

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: 3

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

$$\{w \mid w \in \{a, b\}^* \text{ and } w \text{ has twice as many } a\text{'s as } b\text{'s}\}$$

Valid strings include ϵ , aab, aba, aaaabb, baaaab, baabaa, bbaaaaaa, bbaaaaaab, baaabaaab, aaaaaabbb, and aaaaabbab but not a, b, aa, ab, ba, bb, abab, baaa, bbba, aabb, aaabbbb, aaaabbbbb, or babb.

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
26  aa
27  ab
28  ba
29  bb

```

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

```
30 aaa
31 aab
32 aba
33 abb
34 baa
35 bab
36 bba
37 bbb
38 aaba
39 aabb
40 abab
41 babb
42 bbba
43 aaaab
44 aabab
45 baaaa
46 aaaabb
47 aaabab
48 aaabba
49 aabaab
50 aababa
51 aabbaa
52 abaaab
53 abaaba
54 ababaa
55 abbaaa
56 baaaab
57 baaaba
58 baabaa
59 babaaa
60 bbaaaa
61 aaabbbb
62 baaabaab
63 bbaaaaab
64 bbbaaaaa
65 aaaaaabbbb
66 aaaabbbbb
67 bbbbaaaaa
68 newuser@csunix ~/4301/07> cat 01.dat | ./lab07
69 Your Name
70 CS 4301
71 Lab 7
72 {w | w in {a, b}* and w has twice as many a's as b's}
73
74 Input:      Result:  ** accepted **
75
76 Input:  a  Result:  -- NOT accepted --
77
```

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

```
78 Input: b Result: -- NOT accepted --
79
80 Input: aa Result: -- NOT accepted --
81
82 Input: ab Result: -- NOT accepted --
83
84 Input: ba Result: -- NOT accepted --
85
86 Input: bb Result: -- NOT accepted --
87
88 Input: aaa Result: -- NOT accepted --
89
90 Input: aab Result: ** accepted **
91
92 Input: aba Result: ** accepted **
93
94 Input: abb Result: -- NOT accepted --
95
96 Input: baa Result: ** accepted **
97
98 Input: bab Result: -- NOT accepted --
99
100 Input: bba Result: -- NOT accepted --
101
102 Input: bbb Result: -- NOT accepted --
103
104 Input: aaba Result: -- NOT accepted --
105
106 Input: aabb Result: -- NOT accepted --
107
108 Input: abab Result: -- NOT accepted --
109
110 Input: babb Result: -- NOT accepted --
111
112 Input: bbba Result: -- NOT accepted --
113
114 Input: aaaab Result: -- NOT accepted --
115
116 Input: aabab Result: -- NOT accepted --
117
118 Input: baaaa Result: -- NOT accepted --
119
120 Input: aaaabb Result: ** accepted **
121
122 Input: aaabab Result: ** accepted **
123
124 Input: aaabba Result: ** accepted **
125
```

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

```
126 Input: aabaab Result: ** accepted **
127
128 Input: aababa Result: ** accepted **
129
130 Input: aabbaa Result: ** accepted **
131
132 Input: abaaab Result: ** accepted **
133
134 Input: abaaba Result: ** accepted **
135
136 Input: ababaa Result: ** accepted **
137
138 Input: abbaaa Result: ** accepted **
139
140 Input: baaaab Result: ** accepted **
141
142 Input: baaaba Result: ** accepted **
143
144 Input: baabaa Result: ** accepted **
145
146 Input: babaaa Result: ** accepted **
147
148 Input: bbaaaa Result: ** accepted **
149
150 Input: aaabbbb Result: -- NOT accepted --
151
152 Input: baaabaab Result: -- NOT accepted --
153
154 Input: bbaaaaab Result: -- NOT accepted --
155
156 Input: bbbaaaaa Result: -- NOT accepted --
157
158 Input: aaaaaabbbb Result: -- NOT accepted --
159
160 Input: aaaabbbbb Result: -- NOT accepted --
161
162 Input: bbbbaaaaa Result: -- NOT accepted --
163
164 newuser@csunix ~/4301/07> cat 01.dat | ./lab07 > my.out
165 newuser@csunix ~/4301/07> diff 01.out my.out
166 newuser@csunix ~/4301/07>
```

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