

Logical Database Design and the Relational Model

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Overview

- The relational data model was first introduced in 1970 by E . F. Codd, then of IBM (Codd, 1970).
- **Basic Definitions** : The relational data model represents data in the form of tables.
- The relational data model consists of the following three components (Fleminand von Halle, 1989):
 - 1. Data structure Data are organized in the form of tables with rows and columns.
 - 2. Data manipulation Powerful operations (using the SQL language) are used to manipulate data stored in the relations
 - 3. Data integrity Facilities are included to specify business rules that maintain the integrity of data when they are manipulated

Relational Data Structure

Figure 5-1 shows an example of a relation named EMPLOYEE!

EMPLOYEE1			
<u>Emp_ID</u>	Name	Dept_Name	Salary
100	Margaret Simpson	Marketing	48,000
140	Allen Beeton	Accounting	52,000
110	Chris Lucero	Info Systems	43,000
190	Lorenzo Davis	Finance	55,000
150	Susan Martin	Marketing	42,000

A relation is a named, two-dimensional table of data

This relation contains the following attributes describing employees: **Emp_ID, Name, Dept_Name, and Salary**

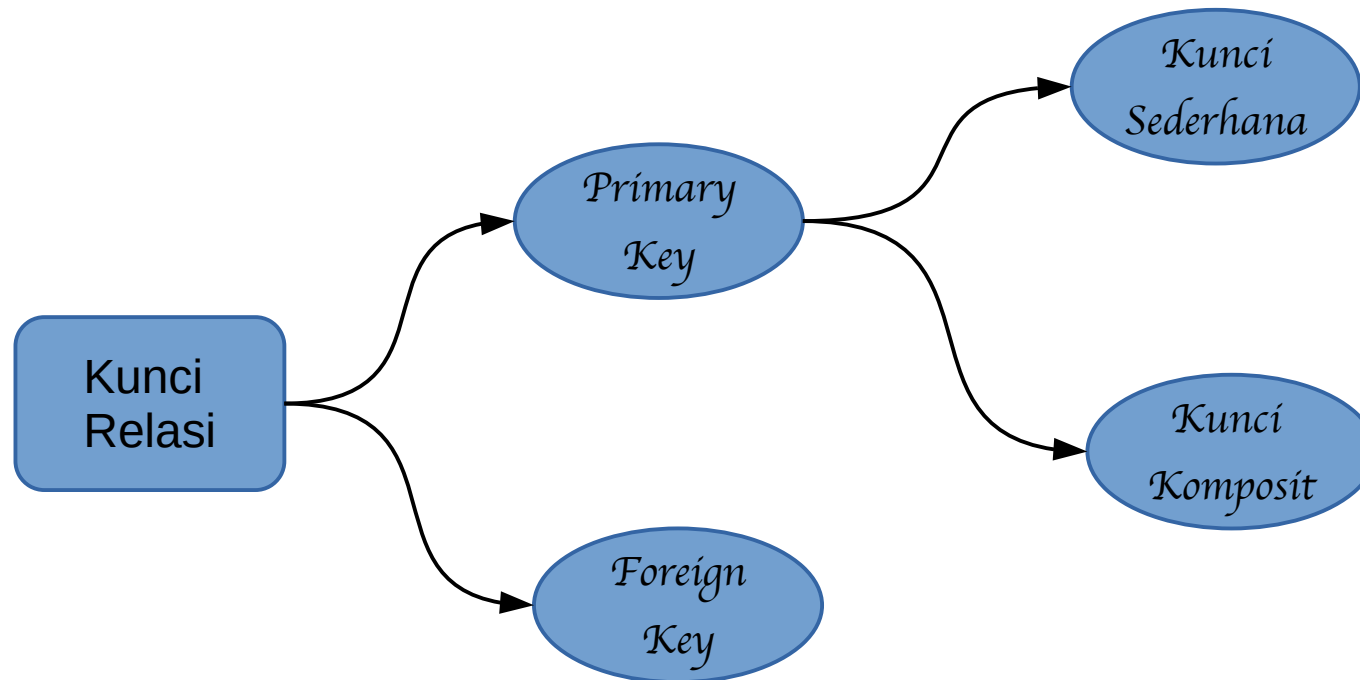
We can express the structure of a relation :

EMPLOYEE!

(Emp_ID,Name,Dept_Name,Salary)

