CS323 Compiler Project Phase 1

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Sorted in alphabetical order.

Test Platform

Name	Value
OS	Ubuntu 22.04.2 LTS on Windows 10 x86_64
Bison	bison (GNU Bison) 3.8.2
Flex	flex 2.6.4
libbison-dev	2:3.8.2+dfsg-1build1
gcc	gcc (Ubuntu 11.4.0-1ubuntu1~22.04) 11.4.0
Make	GNU Make 4.3. Built for x86_64-pc-linux-gnu

Compile

Before: `make clean`

Then: `make` or `make splc`.

Basic Feature List

All implemented.

Extended Feature List

Error Detection

- Hanging else
- Invalid function definition inside functions
- Various errors about missing parenthesis/square bracket:

  Run parser on `test/test_12110804_2.spl` for details on missing square brackets.
- Various errors about missing operands:

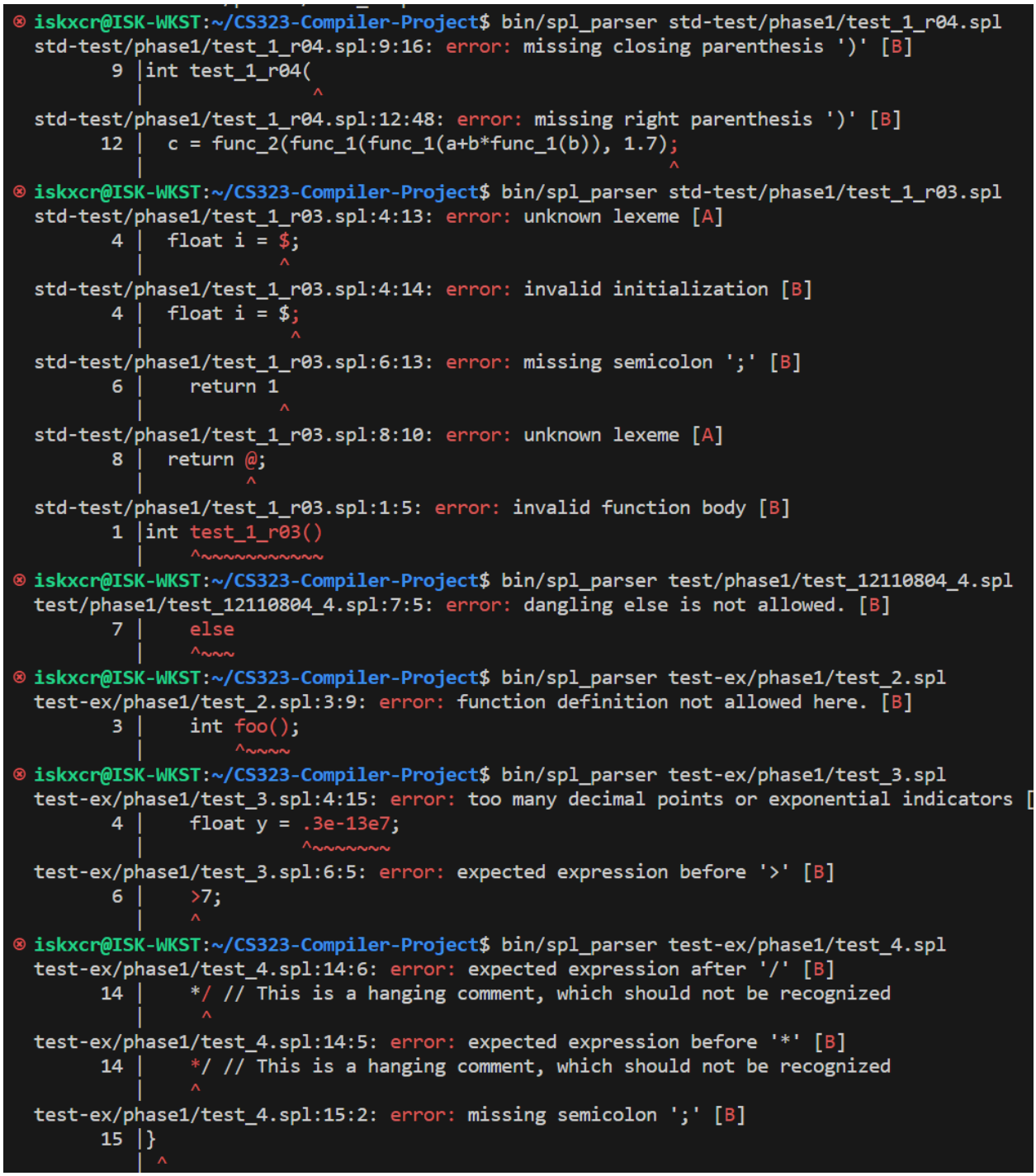
```
iskxcr@ISK-WKST:~/CS323-Compiler-Project$ bin/spl_parser test-ex/extra_test_3.spl
test-ex/extra_test_3.spl:4:15: error: too many decimal points or exponential indicators [A]
      4 |     float y = .3e-13e7;
        |               ^~~~~~~
test-ex/extra_test_3.spl:6:5: error: expected expression before '>' [B]
      6 |     >7;
        |     ^
```

