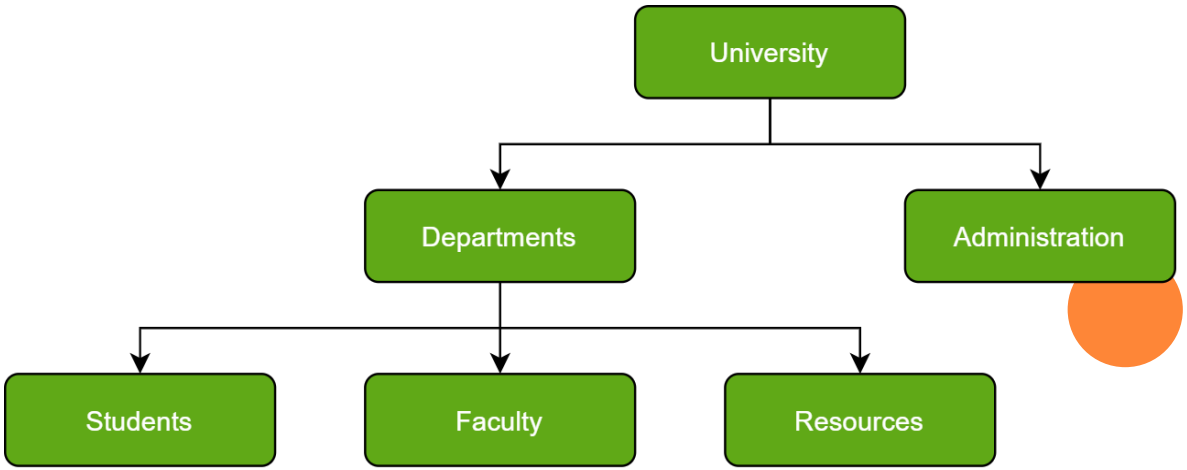
Types of Databases

- Hierarchical
- Network
- Relational
- Key-Value
- Object Oriented
- XML DB

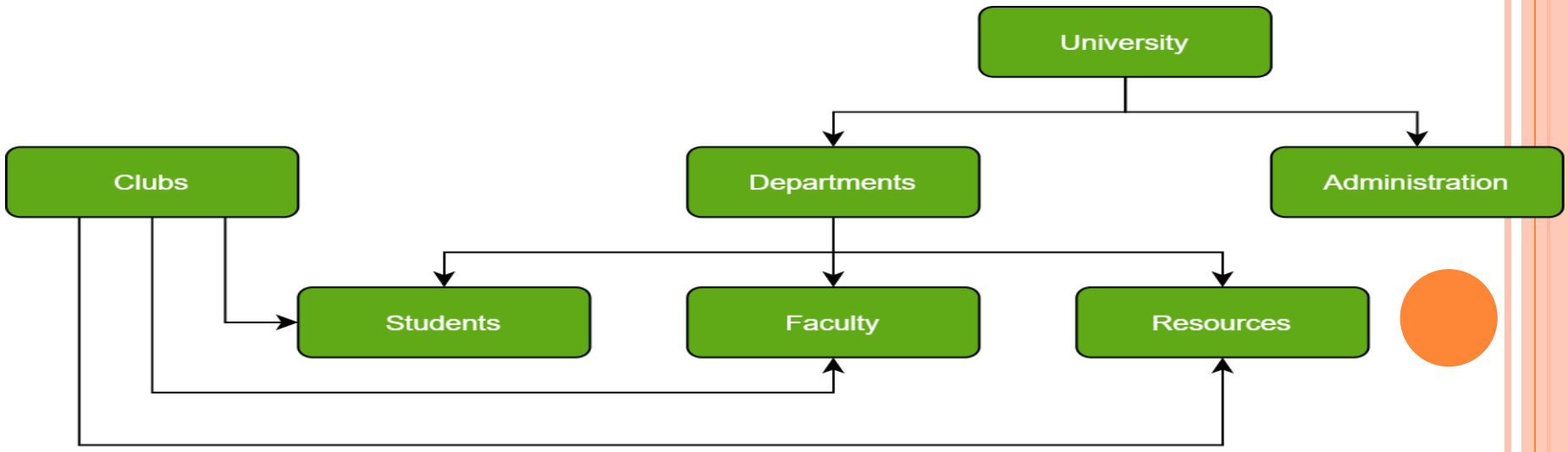
HIERARCHICAL DATABASES (Cont.)

