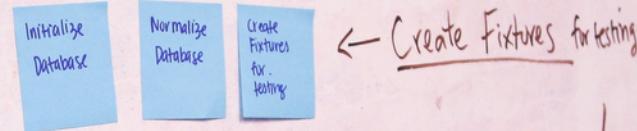
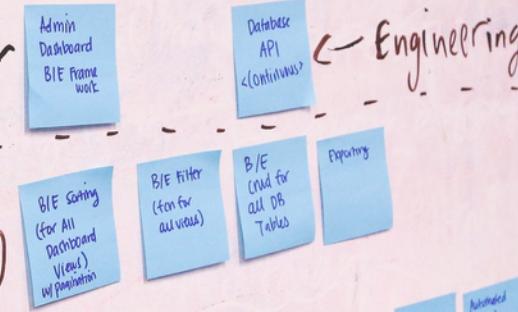


1) WEEK 4: Design



2) WEEK 5: Design



3) WEEK 6: Dev

ADMIN API

CRON  
Automated (send) email B/E

Source: Tommy Wong

# ESSENTIALS OF DATA VISUALIZATION DESIGN

Bernard Suen

Center for Entrepreneurship

Chinese University of Hong Kong

# **RECAP AND ENHANCE**

- 1. Understand the 5 Elements of Computational Thinking.**
- 2. Perform interface, navigation and information design with wireframes.**
- 3. Use JavaScript and JQuery as means to apply computational thinking to solve problems.**

**Decomposition**

**Pattern**

**Abstraction**

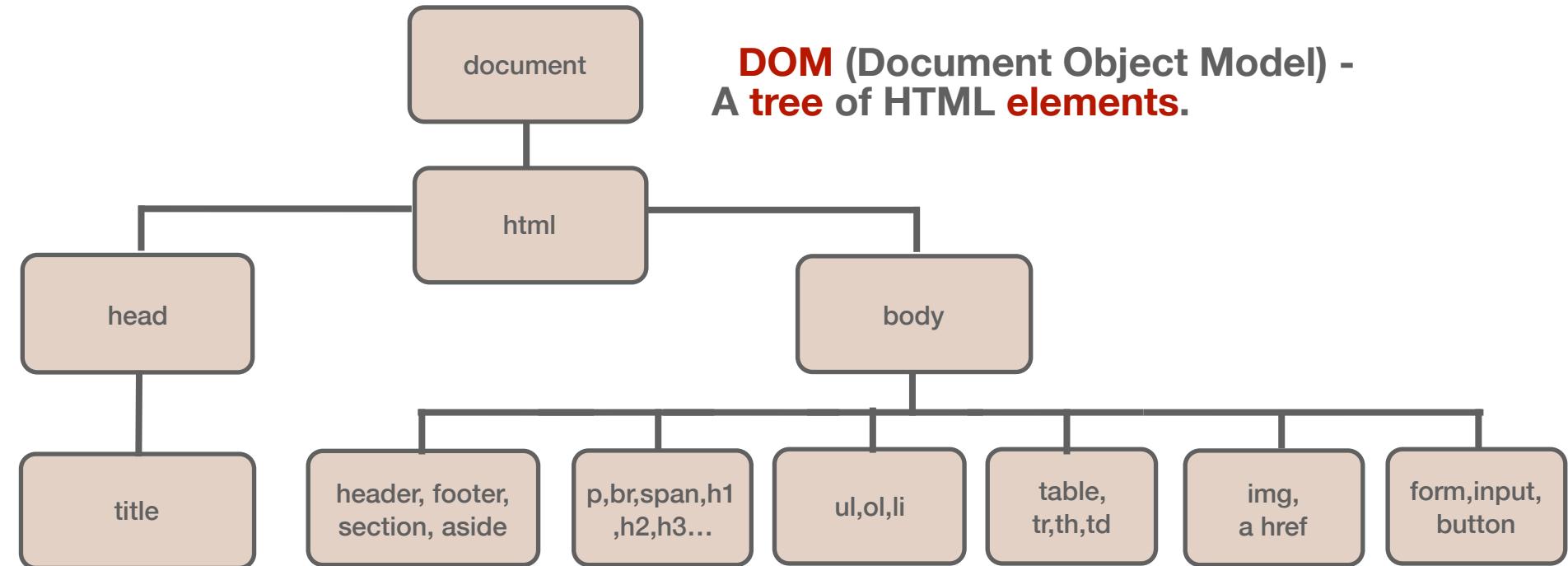
**Algorithm**

**Automation &  
Testing  
(Evaluation)**

**Decomposition**

**Break a problem down into smaller parts.**

## **DOM (Document Object Model) - A tree of HTML elements.**





dfd04.drawio

File Edit View Arrange Extras Help All ch



100%



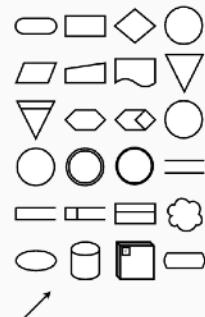
# Dataflow Diagram (Level 1)

Flowchart

Android

Bootstrap

Data Flow Diagram



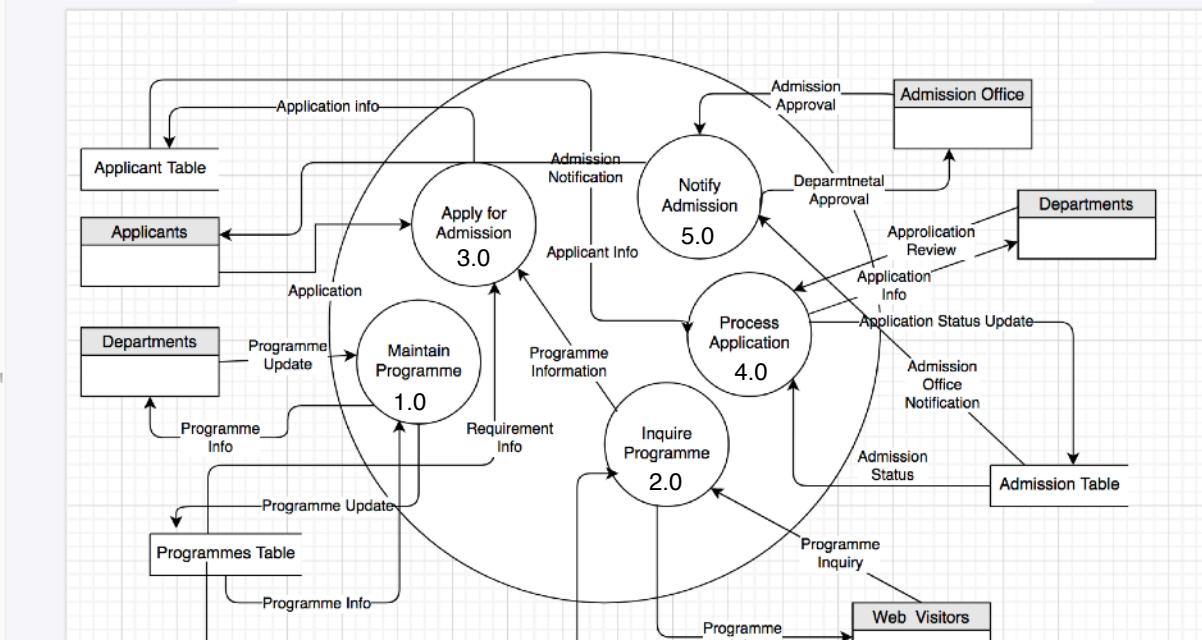
Entity Relation

iOS Icons

iOS UI

iOS6

+ More Shapes...



Diagram

Style

View

- Grid 10 pt  
 Page View  
 Background Image  
 Shadow

Options

- Connection Arrows  
 Connection Points  
 Guides

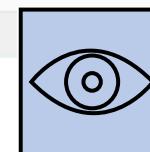
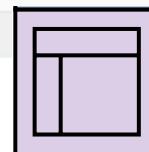
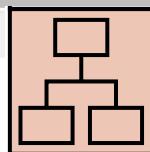
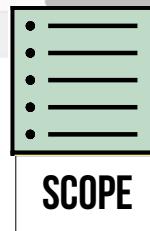
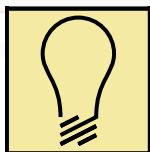
Paper Size

