Subject: Introduction to DBMS
Subject Code: BCA501N
UNIT-I, Part-II

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Outline

- Data Models
- DBMS Architecture
- Data independence

Data Models

A Database model defines the logical design and structure of a database and defines how data will be stored, accessed and updated in a database management system

- Hierarchical Model
- Network Model
- Entity-relationship Model
- Relational Model

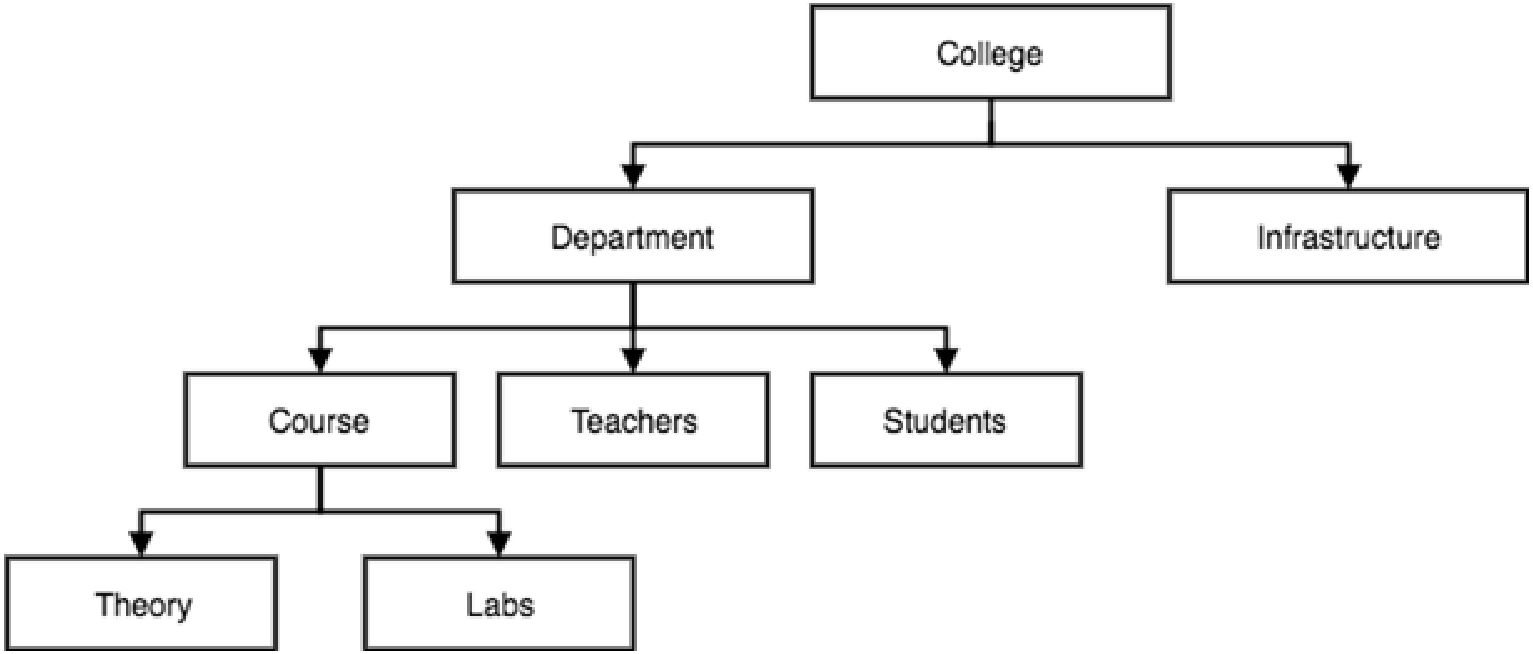
Data Models contd.

- **Hierarchical Model**

  This database model organises data into a tree-like-structure

  Having a single root, to which all the other data is linked

  In this model, a child node will only have a single parent node



Data Models contd.

