Blind Slashing Mechanism Simulation Strategy
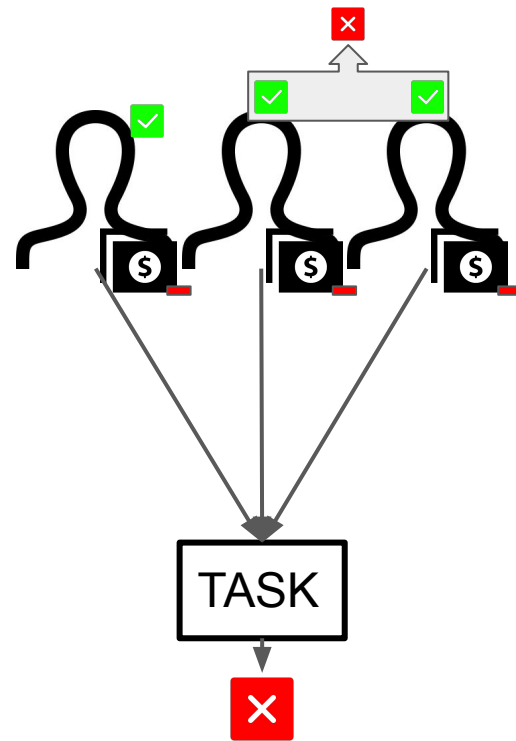
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Blind Slashing: Context
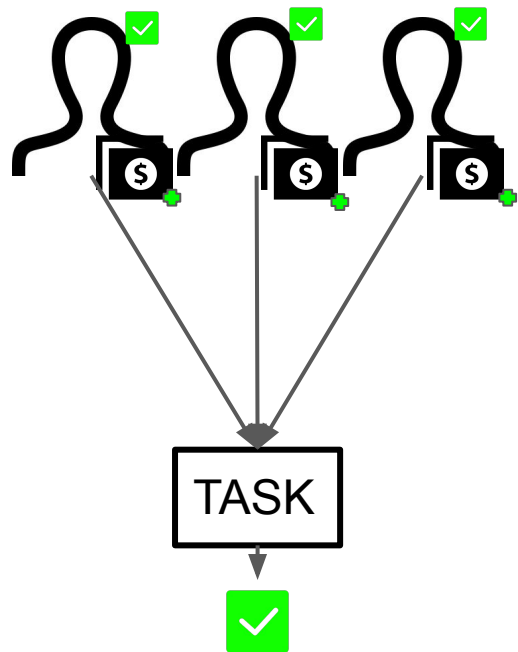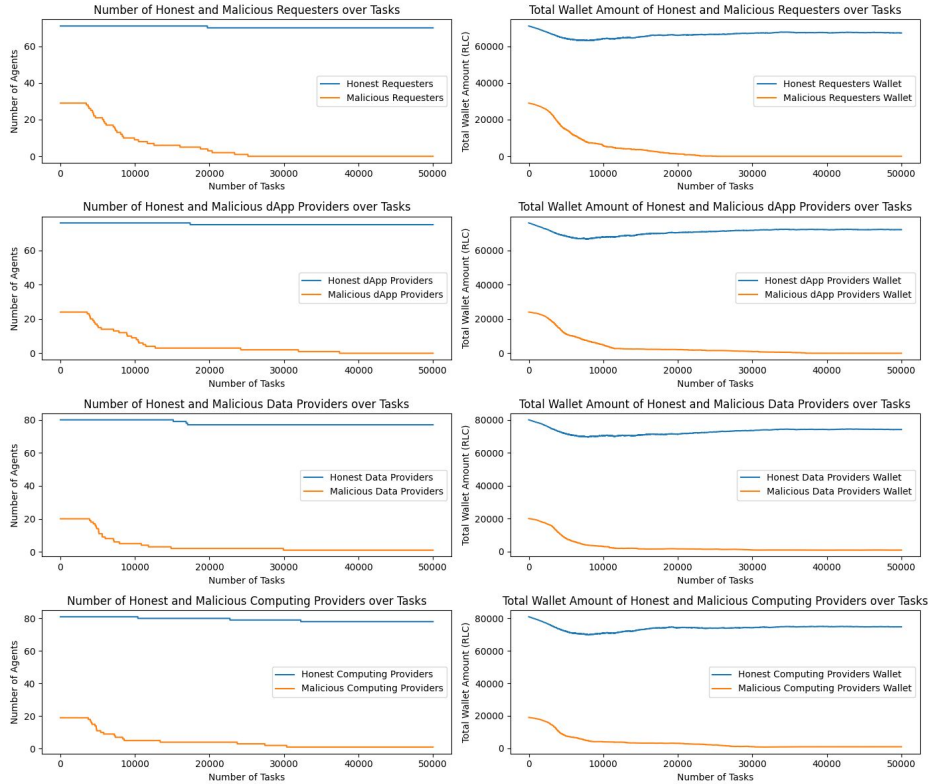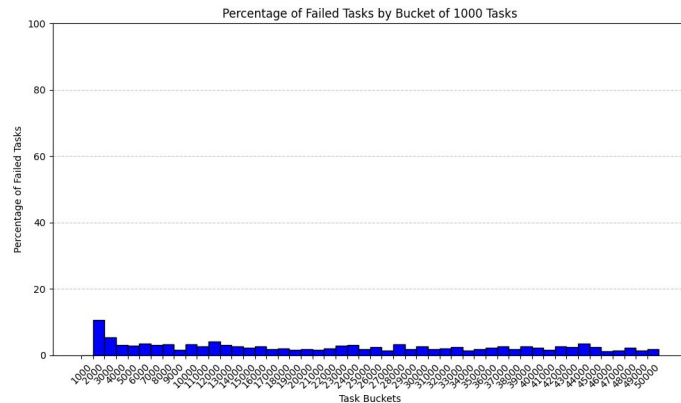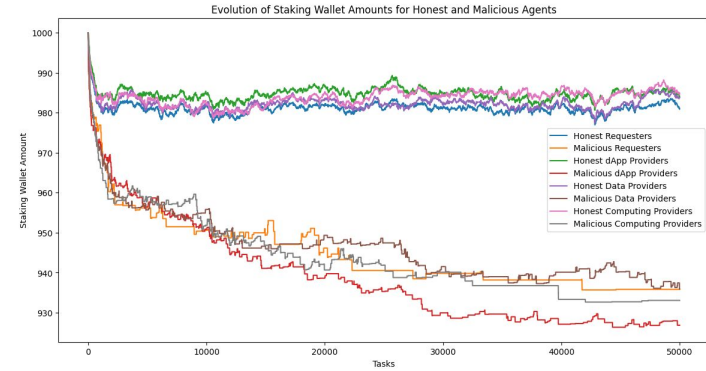

