Module 1 – Overview of IT Industry

PRECTICAL-1. WRITE A SIMPLE "HELLO WORLD" PROGRAM IN TWO DIFFERENT PROGRAMMING LANGUAGES OF YOUR CHOICE. COMPARE THE STRUCTURE AND SYNTAX.

Ans.

1. **Python Program:**

```
# Hello World in Python
Print ("Hello, World!")
```

2. **C Program:**

```
// Hello World in C
#include<stdio.h>
int main() {
        printf("Hello, World!");
       return 0;
        }
```

PRECTICAL-2. Research and create a diagram of how data is transmitted from a client to a server over the internet.

Ans.

Client (Browser / App)

|

| Request: "GET /data"

↓

[TCP/IP Stack]

↓

[Router / Internet]

↓

[TCP/IP Stack]

↓

Server (e.g., Web Server)

|

| Response: "Here is your data"

↑

[TCP/IP Stack]

↑

[Router / Internet]

↑

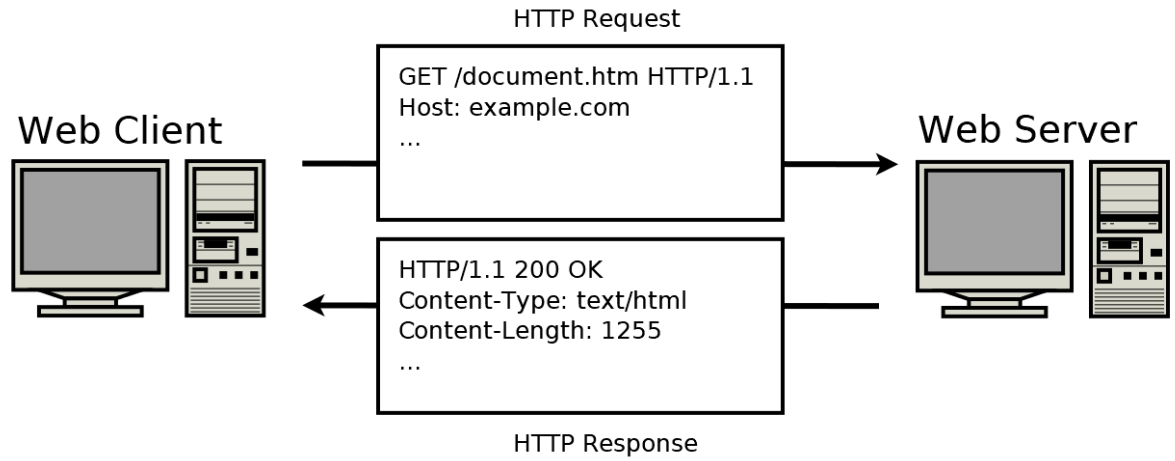
[TCP/IP Stack]

↑

Client receives data

PRECTICAL-3. Design a simple HTTP client-server communication in any language.

Ans.



PRECTICAL-4. Research different types of internet connections (e.g., broadband, fiber, satellite) and list their pros and cons.

Ans.

1. **Digital Subscriber Line (DSL)**

Pros:

- **Widely available**
- **Allows internet and phone use at the same time**

- Affordable for basic users

Cons:

- Speed depends on distance from service provider
- Slower compared to modern options like fiber

2. Cable Internet

Pros:

- Faster than DSL
- Suitable for streaming and gaming
- Uses existing TV cable lines

Cons:

- Shared bandwidth can cause speed drops during peak hours
- Limited availability in rural areas

3. Fiber Optic

Pros:

- Very high speed (up to 1 Gbps or more)
- Low latency and highly reliable
- Great for heavy users (streaming, gaming, work-from-home)

Cons:

- Limited availability in some regions
- Installation may be expensive

4. Satellite Internet

Pros:

- Available in remote and rural areas
- Doesn't require cable or phone lines

Cons:

- High latency (delay), not good for gaming or video calls
- Weather can affect signal quality
- Data caps and slower speeds

5. Wireless Internet (Mobile Data / Wi-Fi)

Pros:

- Convenient and portable
- Easy to set up
- Useful for smartphones and hotspots

Cons:

- Speed and reliability depend on signal strength
- May have data limits or be costly

6. Broadband over Power Lines (BPL)

Pros:

- **Uses existing electrical infrastructure**
- **Easy access where other services are unavailable**

Cons:

- **Not widely available**
- **Interference issues can occur**

PRECTICAL-5. Simulate HTTP and FTP requests using command line tools (e.g., curl).

