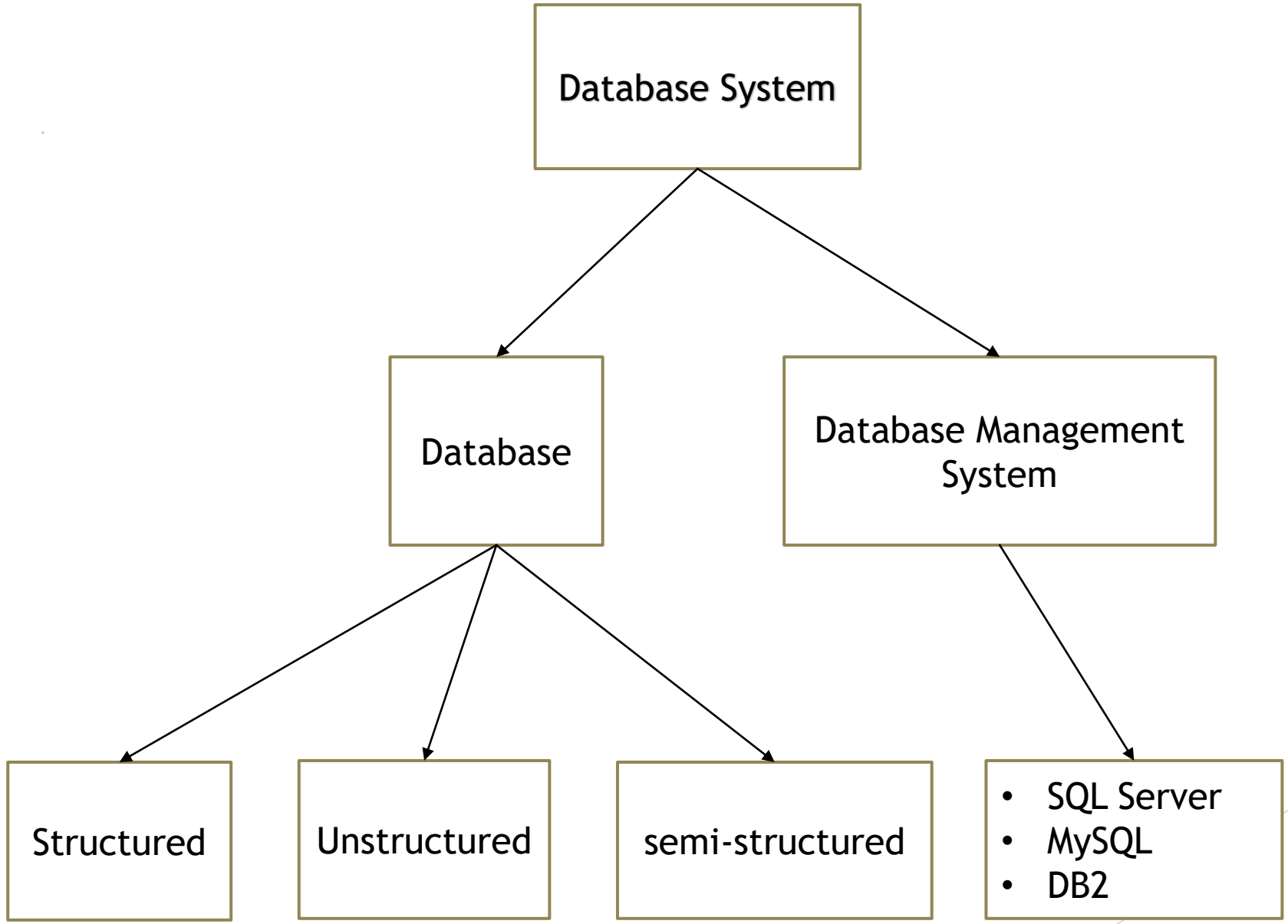
Day-1 Database


Database System
Database
Database Management System
Structured
Unstructured
semi-structured
SQL Server
MySQL
DB2

University Database

Students Table

Student_ID	Name	Class	Age	Marks	City
101	Riya	10	15	89	Delhi
102	Arjun	10	16	92	Mumbai
103	Sneha	9	14	85	Kolkata
104	Rahul	8	13	78	Chennai
105	Priya	9	14	95	Bengaluru

Employee Database

Employee Table

Emp_ID	Name	Department	Age	Salary	Location
E001	Anil	HR	30	45,000	Delhi
E002	Meena	IT	28	60,000	Hyderabad
E003	Rakesh	Finance	35	55,000	Mumbai
E004	Pooja	IT	26	62,000	Bengaluru
E005	Vikram	Sales	32	48,000	Kolkata

Database System

A **Database System** is a **complete setup** that includes:

1. **The database** – where data is stored
2. **The DBMS (Database Management System)** – software that manages the database
3. **Users and Applications** – people or programs that interact with the database
4. **Hardware** – the physical machines (computers, servers, storage) where it all runs

Database

A database is a place where data is stored and organized so it can be easily accessed, managed, and updated.

Example: Like a digital filing cabinet for storing student records, product info, etc.

DBMS (Database Management System)

A DBMS is software that helps you create, manage, and use a database. It handles storing, retrieving, and updating data.

Example: Microsoft Access, MySQL, Oracle.

RDBMS (Relational Database Management System)

An RDBMS is a type of DBMS where data is stored in tables (rows and columns), and different tables can be related.

Example: MySQL, PostgreSQL, SQL Server.

Structured Data

Data that is organized in a fixed format like tables. It's easy to enter, search, and analyze.

Example: A table with student names, roll numbers, and marks

Unstructured Data

Data that has no fixed format or structure. Harder to search or organize.

