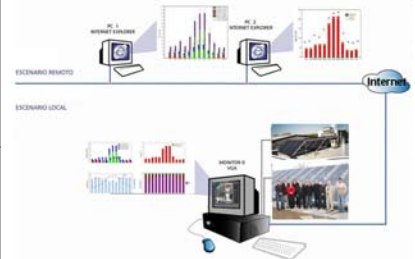




Project n°
TREN/04/FP6EN/SO7.31838/503183

Acronym : SARA

Title : Sustainable Architecture Applied to
Replicable Public-Access Buildings



Instrument : Integrated project

Thematic Priority : [6.1.3.2.1] [ECO-BUILDINGS]

D25: Internet-Based Monitoring Prototype

Development of the software to allow remote access to the local building management system (BMS) of each SARA building.

Date:

30-6-2006

Author(s) / organisation :

Revision:

Rubén Roldán, Mike Barker
Universitat de Barcelona
Dept. Física Aplicada i Òptica

1 INTRODUCTION

The aim of this report is to present the prototype software that will allow remote access to the local building management system (BMS) of each SARA building via internet. Each BMS will supply data files in an agreed format with the objective of permitting the subsequent publication in the project web site of visual information designed to facilitate understanding of the real energy performance of the buildings for the general public. The first proposal regarding the format for this visual information was presented in December 2005 (Deliverable D22). A working (not-published) draft of how the information might look on the internet can be viewed at the following address:

http://www.sara-project.net/article.php3?id_article=17

The software should contemplate the fact that the data from each BMS will be stored in a database in a local personal computer (PC) and periodically transferred automatically as .csv files to a File Transfer Protocol (FTP) server.

Zafh.net and the University of Barcelona (UB) will collect the files from this server daily (file name: yyyyymmddBMSXX.csv) and monthly (file name: yyyyymmBMSXX.csv) in order to analyse (Zafh.net) and transform (UB) the data. The results of the analysis and visual interpretation of the information will then be sent to the SARA project web server supported by HESPUL.

2 SOFTWARE PROTOTYPE FOR MONITORING

The first software prototype developed to simulate the flow of data between servers (FTP -> UB -> HESPUL) was tested in March 2006 using the graphics that can be found in article 17 (http://www.sara-project.net/article.php3?id_article=17) and found to work satisfactorily.

The application to allow this file transfer has been developed using LabVIEW® software supporting the DataSocket® technology originally anticipated for data transfer purposes (both National Instruments products, see: www.ni.com). The component phases of the transfer process developed are described and illustrated in the following sections.

2.1 Connection to the local FTP server

Figure 1 represents the subroutine relating to the file download from the local building's FTP server to a remote PC (at UB). It is made up of the following stages or blocks of tasks:

1. Host and remote ports open an FTP connection with a user-name and password to log on to the FTP server. This is followed by active or passive order and file specification to copy the contents of multiple files from the local machine to the remote PC. Finally a "quit" command closes the FTP session.
2. Specification of where the file is to be found, where it is to be saved to and the data transfer mode to be used, followed by transfer and conclusion of the process if the file is found correctly at the first attempt.

- Condition: If the file is not found at the first attempt then the system repeats the process periodically according to a defined frequency.

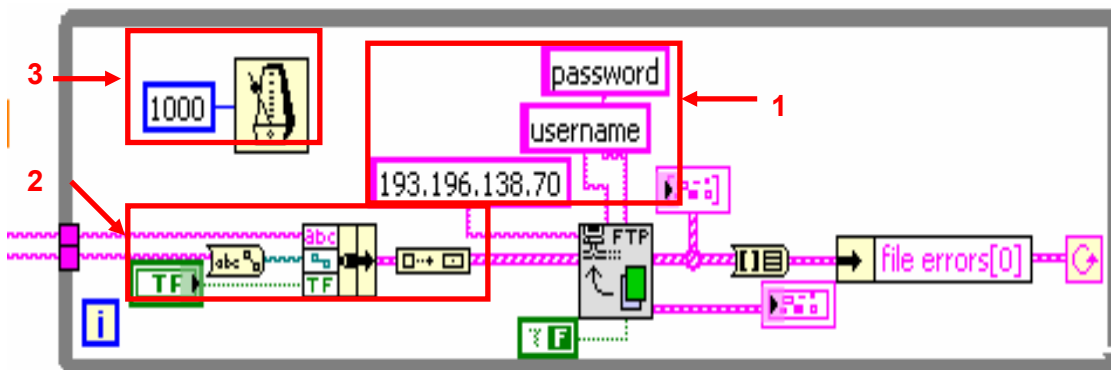


Figure 1: Connection to a local FTP server.

