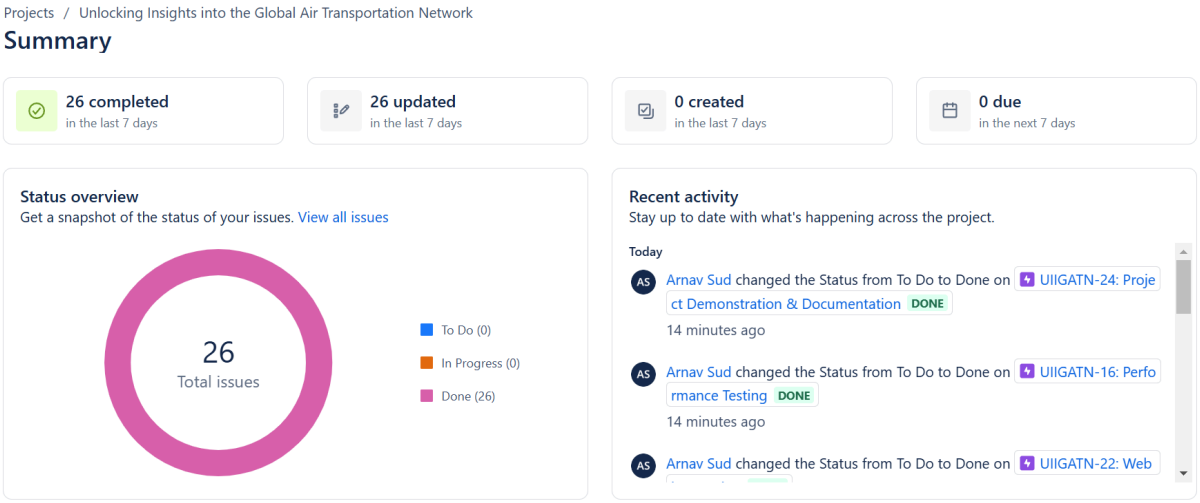
Project Initialization and Planning Phase

Date	31-01-2025
Student ID	SWUID20240124728
Project Name	Unlocking Insights into the Global Air Transportation Network
Maximum Marks	4 Marks

Parent	Summary	Status	Assignee	Sprint	Start date	Inferred st	Due date	Inferred d	Issue color
	Data Collection & Extraction from Database	Complete	Arnav Sud		30-11-2024		05-Dec		purple
UIIGATN-1	Collect the dataset	Done							purple
	Data Preparation	Complete	Arnav Sud		07-12-2024		12-Dec		purple
UIIGATN-3	Prepare the Data for Visualization	Done							purple
	Data Visualization	Complete	Arnav Sud		14-12-2024		25-12-2024		purple
UIIGATN-5	No of Unique Visualizations	Done							purple
UIIGATN-5	World map showing details of all airports within a country	Done							purple
UIIGATN-5	Number of airports within the country	Done							purple
UIIGATN-5	Airports at higher altitude within a country	Done							purple
UIIGATN-5	Airports at higher altitude in the world	Done							purple
UIIGATN-5	Airlines within a country	Done							purple
UIIGATN-5	Number of flights from airport	Done							purple
	Dashboard	Complete	Arnav Sud		28-12-2024		30-12-2024		purple
UIIGATN-13	Responsive and design of dashboard	Done							purple
	Story	Complete	Arnav Sud		04-01-2025		06-01-2025		purple
UIIGATN-15	No of scenes of story	Done							purple
	Performance Testing	Complete	Arnav Sud		11-01-2025		20-01-2025		purple
UIIGATN-16	Amount of data rendered to Database	Done							purple
UIIGATN-16	Utilization of filters	Done							purple
UIIGATN-16	No of calculation fields	Done							purple
UIIGATN-16	No of Visualizations/Graph	Done							purple
	Web integration	Complete	Arnav Sud		25-01-2025		28-01-2025		purple
UIIGATN-22	Dashboard and story embed with UI with flask	Done							purple
	Project Demonstration & Documentation	Complete	Arnav Sud		31-01-2025		31-01-2025		purple
UIIGATN-24	Record Explaination Video for Project End to end solution	Done							purple
UIIGATN-24	Project Documentation - step by step project development procedure	Done							purple

Snapshot from JIRA :



Date	31-01-2025
Student ID	SWUID20240124728
Project Name	Unlocking Insights into the Global Air Transportation Network
Maximum Marks	3 Marks

Unlocking Insights into the Global Air Transportation Network with Tableau" is a project that utilizes Tableau's data visualization capabilities to analyze and understand the complex dynamics of the global air transportation network. By examining data such as flight routes, passenger and cargo volumes, airline performance, and delays, the project aims to provide valuable insights for airline companies, aviation authorities, and policymakers. These insights can help optimize flight schedules, improve operational efficiency, enhance passenger experience, and support strategic planning in the aviation industry.

Project Overview	
Objective	To leverage Tableau’s data visualization capabilities to analyze global air transportation networks and derive actionable insights for optimizing flight operations, enhancing passenger experience, and supporting strategic planning.
Scope	The project encompasses analysis of flight routes, passenger and cargo volumes, airline performance, and delays. It is designed for airline companies, aviation authorities, and policymakers to improve operational efficiency and decision-making.
Problem Statement	
Description	he global air transportation network is a complex system influenced by numerous variables, including flight demand, delays, and airline performance. Without effective analysis, stakeholders struggle to optimize routes and schedules efficiently.

