Functions and Forms

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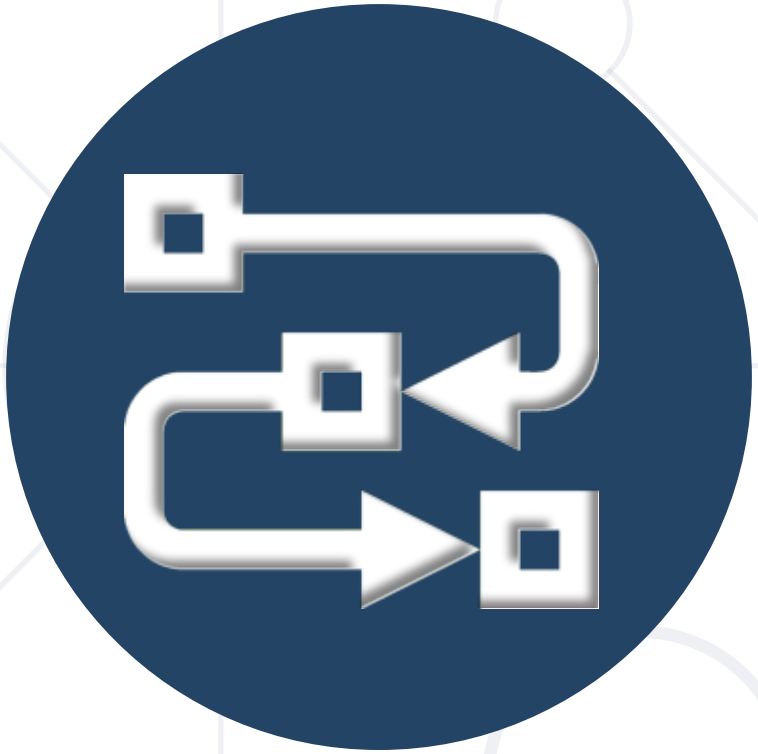

JavaScript Functions Overview

Declaring and Invoking Functions

Functions in JS

- Function == named piece of code
  - Can take parameters and return result

Use camel-case

Function parameter

```
function printStars(count) {
  console.log("*".repeat(count));
}
```

Why Use Functions?

- More **manageable programming**
  - Splits large problems into small pieces
  - Better organization of the program
  - Improves code readability
  - Improves code understandability
- Avoiding **repeating code**
  - Improves code maintainability
- Code **reusability**
  - Using existing functions several times

Function Without Parameters

- Executes the code between the brackets
- Does not return result

```
function multiplyNumbers() {
    let result = 5 * 5;
    console.log(result);
}
multiplyNumbers();          //25
```

Prints result on the console

Declaring and Invoking Functions

Declaring Function

Function Name

Parameters

```
function printText(text){
  console.log(text);
}
```

Function Body

- Variables of type "**let**" inside a function
- Functions can have **several parameters**
- It is possible for function to **not** return a value

Invoking a Function

- Functions are first **declared**, then **invoked** (many times)

```
function printHeader(){
  console.log("----------");
}
```

Function **Declaration**

- Functions can be **invoked (called)** by their name:

```
function main(){
  printHeader();
}
```

Function **Invocation**

Invoking a Function (2)

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- A function can be invoked from:
  - Other functions

```
function printHeader() {
  printHeaderTop();
  printHeaderBottom();
}
```

Function invoking functions

  - Itself (recursion)

```
function crash() {
  crash();
}
```

Function invoking itself

Problem: Car tax calculator

- Write a function that receives a **power** in kW of car's, between 0.00 and 150.00, and **calculates** and **prints** the tax you have to pay in lv.
  - under 37 kW - 0.43 lv./kW
  - 37.01 – 55 kW - 0.50 lv./kW
  - 55.01 – 74.00 - 0.68 lv./kW
  - 74.01 – 110.00 - 1.38 lv./kW
  - up 110.00 - 1.54 lv./kW

Input	Output
57.50	39.10 lv.

