ORACLE

Graph Studio

A new feature of Oracle Autonomous Database

Why are graph databases useful?

Graph databases make it easier to manage, represent, and interact with complex relationships in data. The graph model enables users to apply pattern recognition, classification, and statistical analysis, which allows for more efficient analysis at scale against massive amounts of data.

With a graph, it's possible to discover results from queries and algorithms which opens up a new world of data possibilities for analysts, data scientists, and developers. In fact, for three years running, Gartner has selected graphs as one of their top analytics and data trends because of the significant potential for disruption in the world of data.

Oracle has created Graph Studio, a feature of Oracle Autonomous Database, which is the world's first fully managed, automated graph database interface. Graph Studio makes building graph models, performing graph queries, and running graph analytics simpler than ever.

Introducing Graph Studio, part of Oracle Autonomous Database

With the addition of Graph Studio, Oracle Autonomous Database is now a complete, managed platform for analyzing and visualizing graph models.

With Oracle Autonomous Database, you gain a complete graph database platform that can be **deployed in minutes** with one-click provisioning, integrated tooling, and security, which makes graph analytics a possibility even for beginners.

The new comprehensive tooling includes:

- Automated graph modeling
- Extensive graph analytics and graph query support
- Advanced notebooks and integrated visualization
- Automated install, upgrade, and provisioning

Additional new features include:

- Autosave, backup, and checkpoint data restoration features
- Ability to schedule graph analysis
- Sample notebooks and pre-built templates and workflows for different graph use cases

Graph and the converged database

Graph Studio is part of the Autonomous Database, a self-service database and analytics environment that is self-driving, self-securing, and self-repairing.

Because Autonomous Database is a converged database, that means you can seamlessly perform graph analysis on data used in other systems, like data warehouses or transaction systems. You can also transparently use in-memory and partitioning features to enhance query performance and scalability.

Graph Server and Client downloads are still available for on-premises databases.

Graph Studio—making impact everywhere

Customers and partners everywhere have found success with Oracle's Graph Studio.

AMENIDY

" After facing performance issues with an open-source graph database due to a skyrocketing number of new users, we turned to the graph feature of Oracle Database. Oracle's graph database easily achieved scalability while managing massive amounts of user entity information and their keys. And with the Oracle Autonomous Database, we're gaining large-scale, secure graph capabilities–despite being a startup without a database administrator."

Tatsuro Kamoshida, CTO and Director, AMENIDY

Vlamis Software Solutions

" As an Oracle partner, Vlamis Software Solutions is looking forward to using Graph Studio to develop, explore, and analyze complex data relationships in Oracle Autonomous Database. Graph Studio's point-and-click, low-code user interface enables us to cast traditional relational tables as a graph, allowing us to capitalize on Oracle's comprehensive set of graph algorithms. It's perfect for analyzing complex enterprise-level data relationships."

Dan Vlamis, President, Vlamis Software Solutions

Datalysis

" With Graph Studio in Autonomous Database, you don't need to be a graph expert to explore the power of graphs. Oracle's new simple interface and pre-built workflows make it possible for almost anyone to build graphs, apply analytics, and create visualizations for fraud detection, customer recommendations, smart manufacturing, and other groundbreaking graph use cases."

Gianni Ceresa, Managing Director of DATAlysis and Oracle ACE Director

Automating and simplifying graphs from end-to-end

Graph Studio simplifies and automates the entire graph analytics lifecycle–graph modeling, creation, visualization, analysis, and sharing. All steps are seamlessly provided via the intuitive user interface to database administrators, developers, and data scientists.

Build and model

Collect and prepare

See and detect

Learn and share

Deploy and scale

Graph Studio
Build and model a graph

Customers starting with a relational model from Oracle Database will need to map tabular data into a graph, which enables more freeform data exploration and discovery. Start by preparing data using SQL. The automated graph modeler within Graph Studio suggests graph mapping so that:

- Entities become vertices
- Primary key–foreign key relationships become edges
- N:M relationships turn into direct connections

Analysts and data scientists can iteratively modify the initial graph to fit needs, such as:

- Changing properties to vertices or vice versa
- Converting edges into vertices
- Extending graph with additional data

