HEXAWARE

DBMS- Session1

Course Objective

- To understand Data Storage
- Advantages of using DBMS
- To understand Data models and its types
- To understand Database keys and its types

Session Objective

- Data Storage
- Data Models
- Database Keys

Data Storage

- Information storage and retrieval (data processing) is a major part of the software application development in the IT industry.
- It is mandatory for every software professional to be aware of the approach of data storage and retrieval systems

Data and information

- Data: Known facts, figures, objects and events which can be stored
  - Structured: numbers, text, dates
  - Unstructured Data: images, video, documents
- Examples:
  - RDBMS 02/01/2016 “It is raining”
- Information: Data that is processed to be useful
- Examples:
  - Course Code is 1
  - The course name is RDBMS
  - The begin date of course is 02/01/2016
  - The temperature dropped 20 degrees and then it started raining.

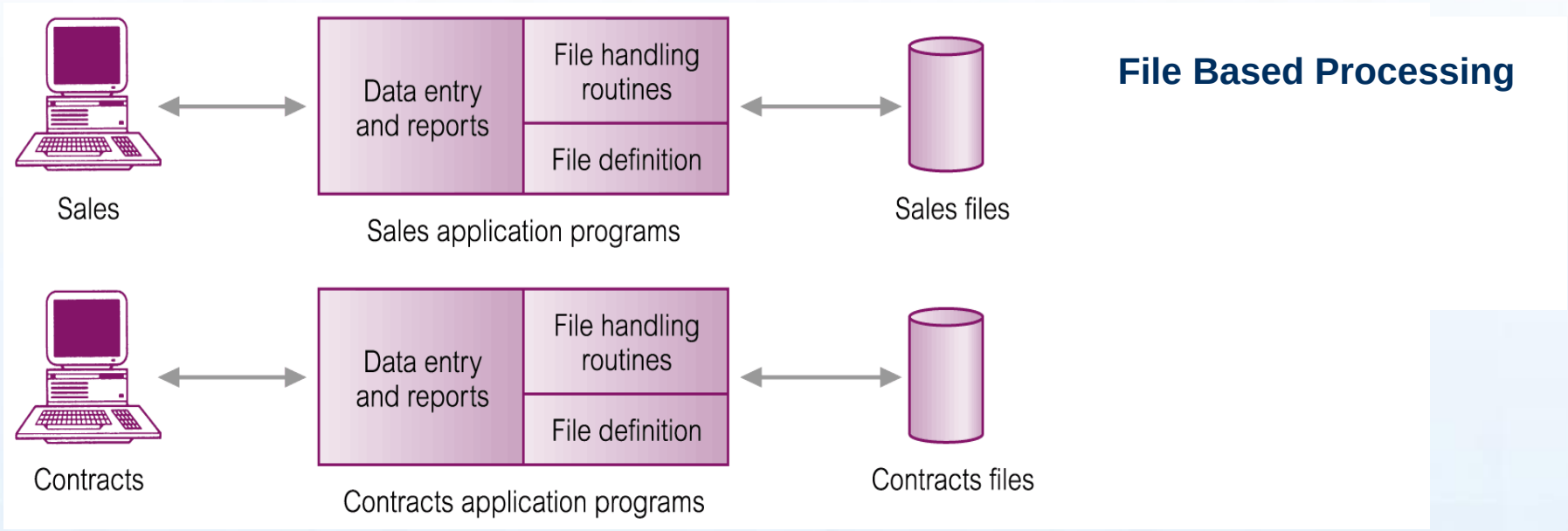
Traditional approach

- The traditional approach to store and access the data is file based system

- **File-based System**

  - Data are stored as collection of records in flat-files (data files) on the disk
  - Collection of application programs that perform services for the end users (e.g. reports) access these data files
  - Each application defines and manages its own data

How traditional approach works?



