

Non-Exam Assessment (Programmed Solution to a Project)

Title: Server Management

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CONTENTS

CHAPTER CS3.1 - DISCUSSION (5 MARKS).....	1
SECTION 3.1.1 - PROBLEM IDENTIFICATION	1
SECTION 3.1.1 - BROAD AIMS AND LIMITATIONS OF THE PROJECT	5
SECTION 3.1.1 - FEEDBACK FROM OTHERS	15
CHAPTER CS3.2 - INVESTIGATION (10 MARKS).....	23
SECTION 3.2.1 - INVESTIGATION OF THE CURRENT SYSTEM.....	23
Subsection 3.2.1.i - Logical Plan of Investigation	23
Subsection 3.2.1.i - Questionnaire evidence	24
Subsection 3.2.1.ii - Observation evidence.....	31
Subsection 3.2.1.i - Document/Record inspection evidence	33
Subsection 3.2.1.ii - Interview evidence.....	34
SECTION 3.2.2 - RESEARCH INTO EXISTING SOLUTIONS	36
Subsection 3.2.2.i - Functional features	36
Subsection 3.2.2.ii - Interface features.....	39
Subsection 3.2.2.iii - Advantages and disadvantages	41
SECTION 3.2.3 - CURRENT STAKEHOLDERS.....	43
Subsection 3.2.3.i - Organisational stakeholders.....	43
Subsection 3.2.3.ii - External stakeholders.....	45
SECTION 3.2.4 - DATA AND INPUT AND PROCESSING BY THE CURRENT SYSTEM (INCLUDE A DFD IN THIS SECTION).....	46
Subsection 3.2.4.i - Explanation of current inputs.....	46
Subsection 3.2.4.ii - Explanation of current processes	47
Subsection 3.2.4.iii - Data Flow diagram of current system	48
SECTION 3.2.5 - OUTPUTS FROM THE CURRENT SYSTEM.....	50
SECTION 3.2.6 - LIMITATIONS OF THE CURRENT SYSTEM.....	51
SECTION 3.2.7 - PROJECT WORKING SPECIFICATION.....	53
SECTION 3.2.8 - METHODS USED IN THE PROBLEM SOLUTION	55
SECTION 3.2.9 - OBJECTIVES AND MEASURABLE SUCCESS CRITERIA	57
Subsection 3.2.9.i - List of objectives	57
SECTION 3.2.10 - MEASURABLE SUCCESS CRITERIA	58
CHAPTER CS3.3 - DESIGN (15 MARKS).....	59
SECTION 3.3.1 - INPUT AND OUTPUT.....	59

Subsection 3.3.1.i - Screen layouts	59
Subsection 3.3.1.ii - Other forms of input and output.....	64
SECTION 3.3.2 - DATA STRUCTURES AND METHODS OF ACCESS (INCLUDING ERDs AND STANDARD NOTATION).....	67
Subsection 3.3.2.i - Entity Relationship diagrams.....	67
Subsection 3.3.2.ii - Standard Notation.....	68
Subsection 3.3.2.iii - Data structures.....	69
Subsection 3.3.2.iv - Validation.....	81
SECTION 3.3.3 - PROCESSING STAGES.....	82
Subsection 3.3.3.i - Overview of processing stages described graphically using JSP/Structure Diagram or DFD.....	82
Subsection 3.3.3.ii - Detailed descriptions of separate processes (link to each objective)	83
CHAPTER CS3.4 - PROTOTYPE (10 MARKS)	87
SECTION 3.4.1 - AREAS INCLUDED IN THE PROTOTYPE	87
SECTION 3.4.2 - SCREENS AND OUTPUTS FOR THE PROTOTYPE SOLUTION	89
SECTION 3.4.3 - EVIDENCE OF A FUNCTIONING PROTOTYPE SYSTEM	101
Subsection 3.4.3.i - Code listing for the prototype.....	101
Subsection 3.4.3.ii - Evidence of data output & storage for the prototype.....	131
SECTION 3.4.4 - PROTOTYPE EVALUATION.....	135
SECTION 3.4.5 - IMPROVEMENTS TO THE PROTOTYPE SYSTEM	137
CHAPTER CS3.5 - POST-PROTOTYPE REFINEMENT OF DESIGN (5 MARKS).....	139
SECTION 3.5.1 - FEEDBACK AND ITS IMPLICATIONS	139
SECTION 3.5.2 - DETAILED RE-DESIGN EVIDENCE.....	143
Subsection 3.5.2.i - Changes to program.....	143
CHAPTER CS3.6 - SOFTWARE DEVELOPMENT (25 MARKS).....	146
SECTION 3.6.1 - NORMALISED DATA MODEL (INCLUDE THE DATABASE DATA DICTIONARY)	146
SECTION 3.6.2 - LIST OF VARIABLES AND DESCRIPTION OF DATA STRUCTURES USED.....	162
SECTION 3.6.3 - FULLY ANNOTATED CODE LISTING	192
Subsection 3.6.3.i - Project file - unannotated - program.cs	192
Subsection 3.6.3.ii - setupDatabase.cs [design] - design view.....	193
Subsection 3.6.3.iii - setupDatabase.designer.cs - Object file - unannotated	194
Subsection 3.6.3.iv - setupDatabase.cs - Code file - annotated.....	200
Subsection 3.6.3.v - setupEmailConfiguration.cs [design] - design view.....	205
Subsection 3.6.3.vi - setupEmailConfiguration.designer.cs - Object file - unannotated	206
Subsection 3.6.3.vii - setupEmailConfiguration.cs - Code file - annotated	212
Subsection 3.6.3.viii - setupCompanyCreate.cs [design] - design view	213

Subsection 3.6.3.ix - setupCompanyCreate.designer.cs - Object file - unannotated	214
Subsection 3.6.3.x - setupCompanyCreate.cs - Code file - annotated	218
Subsection 3.6.3.xi - setupUserCreate.cs [design] - design view.....	219
Subsection 3.6.3.xii - setupUserCreate.designer.cs - Object file - unannotated	220
Subsection 3.6.3.xiii - setupUserCreate.cs - Code file - annotated	228
Subsection 3.6.3.xiv - loginMenu.cs [design] - design view.....	230
Subsection 3.6.3.xv - loginMenu.designer.cs - Object file - unannotated	231
Subsection 3.6.3.xvi - loginMenu.cs - Code file - annotated	235
Subsection 3.6.3.xvii - mainDashboard.cs [design] - design view.....	241
Subsection 3.6.3.xviii - mainDashboard.designer.cs - Object file - unannotated	242
Subsection 3.6.3.xix - mainDashboard.cs - Code file - annotated.....	251
Subsection 3.6.3.xx - accountManagement.cs [design] - design view	254
Subsection 3.6.3.xxi - accountManagement.designer.cs - Object file - unannotated.....	255
Subsection 3.6.3.xxii - accountManagement.cs - Code file - annotated.....	267
Subsection 3.6.3.xxiii - accountUsername.cs [design] - design view	271
Subsection 3.6.3.xxiv - accountUsername.designer.cs - Object file - unannotated	272
Subsection 3.6.3.xxv - accountUsername.cs - Code file - annotated.....	277
Subsection 3.6.3.xxvi - accountPassword.cs [design] - design view	278
Subsection 3.6.3.xxvii - accountPassword.designer.cs - Object file - unannotated	279
Subsection 3.6.3.xxviii - accountPassword.cs - Code file - annotated	284
Subsection 3.6.3.xxix - accountEmail.cs [design] - design view.....	286
Subsection 3.6.3.xxx - accountEmail.designer.cs - Object file - unannotated.....	287
Subsection 3.6.3.xxxi - accountEmail.cs - Code file - annotated.....	292
Subsection 3.6.3.xxxii - accountForename.cs [design] - design view	294
Subsection 3.6.3.xxxiii - accountForename.designer.cs - Object file - unannotated.....	295
Subsection 3.6.3.xxxiv - accountForename.cs - Code file - annotated	300
Subsection 3.6.3.xxxv - accountSurname.cs [design] - design view	302
Subsection 3.6.3.xxxvi - accountSurname.designer.cs - Object file - unannotated	303
Subsection 3.6.3.xxxvii - accountSurname.cs - Code file - annotated	308
Subsection 3.6.3.xxxviii - backupNodeList.cs [design] - design view.....	310
Subsection 3.6.3.xxxix - backupNodeList.designer.cs - Object file - unannotated	311
Subsection 3.6.3.xl - backupNodeList.cs - Code file - annotated	321
Subsection 3.6.3.xli - backupNodeCreate.cs [design] - design view.....	325
Subsection 3.6.3.xlii - backupNodeCreate.designer.cs - Object file - unannotated.....	326
Subsection 3.6.3.xliii - backupNodeCreate.cs - Code file - annotated.....	336
Subsection 3.6.3.xliv - backupNodeEdit.cs [design] - design view.....	341

