Boeing Corporation - Determine parameters, database plan, and implementation plan for IoT Project.

Project Profile - In partnership with the McNair Center for Aerospace Innovation and Research and the Boeing Company, our team worked to collect, store, and analyze data of the Kuka Induction Welding Robot within a MongoDB database. The purpose of the data analysis is to prevent malfunctions from happening in the future, saving the Boeing Company time, money, and resources.

Specific Client Needs
- Capability to access the data
- Capability to query data after collected
- Capability to store data in virtual environment
- Capability to display the data in meaningful format
- Capability to collect and analyze data from the Kuka robot.

Technical Requirements
- Collection of data that provides required information for McNair to gather information of machine performance
- Collect information on necessary maintenance
- Collection of data that provides required information for McNair to gather information of quality rating.

Product Deliverables
1st Deliverables / Prototypes
1. Tour McNair Center
2. Gather data and requirements for the database
3. Plan architecture and organization of database

2nd Deliverables / Prototypes
1. Database Created
2. Create an organized setup for analyzing data
3. Store the analyzed data into an easily accessible database

3rd Deliverables / Prototypes
1. Populate tables
2. Validation Testing
3. Create a dashboard

Project Success Factors
- Having a well-built database
- Having a good front end dashboard
- Collecting and analyzing data that positively impacts their manufacturing process
- Having the correct hardware and software to establish a database
- Having Virtual Machines to be able to store and analyze the data

Project Results and Future Recommendations
- Established the resources needed to be able to complete this project properly
- Created a NoSQL database using MongoDB
- Developed the plan, hardware and software needed to implement VMs for the McNair center data.

Future Recommendations - The next group should take action on getting 2 VMs setup in the IT lab on USC's network that the student group can access. From there, the data can start being stored and analyzed within the database on USC's network. This database will manage storage and provide the resources needed for predictive analysis on the Kuka robot data.

Major Project Milestones (Key Deliverables)
- Gain access to the data from the Kuka robots at the McNair center
- Creating a NoSQL database using MongoDB
- Analyze the data and create visualization
- Prepare a plan and procedure on the resources needed to complete this project with the proper database
- Establish the specifications for the Virtual Machines needed for the database and analytics
- Begin communication and implementation of developing the VMs on the USC IT lab for students

Lessons Learned
Raymond Padgett - I learned to always be thinking ahead in case of obstacles during the process.
Jeremy Middleton - I learned that it’s best to look at the smaller obstacles to complete first when dealing with a large project. A difficult project can be split into more manageable tasks when viewed in the right perspective.
Kevin Shick - I learned that communication between all of the different stakeholders is paramount to the success of a project. My key takeaway from this project is, if you encounter any possible roadblocks, don’t be afraid to ask for help rather than waste time trying to figure it out yourself.
Kevin Wise - I learned that identifying the roles of the team members is critical to success. When every member is aware of their responsibilities, work can be done more efficiently.

Key Stakeholders
- Gary Hilton (Boeing)
- Omar Aguilar (Boeing)
- Michael Johnson (Boeing)
- Udo Mohr (Boeing)
- Dr. Van tooren (McNair Center Director)
- Dr. Patten (Professor)
- Professor Gumina (SQL)
- Professor Gerdes (VB/Conversion)

Project Budget
This is the section where you list your:
- Anticipated (Time) Budget - The projected time budget for this project was calculated to be 160 hours or $160.
- Actual Project (Time) Budget: The actual total budgeted hours for the project was $150 for 150 hours of work.

Technologies Used
- Kuka Controller
- Kuka Induction Welding Machine
- MongoDB database
- Microsoft Azure

Database Structure

Project Mission Statement
To use automated methods to collect data from the Kuka Induction Welding robot, storing it in a custom built database so that it is available to analyze and prevent malfunctions from happening in the future, saving the business time, money, and resources.

Specs for VM database
For the database server:
- 4-8 vCPUs
- 8-32GB of RAM
- 0.5-1TB of hard drive space
- MS Windows Server 2012R2-2016
- MS SQL Server 2014-2016
For an analytics server:
- 4-8 vCPUs
- 16-32GB of RAM
- 0.5-1TB of hard drive space
- Red Hat Linux 6/7