

CS179M

Team N (Microsoft)

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Our Basic Understanding

- There will be a UI that allows the operator to select what containers are going to come off of the ship [e]
- There is a manifest that contains all container information on the ship [f, g]
 - The manifest contains the position of the container [yy, xx]
 - The manifest contains the weight of the container {zzzzz}
 - The manifest contains the description
 - The manifest is sent by email at latest few hours before the ship arrives.
- All ships are in 8 rows x 12 columns grid. However, some slots are not available based on the shape of the ship. [e]
 - To move a container one position in the grid takes 1 minute
- There are two operations: [e]
 - Basic Operation: Loading/offloading the ship in the fastest way possible
 - Advanced Operation: Balancing the containers on the ship
- The log contain all discrete events with a time/date stamp [a,e]
 - The log is not meant to read by a computer, it is meant to be read by user
 - Append only (cannot modify)
 - Tracks new operators leaving and coming
 - Tracks every movement of containers
 - Time formatted as follows: mm/dd/yyyy hrs:min:sec (24 hr clock)
 - System should be able to annotate logs and any given time (make notes etc.)
 - Logs should be searchable
- Program will be able to recover from power outage and continue seamlessly from the last remembered operation

Our Basic Understanding (Basic Operation)

- You want a system that gives the optimal (fastest) way to load/unload containers off of a ship [a]
- Transfer list with information about containers coming off of the ship [e]
 - Transfer list is sent by the head office.
 - No specific structure, not ambiguous
 - The transfer list doesn't refer to the order of operations, our system does that.
 - Includes information about the the time of arrival, Offload, and the Load
- Once containers are selected by the operator, provide animation for how it is done
- The operator can control a tannoy that broadcasts in the truck holding area.
- The trucks can move from the loading area to the holding area in under 15 seconds. [e]

When CanardII arrives (about 3pm Wednesday),
Offload all Walmart deliveries, and a container labeled "Ford truck parts".
Load, Empty container from John Deere I, Empty container from John Deere II,
Raw sugar Hawaii farms 723736

Our Basic Understanding (Advanced Operation)

- You want a system that gives the optimal (fastest) way to balance a ship. [e]
- Our system should: [e]
 - display some animation which shows the steps for balancing the ship
 - give an time estimate of how long it will take to balance the ship
 - Produce an order of operations list
- Balance [b,e]
 - A ship is considered balanced as long as the total mass of the port side and the total mass of the starboard side are within ten percent of each other.
 - Does not need to be in equilibrium, just legally balanced
 - Empty containers has mass of 0
- By Maritime Law sometimes it is impossible to perfectly balance a ship, In those cases you do SIFT operation which may balance the ship [b,e]
- However, we won't be implementing SIFT operation in our software since it would make the process much slower [e]

Stakeholders

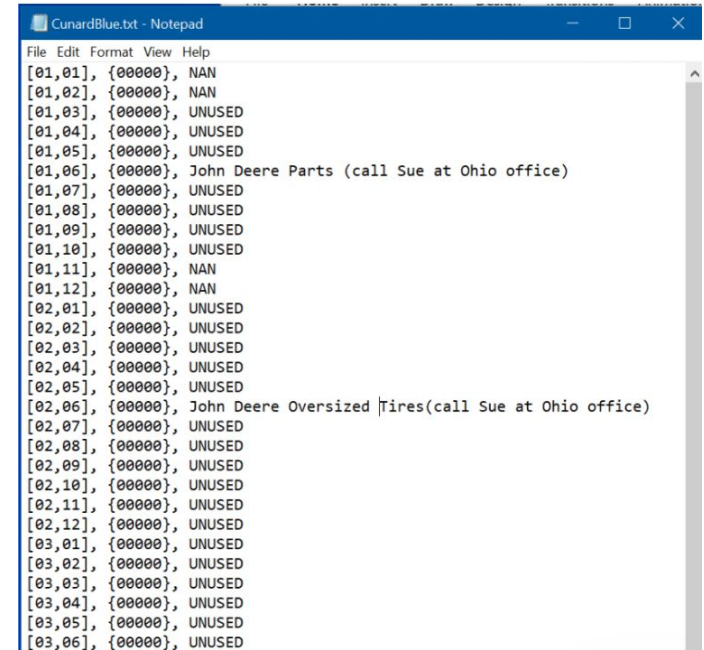
- Mr. Keogh
- Operator
- Truck Drivers
- Ship crew members
- Companies these ships are going to and coming from
- Consumers of container contents
- **Securities**

