Database Management Systems

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2015 – 2016

Points to Cover

- Objectives
- Three Types of Relationship
- Examples of One-to-One Relationship
- Examples of One-to-Many Relationship
- Examples of Many-to-Many Relationship
- Examples from Database – Primary Key
- Key in a table
- Primary Key & Foreign
- Examples from Database

Objectives

- Understand different type of keys in a Table.
- Understand the different type of Table relationship
- Identify the primary key and foreign key to create a relationship.

Examples of One-to-One Relationship

- A student belongs to only one Program
- A student has one and only ID
- An employee has one computer assign
- One person has one passport.
- A car model is made by one company.
- A book is published by one company.
- A software program is made by one organization.
- An apple comes from one source (a tree).

Examples of One-to-many (or many-to- one) Relationship

- A mother can have many children
- A Program could have many students enrolled
- 1 Employer has many Employees
- 1 Guitar has many Guitar Strings
- 1 Car has many Seats

Examples of Many-to-Many Relationship

- A student could take many course and a course could have many students
- An author could have many books and a book could have many author
- A music album could have many artists/performers and an artist/performer could have many albums

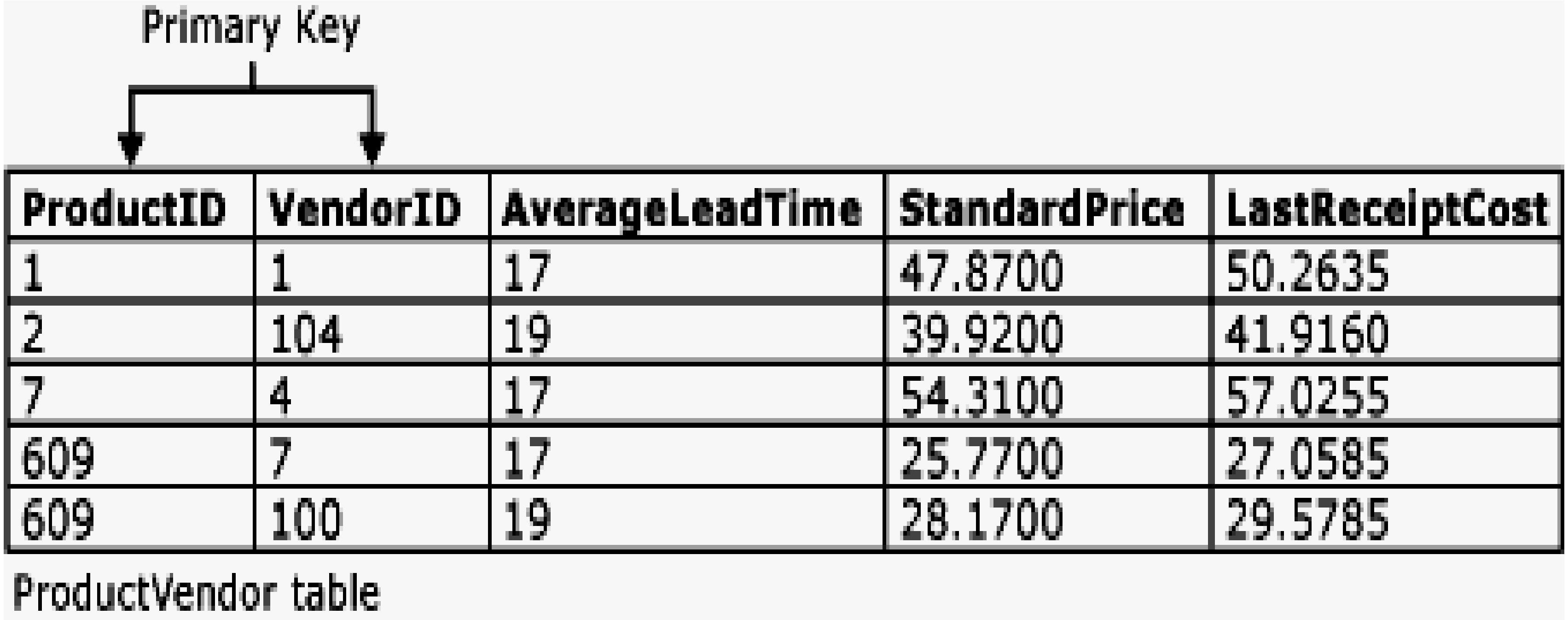
Key in a table

- A **key** in a table is a field or group of fields that creates identity, makes relationship with another table and/or make a table more efficient.

Primary Key

A table typically has a column or combination of columns that contain values that uniquely identify each row in the table. This column, or columns, is called the **primary key (PK)** of the table and enforces the entity integrity of the table. Because primary key constraints guarantee unique data, they are frequently defined on an identity column.

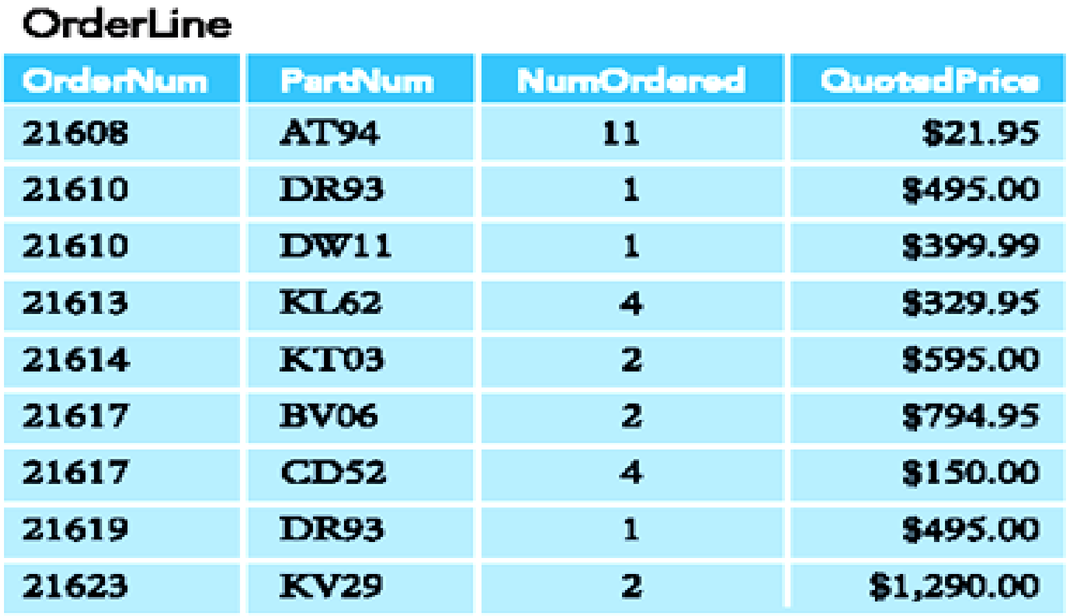
Example of Primary Key


Primary Key

ProductID	VendorID	AverageLeadTime	StandardPrice	LastReceiptCost
1	1	17	47.8700	50.2635
2	104	19	39.9200	41.9160
7	4	17	54.3100	57.0255
609	7	17	25.7700	27.0585
609	100	19	28.1700	29.5785

