Competitive Workshop: Design Database 😊

Overview

This collaborative workshop challenges trainees to design a moderately complex database based on real-world scenarios. Working in teams of 4 members, participants will apply their understanding of **entities, relationships, attributes, and keys** using tools like DB Designer. The goal is to reinforce core database modeling skills through practical, scenario-based design.

Learning Objectives

By the end of this activity, each team will be able to:

- Identify **entities**, **attributes**, and **relationships** from system requirements.

- Classify **attribute types** (simple, composite, multi-valued, derived, complex).

- Distinguish between **strong** and **weak** entities.

- Apply **cardinality and participation constraints** correctly.

- Use **primary**, **composite**, and **partial keys** appropriately.

- Represent database models using **professional ER diagrams**.

Workshop Deliverables

1. Entity-Relationship Diagram (ERD)

Workshop Phases

Phase 1: Scenario Assignment & Brainstorming

- Discuss the system's components to identify:

    o Entities

    o Attributes

    o Relationships

- Begin ERD design with paper then if they want to use using a visual tool.

Phase 2: Drawing ERD

Recommended Tools

- DB Designer (https://dbdesigner.page)

- Draw.io

- Whiteboard (for sketching before digital work)

- ✨ Let your **creativity**, **teamwork**, and **database logic** shine!

Online Course Platform

- Students enroll in courses and receive a grade.

- Each student can have multiple contact emails and may belong to a specific learning track.

- Instructors teach many courses but must belong to a department.

- Each course has a unique code, title, duration (in weeks), and may have prerequisites.

- Certificates are issued upon course completion if the grade is passing (derived condition).

- Courses can include downloadable resources and scheduled live sessions.

Employee Management System

- Employees belong to departments and are assigned roles (e.g., Manager, Developer).

- Each employee has a salary record with basic salary, bonuses, and deductions (derived total).

- Departments can manage multiple projects; each project has a name, deadline, and client.

- Employees are assigned to projects with number of hours worked as a relationship attribute.

- Performance evaluations are issued quarterly for each employee.

- If an employee resigns, their salary and project assignments are archived (weak relationship).

Payment System

- Clients can register with name, business info, and multiple contact persons.

- Invoices include multiple items (name, quantity, price), and a due date.

- Payments can be made in installments and may cover multiple invoices.

- A payment includes method (cash, card, bank), status, and confirmation number.

- Clients can receive credit notes (optional) in case of overpayment.

- Discounts may apply to invoice items, not the entire invoice (nested attribute structure).

Recruitment Management System

- Applicants apply for jobs by uploading a CV and selecting preferred interview time slots.

- A job may have multiple applicants and multiple interviews per applicant.

- Each interview is conducted by one or more recruiters and has a score, date, and notes.

- Job positions belong to departments and are tagged with required skills.

- Applicants may be offered a contract after final interview. Contract includes salary, duration, and probation period.

- Skills are multi-valued attributes of both applicants and jobs.

University Research System (Advanced)

- Professors supervise research projects. Each project may have one or more supervisors.

- Students contribute to projects and may work on multiple projects at the same time.

- Track the **number of hours**, **contribution description**, and **start/end dates** of each student's involvement.

- Projects are funded by external organizations and have budgets, funding dates, and progress reports.

- Each student has a research area and academic advisor (who may or may not be their project supervisor).

- Projects can include multiple research papers authored by students and/or professors.

E-Commerce Platform (Advanced)

- Customers have accounts with wishlists, reviews, and multiple shipping addresses.

- Orders can include multiple products with selected **options** (color, size), and discounts (percentage or fixed).

- Track quantity per product, subtotal per item, and overall shipping status (pending, shipped, delivered).

- Products belong to multiple categories and may be temporarily unavailable.

- Customers may earn loyalty points per order (a **derived attribute**).

- Wishlisted items are **not necessarily purchased** but should be tracked.

Event Management System (Advanced)

- Organizers create events, which may include multiple **parallel sessions**.

- Attendees register and select sessions they plan to attend.

- Each session is held in a specific room, has a speaker, and may have **prerequisite sessions**.

- Track RSVP status (confirmed, tentative, canceled), actual attendance, and feedback per session.

- Some events are ticketed, and tickets may have tiers (VIP, Standard) with price differences.

- Each event can have **sponsors**, promotional materials, and registration deadlines.

Healthcare Insurance System (Advanced)

- Patients subscribe to one or more insurance plans, each covering specific treatments and having a premium, validity period, and co-pay rate.

- Doctors provide treatments which may or may not be covered under a patient's current plan.

- Each treatment has a cost, and the **co-pay amount** must be calculated.

- Approvals are required for some treatments and include request date, decision status, and comments.

- Policies have different **coverage rules** (e.g., annual limits, excluded treatments).

- Doctors are affiliated with hospitals and may have specialty areas.

Freelance Job Marketplace (Advanced)

- Clients post projects with budgets, deadlines, and required skills.

- Freelancers apply to projects and are interviewed. Interviews may include questions, scores, and comments.

- Upon selection, the freelancer is assigned a contract with milestones, payment terms, and delivery expectations.

- Freelancers submit deliverables tied to milestones, and clients leave reviews after project completion.

- Payments may be made per milestone or in full upon project closure.

- Both clients and freelancers have profiles with ratings, portfolios, and histories.