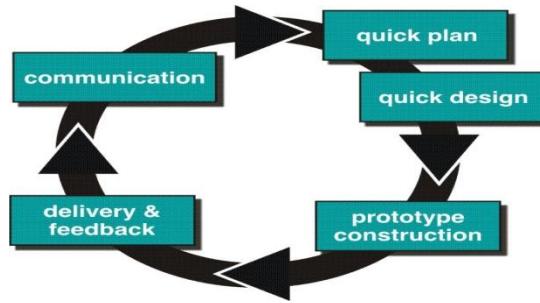


“Instruction to Software Engineering” Final Examination(A)

(闭卷, 120 分钟)

1. Please describe the differences between following items briefly. (15 Points)
 - 1) Customer and End-User; 客户,软件产品的采购者/合同签约方(甲方);终端用户,软件产品的使用者;
 - 2) Requirement and Specification; 用户需求,来自用户对系统的描述,需求分析的输入; 软件规格说明书,来自开发者对系统的描述,需求分析的输出;
 - 3) Software Design and Programming; 软件设计是满足软件需求的解决方案,软件设计包括数据设计\架构设计\GUI 设计\构件级设计;软件编程是软件设计的实现,具体用编程语言实现;
 - 4) Software Construction and Software Deployment; 软件构造是软件实现的系列工作, 包括编程\集成第三方软件等;软件部署是软件生成后在具体的应用环境发布\安装\运行的过程;
 - 5) Black-Box Testing and White-Box Testing;黑盒测试是基于软件的输入和输出的测试,针对可执行软件;白盒测试是基于软件结构的测试,需要知道源代码;

2. There are five activities in generic process framework. Please apply them to describe the Prototyping process model. (5 Points)



3. Please describe the Agile process model in your own words and explain why it is important for software processes to be agile. (8 Points)



"敏捷"可以快速相应变化;

"敏捷"将大问题变小问题,将复杂问题变简单问题,有利于问题的解决;

"敏捷"使用户和开发者更紧密合作,团队成员更相互协作;

"敏捷"更提高工作效率\降低开发成本;

4. Please list the four designs required for a complete specification of a software design and the role of each. (8 Points)

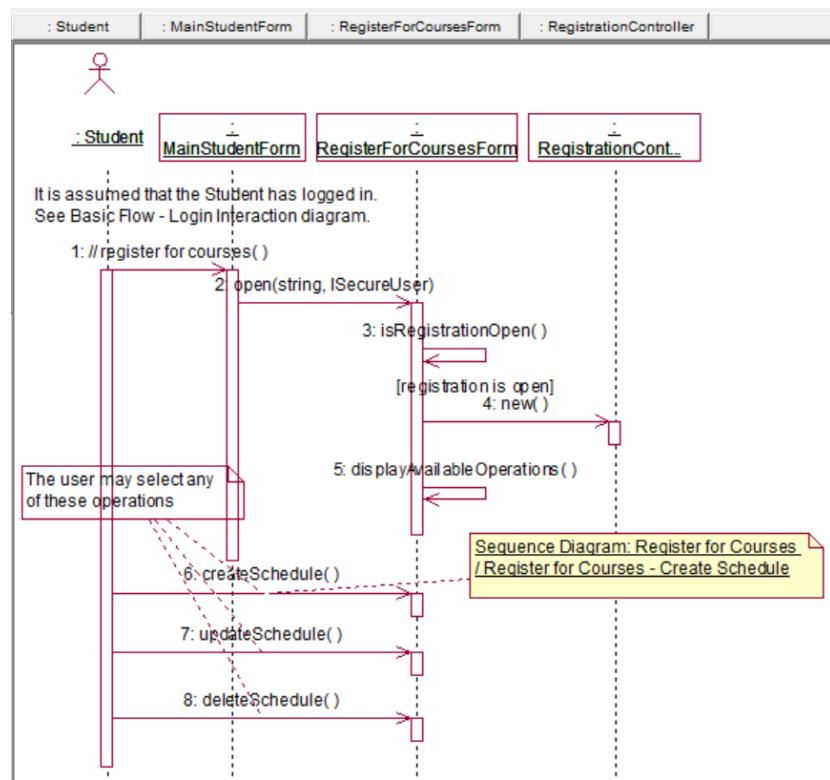
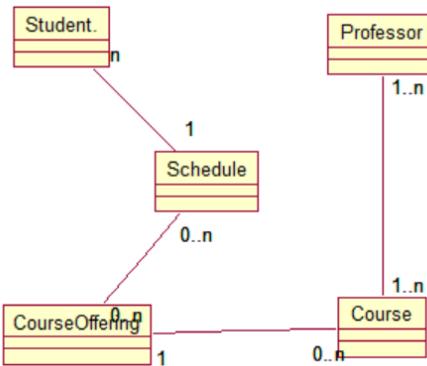
数据设计,设计系统的数据结构或数据库;