Solution: Car tax calculator

```
function solve(kW) {
    let power = Number(kW);
    calculate(power);
}
function calculate(power) {
    let tax = 0;
    if (power > 110 ){
        tax = power * 1.54;
    } else if (power > 74 ){
        tax = power * 1.38;
    } else //TODO
    tax = tax.toFixed(2);
    console.log(tax + ' lv.');
}
```

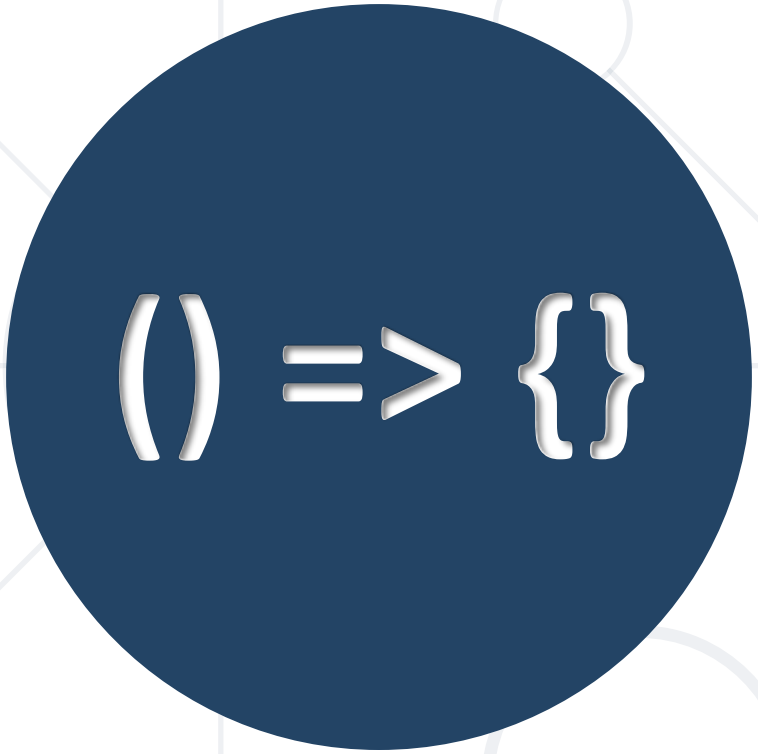
Problem: Car tax calculator II

- Add a new tax calculation function to the **previous code**
- Receive **two parameters**
  - Kilowatts
  - Car age
- The **coefficient** depends on the age of the vehicle
  - Under 5 years - **2.80**
  - 5 - 14 year - **1.50**
  - Up to 14 - **1.00**

Input	Output
45, 10	33.75 lv.

Solution: Car tax calculator II

```
function solve(kW, age) {
    let coefficient = calcCoeff(age);
    let powerPrice = calcPowerPrice(kW);
    totalPrice = (powerPrice * coefficient).toFixed(2) + " lv.";
    console.log(totalPrice);
}
function calcCoeff(age) {
    let coefficient = 0;
    if (age > 14){
        coefficient = 1;
    } else //TODO
    return coefficient;
} //TODO: implement the calcPowerPrice function
```



Arrow Functions

Arrow Functions

- Functions in JS can be written in **short form** using "**=>**" (**arrow**)

```
let increment = x => x + 1;
console.log(increment(5));  // 6
```

```
let increment = function(x) {
  return x + 1;
}
```

This is the same as the above function

```
let sum = (a, b) => a + b;
console.log(sum(5, 6));  // 11
```

