GEOM90008 Assignment 2 Project Proposal

1. Project Name: Drone Management Database for Universities

2. Contents

3. Project Team

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4. Summary of requirements

4.1 Project rationale

The university is expanding the use of drones to promote space science research. Therefore, the university needs a database (DB) system to manage all information related to drones to effectively implement the flight planning, compliance verification, and status monitoring of drone activities.

The main needs for applying DB system technology are as follows.

- DB technology can store and manage route planning information for drones, such as starting point, destination, waypoint, flight altitude. The information can then be queried and updated to monitor drone flights.
- DB technology can store flight rules and restrictions, e.g.,CASA rules. Even when rules or restrictions change, The information can be updated in a timely manner to ensure that flights always comply with the latest regulations.
- DB can store and manage drone status information, such as sensors and battery status. This information can be monitored in real-time through database technology, and administrators can be reminded to timely replace hardware when needed to ensure safety of drone flight.
- A large amount of drone route planning and status information can be recorded and analyzed effectively through DB technology, such as generating historical flight data reports. These reports provide useful information for decision makers to support optimization and improvement of drone operations.
- The existence of spatial data makes the use of DB more necessary because flat files are difficult to represent high-dimensional data, while DB technology

has the advantage of visualization for spatial data, making data access and reference much more convenient, visible and clear.

The goal of the Drone Management Database project for the university is to develop a comprehensive DB system that will enable the university to store and manage all drone-related data and allow users to query and perform spatial calculations based on data for the purpose of compliance, monitoring, and supporting drone activity planning. The system will ensure that a series of drone flight regulations are followed by flights. And the system will also support operator management and equipment management, and provide additional desiderata such as identifying the closest hotels and emergency locations. Ultimately, the DB system will provide safe and efficient drone operation management for university research purposes.

4.2 Project scope

4.2.1 CASA

The system should automatically verify compliance with CASA rules based on the flight plan of each flight and the spatial data stored in the database and provide pilots with matters that must be avoided. The details are as follows:

- The system automatically determines whether the path in the flight plan meets the CASA rules for execution.
- The system should determine whether the pilot must be university employees or students who are only allowed to fly on university properties.
- The system should provide the shortest path from the university central location to the potential start point.
- The system should calculate the maximum and minimum elevation angles of flight, as well as the total upward and downward values along the flight path. Ensure that the drone remains at least 15 meters above the ground and does not exceed the minimum limit.

4.2.2 Operator support

In addition, the system should also support operator and equipment management, as follows:

- The system can identify employee ID,names and employee contact information.

- The system should track the operator of flights and record the historical flights supported by each operator.
- The system should record the operator’s refresher courses,identify all operators who need training next month,and calculate the operator’s flight time.
- The system should store maintenance dates for all drones, sensors, and batteries, ensuring that the maximum inspection interval for all batteries does not exceed 2 years, and the inspection interval for all sensors does not exceed 1 year.
- The system should ensure that the sensors and batteries of each drone can meet the flight load and flight duration.
- The system should determine the appropriate pilot (time and ability) based on the flight path.

4.2.3 Additional Desiderate

The system should also meet some additional desiderate.

- The system can be used to identify the three closest hotels to the start point of the flight.
- The system can provide staff with a path from the start of the flight to the nearest hospital or emergency location.
- All map data needs to be stored in either GDA94 or GDA2020. And the flight paths are to be inputted in WGS84. The database will handle reprojecting dynamically when in the flight.

4.2.4 Data desiderata

The system will use at least three data sources including authoritative source, crowdsourced source (OSM), and measured or user-provided source (e.g., flight path). The map provided by the system will include points, lines, polygons and a raster dataset.

4.2.5 Data access

The system should support the use of basic SQL queries for demonstration, and support visual spatial query results connected to QGIS.

4.3 Anticipated uses and user types

User types:

- Flight operators (including untrained and trained university students, commercial personnel)
- Staff (including equipment and server administration/maintenance staff)

Anticipated uses:

- Explore specific locations and give directions (for commercial use).
- Track, view, collect and store space and operator data on campus.

5. Conceptual Database Design

5.1 Conceptual ER diagram

A showcase of the ER diagram is presented in Appendix 7.1 Conceptual ER diagram.

5.2 Logical model of Relations

A showcase of the Logical model is presented in Appendix 7.2 Logical model of Relations.

5.3 Data Model Documentation

A showcase of the Data Dictionary is presented in Appendix 7.3.1 Data Dictionary, Appendix 7.3.2 Legend, symbols and Abbreviations in logical model and Appendix 7.3.3 Documentation.

6. Outline envisaged Data Sources

- Base Map: VicMap Lite

A map from an authoritative source provided by the Australian Department of Energy, Environment, and Climate Action. The data series describing the main features of the Victorian state will mainly be used as the base map in this project, as well as simplified attributes such as place names, regional names, airports, state boundaries, etc.
The geographic reference system for this map is Vic grid on GDA2020 (EPSG:7899), which is a GDA2020-based system that is more accurate in reality compared to GDA-

99, considering changes in the shape and size of the Earth's surface. Meanwhile, the Vic grid system is the most suitable for Victoria state.

