

Software Testing and Quality Assurance

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- Something about this course
 - Academic degree course
 - English&Chinese teaching & learning
 - Some rules: attendance/homework/exercises
 - The references

Software Testing and Quality Assurance

The screenshot shows a web browser displaying a course page from Zhihuishu.com. The title of the course is "《软件测试》" (Software Testing), which is categorized under "计算机类 (0809)". The course introduction section includes a brief description: "学习软件测试基础知识，掌握软件测试应用技能，了解软件测试的前沿发展" (Learn basic knowledge of software testing, master application skills, understand the frontiers of software testing). It also lists the following details: 学分 1.0, 学时 18.0, 教师 章晓芳、程宝雷、屈蕴茜, and 学校 苏州大学. At the bottom, there is a link labeled "了解更多" (Learn more). The browser's address bar shows the URL: https://coursehome.zhihuishu.com/courseHome/1000002143?cparams=JTDCTlyY291cnNISWQlMjI6MT/. The browser interface includes various toolbars and a search bar.

Software Testing and Quality Assurance

The screenshot shows a web browser window displaying a course page for "Software Testing". The title bar reads "视频检查_智慧树" and the URL is <https://courseh5.zhihuishu.com/cc.html#/chapterVideo/1000002143/0/1?cparams=JTkCJTyY291cnNISW>. The main content area is titled "《软件测试》" and shows a video player for "3.1 白盒测试的基本概念". The video thumbnail features the text "白盒测试" and "白盒测试的基本概念" over a digital background, with "主讲老师: 程宝雷" below it. The video player has a progress bar with several video sequence numbers (1.1, 1.2, 2.1.1, 2.1.2, 2.2.1, 2.2.2, 3.1, 3.2.1, 3.2.2, 3.2.3, 3.2.4, 4.1.1, 4.1.2, 4.1.3, 4.1.4, 4.2.1, 4.2.2) and colored status indicators (red for feedback, green for completed, blue for checked). To the right of the video player is a "反馈记录" section containing two entries:

[视频 00:05:17]
139****7865在2020-12-16 20:29提交
这边520的20应该是指数，代表5的20次方
处理结果：已处理
处理人：方园
[视频 00:05:14]
139****7865在2020-11-06 20:37提交
520不对，20为上标，表示的意思是5的20次方
处理结果：已处理
处理人：方园

- The contents
 - Introduction of STQA
 - Basic concepts of ST
 - Testing methods: Wh
 - Testing phases: U-I-S
 - Testing report
 - Testing metrics

-  STQA_Session_01_Introduction
-  STQA_Session_02_Preliminary
-  STQA_Session_03_Logic coverage
-  STQA_Session_04_Control flow graph
-  STQA_Session_05_Basic path testing
-  STQA_Session_06_Loop testing&Data flow t...
-  STQA_Session_06-plus--Data flow testing
-  STQA_Session_07_BVA
-  STQA_Session_08_EP
-  STQA_Session_09_DT
-  STQA_Session_10_CEG
-  STQA_Session_11_CT
-  STQA_Session_12_UISA
-  STQA_Session_13_Regression testing
-  STQA_Session_14_Performance testing
-  STQA_Session_15_Bug report
-  STQA_Session_16_Testing metrics
-  STQA_Session_17_Testing management

- Score?
- Course objectives?
 - Application in graduation project
 - Publication of papers

