Ted M. Young

Java Trainer, Coach, & Live Coder

Event-Sourcing from Scratch

How Should We Persist Data?

Me: https://**ted.dev**/about

BlueSky: **@ted.dev**

Twitch: https://JitterTed.**Stream**

YouTube: https://JitterTed.**TV**

Source Code? Slides? Recording?

https://ted.dev/talks

Ted M. Young
ted@tedmyoung.com

I Can Help Your Team...

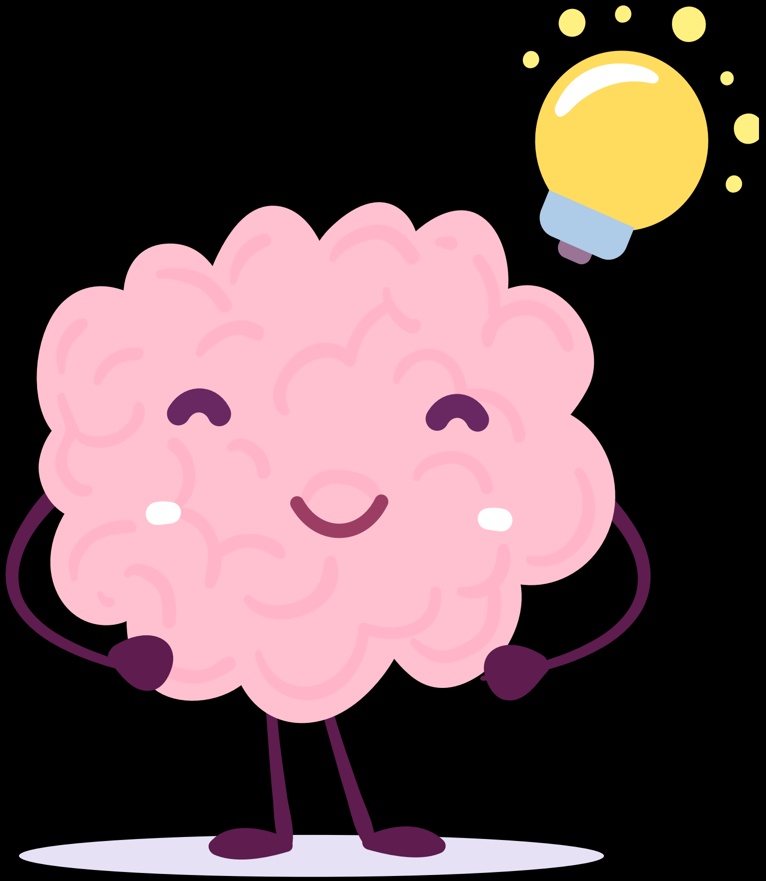
Write more Testable code with more Effective tests

Be more productive in **Java & Spring**

Effectively use **TDD**

Refactor Messy Code

Ask Questions As You Need



I may defer the answer if I'm going to cover it later!

Event Sourcing Frameworks/Libraries

Java: AxonIQ

.NET: Marten

PHP: EventSauce

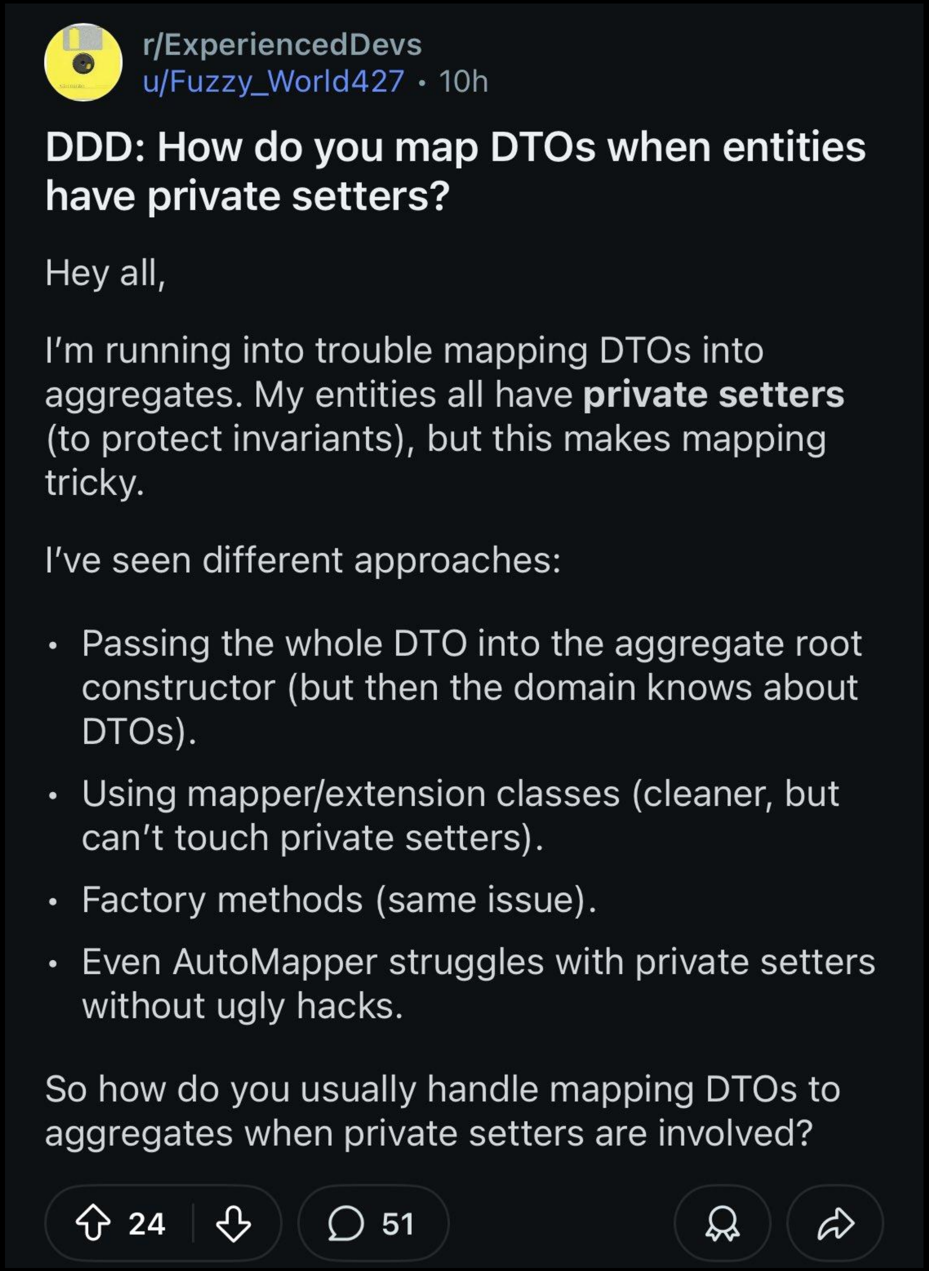
What's in this TED Talk…

1. How do we persist data?
2. Define terms, clear up misconceptions
3. JitterTix: Concert Event Ticketing domain
4. Dig into code (warning: generics!) & tests
5. Related topics to explore on your own:
    - CQRS, Event Modeling, Event Storming
    - Versioning & Schema Migration
    - Performance & Snapshotting
    - Dynamic Consistency Boundary & Decider & GDPR

How do we Persist Data?

Often: Map Objects to Database Tables (ORM)

Mapping Objects from/to Database



r/ExperiencedDevs
u/Fuzzy_World427 • 10h

DDD: How do you map DTOs when entities have private setters?

Hey all,

I'm running into trouble mapping DTOs into aggregates. My entities all have **private setters** (to protect invariants), but this makes mapping tricky.

