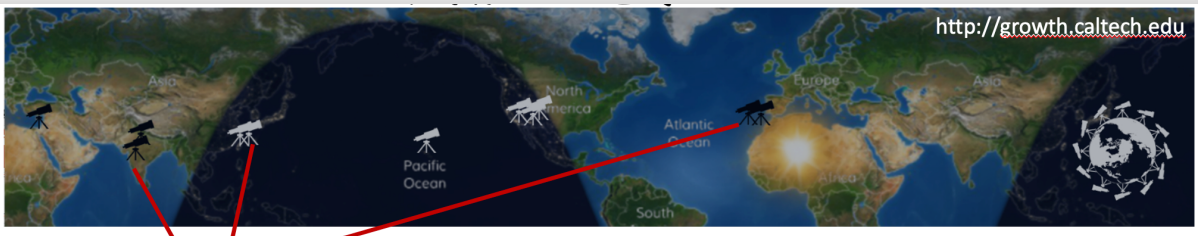
2020 ADB Final Project Specifications
Observational Astronomy United

Background

In observational astronomy, people desire as much observation time as possible either for science purpose or for amateur astrophotography. Both professional and amateur astronomers spent lots of money, time, and effort to buy telescopes, build observatories, and do observations individually. Everyone wants to be the first or the best in his/her field. However, these purposes or projects might be similar or even duplicated. Others like elementary/high schools' educational observatories or amateur astronomers with less spare time for observations might come across a situation which is not knowing what to observe and/or instruments being left idle for a long period of time.

In this project, we aim to create a platform for astronomy people to collaborate with each other for their observations. In this platform, there are people provide observation ideas by proposing projects and others offer observation by their equipment. System will recommend projects depending on your location, equipment setup, and personal preference (e.g. interested targets). Users can decide which projects to join and project managers can manage his/her group on this platform. With the targets to be observed and equipment to take the observation, our system could further allocate suitable observation schedules to all the equipment according to the projects that users are joined.



Equipment: E1, E2, E3, …

User: U1, U2, U3, … **(each User may have multiple Equipment at different locations)**

Project: P1, P2, P3, … **(each Project may have requirements on Equipment capabilities)**

Target: T1, T2, T3, … **(each Project may contain multiple Targets)**

(each Target may only be seen at some locations)

By utilizing the concepts learned in the Advanced Databases course, your goal is to design a platform which can gather astronomers around the world to collaborate and discuss together. The details of specification are provided below.

Requirements

1. **Basic elements**: The system contains several major datasets as follows:
    a. **Users:** Personal info and their interests.
    b. **Equipment:** The equipment to observe targets, which majorly contains the location and capabilities of itself.
    c. **User's equipment**: The mapping table to indicate which user have what equipment, equipment's locations and environment conditions.

d. **Projects:** Project type, title, project managers (PIs), target(s) information, required capabilities from equipment, and so on.
e. **Targets:** Target's name and its location on Celestial sphere.
f. **Project's Targets:** Recording the observing targets of each project and the criteria to observe the corresponding target.

Note that example datasets are provided to test the system.

2. **Basic Functionality**:
    a. **User Basics:** Basic functions for users to user login and manage (e.g. new, update, view, or delete) personal information, their equipment.
    b. **Projects Basics:** Basic functions to propose projects with observation targets and requirements on equipment (e.g. locations and capabilities) and display projects to users that have qualified equipment.
    c. **GUI Interfaces:** It can be web-based or window-based interfaces. There is no any specific requirements.

3. **Exploration Querying**:
    a. **Equipment Schedule Arrangements:** With users join several projects, the schedule of users' equipment to observe different targets could be retrieved. Each day, for example, can be divided into 4 six-hour periods and the schedule function is limited to calculated for next coming six-hour period. For a user, s/he must be able to see the schedule for her/his equipment. As a project manager, s/he must be able to view all the equipment participate to the project.
    b. **(Bonus) Recommendations of Projects:** In basic functionality, for each user, the displayed projects are only constrained by the requirements of equipment. However, users may have their priority for different targets/ projects. It is also beneficial to combined with a user-based recommendation to rank the projects.
    c. **(Bonus) Recommendations of Users:** As our system potentially create a community that consists of astronomy people, users could get the user recommendations within this community to increase the social engagements.

4. **Spatial and Graph Databases** are required to be adopted in the system. The geographical information and operations should be handled by spatial database, such as the location of equipment. You can also apply any other database to the system.

Grouping

In this project, please form groups of **4 people**. The grouping spreadsheet can be found here: https://docs.google.com/spreadsheets/d/1FdgclMpUO62AS5wdA0GyALyYJrS-RdgAQx0UB2a5XCs/edit?usp=sharing

Grading

1. **Video Presentation (10%)**: You need to record a short introduction video for 3~5 minutes and upload to e-learn system. The video will be uploaded to YouTube.

2. **Poster and System Demo (50%)**: Achieve the goal of a full-functional Course Roadmap Application. This includes the support of all the mechanisms and functionalities listed above. You need to prepare a poster to introduce people what you do and prepare your complete application for live demo.

3. **Database Structure (10%)**: Provide detailed information on the data model and the schema/s you designed. This also goes in the report.

4. **Report (30%)**: Explain the concepts and techniques you use, and which parts are related to the Advanced Database course. Additionally, **you need to provide details of what each member contributes** in your group.

5. **Bonus (20%)**

If you have any questions related to the project, please contact TAs in advance.