Telerik Academy

Functions

Reusable parts of Code

JavaScript Fundamentals

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http://academy.telerik.com

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Functions Overview

What is a function?

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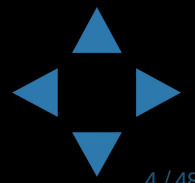
What is a Function?

- A function is a kind of building block that solves a small problem
  - A piece of code that has a name and can be called from other code
  - Can take parameters and return a value
- Functions allow programmers to construct large programs from simple pieces



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Why to Use Functions?

- More manageable programming
  - Split large problems into small pieces
  - Better organization of the program
  - Improve code readability and understandability
  - Enhance abstraction
- Avoiding repeating code
  - Improve code maintainability
- Code reusability
  - Using existing functions several times

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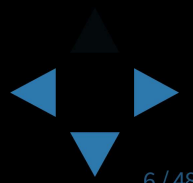
Declaring and Creating Functions



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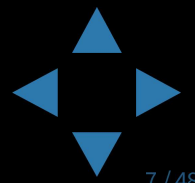
Declaring and Creating Functions

- Each function has a name
  - It is used to call the function
  - Describes its purpose
- Functions in JavaScript do not explicitly define return type
  - Each function always returns a value

```
function printLogo() {
    console.log("JavaScript Fundamentals");
    console.log("Telerik Software Academy");
}
```

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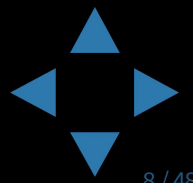
Declaring and Creating Functions

Demo



Telerik Academy Ways of Defining a Function

- Functions can be defined in three ways:
  - Using the constructor of the Function object

```
var print = new Function("console.log('Hello')");
```

  - By function declaration

```
function print() { console.log("Hello") };
```

  - By function expression

```
var print = function() { console.log("Hello") };
var print = function printFunc() { console.log("Hello"
```

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Calling Functions

Executing the Function Code

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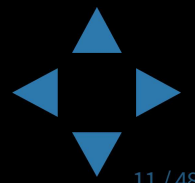
Calling Functions

- To call a function, simply use:
  - The function's name
  - Parentheses
  - A semicolon (;)
    - Optional, but preferred
- This will execute the code in the function's body and will result in printing the following:

```
printLogo();
//JavaScript Fundamentals
//Telerik Software Academy
```

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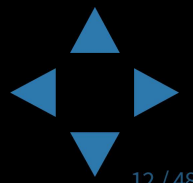
Calling Functions

- A function can be called from:
  - Any other function
  - Itself (process known as recursion)

```
function print(){
    console.log("printed");
}

function anotherPrint(){
    print();
    anotherPrint();
}
```

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Declaring and Calling Functions

Demo

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Functions with Parameters

Passing information to functions

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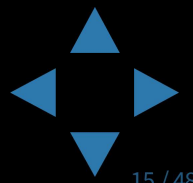
Function Parameters

- To pass information to a function, you can use parameters (also known as arguments)
  - You can pass zero or several input values
  - Each parameter has a name
  - Parameters are assigned to particular values when the function is called
- Parameters change the function behavior depending on the passed values



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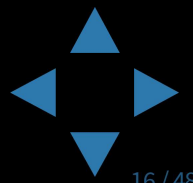
Defining and Using Function Parameters

- Function's behavior depends on its parameters
- Parameters can be of any type
  - `Number`, `String`, `Object`, `Array`, etc.
  - Even `Function`

```
function printSign(number) {
    if (number > 0) {
        console.log("Positive");
    } else if (number < 0) {
        console.log("Negative");
    } else {
        console.log("Zero");
    }
}
```

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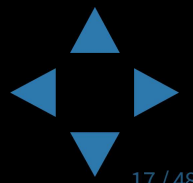
Defining and Using Function Parameters

- Functions can have as many parameters as needed:

```
function printMax(x, y) {
  var max;
  x = +x; y = +y;
  max = x;

  if (y > max) {
    max = y;
  }

  console.log(`Maximal number: ${max}`);
}
```

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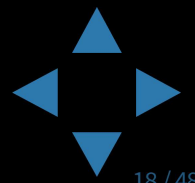
Calling Functions with Parameters

- To call a function and pass values to its parameters:
  - Use the function's name, followed by a list of expressions for each parameter
- *Example*:

```
printSign(-5);
printSign(balance);
printSign(2 + 3);
printMax(100, 200);
printMax(oldQuantity * 1.5, quantity * 2);
```

