

STA261

MANAJEMEN DATA RELASIONAL

Model Data Relasional

DEPARTEMEN STATISTIKA
FAKULTAS MATEMATIKA DAN ILMU PENGETAHUAN ALAM
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Relational Data model

- Introduced by Ted Codd of IBM Research in 1970
- The model uses the concept of a mathematical relation
- First commercial implementations available in early 1980s by IBM and Oracle
- Has been implemented in a large number of commercial system
- Popular Relational DBMS: Oracle, DB2, MySQL, PostgreSQL, **SQLite**
- Preceded by hierarchical and network models

Relational Model Concept

- Represents database as a collection of relations
- Each relation resembles a table of values
 - Row
 - ✓ Represents a collection of related data values
 - ✓ Represents a fact that typically corresponds to a real world entity or relationship
 - Table name and column names
 - ✓ Interpret the meaning of the values in each row
 - Formal Terminology
 - ✓ Row → Tuple
 - ✓ Column header → Attribute
 - ✓ Table → Relation

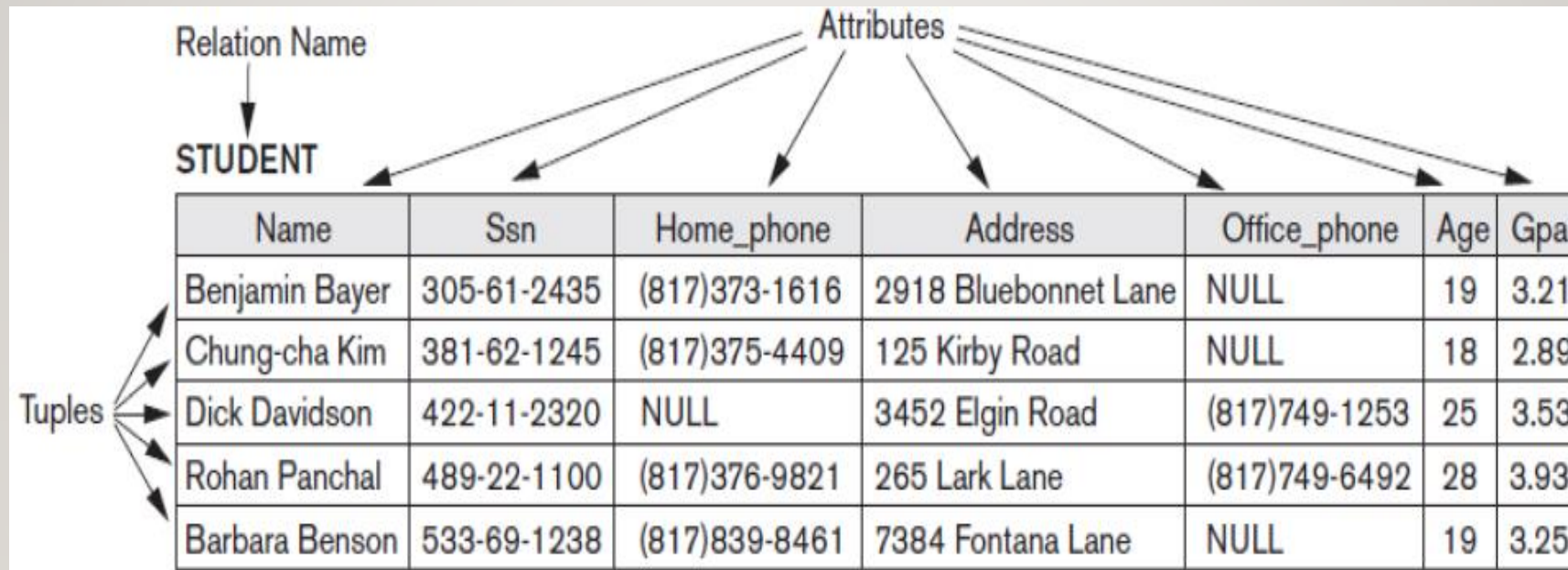


Figure 5.1 The attributes and tuples of a relation STUDENT

Equivalent Terminology

<i>Formal (Relational Model)</i>	<i>Non Formal</i>
<i>Relation</i>	<i>Table (File)</i>
<i>Tuple</i>	<i>Row (Record)</i>
<i>Attribute</i>	<i>Column Header (Field)</i>
<i>Domain</i>	<i>All possible column values</i>
<i>Schema of a relation</i>	<i>Table definition</i>
<i>State of the relation</i>	<i>Populated table</i>

