



Strong Consistency with NoSQL Databases

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Facts & Figures

Founded **1994**

More than **100 employees**

2013 more than **15 million Euro** turnover

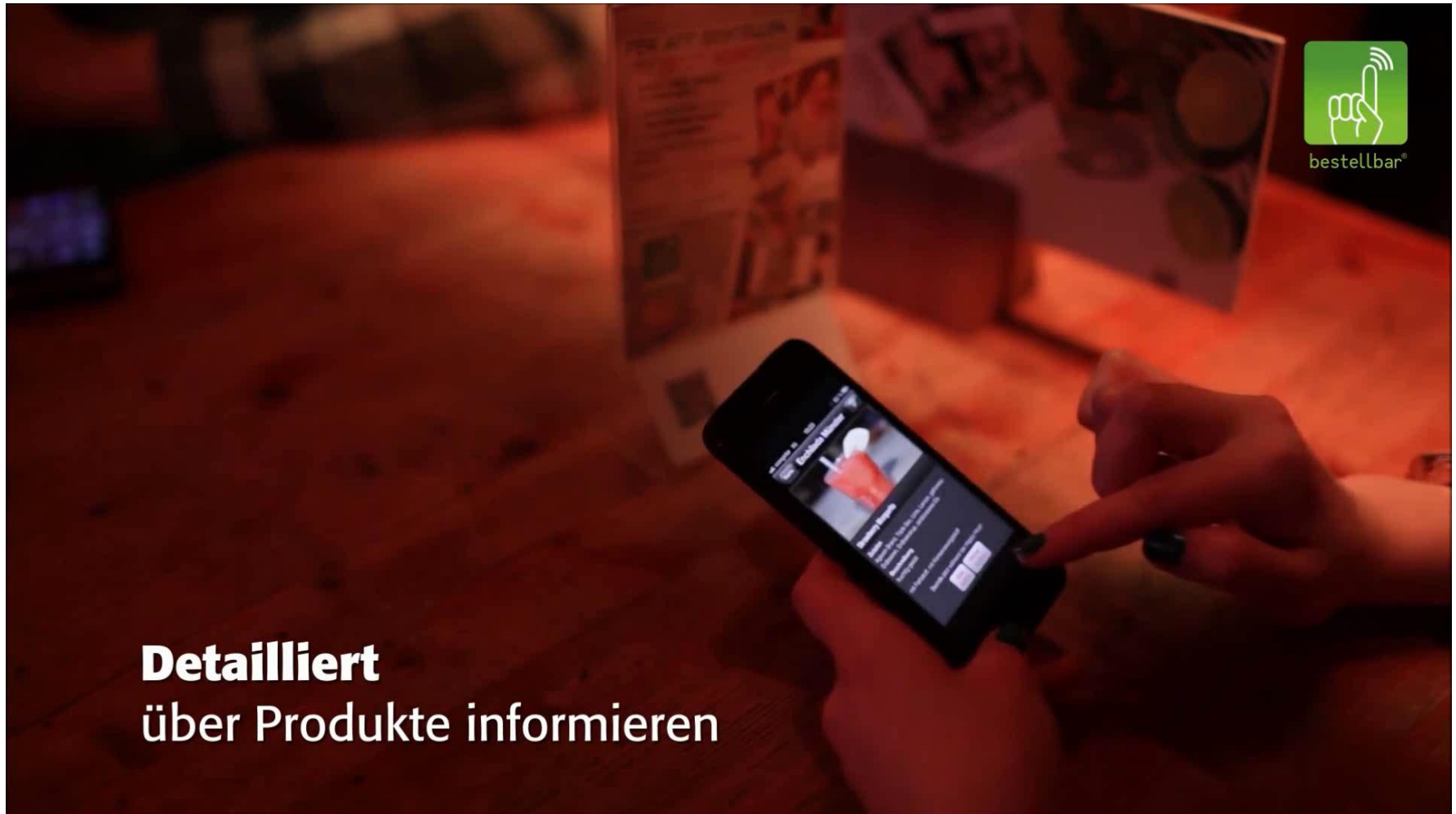
Independent – of product vendors and banks

