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PROFESSIONAL SERVICES



# Oracle Database 23c Expert Panel: Best New Features



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Oracle ACE Director



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CIO VNA  
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InComm Payments  
Oracle ACE Pro



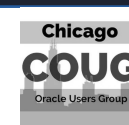
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Product Manager  
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Maria Colgan

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Maria Colgan has been a part of Oracle Corporation since version 7.3 was released in 1996, and advocates for Oracle Database, as well as best practices for incorporating the database into company environments. Maria has spent her entire career deeply involved with enhancing the performance of databases and applications, most notably SQL query tuning.

Her personal mission is to help companies attain the flexibility and resilience they need (especially in today's ever-changing world), by helping them make better use of this incredible technology.

Follow her blog at <https://www.sqlmaria.com/>



Charles Kim

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Charles Kim is an Oracle ACE Director, VMware Expert, an Oracle Certified DBA, a Certified Exadata Specialist, and a Certified Oracle Linux, Oracle Cloud, and RAC Expert. Charles was selected into the Oracle ACE Program in 2008 and became an Oracle ACE Director as of December 2009.

Charles is a co-founder and CEO of Viscosity North America, a highly specialized niche consulting organization comprised of industry experts in Oracle Engineered Systems, RAC, Oracle Cloud, Virtualization, and Performance Tuning.



Troy Ligon

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Troy Ligon is an Oracle ACE and a regular speaker at conferences across the country. Troy is President of the Suncoast Oracle Users Group in Tampa, FL and serves on the Quest IOUG Advisory Board of Directors.

With over 35 years' IT experience, Troy has held senior roles at American Express, CitiBank, IBM, and other Fortune 100 firms. Troy is currently Director of Enterprise Architecture for InComm Payments, a global financial services firm managing annual volumes over \$50billion across 43 countries.



Rich Niemiec

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Rich Niemiec is the current Chief Innovation Officer of Viscosity North America. Rich is an Oracle Ace Director, a world-renowned IT Expert, and was a co-founder and the CEO of TUSC, a Chicago-based systems integrator of Oracle-based business solutions started in 1988. Rich has served as President of Rolta TUSC and Rolta EICT.

Rich is the past President of the International Oracle Users Group (IOUG) and the current President of the Midwest Oracle Users Group (MOUG). Rich has architected and tuned many Fortune 500 systems over the past 25 years.



Jeff Smith

Oracle Corp | Distinguished  
Product Manager

 @thatjeffsmith

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Jeff is a master product manager in the Database team, responsible for Oracle SQL Developer, SQL Developer Data Modeler, SQLcl, REST Data Services, and our newest product, SQL Developer Web.

Jeff has two decades experience in the commercial software industry with a customer-driven focus. Support, testing, documentation, product management and marketing, pre and post sales support - helping customers succeed and making the most of their technology investments.

Follow his blog at <https://www.thatjeffsmith.com/>

# Viscosity Pillars and Delivery Models



## DATA

Oracle & SQL Server PostGres  
Performance Tuning  
Data Replication  
Data Warehousing Analytics  
Data Integration  
ERP Blue Prints  
Database Upgrades



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E-Business Suite  
SAAS/PAAS



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## Our Mission

- Share information with other Oracle User Groups.
- Network with other local Oracle users.
- Share hints and tips with fellow members.
- Learn from the exciting guest speakers at every meeting.
- Express your views and ask questions about Oracle technology.
- It's FREE!

Visit COUG at  
<https://www.coug.us/>



Join MOUG and COUG for their annual joint conference in Chicago on September 23, 2022 in the brand new Oracle Innovation Lab in Deerfield!

Registration now closed

## Midwest & Chicago Oracle Users Group Joint Conference

For more information about the conference, visit [viscosityna.com/cougmoug22](https://viscosityna.com/cougmoug22)

Join us on Friday, September 23, 2022 from 8:00 AM - 5:00 pm!



Visit MOUG at

<https://midwestoug.square.site/>



[nyoug.org](http://nyoug.org)

**NYOUG**

## **New York Oracle User Group**

Virtually live from New York, the world's most exciting city welcomes all Oracle users, associates, students and professionals to become part of this dynamic group.

NYOUG was formed in 1984 for the exchange of ideas, assistance and support among users of Oracle software products.

### **L**eadership

Contact Us / E-Mail

President	Simay Alpoge
Vice President	Coleman Leviter
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<a href="mailto:treasurer@nyoug.org">treasurer@nyoug.org</a>

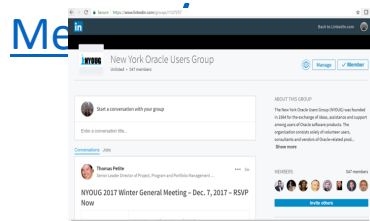


Connect with us !