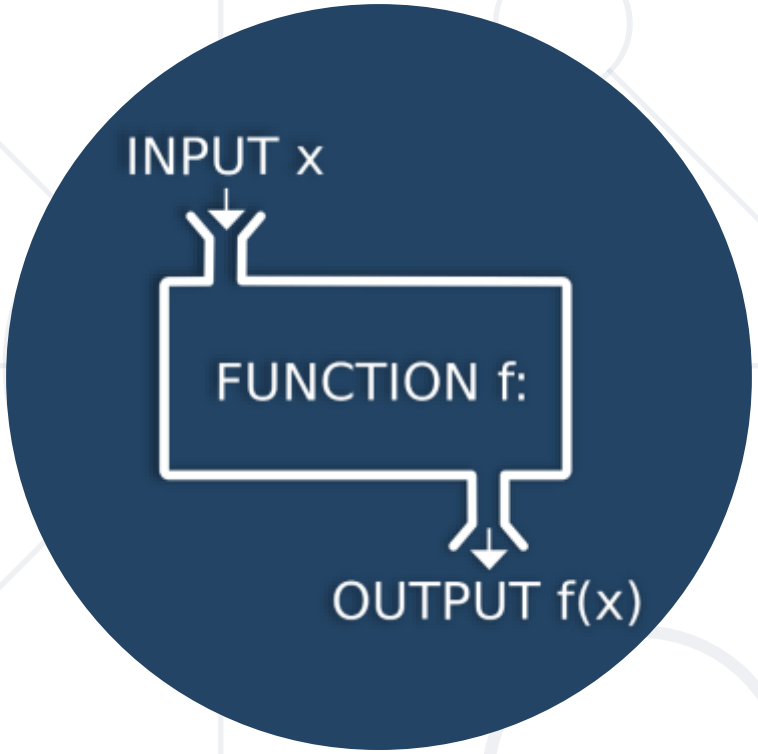
Problem: Simple calculator

- Write a function that **receives three parameters** and write an arrow function, that calculates a result depending on operator
- The operator can be '**multiply**', '**divide**', '**add**', '**subtract**'
- The input comes as three parameters - two **numbers** and an operator as a **string**

Input	Output
`5, 10, 'multiply'`	25

Solution: Simple calculator

```
function solve(a, b, operator) {
    switch (operator) {
        case 'multiply':
            let multyiply = (a, b) => a * b;
            console.log(multyiply(a, b));
            break;
        case 'divide':
            //TODO
        case 'add':
            //TODO
        case 'subtract':
            //TODO
    }
}
```



Nested Functions

Example

- Functions in JS can be **nested**, i.e. hold other functions
- Inner functions have access to variables from their parent

Main function

```
function drawDiamond(size) {
  drawTop(size / 2)
  drawBottom(size / 2)
}
```

Nesting the functions

Problem: Car tax calculator III

- Add new functionality to the calculator for the motorcycle tax
- Parameters:
  - First – **vehicle type**
  - Second – engine's **volume**
  - Third - **years**

Input	Output
'motorcycle', 450, 10	63.00 lv.

Solution: Car tax calculator III

```
function solve(type, kW, age) {
    switch (type){
        case "motorcycle":
            totalCalc(kW);
            break;
        case "car":
            let result = totalCalc(powerCalc(kW),calcCoeff(age));
            console.log(result);
            break;
    }
} //TODO: implement the other functions
```

Naming and Best Practices

Naming Functions

- Functions naming guidelines
  - Use **meaningful** function names
  - Should be in **camelCase**
  - Function names should answer the question:
    - **What does this function do**?

```
findStudent, loadReport, sine
```

```
Method1, DoSomething, handleStuff, DirtyHack
```

  - If you cannot find a good name for a function, think about whether it has a **clear intent**

Naming Function Parameters

- Function parameters names
  - Preferred form: [**Noun**] or [**Adjective**] + [**Noun**]
  - Should be in **camelCase**
  - Should be **meaningful**

```
firstName, report, speedKmH,
usersList, fontSizeInPixels, font
```

  - **Unit of measure should be obvious**

```
p, p1, p2, populate, LastName, last_name, convertImage
```

Functions – Best Practices

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- Each function should perform a **single**, well-defined task
  - A Function's name should **describe that task** in a clear and non-ambiguous way
- **Avoid** functions **longer than one screen**
  - **Split them** to several shorter functions

```
function printReceipt(){
    printHeader();
    printBody();
    printFooter();
}
```

Self documenting and easy to test

Code Structure and Code Formatting

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- Make sure to use correct **indentation**

```
function main(){
    // some code…
    // some more code…
}
```

```
function Main()
      {
            // some code…
// some more code…
}
```

