Links

This Notebook: https://1drv.ms/o/s!AknT1SrRpCz-xvJQXWnhOEQjO7vKwA?e=Vz65A7

GitHub: vivekduttamishra/202407-g7cr-sqlserver (github.com)

Assignments

Assingmnet 2.1
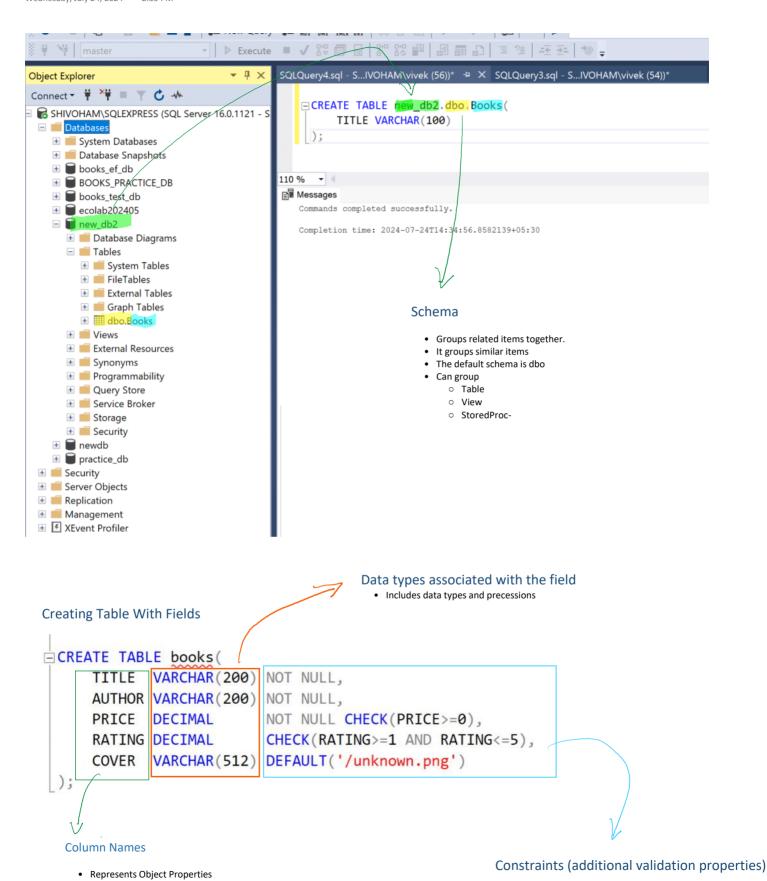
Lalit
John
Naveen
Saifulla

Assignment 2.2

1. Vamsi

2. Prasad
3. Sathish
4. John
5. Keerthana
6. Shiva Krishna
7. Tejashwani
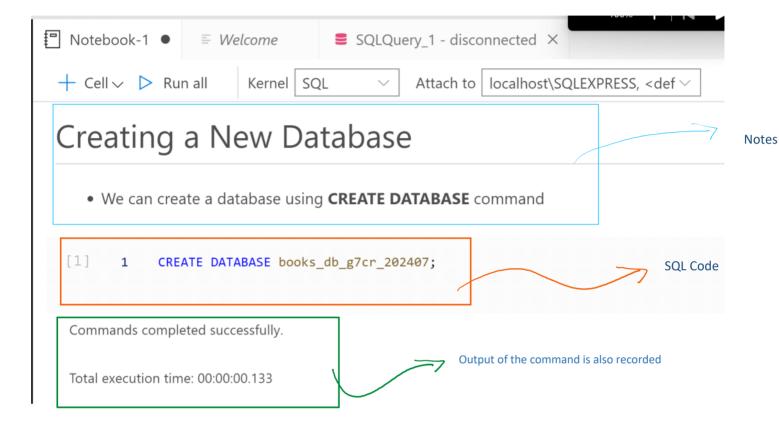8. Nagasritha
9. Jahnavi
10. Prasanna

