OPEN SYSTEMS INTERCONNECTION CONCEPTS FOR LOCAL AREA NETWORKS

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ABSTRACT

Introduction

This task is part of an integrated project which is aimed at providing a local area network for the Open University of Sri Lanka. The project was started by defining the parameters and establishing specifications of the OUNET. Four researchers work on the project.

The design of the user interface is identified as the subject of this thesis. This covers the three upper layers of the ISO/OSI reference model. The hardware which is required for the implentation is termed Firmware Configurable Interface(FCI). User interface and the FCI are discussed in detail in this thesis.

At this stage it is not easy to clearly demarcate the upper three layers. However some parts are implemented in the host machine while the others are implemented in the Firmware configurable Interface. The "openness" is built into the interface by means of firmware configurability.

The programs intended for sharing the resources of the network, are resident in the host machine as well as in the FCI. These programs are portable, but need some modifications to accommodate operating system dependent parameters. The C programming language is used for code generation.

The User Interface

The proposed OUNET is a distributed control network, or in other words, all the nodes are autonomous. They progress in their execution of code independent of the other nodes unless a demand is made by any other node in the network. These changes or interrupts are only by means of messages exchanged between nodes and not by placing messages in a shared memory as in a shared memory multi-processer configuration.

The proposed network will provide the following facilities for the user:

1) File transfer between computers.
2) File transfer between computers and global mass storage.
3) File printing.
4) Remote program execution.
5) Distributed database management.
6) Intelligent workstations.

Since all the minicomputers within the Open University support UNIX, the software developed is intended for the UNIX environment. Two main programs were developed to provide the above mentioned facilities. Network Access Program(NAP) has to be invoked by the user as and when required. This program prompts the user with a "JOB CARD" to be filled in with appropriate information. The second program named "LISN" runs in the background to catch any messages coming from a node in the network. Data communication takes place in the form of blocks of messages with the use of Structured Communication Blocks(SCBs).

Operating System dependency and hardware dependency cannot be completely eliminated due to the fact that some of the operating system dependent factors, such as file structure, process id etc, have to be used. However OS dependent and hardware dependent parts are kept to a minimum in a different file so that porting can be effected with least possible modification at the source code level.

The Firmware Configurable Interface(FCI)

When it is necessary to connect different makes of computers to a network, it demands many different interfaces. To overcome this problem of designing and manufacturing different interfaces, the concept of Firmware Configurable Interface was suggested. As the name implies it is so designed that it can be configured to suit the host machine by simply changing on-board ROM devices. Due to this fact it inherits a certain amount of "openness".

The FCI is build using a single board microcomputer supplied by Siemens A.G. This has 512K memory onboard and two sockets for EPROMs up to 512 Kilo bytes. The Processor is Intel 80188. There are two RS 232 ports and an IEEE 796 compatible bus connector.

In this particular implementation, host computers are connected to the FCI through the RS 232 port. This imposes a serious limitation in the communication speed. To overcome this, in future designs, host machines should be connected to FCI's through their respective buses.

Software and Firmware

The software for the host machine was developed using a SORD M680UX. The firmware necessary for the FCI was developed using a 16 bit(80286) PC/AT machine.