

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

ATLANTA  
CODE  
CAMP



Platinum

**Cognizant Softvision**



**KENNESAW STATE  
UNIVERSITY**  
COLLEGE OF COMPUTING AND  
SOFTWARE ENGINEERING

Gold

**Wintellect**  
an atmosera company

**slalom**

**<epam>**

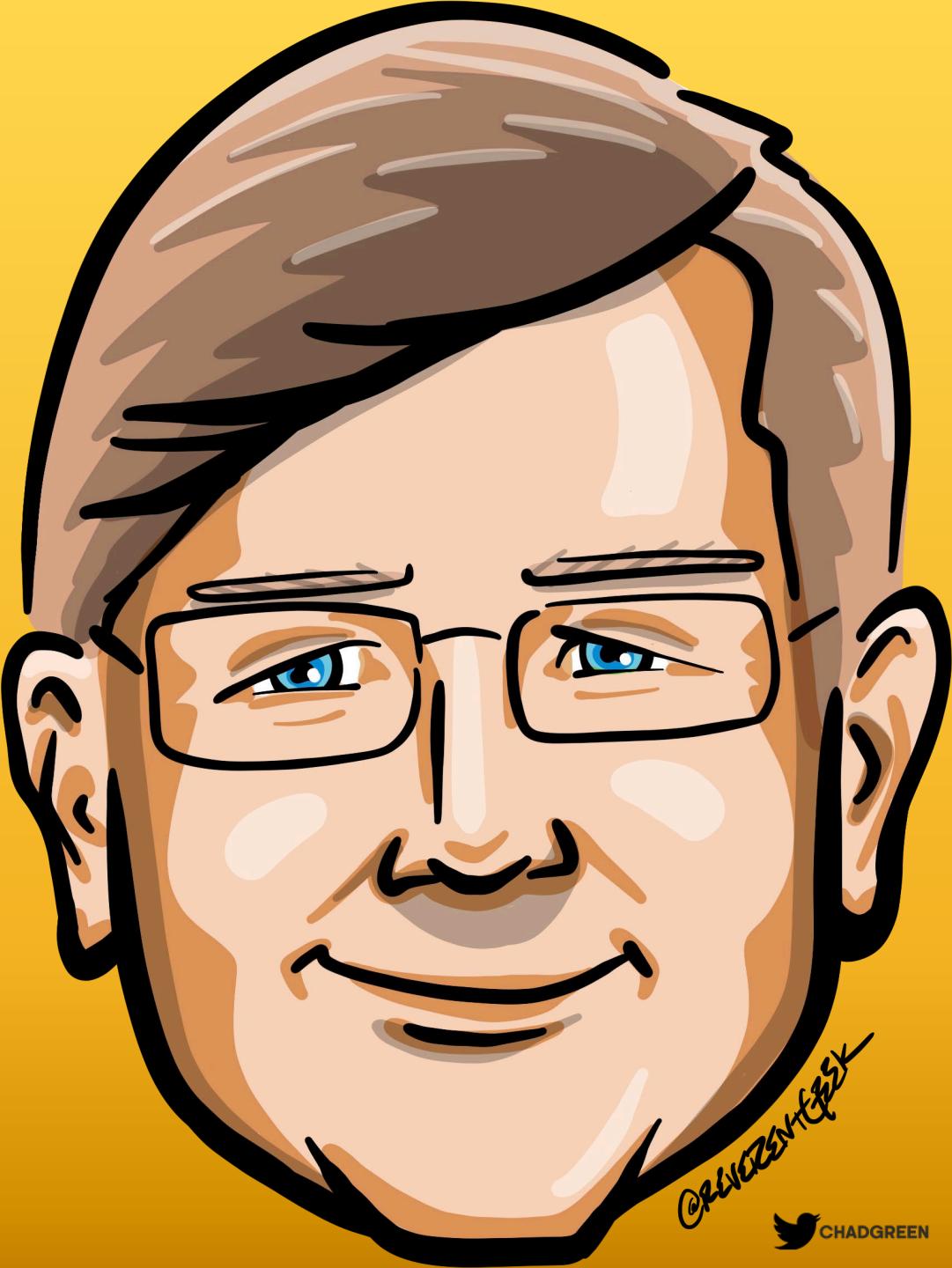
**CODINGBLOCKS.NET**

Silver

**brightree<sup>®</sup>**  
by ResMed

# Who is Chad Green

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- linkedin ChadwickEGreen



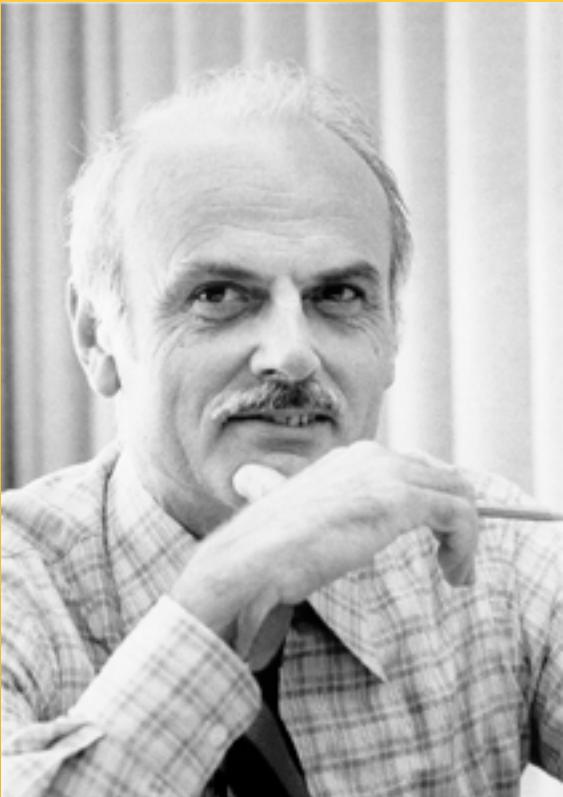


# How did I get started with NoSQL databases?

# 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

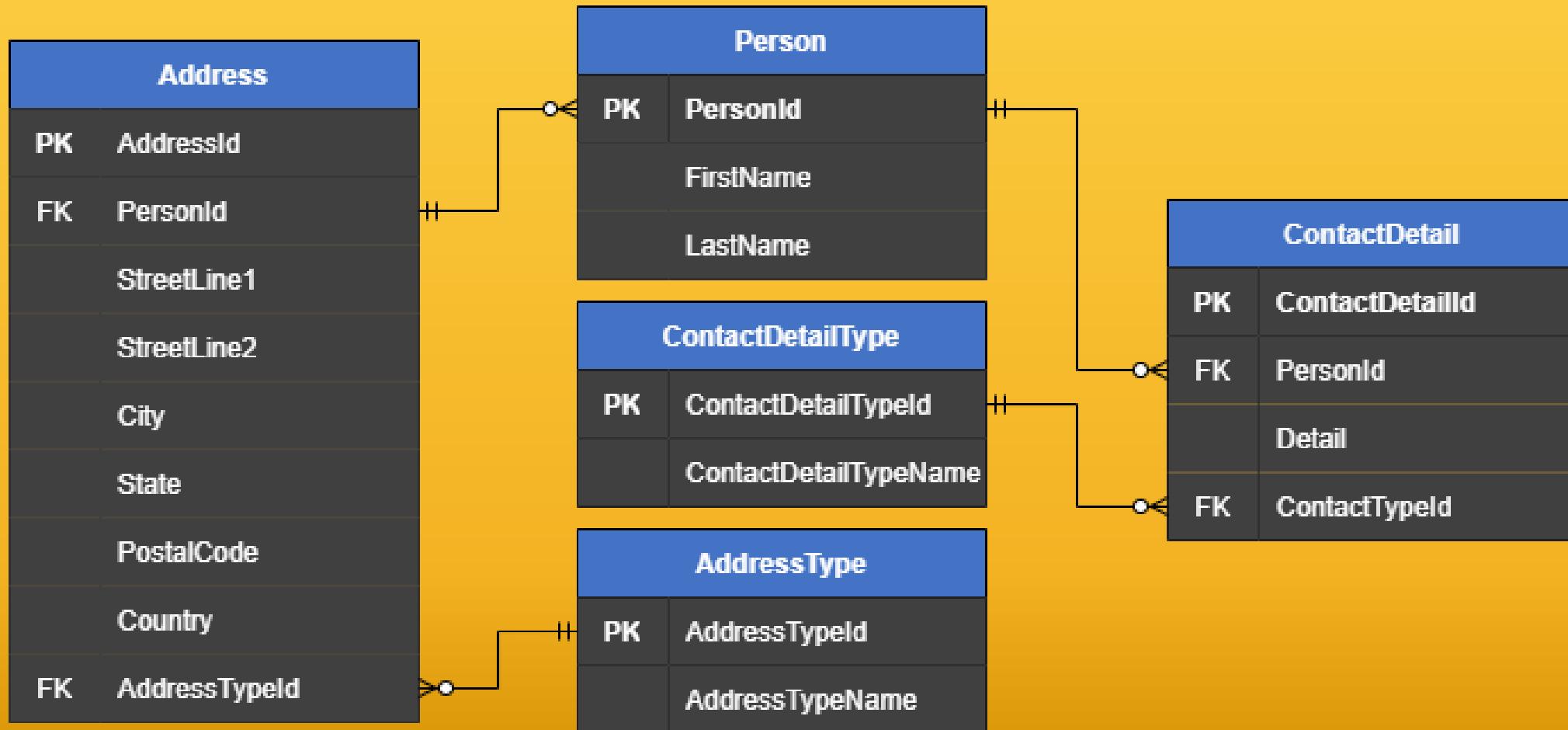
9: Logic data independence

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



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# Big Names in Relational Databases

