

A PARTNERSHIP SCHOOL - INDUSTRY BENEFITING THE INTEGRATION OF THE UNITS OF THE UNIVERSITY

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Abstract. *To integrate of an optimized way from Intranet and/or extranet (InterNet) the data proceeding from a collecting station of meteorological data, TDL-14 model (THIES, 1998) manufactured by the German company Thies Clima, of property of the Instituto Presbiteriano Mackenzie, it was firmed an agreement of contribution for the modernization of an already used supervisory software and in the creation of a system topology that allowed the expansion and improvements with new characteristics to this system and, that, at the same time, was carried a qualification to LabVIEW® software. This development, carried through by means of the partnership company school, created a server of data with information of the meteorological station to be divulged between the academic units of the institution, provoking, with this, an interdisciplinary linking and, making it available to other entities or users, dedicated to the study of the environment or the climatology. The supervisory system based in the programming platform LabVIEW® (NATIONAL, 1998), was the convergence point so that the partnership between particular company and University with sights to qualification has been installed, update and development. On the other hand, a space in the site of the University for the rank of a reference to the carried development was offered.*

Key words: *Partnership, interdisciplinarity, LabVIEW, meteorology, serial communication, data acquisition*

1. Introduction

According to NOLETO (2003) partnership is defined as being the meeting of persons for the exploration of interests in common. However, in professional terms, the search for an only interest does not exist of the form which was defined, but, in the search of a particular solution inside of an only problem. The partnership idea, in question, raised a more important concept that it is the form to interact with entities not academics. In the case, supply a deficiency in the use of software LabVIEW, through out the solution of a problem of propagation of meteorological data in the University and in the InterNet. In other words, a problem was used to supply another one.

The formation of partnership (D.O.U Law nº 9790), accord or group of research, inside of the academic environment is not a newness and it is ostensibly practised in the state schools, however in the scope of the particular institutions it starts to be a new option for the acquisition of resources. On the other hand, for imposition of the LDB, Law of Lines of direction and Bases of the Education, (D.O.U. Law nº 9394), all the entities with status of University will have to be engaged with research and this will induce the search of resources before the official agencies financiers and, these in turn, only will liberate executed resources for criteria of scientific productivity and projects. This situation indicates that, the search of qualification and financing for formation of a critical mass can come by means of partnerships. On the other hand the partnership so practised between governmental entities of education and particular companies, can now appear too, of more accented form, between particular institutions of education and the companies. In the case in question it did not have a money exchange or allowance for expenses for solution, but Marketing for qualification.

Inside of this legislative panorama and in the search of an institutional contribution, the break-even point in the partnership was discovered that, according to NOLETO (2003) the abilities are evaluated of each part discovering itself the points of mutual interest. That, in the case, it was the modernization of a supervisory software. Another important point was to deposit belief in the partnership and to avoid capricious behaviors that could take the project the depreciation. At any moment a concern existed in fulfill only an inspect part, since it was not premise of none of the parts and, in that case, could place in risk the technician-social part. It has been understood that, the occurred biunivocal correspondence avoided that the divergence of interests occurred. The type of established partnership, as seen, was not conventional, or either, to search a partner with great economic and known power so that, the project was valued by means of the known mark and the invested monetary volume. This structure, more used, normally doesn't last long and relieves only the present results. The proposal form, less conventional, in the choice of a partner was the delimitation of a project that both have accomplishment conditions. This type of partnership relieves, not only, present results, but also future results due to the both security - confidence. Thus, it has developed a partner that generated, through a qualification the application to a supervisory software, whose accomplishment had the incumbency to establish connection academic units and, as by-product, prevented financial expenses for the institution in the purchase of a dedicated software for this function and in the qualification of its employees.