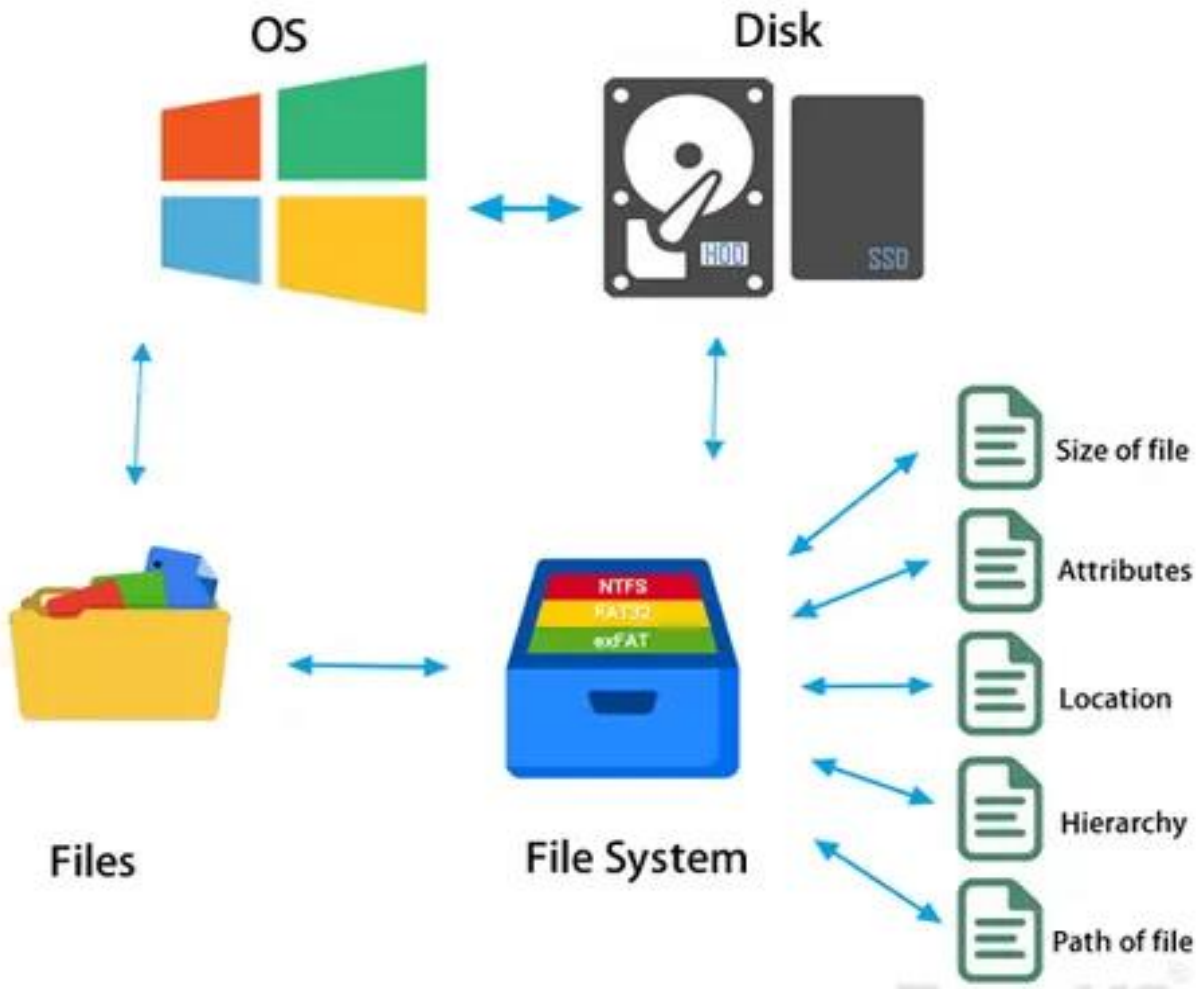
Example: Videos, images, audio files, free-form text.

Semi-Structured Data

Data that is not in table format, but still has some structure using tags or markers (like JSON, XML).

Example: A JSON document with user info — name, email, and optional fields like hobbies or address.

File system


OS
Disk
HDD
SSD
NTFS
FAT32
exFAT
Size of file
Attributes
Location
Hierarchy
Path of file
Files
File System
EaseUS
Make your life easy!

File System

- Digital organizer.
- It manages how files are stored, named, and retrieved on the disk.
- Examples: ntfs, fat32, exfat, ext4.

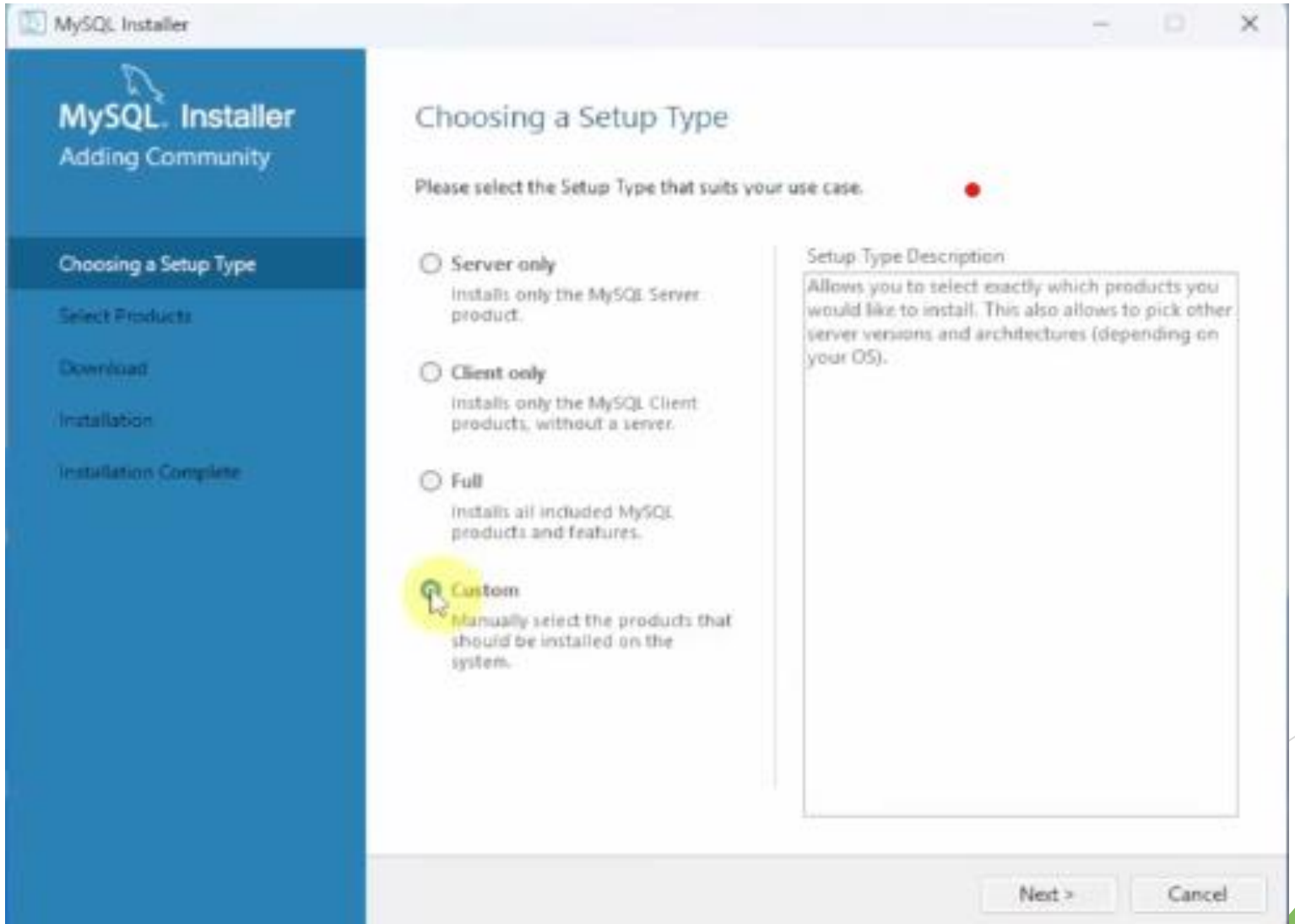
The file system keeps track of the following things about each file

