INTRANET PROCESS MANAGEMENT SYSTEM

PROJECT WORK DONE AT

QUASAR INFOTECH AND TELECOMMUNICATION, BANGALORE

PROJECT REPORT P-991

SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE AWARD OF THE DEGREE OF
MASTER OF COMPUTER APPLICATIONS
OF BHARATHIAR UNIVERSITY, COIMBATORE.

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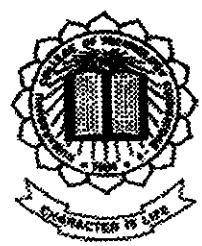

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CERTIFICATE

This is to certify that the project work titled

INTRANET PROCESS MANAGEMENT SYSTEM

Done by

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Submitted in partial fulfillment of the requirements for the award of the degree of

Master of Computer Applications of Bharathiar University.

Professor and Head

Internal Guide

Submitted to University Examination held on 16-04-2003

Internal Examiner

External Examiner 16/4/03

Quasar Infotech and Telecommunications Pvt. Ltd.

TO WHOM SO EVER IT MAY BE CONCERNED

This is to certify that Mr. Kiran P.B. (Final MCA, Kumaraguru College of Technology) has successfully completed the project titled. **"Intranet Process Management"** during the period of Jan 2003 to March 2003, using ASP & SQL Server. The Company holds the authority to retain the source code.

Date: March 28, 2003

Quasar Infotech and Telecommunication Pvt. Ltd.

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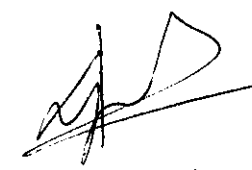
DECLARATION

DECLARATION

I hereby declare that the project titled **"Intranet Process Management System"**, submitted to **Bharathiar University** as the project work of **Master of Computer Applications Degree**, is a record of original work done by me under the supervision and guidance of **Mr. Nagaraj**, Project Leader, Quasar Infotech and Telecommunications, Bangalore and, **Mr. A. Muthukumar**, Assistant Professor, Department of Computer Science and Engineering, Kumaraguru College of Technology, Coimbatore and, this project work has not found the basis for the award of any Degree/ Diploma/ Associateship/ Fellowship or similar titles to any candidate of any university

Place: Coimbatore

Date: 16-4-2003



(Kiran. P.B)

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I take this opportunity to thank my family, friends and well-wishers for their outstanding support throughout my life and for being responsible for the person I am today.

SYNOPSIS

The Intranet Process Management system (IPMs) is a web-based system used to enhance and automate the management of the internal process of an organization. The project was developed at Quasar InfoTech and Telecommunications, Bangalore, a software solution-cum-support provider in fields varying from Healthcare to Defense, encompassing Telecommunication and Aviation.

The purpose of the Intranet Process Management system is to design and implement an automated Process Management system for the employees of the organization. A well-designed information processing infrastructure is the foundation on which an efficient Process Management system can be built. This system has a highly user-friendly interface, which provides the employees a well-organized and cheaper alternative for internal communication and information sharing.

Therefore, the proposed system would enable the company to,

- Automate certain levels of managerial functions, within the legal boundaries of the company.
- Have an economical and faster internal communication system.
- Provide the employees support regarding any of their hardware or software queries.
- Maintain a bulletin board regarding the schedules and events within the company.
- Enhance the process of recruitment with speed and efficiency.
- Provide the employees an unproblematic means of leave application and management.

The IPMs has been developed using,

- Active Server Pages 3.0
- SQL Server 7.0
- Microsoft® Visual InterDev 6.0

- Internet Information Server 5.1

The system consists of the following modules,

- User Creation
- User Authentication
- Product Information Management
- Device Driver download Manager
- Help Desk
- Recruitment
- Personnel Information Management
- Personnel Leave Management
- Personal Message Board
- News Room
- Company Policy and Holiday information
- Query-based Search Tool ("*Ancilla*")

A well-managed and efficient information interaction between the above modules helps in the smooth and glitch-free running of the Intranet Process Management system.

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INTRODUCTION

PROJECT OVERVIEW

The Intranet Process Management system (IPMs) is a web-based solution provider for most of the in-house requirements of the personnel of an organization. The employees can have access to information as per their need and authority, thereby helping them to efficiently and effortlessly carry out their separate functionalities within the various hierarchies of the organization.

The IPMs, being a web-based system, any employee, who has connection to the local intranet and possesses a valid username and password, can have easy and effortless access to the vast information content.

The key information provided to the personnel by the IPMs is as follows,

- Information pertaining to the various products of the organization.
- Downloads of various commonly used and needed devices drivers and software updates.
- Solution provided by the Help Desk for most of the IT-related queries of the personnel.
- Contact information regarding the various personnel employed by the organization.
- Clear-cut information about the various resumes of the potential candidates for recruitment.
- Details regarding the various leave taken by the personnel.
- Messages sent to one employee by another.
- News pertaining to the various achievements, schedules and events associated with the organization.
- Information regarding the various policies and holidays correlated to the organization.
- Information regarding the users who have been granted access to the system.

The IPMs consists of the following essential modules,

- **User Creation**

  An employee of the organization can have access to the system only if he's granted access to it by means of a username and password. The various administrators perform this task of user creation. Each employee is permitted only one username.

- **User Authentication**

  At the time of log on, the credentials of the user are verified with the user database. Only if the user proves to be a valid one is he granted access to the system. As per the rights assigned to him, information is provided to the user.

- **Product Information Management**

  This zone of the IPMs provides information pertaining to the various products developed by the organization. A normal user is permitted to only view the information. An Administrator is allowed the following actions,

  - Add new product
  - Edit an existing product
  - Delete an existing product

- **Device Driver download Manager**

  As the need arises, the personnel would be able to download the commonly used/needed device drivers or software updates. The Administrator, who uploads new drivers and software updates or, deletes outdated drivers and software updates from the list, manages the download list.

- **Help Desk**

  The Help Desk, as its name signifies, provides the personnel support with regard to any of his/her hardware or software queries. The users posts the queries in this section and, the personnel associated with the Help Desk provide the necessary solution.

- **Recruitment**

  On the receipt of the resumes of the potential recruits, the details are uploaded to the database. As the need for recruitment arises, the existing bank of resumes is searched for based on the required criteria of experience, skill set and certifications. Only the Human Resources manager manages all this.

- **Personnel Information Management**

  At the time of induction of a person by the organization, his/her contact information is uploaded to the database. Any user can view these details as the need arises, by visiting the specific link.

- **Personnel Leave Management**

  The management of the leaves taken by the personnel constitutes one of the most important functions of the Human Resources Department. The IPMs eases this task, by automating the leave application and approval, thereby enabling quick and smooth functioning.

- **Personal Message Board**

  Communication within an organization is one of the most vital requirements for effective inter-personnel relations. The message board allows for efficient one-to-one communication. Only the recipient of the message would be able to view it.

- **News Room**

  One-to-one messaging alone is not enough within an organization. There also needs to be a common bulletin board where news pertaining to the organization can be shared with the personnel. The Human Relations personnel post the news in the News Room.

- **Company Policy and Holiday information**

  It is highly essential that the personnel of an organization should be aware

the Human Resources Department to keep the policies and the holiday list of the company updated.

- **Query-based Search Tool ("*Ancilla*")**

  The Support personnel of the organization would need to have access to the vast databank of solutions, in order to swiftly answer queries sent to them. The *Ancilla* functions as a search tool enabling the personnel to efficiently order the key words for search and, provides a set of most optimal results.

ORGANIZATION PROFILE

Quasar InfoTech and Telecommunications, situated at Bangalore, is a software solution cum support provider in fields varying from Healthcare to Defense, encompassing Telecommunication and Aviation development.

At Quasar, the focus remains on providing software solutions that enable organizations to deliver quality service to their customers and increase employee productivity at minimal costs. These solutions integrate the customized deliverables with best-in-class technologies for efficient results. Global organizations leverage Quasar InfoTech to increase customer satisfaction and improve operational efficiencies. In deploying customized solutions, enterprises leverage higher productivity. Quasar InfoTech's expertise spans different technologies and knowledge domains.

The product co-development capabilities of Quasar span from prototype development through product development and ongoing enhancements. Their framework identifies specific software engineering and product management roles in this product life cycle. They work with clients to commence a key relationship that defines Quasar and client roles and, the areas of joint responsibility.

Quasar, has its expertise in areas pertaining to,

- Content management
- Data Migration
- Smart Card integration
- Personalization technologies
- Industry-specific business applications

Quasar accentuates it presence in the domains of,

- Defense Product development
- Telecommunication Solutions
- Store and Fleet management

Quasar caters to the diverse needs of a client list ranging from Wipro InfoTech and Indiatimes to, Wockhardt and CTWT Clinic of France.

The proficiency of Quasar is not confined to the realm of software development. They believe in providing unsurpassed technical support solutions that enable organizations to deliver high quality tech support to their customers and employees at optimal costs. These solutions integrate their 7 x 24, personalized support services with state-of-the-art technologies for knowledge management and automated support.

The services of Quasar in the field of technical support incorporates,

- Technical product support
- Outsourced Technical Helpdesk
- Knowledge Management Solutions
- Staff Augmentation Services

Technical Support Solution is provide by Quasar for,

- OEMs (PDAs, PCs, Mobile PCs, Peripheral devices, Modems, Routers)
- Internet Service Providers
- ITSPs / Helpdesk Service Providers
- Wireless Service Providers
- Application Service Providers
- Software Publishers / Independent Software Vendors
- Large and Small Enterprises
- Computer Retail Stores

Quasar InfoTech augments value to Enterprises over three parameters,

- End user/ Customer Satisfaction: Their domain knowledge has resulted in optimized support processes that deliver focused, end user-centric technical support
- Operational Efficiencies: Through effective use of knowledge management tools to enhance productivity
- Cost

The channels exploited to deliver the services are,

- Email
- Chat
- Telephone (offshore)
- Remote Diagnostic Tools
- Collaborative Browsing Tools
- Onsite Experts
- Self-help Resources (including intelligent, searchable databases)

EXISTING SYSTEM

The existing system was an environment where there was the absence of an Intranet site and, was very much dependent on the Internet for all internal needs of the organization, like messaging, downloads etc. the speed of operation was solely dependent on the traffic flow of the Internet.

A person wishing to pass a message to another had to rely on either the normal Internet mailing system or, had to depend on third-party messenger tools like Yahoo® Messenger or MSN® Messenger. Also, if a particular device driver or software update/patch was necessary, each one of the personnel had to individually search the whole Internet for it, sometimes resulting in fruitless searches.

Also, the environment was not suitable for effective and efficient internal information sharing.

Limitations

- The existing system is a completely manual one.
- Lack of ease of internal communication.
- Processes of Leave Management are very time consuming and involve lot of paperwork.
- Absence of an interface for effective information sharing within the organization.

PROPOSED SYSEM

The Intranet Process Management system (IPMs) is a web-based solution provider for most of the in-house requirements of the personnel of an organization. The employees can have access to information as per their need and authority, thereby helping them to efficiently and effortlessly carry out their separate functionalities within the various hierarchies of the organization.

The proposed system seeks to overcome all the limitations of the existing system, and also add even more functionality to the system, making it more user-friendly and loaded with features. The IPMs also seeks to bring about more transparency and security for the various transactions carried out by the personnel, within the organization.

The IPMs has been designed to be a robust and fully scalable solution for enabling effective and efficient management of the various internal processes of the organization.

Objectives

- To change the existing manual system to a web-based, automated system, which is highly user-friendly and interactive.
- Increase level of security and reliability by the usage of usernames and passwords, for internal information sharing by the employees.
- Managing the level of information access by the granting of user rights.
- To bring about easy and efficient means for internal communications, by means of the Message Board and the News Room.
- To reduce the time and resources spent by the personnel, for various activities like device driver or software updates/patches downloads.
- To avoid the usage of third party messaging services, like Yahoo® Messenger, MSN® Messenger etc., for internal communication.
- To reduce the amount of paperwork involved in various activities like leave application/approval.

- To reduce the amount of dependency on the Internet, for the in-house needs of the personnel.
- To keep the employees well informed about the activities, both internal and external, of the organization.

REQUIREMENTS OF NEW SYSTEM

The development of the proposed IPMs involves entirely new data requirements and, the database design involves various fields pertinent to the different modules encompassed by it.

FUNCTIONAL REQUIREMENTS

The various functional requirements vital to the IPMs include,

- It requires online authentication of the users through their Username and Password.
- It requires defining the nature of each user and granting him rights according to his/her realm of functioning within the precincts of the organization.
- It requires the various site maintenance administrators to keep the information and downloads posted on the site to be kept updated.
- It requires the system to generate automatic confirmation messages for most of the actions performed within the site.
- It requires communication between the personnel of the organization to be carried out effortlessly and efficiently.
- It requires fast response time for any of the requests placed by any user on IPMs.

EXTERNAL INTERFACE REQUIREMENTS

The external interface requirement of the IPMs comprises those pertaining to the User Interfaces and the various Hardware Interfaces.

User Interfaces

The whole system is developed keeping in mind the very vital factor of user friendliness. All the user needs to do is to authenticate him/her self, with his/her Username and Password, in order to access the system. Based on his/her level of access, approved by the administrators, the relevant information is available at his/her disposal. The relevant functions of the system are performed based on the choice of

communication, the relevant feedback is provided to the user, based on the request placed by him/her.

Hardware Interfaces

The external hardware requirements of the system are simple and minimal. Any personnel of the organization can access the system, provided he/she has access to a computer possessing a network card and, is connected to the Local Intranet. Almost all the employees of the organization would satisfy this criterion and, thus it proves to be a highly cost-effective approach.

PERFORMANCE REQUIREMENTS

The performance requirements of a system play a major role in evaluating the system, with regard to the expected and the actual outcomes.

Some of the performance requirements that need to be satisfied by the system are,

- The system should be available in a minimal response time.
- It should be able to carry out the complete startup procedure after a particular session has been logged.
- All the links should be directed to the appropriate pages.
- All invalid fields should be checked immediately, at the client side, to avoid time elapse.
- All the transactions should be carried out effortlessly and efficiently.
- Confirmations and alerts should be generated automatically.
- All communications between the users must be effective and cost-effective.

USER CHARACTERISTICS

The Intranet Process Management system being developed is highly user friendly. It has been designed to provide it diverse users with their permitted information, in a manner that is both aesthetically and logically satisfying.

The various users who access the IPMs can be categorized based upon their functionality as,

- Super Administrator
- Technical Administrator
- Human Resource Administrator
- Help Desk Administrator
- Normal User

Depending on the role of each user, within the organization, the IPMs provide him/her with different views of the system, enabling or disabling certain features available within the IPMs.

Some of the key information available for access only to the administrators of the system is,

- Creation/deletion of new/existing users
- Addition/deletion of personnel to/from the Personnel Information List
- Uploading and deletion of new/existing device drivers and software updates
- Addition and deletion of News to/from the News Bulletin Board
- Posting of new resumes received by the organization
- Searching for the suitable recruits from the list of resumes available, as the need arises

The nature of a user is determined at the time of his/her login into the system. This is done along with the verification performed, using the user database, to ascertain the authenticity of the personnel who has just logged in.

Some of the other user-friendly options include,

- **Download device drivers and software updates**

  The IPMs allows its users to download device drivers and software updates and patches, as the need for them arises. This feature enables the users to overcome his/her futile and time-consuming searches on the web for the same.

- **Post personal messages**

  This feature of the IPMs allows the users to send personal one-to-one short messages to the other personnel of the organization. This facility takes the burden of having to depend upon the third-party tools like Yahoo® Messenger and MSN® Messenger.

- **Apply leave**

  The IPMs allows for its users to submit their applications for leave, online. This is done in a manner avoiding the existing practice of sending mails to the concerned authority. The proposed system does this task in a manner that is very much user-friendly and easy, making it only a job of selecting the required options.

PROGRAMMING ENVIRONMENT

HARDWARE CONFIGURATION

The minimal hardware requirements for the proposed Intranet Process Management system is,

Server

- Intel® Pentium III processor
- 128 MB RAM
- 4.3 GB free Hard Disk space

Client

- Intel® Pentium II processor
- 32 MB RAM
- 2.1 GB Hard Disk space
- Ethernet card for connectivity to the local Intranet

The hardware requirements mentioned above are in addition to the different pointing devices, display devices and input devices.

SOFTWARE TOOLS USED

The software tools used for the successful development and deployment of the Intranet Process Management system are,

- Active Server Pages (ASP)
- Microsoft® SQL Server 2000
- Microsoft® Visual InterDev 6.0
- Microsoft® Internet Information Server 5.1

These tools have been employed on the following platform,

- Microsoft® Windows NT 4.x / Microsoft® Windows 9x on the client side
- Microsoft® Windows NT 4.x / Microsoft® Windows 2000 Server on the sever side

ACTIVE SERVER PAGES

A Web server hosts information in the form of HTML files. Interactive Web sites are said to host dynamic HTML content. These HTML files are create by the Web server in response to user request and transfers the files to the user's Web browser. As the Web server plays an active role in creating Web pages, it is called as an Active Server.

The technology that enables Web servers to host dynamic data is known as Active Server Pages (ASP). The Web server stores information in the form of ASP files instead of ordinary HTML files. Theses ASP files can be accessed in the same manner as ordinary HTML files. But, while the HTML files are sent directly to the client browser, the server first pre-processes the ASP files.

The ASP files are sent to a special server-side program known as ASP.DLL. This program scans the file from top to bottom and executes the commands that it encounters during the process. At the end of the file processing, the server program produces an HTML file. It is in this HTML file that is transmitted to the browser, instead of the original ASP file. The browser interprets the HTML file in the same way as normal HTML files.

An ASP file is a standard HTML file that can contain normal HTML tags to enable the browser to interpret and display the file the way it author intended. It can contain client-side scripts, client-side ActiveX controls, Java applets, and anything that an HTML file can contain. But, it is superior to an ordinary HTML file as it can contain certain additional features like,

- **Server-side scripts:** It is this feature that makes Web pages dynamic. ASP.Dll executes the scripts and develops the HTML file accordingly.

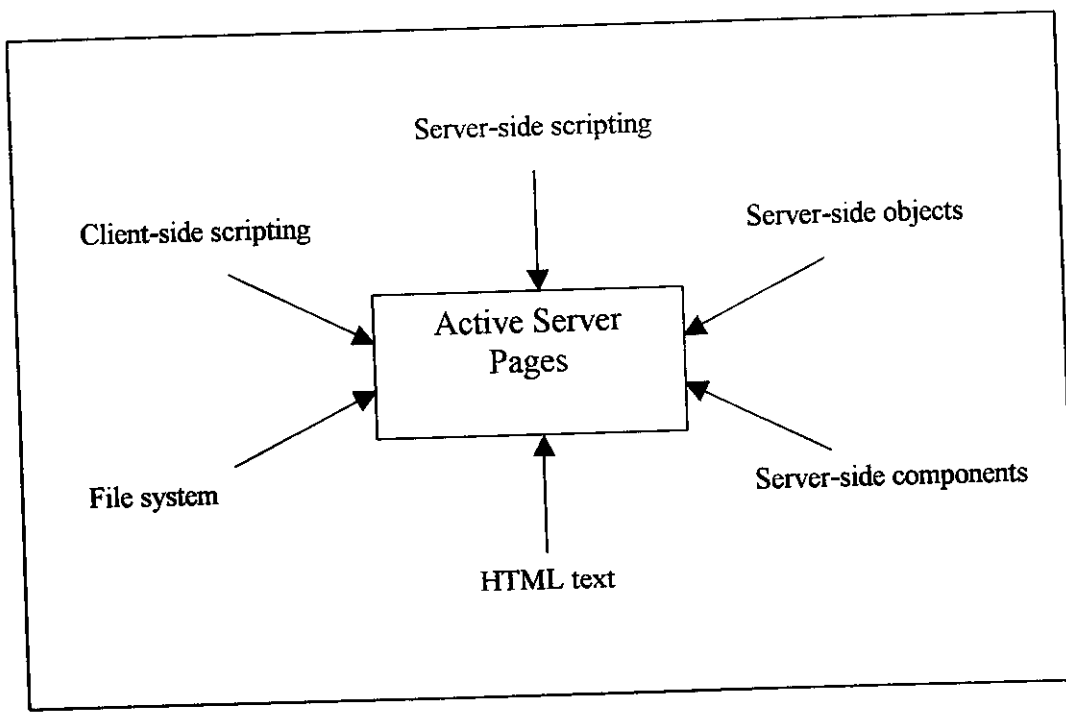
- **Built-in objects:** These objects can be used to enhance scripts and whatever they can do. These are commonly used to exchange information between client browser and the ASP.

- **Server-side components:** ASP also includes standard server-side ActiveX components. They can be used to test Web browsers or add Hit counters to Web pages. ASP supports user-developed components that can be used to extend the capabilities of Web pages and customize them as desired by Web authors.

- **Database Connectivity:** an ASP can be used to connect to and exchange data with a database through a special set of objects known as the ActiveX Data Objects (ADO). This eliminates the need for updating the Web pages as data changes. The Web page always reflects the current information.

Elements of ASP

An ASP application comprises of various elements that together form the ASP application.



- **Scripts**

  ASPs enhance Web pages through Active Scripting. Active scripting is Microsoft's® version of server-side scripting that enables HTML files to call server-side components and objects. ASPs can use any scripting language to create server-side scripts as long as he scripting engine (which processes the script) is compatible with the ActiveX scripting standards.

- **Objects**

  An object is an entity that has a unique and well-defined identity, state and behavior. A unique identity is of course essential to distinguish one object from another. The state of an object is defined by the set of values of its properties. But, an object contains much more than just properties. It contains methods that can be used to manipulate these properties. The behavior of the object can thus be varied by calling methods associated with that object. An object can also have collections of values linked to keys. The keys are used to refer to their associated values.

- **Components**

  ASP components are similar to ASP objects and can thus be used to enhance the functionality of ASP scripts. A component can contain more that one object and is usually used to perform more specialized functions. Further, it can be instantiated before it can be used.