Inside of the partnership there was the institutional agreement for publication of a reference partnership with commitment of the company to carry through the qualification and update front to software LabVIEW®. This software was chosen, therefore because there is the intention of uses it in academic applications such is used in wide scales the software of numerical simulation Matlab®. The objective of the project is to make it available for the use in Intranet and/or extranet, proceeding data from the station of collection of meteorological data TDL-14 model (THIES, 1998) manufactured by the German company Thies Climate of property of the Institute Presbyterian Mackenzie. This procedure creates a server of data whose stores the information sent by the station and facilitates the availability to be divulged between the academic community of the institution and interested entities. Currently the College of Architecture and Urbanism in disciplines Environmental Comfort, College of Biological Sciences, Accurate Sciences and Experimental in the group of research Instrumental Analytical Chemistry laboratory, in it disciplines Ecology and in the School of Engineering in the departments of Civil Engineering and Mechanics they use these data. It is important to point out that the proceeding data from the station had already been part of scientific works published in Congresses such as Santos (2004). The partnership and the project had made successful, therefore, both partners had felt themselves satisfied with the results, had a knowledge profit and the intention to promote new projects.

2. Justification:

The knowledge of the climatic variable inside of the academic target applies not only the isolated sectors inside of the University, but to all those that search, through research, verify the climatic influences of its area of study. In our case that is justified, therefore, after modifications, improvements and transference of the place, the station serves to the academic community as a whole. Today the data is used not only to the College of Architecture and Urbanism, but also it is applied in Engineering where the importance of data goes since the practical ones of meteorology, in the equipment calibration, until the correlation with processes of concrete cure, subject treated in the School of Engineering. Another aspect is in the laboratorial practices aid in the initial courses of General Physics I, General Physics II and General Physics III as well as the works of Scientific Initiation and works of Conclusion of Course.

In a next future, that depends on agreements and accords, it can be extended to the linking of this station with others in education institutions and research. Its privileged position, center of the city, makes of these very important data in the agreement of the dynamics of the climate in this region, as well as in the study of the thermal gradient of the city. This makes it noticed, therefore, the Center of Flood Management (CGE) of the City hall of the City of São Paulo, the INMET (National Institute of Meteorology) and the CEPAGRI (Center of Meteorological and Climatic Research Applied Agriculture-Unicamp) have shown interest in the data and argue an exchange of information on them.

3. Methodology

3.1. Description of the collected system of data without modifications:

The station of collection of meteorological data, model TDL14, schematically symbolized for the Fig.1, has six equidistant transducers between itself through connecting rods, forming a species of antenna, Fig.2. The collection of data is made 24 hours per day, every day of the week,. The measured largenesses are: Temperature, atmospheric Pressure, Speed of the wind, Direction of the wind, Humidity and solar Radiation. The system still counts on a solar panel, whose function is to keep the load of a battery to supply energy to datalogger (data collector). The signals proceeding from each sensor are sent for the collector of data located exactly below of the antenna that has the function to interpret and to condition the signals. The conditioning is to supply to the signals a corresponding binary numerical value. These data are stored in the collector of data until they are requested. Another function is the assembly of a datagram (given in format txt - text) that it is a numerical sequence indicating the order of the information that will be sent to each solicitation. This solicitation has left of a computer located in one of the laboratories of Physics, that has a software (original) that generates and files the collected data. The transmission of the data, between the station and the laboratory, is made by means of standard RS485, therefore the station of collection of data and the computer are connected between itself through a cable and both change information in serial way. Standard RS485 was chosen to make the transmission of the serial communication of data between the meteorological station and the computer because it has the easiness and the good characteristic to allow the use of more extensive cables, being able to have approximately assured the quality of the transmission of the signal for 1,0 km of cables, thing that does not happen with standards more traditional as, for example: the RS232C that allows to with security a serial transmission /reception of data up to 15,0 m of distance through cables. As it has a considerable great distance, approximately 300,0 m, between the meteorological station and the computer, in the laboratory of Physics, it was necessary the use of this standard.