Long-time customer relations

Close connection with our customers

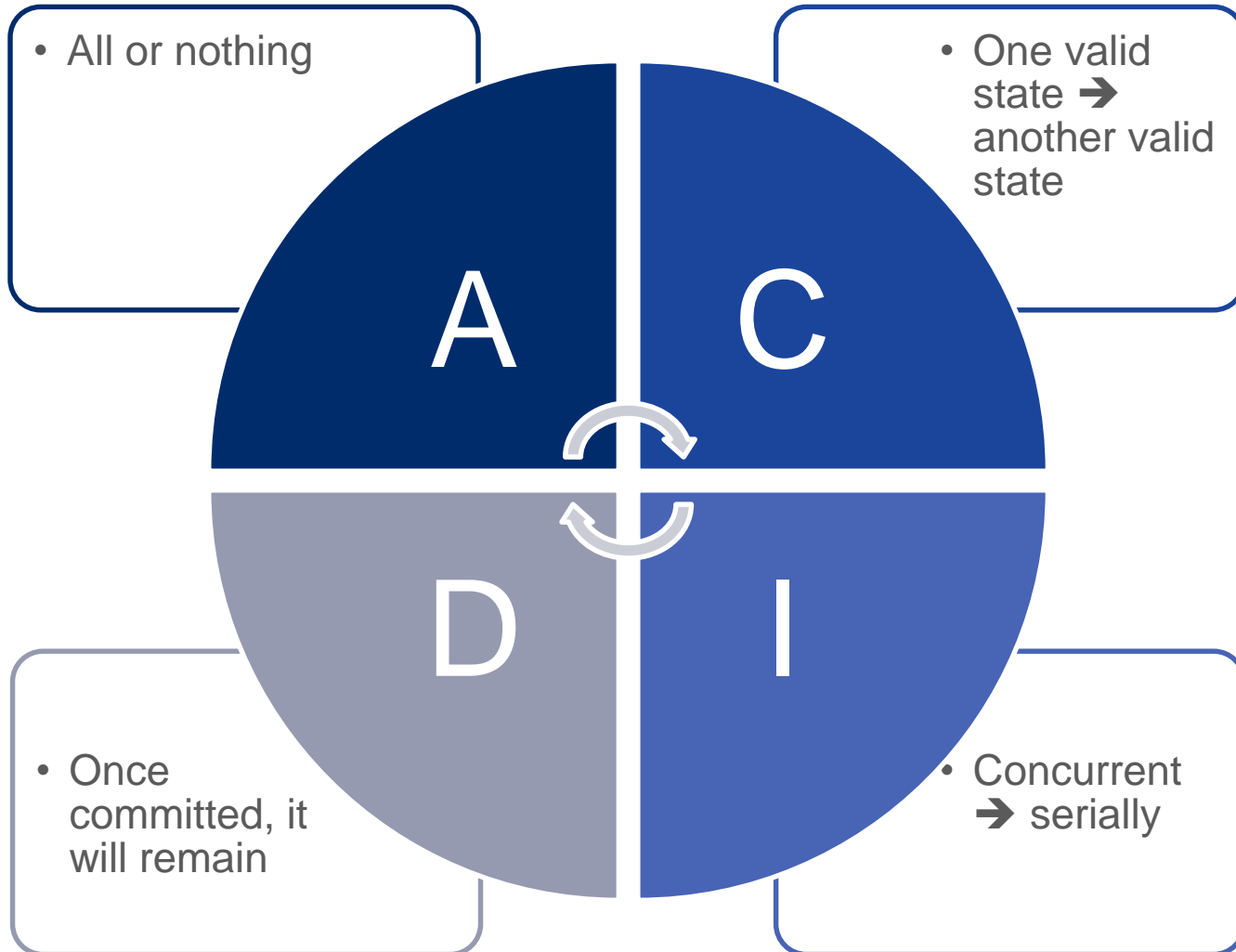
Offices in  Münster  Köln

Eventual Consistency Is Acceptable

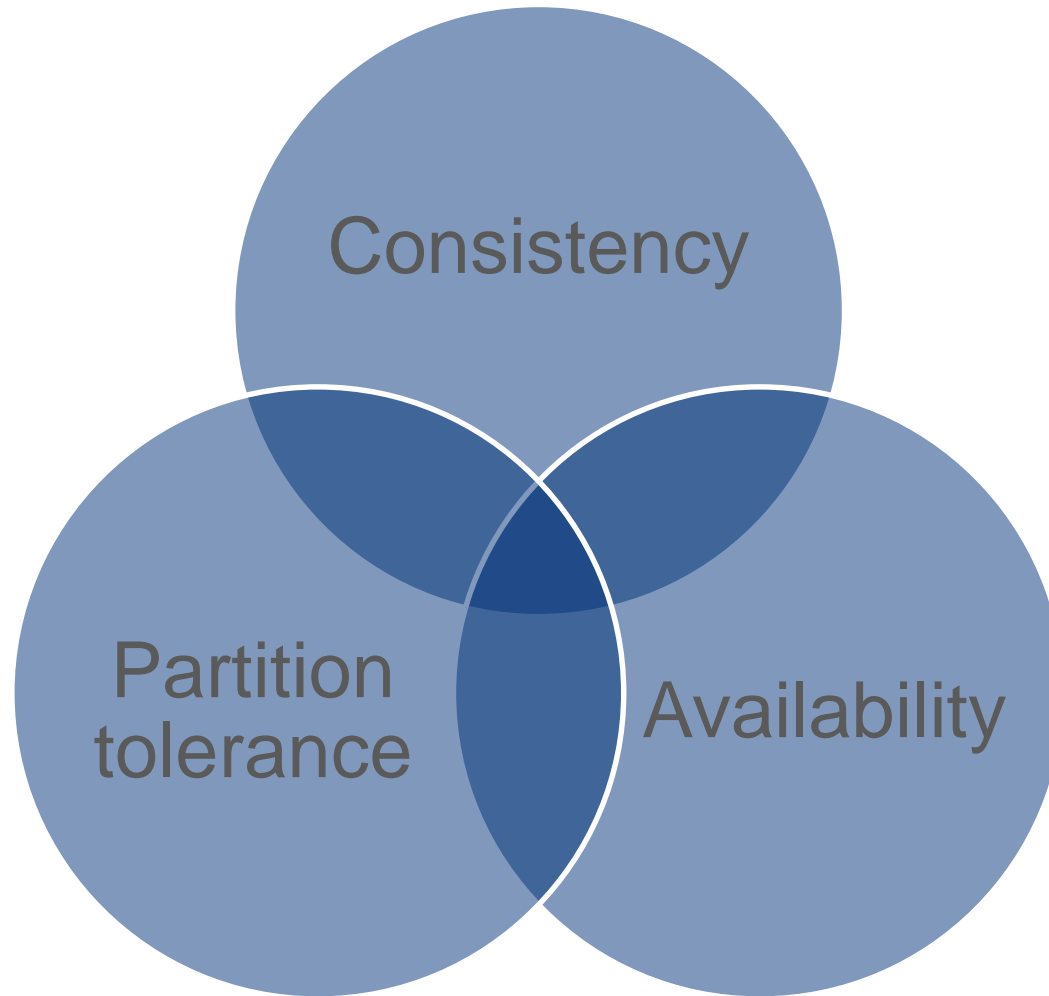


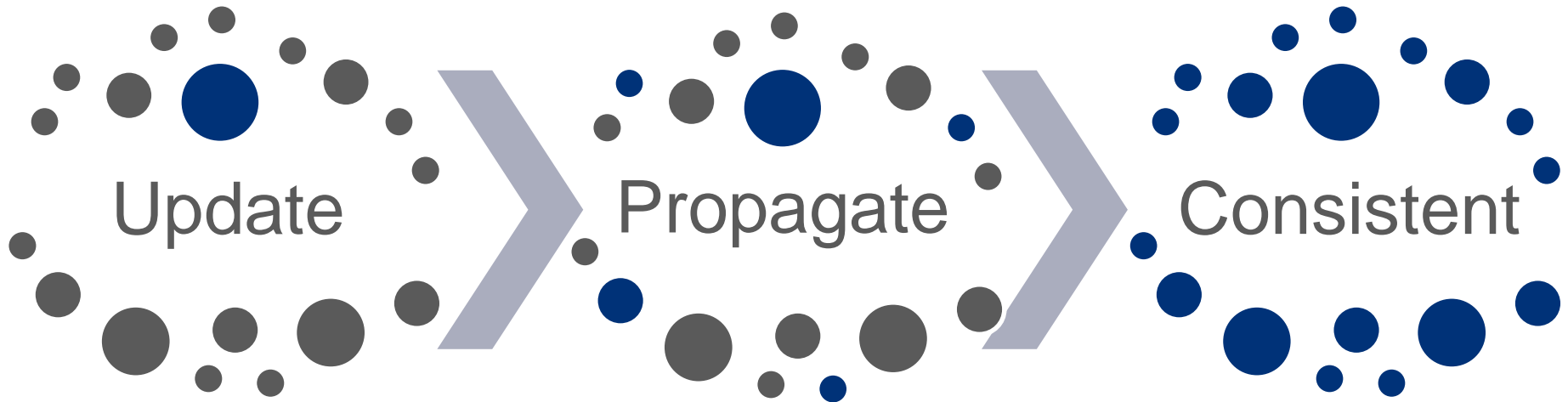
