WRITE A PROGRAM USING ANY PROGRAMMING LANGUAGE OF YOUR CHOICE TO DEMONSTRATE THE USE OF WELL FULLY DEFINED CALCULATOR

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CREATING A SCIENTIFIC CALCULATOR

Developing a web-based scientific calculator application, involves several steps. Here is the guide used developing a web-based scientific calculator that includes basic arithmetic operations, trigonometric functions, square roots, logarithms (base 10 and natural log), exponentiation, and factorials using HTML, CSS, and JavaScript..

STEP-BY-STEP CREATION OF AN ENHANCED WEB-BASED SCIENTIFIC CALCULATOR

1 Define Requirements and Features

- Include basic arithmetic operations, trigonometric functions (sine, cosine, tangent), square root, logarithms (log and ln), exponentiation, and factorials.

2. Design the User Interface

- Plan the layout to include buttons for the new scientific functions.
- Design the display area to show the current input and result.

3. Set-Up the Development Environment

- Use a code editor like Visual Studio Code, Sublime Text, or any other preferred editor.
- Create a new project folder and add HTML, CSS, and JavaScript files.

4. Implement HTML Structure

- Create the HTML structure for the calculator, including buttons and display areas.

```
html
<!DOCTYPE html>
<html lang="en">
<head>
   <meta charset="UTF-8">
   <meta name="viewport" content="width=device-width, initial-scale=1.0">
   <title>Web-Based Scientific Calculator</title>
   <link rel="stylesheet" href="styles.css">
</head>
<body>
   <div class="calculator">
   <h2>GROUP F ( Scientific Calculator) </h2>
      <div class="display" id="display"></div>
      <div class="buttons">
         <button class="btn" onclick="clearDisplay()">C</button>
         <button class="btn" onclick="deleteLast()">DEL</button>
```

```
        <button class="btn" onclick="appendOperator('/')">/</button>
        <button class="btn" onclick="appendOperator('*')">*</button>
        <button class="btn" onclick="appendNumber(7)">7</button>
        <button class="btn" onclick="appendNumber(8)">8</button>
        <button class="btn" onclick="appendNumber(9)">9</button>
        <button class="btn" onclick="appendOperator('-')">-</button>
        <button class="btn" onclick="appendNumber(4)">4</button>
        <button class="btn" onclick="appendNumber(5)">5</button>
        <button class="btn" onclick="appendNumber(6)">6</button>
        <button class="btn" onclick="appendOperator('+')">+</button>
        <button class="btn" onclick="appendNumber(1)">1</button>
        <button class="btn" onclick="appendNumber(2)">2</button>
        <button class="btn" onclick="appendNumber(3)">3</button>
        <button class="btn equal" onclick="calculateResult()">=</button>
        <button class="btn" onclick="appendNumber(0)">0</button>
        <button class="btn" onclick="appendDot()">.</button>
        <button class="btn" onclick="appendFunction('Math.sqrt')">√</button>
        <button class="btn" onclick="appendFunction('Math.sin')">sin</button>
        <button class="btn" onclick="appendFunction('Math.cos')">cos</button>
        <button class="btn" onclick="appendFunction('Math.tan')">tan</button>
        <button class="btn" onclick="appendFunction('Math.log10')">log</button>
        <button class="btn" onclick="appendFunction('Math.log')">ln</button>
        <button class="btn" onclick="appendOperator('^')">^</button>
        <button class="btn" onclick="calculateFactorial()">!</button>
      </div>
    </div>
    <script src="script.js"></script>
</body>
</html>
```

5. Style the Calculator with CSS

- Add styles to make the calculator visually appealing and user-friendly.

css

```
/* styles.css */
body {
    display: flex;
    justify-content: center;
    align-items: center;
    height: 100vh;
    background-color: #f0f0f0;
    margin: 0;
    font-family: Arial, sans-serif;
}

.calculator {
    border: 2px solid #333;
    border-radius: 10px;
    padding: 20px;
    background-color: #fff;
```

```
    box-shadow: 0 0 10px rgba(0, 0, 0, 0.1);
}

.display {
    font-size: 2em;
    margin-bottom: 10px;
    padding: 10px;
    border: 1px solid #ccc;
    text-align: right;
    background-color: #e9e9e9;
    border-radius: 5px;
    min-height: 40px;
}

.buttons {
    display: grid;
    grid-template-columns: repeat(4, 1fr);
    gap: 10px;
}

.btn {
    font-size: 1.5em;
    padding: 15px;
    border: none;
    border-radius: 5px;
    background-color: #f1f1f1;
    cursor: pointer;
    transition: background-color 0.2s;
}

.btn:hover {
    background-color: #ddd;
}

.equal {
    grid-column: span 2;
    background-color: #ff9500;
    color: #fff;
}

.equal:hover {
    background-color: #e08500;
}
```