Ans.

1. **Simulating an HTTP Request Using curl**

   Command:

   curl http://example.com

   Explanation:

   - **This command sends an HTTP GET request to the server at example.com.**
   - **The server responds with the HTML content of the page.**
   - **Useful for testing websites or APIs.**

2. **Simulating an FTP Request Using curl**

   Command (to download a file):

   curl ftp://ftp.example.com/file.txt --user username:password

   Explanation:

   - **Connects to an FTP server.**
   - **Logs in with provided username and password.**
   - **Downloads the file file.txt from the FTP server.**

PRECTICAL-6. Identify and explain three common application security vulnerabilities. Suggest possible solutions.

Ans.

1. **SQL Injection**
   - **Problem: Hacker tricks the app to get into the database.**
   - **Fix: Check and clean user input.**
2. **XSS (Cross-Site Scripting)**
   - **Problem: Hacker puts bad code in a website that runs on other people's screens.**
   - **Fix: Don't show user input directly. Clean it first.**

3. **Weak Login System**
   - **Problem:** Easy passwords or no security checks.
   - **Fix:** Use strong passwords and add OTP or 2-step login.

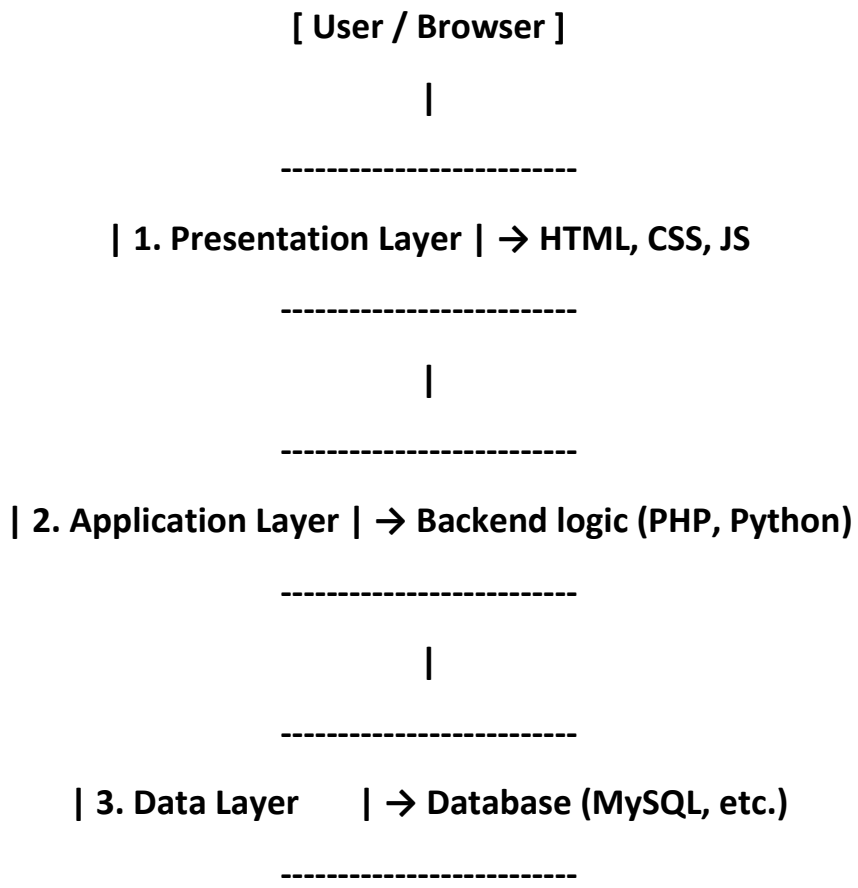
PRECTICAL-7.Identify and classify 5 applications you use daily as either system software or application software.

