



Free Workshop
@ Google Meet
31 August 2025, 2 PM (UTC +7)



Data Warehouse & Business Intelligence Fundamental

/Projek DOS 
DNAStudio
Teknologi Indonesia

Tech stack:  Superset  DORIS



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(TECHNICAL CONSULTANT)

/Projek DOS

Workshop

Data Warehouse & Business Intelligence Fundamental

Unlocked data insight

Sponsored by: 
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DNA (dnastudio.co.id)

DNA help organizations turn data into decisions. By combining open-source flexibility with enterprise-grade tools, our team delivers scalable analytics and AI solutions tailored to business needs.

Backed by deep technical expertise and practical consulting experience, DNA focus on building systems that are efficient, sustainable, and truly valuable to the people who use them.

Service



Application Development

We develop apps accordingly as our clients requirements and we provides application development solution to help our client build the most efficient and flexible applications.



Training Center

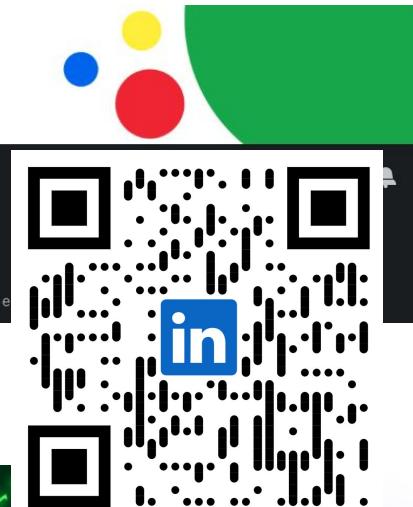
We provide various IT training services, including website programming (design and programming) and we have also held about Data Warehouse, ETL, BI, SQL and Java Technology training.

Driven by Experience



DNAStudio Teknologi Indonesia

Driven by Experience
IT Services and IT Consulting · Jakarta · 10 followers · 2-10 e



IT Expert

We provide IT Expert Services by finding and placing talented candidates that meet the standards quality to answer resource needs of the organization



Website Development

We offers a variety of website design and development services, from creating responsive website designs, to building custom e-commerce using the latest and proven web technologies.

Table of contents

- 01 Introduction
- 02 Data & Business
- 03 DWH & BI Fundamental
- 04 Data Source & Integration
- 05 Data Warehouse
- 06 Business Intelligence
- 07 Demo (Create Report & Dashboard)
- 08 Summary & Quiz



01

Introduction

Intro / Projek DOS

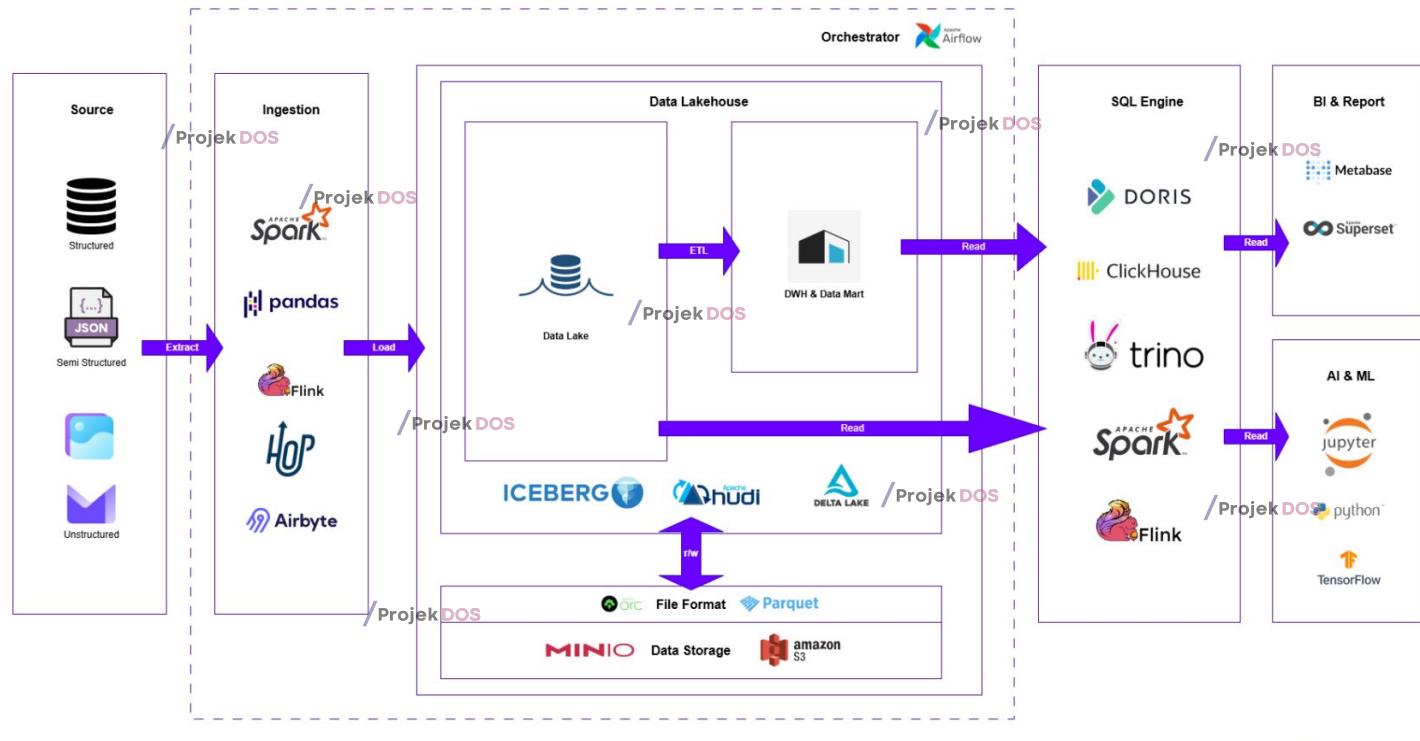
Projek DOS

Founded in 2025, Projek DOS as a **real world scenario** environments initiative currently focused education using open-source technology. The goal is to empower individuals & business to connect, networking & sharing knowledge about:

- Business Intelligence
- Data Warehouse
- Data Lake
- Blockchain
- Artificial Intelligence
- More



Tech Stack Showcase

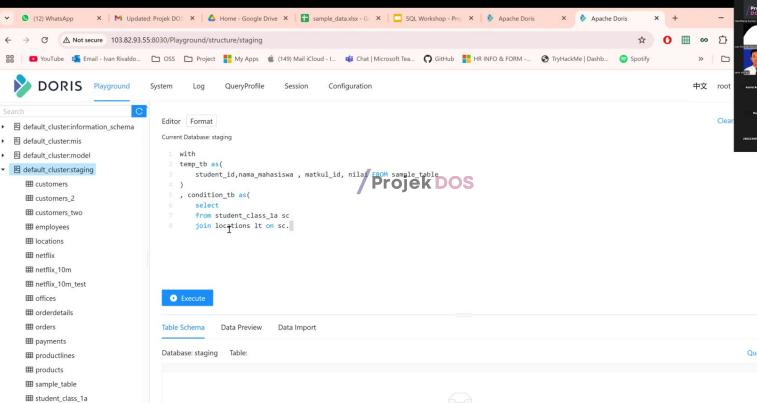


Free Education Roadmap (2025)



Initiative	Objective	Apr	May	Jul	Aug	Sep	Oct	Nov	Dec
✓ SQL	Mastering data querying, manipulation, and optimization for efficient database management								
✓ ETL	Extracting, transforming, and loading data for seamless integration and processing								
✓ Orchestrator	Managing and coordinating end-to-end data workflows automatically								
Business Intelligence	Leveraging analytics and visualization tools to drive data-driven decisions								
Near Real Time	Building Near Real Time data ingestion for advanced data solutions.								
Other	Exploring more essential technologies								

Previous Workshop - SQL (26, April 2025)



```
with
    temp_tb as(
        student_id, name Mahasiswa , matkul_id, nilai
        new sample_table
    )
, condition_tb as(
    select
        from student_class_1a
        join locations lt on sc.||
```



In this workshop, we explored key concepts of Query and hands-on SQL examples, including:

- String Manipulation
- Subquery
- CTE (Common Table Expression)
- Windowing Function

Projek DOS

Workshop Certificate

Projek Freedom Open Source certify that

Joe Doe

has successfully completed

Learn SQL Query using Apache Doris

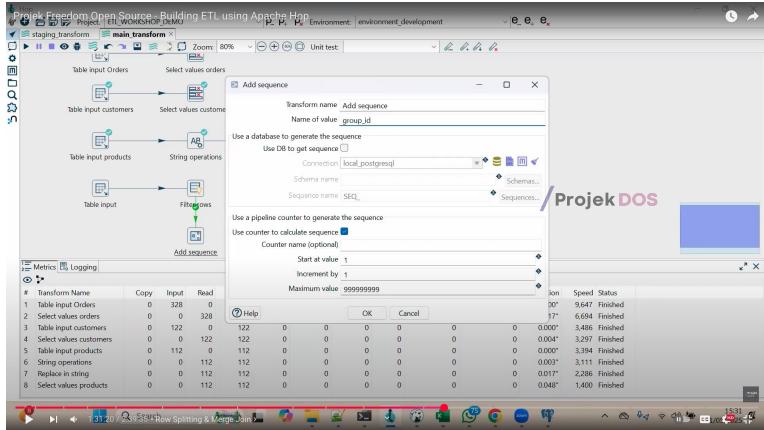
Awarded for completing the "Learn SQL using Apache Doris" workshop. This program covered SQL fundamentals and analytics using Apache Doris, equipping participants with practical skills for querying and analyzing data.

Completion Date: April 26, 2025 Expiration Date: April 26, 2026

DNAStudio DORIS Wandhana Kurnia Wandhana Kurnia has been successfully certified

Distributed by Certifier

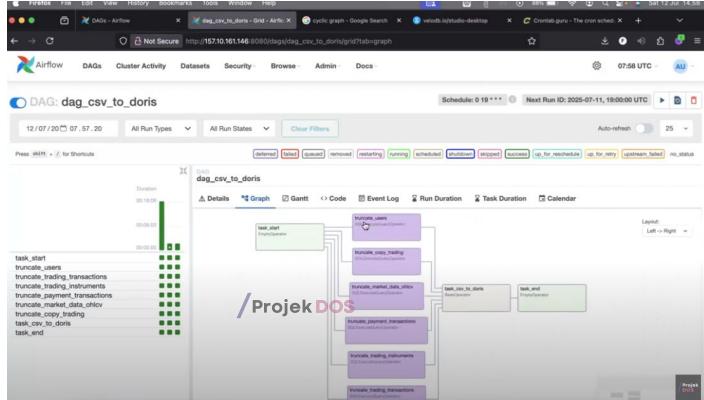
Previous Workshop - ETL (31, May 2025)



In this workshop, we explored key concepts of ETL and hands-on data transformation examples using Apache Hop, including:

- Extracting data from multiple sources
- Data Cleaning & Transformation
- Loading into target tables
- Run ETL workflows

Previous Workshop - Orchestrator (12, Jul 2025)



This hands-on session covers end-to-end orchestration with Airflow, MPP query power with Doris, and analytics using Trading Exchange use Case .

- Apache Airflow Orchestration
- Data Lake House Design
- Hands-on Data Modeling: Trading Exchange use case
- Apache Doris as Data Repository



Open Partnership & Collaborate



University

- + Hands-on training via workshops & labs.
- + Certification programs for students.
- + Support for building academic projects



Government

- + Training Program for digital and data literacy
- + Support for national/regional education initiatives.
- + Public sector upskilling & seminars.



