Pirate Fighting Crisis Management System

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Table of Contents:

Assumptions:

1. The tracking component is responsible for tracking all types of boats including pirate boats in international water.
   a. Monitors movements(and location) of cargo ships, pirate ships and military resources.
   b. Military resources include: Warships, fighter jets and helicopters
2. The AI component uses information from the tracking component (movement data of various ships) to determine if a threat is imminent.
   a. The management component uses this information to determine what mitigation actions are necessary.
   b. The management component uses the AI component to find out what nearby military resources are available to fight pirates.
3. In a crisis:
   a. The management component use the AI component to receive information about the current crisis.
   b. The management component notifies the US Navy headquarters of the latest events in real time automatically.
4. Both the AI component and the tracking system will be running 100% of the time for the management system to use.
   a. There is no expected downtime for the management system.
5. If hostages are taken:
   a. The management component uses the data from the AI component to notify the military resources of the situation.
   b. The management component calls for a negotiator who can speak the same language as the pirates.
6. The managerial component is responsible for events relating to:
   a. Ships, pirate ships, warships, fighter jets, helicopters, negotiators, medical supplies, food supplies and news agencies.
   b. Dealing with other entities relative to the system.
7. We are only sending the news to the associated press which can then go to other news sources. The news sent will be information regarding time, date, location,

threat level, and duration of the crisis event.

8. After sending information to the navy, our management system's job is complete as our system waits for a resolved response from the navy.

9. There is no need for manual data entry, as the system is completely automated.

10. The managerial system has access to a database for the suppliers and the supplies they offer, therefore in the cas of ordering supplies our system will automatically contact the suppliers and send a request order.

11. The managerial system operates like a server. It has no interactive interface and receives and sends data.

12. The AI system and the tracking system are both black boxes to the managerial system and we only receive data from them. The managerial system has no knowledge of their organization or software construction besides what is detailed in the project document.

13. We don't know how the AI and Tracking systems are constructed but can assume that some of the methods in the class diagram have to exist since the data is being sent to our managerial system.

PHASE 1:

1.Requirements (Functional & Non-Functional)

Functional Requirements
1. The managerial component shall receive feedback from the A.I. component about events occuring in the field.

2. The managerial system shall send updates to news agencies about events occuring in the field.

3. The managerial system shall automatically notify the US Navy headquarters about imminent threats.

4. The managerial component should display suggested options for event mitigation
    a. The managerial component should display when the next event will take place.

5. The managerial system shall be responsible for events relating to ships, pirate ships, warships, fighter jets, helicopters, negotiators, medical supplies, and food supplies.

Non-Functional Requirements

1. The managerial component is a mission-critical system: should have 100% uptime.
2. The managerial component must maintain constant communication with the AI component 100% of the time.
3. The AI system must maintain communication with the tracking system 100% of the time.
4. The managerial component must be able to communicate mitigation decisions to the AI component and the US Navy headquarters within 2 seconds.
5. The system failure rate must be less than 1 failure per 1000 hours of operation.
6. After each attack, the managerial system should accurately send information to the news companies, whenever its not being used.

