

WEBX CA PREREQUISITE

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Project Title: - Microscope Booking System – Simplifying Laboratory Resource Management

Project Description: -

The Microscope Booking System is a web-based full-stack application designed to automate and streamline the reservation process for laboratory microscopes. Built using Flask for the backend, MongoDB Atlas for the database, and HTML/CSS/JavaScript for the frontend, the system enables users to register, verify via email-based OTP, log in securely, and book microscope slots in real time.

The application aims to enhance efficiency, avoid scheduling conflicts, and provide transparency in equipment usage for educational institutions and research laboratories.

SYSTEM REQUIREMENTS:

Software Requirements

1. Python (3.8 or higher): Required for running the Flask backend
2. Flask Libraries:
 - a. Flask
 - b. Flask-Login
 - c. Flask-SocketIO
 - d. Flask-CORS
 - e. python-dotenv
 - f. pymongo
3. MongoDB Atlas: Cloud-based NoSQL database
4. Visual Studio Code: Recommended IDE for development
5. Postman: For API testing and verifying backend functionality
6. Git: For version control and collaboration.

Hardware Requirements

1. Processor: Intel Core i5 or higher
2. RAM: Minimum 16GB
3. Storage: Minimum 5GB free disk space
4. Operating System: Windows 10/11

Technology Stack

| Layer | Technology |
|-----------|-----------------------------|
| Frontend | HTML, CSS, Bootstrap, JS |
| Backend | Python (Flask), Flask-Login |
| Database | MongoDB |
| Auth | OTP via SMTP (Gmail) |
| Hosting | Render (Backend) |
| Analytics | Google Analytics (GA4) |

SETUP INSTRUCTIONS

Backend Setup

1. Navigate to your project folder:
`cd microscope-booking-system`
2. Create a virtual environment:
`python -m venv venv`
3. Activate the virtual environment:
`venv\Scripts\activate`
4. Install required Python dependencies:
`pip install -r requirements.txt`
5. Start the Flask development server:
`python app.py`

Frontend Setup

The frontend of the Microscope Booking System is built using standard web technologies — HTML5, CSS3, JavaScript, and Bootstrap — and is rendered through Flask templates.

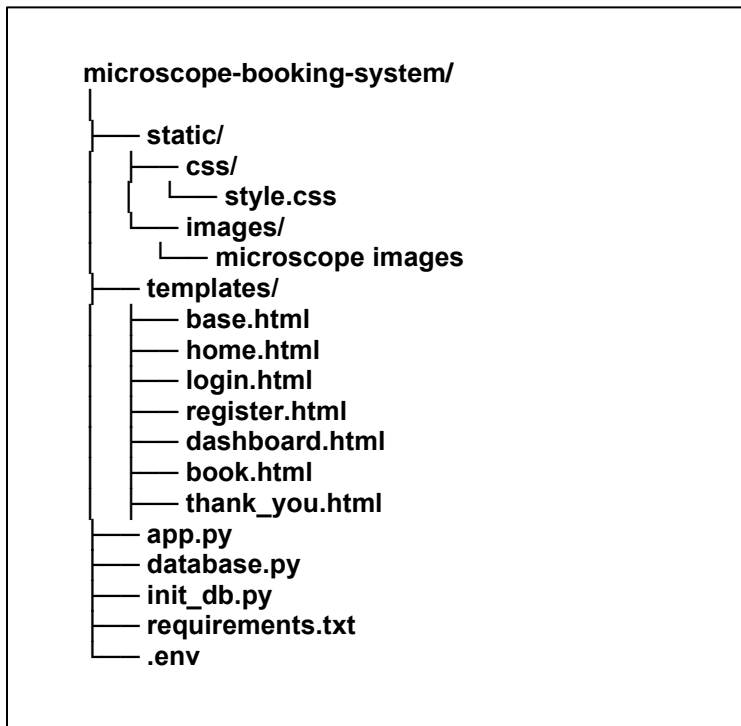
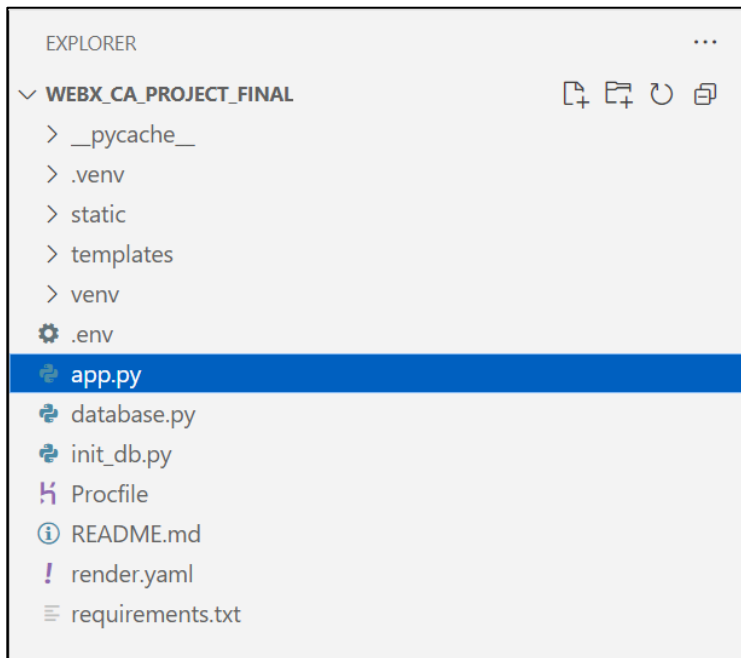
Access the Website

