

软工导 2023 复习

1. Many modern applications change frequently before they are presented to the end user and then after the first versions have been used. Think about few ways to build software to stop deterioration due to change.

Make sure that software is designed so that changes in one part of a program do not create side-effects in another part of the program.

Make sure that software is designed so that it does not depend on external devices or systems that are likely to change with time.

Make sure test cases and results are archived and available so that the software can be retested when changes are made.

Make sure you spend time understanding what the customer wants.

确保软件的设计不会对程序的某一部分产生副作用。

确保软件的设计不依赖于可能随时间而改变的外部设备或系统。

确保测试用例和结果存档可用，以便在软件发生更改时可以重新测试。

确保花时间了解客户的需求

2. For the waterfall model, describe situations where this model can and cannot be used and why.

The waterfall model is appropriate for projects with the following characteristics:

(1) the problem is well understood (requirements are well-defined)

(2) the delivery date is realistic

(3) it's unlikely that major changes in requirements will be requested as the project proceeds.

瀑布模型适用于具有以下特征的项目：

(1) 对问题有充分的了解（需求定义明确）

(2) 交付日期切合实际

(3) 在项目进行过程中，不太可能要求对需求进行重大变更。

3. Incremental process models tend to be among the most widely used in the industry. Describe the conditions under which such models should be used and what an “increment” means in terms of project work and delivery.

Incremental models are useful when staffing is unavailable for a complete implementation by the business deadline. In addition, increments can be planned to manage technical risks. The "increment" is often a core product, i.e., basic requirements are addressed but many supplementary features remain undelivered. The process is repeated following the delivery of each increment, until the complete product is produced.

当没有足够的人员在业务截止日期前完成全部实施工作时，增量模式就会派上用场。增量“通常是一种核心产品，即基本要求已得到满足，但许多补充功能仍未交付。在交付每个增量后，都要重复这一过程，直到生产出完整的产品。

4. Describe the phases of the prototyping model for software development?

Requirements are gathered by having the customer and developer meet and identify whatever objectives and requirements they can. Quick design follows, focusing on representation of the software that will be visible to the customer. A prototype is constructed by the developer and evaluated by the customer and used to refine the requirements. Iteration occurs and the prototype is tuned to satisfy the customer's needs..

收集需求的方法是让客户和开发人员会面，并确定他们所能确定的任何目标和要求。随后进行快速设计，重点是让客户看到软件的表现形式。开发人员构建原型，客户对原型进行评估，从而完善需求。然后进行迭代，调整原型以满足客户的需求。

5. What are the primary advantages of the component-based process model for software engineering?

Component-based process models promote software reuse and reusability and can result in: 70% reduction in development cycle times, 84% reduction in project costs and 70% increase in productivity.

基于组件的流程模型可促进软件的重用性和可重用性，并可实现以下目标 开发周期缩短 70%，项目成本降低 84%，生产率提高 70%。

6. Describe the 5 phases of the Unified Process model for software engineering?

Inception phase (customer communication, planning, use-case creation)

Elaboration phase (creation of analysis and design models)

Construction phase (translates design model into software components)

Transition phase (software transferred from developer to end user for acceptance testing)

Production (on going monitoring and support software during active use)

初始阶段（客户沟通、规划、用例创建）

阐述阶段（创建分析和设计模型）

构建阶段（将设计模型转化为软件组件）

过渡阶段（软件从开发人员转交给最终用户进行验收测试）

生产（在使用过程中持续监控和支持软件）

7. List the key issues stressed by an agile philosophy of software engineering.

The importance of self-organizing teams

Communication and collaboration between team members and customers

Recognition that change represents opportunity

Emphasis on rapid delivery of software that satisfies the customer

自我组织团队的重要性

团队成员与客户之间的沟通与合作

认识到变化就是机遇

强调快速交付令客户满意的软件

评阅教师	得分

一、简答论述题（本大题共 3 小题，共 35 分）。

1. There are five activities in generic process framework. Please apply them to describe the spiral process model. (10 Points)
2. List and describe three golden rules that should be applied when building any user interface. (9 Points)
3. Please describe the differences between following items briefly. (16 Points)
 - (1) Requirement and Specification;
 - (2) Black-Box Testing and White-Box Testing;
 - (3) Verification and Validation;
 - (4) Coupling and Cohesion;

