CENTRALISED NETWORK TRAFFIC ASSESSMENT SYSTEM

PROJECT WORK DONE AT

GPLAST (P) LIMITED

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF

MASTERS OF SCIENCE (APPLIED SCIENCE/ COMPUTER TECHNOLOGY)

OF BHARATHIAR UNIVERSITY, COIMBATORE
SUBMITTED BY

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GUIDED BY

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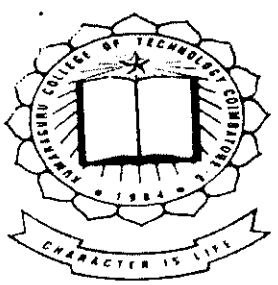
Dept. of Computer Science & Engineering
Kumaraguru College Of Technology, Cbe.



Dept. of Computer Science & Engineering
Kumaraguru College Of Technology,
Coimbatore – 641 006

APRIL 2003

Dept. of Computer Science & Engineering

Kumaraguru College Of Technology

(Affiliated to Bharathiar University)

COIMBATORE-641 006

CERTIFICATE

This is to certify that the project work entitled

CENTRALISED NETWORK TRAFFIC ASSESSMENT SYSTEM

Done by

RANGANAYAKE.R.G
Reg.No: 0137Q0048

Submitted in partial fulfillment of the requirements for the award of the degree of Master Of Science (Applied Science/Computer Technology) of Bharathiar University.

Professor and Head

Internal Guide

Submitted for the university examination held on..10/5/03....

R. Dinesh (10.5.03)
Internal Examiner
apl/csse/kct

External Examiner

ACKNOWLEDGEMENTS

An endeavor over a long period can be successful only with the advice and support of many well wishers. We take this opportunity to express our gratitude a ıd appreciation to all of them.

We, the students of kumaraguru college of Technology are really proud in doing our project at G PLAST , Coimbatore.

We are bound to express our gratitude to Dr.K.K.Padmanaban Phd,Principal,Kumaraguru College of Technology, for his constant encouragement throughout our course.

We wish to thank Dr.S.Thangasamy H.O.D of Computer Science Department for constantly encouraging us to pursue new goals and ideas. We thank our Course coordinator Mr.Dinesh M.S for guiding us throughout the project.

We admit our heart felt thanks to our internal project guide Mr.Muthukumar M.sc, MCA, M.Phil, faculty member in Computer Science Department for being supportive throughout the project.

We owe much to Mr.Raj Mohan and Mr.A.Jayakrishnan their inspiring advice, immense help, and wholehearted support and constant encouragement throughout the tenure of this project work at their esteemed organization.

We express our gratitude to the Mr. Yuvaraj of GPLAST for giving us a project in satisfying their needs.

We wish to thank all our friends and our family members who were showing their contributions in many subtle ways and indeed instrumental in achieving final results

G PLAST

G-PLAST (P) LTD

oling ❖ Plastic Injection Moulding ❖ Die Casting

GPL/HR/2003
11th April, 2003

We hereby certify that **Ms.RANGANAYAKE. R.G.** Student of M.Sc-CT from Kumaraguru College of Technology, Coimbatore has successfully completed her Project work CENTRALIZED NETWORK TREFFIC ASSESSMENT in our concern.

During the course of her project period we found her to be inquisitive, enthusiastic and diligent in her work. We wish her all success in her future endeavors.

For G-Plast(P) ltd.,

(Raj Mohan .V)
HR Manager.

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SYNOPSIS

Computer plays dominant role in the successful functioning of any organization . nowadays personal computers with minimum ability connected with super power servers have formal place in science and engineering and also being adapted in increasing sophisticated application.

The project "Centralized network traffic assessement" is dedicated for a Multinational Mould manufacuters, GPLAST,an highly engineered company. The most general form of system structure is the network. The company has a large network of computer in each department. The project is designed in favor to the design department of Gplast. The client monitors analyzes and monitors all the incoming and outgoing packets and the details such as Source IP address & Port, Destination IP address & port, packet size, protocol type, packet type, time of origination, etc are recorded. Each client monitor sends these details to the server monitor.

Modularity enhances design clarity, which in turn eases implementation, debugging, testing, documentation and maintenance of the software product.

CONTENT

1. INTRODUCTION

1.1 PROJECT PURPOSE :

- To develop an effective, flexible, stable and user-friendly network monitoring and control tool.
- To facilitate the network administrator in managing the network under various aspects.
- To give out a robust control and analysis of the network.
- To guide the network administrator for the productive utilization of the network.

1.2 PROJECT SCOPE :

The project works in systems that are connected in network. The server has control over all the systems connected in network. The server looks after the systems packet in flow and outflow of each system connected to it. The systems under the control of server gets message from the server machine when the size of the packets exceeds the limitation.

To achieve the above said concepts we need the system to be networked with a centralized server because the entire project revolves around the server connected through TCP/IP. Under this mechanism, the Administrator has entire power for the application present in the Server.

1.3 PROJECT DEFINITION ,ACRONYMS AND ABBREVIATIONS

Definitions:

Client :

A client is a program that connects to a server program to perform some services .A client program is run only when the service is needed.

Server :

A server is a program that provides some service. It runs continuously waiting for a client to connect to it. Server programs listen for incoming connections. When incoming connection is detected the server program can accept the connection, after which the i/p, o/p can occur

Port :

Port is the memory address to which information is transferred. It is the communication that allows devices to be physically attached. Logical port specified by a 16-bit number, which is port of TCP/IP uniquely, identifies the application running on that computer.

Packet :

Block of data for data transmission. Contains control information such as routing, data , address.

Libpcap :

Libpcap is Library function that is used for the purpose of packet capture. This product have a collection of inbuilt functions and interfaces used to calculate the packet transfer between the port 23 (telnet)of the two systems.

ACRONYMS & ABBREVIATIONS :

IPX	- Internet Packet Exchange
FAT	- File Allocation Table
CEI	- Connection Endpoint Identifier
IP	- Internet Protocol
CRF	- Connection Related Function
DXI	- Data Exchange Interface
LAN	- Local Area Network
UNI	- User-Network Interface

1.4 PROJECT REFERENCES :

The head of Gplast (p) ltd HRD Mr. Raj Mohan allotted us the project entitled "Centralized network Traffic assessment system" and directed us to our guide.

Our external guides Mr.Yuvaraj and Mr.A.Jayakrishnan gave us immense help, wholehearted support and constant encouragement throughout the tenure of this project work at their esteemed organization.

Our internal guide Mr.Muthukumar helped as by sharing his ideas and views of developing a networking project using c language

1.5 PROJECT OVERVIEW :

The Project entitled **"CENTRALISED NETWORK TRAFFIC ASSESSMENT SYSTEM "**, deals with monitoring the network and providing the network administrator, the details about the network traffic, packets transmission, participation of individual node in the network, packet types transmitted, bandwidth amount utilized by individual nodes, protocols used for transmission, etc .

Individual client monitors are implemented in each node of the network. The client monitors analyzes and monitors all the incoming and outgoing packets and the details such as Source IP address & Port, Destination IP address & port, packet size, protocol type, packet type, time of origination, etc are recorded. Each client monitor sends these details to the server monitor.

