Architecture document design

Flight Fare Prediction

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1.Introduction

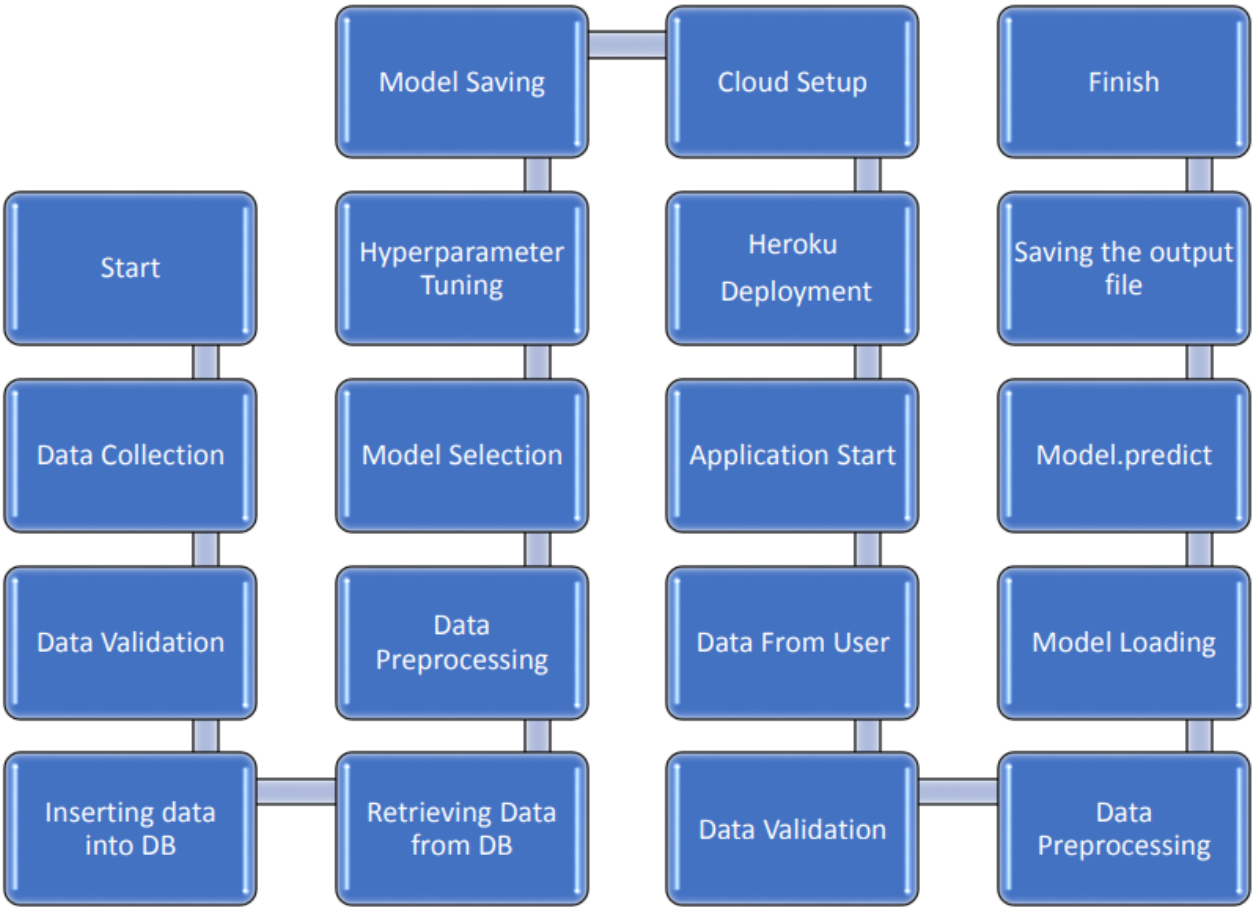
1.1 What is Low-Level design document?

The goal of LLD or a low-level design document (LLDD) is to give the internal logical design of the actual program code for flight fare estimation System. LLD describes the class diagrams with the methods and relations between classes and program specs. It describes the modules so that the programmer can directly code the program from the document.