Business

- + Custom training to upskill employees.
- + Practical sessions on trend technology stack
- + Event Workshop & Product Showcase

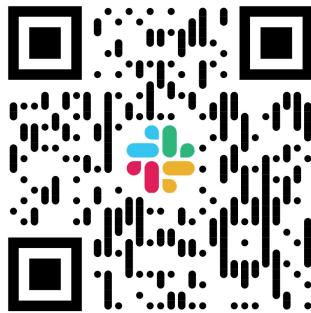


Community

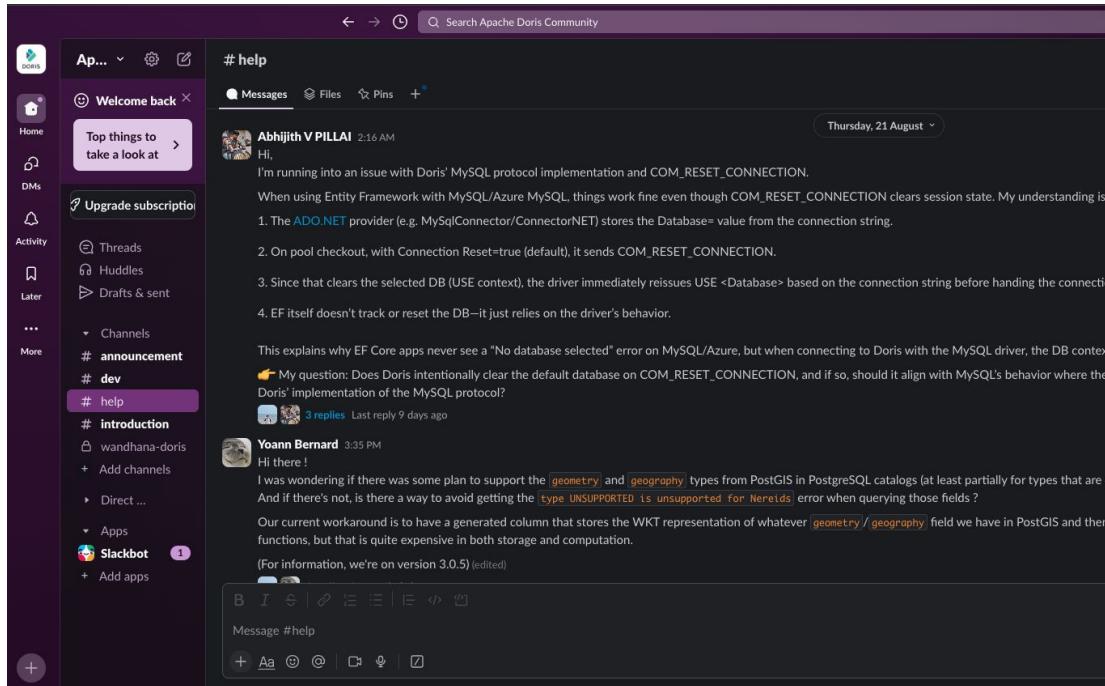
- + Organizing meetups, hackathons, & open forums
- + Support for open-source contributions & learning
- + Knowledge sharing via local tech communities



(Currently) Active Contribute & Collaborate:



[Join Slack](#)



The screenshot shows a Slack interface for the "#help" channel. The left sidebar shows various channels like "#announcement", "#dev", "#help" (which is selected), "#introduction", and "#wandhana-doris". A message from user "Abhijith V PILLAI" at 2:16 AM says: "Hi, I'm running into an issue with Doris' MySQL protocol implementation and COM_RESET_CONNECTION. When using Entity Framework with MySQL/Azure MySQL, things work fine even though COM_RESET_CONNECTION clears session state. My understanding is: 1. The ADO.NET provider (e.g. MySqlConnector/ConnectorNET) stores the Database= value from the connection string. 2. On pool checkout, with Connection Reset=true (default), it sends COM_RESET_CONNECTION. 3. Since that clears the selected DB (USE context), the driver immediately reissues USE <Database> based on the connection string before handing the connection to EF itself. 4. EF itself doesn't track or reset the DB—it just relies on the driver's behavior." Below this, another message from "Yoann Bernard" at 3:35 PM asks: "I was wondering if there was some plan to support the geometry and geography types from PostGIS in PostgreSQL catalogs (at least partially for types that are explicitly supported). And if there's not, is there a way to avoid getting the type UNSUPPORTED is unsupported for Nereids error when querying those fields ? Our current workaround is to have a generated column that stores the WKT representation of whatever geometry / geography field we have in PostGIS and then functions, but that is quite expensive in both storage and computation. (For information, we're on version 3.0.5) (edited)"

About Me - Speaker

Wandhana Kurnia

Technical Consultant with 10+ years of experience in banking and finance Industry (Indonesia, Philippines), focus on design & develop end-to-end data solutions including Data Warehouses, Data Lakes to turn data into actionable insights.



Wandhana Kurnia



[LinkedIn](#)



Fastest Growing Careers

In the next upcoming years, Job related to Data & Artificial Intelligence are the **Top Performer & Highest Demands** on Job Market.

(Source: World Economic Forum)



FIGURE 2.2

Fastest-growing and fastest-declining jobs, 2025-2030

Top jobs by fastest net growth and net decline, projected by surveyed employers

Top fastest growing jobs

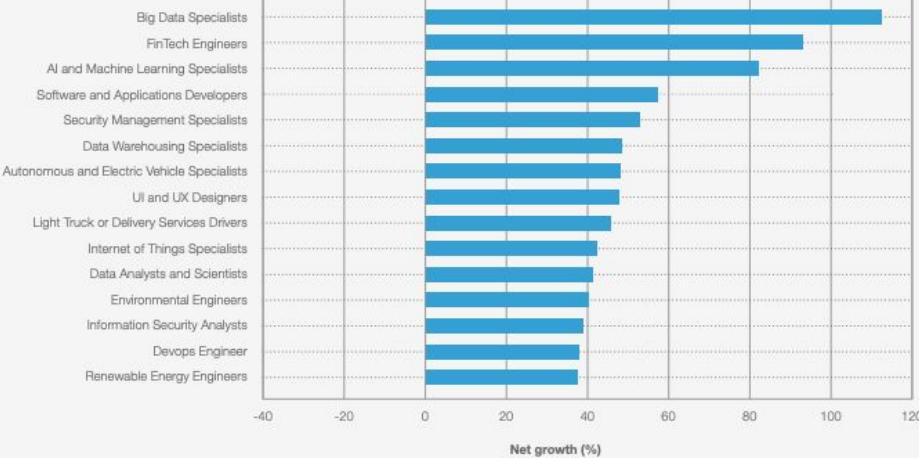


Image Credit: WEF

#1 Skills on Rise

Technological skills are projected to grow in importance more rapidly than any other type of skills. Among these, **AI and big data top the list as the fastest-growing skills**

(Source: World Economic Forum)

Reports
Published 7 January 2020

The Future of Jobs Report 2025

Download PDF 

Technological change, geographic fragmentation, economic uncertainty, demographic shifts and the green transition – individually and in combination are among the major drivers expected to shape and transform the global labour market by 2030. The Future of Jobs Report 2025 is the third edition of the annual report of the World Economic Forum, collectively representing more than 14 million workers across 22 industry clusters and 55 economies from around the world – to examine how these macrotrends impact jobs and skills, and the workforce transformation strategies employers plan to embark on in response across the 2020 to 2030 timeframe.

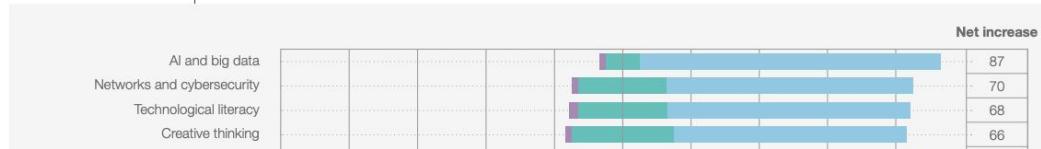


FIGURE 3.4

Skills on the rise, 2025-2030

Share of employers that consider skills to be increasing, decreasing, or remaining stable in importance. Skills are ranked based on net increase, which is the difference between the share of employers that consider a skill category to be increasing in use and those that consider it to be decreasing in use.



AI and big data top the list of fastest-growing skills, followed closely by **networks and cybersecurity** as well as **technology literacy**. Complementing these technology-related skills, **creative thinking, resilience, flexibility and agility**, along with **curiosity and lifelong learning**, are also expected to continue to rise in importance over the 2025-2030 period. Conversely, manual dexterity, endurance and precision stand out with notable net declines in skills demand, with 24% of respondents foreseeing a decrease in their importance.

Image Credit: WEF

Salary Range 😊

With **Senior/Lead/Manager Level of hands-on experience** in the data field, We are seeing competitive compensation. For example: Business Intelligence Analyst The average monthly salary typically **IDR 27,000,000,000 (even more)**, depending on the industry, experience, technical skill set, and company size.

[\(Source: michael page - Salary Guide 2025\)](#)

Technology

Salary Guide

Data below shows salary in IDR '000,000

Analytics	Average Gross Monthly Salary
Business Intelligence (BI) Analyst	27
Lead Data Analyst	30
Business Analytics Manager	39
Lead Data Engineer	42

Image Credit: Michael Page

02

Data & Business

Data making Insight

Data is just the raw material. It's a collection of facts and figures, scattered and disconnected—like loose pieces of a puzzle.

Analytics is the process of putting the puzzle together. It organizes the pieces and reveals the picture. You can see what's there and describe the scene.

Insight is understanding the story behind the puzzle. It's the moment you understand *why* the pieces fit together the way they do. With that understanding, you can predict what happens next and make smart decisions.

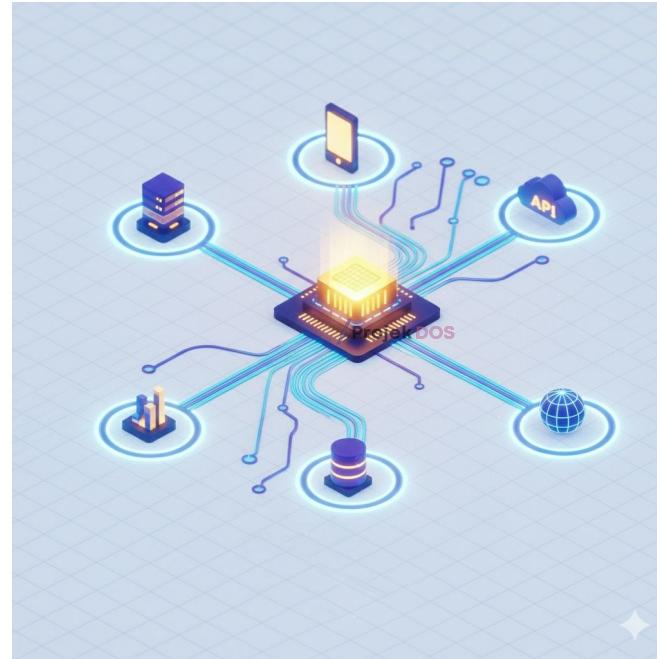
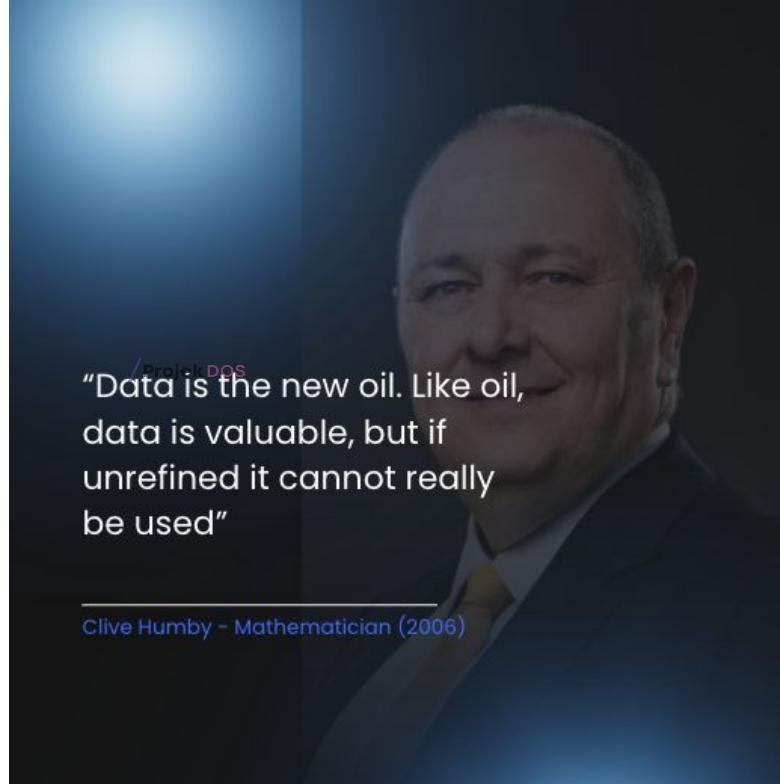


Image: Gemini AI generate (data platform)

“Data is the new Oil”

In the 21st century, data is the fuel that powers innovation, just like oil did in the industrial era. Raw data, like crude oil, has little value until it is refined.

Through analytics and business intelligence, data transforms into actionable insights that drive decisions, create new products, and unlock growth. Companies that harness data effectively dominate their markets, while those who ignore it risk being left behind.



Clive Humby - Mathematician (2006)

Support Decision Making

Raw data is valuable. When analyzed, it transforms into insight. Acting on those insights sparks meaningful actions, and those actions generate real value—higher profits, greater efficiency, and smarter, faster decisions.

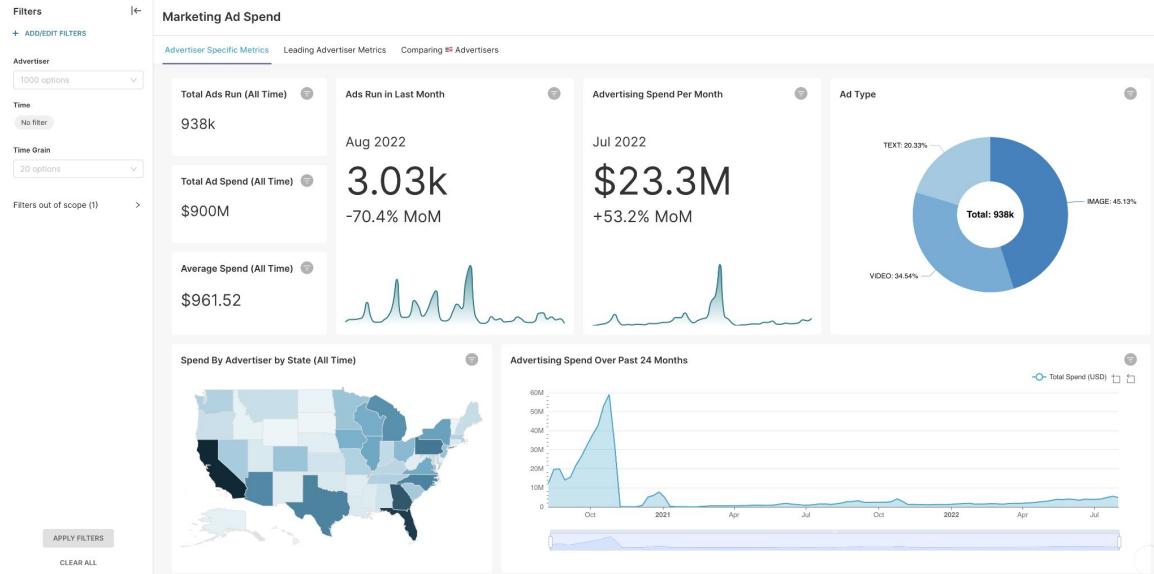


Image Credit: Preset.io

Google Map



Google monetizes Google Maps—selling advertising to local businesses and providing location-based services to enterprises.

