Vietnamese National University HCM
HCMC International University
School of Computer Science and Engineering

List of Topics for Project Assignments

Course: Principles of Database Management

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Guidelines for students

The following are topics for a project assignment in Principles of Database Management courses at the School of Computer Science and Engineering, International University, VNU-HCM.

Ten or five students will be randomly selected to form a group. After forming their groups, students will work together on a given topic. Once again, a topic from this list will be randomly assigned to each group. Each group will learn how to implement their assignments in stages. In the last three theory sessions, each group presented its results to the other groups and received feedback from classmates.

After choosing a topic, you need to study it thoroughly and carefully follow the tasks outlined in the assignment specification document. Talk with your teammates to gain a better understanding of your topic. During labs, you can ask your tutors for clarification on any unclear issues. Remember that all the effort is yours; tutors only provide brief advice based on your work.

Please register using the link shared in the Zalo group.

ACKNOWLEDGEMENT

UpGrad and InstantEduHelp Company have compiled the following topics.

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PDM Project Ideas

The following are some easy and exciting database project ideas. Choose one according to your requirements:

1. Railway System

Design a database system to manage a country's railway network, one of the largest and most complex public transportation systems. The project will focus on tracking stations, trains, and schedules, with the option to expand to passengers and reservations.

Your project may include:

- Stations: Store station names and their unique identifiers.
- Tracks: Record tracks that connect two stations (assume one track between two stations for simplicity).
- Trains: Assign train IDs and names to identify each train in the system.
- Schedules: Maintain train schedules, including:
  - Starting station and departure time
  - Destination station and arrival time
  - Intermediate stations, with sequence order, arrival, and departure times
  - Daily running assumption (each train completes its journey within a single day).
- Passenger information (optional): Add details of coaches, coach types (sleeper, AC, general), seat numbers, and passenger bookings.
- Reservations and ticketing (optional advanced feature): Record passenger names, assigned seats, ticket numbers, and payment details.

Objective: To build a system that simplifies the management of railway operations by accurately tracking stations, trains, and schedules. More advanced implementations can handle passenger reservations, making the system closer to a real-world railway management solution.

2. Payroll Management Solution

Design a database system to manage employee payroll processes within an organization. Payroll is critical for both employees and management, and a structured system helps ensure accuracy, transparency, and compliance.

Your project may include:

- Employee Records: Assign a unique employee ID and save details such as name, role, department, and date of joining.
- Salary details: Track basic pay, salary release dates, and payment status.
- Allowances: Record additional pay components like HRA (House Rent Allowance), DA (Dearness Allowance), medical allowance, and bonuses.
- Deductions: Track deductions for extra leaves, taxes, or other penalties.
- Departmental structure: Link employees to their respective departments for reporting and analytics.
- Payroll history: Maintain monthly/annual payroll records for auditing and compliance purposes.
- Automation: Optionally add features to automatically calculate net salary (basic pay + allowances – deductions).

Objective: To create a payroll management system that simplifies salary processing, ensures accuracy in payments, and supports scalability for large organizations with multiple departments.

3. Content Management System (CMS) for a Blog

Develop a database-backed CMS that allows users to design websites and publish blog posts without requiring coding knowledge. The system should provide an intuitive interface for creating and managing web pages, while storing content efficiently in a database.

Your project may include:

- User accounts: Allow blog owners to register, log in, and manage their sites.
- Website builder: Provide a drag-and-drop interface that allows users to place components (such as text, images, and videos) into predefined placeholders on a page template.
- Content management: Enable users to add, edit, and delete textual and media content, with data stored in the database.
- Blog publishing: Include a text editor that accepts user input, converts it into HTML, and saves it in the database for later retrieval.
- Template system: Allow users to apply predefined or custom templates for their blog layout.
- Serving blog posts: Blog content must be fetched from the database and displayed dynamically within the chosen page template.
- Hosting and protocols: Ensure the website can be published over both HTTP and HTTPS for security.

Objective: To design a CMS similar to WordPress or Drupal, where non-technical users can create professional websites and blogs through drag-and-drop tools, automated publishing, and database-driven content storage.

