

Oracle

“A relational database is a type of database that stores and provides access to data points that are related to one another. Relational databases are based on the relational model, an intuitive, straightforward way of representing data in tables. In a relational database, each row in the table is a record with a unique ID called the key. The columns of the table hold attributes of the data, and each record usually has a value for each attribute, making it easy to establish the relationships among data points.”





Main concepts

Information for operations

SQL or Structured Query Language



Agenda

**Getting to Know Relational
Databases**

**Understanding How Relational
Databases Work**

Learning SQL

**Understanding Advanced
Capabilities**



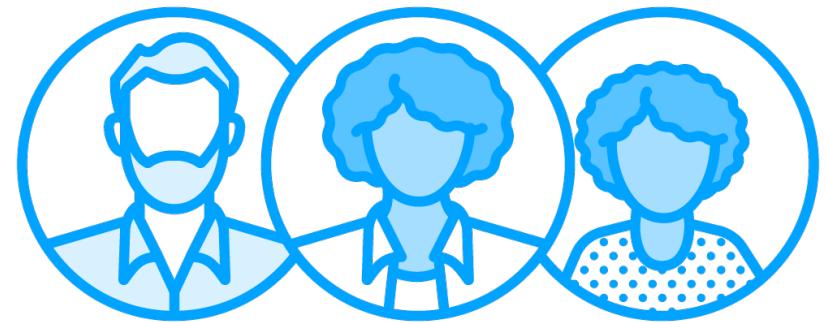


PostgreSQL

Version is 15.2



The Course Details



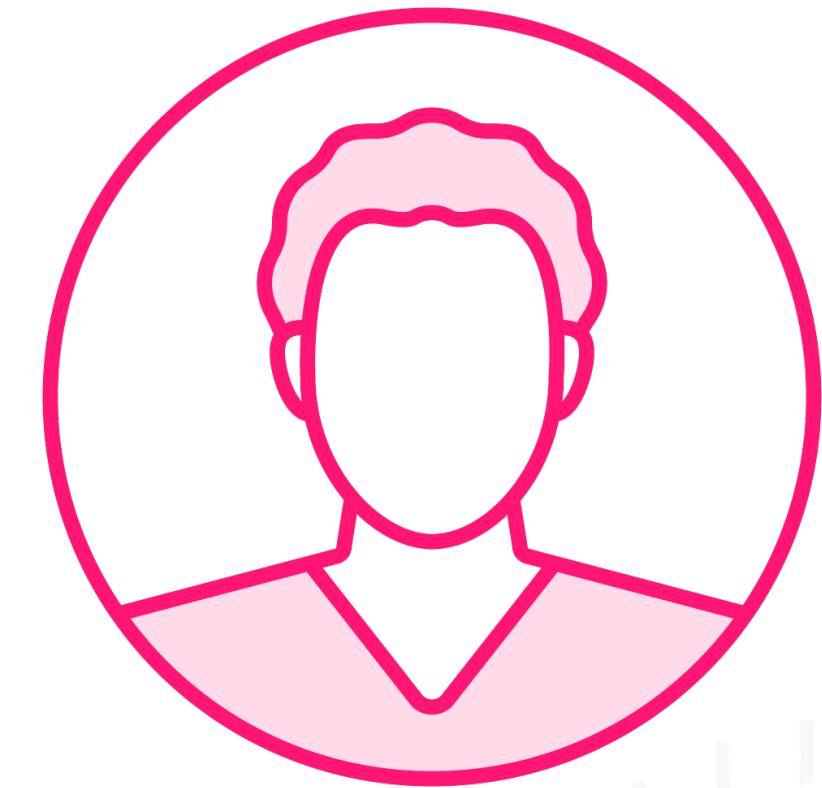
Audience



Basic principles



**What Is
Programming?**



My background



Fundamentals of Relational Databases



A Relational Model of Data for Large Shared Data Banks

E. F. CODD

IBM Research Laboratory, San Jose, California

Future users of large data banks must be protected from having to know how the data is organized in the machine (the internal representation). A prompting service which supplies such information is not a satisfactory solution. Activities of users at terminals and most application programs should remain unaffected when the internal representation of data is changed and even when some aspects of the external representation are changed. Changes in data representation will often be needed as a result of changes in query, update, and report traffic and natural growth in the types of stored information.

Existing noninferential, formatted data systems provide users with tree-structured files or slightly more general network models of the data. In Section 1, inadequacies of these models

The relational view (or model) of data described in Section 1 appears to be superior in several respects to the graph or network model [3, 4] presently in vogue for noninferential systems. It provides a means of describing data with its natural structure only—that is, without superimposing any additional structure for machine representation purposes. Accordingly, it provides a basis for a high level data language which will yield maximal independence between programs on the one hand and machine representation and organization of data on the other.

A further advantage of the relational view is that it forms a sound basis for treating derivability, redundancy, and consistency of relations—these are discussed in Section 2. The network model, on the other hand, has spawned a number of confusions, not the least of which is mistaking the derivation of connections for the derivation of relations (see remarks in Section 2 on the “connection trap”).

