ID2209 Distributed Artifical Intelligence and Intelligent Agents

Homework 3

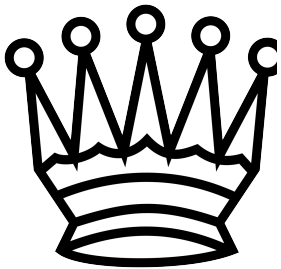
Homework3 Introduction

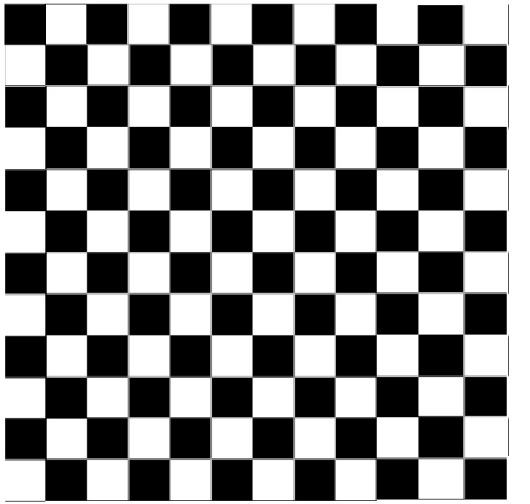
- Topics covered in this session:
  - Coordination and Communication
  - Agent Mobility

- Complementary materials: Guide on JADE Agent Mobility http://www.iro.umontreal.ca/~vaucher/Agents/Jade/Mobility.html

Task 1

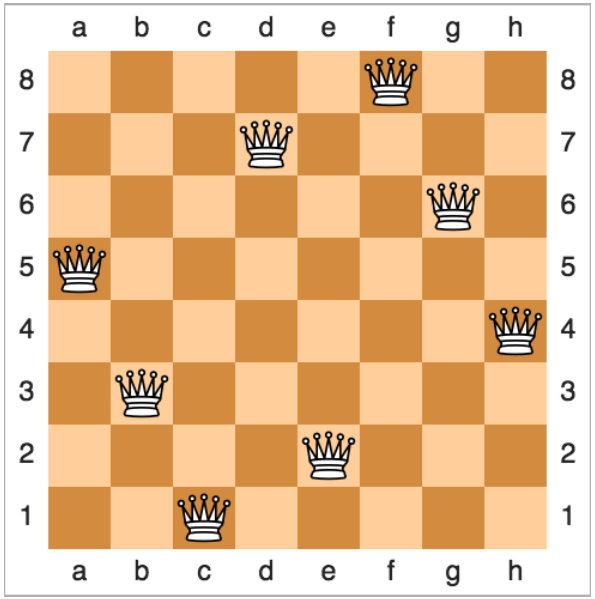
The aim of this task is to understand how agents communicate and cooperate to achieve their goal using the **N Queens** problems as example.



