

选择题

- 1) What models are created during the analysis phase of a software development process?
(A) Data model; (B) Linear sequential model; (C) Functional model; (D) Behavioral model; (E) Prototyping model.
- 2) Which diagrams are to be built in an object-behavior model? _____
(A) use-case (B) event trace (C) data flow (D) state transition
- 3) What models are created during the analysis phase of a software development process?
(A) Linear sequential model (B) Data model (C) Functional model
(D) Prototyping model (E) Behavioral model
- 4) What models are created during the analysis phase of a software development process?
(A) Data model (B) Linear sequential model (C) Functional model (D) Behavioral model
- 5) Which of these are elements of an object-oriented analysis model?
A) Behavioral elements
B) Data elements
C) Class-based elements
D) Scenario-based elements
- 6) _____ can be used in the scenario-based modeling
A) Use case diagram
B) Activity diagram
C) Class diagram
D) CRC cards
- 7) Tests derived from behavioral class models should be based on the _____.
A) data flow diagram C) state diagram
B) object-relation diagram D) use-case diagram
- 8) The relationships shown in a data model must be classified to show their
A) cardinality
B) directionality
C) modality
D) probability
- 9) Events occur whenever a(n) _____.
A) actor and the OO system exchange information C) messages are passed between objects
B) class operation is invoked D) all of the above

简答题

- 1) 需求规格说明中，描绘系统逻辑模型的最主要工具是 _____。
- 2) When evaluating a product, why is it important to have data collection and analysis done *automatically* whenever possible? (8 pts.)

- 3) Explain why encapsulation, inheritance, and polymorphism are three important characteristics of object-oriented systems.

判断题

- 1) 需求分析的目的是确定目标系统必须具备哪些功能。 ()
- 2) 需求分析中为了确定每个数据元素的来源和初步定义有关算法, 应沿 DFD 从输出端往输入端进行回溯。 ()
- 3) 面向对象分析中建立的问题域子系统、人机交互子系统和功能模型分别从三个不同侧面描述了所要开发的系统。 ()
- 4) Implementation view should be considered first during software requirements analysis. ()
- 5) The state transition diagram depicts functions that transform the data flow. ()
- 6) Explain the role of each element of the conventional analysis model: data dictionary, entity relationship diagram, and data flow diagram.
- 7) The primary purpose of an entity relationship diagram in the data model is to allow normalization of relationship tables.
- 8) The purpose of data dictionary is to depict data object relationships.
- 9) Data flow diagram (DFD) provides an indication of how data are transformed as they move through the system and the functions that transform the data flow.
- 10) We should consider the implementation view first during software requirements analysis.
- 11) Class responsibilities are defined by both its attributes and operations.
- 12) Every computer-based system can be modeled as an information transform using an input-processing-output template.
- 13) Object-oriented domain analysis is concerned with the identification and specification of reusable capabilities within an application domain.
- 14) The object-behavior model indicates how the system objects collaborate with one another.
- 15) Project requirements continually change, but change can be easily accommodated because software is flexible and middleware is powerful.
- 16) Inheritance provides a mechanism by which changes to lower level classes can be propagated to all super classes quickly.

论述题

- 1) **Given the description of Document Management System, please analyze the system requirements and complete the requested models. (50 pts.)**

Document Management System description: The system is for managing the lifecycle of documents. The software can catalog the documents into many hierarchical directories. Any one piece of document belongs to one and only one directory and contains some versions, which may include some files. Each of the above objects is attached with at least three attributes: id, name and created time. User can create a new document and add it to the specified directory. When a user checks out a document version, system will lock the document version until the user checks in a new version. User can search document by name and delete the document.

1. Please draw two data flow diagrams for creating a new document (including building a default version and uploading some files) in a specified directory and searching some documents by name. (12 pts.)

2. Please give the 2 most important data dictionary cards. (8 pts.)
3. Please draw the state transition diagram for a document. (10 pts.)
4. Please give the 4 most important CRC cards. (8 pts.)
5. Please draw the relationship diagram between objects according to the above 4 CRC cards. (12 pts.)

2) Given the description of Document Management System, please analyze the system requirements and complete the requested models. (50 pts.)

Document Management System description: The system is for managing the lifecycle of documents. The software can catalog the documents into many hierarchical directories. Any one piece of document belongs to one and only one directory and contains some versions, which may include some files. Each of the above objects is attached with at least three attributes: id, name and created time. User can create a new document and add it to the specified directory. When a user checks out a document version, system will lock the document version until the user checks in a new version. User can search document by name and delete the document.

2. Please give the 2 most important data dictionary cards. (8 pts.)
4. Please draw the class diagrams and specify the relationships between objects. (10 pts.)
5. Please give the 4 most important CRC cards. (8 pts.)