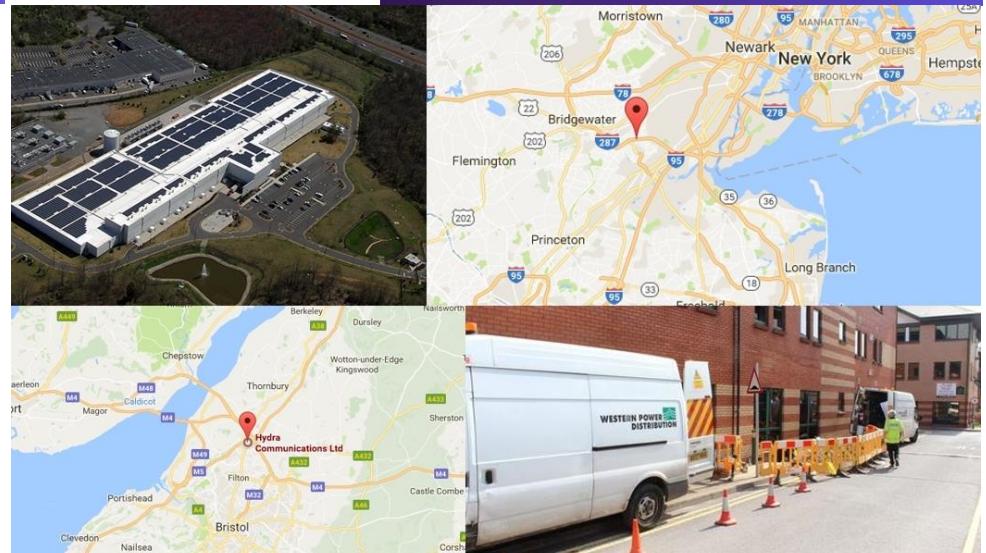
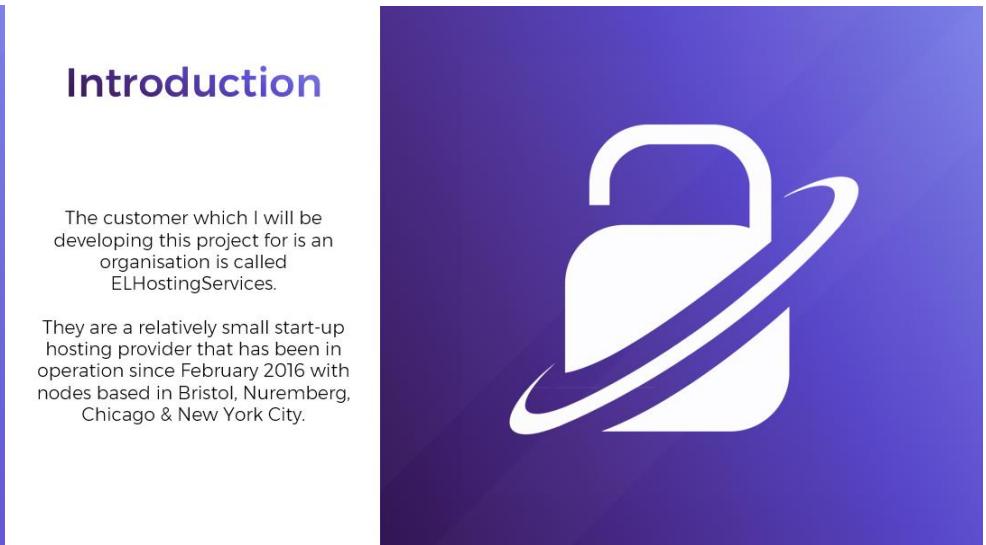
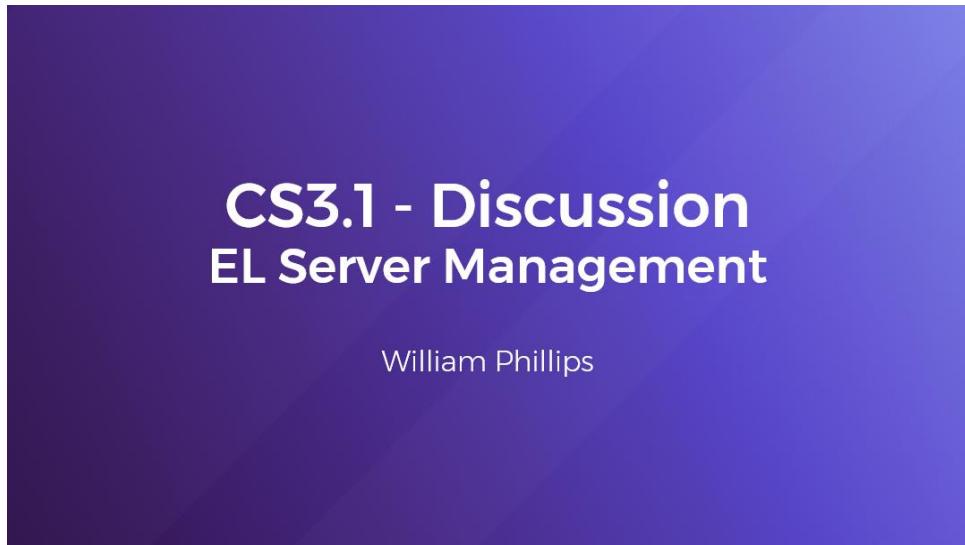
Subsection 3.6.3.xlv - backupNodeEdit.designer.cs - Object file - unannotated	342
Subsection 3.6.3.xlvi - backupNodeEdit.cs - Code file - annotated	352
Subsection 3.6.3.xvii - backupNodeDelete.cs [design] - design view	358
Subsection 3.6.3.xviii - backupNodeDelete.designer.cs - Object file - unannotated	359
Subsection 3.6.3.xlix - backupNodeDelete.cs - Code file - annotated	362
Subsection 3.6.3.I - backupRunProcess.cs [design] - design view	364
Subsection 3.6.3.II - backupRunProcess.designer.cs - Object file - unannotated	365
Subsection 3.6.3.III - backupRunProcess.cs - Code file - annotated	368
Subsection 3.6.3.III - controlManagement.cs [design] - design view	372
Subsection 3.6.3.IV - controlManagement.designer.cs - Object file - unannotated	373
Subsection 3.6.3.IV - controlManagement.cs - Code file - annotated	378
Subsection 3.6.3.IVI - controlCommandCreate.cs [design] - design view	381
Subsection 3.6.3.IVII - controlCommandCreate.designer.cs - Object file - unannotated	382
Subsection 3.6.3.IVIII - controlCommandCreate.cs - Code file - annotated	386
Subsection 3.6.3.IIX - controlCommandEdit.cs [design] - design view	390
Subsection 3.6.3.IX - controlCommandEdit.designer.cs - Object file - unannotated	391
Subsection 3.6.3.IXI - controlCommandEdit.cs - Code file - annotated	395
Subsection 3.6.3.IXII - controlCommandDelete.cs [design] - design view	401
Subsection 3.6.3.IXIII - controlCommandDelete.designer.cs - Object file - unannotated	402
Subsection 3.6.3.IXIV - controlCommandDelete.cs - Code file - annotated	405
Subsection 3.6.3.IXV - controlCommandRun.cs [design] - design view	407
Subsection 3.6.3.IXVI - controlCommandRun.designer.cs - Object file - unannotated	408
Subsection 3.6.3.IXVII - controlCommandRun.cs - Code file - annotated	412
Subsection 3.6.3.IXVIII - controlCommandStatus.cs [design] - design view	416
Subsection 3.6.3.IXIX - controlCommandStatus.designer.cs - Object file - unannotated	417
Subsection 3.6.3.IXX - controlCommandStatus.cs - Code file - annotated	419
Subsection 3.6.3.IXXI - locationManagement.cs [design] - design view	421
Subsection 3.6.3.IXXII - locationManagement.designer.cs - Object file - unannotated	422
Subsection 3.6.3.IXXIII - locationManagement.cs - Code file - annotated	432
Subsection 3.6.3.IXXIV - locationCreate.cs [design] - design view	436
Subsection 3.6.3.IXXV - locationCreate.designer.cs - Object file - unannotated	437
Subsection 3.6.3.IXXVI - locationCreate.cs - Code file - annotated	442
Subsection 3.6.3.IXXVII - locationEdit.cs [design] - design view	444
Subsection 3.6.3.IXXVIII - locationEdit.designer.cs - Object file - unannotated	445
Subsection 3.6.3.IXXIX - locationEdit.cs - Code file - annotated	450
Subsection 3.6.3.IXXX - locationDelete.cs [design] - design view	453

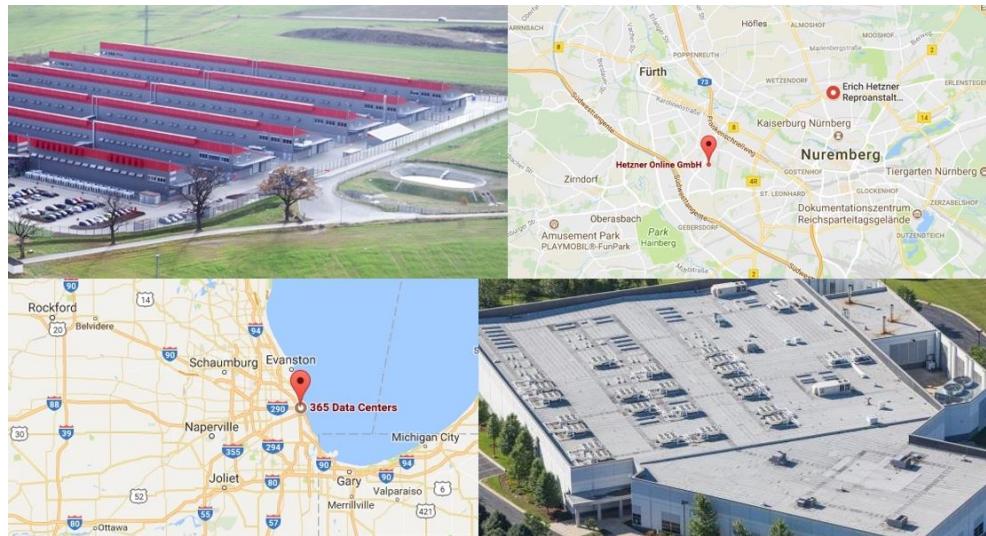
Subsection 3.6.3.lxxxi - locationDelete.designer.cs - Object file - unannotated.....	454
Subsection 3.6.3.lxxxii - locationDelete.cs - Code file - annotated.....	457
Subsection 3.6.3.lxxxiii - serverManagement.cs [design] - design view.....	459
Subsection 3.6.3.lxxxiv - serverManagement.designer.cs - Object file - unannotated	460
Subsection 3.6.3.lxxxv - serverManagement.cs - Code file - annotated.....	469
Subsection 3.6.3.lxxxvi - serverCreate.cs [design] - design view.....	475
Subsection 3.6.3.lxxxvii - serverCreate.designer.cs - Object file - unannotated	476
Subsection 3.6.3.lxxxviii - serverCreate.cs - Code file - annotated	485
Subsection 3.6.3.lxxxix - serverEdit.cs [design] - design view	489
Subsection 3.6.3.xc - serverEdit.designer.cs - Object file - unannotated.....	490
Subsection 3.6.3.xci - serverEdit.cs - Code file - annotated.....	499
Subsection 3.6.3.xcii - serverDelete.cs [design] - design view	505
Subsection 3.6.3.xciii - serverDelete.designer.cs - Object file - unannotated	506
Subsection 3.6.3.xciv - serverDelete.cs - Code file - annotated.....	509
Subsection 3.6.3.xcv - ticketNew.cs [design] - design view	511
Subsection 3.6.3.xcvi - ticketNew.designer.cs - Object file - unannotated.....	512
Subsection 3.6.3.xcvii - ticketNew.cs - Code file - annotated.....	517
Subsection 3.6.3.xcviii - ticketReply.cs [design] - design view	519
Subsection 3.6.3.xcix - ticketReply.designer.cs - Object file - unannotated	521
Subsection 3.6.3.c - ticketReply.cs - Code file - annotated	525
Subsection 3.6.3.ci - ticketView.cs [design] - design view	528
Subsection 3.6.3.cii - ticketView.designer.cs - Object file - unannotated	529
Subsection 3.6.3.ciii - ticketView.cs - Code file - annotated	537
Subsection 3.6.3.civ - userList.cs [design] - design view.....	541
Subsection 3.6.3.cv - userList.designer.cs - Object file - unannotated	542
Subsection 3.6.3.cvi - userList.cs - Code file - annotated	552
Subsection 3.6.3.cvii - userCreate.cs [design] - design view.....	556
Subsection 3.6.3.cviii - userCreate.designer.cs - Object file - unannotated	557
Subsection 3.6.3.cix - userCreate.cs - Code file - annotated	564
Subsection 3.6.3.cx - userEdit.cs [design] - design view	567
Subsection 3.6.3.cxi - userEdit.designer.cs - Object file - unannotated	568
Subsection 3.6.3.cxii - userEdit.cs - Code file - annotated	576
Subsection 3.6.3.cxiii - userDelete.cs [design] - design view.....	581
Subsection 3.6.3.cxiv - userDelete.designer.cs - Object file - unannotated	582
Subsection 3.6.3.cxv - userDelete.cs - Code file - annotated	585
SECTION 3.6.4 - COMPLETED USER INTERFACE INCLUDING FULL DESCRIPTION OF FEATURES THAT MAKE IT FIT FOR AUDIENCE AND PURPOSE.	587

