

# CS323 Compiler Project Phase 1

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*Sorted in alphabetical order.*

## Test Platform

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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

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Before: `make clean`

Then: `make` or `make splc`.

## Basic Feature List

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All implemented.

## Extended Feature List

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### Error Detection

- Hanging else
- Invalid function definition inside functions
- Various errors about missing parenthesis/square bracket:  
Run parser on `test/test_12110804_2.sp1` 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

```

iskxcr@ISK-WKST:~/CS323-Compiler-Project$ bin/spl_parser tests/phase1/basic/test_1_r04.spl
tests/phase1/basic/test_1_r04.spl:9:16: error: missing closing parenthesis ')' [B]
9 | int test_1_r04(
  |               ^
tests/phase1/basic/test_1_r04.spl:12:48: error: missing right parenthesis ')' [B]
12 | c = func_2(func_1(func_1(a+b*func_1(b)), 1.7);
   |                                           ^
iskxcr@ISK-WKST:~/CS323-Compiler-Project$ bin/spl_parser tests/phase1/basic/test_1_r03.spl
tests/phase1/basic/test_1_r03.spl:4:13: error: unknown lexeme [A]
4 | float i = $;
  |           ^
tests/phase1/basic/test_1_r03.spl:6:13: error: missing semicolon ';' [B]
6 | return 1
  |         ^
tests/phase1/basic/test_1_r03.spl:8:10: error: unknown lexeme [A]
8 | return @;
  |         ^
iskxcr@ISK-WKST:~/CS323-Compiler-Project$ bin/spl_parser tests/phase1/extended/test_6.spl
tests/phase1/extended/test_6.spl:2:5: error: hanging else is not allowed. [B]
2 | else
  |     ^~~~
iskxcr@ISK-WKST:~/CS323-Compiler-Project$ bin/spl_parser tests/phase1/extended/test_4.spl
tests/phase1/extended/test_4.spl:3:9: error: function definition not allowed here. [B]
3 | int test_p()
  |     ^~~~~~
tests/phase1/extended/test_4.spl:3:17: error: missing semicolon ';' [B]
3 | int test_p()
  |               ^
iskxcr@ISK-WKST:~/CS323-Compiler-Project$ bin/spl_parser tests/phase1/bonus_test/extra_test_2.spl
tests/phase1/bonus_test/extra_test_2.spl:3:9: error: function definition not allowed here. [B]
3 | int foo();
  |     ^~~~~
iskxcr@ISK-WKST:~/CS323-Compiler-Project$

```

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.sp1` 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.sp1` 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.sp1` 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/sp1_parser test-ex/extra_test_4.sp1
syntax error, unexpected RC at line 15
test-ex/extra_test_4.sp1:14:6: error: expected expression after '/' [B]
14 |      */ // This is a hanging comment, which should not be recognized
   |      ^
test-ex/extra_test_4.sp1:14:5: 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.sp1:15:2: error: missing semicolon ';' [B]
15 |  }
   |  ^
```

This is done by assigning `yy1ex` with specific states.

Run parser on `test-ex/test_4.sp1` 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.sp1` for details.

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