AMRITA
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DEEMED TO BE UNIVERSITY

19CSE202 DATABASE MANAGEMENT SYSTEMS

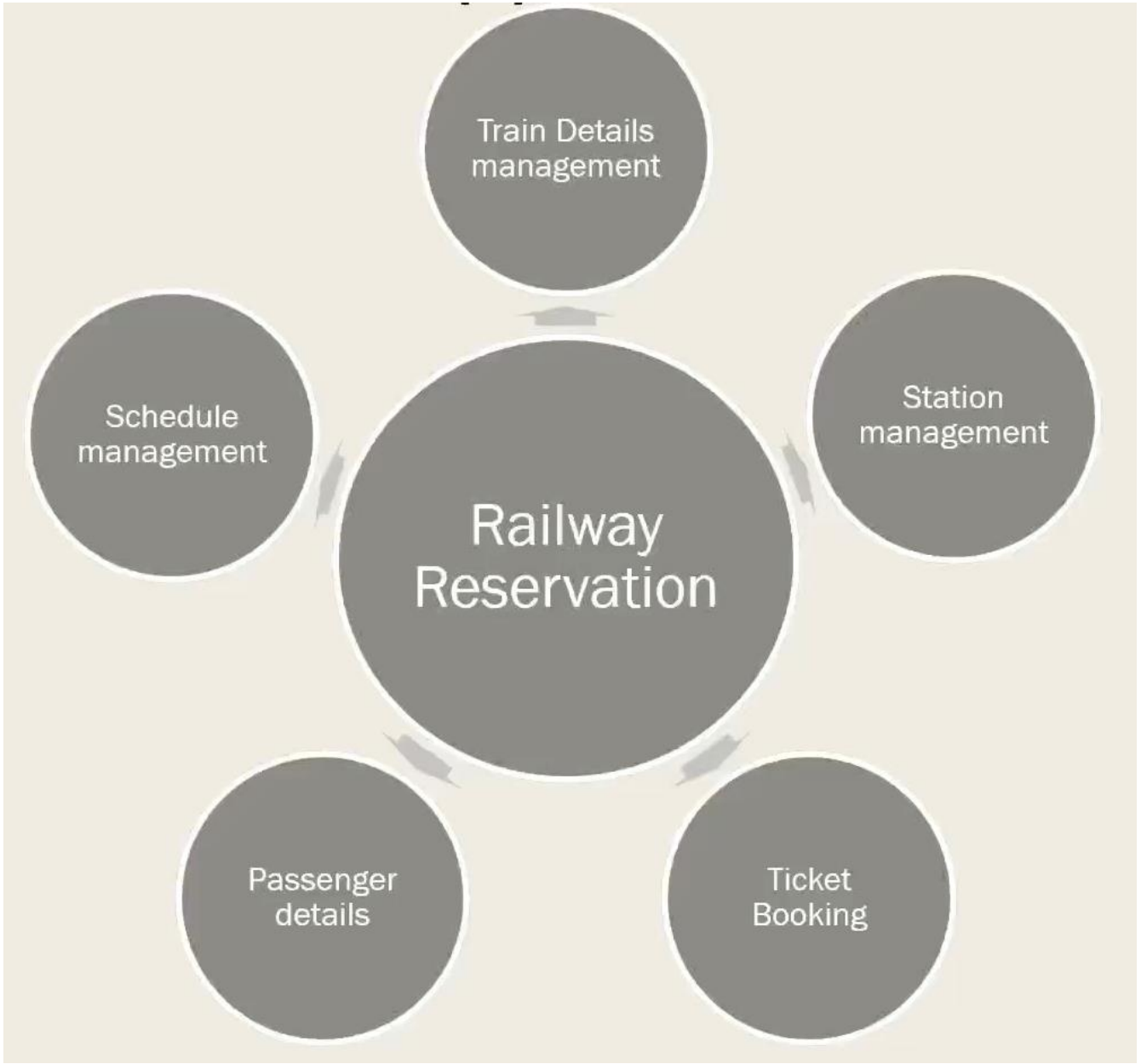
L-T-P-C: 3-0-3-4

FILE SYSTEM
Vs
DBMS

DB + DBMS

- DB : Huge collection of organized interrelated data
- Database Management System(DBMS)
  - *A general-purpose application software to make sense out of DBs*
  - *Define, Construct, and Manipulate the DBs for various applications in a flexible and convenient manner.*