1.2. Scope

Low-level design (LLD) is a component-level design process that follows a step-by-step refinement process. This process can be used for designing data structures, required software architecture, source code and ultimately, performance algorithms. Overall, the data organization may be defined during requirement analysis and then refined during data design work

2. Architecture



3. Dataset

3.1 Dataset Overview

The training dataset consists of 12 columns and every column datatype is string except the last one that is “Price” which is a integer datatype.

Id	Airline	Date_of_Journey	Source	Destinatio	Route	Dep_Time	Arrival_Time	Duration	Total_Stops	Additional_Info	Price
4317	Multiple carriers	18-05-2019	Delhi	Cochin	DEL Ãcâ€ â€™ BOM Ãcâ€ â€™ COK	08:30	19:15	10h 45m	1 stop	No info	7887
3372	Air Asia	21-05-2019	Kolkata	Banglore	CCU Ãcâ€ â€™ BBI Ãcâ€ â€™ BLR	19:55	23:30	3h 35m	1 stop	No info	5162
1584	Jet Airways	06-06-2019	Delhi	Cochin	DEL Ãcâ€ â€™ BOM Ãcâ€ â€™ COK	19:15	07-06-2021 19:00	23h 45m	1 stop	No info	14714
7034	IndiGo	21-05-2019	Delhi	Cochin	DEL Ãcâ€ â€™ PNQ Ãcâ€ â€™ COK	23:30	22-05-2021 04:35	5h 5m	1 stop	No info	8745
9892	Air India	03-06-2019	Delhi	Cochin	DEL Ãcâ€ â€™ GOI Ãcâ€ â€™ BOM Ãcâ€ â	10:55	19:15	8h 20m	2 stops	No info	12173
9640	Multiple carriers	09-06-2019	Delhi	Cochin	DEL Ãcâ€ â€™ BOM Ãcâ€ â€™ COK	16:00	10-06-2021 01:30	9h 30m	1 stop	No info	13587
9067	IndiGo	01-06-2019	Delhi	Cochin	DEL Ãcâ€ â€™ MAA Ãcâ€ â€™ COK	02:00	07:25	5h 25m	1 stop	No info	5636
4830	IndiGo	24-03-2019	Kolkata	Banglore	CCU Ãcâ€ â€™ HYD Ãcâ€ â€™ BLR	15:10	19:50	4h 40m	1 stop	No info	7476
2731	Multiple carriers	09-05-2019	Delhi	Cochin	DEL Ãcâ€ â€™ BOM Ãcâ€ â€™ COK	10:20	19:00	8h 40m	1 stop	No info	9794
10113	Jet Airways	01-03-2019	Banglore	New Delhi	BLR Ãcâ€ â€™ BOM Ãcâ€ â€™ DEL	07:00	13:15	6h 15m	1 stop	No info	26890
5056	Air India	18-05-2019	Delhi	Cochin	DEL Ãcâ€ â€™ BLR Ãcâ€ â€™ COK	09:45	23:00	13h 15m	1 stop	No info	8907
6428	Vistara	12-06-2019	Chennai	Kolkata	MAA Ãcâ€ â€™ CCU	17:45	20:05	2h 20m	non-stop	No info	11982

Testing Data consists of only 10 columns because there will not be two columns first is Id and second is Price. The data type inside the test day for every column is a string.