Detailliert
über Produkte informieren

ACID Transactions



CAP Theorem (Brewer, 2000)

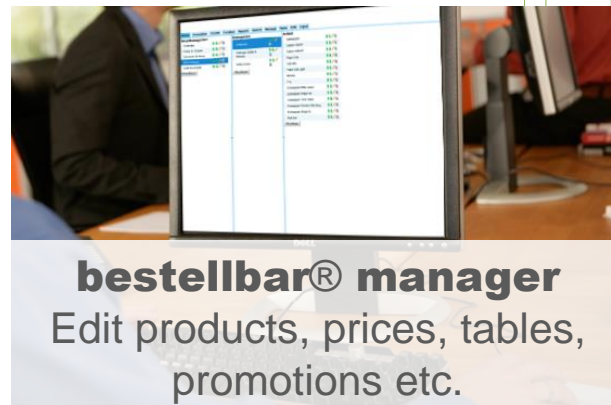
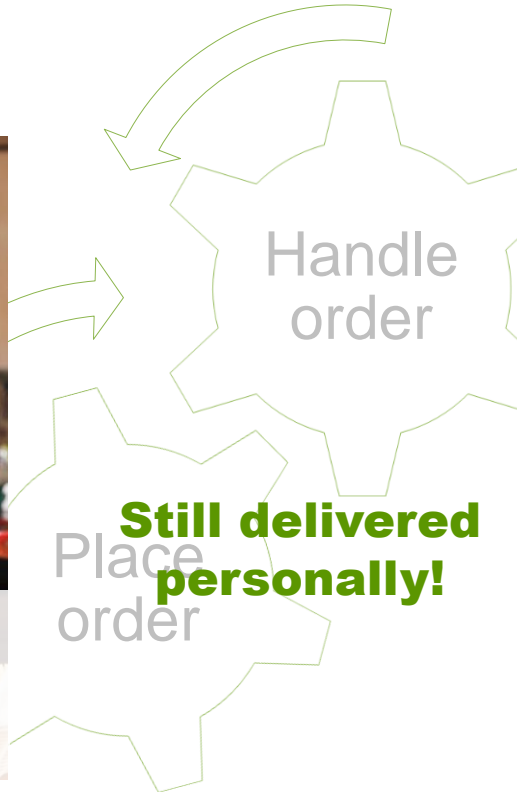
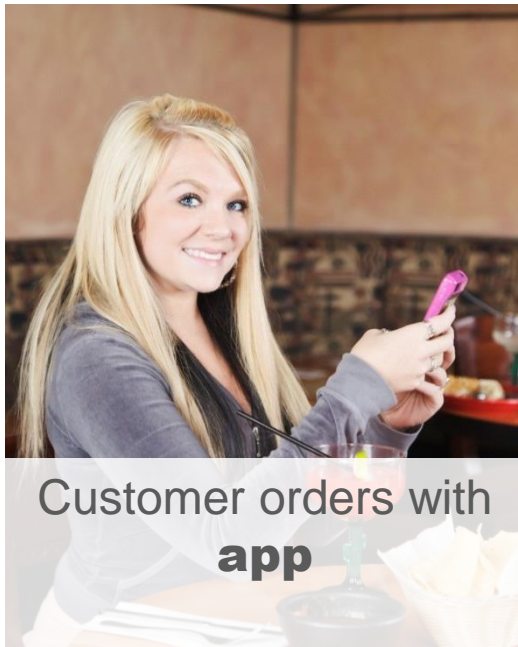