Twitter - @nyoug\_nyc, @NYOUG\_Pres

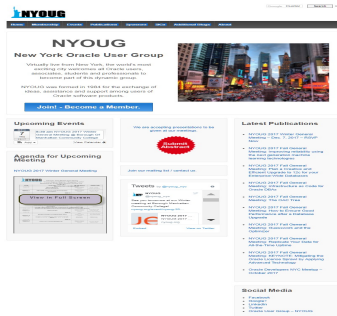
Meetup - <https://www.meetup.com/New-York-Open-Group->



Linkedin – New York Oracle Users Group



Facebook - New York Oracle Users Group



Web site – <http://nyoug.org/>

**For over 25 years, RMOUG has provided opportunities for community members to broaden their technical knowledge through our Training Days Conference, webinars, workshops, and forums where we share technical knowledge, ideas, and experiences.**

**RMOUG**



*Rocky the O.W.L.*



- **Benefits of Membership**

- ❖ Networking with speakers and members of our community
- ❖ “By the Mug” Monthly Community Newsletter
- ❖ Complimentary Educational Workshops
- ❖ Discounted pricing to our Annual Training Days Conference
- ❖ Professional Development via Volunteer Opportunities
- *Further details available at: <https://rmoug.org>*



# RMOUG



<https://rmoug.org/Training-Days-2023>

- *RMOUG Training Days 2023* is a premier event for Oracle professionals, February 15 – 17<sup>th</sup>, 2023
- Attendees will have the opportunity to learn from industry experts and deepen their knowledge and skills in an engaging environment
- Several Deep Dives and New/Emergent Technology sessions
- Wide range of topics and something for everyone - whether new to Oracle or seasoned veterans
- Don't miss this opportunity to stay ahead of the curve and advance your career
- **REGISTRATION IS OPEN!**
  - Attend In-person “Live and Hands-on Workshops” at: <https://rmoug.org/event-4786050/Registration>
  - To Attend Online at “Virtual and Hybrid”:  
<https://rmoug.org/event-5012690/Registration>
  - Attend In-person for a Single-day (Thursday and Friday Only)





- **Back by popular demand “Single-Day Ticket” for Training Days 2023**
  - ❖ Attend In-person for a Single-day register at:
    - “Live and Hands-on Workshops” at:
      - <https://rmoug.org/event-4786050/Registration>
        - Select option “00” for a Single-day ticket for Thursday, 2/16/23
        - Select option “01” for a Single-day ticket for Friday, 2/17/23



WWW.SOUG.NET

HOME MESSAGE BOARD NEXT MEETING  
 MEETINGS DOCUMENTS January 18  
 NEWS & LINKS BOARD MEMBERS CLICK FOR MORE DETAILS  
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Visit SOUG at <https://www.soug.net/>

**Next Meeting :**

January 18, 2023

**Performance Technology Day with 23c**

Back by popular demand, I'm happy to announce another SOUG Tech Day!

Come join leading Oracle experts in Tampa, Florida. Oracle ACE Directors and Oracle sessions on performance tuning techniques and tips.



Block off your calendar for January 18th (Wednesday). The event will be held at Fleming Steakhouse, 4322 W Boy Scout Blvd in Tampa.

The high level agenda for the Tampa Performance Technology Day with 23c will be:



# Utah Oracle Users Group



[www.utoug.org](http://www.utoug.org)

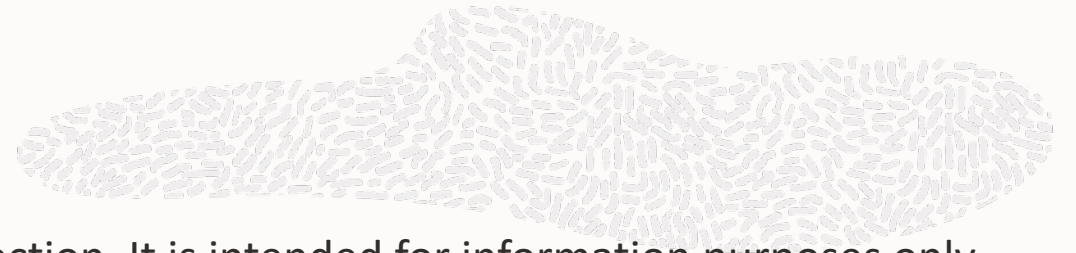
- Regional Oracle users' group
  - Based in Salt Lake City, UT
- Founded in 1995
- Membership is free!
- Education and networking
- Frequent webinars and in-person presentations
  - "We pay our speakers!"
- Annual Training Days conference



- **When:** March 7-8, 2023
- **Where:** University of Utah, Salt Lake City
- **What:** Top expert speakers from all over the world
- Early Bird registration ends February 6
- UTOUG Ski Day follows the conference
  - Unwind and network at a local ski resort
- <https://trainingdays.utoug.org>



# Safe Harbor Statement



This presentation is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, release, timing, and pricing of any features or functionality described for Oracle’s products may change and remains at the sole discretion of Oracle Corporation.

