

GOING SCHEMA-LESS: HOW TO MIGRATE A RELATIONAL DATABASE TO A NOSQL DATABASE



Titanium Sponsors



Platinum Sponsors

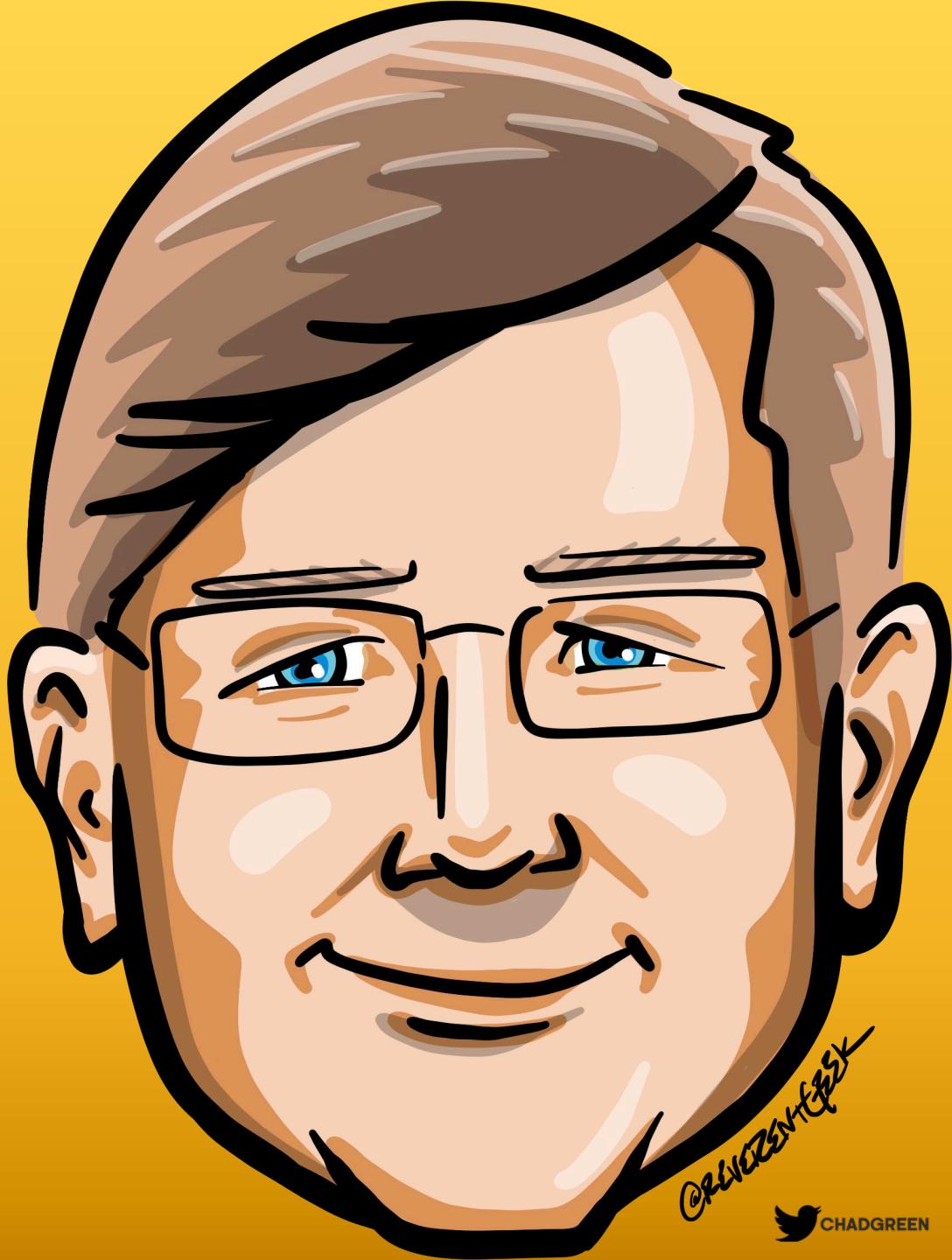


Gold Sponsors



Who is Chad Green

- ✉ chadgreen@chadgreen.com
- ✳ TaleLearnCode
- 🌐 ChadGreen.com
- 🐦 ChadGreen & TaleLearnCode
- linkedin ChadwickEGreen



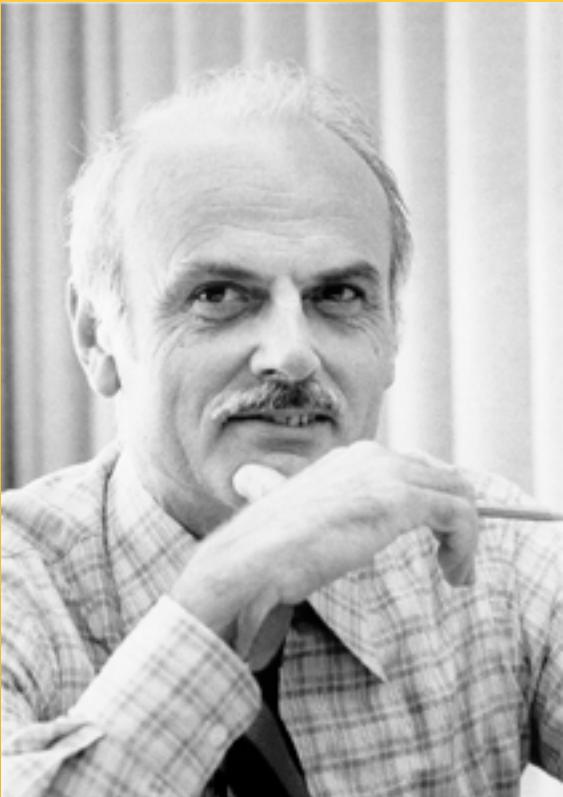


How did I get started with NoSQL databases?

What are Relational Databases



Relational Model



- First-order predicate logic
- Described by Edgar Codd in 1969
- Data represented in terms of tuples
- Purpose is to provide declarative method for specifying data and queries

