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CONNECTRIX

Submitted

by

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Shalini

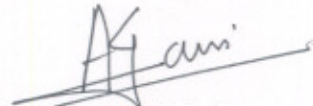
(Shalini Bajaj)

Certificate

This is to certify that **Shalini Bajaj** , doing her Masters in Computer Applications (M.C.A) from Thapar Institute of Engineering and Technology was assigned to develop "**Connectrix -A test tool for checking connectivity between two end connectors of a cable against defined configuration** " at Hughes Software Systems .Connectrix is the authentic idea of Hughes Software Systems .Hughes Software Systems has copyrights for the concerned work .

The duration of the project is five months (from 6th January ,1997 to 10th June , 1997.)

The work done by her was found to be good .The documents and source code created by her are not published as part of the report because of company's confidential reasons .



(Mr. Ajit Jain)

Sr. Project Manager,
Hughes Software Systems,
Gurgaon .

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INTRODUCTION

Chapter 1

Company Profile

Hughes Software Systems(HSS) specializes in the development of software solutions , products and services in the leading edge technologies for the global market place . HSS is a subsidiary of Hughes Network Systems Inc.

Headquartered in Gurgaon , a New Delhi suburb , HSS has presence in USA and Indonesia for sales and support with customers based in USA , Europe and Asia .

HSS , an ISO 9001 certified company , today is #1 in Communication Software in India and is poised for explosive growth in the coming years .

While HSS takes advantage of the complementary and synergistic resources of Hughes family , it operates as a fully self contained business unit and is focussing on software related services to different international customers .

What started as a small outfit with only around 20 software professionals in 1992 has now grown to large team. Today , HSS has around 275+ software engineers and all of them are highly skilled professionals .

They come from various streams of engineering , primarily ,Computers and Electrical/Electronics engineering . They have wide ranging expertise in software development .

Since its inception in 1992 , HSS has maintained a 100% growth both in its manpower and turnover .

HSS is one of the largest exporter of communication software from India and offers high quality , cost effective services and solutions connected with all aspects of Communication and Networking.HSS operates from New Delhi , India and has spread its wings with its first office coming up in Indonesia in just two years of its operations .

HSS has invested more than U.S.\$ 18 million for the development facilities in India as of today. This is one of the largest investments made in this area by many Indian software technology park .

HSS is increasingly focussing on its core competencies and looking to partnerships with others to achieve "best in class" . This will complement HSS' resources with its partners and make a winning combination .

Hughes Software systems (HSS) is subsidiary of Hughes Network Systems, Inc. (HNS) , a company headquartered in United States of America. HNS, a unit of Hughes Electronics Corporation , is—simply and completely – a networking company , dedicated to providing products and services to build and operate digital communications networks worldwide.

With a unique combination of wireline and wireless technologies, HNS is one of the world's largest suppliers of wide area networks. HNS foundations in networking stretch back more than 20 years.

The company has grown at an average annual growth rate of 35% since 1987 ending 1995 with revenues of over US\$ 900 million. HNS employs more than 3,000 people and has sales and support offices in 15 countries. HNS has two other companies in India : Hughes Escorts Communications Limited , a leading supplier of VSAT based private corporate networks and Hughes Ispat Limited , a telecom operating company to provide telecom services in the liberalized Indian economy . Hughes Electronics Corporation is a world leader in high technology electronic systems with a revenue of US\$ 14.8 billion in 1995. Its major business areas are Automotive Electronics, Telecommunications and Space , and Aerospace and Defence Systems . The other major units are Hughes Telecommunications and Space , DIRECTV and Delco Electronics.

Telecommunications And Space

Hughes Telecommunications and Space (HTS) has operating units that manufacture satellites and provide communications services: Hughes Space and Communications Company builds satellites and is the world's leader in the communications satellite market , having approxi-

mately 60 percent market share. Hughes Communications, Inc. , is an owner/operator of 18 satellites and is the world's leading provider of distribution services for cable television systems, news companies and private business networks. HTS is also developing and operating international direct-to-home TV services and building new business in satellite mobile communications and high speed interactive satellite communications.