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**ANNOUNCING**

# Oracle Database 23c

Oracle Database 23c accelerates Oracle's mission to make it **simple** to develop and run all data-driven apps

BETA available in October 2022, on-premises and in Oracle Cloud



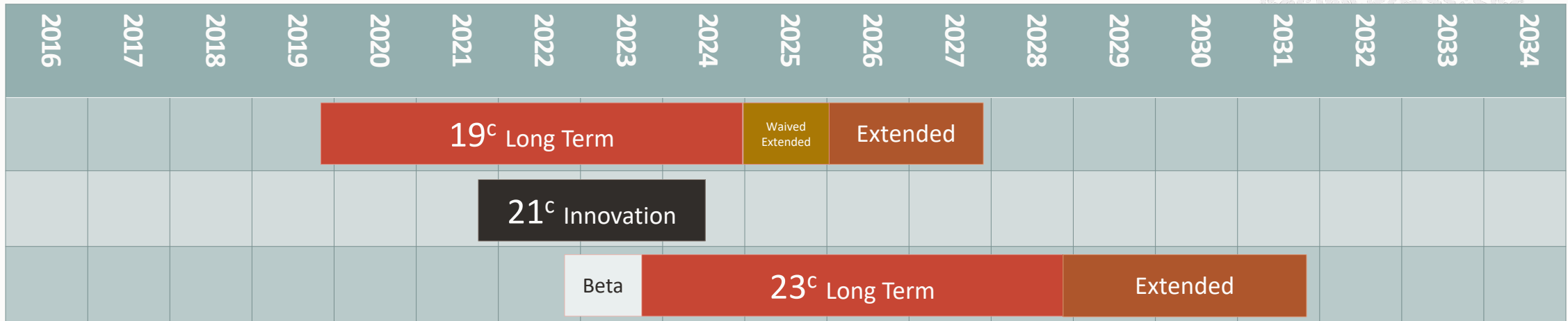
<https://tinyurl.com/OracleBeta>

A laptop screen displaying the Oracle Database 23c announcement. The text on the screen reads "23c" in a large, bold, black font, with "App Simple" in a slightly smaller, bold, black font below it.

# 23c

## App Simple

# Projected Database Release and Support Timeline

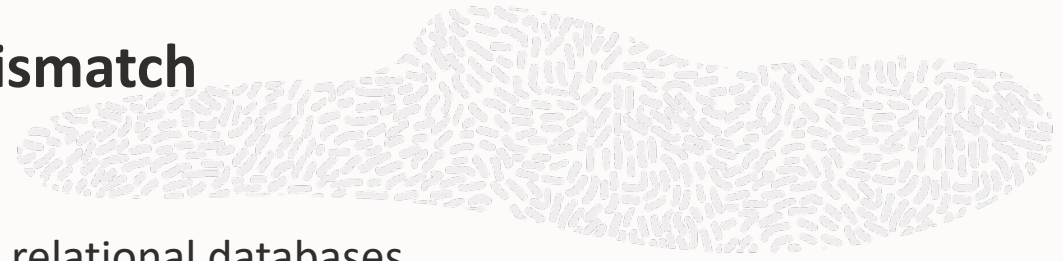


- Innovation Release - 2 years of Premier Support, and no Extended Support
- Long Term Release - 5 years of Premier Support, and 3 years of Extended Support
- Always refer to MOS Note: Release Schedule of Current Database Releases (Doc ID 742060.1)

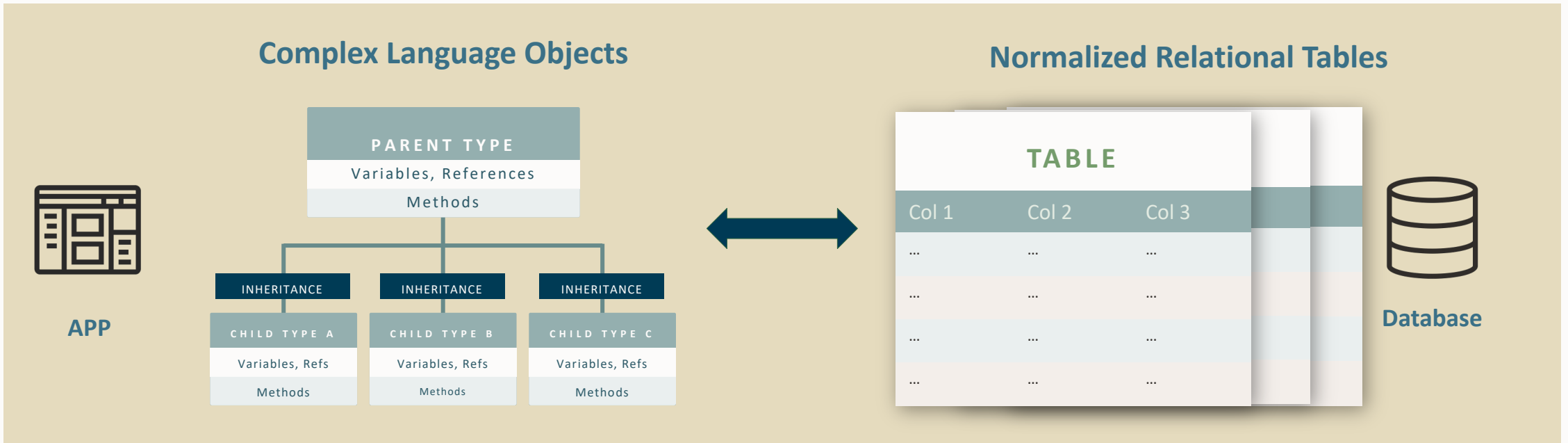
# JSON Relational Duality



# Programming Language Object to Relational Mismatch



Apps represent and manipulate data in very different ways from relational databases