评阅教师	得分

二、非标准答案题（本大题共 1 小题，共 15 分）。

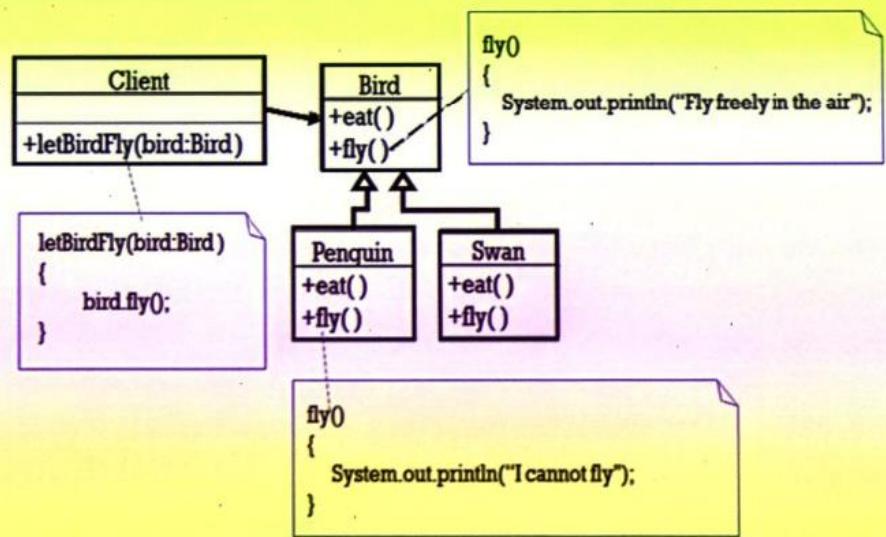
1. Please describe the Agile process model in your own words and explain why it is important for software processes to be agile. (15 Points)

评阅教师	得分

三、应用、设计及分析题（本大题共 4 小题，共 50 分）。

1. A news management system is mainly used to publish news, the administrator only needs one, after logging in, you can Post news in the background. Anyone can browse the news, and the viewer can register as a member of the system, and can comment on the news after registration. Administrators can manage news, comments, and registered members in the background, such as modifying and deleting.
- (1) Please develop an entity-relationship diagram that describes data objects, relationships, and attributes. (4 Points)
- (2) Please draw a use case diagram of the news management system. (6 Points)

2. A component-level design is given in the following class diagram. Please assess whether this design is following the basic design principles or not. If not, please give your comments as well as improvement solution. (10 Points)



Tips: This component is composed of Client, Bird, Penguin and Swan. When executing the method `letbirdfly` (Bird) of Client, it is expected to output the statement "fly free in the air". However, when replacing the base class Bird with subclass Penguin, the output statement "I cannot fly" is inconsistent with the expectation.

3. Given the program logic as follows: (14 Points)

```
public int binSearch(int arr[], int objectValue) {  
    int left = 0;  
    int right = arr.length - 1;  
    int mid;  
    while (left < right) {  
        mid = (right - left) / 2 + left;  
        if (arr[mid] == objectValue) {  
            return mid;  
        } else if (objectValue < arr[mid]) {  
            right = mid - 1;  
        } else {  
            left = mid + 1;  
        }  
    }  
    return -1;  
}
```

(1) Please draw the Flow Chat for this program. (5 Points)

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

(3) Please list a set of independent path and design a set of test case for basic path testing. (6 Points)

4. Carefully read the material:

Material:

Students can search for Program through the "Overseas Project Application System". If he find a project of interest, he can continue to view Program Details. If the project details can attract him, he can submit the application online. Each student can apply for up to two projects.

(1) Identify the classes and relationships between them, and use UML class diagrams to represent these classes and relationships. (8 Points)

(2) Please design a GUI sequence for the "Overseas Project Application System". Please provide the layout of each GUI and the navigation relationships between the GUI(GUI=Graphical User Interface). (8 Points)