Codd's 12 Rules

0: Foundation Rule

1: Information Rule

2: Guaranteed Access

3: Systematic treatment of
NULL values

4: Active Online Catalog

5: Comprehensive data
sublanguage

6: View Updating

7: Possible for high-level
insert, update, and delete

8: Physical data
independence

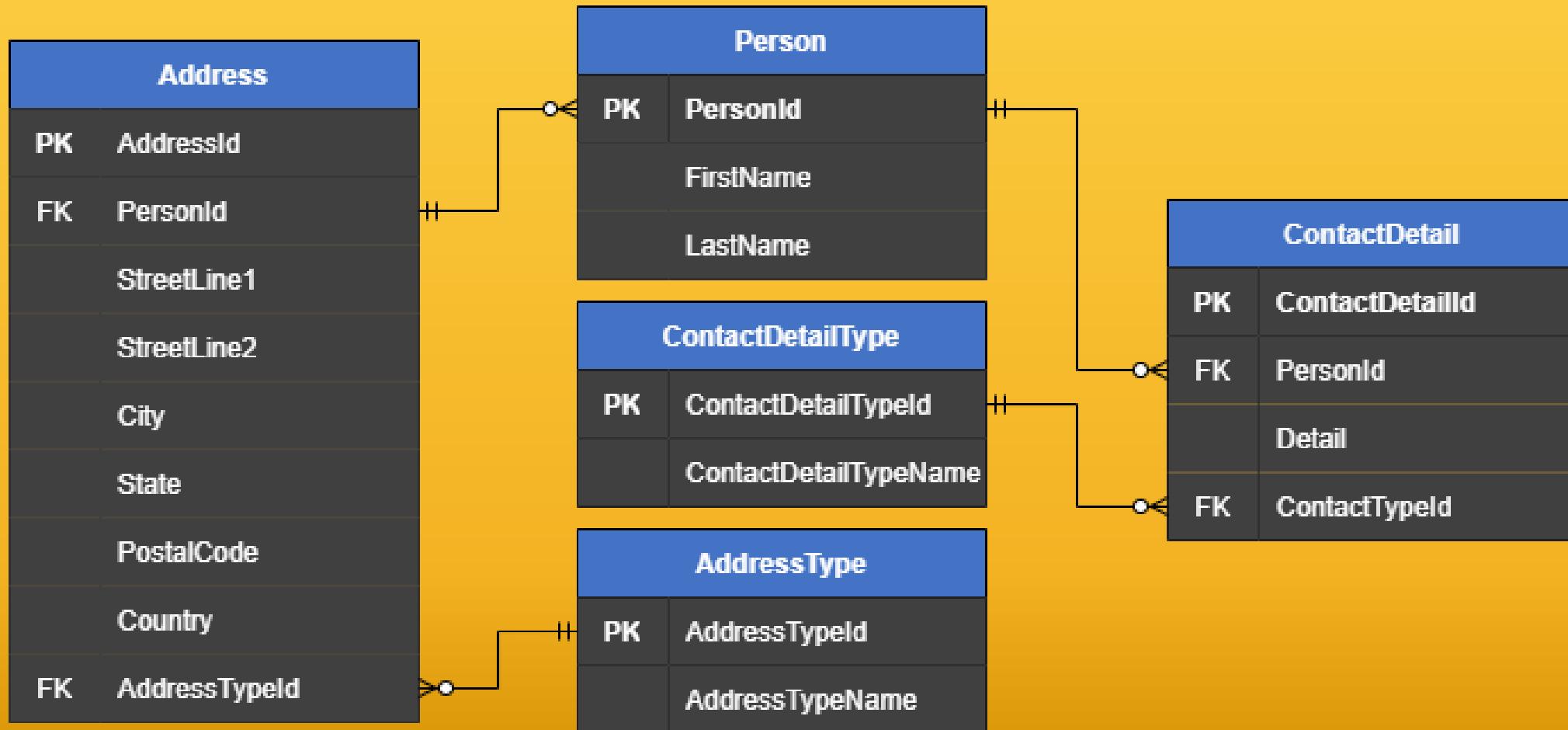
9: Logic data independence

10: Integrity Independence

11: Distribution
Independence

12: Nonsubversion Rule

Typical Relational Model



True star of Relational Databases

SQL

Structured Query Language

SEQUEL

True star of Relational Databases

SQL

Structured



By Saufhn - Own work, CC BY-SA 4.0,
<https://commons.wikimedia.org/w/index.php?curid=87255205>