CHAPTER CS3.7 - TESTING (15 MARKS).....	625
SECTION 3.7.1 - DEVELOPMENTAL TESTING [5 MARKS].....	625
Subsection 3.7.1.i - Evidence of comprehensive testing at each stage of the development of the solution and problems encountered and actions taken.....	625
SECTION 3.7.2 - TESTING THE FINAL SYSTEM.....	630
Subsection 3.7.2.i - Test plan.....	630
Subsection 3.7.2.ii - Actual test runs.....	640
CHAPTER CS3.8 - EVALUATION (15 MARKS)	688
SECTION 3.8.1 - EVALUATE THE SYSTEM	688
Subsection 3.8.1.i - Evaluate the programming language	688
Subsection 3.8.1.ii - Compare your solution with commercially available systems	690
Subsection 3.8.1.iii - Successful features of the system	693
Subsection 3.8.1.iv - Potential improvements to less successful features of the system	695
Subsection 3.8.1.v - Strengths and weaknesses of your own performance.....	697
Subsection 3.8.1.vi - Changes of approach that would be adopted.....	700

Chapter CS3.1 - DISCUSSION (5 MARKS)

Section 3.1.1 - Problem identification





Dedicated Servers
Powerful and reliable dedicated servers.

1 SELECT SERVICE 2 CONFIGURE 3 CHECKOUT 4 DONE!

I7 4790 Customisable/MONTH	I7 6700K Customisable/MONTH	I7 7700K Customisable/MONTH
4 Cores @ 3.6GHz 32GB DDR4 RAM 240GB SSD 10TB Bandwidth 10Gbps Uplink	4 Cores @ 4.0GHz 32GB DDR4 RAM 240GB SSD 10TB Bandwidth 10Gbps Uplink	4 Cores @ 4.2GHz 32GB DDR4 RAM 480GB SSD 10TB Bandwidth 10Gbps Uplink

These screenshots cover my introduction to the company and the project I wish to perform. It also showcases the 4 locations the company currently operates from, which are Bristol, Nuremberg, Chicago and Piscataway. I've referenced their locations on a map in addition to the buildings they operate from.

I explained the project I am looking to perform, but only gave a brief overview/summary.

In the images below, I cover all of the obvious problems I can see with their existing solution after being quickly showed the program that I will be replacing. I am returning soon to continue with a further investigation but viewing the program has given me an idea on what I need to create, need to improve upon and better it, in addition to the few features I already had in mind to complete.

Problem Identification

The existing system is very outdated, inefficient and not flexible at all. The system is incredibly insecure, allows for a very limited set of processes to be executed and can only be accessed by two personnel due to no permission or restriction system being in place leaving root access open to anyone who is using the system.

All access logs are saved in a single flat file database, containing a lot of duplicated and unnecessary redundant data.

Problem Identification

Backups whole server, rather than critical data

Every text file contains the exact same bash script however with a slight alteration to the login credentials to the backup node assigned. This leaves a lot of commands being the same, wasting storage space and being overall, very inefficient.

Problem Identification

Messy & Unorganized While Running

If one command is required to be processed on all nodes within the system, multiple SSH windows will appear on the screen causing the system to run inefficiently and hindering the use of the computer while it is running.

No Support

For users using the system, if one of the nodes errors performing the action, there is no method of getting support relating to that problem.



Problem Identification

Commands run from a txt file for each server

The system is designed so that a Putty file is executed which automatically logs into a node defined, and runs a bash script allowing for very basic input which will then perform a process as requested by the user. This means that commands are pre-defined and very limited.

Root access to anyone who has the Putty File

For fast access, the putty shortcut not only executes the code within the txt file, however automatically logs into the node as root to be able to perform the commands quickly. This leaves the root password to every node in plaintext within each putty shortcut. is stored within a flat file database causing duplicated data.

The limitations of their existing project are vast, as the system is very basic and normally requires the members of staff at the company to perform actions manually. This does open up a massive opportunity to pack the project with features and improvements which I can build into my code.

Problems which currently need addressing:

- The servers can only be controlled from one computer which has the software in it, due to there being no remote database or login system.
- Security - all server root passwords are stored in plain text in a .txt file rather than securely in a database.
- No support - users have to physically call up a systems administrator to request assistance when something goes wrong.
- When something needs updating, it needs to be updated 30+ times due to the commands being replicated in different files.
- It is inefficient to run; there are 30+ terminals open on the computer screen making finding a specific window very hard - making debugging tricky.
- Backups are processed to backup all data; there is no way to tell the system which folders need updating specifically, so everything is processed.
- Tracking is done by writing the running logs to a single flat file database, however, is unable to log commands or who is acting.
- All users can perform all actions with admin access; there is no permission system in place.
- Lack of advanced commands, the system is designed to backup and backup only, so there isn't an option to mass update, mass run commands or view logs or statistics for each node.
- Timed actions - unable to schedule commands

All of these reported problems will give me a better understanding of what I can do to improve and better the project that I will be creating, and make sure that I can cover all of the areas which the client currently finds annoying.

Section 3.1.1 - Broad aims and limitations of the project

Project Aims and Goals

Automation

Another aspect of the project which I wish to crack is the automation, allowing for live command updates, instant variable commands and scheduled tasks to be performed across all nodes or a specific node within the system.

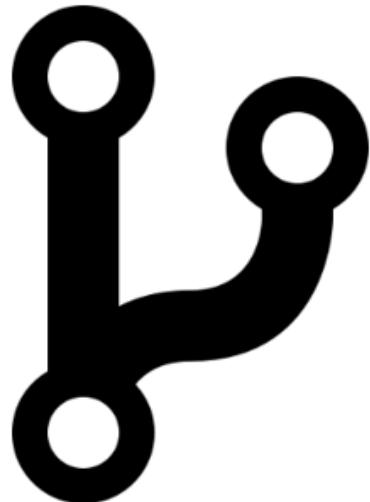
Support

A built in, integrated support system to allow users to directly contact a system admin to assist running a command would be required.

Within the project, I am looking to be able to create & allow the users to define a list of standard commands which can automatically be run on all machines at the same time. Allowing for mass updates and mass downloads/configuration of new software.

I am also looking to integrate a support system, in a ticket style, where users can create a support ticket within the program and for an administrator to be able to reply directly to the request. This covers one of the issues which the company brought to my attention and also will be a very nice feature, in general, to speed up conversations.

Project Aims and Goals



External Use

One additional feature which would be a great additional feature for the system would be to implement additional settings and configurations for users, allowing non-employees of EL to be able to register and to use the system. Processing these plans through an automatic payment process would make the whole process much more efficient as an additional feature and service to sell.

I am determined to create an external use system for the project, allowing other companies to register an admin account, pay for a server management plan and to be able to add and control their hardware through the same system which ELHostingServices uses. This should, in theory, be beneficial for EL because they can receive payment from their competitors using their software to manage their nodes.

Project Aims and Goals

Permissions

When moving to an online application which can be accessed from multiple different locations, it opens the possibility for other users to make use of your software too. With the ability for permissions to be created, the system can also be opened up to external entities for them to create accounts and to manage separate sets of servers in parallel to the main organisation, EL.

Tracking

If something CAN go wrong, it WILL go wrong.

Tracking will be a large part of the software, from detailed login reports to command tracking and file changes will allow future users to monitor their nodes and keep track of what users are doing.

With a better system comes better permissions. Restricting access to specific people to perform different commands to the system will benefit all the users. In addition to that, tracking what each user does and what each action they perform is also another benefit as you can then see what each user is doing. You can also undo things when problems occur as you can view the commands which caused the issue in the first place.

Project Aims and Goals

Backup Services

This goal is more of an additional feature which I would like to implement into the system, however it differs from the ability to perform automatic and emergency backups of all nodes.

My hope, with the help of some PHP, is to be able to automatically provision backup infrastructure within a nearby datacentre when an emergency backup is provisioned. Encrypted Laser (and other companies) have standard backup systems in place for regular backups, however offering an instant burst of available storage with a large network port will allow for the emergency backup feature to be more effective.