Impact	Improving visibility into airline performance, delays, and passenger/cargo trends can help optimize flight schedules, reduce costs, and enhance overall operational efficiency in the aviation industry.
Proposed Solution	
Approach	Utilize Tableau to create interactive dashboards that visualize critical data points such as flight routes, delays, passenger and cargo volumes, and airline performance. This will enable data-driven decision-making for aviation stakeholders.
Key Features	- Interactive dashboards for real-time analysis - Visual representation of flight routes and congestion areas - Performance tracking of airlines and airport efficiency - Identification of trends in passenger and cargo movement - Delay analysis and predictive insights for operational improvements

Date	31-01-2025
Student ID	SWUID20240124728
Project Name	Unlocking Insights into the Global Air Transportation Network
Maximum Marks	3 Marks

Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	An airline operations manager	Optimize flight schedules and improve efficiency	I lack clear visibility into flight performance and congestion patterns	The data is scattered across multiple sources and not easily visualized	Frustrated and unable to make data-driven decisions
PS-2	A policymaker in the aviation industry	Enhance passenger experience and reduce delays	I do not have access to real-time insights on flight delays and trends	Current reporting tools are not interactive or user-friendly	Limited in making effective policies and dissatisfied

Data Collection and Preprocessing Phase

Date	31-01-2025
Student ID	SWUID20240124728
Project Name	Unlocking Insights into the Global Air Transportation Network
Maximum Marks	2 Marks

Data Collection Plan Template

Section	Description
Project Overview	The project, *Unlocking Insights into the Global Air Transportation Network with Tableau*, aims to analyze flight routes, passenger and cargo volumes, airline performance, and delays using Tableau's data visualization capabilities. The insights derived will help airline companies, aviation authorities, and policymakers optimize flight schedules, improve operational efficiency, and enhance passenger experience.
Data Collection Plan	Data is collected from the drive link provided. The data is loaded, cleaned, and preprocessed using Tableau Data Prep before being connected to Tableau for visualization.

Raw Data Sources Identified	**Airlines**: Contains airline details such as airline ID, name, IATA, ICAO, call sign, country and active. - **Airports**: Includes airport information such as airport ID, name, location (city, country), latitude, longitude, altitude and timezone. - **Routes**: Captures flight routes between airports, including airline codes, source and destination airports, equipment and the number of stops. - **Airplanes**: Contains aircraft details like name, IATA and ICAO codes.

Raw Data Sources Template

Source Name	Description	Location/URL	Format	Size	Access Permissions
Our Airports	Has 4 excel sheets.	Link	CSV	4000 KB	Public

Date	31-01-2025
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Maximum Marks	3 Marks

Data Source	Data Quality Issue	Severity	Resolution Plan
Airports	Duplicates in Name columns. /N and null values.	Low	Solved using Tableau Prep Builder
Routes	Source and destination IDs do not match with any values in other tables	High	Solved using Tableau Prep Builder
Airlines	Duplicates in Name columns. /N and null values.	Low	Solved using Tableau Prep Builder
Airplanes	Duplicates in Name columns. /N and null values.	Low	Solved using Tableau Prep Builder

Date	31-01-2025
Student ID	SWUID20240124728
Project Name	Unlocking Insights into the Global Air Transportation Network
Maximum Marks	10 Marks

Section	**Description**
Data Overview	The dataset consists of four tables: **Airlines, Airports, Routes, and Airplanes**. The data includes airline details, airport information, flight routes, and aircraft specifications. These datasets help analyze air traffic, airline performance, and flight patterns.
Data Cleaning	- Removed **IATA** and **ICAO** columns from relevant tables due to a high percentage of null values. - Dropped the **type** column from the **Airports** table as it was not useful. - Performed general cleaning across all tables to remove duplicates and ensure data consistency. - Ensured no null values remained in the final dataset.
Data Transformation	- Filtered out irrelevant or missing data. - Sorted data for better accessibility in visualizations. - Ensured necessary columns were retained for analysis.
Data Type Conversion	- Standardized data types to ensure compatibility in Tableau. - Corrected incorrect formats where necessary.
Column Splitting and Merging	Merged **Airports** and **Routes** tables using a **left join** on **source airport ID and ICAO codes** to track air traffic at each airport.

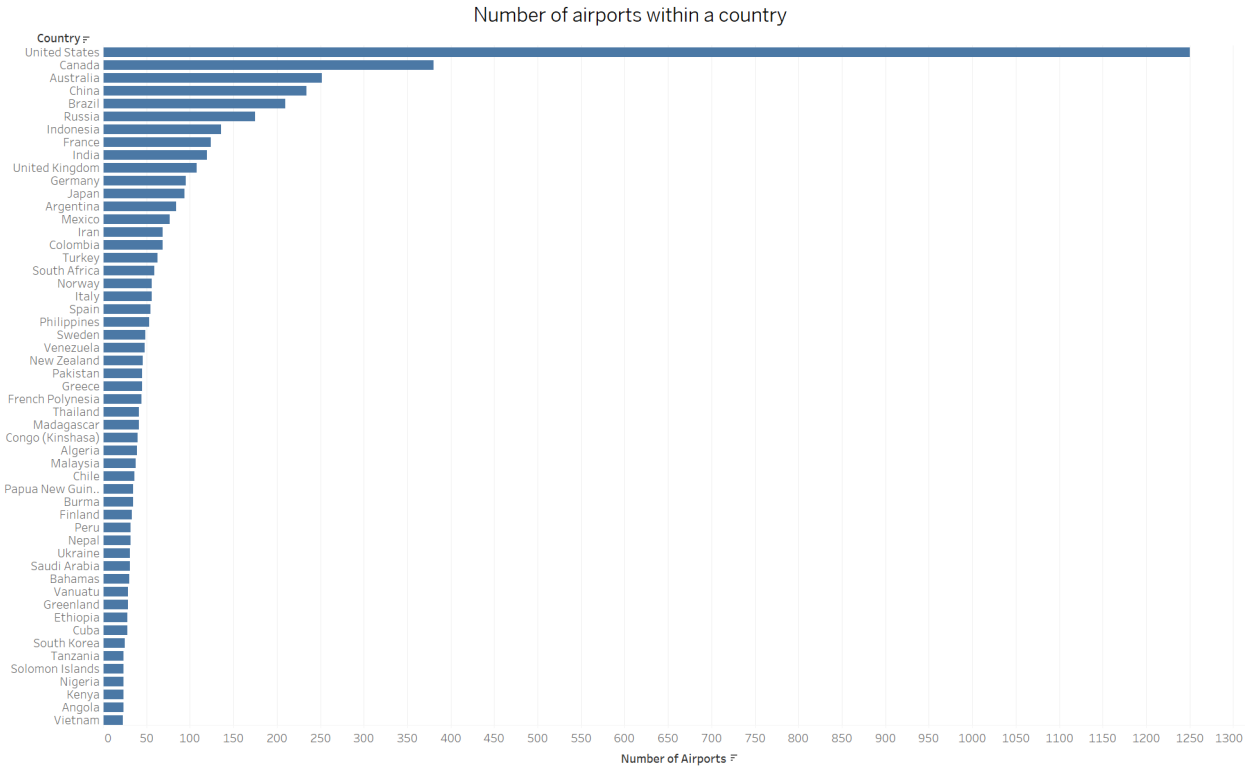
Data Modeling	- Established relationships between the tables to support interactive visualizations. - Maintained the structure for easy aggregation of data in Tableau.
Save Processed Data	- Created a **Tableau Data Prep Flow** to generate five outputs: four cleaned tables and one merged dataset. - Used the final processed data as the primary **data source** for Tableau visualizations.