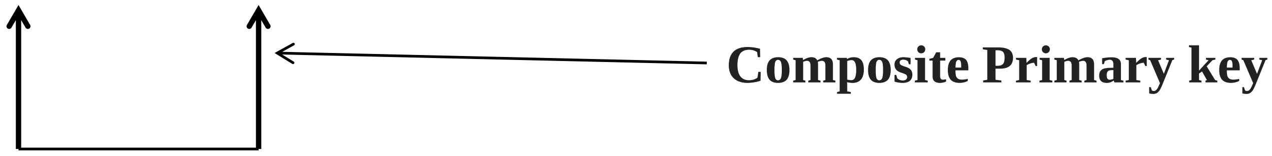
ProductVendor table

Examples Primary Key



OrderLine

OrderNum	PartNum	NumOrdered	QuotedPrice
21608	AT94	11	$21.95
21610	DR93	1	$495.00
21610	DW11	1	$399.99
21613	KL62	4	$329.95
21614	KT03	2	$595.00
21617	BV06	2	$794.95
21617	CD52	4	$150.00
21619	DR93	1	$495.00
21623	KV29	2	$1,290.00



Composite Primary key

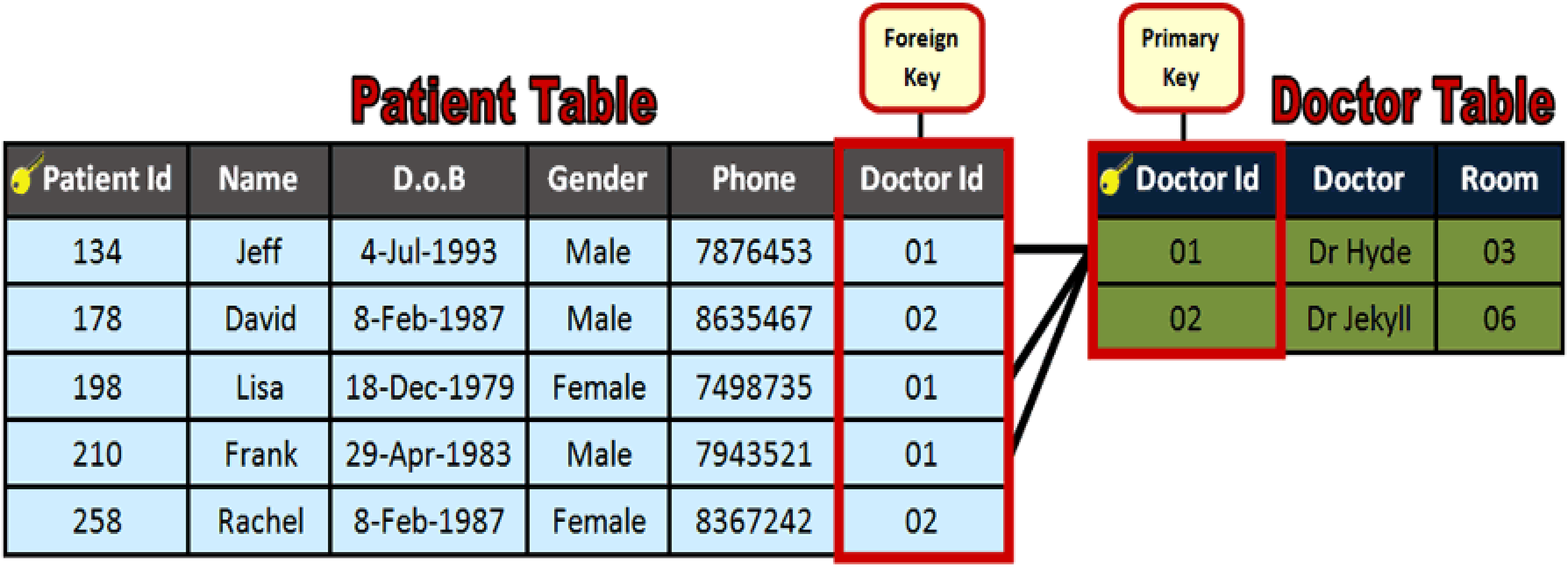
Ordernum and **Partnum** makes up the primary key
Of the OrderLine table. This is what is known as a **Composite Primary key**, that is, primary key that is made up of more than one field.

Foreign Key

In context of relational **databases**, a **foreign key** is a field (or collection of fields) in one table that uniquely identifies a row of another table. In simpler words, the **foreign key** is defined in a second table, but it refers to the primary **key** in the first table. It is normally denoted with its first two letters, namely, **FK**.

FK , A field that defines the relationship between 2 tables

Examples Foreign Key



Patient Table

Foreign Key

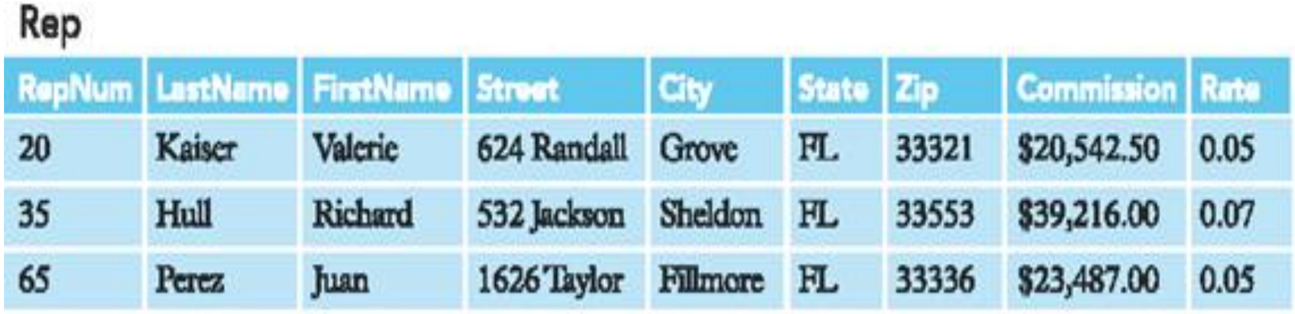
🔑 Patient Id	Name	D.o.B	Gender	Phone	Doctor Id
134	Jeff	4-Jul-1993	Male	7876453	01
178	David	8-Feb-1987	Male	8635467	02
198	Lisa	18-Dec-1979	Female	7498735	01
210	Frank	29-Apr-1983	Male	7943521	01
258	Rachel	8-Feb-1987	Female	8367242	02