DIRECTV

DIRECTV developed the world's first all-digital , direct-to-home , satellite-based television service . DIRECTV provides 175 channels of video and audio to customers in the United States , where it already has the leading share of the satellite-to-home video market . Sales of the 18-inch satellite dish and related equipment , the Digital Satellite System(DSS) , represent the most successful consumer electronics introduction in history .

Hughes Network Systems

Hughes Network Systems designs and manufactures telecommunications networks and systems and provides related services. HNS is the leading provider of such wireless systems : satellite-based business networks , with more than 60 percent of the global market ; cellular based fixed wireless telephone systems; and mobile cellular digital packet data systems .

Automotive Electronics

Delco Electronics

Delco Electronics is one of the world's largest providers of vehicle electronics . The company has a 23 percent share of the global market . Delco Electronics designs , develops and manufactures a wide array of automotive electronics including air bags electronics , antilock brake control modules , remote keyless entry systems , engine and transmission controls , vehicle security electronics , pressure sensors and security systems . Other products include audio systems and active antennas , navigation systems , communication systems , instrument cluster and climate controls .

Chapter 2

Introduction

Checking the connectivity between two end connectors of a cable can be achieved by two ways .One way is to have a hardware that ensures proper connectivity .The problem with this method is that it checks a particular set of cables for which the hardware is designed .The second way is by using multimeter which is a time consuming process . Moreover this does not do exhaustive checking of all pins in the cable .Connectrix is a software solution to the problem stated above .It is a PC based tool to check the authenticity of a cable against defined configuration .It offers a generalized means of testing any cable .Third party generic I/O cards available in the market can be used to read the status of a cable using a PC .

2.1 Features :

Connectrix has the following features to facilitate the user with a fast and error free method of testing the connectivity of cables .

- Provides the user with a database containing information about various connector types .The information about connector types includes :
 - the name of the Connector .
 - the number of pins on each of them .
- Allows the user to modify the database of connector types .Modification involves:
 - Addition of Connector Types .
 - Deletion of Connector Types .
- Facilitates the user to read the various connections between the two end connectors of a cable which are presently fixed on the I/O card .
- Allows the user to save the connections read from the I/O card in some file ,filename being specified by the user .

- Facilitates the user to load some file having connections .
- Provides with a facility to modify the connections and save it in already open file or some other file , name defined by the user .
- Has the facility to read all the files already stored as master cable configuration .
- Checks the configuration read from the I/O card against the configuration defined by the user .
- Displays the result of the comparison to the user as PASS or FAIL .
- Displays the detailed result of the comparison which includes :
 - Connections that exist but are not defined by the user .
 - Connections that are defined by the user but actually donot exist .

PROBLEM DEFINITION

Chapter 1

Problem Definition

Cables are needed for various purposes .The basic problem with a cable is to check its connectivity .Till now multimeter was being used for this purpose ,which is a time consuming process .In addition , it doesnot perform exhaustive checking .Another way is to design some hardware for checking the connectivity across two end connectors .The demerit of this method is that the hardware is limited to the specific cable for which it is defined .Connectrix is a software solution to the problem . It is designed to overcome the inconvenience cable users have been facing .It is to facilitate the users with a fast ,generalized ,error free method of testing cables .

Chapter 2

Methodology

Connectrix is the solution to the problem faced by cable manufacturers , engineers working in laboratories .Connectrix was designed to provide the users with error free , fast method of checking connectivity between two end connectors of a cable against defined configuration .

The user is provided with a database that contains information about various Conectors .He is allowed to modify the database by adding some Connector types and deleting some of them as per his requirements .

An I/O card is used to read the actual cable configuration .The user can read the actual cable configuration and store it as a master cable configuration in some file .

The user is provided with a screen where he can enter connections .

The user defined connections are tested against actual cable configuration and the result is displayed to the user as PASS or FAIL and the detailed result also .

TESTING

Chapter 1

Testing

The software has to be tested

- to see if it meets all the requirements .
- to ensure it doesn't crash for invalid sequence of inputs .
- to ensure it produces the expected results for valid sequence of inputs .

1.1 Unit Testing

Each module is tested independently for correctness .Till the date of completion of this report only two modules have been completed ,they are :

1.1.1 GUI Module Testing

All the screens are tested for each of the functionality it has .