Use the user interface or property graph query language (PGQL) statements to edit the graph model. The resulting model can be visualized to see the entities that become vertices and the relationships that become edges.
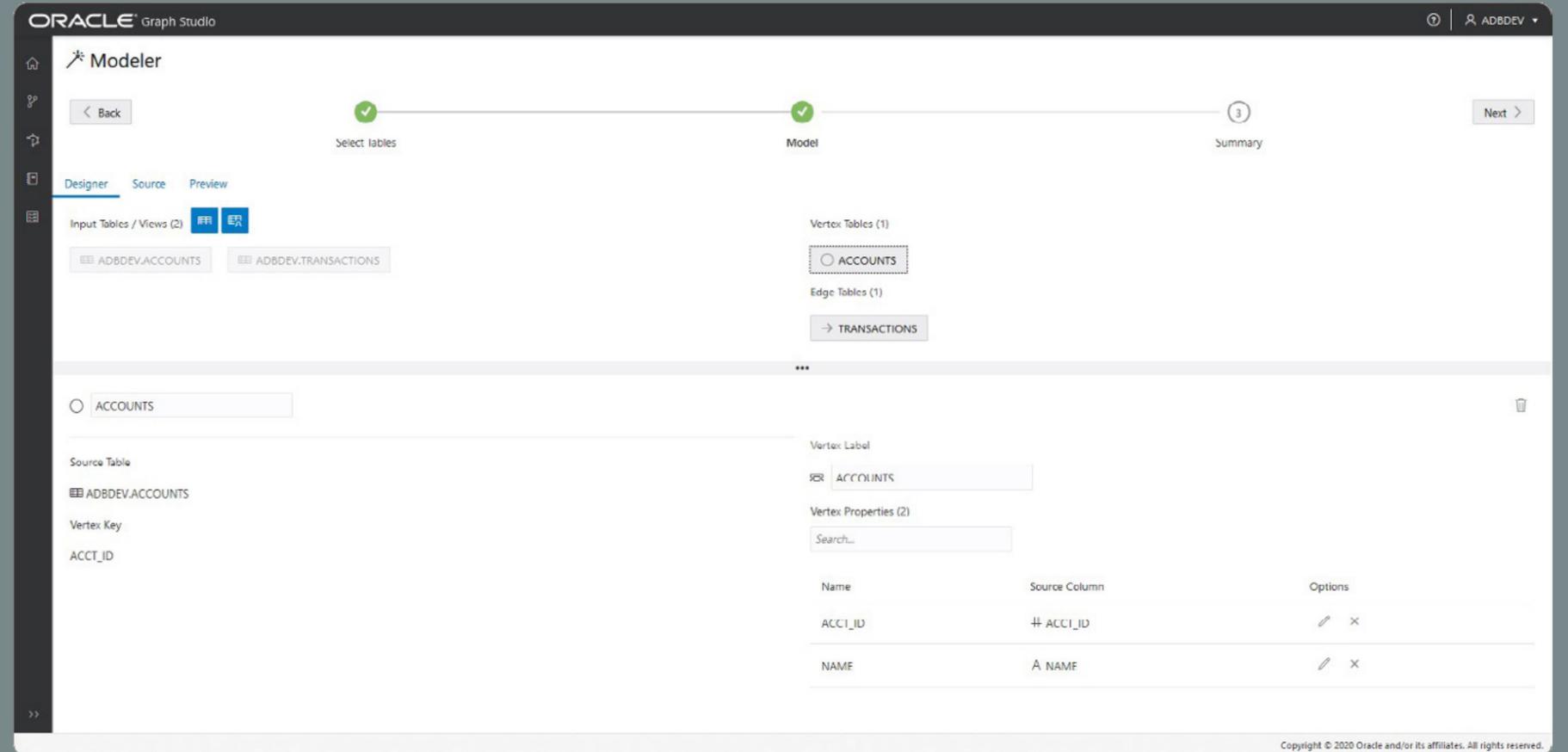
Collect and prepare data

The graph is stored in Oracle Autonomous Database. The data for vertices resides in one table, and the data for edges resides in another.

The graph can be created, queried, and updated using a SQL-like property graph query language called PGQL. Data can also be modified using regular SQL, including bulk loading.

The Query Playground in Graph Studio provides a simple interface to enter and execute PGQL to create, edit, or inspect the graph.