Primary Key

Doctor Table

🔑 Doctor Id	Doctor	Room
01	Dr Hyde	03
02	Dr Jekyll	06

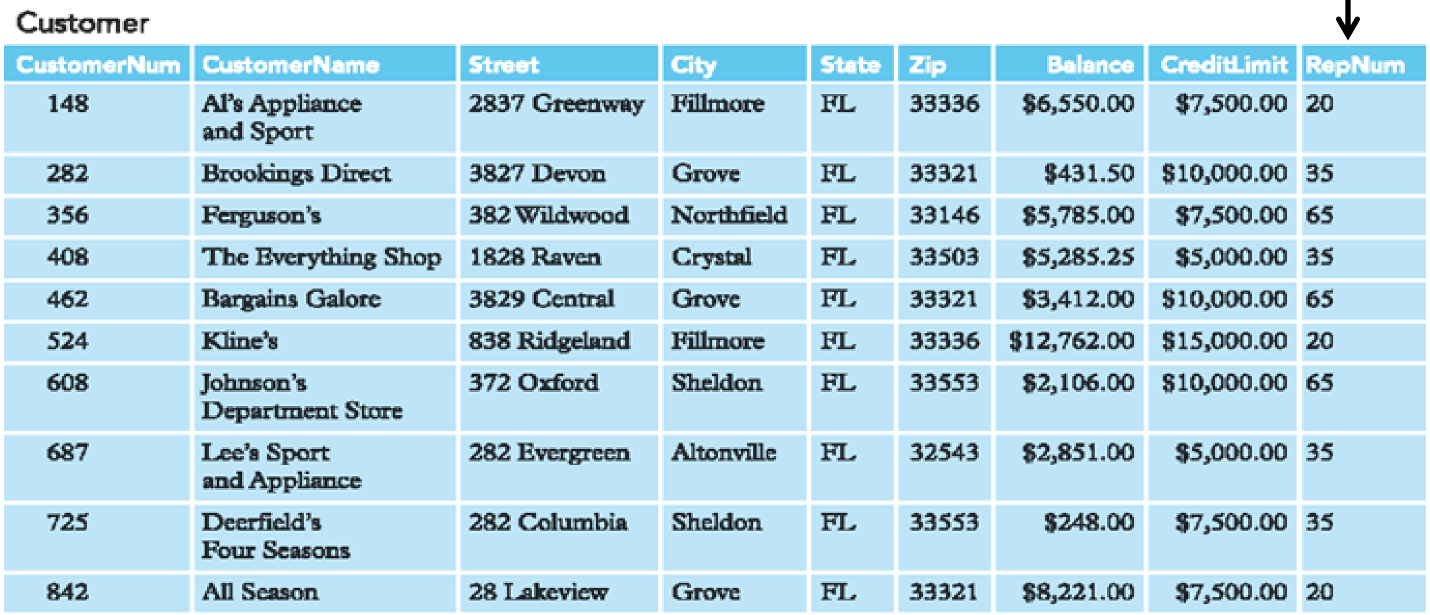
Example of Foreign Key



Rep

RepNum	LastName	FirstName	Street	City	State	Zip	Commission	Rate
20	Kaiser	Valerie	624 Randall	Grove	FL	33321	$20,542.50	0.05
35	Hull	Richard	532 Jackson	Sheldon	FL	33553	$39,216.00	0.07
65	Perez	Juan	1626 Taylor	Fillmore	FL	33336	$23,487.00	0.05

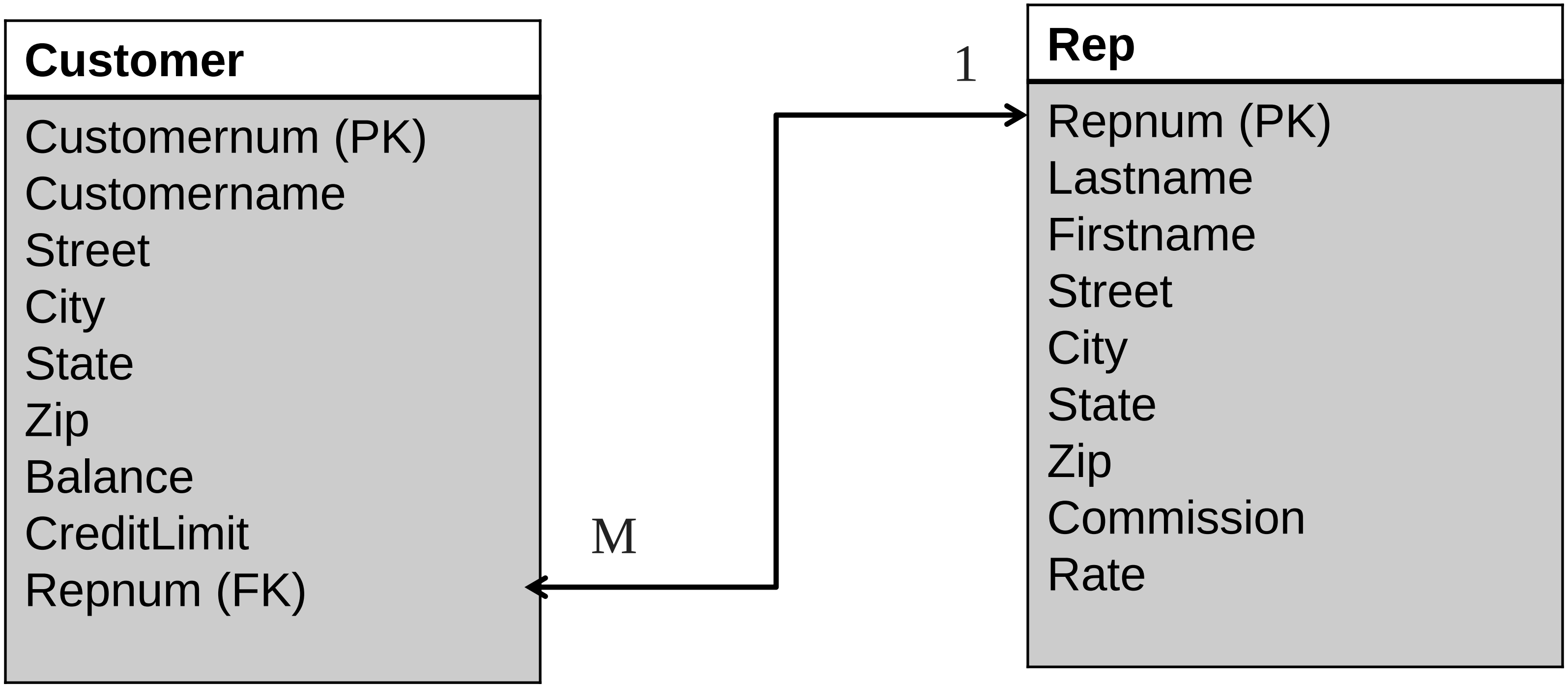
Repnum is a *Foreign key* borrowed from Rep table