架构设计,设计系统的软件构件\构件功能\构件关系;

用户界面设计,设计系统的人机接口,即用户的使用界面;

构件设计,设计构件内部的模块\类;

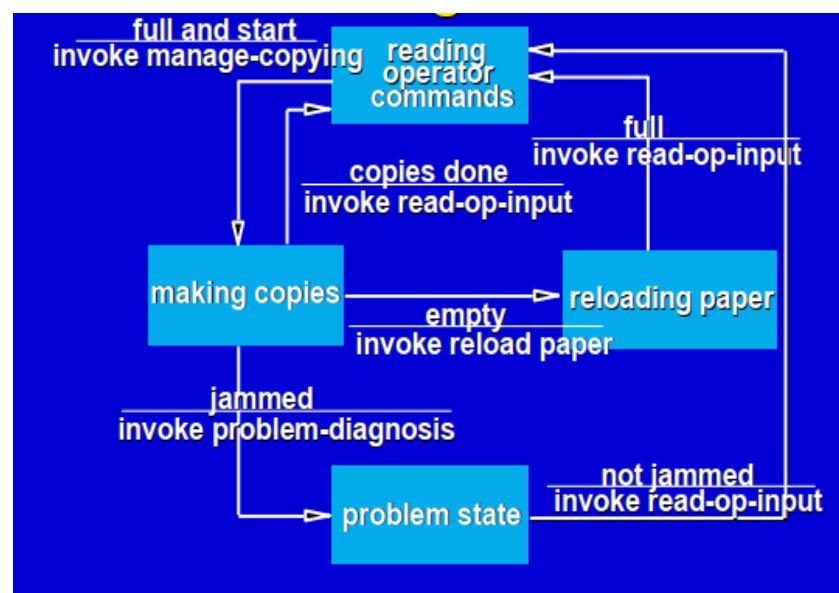
5. You have been asked to build a network-based course registration system for your university. (10 Points)
- (1) Please develop an entity-relationship diagram or class diagram that describes data objects, relationships, and attributes. (5 Points)
- (2) Please develop a sequence diagram showing the interaction involved when a student registers for a course. Courses may have limited enrolment (选课限制), so the registration process must include to check whether the places are available. Assume that the student access an electronic course catalog to find out about available courses. (5 Points)



6. The working process of the copier (复印机) is as follows.

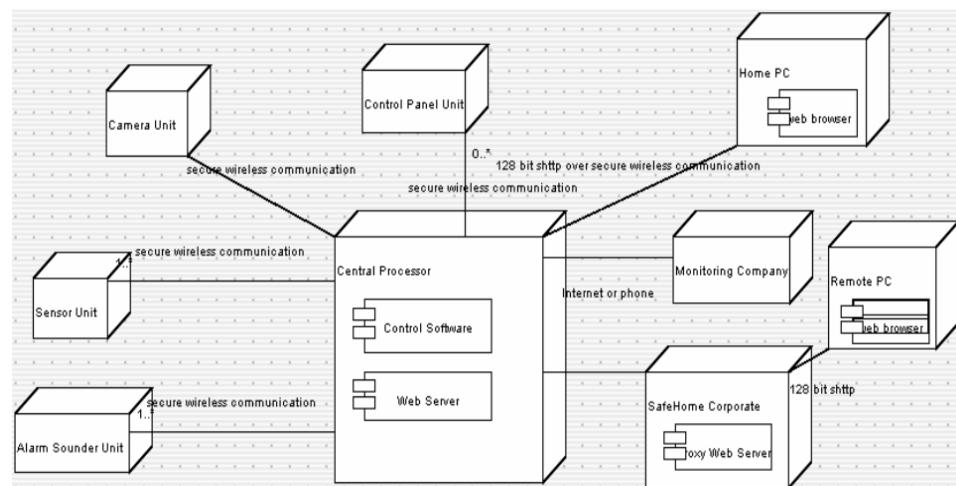
When the copy order is not received, the copier is idle (空闲). Once the copy order is received, the copier will enter the copy state. After completing the work specified in one copy order, the copier will return to the idle state and wait for the next copy order; If no paper is found during the execution of the copy command, it will enter the state of paper shortage, issue a warning, wait for the paper to be loaded, and enter the idle state after the paper is full, ready to receive the copy command; If a paper jam (卡纸) occurs during copying, enter the paper jam state, issue a warning, wait for the maintenance personnel to remove the fault, and return to the idle state after trouble shooting.

