

# Individual Project Visualization



## Semester 4 HMI

HMI Challenge

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Student: Andre Sanao

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# Acronyms

<i>Acronym</i>	<i>Meaning</i>
<i>HMI</i>	→ Human-machine Interaction and Control
<i>SQL</i>	→ Structured Query Language

*Table 1 – List of acronyms used throughout the report.*

# Introduction

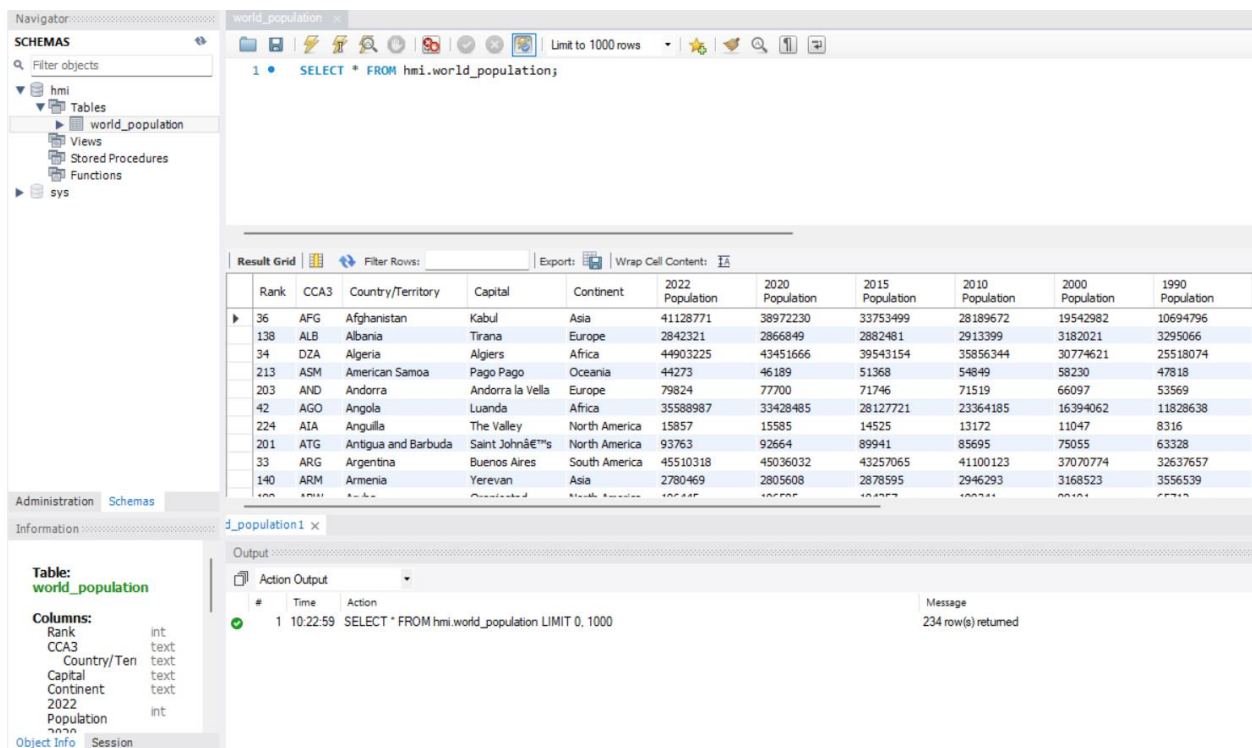
The assignment on which this document presents a small challenge of HMI subject. HMI also known as Human-machine Interaction and Control is a subject for semester 4 where we learn how to develop modules which humans are using to either interact, monitor and/or control a machine, process, data, etc. These are then displayed in a dashboard to create an insight of what is happening in a smart industry. In the following sections will provide the procedure and conclusion of the assignment.

# Procedure

In this assignment, we have to create a proper visualization of a chosen dataset and the relation between them, and any other information about the dataset aims to communicate to a certain target group of users. The main goal is to exercise of what we want to represent and how can we visualize the data in the best way possible.

The dataset that I have chosen is a historical population data for every country/territory in the world by different parameters like area size of the country/territory, continent, capital, population growth rate, density, ranking based on population, world population percentage etc. Our goal is to target users who are curious about the country population or how many people live in the world. It is also important for users to know the growth rate of each country for their own research purposes. Governments also use these data to keep count the population in their country as it can affect the economy or prevent overpopulation due to immigrants.