The real product isn't the app—it's the data. Just like oil refined into fuel, data refined into insight powers entire industries.

Who use it? example:

- **Domino.** Location intelligence and routing to ensure on-time pizza delivery.
[\(source\)](#)
- **OYO Hotels.** Rich location details, maps for property booking, nearby attractions.
[\(source\)](#)
- **Tokopedia.** Address Autocomplete & validation to reduce delivery failures.
[\(source\)](#)

The screenshot shows the Google Maps Platform Pricing page. At the top, there are navigation links: Google Maps Platform, Why Google, Products, Solutions, Pricing, and Resources. A search bar and a 'C' icon are also present. Below the navigation, a banner says "Pay as you go and unlock automatic volume discounts." There are two tabs: "Product type" (which is selected) and "Use case". Under "Product type", there are four categories: Maps, Routes, Places, and Environment. The "Maps" category is selected. On the left, there's a large image of a map showing locations like Kitale, Eldoret, Nakuru, and Naivasha. To the right of the map, there's a section titled "PRODUCT TYPE" with a "Maps" icon. It describes building customized, agile experiences using Static and Dynamic maps, Street View imagery, and 360° views. To the right of this is a "MONTHLY COST CALCULATOR" box. It shows a breakdown for "Dynamic Maps": \$4,970 per month (estimate) for 1,000,000 requests, with "Included" at 0 and "10K" selected. It also includes "Standard support" which is "Free (included)" and an option to "Upgrade to Enhanced Support". A large "\$4,970" is prominently displayed at the bottom of the calculator box.

Image: Google Map Platform

Meta Ads



Meta (Facebook, Instagram) doesn't charge users. Instead, it collects massive amounts of behavioral data—likes, shares, clicks, time spent, location. This raw data is processed into detailed user profiles.

Businesses then pay Meta to target ads to highly specific audiences (e.g., Man aged 25-35 who like data and live in Jakarta'). This precision targeting drives higher ad ROI.

A screenshot of the Meta Ads landing page. The main headline reads "Your customers are here. Find them with Meta ads." Below it, a subtext says "Reach new and existing customers as they connect with people and find communities on Facebook, Instagram, Messenger and WhatsApp." At the bottom left are two buttons: "Create ad" and "Continue learning". To the right, there's a collage of mobile screens from various Meta-owned platforms: Facebook, Instagram, WhatsApp, Messenger, and Marketplace. The Marketplace screen shows a dish, while the Instagram screen shows a woman with colorful makeup.

Image: Meta Ads

UMKM (F&B)

For a **cafe & eatery**, daily data is collected from POS transactions, menu orders, and customer visits. At first, it's just raw numbers—but when analyzed, it turns into actionable insights.

For example:

- the data shows that **fried rice and iced coffee** are the top-selling items, with **peak traffic between 11:30 AM and 1:30 PM** for lunch and **6 PM to 8 PM** for dinner.
- It also reveals that rainy days reduce dine-in customers but increase **GoFood and GrabFood** orders by 40%.
- Acting on these insights, the cafe launches "**Lunch Combo Fried Rice + Iced Coffee**" promos during lunch hours, adds free delivery on rainy days, and posts Instagram stories before peak hours to boost engagement.
- As a result, sales grow by **20% in one month**, online orders surge during rainy days, and food waste drops by **25%**.



Image: Gemini AI generator (Projek Cafe)

Enterprise (Banking)

For a large enterprise like Bank, raw data comes from millions of daily transactions, loan applications, and customer profiles. Alone, it's just numbers—but analysis converts it into powerful insights.

For example:

- credit scoring use **customer income, spending habits, repayment history, and digital behavior** to predict loan default risk.
- The analysis shows that applicants with high e-commerce spending but no existing loans have a 30% higher approval success rate, **while those with frequent late utility payments carry a higher default risk.**
- Acting on these insights, the bank optimizes its loan approval process, **speeding up low-risk approvals and rejecting high-risk profiles automatically.**
- This results in faster loan disbursement for **good customers**, a 20% reduction in NPL (Non-Performing Loans), and improved profitability.



Image Credit: Bank Of America (Fortune)

03

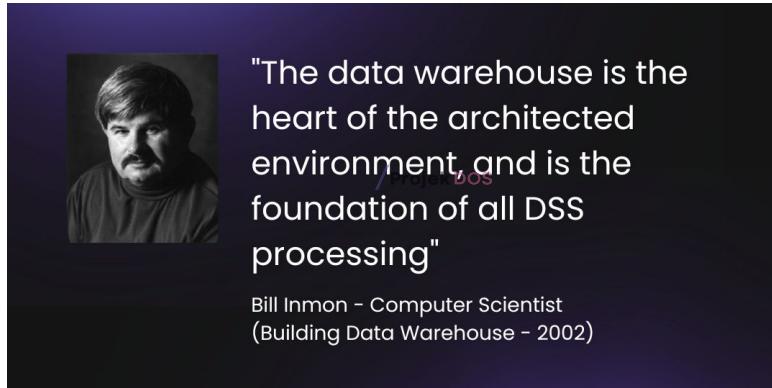
DWH & BI Fundamental

Data Warehouse

In a business, data comes from many sources—sales systems, apps, websites, finance systems. If every department keeps its own data, it becomes **inconsistent, and hard to analyze.**

That's why we use a **Data Warehouse**: "is a system used for *reporting* and *data analysis* and is a core component of *business intelligence*.

Data warehouses are central *repositories* of data integrated from disparate sources. They store current and historical data organized in a way that is optimized for data analysis, generation of reports, and developing insights across the integrated data." (Wikipedia.)



"The data warehouse is the heart of the architected environment, and is the foundation of all DSS processing"

Bill Inmon – Computer Scientist
(Building Data Warehouse – 2002)

Data Warehouse Characteristic

A **Data Warehouse (DWH)** is not just a big database—it's designed for **analytics and decision-making**, not day-to-day transactions. Its characteristics make it powerful and unique:

1. **Subject-Oriented**

Focuses on business subjects like sales, finance, or customers

2. **Integrated**

Combines data from multiple sources—POS, ERP, Other Sources—into a single, consistent format

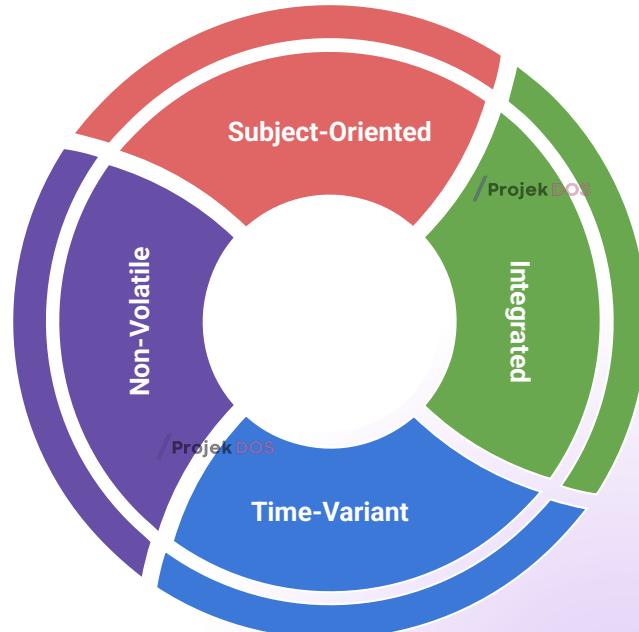
3. **Time-Variant**

Stores historical data over years, enabling trend and forecast analysis.

Example: Compare sales in 2019 vs 2025 to plan next year's inventory

4. **Non-Volatile**

Data is **read-only** for analytics; it's not updated like a transaction system.



DWH Implementation

Top-Down Approach in Data Warehousing



Business Strategy & Requirements

Establishing overall goals and strategies for data utilization.



Data Warehouse Design

Creating an **enterprise data model** to organize data effectively.



ETL Processes

Extracting, transforming, and loading data for accessibility.



Data Marts

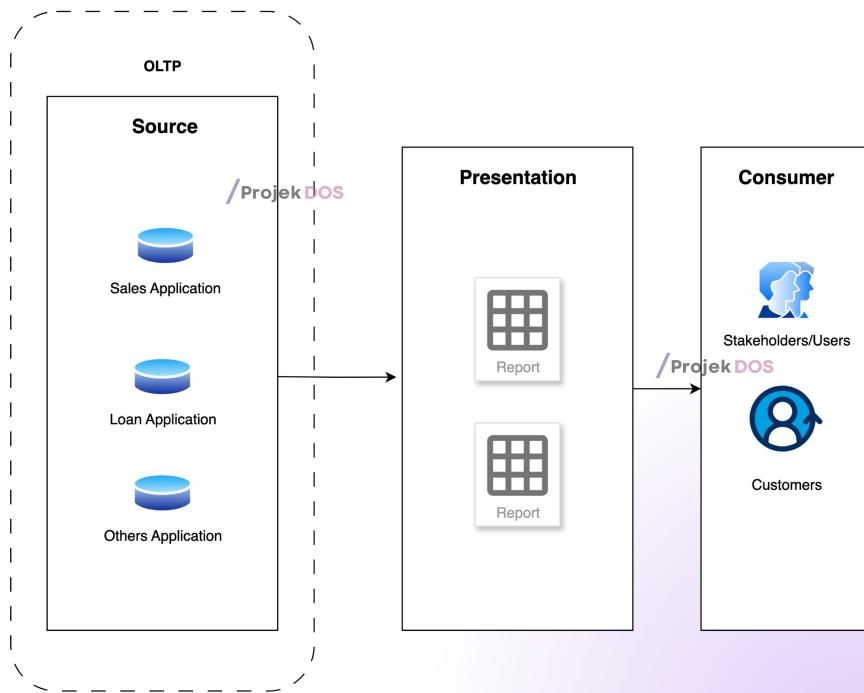
Providing tailored data access for specific departments to enhance decision-making.

Traditional System

In the early days, businesses stored and processed data in **operational systems** like **ERP, POS**. These systems were designed for **transactional processing (OLTP)**—handling daily operations such as sales, inventory, and customer transactions.

When management needed reports, data was extracted **directly from these operational databases**. This approach had several problems:

- **Performance Issues:** Running heavy reports on transactional systems slowed down daily operations.
- **Data Silos:** Each department (sales, finance, marketing) maintained its own database, leading to **inconsistent numbers** and no single source of truth.
- **Historical Data Loss:** Systems focused on current transactions, not long-term history, making **trend analysis difficult**.
- **Complex & Slow Reporting:** Reports took days or weeks to prepare because analysts had to **manually gather and reconcile data** from multiple systems.



Common Issues

Common Issues	Case
Data is Not Centralized	Data is scattered across various systems and sources, making it difficult to get a holistic view of the business
Data Inconsistency	The same data may exist in multiple locations with different formats or values, leading to inconsistencies in analysis.
Lack of Historical Data	Many systems only store current data, without maintaining historical records, making trend analysis and forecasting difficult.
Compliance and Data Governance Challenges	Ensuring that data across different sources meets regulatory and governance requirements can be difficult without a structured approach like a DWH.
Difficulty in Data Integration	Combining data from different sources, formats, and structures is time-consuming and prone to errors without a unified platform.
Limited Analytical Capabilities	Current systems may not support advanced analytics, making it difficult to derive insights from large and complex datasets.

Real Case Impact

"Sepanjang 2022 lalu, OJK telah mengenakan sanksi atas keterlambatan laporan dari 276 emiten, antara lain keterlambatan penyampaian laporan keuangan, tahunan, dan penggunaan dana dengan total denda Rp 12,44 miliar

Sementara untuk sanksi yang diberikan kepada emiten atas persoalan non keterlambatan, denda yang sebanyak Rp 21,9 miliar secara akumulasi. Adapun kasus terbanyak ialah menyangkut transaksi material. Dengan demikian, kalau dijumlahkan total OJK telah memberlakukan denda sebesar Rp 34,34 miliar." - Detik.