Session 1

Introduction of Software Quality Assurance and Software Testing

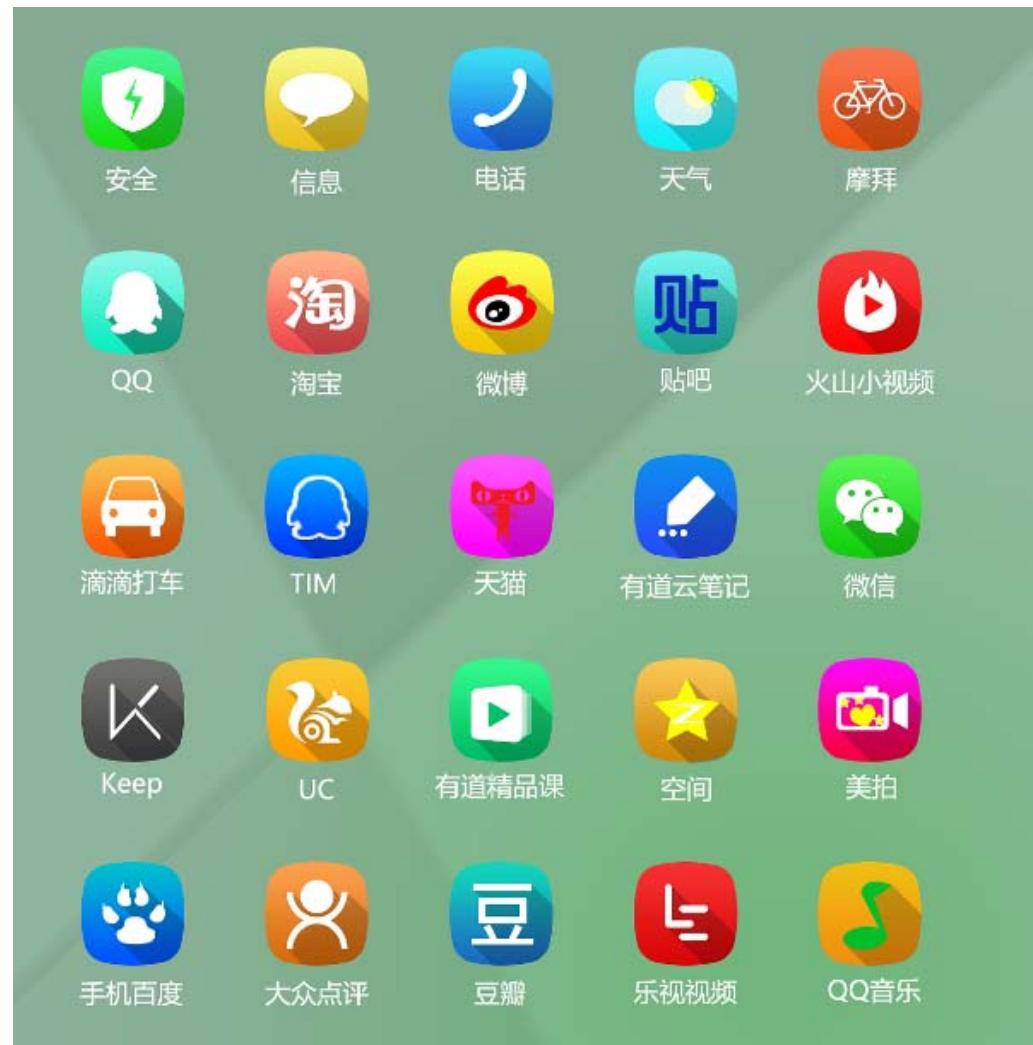
Objectives

- ◆ In this session, you will learn:
 - ◆ The basic idea of SQA
 - ◆ Quality assurance and quality control
 - ◆ Testing overview

- ◆ Why we need software testing?

Software Testing and Quality Assurance

◆ We need software



软件的组成部分有哪些? ()

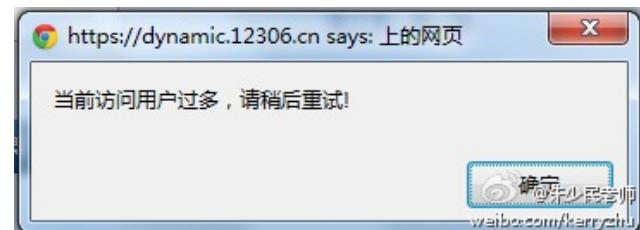
- A. 计算机程序
- B. 计算机程序和文档
- C. 计算机程序和规程
- D. 计算机程序、规程以及可能的相关文档和运行计算机系统所需的数据

