西 安 电 子 科 技 大

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。

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Question 1: Explanations (10 points)

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

软件体系结构包括构成系统设计元素的描述，设计元素的交互模式以及在这些模式中的约束。精简为组件+连接件+约束。

2. Please describe the "process control" architecture style.

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

1. Which of the following tactic can be used to achieve the Modifiability? [ ]

A) Hide information B) Ping/echo

C) Manage event rate D) Maintain a model of the task

2. Which of the following tactic can be used to achieve the Security? [ ]

A) Introduce concurrency B) Limit Exposure

C) Reduce computational overhead D) Manage event rate

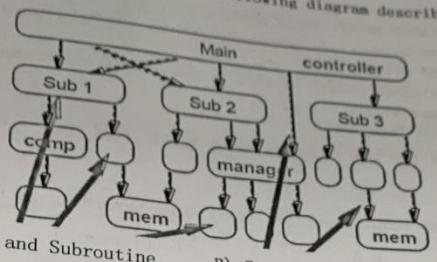
3. Which of the following tactic can be used to achieve the Performance? [ ]

A) heart beat B) Limit access

C) Increase computation efficiency D) Maintain integrity

4. Which diagram is a great tool for representing an external view of a system?
[ ]
A) Sequence diagram
B) Communication diagram
C) Activity diagram
D) Use Case diagram

5. Which architecture style does the following diagram describe?
[A]



A) Main Program and Subroutine
B) Sequential Batch
C) Layered
D) Repository

Question 3: Architecture Analysis and Design (70 points)

1. Quality Attribute and Architecture Style (38 points)

A business software company produces a series of office software. Considering usability, such a software product maintains a configuration file, which contains end-user's specific usage preference items. And each product has its specific configuration file.

However, in real usage scenarios it is found that the configuration information from different products often overlaps(重叠) or has similar details on lots of aspects. Once an end user installs the office software series, he or she has to repeatedly perform many redundant operations to preserve the same usage preference setting. Now please use a new strategy and design a software tool to manage various configure files in a unified way.

Followings are some detailed requirements for the system.

(1) Each user could check a specific configuration item by searching its keyword.

(2) The average latency a configuration item is accessed is required to be less than 20ms.

(3) The tool should adopt the same UI with the Windows, to which end users will be familiar.
(4) When apart of configuration information is damaged, the system could recover according to the initial setting file within 5 seconds.
(5) Only authorized administrator has the authority to delete a configuration item.
(6) The unit tester could perform unit test at the compile time. The response to each test can be observable, and 90% of statements have been executed in each unit test.
(7) Every minor update of this system should be accomplished by 2 developers within 1 hour.

Please analyze the requirements and complete following 4 questions:

Questions:

a) Identify the related quality attributes according to the requirements.

requirement	Q A
(1)	
(2)	
(3)	
(4)	

requirement	Q A
(5)	
(6)	
(7)	

b) 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		

c) For each quality attribute, list at least 2 tactics for archiving the corresponding quality attribute.

QA	tactics
Availability	
Modifiability	
Performance	
Security	
Testability	
Usability	

d) 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 company plans to develop a video sharing Web site. The development team analyzed the Quality Attributes, designed architecture and wanted to use Utility Tree to evaluate the architecture, followings are the scenarios.

(1) Deliver video in real time
(2) Add message queue(消息队列) middleware in < 20 person-month
(3) The crash of Web server #1 requires traffic redirected to Web server #2 in < 5 seconds
(4) Reduce storage latency on customer DB to < 200ms
(5) Change Web user interface in < 4 person-weeks
(6) Any network failures should be detected and recovered in < 1(minutes
(7) Credit card transactions are secure 99.999% of the time
(8) User Database accessing is secure 99.99% of the time

According the scenarios, please construct a Utility Tree.

3. Architecture Evaluation (16 points)

Identify and record risks and non-risks, sensitivity points and tradeoffs is an important task in architecture evaluation. Please describe the definitions of risk, non-risk, sensitivity point and tradeoffs and then read the following descriptions and point out each description is a risks, non-risks, sensitivity points or tradeoffs.

(1) "although the underlying(底层) framework of this system is good and stable, rules for writing business logic tier of your 3-tier style are not clearly articulated（说明）."

(2) "Changing the timing scheme from a harmonic（精确的） framework to a non-harmonic framework would impact far reaching impacts（极大地影响） to other modules."

(3) "In order to achieve the required level of performance in the discrete event generation component, assembly language had to be used thereby reducing the portability（可移植性） of this component."

(4) "Assuming message arrival rates of once per second, a processing time of less than 30ms, and the existence of one higher priority process, a 1 second soft deadline seems reasonable."