

A04: Consensus Mechanism Debate

Which Consensus Mechanism Reigns Supreme?

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Learning Objectives

- Deeply understand at least one consensus mechanism
- Compare trade-offs across PoW, PoS, DPoS, and BFT
- Apply the blockchain trilemma to real use cases
- Develop and defend technical arguments under cross-examination

Assignment Details

- Time: 60 minutes total
- Format: 4 teams
- Difficulty: Medium
- Points: 50

Grading Breakdown

- Technical accuracy: 15 pts
- Argument quality: 12 pts
- Cross-exam engagement: 10 pts
- Use case application: 8 pts
- Presentation: 5 pts

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A04:

Three Properties

- **Decentralization:** How many independent validators? How easy to join?
- **Security:** How costly to attack? What's the threat model?
- **Scalability:** Transactions per second? Finality time?

The Trade-Off

- Most systems can optimize for 2 out of 3
- Your mechanism makes specific trade-offs — know them!

Your Debate Lens

Every argument should connect back to the trilemma. When defending your mechanism, explain *which* trade-off it makes and *why* that trade-off is acceptable.

Example

- PoW: High security + decentralization, lower scalability
- PoS: Good scalability + security, debatable decentralization

The Four Teams

- **Team 1:** Proof of Work (PoW)
- **Team 2:** Proof of Stake (PoS)
- **Team 3:** Delegated Proof of Stake (DPoS)
- **Team 4:** Byzantine Fault Tolerance (BFT)

Materials

- Each team receives a mechanism prep sheet
- Prep sheets contain: mechanism overview, strengths, weaknesses, real examples

Important

You must defend your assigned mechanism even if you personally prefer another. This builds critical thinking skills.

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A04:

Phase 1: Preparation (0–10 min)

- 1 Form teams and receive prep sheets
- 2 Read your mechanism's overview, strengths, and weaknesses
- 3 Prepare your opening argument (2 min max)
- 4 Anticipate attacks from other teams

Debate Tips

- Use specific technical facts, not vague claims
- Acknowledge weaknesses honestly, then explain mitigations
- Attack other mechanisms' *trade-offs*, not strawmen

Phase 2: Round-Robin Debates (10–30 min)

- 1 Each team delivers 2-minute opening statement
- 2 After each opening: 3-minute cross-examination from other teams
- 3 Answer questions directly and defend your mechanism's trade-offs

Cross-Exam Examples

- “How does PoW justify its energy consumption when PoS achieves similar security?”
- “If DPoS has only 21 validators, how is that decentralized?”

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Steps

- 1 Receive 6 use case scenario cards
- 2 For each scenario, teams argue why their mechanism is the best fit
- 3 Consider the specific requirements: throughput, finality, decentralization, energy
- 4 Prepare a 1-minute defense for each scenario
- 5 Class discusses and votes on best fit per scenario

Think Practically

A global payment system has different needs than a supply chain tracker. Match the mechanism's strengths to the use case's *specific* requirements.

Scenario Examples

- Global remittance network
- Enterprise supply chain
- Decentralized social media
- Central bank digital currency

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A04:

Peer Voting (45–55 min)

- 1 Anonymous ballot: rank all 4 mechanisms
- 2 Criteria: technical accuracy, argument quality, cross-exam performance
- 3 Submit ballots to instructor

Instructor Debrief (55–60 min)

- Reveal voting results
- Discuss what the class learned
- Highlight surprising arguments and insights
- Connect to real-world protocol choices

Voting Ballots

- Rank 1st through 4th
- Brief written justification for your top choice

No “Right” Answer

The goal is not to crown a winner. Every mechanism has legitimate use cases. The value is in understanding *why* each trade-off exists.

Strong Arguments

- Cite specific numbers (TPS, energy usage, validator count)
- Name real blockchains using your mechanism
- Acknowledge weaknesses before opponents raise them
- Propose solutions to known limitations

Common Pitfalls

- Don't just say "our mechanism is the best" — explain *why* and *for what*
- Don't ignore the trilemma — all mechanisms make trade-offs
- Don't attack other teams personally — attack the mechanism's design

Remember

The best debaters understand their opponent's mechanism as well as their own.

Assignment Page

digital-ai-finance.github.io/crypto-economics/assignments/A04_consensus_debate/instructions.html

All Assignments

digital-ai-finance.github.io/crypto-economics/assignments/index.html

Form your teams and study your prep sheets!

You have 10 minutes to prepare, then the debates begin. Total time: 60 minutes.