6. Implement JavaScript Functionality

- Write JavaScript functions to handle button clicks, perform calculations, and update the display.

javascript

```
// script.js
let display = document.getElementById('display');
let currentInput = '';
let resultDisplayed = false;

function appendNumber(number) {
    if (resultDisplayed) {
        currentInput = '';
        resultDisplayed = false;
    }
    currentInput += number;
    updateDisplay();
}

function appendOperator(operator) {
    if (resultDisplayed) {
        resultDisplayed = false;
    }
    if (operator === '^') {
        currentInput += '**';
    } else {
        currentInput += ` ${operator} `;
    }
    updateDisplay();
}

function appendFunction(func) {
    if (resultDisplayed) {
        currentInput = '';
        resultDisplayed = false;
    }
    currentInput += ` ${func}(`;
    updateDisplay();
}

function appendDot() {
    if (resultDisplayed) {
        currentInput = '';
        resultDisplayed = false;
    }
    currentInput += '.';
    updateDisplay();
}

function clearDisplay() {
    currentInput = '';
    updateDisplay();
}

function deleteLast() {
    currentInput = currentInput.trim().slice(0, -1);
    updateDisplay();
}

function calculateResult() {
```

```
    try {
        currentInput = currentInput.replace(/√/g, 'Math.sqrt');
        let result = eval(currentInput);
        currentInput = result.toString();
        resultDisplayed = true;
        updateDisplay();
    } catch (e) {
        currentInput = 'Error';
        updateDisplay();
    }
}

function calculateFactorial() {
    if (resultDisplayed) {
        resultDisplayed = false;
    }
    let num = parseInt(currentInput);
    if (isNaN(num)) {
        currentInput = 'Error';
    } else {
        currentInput = factorial(num).toString();
    }
    resultDisplayed = true;
    updateDisplay();
}

function factorial(n) {
    if (n === 0 || n === 1) return 1;
    return n * factorial(n - 1);
}

function updateDisplay() {
    display.innerText = currentInput;
}
```

7. Test and Debug

- Open the HTML file in a web browser and test all functionalities to ensure they work as expected.
- Debug any issues such as incorrect calculations or input handling errors.

8. Optimize and Enhance

- Optimize the code for better performance and responsiveness.
- Consider adding additional features like parentheses for grouping operations if desired.

9. Documentation and User Guide

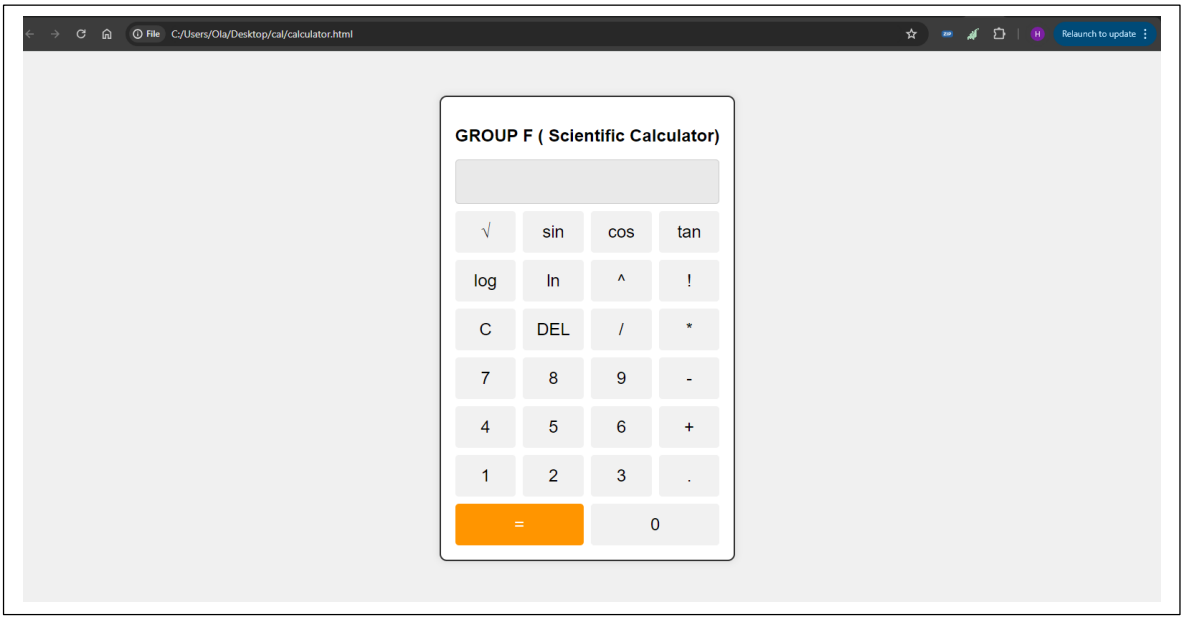
- Provide documentation on how to use the calculator.
- Include a user guide to explain each function and how to perform calculations.