**ORACLE®**



PostgreSQL



# 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

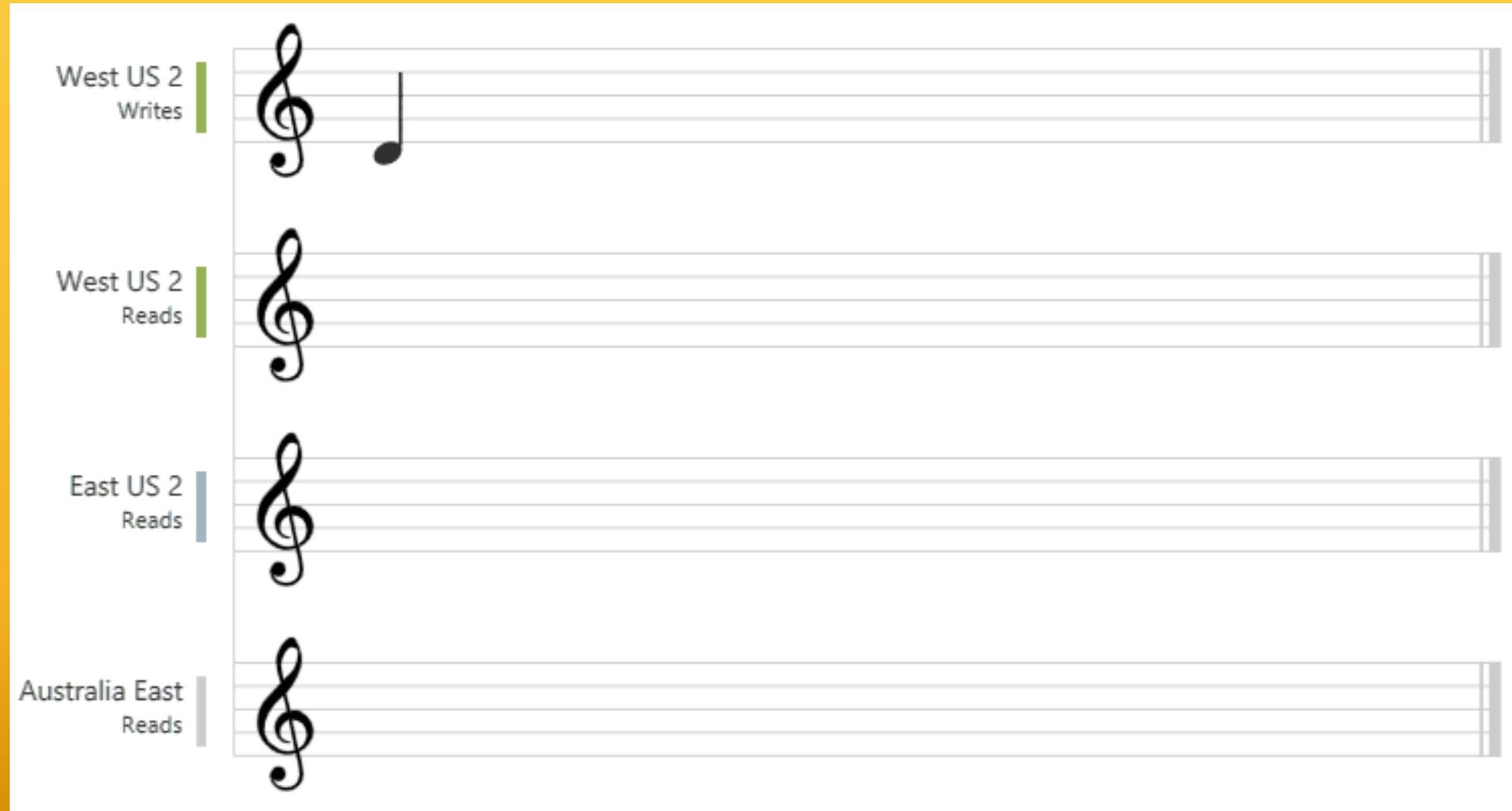
Limiting Object-  
Relational Impedance

# 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

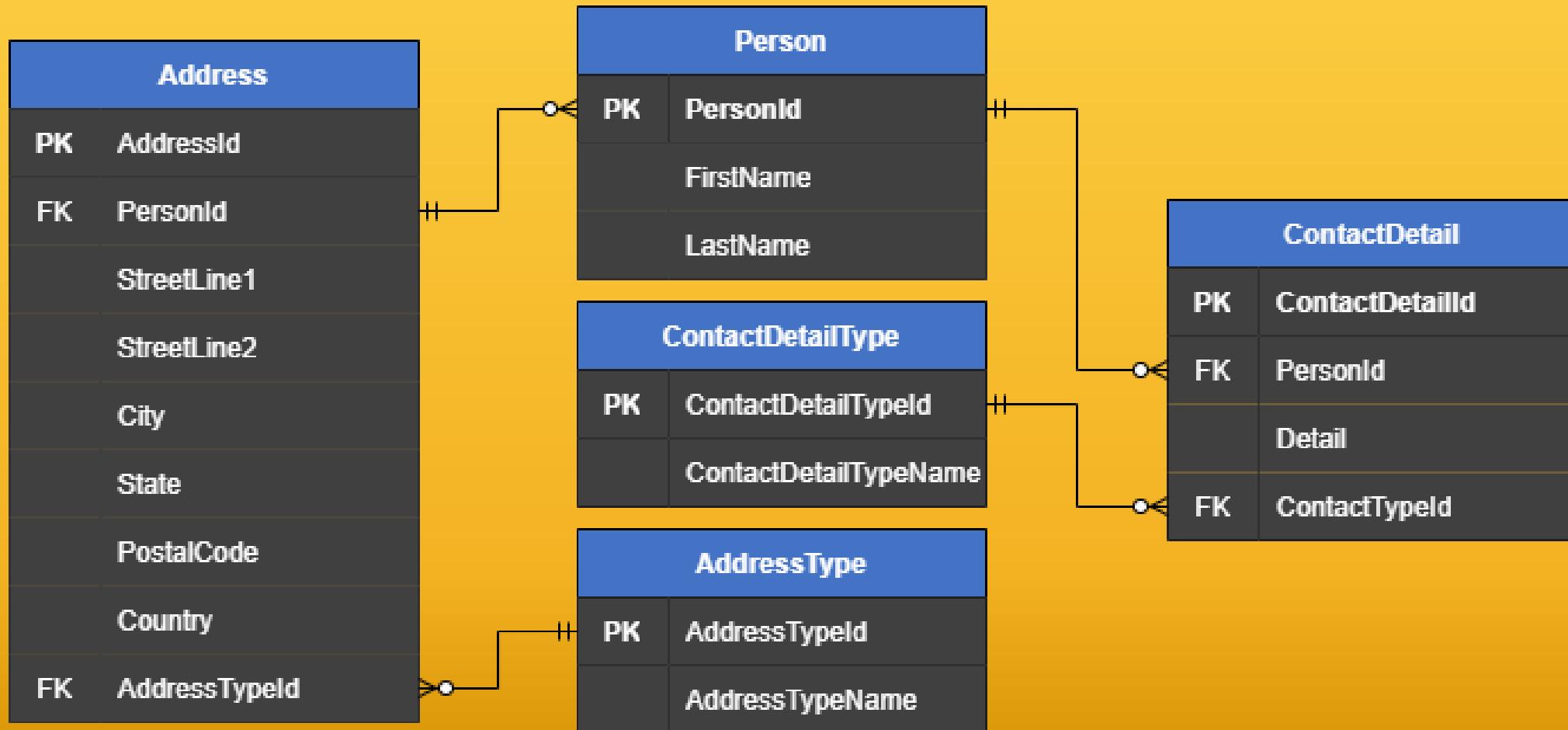


elastic



ArangoDB

# 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

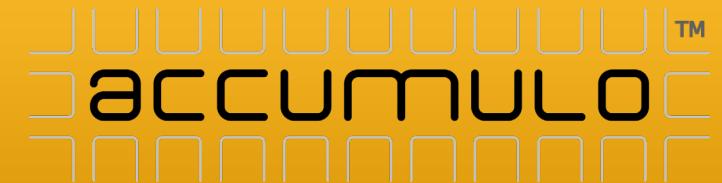


