

# Assignment 2 part B Report

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Organization of Programming Languages

## Changes to Extend the Calculator Language:

### 1. New Tokens and Keywords:

- Added tokens for `if`, `while`, and `end` keywords, as well as relational operators: `=`, `<>`, `<`, `>`, `<=`, and `>=`.
- Updated `scan.h` with these new tokens.
- Modified `scan.cpp` to recognize `if`, `while`, `end`, and relational operators, returning the appropriate tokens.

### 2. Extended Grammar for Parsing:

- Updated `parse.cpp` to support `if` and `while` statements:
  - Added a `cond()` function to handle conditions with relational operators.
  - Added an `ro()` function to recognize relational operators (`=`, `<`, `>`, etc.).
  - Modified `stmt()` to parse `if` and `while` statements using `cond()`.

### 3. Adjustments for Epsilon Productions:

- Updated `factor_tail()` and `term_tail()` in `parse.cpp` to recognize relational operators as epsilon productions. This allowed the parser to handle expressions with relational operators smoothly and return control to the `cond()` function when appropriate.

### 4. Test Cases:

- Added test cases in the `Makefile` under a `test` target to verify `if` and `while` constructs, as well as the new relational operators.
- Example test cases included variable assignments, arithmetic operations, and conditional and loop statements to ensure proper functionality.

## Notes:

- To build the project: `make` and then `./parse`
- To run test cases in the Makefile: `make test`
- To clean the project: `make clean`