Use Case Diagram

Managerial Component
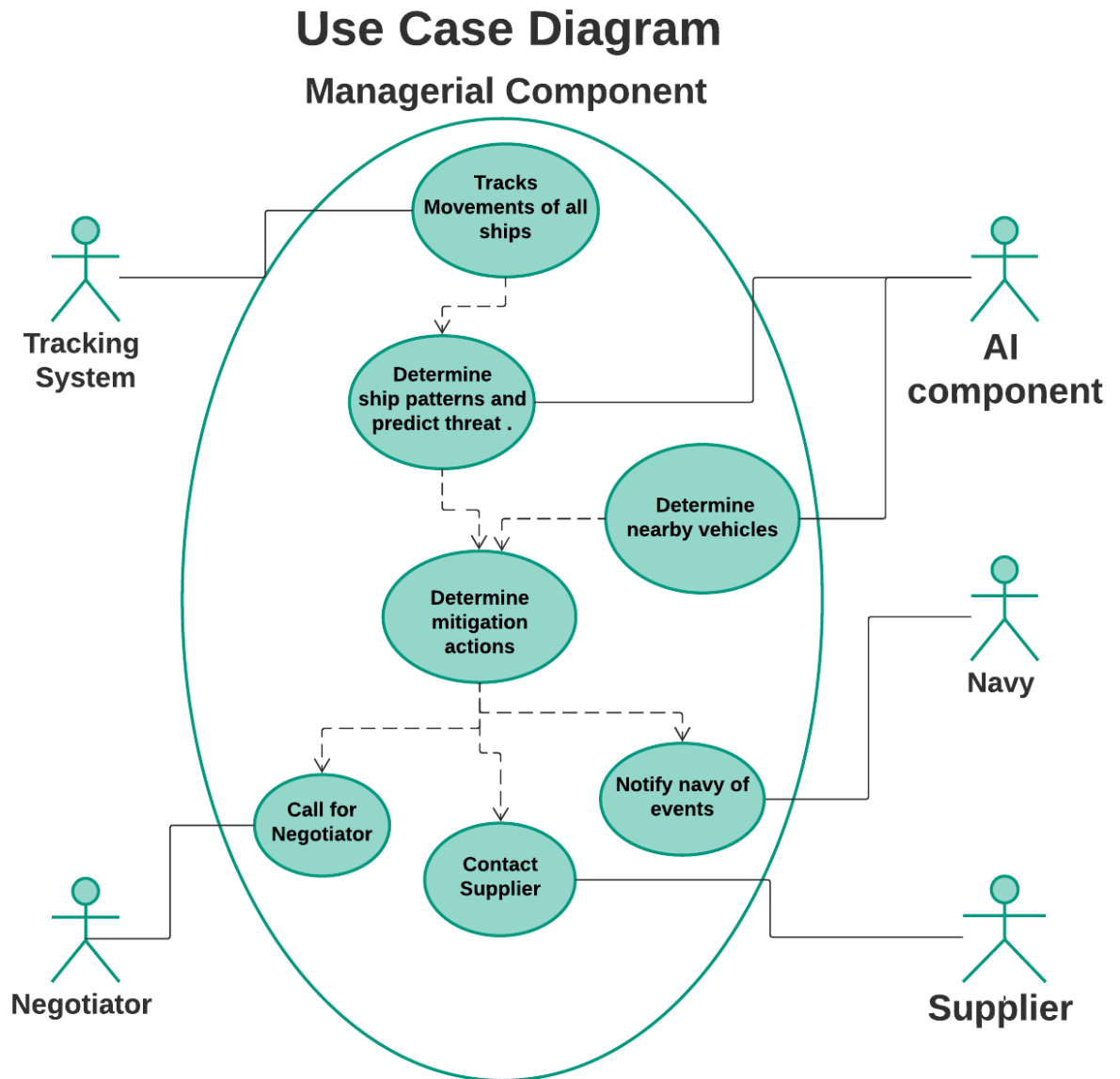
The Use-Case diagram consists of 5 actors; Tracking System, Negotiator, AI Component, the Navy, and a Supplier. These actors all play a role in the Managerial component we've been given to describe. First, the Tracking System tracks the movements of all ships in the waters of our system. The AI component then determines the ship patterns and predicts incoming threats. Based on all this information, our

Managerial component determines the necessary mitigation actions to be taken. These mitigation actions can be; calling for a negotiator in case of a hostage situation. A negotiator that is able to speak the language of the pirates is needed to minimize casualties and cooperate in a correct manner. Contacting a supplier can also be an action taken by the Managerial System. In the case of aiding ships with items, calling for a Supplier that can provide this service would be essential. Last, the Managerial component may decide to call the Navy. The Navy can then deal with a situation presented to them and take action in a beneficial way. Thus, the Managerial component controls situations in the waters and is a pivotal part in this way.
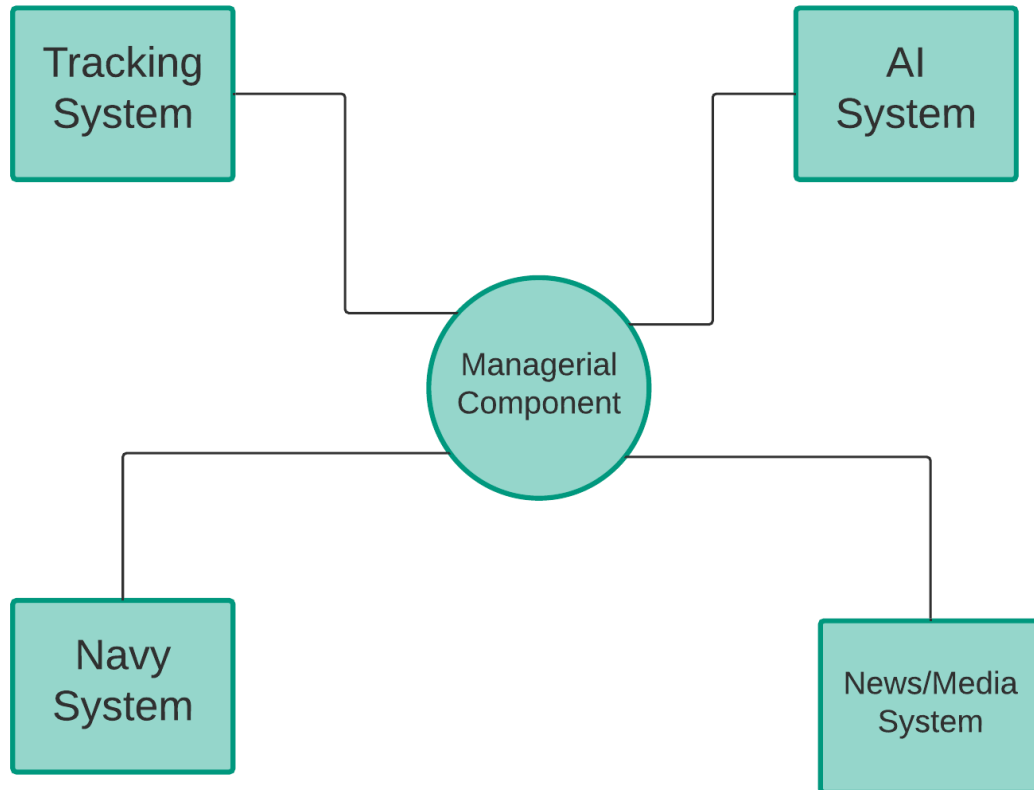
Use Case Narrative