Source:

<https://finance.detik.com/bursa-dan-valas/d-6990849/gegara-telat-sampaikan-laporan-ke-ojk-276-emiten-kena-denda-rp-34-miliar>

Gegara Telat Sampaikan Laporan ke OJK, 276 Emiten Kena Denda Rp 34 Miliar

Shafira Cendra Arini - [detikFinance](#)

Kamis, 19 Oktober 2023 13:29 WIB



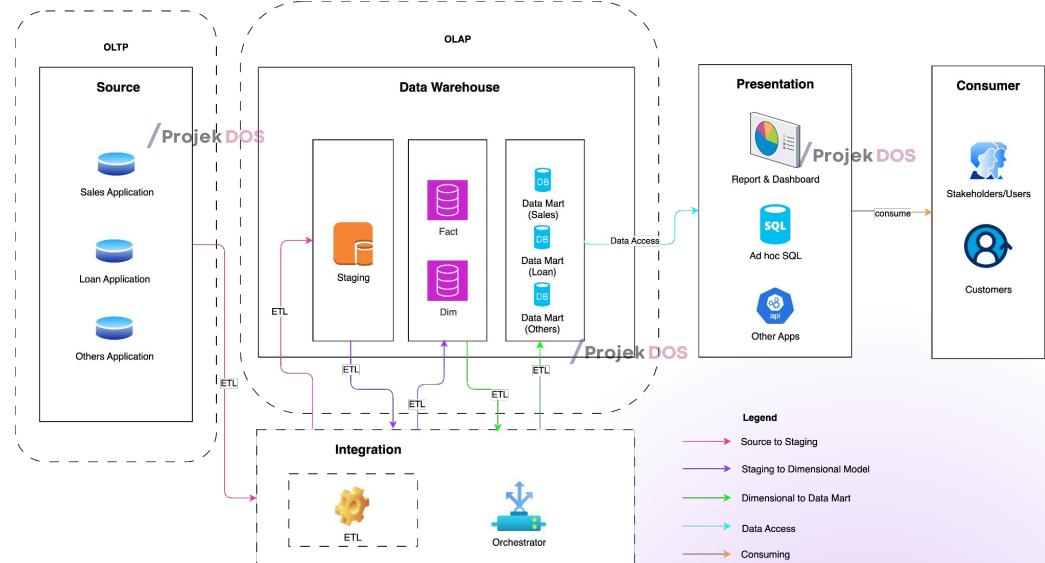
Ilustrasi Gedung OJK - Foto: Grandyos Zafna

DWH Architecture

A **Data Warehouse architecture** is the blueprint of how data flows from its source to your business dashboards. It defines how raw data is collected, transformed, stored, and delivered as insights.

A typical DWH architecture has **three main layers**:

- Source Layer (Data Sources)**
These sources produce **raw data**
- Integration Layer (ETL & Orchestrator)**
Data is cleansed, standardized **in the Data Warehouse**.
- Data Warehouse Layer**
This is the **centralized, structured repository** designed for **query performance and analytics**.
- Presentation Layer (Analytics & BI)**
This is where **business users interact** with data through dashboards, reports, and visualizations using BI tools to support Decision Making



Real World Use Case #1



NIO Inc. is a leading company in the premium smart electric vehicle market. NIO sells premium smart electric vehicles, driving innovations in autonomous driving, digital technologies, electric powertrains and batteries.

NIO use this OLAP Architecture to improve product performance, SQL protocol, system compatibility, learning and operation and maintenance costs

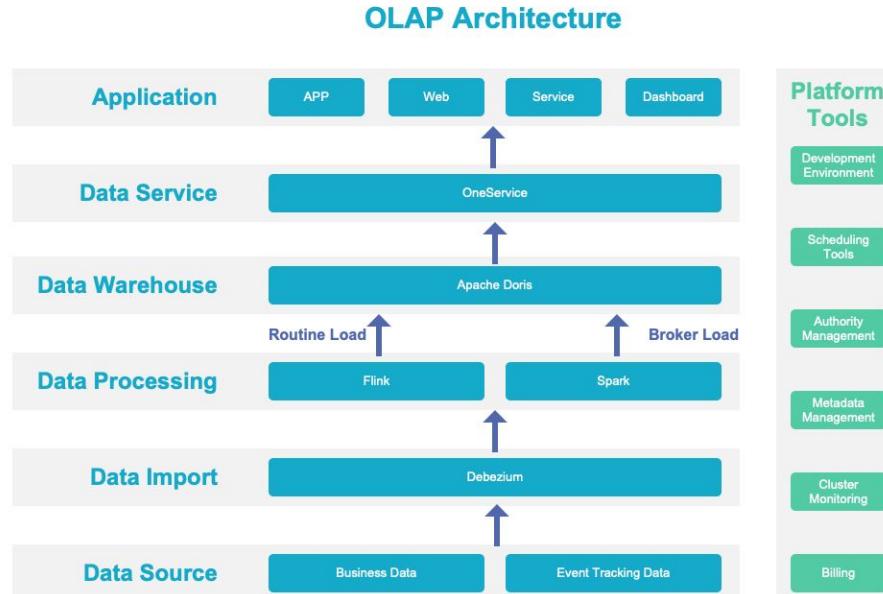


Image Credit: [Apache Doris in Nio](#)

Real World Use Case #2

Meta Platform Inc.



Meta owns and operates several prominent social media platforms and communication services, including Facebook, Instagram, Threads, Messenger and WhatsApp

By leveraging a Data Warehouse, Meta transforms raw behavioral signals into insights that fuel AI Model. In short, the Data Warehouse is Meta's engine for personalization, and monetization.

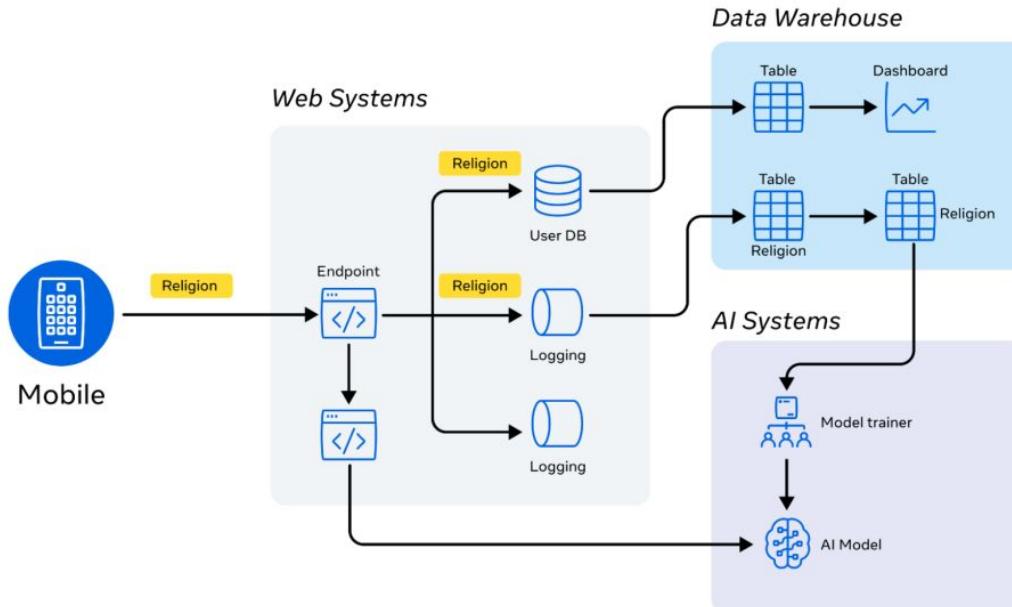


Image Credit: [Meta Engineering](#)

04

Source & Integration

Data Sources Layer

Structured Data is like a well-organized spreadsheet: rows, columns, and clearly defined types—such as customer names, sales transactions, or inventory data stored in relational databases.

Table of baby-name data
(baby-2010.csv)

name	rank	gender	year
Jacob	1	boy	2010
Isabella	1	girl	2010
Ethan	2	boy	2010
Sophia	2	girl	2010
Michael	3	boy	2010

Field names

One row (4 fields)

2000 rows all told

Image Credit: Stanford.edu

Semi-Structured Data sits in the middle. It doesn't fit neatly into rows and columns, but it still has structure—think of JSON from Application.

```
    "identification": [
4988     {
4989         "name": "PinkSale"
4990     },
4991     {
4992         "id": "fuzzybear",
4993         "symbol": "fuzzy",
4994         "name": "Fuzzybear"
4995     },
4996     {
4997         "id": "bxn",
4998         "symbol": "bxn",
4999         "name": "BXN"
5000     }
5001 ],
5002 },
5003 "market_data": [
5004     {
5005         "id": "bitcoin",
5006         "current_price": 108353,
5007         "market_cap": 215616892482,
5008         "market_cap_rank": 1,
5009         "total_volume": 22691800969,
5010         "high_24h": 109574,
5011         "low_24h": 108869,
5012     },
5013     {
5014         "id": "ethereum",
5015         "current_price": 2535.43,
```

Unstructured Data is the wild west. It has no predefined format—free-text customer reviews, audio files, videos, images, or raw log files. This kind of data needs advanced tools and processing to make sense of it.

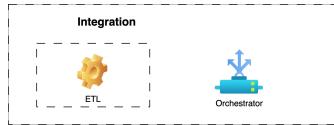
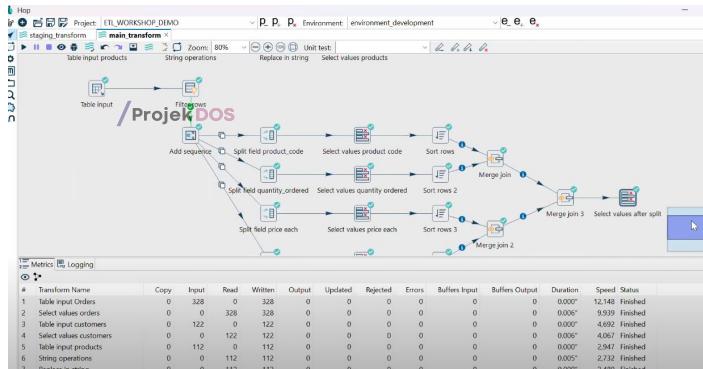
Image Credit: Airflow

Integration Layer

Before raw data can power analytics, it needs to be **clean, organized, and trustworthy**. That's where the **Integration Layer** comes in. Think of it as the **refinery** that transforms raw data into consumed-ready data.

ETL (Extract, Transform, Load)

- Extract:** Pulls data from multiple sources—databases, APIs, logs, apps.
- Transform:** Cleanses, validates, and standardizes data. For example, fixing inconsistent date formats, removing duplicates, and enriching records with additional attributes.
- Load:** Moves the refined data into the **Data Warehouse** for storage and future use.

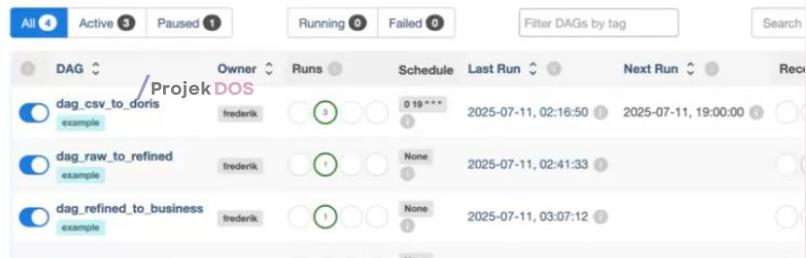


Orchestrator

ETL isn't a one-time job; it runs on schedules or triggers. Orchestration tools (like **Apache Airflow**) act like the **conductor of a data orchestration**, ensuring:

- Workflows run in the correct order (e.g., sales data before customer data joins).
- Dependencies are managed.
- Failures are detected and retried automatically.

DAGs



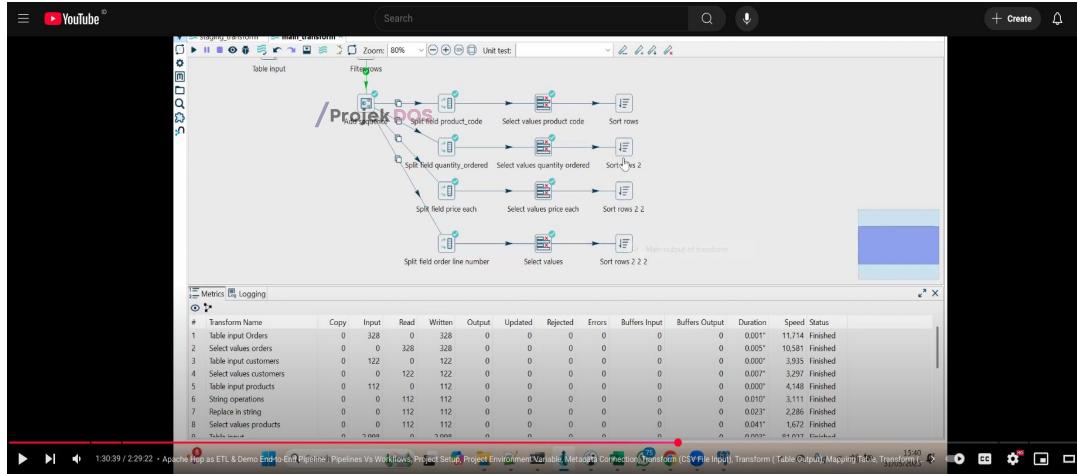
Integration - ETL (Popular)

ETL tools are well-established in the data industry. Some of the most popular and mature solutions include:

- **SQL Server Integration Services (SSIS)** – A Microsoft tool for building enterprise-level data integration and workflow solutions.
- **Apache Hop** – An open-source data orchestration and ETL platform that helps design, execute, and monitor data pipelines.
- **IBM InfoSphere DataStage** – An enterprise-grade ETL platform from IBM, designed for large-scale and complex data environments.
- **Talend Data Integration** – A widely used ETL tool for enterprise versions, known for its flexibility and wide range of connectors.
- **Apache Nifi** – An Open Source ETL solution with a graphical interface used for batch and real-time data processing.