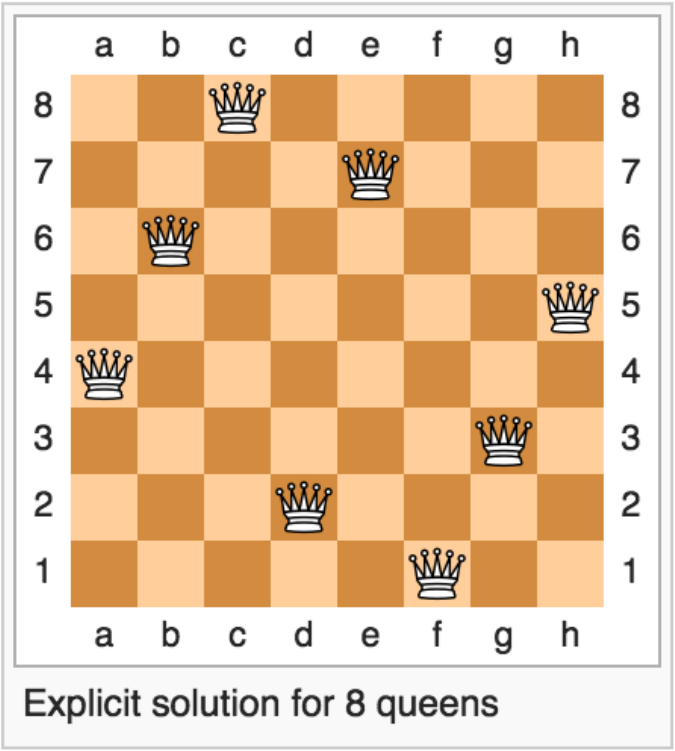


Example of a special case of the N Queens problem: 8 Queens Puzzle

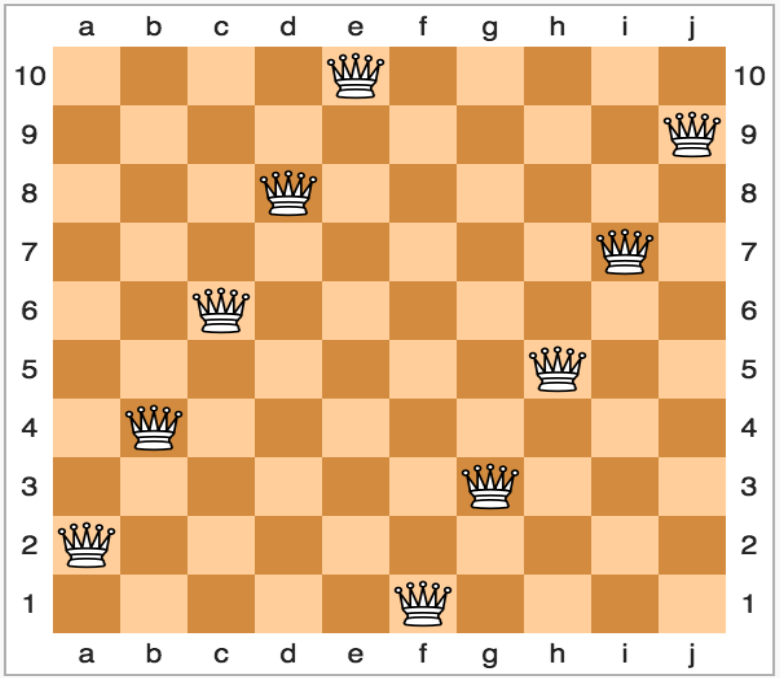
- The problem of placing 8 queens on an 8 by 8 chessboard, so that no two queens threatens each other.
- How to solve it: no two queens share the same row, column or diagonal
- Many different solutions – different arrangements
- **N Queens problem** is the problem of placing N queens in an n by n chessboard.
- Exceptions for N are 2 and 3



Examples of Possible Solutions for N=8, N=10



Explicit solution for 8 queens



Explicit solution for 10 queens

Source: https://en.wikipedia.org/wiki/Eight_queens_puzzle

Task#1

- The N-Queens problem (chess):
  - Each queen is modelled as an agent.
  - Each queen moves along a row in a matrix and places itself such that it will not be attacked by another queen.
  - A queen may be attacked by another if they are in the same column, or row or along the same diagonal

Task #1 continue

- Messages are passed between the agents in order to update each other of their positions.
- Each agent can communicate with the agent(s) that precedes or comes after it. It sends the positions of the queens positioned so far.
- If the positions of the previous queens are unacceptable for the current queen it sends a corresponding message to the previous queen to find another position.
- This process continues all queens have positions that are acceptable for all

Task #1 deliverables

- Implement solutions for n=4,5,6,…
- Introduce a possibility to get different solutions. How many solutions you get for different n.
- Deliver a report including description of your solution, code and protocol(s) of communication

Task2

- Goal:
  - Hands on experience with Agent Mobility

- Extending (**Dutch Auction**) for intra-platform **mobility**.

Programming agent mobility in JADE

- Programming guide (should be very easy to follow): http://www.iro.umontreal.ca/~vaucher/Agents/Jade/Mobility.html

- Intra-platform mobility → moving between containers in the same platform

- Specific methods for agent mobility: doMove(), beforeMove(), afterMove(), doClone(), beforeClone(), afterClone()

Scenario described

- Consider a **auctioneer** agent in an auctioneer – Agent Container

And

- Two separate containers for two separate/different **participant** types
  - (e.g. **participants** from HM and **participants** from Galileo Museum).

