div class="section">SECTION 4</div>
        </div>
    </div>
</body>
</html>
```

An Ordered List

1. Item 1
2. Item 2
3. Item 3
4. Item 4

HTML Fundamentals

Images

```
<!DOCTYPE html>
<head>
    <title> An Image Example Page </title>
</head>
<body>
    <div id="heading"> TITLE HEADING </div>
    <div id="container">
        <div id="side">SIDE</div>
        <div id="inner">
            <div class="section">
                <h2>An Image on the page</h2>
                
            </div>
            <div class="section">SECTION 2</div>
            <div class="section">SECTION 3</div>
            <div class="section">SECTION 4</div>
        </div>
    </div>
</body>
</html>
```

An Image on the page



HTML Fundamentals

Some tags have extra attributes

```








align="left | right | top | bottom | middle"
border="1 | 0"
vspace="100px" hspace="100px"
```

HTML Fundamentals

Anchors - Linking to other pages

```
<a href="../map.html">The map</a>
```

```
<a href="../about.html" target="_BLANK">A about page in a new window</a>
```

```
<a href="http://www.google.com" target="_BLANK">  
    
</a>
```

```
<a href="..../index.html">A link to a file in a directory that is outside the folder</a>
```

```
<a href="#">What does this link do?</a>
```

HTML Fundamentals

Tables

```
<!DOCTYPE html>
<head>
    <title> An Table Example Page </title>
</head>
<body>
    <table border="1">
        <tr>
            <th>Header 1</th>
            <th>Header 2</th>
        </tr>
        <tr>
            <td>Cell A1</td>
            <td>Cell B1</td>
        </tr>
        <tr>
            <td>Cell A2</td>
            <td>Cell B2</td>
        </tr>
    </table>
</body>
</html>
```

Header 1	Header 2
Cell A1	Cell B1
Cell A2	Cell B2

HTML Fundamentals

Frames - Embed and iFrames

```
<!DOCTYPE html>
<head>
    <title> An iFrame Example Page </title>
</head>
<body>
    <iframe width="420" height="315" src="https://www.youtube.com/embed/dQw4w9WgXcQ" frameborder="0" allowfullscreen></iframe>
</body>
</html>
```

iframe - used to include other pages directly inside your page

Super Styling

Or how to make a page look beautiful.



CSS Fundamentals

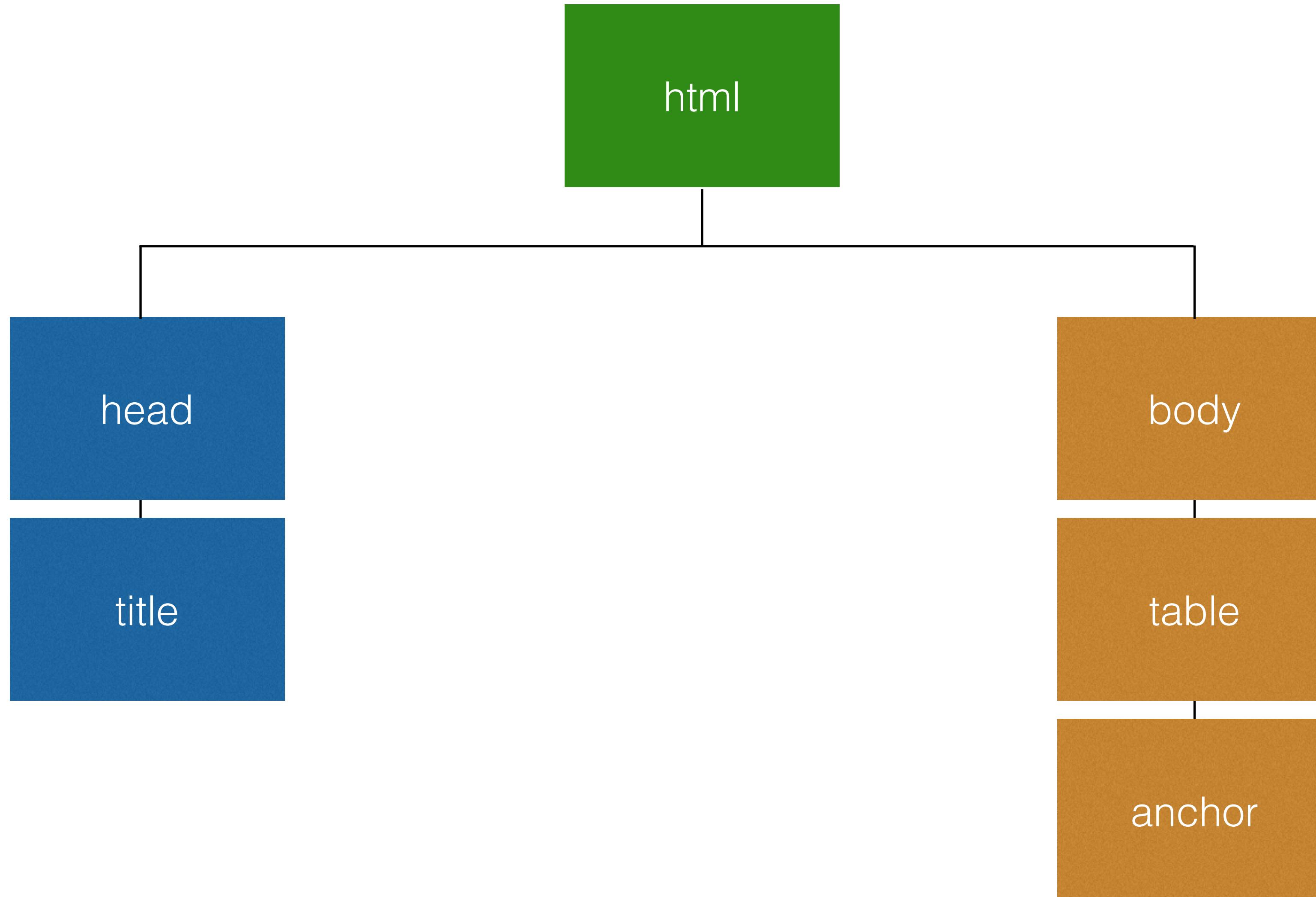
What's with all these abbreviations, Steve?

CASCADING STYLE SHEET

A sheet of styles applied to elements on a webpage.

CSS Fundamentals

Like a waterfall rules cascade down the tree



CSS Fundamentals

Where the magic happens.