Ans.

- Google Chrome – Application Software
- Microsoft Word – Application Software
- Windows 10 – System Software
- VLC Media Player – Application Software
- Antivirus (like Quick Heal) – System Software

PRECTICAL-8.Design a basic three-tier software architecture diagram for a web application.

Ans.



PRECTICAL-9.Create a case study on the functionality of the presentation, business logic, and data access layers of a given software system.

Ans.

1. **Presentation Layer (Frontend / UI)**

Role: This is what the user interacts with.

- **User browses restaurants and food items**
- **Adds food to cart**
- **Enters delivery details**
- **Makes payment**

Technologies Used: HTML, CSS, JavaScript, React, Flutter (for mobile)

2. **Business Logic Layer (Application Layer)**

Role: This handles all decision-making and rules.

- **Processes order and verify payment**
- **Applies discounts and taxes**
- **Matches user with nearby delivery agents**
- **Calculates estimated delivery time**

Technologies Used: Node.js, Java, PHP, Python

3. **Data Access Layer (Database Layer)**

Role: Deals with storing and retrieving data.

- **Saves user profiles, orders, and payment info**
- **Fetches list of restaurants and menus**
- **Tracks real-time delivery status**
- **Stores feedback and reviews**

Technologies Used: MySQL, MongoDB, PostgreSQL

PRECTICAL-10.Explore different types of software environments (development, testing, production). Set up a basic environment in a virtual machine.

Ans.

Types of Software Environments:

1. **Development Environment**

o Used by developers to write and build code

o Contains IDEs, compilers, and debugging tools

- o Example: VS Code, Python, XAMPP

2. Testing Environment
   - o Used by QA (testers) to test features
   - o Isolated from development and production
   - o Includes tools for automated/manual testing
   - o Example: Selenium, Postman, JUnit
3. Production Environment
   - o The live environment where real users access the application
   - o Must be stable, secure, and monitored
   - o Example: Hosted web server (Apache, Nginx), Cloud (AWS, Azure)

Basic Virtual Machine Setup (Example using VirtualBox):

1. Install VirtualBox or VMware

2. Create a new virtual machine

   - o Choose OS (e.g., Ubuntu or Windows)
   - o Allocate RAM and disk space

3. Install a development stack

   - o Example for web development:
     - ▪ Install Apache, MySQL, PHP (or use XAMPP)
     - ▪ Install code editor (e.g., VS Code)

4. Test a basic web page or script

   - o Create a hello.php file
   - o Run it in the browser from localhost

PRECTICAL-11. Write and upload your first source code file to Github.

Ans.

1. **Write a Simple Code File**

   Create a simple file named hello.py:

   ```
   # hello.py

   print("Hello, GitHub!")
   ```

2. **Create a Repository on GitHub**

- Go to https://github.com
- Click New Repository
- Name it (e.g., first-code)
- Add a description (optional)
- Choose Public
- Click Create repository

3. **Upload the Code Using Git (Command Line)**

Open terminal or Git :

```
git init

git add hello.py

git commit -m "Add hello.py"

git branch -M main

git remote add origin https://github.com/your-username/first-code.git

git push -u origin main
```

PRECTICAL-12. Create a Github repository and document how to commit and push code changes.

Ans.

Step 1: Create a GitHub Repository:

1. Go to https://github.com
2. Click on “New” to create a new repository
3. Enter a repository name (e.g., my-first-repo)
4. (Optional) Add a description
5. Choose Public or Private
6. Click Create repository

Step 2: Prepare Your Project Locally:

Create a folder and add a file (e.g., main.py):

python

 # main.py

print("This is my first commit!")