11. xx

DBMS

Wednesday, July 24, 2024   10:46 AM

Creating Table

```
master                Execute

Object Explorer                            SQLQuery4.sql - S...IVOHAM\vivek (56))*    ×    SQLQuery3.sql - S...IVOHAM\vivek (54))*
Connect
                                           CREATE  TABLE new_db2.dbo.Books(
SHIVOHAM\SQLEXPRESS (SQL Server 16.0.1121 - S      TITLE VARCHAR(100)
  Databases                                );
    System Databases
    Database Snapshots
    books_ef_db
    BOOKS_PRACTICE_DB                      110 %
    books_test_db                          Messages
    ecolab202405                             Commands completed successfully.
    new_db2
      Database Diagrams                       Completion time: 2024-07-24T14:34:56.8582139+05:30
      Tables
        System Tables
        FileTables
        External Tables
        Graph Tables
        dbo.Books                                            Schema
    Views
    External Resources                             • Groups related items together.
    Synonyms                                       • It groups similar items
    Programmability                                • The default schema is dbo
    Query Store                                    • Can group
    Service Broker                                     ○ Table
    Storage                                            ○ View
    Security                                           ○ StoredProc-
  newdb
  practice_db
  Security
  Server Objects
  Replication
  Management
  XEvent Profiler
```

Creating Table With Fields

Data types associated with the field
- Includes data types and precessions

```
CREATE TABLE books(
    TITLE   VARCHAR(200)  NOT NULL,
    AUTHOR  VARCHAR(200)  NOT NULL,
    PRICE   DECIMAL       NOT NULL CHECK(PRICE>=0),
    RATING  DECIMAL       CHECK(RATING>=1 AND RATING<=5),
    COVER   VARCHAR(512)  DEFAULT('/unknown.png')
);
```

Column Names
- Represents Object Properties

Constraints (additional validation properties)
- NOT NULL
- CHECK for conditions

Azure Studio Notebook

Wednesday, July 24, 2024   3:17 PM

- A Jupyter style notebook for SqlSever
  - Jupyter is quite popular with Python developers
- Allows us to record
  - Notes
  - Codes
  - Code Output

Insert

Approach #1 Provide Column Name And values

- Values must be provided in the same order as column name

```sql
[4]    1    INSERT
       2        INTO BOOKS(TITLE,AUTHOR,PRICE,RATING,COVER)
       3        VALUES    ('The Accursed God','Vivek Dutta Mishra',299, 4.7, 'tag.png');
```
SQL

(1 row affected)

Success

Approach #2 Provide Only Values

```sql
[5]    1    INSERT
       2        INTO BOOKS
       3        VALUES    ('Manas','Vivek Dutta Mishra',199, 4.6, 'manas.png');
```

(1 row affected)

- Column Name will be in the same order as Create Table definition

```sql
CREATE TABLE books(
    TITLE  VARCHAR(200) NOT NULL,
    AUTHOR VARCHAR(200) NOT NULL,
    PRICE  DECIMAL      NOT NULL CHECK(PRICE>=0),
    RATING DECIMAL      CHECK(RATING>=1 AND RATING<=5),
    COVER  VARCHAR(512) DEFAULT('/unknown.png')
);
```

Insert with constraint failure results in error

```sql
[19]   1    INSERT
       2        INTO BOOKS(TITLE,PRICE,RATING)
       3        VALUES    ('Rashmirathi',299, 4.7);
```
SQL

Msg 515, Level 16, State 2, Line 1
Cannot insert the value NULL into column 'AUTHOR', table 'books_db_g7cr_202407.dbo.books'; column does not allow nulls. INSERT fails.

The statement has been terminated.

Total execution time: 00:00:00.003

```sql
1    INSERT
2        INTO BOOKS(TITLE,AUTHOR,PRICE,RATING)
3        VALUES    ('Rashmirathi','Ramdhari Singh Dinkar',299, 10);
```
SQL

Msg 547, Level 16, State 0, Line 1
The INSERT statement conflicted with the CHECK constraint "CK__books__RATING__5165187F". The conflict occurred in database "books_db_g7cr_202407", table "dbo.books", column 'RATING'.

The statement has been terminated.

The INSERT statement conflicted with the CHECK constraint "CK__books__RATING__3E1D39E1". The conflict occurred in database "books_db_y783_38249", table "dbo.books", column 'RATING'.

The statement has been terminated.