```
<!DOCTYPE html>
<head>
  <title> An CSS Styled Page </title>
  <link rel="stylesheet" href=".css/style.css">
  <style>
    body{
      background-color: red;
    }
  </style>
</head>
<body></body>
</html>
```

Inline or files of style rules that are applied to tags on the page.
Style files end with file extension .css

CSS Fundamentals

Set of simple rules to apply to elements

```
#header-menu{  
    display: inline;  
    float: right;  
    font-size: 18px;  
    font-weight: 200;  
    line-height: 27px;  
    color: red;  
    margin-top: 20px;  
}
```

```
.login-form{  
    margin: 0 auto;  
    margin-top: -50px;  
    margin-bottom: 50px;  
    width: 600px;  
    height: 200px;  
}
```

```
body{  
    font-family: Arial;  
    font-size: 14px;  
    color: #ffffff;  
    margin-right: 40px;  
    margin-left: 40px;  
    margin-top: 40px;  
    margin-bottom: 20px;  
}
```

Each rule ends with a semi-colon and is indented

CSS Fundamentals

First 2 Major Rules

```
<div id="header"></div>
```

```
#header{  
    background-color: red;  
    width: 100px;  
    height: 100px;  
}
```

rules apply to id's

CSS Fundamentals

First 2 Major Rules

```
<div class="post"></div>
```

```
.post{  
    background-color: blue;  
    width: 100px;  
    height: 100px;  
    background: url('../images/background.jpg');  
}
```

. rules apply to **every** class

CSS Fundamentals

Applying Style Rules

```
.post{  
    background-color: red;  
    width: 100px;  
    height: 100px;  
}
```

```
<div class="post" style="background-color: black;">  
    What colour is my background?  
</div>
```

Why do you think this is bad practice?

CSS Fundamentals

Color Rules - Painting by Numbers

```
.post{  
background-color: #ff0000;  
width: 100px;  
height: 100px;  
}
```

#ff0000

R
255

G
0

B
0

Hexadecimal Values for Colors vs RGB

CSS Fundamentals

Fonts

```
h1{  
    font-family: Arial;  
    font-size: 20px;  
    font-style: italic  
}
```

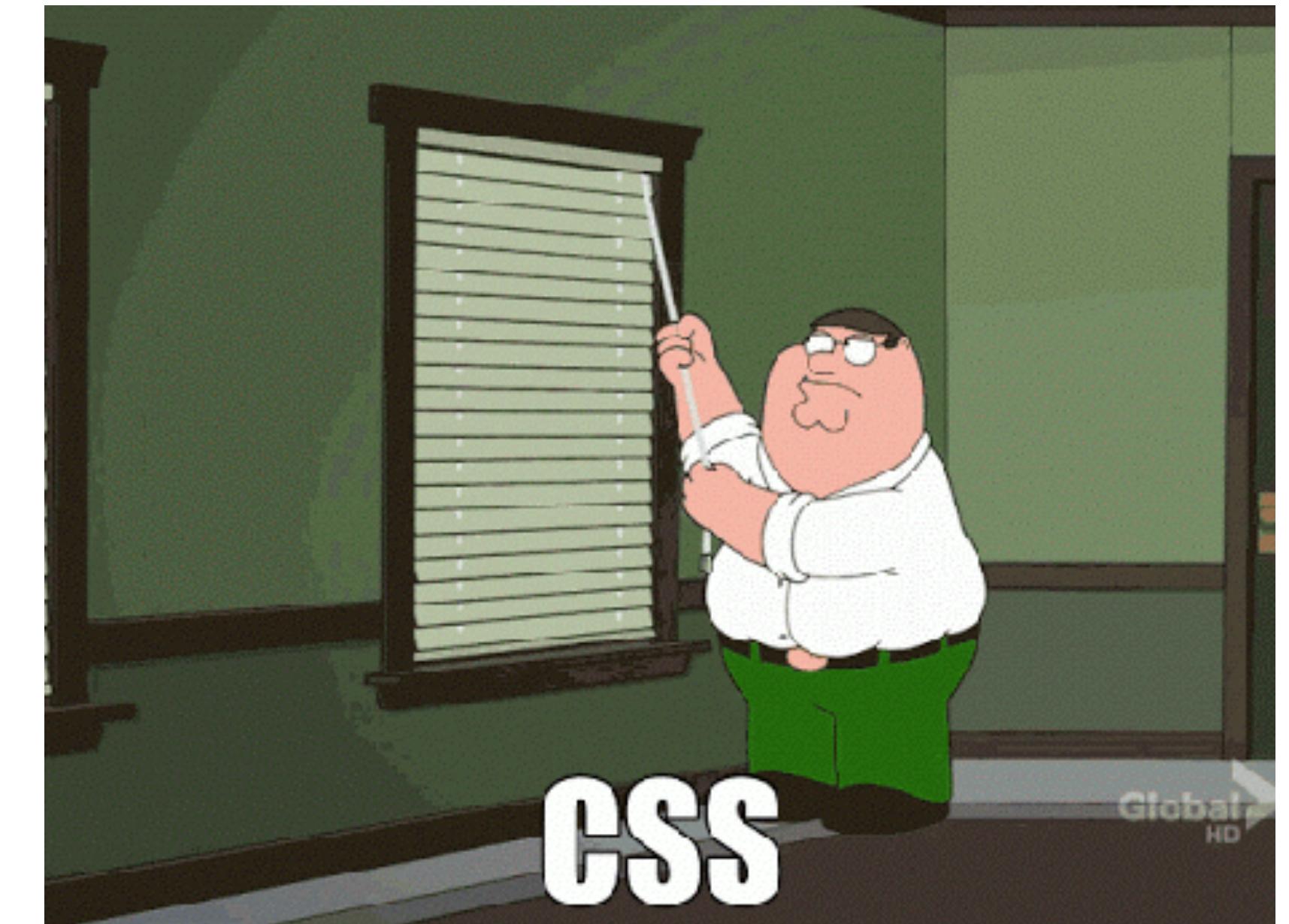
Look at W3 Schools specification

http://www.w3schools.com/css/css_font.asp

CSS Fundamentals

Different Browsers Render Certain Rules Differently