Last ETL Workshop - Apache Hop



Learn:

- Introduction to ETL (Extract, Transform, Load) concepts
- Real-world ETL workflows and use cases
- Apache Hop overview and setup for development
- Data ingestion from CSV & Excel into PostgreSQL
- Joining and merging data from multiple file sources
- Renaming fields and applying conditional logic ("CASE WHEN")
- Grouping, sorting, cleansing, and transforming data
- Splitting multi-value fields & handling nulls and data types
- Validating records and preparing data for analytics
- Connecting Apache Hop to Apache Doris (OLAP)
- Loading transformed data into Doris with bash scripts
- Previewing dashboards using Preset (Apache Superset) on denormalized data

Projek Dos (Series) - Building ETL using Apache Hop & Doris | 2 Hours Full Workshop ([Link](#))

Integration - Orchestrator (Popular)

Most popular Open Source Orchestration tools in business :

1. **Apache Airflow** - <https://github.com/apache/airflow>
 - Most widely adopted
 - DAG-based workflows in Python.
 - Rich UI, extensible plugins
2. **Prefect (V1 OSS)** - <https://github.com/PrefectHQ/prefect>
3. **Dagster OSS** - <https://github.com/dagster-io/dagster>

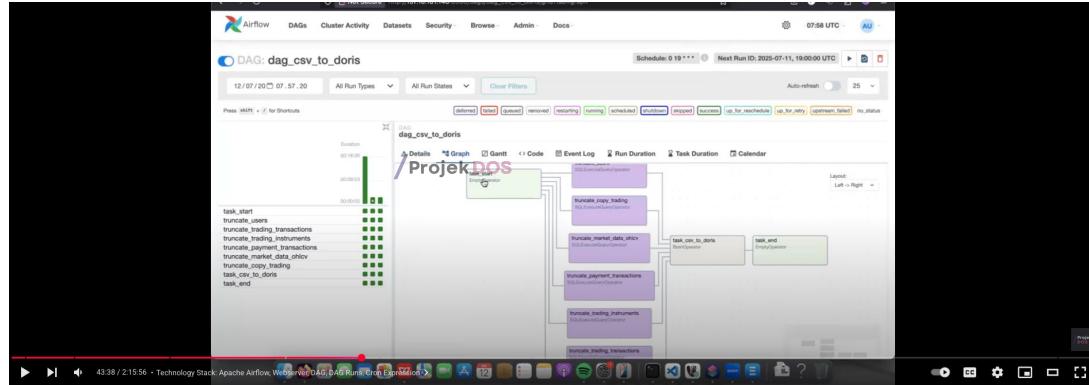


Cloud Natives:

1. AWS Step Functions
2. Google Cloud Composer (based on Airflow)
3. Azure Data Factory



Last Orchestrator Workshop - Apache Airflow



Learn:

- Apache Airflow Orchestration: DAGs, CRONs, and automation concepts from scratch
- Medallion Architecture (Raw, Refined, Business)
- Hands-on Data Modeling: Trading Exchange use case with ERD walkthrough (Crypto, Equity, Forex)
- Apache Doris & Star Schema: High-speed analytics with a scalable MPP database
- VeloDB: using VeloDB studio for accessing & building sql in Doris.
- Live Coding: Step-by-step build of a working data pipeline from ingestion to insights
- Ideal for students, early-career professionals, and tech educators across Indonesia and beyond.

Projek Dos (Series) - From Zero to Data Lakehouse: Airflow + Doris | 2 hours Full Workshop ([Link](#))

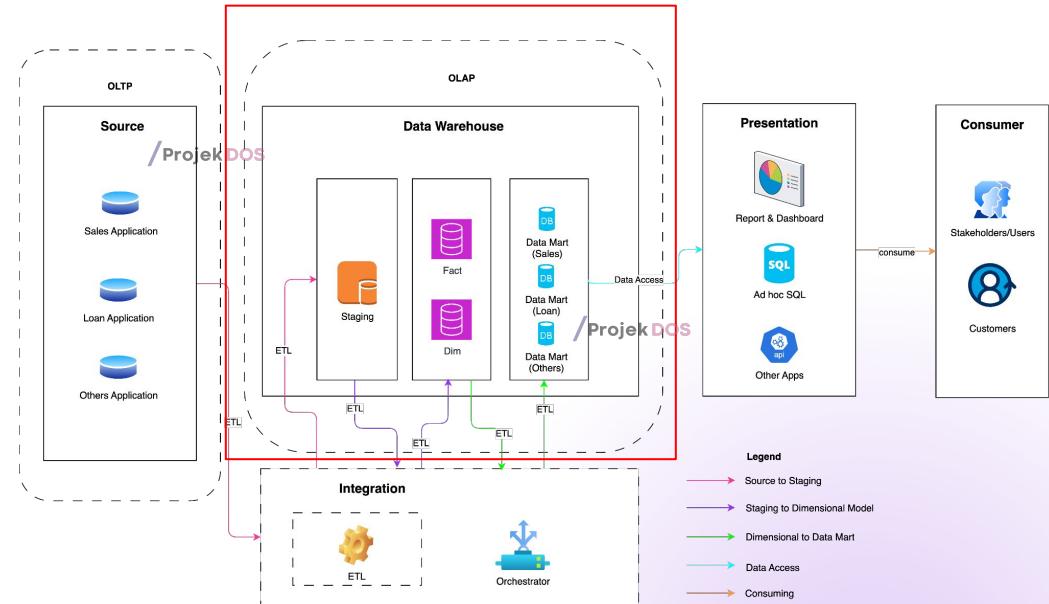
05

Data Warehouse

Data Warehouse Layer

The **Data Warehouse layer** as centralized repository that consolidates data from multiple sources into a single source of truth. It ensures consistency, accuracy, and historical tracking for analytics, compliance, and strategic decisions.

This foundation powers BI dashboards, advanced reporting, and even AI models—turning raw data into actionable insights.



DWH - Staging

Staging in a Data Warehouse is an area where raw data from multiple operational systems is first collected before being processed for analytics.

Its main purpose is to act as a landing zone for extracted data in its original or lightly transformed format. In this stage, data is validated, cleansed, and checked for duplicates or inconsistencies to ensure quality before loading into the core data warehouse.

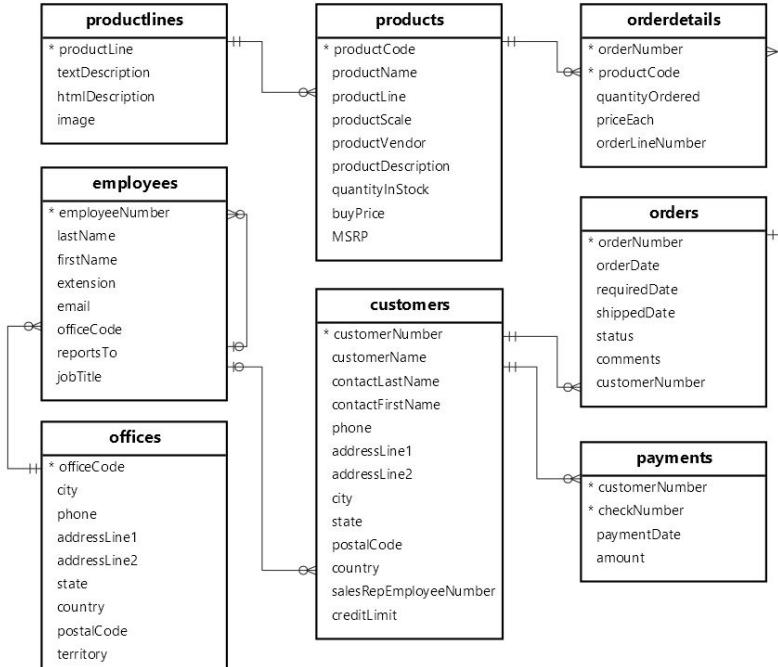
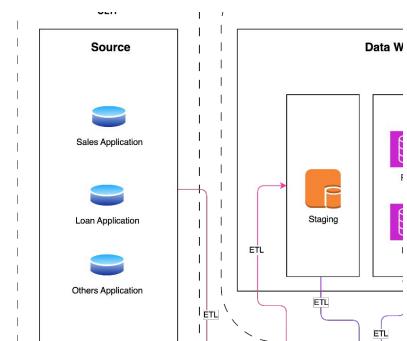


Image Credit: mysqltutorial.org

Staging - 3NF Model

Third normal form (3NF) is a level of database normalization.

Database normalization is the process of structuring a relational database in order to reduce data redundancy and improve data integrity. (wikipedia)

Staging is closely related to **3NF (Third Normal Form)** because most source systems, such as ERP or Core databases, store data in a normalized form to reduce redundancy and maintain integrity.

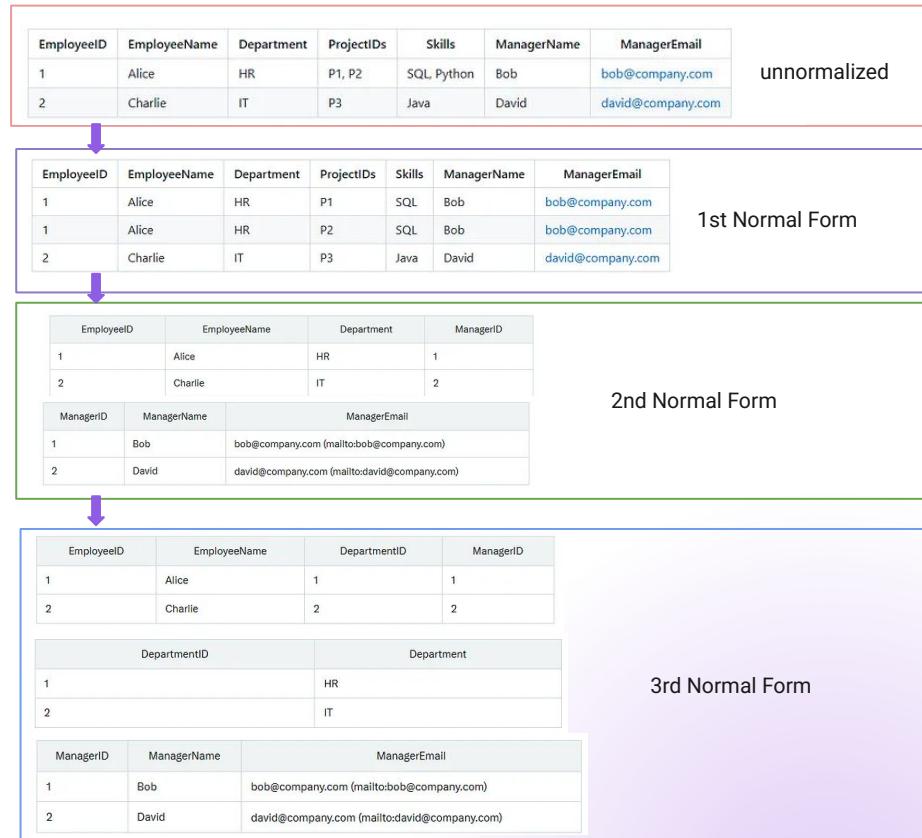
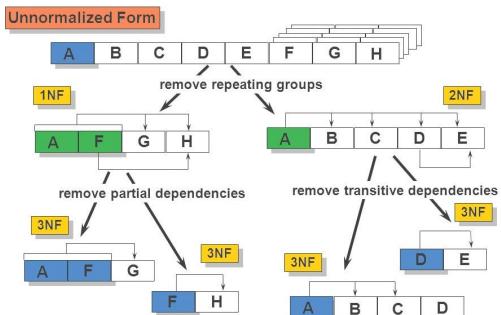


Image Credit: devgenius.io

Last SQL Workshop - Apache Doris

The screenshot shows the Apache Doris playground interface. A user named 'root' is logged in. The sidebar lists several databases: netez_tut, offices, orderdetails, orders, payments, productives, products, sample_table, and student_class_1a. The current database is 'ProjekDOS'. A query has been run successfully:

```
SELECT nama_mahasiswa, created_at, CURRENT_DATE(), NOW(), CURRENT_TIMESTAMP(),
       DATE_FORMAT(created_at, '%Y-%m-%d'),
       YEAR(created_at), MONTH(created_at), DAY(created_at),
       DATE(FROMCURRENT_DATE(), created_at),
       DATE_ADD(created_at, INTERVAL 2 DAY)
  FROM student_class_1a
```

The execution time was 12 ms. The results table displays data for student 'Nabila':

nama_mahasiswa	created_at	current_date()	now()	current_timestamp()	date_format(created_at, '%Y-%m-%d')	year(created_at)	month(created_at)	day(created_at)	datediff(current_date, created_at)
Nabila	2025-04-13 10:18:10	2025-04-26 04:26:07.930	2025-04-26 07:09:30	2025-04-26 07:09:30	2025-04-13	2025	4	13	13
	2025-04-13	2025-04-26	2025-04-26	2025-04-26 07:09:30	2025-04-13	2025	4	13	13

Learn:

- OLTP VS OLAP
- Columnar Store
- String Manipulation
- Aggregate Function
- Join (Inner Join, Left Join, Right Join, Full Outer Join, Cross Join)
- Subquery
- CTE (Common Table Expression)
- Windowing Function

Projek Dos (Series) - Learn SQL using Apache Doris | 1.5 Hours Full Workshop ([Link](#))

DWH - Dimensional Model

Dimensional models focus on process measurement events, dividing data into either measurements or the “**who, what, where, when, why, and how**” descriptive context.