- **Network Model**

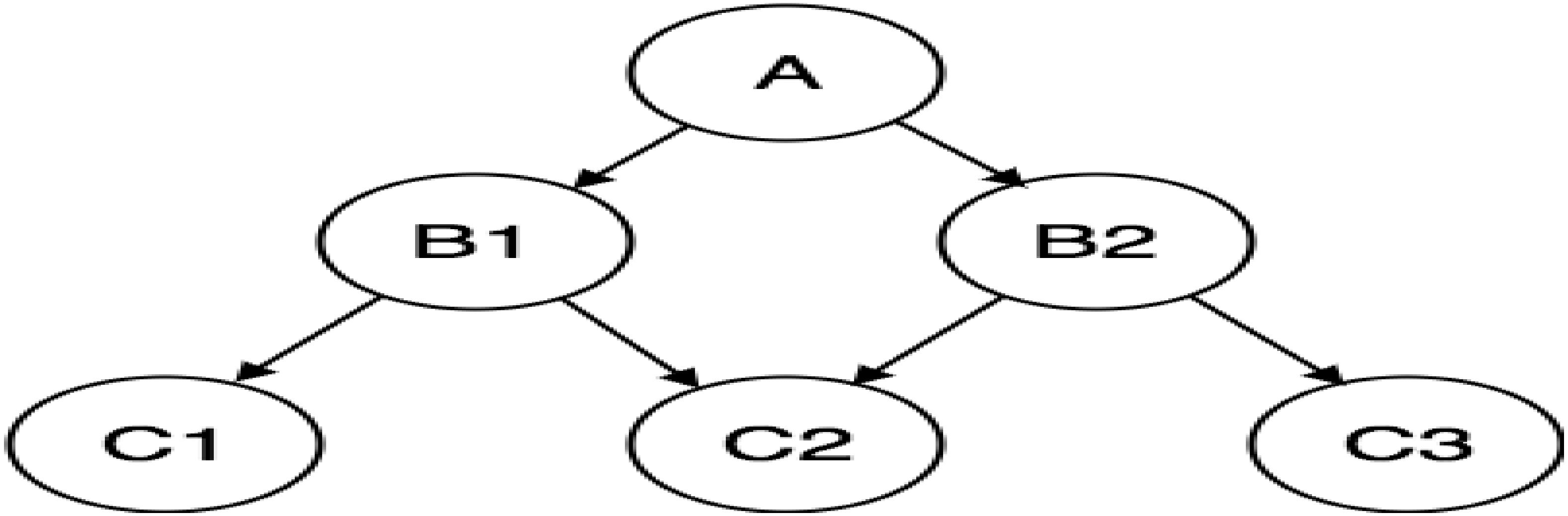
  This is an extension of the Hierarchical model

  In this model data is organised more like a graph

  Allowed to have more than one parent node

  Accessing the data is also easier and fast

  Used to map many-to-many data relationships.

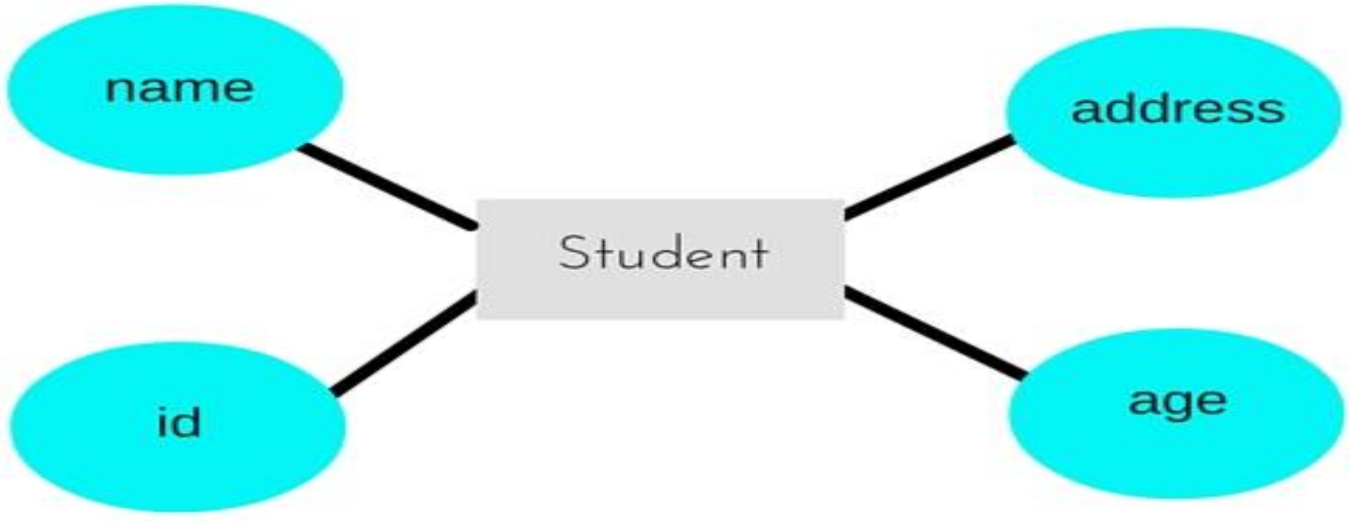


Data Models contd.

