DEPARTMENT OF COMPUTER SCIENCE AND SOFTWARE ENGINEERING CONCORDIA UNIVERSITY

COMP 5461: Operating Systems

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Programming Assignment 2

Submitted to:

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Task 3

(i):

Output 1:

```
Initial value of stack top = d.
Main thread will now fork several threads.
Two Consumer threads have been created.
Two Producer threads have been created.
One CharStackProber thread has been created.
Consumer thread [TID=1] starts executing.
Producer thread [TID=3] starts executing.
Consumer thread [TID=2] starts executing.
Consumer thread [TID=1] pops character =d
Producer thread [TID=4] starts executing.
Consumer thread [TID=2] pops character =d
Producer thread [TID=3] pushes character =d
Consumer thread [TID=2] pops character =c
Producer thread [TID=4] pushes character =c
CharStackProber thread [TID=5] starts executing.
Consumer thread [TID=1] pops character =c
Stack S = ([a],[b],[c],[$],[$],[$],[$],[$],[$],[$])
Producer thread [TID=4] pushes character =c
Consumer thread [TID=2] pops character =c
Producer thread [TID=3] pushes character =c
Consumer thread [TID=2] terminates.
Stack S = ([a],[b],[c],[$],[$],[$],[$],[$],[$],[$])
Stack S = ([a],[b],[c],[$],[$],[$],[$],[$],[$],[$])
Stack S = ([a],[b],[c],[$],[$],[$],[$],[$],[$],[$])
Stack S = ([a],[b],[c],[$],[$],[$],[$],[$],[$],[$])
Stack S = ([a],[b],[c],[$],[$],[$],[$],[$],[$],[$])
Producer thread [TID=4] pushes character =d
Consumer thread [TID=1] pops character =e
Producer thread [TID=3] pushes character =e
Consumer thread [TID=1] terminates.
Producer thread [TID=4] terminates.
Producer thread [TID=3] terminates.
System terminates normally.
Final value of top = 3.
Final value of stack top = d.
Final value of stack top-1 = c.
BUILD SUCCESSFUL (total time: 0 seconds)
```

Output 2:

```
Main thread starts executing.
Initial value of top = 3.
Initial value of stack top = d.
Main thread will now fork several threads.
Two Consumer threads have been created.
Two Producer threads have been created.
One CharStackProber thread has been created.
Consumer thread [TID=1] starts executing.
```

Consumer thread [TID=1] pops character =d
Producer thread [TID=3] starts executing.
Consumer thread [TID=2] starts executing.
Consumer thread [TID=1] pops character =c
Consumer thread [TID=2] pops character =c
Producer thread [TID=4] starts executing.
Producer thread [TID=3] pushes character =c
Producer thread [TID=4] pushes character =a
CharStackProber thread [TID=5] starts executing.
Consumer thread [TID=2] pops character =a
Consumer thread [TID=1] pops character =b
Stack S = ([a],[b],[c],[$],[$],[$],[$],[$],[$],[$])
Producer thread [TID=4] pushes character =c
Stack S = ([a],[b],[c],[$],[$],[$],[$],[$],[$],[$])
Producer thread [TID=3] pushes character =b
Stack S = ([a],[b],[c],[$],[$],[$],[$],[$],[$],[$])
Consumer thread [TID=1] terminates.
Stack S = ([a],[b],[c],[$],[$],[$],[$],[$],[$],[$])
Stack S = ([a],[b],[c],[$],[$],[$],[$],[$],[$],[$])
Stack S = ([a],[b],[c],[$],[$],[$],[$],[$],[$],[$])
Producer thread [TID=4] pushes character =d
Producer thread [TID=3] pushes character =d
Consumer thread [TID=2] pops character =d
Producer thread [TID=3] terminates.
Producer thread [TID=4] terminates.
Consumer thread [TID=2] terminates.
System terminates normally.
Final value of top = 3.
Final value of stack top = d.
Final value of stack top-1 = c.

Output 3:

Main thread starts executing.
Initial value of top = 3.
Initial value of stack top = d.
Main thread will now fork several threads.
Two Consumer threads have been created.
Two Producer threads have been created.
One CharStackProber thread has been created.
Consumer thread [TID=1] starts executing.
Consumer thread [TID=1] pops character =d
Consumer thread [TID=1] pops character =c
Consumer thread [TID=1] pops character =b
Producer thread [TID=3] starts executing.
Producer thread [TID=4] starts executing.
Producer thread [TID=3] pushes character =b
Consumer thread [TID=1] terminates.
Consumer thread [TID=2] starts executing.
Consumer thread [TID=2] pops character =d
Consumer thread [TID=2] pops character =c
CharStackProber thread [TID=5] starts executing.
Producer thread [TID=3] pushes character =d

Producer thread [TID=4] pushes character =c
Stack S = ([a],[$],[$],[$],[$],[$],[$],[$],[$],[$])
Consumer thread [TID=2] pops character =b
Stack S = ([a],[$],[$],[$],[$],[$],[$],[$],[$],[$])
Consumer thread [TID=2] terminates.
Stack S = ([a],[$],[$],[$],[$],[$],[$],[$],[$],[$])
Stack S = ([a],[$],[$],[$],[$],[$],[$],[$],[$],[$])
Stack S = ([a],[$],[$],[$],[$],[$],[$],[$],[$],[$])
Stack S = ([a],[$],[$],[$],[$],[$],[$],[$],[$],[$])
Producer thread [TID=4] pushes character =b
Producer thread [TID=3] pushes character =c
Producer thread [TID=4] pushes character =d
Producer thread [TID=3] terminates.
Producer thread [TID=4] terminates.
System terminates normally.
Final value of top = 3.
Final value of stack top = d.
Final value of stack top-1 = c.

ii)

```
Stack S = ([a],[b],[c],[d],[$],[$],[$],[$],[$],[$])
Stack S = ([a],[b],[c],[d],[$],[$],[$],[$],[$],[$])
Stack S = ([a],[b],[c],[d],[$],[$],[$],[$],[$],[$])
Stack S = ([a],[b],[c],[d],[$],[$],[$],[$],[$],[$])
Stack S = ([a],[b],[c],[d],[$],[$],[$],[$],[$],[$])
Stack S = ([a],[b],[c],[$],[$],[$],[$],[$],[$],[$])

Stack S = ([a],[b],[c],[d],[e],[f],[$],[$],[$],[$])
Stack S = ([a],[b],[c],[d],[e],[f],[$],[$],[$],[$])
Stack S = ([a],[b],[c],[d],[e],[f],[$],[$],[$],[$])
Stack S = ([a],[b],[c],[d],[e],[f],[$],[$],[$],[$])
Stack S = ([a],[b],[c],[d],[e],[f],[$],[$],[$],[$])
Stack S = ([a],[b],[c],[d],[e],[f],[$],[$],[$],[$])

Stack S = ([$],[$],[$],[$],[$],[$],[$],[$],[$],[$])
Stack S = ([a],[$],[$],[$],[$],[$],[$],[$],[$],[$])
Stack S = ([a],[b],[$],[$],[$],[$],[$],[$],[$],[$])
Stack S = ([a],[b],[c],[$],[$],[$],[$],[$],[$],[$])
Stack S = ([a],[b],[c],[d],[$],[$],[$],[$],[$],[$])
Stack S = ([a],[b],[c],[d],[$],[$],[$],[$],[$],[$])
```