DATASTAX

Hands-on With Apache Cassandra® ACID Transactions

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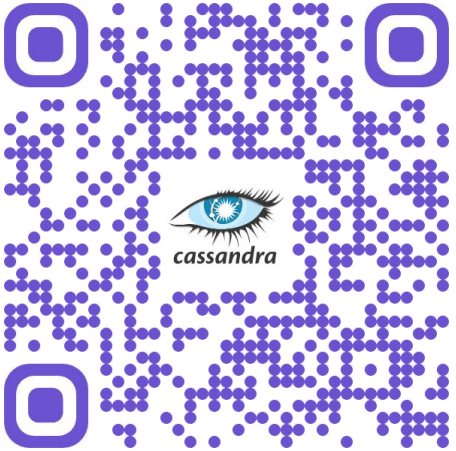
Are We There Yet?

Over 5 years in the making, and…

Time to Get Hands-On!

https://github.com/pmcfadin/awesome-accord



Warning

- This is pre-merge code
- There will be bugs
- There will be missing features

Why then?

Feedback

We need to understand real world use cases and syntax issues.

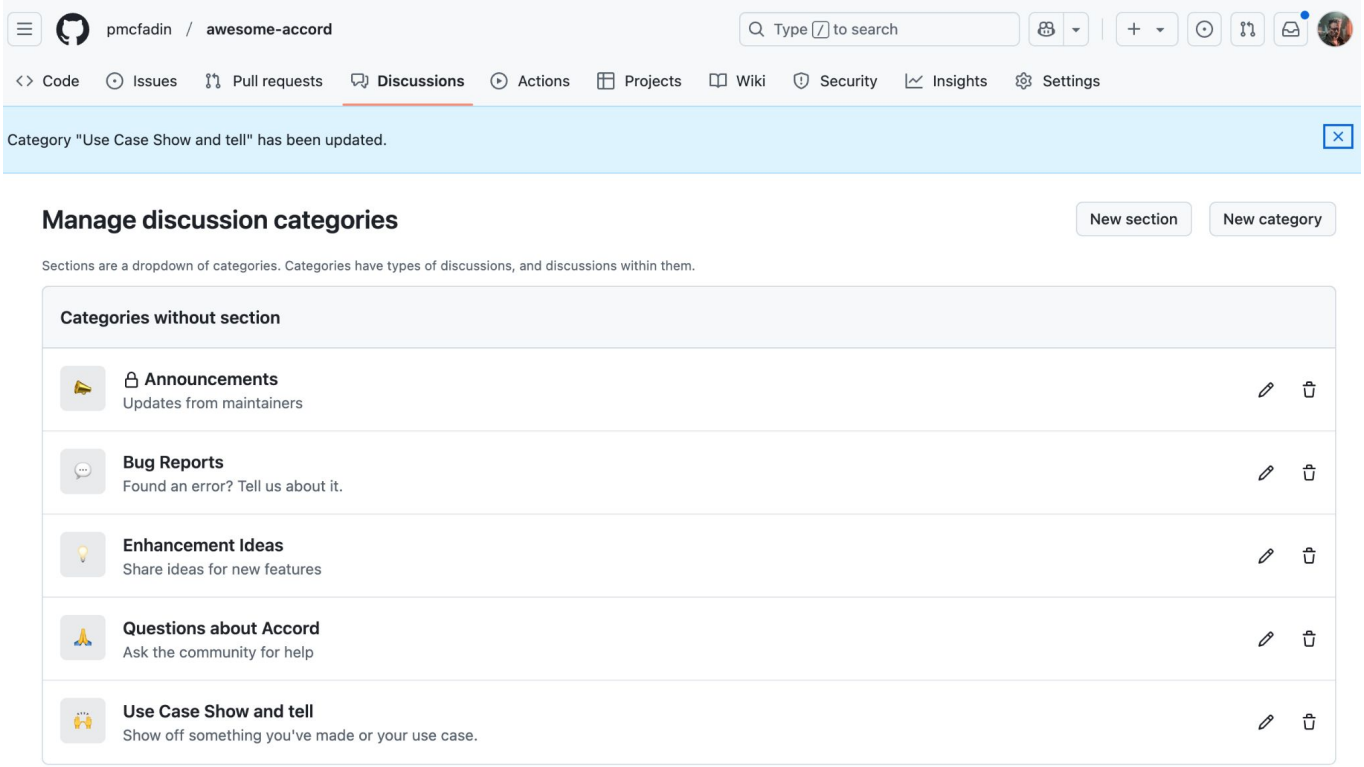
Speed

More eyes. More Fixes. Faster time to release!

Preparation

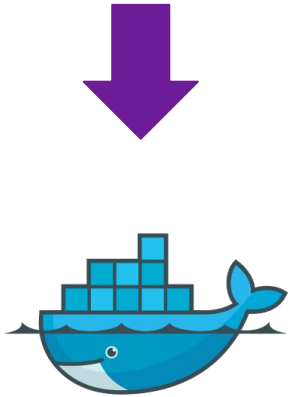
This will shape the next ten years of the project.

