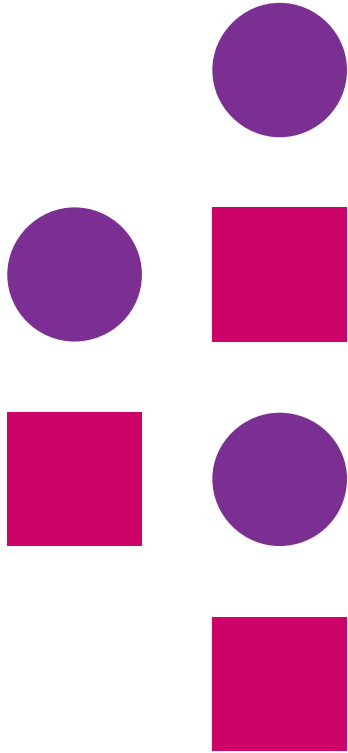
WSA | Forward looking IT finishing school

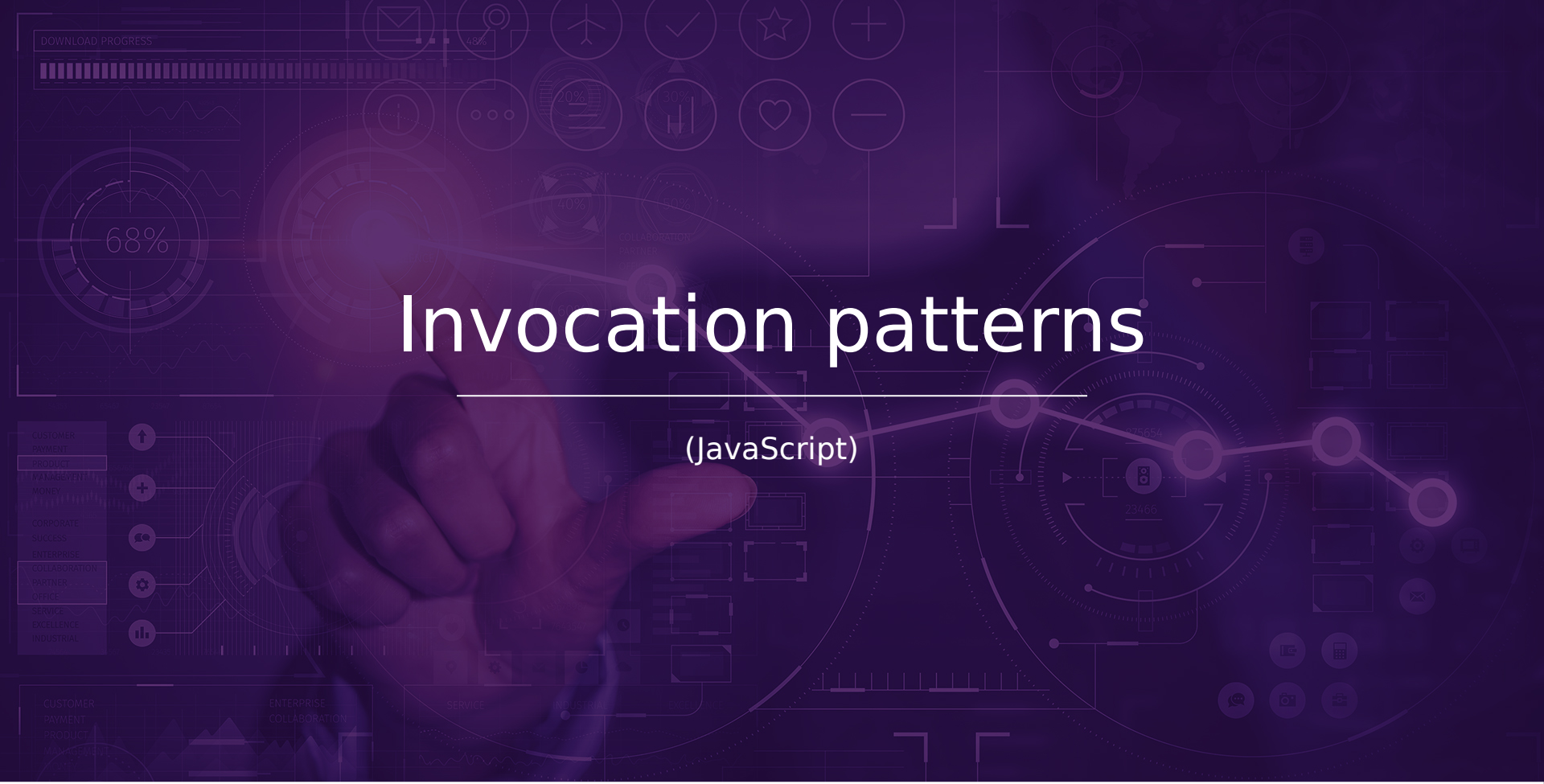
Function

JavaScript

Table of Content

- Invocation patterns
- Recursion





Invocation patterns

(JavaScript)