INTERNET INFORMATION SERVER (IIS)

Microsoft® Internet Information Server 5.1 is a popular Web server. If you are connected to an Intranet, or a corporate network, you can share documents with your co-workers from your own computer. You can also test your Web site before you upload it to an Internet Service Provider (ISP).

The IIS transmits information in HTML pages by using the Hypertext Transport Protocol (HTTP). It provides most of the functionality of Microsoft® IIS, including the ability to,

- Publish Web pages on the Internet or, over a LAN on an Intranet
- Support Microsoft® ActiveX programs

Microsoft® VISUAL INTERDEV 6.0

The Visual InterDev architecture offers several advantages. Some being,

- You don't have to be concerned with configuring your Web server for your application. Visual InterDev does this for you automatically.
- You can test your scripts and view your HTML files immediately because your master files are updated on the Web server automatically, when you save your work.
- Even without source control, multiple developers can work on files in the same Web simply by creating their own local project files, which point to the same Web. These projects maintain separate working directories and option settings.
- You don't need to have physical access to the Web server machine to create, modify and even remove Web application files because all access to the server occurs through HTTP. You can even author content on the other side of a firewall, since proxy servers allow HTTP to pass through.

MICROSOFT® SQL SERVER 2000

Microsoft® SQL Server™ 2000 is a set of components that work together to meet the data storage and analysis needs of the largest Web sites and enterprise data processing systems, yet at the same time can provide easy-to-use data storage services to an individual or small business.

Microsoft® SQL Server 2000 features include,

- **Internet Integration**

  The SQL Server 2000 database engine includes integrated XML support. It also has the scalability, availability, and security features required to operate as the data storage component of the largest Web sites. The SQL Server 2000 programming model is integrated with the Windows DNA architecture for developing Web applications, and SQL Server 2000 supports features such as English Query and the Microsoft Search Service to incorporate user-friendly queries and powerful search capabilities in Web applications.

- **Scalability and Availability**

  The same database engine can be used across platforms ranging from laptop computers running Microsoft® Windows 98 through large, multiprocessor servers running Microsoft® Windows 2000 Data Center Edition. SQL Server 2000 Enterprise Edition supports features such as federated servers, indexed views, and large memory support that allow it to scale to the performance levels required by the largest Web sites.

- **Enterprise Level Database Features**

  The SQL Server 2000 relational database engine supports the features required to support demanding data processing environments. The database engine protects data integrity while minimizing the overhead of managing thousands of users concurrently modifying the database. SQL Server 2000 distributed queries allow you to reference data from multiple sources as if it were a part of a SQL Server 2000 database, while at the same time, the distributed transaction support protects the integrity of any updates of the distributed data. Replication allows you to also maintain multiple copies of data, while ensuring that the separate copies remain synchronized. You can replicate a set of data to multiple, mobile, disconnected users, have them work autonomously and merger their modifications back to the publisher.

- **Ease of Installation, deployment and use**

  SQL Server 2000 includes a set of administrative and development tools that improve upon the process of installing, deploying, managing, and using SQL Server across several sites. SQL Server 2000 also supports a standards-based programming model integrated with the Windows DNA, making the use of SQL Server databases and data warehouses a seamless part of building powerful and scalable systems. These features allow you to rapidly deliver SQL Server applications that customers can implement with a minimum of installation and administrative overheads.

- **Data Warehousing**

  SQL Server 2000 includes tools for extracting and analyzing summary data for online analytical processing. SQL Server also includes tools for visually designing databases and analyzing data using English-based questions.

SQL Server 2000 provides two fundamental services to applications in a Windows DNA environment namely,

- **SQL Server 2000 relational database engine**

  The SQL Server 2000 relational database engine is a modern, highly scalable, highly reliable engine for storing data. The database engine stores data in tables. Each table represents some object of interest to the organization. Each table has columns that represent an attribute of the object modeled by the table and rows that represent a single occurrence of the type of object modeled by the table. Applications can submit Structured Query Language (SQL) statements to the database engine, which returns the results to the application in the form of a tabular result set. The specific dialect of SQL supported by SQL Server is called Transact-SQL. Applications can also submit either SQL statements or XPath queries and request that the database engine return the results in the form of an XML document.

The relational database engine is highly scalable. The SQL Server 2000, Enterprise Edition can support groups of database servers that cooperate to form terabyte-sized databases accessed by thousands of users at the same time. The database engine also tunes itself, dynamically acquiring resources as more users connect to the database, and then freeing the resources as the users log off. This means that the smaller editions of SQL Server can be used for individuals or small workgroups that do not have dedicated database administrators. Also, the relational database engine is highly reliable and capable of running for long periods without down time. Administrative actions that required stopping and starting in earlier versions of the database engine can now be performed while the engine is running, increasing availability. The relational database engine is also highly secure. Login authentication can be integrated with Windows Authentication, so that no passwords are stored in SQL Server or sent across the network where they could be read by network sniffers.

The distributed query feature of the database engine allows you to access data from any source of data that can be accessed using OLE DB. The tables of the remote OLE DB data source can be referenced in Transact-SQL statements just like tables that actually reside in a SQL Server database. In addition, the full-text search feature allows you to perform sophisticated pattern matches against textual data stored in SQL Server database or Windows files. The relational database engine is capable of storing detailed records of all the transactions generated by the top online transaction processing (OLTP) systems. The database engine can also support the demanding processing requirements for fact tables and dimension tables in the largest online analytical (OLAP) data warehouses.

- **Microsoft SQL Server 2000 Analysis Services**

  Microsoft SQL Server 2000 Analysis Services provides tools for analyzing the data stored in data warehouses and data marts. Certain analytical processes, such as getting a summary of the monthly sales by product of

records of an OLTP system. To speed up these types of analytical processes, data from an OLTP system is periodically summarized and stored in fact and dimension tables in a data warehouse or data mart. Analysis Services presents the data from these fact and dimension tables as multidimensional cubes that can be analyzed for trends and other information that is important for planning future work. Processing OLAP queries on multidimensional Analysis Services cubes is substantially faster than attempting the same queries on the detail data recorded in the OLTP databases.

Application Support

Both the relational database engine and Analysis Services provide native support for the common Windows DNA or Win32 data access interfaces, such as ActiveX Data Objects (ADO), OLE DB, and Open Database Connectivity (ODBC). Applications can use any of these Application Programming Interfaces (APIs) to send SQL or XML statements to the relational database engine using a native OLE DB provider or ODBC driver. SQL Server 2000 also introduces the ability to use HTTP to send SQL or XML statements to the relational database engine. Applications can use the multidimensional extensions of either ADO or OLE DB to send Multidimensional Expressions (MDX) queries to Analysis Services. Because SQL Server uses the standard Windows DNA data access APIs, the development of SQL Server applications is well supported by the Microsoft application development environments. In addition, interactive query tools, such as Query Analyzer, provide templates, interactive debuggers, and interactive test environments that speed the ability of your programmers to deliver SQL Server applications.

In addition to supporting the data storage and OLAP processing needs of applications, SQL Server 2000 provides a full set of easy to use, graphical administration tools and wizards for creating, configuring, and maintaining databases, data warehouses, and data marts. SQL Server also documents the administration APIs used by the SQL Server tools, giving you the ability to incorporate SQL Server administration functionality directly into your own applications.

Database Architecture

Microsoft® SQL Server 2000 data is stored in databases. The data in a database is organized into the logical components visible to users. A database is also physically implemented as two or more files on disk. When using a database, you work primarily with the logical components such as tables, views, procedures, and users. The physical implementation of files is largely transparent. Typically, only the database administrator needs to work with the physical implementation.

Each instance of SQL Server has four system databases (master, model, tempdb, and msdb) and one or more user databases. It is not necessary to run multiple copies of the SQL Server database engine to allow multiple users to access the databases on a server. An instance of the SQL Server Standard or Enterprise Edition is capable of handling thousands of users working in multiple databases at the same time. Each instance of SQL Server makes all databases in the instance available to all users that connect to the instance, subject to the defined security permissions.

SYSTEM STUDY AND DEVELOPMENT

INPUT DESIGN

The main objective of the input design is to make data entry error-free. Input design aims to reduce errors in data processing that occurs because of inaccurate input data by providing a proper input design. Authenticated database access control is given to the administrator-authorized users to operate on the databases.

All the forms are designed so that they are user-friendly and all the details of the links are displayed before they are to be accessed. The input for the system is to login as,

- Super Administrator
- Technical Administrator
- Human Resources Administrator
- Help Desk Administrator
- Normal User

Once the user enters his/her username and password, he is authenticated using the corresponding database. Only those users, who have been granted access rights by the administrator, are allowed access to the system. If the user authentication turns to be successful, he/she is logged into the system and the corresponding page is displayed, depending on the nature of the user.

A user of the IPMs is provided with total flexibility for,

- Accessing information permitted to him/her by the administrator
- Changing his/her password
- Communicating with the other authorized users of the system

Validations

The input validations performed for the IPMs are,

- Username is checked for uniqueness
- The password field should have a minimum length of 10 characters and a

- The date fields are checked for correct formats.
- Any dates, associated with fields other than that of age, need to be either the system date or, a later one
- The fields pertaining to number of days, should be only of numeric type
- Check for the selection of any entry before performing the corresponding deletion operation

OUTPUT DESIGN

On successful logging in of a user to the IPMs, he/she is provided with the set of information that has been granted access to him/her.

If the user is a normal user, he/she is provided with access to,

- View information pertaining to the products of the company, contact details of the personnel of the organization, news posted on the news bulletin board etc.
- Send and receive personal short messages to and from the other personnel
- View their corresponding leave status and, apply for leave when needed
- Download device drivers and software updates and patches, upon requirement
- Post queries, regarding their hardware and software problems, to the Help Desk
- View the details regarding the organization policies and holiday listing

If the user is a Technical Administrator, he/she is provided access to the following additional information.

- Upload new device drivers and software updates and patches
- Modify existing downloads
- Delete unwanted and obsolete downloads

If the user is a Human Resource Administrator, he/she is provided access to the following additional information.

- Post the details of the resumes received by the organization, from prospective recruits
- Perform searches on the available resumes based upon the criteria or requirement
- Add details about the new personnel joining the organization
- Edit the information pertaining to the contact address of the existing personnel of the organization

- Approve the leave applied for by the other personnel
- Create or modify the leave schedules and policies of the organization

If the user is a Help Desk Administrator, he/she is provided access to the following additional information.

- Answer the queries posted by the other personnel, with regard to their hardware and software problems.

If the user is a Super Administrator, he/she is provided with total access to all the information available on the system. He/she is also responsible for the creation and deletion of the various users of the system.

Thus, the different pages have these options generated according to the type of user who has logged in. hence, the different pages are marked with varied picturization giving various static as well as dynamic links.

DATABASE DESIGN

The database used for the IPMs is SQL Server 2000 and some of the tables used by the system, in alphabetic order, are,

- **Asset_Mast**

  This table stores the details regarding the different assets (or, peripherals) used within the organization.

- **Download_Category_Mast**

  This table contains the details regarding the different download categories available.

- **Driver_Det**

  This table contains information regarding the different items available for download by the user.

- **Emp_Category_Mast**

  The information regarding the different available employee categories is stored in this table.

- **Emp_Desig_Det**

  Information about the various available employee designations is stored in this table.

- **Emp_Leave_Det**

  Information regarding the leave permissible for each employee is contained here.

- **Employee_Mast**

  The details regarding the contact address of the personnel are contained within this table.

- **Financial_Year_Mast**

  Information regarding the different financial years is stored in this table.

- **Help_Desk_Query_Det**

  Information regarding the queries posted by the personnel to the Help Desk can be got from this table.

- **Holidays_Mast**

  The details about the various holidays permitted by the company are contained in this table.

- **Job_Profile_Mast**

  The information about the various job profiles available within the organization is stored here.

- **Leave_Appln_Det**

  The details regarding the different leave taken by each of the personnel is stored in this table.

- **Leave_Mast**

  The various available leaves and details regarding each one of them are stored in this table.

- **Message_Det**

  The details regarding the various personal short messages sent by the personnel to each other are stored here.

- **News_Det**

  The details regarding the different news posted on the News Bulletin Board is stored here.

- **Policies_Mast**

  Information regarding the different policies put forward by the organization is stored here.

- **Recruit_Det**

  The details contained in the resumes sent by the prospective recruits are stored in this table.

- **Software_Products_Det**

  Information pertaining to the various software products associated with the organization is stored here.

- **Users_Mast**

  This table contains information about each one of the authorized users of the IPMs. It is this table that plays the major role in user authentication at the time of logon.

PROCESS DESIGN

The Intranet Process Management system (IPMs) is a web-based solution provider for most of the in-house requirements of the personnel of an organization. The employees can have access to information as per their need and authority, thereby helping them to efficiently and effortlessly carry out their separate functionalities within the various hierarchies of the organization.

The various modules constituting the system can be categorized, based upon theirs functionality as,

- **User Creation**

  It is the Super administrator who, initially, has access to the whole system. He/she creates the various users, categorizing them based on their functionality within the organization.

- **User Authentication**

  At the time of logon, each of the personnel is authenticated based on their Username and Password. Each user is permitted to only one Username and, it is based on the result of this authentication that the relevant options are available to each one of the users.

- **Product Information Management**

  The information regarding the different products developed and, under development, by the organization is categorized maintained through this module. Any new additions as well as modification and deletion of existing information are also carried out here.

- **Device Driver download Manager**

  The information pertaining to the various available downloads of device drivers and software updates and patches are segregated and managed through this module. As per the need, the information is modified, or deleted when obsolete.

- **Help Desk**

  The functionality of this module is to provide satisfactory solutions for the queries, pertaining to the hardware and software, posted by the personnel of the organization. If the personnel are not satisfied by the solution provided, he/she also has the option to re-post the same query. Almost all the personnel of the organization carry out the deletion, re-posting and posting of the queries.

- **Recruitment**

  This module, as its name signifies, is related to the recruitment procedure of the organization. It is the Human Resources personnel who deal with he functioning of this module. The new resumes received are posted into the system and, a search is performed upon them as the need for recruitment arises.

- **Personnel Information Management**

  The management of this module too is under the authority of the Human Resources department. The information handled by this module deals with the contact information and other personal details of each one of the personnel associated with the organization.

- **Personnel Leave Management**

  This module performs the management of the leave taken and those requested for. When an employee applies for leave, aware about his current status, the application is forwarded to his Reporting Officer. On approval, it is sent to the Human resource Manager, upon whose approval the leave is granted. The leave status of the employee is updated when his/her leave is granted.

- **Personal Message Board**

  It is this module that helps the personnel in sending personal short messages within the boundaries of the organization. The message sent is

sending the same message to multiple persons, at the same time, is not possible.

- **News Room**

  This module manages the news posted on the News Bulletin Board. It is the Human Resources Department that maintains the proper functioning of this module. The news regarding the various achievements and schedules of the organization are the key information handled by this module.

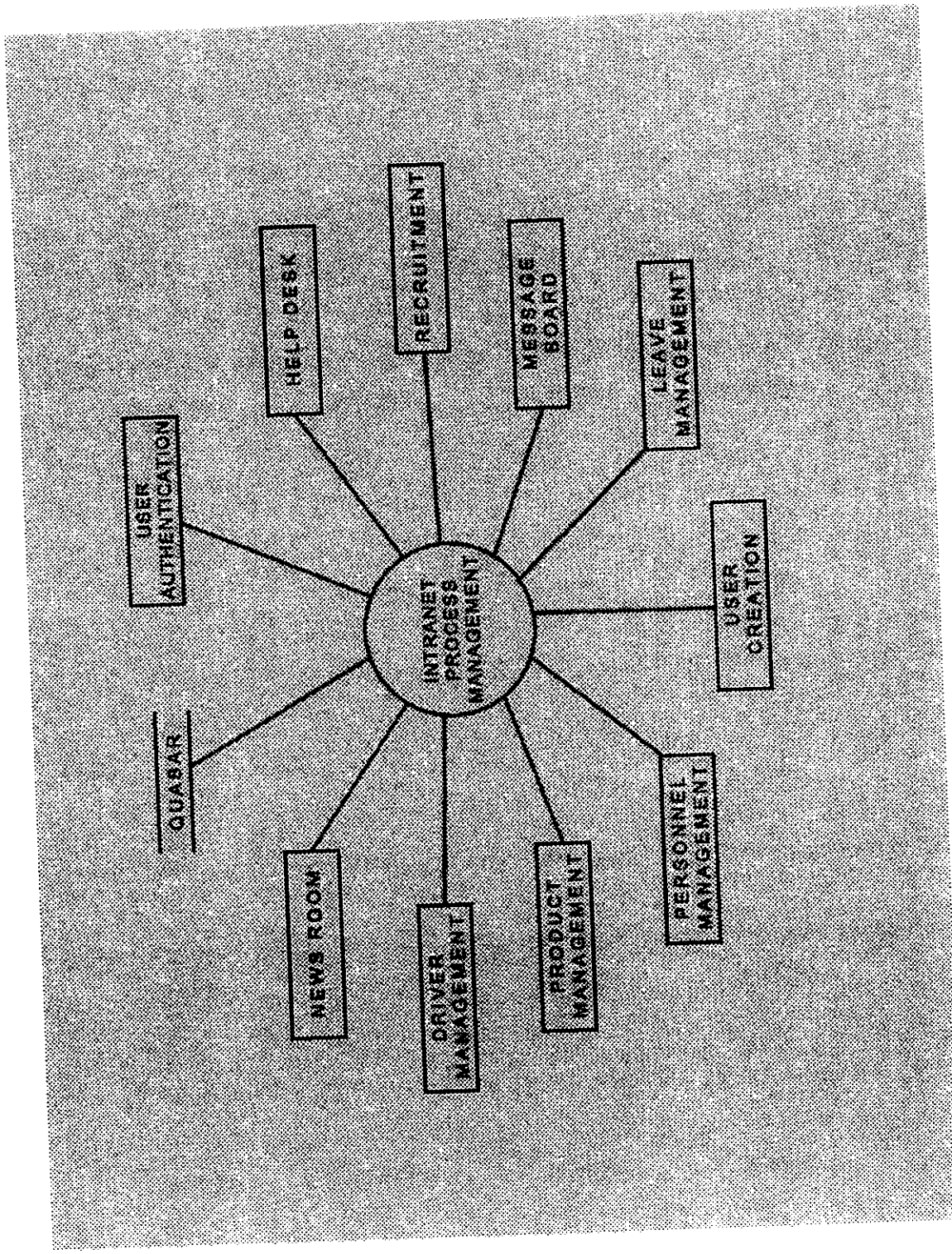
- **Company Policy and Holiday information**

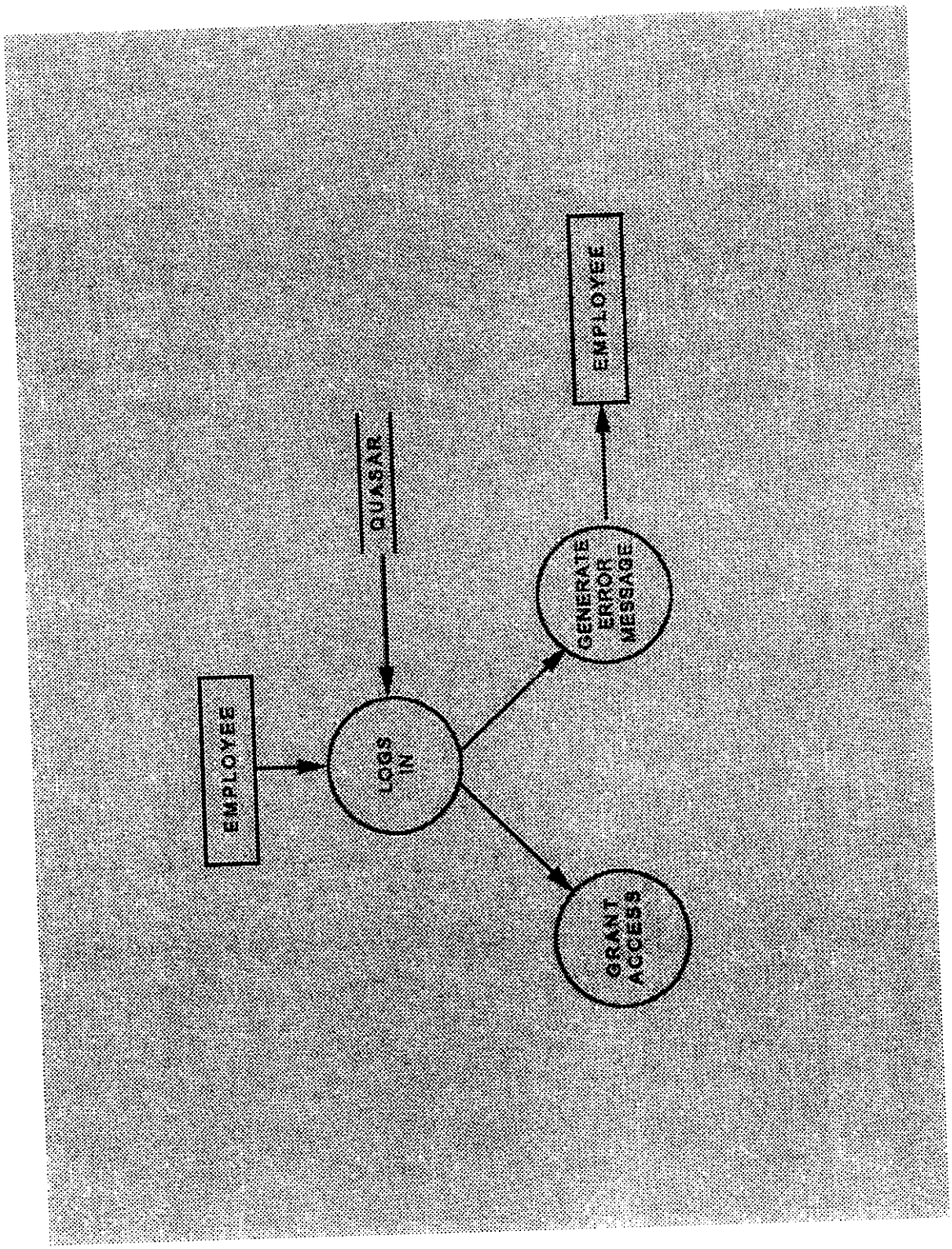
  This is stated to be one of the simplest modules in terms of functionality. The Human Resources Department uses this module to inform the personnel about the different policies and holidays associated with the company.