Important Contributions



What Do You Get?

Local



/docker

Cloud

/easy-cass-lab*

*Thanks to Jon Haddad!

```
# Pull the latest image
docker pull pmcfadin/cassandra-accord

# Start a container
docker run -d \
  --name cassandra-accord \
  -p 9042:9042 \
  pmcfadin/cassandra-accord

# Connect using cqlsh
docker exec -it cassandra-accord ./bin/cqlsh
```

Examples

```
examples/
├── banking/                    # Financial transaction examples
├── inventory/                  # Inventory management examples
└── user-management/            # User registration and
management
```

```
./setup.sh
```

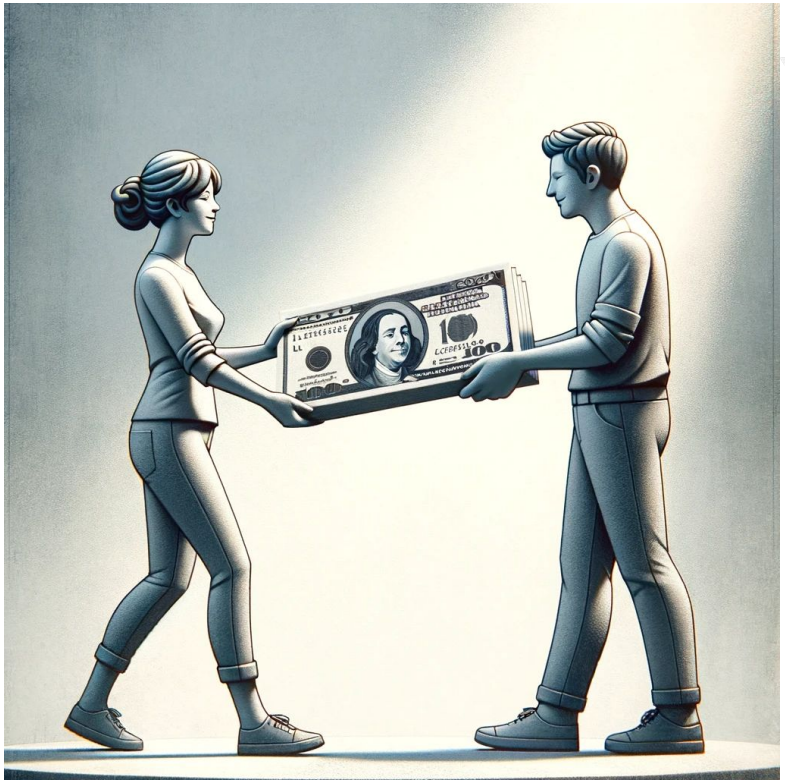
Use Cases Cassandra Can't Do...