Airline	Date_of_Journey	Source	Destinatio	Route	Dep_Time	Arrival_Time	Duration	Total_Stop	Additional_Info
Jet Airway	06-06-2019	Delhi	Cochin	DEL â†’ BOM â†’ COK	17:30	07-06-2021 04:25	10h 55m	1 stop	No info
IndiGo	12-05-2019	Kolkata	Banglore	CCU â†’ MAA â†’ BLR	06:20	10:20	4h	1 stop	No info
Jet Airway	21-05-2019	Delhi	Cochin	DEL â†’ BOM â†’ COK	19:15	22-05-2021 19:00	23h 45m	1 stop	In-flight meal not included
Multiple ca	21-05-2019	Delhi	Cochin	DEL â†’ BOM â†’ COK	08:00	21:00	13h	1 stop	No info
Air Asia	24-06-2019	Banglore	Delhi	BLR â†’ DEL	23:55	25-06-2021 02:45	2h 50m	non-stop	No info
Jet Airway	12-06-2019	Delhi	Cochin	DEL â†’ BOM â†’ COK	18:15	13-06-2021 12:35	18h 20m	1 stop	In-flight meal not included
Air India	12-03-2019	Banglore	New Delhi	BLR â†’ TRV â†’ DEL	07:30	22:35	15h 5m	1 stop	No info
IndiGo	01-05-2019	Kolkata	Banglore	CCU â†’ HYD â†’ BLR	15:15	20:30	5h 15m	1 stop	No info
IndiGo	15-03-2019	Kolkata	Banglore	CCU â†’ BLR	10:10	12:55	2h 45m	non-stop	No info
Jet Airway	18-05-2019	Kolkata	Banglore	CCU â†’ BOM â†’ BLR	16:30	22:35	6h 5m	1 stop	No info
Jet Airway	21-03-2019	Delhi	Cochin	DEL â†’ MAA â†’ BOM â	13:55	22-03-2021 18:50	28h 55m	2 stops	In-flight meal not included
IndiGo	15-06-2019	Delhi	Cochin	DEL â†’ HYD â†’ COK	06:50	16:10	9h 20m	1 stop	No info
Multiple ca	15-05-2019	Delhi	Cochin	DEL â†’ BOM â†’ COK	09:00	19:15	10h 15m	1 stop	No info
Jet Airway	12-03-2019	Banglore	New Delhi	BLR â†’ BOM â†’ DEL	05:45	10:25	4h 40m	1 stop	No info
Jet Airway	03-06-2019	Delhi	Cochin	DEL â†’ BOM â†’ COK	19:15	04-06-2021 12:35	17h 20m	1 stop	In-flight meal not included
Jet Airway	06-03-2019	Banglore	New Delhi	BLR â†’ BOM â†’ DEL	21:25	07-03-2021 08:15	10h 50m	1 stop	No info
Multiple ca	06-06-2019	Delhi	Cochin	DEL â†’ HYD â†’ COK	13:15	22:30	9h 15m	1 stop	No info
Vistara	24-03-2019	Kolkata	Banglore	CCU â†’ DEL â†’ BLR	09:55	22:10	12h 15m	1 stop	No info
Jet Airway	12-06-2019	Delhi	Cochin	DEL â†’ BOM â†’ COK	19:15	13-06-2021 04:25	9h 10m	1 stop	In-flight meal not included
Jet Airway	12-03-2019	Banglore	New Delhi	BLR â†’ BOM â†’ DEL	22:55	13-03-2021 08:15	9h 20m	1 stop	No info
IndiGo	06-03-2019	Delhi	Cochin	DEL â†’ BOM â†’ COK	10:45	07-03-2021 01:35	14h 50m	1 stop	No info
Jet Airway	09-05-2019	Kolkata	Banglore	CCU â†’ BOM â†’ BLR	20:00	10-05-2021 10:05	14h 5m	1 stop	In-flight meal not included
Jet Airway	18-03-2019	Banglore	New Delhi	BLR â†’ BOM â†’ DEL	21:25	16-03-2021 09:00	11h 35m	1 stop	In-flight meal not included

4. Logging

Logging is very important to keep track of the activities performed by our application. I have used logging module to do so. All the logs either it is train or test, both will be present inside All_logs folder. Logging helps us in debugging process also so it is mandatory to do.

5. Database

The database I am using is Cassandra db. System needs to store every request into the database and we need to store it in such a way that it is easy to retrain the model as well. The system stores each and every data given by the user or received on request to the database.