Step 3: Use Git to Commit and Push Code:

Open Git or Terminal, then run:

git init # Initialize Git in the folder

git add . # Stage all files

git commit -m "Initial commit" # Commit changes with a message

git branch -M main # Rename default branch to main

git remote add origin https://github.com/your-username/my-first-repo.git

git push -u origin main # Push changes to GitHub

Replace your-username with your actual GitHub username.

Summary:

- **You created a GitHub repository**
- **Committed code using Git**
- **Pushed it to GitHub successfully**

PRECTICAL-13.Create a student account on Github and collaborate on a small project with a classmate.

Ans.

Tasks to Perform:

1. Create a GitHub account by visiting https://github.com.

2. Set up your profile with your real name and profile photo.

3. Create a new repository named collab-project.

4. Add a README.md file describing the project.

5. Invite your classmate as a collaborator via repository settings.

6. Both team members should commit at least one file each.

7. Explore features like:

- **o Issues**
- **o Pull requests**
- **o Commit history**

Tools Required:

- **GitHub account**
- **Web browser**
- **Basic internet connection**

PRECTICAL-14.Create a list of software you use regularly and classify them into the following categories: system, application, and utility software.

Ans.

1.System Software

These manage and control computer hardware and serve as a platform for application software.

- **Windows 11 / macOS / Linux – Operating systems**
- **Android / iOS – Mobile operating systems**
- **Device Drivers – Graphics card driver, printer driver**

2.Application Software

These are programs designed to perform specific tasks for the user.

- **Microsoft Word – Word processing**
- **Google Chrome / Microsoft Edge – Web browsing**
- **Zoom / Microsoft Teams – Video conferencing**
- **Spotify / YouTube – Media streaming**
- **Photoshop / Canva – Photo editing**
- **MS Excel – Spreadsheet work**
- **WhatsApp / Gmail – Communication**

3.Software

These help maintain, protect, and optimize the computer system.

- **Antivirus (e.g., Windows Defender, Avast) – Protects from malware**
- **WinRAR / 7-Zip – File compression**
- **CCleaner – System cleaning and optimization**
- **Backup Tools (e.g., Google Drive, OneDrive) – Data backup**
- **Disk Cleanup / Disk Defragmenter – System maintenance**

PRECTICAL-15.Follow a GIT tutorial to practice cloning, branching, and merging repositories.

Ans.

Tasks to Perform:

1. **Cloning a Repository:**
   - **Use git clone to download a remote repository to your local machine.**
   - **Example: code git clone https://github.com/username/repository-name.git**
2. **Creating a Branch:**

o Create a new branch to add features without affecting the main code.

o Example: code git checkout -b feature-branch

3. Making Changes:

o Edit files, commit the changes using git commit, and push to the new branch.

4. Merging Branches:

o Switch to the main branch and merge the feature branch into it.

o Example: code-- git checkout main git merge feature-branch

5. Resolve Merge Conflicts (if any):

o Practice conflict resolution when Git highlights file conflicts.

PRECTICAL-16. Write a report on the various types of application software and how they improve productivity.

Ans.

Suggested Report Structure:

1. Word Processing Software:
   - Example: Microsoft Word, Google Docs
   - Productivity Impact: Helps create, edit, format, and print text documents quickly and professionally.
2. Spreadsheet Software:
   - Example: Microsoft Excel, Google Sheets
   - Productivity Impact: Allows data analysis, calculations, chart generation, and financial modeling.
3. Presentation Software:
   - Example: PowerPoint, Canva
   - Productivity Impact: Enables professionals to communicate ideas effectively with visual support.
4. Database Management Software (DBMS):
   - Example: Microsoft Access, MySQL
   - Productivity Impact: Organizes and retrieves structured data efficiently, saving time and effort.
5. Multimedia Software:
   - Example: Adobe Photoshop, VLC Media Player

- **Productivity Impact: Facilitates content creation, editing, and consumption (videos, graphics, audio).**

6. **Web Browsers:**
   - **Example: Google Chrome, Mozilla Firefox**
   - **Productivity Impact: Provides access to information, tools, and web applications instantly.**
7. **Communication Software:**
   - **Example: Zoom, Microsoft Teams, Slack**
   - **Productivity Impact: Enables instant messaging, video conferencing, and team collaboration.**

PRECTICAL-17. Create a flowchart representing the Software Development Life Cycle (SDLC).