Business Question and Visualization Report

Date	31-01-2025
Student ID	SWUID20240124728
Project Name	Unlocking Insights into the Global Air Transportation Network
Maximum Marks	5 Marks

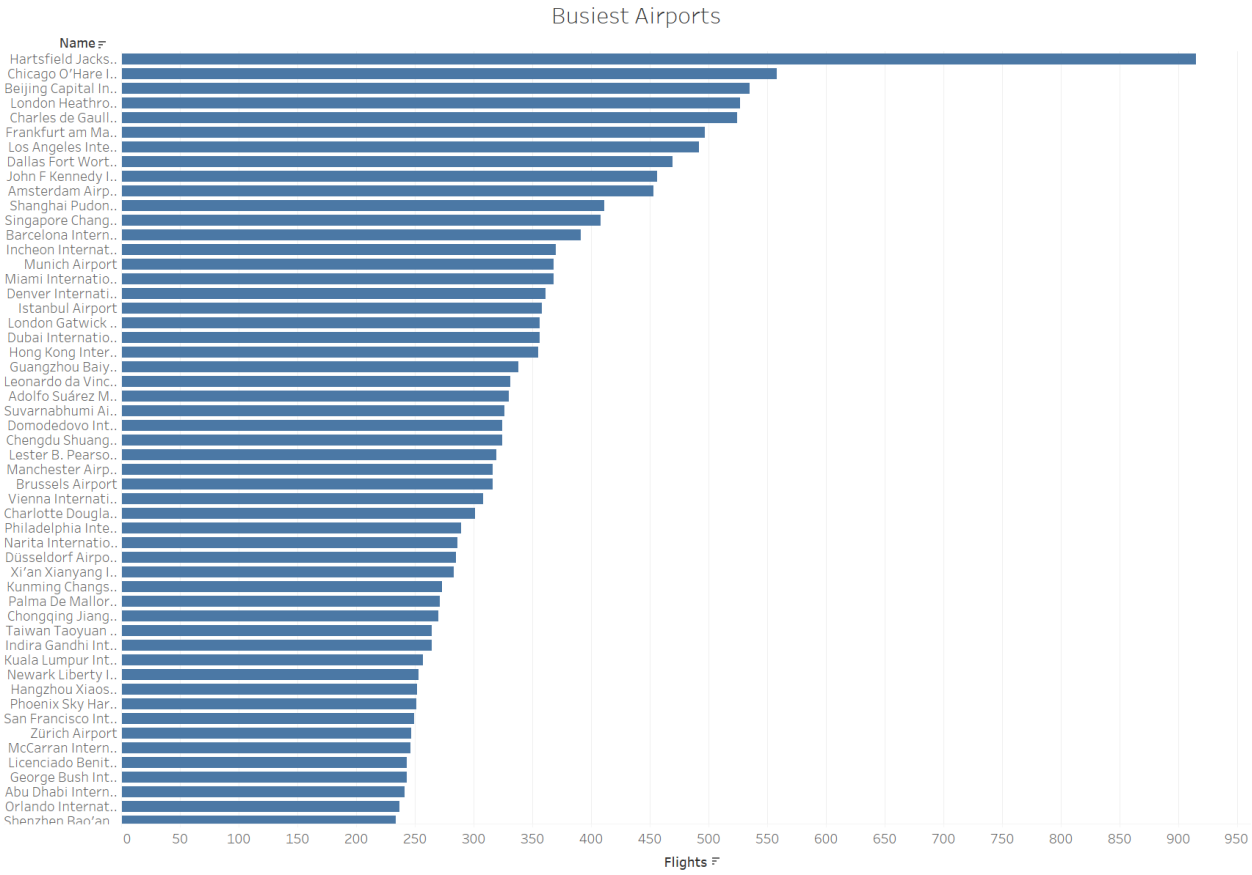
1. Which country has the most number of airports?

