CSE3000 Weekly Progress Presentation

WEEK 5

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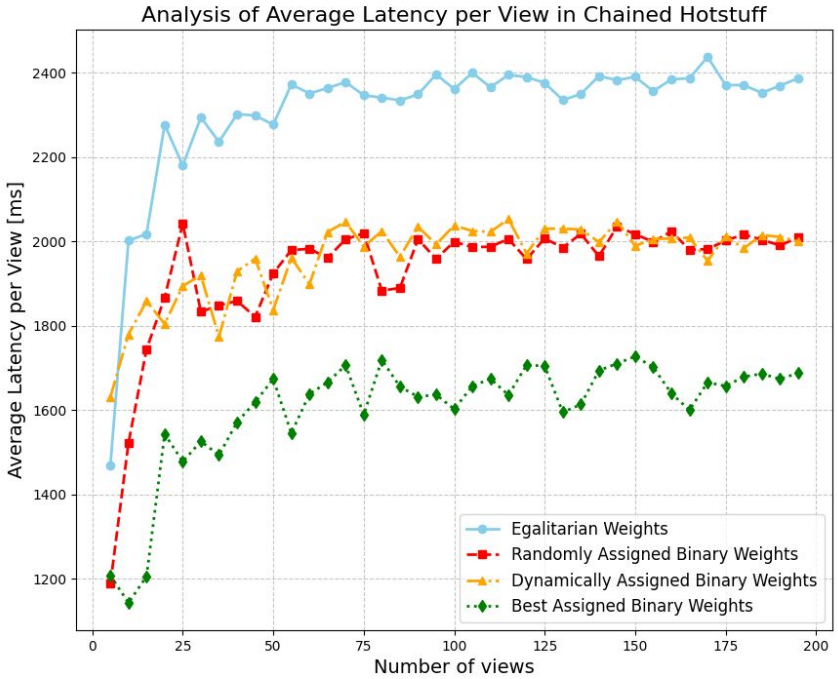
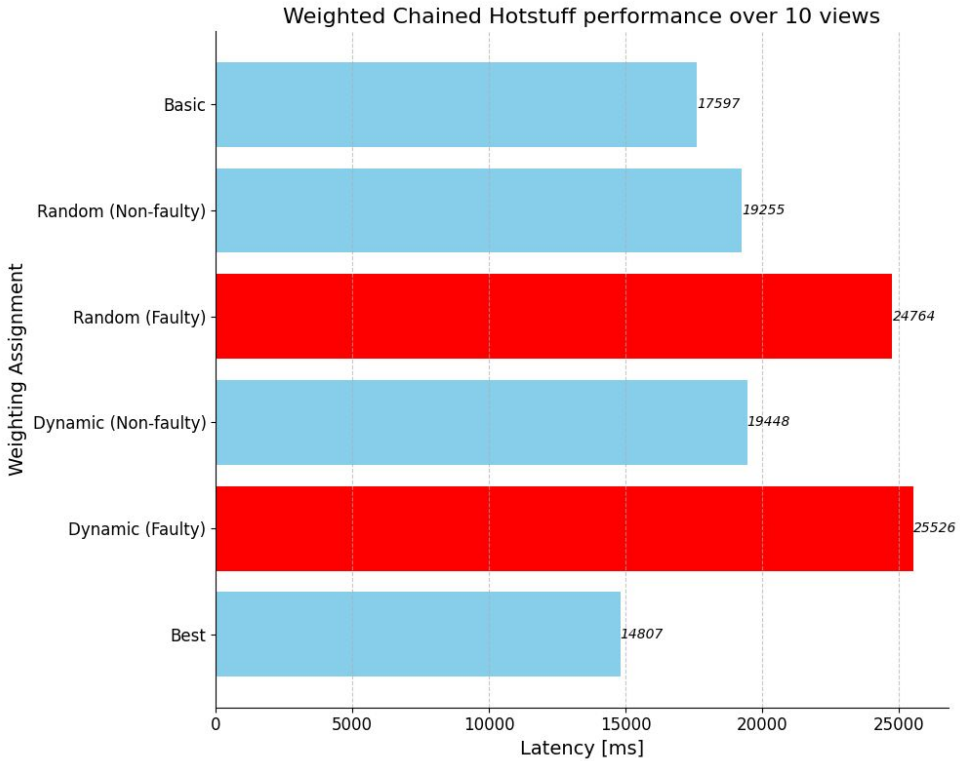
What have I done so far?

