B.Sc. in Computer Science and Engineering Thesis

Bangladesh Navy Officer's Information Management System

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CERTIFICATION

This thesis paper titled **"Bangladesh Navy Officer's Information Management System"**, submitted by the group as mentioned below has been accepted as satisfactory in partial fulfillment of the requirements for the degree B.Sc. in Computer Science and Engineering in December 2014.

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CANDIDATES' DECLARATION

This is to certify that the work presented in this thesis paper, titled, "Bangladesh Navy Officer's Information Management System", is the outcome of the investigation and research carried out by the following students under the supervision of Group Captain Md. Afzal Hossain, psc, Senior Instructor and Head of the Department, Department of Computer Science and Engineering (CSE), Military Institue of Science and Technology.

It is also declared that neither this thesis paper nor any part thereof has been submitted anywhere else for the award of any degree, diploma or other qualifications.

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ABSTRACT

Current age is a world of technology; every organization in the world is going to turn into automation system from the manual system because people may love to work from different location, fast access, keeping digital records and better performance. “Bangladesh Navy Officer’s Information Management System”a part of automation system at BN HQ is highly required for smart functioning of Naval Secretariat Branch of NHQ. Existing system of information management is done both manually and by an old system which is almost outdated. Present system is not robust enough to handle the new upcoming requirements of Bangladesh Navy. Presently the system is in Offline mode and only NS branch has access to it. NS branch face many difficulties while sending some particular information of officers to some other departments of NHQ. So experiencing all those difficulties and to improve the information transaction we decided to develop a web based information management system where NS branch will have main access and other branches will have limited access to the system. Our developed system will be made Online on the intra-network of NHQ and time consuming official information handling will be improved.On successful trial on intra-network infrastructure the project could be integrated to the existing website of Bangladesh Navy.

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LIST OF ABBREVIATION

BNOIMS : Bangladesh Navy Officers Information Management System.
NHQ : Naval Headquarter.
NS : Naval Secretariat.
DNIT : Directorate of Naval Information and Technology.
DNO : Directorate of Naval Operations.
DNP : Directorate of Naval Personal.
SONA : Staff Officer Naval Appointment.
DNI : Directorate of Naval Intelligence.
UML : Unified Modeling Language.
OORP : Object Oriented Rapid Prototyping.
SQL : Structured Query Language.
TCP : Transmission Control protocol.
HTTP : Hypertext Transfer protocol.
FTP : File Transfer Protocol.
SQL : Structured Query Language.
PHP : Hypertext Preprocessor.
HTML : Hypertext Markup Language.
CSRF : Cross-Site Request Forgery.
CSS : Cascading Style Sheet.
ISO : International Organization for Standardization.
URL : Uniform Resource Locator.
IP : Internet Protocol.
WAN : Wireless Area Network.
OPR : Officer's Performance Record.
ERP : Enterprise Rresource Planning.
IP : Internet Protocol.
WAN : Wireless Area Network.
OPR : Officer's Performance Record.

CHAPTER 1
INTRODUCTION

1.1 Overview

The use of information and communication technology has been playing a vital role in the 21st century due to Globalization.To adapt with the new technical era of Globalization,the democratic government of Bangladesh has declared the “vision 2021”which targets the establishment of a resourceful and modern country by 2021 through effective use of information and communication technology so that the country could be represented as “Digital Bangladesh”.

“Digital Bangladesh”does not only refer to the broad use of computers, perhaps it refers to the modern philosophy of effective use of technology in terms of implementing the promises in education, health, job placement, e-office system etc [1]. Therefore, the government underscores a changing attitude, positive thinking and innovative ideas for the success of “Digital Bangladesh”.

The first step of digitalization starts from the government itself. The vision was to make all the official system correspondence, file maintenance, official communication online based which refers to the e-office system. To cope with the Government’s Digitalization plan, Bangladesh Navy took its step towards the digitalization of Navy. Since Navy always depends upon the latest technology and ICT based infrastructure, it is imperative to automate the functionality of Bangladesh Navy. It is experienced that there are a lot of space to automate the organization. After the automation of a system its functionality becomes easy, reliable, fast and very handy to the personnel of Navy. The first step of this Digitalization is to make an efficient, online based officers Information Management System for Bangladesh Navy. The system also contain online leave application,confirmation of leave,asking individual query to naval secretariat and getting the answers of all query. This online based procedure reduces huge official complexity and enhances proper functioning of NS.

1.2 BNOIMS

BNOIMS is a web based system consisting of detailed information about each individual officer of Bangladesh Navy. The system consists of two parts. First part consists of the information database and second part consists of the web based access system including user interactive platform. Since NS needs to deal with all the information of an officer including his personal info,course and career info,OPR info,transfer info,UN mission info and current appointment info. All this information under same account is available for update or insert. This reduces the separate file handling for an officer. The selection process for any course or mission has become easier by manipulating the available information. From the user end all officer of Bangladesh Navy will get an access to their individual account and have the authority to view their basic information and update few of their information. The user could apply for any types of leave in online and would get the permission or declination in online. They will also be able to transmit any information or their query to the NS through the user feedback system. Overall the system ensures better performance and thus enables the efficient functioning of NS.

1.3 Objectives

We have developed an online based Officer's Information Management System for the Naval Secretariat department of Bangladesh Navy. Our main objectives are:

1. Studying the feasibility of introducing automation in Bangladesh Navy.

2. Explaining the automation of activities at NHQ to show that it can function smoothly.

3. Proposing the web design for the Officer's Information Management System.

4. Combining several related activities together to automate different form entries.

5. To make easy process of online information filing and leave application of officers ensuring minimizing hassles and time

6. Significantly increase the operational efficiency of Naval secretariat.

7. Proposing future expansion of the information management system for Naval Secretariat.

1.4 Scope of Thesis

The project propositions are described below

1. Carrying out detailed study and analysis of the existing offline based database for the officers of Bangladesh Navy.

2. Designing an online based database system and information entry form.

3. Determining different modules to be engaged for online form filling and accumulate those modules to the process.

4. Developing user friendly and secured web based information management system.

5. Ensuring different types of security protocols for different categories of user.

6. Enabling auto calculation of data based on their pre-requirements.

7. Enabling automation for different modules.

8. Designing and implementing the Officer's Information Management System Database.

9. Implementation of the system in full.

1.5 Problem Statement

The existing database of the Naval Secretariat of Bangladesh Navy is fully offline based. The database is limited only to the personnel of the NS branch. No other department has any access to the information system thereby paperwork system is still prevailing while providing or fetching information to NS or other departments. This manual paperwork system is time consuming and full of hassle. Again no other individual officer has access to the database which limits the update of different data fields. Thus the system is not robust enough to handle the information which are changing time to time.

So from this point of view the Naval Secretariat department of Navy Headquarter has taken initiative to develop an online based and interactive information management system for the officers of Bangladesh Navy in collaboration with the Computer Science and Engineering Department of Military Institute of Science and Technology.

1.6 Thesis Organization

This thesis consists of eight chapters. Chapter one introduces the overview, objectives, BNOIMS, scope of the thesis and problem statement.

