Levels & Types of Testing
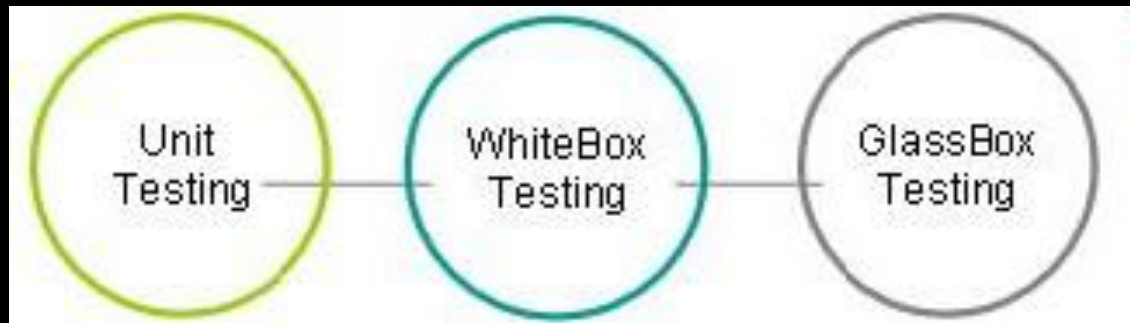
Different Levels of Testing

1. Unit Testing
2. Integration Testing
3. System Testing
4. Acceptance Testing

Unit Testing

Unit Testing is a testing in which the individual unit of a software are tested in isolation from other parts of a program.

Unit Testing

What is an unit ?

- A unit is the smallest testable part of an application.

When is unit testing performed ?

- Unit Testing is performed prior to integration testing

Who performs unit testing ?

- Unit Testing is primarily carried out by the developers themselves

Which testing method is used in Unit Testing?

- White box testing methods are employed

Unit Testing

Advantages :

- To catch the defects that occurs at the early stage of software development.

- To minimize the defects before moving to next level

- Unit testing increases confidence in maintaining code

- Code is reusable and reliable

Disadvantages :

- Unit Testing cannot be expected to catch every error in the program.

- To obtain the intended benefits from unit testing, use of version control system is essential

Integration Testing

Integration Testing refers to the testing in which software units of an application are combined and tested for a communication interface between them

Integration Testing - Analogy

During the process of manufacturing a ballpoint pen, the cap, the body, the tail and clip, the ink cartridge and the ballpoint are produced separately and unit tested separately.

When two or more units are ready, they are assembled and Integration Testing is performed.

For example, whether the cap fits into the body as required or not.

Integration Testing

What is the purpose of integration testing ?

- The purpose of Integration Testing is to expose faults in the interaction between integrated units.

When is integration testing performed ?

- Integration Testing is performed after unit testing and prior to system testing

Who performs integration testing ?

- Either Developers themselves or independent Testers perform Integration Testing.

Which testing method is used in integration testing?

