

Source File: ~/4301/05/lab05. (C|CPP|cpp|c++|cc|cxx|cp)
Input: Under control of main function
Output: Under control of main function
Value: 3

For $\Sigma = \{a, b\}$, construct a finite state automata that accepts the set consisting of

$\{x \mid x \in \{a, b\}^* \text{ and that have a substring of length four that begins and ends with the same symbol}\}$

Valid strings include aabbbbb, bbbbbbaa, bbbabbabbb, abba, babba, abbbba, bbabababa, bbaaaabaaa, baaaaabaaa, abaaaaa, and bababaabababa, but not ϵ , aab, aba, baa, babab, aabbb, bbbba, abba, a, b, aa, ab, ba, bb, aaa, baa, aba, bbb, or baba.

This assignment will use the same header file and sample main function used for Lab 04. A sample execution sequence is shown in Figure 1. To use the Makefile as distributed in class, add a target of lab05 to targets2srcfiles.

Additional notes:

- The main function appends the character '%' to each line as it is read in.
- The halt state is 0 and the start state is 1.

```
1 newuser@csunix ~> cd 4301
2 newuser@csunix ~/4301> ./getlab.ksh 05
3 * Checking to see if a folder exists for Lab 05. . .No
4 * Creating a folder for Lab 05
5 * Checking to see if Lab 05 has sample input and output files. . .Yes
6 * Copying input and output files for Lab 05
7   from folder /usr/local/4301/data/05 to folder ./05
8 * Checking to see if /usr/local/4301/src/lab05main.C exists. . .Yes
9 * Copying file /usr/local/4301/src/lab05main.C to folder ./05
10 * Checking to see if /usr/local/4301/include/lab05.h exists. . .No
11 * Copying file /usr/local/4301/src/Makefile to folder ./05
12 * Adding a target of lab05 to targets2srcfiles
13 * Touching file ./05/lab05.cpp
14 * Edit file ./05/lab05.cpp in Notepad++
15 newuser@csunix ~/4301> cd 05
16 newuser@csunix ~/4301/05> ls
17 00.dat      00.out      Makefile    lab05.cpp   lab05main.C
18 newuser@csunix ~/4301/05> make lab05
19 g++ -g -Wall -std=c++11 -c lab05main.C -I/usr/local/4301/include -I.
20 g++ -g -Wall -std=c++11 -c lab05.cpp -I/usr/local/4301/include -I.
21 g++ -o lab05 lab05main.o lab05.o -L/usr/local/4301/lib -lm
22 newuser@csunix ~/4301/05> cat 00.dat
23 aab
24 aba
25 baa
26 babab
27 aabbb
28 bbbba
29 abbba
30 aabbbbb
```

Figure 1. Commands to Compile, Link, & Run Lab 05 (Part 1 of 3)

```
31 bbbbbbbbaa
32 bbbabbbabbb
33
34 a
35 b
36 aa
37 ab
38 ba
39 bb
40 aaa
41 baa
42 aba
43 bbb
44 abba
45 baba
46 babba
47 abbbba
48 bbabababa
49 bbaaaabaaa
50 babaaabaaa
51 abaaaaaaaaaaa
52 bababaabababa
53 newuser@csunix ~/4301/05> cat 00.dat | ./lab05
54 Your Name
55 CS 4301
56 Lab 5
57 {x | x in {a, b}* and that have a substring of length four that
58     begins and ends with the same symbol}
59
60 Input: aab --- invalid input ---
61
62 Input: aba --- invalid input ---
63
64 Input: baa --- invalid input ---
65
66 Input: babab --- invalid input ---
67
68 Input: aabbb --- invalid input ---
69
70 Input: bbbba --- invalid input ---
71
72 Input: abbba --- invalid input ---
73
74 Input: aabbbb *** valid input ***
75
76 Input: bbbbbbbbaa *** valid input ***
77
78 Input: bbbabbbabbb *** valid input ***
79
```

Figure 1. Commands to Compile, Link, & Run Lab 05 (Part 2 of 3)

```
80 Input:  --- invalid input ---
81
82 Input:  a --- invalid input ---
83
84 Input:  b --- invalid input ---
85
86 Input:  aa --- invalid input ---
87
88 Input:  ab --- invalid input ---
89
90 Input:  ba --- invalid input ---
91
92 Input:  bb --- invalid input ---
93
94 Input:  aaa --- invalid input ---
95
96 Input:  baa --- invalid input ---
97
98 Input:  aba --- invalid input ---
99
100 Input:  bbb --- invalid input ---
101
102 Input:  abba *** valid input ***
103
104 Input:  baba --- invalid input ---
105
106 Input:  babba *** valid input ***
107
108 Input:  abbbba *** valid input ***
109
110 Input:  bbabababa *** valid input ***
111
112 Input:  bbaaaabaaa *** valid input ***
113
114 Input:  babaaabaaa *** valid input ***
115
116 Input:  abaaaaaaaaa *** valid input ***
117
118 Input:  bababaabababa *** valid input ***
119
120 newuser@csunix ~/4301/05> cat 00.dat | ./lab05 > my.out
121 newuser@csunix ~/4301/05> diff 00.out my.out
122 newuser@csunix ~/4301/05>
```

Figure 1. Commands to Compile, Link, & Run Lab 05 (Part 3 of 3)