Collaborative Environment for Testbench Development

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1. Introduction

The objective of this short paper is to report on an experiment undertaken in the EU project E-Colleg "Advanced Infrastructure for Pan-European Collaborative Engineering" (IST-1999-11746) that aims at distributed collaborative testbench development.

The overall goal of the E-Colleg project (www.ecolleg.org) is to provide a new platform for distributed collaborative engineering through the definition and implementation of an advanced infrastructure that will offer sophisticated services for tool registration and management. In contrast to current industrial practice and available frameworks, this infrastructure and technology will consist of a set of interacting, location transparent services that can be dynamically configured and adapted to arbitrary tool configurations and location-independent design teams at run-time [1]. The vision for such an infrastructure stems from extensive experiments with the ASTAI® integration platform (www.c-lab.de/astair/) that has been provided to the E-Colleg consortium by Siemens Business Services (C-Lab, Paderborn, Germany).

In an application scenario that is realised by Infineon Technologies and Silesian University of Technology this infrastructure has been deployed to testbench generation.

2. Towards a new collaborative environment

Driven by the extremely high effort for making functional tests at Infineon, work was conducted towards a testbench environment, which should attack functional test complexity by a high degree of re-use. This resulted in the testbench environment called "Reflective" [2]. Currently, within Infineon only centralised workflows for the Reflective environment are used.

Infineon is working on standardized IP-based design flows and integrating SMEs into Infineon's internal design flow. The application of the collaborative technology based on the new E-Colleg collaborative infrastructure [1] opens new possibilities for Infineon's testbench development tasks, because, among others, the existing environment can be used on each partner site, and be coupled using collaborative workflows.

Figure 1 presents a vision for collaborative testbench development environment. This environment integrates a set of distributed workflows that cross borders on involved organisations. The first group of workflows, called "workflows with local tools", performs tasks using local tools only, like text editing, code preparation, simple analysis of code quality (e.g., code coverage), and a basic verification. These tasks are performed at both Infineon and SUT sites independently. The second group of workflows, called "workflows with shared tools", takes advantage of an access to tools existing on remote sites. Sharing these tools is a challenging task for both organisations, especially taking into account possibly appearing data exchange and security issues.

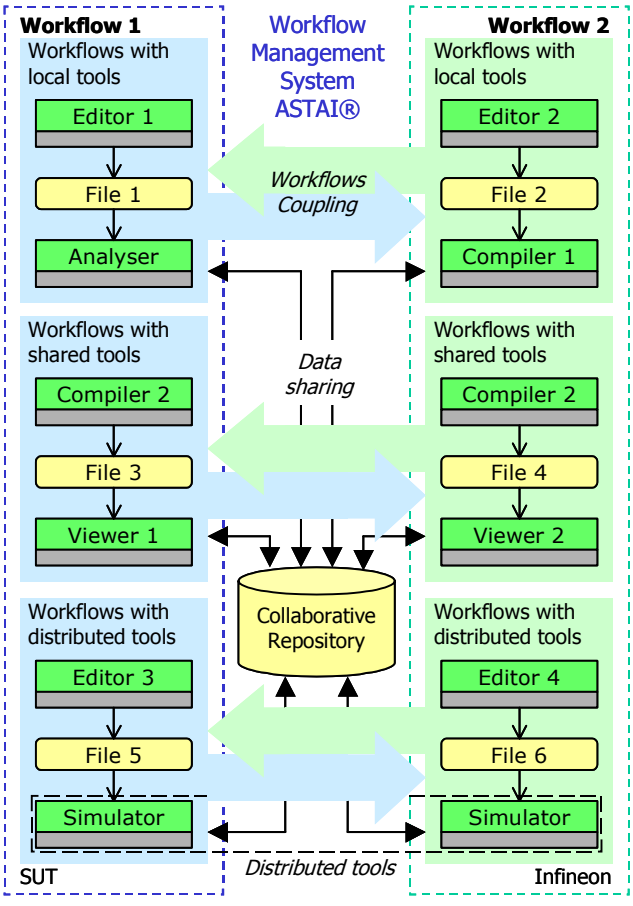

Figure 1. Collaborative Testbench Development.

