

Ex.No: 8

UIT2602 WEB PROGRAMMING

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CALCULATOR RESTFUL WEB SERVICE

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1. AIM:

The aim of this program is to create a RESTful web service for a calculator application, allowing users to perform arithmetic operations remotely via HTTP requests. The program will utilise AngularJS for the client-side interface and Express.js for the server-side implementation.

2. WEB TOOLS AND METHODOLOGY:

- Node . js: Node.js's asynchronous I/O model.
- Express: Express's minimalist framework for creating server-side applications."
- WebBrowser: To Test The Functionality Of the Website.

3. IMPLEMENTATION AND PROCEDURE:

a. Install Node.js:

- Ensure Node.js installed on the machine.
- Download and install it from the official Node.js website: Node.js Downloads.

b. Set Up Project Directory:

- Create a new directory for your project.
- Inside the project directory, create two files: index.html for the client-side code and server.js for the server-side code.

c. Install Dependencies:

- Run the following command to install the Express.js dependency for your server: `npm install express (cmd)` at project directory.

d. Run the Server:

- In the terminal, while still in the project directory, run the following command to start the Express.js server: `node server.js (cmd)`

e. Access the Calculator App:

- Access the Calculator App.
- Open a web browser and navigate to `http://localhost:3000`.
- This will load the HTML file with the AngularJS code.
- The calculator application interface with input fields for operands, a dropdown for the operator, and a "Calculate" button appears.
- Enter the operands and select an operator, then click the "Calculate" button to perform the calculation.
- The result should be displayed below.

4. SOURCE CODE:

❖ */public/Index.html:*

```
<!DOCTYPE html>
<html lang="en" ng-app="calculatorApp">
<head>
  <meta charset="UTF-8">
  <title>Calculator</title>
  <script
src="https://ajax.googleapis.com/ajax/libs/angularjs/1.8.2/angular.min.js"></sc
```

ript>

```
<script src="calculator.js"></script>
```

```
<style>
```

```
body {
```

```
    font-family: Arial, sans-serif;
```

```
    background-color: #eab676; /* Light gray background */
```

```
    padding: 20px;
```

```
    display: flex;
```

```
    justify-content: center;
```

```
    align-items: center;
```

```
    height: 100vh; /* Make the body full height of the viewport */
```

```
}
```

```
.calculator {
```

```
    background-color: #ffffff; /* White background */
```

```
    border-radius: 10px;
```

```
    padding: 20px;
```

```
    box-shadow: 0 2px 4px rgba(0, 0, 0, 0.1); /* Soft shadow */
```

```
    width: 300px;
```

```
}
```

```
.calculator input[type="number"],
```

```
.calculator select {
```

```
    padding: 8px;
```

```
    margin-right: 10px;
```

```
    border: 1px solid #cccccc; /* Light gray border */
```

```
    border-radius: 5px;
```

```
    font-size: 16px;
```

```
    width: 80px;
```

```
}
```

```
.calculator button {
```

```
    padding: 8px 16px;
```

```
    background-color: #4caf50; /* Green button */
```

```

    color: #ffffff; /* White text */
    border: none;
    border-radius: 5px;
    cursor: pointer;
    font-size: 16px;
}

.calculator button:hover {
    background-color: #45a049; /* Darker green button on hover */
}

.calculator p {
    font-size: 18px;
    margin-top: 10px;
}
</style>
</head>
<body ng-controller="CalculatorController as calcCtrl">
    <div class="calculator">
        <input type="number" ng-model="calcCtrl.firstOperand">
        <select ng-model="calcCtrl.operator">
            <option value="+">+</option>
            <option value="-">-</option>
            <option value="*">*</option>
            <option value="/">/</option>
        </select>
        <input type="number" ng-model="calcCtrl.secondOperand">
        <button ng-click="calcCtrl.calculate()">Calculate</button>
        <p>Result: {{ calcCtrl.answer }}</p>
    </div>
</body>
</html>

```

❖ */public/calculator.js:*

```
angular.module('calculatorApp', [])  
  .controller('CalculatorController', ['$http', function($http) {  
    var self = this;  
    self.firstOperand = 0;  
    self.secondOperand = 0;  
    self.operator = '+';  
    self.answer = '';  
  
    self.calculate = function() {  
      $http.get('/calculate', {  
        params: {  
          first: self.firstOperand,  
          second: self.secondOperand,  
          operator: self.operator  
        }  
      }).then(function(response) {  
        if (response.data.result !== undefined) {  
          self.answer = response.data.result;  
        } else {  
          self.answer = 'Error: ' + response.data.error;  
        }  
      }).catch(function(error) {  
        console.error('Error occurred while calculating:', error);  
        self.answer = 'Error occurred while calculating';  
      });  
    };  
  });
```

```

❖ /server.js:
const express = require('express');
const app = express();
const port = 3000;

// Serve static files from the public directory
app.use(express.static('public'))
// Route handler for GET request to /calculate
app.get('/calculate', (req, res) => {
  const { first, second, operator } = req.query;
  const num1 = parseFloat(first);
  const num2 = parseFloat(second);
  let result;

  switch(operator) {
    case '+':
      result = num1 + num2;
      break;
    case '-':
      result = num1 - num2;
      break;
    case '*':
      result = num1 * num2;
      break;
    case '/':
      result = num1 / num2;
      break;
    default:
      result = 'Invalid operator';
  }

  res.json({ result });
});

app.listen(port, () => {
  console.log(`Server is running on http://localhost:${port}`);
});