4. Multi-client website offering client services

Design a database system to support a multi-client platform where merchants can showcase and sell their services, and customers can easily browse, book, and pay for them. The platform should serve as a marketplace that connects merchants with end-users.

Your project may include:

- Merchant accounts: Merchants can register, log in, and create their profile pages. Each page should list available services with details such as description, price, and availability.
- Customer accounts: End-users (customers of the merchants) can register, log in, and browse services offered by different merchants.
- Service catalog: Maintain records of all services across merchants, categorized for more straightforward navigation.
- Booking and checkout system: Customers can select services, add them to their cart, and proceed through a standardized checkout process.
- Payment Gateway: Integrate secure payment methods and store transaction details securely.
- Order and transaction history: Track past purchases, booking details, and payment records for both merchants and customers.
- Admin panel: Allow administrators to manage merchant registrations, monitor transactions, and oversee platform activities.

Objective: To create a system that acts as a service marketplace, providing merchants with a digital storefront while enabling customers to purchase services securely and conveniently.

5. E-commerce website for automotive parts

Build a database-driven e-commerce platform that enables customers to browse, purchase, and pay for automotive parts online. The system should provide a smooth shopping experience for users and efficient inventory and sales management for the business.

Your project may include:

- User accounts: Customers can register, log in, and manage their profiles and order history.
- Product catalog: Display automotive parts with details such as product name, category, brand, specifications, price, and availability.
- Shopping cart: Allow users to add, update, or remove products before checkout.
- Order management: Record order details including product list, total amount, shipping address, and order status (pending, shipped, delivered).
- Payment gateway: Integrate secure payment options (credit/debit cards, digital wallets).
- Inventory management: Track stock levels, update availability after purchases, and notify when items are out of stock.
- Admin dashboard: Enable administrators to manage products, view sales reports, and track customer activities.

Objective: To design a system that makes automotive parts purchasing convenient for customers while giving sellers a streamlined platform for managing inventory, sales, and payments.

6. Web portal for motor servicing at home

Develop a database-backed web portal for an automotive workshop that provides doorstep motor servicing. The system will allow customers to browse services, book appointments, and complete payments online, while helping the workshop manage bookings and operations efficiently.

Your project may include:

- User accounts: Customers can register, log in, and manage their profiles.
- Service catalog: Show available motor services (e.g., oil change, tire replacement, engine checkup) with descriptions and costs.
- Cart and booking system: Customers can add services to a cart, select their preferred service time slot, and complete the checkout process.
- Scheduling and time slots: Manage service bookings, mechanic availability, and time slot assignments.
- Payment details: Record invoices, transaction IDs, and payment statuses.
- Workshop management: Store mechanic details, assigned jobs, and service completion reports.
- Notifications: Optional reminders for upcoming bookings and confirmations of service completion.

Objective: To build a system that simplifies the process of booking motor services at home, improves customer convenience, and streamlines workshop operations.

7. Project Management application

Develop a database system to support a project management platform where users can create, assign, and track tasks. The system should also allow collaboration between users, similar to features in social media platforms.

Your project may include:

- User profiles: Store account details, contact information, and login credentials.
- Projects: Allow users to create projects with details such as project name, description, start date, and due date.
- Tasks: Manage tasks within projects, including task title, description, deadline, status (open, in-progress, completed, archived), and priority.
- Task assignment: Enable users to assign tasks to other users and track responsibility.
- Comments & communication: Support comments on tasks, similar to social media posts, to encourage collaboration.
- Calendar view: Provide a calendar-based view of tasks and deadlines.
- Kanban board: Allow tasks to be organized in a Kanban-style board (e.g., To Do, In Progress, Completed).
- Archiving: Enable users to close and archive both tasks and projects after completion.

Objective**:** To create a database that supports a feature-rich project management system, combining collaboration tools with structured task and project tracking for effective teamwork.

8. Airport Passengers Maintenance

Design a database system to manage airport operations, focusing on passengers, flights, employees, and luggage. Since airports handle a massive amount of information daily, a well-structured system can improve efficiency and reduce errors.