The file naming procedure has been automated by the design of the naming format. By way of example, in the case of LaTour de Salvagny in France, the naming protocol is as follows:

monthly file: `yyyymmBMSFR.csv` (year-month-data source- building identifier.File type)

daily file: `yyyymmddBMSFR.csv` (yr-month-day-data source-building identifier.File type)

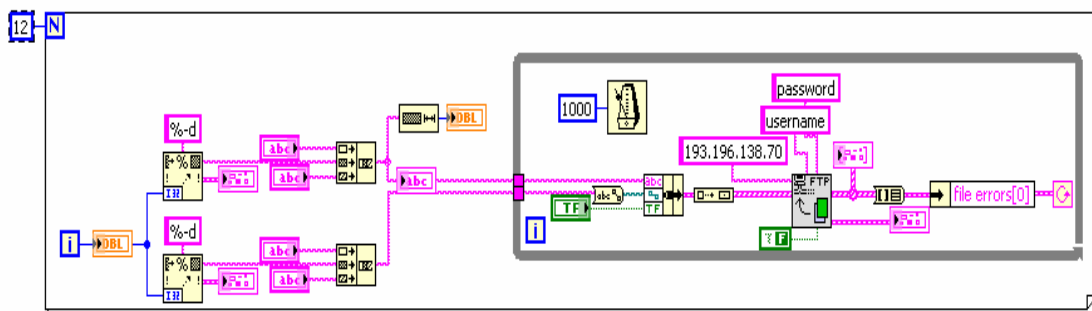


Figure 2: File sourcing, naming and indexing routine

2.2 File analysis and treatment

Once a file has been downloaded from the FTP server of any building, the next step is data analysis and treatment/transformation for graphical representation. Figure 3 illustrates the description (below) of how this is done:

- The downloaded file is opened using Microsoft Excel®, graphics are produced automatically using visual basic (see below) and then exported in .png format.
- There are various sub-processes for the numerical analysis and transformation of data, programmed in Visual Basic for Applications (VBA).