3) Given the description of the Football Player System, please analyze the system requirements and complete the requested models. (50 pts.)

Football Player System description: The system is to control the motion of robots in a multi-robot football competition. The software must be able to decode the images obtained by the cameras in the robots' eyes, analyze the information and judge the current state of the field (i.e. the positions of collaborators, rivals, and the ball). Then the system is supposed to send a signal of action (i.e. forward, backward, turn, or stop) to the engine. At the mean time, the software must be able to recognize foul plays. The system can be connected to the main server and be loaded with knowledge such as the rules and strategies of the competition.

1. Please draw the data flow diagram for the system. (12 pts.)
2. Please give the 4 most important data dictionary cards. (8 pts.)
3. Please draw the system state transition diagram. (10 pts.)
4. Please give the 4 most important CRC cards. (8 pts.)
5. Please draw the relationship diagram between objects according to the above 4 CRC cards. (12 pts.)

4) Given the description of a system, please analyze the system requirements and complete the requested models. (40 pts.)

Order-Processing System description: A company is establishing a new catalog sales division to sell casual apparel and outdoor merchandise. The catalog will be published on the World Wide Web, and orders can be placed by e-mail, via the Web site, or via telephone, or fax. A client/server system will be built to support order processing at the company site. Shipment can be made if payment is by credit card, and must wait until the check is cashed if payment is by check.

2. Please draw the data flow diagram for the system. (10 pts.)
4. Please draw the class diagrams and specify the relationships between objects. (8 pts.)

5. Please give the 4 most important CRC cards. (8 pts.)

5) Given the description of a system, please analyze the system requirements and complete the requested models. (40 pts.)

Water-Monitoring System description: The water-monitoring system is to gather data at many points throughout a river valley. At the collection sites, several calculations are done according to the data (date, direction, level, flux, rainfall, etc.) and the results (statistics, forecast, summary report, etc.) are communicated to a central location for comprehensive reporting. An automatically generated report mainly contains charts and tables of all kinds of data collected from different locations, together with a summary document. Different department is allowed to access different part of a report.

2. Please draw the data flow diagram for the system. (10 pts.)

4. Please draw the class diagrams and specify the relationships between objects. (8 pts.)

5. Please give the 4 most important CRC cards. (8 pts.)

17) Given the description of a system, please analyze the system requirements and complete the requested models by either the conventional methods or the object-oriented methods. (40 pts.)

The E-mail System description: You are responsible for the development of an electronic mail (e-mail) system to be implemented on a PC network. The e-mail system will enable users to receive letters from another user, or to create letters to be mailed to another user or to a specific address list. Letters can be read, copied, stored, etc. The e-mail system will make use of a simple full-screen editor on a video display terminal to create letters. The editor allows text to be inserted, deleted, and modified. Sections of text can be “cut” from one part of the file and “pasted” to another part of the file. The user can specify a text string, and the editor can find the next occurrence of that string. Through the editor, the user can specify margin, background, and tab settings.

Please specify your choice here: A – conventional methods; or B – object-oriented methods

A	B
(1) Please draw the data flow diagram for the e-mail system. (10 pts.)	(1) Please draw the data flow diagram for the e-mail system. (10 pts.)
(2) Please describe at least 4 important data by data dictionary cards. (8 pts.)	(2) Please draw an event trace diagram for the normal use case of the e-mail system. (5 pts.)
(3) Please draw an entity relationship diagram for the e-mail system. (5 pts.)	(3) Please draw the class diagrams and specify the relationships between objects. (12 pts.)
(4) Please draw a system hierarchy based on DFD given in step (1). (12 pts.)	(4) Please draw at least 2 state transition diagrams. (8 pts.)

7) 某市政部门欲开发计算机控制的路障与维修系统（PHTRS）。路障被发现上报后，系统赋予该路障一个识别号码，并存入其所在街道地址、大小（按1比10的比例）、位置（路中、人行道上等等）、所属街区（根据街道地址得出）、以及维修优先级（根据其大小确定）。对

每个路障有一个施工命令，包括路障位置、大小、施工队编号、施工人数、配备工具、维修的工时数、路障状态（施工中、已修复、临时修复、未修复）、材料用量、维护费用（根据维修工时、人数、材料及工具等计算得出）。最后，系统建立一个损失报告文件，记录此路障造成的损失，包括市民的姓名、地址、电话、损失类型、以及损失量（以元为单位）。PHTRS 是一个在线系统，可随时查询。

下面两套题目中，请你**任选一套**完成。请圈出你的选择： **A** **B**

A

1. 画出 PHTRS 的数据流图。（10 分）
2. 请用数据字典的方法完成 PHTRS 所涉及的数据(至少 4 个)。（8 分）
3. 用面向数据流的设计方法来设计出软件体系结构，给出 HIPO 图（至少写出 6 个主要模块的 IPO 图）。（15 分）