Successful execution
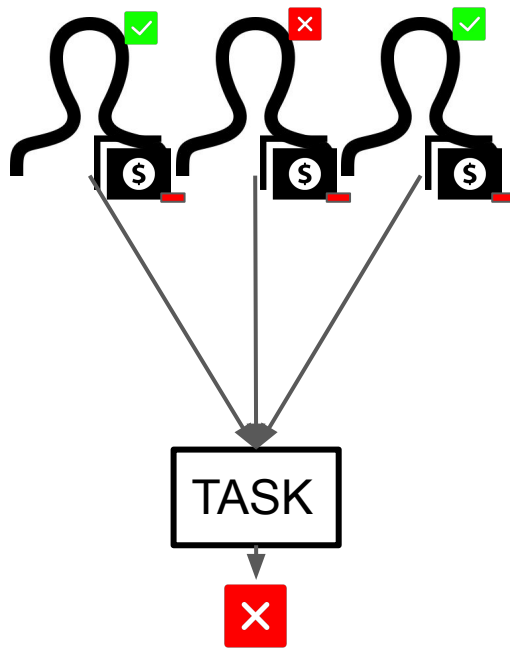
Individual failure

Combination failure

Previous simulations

- Slashing system.
- Fixed environment (no new actors).
- Non binary strategy.
- Not accounting for faulty combination of actors.

