UNIVERSITY OF LA VERNE
LA VERNE, CALIFORNIA

Spring 2021

SENIOR PROJECT

WORK YARD INVENTORY DATABASE

A SENIOR PROJECT SUBMITTED TO:

THE FACULTY OF

COMPUTER SCIENCE & COMPUTER ENGINEERING DEPARTMENT

IN CANDIDACY FOR THE DEGREE OF

BACHELORS OF SCIENCE

COMPUTER SCIENCE WITH A CONCENTRATION IN INFORMATION SCIENCE

BY

JOSEPH MUELL

FACULTY ADVISOR
SETA WHITBY

Acknowledgments

I would like to thank the University of La Verne faculty for all their efforts and dedication to helping every single student succeed throughout their time at the University of La Verne.

Thank you to the computer science department for doing everything they can to ensure the success of the students, we cannot thank you enough.

Thank you, Dr. Seta Whitby, for helping me strive and guide me through my time at the University of La Verne as my academic advisor but also as my mentor.

I cannot thank my parents enough for pushing me towards my success, but also for being the first to graduate from college in my family means the world to me and I hope to pave that path for my future family.

Abstract

The purpose of this project is to implement database skills learned in Computer Science into one project. This database will keep track of machines, tools, and storage items located at the Coast Machinery Movers facility for the dispatch department. Microsoft Access is used to store, analyze, and edit the information for the dispatch team. This database was successful and functional. For expansion, the data will be moved to an SQL server to be accessed via a web browser for the groundmen department.

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Introduction

Coast Machinery Movers began with a vision of bringing machinery moving at an affordable cost to businesses. Coast began in Los Angeles County and is beginning to expand to different parts of Southern California. This shift in expansion for the company would bring an uprising of a small business to a major company that can compete with larger corporations. As a result, this will begin the decline of a monopoly of the machinery moving business.

A problem that Coast Machinery Movers is facing is the move towards computer systems over paperwork. One of the first steps towards the transition was the creation of a new website. This website is much more fluid and dynamic compared to the previous one. However, the dispatch department was not under consideration of the transition. Dispatch is left with having to manage a whole inventory system on a whiteboard that shows where everything is at. Creating a virtual database would be ideal for the company as it can be accessed anywhere within the company. Eventually the database will have to be accessed outside of the company, but the time constraint would not make it feasible.

This will be the first step towards a paperless system for the dispatch department and allow the workers in the department to focus on other tasks. With the approval from the CEO and CFO a database system can be put in place for the department.

Literature Review

Author Brenda Katherine Marincic conducts a research paper on how to create an inventory database system for a local cattle ranch. Marincic mentions that the cattle ranch has no database that can be monitored which causes the farmers to have little knowledge of what is available. One thing to note is that there should be a system to understand what machinery is on the ranch. From there the machinery will be analyzed as far as: repairs, work needed, and purchase date. All of these will prove to be useful for the farmers in case a machine is needed. The database also took note of the purchase date of the machine and over time allows the finance department to make the judgement as to whether to keep investing into the machine or acquire a new machine. This idea can be added to the database system for Coast as it keeps track of the purchase date, possible warranties for the machines or tools, and any repairs that may be needed. One column that will be added to the database will be all the repairs for the tool or machine. This will be a logbook in case something was to fail then the logbook can be accessed to see if it was a bad repair or a new issue.

Authors Igor Krejci, Petr Mazouch, Kristyna Vltavska, and Roman Kvasnicka use multiple equations to calculate the depreciation value of the machines that were purchased for the agriculture business. This article shows that over time the value of the machine regardless of the reliability will begin to depreciate until the machine itself should be replaced. One note of this article is that every machine has different life spans as some will be used more than others,

therefore the value of the machine will vary depending on: usage, maintenance, and first purchase date. Although from the research paper it is hard to determine if the environment influences the machines. For example, a forklift in the machinery moving business was maintained would the forklift last longer or would it still depreciate as the forklift is under consistent heavy load or would it stay the same. This is something that must be noted as every job site is different and some of the machines are used to move small things while others push the limits of the machines in order to complete the job.