In-memory analytics engine

Database tables

1

Edge table

Vertex table

Property graph schema
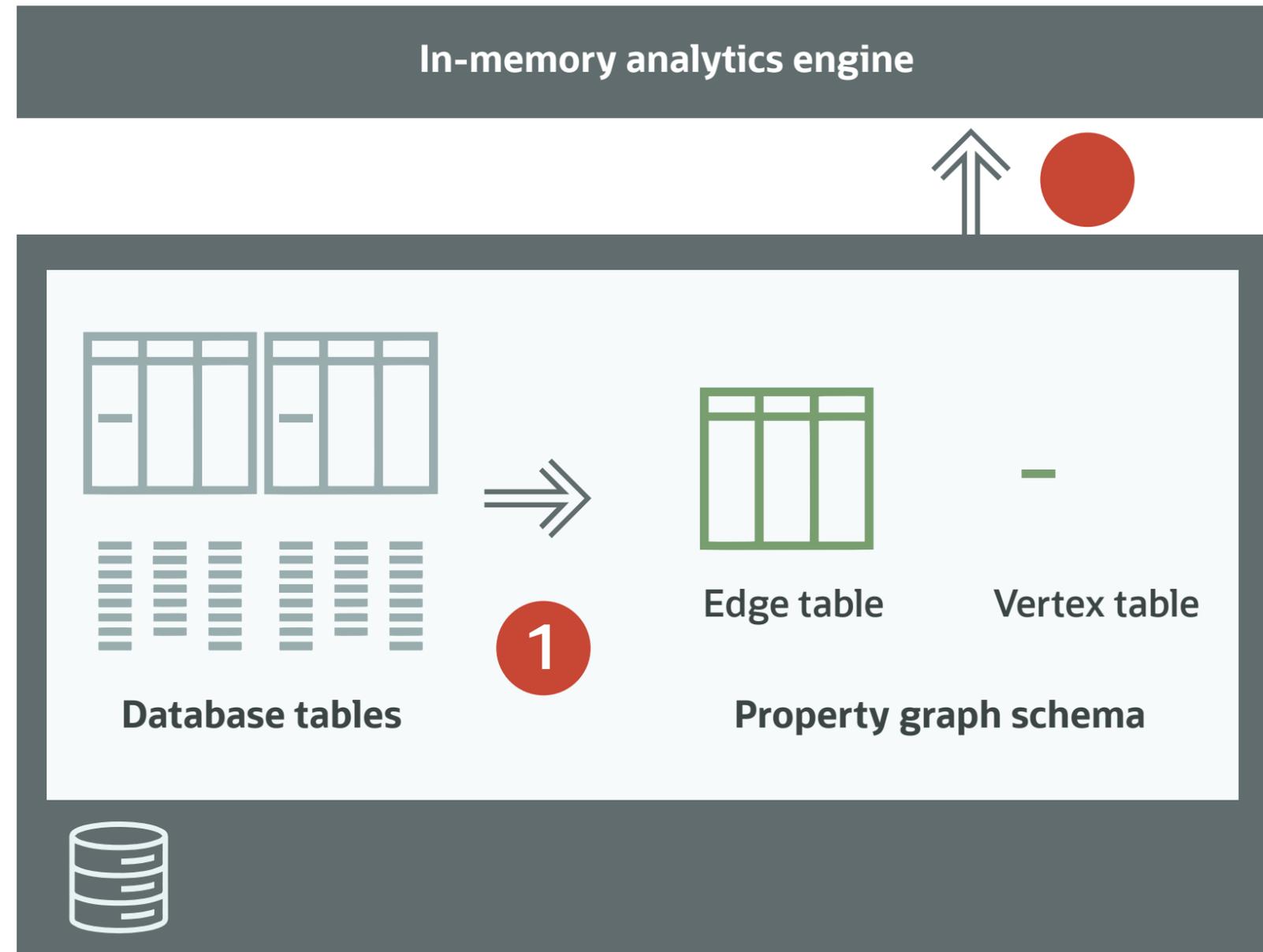
Graph Studio

See and detect data

Enable more efficient graph analysis with an in-memory graph server and PGQL.

In-memory graph server

Graph analysis is powered by the in-memory graph server which has 60 built-in, powerful, parallel, in-memory algorithms. The graph algorithms explore the paths and distances between the vertices, identify patterns, anomalies, and communities in the graph, rank the importance of the vertices, and discover clusters of vertices. The algorithms will often look at incoming edges, importance of neighboring vertices, and other indicators to help determine importance.

