

COMP5222 Assignment 1

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COMP 5222

Software Testing and Quality Assurance

Assignment 1

Due date: Nov 2, 2012 Total Mark: 60

Question 1

(a) Why is it impossible to guarantee that an arbitrary software application is error free? Give 3 reasons. (3 marks)

“Human make errors in their thoughts, actions and making decisions. Error are a part of daily life.”

It can be analyzed in different levels in software development, such as system design, function planning and coding.

In system design level, the communication with clients is always very difficult. People didn't know what they really want. The common case is that the client comes with only a general idea. The design of whole system will be tested for several times by making prototypes, system framework charts, function lists and etc. The case is even worse in function planning level. Functions can be too hard to implement then alternate ways should be taken, or other supportive functions should be added. These all require recursive coding and tests. The errors are always very stupid in coding level and it is really a tar pit consuming lots of time and cost.

Even for a properly run software application, it is impossible to guarantee its quality. There are several possible errors which are very hard to test.

1. Time

Sometimes the time could be a “time bomb”, for example, Millennium bug. This error occurs only when it comes to a certain time.

2. Overburden

When the data is too much or the running time is too long, software fails. Maybe it's hours or days, or it may be years or decays.

3. False Use

The most often and damaging example should be using `rm -rf` as a unix or linux admin in root. Or some unexpected input data or input sequence.

(b) List 5 characteristics of a test case that is “better” than another test case. (5 marks)

1. Straight to the target

A test case should be aiming to a certain object. Maybe a certain condition, a certain line of code, or a certain boundary. Each failed test case should lead the test engineer to the right point of the defect.

2. Make sure the key component is tested

Due to time/cost limit, the test case testing key component is better than the one testing components never used.

3. Test boundary cases specified by the requirements

There are many possible inputs. The boundary test cases are much better than random test cases.

4. Do not repeat

A test case should be independent with others. There is no need to test multiple times on one same condition except stress test.

5. Cause the program to exercise certain error-prone situations.

Make sure the program will not collapse even the test case is not in requisition.

(c) Identify 5 key process factors that influence the effort required for doing testing. (5 marks)

1. Maturity of the software development process;
2. Quality and testability of the testobject;
3. Test infrastructure;
4. Skills of staff members;
5. Quality goals and test strategy.

Question 2

The following module of the Beer system calculates the cost of wine orders. The wine is sold in boxes of 12 bottles, and is of three types: A. Shiraz, B. Cabernet Sauvignon, and C. Lambrusco. The code is as follows:

```
Procedure CostOfWine (in: no_of_boxA, no_of_boxB, no_of_boxC;  
                     out: cost_to_customer) is  
Begin  
  1  cost_of_boxA = 60;  
  2  cost_of_boxB = 80;  
  3  cost_of_boxC = 100;  
  4  if (no_of_boxA == 2)  
  5      discount = 5;  
  6  elseif (no_of_boxA == 1 AND no_of_boxB == 1)  
  7      discount = 8;  
  8  elseif (no_of_boxC == 3)  
  9      discount = 10;  
 10  else  
 11      discount = 0;  
 12  ifend  
 13  cost_to_customer = ( (no_of_boxA * cost_of_boxA) + (no_of_boxB * cost_of_boxB)  
                        + (no_of_boxC * cost_of_boxC) ) * (100 - discount) / 100;  
 14  return (cost_to_customer);  
end Procedure CostOfWine;
```

(a) Draw a control flow chart for procedure CostOfWine. (4 marks)

The control flow chart is shown as Figure 1.

(b) Calculate the cyclomatic complexity of procedure CostOfWine. (2 marks)

The cyclomatic complexity is $v(g) = e - n + 2 = 16 - 14 + 2 = 4$

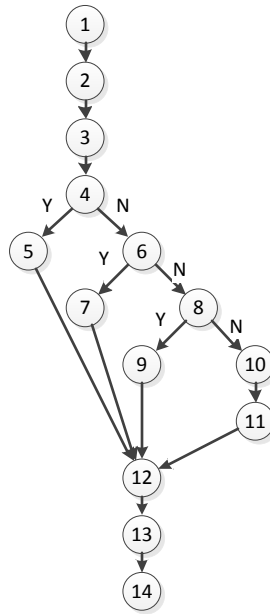


Figure 1: control flow chart

(c) Create test cases that test all the basis paths and provide a set of input values and expected results (in terms of values for cost_to_customer). (5 marks)

path	input	expected result
1-2-3-4-5-12-13-14	(2,0,0)	114
1-2-3-4-6-7-12-13-14	(1,1,0)	128.8
1-2-3-4-6-8-9-12-13-14	(0,0,3)	270
1-2-3-4-6-8-10-11-12-13-14	(0,0,1)	100

Question 3

From an IBM study, verification prior to coding is 50% effective, and after coding is 80%. It is 10 times as costly to correct a defect after coding as before, and 100 times as costly to correct a production defect.

Compare doing verification only after coding vs. during all phases.

Assume

- there are 5 phases: Requirements, Design, Code, Test, and Production.
- 20 errors introduced at Requirements
- 20 errors introduced at Design
- 20 errors introduced at Code

(a) Work out the cost of fixing all defects when verification is done at the Test phase. (4 marks)

(b) Work out the cost of fixing all defects when verification is done at each of Requirements, Design, Code and Test phases. (8 marks)

Question 4

A bug tracking tool offers many useful functions to the users to report, track, classify bug/defect reports, etc. Take a close look at [Bugzilla](#) and list 8 key functions of this tool that help with bug tracking. (8 marks)

Question 5 (16 marks)

iMove Company is headquartered in Hong Kong and has a loyal customer base of over 2000 throughout Asia. It has its own distribution centers and maintains a fleet of delivery vehicles. Its information systems are all centrally maintained by the Information Systems (IS) staff.

The CEO of iMove wants to expand their customer base and reduce the cost of doing business. Each employee at iMove has internet access through the corporate hub. The most common use of the internet is for e-mail with sales staff (about 10) and other business partners (about 25). The company maintains a website that provides information on the company and its products.

The CEO has decided to implement a mobile solution for inventory management, which will provide its sale staff and business partners up-to-date data on its inventory any where any time. iMove has contracted out the development to your company. Write a system test plan for the system you are developing for iMove. The document's audience is mainly your internal test team and also the client manager.

The test plan should include:

- Test strategy
- Test objectives and scope
- Test phases
- Test schedule and milestones
- Entry criteria for each milestone's phase

- Tasks to be performed during each phase
- Deliverables and exit criteria for each Milestone
- Roles and responsibility
- Required testing resource

You will be graded on the following items:

1. Readability and organization of your test plan.
2. Thoroughness of test plan.

Page Limit: 12 pages.

Reference: [IEEE Test Plan template](#)