

S4 Compiler Project

Copy your `S3.java` to `S4.java`. Then replace every occurrence of "S3" in `S4.java` with "S4".

Be sure your name replaces the "... " in `S4.java`.

Modify `S4.java` so that it meets the specifications for S4 described below.

Compile your S4 compiler with

```
javac S4.java
```

Compile `S4.s` (which is in the J1 Software Package) with your S4 compiler with

```
java S4 S4
```

Assemble the output file `S4.a` created by your S4 compiler with

```
a S4.a
```

Finally run the executable program in `S4.e` created by the assembler with

```
e S4 /c
```

Submit `S4.java`, and `S4.<family name>.log` (the log file that the `e` program creates when it runs `S4.e`) in the form requested. NO ZIP FILES.

15.1 SPECIFICATIONS FOR S4

Incorporate the following extensions to the S3 compiler to get the S4 compiler (see Problem 15.1):

- 1) Add support for the while, if, if-else, and do-while control statements. Do *not* support relational or boolean operators and expressions. The true/false expressions in the while, if, if-else, and do-while statements are all arithmetic. A zero value represents false; a non-zero value represents true. See `S4.s` (the test program for the S4 compiler).
- 2) Perform range checking on integer constants.
- 3) Add support for a string constant with embedded quotes. An embedded quote must be preceded by an odd number of backslashes. For example, the following statement is now legal:

```
println("He said, \"Hello\" to me.");
```

The string in this statement should be passed as is by the token manager to the parser.

Also add support for string constants that span multiple lines. Every line break in a string constant must be preceded immediately by a backslash. For example, the following statement has two line breaks, each preceded by a backslash:

```
println("one\  
two\  
three");
```

Because the assembler does not support strings that span lines, a multiple-line string constant should be returned by the token manager to the parser as a single-line string (i.e., with its backslash-line break sequences removed). For example, the string in the statement above should be returned as "onetwothree".