```

5. OUTPUT SCREENSHOTS:

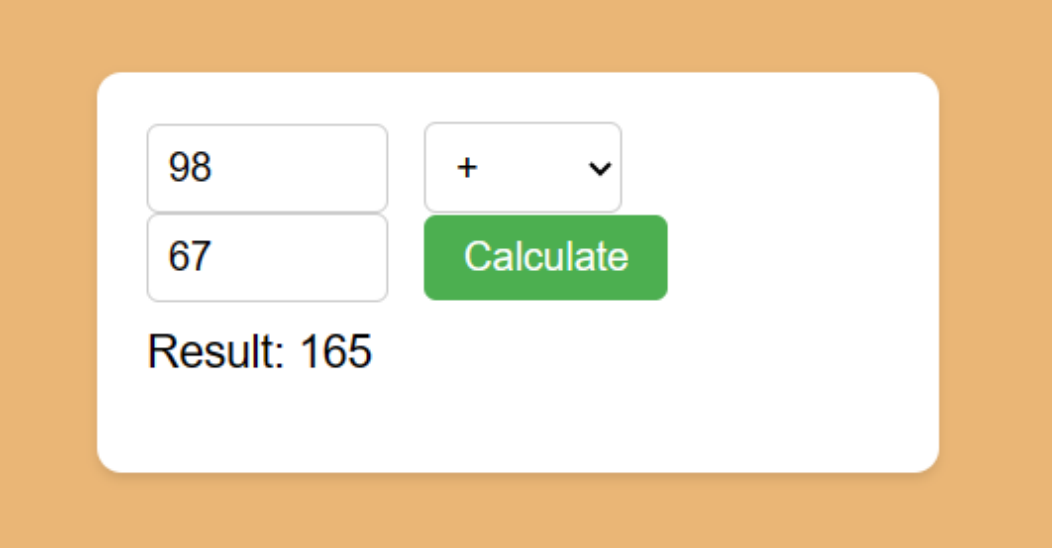
❖ *Install Express :*

```
PS C:\Users\LENOVO\Downloads\Calculator> npm install express
up to date, audited 66 packages in 833ms
12 packages are looking for funding
```

❖ *Run the server:*

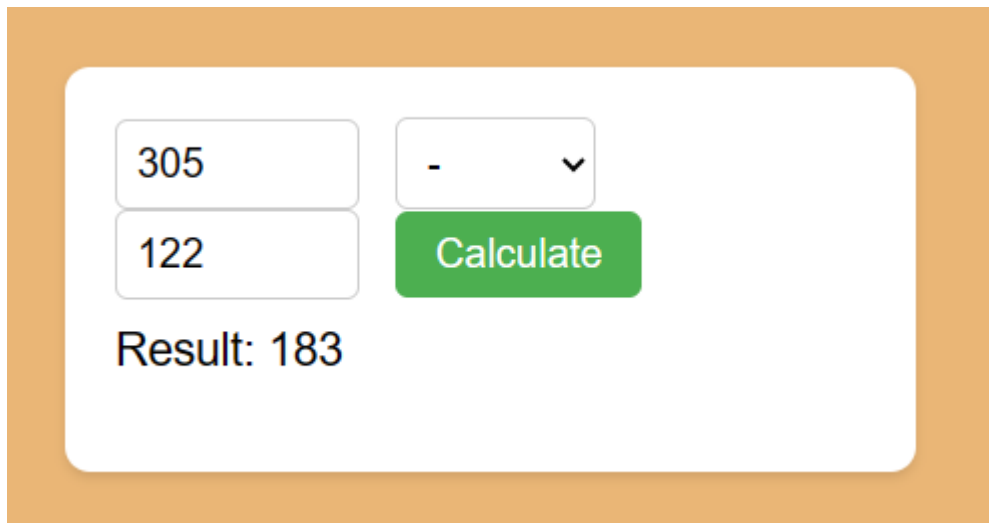
```
PS C:\Users\LENOVO\Downloads\Calculator -1> node server.js
Server is running on http://localhost:3000
```