To shelter supervisory software a common computer PC is used, that does not have a serial door in standard RS485, but so soon the signal arrives by the cable it passes for a converter that places it in present standard RS232C in the majority of the Personal Computers (PCs) found in the market. The converter is connected the communication door COM2 of the PC by connector DB25. The converted datagram, that arrives at the PC is interpreted by the supervisory software that will make the publication of the data in the screen.

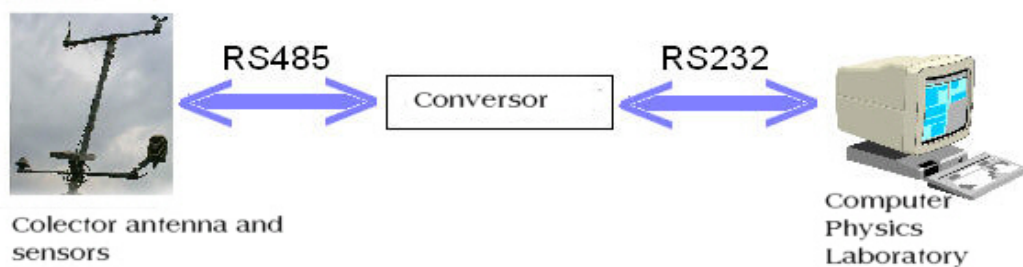


Figura 1. Schematical representation of the system of collect of meteorological data indicating the main parts.

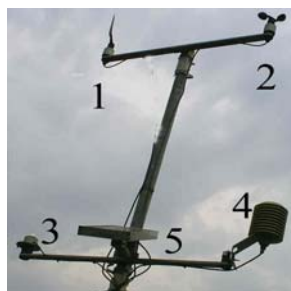


Figure 2. The figure shows the components of the collecting station of data : 1-Direction of the wind, 2-Anemometer, 3-Pyranometer, 4-Weather and Radiation Shield, 5- Solar Cell. The barometer is protected inside of the box of the collector of data

3.2. Description of the modifications introduced in the system during the qualification process:

Software LabVIEW was chosen because it is appropriate for the acquisition of data and to have a strict graphical programming language. On the other hand, the university has a version of software, saving unnecessary expenses. No physical change in the hardware topology was carried through, but to that in respect to the installed services of software. The collecting station of data is continued connected to a computer PC changing data serially by RS485, being this converted to the standard RS232. The modification made, in relation to the previous description, is that computer PC of the laboratory of Physics functions as a server connected in the Intranet of the University through its plate of Ethernet net, thus configuring the necessary conditions of the hardware for the spreading and access of the information of the system. The Fig.3 below indicates how have stayed the introduced modifications.

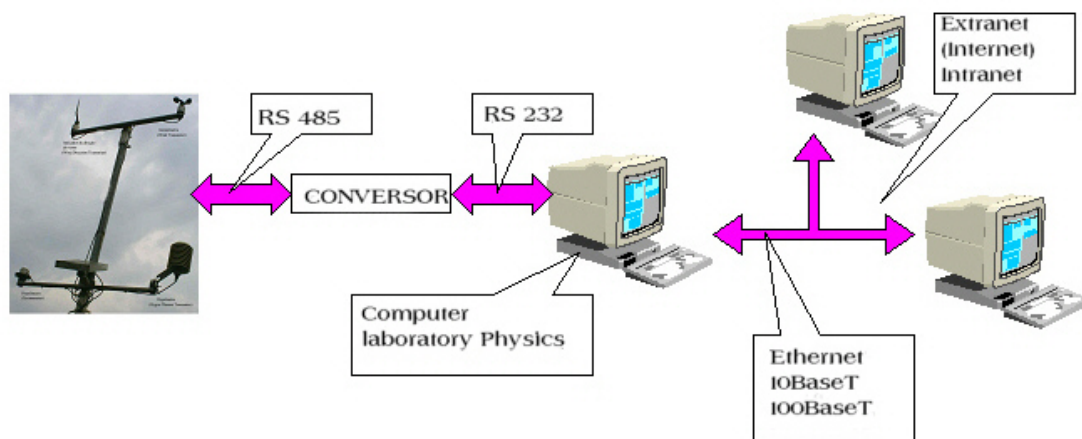


Figure.3 Schematical Diagram of the system of collection of data showing the conceptual modification of the system with its linking in the Intranet.