B

1. 编写正常情况脚本。（4 分）
2. 根据脚本画出事件跟踪图。（4 分）
3. 画出 PHTRS 状态图。（5 分）
4. 画出 PHTRS 的数据流图。（10 分）
5. 完成五个层次的叠加效果图。（10 分）

8) 拟开发一个机票预订系统 ZDBKG。该系统有如下需求：“旅行社把预订机票的旅客信息（姓名、性别、工作单位、身份证号码、旅行时间、旅行目的地等）输入系统，系统为旅客安排航班，打印出取票通知和帐单，旅客在飞机起飞的前一天凭取票通知和帐单交款取票，系统校对无误即印出机票给旅客。”所开发的系统要求在网络平台上运行。下面两套题目中，请你**任选一套**完成。请圈出你的选择： **A** **B**

A

1. 用层次方框图来表示系统的需求。（5 分）
2. 画出 ZDBKG 系统的数据流图。（6 分）
3. 请用数据字典的方法完成 ZDBKG 系统所涉及的数据(至少 8 个)。（4 分）

B

1. 从题目的需求陈述中，筛选出 ZDBKG 系统的类-&对象。（5 分）
2. 编写正常情况脚本。（4 分）
3. 根据脚本画出事件跟踪图。（4 分）
4. 画出 ZDBKG 系统状态图。（6 分）
5. 画出 ZDBKG 系统的数据流图。（6 分）
6. 完成五个层次的叠加效果图。（10 分）

9) Software scope: A company is establishing a new catalog sales division（分类推销部）

to sell casual apparel（便装）and outdoor merchandise（户外活动商品）. The casual apparel catalog includes shirts (bowling shirts, golf shirts, racing shirts, college shirts, etc.), wears (ladies wear, active wear, outer wear, etc.), jackets (leather jackets, rain jackets, casual jackets, etc.), and others such as sunglasses, hats, pants, and more. The outdoor merchandise catalog includes goods for hunting, fishing, camping, and more. The catalog will be published on the World Wide Web, and orders can be placed by e-mail, via the web site, or via telephone, or fax. A client/server system will be built to support order processing at the company site. The orders are to be collected daily from all places, and be stored in a database. Everyday at 6:00pm, the orders are classified and sent to the corresponding shipment departments. Shipment can be made if payment is by credit card, and must wait until the check is cashed if payment is by check. If the ordered item is out of storage, a notification will be sent to the customer, and the order will be delayed or canceled, depending on the customer's decision.

1. Please draw the data flow diagram for processing an order. (12 pts.)
2. Please give the two CRC cards for classes “catalog” and “order”. (8 pts.)
3. Please give the use-case for browsing the web-site and place an order with credit card payment. (10 pts.)
4. Please draw the corresponding NSU for the use-case described in step 3. (10 pts.)
5. Please draw the overall hierarchical call-and-return architecture of the system. (10 pts.)

10)Software scope: A CASE (Computer Aided Software Engineering) tool company is developing a new Bug Management System (BMS) to improve and control software testing process.

The system administrator of BMS will create and manage the projects (name, description, project manager, project developer and testing people) and users. After testing one software product, a bug finder will login to BMS and submit the bugs into the system. For each bug, the bug finder will select the proper project and input the following attributes: name, catalog (catastrophic, critical, marginal or suggestion), description, attached file, occur time. Software project manager can browse and query his or her related project bugs, assign any unassigned bugs to the related developer. A software developer needs to browse his or her bugs everyday, fix the bugs, change the bug state from “assigned” to “repaired” and input the comments and repair time. Testing people will check every repaired bug, validate it, and mark it “validated” if the bug has been repaired perfectly or return it to the developer if the bug hasn’t been properly repaired.

1. Please draw the data flow diagram for processing a bug. (12 pts.)
2. Please give the two CRC cards for classes “bug” and “project”. (10 pts.)
3. Please give the state diagram for the “bug” class. (8 pts.)
4. Please draw the web-based software architecture of BMS. (10 pts.)
5. Please describe the testing strategy for BMS product. (10 pts.)

11) Software scope: An Online Course Selection (OCS) system is supposed to help students select courses with no conflicts. All the courses are managed by the system administrator, including courses for undergraduate students and those for graduate students. There are three kinds of courses: mandatory (必修), elective (选修), or minor (辅修). Student user can login with student ID and a password. OCS system will list the current user’s selected courses. Some detailed information (such as the credits and current capacity) of each course must be displayed as well. The user may check course list to find the ones he/she wants to select. When the user makes a selection, the system is supposed to check if this selection is valid (that is, the user has the authority and the selection will cause no conflict). An error message will be displayed if the selection is invalid, or else this selection will be recorded by the database. The system administrator must be able to check various of statistics including the number of students registered for each course, the number of courses selected by each student, or the number of students taking a given amount of credits, etc.. The administrator also needs to query information for a single course (e.g. print the students name list) or a single student (e.g. print a timetable of all the courses taken).