Dimensional models can be referred to as star schemas, known as online analytical processing (OLAP).

Star schemas characteristically consist of fact tables linked to associated dimension tables via primary/foreign key relationships.”

Source:

<https://www.kimballgroup.com/data-warehouse-business-intelligence-resources/kimball-techniques/dimensional-modeling-techniques/star-schema-olap-cube/>

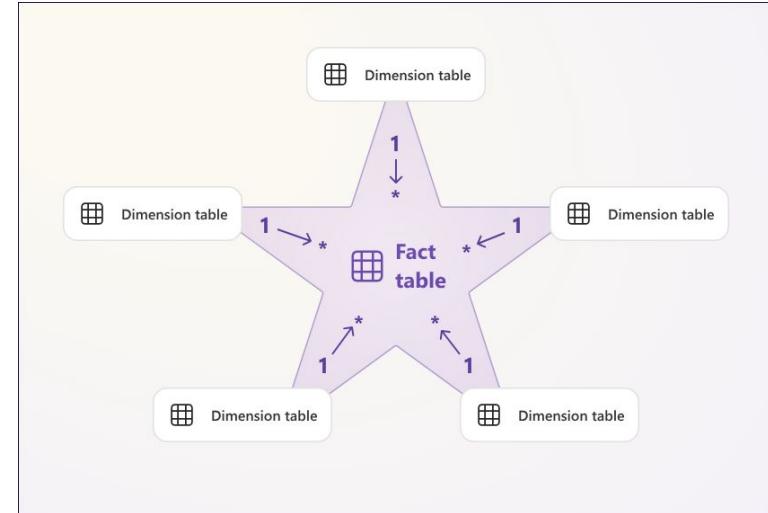
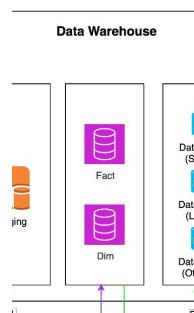


Image Credit: Microsoft

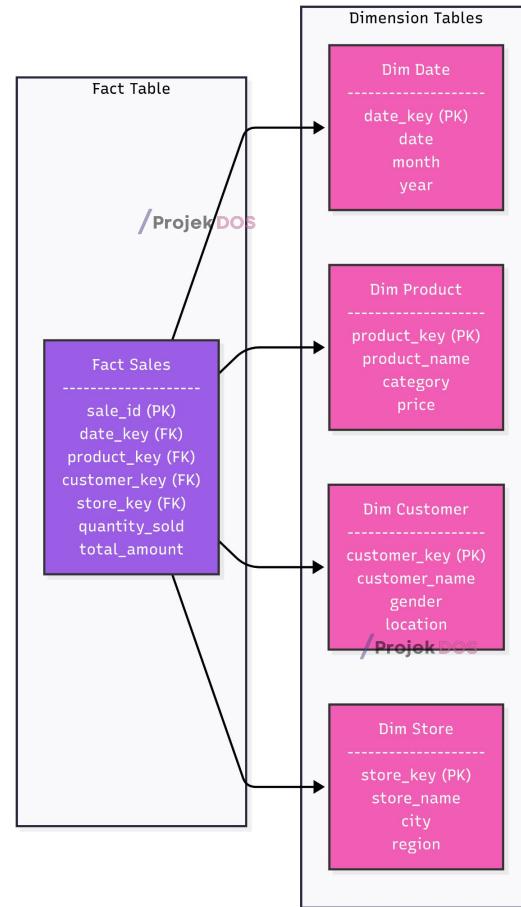
DWH - Star Schema

Star schema and its related concepts are fundamental for building BI models that deliver both speed and simplicity. The structure is purpose-built for analytics, ensuring that queries run efficiently and data is easy to interpret.

In BI tools, every visualization generates queries that typically **filter, group, and aggregate** data. A well-structured semantic model should support these operations seamlessly. The star schema design naturally aligns with this need:

- **Dimension tables** provide descriptive attributes, making filtering and grouping intuitive.
- **Fact tables** store quantitative data, enabling fast aggregation and summarization.

This approach not only optimizes query performance but also improves usability for analysts and decision-makers.



DWH - Fact Table

SaleID	DateKey	CustomerKey	StoreKey	ProductKey	SalesAmount	Quantity
1	20240101	101	201	301	150.00	2
2	20240102	102	202	302	200.00	1
3	20240103	103	203	303	75.00	3
4	20240104	104	204	304	320.00	4
5	20240105	105	205	305	500.00	5

Fact tables are the core of a dimensional model, designed to store **quantitative data about business processes or events**. These events can include **sales transactions, inventory balances, exchange rates, sensor readings, or any measurable activity**.

Unlike dimension tables, which describe entities, fact tables capture **what happened, when it happened, and how much of the measure**.

A fact table typically contains:

- **Foreign keys** that link to related **dimension tables** (e.g., DateKey, ProductKey, CustomerKey).
- **Numeric measures** or metrics (e.g., QuantitySold, Revenue, Cost).
- **Optional descriptive columns** for additional context.

DWH - Dimension Table

Dimension tables represent the descriptive context of your business—essentially the “who,” “what,” “where,” and “when” behind your data. These tables define the entities you want to analyze, such as products, customers, locations, or even abstract concepts like time.

One of the most common and critical dimensions in any star schema is the **Date Dimension**, which enables time-based analysis like trends, seasonality, and period comparisons.

Each dimension table contains:

- **A primary key** (or composite keys) that uniquely identifies each record.
- **Descriptive attributes** that provide business-friendly labels and categories, supporting **filtering, grouping, and drilling down** in reports.

Dimension tables make your BI model intuitive and powerful, turning raw numbers into meaningful, context-rich insights.

DateKey	FullDate	Day	Month	Year
20250801	2025-08-01	01	August	2025
20250802	2025-08-02	02	August	2025
20250803	2025-08-03	03	August	2025
20250804	2025-08-04	04	August	2025
20250805	2025-08-05	05	August	2025

CustomerKey	CustomerName	Gender	City	Country
201	John Doe	M	New York	USA
202	Jane Smith	F	London	UK
203	Michael Lee	M	Sydney	Australia
204	Anna Garcia	F	Madrid	Spain
205	David Kim	M	Seoul	South Korea

StoreKey	StoreName	City	State	Country
301	Central Mart	New York	NY	USA
302	Westside Shop	Los Angeles	CA	USA
303	East End Retail	London	England	UK
304	City Center Outlet	Sydney	NSW	Australia
305	Global Store	Madrid	Madrid	Spain

Slowly Changing Dimension

A Slowly Changing Dimension refers to how dimensional attributes in a data warehouse **change over time at a slower rate than fact data**. For example, a customer's address, phone number, or job title may change occasionally, but we need to decide **how to handle historical data** when these changes occur.

Types of SCD:

1. Type 0 – Retain Original

Keep the original value; no changes are tracked.

2. Type 1 – Overwrite

Update with the new value (no history kept).

3. Type 2 – Add New Row (keep changes history)

Create a new record with a version indicator or date range to preserve history.

Business intelligence often needs to **analyze past performance based on the correct historical context**. If a customer changed their region, should last year's sales reflect the old region or the new one? SCD strategies answer that.

SCD Type	Dimension Table Action	Impact on Fact Analysis
Type 0	No change to attribute value	Facts associated with attribute's original value
Type 1	Overwrite attribute value	Facts associated with attribute's current value
Type 2	Add new dimension row for profile with new attribute value	Facts associated with attribute value in effect when fact occurred
Type 3	Add new column to preserve attribute's current and prior values	Facts associated with both current and prior attribute alternative values
Type 4	Add mini-dimension table containing rapidly changing attributes	Facts associated with rapidly changing attributes in effect when fact occurred
Type 5	Add type 4 mini-dimension, along with overwritten type 1 mini-dimension key in base dimension	Facts associated with rapidly changing attributes in effect when fact occurred, plus current rapidly changing attribute values
Type 6	Add type 1 overwritten attributes to type 2 dimension row, and overwrite all prior dimension rows	Facts associated with attribute value in effect when fact occurred, plus current values
Type 7	Add type 2 dimension row with new attribute value, plus view limited to current rows and/or attribute values	Facts associated with attribute value in effect when fact occurred, plus current values



DWH - Dimension SCD Type 0

SCD Type 0 – Retain Original

In SCD Type 0, the original data never changes, even if the real-world attribute changes.

DateKey	Date	Day	Month	Year
20240101	2024-01-01	Mon	Jan	2024
20240102	2024-01-02	Tue	Jan	2024
20240103	2024-01-03	Wed <small>/Projek DOS</small>	Jan	2024
20240104	2024-01-04	Thu	Jan	2024
20240105	2024-01-05	Fri	Jan	2024
20240106	2024-01-06	Sat	Jan	2024
20240107	2024-01-07	Sun	Jan	2024
20240108	2024-01-08 <small>/Projek DOS</small>	Mon	Jan	2024
20240109	2024-01-09	Tue	Jan	2024
20240110	2024-01-10	Wed	Jan	2024

DWH - Dimension SCD Type 1

SCD Type 1 – Overwrite

In SCD Type 1, old data is overwritten. Historical values are not kept.

ProductKey	ProductName	Category	Price
101	iPhone 14	Mobile	999
102	Galaxy S22	Mobile	899
103	MacBook Air	Laptop	1299
104	Dell XPS	Laptop	1199
105	iPad Pro	Tablet	799
106	Surface Pro	Tablet	999
107	Apple Watch	Wearable	399
108	Galaxy Watch	Wearable	349
109	Pixel Phone	Mobile	799
110	Asus ZenBook	Laptop	1099

DWH - Dimension SCD Type 2

SCD Type 2 – Add New Row (Track History)

In SCD Type 2, a new row is inserted when an attribute changes, keeping history with date ranges or version indicators.

CustomerKey	CustomerName	City	StartDate	EndDate	CurrentFlag
201	John Smith	New York	2023-01-01	2024-05-10	0
202	John Smith	Los Angeles	2024-05-11	9999-12-31	1
203	Mary Johnson	Chicago	2023-03-01	9999-12-31	1
204	James Brown	Boston	2023-02-15	2024-07-20	0
205	James Brown	San Francisco	2024-07-21	9999-12-31	1
206	Patricia Miller	Miami	2023-04-10	9999-12-31	1 Projek DOS
207	Robert Wilson	Seattle	2023-05-05	9999-12-31	
208	Linda Davis	Houston	2023-06-20	9999-12-31	1
209	Michael Garcia	Austin	2023-07-10	9999-12-31	1
210	Sarah Martinez	Denver	2023-08-01	9999-12-31	1
211	David Anderson	Portland	2023-09-15	9999-12-31	1
212	Emma Thompson	Dallas	2023-10-05	9999-12-31	1
213	Paul Clark	Atlanta	2023-11-20	9999-12-31	1

DWH - Data Mart

SalesID	Date	CustomerName	CustomerCity	StoreName	StoreRegion	ProductName	Category	Quantity	UnitPrice	TotalSales	Discount	NetSales
1	2025-08-01	Alice Smith	New York	Store A	East	Laptop	Electronics	2	800	1600	100	1500
2	2025-08-02	John Doe	Chicago	Store B	Midwest	Smartphone	Electronics	1	500	500	50	450
3	2025-08-02	Mary Johnson	Boston	Store A	East	Tablet	Electronics	3	300	900	90	810
4	2025-08-03	James Brown	Dallas	Store C	South	Headphones	Accessories	4	50	200	20	180
5	2025-08-03	Linda Green	Miami	Store D	South	Camera	Electronics	1	600	600	60	540
6	2025-08-04	Michael Lee	Seattle	Store E	West	Keyboard	Accessories	2	40	80	10	70
7	2025-08-04	Susan Clark	Denver	Store F	Midwest	Monitor	Electronics	1	200	200	20	180
8	2025-08-05	Robert Davis	Los Angeles	Store G	West	Mouse	Accessories	5	25	125	15	110
9	2025-08-05	Emily White	Houston	Store H	South	Printer	Electronics	1	150	150	10	140
10	2025-08-06	David Wilson	Atlanta	Store I	East	Webcam	Accessories	2	75	150	15	135

A data mart is a denormalized, flat structure derived from a dimensional model (fact and dimension tables), built to simplify reporting for a specific business area or department.

By consolidating facts and dimensions into a single table, it reduces complexity, speeds up queries, and makes it easier for business users and BI tools to create reports and dashboards. This approach delivers quick, user-friendly access to actionable insights without requiring deep technical knowledge.