Graph Studio comes with 60 algorithms for:

- Community detection
- Ranking and walking
- Structure evaluation
- Path finding
- Link prediction
- And more

PGQL, a graph query language

Graph Studio provides general-purpose property graph support. PGQL is a powerful SQL-like graph query language. Analysts, developers, and data scientists can also query by using PGQL to search for surrounding nodes, traverse property paths, pattern matching, and extracting sub-graphs.

Algorithm

Query
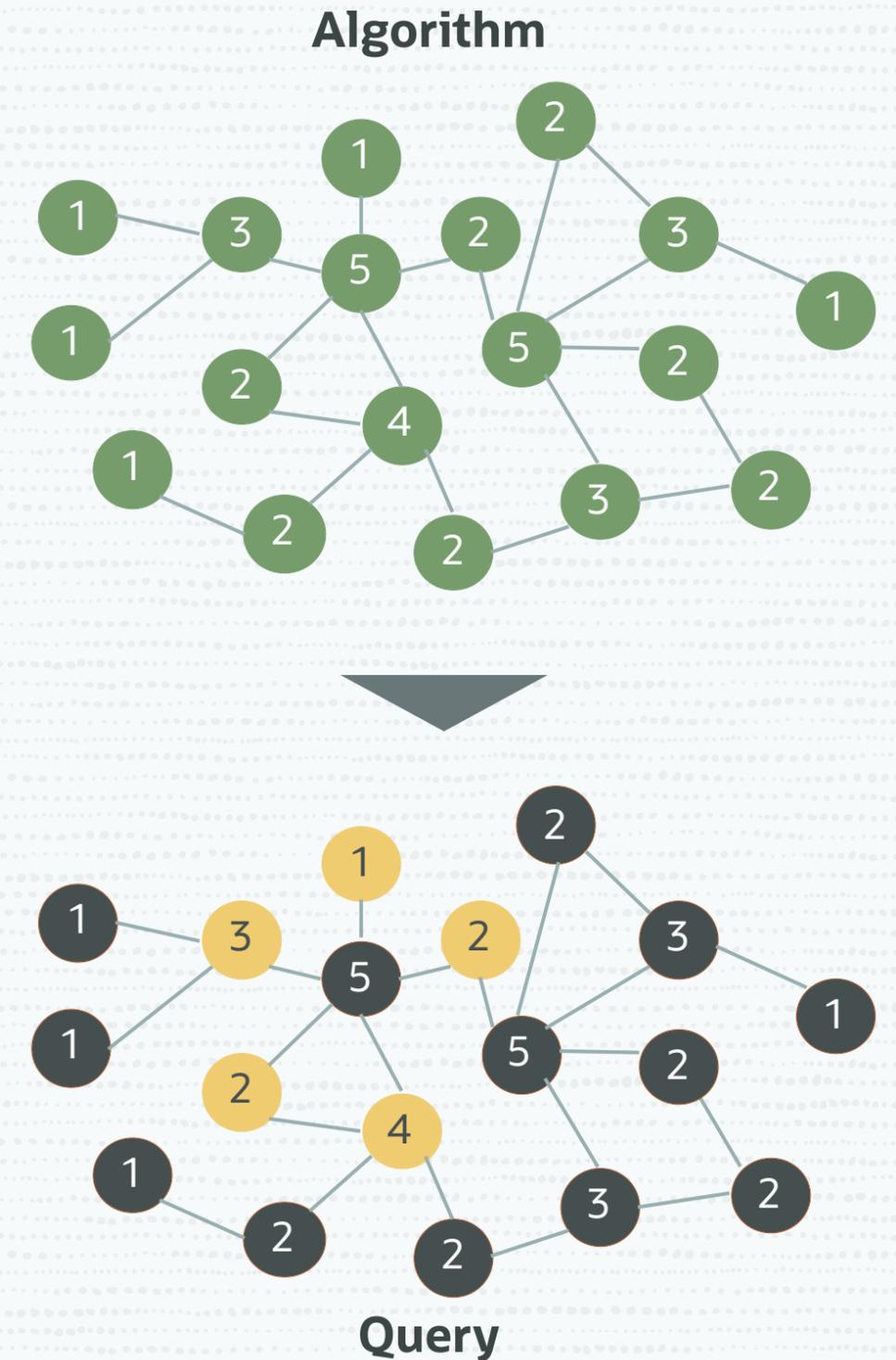
Graph Studio
Learn from data and share

Data is only valuable if it's used. Graph Studio notebooks enable interactive graph visualization through tables, charts, and more.