10. Deployment

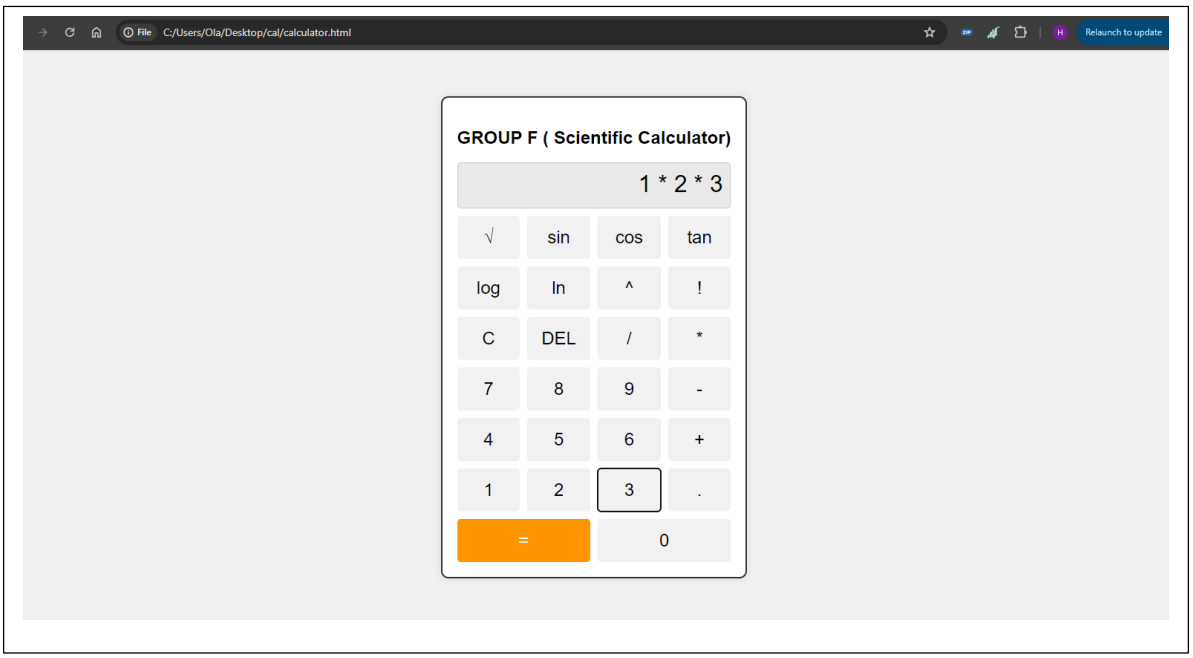
- Host the web-based calculator on a web server or use services like GitHub Pages for deployment.
- Share the link with users to access the calculator online.

By following these steps, you can create a functional and user-friendly web-based scientific calculator with basic arithmetic operations, trigonometric functions, square roots, logarithms, exponentiation, and factorials using HTML, CSS, and JavaScript.