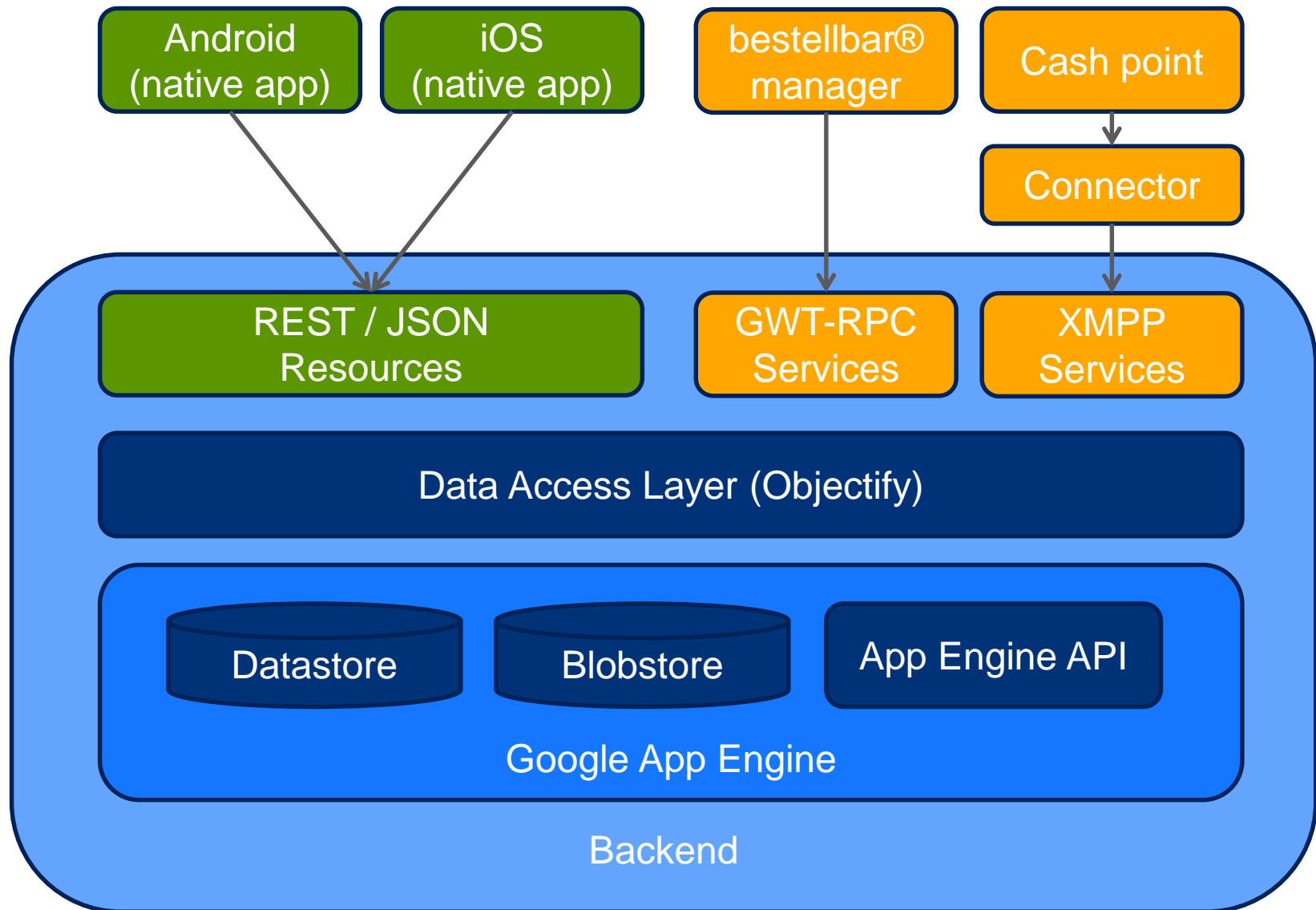
- Amazon popularized the concept of **Eventual Consistency**
 - *“the storage system guarantees that if no new updates are made to the object, eventually all accesses will return the last updated value”*

Werner Vogels, Amazon.com

bestellbar® – easy.mobile.order.