Work collaboratively with others and share results through a multi-purpose notebook for collaboration, with guides for documentation, visualization, and interactive analysis.

The notebook includes interpreters including:

• Markdown for documentation

• Java for coding and graph algorithms

• PGQL for pattern-matching queries
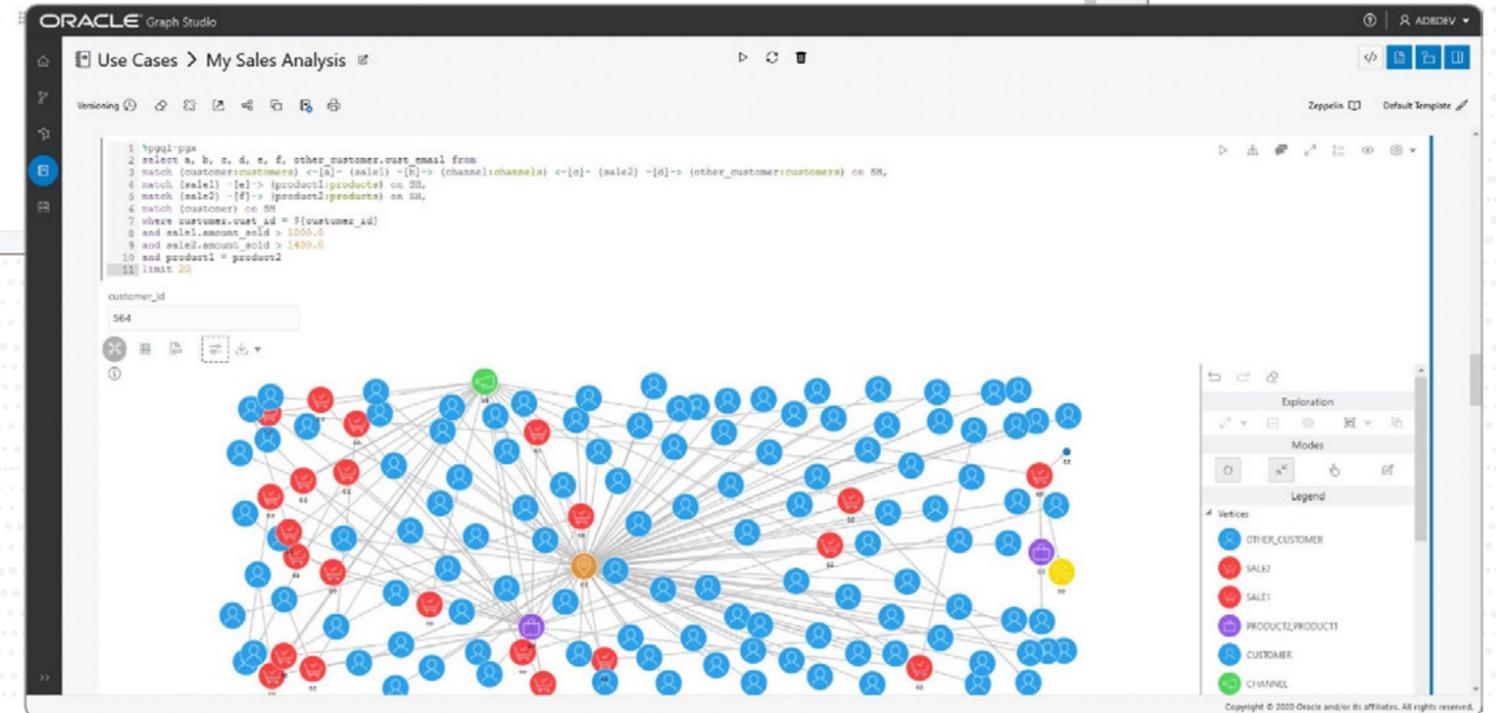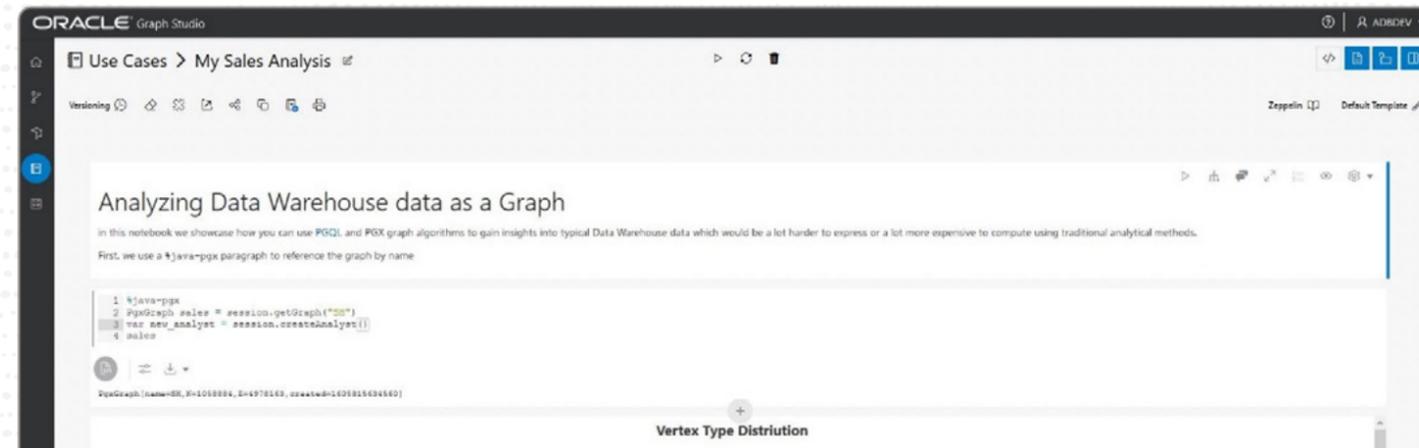
Graph Studio
Deploy and scale