```
.collector-display{  
    margin-bottom: 10px;  
    background-repeat: no-repeat;  
    background-position: right;  
    -moz-opacity: 1.0;  
    opacity: 1.0;  
}
```



Look at W3 Schools specification
<http://www.w3schools.com/css>

CSS Fundamentals

Different Browsers Render Certain Rules Differently

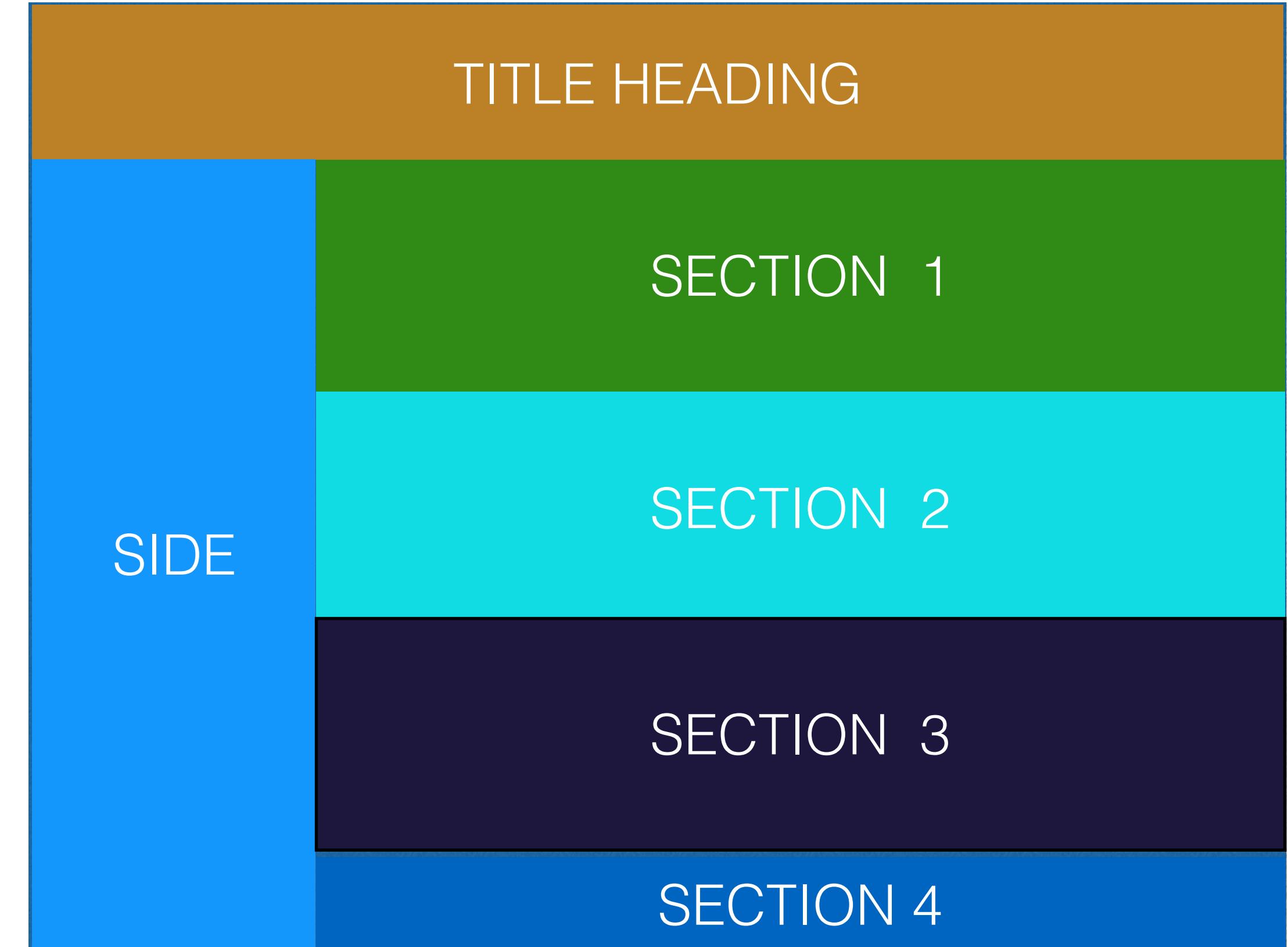
```
.collector-display{  
background-image: -ms-linear-gradient(top, #ffffff, #e6e6e6);  
background-image: -webkit-gradient(linear, 0 0, 0 100%, from(#ffffff), to(#e6e6e6));  
background-image: -webkit-linear-gradient(top, #ffffff, #e6e6e6);  
background-image: -o-linear-gradient(top, #ffffff, #e6e6e6);  
background-image: linear-gradient(top, #ffffff, #e6e6e6);  
background-image: -moz-linear-gradient(top, #ffffff, #e6e6e6);  
}
```

Look at W3 Schools specification
<http://www.w3schools.com/css>

CSS Fundamentals

Positioning

