PriviChat: A Secure P2P Communication App

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Workshop: Network Applications

The Privacy Problem in Modern Chat Apps

End-to-End Encryption Issues: Many chat apps store backups on cloud servers that are often not encrypted, leaving them vulnerable.

Metadata Collection: Even if messages are encrypted, metadata can reveal communication patterns.

Data Selling: User data is often sold to third parties, compromising privacy.

Target Audience: Privacy-conscious users, activists, journalists, and professionals handling sensitive information.

PriviChat: The Secure Alternative

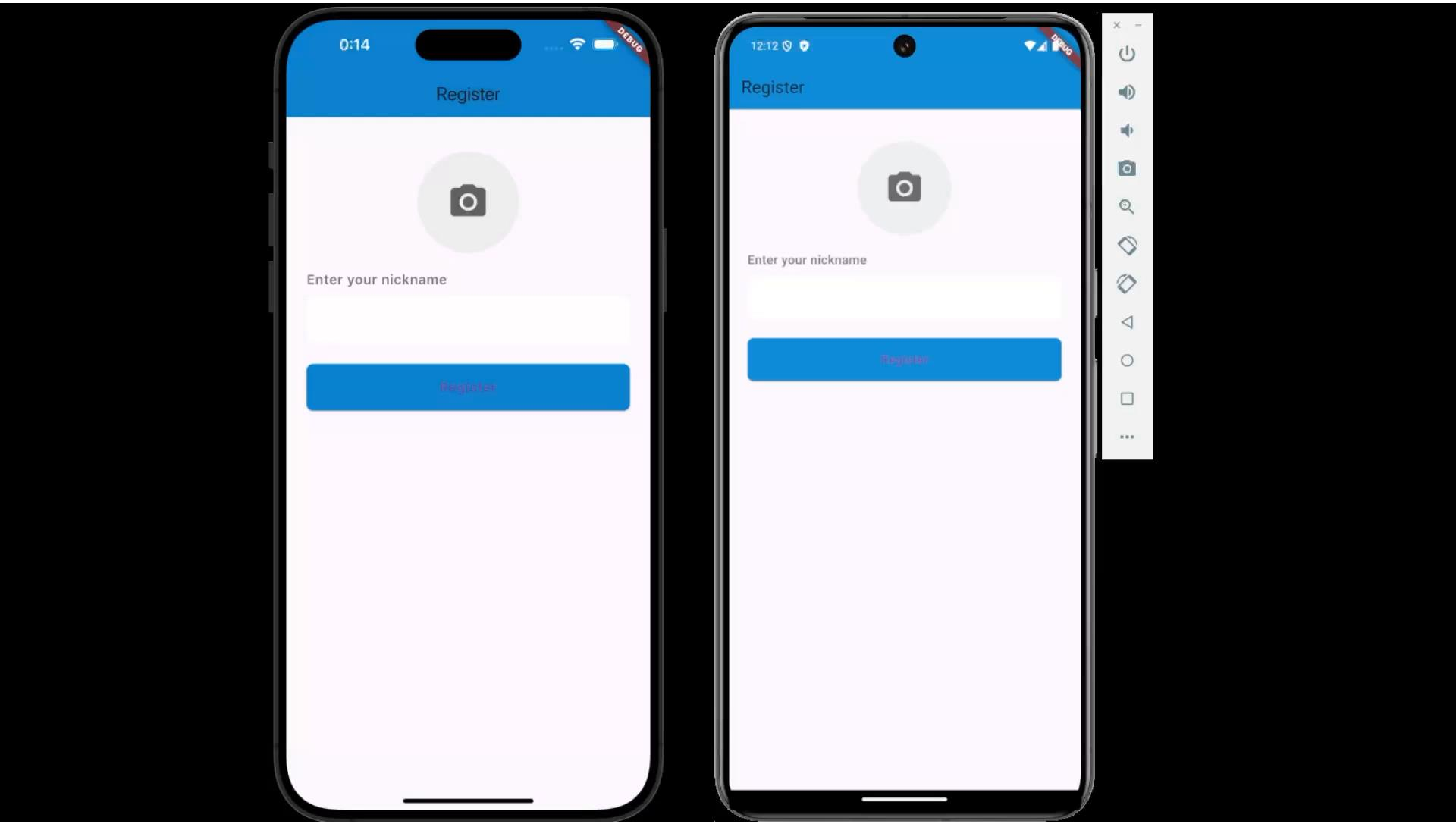
Peer-to-Peer (P2P) Communication: PriviChat uses a decentralized architecture for direct communication.

End-to-End Encryption: Every message, file, and call is encrypted from sender to recipient.

Local Data Storage: All data is stored locally on the user's device.

Transparency and Control: Users have full control over their data with no hidden backdoors.