Amazon  
DynamoDB

# Many types of NoSQL databases



Wide Column



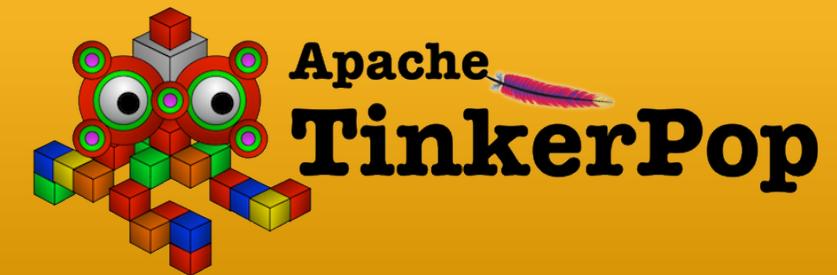
# Many types of NoSQL databases



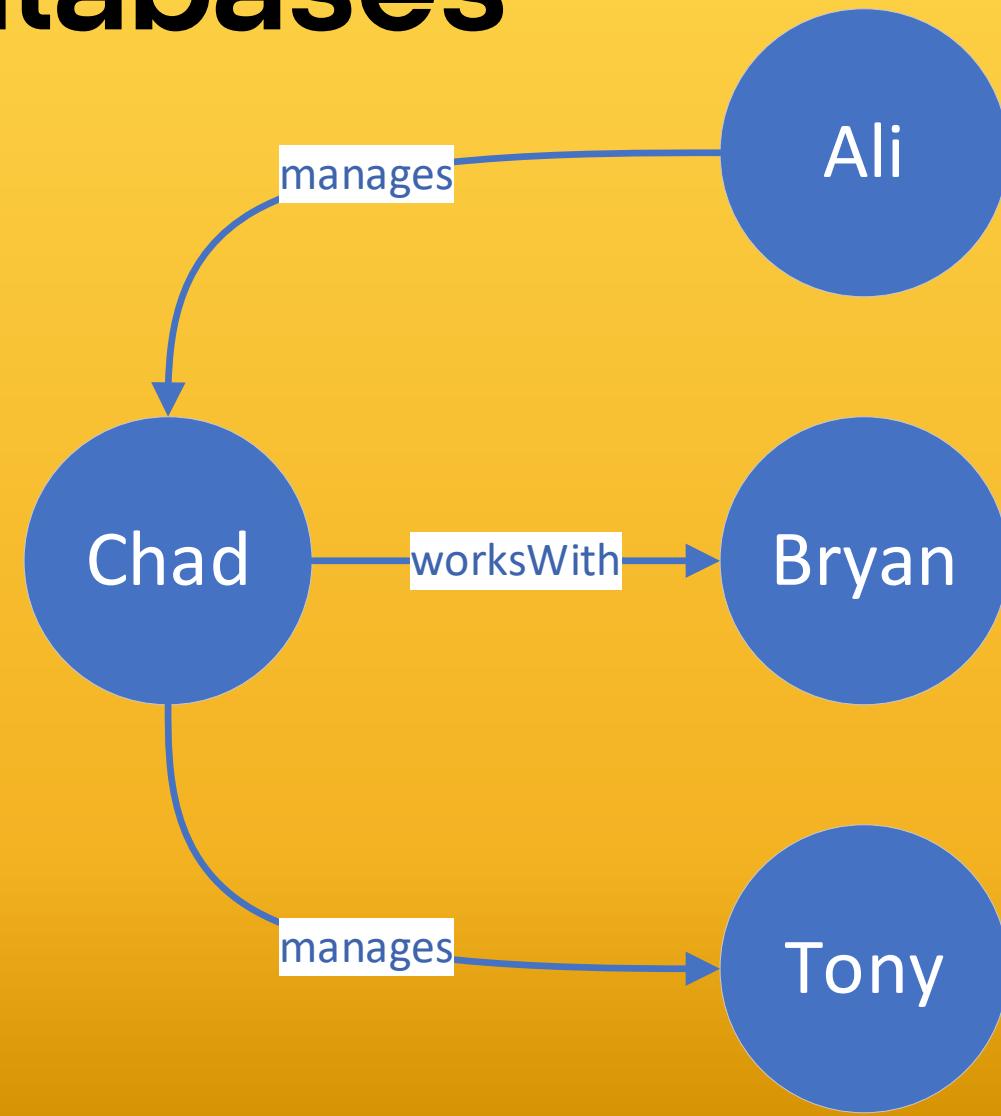
Graph



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

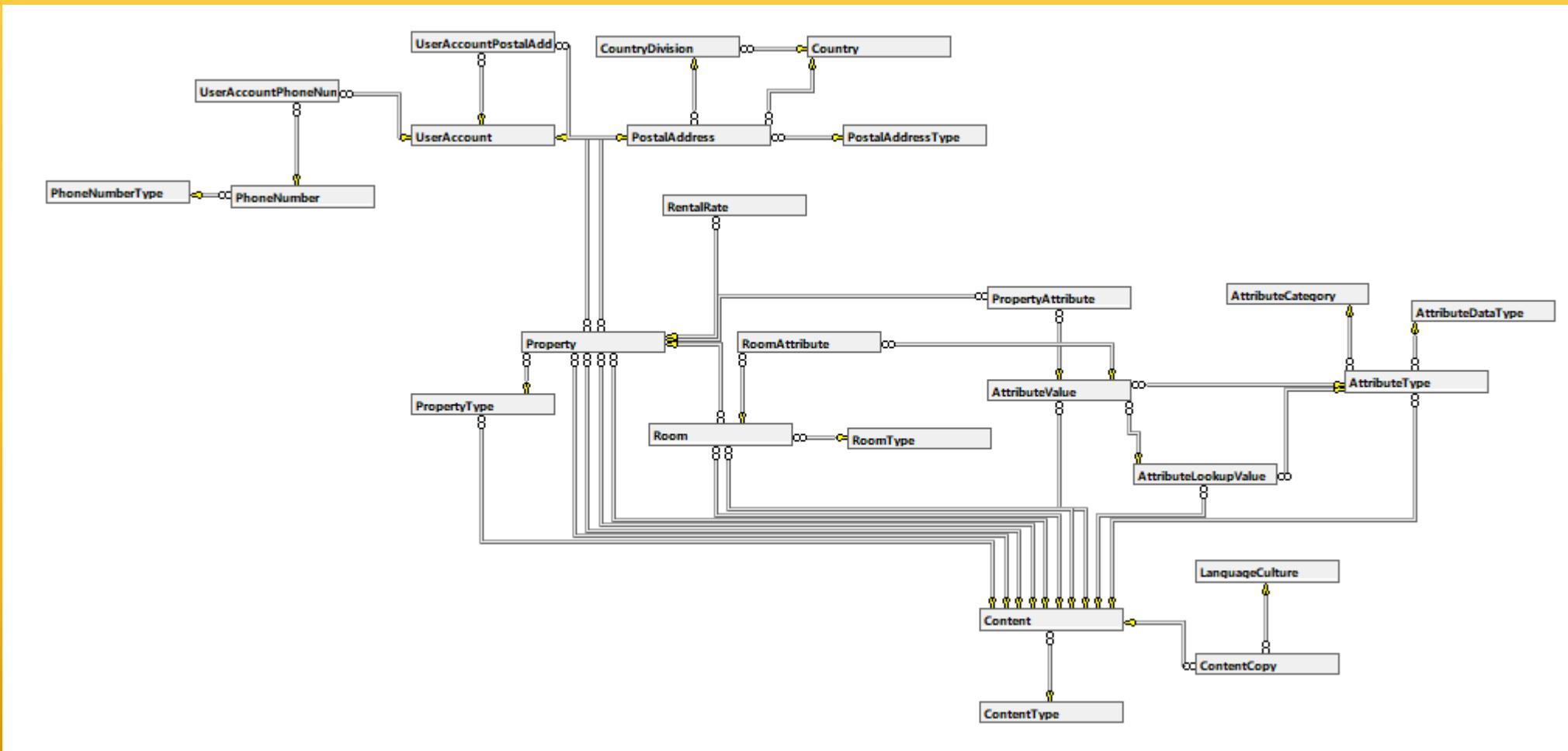
User Accounts

Properties

Reference Types