Use Case Number	1
Use Case Name	Mitigaton
Purpose	Determine the necessary mitigation actions to be taken
Primary Actor	Managerial Component
Secondary Actors	1. A.I. Component 2. Tracking System
Priority	High
Preconditions	1. AI Will use the tracking system to determine if a threat is imminent
Exceptions	1. Tracking System fails to communicate back to AI 2. AI Unable to retrieve information from the Tracking System
Frequency of Use	Everyday : 24/7
Scenario	1. Tracking system tracks movements of all ships in international water 2. AI will use the information form tracking system to determine if a threat is nearby 3. The managerial component uses information from the AI to determine mitigation actions to be taken 4. Also notify warships that can fight-off pirates

This use case is very important out all most the use-cases we could have chosen to use in the use case narrative. The name of this use-case is mitigation and the number identification is 1. Very simple use case narrative as it describes any mitigation actions to be taken in certain situations. So first off, you would have three actors, one primary actor being the managerial component then the secondary two actors would be the AI component alongside the Tracking system. Now it is a high priority because of what it can provide and that is safety for anyone on international waters. So in this use case narrative the AI component will use information from the tracking system to determine if a threat is imminent. The tracking system will start to track every single ship that is on international waters and send that information to the AI component. The AI component would scan through the information retrieved and decide if their are any ships on the water that are not supposed to be there. If it finds these situations it would immediately send information to the managerial component about having a serious threat on international waters. The managerial component once it receives that information would have contact with the Navy headquarters informing the situation to where the Navy would determine to take action. This use case is very important like we stated before and thus it has to be up and running for 24 hours and 7 days non stop. If somehow the AI cannot connect to the managerial or the tracking system, the tracking system stops tracking or the Navy does not receive their information then international waters would not be in safe condition for all the ships out there.

3. Domain Analysis (System Context Model and Data flow diagrams)

Data Flow Level 0

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Tracking                              AI
System                              System

                Managerial
                Component

Navy                              News/Media
System                             System
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The data flow level 0 diagram is pretty straightforward and does not need a genius to construct and understand. The main entity is going to be the managerial component and it would be linked with the Navy, Tracking system, AI component and the Media. Whatever the managerial component has it will be sending the information to the appropriate channel. If there are threats then it would go the the Navy and media, if it needs contact with nearby supplies it would need to track them using the tracking system information provided.

Data Flow Level 1
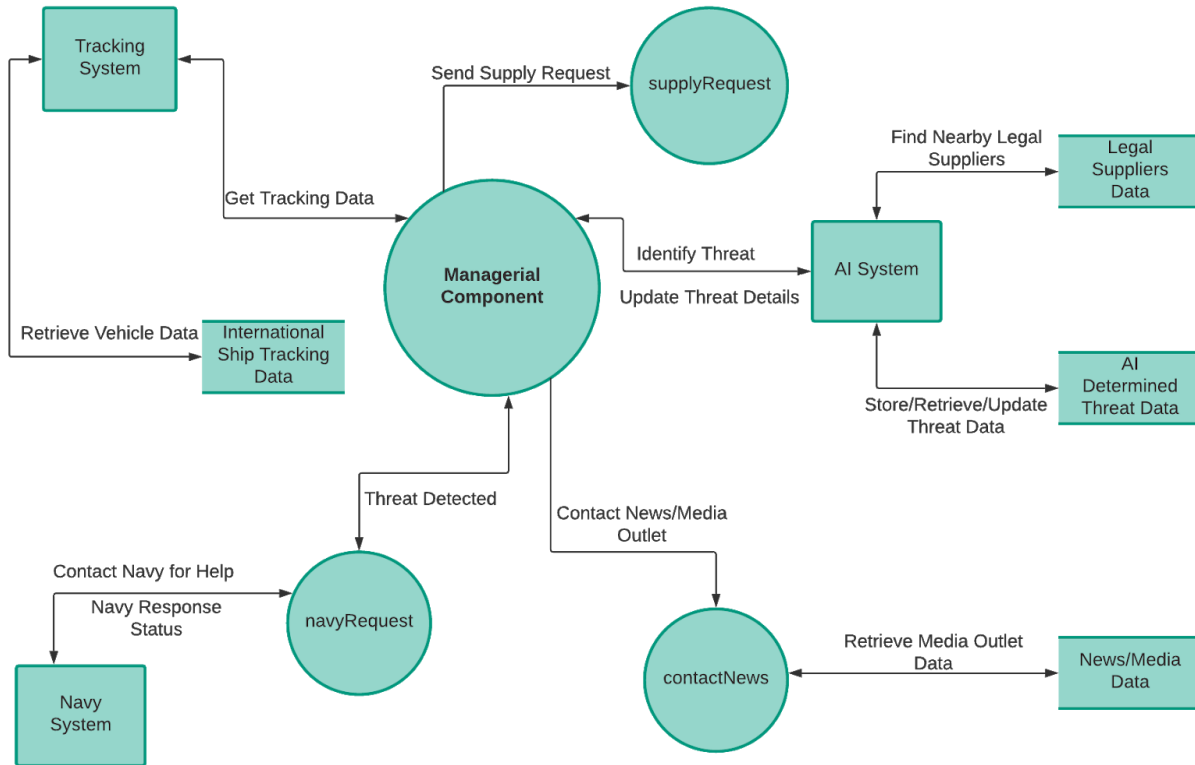
The Data Flow Level 1 diagram shows more detail than the Level 0 diagram. Here, you can see the high-level subprocesses that make up the Managerial Component for the system. Arrows indicate directionality of data flow and the purpose of that action. Several datastores show how specific information can be accessed and used by the system. As an example, the contactNews process can collect data about news and media outlets like the Associated Press by interacting with the News/Media datasource. It can use that data to send crisis event information to the appropriate sources.