I've seen different approaches:

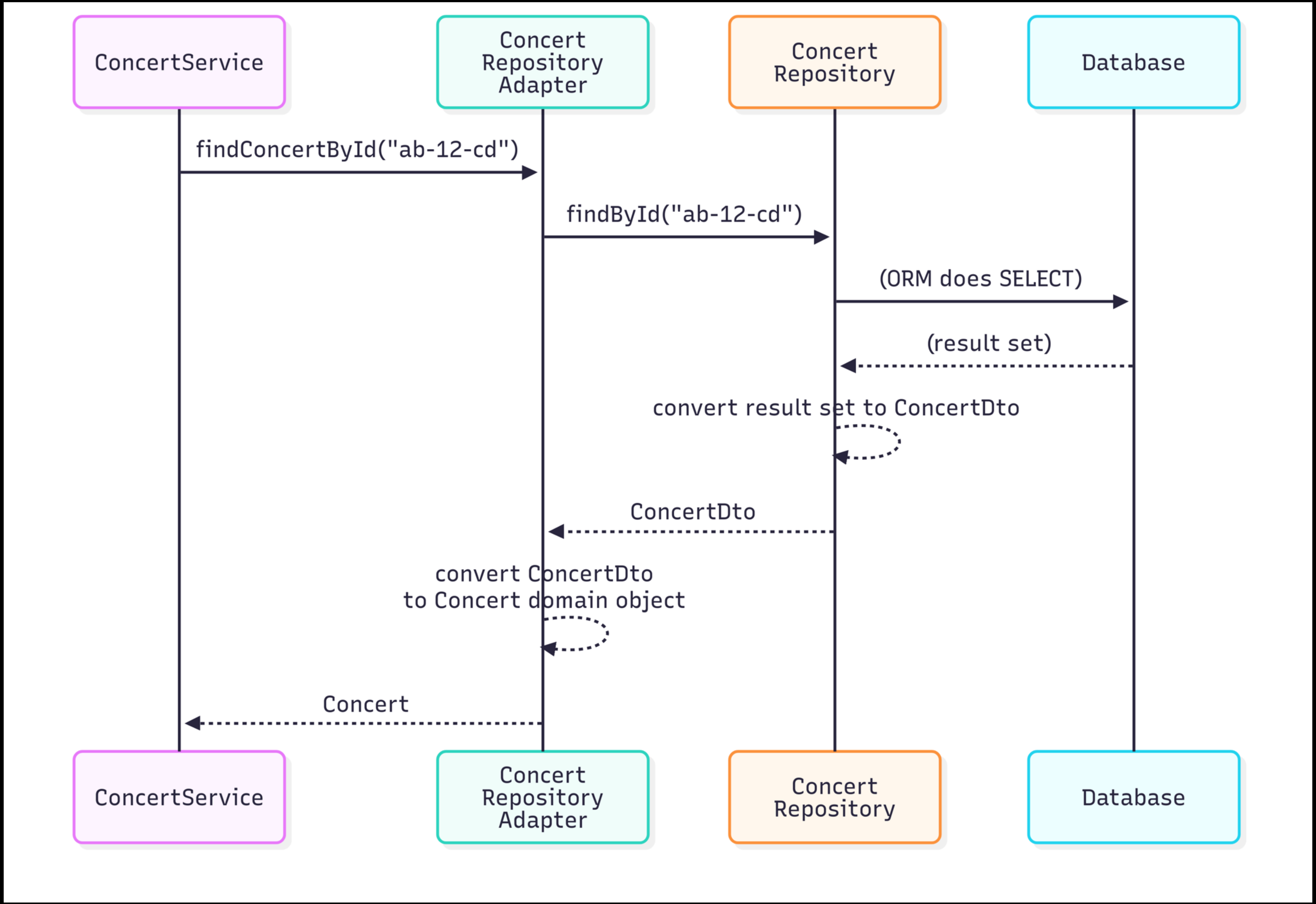
- Passing the whole DTO into the aggregate root constructor (but then the domain knows about DTOs).
- Using mapper/extension classes (cleaner, but can't touch private setters).
- Factory methods (same issue).
- Even AutoMapper struggles with private setters without ugly hacks.

So how do you usually handle mapping DTOs to aggregates when private setters are involved?

24 51

https://ted.dev/about

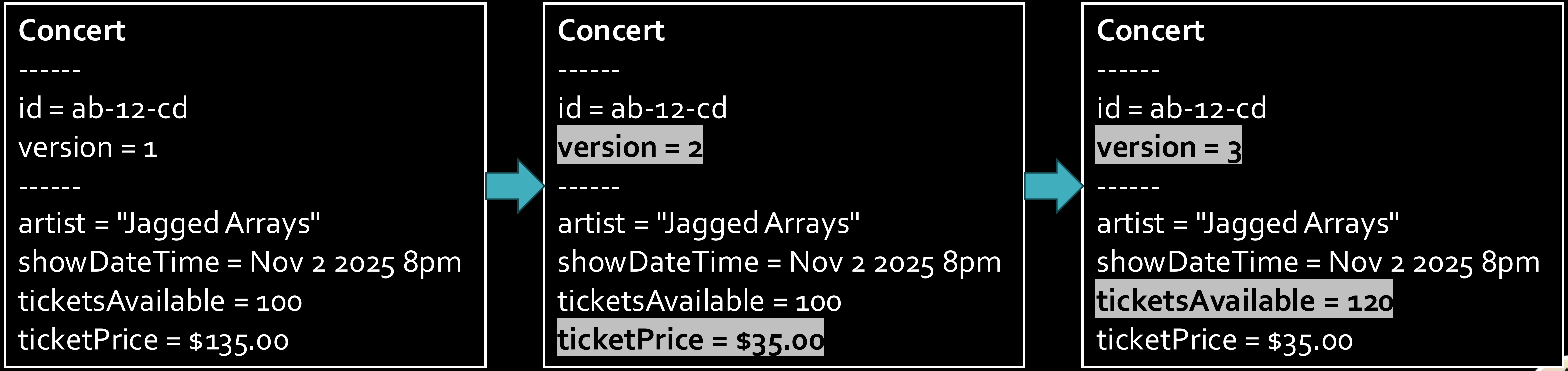
Adapter-Driven Persistence


ConcertService
Concert Repository Adapter
Concert Repository
Database
findConcertById("ab-12-cd")
findById("ab-12-cd")
(ORM does SELECT)
(result set)
convert result set to ConcertDto
ConcertDto
convert ConcertDto to Concert domain object
Concert
ConcertService
Concert Repository Adapter
Concert Repository
Database

https://ted.dev/about

Storing Data as "CRUD" or "State"

- "State-Sourced" / "CRUD-Sourced"
- No history, throws away old information
- No knowledge of how/why state changed

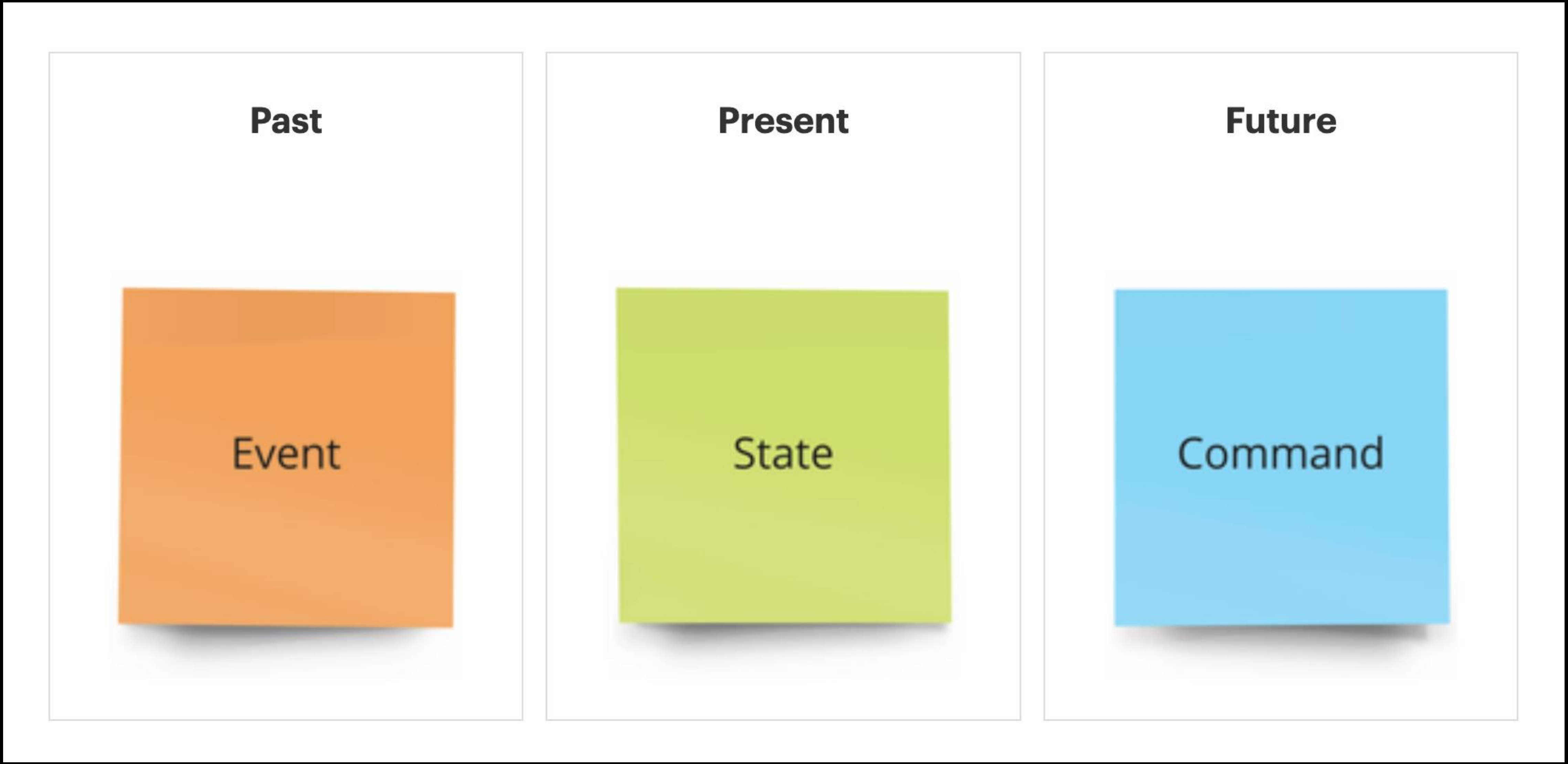


Concert
------
id = ab-12-cd
version = 1
------
artist = "Jagged Arrays"
showDateTime = Nov 2 2025 8pm
ticketsAvailable = 100
ticketPrice = $135.00