Authors Johnamae A. Khow and Michael N. Young go in depth on how a business uses RFIDs on each part for their inventory system to keep track of the location. This study proved to be effective as inventory was not missing and was easily located. This system could be implemented into my project for Coast Machinery Movers as the storage table can have an ID that is specific for the RFID. This can also help locate where the contents are stored in the yard for the Groundmen Department. Eventually this can be added to the other tables to locate where a specific tool or machine is at rather than having to manually input the location of the machine or tool. One issue with this is that the study was conducted in a warehouse where receivers can be placed on the roof of the building. At Coast Machinery Movers that cannot be done as it is an open yard with no roof. The alternative that can be done is to have poles around the yard at high altitudes with receivers to have connection with the RFIDs. This concept would need approval from the dispatch department with modifications to the idea along with the CEO for funds.

Analysis

I chose to work on this project for Coast Machinery Movers as I was a Project Manager Assistant Intern. I learned a lot from them as far as how to implement time management skills into the workforce along with effective communication with my team. The software that I used for the database was requested by the General Manager to accommodate their system that is currently in place. In this project I will be using Microsoft Access for the database since they have Office 365 and allows multiple end users in the dispatch department to have access without the use of third-party applications. Office 365 business allows multiple users to edit one file and save it to their cloud system, Coast does have separate departments in the Office 365 panel so only the dispatch department will be able to have access to the file. From there everyone will have view permission except for the manager that has read and write access.

Design

In Microsoft Access I built the tables for the database. I created 3 different tables: Machines, Tools, and Storage. The Machines table includes Available, Model, Year Built, Repairs Needed, Warranty, and Notes. The Tools table includes Available, Model, Year Built, Repairs Needed, Warranty, and Notes. The Storage table includes Customer/Company, Number of Items, Date of Storage, Description of Item(s), and Notes. These tables will be accessible to the entire dispatch department as view mode only while the dispatch manager can edit the database. In the future, the database will be accessible through a web client that will be managed by the dispatch manager as well as a backup database in case of emergency or someone gains unauthorized access to the database for malicious intent.

Implementation

The first step was to gather as much information on the machines, tools, and storage items as possible for the database. After some time, all the necessary data was gathered and was ready to be placed into the database. The tables for the machines, tools, and storage were made and sent to the dispatch manager where changes were made for their needs. While in the beginning the database was quite easy to create and since I had coursework in Database Management, I knew how to write SQL code. However, I began to have difficulties with the design of the database as I wanted the database to be simple yet informative. There were multiple instances that the database had to be changed or altered to meet the requirements for the end user. Despite all this Microsoft Access is easy to use and editing the database without having to rewrite the SQL code was much easier for the end user.

Since the company uses Office 365 the database will be shared with the General Manager and Dispatch Manager to be able to edit the data while the rest of the Dispatch Team can view the data. After some testing with multiple user's computers, I was able to confirm that the database was shared across the dispatch department and no other departments were able to access the file. After testing the dispatch managers access to the file, I was able to confirm that they have read and write access while everyone else in the department only has view access.

Conclusion

Overall, the end user was very satisfied with the project. Although Coast has taken the first step with moving towards technology by creating a new website, this is the first step for the dispatch department towards a paperless system and allows the department to function without worry of the company inventory system. This project taught me a lot about prioritizing what the end user views the system to be rather than what I may think it will be. This project also taught me how to prioritize my time and working with customers based on their time availability. I have used my Project Management class to teach myself time management as well as understanding the end user's requirement for the system. For the future, the database will be transferred over to another SQL system so that the database can be accessed via a web browser for the Groundmen Department. One option that can be free and open source for the company is phpMyAdmin and can be ran on a local host server, however, to be accessed remotely there would need to be more steps to secure the connection. More than likely an SSL Certificate would need to be put in place for the website along with creating logins and passwords.

References

Marincic, Brenda Katherine. *Maintaining a Machinery and Equipment Inventory on a Mountain Valley Cattle Ranch*. ProQuest Dissertations, 1986, www.proquest.com/openview/52439aecd1cf97fc6726e0a9864fe34e/1.pdf?pq-origsite=gscholar&cbl=18750&diss=y.

Krejčí, I., et al. "Age of Machinery and Equipment in the Czech Agriculture." *Agricultural Economics*, Internal Grant Agency of the Czech University of Life Sciences Prague, 19 Aug. 2015, www.agriculturejournals.cz/web/agricecon.htm?type=article&id=238_2014-AGRICECON .