Customer

CustomerNum	CustomerName	Street	City	State	Zip	Balance	CreditLimit	RepNum
148	Al's Appliance and Sport	2837 Greenway	Fillmore	FL	33336	$6,550.00	$7,500.00	20
282	Brookings Direct	3827 Devon	Grove	FL	33321	$431.50	$10,000.00	35
356	Ferguson's	382 Wildwood	Northfield	FL	33146	$5,785.00	$7,500.00	65
408	The Everything Shop	1828 Raven	Crystal	FL	33503	$5,285.25	$5,000.00	35
462	Bargains Galore	3829 Central	Grove	FL	33321	$3,412.00	$10,000.00	65
524	Kline's	838 Ridgeland	Fillmore	FL	33336	$12,762.00	$15,000.00	20
608	Johnson's Department Store	372 Oxford	Sheldon	FL	33553	$2,106.00	$10,000.00	65
687	Lee's Sport and Appliance	282 Evergreen	Altonville	FL	32543	$2,851.00	$5,000.00	35
725	Deerfield's Four Seasons	282 Columbia	Sheldon	FL	33553	$248.00	$7,500.00	35
842	All Season	28 Lakeview	Grove	FL	33321	$8,221.00	$7,500.00	20

Notation example



Customer

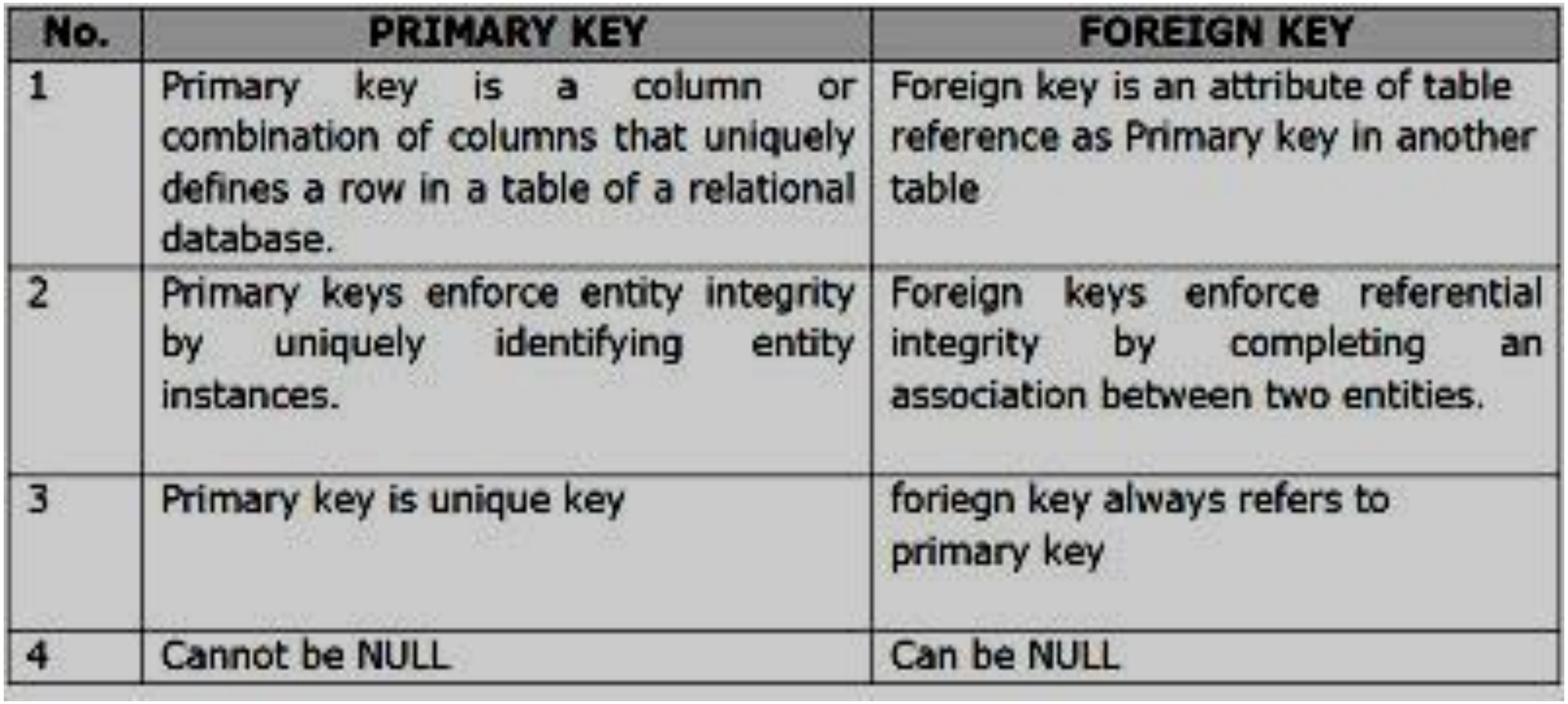
Customernum (PK)
Customername
Street
City
State
Zip
Balance
CreditLimit
Repnum (FK)

