Executive Summary on the PHI Inventory Management Database

PHI America Limited is a Trinidad and Tobago registered company and it is based at Pierce International Airport. PHI America is a subsidiary of PHI Aviation LLC which is based in Louisiana USA and was established on the 21st February 1949 to help support the oil industry seismic crews along the Louisiana coast. PHI Aviation operates and maintains many state of the art helicopters and these can range from light, to medium to heavy class helicopters. Within the 213 aircrafts the company has, they have over 12 million flight hours with very highly trained staff. They have staff from flight operations, to crew, to maintenance teams meaning they can overcome very unique challenges during flight operations because they have staff trained from many different areas. PHI core values reflect what is important to the company and this includes a safe efficient and quality service (PHI, 2023). PHI also have a medical company called PHI Air medical, which is the leading air ambulance provider in the USA, they have an unmatched safety record with the best aviation, medical and communication specialist which are all highly trained. In 2022, PHI Aviation introduced its Maintenance, Repair, and Overhaul operation.

With multiple different sites this means there is lots of staff from different departments which need access to this data for multiple different reasons, so with the data being used for different reasons it has to be laid out in a clear and precise format and be readable for everyone's purpose.
The necessity of an inventory management database for this company is because of the different types of PHI organisations, PHI America, PHI Aviation and PHI medical. This means there are multiple bases that are located worldwide, meaning there is lots of data from multiple different sites, including parts, part numbers, part names, stock, description of the parts used, quantity, where its locate, cost and serial numbers, see table 1 below. As there are so many different types of aircrafts, this would mean there is a large number of aircraft parts and the aircrafts will also been located at different sites so keeping up to date with the parts location, quantity, part numbers and for which air craft they are for is going to get complicated and confusing to look for, so with this database it is going to make it much easier and more effective to be able to find out all of this information in one area and be easily accessible for all the departments throughout the different sites.

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,1. Identifying the Data Types Used and Reasoning for Each Attribute in the Aircraft Inventory Management Database

The database I have chosen to present this data is the MySQL worksheet and it was designed using the MySQL language, this is because using this as the interface will allow the users to access the database and multiple reports while enabling auditing of the database to ensure regulations are followed by following database security measures. MySQL enables role-specific functionality so it ranges for user to user so it will be used for different roles and different functions.

MySQL will also help to identify part availability at a local warehouse along with its zone, bin number and weather it would need to be shipped, this is an advantage for multiple different departments. It will be helpful for the aircraft maintenance engineers when they fix the aircrafts. It will be helpful to the stock team for keeping an eye on stock, prices and quantity of parts and it would also be helpful to the finance team for keeping track of spending, seeing where money is being spent and also to show to auditing purposes. (Pierobon, 2019). This is a huge advantage because it will end up in the long run being more cost effective and easily manageable. The other

advantage is being able to look at a variety of suppliers to compare prices. It can also be used for predicting future demand for a specific part, allowing stakeholders to predict how much stock will have to be ordered in advance (Ross, 2022).

So the purpose of this project was to design and build a single logical database management system for PHI. This is to help manage all of the data in an easy and accessible way. I choose MySQL to present this data as it is the better choice than a NoSQL database. That is because NoSQL is inapplicable because it does not provide all the features necessary for the data we have. MySQL is an open source relational database management system, it is a structured query language SQL and it is used to access data which is stored in rows and columns. Where as other management systems like mongoDB is a noSQL databases and is document based so mySQL is the better choice for our data as it is in tables containing rows and columns. MySQL is developed and maintained by oracle and requires a schema definition for the tables in the database where as mongoDB is schema free, its unrelated data is stored in JSON like documents and it doesn't support foreign keys. MySQL is the preferred database as it supports usage of foreign keys to link one table to another, meaning all our data can have individual tables to look at but also be linked together for easy access, but because it is separate tables its not overwhelming data and it is kept neat and tidy to look at and not to confusing as as we have lots of aircraft parts, part suppliers, serialized info and location of aircraft parts, if these are all linked together it makes it much easier to find all the information needed in one place. As seen below in Fig.1.