The agreement between the parts established that the supervisory one would be the main objective of the partnership and, so that it could be reached, some specific knowledge would have to be reached. For this, before any modification a cycle of basic classes referring to software was initiated. These lessons had been divided in modules and, each one, enclosing a specific content. To the end of each module, practical implementations were carried through aiming to compose the supervisory one for the collection of data.

The process approximately lasted one year with beginning in March and end in November with weekly of two hours classes respecting vacation, school recess and holiday classes.

The employed material was one laptop and softwares LabVIEW and Dreamweaver. The place of the classes was in the dependences of the University where it was counted on infra - structure, as: classroom, blackboard, material of writing and other resources.

The modules had been planned to fulfill the following steps:

- a) Basic knowledge - familiarization with software (BISHOP,2001);
- b) Basic Knowledge - first constructions (communication);
- c) Basic Knowledge - acquisition of data;
- d) Intermediate Knowledge - Construction of the first application (ServMet);
- e) Intermediate knowledge - Construction of the second application (Metpage);
- f) Final Knowledge - Special applications (Server, InterNet, Intranet. Webpage);

3.2.1. ServMet (Serving of Meteorological Data Local)

Created routine to function 24 hours per day and in case of misfeed in the microcomputer, it automatically returns to function thus that the system again will be energized. The routine is written in LabVIEW (BEYON, 2001), composed for another routine of serial communication and a server TCP (File Transfer Protocol) indicated schematically in the Fig.4. The first routine collects the data proceeding from the meteorological station for the serial door and the second routine is responsible so that the customers who connect the server for intra or extranet have conditions to have access to the data received from the station. The ServMet also has one third internal routine that generates a spreadsheet of data, that can be opened in calculation spread sheets, for example, Excel. This spread sheet that contains meteorological data collected from the station are published in this under the following conditions:

- a) Daily, the system generates a spreadsheet to store data collected inside of a definitive regularity (1, 2, 5,10 minutes) in a way that to be able to generate statisticians on meteorological data.
- b) Inside of the determined regularity, the system publishes a new line in this spread sheet with meteorological instantaneous data proceeding from the station, thus until it locks up the period, when will be generated a new spread sheet for the data of following day and, publishing the previous spread sheet in the directory of a serving FTP. This allows that any interested party who has access to the internal net can search it to be able to use the information.

3.2.2. MetPAGE (Site of the Intra/ExtraNET with up to date data proceeding from the ServMET)

A subroutine (MontaPage) inside of ServMet routine is a server of page for the InterNet (web), whose address is <http://200.182.207.133/fisica/>, being able to be accessed by the Intra/Extranet (InterNet) with referring details to the had accessed measurements of the meteorological station through the ServMET. This resource, allows that users can access the service, without possessing the specific program customer, possessing the access to Intra/Extranet is enough, a browser of installed navigation and the address of the server web where is in the MetPAGE. The information of this page can be up to date to each a minute and the regularity can be modified. Fig. 4 shows to the schematical diagram of the logic of the system after the modifications.

The aspect of the graphical interface of control can be seen in Fig. 5 and has the following resources: Control of update of the Webpage, configuration of the serial interface, visualization of the datagram and information of the station.