Previous simulations

Evolution of the Number of Honest and Malicious Agents

Evolution of Staking Wallet Amounts for Honest and Malicious Agents

Percentage of Failed Tasks by Bucket of 1000 Tasks
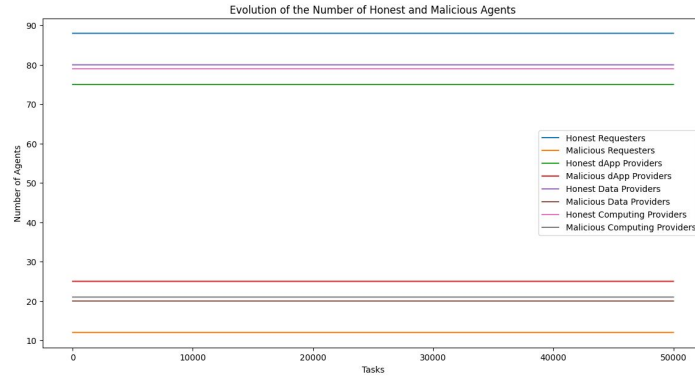
- Slashing system with "reputation" improvement.
- Fixed environment (no new actors).
- Non binary strategy.
- Not accounting for faulty combinations of assets.

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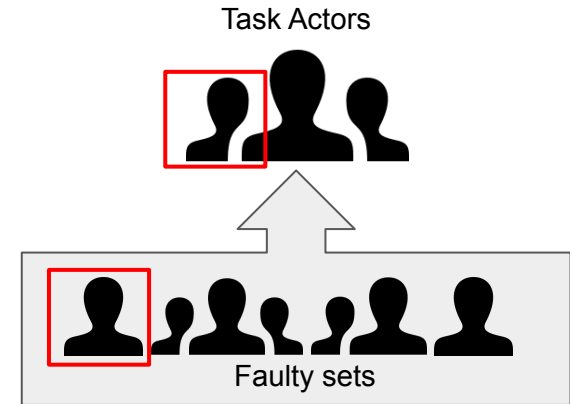# Core elements of the Simulation

- A list of **n** actors, with each actor having:
  - An initial stake S_0
- A list of faulty sets of actors, with each set having:
  - Between **1** and **n** actors.
  - A probability of failure.

Actors

Faulty sets
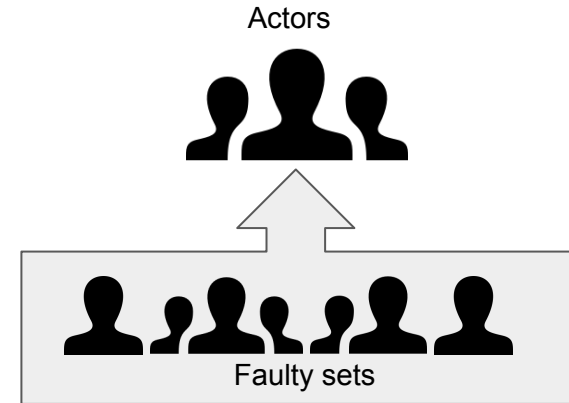
Task Execution

Task Execution Flow

Pick a random set of 2 to n actors

Subset of actors in faulty sets? — Yes / No

Yes → Compute probability P of failure
No → Task is a success → Reward all actors in the set

P > P_fail? — Yes / No

Yes → Task is a failure → Slash all actors in the set
No → Task is a success → Reward all actors in the set