- **Entity-relationship Model**

  Relationships are created by dividing object of interest into entity and its characteristics into attributes

  Defined to represent the relationships into pictorial form to make it easier for different stakeholders to understand



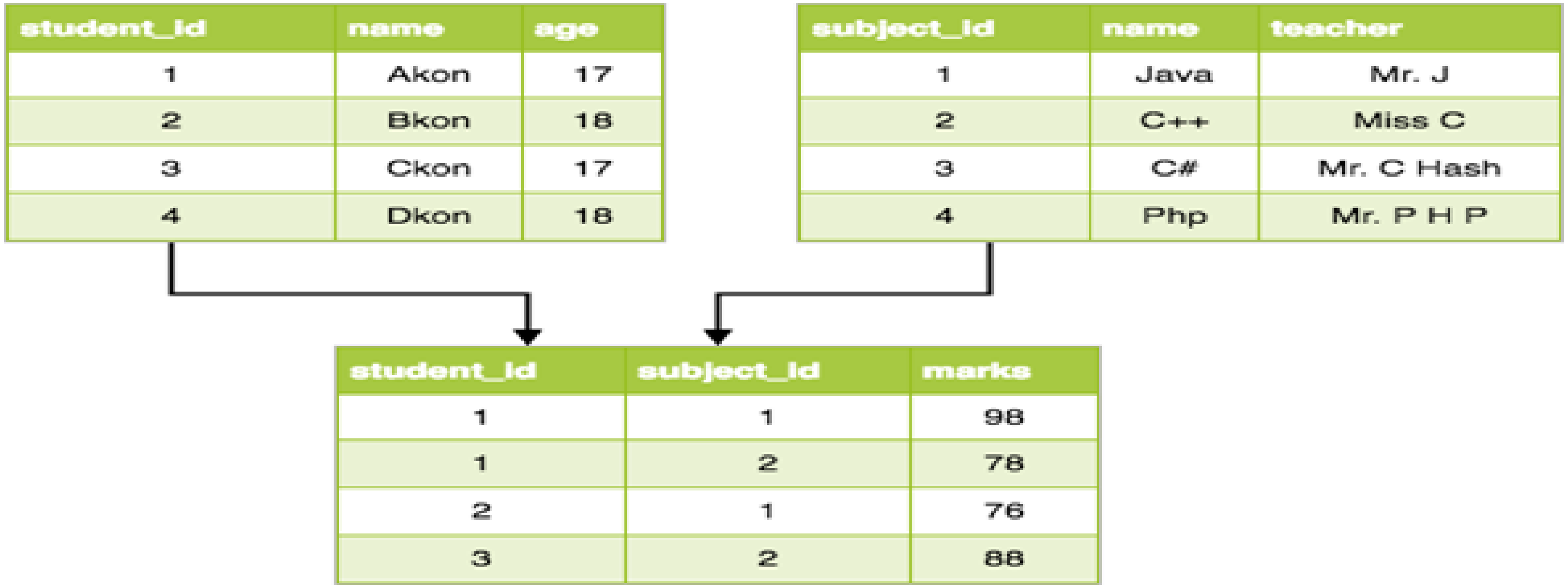
Data Models contd.

- **Relational Model**

  Data is organised in two-dimensional tables and the relationship is maintained by storing a common field

  The basic structure of data in the relational model is tables.

  All the information related to a particular type is stored in rows of that table.



student_id	name	age
1	Akon	17
2	Bkon	18
3	Ckon	17
4	Dkon	18

subject_id	name	teacher
1	Java	Mr. J
2	C++	Miss C
3	C#	Mr. C Hash
4	Php	Mr. P H P

student_id	subject_id	marks
1	1	98
1	2	78
2	1	76
3	2	88

DBMS Architecture

- The design of a DBMS depends on its architecture.
- It can be centralized or decentralized or hierarchical.
- An n-tier architecture divides the whole system into related but independent n modules, which can be independently modified, altered, changed, or replaced.

1-tier architecture

The DBMS is the only entity

Any changes done here will directly be done on the DBMS itself

It does not provide handy tools for end-users.