Rooms

# Relational Data Model



# Real World: Why Relational

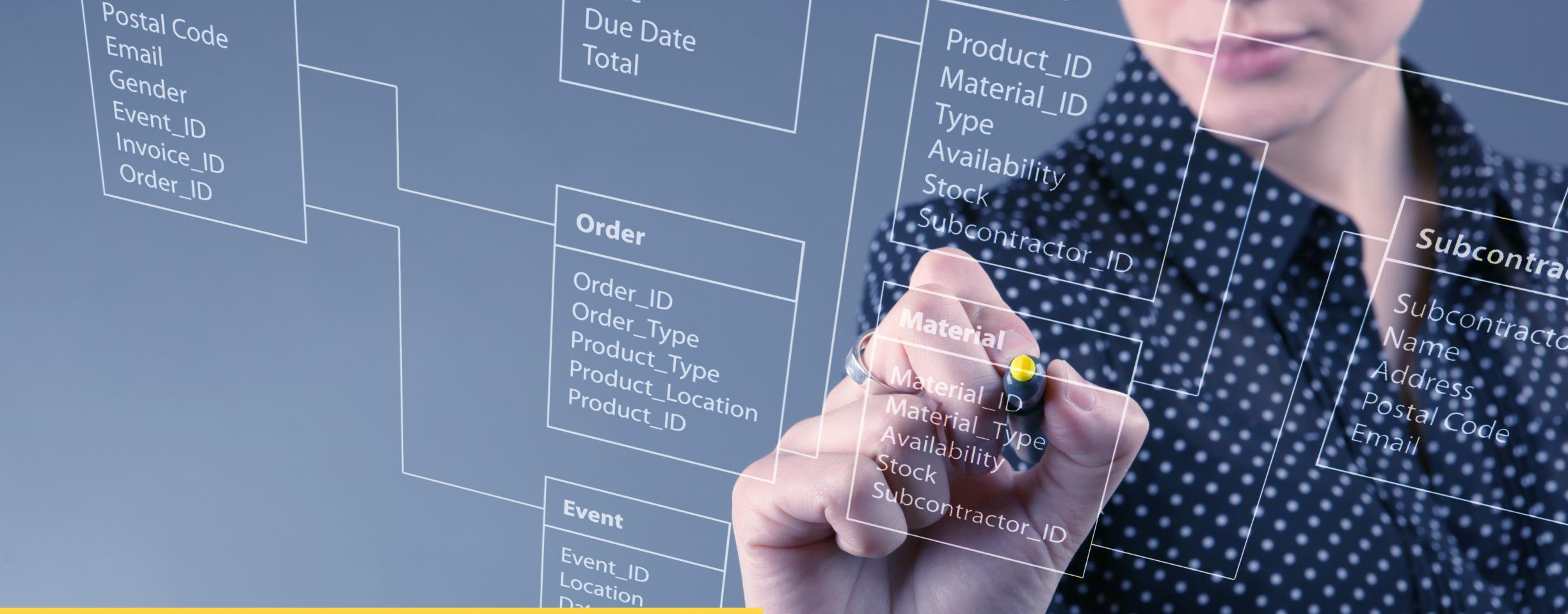
Skillset

Time to Market

Other Products

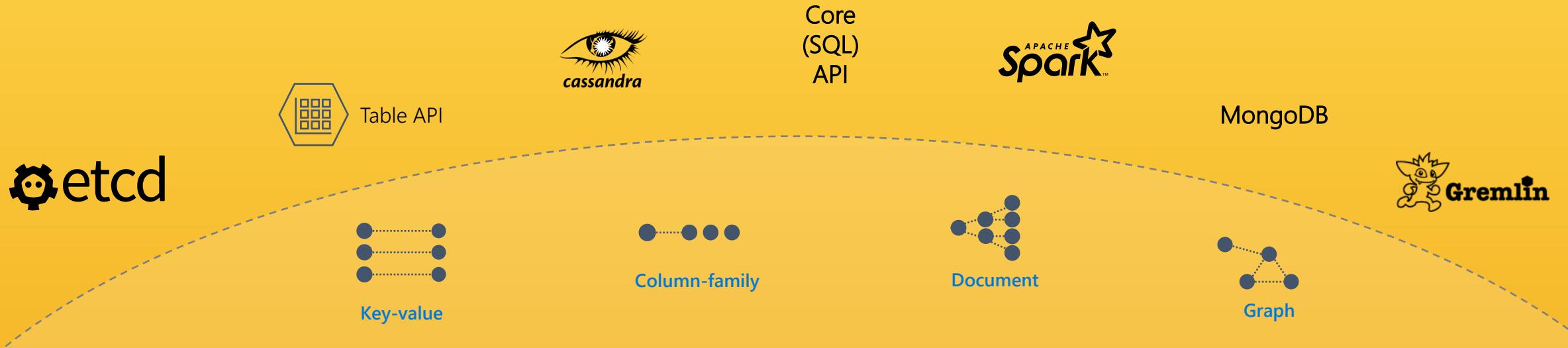
# Issues Found in Real-World Project

- 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 99<sup>th</sup> 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