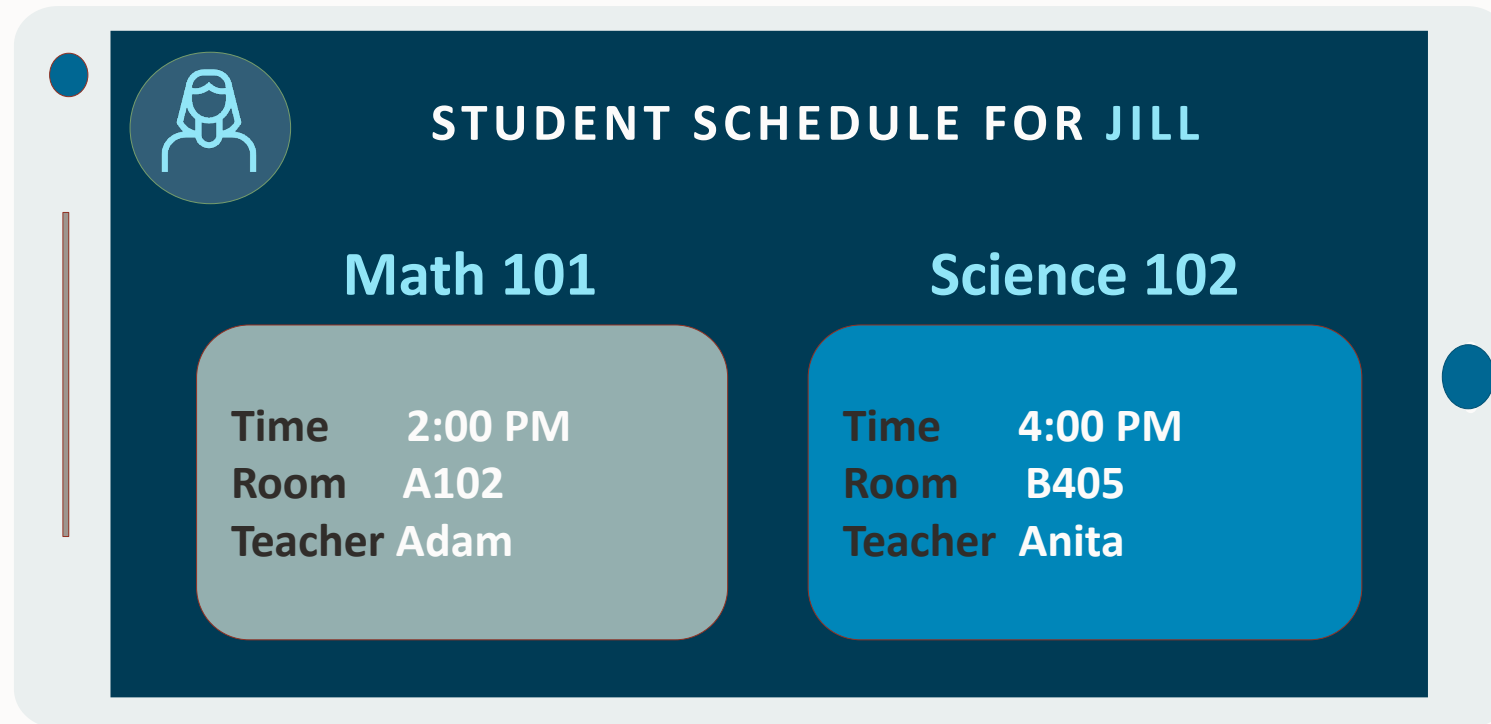
Converting language objects to normalized relational data requires some skill and effort

**Object Relational Mismatch**



# App Dev Example: Student Schedule


Imagine we've been asked to build an app that creates a student course schedule




# App Dev Example: Student Schedule

Imagine we've been asked to build an app that creates a student course schedule

The data needed for this app is stored in four normalized tables inside a relational schema:




STUDENT		
STUID	SNAME	SINFO
S3245	Jill	...
S8524	John	...
S1735	Jane	...
S3409	Jim	...



TEACHER		
TEACHID	TNAME	TINFO
T123	Anika	...
T543	Adam	...
T789	Anita	...
T612	Alex	...



COURSE				
CID	CNAME	ROOM	TIME	TEA_ID
C12	MA01	A102	14:00	T543
C34	SCI02	B405	16:00	T789
C56	HIS02	A102	14:00	T612
C78	LA01	A256	12:00	T543



STUDENT COURSES	
STUID	CID
S3245	C123
S8524	C567
S3245	C345
S3409	C123



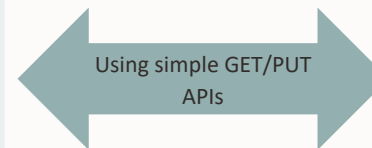
# App Dev Example: Student Schedule

Imagine we've been asked to build an app that creates a student course schedule

Ideally, the developer wants to build Jill's schedule using a single database operation that returns all the data they need for the app

**STUDENT SCHEDULE FOR JILL**

<b>Math 101</b>	<b>Science 102</b>
Time 2:00 PM	Time 4:00 PM
Room A102	Room B405
Teacher Adam	Teacher Anita



### A single JSON Document

```
{
  "student"      : "Jill",
  "schedule"    :
  [ {
    "time"       : "14:00",
    "course"     : "Math 101",
    "room"       : "A102",
    "teacher"    : "Adam"
  },
  {
    "time"       : "16:00",
    "course"     : "Science 102",
    "room"       : "B405",
    "teacher"    : "Anita"
  }
  ]
}
```