The server monitor stores the information gathered from the client monitors, into the MySQL database tables. This storage occurs in user defined time interval. The data is flushed out after generating an overall summary from it. This summary is stored permanently for report generation and future reference.

Various are generated reports in different time intervals. The reports reveal the information such as current traffic load, protocol usage, client current status, peak time, bandwidth utilization, node vise summary, overall network traffic summary, etc.

The user interface for the server monitor and the client monitors have been developed by a Linux GUI developing tool – Trolltech's QT Designer. This is an effective tool based on WYSIWYG (What You See Is What You Get).

2. GENERAL DESCRIPTION

2.1 COMPANY PROFILE :

G PLAST, a concern of G.D.Naidu group of company was a ISO 9001 company in tool making, molding and die making. They are dedicated to this service for the past50 years.

G-Plast is a ISO 9000 concern of UMS Group having a turn over of 250 crores and an expertise in the field of Plastic Injection moulds & Die casting die's for more than three decades in India

GPLAST is based at Coimbatore, India. The company has established a strategic relationship with Wipro, Maya appliances , GE-Medical German in order to cater to the mould requirements of its clients in Germany and Australia respectively.

2.2 EXISTING SYSTEM :

Various monitoring tools are available, like *Ethereal, TCP Dump*. Most of these tools are stand alone monitors. They monitor only a single system or node in which they are implemented. These tools just monitors the incoming and outgoing packets of a system and the packet details are displayed. Some tools like TCP Dump generates summaries and log files.

DRAWBACKS IN THE EXISTING SYSTEM :

The company uses the above tools, which are free of cost. These tools lack many features and facilities that are essential for an effective network administration. These tools does not provide any effective way to control or analyze the network and the individual client nodes in the network.

The network administrator is not furnished with flexible features and controls. So the existing system does not play a vital role in the network management and administration.

The drawbacks observed in these existing systems are summarized as,

No clients-server centralized monitoring:

Using this existing tool, all nodes in the network cannot be monitored with a centralized control.

No database storage:

Ethereal does not stores the details or the summary to a database, which will be very useful for the network administrator for information retrieval. TCP Dump, although generates logs it lacks database storage.

No effective & clear reports are generated :

Reports about the network traffic and flow of packets are very essential to a network administrator for flawless network control and analysis. But these existing tools does not generates any reports. The summary and logs generated by TCP Dump will not be as effective as the graphical reports.

No calculation of traffic load and bandwidth utilization:

The network traffic load, client vise and overall bandwidth usage are not calculated in this existing system. These information will be very helpful for the network administrator in controlling the traffic and optimizing the network bandwidth utilization.

DEVELOPING SOLUTION STRATEGIES :

The problems and drawbacks faced in the existing system are solved with optimal solution strategies in the proposed system. The solution strategies are developed with careful procedural approach to give out effective and optimal solution. The modules that are designed and developed as the required solution strategies are as below,

Socket Connection & Packet Monitoring :

Individual client monitors are implemented in each node of the network. The client monitors analyzes and monitors all the incoming and outgoing packets and the details such as Source IP address & Port, Destination IP address & port, packet size, protocol type, packet type, time of origination, etc are recorded. Each client monitor sends these details to the server monitor through the socket connection between the clients and the server. The sockets are created and connected by socket programming. The packets are monitored by 'libpcap' library functions.

Calculation & Storage :

The server monitor stores the information gathered from the client monitors, into the MySQL database tables. This storage occurs in user defined time interval. The data is flushed out after generating an overall summary from it. This summary is stored permanently for report generation and future reference.

The values for bandwidth utilization and network traffic load are calculated dynamically in an interval of user defined time, one second will be ideal. The bandwidth and traffic load is also calculated from the stored summary and recorded in the database. This can be used for future analysis of the network.

Report Generation :

The monitored details and the calculated values are stored in the tables and simultaneously reports are generated. Reports frequencies are At that time reports, daily reports, node vise reports, overall reports, summary reports, etc.

Since the C language has no effective facility for graphical report generation, the effective graphical report generation library – 'Dislin' has been selected to create and manipulate the reports.

Using the libraries of Dislin, various 2D,3D charts are generated for various values of the network.. The reports are generated as pie charts, bar charts, 3D mesh charts, curves etc.

The notable advantage in this report generation is that all the report can be saved as Portable Network Graphics file format.

2.3 PRODUCT PERSPECTIVE :

- The number of sent or received packets has to be calculated using libpcap tool.
- The result will be displayed in a graphical form.
- Calculation for bandwidth utilization.
- Peek network utilization period.
- IP connection statistics : IP address, ports, session, etc can be done.
- Alert generation during heavy traffic etc can be provided.

The project works in systems that are connected in network. The server has control over all the systems connected in network. The server looks after the systems packet in flow and outflow of each system connected to it. The systems under the control of server gets message from the server machine when the size of the packets exceeds the limitation.

2.4 PRODUCT FUNCTION

This monitors the incoming and outgoing packets i.e. the traffic of the system which is connected to the root system (server). Not only the packets but also the Bandwidth is also calculated. It display alert message in the generated during the heavy traffic. A graphical from of the result is displayed. This is used to manage the traffic of the network in a local system and controls the privileges and performance of the each system connected to the network. When the administrator wishes to see the GUI based output, it is also made possible through the graphical display.

2.5 USER CHARACTERISTICS :

For any application developed, training is considered to be a major activity wherein the system developer should disseminate relevant information about the system which was developed and how it can be used thereby convincing the end user's requirements. A spirit of co-operation will be extremely valuable to the system developer and will go a long way towards successful implementation and operation of the system.

The system developer should ensure that the end user of the product should be well equipped to put the system towards its intended use. Effective implementation of the system depends on the efficiency of the end user to implement it at the right place at the right time.

3. SPECIFIC REQUIREMENTS

3.1 FUNCTIONAL REQUIREMENTS

3.1.1 INTRODUCTION :

Load balancing occurs when two or more paths to a destination exist and can be utilized depending on the network load. The flow of application data will profile client-server interaction and is crucial fro efficient resource allocation. The hierarchy allows autonomous segment to be internetworked together.

