QuicSync

A Decentralized file sharing mechanism using **QUIC (Quick UDP Internet Connections)** protocol

Team

Members

- **Shoray Singhal** - LCI2020037
- **Nehal Sharma** - LCS2020001
- **Sankalp Sahu** - LCI2020016
- **Mili Singh** - LIT2020032

Supervisor

- **Dr. Mainak Adhikari** - Assistant Professor, CSE, IIIT Lucknow

Introduction

- Develop a fast, secure, and user-friendly decentralized file sharing system utilizing QUIC transport protocol.
- Use the encryption features of QUIC to ensure the secure transmission of data.
- Extensive testing and benchmarking will validate the system's effectiveness and superiority over other existing peer-to-peer file sharing systems.
- Make a proof-of-concept implementation of a hybrid P2P file sharing system using QUIC.

Related Work

SNo.	Authors	Objective	Gap
1	Enrique Costa-Montenegro et al	To Model a BitTorrent network as a multi-agent system	Incompatible with Binary-Agent system
2	Adam Langley et al	The QUIC Transport Protocol: Design and Internet-Scale Deployment	Limited Gain on Mobile Devices
3	Karthikeyan Bhargavan et al	To develop a verified reference implementation of TLS 1.2	No protection against Side-Channel Attacks

Motivation

Most decentralized file sharing systems use a peer-to-peer (P2P) networking method using the BitTorrent Protocol. It is designed to work with large numbers of users and handle high-bandwidth connections, making it an efficient and scalable solution for large file sharing.

But BitTorrent has some drawbacks:

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- Reliance on trackers
- Traffic is often unencrypted
- Performance affected by the number of seeders, leechers and network congestion
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QUIC

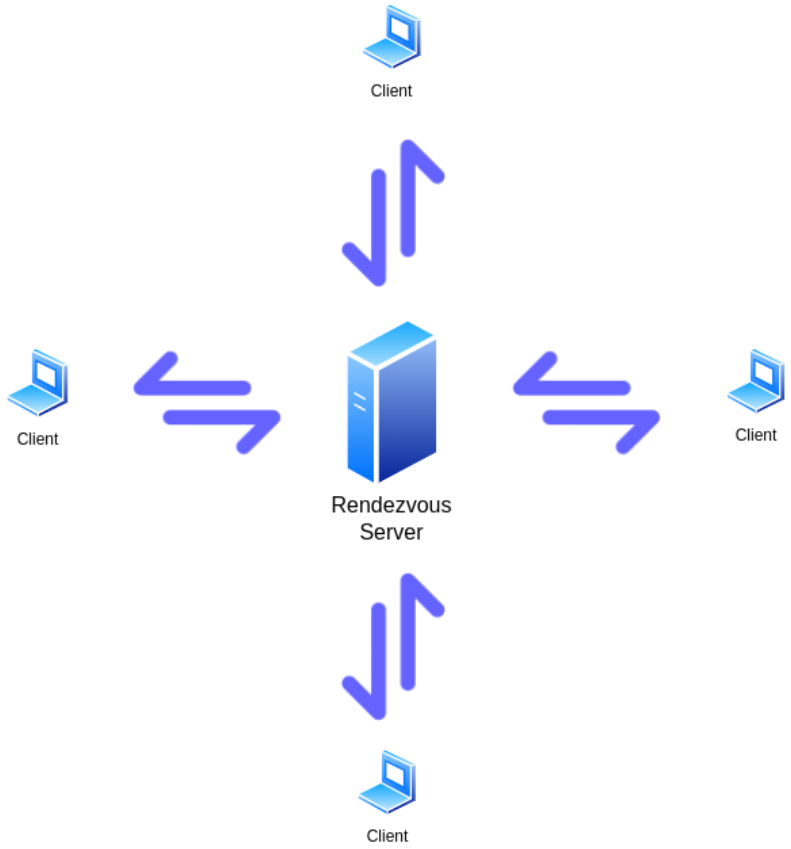
- **Improved speed and efficiency**
  - Reducing connection setup time, and minimizing protocol overheads.
- **Improved security**
  - Using TLS 1.3 for encryption and authentication.
- **Improved reliability**
  - Using QUIC's loss recovery and congestion control mechanisms.