Your project may include:

- Passenger details: Store passenger names, IDs (e.g., passport number), contact details, and travel history.
- Flights and planes: Record flight numbers, destinations, schedules, aircraft details, and assigned crew.
- Luggage tracking: Maintain records of baggage linked to each passenger, including baggage ID, weight, and status (checked-in, loaded, lost, delivered).
- Employee records: Store details of airport staff (pilots, cabin crew, ground staff, security) and their assigned roles.
- Ticketing and boarding: Track ticket purchases, boarding passes, and seat assignments.
- Security and safety: Optionally log passenger screening results, restricted items, or emergency incidents.

Objective: To create a system that helps airports efficiently manage passengers, flights, luggage, and staff, reducing delays and ensuring smooth operations.

9. Varied Insurance

Create a database system to manage insurance policies for both individuals and companies. The system should keep track of clients, their policies, and claims, making it easier for insurance providers to manage records and for customers to access their policy information.

Your project may include:

- Customer details: Store client information such as name, address, contact details, and whether the client is an individual or a company.
- Insurance policies: Record policy number, policy type (life, health, vehicle, property, etc.), purchase date, purchase year, issuing branch, and expiry date.
- Billing information: Track bill number, payment history, and premium amounts.
- Incidents and claims: Store details of reported incidents, claim amounts, claim dates, and settlement status.
- Policy ownership: Link policies to individual clients or company accounts.
- Renewals and alerts: Generate notifications for upcoming policy expirations or pending claims.

Objective: To design a system that ensures proper management of insurance policies and claims, reduces paperwork, and improves accessibility for both insurers and policyholders.

10. Registered Vehicle Details

Design a database system to store and manage information about registered vehicles and their owners. This system will assist government agencies, insurance companies, or transportation authorities in efficiently tracking vehicle ownership and ensuring legal compliance.

Your project may include:

- Vehicle details: Store information such as registration number, vehicle type, model, manufacturer, engine number, and chassis number.
- Owner details: Record owner information such as name, address, contact information, and unique identifiers (e.g., PAN, driver's license).
- Registration information: Keep track of registration dates, renewal dates, and registration validity.
- Insurance details: Track insurance provider, policy number, coverage, and expiry date.
- Ownership transfer: Maintain a record of ownership changes during vehicle sales.
- Fines and violations: Optionally monitor traffic violations, fines, and penalties associated with vehicles.

Objective: To build a system that prioritizes accurate tracking of vehicles and owners, improves data accessibility for authorities, and ensures compliance with regulations.

11. Blood Donation

Develop a database system to manage blood donations, donors, doctors, and blood bank inventories. This system will help hospitals and blood banks organize donation drives, track availability, and assign doctors to patients more efficiently.

Your project may include:

- Donors (Patients): Store details of donors such as name, contact, blood group, and donation history.
- Doctors: Manage doctor profiles, their assigned duties, and links to blood banks.
- Blood Banks: Record information about each blood bank, including location, available blood units, and assigned doctors.
- Blood Inventory: Track blood units by type (A, B, AB, O), availability status (available, finished, reserved), and expiration dates.
- Donation and Requests: Record donation events, blood requests, and fulfillment statuses.
- Availability Management: Mark blood units as available, finished, or ready for restock.

Objective: To build a system that ensures smooth coordination between donors, doctors, and blood banks, making blood availability more transparent and reliable.

12. Training group database project

Design a database system to manage a company's training programs, instructors, and trainees. The company specializes in advanced technology

courses and needs a well-structured system to handle scheduling, assignments, and participant information.

Your project may include:

- Instructors: Store instructor details, including expertise areas and teaching assignments.
- Courses: Track 20 advanced technology courses offered by the company.
- Teaching teams: Each course is handled by a team of at least 5 instructors. An instructor can belong to a maximum of 3 teaching teams.
- Trainees: Record trainee details. Each session can accommodate up to 500 trainees.
- Training sessions: Manage scheduling of sessions and course assignments. Each trainee takes exactly one advanced course per session.
- Research activities: Track research responsibilities that instructors may also be assigned to.

