

Lab3: Flexible

After learning queue and stack in class, you are wondering if there is something more flexible. Maybe a list supporting *pop* and *push* on both sides sounds great.

You should maintain such a list, and support 4 operations:

- `+s` : push `s` to the left side
- `-` : pop a char from the left side and print it
- `<s` : push `s` to the right side
- `>` : pop a char from the right side and print it

Here, the list is empty at first, and `s` can be letters either lowercase or uppercase. If the list pops when empty, just print a `_` as the result.

Sample Input

```
--a+d+o+A><b->
```

Sample Output

```
--a+d+o+A><b->
_aAb
```

Notice: echo included

Explanation:

Operation	List	Output
-		_
+a	a	
+D	Da	
+d	dDa	

Operation	List	Output
+o	odDa	
+A	AodDa	
>	AodD	a
<b	AodDb	
-	odDb	A
>	odD	b

Requirements

- Write program with **LC-3 assembly language**
- Start your program at `x3000`
- You can refer to APPENDIX A.1 for the address space you are allowed (Unprivileged Memory) to use.
- Use `trap x20` to input (prompt of `trap x23` is not allowed), and echo the input. Your output should be in the second line.
- The input will only contain the operations mentioned above and end with newline (`10` in ASCII)
- Remember to halt your program in the end
- **NO CHEATING**

Grading

Lab 3 takes 7% of the final score, consisting of Check and Report.

Check (50%)

- Contact to your lab TA to check your code. In most cases, it is required to be **OFFLINE**.
- TA will test your code in different cases. Correctness is the primary factor in grading.
- TA will ask you questions to make sure you finish it on your own. It is very important to be familiar with the lab and your code. Suggestion: write some comments in case you forget what your code means.
- You can retry if you fails a check, but there will be a penalty of 10% points in Check part each time.

Report (50%)

- Written in **English**, concise and complete
- Convince TA that you finish the lab on your own
- **No more than** 3 A4 pages
- Consisting of:
 - Algorithm explanation
 - Essential parts of your code with sufficient comments
 - Questions TA asked you and your answer in Check

Other Penalty

- Delay: -10% each day after ddl
- Cheating: -100%, and -10% in final score of the course