Assumptions

- Every employee is able to speak/write basic english [e]
- ~~All employees are male [h]~~
- Employees work 8 hour shifts [e] **Work time can be flexible**
 - ~~12-8~~
 - ~~8-4~~
 - ~~2-12~~
- Crane tower has 360 degree view and very bright [e]
- Crane tower very noisy [e, a]
- Manifest is always in the same format and is received by operator before the ship arrives [g]
- Truck drivers have a valid drivers license [e]
- Manifest and transfer list will always arrive on time [b]
- Manifest is always in the same strict format [e]
- Transfer list is not to be read by the program [e]

Inputs

- Manifest: Is read by the program to show the information of the containers on the ship.
 - All the manifests are in the same strict format.
 - [row, col], {weight}, DESCRIPTION
 - 'row' and 'col' are 2 digit. 'weight' is 5 digit and in the unit of kg.
 - ~~'Description' is limited by 100 letters.~~
 - 'Description' is limited by 255 letters and can be as short as 1 char
 - If the size of 'Description' is 1, it has to be printable char
 - If the description says 'NAN', that space is not available on the ship.
 - 'UNUSED' means that is an open/available space for containers
- Moving Order: An operator chooses the container to move. (Basic operation)
 - Operator reads information on the transfer list and choses which container is being moved off of the ship
 - Operators select operation from menu (load/offload, balance, upload manifest)
 - Operators select containers to be offloaded
 - For loaded containers, the crane operator enters weight and description of the container
- System date and time:
 - Everything in the log file is time and date stamped
 - All times are on a 24hr clock
 - All times are in PST



```
CunardBlue.txt - Notepad
File Edit Format View Help
[01,01], {00000}, NAN
[01,02], {00000}, NAN
[01,03], {00000}, UNUSED
[01,04], {00000}, UNUSED
[01,05], {00000}, UNUSED
[01,06], {00000}, John Deere Parts (call Sue at Ohio office)
[01,07], {00000}, UNUSED
[01,08], {00000}, UNUSED
[01,09], {00000}, UNUSED
[01,10], {00000}, UNUSED
[01,11], {00000}, NAN
[01,12], {00000}, NAN
[02,01], {00000}, UNUSED
[02,02], {00000}, UNUSED
[02,03], {00000}, UNUSED
[02,04], {00000}, UNUSED
[02,05], {00000}, UNUSED
[02,06], {00000}, John Deere Oversized Tires(call Sue at Ohio office)
[02,07], {00000}, UNUSED
[02,08], {00000}, UNUSED
[02,09], {00000}, UNUSED
[02,10], {00000}, UNUSED
[02,11], {00000}, UNUSED
[02,12], {00000}, UNUSED
[03,01], {00000}, UNUSED
[03,02], {00000}, UNUSED
[03,03], {00000}, UNUSED
[03,04], {00000}, UNUSED
[03,05], {00000}, UNUSED
[03,06], {00000}, UNUSED
```

