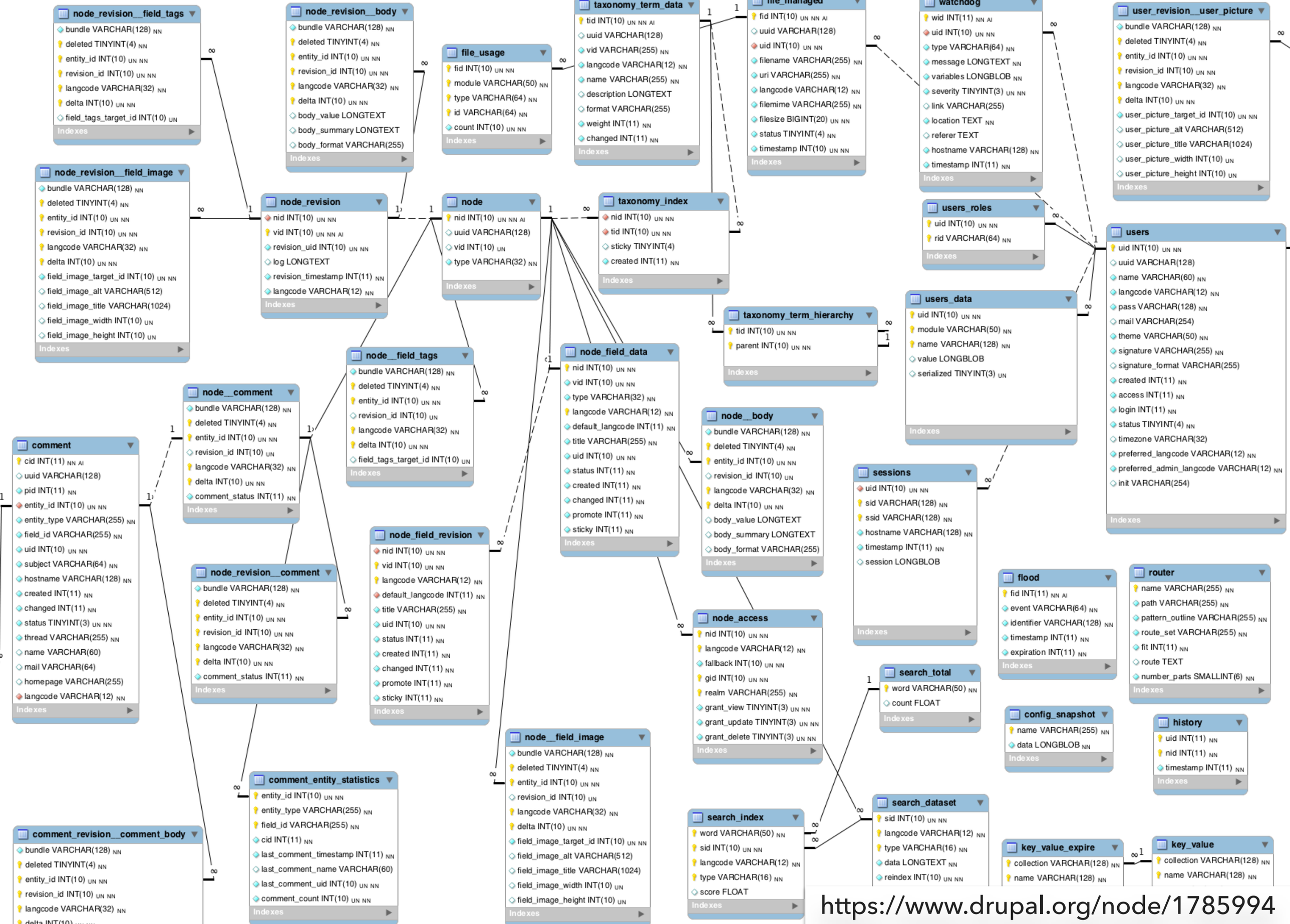
Question

If we update a Repair PO, what else do we need to save as part of that transaction?