Ans.

Phases of SDLC to Include:

- **1. Requirement Analysis**
- **2. System Design**
- **3. Implementation (Coding)**
- **4. Testing**
- **5. Deployment**
- **6. Maintenance**

Sample Flowchart Structure :

csharp

[Start]

↓

[Requirement Analysis]

↓

[System Design]

↓

[Implementation]

↓

[Testing]

↓

[Deployment]

↓

[Maintenance]

↓

[End]

You can also include decision points (e.g., after testing: "Is software bug-free?" → Yes → Deploy / No → Return to Coding)

PRECTICAL-18. Write a requirement specification for a simple library management system.

Ans.

Sample Requirement Specification Document:

1. Introduction:
   - Purpose: To manage books, members, and borrowing activities in a digital format.
   - Scope: The system will allow librarians to add/remove books, register members, issue/return books, and generate reports.
2. Functional Requirements:
   - The system shall allow the librarian to:
     - o Add, delete, and update book records.
     - o Register and manage members.
     - o Issue books to members.
     - o Return books from members.
     - o Generate overdue fine reports.
   - The system shall display:
     - o Available and borrowed books.
     - o Member transaction history.
     - o Due date alerts.
3. Non-Functional Requirements:
   - Usability: User-friendly UI for easy navigation.

- **Reliability: System should handle simultaneous users and maintain data consistency.**
- **Security: Login credentials required for librarian and staff access.**
- **Performance: The system should perform all operations within 2 seconds.**
- **Portability: Should work on web browsers and desktop platforms.**

4. **Assumptions:**
   - **Users have basic computer literacy.**
   - **Database is regularly backed up.**

PRECTICAL-19. Perform a functional analysis for an online shopping system.

Ans.

Functional Requirements of Online Shopping System:

1. **User Registration & Login:**
   - **Users must be able to register and securely log in.**
   - **Forgot password and user authentication features included.**
2. **Product Browsing and Search:**
   - **Users can browse by category, search for products using keywords, and filter results.**
3. **Shopping Cart:**
   - **Users can add/remove products, view totals, and update quantities.**
4. **Checkout and Payment:**
   - **System calculates total price with taxes and shipping.**
   - **Supports payment gateways like UPI, Credit/Debit Cards, Net Banking.**
5. **Order Management:**
   - **Users can view order history, current status (shipped, delivered), and cancel orders.**
6. **Admin Functionalities:**

- **Add/update/delete product listings**
- **Manage inventory, users, and process orders**

7. **Feedback and Reviews:**
   - **Customers can leave product ratings and reviews.**

Optional Functional Block Diagram:

A diagram showing the flow between:

User → Product Search → Cart → Checkout → Payment → Order Confirmation

PRECTICAL-20. Design a basic system architecture for a food delivery app.

Ans.

Tasks to Perform:

1. Identify the main system components and user roles.

2. Design a basic architecture diagram.

3. Describe the role of each component and how data flows through the system.

Architecture Components:

1. **Frontend (User Interface):**
   - **Customer App: Browse restaurants, place orders, track delivery.**
   - **Restaurant Panel: Accept/prepare orders, update status.**
   - **Delivery App: Accept delivery tasks, update real-time location.**

2. Backend (Application Server):

- **Handles:**
  - **o Order placement logic**
  - **o Authentication and user data**
  - **o Payment integration**

- o Notification system (push/SMS/email)
- o Order status updates

3. Database Layer:

Stores:

- User data (login, address, orders)
- Restaurant menus and availability
- Payment history and reviews
- Delivery logs

4. Payment Gateway API:

- Securely processes transactions via UPI, cards, wallets, etc.