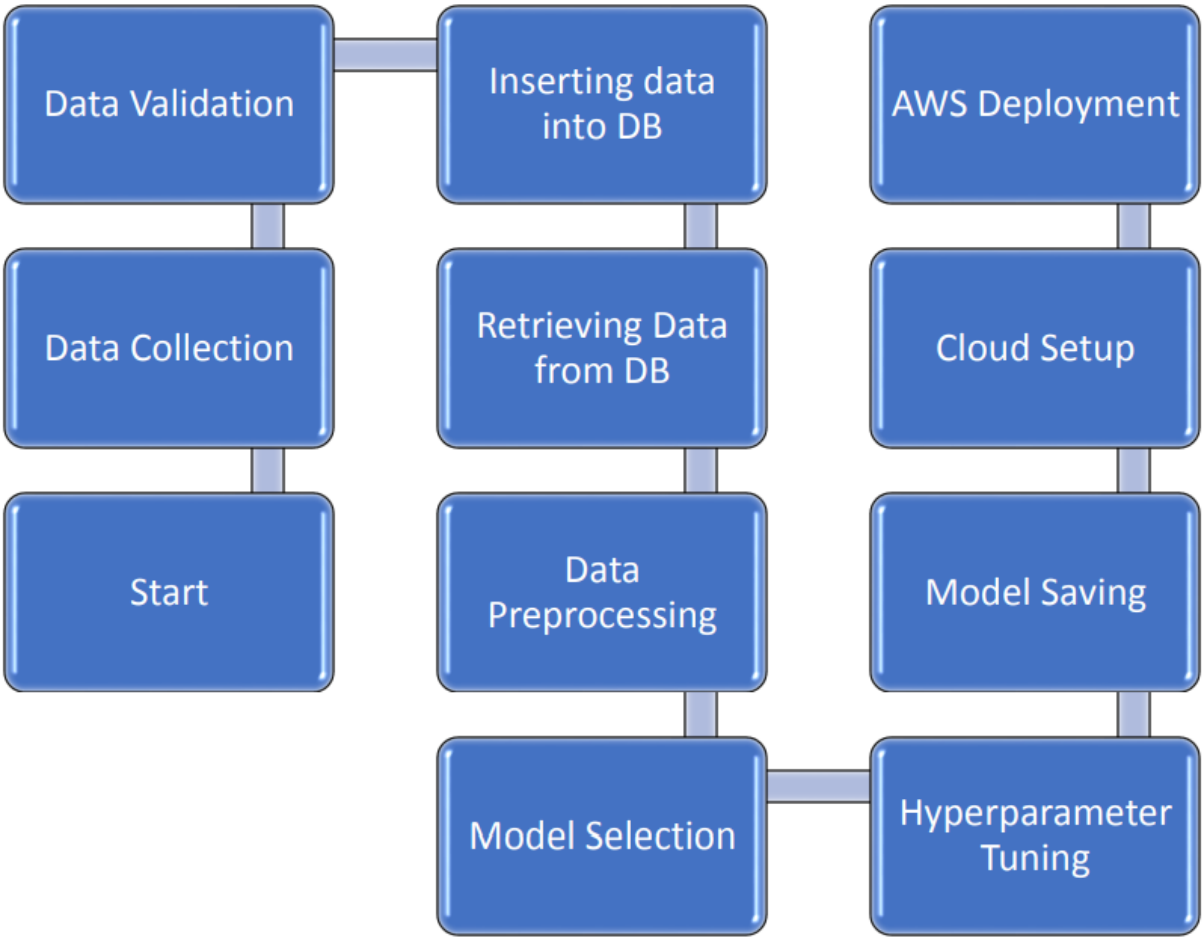
6. Deployment

Deployment is done in Heroku and it's a production server.

