

INSTITUTE OF TECHNOLOGY CARLOW

No: ???S

SCHOOL OF SCIENCE

DEPARTMENT OF COMPUTING AND NETWORKING

SUMMER EXAMINATIONS 2011

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.**

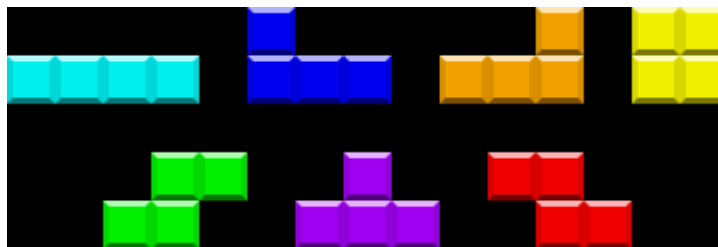
Question 1 {Compulsory} [50 Marks]

Consider the following well known game known as Tetris:

A random sequence of tetrominoes shapes, composed of four square blocks each, fall down the playing field (a rectangular vertical shaft, called the "well" or "matrix"). The objective of the game is to manipulate these tetrominoes, by moving each one sideways and rotating it by 90 degree units, with the aim of creating a horizontal line of blocks without gaps. When such a line is created, it disappears, and any block above the deleted line will fall. With every ten lines that are cleared, the game enters a new level. As the game progresses, each level causes the tetrominoes to fall faster, and the game ends when the stack of tetrominoes reaches the top of the playing field and no new tetrominoes are able to enter.

[adapted from <http://en.wikipedia.org/wiki/Tetris>]

As a reminder, here are the possible tetrominoes shapes:



In this version of Tetris no options are available and only a basic scoring mechanism is necessary : 1 point per line cleared.

a) [3 Marks]

Draw a suitable use case diagram containing only the following use cases:

- Start App;
- Play Game;
- Update Game State;
- Quit Game;
- Quit App.

b) [7 Marks]

Write all your use cases in a fully detailed style using the following format:

- name:
- actor(s):
- description:
- main success scenario:
- alternatives:

c) [10 Marks]

Draw a rich UML domain model that supports fully the entire game as described.

d) [5 Marks]

Draw the necessary UML system sequence diagrams for the “Play Game” and “Update Game State” use cases.

e) [10 Marks]

Only considering the postconditions, write the contracts for the system operations of the “Play Game” and “Update Game State” use cases.

f) [10 Marks]

Draw the necessary UML interaction diagrams for the “Play Game” and “Update Game State” use cases.

g) [5 Marks]

Draw the UML design class diagram of your work so far to support the “Play Game” and “Update Game State” use cases.

Question 2 [25 Marks]

a) [10 Marks]

Describe the Inception phase of the Unified Process under the following headings:

1. Main purpose of the Inception phase;
2. Activities and artefacts of the UP Inception phase;
3. When should the transition to the next phase occur?

b) [10 Marks]

What are the typical problems associated with evolutionary approaches to software development?

c) [5 Marks]

Within an evolutionary development process, which guidelines would you give regarding the duration of an individual iteration. Justify your answer.

Question 3 [25 Marks]

a) [5 Marks]

Describe in detail the Pure Fabrication design pattern.

b) [15 Marks]

Explain the “Gang of Four” Factory design pattern. Use Examples.

c) [5 Marks]

Describe in detail the Indirection design pattern.

Question 4 [25 Marks]