Constraints to consider in your ERD:

- The company has 50 instructors.
- One course → handled by a teaching team of 5+ instructors.
- One instructor → max three teaching teams.
- One session → up to 500 trainees.
- One trainee → enrolls in 1 course per session.

Objective: To create a database that efficiently manages courses, instructors, and trainees, while respecting the constraints of team assignments and session limits.

13. Online CV Builder:

Create a database system that supports an online platform for generating CVs (Curriculum Vitae). Instead of manually formatting CVs, users can input their information into structured forms, and the system will automatically generate a professional CV.

Your project may include:

- User profiles: Store basic details, including name, contact information, and login credentials.
- Education records: Track degrees, certifications, institutions, and graduation dates.
- Work experience: Store job titles, company names, responsibilities, and employment periods.
- Skills and achievements: Record technical skills, languages, awards, and recognitions.
- CV templates: Maintain various CV styles and formats for users to choose from.
- Generated CVs: Save and allow users to update or download their CVs.

Objective: To build a system that simplifies the process of creating and managing CVs by storing user data in a database and automatically generating professional resumes.

14. Tax Calculation System Database:

Develop a database system to manage and automate tax-related processes for individuals, enterprises, or government agencies. Manual tax management is time-consuming and prone to errors, but a well-designed database can streamline calculations and record-keeping.

Your project may include:

- Taxpayer information: Record details of individuals and organizations (e.g., name, ID, income category, business type).
- Income and expense records: Track income sources, allowable deductions, and business expenses.
- Tax rules and rates: Maintain tax slabs, percentages, and exemptions applicable to various taxpayer categories.
- Automatic tax calculation: Compute payable tax based on stored income/expense data and applicable rules.
- Payment tracking: Record payment details, outstanding balances, and due dates.
- Reports and compliance: Generate tax statements, summaries, and compliance reports for audits or government filings.

Objective: To design a system that ensures accuracy in tax computation, reduces administrative workload, and provides transparency for both taxpayers and authorities.

15. Water Supply Management System Database

Design a database system to manage water supply connections, billing, and customer information efficiently. Manually handling records for

thousands of households and businesses is difficult, so a centralized database is essential.

Your project may include:

- Customer records: Store details of households, businesses, and institutions connected to the water supply.
- Connection management: Track water meter installations, connection IDs, and service locations.
- Billing system: Record water consumption, calculate bills, and manage payments.
- Complaints and Service Requests: Log customer complaints, service interruptions, and maintenance requests.
- Supplier operations: Assist water suppliers in monitoring overall distribution, identifying issues, and enhancing service delivery.
- Reports and analytics: Generate usage reports, revenue summaries, and efficiency analyses.

Objective: To create a system that simplifies water supply management, reduces manual errors, and improves both customer satisfaction and supplier efficiency—ultimately saving time and costs for institutions.

16. University health care database:

Design a database system to support a university's healthcare management. The database will focus on monitoring student health, especially in cases of contagious or serious diseases.

Your project may include:

- Student Health records: Store student information, including medical history and current health status.
- Disease tracking: Record and track students affected by specific illnesses, including timelines, treatments, and recovery status.
- Healthcare services: Manage appointments, medical staff, prescriptions, and preventive care activities.
- Reports and alerts: Generate reports for university administrators and send alerts when certain health risks or outbreaks are detected.

Objective**:** To create a system that helps universities maintain a healthier environment by improving access to medical data, streamlining disease tracking, and supporting timely interventions.

17. Task management database:

Well-defined relations that automatically sort when added to the database will improve ease of use. You can always sell it later to startups and existing enterprises.

The Task Management Database is a well-organized and efficient system designed to help individuals and organizations organize, track, and prioritize tasks and activities effectively. This database streamlines workflows, boosts productivity, and provides a valuable resource for managing projects and assignments. Additionally, it has the potential for commercialization, making it an appealing product for startups and established companies.

