Oracle Autonomous JSON Database

Faster JSON Development at Lower Cost

Data - The world's most valuable resource

$430B
advantage for data driven organizations
- IDC

19X
likely to be more profitable
- McKinsey

10%
increase in data accessibility translates into **$65.7M** in net income
- Baseline

Unique

Data cannot be substituted by other data, because each carries different information.

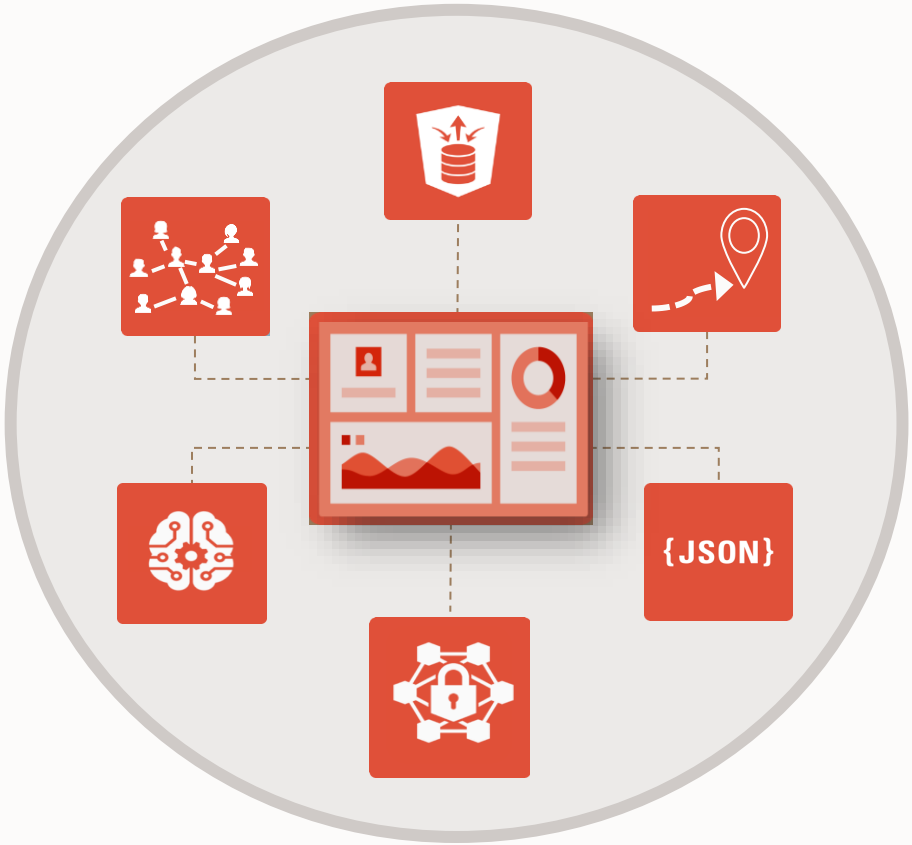
Experience

Data can be accurately evaluated only after data have been experienced.

Always there

Data can be consumed over and over again by different parties.