File Based Processing

Sales Files

PropertyForRent (propertyNo, street, city, postcode, type, rooms, rent, ownerNo)
PrivateOwner (ownerNo, fName, lName, address, telNo)
Client (clientNo, fName, lName, address, telNo, prefType, maxRent)

Contracts Files

Lease (leaseNo, propertyNo, clientNo, rent, paymentMethod, deposit, paid, rentStart, rentFinish, duration)
PropertyForRent (propertyNo, street, city, postcode, rent)
Client (clientNo, fName, lName, address, telNo)

Limitations of traditional approach

- Separation and isolation of data
  - Each program maintains its own set of data.
  - Users of one program may be unaware of potentially useful data held by other programs.
- Duplication of data
  - Same data is held by different applications.
  - Wasted space and potentially different values and/or different formats for the same item.
- No Concurrent access to data
- No simultaneous application access to data
- No data independence
  - File structure is defined in the program code

Database approach

- Data is stored in the database as a collection of data files
- Database:
  - A collection of related data.
- Database Management System (DBMS):
  - A software package/ system to facilitate the creation and maintenance of a computerized database.
- Database System:
  - The DBMS software together with the database

Advantages of database approach (DBMS)

- Control of data redundancy
- Data consistency
- Program-Data independence
- More Secure
- Concurrent access to data through application programs
- Flexible for application development

Data Model

What is data model?

- Integrated collection of concepts (Tool) for describing data, relationships between data, and constraints on the data in a database

Why data model?

- To represent data in an understandable way.

Types of data models include:

- Object-based
- Record-based
- Physical

11

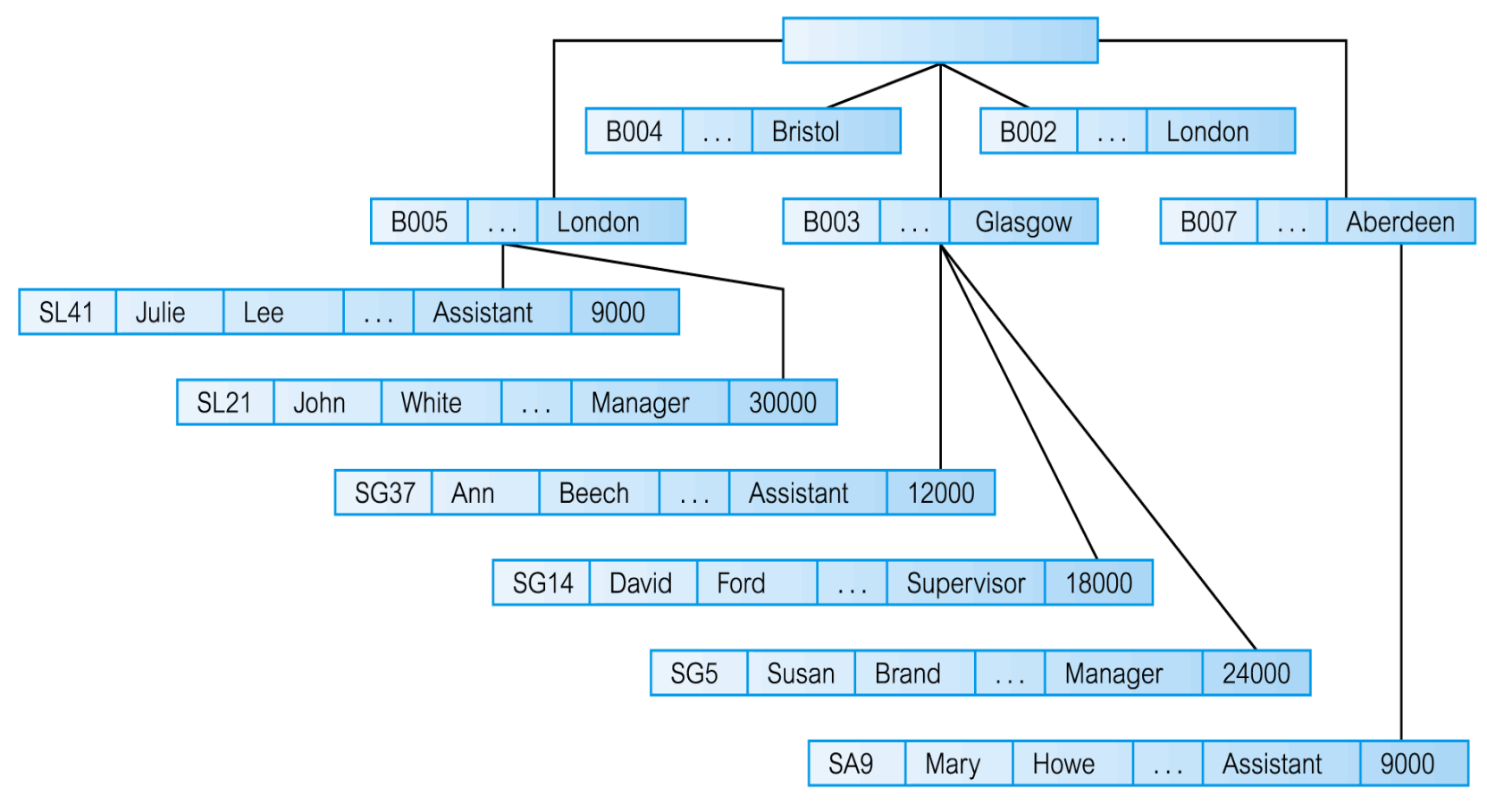
Types of data model

Object-Based Data Models
- Entity-Relationship
- Semantic