Transactional boundaries are often ad-hoc and create sprawling dependencies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filemime VARCHAR(255) NN
filesize BIGINT(20) UN NN
status TINYINT(4) NN
timestamp INT(10) UN NN
Indexes
watchdog
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uid INT(10) UN NN
type VARCHAR(64) NN
message LONGTEXT NN
variables LONGBLOB NN
severity TINYINT(3) UN NN
link VARCHAR(255)
location TEXT NN
referer TEXT
hostname VARCHAR(128) NN
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changed INT(11) NN
promote INT(11) NN
sticky INT(11) NN
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revision_id INT(10) UN NN
langcode VARCHAR(32) NN
https://www.drupal.org/node/1785994

Building performant, scalable, robust, distributed systems requires embracing decoupling and latency boundaries

Concurrency is tricky to get right, and can really negatively impact performance

Aggregates

Modeling Boundaries

Transaction
Distribution
Concurrency

Aggregate

A cluster of domain objects that can be treated as a single unit

Purchase order

ABC432

Line Item

Purchase order

XYZ124

Line Item

5 Guidelines for Aggregate Design

Guideline #1

Design small, cohesive aggregates

Avoid large, ad-hoc, sprawling transactional, distribution and concurrency boundaries

Guideline #2

Identify true invariants to clarify aggregate boundaries

Sample Invariants

Contract must always have valid:

- ClientCompany
- Product
- TermsAndConditions

Repair PO must always have at least one LineItem

What Needs to Change…

To separate RepairPurchaseOrders, Claims and Contracts into separate aggregates?

Guideline #3

Reference other aggregates by identity

Aggregate Root

An entity that serves as the identity holder, namesake, and gatekeeper for the aggregate.

Use the delete rule of thumb to assist you in identifying the root of an aggregate.

Use the Factory pattern to construct more complex aggregates to ensure invariants are enforced correctly.

Guideline #4

Only hold references to
aggregate roots
(i.e. limit interconnectedness)

New Invariants

–*A pending Contract cannot have any Claims.*

–*Only one open Claim at a time per active Contract.*

–*Sum of costs of all Claims for a Contract must <u>never</u> exceed the LimitOfLiability.*

- What needs to change in your design to make Claims part of the Contract aggregates again?

- How well does your design handle relating each RepairPO to its associated Claim, especially when there are multiple Claims for a Contract?

