

# A(E)3M33UI — Semestral project 2:

## Hierarchical planning

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**Version number 2, April 24, 2014**

**Deadline: 09-05- 2014**

### Introduction

The goal of this task is to become familiar with hierarchical planning by writing a JSHOP2 definition of planning domain and planning problem. The JSHOP2 folder can be downloaded from courseware pages. For installation, use the following instruction (README file from JSHOP2 folder can be also used).

### Technical notes

1. Download and unpack the folder JSHOP2 to your hard drive.
2. Make sure that JAVA SE is installed on your computer, if not, install it. Don't forget to change environment variable PATH, which should contain the path to bin folder of JAVA (for example "C:\Program Files\Java\jdk1.8.0\bin"). In Windows, this can be done by right click on Computer--> properties -->Advanced-->Environment variables. Use Google for more hints.
3. Create or edit environment variable CLASSPATH ([http://www3.ntu.edu.sg/home/ehchua/programming/howto/environment\\_variables.html](http://www3.ntu.edu.sg/home/ehchua/programming/howto/environment_variables.html))
4. Run compilation of source files by running make c from JSHOP2 directory
5. Run demonstration files by running make 1,2,3...

### Scenario

The goal is to propose and implement a control for a group of soldiers. The soldiers must accomplish several objectives by a cooperative behavior. An environment is modeled by a graph of non-oriented edges. If there is an edge between two nodes, a soldier can move between these two vertices. Your modeled environment will have 30 vertices and 30 -60 edges. The non-oriented edge can be defined by predicate (link A B)(link B A).

There is also a group of four soldiers in some vertices. In four vertices, one can also find monsters. The mission objective is to destroy all the monsters. There are the following constraints:

1. A monster can be killed by at least two soldiers – one is holding a supporting fire in a distance of exactly one edge from the monster and one is directly attacking the monster in the same node. (Soldier must attack the monster whenever it gets to the same node as the monster).

2. During the attack, the attacking soldier is always injured by the monster. **An injured soldier cannot fight with the monster, but can hold the supporting fire.**
3. One of the soldiers is medic, which has a capability of healing an injured soldier. The plan must contain an operator HEALING ?medic ?soldier, which can be applied only if ?medic and ?soldier are in the same node. For simplicity, the healing takes infinitely short period.
4. The medic cannot attack, but can hold the supporting fire.
5. For safety reasons, maximum number of soldiers in one node is two.
6. Each soldier must see at least one another soldier in the maximum distance of one **edge**.
7. The soldiers know the number and positions of all the monsters.

Display an evolution of game state according to the plan as a sequence of diagrams with color vertices. (Animation or a sequence of images)

## Evaluation

Maximum score is 10 points. If you will not submit a working implementation, you obtain 0 points.

**Implementation** covers 0-6 points and the evaluation criteria are:

- Proper specification of domain and problem, which are solved by JSHOP2 in a reasonable time.
- Satisfaction of the above specification.
- **Successful pass in a validation trial consisting of running the planning on a testing environment**
- **Implementation, in which some soldiers will not participate the task (e.g. only medic and one soldier are solving it), is acceptable, but gets -1 score point and cannot obtain any bonus point.**

**Report** covers 0-4 points and the evaluation criteria are:

- A comprehensive description of the implementation and the way of satisfaction of the specification
- Grammatical and formal aspects

**Bonus** covers 0-2 points

- 1 point if the report is written in LATEX and its source-files are also submitted
- 1 point is for really elegant, interesting and original approach solution or for solution, which works for any reasonable number of soldiers, medics and monsters.

## Submission

ZIP archive must be submitted that contains the following files:

- File named *surname\_domain* with domain specification
- File named *surname\_problem* with problem specification

- Animation or a set of numbered images describing the progress of the plan execution
- File surname.pdf with the report, which includes the following sections: description of domain specification, description of the problem specification, discussion about the plan

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