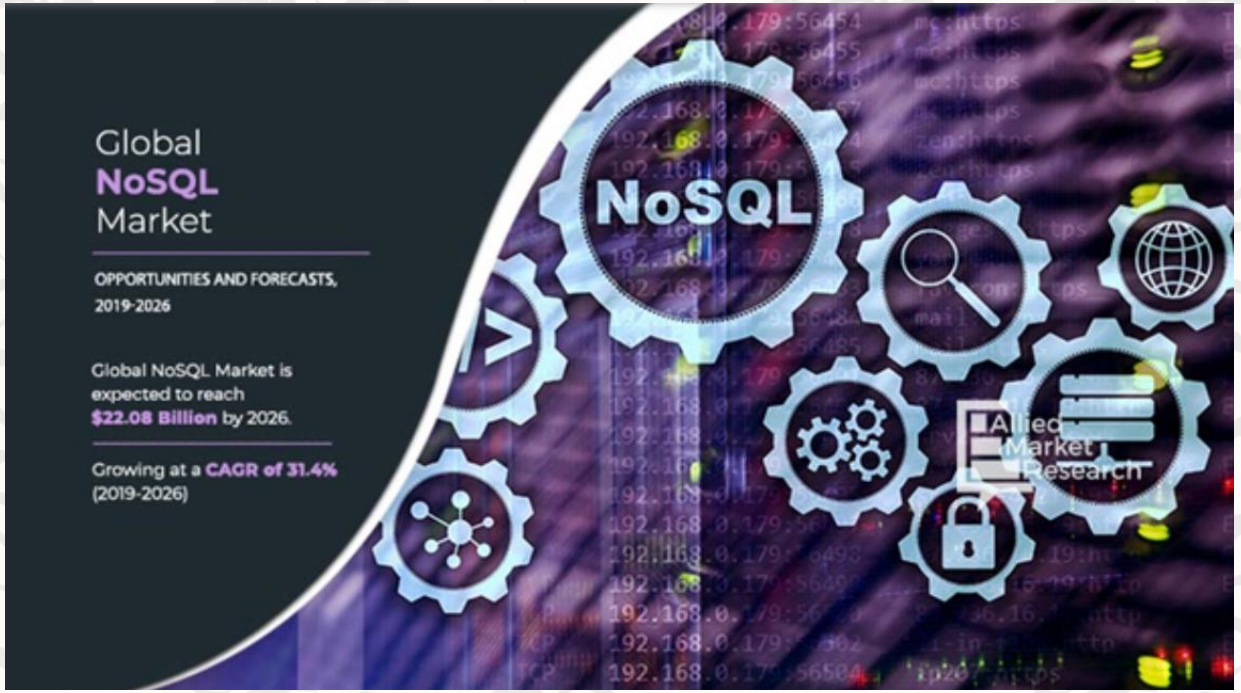
The Future is Data Driven Applications



Creating **value from data** will increasingly determine **competitiveness**

31.4% CAGR

Applications such as e-commerce, web, IoT and social game development are anticipated to drive the growth of Global NoSQL Market to **$22.08** Billion by 2026*



Source: https://www.alliedmarketresearch.com/NoSQL-market

Modern application development—architectural tenets

Produce and consume data at **high volume** and **high rate**

Require **highly responsive** user interface

Expect **innovations** to happen **rapidly**

Run anywhere and interoperate with **data hosted anywhere**

Require **highly available** database solution

Demand throughput and storage **elasticity**

Manage **continuously evolving** data models

Demand **rapid deployment** and **maintenance-free** database

Why do application developers prefer JSON?

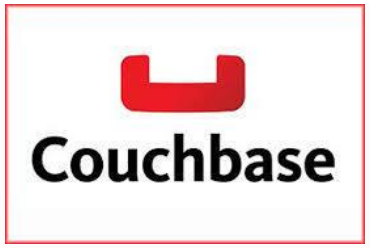
Simpler Application Development

- JSON Documents support dynamic schemas and make **schema changes** easy
- JSON is **common data format** across App and Database tiers
- Flexible in **storing variety of data** such as user-generated, geo-spatial, IoT data, social graphs
- **Document-centric APIs** make developers more productive

JSON database use cases

Mobile applications	**Internet of things**	**360 degree customer view**	**User profile management**	**Catalog data**
				
Content management	**Online advertising**	**Real time Big data**	**Social network**	**Gaming**
				

What's lacking in specialized Document Databases today?



- Transparent scale-out with **Full ACID** transactions
- Most JSON document stores **cannot perform complex joins** across multiple JSON documents and collections
- Cannot combine JSON and non-JSON data types, which is increasingly required
  - Data gets **fragmented** across various data stores
- **Custom application code** needed to accomplish basic data management tasks

ANNOUNCING

New Autonomous JSON Database

The JSON Features of MongoDB and More for a lower price

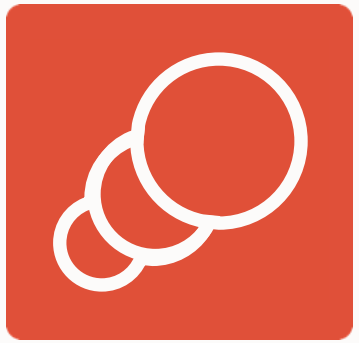
Oracle Autonomous JSON Database

A managed cloud service for JSON storage

- New service for **JSON-centric** development
- Flexible and fast at scale
- **Native** JSON storage
- Simple **document APIs**
  - Language drivers, command-line, and REST
  - SQL not required