Icon	What It Means
 **Size of file**	How big the file is (in KB, MB, etc.)
 **Attributes**	Whether the file is read-only, hidden, etc.
Location	Where on the disk the file is stored
 **Hierarchy**	The folder structure (which folder it's in)
 **Path of file**	Full address of the file (like C:\Users\Name\file.txt)

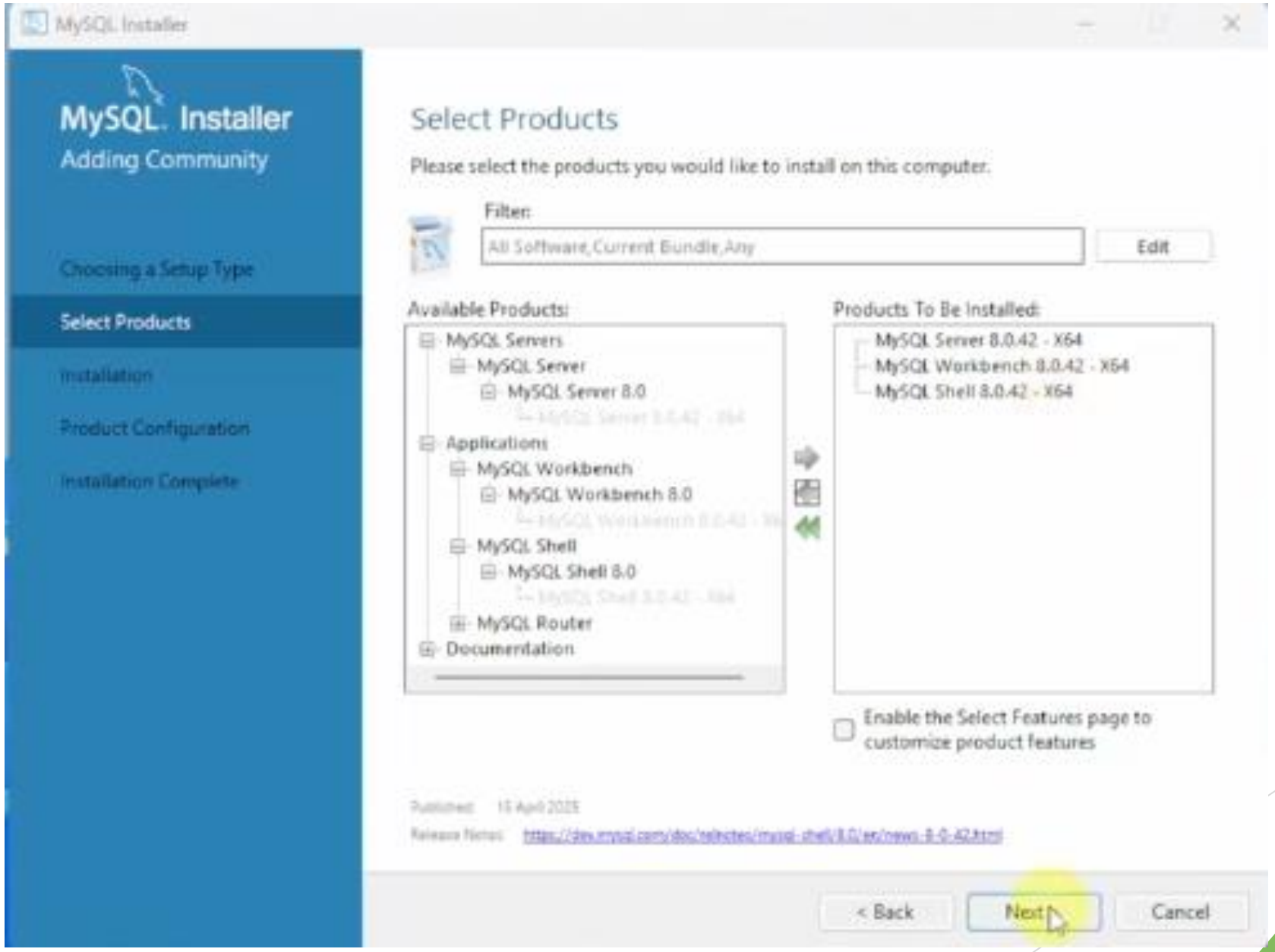
Feature	File System	Database
Definition	A way to store and organize files on a storage device	A structured system to store, manage, and query data
Data Storage	Stores data in files and folders	Stores data in tables (rows & columns)
Data Format	Unstructured or semi-structured	Structured (using schemas)
Data Access	Manual or through limited programs	Can be accessed using **SQL** or queries
Data Redundancy	High (same data can exist in multiple files)	Low (data normalization reduces repetition)
Search Speed	Slower, especially with large or scattered data	Faster with indexing and optimized queries
Security	Basic (file permissions like read/write)	Advanced (user roles, encryption, access control)
Backup & Recovery	Manual or OS-based backup	Built-in backup, restore, and transaction recovery options
Multi-user Access	Not easy or safe	Supports multiple users at once safely
Example	Windows File Explorer, FAT32, NTFS	MySQL, PostgreSQL, Oracle, MongoDB

