Rep-Lab2-TypeCheck

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通过!

```
● (base) ivan@IVANIVY-SAVIOR:~/project/compiler_project/src$ make clean;make
rm *.o *.output y.tab.cpp y.tab.hpp lex.yy.cpp compiler tests/*.ast
yacc -o y.tab.cpp -d parser.yacc -v --debug
clang++ -std=c++17 -g -c y.tab.cpp
y.tab.cpp:2349:20: warning: ISO C++11 does not allow conversion from string literal to 'char *' [-Wwritable
-strings]
      yyerror (YY_("syntax error"));
                  ^
y.tab.cpp:2493:16: warning: ISO C++11 does not allow conversion from string literal to 'char *' [-Wwritable
-strings]
   yyerror (YY_("memory exhausted"));
                  ^
2 warnings generated.
lex -o lex.yy.cpp lexer.lex
clang++ -std=c++17 -g -c lex.yy.cpp
clang++ -std=c++17 -g -c TypeCheck.cpp
clang++ -std=c++17 -g -c TeaplAst.cpp
clang++ -std=c++17 -g -c TeaplaAst.cpp
clang++ -std=c++17 -g -c PrintTeaplaAst.cpp
clang++ -std=c++17 -g -c compiler.cpp
clang++ -std=c++17 -g -o compiler y.tab.o lex.yy.o TypeCheck.o TeaplAst.o TeaplaAst.o PrintTeaplaAst.o comp
iler.o
Processing file: tests/07_function_call.tea
Typecheck passed!
Processing file: tests/06_member_not_defined.tea
Typecheck error in line 10, col 4: Member 'tail' not declared in struct 'c'.
Processing file: tests/04_local_global_vars.tea
Typecheck passed!
Processing file: tests/05_duplicate_definition.tea
Typecheck error in line 7, col 8: Scalar 'a' already declared.
Processing file: tests/01_var_not_defined.tea
Typecheck error in line 6, col 4: Variable 'c' not declared.
Processing file: tests/10_comprehensive_case.tea
Typecheck passed!
Processing file: tests/08_if_bool_comp.tea
Typecheck error in line 15, col 7: Comparison type mismatch.
Processing file: tests/09_not_struct.tea
Typecheck error in line 13, col 4: Variable 'a' should be a struct.
Processing file: tests/02_assign_to_func.tea
Typecheck error in line 6, col 4: Variable 'main' not declared.
Processing file: tests/03_func_ret_not_match.tea
Typecheck error in line 8, col 0: Function 'main' return type mismatch.
```

增加了自己的两个测试:

11 是测试定义时右值不匹配

12 是测试定义数组左右长度不等

```
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y.tab.cpp:2349:20: warning: ISO C++11 does not allow conversion from string literal to 'char *' [-Wwritable-strings]
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                   ^
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clang++ -std=c++17 -g -c TeaplaAst.cpp
clang++ -std=c++17 -g -c PrintTeaplaAst.cpp
clang++ -std=c++17 -g -c compiler.cpp
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Processing file: tests/07_function_call.tea
Typecheck passed!
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Typecheck error in line 10, col 4: Member 'tail' not declared in struct 'c'.
Processing file: tests/01_var_not_defined.tea
Typecheck error in line 6, col 4: Variable 'c' not declared.
Processing file: tests/04_local_global_vars.tea
Typecheck passed!
Processing file: tests/05_duplicate_definition.tea
Typecheck error in line 7, col 8: Scalar 'a' already declared.
Processing file: tests/11_array_length.tea
Typecheck error in line 4, col 8: Array 'a' def type mismatch.
Processing file: tests/10_comprehensive_case.tea
Typecheck passed!
Processing file: tests/08_if_bool_comp.tea
Typecheck error in line 15, col 7: Comparison type mismatch.
Processing file: tests/12_def_assign_var.tea
Typecheck error in line 4, col 16: Variable 'len' not declared.
Processing file: tests/09_not_struct.tea
Typecheck error in line 13, col 4: Variable 'a' should be a struct.
Processing file: tests/02_assign_to_func.tea
Typecheck error in line 6, col 4: Variable 'main' not declared.
Processing file: tests/03_func_ret_not_match.tea
Typecheck error in line 8, col 0: Function 'main' return type mismatch.
```

设计和感想

非常细节的lab, 尤其是

1. 关于作用域, 我设计了一个栈, 叫他作用域栈, 后来扩充成两个栈:
   1. scopeStack, 存放该作用域的所有变量的类型;
   2. paramStack 存放该作用域的所有函数的参数, 结构体的成员, 数组的长度, 就是各种参数(数组长度好像本来没有检查, 自己加了)