PHASE 2:

1. Behavioral model

Behavioral Diagram - Sequence
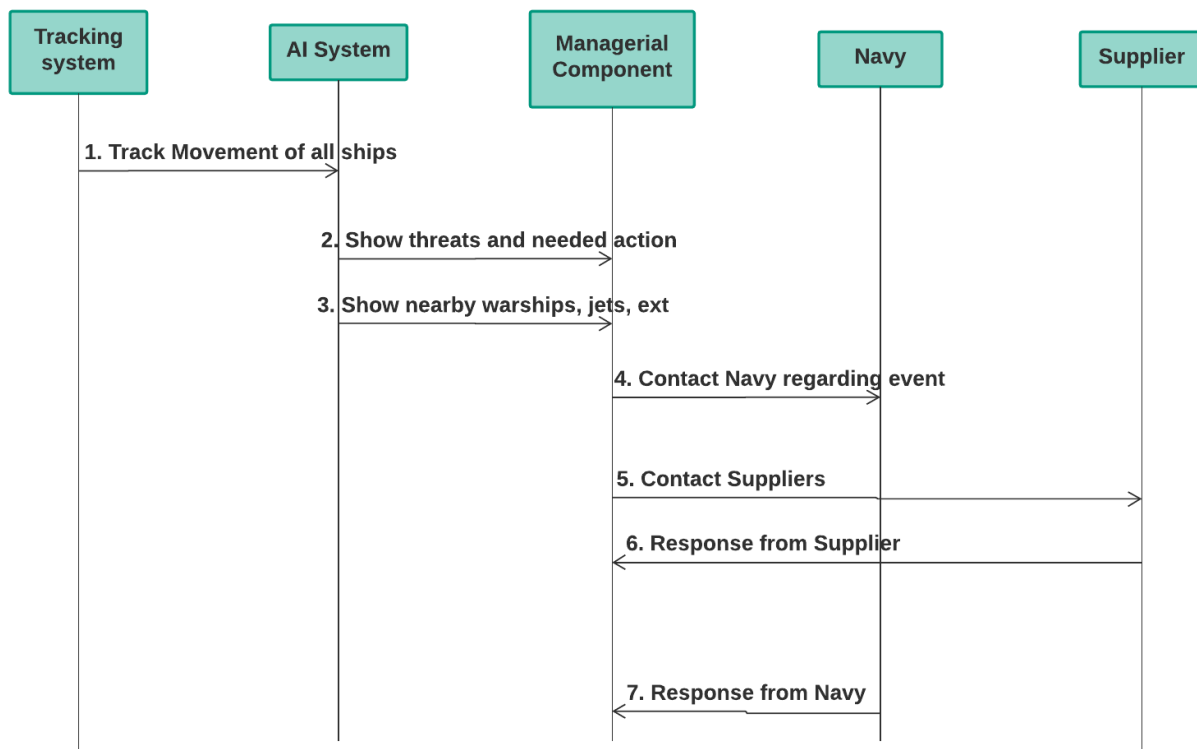
As a group we choose to use a sequence diagram for our behavioral diagram rather than a state diagram. In this sequence diagram we show the flow of data for the use case. The use case starts with the tracking system which initially provides information regarding all the ships in international water. The AI component takes that information and contacts our managerial component regarding any threats that are likely to occur along with nearby ships, warships, jets, and more. Our managerial components then serves as the middle guy that will take the information from the AI system and contact the navy and suppliers if necessary. Overall the sequence diagram shows the flow of data for our

use case.