Concert
------
id = ab-12-cd
version = 2
------
artist = "Jagged Arrays"
showDateTime = Nov 2 2025 8pm
ticketsAvailable = 100
ticketPrice = $35.00

Concert
------
id = ab-12-cd
version = 3
------
artist = "Jagged Arrays"
showDateTime = Nov 2 2025 8pm
ticketsAvailable = 120
ticketPrice = $35.00

Fundamentals



Definitions: EVENT (the past)

a *fact,* something that *happened*

CustomerRegistered

ConcertScheduled

TicketPurchased

TicketTransferred

Definition: STATE (now)

Data model needed by the application.

```
Concert
------
id = ab-12-cd
version = 1
------
artist = "Jagged Arrays"
showDateTime = Nov 2 2025 8pm
ticketsAvailable = 100
ticketPrice = $135.00
```

Definition: COMMAND (future)

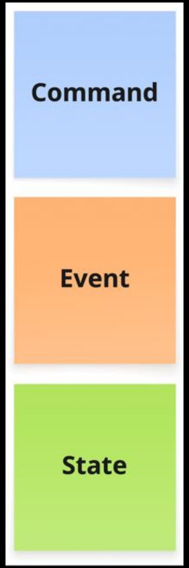
Request to change state

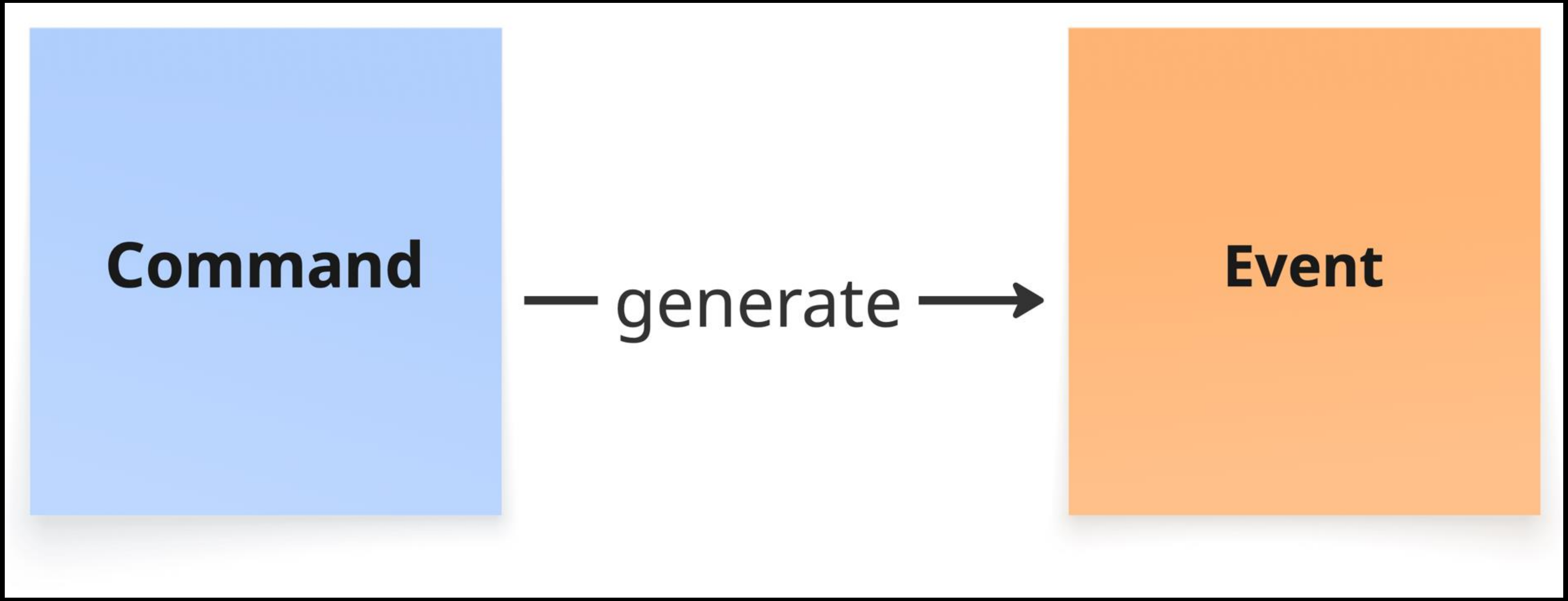
schedule

reschedule

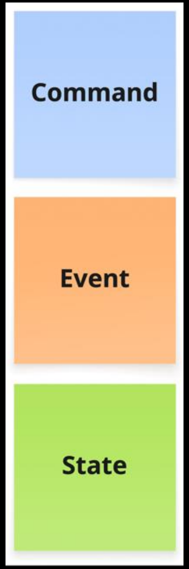
purchaseTickets

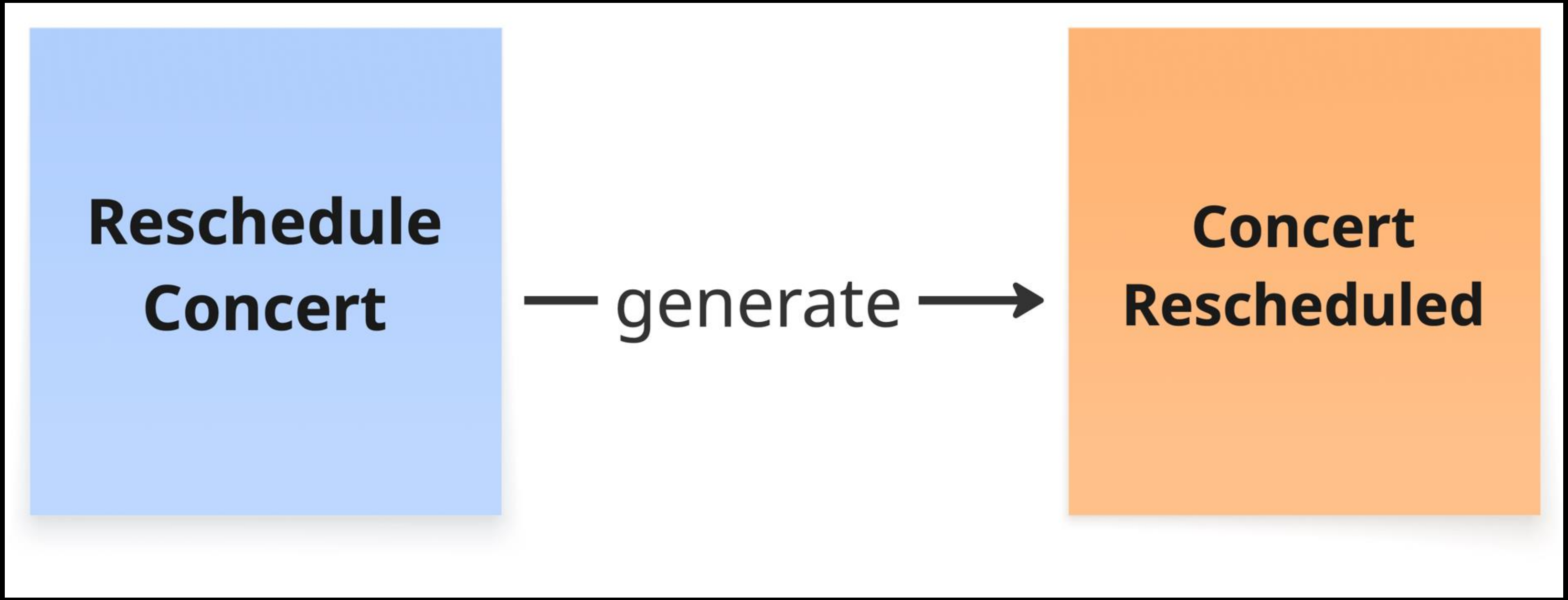
Commands Generate Events



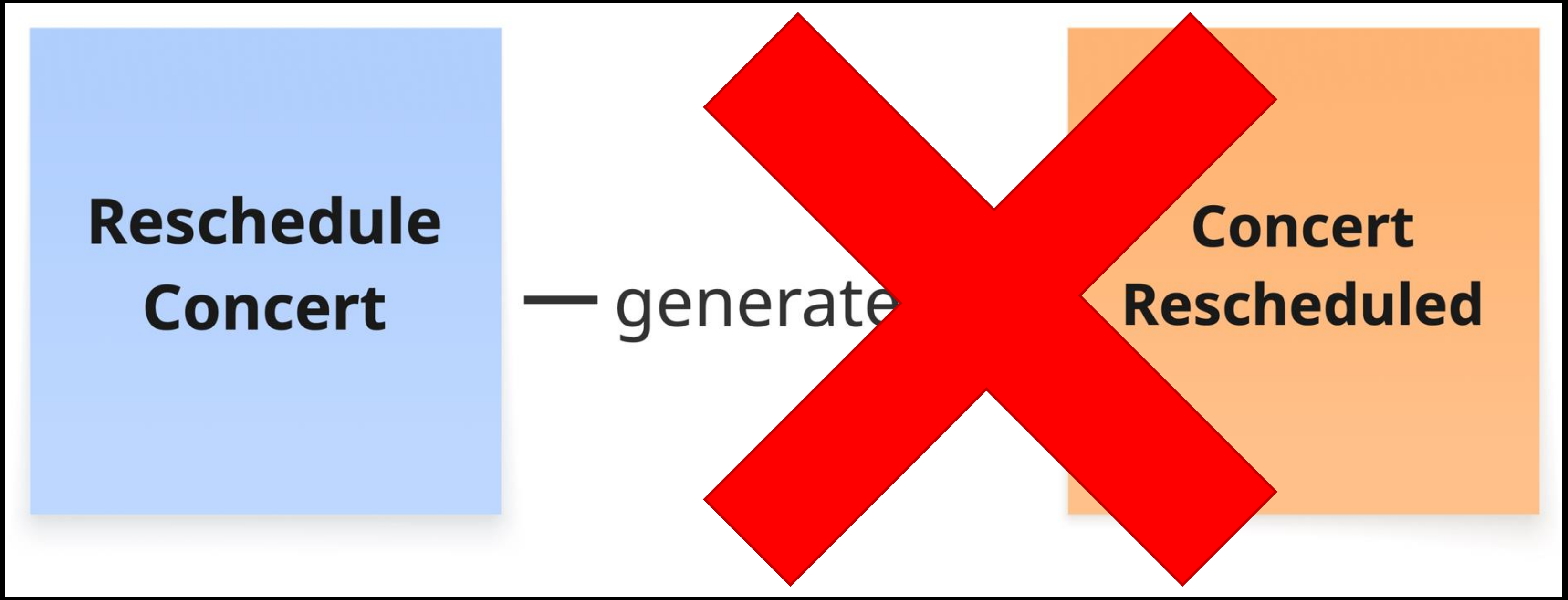


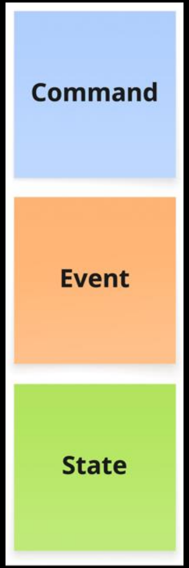
Commands Generate Events



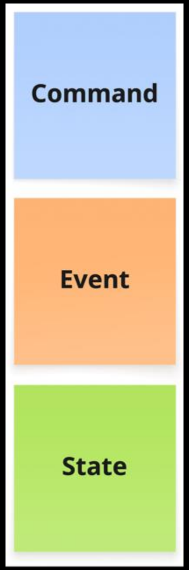


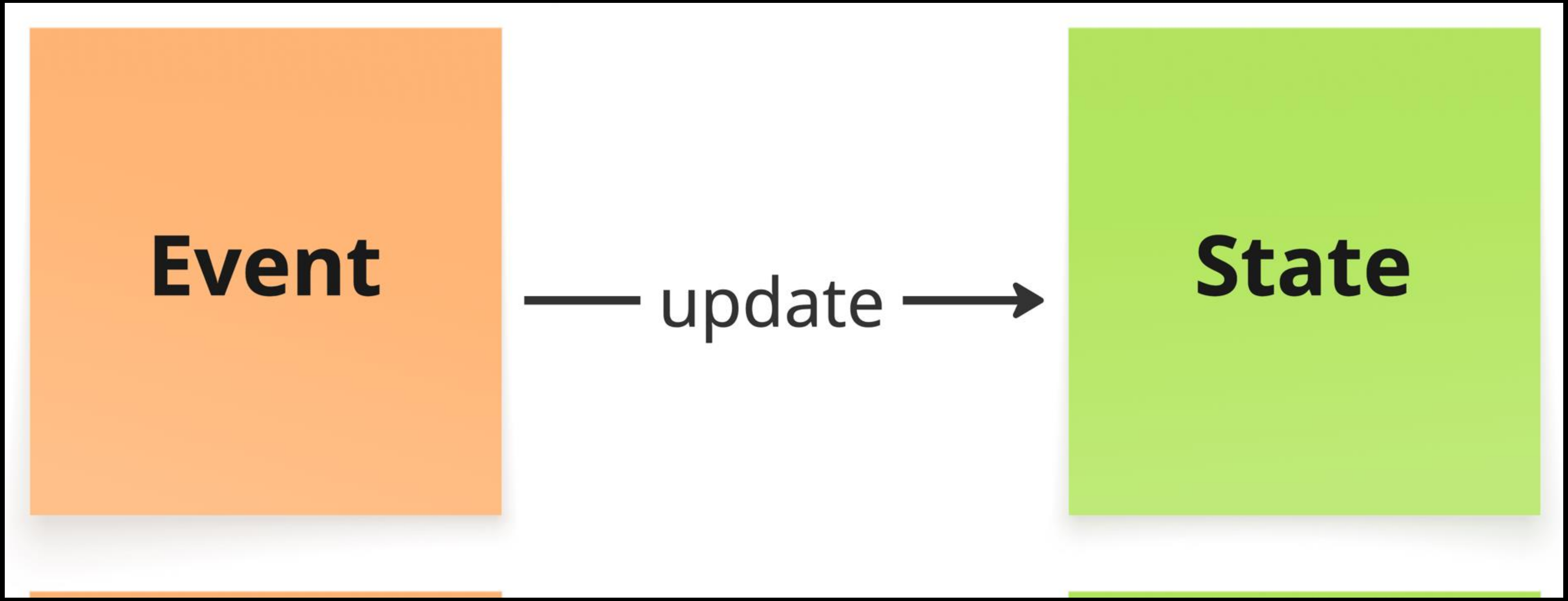
...unless It's Not Allowed



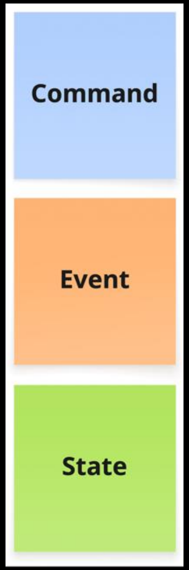


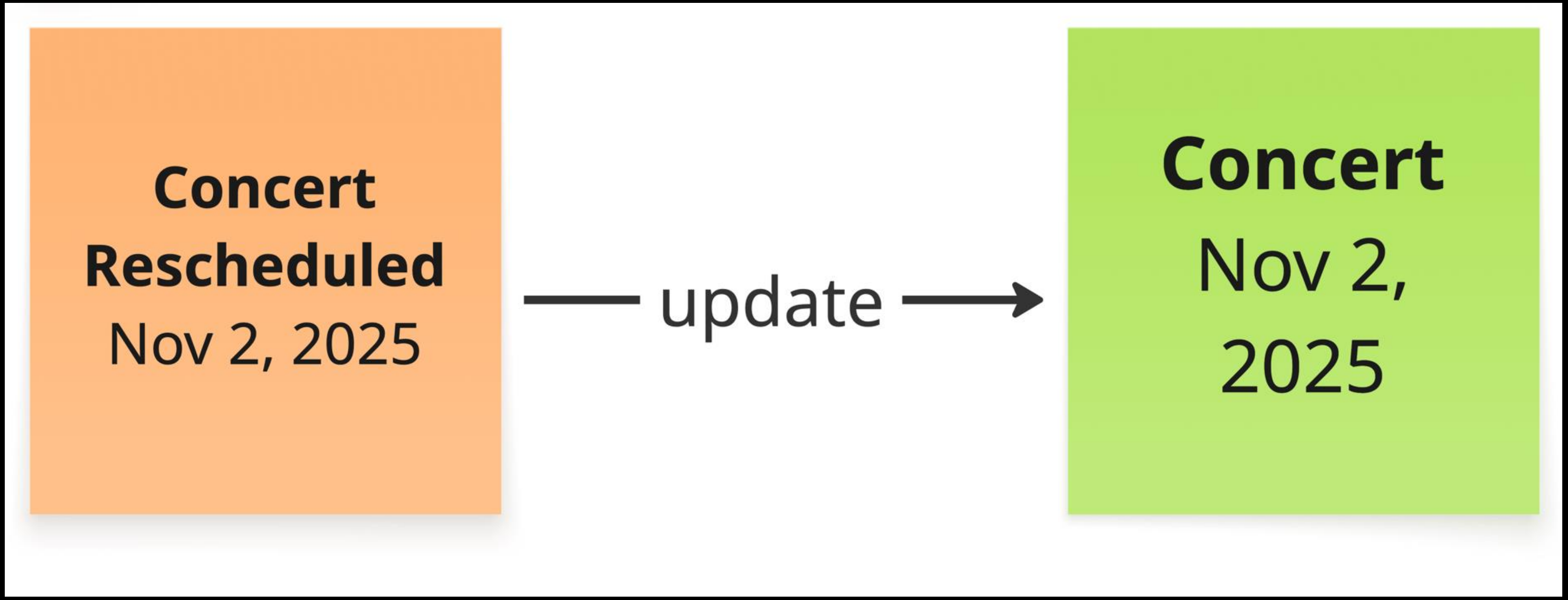
Events Update State



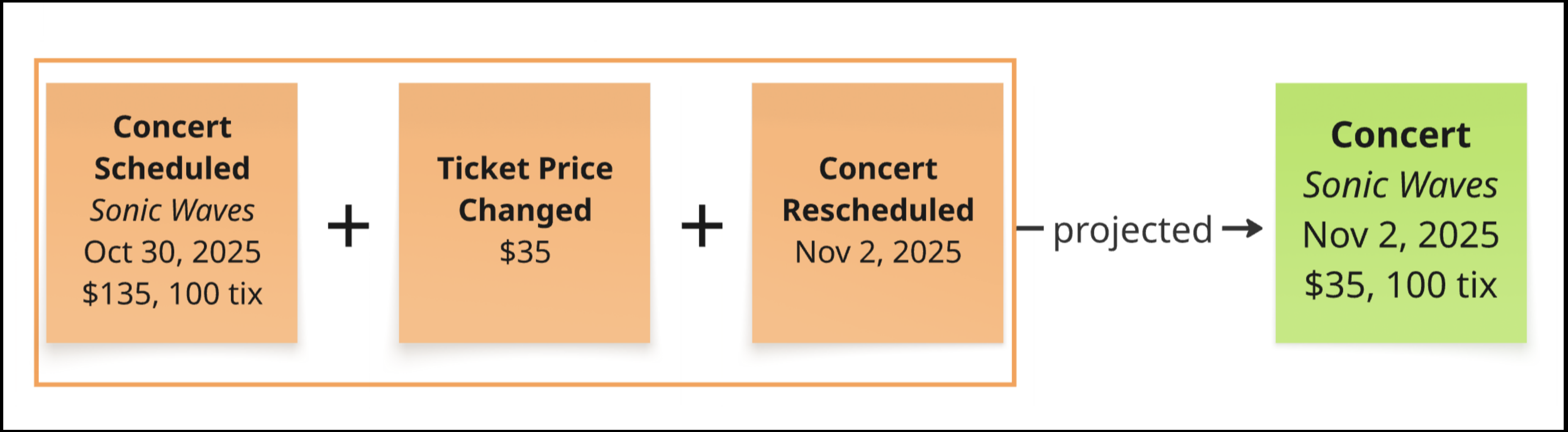


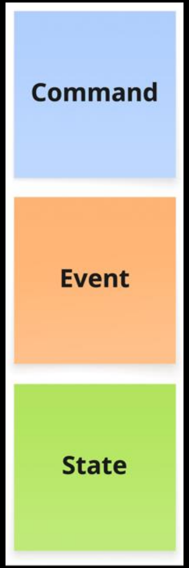
Events Update State (always!)





Events *Project* to State





Event-Sourcing PROJECTION