MySql Installation Window

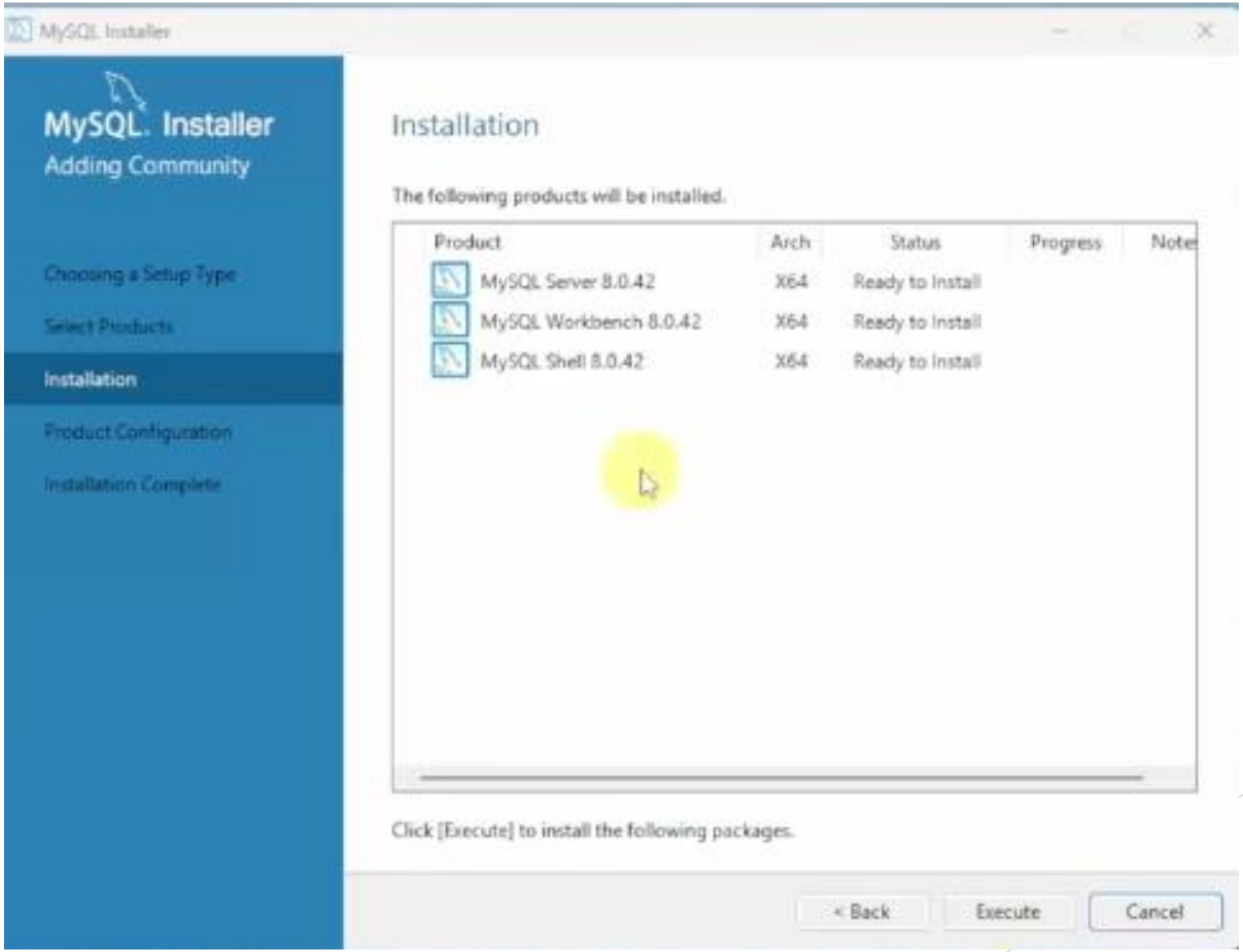
Step - 1



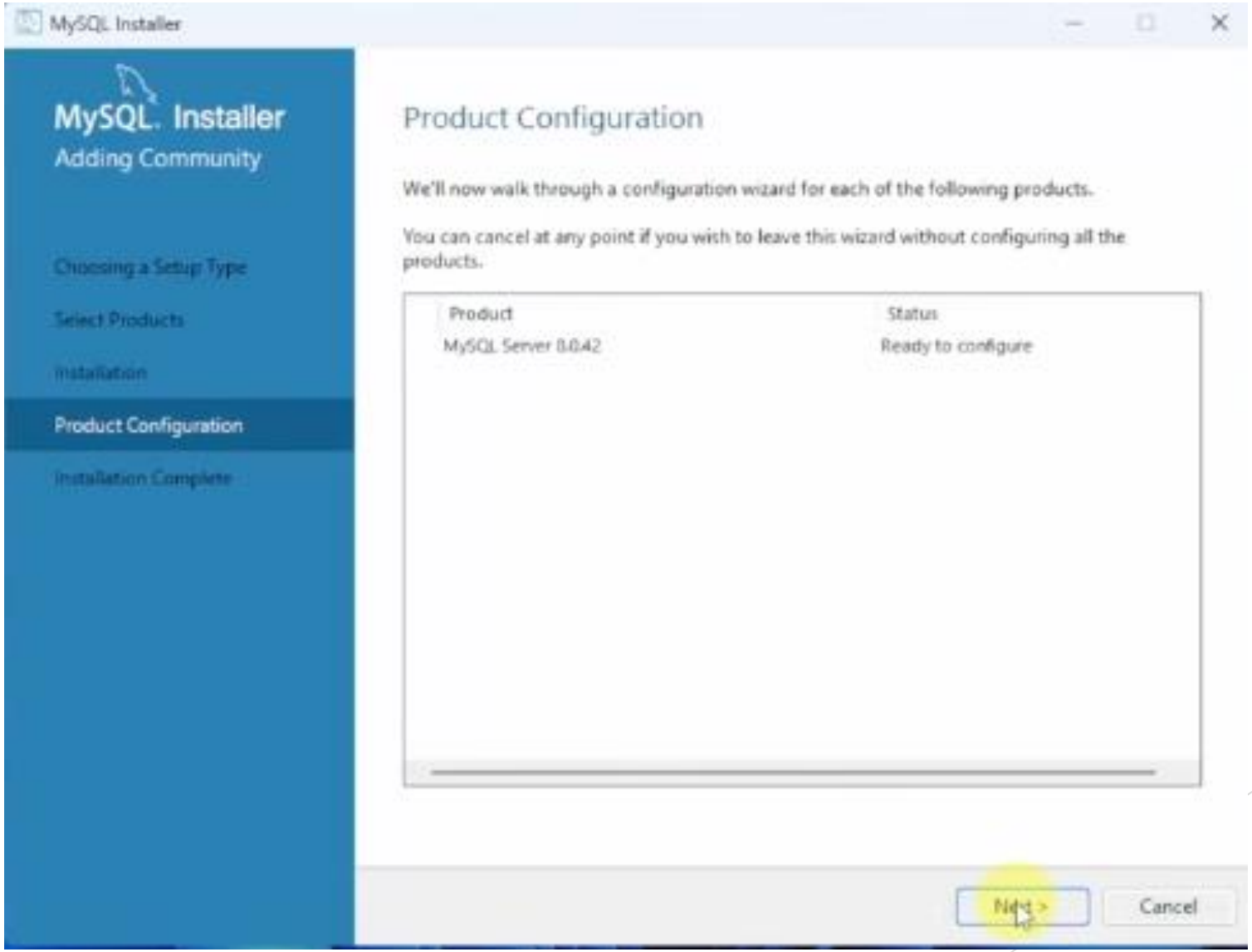
Step - 2


MySQL Installer
MySQL. Installer
Adding Community
Choosing a Setup Type
Select Products
Installation
Product Configuration
Installation Complete
Select Products
Please select the products you would like to install on this computer.
Filter:
All Software,Current Bundle,Any
Edit
Available Products:
MySQL Servers
MySQL Server
MySQL Server 8.0
Applications
MySQL Workbench
MySQL Workbench 8.0
MySQL Shell
MySQL Shell 8.0
MySQL Router
Documentation
Products To Be Installed:
MySQL Server 8.0.42 - X64
MySQL Workbench 8.0.42 - X64
MySQL Shell 8.0.42 - X64
Enable the Select Features page to customize product features
< Back
Next >
Cancel