Project Aims and Goals



Simple Control

Perhaps the most important aspect of this project, and the reason why I wish to complete it will to enable simplified management of nodes connected to the software, without the needs for multiple putty terminals open and pre-defined commands which are stored in text files. Allowing for commands and controls stored in a remote database it also allows other users to perform commands which they have been given access too.

Security. A Lot.

Within this project, security will be the largest aspect of it. Between salting and hashing all passwords, to creating secure sessions to the server – a wrong line of code or bug within the system could allow full access to user passwords and the root administration passwords to all servers stored on the systems database.

The full list of features I wish to develop into my project:

- Simple Control Anywhere – One application which can perform all tasks requested in the background, in a simple and understandable user interface which can be accessed from anywhere in the world with a remote access login to the program.
- Security – A security module to ensure that all passwords and sensitive data is encrypted and stored securely in the database so that there is no risk of data leaks. Also preventing unauthorised access is a must.
- Automation – Creating the ability to perform actions automatically with one click of a button rather than having to specify a command manually. These commands are pre-defined and will run smoothly on all operating systems supported.
- Backup Module – The main focus of the existing program is primarily on backups, so creating a one-click backup solution for all servers (also automating it) is a must. Configuring the system to only backup data required (or to allow the user to specify which files are needed) will make the process a lot more enjoyable.
- Support Ticketing System – Allow the users and staff of the program to request assistance from a system administrator if something within the program throws back something it shouldn't, or just to be able to request assistance relating to the server itself without having to navigate to an external system to request help.
- Permission Module – Offering the system admins to be able to adjust the permission levels of staff members and what actions they can perform while using the program. This will be a very heavy module but allows for control, and most importantly peace of mind that things won't randomly get broken by people pressing things they shouldn't.
- Automatic Installation – Anyone on any computer in the world can login to an existing company's server setup and their account, or start from scratch and install the system onto their MySQL server. Solution limitations

Solution Limitations

Windows Server Support

The system will be developed for Linux based operating systems which support SSH. To be able to perform SSH commands on a Windows node, an SSH server would be required to be installed, and the system reconfigured to run commands through PowerShell.

Management of Offline/Wrongly Configured Node

If a node is offline, or has a incorrectly configured network the node will be unable to be controlled as a stable SSH connection is able to be made. Online nodes can still be managed however an offline server can't be controlled unless you have physical access to it.

One aspect which I failed to include within the solutions limitation during my presentation is the fact that the program I am creating will only be able to run on Windows, rather than Linux or Mac OS. The software is also restricted to desktop or laptop devices, due to no mobile app or website being created to allow additional users to access the system.

The system will only be able to support interactions with a Linux server due to the issue that SSH isn't by default supported in the Windows operating system, but is widely available across Linux devices. This makes it perfect for a Linux server management tool but will provide some issues if attempting to communicate with Windows. In addition to that for Windows, the default commands would have to be completely redone to support being processed through PowerShell or CMD rather than a standard terminal. Due to these reasons, I have decided that I will keep the program focused on Linux.

The program I wish to develop is going to be communicating with devices through SSH, meaning that the node must have full internet access, be turned on and be configured to accept SSH commands. Without those requirements, the system will be unable to connect or interact with the device leading to there being no command sent.

Project Limitations

Network Management

One limitation of this project is that there is no way for the software to connect and also manage the network routing within the datacentre. Even though it is technically possible, from a remote connection only using SSH to connect to servers controlling packet routing is infeasible.

OS Provisioning

Due to the fact that this software will manage nodes through SSH, it will be unable to provision operating systems as it needs an already configured Linux OS to be setup already. Operating system reinstalls need KVM root access.

Website Control

Unfortunately, to code a website and an online control panel just isn't possible within the given time frame. Automated web services will be used for the remote database and payment processing but to allow users to connect and perform actions via the web would be a completely separate project.

For a project limitation, the main limitation which I have foreseen is that it will be unable to perform an operating system reinstall through the system due to the drop in connection and manual intervention being required. This makes it impossible to perform from a remote location fully over SSH. This also links to be able to control the networking configuration of each node connected to the system. This requires a much more advanced setup being made which will interact with the routers which do not support SSH. Unfortunately, the problem prevents this configuration from being a part of the project.

The final project limitation which I will not be able to complete is to turn this system into a website. This will be a desktop program which will run on computers only. This does mean that to connect or sign in you will have to have the program downloaded rather than being to access a website to login.

Section 3.1.1 - Feedback from others

To collect feedback after giving the presentation, I decided to go down a different route than my peers did for their projects. Instead of printing out a sheet and providing that to them to fill out, I provided a shortened link to a Google form page. The link is: <https://www.elhspowered.com/feedback>

I received a total of 6 responses (one from every person in my group) and asked a range of questions to probe for feedback on my project to see what they liked and what they felt wasn't going to go well.

The screenshot shows a survey form titled "ELSM Feedback Request Form". At the top, there are navigation icons for back, forward, file, and star, along with a "SEND" button and other settings. Below the header, there are two tabs: "QUESTIONS" and "RESPONSES". The "RESPONSES" tab is selected, showing a count of 6 responses.

Who has responded?

Email

- gw162342@truro-penwith.ac.uk
- tp162024@truro-penwith.ac.uk
- ta161267@truro-penwith.ac.uk
- mc160709@truro-penwith.ac.uk
- lc163873@truro-penwith.ac.uk
- mp161687@truro-penwith.ac.uk

Surname

6 responses

Webb

Perry

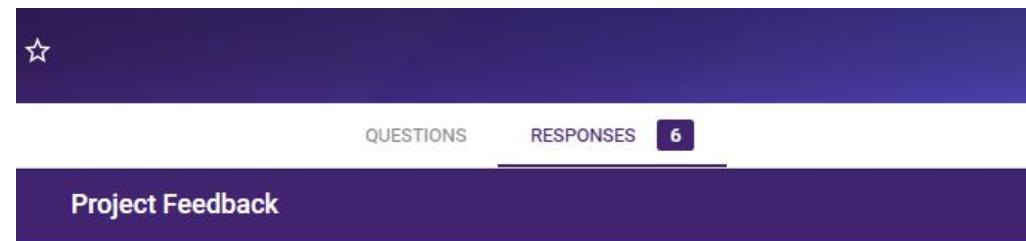
Allan

Cocklin

cox

Pearson

The first two questions I created for the survey were just to establish who was taking part in completing the form. This was mainly to ensure the form hadn't found its way into anyone else's browser. It was filled out by every member of my group, and they offered some great insight into what exactly needed to be changed and what they felt the project was going to achieve for the company.

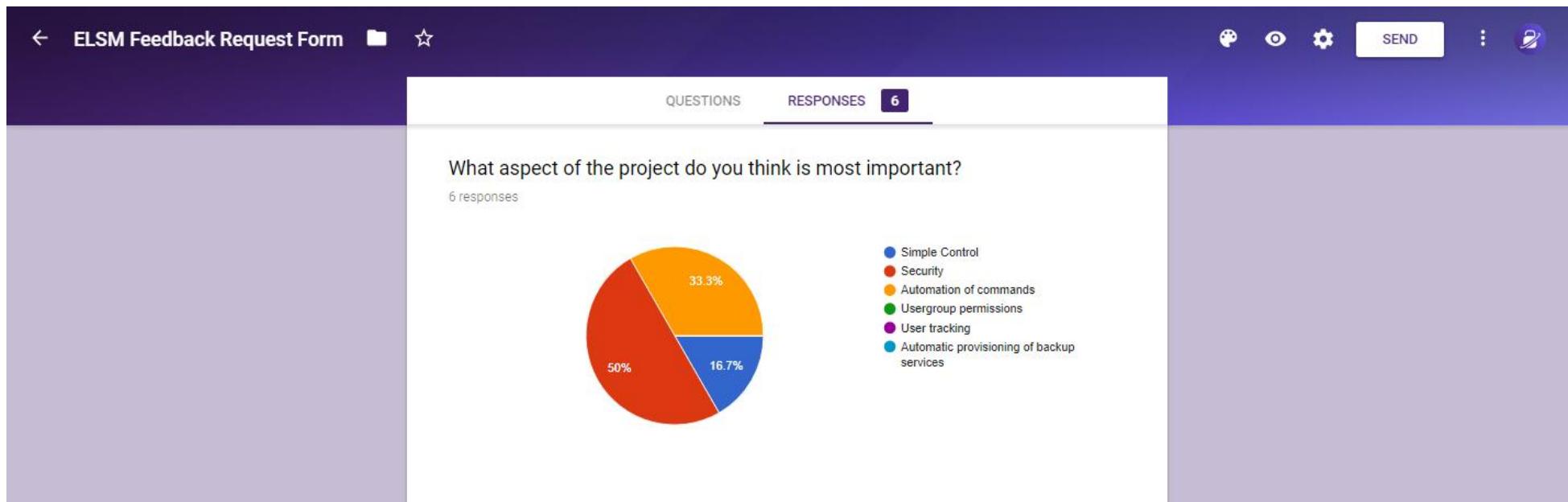


Do you believe the project has potential?

6 responses



The first question of the information collection section was just to see if my peers believed that if I can complete this project, that it could have potential to change the way that EL manage their systems. With 100% of answers pointing to the "Yes" option, I hope to be able to fully complete the project so that it can indeed have potential and be used in a full working order.



Requesting a summary of which feature I proposed would be the most important to the company, I received some mixed responses. However, they identify which sections of the program they see as being the most critical to the project. This will assist later due to the project also allowing external users to access the program.

← ELSM Feedback Request Form ⌂ ☆

QUESTIONS RESPONSES 6

Is there any aspect of the project you think will be too difficult to complete in the given time frame?

6 responses

Security features

I feel like you may be able to complete everything if you work quickly enough

No

no

don't think so

No i think you will finish your project on time

← ELSM Feedback Request Form ⌂ ☆

QUESTIONS RESPONSES 6

How much do you believe the software will improve existing services?