Characteristics of Relations

- Ordering of **tuples in a relation**
 - Relation defined as a set of tuples
 - Elements have no order among them

STUDENT						
Name	Ssn	Home_phone	Address	Office_phone	Age	Gpa
Dick Davidson	422-11-2320	NULL	3452 Elgin Road	(817)749-1253	25	3.53
Barbara Benson	533-69-1238	(817)839-8461	7384 Fontana Lane	NULL	19	3.25
Rohan Panchal	489-22-1100	(817)376-9821	265 Lark Lane	(817)749-6492	28	3.93
Chung-cha Kim	381-62-1245	(817)375-4409	125 Kirby Road	NULL	18	2.89
Benjamin Bayer	305-61-2435	(817)373-1616	2918 Bluebonnet Lane	NULL	19	3.21

Characteristics of Relations

- Ordering of **values within a tuple**
 - Order of attributes and values is not important
 - As long as correspondence between attributes and values maintained
- Alternative definition of a relation
 - Tuple considered as a set of (<attribute>, <value>) pairs
 - Each pair gives the value of the mapping from an attribute A_i to a value v_i from $\text{dom}(A_i)$

Relational Model Constraints

- Classification of *Relational Integrity Constraints*
 - Key constraint
 - Entity integrity constraint
 - Referential Integrity constraint
 - Domain constraint

Key Constraints and Constraints on NULL Values

Key Constraints : **No two tuples** can have the same combination of values for all their attributes.

- **Superkey (SK)**
an attribute or set of attributes that guarantee that **no two distinct** tuples R can have the same value for SK

Key Constraints and Constraints on NULL Values

Key Constraints : No two tuples can have the same combination of values for all their attributes.

- **Key**
 - Superkey of R
 - Key satisfies two properties:
 1. Two distinct tuples in any state of relation **cannot** have identical values for (all) attributes in key
 2. Minimal superkey : cannot be removed and still have **uniqueness** constraint

Key Constraints and Constraints on NULL Values

Key Constraints : No two tuples can have the same combination of values for all their attributes.

- **Candidate key**
Relation schema may have more than one key
- **Primary key** of the relation
Designated among candidate keys
Underline attribute

SSN	FName	LName	BirthDate	Sex	Address
0606007800	Ahmad	Zakky	10-4-87	L	Jakarta
0607001123	Gede	Saraswati	19-9-87	P	Denpasar
0607120012	Bayu	Wirawan	12-12-86	L	Jimbaran
0607121023	Satya	Wirawan	12-12-86	L	Jimbaran
0607131240	Fira	Bahira	1-3-87	P	Jakarta
0607132222	Nayla	Putri	1-9-86	P	Depok

Super key: SSN, {SSN, Lname}, {FName, BirthDate}, {FName, Sex}, ...

Candidate key: SSN, FName

Primary Key: SSN

Alternate Key: FName

CAR

<u>License_number</u>	Engine_serial_number	Make	Model	Year
Texas ABC-739	A69352	Ford	Mustang	02
Florida TVP-347	B43696	Oldsmobile	Cutlass	05
New York MPO-22	X83554	Oldsmobile	Delta	01
California 432-TFY	C43742	Mercedes	190-D	99
California RSK-629	Y82935	Toyota	Camry	04
Texas RSK-629	U028365	Jaguar	XJS	04

Figure 5.4 The CAR relation, with two candidate keys: License_number and Engine_serial_number

Relational database schema

EMPLOYEE

Fname	Minit	Lname	<u>Ssn</u>	Bdate	Address	Sex	Salary	Super_ssn	Dno
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DEPARTMENT

Dname	<u>Dnumber</u>	Mgr_ssn	Mgr_start_date
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DEPT_LOCATIONS

<u>Dnumber</u>	<u>Dlocation</u>
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PROJECT

Pname	<u>Pnumber</u>	Plocation	Dnum
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WORKS_ON

<u>Essn</u>	<u>Pno</u>	Hours
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DEPENDENT

<u>Essn</u>	<u>Dependent_name</u>	Sex	Bdate	Relationship
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Figure 5.5

Schema diagram for the COMPANY relational database schema.