A4 (210 mm x 297 mm)  
 Portrait  Landscape

Edit Data

Clear Default Style

Page-1

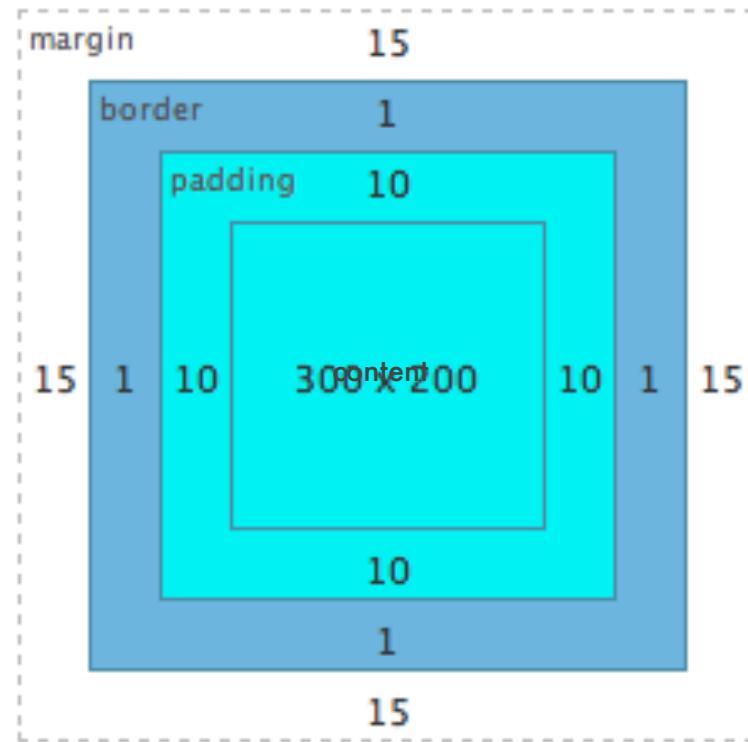


**Pattern**

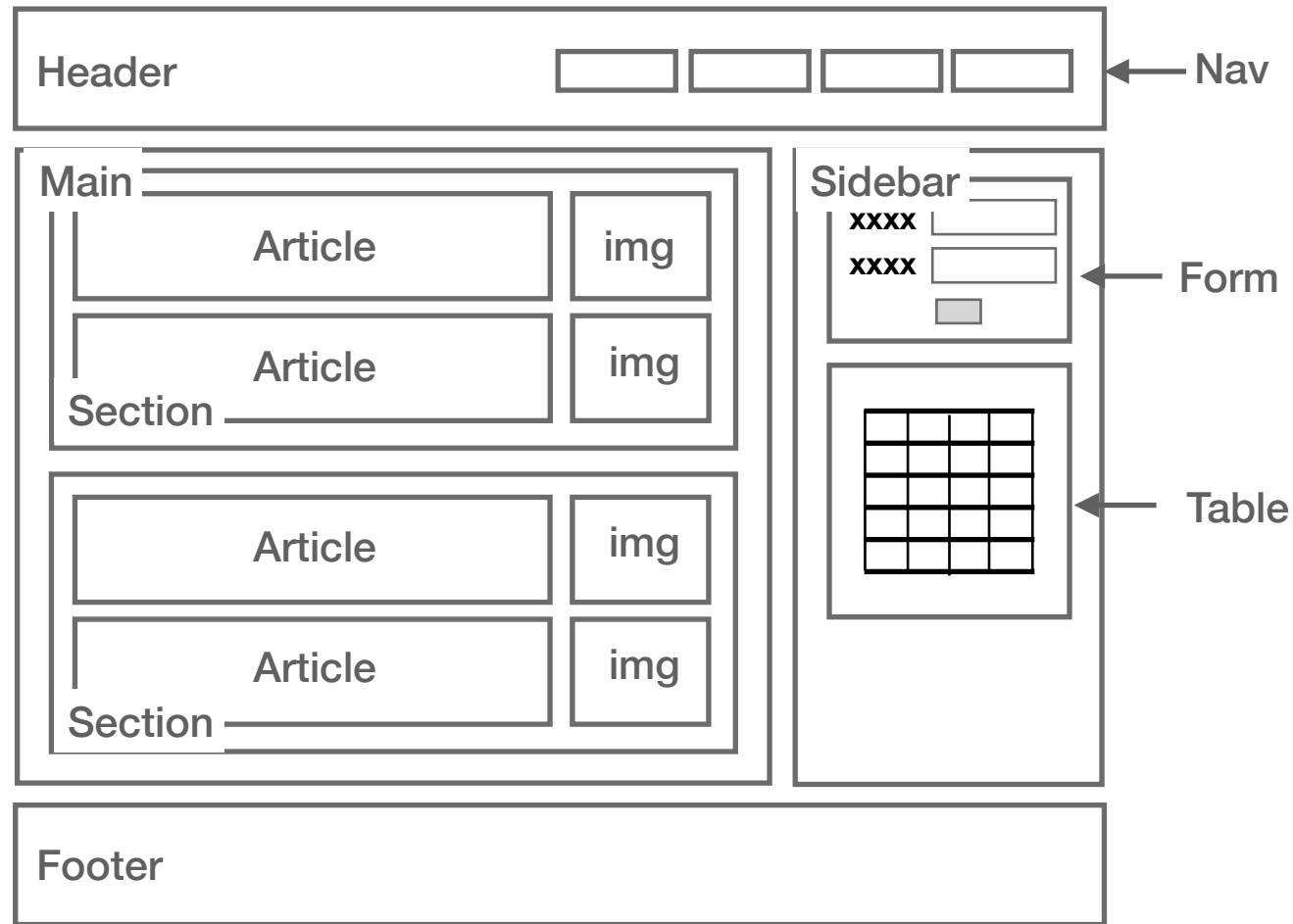
**Discover similarities between things.**

**Decomposition enables us to breakdown complex problem into smaller parts for making it easier to discover and combine repeatable patterns with proven outcome into the final solution.**

# The Box Model



## Wireframe



## Section 1

### Article 1

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Phasellus eu ligula consequat nisl tempor ultricies. Suspendisse porta tempus eleifend. Suspendisse potenti. Nam ultrices, dolor ac faucibus ornare, nulla enim feugiat ante, a bibendum velit felis in libero. Nullam feugiat metus lacinia urna mollis venenatis. Mauris mollis erat molestie, pharetra massa eget, placerat lectus. Aenean pharetra dolor sed odio vehicula, ut commodo lacus fringilla. Duis et diam placerat, eleifend orci eget, egestas erat.

### Article 2

Vestibulum ullamcorper nisl elit, non semper nunc viverra eu. Etiam vitae consectetur sapien. Vestibulum lorem ante, dignissim vel orci et, luctus luctus erat. Vestibulum at lorem vitae massa mollis sollicitudin non in dui. Duis venenatis, felis euismod faucibus vulputate, enim arcu laoreet elit, et interdum magna erat non mauris. Nulla vel accumsan augue. Suspendisse id vehicula libero, nec eleifend arcu. Proin sed pellentesque diam. Suspendisse quis sem maximus orci tristique volutpat quis quis mauris. Phasellus a urna enim. Sed pharetra, ipsum ac eleifend mattis, dolor velit pulvinar neque, at ultricies elit libero nec ex. Proin tempor ipsum sed dolor feugiat suscipit. Donec gravida tellus maximus ex auctor laoreet.

## Section 2

### Article 1

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Phasellus eu ligula consequat nisl tempor ultricies. Suspendisse porta tempus eleifend. Suspendisse potenti. Nam ultrices, dolor ac faucibus ornare, nulla enim feugiat ante, a bibendum velit felis in libero. Nullam feugiat metus lacinia urna mollis venenatis. Mauris mollis erat molestie, pharetra massa eget, placerat lectus. Aenean pharetra dolor sed odio vehicula, ut commodo lacus fringilla. Duis et diam placerat, eleifend orci eget, egestas erat.

### Article 2

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User Name:

Password:

Hello bernard! Your password is 1234.



Event	Month	Day	Venue
Lesson 5	Oct	5th	Online
Lesson 6	Oct	12th	Online
Lesson 7	Oct	19th	Online
Lesson 8	Oct	26th	Online

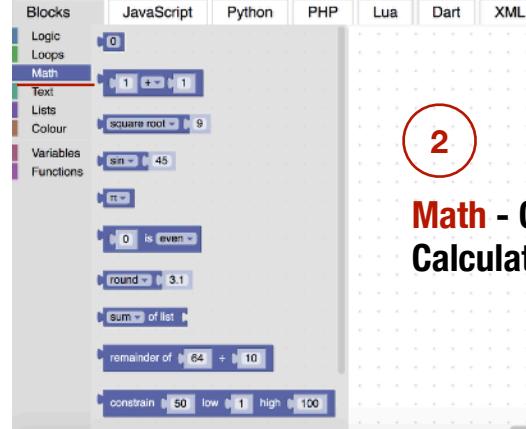


# **4 Key Patterns in Programming**



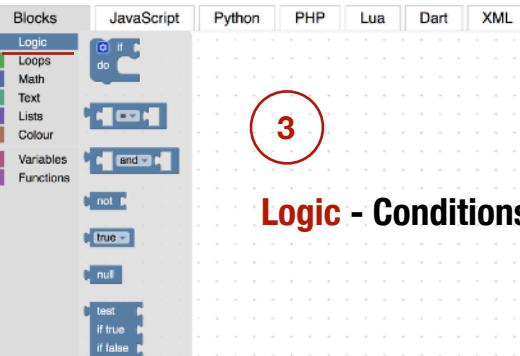
1

## Variables - Equation Assignment



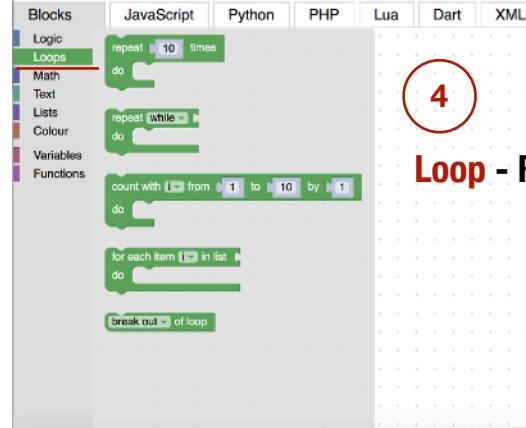
2

## Math - Operations for Calculation



3

## Logic - Conditions for Comparison



4

## Loop - Repetition

# **Data Types in JavaScript**

**Assigning a value to a variable is called:  
declaring a **variable**  
and its data type:**

- **String** - e.g. **var str\_var = "This is a string.";**
- **Numeric** - e.g. **var num\_var = 3.2;**
- **Boolean** - e.g. **var bol\_var = true;**

## More Advanced JS Data Structures: **Array** and **Object**

- **Array** - a list of elements e.g.

```
var fruits = ["apple", "grape", "pear"];
```

```
var student_list = [ ]; // empty student list;
```

- **Object** - a collection of properties represented in name:values pairs e.g.

```
var students {  
    student_id: 1155115511;  
    student_fname: "Bernard";  
    student_lname: "Suen";  
    student_major: "New Media";  
}
```

**Let try out an example in Chrome console**

```
> students = [];
> student1 = {name:'Peter Chan', id:'1001'};
> student2 = {name:'David Li', id:'1002'};
> student3 = {name:'Joyce Xu', id:'1003'};
> students.push(student1);
> students.push(student2);
> students.push(student3);
```

**After data, let's move on to  
“operation” related patterns.**

**To transform data, we need **input/output**,  
**mathematical**, **logical**, and **loop** operations.**

## **Basic Input/Output Commands**

- **Entering a variable** - e.g. `var x = prompt("Enter x value");`
- **Displaying a variable** - e.g. `alert("x = " + x_var);`

About Courses Meetings

127.0.0.1:5502 says

Hello Bernard! Your password is password.

OK

## Section 1

### Article 1

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User Name:

Password:

Event	Month	Day	Venue
Lesson 5	Oct	5th	Online
Lesson 6	Oct	12th	Online
Lesson 7	Oct	19th	Online
Lesson 8	Oct	26th	Online

### Article 2

About Courses Meetings

127.0.0.1:5502 says

Hello Bernard! Your password is password.

