

CS 301 - Introduction to Database Systems
Course Project Specification
Faculty Leave Portal at Academic University (Total Weightage: 25%)
2020 -- 2021 Semester II

General Instructions:

- **Allowed team size:** 2 members or 3 members. Projects from teams of size 3 would be more complicated for the same score and same deadline.
- Students should use the given idea and develop it into a full-scale project proposal. We are just giving a just high level idea of the project and by no means a full specification.
- You are allowed C/ C++, JAVA, PHP and Python for these projects. For any other language, you should first get an approval.
- Periodic discussions are mandatory to give a proper direction (and guidance as needed) to the projects.
- Do not disappear after taking a topic and show up only in the week before the final deadline. In such cases, instructors would simply proceed with their discretion on what should have been done!

Important Notes:

- SQL tutorial: <https://www.w3schools.com/sql/>
- Refer material on database triggers, database authorization, functions and procedures.
- Web applications development in Java, Python

Project Description:

You are expected to develop a faculty leave portal for an academic university. For this project, you are expected to develop code for both the front-end UI and the back-end of the system. Given that this course focuses on topics related to databases systems, we would expect a more thorough effort on the database part of the project. However, there should be a bare minimum effort on front-end UI as well.

Faculty in an academic university are largely divided into two categories: (a) Faculty and (d) cross-cutting faculty (e.g., Deans and Associate Deans etc.). People in each of these categories are formed into a hierarchy with the Director at the top most level. And as expected, people participating in this hierarchy (at various roles) change with time. Your design must allow for such changes and should also keep a track of it. Following is a brief background on the hierarchy of faculty (in an IIT):

Faculty: Faculty are divided into departments (e.g., CS, EE, ME, Civil, etc.). Each department has a head-of-department (HoD) who is also one of the faculty members in the department. Each HoD appointment is a time bound appointment and is thus associated with a start-date and end-date.

Cross-cutting Faculty: In any institute, we do have some faculty who are not associated with any particular department. Examples of this include, Dean Faculty Affairs, Dean Academic Affairs, Dean Research and Dean Student Affairs. All Deans are faculty who have been appointed to the said post for a certain duration. And during the period they hold the Dean position, they are deemed to be a “cross cutting faculty.”

Concepts relevant to faculty:

- **Leave applications:** From time-to-time, faculty can go on a leave. Depending on the post of the applicant, his/her leave application would go through a specific route. For instance, leave application of a faculty follows the following route for approval: Faculty → HoD → Dean Faculty Affairs. In each stage, the person forwards with comments. Finally Dean Faculty Affairs approves or rejects. After approval, leave is deducted from the available leaves and an intimation is sent to faculty.

Note that leave applications of HoDs and Deans are approved directly by the Director. Two more things to note here: (a) each employee has a fixed number of leaves per year (and they expire at the end of the year). (b) Sometimes, HoD, concerned head, and/or Dean FAA may redirect the application to the employee for more comments. Once approved (or rejected), the concerned faculty is intimated. Also note that the concerned faculty should be able to see the current position of the leave application and all the comments made on it by different entities. These comments can also be seen by HoD and Dean Faculty Affairs.

Assume the following Depts in Faculty: CSE, ME and EE. Each Dept has an HoD. HoD is a current faculty of the dept.

Assume the following Deans: Dean Faculty Affairs (any of the current faculty can become Dean for a certain duration).

Assume one Director: And everybody comes under the Director. Director is also a faculty in any one of the departments.

Portals to be implemented:

- **Basic Employee Portals:** Each of the employees would have their own personal portals. Portals should have the following: (a) Personal Information, (b) Total number leaves available this year, (c) Status of the leave applications (including the comments added by various entities), (d) Options to start new leave applications, (e) Respond to comments made on leave applications.
- **Specialized Portals:** Each of the named positions such as HoD, Dean and Director would have specialized portals for handling the applications. Note that all the specialized portal logins must be tied up with an employee (implicity). For e.g., consider a faculty named Dr Rajesh in the CSE dept. When he becomes the HoD of the CSE dept, his login should now have options to approve/reject/make comments on the leave applications of the CSE dept faculty. And his own leave applications would now go to the Director. These features should be removed when he steps down from the HoD position.

Constraints:

- **Complete Paper Trail Needs to be Maintained in the system:** Information on “Who signed what and when” must always be stored in the database. Even if an employee leaves the institute, there should be a record on what all did he/she approve. Similar is the case when HoDs or Deans change. Note that all the specialized portal login must be tied up with an employee. For instance, if a faculty signs an application via his/her Deans login, then appropriate information regarding this must be stored in the database.
- An employee can launch only one leave application at a time.
- Your design should have relevant security features. For instance, a faculty should not have write access to the field/table containing Dean’s comments (or HoD comments) on leave applications, he/she can only read it.
- Director has the authority to change the HoD and Dean appointments. In other words, appointing HoD or Dean should be an option in the Director’s portal.
- **Change of HoD or Dean FAA:** Whenever there is a change in HoD or Dean FAA, then all the pending (i.e., they have not been either rejected or approved) applications should be automatically forwarded to the new person. It should also have comments made by the previous person (as needed).
- One can apply for leave only for the future dates. In case a faculty applies for leave for past dates, it will be called as “retrospective leave” and the following route needs to be followed in that case: Faculty → HoD → Dean Faculty Affairs → Director. This does not apply to HoD and Deans as they leave applications goes to the Director anyways. In this case faculty must write a reason for not applying leave before.

- In case the leave is not approved/rejected before the start date of the leave, then it is automatically “rejected by the system.” Appropriate comments should be appended to the application by the system that the application was automatically rejected by the system as the application was not approved/rejected by the proposed start date.
- In case someone requests for more number of leaves than what he/she currently has, then after approval a system generated message should be attached to the application stating that he/she does not have enough leaves. And deduct whatever max number of leaves are possible.
- If HoD rejects a leave application, then it cannot be forwarded to Dean FAA.

Extra Work for Team size-3 (team size-2 can ignore this portion)

Extend the previously developed solution to include the concepts of the sponsored projects. From time-to-time, faculty write proposals for sponsored projects from external funding agencies such as DST, DBT, etc. Typically, these projects have a budget to hire project associates.

Following concepts need to be addressed while designing this component of the project:

1. A project can have multiple PIs. Out of these, one is designated as the main PI and others as Co-PIs. Each of them would be a faculty in the institute.
2. Each project would have several budget heads, e.g., manpower, equipment and travel.
3. A PI can hire a project associate if money is available in the manpower budget. A manpower has a fixed salary e.g., 31,000 per month (for JRF) or 40,000 (for SRF). These salaries are fixed by the funding agency.
4. Before a project associate hiring can be done, PIs need to get approval from the institute. Approval is also similar to leave application. A PI (Co-PI or main PI) puts in the application. This application (containing the number of months for which associate would be hired) goes to main PI (if applicable). Following this, the application is forwarded to Dean Sponsored Projects for approval. Post approval, the application is sent back to faculty.
5. **Note that the projects should be tied up with the personal portal of the faculty. In other words, you should not make another portal for PIs.**
6. Complete expenditure report of all the projects must be stored (and also visible to PIs)
7. Complete information trail on “who approved what (and when)” must be maintained. This must be stored even if a faculty leaves the institute.

Key Deliverables:

1. ER diagram, schema of the tables, plans on triggers and stored procedures. Your diagram should have **least possible redundancy of data and attributes must be stored in appropriate entities.**
2. Final Demo after implementing all the required portals.