- *Visualization*: Bar chart showing countries and no. of airports they have.
- *Screenshot of visualization:*



2. Which is the busiest airport?

- *Visualization*: Bar chart showing airports with the most flights
- *Screenshot of visualization:*



3. Which is the airport with highest altitude?

- *Visualization*: Table showing airports with highest altitudes in descending order.
- *Screenshot of visualization:*

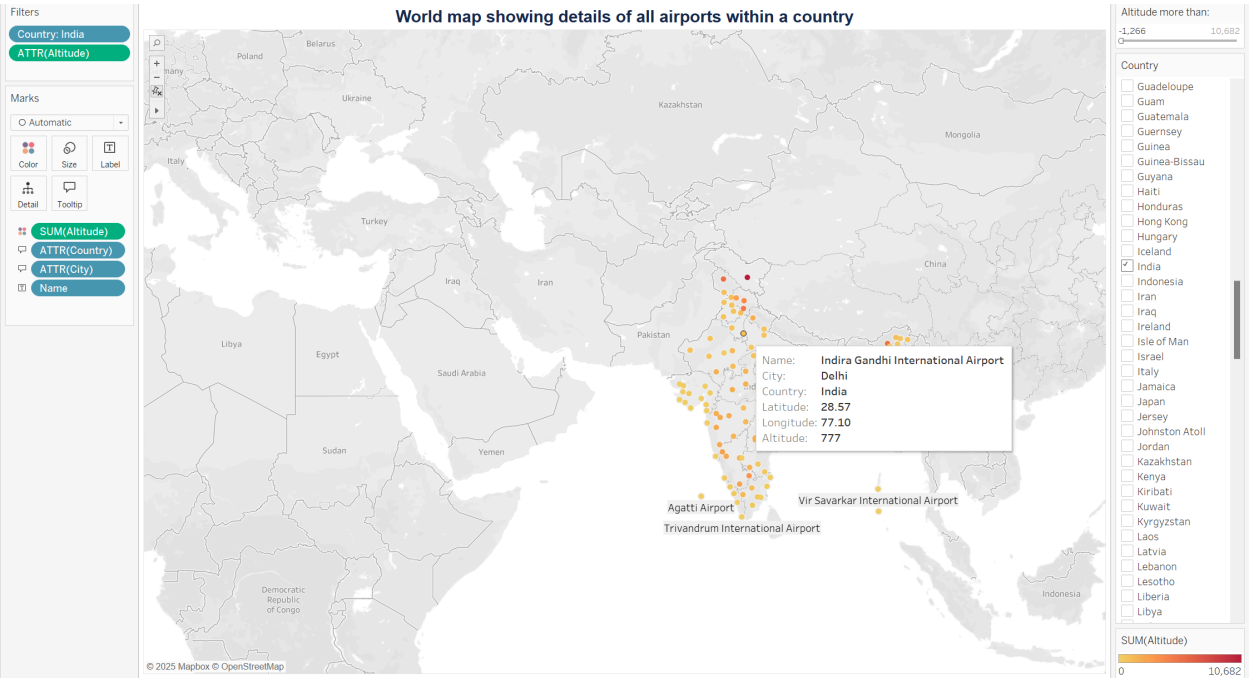
Airports with highest altitudes

Alti..	Name	City	Country
14,472	Daocheng Yading Airport	Daocheng	China
14,219	Qamdo Bangda Airport	Bangda	China
14,042	Kangding Airport	Kangding	China
14,022	Ngari Gunsa Airport	Shiquanhe	China
13,355	El Alto International Airport	La Paz	Bolivia
12,913	Capitan Nicolas Rojas Airport	Potosi	Bolivia
12,816	Yushu Batang Airport	Yushu	China
12,552	Inca Manco Capac International Airport	Juliaca	Peru
12,426	Golog Maqin Airport	Golog	China
12,400	Syangboche Airport	Syangboche	Nepal
12,152	Juan Mendoza Airport	Oruro	Bolivia
11,713	Lhasa Gonggar Airport	Lhasa	China
11,600	Hongyuan Airport	Ngawa	China
11,327	Jiuzhai Huanglong Airport	Jiuzhaigou	China
11,300	Andahuaylas Airport	Andahuaylas	Peru
11,136	Uyuni Airport	Uyuni	Bolivia
11,034	Francisco Carle Airport	Jauja	Peru
11,001	Manang Airport	Manang	Nepal
10,860	Alejandro Velasco Astete International Airpo..	Cuzco	Peru
10,804	Ninglang Luguhu Airport	Ninglang	China
10,761	Diqing Airport	Shangri-La	China
10,682	Leh Kushok Bakula Rimpochee Airport	Leh	India
10,510	Gannan Xiahe Airport	Xiahe city	China
9,843	Delingha Airport	Haixi	China
9,765	San Luis Airport	Ipiales	Colombia
9,675	Nyingchi Airport	Nyingchi	China
9,649	Teniente Coronel Luis a Mantilla Airport	Tulcan	Ecuador
9,540	Juana Azurduy De Padilla Airport	Sucre	Bolivia
9,380	Lukla Airport	Lukla	Nepal
9,334	Golmud Airport	Golmud	China
9,246	Simikot Airport	Simikot	Nepal
9,205	Cotopaxi International Airport	Latacunga	Ecuador
9,097	Comandante FAP German Arias Graziani Airp..	Anta	Peru
9,070	Telluride Regional Airport	Telluride	United States
8,976	Jomsom Airport	Jomsom	Nepal
8,917	Coronel FAP Alfredo Mendivil Duarte Airport	Ayacucho	Peru
8,781	Mayor General FAP Armando Revoredo Iglesi..	Cajamarca	Peru
8,530	Heihe Airport	Heihe	China
8,502	Chachoán Airport	Ambato	Ecuador
8,490	Debre Tabor Airport	Debre Tabor	Ethiopia
8,485	Bathpalathang Airport	Jakar	Bhutan
8,466	Licenciado Adolfo Lopez Mateos Internation..	Toluca	Mexico
8,405	Mekane Selam Airport	Mekane Selam	Ethiopia
	Rodríguez Ballón International Airport	Arequipa	Peru
8,367	Bamiyan Airport	Bamyan	Afghanistan
8,365	Shennongjia Hongping Airport	Shennongjia	China
8,361	El Dorado International Airport	Bogota	Colombia
8,360	Jorge Wilsterman International Airport	Cochabamba	Bolivia
8,333	Chachapoyas Airport	Chachapoyas	Peru
8,306	Mariscal Lamar Airport	Cuenca	Ecuador
8,202	Zhongwei Shapotou Airport	Zhongwei	China
8,200	Dolpa Airport	Dolpa	Nepal
8,136	Debra Marcos Airport	Debre Marqos	Ethiopia
7,990	Taplejung Airport	Taplejung	Nepal
7,989	Illaga Airport	Illaga	Indonesia
7,918	Phaplu Airport	Phaplu	Nepal

4. World map showing details of all airports within a country ?

- *Visualization*: World map with tooltip as name,city,country,altitude and lat & long.