Chapter two contains the review of the existing database system of the Naval Secretariat, the advantages and disadvantages of the existing system, block diagram of the existing system, system review and the proposed system.

Chapter three includes the customer requirement specification(CRS) which indicates the requirements by the Naval Secretariat for a newly built information management system. Chapter four includes the software requirement specification(SRS) of the designed software.

Chapter five contains the details process of BNOIMS. It includes the system incorporation, process of system running and selection of language to design the web based application.

Chapter six contains the security aspects of BNOIMS. This features the overview of security aspects, web application security, threats to the website and the security measures of the newly designed website.

Chapter seven contains the discussion about the newly built system. This contain features about the advantage of the new system, disadvantage of system and the problem faced while designing the system.

The last chapter contains the conclusion. It includes the concluding words and the future expansion of the BNOIMS.

CHAPTER 2
PRELIMINARY WORK AND BACKGROUND INFO

2.1 Review of Existing System

The existing System serves the purpose of processing all information in regards to an officer whether in service or on retirement. Facilities for entering, storing and processing both static and dynamic type of information are provided. All features are menu driven. There are nine menus in existing system. The administrator of present system is NS department. Naval secretariat of NS department has the sole authority regarding administration, posting, promotion and career of BN officers. There are separate staffs under him. The NS department contains all the information about all officers of Bangladesh Navy. The system has mainly two categories of clients. They are:

a. Naval Secretariat of NHQ.

b. Other departments of NHQ.

But only NS department has interface of present system and other departments don't have any interaction with the system. They go to NS department for their required information about officers which is a manual system. So the present system is not efficient enough.

2.2 Advantage of Existing System

With the age of technological innovation there is explosion in the field of database management system. The present system is database based. The system have both manual and automated feature. Existing system has the following advantages:

a. The system is running for long time, so it is well established, verified and correct.

b. All people using the system is acquainted with using the system.

c. Users are trained on the system.

d. As present system is offline so no web security problem.

2.3 Disadvantages of Existing System

There are many drawbacks of the existing system like huge paper work and documentation for transferring information to other departments.Enrollment of huge manpower and more time consumption is required for the present system.Decision making becomes delayed because all departments wait for the information from NS department.The system is subject to human error.

2.4 Block diagram of Existing System

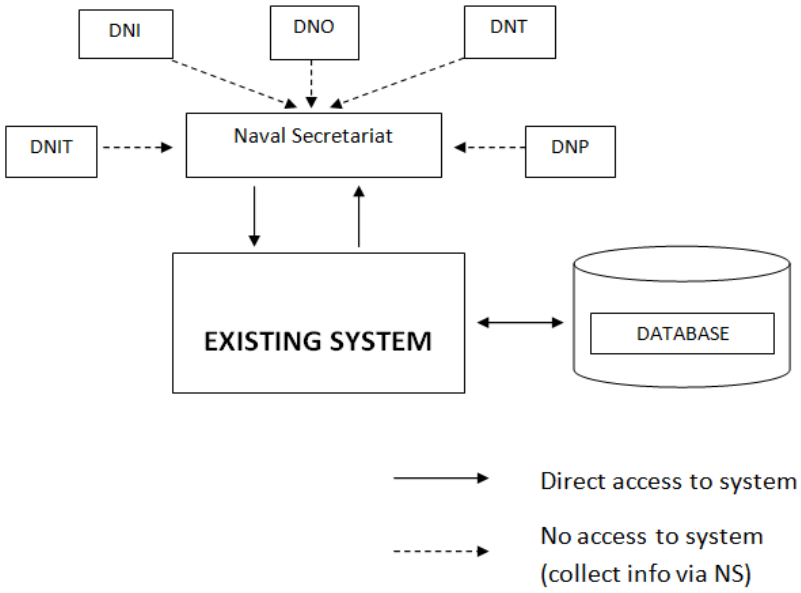

Figure 2.1: Existing System.

2.5 System Analysis

From the above discussion we can see that the necessity of an improved automated information management system. Again, an automation process makes the system process faster and perfect. So upgradation is really required for present system which is not at all robust enough to handle present and upcoming requirements. But after all the feasibility study it has been found upgrading the present system is not feasible enough and it is more costly. The present database structure is outdated and it is not possible to add more data fields. After doing economical feasibility study is has been found that new system development will

be more reasonable. The percentage of successfulness in BNOIMS is almost 100%. It will be guaranteed that the system will be totally error free.

2.6 Proposed System

Bangladesh Navy Officer's Information Management System (BNOIMS) is an user interactive web based system. All the information of officers will be kept in a mySql database. The database will be linked with the web page for better interaction. NS department will have administrative power of the system and other departments will have some access to the system according to their privilege. Privilege of other departments will be enlisted according to their requirements of the system. Our developed system will give all the technical and economical feasibility. It will make the office work of NS and other departments of NHQ easy and fast. Overall it will provide better functioning of NHQ.

CHAPTER 3
CUSTOMER REQUIREMENT SPECIFICATION (CRS)

3.1 Executive Summary

3.1.1 Project Overview

Officer's Information Management System is a system consisting of database and online access system for Naval secretariat of Bangladesh Navy. It will store the detailed information of all officers of Bangladesh Navy and thus provide the efficient use of the officers information for various aspect of management and operation in Naval Secretariat.

3.1.2 Purpose and Scope of this Specification

The purpose of CRS is to define customer requirements and provide brief information of the requirements. It also helps the designers/reviewers/clients to verify the appropriateness and completeness of the requirements; and helps to communicate the requirements to project team members [2]. CRS also serves as a basis for preparing system requirements specifications (SRS) document. The purpose of this specification is to describe the software particulars and various interfaces of software and its hardware specification and its intended audience is Naval secretariat.

3.2 Product/Service Description

The software will facilitate Naval secretariat by managing and handling officers information in various aspect of management, training and operation like posting, leave information, promotion, mission, courses and so on.

3.2.1 Product Context

Any information management system has some important component for actors and stakeholders of system [3]. The following are the key components:

- A centralized information management system for the stakeholders to search information and to query about any other stakeholder.
- A information management system database to provide effective tracking and tracing facility to all stakeholders and also acts as data warehouse for research, analysis and reports.
- A web based application that acts as a single electronic window for stakeholders to access and filling up their individual information and maintaining the central database of officers information.

3.2.2 User Characteristics

There are several users of this system. They are-

- SONA-I.
- SONA-II.
- SONA-II(plan).
- SONA-II(cw).
- DNIT.
- DNI.
- DNT.
- DNO.
- DNP.
- Data entry operators.
- Individual user.
- Network administrator.

