HL Group

Boolean Logic Simulator in C++

Test Cases

Version <1.1>

Revision History

Date	Version	Description	Author
04/28/24	1.0	Initial Template Completed	Riley England
05/02/24	1.1	Adjusted Test Cases	Riley England

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Test Cases

1. Purpose

The purpose of this document is to define and describe the test cases for the Boolean Logic Simulator in C++. This simulator evaluates various boolean expressions using operators NOT, OR, AND, XOR, and NAND. The document outlines specific test scenarios to verify the correctness and functionality of the simulator under different conditions and inputs. The aim is to ensure that the simulator is robust, reliable, and behaves as expected according to the specified requirements.

2. Test case identifier

Each test case is uniquely identified using a prefix and sequential number to ensure easy reference. The identifiers are:

- **SE:** Single Expression Test (e.g., SE-1)
- **NOT:** NOT Operator Test (e.g., NOT-1)
- **OR:** OR Operator Test (e.g., OR-1)
- **AND:** AND Operator Test (e.g., AND-1)
- **XOR:** XOR Operator Test (e.g., XOR-1)
- **NAND:** NAND Operator Test (e.g., NAND-1)
- **FULL:** Combined Operators Test (e.g., FULL-1)
- **ERR:** Error Handling Test (e.g., ERR-1)
- **P:** Provided Test (e.g., P-1)
- **PI:** Provided Invalid Test (e.g., PI-1)

3. Test item

Test Case ID	Test Case Description	Test Data	Expected Results	Actual Results	Pass/Fail Status
SE-1	Evaluate a single True	T	T	T	Pass
SE-2	Evaluate a single False	F	F	F	Pass
NOT-1	Evaluate a basic 'NOT'	!T	F	F	Pass
NOT-2	Evaluate a basic 'NOT'	!F	T	T	Pass
OR-1	Evaluate a basic 'OR'	T|T	T	T	Pass
OR-2	Evaluate a basic 'OR'	T|F	T	T	Pass
OR-3	Evaluate a basic 'OR'	F|T	T	T	Pass
OR-4	Evaluate a basic 'OR'	F|F	F	F	Pass
OR-5	Evaluate multiple 'OR' statements	T|T|T	T	T	Pass

OR-6	Evaluate multiple 'OR' statements	T|F|T	T	T	Pass
OR-7	Evaluate multiple 'OR' statements	F|F|T	T	T	Pass
OR-8	Evaluate multiple 'OR' statements	F|F|F	F	F	Pass
AND-1	Evaluate a basic 'AND'	T&T	T	T	Pass
AND-2	Evaluate a basic 'AND'	T&F	F	F	Pass
AND-3	Evaluate a basic 'AND'	F&F	F	F	Pass
AND-4	Evaluate a basic 'AND'	!(F&T)	F	F	Pass
AND-5	Evaluate multiple 'AND' statements	T&T&T	T	T	Pass
AND-6	Evaluate multiple 'AND' statements	T&F&T	F	F	Pass
AND-7	Evaluate multiple 'AND' statements	F&F&F	F	F	Pass
AND-8	Evaluate multiple 'AND' statements	!(T&F&T)	F	F	Pass
XOR-1	Evaluate a basic 'XOR'	T$T	F	F	Pass
XOR-2	Evaluate a basic 'XOR'	T$F	T	T	Pass
XOR-3	Evaluate a basic 'XOR'	F$T	T	T	Pass
XOR-4	Evaluate a basic 'XOR'	F$F	F	F	Pass
XOR-5	Evaluate multiple 'XOR' statements	TTT	T	T	Pass
XOR-6	Evaluate multiple 'XOR' statements	TFT	F	F	Pass

XOR-7	Evaluate multiple 'XOR' statements	TFF	T	T	Pass
XOR-8	Evaluate multiple 'XOR' statements	FFF	F	F	Pass
NAND-1	Evaluate a basic 'NAND'	T@T	F	F	Pass
NAND-2	Evaluate a basic 'NAND'	T@F	T	T	Pass
NAND-3	Evaluate a basic 'NAND'	F@T	T	T	Pass
NAND-4	Evaluate a basic 'NAND'	F@F	T	T	Pass
NAND-5	Evaluate multiple 'NAND' statements	T@T@T	F	F	Pass
NAND-6	Evaluate multiple 'NAND' statements	T@F@T	F	F	Pass
NAND-7	Evaluate multiple 'NAND' statements	T@F@F	T	T	Pass
NAND-8	Evaluate multiple 'NAND' statements	F@F@F	T	T	Pass
FULL-1	Evaluate statement with both 'AND' and 'OR' operators	T|F&T	T	T	Pass
FULL-2	Evaluate statement with both 'AND' and 'OR' operators	(T|F)&F	F	F	Pass
FULL-3	Evaluate statement with both 'AND' and 'OR' operators	F&T|T&F	F	F	Pass
FULL-4	Evaluate statement with both 'AND' and 'OR' operators	T$(F|T)	F	F	Pass

FULL-5	Evaluate statement with both 'AND' and 'OR' operators	(T$F)&(F|T)	T	T	Pass
FULL-6	Evaluate statement with both 'AND' and 'OR' operators	((T|F)&(T))|(F&T)	T	T	Pass
FULL-7	Evaluate statement with both 'AND' and 'OR' operators	T&F|F&T|T	F	F	Pass
FULL-8	Evaluate statement with both 'AND' and 'OR' operators	T&F|F$T|T	T	T	Pass
FULL-9	Evaluate statement with 'AND', 'OR', and 'NOT' operators	!F&(T|F)	T	T	Pass
FULL-10	Evaluate statement with 'AND', 'OR', and 'NOT' operators	!(T&F)|(F$T)	T	T	Pass
FULL-11	Evaluate statement with 'AND', 'OR', and 'NOT' operators	!T|(F&(!F))	F	F	Pass
FULL-12	Evaluate statement with 'AND', 'OR', and 'NOT' operators	(!(F|T))&(F|T)	F	F	Pass
FULL-13	Evaluate statement with 'AND', 'OR', and 'XOR' operators	T$(T&F)|(T&T)	T	T	Pass
FULL-14	Evaluate statement with 'AND', 'OR', and 'XOR' operators	(T|F)$(T&F)	T	T	Pass
FULL-15	Evaluate statement with 'AND', 'OR', 'NOT', and 'XOR' operators	!(T&F)|(F$T)	T	T	Pass