# Oracle is a Document Databases

Oracle is already an excellent document store

- Offer SODA or MongoDB-compatible API
- Provides standard **SQL** access to documents
- **Full ACID consistency** across documents

However, when used as a storage format, documents create issues with data duplication and data consistency

The course and teacher information is redundantly stored in each student's schedule

If this duplicate data changes, the change needs to be reflected in all documents

The image shows two student schedule cards. The top card is for Jill, titled 'STUDENT SCHEDULE FOR JILL'. It features a student icon and two course boxes: 'Math 101' (Time: 2:00 PM, Room: A102, Teacher: Adam) and 'Science 102' (Time: 4:00 PM, Room: B405, Teacher: Anita). The bottom card is for Jack, titled 'STUDENT SCHEDULE FOR JACK'. It features a student icon and two course boxes: 'Science 102' (Time: 4:00 PM, Room: B405, Teacher: Anita) and 'Physics' (Time: 6:00 PM, Room: A115, Teacher: Alex). The 'Science 102' box in Jack's schedule is highlighted with a red border, showing that the same course and teacher information is duplicated across different student documents.

# JSON Document Relational Duality

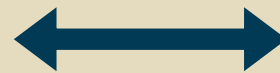
Architecturally provides use-case simplicity of JSON with multi-use case power of relational

Data is **stored as rows** in tables to provide the benefits of the relational model and SQL access

Data can be **accessed as JSON documents** to deliver the application simplicity of documents

## Storage Format

TABLE		
Col 1	Col 2	Col 3
...	...	...
...	...	...
...	...	...
...	...	...



## Access Formats

```
{
  "name1" : "String Value1",
  "name2" :
    {
      "name3" : "14:00",
      "name4" : 1234
    }
}
```

udent Jill",  
Anita",  
ence 102",  
s 201",

PUT Doc

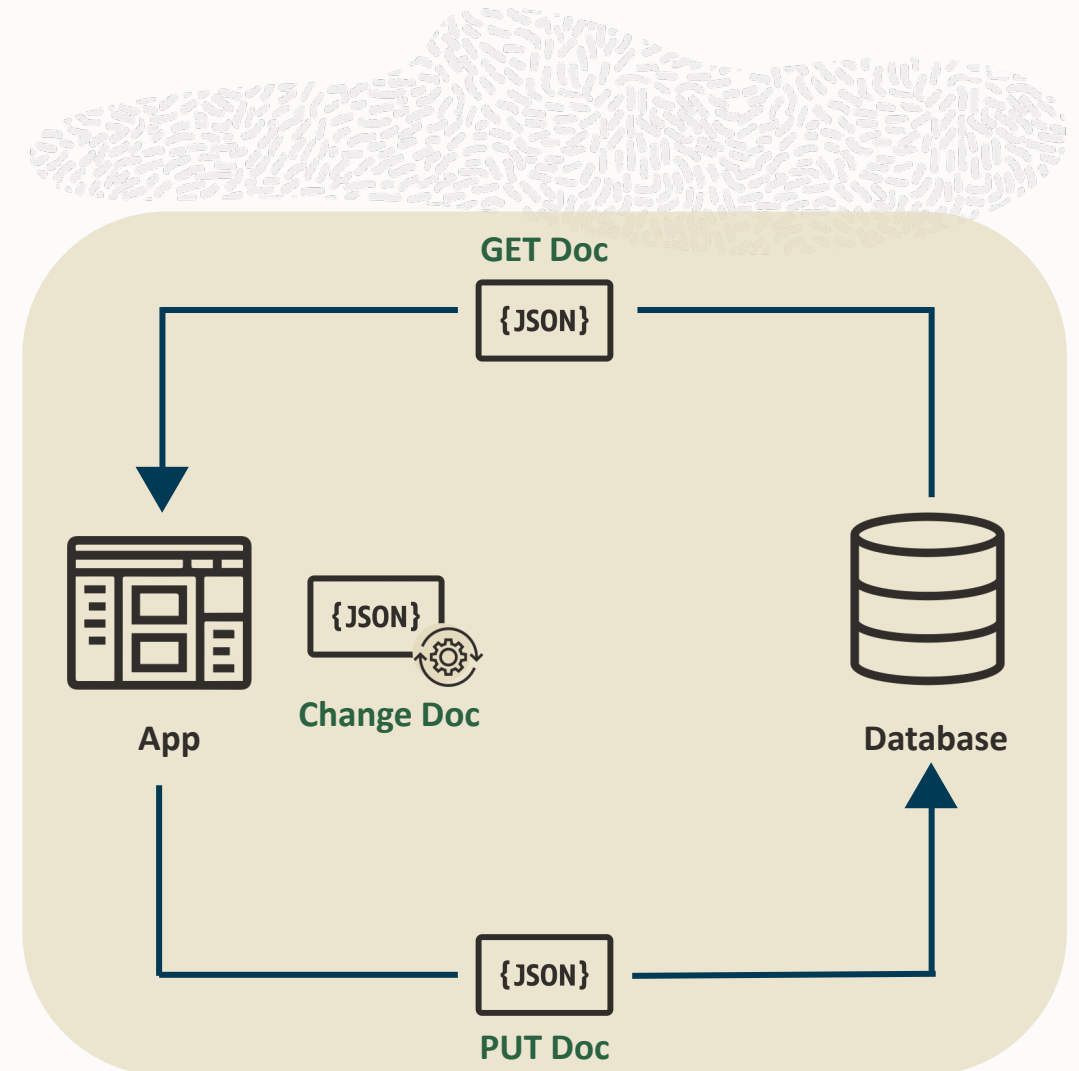
# Extreme Simplicity for Developers

JSON Duality Views are extremely simple to access using REST:

- GET a document from the View
- Make any changes needed to the document
- PUT the document back into the View

The database automatically detects the changes in the new document and modifies the underlying rows

- All duality views that share the same data immediately reflect this change
- Developers no longer have to worry about inconsistencies



# REST API Support for JSON Duality Views



# ORDS & JSON Duality Views || AutoREST APIs

The screenshot displays the Oracle SQL Developer interface. On the left, the Navigator pane shows the schema 'JANUS' with a view 'RACE\_DV'. The main editor shows the following SQL code:

```
1 CREATE OR REPLACE JSON RELATIONAL DUALITY VIEW race_dv AS
2 > SELECT JSON {'raceId': IS r.race_id, ...
26 BEGIN
27   ORDS_ENABLE_OBJECT(
28     P_ENABLED => TRUE,
29     P_SCHEMA => 'JANUS',
30     P_OBJECT => 'RACE_DV',
31     P_OBJECT_TYPE => 'VIEW',
32     P_OBJECT_ALIAS => 'race_dv',
33     P_AUTO_REST_AUTH => FALSE
34   );
35   COMMIT;
36 END;
37
38
```

Below the code, the 'Script Output' pane shows the execution results:

```
Json RELATIONAL created.
Elapsed: 00:00:00.162

PL/SQL procedure successfully completed.
Elapsed: 00:00:00.291
```

On the right, a browser window shows the REST endpoint `localhost:8080/ords/janus/race_dv/` returning a JSON response:

```
{
  "items": [
    {
      "raceId": 201,
      "name": "Blue Air Bahrain Grand Prix",
      "laps": 57,
      "date": "2022-03-20T00:00:00",
      "podium": {
        "winner": {
          "name": "Charles Leclerc",
          "time": "01:37:33.584"
        },
        "firstRunnerUp": {
          "name": "Carlos Sainz Jr",
          "time": "01:37:39.182"
        },
        "secondRunnerUp": {
          "name": "Lewis Hamilton",
          "time": "01:37:43.259"
        }
      }
    }
  ],
  "result": [
    {
      "driverRaceMapId": 3,
      "position": 1,
      "driverId": 103,
      "name": "Charles Leclerc"
    },
    {
      "driverRaceMapId": 4,
      "position": 2,
      "driverId": 104,
      "name": "Carlos Sainz Jr"
    },
    {
      "driverRaceMapId": 9,
      "position": 3
    }
  ]
}
```

## Supported Endpoints

GET collection/  
GET collection/:item  
POST collection/  
POST collection/batchload  
PUT collection/:item  
DELETE collection/:item  
DELETE collection/q?=  
DELETE collection/q?=&id=

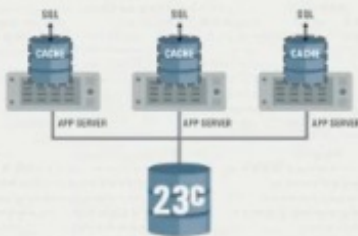


# 23c Tuning Benefits

# True Cache: App Tier, Edge, Regional, or Multi-Cloud Cache

23c

## Core Database and Performance



### TrueCache

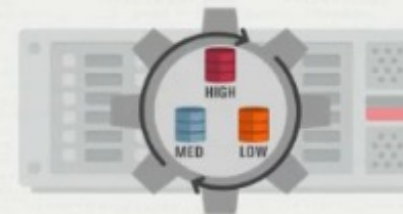
Provides an in-memory, high performance cache that is always consistent with the database.

This results in more responsive applications and lower load on the database server.



### Sharding Enhancements

New functionality makes it simpler to create and manage shard replicas. New sharding models also improve the distribution of data for shard keys with few unique values.



### Inter-Instance Resource Management

DBAs can specify the priority of different databases running on the same server.

This enables better utilization of hardware and reduces the risk associated with server consolidation.

### Priority Transactions



### Automatic Transaction Abort

Low priority transactions that block high priority transactions can be automatically aborted. This reduces the admin burden on the DBA whilst maintaining high transaction throughput.

\*23c Slides: Andrew Mendelsohn, Jenny Tsai-Smith/Dominic Giles, Philippe Lions

## Oracle Database 23c For The Developer



### SQL Domains

Allows developers to define domain level datatypes once, and share their constraint checks across multiple tables.



### OKafka

Kafka applications can now run directly against the Oracle Database with minimal code changes leveraging high performance Transaction Even Queues (TEQ).



### JavaScript Stored Logic

Allows developers to create stored procedures using JavaScript in the database. This functionality also allows developers to leverage the huge number of JavaScript libraries.

