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Team 10
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Final Project Report

Introduction

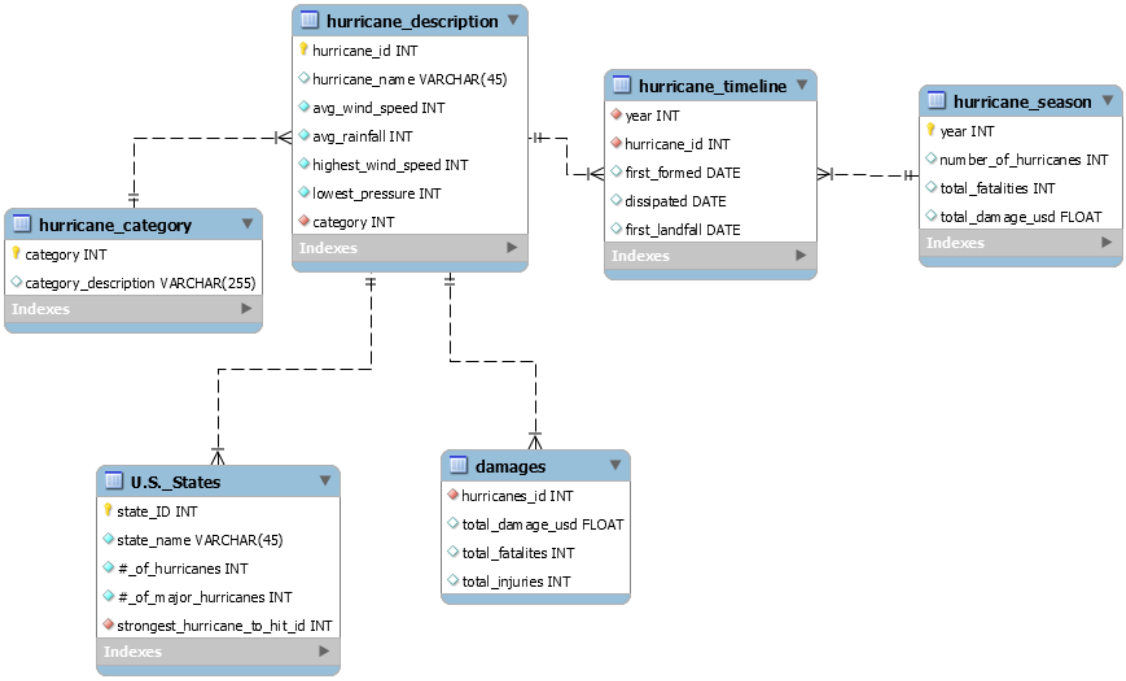
Our team created a database containing useful and obtainable information related to all hurricanes that have made landfall in the United States from 2000 to 2019. Information, data, and statistics about hurricanes are very spread out across the Internet between multiple websites such as Wikipedia and various government-owned websites, so we sought to centralize all meaningful data about hurricanes into a single database. We constrained the scope of our project to just hurricanes that have made landfall in the U.S. in the past 20 years so that the database is not too large to handle. Some categories of data our team included in our database are the category of the hurricane, the average wind speed and rainfall of the hurricane, the states the hurricane affected, the estimated casualties and property damage, and more.

One of the reasons why we decided to create this database is because it is theorized that global warming, an important issue of our time, may lead to an increase in the amount of hurricanes that occur, and may also lead to more dangerous and intense hurricanes. According to the Center For Climate and Energy Solutions, warmer sea surface temperatures caused by climate change and global warming may cause hurricanes and tropical storms to have stronger wind speeds, and may also increase the amount of precipitation caused by hurricanes. These increased wind speeds and precipitation could potentially lead to an increased loss of life and property damage. With our database, meteorologists can look at how the amount of hurricanes

per year has been potentially changing, and to see if hurricanes have been intensifying in recent years.