Graph Studio benefits from existing Oracle Autonomous Database features such as auto-scaling. Because Graph Studio is already part of Oracle Autonomous Database, there is no need for IT to install, deploy, or manage the graph database.

In addition, it has specific enhancements within the in-memory graph server which include:

- Automatic memory allocation upon load
- Automatic memory de-allocation when not used
- Pre-allocation possible
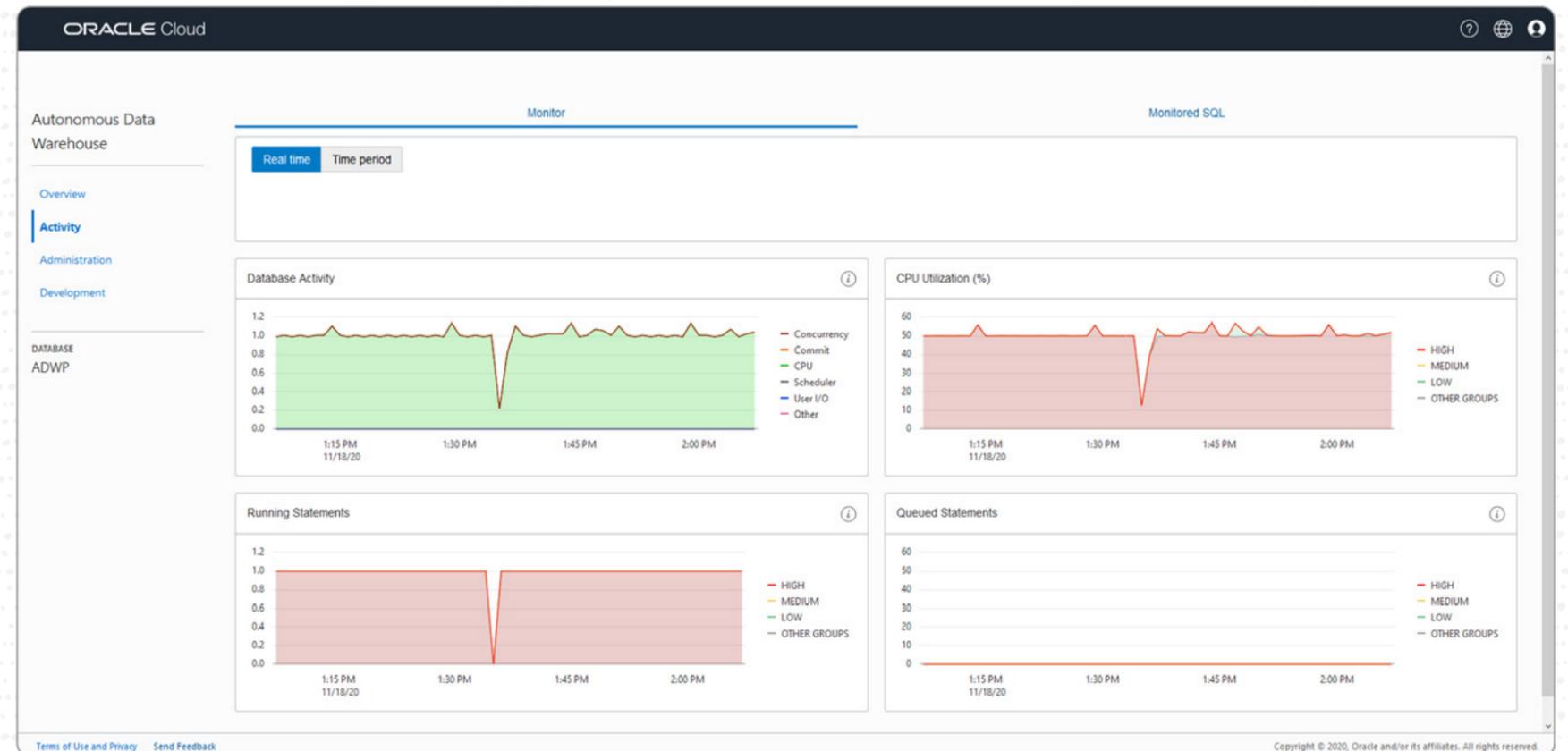
Graph Studio for data scientists