- Leave a **blank line** between **functions**, after **loops** and after **if** statements
- Always use **curly brackets** for loops and if statements bodies
- **Avoid long lines** and **complex expressions**

Forms Definition

What is a Form

- A **webform**, **web form** or **HTML form** on a web page allows a user to enter data that is sent to a server for processing
- Forms can resemble **paper** or **database** forms because web users fill out the forms using **checkboxes**, **radio buttons** or **text fields**

Form example

Need Information

First Name	
Middle Name	
Last Name	
Address	
City	State
Zip/Postal Code	
Country	
Phone (country code, area code and number)	(+) -
E-mail	
Birth date	Day Month Year (4 digit)
Gender	
Starting date	Spring 2006 Summer 2006
Comments/Questions	This is the place for comments and questions...

Submit Reset this form

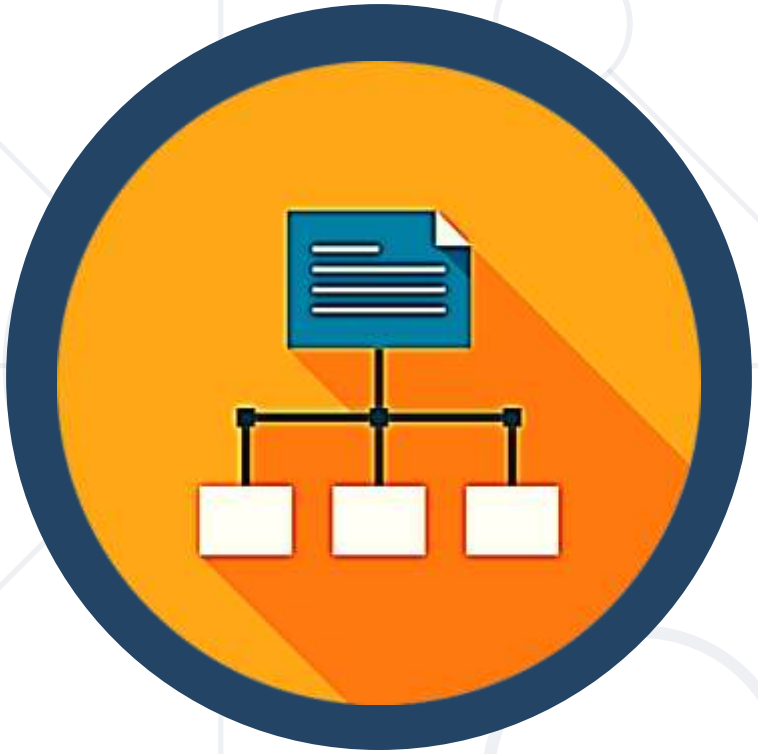
Input field

Text area

Select

Radio buttons

Submit button



Structure

Components of a form

Components

- **Form Name** - specifies the name of a form
- **Form Action** - specifies where to send the form-data when a form is submitted
- **Input Type** - defines an input control
- **onClick -** is an event handler

Code example

```
<form method="post">
Name: <input type="text" name ="name"/><br>
Email: <input type="text" name ="email"/><br>
Gender: <input type="radio" name ="gender"/>Male<br>
   <input type="radio" name ="gender"/>Female<br>
Comments: <br>
   <textarea name="comments">Any other
comments?</textarea><br>
<input type="submit"/><br>
<form>
```