Guideline #5

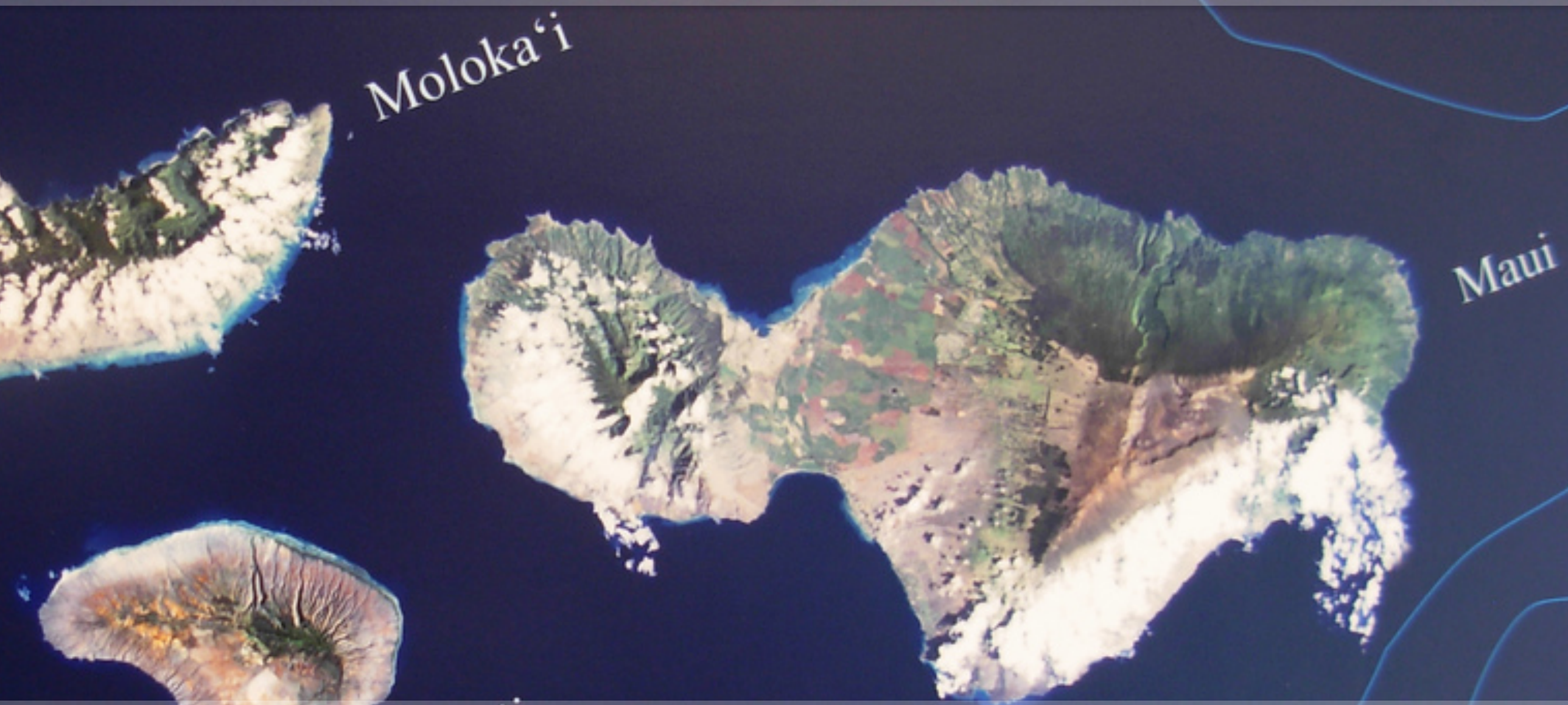
Use eventual consistency across aggregate boundaries

Aggregates are “eventually consistent” with each other.

- asynchronous updates propagate through system

Aggregates are always internally consistent.

Invariants apply at every transaction commit



Aggregates are consistency islands

EventStorming

EventStorm how you think the Limit of Liability scenario <u>should</u> work for Repair warranties. Assume Contracts, Claims and Repair POs are different aggregates.

Include any domain events necessary, including

- Contract is terminated
- Associated open Claims are closed
- Repair POs are finalized
- Customer is notified
- Finance is notified of relevant financials