Big Names in Relational Databases

ORACLE®



**Microsoft®
SQL Server®**



PostgreSQL



SQLite



What are NoSQL Databases



What are NoSQL Databases

Modeled in means other than tabular relations

Existed since late 1960s

Increasingly used in big data and real-time web applications

NoSQL Motivations

Simplicity of Design

Simpler Horizontal
Scaling

Finer Control over
Availability

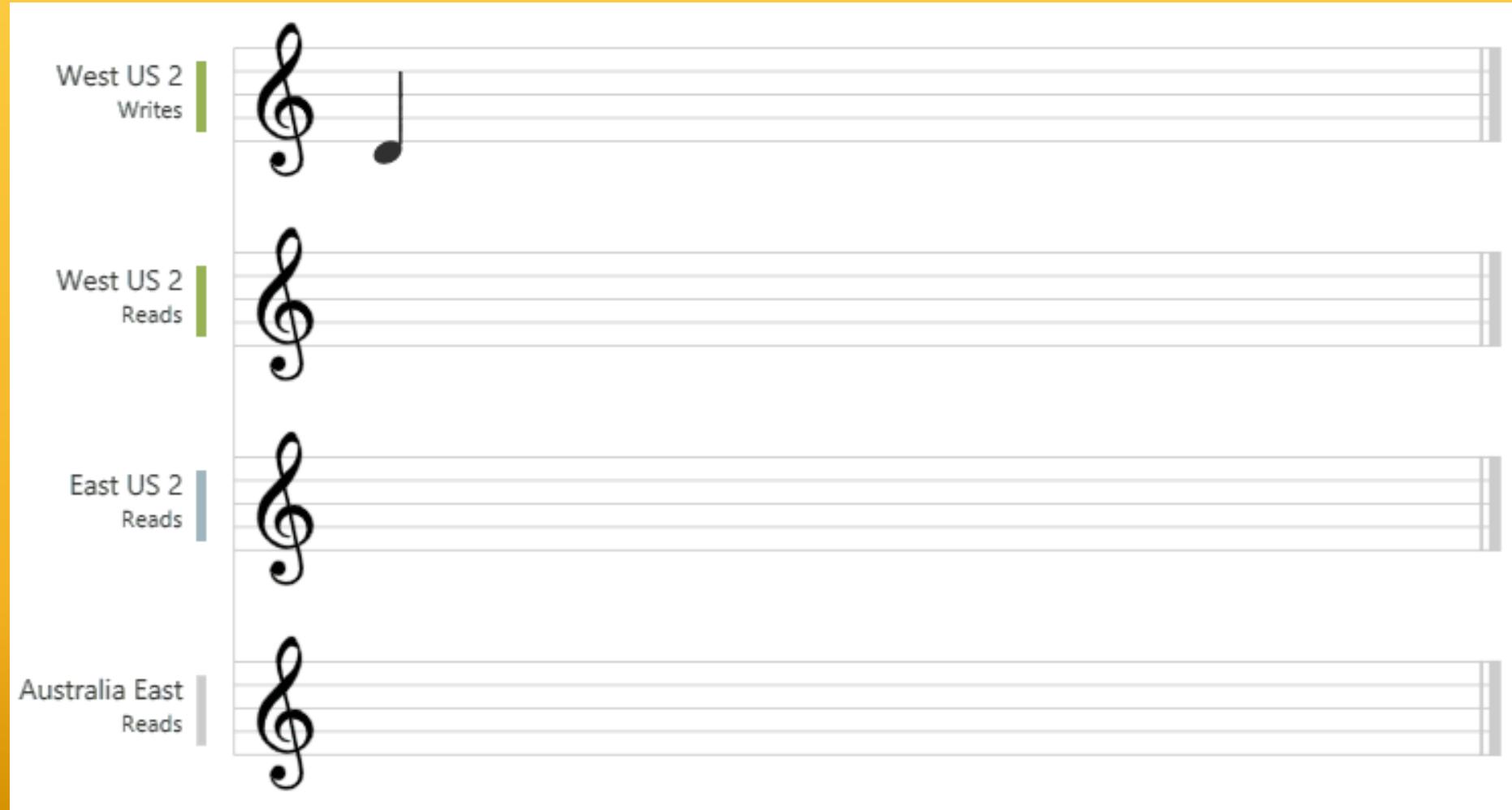
Limiting Object-
Relational Impedance

Availability over Consistency

Relational
ACID Transactions

NoSQL
Eventual Consistency

Eventual Consistency



What's in a Name

NoSQL

What's in a Name

NoSQL

What's in a Name

Not only SQL

Non-SQL

Non-Relational

NoSQL

What's in a Name

Not only SQL

Non-SQL

Non-Relational

NOSQL

What's in a Name

No-Schema

Not only SQL

Non-SQL

Non-Relational

NOSQL

Many types of NoSQL databases



Couchbase



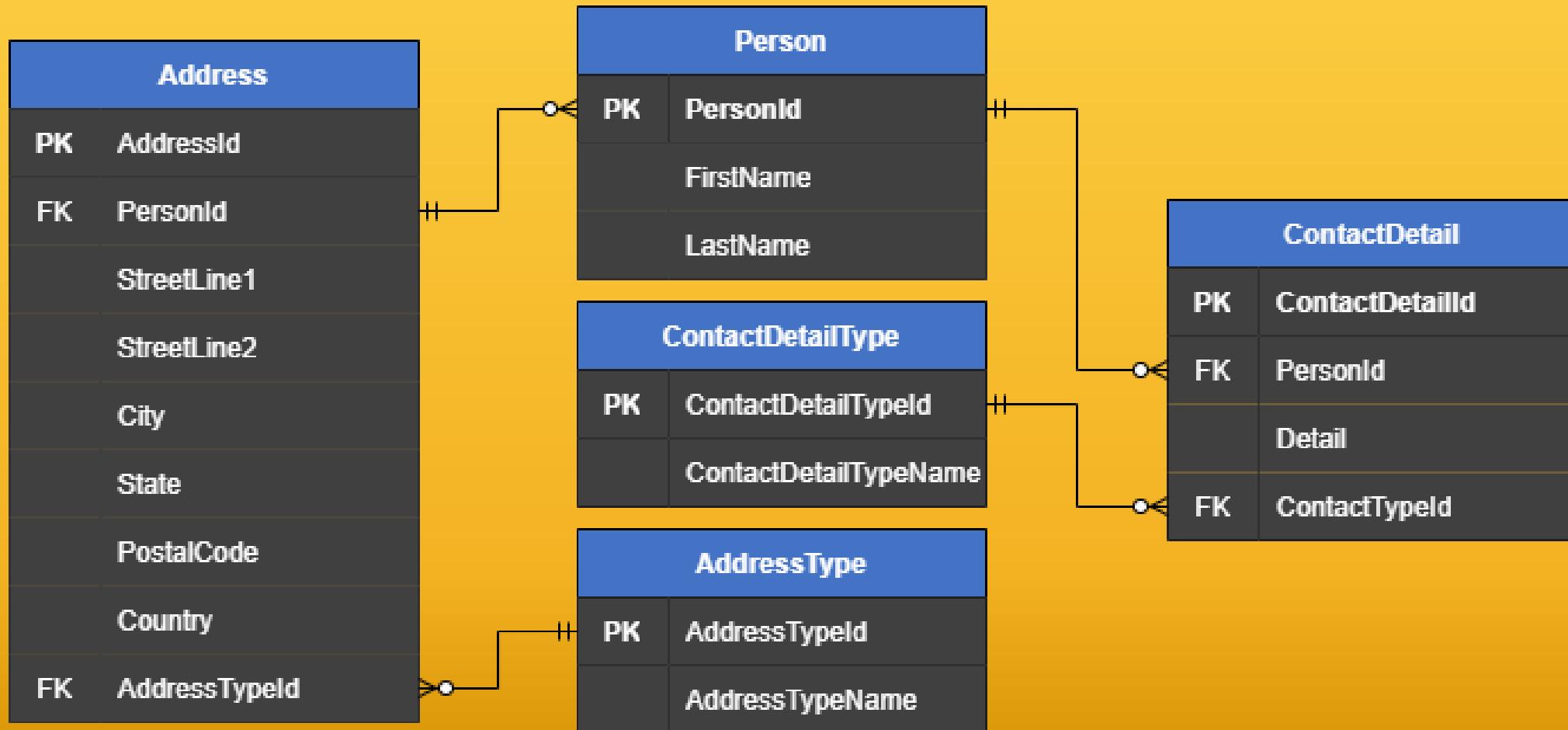
Document



elastic



Typical Relational Model



Same but in a document database

```
{  
  "id": "1",  
  "firstName": "Thomas",  
  "lastName": "Andersen",  
  "addresses": [  
    {  
      "city": "Seattle",  
      "state": "WA",  
      "type": {  
        "name": "Primary"  
      }  
    }  
  ],  
  "contactDetails": [  
    {  
      "detail": "First Detail",  
      "type": {  
        "name": "A detail type"  
      }  
    }  
  ]  
}
```

Many types of NoSQL databases



Key-Value



redis

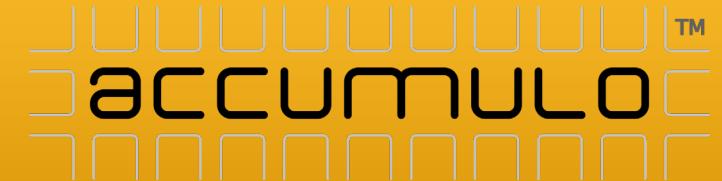


Amazon
DynamoDB

Many types of NoSQL databases



Wide Column



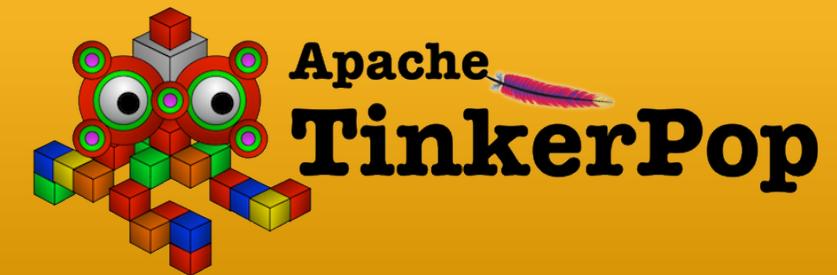
Many types of NoSQL databases



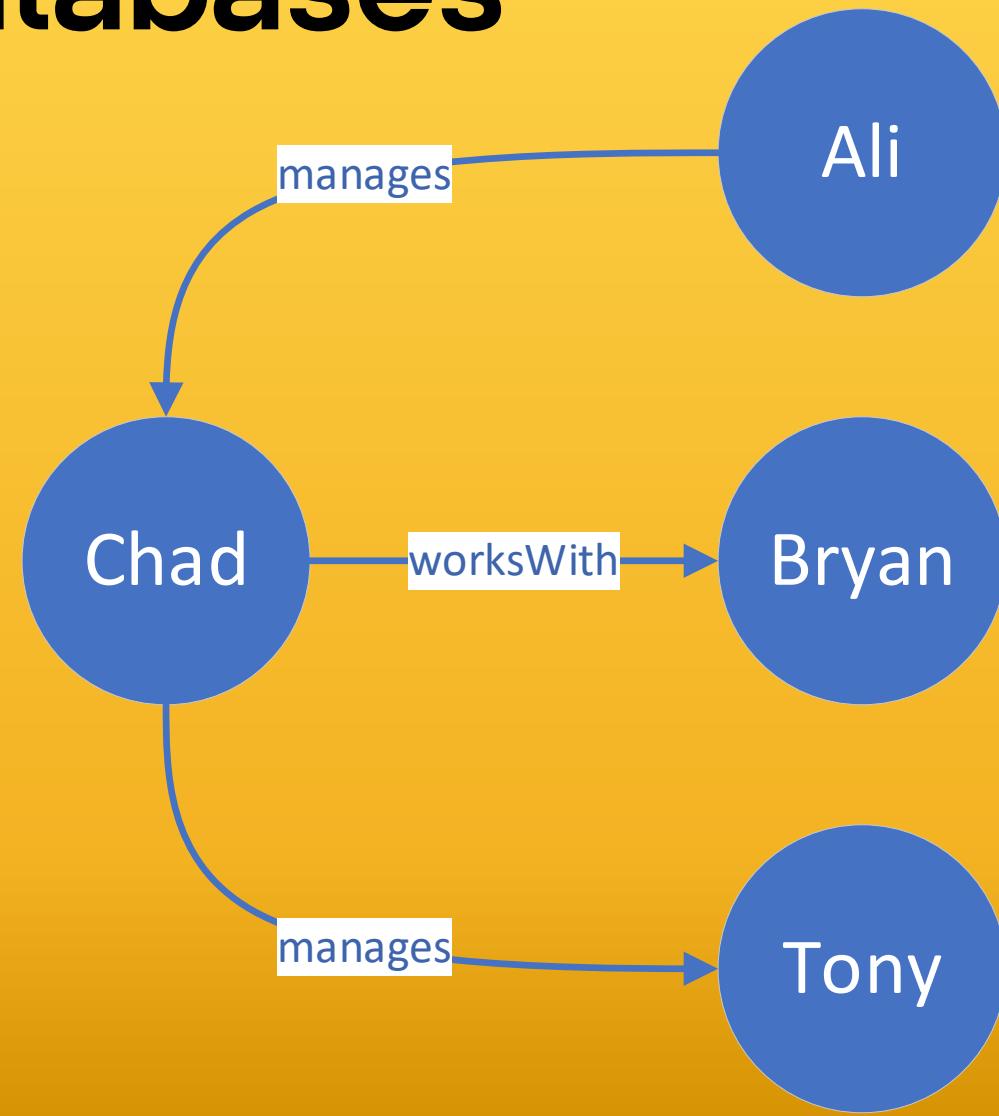
Graph



Amazon
Neptune



Graph Databases



Many types of NoSQL databases

Document

Key-Value

Wide Column

Graph

Object

Tabular

Tuple Store

Triple Store



Data Model Comparison

Data Model	Performance	Scalability	Flexibility	Complexity	Functionality
Key-Value Store	High	High	High	None	Variable (None)
Column Store	High	High	Moderate	Low	Minimal
Document Store	High	Variable (High)	High	Low	Variable (Low)
Graph	Variable	Variable	High	High	Graph Theory
Relational	Variable	Variable	Low	Moderate	Relational Algebra

Ben Scofield – NoSQL presentation at CodeMash 2010

Things to think about

Skillset

Time to Market

Known Data Structure

Scalability

Don't forget

Hybrid

Example Explainer



Based on Real-World Project



Product & Pricing Management (PPM)

Vacation Rental Listing

- Allow property owners to list their vacation rentals
- Allow vacationers the ability to search for vacation rentals
- Provide vacationers with details of the properties
- Allow for configurable property/room attributes
- Localized versions of all the information