Vicmap Lite - Dataset - Victorian Government Data Directory
https://discover.data.vic.gov.au/dataset/vicmap-lite1

- Critical infrastructures: OpenStreetMap(OSM)

OpenStreetMap, which is a community driven crowdsourced map database, provides spatial data for Australia. In this system, we only choose a small subset of the data provided by OSM, including hotels, emergency services, beaches, parks, etc.
The spatial data provided by OSM is based on the WGS84 geographic reference system (EPSG:4326). Therefore, when importing data, the coordinates need to be converted and re-projected onto the GDA2020 reference system.
Geofabrik Download Server http://download.geofabrik.de/australia-oceania/australia.html

- Raster DEM, street network: the subject team provided source

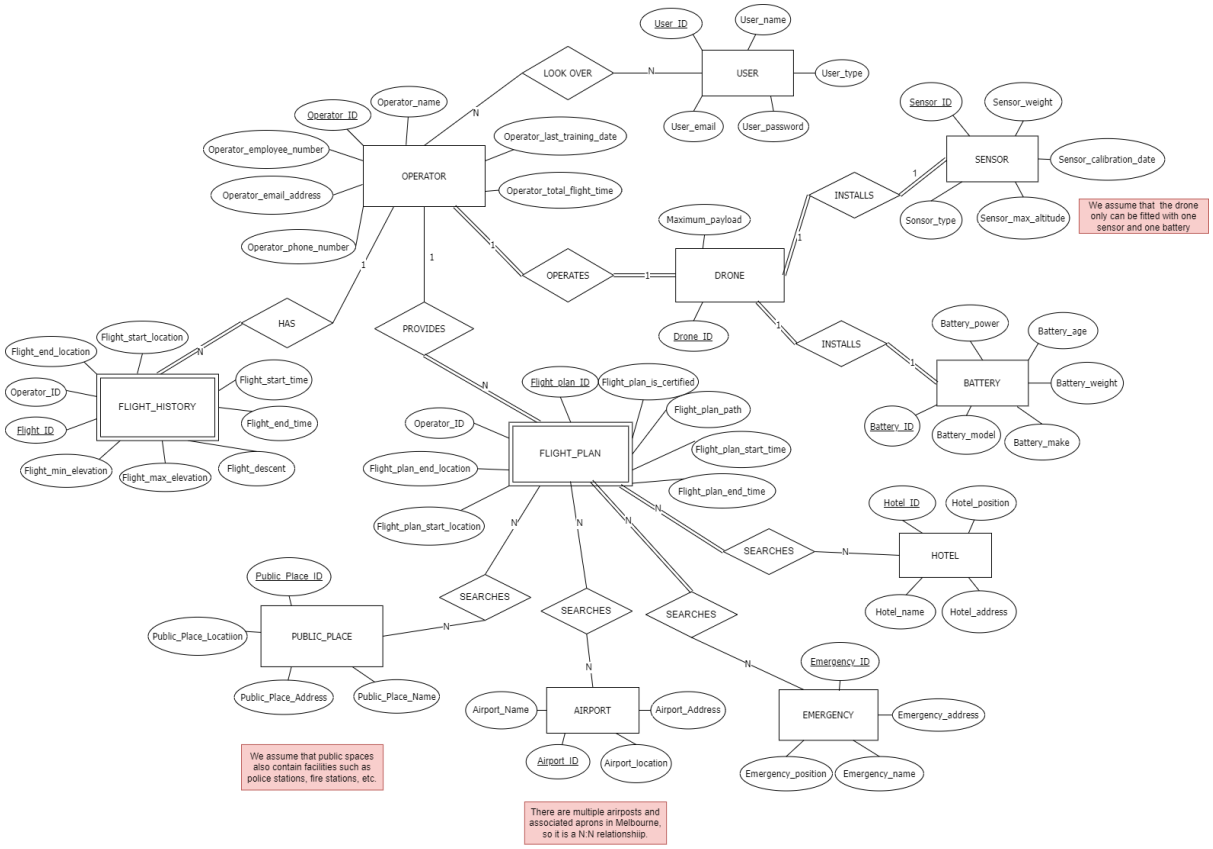
The subject team will also make a set of commonly used data available to all (Raster DEM, street network). Raster Digital Elevation Model (DEM) is a raster dataset used to describe the height of the ground, which represents the height information of the ground by the elevation value of each pixel. With DEM, the 3-D aspects of drone management can be achieved, such as height issues in planning.
Since the road network is also provided, only the base map and basic infrastructures are needed to meet the basic management needs.