2. Object Oriented Design (Class diagram)
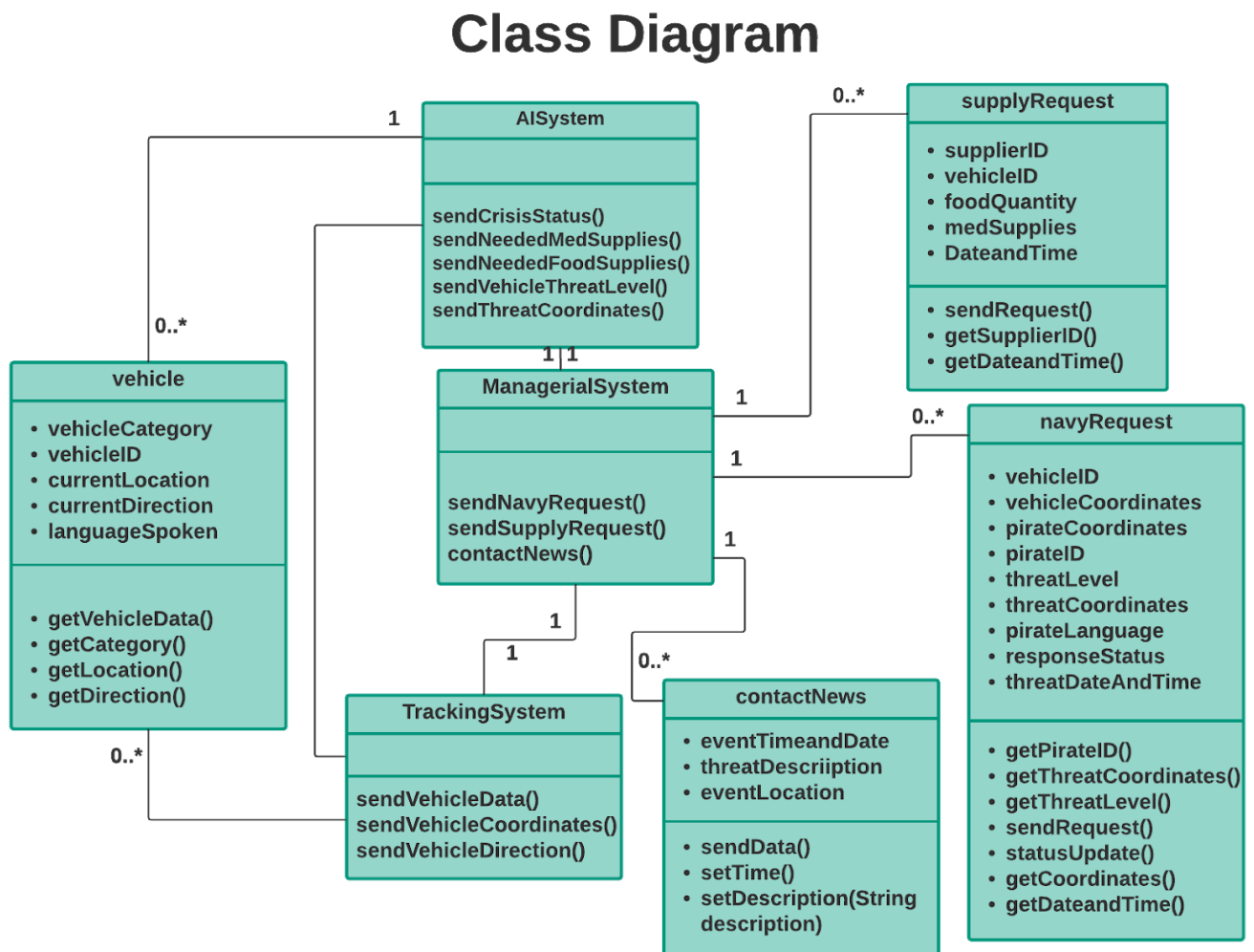
Class Diagram

The class diagram provides a description of the classes that make up the managerial component of the system. The Managerial System class acts as a top-level driver class, providing an environment for objects of the other classes to perform the necessary tasks.

From here objects of the AISystem, Tracking System, vehicle, supplyRequest, navyRequest and contactNews classes can created and used. The AISystem class provides the ManagerialSystem the ability to interface with the external AI system. Methods such as sendVehicleThreatLevel() are used to retrieve information from the external AI system and provide it to another object within the ManagerialSystem. The vehicle class is used to represent real-world vehicle entities, such as commercial ships, pirate ships and navy resources. Data retrieved from the AISystem and the TrackingSystem is used to create vehicle objects. Those objects can then be referenced directly by other objects within the ManagerialSystem. The supplyRequest class provides the ability to send requests for food and medical supplies to legal suppliers. A supplyRequest object is created when the AI system determines that an event has occurred, data about the event is used to determine the appropriate suppliers and supplies and then a request is sent. The getDateAndTime() method provides the ability to timestamp requests. The navyRequest class provides the ability to send a request for assistance to the US Navy Headquarters once a dangerous threat has been detected. A request sent by an object of the navyRequest class is the primary means by which a ship may receive direct assistance from the Navy during and after a pirate attack. Data about the vehicles involved in the event (including coordinates, threat level, language of the pirate ship, etc.) is sent to the Navy so that they can determine the appropriate response. Given the ever-shifting landscape of available resources, the Navy is best suited to determine what action they can take once they are aware of the crisis.

PHASE 3: Software project introduction

1. Software project introduction

a. Project overviews
i. Objective

The objective of the pirate management crisis fighting system is to create a management system that would take inputs from the AI system to mitigate threats and act accordingly. Our management system would receive information from the AI component regarding pirate ships that would potentially cross paths with military ships and information regarding where the event/threat would occur. When the AI component sends us the viable information, our system should quickly respond by sending a threat

signal to the navy and the suppliers if needed. After we contact the navy, our system should wait for a resolved response for that specific event. When the event/threat is resolved and our system is not being utilized, a signal should be send to the news agency about the events that occured,

ii. Additional Goals

- Have the managerial system be running 100% of the time.
- Manage a backup component just in case the managerial system goes down, probably a hidden remote location where only credential people know the location.
- Very secure network, untouchable software that cannot be accessed by anyone but only some important individuals, like FBI directors.