6 responses

Score	Responses (%)
1	0 (0%)
2	0 (0%)
3	0 (0%)
4	0 (0%)
5	0 (0%)
6	0 (0%)
7	2 (33.3%)
8	2 (33.3%)
9	1 (16.7%)
10	1 (16.7%)

One section of the input form which did open my eyes, was that there was quite a bit of doubt that this project could REALLY make a massive difference for EL. It will improve systems, however, won't dramatically change how they go about their standard operation. I am going to have to push with automation and fill the program with as many features as possible so that it has a higher potential of doing so to a better standard. It also links into something which I wasn't expecting, that there was a doubt that the project can even be completed within the given time, with a couple of my peers feeling that the project is too large. One user can be seen commenting to me that if I work very hard I will only just be able to complete everything.

The screenshot shows a feedback form titled "ELSM Feedback Request Form". The main section displays a list of responses to the question "What aspect of this project do you think will be the hardest to complete?". There are six responses listed:

- Security
- The automation
- Connecting to the servers
- the backups
- Automatic provisioning of backup services
- Connecting to the server

Seeing what my peers expected me to find the hardest was also quite interesting, because two out the six believed that the initial connecting to the servers would be the tricky bit with others than thinking that potentially all other aspects of the project will be difficult. I believe I already have the connecting of the servers down, as doing a very quick bit of research online there seems to be ab SSH library for C#.

The screenshot shows a Google Forms interface. At the top, there's a navigation bar with a back arrow, the title "ELSM Feedback Request Form", a folder icon, a star icon, and various settings and send buttons. Below the title, there are two tabs: "QUESTIONS" and "RESPONSES". The "RESPONSES" tab is selected, showing a count of "6". A single response is displayed for a question asking for ideas to improve the project. The question text is: "While watching the presentation, have you thought of any other ideas that could improve the project? If yes, what were they?". Below the question, it says "4 responses". The responses listed are: "no (2)", "Logging purchases/sales", and "nope". Each response has a small purple bar next to it.

The final part of my form was probing to see if there were any parts of the project which my peers feel like I should improve on, with almost all of them giving a “no” answer that is quite satisfying, with only one being able to see an obvious place for improvement. The logging of the transactions and sales. This will be beneficial for EL as they can see active users within their system and how much money they are making from it.

Chapter CS3.2 - INVESTIGATION (10 MARKS)

Section 3.2.1 - Investigation of the current system

Subsection 3.2.1.i - Logical Plan of Investigation

For my investigation, I plan on using multiple different methods to ensure that I can get the best set of results and that I can go into developing the new system with adequate information what the current system can and cannot do. In addition to that, I would also like to learn what the users of it specifically want, dislike and like.

I intend to first send out a general survey to all staff members within the company which I know have interacted with the software at some point to get a very brief overview of the software. One downside I can see to this method is that surveys aren't very detailed, and are more than likely going to be filled out quite quickly. This means that they won't be very reliable, but hopefully, it will give me an overall view of what their opinions will be.

My next method of investigation will be to observe the users when they interact with the system, to get an idea of how the program operates. This will give me a better insight into what they currently use and how they interact with it on a day to day basis. I expect this to be very beneficial as I can see first-hand how feature packed the software is currently and the actions which the employees must follow to use it correctly.

In addition to these two methods of investigation, I plan on looking at the existing documentation of their system. From what Jamie has told me, is that there are only very basic user instructions and very basic backend code documentation. Regardless, it will be interesting to see exactly what the system requires and how it runs.

My final method of investigation will be to directly interview a few of the staff members at Encrypted Laser who use the software, some of them will use it daily, others will only use it intermittently, but I will be able to have an in-depth discussion to expand on the surveys submitted earlier into my investigation.

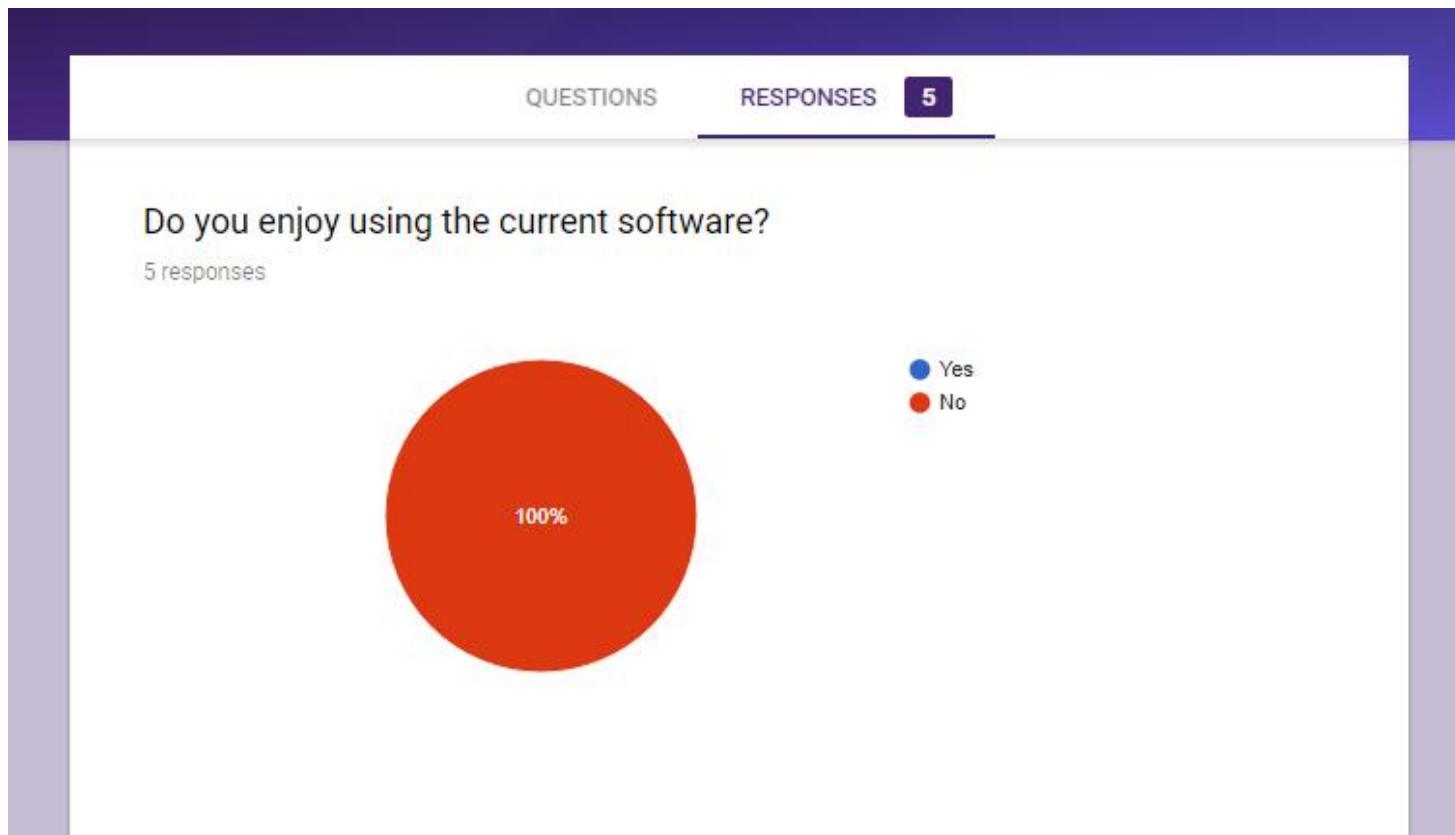
Subsection 3.2.1.i - Questionnaire evidence

For the questionnaires, I chose to follow the same route that I did for my questionnaires that I sent out to my classmates – send it via Google Forms. Very kindly, --Redacted Name-- the company's Public Relations officer intercepted my survey and sent it in a company email for all employees to fill out. This overcame the issue which I had previously feared, whereby the survey wouldn't have been filled out much.

The screenshot shows a Google Forms survey interface. At the top, there are tabs for 'QUESTIONS' and 'RESPONSES'. The 'RESPONSES' tab is selected, showing a count of '5'. Below this, the text '5 responses' is displayed. To the right are icons for adding a response and more options. Further down, there are tabs for 'SUMMARY' and 'INDIVIDUAL', with 'INDIVIDUAL' being the active tab. A switch labeled 'Accepting responses' is turned on. The section titled 'Who has responded?' lists five email addresses:

- Email: wilson@elhostingservices.com
- Email: callum@elhostingservices.com
- Email: michael@elhostingservices.com
- Email: jamie@elhostingservices.com
- Email: max@elhostingservices.com

5 of the six staff members have replied to the survey request as of writing this, which is a very good completion percentage. This can give me enough data to get a general idea of staff beliefs of the current system they have in place.



The first question of the survey asked a very simple question – do you enjoy using the current software? The answer was clear and simple, with 100% of answers being 'No'. This has made me realise that for my software to be beneficial in any way, it needs to be as simple and easy to use as possible so that the users can enjoy using it and not find it annoying or a hassle. Having ugly, unoptimized and feature lacking software makes the job a lot less pleasant and can also hinder the amount of work getting done which is clear with all the staff giving the impression they don't like it.

The screenshot shows a survey interface with a purple header bar. Below the header, there are two tabs: 'QUESTIONS' and 'RESPONSES'. The 'RESPONSES' tab is selected, indicated by a blue underline and a dark blue box containing the number '5'. The main content area has a white background with a light gray border. At the top of this area, the question is displayed in bold black font: 'What aspect of the software would you wish to see improved upon the most?'. Below the question, the text '5 responses' is shown in a smaller, gray font. The five responses are listed vertically, each enclosed in a light gray box:

- How easy it is to run a specific command across all servers
- Ease of use
- The features which the system has, be able to perform more actions rather than the very limited set which are currently in place.
- Not have 50,000 windows open when you attempt to run a command across all the servers.
- For me to be able to use the system fully without having to have a supervisor be with me while I use the program. Having a permission system would be nice.

My second question probed for answers regarding the aspect of the program which the staff members wanted to see improved the most. In hindsight, this question conflicts with another one I ask later on which isn't exactly the best on my part. The first two members of staff to fill out the survey mentioned ease of use for the program what the area which they wanted to see improved the most. Other areas of the program which staff wished to have improved include the window popup problem when running commands on multiple servers, more features being requested and also a permission request was mentioned.

QUESTIONS RESPONSES **5**

What new feature would you want to see integrated into the software?

5 responses

The ability to have permissions which can allow lower level staff to begin using the software.