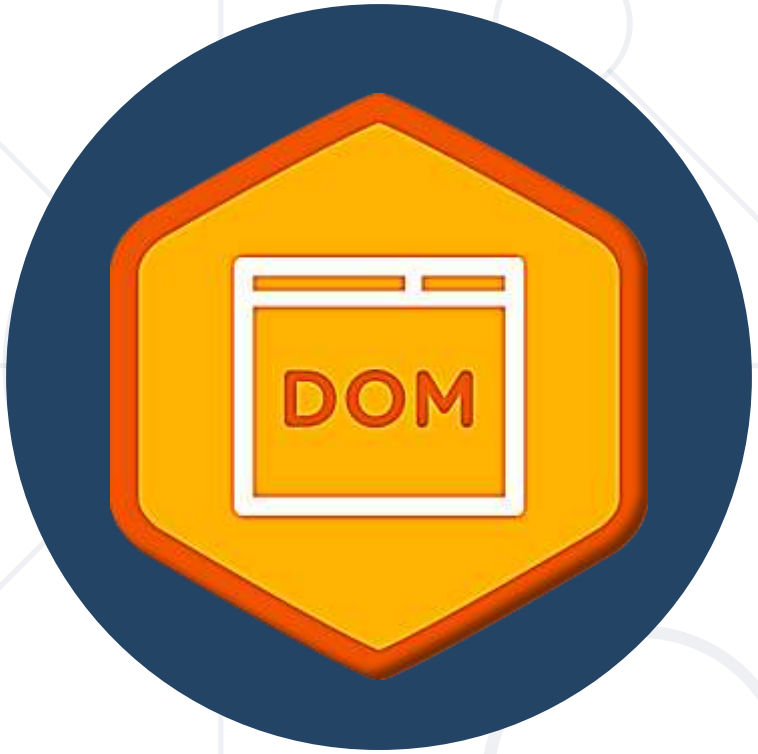
Type

Type of input

Radio buttons

Textarea

Submit button



DOM

Document Object Model

What is DOM

- What is **D**ocument **O**bject **M**odel (**DOM**)?
  - HTML documents in the browser are stored as "**DOM tree**"
  - Consists of **elements** with **child elements**
  - Elements have **properties** (attribute + value) and **events**
- The **DOM API** allows **searching / modifying** the DOM tree

```
let menu = document.getElementById('menu');
menu.style.display = 'none';
menu.appendChild(document.createElement('hr'));
```

Selecting HTML Elements from DOM

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- Select a single element → returns **HTMLElement**

```
let header = document.getElementById('header');
let nav = document.querySelector('#main-nav');
let root = document.documentElement;
```

- Select a collection of elements → returns a **collection**

```
let inputs = document.getElementsByTagName('li');
let towns = document.getElementsByName('towns[]');
let header = document.querySelectorAll('#nav li');
let allLinks = document.links;
```

Accessing Element Text

- The contents of HTML elements are stored in text nodes
  - To access the contents of an element:

```
let element = document.getElementById('main');
let text = element.textContent;
element.textContent = "Welcome to the DOM";
```

```
<html>
  <head></head>
  <body>
    <div id="main">This is JavaScript!</div>
  </body>
</html>
```

```
<html>
  <head></head>
  <body>
    <div id="main">Welcome to the DOM</div>
  </body>
</html>
```

  - If the element has children, returns all text concatenated

Getting and setting values of a form

Getting and Setting Values

- Use DOM to access an element from the form

```
<input type= "text" name="name" id= "uniqueID"/>
```

```
let nameValue = document.getElementById("uniqueID").value
```

- Use DOM to set the value of element from the form

```
<input type= "text" name="name" id= "uniqueID"/>
```

```
document.getElementById("uniqueID").value = "Peter"
```

Additional components

More events

- **onFocus** - an event is triggered with a form object, gets input focus (the insertion point is clicked there).
- **onBlur** - an event is triggered with a form object, loses input focus (th e insertion point is clicked out of there).
- **onChange** - an event is triggered when a new item is selected in a list box.
- **onSelect** - an event is triggered when text in a text or text area box is selected.
- **onSubmit** - an event is triggered when the form is submitted to the server (more about this important hander later in the column).

