Programming Paradigms

Integration project

Pickle Cannon Programming Language

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# Summary

*Pickle Cannon* is a simplistic programming language mostly intended for simple mathematical or logical calculations. The main features of the language are discussed below.

Firstly, language supports three data types in total. Two basic types - integers and booleans and one compound type – array. Arrays can be only one-dimensional and store the values of one of the basic types. Language is strongly typed, thus, before each new declaration of the variable its type must be specified. Each declaration of the variable does not require a programmer to specify an initial value and it is assigned by default if it was not specified. *Pickle Cannon* also supports local and nested scopes which allow a programmer to re-declare variables with the same name in the newly opened scope.

Secondly, language supports simple mathematical and logical expressions. Addition, subtraction, negation, multiplication, soft-division and comparisons are all possible arithmetic operations that can be applied to integers. Logical negation, logical AND, logical OR and equality/inequality are all possible logical operations that can be applied to booleans.

Thirdly, language supports program control flow constructs. These two constructs are *if* and *while* statements. *if* construct may consist only of *if* statement or of *if-else* statement. *While* cycle will be executed until the condition is met and does not support any cycle-ending commands like a *break* or *continue*.

Fourthly, language supports simplistic concurrency mechanisms. *Pickle Cannon* allows a programmer to spawn and join threads using fork/join construct. Also, language syntax allows declaring shared variables that can be accessed across multiple threads. Moreover, language has one global lock which can be used to make changes to a shared object in a concurrently safe manner.

Lastly, language supports procedures. All procedures are declared before the main body, which in *Pickle Cannon* language starts with the *cannon* keyword. All procedures in the *Pickle Cannon* language are called *pickles*, thus the name of the language. Even though procedures must be declared before the main body, they still can call other procedures even if they are declared below them. As it may already be clear language supports only procedures, so it is not possible to return value to the caller.

These are all main features supported by the *Pickle Cannon* language, which are discussed in greater detail in the *Detailed language description* section.

# Problems and solutions

During the project there were 4 main encountered problems.

## Concurrency

## Memory management

## Register allocation

## Arrays

# Detailed language description

# Description of software

# Test plan and results

# Conclusions

# Appendices

## Grammar specification

## Extended test program