- Flight Path: user provided source

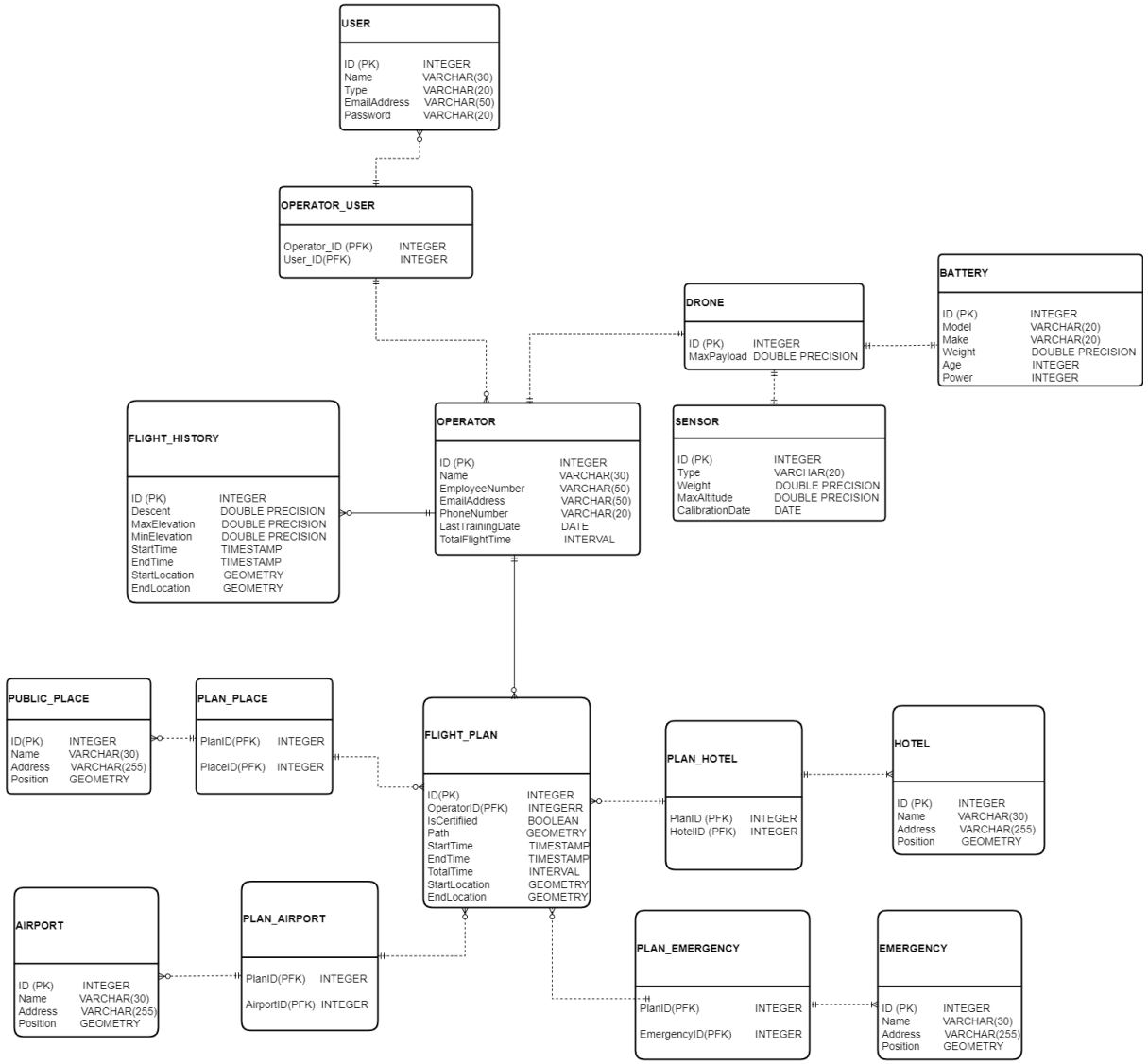
The flight plan provided by the user contains the minimum unit data required for flight, which is inputted in the WGS84 (longitude, latitude, in decimal degrees) and needs to be dynamically reprojected and calculated in real-time.

7. Appendix

7.1 Conceptual ER diagram



7.2 Logical model of Relations



7.3 Data Dictionary and Data Model Documentation

7.3.1 Data Dictionary

USER (ID INTEGER PK, Name VARCHAR(30), Type VARCHAR(20), EmailAddress VARCHAR(30), Password VARCHAR(20))

Attribute	Data Type	Description
ID	INTEGER	User ID(primary key)

Name	VARCHAR(30)	Uesr’s name
Type	VARCHAR(20)	User type(e.g., admin)
EmailAddress	VARCHAR(50)	User’s email address
Password	VARCHAR(30)	User’s password

OPERATOR_USER (Operator_ID INTEGER PFK, User_ID INTEGER PFK)

Attribute	Data Type	Description
Operator_ID	INTEGER	Operator ID(primary key and foreign key)
User_ID	INTEGER	User ID(primary key and foreign key)

OPERATOR(ID INTEGER PK, Name VARCHAR(30), EmployeeNumber VARCHAR(50), EmailAddress VARCHAR(50), PhoneNumber VARCHAR(20), LastTrainingDate DATE, TotalFlightTime INTERVAL)