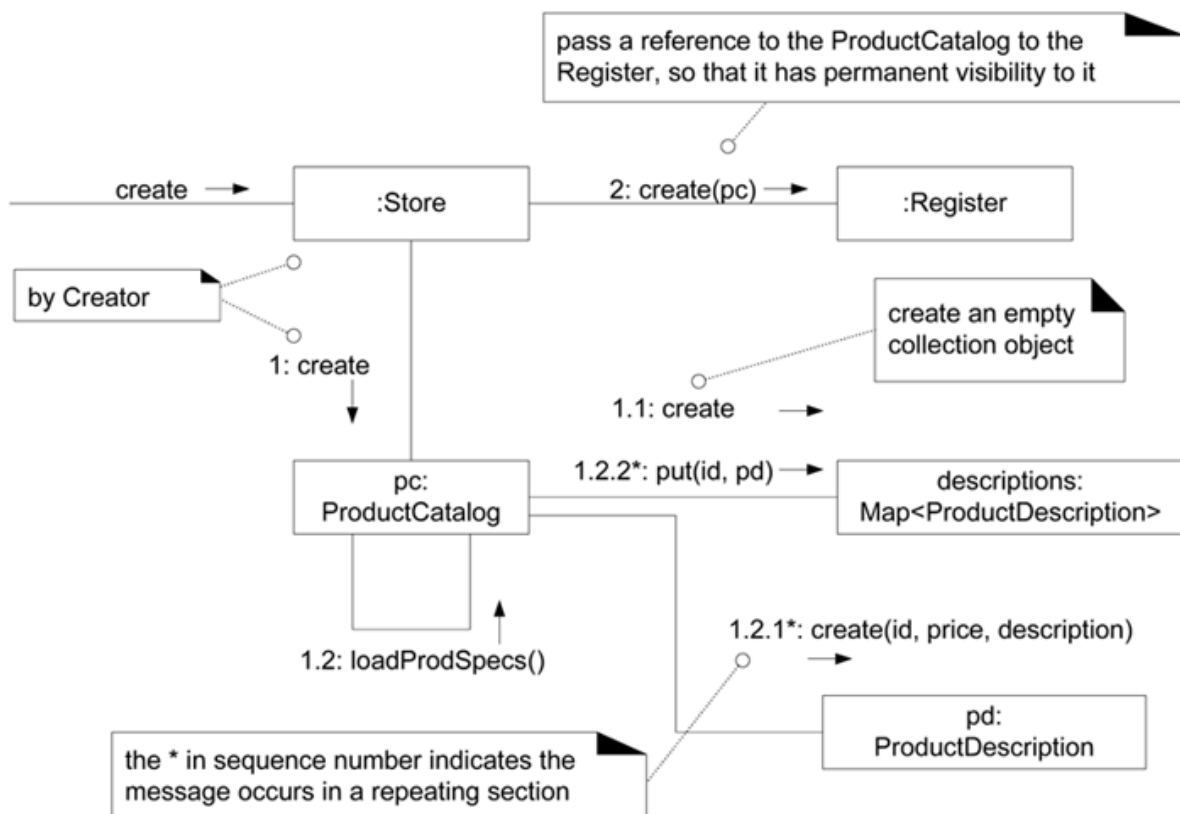
a) [7 Marks]

Draw the State Machine Diagram, using the UML notation, corresponding to this State Transition Table:

Current State	Condition	State Transition
Runaway	Safe	Patrol
Attack	WeakerThanEnemy	RunAway
Patrol	Threatened and StrongerThanEnemy	Attack
Patrol	Threatened and WeakerThanEnemy	RunAway

b) [8 Marks]

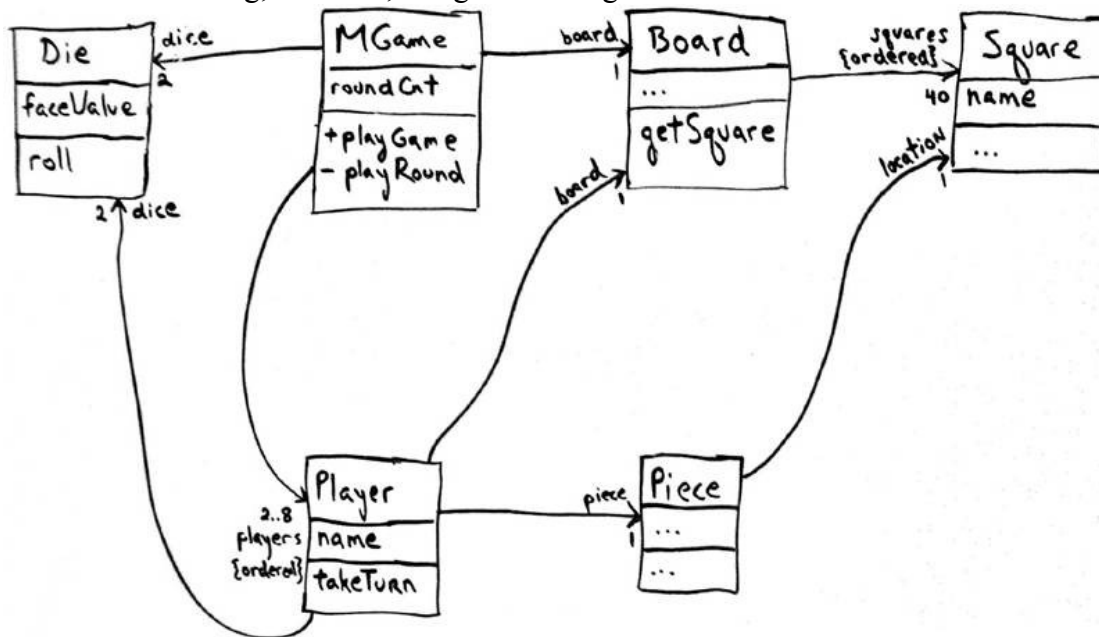
Given the following interaction diagram:



write the code, using any suitable notation, of the constructor method of the Store class.

c) [10 Marks]

Given the following, informal, design class diagram:



write, using any suitable notation, the code corresponding to all the classes mentioned. Note that you are not required to write the methods' code.

Question 5 [25 Marks]

a) [15 Marks]

Discuss the notion of contracts in software development under the following headings:

- What are contracts?
- Main purpose of contracts;
- Guidelines for writing good contracts;
- Your thoughts on their usage during agile development.

b) [5 Marks]

What is the purpose of the Vision document in the Unified Process?

c) [5 Marks]

In your view, what is, or are, the most useful artefact, or artefacts, created during UML software design? Justify your answer.