Function Invocation Patterns

- The code in a function is not executed when the function is defined
- Function is executed when it is invoked
- Functions can be invoked in 4 different ways
  - Invoking a function as a “function”
  - Invoking a function as a “method”
  - Invoking a function with a “Constructor function”
  - Invoking a function with a “apply and call”

Invocation pattern
(invoking as function)

```
<script>
	var obj;
	function square(a) {
		return a * a;
	}
	document.write(“Square of 3 is ” + square(3));
</script>
```

Invocation pattern
(invoking as method)

- When a function is part of an object, it is called a method
- Method invocation is the pattern of invoking a function that is part of an object
- JavaScript will set the this parameter to the object where the method was invoked on
- JavaScript binds this at execution (also known as late binding)

Invocation pattern
(invoking as method)

```
<script>
        var obj = { firstName: "Smith", lastName: "Doe",
            fullName: function() {
                return this.firstName + " " + this.lastName;
            }
        };
    // In the example above, this would be set to obj
        document.write("Full name is " + obj.fullName());
</script>
```

Invocation pattern
(Constructor invocation)

- The constructor invocation pattern involves putting the new operator just before the function is invoked
- If the function returns a primitive type (number, string, boolean, null or undefined)
  - The return will be ignored and instead this will be returned (which is set to the new object)
- If the function returns an instance of Object
  - The object will be returned instead of returning this

Invocation pattern
(Constructor invocation - 1)

```
<script>
    var Fullname = function(firstname, lastname) {
        // create a property fullname
        return this.fullname = firstname + ‘ ’ + lastname;
    };
    var obj = new Fullname(“Tenali”, “Raman”);
    document.write("Full name is " + obj.fullname);
</script>
```

Invocation pattern
(Constructor invocation - 2)

```
<script>
    var Fullname = function(firstname, lastname) {
        // return object
        return { fullname : firstname + ‘ ’ + lastname }
    };
    var obj = new Fullname(“Tenali”, “Raman”);
    document.write("Full name is " + obj.fullname);
</script>
```

Invocation pattern
(with apply() and call() methods)

- JavaScript functions are objects and have properties and methods
- The call() and apply() are predefined method, invoke the function indirectly
- The call() method uses its own argument list as arguments to the function
- The apply() method expects an array of values to be used as arguments

Invocation pattern
(by call() method)

```
<script>
        var obj;
        function square(a) {
            return a * a;
        }
        document.write("Square of 3 is " + square.call(obj, 3));
</script>
```

Invocation pattern
(by apply() method)

```
<script>
        var obj, arrSum;
        function sum(x, y) {
            return x + y;
        }
        arrSum = [5, 4];
        document.write("Sum = " + sum.apply(obj, arrSum));
</script>
```

Function Expression

Syntax:

```
var func = function  (param-1, param-2, . . . , param-n) {
  statement(s);
}
```

- Variable can be used to invoke the function
- Above function is an anonymous function (a function without a name)

Function Hoisting

- JavaScript moves variable and function declarations to top of the current scope; this is called hoisting
- Due to hoisting JavaScript functions can be called before they are declared

```
var s = sum (x, y);
function sum (x, y) {
    return x + y;
}
```

```
function sum (x, y) {
    return x + y;
}
var s = sum (x, y);
```

Function Hoisting

- Function expressions are not hoisted onto the beginning of the scope, therefore they cannot be used before they appear in the code

Self Invoking Function

- Function expressions can be used to self-invoke function (start automatically without being called)
- This is done by using parenthesis () -- also known as function invocation operator

Syntax:

```
( function_expression ) ( );
```

Self Invoking Function

- Such expressions also known as IIFE (Immediately Invokable Function Expression

Example:

```
( function () {
      document.write("I am self invoking function");
} ) ( );
```

JavaScript Scopes
(what?)

- Scope determines the accessibility (or visibility) of variables, objects, and functions from different parts of the code at runtime
- JavaScript has two types of scope
  - Local scope
  - Global scope
- Please note that, in JavaScript, objects and functions are also variables

JavaScript Scopes
(why?)

- Scope provides security to data that, in principle, shall be accessed only by intended part of the code
- If data is exposed to all parts of program then it can be modified anytime without your notice which will lead to unexpected behaviour and results
- Scope also allow use to use same names in different functions

JavaScript Scopes
(Local Scope)

- Variables defined within a function are local to the function
- Such variables have local scope and can't be accessed outside the function
- Since local variables are only recognized inside their functions, variables with the same name can be used in different functions
- Local variables are created when a function is invoked (started), and deleted when the function exits (ended)

JavaScript Scopes
(Local Scope)

```
<script>
function square(num) {
      var result = num * num;  // variable with local scope
}
Square(3);  // invoke the function
document.write("Square of number = " + result);  // Exception
</script>
```

JavaScript Scopes
(Global Scope)

- Variables defined outside a function have global scope
- Such variables are visible to all the functions within a document, hence, can be shared across functions

JavaScript Scopes
(Global Scope)

```
<script>
var result;  // variable with global scope
function square(num) {
      result = num * num;
}
square(3);  // invoke the function
document.write("Square of number = " + result);
</script>
```

JavaScript Scopes
(Function and block scopes)

- Further, in JavaScript, there are two kinds of local scope
  - Function scope
  - Block scope
- A block of code is created with curly braces { }
- Conditional statements (if, switch) and loops (for, while, do-while) do not create new scope

JavaScript Scopes
(How variables are created?)