- "Configure Connector Type" dialog box is tested for addition and deletion of Connector types and the corresponding number of pins in the database maintained for Connector type information . The dialog box is tested for the duplicacy of particular Connector type in the case of addition as well as absence of some Connector type selected for deletion .
- "Define Master Cable" dialog box is tested for various connections made in the I/O card.
- "Cable Specification Details" dialog box is checked for various Connector types .It is also tesed for duplicate connections .
- "Perform Test" dialog box is tested for displaying all the files against which connections raed from the I/O card are to be tested .

1.1.2 I/O Card Module Testing

I/O card is tested for various connections .By connecting different pins , this module is checked whether it gives correct results or not .

APPLICATIONS

Chapter 1

Applications

Connectrix has the following applications :

- It can be used by cable manufacturers to test the connectivity of various cables .
- Connectrix can be used in laboratories for finding the cable configuration as well as testing it against some master cable .

APPENDIX

Chapter 1

Installation Manual

1.1 Hardware and System Requirements

Before installation the system is checked to see if it has following minimum requirements.

SYSTEM	IBM Compatible PC with 80386 or higher processor .
MONITOR	VGA or EGA .
MEMORY	4MB RAM.
OTHER PERIPHERALS	Hard Disk , Mouse .
WINDOWS	Version 3.1 or higher .
ADD ON CARD	PC DIO 24 .

The software can then be installed by copying into any directory the following files :

1. Connx.exe .
2. Ct.txt .

INSTALLATION OF I/O CARD

The PC DIO 24 can be installed in any unused 8 bit or 16 bit expansion slot in your computer .The following are general installation instructions :

- Turn off the computer .
- Remove the top cover or access port to the I/O channel .
- Remove the expansion slot cover on the back panel of the computer .

- Insert the PC-DIO-24 in an unused 8-bit or 16-bit slot .
- Screw the mounting bracket of the PC DIO 24 to the back panel rail of the computer.
- Check the installation .
- Replace the cover to the computer .

Chapter 2

User Manual

2.1 How To Start

- Load Windows .
- Run Connx.exe from the Program Manager .

2.2 Interface

The Connectrix provides a graphical user interface for testing an actual cable. The operator interacts with the Connectrix through the keyboard and the mouse attached to the PC . It provides a MS Windows based screen interface . The operator provides the inputs to it through a forms driven screen interface . The Connectrix in turn uses this configuration to compare with the existing cable connections . The opening window can be and reduced to an icon . It also has a menu bar with pull down menus providing the list of commands supported by the tool. Selection of a command for execution presents a dialog box displaying the various fields and the range of valid data for each field.

When Connx.exe is run , a main screen appears .It has following menu items :

- Configure .
- Test .

When Configure is clicked , following submenu items appear :

- ◆ **Connector type** : When this menu item is clicked a dialog box appears which is to facilitate the user to add or delete Connector type and its corresponding information from the database maintained .As soon as the user clicks on button Close all the Connector types along with the number of pins on each of them are stored in a file .

- ◆ **Master Cable** : This dialog box displays the pin connections read from the I/O card .It also provides the facility of saving the connections in a file specified by the user .
- ◆ **Cable Specification Details** : When this menu item is clicked , a dialog box appears which is for the user to enter connections .It also has the facility to load the previously stored connections .The user can also modify the connections and then save it in the already open file or some other file depending on his requirement.
- ◆ **Perform Test** : This menu item opens up a dialog box that performs the actual testing of the cable put in the I/O card against some predefined configuration .It displays the result of the comparison as PASS or FAIL as well as the detailed result.
- ◆ **Exit** : Click on Exit to quit the system .

Chapter 3

ABOUT PC DIO 24

3.1 About PC DIO 24

PC DIO 24 is a 24-bit parallel , digital I/O interface for the PC . An 8255A controls the 24 bits of digital I/O . The 8255A is very flexible and powerful when interfacing with peripheral equipment, can operate in either a unidirectional or bidirectional bus mode, and can generate interrupt request outputs . The 8255A can be programmed for almost any 8 bit or 16 bit digital I/O application. All digital I/O is through a standard 50-pin male connector . The pin assignments for this connector are compatible with standard 24-channel digital I/O applications .