Key Components and Data Elements:

- Task Information

- Task Relationships
- Task Categories
- Task Assignment and Notifications
- User Accounts
- Progress Tracking
- Task History

The Task Management Database simplifies task organization, helping individuals and teams stay focused and productive. It enhances communication, task collaboration, and project handling. Additionally, its structured data and user-friendly interface make it an attractive product for startups and enterprises looking for effective task management solutions.

18. Employee attendance system database:

Now, managing attendance and monitoring employees will become simpler. This unique database will assist managers in ensuring proper attendance for every employee.

The Employee Attendance System Database is a key tool for organizations to effectively manage attendance records, track work hours, and ensure proper staffing. This database makes it easier to monitor and analyze employee attendance, giving managers the information they need to make informed decisions about workforce scheduling and productivity.

Key Components and Data Elements:

- Employee Information
- Attendance Records
- Employee Time Clock

- Shift Scheduling
- Leave Approval Workflow
- Compliance Tracking
- User Roles and Permissions

The Employee Attendance System Database boosts organizational productivity by providing accurate, current attendance data. It supports managers in making informed decisions about workforce management, recognizing attendance patterns, and ensuring employees follow attendance policies. This system is a valuable tool for fostering employee accountability and enhancing productivity within the organization.

19. Online voting system database:

Managing the data of every eligible voter with a database that also prevents double voting will become a major issue in the coming years.

The Online Voting System Database is a vital part of modern elections. It ensures effective and secure handling of voter data and maintains the trustworthiness of the voting process. It marks a major technological progress in democratic voting, allowing eligible voters to cast their ballots remotely while protecting against fraud like double voting.

Key Components and Data Elements:

- Voter Registration
- Voting Records
- Preventing Double Voting
- Election Management
- Vote Counting

- Results Display
- Voter Support

The Online Voting System Database represents a groundbreaking approach to democratization, making the voting process more accessible and convenient for citizens. It improves the accuracy and transparency of elections while implementing security measures to prevent fraud. As the digital age continues to advance, online voting systems are likely to play an increasingly important role in shaping the future of democratic participation.

20. Video streaming database:

A large database that will either store all the videos or links to those videos. It requires a lot of development work.

The Video Streaming Database is a sizable and complex system built to handle a large collection of videos or links to videos. This database acts as the core of video streaming platforms, facilitating the storage, organization, retrieval, and delivery of video content to users online. Extensive development work is necessary to ensure efficient operation and a smooth user experience.

Key Components and Data Elements:

- Video Content Management
- Video Storage
- User Profiles and Authentication
- Streaming and Delivery
- Search and Recommendation Engine
- User Interaction

- Content Management

The Video Streaming Database is essential for providing a smooth and enjoyable streaming experience to users. It involves intricate backend development, content management, and infrastructure upkeep to ensure videos are available and accessible on demand. These databases support popular streaming services and require continuous development and optimization to keep up with the changing needs of the digital entertainment industry.

21. Article search engine database:

A database that manages all the articles and keeps a tab on all of them.

The Article Search Engine Database is a comprehensive system designed to efficiently manage and organize articles from various sources. Its main goal is to catalog, store, and facilitate the retrieval of articles while maintaining accurate metadata.

Some Key Components:

- Article Repository
- Metadata Management
- User Profiles
- Search Functionality
- Recommendations

The Article Search Engine Database streamlines managing and retrieving articles, making it a valuable resource for researchers, students, and professionals. It makes it easier to find relevant articles, track changes, and stay informed in different fields of knowledge.

22. Invoice billing database:

A system that has a price list and recognizes when a keyword is entered. It is one of the best databases ever created for shopping complexes. It is also one of the top Oracle database project ideas for final-year students.

The Invoice Billing Database is a strong and flexible system created to make billing easier, especially in shopping malls and retail stores. This database provides a complete solution by keeping a price list and using keyword recognition to make billing and invoicing simpler.

Some Key Data Sections:

- Product Information
- Customer Data
- Invoice Records
- Price List
- Keyword Recognition
- Payment Information

This database project greatly improves the efficiency of billing processes in shopping malls, offering an easy-to-use interface for both customers and staff. The keyword recognition feature speeds up billing, reduces mistakes, and boosts customer satisfaction. It is a great project idea for final-year students, especially those interested in Oracle database development, as it blends practicality with innovative technology.