Progress on Chained Hotstuff



Progress on Chained Hotstuff



Progress on Optimal Weighting Scheme

EXAMPLE SIMULATED ANNEALING

> NETWORK SETUP -> ONE PHASE HOTSTUFF COMMUNICATION

Lcommunication_step = [vector of message latency for each replica, registered by leader] -> sorted by latency indices of replicas (priority of making quorum)

Lnew-view = [0, 440, 550, 674, 330] -> [0, 4, 1, 2, 3]
Lprepare = [0, 523, 920, 465, 310] -> [0, 4, 3, 1, 2]
Lpre-commit = [0, 606, 360, 423, 416] -> [0, 2, 4, 3, 1]
Lcommit = [0, 78, 606, 760, 954] -> [0, 1, 2, 3, 4]

> Simulated Annealing solution

Quorum weight:
2.58608277643847

Weighting distribution scheme:
[0.8878000075783116, 0.554432334641603, 0.10368957234331376, 1.0401608618752418, 1.9350817188962837]

Non-faulty -> 1816 latency
- Lnew-view -> (0, 4) quorum => 330
- Lprepare -> (0, 4) quorum => 310
- Lprecommit -> (0, 2, 4) quorum => 416
- Lcommit -> (0, 1, 2, 3) quorum => 760

Faulty -> 2964 latency (1 faulty replica - best performing one that is not leader)
- Lnew-view -> (0, 1, 2, 3) quorum => 674
- Lprepare -> (0, 3, 1, 2) quorum => 920
- Lprecommit -> (0, 4) quorum => 416
- Lcommit -> (0, 2, 3, 4) quorum => 954

Progress on Optimal Weighting Scheme

AWARE
Quorum weight:
5

Weighting distribution scheme:
[2, 2, 1, 1, 1]

Non-faulty -> 1992 latency
    Lnew-view -> (0, 4, 1) quorum => 440
    Lprepare -> (0, 4, 3, 1) quorum => 523
    Lprecommit -> (0, 2, 4, 3) quorum => 423
    Lcommit -> (0, 1, 2) quorum => 606

Faulty -> 2633 latency (1 faulty replica - best performing one that is not leader)
    Lnew-view -> (0, 1, 2) quorum => 550
    Lprepare -> (0, 3, 1) quorum => 523
    Lprecommit -> (0, 4, 3, 1) quorum => 606
    Lcommit -> (0, 2, 3, 4) quorum => 954

Midterm overall progress

Hotstuff

- ➔ Basic and Weighted implementation
- ➔ Basic vs Weighted under the following conditions
  - ◆ 1 view, 1 simulation, same network setting
  - ◆ 1 view, 10000 simulations, different network setting for every simulation
    => average difference in performance between the two
  - ◆ 10 views (randomly generated leader rotation scheme), 1 simulation, same network setting
- ➔ Average Basic/Weighted Hotstuff for 10000 simulations - overall Normal Dist.
- ➔ Simulated Annealing to get Best case scenario for Weighted Hotstuff

Midterm overall progress

Chained Hotstuff

- ➔ Implementation under the following possible behaviors:
  - “basic”: normal algorithm with weights 1 (majority quorum weight)
  - “random”: AWARE weighting scheme - assign weights randomly in each view (binary weights Vmax/Vmin)
  - “dynamic”: AWARE weighting scheme - assign weights “dynamically” based on replica performance of previous view”
  - “best”: AWARE weighting scheme - at each view perform Simulated Annealing target best performing weight assignment (the overall ideal scenario)
- ➔ Analysis of the multiple variants of Chained Hotstuff under the following:
  - 10 views, 10000 simulations - Average Latency for each variant of algorithm behaviour
  - Average latency per view for all algorithm versions over multiple views
  - Faulty nodes impact on “dynamic” and “random”

Midterm overall progress

Optimal Weighting Scheme

- ➔ **Implementation of Simulated Annealing approach for finding the best weights for a given network setup**
- ➔ **Comparison with binary AWARE and egalitarian weighting schemes**
- ➔ **Analysis taking into consideration behaviour when introducing f faulty nodes**

Paper

- ➔ **Introduction**
- ➔ **Related work**
- ➔ **Background**

What is next?

Goals for the week onwards

1. Continue the experiment phase and test behaviour over multiple possible network scenarios.
2. Adjust implementations based on Midterm feedback.
3. Advance on paper by writing the Contribution and Experimental setup and Results sections.

My Questions