

# PostgreSQL

**Fanavaran Anisa**

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Linux & Open Source Training Center

[www.anisa.co.ir](http://www.anisa.co.ir)



## About Me

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- BigData.ir (since 1392)
- UT PHD Student & Instructor
- Big Data & Data Engineering Lecturer
- CTO of a private AI powered retailer company
- CDO of Saba Tamin ...
- CTO & Data Architect & Developer in many projects



# Course Overview



# Introduction to PostgreSQL Course

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Getting Started and Basic SQL	Backup and Recovery
Introduction and Installing PostgreSQL	Log Management and Replication
Entity-Relationship (ER) Design	Explain and Query Monitoring
Data Definition Language (DDL)	User Access, Security, and Programming
Data Manipulation Language (DML)	User Access Management
SELECT Query Fundamentals	Security and Encryption
Joins and CTE	Writing PL/PgSQL Code (IF, FOR, WHILE)
Advanced SQL Techniques	Functions and Stored Procedures
Subqueries and CASE WHEN	Triggers
Window Functions	Lateral Join and Flattening
Practical Queries(Exercise)	Internal PostgreSQL Tables
Working With JSON Data	Foreign Data Wrappers (FDW) and Cross-Database
Recursive queries for tree structures/Arrays	Queries
Popular SQL/PG functions	Postgres Extensions and PostGIS
Full-Text Search, Vectorization, and	Distributed PG Using Citus
Columnar Storage	High Availability
Views and Materialized Views	Query Parallelism
Index Types and Usage Guide	Managing Large Databases
	SupaBase and Other modern Online PG Tools



# Target Audiences



# Who should learn PostgreSQL?

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- Data Analyzers
- Software Eng. Student
- Backend Developers
- Data Engineers
- Postgres Fans
- ....



# Why Postgres?



# Why Postgres

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- Open-source nature
- ACID compliance
- Support for advanced data types
- Extensibility & It's Ecosystem
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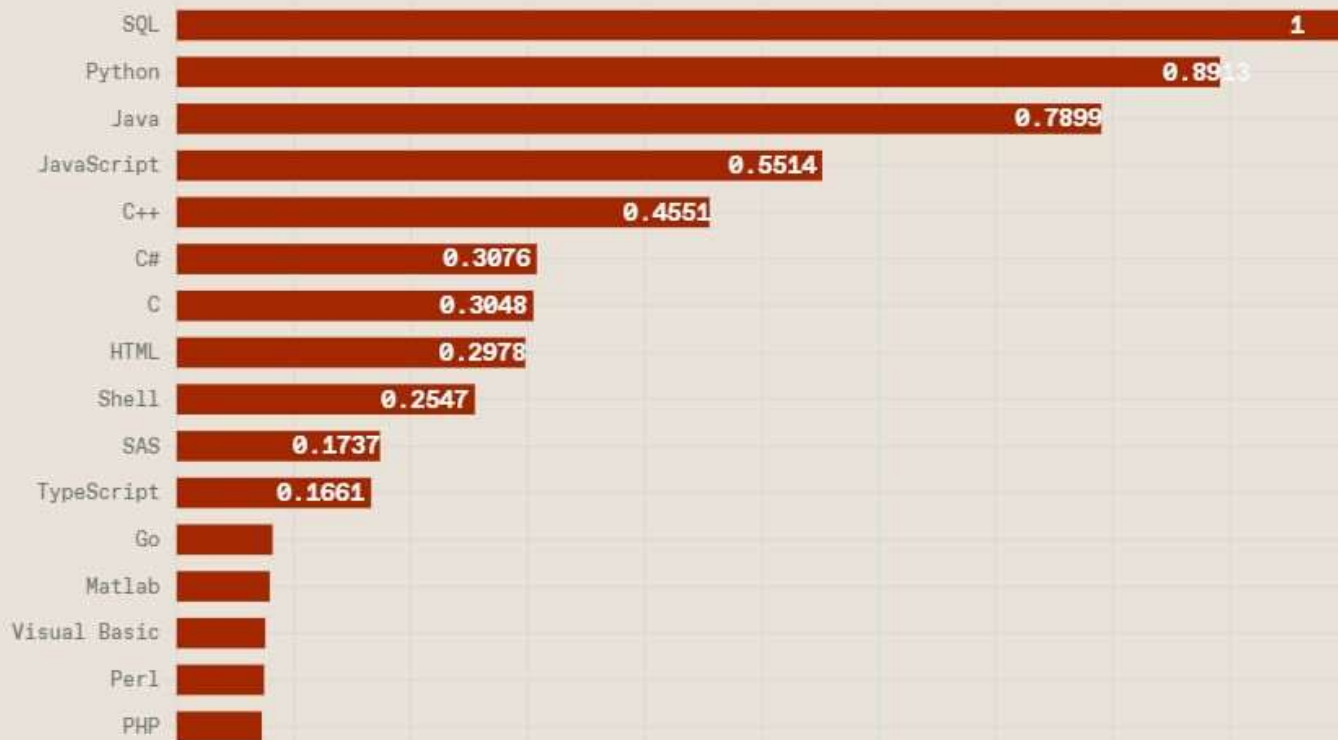