23. Online examination system database:

Feeding in all the dates and ensuring every student is informed about them, this database will improve reliability and make management easier.

The online examination system database is an essential part of modern educational institutions. It helps with scheduling, administering, and managing online exams. Its main goal is to improve reliability, simplify processes, and ensure smooth communication with students about exam schedules and details.

Some Key Data Sections:

- Exam Information
- Student Profiles
- Exam Registrations
- Exam Results

By centralizing exam-related information and communication, this database project greatly enhances reliability and simplifies online exam management. Students can easily check their exam schedules and receive timely updates, leading to a more efficient and convenient testing process for both students and educational institutions.

24. Warehouse management system database:

A database that gathers information about a warehouse and encourages effective management of the staff working there.

Creating a warehouse management system database involves designing a comprehensive solution to effectively handle warehouse operations and

oversee personnel activities. This project aims to streamline processes within a warehouse environment, ensuring optimal inventory control and workforce management.

Some Key Data Sections:

- Inventory Item
- Orders and Shipment
- Personnel Information
- Stock Level
- Transaction

The system should offer a user-friendly interface for warehouse staff and administrators to input, retrieve, and analyze data effectively, ultimately improving warehouse management efficiency.

25. Farming Assistance Web Service:

The farming assistant web service is a platform built to help farmers boost profitability by allowing direct communication between farmers and suppliers, as well as among farmers themselves. This service improves business communication and encourages transparency within the system.

Some Key Data Sections:

- Farmer
- Supplier
- Administrator
- Inventory Item
- Transaction

This innovative platform enables farmers to log in and communicate with their respective suppliers. Farmers receive notifications whenever dealers post an advertisement. They also have the option to submit their grievances and complaints to the relevant dealers or authorities through their farmer login on a separate complaints page. Authorities can access that page regularly using their login credentials.

26. Library Management System:

A library management system is software created to handle all library functions. It assists the librarian in maintaining a database of books and loans made by members, including their due dates.

Some Key Data Sections:

- Books
- Author
- Borrower
- Borrowing

A library management system is used to maintain library records. It tracks the number of books in the library, how many books are issued, returned, renewed, or have late fines, and can locate books instantly.

27. Hotel Management System:

Creating a hotel management system data model involves a systematic process of identifying entities, their attributes, relationships, and cardinalities to accurately represent the system's structure and functions.

Some Key Data Sections:

- Hotel
- Room
- Room type
- Guest
- Booking
- Staff
- Payment

A hotel management system provides efficient check-in and check-out processes, manages room reservations carefully, and handles many room assignments. It must also meticulously coordinate guest data, room availability, and financial transactions.

28. Digital Bus Pass For Local Buses:

An online bus pass system would be helpful for everyone to access bus passes online instead of waiting in long lines to get their passes. This project aims to provide an effective solution for managing bus pass information.

Some Key Data Sections:

- Admin
- Bus
- Pass
- User
- Payment
- Conductor

This system provides an efficient way to manage all bus pass information through a database. It helps the public those who face issues like waiting in line to register and renew their passes. With this system, users can renew their passes at any time. The pass contains all the information entered by the user when filling out online bus passes.

29. Online Loan Application & Verification System:

It can take weeks or even months for loans to be approved, and people often need to visit the loan office multiple times to submit documents and verify information. Our project aims to automate the loan process for both bankers and customers.

Some Key Data Sections:

- User
- Bank
- Account
- Loan

Here, users can view different loans, along with their interest rates and required documents. The bank can see users' requests and manage all the loans.

30. Parking Booking System:

The project is an intelligent parking booking system that offers customers a simple way to reserve a parking space online. It solves the problem of searching for a parking spot in commercial areas, saving time.

Some Key Data Sections:

- Parking Areas
- Booking
- User
- Admin
- Payment

Therefore, this system allows users to view various parking areas to check their availability. If a parking space is available, users can reserve it for a specific time slot. Users can cancel their reservations at any time. Payments can be made online with a credit card or in person with cash.