Attribute	Data Type	Description
ID	INTEGER	Operator ID(Primary key)
NAME	VARCHAR(30)	Operator’s name
EmployeeNumber	VARCHAR(50)	Operator’s employee number
EmailAddress	VARCHAR(50)	Operator’s email address
PhoneNumber	VARCHAR(20)	Operator’s phone number

LastTrainingDate	DATE	Date the operator last received a training course(format: YYYY-MM-DD, e.g., 2023-04-04)
TotalFlightTime	INTERVAL	Total accumulated flight time of the operator(unit: hour)

DRONE (ID INTEGER PK, MaxPayload INTEGER)

Attribute	Data Type	Description
ID	INTEGER	Drone ID(primary key)
MaxPayload	DOUBLE PRECISION	Drone’s maximum payload(unit: kilogram, e.g., 20.08 kg)

BATTERY (ID INTEGER PK, Model VARCHAR(20), Make VARCHAR(20), Weight INTEGER, Age INTEGER, Power INTEGER)

Attribute	Data Type	Description
ID	INTEGER	Battery ID(primary key)
Model	VARCHAR(20)	Battery’s model(e.g., AX505)
Make	VARCHAR(20)	Battery’s make(e.g., Kogan)
Weight	DOUBLE PRECISION	Battery’s weight(unit: kilogram, e.g., 15.80 kg)

Age	INTEGER	Battery’s age (unit: year, e.g., 5 years)
Power	INTEGER	Battery’s Power level (percentage, e.g., 65%)

SENSOR(ID INTEGER PK, Type VARCHAR(20), Weight DOUBLE PRECISION, MaxAltitude DOUBLE PRECISION, CalibrationDate DATE)

Attribute	Data Type	Description
ID	INTEGER	Sensor ID(primary key)
Type	INTEGER	Sensor Type(e.g., GPS , Vision, Gyro)
Weight	DOUBLE PRECISION	Sensor’s Weight(unit: kilogram, e.g., 0.02 kg)
MaxAltitude	DOUBLE PRECISION	Sensor’s max working altitude(unit: meter, e.g., 25.00 meters)
CalibrationDate	DATE	Sensor’s last calibration time(format: YYYY-MM-DD, e.g., 2023-04-04)

FLIGHT_HISTORY (ID INTEGER PK, Descent DOUBLE PRECISION, MaxElevation DOUBLE PRECISION, MinElevation DOUBLE PRECISION, StartTime TIMESTAMP, EndTime TIMESTAMP, StartLocation GEOMETRY, EndLocation GEOMETRY)

Attribute	Data Type	Description
ID	INTEGER	Flight history

		ID(primary key)
Descent	DOUBLE PRECISION	Flight’s descent(unit: meter, e.g., 342.12 meters)
MinElevation	DOUBLE PRECISION	Flight’s min elevation(unit: meter, e.g., 2020.34 meters)
MaxElevation	DOUBLE PRECISION	Flight’s max elevation(unit: meter, e.g., 2020.34 meters)
StartTime	TIMESTAMP	Flight’s start time(format: YYYY-MM-DD HH:HI:SS, e.g., 2023-04-04 15:03:02)
EndTime	TIMESTAMP	Flight’s end time(format: YYYY-MM-DD HH:HI:SS, e.g., 2023-04-04 15:50:10)
StartLocation	GEMOTRY	Flight’s start location (Geometry: Point)
EndLocation	GEMOTRY	Flight’s end location (Geometry: Point)

AIRPORT (ID INTEGER PK, Name VARCHAR(30), Address VARCHAR(255), Position GEOMETRY)

Attribute	Data Type	Description
ID	INTEGER	Airport ID(primary key)
Name	VARCHAR(30)	Airport’s name

Address	VARCHAR(255)	Airport Address(e.g., 23-24 Queen street VIC 3000)
Position	GEMOTRY	Airport Position (Geometry: Point)

PLAN_AIRPORT (PlanID INTEGER PFK, AirportID INTEGER PFK)

Attribute	Data Type	Description
PlanID	INTEGER	Plan ID(primary key and foreign key)
AirportID	INTEGER	Airport ID(primary key and foreign key)

PUBLIC_PLACE(ID INTEGER PK, Name VARCHAR(30), Address VARCHAR(50), Position GEOMETRY)

Attribute	Data Type	Description
ID	INTEGER	Public place ID(primary key)
Name	VARCHAR(30)	Public place name
Address	VARCHAR(255)	Public place Address(e.g., 23-24 Queen street VIC 3000)
Position	GEOMETRY	Public place position (Geometry: Point)

PLAN_PLACE (PlanID INTEGER PFK, AirportID INTEGER PFK)

Attribute	Data Type	Description
PlanID	INTEGER	Plan ID(primary key and foreign key)
PlaceID	INTEGER	Place ID(primary key and foreign key)

HOTEL(ID INTEGER PK, Name VARCHAR(30), Address VARCHAR(255), Position GEOMETRY)