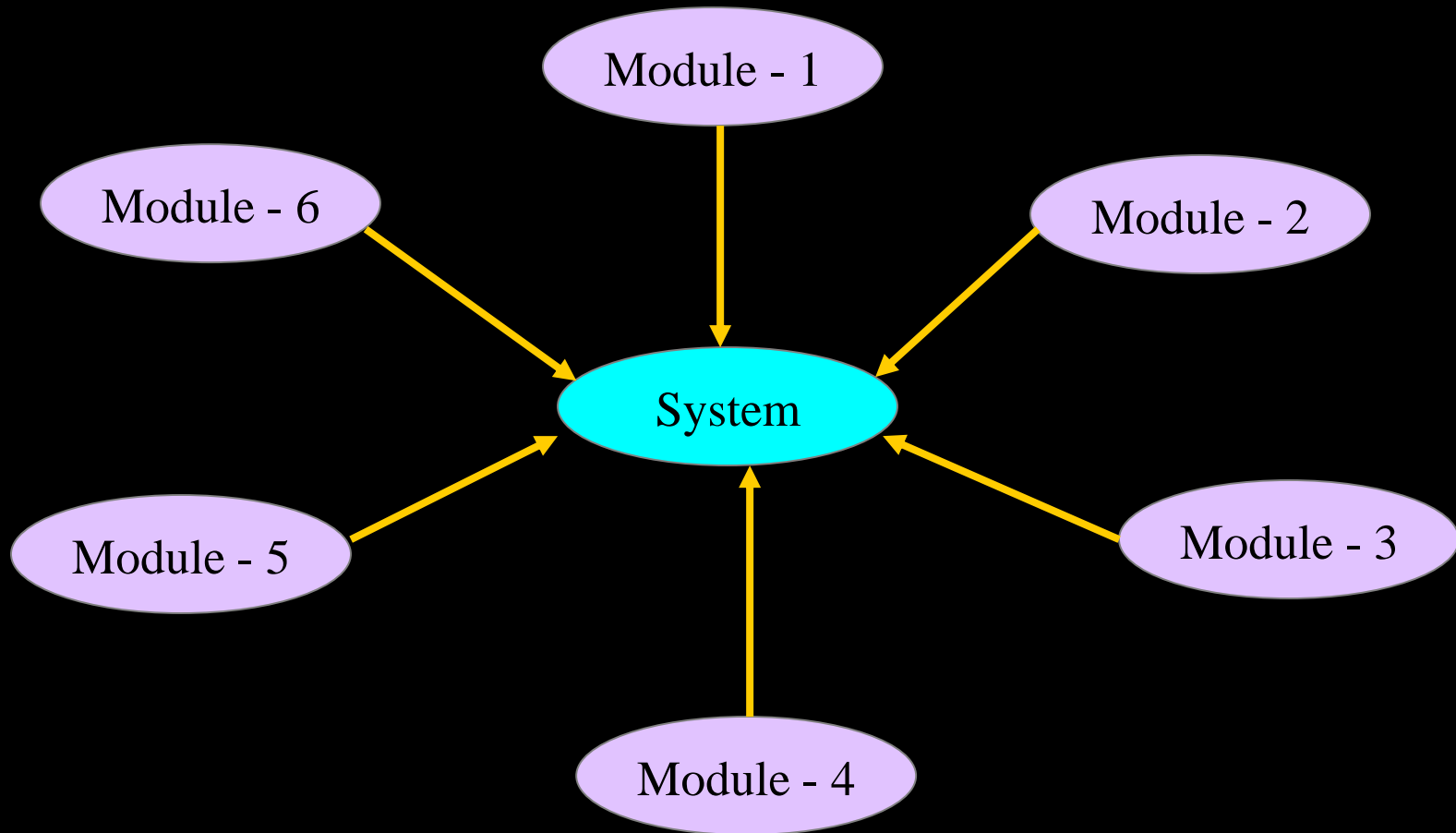- Any of the Black Box Testing, White Box Testing methods can be used.

Integration Testing Types

Big Bang

Top Down

Bottom Up

Big Bang

Big Bang

A type of integration in which software components of an application are combined all at once into a overall system according to this approach

Advantages :

• To check the data flow from one module to another
• Communication between various modules is checked

Disadvantages :

• Communication between various modules is checked
• Defects present at the interfaces of components are identified at very late stage.
• It is very difficult to isolate the defects found, as it is very difficult to tell whether defect is in component or interface.