- ◆ We need software of good quality

08奥运票务中心、12306的道歉



2007年10月30日，北京奥运会第二阶段门票销售刚启动就因为购票者太多而被迫暂停。低估了群众购票的热情，导致售票系统出现了瓶颈问题



一个缺陷造成了数亿美元损失

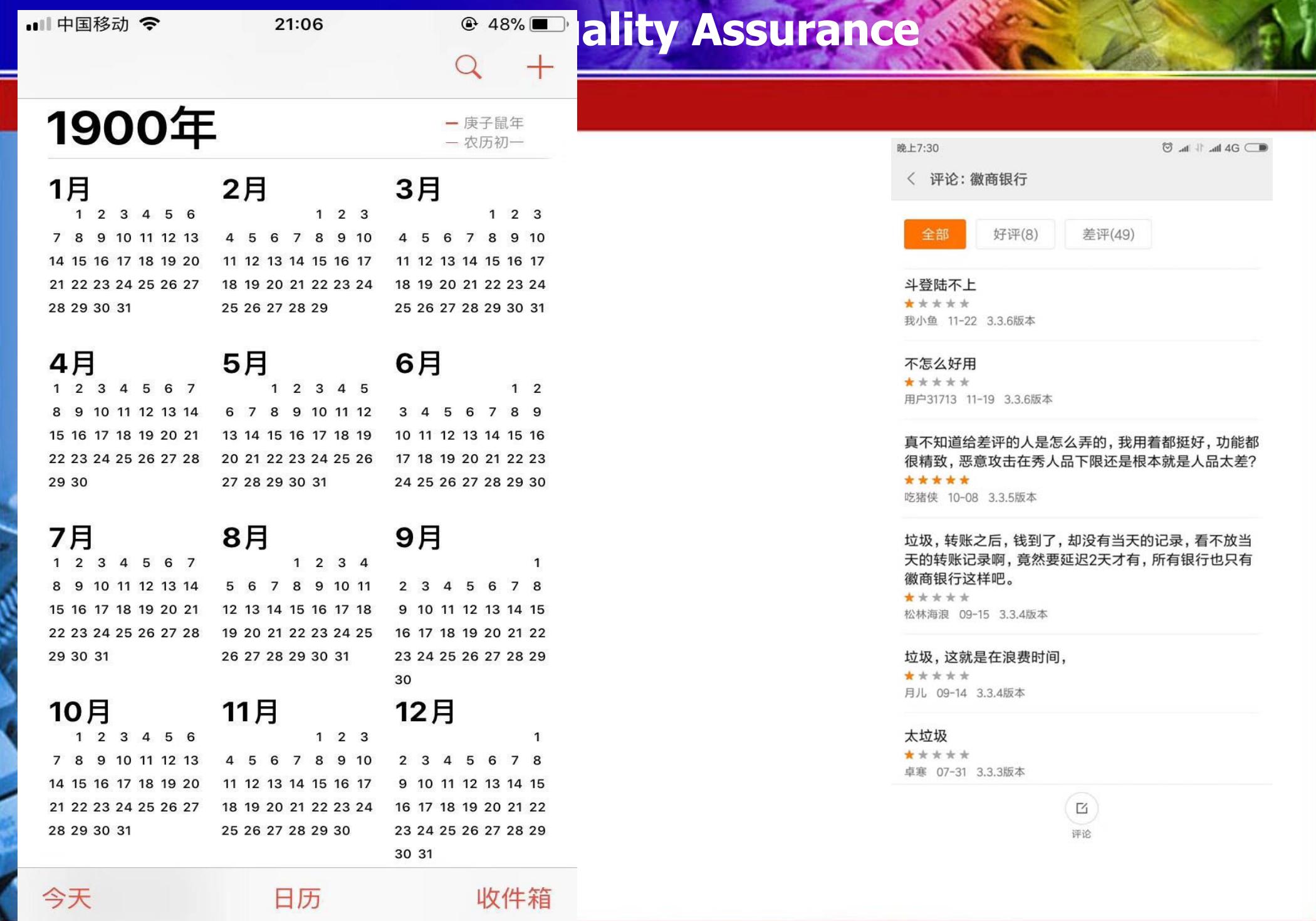
$$(4195835 / 3145727) \times 3145727 - 4195835 = ?$$