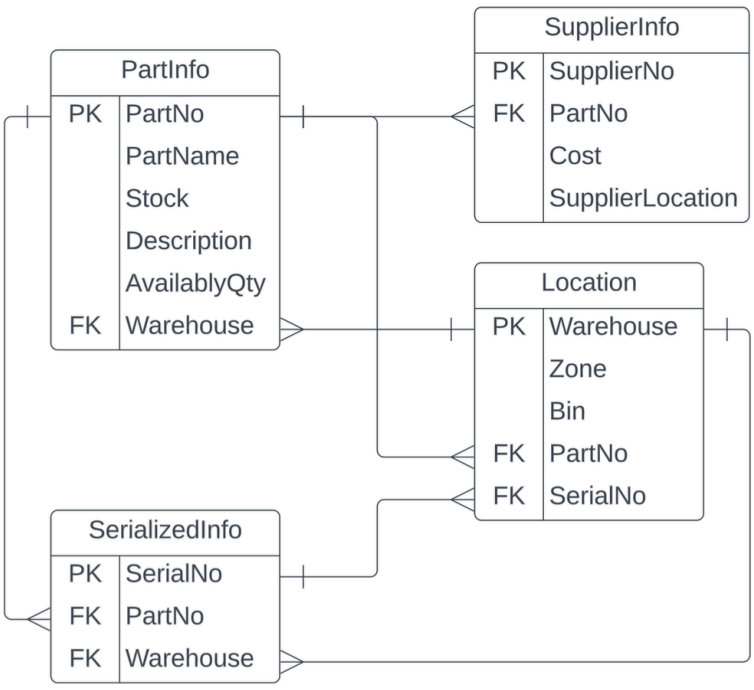

Figure 1 Illustrating the Entity Relationship Diagram for the Aircraft Inventory Management Database

MySQL requires a schema definition for the tables in the data and it also supports master slave replication and master master replication. It can also be scaled vertically, this means by adding more RAM for example, so this database can grow with the company making it future proof to grow with the company, where as mongoDB, can be scaled vertically and horizontal, meaning adding more RAM for example or adding more machines to the pool of resources. So even though MongoDB can be scaled horizontal the other features don't meet our needs for this data. The future proofing of a database is crucial for the continued functioning and growth of any organisation 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).

GDPR directive is the "Regulation (EU) 2016/679, the protection of natural persons with regard to the processing of personal data and on the free movement of such data". (European Commission, 2018). GDPR is one of the worlds strongest set of data protection rules.
The data protection act 2018 sets standards of what must be followed to meet the laws in place when it comes to handling data. The data protection act 2018 is the UKs implementation of GDPR. Personal data is protected and anyone responsible for it must follow strict rules called the data protection principles. They must make sure it is used fairly, lawfully and transparently, it is only used for specified purposes, it is only used in a relevant and only to what is necessary way, it is accurate and kept up to date, it is kept for no longer than it is needed, and handled in a secure way including protection against unlawful or unauthorised processing, access, loss or destruction and damage. (The data protection act, 2018). The database will also have to abide by the copyright, designs and patents act 1988. To ensure staff abide by these principles set in place training of staff would be needed, also the database will only be used for what it is needed for as it will only contain information about aircraft parts, any personal information will be used lawfully and only for specified purposes and all the staff must work as a team to ensure the data is always kept up to date.

So overall, to have all of the data in an inventory management database will have a huge benefit on the company, by only having to ensure one database abides by the laws and regulations rather than multiple different databases in multiple locations and them being hard to keep up to date because there is to many. The biggest benefit to the company we will see from having this is that it will be easier to look up all the information needed when looking at the aircraft parts, it will also be more cost effective, the stock department will be able to look at the data and know when stock needs ordering, they can also set up so when stock starts to get low they know when more needs ordering and the finance department will be able to use it for audits and keep on top of prices and even compare prices easier. Having a database can reduce the amount of time staff spend managing data, because staff won't need to be consistently going through multiple databases keeping them all up to date and risking errors, the data is all in one place and it will also allow the data to be analysed in a variety of ways, it will also help to improve the quality of consistency of the information and it will help promote a disciplined approach to data management. It will help increase overall productivity because it will make the jobs of searching for this data easier and ensuring it is reliable. It will also save space on staff computers, preventing duplication and allow staff to work better and faster therefore being more productive and cost efficient. With all the information being in one place its easier to secure and easier for everyone to have access to it. Having this database will also mean everyone is reading the same data and everyone who needs to has access to it, no one will be reading the wrong information therefore benefiting the company. The database meets the regulations it needs to because it only contains relevant information and will only be used for its purpose. The people trained to use the database will use it respectfully and confidentially and ensure it is up to date and personal information for example company sensitive information is kept no longer than it is needed. The staff will need to be trained in how to abide by the database regulations to ensure rules are followed.

So I believe MySQL workbench database is the best database for our use for this data, as described above the benefits it clearly outweighs the benefits of a NonSQL database. It will provide a good base for everyone to find what they need to be able to do their job effectively.

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