Top Down
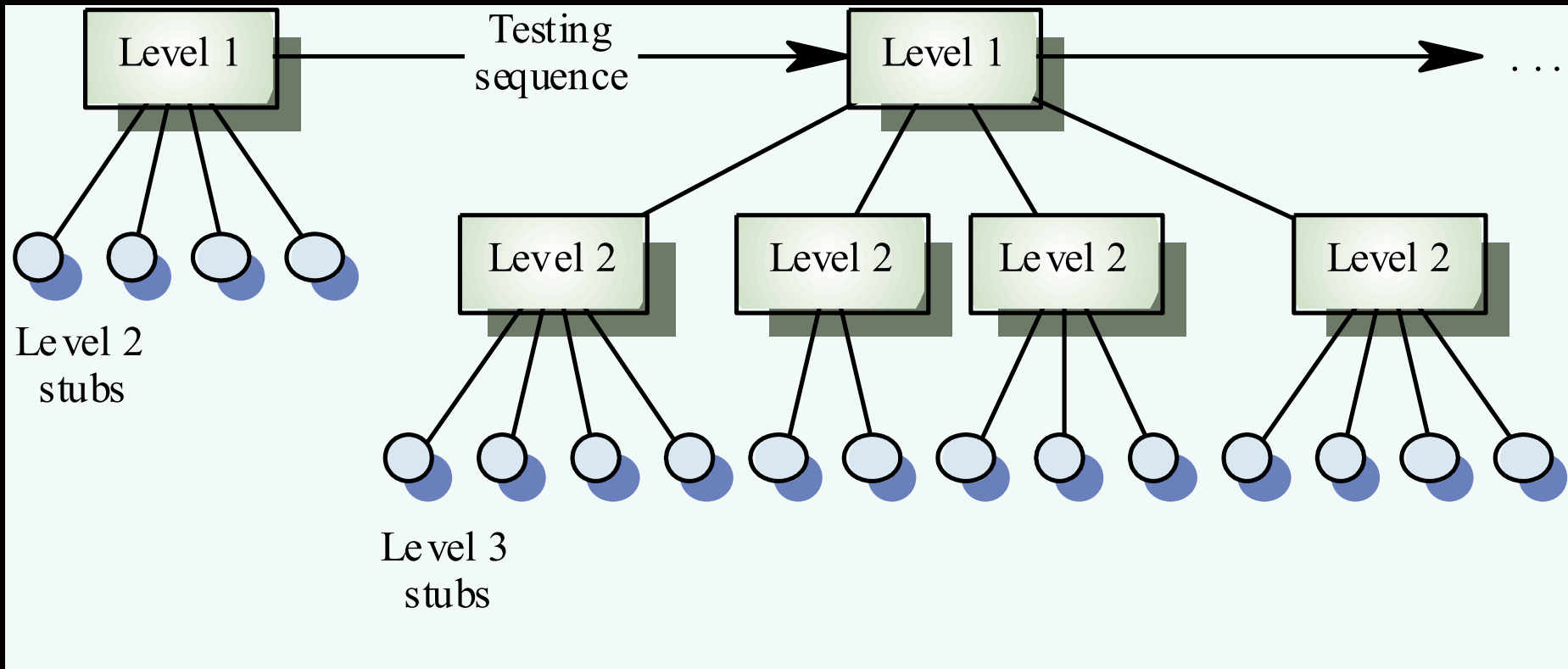
Top Down

In top down integration testing, all the modules are added or combined from higher level hierarchy i.e., the higher level module is tested first with **stubs** and then the next level of lower level modules are added and tested

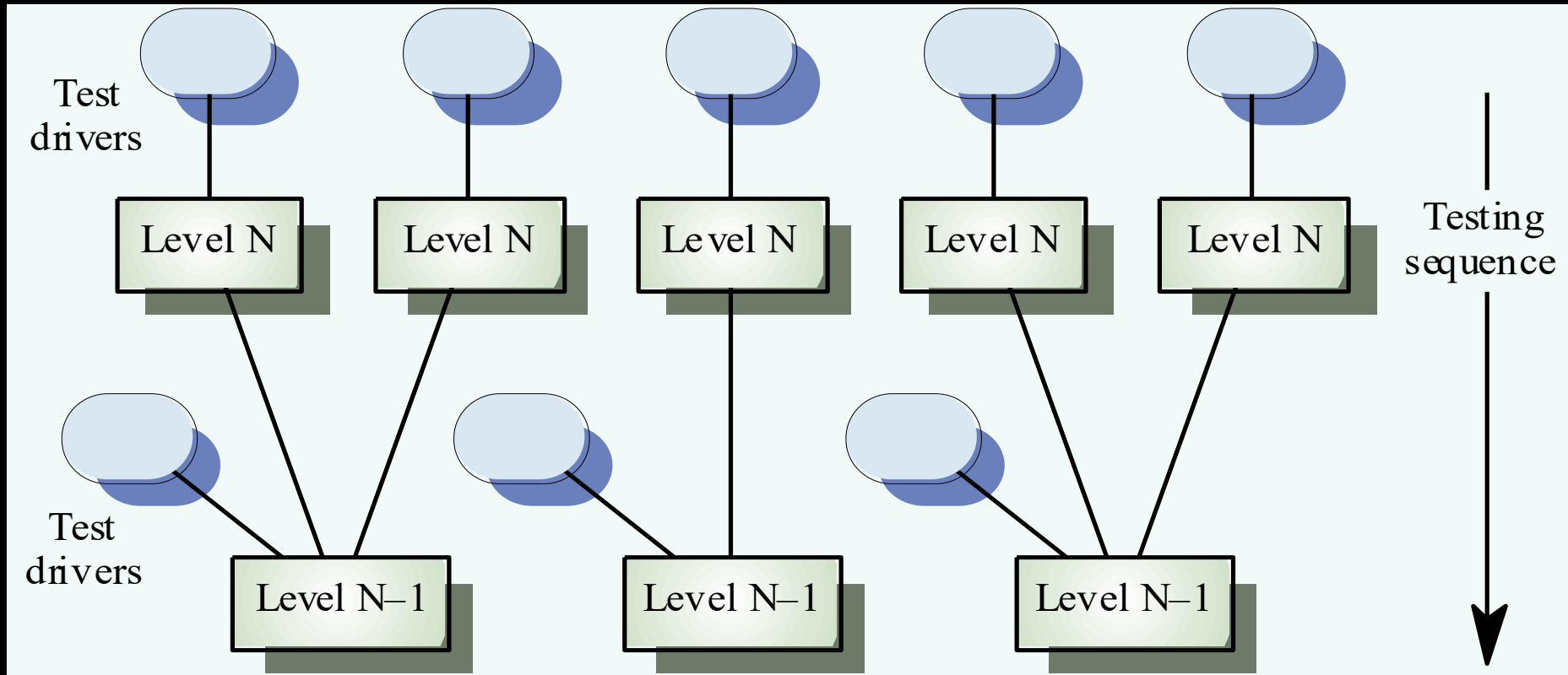Stubs are dummy modules which simulate sub-modules