- A Hierarchical Database Management System (HDBMS) is a type of DBMS that organizes data in a hierarchical tree-like structure.
- In an HDBMS, data is represented as a series of records, with each record having one parent record and one or more child records. This creates a parent-child relationship between records, with the parent record being at the top of the hierarchy and child records being at the bottom.



Network Databases (Cont.)

- This is looks like a Hierarchical database model due to which many time it is called as modified version of Hierarchical database.
- Network database model organised data more like a graph and can have more than one parent node. The network model is a database model conceived as a flexible way of representing objects and their relationships.



Relational Database (Cont.)

- A relational database is developed by E. F. Codd in 1970. The various software systems used to maintain relational databases are known as a relational database management system (RDBMS).
- In this model, data is organized in rows and column structure i.e., two-dimensional tables and the relationship is maintained by storing a common field.
- It consists of three major components.
- In relational model, three key terms are heavily used such as relations, attributes, and domains.
- A relation nothing but is a table with rows and columns.
- The named columns of the relation are called as attributes, and finally the domain is nothing but the set of values the attributes can take.

Relational Database (Cont.)

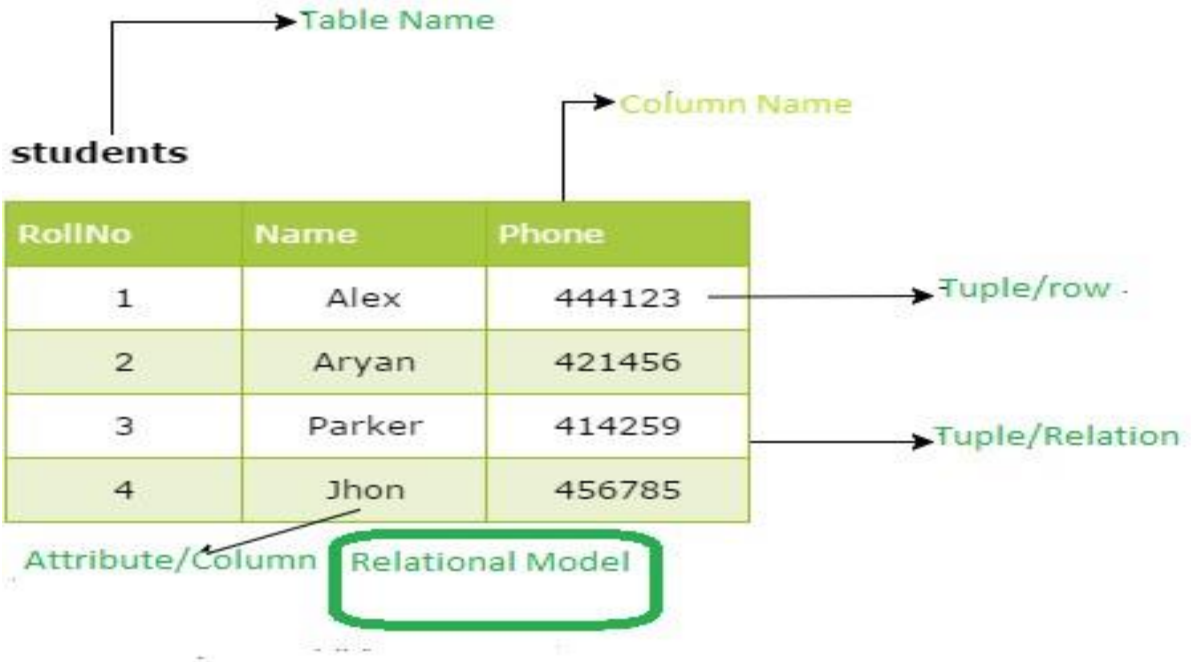
Terminology used in Relational Model

• Tuple: Each row in a table is known as tuple.