5. Real-Time Tracking System:

- Uses GPS and mapping APIs (e.g., Google Maps)
- Tracks delivery location
- Shows ETA to customers

6. Notification System:

- Sends order confirmations, delivery status, offers, etc.

PRECTICAL-21. Develop test cases for a simple calculator program.

Ans.

Tasks to Perform:

1. Identify the calculator functions to be tested.
2. Define input values, expected output, and conditions.
3. Organize test cases into a test case table.

Calculator Functionalities to Test:

- Addition (+)
- Subtraction (-)

- **Multiplication (*)**
- **Division (/)**
- **Handling of invalid inputs**
- **Division by zero**

PRECTICAL-22. Document a real-world case where a software application required critical maintenance.

Ans.

Tasks to Perform:

1. **Research a known software maintenance case.**
2. **Describe the problem, its cause, and the maintenance performed.**
3. **Summarize the outcome and lessons learned.**

Case Study:

1. **Background:**

   WhatsApp, the popular messaging application owned by Meta, faced a global outage on 25th October 2022. Users were unable to send or receive messages for over two hours.

2. **Problem Description:**
   - **Messages were stuck on the "clock" icon.**
   - **Groups and private chats were unresponsive.**
   - **Web version also failed to connect.**
   - **The issue impacted millions of users worldwide.**
3. **Cause:**
   - **Internal server configuration changes triggered a major communication breakdown between WhatsApp servers.**
   - **Load balancing failed due to improper update deployment.**
4. **Maintenance Actions Taken:**
   - **The engineering team rolled back the latest deployment.**
   - **Reconfigured server communication modules.**
   - **Conducted an emergency round of system health checks and network traffic balancing.**
5. **Outcome:**

- Services were gradually restored within 2.5 hours.
- Meta issued a public apology and promised enhanced monitoring.
- Internal deployment processes were revised to include stricter testing phases.

PRECTICAL-23.Create a DFD for a hospital management system.

Ans.

Tasks to Perform:

1. Identify key processes and external entities in the hospital system.
2. Create a Level 0 DFD (Context Diagram).
3. Expand into a Level 1 DFD showing detailed interactions.

Level 0 - DFD (Context Diagram) :

External Entities:

- Patient
- Doctor
- Receptionist
- Admin

Processes:

- Hospital Management System

Data Flows:

- Patient provides registration details
- Doctor provides diagnosis
- Receptionist schedules appointments
- Admin manages records

Code---

[Patient] → (HMS) ← [Doctor]

[Receptionist] → (Hospital Management System) ← [Admin]

Level 1 - DFD (Detailed Process Breakdown) :

Processes:

1. Patient Registration
2. Appointment Scheduling
3. Medical Diagnosis
4. Billing and Discharge
5. Report Generation

Data Stores:

- Patient Records
- Appointment Database
- Billing Info
- Medical History

Example Flow:

scss

code—

[Patient] → (1. Patient Registration) → [Patient Records]

[Receptionist] → (2. Appointment Scheduling) → [Appointment DB]

[Doctor] → (3. Medical Diagnosis) ↔ [Medical History]

(HMS) → (4. Billing & Discharge) → [Billing Info]

PRECTICAL-24.Build a simple desktop calculator application using a GUI library.

Ans.

Tasks to Perform:

1. **Design a calculator GUI with buttons for digits (0-9), operations (+, –, ×, ÷), clear, and equals.**
2. **Implement logic to handle button clicks and perform operations.**
3. **Display results and handle invalid inputs (e.g., division by zero).**

Suggested Tech Stack :

- **Language: Python (Recommended)**
- **GUI Library: Tkinter**

Design Notes :

- **Use frames to organize buttons into rows**
- **Validate inputs and handle edge cases**
- **UI should be responsive and user-friendly**

Tools Required :

- **Python 3.x**
- **Tkinter (comes built-in with Python)**
- **Code editor (VS Code / PyCharm / IDLE)**

Learning Outcome :

After completing this lab, students will:

- **Understand GUI event handling and layout design**
- **Be able to create interactive desktop apps**
- **Learn how to integrate logic with GUI controls**

PRECTICAL-25.Draw a flowchart representing the logic of a basic online registration system.