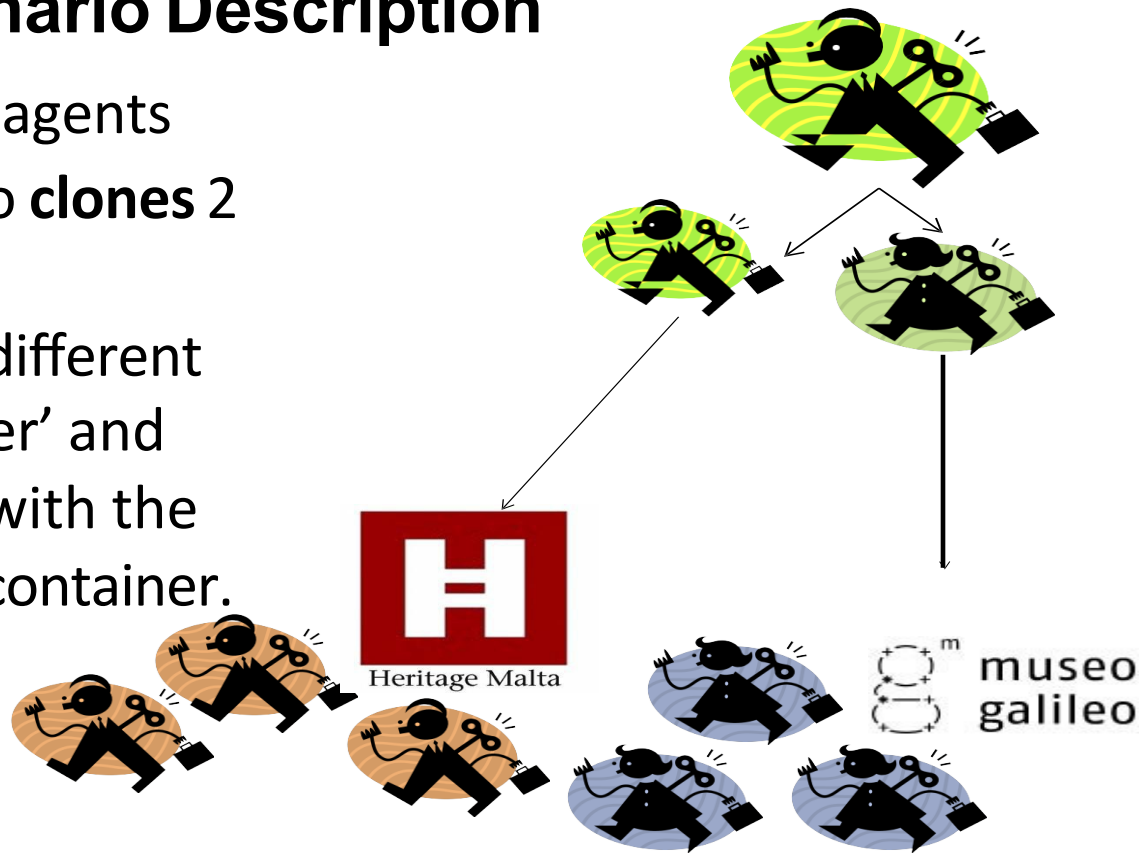
Heritage Malta

museo galileo

http://www.museogalileo.it/en/index.html
http://www.heritagemalta.org/museums/museums.html

Scenario Description

- auctioneer agent **clones** 2 agents
- each participant agent also **clones** 2 agents
- each of which moves to a different ‘participant agent container’ and executes **Dutch Auction** with the participant agents in that container.



Assumptions

- Consider at least two participants in each ‘participant agent container’.
- These participants
  - One being the actual participant agent and the other ones are their clones.

Scenario continued

- Upon the end of execution
  - the clones migrate back to their home container, share best price obtained among them and announce the best price offered from any of the participants.

Deliverables

- Upload your report and documented Source Code (with instructions for execution) in Canvas.
- An announcement with the doodle link for registration of demo will be sent after deadline of homework