Test Results

Test Game

********* Start testing of TestGame *********

Config: Using QtTest library 6.9.0, Qt 6.9.0 (x86_64-little_endian-llp64 shared (dynamic) release build; by GCC 13.1.0), windows 10

PASS   : TestGame::initTestCase()

PASS   : TestGame::testInitialState()

PASS   : TestGame::testMakeMove()

PASS   : TestGame::testInvalidMoves()

PASS   : TestGame::testSwitchPlayer()

PASS   : TestGame::testCheckWin(horizontal_top)

PASS   : TestGame::testCheckWin(horizontal_middle)

PASS   : TestGame::testCheckWin(horizontal_bottom)

PASS   : TestGame::testCheckWin(vertical_left)

PASS   : TestGame::testCheckWin(vertical_middle)

PASS   : TestGame::testCheckWin(vertical_right)

PASS   : TestGame::testCheckWin(diagonal_main)

PASS   : TestGame::testCheckWin(diagonal_anti)

PASS   : TestGame::testCheckWin(no_win)

PASS   : TestGame::testCheckDraw()

PASS   : TestGame::testGetBoardValue()

PASS   : TestGame::testGetBoardStateAsString()

PASS   : TestGame::testSetAIDifficulty()

PASS   : TestGame::testAIMovesEasy()

PASS   : TestGame::testAIMovesHard()

PASS   : TestGame::testAIMovesPerfect()

PASS   : TestGame::testEvaluateBoard()

PASS   : TestGame::testBuildGameTree()

PASS   : TestGame::testMinimaxTree()

PASS   : TestGame::cleanupTestCase()

Totals: 25 passed, 0 failed, 0 skipped, 0 blacklisted, 257ms

********* Finished testing of TestGame *********

Test User

********* Start testing of TestUser *********

Config: Using QtTest library 6.9.0, Qt 6.9.0 (x86_64-little_endian-llp64 shared (dynamic) release build; by GCC 13.1.0), windows 11

PASS   : TestUser::initTestCase()

PASS   : TestUser::testInitialState()

User registered successfully!

PASS   : TestUser::testSignup()

PASS   : TestUser::testLogin()

PASS   : TestUser::testLoginFailure()

PASS   : TestUser::testLogout()

User registered successfully!

PASS   : TestUser::testDuplicateSignup()

PASS   : TestUser::cleanupTestCase()

Totals: 8 passed, 0 failed, 0 skipped, 0 blacklisted, 2797ms

********* Finished testing of TestUser *********

Test DB

********* Start testing of TestDBManager *********

Config: Using QtTest library 6.9.0, Qt 6.9.0 (x86_64-little_endian-llp64 shared (dynamic) release build; by GCC 13.1.0), windows 11

PASS   : TestDBManager::initTestCase()

PASS   : TestDBManager::testSingleton()

PASS   : TestDBManager::testAddUser()

PASS   : TestDBManager::testCheckUserCredentials()

PASS   : TestDBManager::testUsernameExists()

PASS   : TestDBManager::testSaveGameRecord()

PASS   : TestDBManager::testGetGameRecords()

PASS   : TestDBManager::cleanupTestCase()

Totals: 8 passed, 0 failed, 0 skipped, 0 blacklisted, 26ms

********* Finished testing of TestDBManager *********

TestGameHistory

Config: Using QtTest library 6.9.0, Qt 6.9.0 (x86_64-little_endian-llp64 shared (dynamic) release build; by GCC 13.1.0), windows 10

PASS   : TestGameHistoryModel::initTestCase()

PASS   : TestGameHistoryModel::testInitialState()

PASS   : TestGameHistoryModel::testLoadHistory()

PASS   : TestGameHistoryModel::testAddGameRecord()

PASS   : TestGameHistoryModel::testModelData()

PASS   : TestGameHistoryModel::cleanupTestCase()

Totals: 6 passed, 0 failed, 0 skipped, 0 blacklisted, 49ms

Test Performance

********* Start testing of TestPerformance *********

Config: Using QtTest library 6.9.0, Qt 6.9.0 (x86_64-little_endian-llp64 shared (dynamic) release build; by GCC 13.1.0), windows 10