FULL-16	Evaluate statement with 'AND', 'OR', 'NOT', and 'XOR' operators	!(F&F)&(T|F$F)	T	T	Pass
FULL-17	Evaluate statement with 'AND', 'OR', 'XOR', and 'NAND' operators	(T&F)|(T$F)@(F|F)	T	T	Pass
FULL-18	Evaluate statement with 'AND', 'OR', 'XOR', and 'NAND' operators	T&(F@(T|T$F))	T	T	Pass
FULL-19	Evaluate statement all avaliable operators.	!T&(F@F)|(F$F)	F	F	Pass
FULL-20	Evaluate statement with multiple operators.	!(T&F)&(T|F)|(T@F)	T	T	Pass
ERR-1	Evaluate improper inputs: Missing parenthesis	(T&F	Error: Missing closing parenthesis	Error: Missing closing parenthesis	Pass
ERR-2	Evaluate improper inputs: Improper parentheses	(((((((T&F))$T))))	Error: Missing closing parenthesis	Error: Missing closing parenthesis	Pass
ERR-3	Evaluate improper inputs: Two operations in a row	T&|F	Error: Consecutive operators detected: '&' followed by '|'	Error: Consecutive operators detected: '&' followed by '|'	Pass
ERR-4	Evaluate improper inputs: Missing operand	!T&!F	Error: Consecutive operators detected: '&' followed by '!'	Error: Consecutive operators detected: '&' followed by '!'	Pass
ERR-5	Evaluate improper inputs: Missing operator	TT	Error: Invalid expression: Unresolved operands or operators	Error: Invalid expression: Unresolved operands or operators	Pass

ERR-6	Evaluate improper inputs: Missing operator	T(F&F)	Error: Invalid expression: Unresolved operands or operators	Error: Invalid expression: Unresolved operands or operators	Pass
ERR-7	Evaluate improper inputs: invalid characters	a	Error: Missing truth value for variable 'a'	Error: Missing truth value for variable 'a'	Pass
ERR-8	Evaluate improper inputs: invalid characters	1&0	Error: Unrecognized operator symbol: '1'	Error: Unrecognized operator symbol: '1'	Pass
ERR-9	Evaluate improper inputs: invalid characters	T^T	Error: Unrecognized operator symbol: '^'	Error: Unrecognized operator symbol: '^'	Pass
ERR-10	Evaluate improper inputs: invalid characters	A^T	Error: Missing truth value for variable 'A'	Error: Missing truth value for variable 'A'	Pass
TT-1	Print truth tables	2 (code in menu)	truth tables for logical and, or, not, nand, and xor	truth tables for logical and, or, not, nand, and xor	Pass
P-1	Provided Test Case #1	(T|F)$F	T	T	Pass
P-2	Provided Test Case #2	!(T&T)	F	F	Pass
P-3	Provided Test Case #3	(F@T)|(T@F)	T	T	Pass
P-4	Provided Test Case #4	(T$T)&F	F	F	Pass
P-5	Provided Test Case #5	(!F)|(!T)	T	T	Pass
P-6	Provided Test Case #6	(((((T | F) & F) | (T & (T | F))) @ (T @ T)) $ (! (T | F)))	T	T	Pass
P-7	Provided Test Case #7	((F $ ((T | F) & (F @ (T | F)))) | (T $ (T & F)))	T	T	Pass
P-8	Provided Test Case #8	(((! (T $ F)) & (T @ T)) | ((F | T) & (T $ T)))	F	F	Pass

P-9	Provided Test Case #9	(((T @ T) $ (F @ T)) | ((!T) & (T | (!T))))	T	T	Pass
P-10	Provided Test Case #10	((F @ T) $ (T | (F & F))) & (T & (T @ (!T)))	F	F	Pass
PI-1	Provided Invalid Expression #1	!&T	Error: Consecutive operators detected: '!' followed by '&'	Error: Consecutive operators detected: '!' followed by '&'	Pass
PI-2	Provided Invalid Expression #2	T?T	Error: Unrecognized operator symbol: '?'	Error: Unrecognized operator symbol: '?'	Pass
PI-3	Provided Invalid Expression #3	(T|	Error: Missing closing parenthesis	Error: Missing closing parenthesis	Pass
PI-4	Provided Invalid Expression #4	T = !(T&T)	Error: Variable defined in terms of itself	Error: Variable defined in terms of itself	Pass
PI-5	Provided Invalid Expression #5		Error: No operands or operators present	Error: No operands or operators present	Pass
PI-6	Provided Invalid Expression #6	T&&&F	Error: Consecutive operators detected: '&' followed by '&'	Error: Consecutive operators detected: '&' followed by '&'	Pass
PI-7	Provided Invalid Expression #7	X|Y	Error: Missing truth value for variable 'X'	Error: Missing truth value for variable 'X'	Pass
PI-8	Provided Invalid Expression #8	T!	Error: NOT operator applied after an operand	Error: NOT operator applied after an operand	Pass
PI-9	Provided Invalid Expression #9	a&b	Error: Missing truth value for variable 'a'	Error: Missing truth value for variable 'a'	Pass