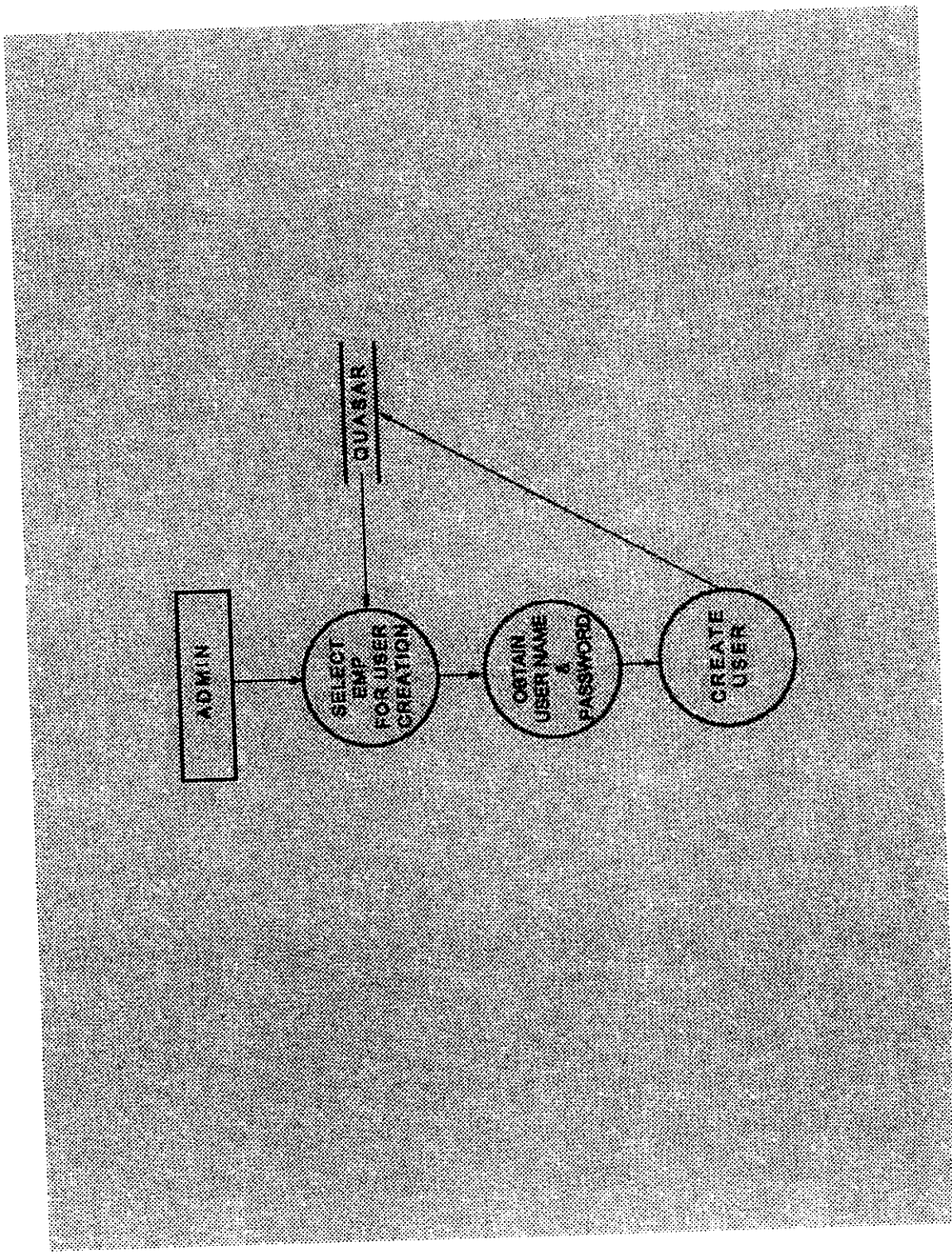
- **Query-based Search Tool ("*Ancilla*")**

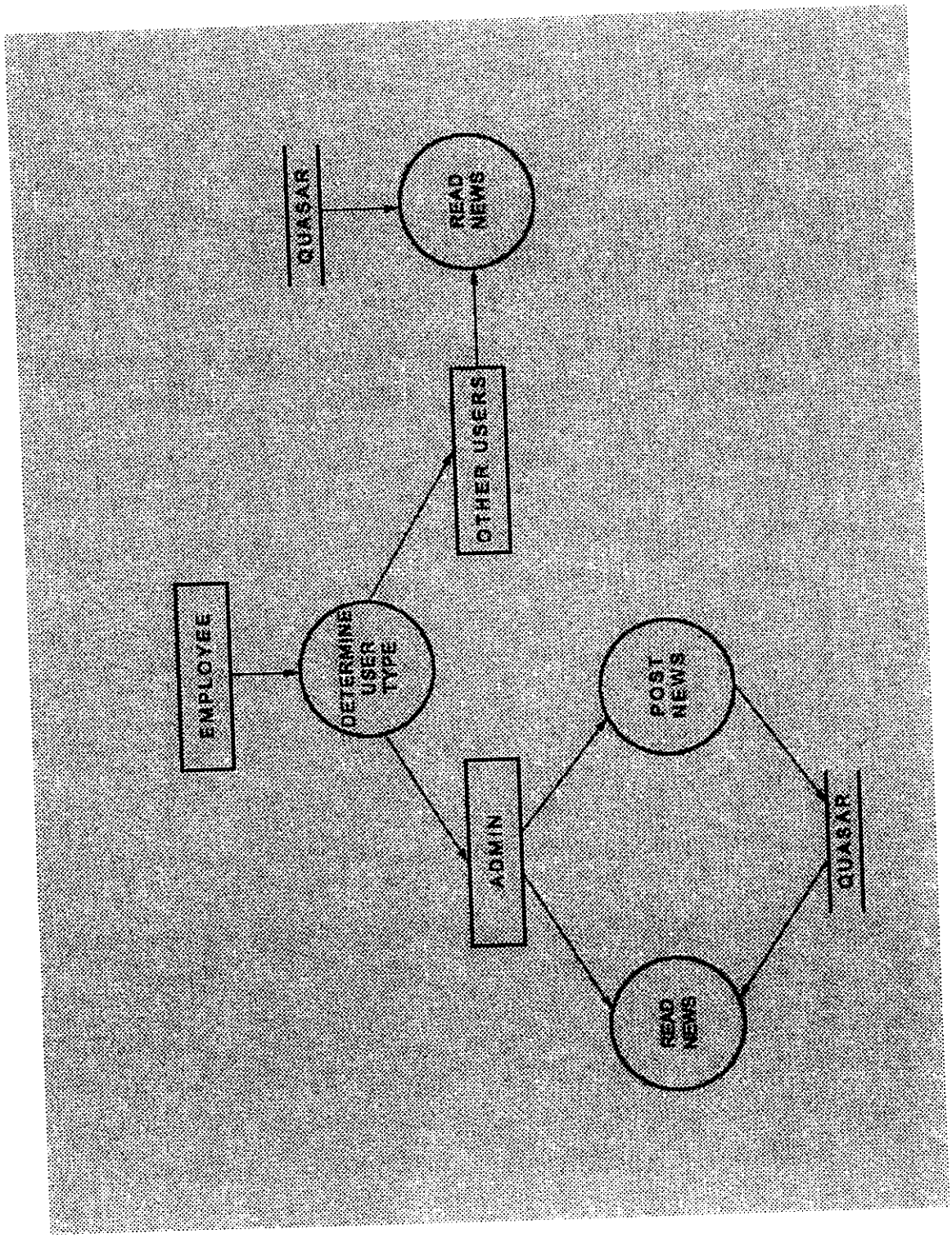
  This is a scaled down version of one of the most wonderful CRM tools developed by Quasar InfoTech. This proves to be very helpful to both the Help Desk and the Support personnel of the organization. It enables them to make a search based on the criteria of the query. As the result, five of the best solutions are provided. The user can either accept or reject these solutions. Each of the solutions is rated based upon the rate of acceptance or rejection, by the user.

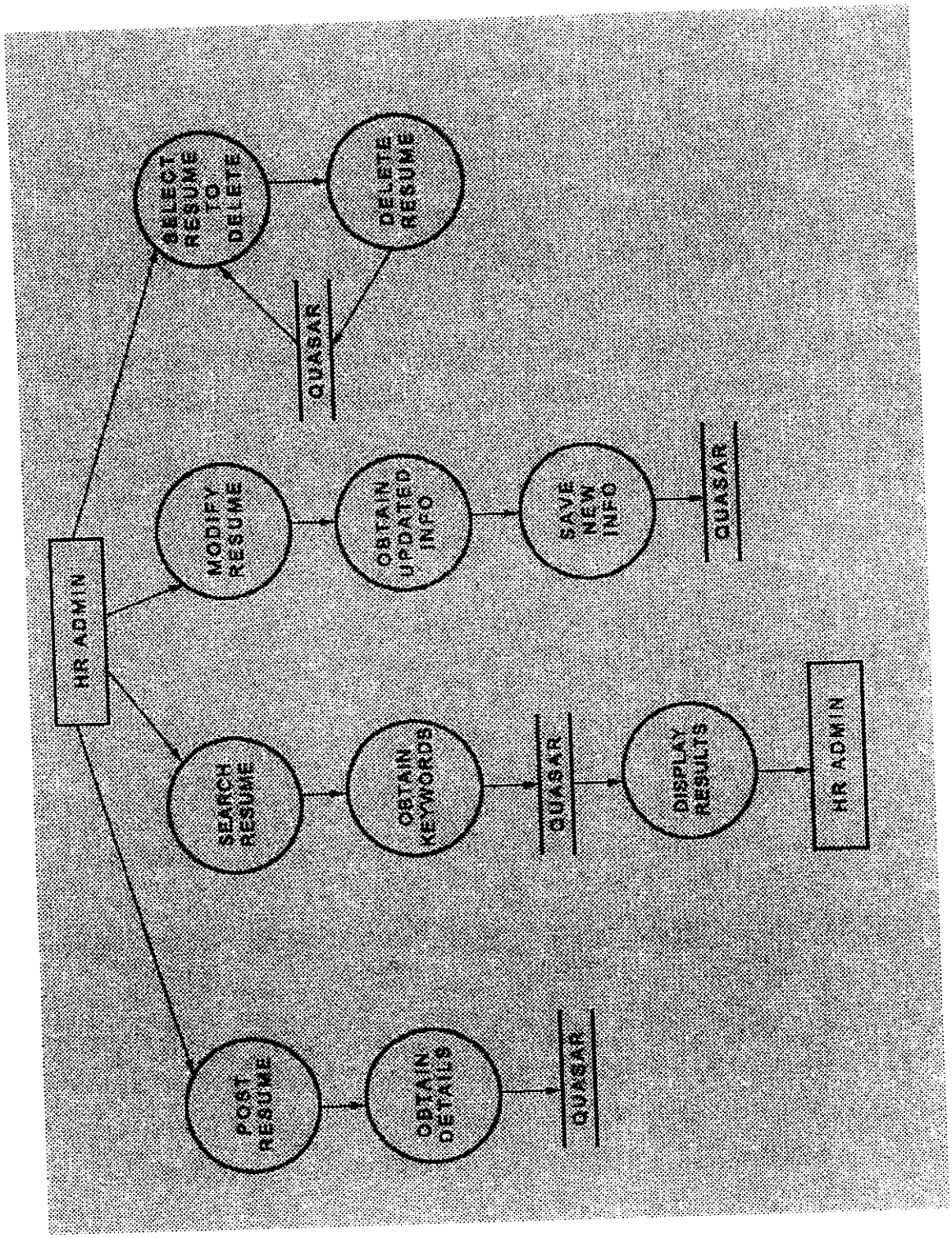
DATA FLOW DIAGRAMS

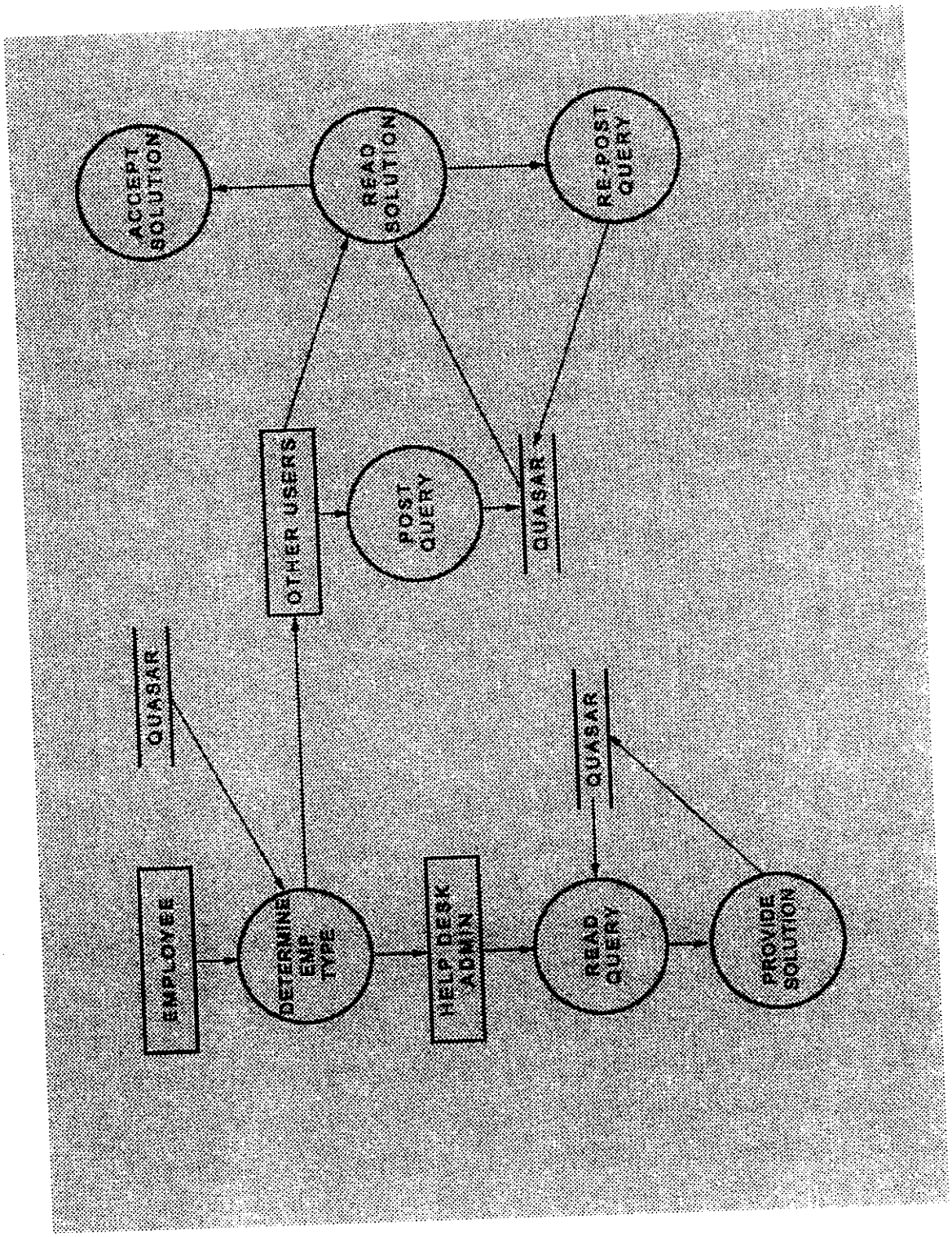


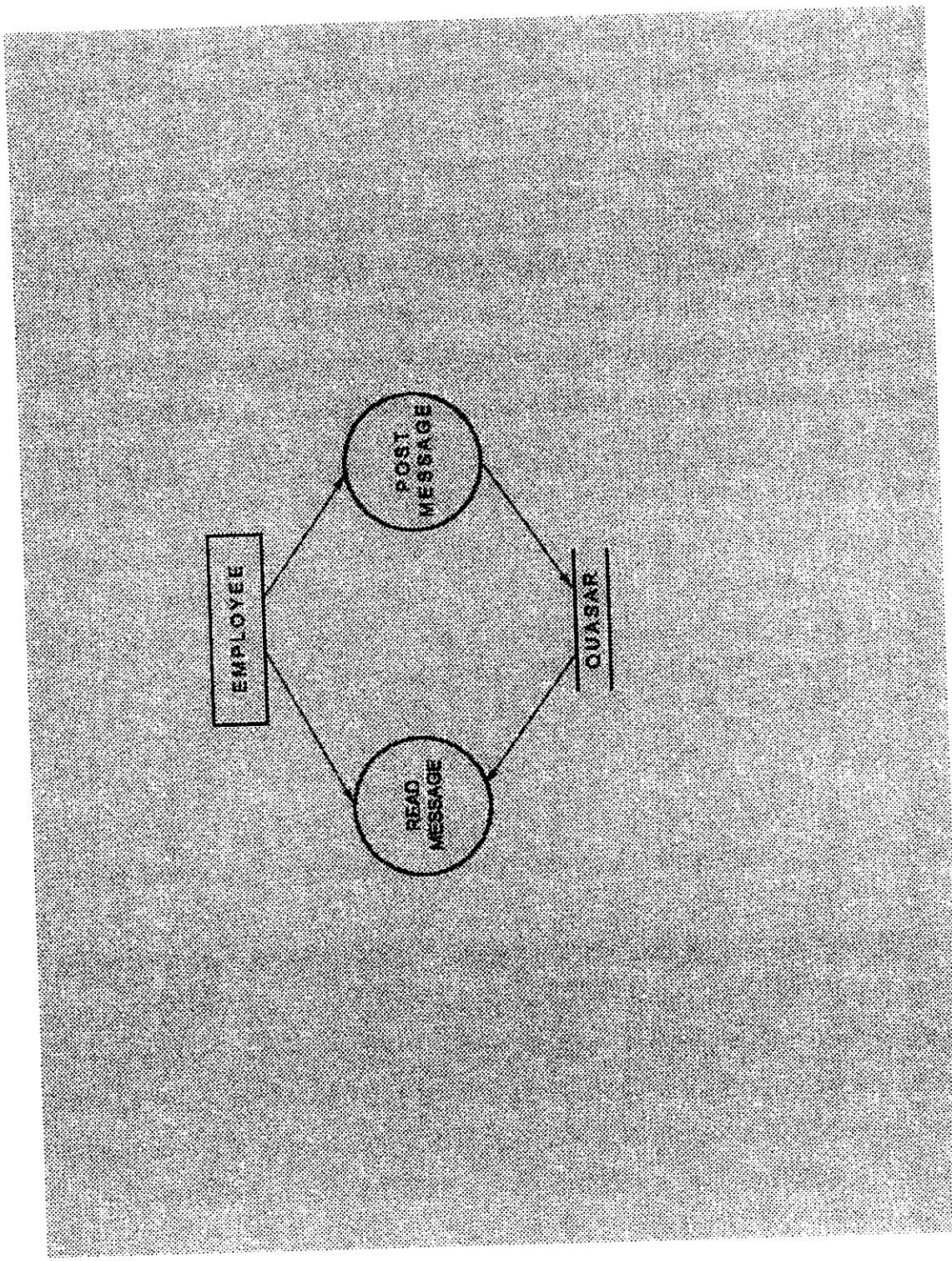

EMPLOYEE
LOGS IN
QUASAR
GENERATE ERROR MESSAGE
EMPLOYEE
GRANT ACCESS


QUASAR
ADMIN
SELECT EMP FOR USER CREATION
OBTAIN USER NAME & PASSWORD
CREATE USER

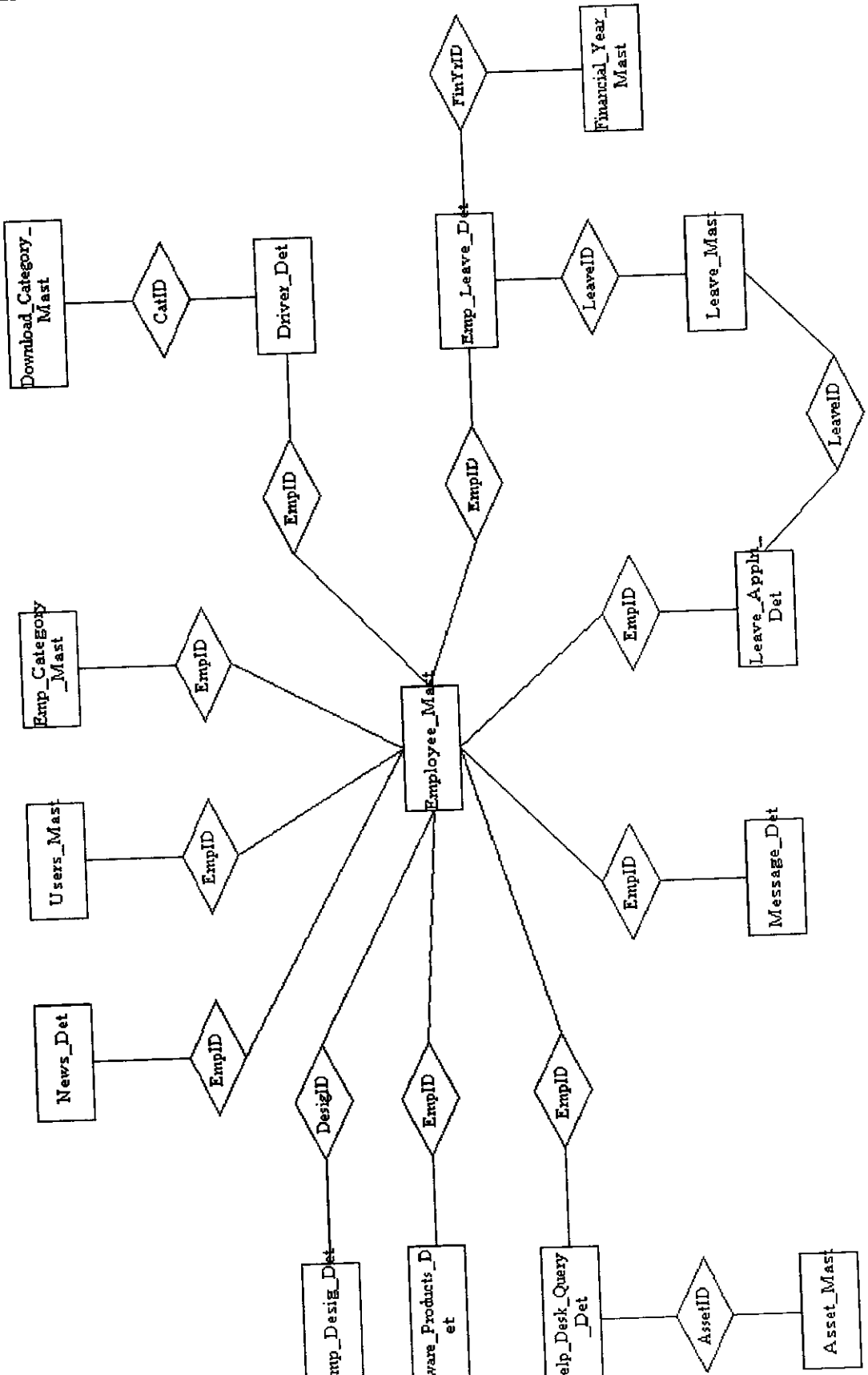

QUASAR
READ NEWS
OTHER USERS
EMPLOYEE
DETERMINE USER TYPE
ADMIN
POST NEWS
READ NEWS
QUASAR


HR ADMIN
SELECT RESUME TO DELETE
DELETE RESUME
QUASAR
MODIFY RESUME
OBTAIN UPDATED INFO
SAVE NEW INFO
QUASAR
SEARCH RESUME
OBTAIN KEYWORDS
QUASAR
DISPLAY RESULTS
HR ADMIN
POST RESUME
OBTAIN DETAILS
QUASAR


ACCEPT SOLUTION
READ SOLUTION
RE-POST QUERY
OTHER USERS
POST QUERY
QUASAR
QUASAR
QUASAR
EMPLOYEE
DETERMINE EMP. TYPE
HELP DESK ADMIN
READ QUERY
PROVIDE SOLUTION


POST MESSAGE
EMPLOYEE
QUASAR
READ MESSAGE

ENTITY RELATIONSHIP DIAGRAM



SYSTEM IMPLEMENTATION AND TESTING

SYSTEM IMPLEMENTATION

Implementation is that stage of the project where the theoretical design is turned into a working system. The implementation stage is the most crucial stage in achieving a successful new system and in giving the users confidence that the new system will work and be effective.