Ans.

Tasks to Perform :

1. **Identify the sequence of steps a user follows in an online registration form.**
2. **Define decision points such as validation and duplication check.**

3. **Draw a flowchart using standard flowchart symbols.**

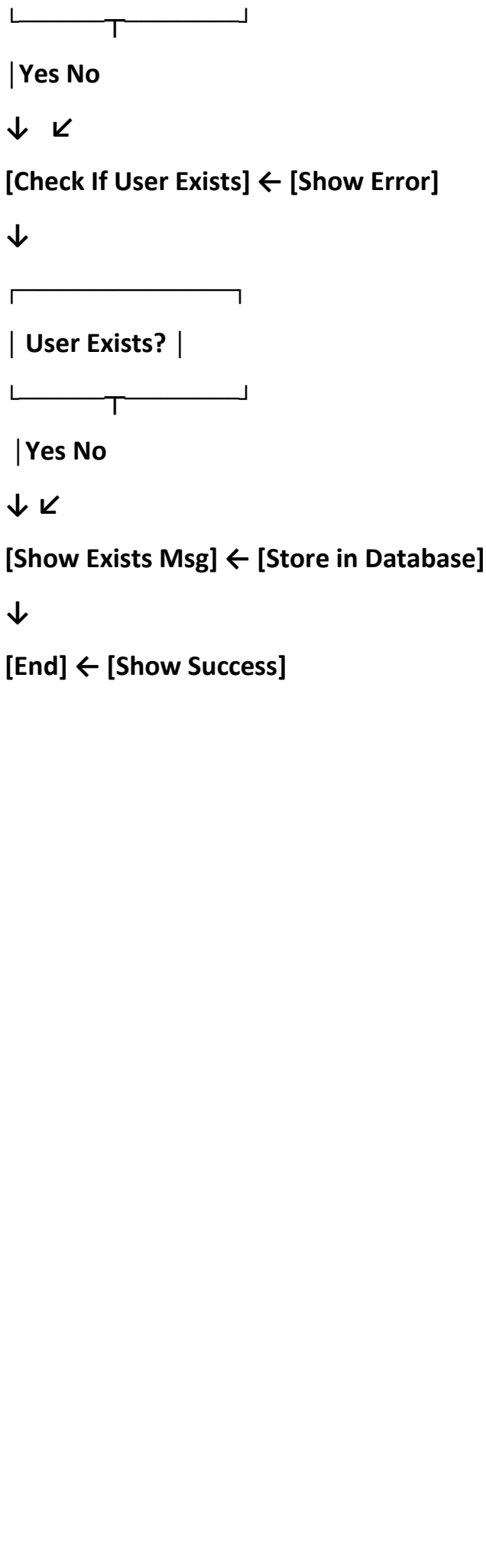
Flowchart Logic Description :

1. Start
2. Display Registration Form
3. User Inputs Details
4. Validate Required Fields
    - o If Invalid → Show Error → Go to Step 3
    - o If Valid → Proceed
5. Check If User Already Exists
    - o If Yes → Show "User Exists" Message → End
    - o If No → Proceed
6. Store User Data in Database
7. Show Registration Success Message
8. End

Flowchart (Text Representation):

code

```
[Start]
↓
[Display Registration Form]
↓
[User Enters Details]
↓
[Validate Inputs]
↓
┌──────────────────┐
| Inputs Valid? |
```



[Check If User Exists] ← [Show Error]

↓

[User Exists?]

↓ ↙

[Show Exists Msg] ← [Store in Database]

↓

[End] ← [Show Success]