Data scientists need more insights from their data, which can become more accessible through graph analytics and the creation of new engineered features. When it comes to machine learning, data scientists can include those features derived from graphs to generate new insights, such as using clustering to find similar customers based on the products they bought.

With Graph Studio, data scientists can efficiently analyze the connectivity in the data and enrich it through feature engineering with the Graph Studio modeler, in-memory graph server, notebooks, and end-to-end analytics flows. Then, data scientists can share the workflow and results collaboratively so others can use it for implementation in a production environment.

Through Graph Studio, data scientists can take the graph as an input, adjust it as needed, and execute algorithms and perform pattern-matching queries all within a collaborative notebook environment. Because the graph model does not mandate a fixed schema, the definition of entities and relationships as well as their properties can evolve over time without necessarily impacting all previous work. This allows for faster results and more agile development.

Graph Studio for analysts

Analysts face the challenge to come up with more insights every day—and in a world where much of data is connected, it can be challenging to find those insights. Graph databases offer a new perspective on existing datasets, enabling pattern matching queries which in conventional technologies would be much harder to express. In addition, graphs enable analysts to execute graph algorithms and pattern-matching queries hundreds of times faster.

This makes it easier for business analysts to perform data discovery, and then, like the data scientists, perform exploration in notebooks, visualize the graphs, and then share the work collaboratively.
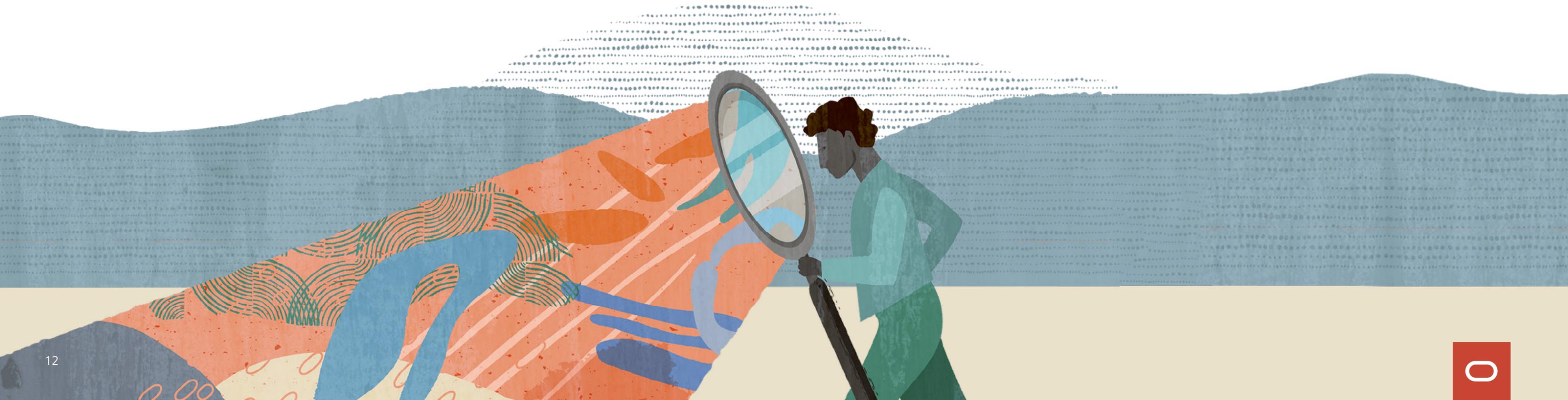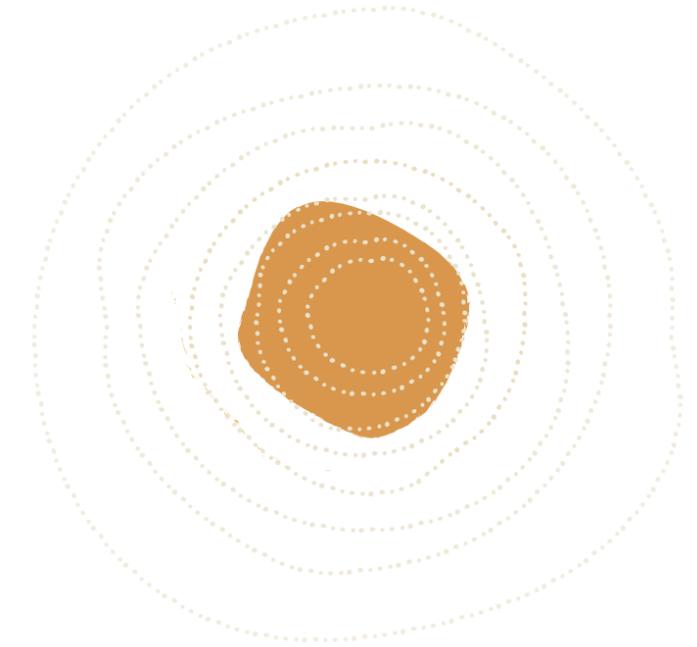
Common graph use cases

Financial services
- Money laundering
- Money mule detection
