PHI Inventory Management Database

PHI Americas (PHIA) Limited is a Trinidad and Tobago registered company which is based at Guardian Holdings Hangar, Piarco International Airport in Piarco. It is a subsidiary of PHI Aviation LLC which is based in Lafayette, Louisiana USA. PHI Aviation was established on the 21st of February 1949 to support oil industry seismic crews on Louisiana's coast. PHI Aviation operates and maintains many state of the art helicopters from light, to medium and even heavy class helicopters. They have over 213 aircrafts with over 12 million flight hours. PHI staff are highly trained in every aspect of the company from flight operations and crews to maintenance teams meaning they can overcome many unique challenges during their flight operations. PHI core values reflect what is important to the company and this includes a safe efficient and quality service (PHI, 2023). PHI Air Medical: Medevac and Air Ambulance Services is the leading air ambulance provider in the USA with an unmatched safety record and the best aviation, medical, and communication specialists. In 2022, PHI Aviation introduced its Maintenance, Repair, and Overhaul operation.

The necessity of an Inventory Management Database for this operation is due to the number of bases that are located worldwide, and also improving company efficiency across departments. The use of a database would help users identify part availability at a local warehouse, its zone, and bin number, or whether it would have to be shipped. Another benefit would be the ability to look at a variety of suppliers and compare prices to find the most economical choice if the warehouses are out of stock. Various use-case scenarios apply to this Inventory Management Database for PHI Aviation and across multiple departments so this is a company wide benefit rather than a department specific improvement. Aircraft maintenance engineers would benefit greatly from it when checking for the availability of a specific aircraft part to either plan preventative maintenance work or doing repair work. The stores personnel would also be able to access the database when ordering from other warehouses as well as when verifying that the serial numbers match the database and location record, and in addition they would be able to verify stock count levels to order, or set a minimum order quantity so once the level drops below a certain

number, the database will request that minimum amount. Last but not least, the finance department can reference the database when doing audits or when writing invoices for suppliers or other parties (Pierobon, 2019). The inventory database can also be used to predict future demand for specific parts, allowing the stakeholders to predict how much stock will have to be ordered in advance (Ross, 2022).

The database will consist of four tables containing records about the aircraft parts that are in stock (PartInfo), parts suppliers (SupplierInfo), SerializedInfo, and Location of the aircraft parts. The attributes and their respective entities will be listed in Table 1. The capitalized items are the entities, the bolded items are the primary keys of the respective tables, and the foreign keys are italicized. The data types used for each attribute are identified in Table 2. The relationships between the tables are illustrated by using an Entity Relationship Diagram in Figure 1.

The information for aircraft parts was sourced from the original equipment manufacturers and input on a master spreadsheet. Following data collection, data cleaning techniques were implemented, the first of which was removing any duplicate items, which proved uncomplicated due to serial numbers on differing parts being unique items. The removal of irrelevant data was then accomplished by reviewing what was required and then expected by the client. Data conversion was the next method accomplished to ensure that the data formats which were used in the database design were correctly mapped to the spreadsheet created, as this will allow for a more efficient import of the information, and to further increase efficiency, any formatting differences were cleared to reduce unnecessary data processing during the import. Concluding the data cleaning process was the removal or correction of missing values from the data set, and if any were found missing, the vendor was contacted and information completed.

This document was uploaded to MySQL Workbench and the database was designed using the MySQL language. The use of MySQL Workbench as the user interface will allow users to access the database and multiple reports while enabling auditing of the database to ensure database security. The user interface of MySQL Workbench ranges from user to user, depending on what they are using it for; different user roles will have different functions (Inan and Juita, 2011). This functionality was the main

reason for choosing MySQL Workbench as it enables role-specific functionality (MYSQL Workbench, 2019).

