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DATA STRUCTURE AND ALGORITHM

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Project 88: Stack Questions

1. Practical (Rwanda): UR pushes ["Lecture1", "Lecture2", "Lecture3"]. Undo one. Which is top?

A stack follows LIFO (Last In, First Out).

Sequence of pushes:

Push "Lecture1" → Stack: [Lecture1]

Push "Lecture2" → Stack: [Lecture1, Lecture2]

Push "Lecture3" → Stack: [Lecture1, Lecture2, Lecture3]

Undo one = pop last item → "Lecture3" is removed.

Remaining top = "Lecture2".

Answer: "Lecture2" is on top.

2. Practical (Rwanda): In Irembo, push ["Upload ID", "Fill Address", "Submit"]. Undo two. Which remains?

Push sequence:

"Upload ID" → [Upload ID]

"Fill Address" → [Upload ID, Fill Address]

"Submit" → [Upload ID, Fill Address, Submit]

Undo two = pop twice:

Remove "Submit" → [Upload ID, Fill Address]

Remove "Fill Address" → [Upload ID]

Answer: "Upload ID" remains.

3. Challenge: Push ["A", "B", "C"], pop all, push "D". Which is top?

Push "A" → [A]

Push "B" → [A, B]

Push "C" → [A, B, C]

Pop all → [] (empty stack)

Push "D" → [D]

✅ Answer: "D" is the top.

4. Reflection: Why stack suits redo/undo in online platforms?

Reasoning:

Actions in online platforms (typing, clicking, editing documents) follow a timeline.

The last action you did should be the first one to undo (LIFO principle).

Example: If you typed a sentence, then applied bold, then changed color:

Undo → removes color first, then bold, then typing.

Redo works the same way, but in reverse.

Stacks perfectly fit this last-action priority system.

Answer: Stack suits redo/undo because it matches real human interaction order — the last change is undone first.

🔻 Project 88: Queue Questions

1. Practical (Rwanda): At CHUK, 10 patients queue. After 7 served, who is front?

Queue follows FIFO (First In, First Out).

Order: P1, P2, P3, …, P10

After serving 7 → P1 to P7 leave.

New front = P8

✓ Answer: Patient 8 is in front.

2. Practical (Rwanda): At Nyabugogo, 6 buses queue. Who is served second?

Bus order: B1, B2, B3, B4, B5, B6

Served order:

First served = B1

Second served = B2

✓ Answer: Bus 2 is served second.

3. Challenge: Queue vs stack for concert ticket lines. Which works?

Stack (LIFO): Last person to arrive would get ticket first → unfair.

Queue (FIFO): First person to arrive is served first → fair system.

In real life, ticket sales must reward early arrival, so queue is correct.

✓ Answer: Queue works because it ensures fairness and order in ticket distribution.

4. Reflection: Why FIFO ensures fairness in entertainment events?

In events like concerts, buses, hospitals, and elections:

People who come earlier deserve service earlier.

FIFO respects time of arrival → builds trust and fairness.

Without FIFO, chaos would happen (newcomers getting ahead of those waiting longer).

✓ Answer: FIFO ensures fairness because it respects arrival order, prevents cheating, and keeps systems organized.