



Beijing-Dublin International College



SEMESTER 2 FINAL EXAMINATION - 2018/2019

COMP3029J Software Systems Architecture

MODULE COORDINATOR: Zhenyan Ji

Time Allowed: 90 minutes

Instructions for Candidates

BJUT Student ID: _____ **UCD Student ID:** _____

I have read and clearly understand the Examination Rules of both Beijing University of Technology and University College Dublin. I am aware of the Punishment for Violating the Rules of Beijing University of Technology and/or University College Dublin. I hereby promise to abide by the relevant rules and regulations by not giving or receiving any help during the exam. If caught violating the rules, I accept the punishment thereof.

Honesty Pledge: _____ **(Signature)**

Instructions for Invigilators

All electronic devices, notebooks, books, work papers are strictly prohibited.

Section I SINGLE CHOICE. (2 points each, 20 points in total)**Identify the choice that *best* completes the statement or answers the question.**

____1. A system should be able to continue working when Internet attacks arrive. Which quality attribute is this?

- A. Security
- B. Usability
- C. Recoverability
- D. None of above

____2. Any module of a system cannot be reused in a different system. This means the system design is ().

- A. Rigid
- B. Immobile
- C. Viscous
- D. Of needless repetition

____3. () packages should be also ().

- A. Stable, abstract
- B. Instable, abstract
- C. Stable, concrete
- D. None of above

____4. What is advantage of repository model style?

- A. Subsystems do not depend on each other
- B. Data storage and subsystems do not depend on each other
- C. Subsystems depend on each other
- D. Data storage and subsystems depend on each other.

____5. Which two principles concern about high cohesion in design?

- A. SRP, OCP
- B. SRP, LSP
- C. SRP, ISP
- D. DIP, ISP

____6. The graphical user interface of a system should be easy and friendly for people to use it. What quality attribute is this?

- A. Performance
- B. Security
- C. Availability
- D. Usability

____7 a single change of a software may cause a cascade of subsequent changes in dependent modules. This means the software design is ().

- A. Rigid
- B. Immobile
- C. Mobile
- D. Viscous

____8 Dependency should go from the () packages to the () packages.

- A. Most stable, least stable
- B. Most abstract, least abstract
- C. Least stable, most stable
- D. Least concrete, most concrete

____9. What are the advantage of pipe & filters?

- A. Filters communicate with each other by transferring data.
- B. It's easy to reuse filters and add new filters.
- C. Interactive applications are encouraged by the style
- D. a,b
- E. b,c

____10. If an interface is a fat interface, i.e. having multiple responsibilities, what principle should be used to solve the problem?

- | | |
|--------|--------|
| A. OCP | C. DIP |
| B. ISP | D. LSP |

Section II True and False (1 points for each question, 10 points in total).

- ()1. Performance can be measured with throughput, latency or deadline.
- ()2. Many systems adopt graphical user interface to meet scalability requirements.
- ()3. If it is more and more difficult to modify software along with version updating, the design is viscous.
- ()4. A software system must be modelled with exact "4+1"views.
- ()5. A software architecture can use more than one architectural patterns.
- ()6. Microservices in an application can be developed in different programming languages.
- ()7. The ISP can be used to guarantee high cohesion.
- ()8. Peer to peer style has a central server.
- ()9. If a system has low coupling and high cohesion, the modifiability of the system is good.
- ()10. 4+1 view model consists of logical view, development view, process view, implementation view and physical view.

Section III Answer the questions in brief. (45 points in total)

1. (7 points) A module can not only calculate user's preference but also access database. What principle is violated? How to fix it?
2. (7 points) What is the definition of Software Architecture? Why need we do architecture design?
3. (7 points) Explain the meaning of **Usability** and briefly provide at least THREE solutions to improve **Usability**.

4.(7 points)What is the "morning-after-syndrome"? Give TWO ways to avoid it.

5.(7 points) What are the benefits to produce software by software product line?

6.(10 points)what is monolithic architecture? What is microservice architecture? Compare them and write their advantages and disadvantages.

Section IV (25 points in total). Analyze the following system requirements and answer the questions.

Nowadays there are many online stores such as JingDong, Taobao, Amazon and so on. They bring a customer great convenience to do shopping. The following is simplified requirements for an online store.

Requirements:

- A customer can browse different goods.
- A customer can search the online store by keywords.
- A customer can filter goods by price, manufacturer, categories and so on.
- A customer can add goods to shopping cart. The user can view and modify the shopping list.
- A customer can pay a bill by a credit card, ali-pay, wechat-pay, or paypal.
- A customer should feel confident that their personal information will be protected and the payment is secure.
- The store provides special offers like order discounts, coupon codes, and free shipping. The offers can be combined. The special offers can encourage customers to take advantage of a "good deal".

Tasks:

- i. (5 points) what architectural style/pattern can be used to design the system? Tell the reason for you to select the architecture style.
- ii. (10 points) draw the architecture diagram for the system. The architecture diagram should embody modules and the relationships between modules.
- iii. (10 points) Based on the requirements, what quality attribute should be considered? Tell the solutions to meet the quality attribute.