A function that constructs a *data model* by sequentially *replaying events* from the *event store*.

Event Store

An append-only "database" that records all events generated by the application.

⍰

Benefits of Event-Sourcing

Ask Questions You Didn't Know You Had

How many customers transfer tickets?

Immutable Events

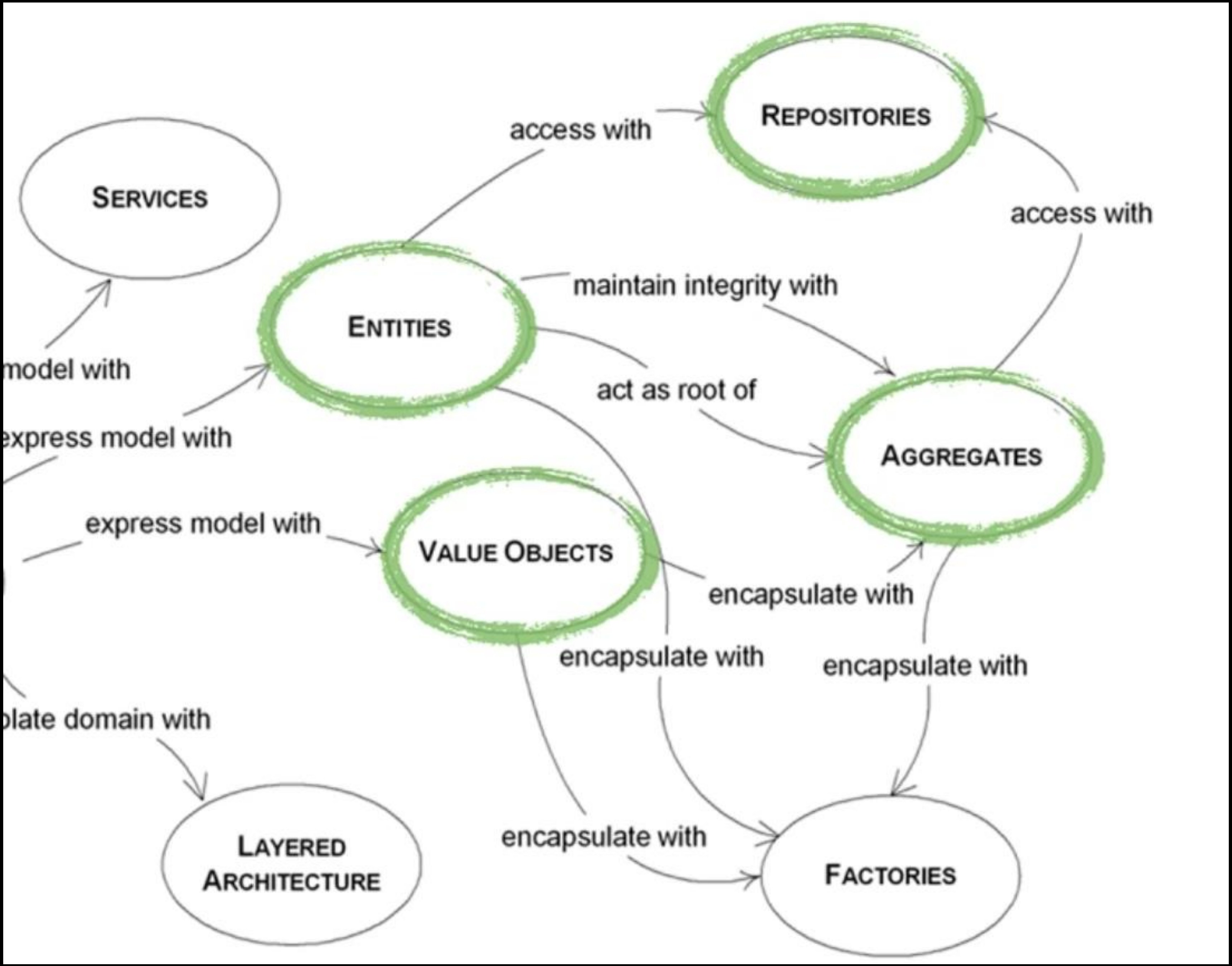
Never lose information: there is no DELETE

Replayability

Time Travel: see state of system in the past

Doman-Driven Design

Tactical Patterns



REPOSITORIES
SERVICES
access with
access with
ENTITIES
maintain integrity with
model with
act as root of
AGGREGATES
express model with
express model with
VALUE OBJECTS
encapsulate with
encapsulate with
encapsulate with
late domain with
LAYERED ARCHITECTURE
encapsulate with
FACTORIES