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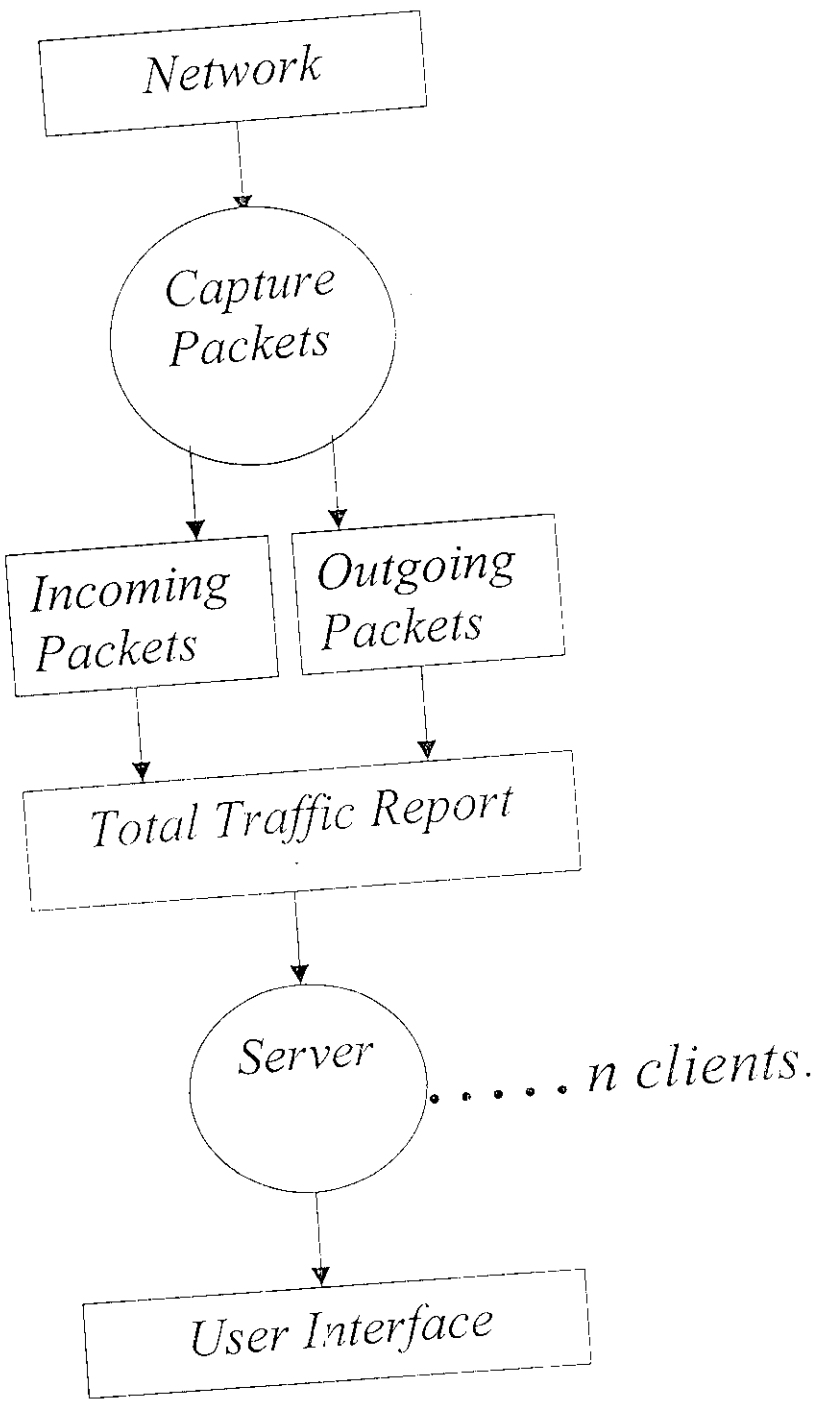
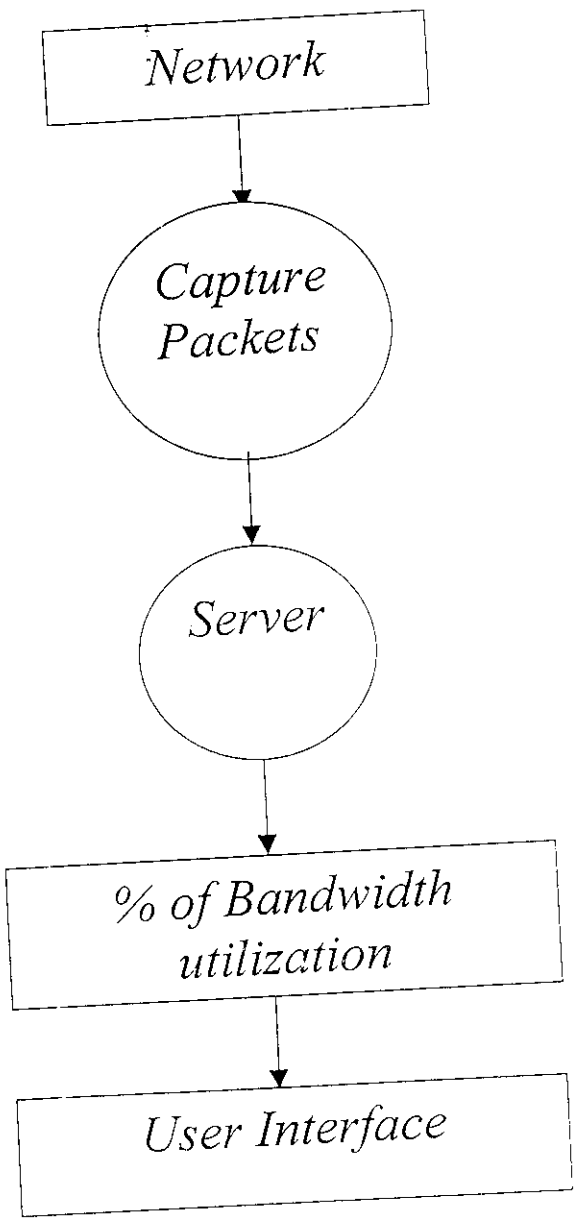
SYSTEM FLOW CHART