Oracle Autonomous JSON Database

Provides the same benefits as NoSQL document stores



Elastic compute and storage

Single-digit latency reads and writes

Highly available

Low price, always-free tier

Oracle Autonomous JSON Database

More than a simple document store

- ✓ Autonomous
- ✓ Full SQL support
- ✓ ACID transactions
- ✓ Advanced security
- ✓ APEX low-code development
- ✓ One-click instant expansion to ATP

One Autonomous Database family optimized for varied workloads

Oracle Autonomous Database

Autonomous Data Warehouse

Analytic workloads

- Data warehouse, data mart
- Data lake, machine learning

Autonomous Transaction Processing

OLTP and mixed workloads

- Transactions, batch, reporting, IoT
- Application development, machine learning

Autonomous JSON Database

Native JSON Document

- User profile management
- Customer 360
- Catalog and content management

Choose the one that best meets your workload needs

Oracle Autonomous Database

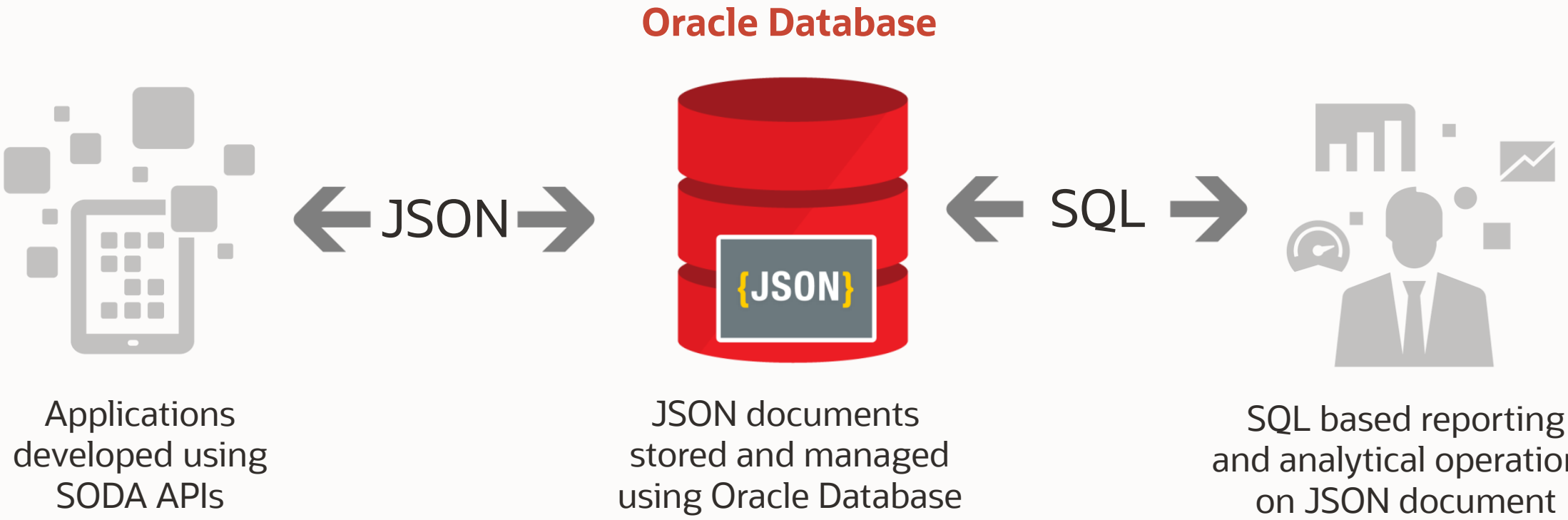
Automates all database operations

- Automatic provisioning
- Automatic configuration
- Automatic encryption
- Automatic online updating
- Automatic elastic scaling
- Automatic tuning
- And a lot more…

