1. **Tools used to build the application**

- Language: Python

- DBMS: MySQL

- Libraries: (1) mysql-connector-python (to create, populate and query the database using Python), (2) Flask (to connect Python code to HTML webpages), (3) flask-mysqldb (to connect the MySQL database to HTML webpages)

2. **Instructions to set up the database**

- Create the database: Open MySQL Command Line Client and log in by entering your username and password. Run the command 'create database AMS_v3;' to create the database called ' AMS_v3'. (You could change the name to your preference, but make sure you change it in the files 'create_tables_and_populate_database.py' and 'app.py' as well)

- Create the tables/relations and populate them with data: To do this, first change lines 3-7 in the file 'create_tables_and_populate_database.py' to reflect your MySQL username, password and database name. Then run the file 'create_tables_and_populate_database.py' by entering the command 'python create_tables_and_populate_database.py' in the command prompt/terminal. This should create the tables, set up foreign key references and populate the tables with data. The data used was fake/generated, but real data about flights and airports was taken wherever possible.

3. **Instructions to run the demo**

- Run the application: Again, you'll need to change certain lines to reflect your MySQL username, password and database name, this time in lines 14-17 of the file 'app.py'. Then, run the command 'python app.py' in the command prompt/terminal. You'll see a message like this: "Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)". Click on the URL; this will launch the web application on a web browser (such as Google Chrome). The functionalities of this application can be run by following these instructions: (NOTE: When giving user input, no quotations are needed)

i. Log In: This functionality is for the managers of the airports. There are 3 airports in the AIRPORT table, each having a manager. Enter an airport name and the corresponding manager's ssn into the respective boxes and click on the 'Manager Login' button to login. (E.g. enter 'Hartsfield-Jackson Atlanta International Airport' and '987-65-4321' into the fields corresponding to Airport and SSN, and then click on the button). This should log you into the application as the manager of an airport.

ii. Contact Other Managers: Enter the name of an airport and click on the button "Get Manager's Info' to get the contact information (name and phone number) of the manager of that airport. (E.g. enter 'O'Hare International Airport' to get the information about the manager of this airport). You could also enter 'All Airports' and it will return the contact information about the managers of each airport.

iii. Average Experience of Cabin Crew on flights on a particular route: Enter the departure and arrival airports (to specify a route) and click on the button 'Get Average Crew Experience On A Route'. This will return the average experience of the flight crew on all flights flying this route, and the results are grouped by the crew's job (e.g. Captain, First Officer, Flight Attendant). (E.g. enter 'Hartsfield-Jackson Atlanta International Airport' and 'O'Hare International Airport' to get the average cabin crew experience on flights from Atlanta to Chicago).

iv. What flights was an aircraft used on: Enter the aircraft serial number and click on the button 'Get Flights where this Aircraft was used'. This will return all the flights in the database on which the specified aircraft was used. (E.g. enter 5 to see all the flights an aircraft with serial number 5 was used).

v. What flights was an aircraft model used on: Enter the aircraft model and click on the button 'Get Flights where this Aircraft Model was used'. This will return all the flights in the database on which the specified aircraft model was used. (E.g. enter A320 to see all the flights on which an Airbus A320 was used).

vi. For flights arriving at an airport, what aircraft were used and what hangars were the planes kept in: Enter the arrival airport and click on the button 'Get Aircraft used for Flights Arriving At this Airport and Hangars they were kept in'. This will return the aircraft used (serial number, model and airline) and the hangars they were kept in. (E.g. enter 'O'Hare International Airport' as the arrival airport to see the aircraft that were used and the hangars they were kept in)

vii. Aircraft that haven't been maintained since a particular date: Select a date and click on the button 'List Aircraft that haven't undergone maintenance since'. This will return the aircraft that haven't been maintained since a particular date, and their last date of maintenance. (E.g. select Nov 4th as the date to see the aircraft that haven't been maintained since this date)

viii.
Given a flight is having issues, get the phone number of an engineer who specializes in that model, and the hangar ID to inform the pilot to taxi to the location of the hangar: Enter the flight ID and click on the button 'Get Engineer's Phone Number and Hangar Location'. This will return the contact information of the engineer as well as the location of the hangar. (E.g. select Flight ID to be 'AA1301', and you'll get the contact information of the 2 engineers at the destination airport who specialize in this model, along with the location of the hangars that the work at).

ix. Click on the 'Go to Retrieval Page' button to go to the next web page full of functionalities that don't require user input.

x. Click on the 'Log Out' button to return back to the Log In page.

xi. Average Salary of Employees, Group by Airport, JobType: Click on the 'Get Average Employee Salary' button to get the average salary of all employees, grouped by the airport they work at, and their job (Customer Service, Ground Level, Engineers)

xii. Average Experience of Flight Crew on each Flight: Click on the 'Get Average Crew Experience' button to get the average experience of all the crew members on each flight.

xiii.
Last Flight and Date of Maintenance of each flight: Click on the 'Get Last Flight and Maintenance' button to get the last flight each aircraft was flown on, and information about the last time it underwent maintenance.

xiv. Most commonly used Aircraft Models: Click on the 'Get Most Common Aircraft Models' button to get the number of flights each aircraft model is used on in the entire database.

xv. Number of flights in a day, group by airline: Click on the 'Get count of flights per day by airline' button to get the number of flights per day on each airline (GROUP BY date, airline).

xvi.

Number of flights in a day, group by aircraft model: Click on the 'Get count of flights per day by aircraft model' button to get the number of flights per day on each aircraft model (GROUP BY date, aircraft model).

xvii.

Click on the 'Go Back' button to go to the Manager's Functionalities page.