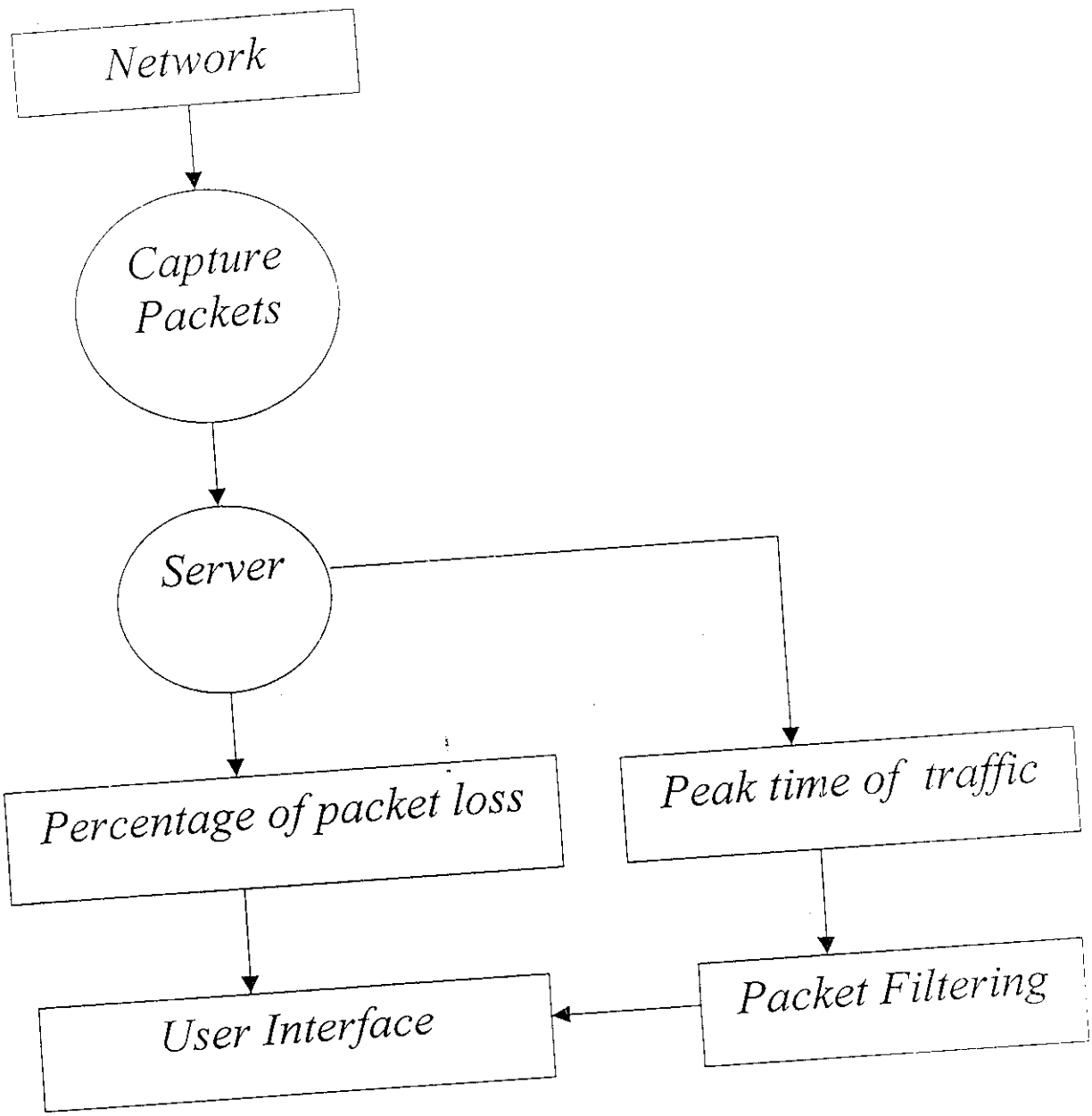
FLOWCHART FOR PACKET MONITORING



FLOWCHART FOR BANDWIDTH UTILIZATION



FLOWCHART FOR PACKET FILTERING & PACKET LOSS PERCENTAGE



3.2 DESIGN CONSTRAINTS

3.2.1 SOFTWARE SPECIFICATION :

Front end tool : C, QT Designer 3.0

Back end tool : MySQL 2.0

Operating System : Red Hat Linux 8.0 or Higher

Software tools : DISLIN Plotting Package

QT Designer:

C language gives only character oriented interface, i.e., CUI – Character User Interface. This CUI will not be effective in look and feel. Moreover the user operations will be a tedious task. So in this proposed system, the user interface for the server monitor and the client monitors have been developed by a Linux GUI developing tool – Trolltech's QT Designer. This is an effective tool based on WYSIWYG (What You See Is What You Get). This QT Designer is bundled with many Display controls and Viewing components. The components such as

Dial Meter, Progress Bar , Line Edit, Time Edit, Pixel Map which are available in this QT designer have been used effectively.

Qt is a multiplatform C++ GUI application framework. It provides application developers with all the functionality needed to build state-of-the-art graphical user interfaces. Qt is fully object-oriented, easily extensible, and allows true component programming.

Since its commercial introduction in early 1996, Qt has formed the basis of many thousands of successful applications worldwide. Qt is also the basis of the popular KDE Linux desktop environment, a standard component of all major Linux distributions.

Qt is supported on the following platforms:

- MS/Windows - 95, 98, NT 4.0, ME, and 2000
- Unix/X11 - Linux, Sun Solaris, HP-UX, Compaq Tru64 UNIX, IBM AIX, SGI IRIX and a wide range of others
- Macintosh - Mac OS X
- Embedded - Linux platforms with frame buffer support.

Qt Designer makes it easy to experiment with user interface design. At any time you can generate the code required to reproduce the user interface from the files Qt Designer produces, changing your design as often as you like. If you used the previous version you will find yourself immediately productive in the new version since the interface is fundamentally unchanged. But you will find new widgets and new and improved functionality which have been developed as a result of your feedback.

Qt Designer helps you build user interfaces with layout tools that move and scale your widgets (controls in Windows terminology) automatically at runtime. The resulting interfaces are both functional and attractive, comfortably suiting your users operating environments and preferences. Qt Designer supports Qt's signals and slots mechanism for type-safe communication between widgets. Qt Designer includes a code editor which you can use to embed your own custom slots inside the generated code. Those who prefer to separate generated code from hand crafted code can continue to use the sub classing approach pioneered in the first version of Qt Designer.

MySQL:

MySQL is a SQL (Structured Query Language) database server. SQL is the most popular database language in the world. MySQL is a client server implementation that consists of a server daemon mysqld and many different client programs/libraries.

The main goals of MySQL are speed and robustness. The base upon which MySQL is built is a set of routines that have been used in a highly demanding production environment for many years.

Features :

- Multi-threaded.
- C, C++, JAVA, Perl, Python and TCL API's. See section MySQL client tools and API's
- Lots of column types like: signed/unsigned integers 1,2,3,4,8 bytes long, FLOAT, CHAR, VARCHAR, TEXT, BLOB, DATE, SET and ENUM types. See section Column types.
- Join optimizer with one-sweep multi-join (all joins made in one pass).
- Full function support in the SELECT and WHERE parts. Example: select column1+column2 from table where column1/column2 > 0

- SQL functions are implemented through a very optimised class library and should be as fast as they can get! Usually there shouldn't be any memory allocation at all after the query initialization.
- Full support for SQL GROUP BY and ORDER BY. Support for group functions (SUM, MAX and MIN).
- A privilege and password system with is very flexible and secure. Allows host based verification.
- All password traffic on the net is encrypted.
- Very fast B-tree disk tables with key compression.
- Fixed and variable length records.
- 16 indexes/table. Each index may consist of 1 to 15 columns/parts of columns. Max key length is 127 bytes. A key may be a prefix of a CHAR field.
- ODBC Open-DataBase-Connectivity for Windows95 (with source). All ODBC 2.5 functions and lots of others.
- In memory hash tables always used as temporary tables.
- Can handle big databases All columns have default values. One can always use INSERT on any subset of columns.
- Uses GNU autoconf for portability.

- Written in C and C++. Tested with gcc 2.7.2.
- A thread based memory allocation system (very fast and no memory trashing).
- No memory leaks. Tested with a commercial memory leakage detector (purify).
- A very fast table check and repair utility (isamchk).
- All data saved in ISO8859_1 format. All comparisons for normal string columns are case insensitive.
- Full ISO8859_1 (Latin1) support. For example Scandinavian åäö is allowed in table and column names.
- Sorts by ISO8859_1 Latin1 (the Swedish way at the moment). It is possible to change this in the source by adding new sort order arrays.
- Alias on tables and columns as in the SQL92 standard. avg & count).
- INSERT,UPDATE and DELETE returns how many rows were affected.
- Function names do not clash with table or column names. For example ABS is a valid column name. The only restriction is that space is not allowed between a function name and the '(' when using functions.

- All MySQL commands have --help or -? for help.
- The server currently supports error messages to clients in many languages.
- The clients uses a TCP connection or unix socket when connecting to the MySQL server.
- User commands as show tables, show keys from table and show columns from table

DISLIN:

DISLIN is a high-level plotting library for displaying data as curves, polar plots, bar graphs, pie charts, 3D-color plots, surfaces, contours and maps.