Khow, Johnamae A, and Michael N Young. "Assessing the Impact of Radio Frequency Identification (RFID) System on the Inventory Management of an Auto and Heavy Machinery Parts Dealer." *Assessing the Impact of Radio Frequency Identification (RFID) System on the Inventory Management of an Auto and Heavy Machinery Parts Dealer | 2020 The 6th International Conference on Industrial and Business Engineering*, 27 Sept. 2020, dl.acm.org/doi/abs/10.1145/3429551.3429569.

Appendices

Appendix A: Proposal

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1 Personal background

My name is Joseph Muell and I am a student at the University of La Verne majoring in Computer Science with an Information Science concentration. I began my journey with the University of La Verne in the fall of 2017 and I will be graduating in the Spring of 2021. I chose this major as my interest in computers began when I was 14 years old building computers and websites, creating my own servers, and developing an interest in Cybersecurity. I chose the Information Science route as I have an interest in becoming an analyst that builds databases and implements new systems. I will start my master's degree in Cybersecurity with Arizona State University in the Fall of 2022 and finish in the Spring of 2024. During the time in my master's program, I will be in the military as a Cryptography Technician with the Navy for 5 years. After the military I will transfer to a government entity as an Information Security Analyst.

2 Introduction

Coast Machinery Movers began with a vision of bringing machinery moving at an affordable cost to businesses. Coast began in the Los Angeles County and is beginning to expand to different parts of Southern California. This shift in expansion for the company would bring an uprising of a small business to a major company that can compete with larger corporations. As a result, this will begin the decline of a monopoly of the machinery moving business.

3 Organizational overview

Coast Machinery Movers was created in 1980 by Larry Beard in the city of South El Monte and have been in the industrial moving business for 40 years. The company was founded with by having 2 forklifts, one truck, and 6 employees. Currently the company is so successful that it grew to having 8 forklifts, 6 trucks, and 40 employees. There are 6 departments in the company: financing, upper management, dispatch, sales, and groundmen. The groundmen go to job sites and require lots of equipment every day. The equipment they take are determined by the job site and what is available according to dispatch.

4 Problem statement

A problem that Coast is facing is the move towards computer systems over paperwork. During this transition dispatch is left with having to manage a whole inventory system on a whiteboard that shows where everything is at. As a result, the dispatch department is not happy with having to consistently look and adjust the whiteboard throughout day-to-day procedures. The General Manager must report their inventory to the stakeholders and the CEO of the company. However, the problem with this is that there is no information for their current inventory available and it takes about 3 business days to create an inventory report. As a result, this pulls the General Manager away from his

daily assigned tasks. Customers have also sent complaints regarding equipment not functioning properly. The General Manager needs to investigate these complaints however without identifying the specific equipment ID makes it nearly impossible to find what type of repairs are necessary.

5 Description of the current system

For a customer to receive the right equipment a work order must be placed by a foreman. In this work order the foreman determines: crew size, machines necessary, and tools necessary. From there the work order will be sent to dispatch so that they can place the equipment's, machines, and crews to the job. Dispatch will write all the equipment, machines, and names of the people for the job site on the white board. The next morning everyone will go to the whiteboard to know what job site they are going to for the day and take the necessary equipment with them. If more equipment is needed throughout the day the foreman will call dispatch to place a request for equipment. Dispatch will check on the whiteboard if that equipment is available and respond back to the foreman within ten minutes.

6 Description of the Proposed System

This project will build a database and inventory control for the dispatch office. When foreman needs equipment throughout the day, they can check the database to see if the equipment is available on the spot allowing dispatch to maintain the database. The database will be built with Microsoft Access as Coast Machinery Movers requests that I use that program. The database will keep track of the: machines, tools, and any storage that is in use for other companies. This will replace the current system of the whiteboard to allow dispatch to have access to an electronic database. Allow for the General Manager to generate reports for stakeholders and CEO. Allow for the General Manager to have information on the current inventory and resolve customer complaints on equipment not functioning as each equipment will be given repairs needed and the repair date(s).

6.1 Scope of the project

For this senior project only building an inventory database is the scope. Allowing the database to be accessed by web or app is out of the scope of the project. Coast Machinery Movers requested that the database is built with Microsoft Access.