Data Model

Attributes

Content

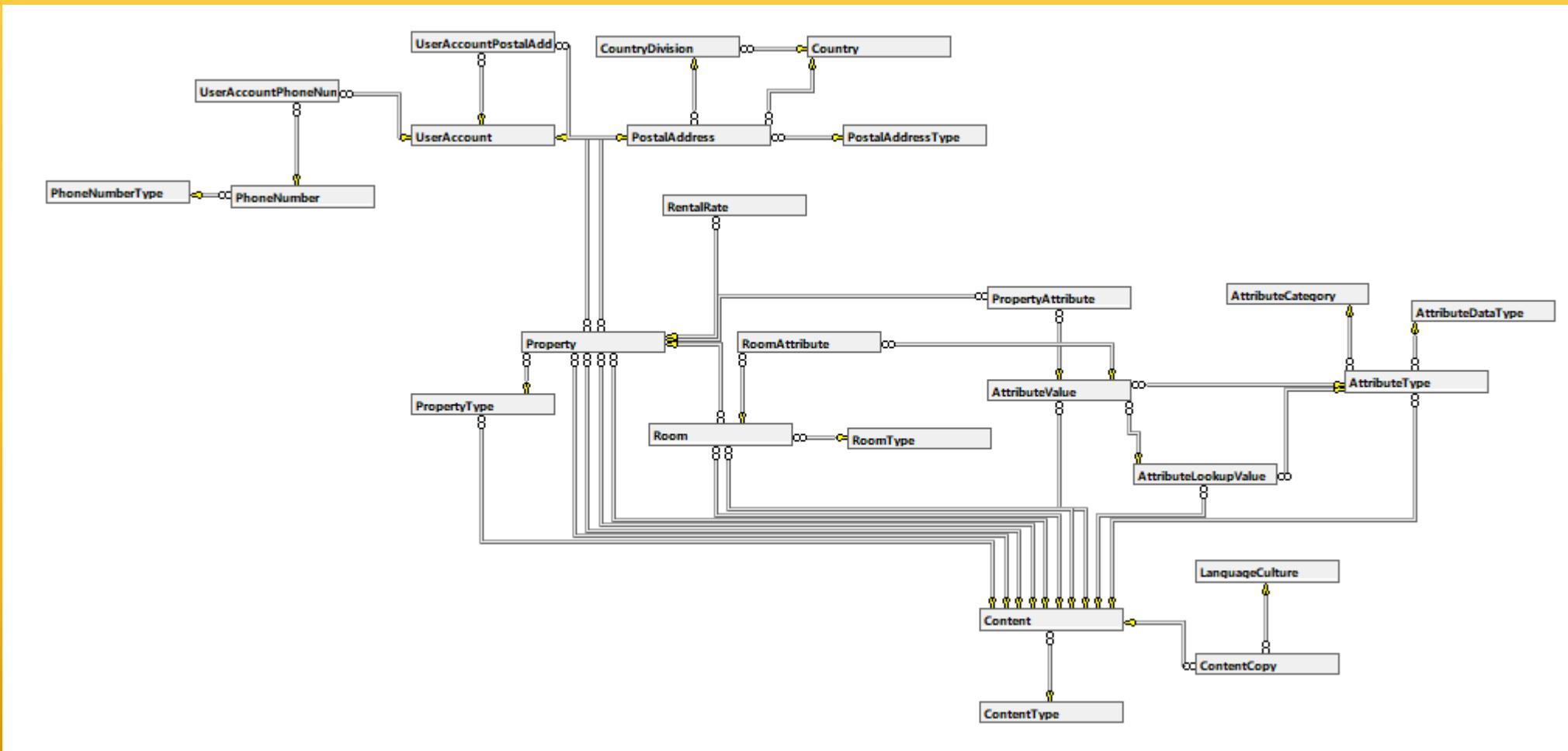
User Accounts

Properties

Reference Types

Rooms

Relational Data Model



Real World: Why Relational

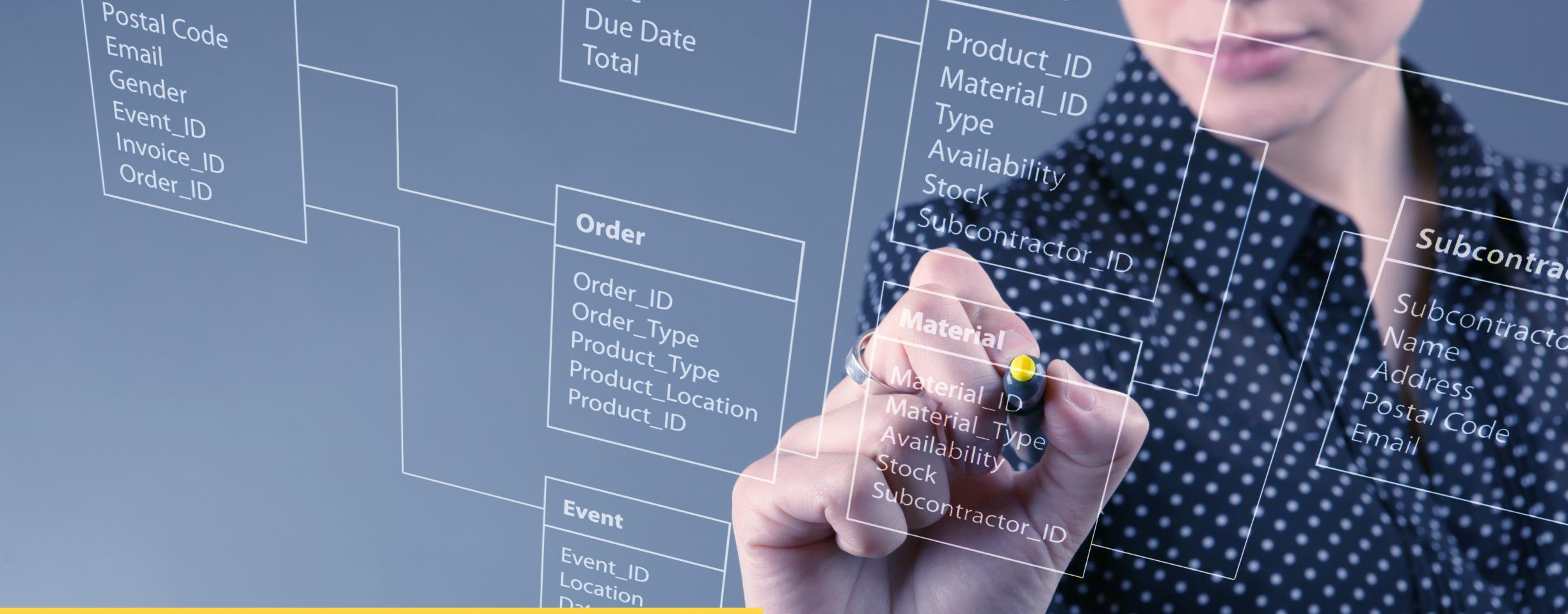
Skillset

Time to Market

Other Products

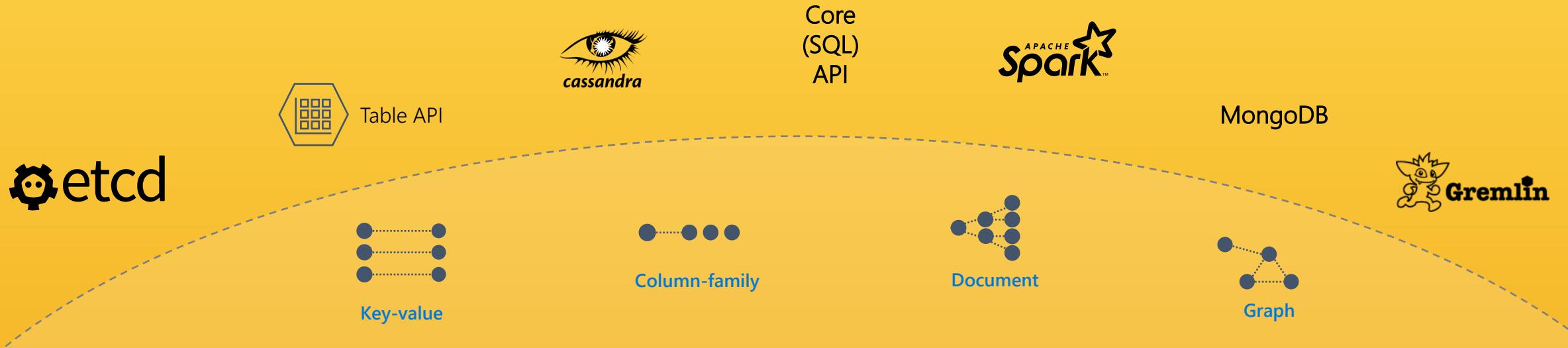
Issues Found in Real-World Project

- Searching against the attributes is difficult
- Navigation is deep



Very Quick Intro to Cosmos DB

Azure Cosmos DB



Elastic scale out
of storage & throughput

Guaranteed low latency
at the 99th percentile

Five well-defined
consistency models

Turnkey global
distribution

Comprehensive
SLAs

Which Azure Cosmos DB Data API?

Core
(SQL)
API

Core (SQL) API

Which Azure Cosmos DB Data API?

Core
(SQL)
API



MongoDB

Which Azure Cosmos DB Data API?

Core
(SQL)
API



Table Storage

Which Azure Cosmos DB Data API?

Core
(SQL)
API



Gremlin

Which Azure Cosmos DB Data API?