The implementations stage is, in its own right, a system project. It involves careful planning, investigation of the current system and its constraints on implementation, design of methods to achieve the changeover, training of staff in the changeover procedures and evaluation of changeover methods.

The tasks involved in implementation are,

- Implementations planning
- Computer system testing
- Education and training
- Full system testing
- File set-up
- File conversion
- Changeover
- Amendments

The development of the system begins with all the specifications gathered and the system designed so as to serve the purpose of relieving the manual labour required.

The implementation of the Intranet Process Management system (IPMs) is not performed in a single go. It is done so in a manner of parallel operation, along with the existing system. This is done so as to ensure the perfect execution of all the modules of the IPMs. On successful and satisfactory testing, the slow transition from the existing manual system to the new one is carefully undertaken.

Finally, after total user acceptance, the old system is shelved and the new IPMs is deployed in a full-fledged manner.

SYSTEM TESTING

Software testing is the process of executing the program with the intent of finding an error. Testing demonstrates that software functions appear to be working according to specification, that behavioral and performance requirements appear to have been met. In addition, data collected as testing is conducted provide a good indication of software reliability and some indication of software quality as a whole. As for every software products, the IPMs was tested using the two basic testing techniques,

- **Black Box Testing**

  Black Box testing, also called behavioral testing, focuses on the functional requirements of the system. Black Box tests are used to demonstrate that software functions are operational, that input is properly accepted and output is correctly produced, and that the integrity of external information (database) is maintained. Black- Box testing attempts to find errors in the categories of,

  - Incorrect or missing functions
  - Interface errors
  - Errors in data structures or external database access
  - Behavior or performance errors
  - Initialization errors
  - Termination errors

  In order to test the IPMs under Black Box testing, different combinations of input were provided to check for the obtaining of the required output. A set of test data was prepared, for verifying the order of operation execution and, was found successful.

- **White Box Testing**

  White Box testing, also called glass-box testing, is conducted to ensure that the internal operations are performed according to specifications and all internal components have been adequately exercised. It is a test case

derive test cases. Providing test cases that exercise specific sets of conditions and/or loops tests logical paths through the software. Using the White Box testing method test cases are derived that,

- Guarantee that all independent paths within a module have been exercised at least once,
- Exercise all logical decisions on their true and false sides,
- Execute all loops at their boundaries and within their operational bounds,
- Exercise internal data structures to ensure their validity.

The important data structures had been probed for their validity and were found to be successful.

The attributes of both the Black Box testing and the White Box testing were combined to validate the interfaces and ensured that the internal functioning of the software were correct.

Unit Testing

Unit testing focuses on verifying the smallest unit of software design – the software component or module. The module interfaces was tested to ensure that information flow, into and out of the program unit under test, was proper. The local data structure was examined to ensure that data stored temporarily maintains its integrity during all steps in the execution of the algorithms execution. Boundary conditions were also tested to ensure that the module operates properly at the boundaries established to limit or restrict processing.

Integration Testing

Integration testing is a systematic technique for constructing the program structure while constructing tests to uncover errors associated with interfacing. The top-down incremental integration approach was followed and the program was built and tested in small increments. The unit-tested modules were taken and were used as the building blocks in constructing a program structure that has been dictated by

CONCLUSION

The Intranet Process Management system (IPMs), a web-based solution provider, strives to satisfy most of the in-house requirements of the personnel of an organization. The employees can have access to information as per their need and authority, thereby helping them to efficiently and effortlessly carry out their separate functionalities within the various hierarchies of the organization.

Upon the successful implementation of the IPMs, it was found to have a high degree of user satisfaction and acceptance. It has been approved by most of the personnel of the organization that the system had successfully reduced the intensity of their work and, has proved itself by providing its deliverables in an efficient and consistent manner.

The IPMs has also helped the personnel in bringing about greater synchrony in their operation, by easing the tedious procedures necessary for communication within the organization.

SCOPE FOR FUTURE DEVELOPMENT

The Intranet Process Management system (IPMs) developed is highly flexible and extensible. Upgrades can be performed on the system, up to any required level. The system being highly user-friendly and customizable, can be implemented at any company requiring an enhanced and automated process for the management of their internal processes. Also, the information provided by the IPMs can be further increased in an effortless manner as the need arises.

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- Software Technology Group International; Active Server Pages; Software Technology Group International; 1999
- Microsoft Press; SQL Server 7.0; Microsoft Press; 1999
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WEB SITES

- www.microsoft.com - 05-01-2003
- www.asp.com - 20-01-2003
- www.the4guysfromrolla.com - 02-02-2003

TABLES

ASSET_MAST

Column Name	Data Type	Length	Allow Nulls
AM_AssetID	Int	4	No
AM_AssetName	Varchar	20	No

Primary key: AM_AssetID

DOWNLOAD_CATEGORY_MAST

Column Name	Data Type	Length	Allow Nulls
DCM_DownCatID	Int	4	No
DCM_DownCatName	Varchar	50	No

Primary key: DCM_DownCatID

EMP_CATEGORY_MAST

Column Name	Data Type	Length	Allow Nulls
ECM_TypeID	Smallint	2	No
ECM_EmpCategory	Varchar	20	No

Primary key: ECM_TypeID

DRIVER_DET

Column Name	Data Type	Length	Allow Nulls
DD_DriverID	Int	4	No
DD_DriverHead	Varchar	50	No
DD_CatID	Int	4	No
DD_DriverDesc	Varchar	250	No
DD_DateTime	Datetime	8	No
DD_Link	Varchar	100	No
DD_EmpID	Int	4	No

Primary key: DD_DriverID

Driver_Det(DD_CatID) *references* Download_Category_Mast(DCM_DownCatID)

Driver_Det(DD_EmpID) *references* Employee_Mast(EM_EmpID)

EMP_DESIG_DET

Column Name	Data Type	Length	Allow Nulls
EDM_DesigID	Smallint	2	No
EDM_DesigDesc	Varchar	50	No

Primary key: EDM_DesigID

EMP_LEAVE_DET

Column Name	Data Type	Length	Allow Nulls
ELD_ID	Numeric	9	No
ELD_FinancialYearID	Int	4	No
ELD_EmpID	Int	4	No
ELD_LeaveID	Smallint	2	No
ELD_NoOfDaysLeft	Smallint	2	No

Primary key: ELD_ID

Emp_Leave_Det(ELD_EmpID) *references* Employee_Mast(EM_EmpID)

Emp_Leave_Det(ELD_FinancialYearID) *references* Financial_Year_Mast

(Emp_Leave_Det()

Emp_Leave_Det(ELD_LeaveID) *references* Leave_Mast(LM_LeaveID)

EMPLOYEE_MAST

Column Name	Data Type	Length	Allow Nulls
EM_EmpID	Int	4	No
EM_Name	Varchar	30	No
EM_Addr	Varchar	50	No
EM_ResPhone	Varchar	20	Yes
EM_Mobile	Varchar	20	Yes
EM_EmpCatID	Smallint	2	No
EM_DesigID	Smallint	2	No
EM_Sex	Char	1	No
EM_DOB	Datetime	8	No
EM_MailID	Varchar	50	Yes

Primary key: EM_EmpID

Employee_Mast(EM_EmpCatID) *references* Emp_Category_Mast(ECM_TypeID)

Employee_Mast(EM_DesigID) *references* Emp_Desig_Det(EDM_DesigID)

FINANCIAL_YEAR_MAST

Column Name	Data Type	Length	Allow Nulls
FYM_FinYrID	Int	4	No
FYM_FinYrStart	Datetime	8	No
FYM_FinYrEnd	Datetime	8	No

Primary key: FYM_FinYrID

HELP_DESK_QUERY_DET

Column Name	Data Type	Length	Allow Nulls
HDQD_QryID	Int	4	No
HDQD_AssetID	Int	4	No
HDQD_EmpID	Int	4	No
HDQD_QrySub	Varchar	70	No
HDQD_QryDesc	Varchar	300	No
HDQD_QryPrior	Smallint	2	No
HDQD_Solution	Varchar	300	Yes
HDQD_Post_DateTime	Datetime	8	No
HDQD_Solve_DateTime	Datetime	8	Yes
HDQD_QryStatus	Bit	1	No

Primary key: HDQD_QryID

Help_Desk_Query_Det(HDQD_AssetID) *references* Asset_Mast(AM_AssetID)

Help_Desk_Query_Det(HDQD_EmpID) *references* Employee_Mast(EM_EmpID)

HOLIDAYS_MAST

Column Name	Data Type	Length	Allow Nulls
HM_HolidayID	Smallint	2	No
HM_HolidayDesc	Varchar	50	No
HM_Day	Datetime	8	No

Primary key: HM_HolidayID

JOB_PROFILE_MAST

Column Name	Data Type	Length	Allow Nulls
JPM_ProfileID	Smallint	2	No
JPM_ProfName	Varchar	50	No

Primary key: JPM_ProfileID

LEAVE_APPLN_DET

Column Name	Data Type	Length	Allow Nulls
LAD_ApplnID	Bigint	8	No
LAD_EmpID	Int	4	No
LAD_FinYrID	Int	4	No
LAD_LeaveID	Smallint	2	No
LAD_StartDate	Datetime	8	No
LAD_NoOfDays	Smallint	2	No
LAD_Reason	Varchar	250	Yes
LAD_ROID	Int	4	No
LAD_ROStatus	Char	1	No
LAD_ROComments	Varchar	250	Yes
LAD_HRStatus	Char	1	No
LAD_HRComments	Varchar	250	Yes
LAD_FinalStatus	Char	1	No
LAD_Comments	Varchar	250	Yes

Primary key: LAD_ApplnID

Leave_Appln_Det(LAD_EmpID) *references* Employee_Mast(EM_EmpID)

Leave_Appln_Det(LAD_ROID) *references* Employee_Mast(EM_EmpID)

Leave_Appln_Det(LAD_LeaveID) *references* Leave_Mast(LM_LeaveID)

LEAVE_MAST

Column Name	Data Type	Length	Allow Nulls
LM_LeaveID	Smallint	2	No
LM_LeaveType	Varchar	50	No
LM_NoOfDays	Smallint	2	No

Primary key: LM_LeaveID

MESSAGE_DET

Column Name	Data Type	Length	Allow Nulls
MD_MessageID	Int	4	No
MD_EmpID_To	Int	4	No
MD_EmpID_Frm	Int	4	No
MD_Message	Varchar	250	No
MD_DateTime	Datetime	8	No

Primary key: MD_MessageID

Message_Det(MD_EmpID_To) *references* Employee_Mast(EM_EmpID)

Message_Det(MD_EmpID_Frm) *references* Employee_Mast(EM_EmpID)

NEWS_DET

Column Name	Data Type	Length	Allow Nulls
ND_NewsID	Int	4	No
ND_NewsTitle	Varchar	30	No
ND_NewsDesc	Varchar	1000	No
ND_DateTime	Datetime	8	No
ND_EmpID	Int	4	No

Primary key: ND_NewsID

News_Det(ND_EmpID) *references* Employee_Mast(EM_EmpID)

POLICIES_MAST

Column Name	Data Type	Length	Allow Nulls
PM_PolicyID	Int	4	No
PM_PolicyHead	Varchar	20	No
PM_PolicyDesc	Varchar	250	No

Primary key: PM_PolicyID

RECRUIT_DET

Column Name	Data Type	Length	Allow Nulls
RD_ResID	Int	4	No
RD_Name	Varchar	50	No
RD_Addr	Varchar	80	No
RD_DOB	Datetime	8	No
RD_Sex	Char	1	No
RD_MailID	Varchar	50	Yes
RD_Tele	Varchar	35	Yes
RD_ProfID	Smallint	2	No
RD_Status	Varchar	100	No
RD_Skills	Varchar	100	No
RD_Cert	Varchar	100	Yes
RD_Exp	Smallint	2	No
RD_ExpDet	Varchar	2500	Yes
RD_Ref	Varchar	50	Yes
RD_Memo	Varchar	250	Yes

Primary key: RD_ResID

Recruit_Det(RD_ProfID) *references* Job_Profile_Mast(JPM_ProfID)

SOFTWARE_PRODUCTS_DET

Column Name	Data Type	Length	Allow Nulls
SPD_SoftID	Int	4	No
SPD_SoftHead	Varchar	30	No
SPD_SoftDesc	Varchar	750	No
SPD_DateTime	Datetime	8	No
SPD_EmpID	Int	4	No

Primary key: SPD_SoftID

Software_Product_Det(SPD_ EmpID) *references* Employee_Mast(EM_EmpID)

USERS_MAST

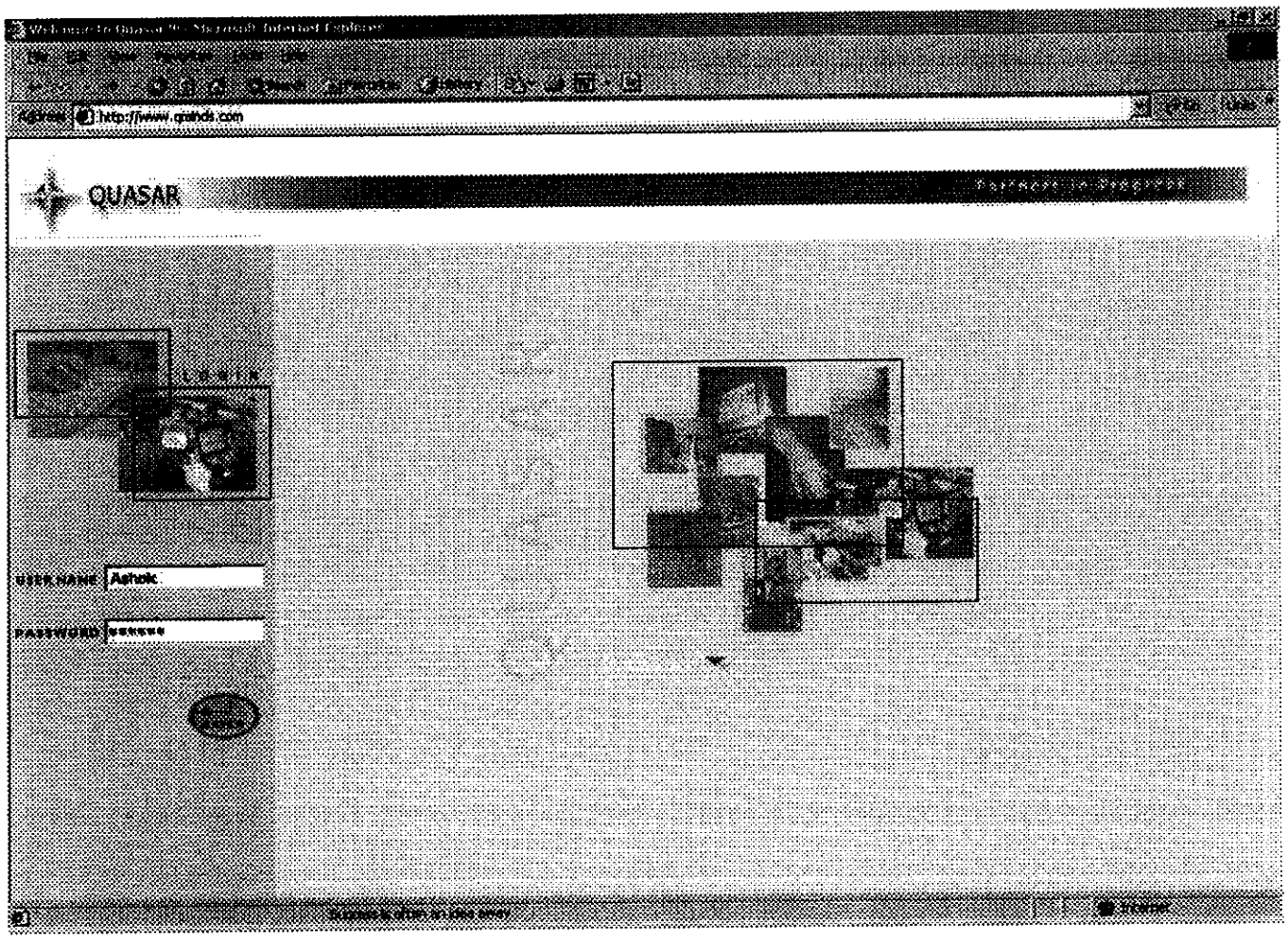
Column Name	Data Type	Length	Allow Nulls
UM_UserID	Int	4	No
UM_EmpID	Int	4	No
UM_Uname	Varchar	20	No
UM_Pwd	Varchar	20	No
UM_UserType	Char	1	No

Primary key: UM_UserID

Users_Mast(UM_ EmpID) *references* Employee_Mast(EM_EmpID)

SAMPLE SCREENS

Page



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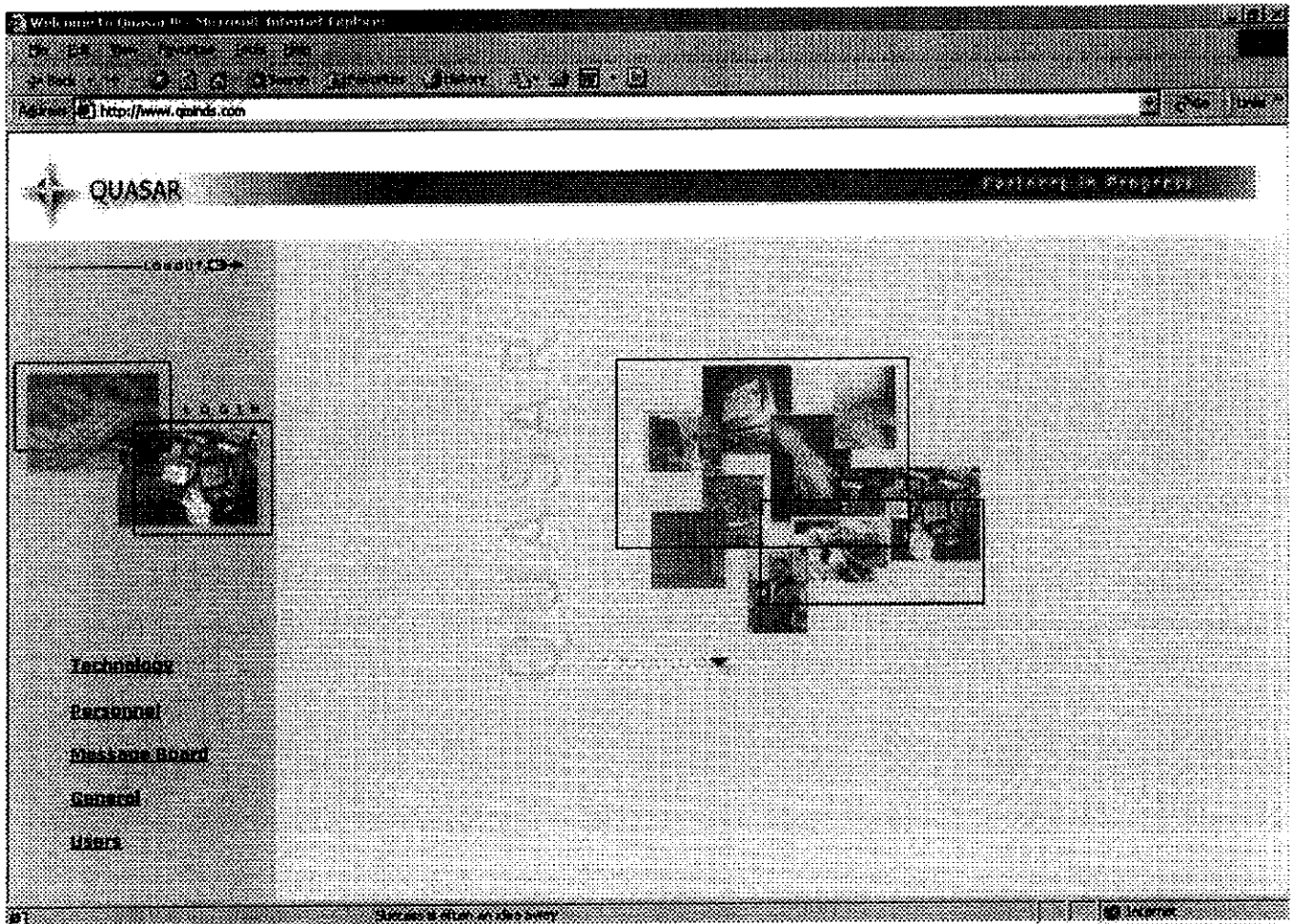
http://www.quinds.com
QUASAR
Logout
Technology
Personnel
Message Board
General
Users