- JavaScript processes all variable declarations before executing any code, whether the declaration is inside a conditional block or other construct
- JavaScript first looks for all variable declarations in given scope and creates the variables with an initial value of undefined
- If a variable is declared with a value, then it still initially has the value undefined and takes on the declared value only when the line that contains the declaration is executed

JavaScript Scopes
(How variables are created?)

- Once JavaScript has found all the variables, it executes the code
- If a variable is implicitly declared inside a function -
  - Variable has not been declared with keyword “var”
  - And, appears on the left side of an assignment expression

is created as a global variable

JavaScript Scopes
(Global Scope)

```
<script>
function square(num) {
      result = num * num;  // Automatically global variable
}
document.write("Square of number = " + result);
</script>
```

JavaScript Scopes
(Global Scope)

- Global variables are not automatically created in "Strict Mode"

```
<script>
function square(num) {
      “use strict”;
      result = num * num;
}
document.write(“Square of number = ” + result);  // Exception
</script>
```

JavaScript Scopes
(Global Scope)

- Global variables belong to window object

```
<script>
function square(num) {
      result = num * num;
}
document.write("Square of number = " + window.result);
</script>
```

JavaScript Scopes
(Function scope variable)

- Variables declared using keyword “var” within a function has function scope

JavaScript Scopes
(Function scope variable)

```
<script>
        function func() {
            var x = 10;  // function scope variable
            {
                var x = 20;  // function scope variable
                document.write("<br>x = " + x);  // shall print 20
            }
            document.write("<br>x = " + x);  // shall print 20
        }
</script>
```

JavaScript Scopes
(Block scope variable)

- ECMA script 6 has introduced keywords “let” and “const”
- Variables declared using these keywords will have block level scope
- For these variables, the braces {. . .} define a new scope

JavaScript Scopes
(Block scope variable - let)

```
<script>
        function func() {
            let x = 10;
            {
                let x = 20;
                document.write("<br>x = " + x);  // shall print 20
            }
            document.write("<br>x = " + x);  // shall print 10
        }
</script>
```

JavaScript Scopes
(Block scope variable - const)

```
<script>
        function func() {
            const name = “Webstack Academy”;
            {
                const name = “Hello world!”;
                document.write("<br>name = " + name);
            }
            document.write("<br>name = " + name);
        }
</script>
```

JavaScript Scopes
(Life time of variables)

- Life time of a variable is the time duration between it's creation and deletion

Variable	Keyword	Scope	Life time
Local	Var	Function	• Created when function is invoked • Deleted when function exits
	Let, const	Function or block	• Created when function is invoked • Deleted when function exits
Global	var, let, const	Browser Window	• Created when web page is loaded in the browser window (tab) • Deleted when browser window (tab) is closed
	var, let, const	Block	• Created when block is entered • Deleted when block is exited

JavaScript Scopes
(important notes)

- Do not create global variables unless needed
- Your global variables or functions can overwrite window variables or functions
- Opposite is also possible; any function (including window object) can overwrite your global variables and functions

Function Closures

- In JavaScript, an inner (nested) function stores references to the local variables that are present in the same scope as the function itself, even after the function returns
- The inner function has access to the outer function's variables; this behavior is called lexical scoping
- However, the outer function does not have access to the inner function's variables

Function Closures

- A closure is an inner function that has access to the outer function’s variables – scope chain
- The closure has three scope chains:
  - It has access to its own block scope (variables defined between its curly brackets)
  - It has access to the outer function’s variables
  - It has access to the global variables

Function Closures
(Example)

```
<script>
function disp() { // Parent function
        var name = "Webstack Academy"; // name is a local variable
        displayName() { // displayName() is the inner function, a closure
        alert (name); // The inner function uses variable of parent function
    }
    displayName(); // child function call
}
disp(); // parent function call
</script>
```

Recursion

(JavaScript)

Recursion

- Recursion is the process in which a function is called by itself
- Recursion is a technique for iterating over an operation by having a function call itself repeatedly until it arrives at a result

Recursion
(Example)

```
<script>
var factorial = function(n) {
  if (n <= 0) {
    return 1;
  } else {
    return (n * factorial(n - 1));
  }
};
document.write("factorial value"+factorial(5));
</script>
```

Exercise

- Write a JavaScript function to find sum of digits of a number
- Write a JavaScript program to compute x raise to the power y using recursion

WSA | Forward looking IT finishing school

Web Stack Academy (P) Ltd

#83, Farah Towers,

1st floor,MG Road,

Bangalore – 560001

M: +91-80-4128 9576

T: +91-98862 69112

E: info@www.webstackacademy.com