Task Actors

Faulty sets
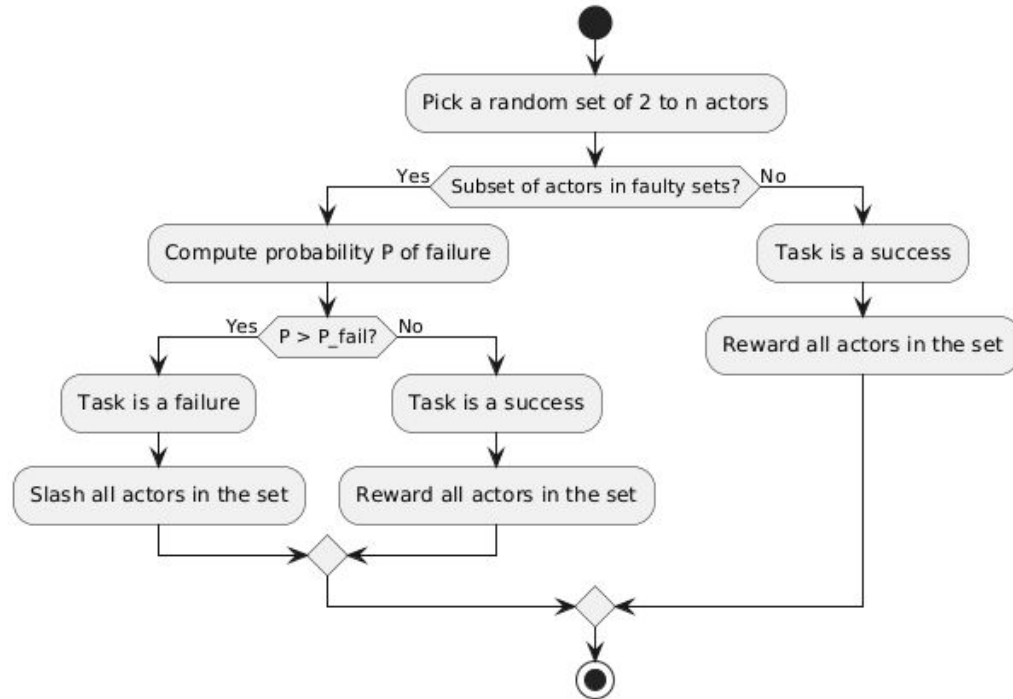
Actor Lifecycle

- Actors are removed when their stake reaches 0.
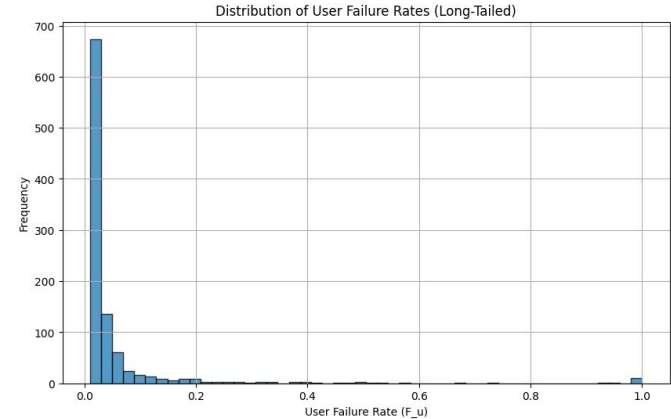- New actors are added regularly using normal distribution of fault probabilities.
- New incompatible combination including fresh actors are regularly added using normal distribution of fault probabilities.

Distribution of User Failure Rates (Long-Tailed)

Expected results

- Do actors with failure rate below our threshold survive ?
- Is the system overall reliability improved after some time ?
- With what rate of arrival of faulty actor can the reliability be sustained ?

- We will execute a task several time picking random actors.
- We will punish or reward actors depending on the outcome.
- We will track actors stake depending on their failure probability (by bucket of 0.1 probably).
- We will track system mean failure rate over time.

Scenarios to simulate

Scenario 1 - witness: No blind slashing, Binary behavior, single actor faults.
Scenario 1 - blind slashing: Blind slashing, Binary behavior, single actor faults.

Scenario 2 - witness: No blind slashing, Continuous behavior, single actor faults.
Scenario 2 - blind slashing: Blind slashing, Continuous behavior, single actor faults.

Scenario 3 - witness: No blind slashing, Binary behavior, multi-actor faults.
Scenario 3 - blind slashing: Blind slashing, Binary behavior, multi-actor faults.

Scenario 4 - witness: No blind slashing, Continuous behavior, multi-actor faults.
Scenario 4 - blind slashing: Blind slashing, Continuous behavior, multi-actor faults.