Finally, the relational view permits a clearer evaluation of the scope and logical limitations of present formatted data systems, and also the relative merits (from a logical standpoint) of competing representations of data within a single system. Examples of this clearer perspective are



Relational Database Concept

IBM resistance

IMS database



History of Relational Databases

1974
IBM
System R

1980s
Growth Industry
IBM, Sybase, Ashton-Tate and Informix

2000s
Alternatives Emerge
NoSQL and data warehouses

1977
Larry Ellison
Co-founds Oracle

1990s
New Drivers
Internet and ecommerce



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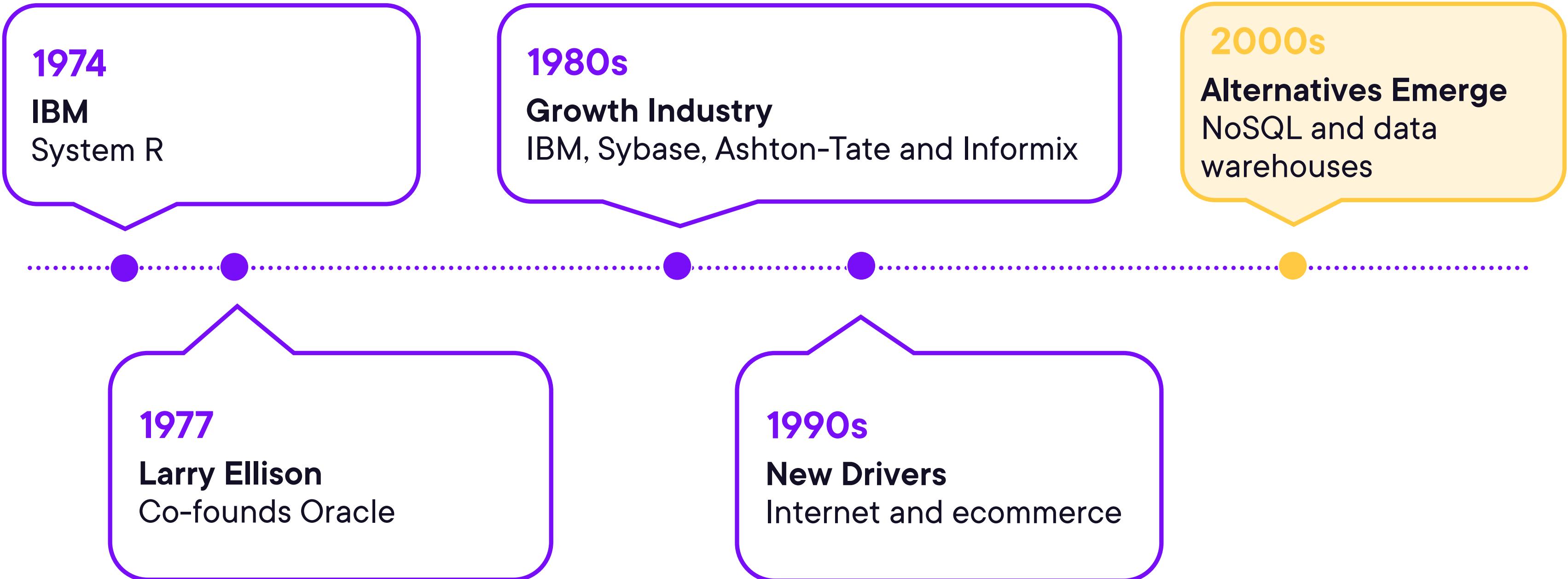
1990s

New Drivers

Internet and ecommerce



History of Relational Databases



What Is a Relational Database?

FirstName	LastName	Address	City	State
Jane	Smith	120 Lemon Street	Los Angeles	CA
Larry	Miles	400 Maple Street	New York	NY
Mary	Moore	100 Orange Street	Miami	FL
Ben	Johnson	200 Main Street	San Francisco	CA



What Is a Relational Database?

Customers Table

Cust-ID	Name	Billing Address	Shipping Address
100	Jane Smith	100 Maple Street	100 Maple Street
101	Larry Jensen	300 Orange Street	450 Main Street
102	Mary Gates	110 Lemon Street	110 Lemon Street

Orders Table

Order-ID	Order-Date	Ship-Date	Status
102	01-09-2023	01-10-2023	001
104	01-12-2023	01-12-2023	001
103	01-13-2023	01-13-2023	010
103	01-13-2023	01-14-2023	011
101	01-14-2023	01-14-2023	005



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103	01-13-2023	01-14-2023	011
101	01-14-2023	01-14-2023	005



Benefits



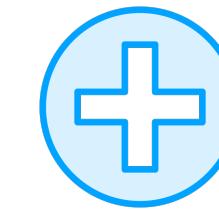
Standard approaches



Collaboration



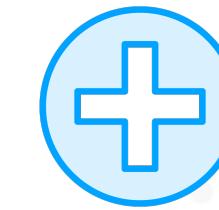
SQL



Security



Separation



Compliance



Disadvantages

Costs

Maintenance

Modern Use Cases

Unstructured Data





Types of Databases



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		REVENUES (\$M) CHANGE	REVENUE PERCENT CHANGE	PROFITS (\$M)	PROFITS PERCENT CHANGE	ASSETS (\$M)	MARKET VALUE — AS OF MARCH 31, 2022 (\$M)	CHANGE IN RANK (FULL 1000)	EMPLOYEES	CHANGE IN RANK (500 ONLY)
1	Walmart	\$572,754	2.4%	\$13,673	1.2%	\$244,860	\$409,795	-	2,300,000	-
2	Amazon	\$469,822	21.7%	\$33,364	56.4%	\$420,549	\$1,658,807.3	-	1,608,000	-
3	Apple	\$365,817	33.3%	\$94,680	64.9%	\$351,002	\$2,849,537.6	-	154,000	-
4	CVS Health	\$292,111	8.7%	\$7,910	10.2%	\$232,999	\$132,839.2	-	258,000	-
5	UnitedHealth Group	\$287,597	11.8%	\$17,285	12.2%	\$212,206	\$479,830.3	-	350,000	-
6	Exxon Mobil	\$285,640	57.4%	\$23,040	-	\$338,923	\$349,652.4	4	63,000	4
7	Berkshire Hathaway	\$276,094	12.5%	\$89,795	111.2%	\$958,784	\$779,542.3	-1	372,000	-1
8	Alphabet	\$257,637	41.2%	\$76,033	88.8%	\$359,268	\$1,842,326.1	1	156,500	1
9	McKesson	\$238,228	3.1%	\$-4,539	-604.3%	\$65,015	\$45,857.8	-2	67,500	-2



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Database

Oracle database services and products offer customers cost-optimized and high-performance versions of Oracle Database, the world's leading converged, multi-model database management system, as well as in-memory, NoSQL and MySQL databases.