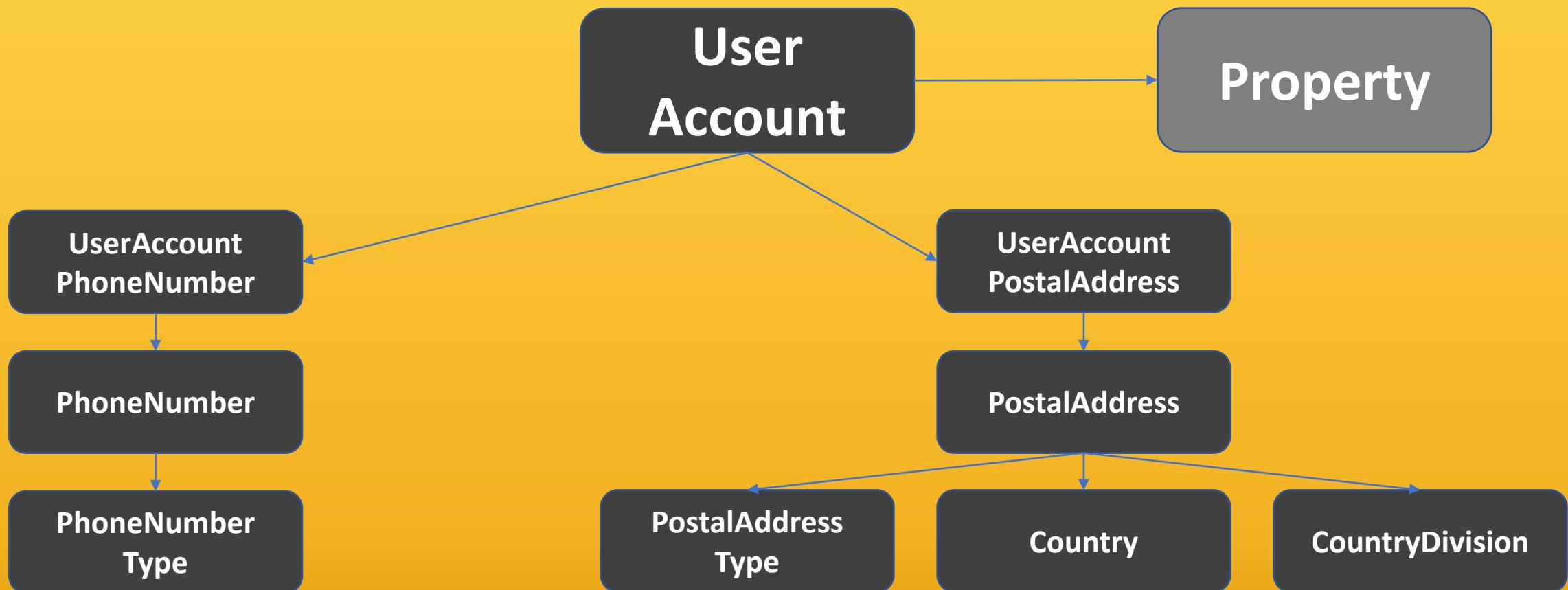
**Reference Types**

referenceTypeName

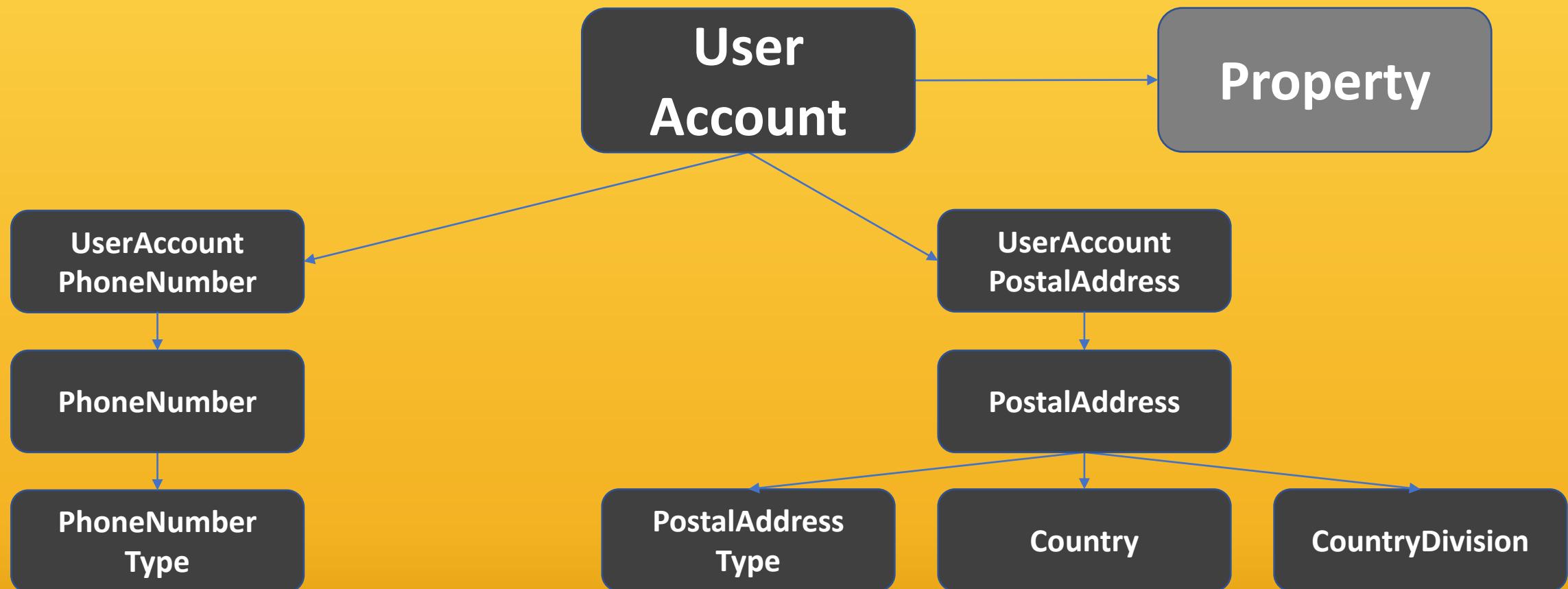
**Properties by Location**

locationId

# User Account Migration



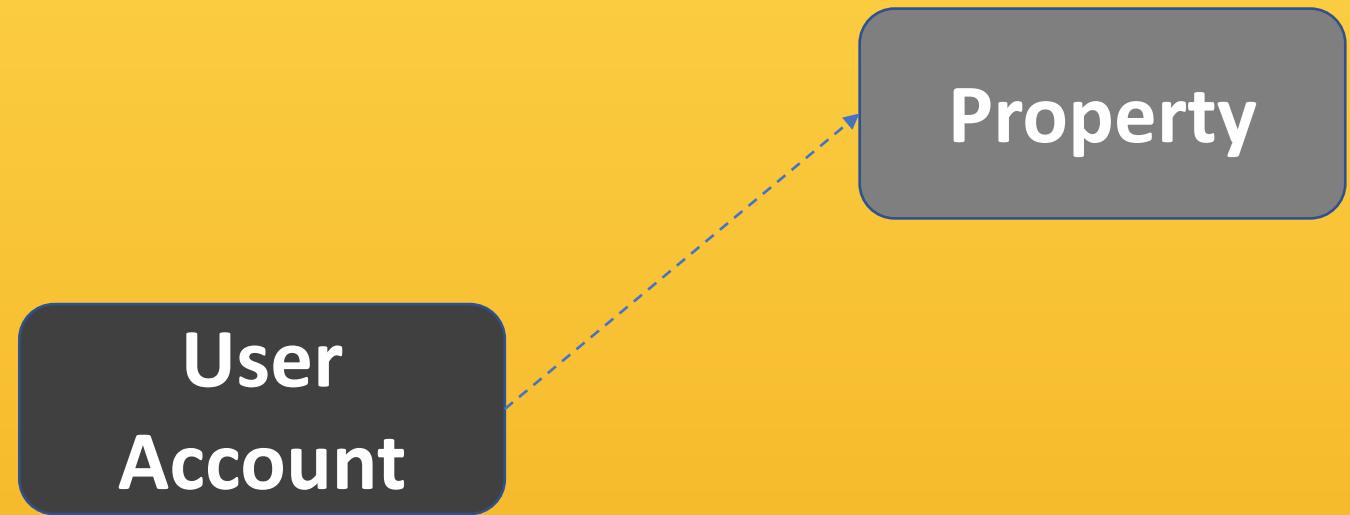
# User Account Migration



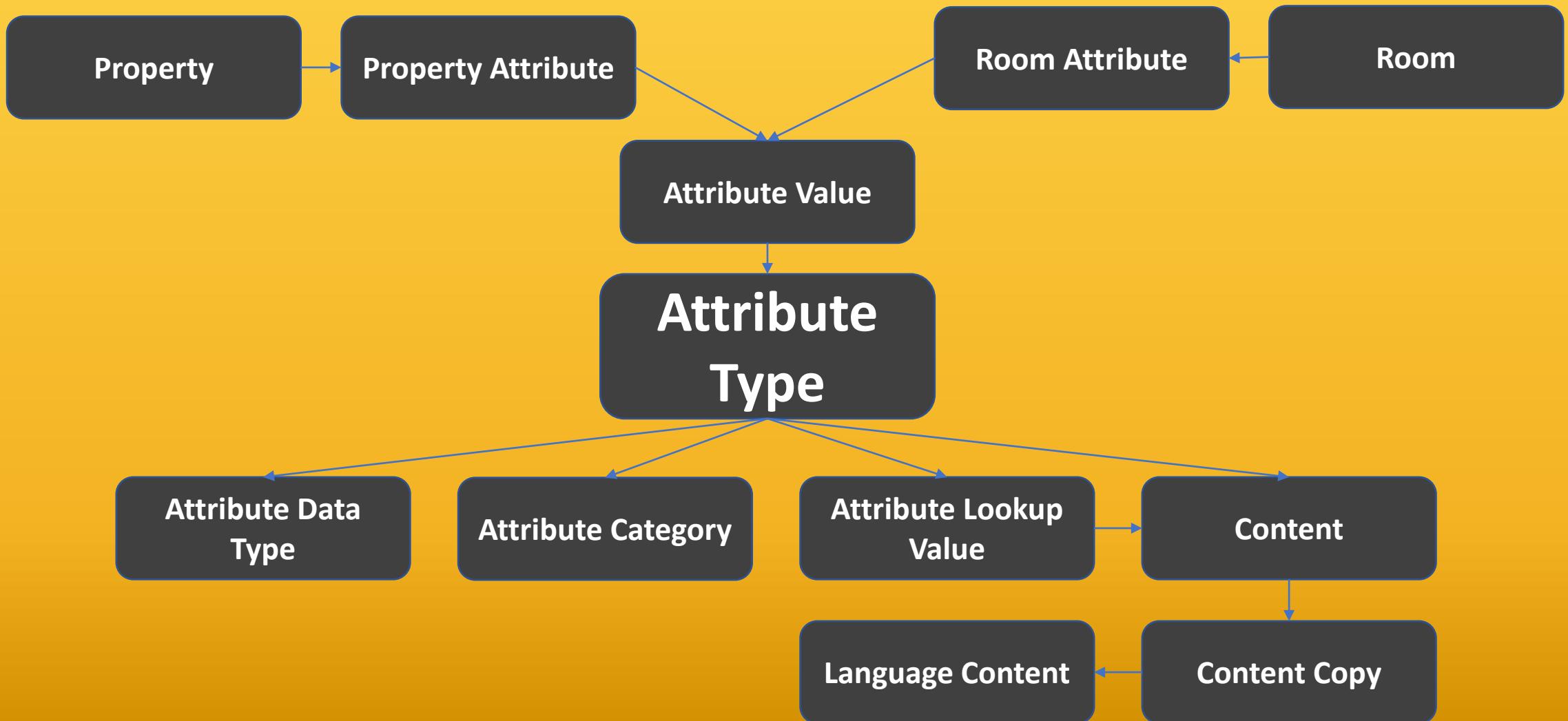
