Data Flow in UML Activity Diagram:

## Explanation of Data Flow:

1. **Start Quiz**: The quiz process begins when the user joins the quiz.
2. **User Joins Quiz**: The user joins by providing a unique quiz ID via the **Client Application**.
3. **Validate Quiz ID**: The **Quiz Server** verifies the provided quiz ID to ensure the user is entering an active session.
4. **Send Quiz Questions**: If the quiz ID is valid, the **Quiz Server** sends the quiz questions to the **Client Application**.
5. **User Submits Answer**: The user answers the questions, and their answers are submitted back to the **Quiz Server** via the **Client Application**.
6. **Process Answer & Update Score**: The **Quiz Server** processes the answer, calculates the score, and updates the user's score.
7. **Update Score in Database**: The **Quiz Server** stores the updated score in the **Database**.
8. **Push Updated Score to Leaderboard Service**: The **Quiz Server** sends the updated score to the **Leaderboard Service**.
9. **Update Real-Time Leaderboard**: The **Leaderboard Service** updates the leaderboard based on the new scores.
10. **Push Leaderboard Updates to All Clients**: The **Leaderboard Service** pushes the updated leaderboard to all connected clients via **WebSocket** in real-time.

## Key Components in the Data Flow:

* **Client Application**: The user interface for interacting with the quiz and viewing real-time updates.
* **Quiz Server**: The backend logic responsible for quiz flow, user score calculation, and data processing.
* **Database**: Stores user and quiz data, including answers and scores.
* **Leaderboard Service**: Keeps track of rankings and manages the real-time leaderboard.
* **WebSocket (Real-Time Communication Service)**: Enables live updates of the leaderboard and scores to all clients.