QDEBUG : TestPerformance::initTestCase() === Starting Performance Test Suite ===

QDEBUG : TestPerformance::initTestCase() System Information:

QDEBUG : TestPerformance::initTestCase() - Qt Version: 6.9.0

QDEBUG : TestPerformance::initTestCase() - Thread Count: 12

QDEBUG : TestPerformance::initTestCase() - Application PID: 9384

PASS   : TestPerformance::initTestCase()

QDEBUG : TestPerformance::benchmarkAIMoveEasy() Easy AI Move benchmark completed

QDEBUG : TestPerformance::benchmarkAIMoveEasy() Easy AI Move benchmark completed

QDEBUG : TestPerformance::benchmarkAIMoveEasy() Easy AI Move benchmark completed

QDEBUG : TestPerformance::benchmarkAIMoveEasy() Easy AI Move benchmark completed

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QDEBUG : TestPerformance::benchmarkAIMoveEasy() Easy AI Move benchmark completed

QDEBUG : TestPerformance::benchmarkAIMoveEasy() Easy AI Move benchmark completed

QDEBUG : TestPerformance::benchmarkAIMoveEasy() Easy AI Move benchmark completed

PASS   : TestPerformance::benchmarkAIMoveEasy()

RESULT : TestPerformance::benchmarkAIMoveEasy():

   0.0020 msecs per iteration (total: 66, iterations: 32768)

QDEBUG : TestPerformance::benchmarkAIMoveMedium() Medium AI Move benchmark completed

QDEBUG : TestPerformance::benchmarkAIMoveMedium() Medium AI Move benchmark completed

QDEBUG : TestPerformance::benchmarkAIMoveMedium() Medium AI Move benchmark completed

QDEBUG : TestPerformance::benchmarkAIMoveMedium() Medium AI Move benchmark completed

QDEBUG : TestPerformance::benchmarkAIMoveMedium() Medium AI Move benchmark completed

QDEBUG : TestPerformance::benchmarkAIMoveMedium() Medium AI Move benchmark completed

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QDEBUG : TestPerformance::benchmarkAIMoveMedium() Medium AI Move benchmark completed

QDEBUG : TestPerformance::benchmarkAIMoveMedium() Medium AI Move benchmark completed

QDEBUG : TestPerformance::benchmarkAIMoveMedium() Medium AI Move benchmark completed

PASS   : TestPerformance::benchmarkAIMoveMedium()

RESULT : TestPerformance::benchmarkAIMoveMedium():

   0.0027 msecs per iteration (total: 90, iterations: 32768)

QDEBUG : TestPerformance::benchmarkAIMoveHard() Hard AI Move benchmark completed

QDEBUG : TestPerformance::benchmarkAIMoveHard() Hard AI Move benchmark completed

QDEBUG : TestPerformance::benchmarkAIMoveHard() Hard AI Move benchmark completed

QDEBUG : TestPerformance::benchmarkAIMoveHard() Hard AI Move benchmark completed

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QDEBUG : TestPerformance::benchmarkAIMoveHard() Hard AI Move benchmark completed

QDEBUG : TestPerformance::benchmarkAIMoveHard() Hard AI Move benchmark completed

PASS   : TestPerformance::benchmarkAIMoveHard()

RESULT : TestPerformance::benchmarkAIMoveHard():

    0.0015 msecs per iteration (total: 52, iterations: 32768)

QDEBUG : TestPerformance::benchmarkAIMoveImpossible() Impossible AI Move benchmark completed

QDEBUG : TestPerformance::benchmarkAIMoveImpossible() Impossible AI Move benchmark completed

QDEBUG : TestPerformance::benchmarkAIMoveImpossible() Impossible AI Move benchmark completed

QDEBUG : TestPerformance::benchmarkAIMoveImpossible() Impossible AI Move benchmark completed

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QDEBUG : TestPerformance::benchmarkAIMoveImpossible() Impossible AI Move benchmark completed

