

# 2PC

NEW\*

# Byzantine fault tolerant



*Douwe*



*Michael*



*Miguel*



*Patrik*

Full video on  
[YouTube](#)

\* new implementation by us

# Agenda

Introduction

Implementation

Evaluation

Demo, Wrap-Up

Q&A

# What is a BFTDCP? *A look at the paper*

## **A Byzantine Fault Tolerant Distributed Commit Protocol**

Wenbing Zhao

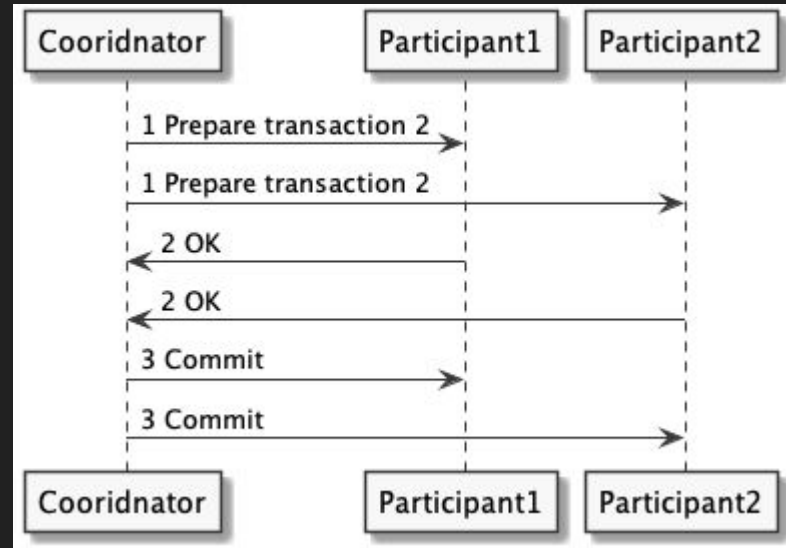
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# Background to BFTDCP?

A commit protocol

Only benign faults

## 2PC



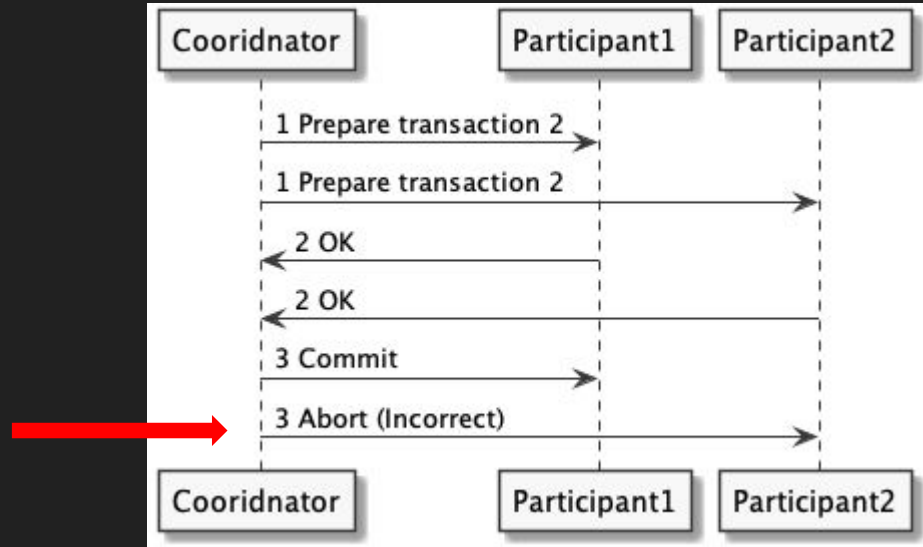
What is the problems?

Byzantine faults

One coordinator

Different truths

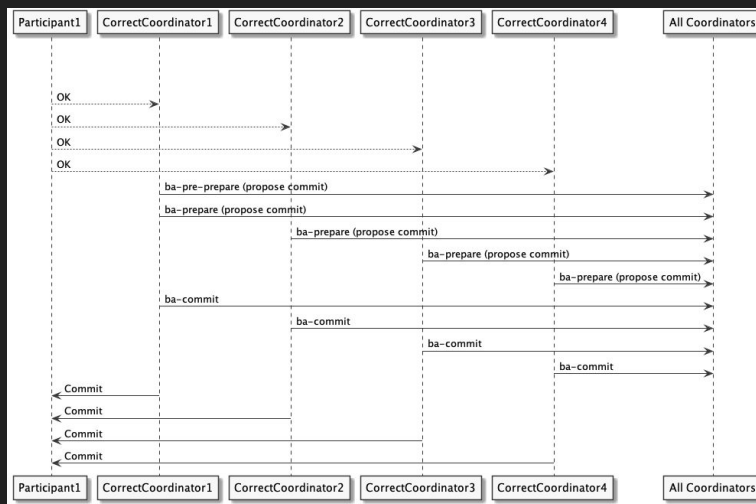
2PC faulty



# Why BFTDCP? *A look at the paper*

## Byzantine Fault Tolerant Distributed Commit Protocol

1. Byzantine agreement on registered participants
2. Byzantine agreement on the participants votes



# Implementation

Actor framework:  akka typed.

