**Integration Testing:**

Integration testing is the phase in software testing, wherein individual software modules are combined and tested as a group in multiple ways.

[ A unit is defined as the smallest testable part of an application].

when software application is tested through integration testing, it exposes the problems and issues with the interfaces among program components before trouble occurs in real world execution.

**Types of Integration Testing:**

1. **Incremental Integration Testing**:

The developers integrate the modules one by one using stubs and drivers to uncover defects in the software program. Here, each module has a definitive role to play in the project or product structure and has clearly defined dependencies, which can be known only at the runtime. The most important quality of incremental integration testing is that the defects are found early in a smaller assembly, when it is relatively easy to detect the root cause of the same. Incremental Integration Testing is performed on software through the following approaches:

* **Top-Down Integration Approach**: In [top-down approach](http://www.professionalqa.com/top-down-integration-testing) the testing takes place from top to bottom, following the control flow or architectural structure. Additionally, components or systems are substituted by stubs.
* **Bottom-Up Integration Approach**: In this approach of incremental integration testing, all the modules at the lower level of the software are tested with higher modules until all the modules are tested. The components or systems are substituted with drivers.

1. **Non-Incremental Integration Testing**:

Whenever the relationship between the modules is not clear, non-incremental integration testing or big bang integration is executed. In this case the data is created in one module and is combined with all the other modules to check as well as test the flow of data between them.

[Big Bang Integration Testing](http://www.professionalqa.com/big-bang-integration-testing): In this type of integration testing approach, most of the developed modules are coupled together to form a complete software system or a major part of the system, which is then used for integration testing.

1. **Sandwich Testing**:

[Sandwich testing](http://www.professionalqa.com/sandwich-testing) is a culmination of both incremental as well as non-incremental integration testing, wherein Bottom-Up approach is focused on middle to top layer, Top-Down approach is concerned about layers from middle to downwards and the Big Bang approach is followed for the middle layer.

**Stubs and Drivers:**

To achieve desired goals and to detect all the faults in the integrated units, the test drivers and [test stubs](http://www.professionalqa.com/stubs-and-drivers) are used in integration testing, which assist testers with the process of testing.

The term stubs and drivers refer to the replica of the modules, which acts as a substitute to the undeveloped or missing module. The stubs and drives are specifically developed to meet the necessary requirements of the unavailable modules and are immensely useful in getting expected results.

**Stubs**:

Stubs are used to test modules and are created by the team of testers during the process of [Top-Down Integration Testing](http://www.professionalqa.com/top-down-integration-testing). With the assistance of these test stubs testers are capable of stimulating the behaviour of the lower level modules that are not yet integrated with the software. Moreover, it helps stimulates the activity of the missing components.

Types of Stubs:

There are basically four types of stubs used in top-down approach of integration testing, which are mentioned below:

* Displays the trace message.
* Values of parameter is displayed.
* Returns the values that are used by the modules.
* Returns the values selected by the parameters that were used by modules being tested.

**Drivers**:

Drivers are used by software testers to fulfil the requirements of missing or incomplete components and modules. These are usually complex are developed during [Bottom-Up approach of Integration Testing](http://www.professionalqa.com/bottom-up-approach). Drivers can be utilized to test the lower levels of the code, when the upper level of codes or modules are not developed. Drivers act as pseudo codes that are mainly used when the stub modules are ready, but the primary modules are not ready.

Stubs are commonly referred to as "called programs" and are being used in top bottom approach of the integration testing.

Drivers are "calling program" and they are used in bottom-up integration testing.

Stubs are similar to the components, which are under test, in a very simple and basic form, whereas driver is used to invoke the component that needs to be tested.

Stubs, are usually, considered for low level modules, whereas drivers represent the high- level modules.

**Test Harness:**

A test harness is a set of software’s (automation tools) and test data composed for the purpose of testing a software application or a product by executing it under different conditions and then checking the response and behaviour of the application under test.

Stubs and drivers are two types of [test harness](http://www.professionalqa.com/test-harness), which is a collection of software and [test](http://www.professionalqa.com/test-data-and-its-importance) that is configured together in order to test a unit of a program by stimulating variety of conditions while constantly monitoring its outputs and behaviour.