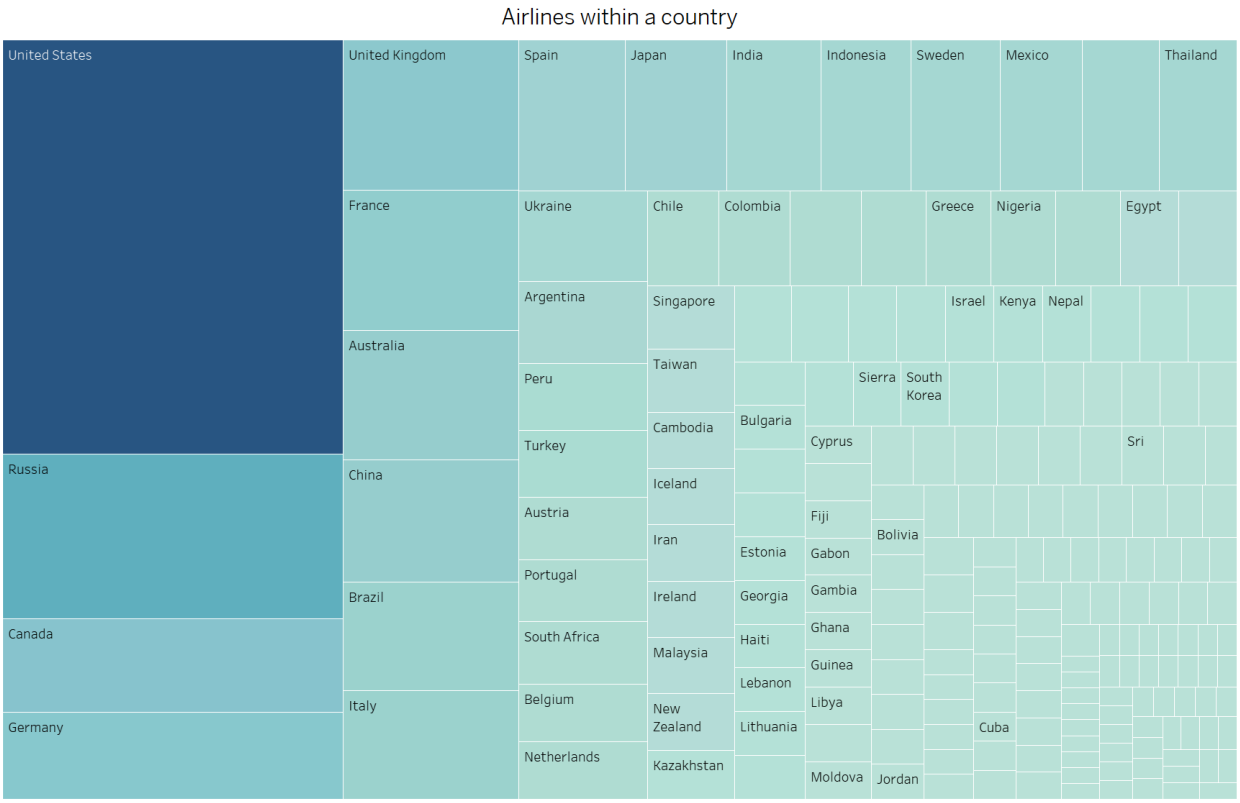
- *Screenshot of visualization:*




World map showing details of all airports within a country
Eureka Airport
Thule Air Base
Svalbard Airport, Longyear
Ittoqqortoormiit Heliport
Adak Airport
Mataveri Airport
Raivavae Air
Teniente Rodolfo Marsh Martin Base
© 2025 Mapbox © OpenStreetMap
Altitude more than:
-1,266
14,472
Country
(All)
Afghanistan
Albania
Algeria
American Samoa
Angola
Anguilla
Antarctica
Antigua and Barb...
Argentina
Armenia
Aruba
Australia
Austria
Azerbaijan
Bahamas
Bahrain
Bangladesh
Barbados
Belarus
Belgium
Belize
Benin
Bermuda
Bhutan
Bolivia
Bosnia and Herze...
Botswana
Brazil
British Indian Oc...
British Virgin Isl...
Brunei
Bulgaria
Burkina Faso
Burma
Burundi
SUM(Altitude)
-1,266
14,472

5. Which country has the most airlines?

- *Visualization*: Tree map showing countries with most airlines.
- *Screenshot of visualization:*



6. Which is the airport with highest altitude [Countrywise]?

- *Visualization*: Table showing airports with highest altitudes in descending order in India.