Total execution time: 00:00:00.004

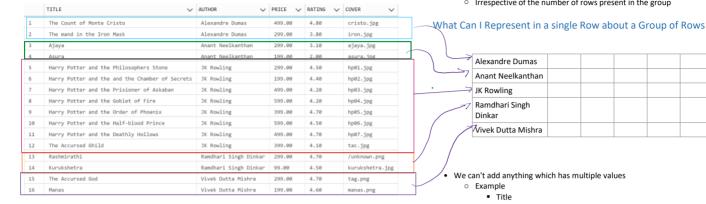# Group By Query

- Group By Splits The Given Table into multiple Sub Tables based on a Unique Key
- For Example
  - We can group our Books By Author
  - Now our table will logically split into multiple tables on for each author
- Now We return result that will have
  - 1 row information for each group.

Group By Author

- There will be on group of rows per distinct author
- The Query will return a result where each group will be represented by a single row
  - Irrespective of the number of rows present in the group

What Can I Represent in a single Row about a Group of Rows

TITLE	AUTHOR	PRICE	RATING	COVER
1	The Count of Monte Cristo	Alexandre Dumas	499.00	4.80	cristo.jpg
2	The mand in the Iron Mask	Alexandre Dumas	299.00	3.80	iron.jpg
3	Ajaya	Anant Neelkanthan	299.00	3.10	ajaya.jpg
4	Asura	Anant Neelkanthan	199.00	2.00	asura.jpg
5	Harry Potter and the Philosophers Stone	JK Rowling	299.00	4.50	hp01.jpg
6	Harry Potter and the and the Chamber of Secrets	JK Rowling	199.00	4.40	hp02.jpg
7	Harry Potter and the Prisioner of Askaban	JK Rowling	499.00	4.20	hp03.jpg
8	Harry Potter and the Goblet of Fire	JK Rowling	599.00	4.20	hp04.jpg
9	Harry Potter and the Order of Phoenix	JK Rowling	399.00	4.70	hp05.jpg
10	Harry Potter and the Half-blood Prince	JK Rowling	599.00	4.50	hp06.jpg
11	Harry Potter and the Deathly Hollows	JK Rowling	499.00	4.70	hp07.jpg
12	The Accursed Ghild	JK Rowling	399.00	4.10	tac.jpg
13	Rashmirathi	Ramdhari Singh Dinkar	299.00	4.70	/unknown.png
14	Kurukshetra	Ramdhari Singh Dinkar	99.00	4.50	kurukshetra.jpg
15	The Accursed God	Vivek Dutta Mishra	299.00	4.70	tag.png
16	Manas	Vivek Dutta Mishra	199.00	4.60	manas.png

Alexandre Dumas					
Anant Neelkanthan					
JK Rowling					
Ramdhari Singh Dinkar					
Vivek Dutta Mishra					

- We can't add anything which has multiple values
  - Example
    - Title
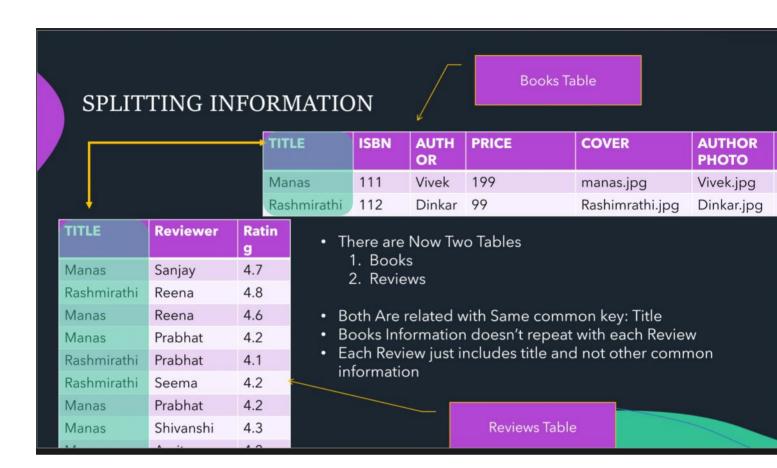   - Each group has more than 1 title. We can't include in a single row
    - Same goes for
      - Price, Cover, Rating
- We can Include Author (Group Key)
  - All Rows have same Author.