Attribute	Data Type	Description
ID	INTEGER	Hotel ID(primary key)
Name	VARCHAR(30)	Hotel ‘s name
Address	VARCHAR(255)	Hotel Address(e.g., 23-24 Queen street VIC 3000)
Position	GEMOTRY	Hotel Position(Geometry: Point)

PLAN_HOTEL (PlanID INTEGER PFK, AirportID INTEGER PFK)

Attribute	Data Type	Description
PlanID	INTEGER	Plan ID(primary key and foreign key)
HotelID	INTEGER	Hotel ID(primary key and foreign key)

EMERGENCY(ID INTEGER PK, Name VARCHAR(30), Address VARCHAR(255), Position GEOMETRY)

Attribute	Data Type	Description
ID	INTEGER	EmergencyID(primary key)
Name	VARCHAR(30)	Emergency name
Address	VARCHAR(255)	Emergency Address(e.g., 23-24 Queen street VIC 3000)
Position	GEMOTRY	Emergency Position(Geometry: Point)

PLAN_EMERGENCY (PlanID INTEGER PFK, AirportID INTEGER PFK)

Attribute	Data Type	Description
PlanID	INTEGER	Plan ID(primary key and foreign key)
EmergencyID	INTEGER	EmergencyID(primary key and foreign key)

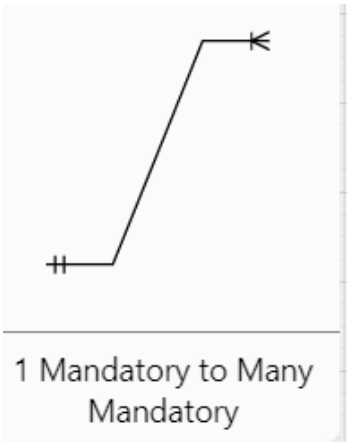
FLIGHT_PLAN(ID INTEGER PK, OperatorID INTEGER PFK, IsCertified BOOLEAN, Path GEOMETRY, StartTime TIMESTAMP, EndTime TIMESTAMP, TotalTime INTERVAL, StartLocation GEOMETRY, EndLocation GEOMETRY)

Attribute	Data Type	Description
ID	INTEGER	Flight Plan ID(primary

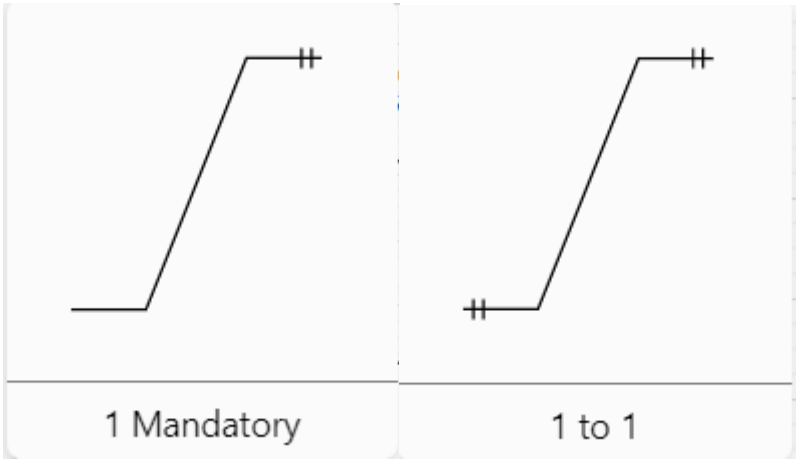
		key)
OperatorID	INTEGER	Flight Plan Operator's ID(primary key and foreign key)
IsCertified	BOOLEAN	The operator has full qualification or not (TRUE: yes, False: no)
Path	GEMOTRY	Flight plan path(Geometry: Linestring)
StartTime	TIMESTAMP	Flight plan start time(format: YYYY-MM-DD HH:HI:SS, e.g., 2023-04-04 15:03:02)
EndTime	TIMESTAMP	Flight plan end time (format: YYYY-MM-DD HH: HI:SS, e.g., 2023-04-04 15:15:01)
StartLocation	GEMOTRY	Flight plan start location (Geometry: Point)
EndLocation	GEMOTRY	Flight plan end location (Geometry: Point)

7.3.2 Legend, symbols and abbreviations in logical model

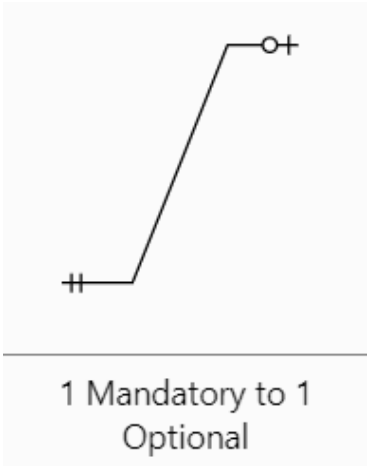
ONE MANDATORY TO MANY(N): An object may be associated with one or more objects.



