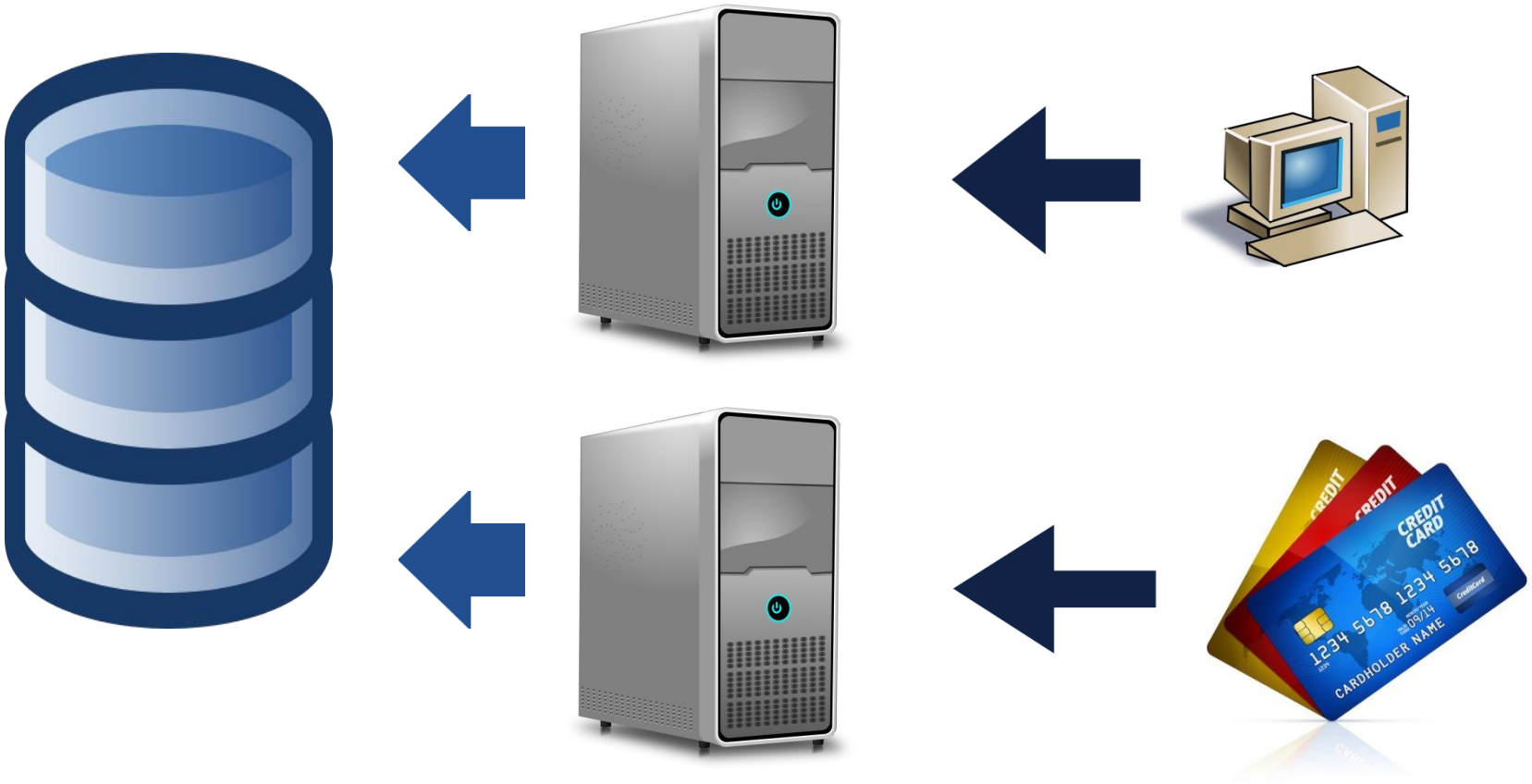
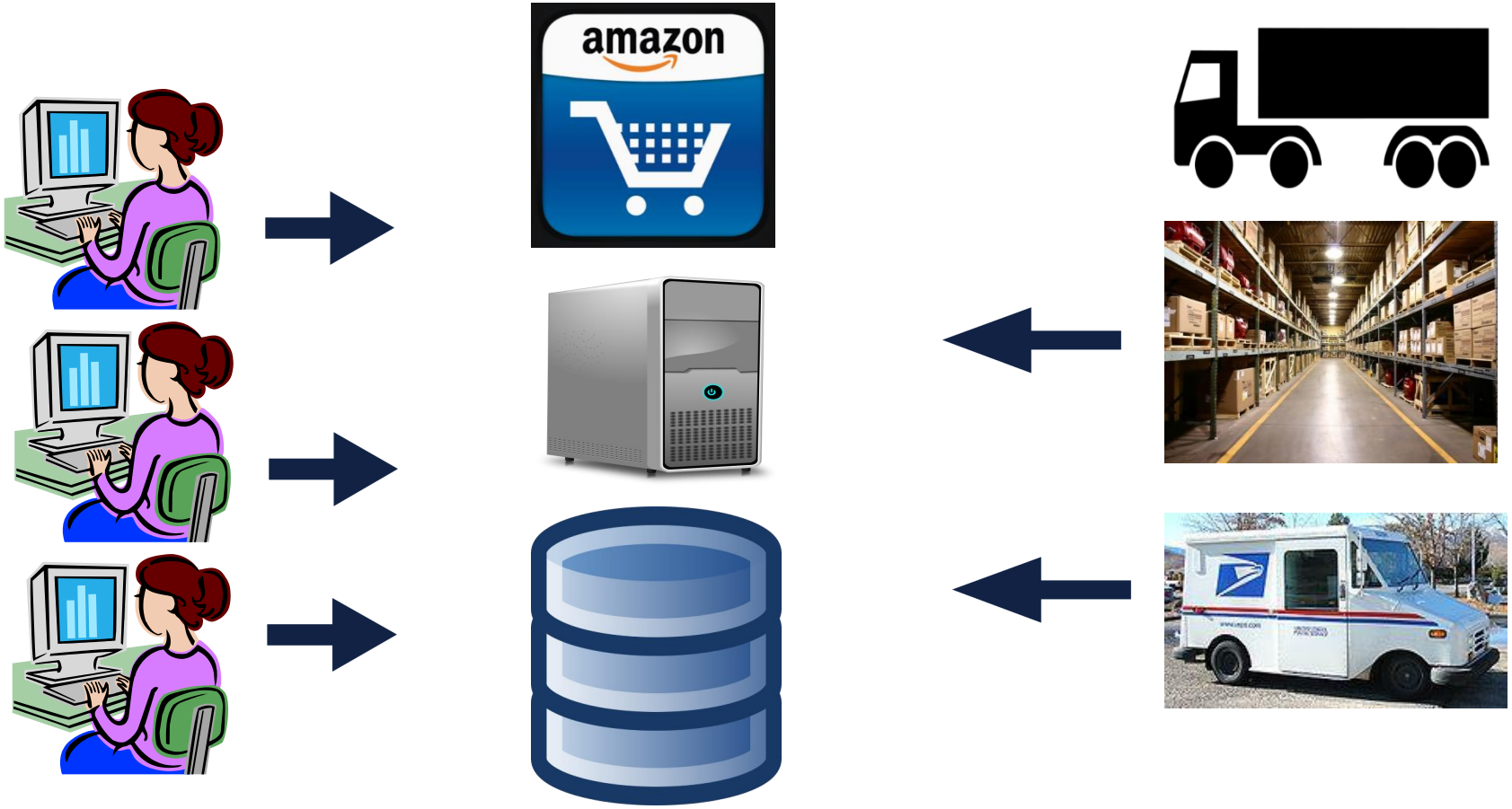
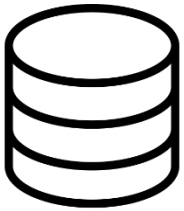
Bank system


