

Home Exam Object Oriented Design

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Background

This document describes a home exam for the time period Januari 2021 in the courses:

PA1458 (PA1415) Software Design / Programvaruteknik, 7.5 ECTS

PA1459 (PA1435) Object Oriented Design / Objektorienterad Design, 6 ECTS

PA1460 (PA1443) Introduction to Software Design and Architectures / Introduktion till programvarudesign och arkitektur, 5 ECTS

The exam consists of two tasks (see below), and you have **one week** to complete and submit your answer. Thus, the exam is published on the 8:e Januari, and your submission is due on the 15:e Januari at **23:59**. I have to be able to open and read your submission so a PDF or a Word-document is a good idea.

You may use any books and internet resources you see fit, and you may discuss your solution with each other, but with a few limitations:

- The system that you invent and use to complete the tasks must be unique for each student.
- The answers to the questions must be unique for you.

You may answer the questions either in Swedish or in English.

1 Tasks

1.1 Task 1 (4 questions)

1. Invent a small system where you can use the design pattern Observer Pattern. Describe the system and how you intend to use the design pattern to solve a part of the system.
2. Create a class diagram with classes, attributes, and methods for the part of the system where your Observer Pattern is used. If you are not able to create a graphical diagram, then describe it in code according to the following:

' A comment

' Declare a class

class KlassA

class KlassB

class KlassC

' Methods and attributes

KlassA : +publicMethod()

KlassA : -privateMethod()

KlassA : +int publicAttribute

KlassA : -int privateAttribute

' Relations between classes

KlassA -- KlassB 'an association

KlassB <|-- KlassC 'inheritance. KlassC inherits from KlassB

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1. Describe how you have used Observer Pattern and which classes and methods that are involved. What are their roles? What are their responsibilities?
2. Write pseudocode (or code in Java or C++) for the methods where you create objects according to your Observer Pattern and the methods where you use these objects.

1.2 Task 2 (2 questions)

1. Describe briefly in what way is Observer Pattern related to the GRASP patterns Information Expert and Controller?
2. Use your system from Task 1 and describe how Information Expert and Controller are used to assign responsibilities to the classes in your system.

2 Marking Guide

To pass the exam you must get at least one point from each of the criteria below and score more than 60% (9 points).

2.1 Criteria

- Involved Classes

0. The classes in the class diagram are not part of the requested design pattern.
1. Some of the classes can be interpreted to be part of the requested design pattern. Roles and responsibilities are not described.
- 2.
3. The classes for the requested design pattern are part of the class diagram. Roles and responsibilities are shallowly described but with a few deficiencies.
- 4.
5. The classes for the requested design pattern are part of the class diagram. The design pattern is clearly marked in the class diagram. Roles and responsibilities are clearly and correctly described.

- Involved Methods and Attributes

0. There are no methods or attributes in the class diagram. Pseudocode for relevant methods to not work according to the requested design pattern.
1. Some of the methods and attributes needed for the requested design pattern are part of the class diagram. Pseudocode for some of the relevant methods more or less work according to the requested design pattern.
- 2.
3. Most methods and attributes needed for the requested design pattern are part of the class diagram and in the right classes. Pseudocode for relevant methods more or less work according to the requested design pattern.
- 4.
5. All methods and attributes needed for the requested design pattern are part of the class diagram and in the right class. Pseudocode for all methods and attributes work according to the requested design pattern.

- GRASP Patterns

0. The requested GRASP patterns, and their relation to the requested design pattern are not described or the description is seriously flawed.
1. One of the requested GRASP patterns and their relation to the requested design pattern is shallowly but mostly correctly described. The classes in the example system have described responsibilities but it is unclear how the requested GRASP patterns have been used to assign responsibilities to the different classes.
- 2.
3. All requested GRASP patterns and their relation to the requested design pattern are mostly correctly described. The classes in the example system have described responsibilities and it is mostly clear how the requested GRASP patterns are used to assign responsibilities to the different classes.
- 4.
5. All requested GRASP patterns and their relation to the requested design pattern are correctly described and described in depth. The classes in the example system have described responsibilities and it is clear how the requested GRASP patterns are used to assign responsibilities to the different classes.

2.2 Grade Limits

Grade	Percent	Points
MAX	100%	15
A	90%	13.5
B	80%	12
C	70%	10.5
D	65%	9.75
E	60%	9