OK

```
<form id='login'>
  <div class='form-group'>
    <label>
      User Name:
    </label>
    <input type='text' name='username'>
  </div>
  <div class='form-group'>
    <label>
      Password:
    </label>
    <input type='password' name='pwd'>
  </div>
  <button id='submitBtn' type='button'>Send</button>
</form>
```

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## Article 2

User Name:

Password:

Send

1



Event	Month	Day	Venue
Lesson 5	Oct	5th	Online
Lesson 6	Oct	12th	Online
Lesson 7	Oct	19th	Online
Lesson 8	Oct	26th	Online

```
<script>
  document.getElementById('submitBtn').addEventListener('click', sayHello);
  function sayHello() {
    var username = document.forms[0].username.value;
    var password = document.forms[0].pwd.value;
    alert("Hello " + username + "! Your password is " + password + '.');
  }
</script>
```

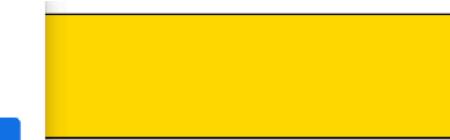
About Courses Meetings

127.0.0.1:5502 says  
Hello Bernard! Your password is password.

```
<form id='login'>
  <div class='form-group'>
    <label>
      User Name:
    </label>
    <input type='text' name='username'>
  </div>
  <div class='form-group'>
    <label>
      Password:
    </label>
    <input type='password' name='pwd'>
  </div>
  <button id='submitBtn' type='button'>Send</button>
</form>
```

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OK



User Name:

Password:

Send



Event	Month	Day	Venue
Lesson 5	Oct	5th	Online
Lesson 6	Oct	12th	Online
Lesson 7	Oct	19th	Online
Lesson 8	Oct	26th	Online

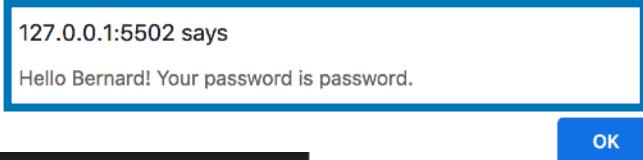
## Article 2

```
<script>
  document.getElementById('submitBtn').addEventListener('click', sayHello);

  function sayHello() {
    var username = document.forms[0].username.value;
    var password = document.forms[0].pwd.value;
    alert("Hello " + username + "! Your password is " + password + ".");
  }
</script>
```

1

2



```
<form id='login'>
  <div class='form-group'>
    <label>
      User Name:
    </label>
    <input type='text' name='username'>
  </div>
  <div class='form-group'>
    <label>
      Password:
    </label>
    <input type='password' name='pwd'>
  </div>
  <button id='submitBtn' type='button'>Send</button>
</form>
```

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ut commodo lacus fringilla. Duis et diam placerat,  
egestas erat.

User Name:  
Bernard  
Password:  
password

Send



Event	Month	Day	Venue
Lesson 5	Oct	5th	Online
Lesson 6	Oct	12th	Online
Lesson 7	Oct	19th	Online
Lesson 8	Oct	26th	Online

```
<script>
  document.getElementById('submitBtn').addEventListener('click', sayHello);
  function sayHello() {
    var username = document.forms[0].username.value;
    var password = document.forms[0].pwd.value;
    alert("Hello " + username + "! Your password is " + password + ".");
  }
</script>
```

## Article 2

**Output without popup:  
innerHTML**

```

<form id='login'>
  <div class='form-group'>
    <label>
      User Name:
    </label>
    <input type='text' name='username'>
  </div>
  <div class='form-group'>
    <label>
      Password:
    </label>
    <input type='password' name='pwd'>
  </div>
  <button id='submitBtn' type='button'>Send</button>
</form>
<div id='answer'></div>

```

ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum.



User Name:  
  
 Password:

Hello Bernard! Your password is password.



Event	Month	Day	Venue
Lesson 5	Oct	5th	Online
Lesson 6	Oct	12th	Online

```

<script>
  document.getElementById('submitBtn').addEventListener('click', sayHello);
  function sayHello() {
    var username = document.forms[0].username.value;
    var password = document.forms[0].pwd.value;
    alert("Hello " + username + "! Your password is " + password + '.');
    var answer = "Hello " + username + "! Your password is " + password + '.';
    document.getElementById('answer').innerHTML = answer;
  }
</script>

```

## Article 2

Blocks    JavaScript    Python    PHP    Lua    Dart    XML



1

## Variables - Equation Assignment

Logic  
Loops  
Math  
Text  
Lists  
Colour  
Variables  
Functions

Blocks    JavaScript    Python    PHP    Lua    Dart    XML



2

## Math - Operations for Calculation

Blocks    JavaScript    Python    PHP    Lua    Dart    XML

Logic  
Loops  
**Math**  
Text  
Lists  
Colour  
Variables  
Functions

- 0
- 1 + 1
- square root 9
- sin 45
- π
- 0 is even
- round 3.1
- sum of list
- remainder of 64 / 10
- constrain 50 low 1 high 100

Blocks    JavaScript    Python    PHP    Lua    Dart    XML



3

## Logic - Conditions for Comparison

Logic  
Loops  
Math  
Text  
Lists  
Colour  
Variables  
Functions

Blocks    JavaScript    Python    PHP    Lua    Dart    XML

Logic  
**Loops**  
Math  
Text  
Lists  
Colour  
Variables  
Functions

- repeat 10 times
- do
- repeat while
- do
- count with i from 1 to 10 by 1
- do
- for each item i in list
- do
- break out of loop

4

## Loop - Repetition

Home page

# Home Page

## Simple Demo of JavaScript and JQuery

Welcome to HTML/CSS/JS play

This is a simple demonstration of JavaScript and JQuery providing the simple CSS styling.

X + Y = ?

Another X + Y = ?

Change Text Color of Welcome Message

Hide H2 text

Show H2 text in blue

Enter first number:

Enter second number:

Home page

# Home Page

## Simple Demo of Java

```
function ask_for_x_n_y() {  
    var x = prompt("Enter x value");  
    var y = prompt("Enter y value");  
    var z = compute_x_plus_y(x,y);  
    var x = document.getElementById("demo");  
    x.style.fontSize = "25px";  
    x.style.color = "red";  
    document.getElementById("demo").innerHTML = z;  
}
```

X + Y = ?    Another X + Y = ?    Change

Enter first number:

Enter second number:

```
function ask_xy() {  
    var x = document.getElementById("1st_num").value;  
    var y = document.getElementById("2nd_num").value;  
    var z = compute_x_plus_y(x,y);  
    var x = document.getElementById("demo");  
    x.style.fontSize = "25px";  
    x.style.color = "red";  
    document.getElementById("demo").innerHTML = "The answer is " + z;  
}
```

```
<br>  
<button type="button" class="btn btn-primary" onclick="ask_for_x_n_y();">X + Y = ?</button>  
<button type="button" class="btn btn-primary" onclick="ask_xy();">Another X + Y = ?</button>  
<button type="button" class="btn btn-success" onclick="show_topic();">Change Topic</button>  
<button type="button" class="btn btn-info" id='hide_h2'>Hide H2 text</button>  
<button type="button" class="btn btn-warning" id='show_h2'>Show H2 text in blue</button>  
<form id="myForm">  
    <div class="form-group">  
        <label for="1st">Enter first number:</label>  
        <input type="text" class="form-control" id='1st_num'>  
    </div>  
    <div class="form-group">  
        <label for="2nd">Enter second number:</label>  
        <input type="text" class="form-control" id='2nd_num'>  
    </div>  
</form>
```

```
function compute_x_plus_y(x,y) {  
    var z = 0;  
    x = parseInt(x);  
    y = parseInt(y);  
    z = x + y;  
    return z;  
}
```

3 Return result z

```
function ask_for_x_n_y() {  
    var x = prompt("Enter x value");  
    var y = prompt("Enter y value");  
    var z = compute_x_plus_y(x,y);  
    var x = document.getElementById("demo");  
    x.style.fontSize = "25px";  
    x.style.color = "red";  
    document.getElementById("demo").innerHTML = "The answer is " + z;  
}
```

1 Input x and y values

2 Call compute\_x\_plus\_y function

4 Output z

```
function ask_xy() {  
    var x = document.getElementById("1st_num").value;  
    var y = document.getElementById("2nd_num").value;  
    var z = compute_x_plus_y(x,y);  
    var x = document.getElementById("demo");  
    x.style.fontSize = "25px";  
    x.style.color = "red";  
    document.getElementById("demo").innerHTML = "The answer is " + z;  
}
```

1 Input x and y values

2 Call compute\_x\_plus\_y function

4 Output z

Home page

# Home Page

## Simple Demo of JavaScript and JQuery

Welcome to HTML/CSS/JS play

The answer is 8

X + Y = ?

Another X + Y = ?

Change Text Color of Welcome Message

Hide H2 text

Show H2 text in blue

Enter first number:

4

Enter second number:

4

Blocks    JavaScript    Python    PHP    Lua    Dart    XML



1

## Variables - Equation Assignment

Logic  
Loops  
Math  
Text  
Lists  
Colour  
Variables  
Functions

Blocks    JavaScript    Python    PHP    Lua    Dart    XML



2

## Math - Operations for Calculation

Blocks    JavaScript    Python    PHP    Lua    Dart    XML

Logic  
Loops  
Math  
Text  
Lists  
Colour  
Variables  
Functions

0  
1 + 1  
square root 9  
is 45  
it  
0 is even  
round 3.1  
sum of list  
remainder of 64 + 100  
constrain 50 low 1 high 100

Blocks    JavaScript    Python    PHP    Lua    Dart    XML



3

## Logic - Conditions for Comparison

Logic  
Loops  
Math  
Text  
Lists  
Colour  
Variables  
Functions

Blocks    JavaScript    Python    PHP    Lua    Dart    XML

Logic  
Loops  
Math  
Text  
Lists  
Colour  
Variables  
Functions

repeat 10 times  
do  
repeat while  
do  
count with i from 1 to 10 by 1  
do  
for each item i in list  
do  
break out of loop

4

## Loop - Repetition

About Courses Meetings Blogs

## Section 1

### Article 1

```
<script>
    document.getElementById('submitBtn').addEventListener('click', sayHello);
    function sayHello() {
        var username = document.forms[0].username.value;
        var password = document.forms[0].pwd.value;
        alert("Hello " + username + "! Your password is " + password + '.');
    }
</script>
```

User Name:	<input type="text"/>
Password:	<input type="password"/>
<input type="button" value="Send"/>	

Day	Venue
	Online
	Online
	Online
	Online

### Article 2

About Courses Meetings

127.0.0.1:5502 says  
username cannot be blank!

OK

## Section 1

### Article 1

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Phasellus eu ligula consequat nisl tempor ultricies. Suspendisse porta tempus eleifend. Suspendisse potenti. Nam ultrices, dolor ac faucibus ornare, nulla enim feugiat ante, a bibendum velit felis in libero. Nullam feugiat metus lacinia urna mollis venenatis. Mauris mollis erat molestie, pharetra massa eget, placerat lectus. Aenean pharetra dolor sed odio vehicula, ut commodo lacus fringilla. Duis et diam placerat, eleifend orci eget, egestas erat.



User Name:

Password:

Send

Event	Month	Day	Venue
Lesson 5	Oct	5th	Online
Lesson 6	Oct	12th	Online
Lesson 7	Oct	19th	Online
Lesson 8	Oct	26th	Online

### Article 2

About Courses Meetings

127.0.0.1:5502 says  
password cannot be blank!

