Final Project

Computaion III

Prison App

15th November - 24th December

NOVA IMS

2021

Contents

1 Project Rules **1**

2 Project Description **1**

3 Prisoner **3**

4 Prison **4**

5 Contraband **5**

6 Main Class **6**

1 Project Rules

This project aims to evaluate your ability to implement the knowledge obtained during both the practical and theoretical classes of Computation III while also assessing your capability of solving problems in a creative and technical way.

The groups are the ones you may find in the excel file attached to the message sent on the 30th of October. No modifications are possible at this time. The deadline for the delivery of this project is the ***31st of December, 23:59h***. Groups who will not respect this deadline will suffer a value for each day of delay (up until 5 days, afterwards the project will not be accepted and the students will have to do the second phase exam).

All projects must be defended on the day of the 1st phase exam. The defenses will start at 8:30 on the 14th of January and a detailed schedule will be provided in that same month. In the project defense, you will be asked questions regarding your implementation of the project as well as questions about the theoretical concepts.
All members of the group will be asked questions and students who will not be able to provide satisfactory answers will be discounted.

You must deliver an **UML class diagram** of your project.

Projects will be delivered through Moodle (Using the correct delivery link).

Make sure you read every section carefully!

2 Project Description

Your goal in this project is to implement the necessary classes in order to create the "Prison App".

Your imagination and implementation ability is going to be tested! You will be given a general idea of what "Prison App" consists of and you will be given the liberty to make it come to life in the best way you find possible! Be creative, think out of the box!

This app will not only contain simulations of days at a prison but also implementation of different prisoners that according to their traits go about their day differently (Engage in different activities, work in different places, etc...)

Keep in mind that all of the classes must contain a constructor (if applicable) and all the "obvious" methods (methods that return the private variables that the class might have)

The overall behaviour of the Prison is:

- Each prisoner is an individual with specific characteristics that either refer to his personality (e.g., intelligence, mood tendency, food preferences, etc...) or his sentence (e.g., sentence duration, crime committed, possibility for parole, etc...).

- Throughout the days, prisoners move around the prison in order to engage in their daily activities like their work or recess time.

- Contraband is part of the daily reality in prisons. Given how some prisoners could be hiding contraband, Correctional Officers' (COs) will try to locate and confiscate it.

- The prison is a dynamic environment were prisoners interact and events happen

Your **"Prison App"** will...

- Simulate days in the Prison:

  - During each day, prisoners will interact with others and engage in several activities: all prisoners will have to eat, shower, share a space with others, those who have a job will work, those who are not in isolation will get recess time, etc..

  - During each day, some prisoners try to hide contraband.Their success depends on a series of factors that you consider relevant (e.g., their intelligence, their access to different locations, their cellmates, etc...). Correctional officers will perform searches. The number of searches a day will also depend on a series of events (e.g., a Cell block with more violent prisoners might get more searches than one with fewer, etc...). Note that not all prisoners will hold contraband. It's up to you to decide which ones would.

  - During each day, prisoners interact with each other. It's up to you to simulate that interaction in the most original way possible. For instance, they can become friends with each other, fight, or do anything else you can think of.

- Represent the prison complex:

  - Keeping track of all the prisoners and staff, knowing where they are in the prison at any time.

  - A prison is composed of different areas. You have the cells (divided into different cell blocks where different types of prisoners are placed), the showers, the cafeteria, recess area, electrical units, commissary, warden's office, staff room and others. All these different locations are connected with hallways

and pathways. Naturally, Not everybody has access to all places.

When going through their different activities (e.g., exercise, play, work, visit other inmate cells), prisoners must move from one point of the prison to another.

3 Prisoner

- Each prisoner is an individual with specific characteristics and a personality:
  - Intelligence, charisma, friendliness, food preferences, activity preferences, mood tendency and others are examples of personality characteristics that can influence the way the prisoner goes about their days in prison and how they interact with others.
  - throughout their stay in prison inmates can be more or less satisfied. Their satisfaction could depend on many factors like how many activities they got to do, how many social interactions they had, if they enjoyed the food, if they were in the presence of inmates they liked/disliked etc...
- Each prisoner is an individual that committed a crime and got sentenced for it:
  - Duration of the crime, severity of the crime, partners in crime, location of crime and others are examples of things that can be used to describe a crime
- Some prisoners might have a job within the prison (e.g., in electric, the cafeteria, cleaning, etc...)
- Prisoners will be located in a specific cell block or in solitary. And therefore they can (or not) interact with other prisoners.
- They might try to hide contraband either in their cells, other locations or on their person. When caught, they may face added sentence.

!!!! Each prisoner goes about their day, moving through the prison by **ALWAYS** going through the **shortest path** possible between areas. Calculate the shortest path using a Graph algorithm that you learned in class.

4 Prison

You must represent the prison by its features (prisoners, staff and composition).

- As previously described a prison is composed of different areas (e.g., cell blocks, cafeteria, etc..) that are joined by hallways and pathways.

- Different areas are adjacent to each other. For instance, if the maintenance room is right after the cafeteria, it is adjacent to it.

- The prison will have daily activities and staff that ensure that it runs smoothly. Anything that happens in the prison must affect the relevant features. For instance, a prisoner going to work will have their money balance updated at the end of the day or if a fight happens prisoners will be separated and put in different blocks, etc...

You can choose whatever layout you want for your prison. Make sure you computationally represent the location of each area well so the layout of the prison is clear and the paths that the inmates undergo are simple (e.g., Cell A12 –>Hall A1 –>Hall A2 –>Showers).

An example of a prison layout can be found below (taken from the game - Prison Architect):

5 Contraband

Prisoners will have contraband. Contraband are illegal items like cigarettes, drugs, alcohol, shivs and others.

- Contraband can be found on inmates or hidden in different locations. Some items are more severe than others (i.e., a prisoner will get into more trouble for a weapon than they would for a cigarette
- When found by a CO on an inmate (or hidden) it must be confiscated and removed from the prison complex.

6 Main Class

All of the little pieces of our "Prison App" will come together in our Main class. In this class you must make the magic happen! As mentioned endlessly during our classes your creativity is always the limit of your ability! You can get as creative as you'd like/can in this implementation. However, some important guidelines are important. The overall idea of this class is the following:

- Create 10 different prisoners. Ask the user if they would also like to add prisoners on top of the ones you created. They are allowed to add as many prisoners as they would like

- Simulate 10 days in the prison. Consider 2 as the default amount of random contraband searches.

- Each day, prisoners that work must do so.

- As the day progresses, prisoners move around the prison to do their activities and the user must be informed of their moves. For example, something like "Prisoner #12AB64 is moving from his cell to hall A" can be printed on console. Remember they always move around using **the shortest path possible**. Note that what activities an inmate will do will depend on their job, personal preference and the time of day (e.g., an eating schedule can be in place, curfew, specific recess times, etc...)

- After the 10 days are simulated, output a summary of the prison activity. You can get as creative as you'd like in this step but you must provide the user with information about:

    1. Number of contraband searches
    2. Number of confiscated items
    3. Number of prisoners caught in illegal activities (i.e., with contraband or fighting)
    4. Overall average inmate and staff satisfaction

Good work! ☺