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Discover the benefits of a converged database (2:49)

Oracle is a Leader in the Gartner 2022 Magic Quadrant™ for Cloud Database Management Systems

Oracle was named a Leader in the "2022 Magic Quadrant™ for Cloud Database Management Systems" and scored highest in the 2022 Gartner "Critical Capabilities for Cloud Database Management Systems for Operational Use Cases."

[Read the analyst reports](#)





24%

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20.6%





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IBM Db2

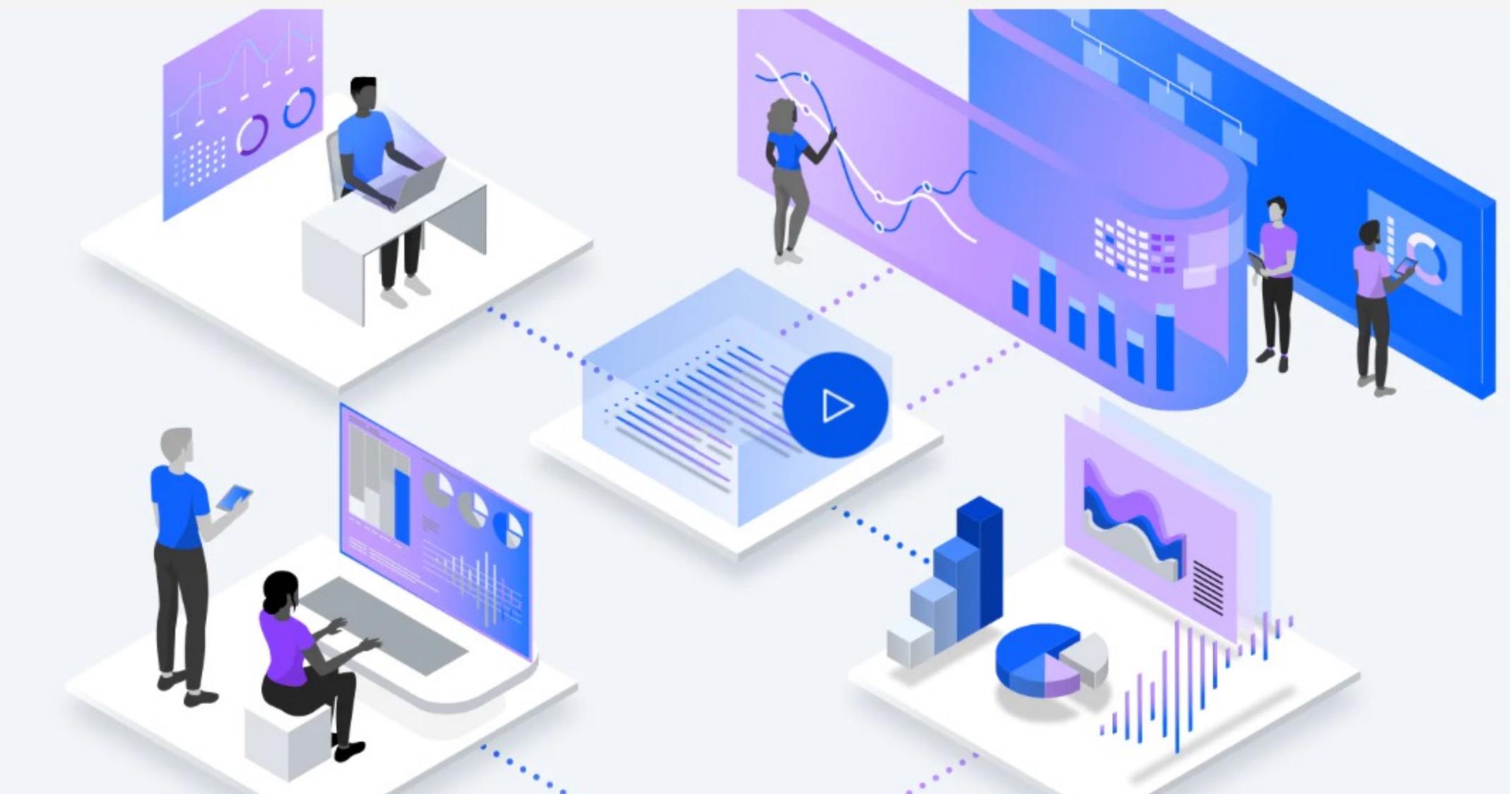
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 Watch the video (2:57)





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Press Release

Oracle Buys Sun

Oracle Corporation (NASDAQ: ORCL) and Sun Microsystems (NASDAQ: JAVA) announced today they have entered into a definitive agreement under which Oracle will acquire Sun common stock for \$9.50 per share in cash. The transaction is valued at approximately \$7.4 billion, or \$5.6 billion net of Sun's cash and debt. "We expect this acquisition to be accretive to Oracle's earnings by at least 15 cents on a non-GAAP basis in the first full year after closing. We estimate that the acquired business will contribute over \$1.5 billion to Oracle's non-GAAP operating profit in the first year, increasing to over \$2 billion in the second year. This would make the Sun acquisition more profitable in per share contribution in the first year than we had planned for the acquisitions of BEA, PeopleSoft and Siebel combined," said Oracle President Safra Catz.