# User Account Migration



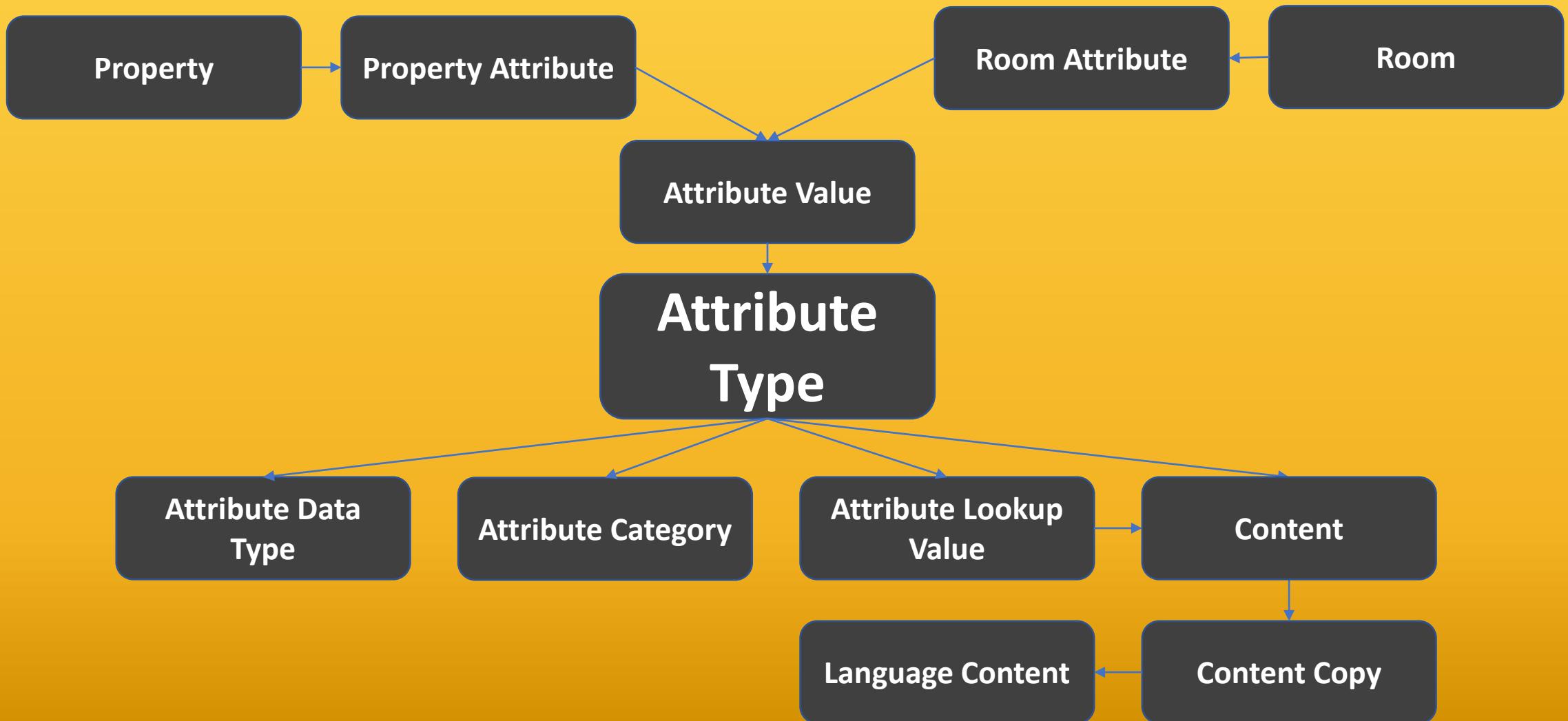
# User Account Migration



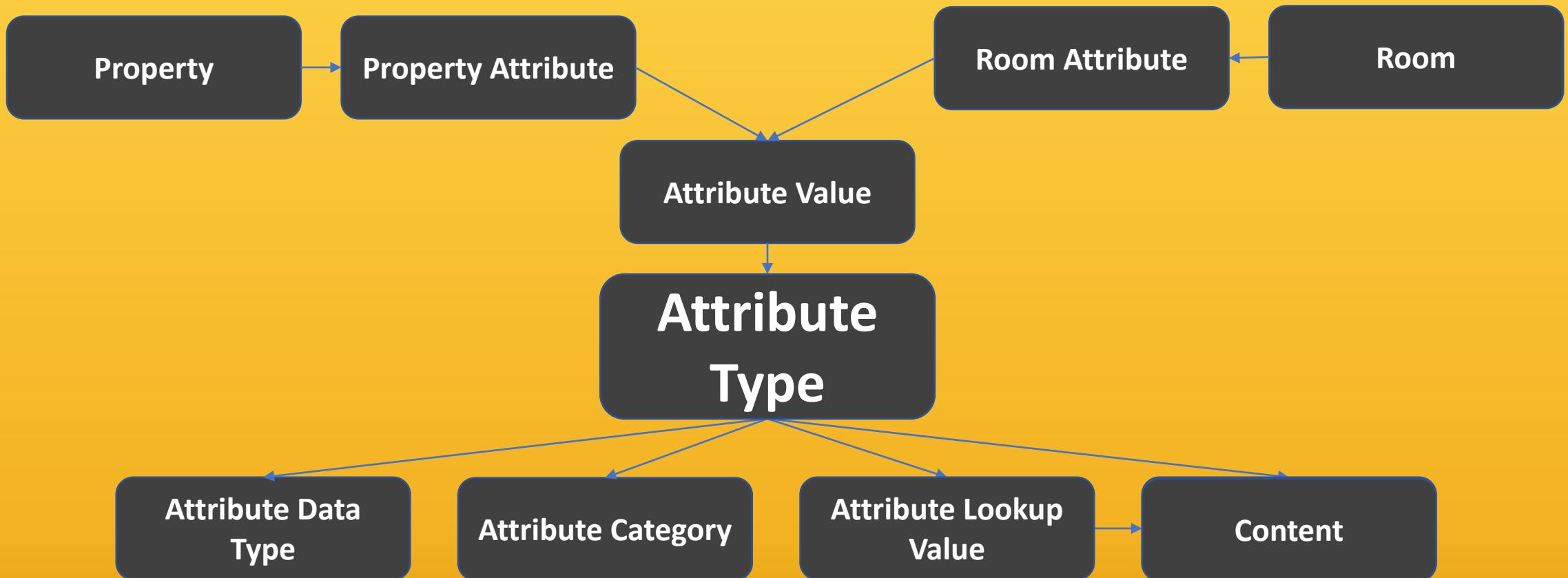
# Attribute Migration



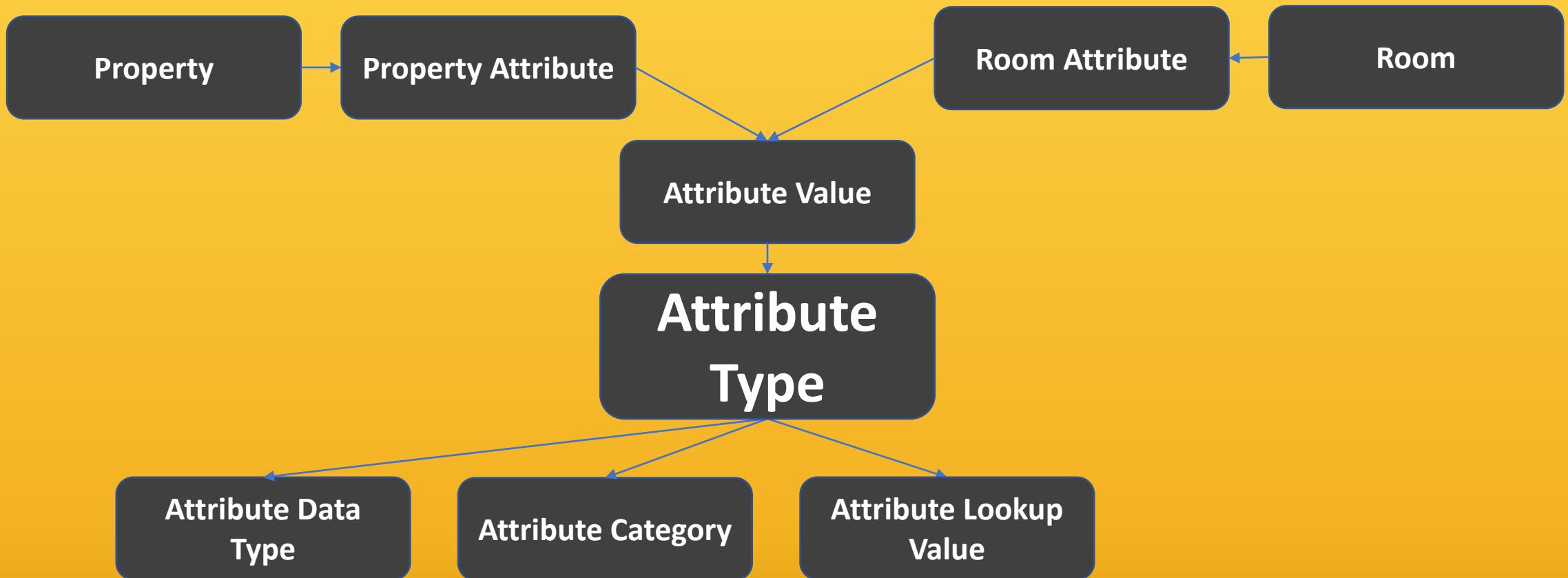
# Attribute Migration



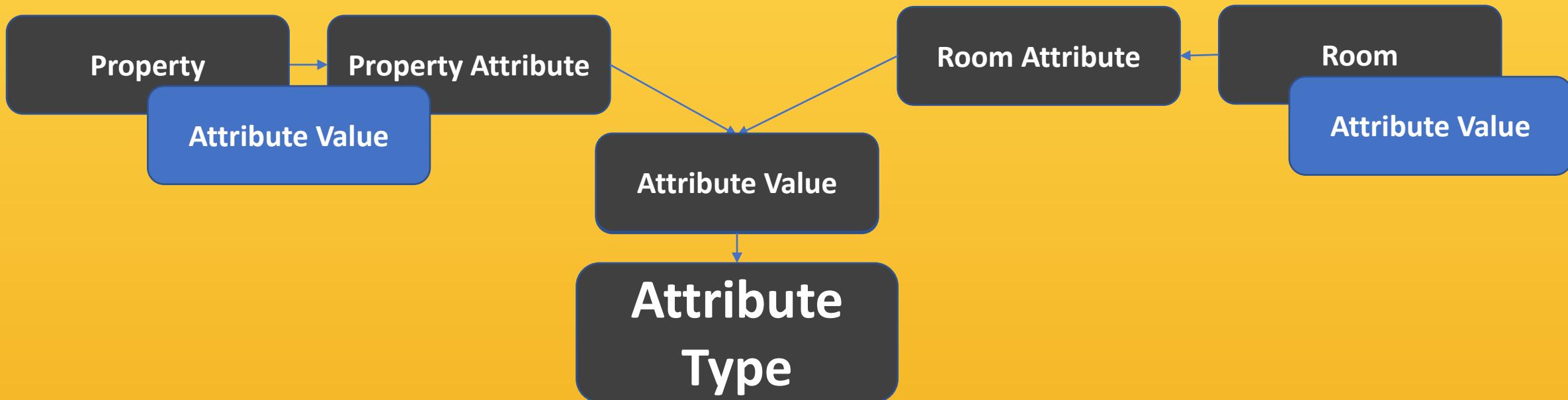
