Chapter five

Software Testing

5.1 What is software testing?

Once source code has been generated, software must be tested to uncover and correct as many errors as possible before delivery to the customer. Software testing is a critical element of software quality assurance.

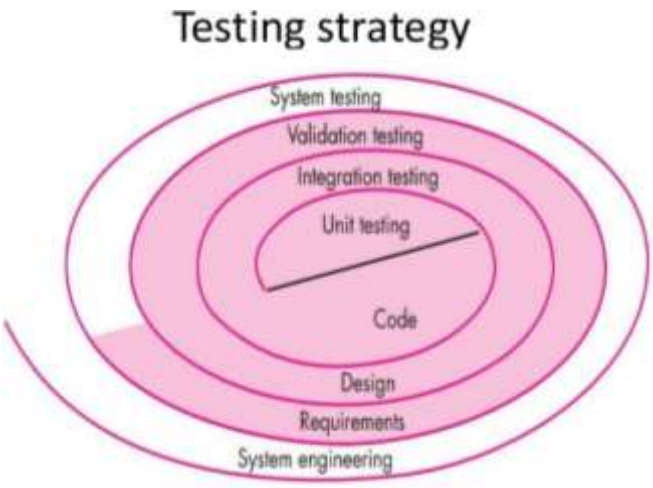
5.2 Testing goals or why testing:

Two objectives – Verification and Validation (V&V):

1. To uncover errors (or bugs) in the software before delivery to the client. This is called Verification -Verify that the program is working. “Are you building the product right? Right?”
2. To ascertain that the software meet its requirement specification. This is called Validation – Validate that the software meets its requirements. “Are you building the right product?

5.3 Testing process stages

1. Unit Testing



Ensure that the software component or module operates correctly. By testing each component or module is independently. Components may be simple entities such as functions or object

يتم تجربة كل مكون او module بصورة مستقلة ليتم تصحيح الاخطاء في اطار كل module

2. integration testing

The entire program is tested as a whole, by taking unit tested components and build a program structure.

يتم اختبار النظام ككل بواسطة توحيد unit program tests في structure of program

3. validation testing

Validation testing begins at the culmination of integration testing, when individual components have been exercised, the software is completely assembled as a package, and interfacing errors have been uncovered and corrected. validation succeeds when software functions in a manner that can be reasonably expected by the customer.

يبدا عندما تتم المرحلة السابقة عملية integration testing حيث ان المكونات المفردة (اجزاء module of software) يتم تجميعها وربطها as package واكتشاف وتصحيح الاخطاء . وتنجح عملية التحقق من الصحة عندما يعمل البرنامج بطريقة يمكن أن يتوقعها العميل بشكل معقول.

4. **system testing**

Software is only one element of a larger computer-based system. This test is also concerned with validating that the system meets its functional and non-functional requirements and testing the emergent system properties.

5. **acceptance testing**

This is final stage in the testing process before the system Is accepted for operational use. the system is tested with data supplied by customer.

هذه هي المرحلة الأخيرة في عملية الاختبار قبل قبول النظام للاستخدام التشغيلي .يتم اختبار النظام بالبيانات المقدمة من عميل النظام

there are two testing processes:

- Alpha Testing
- Beta Testing

5.4 Test cases techniques:

1. **black – box testing(behavioural testing)**

Focuses on the functional requirements of the software. Black-box tests are designed to validate functional requirement and performed in last step in the testing.

Black box testing enables the software engineer to derive sets of input conditions that will fully exercise all functional requirements for a program.

يقوم مهندس البرمجيات باختبار مجموعة من المدخلات الى البرنامج لاختبار هل يحقق functional requirements

Black-box testing attempts to find errors in the following:

a) incorrect or missing functions
b) interface errors
c) errors in data structures or external data base access
d) behaviour or performance errors

2. **white – box testing (glass box testing)**

Preformed in early testing stage. White box testing use the control structure of the procedure design to drive test cases