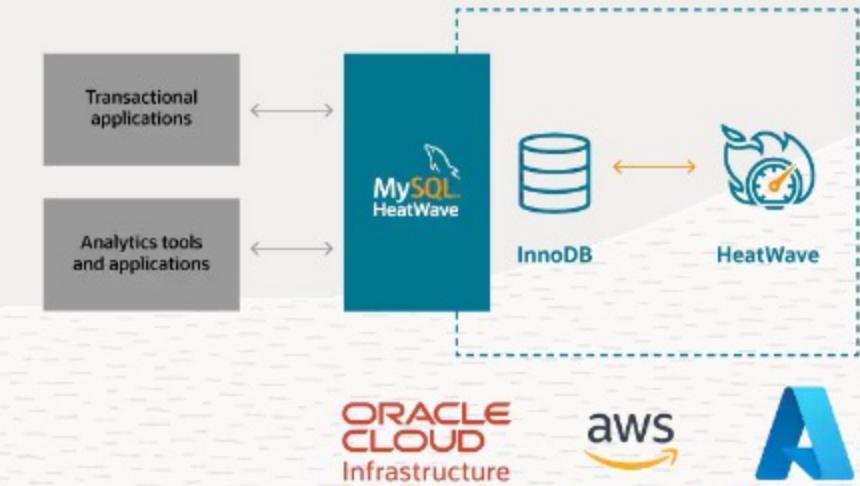
"The acquisition of Sun transforms the IT industry, combining best-in-class enterprise software and mission-critical computing systems," said Oracle CEO Larry Ellison. "Oracle will be the only company that can engineer an integrated system – applications to disk – where all the pieces fit and work together so customers do not have to do it themselves. Our customers benefit as their systems integration costs go down while system performance, reliability and security go up."

There are substantial long-term strategic customer advantages to Oracle owning two key Sun software assets: Java and Solaris. Java is one of the computer industry's best-known brands and most widely deployed technologies, and it is the most important software Oracle has ever acquired. Oracle Fusion Middleware, Oracle's fastest growing business, is built



HeatWave—In-Memory Query Accelerator with Built-in ML

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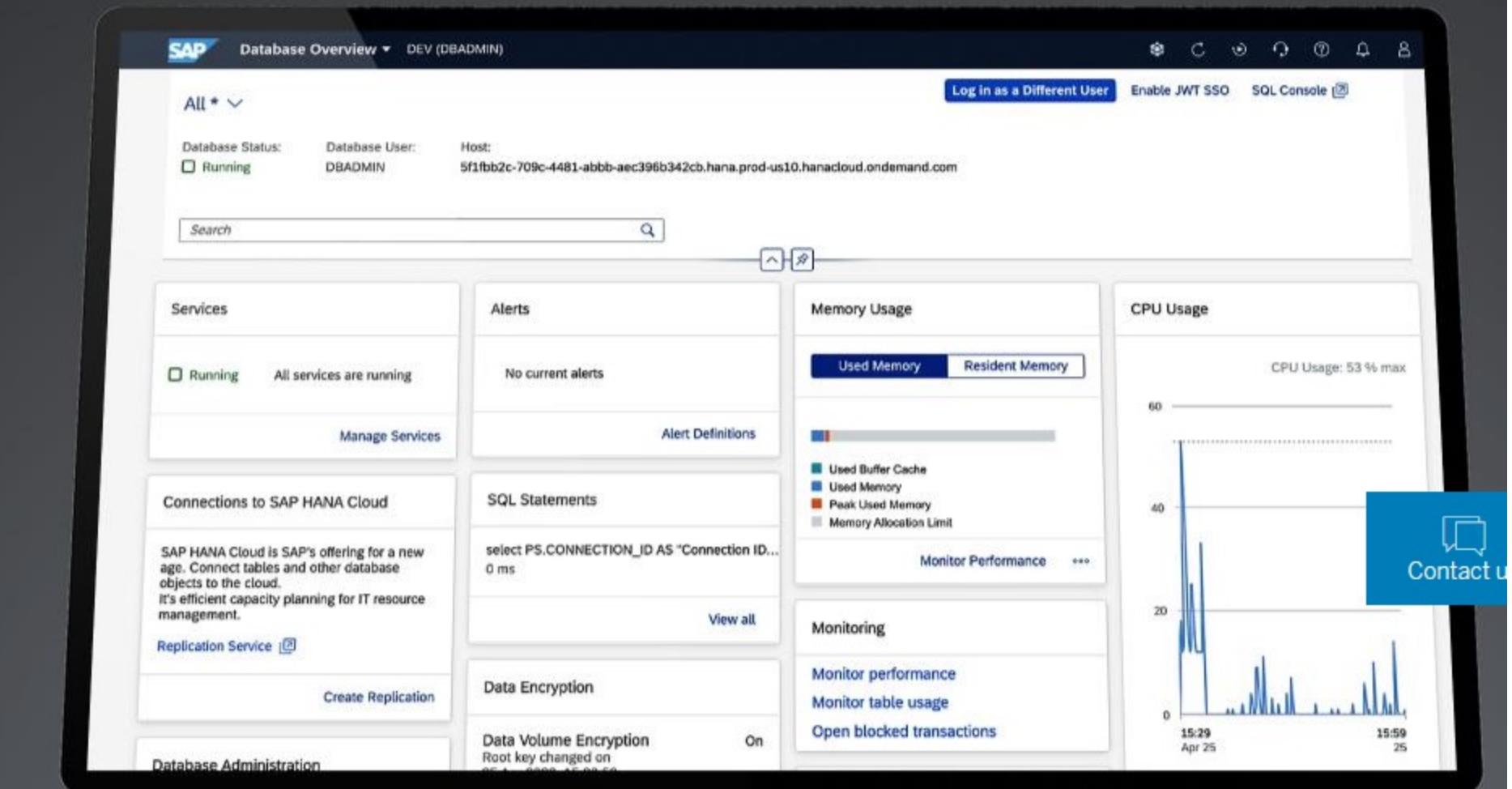
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Latest releases **11.0.1 (RC)**, **10.11.2**, **10.10.3**, **10.9.5**, **10.8.7**, **10.7.8**, **10.6.12**, **10.5.19**, **10.4.28**, **10.3.38**. Vote in our poll!