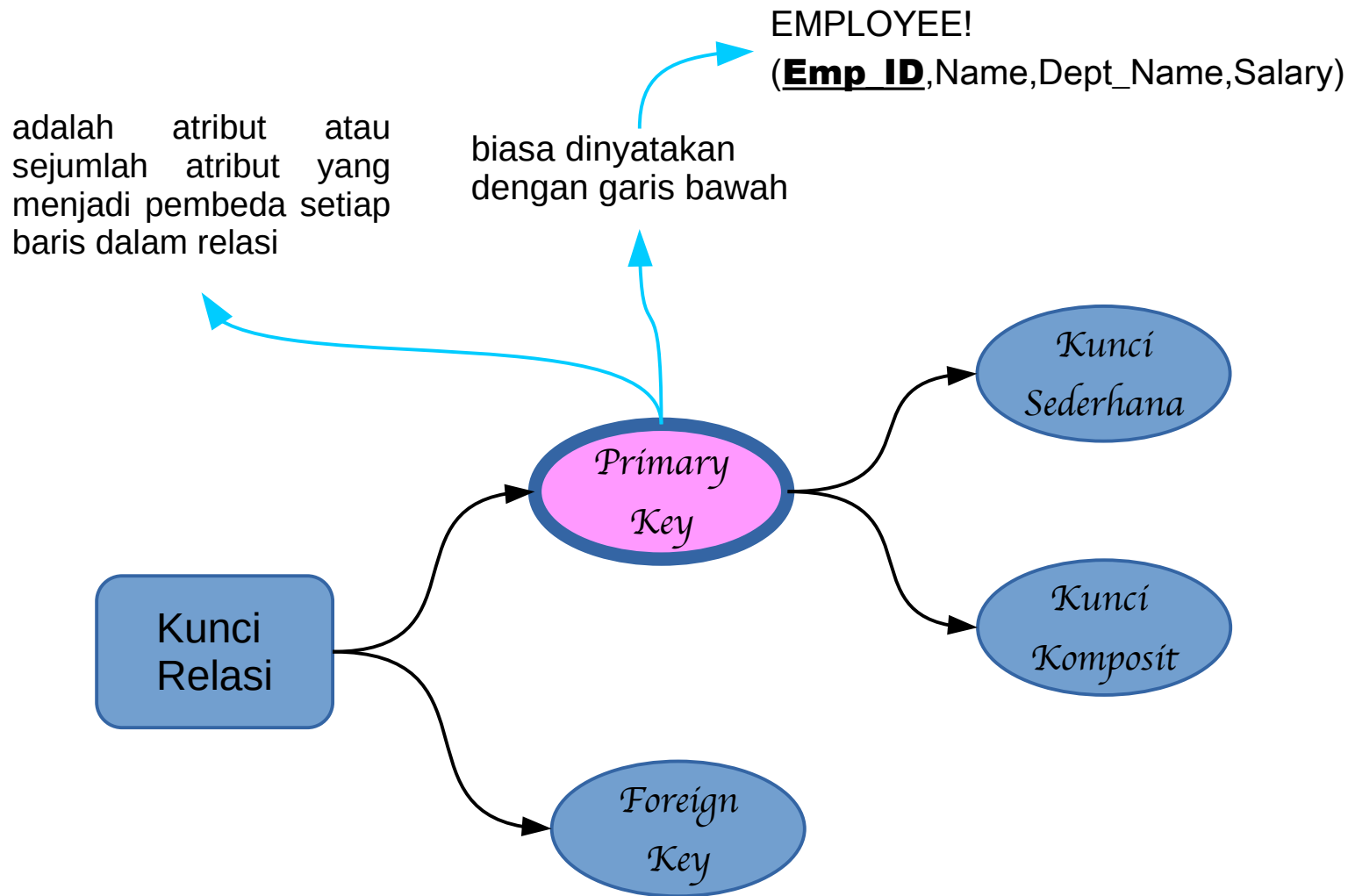
Relational Keys

Kunci Relasi



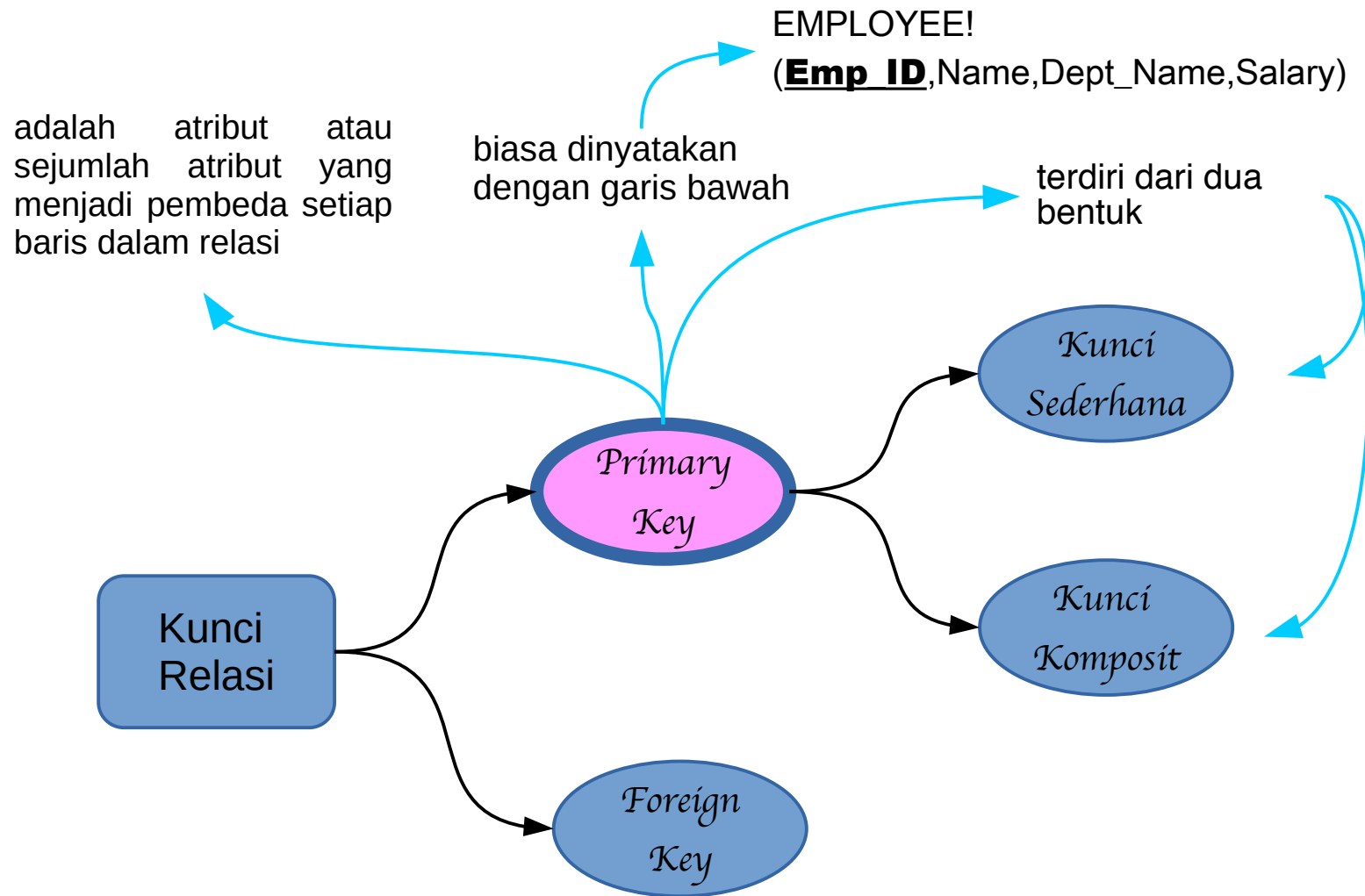
Relational Keys

Primary Key



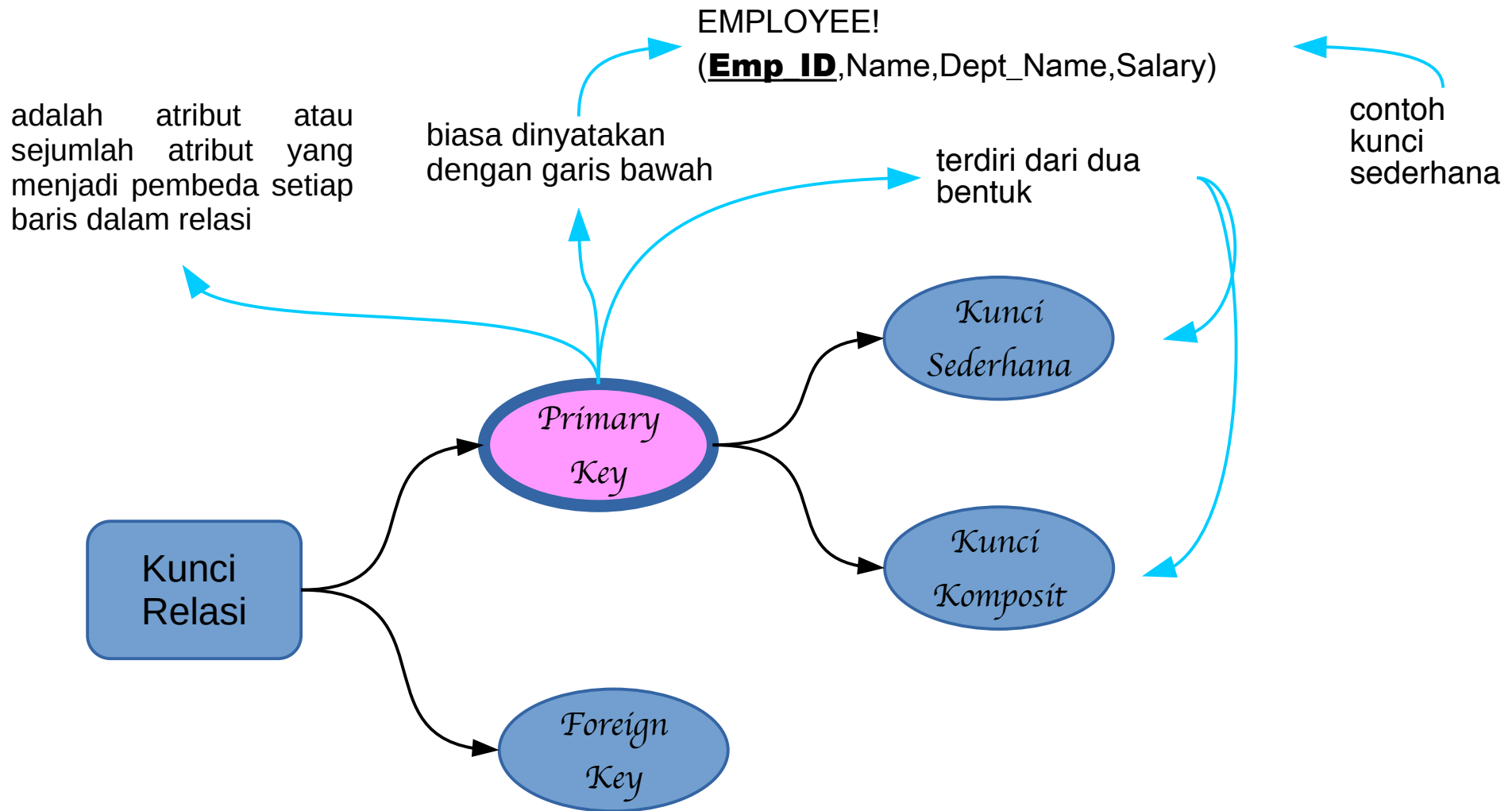
Relational Keys

Primary Key



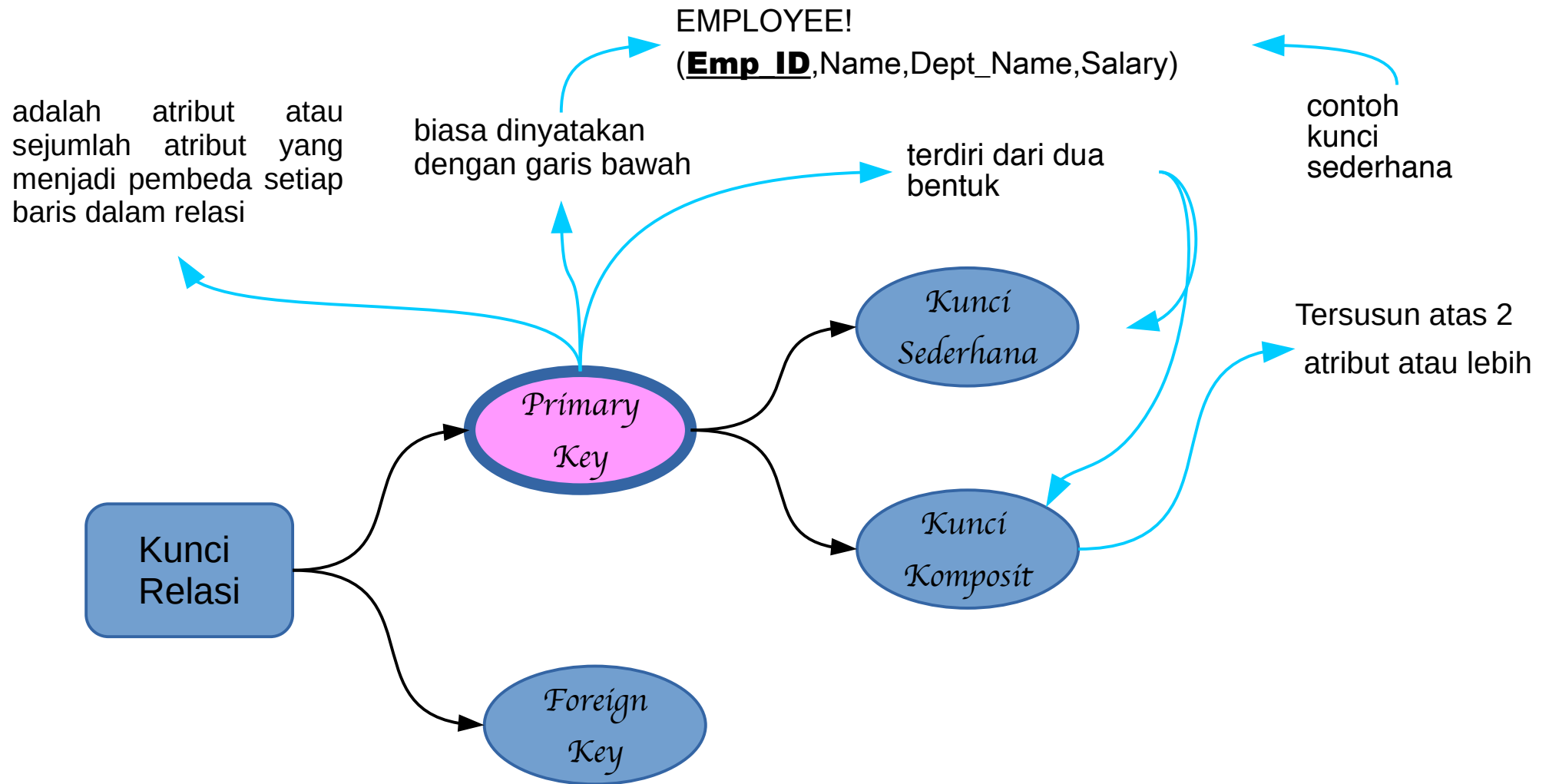
Relational Keys

Primary Key



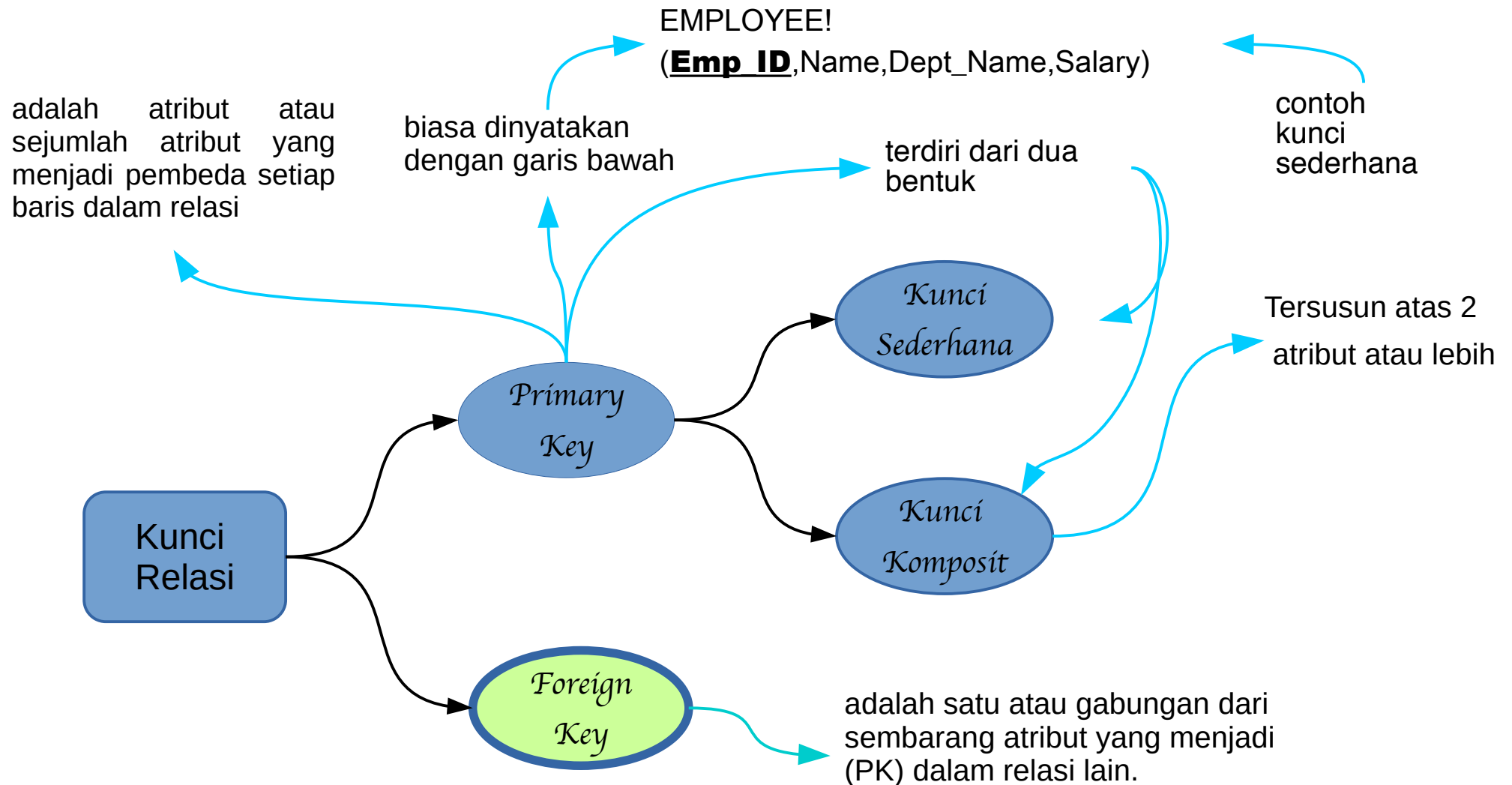
Relational Keys

Primary Key



Relational Keys

Foreign Key



Kunci Relasi

Contoh dalam relasi (tabel)

Relasi Mahasiswa

<u>NIM</u>	NAMA_MHS
55	Ashadi
56	Rina
57	Budi

Relasi Matakuliah

<u>KODE_MK</u>	NAMA_MK	SKS
DB001	Pengantar Basis Data	3
DB002	Basis Data Lanjut	3
PI001	Teknik Multimedia	2

Relasi Nilai

<u>NIM</u>	<u>KODE_MK</u>	NILAI
55	DB001	A
55	PI001	B
56	DB001	B
57	DB001	A
57	DB002	A

Relasi : Mahasiswa
PK : NIM

Relasi Nilai
PK : NIM + KODE_MK
FK : NIM, KODE_MK

Relasi Matakuliah
PK : KODE_MK

Sifat Pada Relasi (Tabel)

Beberapa sifat yang melekat dalam relasi:

- Setiap tabel dalam basis data memiliki nama yang unik
- Tidak ada baris yang kembar
- Urutan tupel tidak penting
- Setiap atribut memiliki nama yang unik
- Letak atribut bebas
- Setiap atribut memiliki nilai tunggal dan jenisnya sama untuk semua baris

Sifat Pada Relasi (Tabel)

Tidak boleh terdapat baris kembar

NO_MHS	KODE_MK	NILAI
55	DB001	A
55	PI001	B
56	DB001	B
57	DB001	A
57	DB001	B

Urutan Tuple/baris tidak penting

NO_MHS	KODE_MK	NILAI
55	DB001	A
55	PI001	B
56	DB001	B
57	DB001	A
57	DB002	A

NO_MHS	KODE_MK	NILAI
57	DB001	A
55	PI001	B
56	DB001	B
55	DB001	A
57	DB002	A

Sifat Dalam Relasi

atribut memiliki nilai tunggal

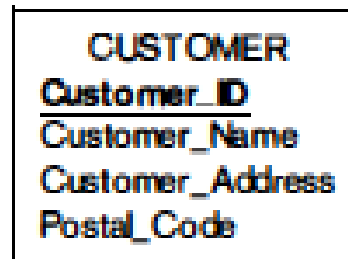
Nilai tidak tunggal

NO_SISWA	TES_1	TES_2
12	75	80
13	76	78
14	89	58
15	60	90
16	75	86

NO_SISWA	TES
12	75
	80
13	76
	78
14	89
	58
15	60
	90
16	75
	86

Transforming ER / EER Diagrams Into Relations

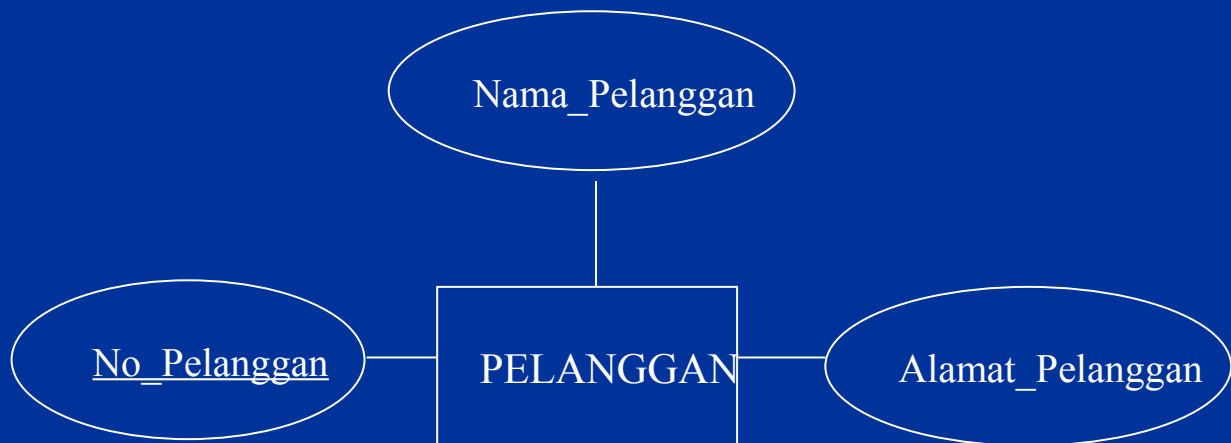
- Memetakan Entitas Reguler (kuat)



CUSTOMER			
<u>Customer_ID</u>	Customer_Name	Customer_Address	Postal_Code

Tranformasi Diagram ER/EER ke Relasi

- Memetakan Entitas Reguler (kuat)