Step - 3


MySQL Installer
MySQL. Installer
Adding Community
Choosing a Setup Type
Select Products
Installation
Product Configuration
Installation Complete
Installation
The following products will be installed.
Product
Arch
Status
Progress
Note
MySQL Server 8.0.42
X64
Ready to Install
MySQL Workbench 8.0.42
X64
Ready to Install
MySQL Shell 8.0.42
X64
Ready to Install
Click [Execute] to install the following packages.
< Back
Execute
Cancel

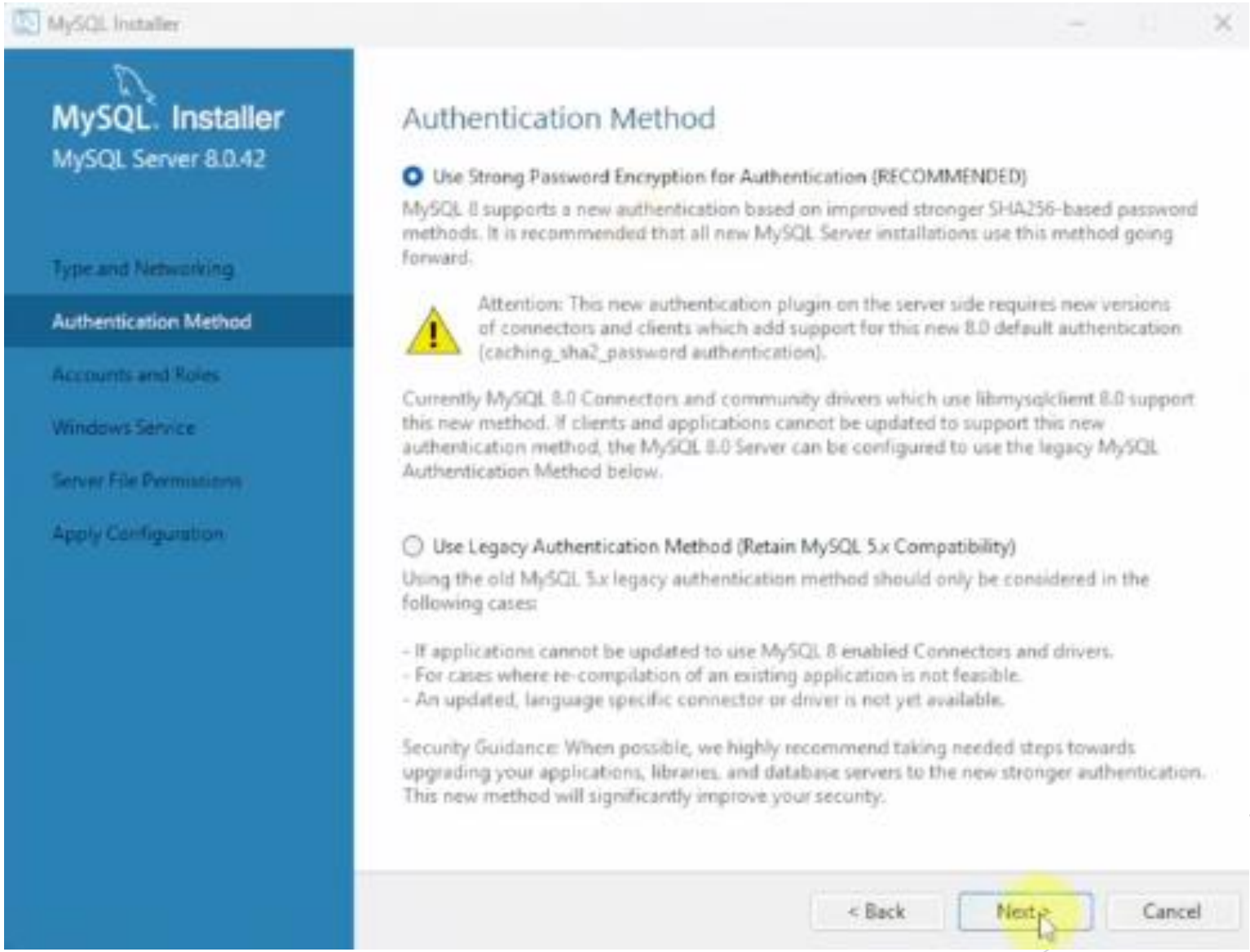
Step - 4


MySQL Installer
MySQL. Installer
Adding Community
Choosing a Setup Type
Select Products
Installation
Product Configuration
Installation Complete
Product Configuration
We'll now walk through a configuration wizard for each of the following products.
You can cancel at any point if you wish to leave this wizard without configuring all the products.
Product
Status
MySQL Server 8.0.42
Ready to configure
Next >
Cancel