BOARD CONFIGURATION

The PC DIO 24 contains one DIP switch and two jumpers to configure the base I/O address and interrupts respectively .The PC DIO 24 also contains one fuse to protect +5 power output .The PC DIO 24 is configured to a base I/O address of hex 210 , to use interrupt enable line PC4, and to use interrupt level 5. These settings are suitable for most systems. If the system has other hardware at this base I/O address , interrupt enable line , or interrupt level , settings have to be changed .

INTERRUPT SELECTION

There are two sets of jumpers for interrupt selection on the PC DIO 24 board. W1 is used for selecting the interrupt enable line. W2 is for selecting the interrupt level .

INTERRUPT ENABLE SETTINGS

To enable interrupt requests from the PC DIO 24 , set jumper W1 to select PC2 , PC4, or PC6 as the active low interrupt enable line. When the interrupt enable line is logic low , interrupts are enabled from the PC DIO 24 board . If W1 is set to N/C , all interrupt requests from the PC DIO 24 are disabled . Fig 1 shows the possible jumper settings for W1 . The board is shipped with this jumper to PC4 ; therefore , interrupt requests from the board are enabled and controlled by PC4 .

INTERRUPT LEVEL SETTINGS

The PC DIO 24 board can connect to any one of the six interrupt lines of the PC I/O Channel : IRQ3 , IRQ4 , IRQ5 , IRQ6 ,IRQ7 or IRQ9 .The interrupt line can be selected by setting a jumper on W2..To use the interrupt capability of the board , an interrupt line should be selected and jumper should be placed in the appropriate position .The default interrupt line is IRQ5 . To change to another line , remove the jumper from IRQ5 and place it on the pins for another request line .Fig 2 shows the default setting for IRQ5 .

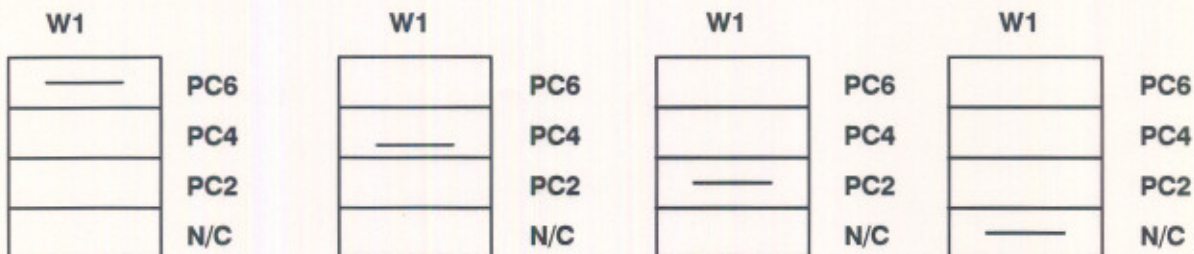


Figure 1. Jumper Settings - PC6,PC4,PC2 and N/C

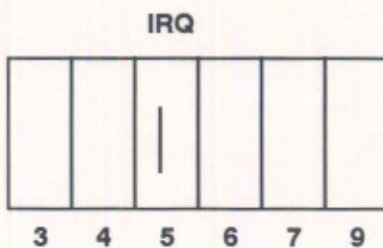


Figure 2. Interrupt Jumper Setting for IRQ5

I/O CONNECTOR PIN DESCRIPTION

Fig 3 shows the pin assignments for the PC DIO 24 digital I/O connector .

PC7	1	2	GND
PC6	3	4	GND
PC5	5	6	GND
PC4	7	8	GND
PC3	9	10	GND
PC2	11	12	GND
PC1	13	14	GND
PC0	15	16	GND
PB7	17	18	GND
PB6	19	20	GND
PB5	21	22	GND
PB4	23	24	GND
PB3	25	26	GND
PB2	27	28	GND
PB1	29	30	GND
PB0	31	32	GND
PA7	33	34	GND
PA6	35	36	GND
PA5	37	38	GND
PA4	39	40	GND
PA3	41	42	GND
PA2	43	44	GND
PA1	45	46	GND
PA0	47	48	GND
+5V	49	50	GND

Figure 3. Digital I/O Connector Pin Assignments

Chapter 4 References

S.NO.	TITLE	AUTHOR
1.	Borland C++ Windows Programming	Steven Holzner
2.	Programming with C	Byron S .Gottfried
3.	The 'C' Odyssey	Vijay Mukhi