DISLIN is intended to be a powerful and easy to use software package for scientists and programmers. There are only a few graphics routines with a short parameter list needed to display the desired graphical output. A large variety of parameter setting routines can then be called to create individually customized graphics.

DISLIN is available for several C, Fortran 77 and Fortran 90 compilers on the operating systems UNIX, Linux, FreeBSD, OpenVMS, MS-DOS and Windows. DISLIN programs are very system - independent, they can be ported from one operating system

to another without any changes. For some operating systems, the programming languages Python, Perl and Java are also supported by DISLIN.

DISLIN is a high level library of subroutines and functions that display data graphically. It is intended to be a powerful and easy to use software package for programmers and scientists that does not require knowledge of hardware features. The software is available for the programming languages C, Fortran 77, Fortran 90, Perl, Python and Java.

DISLIN can display graphic information directly on graphic terminals or store them in metafiles. The supported display types are VGA, X Windows, Windows API and Tektronix. The supported file formats are GKSLIN, CGM, HPGL, PostScript, PDF, Prescribe, WMF, PNG, BMP and TIFF. DISLIN metafiles can either be printed on various devices using the DISLIN driver program DISDRV or imported into third party products such as TeX and MS Word.The library contains the following features:

- 9 software fonts where each font provides 6 alphabets.
- Hardware fonts for PostScript printers and TrueType fonts for Windows 9x/NT/2000 displays and WMF files can also be used. The different alphabets contain Roman, Greek, Russian, mathematical and special European characters. TeX instructions can be used for plotting mathematical formulas.

- Plotting of two- and three-dimensional axis systems. Axes can be linearly or logarithmically scaled and labeled with linear, logarithmic, time, date, map and user-defined formats.
- Plotting of curves. Several curves can appear in one axis system and can be differentiated by colour, line style and pattern. Multiple axis system can be displayed on a page.
- Plotting of legends.
- Elementary plot routines for lines, vectors and outlined or filled regions such as rectangles, circles, arcs, ellipses and polygons.
- Shielded regions can be defined.
- Business graphics.
- 3-D color graphics.
- 3-D graphics.
- Elementary image routines.
- Geographical projections and plotting of maps.
- Contouring.

3.3.2 HARDWARE SPECIFICATION :

Minimum Requirements

Server:

Processor	: Pentium III 750 MHz
Ram	: 128 MB
HDD	: 4.5 GB
NIC	: 10/100 Mbps Ethernet card

Client:

Processor	: Pentium III 350 MHz
Ram	: 128 MB
HDD	: 2.5 GB
NIC	: 10/100 Mbps Ethernet card

3.3.3 NETWORK SPECIFICATION :

A minimum configured Ethernet LAN

3.3.4 DESIGN CONCEPTS :

Every intellectual discipline is characterized by fundamental concepts and specific techniques. Techniques are the manifestations of the concepts as they apply to particular situations .Technique come and go with changes in technologies, intellectual facts ,economic conditions and social concerns. By definition, fundamental principles remain the same throughout. They provide the underlying basis for development and evaluation of techniques.

Fundamental concepts of software design include abstraction, structure, information hiding, modularity, concurrency, verification and aesthetics.

Structure :

Structure is fundamental characteristics of computer software. The use of structuring permits decomposition of a large system into smaller, more manageable units with well-defined relationships to the other units in the system.

The most general form of system structure is the network. A computing network can be represented as a directed graph, consisting of nodes and arcs. The nodes can represent processing elements that transform data and the arcs can be used to represent data links between nodes. Alternatively, the nodes can represent data stores and the arcs data transformation.

Modularity :

Modular systems consist of well defined, manageable units with well defined interfaces among the units. Desirable properties of a modular system include:

- Each processing abstraction a well-defined sub-system that is potentially useful in other applications.
- Each function in each abstraction has a single, well - defined purposes.

- Each function manipulates no more than one major data structure.
- Functions share global data selectively .It is easy to identify all routines that share a major data structure.
- Functions that manipulate instances of abstract data types are encapsulated with the data structure being manipulated.

Modularity enhances design clarity, which in turn eases implementation, debugging, testing, documentation and maintenance of the software product.

Concurrency :

Software systems can be categorized as sequential or concurrent. In a sequential system, only one portion of the system is active at any given time. Concurrent systems have independent processes that can be activated simultaneously if multiple processors are available. On a single processor, concurrent processes can be interleaved in execution time. This permits implementation of time-shared, multi-programmed and real-time systems.

Verification :

Verification is a fundamental concept in software design. Design is the bridge between customer requirement and an implementation that satisfies those requirements. A design is verifiable if it can be demonstrated that the design will result in an implementation that satisfies the customer's requirements. This is typically done in two steps:

- Verification that the software requirements definition satisfies the customer need (Verification of the requirements)
- Verification that the design satisfies the requirements definition (Verification of the design)

4.3.5 DATABASE DESIGN :

Database design is an important part of the system design phase. In a database environment, several users use the available data. Instead of each program managing its own data, authorized users share data across applications with the database software managing the data as an entity. The primary objectives of the database design include fast response time to inquires, more information at low cost, control of redundancy, clarity and ease of use, data and program independence, accuracy and integrity of the system, fast recovery and availability of a powerful and user language. The theme behind a database is to handle information as an integrated whole, thus making access to information easy, quick, inexpensive and flexible for the users.

TABLE STRUCTURES :

I Packet Details :

Name	Type
SOURCEIP	VARCHAR(15)
DESTINATIONIP	VARCHAR(15)
SOURCEPORT	VARCHAR(5)
DESTINATIONPORT	VARCHAR(5)
PACKETSIZE	INT(5)
PROTOCOLTYPE	VARCHAR(10)
PACKETTYPE	VARCHAR(10)
TIMEOFOCCURANCE	TIME

II Summary

Name	Type
CLIENTIP	VARCHAR(15)
TCPPKTS	VARCHAR(15)
UDPPKTS	INT(10)
ICMPPKTS	INT(10)
OTHERPKTS	INT(10)
TOTALBYTES	INT(10)