Rep

Repnum (PK)
Lastname
Firstname
Street
City
State
Zip
Commission
Rate

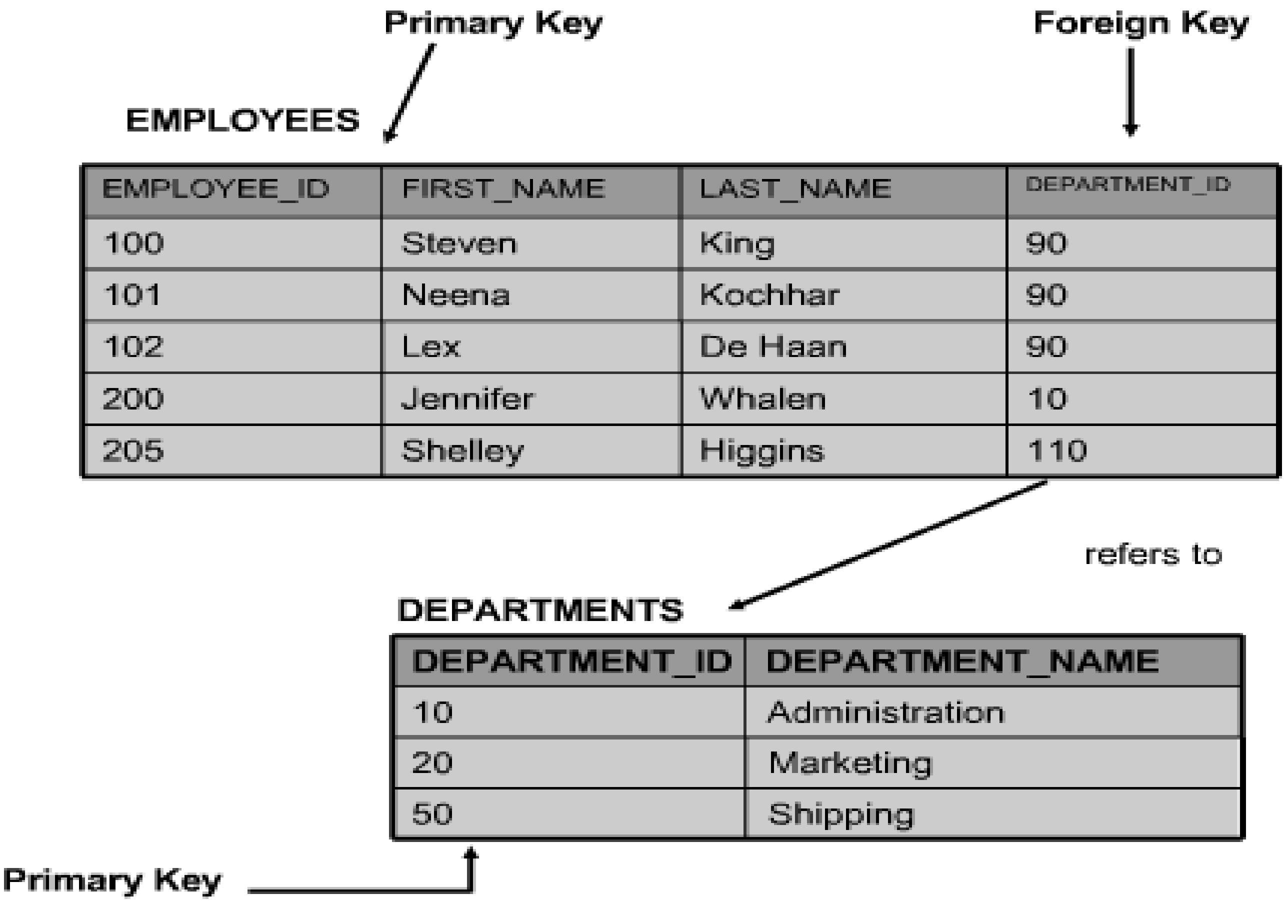
- One Rep could have one or more customer (one to many) using Primary and foreign key to create the relationship.

Foreign Key vs Primary Key



No.	PRIMARY KEY	FOREIGN KEY
1	Primary key is a column or combination of columns that uniquely defines a row in a table of a relational database.	Foreign key is an attribute of table reference as Primary key in another table
2	Primary keys enforce entity integrity by uniquely identifying entity instances.	Foreign keys enforce referential integrity by completing an association between two entities.
3	Primary key is unique key	foriegn key always refers to primary key
4	Cannot be NULL	Can be NULL

Foreign Key vs Primary Key



Primary Key

Foreign Key

EMPLOYEES

EMPLOYEE_ID	FIRST_NAME	LAST_NAME	DEPARTMENT_ID
100	Steven	King	90
101	Neena	Kochhar	90
102	Lex	De Haan	90
200	Jennifer	Whalen	10
205	Shelley	Higgins	110