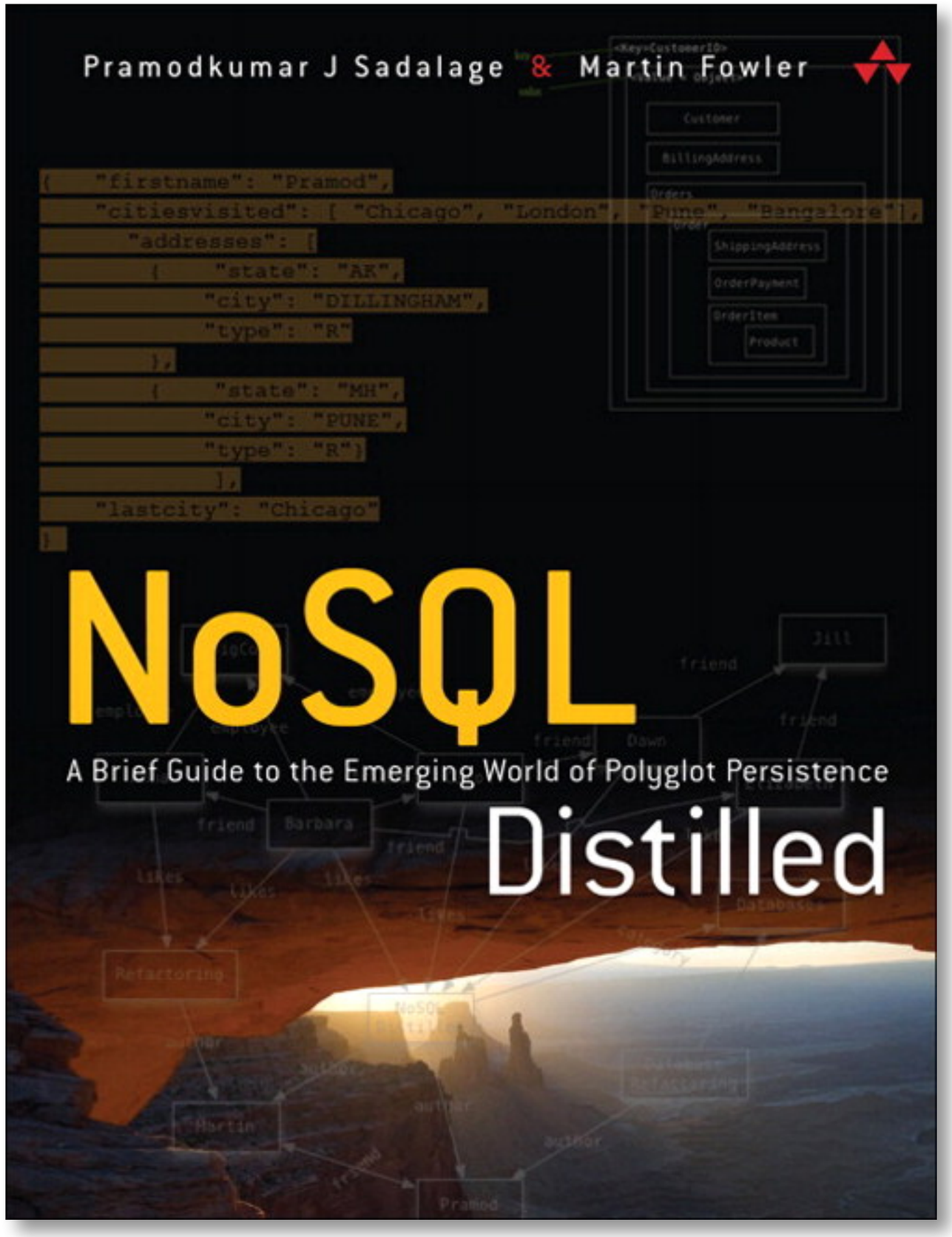
Aggregate Persistance

Aggregates are the basic element of transfer of data storage

- you request to load or save *whole aggregates.*

Repositories are services that provide access to stored aggregates in terms of the ubiquitous language