- Returns rows in a given group and not in entire Books table

```
1  SELECT
2      AUTHOR,
3      COUNT(*) AS BOOKS_WRITTEN,
4      AVG(RATING) AS AVG_RATING
5  FROM
6      BOOKS
7  GROUP BY
8      AUTHOR
```

Operates on the rows
Within the group and not on the entire table

Assignment 01.01

SPLITTING INFORMATION

Books Table

TITLE	ISBN	AUTHOR	PRICE	COVER	AUTHOR PHOTO
Manas	111	Vivek	199	manas.jpg	Vivek.jpg
Rashmirathi	112	Dinkar	99	Rashimrathi.jpg	Dinkar.jpg

TITLE	Reviewer	Rating
Manas	Sanjay	4.7
Rashmirathi	Reena	4.8
Manas	Reena	4.6
Manas	Prabhat	4.2
Rashmirathi	Prabhat	4.1
Rashmirathi	Seema	4.2
Manas	Prabhat	4.2
Manas	Shivanshi	4.3

- There are Now Two Tables
  1. Books
  2. Reviews

- Both Are related with Same common key: Title
- Books Information doesn't repeat with each Review
- Each Review just includes title and not other common information

Reviews Table
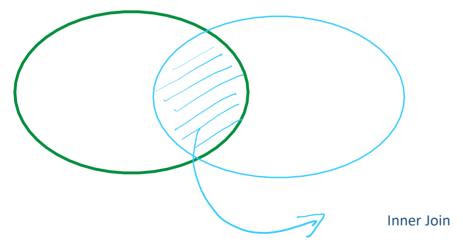
Joins

JOIN

Books's Table

Reviewer

Default Result without Join is Cartisian Product of two

We want to join overlapping (related data)

Inner Join
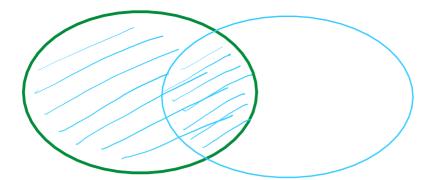
- Take only those rows from both sides which are related
- The relating values should be present in both sides
- ANY ROW IN EITHER TABLE WITHOUT A CORRESPONDENCE IN ANOTHER IS IGNORED.
- This behavior is similar to what we get with WHERE CLAUSE

Left Outer Join

LEFT TABLE —> MENTIONED IN FROM CLAUSE
RIGHT TABLE —> MENTIONED BY THE JOIN CLAUSE

- We take all Rows from
  - the Left Table
    - Mentioned in FROM CLAUSE
  - And match It with corresponding rows in
    - the right table
      - MENTIONED BY JOIN
- If there is No correspndence in the right table the right table cells are filled with NULL VALUE
- Any row in right table that is not present in left is INGNORED

Sql for books
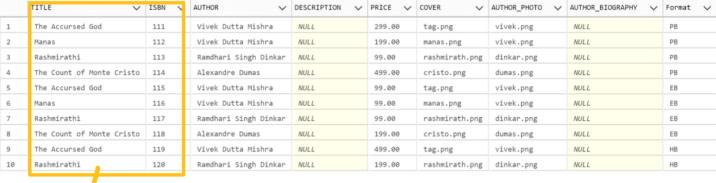
Thursday, July 25, 2024   2:55 PM

Composite Keys

Thursday, July 25, 2024   3:15 PM

- Sometimes we can't uniquely identify a record (object) based on a single field
- We may have multiple information to identify a unique Value

In our example

- Book title is not guaranteed to be unique
    - Different authors can write books with same title
- ISBN is also not guaranteed to be unqiue
    - Same book may have different ISBN
- To find out all the details of a book, we can identify with a combination of these two fields