CREDIT
CREDIT
CREDIT CARD
1234 5678 1234 5678
CARDHOLDER NAME

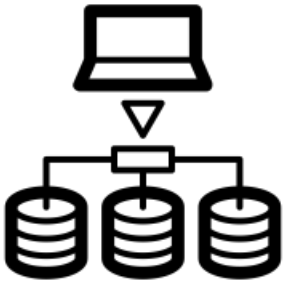
Web store (eCommerce)



Database



A **database** is an organized collection of data. It is the collection of schemas, tables, queries, views, stored procedures, and other objects.



A **database management system** (DBMS) is a computer software application that interacts with the user, other applications, and the database itself to capture and analyze data.

Relational database management system (RDBMS) is a type of dbms having relationships between the tables using indexes and different constraints like primary key, foreign key etc.

Table

A **table** is a collection of related data held in a structured format within a database. It consists of columns, and rows.

CustomerId	FirstName	LastName	Email	Phone	AltPhone	FaxNumber	ZipCode	NewsLetter
1	John	Smith	John@gmail.com	703-543-3302	703-543-3302	NULL	22201	1
2	Jeremy	Smith	Jeremy@gmail.com	723-543-3302	NULL	NULL	22203	0
3	Mark	Long	MarkLong@Yahoo.com	722-366-5588	NULL	NULL	22031	1
4	Bob	James	bob@microsoft.com	703-366-9632	NULL	703-455-9632	22221	0
5	Adam	Marcos	adam@Marcos.com	703-566-0000	NULL	703-366-0000	22001	1

Database design

Customers + Schedules relationship

CustomerId	FirstName	LastName	Email	Phone	ZipCode	ScheduleDescription	DateNeeded	JobType
1	John	Smith	John@gmail.com	703-543-3302	22201	Kitchen remodel needed	2013-10-10	Remodeling
2	Jeremy	Smith	Jeremy@gmail.com	723-543-3302	22203	Decorationg help for dinig room	2013-10-15	Decorating
3	Mark	Long	MarkLong@Yahoo.com	722-366-5588	22031	Kitchen remodel needed	2015-11-29	Remodeling
3	Mark	Long	MarkLong@Yahoo.com	722-366-5588	22031	Garade rebuild	2016-12-31	Rebuild

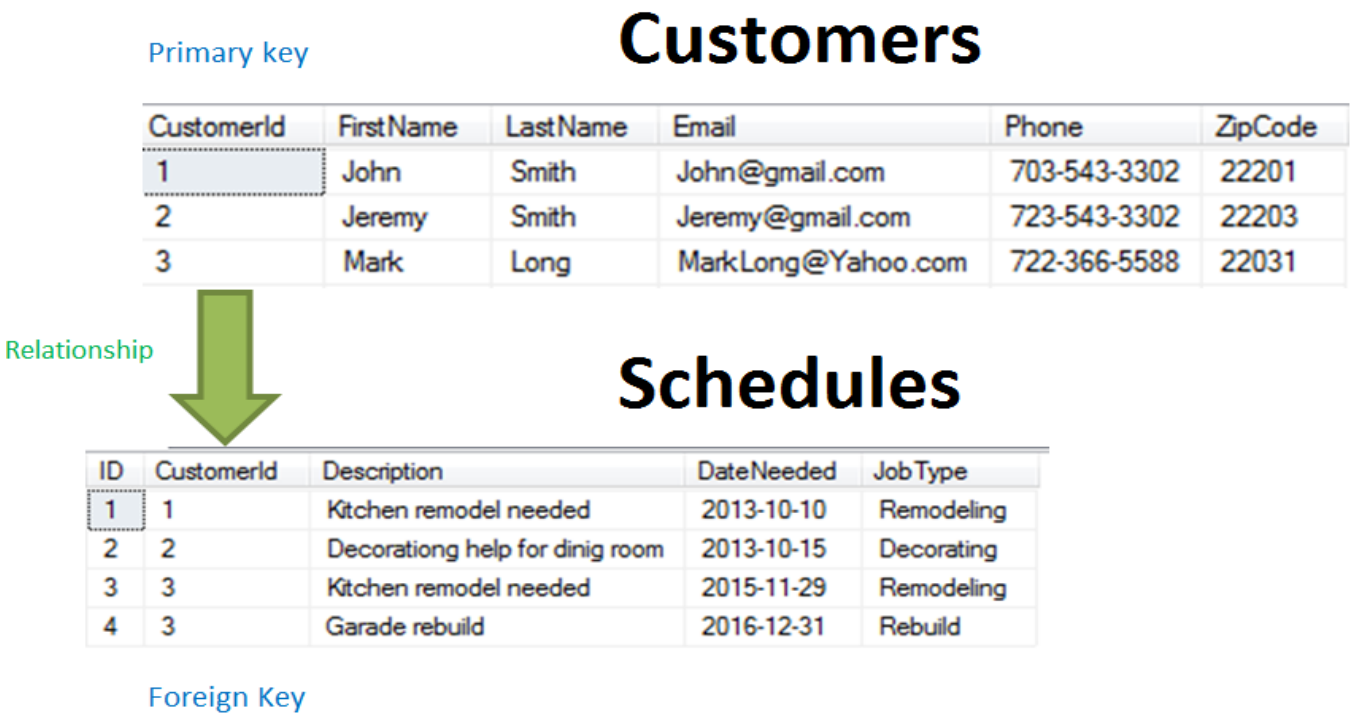
Problems:

1. Duplicated data
2. Updated problem
3. Possible data ambiguity

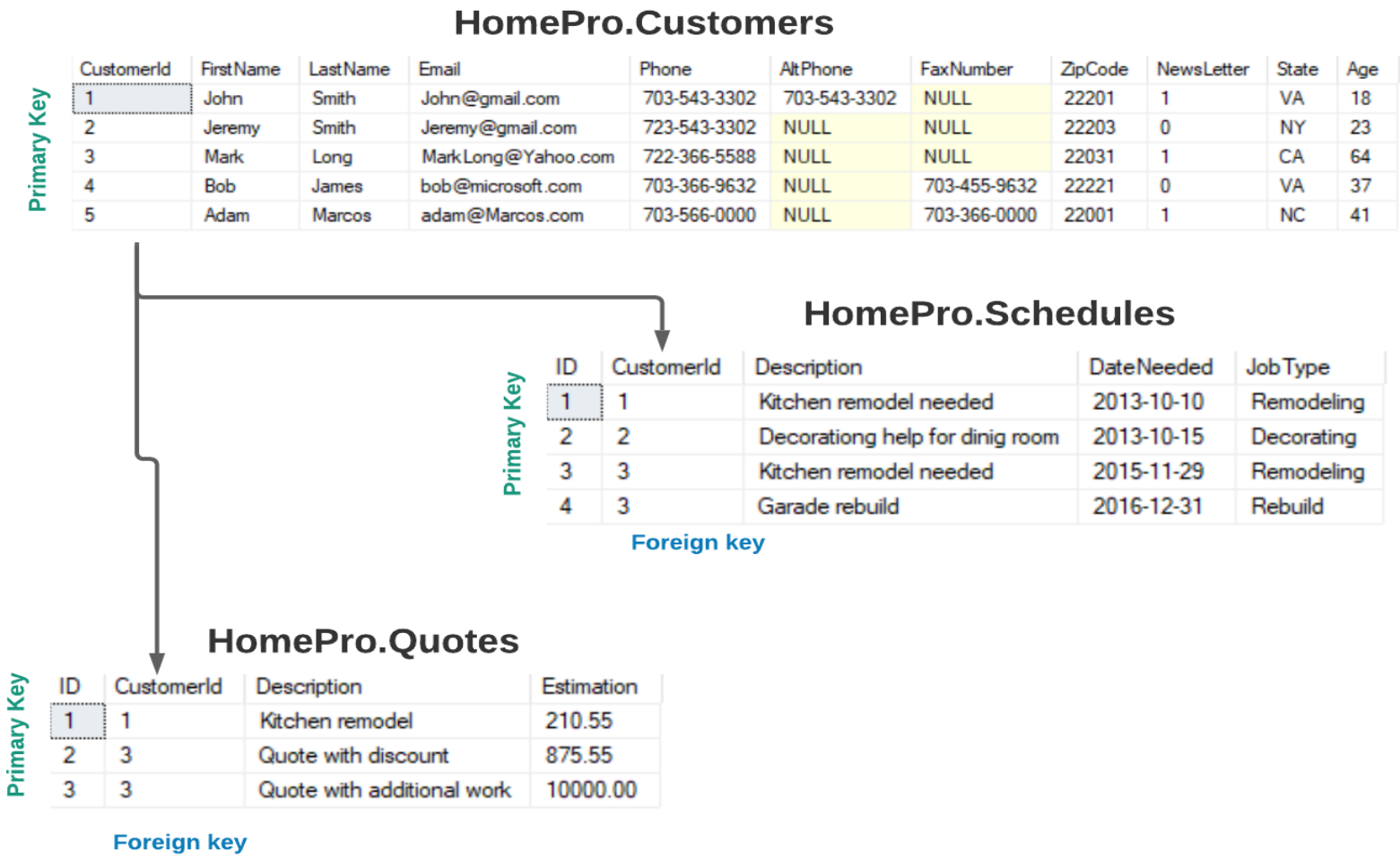
Database design (Normalization)

Solution

Each table contains information about single functional item.