• Cardinality of a relation: The number of tuples in a relation determines its cardinality.

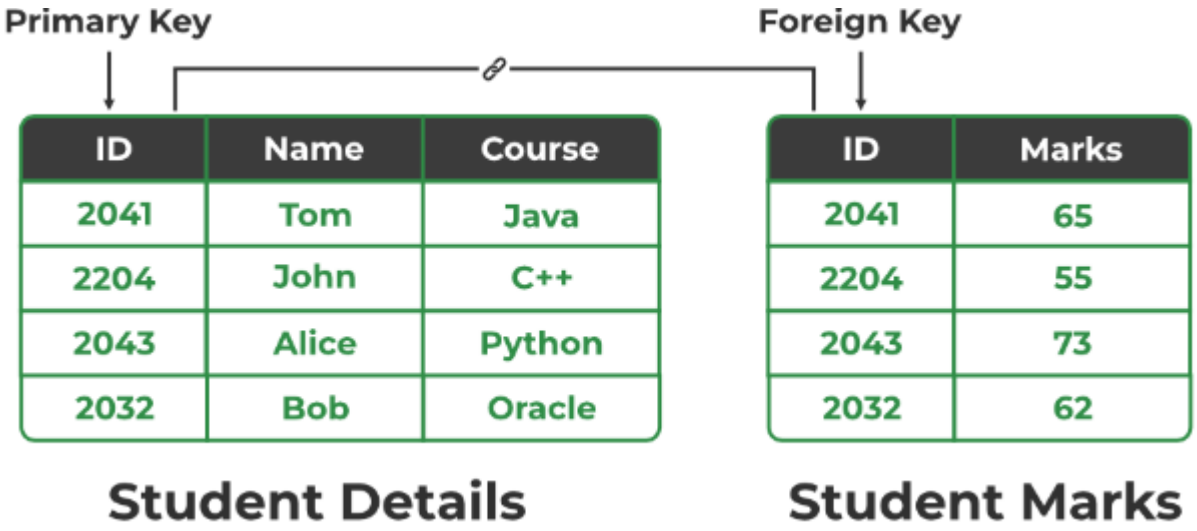
In this case, the relation has a cardinality of 4.

• Degree of a relation: Each column in the tuple is called an attribute. The number of attributes in a relation determines its degree. The relation in figure has a degree of 3.



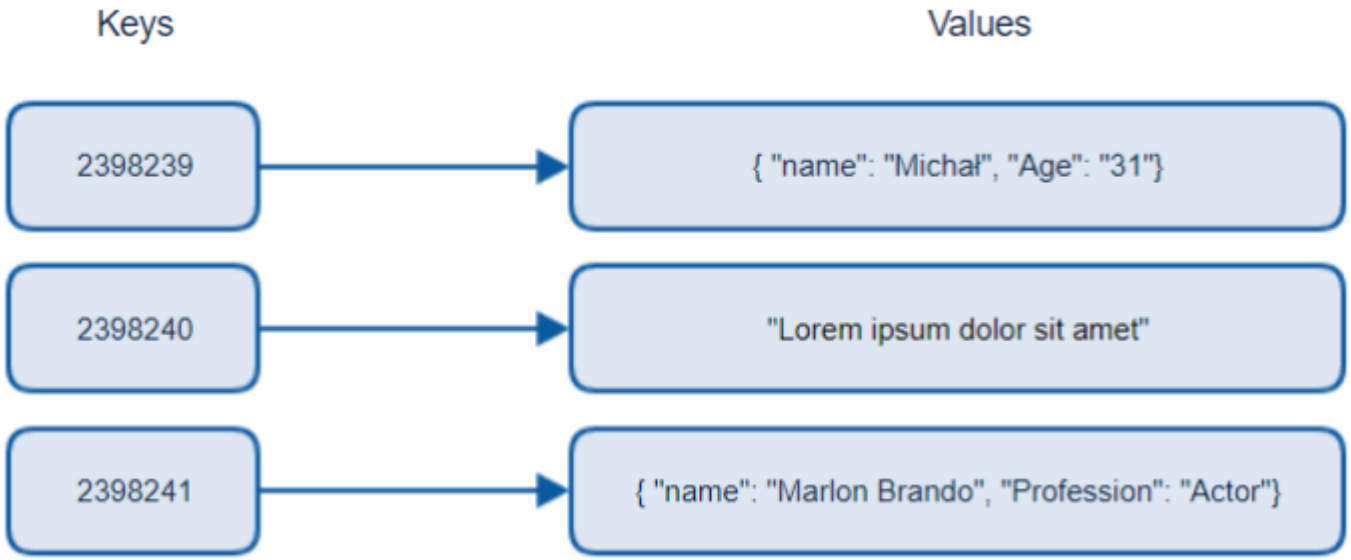
Relational Database (Cont.)