	TITLE	ISBN	AUTHOR	DESCRIPTION	PRICE	COVER	AUTHOR_PHOTO	AUTHOR_BIOGRAPHY	Format
1	The Accursed God	111	Vivek Dutta Mishra	NULL	299.00	tag.png	vivek.png	NULL	PB
2	Manas	112	Vivek Dutta Mishra	NULL	199.00	manas.png	vivek.png	NULL	PB
3	Rashmirathi	113	Ramdhari Singh Dinkar	NULL	99.00	rashmirath.png	dinkar.png	NULL	PB
4	The Count of Monte Cristo	114	Alexandre Dumas	NULL	499.00	cristo.png	dumas.png	NULL	PB
5	The Accursed God	115	Vivek Dutta Mishra	NULL	99.00	tag.png	vivek.png	NULL	EB
6	Manas	116	Vivek Dutta Mishra	NULL	99.00	manas.png	vivek.png	NULL	EB
7	Rashmirathi	117	Ramdhari Singh Dinkar	NULL	99.00	rashmirath.png	dinkar.png	NULL	EB
8	The Count of Monte Cristo	118	Alexandre Dumas	NULL	199.00	cristo.png	dumas.png	NULL	EB
9	The Accursed God	119	Vivek Dutta Mishra	NULL	499.00	tag.png	vivek.png	NULL	HB
10	Rashmirathi	120	Ramdhari Singh Dinkar	NULL	199.00	rashmirath.png	dinkar.png	NULL	HB

Composite Key.
- They together identify the entire row.
- Combination will create unique row

We still have Redundant Data in our application
- We have a combination title*isbn rows
- It causes a problem

Problem:

- What should the Review Depend on?
    - Title?
        - Different books may have same title
    - ISBN?
        - Same book may have different title
        - Reviews for one ISBN will not reflect in other ISBN or same book
    - Title+ISBN?
        - That is same as ISBN

Normalization #2

Thursday, July 25, 2024   3:20 PM

Problem that 2NF solves

- All non identity column must depend on the entire key
    - No non-identity column should depend on partial key

- In our example our identity is based on
    - Title
    - ISBN

- But some information are based only on
    - ISBN
        - Format
        - Price
        - Cover
    - Title
        - Author
        - Description
        - Reviews

	TITLE	ISBN	AUTHOR	DESCRIPTION	PRICE	COVER	AUTHOR_PHOTO	AUTHOR_BIOGRAPHY	Format
1	The Accursed God	111	Vivek Dutta Mishra	NULL	299.00	tag.png	vivek.png	NULL	PB
2	Manas	112	Vivek Dutta Mishra	NULL	199.00	manas.png	vivek.png	NULL	PB
3	Rashmirathi	113	Ramdhari Singh Dinkar	NULL	99.00	rashmirath.png	dinkar.png	NULL	PB
4	The Count of Monte Cristo	114	Alexandre Dumas	NULL	499.00	cristo.png	dumas.png	NULL	PB
5	The Accursed God	115	Vivek Dutta Mishra	NULL	99.00	tag.png	vivek.png	NULL	EB
6	Manas	116	Vivek Dutta Mishra	NULL	99.00	manas.png	vivek.png	NULL	EB
7	Rashmirathi	117	Ramdhari Singh Dinkar	NULL	99.00	rashmirath.png	dinkar.png	NULL	EB
8	The Count of Monte Cristo	118	Alexandre Dumas	NULL	199.00	cristo.png	dumas.png	NULL	EB
9	The Accursed God	119	Vivek Dutta Mishra	NULL	499.00	tag.png	vivek.png	NULL	HB
10	Rashmirathi	120	Ramdhari Singh Dinkar	NULL	199.00	rashmirath.png	dinkar.png	NULL	HB

2NF

- Make sure non-identity column should depend on entire idenity value

Phase #1

- To do this we can split the whole code in two table and move identity column in different tables
    - Avoid composite key

	TITLE	DESCRIPTION	AUTHOR	AUTHOR_PHOTO	AUTHOR_BIOGRAPHY
1	Manas	NULL	Vivek Dutta Mishra	vivek.png	NULL
2	Rashmirathi	NULL	Ramdhari Singh Dinkar	dinkar.png	NULL
3	The Accursed God	NULL	Manoj Kumar	manoj.png	NULL
4	The Accursed God	NULL	Vivek Dutta Mishra	vivek.png	NULL
5	The Count of Monte Cristo	NULL	Alexandre Dumas	dumas.png	NULL

	ISBN	PRICE	FORMAT	COVER	Book_ID
1	111	299.00	PB	tag.png	4
2	112	199.00	PB	manas.png	1
3	113	99.00	PB	rashmirath.png	2
4	114	499.00	PB	cristo.png	5
5	115	99.00	EB	tag.png	4
6	116	99.00	EB	manas.png	1
					2

What is the link/join between these two tables?