bestellbar® Architecture



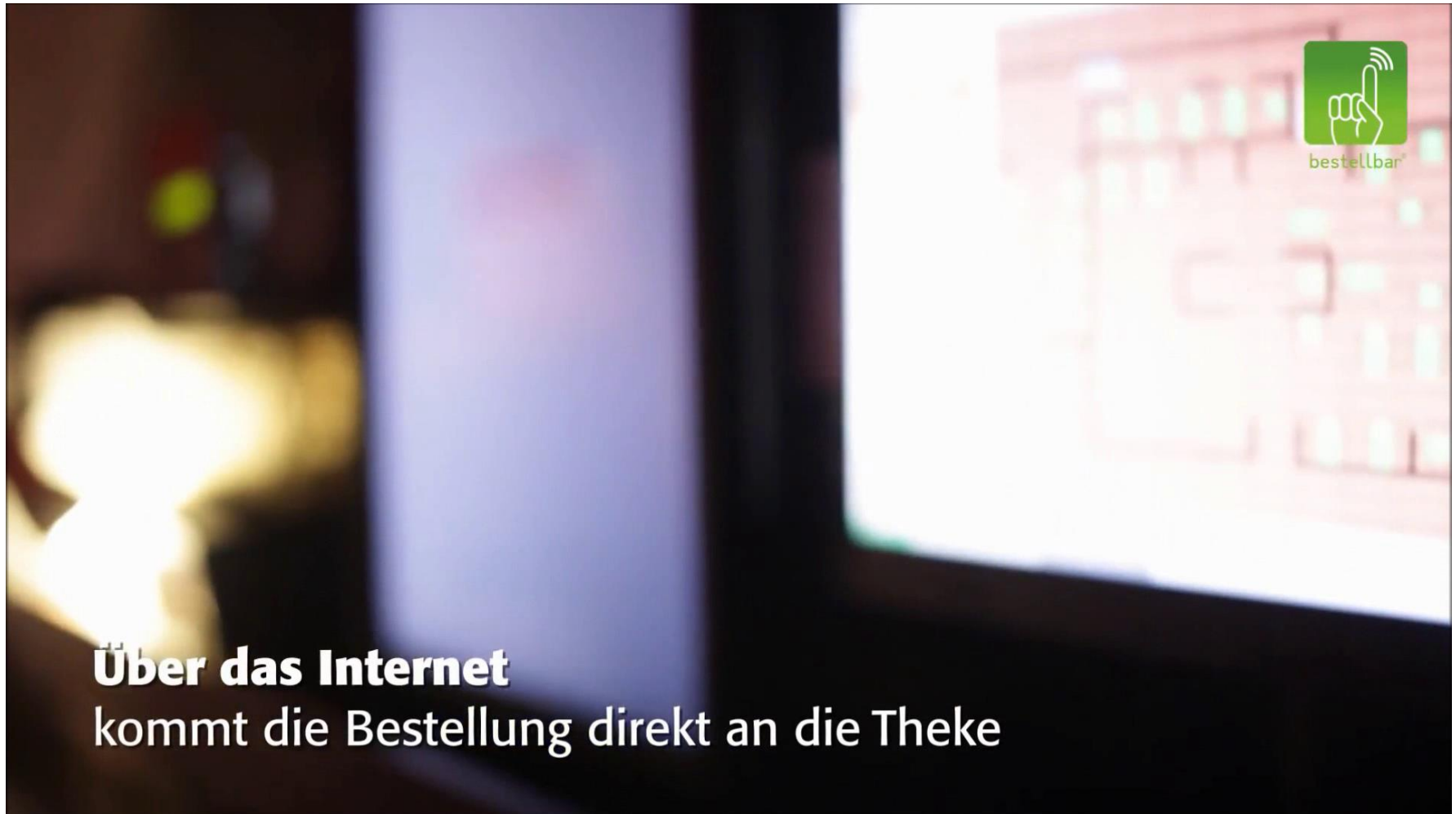
Accept Eventual Consistency

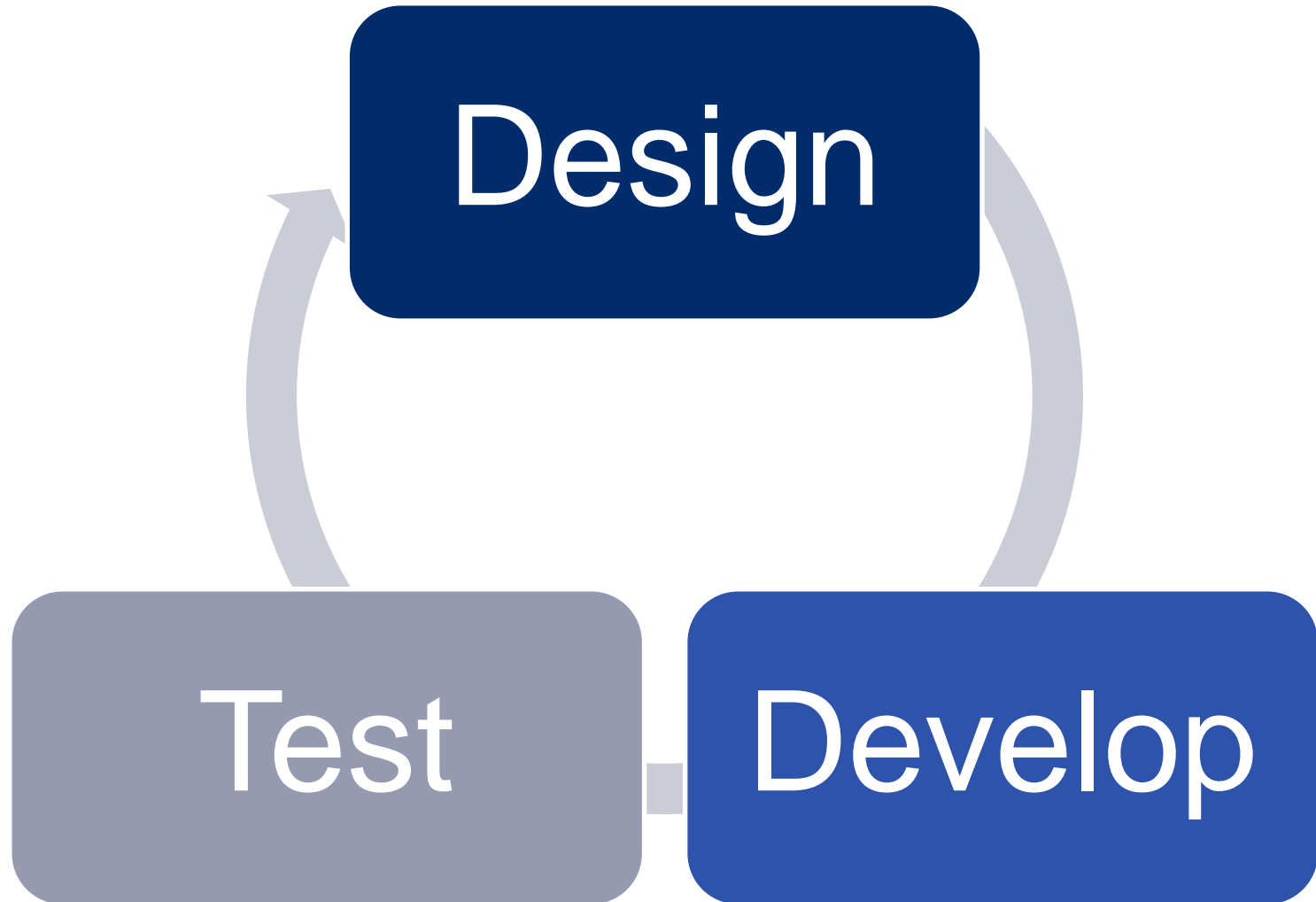


Detailliert
über Produkte informieren

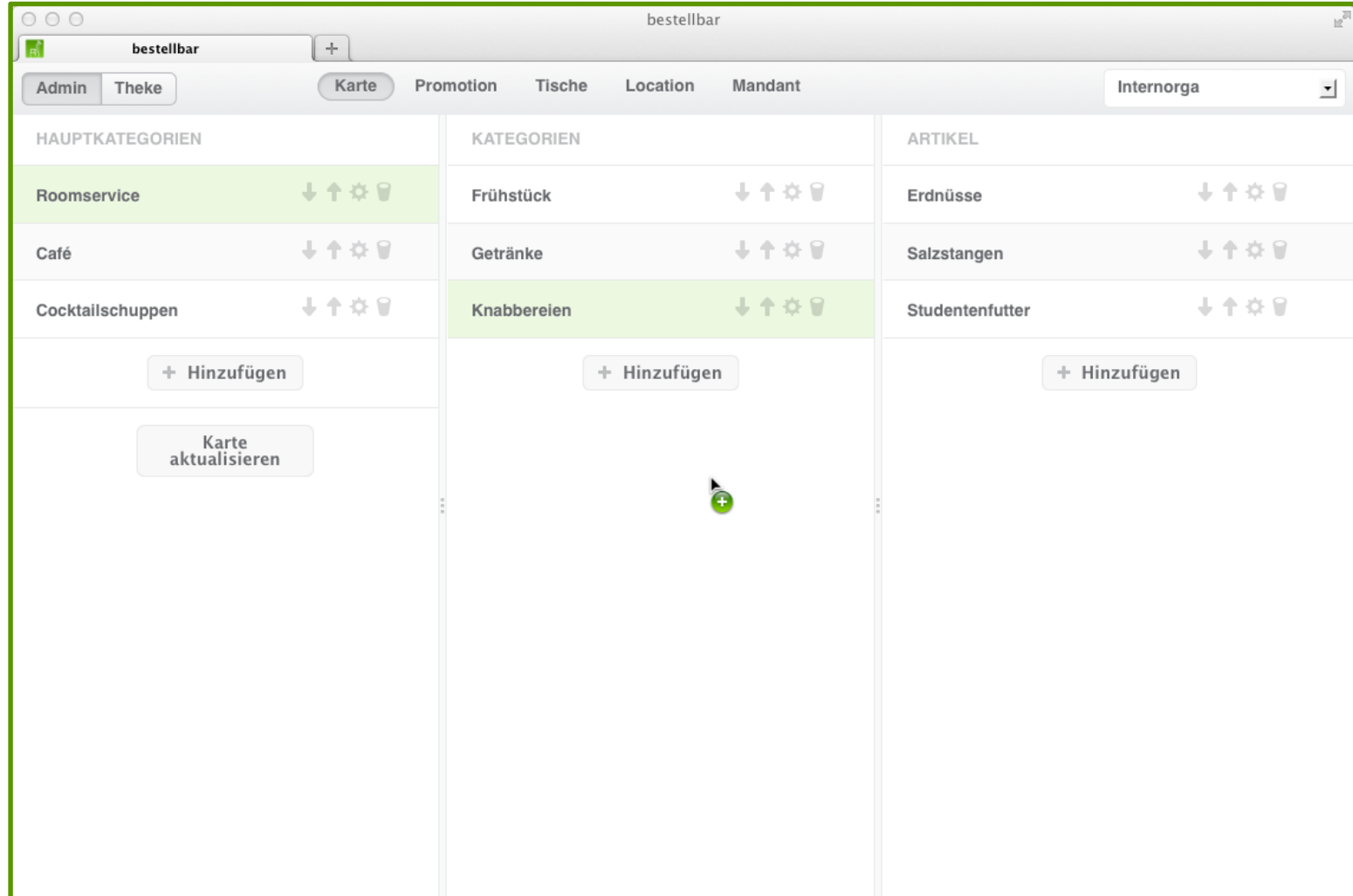
Getränk
mit 2Klicks bestellen