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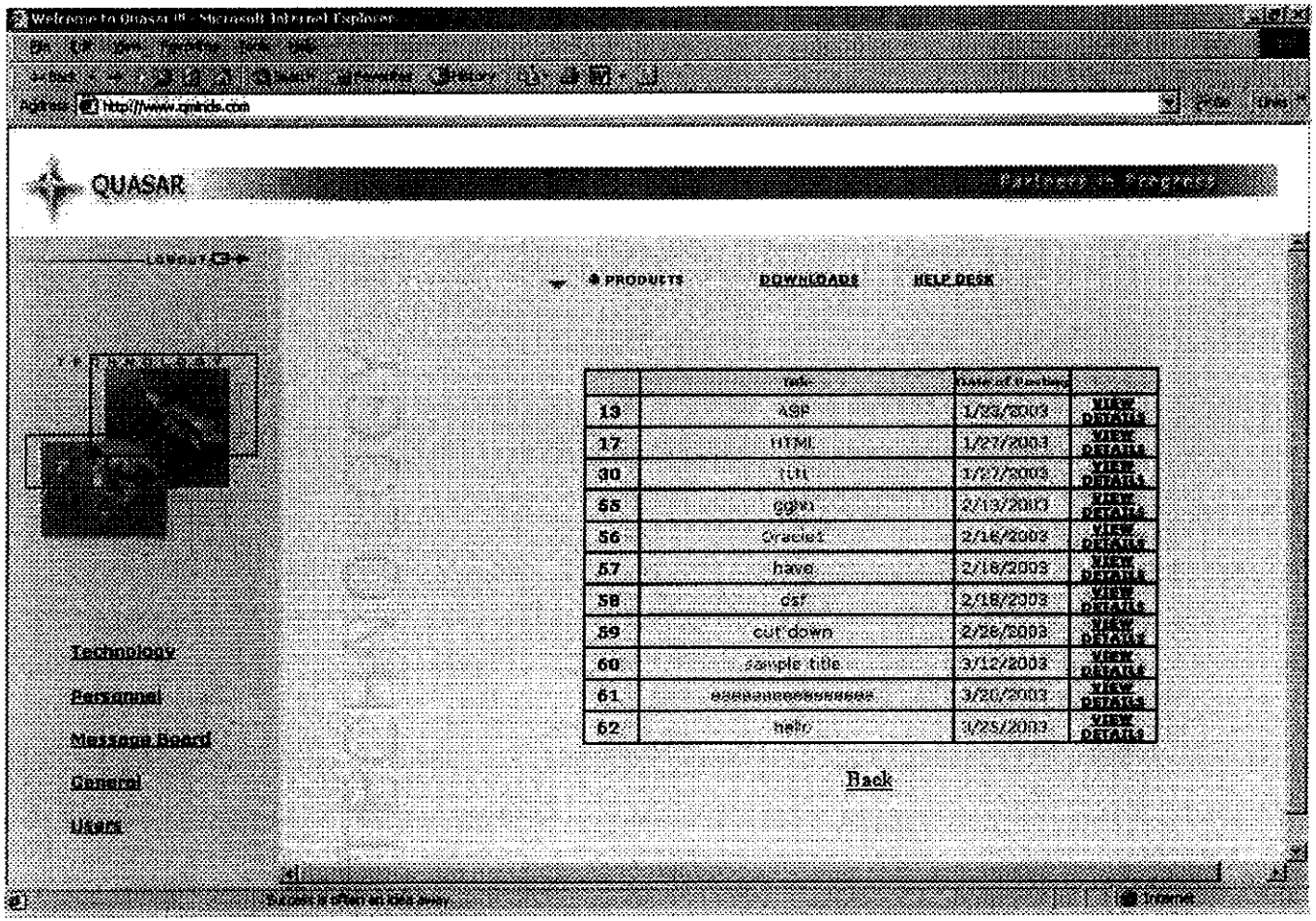

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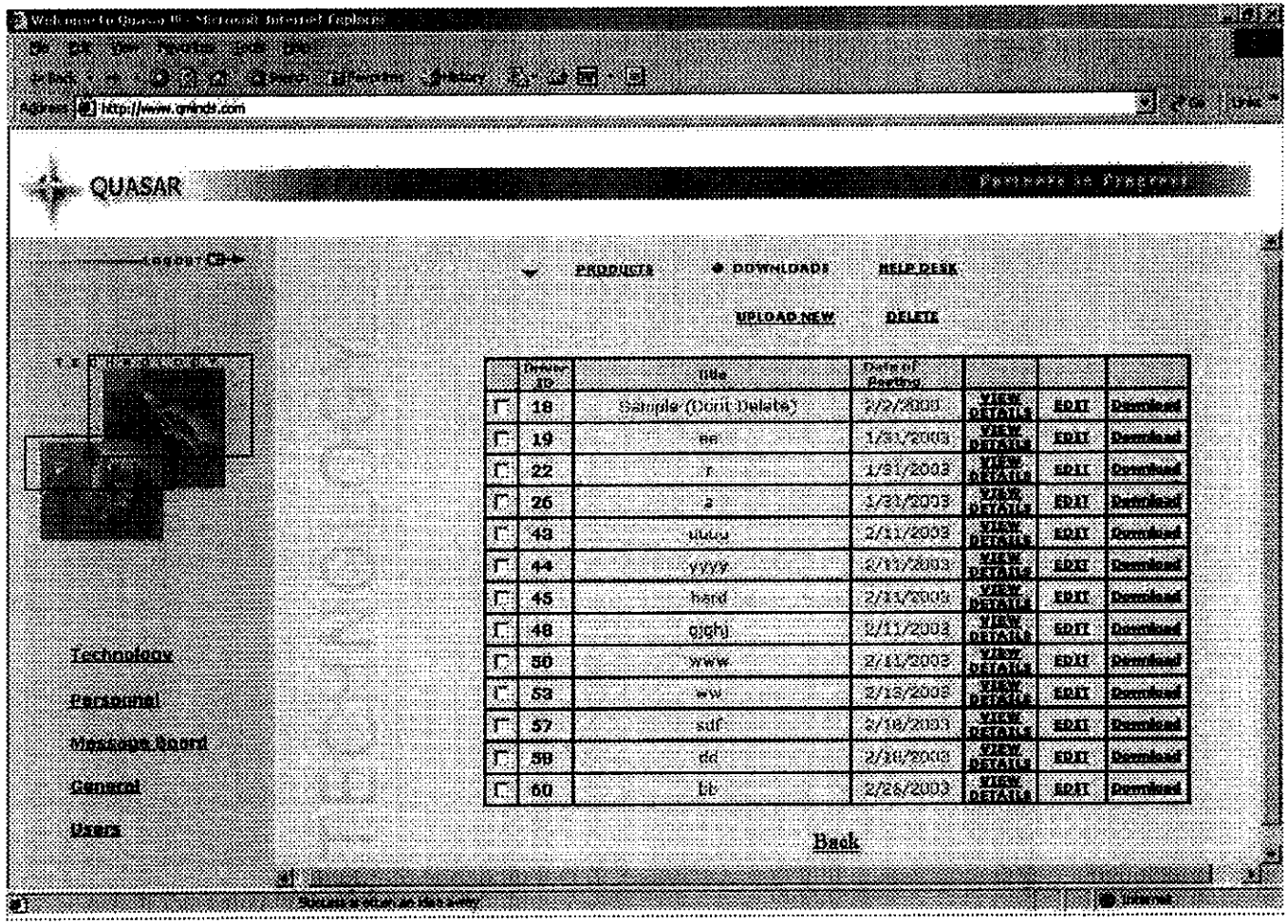

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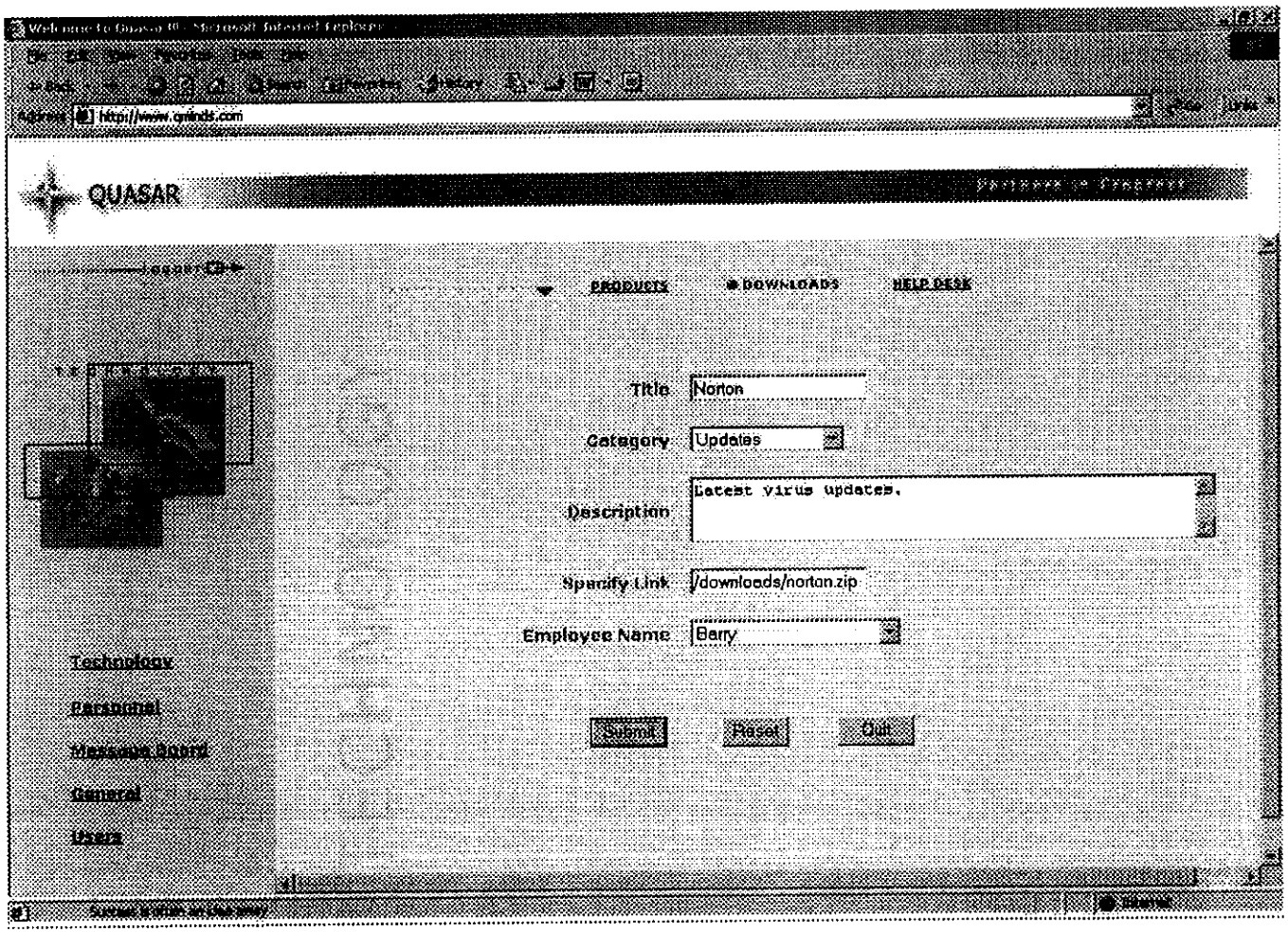

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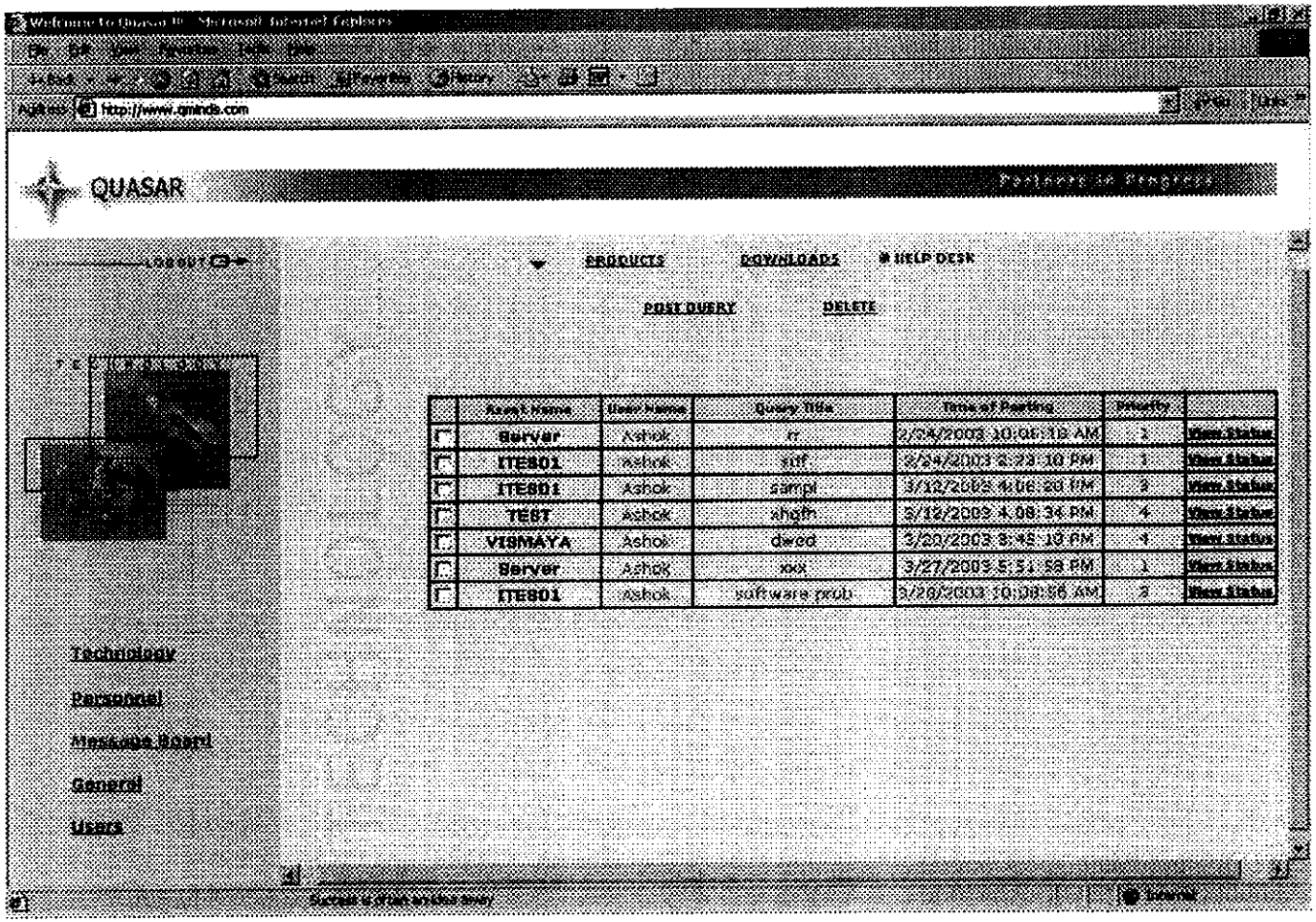

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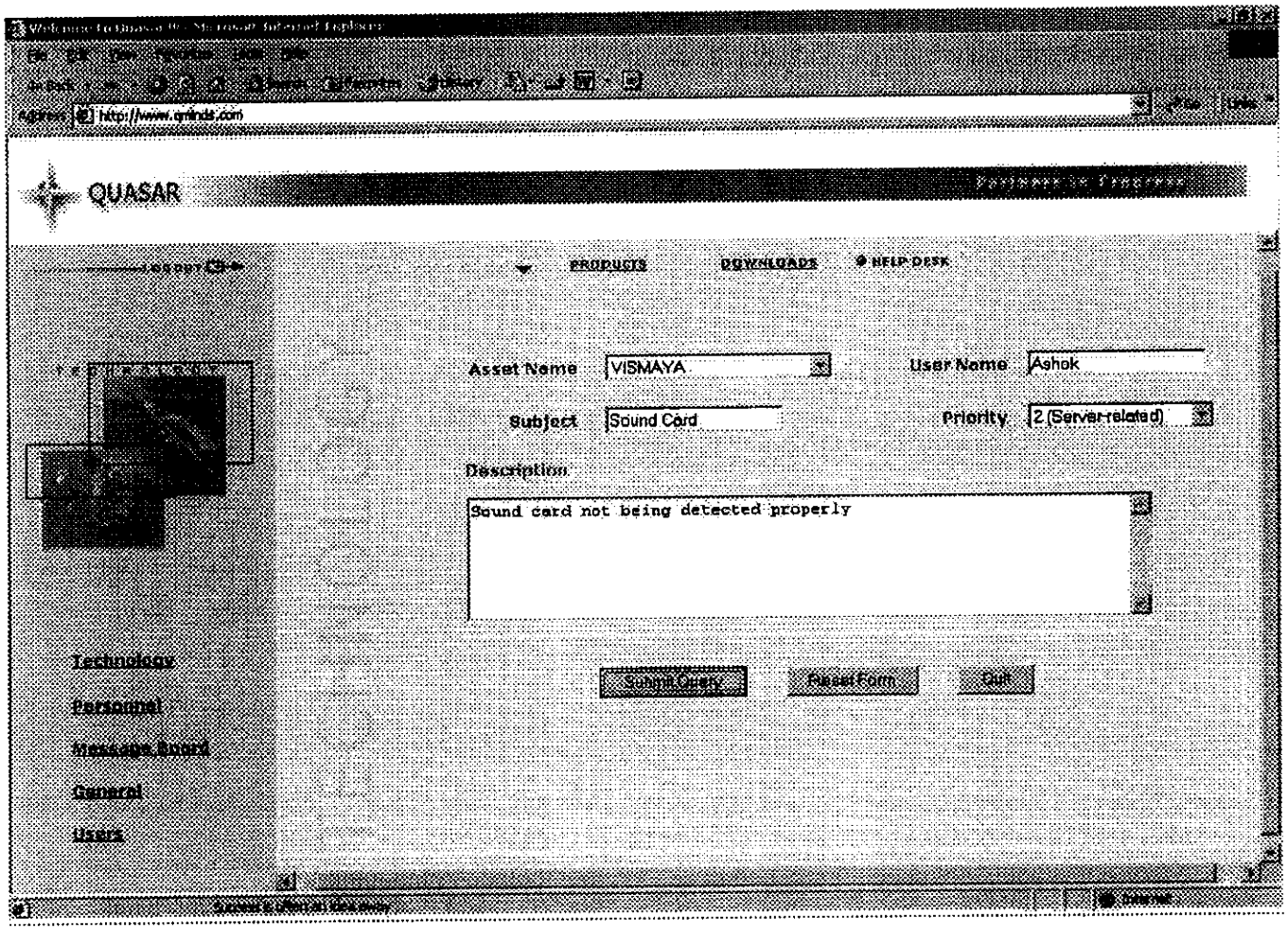

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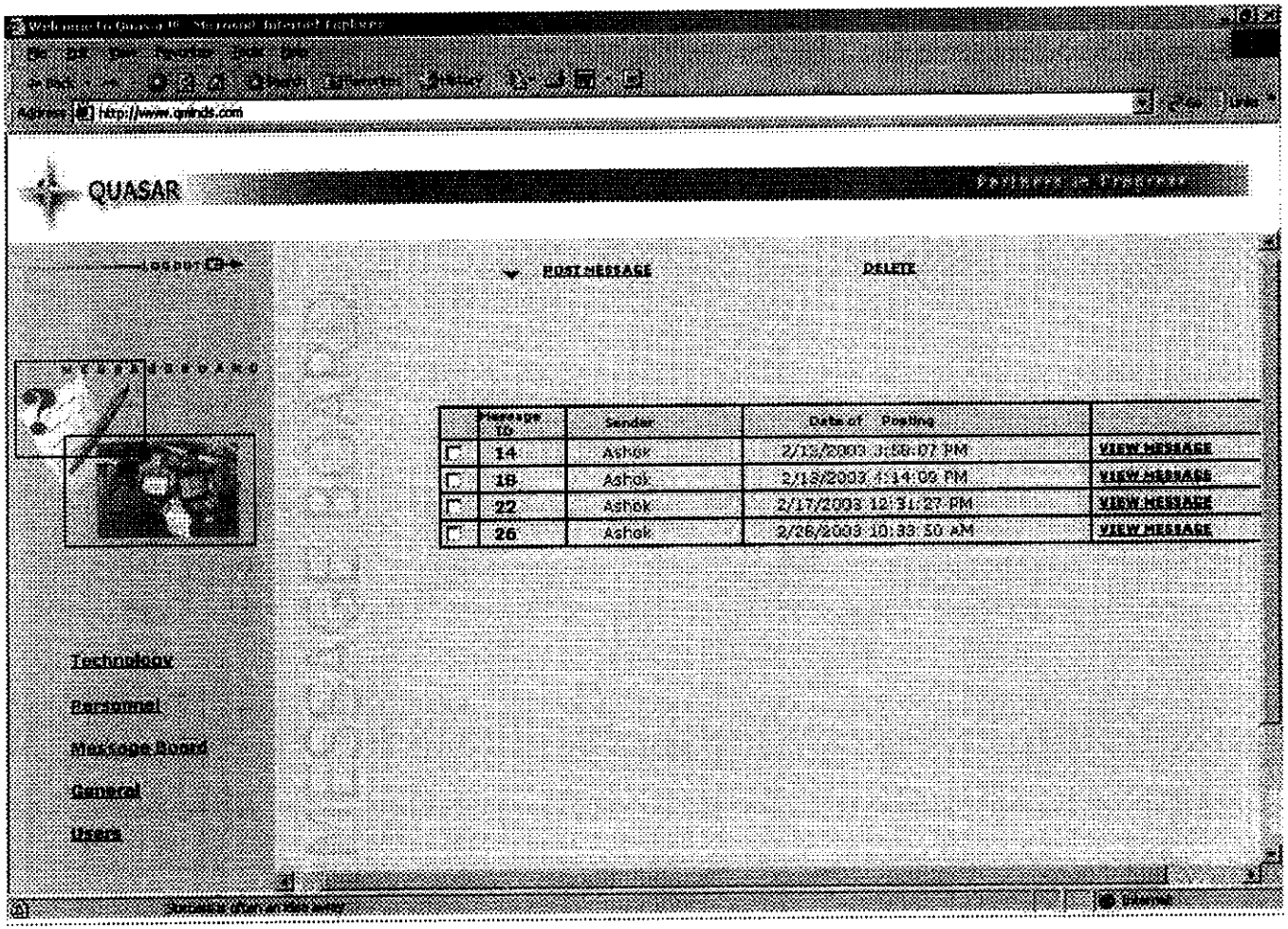