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[Learn More](#)[Feature Matrix](#)

Latest Releases

2023-02-09 - PostgreSQL 15.2, 14.7, 13.10, 12.14, and 11.19 Released!

The PostgreSQL Global Development Group has [released an update](#) to all supported versions of PostgreSQL, including 15.2, 14.7, 13.10, 12.14, and 11.19. This release closes one security vulnerability and fixes over 60 bugs reported over the last several months.

For the full list of changes, please review the [release notes](#). You can get the updates on the [download](#) page.

15.2 · 2023-02-09 · [Notes](#)

14.7 · 2023-02-09 · [Notes](#)

13.10 · 2023-02-09 · [Notes](#)

12.14 · 2023-02-09 · [Notes](#)

11.19 · 2023-02-09 · [Notes](#)





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Roles



Database Administrator (DBA)

Tasks

Skills

Background





Data analyst or business analyst

Trends and insights

Financial matters

Reports and dashboards

Business intelligence (BI) tools



Data Scientist

Role and background

**Deep learning and
neural networks**

**Analyze large
amounts of data**



Alternatives to Relational Databases





Less structure

Developer focus

Distribution

Different types



Customers

Customer Data			
ID	Name	Address	Phone
1	John Doe	123 Main St	555-1234
2	Jane Doe	456 Elm St	555-2345
3	Bob Smith	789 Oak St	555-3456
4	Susan Smith	210 Pine St	555-4567
5	David Johnson	345 Cedar St	555-5678
6	Karen Johnson	678 Birch St	555-6789
7	Michael Williams	910 Maple St	555-7890
8	Sarah Williams	112 Pine St	555-8901
9	James Miller	134 Cedar St	555-9012
10	Laura Miller	155 Birch St	555-0123

Orders

Order Details			
ID	Customer	Product	Quantity
1	1	Product A	2
2	2	Product B	3
3	3	Product C	1
4	4	Product D	4
5	5	Product E	2
6	6	Product F	3
7	7	Product G	1
8	8	Product H	5
9	9	Product I	2
10	10	Product J	4



Customers

Orders

Customers and Orders



```
{  
  "_id": 101,  
  "orderDate": "01-09-2023",  
  "customer": {  
    "custId": 1,  
    "firstName": "Jane",  
    "lastName": "Smith"  
  },  
  "address": {  
    "street": "120 Lemon Street",  
    "city": "Los Angeles",  
    "city": "California",  
  },  
  "orders": [  
    {  
      "productId": 050,  
      "price": 49.99,  
      "description": "Relational Database Book"  
    }  
  ]  
}
```