```
<!DOCTYPE html>
<head>
  <title> An Example Page </title>
</head>
<body>
  <div id="heading"> TITLE HEADING </div>
  <div id="container">
    <div id="side">SIDE</div>
    <div id="inner">
      <div class="section">SECTION 1</div>
      <div class="section">SECTION 2</div>
      <div class="section">SECTION 3</div>
      <div class="section">SECTION 4</div>
    </div>
  </div>
</body>
</html>
```

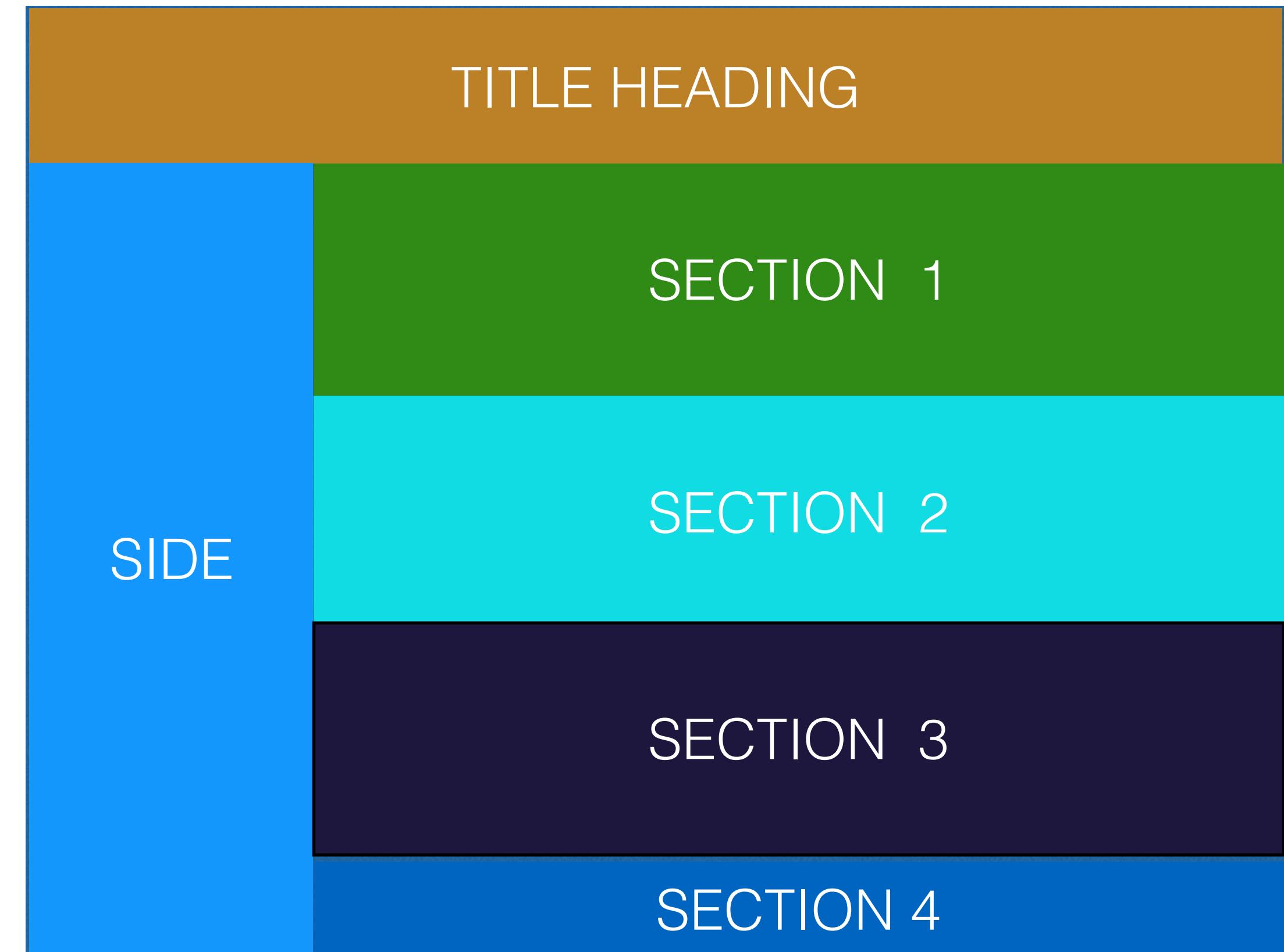


What does this look like in a browser?

CSS Fundamentals

Positioning

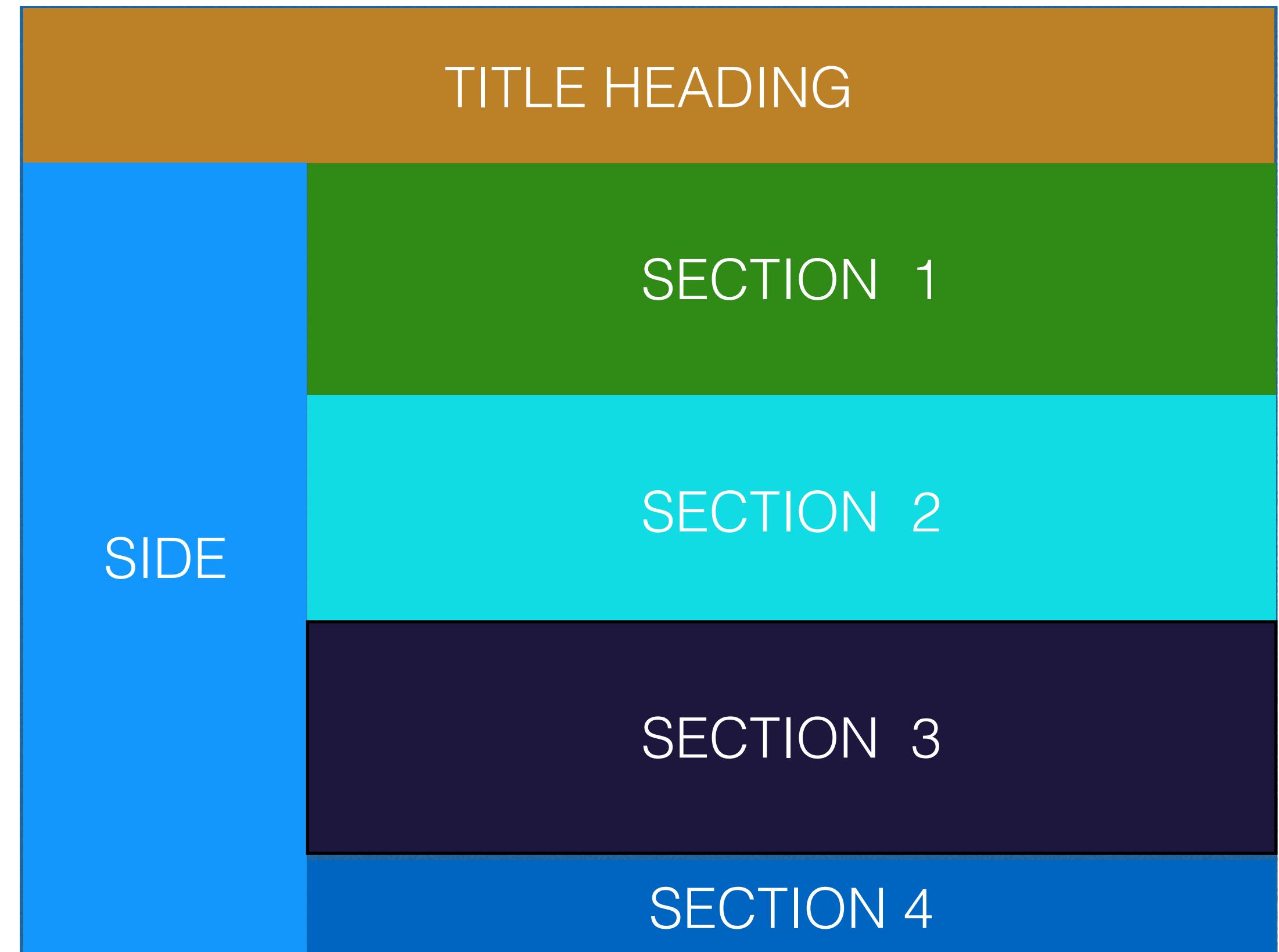
```
#heading{  
    width: 100%;  
}  
  
