ID2209

ASSIGNMENT 3

COORDINATION & UTILITY

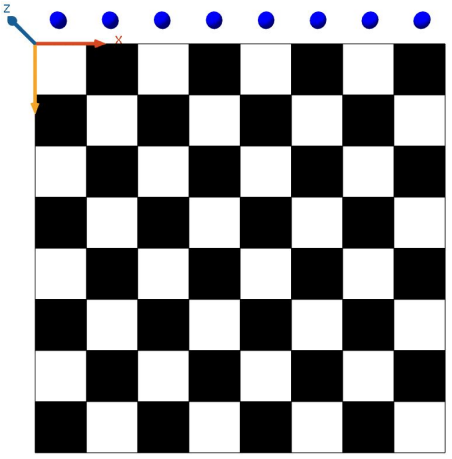
Introduction and objectives

This assignment was divided into two different tasks:

1. **N-Queen problem**.
2. **Festival, highest utility problem**: + *Extra*: **Global utility.**

Task 1 : N-Queen problem

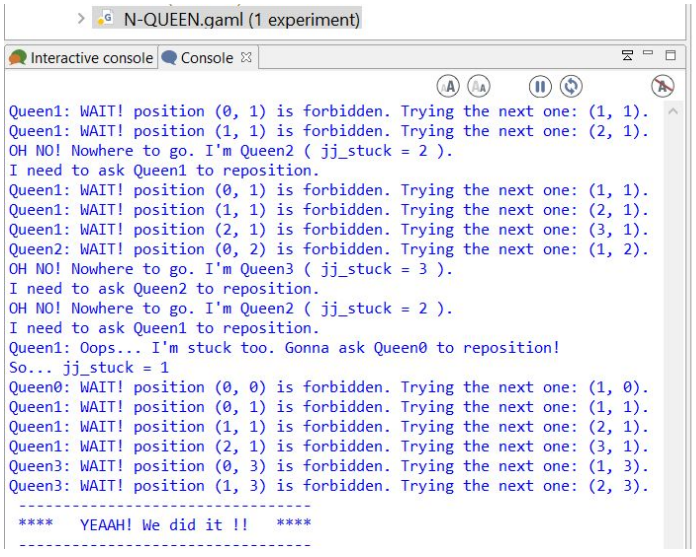
The objective in this task is to place N queens on a NxN chessboard such that each queen cannot attack or be attacked from all other queens; each queen is an agent and they communicate one with each other to establish the permitted cells.

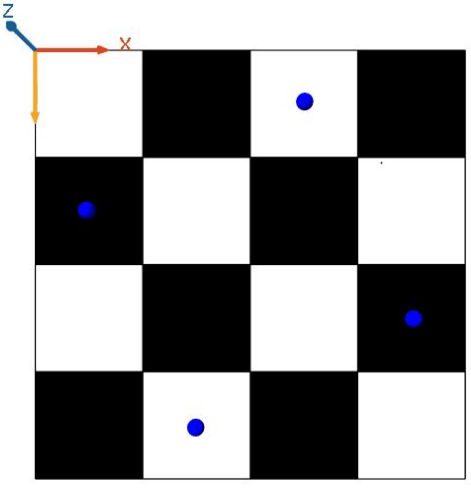


In our simulation, we start with queens from the top and the first starts, occupies the first available position and once is placed, then the second one repeats the process; if for the j-th queen there are no available cells to occupy, then it asks to the previous queen to reposition, and this backward communication continues until one queen is available to move into a new position. Then, starting from the next queen from the repositioned one, the process of positioning starts again.

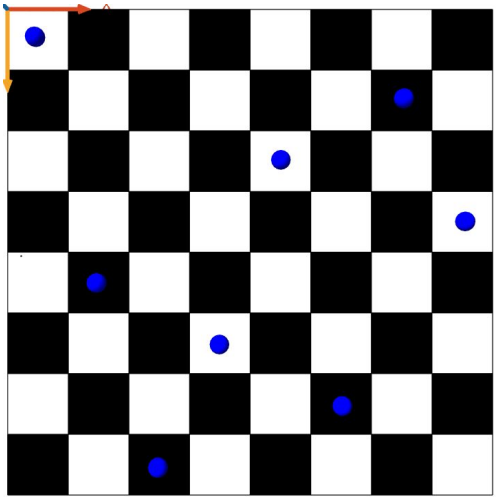
This goes on until a feasible combination is found.