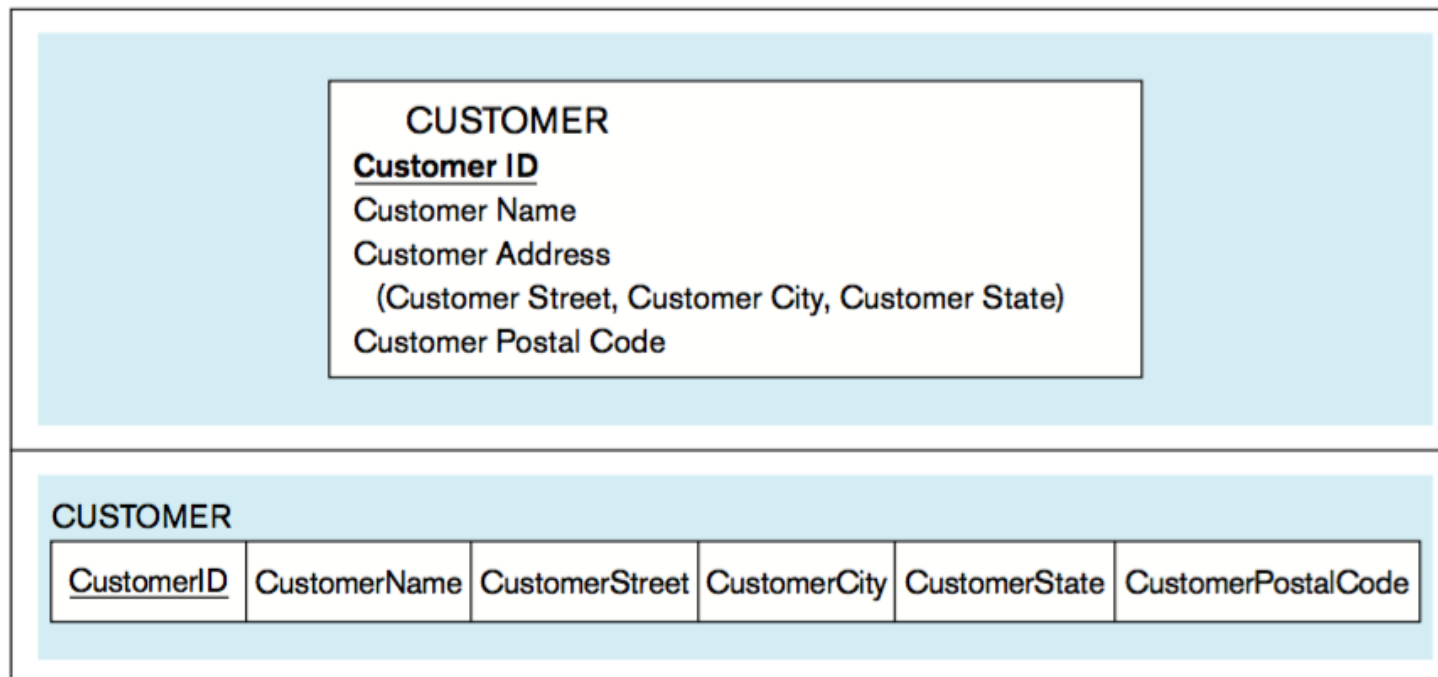
Tipe entitas
PELANGGAN



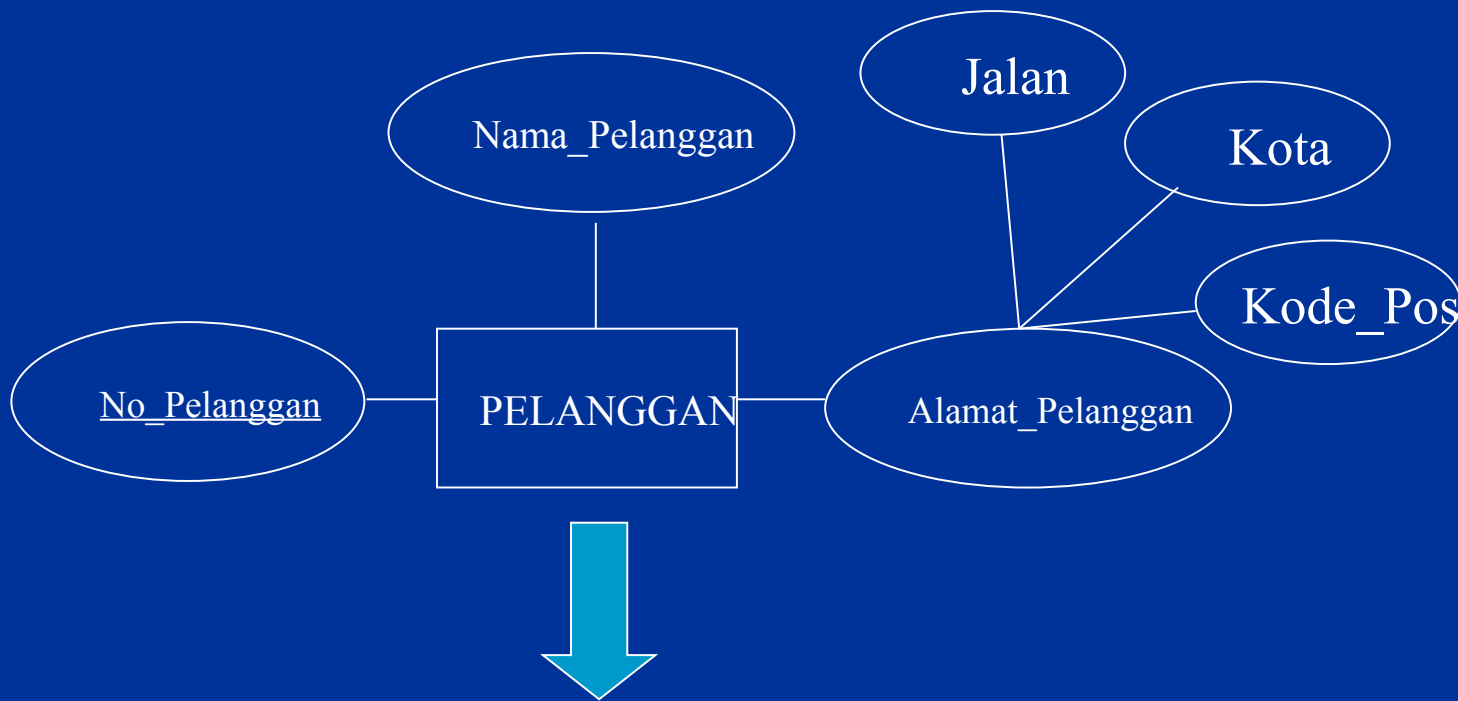
<u>No_Pelanggan</u>	Nama_Pelanggan	Alamat_Pelanggan
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Relasi PELANGGAN

Atribut Komposit



Atribut Komposit

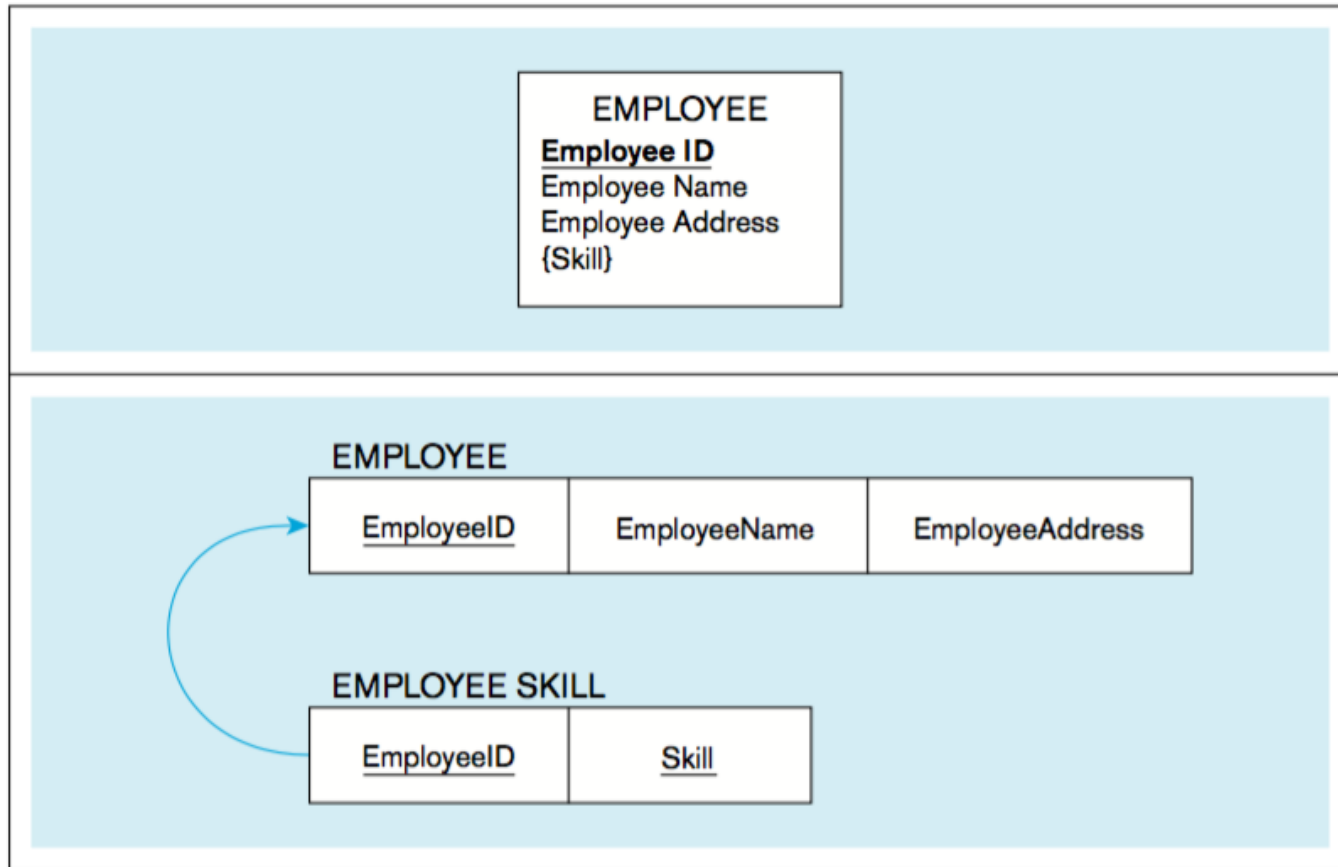


Tipe entitas
PELANGGAN
dengan atribut
komposit

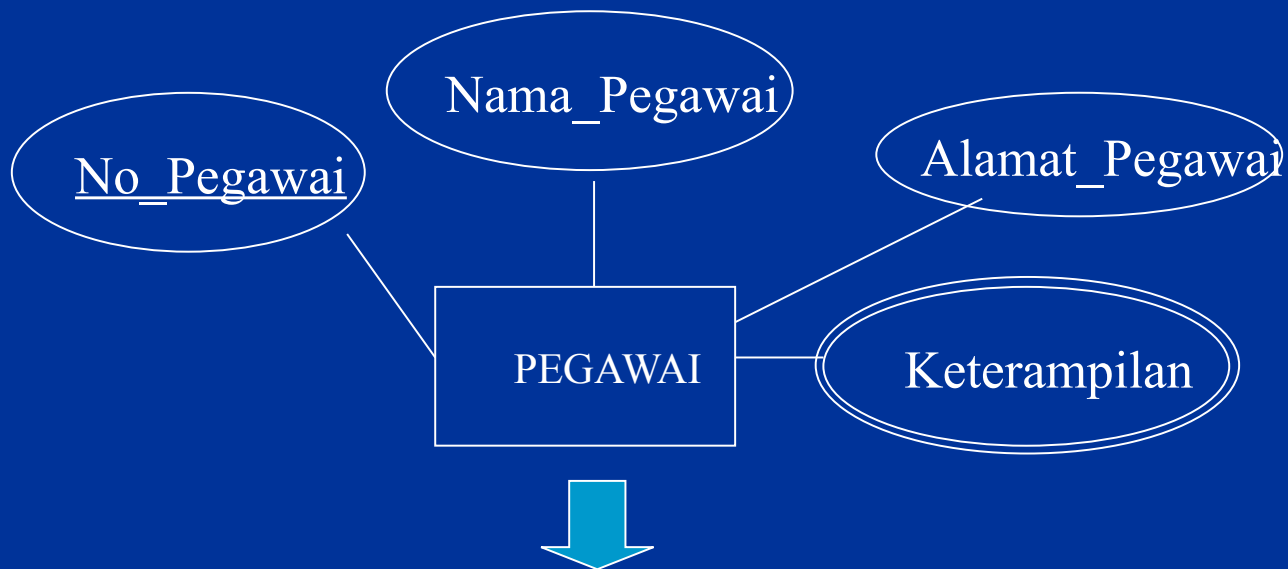
<u>No_Pelanggan</u>	Nama_Pelanggan	Jalan	Kota	Kode_Pos
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Relasi
PELANGGAN