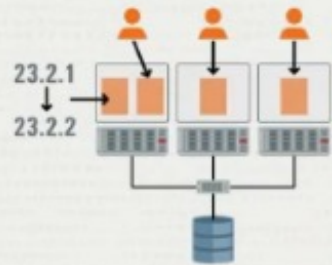
### Lock-free Column Value Reservations



### Escrow Locking

Allows developers to specify the thresholds at which locks are applied to rows. This can help in situations where long-held locks can prevent the processing of additional transactions.

## High Availability



### Dual Instance Rolling Patching

Users can now stand up two instances of a database on the same server, patching them in a rolling fashion.

Single server databases can now benefit from higher availability.

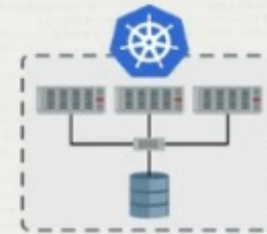
### Real-time SQL Plan Management



### Auto SQL Repair

When the Oracle Database encounters critical SQL error or performance regression, it will look for alternative approaches to execute the statement.

Improves the over all availability of applications.



### RAC on K8s & Podman

Users choosing to run Oracle Real Application Clusters in Kubernetes can now benefit from business continuity during planned and unplanned outages.



### Read-Only Per-PDB Standbys

Per-PDB Data Guard now supports the PDBs being opened Read-Only.

This further increases the flexibility of solution supporting the offloading of reporting on the standby.

# Oracle Database Security

Built over MANY years...



Fully Encrypted Database  
Tablespace Encryption (TDE)

Encryption in the Silicon (M7)

Oracle Multi-Tenant Security (PDBs)

Oracle Audit Vault

Oracle Database Vault

DB Security Evaluation #19

Transparent Data Encryption

EM Configuration Scanning

Fine Grained Auditing (9i)

Secure application roles

Client Identifier / Identity propagation

Oracle Label Security (2000)

Proxy authentication

Enterprise User Security

Global roles

Virtual Private Database (8i)

Database Encryption API

Strong authentication (PKI, Kerberos, RADIUS)

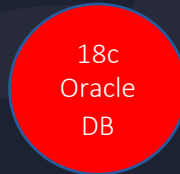
Native Network Encryption (Oracle7)

Database Auditing

Government customer

1977

2023 +



18c: User-defined Master Encryption Key)



19c: Oracle Database supplied schema-only accounts have passwords removed (not sample accounts)



Global Fault-Tolerant Key Vault & Oracle Data Safe



In-DB SQL Firewall blocks unauthorized SQL & PL/SQL Injection Attacks;  
1024 byte DB password

# SQL Enhancements

# SQL Enhancements

- **BOOLEAN Datatype**
- **SELECT without FROM clause**
- **IF [NOT] EXISTS for DDL statements**
- **Column aliases in GROUP BY and HAVING clauses**
- **Multi-value INSERT statements**
- **Direct JOINS in UPDATE statements**
- **Schema-level privileges**



# BOOLEAN Datatype

```
CREATE TABLE troy (line VARCHAR2(100), active BOOLEAN);  
INSERT INTO troy VALUES ('this line appears', true);  
INSERT INTO troy VALUES ('this line does not appear', false);  
INSERT INTO troy VALUES ('this line appears', 1);  
INSERT INTO troy VALUES ('this line does not appear', 0);  
INSERT INTO troy VALUES ('this line appears', 't');  
INSERT INTO troy VALUES ('this line does not appear', 'f');  
SELECT line FROM troy WHERE active;
```

LINE

-----

this line appears

this line appears

this line appears

# SELECT without FROM clause

```
SQL> SELECT SYSDATE;
```

```
SYSDATE
```

```
-----  
2023-01-24 12:36:57
```

```
SQL> SELECT 'hello world';
```

```
'HELLO WORLD'
```

```
-----  
Hello world
```

```
SQL> SELECT 1+1;
```

```
1+1
```

```
-----  
2
```

# IF [NOT] EXISTS for DDL statements

SQL> CREATE TABLE **IF NOT EXISTS** troy (line VARCHAR2(100), active BOOLEAN);  
Table created.

SQL> CREATE TABLE **IF NOT EXISTS** troy (line VARCHAR2(100), active BOOLEAN);  
Table created.

SQL> DROP TABLE **IF EXISTS** troy (line VARCHAR2(100), active BOOLEAN);  
Table dropped.

SQL> DROP TABLE **IF EXISTS** troy (line VARCHAR2(100), active BOOLEAN);  
Table dropped.

# Column aliases in GROUP BY and HAVING clauses

```
SQL> SELECT first||' '||middle||' '||last AS name,  
EXTRACT(YEAR FROM appointment_date) AS age  
GROUP BY first||' '||middle||' '||last  
HAVING EXTRACT(YEAR FROM appointment_date) > 2020;
```

```
SQL> SELECT first||' '||middle||' '||last AS name,  
EXTRACT(YEAR FROM appointment_date) AS age  
GROUP BY name  
HAVING age > 2020;
```

# Multi-value INSERT statements

```
SQL> INSERT INTO troy VALUES (1,'hello')(2,'world')(3,'!');
```

3 row(s) inserted.

```
SQL> SELECT * FROM troy;
```

SEQ	WORD
-----	------

---

1	hello
---	-------

2	world
---	-------

3	!
---	---

# Direct JOINS in UPDATE statements

```
SQL> UPDATE emp e SET e.salary = e.salary + r.raise  
FROM reviews r  
WHERE e.empid=r.empid  
AND r.rating='top performer';
```