- Functional
- Object-Oriented.

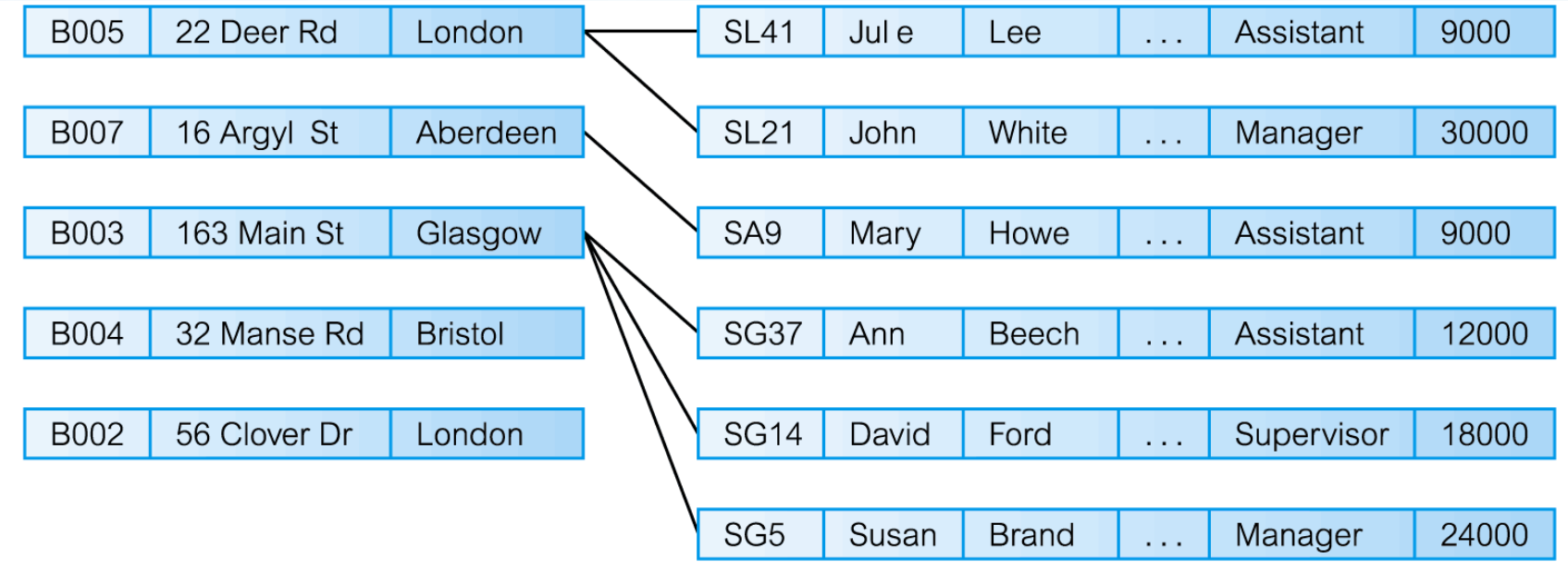
Record-Based Data Models
- Relational Data Model
- Network Data Model
- Hierarchical Data Model