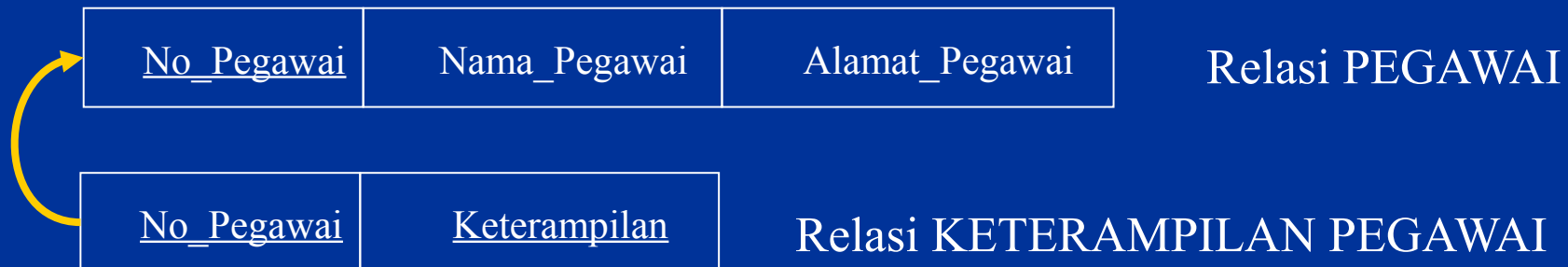
Atribut Bernilai Banyak



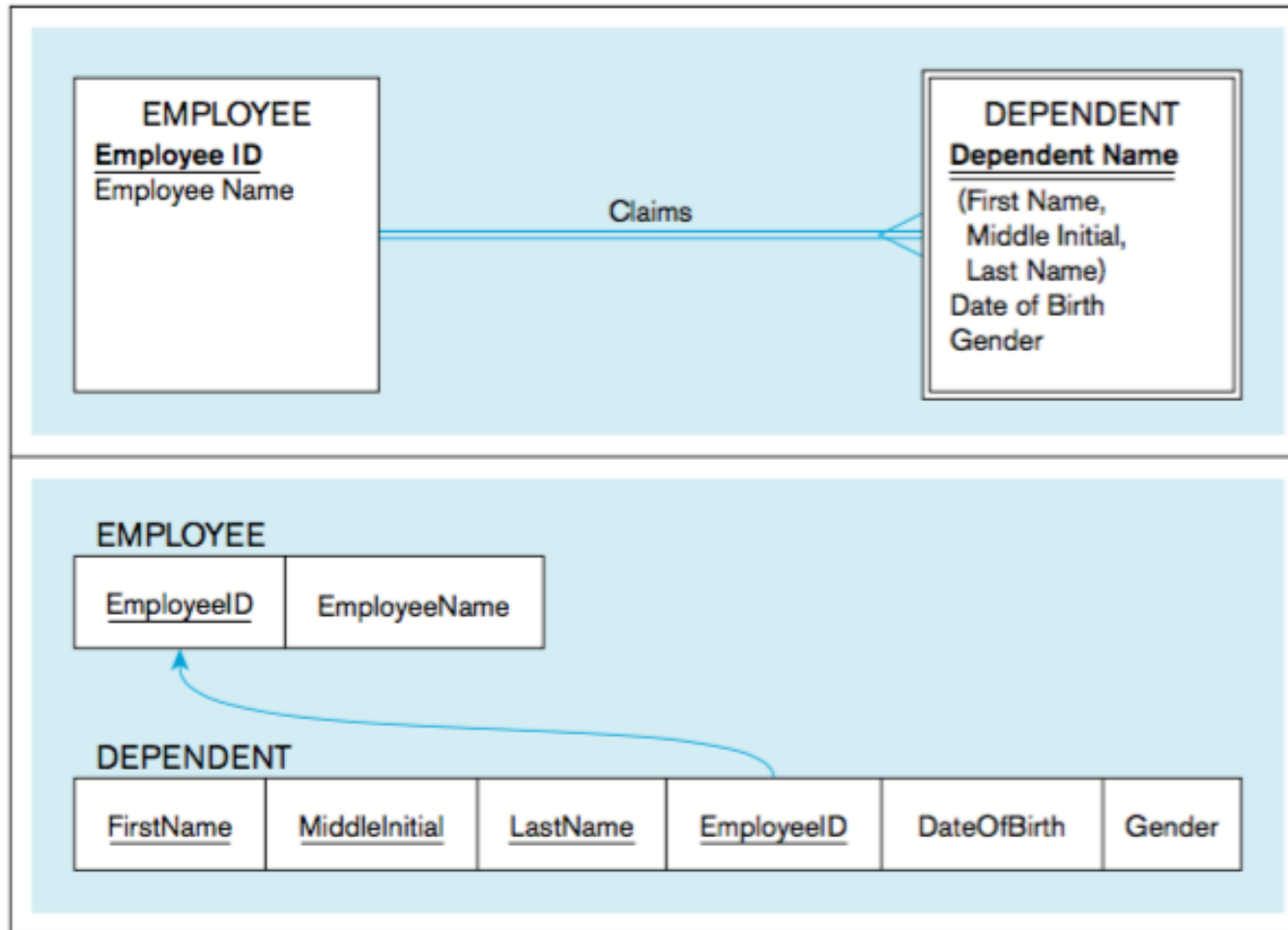
Multivalue Atribut



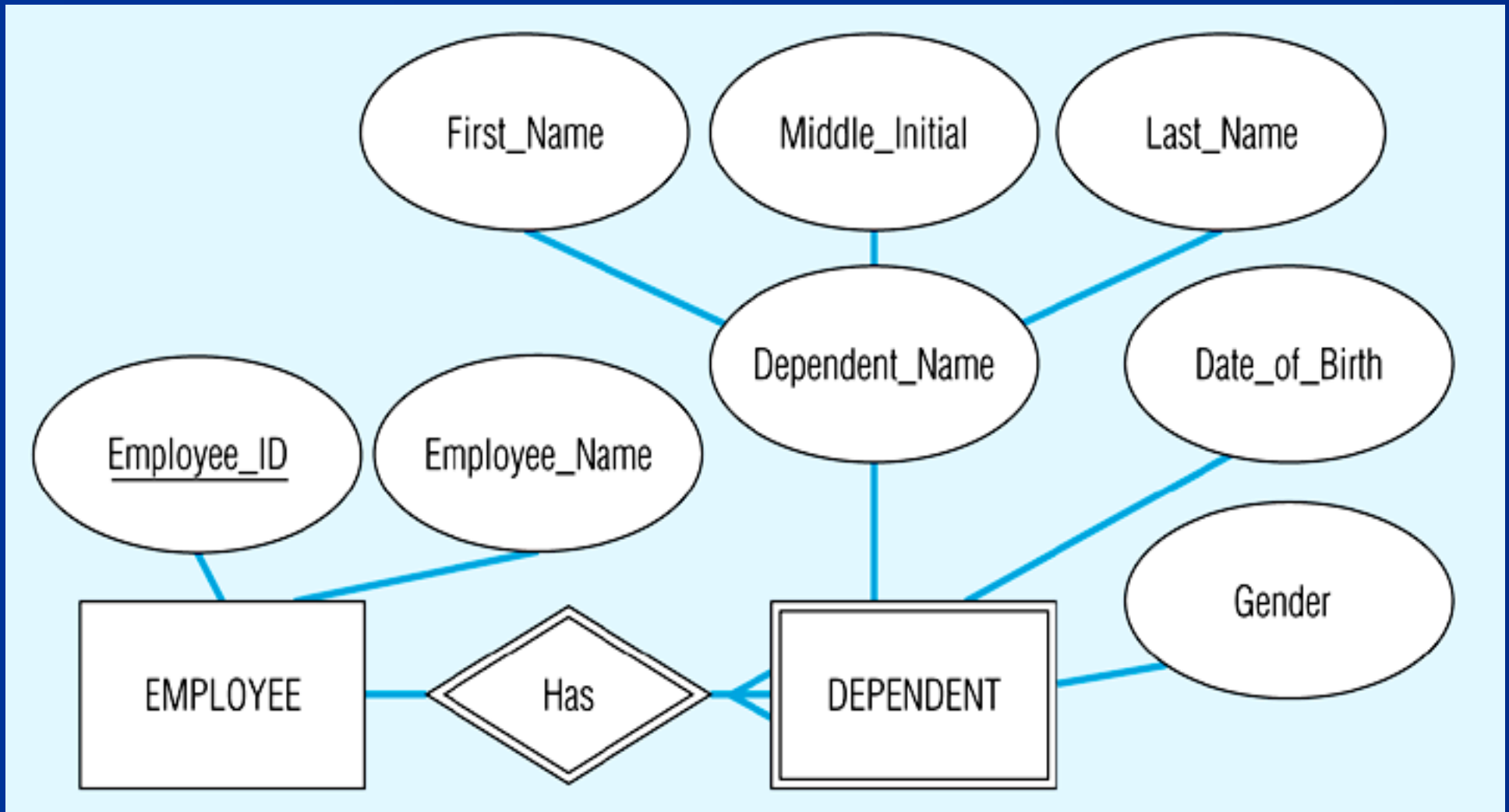
Tipe entitas
PEGAWAI dengan
atribut bernilai ganda