Programming language:



*Local implementation :*

- BFTDC Protocol
- Byzantine Agreement Algorithm
- Signed messages
- Timeouts

*Not implemented :*

- ❑ View changes
- ❑ Akka remote artery

# Evaluation *Functional Tests*

```
"A transaction" must {  
  "succeed with 1 coordinator and 1 participant" in {
```

Commit

Participant aborts

Initiator aborts

Unresponsive coordinator replica

Byzantine coordinator replica

```
  }  
}
```

- ▼ ✓ A transaction
  - ✓ succeed with 1 coordinator and 1 participant
  - ✓ succeed with 4 coordinators and 1 participant
  - ✓ succeed with 1 coordinator and 4 participants
- ▼ ✓ A participant
  - ✓ be able to unilaterally abort a transaction
  - ✓ be able to unilaterally abort a transaction (4 participants)
  - ✓ be able to unilaterally abort a transaction (4 coordinators)
- ▼ ✓ The initiator
  - ✓ be able to abort
  - ✓ be able to abort with 4 coordinators
  - ✓ be able to abort with 4 participants
- ▼ ✓ 2 transactions
  - ✓ succeed
- ▼ ✓ 3 normal coordinators and 1 non-responsive coordinator
  - ✓ succeed commit with 1 participant
  - ✓ succeed abort with 1 participant
- ▼ ✓ 3 normal coordinators and 1 byzantine non-primary coordinator
  - ✓ succeed commit with 1 participant
  - ✓ succeed abort with 1 participant
- ▼ ✗ 3 normal coordinators and 1 byzantine primary coordinator
  - ✗ succeed with 1 participant
  - ✗ succeed abort with 1 participant
- ▼ ✓ a coordinator
  - ✓ be able to suggest a view change if the timeout is exceeded

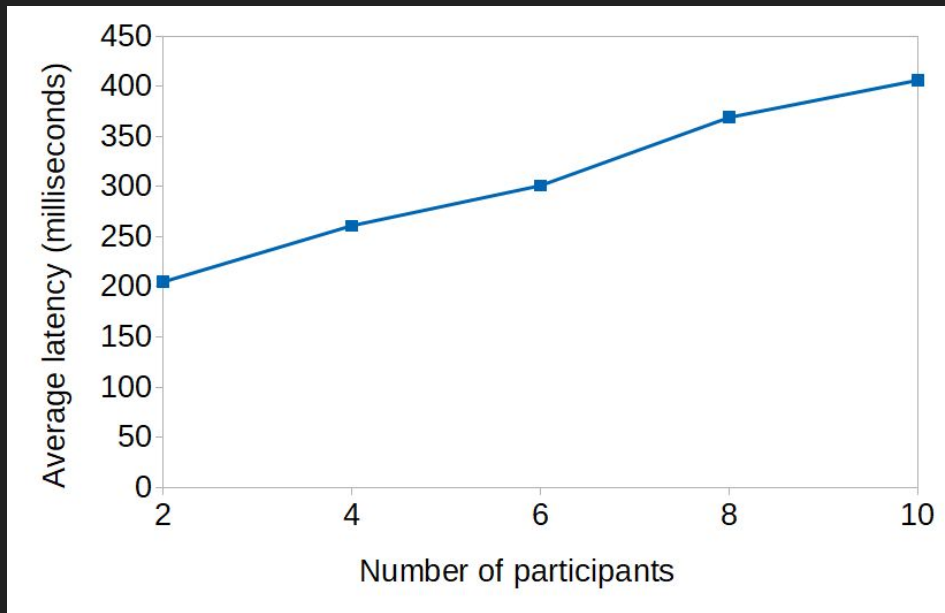


# Evaluation *Non-Functional Tests*

Latency test with sequential commits

4 coordinators

500 commits

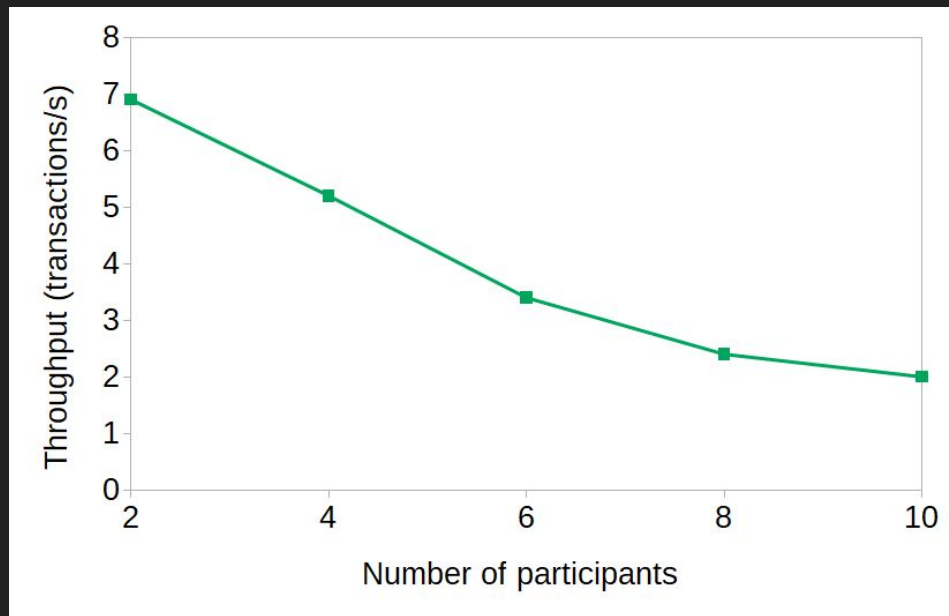


# Evaluation *Non-Functional Tests*

Throughput test with high queue depth

4 coordinators

500 commits



# Demo

Q&A