# Attribute Migration



# Attribute Migration



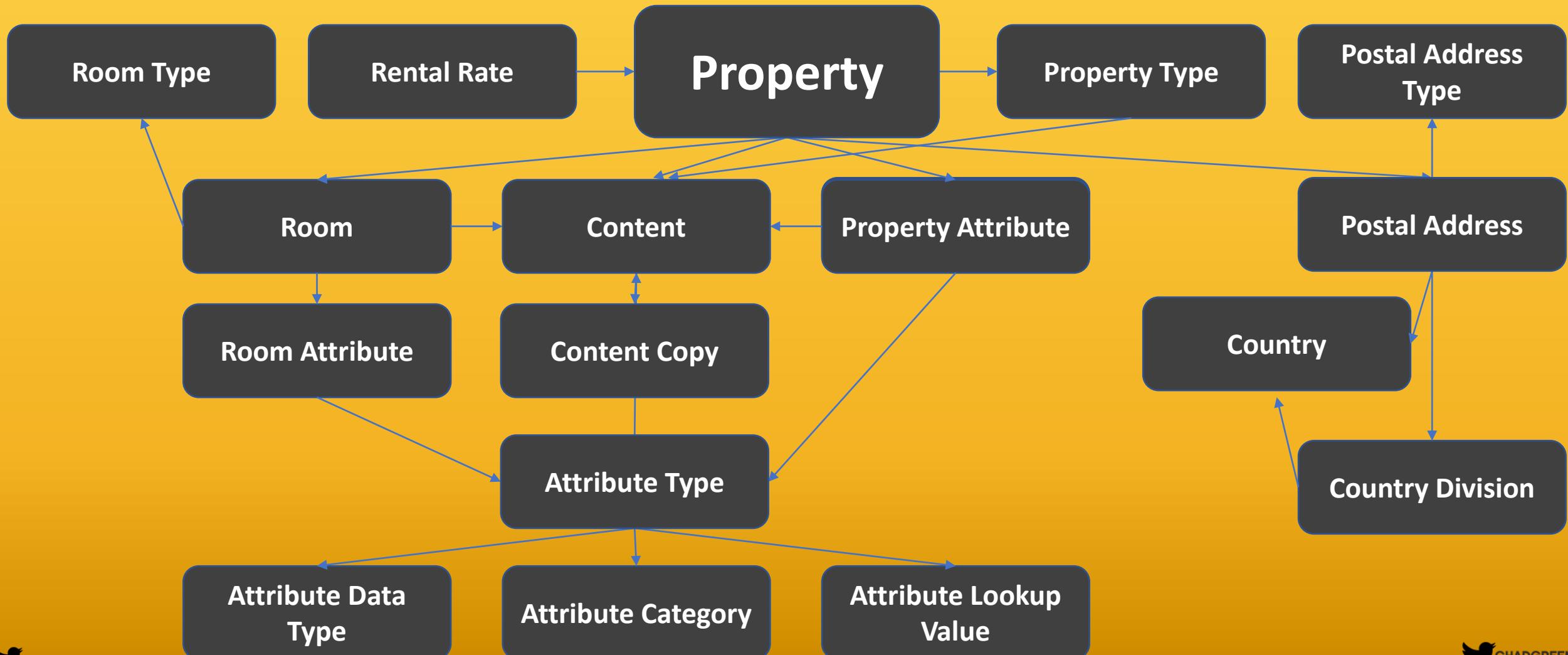
# Attribute Migration



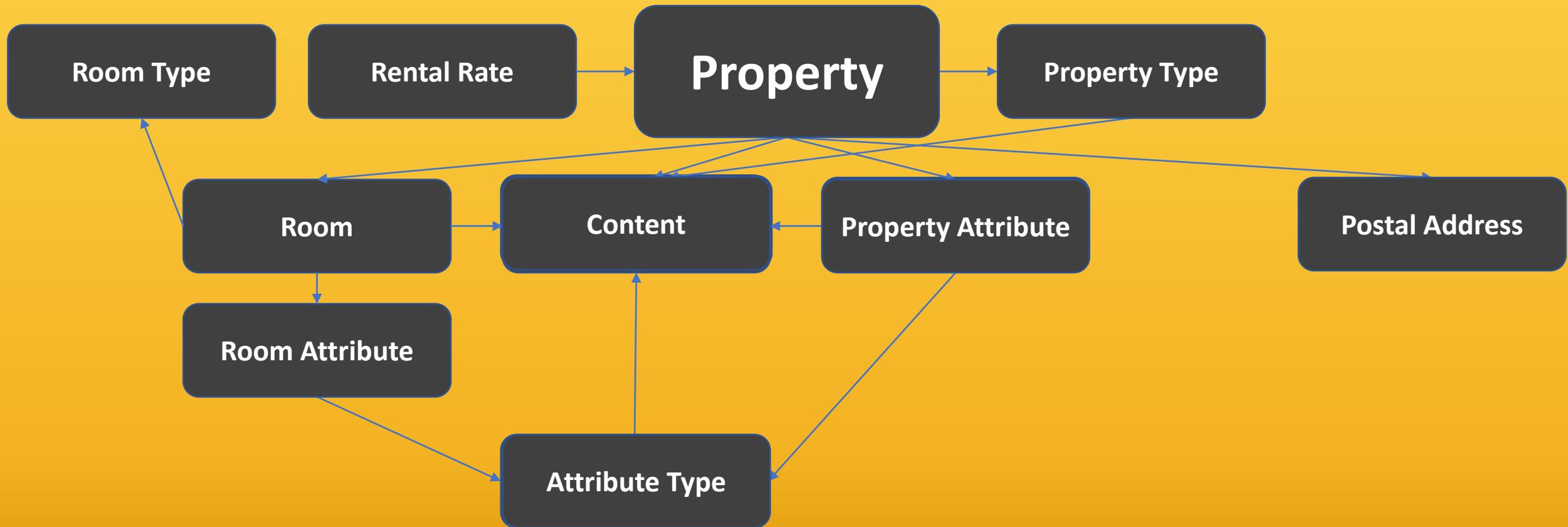
# Attribute Migration



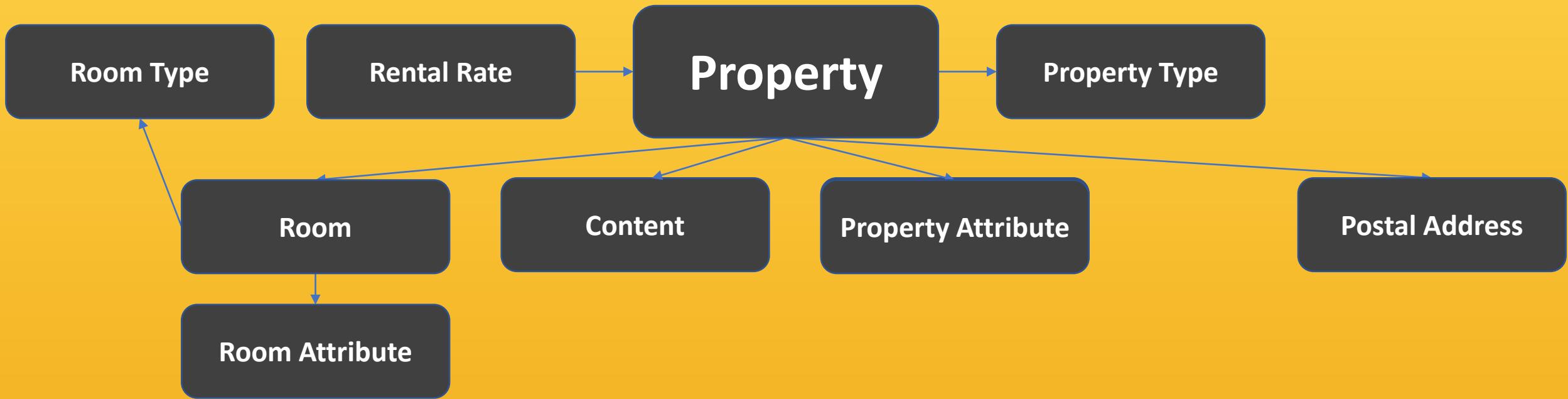