- Once the server starts, visit: <http://localhost:5000>

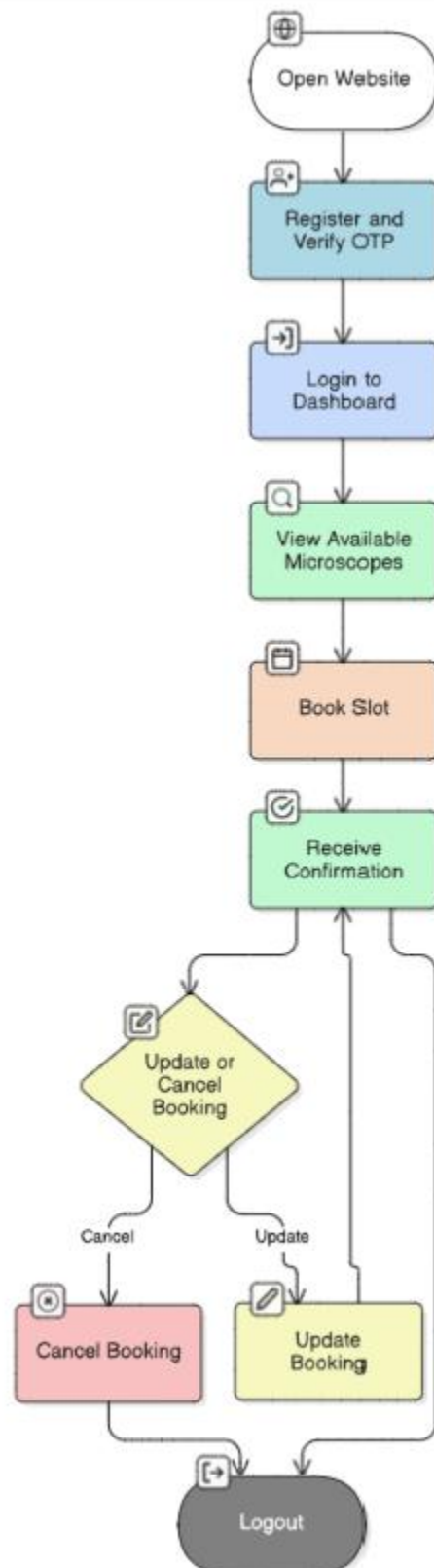
Database Setup (MongoDB Atlas)

1. Go to: <https://www.mongodb.com/cloud/atlas>
2. Create a free account and a new cluster
3. Add a database user with a username and password
4. Whitelist your current IP address
5. Create a database called `microscope_booking`
6. Get your connection URI and paste it into your `.env` file

PROJECT DIRECTORY STRUCTURE



Proposed Architecture



Conclusion:-

By carefully setting up the environment with Python, Flask, MongoDB Atlas, and integrating essential services like SMTP and Google Analytics, the Microscope Booking System ensures a smooth user experience. This prerequisite setup provides a strong foundation for efficient, real-time laboratory equipment management, significantly improving transparency and user satisfaction.