#side{  
    width: 33%;  
}  
  
#inner{  
    width: 66%;  
}  
  
.section{  
    width: 100%;  
}
```



CSS Fundamentals

Positioning

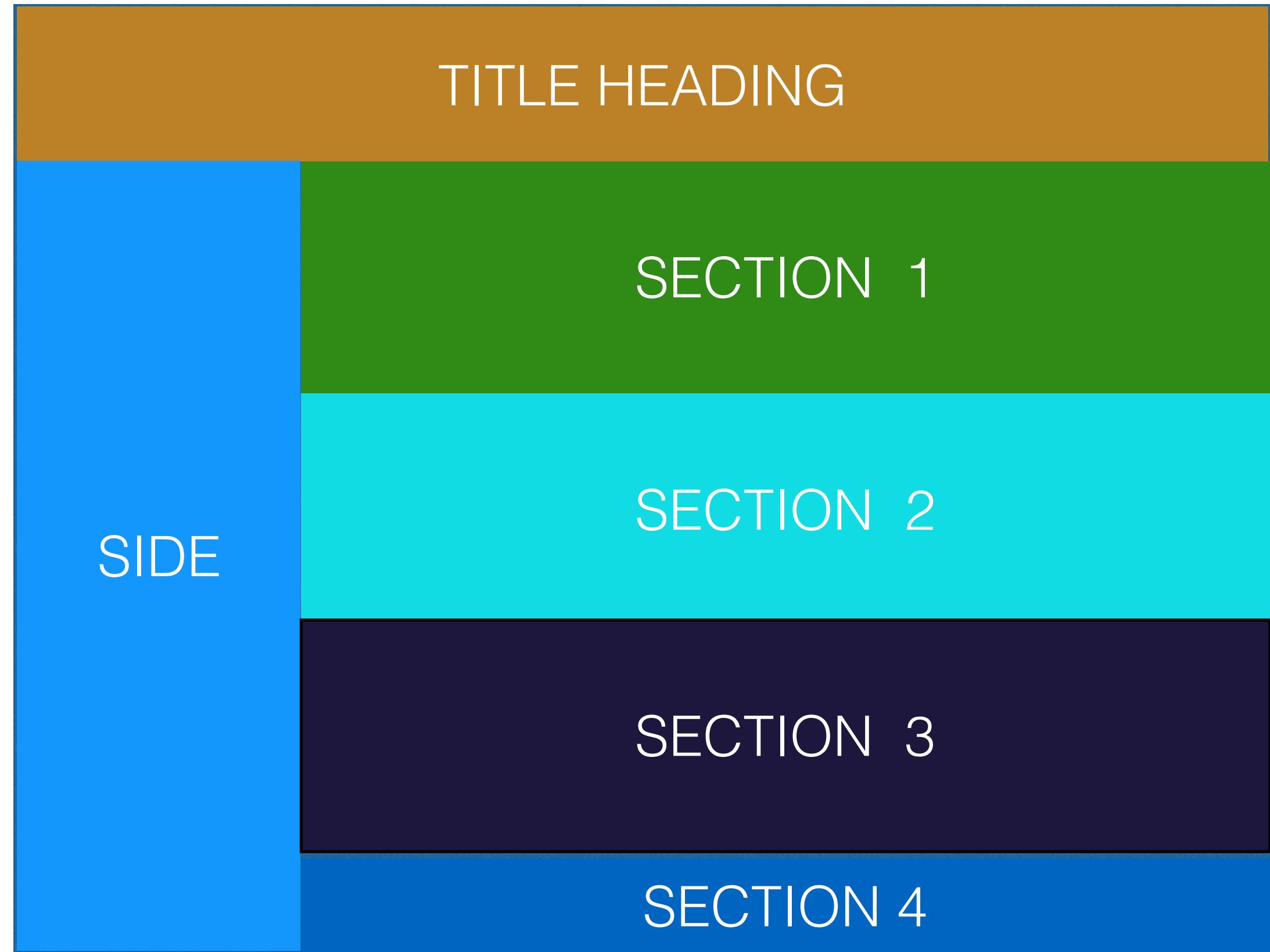
```
#heading{  
    width: 100%;  
    background-color: orange;  
}  
  