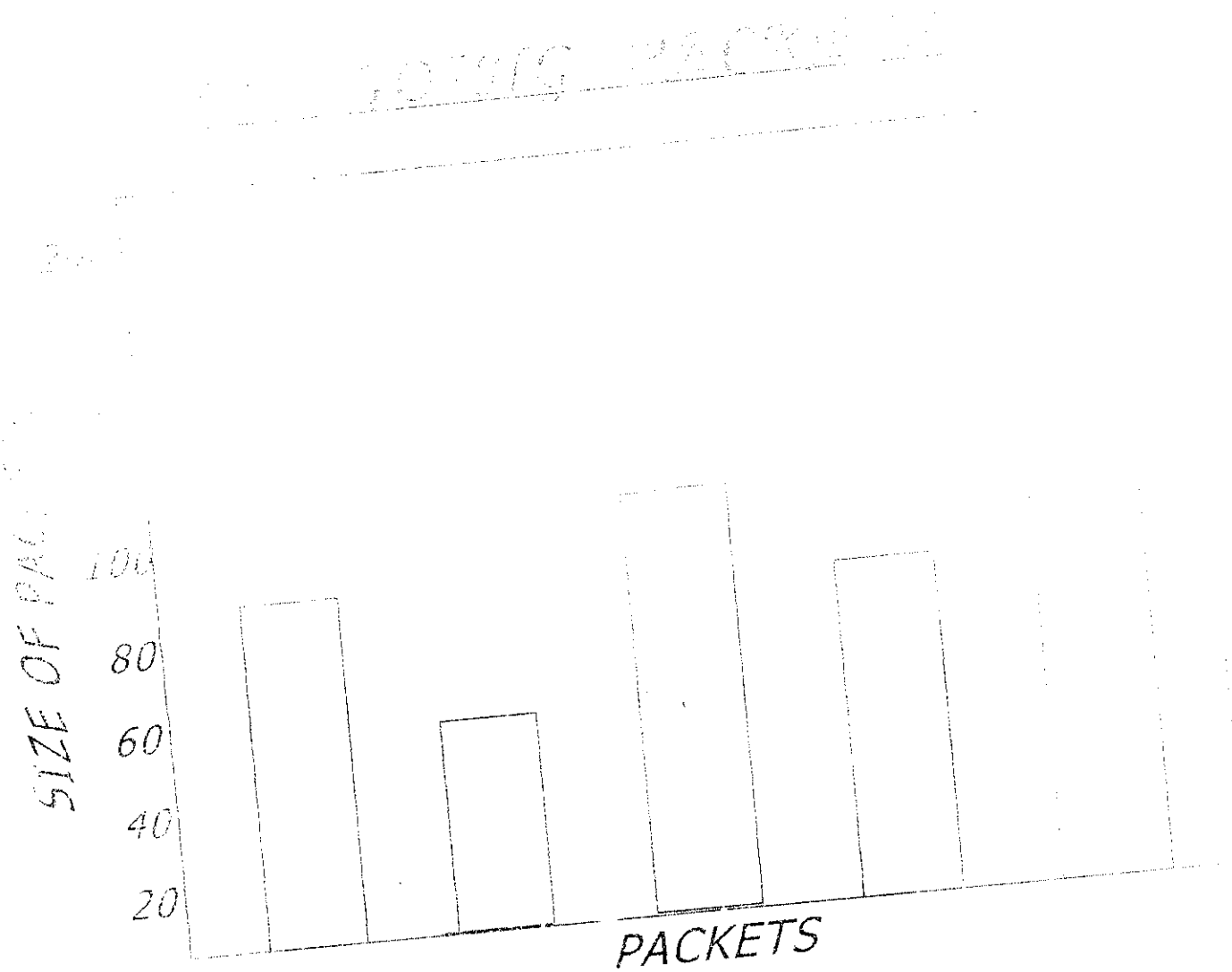
DEVELOPMENT APPROACH :

Development Approach was initiated with "Tables Creation" as proposed prior in the Design phase. Complete key definitions and constraints were imposed on to respective tables and columns. Precise column widths were supplied to the needed data type for columns.

Modules segregation marked the next stage in the development Approach. Appropriate modules for the process were defined with validation checks and error warnings were provided.

There arise a problem of code repetition in some typical cases, which lead to inefficient utilization of memory space and large time consumption. Hence functions were used to eradicate the above drawbacks. Functions form an efficient way of modular programming with reduced coding in each module.

Thus development approach gets over after the modular programming according to the design phase specification.


SIZE OF PACKETS
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80
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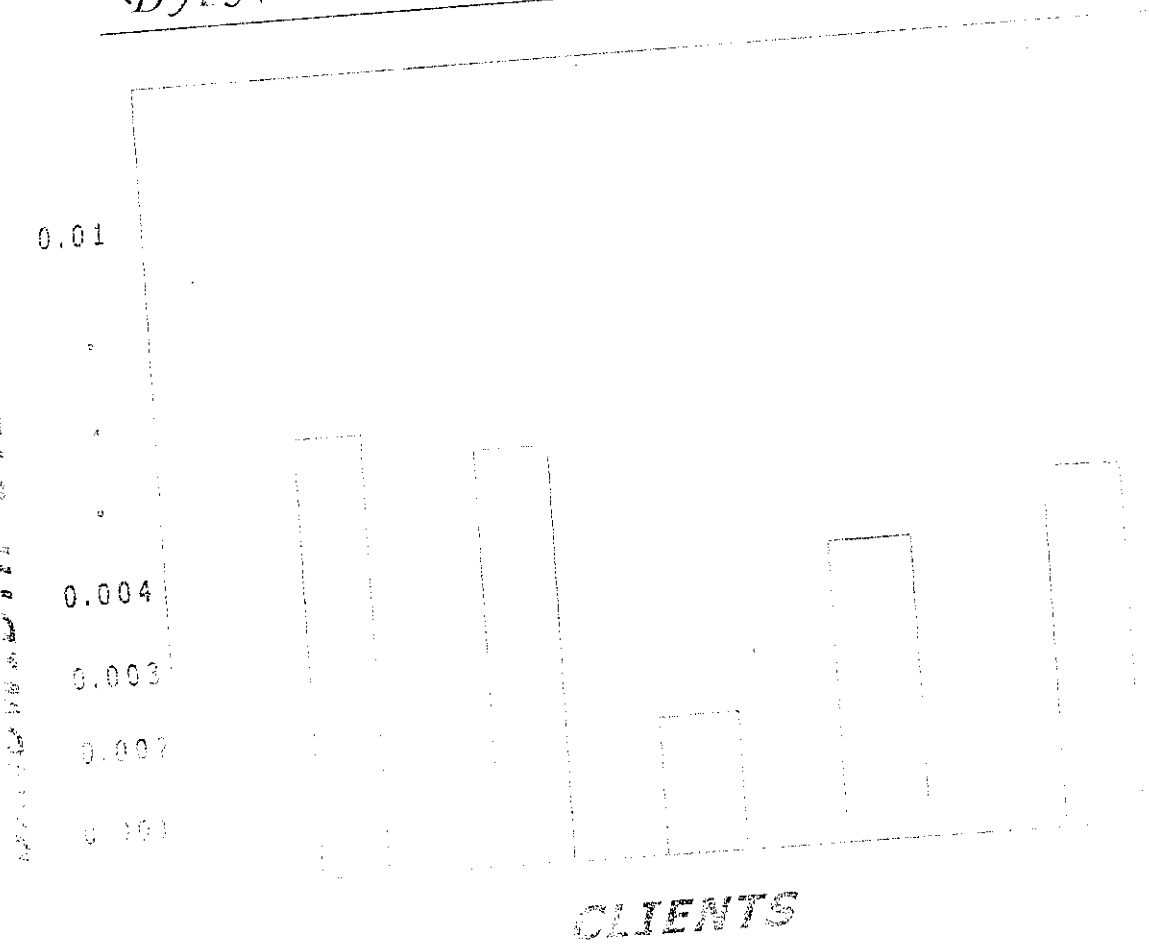
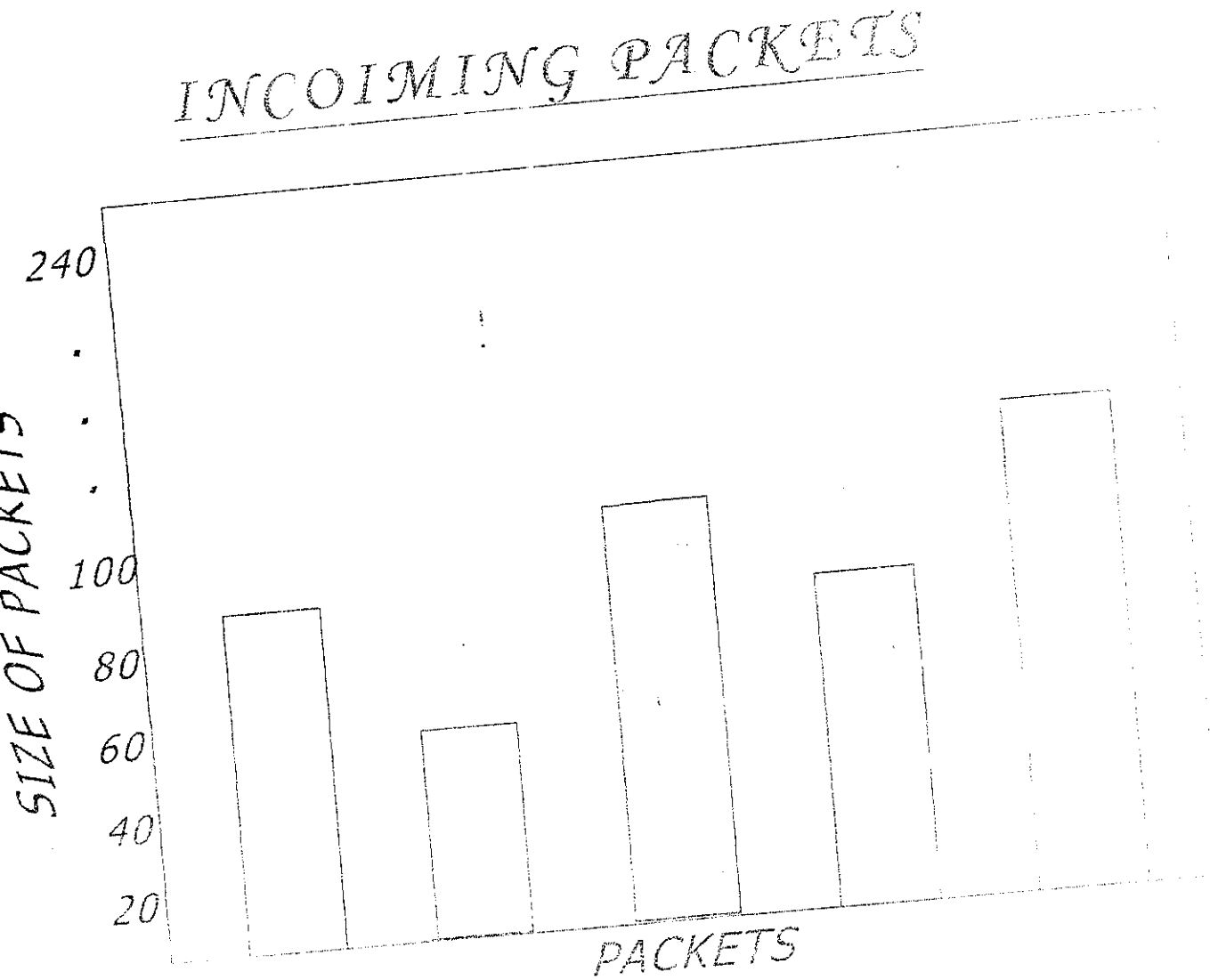
40
20
PACKETS