QDEBUG : TestPerformance::benchmarkAIMoveImpossible() Impossible AI Move benchmark completed

PASS   : TestPerformance::benchmarkAIMoveImpossible()

RESULT : TestPerformance::benchmarkAIMoveImpossible():

   0.45 msecs per iteration (total: 58, iterations: 128)

QDEBUG : TestPerformance::benchmarkGameTreeBuilding() Game Tree Building benchmark completed

QDEBUG : TestPerformance::benchmarkGameTreeBuilding() Game Tree Building benchmark completed

QDEBUG : TestPerformance::benchmarkGameTreeBuilding() Game Tree Building benchmark completed

QDEBUG : TestPerformance::benchmarkGameTreeBuilding() Game Tree Building benchmark completed

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QDEBUG : TestPerformance::benchmarkGameTreeBuilding() Game Tree Building benchmark completed

PASS   : TestPerformance::benchmarkGameTreeBuilding()

RESULT : TestPerformance::benchmarkGameTreeBuilding():

0.070 msecs per iteration (total: 72, iterations: 1024)

QDEBUG : TestPerformance::benchmarkMinimaxCalculation() Minimax Calculation benchmark completed

QDEBUG : TestPerformance::benchmarkMinimaxCalculation() Minimax Calculation benchmark completed

QDEBUG : TestPerformance::benchmarkMinimaxCalculation() Minimax Calculation benchmark completed

QDEBUG : TestPerformance::benchmarkMinimaxCalculation() Minimax Calculation benchmark completed

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QDEBUG : TestPerformance::benchmarkMinimaxCalculation() Minimax Calculation benchmark completed

PASS   : TestPerformance::benchmarkMinimaxCalculation()

RESULT : TestPerformance::benchmarkMinimaxCalculation():

3.3 msecs per iteration (total: 53, iterations: 16)

QDEBUG : TestPerformance::benchmarkBoardEvaluation() Board Evaluation benchmark completed

QDEBUG : TestPerformance::benchmarkBoardEvaluation() Board Evaluation benchmark completed

QDEBUG : TestPerformance::benchmarkBoardEvaluation() Board Evaluation benchmark completed

QDEBUG : TestPerformance::benchmarkBoardEvaluation() Board Evaluation benchmark completed

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QDEBUG : TestPerformance::benchmarkBoardEvaluation() Board Evaluation benchmark completed

QDEBUG : TestPerformance::benchmarkBoardEvaluation() Board Evaluation benchmark completed

PASS   : TestPerformance::benchmarkBoardEvaluation()

RESULT : TestPerformance::benchmarkBoardEvaluation():

   0.000012 msecs per iteration (total: 52, iterations: 4194304)

QDEBUG : TestPerformance::benchmarkBoardEvaluationBatch() Batch Board Evaluation benchmark completed

QDEBUG : TestPerformance::benchmarkBoardEvaluationBatch() Batch Board Evaluation benchmark completed

QDEBUG : TestPerformance::benchmarkBoardEvaluationBatch() Batch Board Evaluation benchmark completed

QDEBUG : TestPerformance::benchmarkBoardEvaluationBatch() Batch Board Evaluation benchmark completed

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QDEBUG : TestPerformance::benchmarkBoardEvaluationBatch() Batch Board Evaluation benchmark completed

PASS   : TestPerformance::benchmarkBoardEvaluationBatch()

RESULT : TestPerformance::benchmarkBoardEvaluationBatch():

   0.00011 msecs per iteration (total: 62, iterations: 524288)

QDEBUG : TestPerformance::benchmarkFullGameSimulation() Full Game Simulation benchmark completed

QDEBUG : TestPerformance::benchmarkFullGameSimulation() Full Game Simulation benchmark completed

QDEBUG : TestPerformance::benchmarkFullGameSimulation() Full Game Simulation benchmark completed

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QDEBUG : TestPerformance::benchmarkFullGameSimulation() Full Game Simulation benchmark completed

PASS   : TestPerformance::benchmarkFullGameSimulation()

RESULT : TestPerformance::benchmarkFullGameSimulation():

