西 安 电 子 科 技 大 学

考试时间 120 分钟

试　　题

题号	一	二	三	总分
分数				

1. 考试形式：闭卷； 2. 本试卷共 3 大题，满分 100 分。

班级_____学号_____姓名_____任课教师_____

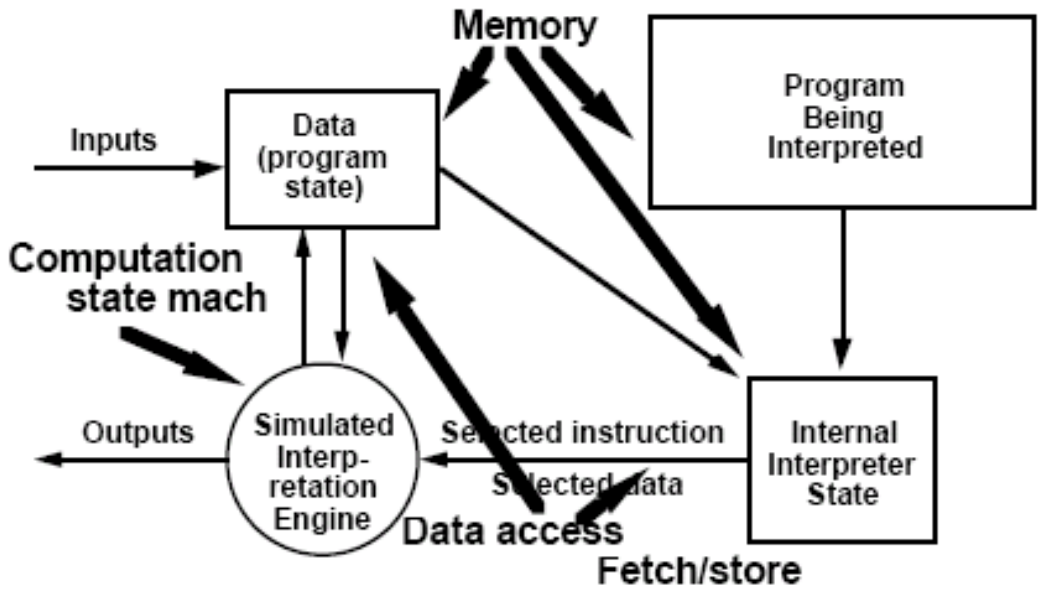
Note: Write all answers on the answer sheet(请将答案写在答题纸上).

Question 1: Explanations (10 points)

1. **Briefly describe each view in Kruchten's 4+1 views.**
2. **Please describe the "Call/return" or "Layered" architecture style and point out its advantages and disadvantages.**

Question 2: Multiple Choice（单项选择）(20 points)

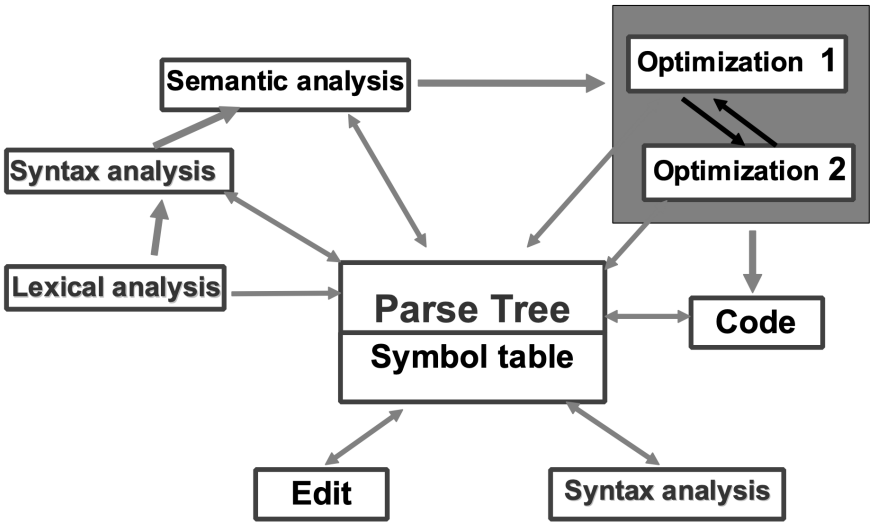
1. Which architecture style does the following diagram describe?



