

LUASCRIP

Overview

Project: LUASCRIP Programming Language

Current Week: Week 5 (Phase 1A-1D Critical Stabilization)

Last Updated: September 30, 2025

Status: Weeks 1-4 Complete, Week 5 In Progress

Development Timeline

Completed Phases

Week 1: Foundation (✓ Complete)

- **Duration:** 7 days
- **Status:** 100% Complete
- **Key Deliverables:** Project structure, basic lexer, initial parser framework

Week 2: Core Parser (✓ Complete)

- **Duration:** 7 days
- **Status:** 100% Complete
- **Key Deliverables:** Expression parsing, statement parsing, AST definitions

Week 3: Interpreter Engine (✓ Complete)

- **Duration:** 7 days
- **Status:** 100% Complete
- **Key Deliverables:** AST evaluation, variable environment, function calls

Week 4: Testing and Documentation (✓ Complete)

- **Duration:** 7 days
- **Status:** 100% Complete
- **Key Deliverables:** Test framework, benchmarking, initial docs

Current Phase

Week 5: Critical Stabilization (🔄 In Progress)





- **Duration:** 7 days
- **Status:** Phase 1A-1D In Progress
- **Focus:** Runtime fixes, documentation accuracy, testing stability

Feature-by-Feature Status







Core Language Components

Lexical Analysis





- **Token Recognition:** ✓ Complete
- **Keyword Handling:** ✓ Complete
- **Operator Tokenization:** ✓ Complete

- **String Literal Parsing:**  Complete
- **Number Literal Parsing:**  Complete
- **Comment Handling:**  Complete
- **Error Recovery:**  Stabilization in progress




Syntax Analysis

- **Expression Parsing:**  Complete
- **Statement Parsing:**  Complete
- **Function Declaration Parsing:**  Complete
- **Control Flow Parsing:**  Complete
- **AST Generation:**  Complete
- **Syntax Error Reporting:**  Improvements in progress

Semantic Analysis






- **Variable Scope Resolution:**  Complete (minor fixes in progress)
- **Type Checking:**  Basic implementation, refinements ongoing
- **Function Signature Validation:**  Complete
- **Undefined Variable Detection:**  Complete

Runtime Engine




- **Expression Evaluation:**  Complete
- **Statement Execution:**  Complete
- **Function Call Mechanism:**  Complete
- **Variable Environment:**  Complete (optimization in progress)
- **Memory Management:**  Fixes in progress
- **Error Handling:**  Framework complete, coverage expanding

Data Types

Primitive Types





- **Numbers (Integer):**  Complete
- **Numbers (Float):**  Complete
- **Strings:**  Complete (concatenation fixes in progress)
- **Booleans:**  Complete
- **Nil/Null:**  Complete

Composite Types





- **Tables/Arrays:**  Planned for Week 6
- **Objects:**  Planned for Week 7
- **Functions as First-Class:**  Complete

Control Flow








Conditional Statements

- **If Statements:**  Complete
- **If-Else Statements:**  Complete
- **Nested Conditionals:**  Complete
- **Ternary Operator:**  Planned for Week 6

Loops





- **While Loops:**  Complete
- **For Loops:**  Complete
- **Break/Continue:**  Complete
- **Nested Loops:**  Complete (edge case fixes in progress)

Functions




- **Function Definition:**  Complete
- **Function Calls:**  Complete
- **Parameter Passing:**  Complete
- **Return Values:**  Complete
- **Local Functions:**  Complete
- **Closures:**  Basic implementation, refinements in progress
- **Recursion:**  Complete (stack overflow fixes in progress)

Standard Library

Core Functions

- **print():**  Complete
- **type():**  Complete
- **tostring():**  Complete
- **tonumber():**  Complete

String Functions





- **String concatenation:**  Complete (memory leak fixes in progress)
- **String length:**  Complete
- **String indexing:**  Planned for Week 6