3.2.3 Assumptions

Operating System : Windows 7
Server Application : mySql 5.6, Apache HTTP Server 2.4.10
Front-end Application : PHP 5.5.0, HTML 5

3.2.4 Constraints

1. Parallel operation with an old system.
2. Until the new system is fully developed it is required to maintain the old prevailing system. Once after the successful trial of the new system, system should be considered in service.
3. Access, management and security.
    - All the officers of Bangladesh Navy will have access to the system as individual user.
    - Special privilege system must be arranged for the NS officials and the data entry operators.
    - Full access system for the system and the network security administrator.
    - Strong security must be provided against all types of security breaches. Specially it must be ensured so that system hacking is totally impossible. Security must be tightened by implementing both the hardware and the software solution.
4. Privilege should be set up in such a way that no one can access to the other data of higher privileged system.
5. The administrator must have the capacity to change the privilege of any specific user.
6. Criticality of the application.
    - The system is designed in such a way that it is easily accessible to all the users. It is made as a Simple application.
    - Easy to understandable to all users and thereby it reduces the complexity and the requirements of less training time.
7. System resource constraints.
    - Compatible with present server system.
    - Requirements of hardware based server security to ensure the proper security of the hardware.
    - The system must be connected with the internet so that individual user could access the system from anywhere.
    - Require training time.
8. Other design constraints.
    - Easy design process to make the system user friendly.

3.2.5 Dependencies

1. Login system should be made first before all other related system.
2. Login system must have some identification factor to identify between normal user and admin.
3. Normal user interface should be made before the admin dashboard.
4. Should be compatible with any browser and also compatible with the mobile, tablet or any handhold smart devices.
5. Easy and simple interface as the data entry operators will give entry to the data.
6. Easy report and output design.
7. The system processing time must be small to make it faster and effective.

3.3 Requirements

An illustration of user login system is shown in figure 3.1. Basic layout of system is shown in figure 3.5.

3.3.1 Functional Requirements

Figure 3.1: User Login System.

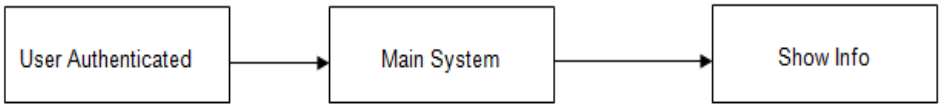

Figure 3.2: User System(show info).

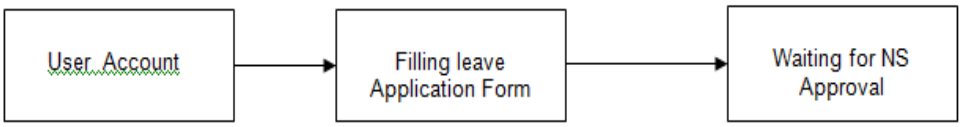

Figure 3.3: User System(leave application).

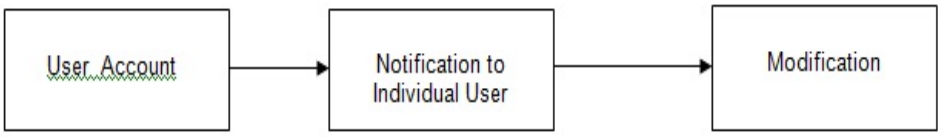

Figure 3.4: User System(edit info).

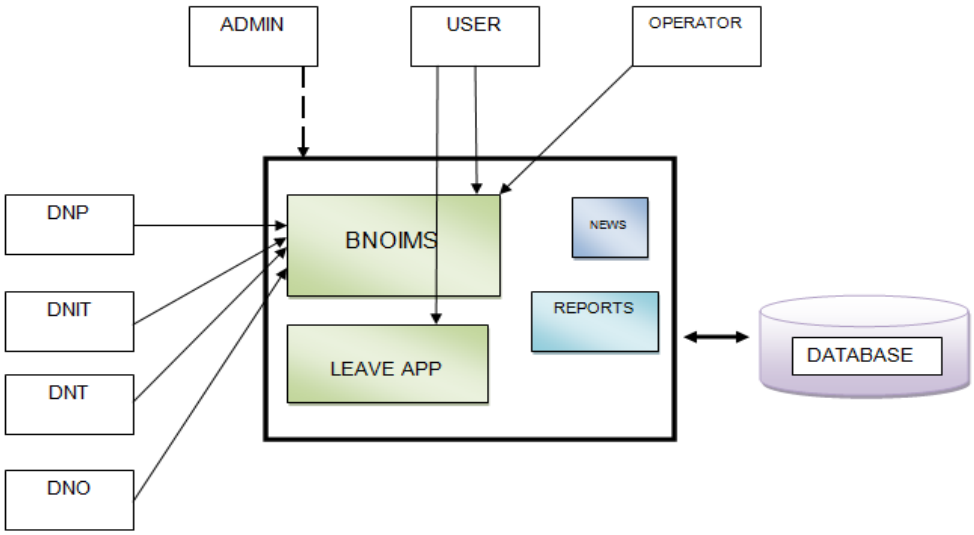

Figure 3.5: Basic layout of System.

3.3.2 User Interface Requirements

1. Individual report for individual users.
2. Data entry operator must have easy interface and input method.
3. Confirmation message on successful data entry.
4. Admin must have different interface with all possible search.

3.3.3 Usability and Performance

The user documentation and help should be complete. The help should be context sensitive and explain how to achieve common tasks. The system should be easy to learn.
75 percent of the transactions shall be processed in less than 10 second rather than an operator shall not have to wait for the transaction to complete. It Should give efficient search time.

3.3.4 Capacity and Availability

The number of simultaneous users to be supported is minimum 50, the maximum simultaneous user load, per-user memory requirements is very less, expected application throughput is fast. The maximum acceptable time (or average time) for a service request should be good.
Some specific and measurable requirements are:

1. 24 Hours of operation.
2. Level of availability must be good.
3. Coverage only within Bangladesh Navy.

3.3.5 Manageability/Maintainability

Monitoring: Product or service health monitoring, failure conditions, error detection, logging, and correction should be done accordingly.Service should be provided on call basis.

Maintenance: There must be attributes of the system that relate to ease of maintenance. Maintenance can be done in 6 month basis or in case of any emergency operations.

Certain rules on any normal and special operations required by the user, including:

1. Periods of interactive operations and periods of unattended operations.
2. Data processing support functions.
3. Backup and recovery operations.
4. Safety considerations and requirements.
5. Disaster recovery and business resumption.

3.3.6 System Interface

Operational Environment (Server):

Software:
PHP 5.5, Apache 2.4.10, Oracle 10g 10.2.0.1.0 Database Server will be used.
Hardware:
Processor: 3.0 GHz Pentium 4 Processor or higher is required. Memory: 2 GB of RAM or higher is required.
Hard Disk:
10 TB of available space or higher is required.
NIC:
Ethernet card is required.

Operational Environment(Client):

Software : Internet Explorer/ Mozilla Firefox.
Hardware : Windows PC.
Processor : 1.6 GHz Pentium 4 Processor or higher is required.
Memory : 50 GB of available space or higher is required.
HardDisk : Synteny Block
NIC : Ethernet card is required.
Printer : Any printer connection.

3.3.7 Security

1. Protection.

2. Create User
    - Create User with password.
    - Assign Privilege.
    - Change Password.
3. Reporting Requirements- User List.
4. Authorization and Authentication.
    - There are some Authorization and Authentication factors. Admin must have special privilege .Admin must be authorized to do any change. The final authentication of some specific information is left for the approval of the admin. If the admin does not approve the data then it will not be valid. The admin must be notified about any change occurred in the system.