MySQL is a popular open-source relational database management system for web applications. The security measures that will be in place to protect the data from breaches and unauthorized access to our Database would include User authentication and authorization, Network security measures such as firewalls, and finally, regular security training and awareness for the database administrators. The User interface for interacting with the database in MySQL can be created using Python or R programming libraries such as Flask and Shiny. It would have the functionality necessary for tasks such as Database Management (creating and deleting) Table Management (creating and deleting), Query Execution(SQL Query Editor, Execution Button, Results Display), and last but not least, Access Management (List of Authorized users, Create and Delete user Buttons).

The futureproofing of a database is crucial for the continued functioning and growth of any organization and with MySQL Workbench, this is achieved primarily by the scalability of the database and the continuous updating of the information stored which is achieved via database administrators with assistance from various departments. Departments will send updated lists of vendors for addition or removal from the database along with any further related changes (MySQL Workbench, 2023).

PARTINFO	SUPPLIERINFO	SERIALIZEDINFO	LOCATION
PartNo	**SupplierNo**	**SerialNo**	**Warehouse**
PartName	*PartNo*	*PartNo*	Zone
Stock	Cost	*Warehouse*	Bin
Description	SupplierLocation		*PartNo*
AvailableQty			*SerialNo*
Warehouse			

Table 1 Illustrating the Attribute and Entities for the Aircraft Inventory Management Database

Attribute	Data Type	Reason for Choice
PartNo	Varchar	Part number can consist of alphanumeric characters and requires both integer and character type.
PartName	Varchar	Part name can consist of alphanumeric characters and requires both integer and character type.
Stock	Bool	Stock will be zero, or greater than zero hence boolean is applicable.
Description	Longtext	Description gives a brief explanation of the parts used and can require multiple sentences.
AvailableQty	Int UNSIGNED	Available quantity will be a numeral and Unsigned will indicate it cannot be a negative value.
Warehouse	Varchar	Part name can consist of alphanumeric characters and requires both integer and character type.
SupplierNo	Varchar	Part name can consist of alphanumeric characters and requires both integer and character type.
Cost	Decimal	Cost is a currency and as such will have the value after the decimal set to 2.
SupplierLocation	LongText	Supplier location is the address of the supplier and will include street name, state, and country.
SerialNo	Varchar	SerialNo can consist of alphanumeric characters and requires both integer and character type.
Zone	Varchar	Zone can consist of alphanumeric characters and requires both integer and character type.
Bin	Varchar	Bin can consist of alphanumeric characters and requires both integer and character type.

