CONCEPT OF RELATIONAL DATABASE AND INTEGRITY CONSTRAINTS

StuGather

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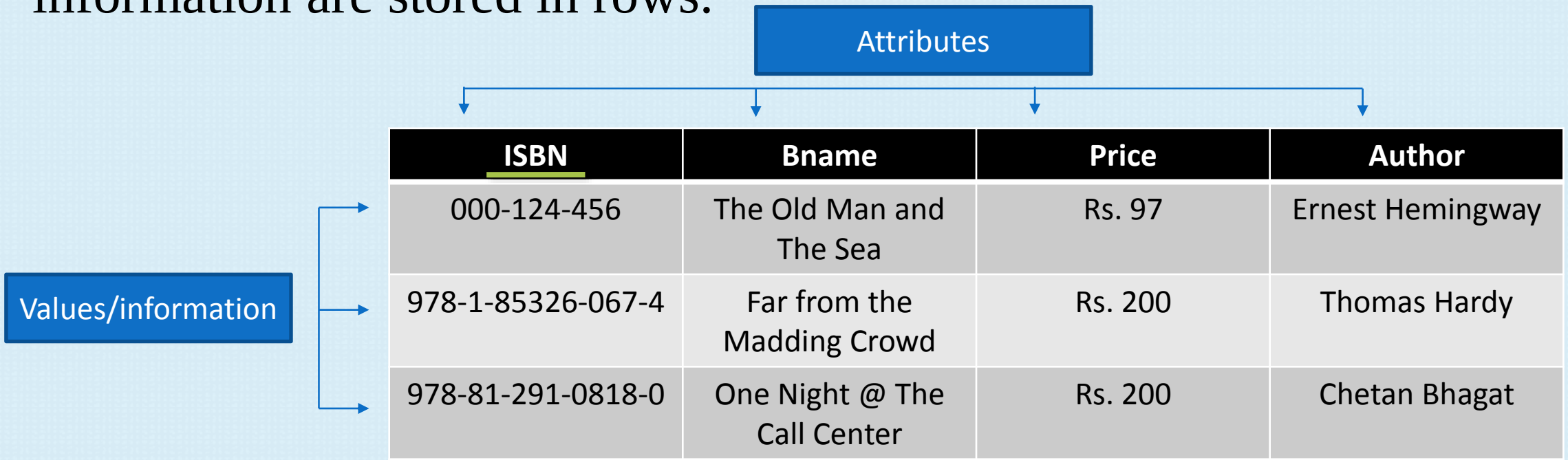
Relational Database Model

- Relational Model was developed by E.F. Codd,
- Most popular database model in the world,
- The data are stored on relation (table), relation in Relational Database is similar to table where column represents attributes, and information are stored in rows.



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- The concept of Primary Key and Foreign Key helps to create logical relationship between relations.
- Primary Key is a one of the best keys that is chosen by database designer for the purpose of uniquely identifying all the entities of entity set.
  - A combination of a NOT NULL and UNIQUE. Ensures that a column (or combination of two or more columns) have an unique identity which helps to find a particular record in a table more easily and quickly.
- Foreign Key is actually the primary key of one table and serves as attribute for another table.
  - Ensures the referential integrity of the data in one table to match values in another table

Contd…

ISBN	Bname	Price	Author
000-124-456	The Old Man and The Sea	Rs. 97	Ernest Hemingway
978-1-85326-067-4	Far from the Madding Crowd	Rs. 200	Thomas Hardy
978-81-291-0818-0	One Night @ The Call Center	Rs. 200	Chetan Bhagat

Foreign Key

ID	Name	Grade	ISBN
0001	Sanjay Sharma	BBA	978-81-291-0818-0
0002	Sushil Shrestha	BSC	000-124-456
0030	Samikshaya Sharma	BBA	978-1-85326-067-4

Data Types and their Notation in SQL SERVER

- Integer : INT
- Number (Decimal) : FLOAT or REAL
- Currency : MONEY
- String (fixed) : CHAR
- String (Variable) : VARCHAR
- Date : DATETIME

Data integrity

- The fundamental set of rules,
- Implemented for the purpose of maintaining accuracy, reliability, and consistency in data,
- Helps to avoid accidental deletion of data,
- Prevents the entry of invalid data in database,

Types of Data Integrity

Entity Integrity

- Generally applies on an attribute,
- Concerned with the presence of primary key in each relation(table),
- It advocates the following:
  - Primary Key must be NOT NULL,
  - Primary Key must be UNIQUE,

  NOTE:

  IF THERE IS NULL VALUE FOR A PRIMARY KEY, THEN IT WILL BE UNATTAINABLE FOR US TO IDENTIFY ALL THE TUPLES INDIVIDUALLY.