Physical Data Models

Hierarchical Data Model



Network Data Model



Relational data model

Branch

branchNo	street	city	postCode
B005	22 Deer Rd	London	SW1 4EH
B007	16 Argyll St	Aberdeen	AB2 3SU
B003	163 Main St	Glasgow	G11 9QX
B004	32 Manse Rd	Bristol	BS99 1NZ
B002	56 Clover Dr	London	NW10 6EU

Staff

staffNo	fName	lName	position	sex	DOB	salary	branchNo
SL21	John	White	Manager	M	1-Oct-45	30000	B005
SG37	Ann	Beech	Assistant	F	10-Nov-60	12000	B003
SG14	David	Ford	Supervisor	M	24-Mar-58	18000	B003
SA9	Mary	Howe	Assistant	F	19-Feb-70	9000	B007
SG5	Susan	Brand	Manager	F	3-Jun-40	24000	B003
SL41	Julie	Lee	Assistant	F	13-Jun-65	9000	B005

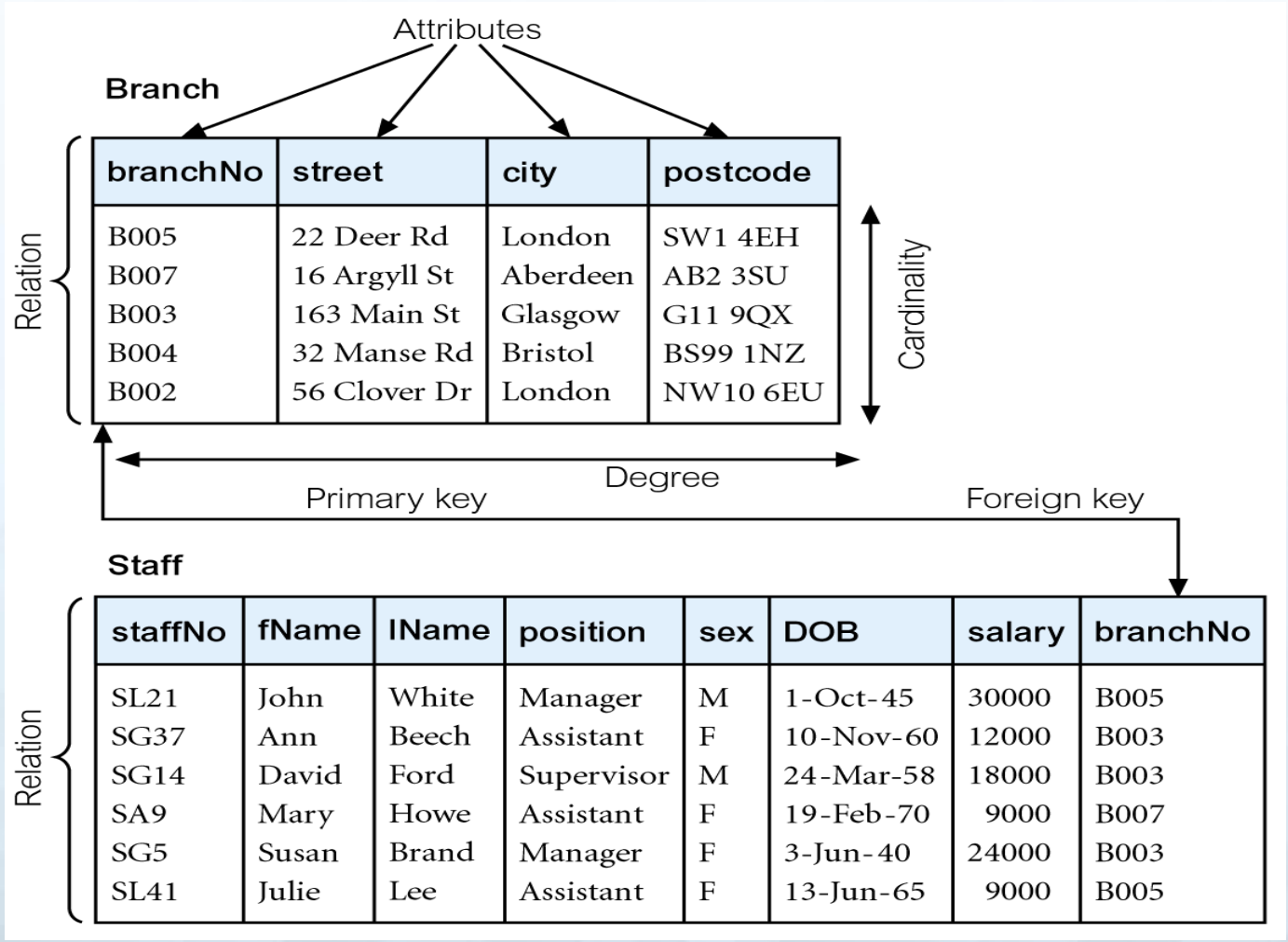
Relational data model contd…

- Relational Model:
  - Proposed in 1970 by E.F. Codd (IBM), first commercial system in 1981-82.
  - Now in several commercial products (e.g. DB2, ORACLE, MS SQL Server, SYBASE, INFORMIX).
  - Several free open source implementations, e.g. MySQL, PostgreSQL

Relational Model Terminology

- A table with columns and rows.
  - Only applies to logical structure of the database, not the physical structure.
- Attribute is a named column of a relation.
- Domain is the set of allowable values for one or more attributes
- Tuple is a row of a relation.
- Degree is the number of attributes in a relation.
- Cardinality is the number of tuples in a relation.
- Relational Database is a collection of normalized relations with distinct relation names

Relational Model Example



Data Base Keys

Keys

- A key is a one or more attributes, used to identify a record in a relation/table

- Relation model support different types of keys
  - Candidate key
  - Super key
  - Foreign key
  - Alternate key
  - Primary key
  - Composite key

Keys contd…

- **Candidate Key**
  - One or more attributes, which is used to uniquely identify a record in a relation

- **Super key**
  - One or more attributes, which is used to uniquely identify a record in a relation
  - super set of candidate key i.e., Candidate key + non key attributes

Student

Stud Name	Stud ID	DOB	Address	e-mail
Shuja	101	11-11-1978	Bangalore	Shuja@xyz.com
Amit	102	10-07-1992	Chennai	Amit@abc.com
Ipsitha	103	11-05-1989	Hyderabad	Ipsitha@bbc.com
Narendra	104	10-07-1967	Madurai	Narendra@bbc.com
Pai	106	11-08-1990	Gurgan	v.pai@ecole.com
Amy	107	19-12-1978	Delhi	Amy@ecole.com
Amit	105	11-11-1978	Bangalore	Amit@ccd.com

Candidate Key(s): 1. Stud Id 2. e-mail
Super Key(s): 1. Stud ID + Stud Name 2. Stud ID + DOB 3. e-mail + Stud Name

contd…

- **Foreign Key**
  - Used to relate one or more relations/tables
  - One or more attributes, which is used to refer value of a candidate key in the same relation or a different relation