Core
(SQL)
API



Cassandra

Migrating to NoSQL



Document Database Structure

Cosmos DB Account

Database

Database

Container

Container

Container

Container

Item

Item

Item

Item

Item

Item

Item

Item

Vacation Rentals Data Model

Attributes

Content

User Accounts

Properties

Reference Types

Rooms

Vacation Rentals Data Model

Attributes

attributeTypeId

Content

User Accounts

userAccountId

Properties

propertyId

Rooms

referenceTypeName

Reference Types

Vacation Rentals Data Model

Attributes

attributeTypeId

User Accounts

userAccountId

Properties

propertyId

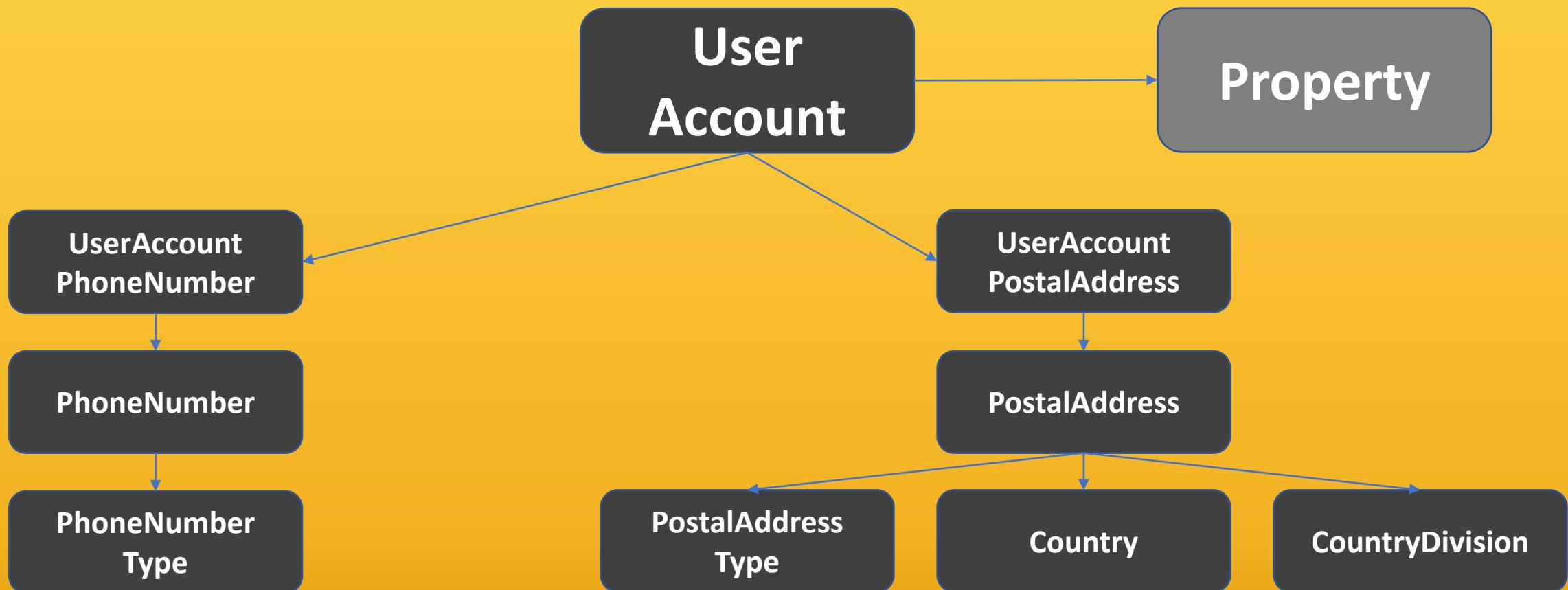
Reference Types

referenceTypeName

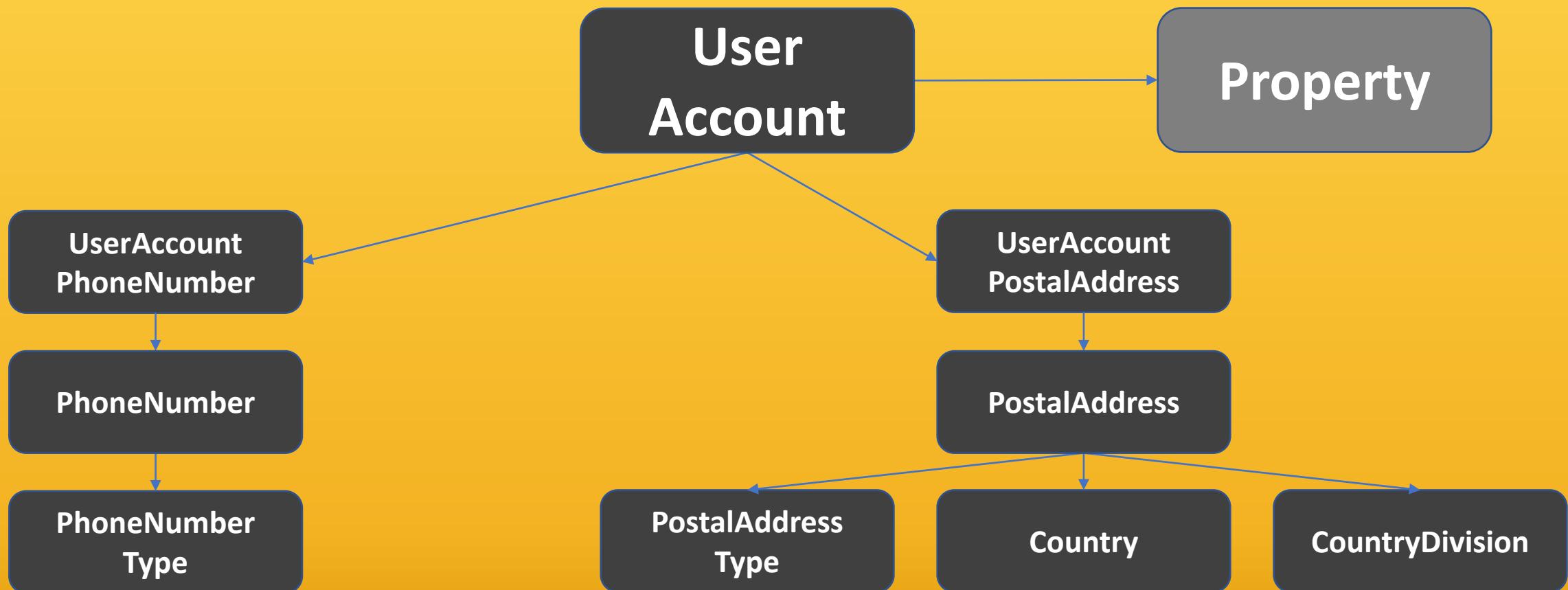
Properties by Location

locationId

User Account Migration



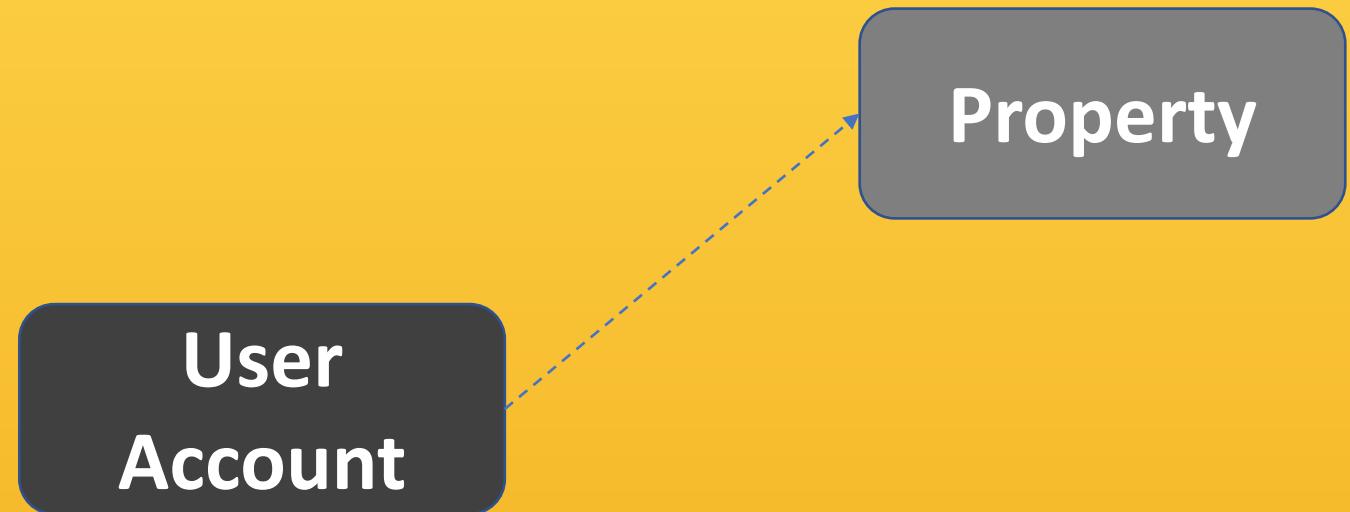
User Account Migration



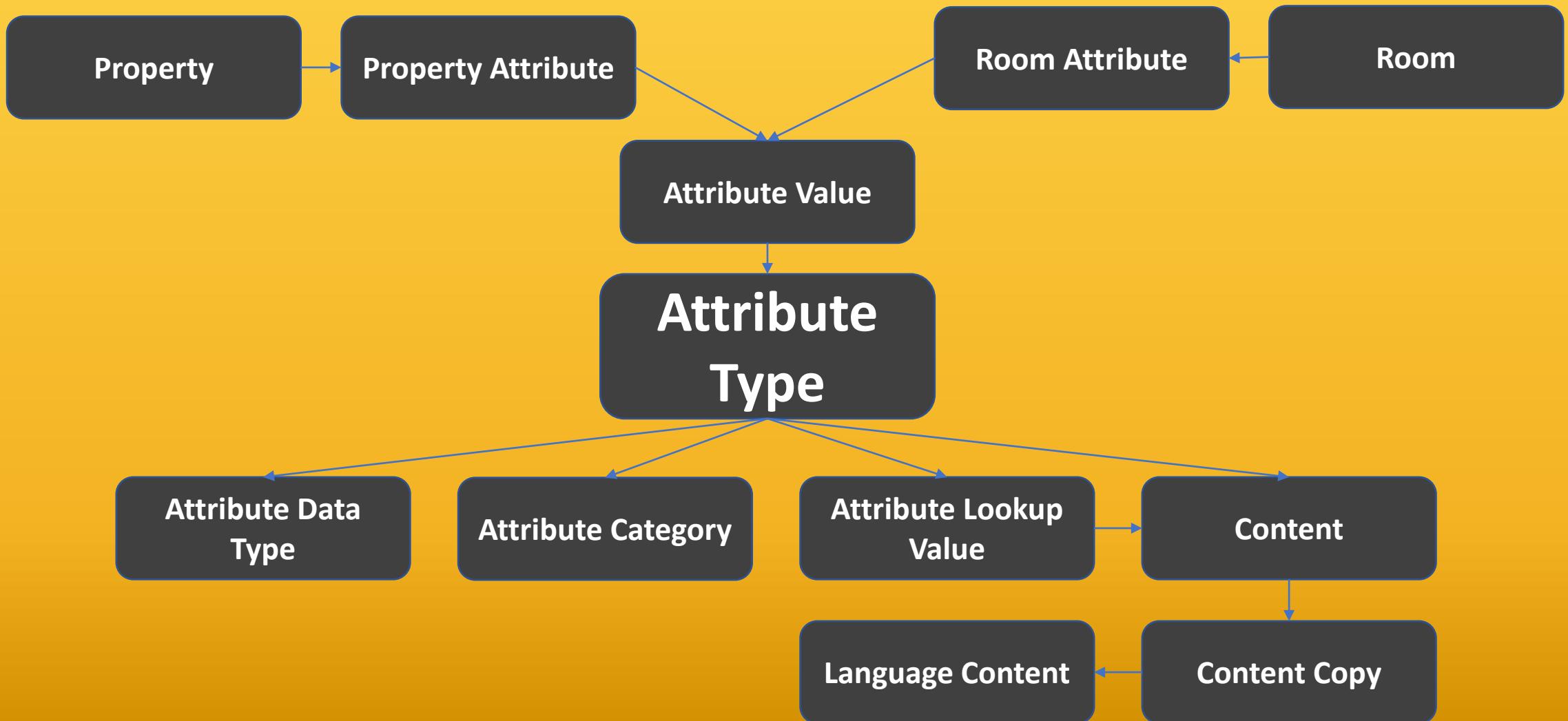
User Account Migration



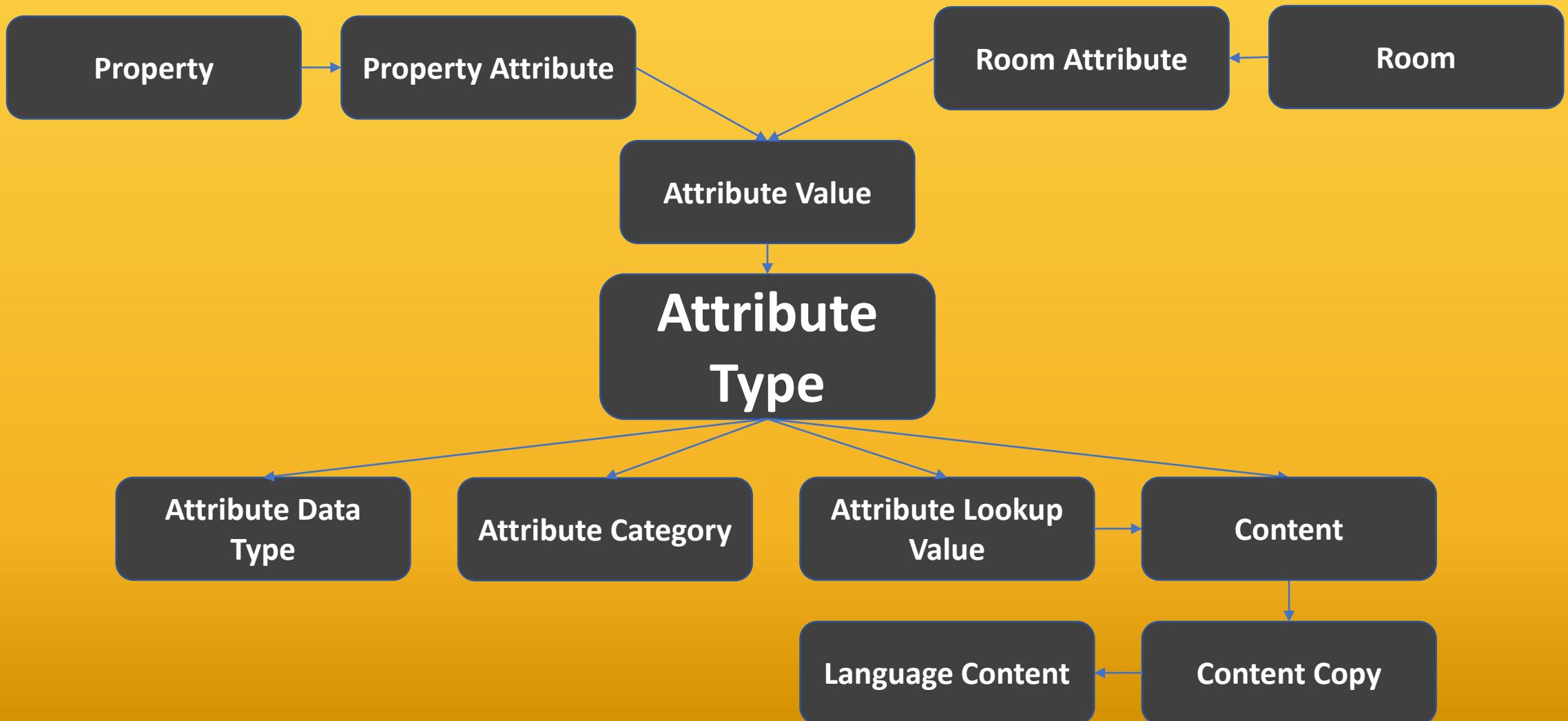
User Account Migration



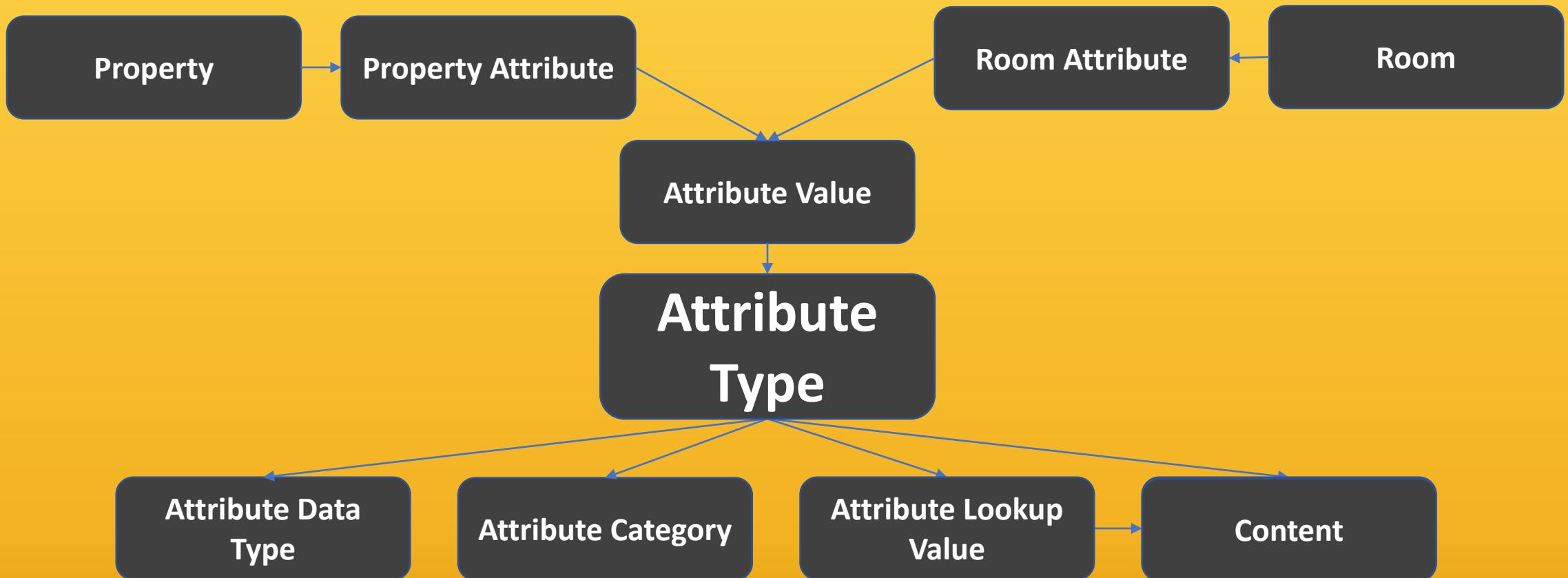
Attribute Migration