Research Question : *To compare the performance of the QUIC protocol with other protocols commonly used in decentralized file sharing systems, such as BitTorrent or IPFS.*

Scenario (1/3)

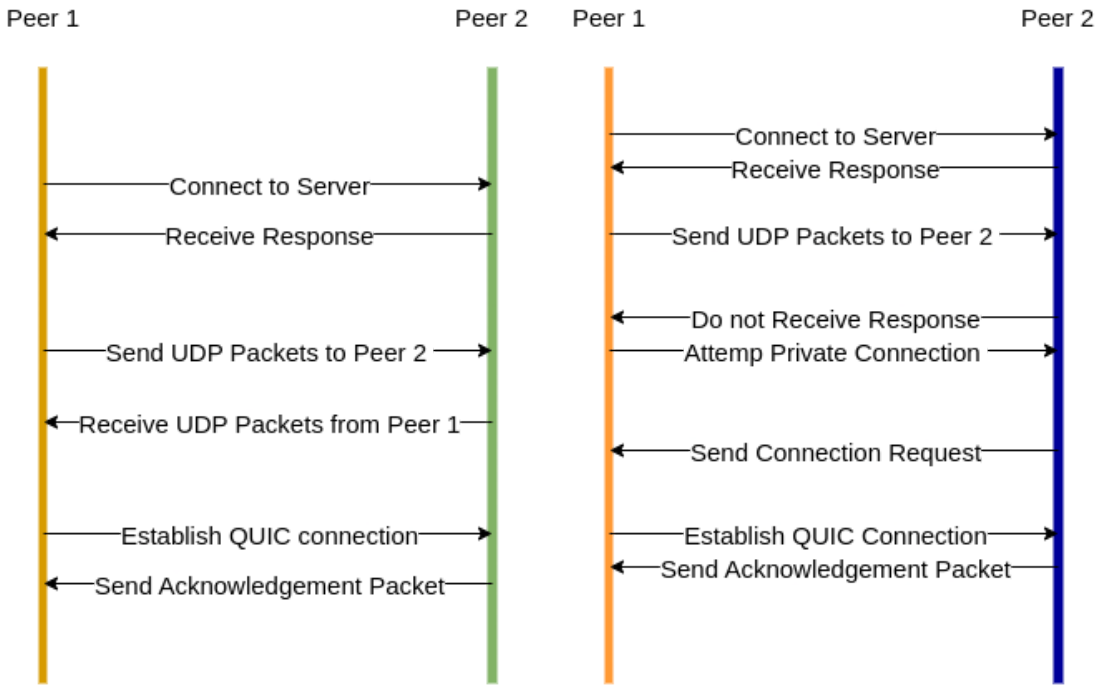
Overall scenario of the project is as follows:

- Peers connect to the rendezvous server and exchange information.