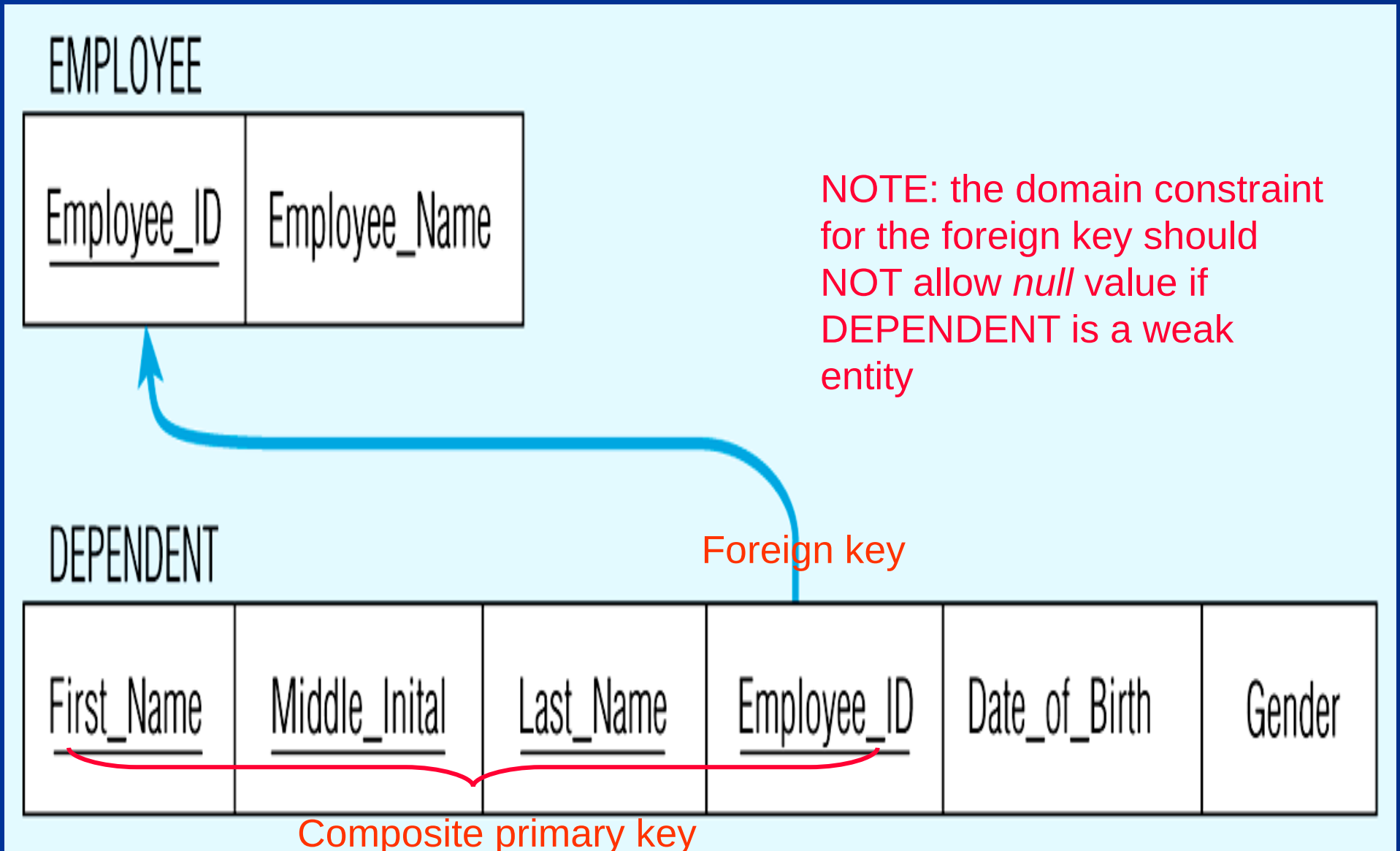
Pemetaan Entitas Lemah



Pemetaan Entitas Lemah

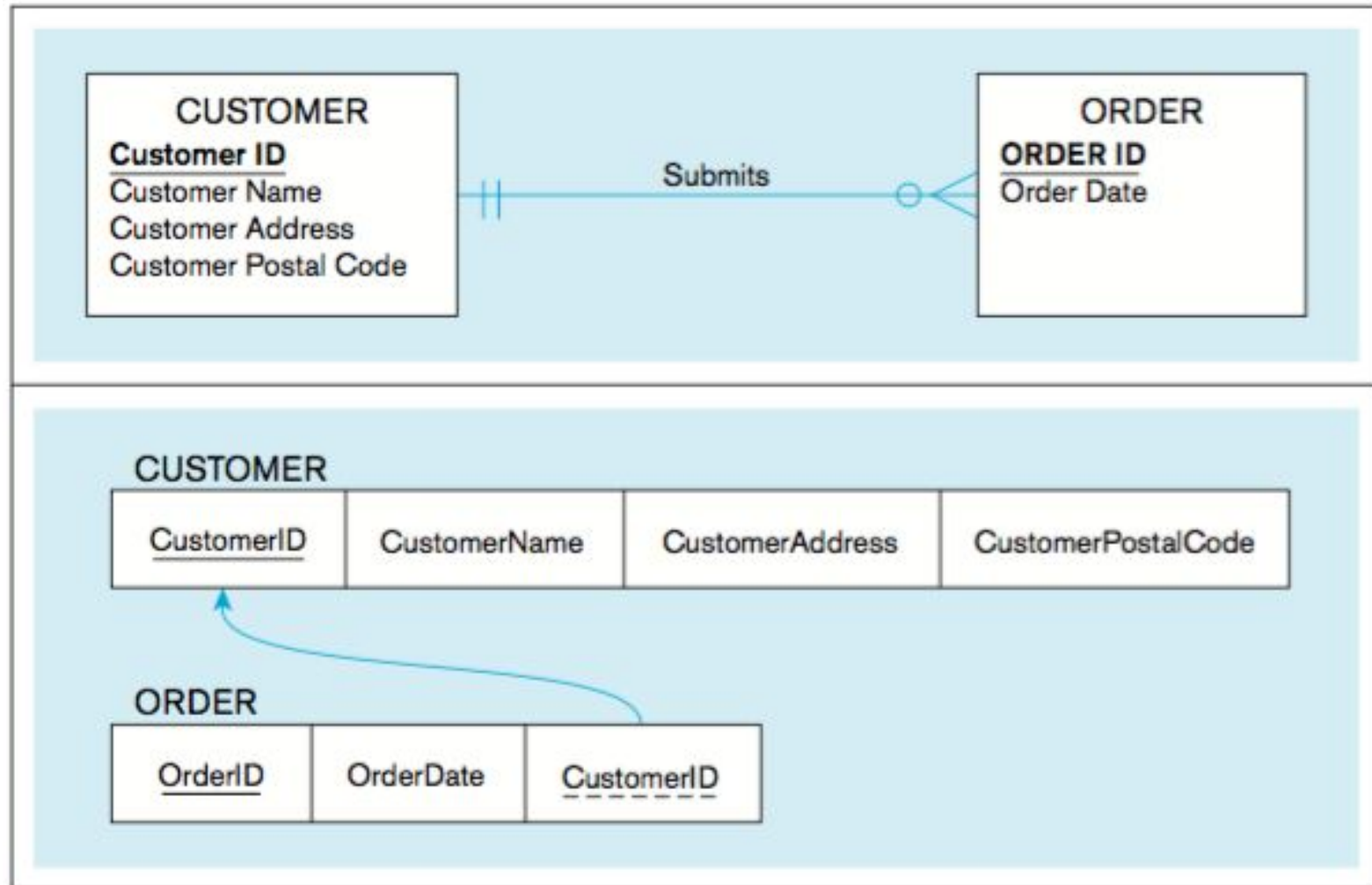


Pemetaan Entitas Lemah

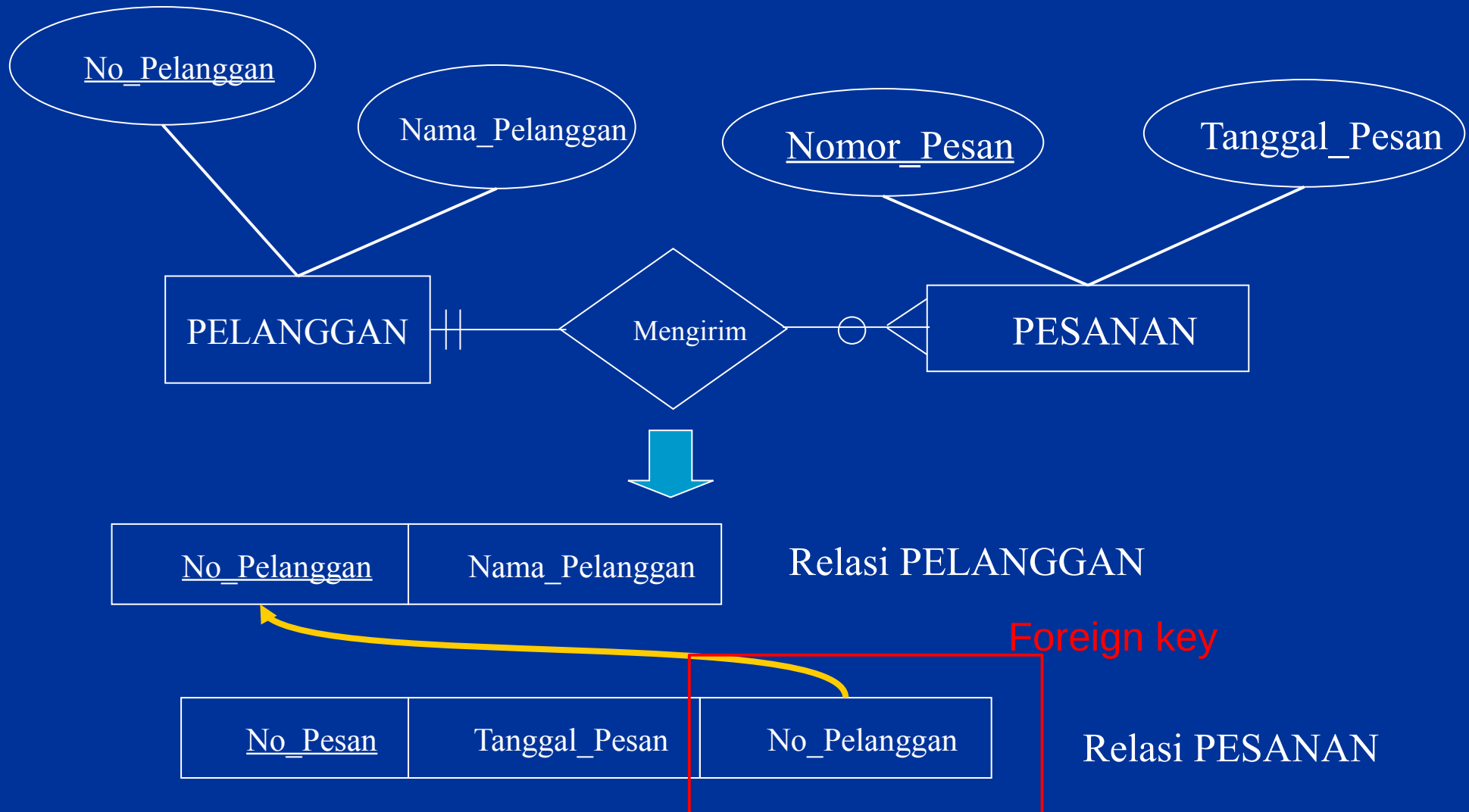


Pemetaan Relasi Binari

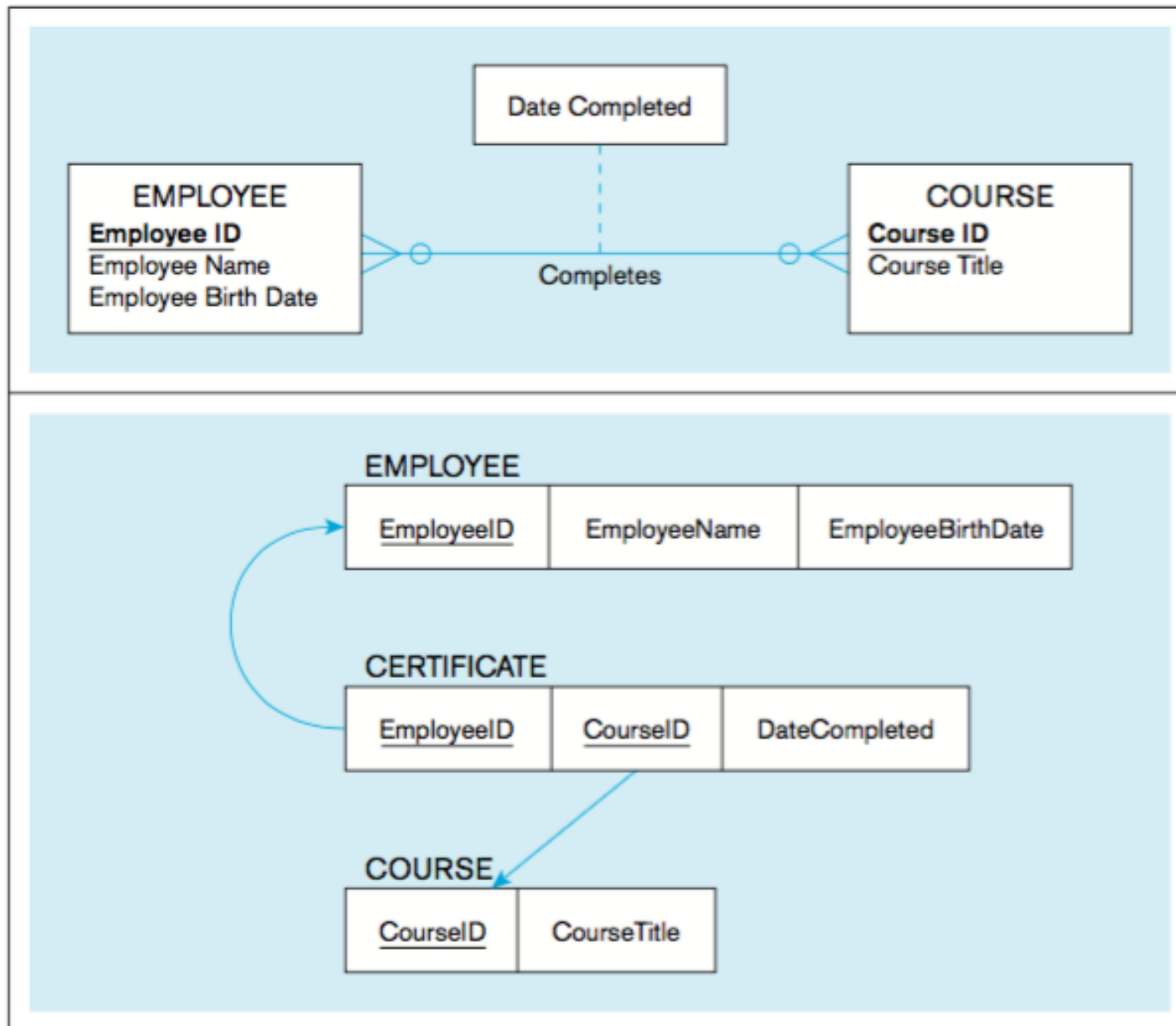
Relasi One to Many



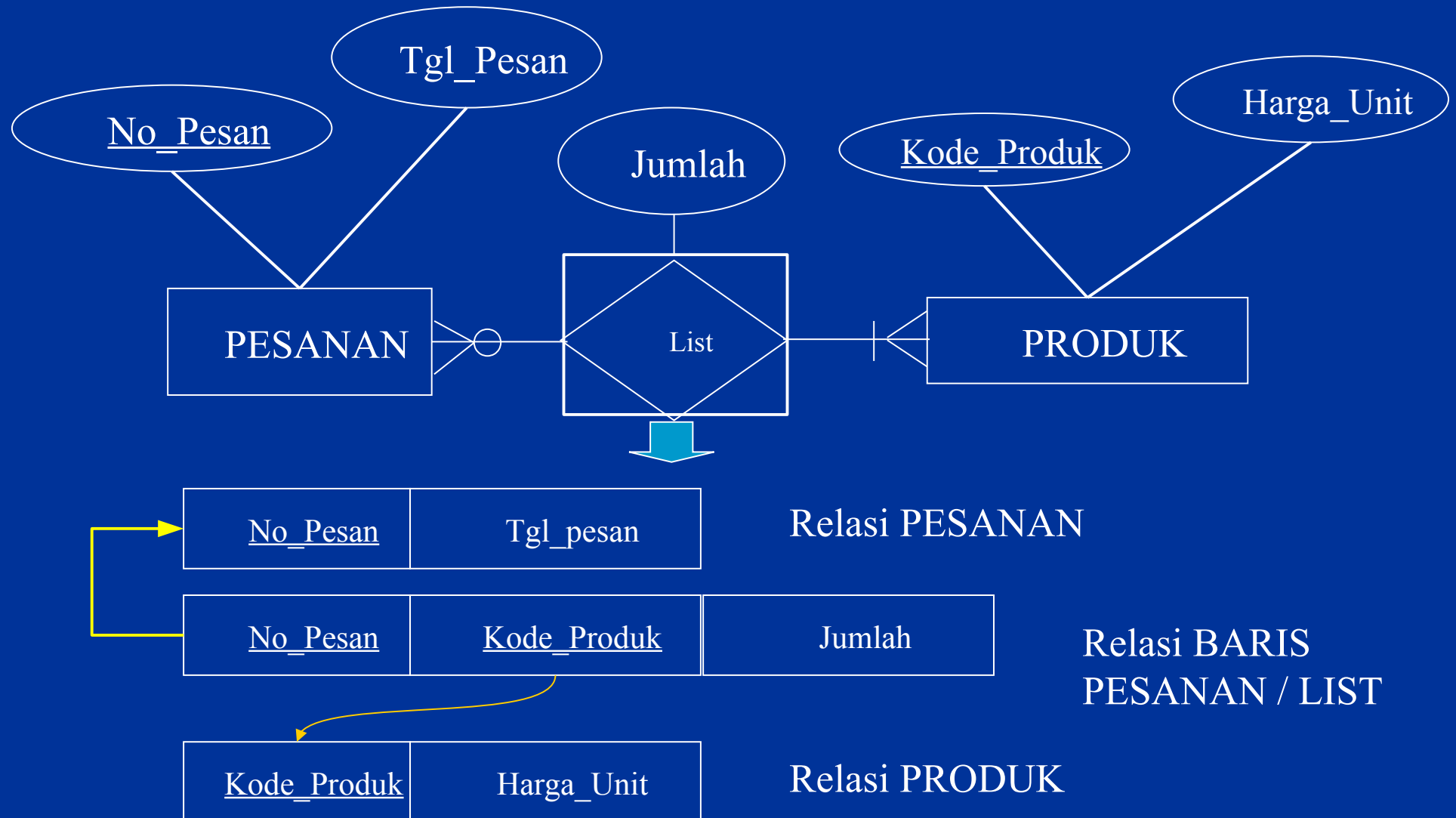
Relasi One to Many



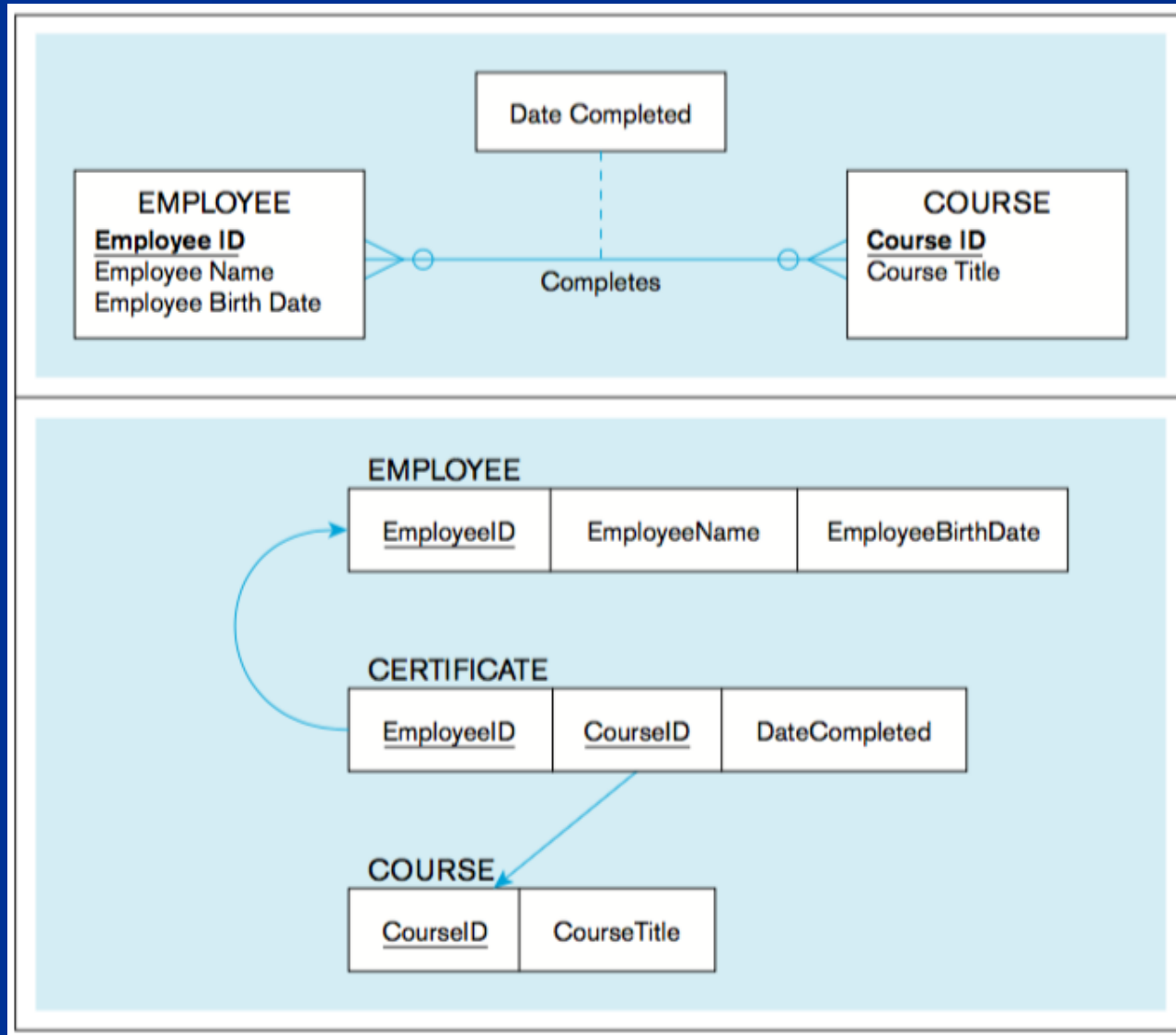
Relasi Many to Many



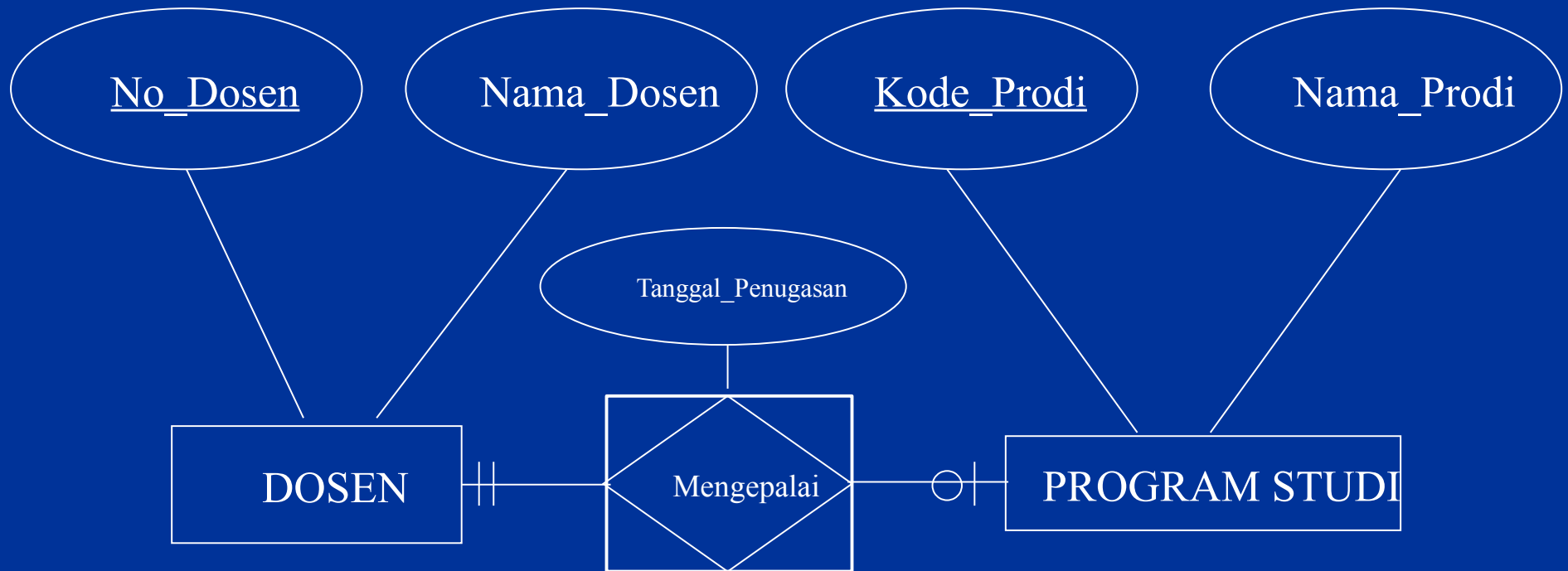
Relasi Many to Many



Relasi Many to Many