There are several tools where we can visualize the dataset and after experimenting with available tools, I decided that Grafana is perfect due to the UI is easy to learn and it is popular in smart industries. To be able to use the dataset, we needed to install a data source for fetch the data. In Grafana, there multiple data sources you can use to obtain and manage the dataset. I chose MySQL since I have used it in the past before and have some knowledge in creating queries. We needed to configure the local host and set the correct database in order fetch the data in SQL. (See figure 1)



The screenshot displays a MySQL database management system interface. On the left, a 'SCHEMAS' sidebar shows a tree view with 'hmi' as the selected database, containing 'world\_population' under the 'Tables' section. The main query editor shows a SQL query: `SELECT * FROM hmi.world_population;`. Below the query, a 'Result Grid' displays a table of population data. The table has columns for Rank, CCA3, Country/Territory, Capital, Continent, and population for the years 2022, 2020, 2015, 2010, 2000, and 1990. The first few rows are visible, showing data for Afghanistan, Albania, Algeria, American Samoa, Andorra, Angola, Antigua and Barbuda, Argentina, and Armenia. At the bottom, an 'Output' section shows the execution of the query, indicating that 234 rows were returned.

Rank	CCA3	Country/Territory	Capital	Continent	2022 Population	2020 Population	2015 Population	2010 Population	2000 Population	1990 Population
36	AFG	Afghanistan	Kabul	Asia	41128771	38972230	33753499	28189672	19542982	10694796
138	ALB	Albania	Tirana	Europe	2842321	2866849	2882481	2913399	3182021	3295066
34	DZA	Algeria	Algiers	Africa	44903225	43451666	39543154	35856344	30774621	25518074
213	ASM	American Samoa	Pago Pago	Oceania	44273	46189	51368	54849	58230	47818
203	AND	Andorra	Andorra la Vella	Europe	79824	77700	71746	71519	66097	53569
42	AGO	Angola	Luanda	Africa	35588987	33428485	28127721	23364185	16394062	11828638
224	AIA	Anguilla	The Valley	North America	15857	15585	14525	13172	11047	8316
201	ATG	Antigua and Barbuda	Saint John's	North America	93763	92664	89941	85695	75055	63328
33	ARG	Argentina	Buenos Aires	South America	45510318	45036032	43257065	41100123	37070774	32637657
140	ARM	Armenia	Yerevan	Asia	2780469	2805608	2878595	2946293	3168523	3556539

Figure 1 MySQL Database

I connected my local SQL server to Grafana and created visualizations for the world population dataset. (See figure 2)