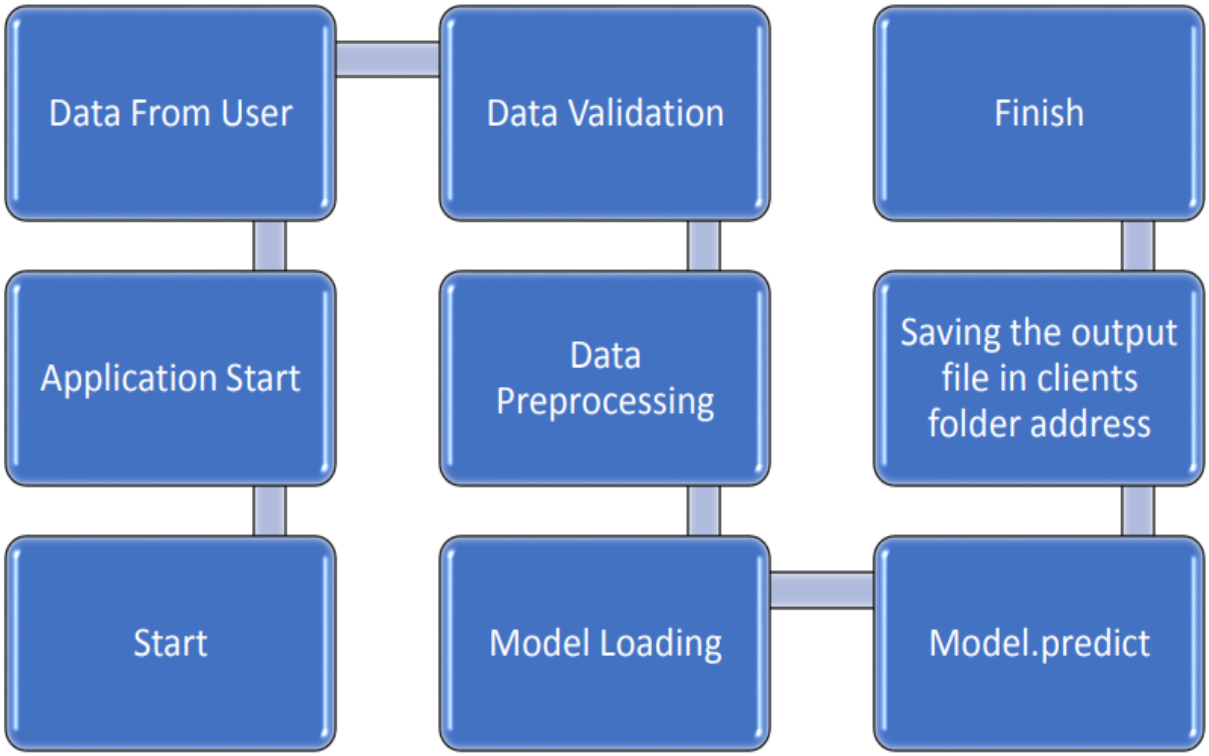
7. Proposed Solution

Solution is very simple here. I am going to build a simple ML model which will be able to predict the flight fare based on the data given. Doing some EDA on the dataset I got to know that xgboost, Random Forest will be the best.

8. Model Training/Validation workflow



9. User I/O workflow



10. Test Cases

Test cases are given below

Test Case Description	Pre-Requisite	Expected Result
Verify whether the Application URL is accessible to the user	1. Application URL should be defined	Application URL should be accessible to the user
Verify whether the Application loads completely for the user when the URL is accessed	1. Application URL is accessible 2. Application is deployed	The Application should load completely for the user when the URL is accessed
Verify Response time of url from backend model.	1. Application is accessible	The latency and accessibility of application is very faster we got in Heroku service.
Verify whether user is giving standard input.	1. Handeled test cases at backends.	User should be able to see successfully valid results.
Verify whether user is able to edit all input fields	1. Application is accessible	User should be able to edit all input fields
Verify whether user gets Custom File Predict, Default File Predict button to submit the inputs	1. Application is accessible	User should get both buttons to submit the inputs
Verify whether user is presented with recommended results on clicking submit	1. Application is accessible	User should be presented with recommended results on clicking submit
Verify whether the recommended results are in accordance to the selections user made	1. Application is accessible	The recommended results should be in accordance to the selections user made