- *Screenshot of visualization:*

Alti..	Name	City	Country
10,682	Leh Kushok Bakula Rimpochee Airport	Leh	India
5,429	Sheikh ul Alam Airport	Srinagar	India
5,403	Ziro Airport	Zero	India
5,072	Shimla Airport	Shimla	India
3,573	Kullu Manali Airport	Kulu	India
3,000	Kempegowda International Airport	Bangalore	India
2,910	Shillong Airport	Shillong	India
2,540	Imphal Airport	Imphal	India
2,525	Kangra Airport	Kangra	India
2,487	Belgaum Airport	Belgaum	India
2,349	Mysore Airport	Mysore	India
2,171	Hubli Airport	Hubli	India
2,148	Birsa Munda Airport	Ranchi	India
2,024	Rajiv Gandhi International Airport	Hyderabad	India
1,996	Kolhapur Airport	Kolhapur	India
1,952	Jeypore Airport	Jeypore	India
1,942	Pune Airport	Pune	India
1,926	Shirdi Airport	Shirdi	India
1,911	Aurangabad Airport	Aurangabad	India
1,900	Nashik Airport	Nasik Road	India
1,850	Devi Ahilyabai Holkar Airport	Indore	India
1,831	Dehradun Airport	Dehra Dun	India
1,742	Begumpet Airport	Hyderabad	India
1,711	Raja Bhoj International Airport	Bhopal	India
1,684	Maharana Pratap Airport	Udaipur	India
1,670	Vijayanagar Aerodrome (JSW)	Toranagallu	India
1,624	Jabalpur Airport	Jabalpur	India
1,600	Guna Airport	Guna	India
1,584	Solapur Airport	Sholapur	India
1,558	Sri Sathya Sai Airport	Puttaparthi	India
1,398	Lengpui Airport	Aizwal	India
1,324	Coimbatore International Airport	Coimbatore	India
1,263	Jaipur International Airport	Jaipur	India
1,250	Nanded Airport	Nanded	India
1,060	Satna Airport	Satna	India
1,041	Raipur Airport	Raipur	India
1,033	Dr. Babasaheb Ambedkar International Airp..	Nagpur	India
1,029	Jammu Airport	Jammu	India
1,017	Pathankot Airport	Pathankot	India
1,012	Chandigarh Airport	Chandigarh	India
1,008	Salem Airport	Salem	India
999	Akola Airport	Akola	India
900	Along Airport	Along	India
899	Bilaspur Airport	Bilaspur	India
896	Kota Airport	Kota	India
847	Dhanbad Airport	Dhanbad	India
834	Ludhiana Airport	Ludhiaha	India
800	Tezu Airport	Tezu	India
777	Indira Gandhi International Airport	Delhi	India
775	Adampur Airport	Adampur	India
769	Pantnagar Airport	Nainital	India
756	Sri Guru Ram Dass Jee International Airport	Amritsar	India
751	Jaisalmer Airport	Jaisalmer	India
750	Nal Airport	Bikaner	India
728	Khajuraho Airport	Khajuraho	India
717	Jodhpur Airport	Jodhpur	India