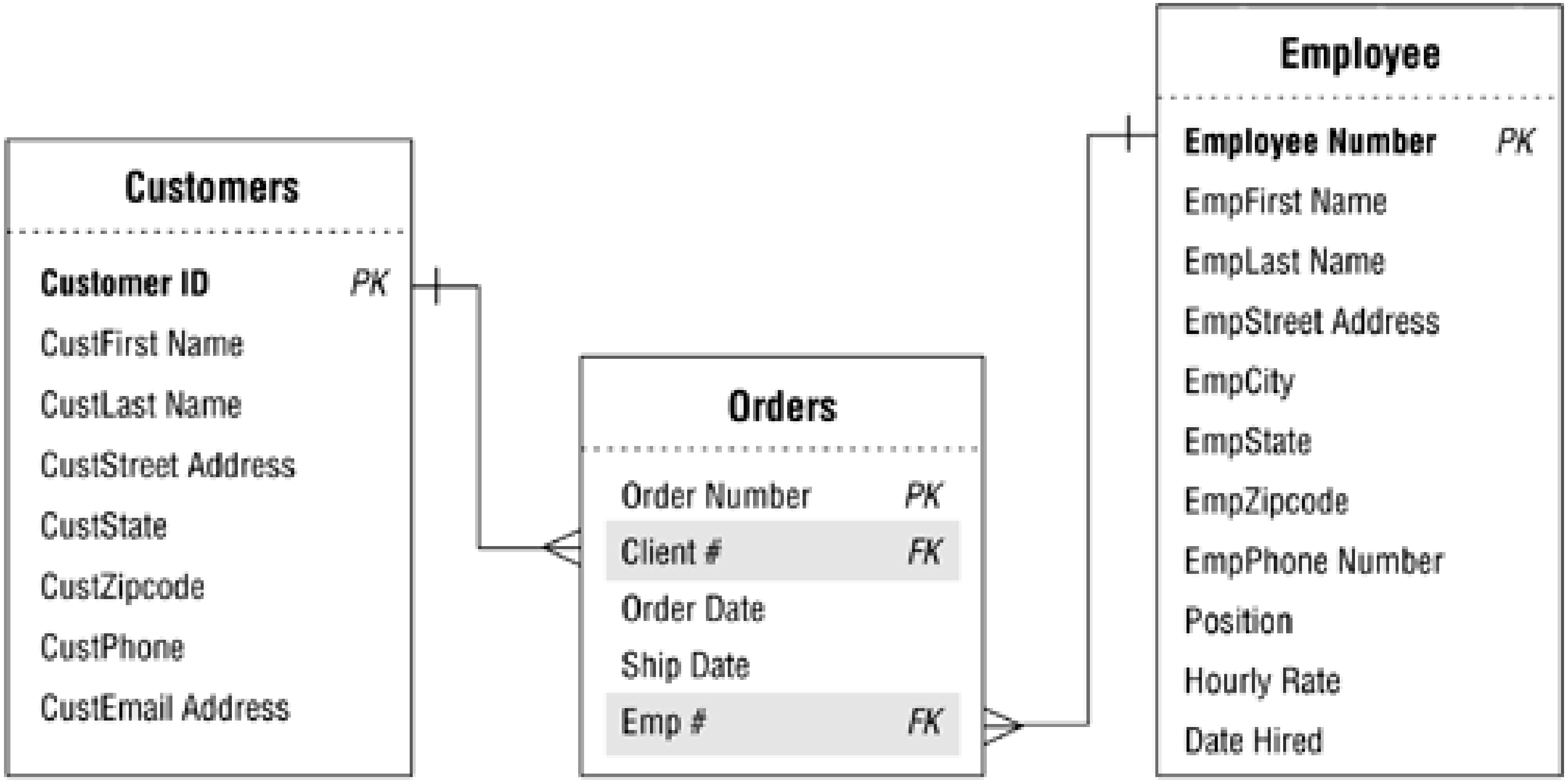
refers to

DEPARTMENTS

DEPARTMENT_ID	DEPARTMENT_NAME
10	Administration
20	Marketing
50	Shipping

Primary Key

Foreign Key vs Primary Key



Customers

Customer ID PK
CustFirst Name
CustLast Name
CustStreet Address
CustState
CustZipcode
CustPhone
CustEmail Address

Orders

Order Number PK
Client # FK
Order Date
Ship Date
Emp # FK

Employee

Employee Number PK
EmpFirst Name
EmpLast Name
EmpStreet Address
EmpCity
EmpState
EmpZipcode
EmpPhone Number
Position
Hourly Rate
Date Hired

Super Key and Candidate Key

Super Key

A Super key is any combination of fields within a table that uniquely identifies each record within that table.

