

# Problem 1172: Dinner Plate Stacks

## Problem Information

**Difficulty:** Hard

**Acceptance Rate:** 33.24%

**Paid Only:** No

**Tags:** Hash Table, Stack, Design, Heap (Priority Queue)

## Problem Description

You have an infinite number of stacks arranged in a row and numbered (left to right) from `0`, each of the stacks has the same maximum capacity.

Implement the `DinnerPlates` class:

\* `DinnerPlates(int capacity)` Initializes the object with the maximum capacity of the stacks `capacity`. \* `void push(int val)` Pushes the given integer `val` into the leftmost stack with a size less than `capacity`. \* `int pop()` Returns the value at the top of the rightmost non-empty stack and removes it from that stack, and returns `-1` if all the stacks are empty. \* `int popAtStack(int index)` Returns the value at the top of the stack with the given index `index` and removes it from that stack or returns `-1` if the stack with that given index is empty.

**Example 1:**

```
**Input** ["DinnerPlates", "push", "push", "push", "push", "push", "popAtStack", "push", "push",
"popAtStack", "popAtStack", "pop", "pop", "pop", "pop", "pop"] [[2], [1], [2], [3], [4], [5], [0], [20],
[21], [0], [2], [], [], [], [], []] **Output** [null, null, null, null, null, null, 2, null, null, 20, 21, 5, 4, 3, 1,
-1] **Explanation:** DinnerPlates D = DinnerPlates(2); // Initialize with capacity = 2 D.push(1);
D.push(2); D.push(3); D.push(4); D.push(5); // The stacks are now: 2 4 1 3 5 ■■■
D.popAtStack(0); // Returns 2. The stacks are now: 4 1 3 5 ■■■ D.push(20); // The stacks
are now: 20 4 1 3 5 ■■■ D.push(21); // The stacks are now: 20 4 21 1 3 5 ■■■
D.popAtStack(0); // Returns 20. The stacks are now: 4 21 1 3 5 ■■■ D.popAtStack(2); //
Returns 21. The stacks are now: 4 1 3 5 ■■■ D.pop() // Returns 5. The stacks are now: 4 1
3 ■■■ D.pop() // Returns 4. The stacks are now: 1 3 ■■■ D.pop() // Returns 3. The stacks are
now: 1 ■■■ D.pop() // Returns 1. There are no stacks. D.pop() // Returns -1. There are still no
stacks.
```

**\*\*Constraints:\*\***

\* `1 <= capacity <= 2 \* 104` \* `1 <= val <= 2 \* 104` \* `0 <= index <= 105` \* At most `2 \* 105` calls will be made to `push`, `pop`, and `popAtStack`.

## Code Snippets

**C++:**

```
class DinnerPlates {
public:
    DinnerPlates(int capacity) {

    }

    void push(int val) {

    }

    int pop() {

    }

    int popAtStack(int index) {

    }
};

/**
 * Your DinnerPlates object will be instantiated and called as such:
 * DinnerPlates* obj = new DinnerPlates(capacity);
 * obj->push(val);
 * int param_2 = obj->pop();
 * int param_3 = obj->popAtStack(index);
 */
```

**Java:**

```
class DinnerPlates {

    public DinnerPlates(int capacity) {
```

```

}

public void push(int val) {

}

public int pop() {

}

public int popAtStack(int index) {

}

}

/**
 * Your DinnerPlates object will be instantiated and called as such:
 * DinnerPlates obj = new DinnerPlates(capacity);
 * obj.push(val);
 * int param_2 = obj.pop();
 * int param_3 = obj.popAtStack(index);
 */

```

### Python3:

```

class DinnerPlates:

    def __init__(self, capacity: int):

    def push(self, val: int) -> None:

    def pop(self) -> int:

    def popAtStack(self, index: int) -> int:

    # Your DinnerPlates object will be instantiated and called as such:

```

```
# obj = DinnerPlates(capacity)
# obj.push(val)
# param_2 = obj.pop()
# param_3 = obj.popAtStack(index)
```