Please use the UML Statechart Diagram to describe the behavior of the copier. (12 Points)



7. There is the Deployment diagram for SafeHome system. Please answer following questions according to the diagram: (8 Points)

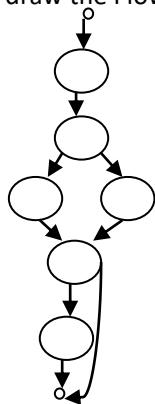
- 1) What's kind of software architecture was designed for SafeHome system? How many components were designed in this system and what are them?
 - i. B/S 结构, 3 个构件: Control Software, Web Server, Poxy Web Server;
- 2) Please describe the networks and network protocols that were used in SafeHome system.
 - i. Wireless, Internet, Phone, 128 bit shhttp,



8. Given the program logic as follows: (12 Points)

```
int a, b;
int x=0;
int y=0;
if( a>b ){
    x = a-b;}
else {
    x = b-a; }
while ( b<0 ) {
    y += b;
    b++; }
```

(1) Please draw the Flow Chat for this program. (4 Points)



(2) Please compute the cycle complexity of program. (3 Points)

3

(3) Please list a set of independent path and design a set of test case for basic path testing.

(5 Points)

{2,-1}, {-1, 2},{-2,-1}

9. A POS (Point-of-Sale) system is a computerized application used to record sales and handle payments. It is typically used in a retail store (零售商店). Consider the scenario “A Cashier process sale” as follows. (12 Points)

Use Case : Process Sale

Primary Actor: Cashier

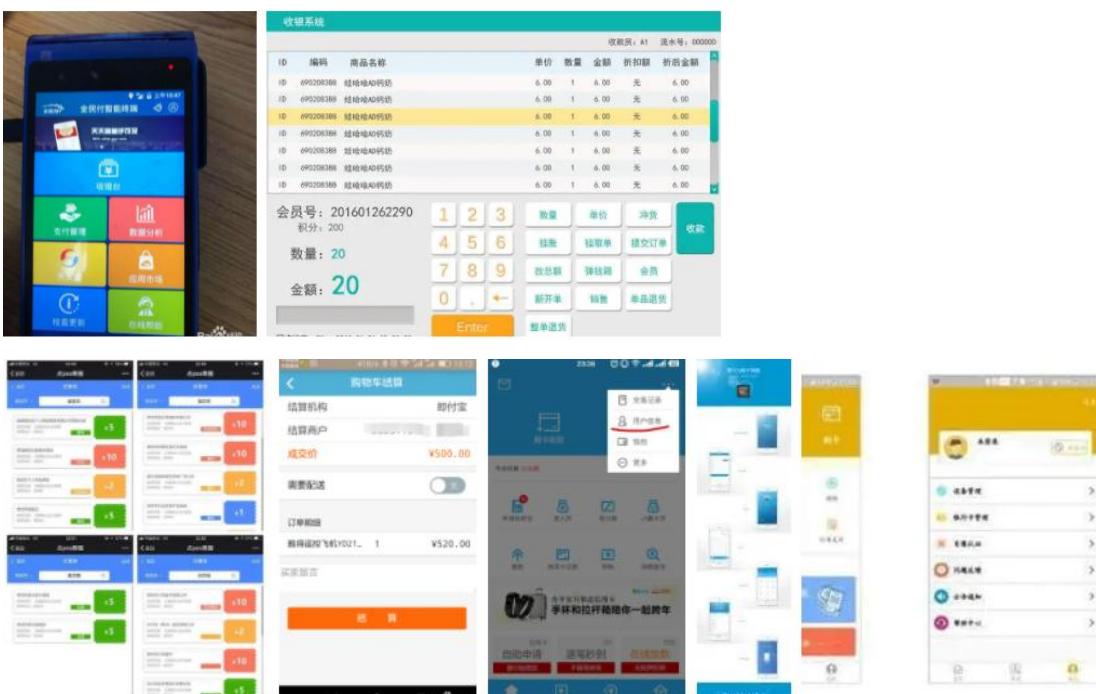
Preconditions: Cashier is identified and authenticated.

