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**✅ Rekomendasi Perbaikan untuk Query**

**Langkah 1:** Tambahkan index:  
sql  
CREATE INDEX idx\_transaksi\_tanggal ON transaksi(tanggal\_transaksi);

CREATE INDEX idx\_transaksi\_produk ON transaksi(id\_produk);

**Langkah 2:** Gunakan materialized view jika memungkinkan:

Sql  
CREATE MATERIALIZED VIEW mv\_penjualan\_produk AS

SELECT p.id\_produk, p.nama\_produk, SUM(t.total\_harga) AS total\_penjualan, DATE\_TRUNC('month', t.tanggal\_transaksi) AS bulan

FROM transaksi t

JOIN produk p ON t.id\_produk = p.id\_produk

GROUP BY p.id\_produk, p.nama\_produk, DATE\_TRUNC('month', t.tanggal\_transaksi);

**Langkah 3:** Query bisa cukup dari materialized view:

sql

SELECT nama\_produk, SUM(total\_penjualan) AS total\_penjualan

FROM mv\_penjualan\_produk

WHERE bulan BETWEEN '2023-01-01' AND '2023-12-31'

GROUP BY nama\_produk

ORDER BY total\_penjualan DESC;

Desain database

A diagram of a company structure

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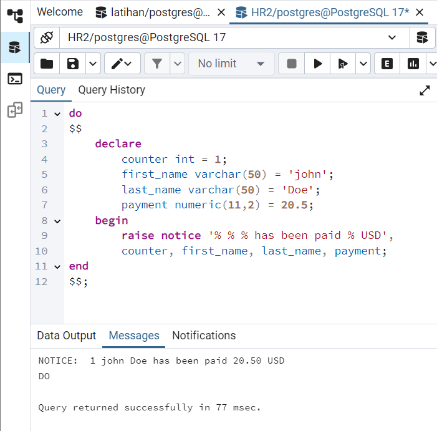
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**🧩 Komponen Utama dalam Desain Database**

**1. Entitas (Entity)**

Objek nyata yang datanya ingin kita simpan. Contoh:

* Mahasiswa
* Produk
* Pelanggan
* Transaksi

**2. Atribut**

Sifat atau informasi dari entitas.  
Contoh pada entitas Mahasiswa:

* nim, nama, jurusan, angkatan

**3. Primary Key (PK)**

Kolom unik yang membedakan setiap baris.  
Contoh: id\_produk, nim, id\_transaksi

**4. Foreign Key (FK)**

Kolom yang menghubungkan satu tabel ke tabel lain.  
Contoh: id\_pelanggan di tabel transaksi mengacu ke id\_pelanggan di tabel pelanggan.

A diagram of a server

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A diagram of a company

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A diagram of a data flow

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