OK

## Section 1

### Article 1

```
<script>
    document.getElementById('submitBtn').addEventListener('click', sayHello);
    function sayHello() {
        var username = document.forms[0].username.value;
        var password = document.forms[0].pwd.value;
        if (username == '') {alert('username cannot be blank!');}
        if (password == '') {alert('password cannot be blank!');}
        if (username !== '' && password !== '') {
            alert("Hello " + username + "! Your password is " + password + '.');
            var answer = "Hello " + username + "! Your password is " + password + '.';
            document.getElementById('answer').innerHTML = answer;
        }
    }
</script>
```

User Name:

Password:

Send

Day	Venue
1	Online
2	Online
3	Online
4	Online

Blocks    JavaScript    Python    PHP    Lua    Dart    XML



1

## Variables - Equation Assignment

Logic  
Loops  
Math  
Text  
Lists  
Colour  
**Variables**  
Functions

Blocks    JavaScript    Python    PHP    Lua    Dart    XML



2

## Math - Operations for Calculation

Blocks    **Math**    0  
Logic  
Loops  
Text  
Lists  
Colour  
Variables  
Functions

- 1 + 1
- square root → 9
- sum → 45
- 0 is even →
- round → 3.1
- sum of list
- remainder of 64 ÷ 10
- constrain 50 low 1 high 100

Blocks    JavaScript    Python    PHP    Lua    Dart    XML



3

## Logic - Conditions for Comparison

Logic  
**Loops**  
Math  
Text  
Lists  
Colour  
Variables  
Functions

Blocks    **Loops**    repeat 10 times  
Logic  
Text  
Lists  
Colour  
Variables  
Functions

- repeat 10 times  
do
- repeat while  
do
- count with i from 1 to 10 by 1  
do
- for each item i in list  
do
- break out of loop

4

## Loop - Repetition



## Let try out an example in Chrome console

```
> students = [];
> student1 = {name:'Peter Chan', id:'1001'};
> student2 = {name:'David Li', id:'1002'};
> student3 = {name:'Joyce Xu', id:'1003'};
> students.push(student1);
> students.push(student2);
> students.push(student3);
> for (i=0; i< 3 ;i++) { alert(students[i].id);}
> for (i=0; i< students.length ;i++) { alert(students[i].id);}
> for (i=0; i< students.length ;i++)
{document.getElementById("result").innerHTML += "<br>"+
students[i].id;}
```

# **Application of Loop in LocalStorage**

## Section 1

```
<form id="fid">
  <div class='form-group'>
    <label>Student Id:</label><input type="text" id="student_id" name="st
  </div>
  <div class='form-group'>
    <label>Student Name:</label><input type="text" id="student_name" name="st
  </div>
</form>
<button id="enter_btn">Enter</button>
<button id="store_btn">Store</button>
<button id="clear_btn">Clear Screen</button>
<button id="retrieve_btn">Retrieve</button>
<button id="delete_btn">Delete All</button>
<h4><b>Student List</b></h4>
<div id="demo"></div>
```

## Section 2

User Name:	<input type="text"/>		
Password:	<input type="password"/>		
<input type="button" value="Send"/>			
Event	Month	Day	Venue
Lesson 5	Oct	5th	Online
Lesson 6	Oct	12th	Online
Lesson 7	Oct	19th	Online
Lesson 8	Oct	26th	Online

Student Id:	<input type="text" value="student ID"/>
Student Name:	<input type="text" value="student Name"/>
<input type="button" value="Enter"/> <input type="button" value="Store"/> <input type="button" value="Clear Screen"/> <input type="button" value="Retrieve"/> <input type="button" value="Delete All"/>	
<b>Student List</b>	

## Section 1

### Article 1

```
document.getElementById("enter_btn").addEventListener("click", function() {
    sid = document.getElementById("student_id").value;
    sname = document.getElementById("student_name").value;
    message = "Student ID:"+sid+"  
"+"Student Name:"+sname+"  
";
    document.getElementById("demo").innerHTML += message;
    student = {};
    student.id = sid;
    student.name = sname;
    students.push(student);
});
```

pharetra, ipsum ac eleifend mattis, dolor velit pur�inal neque, at dictries elit libero nec ex. Proin tempor ipsum sed dolor feugiat suscipit. Donec gravida tellus maximus ex auctor laoreet.

## Section 2

User Name:	<input type="text"/>
Password:	<input type="password"/>
<input type="button" value="Send"/>	

Event	Month	Day	Venue
Lesson 5	Oct	5th	Online
Lesson 6	Oct	12th	Online
Lesson 7	Oct	19th	Online
Lesson 8	Oct	26th	Online

Student Id:	<input type="text" value="1111"/>
Student Name:	<input type="text" value="Peter"/>

### Student List

```
<button id="enter_btn">Enter</button>
<button id="store_btn">Store</button>
<button id="clear_btn">Clear Screen</button>
<button id="retrieve_btn">Retrieve</button>
<button id="delete_btn">Delete All</button>
<h4><b>Student List</b></h4>
<div id="demo"></div>
```

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enatis. Mauris mollis  
erat molestie pharetra massa eget placerat lectus. Aenean pharetra dolor sed odio vehicula ut commodo.



```
document.getElementById("enter_btn").addEventListener("click", function() {
    sid = document.getElementById("student_id").value;
    sname = document.getElementById("student_name").value;
    message = "Student ID:" + sid + "<br>" + "Student Name:" + sname + "<br>";
    document.getElementById("demo").innerHTML += message;
    student = {};
    student.id = sid;
    student.name = sname;
    students.push(student);
});
```

## Section 2

User Name:

Password:

Send

Event	Month	Day	Venue
Lesson 5	Oct	5th	Online
Lesson 6	Oct	12th	Online
Lesson 7	Oct	19th	Online
Lesson 8	Oct	26th	Online

Student Id:

Student Name:

[Enter](#) [Store](#) [Clear Screen](#) [Retrieve](#) [Delete All](#)

**Student List**

Student ID:1111  
Student Name:Peter

## Section 1

### Article 1

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### Article 2

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## Section 2

### Article 1

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User Name:	<input type="text"/>
Password:	<input type="password"/>
<input type="button" value="Send"/>	

Event	Month	Day	Venue
Lesson 5	Oct	5th	Online
Lesson 6	Oct	12th	Online
Lesson 7	Oct	19th	Online
Lesson 8	Oct	26th	Online

Student Id:	<input type="text" value="3333"/>
Student Name:	<input type="text" value="John"/>
<input type="button" value="Enter"/> <input type="button" value="Store"/> <input type="button" value="Clear Screen"/> <input type="button" value="Retrieve"/> <input type="button" value="Delete All"/>	

Student List
Student ID:1111
Student Name:Peter
Student ID:2222
Student Name:David
Student ID:3333
Student Name:John

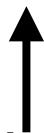
## Section 1

```
<script>
    document.getElementById('submitBtn').addEventListener('click', sayHello);
    function sayHello() {
        var username = document.forms[0].username.value;
        var password = document.forms[0].pwd.value;
        alert("Hello " + username + "! Your password is " + password + '.');
    }
</script>
```

## Article 2

```
document.getElementById("store_btn").addEventListener("click", function() {
    localStorage.setItem("studentDB", JSON.stringify(students));
}),
```

ipsum sed dolor feugiat suscipit. Donec gravida tellus maximus ex auctor laoreet.



## Section 2

### Anonymous JavaScript Function

## Article 1

Ipsum sed dolor feugiat suscipit. Donec gravida tellus maximus ex auctor laoreet. Suspendisse porta tempus eleifend. Suspendisse potenti. Nam ultrices, dolor ac faucibus ornare, nulla enim feugiat ante, a bibendum velit felis in libero. Nullam feugiat metus lacinia urna mollis venenatis. Mauris mollis erat molestie pharetra massa aenean placerat lectus Aenean pharetra dolor sed odio vehicula ut commodo

User Name:	<input type="text"/>
Password:	<input type="password"/>
<input type="button" value="Send"/>	

Event	Month	Day	Venue
Lesson 5	Oct	5th	Online
Lesson 6	Oct	12th	Online
Lesson 7	Oct	19th	Online
Lesson 8	Oct	26th	Online

Student Id:	<input type="text" value="3333"/>
Student Name:	<input type="text" value="John"/>

<input type="button" value="Enter"/>	<input style="background-color: black; color: white; border: none; font-weight: bold; font-size: inherit; padding: 2px 5px; border-radius: 5px;" type="button" value="Store"/>	<input type="button" value="Clear Screen"/>	<input type="button" value="Retrieve"/>	<input type="button" value="Delete All"/>
<b>Student List</b>				
Student ID:1111 Student Name:Peter				
Student ID:2222 Student Name:David				
Student ID:3333 Student Name:John				

Article 2

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```
document.getElementById("store_btn").addEventListener("click", function() {
    localStorage.setItem("studentDB", JSON.stringify(students));
});
```

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Lesson 5	Oct	5th	Online
Lesson 6	Oct	12th	Online
Lesson 7	Oct	19th	Online
Lesson 8	Oct	26th	Online

<b>Student Id:</b>	<input type="text" value="3333"/>
<b>Student Name:</b>	<input type="text" value="John"/>

## **Student List**

Student ID:1111  
Student Name: Peter  
Student ID:2222  
Student Name: David  
Student ID:3333  
Student Name: John



The screenshot shows the Chrome DevTools Application tab selected. On the left sidebar, under the Application section, 'Local Storage' is expanded, revealing its contents. The main area displays a table with two columns: 'Key' and 'Value'. There is one entry named 'studentDB' with a value of an array containing three objects, each representing a student with an id and name.

Key	Value
studentDB	[{"id": "1111", "name": "Peter"}, {"id": "2222", "name": "David"}, {"id": "3333", "name": "John"}]

▼ [{"id": "1111", "name": "Peter"}, {"id": "2222", "name": "David"}, {"id": "3333", "name": "John"}]  
▶ 0: {"id": "1111", "name": "Peter"}  
▶ 1: {"id": "2222", "name": "David"}  
▶ 2: {"id": "3333", "name": "John"}

## Section 1

### Article 1

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```
document.getElementById("clear_btn").addEventListener("click", function() {
    students = [];
    display_list = '';
    json_string = '';
    document.getElementById("demo").innerHTML = display_list;
});
```

## Section 2

### Article 1

User Name:	<input type="text"/>
Password:	<input type="password"/>
<input type="button" value="Send"/>	

Event	Month	Day	Venue
Lesson 5	Oct	5th	Online
Lesson 6	Oct	12th	Online
Lesson 7	Oct	19th	Online
Lesson 8	Oct	26th	Online