3.3.8 Data Management

1. Types of information used by various functions.
2. Frequency of use.
3. Data access rules.
4. Data entities and relationships.
5. Integrity constraints.
6. Data retention.
7. Valid range, accuracy, and/or tolerance.
8. Units of measure.
9. Data formats.
10. Default or initial values.

3.3.9 Standards Compliance

This could specify the requirement for software to trace processing activity. Such traces are needed for some applications to meet minimum regulatory or financial standards.

3.3.10 Portability

The system should provide the facility of data backup and restore in such a way that anyone could be adopted in these facility. The system must have the ability to perform automatic generation of data for the purpose of backup at a specific time of the day.

3.4 Exception Handling Requirements

The system should provide the facility of data backup and restore in such a way that anyone could be adopted in these facility. The system must have the ability to perform automatic generation of data for the purpose of backup at a specific time of the day.

3.5 Documentation Requirements

The following documentation should be provided:

1. Detail code and design should be documented as other designers and programmers could easily read the system.
2. User manual should be designed as self learning tools for the new users.
3. System troubleshooting manual should also be provided In order to solve any ordinary problems that occurred while running the system.

CHAPTER 4
SOFTWARE REQUIREMENTS SPECIFICATION(SRS)

4.1 Overview

The software requirement specification assures the project management stakeholders and client that the development team has really understood the business requirements documentation properly. This also provides confidence that the team will develop the functionality which has been detailed [4]. The Software Requirement Specification is documented in such a way that it breaks the deliverables into smaller components. The information is organized in such a way that the developers will not only understand the boundaries within which they need to work, but also what functionality needs to be developed and in what order.

4.2 Problem Statement

The Naval secretariat is unable to cope with new requirements of officer's information management system like adding new data fields. They face great problem handling the high volume of telephone calls received at the promotion time and posting time of officers. A large amount of information transfer is done among branches of NHQ. All of those are done by paper. So information transfer is very time consuming and same job is repeatedly done. An online officer information management system needs to be developed. In addition, officers on shore, off shore, in-state, out of state, and out of country can easily and inexpensively take advantage of many of the services provided by the Naval Secretariat Office of the Bangladesh Navy Headquarter.

4.3 Overview

4.3.1 Background

Bangladesh Navy officer‘s career, progress, promotion and posting is solely controlled by NHQ from the office of Naval Secretariat. All the information of the officers are kept in a outdated system and paper now a days. The present system is no more efficient enough to

handle new requirements of information about officers. So an up gradation of digital preservation of data and information is a demand of time. Sometimes it‘s necessary to contact with individual officer for taking his suggestion or decision for any appointment, posting or course. But to find out an officer‘s information from backdated system and paper file is really tough and time consuming. The response time for querying about an officer from paper written file are getting longer as well as each officer‘s waiting and processing time.
With the current process involved and the mounting frustrations and complaints from officers, commanding officers and personnel alike, there is an urgent need to develop the Bangladesh Navy Officer‘s Information Management System (BNOIMS).

4.3.2 Overall Description

The whole system will be web based. The website will have the user interface of the officer‘s information management system. The officer‘s information will be kept in an database. This database will be in the server of Director of Naval Information and Technology (DNIT). The website contains a connection with the database. BN officers have access to website with individual user id and password.

4.4 Investigation and Analysis Methodology

4.4.1 System Investigation

In this system an user will have access by entering user id and password to login page of the website. Then the system will verify about the user whether he/she is an serving officer of Bangladesh navy or not. If so then system will approve the user. The system will mainly have two kind of users. They are:

1. Admin.
2. User.

The user will have to use his personal no and password to login to the system. For next time login the system checks back the pre stored value and approve the user to based on that matching.
The admin will also have to login using his personal no and password. The interface of admin will be different from normal users. The functionality of admin is also different from users.
The database will be created for each officer of Bangladesh navy. The primary key to distinguish each officer is his personal number.

4.4.2 System Analysis and Requirements Specification

An external view of the enterprise model of the officers information management system including officers individual records, general information, family information, course, training information, department and staff information, course requirements, and promotion schedules will be developed using Unified Modeling Language(UML) [5].This System Requirement Specifications documents will form part of the documentation for the project. Some desired features of the new system include:

1. The ability to search/view general information of individual officers on-line.
2. Provide officers course report .
3. Evaluate prerequisites for foreign courses against officers records.
4. Allow officers to give his choice of next posting, change of basic information, next of keen info, mobile no, mail address etc.
5. Access of other departments of NHQ.
6. Provide officers leave application sub-system.

Analysis methodology will involve business analysis, requirement analysis, data analysis, process analysis, web and application architecture [3]. Description of these analysis is given below:

1. Business analysis state the Navy rules, BNOIMS system interfaces, BNOIMS function.
2. Ownership, sponsorship and associated project budget requirement.
3. Requirement analysis is system I/O description, user requirement definition, functional and security requirement.
4. Data analysis involve data collection process, data validation, data storage, manipulation and retrieval.
5. Process analysis is data/process flow analysis, process decomposition and system interfaces.
6. Application architecture will analyze application information structure, usability, user interface design,
7. Interaction and application implementation.

4.4.3 Prototyping

The Object Oriented Rapid Prototyping (OORP) method will be used to implement a limited and functional prototype for the information management system [6]. The prototype will be a working example of part of the system for demonstration and proof of concept purposes only. It will include web-based forms as an end-user interface with the mySql database. The prototype will act as guideline to the implementation team.

4.5 Constraints

4.5.1 Scalability

The present information management system does not scale well to increasing system demands. BNOIMS is robust and system is designed to handle and resolve concurrent sessions. Error handling is also limited to few anticipated or common errors.

4.5.2 Data and Function Mapping

A new function added to the mainframe based information management system can be readily mapped to the existing information system. A new filed can be added to database using admin interface so that upcoming requirements can be fulfilled. But For example, a new information added to the information system will require a source code change and change in the database.

4.5.3 Proprietary hardware and software

The system requires proprietary hardware and software from DNIT in order to be operational.

4.5.4 Project Schedule

There is 1 year time frame to implement a production system of an officers information management system from project commencement in time from February 2014 and it ends in December 2014. But improvements will continue until it becomes fully automated and robust system.

4.6 Operational Requirements

4.6.1 Help Desk Support

System users have a 24x7 access to e-mail assistance for questions that are technical in nature, such as, slow or sluggish system response time, incompatible browser features, application errors, system downtime inquiries, account lock-out assistance, etc.

4.6.2 Application Services and Technical support

Programmers and application developers will have access to source code to address bugs or system enhancements as deemed necessary [7]. Network Administrator and DBA support is also required to maintain a 24x7 system uptime. System security and access levels are provided in the Online system. There are varying levels of system access and functional authority. Each officer‘s Access is limited to his/her own records. Only authorized system administrator(s), naval secretariat staffs,SONA-1 and SONA-II have access to all officer‘s records.

4.6.3 System Interface

The system will remain operational and its functionality will be complementary but not independent from the online registration system. At any one time, the individual officer have to use the online system only, but the office of naval secretariat can use both the Online and offline system. The online system will be operational always.

4.6.4 System hardware fail over and routine back up

DNIT department will handle system hardware tasks such as data tape back-up, hardware maintenance, fail over, scheduled system patches and maintenance.