Integrity, Referential Integrity, and Foreign Keys

- **Entity integrity constraint**

No primary key value can be **NULL**

- **Referential integrity constraint**

Specified between two relations

Maintains consistency among tuples in two relations

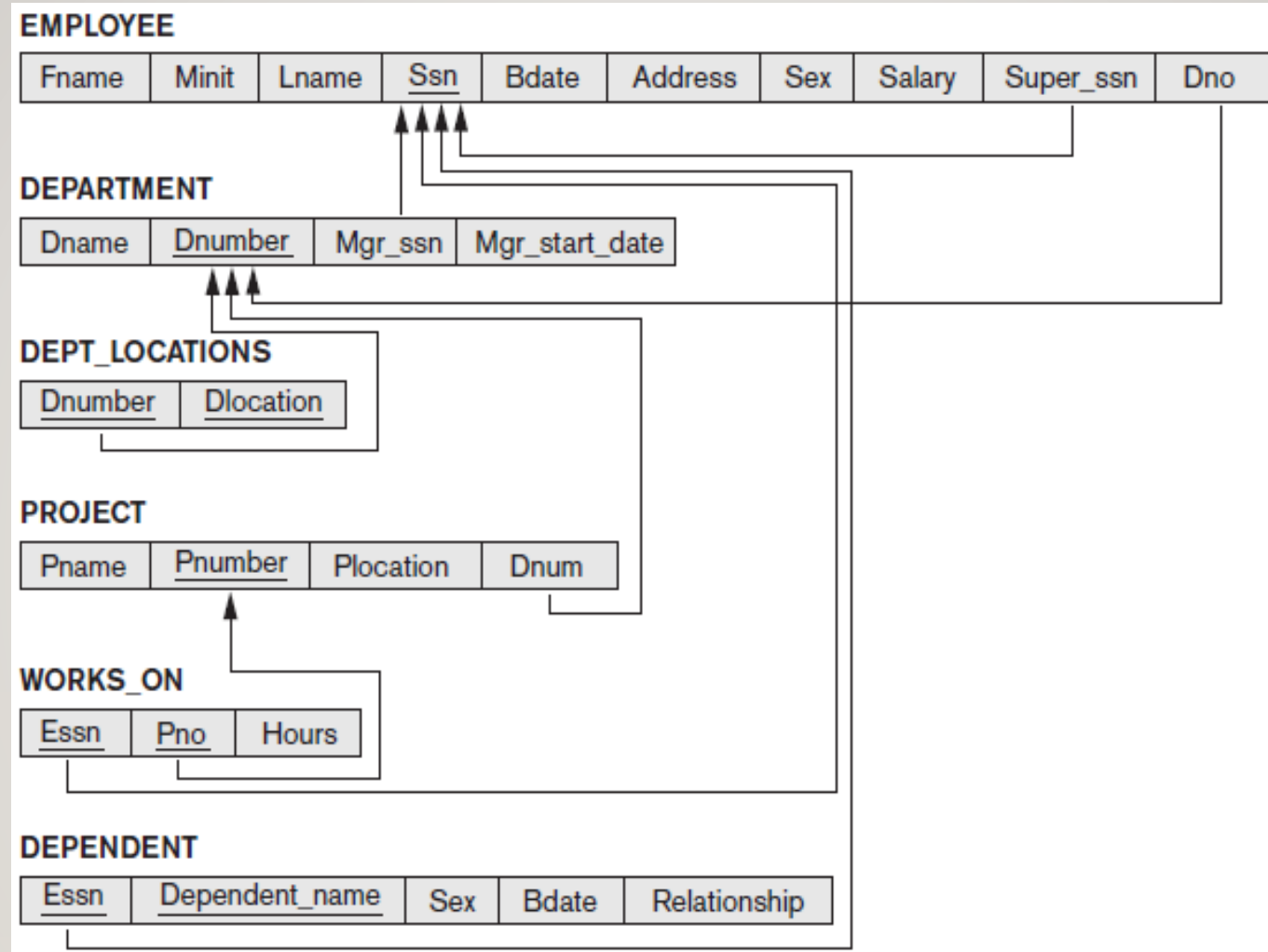
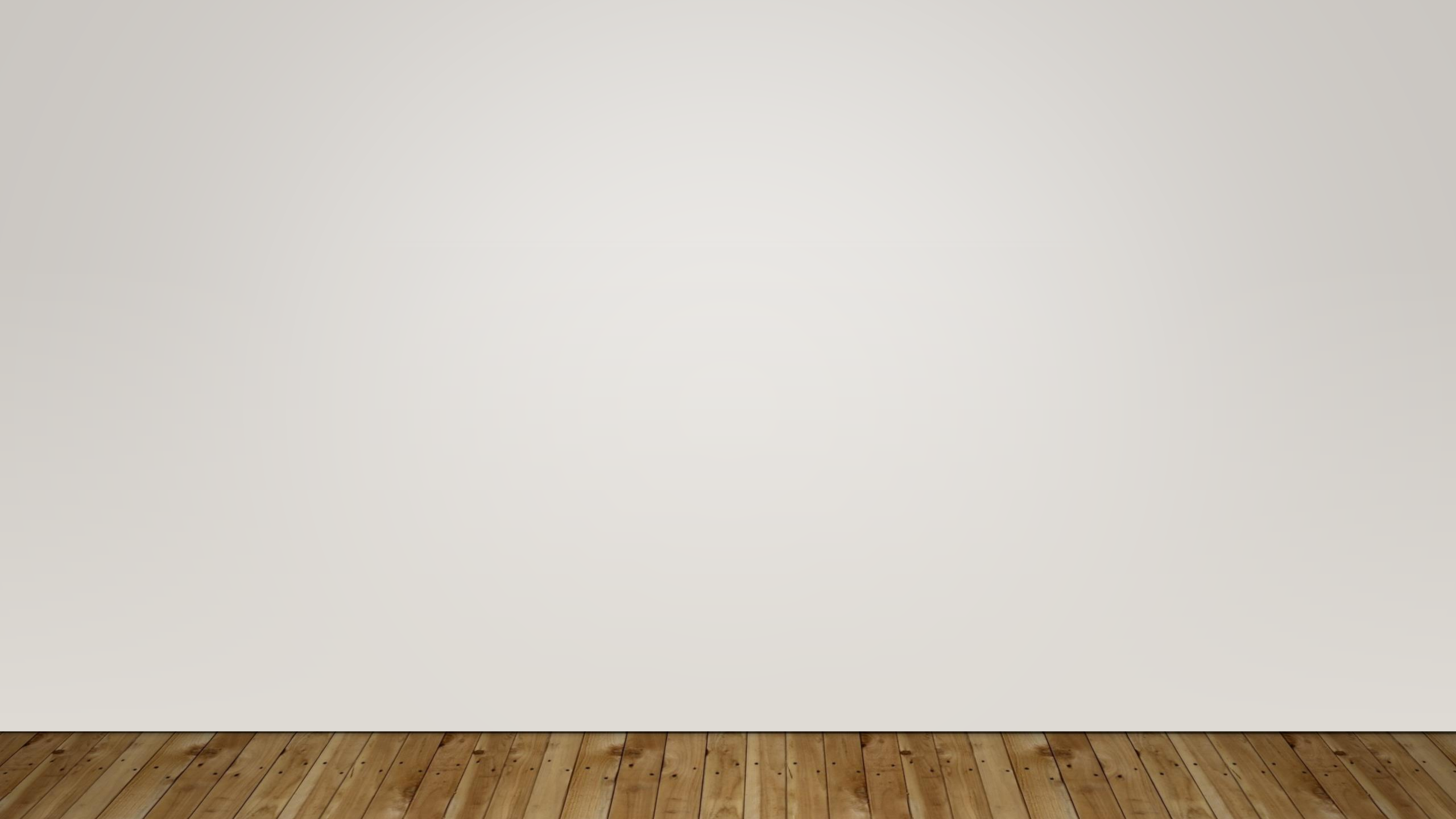


Figure 5.7 Referential integrity constraints displayed on the COMPANY relational database schema



Diketahui:

Basis data yang memproses order (pemesanan) pada sebuah perusahaan memiliki 6 relasi berikut:

CUSTOMER (Cust#, Cname, City)

ORDER (Order#, Odate, Cust#, Ord_Amt)

ORDER_ITEM (Order#, Item#, Qty)

ITEM (Item#, Unit_price)

SHIPMENT (Order#, Warehouse#, Ship_date)

WAREHOUSE (Warehouse#, City)

1. Ord_Amt mengacu pada jumlah harga pada satu kali order.
 2. Odate menyatakan tanggal pemesanan dilakukan
 3. Ship_date menyatakan tanggal pengiriman barang yang dipesan customer dari gudang.
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- a) Buatlah **entity relationship** untuk basis data tersebut.
 - b) Buatlah **referential integrity constraints** untuk basis data tersebut.
Asumsikan bahwa suatu order dapat mengambil barang dari beberapa gudang (warehouse).
Nyatakan **foreign key** yang mungkin untuk skema basis data ini.

Model Data Relasional