JSON Schema and Relational Databases:
Bridging the Gap!

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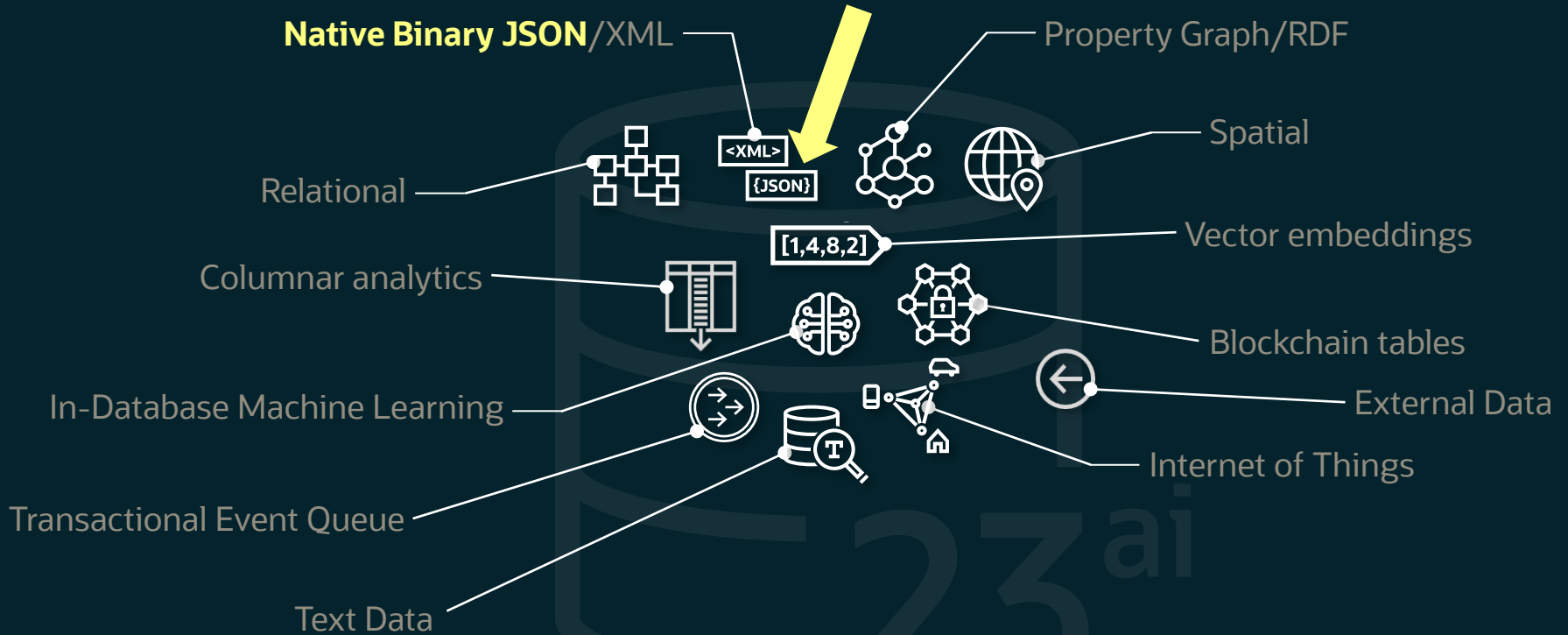
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23ai

apidays PARIS

Bridging the Gap: Two Facets of Data

Data

https://

{JSON}

SALES

SQL

Everything looks like
Objects

Everything looks like
Rows and Columns

Oracle Converged Database

Native Binary JSON/XML

Property Graph/RDF

Spatial

Relational

Vector embeddings

Columnar analytics

Blockchain tables

In-Database Machine Learning

External Data

Internet of Things

Transactional Event Queue

Text Data

JSON in the Oracle Database – Quick Update

12c (2014)
JSON-**text** storage
and query processing
SODA APIs

18c
GeoJSON,
On statement Materialized Views,
SODA for PL/SQL

21c
Native JSON datatype,
Multivalue index

12cR2
Dataguide,
Columnar processing,
Search index

19c
Binary JSON storage (OSON),
MongoDB API,
Partial updates

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Duality views,
JSON native collections,
JSON Schemas,
JS stored procedures,
Performance…

{⟨⟩} JSON Schemas Use Cases for Databases

JSON Data Guide

- Get JSON schema from JSON document(s)

- Detect field types, optional fields, hierarchies…

- Generate JSON schema from database objects (tables, views, Duality Views…)