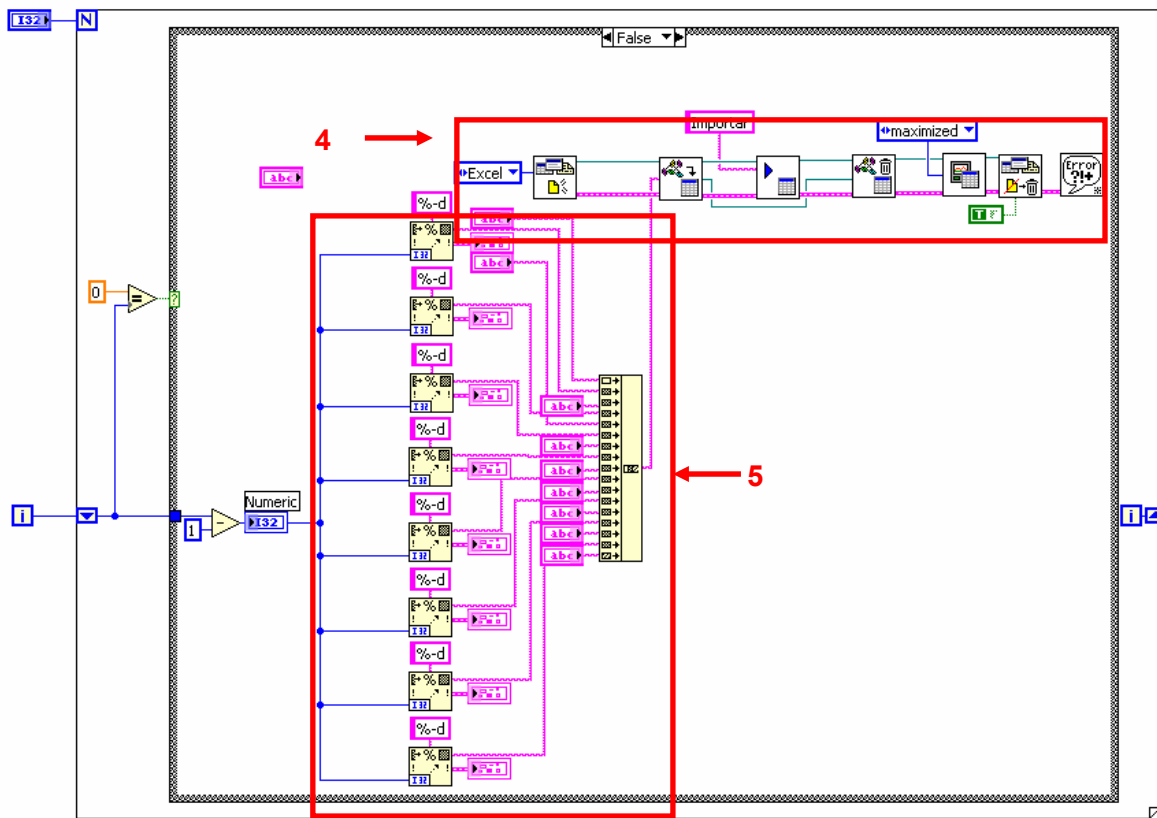


Figure 3: Data treatment and analysis

The treatment and export routines will be distinct for each SARA site, depending on variables such as the number and distribution of sensors in each building, the nomenclature and distribution of the files generated by each local management system. At the time of writing, the protocols required for these local variations have been established for the completed building in France. In the UK, the exact specifications of data to be transferred are pending confirmation following trials with the data management system (TREND/Imap). We are now waiting for the first data to be transferred (expected by September 2006).

To facilitate the storage of the treated and published data, the implementation of a dedicated database on a PC at the UB has been contemplated and will be developed as and when the volume of data to be managed is seen to demand this facility.

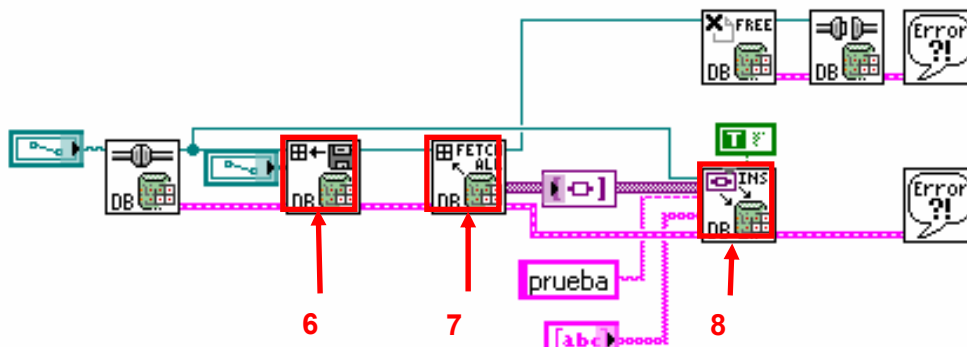


Figura 4: Local database management structure.

Figure 4 shows the various stages of the process, namely how:

6. Load a record-set and return a unique reference that identifies this set.
7. Retrieve the data from the identified record-set and transform the data into a two dimensional variant array.
8. Finally, the data is stored in the database identified by the connection reference.

2.3 Exporting the Graph files to the HESPUL Server

The final phase is the transfer of the image files (.png) to the HESPUL web Server as illustrated in figure 5.

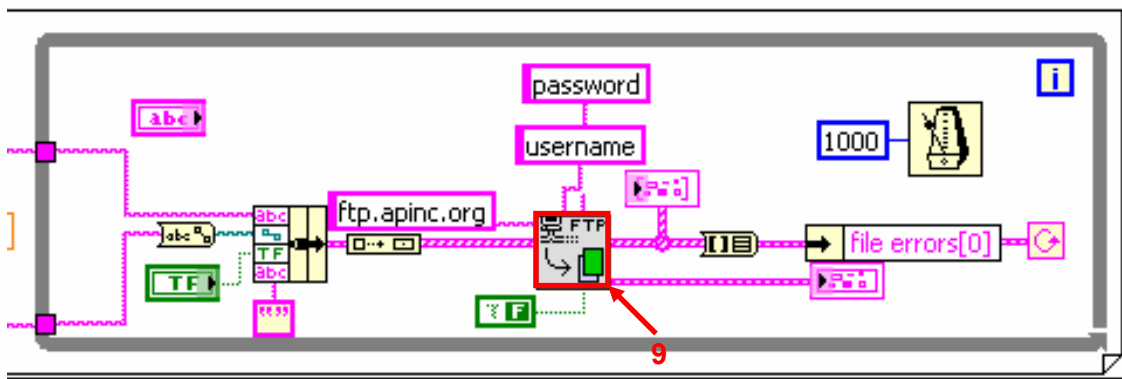


Figure 5: Connection to the HESPUL file server.

The process is similar to that of figure 1. The only difference is that step 9, connects with HESPUL's SARA web server and copies the multiple files from the UB to this server. The file generation routine is similar to that in figure 2.

3 CONCLUSION

The blocks represented here are common, basic aspects of the software that will permit remote access to all the distinct local management systems (BMS).

In order to detect possible errors prior to the presentation of the results in public, once all the component blocks and each system has been interconnected, a trial period will be required in the private area of the SARA web site.