Student Id:	<input type="text" value="3333"/>
Student Name:	<input type="text" value="John"/>

**Student List**

## Section 1

### Article 1

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### Article 2

```
document.getElementById("retrieve_btn").addEventListener("click", function() {
    json_string = localStorage.getItem("studentDB");
    student_list = JSON.parse(json_string);
    for (i=0;i<student_list.length;i++) {
        display_list = display_list + "Student ID:"+student_list[i].id+"<br>"+"Student Name: "+student_list[i].name;
        students.push(student_list[i]);
    };
});
```

## Section 2

### Article 1

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User Name:	<input type="text"/>
Password:	<input type="password"/>
<input type="button" value="Send"/>	

Event	Month	Day	Venue
Lesson 5	Oct	5th	Online
Lesson 6	Oct	12th	Online
Lesson 7	Oct	19th	Online
Lesson 8	Oct	26th	Online

Student Id:	<input type="text" value="3333"/>
Student Name:	<input type="text" value="John"/>
<input type="button" value="Enter"/> <input type="button" value="Store"/> <input type="button" value="Clear Screen"/> <input type="button" value="Retrieve"/> <input type="button" value="Delete All"/>	

Student List
Student ID:1111
Student Name: Peter
Student ID:2222
Student Name: David
Student ID:3333
Student Name: John

## Section 1

### Article 1

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```
document.getElementById("delete_btn").addEventListener("click", function() {
    localStorage.removeItem("studentDB");
    students = [];
    display_list = '';
    json_string = '';
    document.getElementById("demo").innerHTML = display_list;
});
```



User Name:	<input type="text"/>
Password:	<input type="password"/>
<input type="button" value="Send"/>	

Event	Month	Day	Venue
Lesson 5	Oct	5th	Online
Lesson 6	Oct	12th	Online
Lesson 7	Oct	19th	Online
Lesson 8	Oct	26th	Online

Student Id:	<input type="text" value="3333"/>
Student Name:	<input type="text" value="John"/>

<input type="button" value="Enter"/>	<input type="button" value="Store"/>	<input type="button" value="Clear Screen"/>	<input type="button" value="Retrieve"/>	<input style="background-color: black; color: white; border: none; width: 100px; height: 30px; font-size: 10px; font-weight: bold; border-radius: 5px;" type="button" value="Delete All"/>
<b>Student List</b>				

## Section 2

## Article 2

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## Section 2

## Article 1

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Lesson 5	Oct	5th	Online
Lesson 6	Oct	12th	Online
Lesson 7	Oct	19th	Online
Lesson 8	Oct	26th	Online

Student Id:

Student Name:

Enter Store Clear Screen Retrieve **Delete All**

Student List



Screenshot of the Chrome DevTools Application panel.

The Application panel shows the following sections:

- Manifest:** Shows a manifest file.
- Service Workers:** Shows a service worker for the URL `http://127.0.0.1:5502`.
- Clear storage:** A button to clear local storage.
- Storage:** A section with two expandable items:
  - Local Storage:** Expanded, showing the key `http://127.0.0.1:5502` and its value `Object`. The value is highlighted with a red box.
  - Session Storage:** Collapsed.
- Console:** A link to the developer console.
- What's New:** A link to the latest news.

The right side of the panel displays the value of the selected key in Local Storage, which is currently empty. A placeholder text "Select a value to preview" is visible.

## **Use of LocalStorage**

- Remember status from previous session (e.g. points).
- Save variables that are used repeatedly (e.g. email address and password).
- Minimize constant communication with the server to reduce performance load.
- Require synchronisation with server to maintain consistency between server and local information
- There are many ways to store variables locally.  
LocalStorage is only one of them, perhaps the easiest.



大家正在搜：武汉新洲一自建...

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发现

游戏

注册

登录

精選

兩性

娛樂

寵物

旅遊



帐号登录 安全登录

邮箱/会员帐号/手机号

请输入密码

记住我 忘记密码

Elements Console Sources Network Performance Memory Application Security Lighthouse 6 |

Storage

- Local Storage
- Session Storage
- IndexedDB
- Web SQL
- Cookies
  - https://weibo.com

Key	Value
goog_pem_mod	72
WBHotSearchKeynew	%7B%22list%22%3A%5B%7B%22n%
google_experiment_mod36	545
google_experiment_mod47	934
WBStoreTid	
google_experiment_mod44	277
WBHotSearchKeynew	621

Cache

- Cache Storage
- Application Cache



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旅游



帐号登录

安全登录

邮箱/会员帐号/手机号

请输入密码

 记住我

忘记密码

Elements Console Sources Network Performance Memory Application Security Lighthouse

Storage

- Local Storage
  - https://weibo.com
- Session Storage
- IndexedDB
- Web SQL

Cookies

Name	Value	D.	P.	Exp...	S..	Htt...	Se...	Sa...	Pr...
WBS...	70753a84f86f85ff undefined	w...	/	202...	35				M...
Ixlrttp	1578733570	....	/	202...	17				M...
UM...	1747252309817d-0eff81d9a176bf-15306257-fa...	....	/	202...	72				M...
_gads	ID=93ac46e05fa9c72a:T=1599645822:S=ALNI_M...	....	/	202...	75				M...
SINA...	58.153.249.24_1599645818.223866	....	/	203...	41				M...
ULV	1599645816424:1:1:1::	....	/	202...	24				M...
UOR	www.baidu.com,tech.sina.com.cn,	....	/	202...	34				M...
gat	1	/		202	24				M...

Cache

- Cache Storage
- Application Cache

Console What's New X

<https://medium.com/swlh/cookies-vs-localstorage-whats-the-difference-d99f0eb09b44>

# **Wire-framing**

Source: Elements of User Experience by Jesse James Garrett

# UX Elements

## Solution Space

how and how much

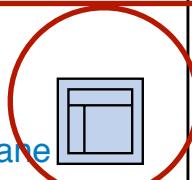
## Problem Space

who, what, and why

The Surface Plane



The Skeleton Plane



The Structure Plane



The Scope Plane



The Strategy Plane



Concrete

Completion

time

Abstract

Conception

Visual Design

Interface Design / Navigation Design

Information Design

Interaction Design / Information Architecture

Functional Specifications / Content Requirements

User Needs

Site Objectives

Deployment

Evaluation

Modeling

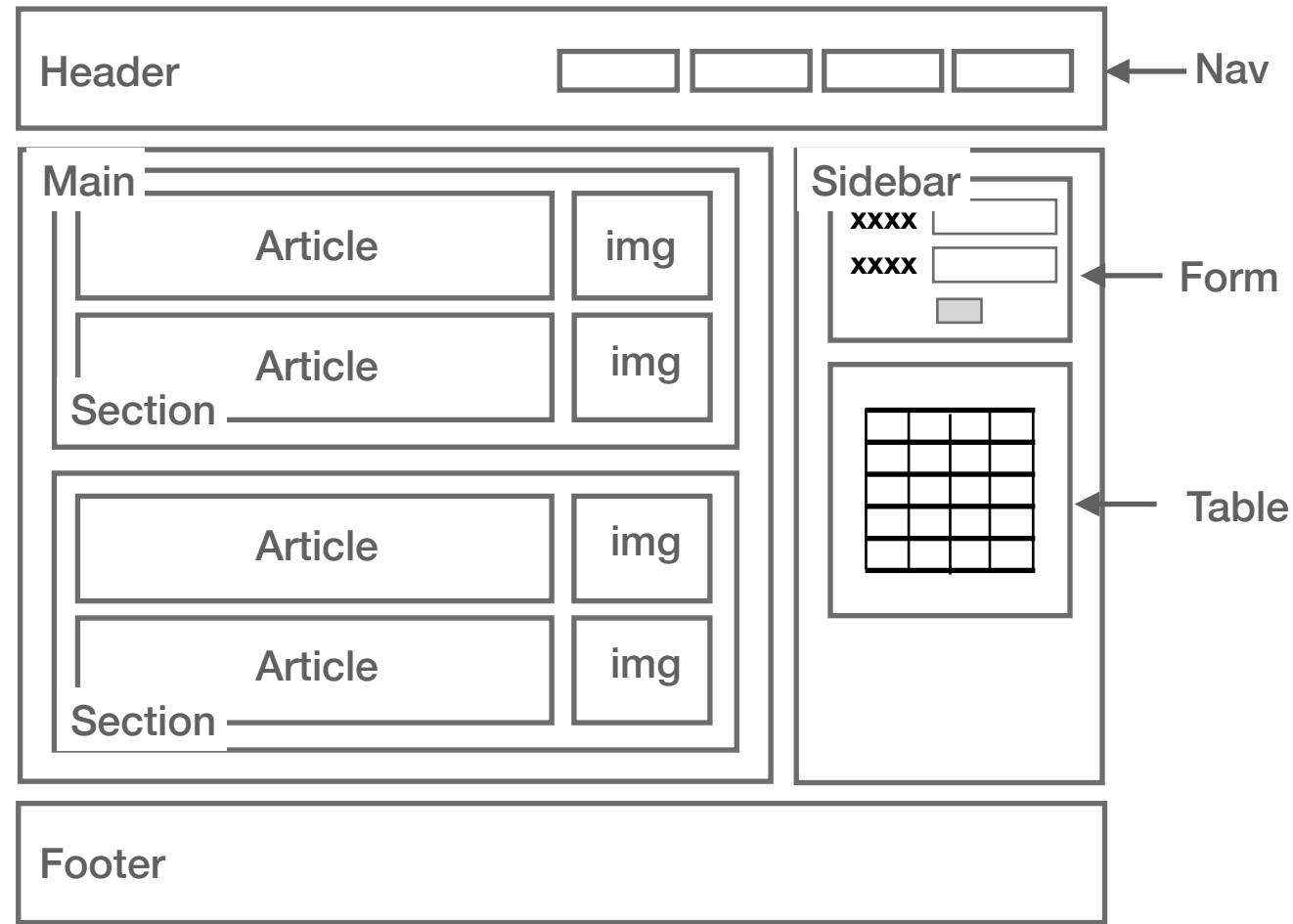
Data Preparation

Data Understanding

Business Understanding



## Wireframe



## Section 1

### Article 1

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User Name:

Password:

Event	Month	Day	Venue
Lesson 5	Oct	5th	Online
Lesson 6	Oct	12th	Online
Lesson 7	Oct	19th	Online
Lesson 8	Oct	26th	Online

### Article 2

Vestibulum ullamcorper nisl elit non semper nunc viverra eu

## Abstraction

Ignore irrelevant details to focus on **essential features** to be **synthesized** into one **solution** or classification that works **for multiple situations**.

**The “Box Model”** is an abstraction that allows us to understand a web page and the elements embedded inside as a hierarchical structure of boxes (i.e. **the DOM**). Therefore, we can easily manipulate the HTML elements with same set of HTML, CSS, and JavaScript rules.

**JavaScript functions that transform input into output through manipulation of DOM elements, CSS styling and events (mouse, keyboard, form, CSS, focus, window, etc.)**

## **Algorithm**

An algorithm is a set of **step-by-step sequence** of instructions designed to perform a specific task.

A programming function or combination of functions designed to solve a problem can be understood as an implementation of an algorithm.

# Basic Structure of a JavaScript Function