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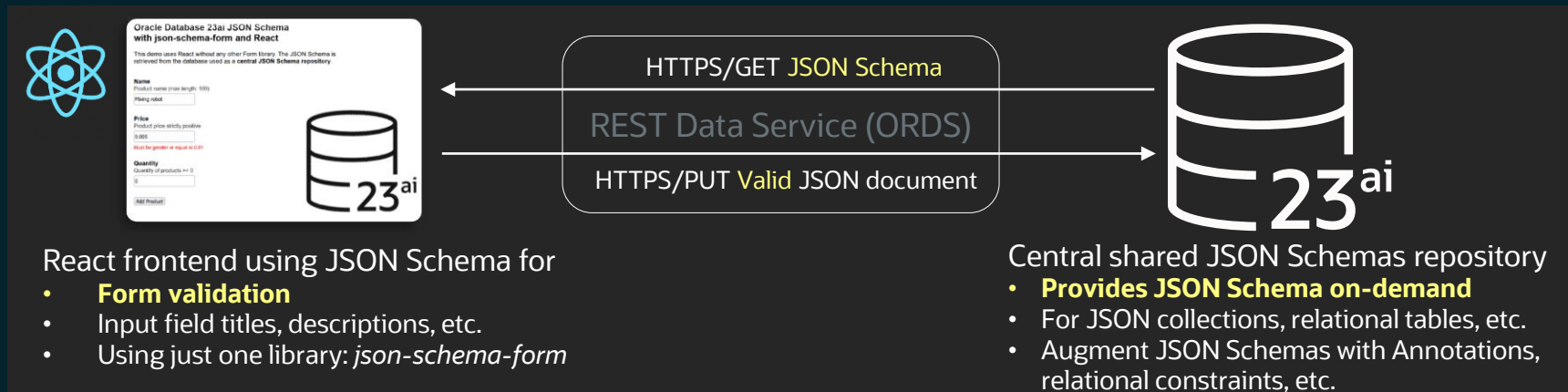- Generate JSON schema from database objects (tables, views, Duality Views…)

Data Validation

- Validate JSON schema and JSON documents

- Report errors

- Data Use Case Domains can leverage JSON Schema

- Centralize JSON schema for client-side validation

Oracle Database 23ai JSON Schema
with json-schema-form and React

This demo uses React without any other Form library. The JSON Schema is retrieved from the database used as a central JSON Schema repository.

Name
Product name (max length: 100)
Piking robot

Price
Product price strictly positive
0.005
Must be greater or equal to 0.01

Quantity
Quantity of products >= 0
0

Add Product

HTTPS/GET JSON Schema

REST Data Service (ORDS)

HTTPS/PUT Valid JSON document

React frontend using JSON Schema for
- **Form validation**
- Input field titles, descriptions, etc.
- Using just one library: *json-schema-form*

Central shared JSON Schemas repository
- **Provides JSON Schema on-demand**
- For JSON collections, relational tables, etc.
- Augment JSON Schemas with Annotations, relational constraints, etc.

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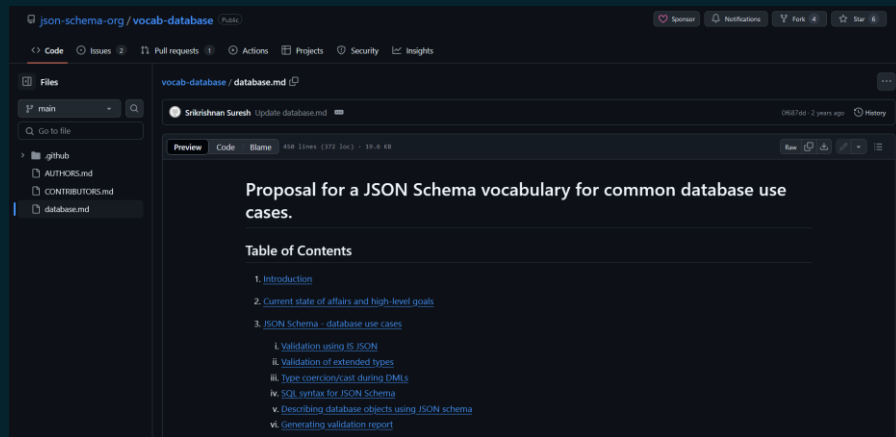- Generate JSON schema from database objects (tables, views, Duality Views…)

Performance Improvement

- Leverage JSON schema vocabulary for databases

- Allows casting field values into SQL datatypes (using extendedType) during DMLs

- Ensure better performance for non-JSON-standard types: DATE, TIMESTAMP, INTERVAL, VECTOR…

https://github.com/json-schema-org/vocab-database/blob/main/database.md

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Relational Model Evolution

- A JSON Full-Text search index can maintain table level Data Guide in real-time

- Upon insertion of new fields, the table gets new virtual columns flattening JSON documents hierarchies to ease analytics with SQL

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JSON Schemas *help* Relational Databases
Bridging the Gap!

Data

One last word ☺

GitHub repository for demos source code
→ https://github.com/loiclefevre/apidays-paris-2024

You can use Oracle Database 23ᵃⁱ
for **FREE** (Linux, Windows, MAC OS,
Always Free Autonomous, and Container)

{ "credits": "Thank You" }