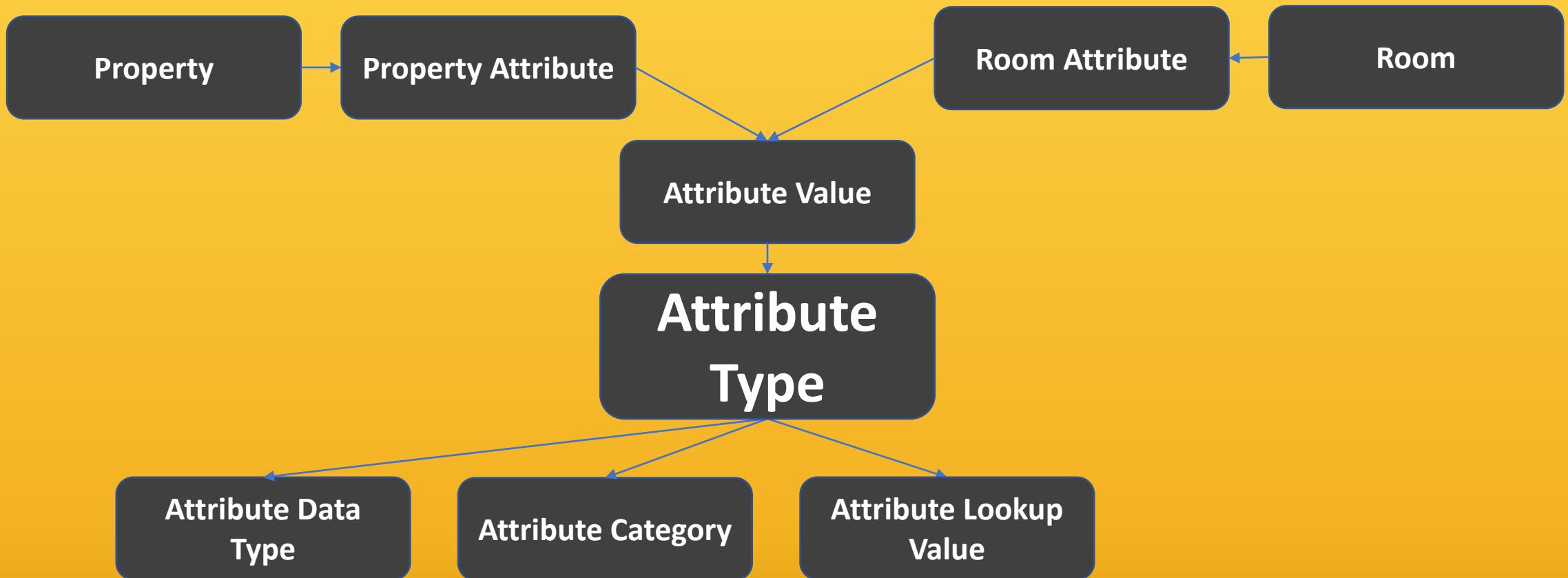
Attribute Migration



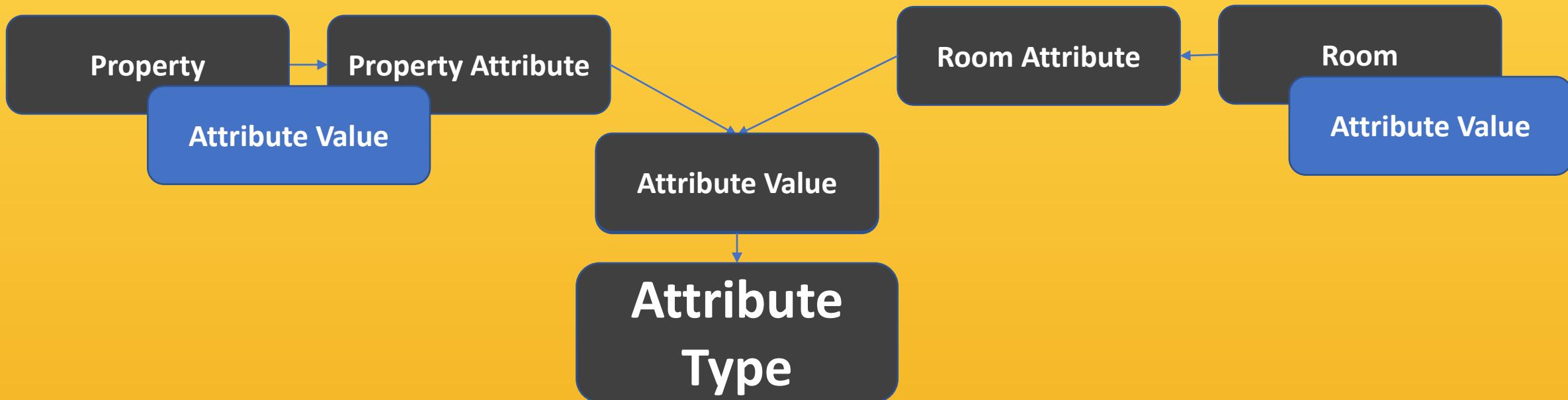
Attribute Migration



Attribute Migration



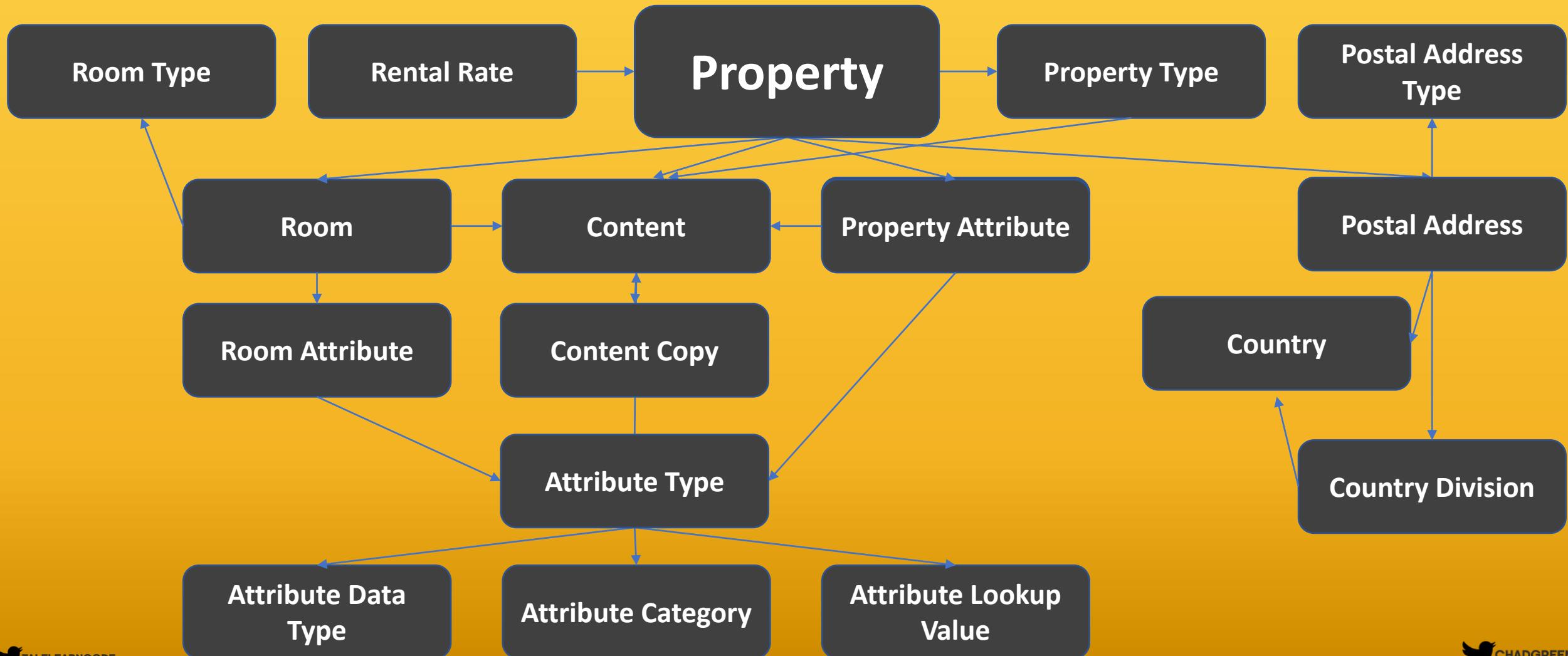
Attribute Migration



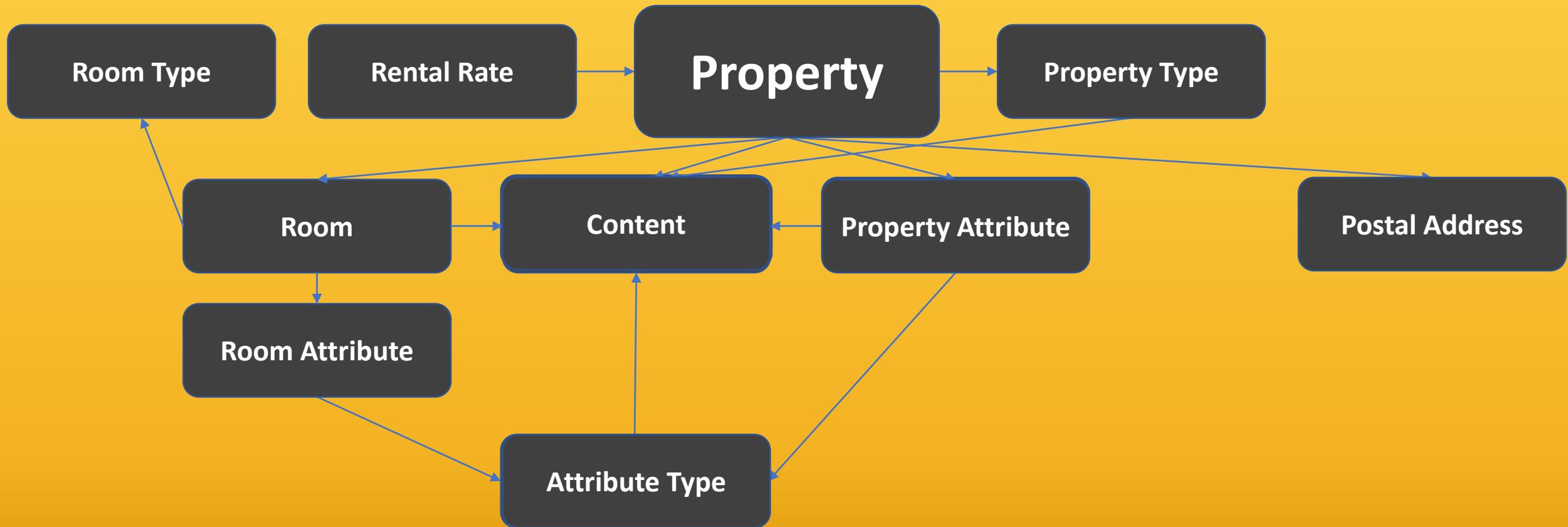
Attribute Migration



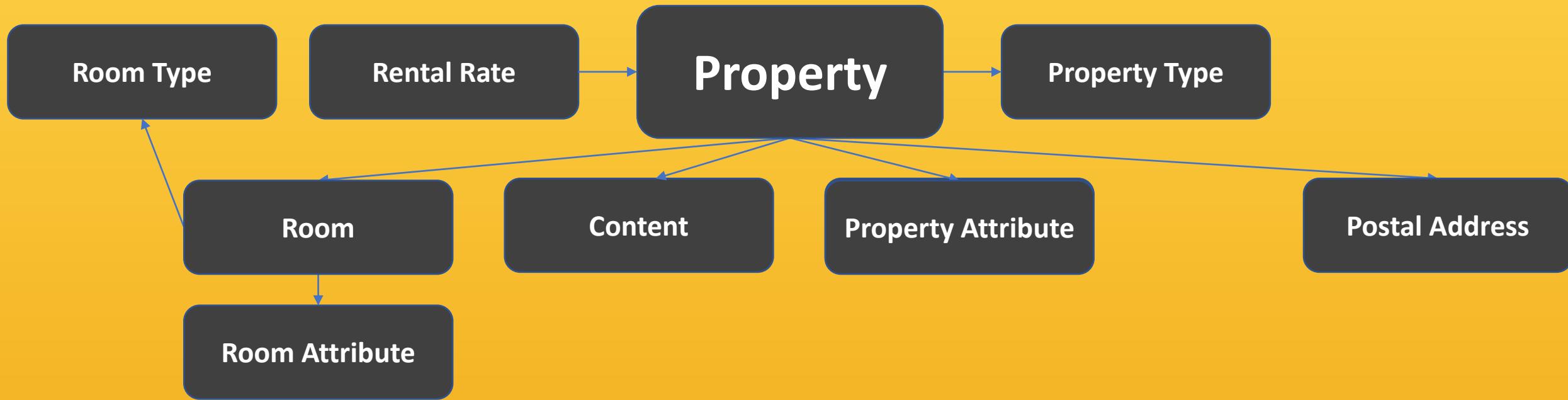
Property Migration



Property Migration



Property Migration



Property Migration



Property Migration

Property

Property Migration

Property

Reference Types

Country

Postal Address
Type