Encapsulate actual storage and query technology inside repositories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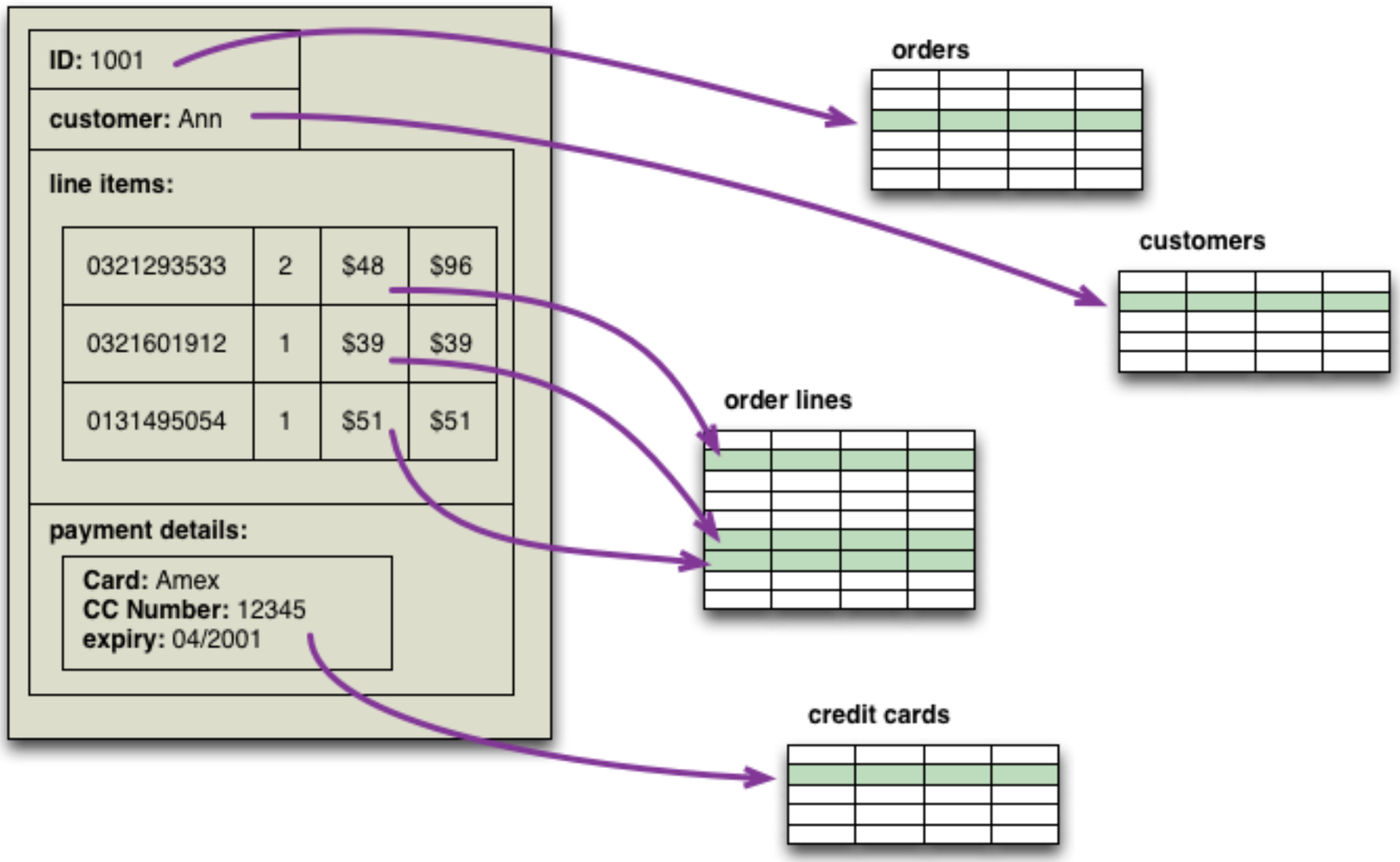
NoSQL
A Brief Guide to the Emerging World of Polyglot Persistence
Distilled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customer: Ann
line items:
0321293533
2
$48
$96
0321601912
1
$39
$39
0131495054
1
$51
$51
payment details:
Card: Amex
CC Number: 12345
expiry: 04/2001
orders
customers
order lines
credit cards

```
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        state: 'CO'
    }
