

14:00-17:00

November 28,
2016

Exam Hall Central
Block

EXAMS
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University of the Witwatersrand, Johannesburg

Course or topic No(s)

COMS 3009

Course or topic name(s)

Paper Number & title

Software Design

Examination to be held during the month(s) of

November, 2016

Year of study

3

Degrees/Diplomas for which this course is prescribed

BSc

Faculties presenting candidates

Science

Internal examiner(s)

Dr. Terence van Zyl

External examiner(s)

Prof. Stefan Gruner

Special materials

Time allowance

180 minutes

Instructions to candidates

- This is a closed book, closed notes examination.
- Answer as many questions in the answer book as you can.
- Calculators are permitted.



UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
School of Computer Science and Applied Mathematics

Software Design

BSc Undergraduate
COMS 3009

FINAL EXAM

DATE: November 28, 2016

TIME: 14:00-17:00

ASSESSOR(S):

Dr. Terence van Zyl

DURATION - 180 minutes

MARKS - 90

NUMBER OF PAGES: 5 PAGES INCLUDING FRONT PAGE

INSTRUCTIONS

- This is a closed book, closed notes examination.
- Answer as many questions in the answer book as you can.
- Calculators are permitted.

1. Answer the following short questions.

- (a) Why would we say that software is complex but not complicated? (2)
- (b) What are the three different types of requirements that can be gathered? (3)
- (c) Name three non-functional requirements? (3)
- (d) What is the role of UML? Give one benefit of UML over more adhoc processes. (2)
- (e) What is a design Pattern? (2)
- (f) What is an Anti-Pattern? (2)
- (g) What is the role of Acceptance Tests? (1)
- (h) Difference between Analysis and Specification of requirements? (2)
- (i) What is the difference between test coverage and code coverage? (2)

Total for Question 1: 19

2. Compare the Waterfall, Iterative and Incremental and Agile methods. (3)

Total for Question 2: 3

3. Name a set of use cases/actors and draw a use case diagram for the following user story. (6)

“As an authenticated student, I can see whether I will be accepted into the programme based on my matric marks stored in the GED Mark System.”

Total for Question 3: 6

4. Fill in as much as possible of a use case specification for the user story below. (8)

“As a tenant, landlord or auto-lock timer, I would like to be able to lock the door if it is closed. If it is not closed I should be signalled and given a chance to close it so that it can be locked.”

Here is the schema for a use case specification.

Schema for Detailed Use Cases

Use Case UC-#:	Name / Identifier [verb phrase]
Related Requirements:	List of the requirements that are addressed by this use case
Initiating Actor:	Actor who initiates interaction with the system to accomplish a goal
Actor's Goal:	Informal description of the initiating actor's goal
Participating Actors:	Actors that will help achieve the goal or need to know about the outcome
Preconditions:	What is assumed about the state of the system before the interaction starts
Postconditions:	What are the results after the goal is achieved or abandoned; i.e., what must be true about the system at the time the execution of this use case is completed
Flow of Events for Main Success Scenario:	
→	1. The initiating actor delivers an action or stimulus to the system (the arrow indicates the direction of interaction, to- or from the system)
←	2. The system's reaction or response to the stimulus; the system can also send a message to a participating actor, if any
→	3. ...
Flow of Events for Extensions (Alternate Scenarios):	
What could go wrong? List the exceptions to the routine and describe how they are handled	
→	1a. For example, actor enters invalid data
←	2a. For example, power outage, network failure, or requested data unavailable
	...
The arrows on the left indicate the direction of interaction: → Actor's action; ← System's reaction	

Total for Question 4: 8

5. Give the following components in an invoicing system: (10)

1. User Interface for Iphone
2. User Interface for Android
3. Customer Resource Management (CRM) Component uses Oracle
4. Billing Component uses MySQL
5. SMS Notification Component that is triggered by the billing component
6. Oracle DB Component
7. MySQL DB Component

draw a UML component diagram for a layered architecture. There is no need to name your interfaces.

Total for Question 5: 10

6. What is the difference between Architecture and Design? (4)

Total for Question 6: 4

7. Explain what is meant by “Architectural Decisions Often Involve Compromise”. (3)

8. Compare the following two architectures with respect to the following non-functional requirements. Agility, Deployment, Testability, Performance, Scalability, Development. (6)

Layered and Mikrokernel

Total for Question 8: 6

9. What are some characteristics of good software design? (3)

Total for Question 9: 3

10. What is a Mock object in the context of unit testing? (4)

Total for Question 10: 4

11. What is Vertical Integration Testing? Use a schematic description. (8)

Total for Question 11: 8

12. What is the difference between Scrum and Waterfall? (4)

Total for Question 12: 4

13. For four of the design patterns below. Briefly describe the pattern and why we would use patterns. (8)

- Constructor Pattern
- Module Pattern
- Singleton Pattern
- Observer Pattern
- Mediator Pattern
- Prototype Pattern
- Facade Pattern
- Factory Pattern
- Flyweight Pattern

Total for Question 13: 8

14. Explain when Not To Use The Factory Pattern? (4)

Total for Question 14: 4