Hubungan 1 to 1



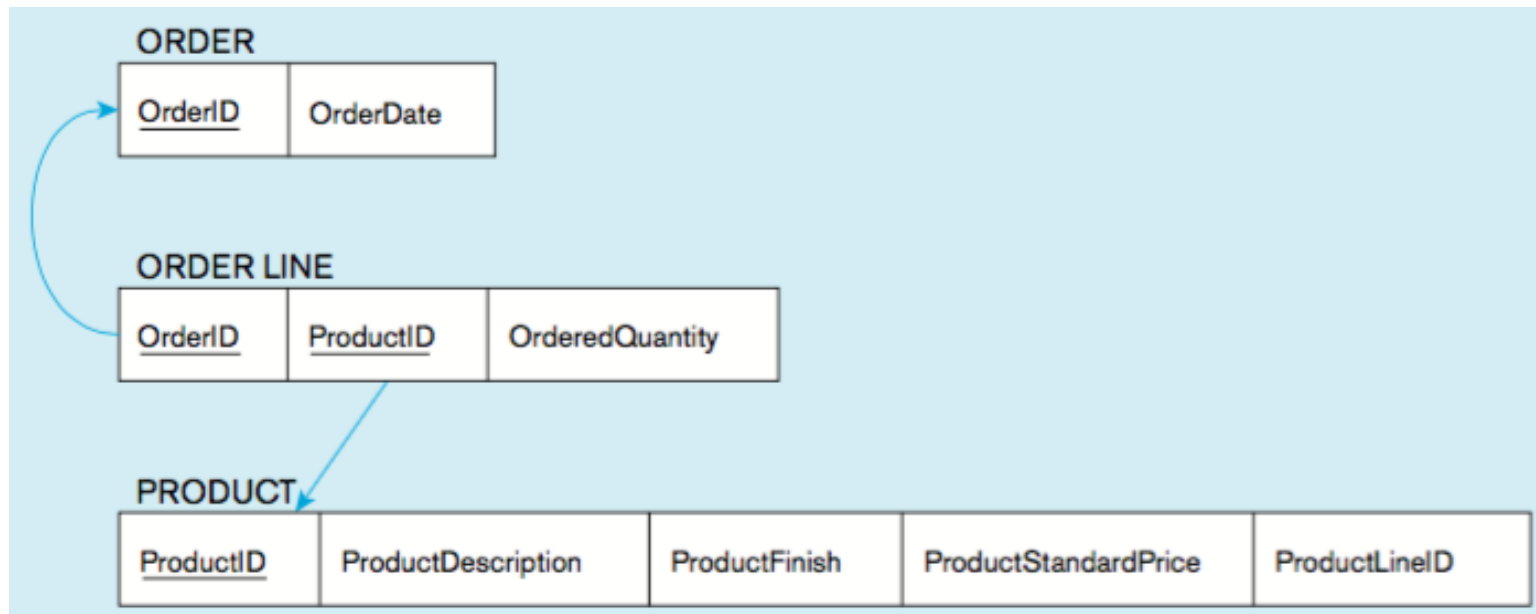
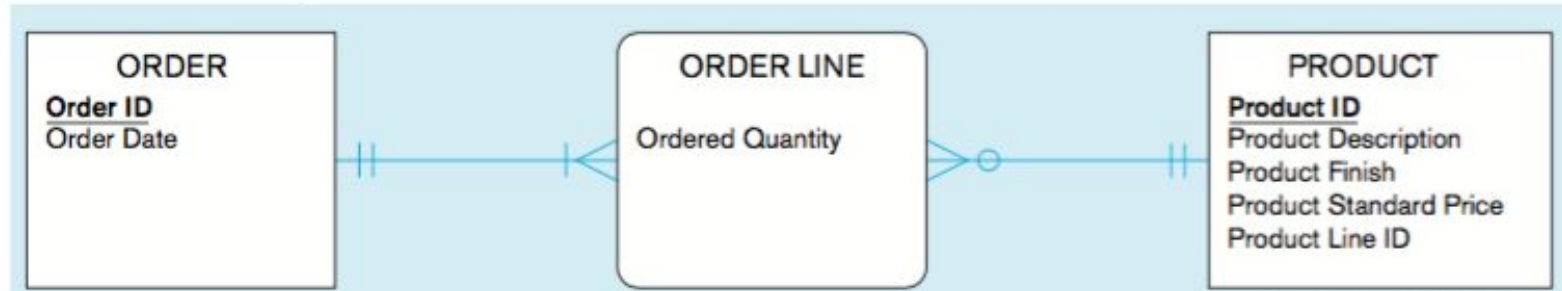
<u>No_Dosen</u>	Nama_Dosen
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Relasi DOSEN

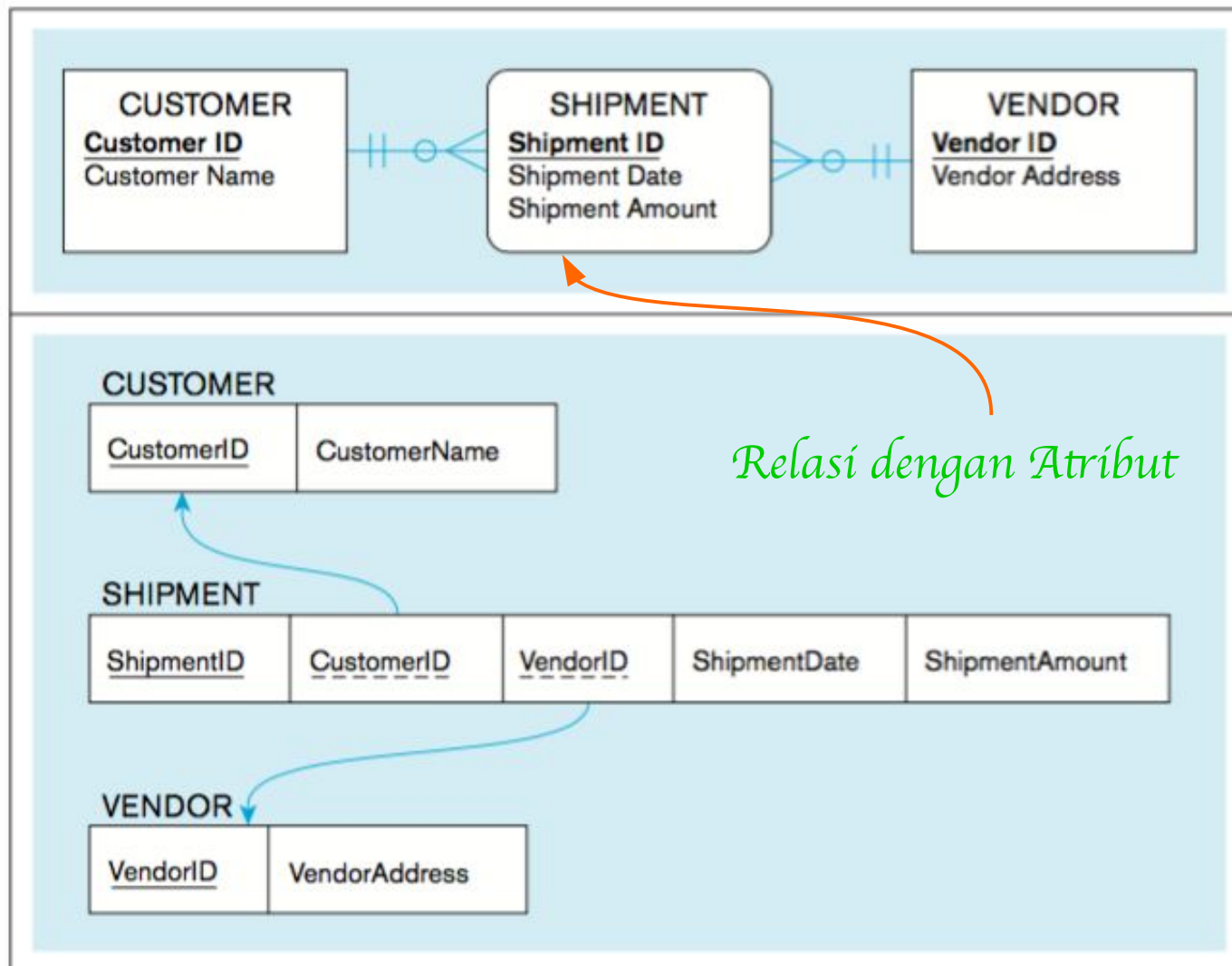
<u>Kode_Prodi</u>	Nama_Prodi	No_Dosen	Tanggal_penugasan
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Relasi
PROGRA
M STUDI

Pemetaan Entitas Asosiatif

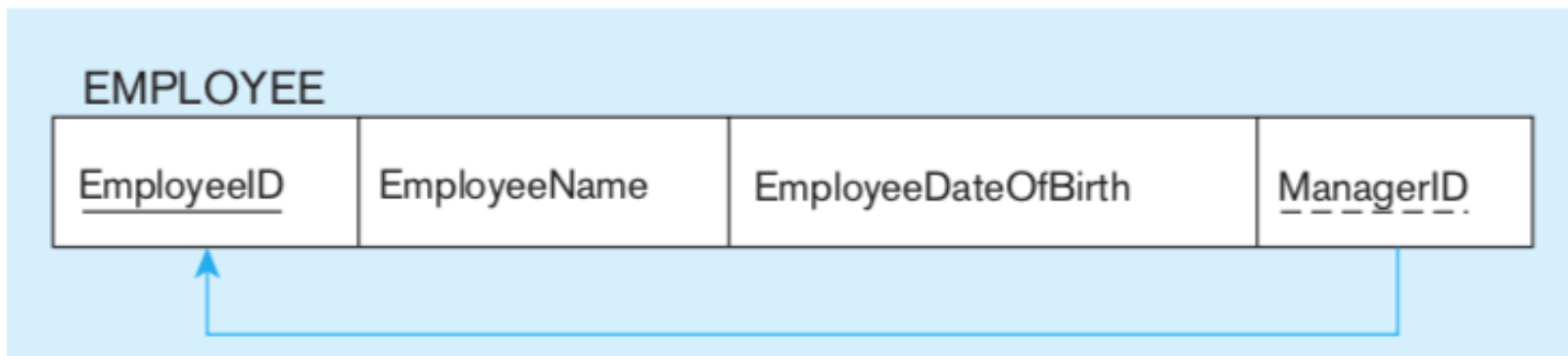
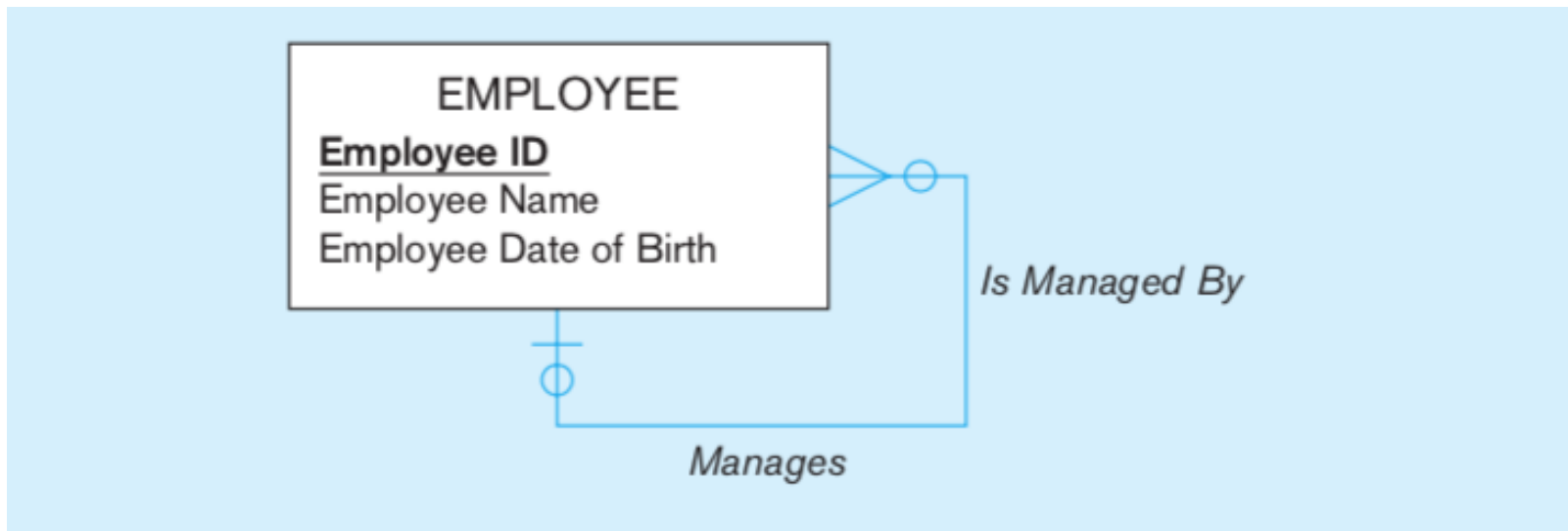