STATUS DO ServMET

port
6341

número de conexões
0

Fila de conexões TCP

Servidor de informações MET

MetPAGE ativado

STOP

Dados ServMET

Configuração Interface Serial

port number: 1 baud rate: 9600 data bits: 7 stop bits: 1 bit parity: even parity 2

flow control etc.

input XON/XOFF: input HW Handshake: input alt HW HShk:

output XON/XOFF: output HW Handshake: output alt HW HShk:


XOFF byte: x13 XON byte: x11 parity error byte: x0

Inf. da Estação


Nome da estação	Coordenadas da estação	Altitude da estação
Mackenzie	23°32'51.0"S 046°39'04.9"W	780m

MetPAGE

Período de atualização MetPAGE(em minutos) Minutos Faltantes para atualização MetPAGE




1



46 min 4 seg.


Liga MetPAGE



OUTRAS FUNÇÕES

WServMET

Acessa



Sistema Inicializado em:

x/y

Hora do Sistema: 0,00

Tempo do sistema no Ar:

Figure 4. Interface of control of the meteorological data.

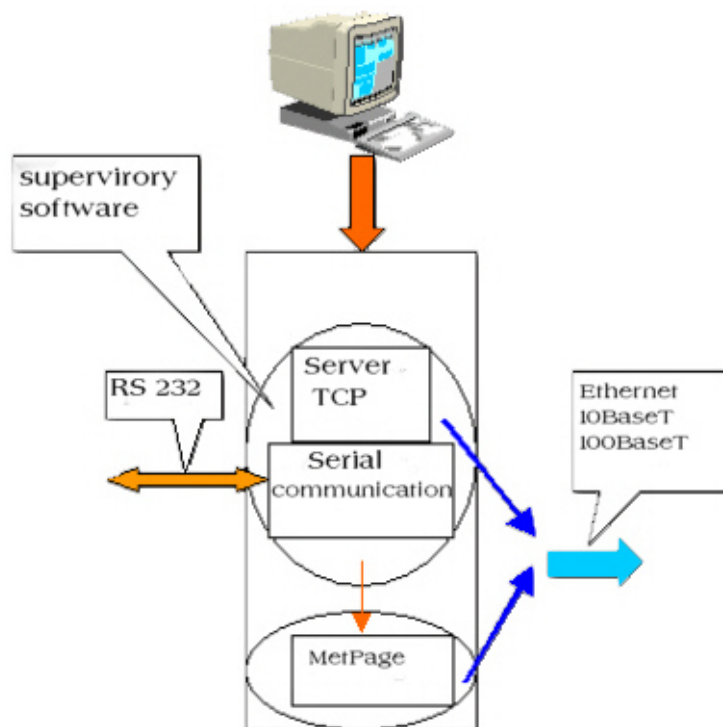


Figure 5. Modification introduced in system to serve meteorological data.

To access the information supplied for this system in time real, we need software that functions as customer, which can be written in any language, since that has the following itens: a customer for connection TCP and an interface for publication of the collected data. For such, the MET was created (Standard Application of a customer of the ServMET system). It is a software written in LabVIEW and composed for a Customer TCP and an interface of supervision and graphical management. Through this application, the user of the Intra/ExtraNET, has conditions to collect in real time the data of the station.

4. Final commentaries

Results generated for partnership had demonstrated, not only through modification of supervisory, but also applications are allowed for future ones and, the result of this established a qualification, whose initial results indicate that the implemented modifications are superior to the original system, therefore allow easy access for the academic community, as much to common users as researchers.

Currently the group of studies on ambient pollution of the College of Biological Sciences, Accurate and Experimental Sciences as well as the College of Architecture and School of Engineering have already benefited of the data.

Studies for the interconnection with the Control center of Floods of the Municipal City hall of São Paulo still exist that counts on a similar system to this, used in Mackenzie, aiming at to the integration and centralization of all the collected data of the meteorological stations of its property, in real time, spread for the city.

The following resources will be implemented in the future to increase the capacity of the system:

- a) Electronic system for the interpretation, diagnosis and forecast of meteorological conditions. This system will be called **METInter**
- b) Electronic System for sending of meteorological information by e-mail. The users will be able to request files of last and present data and the sending will be automatic. This system will be called **ServMET Mail**.

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6. Responsibility notice

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