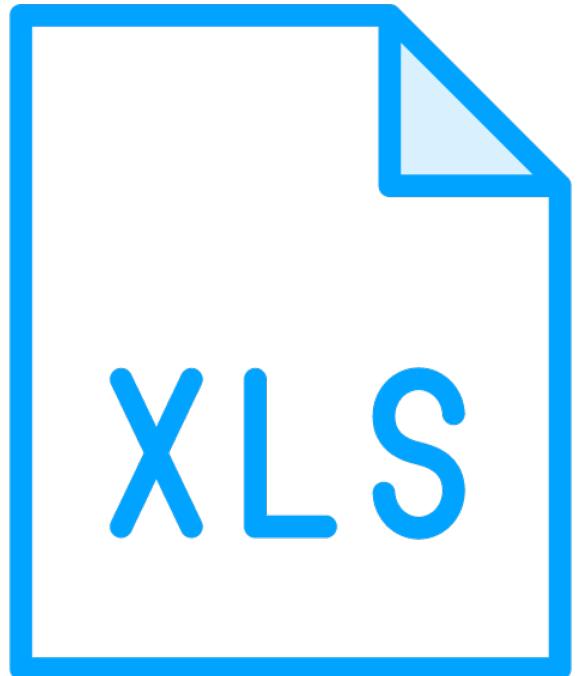
Factors for a NoSQL Database

**Enormous amounts
of data**

Unstructured data

Agile development





Functions

Similarities

Differences

Complex data requirements

Integrity



Flat-File Databases

State, Abbreviation, State Capital

Alabama, AL, Montgomery

Alaska, AK, Juneau

Arizona, AZ, Phoenix

Arkansas, AR, Little Rock

California, CA, Sacramento

Colorado, CO, Denver

Connecticut, CT, Hartford

Delaware, DE, Dover

Florida, FL, Tallahassee

Georgia, GA, Atlanta



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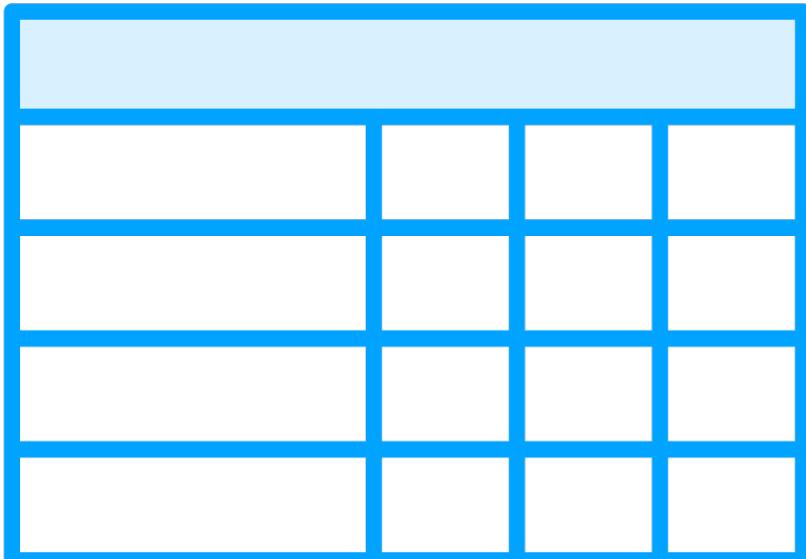
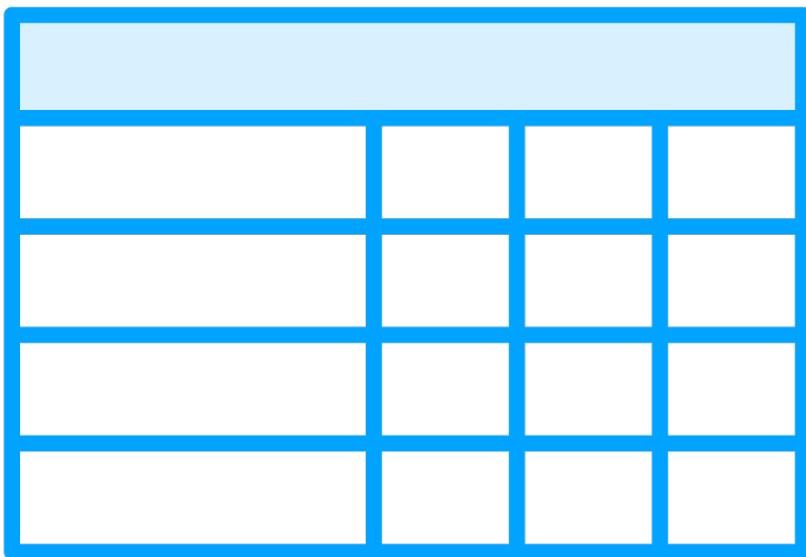
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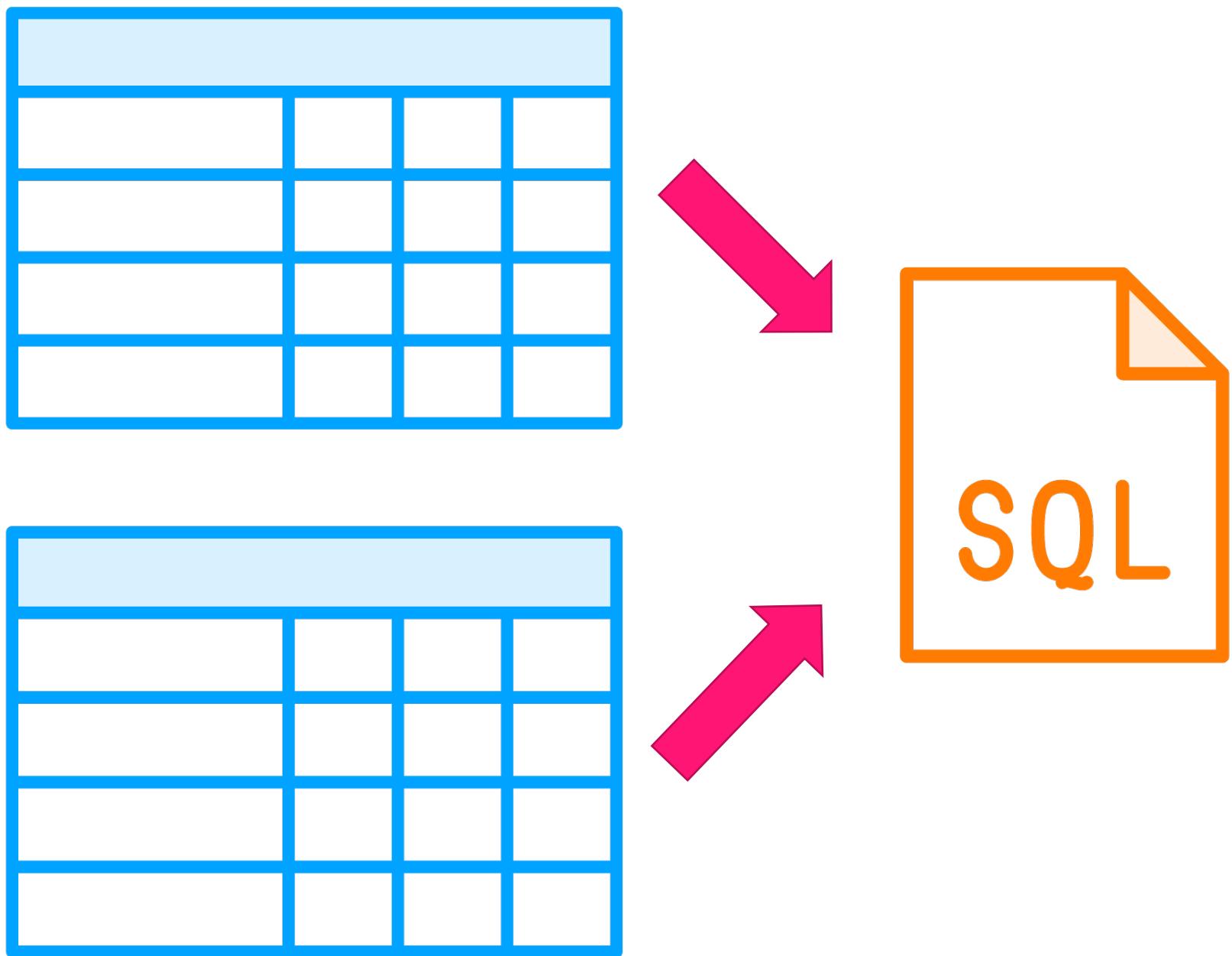
Employees		
Name	Birthday	Contact Info