Outputs

- All the information of the containers (manifest) are read by the program and shown to the operator through the monitor. [e]
- Animation of motion is displayed onto the screen [e]
- Log file:
 - Every entry is time and date stamped
 - Saved as text file
 - Operators name
 - Operator signs in/out
 - Containers being moved (load/offload, balancing)
- Edited manifest with “OUTBOUND” appended to it [b,c]

```
June 1st 2023: 00:02 John Smith signs out
June 1st 2023: 00:02 Anil Patel signs in
June 1st 2023: 02:04 Manifest HMMAlgeciras.txt is opened, there are 12 containers on the ship
June 1st 2023: 04:23 "Walmart Bikes Moreno Valley South" is offloaded.
June 1st 2023: 04:56 "Walmart Toasters Moreno Valley South" is offloaded.
June 1st 2023: 05:34 "Amazon Empty, Let John or Mike in packaging when arrives" is unloaded.
June 1st 2023: 06:02 Finished a Cycle. Manifest HMMAlgecirasOUTBOUND.txt was written to desktop, and a
reminder pop-up to operator to send file was displayed.
June 1st 2023: 07:11 Manifest HMMAFreiger.txt is opened, there are 34 containers on the ship
June 1st 2023: 07:43 "Apple Valley Machine parts, call 902-555-2322 if problem" is offloaded.
June 1st 2023: 07:59 Anil Patel signs out
June 1st 2023: 08:00 Sue Smith signs in
June 1st 2023: 08:12 "Apple Valley Tires, call 902-555-2322 if problem" is offloaded.
::
June 2nd 2023: 01:13 Finished a Cycle. Manifest HMMAFreigerOUTBOUND.txt was written to desktop, and a
reminder pop-up to operator to send file was displayed.
```


Scenario I: part 1

- John Smith is a 2-year employee Mr. Keogh
- He has a highschool diploma in Long Beach, CA
- After serving a 4 year term in the Navy, John started working for Mr. Keogh and has been working for him ever since.
- He works full time Monday-Friday from 12PM-8PM

Scenario I: part 2

- John wakes up 11 AM on February 10th, 2022
- John arrives to the employee lot at 11:45AM
- He shows his ID and passes the entrance of the cranning zone.
- John signs into the system and opens up his email at 11:56AM
- He sees an email from a ship captain that he will be arriving at 12:30PM
- He also sees the transfer list which was emailed by the front office
- John downloads the attached files (Manifest, transfer list)

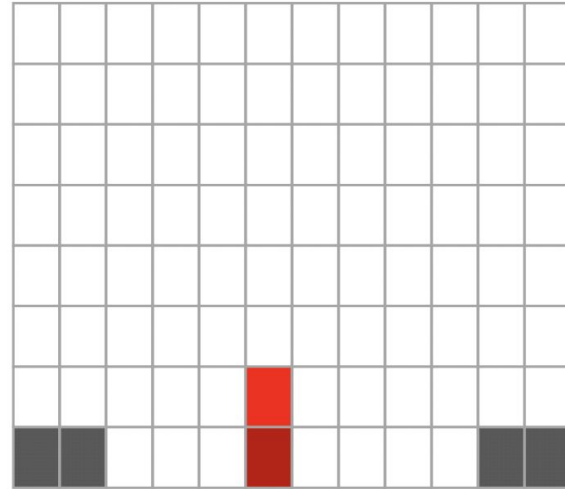
Scenario 1: part 3

- John selects the “Upload manifest” option to give the software the information of what is currently loaded on the ship
- John then opens up the transfer list to see what is going to be loaded/unloaded from the ship.

Menu		
Upload Manifest	Offload/Load	Balance

Scenario 1: part 4


- Once the manifest is loaded John selects the Load/Unload function.
- A 12x8 grid appears on the screen with the ships contents.
- John selects the containers that are to be unloaded by clicking on them
- John then confirms his selection



Confirm

Scenario 1: part 5

- Once the selection has been confirmed for unloading the containers, a second window appears asking to enter containers to be loaded.
- John enters “Big 5: Gym equipment” as the description for a quantity of 2 containers. He then enters “Amazon: Riverside Warehouse” for a quantity of 5 containers and confirms his choice.