Yet

Bank Transactions

- Moving data from one table to another. Exclusively
- Maintains order
- Maintains exclusivity

The classic “Alice to Bob” transaction



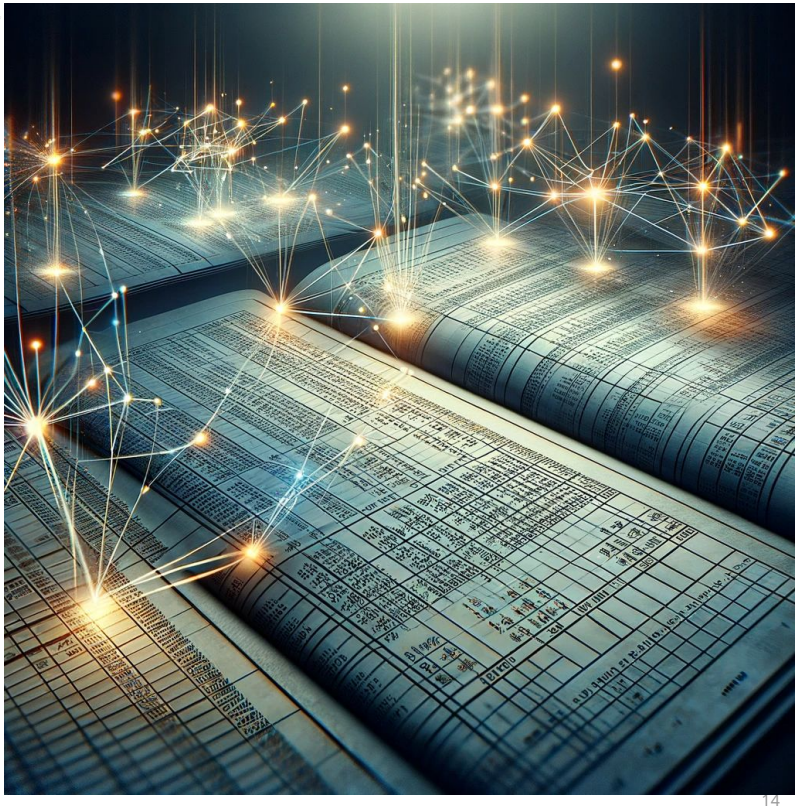
Inventory Management

- Inventory is finite
- “Go to zero” problem

Bonus problem: High concurrency

Batch consensus(user-management)

- Every change
  - Exclusive
  - In order
  - Adheres to timing



Usage

Transaction Syntax - Boundaries

```
BEGIN TRANSACTION
   LET <tuple> = ( SELECT <column1>,<column2>..  FROM <table> WHERE <condition);

   SELECT <return_column>  FROM <table> WHERE <condition>;

   IF <tuple_condition> THEN
       UPDATE|INSERT|DELETE..
   END IF
COMMIT TRANSACTION;
```

- Everything inside happens or it doesn't
- All statements are isolated
- All mutations are atomic
- No rollbacks (yet)

Transaction Syntax - State collection

```
BEGIN TRANSACTION
   LET <tuple> = (SELECT <column1>,<column2>.. FROM <table> WHERE <condition);

   SELECT <return_column>  FROM <table> WHERE <condition>;

   IF <tuple_condition> THEN
       UPDATE|INSERT|DELETE..
   END IF
COMMIT TRANSACTION;
```

- Gather state for use in the conditional below
- Tuple stores one or more columns of data

Transaction Syntax - Return value

```
BEGIN TRANSACTION
   LET <tuple> = ( SELECT <column1>,<column2>..  FROM <table> WHERE <condition);

   SELECT <return_column> FROM <table> WHERE <condition>;

   IF <tuple_condition> THEN
       UPDATE|INSERT|DELETE..
   END IF
COMMIT TRANSACTION;
```