Nothing to Learn – Nothing to Do

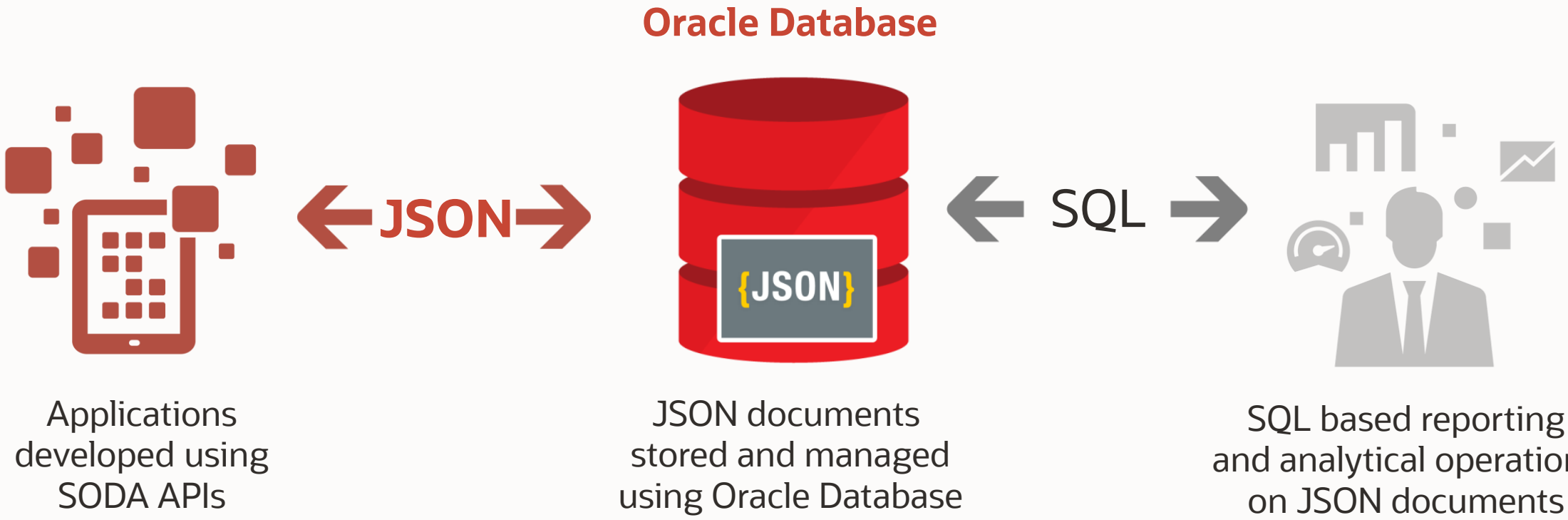
Oracle Autonomous JSON Database

Oracle's Converged Database supports both NoSQL and SQL access



Autonomous JSON Database

Simple NoSQL Development experience



CRUD operations

Introducing SODA (Simple Oracle Document Access) and SQLcl

SODA APIs

- NoSQL-style APIs for
  - Java, JavaScript/Node.js, Python, REST, PL/SQL, C…
- Used to manage JSON data
  - create collections
  - store documents in collections
  - retrieve documents
  - query documents
  - ***No need to know SQL!***

SQLcl

- Modern SQL Developer Command Line interface for Oracle database
- Provides
  - inline editing, statement completion, command recall…
  - **SODA commands**

CRUD operations

Introducing SODA (Simple Oracle Document Access) and SQLcl

```
SODA allows schemaless application development using the JSON data model.
        SODA create <collection_name>
             Create a new collection

        SODA list
             List all the collections

        SODA get <collection_name> [-all | -f | -k | -klist] [{<key> | <k1> <k2> ... > | <qbe>}]
             List documents the collection
             Optional arguments:
                   -all    list the keys of all docs in the collection
                   -k      list docs matching the specific <key>
                   -klist  list docs matching the list of keys
                   -f      list docs matching the <qbe>

        SODA insert <collection_name> <json_str | filename>
             Insert a new document within a collection

        SODA drop <collection_name>
             Delete existing collection

        SODA count <collection_name> [<qbe>]
             Count # of docs inside collection.
             Optional <qbe> returns # of matching docs

        SODA replace <collection_name> <oldkey> <new_{str|doc}>
             Replace one doc for another

        SODA remove <collection_name> [-k | -klist |-f] {<key> | <k1> <k2> ... | <qbe>}
             Remove doc(s) from collection
             Optional arguments:
                   -k     remove doc in collection matching the specific <key>
                   -klist remove doc in collection matching the list <key1> <key2> ... >
                   -f     remove doc in collection matching <qbe>
```

SQLcl

- Modern SQL Developer Command Line interface for Oracle Database
- Provides
  - Inline editing, statement completion, command recall…
  - **SODA commands**

