WebLab-GPIB at University of Deusto

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Abstract:

A WebLab consists of both, a hardware and software development used as a means to interact with remote experiments, located in a traditional laboratory. Normally, the access to these remote experiments and devices is a web-based application. In this paper it is presented the WebLab-GPIB, developed at University of Deusto, which provides students with an Internet based application through which they can work on GPIB lab exercises without the necessity of physically sharing real equipment. The experience brings out a real solution for the practical problems of scheduling when the same devices are shared among quite a big group of students in the laboratory.

1   Introduction

Students on the fifth year of Telecommunication Engineering must develop a C program to control the instrumentation in the laboratory. The practices of the subject called "Electronic Instrumentation" involve working with the following devices: a Spectrum Analyzer (Advantest R3131) and a RF Signal Generator (Rohde&Schwarz SMY01). The C program consists of a group of the necessary GPIB (General Porpouse Instrumentation Bus) commands, which are used to control and manage those devices.

One of most common problems in the laboratory is the fact that instrumentation equipment is usually expensive. For this reason, there are only two spectrum analyzers and two RF signal generators in the Telecommunication Lab of University of Deusto, and about 50 students attending the course in Electronic Instrumentation. Practices are made in pairs and each exercise is planned for a two-hour work. So the scheduling lasts for about two weeks, which makes students wait a lot to complete their lab exercises in turns.

So far, students needed to run their control program at the PC to which the equipment is connected. From now on, and thanks to the WebLab-GPIB, this PC works as an application server to which students get connected by the Internet, and don't need a real presence in front of the devices to test their control program, any more.

So that, some benefits experimented when using the WebLab-GPIB can be listed as follows:
- The throughput of the devices increases to a maximum.
- The waiting time of students decreases to a minimum.
- The access to laboratory equipment is opened to everyone.
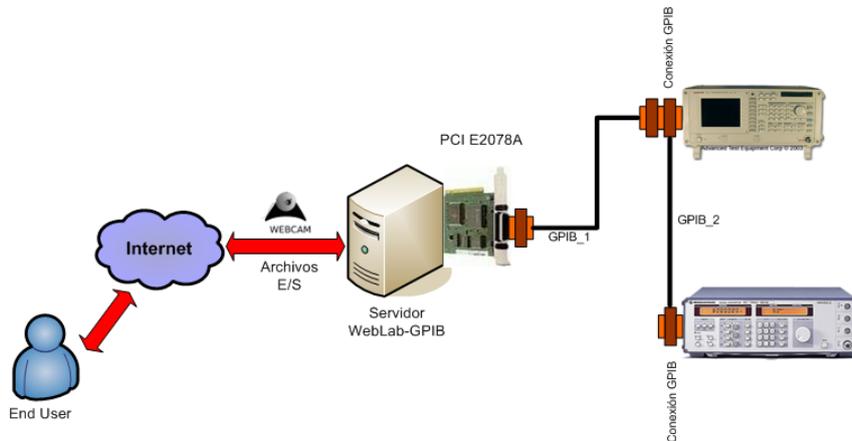
2   WebLab-GPIB architecture

The specific hardware that has been used in WebLab-GPIB is:
- RF Signal Generator Rohde&Schwarz SMY01.
- Spectrum Analyzer Advantest R3131
- Agilent PCI E2078A board (GPIB interface)
- GPIB cables.

The user only needs to install a C compiler and VISA (Virtual Instrument Software Architecture) libraries in his PC. Once the user finds a program compiled without errors, the moment to test its functionality has arrived. And the WebLab-GPIB gives the student the possibility to do so.

The WebLab-GPIB is based on the previous software design used for other WebLabs in University of Deusto [1], such as: WebLab-FPGA and WebLab-CPLD. It is important to build a versatile and scalable architecture in

order to develop WebLabs for different experiments in a simple way. The following figure shows the architecture used.

Figure 1. WebLab-GPIB architecture.

3   Results.

The following table summarizes the results of a questionnaire given to the students. The grading system goes from 1 to 5. All of them are students of the fifth year of Telecommunication Engineering and they attend the course on "Electronic Instrumentation", in which the WebLab-GPIB has been used:

Questions	Media
1. Has WebLab helped you with the subject?	**2,7**
2. Did you feel that you were in a better position by having been in the WebLab group?	**3**
3. Do you think it is a good idea if this WebLab experiment is extended to all the students?	**4,2**
4. Is it easy to use?	**4,2**
5. What is the quality of the WebCam like?	**1,9**
6. Do you think is a good idea?	**4,6**
7. What do you think about the time assigned to each connection?	**3,4**
8. Do you think it is a useful tool?	**3,9**
9. Being far from the prototype, have you felt you were in control of it?	**3,5**
10. Would you like to use WebLab in other subjects?	**4**
11. What is your global satisfaction with WebLab?	**2,8**

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