# Why Postgres

## Top Programming Languages 2023

Click a button to see a differently weighted ranking

Spectrum **Jobs** Trending



# Why Postgres : DB-Engines Db of the Year

Year	Database
2022	Snowflake
2021	Snowflake
2020	PostgreSQL
2019	MySQL
2018	PostgreSQL
2017	PostgreSQL
2016	Microsoft SQL Server
2015	Oracle
2014	MongoDB
2013	MongoDB

# Why Postgres – StackOverFlow Survey



## Overview

## Developer Profile

## Technology

Most popular technologies

Admired and Desired

Worked with vs. want to work with

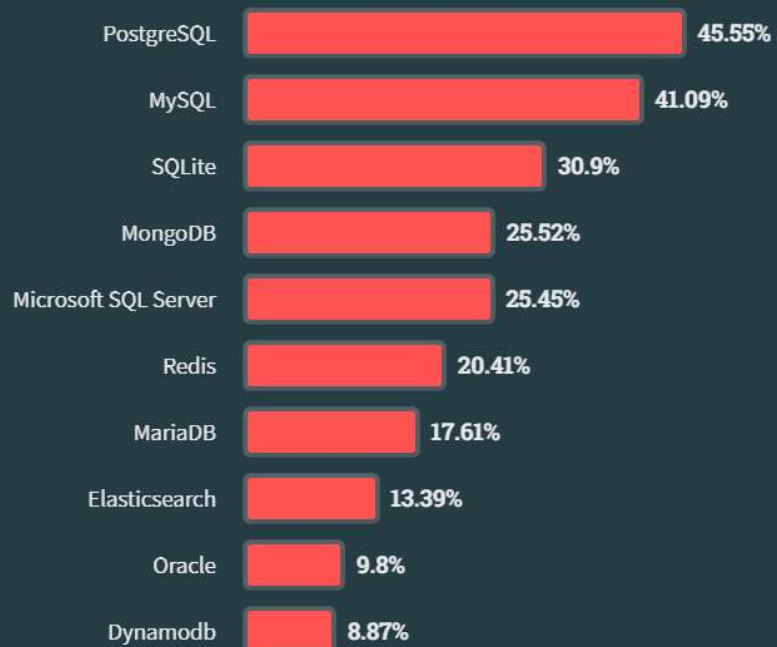
Top paying technologies

## AI

## Work



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## Community

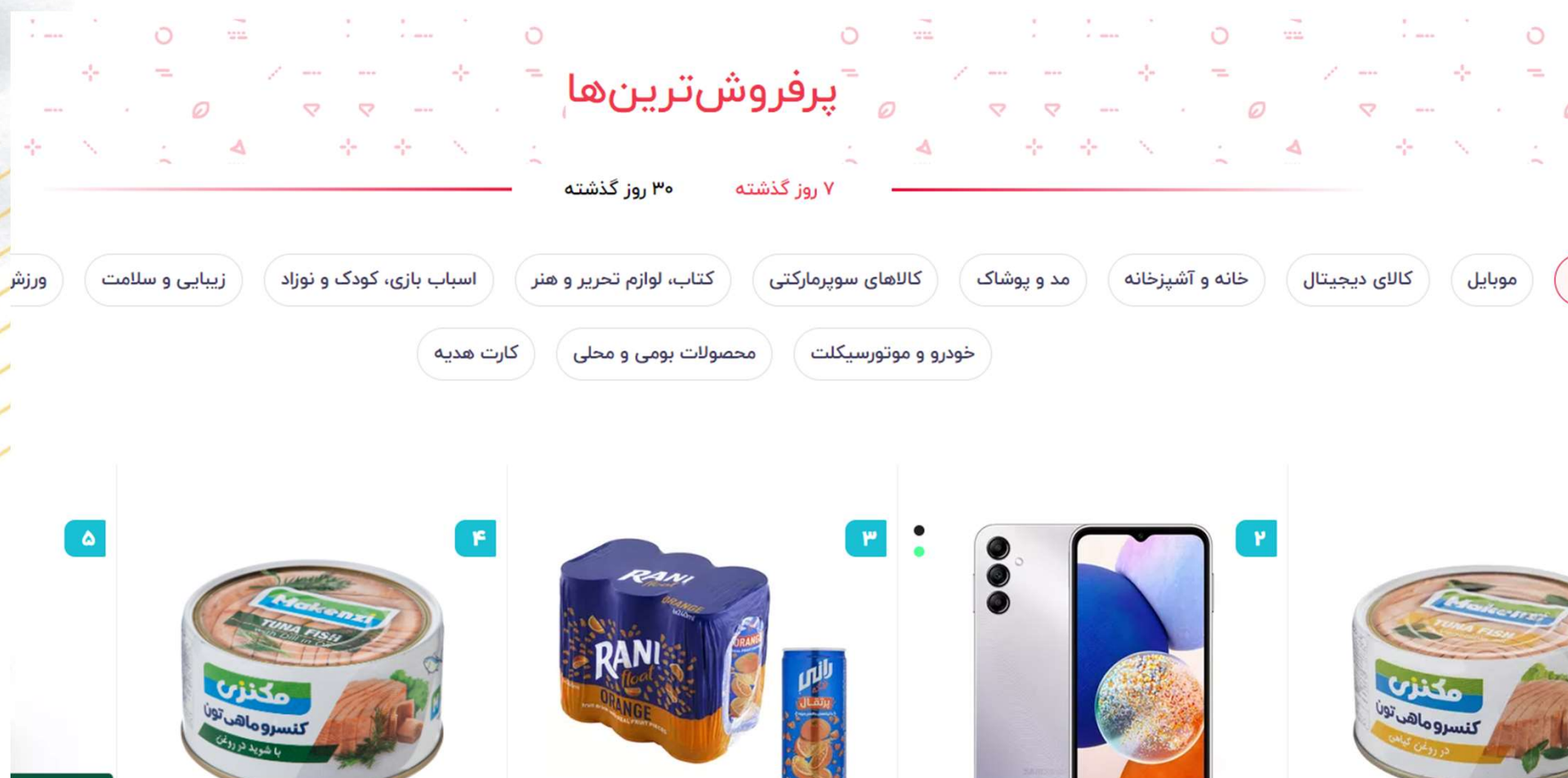


# Why Postgres

البته این موضوع به این معنی نیست که در طراحی سامانه‌های پیچیده امروزی، تنها به پستگرس اکتفا شود. تجربه و توصیه فعالان این حوزه، استفاده از معماری‌های ترکیبی است که بسته به نیاز از تمامی بانک‌های اطلاعاتی نوین به عنوان اجزای یک سامانه اطلاعاتی بزرگ، استفاده شود. آنچه مدنظر ماست این است که برای هسته اصلی سامانه به شرطی که ماهیت داده‌های آن تراکنشی باشد مثل اکثر سامانه‌های تجاری که نیاز به به ذخیره، به روزرسانی و حذف داده‌های کاربران، محصولات، سفارش‌ها و مانند آن را دارند، از پستگرس در کنار سایر بانک‌های اطلاعاتی غیر رابطه‌ای استفاده شود.



# A Practical Sample - Digikala





# History



# Origin & History

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- The first implementation of [POSTGRES] began back in 1986 and was put into production in 1988.
- After the user community and demands doubled in size in the early 90s, the POSTGRES Project ended and Postgres95, an open-source SQL language interpreter, was launched.