Entity

Unique (Has Identity), History, and Attributes

Value Object

Identified Only by its Attributes (immutable)

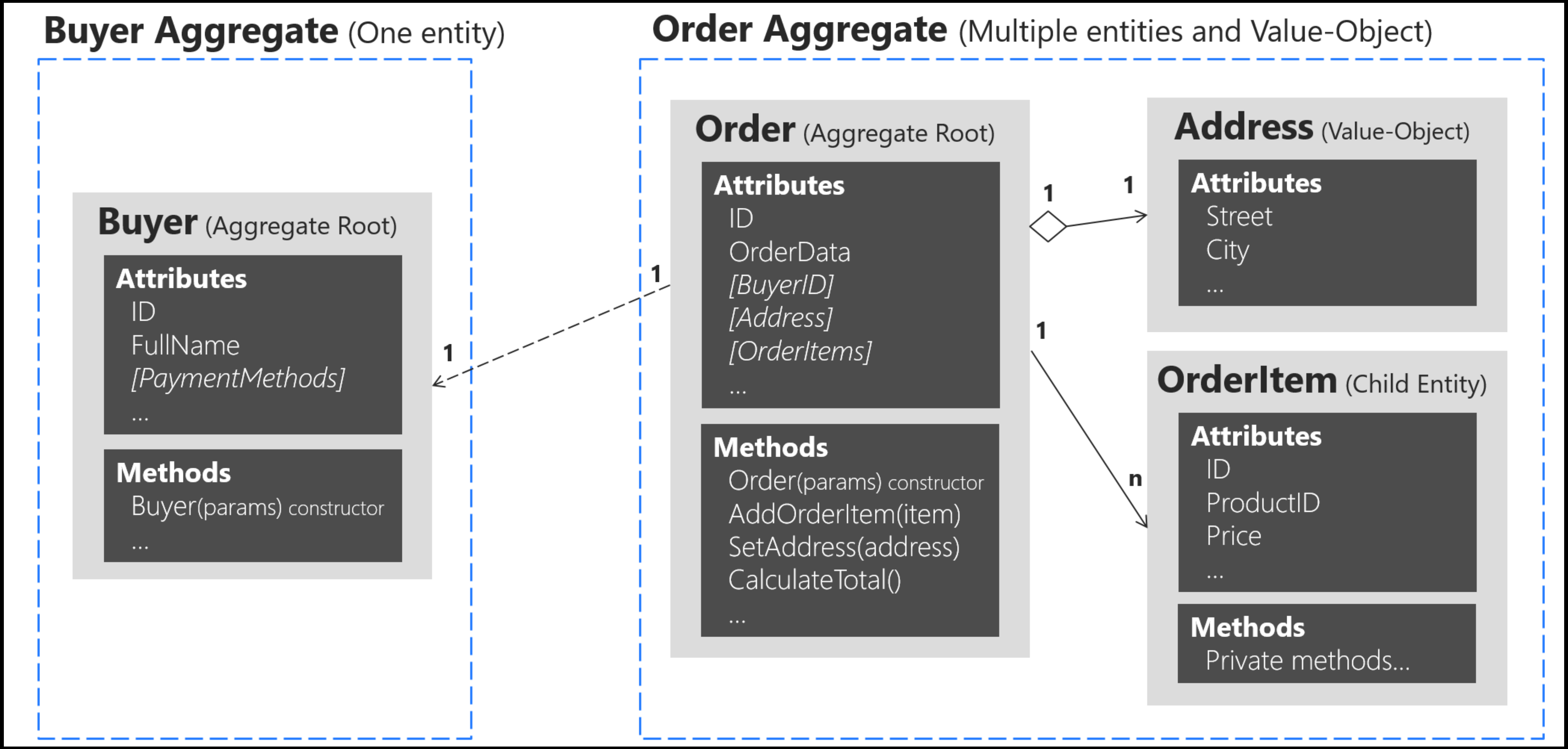
Quantify, describe, and measure

Aggregate

Consistency [transactional] Boundary

(Enforced by "Aggregate Root" Entity)

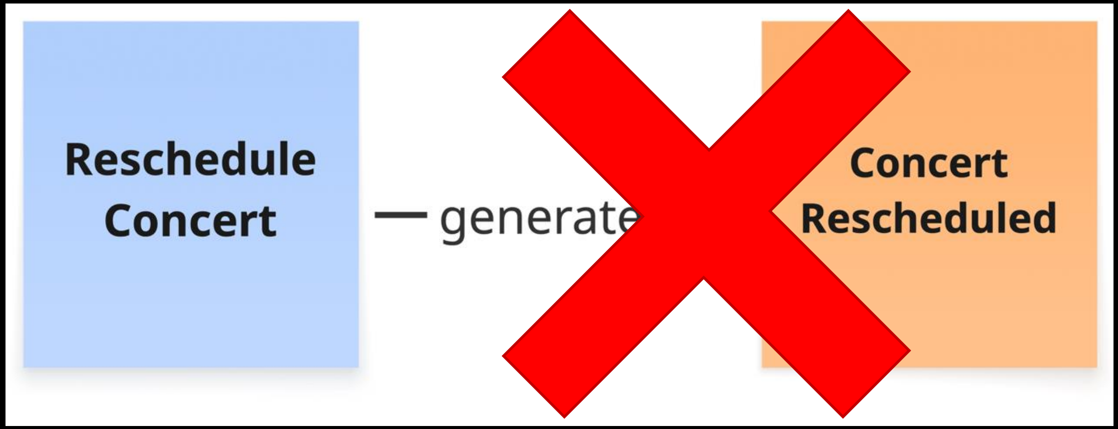
Aggregate Pattern



https://ted.dev/about

Repository

Used for Storing and Retrieving Aggregates



Aggregate & Projections

Aggregates in Event-Sourcing is a *Projection*

and the *Decider*

Misconceptions

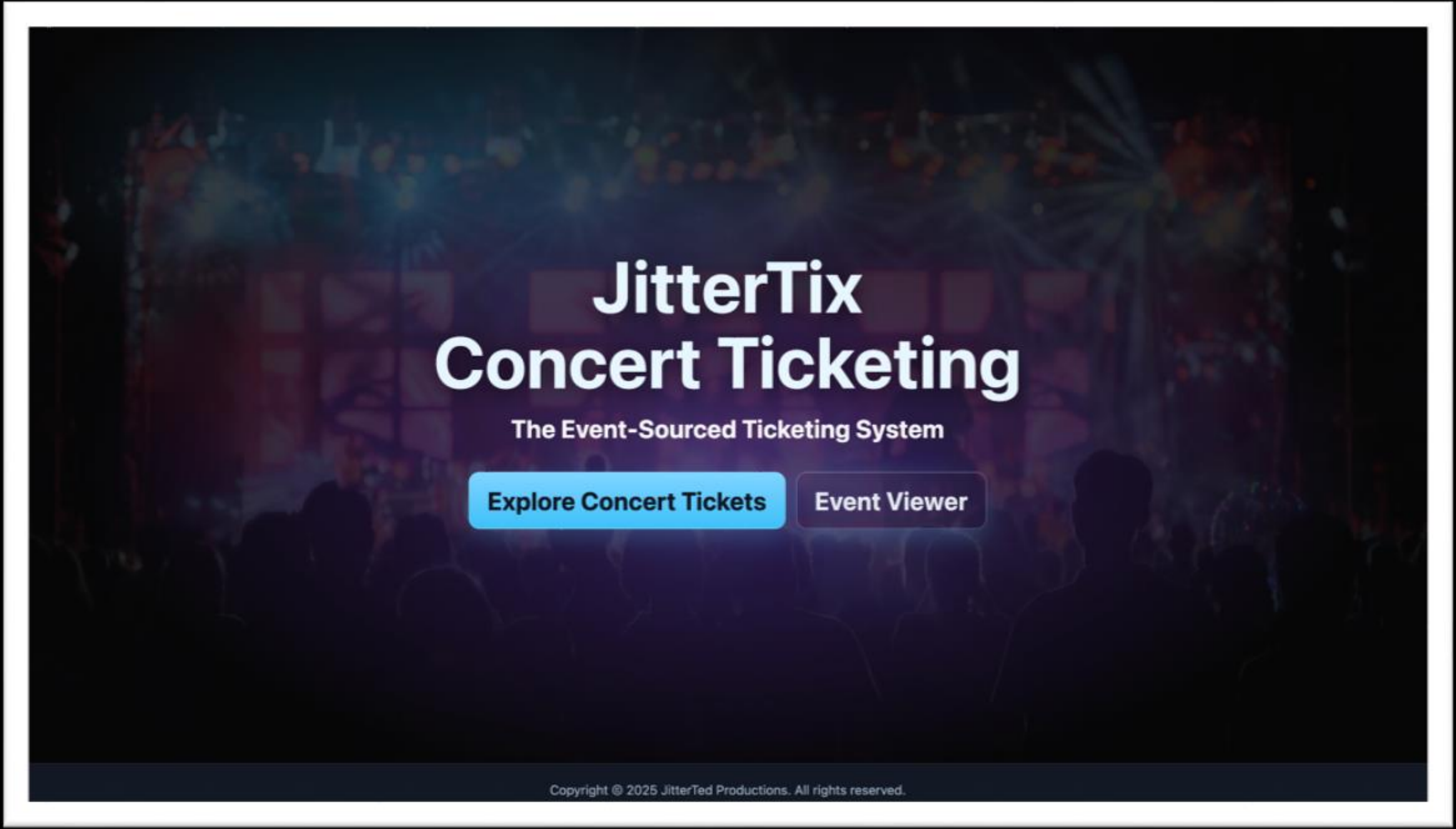
Event-Driven Architecture

Different Kinds of Events

CQRS

Command-Query Responsibility Segregation

Does Not Require Event-Sourcing!