Project Deliverables

Once the project is complete, there are several deliverables that can be expected:

1. The executable code module will be available for integration into the greater system, along with the AI component and Tracking System.
2. The design documents:
    a. Specifications
    b. Use Case Diagram
    c. Use Case Narratives
    d. Data Flow Diagrams
    e. Behavioral Diagram
    f. Class Diagram
    g. Timeline
    h. Gantt Chart
3. User Manual:
    a. An explanation of the purpose and usage of the system.
    b. As this is intended to be a fully automated system. There will be no instructions pertaining to an 'operator's interface. There will be, however,

> documentation on how the system functions and the purpose of each class.
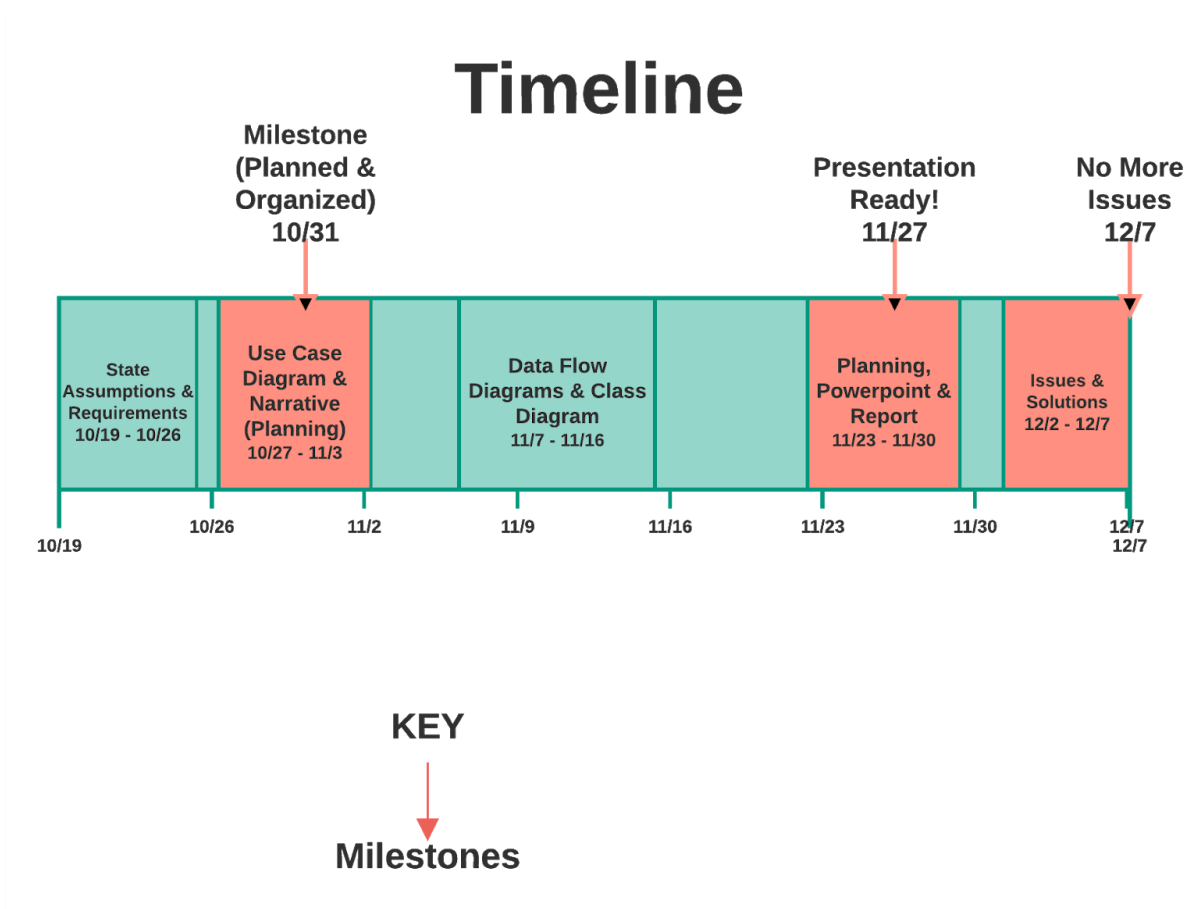>
> c. Class descriptions
>   i.   Each class will be fully documented and described. Each attribute's purpose is detailed along with the function of each method.

During the development of the project, there are other, related, deliverables:

1. Based on the development timeline, periodic, regular reports will provide and indication of progress.
2. As development milestones are met, finished executable code modules will be provided.
3. Along with each module, documentation on the module will be provided.