#side{  
    width: 33%;  
    background-color: blue;  
}  
  
#inner{  
    width: 66%;  
}  
  
.section{  
    width: 100%;  
    background-color: #00ff00;  
}
```



CSS Fundamentals

Positioning

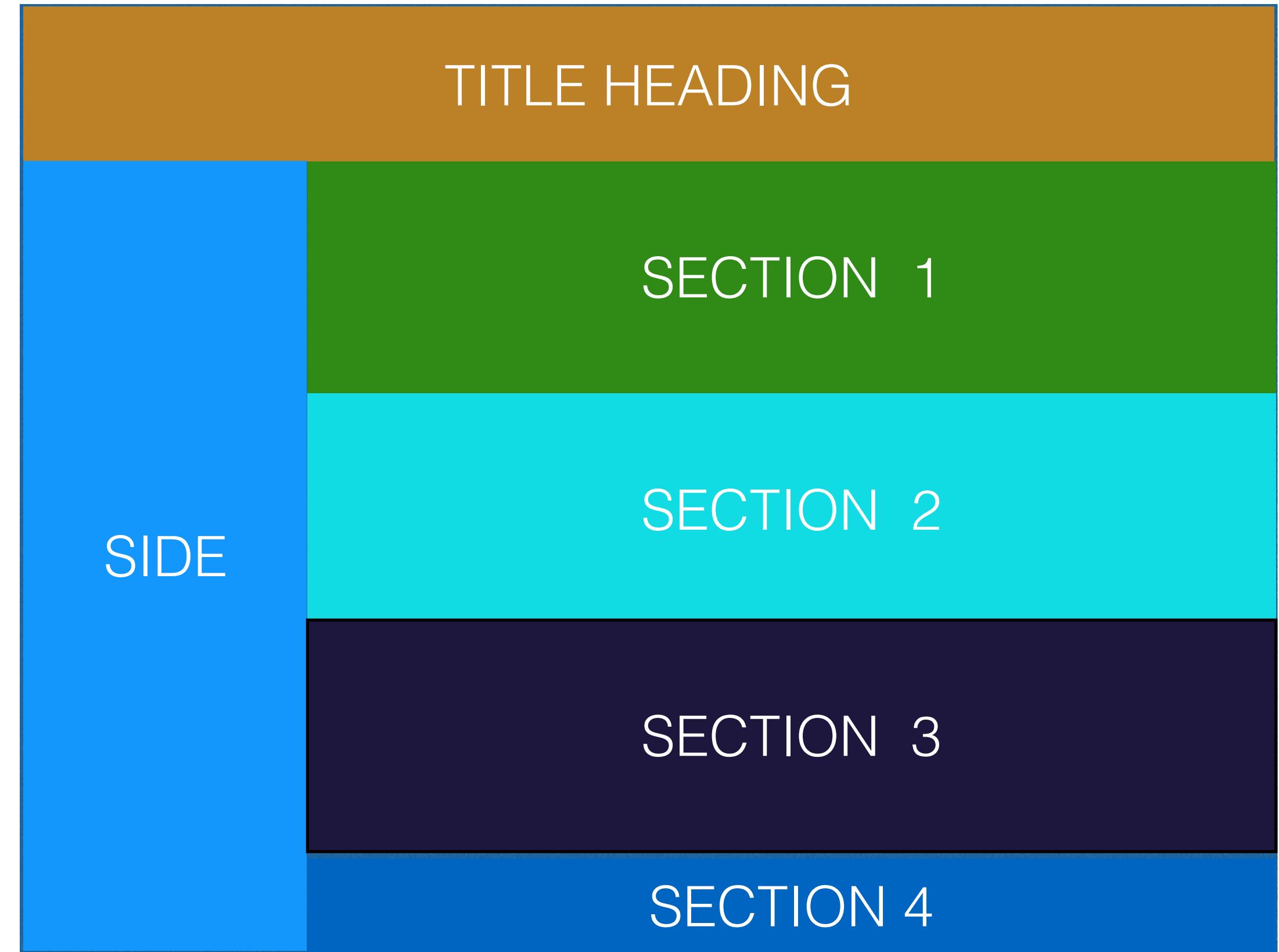
```
#heading{  
    width: 100%;  
    background-color: orange;  
    height: 200px;  
}  
  