- Errors about invalid constant form:

```
iskxcr@ISK-WKST:~/CS323-Compiler-Project$ bin/spl_parser test/test_5.spl
test/test_5.spl:3:13: warning: overflow in integer constant [WARNING]
      3 |     int x = 0x123456789;
        |             ^~~~~~~~~~
test/test_5.spl:5:13: warning: overflow in integer constant [WARNING]
      5 |     int z = 4294967308;
        |             ^~~~~~~~~~
test/test_5.spl:6:13: warning: overflow in integer constant [WARNING]
      6 |     int k = 2147483649;
        |             ^~~~~~~~~~
```

Other SPL Parser Features

- Optimized error/warning output



This may cause the `diff` utility not to work when doing batch verifying, as ASCII control sequences are used to color the output and they will not be recognized by `diff`.

The output parsing tree will not get colored.

This is done by using ASCII control sequences and reusable file descriptors. ***Some of the SPL grammar structure is modified, but the target language does not change.***

  - `StmtList` *and* `DefList` *now* ***cannot*** *be empty.*
- Allowing unary operators: `+/-`, unary prefix/postfix operator: `++/--`

  Run parser on `test/test_5.spl` for details.
- Allowing `for` loop declaration
  - Allow any type of for loop combination:

```
for ([optional definition]; [optional expression]; optional expression)
    stmt
```

*This is done by decomposing the for loop into **loop body** and **statement**.*

Run parser on `test_ex/test_6.spl` for details.

- Allowing the following floating-point declaration, given by `[0-9]*\.[0-9]+([eE][-+]?[0-9]+)?`:

```
float y = .3e-13;
```

Run parser on `test-ex/test_3.spl` for details.

- Allowing single-line/cross-line comments

```
int main()
{
    int a = 0; // This is a single comment.
    int b = 0; // This is a cross-line comment \
                  as you can tell by changing the language server interpreting this
comment to match the C language.
    int c = 233; // Hi! C
    /*
    This is a cross-line comment.
    */
    int d = c;
    /* Hi!
    */

    */ // This is a hanging comment, which should not be recognized
}
```

```
iskxcr@ISK-WKST:~/CS323-Compiler-Project$ bin/spl_parser test-ex/extra_test_4.spl
syntax error, unexpected RC at line 15
test-ex/extra_test_4.spl:14:6: error: expected expression after '/' [B]
      14 |    */ // This is a hanging comment, which should not be recognized
         |     ^
test-ex/extra_test_4.spl:14:5: error: expected expression before '*' [B]
      14 |    */ // This is a hanging comment, which should not be recognized
         |    ^
syntax error, unexpected RC at line 15
test-ex/extra_test_4.spl:15:2: error: missing semicolon ';' [B]
      15 |}
         | ^
```

This is done by assigning `yylex` with specific states.

Run parser on `test-ex/test_4.spl` for details.

- Allow single-line/cross-line strings:
  - Allowed escape characters: `\[abefnrtv\'"?]`

```
int main()
{
    char msg1 = "Hi Just want to test!";

    char msg2 = "Hi \
                Just want to test!";

    char msg3 = "Hi"
                "Thanks!";
    printf("[%s]", msg);
    return 0;
}
```

This is done by assigning `yylex` *with specific states*.

Run parser on `test-ex/test_5.spl` for details.

There are other tests that do hybrid testing. You may check them out individually.