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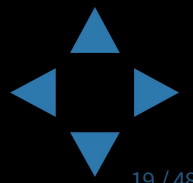
Functions Parameters – *Example*

- *Example:* print the sign of a number

```
function printSign(number) {
  number = +number;

  if (number > 0) {
    console.log(`The number ${number} is positive.`);
  } else if (number < 0) {
    console.log(`The number ${number} is negative.`);
  } else {
    console.log(`The number ${number} is zero.`);
  }
}
```



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Functions Parameters – *Example*

- *Example:* print the max between 2 numbers

```
function printMax(x, y) {
  var max = x;

  if (max < y) {
    max = y;
  }

  console.log(`Maximal number: ${max}`);
}
```


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Function Parameters

Demo

Telerik Academy Printing Triangle – *Example*

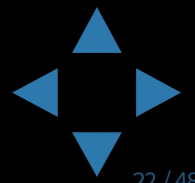
- Creating a program for printing triangles as shown below:

```
n = 6

1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
1 2 3 4 5 6
1 2 3 4 5
1 2 3 4
1 2 3
1 2
1
```

```
n = 5


1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
1 2 3 4
1 2 3
1 2
1
```



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Printing Triangle: *Example*

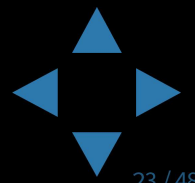
- *Example:* Printing the Triangle:

```
function pringTriangle(n) {
  var line;
  n = +n;

  for (line = 1; line <= n; line += 1) {
    printLine(1, line);
  }

  for (line = n-1; line >= 1; line -= 1) {
    printLine(1, line);
  }

function printLine(start, end) {
  var line = "",
      i;
  start = +start; end = +end;
  for (i = start; i <= end; i += 1){
    line += " " + i;
  }
  console.log(line);
}
```



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Printing Triangle

Demo

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The arguments Object

Access to all function parameters

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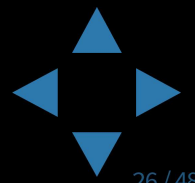
arguments Object

- Every function in JavaScript has an implicit parameter `arguments`
  - It holds information about the function and all the parameters passed to the function
  - No need to be explicitly declared
    - It exists in every function

```
function printArguments() {
  var i;
  for(i in arguments) {
    console.log(arguments[i]);
  }
}
printArguments(1, 2, 3, 4); //1, 2, 3, 4
```



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The arguments Object

- The arguments object is not an array
  - It just has some of the array functionality
- If in need to iterate it, better parse it to an array:

```
function printArguments() {
  var i,
      args;

  args = [].slice.apply(arguments);
  for(i in args) {
    console.log(args[i]);
  }
}

printArguments(1, 2, 3, 4); //1, 2, 3, 4
```

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Returning Values From Functions

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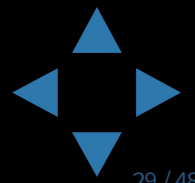
Returning Values from Functions

- Every function in JavaScript returns a value
  - Returns `undefined` implicitly
  - Can be set explicitly
  - The return value can be of any type
    - `Number`, `String`, `Object`, `Function`
    - *Examples:*

```
var head = arr.shift();
var price = getPrice() * quantity * 1.20;
var noValue = arr.sort();
```

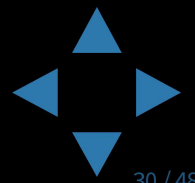



Defining Functions That Return a Value

- Functions can return any type of data:
  - `Number`, `String`, `Object`, etc...
- Use `return` keyword to return a result

```
function multiply (firstNum, secondNum) {
    return firstNum * secondNum;
}

function sum (numbers) {
  var sum = 0, number;
  for(number of numbers){
    sum += number;
  }
  return sum;
}
```



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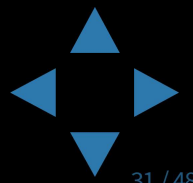
The return Statement

- The return statement:
  - Immediately terminates function's execution
  - Returns specified expression to the caller
- To terminate function execution, use just:

```
return;
```

- Return can be used several times in a function body
  - To return a different value in different cases