Validating Forms

Data Validation

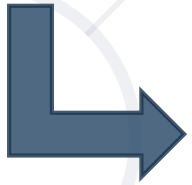
- Data validation is the process of ensuring that user input is **clean**, **correct**, and **useful**
- Typical validation tasks are:
  - Required fields must be filled
  - The input data is valid
  - The input must be the required type

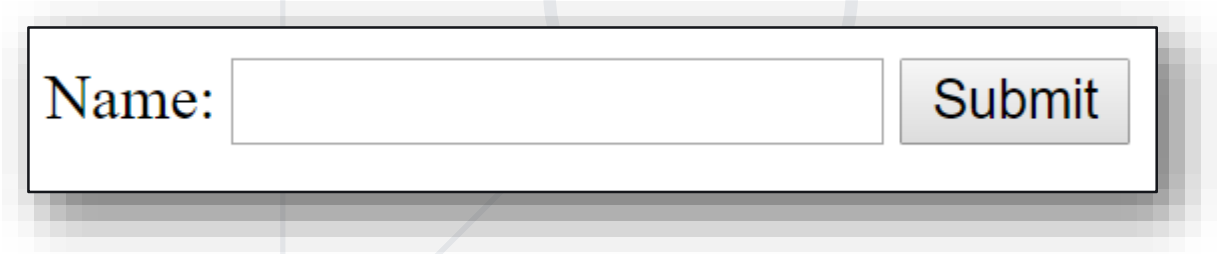
Automatic HTML Form Validation

- Make a field **required** to validate it:

```
<form method="post">
  <input type="text" name="fname" required>
  <input type="submit" value="Submit">
</form>
```

Making a field value **required**





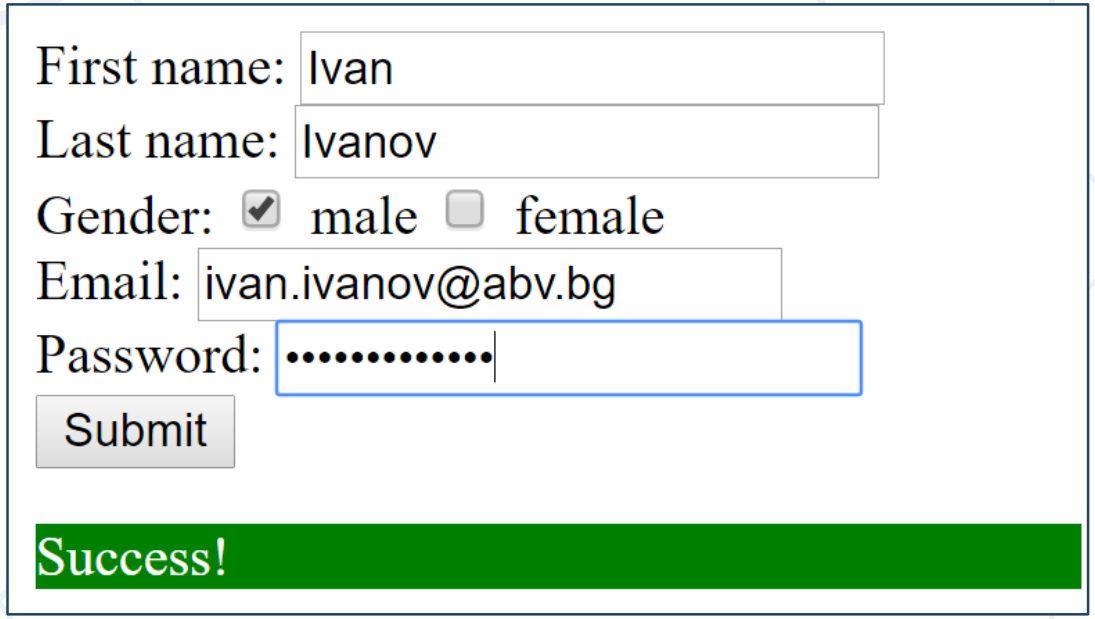
CSS Pseudo Selectors

- Use **CSS** to "validate" input fields

Selector	Description
:disabled	Selects input elements with the "disabled" attribute
:invalid	Selects input elements with invalid values
:optional	Selects input elements with no "required" attribute
:required	Selects input elements with "required" attribute
:valid	Select input elements with valid values

