

COVID Vaccination Portal: A Python-MySQL Based System for Efficient Vaccine Slot Management

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Introduction

The COVID-19 outbreak led to the development of digital platforms to support mass vaccination. However, challenges such as slot shortages, manual record-keeping, and inefficient registration processes persisted in many systems. To overcome these challenges, we developed a COVID Vaccination Portal that simplifies and digitizes the registration, slot booking, and record management process using a Python-MySQL stack.

Objectives

- To build a user-friendly interface for vaccine registration.
- To enable search and filter options based on PIN code and vaccine type.
- To allow administrators to manage slots and vaccine inventory.
- To automate database record keeping for future analysis and reporting.

Technology Stack

- Frontend Interface: Tkinter (Python GUI library)
- Backend Logic: Python
- Database: MySQL
- Development Tools: MySQL Workbench, Python IDLE

System Architecture

The system is divided into two main user roles:

- Users: Can register, search centers, and book slots.
- Administrators: Can add/delete vaccination centers, update slot availability, manage vaccine types (Covaxin/Covishield), and oversee booster/additional doses.

Diagram:

User/Admin --> Python GUI --> Backend Logic --> MySQL Database

Key Features

- User Registration: Name, age, ID proof, and contact details.
- Slot Search: Search by PIN code, age group, and vaccine type.
- Slot Booking: Select available time and dose (Dose 1, Dose 2, Booster).
- Admin Panel: Add/delete centers, update vaccine availability and dose types.
- Data Management: Real-time updates and records stored securely in MySQL.

Results and Testing

The system was tested using dummy data for multiple users and centers. The following outcomes were observed:

- Slot search and filtering functioned correctly.
- Admin updates were reflected instantly.
- No major bugs were encountered during booking or record insertion.

Challenges Faced

- Ensuring real-time synchronization between GUI and MySQL database.
- Designing a scalable database schema for multiple vaccines and doses.
- Handling age-based restrictions dynamically in search filters.

Future Scope

- Web-based version with Django or Flask.
- Integration of OTP-based authentication.
- Notification system via email/SMS.
- Dashboards for real-time analytics (dose coverage, age-group wise stats).

Conclusion

The COVID Vaccination Portal offers an efficient and scalable system for managing vaccination operations digitally. Built with Python and MySQL, it simplifies both user registration and backend administration. With further improvements, this system can be extended for use in real-world

healthcare infrastructures.

References

[1] Python Documentation - <https://docs.python.org>

[2] MySQL Reference Manual - <https://dev.mysql.com/doc>

[3] WHO COVID-19 Vaccination Guidelines - <https://www.who.int>