IN SQL (Entity Integrity)

```
CREATE TABLE Library (
ISBN INT,
Bname VARCHAR (20),
Price MONEY,
Author VARCHAR (20),
CONSTRAINT pk_id PRIMARY KEY (ISBN));
```

Primary Key

ISBN	Bname	Price	Author
000-124-456	The Old Man and The Sea	Rs. 97	Ernest Hemingway
978-1-85326-067-4	Far from the Madding Crowd	Rs. 200	Thomas Hardy
978-81-291-0818-0	One Night @ The Call Center	Rs. 200	Chetan Bhagat

Contd…

- Domain Integrity
  - Domain Constraint is one of the elementary form of integrity constraint that helps to maintain accuracy and consistency,
  - Helps to avoid duplication of data,
- Referential Integrity
  - Enables to establish relationship between two relations through the application of concept of PRIMARY KEY and FOREIGN KEY.

Introduction to Integrity Constraints

Integrity Constraint

- Set of rules that helps to maintain correctness of data,
- Prevent from accidental deletion and insertion of data,
- Types of Integrity constraint
  - Domain Constraint
  - Referential Integrity Constraint
  - Assertion
  - Triggers

Domain Constraint

- A domain is defined as the set of all unique values that can be allowed for an attribute.
- For example, a domain of day-of-week is Sunday, Monday, Tuesday ... Saturday.
- Domain Constraint is one of the elementary form of integrity constraint that helps to maintain accuracy and consistency,
- Helps to avoid common errors such as date : 30th February, 2010…
- CHECK, UNIQUE, NOT NULL, PRIMARY KEY are the examples of Domain Constraints

IN SQL (Domain Integrity)

```
CREATE TABLE Student (
ID INT PRIMARY KEY,
Sname VARCHAR (20) NOT NULL,
Grade VARCHAR (20),
Age INT CHECK(Age BETWEEN 19 AND 21),
Email_id VARCHAR (30) UNIQUE);
```

ID	Sname	Grade	Age	Email_id
0001	Sanjay Sharma	BBA	20	sanjay120@gmail.com
0002	Sushil Shrestha	BSC	21	Shth.susil@yahoo.com
0003	Samikshaya Sharma	BBA	19	Sami.sharma@rediff.com

In Case:

INERT INTO Student VALUES (0004, 'Nisha Thapa Magar', 'BBA', 22, 'sujan98@gmail.com')

It will not be accepted as Age>21

Referential Integrity Constraint

- Has sturdy link with entity integrity,
- The referential integrity relies on the entity integrity,
- **Referential integrity** is a property of data which, when satisfied, requires every value of one attribute (column) of a relation (table) to exist as a value of another attribute in a different (or the same) relation (table).
- Referential Integrity is based on the concept of foreign key,

IN SQL (Entity Integrity)

```
CREATE TABLE Library (
ISBN INT,
Bname VARCHAR (20),
Price MONEY,
Author VARCHAR (20),
CONSTRAINT pk_id PRIMARY
KEY (ISBN));
```

IN SQL (Referential Integrity)

```
CREATE TABLE Student (
ID INT PRIMARY KEY,
Sname VARCHAR (20),
Grade VARCHAR (20),
ISBN INT FOREIGN KEY
REFERENCES Library (ISBN));
```

Library

ISBN	Bname	Price	Author
000-124-456	The Old Man and The Sea	Rs. 97	Ernest Hemingway
978-1-85326-067-4	Far from the Madding Crowd	Rs. 200	Thomas Hardy
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Foreign Key

Student

ID	Sname	Grade	ISBN
0001	Sanjay Sharma	BBA	978-81-291-0818-0
0002	Sushil Shrestha	BSC	000-124-456
0030	Samikshaya Sharma	BBA	978-1-85326-067-4

Contd…

- Assertion
  - General purpose CHECK that allows for the enforcement of any condition over entire database
- Triggers
  - Special type of stored procedure that automatically gets executed in the DBMS in response to specific change in database