Problem: Forms

- Create a form that gathers information about a person
- There should be validation for each field:
  - First and Last name can not be empty
  - The user should check only one of the gender types
  - Email should include @ and a dot (.)
  - Password should be at least 6 symbols
  - If there are invalid fields print appropriate messages



Live Exercises

Summary

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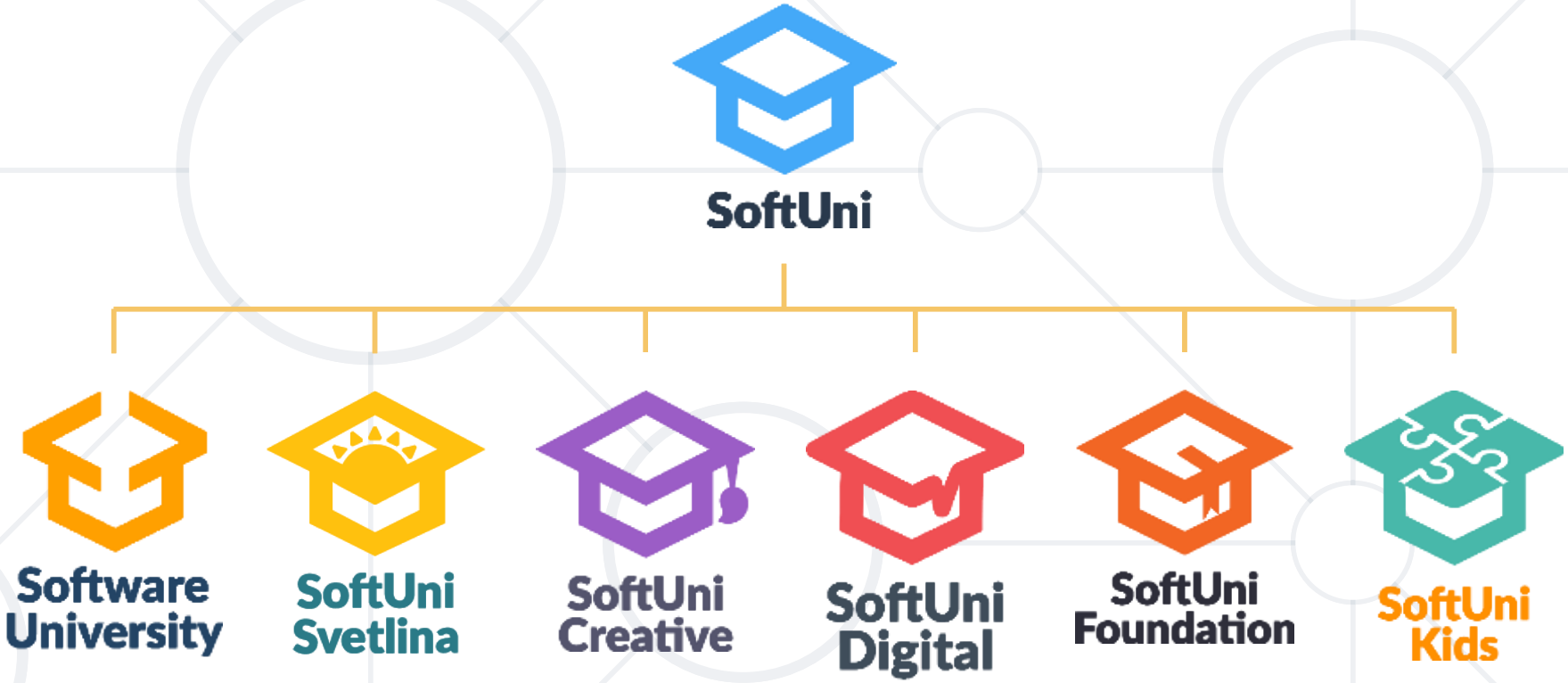
- Functions:
  - Break large programs into simple **functions** that solve small sub-problems
  - Consist of **declaration** and **body**
  - Are invoked by their **name**
  - Can accept **parameters**
- Forms:
  - Are used to enter data that is sent to a server for processing
  - Are used to get and set values of the form with the help of **DOM**

Questions?



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