Oracle SODA examples

Node.js

```
conn = await oracledb.getConnection(…);
db = conn.getSodaDatabase();
col = await db.createCollection("purchase_orders");
await col.drop();
```

Python

```
conn =cx_Oracle.connect(…);
db = conn.getSodaDatabase();
col = db.createCollection("purchase_orders");
col.drop();
```

Java

```
OracleClient client = new OracleRDBMSClient();
db = client.getDatabase(jdbcConn);
OracleCollection col =
db.admin.createCollection("purchase_orders");
col.admin().drop();
```

PL/SQL (and Oracle Application Express)

```
col := dbms_soda.create_collection('purchase_orders');

select dbms_soda.drop_collection('purchase_orders')
from dual;
```

MongoDB compared to Oracle SODA

```
MongoClient mongoClient = new MongoClient();
DB database = mongoClient.getDB("procurement");
DBCollection coll =
database.getCollection("purchase_orders");

BasicDBObject po = new
BasicDBObject(JSON.parse(json1));
coll.insert(po);

DBObject query = new BasicDBObject("Requestor",
"Alexis Bull");

DBCursor cursor = coll.find(query);
DBObject doc = cursor.one();
```

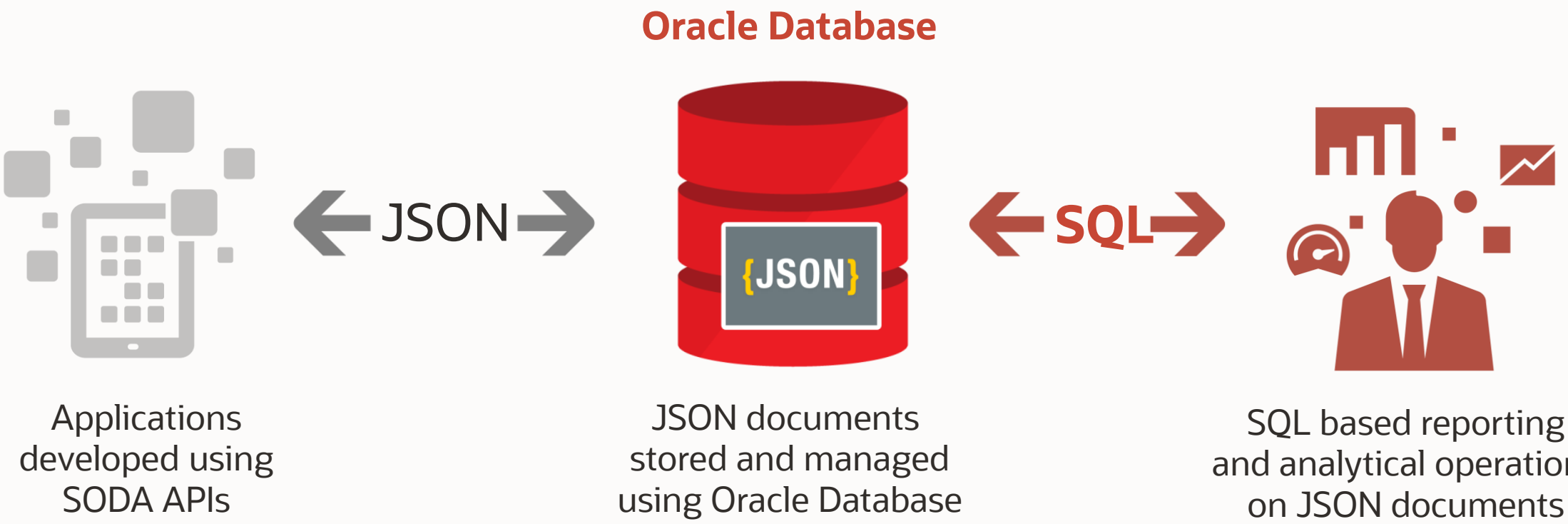
```
OracleDatabase db = new
OracleRDBMSClient().getDatabase(jdbcConnection);
OracleCollection coll =
db.admin().createCollection("purchase_orders");

OracleDocument po = db.createDocumentFromString(json1));
coll.insert(po);

OracleDocument qbe =
db.createDocumentFromString("""{"Requestor":"Alexis
Bull"}""");
OracleCursor cursor = coll.find().filter(qbe).getCursor();
OracleDocument doc = cursor.next();
```