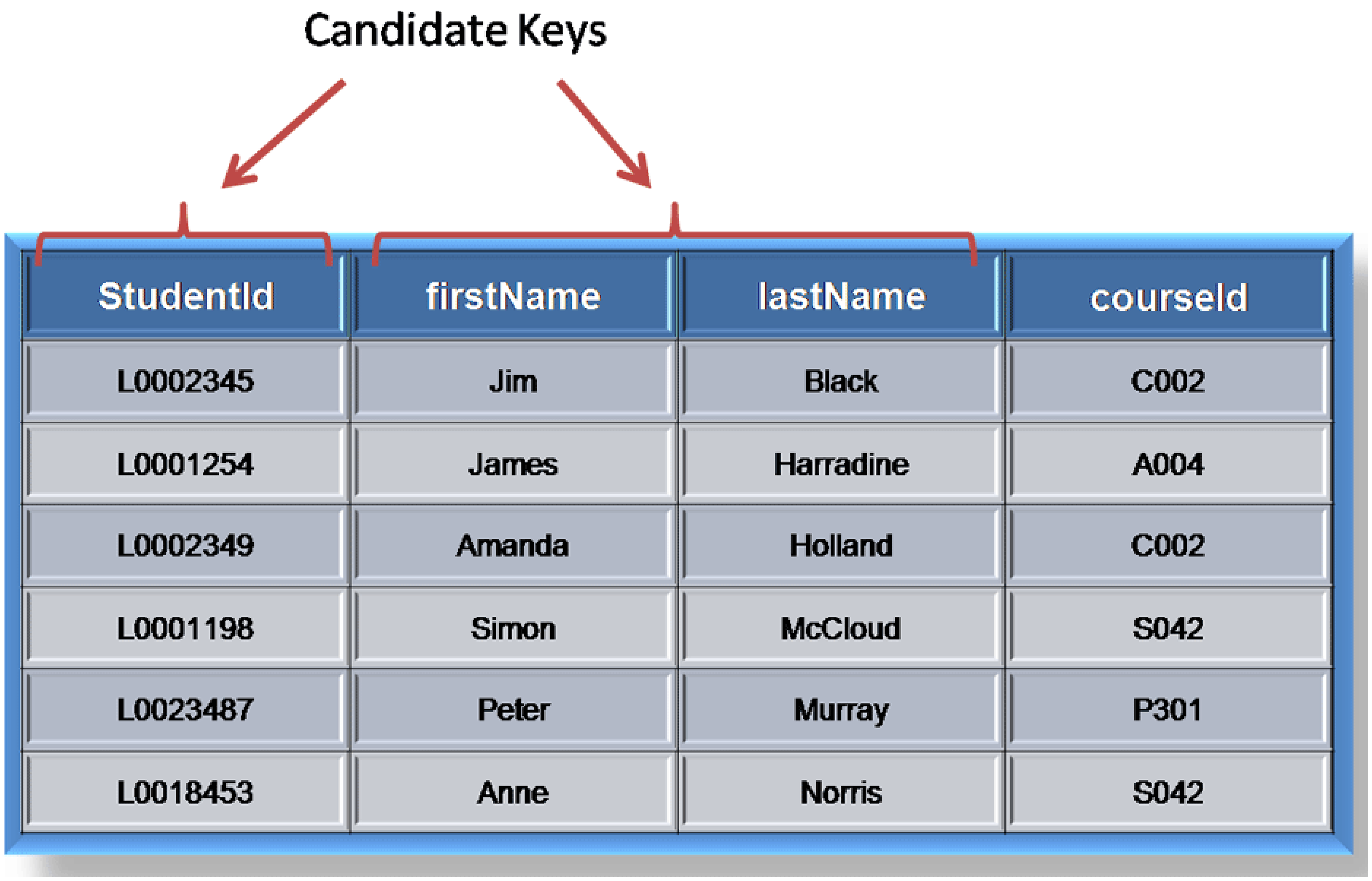
Candidate Key

A candidate is a subset of a super key. A candidate key is a single field or the least combination of fields that uniquely identifies each record in the table. The least combination of fields distinguishes a candidate key from a super key. Every table must have at least one candidate key but at the same time can have several.

Super Key and Candidate Key

As an example we might have a **student_id** that uniquely identifies the students in a student table. This would be a **candidate key**. But in the same table we might have the **student's first name and last name** that also, when **combined**, **uniquely identify** the student in a student table. These would both be candidate keys.

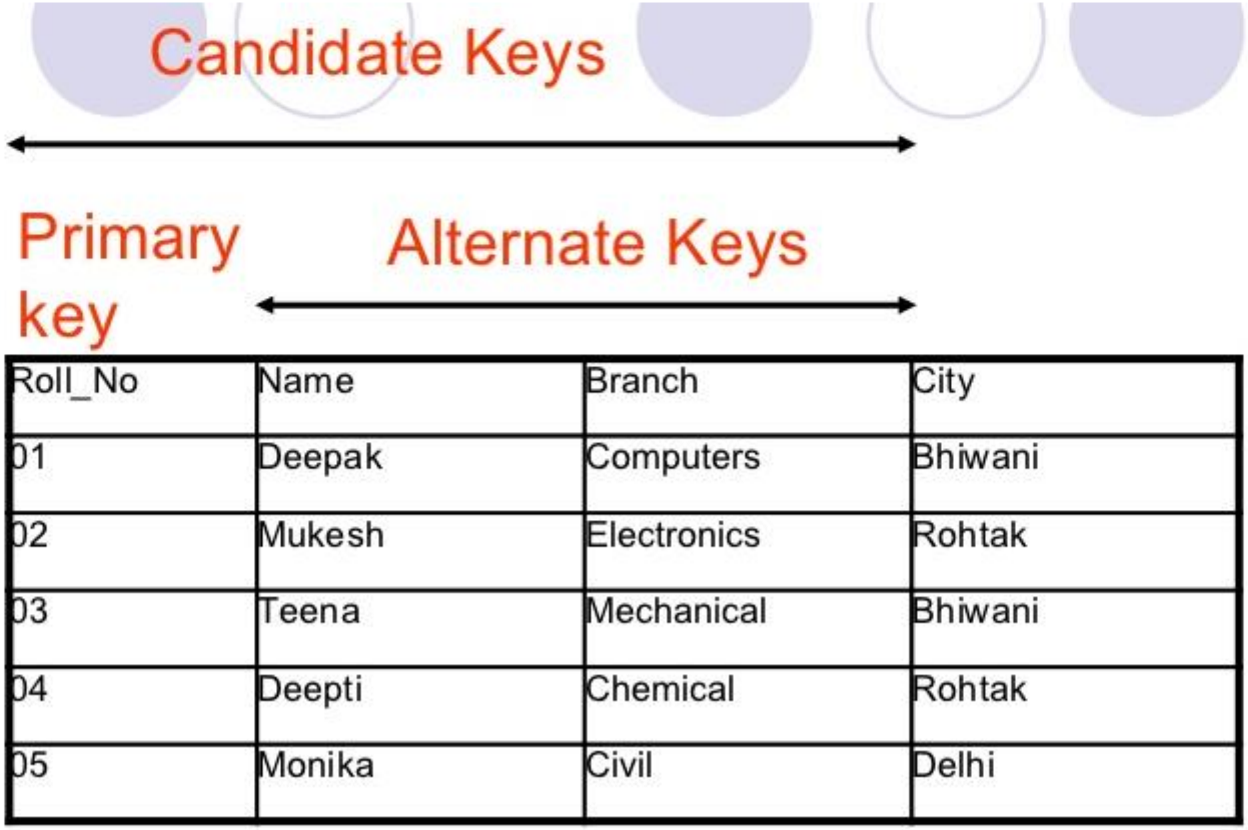
Example of Candidate Key



Candidate Keys

StudentId	firstName	lastName	courseId
L0002345	Jim	Black	C002
L0001254	James	Harradine	A004
L0002349	Amanda	Holland	C002
L0001198	Simon	McCloud	S042
L0023487	Peter	Murray	P301
L0018453	Anne	Norris	S042

Example of Candidate Key


Candidate Keys
Primary key
Alternate Keys

Roll_No	Name	Branch	City
01	Deepak	Computers	Bhiwani
02	Mukesh	Electronics	Rohtak
03	Teena	Mechanical	Bhiwani
04	Deepti	Chemical	Rohtak
05	Monika	Civil	Delhi

What does Composite Key mean?

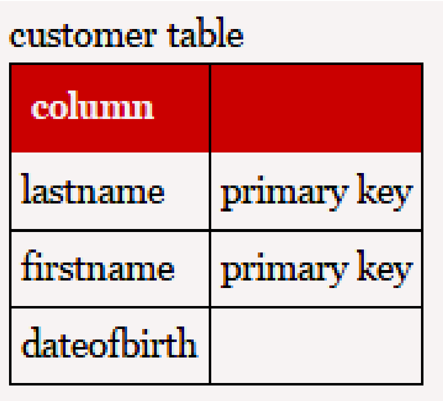
What does *Composite Key* mean?

A composite key, in the context of relational databases, is a combination of two or more columns in a table that can be used to uniquely identify each row in the table. Uniqueness is only guaranteed when the columns are combined; when taken individually the columns do not guarantee uniqueness.

What does Composite Key mean?

When a primary key is created from a combination of 2 or more columns, the primary key is called a composite key. Each column may not be unique by itself within the database table but when combined with the other column(s) in the composite key, the combination is unique.

