# Project Summary and Timeline

## 1. Simple Explanation of the Project

This project focuses on improving cloud resource access control by moving away from traditional centralized IAM (Identity and Access Management) systems, which have vulnerabilities such as single points of failure and insider threats. The research proposes a decentralized solution using blockchain-based multi-signature smart contracts enhanced with FROST (Flexible Round-Optimized Schnorr Threshold) cryptography.

The solution introduces decentralized consensus mechanisms with threshold cryptography and gas-optimized smart contracts on Ethereum, designed to deliver high security, reduce operational costs, and achieve sub-second authorization times even in multi-cloud environments. This approach aims to make IAM systems Byzantine fault-tolerant, scalable, transparent, and efficient.

## 2. Timeline (Week 2 – Week 12)

* Week 2: Finalize literature review, refine research problem, confirm dataset (AWS CloudTrail + Azure Activity logs).
* Week 3: System design: define architecture (FROST threshold verifier, smart contracts, API gateway).
* Week 4: Implement base FROST threshold cryptography modules, test Solidity contract prototypes for gas optimization.
* Week 5: Develop smart contract integration with AWS/Azure APIs (RESTful gateway).
* Week 6: Introduce policy repository, Merkle tree structures, and audit logs for compliance.
* Week 7: Implement Byzantine fault tolerance (HotStuff consensus + ROAST wrapper).
* Week 8: Integrate Layer 2 scaling solutions (Optimistic Rollups/Arbitrum) and caching mechanisms.
* Week 9: Benchmarking phase – measure throughput, latency, gas costs, and incident detection rate.
* Week 10: Perform comparative analysis with centralized IAM (AWS IAM, Azure AD) and blockchain-based baselines.
* Week 11: Document findings, discussion of limitations, draft conclusion & abstract.
* Week 12: Finalize dissertation, prepare presentation slides, rehearse and submit.

## 3. Notes for Class Update (End of Week 2)

So far, I have completed the literature review, finalized my research question, and identified the AWS CloudTrail dataset along with Azure Activity logs for multi-cloud testing. I have refined the project problem statement to highlight the weaknesses of centralized IAM systems and the benefits of decentralized, blockchain-based access control. From next week, I will begin system design and define the architecture of the decentralized IAM solution.

## 4. Possibility of Publishing a Research Paper

If the results show significant improvements in both performance and security, this project has potential for research publication in blockchain security or cloud computing journals. Potential contributions include:  
- Integration of FROST threshold cryptography with gas-optimized smart contracts.  
- Benchmarking IAM systems across AWS, Azure, and blockchain environments.  
- Achieving sub-second latency and lower gas costs compared to current blockchain IAM solutions.  
- Providing real-world enterprise-ready insights into decentralized access control systems.