- Since then, Postgres has continued to receive widespread adoption, especially with the introduction of the public cloud. With each release, there are significant enhancements and improvements providing more functionality and scalability for customer data.

](<https://www.postgresql.org/docs/current/history.html>)






# Origin & History

Version	Year	Key Features
PostgreSQL 6.0	1996	First official PostgreSQL release, Open-source licensing
PostgreSQL 7.1	2001	Introduction of Write-Ahead Logging (WAL), Enhanced query optimizer
PostgreSQL 9.0	2010	Streaming replication, Hot standby
PostgreSQL 12	2019	Advanced indexing, Improved partitioning support
PostgreSQL 13	2020	Enhanced partitioning and indexing, Improved query performance
PostgreSQL 14	2021	Better performance and usability for logical replication and connection handling
PostgreSQL 15	2022	Improved sort performance, JSON enhancements, Incremental sorting
PostgreSQL 16	2023	<b>expanded SQL/JSON syntax</b> , advanced monitoring statistics, and refined access control mechanisms, ensuring efficient policy management across extensive deployments.



# ORDBMS vs DBMS

Feature	ORDBMS (Object-Relational DBMS)	RDBMS (Relational DBMS)
Data Model	Extends relational model with object-oriented features.	Purely relational model.
Complexity	More complex, handles complex data types.	Simpler, primarily for structured data.
Use Case	Suitable for applications requiring complex data representation (like CAD, multimedia).	Ideal for transactional and operational databases with structured data.
Query Language	Extensions to SQL for object-oriented features.	Standard SQL.
Performance	Can be slower due to complexity.	Generally faster for simple queries.
Example	PostgreSQL, Oracle. 	MySQL, SQLite.



# Section Overview



**Any Question ?**

