Project Title: Flowchart Maker App

Overview

Build an Android app that allows users to create, edit, and visualize flow charts right from their device. Users can add nodes (process steps, decisions, inputs/outputs), link them with directional arrows, and label each connection. The app should work fully offline, saving flowcharts locally and supporting real-time validation (e.g., checking for cycles or missing start/end nodes). Remember how we make flowchart in our C course work, same app if we can make for students that can make any flow chart of their choice. Remember you will not be able to use LLM or any other 3rd party software to make the core thing.

Key Objectives

1. **Flowchart Creation & Editing**

• Drag-and-drop interface for placing nodes (e.g., Start, Process, Decision).

• Ability to move or resize nodes and draw directional edges between them.

• Label nodes and edges with short text.

2. **Validation & Feedback**

• Detect potential issues (like unconnected nodes, multiple starts/ends, cyclical paths if undesired).

• Display concise error messages or visual highlights if the flowchart is invalid.

3. **Execution or Simulation (Optional)**

• Let users “simulate” their flowchart by starting at the initial node and following decision paths, possibly prompting for user input on branches.

• Show a step-by-step trace or highlight the active node as the simulation runs.

4. **Data Storage (Offline-First)**

• Store flowcharts locally in a lightweight format (e.g., JSON or a small database).

• Support creating multiple flowcharts, each saved with a title or tags.

• Optional export/import of flowcharts as files to share with others or back up.

5. **Performance & Concurrency**

• Smooth interactions even with moderate node counts (e.g., 50+ nodes/edges).

• Use background threads or coroutines for loading/saving larger diagrams without blocking UI.

• Any checks (cycle detection, layout updates) should be quick to avoid stutters.

6. **Usability & UI/UX**

• Clear, intuitive design for placing and linking nodes on a canvas.

• Zoom and pan gestures for navigating large flowcharts.

• An “overview” or mini-map to jump around large diagrams.

7. **Optional Advanced Features**

• **Node Templates**: Predefined shapes for Start/End, Decisions, Processes, etc.

• **Auto-Layout**: Automatically arrange nodes to minimize edge crossing or cluster related nodes.

• **Collaboration**: (Advanced) Sync or share flowcharts over LAN/Wi-Fi Direct, merging edits if desired.

Constraints

• Must work fully **offline** (no external servers or APIs needed).

• Store all flowchart data **on-device**.

• Design for smooth performance with up to 50–100 nodes.

• Keep the UI minimal yet functional for rapid flowcharting.

Deliverables

1. **Working APK**: Demonstrate node placement, linking, editing, and saving.

2. **Source Code & Setup Guide**: Document how to build and run the app, plus brief explanations of data structures or concurrency usage.

3. **Demo**: Show creating a flowchart from scratch, highlighting validation feedback and saving/loading offline.

Impact

An offline flowchart tool on Android helps students, professionals, and hobbyists quickly sketch and refine process flows or algorithms on the go. It demonstrates solid **CS concepts** (graph data structures, concurrency in saving/loading, and optional cycle detection) while providing a portable, user-friendly design tool.