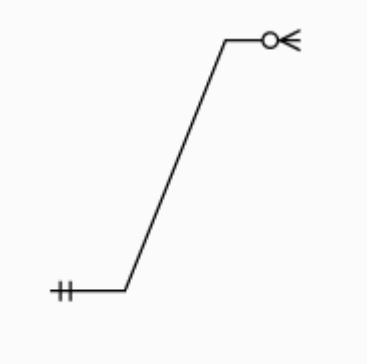
ONE TO ONE: An object may be associated with one objects.



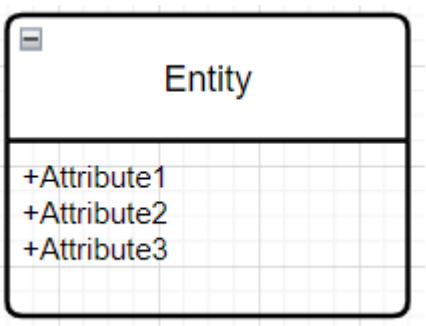
OPTIONAL TO ONE: 0 or one object may be associated with one objects.



ONE TO MANY OPTIONAL: An object may be associated with 0 or more objects.



TABLE(ENTITY): Store the contents of each section (attributes) and their key, including the primary key, foreign key.



STRONG RELATIONSHIP: Between two weak entities (or strong and weak entities) we will use it to connect and better recognise the weak entities. Each child table object is dependent on the parent table object for its existence

WEAK RELATIONSHIP: Between two strong entities, we will use it to connect and better recognise the strong entities. The objects in each table in the relationship exist independently of the other objects.

Primary Key - PK: Each entity has one and only one key that can be used as an identifier for the entity.

Foreign Key - FK: It is used to build a relationship between two entities.

Primary Foreign Key - PFK: It is used to build a relationship between two entities, and it is a part of primary key.