4.6.5 Audit Trail

System audit trails are inherent part of all officer‘s information. Among others, all data update time records will capture what action was taken, when (time-stamp) the update occurred and who made the update or change.

4.7 Functional Requirements

The Online information management system is self-service style system that initially create a new user and then the data will be inserted from the system administrator‘s side. The individual user will know their user id and password through letter. The system should support management of personal, official and other leave activities of NS.

4.7.1 Officer‘s Self-service

Officer can make choices to his/her courses, deputation, posting that are about to be taken place in the future. Among others the online information management system will have the specific functionalities.

4.7.2 Personal Profile

In general officer interface will have some specific fields. Which are: [8]

1. Officer General Info.
2. Officer Family info.
3. Officer Physical Structure info.
4. Officer NOK info.
5. Officer Heir info.
6. Officer Course info.
7. Sports and Culture.

4.8 Input Requirements

Officer identifier key and user access

Each user is assigned with a unique identifier that is his personal number upon commission to the Bangladesh Navy. The officer must know this. This identifying key maps to all his/her registration, data record information in the main database system. Only the serving officers have their online registration accounts enabled and the retired officer‘s information will be preserved but their accesses will be ceased.

4.8.1 System login info

System login info like passwords, user name will be made available through the system. It will be generated by administrative side through system. User has to login in the system through user id and password.

4.8.2 Action Codes

All other action codes such as course add/drop and apply for leave will be available online for reference and to assist users. The user can edit update certain information based on their privilege.

4.9 Process Requirements

The following are among the inherent requirements that the online information management system must be able to handle.

4.9.1 MySql Transaction

The system must be able to send, receive and trigger transaction to the mysql database system.

4.9.2 Data Integrity

Commit operations that are completed and/or rollback unfinished or time-out operations. Nobody should be allowed to tamper with data; Enhanced Security for sensitive data [9]. It should be made sure that only users who are given specific rights can access data and all actions are logged, thus providing an extensive role based authorization.

4.9.3 Data validation

Data error from the user's end and from the back-end database-processing end must be gracefully handled. There will be data validation and error-handling routines as part of the online information management system.

4.9.4 Performance

Must resolve locking issues and handle concurrent use of the system on a 24x7 basis. Send, receive and display user messages to assist the over-all user experience.

4.9.5 Data repository

The online registration system will maintain the existing user into a database but the officers information will be kept into a separate database as the main repository of data. Class diagram of some of the system is illustrated in figures 4.1 4.2 4.3.

Class view of some system:

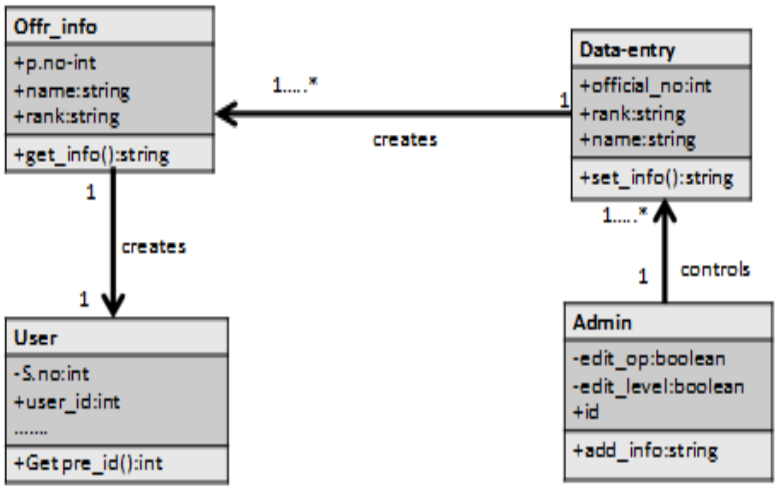

Figure 4.1: Class Diagram (User entry system).

4.10 Reports and summaries

Naval Secretary, SONA-1, SONA-II, other departments and system administrators must be able to extract summarized and rolled-up data into meaningful information. All records will be archived but accessible on demand. Many search query is also available for admin of the system. [8]

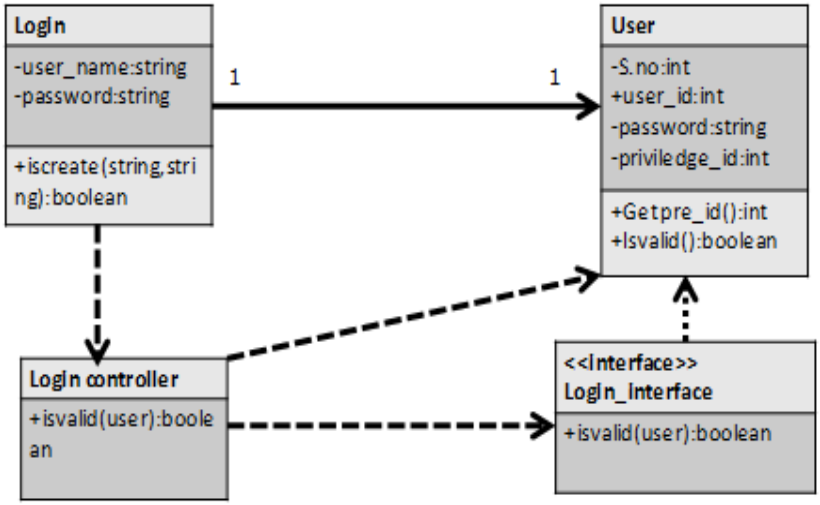

Figure 4.2: Class Diagram (Data entry system).

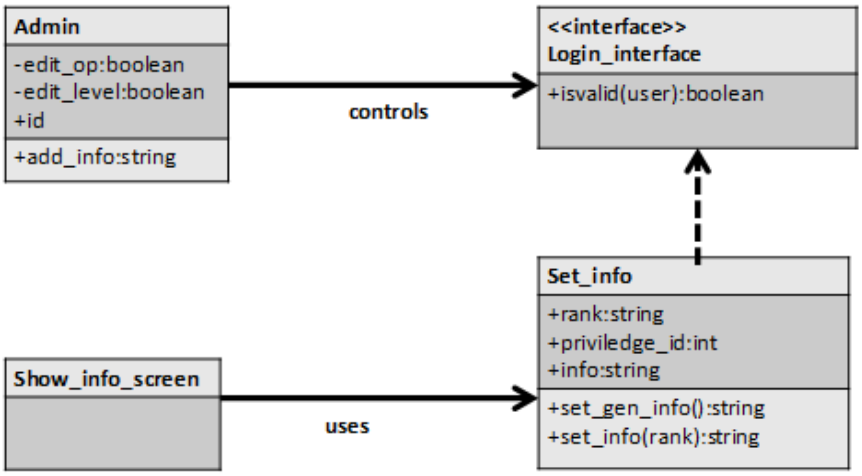

Figure 4.3: Class Diagram (Show user info system).

4.11 Hardware Requirements

4.11.1 Network

Currently Bangladesh Navy does not have any network infrastructure connecting all the Naval bases. Navy is currently connected with the commercial networks. So the proposed system will be available to access from any parts of the world through the Internet by the individual user.

4.11.2 Client Computers

Windows client computers, mobile platform.