1. Please draw the data flow diagram for the system. (15 pts.)

2. Please give the two CRC cards for classes “student” and “course”. (10 pts.)
3. Please give the use-case for selecting a course. (8 pts.)
4. Please draw the NSU for the above use-case. (12 pts.)
5. Given the pseudo-code for authority checking. Please describe the testing strategy for this function. (10 pts.)

BEGIN Authority_checking

if (selected course is open to user's major)

if (selected course is open in this semester && current capacity > 0)

return YES;

else return NO;

else return NO;

END Authority_checking

12)Software scope: The main purpose of the system is to store and query the large amount of sale data and promote work efficiency in the supermarket. The system adopts the popular client/server architecture. All the customers, goods, and purchase information are stored in a central data server. Several client desktops, which are used to input goods purchase information, are connected to data server by network. Customers can return the goods they have bought if the goods defects are confirmed by sale manager. The system also records the inventory quantity (库存量) for each goods, and should order from the suppliers if the quantity is below a certain threshold (阈值). A special discount is given to the customer who has a VIP card.

1. Please develop complete use-cases for the activities of returning goods and ordering goods from suppliers. (10 pts.)
2. Please give the CRC cards for the classes of *Customer* and *Goods*. (10 pts.)
3. Please draw the data flow diagram for the system. (10 pts.)
4. Please draw the state transition diagram for the class *Goods*. (10 pts.)
5. Suppose the *goods purchase* function is to be tested, please design the test cases by applying equivalence partitioning and boundary value analysis technique. (10 pts.)

13) Software scope: Infrastructure As A Service (IaaS) is a kind of popular cloud service model, customers can rent or purchase the computing resource (Virtual Machine) on demand, which are deployed in the cloud service provider site, not in the customer site. IaaS Business Operation Supporting System (*iBOSS*), such as Amazon EC2 AWS, is used to manage the computing resource pool and supply the user interaction interface.

Firstly the *iBOSS* administrator will register the hardware resource (ID,

Name, Catalog, Location, CPU, Memory, Disk, NIO etc) to the IaaS platform. Then *iBOSS* can catalog, browse, modify and remove all of the resource. The customers can make his/her resource order by inputting the customer's name, address, the number of CPU, the capability of Memory and Disk, duration, the bank account information from the website. *iBOSS* will forward the order to the financial approver and IT administrator to check the resource availability and financial information. If the computing pool is available and customers have finished the payment, *iBOSS* will create some virtual machines (based on XEN, KVM, VMWare etc) according to the order, and email the order response form (account, password, IP address etc) to the customers. Otherwise, *iBOSS* will tell the customers to complete the orders or say sorry for the limited computing resource. Furthermore, *iBOSS* needs to manage all of the customers, and to monitor and configure all of the virtual machines to guarantee the quality of service.

1. Please draw the data flow diagram for the *iBOSS* system. (12 pts.)
2. Please give the two CRC cards for classes "order" and "resource". (10 pts.)
3. Please give the state diagram for the "resource" class. (8 pts.)
4. Please draw the web-based software architecture of *iBOSS*. (10 pts.)
5. Please describe the testing strategy for *iBOSS*. (10 pts.)

14) Software scope: An Internet company plans to build a Cloud Reading Platform (*CRP*), for example NetEase Cloud Reader, which can bridge the publishing houses and readers through cloud and mobile device.

The publishing house (PH) can deliver its digital book online to *CRP*. For each digital book, the PH should describe the book name, catalog, writer, abstract, table of content, ISBN number, price, the size of file, and upload the related acceptable digital resource. The administrator of *CRP* can browse all of the digital books and approve the new upload digital resource. If the resource is compatible, integrated and attractive, admin will accept the application and create one configuration command to the system technology support (PST). Otherwise, admin will reject the application and fill in one rejection form to PH. Aided by the PH, PST will conduct some book package work, such as mobile device screen adaptation, format translation, index build, then publish the book online. Using the mobile device, readers can browse, buy and read the book, can search the book by the topic, catalog or other keywords, can write his or her comments for the books. To meet the personal requirement of readers, *CRP* will log the readers' reading behavior and recommend the book to the related readers automatically by analyzing the logs.

1. Please draw the data flow diagram for publishing a digital book using *CRP*. (12 pts.)
2. Please give the two CRC cards for classes "digital book" and "reader". (10 pts.)

- 3. Please give the state diagram for the “digital book” class. (8 pts.)**
- 4. Please draw the software architecture of CRP. (10 pts.)**
- 5. Please describe the testing strategy for CRP. (10 pts.)**