2. Project Plan

a. Project Activities and milestone

Timeline

Milestone (Planned & Organized) 10/31

Presentation Ready! 11/27

No More Issues 12/7

| State Assumptions & Requirements 10/19 - 10/26 | Use Case Diagram & Narrative (Planning) 10/27 - 11/3 | Data Flow Diagrams & Class Diagram 11/7 - 11/16 | | Planning, Powerpoint & Report 11/23 - 11/30 | Issues & Solutions 12/2 - 12/7 |

10/19   10/26   11/2   11/9   11/16   11/23   11/30   12/7   12/7

KEY

Milestones

The timeline was created during the first meeting we had as a group. The first thing we discussed about was how are we going to be using each week and listed down every task to be completed for the week. We used and followed this timeline to make sure that the project was finished in time and have the group always be ahead of time on the deadlines of the timeline created. The arrows that point to the red blocks of tasks were the milestones of our project. Which means to the group after completing this specific task meant that a large and difficult portion of the project was successfully completed. The project started with the first week of the group having to read the project description many times and stating the important assumptions that the group could find out. Also list down the requirements needed for the system the group is trying to create, whether it was non-functional or functional requirements, the group listed everything that we could possibly find. The following week the use case narrative and diagram were getting started. Once that milestone was finished we could look at other diagrams and just related them to the use case that was just created, that was why we decided to choose the first milestone of our project to be the first diagram we accomplished. After creating the rest of the diagrams we started to put everything together for the presentation. It was not a good time for the presentation because it came on time of the thanksgiving holiday, people were getting lazy and you can not blame them. Thankfully it was accomplished and another milestone completed. The final step of the timeline was to state the problems that the group faced and the solution that could be found for those specific problems. Of course that was the final milestone and most important one because after that the group could confidently submit the report without any problems facing the project.

Gantt Chart

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	
Requirements	Requirements						Phase 1
Use Case Diagram & Narrative	Use-Case Diagram						Phase 2
Data Flow Diagram		Data Flow Diagram					Phase 3
Behaioral Diagram			Behavioral Diagram				
Powerpoint			Powerpoint				
Class Diagram				Class Diagram			
Timeline graph					TImeline graph		
Objective & Goals	Objective & Goals						
Report					Report		
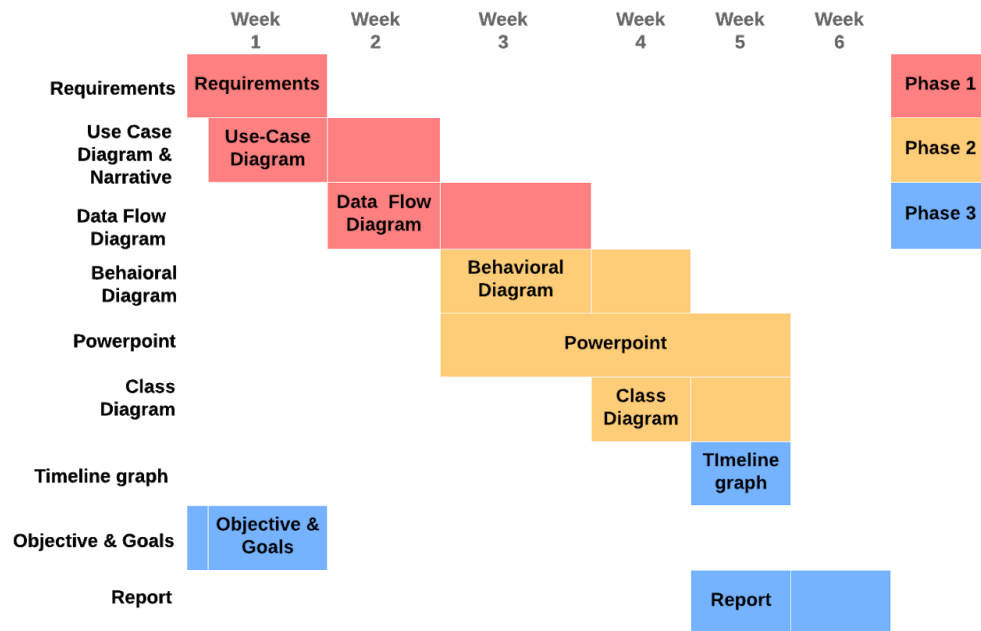
In the Gantt chart, it is similar to all the other project scheduling diagrams we used but this one was created last. Because of how unsure we were to actually follow the Gantt chart, we mostly relied on the timeline diagram for our planning but this chart was used to ensure everything was done in the right time and no delays of the software planning was not met in the deadline. The requirements and use-case diagrams were needed to be completed before week 1 was over because the data flow diagram needed to be started and completed in week 2. We also wanted to start the class diagram but we needed more manpower to work on that one so we decided to split in the for phase 2 and finish everything else, leaving class diagram last to be accomplished. The final phase was started around week 5 which was the including the planning strategies we wanted to use and creating the report once the whole team worked and finished the class diagram. Of course the objectives and goals were set in the beginning of the project even though it

was stated to be apart of phase 3, which made no sense to us and will be mentioned in our report about one of the problems we faced during the project.