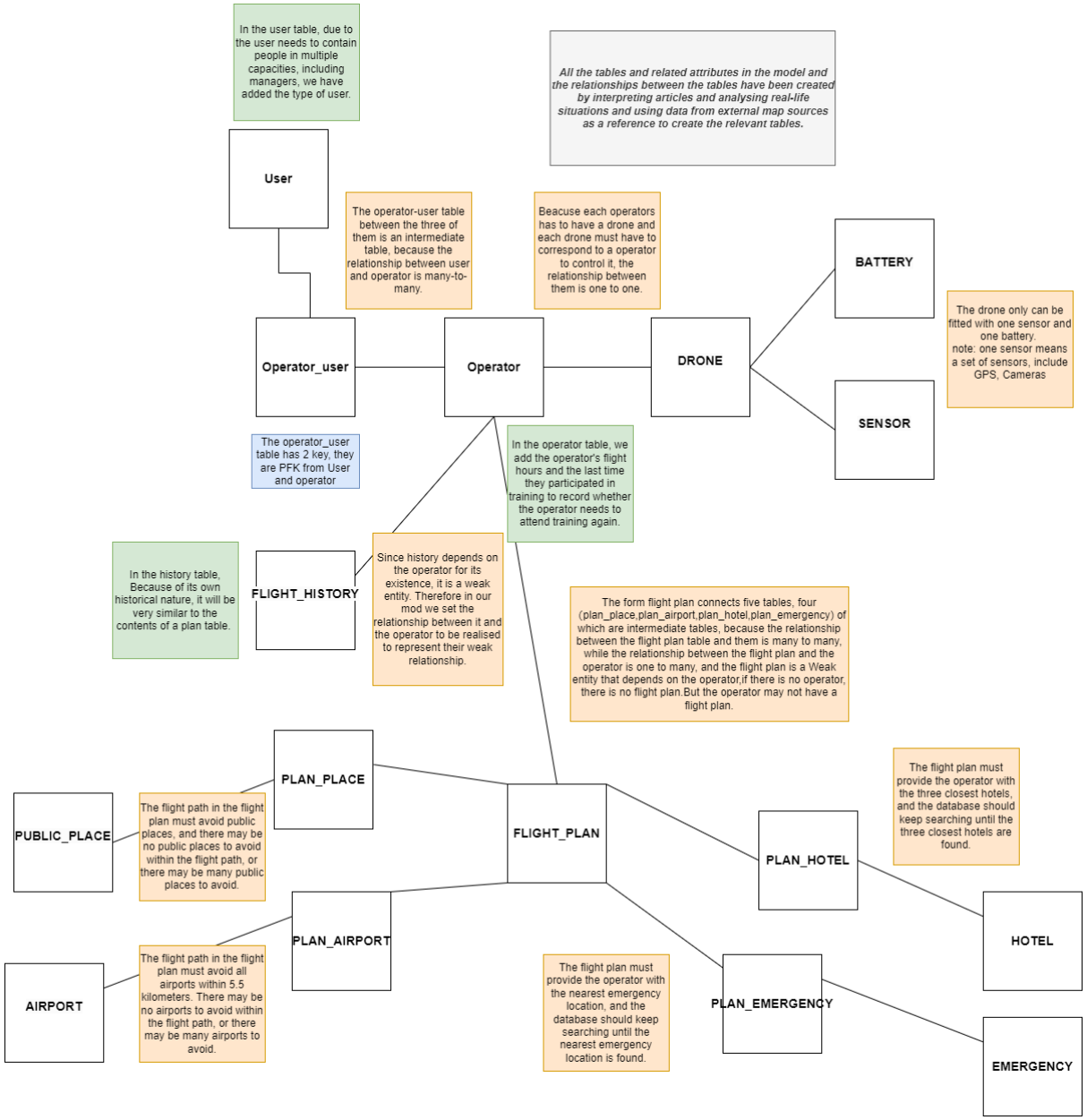
7.3.3 Documentation

After reading and discussing the requirements document and the relevant rules, together with real-life situations and map information from external sources, we have come up with a basic design for our database model. We plan to design 11 entities in the *conceptual model*, which include the following entities:

OPERATOR (strong entity)
USER (strong entity)
DRONE (strong entity)
SENSOR (strong entity)
BATTERY (strong entity)
FLIGHT_HISTORY (weak entity)
FLIGHT_PLAN (weak entity)
PUBLIC_PLACE (strong entity)
HOTEL (strong entity)
AIRPORT (strong entity)
EMERGENCY (strong entity)

The difference between these strong entities and the remaining two weak entities is that they are all entities that will exist when the database is created and are not dependent on being identified by other entities, and that they all

have their own unique identifier. The history entity and plan entity, on the other hand, need the primary key in the operator entity as their identifier and if they lose this identifier they cannot continue to exist as they cannot be identified. We have therefore designed them as weak entities.
With regard to the operator and user entities, the reason for this is to separate the work of the two, and because the user also contains the system's administrative staff, which would be unwieldy if they were all placed in the operator.
Regarding the relationship between battery, sensor and drone, in our view each drone corresponds to a sensor device (set) and a battery.
Regarding the four entities hotel, airport, emergency and public place, we think they need to be searched by the system for surrounding facilities only when the user proposes a flight plan, so they are connected to the plan entity and need to be searched for multiple surrounding facilities and one facility may appear in different plans, so we think they are in a many-to-many relationship.
The reason we have chosen to use these entities as the basis for our entities is that we have interpreted the content and rules of the requirements and believe that their presence is necessary to enable the database to perform its most basic operations and to ensure that all relevant data can be read and recorded by the system and the database in order to ensure its proper functioning and compliance with the user's requirements.



(This diagram is about logical model)

7.4 Individual reflection

7.4.1 Jiaming Xian

Regarding my contribution to the group project proposal, I was responsible for writing the project rationale and participating in discussions on project scope. I participated in both physical modeling and logical modeling, including system component design, the E-R diagram and logical diagram design. Also, I elaborated the data dictionary and collected the required external data resources.

I gained a lot from this group collaboration. Firstly, I think our group collaboration has been very effective. My role is more like that of a knowledge provider, coordinator, and reviewer. Secondly, I realize that each team member's ideas may vary, so it is crucial to ensure that everyone's ideas are clearly presented and thoroughly discussed. Efficient communication, and timely organization are key factors that determine the success of a collaboration. Otherwise, it will become a mess where it will be hard to reach a final agreement.

One of my strengths is that I am good at communicating in collaboration. Specifically, I can accurately convey my ideas to my team members, and patiently respond to others' questions and suggestions. Another advantage of mine is that I will ensure that my knowledge base is updated promptly, as I realize that without complete basic knowledge, group collaboration will waste a lot of time on collective learning. Finally, my meticulous personality allows me to carefully and conscientiously complete assigned tasks, minimizing omissions.

My weakness, at the beginning of the project collaboration, was a lack of practical experience in database management projects and a lack of familiarity with spatial data. This disadvantage is reflected in the knowledge reserve, but after timely reviewing and learning, my knowledge base has been well updated. The second disadvantage is that I have a relatively mild personality, and sometimes feel a bit difficult proposing my new ideas and questioning others' ideas. But through this collaboration, I understand that it is reasonable and necessary for everyone to put forward their ideas and opinions. Only by exchanging ideas can we better produce cooperation results.

Finally, I have some thoughts on my future self-development. Firstly, the ability to collaborate with others is very important for individuals, as they will also encounter a lot of collaborative projects in my career, which means that most projects are completed by teams rather than individuals. Secondly, knowledge and ability become the cornerstone of collaboration. If team members lack knowledge and abilities, it is difficult for everyone to contribute to the collaboration, let alone effective collaboration. Last but not least, it is for my personality that I should be more open to put forward more of my insights and doubts with rational explanations in future collaborations.

7.4.2 Sijia Pei

This team collaboration was quite comfortable. Everyone actively expressed their opinions on the project. Under the collision of everyone's thoughts, we successfully completed the task of this stage.For me personally, there are some contributions to the project and some shortcomings that I have made.Firstly, for the team, I participated in most of the tasks and my main contributions were: 1) Organize the document structure. Discuss project requirements with team members and organize all requirements as well as the desired functions that can be met in the project. 2) Extract keywords from project details and determine each entity and its attributes in the concept diagram. 3) Organize the relationships between each entity and present them in the diagram. 4) Confirm the data type of attributes based on the concept diagram logic diagram. 5) Write a Data Model Documentation based on a logical diagram (explain the relationship between each table and why it is like this?)