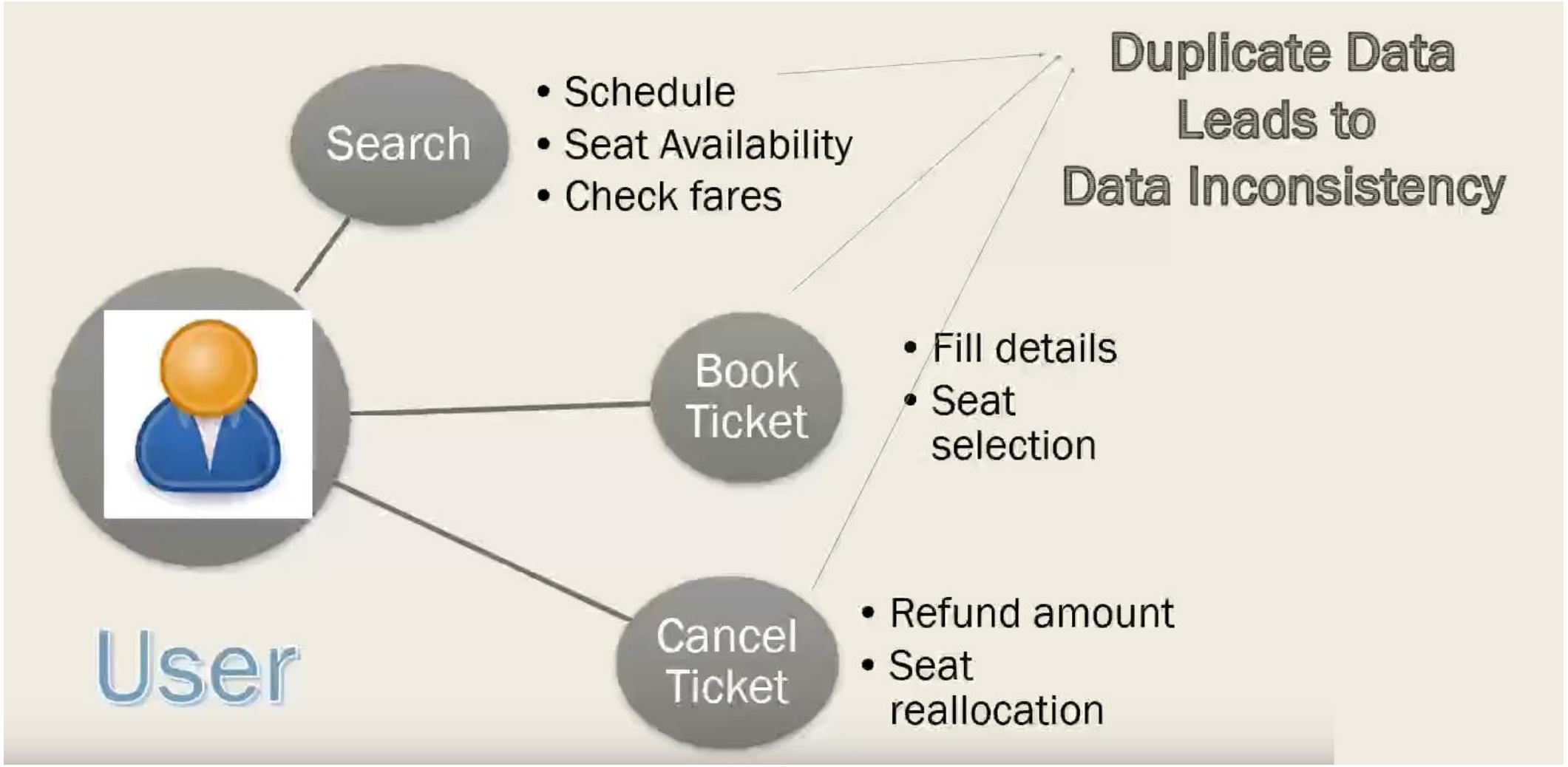
Railway DB and its Applications



Why not "program up" DBs?

- Usage of Conventional Files in programming languages
- Complicated Structure
- Huge DBs
- Use simultaneously

DATA ISOLATION



Manual Program Versus Declarative Querying

```
Public String search(.....)
{
     .....
      return
}
```

```
Select * from Schedule
where train_no = 16538
```