Pemetaan Entitas Asosiatif

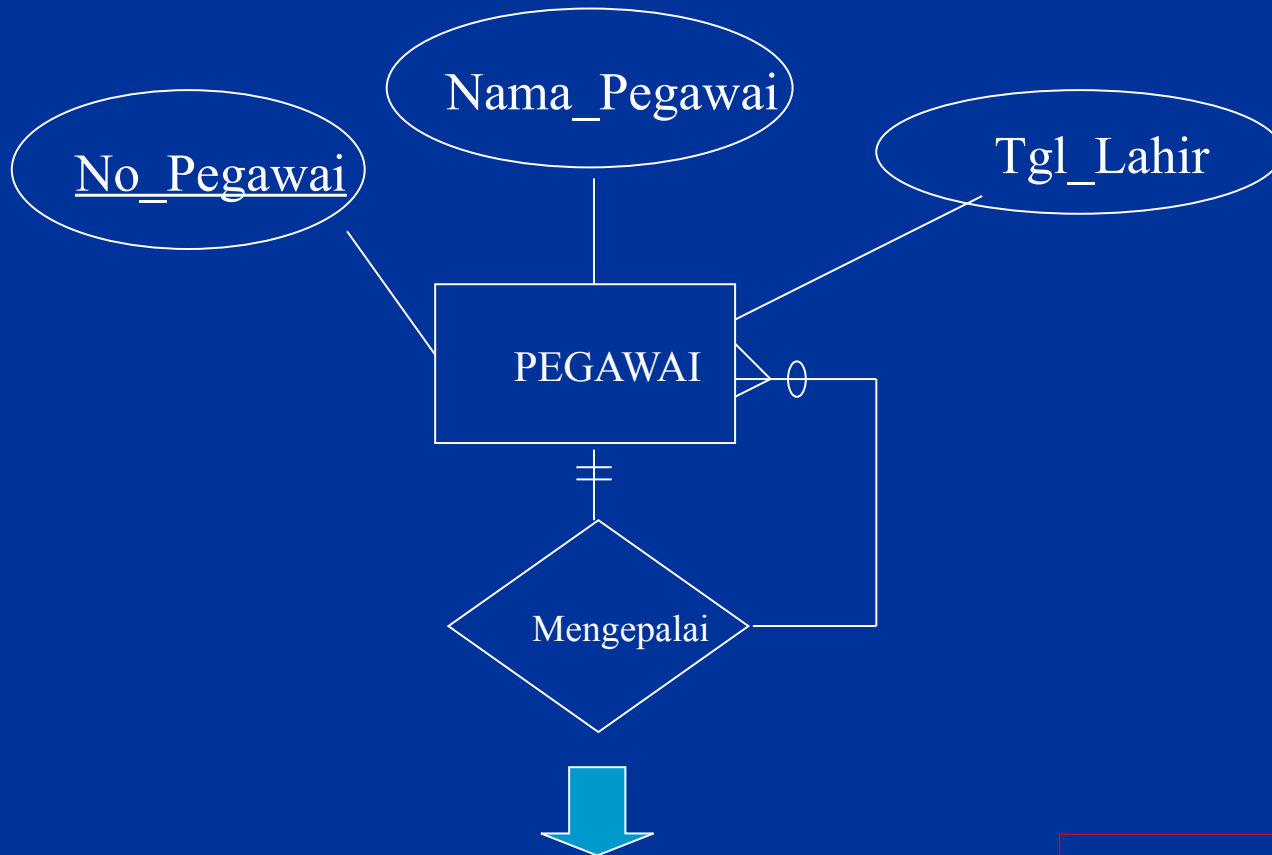


RELASY UNARY

Unary One to Many



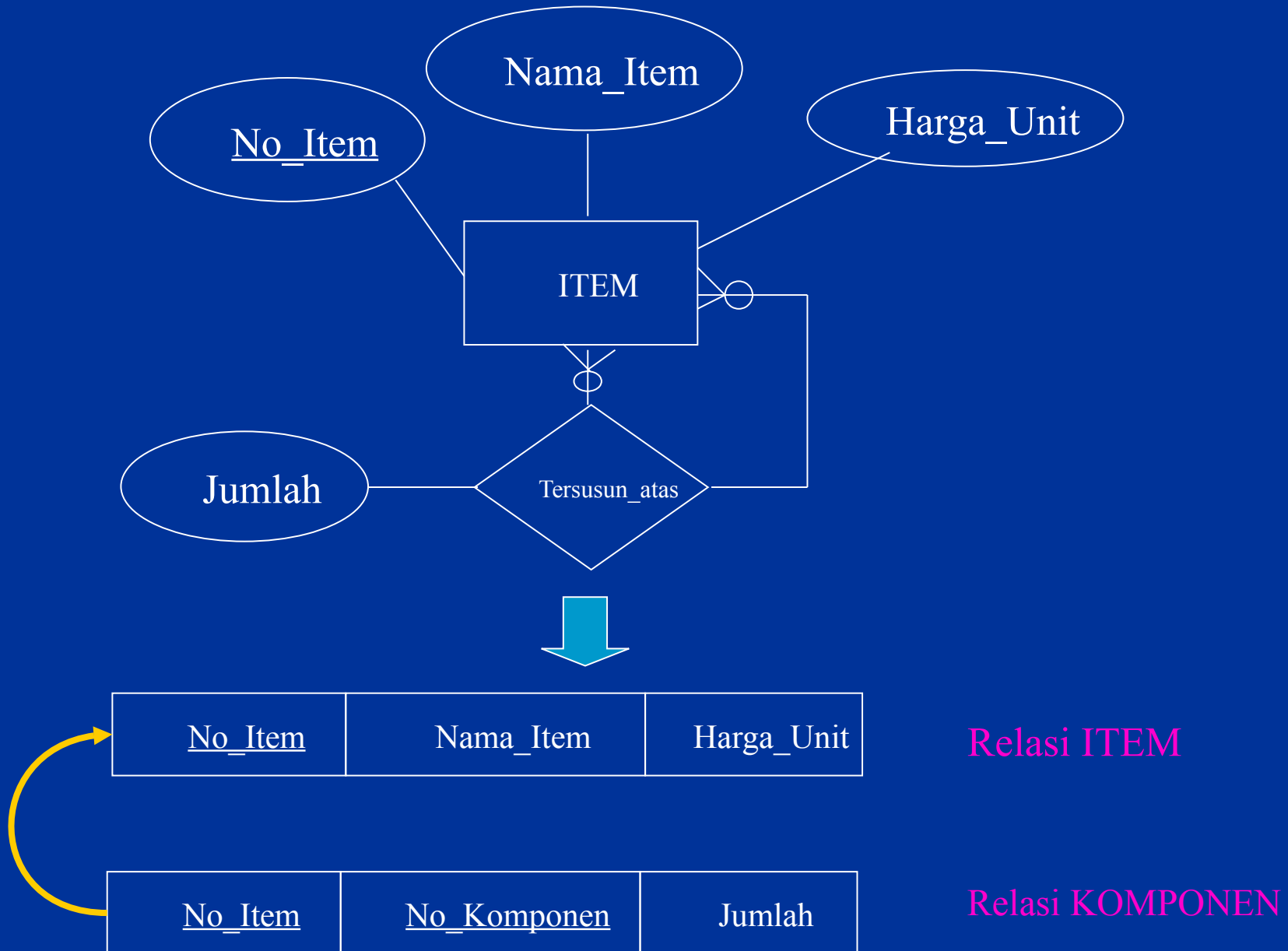
Unary One to Many



<u>No_Pegawai</u>	Nama_Pegawai	Tgl_lahir	ID_Manajer • - - - - -
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Relasi PEGAWAI

Unary Many to Many

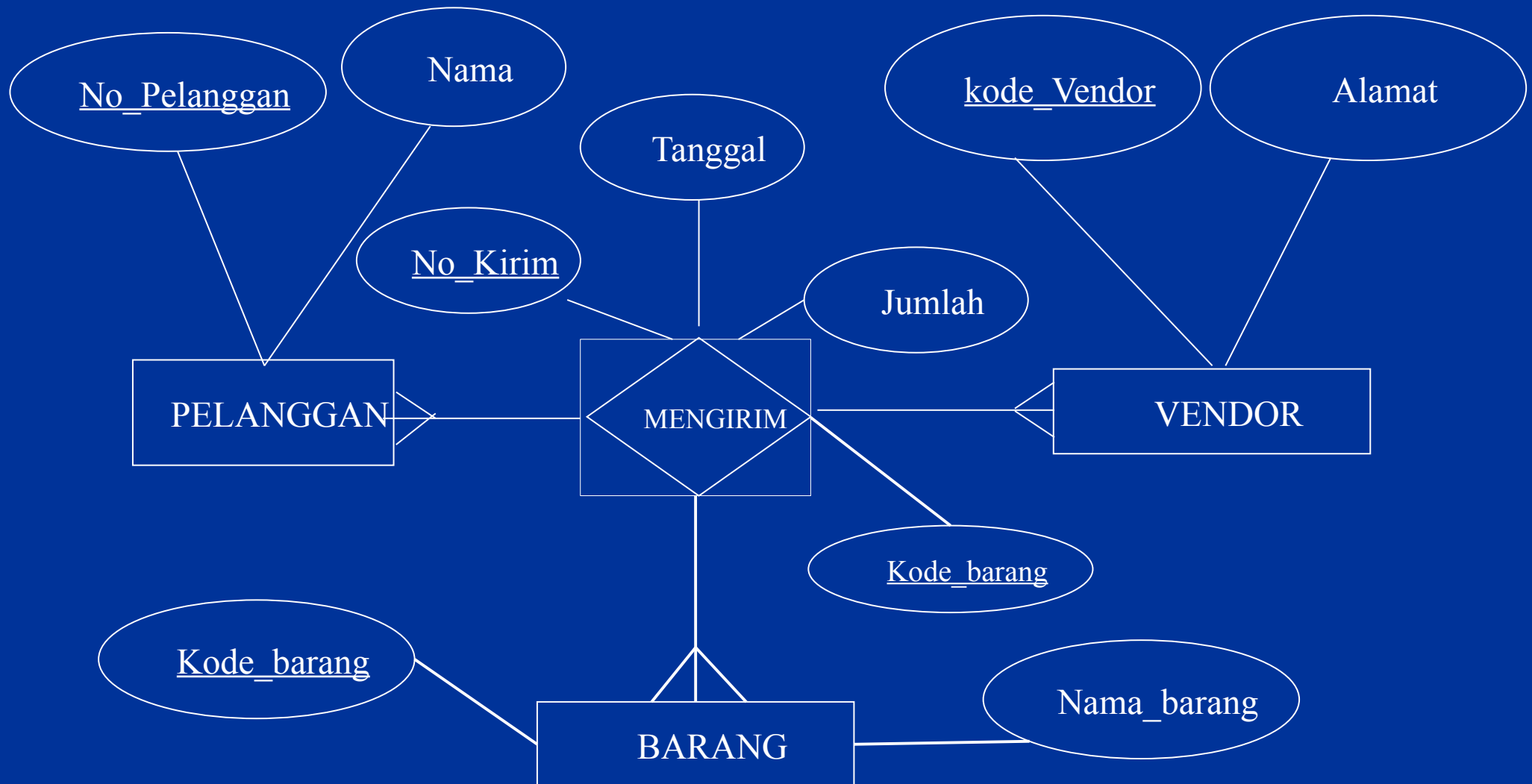


Relasi Ternary (and n-ary)

Mapping Ternary (and n-ary) Relationships

- Satu relasi/tabel untuk masing-masing entity dan satu associative entity
- Associative entity memiliki foreign keys di setiap entity pada relationship

Relasi ternary



Relasi Ternary

Relasi PELANGGAN

<u>No_Pelanggan</u>	Nama
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<u>No_Kirim</u>	Kode_barang	Tanggal	Jumlah	No_Pelanggan	Kode_Vendor
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Relasi
PENGIRIMA
N