During this process, I also discovered some obvious areas where I am not good at:

1) The assumptions about drones, sensors, and batteries were too complex when drawing the concept diagram. Make everyone feel dizzy. 2)It is difficult to clearly distinguish the relationships between entities in the concept diagram, and often the one to many relationships are reversed. 3) In the logic diagram, I almost forgot about the need to create an intermediate table for many to many relationships. 4)It is still unclear what to write about Data Model Documentation. Although the above aspects were not done well, it also to some extent prompted team members to brainstorm, allowing everyone to provide some help to other team members in their professional field.

For future project development, data collection may face some challenges, and we cannot find detailed data sources. The specific method for implementing this database system is currently unclear. Currently, I need to increase the amount of data in the database and search for information to find ways to implement the system database. In terms of team collaboration, the current collaboration mainly manifests in everyone completing all the work together in the meeting. Although real-time communication can be achieved during meetings, it is difficult for everyone to find common leisure time. Therefore, in future collaborations, there may be more opportunities for everyone to independently complete each person's tasks.This project not only improved my project management and team collaboration skills, but also consolidated my understanding of databases. Among them, databases are very helpful for machine learning and artificial intelligence, and training artificial intelligence requires the help of databases.I believe that the subsequent development of this project and my future development in the industry will benefit from it, and I look forward to working with my team to complete the subsequent tasks.

7.4.3 XINGTING Zong

In terms of my contribution, I have been able to clearly understand how to provide users with a conceptual model and a logical model database with differentiated information. I have been able to explain through the requirements content how the conceptual model focuses on the overall structure of the database that the user needs, including its entities, relationships and attributes, while the logical model contains more specific and detailed information (including but not limited to terminology such as symbols, diagrams and columns). We focus on the implementation of a realistic design of the database, ensuring that it meets the needs and conforms to some of its real-life details and characteristics.

Through the assignment making process, I learnt a lot about team dynamics and collaboration and enhanced my team experience. In our team, we work individually and collaboratively to achieve our weekly goals and solve our challenges.

One of my strengths in this area is my ability to communicate complex technical concepts in a clear and understandable manner and to organize team meetings. However, one of my weaknesses may be a lack of my own personal and team experience working on database projects, and although I have studied the content before, it does not provide enough experience to meet my needs in this assignment. However, our team was able to complement each other's weaknesses and we worked as a team to avoid our weaknesses being magnified, which kept our database project progressing smoothly. In order to avoid my weaknesses affecting the team's effectiveness in the future, I will learn more from the experience of this project and take stock of it to keep myself in as good a position as possible for future projects.

I was involved in all aspects of the project, including writing the documentation, analyzing the user requirements, and creating and designing the two mods. Going forward, I will continue to learn about database design and development, as well as learning more about team dynamics and collaboration. In doing so, I believe I can continue to make a meaningful contribution to the community of users who rely on me for information and guidance, and to the team members who will support me in the future.

7.4.4 YANXI Ke

In this group assignment, I was involved in the project requirement analysis, creating E-R diagrams, logical design, and database instance diagrams. I also participated in all project discussions, attempting to solve various problems through different approaches. I gained a lot from this team collaboration. Firstly, it was a smooth activity, with other group members being very enthusiastic and professional. While trying to collaborate with them, I was able to understand my strengths and weaknesses compared to them. They were very eager to guide me and engage in any necessary discussions with others.

I might have been a bit careless in studying the project details, but they were very eager to guide me and provide help. This made me realize that I need to do more and be more meticulous. As a result, I became increasingly careful and diligent in the later stages of the project.

One of my strengths is that I am good at listening and summarizing, which allows me to smooth out any gaps within the group and act as a glue that holds everyone together. I am always the first to try and resolve or alleviate any conflicts that arise within the group. I am happy to help others, as helping them also helps me. On the other hand, I am very open to receiving feedback and assistance from others, and I use this input to make positive changes in myself.

At the beginning of the project, due to a lack of practical knowledge related to database projects, I frequently asked my team members questions on the subject. With the help of my teammates and self-learning, I was able to supplement my knowledge and contribute as much as possible to the group's success.

In summary, throughout the group project, I have demonstrated strengths in listening, summarizing, and acting as a unifying force within the team. I have been proactive in resolving conflicts and have shown a willingness to help others, as well as being open to receiving feedback and assistance for self-improvement. My experience in this project has allowed me to identify areas where I need to improve, such as being more meticulous and diligent.

In the pursuit of personal and professional growth, it is essential to focus on enhancing communication and collaboration skills, deepening expertise in your field, embracing a growth mindset, and developing project management abilities. By refining these key areas, you will be well-prepared to overcome challenges and excel in future endeavors, leading to success in both group projects and individual work.