Host / Target Testing with the LDRA tool suite

What is Host/Target testing?

The principle behind host/target testing is that the application under test is executed in its normal, target, environment and the test results that are produced are evaluated and analysed back on a separate host platform.

This facilitates the testing of embedded systems which are developed on a host platform and cross-compiled and downloaded onto a specific target processor.

An example solution for Embedded System Development

Within such an environment LDRA Testbed may be used to firstly perform a Static Analysis and Instrumentation of the software application on the host platform.

Then secondly, following execution of the instrumented application in the target environment, LDRA Testbed will analyse the resulting control flow data and generate the associated Dynamic Coverage Analysis results.

A common example of this process would see the LDRA Testbed analysis performed on a workstation and the execution of the application on a specialised chip, which controls specific hardware. However, it is not uncommon to find the opposite process, for example analysis on a PC and execution on a mainframe. In this case the instrumented code can interact with sophisticated databases and other systems.

Benefits of Host/Target Testing

- Ability to carry out analysis on host computer and execution on a target processor or mainframe
- Instrumented code executes in its intended environment
- Analysis work is off-loaded onto a powerful host

LDRA Host/Target Testing Availability

The LDRA tool suite may be utilised for Host/Target testing in commercially available, or custom built environments. The target platforms page of the LDRA website provides a non-exhaustive target platform list and gives a flavour of the breadth of coverage.

Requirements for Host/Target Testing

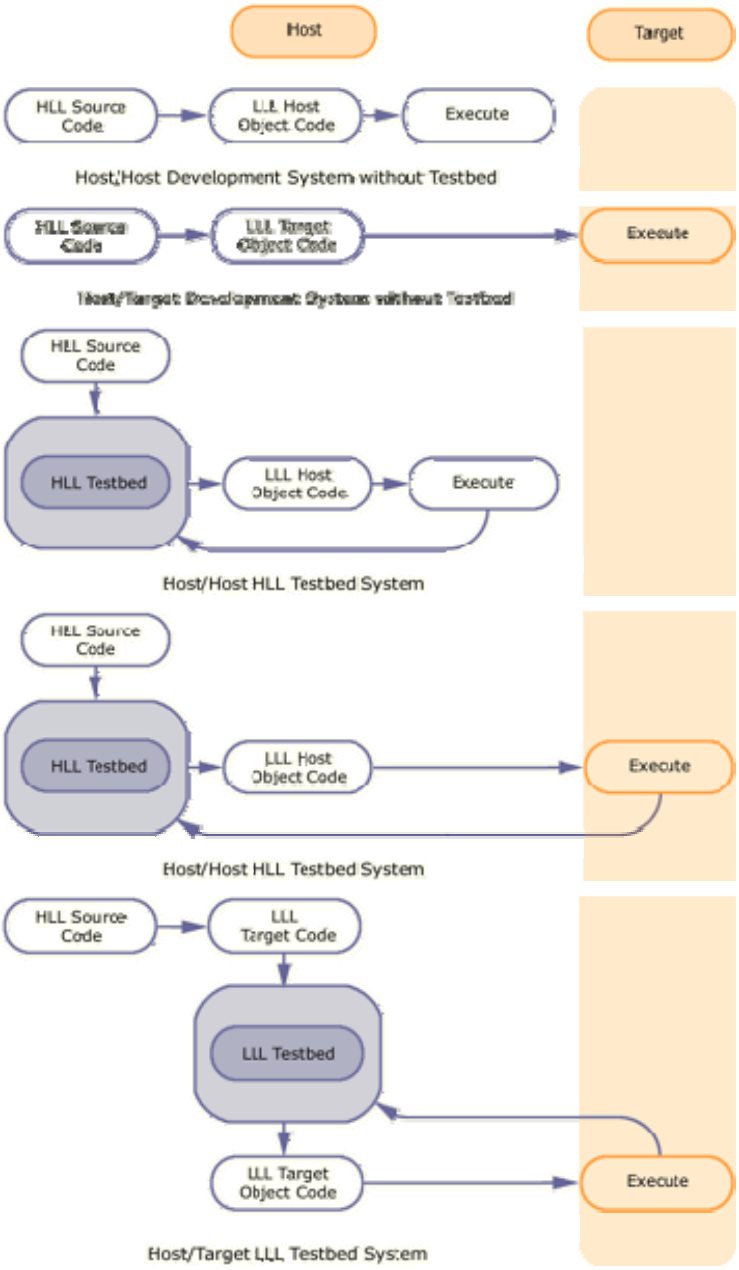
The basic requirement for host/target testing is a means of communication from the target back to the host. Normally, LDRA Testbed instrumentation is configured to write to the host file system at run time, as it is the most convenient mass storage device. In the case of a separate target microprocessor, a device may not be available due to packaging or environmental constraints. If this is so, an alternative must be found.

Sometimes a target system will have a spare communication link available to the host. It can be used for downloading target images produced by cross compilers. This offers the most elegant storage solution, employing the communication link to stream data generated by the instrumented target image back to the host at run time.

A communications driver must be installed on the host to receive the data and arrange storage in a convenient file. By using this technique, the execution history generated by the instrumented target image can be channelled back to the host, and stored for Dynamic Coverage Analysis after run time.

Network connections, such as ethernet, can be used as an alternative to a standard communication link. Also, if no other link exists then it may be possible to arrange for storage of the execution history by using a RAM area of memory on the target. This solution requires that an unused area exists, and it is sufficiently large enough to accommodate the generated data. If this appears possible then the buffer can be up-loaded to the host after run-time in preparation for Dynamic Coverage Analysis. This solution is becoming more viable as large RAMs on dedicated microprocessors become more common with the availability of larger RAM chips. Presently, the host/target communication link solution remains the most flexible.

LDRA Testbed in Various Host/Target Environments



iSYSTEM LDRA CPU Support

iSYSTEM AG manufactures a range of development tools used for emulation and test of embedded applications. iSYSTEM is independent of any of the semiconductor, compiler and real time processor system manufacturers. This independence has resulted in a high number of supported microcontrollers, (>1000 8-/16-/32-Bit from more than 40 manufacturer architectures) similarly for compilers (>150) and thirdly, the open basis of their products bodes well for future architectures.

iSYSTEM and the LDRA tool suite is fully integrated with different manufacturers, CPU and target interfaces. The matrix provided at the top of the page provides details on the current integrations between the LDRA tool suite and the iSYSTEM product range.

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For more information on iSYSTEM please visit www.isystem.com.

The Host/Target Instrumentation Process

The instrumentation process employed within LDRA Testbed is highly flexible and can be easily tailored to cope with a wide variety of different host/target environments. LDRA Testbed automatically inserts instrumentation probes into a copy of the source code. These probes write to an execution history channel. The source code of the probes is supplied, and may be configured for the unique features of a particular target.

Host/Target Environments

LDRA Testbed has been successfully used in host/target environments with many different types of communication links including serial and parallel I/O lines, in-circuit emulators, ethernet, DMA channels, software simulators, local disk transfer, dual booting file systems, telephony and many more. The high degree of flexibility that this demonstrates means that LDRA Testbed is particularly suited to real-time testing.