Advantages :

With Top-Down Integration Testing, major modules are coded and tested first - strong psychological boost when major modules are done.

Disadvantages :

It involves creation of more number of stubs – which consumes more time and more cost.

Bottom up

Bottom up

In bottom up integration testing, modules are added to form lower level hierarchy to higher level hierarchy i.e., lower level modules are tested first using **drivers** and then next set of higher level modules are added and tested

Drivers are dummy modules which simulate Main Module

Advantages :

Compared to stubs, only less number of drivers need to be developed – which means less time and less cost.

Disadvantages :

Major design errors cannot be detected till the end.

Testing type under Integration Testing

Smoke Testing

- Smoke Testing comes under the scope of Integration Testing
- A smoke test is a collection of written tests that are performed on a system prior to **being accepted for further testing**
- Also known as a build verification test (BVT)
- It checks for major functionality areas.
- Shallow and wide approach to the application

Example :

Testing for the major functionalities in HMS like Login, Check in and Check out.

System Testing

System testing is testing conducted on a complete, integrated system to evaluate the system's compliance with its specified requirements. System testing falls within the scope of Black box testing, and as such, should require no knowledge of the inner design of the code
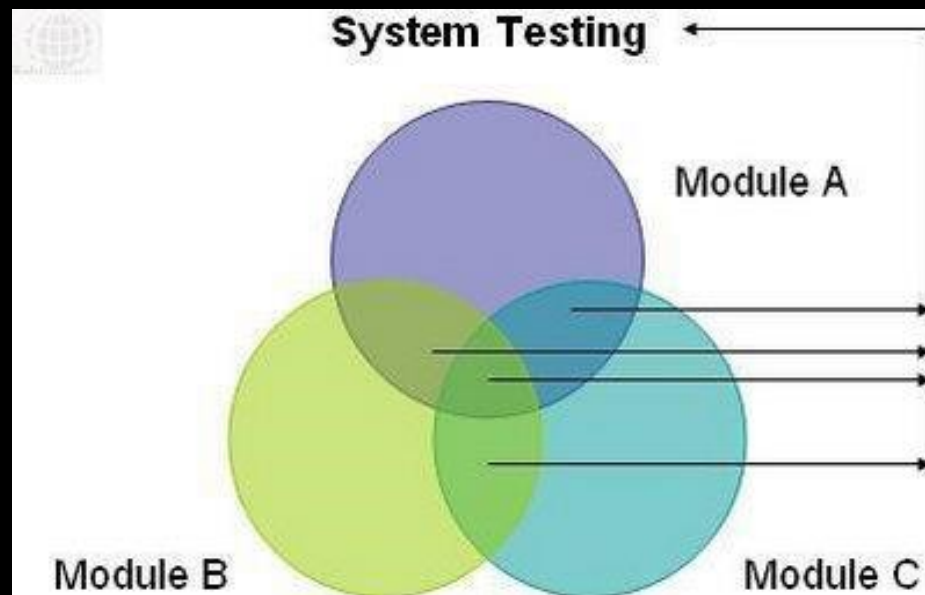
System Testing

What is the purpose of system testing ?