最后 **Intel**公司付出很大代价，回收**CPU**，造成
4亿美元损失

波音737 MAX 软件故障





- ◆ We need some methods to ensure the quality

软件错误

在软件生命周期内不希望或不可接受的人为错误，结果导致软件缺陷的产生

软件缺陷

缺陷存在于软件及相关的文档中，在特定的条件下会使软件产生故障

软件故障

软件处于一种不希望或不可接受的内部状态，不及时处理就会使软件失效

软件失效

软件处于一种不希望或不可接受的外部状态

- 软件中存在的缺陷给我们带来的损失是巨大的，这也说明了软件测试的必要性和重要性
- 测试是所有工程学科的基本组成单元，自然也是软件开发的重要组成部分
- 测试人员水平越高，找到软件问题的时间就越早，软件就越容易更正，产品发布之后越稳定，收益越大

Software Testing and Quality Assurance



微信号: QualityReport

- Eating your own dog food, *Dogfooding*
- 自己公司使用自己开发的产品
 - 1988 年，微软的高管 Paul Maritz 在写给测试主管的一封邮件中

故事1:二战期间，美国空军降落伞的合格率为99.9%，这就意味着从概率上来说，每一千个跳伞的士兵中会有一个因为降落伞不合格而丧命。军方要求厂家必须让合格率达到100%才行，厂家负责人说他们竭尽全力了，99.9%已是极限，除非出现奇迹，军方就改变了检查制度，要求厂家负责人亲自跳伞检测。从此，奇迹出现了，降落伞的合格率达到了百分之百。

都吃一罐自己公司的狗粮。

- 二战期间降落伞
- 百度无人车

[李彦宏 - 百度百科](#)



职业：百度董事长兼首席执行官

生日：1968年11月17日

主要成就：发明超链分析技术并获美国专利，商业周刊2006年全球最...

简介：[李彦宏](#) (Robin Li)，男，汉族，无党派人士，1968年...

人物经历 社会兼职 社会活动 出版图书 荣誉成就 更多 >

百度百科

Fundamentals of Software Quality Assurance

- ◆ Quality is defined as the degree of excellence of a software.
- ◆ Quality can be interpreted as meeting the following customer requirements:
 - ◆ Explicit
 - ◆ External: features, usability
 - ◆ Implicit
 - ◆ Internal: maintainability, user experience

Introducing Software Quality Assurance

- ◆ To ensure quality in the software development process, you need to implement software quality assurance activities in **each phase** of the Software Development Life Cycle (SDLC).
- ◆ SQA is a **planned** and **systematic** approach for **monitoring and improving** the software development process.
- ◆ SQA processes evaluate the **adherence** of a software product to software product standards.

Introducing Software Quality Assurance (Contd.)

- ◆ SQA Activities in Various Phases of the SDLC:
 - ◆ Software conception and initiation
 - ◆ Analysis
 - ◆ Design
 - ◆ Construction
 - ◆ Testing

Introducing Software Quality Assurance (Contd.)

- ◆ To ensure that the quality assurance objectives are met, a project **SQA (P11) plan** is created.
 - ◆ A part of comprehensive project plan
 - ◆ Specifies the QA procedure
 - ◆ Assigns roles and responsibilities
 - ◆ Plan-Do-Check-Action

Quality Assurance and Quality Control

- ◆ Quality activities can be segmented into two categories:
 - ◆ Preventive activities
 - ◆ Detective activities

Quality Assurance and Quality Control

- ◆ QA is oriented to the **prevention** of defects rather than their detection and is used to implement the defined quality policy of an organization **through the process** of development and continuous improvement.

Quality Assurance and Quality Control (Contd.)

- ◆ Quality Assurance (QA) activities include:
 - ◆ Quality Audit
 - ◆ Process definition
 - ◆ Tool selection
 - ◆ Training
 - ◆ Peer review
 - ◆ Requirements tracking
 - ◆ Quality metrics collection
 - ◆ ...

Quality Assurance and Quality Control (Contd.)

- ◆ Quality Control (QC) is the process by which the quality of a product is **compared with specific standards**, and action is taken if the quality does not match the applicable standards.
- ◆ QC is oriented to **detection** of defects rather than prevention.

Quality Assurance and Quality Control (Contd.)

- ◆ QC activities include:
 - ◆ Inspection
 - ◆ Testing
 - ◆ Checkpoint review
 - ◆ ...
 - ◆ QA VS. QC

Testing Overview

- ◆ **What is testing ?**
- ◆ **Who does testing ?**
- ◆ **When to Start testing ?**
- ◆ **When to Stop testing ?**

- ◆ **5W+1H**

Testing Overview

- ◆ What is testing ?