   0.0078 msecs per iteration (total: 64, iterations: 8192)

QDEBUG : TestPerformance::benchmarkMultipleGameSimulations() Multiple Game Simulations benchmark completed

QDEBUG : TestPerformance::benchmarkMultipleGameSimulations() Multiple Game Simulations benchmark completed

QDEBUG : TestPerformance::benchmarkMultipleGameSimulations() Multiple Game Simulations benchmark completed

QDEBUG : TestPerformance::benchmarkMultipleGameSimulations() Multiple Game Simulations benchmark completed

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QDEBUG : TestPerformance::benchmarkMultipleGameSimulations() Multiple Game Simulations benchmark completed

PASS   : TestPerformance::benchmarkMultipleGameSimulations()

RESULT : TestPerformance::benchmarkMultipleGameSimulations():

   0.19 msecs per iteration (total: 98, iterations: 512)

QDEBUG : TestPerformance::benchmarkMemoryUsage() Memory usage test - Initial: 0 KB, Final: 0 KB

QDEBUG : TestPerformance::benchmarkMemoryUsage() Memory usage test - Initial: 0 KB, Final: 0 KB

PASS   : TestPerformance::benchmarkMemoryUsage()

RESULT : TestPerformance::benchmarkMemoryUsage():

   1,281 msecs per iteration (total: 1,281, iterations: 1)

QDEBUG : TestPerformance::benchmarkMemoryLeakTest() Memory leak test iteration 0 - Memory: 0 KB

QDEBUG : TestPerformance::benchmarkMemoryLeakTest() Memory leak test iteration 20 - Memory: 0 KB

QDEBUG : TestPerformance::benchmarkMemoryLeakTest() Memory leak test iteration 40 - Memory: 0 KB

QDEBUG : TestPerformance::benchmarkMemoryLeakTest() Memory leak test iteration 60 - Memory: 0 KB

QDEBUG : TestPerformance::benchmarkMemoryLeakTest() Memory leak test iteration 80 - Memory: 0 KB

QDEBUG : TestPerformance::benchmarkMemoryLeakTest() Memory leak test completed

QDEBUG : TestPerformance::benchmarkMemoryLeakTest() Initial memory: 0 KB

QDEBUG : TestPerformance::benchmarkMemoryLeakTest() Final memory: 0 KB

QDEBUG : TestPerformance::benchmarkMemoryLeakTest() Memory difference: 0 KB

PASS   : TestPerformance::benchmarkMemoryLeakTest()

QDEBUG : TestPerformance::benchmarkConcurrentGames() Concurrent Games benchmark completed

QDEBUG : TestPerformance::benchmarkConcurrentGames() Concurrent Games benchmark completed

QDEBUG : TestPerformance::benchmarkConcurrentGames() Concurrent Games benchmark completed

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QDEBUG : TestPerformance::benchmarkConcurrentGames() Concurrent Games benchmark completed

QDEBUG : TestPerformance::benchmarkConcurrentGames() Concurrent Games benchmark completed

PASS   : TestPerformance::benchmarkConcurrentGames()

RESULT : TestPerformance::benchmarkConcurrentGames():

   0.079 msecs per iteration (total: 81, iterations: 1024)

QDEBUG : TestPerformance::performanceStressTest() Stress test progress: 0 / 500

QDEBUG : TestPerformance::performanceStressTest() Stress test progress: 100 / 500

QDEBUG : TestPerformance::performanceStressTest() Stress test progress: 200 / 500

QDEBUG : TestPerformance::performanceStressTest() Stress test progress: 300 / 500

QDEBUG : TestPerformance::performanceStressTest() Stress test progress: 400 / 500

QDEBUG : TestPerformance::performanceStressTest() === Performance Metrics for "Stress Test" ===

QDEBUG : TestPerformance::performanceStressTest() Total iterations: 500

QDEBUG : TestPerformance::performanceStressTest() Total time: 56 ms

QDEBUG : TestPerformance::performanceStressTest() Average time per iteration: 0.112 ms