A) Explicit invocation　　**B) Interpreters**

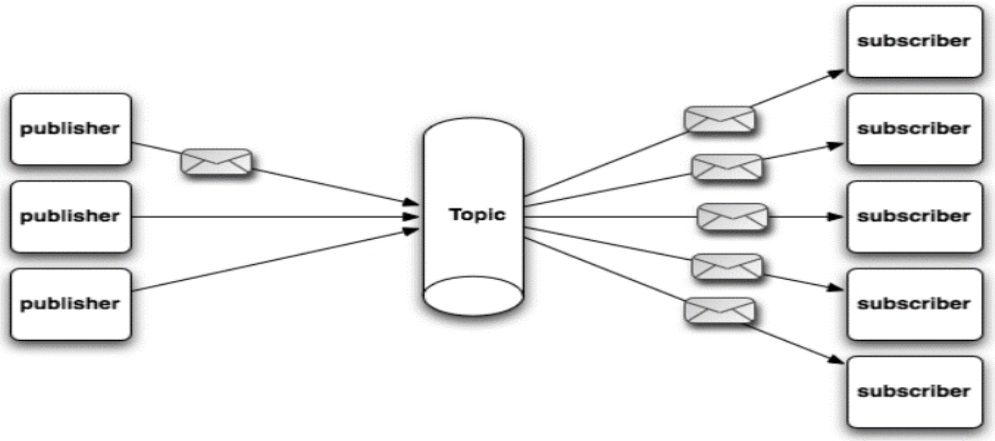
C) blackboard　　**D) Client-Server**

2. Which architecture style does the following diagram describe?



A) Batch sequential **B) Blackboard**
C) Object oriented **D) Repository**

3. Which architecture style does the following diagram describe?



A) Object-Oriented **B) Virtual Machine**
C) Communicating Processes **D) Event systems**

4. Which of the following tactic can be used to achieve the Availability?
A) Prevention of Ripple Effect **B) Resource Arbitration**
C) Defer Binding Time **D) Fault Detection**

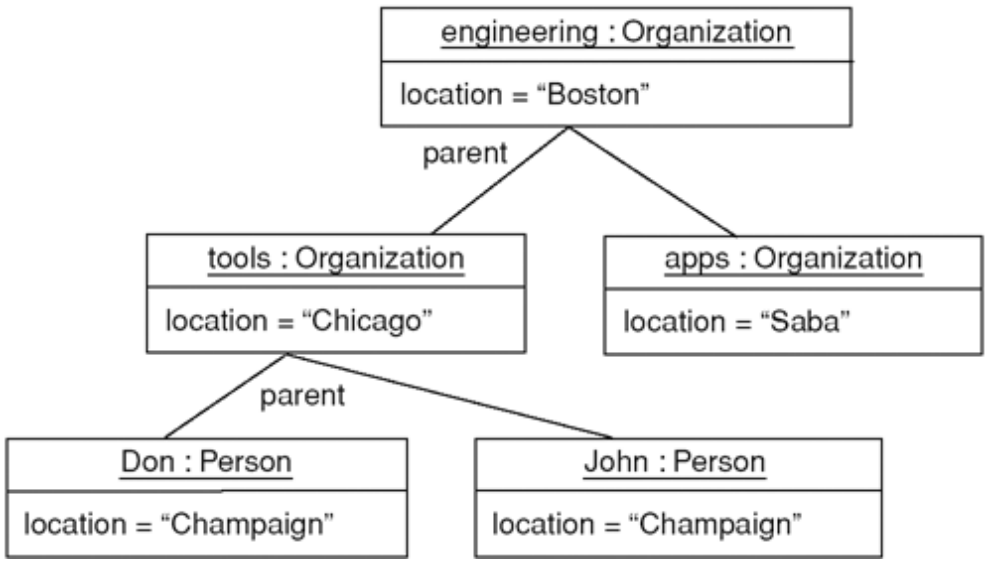
5. Which of the following tactic can be used to achieve the Performance?