Network Diagram
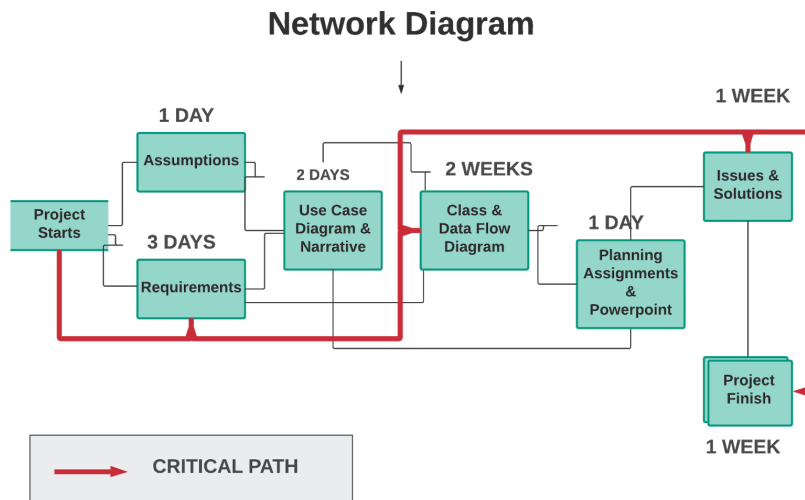
In this diagram we created our own timeline of the project to illustrate what significant steps it took us from the start of the project till the finish line. The diagram started stating assumptions and listing down requirements needed for the managerial component. The second week we started the Use case diagram and narrative, which was a fast process so we decided to start right away with the class and data flow diagram. This process phase took the longest for us to complete then we went on working with our presentation. We discussed some issues we faced, which will be covered soon with solutions we came up with as a group. The project was finished right on time and all the deadline that we assigned the group was completed in time. We added a critical path to our diagram to show the longest assignments for each project phase took us. We can see that the requirements took more than the assumptions and class diagram took longer than the use case diagram. Issues and solutions took longer than the planning because more discussions were needed and the project finish process took a while for the group to combine everything together and make sure nothing was missing.

Project Responsibilities:

Each member of the team had certain assignments to accomplish each week we would meet up and would have to complete certain assignment before our next meeting. So we had a process of contributing to the team with dedicated deadlines to be followed.

Omar Said: Was in charge of the creation of the use case narrative, data flow level 0 diagram, Gantt chart and Network Diagram including the critical path.

Parth Patel: Stated the assumptions of the entire project, created class diagram with help from Dillon. Parth stated the requirements of the project, created the behavioral model and the outline of the powerpoint slides.

German Guzman: Creator of the use case diagram and data flow level 0 model. Helped out Parth and Dillon on the class diagram and created a timeline for the group to follow.

Dillon John: Stated assumptions with Parth and had a helping hand with Parth and German with the class diagram. Stated some more requirements and organized and designed the groups powerpoint slides.

Every member from the group also put in time to finish the report. The workload was equally distributed.

Experience and Issues:

Problems:

So starting off with the interior problems this team faced was being able to meet up at the right time and place. Most of our schedules were packed, whether it was some team members having classes during the meetups we tried to set up, or work outside of campus came into play or even having to leave early from the meet ups to avoid traffic or "family needs me". Of course this was a small problem because thankfully through texting and video chats using the app Discord allowed us to be in contact with each other 24/7. We usually communicated through the app when we could not meet up during the weekdays. But eventually we got the project done in time and everything was looking great.

Another problem we faced and this problem annoyed the whole team alot, it was the description of the project itself. The team felt not a lot of information was provided

so we would second guess our choices and options toward the project. The organization of the project did not make sense to follow. The phases were not making sense at all, whether it was the group having to create the planning schedule well after most of the diagrams were created or whether we had to create several diagrams that meant the same thing with the same information. The project was not well described but after intense discussions within the group we all came to an understanding on what exactly we have to accomplish. Obviously every phase of the project was completed but the team planned to start with whatever phase made the more sense and that was phase 3. Phase 3 included planning and we made our mind that before started the project, yes phase 1 said to start with the objective and goal but the team wanted to first decide a team leader for each phase and the timing and deadline of each one as well, all fell into the category of phase 3.

Despite all these problems the project has been done with everything that is required and asked for available in the report, but the team did not follow the project steps but we did try to make it work in our favor.

Knowledge learned:

The team mastered their skills in all the diagrams we have learned in this course, whether it was the use-case diagram or the class, data-flow diagram, the team I believe mastered them all. The whole team really did not understand the true meaning of teamwork in the beginning of the week or even understanding the importance of one finishing a task before a certain deadline. But when one became leader it felt he had a bigger responsibility to accomplish his goal for the week or he would have to take the blame at the end of the project. After the team understood the seriousness of the project and how important the deadlines are, we all started to taking it very serious and reminded ourselves that this is not a hard project to do because we have learned all of these materials so it could not be as hard as the paper makes it out to be.

The team overall learned the true meaning of success because we all learned how to help out, teamwork and the no I in team. No one from group wanted to do this alone but from the looks of it you could tell they all had the potential of doing it but the team actually worked together, tried their best to come on time to accomplish their tasks and go home. The team showed persistence and that is something this team can come out this project saying they learned and will use this type of resource knowledge in the near future, if any opportunity crosses their paths.

REFERENCES

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    a. Lucid Charts
        i. http://www.lucidcharts.com
2. For report
    a. Google Docs: Docs
        i. https://www.google.com/docs/about/
3. For Presentation Slides
    a. Google Docs: Slides
        i. https://www.google.com/docs/about/
4. For group communication
    a. Discord Communication