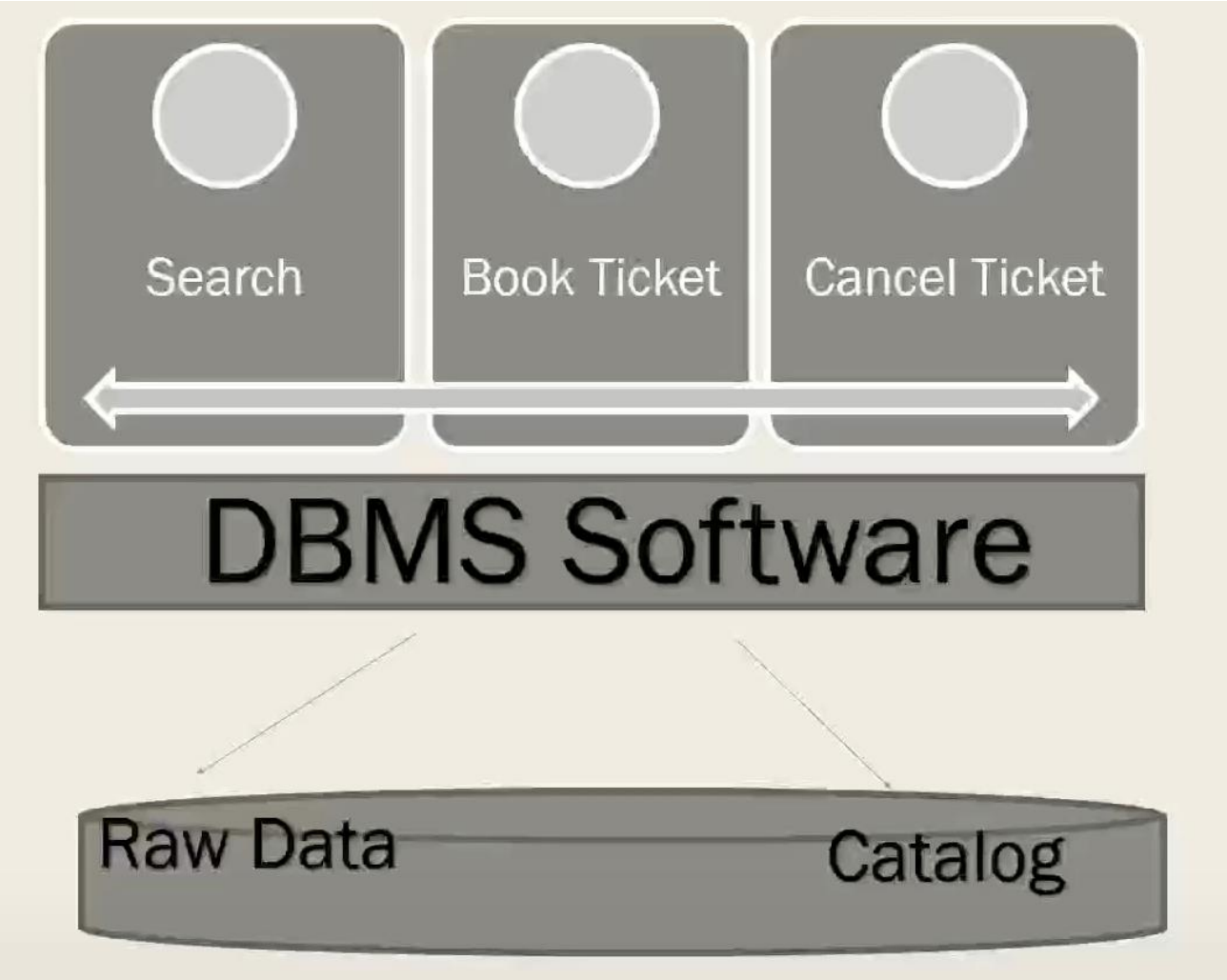
FILE VS DBMS

- Data redundancy and inconsistency
  - *Multiple file formats, duplication of information in different files*
- Difficulty in accessing data
  - *Need to write a new program to carry out each new task*
- Data isolation
  - *Multiple files and formats*
- Integrity problems
  - *Integrity constraints (e.g., ticket fare <> 0) become "buried" in program code rather than being stated explicitly*
  - *Hard to add new constraints or change existing ones*

FILE VS DBMS

- Atomicity of updates
  - *Failures may leave database in an inconsistent state with partial updates carried out*
  - *Example: Seat allocation and payment should either complete or not happen at all*
- Concurrent access by multiple users
  - *Concurrent access needed for performance*
  - *Uncontrolled concurrent accesses can lead to inconsistencies*
    - Example: Two passengers seeing seat availability (5 seats\ and reserving (2,4) at the same time
- Security problems
  - *Hard to provide user access to some, but not all, data*

DBMS Solves Data Isolation



Solved Challenge: Data Organization

- How to store the data
  - *Details of Train in Railways DB*
  - *Details of Customers in Banking DB*
- How to manipulate data
  - *How to update the seat availability once the passengers reserve tickets*
  - *How to update the account balance once withdrawal/deposit occurs*
- How to retrieve data
  - *How to get details of fare for each of the trains depending on the stations*
  - *How to get account statement of a customer for the month of June*

Solved Challenge : Efficiency

- Number of trains may be in hundreds
- But number of passengers may be in millions
- "Get me the passengers who travelled in Garibrath on 20th Feb,2018 from Station X to Station Y".

Quickly and efficiently

Retrieve the details of passengers in a particular train on a particular date.

Solved Challenge: Concurrency and Reliability

Concurrency

- Multiple passengers booking tickets for Train T
- From same Stations : Station X to Station Y
- On the same date and same time

Reliability

- Power Goes Off
- System Crashes

Advantages of DBMS

- Control of redundancy
- Security enforcement
- Data Persistence
- Efficient data retrieval
- Robustness
- Representation of complex relationships
- Data integrity
- Flexibility
- Concurrency
- Reliability.....and many more!!!!

Don't Use DBMS if

- No need for Data Persistence or Data Consistency
- System is computationally intensive and not data intensive
- Only Single user requires an application, data structure is simple, and use case is simple
- Data is quite static and no frequent updates

Popular Companies and DBMS

- Amazon : MySQL and PostgreSQL
- Facebook : MySQL
- Google : BigTable
- Skype : PostgreSQL, Azure Cosmos
- Apple : Cassandra
- Uber, Netflix, Amazon : PostgreSQL
- PeopleSoft, Samsung, Honeywell : Oracle

THANK YOU