RAND Corporated

GUI Boolean Calculator

User's Manual

Version 2.0

Revision History

Date	Version	Description	Author
5/1/2024	1.0	started manual	Jahnvi Maddila
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Table of Contents

1. Purpose

This user manual details the general use, its features, and examples of how to use this software. This manual also contains a glossary of terms, frequently asked questions, and troubleshooting tips to help users further understand the software.

2. Introduction

Welcome to the GUI Boolean Calculator, a sophisticated software tool designed to evaluate Boolean expressions. This application is intended to aid users in performing logical operations with ease, leveraging a graphical user interface to provide a more intuitive and fun interaction. The calculator supports a variety of logical operators and functions, ensuring robust functionality for educational, professional, or personal use.

Features:

- Evaluate Boolean expressions using standard logical operators.
- User-friendly graphical interface for easy operation.
- Immediate feedback on the validity of expressions.
- Detailed error messages to help diagnose issues with input expressions.

Installation:

The calculator can be set up with minimal steps involving downloading the software, installing necessary dependencies, and running it on your local machine. Instructions for both the setup and operation are provided below to get you started without any hassle.

3. Getting started

This section will guide you through using the GUI Boolean Calculator from start to finish. Follow these steps to begin evaluating Boolean expressions:

GUI Boolean Calculator:

1. ***Installation and Setup***
    - Firstly make sure you have Node installed in your machine and added to PATH.
    - Clone or download the repository from GitHub.
    - Navigate to the *gui-calc* directory in your terminal or command prompt.
    - Run *npm install* to install all necessary dependencies. Further, ensure server modules like express, axios, and cors are installed by running *npm install express axios cors*.
2. ***Launching the Application***
    - Open two terminals in the *gui-calc* directory.
    - In the first terminal, execute *npm start* to launch the frontend. This will also display the address

(typically localhost) where the calculator is accessible.

- In the second terminal, start the backend by running *node server.js*. Do not close this terminal.

3. ***Using the Calculator***
    - Open a web browser and navigate to the provided localhost address.
    - Enter Boolean expressions into the calculator's input field. The calculator supports logical operators such as AND (&), OR (|), NOT (!), XOR ($), and NAND (@), as well as parentheses for grouping.
    - Press the evaluate or calculate button to see the result. The calculator will display either True or False depending on the evaluation of the expression.
    - If there's an error in your expression, an error message will appear, helping you identify and correct the mistake.
4. ***Interpreting Results***
    - Results are displayed directly below the input field. True or False indicates the outcome of the Boolean expression based on the logical evaluation.
    - For complex expressions involving multiple operators, ensure proper use of parentheses to clarify precedence and intended logic.
5. ***Exiting the Application***
    - To exit, simply close your browser or stop the backend server by pressing *Ctrl+C* in the terminal running back-end (node server.js) and the terminal running front-end (npm start).

Terminal Calculator

1. ***Installation and Setup***
    - Make sure you have G++ compiler working.
    - Navigate to the *shivansh-src* directory where you've cloned or downloaded the repository.
    - Compile the calculator by running the command: g++ -o calculator calculator.cpp.
2. ***Launching the Application***
    - Execute the compiled binary by running ./calculator in the terminal.
3. ***Using the Calculator***
    - After launching, the program will prompt you to enter a Boolean expression.
    - Input your Boolean expression using logical operators like AND (&), OR (|), NOT (!), XOR ($), and NAND (@).
    - Press enter to evaluate the expression.
    - The result will be displayed immediately, showing either True or False based on the evaluation.
4. ***Exiting the Application***

- To exit the Terminal Calculator, you can enter q or simply close the terminal window.

By following these detailed steps, you can effectively use the GUI Boolean Calculator to evaluate a wide range of

Boolean expressions, making logical computations both simple and accurate.

4. Advanced features

The graphical user interface (GUI) is a key feature of this calculator. It provides a visually appealing and intuitive environment for users to input and evaluate Boolean expressions. The UI is designed to make interaction seamless, with clear buttons for operation and a responsive layout that adjusts to various screen sizes.

5. Troubleshooting

This section outlines common issues you may encounter while using the GUI Boolean Calculator and provides solutions to resolve them effectively:

1. ***Application Does Not Start***
    - *Problem:* The application fails to launch after running npm start or node server.js.
    - *Solution*: Ensure all dependencies are installed correctly by re-running npm install. Check the terminal for any error messages regarding missing modules and install any that are missing.
2. ***Expression Not Evaluated***
    - *Problem*: The calculator does not return any result after an expression is entered.
    - *Solution*: Ensure the expression is correctly formatted according to the Boolean logic syntax. Check for unbalanced parentheses, missing operators, and unsupported symbols.
3. ***Server Connection Issues***
    - *Problem*: The front end cannot connect to the backend server.
    - *Solution*: Ensure that both terminals are running and that no firewall or network settings are blocking the connection. Verify that the backend server is running on the correct port as shown in the terminal.
4. ***Unexpected Results***
    - *Problem*: The results of the expression are not as expected.
    - *Solution*: Verify the precedence of operators in your expression. Use parentheses to define the order of operations explicitly.

6. Examples

This section provides practical examples to demonstrate how to use the GUI Boolean Calculator for evaluating different types of Boolean expressions:

1. ***Simple AND Operation***
    - Expression: T&F
    - Result: False

2. ***Combination of Operators***
    - Expression: (T|F)& (!F)
    - Result: True
3. ***Using XOR***
    - Expression: T$F
    - Result: True
4. ***Nested Expressions***
    - Expression: !((T|F)& (F|!F))
    - Result: False

These examples illustrate how to format and enter Boolean expressions into the calculator and interpret the results.

7. Glossary of terms

Boolean Expression: A combination of Boolean values, operators, and sometimes variables, that evaluates to either true or false.

Operators: Symbols or words that denote operations to be performed. Common Boolean operators include AND (&), OR (|), NOT (!), XOR ($), and NAND (@).

Frontend: The part of the calculator the user interacts with via a web browser.

Backend: Server-side component that processes data and handles business logic.

Dependencies: External libraries or packages that the software relies on to function.

8. FAQ

Q: Can the calculator handle complex Boolean expressions?
A: Yes, the calculator can evaluate complex Boolean expressions involving multiple operators and nested parentheses.

Q: What should I do if the calculator continuously shows 'loading'?
A: This issue may be due to a backend server problem. Ensure that the server is running correctly, and there are no error messages in the server terminal.

Q: Are there any limitations on the length of expressions?
A: The calculator handles most reasonable expression lengths. However, extremely long expressions might slow down the evaluation process.

Q: Can I use the calculator on any web browser?

A: The GUI Boolean Calculator is designed to work on modern web browsers like Chrome, Firefox, Safari, and Edge. Ensure your browser is updated to the latest version for optimal performance.