



Software Testing

Simulations, Emulations, Stubs

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Simulators, Emulators and (Test) Stubs

Software Testing Environment Tools

- Emulators
- Simulators
- Stubs/Test Stubs

These tools can be used to:

- Create inputs and/or outputs for the software,
- Eliminate the need for every system component to be ready,
- Eliminate the need for setting up (expensive) test environments (hardware)

But

- For testing, but they do not replace System Testing.

Software Testing Environment Tools

- Emulators/Emulation

An Emulator is hardware and/or software, that duplicates (or *emulates*) the functions of one computer system (the *guest*) in another computer system (the *host*). Complete implementation of all the functionality.

An Emulator tries to duplicate the *inner workings* of the device/system.

- Simulators/Simulation

Simulation software is software which attempts to (re)create a (real-life or hypothetical) situation on a computer so that it can be studied to see how the system works. In most cases: Implementation of the needed functionalities.

A simulator tries to duplicate the *behavior* of the device/system.

Software Testing Environment Tools

- Stubs/Test Stubs

A stub is a piece of code used to stand in for some other programming functionality.

A Stub is an implementation of (one) specified behavior (partial simulation).

Simulation/Emulation Timing

Simulation Types:

- Live Simulations:
Simulation is executed in real system timing
- Virtual Simulations:
Simulation is executed in controlled timing,
Timing can be slowed down or speeded up.
- Constructive Simulations:
Simulation is executed on basis of a sequence of events,
rather than timing. Visualization is not needed.

Depending on the system, in some cases not all types of Simulations can be applied.

Example: Simulation involves hardware running in real-time, you can only use Live Simulation.

Stubs/Test Stubs

A (Test) Stub replaces a part of the system:

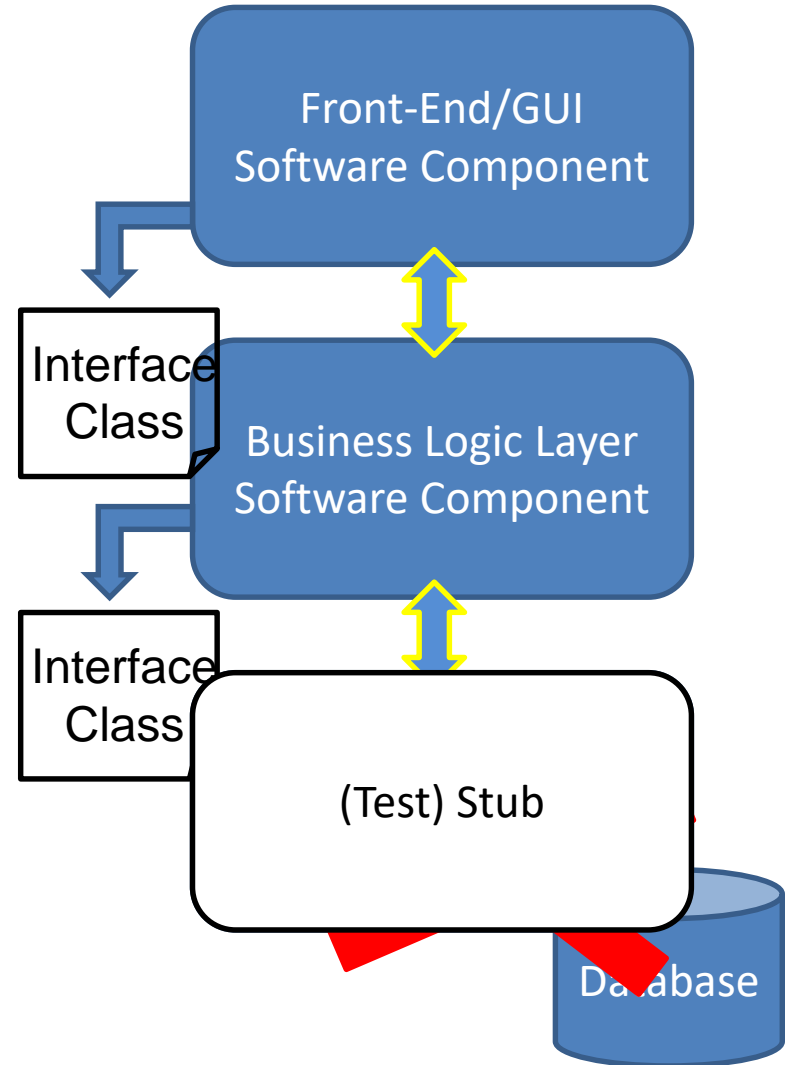
- because that part it is unfinished, or
- because you want to have control on the test environment.

Used by:

- Software Engineers
- Software Testers

```
public User GetUser(int userId)
{
    // Todo: retrieve user account from DB

    // test stub implementation
    return new User(userId, "John", "Doe");
}
```



Questions?