JitterTix
Concert Ticketing

The Event-Sourced Ticketing System

Copyright © 2025 JitterTed Productions. All rights reserved.

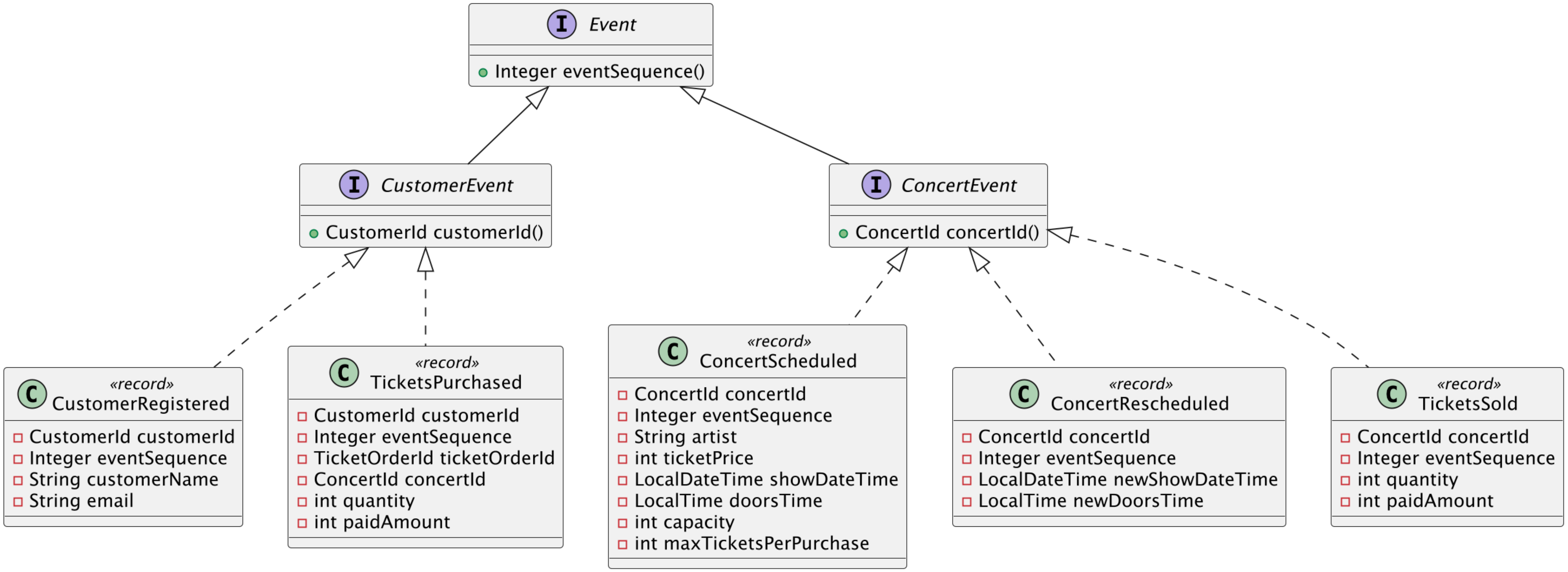
JitterTicket Design

tldraw

JitterTix: Concert Ticketing System

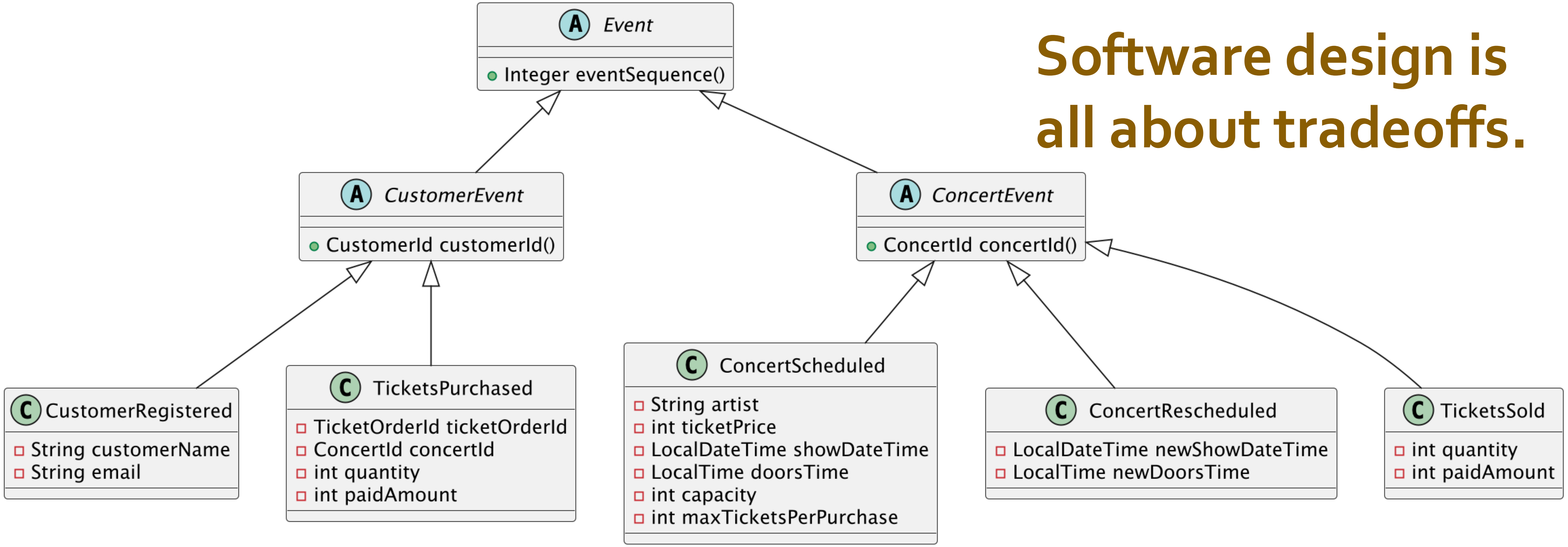
Diving Into the Code

Events as Java Records



https://ted.dev/about

Events as Java Classes



Software design is all about tradeoffs.