- Return state from before transaction

Transaction Syntax - Conditional mutation

```
BEGIN TRANSACTION
   LET <tuple> = ( SELECT <column1>,<column2>..  FROM <table> WHERE <condition);

   SELECT <return_column>  FROM <table> WHERE <condition>;

   IF <tuple_condition> THEN
       UPDATE|INSERT|DELETE..
   END IF
COMMIT TRANSACTION;
```

- Condition test (=, !=, >, <, <=, >=)
- Introduction of NULL, NOT NULL test
- False condition avoids updates

Bank Transaction

Multi-Partition Exclusive Operation

❯ Bank Transaction - Setup

```
CREATE TABLE ks.accounts (
   account_holder text,
   account_balance decimal,
   PRIMARY KEY (account_holder)
);
```

```
INSERT INTO ks.accounts(account_holder, account_balance) VALUES ('bob', 100);
INSERT INTO ks.accounts(account_holder, account_balance) VALUES ('alice', 100);
```

Bank Transaction - Begin

```
BEGIN TRANSACTION
   // Get the balance from Alice's account and store as a Tuple
   LET fromBalance = ( SELECT account_balance FROM ks.accounts WHERE account_holder='alice');

   // Return the balance before update after transaction complete
   SELECT account_balance FROM ks.accounts WHERE account_holder='alice';

   // If Alice's account balance is greater than $20, move $ 20 to Bob
   IF fromBalance.account_balance >= 20 THEN
       UPDATE ks.accounts SET account_balance -= 20 WHERE account_holder='alice';
       UPDATE ks.accounts SET account_balance += 20 WHERE account_holder='bob';
   END IF
COMMIT TRANSACTION;
```

Bank Transaction - Pre-condition

```
BEGIN TRANSACTION
   // Get the balance from Alice's account and store as a Tuple
   LET fromBalance = (SELECT account_balance FROM ks.accounts WHERE account_holder='alice');

   // Return the balance before update after transaction complete
   SELECT account_balance FROM ks.accounts WHERE account_holder='alice';

   // If Alice's account balance is greater than zero, move $ 20 to Bob
   IF fromBalance.account_balance >= 20 THEN
       UPDATE ks.accounts SET account_balance -= 20 WHERE account_holder='alice';
       UPDATE ks.accounts SET account_balance += 20 WHERE account_holder='bob';
   END IF
COMMIT TRANSACTION;
```

Bank Transaction - Output previous state

```
BEGIN TRANSACTION
   // Get the balance  from Alice's account  and store as a Tuple
   LET fromBalance = ( SELECT account_balance  FROM ks.accounts  WHERE account_holder= 'alice');

   // Return the balance before  update after transaction complete
   SELECT account_balance FROM ks.accounts WHERE account_holder='alice';

   // If Alice's account balance is greater than zero, move $  20 to Bob
   IF fromBalance.account_balance >=  20 THEN
       UPDATE ks.accounts  SET account_balance -=  20 WHERE account_holder= 'alice';
       UPDATE ks.accounts  SET account_balance += 20 WHERE account_holder= 'bob';
   END IF
COMMIT TRANSACTION;
```

Bank Transaction - Conditional Statement

```
BEGIN TRANSACTION
   // Get the balance from Alice's account and store as a Tuple
   LET fromBalance = ( SELECT account_balance FROM ks.accounts WHERE account_holder='alice');

   // Return the balance before update after transaction complete
   SELECT account_balance FROM ks.accounts WHERE account_holder='alice';

   // If Alice's account balance is greater than zero, move $ 20 to Bob
   IF fromBalance.account_balance >= 20 THEN
       UPDATE ks.accounts SET account_balance -= 20 WHERE account_holder='alice';
       UPDATE ks.accounts SET account_balance +=20 WHERE account_holder='bob';
   END IF
COMMIT TRANSACTION;
```