Oracle Autonomous JSON Database

All the power of SQL



Simple syntax for SQL queries

Field Access

```
SQL> select j.PO_DOCUMENT
  2    from J_PURCHASEORDER j
  3    where j.PO_DOCUMENT.PONumber = 1600;
```

Collection unnesting

```
SQL> select *
  2     from CUSTOMER NESTED jcol.orders.lineitems[*]
  3          COLUMNS (lineid, quantity, prodid, upc, comments);
```

JSON Generation

```
SQL> select JSON_OBJECT(c.jcol.orders.lineitems FORMAT JSON)
  2    from CUSTOMERS c;
```

Full breadth of Oracle SQL features for JSON data

Spatial Analysis

- Hundreds of built-in spatial analytics functions that can run over GeoJSON

Machine Learning

- Build and score models with 30+ built-in ML algorithms

Procedural Language

- PL/SQL with JSON extensions and SODA support

True ACID Transactions

- Transactions spanning multiple documents and collections; no hand coding required

Virtual Private Database

- Fine-grained document-based security policies

Oracle Autonomous JSON Database vs MongoDB Atlas limitations

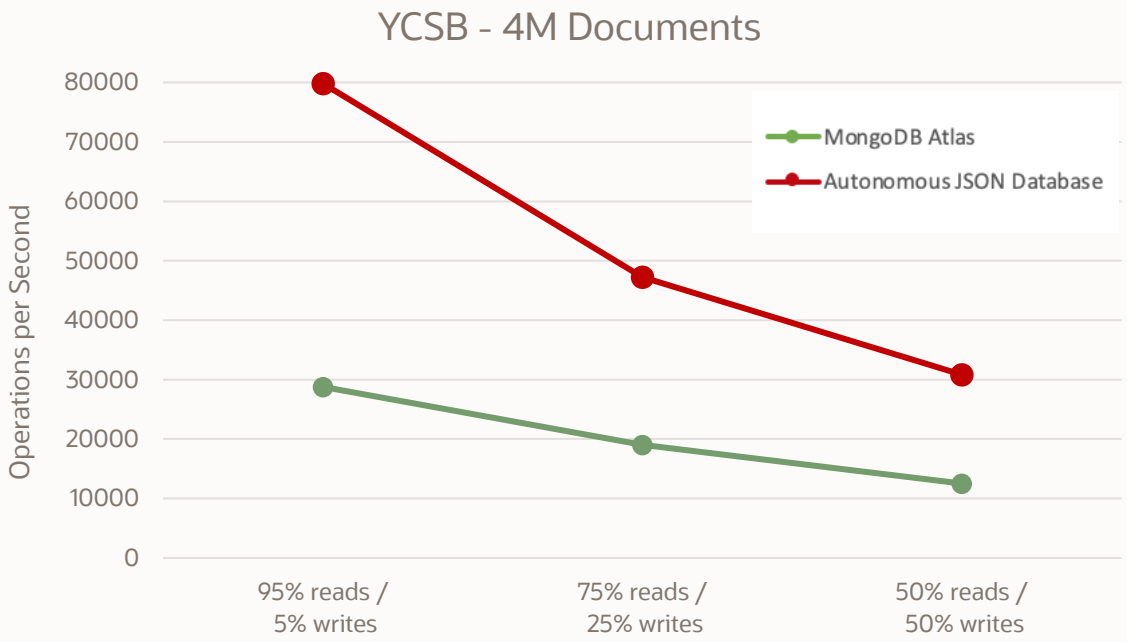
Limitation	Autonomous JSON Database	MongoDB Atlas
Max Document Size	32 MB	16 MB
Nested Depth for Documents	1024 levels	100 levels
Indexes per collection	unlimited	64
Compound index fields	unlimited (with JSON SEARCH INDEX)	32
Full document index	JSON SEARCH Index	-
Server-side functions	Functions, Procedures, Triggers	Not recommended as per MongoDB doc
Multi-document transactions	Always ACID	ACID only upon request via explicit API calls
Transaction duration	unlimited	60 seconds default
Transaction size	unlimited	<=1000 documents recommended
Aggregation data size	unlimited	100 MB RAM + explicit allowDiskUse param