```
<!DOCTYPE html>
<html>
<head><script>
    function addition(a, b) {
        var a = parseInt(a);
        var b = parseInt(b);
        var c = a + b;
        var return c;
    }
    function get_values() {
        var a = prompt("Enter first number:");
        var b = prompt("Enter second number:");
        var z = addition(a,b);
        alert("The answer is:" + z);
    }
</script></head>
<body>
    <button onclick="get_values();">Click here</button>
</body>
</html>
```



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Search



#### Lightweight Footprint

Only 30kB minified and gzipped. Can also be included as an AMD module



#### CSS3 Compliant

Supports CSS3 selectors to find elements as well as in style property manipulation



#### Cross-Browser

Chrome, Edge, Firefox, IE, Safari, Android, iOS, and more



#### Download jQuery

v3.3.1

The 1.x and 2.x branches no longer receive patches.

[View Source on GitHub →](#)

[How jQuery Works →](#)

## What is jQuery?

jQuery is a fast, small, and feature-rich JavaScript library. It makes things like HTML document traversal and manipulation, event handling, animation, and Ajax much simpler with an easy-to-use API that works across a multitude of browsers. With a combination of versatility and extensibility, jQuery has changed the way that millions of people write JavaScript.

## Other Related Projects



## Resources

- [jQuery Core API Documentation](#)
- [jQuery Learning Center](#)
- [jQuery Blog](#)
- [Contribute to jQuery](#)
- [About the jQuery Foundation](#)
- [Browse or Submit jQuery Bugs](#)

## A Brief Look

```
document.getElementById("delete_btn").addEventListener("click", function() {
    localStorage.removeItem("studentDB");
    students = [];
    display_list = '';
    json_string = '';
    document.getElementById("demo").innerHTML = '';
});

$(document).ready(function() {
    json_string = localStorage.getItem("studentDB");
    student_list = JSON.parse(json_string);
    for (i=0;i<student_list.length;i++) {
        display_list = display_list + "Student ID:" + student_list[i].id + "<br>" + "Student Name: " + student_list[i].name;
        students.push(student_list[i]);
    };

    document.getElementById("demo").innerHTML = display_list;
}); // document ready
```

`$(document).ready`  
means the page has  
been fully loaded and  
JavaScript actions can  
now execute.

EVENT  
HANDLER  
(i.e  
LISTENER)