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}
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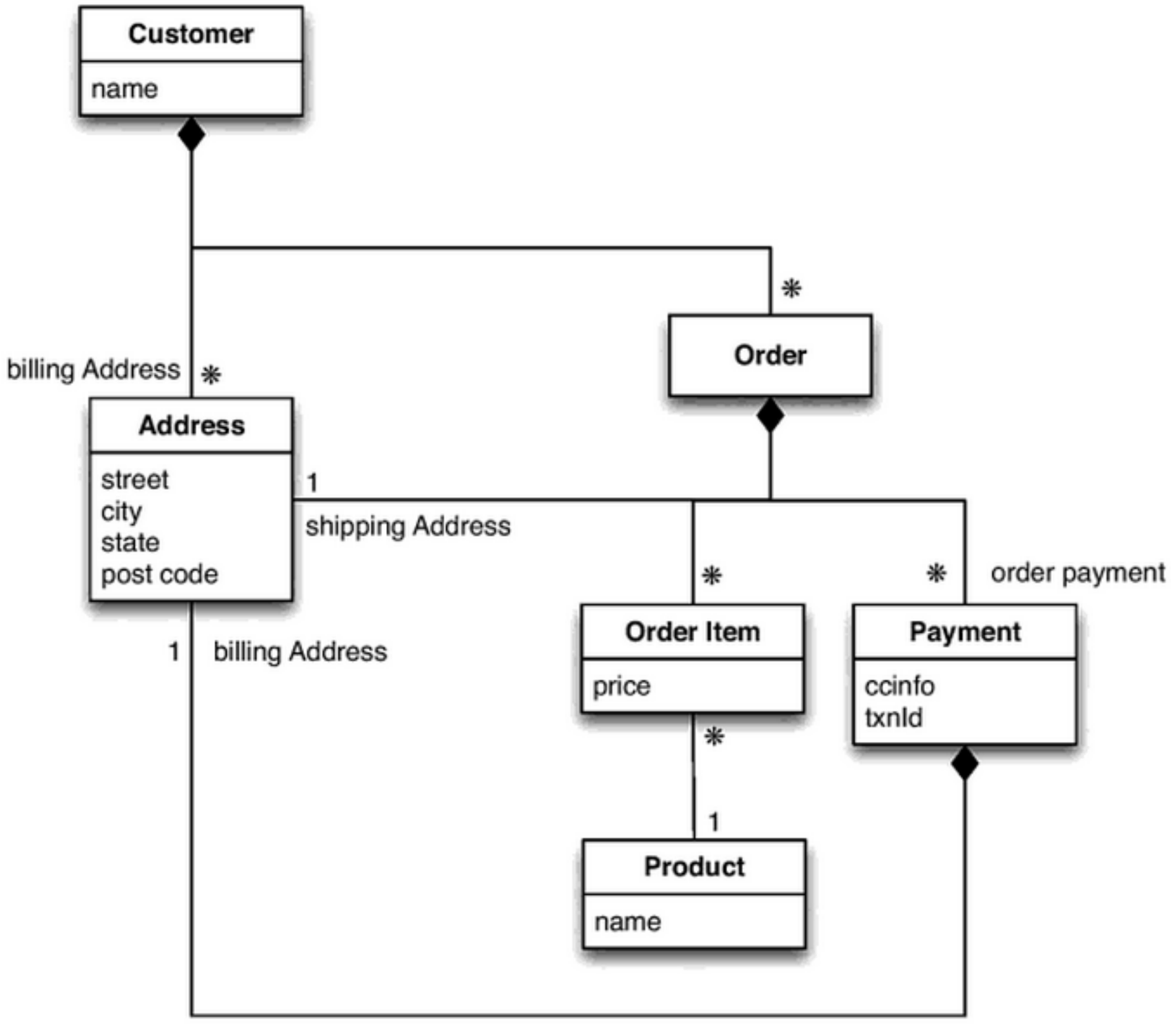
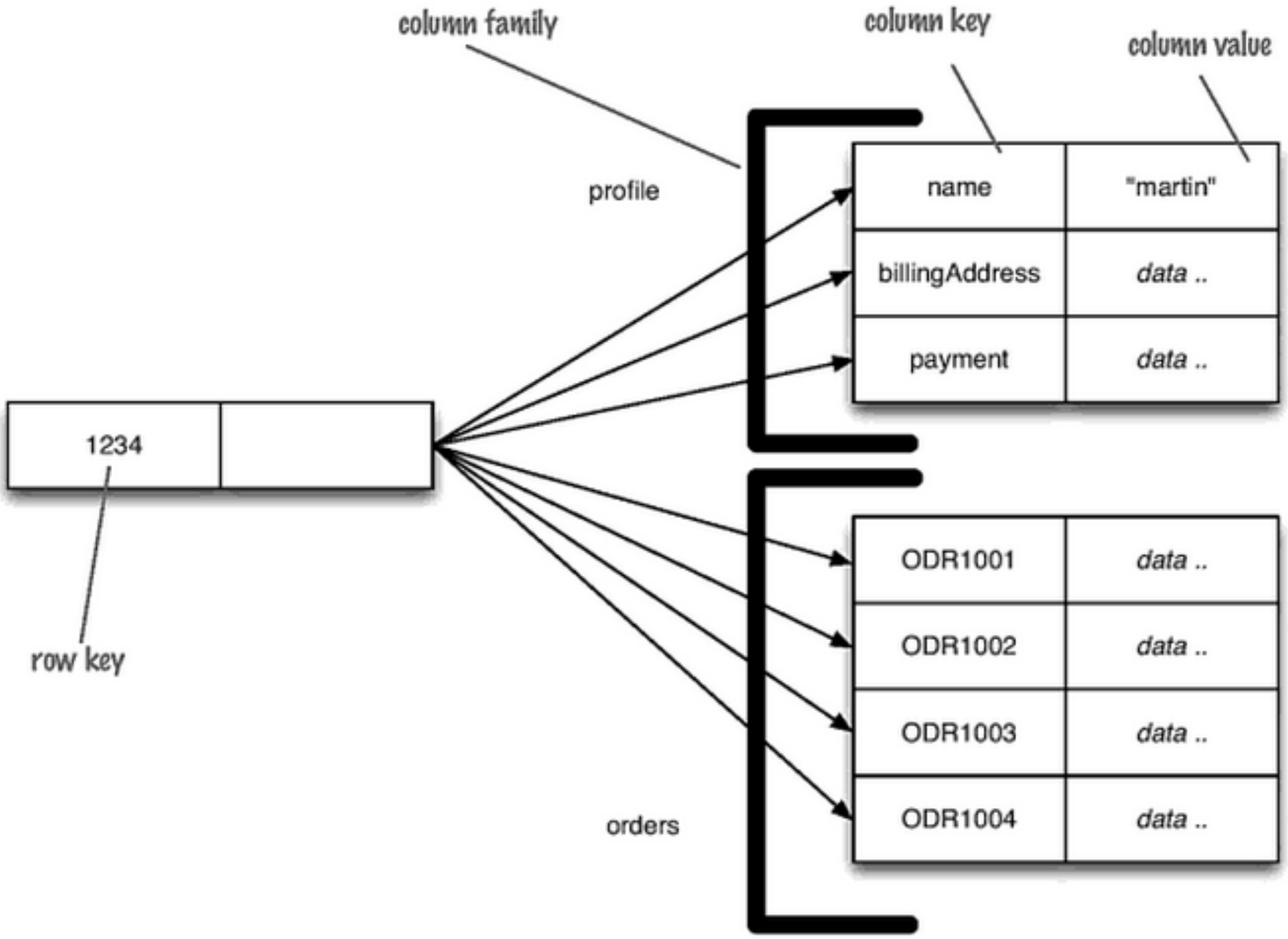

Customer
name
billing Address
*
*
Order
Address
street
city
state
post code
1
shipping Address
1
billing Address
*
*
order payment
Order Item
price
Payment
ccinfo
txnId
*
1
Product
name


column family
column key
column value
profile
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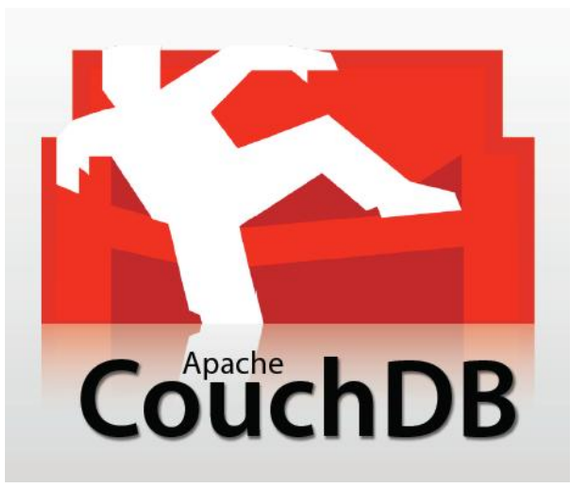
billingAddress
data ..
payment
data ..
1234
row key
ODR1001
data ..
ODR1002
data ..
ODR1003
data ..
ODR1004
data ..
orders

An aggregate is a collection of data that we interact with as a unit.

Aggregates form the boundaries for ACID operations with the database.

Key-value, document, and column-family databases can all be seen as forms of *aggregate-oriented database.*



Aggregates make it easier for the database to manage data storage over clusters.

Aggregate-oriented databases work best

when most data interaction is done with the same aggregate;

aggregate-ignorant databases are better

when interactions use data organized in many different formations.