Pre-set commands and automatic options

I would LOVE to see the ability for me to one click a preset command, and for it to run on ALL servers without a mass amount of damn windows opening.

I would like for the system to be stored on one of the servers, so that you can take the program and run it on any computer without having to have a massive folder of settings.

Permissions for definitely.

One request I made was for the staff member filling out the survey to give me an idea of what extra new feature they wanted to be integrated into the software during my time creating it. One feature which was requested twice was a permission system so different users have different levels of access. This is lucky as it was one which I planned on developing into the panel and it shows there is a need for it. Another feature which was requested twice was in addition to having automated tasks to have pre-set commands which can be used. The final additional feature which was brought up was for the system to run remotely so that different computers can still access it – another feature which I was already planning on integrating.

The screenshot shows a user interface for a survey or poll. At the top, there are two tabs: "QUESTIONS" and "RESPONSES". The "RESPONSES" tab is selected, indicated by a blue bar and the number "5" in a blue box. Below the tabs, the question "What do you like the most about the existing software?" is displayed in bold black text. Underneath the question, it says "5 responses". Five individual responses are listed vertically, each enclosed in a light purple box:

- It is simple and it is hard to get confused.
- Simple and very basic
- Well... it is basic and very simple for everyone who uses it.
- I don't like anything.
- It has a lot of nice features which look like they can be very helpful to speed tasks up.

For the next question, I asked what they liked about the program. The overall consensus was that they liked it being simple and easy to use, with one member of staff saying that they didn't like anything and another saying the features in the program to help speed up tasks.

What do you like the least about the existing software?

5 responses

When running, the number of windows it opens makes it unbearable.

Really restrictive on what you can do

If I update a server password I have to pass that new password to all users to update their versions of the system.
CHANGE PLEASE.

The whole thing. Its old, not really a full 'program' and is annoying to run commands or perform backups.

I can't use it when I am not with my supervisor.

The final question of the survey was a re-worded version of the 2nd question, which I have since realised. Points which were mentioned in that question have been brought up here again, such as the window issue, restrictiveness and lack of flexibility.

In conclusion, the feedback from the staff members at Encrypted Laser was very helpful. It allowed me to see the areas which I need to focus on and what sections of the program the staff members do not like with the existing system. No staff member currently likes the existing system as they find it restrictive, unpleasant or not aesthetically pleasing. There is a clear need requested by staff for a permission system and to compress the system so that when running SSH commands it doesn't run each command in a separate window. One additional issue which it has brought to my attention was that the main aspect of the current system that the staff members liked was that it was really simple. This will be a challenge for me to be able to develop the new system to remain simple, easy to use and understandable so that they continue to be able to use the program without any problems.

The feedback collected is very beneficial and has shown me that there are massive changes and upgrades needed to be able to cover all requests of the staff member and to attempt to make the program more enjoyable to use while being packed with features to make their jobs easier.

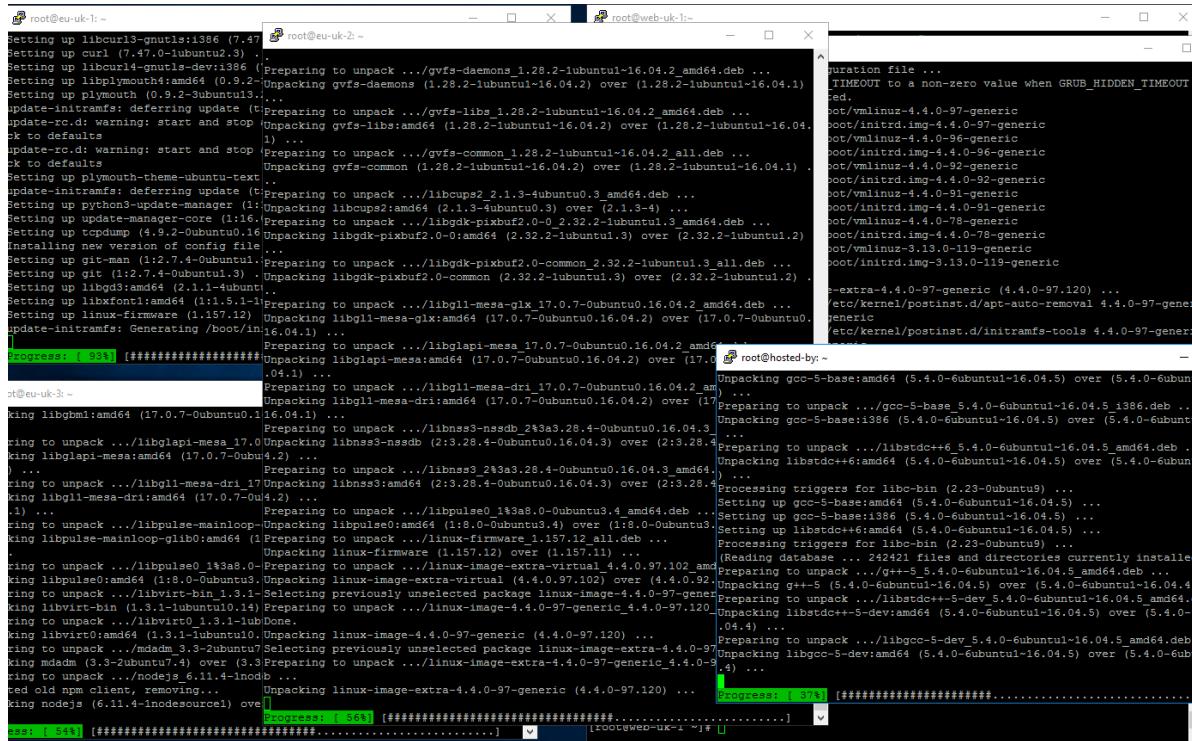
Subsection 3.2.1.ii - Observation evidence

The current system is used to control a range of different servers within multiple datacentres around the world. Each server can be manually controlled for specific incidents and requests. However, when attempting to perform mass commands or operations, it becomes a large issue.

For the development of the program, I am going to be working on controlling all servers within Encrypted Laser's Bristol location – as it can be easily developed on with direct access to the hardware. This will allow a future adjustment to allow different locations to be controlled.

Because each server can be manually controlled and accessed if needed a feature that I won't be developing will be per-server connection and SSH terminal. The staff members already use Putty for that.

With the ability to have direct access to the hardware I am testing on I can see how quickly actions perform, and check that they actually get performed. This will give me confidence, later on, to be able to then ssh control other locations and servers in other datacentres.



The screenshot above is what I captured from one of the staff members, Michael, attempting to run a simple update and upgrade of the Ubuntu software on all nodes within Bristol. The mass amounts of windows make it difficult to see which nodes have finished updating or if any returned an error.

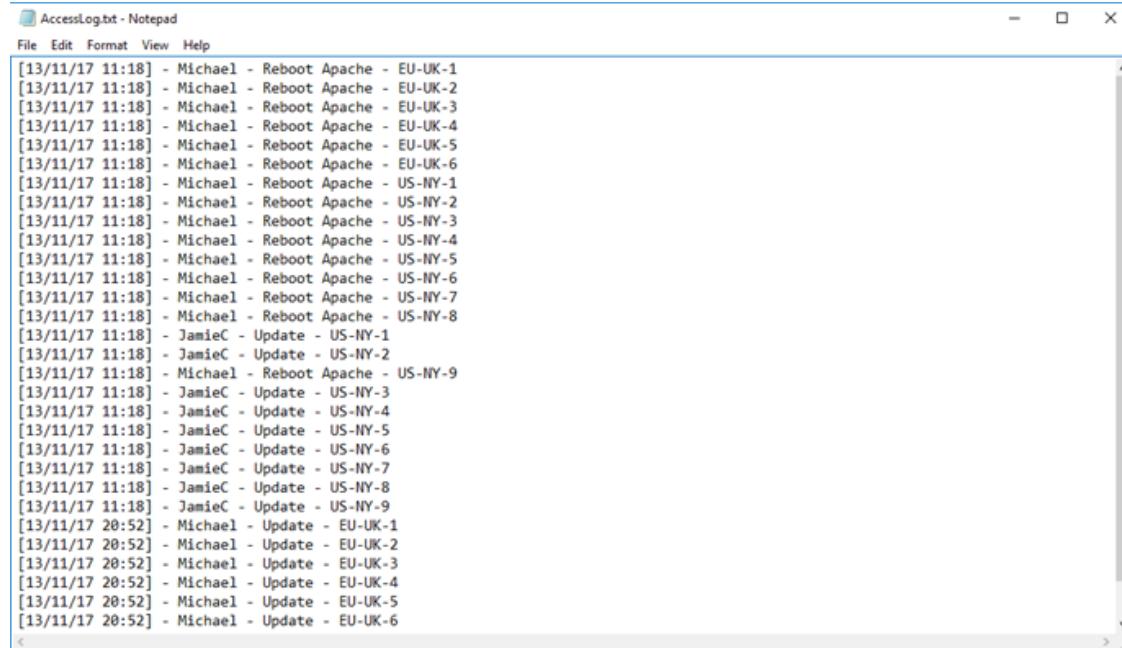
Watching staff members trying to use the software has been an eye-opener as to why no member of the team enjoys using the software. To perform a simple apt update causes a window to pop up for every node making the task of running a command that isn't pre-built into the software a challenge to complete.

The software gets the task done but not in a way which is beneficial to anyone, and you can see that it is designed to do a very limited range of tasks and no more.

Subsection 3.2.1.i - Document/Record inspection evidence

For the documentation inspection, I requested an additional chat with --Redacted Name-- so that I can attempt to get hold of any documentation for the program or instructions for the users on how to use it. I quickly learnt that the software itself wasn't documented very well on the backend, with the only core documentation of the program being the comments left by the previous developer when he was creating the script. Other records only seem to include a very quick tutorial on how to re-configure a backup node for a server to use, and a log text file which is written to whenever a user logs into the program to perform a command. This log file logs the user, time, node and command which is run so that in the future event logs can be kept to debug issues with a node if an incorrect command is run.