```
$(document).ready(function() {
```

```
    $("button#hide_h2").on('click',function(){
```

```
        $("h2").hide();
```

```
    });
```

SELECTORS

```
    $("button#show_h2").on('click',function(){
```

```
        $("h2").show();
```

```
        $("h2").css("color","blue");
```

```
        $("h2").html("You clicked me.");
```

HTML/CSS  
Effects

```
});});
```

Home page

# Home Page

## Simple Demo of JavaScript and JQuery

Welcome to HTML/CSS/JS play

This is a simple demonstration of JavaScript and JQuery providing the simple CSS styling.

X + Y = ?

Another X + Y = ?

Change Text Color of Welcome Message

Hide H2 text

Show H2 text in blue

Enter first number:

Enter second number:

<https://ybsuen.github.io/com5961/assignment05/demo5.html>

設計思維 Design Thinking	用戶體驗 UX Elements	運算思維 Computational Thinking	數據發掘 CRISP-DM	內容重點 Description
同理心 Empathy	策畧 Strategy	分解 Decomposition	商業理解 Business Understanding	Collect stories from stakeholders for framing and decomposing the problem into smaller parts.
界定問題 Definition	範圍 Scope	模式 Patterns	數據理解 Data Understanding	Define the conditions for causing the problem and collect data for grouping observations and defining requirements.
創意發想 Ideation	結構 Structure	抽象化 Abstraction	準備數據 Data Preparation	Design solutions for producing desirable outcome and develop required dataset for validation and evaluation.
開展原型 Prototyping	骨架 Skeleton	算法 Algorithm	建立模型 Modeling	Prototype the solutions through physical and software models.
重複測試 Testing	表面 Surface	自動化/評估 Automation/ Evaluation	評估 Evaluation	Evaluate outcome through testing, integration, and automation, ready for deployment and operation.

# **Our Agenda Today**

1. Understand the **visual communication principles**:  
**the psychology, components, structure, patterns, and process.**
2. **Encoding**: A well-defined purpose (story) for determining the proper functions and form for selecting and designing the appropriate patterns to present the data.
3. **Trigger interactions \*\* with the chosen patterns.**  
**Combining signifiers (well established patterns), affordance (visual and tactile cues), and mental models (cognitive preferences).**

\*\* Equivalent to the “**event**” concept in programming.

Source: Elements of User Experience  
by Jesse James Garrett

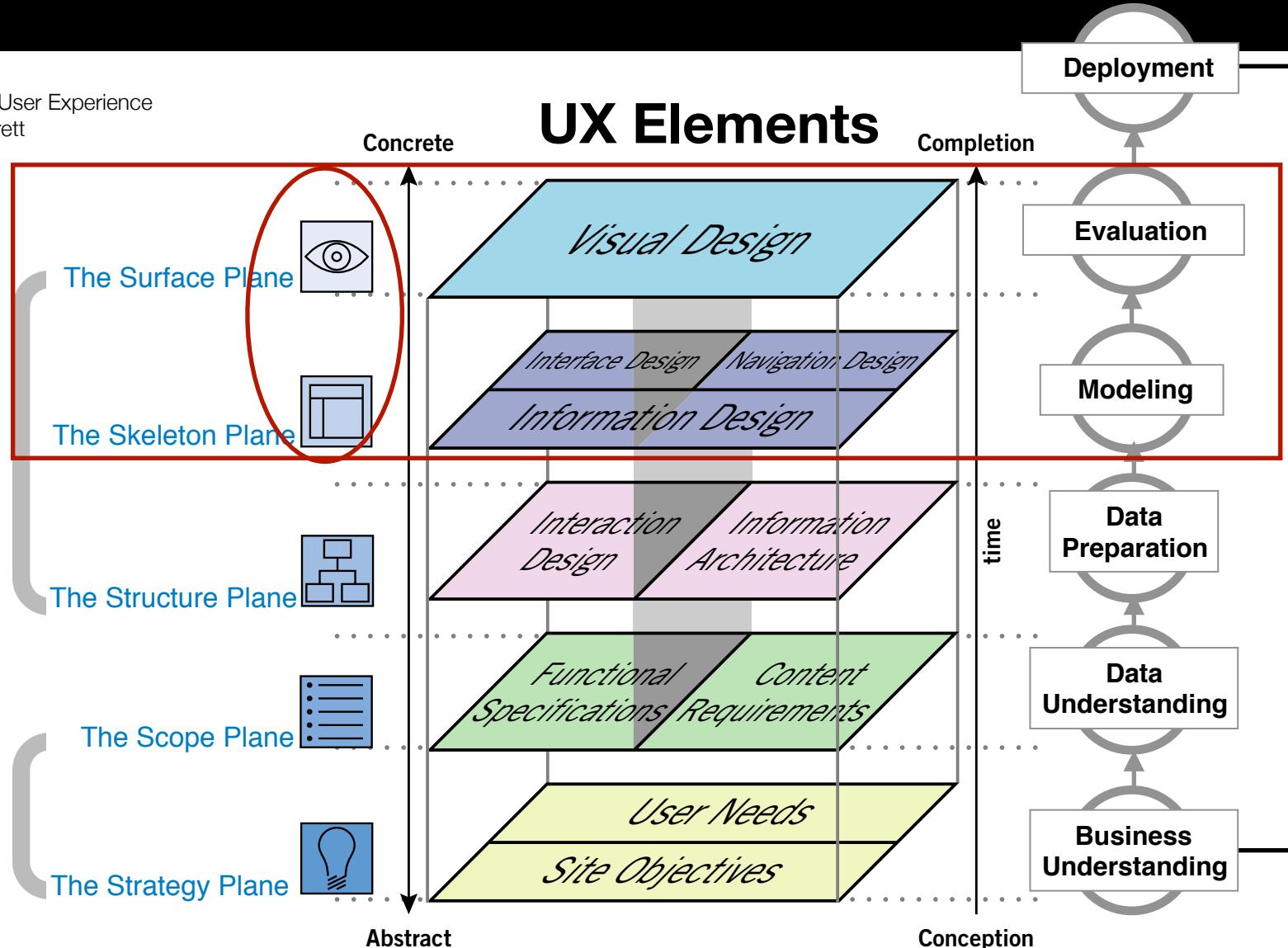
# UX Elements

## Solution Space

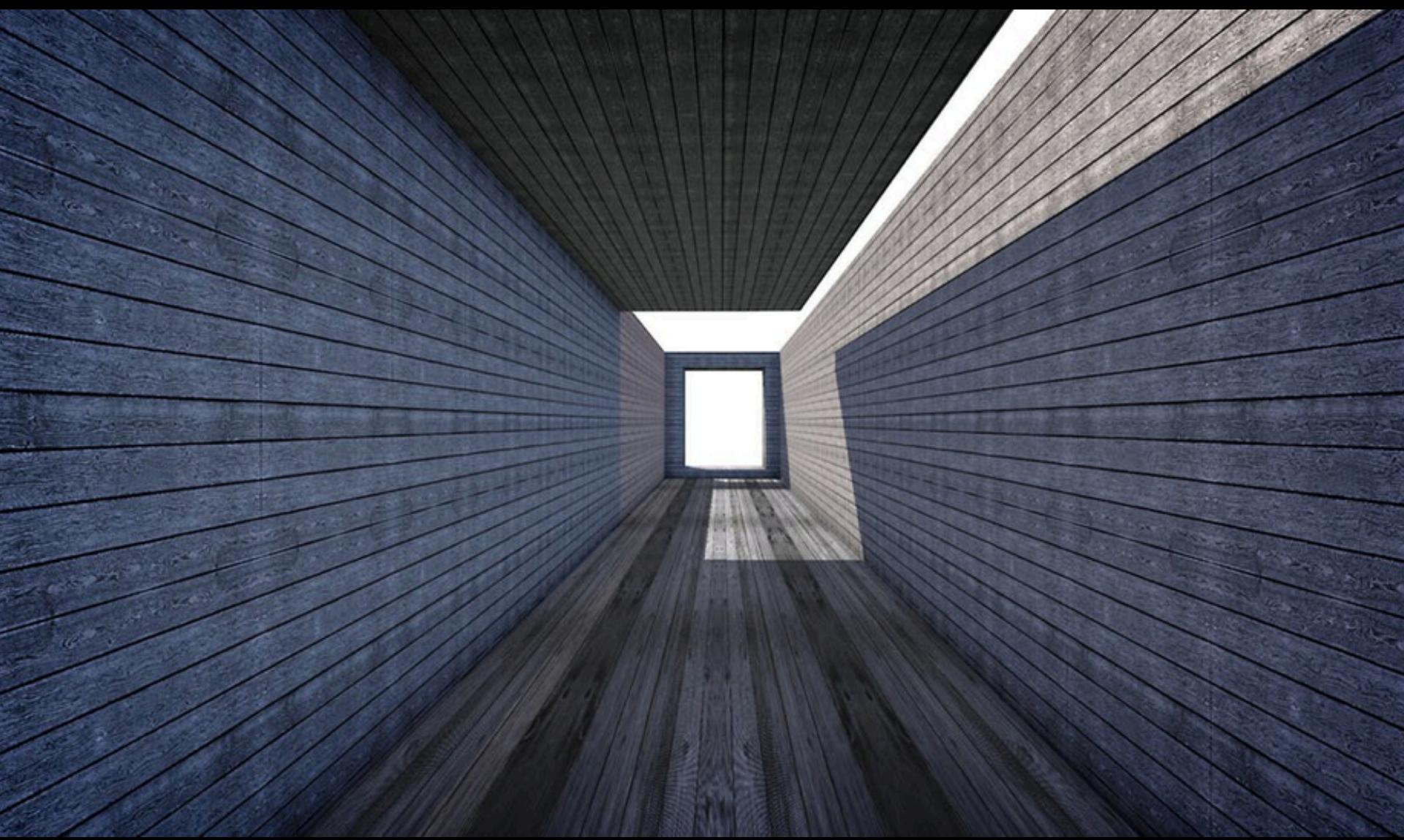
how and  
how much

## Problem Space

who, what,  
and why



# **THE POWER OF VISUAL COMMUNICATION**



**Develop Your Ability to Detect Patterns**  
**- both conceptual and visual**

## **BASIC VISUAL ELEMENTS**

- **Line**
- **Shape**
- **Form**
- **Texture**
- **Balance**
- **Composition**

<https://www.youtube.com/watch?v=YqQx75OPRa0>

## **BASIC COMPOSITION PRINCIPLES**

- **Proximity**
- **White Space**
- **Alignment**
- **Contrast**
- **Repetition**

<https://www.youtube.com/watch?v=a5KYIHNKQB8>

# **COMMON DESIGN PATTERNS**



[https://www.youtube.com/watch?v=aB6us\\_txi54&t=173s](https://www.youtube.com/watch?v=aB6us_txi54&t=173s)

## **COMMON DESIGN PATTERNS**

- **TOOLBAR**
- **APP BAR**
- **TAB**
- **DROPDOWN**
- **APPLICATION DRAWERS**
- **LIST TO DETAILS**
- **MULTI PLANE**

## VISUAL ENCODING

- Choosing the right **chart type (pattern)** to fit its **purpose**
- Use of titles and legends
- Length or height and line weight
- Position, Angle, and Area
- Color, Hue and Shade
- **Interactions** with the encoded patterns

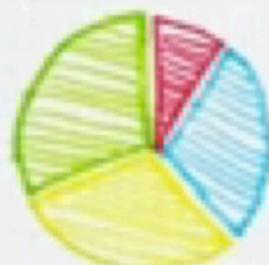
## **BASIC CHART TYPES**

- **Line Chart**
- **Bar Chart**
- **Pie Chart**
- **Scatter Plot**
- **Box and Whisker Graph**

# Nuts *and* Bolts of Chart Types

Created by

online-behavior.com



## PIE CHART

Extremely useful when creating a well-designed document that is intended to people that will not read the data (e.g. management)



## LINE CHART

Useful to show trends, especially upwards (or downwards). Trends people tend to use more obscure charts, like the waterfall chart, see below.



## AREA CHART

Please don't use this chart, I beg you! And please buy one of [other books](#).



## HISTOGRAM

Chart used by responsible analysts who understand the power of segmentation and the sadness that comes from aggregating data.



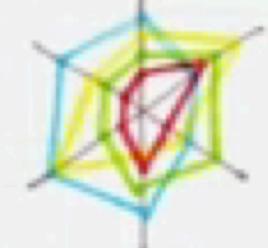
## BAR CHART

Safe choice. But make sure you read Stephen Few's lecture you show the chart to your boss, it will increase the probability of getting a raise.



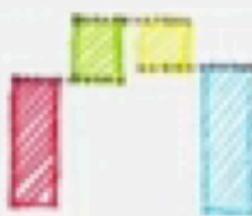
## BUBBLE CHART

If you manage to extract insights from this graph your name is [Hans Rosling](#).



