LabVir. The present status

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1. Introducción

The LabVir project started in 2000 with the aim of implementing distributed instrumentation on Spanish oceanographic vessels and also in the Spanish Antarctic stations [1]. The project brought together technicians working on maintenance tasks in oceanographic vessels and researchers from different areas such as geology, electronics, physics, telematics and so on. The project is being carried out by the Technical University of Catalonia, the Marine Technology Unit of the Spanish National Science Council (CSIC), Global Networking Engineering and "Instituto de Navegación de España" and is funded by the Spanish government under contracts TIC2000-1027 and CTM2004-03486/MAR

2. The starting scenario

In the starting scenario, sensors collecting data were attached to registration devices with limited cooperation and share data facilities. The sensors (and the attached recording devices) had been acquired over the years to meet the increasing demands from the new research projects [2]. Different manufacturers have different philosophies when designing their devices. Hardware and also operative systems were not homogeneous. In a single cabin it was possible to find a robust UNIX machine under Solaris, a PC running DOS, Windows or Linux and a French researcher using his Apple laptop. It would not be easy to combine all these connections.

3. The project

The development of a complete set of applications for data acquisition needs a framework to provide scalability and compatibility between applications, especially in a distributed environment where applications collaborate and share data. Marine data acquisition systems, designed to be boarded on ships or on autonomous platforms require multicomponent hardware and software construction. Current networking technologies have also broadened the concept of acquisition data platforms to any kind of acquisition devices that can interact between themselves using a real-time data network.

The experience gained during these years, together with significant advances in TIC field allows us to plan a more ambitious project which deals with the modelling and construction of distributed systems which involves the information technologies (hardware and software) and also communications, telematics and electronics technologies [3], [4].

The built in Web Services architecture in this environment not only represents an important advance but also brings up more opportunities of creating a flexible, open and secure environment. In fact, CORBA, Java and RMI include base technologies, the mobile agents make the distributed calculation for the local real time processing easy and the configurable processes without prerequisite and Web Services provides a distributed, open and secure architecture. Web Services is a software environment in which the services are provided by URI identified applications, whose interfaces and methods are explained using XML. The users are capable of finding them and learn how to use them. With this new architecture, we achieve a totally distributed system since users can be distributed in a intranet or in internet, the applications can be distributed and they can be found thanks to the UDDI and LDAP services, the process can be distributed using Java Beans and RMI, data are distributed using RMI and all that in a secure environment thanks to SOAP and HTTPS (fig. 1)

4. Realization

The use of embedded PCs like TINI or SNAP (which are small enough to be easily integrated into the measurement equipment), data accessibility through internet, temperature humidity collecting devices, synchronization trigger for geophysics, bathymetric devices and integrated GPS-GSM (fig. 2) are the working examples implemented under the LabVir project to be presented in forthcoming presentations [5].

Far away to simply providing solutions to particular situations, we are trying to present a conceptual model for representing marine data and metadata and for constructing the associated software, defining the basic elements and the ground rules required to implement complex marine data acquisition systems.

The future offers improvements in communications and data transmission, especially in the Antarctic areas. As an example, one of the new goals of the LabVir project is the implementation of a user-friendly web interface that will allow us to monitor and redesign experiments in real time, at up to a distance of 5000 miles from the collecting area.

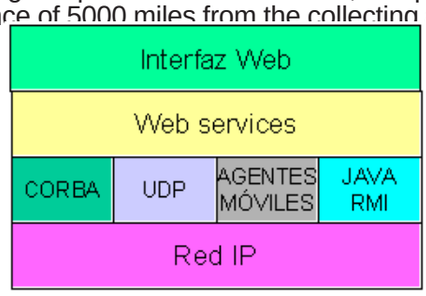

Figure 1. Diferents Technologies used in LabVir

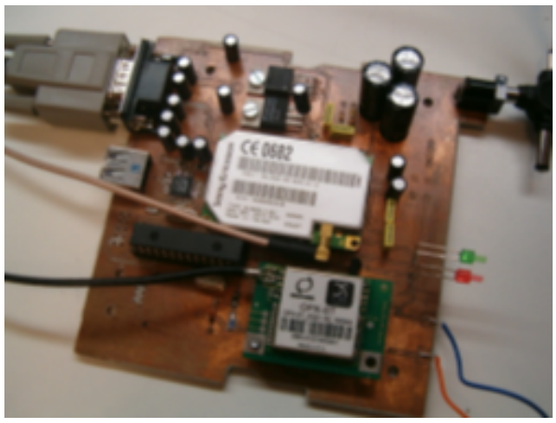

Figure 2. A GPS-GSM prototype

4. References

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Network Management for Marine Sensor Networks

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1. Introduction

Communication networks for connecting heterogeneous systems are going to play a key role in the development of future large data acquisition systems projects in marine science (some of them have already become a reality), particularly in Oceanographic Observation Systems.

In these scenarios, many technological challenges arise that can be approached either improving each of the individual network elements separately (data, sensors, communication protocols, physical layer, etc..) or managing the system as a whole. The purpose of this paper is to make a first theoretical approach to the use of network management techniques in "Marine Sensor Networks". These are already being applied in other fields in which the management of resources is a key element and in which it is necessary to provide services under QoS agreements, such as mobile telephone providers or Internet service providers.

1.1. Marine Sensor Networks

A Marine Sensor Network (MSN) is a group of Instruments and Data Acquisition Systems that, by means of a communications link, work in a cooperative way in order to obtain data from the marine environment.
For instance, cabled MSNs are an ideal way of observing the ocean in a continuous way. They are reliable for many years, offer high band width telemetry and are inexpensive to operate once installed [1].

When deployed over large sea floor areas with the purpose of obtaining long term datasets, MSNs will be a basic tool in Operational Oceanography[1]. The development of MSNs has been widely promoted by the most relevant international organisms for marine science and technology management [2][3].
Some large MSN projects have started recently, such as NEPTUNE [4], that is now in the first sea tests phase. Other projects at their first definition stage, like ESONET [5], are drawing together several marine science centers and technological enterprises from different countries.
One of the most important key items related to the development of these networks is the management of the heterogeneity: different systems and technologies are concurrent in the same network, forced to share hardware resources and exchange data.

Another important aspect of these networks is the maximum extension of the operational time range of the deployed instrumentation, in order to elongate the time data series and also to make the high costs of the network installation more profitable.

Some other projects related to NEPTUNE, such as SENSORS [6], have started recently with the objective of solving these two important aspects.

1.2. Network Management

The Network Management is defined as the group of tasks and techniques related to the planning, organization and supervision of all elements within a network, independently of their nature and location.

The main goal of the Network Management is to reach the maximum levels of availability, efficiency and effectiveness, through the global