Database Description

- ❏ Logical Design



As far as database design goes, we wanted to create a database that makes clear and logical sense, and provides essential information about hurricanes in an organized fashion. We included tables that we thought were needed to provide a clear and detailed picture of each hurricane, such as a hurricane description table, a hurricane timeline table, a hurricane damages table, and more. We also included a table about specific U.S. states and how they are affected by hurricanes, and a table for each year describing the hurricane season. We wanted to create a database that could be expanded upon beyond the scope we chose to work with, so that more information about specific hurricanes could be added, and information about years before 2000 could also be included.

- ❏ Physical Database

Our database of hurricanes includes 6 tables, of which the hurricane description is the main table. This main table references the hurricane category table, the U.S. states table, the damages table, and hurricane timeline table. Three of these tables have a many-to-one relationship to the main table, which are hurricane category, U.S. states, and damages tables. The hurricane timeline table has a one-to-many relationship with the hurricane description table. The hurricane timeline table is a linking table which links the hurricane description table with the hurricane season table.

- ❏ Sample Data

  Unfortunately, we were unable to find any specific CSV files on the internet that had the exact information we were looking to include in our database, so we had to search and compile all the data into individual CSV files on our own. We searched through various websites owned by the National Oceanic and Atmospheric Administration, which contained useful information on each of the hurricanes we included in our database such as the year, highest wind speed, lowest pressure, and more. We also used various websites created by amateur storm enthusiasts which had information on the amount of hurricanes that have occurred in each U.S. state, as well as information about the amount of hurricanes per year. There was certain data that we could not find on any website, such as total injuries caused by hurricanes, and average wind speed, so we had to make educated estimates for these data points.

- ❏ Views/Queries

For our database, we created five views. Each of these views serve different purposes and will allow us to answer many of the questions we had in our initial project proposal document, as well as provide answers to questions we did not include in our proposal. For example, the "most_dangerous" view orders the hurricanes within the database by total fatalities and total damage to show which hurricanes over the years have caused the most destruction. These views are detailed enough to meet all the requirements as stated in the project requirements document. These views will allow users to quickly glean information about the hurricanes detailed in the

database. Additionally, the views are also more accessible to users compared to regular queries since they do not require extensive knowledge on how to use MySQL workbench.

View Name	Req.A	Req.B	Req.C	Req.D	Req.E
cat_5	x	x			
most_dangerous	x		x		
damaged_caused_by_year	x		x	x	
expensive_hurricanes	x	x			
higher_than_average_hurricane_count		x	x		x

Changes From Original Design

For our database, we have multiple aspects from our original design that we considered to be irrelevant for the goal of this database and therefore decided to leave out. One of the main aspects of our database that we felt we needed to leave out that was part of our original design was which states would be impacted by storms respectively. The reason that we felt this would be impactful to leave out was because this would require and immense amount of self-added data, as well as the fact that many of the storms only affect a certain small region, and it would be of no valuable use to us to include that 95% of the country was not impacted by a specific storm. Another aspect of our database that we decided was irrelevant was any data before 2000.

The reason that we decided to leave this out of our report was because we felt that only including data after the year 2000 would keep our data relevant and keep the database at a manageable size. Another thing that was different from our original design was adding information about the death rates for the specific storms.

Lessons learned

Throughout this semester-long project, we learned a valuable skill in not only SQL but how to work collaboratively as a team in a virtual environment. Specifically in SQL we learned how to create queries, import and export data, check and repair tables, back up databases, restore databases, forward engineer ERD's, etc. At one point in time, we were having difficulty narrowing down our target audience. We believed at first that individuals of the community may use our database to be better prepared for storms. With further collaboration through groupme and our group discussions we came to the conclusion that the database would not be predicting storms but rather showing trends of storms that have already occurred. The prediction and following of developing storms would be used by meteorologists rather than the everyday individual. Having this valuable information is something that we all can use in our future endeavours including internships, other classes, and other team based work.

Potential Future Work

Our database just begins to scratch the surface of hurricanes that have struck in the US. For starters, we could incorporate the states that each hurricane has affected since the damage varies by location. Another potential expansion to our database could be to include the hurricanes that have hit other countries within North America. Additionally, in the future, our database could also be used to update users on current storms, rather than just past ones. These

possible features could provide users the option to track how storms have traveled and affected wider areas, while also serving as a warning when dangerous storms are expected to strike a nearby location.