Algorithms and Data Structures for Data Science

lab_quacks

CS 277

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Learning Objectives

Practice using the stack and the queue

Stack ADT

Order: Last-in, First-Out

Operations:

Push( )

Pop( )

Top( )

Queue ADT

Order: First-in, First-Out

Operations:

Enqueue( )

Dequeue( )

Front( )

Programming Practice

For each problem consider:

Do I know what the problem is asking me to do?

What values in the stack or queue are relevant? How can I access them?

Do I need any additional data structures to solve the problem?

isBalanced

```
[[]]
```

```
[[][]
```

```
[a][b]]
```

```
][
```

isBalanced

How do we know when a string is unbalanced?

`[[]]`

Balanced

`[[][]`

What values in my input queue do I need?

Not Balanced

`[a][b]]`

Not Balanced

How can I track these values?

`][`

Not Balanced

leftRotateQueue

```
[a, b, c, d]
```

leftRotateQueue

`[a, b, c, d], 1`

`[b, c, d, a]`

How do we know which rotation we need?

What values in my input do I need to access?

What do I do with every item I access?

removeOdds

```
[1, 2, 3, 4, 5]
```

removeOdds

```
[1, 2, 3, 4, 5]
```

[2, 4]

Can we remove some stack values and not others?

What values in my input do I need to access?

What do I do with every item I access?

mergeSortedQueues

```
[1, 2, 3, 4, 5], [4, 5, 6, 7, 8]
```

mergeSortedQueues

`[1, 2, 3, 4, 5], [4, 5, 6, 7, 8]`

`[1, 2, 3, 4, 4, 5, 5, 6, 7, 8]`

What values in my input do I need to access?

What do I do with every item I access?

Do I need a new data structure?

reverseStack

```
[1, 2, 3, 4, 5]
```

reverseStack

`[1, 2, 3, 4, 5]`

`[5, 4, 3, 2, 1]`

Can I change the values in my stack directly?

What values in my input queue do I need?

What should I do with the values I pop?