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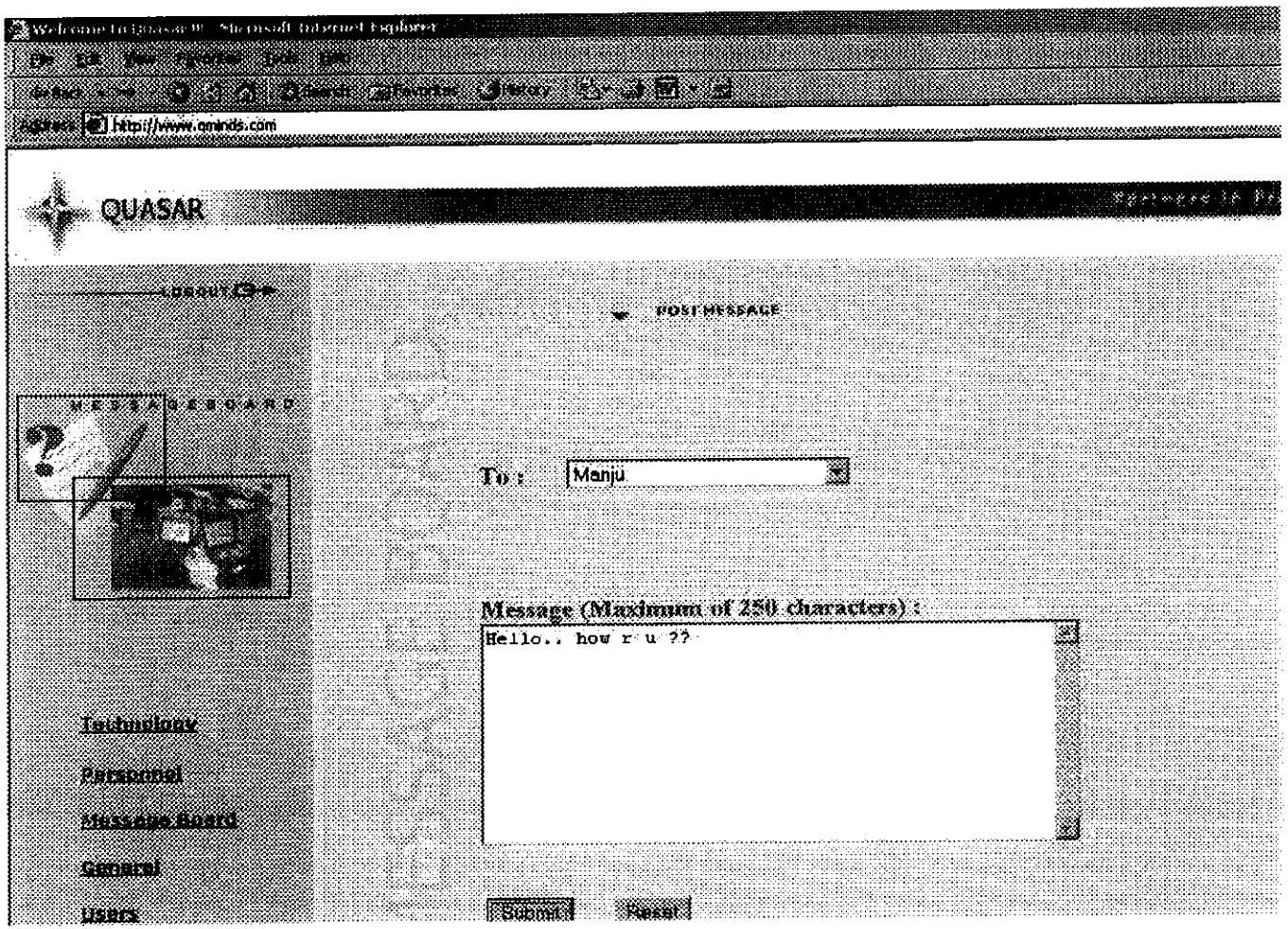

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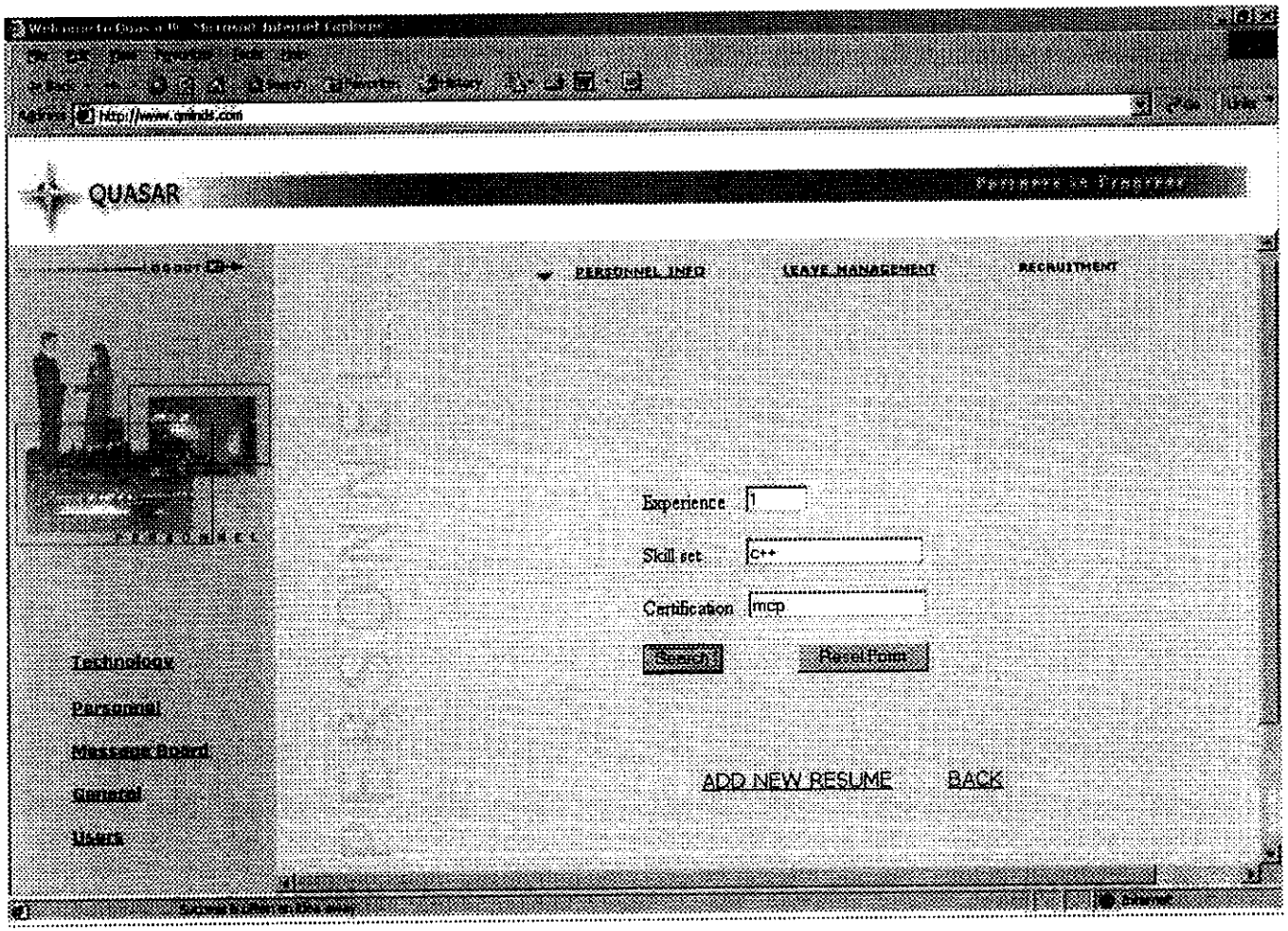

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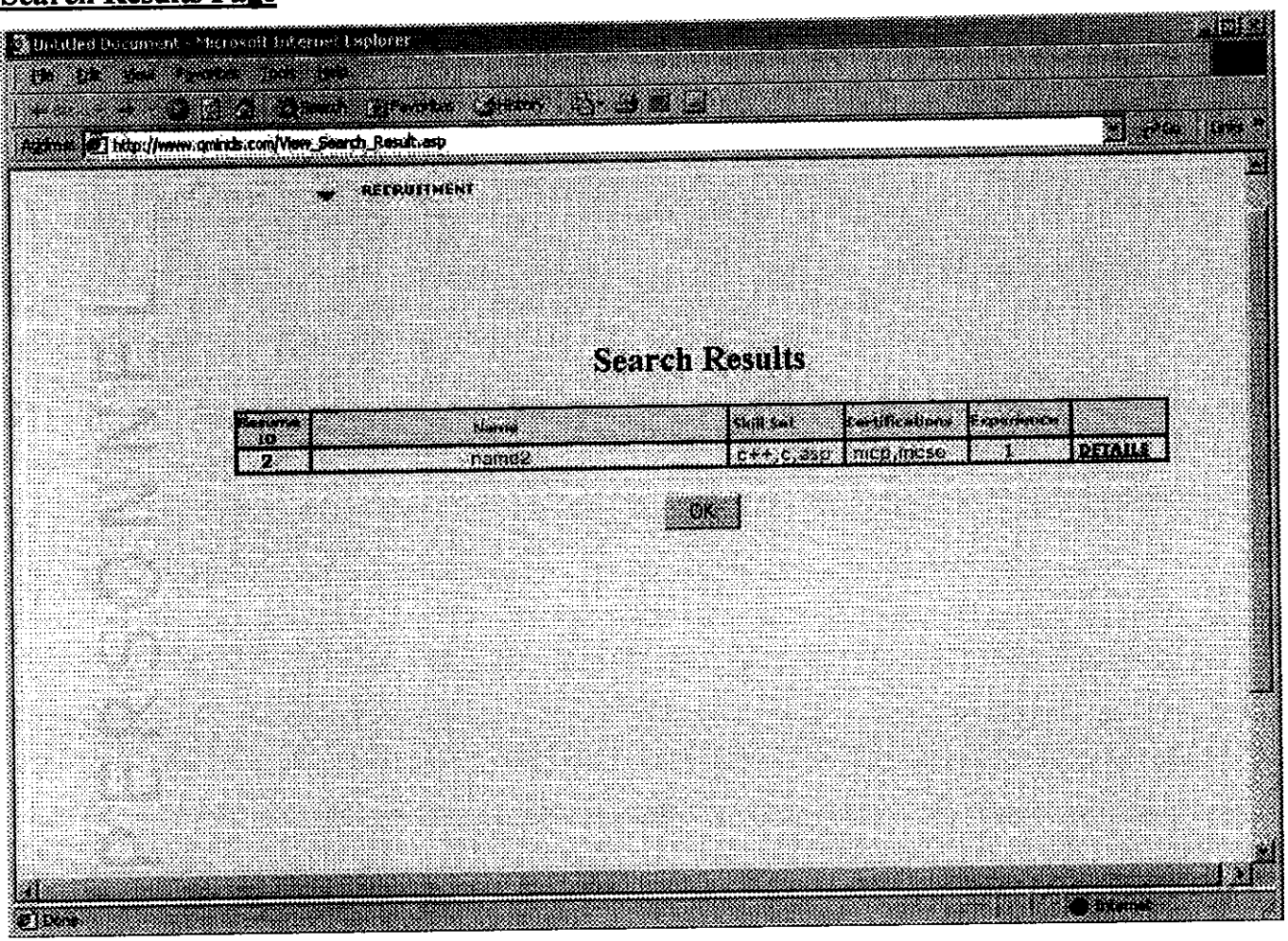

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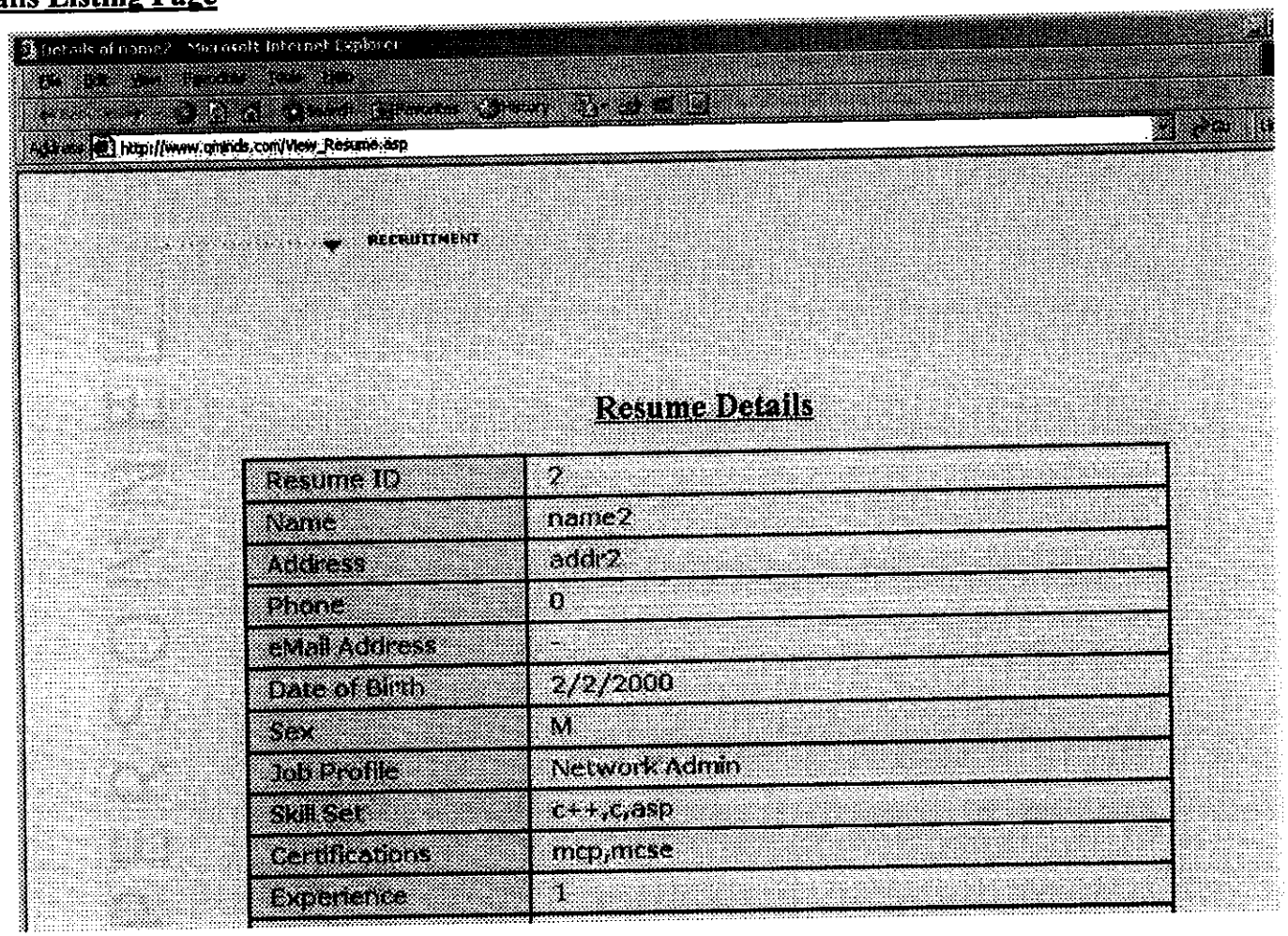

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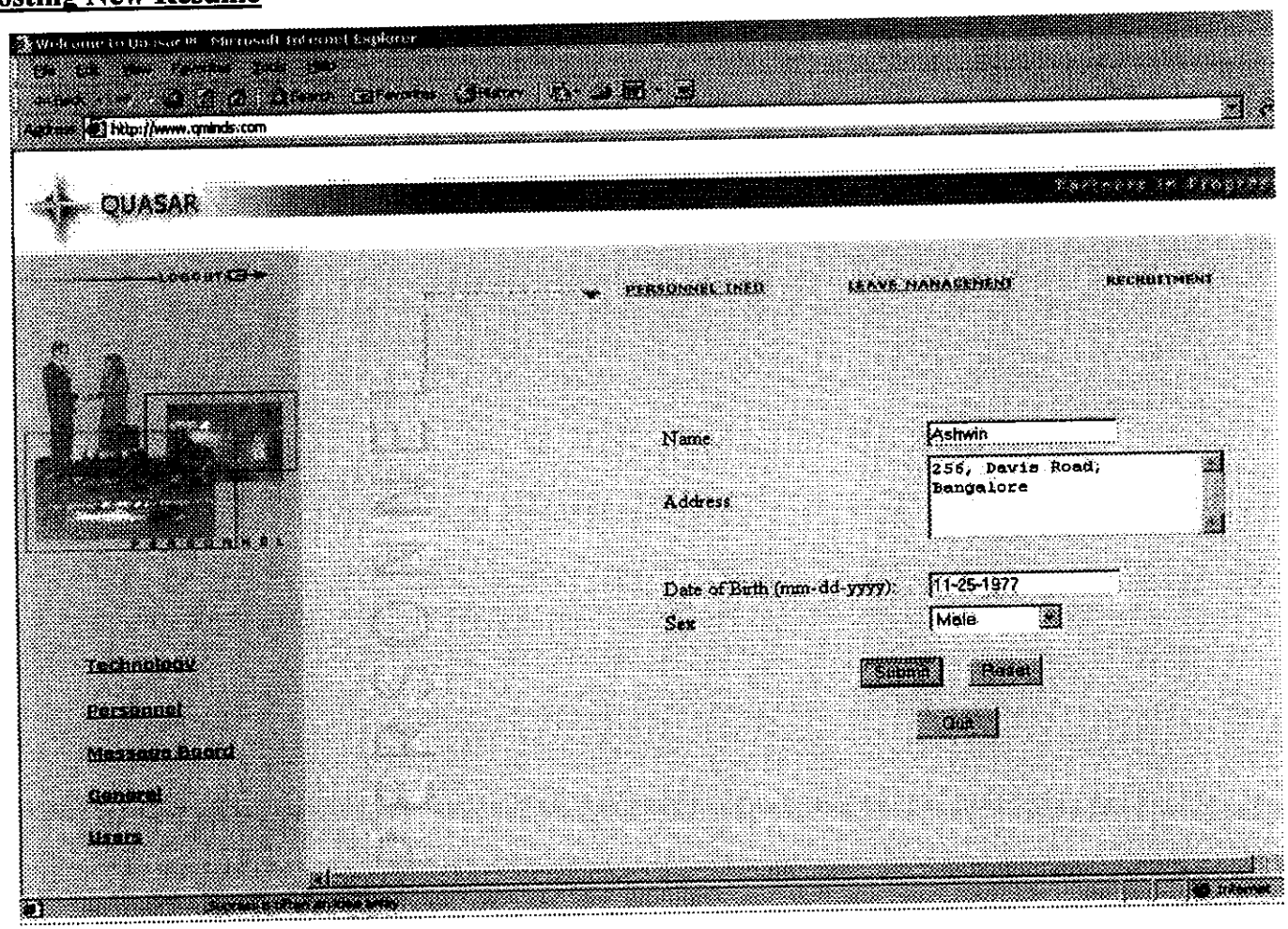

