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Assignment: 2

Subject: SDA

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1. Zoom App Architecture Overview

Zoom's architecture has evolved significantly since its initial release. It started with a simple client-server architecture and has grown into a robust, cloud-based platform capable of handling millions of users across the globe with various communication and collaboration features.

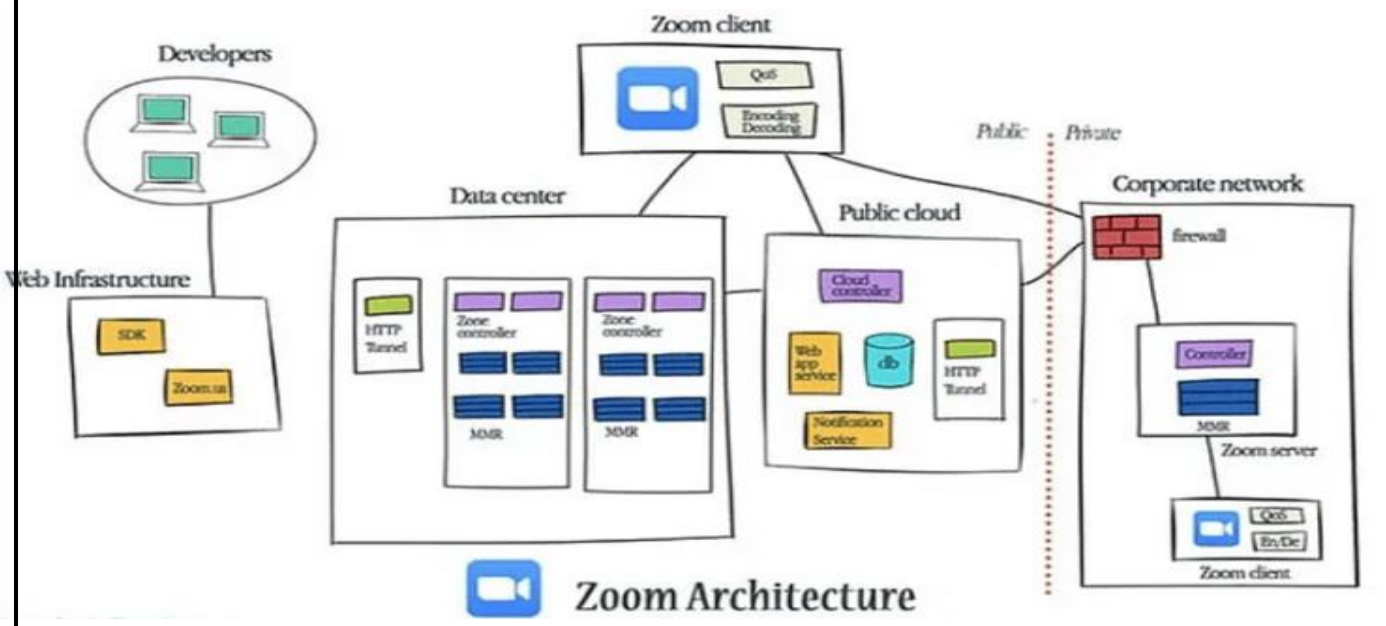
Early Architecture:

- **Client-Server Architecture (2013-2015)**: Initially, Zoom used a centralized client-server architecture, where:
    - **Client-side**: Users (participants in meetings) connected via desktop or mobile apps.
    - **Server-side**: Servers handled the video/audio calls, screen sharing, and other functionalities. The server acted as the intermediary for video streams, which were sent directly to the server and then relayed to other participants.
    - **Peer-to-Peer Video Calls**: In earlier versions, peer-to-peer (P2P) architecture was used for smaller meetings, while server-based architecture was used for large meetings.

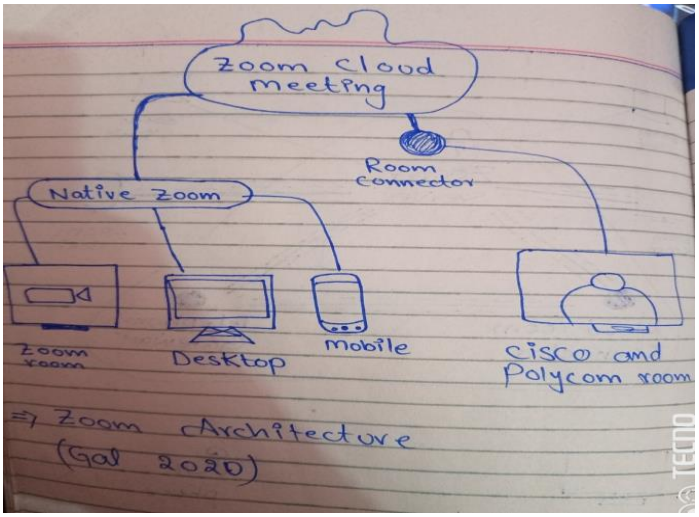
Cloud-Based Architecture:

- As Zoom expanded, it transitioned to a **cloud-based architecture**, distributing its workload across multiple **cloud data centers** globally. This allowed Zoom to handle:
    - High scalability.
    - Lower latency for users worldwide.
    - Integration with external services.
- **Modern Architecture (2020-Present)**: Zoom now utilizes a **multi-cloud infrastructure**, with a **hybrid cloud architecture**, which combines **public and private cloud providers**. The system includes:
    - **Content Delivery Networks (CDNs)** for low-latency video and audio streaming.
    - **Load Balancers** to distribute traffic efficiently.
    - **Microservices Architecture** to allow seamless scalability for specific services like chat, video calling, webinars, etc.
    - **Edge Computing** for real-time data processing closer to the users, enhancing performance.
    - **Security Infrastructure**: End-to-end encryption, multi-factor authentication, and compliance with enterprise security standards.

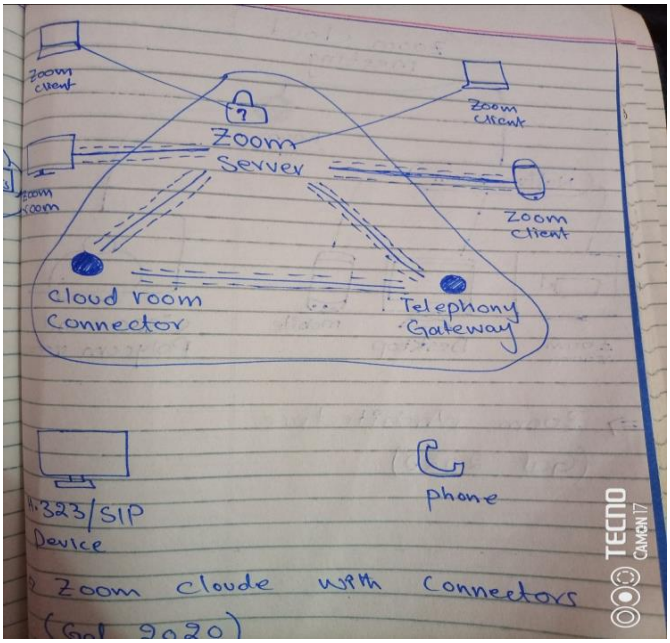
Architectural Diagram:



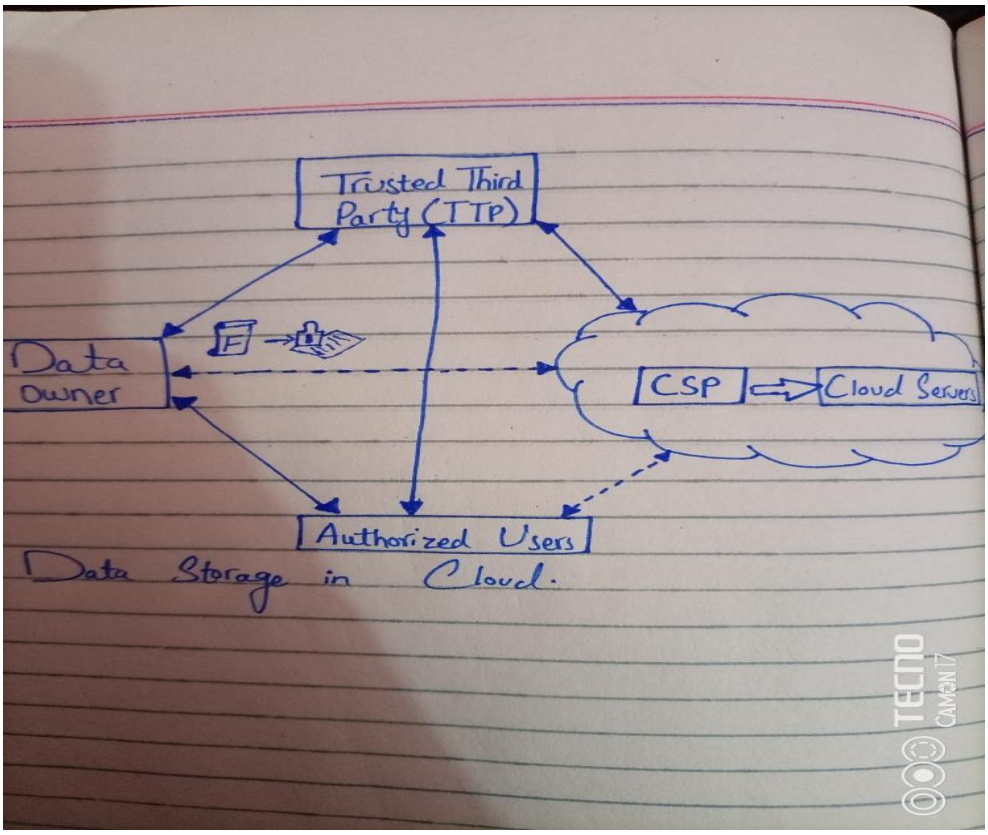
1. **Early Architecture**:



2. **Cloud-Based Architecture**:



DATA STORAGE:



2. Major Zoom Releases, Features, and Release Notes

Release 1.0 (2013)

- **Major Features**:
  - Basic video conferencing with screen sharing.
  - Video and audio calls with support for up to 15 participants.
- **Architecture**: Initial client-server architecture with limited scalability.

Release 3.0 (2015)

- **Major Features**:
  - Integration with Google Calendar, Outlook, and other scheduling tools.
  - Increased meeting capacity (support for 100 participants).
  - Mobile app release (iOS and Android).
- **Release Notes**: Introduction of better mobile support and improved call quality.

Release 5.0 (2016)

- **Major Features**:
  - Cloud recording and cloud storage for meetings.
  - Enhanced security and privacy options.
  - Breakout rooms for smaller group discussions.
- **Architecture**: Adoption of cloud infrastructure to handle increasing demand, with more distributed servers.

Release 5.4 (2017)

- **Major Features**:
  - HD video and audio support.
  - Webinar feature for hosting large events.
  - Enhanced integrations with other apps like Slack and Salesforce.
- **Release Notes**: Zoom optimized for large-scale events and enterprise customers.

Release 4.0 (2020) – Pandemic Growth

- **Major Features**:
  - Massive scaling to support millions of new users due to COVID-19.
  - Introduction of Zoom Webinars, breakout rooms for education and business use.
  - Improved video quality and audio fidelity for large groups.
  - End-to-End Encryption (E2EE) for meetings.
- **Release Notes**: Focus on security and scalability during the pandemic surge. Addition of virtual backgrounds, meeting reactions, and new security measures like waiting rooms.

Release 5.7 (2020)

- **Major Features**:
    - Improved virtual backgrounds with AI enhancements.
    - More security updates, including data encryption and authentication features.
    - Introduction of integrations with more enterprise tools (e.g., Microsoft Teams, Google Workspace).
- **Release Notes**: Focus on enhancing the user experience and security, especially for enterprise clients.

TAHIR ALI WORK CONTRIBUTION:

Release 5.10 (2020)

- **Major Features**:
    - Enhanced breakout rooms, allowing for larger groups (50+).
    - Improved integration with learning management systems (LMS) for schools.
    - Real-time transcription (automatic captions).
- **Release Notes**: Targeted enhancements for education and enterprise use cases, including improvements for larger virtual meetings.

Release 5.13 (2021)

- **Major Features**:
    - Advanced AI-powered meeting features like real-time transcription and translation.
    - Room-based meetings and hybrid team support with Zoom Rooms.
    - New integrations with project management tools like Asana and Trello.
- **Release Notes**: Shift towards supporting hybrid work environments and improving accessibility features.

Release 5.15 (2021)

- **Major Features**:
    - Breakout Rooms with up to 1000 participants.
    - Multi-cloud support for even better scaling and redundancy.
    - Enhanced security features for large meetings and webinars.
- **Release Notes**: Focus on meeting scalability and flexibility for large organizations and hybrid work setups.

Release 5.17 (2022)

- **Major Features**:
    - Zoom Phone expansion for more integrated communication.
    - Support for hybrid work and team collaboration tools like whiteboarding and simultaneous language interpretation.

    - Enhanced reporting and analytics tools for enterprise users.
- **Release Notes**: Focus on creating a full communication suite that goes beyond video meetings.

Release 5.19 (2023)

- **Major Features**:
    - Zoom IQ for sales and customer service teams, leveraging AI for insights and automation.
    - Integration with more third-party platforms and improved workflow automation.
    - Virtual and hybrid event support, including immersive environments.
- **Release Notes**: Continued improvement in AI-driven features, cloud infrastructure, and integration capabilities for a fully unified communication system.

Conclusion

Zoom's architecture has significantly evolved from a simple client-server model to a complex, cloud-based, and hybrid infrastructure that can scale globally. Over the years, Zoom has adapted its system to handle a vast increase in users, with the cloud playing a crucial role in ensuring performance, security, and reliability..