- We can't link it on
    - ISBN
    - Title
- Sometimes we may not have a natural (real-world) column to link the details

4	114	499.00	PB	cristo.png	4
5	115	99.00	EB	tag.png	1
6	116	99.00	EB	manas.png	2
7	117	99.00	EB	rashmirath.png	4
8	118	199.00	EB	cristo.png	4
9	119	499.00	HB	tag.png	1
10	120	199.00	HB	rashmirath.png	3
11	121	299.00	PB	cover.png	3
12	122	299.00	PB	cover-2.png	

- We can't link it on
  - ISBN
  - Title
- Sometimes we may not have a natural (real-world) column to link the details
- In such cases we can create a synthetic key to unqiuely identify the details of
  - It could be a simple numerical id.

Phase #2 Add a Synthetic Column to Master

Normalization#3

Thursday, July 25, 2024　　　5:23 PM

1. For a database to be in 3NF
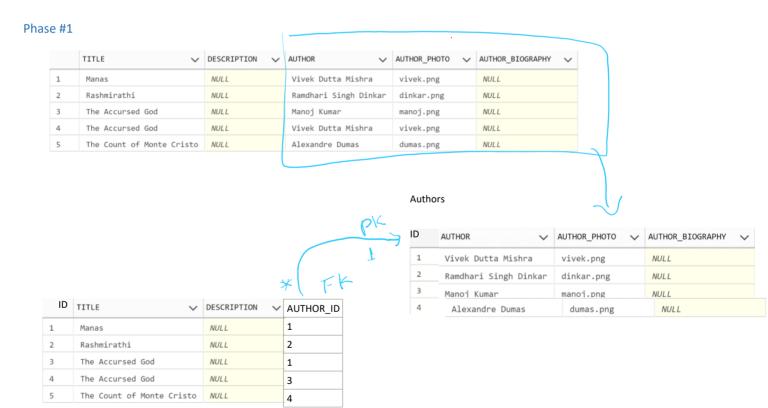
- There should be no transitive dependency
- All non-primary columns should depend on the primary column only
- It shouldn't depend on any other column

	TITLE	DESCRIPTION	AUTHOR	AUTHOR_PHOTO	AUTHOR_BIOGRAPHY
1	Manas	NULL	Vivek Dutta Mishra	vivek.png	NULL
2	Rashmirathi	NULL	Ramdhari Singh Dinkar	dinkar.png	NULL
3	The Accursed God	NULL	Manoj Kumar	manoj.png	NULL
4	The Accursed God	NULL	Vivek Dutta Mishra	vivek.png	NULL
5	The Count of Monte Cristo	NULL	Alexandre Dumas	dumas.png	NULL

Solution

- Any column that doesn't depend on the primary key (key column) doesn't belong to this table
- We can Isolate interdependent columns in a separate table and link them

Phase #1

	TITLE	DESCRIPTION	AUTHOR	AUTHOR_PHOTO	AUTHOR_BIOGRAPHY
1	Manas	NULL	Vivek Dutta Mishra	vivek.png	NULL
2	Rashmirathi	NULL	Ramdhari Singh Dinkar	dinkar.png	NULL
3	The Accursed God	NULL	Manoj Kumar	manoj.png	NULL
4	The Accursed God	NULL	Vivek Dutta Mishra	vivek.png	NULL
5	The Count of Monte Cristo	NULL	Alexandre Dumas	dumas.png	NULL

Authors

ID	AUTHOR	AUTHOR_PHOTO	AUTHOR_BIOGRAPHY
1	Vivek Dutta Mishra	vivek.png	NULL
2	Ramdhari Singh Dinkar	dinkar.png	NULL
3	Manoj Kumar	manoj.png	NULL
4	Alexandre Dumas	dumas.png	NULL