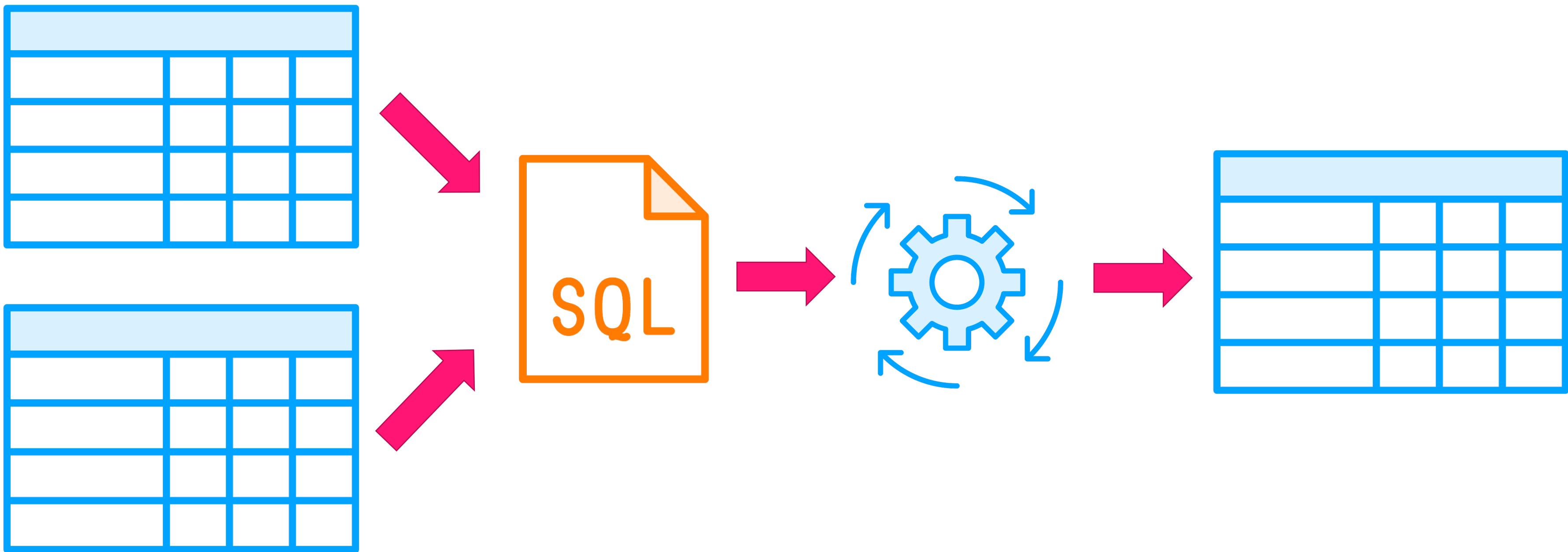
Data Warehouse



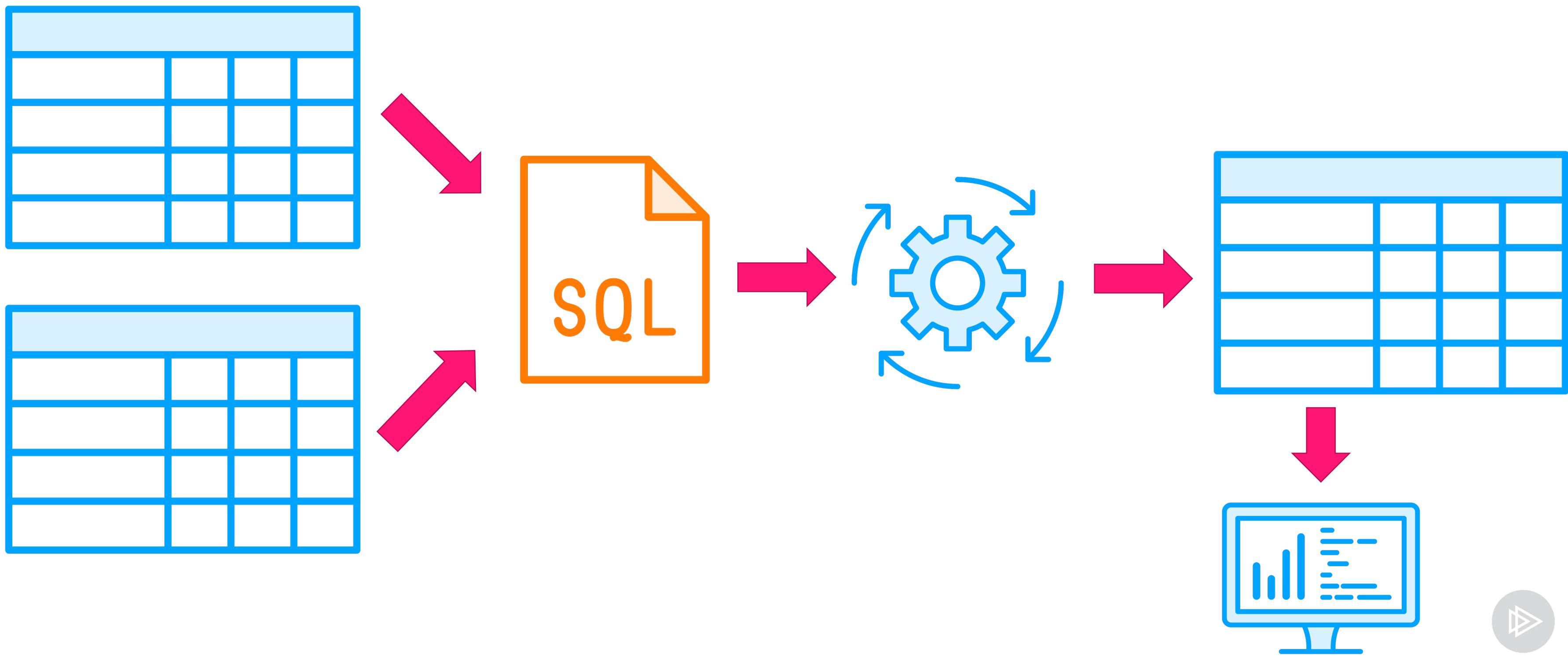
Data Warehouse



Data Warehouse



Data Warehouse



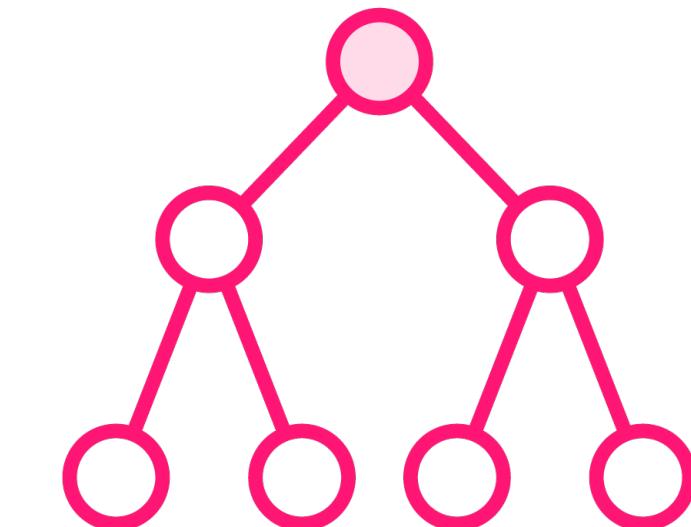
Data Lake



**Centralize all
structured and