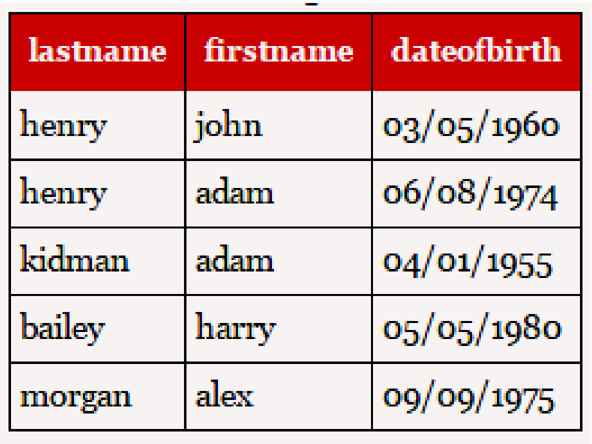
To illustrate the concept of the composite key consider the sample table design below:



customer table

column	
lastname	primary key
firstname	primary key
dateofbirth	

The **lastname** column and the **firstname** column together form a **composite key**. Let's assume that the above tables contain the following data:



lastname	firstname	dateofbirth
henry	john	03/05/1960
henry	adam	06/08/1974
kidman	adam	04/01/1955
bailey	harry	05/05/1980
morgan	alex	09/09/1975

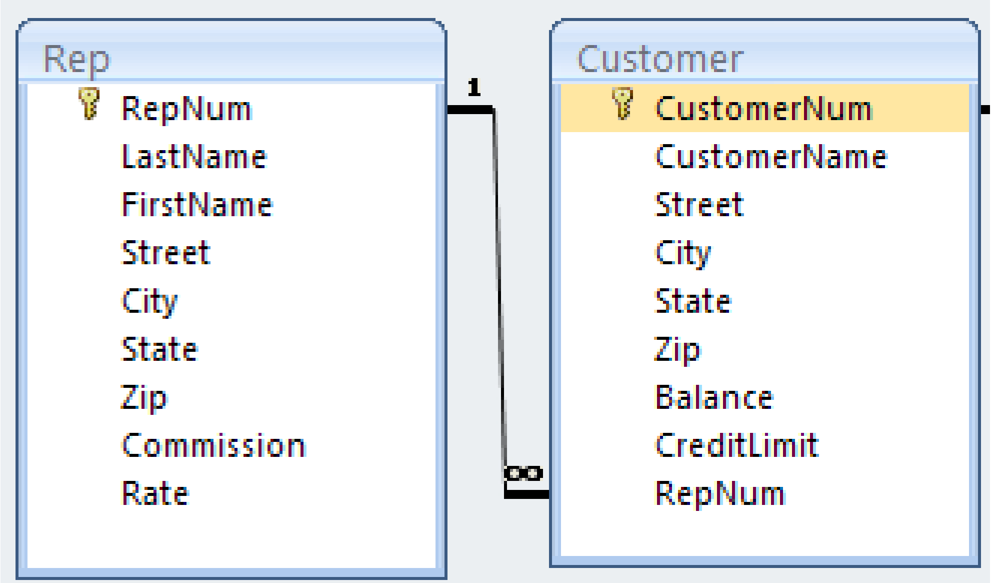
Notice that in the lastname column, there are 2 records with the value 'henry' and in the firstname column, there are 2 records with the value 'adam'. However, there are no records in the database table with a duplicate combination of both the lastname and the firstname.

Referential Integrity

- **Referential Integrity** means that the **Foreign key** must match in terms of actual values and data types with the related **Primary Key.**

Referential Integrity

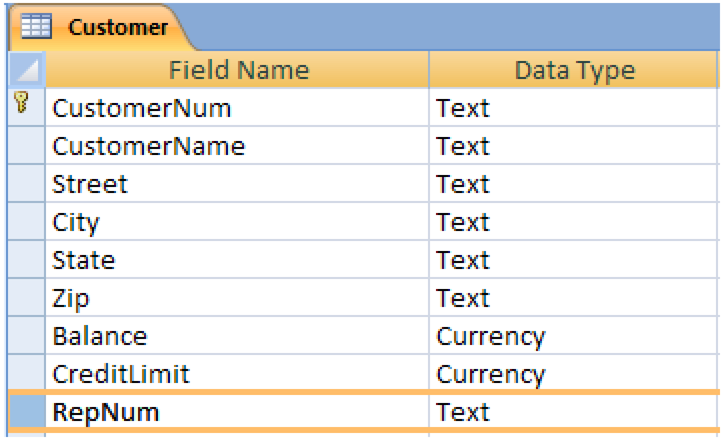
- Example:



- The foreign key RepNum in Customer **must match** with the primary key RepNum in Rep table.

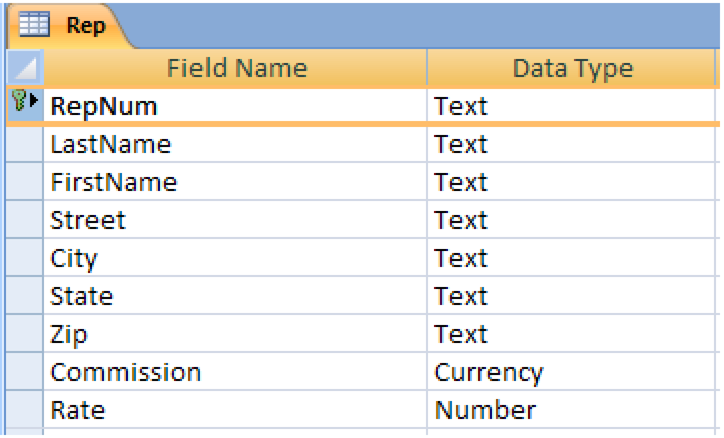
Referential Integrity

- In terms of Data Type



Customer

Field Name	Data Type
CustomerNum	Text
CustomerName	Text
Street	Text
City	Text
State	Text
Zip	Text
Balance	Currency
CreditLimit	Currency
RepNum	Text



Rep

Field Name	Data Type
RepNum	Text
LastName	Text
FirstName	Text
Street	Text
City	Text
State	Text
Zip	Text
Commission	Currency
Rate	Number

- Customer RepNum (Foreign Key) has Text Data type and Rep RepNum (Primary Key) has also Text Data type.

Thank you

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