Telerik Academy The return Statement: *Example*

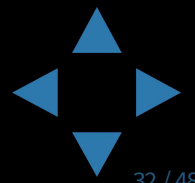
- *Example:* Check if a number is prime:

```
function isPrime(number){
  var divider,
      maxDivider;

  number = +number;
  maxDivider = Math.sqrt(number);

  for(divider = 2; divider <= maxDivider; divider += 1){
    if(number % divider === 0) {
      //Divider found, no need to continue execution;
      return false;
    }
  }

  //All dividers tested and none is found
  //The number is prime
  return true;
}
```

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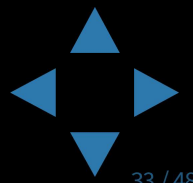
Return Value

Demo



Sum Even Numbers– *Example*

- Calculate the sum of all even numbers in an array

```
function sum(numbers) {
  var number,
    sum = 0;

  for (number of numbers) {
    if (0 === number % 2) {
      sum += number;
    }
  }
  return sum;
}
```

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Sum of Even Numbers

Demo

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Function Scope

Scope of variables and functions

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Function Scope

- Every variable has its scope of usage
  - A scope defines where the variable is accessible
  - Generally there are local and global scope

```
var arr = [1, 2, 3, 4, 5, 6, 7];

function countOccurences (value) {
  var item,
    count = 0;
  for (item of arr) {
    if (item === value) {
      count++;
    }
  }

  return count;
}
```

arr is in the global scope (it is accessible from anywhere)

count is declared inside countOccurences and it can be used only inside it

Try removing the var before count

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Function Scope

Demo

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Function Overloading

Many functions with the same name

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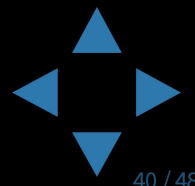
Function Overloading

- JavaScript does not support function overloading
  - i.e. functions with the same name hide each other

```
function print(number) {
  console.log(`Number: ${number}`);
}

function print(number, text) {
  console.log(`Number: ${number}\nText: ${text}`);
}

print(2);
//prints:
//Number: 2
//Text: undefined`
```



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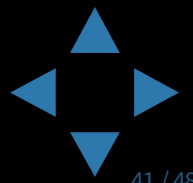
Function Overloading in JavaScript

- Function overloading in JavaScript must be faked
  - i.e. make it look like overloading
- Many ways of fake function overloading exist
  - Different number of parameters
  - Different type of parameters
  - Options parameter (preferred)



Function Overloading: Different Number of Parameters

- Different number of parameters:
  - A simple switch by the length of the arguments

```
function printText (number, text) {
  switch (arguments.length) {
    case 1 : console.log (`Number: ${number}`);
      break;
    case 2 :
      console.log (`Number: ${number}`);
      console.log (`Text: ${text}`);
      break;
  }
}

printText (5); //logs 5
printText (5, "Lorem Ipsum"); //logs 5 and Lorem Ipsum
```

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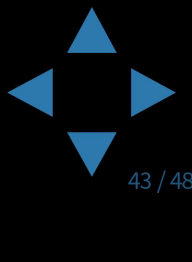
Function Overloading: Different Types of Parameters

- Different type of the parameters:
  - A switch on the type of the parameter

```
function printValue (value) {
  switch (typeof value) {
    case "number" : console.log (`Number: ${value}`); break;
    case "string" : console.log (`String: ${value}`); break;
    case "object" : console.log (`Object: ${value}`); break;
    case "boolean" : console.log (`Number: ${value}`); break;
  }
}

printValue (5);
printValue ("Lorem Ipsum");
printValue ([1, 2, 3, 4]);
printValue (true);
```

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Function Overloading with Default Parameters

- In JavaScript all parameters are optional
  - i.e. functions can be invoked without them
- Yet, there is a reason behind requesting parameters
  - Maybe the function's behavior depends on it?

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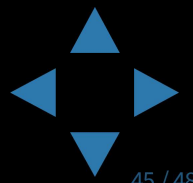
Function Overloading with Default Parameters

- Default parameters are checked in the function body
  - If the parameter is not present - assign a value

```
//only the str parameter is required
function getRandomValue(str, start, end){
  start = start || 0;
  end = end || str.length;
  //function code
}
```

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Function Overloading: Options parameter

- To create functions with options parameter
  - Create the function take a single parameter
  - Each parameter is a property of the options parameter
- *Example:*

```
function getRandomValue(opt) {
  var min = +opt.min || Number.MIN_VALUE;
  var max = +opt.max || Number.MAX_VALUE;

  return (Math.random() * (max - min + 1) + min) | 0;
}

console.log(getRandomValue({min:0, max: 15}));
```