Several tools belong to the group of "workflows with shared tools". The most important for the testbench generation is the Reflective environment itself. The other necessary tools are Infineon's proprietary ones (VPP, ICVS, IVM). The third group of workflows includes distributed tools (e.g., a distributed simulator). The above mentioned tasks are to utilise a common data repository system that is robust, failure free, and assures secure data transfer.

3. Collaborative Experiment

The goal of the experiment was to develop a testbench for functional verification of a Serial ATA hard disk controller VHDL model using the distributed workflow functionality of ASTAI® (Figure 2).

The main aim of the first phase of the workflow is implementation and verification of the SATA interface behavioural model for the Reflective Testbench Element (RTBE). The activities in the Phase I, performed at SUT, include requirement test specification, physical interface modelling, and verification activities of a physical interface. The first phase uses a number of EDA tools for code editing, debugging and verification.

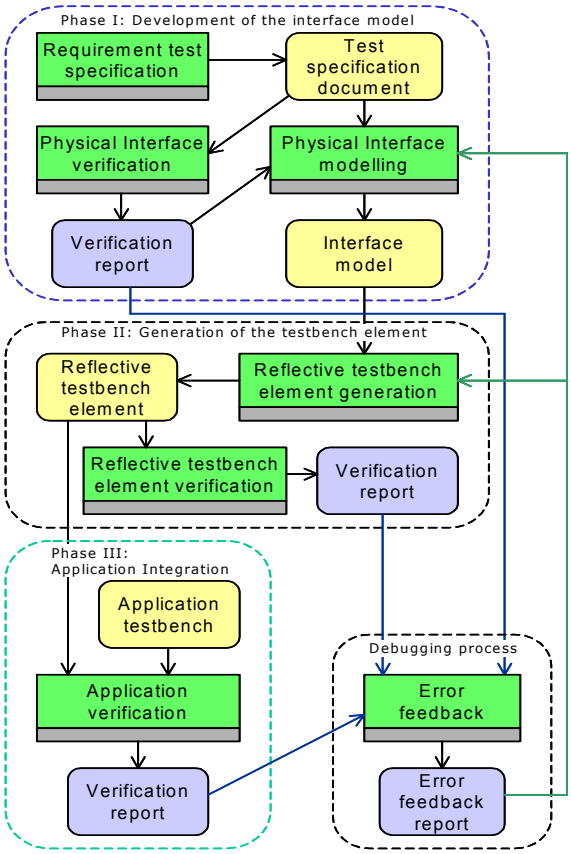

Figure 2. Phases of the collaborative experiment.

The developed and functionally validated SATA package is used in the Phase II of the workflow for the generation of the testbench element. The first activity invokes a set of Infineon's proprietary tools to generate the SATA RTBE. Than, the RTBE verification activity is performed to check if the created testbench element is properly combined into the Reflective test environment.

In the Phase III of the workflow the generated RTBE along with an application testbench are integrated into a current industrial application. The Phase III is performed at Infineon.

All necessary files written or generated in the workflow are stored in a CVS repository common to both partners. An access to the repository can be achieved in a secure manner using SSH protocol. At the end of each designer's work, the verified design is stored into the repository. Simultaneously, the repository enables project file exchange between Infineon and SUT.

The workflow was implemented using the ASTAI® environment installed on Unix workstations in the distributed domains of Infineon and SUT. A workflow management system controls the overall design flow, in particular, launching the project activities and data transfer. However, the ASTAI® environment does not allow for direct coupling of distributed workflows when very strict network security policy is applied, as it is the case of Infineon Technologies. The only possible direct communication through the Internet succeeded when Infineon initiated file transmission and SUT opened its firewall. In our workflow the file exchange was enabled by the common repository.

4. Conclusions

Shortly outlined methodology supports outsourcing of IP development. The main difficulty experienced with the current technology is to cross firewalls and proxy servers. E-Colleg project develops solution based on the Tool Registration and Management Services. TRMS addresses security aspects, as well as, registration and management of design tools. More generally, TRMS will establish foundations for the Advances Collaborative Infra-structure to be designed by the E-Colleg project [3].

5. References

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