Accept Eventual Consistency








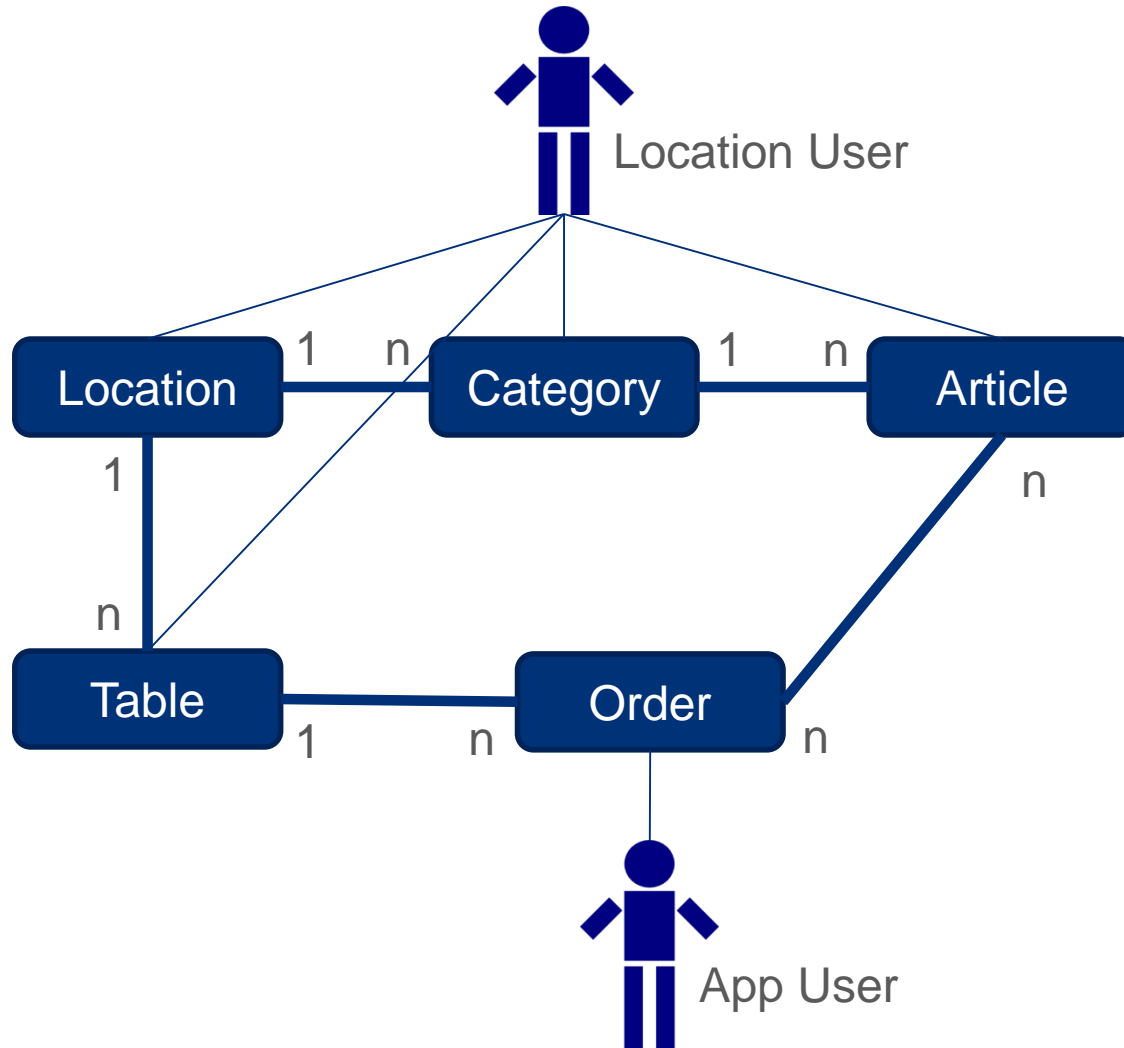
Pitfalls with Eventual Consistency



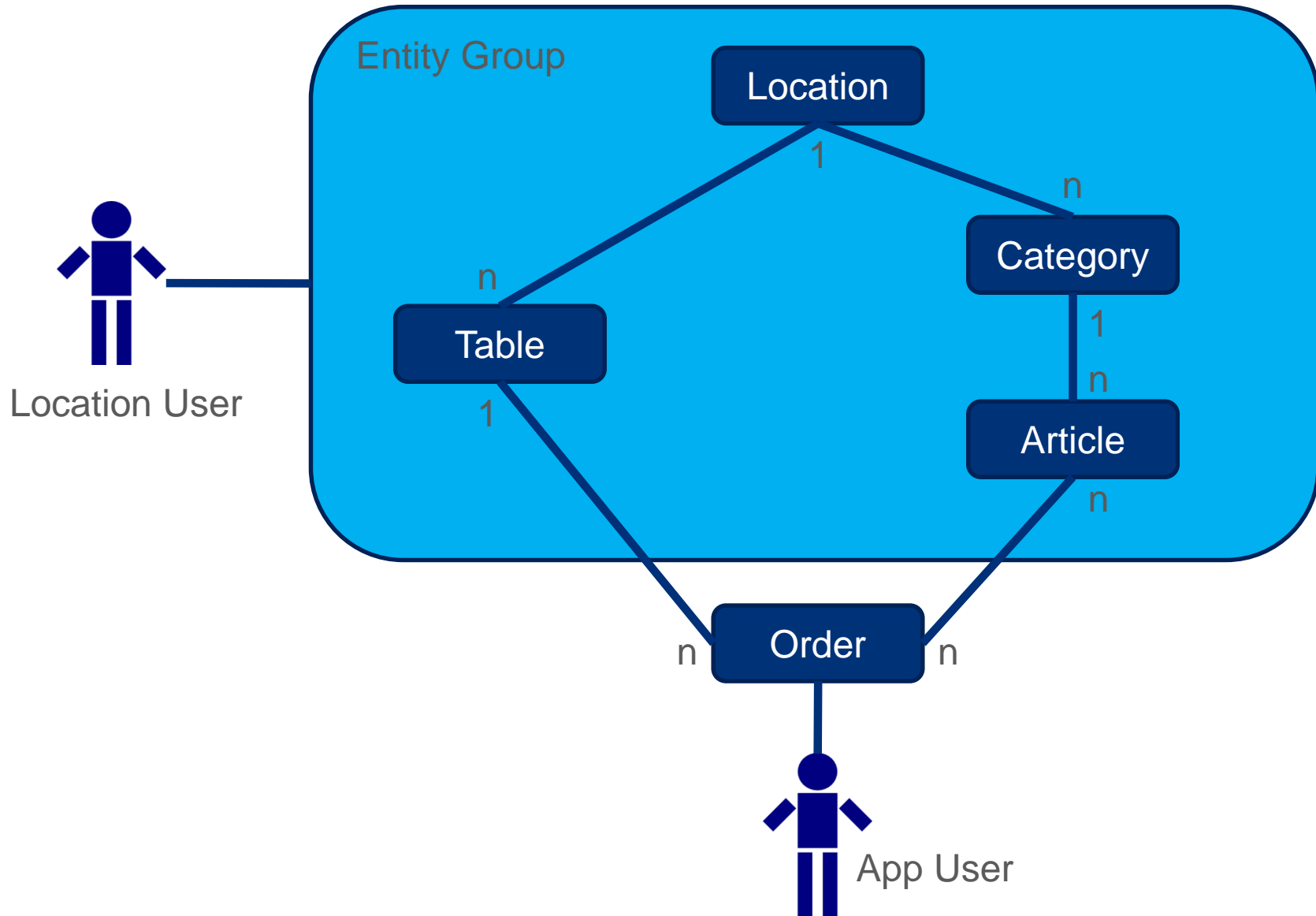
Google App Engine Datastore

Operation	Properties
Put (with primary key)	Strong Consistency 
Delete (with primary key)	Strong Consistency 
Get (with primary key)	Strong Consistency 
Query (without ancestor)	Eventual Consistency 
Ancestor Query (entity group)	Strong Consistency 

bestellbar® Data Model (Simplified)



bestellbar® Data Model (Simplified)



bestellbar® Entity Groups (Simplified)