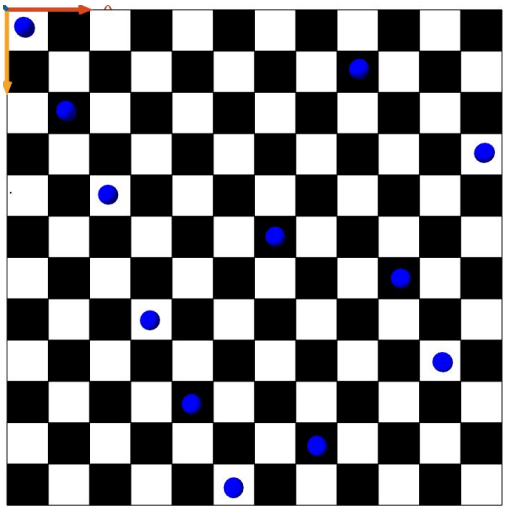
Here's the result of the simulation with N = 4 and the side the log with the evolution of the problem:





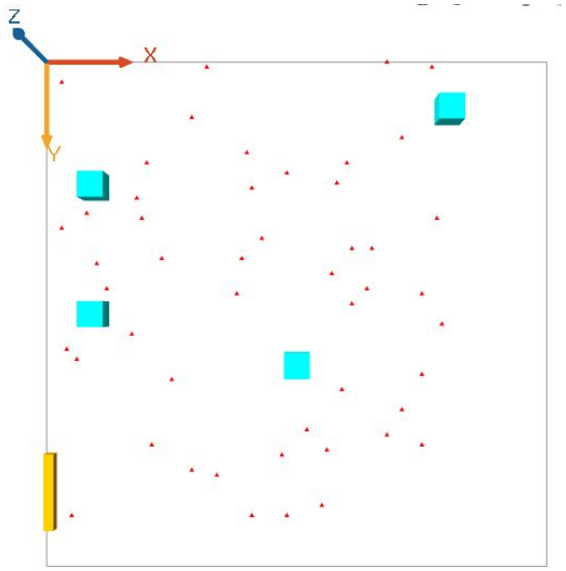
Here are the final positions of the queens with respectively ***N = 8*** and ***N = 12*** :

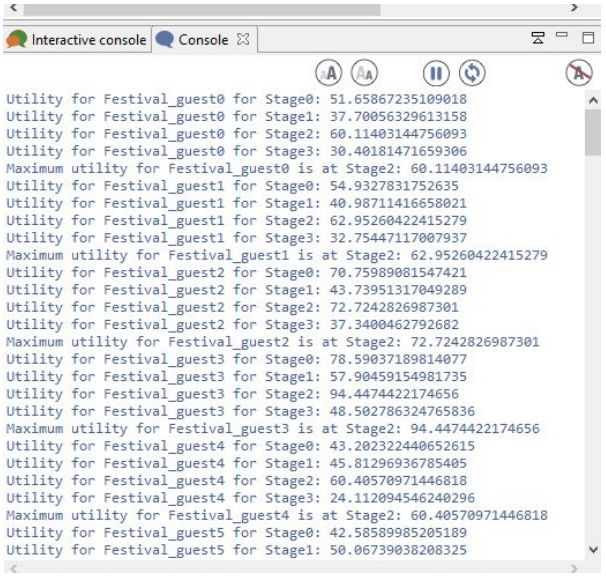




Task 2 : Festival, highest utility problem

Creation of stages where agents can go to, they always know where they are placed. Depending on their own ***utility***, the agent will decide which stage to go.