# Schema-level privileges

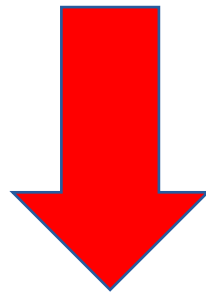
```
SQL> GRANT SELECT ON hr.emp TO troy;
```

```
SQL> GRANT SELECT ON hr.dept TO troy;
```

....

```
SQL> GRANT SELECT ON hr.orders TO troy;
```

```
SQL> GRANT SELECT ON hr.vendor TO troy;
```



```
SQL> GRANT SELECT ANY TABLE ON SCHEMA hr TO troy;
```

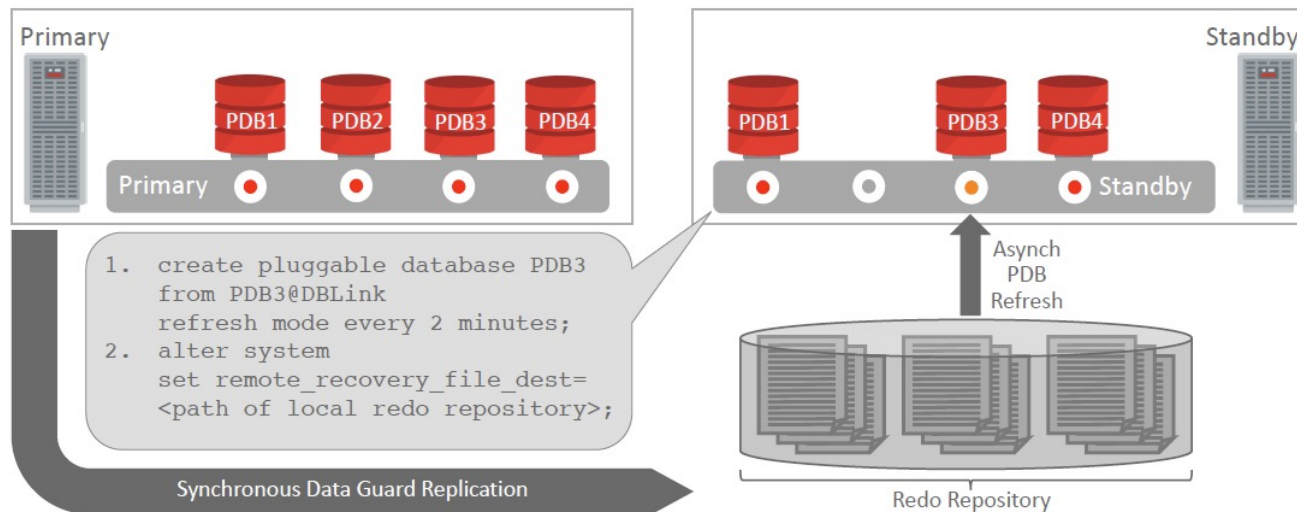
# Data Guard, PDB and HA Enhancements



# Remote Data Guard Redo Repository (18c)

## Near-Zero Data Loss Per-PDB Switchover

Enabled by integration with Data Guard Redo Repository



- A Component of the Data Guard Far Sync
- Requires ADG license

## Advantages

- Minimizes impact of scanning redo logs
- Minimizes amount of redo transport between CDBs
- Enables near-zero data loss architecture



**RAC**  
Oracle RAC on Kubernetes & Podman  
Dual Instance Rolling Patching

**Per-PDB Data Guard Integration Enhancements**

Reconnect Refreshable PDBs to source (23c)  
Disconnect, Open PDBs as Read-Write and then reconnect the PDB as a refreshable PDB  
Essentially like a snapshot standby database

Per-PDB Time Zone (23c on-premise) for Sysdate queries  
Hybrid Read Only Mode (23c on-premise)

PDB-level Data Guard (21c)  
CDB1:PDB1: Primary --> CDB2: PDB1 DR: Standby  
CDB2:PDB2: Primary --> CDB1:PDB2 DR: Standby  
Where CDB1 is the primary for PDB1 and CDB2 is the primary for PDB2

Read-Only Per PDB Standbys (23c)

**Core Database**

Increased number of columns to 4096  
Managing Flashback Database Logs Outside the Fast Recovery Area  
...  
...  
...  
RUR's are transitioning to MRPs (available on Linux x86-64)  
Monthly Recommended Patches (MRPs)

# How do we get to 23c?

Oracle database pgrade paths

# Upgrade Path to Oracle Database 23c



**11<sup>g</sup>**  
RELEASE 2

**12<sup>c</sup>**

**12<sup>c</sup>**  
RELEASE 2

**18<sup>c</sup>**

**19<sup>c</sup>**

**21<sup>c</sup>**

**23<sup>c</sup>**



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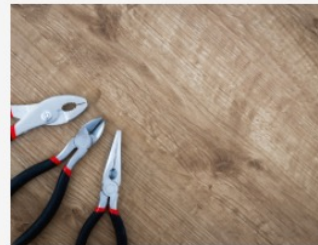
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