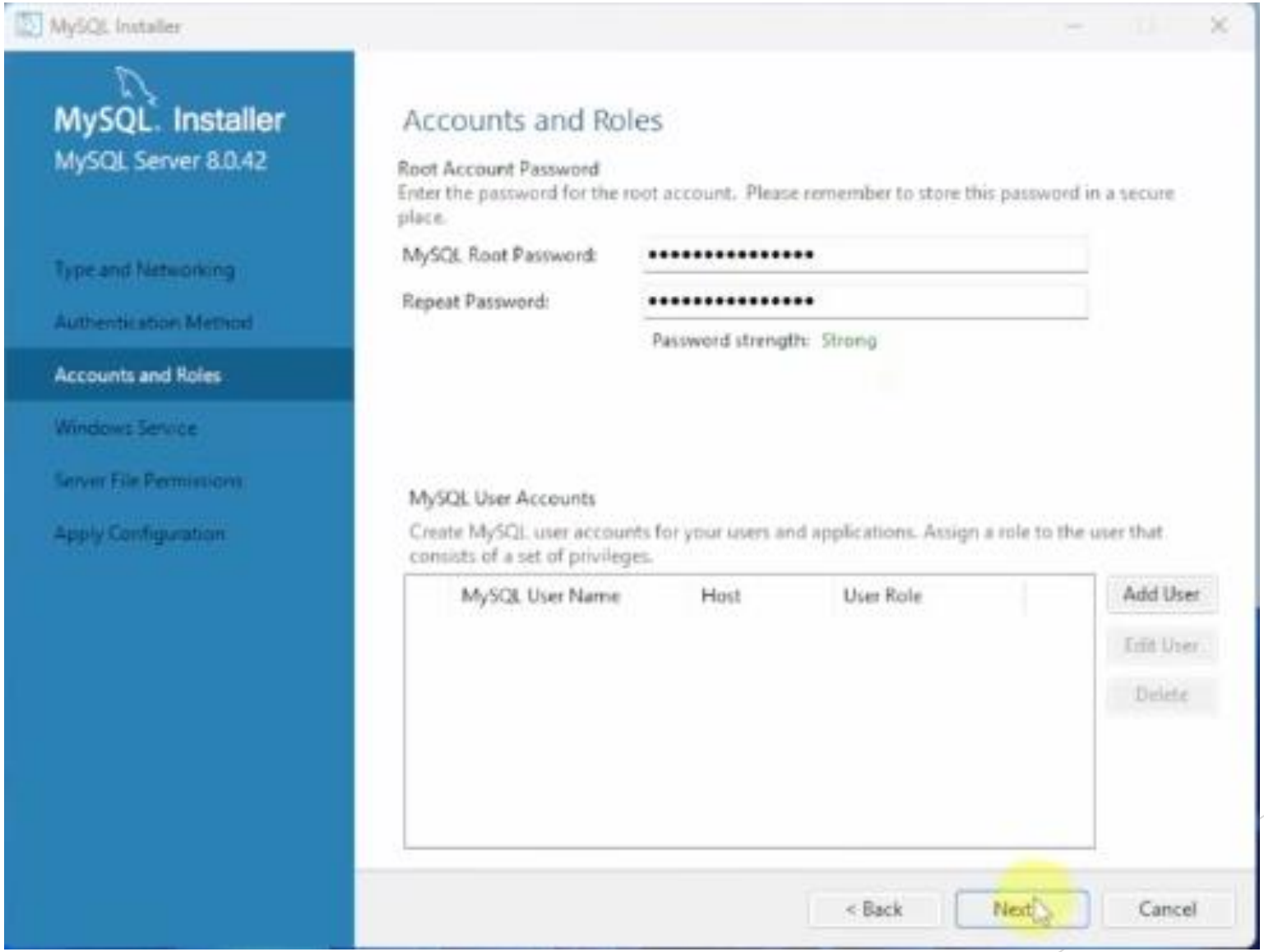
Step - 5


MySQL Installer
MySQL. Installer
MySQL Server 8.0.42
Type and Networking
Authentication Method
Accounts and Roles
Windows Service
Server File Permissions
Apply Configuration
Type and Networking
Server Configuration Type
Choose the correct server configuration type for this MySQL Server installation. This setting will define how much system resources are assigned to the MySQL Server instance.
Config Type: Development Computer
Connectivity
Use the following controls to select how you would like to connect to this server.
TCP/IP
Port: 3306
X Protocol Port: 33060
Open Windows Firewall ports for network access
Named Pipe
Pipe Name: MYSQL
Shared Memory
Memory Name: MYSQL
Advanced Configuration
Select the check box below to get additional configuration pages where you can set advanced and logging options for this server instance.
Show Advanced and Logging Options
Next >
Cancel