DWH - Apache Doris



“Apache Doris , Apache Doris is an MPP-based data warehouse known for its high query speed. It can be used for report analysis, ad-hoc queries, unified data warehouse, and data lake query acceleration” - Doris

<https://doris.apache.org/docs/gettingStarted/what-is-apache-doris>

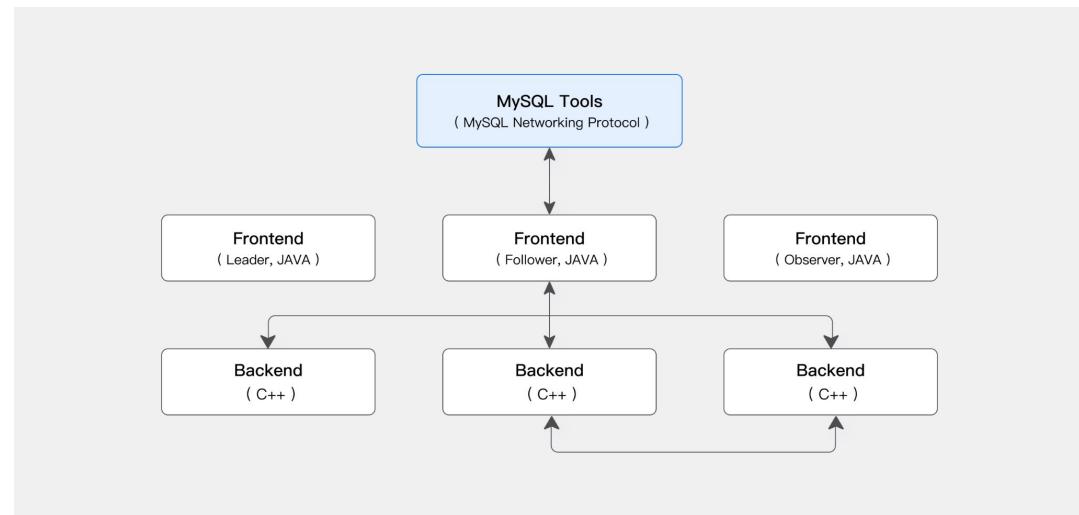
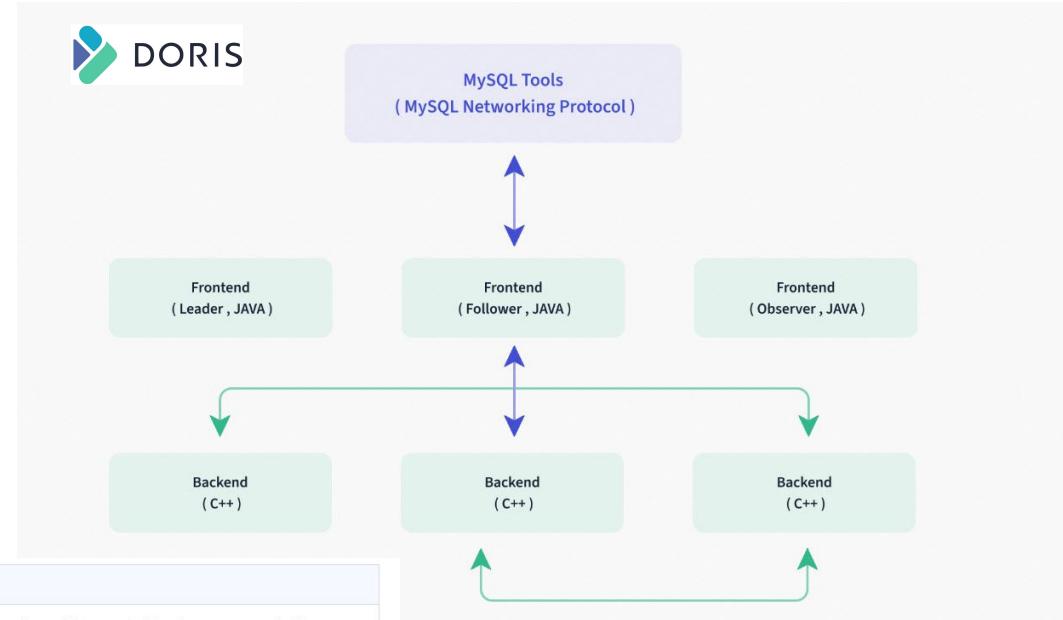


Image Credit: Apache Doris

Doris Architecture

“Architecture Apache Doris is simple and neat with only two types of processes:

- Frontend (FE): It is responsible for user request processing, query parsing and planning, metadata management, and node management.
- Backend (BE): It is used to store data and execute query plans”



Role	Function
Master	The FE Master node is responsible for metadata read and write operations. When metadata changes occur in the Master, they are synchronized to Follower or Observer nodes via the BDB JE protocol.
Follower	The Follower node is responsible for reading metadata. If the Master node fails, a Follower node can be selected as the new Master.
Observer	The Observer node is responsible for reading metadata and is mainly used to increase query concurrency. It does not participate in cluster leadership elections.

Image Credit: Alibaba

DWH Benchmark



"Benchmark Performance of Doris on the Star Schema

Benchmark (SSB) 1000GB test set. (5,999,989,709 rows)

<https://www.cs.umb.edu/~poneil/StarSchemaB.PDF>

Doris tested 13 queries on the Star Schema Benchmark

standard test dataset and result"

Q3. In our third query flight, we want to place restrictions on three dimensions, including the remaining dimension, customer. We base our query on TPCQ5. The query is intended to provide revenue volume for lineorder transactions by customer nation and supplier nation and year within a given region, in a certain time period.

Q3 select c_nation, s_nation, d_year, sum(lo_revenue)
as revenue from customer, lineorder, supplier, date

```
where lo_custkey = c_custkey  
and lo_suppkey = s_suppkey  
and lo_orderdate = d_datekey  
and c_region = 'ASIA' and s_region = 'ASIA'  
and d_year >= 1992 and d_year <= 1997  
group by c_nation, s_nation, d_year  
order by d_year asc, revenue desc;
```

Sample Q3.1

Q3.1 Q3 as written: c_region = 'ASIA' so FF = 1/5 for customer, FF = 1/5 for supplier, and 6-year period FF = 6/7 for d_year; Thus LINEORDER FF = $(1/5)*(1/5)*(6/7) = 6/175$ and the number of lineorder rows selected, for SF = 1, is $(6/175)*6,000,000 \approx 205,714$.

Hardware	Configuration Instructions
Number of Machines	4 Aliyun Virtual Machine (1FE, 3BEs)
CPU	Intel Xeon (Ice Lake) Platinum 8369B 32C
Memory	128G
Disk	Enterprise SSD (PL0)

Total: 19390 ms means all queries

combined took just under 20 seconds

to execute.

Query	Doris 2.0.15.1 (ms)	
q1.1	330	Simple Queries
q1.2	80	
q1.3	80	
q2.1	1780	Medium Complex Queries
q2.2	1970	
q2.3	1510	
q2.4	160	
q3.1	4000	More Complex Queries
q3.2	1720	
q3.3	1510	
q3.4	160	
q4.1	4010	Large Scan & Heavy Queries
q4.2	840	
q4.3	400	
Total	19390	

Image Credit: [Doris Benchmark](#)

06

Business Intelligence

Business Intelligence

“Business intelligence (BI) is a set of technological processes for collecting, managing and analyzing organizational data to yield insights that inform business strategies and operations.

Business intelligence analysts transform raw data into meaningful **insights that drive strategic decision-making within an organization**. BI tools enable business users to access different types of data, historical and current, third-party and in-house, as well as semistructured data and unstructured data such as social media. Users can analyze this information to gain insights into how the business is performing and what it should do next.” - IBM

<https://www.ibm.com/think/topics/business-intelligence>

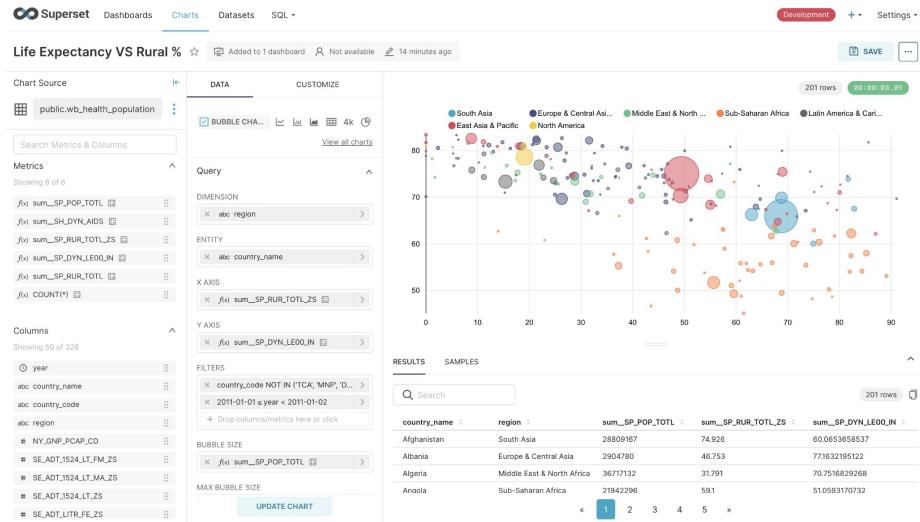


Image Credit: Apache Superset

Report & Dashboard

Reports and dashboards in Business Intelligence provide **predefined, structured views** of business data.

They are designed to track **key performance indicators (KPIs)**, monitor trends, and visualize metrics in an interactive, easy-to-understand format. Dashboards often combine **charts, graphs, and tables** to give stakeholders a quick overview of performance, helping decision-makers act fast with confidence.

Super Duper Sales Dashboard ⭐ Draft

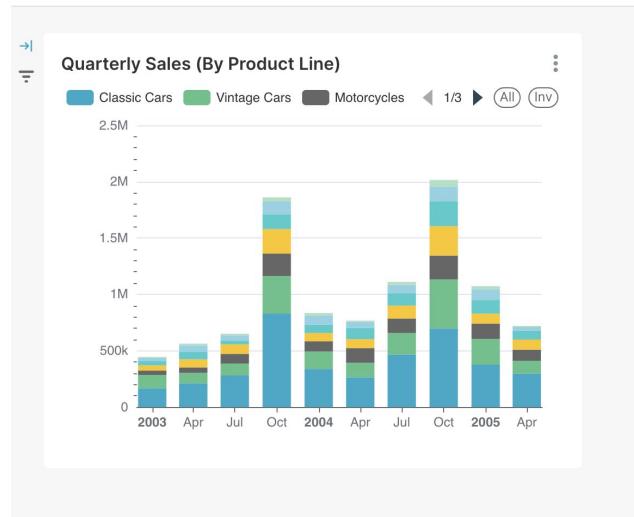
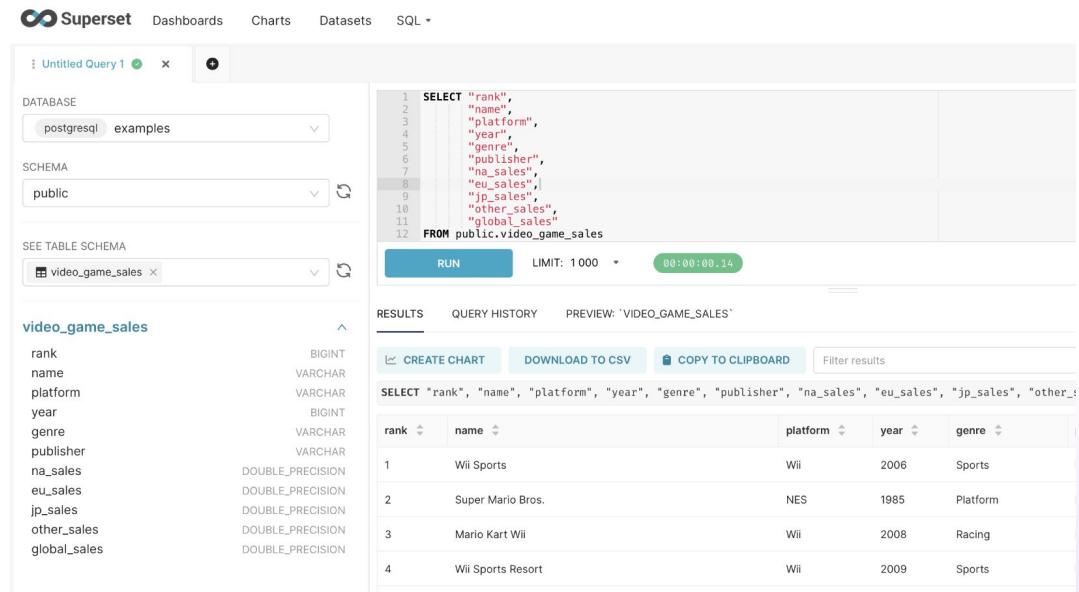


Image Credit: Apache Superset

Ad-Hoc - SQL

Ad hoc reports are **custom, on-demand queries** that allow users or analysts to answer specific business questions not covered by standard reports.

They rely heavily on **SQL queries** or similar tools to retrieve and analyze data directly from the warehouse. This approach provides **flexibility** and is ideal for **exploratory analysis**, troubleshooting, or generating **one-time insights** beyond regular dashboards.