Table 2 Identifying the Data Types Used and Reasoning for Each Attribute in the Aircraft Inventory Management Database
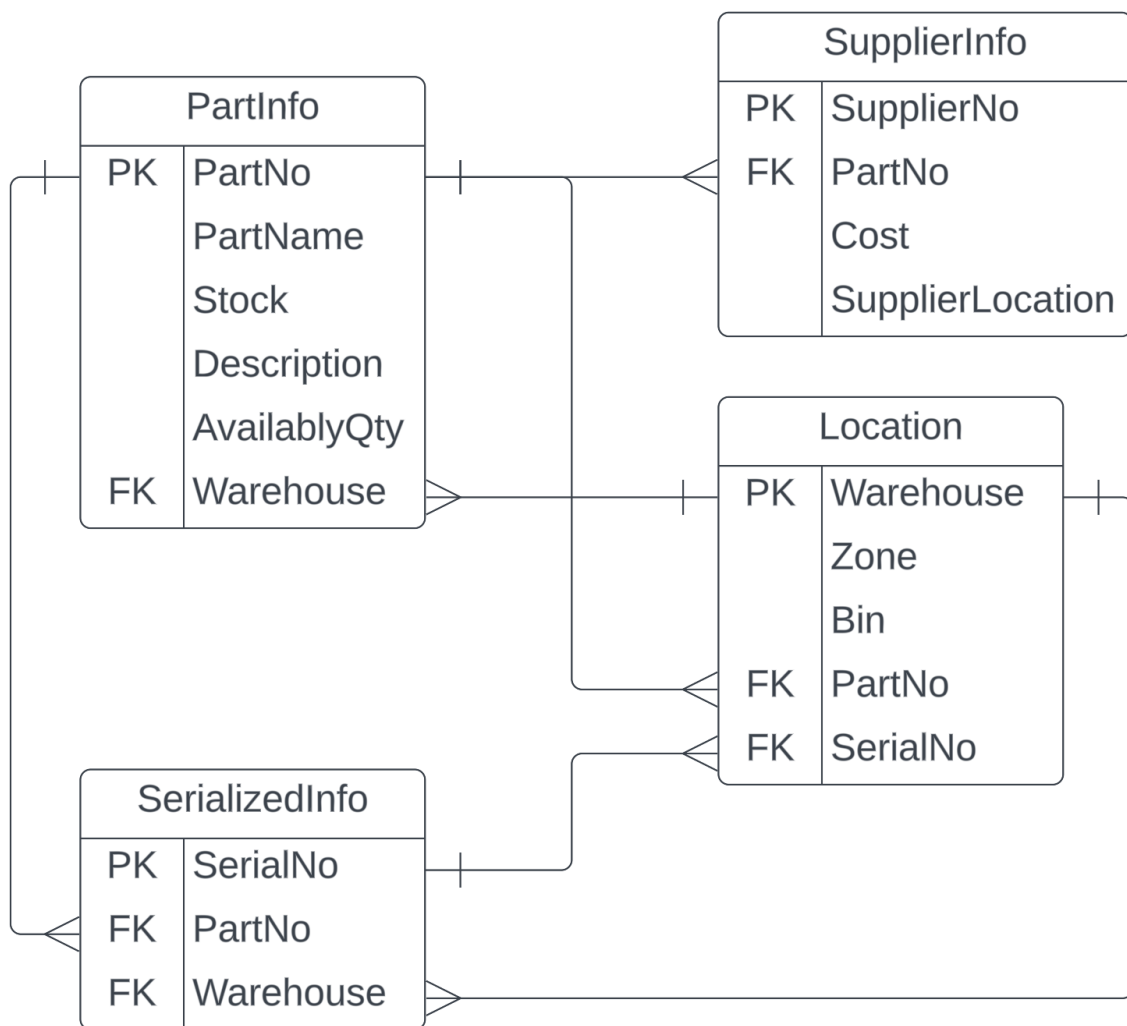
Figure 1 Illustrating the Entity Relationship Diagram for the Aircraft Inventory Management Database

REFERENCES:

- Inan, I. and Juita, R. (2011) Analysis and Design Complex and Large Data Base Using MySQL Workbench. International Journal of Computer Science & Technology 3 (5): 175-178. DOI: 10.5121/ijcsit.2011.3515

- MySQL Workbench. (2019) MySQL NDB Cluster: Scalability. Available from: https://www.mysql.com/products/cluster/scalability.html#:~:text=MySQL%20NDB%20Cluster%20automatically%20shards,and%20directly%20via%20NoSQL%20APIs [Accessed 12th December 2023].

- MySQL Workbench. (2023) MySQL Workbench. Available from: https://www.mysql.com/products/workbench/ [Accessed 12th December 2023].

- PHI. (2023). Home. available from: https://phihelico.com/ [Accessed 16th December 2023].

- PHI. (2023). Our story. Available from: https://phihelico.com/the-phi-difference/our-story/ [Accessed 07th December 2023].

- Pierobon, M. (December 20, 2019) Taking Stock: Importance of Valuable Inventory of Aircraft Parts. Available from: https://www.aviationbusinessnews.com/mro/aircraft-parts-inventory-control/ [Accessed 17th December 2023]

- Ross, S. (2022) The 3 Basics Of Inventory Database Management. Market Business News. Available from: https://marketbusinessnews.com/the-3-basics-of-inventory-database-management/305914/ [Accessed 15th December 2023].