装 订 线

任课教师：

学号：

姓名：

班级：

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☑ 开卷□
2. 考试日期：　　年　　月　　日(答题内容请写在装订线外)

一、简答题（第 1 小题 4 分，第 2 小题 6 分，共 10 分）

1. According to your understanding, please describe what software architecture is.

2. Please describe the “blackboard” architecture style and point out its advantages and disadvantages.

二、单项选择题（每小题 4 分，共 20 分）

1. Which of the following tactic can be used to achieve the security?

(A) Information hiding　　(B) Implicit invocation

(C) Removal from service　　(D) Limit exposure

[　　]

2. Which of the following tactic can be used to achieve the availability?

(A) Hide information　　(B) Heartbeat

(C) Scheduling policy　　(D) Introduce concurrency

[　　]

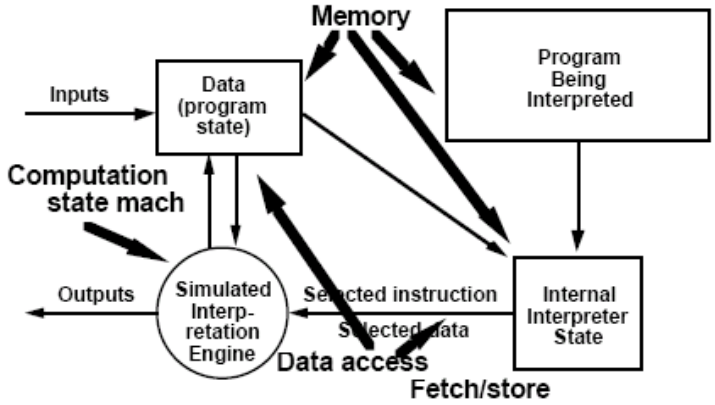
3. Which of the following tactic can be used to achieve the performance?

(A) Prevent ripple effects　　(B) Limit exposure

(C) Manage event rate　　(D) Process communication

[　　]

4. Which architecture style does the following diagram describe?

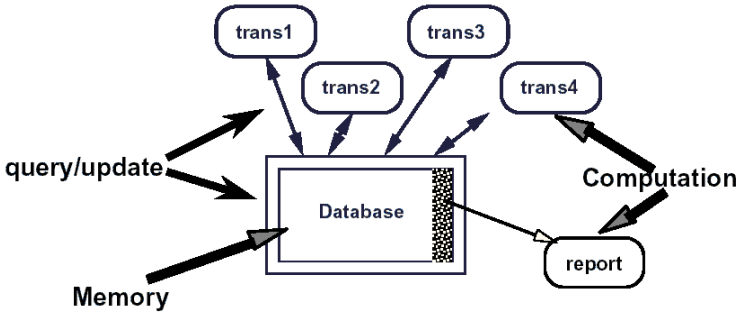


(A) Process control　　(B) Interpreter

(C) Blackboard　　(D) batch sequential

[　　]

5. Which architecture style does the following diagram describe?



(A) Blackboard　　(B) Repository

(C) Implicit invocation　　(D) Layered

[　　]

三、问答题(第 1 小题 38 分，第 2 小题 16 分，第 3 小题 16 分，共 70 分)

1、Quality Attribute and Architecture Style

A company plans to develop a software system for a specific kind of sweeping (扫地) robots. The system will control such a robot to move around and clean up the

indoor floor. A robot is designed to move in a room randomly. When the robot detects a rubbish (垃圾), it is supposed to gather the rubbish and continue to repeat such a step. If an obstacle（障碍物） blocks in its way, the robot should be able to bypass (绕过) the obstacle and move on. This software system is composed of several modules, containing sensor component, walking component, cleaning component, user interface and so on. The core module receives the information from sensor, and then controls walking and cleaning modules to execute tasks. The user interface of the system is in charge of giving operation orders and displaying the current state.

Following are some detailed requirements of this system.

(1) A robot may encounter（遭遇） a malfunction（故障） during working. The average recovery time should be less than 5 minutes.

(2) The system could be accessed remotely. Only authorized user can sign in and control and robot.

(3) The robot will be tested in real environment. The system should provide specific interfaces for this.

(4) When a sensor in the robot is changed, the corresponding software component should be updated by 2 developers within 3 days.

(5) Given a room within 20 square meters broad, the robot is required to sweep it in less than 1 hour.

(6) The user interface is required to be simple and friendly as far as possible.

分析上面的需求，回答下面 4 个问题——

问题一：Identify the related quality attributes according to the requirements.

需求编号	对应的 Q A
（1）	
（2）	
（3）	

需求编号	对应的 Q A
（4）	
（5）	
（6）	

问题二：For each quality attribute, give the corresponding quality attribute scenario.

	Availability	Modifiability
Source		
Stimulus		
Artifact		
Environment		

Response		
Response measure		

	Performance	Security
Source		
Stimulus		
Artifact		
Environment		
Response		
Response measure		

	Testability	Usability
Source		
Stimulus		
Artifact		
Environment		
Response		
Response measure		

问题 3：For each quality attribute, list at least 2 tactics for archiving the corresponding quality attribute.

QA	tactics
Availability	
Modifiability	
Performance	
Security	
Testability	
Usability	

问题 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、构建 Utility Tree

A software company plans to develop an intelligent video surveillance system（智能视频监控系统）. The development team analyzed the Quality Attributes, designed architecture and wanted to use Utility Tree to evaluate the architecture, followings are the scenarios.

(1) A request to deliver real time video must be responded less than 3s.
(2) Power outage（断电） at site 1 requires traffic redirect to site 3 in less than 5 minutes.
(3) An authentication（认证） server should be deployed to support real name authentication.
(4) Adding a middleware to system must be less than 10 person months.
(5) Minimize storage latency on video DB to 300ms.
(6) Customer authorization（授权）database works 99.99% of the time.
(7) Change Web user interface to a flat UI style must be less than 10 person weeks.
(8) The development of a new Android client must be less than 2 person weeks.
(9) Network failure is detected and recovered in < 1.5min

According the scenarios, please construct a Utility Tree.

3、Architecture Evaluation

Identify and record risks and non-risks, sensitivity points and tradeoffs is an important task in architecture evaluation.

:

问题 1：Describe the definitions of risk, non-risk, sensitivity point and tradeoffs

问题 2：Read the following descriptions and point out each description is a risks, non-risks, sensitivity points or tradeoffs.

(1) There is no way of detecting the failure of the communication line between server and clients.
(2) The number of simultaneous connections will significantly affect the number of transactions a database can process per second.
(3) Changing the algorithm of encryption could have an impact on both security and performance.
(4) The data sampling rate is once per second, and the processing time is less than 30ms.
(5) Discount policy for VIP is not clearly described. This could result in replication of functionality.
(6) A system with high modularity might have low portability and performance.

	描述编号（1-6）
Risks	
Non-risks	
Sensivity points	
Tradeoffs	