

Source File: ~/4301/07/lab07. (C|CPP|cpp|c++|cc|cxx|cp)
Input: Under control of main function
Output: Under control of main function
Value: 2

For $\Sigma = \{a, b\}$ and $\Gamma = \{a, b, @\}$, construct a pushdown automata that accepts the set consisting of

$$\left\{ \begin{array}{l} w \mid w \in \{a, b\}^* \text{ and} \\ \text{there are the same number of } a\text{'s as } b\text{'s and} \\ \text{as read from left to right, never has more } b\text{'s than } a\text{'s} \end{array} \right\}$$

Valid strings include ϵ , ab, aabb, abab, aaabbb, aababb, aabbab, abaabb, ababab, and abaaabbabb but not a, b, aa, ba, bb, aaa, aab, aba, abb, baa, bab, bba, bbb, aaaa, aaab, aaba, abaa, abba, abbb, baaa, baab, baba, babb, bbaa, bbab, bbba, bbbb, or abaabbba.

This assignment will use the same header file and sample main function used for Lab 06. A sample execution sequence is shown in Figure 1. To use the Makefile as distributed in class, add a target of lab07 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.
- For each input string tested, the stack is initialized to '@'.

```

1  newuser@csunix ~> cd 4301
2  newuser@csunix ~/4301> ./getlab.ksh 07
3  * Checking to see if a folder exists for Lab 07. . .No
4  * Creating a folder for Lab 07
5  * Checking to see if Lab 07 has sample input and output files. . .Yes
6  * Copying input and output files for Lab 07
7  from folder /usr/local/4301/data/07 to folder ./07
8  * Checking to see if /usr/local/4301/src/lab07main.C exists. . .Yes
9  * Copying file /usr/local/4301/src/lab07main.C to folder ./07
10 * Checking to see if /usr/local/4301/include/lab07.h exists. . .No
11 * Copying file /usr/local/4301/src/Makefile to folder ./07
12 * Adding a target of lab07 to targets2srcfiles
13 * Touching file ./07/lab07.cpp
14 * Edit file ./07/lab07.cpp in Notepad++
15 newuser@csunix ~/4301> cd 07
16 newuser@csunix ~/4301/07> ls
17 01.dat      01.out      Makefile    lab07.cpp   lab07main.C
18 newuser@csunix ~/4301/07> make lab07
19 g++ -g -Wall -std=c++11 -c lab07main.C -I/usr/local/4301/include -I.
20 g++ -g -Wall -std=c++11 -c lab07.cpp -I/usr/local/4301/include -I.
21 g++ -o lab07 lab07main.o lab07.o -L/usr/local/4301/lib -lm
22 newuser@csunix ~/4301/07> cat 01.dat
23
24 a
25 b

```

Figure 1. Commands to Compile, Link, & Run Lab 07 (Part 1 of 4)

```
26 aa
27 ab
28 ba
29 bb
30 aaa
31 aab
32 aba
33 abb
34 baa
35 bab
36 bba
37 bbb
38 aaaa
39 aaab
40 aaba
41 aabb
42 abaa
43 abab
44 abba
45 abbb
46 baaa
47 baab
48 baba
49 babb
50 bbaa
51 bbab
52 bbba
53 bbbb
54 aaabbb
55 aababb
56 aabbab
57 abaabb
58 ababab
59 abaaabbabb
60 abaabbba
61 newuser@csunix ~/4301/07> cat 01.dat | ./lab07
62 Your Name
63 CS 4301
64 Lab 7
65 {w | w in {a, b}* and
66   there are the same number of a's as b's and
67   as read from left to right, never has more b's than a's}
68
69 Input:   Result:  ** accepted **
70
71 Input:  a  Result:  -- NOT accepted --
72
73 Input:  b  Result:  -- NOT accepted --
74
```

Figure 1. Commands to Compile, Link, & Run Lab 07 (Part 2 of 4)

```
75 Input: aa Result: -- NOT accepted --
76
77 Input: ab Result: ** accepted **
78
79 Input: ba Result: -- NOT accepted --
80
81 Input: bb Result: -- NOT accepted --
82
83 Input: aaa Result: -- NOT accepted --
84
85 Input: aab Result: -- NOT accepted --
86
87 Input: aba Result: -- NOT accepted --
88
89 Input: abb Result: -- NOT accepted --
90
91 Input: baa Result: -- NOT accepted --
92
93 Input: bab Result: -- NOT accepted --
94
95 Input: bba Result: -- NOT accepted --
96
97 Input: bbb Result: -- NOT accepted --
98
99 Input: aaaa Result: -- NOT accepted --
100
101 Input: aaab Result: -- NOT accepted --
102
103 Input: aaba Result: -- NOT accepted --
104
105 Input: aabb Result: ** accepted **
106
107 Input: abaa Result: -- NOT accepted --
108
109 Input: abab Result: ** accepted **
110
111 Input: abba Result: -- NOT accepted --
112
113 Input: abbb Result: -- NOT accepted --
114
115 Input: baaa Result: -- NOT accepted --
116
117 Input: baab Result: -- NOT accepted --
118
119 Input: baba Result: -- NOT accepted --
120
121 Input: babb Result: -- NOT accepted --
122
```

Figure 1. Commands to Compile, Link, & Run Lab 07 (Part 3 of 4)

```
123 Input: bbaa Result: -- NOT accepted --
124
125 Input: bbab Result: -- NOT accepted --
126
127 Input: bbba Result: -- NOT accepted --
128
129 Input: bbbb Result: -- NOT accepted --
130
131 Input: aaabbb Result: ** accepted **
132
133 Input: aababb Result: ** accepted **
134
135 Input: aabbab Result: ** accepted **
136
137 Input: abaabb Result: ** accepted **
138
139 Input: ababab Result: ** accepted **
140
141 Input: abaaabbabb Result: ** accepted **
142
143 Input: abaabbba Result: -- NOT accepted --
144
145 \newuser@csunix ~/4301/07> cat 01.dat | ./lab07 > my.out
146 newuser@csunix ~/4301/07> diff 01.out my.out
147 newuser@csunix ~/4301/07>
```

Figure 1. Commands to Compile, Link, & Run Lab 07 (Part 4 of 4)