- Real-time fraud detection

Government
- Tax fraud
- Criminal investigation
- Contact tracing

Marketing
- Customer-360 degrees analysis
- Product recommendations
- Social media analysis

Manufacturing
- Bill of materials
- Traceability
- Master data management

Data regulation and privacy
- GDPR
- Data privacy
- Cyber security

AI and Machine Learning Research
- Feature engineering
- Graph neural networks

Read the full ebook for more information

Summary

Graph databases are powerful tools. By representing transactional and data warehouse data as a graph database, it is easier to use graph analytics, which offer new insights into data relationships, dependencies, and behavioral patterns, among other areas.

Graph Studio in Oracle Autonomous Database offers next-generation capabilities in the world of graph analysis, including:

- End-to-end tooling
- Graph Studio to model, manage and query graphs
- Notebook UI for interactive visualization and analysis
- Scalable, parallel in-memory processing with over 60 pre-built graph algorithms
- PGQL as a pattern matching query language
- Secure and scalable graph storage
- Ease of management, with self-driving, self-securing, self-repairing capabilities from Oracle Autonomous Database

Get started

Start experimenting and see what graphs can do with you, by trying a free workshop.

Or learn more, connect, and visit us online by viewing data sheets, FAQs, pricing, and additional resources.

Sign up for a free trial at Oracle Cloud, or purchase a subscription and get started by visiting the Oracle Help Center.

ORACLE

Connect with us

Call **+1.800.ORACLE1** or visit **oracle.com**. Outside North America,
find your local office at: **oracle.com/contact**.

f facebook.com/oracle

▶ youtube.com/oracle

in linkedin.com/company/oracle

▼ twitter.com/oracle

Disclaimer: If you are unsure whether your data sheet needs a disclaimer, read the revenue recognition policy.
If you have further questions about your content and the disclaimer requirements, e-mail REVREC_US@oracle.com.