Database designers and programmers normally prefer to use single-tier architecture

DBMS Architecture contd.

- **2-tier architecture**

  It must have an application through which the DBMS can be accessed

  Programmers use 2-tier architecture where they access the DBMS by means of an application

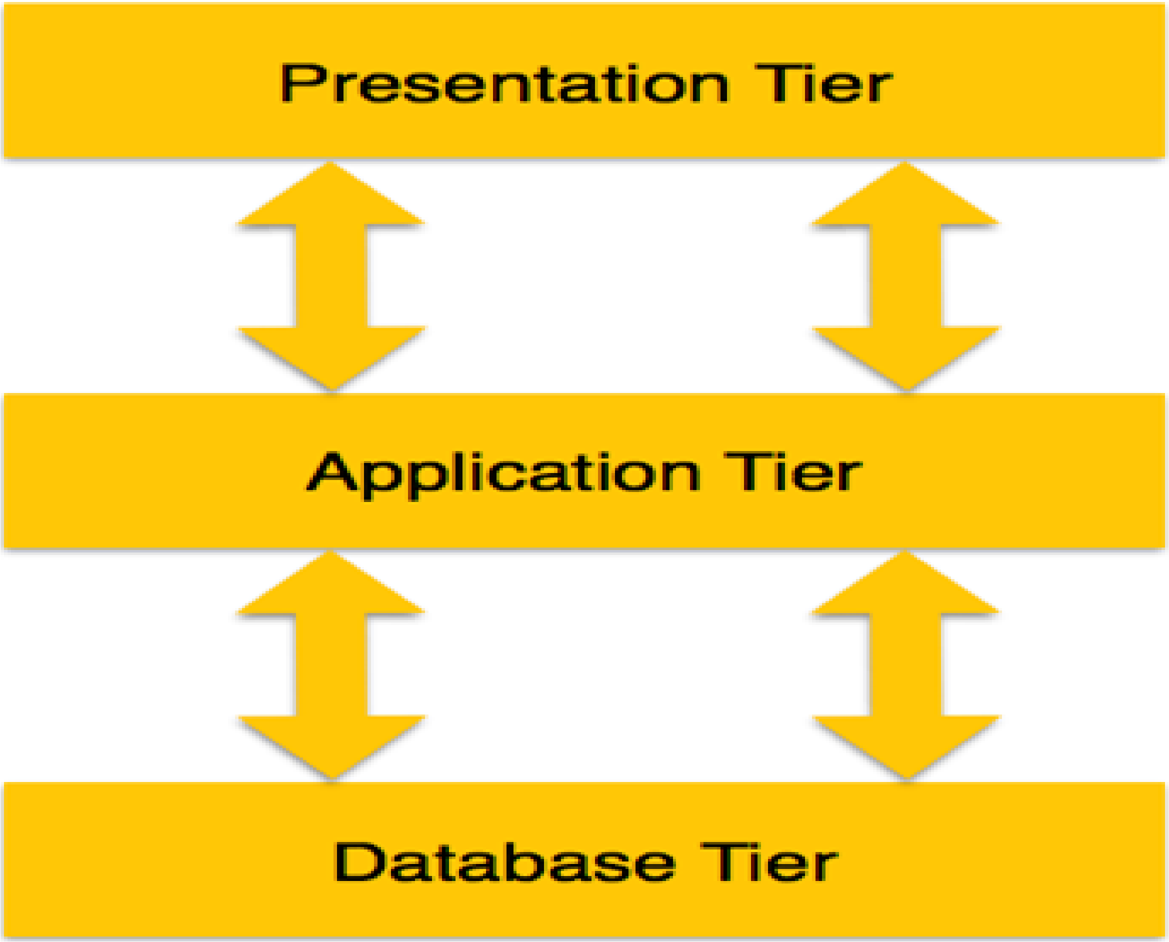
  The application tier is entirely independent of the database in terms of operation, design, and programming

- **3-tier architecture**

  It is the most widely used architecture to design a DBMS

  A 3-tier architecture separates its tiers from each other based on the complexity of the users and how they use the data present in the database

DBMS Architecture contd.



DBMS Architecture contd.

Database (Data) Tier

- The database resides along with its query processing languages.
- Define the data and their constraints at this level.