PK

FK

ID	TITLE	DESCRIPTION	AUTHOR_ID
1	Manas	NULL	1
2	Rashmirathi	NULL	2
3	The Accursed God	NULL	1
4	The Accursed God	NULL	3
5	The Count of Monte Cristo	NULL	4

Phase 2: JOIN them on PK/FK

Assignment 2

Thursday, July 25, 2024   6:03 PM
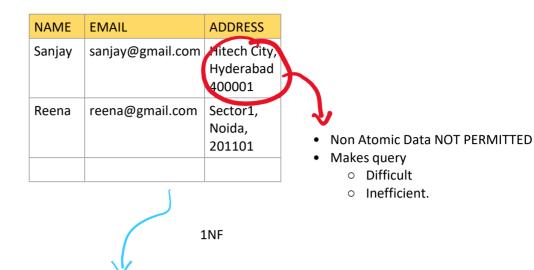
- Implement all tables needed as per 3NF
  - Books
  - ISBNs
  - Authors
  - Reviews

- Add some data as per the current code.

Person

class Person{

    String name;
    String email;
    Address address;

}

Class Address
{
    String street;
    String city;
    String pin;
}

NAME	EMAIL	ADDRESS
Sanjay	sanjay@gmail.com	Hitech City, Hyderabad 400001
Reena	reena@gmail.com	Sector1, Noida, 201101

- Non Atomic Data NOT PERMITTED
- Makes query
  - Difficult
  - Inefficient.

1NF

NAME	EMAIL	STREET	CITY	PIN
Sanjay	sanjay@gmail.com	Hitech City	Hyderabad	400001
Reena	reena@gmail.com	Sector1	Noida	201101

De Normalization

AD

ID	TITLE	DESCRIPTION	AUTHOR_ID
1	Manas	NULL	1
2	Rashmirathi	NULL	2
3	The Accursed God	NULL	1
4	The Accursed God	NULL	3
5	The Count of Monte Cristo	NULL	4

ID

ID	AUTHOR	AUTHOR_PHOTO	AUTHOR_BIOGRAPHY
1	Vivek Dutta Mishra	vivek.png	NULL
2	Ramdhari Singh Dinkar	dinkar.png	NULL
3	Manoj Kumar	manoj.png	NULL
4	Alexandre Dumas	dumas.png	NULL

ID	ISBN	PRICE	FORMAT	COVER	Book_ID
1	111	299.00	PB	tag.png	4
2	112	199.00	PB	manas.png	1
3	113	99.00	PB	rashmirath.png	2
4	114	499.00	PB	cristo.png	5
5	115	99.00	EB	tag.png	4
6	116	99.00	EB	manas.png	1
7	117	99.00	EB	rashmirath.png	2
8	118	199.00	EB	cristo.png	4
9	119	499.00	HB	tag.png	4
10	120	199.00	HB	rashmirath.png	1
11	121	299.00	PB	cover.png	3
12	122	299.00	PB	cover-2.png	3

How do we Create a Page that displays

- Book Title
- Author Name
- Book Cover

The Accursed God
by Vivek Dutta Mishra | 1 January 2020
★★★★½ ∨ 215
Paperback   Ages: 8+ years, from publishers
₹299⁹⁹ M.R.P: ₹480 (38% off)
Up to 5% back with Amazon Pay ICICI card
✓prime One-Day
FREE delivery **Tomorrow 8 am - 12 pm**
Kindle Edition
₹0 kindleunlimited
You own this item
Available instantly
Read Now
Or ₹99 to buy

```
SELECT
      TITLE,
      COVER,
      AUTHOR,
      PRICE
FROM
      BOOKS
JOIN
      AUTHORS
ON
      AUTHOR_ID=AUTHORS.ID
JOIN
      ISBNS
ON
      ISBNS.BOOK_ID=BOOKS.ID
```

DENORMALIZATION

- Denomalization is reverse of normalization
- It recommends minimal redundancy to avoid complex and inefficient queries
- We may some column to a table even if it doesn't belong there and may be present elsewhere
- Example
  - We may add to books table
    - Author name
    - One of the cover images.
  - Now to get the basic information we need to make simple 1 table query.
  - We need to tradeoff between
    - Space wasted for redundant data
    - Time wasted for complex query