7 Requirements for the proposed system design

Software:

- Coast requested that the database be built in Microsoft Access. For the future, the database will be moved to an SQL server or a myPHPAdmin server.

Information:

- Machines, tools, and storage.

8 Implementation plan

1. Gather data for: Machines (model, year built, warranty, repairs needed, and availability), tools (model, year built, warranty, repairs needed, and availability), and storage (customer/company, number of items, date of storage).
2. Create the data tables in Microsoft Access with the given information.
3. Uploading the tables to the company Microsoft Suite and test if the file can be accessed from the dispatch computers. Only the users in the dispatch office may make changes to the file.
4. Create a manual on how to access the file from the Microsoft Suite and train dispatch on how to alter the data if necessary.

9 Request for support from the company if needed

- Software:
    - Microsoft Access

10 Development time frame and cost

2021	February	March	April	May	Summary
Tasks	**1| 2| 3| 4**	**1| 2| 3| 4**	**1| 2| 3| 4**	**1|2|3|4|5**	**Hours|%**
Research	2| 2| 2| 2				8|7.25%
Design	0| 0| 2| 2	1| 0| 0| 0			5|11.6%
Implementation		0| 0| 1| 3	3| 3| 0| 0		10|5.8%
Testing			0| 0| 1| 2		3|19.3%
Final Report			0| 0| 0| 1	6|6|6|10	29|50%
Presentation				0|0|0|0|4	4|14.5%
Hours	12	5	9	32	58|100%

11 Primary contact person

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(626) 579-4510
Tinab@coastmachinerymovers.com

12 Approvals

Name: Dr. Ahmad Abu Shanab Signature: _____Date_____

Name: Dr. Ray Ahmadnia Signature: _____Date_____

Name: Dr. Jozef Goetz Signature: _____Date_____

Name: Dr. Seta Whitby Signature: _____Date_____

Appendix B: Gantts Chart

2021	**February**	**March**	**April**	**May**	**Summary**
Tasks	**1| 2| 3| 4**	**1| 2| 3| 4**	**1| 2| 3| 4**	**1|2|3|4|5**	**Hours|%**
Research	2| 2| 2| 2				8|7.25%
Design	0| 0| 2| 2	1| 0| 0| 0			5|11.6%
Implementation		0| 0| 1| 3	3| 3| 0| 0		10|5.8%
Testing			0| 0| 1| 2		3|19.3%
Final Report			0| 0| 0| 1	6|6|6|10	29|50%
Presentation				0|0|0|0|4	4|14.5%
Hours	12	5	9	32	58|100%

Appendix C: Progress Report 1

1.Were you able to accomplish everything you have promised to do the previous week?

I was able to get back into contact with my previous supervisor so that I can show up to the yard to begin collecting data. I will have to set a time and date with him due to covid.

2.Are you on task? Are you behind? Why or why not?

So far, I am on task however I do need to set the date and time that I can come to the yard to begin collecting the data. So far it sounds like he wants me there only once a week for a hour or two since they need to use the equipment right away.

3.What have you done for your senior project all week?

I have been able to contact my supervisor, I will need to create the tables for the inventory.

4.What do you plan on accomplishing for next week? List at least two items.

I plan on brainstorming some ideas for table(s) and I will set up a day and time in order for me to show up to the yard.

Appendix D: PowerPoint

Computer Science with Information Science CMPS 499: Senior Project

Work Yard Database
University of La Verne, Spring 2021
Presented by: Joseph Muell
Instructor: Dr. Seta Whitby

About Me

- Computer Science major with a concentration in Information Science
- Academic Technology Specialist - University of La Verne Wilson Library
  - Aid students and faculty with hardware or software related questions
  - Independent projects

Coast Machinery Movers

- Machinery moving company
- Created in 1970 by Larry Beard
  - Began with 2 trucks and 2 forklifts
- Produce efficient results from big to small jobs
  - Strive for excellence and customer satisfaction
- House some of the biggest tools in machinery moving in the United States

Abstract

- The purpose of this project is to implement database skills learned in Computer Science into one project. This database will keeptrack of machines, tools, and storage items located at the Coast Machinery Movers facility for the dispatch department. Microsoft Access is used to store, analyze, and edit the information for the Dispatch Team. This database was successful and functional. For expansion, the data will be moved to an SQL server to be accessed via a web browser for the Groundmen Department.