The screenshot shows the Apache Superset web application interface. At the top, there are navigation tabs: Dashboards, Charts, Datasets, and SQL. The SQL tab is active, showing an untitled query window. The query editor contains the following SQL code:

```
1 SELECT "rank",  
2      "name",  
3      "platform",  
4      "year",  
5      "genre",  
6      "publisher",  
7      "na_sales",  
8      "eu_sales",  
9      "jp_sales",  
10     "other_sales",  
11     "global_sales"  
12 FROM public.video_game_sales
```

Below the code, there are buttons for RUN, LIMIT: 1000, and a timestamp of 00:00:00.14. The results section shows a table with the following data:

rank	name	platform	year	genre
1	Wii Sports	Wii	2006	Sports
2	Super Mario Bros.	NES	1985	Platform
3	Mario Kart Wii	Wii	2008	Racing
4	Wii Sports Resort	Wii	2009	Sports

Image Credit: Apache Superset

Apache Superset



Superset

Superset is a modern data exploration and data visualization platform.
Superset can replace or augment proprietary business intelligence tools for many teams. Superset integrates well with a variety of data sources.

Superset provides:

- A no-code interface for building charts quickly
- A powerful, web-based SQL Editor for advanced querying
- A lightweight semantic layer for quickly defining custom dimensions and metrics
- Out of the box support for nearly any SQL database or data engine
- A wide array of beautiful visualizations to showcase your data, ranging from simple bar charts to geospatial visualizations
- Lightweight, configurable caching layer to help ease database load
- Highly extensible security roles and authentication options
- An API for programmatic customization
- A cloud-native architecture designed from the ground up for scale

<https://superset.apache.org/docs/intro>

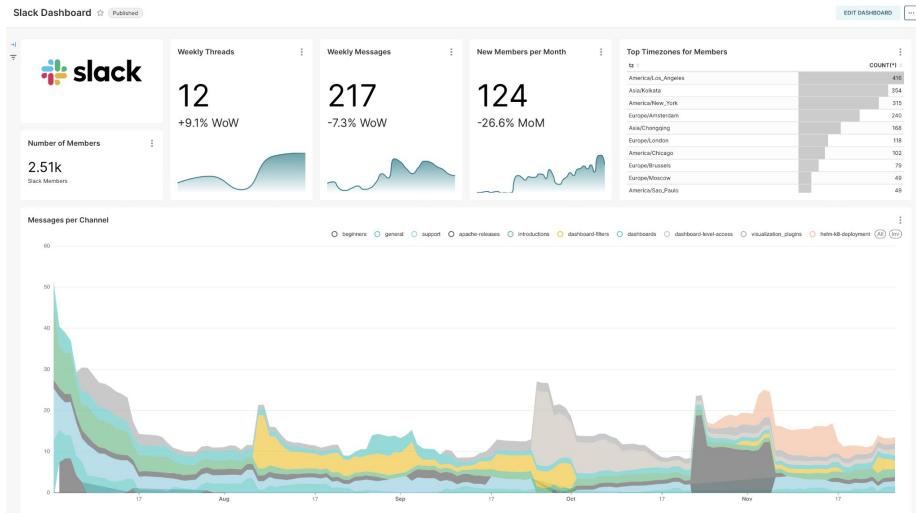
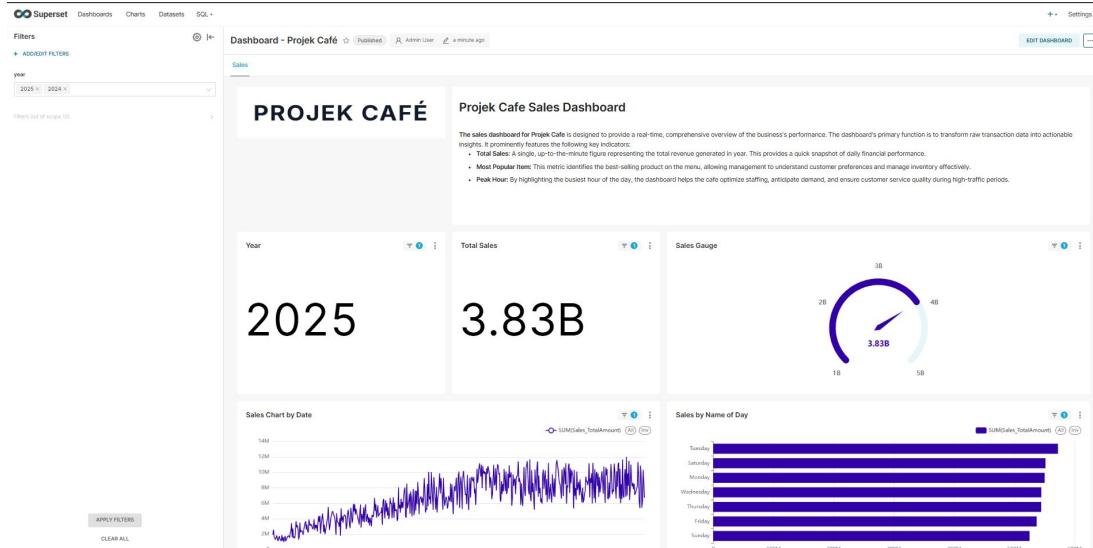


Image Credit: Apache Superset

7. Demo (Create Report & Dashboard)



08

Summary & Quiz

Summary

Participants have learned the fundamentals of **Data Warehousing** and **Business Intelligence**, including why data warehouses exist, their key characteristics, and how they differ from traditional systems.

We explored **data types** (structured, semi-structured, unstructured), **data warehouse architecture layers** (Source, Integration, Warehouse, Presentation), and important design concepts like **staging**, **ETL**, **orchestration**, and the **Star Schema** with **Fact** and **Dimension tables**. Finally, they understood how these elements support analytics, reporting, and decision-making in modern businesses.



Quiz



- URL: <https://github.com/projekdos>
- Repository: [dwhbi_workshop_superset_doris_batch1](#)
- Read the Instruction (Mapping file)
- Solve & Build

Please submit the result to :

1. info@projekdos.com , or
2. projek.freedomopensource@gmail.com

Total 2 winners will get Free Merchandise from us!



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- + [Apache Doris](#) as a high-performance analytical engine.

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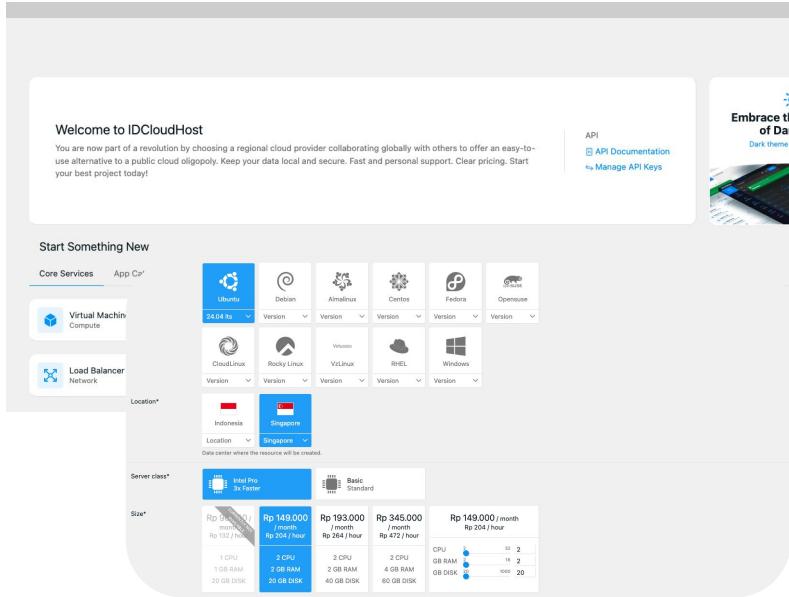
Planned 2026

Roadshow to Campus (Indonesia)

A vision for the future of education and open-source innovation in Indonesia - bringing together modern tech and a vibrant learning community.



Cloud Server by: Id CloudHost



Welcome to idCloudHost
You are now part of a revolution by choosing a regional cloud provider collaborating globally with others to offer an easy-to-use alternative to a public cloud oligopoly. Keep your data local and secure. Fast and personal support. Clear pricing. Start your best project today!

Start Something New

Core Services App Catalog

Virtual Machine Compute

CloudLinux Ubuntu Version 24.04 LTS

Debian Version

Almalinux Version

CentOS Version

Fedora Version

OpenSUSE Version

CloudLinux Version

Rocky Linux Version

VtLinux Version

RHEL Version

Windows Version

Location* Indonesia Singapore

Data center where the resource will be created.

Server class* Intel Pro 3a Prime Basic Standard

Size* Rp 132,000 / month Rp 149,000 / month Rp 193,000 / month Rp 345,000 / month Rp 149,000 / month

1 CPU	2 CPU	2 CPU	2 CPU	CPU
1 GB RAM	2 GB RAM	2 GB RAM	4 GB RAM	32 2
20 GB DISK	20 GB DISK	40 GB DISK	60 GB DISK	16 2
				1000 20



Compute Engine:

- <https://console.idcloudhost.com/>
- Referral; Get Voucher Rp25,000
<https://console.idcloudhost.com/referral/8d3mf2>

Bootcamp (Profession) by :



IT PROFESSIONAL COURSE

DNAStudio
Teknologi Indonesia

Let's Learn Data Engineer!

Start your data journey with our Technical Expert in DNAStudio Training Center

DE COURSE

Apache Airflow, Apache Spark, Python, Jupyter, Apache Superset, Google BigQuery, Google Cloud, PostgreSQL, kafka, Flink, debezium

Every Weekend
DNAStudio Training Center

DWH, SQL, GCP BigQuery, ETL, Apache Airflow, Python, Spark, Kafka Streaming, Flink, Debezium, Apache Superset

* Certificate * Project Portfolio * Career Consult

Apache Flink Mini-Bootcamp: Real-Time Data in Action

Join us for an **immersive 3-Full Day experience** on Apache Flink, Kafka integration, and real-time streaming applications.

LIMITED
5 - 10 participants only.



Bootcamp Next Batch:

- 15% OFF**
1. Data Engineering
<https://forms.gle/cKMzxVLSBtzRrfEK8>
 2. Apache Flink - Deep Dive
<https://forms.gle/paTtU1nRNc45tBVd7>

Digital Transformation by : DNAStudio



DNAStudio
Teknologi Indonesia

The screenshot shows a web-based application interface for form configuration. On the left, there is a sidebar menu with various navigation options such as Front Office, Settings, and HRD. The main area displays a form configuration page with fields for Form Name (table_pasien), Form Prefix (Masukan Prefix Form), Form Title (Daftar Pasien), Form Class (Masukan Class Model Form), Form Description (Daftar Pasien), Form Table Filter SQL (no_rkm_medis>231007), Form Icon (Masukan Icon Form), and Form Table (pasien.pasien). Below these fields is a 'Form Column' section containing a table with columns for Length, Reference Table, Reference Type, Reference Key, Reference Value, Reference SQL Filter, Model Class, Css Class, Icon, Format, Desc, Order, Is Key, Auto Generate, Unique, Searchable, Display Main Table, Read Only, Is Null, and Is Optional. The table has four rows, each with a different color scheme (yellow, grey, light blue, and red).

DNA Enterprise Platform for Modular, Robust, flexible, integrated and Modern Application based on Web Technology.
Example :

1. Human Resource Management
2. Accounting & Finance
3. Inventory & Warehouse
4. Insurance & 3rd Api Integrated
5. and many more

Features:

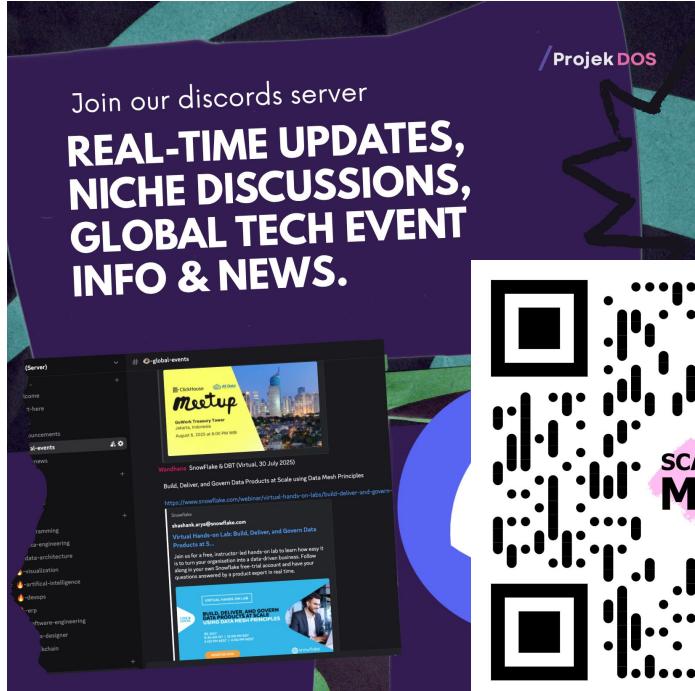
1. Multiplatform (windows dan linux)
2. Parameterize Parameter
3. Auto notification via email
4. Web based Application
5. SLA Support
6. Multi Approve Support
7. Integration with ETL Tools

Contact <https://dnastudio.co.id/contact/>

Thanks!

Business Contact:

 info@projekdos.com



/Projek DOS