Application (Middle) Tier

- The application server and the programs that access the database
- This application tier presents an abstracted view of the database
- End-users are unaware of any existence of the database beyond the application
- Resides in the middle and acts as a mediator between the end-user and the database

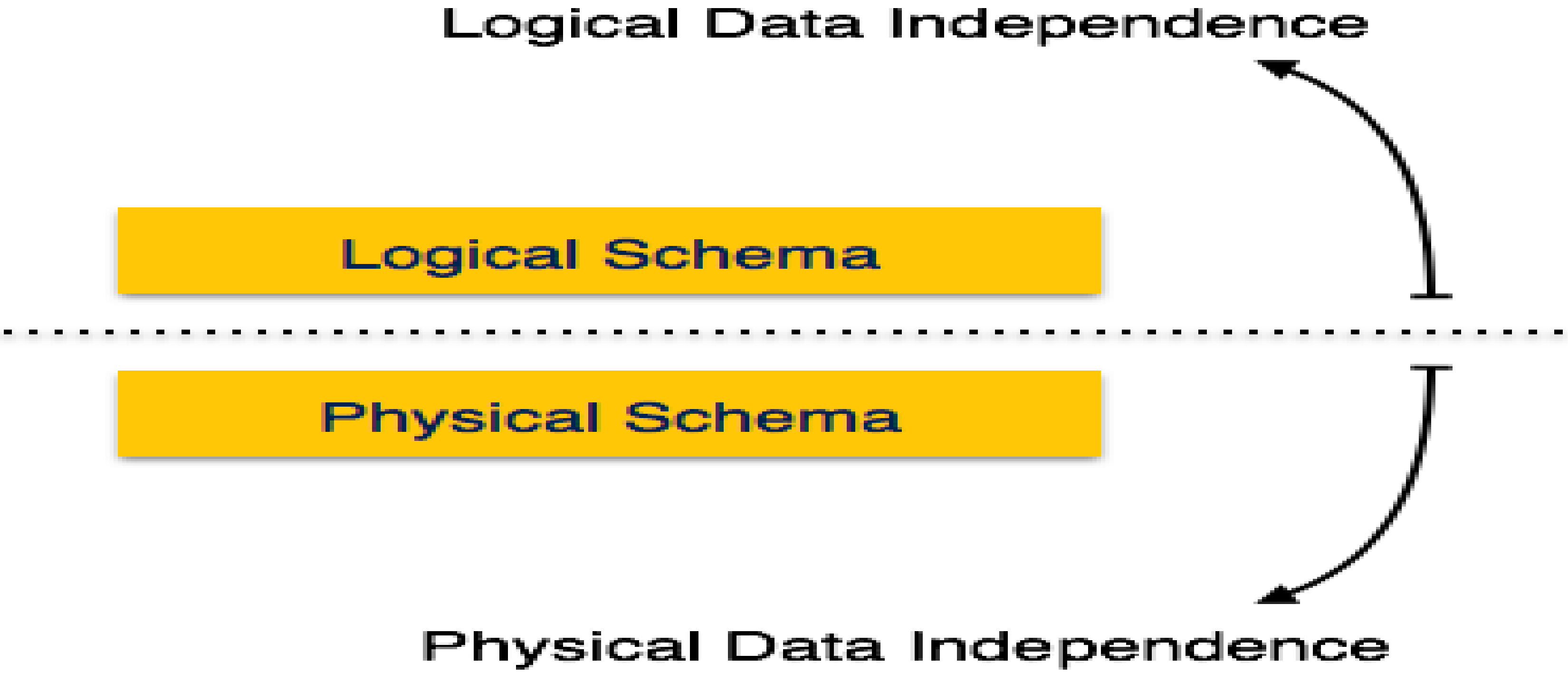
User (Presentation) Tier

- End-users operate on this tier and they know nothing about any existence of the database beyond this layer
- Multiple views of the database can be provided by the application
- All views are generated by applications that reside in the application tier.

Data independence

If a database system is not multi-layered, then it becomes difficult to make any changes in the database system.

Database systems are designed in multi-layers as we learnt earlier



Data independence contd.

Logical Data Independence

Logical data is data about database, that is, it stores information about how data is managed inside

Logical data independence is a kind of mechanism, which liberalizes itself from actual data stored on the disk.

If we do some changes on table format, it should not change the data residing on the disk

Physical Data Independence

All the schemas are logical, and the actual data is stored in bit format on the disk.

Physical data independence is the power to change the physical data without impacting the schema or logical data**.**

References

- https://www.tutorialspoint.com/dbms/dbms_overview.htm
- https://www.studytonight.com/dbms/database-model.php