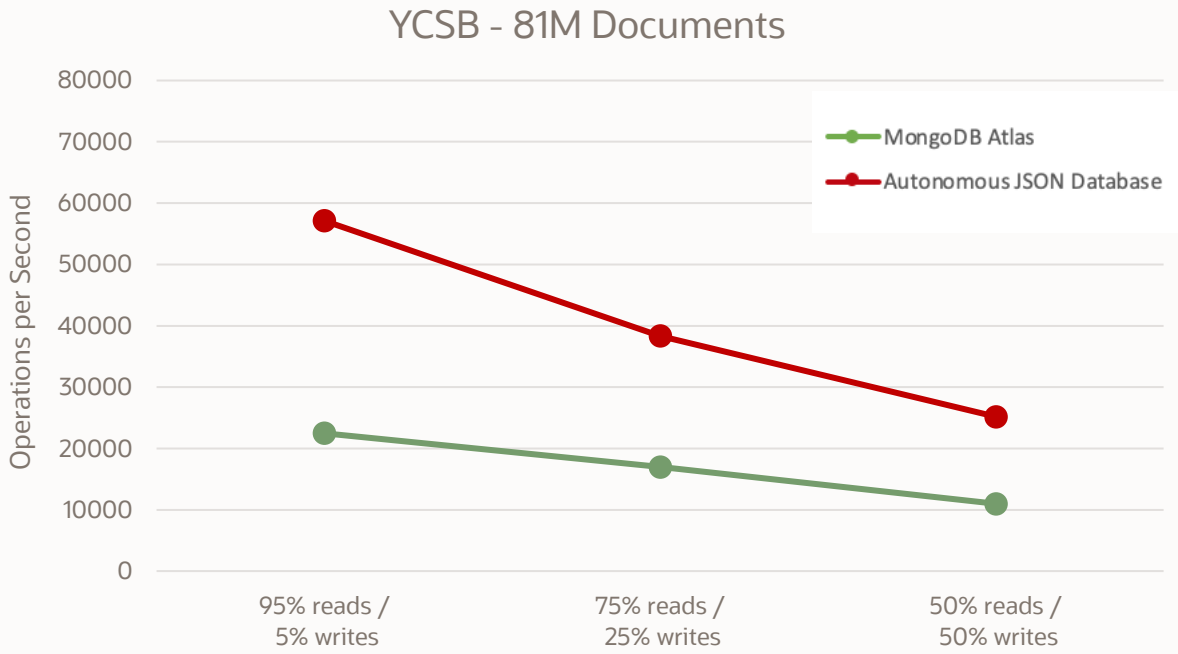
Oracle Autonomous JSON Database vs MongoDB Atlas capabilities

Enterprise Capabilities	Autonomous JSON Database	MongoDB Atlas
Serverless auto-scaling	✓	X
SQL access over JSON documents	✓	X
Cross-Collection Analytics	✓	X
Comprehensive security	✓	X

Oracle Autonomous JSON Database

2X faster than MongoDB at 30% lower cost





Autonomous JSON Database with 8 OCPUs compared to MongoDB Atlas on M60
Industry-standard Yahoo Cloud Serving Benchmark (YCSB) : https://ycsb.site/
*Source of MongoDB results: https://www.mongodb.com/atlas-vs-amazon-documentdb/performance as of 8/12/20

Oracle Autonomous JSON Database

30% lower cost than MongoDB

Autonomous JSON Database Pricing:

- $0.2688 OCPU per hour ($240/month)
- $0.1591 TB per hour ($118.40/month)

	Autonomous JSON DB	MongoDB Atlas
Configuration	8 OCPU 1 TB storage	M60 on AWS 16 vCPU (= 8 OCPU) 320 GB storage
Price (on-demand)	**$2.74 / hour**	**$3.95 / hour**

PLUS: Autonomous JSON Database is auto-scaling, not limited to fix shapes

* https://www.mongodb.com/pricing

Summary—Oracle Autonomous JSON Database

Modern document-centric development

- JSON Collections-based data model
- Rich clients - REST and SODA based development API
- Native JSON storage with advanced indexes and optimized performance

Proven enterprise database features to accelerate development

- ACID transactions
- SQL-based Reporting and Analytics (including scalable parallel execution)

Runs on Autonomous enterprise platform

- Availability
- Security
- Elasticity

More Information

Learn more : [Autonomous JSON Database Web Page]

Sign Up for free : [Autonomous JSON Database Get Started Web Page]

[Documentation]