Dashboard Design

Date	31-01-2025
Student ID	SWUID20240124728
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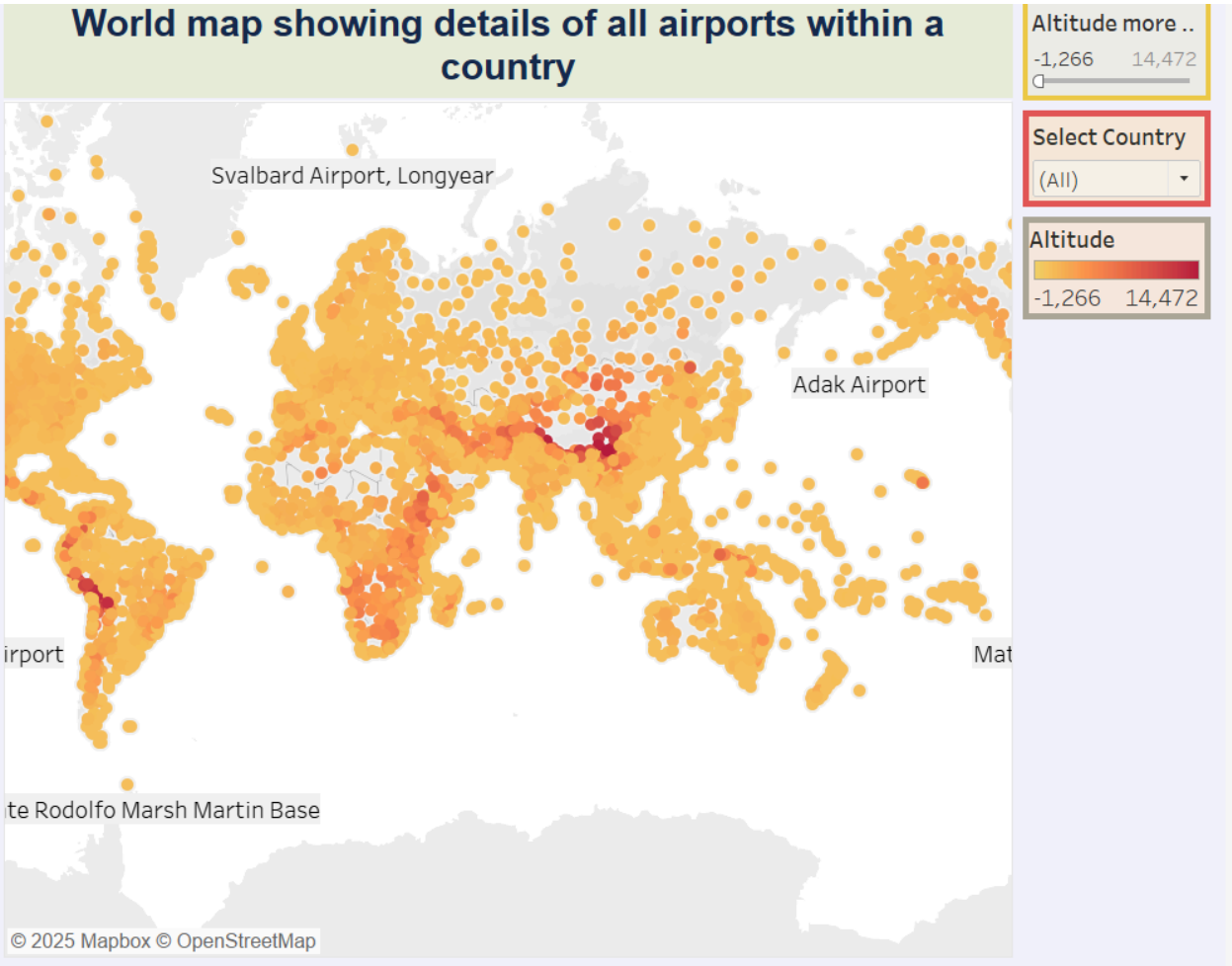
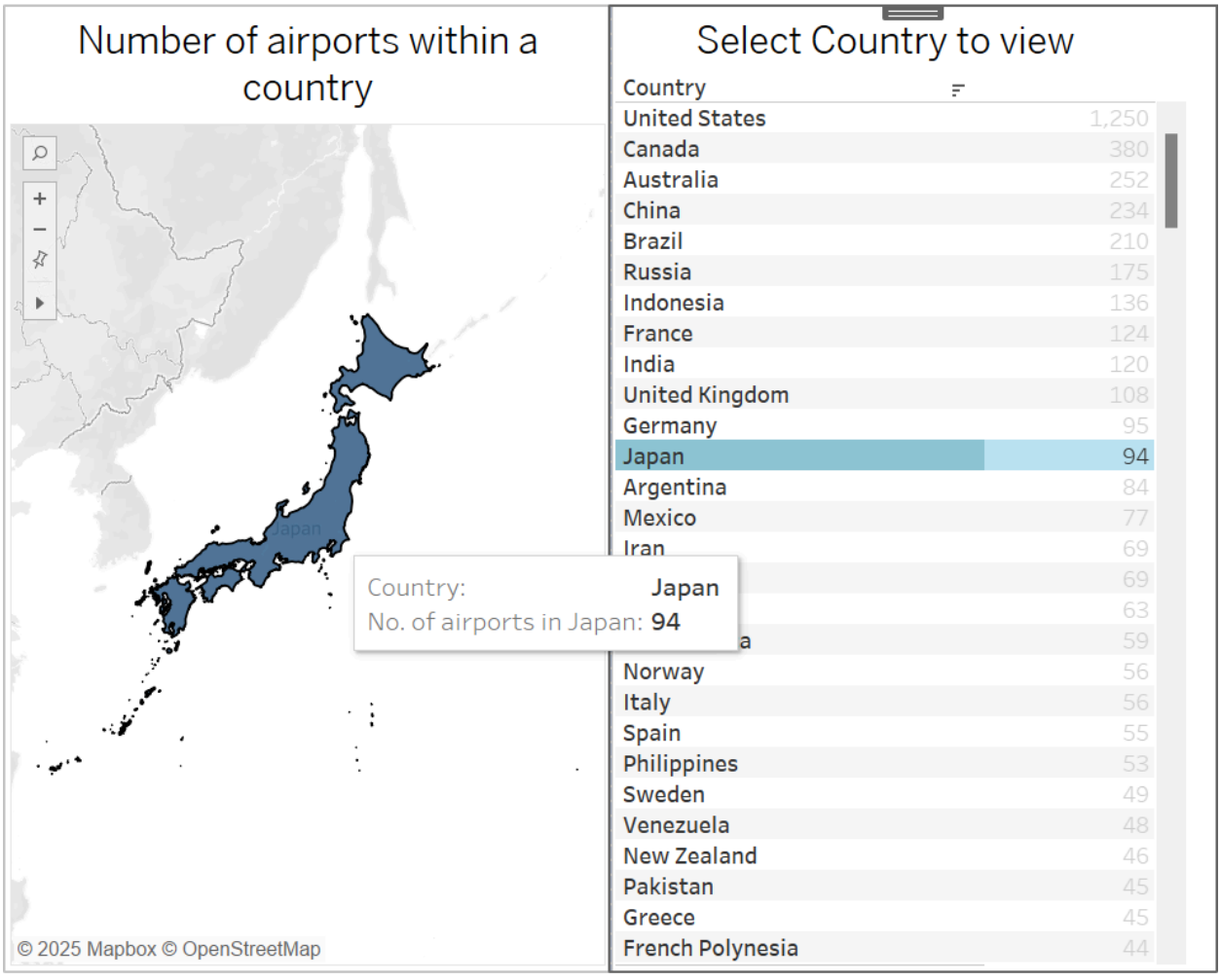
Maximum Marks	5 Marks



Here are potential outcomes from the dashboard image provided:

- **All airports** :The dashboard reports all the airports in the world.
- **Select Country**: Can also select a specific country.

- **Altitude slide meter**: Will display only the airports above the given altitude in the world map.
- **Correlation with altitude**: A Heatmap is used to mark the airports, darker the mark, higher the altitude.



Here are potential outcomes from the dashboard image provided:

- **Map** :The dashboard reports the count of airports.
- **Select Country**: Map will only view the selected country.
- **Correlation with no. of airports**: A Heatmap is used to mark the countries, darker the country, more the airports.

Here are potential outcomes from the dashboard image provided:

- **Map** :The dashboard reports the count of airlines.
- **Country**: Sheet will only show the count for country selected.
- **Correlation with no. of airlines**: A Heatmap is used to mark the countries, darker the country, more the airlines.