Entity Group A

Location A



Entity Group B

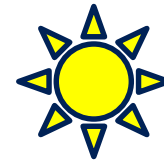
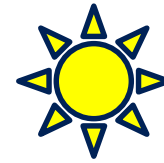
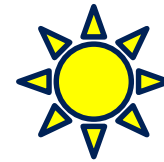
Location B



- we decided in favor of a two-level hierarchy in order to simplify the data access operations
 - one parent instead of a complete hierarchy of up to six ancestors
- the Entity Group is identical for both approaches

Ancestor Queries

- `SELECT * FROM Category`
`WHERE ancestor IS location.key()`
- `SELECT * FROM Table`
`WHERE ancestor IS location.key()`
- `SELECT * FROM Article`
`WHERE ancestor IS location.key()`



- the two-level hierarchy enabled us to migrate the data
- works well with n:m-relationship at lower levels

Datastore Migration

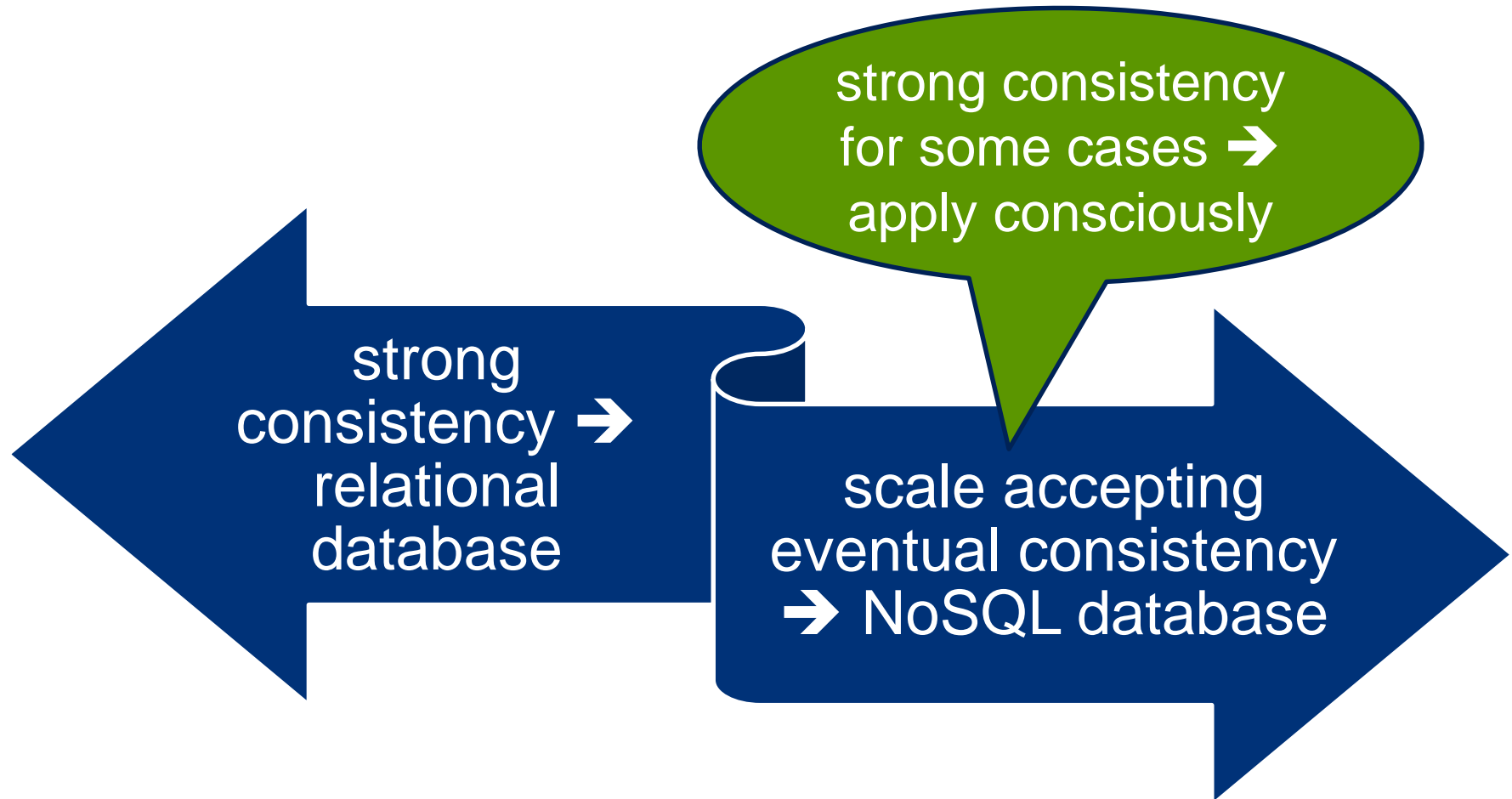


- ancestor for entity group has to be given at insert time
- cost = about 10 person-days
 - migration was the smaller amount
 - changing the queries to include the ancestor was the main part
- downtime = about half an hour (after careful preparation)

Limitations



A Deliberate Decision



**Thank you
for your attention**

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