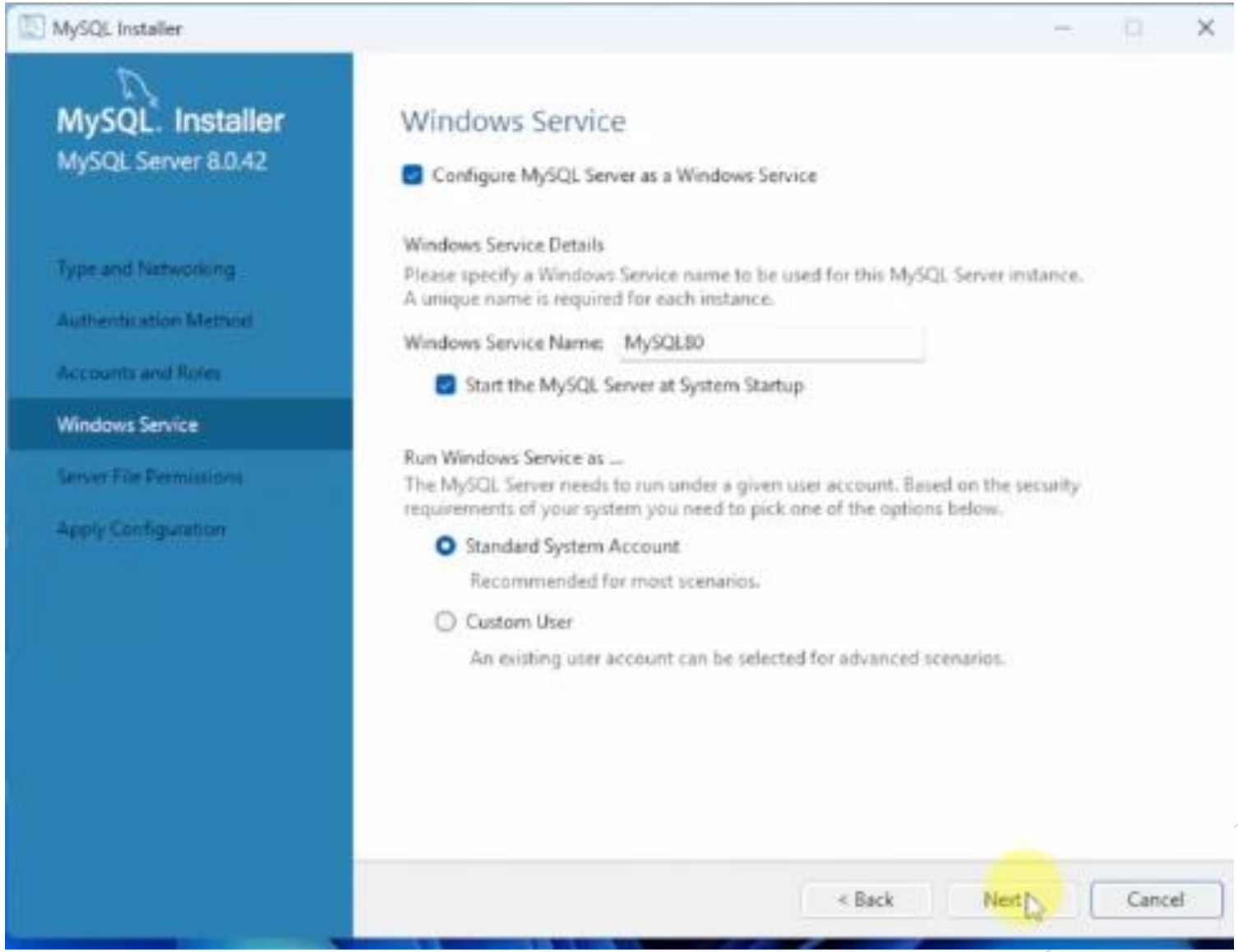
Step - 6


MySQL Installer
MySQL. Installer
MySQL Server 8.0.42
Type and Networking
Authentication Method
Accounts and Roles
Windows Service
Server File Permissions
Apply Configuration
Authentication Method
Use Strong Password Encryption for Authentication (RECOMMENDED)
MySQL 8 supports a new authentication based on improved stronger SHA256-based password methods. It is recommended that all new MySQL Server installations use this method going forward.
Attention: This new authentication plugin on the server side requires new versions of connectors and clients which add support for this new 8.0 default authentication (caching_sha2_password authentication).
Currently MySQL 8.0 Connectors and community drivers which use libmysqlclient 8.0 support this new method. If clients and applications cannot be updated to support this new authentication method, the MySQL 8.0 Server can be configured to use the legacy MySQL Authentication Method below.
Use Legacy Authentication Method (Retain MySQL 5.x Compatibility)
Using the old MySQL 5.x legacy authentication method should only be considered in the following cases:
- If applications cannot be updated to use MySQL 8 enabled Connectors and drivers.
- For cases where re-compilation of an existing application is not feasible.
- An updated, language specific connector or driver is not yet available.
Security Guidance: When possible, we highly recommend taking needed steps towards upgrading your applications, libraries, and database servers to the new stronger authentication. This new method will significantly improve your security.
< Back
Next >
Cancel

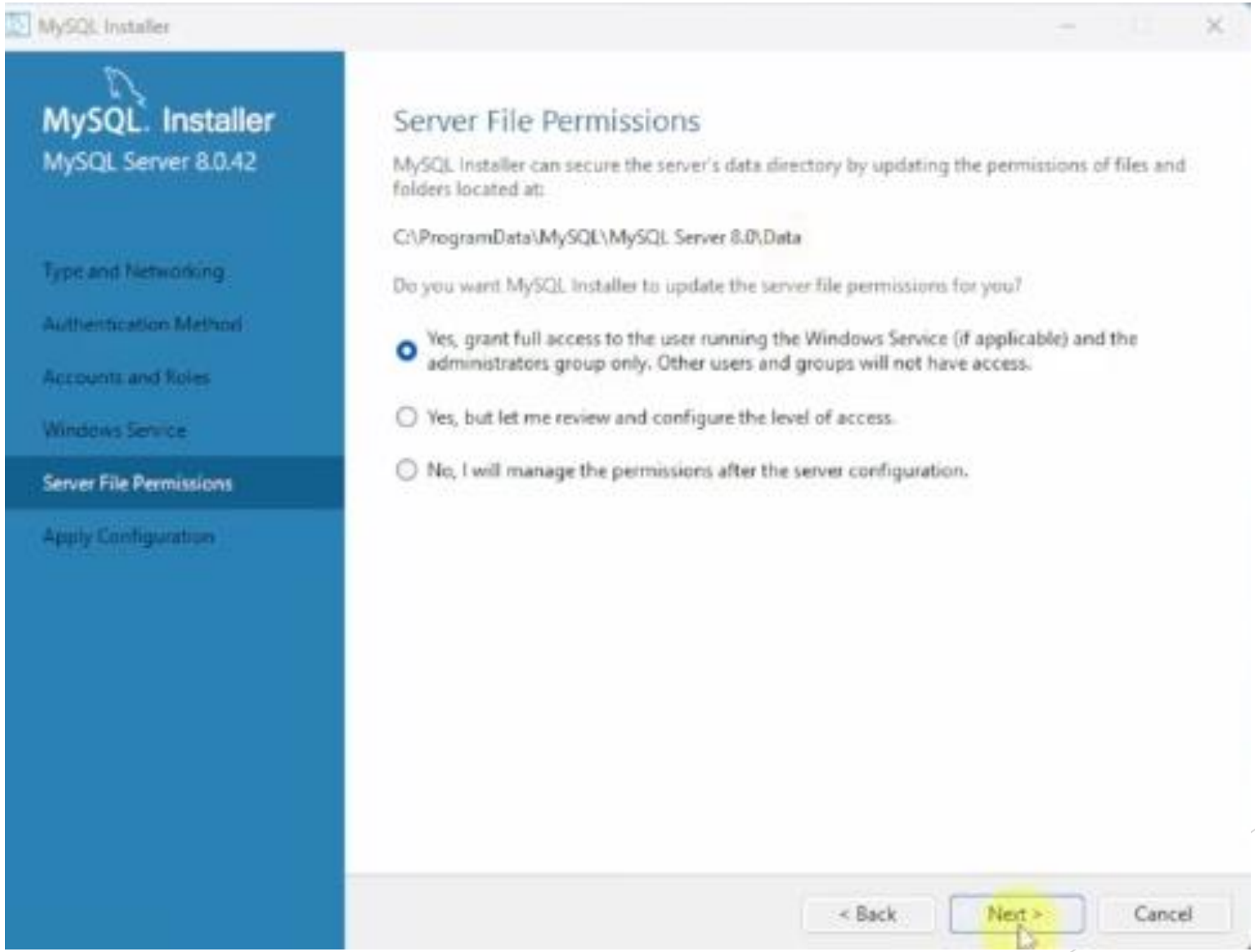
Step - 7


MySQL Installer
MySQL. Installer
MySQL Server 8.0.42
Type and Networking
Authentication Method
Accounts and Roles
Windows Service
Server File Permissions
Apply Configuration
Accounts and Roles
Root Account Password
Enter the password for the root account. Please remember to store this password in a secure place.
MySQL Root Password:
Repeat Password:
Password strength: Strong
MySQL User Accounts
Create MySQL user accounts for your users and applications. Assign a role to the user that consists of a set of privileges.
MySQL User Name
Host
User Role
Add User
Edit User
Delete
< Back
Next >
Cancel