Loading Container

Description:

Next End

Scenario 1: part 6

- After all containers have been entered for loading/unloading the program asks John to confirm if the information is correct

Offload	Load
<div>John Deere: Parts John Deere: Oversized Tires Target: Electronics ...</div>	<div>Amazon: Riverside Warehouse Amazon: Riverside Warehouse Amazon: Riverside Warehouse Amazon: Riverside Warehouse Amazon: Riverside Warehouse Big 5: Gym Equipment Big 5: Gym Equipment</div>
Edit	Confirm

Scenario 1: part 7

- After all of the information has been confirmed the program displays the operations list.
- Program also provides a file that contains an animation of all of the operations
- Program gives John a time estimate for all operations

Scenario 1: part 8

- John opens the operations list and begins studying it for the next 20 minutes while he waits for the ship
- The time is now 12:30 and the ship arrives
- John calls over the driver with the tannoy that is to be loaded with “Target: Electronics”
- John loads driver successfully
- John then calls over the first driver that is dropping off a “Big 5: Gym Equipment” container
- Once John picks up the container from the truck he is prompted by the program to enter the weight of the container
- Once he confirms the weight the program updates the weight of the container

Scenario 1: part 9

- John repeats these steps until he finishes
- John then runs the balance operation
- Upon finishing the program generates a new manifest for the updated cargo of the ship
- The program then prompts a reminder to the user to email the new manifest to the ship
- John then sends the new manifest to the ship's captain by email and gets ready to do it all over again with the next ship

Scenario 2: part 1

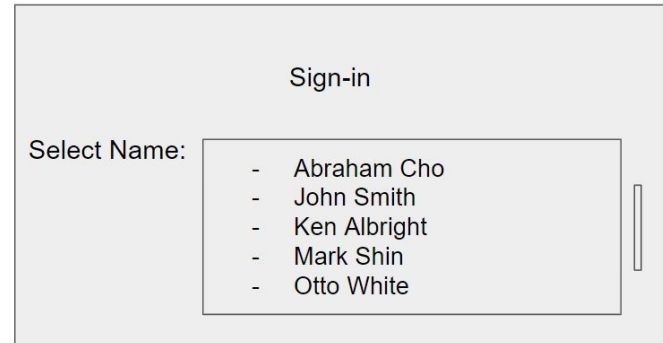
- Ken Albright is a 3-year employee under Mr. Keogh
- He has a bachelor degree in Physics in University of California, Riverside
- He works full time Monday-Friday from 8AM-4PM

Scenario 2: part 2

- Ken parks his car at the employee parking and passes the entrance to start his shift at 7:30.
- While he is chatting with his co-worker, he checks his email on the computer to make sure he has received the manifest.
- The email includes the manifest for the Mayflower ship which requires the balancing service.
- Ken goes to the crane zone at 7:50.

Scenario 2: part 3

- Now it is 7:53 and Ken arrives to his crane position and sees the Mayflower ship at the port being ready to be balanced.
- Ken signs in to the program and select 'Balance' to the program.
- The program says 'The manifest has not been uploaded', and Ken goes back to the main page to upload the manifest.
- Ken selects 'Upload manifest' button to download the Mayflower's manifest and then chooses the 'Balance' again.



Sign-in

Select Name:

- Abraham Cho
- John Smith
- Ken Albright
- Mark Shin
- Otto White

Scenario 2: part 4

- Ken now sees the message on the screen saying 'Running'
- After a few minutes, the program notifies him that the balancing algorithm has been successfully calculated showing the estimated time of the operation; 3 hours and 20 minutes.
- Ken hits the 'Start' button and the program shows the animation of how to move the first container to a new position.
- He follows the animation and completes the first move, and then he clicks 'Next' to work on the next container.
- At 11:32 AM, Ken has finished the last move and the Mayflower is optimally balanced. He notifies the captain of the ship that the balancing has completed and send him the updated manifest. He goes back to the conference room for the lunch break.