PriviChat Demo Video



Technologies and Data Flow in PriviChat

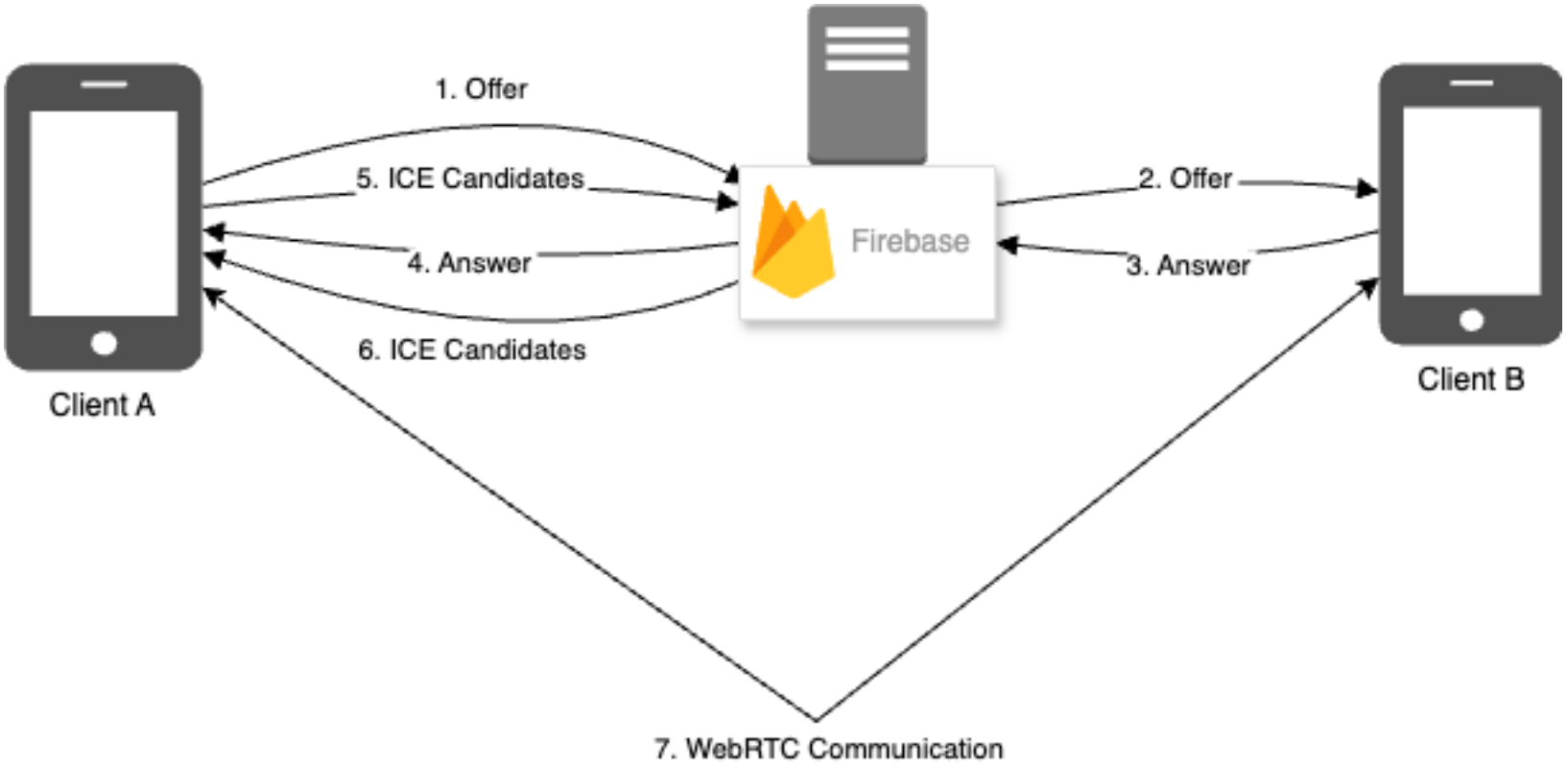
Technologies Used:

- Flutter for cross-platform development.
- Firebase Firestore for P2P discovery.
- WebRTC for secure P2P communication.
- Kotlin and Swift for OS-specific adjustments.

Technologies and Data Flow in PriviChat

Data Flow:	Client ‘A’ initiates communication and discovers Client ‘B’ using Firebase Firestore.
	WebRTC initiates a handshake for a direct P2P connection.
	Secure data transmission occurs directly between devices.
WebRTC Handshake:	ICE Candidates are used to find the best path for P2P connection.
	DTLS-SRTP Encryption secures the connection.
	Once the handshake is complete, secure P2P communication is established.

Technologies and Data Flow in PriviChat



Alternatives to PriviChat’s Approach

Signal: Secure messaging app using end-to-end encryption but relies on centralized servers.

Briar: P2P messaging app using Bluetooth or Wi-Fi for communication.

Server-Based Encryption Models: Apps like WhatsApp offer strong encryption but involve cloud backups and metadata collection.

Drawbacks Compared to PriviChat: Centralized servers, metadata collection, reliance on cloud backups, and less user control.

PriviChat: Secure Communication for the Modern Age

Summary:

- PriviChat addresses critical privacy issues using a decentralized P2P approach, end-to-end encryption, and local data storage.

Impact:

- PriviChat's architecture ensures users have complete control over their data and communications.