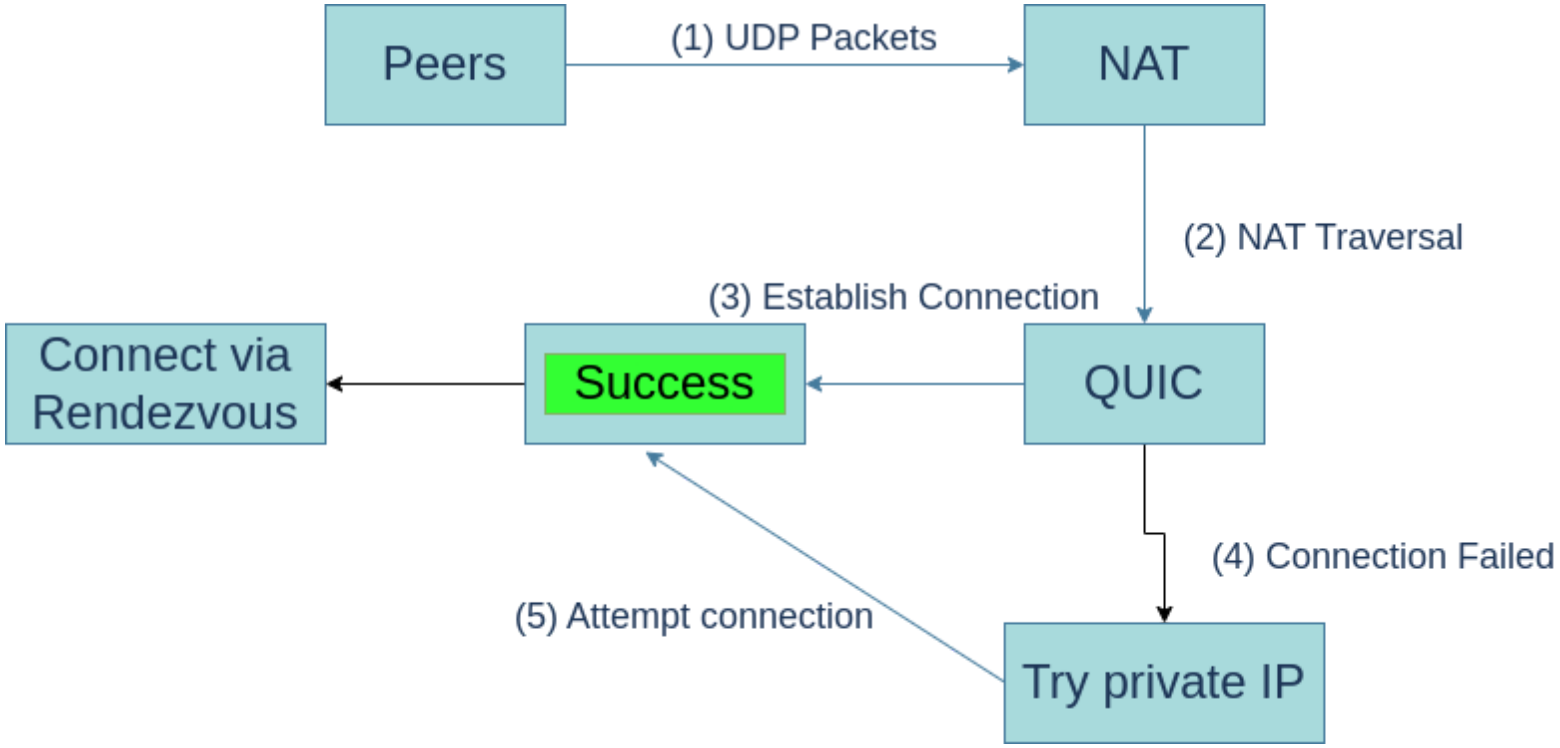
Scenario (2/3)

- Peers exchange UDP packets with each other's public IP addresses in an attempt to traverse the NATs. If successful, they establish a QUIC connection.
- If not, they attempt to establish a Quic connection using their private IP addresses.



Scenario (3/3)

- If a Quic connection is successfully established, the peers can communicate with each other.
- If the private IP connection attempt fails, the peers connect to a rendezvous server to transfer data through the server.



Workplan (1/2)

Till now

- Research and planning phase:
  - Studied the QUIC protocol and its implementation.
  - Studied the working of GO and other tools useful for the project.
- Design phase:
  - Designed the overall architecture of the project.
  - Designed the QUIC protocol implementation.

Workplan (2/2)

Next

- Implementation phase:
  - Implement the QUIC protocol.
  - Implement the rendezvous server.
  - Implement the file sharing system.
  - Implement Encryption and Authentication.
- Testing phase:
  - Test the whole system with contrained bandwidth and latency.
  - Test the system with different number of peers.
  - Test the system with different file sizes.

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