BANDWIDTH UTILIZATION

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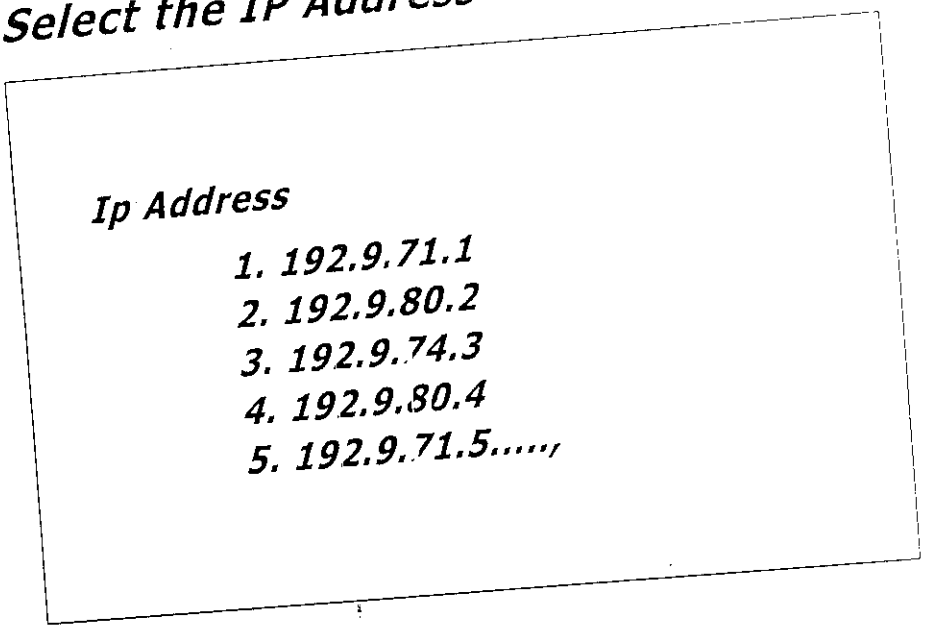
BANDWIDTH UTILIZATION

Select the IP Address -



3.3 PERFORMANCE REQUIREMENTS

Several factors determine the quality of the system.

3.3.1 Reliability :

The project has to be designed in such a way that it works for all sorts of input from the system environment.

3.3.2 Portability :

The project has to be designed in such a way that it can be ported to other system.

3.3.3 Performance :

The system performance is measured by its execution time and space occupied. Hence in order to ensure performance, the system has to be designed efficiently.

3.3.4 Scalability :

Any number of clients can be added to or removed from the network without exceeding the network load. The scalability can be

ensured when the system supports any number of clients without any significant decrease in performance.

3.3.5 Availability :

Because of multitasking capability, virtual memory, and powerful system, Linux works well of Microsoft Windows System. The data storage and retrieval , data manipulation, and data presentation are the three-tier client/server.

3.3.6 Response Time etc :

Linux machines are also known to be extremely fast, because the operating system is very efficient at managing resources such as memory, CPU power, and disk space. More of the Web than one might expect is actually powered by old 486 boxes running Linux and others have built very powerful yet inexpensive supercomputers by creating clusters of Linux boxes running in parallel.

4. TESTING

System testing forms another major part of any system development process. Care should be given during the whole process of testing. Inadequate testing or non - testing leads to errors that may not appear until months later. Effective testing early in the process translates directly into long-term cost savings from a reduced number of errors.

Another reason for system testing is its utility as a user - oriented vehicle before implementation. The performance of the system is measured in this phase.

4.1.1 TESTING METHODS :

System testing begins by testing program modules separately, followed by testing "bundled" modules as a unit. A program module may function perfectly in isolation but fail when interfaced with other modules. The approach is to test each entity with successively large ones.