According to ANSI/IEEE 1059 standard, Testing can be defined as

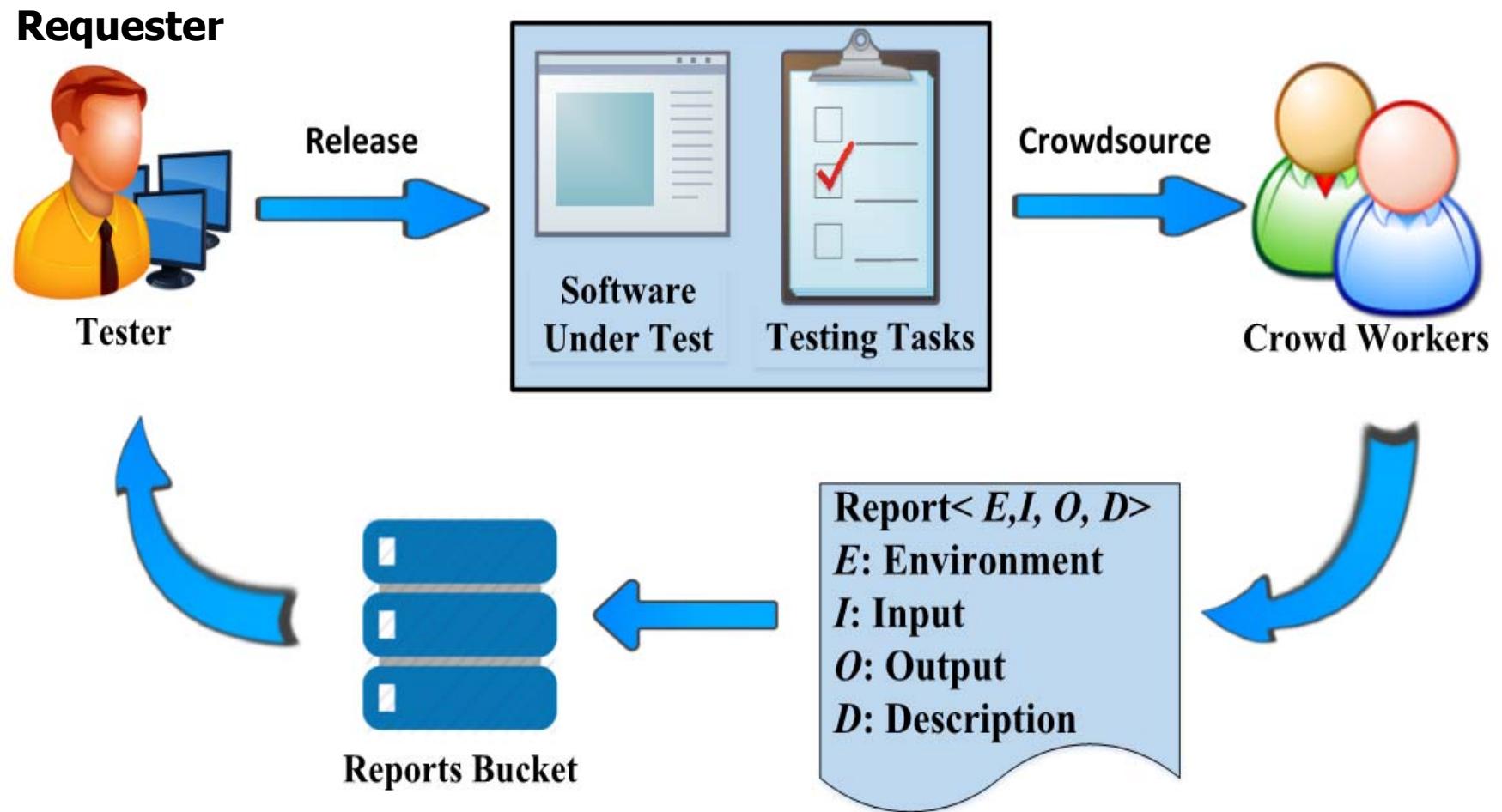
*A process of analyzing a **software item** to **detect** the differences between existing and required conditions (that is defects/errors/bugs...) and to **evaluate** the features of the software item.*