## RADAR CHART

If you want to build a complex model around which you have done a lot of research, that's your choice but only PhDs will understand you.



## WATERFALL CHART

Perfect if you want to hide information or impress other people. Seriously can you think a chart that is also known as a "Flying Saucer Chart" or "Waterfall Chart"? No.



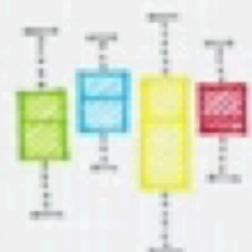
## TREE MAP

I have seen trees and I have seen maps, but how many times this map is a combination of both? If you use it, good for you.



## SCATTERPLOT

Very useful to find outliers, just like the people that commonly create them. Human beings just know up until they're much to the age of 16.



## BOX PLOT

This one is for geeks. If you use it successfully you will get a seat in between Ronaldinho and Adriano (at [Brazilian Games](#)).

<https://www.youtube.com/watch?v=2RCy5hTxuYA>

**With the various **chart types** and **patterns** to  
choose from, WHICH ONE should I pick?**

# **Introducing Google Jamboard**

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[https://gsuite.google.com/intl/en\\_sg/products/jamboard](https://gsuite.google.com/intl/en_sg/products/jamboard)



Untitled Jam



1 / 1



SHARE



Background

Clear frame



<https://www.youtube.com/watch?v=TQPvC1cHztg&list=PLZjMPS3ukEMdHFVUR-32et72NrWgJlobj&index=40>

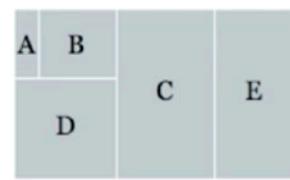
## ***Length or height***



## ***Position***



## ***Area***



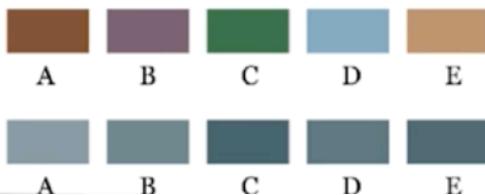
## ***Angle/area***



## ***Line weight***



## ***Hue and shade***



Figures represented  
in all these graphics:  
20% 25% 34% 30% 39%

# Visual encoding

## Main steps on any information graphics project.

1. Define the focus, the story, the goals, the tasks
  2. Do some preliminary research
  3. Choose graphic forms according to 1.
4. Sketches and storyboards; structure the information
5. Complete the research and write the copy
6. Create the graphics, maps, and diagrams

Source: The Functional Art by Alberto Cairo

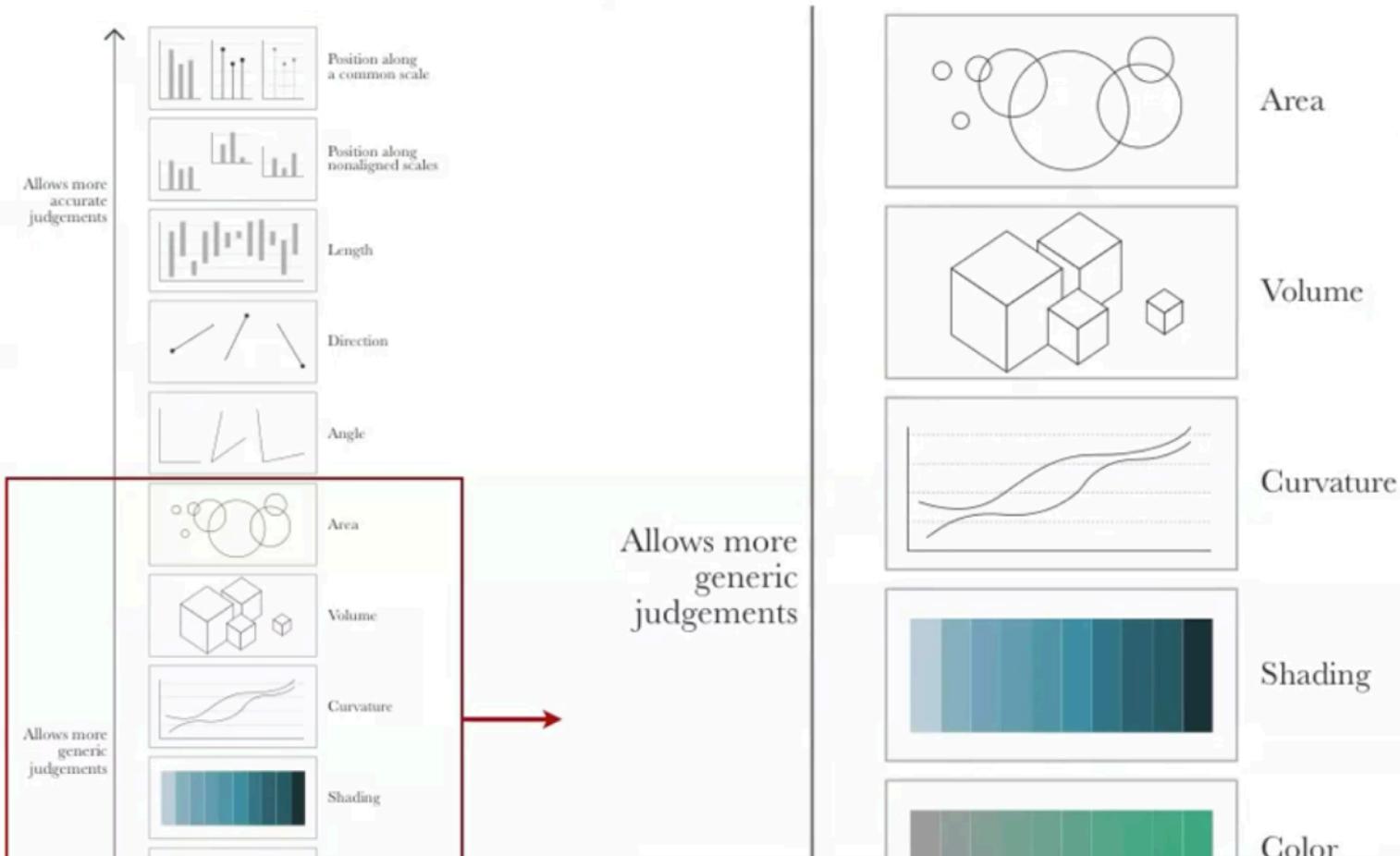
# William Cleveland and Robert McGill

"Graphical perception: theory, experimentation, and application to the development of graphical methods"



# William Cleveland and Robert McGill

"Graphical perception: theory, experimentation, and application to the development of graphical methods"





# **Basic Human Computer Interaction (HCI) Principles**

- **Affordance** (i.e. visual and tactile cues)
- **Signifiers** (i.e. well established patterns)
- **Mental models** (i.e. bias, habits, preconceived notions)

<https://www.youtube.com/watch?v=tZkP9evOAtI>

# The Design of Everyday Things

## by Don Norman



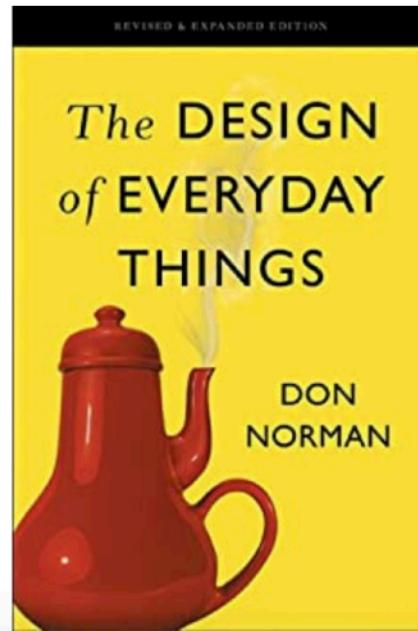
Blake Reichmann

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Jun 9 · 12 min read

★

...



<https://uxdesign.cc/book-notes-the-design-of-everyday-things-by-don-norman-debe462ffc04>

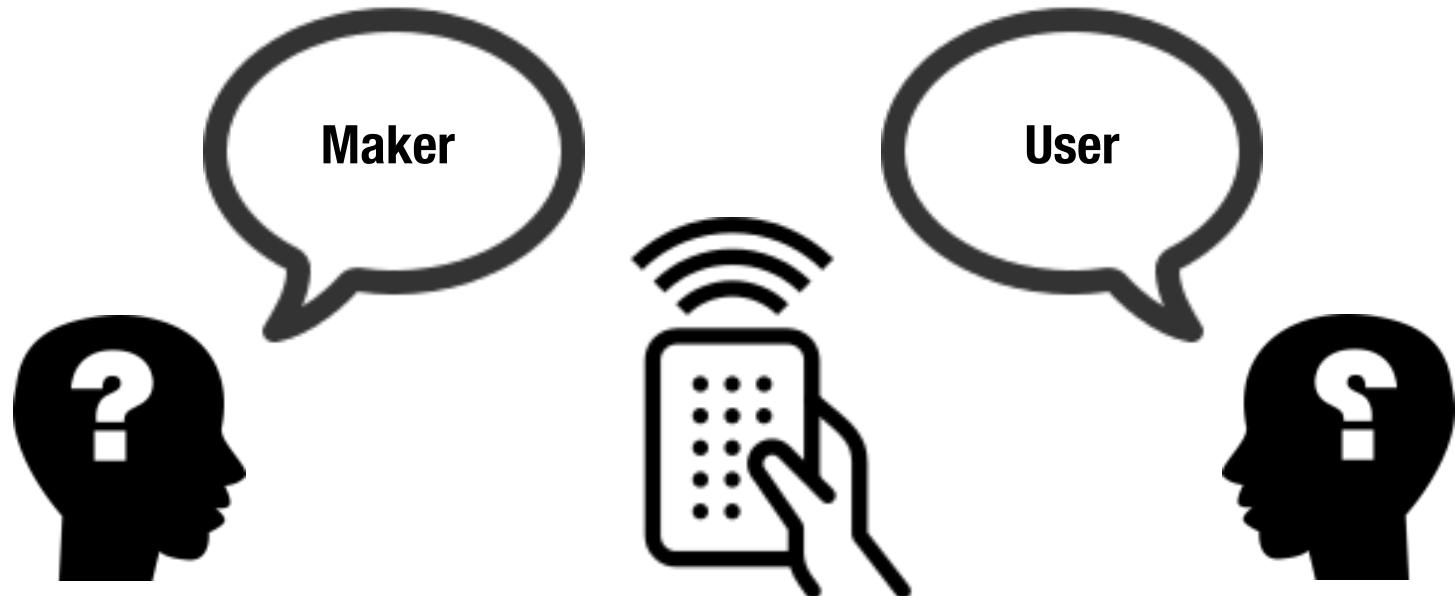


Affordance



**Signifier**

**Gap exists between their mental models**



Adapted from Donald Norman, "The Design of Everyday Thing"

**Mental Models**



## Mental Models

Source: Elements of User Experience  
by Jesse James Garrett

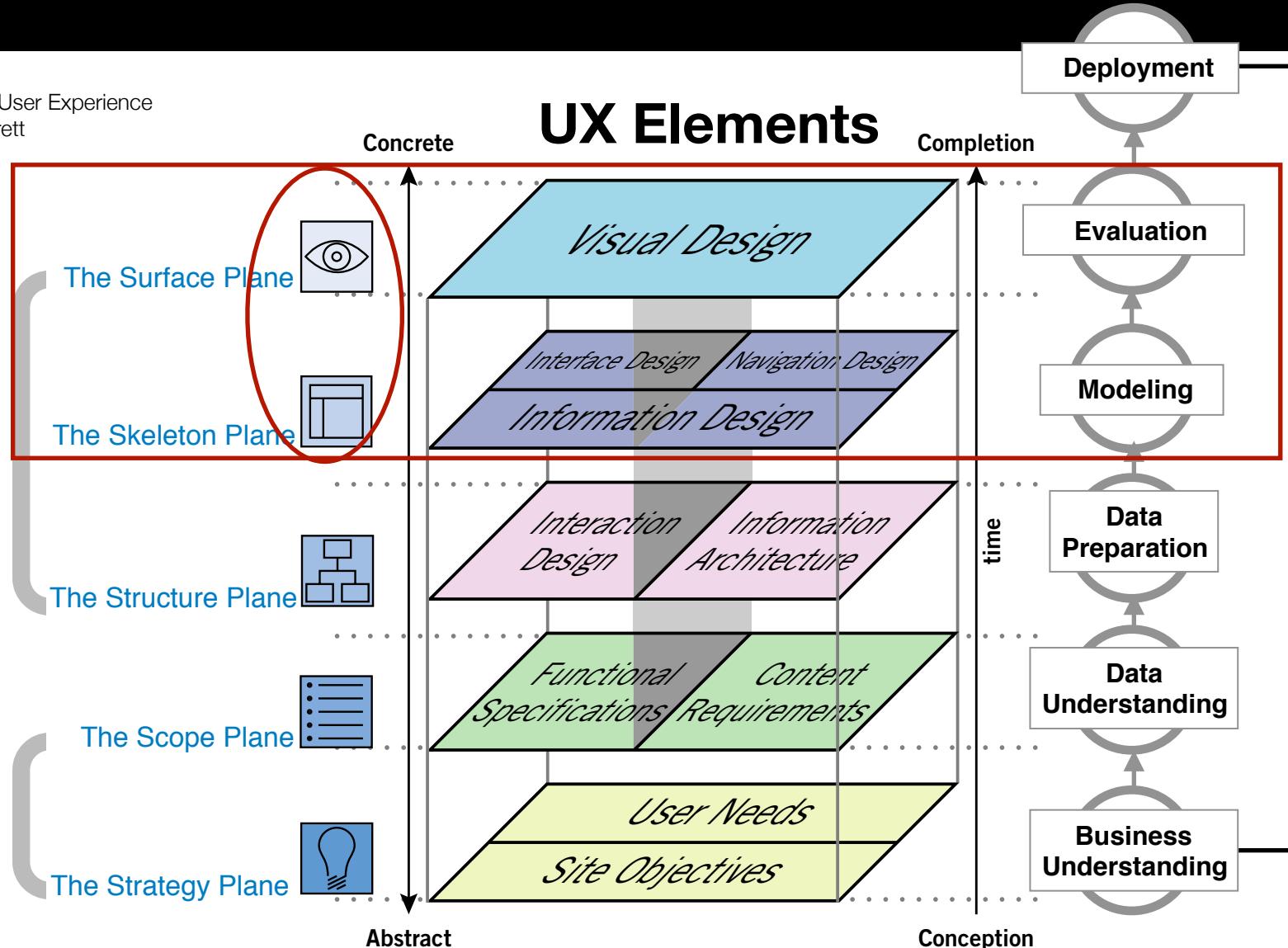
# UX Elements

## Solution Space

how and  
how much

## Problem Space

who, what,  
and why



## **Problem Set #5**

- Pick an Airtable base from your previous assignments or create a new one that suits your needs for the final project (with enough data for showing some useful results)
- Create several views for serving different query and display purposes.
- Create a HTML form with option fields to let user pick other different views to display.
- Please feel free to add other UI and interaction features to make the UX more engaging.

# **EXAMPLE**

The rate of violent crime in Miami is 42% higher than the national average.

violent crime

✓ homicide

rape

robbery

aggravated assault

MILWAUKEE'S VIOLENT CRIME RATE

BALTIMORE'S SPIKE RANDOM

4,500 – VIOLENT CRIMES PER 100,000 PEOPLE

4,000 –

3,500 –

3,000 –

2,500 –

Miami  
1975: 1,771.39

2,000 –

1,500 –

2015: 1,021.31

1,000 –

500 –

0 –

1975

1980

1985

1990

1995

2000

2005

2010

2015

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[https://halliez.github.io/2019-COMM5961/Final\\_Project/index.html](https://halliez.github.io/2019-COMM5961/Final_Project/index.html)

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[https://halliez.github.io/2019-COMM5961/Final\\_Project/novel.html#](https://halliez.github.io/2019-COMM5961/Final_Project/novel.html#)

**THANK YOU FOR YOUR TIME!**

[https://www.youtube.com/watch?v=0rcjHXGDD50&feature=emb\\_logo](https://www.youtube.com/watch?v=0rcjHXGDD50&feature=emb_logo)