



BLEKINGE INSTITUTE OF TECHNOLOGY

Written test in (subject): **Software Design PA1106**

Date: **January the 11th** , 2014

Name: _____

Civic number: _____

Number of sheets handed in: _____

Mark the question(s) you have answered by putting a ring around the relevant number(s)

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

Instructions

A student who cannot produce valid ID will not be permitted to take the examination.

No examination scripts will be accepted by the proctor during the first hour of the examination.

(Students arriving late will thus be permitted to take part in the examination).

Write your name and civic number on each sheet of paper you hand in.

Examination results are posted by e-mail no later than 10 working days after the date of the examination. Exceptions to this rule can occur. In this case, students will be informed by the teacher responsible for the course/program or by the examiner.

All blank answer sheets are to be handed in to the proctor.

(To be filled in by the proctor)

ID presented: _____

Proctor's sign.

Student union fee paid: _____

Proctor's sign.

Student union fee not paid: _____

Proctor's sign.

(To be filled in by the teacher)

Number of credits gained: _____ Grade: _____ ECTS: _____ Examiner's sign: _____

(To be filled in and signed by the student, after the correction of the examination)

I hereby sign my examination script. I am aware that by signing for my script, after correction, I waive my right to contest the examiner's comments and the credits or grade awarded.

Date _____ Signature: _____

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School of Computing
Karlskrona

January the 11th, 2014

Course PA1106

Software Design

Programvarudesign

Third Exam

Points

Question 1	Question 2.1	Question 2.2	Question 2.3	Total

Grade

BTH	ECTS

----- Explanations -----

Questions.

For the multiple choice questions your task is to indicate the following statements as *true* T or *false* F by placing the appropriate letter indicator in the [].

For instance

[T] John likes Mary

indicates that the statement is true, or more precisely you think it is true.

John is

[F] Swedish

[T] English

[F] 5 years old

indicates the John is not Swedish, he is English and he is not 5 years old,

If you know that John is German and 20 years old, you should made the following indications:

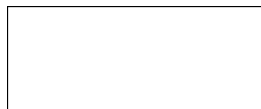
John is

[F] Swedish

[F] English

[F] 5 years old

For the problem questions your answers should be written in the predefined marked places



either labelled boxes

or along labelled lines

Well structured answers will be appreciated.

Marking

Every question, just after the question number, has a number of points allocated for that question.

If all entries for the question are marked correctly you obtain that number of points. For any wrong answer for the question one point is subtracted from the number of allocated points but no negative points are generated. It means that if a question has 2 points allocated and has three places to mark T or F then when you make one error you get 1 point for that question, when you make two errors you get 0 points and when all the answers are wrong you also get 0 points.

Test is worth68 points, 34 point is passed, 45 – very good.

Allowed books

English – Swedish dictionary

A remark on drawings

In the case of tasks that require producing drawings – conceptual models, state diagram, class diagram – please draw first your draft solutions on a spare paper and then redraw them on the marked area on the examination paper trying to arrange the elements (and especially connecting lines) of the picture so that the models were easy readable.

So, good luck!

1. Knowledge**33 p**

1. 2 p
A Development Process describes
 - ☐ order of activities
 - ☐ life cycle
 - ☐ number of class diagrams produced during the design
2. 3 p
Actor
 - ☐ participates in the story of a usecase,
 - ☐ is something that has a behaviour,
 - ☐ is an entity external to the system,
 - ☐ interacts with the system
3. 3 p
The tasks performed during the requirements analysis include
 - ☐ identification of functions that have to be performed by the system
 - ☐ writing non-functional properties of the system
 - ☐ writing UseCases
 - ☐ drawing UseCase Diagrams
4. 3 p
An example of an artefact can be
 - ☐ operation contract
 - ☐ UseCase diagram
 - ☐ problem statement
 - ☐ UseCase
5. 3 p
Link (link = instance of an association!)
 - ☐ is used to model a relationship between concepts in the class diagram,
 - ☐ is used in Object Diagram,
 - ☐ can have multiplicity,
 - ☐ can have directions indicated by arrows.
6. 3 p
Sequence Diagram:
 - ☐ starts with a message representing system operation,
 - ☐ shows objects participating and messages sent between them,
 - ☐ shows a time line for each object involved,
 - ☐ can be replaced by a collaboration diagram,
7. 3 p
Model View Controller
 - ☐ is a pattern used in Conceptual Modelling,
 - ☐ is a pattern used in Development Phase to model the overall structure of the system,
 - ☐ is an architectural pattern,
 - ☐ is used to structure Use Cases.

8.

8 p

Consider a domain described by the model



Is the situation described bellow consistent with (allowed by) the above model:

- ☐ Private:Airplane does not go to any airport,
- ☐ There is only one airplane - LocalExpress flying to Arlanda airport,
- ☐ There must be at least one airplane flying to every airport,
- ☐ The same airplane cannot fly to two different airports,
- ☐ The number of existing airplanes and the number of existing airports must be the same,
- ☐ Bissare:Airplane flies to Kastrup without an engine attached to it,
- ☐ An engine can be removed from F16:Airplane and mounted on the Saab:Airplane,
- ☐ Every engine must be attached to an airplane.
- ☐ The number of airplains flying to an airport is not limited.

9.