Scenario 3: part 1

- Bob Jones is a truck driver at Walmart with over 15-years experience.
- Bob works full time as a driver 60 hours/week.
- Bob has highschool diploma in Barstow, California.
- Bob has a valid driver's license.
- John Smith (same employee as scenario #1)
- John is Mr. Keogh's employee and he is the operator.

Scenario 3: part 2

- It is 2pm and John just took his lunch break.
- John loads a driver with “Target: Electronics” containers successfully.
- Next John is offloading 3 containers with description “Walmart: Riverside Warehouse”.
- John offloads the containers and moves them to the loading position.
- He notices that the truck position is empty.
- He calls up the driver, Bob.
- However he doesn't get a response.

Scenario 3: part 3

- It is 2:10pm and Bob just got back on the road after fixing a flat tire on his truck.
- Bob was supposed to have his truck ready at the loading position at 2pm.
- He still has an hour drive to get to the loading position.
- As a result of the flat tire accident, he is not going to make it on time as scheduled.
- As policy John has to wait for the trucks to get to the loading position.
- Since Bob is not at the loading position and is far away John then calls another truck and loads those containers successfully, and moves on to the next operation.

Maintenance Plan

- The following scenarios may require system maintenance:
 - Change in manifest format
 - Adding different types of ships to the fleet that are not 8x12
 - System bug that was not caught in the testing phase
- In the case of a system bug we will fix it immediately (in less than 2 business day) at no fee.
- In the case of other system maintenance we will charge a fee (~~numbers may vary~~) (5% of original cost)
- If it is a simple change of the original program, it should not cost more than 1% of the original price

Training and Documentation

- Program will be easy to use/follow
- We will provide a demonstration video as well as written documentation on how the program is used.
- Average employees should be able to use it by 2 hours of training.

Compliance with Regulation

- Maritime law for ship balancing [e]
 - Ships weight of the port side and starboard side must be within 10% of each other in order to be legally balanced

Acceptance Testing

- We will have the final deliverable ready on or before **3/18/22**
- We propose the following two tests:
 - Two weeks before the acceptance test you will send us 5 sample manifests with transfer lists or manifests that require balancing. We will test any 2 you choose, live.
 - With zero notice you will provide up to three scenarios and we will test them live.
- The following are metrics of success:
 - User will be able to login and out of the system
 - User will be able to select operation they wish to perform
 - Program will produce the optimal way to load/unload containers from the ship
 - If Mr. Keogh's operator can produce a result significantly faster than this program ($\leq 10\%$) this is considered a failure
 - The program outputs the suboptimal solution within 5 minutes in case it takes longer than 5 minutes to find the optimal solution.
 - Otherwise the program always outputs the optimal solution.

Acceptance Testing (cont.)

- Program will inform the user estimated time to complete the operations
- Program will produce an animation demonstrating the best way to move the containers
- Animation shows the total number of moves. (e.g.) Move 3 of 20
- Program will log every event with a timestamp, log will track
 - Employee logins/logouts
 - Containers loaded
 - Containers unloaded
- Program is able to perform system recovery and recover from power outage, system failure, etc.

Contract

- We propose to create a system that will solve the task at hand
- We will have a final deliverable on or before **March 18, 2022** (or no more than 5 days after acceptance testing).
- We may require up to five hours of your time (or the time of a qualified proxy) to answer any additional questions. Questions should be answered within 48 hours.
- We will not honor any requests “feature creep”, at this price point and delivery date.

Signed (for Mr. Keogh): _____ Date: _____

Signed (for Macrosoft): _____ Date: _____

References

- Elicitation interview with Mr. Keogh [a] (1/23/22)
- Interview with group E (2/5/22) [b]
- Group E Project Pitch (2/7/22) [c]
- Elicitation interview with Mr. Keogh [d] (1/17/22)
- Ship_problem_notes_update_1.pptx [e] (2/8/22)
- Sample manifest provided by customer - “CrisDeBurg.txt” [f]
- Email from customer 1/30/22 [g]
- Email from customer 2/2/22 [h]