- Refer to the diagram below and notice how the concept of ‘Keys’ is used to link two tables.



KEY-VALUE DATABASE (Cont.)

- A key-value database is a type of non relational database that uses a simple key-value method to store data.
- A key-value database stores data as a collection of key-value pairs in which a key serves as a unique identifier.
- Both keys and values can be anything, ranging from simple objects to complex compound objects.
- Key-value databases are highly partitionable and allow horizontal scaling at scales that other types of databases cannot achieve.
- A type of NoSQL DBMS that store data as a mapping of keys to values and are optimized for high-speed data retrieval.



Object Oriented Database (Cont.)

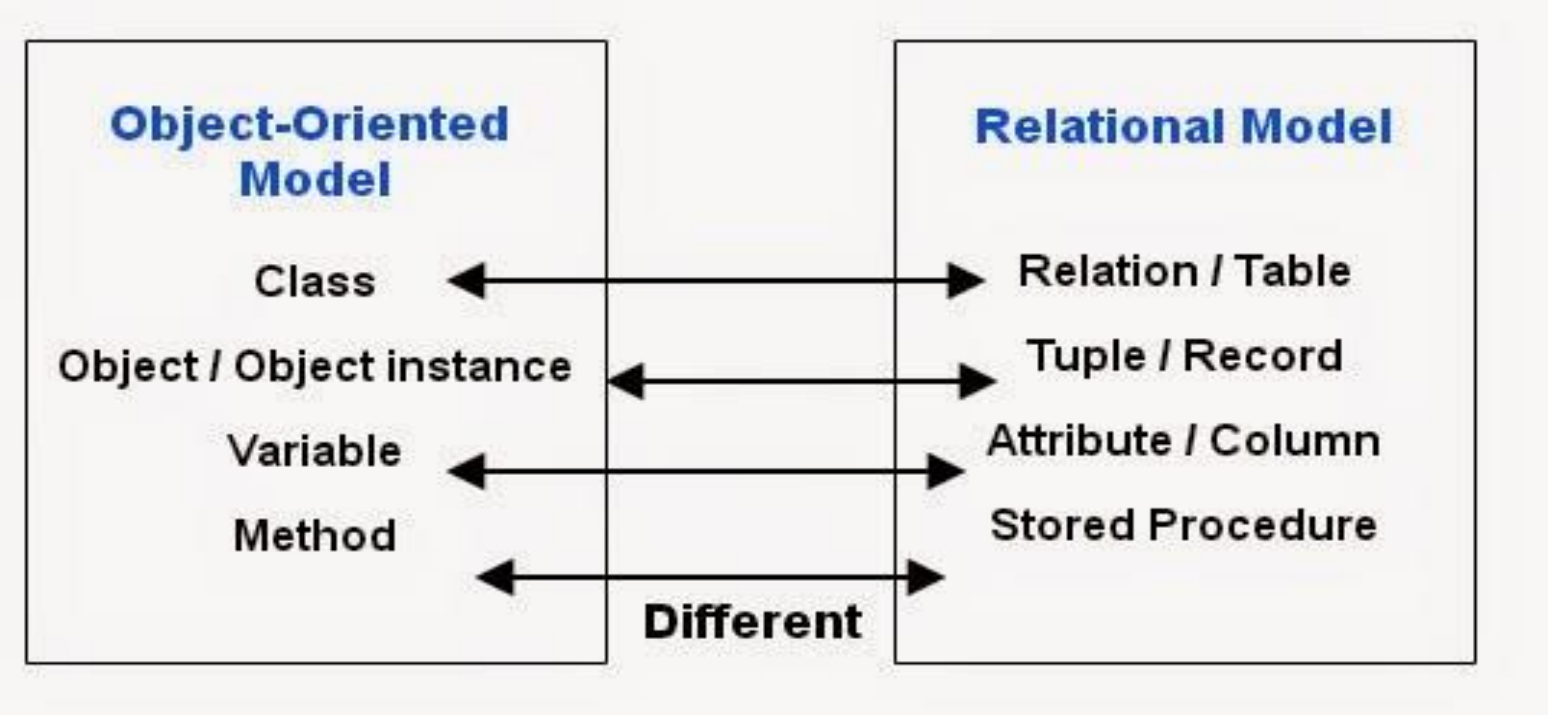
- An Object-oriented Database Management System (OODBMS) is a type of DBMS that organizes data into objects and allows for the creation of classes and inheritance.
- In an OODBMS, data is stored in a format that is similar to objects in object-oriented programming languages, such as Java or C++. Each object has its own properties, methods, and behaviors, and can be part of a class or hierarchy of classes.
- An object database is a system in which information is represented in the form of objects as used in object-oriented programming.
- Object oriented databases are different from relational databases which are table-oriented.