An example of the logs are:



The screenshot shows a Windows Notepad window with the title bar 'AccessLog.txt - Notepad'. The menu bar includes File, Edit, Format, View, and Help. The main content area displays a large list of log entries, each consisting of a timestamp in brackets followed by a hyphen, a user name, a command, and a node identifier. The log entries are as follows:

```
[13/11/17 11:18] - Michael - Reboot Apache - EU-UK-1
[13/11/17 11:18] - Michael - Reboot Apache - EU-UK-2
[13/11/17 11:18] - Michael - Reboot Apache - EU-UK-3
[13/11/17 11:18] - Michael - Reboot Apache - EU-UK-4
[13/11/17 11:18] - Michael - Reboot Apache - EU-UK-5
[13/11/17 11:18] - Michael - Reboot Apache - EU-UK-6
[13/11/17 11:18] - Michael - Reboot Apache - US-NY-1
[13/11/17 11:18] - Michael - Reboot Apache - US-NY-2
[13/11/17 11:18] - Michael - Reboot Apache - US-NY-3
[13/11/17 11:18] - Michael - Reboot Apache - US-NY-4
[13/11/17 11:18] - Michael - Reboot Apache - US-NY-5
[13/11/17 11:18] - Michael - Reboot Apache - US-NY-6
[13/11/17 11:18] - Michael - Reboot Apache - US-NY-7
[13/11/17 11:18] - Michael - Reboot Apache - US-NY-8
[13/11/17 11:18] - JamieC - Update - US-NY-1
[13/11/17 11:18] - JamieC - Update - US-NY-2
[13/11/17 11:18] - Michael - Reboot Apache - US-NY-9
[13/11/17 11:18] - JamieC - Update - US-NY-3
[13/11/17 11:18] - JamieC - Update - US-NY-4
[13/11/17 11:18] - JamieC - Update - US-NY-5
[13/11/17 11:18] - JamieC - Update - US-NY-6
[13/11/17 11:18] - JamieC - Update - US-NY-7
[13/11/17 11:18] - JamieC - Update - US-NY-8
[13/11/17 11:18] - JamieC - Update - US-NY-9
[13/11/17 20:52] - Michael - Update - EU-UK-1
[13/11/17 20:52] - Michael - Update - EU-UK-2
[13/11/17 20:52] - Michael - Update - EU-UK-3
[13/11/17 20:52] - Michael - Update - EU-UK-4
[13/11/17 20:52] - Michael - Update - EU-UK-5
[13/11/17 20:52] - Michael - Update - EU-UK-6
```

Here you can see --Redacted Name-- performing commands to the nodes connected to Encrypted Laser's network, with Michael performing a mass update.

Subsection 3.2.1.ii - Interview evidence

For the interviews in my investigation, I approached --Redacted Name-- and --Redacted Name-- to have a quick conversation with me about the existing system. I had the conversation with both separately, and their beliefs confirmed that which I had thought to look at the results of the survey. Unfortunately, both members of staff are both rather high up within the company which means that I haven't been able to get the prospectus of someone who doesn't have full access. Nevertheless, it helped!

--Redacted Name--

"How efficient do you believe the current program is at processing mass commands?"

In Michaels response, he explained that it could process all requests rather quickly for very standard commands, regardless of the mass amounts of windows that the program opens. For advanced commands however he said becomes a lot more complex to run and to process, an example of this is the backup procedure which must be run out of multiple text files with a lot of terminal commands to run saved in them. He also described the existing solution as 'Decent, but at the same time hideous' which again to me emphasise that staff (including Michael) do dislike using the program, and only use it because it is just slightly faster than running the commands manually. Michael did also say that the program can sometimes crash when attempting to open so many putty sessions, which he said majorly impacted how efficient it could be.

"What is your main use for the program?"

The answer which Michael replied with was rather interesting, his main use for the software is just to run a daily update and upgrade. He has to manually trigger the commands being sent, which he noted would be a lot easier if it was just automated at a specific time each day.

"How do you think the backup system could be improved?"

Michael explained that the thing which he wanted to improve the most of the backup feature would be that as easy as it is to trigger the backup of all servers after configuring the text files. Then to change the backup location that one server is pointing to is such a pain requiring the node to completely re-made within the program and to re-create the text file with the settings. This would then begin pointing the node only then to start backing up to that server.

--Redacted Name--

"Why are you required to use the program?

William explained to me that he is required to use the program from his through Remote Desktop from his laptop on multiple occasions to monitor the server CPU load if a customer reported a potential issue with a node. Running the HTOP command across all nodes allows him to view the general statistics of the nodes, however, does cause an issue when attempting to find the stats of one specific server in the maze of windows. He also went onto say that some machines don't have HTOP installed after their initial configuration, meaning he has to go and manually install it on that node, then re-run the command.

"What aspect of the current program would you say takes you the most amount of time to do?"

The answer that William gave matched one reply I got in the survey - it was highlighting that to work with another member of staff with less access means that the supervisor has to spend their time with that employee to oversee any actions that are performed to ensure that nothing sketchy is run.

"How much benefit would adding remote access to the program bring?"

William mentioned that adding remote access would massively benefit the program, allowing for a higher productivity rate. Currently, he has to remote desktop into his work computer to even view server statistics. Having a remote access system with the ability to just log in to the program would speed up his jobs massively while travelling and on the go. One aspect of the answer William gave was touching on the fact that the login would have to be secured with rate limits to prevent someone getting access to the program and attempting to brute force it and also to prevent SQL injections.

Section 3.2.2 - Research into existing solutions

Subsection 3.2.2.i - Functional features

ImminentMonitor

ImminentMonitor is designed to be an all in one RAT, offering a full control experience over Windows nodes that you have access to and permission to control. The software was developed to be a full solution to remote Windows management. This allows the software to perform very advanced actions which I don't plan on implementing.

Some features of this software include full

Gathering Computer Specifications

Displays the following:

- Client Identifier
- Unique Identifier
- Public IP Address
- Private IP Address
- MAC Address
- Operating System
- Computer Name
- Computer Username
- System Privileges
- Installed Screens
- Processor
- Graphics Card
- Ram
- Ram Usage
- Battery Usage
- Last Reboot
- Installed Anti-Virus
- Firewall Status

The screenshot shows the 'Overview' section of the Imminent Monitor software. It features a grid of six cards, each representing a different feature:

- Remote Desktop:** View and control your remote clients at high speeds exceeding 60 frames per second.
- Remotely Transfer Files:** With our highly advanced file manager feel free to transfer files remotely no matter the size.
- Live Voice Chat:** Have a real-time voice chat with your client to give the best quality remote assistance with a personal touch.
- System Managers:** An all in one panel for everything system related (processes, windows, registry, command prompt, etc)
- Reverse Proxy:** Enable your client as a reverse proxy which combines your network with your clients, in order for full remote administration.
- Friendly Support:** If you need some help setting up Imminent Monitor, or are experiencing problems, we have a very friendly support team ready to assist you should anything go wrong.

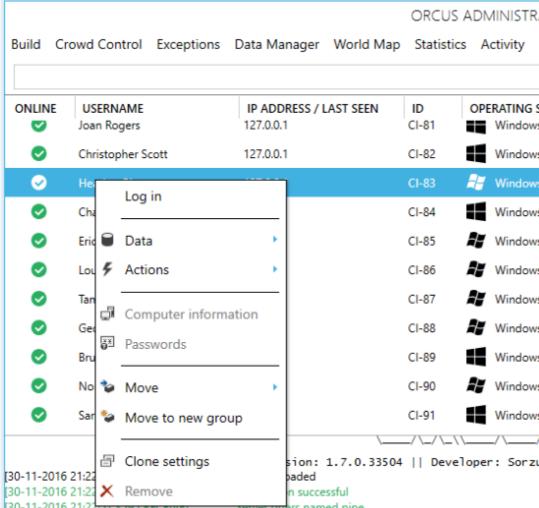
A blue button at the bottom center says "Click here to view a full feature list".

permission Remote Desktop at 60FPS for windows desktop computers, remote file management, reverse proxy configuration and live voice chat between the two computers. In addition to this, other full administrative actions can be performed on the node. Live computer statistics can also be retrieved from the node which I find very useful to monitor resources. I've personally used ImminentMonitor to control and manage a laptop I ran remotely, and there was a lot packed into it. A couple of notable features that I found quite nice was just to be able to see on a map where the laptop was using IP geolocation, in addition to being able to perform commands without something having to process instantly.

Features

Orcus provides a lot features. A full list can be found [here](#)

WHAT WE OFFER	FEATURES
‣ Free Android App	‣ Remote Desktop
‣ Independent Server	‣ Webcam
‣ Customer Service	‣ File Explorer
‣ Transparency	‣ Registry Editor
‣ Open Plugin System	‣ System Restore
‣ Security	‣ Device Manager
‣ 24/7 Support	‣ Startup Manager
‣ Light and Dark Design	‣ Event Log



The screenshot shows the 'Orcus Administration' software interface. At the top, there's a navigation bar with links: Build, Crowd Control, Exceptions, Data Manager, World Map, Statistics, and Activity. Below this is a table titled 'ONLINE' showing user information: USERNAME, IP ADDRESS / LAST SEEN, ID, and OPERATING SYSTEM. The table lists several users, including Joan Rogers, Christopher Scott, and Helen. A context menu is open over the row for Helen, displaying options like 'Log in', 'Data', 'Actions', 'Computer information', 'Passwords', 'Move', 'Move to new group', 'Clone settings', and 'Remove'. The bottom of the screen shows some status messages and a developer note.

One feature that this software is also lacking is to be able to run a command across multiple nodes at the same time. However, you do have the ability to perform them on one machine at a time. This is similar to the current program that the company has access too, meaning that this regarding functionality would not suit them.

The functions of this RAT do feel less tested as some of the functions are currently broken or do not perform any action meaning that the functionality of the program is stunted when compared to others.