unstructured data**



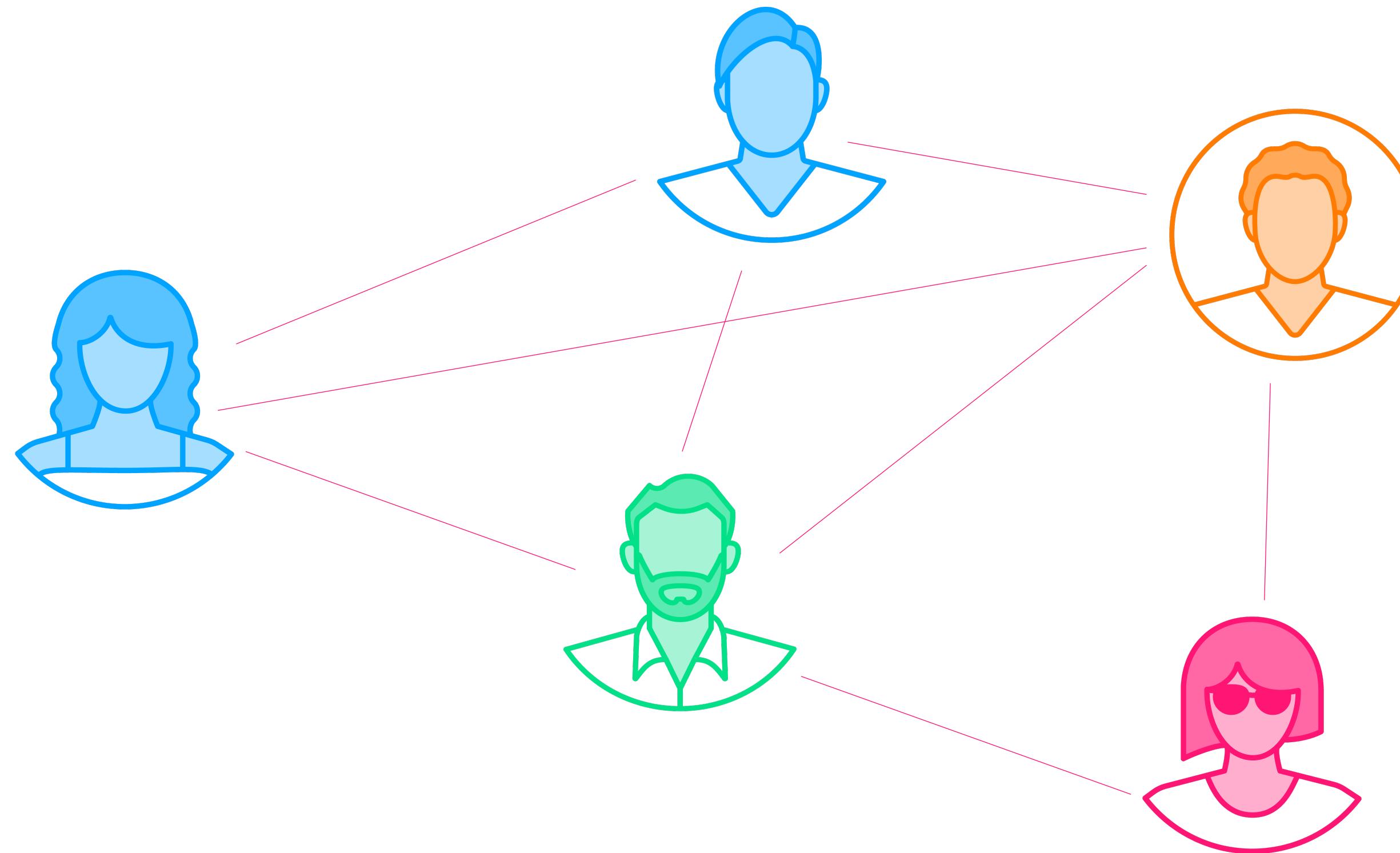
Stored "as is"



**Relational and non-
relational**



Graph Databases



Summary



Basics of relational databases

Advantages

Downsides

Types of database

Roles

Alternatives