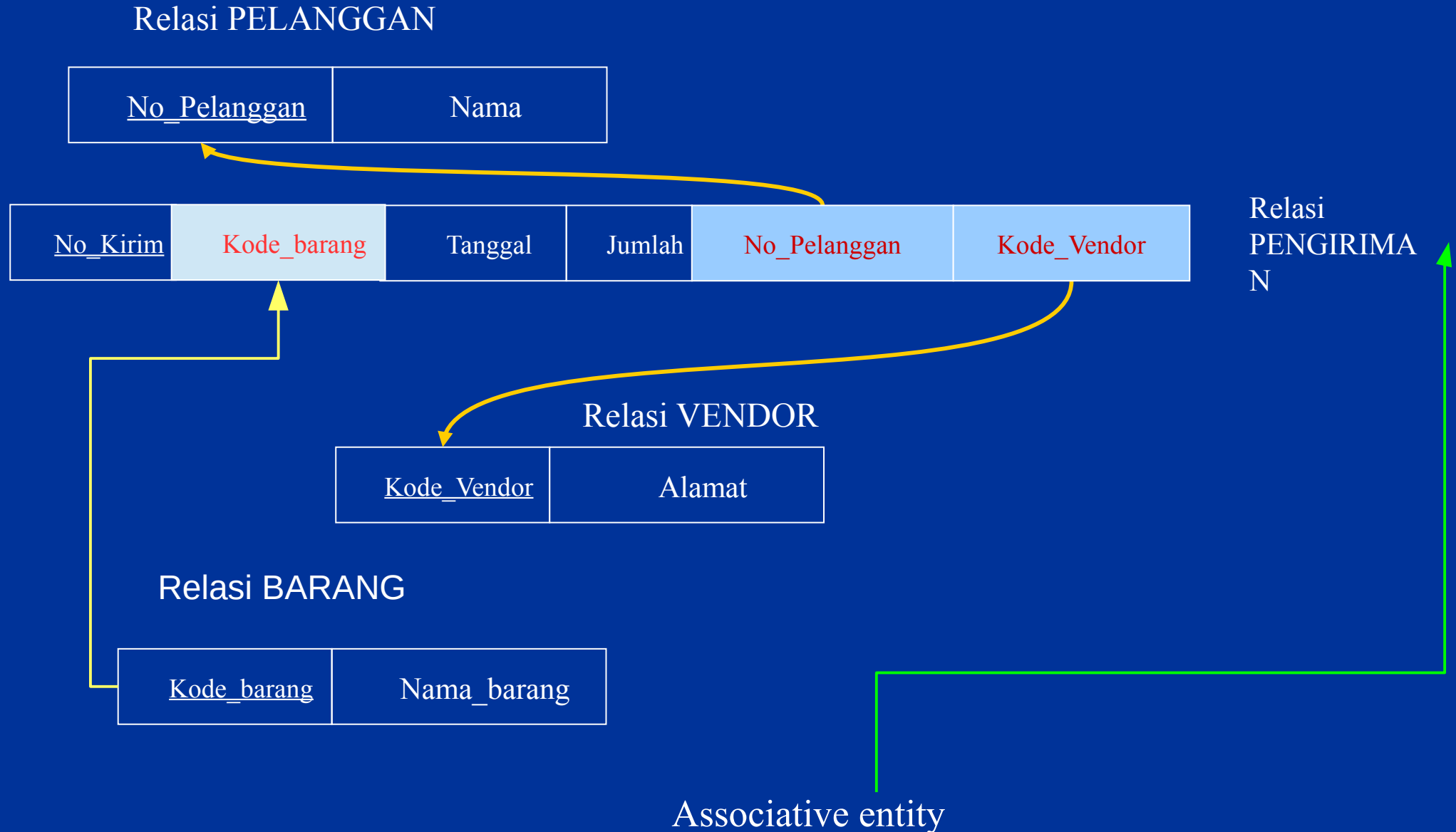
Relasi VENDOR

<u>Kode_Vendor</u>	Alamat
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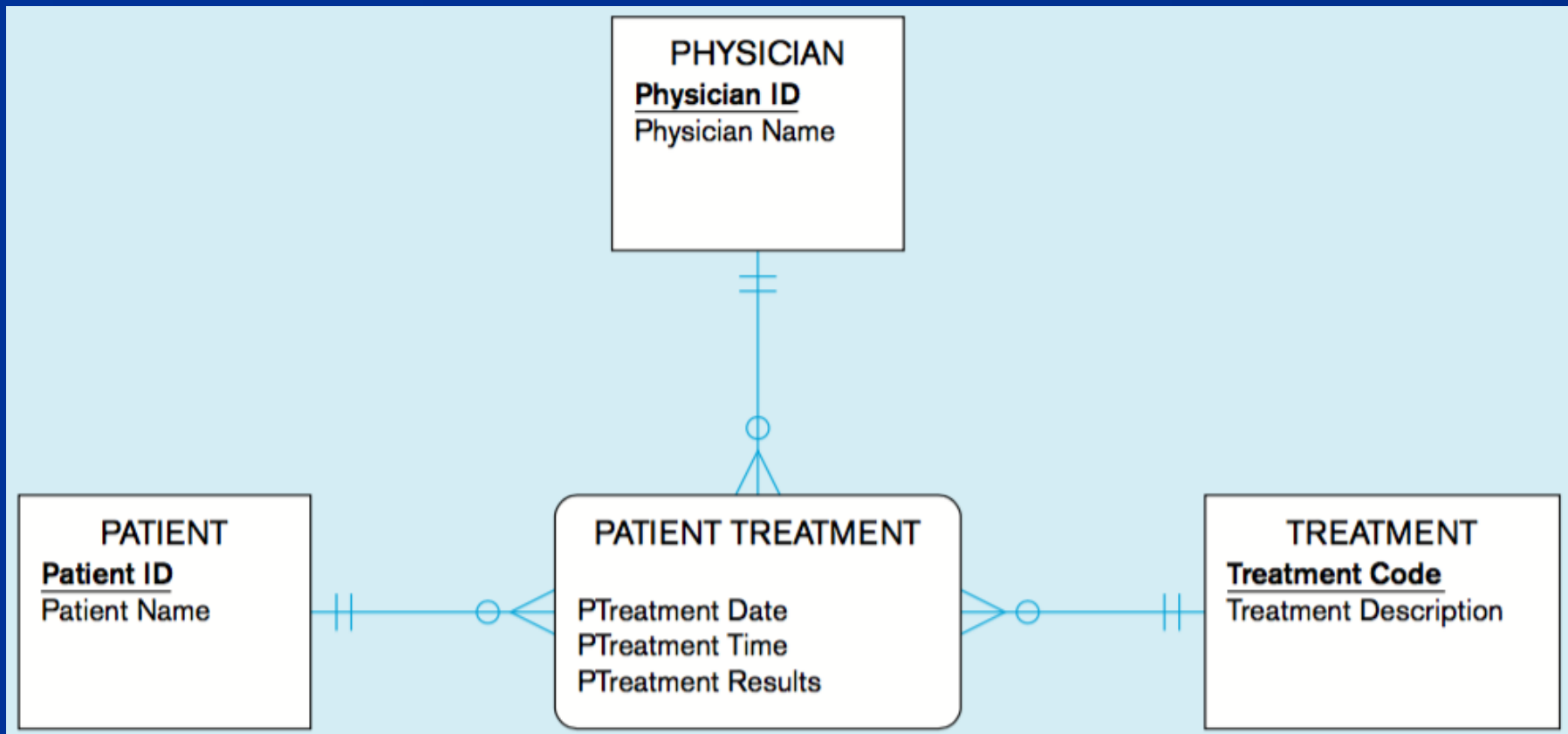
Relasi BARANG

<u>Kode_barang</u>	Nama_barang
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Associative entity

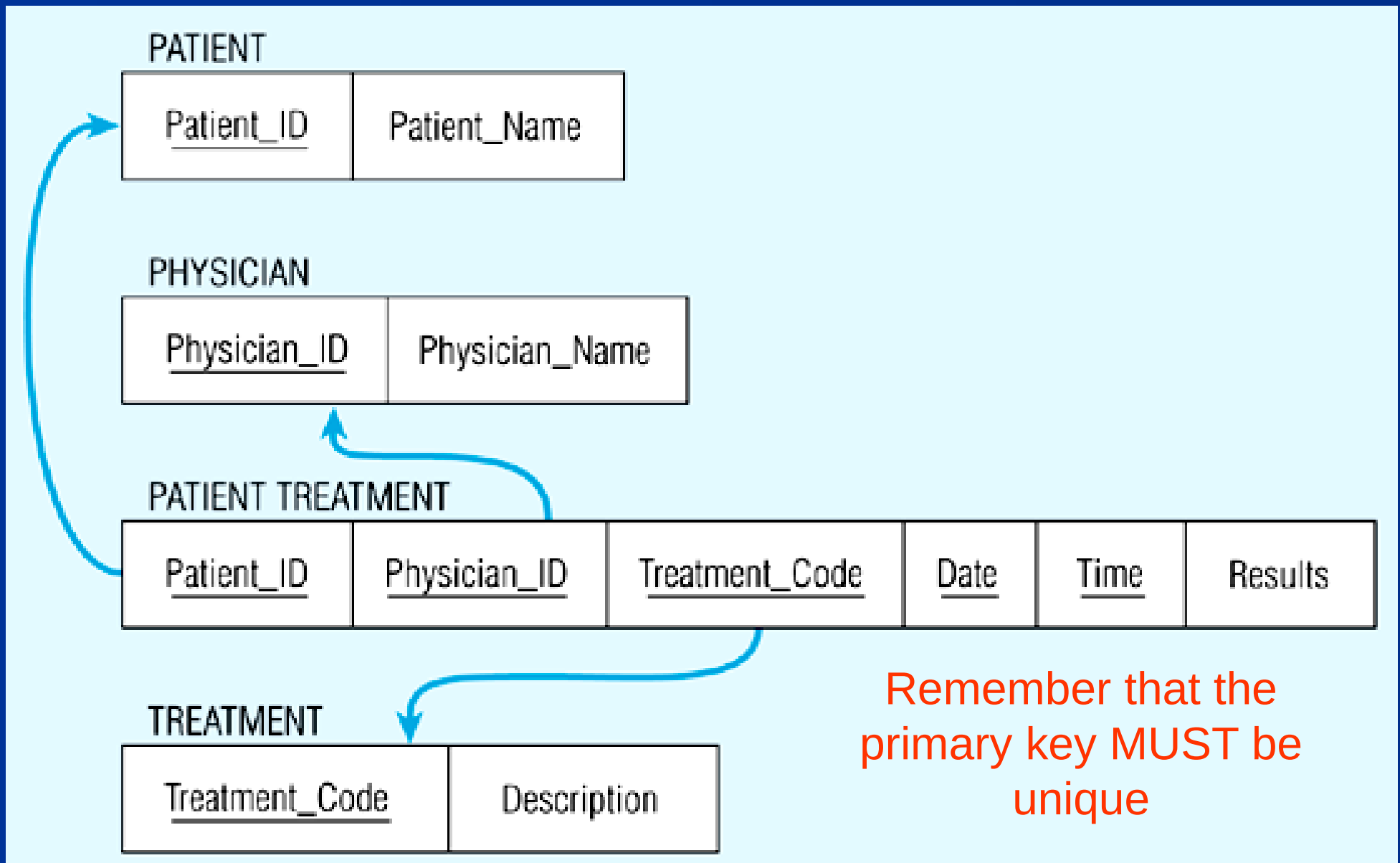


Ternary Relationship

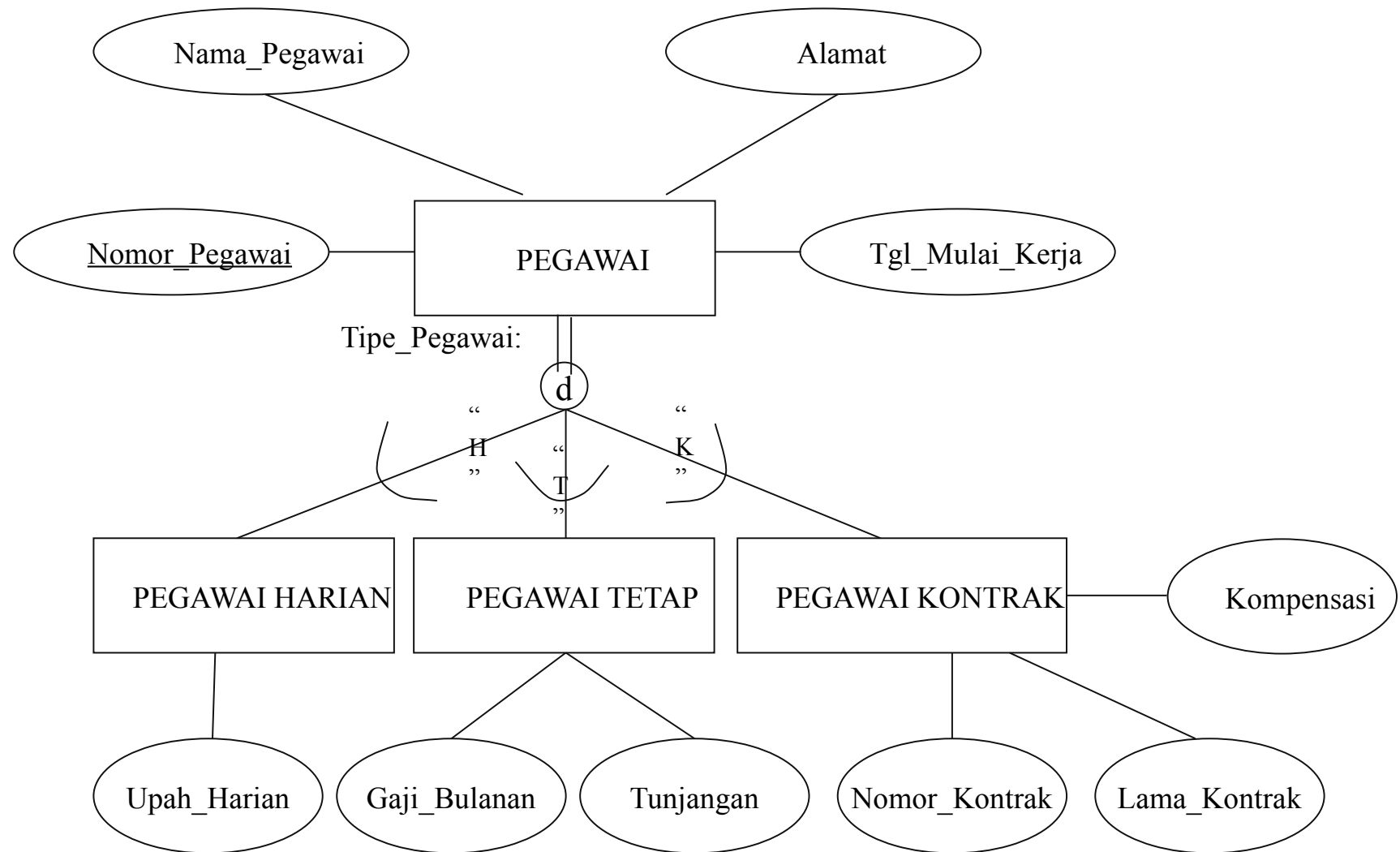


Represents : a patient receiving a treatment from a physician

Figure 5-19(b) Mapping the ternary relationship



Pemetaan Hubungan Supertipe/Subtipe



Pemetaan Hubungan Supertipe/Subtipe ...2

- Model relasional tidak mendukung hubungan supertipe/subtipe secara langsung
- Strategi pemecahan untuk kasus di depan:
 1. Buat relasi terpisah untuk masing-masing supertipe dan subtipe
 2. Berikan atribut-atribut yang umum (termasuk kunci primer) ke supertipe
 3. Masukkan pembeda subtipe pada supertipe
 4. Tambahkan kunci primer pada supertipe ke semua subtipe

Solusi Pemetaan Hubungan Supertipe/Subtipe