Course_Registered

CourseName	Stud ID	Duration	Faculty Name
OOPS	101	6	Geetha
RDBMS	101	6	Anand
C Prog	103	3	Ramya
Web Tech	102	3	Hansa
JAVA	102	6	Geetha
Software Engg.	104	8	Kumar
Mechanics	103	6	Hema

Foreign Key: **Stud ID** in Course_Registered table refers value of Candidate key Stud ID in Student table

- **Alternate Key**
  - Candidate keys that are not selected to be primary key

contd…

- **Primary Key**
  - One or more attributes, which is used to uniquely identify a record in a relation
  - Used in table creation
  - If a relation has several candidate keys, one is chosen arbitrarily to be the primary key

Student

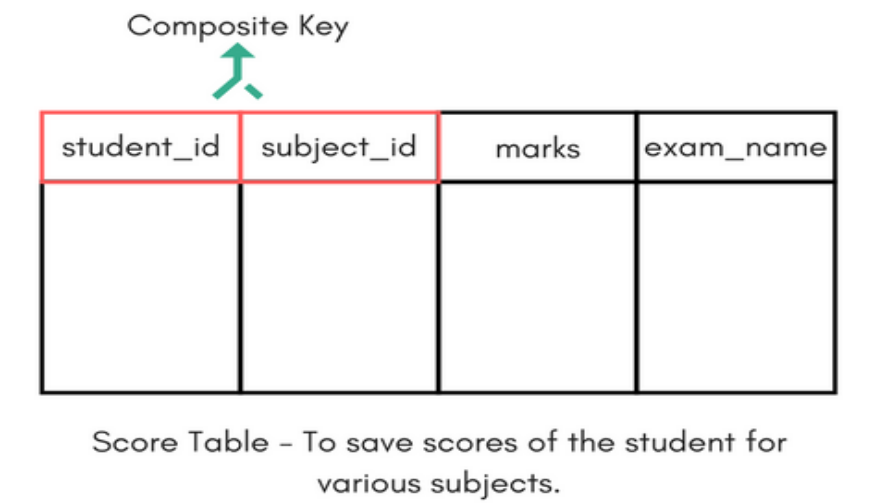
Stud Name	Stud ID	DOB	Address	e-mail
Shuja	101	11-11-1978	Bangalore	Shuja@xyz.com
Amit	102	10-07-1992	Chennai	Amit@abc.com
Ipsitha	103	11-05-1989	Hyderabad	Ipsitha@bbc.com
Narendra	104	10-07-1967	Madurai	Narendra@bbc.com
Pai	106	11-08-1990	Gurgan	v.pai@ecole.com
Amy	107	19-12-1978	Delhi	Amy@ecole.com
Amit	105	11-11-1978	Bangalore	Amit@ccd.com

Candidate Key(s): 1. Stud Id 2. e-mail
Super Key(s): 1. Stud ID+ Stud Name 2. Stud ID + DOB 3. e-mail + Stud Name

Keys contd…

- **Composite Key**
  - A composite key is a set of more than one key that, together, uniquely identifies each record.
  - For example,

Score table:



Score Table - To save scores of the student for various subjects.

  - The **Score** table which stores the marks scored by a student in a particular subject.
  - In this table **Student_id** and **Subject_id** together will form the primary key, hence it is a composite key.

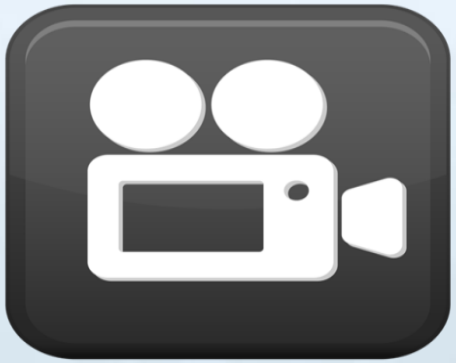
Video on Keys

Objective:

To make the Trainee understand the concept of Database keys.

Video Path:

https://www.youtube.com/watch?v=JkwbhFUftSc



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