Math Functions






- **Basic arithmetic:**  Complete
- **Math library:**  Planned for Week 6

Testing Infrastructure

Test Framework

- **Unit Test Framework:**  Complete
- **Test Runner:**  Complete
- **Assertion Library:**  Complete
- **Test Reporting:**  Complete

Test Coverage

- **Lexer Tests:**  Complete
- **Parser Tests:**  Complete (flaky test fixes in progress)
- **Interpreter Tests:**  Complete
- **Integration Tests:**  Expanding coverage
- **Performance Tests:**  Complete (stability improvements in progress)

Performance and Optimization

Benchmarking

- **Benchmark Framework:**  Complete

- **Performance Metrics:** ✅ Complete
- **Regression Testing:** 🔄 Implementation in progress
- **Performance Profiling:** 🔄 Validation in progress

Optimization

- **Basic Optimizations:** ✅ Complete
- **Memory Usage:** 🔄 Optimization in progress
- **Execution Speed:** ✅ Baseline established, improvements ongoing

Documentation

User Documentation

- **README.md:** ✅ Updated for Week 5
- **Installation Guide:** 🔄 In progress
- **Getting Started Tutorial:** 🔄 In progress
- **Language Reference:** 🔄 In progress

Developer Documentation

- **API Documentation:** 🔄 In progress
- **Architecture Overview:** ⌚ Planned
- **Contributing Guidelines:** ⌚ Planned

Project Management

- **TODO.md:** ✅ Updated for Week 5
- **PROJECT_STATUS.md:** ✅ Updated for Week 5
- **Change Log:** ⌚ Planned

Current Issues and Fixes

Critical Issues (Phase 1A)

1. **Memory Leaks:** String concatenation causing memory leaks
2. **Segmentation Faults:** Edge cases in deep recursion
3. **Cross-Platform:** Windows and macOS compatibility issues

Documentation Issues (Phase 1B)

1. **API Accuracy:** Function signatures need documentation
2. **Usage Examples:** Missing practical examples
3. **Installation:** No clear installation instructions

Testing Issues (Phase 1C)

1. **Flaky Tests:** Parser tests occasionally fail
2. **Test Coverage:** Missing edge case coverage
3. **CI/CD:** No automated testing pipeline

Performance Issues (Phase 1D)

1. **Benchmark Validation:** Need to verify claimed performance
2. **Memory Profiling:** Memory usage patterns need analysis
3. **Load Testing:** Performance under stress needs validation

Success Metrics

Week 5 Phase 1A-1D Goals

- **Phase 1A:** Zero critical runtime issues
- **Phase 1B:** 100% accurate documentation
- **Phase 1C:** 95%+ test reliability
- **Phase 1D:** Validated performance claims

Overall Project Health

- **Code Quality:** High (ongoing improvements)
- **Test Coverage:** 85% (target: 90%)
- **Documentation Coverage:** 60% (target: 90%)
- **Performance:** Meeting baseline targets

Risk Assessment

Low Risk

- Core language features are stable
- Basic functionality is well-tested
- Architecture is sound

Medium Risk

- Cross-platform compatibility needs attention
- Memory management requires optimization
- Documentation gaps need filling

High Risk

- None currently identified

Next Steps

Immediate (Week 5)

1. Complete Phase 1A runtime fixes
2. Finish Phase 1B documentation updates
3. Stabilize Phase 1C testing infrastructure
4. Validate Phase 1D performance claims

Short Term (Week 6-8)





1. Implement table/array data structures
2. Add object-oriented programming support
3. Create comprehensive user documentation
4. Set up CI/CD pipeline

Long Term (Week 9+)

1. Advanced language features (async, modules)
2. JIT compilation
3. IDE tooling support

4. Community building

Legend:

-  Complete
-  In Progress
-  Planned
-  Blocked/Issues

Confidence Level: High for completed features, Medium for in-progress items

Last Review: Week 5 Start

Next Review: Week 5 Mid-point