Testing is everywhere

Testing Overview

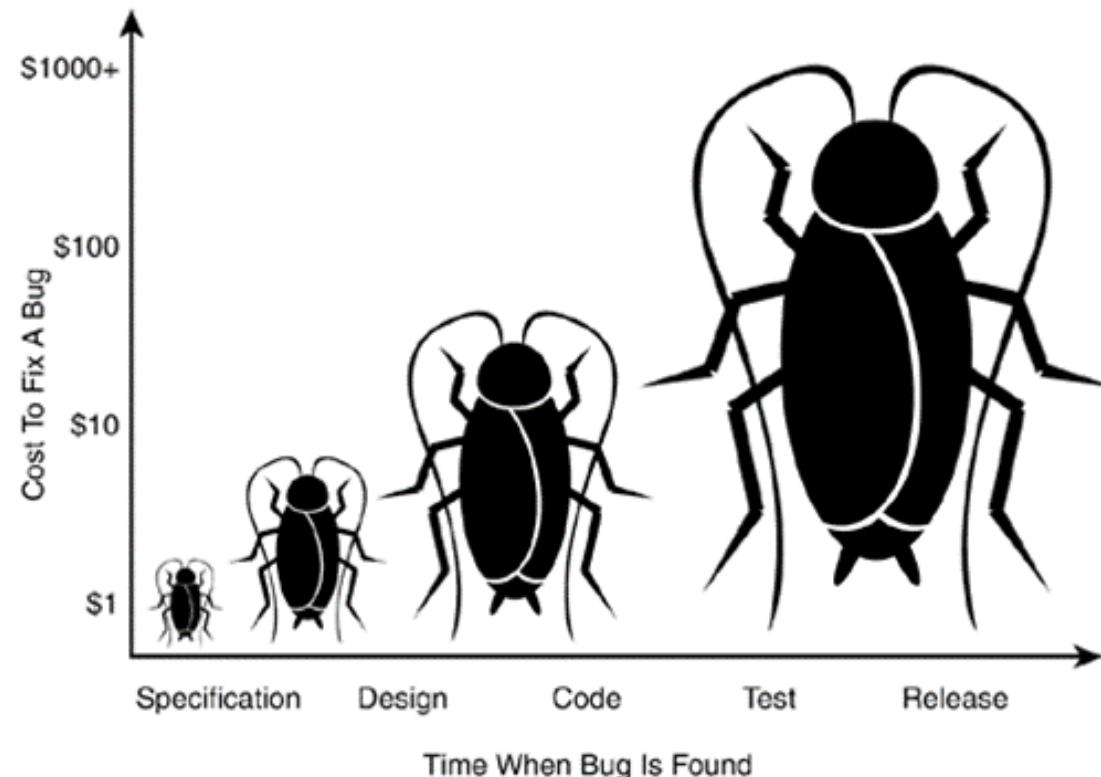
- ◆ Who does testing ?
 - ◆ Software Tester
 - ◆ Software Developer
 - ◆ Project Lead/Manager
 - ◆ End User
- ◆ Crowdsourcing Testing
 - ◆ Anyone—crowd worker

Crowdsourcing Testing(众包测试)



Testing Overview

- ◆ When to Start Testing ?
 - ◆ The earlier, the better



Testing Overview

- ◆ When to Start Testing ?
 - ◆ The earlier, the better
 - ◆ Depends on the development model
 - ◆ Waterfall model vs. incremental model
 - ◆ Testing is done in different forms at every phase of SDLC

Testing Overview

- ◆ When to Stop Testing ?
 - ◆ Testing is a never ending process
 - ◆ Some aspects
 - Testing Deadlines.
 - Completion of test case execution.
 - Completion of functional and code coverage to a certain point.
 - Bug rate falls below a certain level and no high priority bugs are identified.
 - Management decision.

Summary

- ◆ The need of SQA & Testing
- ◆ The basic idea of SQA
- ◆ Difference between quality assurance and quality control
- ◆ Testing overview

◆ A question:

Testing is a subset of quality assurance or
quality control?