QDEBUG : TestPerformance::performanceStressTest() Operations per second: 8928.57

QDEBUG : TestPerformance::performanceStressTest() Average time per AI move: 0.112 ms

QDEBUG : TestPerformance::performanceStressTest() Moves per second: 8928.57

PASS   : TestPerformance::performanceStressTest()

QDEBUG : TestPerformance::performanceScalabilityTest() Scalability test - 1 games: 0 ms total, 0 ms per game

QDEBUG : TestPerformance::performanceScalabilityTest() Scalability test - 5 games: 0 ms total, 0 ms per game

QDEBUG : TestPerformance::performanceScalabilityTest() Scalability test - 10 games: 0 ms total, 0 ms per game

QDEBUG : TestPerformance::performanceScalabilityTest() Scalability test - 20 games: 0 ms total, 0 ms per game

QDEBUG : TestPerformance::performanceScalabilityTest() Scalability test - 50 games: 0 ms total, 0 ms per game

QDEBUG : TestPerformance::performanceScalabilityTest() Scalability test - 100 games: 0 ms total, 0 ms per game

PASS   : TestPerformance::performanceScalabilityTest()

QDEBUG : TestPerformance::performanceCPUIntensiveTest() CPU intensive test progress: 0 / 100

QDEBUG : TestPerformance::performanceCPUIntensiveTest() CPU intensive test progress: 20 / 100

QDEBUG : TestPerformance::performanceCPUIntensiveTest() CPU intensive test progress: 40 / 100

QDEBUG : TestPerformance::performanceCPUIntensiveTest() CPU intensive test progress: 60 / 100

QDEBUG : TestPerformance::performanceCPUIntensiveTest() CPU intensive test progress: 80 / 100

QDEBUG : TestPerformance::performanceCPUIntensiveTest() === Performance Metrics for "CPU Intensive Test" ===

QDEBUG : TestPerformance::performanceCPUIntensiveTest() Total iterations: 100

QDEBUG : TestPerformance::performanceCPUIntensiveTest() Total time: 7 ms

QDEBUG : TestPerformance::performanceCPUIntensiveTest() Average time per iteration: 0.07 ms

QDEBUG : TestPerformance::performanceCPUIntensiveTest() Operations per second: 14285.7

QDEBUG : TestPerformance::performanceCPUIntensiveTest() Average time per tree build+minimax: 0.07 ms

PASS   : TestPerformance::performanceCPUIntensiveTest()

QDEBUG : TestPerformance::compareAIDifficultyPerformance() === AI Difficulty Performance Comparison ===

QDEBUG : TestPerformance::compareAIDifficultyPerformance() "Easy" difficulty - Total: 0 ms, Average: 0 ms per move

QDEBUG : TestPerformance::compareAIDifficultyPerformance() "Medium" difficulty - Total: 0 ms, Average: 0 ms per move

QDEBUG : TestPerformance::compareAIDifficultyPerformance() "Hard" difficulty - Total: 1 ms, Average: 0.01 ms per move

QDEBUG : TestPerformance::compareAIDifficultyPerformance() "Impossible" difficulty - Total: 295 ms, Average: 2.95 ms per move

PASS   : TestPerformance::compareAIDifficultyPerformance()

QDEBUG : TestPerformance::compareAlgorithmEfficiency() === Algorithm Efficiency Comparison ===

QDEBUG : TestPerformance::compareAlgorithmEfficiency() "Early Game" - Total: 147 ms, Average: 2.94 ms per tree operation

QDEBUG : TestPerformance::compareAlgorithmEfficiency() "Mid Game" - Total: 0 ms, Average: 0 ms per tree operation

QDEBUG : TestPerformance::compareAlgorithmEfficiency() "Late Game" - Total: 0 ms, Average: 0 ms per tree operation

PASS   : TestPerformance::compareAlgorithmEfficiency()

QDEBUG : TestPerformance::cleanupTestCase() === Performance Test Suite Completed ===

PASS   : TestPerformance::cleanupTestCase()

Totals: 20 passed, 0 failed, 0 skipped, 0 blacklisted, 12097ms

********* Finished testing of TestPerformance *********