Name	City	
Abdul Rachman Saleh Airport	Malang	3
Achmad Yani Airport	Semarang	17
Adi Sumarmo Wiryokusumo Airport	Solo City	8
Adi Sutjipto International Airport	Yogyakarta	29
Babo Airport	Babo	1
Betoambari Airport	Bau-Bau	1
Buluh Tumbang (H A S Hanandjoeddin) Airport	Tanjung Pandan	4
Dominique Edward Osok Airport	Sorong	8
Dumatumbun Airport	Langgur-Kei Isla..	3
El Tari Airport	Kupang	10
Ende (H Hasan Aroeboesman) Airport	Ende	4
Fakfak Airport	Fak Fak	3
Fatmawati Soekarno Airport	Bengkulu	5
Frans Kaisiepo Airport	Biak	4
Hang Nadim International Airport	Batam	27
Hasanuddin International Airport	Ujung Pandang	56
Husein Sastranegara International Airport	Bandung	21
Iskandar Airport	Pangkalan Bun	7
Jalaluddin Airport	Gorontalo	4
Juanda International Airport	Surabaya	65
Juwata Airport	Taraken	7
Kaimana Airport	Kaimana	3
Kalimarau Airport	Tanjung Redep-..	3
Kao Airport	Kao	1
Kasiguncu Airport	Poso	1
Ketapang(Rahadi Usman) Airport	Ketapang	2
Komodo Airport	Labuhan Bajo	4

Here are potential outcomes from the dashboard image provided:

- **Country**: Sheet will only show the airport for selected country. If **al**l is selected , it will show busiest airports across the world.
- **City:**City of the airport is also displayed.

Story

Date	31-01-2025
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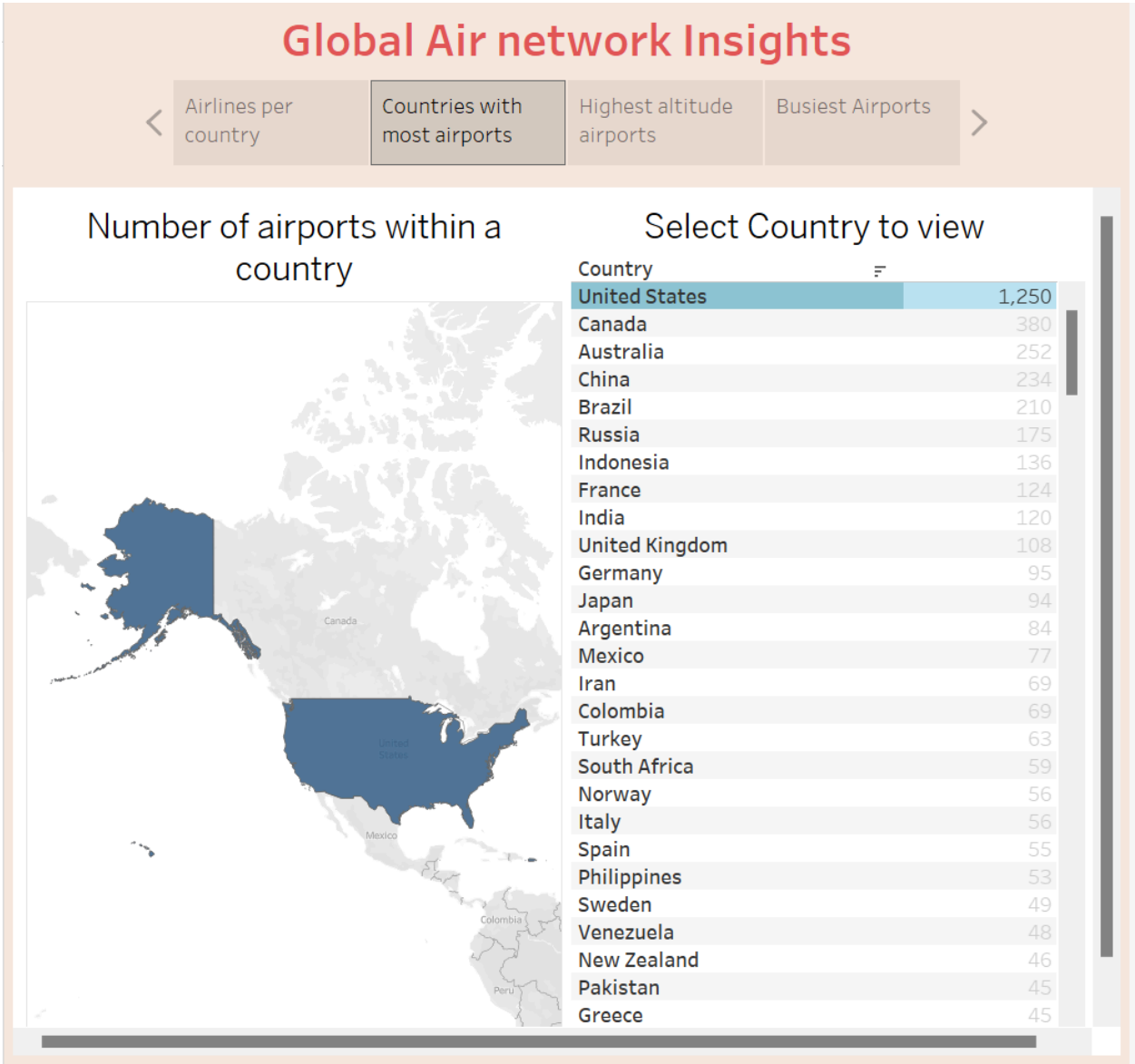
Project Name	Unlocking Insights into the Global Air Transportation Network
Maximum Marks	5 Marks



Observations:

- **Countries with the most airlines**:
  1. United States : 229
  2. Russia: 91
  3.Canada: 52
  4. Germany: 48
  5. United Kingdom: 43

- **Countries with the most airports**:
  1. United States: 1250
  2.Canada: 380
  3. Australia: 252
  4.China: 234
  5.Brazil: 210
- **Airports with the highest altitudes**:
  1. Daocheng Yading Airport China (14,472 ft)
  2.Qamdo Bangda Airport China (14,219 ft)
  3.Kangding Airport China (14,042 ft)
  4.Ngari Gunsa Airport China (14,022 ft)
  5.El Alto International Airport Bolivia (13,355 ft)
- **Busiest Airports**:

  1. Hartsfield–Jackson Atlanta International Airport
  2. Chicago O'Hare International Airport
  3. Beijing Capital International Airport
  4. London Heathrow Airport
  5.Charles De Gaulle International Airport