System testing consists of the following steps:

- Code testing and Debugging
- Integration testing
- Data validation testing

Code Testing and Debugging :

Testing is a process of executing a program with the interest of finding an error. A good test is one that has a high probability of finding the yet undiscovered error. The testing should systematically uncover different class of errors in a minimum amount of time with minimum amount of effort.

Two classes of inputs are provided to the test process.

They are:

- A software configuration that includes a software requirements specification, Design specification and a source code.

- A test configuration that includes a test plan and procedure, any testing tool that is to be used and test cases and their expected result.

Testing is divided into 3 distinct operation viz Modular testing, Integration testing and data validation testing. In the series of testing the following tests are implemented.

Integration Testing :

Though each program works individually, they should work after linking them together. This is also referred to as Interfacing. Data may be lost across interfaces and one module can have adverse effect on another. Subroutines after linking may not do the desired function expected by the main routine. Integration testing is a systematic technique for constructing program structure while at the same time, conducting test to uncover errors associated with the interface. In this testing, the programs are constructed and tested in all segments.

Data Validation Testing :

Data validation is done to see whether the corresponding entries made in the tables are correct. Proper validation checks are done in case of insertion and updating of tables. Duplication of data has to be avoided to the maximum extend.

If any such case arises, then proper error messages or a warning has to be displayed. A double confirmation is made before deleting any specific entries.

White box testing is a test case design method that uses the control structure of other procedurals designs to divide the test cases. The different test cases are

- Guarantee that all independent parts within a module have been exercised at least once.
- Exercise all logical decision on their true/false side.
- Execute all loops at their boundaries and within their operational bounds.
- Exercise internal data structure to ensure their validity.

Each module was tested and the tested modules were linked and integrated.

4.2 QUALITY ASSURANCE :

The amount and complexity of software produced today stagger the imagination. Software development strategies have not kept pace, however and software application fall short of meeting application objectives. Consequently controls must be developed to ensure a quality product. Basically, quality assurance defines the objectives of the project and reviews the overall activities so that errors are corrected early in the development process. Steps are taken in each phase to ensure that there are no errors in the final software.

4.2.1 GENERIC RISK :

Generic risks are a potential threat to every software project. Generic risk should be identified systematically with the clear understanding of the technology. When risks are analyzed, it is important to quantify the level of uncertainty and the degree of loss associated with each risk. To accomplish this, different categories of risks are considered. A considerably more intelligent strategy for handling risk is to be proactive.

Potential risks are identified, their probability and impact are assessed and they are prioritized by importance. Then the software team established a plan for managing the risk. The primary objective is to avoid risk, but because not all risk can be avoided, the team works to develop contingency plan that will enable it to respond in a controlled and effective manner

4.2.2 SECURITY :

Every system must provide built-in features for security and integrity of data without safeguards against unauthorized access, fraud, fire and natural disasters, a system could be vulnerable as to threaten the survival of the organization.

The security concerns,

Operational Security :

Operational security is inbuilt in the system in the form of Username and Password and without this no user can access the Network Information System. Only the network administrator of the organization is given user access. For security reasons, the network administrator may change the Username and Password at frequent intervals of time. The textual name and password given by the user is first encrypted and taken to the database, decrypted there, compared with the stored data in the database and the result of the authentication process is returned to the user. For encryption, the RSA algorithm is used.

4.3 SYSTEM IMPLEMENTATION :

Implementation is the stage of the project where theoretical design is turned into a working system. At this stage, the main work load, the greatest upheaval and the major impact on the existing system shifts to the user department. If the implementation is not carefully planned and controlled, it can cause chaos and confusion. Thus it can be considered to be the most crucial stage in achieving a successful new system and giving the user confidence that the new system will work efficiently and effectively. It involves careful planning, investigation of current settings and its constraints on implementation, design of methods to achieve the change over. The more complex the system being implemented, the more involved will be the system analysis and the design effort required just for implementation.

Proper implementation is essential to provide a reliable system to meet the organization requirements. Successful implementation may not guarantee improvement in the organization using new system, but proper installation will prevent it.

The implementation stage involves the following task.

- Careful planning
- Investigation of system and constraints
- Design of methods to achieve the change over
- Training of staff in the change over phase
- Evaluation of the change over method.

The method of implementation and timescale to be adopted are found initially. Next the system is tested properly and at the same time users are trained in the new procedures.

4.3.1 IMPLEMENTATION PROCEDURE:

Implementation is a stage in the project where the theoretical design is turned into a work system. It is one of the most crucial stages in achieving a successful system and gives confidence about the new system for the users, that it will work efficiently and effectively thereby satisfying the end user requirements.

Implementation is a process that includes all those activities that take place to convert from the old system to the new system. Proper implementation of the system is essential to provide a

reliable system to meet organization requirements. It invokes careful planning, investigation of the existing system and its constraints on implementation, designing of methods to achieve the change over.

During the implementation stage a demo was undertaken and made in front of the end users. The end users carried out aesthetic and functional checks. All the modules were found to be working fine. The project was then implemented.

5. SOFTWARE MAINTENANCE

Provision must be made for environment changes, which may affect either, the computer or other parts of computer based systems, such activity is called maintenance. Maintenance is the enigma of system development. If the system developed very carefully, with attention paid to external influence over a reasonable lifetime, less maintenance will be required.

Maintenance covers a wide range of activities, including correcting code and design errors, updating documentation and test data, and upgrading user support. Software maintenance is a labour intensive job because the software testing process will not uncover all latent errors in a large software system. During the use of any large programs, errors will occur and have to be reported to the developer.

- Corrective maintenance means changing the program function.

- Perfective maintenance means enhancing the performance or modifying the programs to respond to the user's additional or changing needs.

- The process that includes the diagnosis and correction of one or more errors is called Corrective maintenance. Errors are prone to occur if incorrect data is entered in the database, which may alter the existing relationship between the tables.

- The second activity that contributes to a definition of maintenance occurs because of the rapid change that is encountered in every aspects of distributing computing Adaptive maintenance is an activity that modifies software to properly interface with a changing environment.

- The third activity that may be applied to a definition of maintenance occurs when a software packages is successful. At the software is used; recommendations for new capabilities, modifications to existing functions and general enhancement will be received from users. To satisfy requests in the category, perfective maintenance is performed. This activity accounts for the majority of all effort expanded on software maintenance.

6. CONCLUSION

This project 'CENTRALIZED NETWORK TRAFFIC ASSESSMENT' has been designed and developed with the objective of providing a cool and stable network analyzing tool for the network administrator. The way it has been designed ensures the quality and efficiency. This will emerge as a vital gadget and tweaking tool for today's network administration.

7. FUTURE ENHANCEMENTS

This project 'CENTRALIZED NETWORK TRAFFIC ASSESSMENT' has been developed using four tools, QT Designer for GUI, C for base functions, MySQL for information storage and DISLIN for report generation. In future the whole system can be developed using the powerful QT programming and MySQL for storage.

The area of network control has not been focused in this project. So this control module can be added for further ease of usage.

Currently this project is platform reliant to Linux OS only. But when it is converted into fully QT oriented then this flaw goes off. This is because the QT is available for both Linux and Windows.

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