

**LESSON:**

**WORK:**

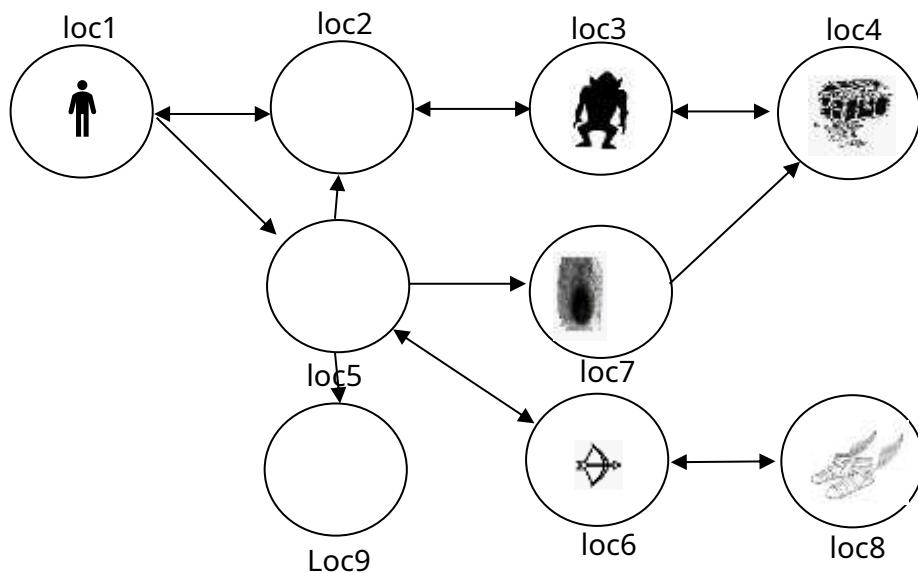
**RATING:**

Artificial intelligence

2 or

0 – 0.5

**Description of the problem**



**Figure 1.** ProblemMonster2

Let it be a game about a hero who enters a network of caves in order to find treasures and transport them out of the network.

The game starts with the hero in the first cave (eg loc1) and ends when the hero is back in the same location (loc1) but with all the treasures hidden in the network.

Each cave can communicate with other caves through passages, but they are not necessarily two-way. Thus a cave (e.g. loc5) may have two-way passages so that the hero can go to other neighboring caves (e.g. loc7) and then return if he wants, but it may also have one-way passages that lead to caves (eg loc7, loc2, loc5) with no immediate return.

Some caves (eg loc7) have pits inside that the hero cannot escape from. So if the hero walks from one cave (eg loc5) to another (eg loc7) that has a pit, then the hero will be trapped and the game ends in defeat.

Also, in some caves (eg loc3) there are monsters inside and if the hero enters the cave where a monster lives, then it will kill him and the game will end in defeat.

For the hero to deal with monsters and pits, some caves (eg loc6 or loc8) may have weapons and/or magic shoes. These can be collected by the hero and used when needed. But the magic shoes e.g. he can fly over the pit inside a cave and be safely in it to continue his wanderings (eg the hero could if he has magic shoes fly from loc5 to loc7 and then walk from loc7 to loc4). With a weapon the hero can kill a monster from a nearby cave (eg loc2) and then enter the cave safely. Weapons can only be used from neighboring caves, which

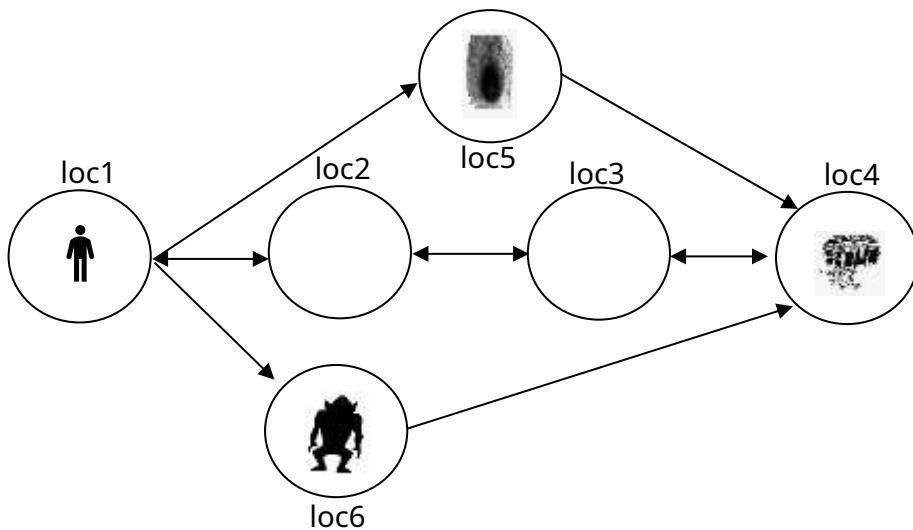
have direct passage to the monster cave (eg can be used by loc2 or loc4 and only by them). Both weapons and magic shoes can be used once each (eg to kill a monster or cross a pit). If there are more monsters or more pits in the network then the hero will have to find more than one weapon or shoes respectively.

### Wanted

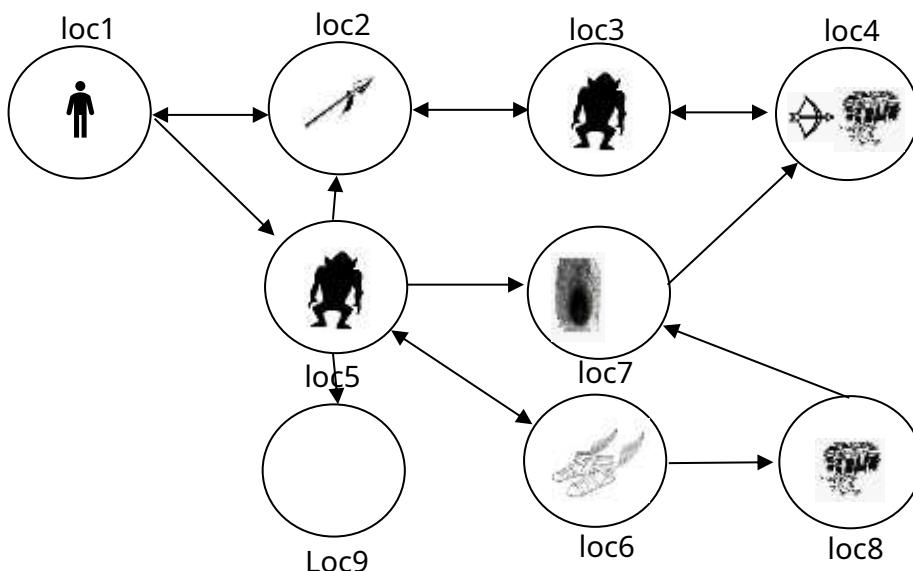
A) To analyze the family of problems (field) of the specific game. The analysis should list the following: entities, relationships, transition operators (name, parameters, conditions, add-list, delete-list) for the field.

B) To write the field and the problems (Monster1, Monster2 and Monster3) in PDDL language.

C) Solve the above problems and record for each one the plan (total length and reference of the steps) as well as the time it took to solve it.



**Figure 2.** ProblemMonster1



**Figure 3.** ProblemMonster3