Object Oriented Database

- The object-oriented data model is based on the object-oriented-programming language concept, which is now in wide use. Inheritance, polymorphism, overloading, object-identity, encapsulation and information hiding with methods to provide an interface to objects are among the key concepts of object-oriented programming that have found applications in data modelling. The object-oriented data model also supports a rich type system, including structured and collection types.
- In object-oriented programming, an **Object Database** is a system in which data is represented as objects.
- Relational Databases, which are table-oriented, are not the same as object-oriented Databases.
- The Object-Oriented Data Model is one of the types of database models that is based on the widely used concept of object-oriented programming languages.

Object Oriented Database (Cont.)

- The following figure shows the difference between relation and object-oriented database model.



XML Database

- The Extensible Markup Language (XML) was not designed for database applications.
- In fact, like the Hyper-Text Markup Language (HTML) on which the World Wide Web is based, XML has its roots in document management, and is derived from a language for structuring large documents known as the Standard Generalized Markup Language (SGML).
- However, unlike SGML and HTML, XML is designed to represent data. It is particularly useful as a data format when an application must communicate with another application, or integrate information from several other applications.

XML Database (Cont.)

- XML database is a data persistence software system used for storing the huge amount of information in XML format. It provides a secure place to store XML documents.
- You can query your stored data by using XQuery, export and serialize into desired format. XML databases are usually associated with document-oriented databases.

Extensible Markup Language (XML) lets you define and store data in a shareable manner. XML supports information exchange between computer systems such as websites, databases, and third-party applications.

```
<?xml version = "1.0"?>
<contact-info>
   <contact1>
      <name>Tanmay Patil</name>
      <company>TutorialsPoint</company>
      <phone>(011) 123-4567</phone>
   </contact1>

   <contact2>
      <name>Manisha Patil</name>
      <company>TutorialsPoint</company>
      <phone>(011) 789-4567</phone>
   </contact2>
</contact-info>
```