❖ *Addition:*



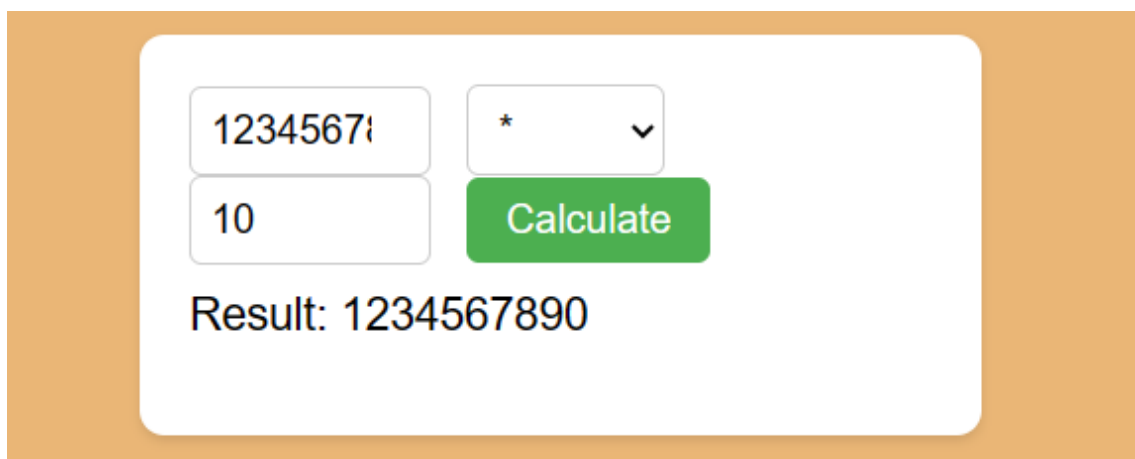
The screenshot shows a web application interface for performing addition. It features two input fields containing the numbers '98' and '67'. To the right of these fields is a dropdown menu with a '+' sign and a downward arrow. Below the input fields is a green 'Calculate' button. The result of the calculation, 'Result: 165', is displayed below the button. The entire interface is set against a light orange background.

❖ *Subtraction:*



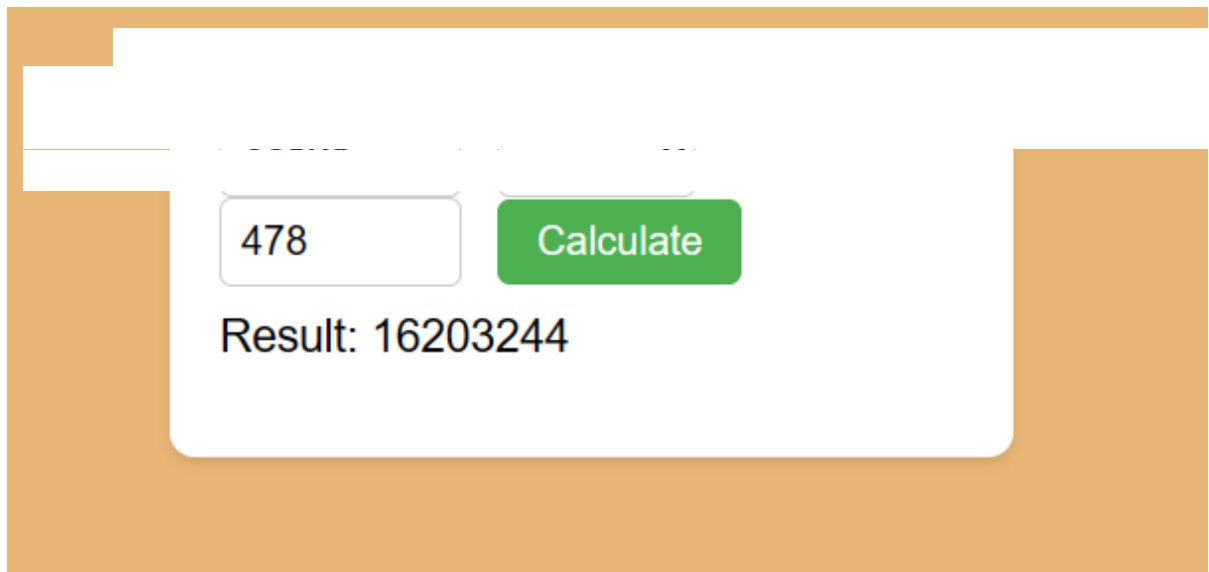
A subtraction calculator interface with an orange background. It features two input fields on the left: the top one contains '305' and the bottom one contains '122'. To the right of these is a dropdown menu showing a minus sign '-' and a downward arrow. Below the input fields is a green 'Calculate' button. At the bottom, the text 'Result: 183' is displayed.

❖ *Multiplication:*



A multiplication calculator interface with an orange background. It features two input fields on the left: the top one contains '12345678' and the bottom one contains '10'. To the right of these is a dropdown menu showing an asterisk '*' and a downward arrow. Below the input fields is a green 'Calculate' button. At the bottom, the text 'Result: 1234567890' is displayed.

❖ *Division:*



A screenshot of a web application interface for performing division. The interface is set against a solid orange background. In the center, there is a white rectangular box with rounded corners. Inside this box, at the top, is a light gray input field containing the number '478'. To the right of the input field is a green rectangular button with the word 'Calculate' in white text. Below the input field and button, the text 'Result: 16203244' is displayed in a black, sans-serif font.

6. CONCLUSION:

Users can input operands and select operators through the user interface, triggering a calculation process handled by the AngularJS controller. On the server side, Express.js routes are configured to handle incoming requests, extract operands and operators, perform the required arithmetic operations, and send back the result to the client. This program provides a seamless and efficient way to perform calculations over the web.