

PDC Project Proposal

Distributed Online Quiz System



Group Members:

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1. Introduction

The Distributed Online Quiz System is a real-time, interactive platform. It allows multiple students to participate in a quiz session simultaneously, where the server broadcasts questions, manages timers, evaluates answers in parallel, and enforces anti-cheating mechanisms using distributed communication technologies like SignalR.

2. Problem Statement

Traditional quiz applications are sequential, lack real-time capabilities, and have weak cheating prevention mechanisms. Students also often cheat during online quiz like by opening new tabs, our system will also handle this problem. This system aims to implement a responsive, and secure distributed quiz solution using .NET technologies and Parallel & Distributed Computing (PDC) concepts.

3. Objectives

- Develop a real-time quiz system using .NET, SignalR.
- Implement multithreading, concurrency, and parallel processing.
- Implement anti-cheating using tab-switch detection.

4. Scope of the Project

- Login/Signup
- Host-controlled quiz session
- Server-side countdown timer
- Real-time question broadcast
- Parallel answer evaluation
- Anti-cheating detection
- Live leaderboard display

5. System Architecture

The system follows a single-server distributed model. A .NET server manages client connections, broadcasts questions, and evaluates answers while using SignalR for real-time communication. Multiple threads handle timers, scoring, and user sessions concurrently.

6. PDC Concepts Used

- Multithreading: Multiple users handled concurrently via SignalR worker tasks.
- Concurrency: Shared quiz state managed with thread-safe collections.
- Parallel Execution: Answer evaluation and timer updates run in parallel.
- Distributed Communication: Real-time updates using SignalR.
- Background Services: Question broadcasting and scoring run on separate server-side tasks.

7. Features & Functionality

- User signup and login
- Real-time participation interface
- Host admin panel
- Anti-cheating detection (tab change)
- Timed question display
- Parallel answer evaluation
- Live leaderboard display during quiz

8. Work Division

Student Name	Student Registration Number	Responsibility/ Module / Feature
Aneeb Ur Rehman	221322	<ul style="list-style-type: none">• User signup and login• Real-time participation interface
Usman Tahir	221463	<ul style="list-style-type: none">• Timed question display• Parallel answer evaluation
Zubair khan	221415	<ul style="list-style-type: none">• Host admin panel• Anti-cheating detection (tab change)• Live leaderboard display during quiz

9. Technology Stack

Backend: .NET, ASP.NET Core, SignalR

Database: SQLite/SQL Server/Supabase

Frontend: Razor Pages /JavaScript

Real-time Layer: SignalR WebSockets

10. Conclusion

The Distributed Online Quiz System demonstrates real-time communication, parallel execution, and distributed design using .NET and PDC principles. The anti-cheating system keeps in check for any cheating activity happening on client side like opening a new tab. This design is suitable for interactive academic environments and effectively demonstrates PDC concepts.