Country Division

Property Type

Language/Culture

Room Type

Phone Number
Type

Attribute Data
Type

Attribute Category

Reference Types

Country

Postal Address
Type

Country Division

Property Type

Language/Culture

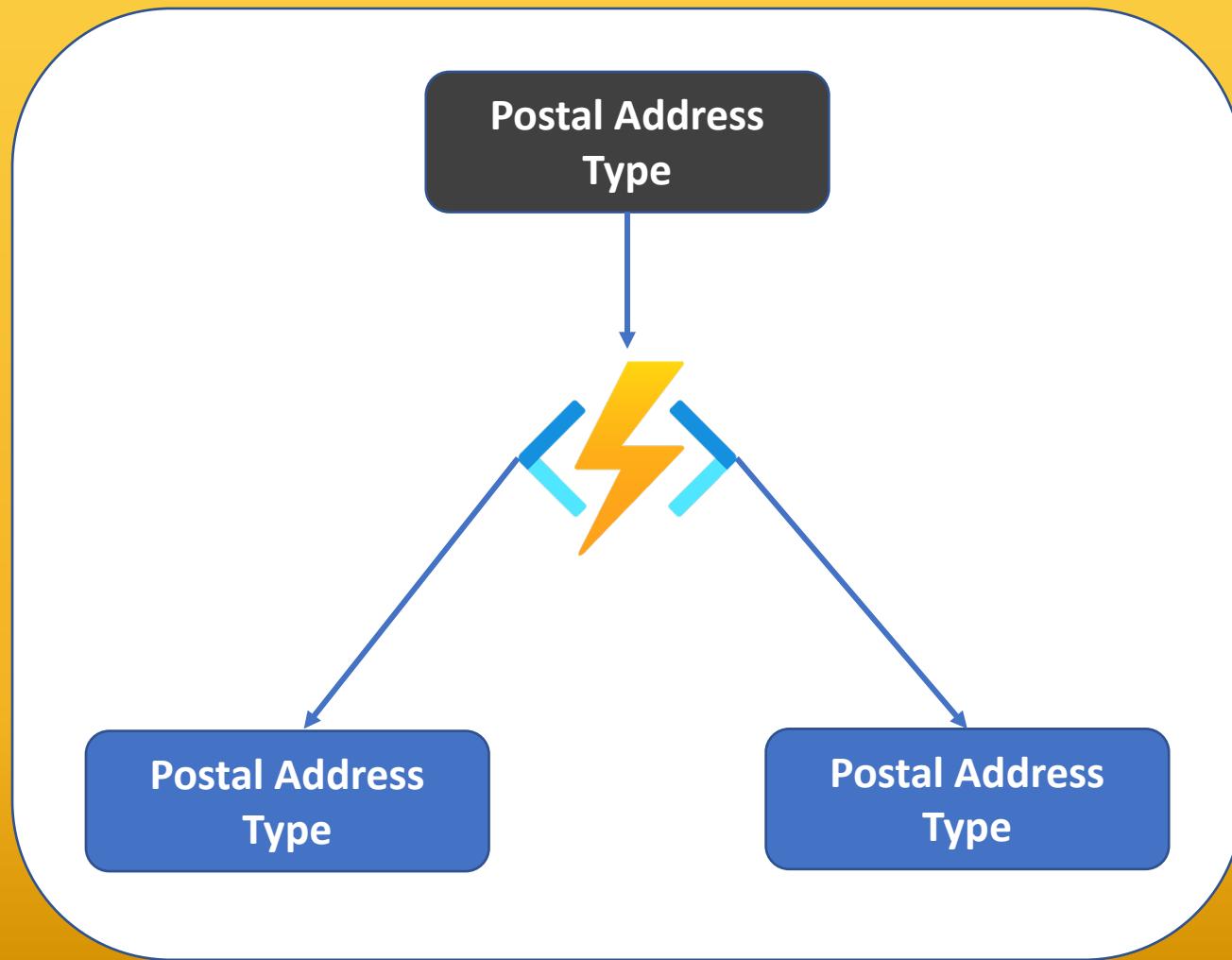
Room Type

Phone Number
Type

Attribute Data
Type

Attribute Category

Reference Types



Best Tool(s) for the Job

Thank You

- ✉ chadgreen@chadgreen.com
- .twitch TaleLearnCode
- 🌐 ChadGreen.com
- 🐦 ChadGreen & TaleLearnCode
- linkedin ChadwickEGreen