Success Guarantee (Post Conditions): Sale is saved. Tax is correctly calculated. Accounting and Inventory are updated. Commissions recorded. Receipt is generated. Payment authorization approvals are recorded.

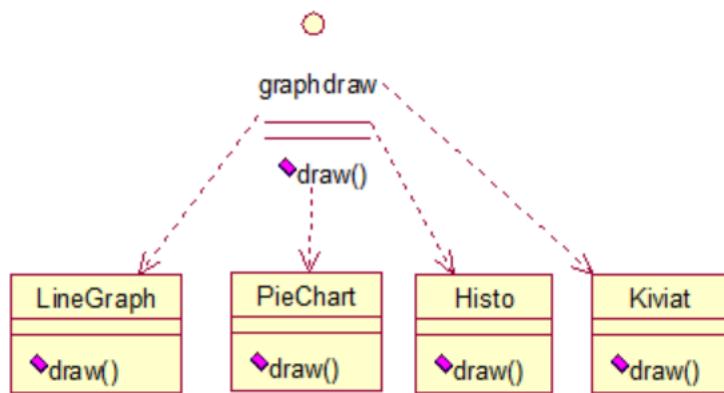
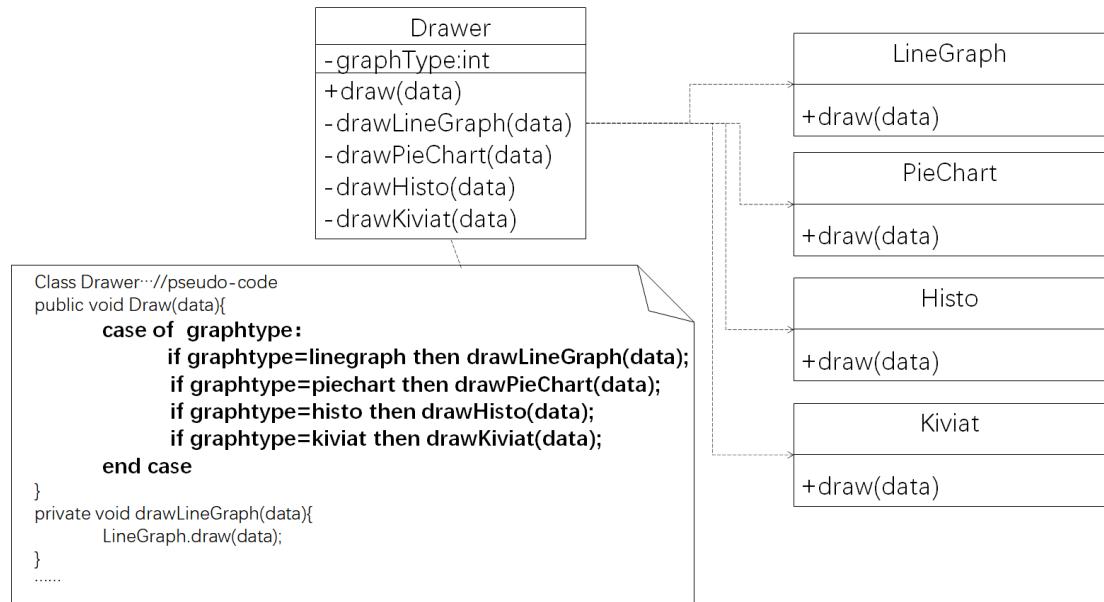
Main Success Scenario (or Basic Flow):

- 1) Customer arrives at POS checkout with goods and/or services to purchase.
- 2) Cashier starts a new sale.
- 3) Cashier enters item identifier.
- 4) System records sale line item and presents item description, price, and running total. Price calculated from a set of price rules. Cashier repeats steps 3-4 until indicates done.
- 5) System presents total with taxes calculated.
- 6) Cashier tells **Customer** the total, and asks for payment.
- 7) Customer pays and **System** handles payment.
- 8) System logs completed sale and sends sale and payment information to the external **Accounting** system (for accounting and commissions) and **Inventory** system (to update inventory).
- 9) System presents receipt.
- 10) Customer leaves with receipt and goods.

According to the above scenario, please design the GUI interface draft for the Cashier.



10. There is an example of component design that violated the principles of OCP (Open-Closed Principle). Please redesign this component model in order to obey OCP principles.
 (10 Points)



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