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Programming Assignment 0: Toy Cool Programs

COMPILERS - I

GOAL : The purpose of this assignment is to acquaint ourselves with features of the Cool language and train ourselves to understand the finer details of languages by reading their specifications. More specifically, we need to write short Cool programs to understand the language.

MIPS code interpretation for all Trivial programs :

Main.main : Calls the main function

addiu \$sp \$sp -28 : Stack pointer is changed (u means unsigned integer)

sw \$fp 28(\$sp) : saves the value of register

move \$s0 \$a0 : moves the value from one register to another

la \$a0 str_const0 : This prints the first string constant

sw \$a0 0(\$sp) : saves the register value

jal Object.copy : Makes the program counter to jump

Main.func : Call the required function

mul \$t1 \$t1 \$t2 : Multiplies the value of the three registers to give the volume

jr \$ra : Jump to the return register

push \$ra = sub \$sp, \$sp - 4 : Pushes the content to the top and return

pop \$ra = lw \$ra, 0(\$sp) : Pop from the stack and returns

\$fp : Points to the first word of frame

\$sp : Points to the last word of frame

ERROR PROGRAMS :

error1.cl :

- * Variable name cannot start with uppercase letter
- * 'int' is not a keyword (Int is a recognised keyword)
- * Variable names must not contain special symbols like '#', '\$'

```
-- "error1.cl", line 3: syntax error at or near TYPEID = StringExample
-- "error1.cl", line 4: syntax error at or near OBJECTID = int
-- "error1.cl", line 5: syntax error at or near ERROR = #
-- Compilation halted due to lex and parse errors
```

error2.cl :

- * A string may not contain a \0 (NULL) character
- * A non-escaped newline character may not appear in a string

```
-- "error2.cl", line 3: syntax error at or near ERROR = \
-- "error2.cl", line 5: syntax error at or near ERROR = Unterminated
string constant
-- Compilation halted due to lex and parse errors
```

error3.cl :

- * Comments should contain two dashes "--"

```
-- "error3.cl", line 3: syntax error at or near ';'
-- Compilation halted due to lex and parse errors
```

error4.cl :

- * The first letter of true and false must be lowercase
- * 'case' is a predefined keyword and can't be used as a variable name

```
-- "error4.cl", line 3: syntax error at or near TYPEID = False
-- "error4.cl", line 5: syntax error at or near ')'
-- Compilation halted due to lex and parse errors
```

error5.cl :

- * There should be no whitespaces between keywords and variable names

```
-- "error5.cl", line 3: syntax error at or near IN
-- Compilation halted due to lex and parse errors
```

Non-Trivial programs :

diamondPrinting.cl :

This code prints a diamond with 9 rows. We have used nested while loops to achieve the pattern.

complexNos.cl :

This is a object-oriented program in which we have made a class for complex numbers. The class includes member functions including sum, difference and multiplication of complex numbers. The user gives a input of choice to find one of the function, and the required complex number is printed out.