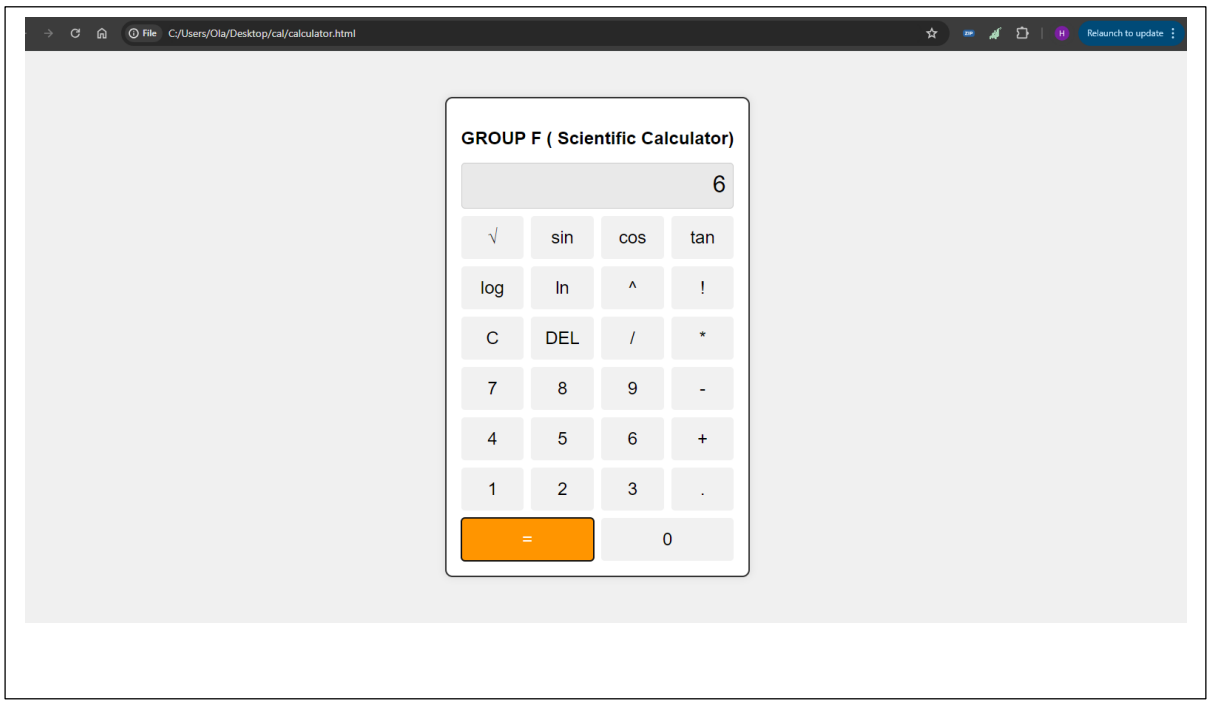
GRAPHIC USER INTERFACE



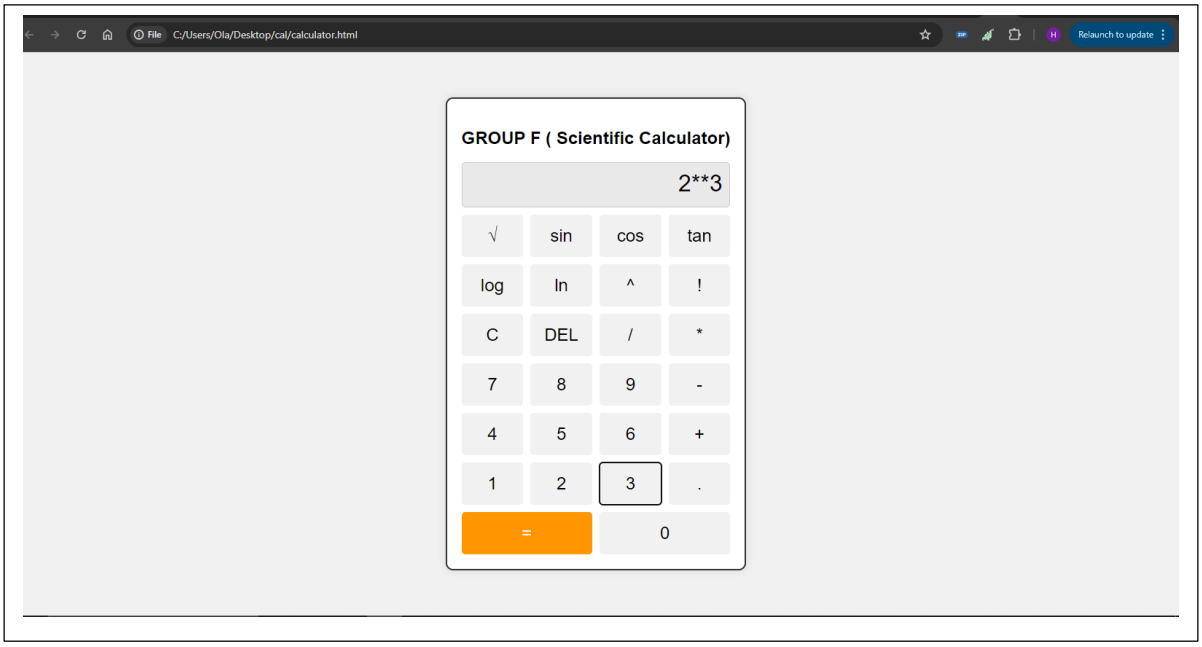
ARTHIMETRIC OPERATIONS



OUTPUT



SQUARE OPERATION



TRIGONOMETRIC FUNCTIONS