#side{  
    width: 33%;  
    height: 100%;  
    background-color: blue;  
}  
  
#inner{  
    width: 66%;  
}  
  
.section{  
    width: 100%;  
    background-color: #00ff00;  
    height: 300px;  
}
```



CSS Fundamentals

Positioning

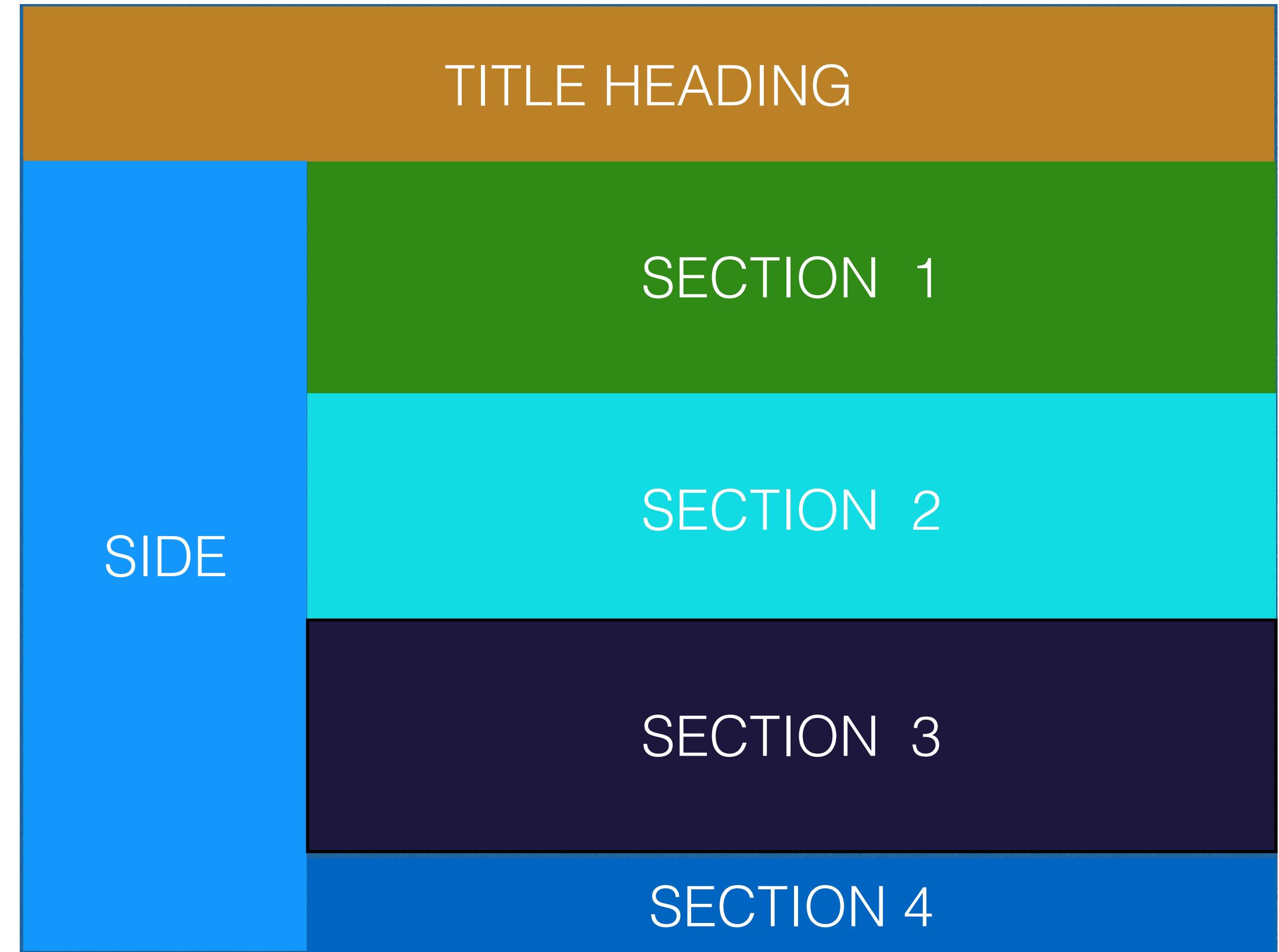
```
#heading{  
    width: 100%;  
    background-color: orange;  
    height: 200px;  
}  
  
.section{  
    width: 100%;  
    background-color: #00ff00;  
    height: 300px;  
}  
  
#side{  
    width: 33%;  
    height: 100%;  
    background-color: blue;  
    float: left;  
}  
  
#inner{  
    width: 66%;  
    float: right;  
}
```



CSS Fundamentals

Positioning

```
body{  
    font-family: Arial;  
    text-align: center;  
    font-size: 50px;  
    color: white;  
}  
  
#heading{  
    width: 100%;  
    background-color: orange;  
    height: 200px;  
}  
  
#side{  
    width: 33%;  
    height: 1400px;  
    background-color: blue;  
    float: left;  
}  
  
#inner{  
    width: 66%;  
    float: right;  
}
```



CSS Fundamentals

Advanced Rules for Positioning

```
.dropdown-menu {  
    position: absolute;  
    top: 100%;  
    right: 0;  
    z-index: 1000;  
    display: none;  
    float: left;  
    min-width: 160px;  
    padding: 4px 0;  
    margin: 1px 0 0;  
    list-style: none;  
    background-color: #ffffff;  
    border: 1px solid #ccc;  
    border: 1px solid rgba(0, 0, 0, 0.2);  
    *border-right-width: 2px;  
    *border-bottom-width: 2px;  
    -webkit-border-radius: 5px;  
    -moz-border-radius: 5px;  
    border-radius: 5px;  
    -webkit-box-shadow: 0 5px 10px rgba(0, 0, 0, 0.2);  
    -moz-box-shadow: 0 5px 10px rgba(0, 0, 0, 0.2);  
    box-shadow: 0 5px 10px rgba(0, 0, 0, 0.2);  
    -webkit-background-clip: padding-box;  
    -moz-background-clip: padding;  
    background-clip: padding-box;  
}
```



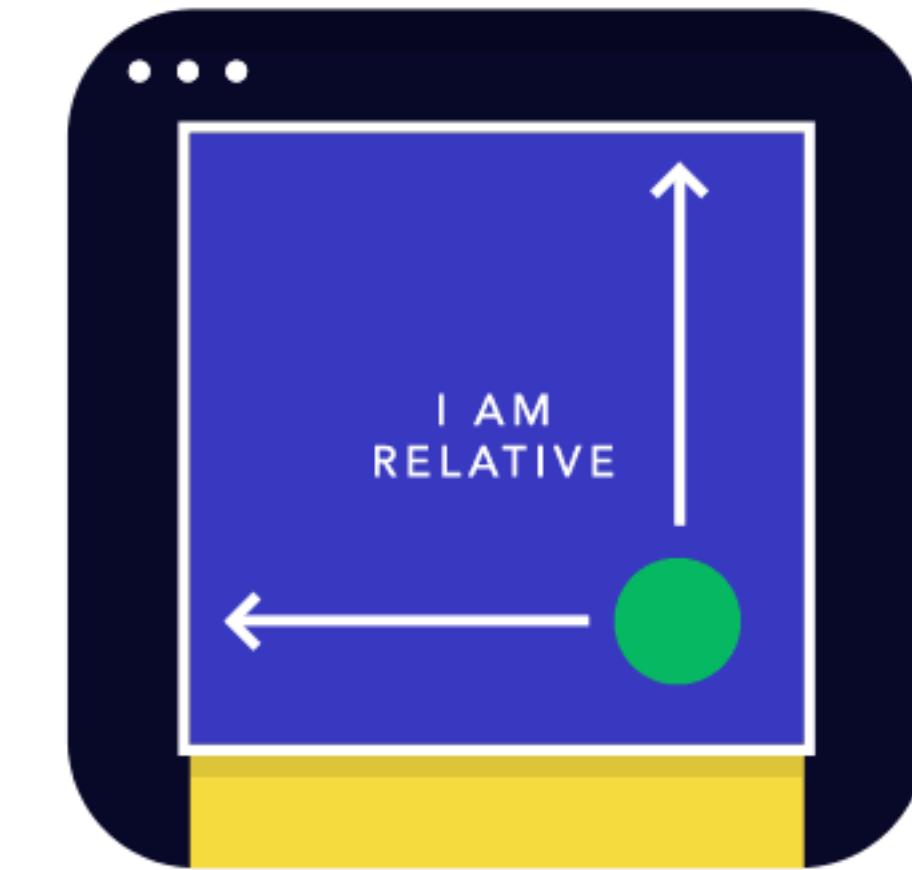
Absolute positioning is Absolute!

Animations shamelessly stolen from: <http://blog.froont.com/positioning-in-web-design/>

CSS Fundamentals

Advanced Rules for Positioning