4.11.3 Production support systems

The proposed system consists of data recovery and disaster recovery facilities. Disaster recovery center will be in the different seismographic zones. For our system disaster recovery center one will be in BNS Titumir, Khulna and the second one will be in BNS Shahid Moazzem, Kaptai, Rangamati. The primary server will be contained in the NS department of NHQ. The system consists of manual data backup option. At the end of every days office duration, the data backup system needs to be initiated which originates a backup.sql file. This file need to be transferred in a separate machine. This backup.sql will be the backup data. In case of any failure of the system this this file would be able to import all the previous information of the database thus making the system a consistent one. Constant power supply will be ensured by implementing three different power solution including PDB power supply,generator supply and the industrial UPS.

4.12 Software Requirements

4.12.1 Client Operating Systems

Windows

4.12.2 Client Application

Java and Java Script compatible browser:

- Firefox.
- IE.
- Opera.

4.12.3 Network System

Network software and protocols in order for systems to communicate:

- TCP.

- HTTP.
- FTP.

4.12.4 Mainframe System

mySql database.

4.12.5 Licenses

Valid licenses are required to run software from third party vendors:

- To use application development tools.
- To use web server, application server and database software in development, test and production mode.

CHAPTER 5
DETAIL PROCESS OF BNOIMS

5.1 Overview

BNOIMS has few specific module. Information management system has create user, insert information of user, edit information, delete user tabs [10]. There are also option for pdf generation of report, creating backup of database, search information about particular officer. Admin can also view the transfer history, promotion history of any officer. When a user is created by admin then user can log in to the system. User can view his general information, history of leave availed, transfer and promotion history. Both admin and user can change his password. Another main module is Online leave application.

5.2 Login System

Admin can create user. Then only user can log in to the system. When admin enters the url of website initial page of website appears. An illustration of initial page is shown in figure 5.1. There are two main category of actors of system. Both have to login by giving user id and password. For user they also have to give user name for logging to the system. User log in panel is shown in figure 5.2. If all the information given by user matches with the data stored in database then user will have access in system.

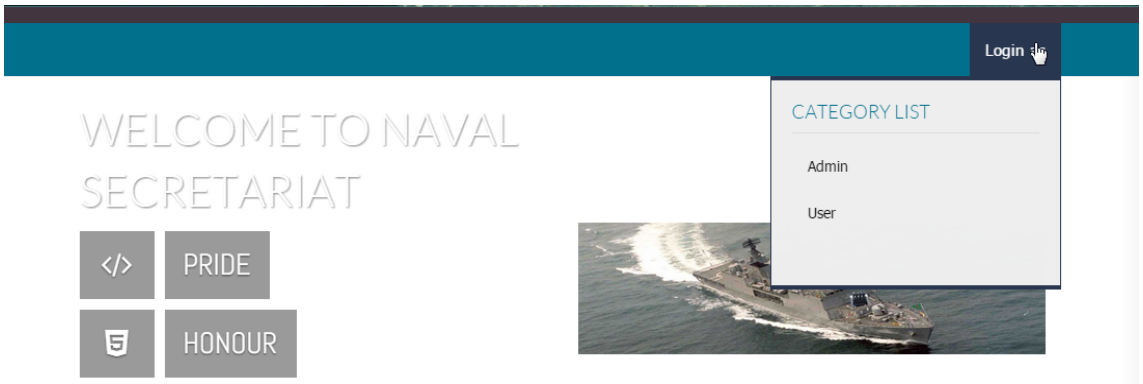

Figure 5.1: Initial View of BNOIMS.

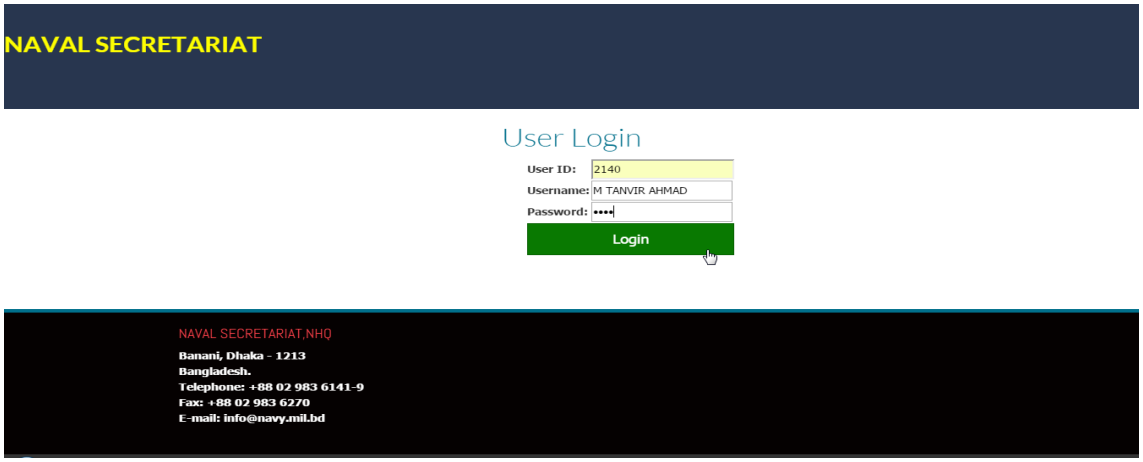

Figure 5.2: Login Panel of User.

5.3 Admin panel

Admin panel has following main tabs. Those are-

1. Dashboard.
2. Create User.
3. Edit User.
4. Show User.
5. Delete User.
6. Add New Admin.
7. Change Password

In dashboard there are notification tabs for leave applied by the users. Admin can do some tasks such as creating backup of data and report generation and search information of particular user. An illustration of Admin home panel is shown in figure 5.3. Admin can create user giving some data such as user name user personal number and user email. An illustration of creation of new user is shown in figure 5.4. There are many fields in database where admin can insert data of any particular officer. Admin can also edit information of any officer when needed. Admin can see all the notification of leave applied by users. There are three different tabs for privilege leave, casual leave and recreational leave. Admin can check the leave application and can approve or disapprove leave application. When admin approves the leave applied by user then data is entered in database. Admin can create new new admin with restricted access.

Figure 5.3: Login Panel of User.

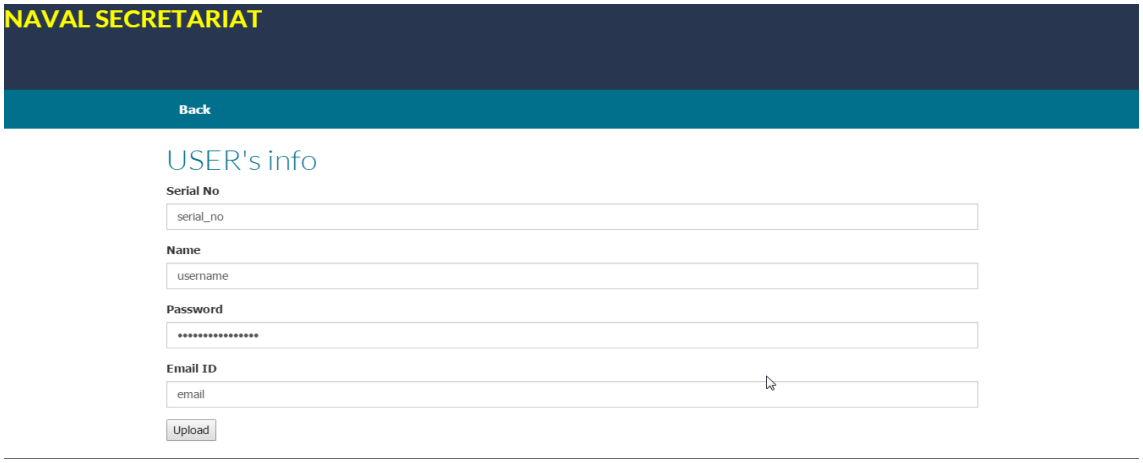

Figure 5.4: Adding New User panel.