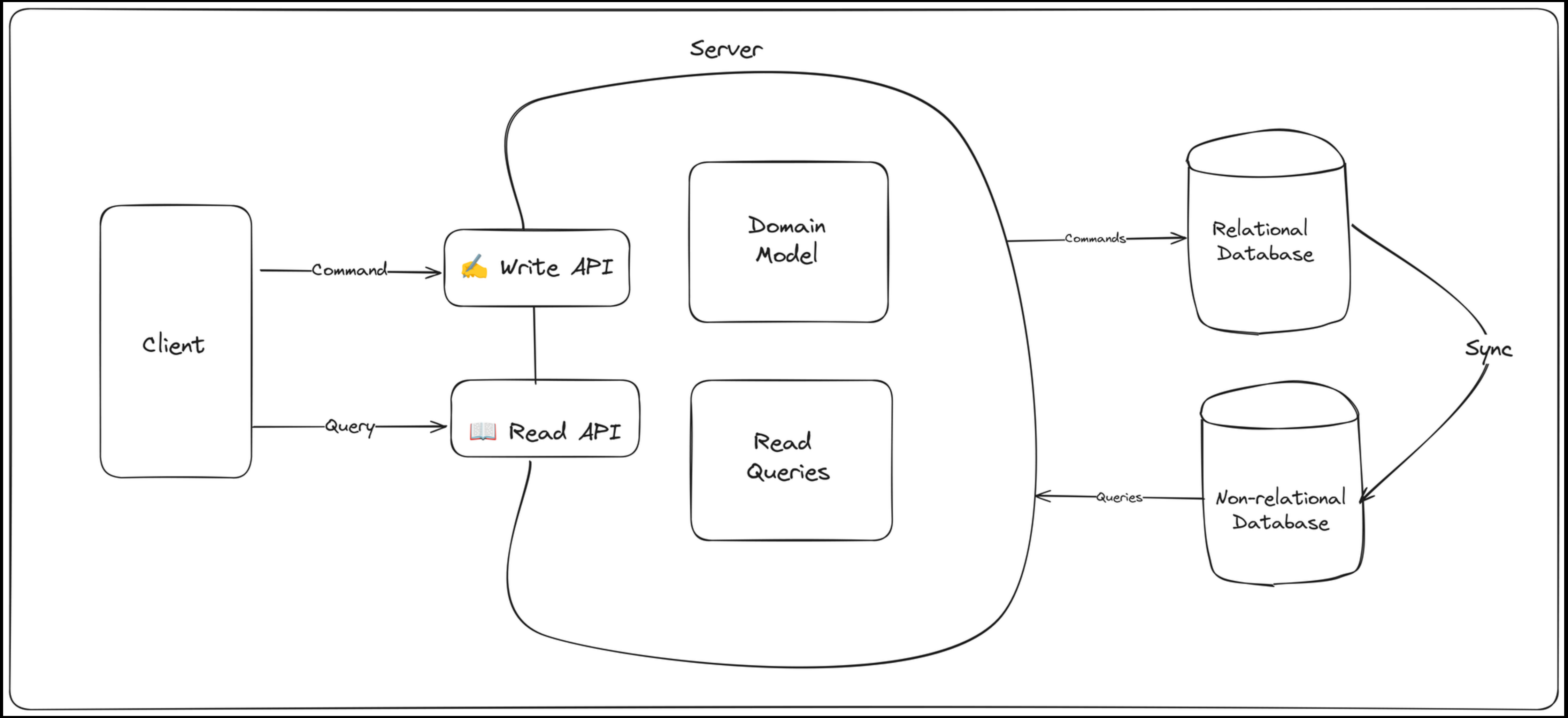
Code Walkthrough

Versioning Event Logs (Streams)

(see Greg Young's Versioning in an Event-Sourced System)

- **Copy-Replace**
- **Split-Stream**
- **Join-Stream**
- **Copy-Transform**

CQRS – Separated Data Models

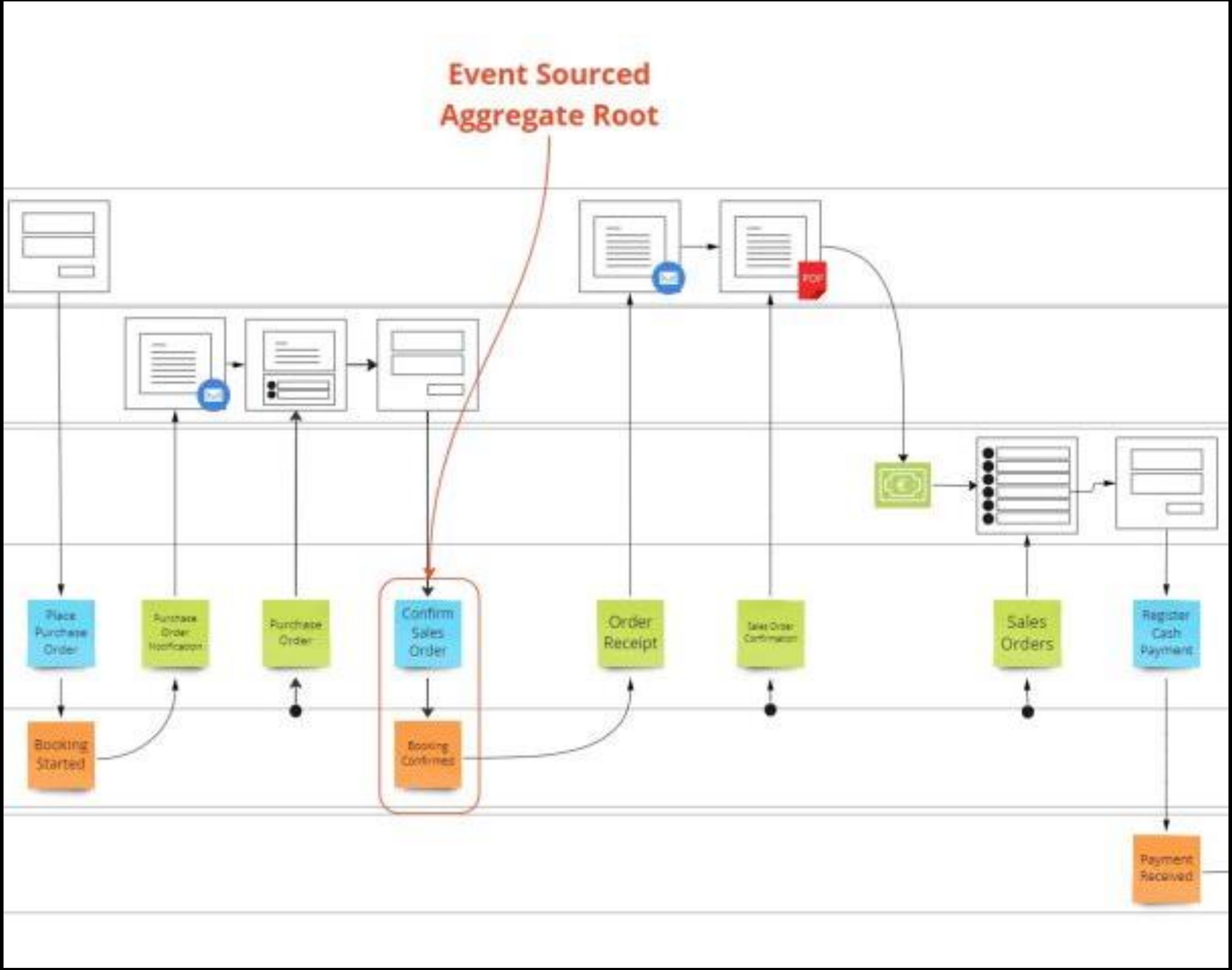


Event Modeling

🟦 Command

🟧 Event

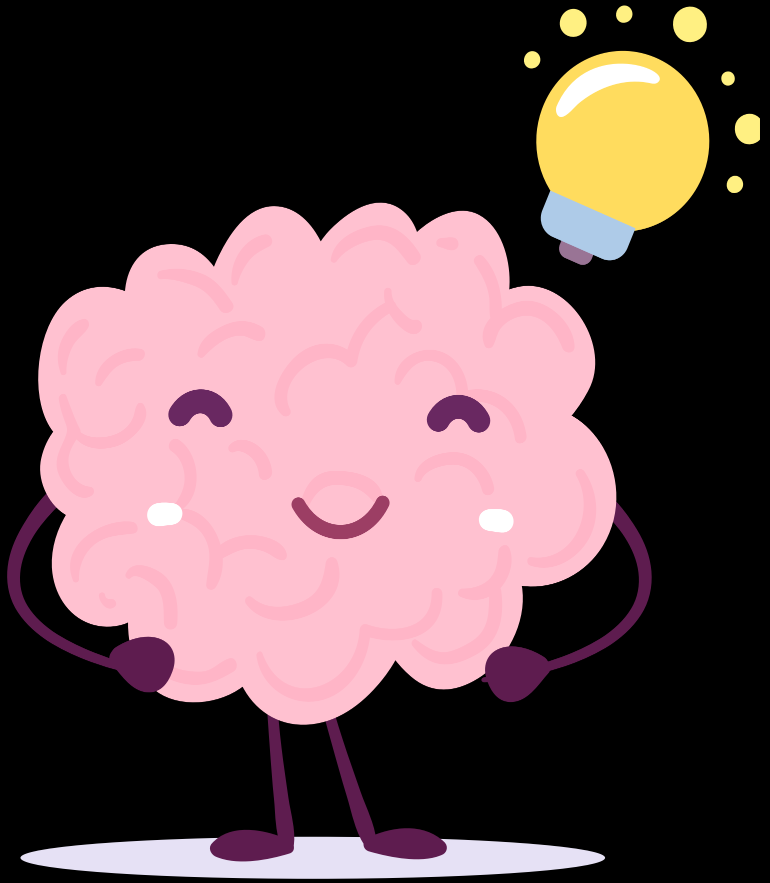
🟩 State



Ted M. Young
Java Trainer, Coach, & Live Coder

Get in touch: ted@tedmyoung.com
About me: https://ted.dev/about

What other questions do you have?



Ted M. Young
Java Trainer, Coach, & Live Coder

Get in touch: ted@tedmyoung.com
About me: https://ted.dev/about

Thank You…

Source Code? Slides?
https://ted.dev/talks/