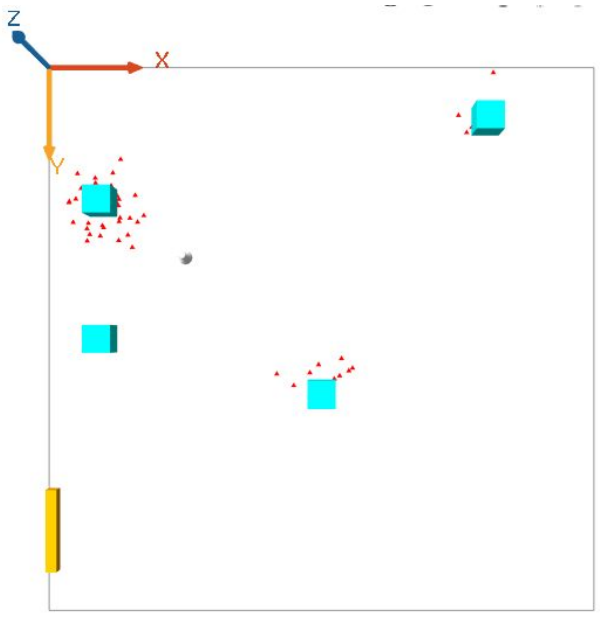




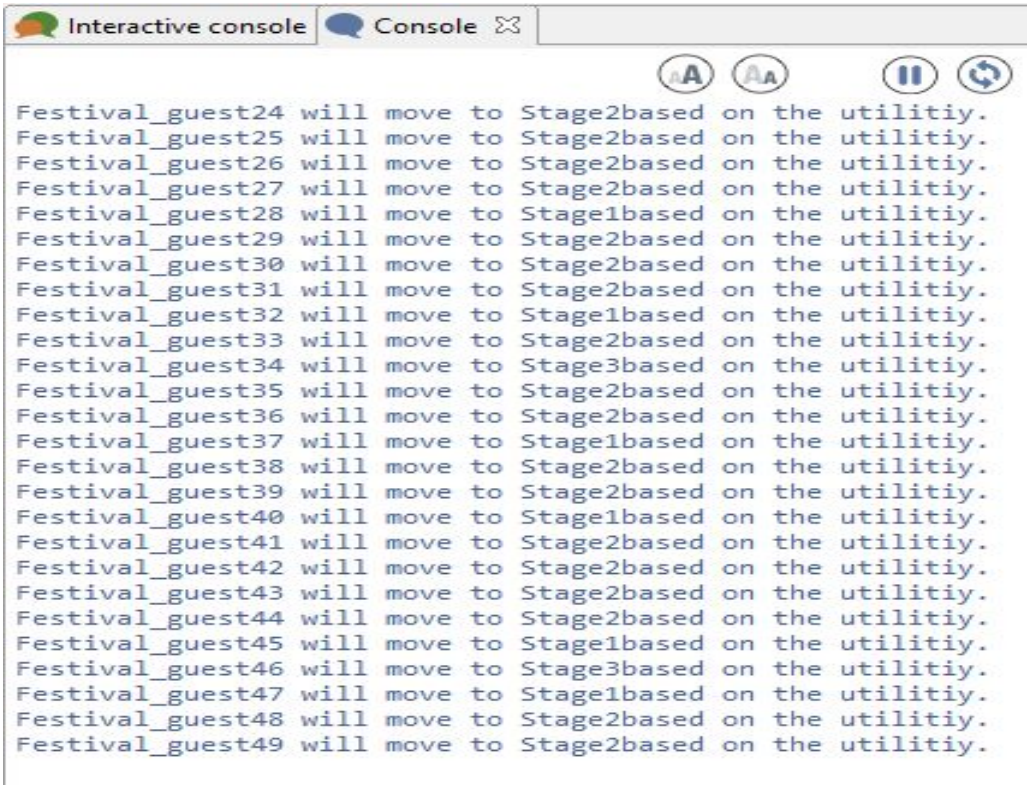
Here are the images for the task where each agent had to select a stage with maximum utility based on attributes like visuals, lights, sound, models, etc.

In this festival, each stage has a set of values for attributes like visuals, sounds, lights (randomized). Each agent first calculates the utilities for each stage depending upon its preferences for these attributes in a randomized manner and then selects the stage with maximum utility.

Extra Task : Festival, Global utility



As seen in the image, each agent interacts with the leader (white) to communicate its preferences for a stage based on its own personal utility. We have introduced “crowd mass”, an additional attribute which creates a conflict of utilities for some agents. Agents who do not mind the crowd may be asked to move to another stage, different from their best choice for maximum global utility in order to accommodate the utilities of agents who do not prefer crowds. Hence, the leader may ask some agents to move around and compromise on their personal utility in order to improve the global utility.



In the figure, we can see that the leader is coordinating between all the agents and instructing some agents to move to a different stage for the sake of global utility. This is done to make sure that agents who do not like the crowd can move to less crowded stages.