5.4 User Panel

User has a home panel which is illustrated in following figure 5.5. In home panel of user we shown user's personal number, rank, email, present organization and joining date in this organization.

There are some tabs to view his personal information and for leave application. An simple illustration of leave application form in figure 5.6. After admin approval user can see notification. If admin disapprove user application then also user will see notification. Uase can view his leave history form history tab. An illustration of leave history is shown in figure 5.7. User can change his password also. There is also option available to ask some question to the admin.

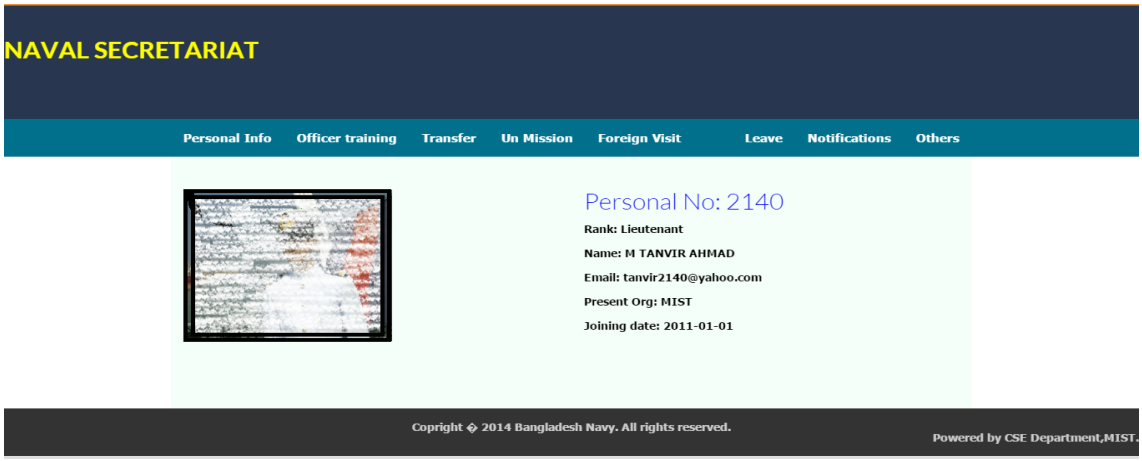

Figure 5.5: User Home Panel.

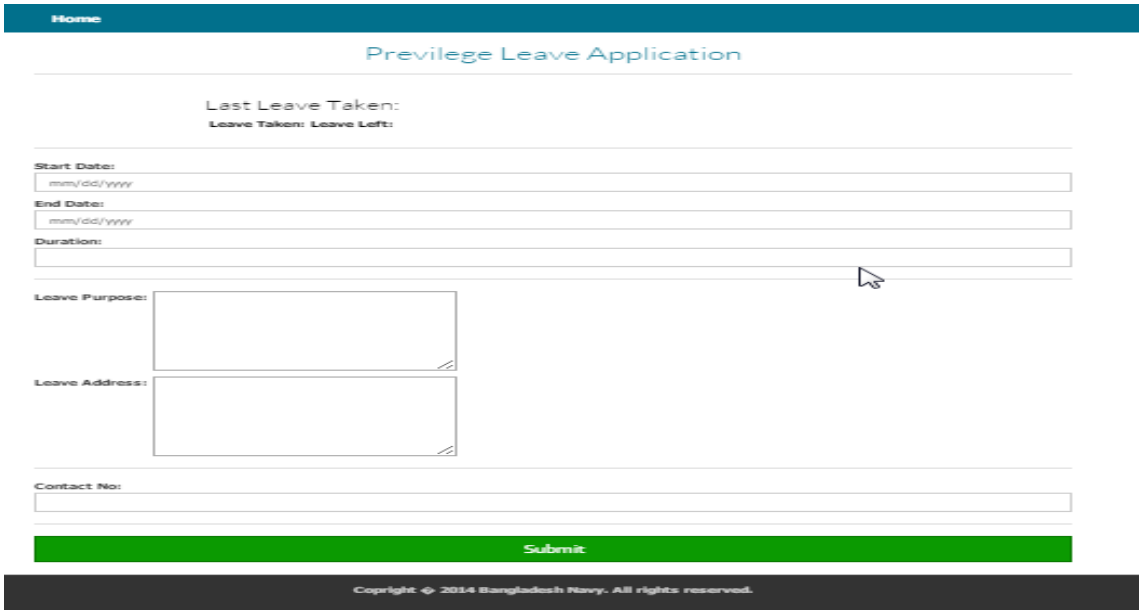

Figure 5.6: Privilege Leave Application Form.

Figure 5.7: Leave History User Interface.

CHAPTER 6
SECURITY ASPECT OF BNOIMS

6.1 Web Application Security

Web application security deals specially with security of website, web application and web services. At a high level, Web application security draws on the principles of application, specifically to internet and web systems [11]. Our web application is developed using programming languages like PHP, Java, HTML, Java script etc. There are a lot of threats and dangers in putting up a Web page to the internet because hackers always try to breach the security of the system. As it is a military web base application we need to take more security measure. The majority of the web application attacks occur through cross site scripting, command injection and SQL injection. There are some dangerous programming errors according to security vendors such as cross site scripting, SQL injections, path disclosure, denial of service, memory corruption [12].

6.2 Threats of the Website

BNOIMS will reside in a web page. This web page will be integrated with BN website. So security of website has to be ensured. Security is also a one of the crucial aspects of web development and it is duty of the developers to maintain the security of the data from coding to running the site without any chance of hacking, fetching and malicious attack on the sites [13]. There are some vulnerabilities of security, and we have taken measurement against list of threats given below:.

1. SQl Injection.
2. Lack of Authentication.
3. HTTP Header Injection.
4. Mail Header Injection.
5. CSRF (Cross-Site Request Forgery).
6. Imposer Session Management.

7. Cross Site Scripting.

The main task of web page developers is to ensure 100 percent web security. The specific security measures as follows:

1. Login password should be encrypted and strong.
2. Session hijacking.
3. Server side data validation.
4. Manage web site via encrypted connection.
5. Use redundancy to protect web site.
6. Using latest version of hardware and software.
7. Connect from a secure network.

So all those security measures have been taken.