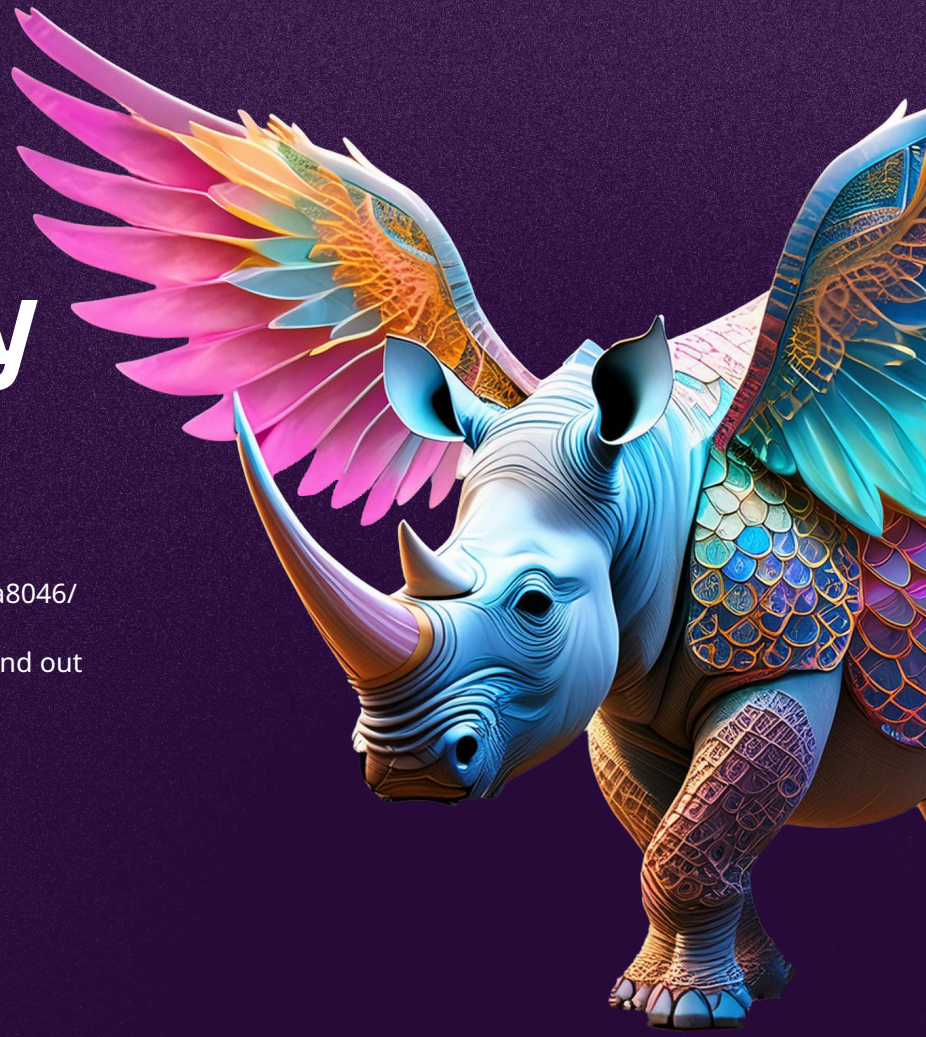
Bank Transaction - Commit

```
BEGIN TRANSACTION
   // Get the balance from Alice's account and store as a Tuple
   LET fromBalance = (SELECT account_balance FROM ks.accounts WHERE account_holder='alice');

   // Return the balance before update after transaction complete
   SELECT account_balance FROM ks.accounts WHERE account_holder='alice';

   // If Alice's account balance is greater than zero, move $ 20 to Bob
   IF fromBalance.account_balance >= 20 THEN
       UPDATE ks.accounts SET account_balance -= 20 WHERE account_holder='alice';
       UPDATE ks.accounts SET account_balance += 20 WHERE account_holder='bob';
   END IF
COMMIT TRANSACTION;
```

Thanks and Stay In-touch!

Follow me on LinkedIn: https://www.linkedin.com/in/patrick-mcfadin-53a8046/

Looking to modernize your Cassandra deployments? Scan this link and find out what options you have.



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