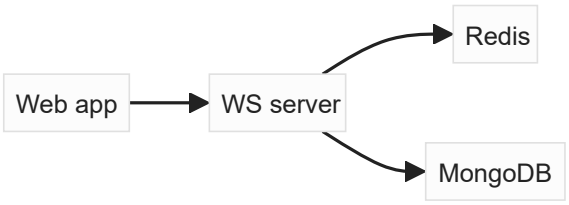
System design

Architecture Diagram



Component Description

- **Web App**: React-based front-end for dynamic user interaction.
- **WS Server**: WebSocket server for real-time communication.
- **Redis**: In-memory store for fast session data handling.
- **MongoDB**: Stores quiz content and metadata.

Data flow

```
on join:
        if room is empty:
                set host = client
                set room state to READY
                retreve 10 random sets of quizzes from DB
                store quizzes into redis
        else:
                retrieve questions from redis store for current room
        send list of Qs and As, initial leaderboards to client

on leave:
        if number of players >= 1 and client == host:
                assign host to next one
        else:
                host = null
        if room is empty after leaving, delete all room data
        update and broadcast new learderboard

on start:
        if client == host:
                set room state to IN_PROGRES
                broadcast timer event every 1s until duration (30s) ends
                when timer reaches 0:
                        broadcast result event
                        set room state to ENDED

on restart:
        if client == host:
                set room state to READY
                reset leaderboard scores
                load new questions
```

```
on submit answer:
        inputs: questionId, answerId
        make sure room state is IN_PROGRES
        if correct:
                increase score
                update leaderboard
```

Technologies and Tool

- Web App: React.js + Vite.
  - Justification: React.js provides a dynamic, efficient UI, while Vite offers fast build times and smooth development for a responsive front-end.
- WebSocket: node.js + socketIO
  - Justification: Node.js handles real-time communication efficiently, and Socket.IO enables fast, bidirectional data exchange for live quiz interactions.
- Database: MongoDB
  - Justification: MongoDB offers scalable, flexible data storage that supports fast read/write operations, perfect for real-time quiz app data.