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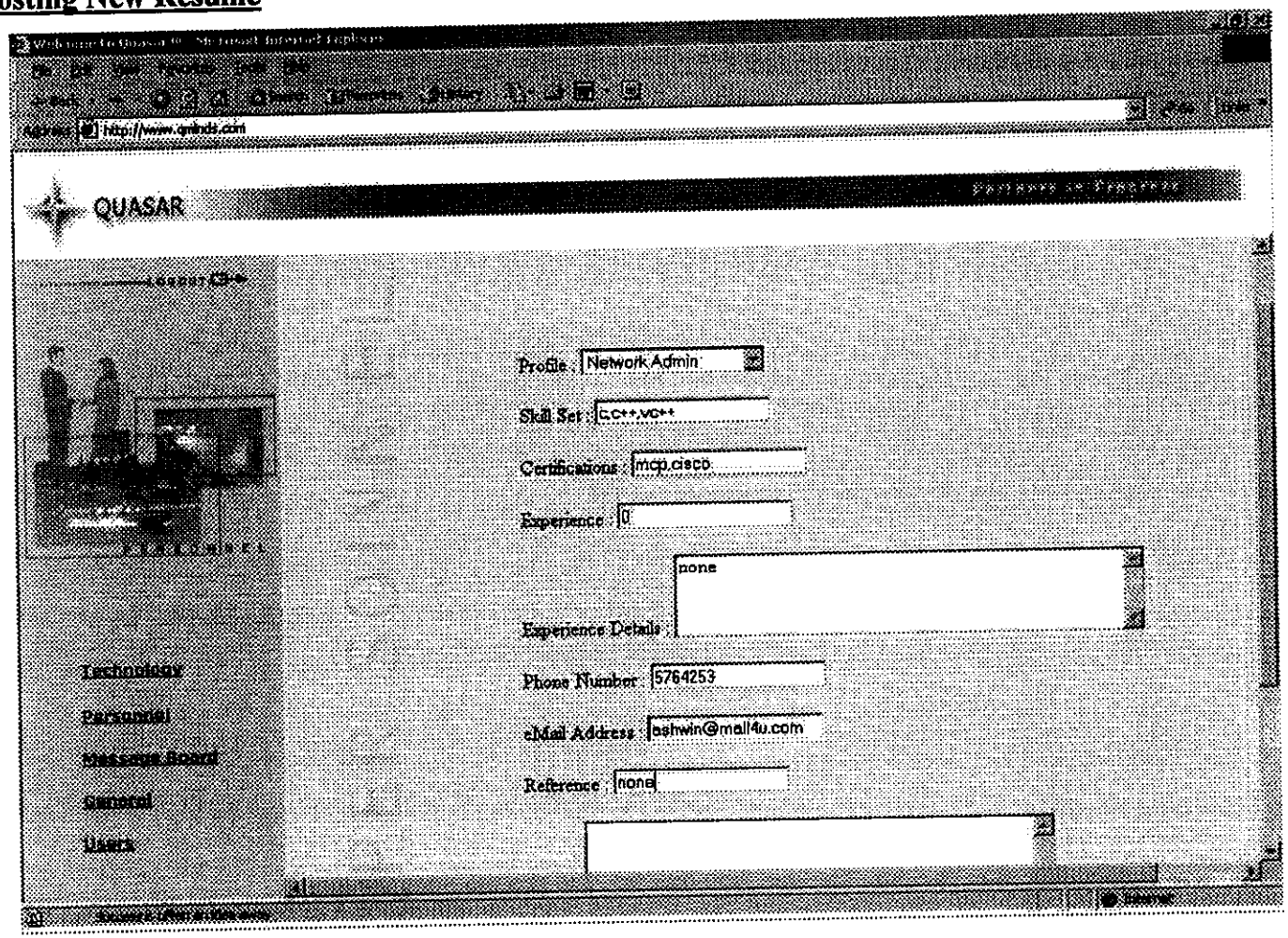

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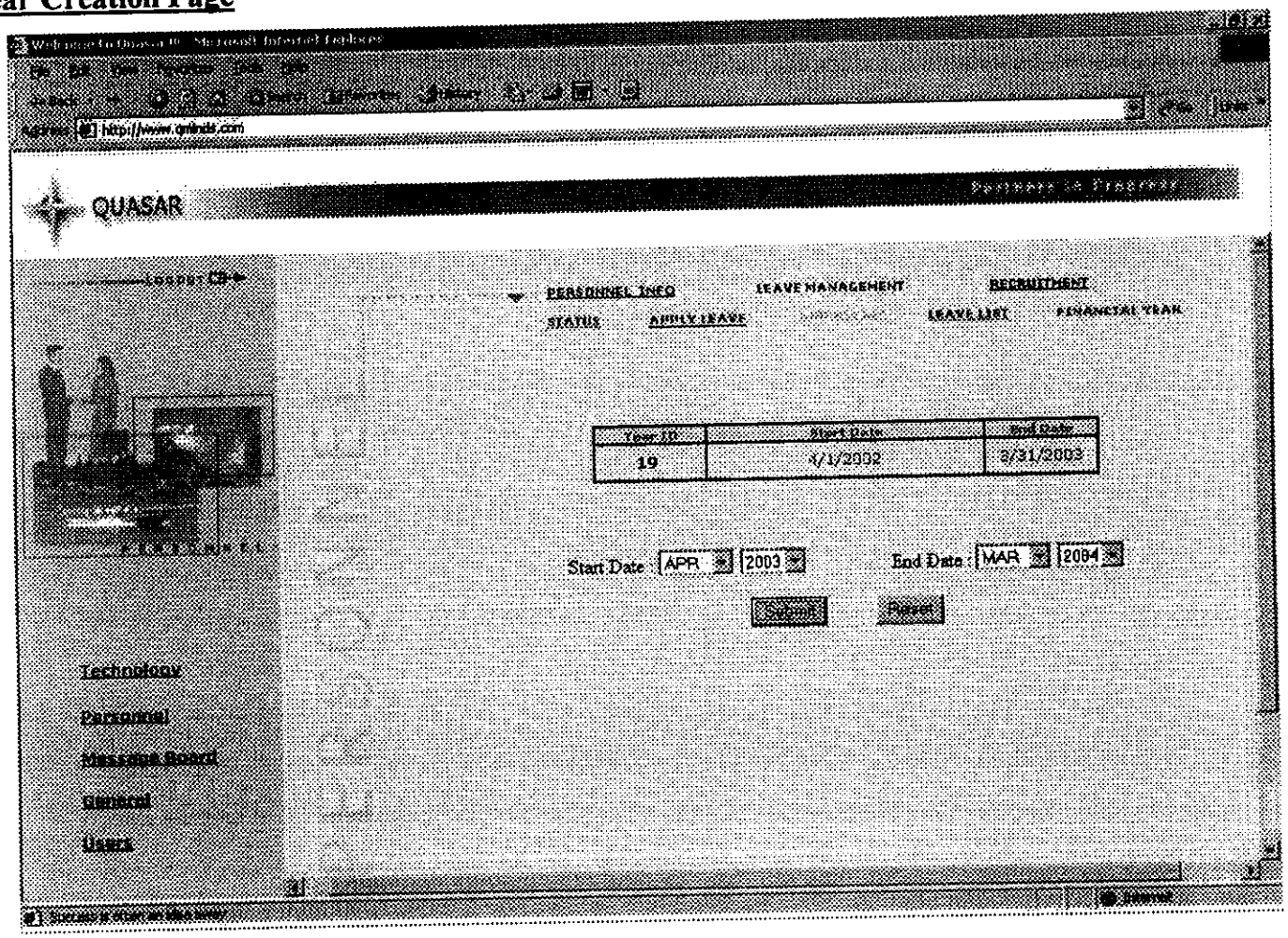

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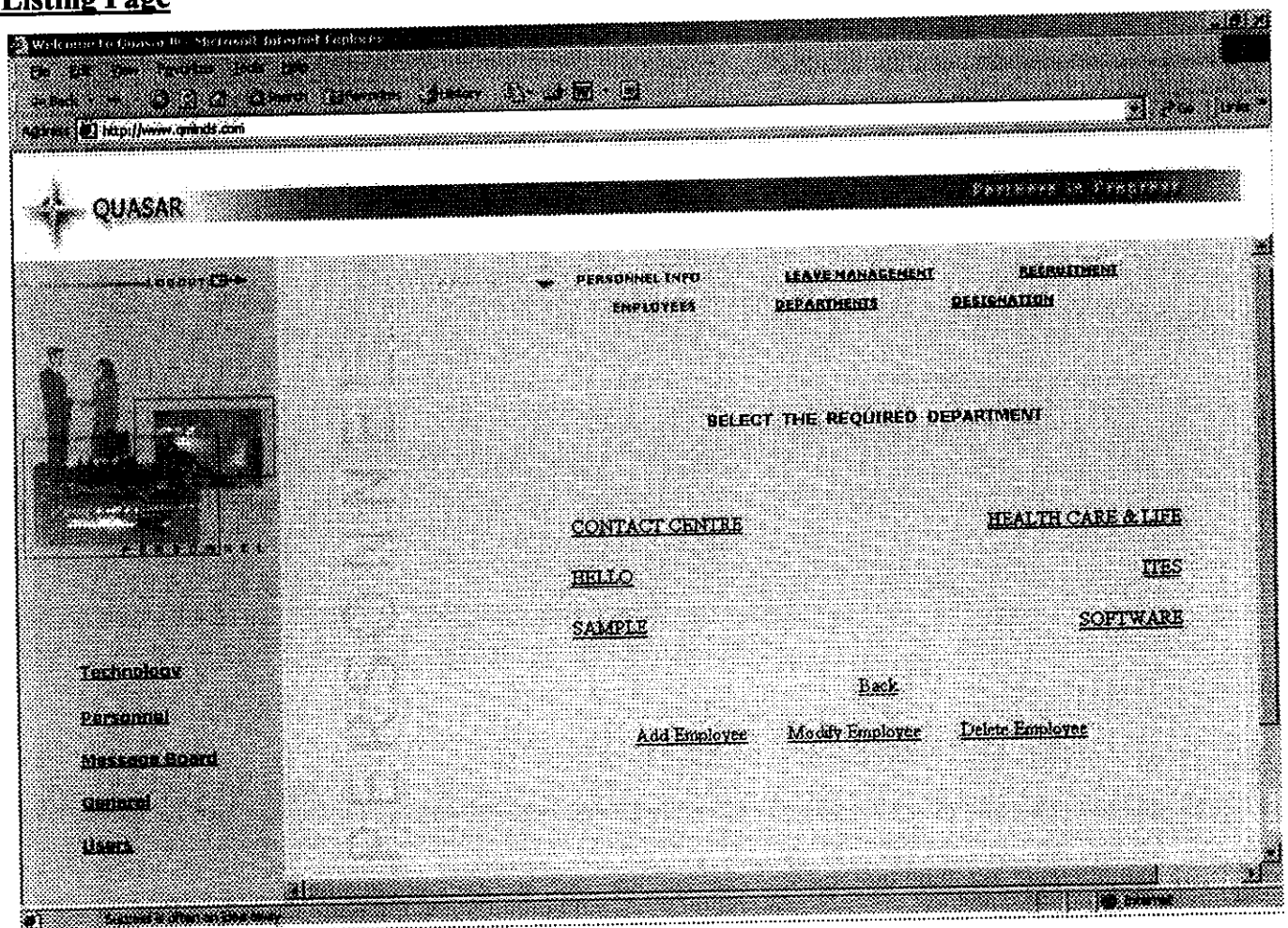

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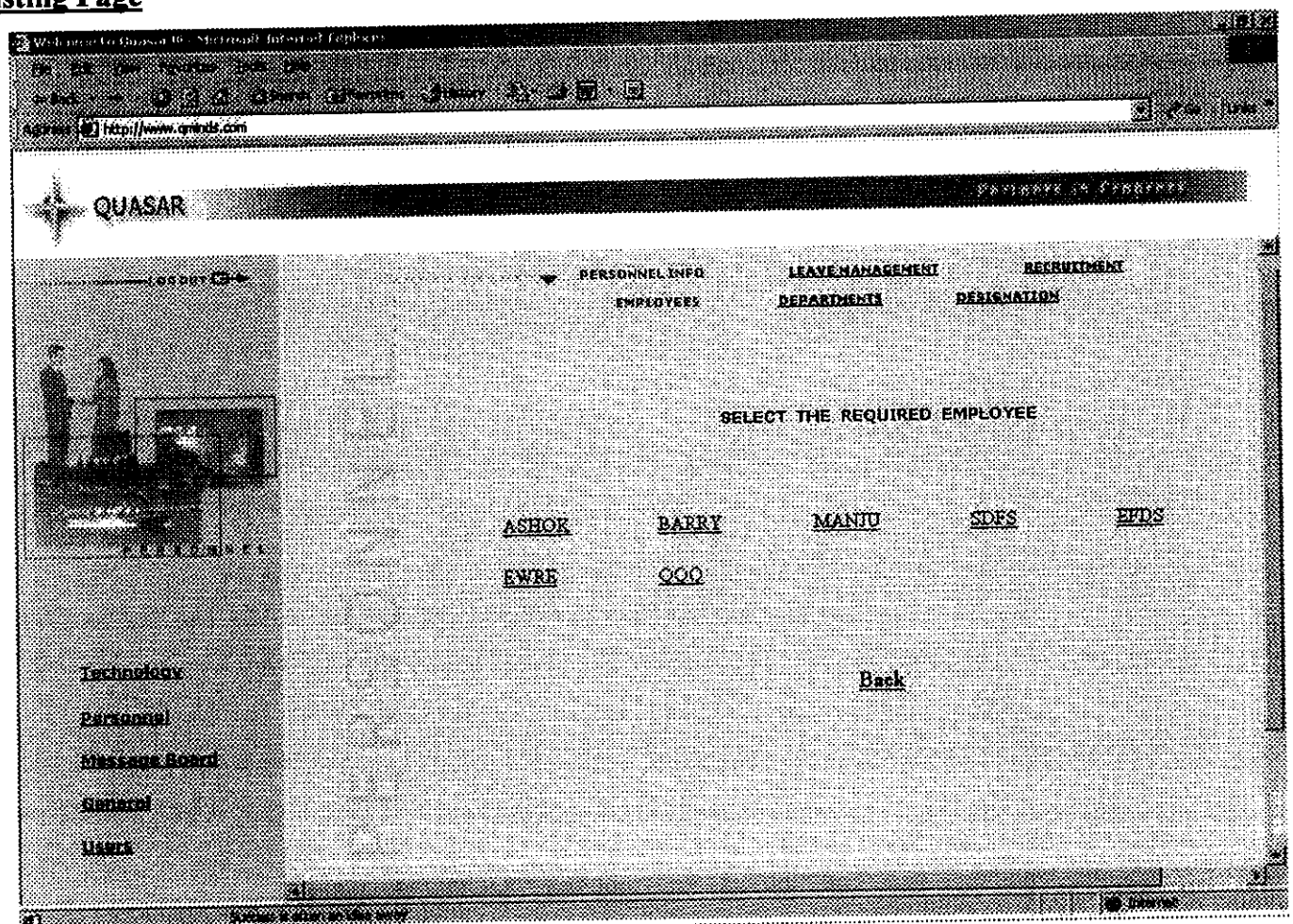

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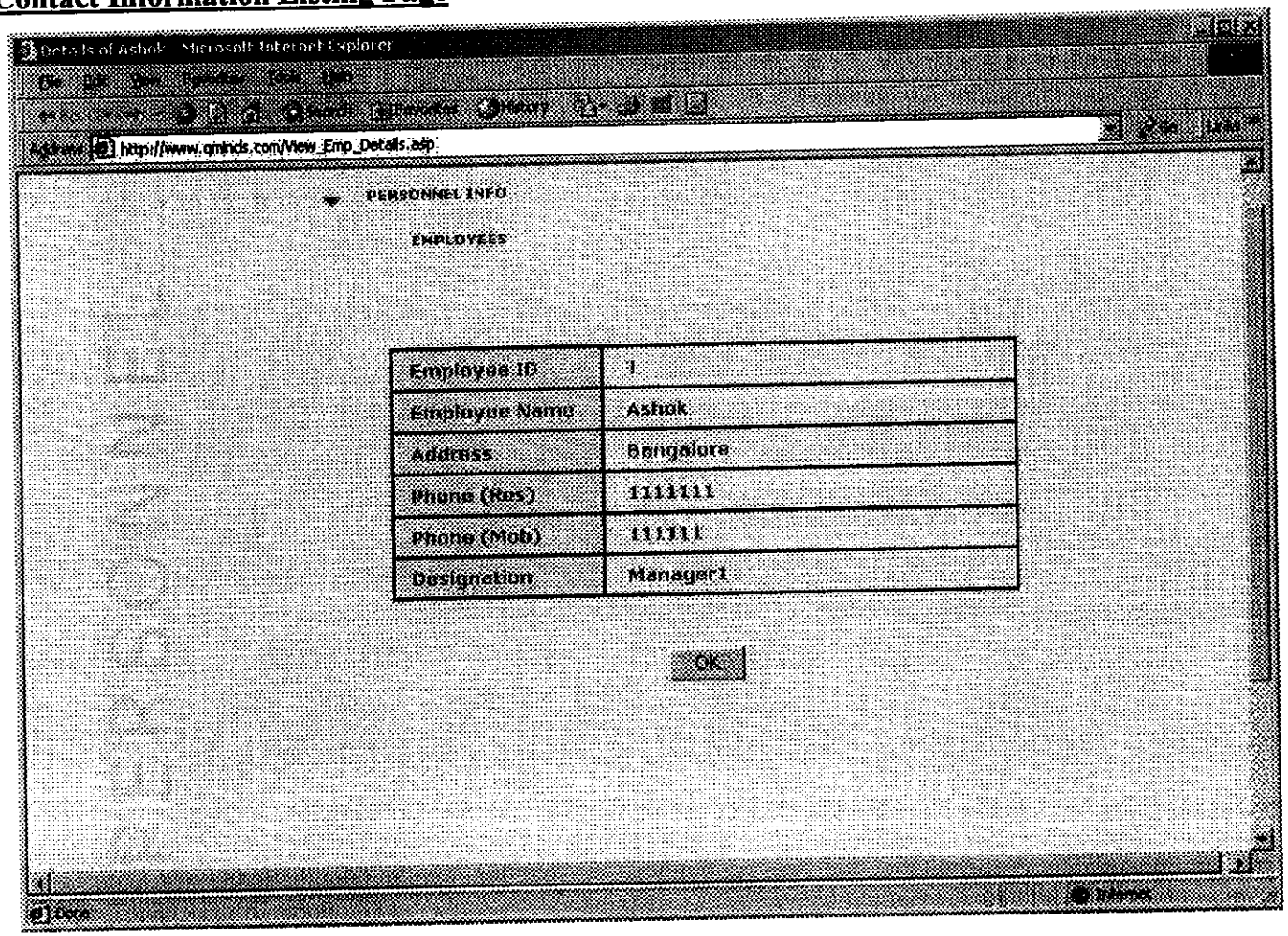

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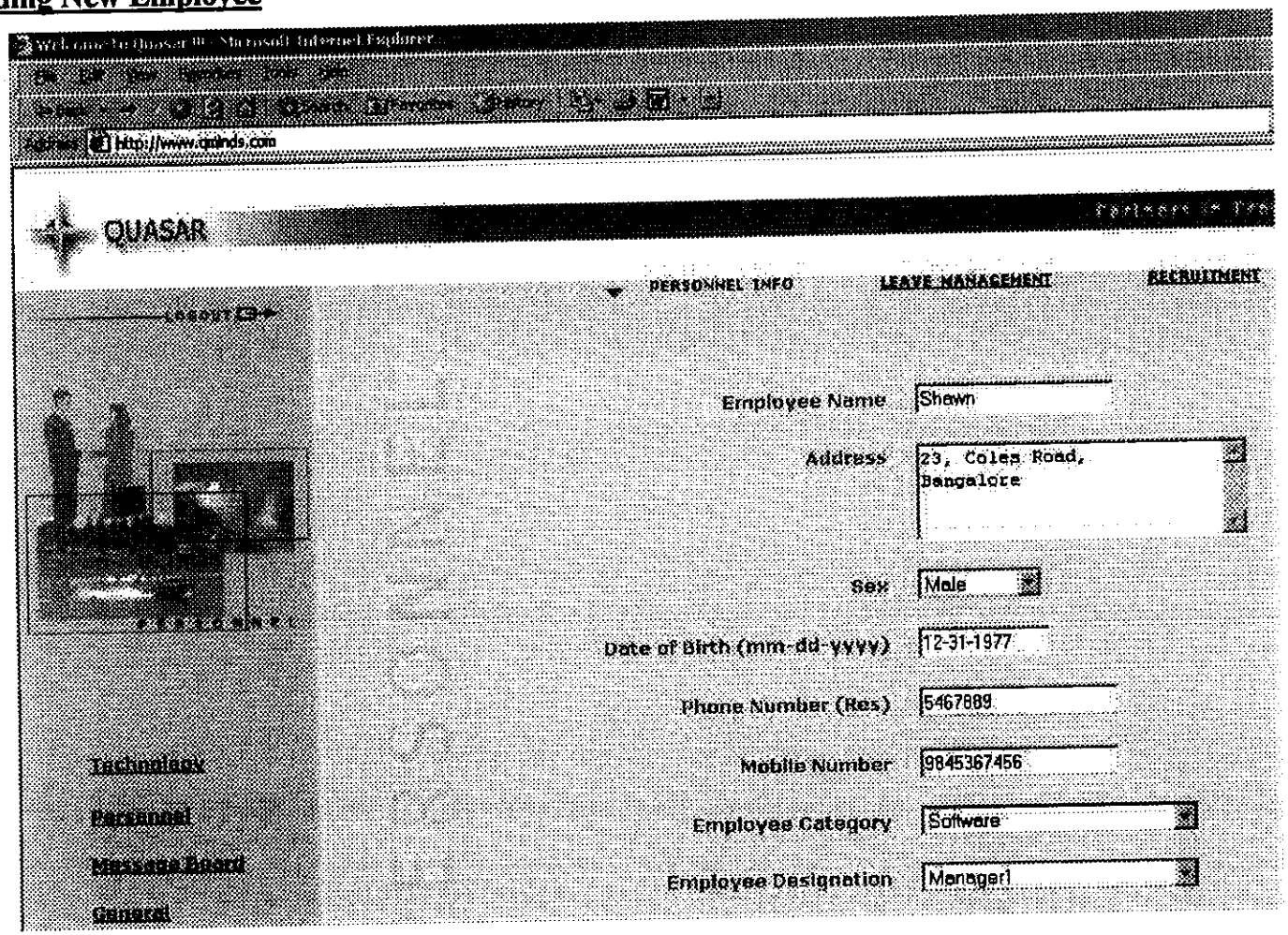