# Property Migration



# 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

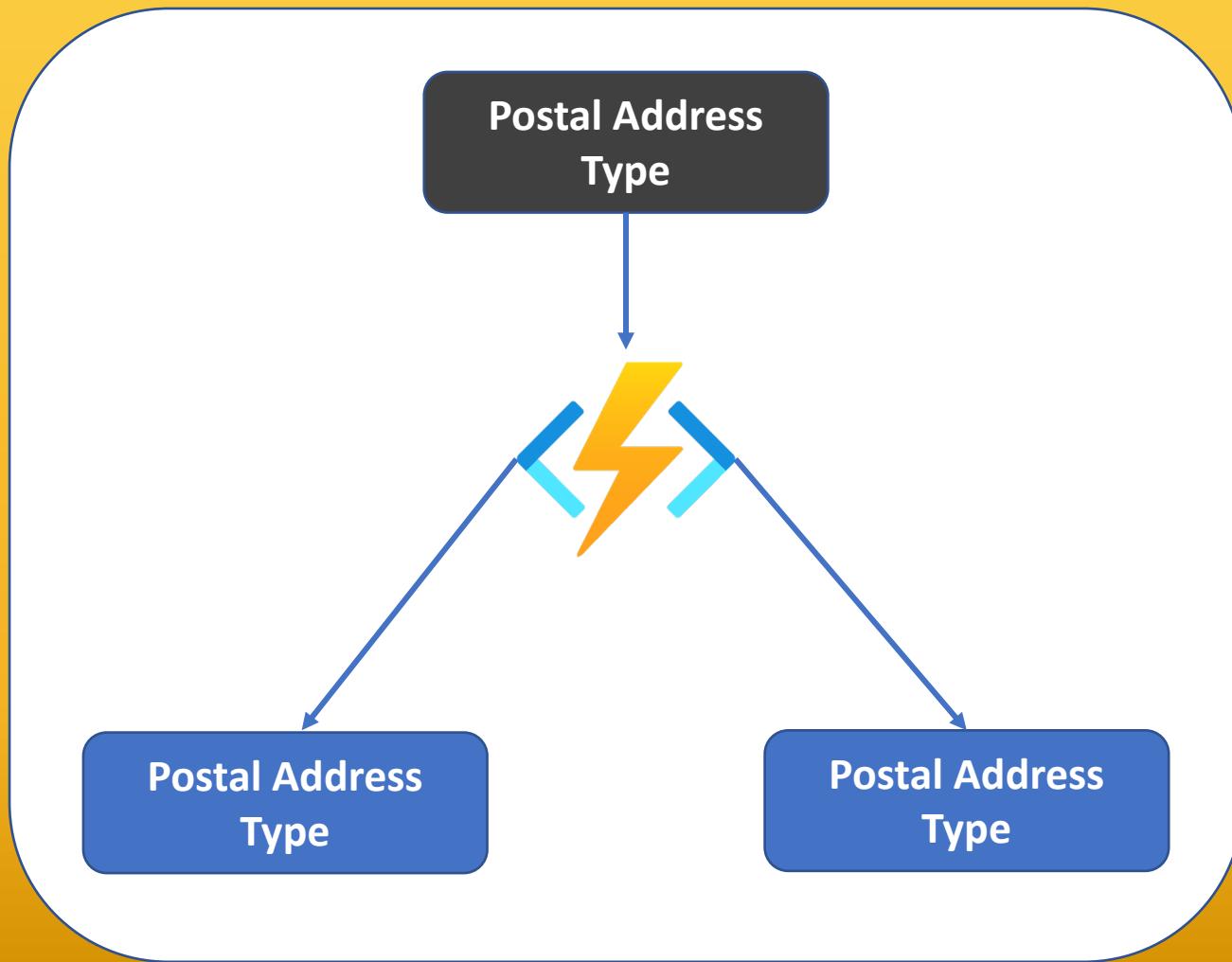
Room Type

Phone Number  
Type

Attribute Data  
Type

Attribute Category

# Reference Types



# **Best Tool(s) for the Job**

# Thank You

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