An electronic design framework  
(Extended Abstract)

Tom J Kazmierski and Neil Clayton  
University of Southampton, United Kingdom,  
tjk@ecs.soton.ac.uk, nrc298@ecs.soton.ac.uk

Introduction
A keynote presentation at the DAC 2000 Conference [1] outlined a concept of how Internet-enabled designs will allow companies to create global design groups to complete complex system-on-chip systems. It was stated that ‘the most important resource needed today is not ideas and its not capital – it is people’. The Internet is a great enabler and multiplier of people resources. The aim of the work presented in this contribution is to provide a framework that harnesses this concept, building upon legacy design tool frameworks. We give a specific example of a web front-end to VAMS, the on-line Southampton University VHDL-AMS parser [2] and Avant!’s Star-Hspice simulator. Both tools have been extensively used in VHDL-AMS and SPICE training. The convergence of the Internet and distributed-object technologies has facilitated the recent success of electronic markets and it this convergence that our project aims to take advantage of. The Internet provides the ability to run multiple web-browsers that can be used for a number of tasks, all of which can be truly global. It is possible to run a web-based chat system, a net-meeting style networked ‘whiteboard’ and web cameras concurrently with a web-based design tool to allow design engineers based anywhere in the globe to discuss designs and simulate circuit modules [3]. Having looked at the current position of the Internet as a design framework in the Electronic Design Automation world [3,4] it is clear that there is a demand for globally accessible tools. Before the concept will be accepted by tool manufactures there must be some system to enable charging customers, either via a subscription or on a per use basis. Our project considers the development of a secure, session-based framework to which the addition of some sort of subscriber system should be straightforward.

Parallels can be drawn with the development of frameworks in the Computer Aided Design environment, where for many years the number of programs and Application Programming Interfaces (API’s) have been increasing with a corresponding rise in the variety of representations for display, storage and communication [5]. The increasing desire for flexible frameworks has led to the web being explored in order to improve traditional areas of weakness in communication and display of the design process [6].

Web-based CAD tools and web technologies
The feasibility of a web-based CAD tool framework has been established in a system based on the VAMS compiler [2] using the Common Gateway Interface and returning textual information. After considering the work done in this area it was clear that further research was needed in order to increase the level of functionality without compromising the system’s basic principles. The Star-Hspice optimising analogue circuit simulator is Avant!’s industrial-grade circuit analysis product for the simulation of electrical circuits in steady-state, transient, and frequency domains. It is
sufficient for the moment to appreciate that Star-Hspice is a command line driven application that reads a set of input files and produces a set of output files. This is a very common structure for legacy electronic design tools and whilst it would be ideal to assume that tool vendors would redesign their software with an internet-based framework in mind it is clear that at there is some reluctance to move in this direction [5]. It is likely that these tool systems will remain in use for some considerable time (especially in academic institutions where savings can be made by utilising older versions of software) and would benefit from a means of web-based access.

Whilst many solutions for dynamic web page generation exist, it is clear that these do not provide the advanced numerical processing abilities required for CAD framework. Solutions such as Microsoft’s Active Server Pages (ASP) [7], which will not allow the required level of communication with tool servers or efficient data manipulation. A strong argument for using Java is that security measures are an integral part of Java’s design. Other distributed solutions cannot make this claim. The business end of the Java security model [8] is conveniently described by using the metaphor of the ‘Sandbox’, which ensures that untrusted - and possibly malicious - applications cannot gain access to system resources.

Complete System Architecture

The architecture of our framework, by its very nature is similar to that of a classic distributed client-server system. The difference is mainly in the extension of the client-server architecture to two-tiers, with the webserver serving client requests whilst acting as client to the tool servers. All the code for the framework is written in Java and so is platform independent, allowing any of the servers to be Linux, MS Windows or Sun-SPARC as in the case of the HSpice server. The webserver that has been used to demonstrate the framework (Java Server Web Development Kit) is only available for Linux in its current version, although older versions are available for other platforms. When the framework is migrated to a more mainstream webserver (Apache is the recommended platform), the truly platform independent nature of the framework will make itself clear.

References