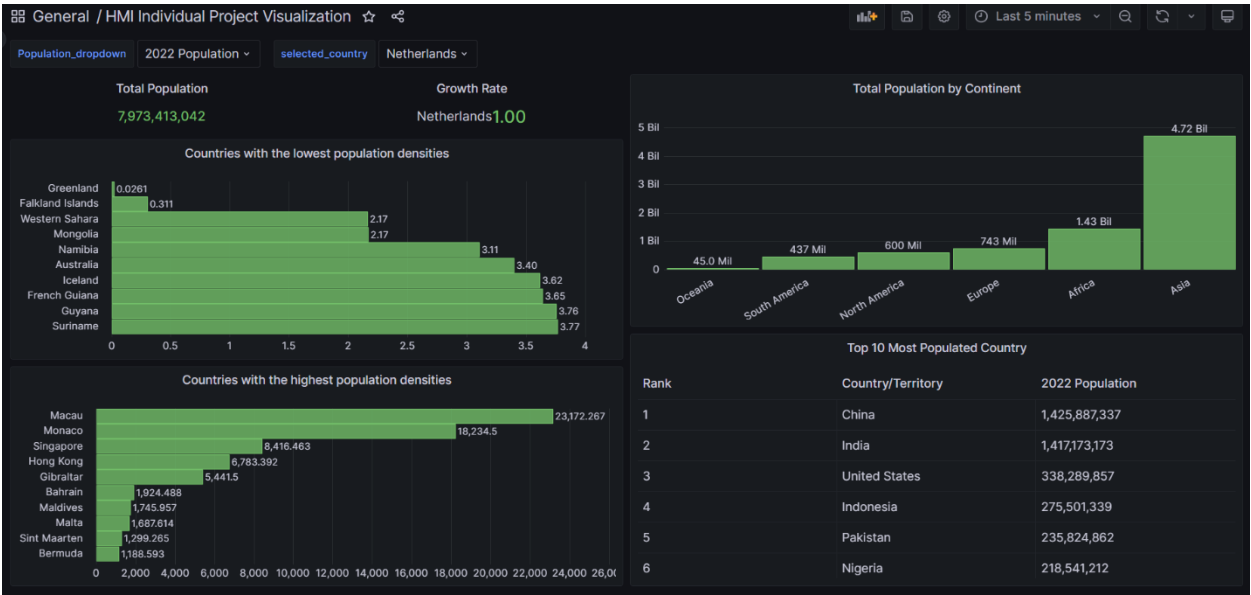


Figure 2 Grafana dashboard

In the figure above, I chose tables and bar charts for visualization since it is a huge dataset and these are more relevant for these types of datasets. I also made it interactive so it can show population for each year and you can select a country to view its growth rate. (See figure 3)

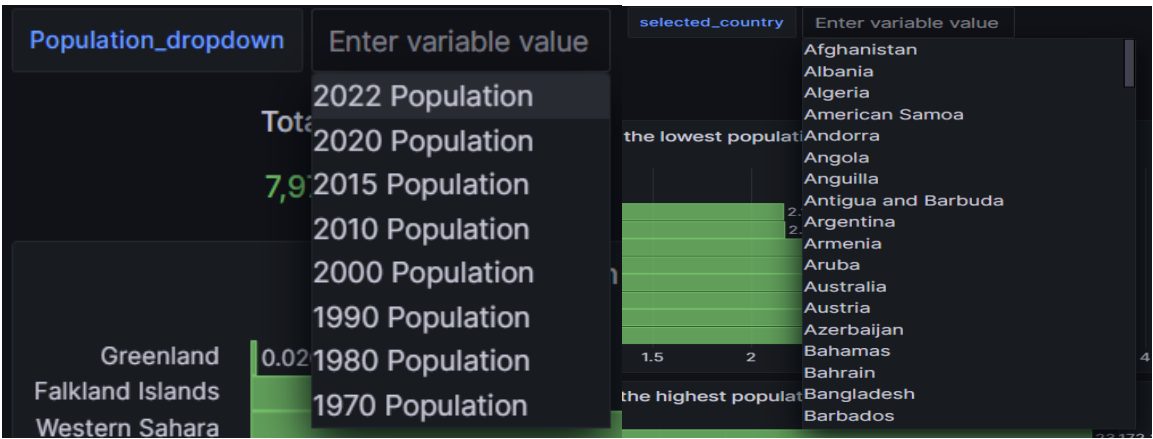


Figure 3 Dashboard Interactive setting

## Conclusion

To conclude this assignment, I have gained knowledge with different dashboard tools as I researched which is easier to use due to most of them has advance UI. Grafana really made visualization easier and there is a huge selection of data sources. I also had problems with choosing the data source to fetch the data because I tried to use Google Sheets as a data source and I have to use an API key which is straightforward but later in the assignment, I realized that I can't manipulate the columns to my preference and migrate my dataset to SQL. The final product is a success and I manage to visualize and display the important data to the targeted users. With all things considered, I have learned how to give what the users want to see displayed in a dashboard with interactive features and I hope I can use this knowledge in future projects.

## Reference

Banerjee, S. (2022, October 20). *World Population Dataset*. Kaggle. Retrieved April 19, 2023, from <https://www.kaggle.com/datasets/iamsouravbanerjee/world-population-dataset?resource=download>

*MySQL Workbench download now "*. MySQL. (n.d.). Retrieved April 19, 2023, from <https://www.mysql.com/products/workbench/>

*JavaScript required. Sign In.* (n.d.). Retrieved April 19, 2023, from <https://fhict.instructure.com/courses/13020/files/1893878?wrap=1>

*Grafana: The Open Observability Platform*. Grafana Labs. (n.d.). Retrieved April 19, 2023, from <https://grafana.com/>