INSTITUTE OF TECHNOLOGY CARLOW

No: ???A

SCHOOL OF SCIENCE

DEPARTMENT OF COMPUTING AND NETWORKING

AUTUMN EXAMINATIONS 2012

COURSE CODE: CW131-2 **DATE: ?**
TIME: ?

Course Title: Bachelor of Science (Honours) in Computer Games Development

Course Year: 2

Subject: **Software Engineering for Games I**

Duration: **3 Hours**

Examiners: **Dr C Meudec**
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SPECIAL REQUIREMENTS:

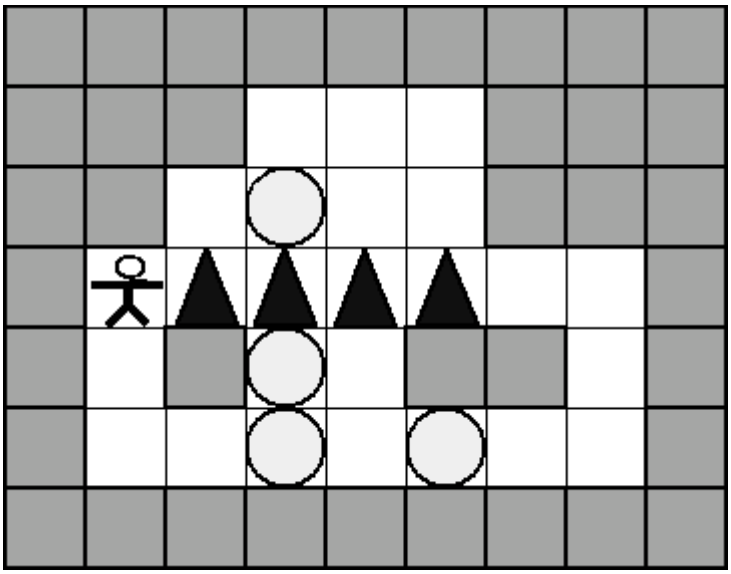
INSTRUCTIONS TO CANDIDATE:

1. **Write your Name, Course, Course Year and Class Group on your answer book;**
2. **Marks as indicated in brackets;**
3. **Answer Question 1 and two other Questions.**

Question 1 {Compulsory} [50 Marks]

Sokoban

Sokoban is a board game which is supposed to resemble a warehouse. The idea of the game is to push goods into goals in a warehouse. The board illustrates the warehouse, it is rectangular and it consists of squares. The board has some pieces: a man, some goods (triangles), some goals (circles) and walls (grey squares).



The man pushes the goods, he cannot pull them. When the man has pushed all goods into the goals, i.e., one good at each goal, the game is over. Several goods may be pushed at once. The man may move to the left, right, up or down using the arrow keys. The man cannot move itself, or goods, into a wall. The man may move over a goal. Walls or goals cannot be moved.

The game should have undo functionality: by pressing the (e.g.) u-key, the game should be left in the state as before the last move. The game should support multiple undo.

If you feel that there are problems with the description of the system above, resolve them yourself by stating assumptions in your answers.

a) [10 Marks]
Write all the necessary use cases in a brief format.

b) [5 Marks]
Draw a suitable UML use case diagram.

c) [15 Marks]
Write the most important use case in a fully dressed format.

d) [20 Marks]
Draw an appropriate domain model for the entire game as described.

Question 2 [25 Marks]

a) [10 Marks]
What is the purpose of the UP inception phase? What are the typical technical documents generated during this phase?

b) [15 Marks]
The objective is to create a finite state machine simulation consisting of two teams of AI ants. The purpose of the simulation is for the ants to collect food and return it to their home position. The ants will have to follow certain obstacles and rules in the simulation. First, the ants will move randomly in their environment in an attempt to locate a piece of food. Once an ant finds a piece of food, it will return to its home position. When it arrives home, it will drop its food and then start a new search for water rather than food. The thirsty ants will roam randomly in search of water. Once an ant finds water, it will resume its search for more food.

Returning food to the home position also will result in a new ant emerging from the home position. The ant population will continue to grow so long as more food is returned to the home position. Of course, the ants will encounter obstacles along the way. In addition to the randomly placed food will be randomly placed poison. Naturally, the poison has a fatal effect on the ants.

Create a UML State Machine Diagram for the behaviour as described.

Question 3 [25 Marks]

a) [5 Marks]
Explain the Gang of Four's adapter design pattern. Use examples.

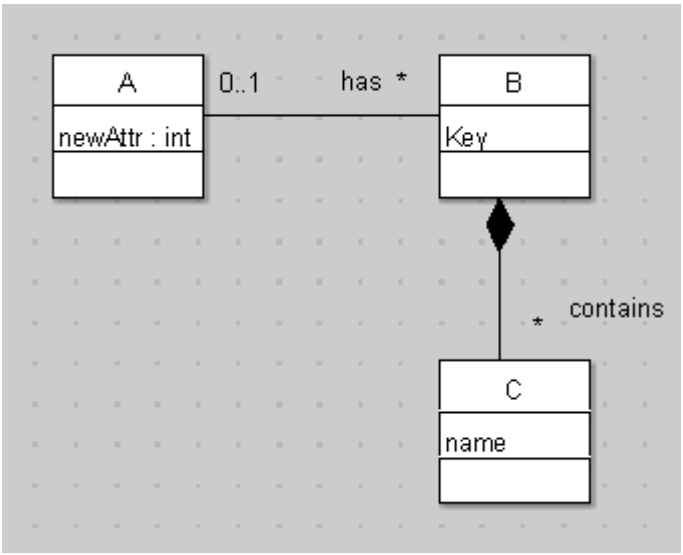
b) [15 Marks]
Describe the structure of, and the typical technical documents generated during, the Unified Process.

c) [5 Marks]
Explain how you would create a use case-driven schedule for the first few iterations within an Agile UP project. Give general guidelines.

Question 4 [25 Marks]

a) [15 Marks]
Explain the rationale behind, and the solutions offered by, the *Protected Variations* design pattern.

b) [10 Marks]
Given the following schematic domain model and contract, draw an appropriate Interaction Diagram knowing that an instance of A must be the controller.

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Contract
Name:              MessageA(K:Key, S: Boolean, n: name)
Responsibilities: ...
Precondition:      There exists a B with whose key is K
Postcondition:
      If S is true
      –  a new C was created (instance creation)
      –  the new C was associated with the correct B according to the
         K:Key match (association formed)
      –  the new C.name has been updated to n (attribute
         modification)
      If S is false
      –  The B which matches K is deleted (instance deletion)
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Question 5 [25 Marks]

a) [10 Marks]
Explain the Model-View Separation Principle. What are the benefits? Which general design pattern could the Model-View Separation Principle be said to address?

b) [5 Marks]
What are Agile Methods in general and Agile Modelling in particular?

c) [5 Marks]
What is the difference between a UML sketching tool and a UML modelling tool? Define round-trip engineering as offered by some tools.

d) [5 Marks]
Explain and illustrate the *Singleton* design pattern.