3 p

What are you using the "Burn down " chart for ?:

- ☐ To collect all strategies
- ☐ To get an overall picture of the activities you have in the project
- ☐ To collect all requirements in a list with the most wanted at the top
- ☐ All activities that you will run after a sprint day has been performed

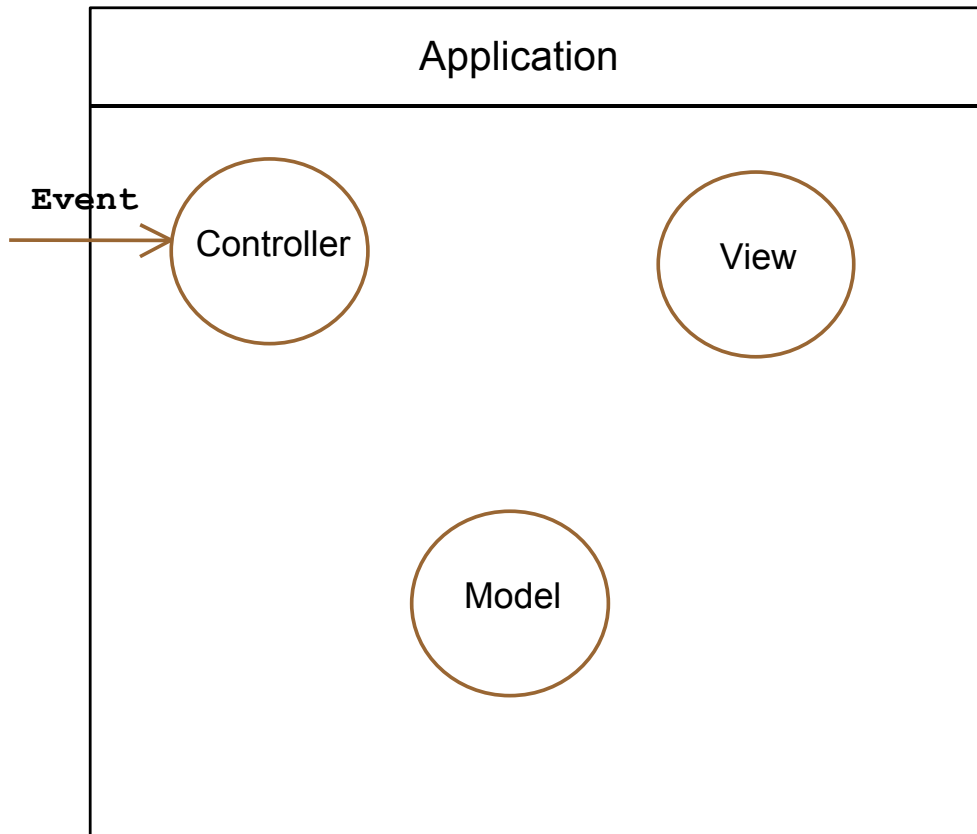
2. Skills

35 p

2.1. Software Architecture

10

- A. Complete a generic scenario for the Model-View-Controller architecture:
show messages and their flow



- B. Describe the responsibilities of:

Controller:

.....
.....
.....

View:

.....
.....
.....
.....

Model:

.....
.....
.....

.....

2.2.

15 p

Object-Oriented Modelling

Draw **conceptual model** for the following fragment of the problem domain concerning the OO University

At the OO University there are two sorts of persons – students and teachers.

Students study at the university and teachers are employed

Teachers deliver courses and students study courses.

Courses are of two kinds – lectures or lab projects.

Courses take place in rooms - lectures in lecture rooms and labs in lab rooms.

Labs are equipped with computers and lecture rooms with a projector.

In every room there is also a board.

There can be from 10 to 30 computers in every lab. Every computer has a unique identifier.

There are also PhD students. They are both students as they study courses and teachers as they can deliver some courses.

Some students have to prepare MSc thesis.

Every PhD student has to prepare PhD thesis.

Every course has a course code – 6 characters, study program – a text describing the course and a number of credits which are assigned to students after completing the course.

Every student has a study record where the total number of study points – the sum of points of all completed courses is stored.

At the university there is a rector who is nominated among the teachers. Rector is changed every two years.

Any person – student and teacher – can login on every computer as a guest user.

Teachers can login as special users but to do so they have different login procedures on different computers.

In your model use advanced modelling features.

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Conceptual Model for OO Univeristy

2.3. Modelling Behaviour**10**

Car transmission system can be in one of three basic states:

- standing – Neutral gear,
- going backward – Reverse gear and
- going forward – Forward gear.

Driver (user of the system) can push the following buttons:

- R – reverse button,
- F – forward button,
- N – neutral button

(and in consequence generate an appropriate event).

When system is in the state of going forward it can be going on the First, the Second or the Third gear.

When the car is going forward the driver can press **Up** or **Down** button.

Pressing up button changes the gear one level up – from 1 to 2, from 2 to 3, pressing the down button changes gear from one level down : from 3 to 2, from 2 to 1.

From Neutral driver can go to both states – to going Forward and to going Backward - by pressing the appropriate button.

When going forward the car can at any moment go to the neutral – by pressing neutral.

It is not possible to go from going forward to going backward. This can be only possible by first going to neutral and then from neutral to backward.

Similar applies to going from backward to forward – it is not possible to go directly from backward to forward – first one has to change to neutral (press neutral button) and then change to forward (press forward button).

Changing from neutral to forward sets the transmission system automatically in gear one.

Draw a State Diagram modelling the behaviour of the transmission system.