Issue with the Current System

- Transition to modern technology is slow
  - Paperwork over computers
    - Decrease in time and efficiency
  - New website
    - Updated hours, contact information, upper management
  - Whiteboard system for inventory
    - Consistently monitored, changes throughout the day, team members are unsure of inventory status

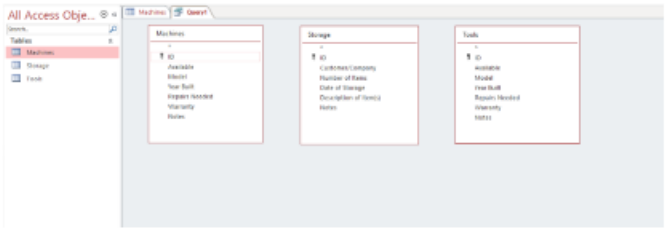


Components

- Computer
- Microsoft Access
  - Office 365

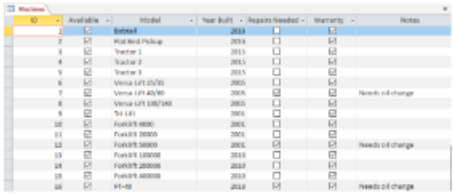
Development

- 3 tables
  - Machines, storage, and tools



Machines Table

- Availability
  - Whether the machine is available
- Model
  - Model of the machine
- Year built
  - Year the machine was built
- Repairs needed, warranty, and notes
  - Whether machine needs repairs, if under warranty, and side notes



Storage Table

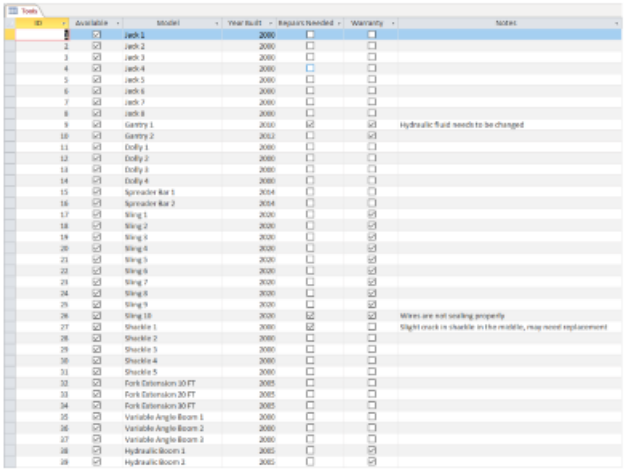
- Customer/company
  - Who the item is stored for
- Number of items
- Date of storage
  - When the items were stored
- Description of the items
- Notes

Storage

ID	Customer/Company	Number of Items	Date of Storage	Description of Item(s)	Notes
1	SpaceX	3	12/17/2020	Heaters	
2	JPL	1	1/25/2021	Hydraulic Press	
3	Summit	2	5/4/2020	Full fabrication machines	Shipped from Italy, waiting to be transported
(New)		0			

Tools Table

- Available
- Model
- Year built
- Repairs needed
- Warranty
- Notes



Future Expansion

- Create a website for the database to be accessible
  - Move database from Microsoft Access to another program
    - phpMyAdmin
  - Create website
    - HTML, CSS, and PHP
- Create a backup database with a recovery plan

Takeaways from the Project

- Courses:
  - CMPS 392 - Project management
    - Helped me with creating a timeline and verify what the user needs from the system
  - CMPS - 490 Database Management Systems
    - Helped me with understanding how to create a database with Microsoft Access
- New Concepts Learned:
  - Take the customers vision of the system and develop it
    - Originally all of my projects I have done are for myself, having to create a database for someone else based off the requirements that were given to me was a bit of a challenge

Conclusion

- Limitations:
  - Originally the project was intended to be created on a web server, however this would take much longer than the original time frame that I had
  - Instead of Microsoft Access the database was going to be created on phpMyAdmin for the website
    - Per request of the company I created the database in Microsoft Access
  - COVID-19
    - Allowed on certain days of the week
- User satisfaction:
  - Dispatch supervisor is very pleased with the project
    - "This will help with the transition towards electronic systems here at the company"
  - Ease of access
  - All users are able to easily edit the data

Thank you

Questions?