6.3 Prohibited Activities

Personnel are prohibited from some activities. Deliberately crashing an information system is strictly prohibited. Users may not realize that they caused a system crash, but if it is shown that the crash occurred as a result of user action, a repetition of the action by that user may be viewed as a deliberate act. Attempting to break into an information resource or to bypass a security feature includes running password-cracking programs or sniffer programs, and attempting to dodge file or other resource permissions. Introducing, or attempting to introduce, computer viruses, Trojan horses, peer-to-peer or other malicious code into an information system. DNIT personnel may test for susceptibility to hardware or software failure, security against hacker attacks, and system infection. The willful, unauthorized access or inspection of confidential or sensitive information to which you have not been approved on a “need to know”basis is prohibited. The purposeful attempt to look at or access information to which one has not been granted access by the appropriate approval procedure is strictly prohibited. Violating or attempting to violate the terms of use is strictly prohibited. Engaging in any activity for any purpose that is illegal or contrary to the policies, procedures is strictly prohibited.

6.4 Security Measures

6.4.1 Reporting Software Malfunctions

Users should inform the appropriate DNIT personnel when the user‘s software does not appear to be functioning correctly. The malfunction - whether accidental or deliberate - may pose an information security risk. If the user, or the admin or data entry operator, suspects a computer virus infection then

1. Disconnect the system from all sorts of network.
2. Inform system administrator immediately.
3. No commands should be carried out including data saving.
4. Must not close any of the computer’s windows or programs.
5. If possible, physically disconnect the computer from networks to which it is attached.
6. Inform the appropriate personnel or Practice ISO as soon as possible.
7. Write down any unusual behavior of the computer (screen messages, unexpected disk access, unusual responses to commands) and the time when they were first noticed.
8. Write down any changes in hardware, software, or software use that preceded the malfunction.
9. Must not attempt to remove a suspected virus! without the concern of professional.

6.4.2 Report Security Incidents

It is the responsibility of each data entry operator or any user to report perceived security incidents on a continuous basis to the admin. A User is any person authorized to access an information resource. Users are responsible for the day-to-day, hands-on security of that resource. Users are to formally report about all security incidents or violations of the security policy immediately to the members of the DNIT.

6.5 Security Measures in Developing the BNOIMS

Some security measures are taken in the coding part.Those are-

1. Strong password system to each and every user to login in main page.For setting the passwords we use letters, alphanumeric and special characters. User can change his password.

2. Session hijacking is the process of claiming control over a web based user session. It occurs when a intruder fraudulently obtains the session ID as an authorized user. After a user ID has been thieved , the intruder will have all the privileges of an authorized user on the system. When a website does not respond in a normal manner or does not respond altogether, it is likely session hijacking is the cause. An user‘s session ID is usually stored within the URL folder in the cookie file. Most communication require authentication procedures to be created and carried out in order to establish a successful connection. Session hijacking exploits this practice by intruding a a session in real time, providing a much easier access to the session ID. Depending on the user‘s level of security knowledge and the nature of the attack, the intrusion may or may not be detectable. So in each pages there is session checking process.

3. Used latest versions of web development tools which are important because they are updated with new layers of security.

6.5.1 Hardware Based Server Security

Hardware based security can be achieved by both using some hardware security module and recommended security measures of server operating systems.Security measures of server operating system.There are some measures given or specified in the windows server 2008 which is currently used in Naval Secretary. We can simply turn off communication with the network ports which are having security threads or which are known for suspicious activities. We can also block some real IP which might create problem or threat for our system.

CHAPTER 7
DISCUSSION

7.1 Implementation of Own IT infrastructure

Network infrastructure, is also commonly used to refer to the grouping of physical hardware and logical components which are needed to provide a number of features for the network, including these common features:

1. Connectivity.
2. Routing and switching capabilities.
3. Network security.
4. Access control.

The network or network infrastructure has to exist before a number of servers needed to maintain applications which are needed by our users can be deployed into networking environment:

1. File and print servers.
2. Web and messaging servers.
3. Database servers.
4. Application servers.

When we plan our network infrastructure, a number of key elements need to be clarified or determined:

1. Determine which physical hardware components are needed for the network infrastructure for Bangladesh navy to implement.
2. Determine the software components needed for the network infrastructure.
3. Determine the following important factors for hardware and software components:

- Specific location of these components.
- How the components are to be installed.
- How the components are to be configured.

Bangladesh Navy can establish a Enterprise network of WAN. This network can be expanded to all the areas of Bangladesh where naval establishment is there.

A Data Center can be proposed to establish in NHQ DNIT . Naval establishment WANs can be connected to the Data Centre using secure BTCL E-1 links. Each establishment and each flotilla can have BTCL internet gateway and Bandwidth Manager.

If own IT infrastructure is established then data security of our system can be resolved. Along with data security, high availability and operational stability are top priorities of data center. The data center must have the ability to run all the necessary applications, required server types and server classes. Due to the increasing number of real-time applications, the number of server variants is soaring as well. It secures the installed servers and components in use.

7.2 Advantages of New System over the Existing System

The newly designed system has the following advantages over the existing system:

1. As the system is maintained automatically it can save huge manpower, huge paperwork and manual documentation work is not required.
2. Time saving and hassle free mechanism.
3. Less chance of human error.
4. Automatic notification to the user for different approval of permission.
5. Online submission of leave application.
6. Notification message system for both the user and the admin.
7. Easy way to ask any question to the administrative authority through dashboard.
8. Individual access for online filling and updating of information by individual officer.
9. Access system for different departments of the Naval headquarter for the necessity of relevant information about an officer.

7.3 Drawbacks of New System

The system has got the following disadvantages:

1. Since data is maintained electronically, provision of proper data backup and recovery system is required.
2. Security breach is a great issue since the system is online based. Thereby high level of server security must be ensured.
3. No form has been designed for setting data of course career planning and transfer career planning of individual officer.
4. Trace setting form is not also designed which is required for the promotion of individual officer.
5. Since it‘s a completely new system, personnel must be trained to cope up with the system.

7.4 Problems Faced

Several problems were encountered during the design of the system. this includes:

1. The php 4.0 ,HTML, CSS language for web page development was not known to us. So we had to learn it to complete the project.
2. Designing of user interface according to their levels of privilege was difficult.
3. Ensuring of proper security against different breaches was extremely difficult.

CHAPTER 8
CONCLUSION

8.1 Concluding words

Technology is growing fast in the world and human needs are increasing day by day. The technology is integrated with the human life cycle. People use technology to simplify their day to day works to save time and cost. But the present system maintained in the NS is a bit slow offline based system without having any interaction with the individual user. The system that has been designed contains an online based user interactive platform where user can update, view and edit their information. The user is having the option to fill up several forms totally online based thereby reducing the processing time. So no latency for submission of application and the approval of the authority enabling the efficient functioning of the Naval secretariat.

Maintaining strict security has ben always a great issue for implementing any military project. The security of BNOIMS is ensured with the implementation of both hardware and software solution. Further efficiency and security can be achieved through the implementation of data centre and the separate network infrastructure of Bangladesh Navy.

8.2 Future expansion

The future expansion of our software may contain several dynamic queries. Automatic calculation of OPR may be added in the software. Presently separate clothing and pay-roll management system are prevailing. The updated version of our software may contain the integration of all these platforms. The implementation of an ERP may be the next desired output.

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