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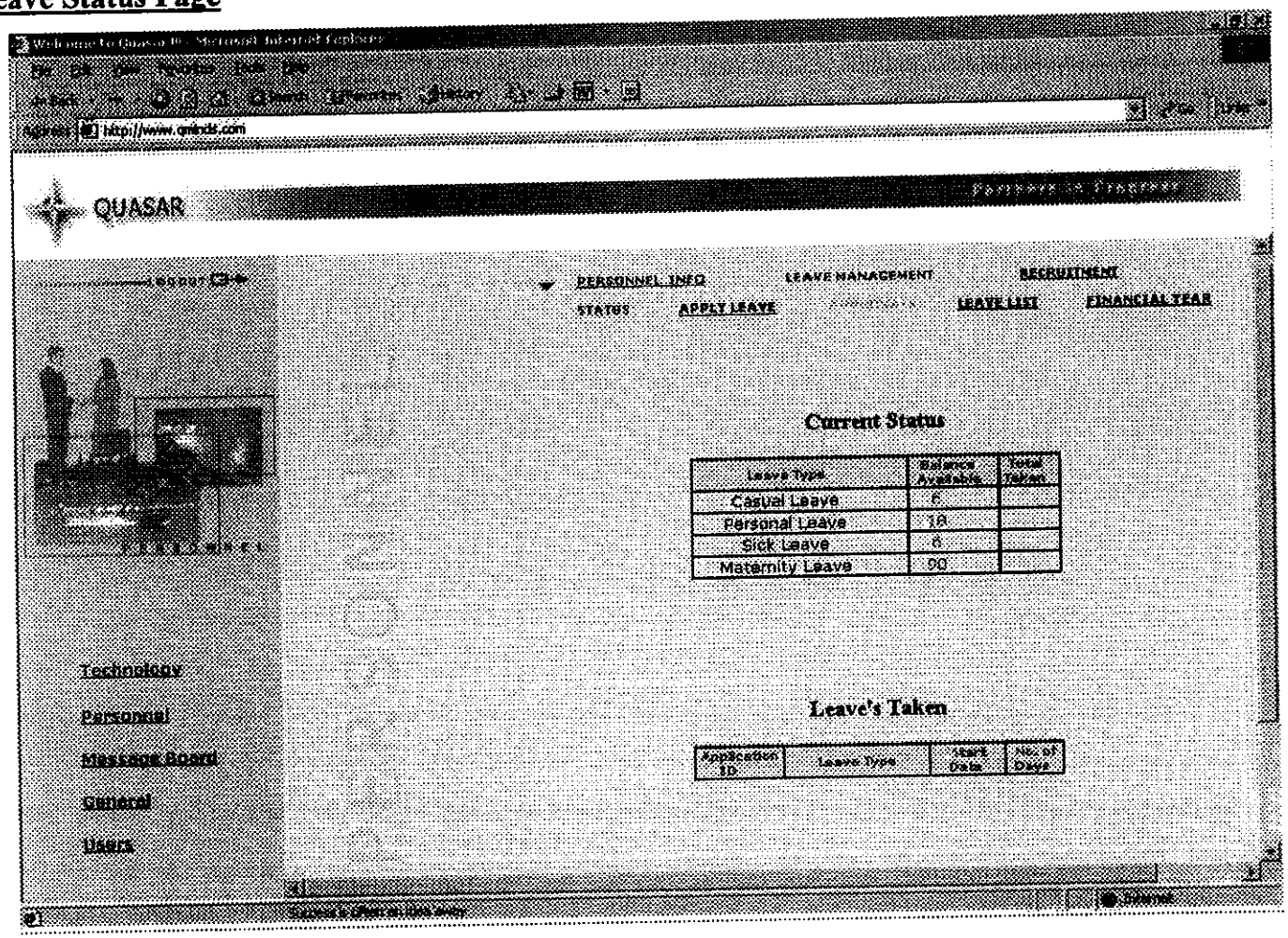

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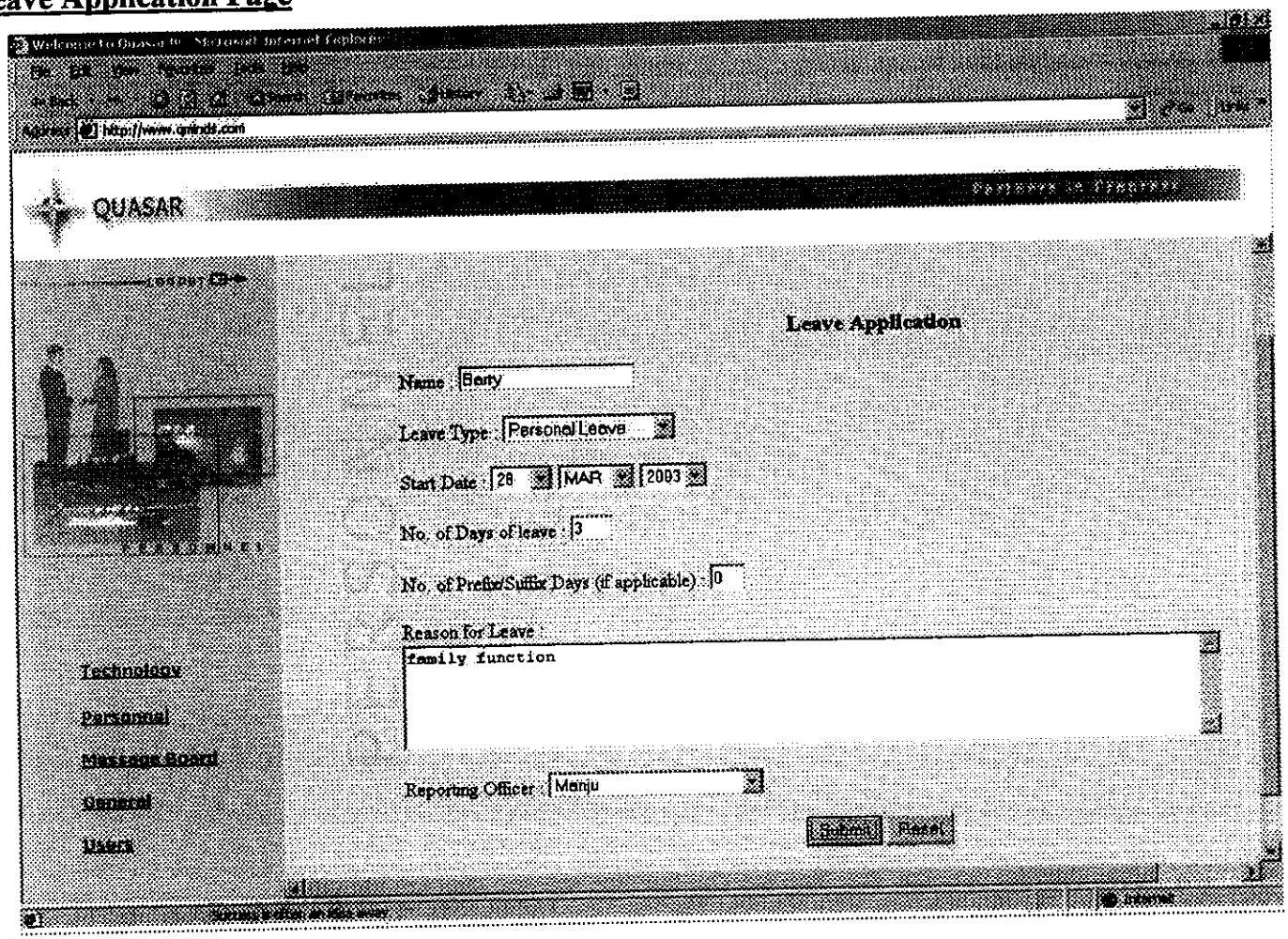

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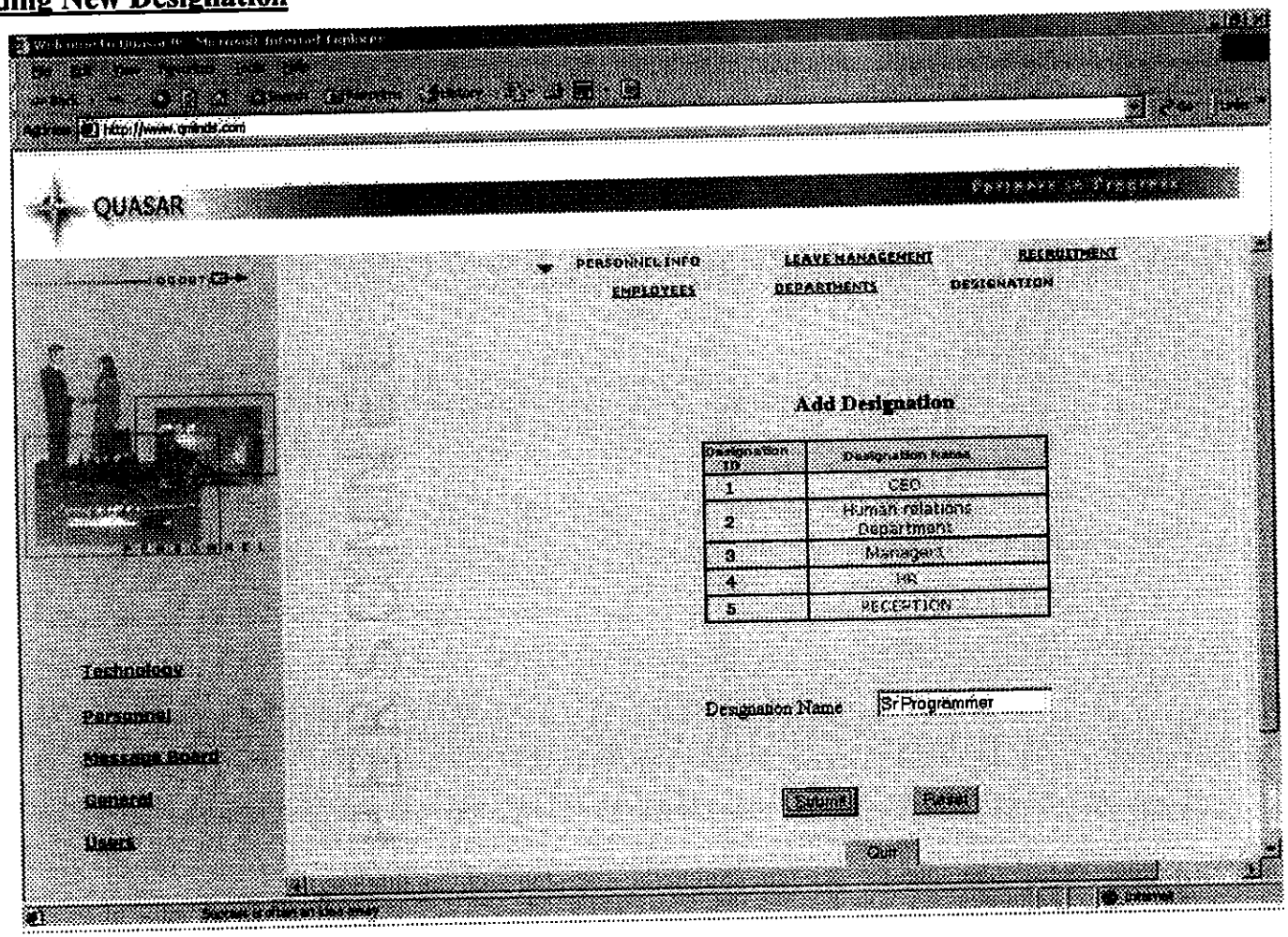

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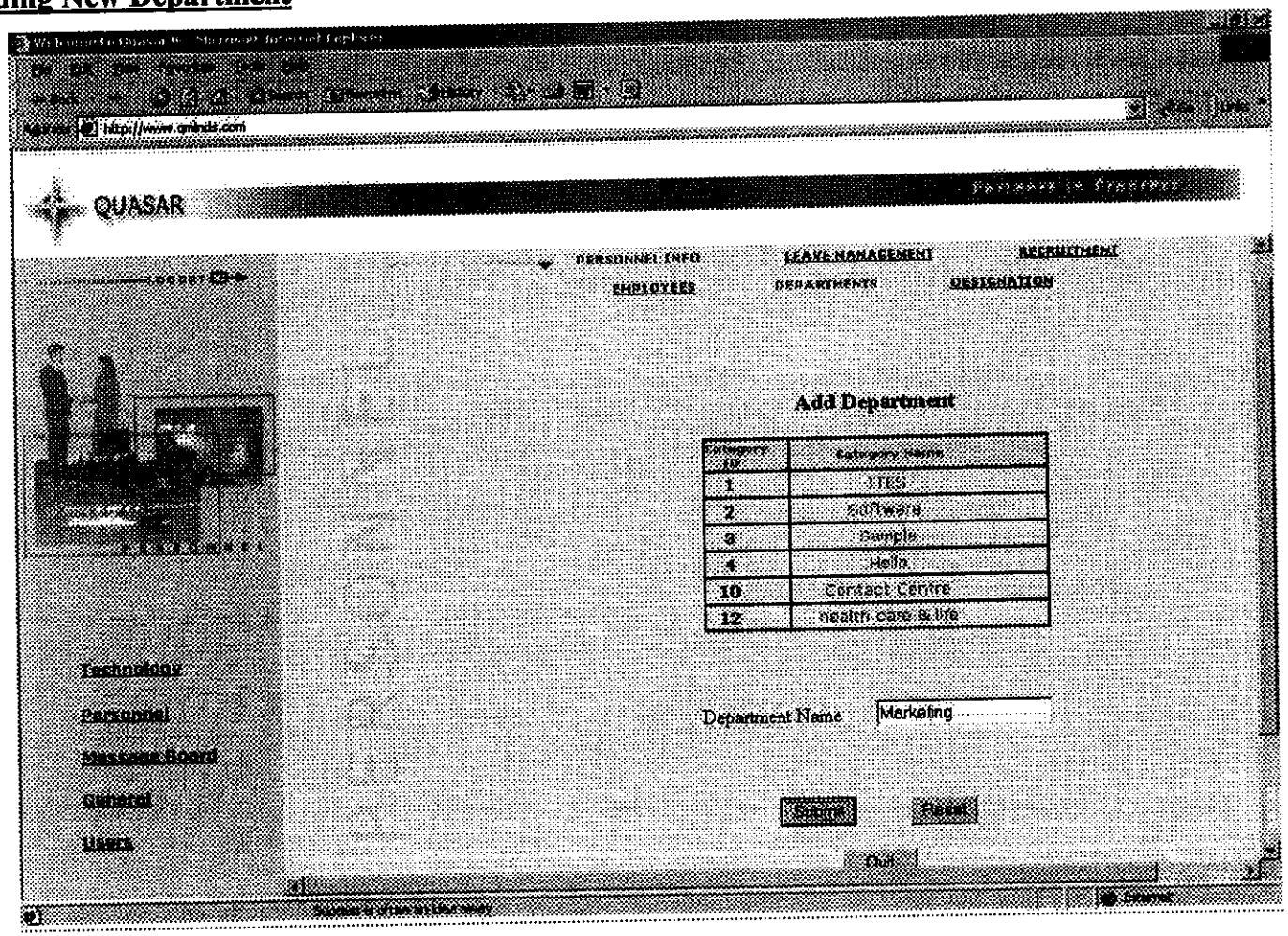

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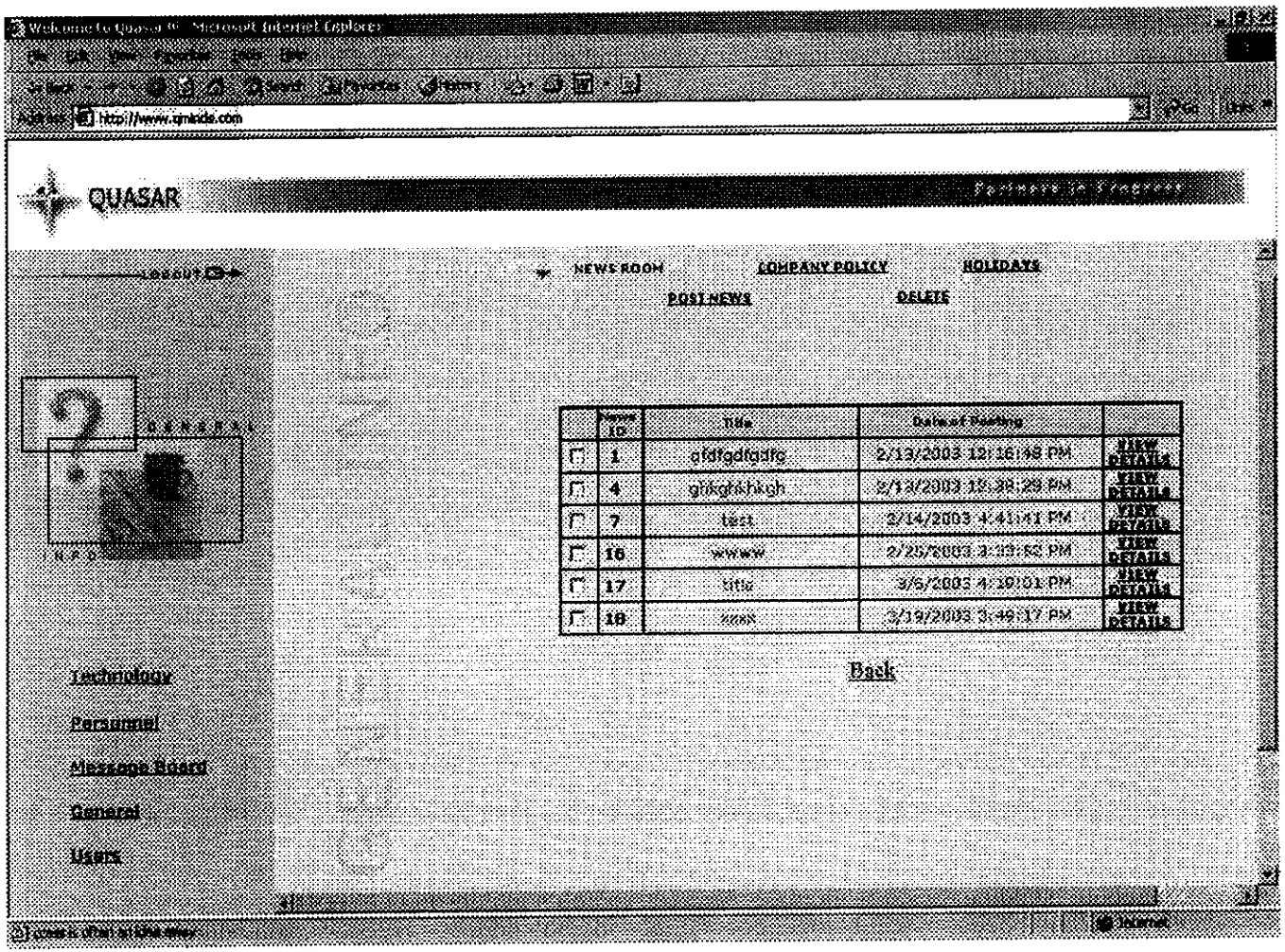

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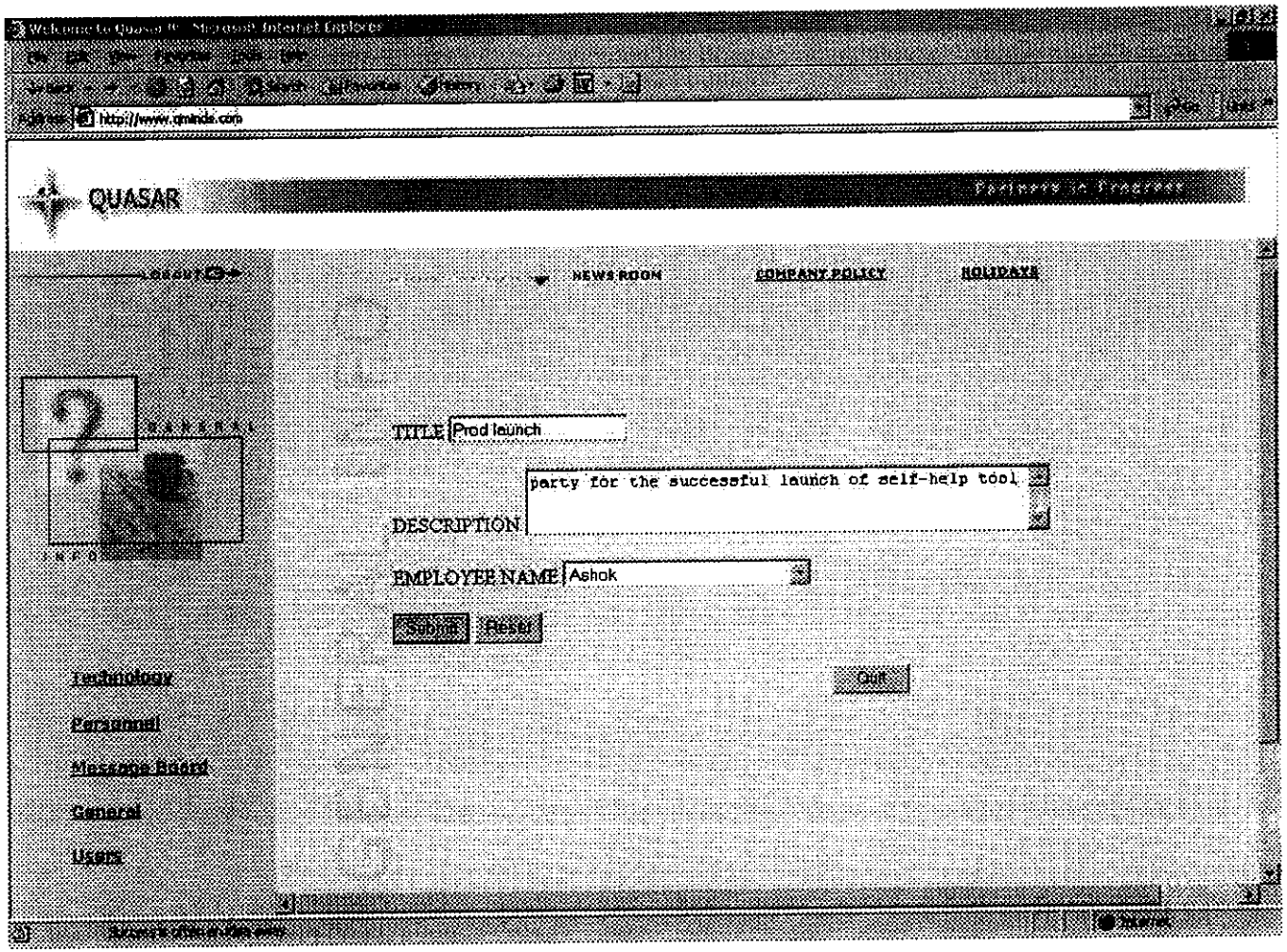

Listing Page