```
.dropdown-menu {  
    position: relative;  
    top: 100%;  
    left: 0;  
    z-index: 1000;  
    display: none;  
    float: left;  
    min-width: 160px;  
    padding: 4px 0;  
    margin: 1px 0 0;  
    list-style: none;  
    background-color: #ffffff;  
    border: 1px solid #ccc;  
    border: 1px solid rgba(0, 0, 0, 0.2);  
    *border-right-width: 2px;  
    *border-bottom-width: 2px;  
    -webkit-border-radius: 5px;  
    -moz-border-radius: 5px;  
    border-radius: 5px;  
    -webkit-box-shadow: 0 5px 10px rgba(0, 0, 0, 0.2);  
    -moz-box-shadow: 0 5px 10px rgba(0, 0, 0, 0.2);  
    box-shadow: 0 5px 10px rgba(0, 0, 0, 0.2);  
    -webkit-background-clip: padding-box;  
    -moz-background-clip: padding;  
    background-clip: padding-box;  
}
```



Relative positioning is relative to parent!
This is the default state for all divs

CSS Fundamentals

Advanced Rules for Positioning

```
.dropdown-menu {  
    position: fixed;  
    top: 100%;  
    left: 0;  
    z-index: 1000;  
    display: none;  
    float: left;  
    min-width: 160px;  
    padding: 4px 0;  
    margin: 1px 0 0;  
    list-style: none;  
    background-color: #ffffff;  
    border: 1px solid #ccc;  
    border: 1px solid rgba(0, 0, 0, 0.2);  
    *border-right-width: 2px;  
    *border-bottom-width: 2px;  
    -webkit-border-radius: 5px;  
    -moz-border-radius: 5px;  
    border-radius: 5px;  
    -webkit-box-shadow: 0 5px 10px rgba(0, 0, 0, 0.2);  
    -moz-box-shadow: 0 5px 10px rgba(0, 0, 0, 0.2);  
    box-shadow: 0 5px 10px rgba(0, 0, 0, 0.2);  
    -webkit-background-clip: padding-box;  
    -moz-background-clip: padding;  
    background-clip: padding-box;  
}
```



Fixed to size of screen

Animations shamelessly stolen from: <http://blog.froont.com/positioning-in-web-design/>

CSS Fundamentals

Advanced Rules for Positioning

```
.dropdown-menu {  
    position: absolute;  
    top: 100%;  
    right: 0;  
    z-index: 1000;  
    display: none;  
    float: left;  
    min-width: 160px;  
    padding: 4px 0;  
    margin: 1px 0 0;  
    list-style: none;  
    background-color: #ffffff;  
    border: 1px solid #ccc;  
    border: 1px solid rgba(0, 0, 0, 0.2);  
    *border-right-width: 2px;  
    *border-bottom-width: 2px;  
    -webkit-border-radius: 5px;  
    -moz-border-radius: 5px;  
    border-radius: 5px;  
    -webkit-box-shadow: 0 5px 10px rgba(0, 0, 0, 0.2);  
    -moz-box-shadow: 0 5px 10px rgba(0, 0, 0, 0.2);  
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    -webkit-background-clip: padding-box;  
    -moz-background-clip: padding;  
    background-clip: padding-box;  
}
```



z-index layers divs

Animations shamelessly stolen from: <http://blog.froont.com/positioning-in-web-design/>

CSS Fundamentals

Practise Practise Practise

- This process will be frustrating
 - Everyone who has ever made a website knows this

<http://www.w3schools.com>

- Scaffolding Libraries help
- Bootstrap - <http://getbootstrap.com/>
- Foundation - <http://foundation.zurb.com/>
- Yeoman - <http://yeoman.io/>



Workshop: Week 7

Creating your first HTML page and uploading to the server

- Create a page to show off your skills
 - Create DOM Elements
 - Explore styles and libraries that can style your page
 - Understanding how HTML/CSS renders on different browsers
- Upload to the server
 - Fix permissions
 - Learn tools used to create websites

Next Week

Learn about Javascript and Interactive Web

8

Interactive Visualisation 2: Javascript

Learn how Javascript interacts with the DOM to provide an interactive experience on a static page

Questions?

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casa