Schema HomePro



Schema Bank

Bank.Clients

Primary Key

ClientId	FirstName	LastName	Phone	Email	State	Age	Type
1	John	Smith	703-543-3302	John@gmail.com	VA	33	Private
2	Jereny	Smith	723-543-3302	Jeremy@gmail.com	WA	19	Private
3	Long	Mark	722-366-5588	MarkLong@Yahoo.com	TN	41	Private
4	Bob	James	703-366-9632	bob@microsoft.com	VA	28	Business
5	Adam	Marcos	703-566-0000	adam@Marcos.com	CA	38	Business
6	Jason	Boley	345-234-9784	json@blabla.com	NY	31	Business
7	Tom	Soyer	572-223-5392	stom@hotmail.com	NJ	49	Private

Bank.Accounts

Primary Key

AccountNum	ClientId	Balance	Type
1	1	10200.00	CHECKING
2	1	3550.00	CREDIT
3	2	1001.00	CHECKING
4	2	150.00	CREDIT
5	3	1303.00	CHECKING
6	3	25000.00	SAVING
7	4	15731.00	CHECKING
8	4	31014.00	SAVING
9	5	1724.00	CHECKING
10	5	3043.00	CREDIT
11	5	79320.00	SAVING

Bank.Transactions

Primary Key

TransactionId	AccountNumFrom	AccountNumTo	Amount	TransactionTime	Status
1	1	2	150.00	2015-01-10 00:00:00.000	Pending
2	1	4	1000.00	2016-02-11 00:00:00.000	Commited
3	1	8	100.00	2016-04-01 00:00:00.000	Rejected
4	1	9	343.55	2017-01-18 00:00:00.000	Pending
5	2	9	36.70	2016-12-10 00:00:00.000	Commited
6	3	9	100.00	2016-12-12 00:00:00.000	Commited
7	5	9	1500.00	2015-01-10 00:00:00.000	Commited
8	5	10	1500.00	2016-06-13 00:00:00.000	Rejected
9	9	10	2300.00	2016-11-30 00:00:00.000	Commited
10	9	11	15000.00	2017-01-01 00:00:00.000	Commited

Foreign key

Foreign key

Foreign key

Primary key

1. The column(s) that has completely unique data throughout the table

2. The main role of a primary key in a data table is to maintain the internal integrity of a data table.

3. Table can have only one primary key.

Foreign key

1. The column that links one table to another table's primary key or unique constraint

2. Table can have any number of foreign keys defined.

Structured Query Language (SQL)

SQL is a language used for creating, storing, fetching and updating of data and database objects in RDBMS.

SELECT

SELECT is used to retrieve rows selected from one or more tables.

Basic syntax:

```
SELECT <columns>
FROM <Table>
WHERE <condition>
ORDER BY <columns>
```

Select (examples)

```
Select * from HomePro.Customers;
```

```
Select FirstName, LastName
From HomePro.Customers
Order by LastName;
```

Where (char, varchar)

```
Select * from HomePro.Customers
Where LastName = 'Smith'
```

```
Select * from HomePro.Customers
Where LastName like  'S%'
```

```
Select * from HomePro.Customers
Where LastName like  '_m%'
```

Where (numbers)

1. Where Age = 10
2. Where Age > 10
3. Where Age > 10 and Age < 40
4. Where Age >= 10 and Age <= 40
5. Where Age between 10 and 40
6. Where Age in (10, 20, 30)

Where (date)

1. Where DateNedeed = ‘2015-11-29’

2. Where DateNedeed > ‘2014-12-30’

3. Where DateNedeed between ‘2015-12-01’ and ‘2015-12-30’

NULL values

- NULL is an unknown and undefined value.
- Arithmetic operation with NULL in SQL will return a NULL.
- ~~Where Value = Null~~ -> Where Value is Null

Question: How much money do you have?

Answer 1. I have $10	Meaning: $10
Answer 3. I have no money	Meaning : $0
Answer 3. I don’t tell you	Meaning : Null

Query with NULL

```
Select *
from HomePro.Customers
where AltPhone is null;
```