- System testing ensures that the entire integrated software system meets requirements

When is system testing performed ?

- System Testing is performed after integration and unit testing are completed and prior to acceptance testing

Who performs system testing ?

- Testers perform system testing.

Which testing method is used in system testing?

- Only black box testing methods are used in system testing

Testing types under System Testing

Adhoc Testing

Sanity Testing

Stress Testing

Usability Testing

Security Testing

Performance Testing

Installation Testing

Load Testing

Regression Testing

Recovery Testing

Compatibility Testing

Testing types under System Testing

Sanity Testing

- A Sanity test is used to determine a small section of the application is still working after a minor change

- A sanity test is a narrow regression test that focuses on one or a few areas of functionality

- Narrow and deep approach to the application

Example :

Testing for 'Status of single rooms' in different logins like Admin, Front Office, Personnel

Testing types under System Testing

Usability Testing

- It is the amount of effort required in learning, operating, preparing inputs, and interpreting the outputs of an application.

- In simple words it is **"The ease of use".**

- A usable web-site would attract more traffic to it meaning thereby increased revenue for its business.

Example :

'Search for guests' has poor usability since it allows to search for any guest only based on name....but not based on phone number or address.

Adhoc Testing

- Adhoc testing is the only testing which is done without any test plan or test cases.

- It helps in deciding the scope and duration of various other type of testing

- The effectiveness of this testing is based on the tester's domain knowledge, experience and ability.

Example :

Adding new employee using 'Employee Detail' menu and checking the same using 'Reports' menu.

Testing types under System Testing

Security Testing

- Security Testing checks the capability of system to defend itself from hostile attack on programs and data

- Security Testing helps in improving the current system and also helps in ensuring that the system will work for longer time.

- Security Testing is very important in today's world, because of the way computer and internet has affected the individual and organization.

Example :

Testing whether the details regarding employee are hidden when logged in as 'Front Office'. It should show only details regarding guests.

Testing types under System Testing

Installation Testing

- Installation & un installation is checked out in the target platform

- It will be conducted on different types of operating system used by the client

- Necessary plug-ins, add-ins, system files are also tested which are required during successful installation of a software

Example :

Installing Hotel management system software in Windows XP as well as in Windows 95 to check whether the installation is successful.

Testing types under System Testing

Performance Testing

- Testing conducted to evaluate the compliance of the system with specified performance requirements

- Often, performance testing is done using automated tools

- It is done mainly for client/server and web based applications

- It is of two types: Load Testing & Stress Testing

- In **Load testing** , the application is tested against heavy loads or inputs in order to find out the response time at specific load.

- In **Stress testing,** the application is tested against heavy loads or inputs in order to find out when the application crashes or the performance degrades.

- Performance Testing Tools :

Load runner   OpenSTA   Rational Performance Tester

User Acceptance Testing

Testing conducted to enable a user/customer to determine whether to accept a software product. Normally performed to validate the software meets a set of agreed acceptance criteria.

User Acceptance Testing

What is the purpose of user acceptance testing ?

- Focuses on input processing, use of the software in the user organization, and whether or not the specifications meet the true processing needs of the user.

When is user acceptance performed ?

- User acceptance testing is performed after completing unit, integration and system testing.

Who performs user acceptance testing ?

- Users will perform user acceptance testing with the help of testers

Which testing method is used in system testing?

- Only black box testing methods are used in user acceptance testing

Testing types under User Acceptance Testing`

Alpha Testing

- In this type of testing, the users are invited at the **development centre** where they use the application and the developers / testers note every particular input or action carried out by the user.

- Done at **80%** completion of software

Beta Testing

- In this type of testing, the software is **distributed as beta version to the users** and users test the application at their sites. In case of any exception/defect, it is reported to developers / testers.

- Done at **98%** completion of software