A) Resource Management **B) Prevention**
C) Recovery Reintroduction **D) Cancel Undo**

6. Which of the following tactic can be used to achieve the Modifiability?
A) Ping/echo **B) Intrusion Detection**
C) Localize Changes **D) Recovering from an Attack**

7. Which of the following quality attributes does not appear in the utility tree?
A) Performance **B) Security**
C) Reliability **D) Modifiablity**

8. Which kind of diagram is the following diagram?



A) Deployment Diagram **B) Class Diagram**
C) Activity diagram **D) Object Diagram**

9. Which diagram can better describe the specific reaction of an object in response to different events?
A) State Diagram **B) Timing Diagram**
C) Object diagram **D) Activity Diagram**

10. What kind of diagram can better describe the functions that the system can provide?
A) Deployment Diagram **B) Use case diagram**
C) Communication Diagram **D) Composite Structure diagram**

Question 3: Architecture Analysis and Design (70 points)

1. Quality Attribute and Architecture Style (38 points)

Please analyze the requirements and complete following 4 Questions.

An IT company wants to develop a software system that will be used by its employees. This system performs the same functions as Weibo. This system allows each department to publish information. It is also possible for employees within the company to follow one or more departments in order to receive information published by these departments. The system will notify all followers when one department publishes new information.

The following are some detailed requirements for this system.

a) An employee can follow one or more departments, and unfollow one department at any time.
b) A system's total downtime should not exceed 10 hours per year.
c) The user interface of the system is similar to Weibo, so it is easy to use.
d) The system provides special interfaces for automating testing.
e) Every minor update of this system should be accomplished by 2 developers within 1 days.
f) For the purpose of preventing cyber attacks, the system is not connected to the Internet.
g) This system enables employees to communicate privately with one another.
h) From the time an employee logs in to displaying their homepage, the loading time should not exceed 0.1 seconds.

Please analyze the requirements and complete following 4 questions:

1) Identify and name the related quality attributes according to the requirements.

2) For each quality attribute, give the corresponding quality attribute scenario.

3) For each quality attribute, list at least 2 solutions for archiving the corresponding quality attribute.

4) According to the requirements, which software architecture

style is better for this system? Describe the reason and list the advantages and disadvantages of architecture style you choose for the system

2. Utility Tree (16 points)

A Software development team have analyzed the Quality attributes (QAs), designed architecture and wanted to use Utility Tree to evaluate the architecture of a software system. The following are the QA scenarios.

a) Add a new data server to reduce latency in scenario 1 to 2.5 seconds within 1 person-week;
b) 4/5 of the servers go down during normal operation without affecting overall system's functionality;
c) Add more servers to reduce the computing latency on main transaction to < 400ms;
d) Credit card transactions are secure 99.999% of the time;
e) Deliver real-time video with less than 3 second latency;
f) Change the encryption module in < 3 person-days;
g) Network failure should be detected and recovered in < 3 minutes;
h) All data of users is encrypted with 99.99% of security;
i) All operations in the system should be recorded for the further auditing;
j) Add a new function to the system in < 20 person-month;
k) A user's account name must have least 6 characters/numbers starting with a letter.

According the scenarios, please construct a Utility Tree.

3. Architecture Evaluation (16 points)

It is an important task in architecture evaluation that identify and record risks and non-risks, sensitivity points and tradeoffs. Please answer the two questions as follows.

1）describe the definitions of the risk, non-risk, sensitivity point

and tradeoff.

2）read the following descriptions and point out each description is the risk, non-risk, sensitivity point or tradeoff.

a) **The average process time of a user's request via the Web is 1s, and the network latency is 3s. The system needs to response the user's request in 7s.**
b) **The complexity of encryption algorithms could have a great impact on both security and performance;**
c) **Suppose the message arrival rates are 300 per second, and the average processing time is 300ms. The process deadline is 60 second;**
d) **The encryption algorithm and the length of the password could have a profound impact on the security.**
e) **The data encoding（编码） algorithm could significantly affect the average effort to modify the transport part of the system.**
f) **The "payment" function is located the second tier of a B/S architecture, and rules for its business logic is not clearly described. This could result in ambiguity（二义性） of the function implementation;**