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BIT: YEAR II

ASSIGNMENT OF DATA STRUCTURE AND ALGORITHM ON (STACK AND QUEUE)

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ANSWER ON STACK

A.BASICS

Q1. The MTN MOMO app back button is good example of **last in last out** because last step you complete is step removed first when you press back button. Example we have:

1.buy airtime

2.buy internet

3.buy electricity

0.press to go back

Which means when you press zero this interface we have here will be removed first and when you continue to press zero from previous step you will reach where you have started and if you continue there will be no element in stack(empty stack) in MTN MOMO app which have storing your operation data in stack data structure and that make it example of application of stack data storing structure.

Q2. Navigating back in UR Canvas is like popping from a stack because it removes the most recently accessed module or page, as a pop operation removes the top item from a stack. It undoes your last action, which is the principle of a stack's pop operation.

B.APPLICATION

Q3. stack can enable an undo function by storing a history of every transaction as it's completed. When a user makes a mistake and presses "undo," the application "pops" the last transaction off the top of the stack, effectively removing it and then user correct that mistakes and this should be impossible if last in is not first out.

Q4. stack can make balanced forms by pushing each opening bracket or field onto the stack. When a matching closing bracket or field is available, the stack pops the corresponding opening one. If the stack is empty at the end, and all brackets were matched, the form is balanced.

C.LOGICAL

Q5. The top of the stack is **“**Group assignment**.”** The Pop() operation removed “Debate” from the stack, and then “Group assignment” was the last item pushed on.

Q6.According to push that have been made in question above there will remain 0 or no item in the stack, because element entered on stack have been four one removed and next three removed later

D .ADVANCED THINKING

Q7. stack enables retracing by - in the booking form. When the user moves to the next step, the current step's state is pushed onto the stack. When the user presses the "back" button, the stack pops the previous step, returning the user to that state.

Q8**.**Push "Umwana" onto the stack.

Push "ni" onto the stack.

Push "umutware" onto the stack.

Pop "umutware" (first out).

Pop "ni" (second out).

Pop "Umwana" (last out). This process reverses the order, resulting in "umutware ni Umwana."

Q9. Many of this situation and application need undo in some case and stack enable it while queue does not and stack is good at blancing form.

Q10. A feature could be an "undo last filter" button. When a user applies a filter to their transaction history, the previous unfiltered state is pushed onto a stack. If the user wants to undo the filter, they just press the button, and the application pops the previous state from the stack, restoring the view.

PART II QUEUE

A.BASIC

Q1: The restaurant shows FIFO (First-In, First-Out) because the first customers is the first to be served. who arrive are at the first queue enable that the order of arrival is maintained, like items in a data queue.

Q2.A YouTube playlist is like a dequeue operation because the next video is removed from front of the list the and played automatically, while new videos (if any) are added to the back. This show the FIFO principle of a queue.

B.APPLICATION

Q3. The line at RRA offices is a real-life queue because it's an organized list of people waiting to be served s New people join the back (enqueue), and the person at the front is served and leaves the line (dequeue).

Q4. Queues improve customer service by ensuring fairness and order. By processing requests in a clear, FIFO manner, customers know they will be served in turn, which reduces confusion and frustration.

C.LOGIC

Q5.Eric is at the front. The operations added Alice, Eric, and Chantal. Then, Alice was dequeued. This leaves Eric and Chantal, with Eric at the front. Jean was then added to the back.

Q6. A queue ensures fairness by processing applications strictly in the order they were **received**. The first application to be submitted (enqueued) is the first one to be processed (dequeued). This prevents new applications from jumping ahead of older .

D. ADAVANCED THINKING

Q7. Linear queue**:** People at a wedding buffet line up in a single file and are served one after another.

Circular queue**:** Buses looping at Nyabugogo bus station can be modeled as a circular queue. When a bus leaves, the next one moves to the front, and the "front" of the line eventually loops back around to the back.

Deque: Boarding a bus from both the front and rear doors is a Deque (Double-Ended Queue), as passengers can be added or removed from either end.

Q8.A queue can model this process by enqueuing each customer's order as it's placed. The restaurant kitchen then dequeues the orders one by one to prepare them. When an order is ready, the customer's name (or order number) is called.

Q9.It's a priority queue because emergencies are not handled on a first-in, first-out basis. They are given a higher priority and jump to the front of the line, regardless of when they arrived.

Q10 Two separate queues could be used: one for waiting drivers and one for waiting students. When a driver is ready, they are enqueued. When a student requests a ride, The system would then from the front of their respective queues and match them, ensuring a fair, first-come, first-served system.