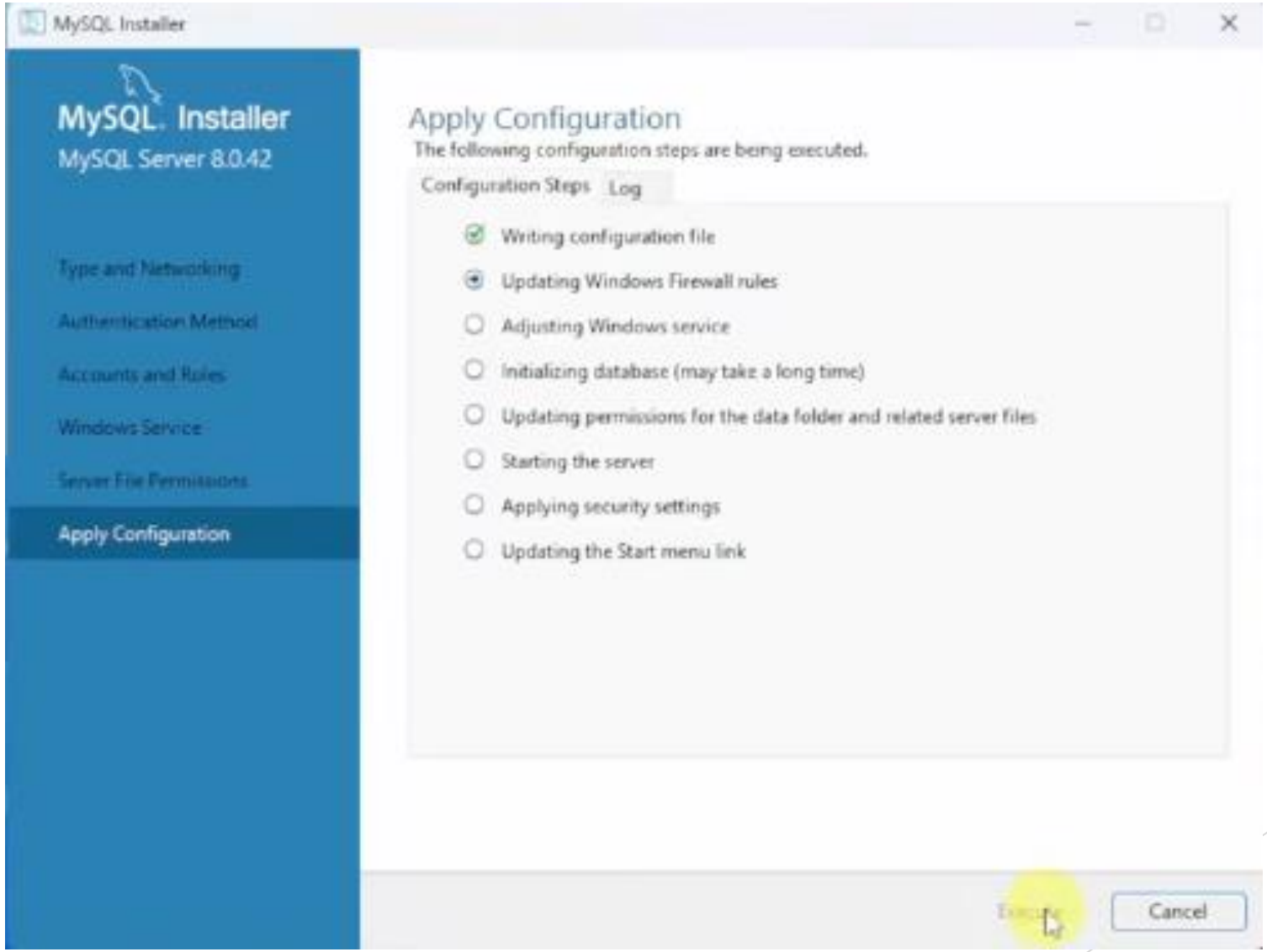
Step - 8


MySQL Installer
MySQL. Installer
MySQL Server 8.0.42
Type and Networking
Authentication Method
Accounts and Roles
Windows Service
Server File Permissions
Apply Configuration
Windows Service
Configure MySQL Server as a Windows Service
Windows Service Details
Please specify a Windows Service name to be used for this MySQL Server instance.
A unique name is required for each instance.
Windows Service Name: MySQL80
Start the MySQL Server at System Startup
Run Windows Service as ...
The MySQL Server needs to run under a given user account. Based on the security requirements of your system you need to pick one of the options below.
Standard System Account
Recommended for most scenarios.
Custom User
An existing user account can be selected for advanced scenarios.
< Back
Next
Cancel

Step - 9


MySQL Installer
MySQL. Installer
MySQL Server 8.0.42
Type and Networking
Authentication Method
Accounts and Roles
Windows Service
Server File Permissions
Apply Configuration
Server File Permissions
MySQL Installer can secure the server's data directory by updating the permissions of files and folders located at:
C:\ProgramData\MySQL\MySQL Server 8.0\Data
Do you want MySQL Installer to update the server file permissions for you?
Yes, grant full access to the user running the Windows Service (if applicable) and the administrators group only. Other users and groups will not have access.
Yes, but let me review and configure the level of access.
No, I will manage the permissions after the server configuration.
< Back
Next >
Cancel

Step - 10


MySQL Installer
MySQL. Installer
MySQL Server 8.0.42
Type and Networking
Authentication Method
Accounts and Roles
Windows Service
Server File Permissions
Apply Configuration
Apply Configuration
The following configuration steps are being executed.
Configuration Steps
Log
Writing configuration file
Updating Windows Firewall rules
Adjusting Windows service
Initializing database (may take a long time)
Updating permissions for the data folder and related server files
Starting the server
Applying security settings
Updating the Start menu link
Cancel

What Is Schema ?

A **schema** is like a **blueprint** or **structure** of a database.
It defines **how data is organized**, including:

•Just like a building plan shows where rooms, doors, and windows go —
A **database schema** shows how tables and data are arranged. **Example**

Column Name	Data Type	Description
id	INT	Unique student ID (Primary Key)
name	VARCHAR	Student name
age	INT	Student age
class_id	INT	Refers to class (Foreign Key)

CRUD in MySQL (For Database and Table)

1. CREATE

Create Database

```
CREATE DATABASE student_db;
```

Create Table

```
USE student_db;
CREATE TABLE students (
id INT PRIMARY KEY,
name VARCHAR(50),
age INT,
department VARCHAR(50),
marks INT
);
```

2. READ (Retrieve data)

Show Databases
SHOW DATABASES;

Show Tables
USE student_db;
SHOW TABLES;

Show Table Structure
DESCRIBE students;

Select All Data
SELECT * FROM students;

Select Specific Columns
SELECT name, marks FROM students;

With Conditions
SELECT * FROM students WHERE age > 20;

UPDATE

Update Table Data
UPDATE students SET marks = 90 WHERE id = 1;

Rename Table
RENAME TABLE students TO student_info;

Add Column
ALTER TABLE student_info ADD email VARCHAR(100);

Modify Column
ALTER TABLE student_info MODIFY marks FLOAT;

Rename Column (MySQL 8+)
ALTER TABLE student_info RENAME COLUMN email TO contact_email;

4. DELETE

Delete Row (Record)
DELETE FROM student_info WHERE id = 1;

Delete All Rows
DELETE FROM student_info;

Drop Table (Deletes table structure and data)
DROP TABLE student_info;

Drop Database (Deletes all tables in DB)
DROP DATABASE student_db;

Example Data Insertion (For Practice)
INSERT INTO students (id, name, age, department, marks) VALUES
(1, 'Ravi', 20, 'Computer Science', 85),
(2, 'Anita', 21, 'Mathematics', 92),
(3, 'Karan', 19, 'Physics', 78);

id	name	age	department	marks
1	Rajat	20	Computer Science	85
2	Meena	21	Mechanical	78
3	Aman	22	Electronics	92
4	Neha	20	Computer Science	88
5	Ravi	23	Civil	73

Basic SELECT Queries

- Write a query to display all the student records.
- Display only name and branch of all students.
- Show all students who belong to the **'Computer Science'** branch.
- Display students who are older than **20 years**.