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Assignment
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Part 1 STACK

A.Basics

Q1. How does this show the LIFO nature of stacks?

. The MoMo app shows the LIFO nature of stacks because the last step you entered is always the one removed when you go back. For instance, when using MoMo app, you enter payment details step by step.Step 1=*182*1*1*recipient's number*amount (frw)*PIN#

Q2: Why is this action similar to popping from a stack?

This action is like popping a stack, this is because when you are learning in UR Canvas, you move through these steps.

1. Open the course.
2. Go to Module
3. Open Lesson
4. Open Quiz

   The app removes the top item , it means the last thing you opened, If you are in the quiz and press back the quiz is removed and you go back to the lesson, press back again lesson will removed and you go to back to the module.

B.Application

Q3: How could a stack enable the undo function when correcting mistakes?

A stack enables the undo function because it stores every action you make in order, with the most recent action always on the top.

Example: If you want to perform actions step by step at BK Mobile Banking:

1.Transfer money

2.Pay electricity bill

3.Pay Application fees

Thes actions are pushed onto the stack in order: Transfer-Pay Electricity-Pay Application fees. If you make a mistake let say you pay much money than what you supposed to pay on Application fees, the undo function will Pop the last action from the stack.

The system looks at the top of the stack (**pay application fees**), remove it, and cancels/reverses it.Now the stack becomes (**Transfer -pay electricity**) If you press undo again, it removes "**pay electricity**" then stack becomes (**Transfer**)Undo is naturally a reverse of your last step and stacks are last perfect for this because they always deal with the most recent action first.

Q4: How can stacks ensure forms are correctly balanced?

Matching brackets **(),[]** is like opening and closing doors. You open one, then another, and you must close them in reverse order. A stack helps track that sequence.

B. Logical

Q5: Which task is next (top of stack)?

After pushing "CBE notes", "Math revision", and "Debate", then popping "Debate", and pushing "Group assignment", the top of the stack is **Group assignment**, the last thing added.

Q6: Which answers remain in the stack after undoing?

If you undo three actions from a stack of five, you are left with the first two.

C. Advanced Thinking

Q7: How does a stack enable this retracing process?

When booking a bus ticket, each step selecting route, time, seat is pushed onto a stack. If you go back, you pop each step one by one.

Q8. Reversing “Umwana ni umutware” using a stack gives you **umutware ni Umwana**.

Q9: Why does a stack suit this case better than a queue?

DFS (Depth-First Search) uses stack because it goes deep first and comes back step by step. A queue would go wide.

Q10: Suggest a feature using stacks for transaction navigation.

-In a money app, you could use a stack to track recent transactions. Pressing “undo” would pop the last transaction and show the previous one.

Part 2 .QUEUE

A. **Basics**

Q1: How does this show FIFO behavior?

The **first customer to arrive** is the **first to be served**. New arrivals **join the back** of the line and **wait their turn**. No one skips ahead service flows in the **exact order of arrival**.

That is a queue First In, First Out.

Q2: Why is this like a dequeue operation?

In a playlist, the first song plays, then the next. Each song waits its turn, just like people in line.

B.Application

Q3: How is this a real-life queue?

At RRA, people line up. Each new person joins the end of the queue, and the first person gets served first.

Q4: How do queues improve customer service?

Queues help keep order. Everyone knows their turn is coming, and no one gets skipped.

B. **Logical**

Q5: Who is at the front now?

- After enqueuing "Emille", "Elia", "Chantal", then dequeuing "Emille", and enqueuing "John", the front of the queue is **Elia**.

Q6: Explain how a queue ensures fairness.

FIFO ensures fairness. If you apply for something, you are processed in the order you arrive no jumping ahead.

D. Advanced Thinking

Q7: Explain how each maps to real Rwandan life.

- **Linear queue**: Like a buffet line one way, no turning back.
- **Circular queue**: Like buses at Nyabugogo they loop and reuse space.
- **Deque**: Like boarding a bus from either front or back flexible.

Q8: **How can queues model this process?**

In a restaurant, orders are taken and placed in a queue. When ready, they are served in order first ordered, first served

Q9: Why is this a priority queue, not a normal queue?

At CHUK, emergencies jump ahead. That is a priority queue urgent cases get treated first, even if they arrived later.

Q10: How would queues fairly match drivers and students?

- Students request rides. Drivers are matched in order. The first student gets the first available driver just like a queue.