Orcus

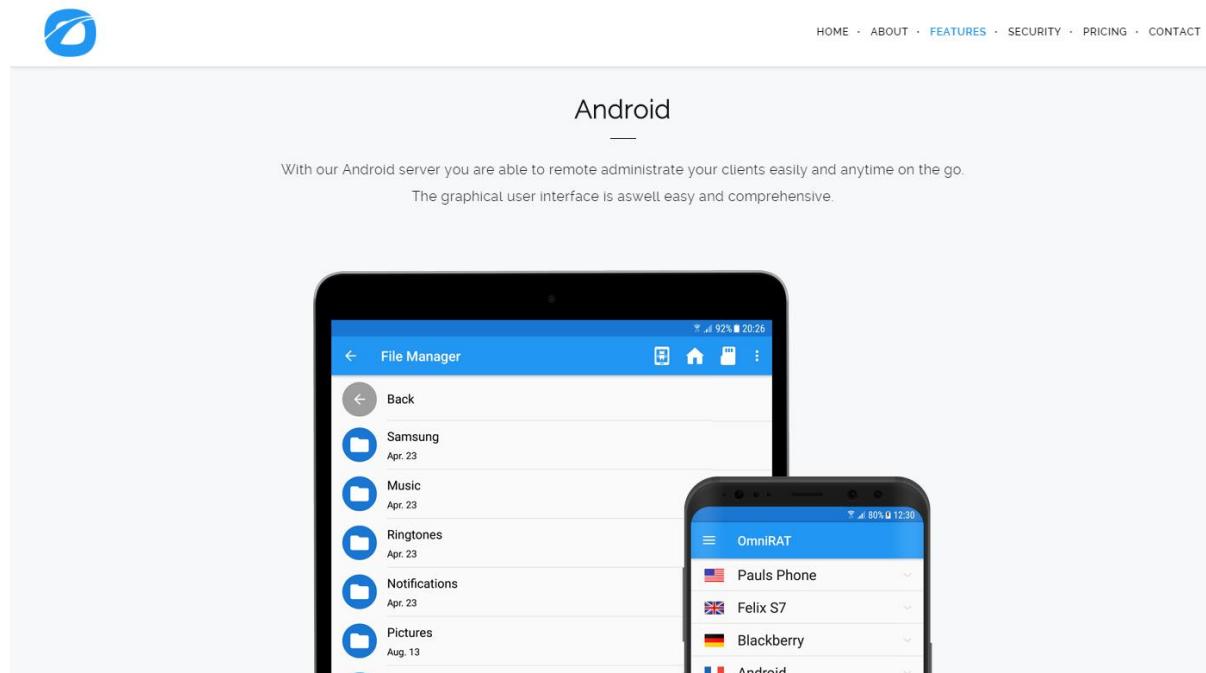
Orcus is very similar to Imminent regarding features, being a full all-in-one system manager. The software is mainly designed for use on Windows computers and their remote management, meaning that it is unable to control Linux based nodes. The features and functions of the program are almost the same as Imminent with the exclusion being an ability to perform the same command across all Windows nodes – which is something that I am interested in developing for Linux.

This program also has very advanced Windows Management actions, such as remote Register Editing, System Restore and File Manager. Remote desktop is also available however after using the program I have found it to be quite sluggish and behind the level of smoothness of screen movement.

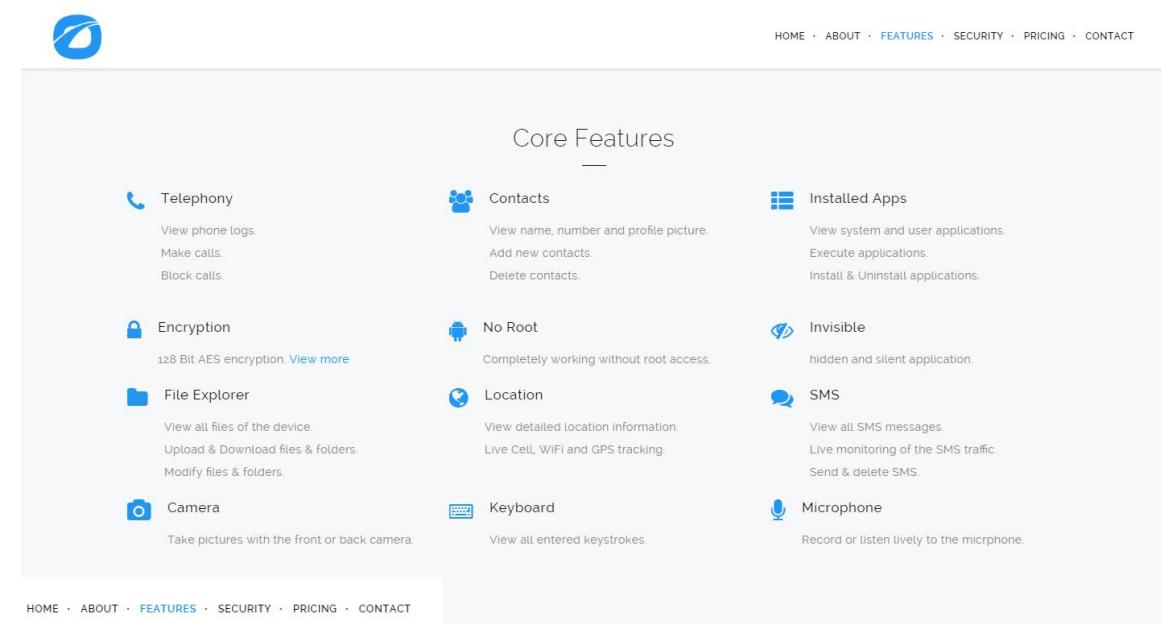
OmniRat

Omni is a relatively new tool on the market which has taken quite a few people by surprise; created in 2015 this remote administration tool has quite a few additional features and quirks than both other systems I have included, combined!

This RAT, however, is the most advanced out of the three that I have included reviewing in the project. The reasoning for this isn't because of the base features, such as File Management, that are included in other RATs but because that it is Multi-OS. Omni can control, and be controlled by Android devices while being able also to be



The screenshot shows two smartphones displaying the OmniRAT application. The top phone's screen is titled 'File Manager' and lists files like 'Samsung Apr. 23', 'Music Apr. 23', 'Ringtones Apr. 23', 'Notifications Apr. 23', and 'Pictures Aug. 13'. The bottom phone's screen is titled 'OmniRAT' and lists clients: 'Pauls Phone', 'Felix S7', 'Blackberry', and 'Android'. Both phones show a standard Android navigation bar at the bottom.

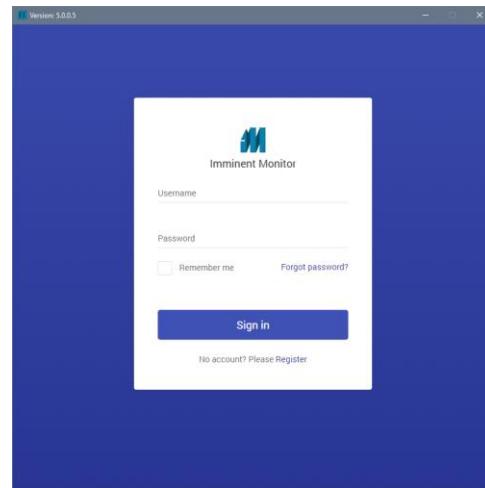


The screenshot shows the 'Core Features' section of the OmniRAT website. It includes icons and descriptions for various features:

- Telephony:** View phone logs, Make calls, Block calls.
- Encryption:** 128 BIT AES encryption. [View more](#)
- File Explorer:** View all files of the device, Upload & Download files & folders, Modify files & folders.
- Camera:** Take pictures with the front or back camera.
- Contacts:** View name, number and profile picture, Add new contacts, Delete contacts.
- No Root:** Completely working without root access.
- Location:** View detailed location information, Live Cell WiFi and GPS tracking.
- Keyboard:** View all entered keystrokes.
- Installed Apps:** View system and user applications, Execute applications, Install & Uninstall applications.
- Invisible:** hidden and silent application.
- SMS:** View all SMS messages, Live monitoring of the SMS traffic, Send & delete SMS.
- Microphone:** Record or listen lively to the microphone.

installed on a range of different operating systems that include Linux, OSX and of course Windows. With the mass amount of new operating systems that this system can control it allows the addition of new features such as SMS management, location tracking, contact management and telephone call control. The features within this program are vast, way beyond the specification that Encrypted Laser require but it will give me a point to work from to ensure that the program I develop is as flexible as possible (but unfortunately without the app).

Subsection 3.2.2.ii - Interface features



ImminentMonitor

Imminent is developed around a single window with different tabs for navigation. This allows for a very compact user experience with very little visual lag or bugs when using the program. The style is locked to the company's blue theme which is not changeable in addition to displaying the ImminentMonitor name around the program. Controls for each node are simple with a right click options menu to send actions to the node. This is very user-friendly but also rather irritating when needing to perform the same action to all nodes under your control as you have to right click each one separately, navigate the menu and then select your option. The main advantage of this program is the smoothness of the commands being sent; all actioned instantly without delay. The software is nicely developer in the graphical sense, with live graphs, location maps and status icons.

Location	Latency	Note	Username	RAM	Operating System	Idle Time	Client
Windows 10 Pro	3 ms		Mathieu Clement	37%	Windows 10 Pro	00:00:00	Default
Windows XP	0 ms		Maurice Hart	37%	Windows 10 Pro	00:00:00	Default
Windows 8 Pro	0 ms		Kelly Holland	37%	Windows XP	00:00:00	Default
Windows 7 Pro	0 ms		Mathis Caron	37%	Windows XP	00:00:00	Default
Windows 8.1 Pro	0 ms		Julio Duran	37%	Windows 8 Pro	00:00:00	Default
Windows 7 Pro	0 ms		Tomini Haas	38%	Windows 8 Pro	00:00:00	Default
Windows 8 Pro	0 ms		Jessica White	37%	Windows 8 Pro	00:00:00	Default
Windows 7 Pro	0 ms		Benjamin Armstrong	37%	Windows 7 Pro	00:00:00	Default
Windows 8.1 Pro	0 ms		Paula Hidalgo	37%	Windows 7 Pro	00:00:00	Default
Windows 7 Pro	0 ms		Kirk White	37%	Windows 7 Pro	00:00:00	Default
Windows 8.1 Pro	0 ms		Nilo Kaupilla	37%	Windows 7 Pro	00:00:00	Default
Windows 7 Pro	0 ms		Yolanda Soler	37%	Windows 7 Pro	00:00:00	Default
Windows 8.1 Pro	0 ms		Alexandra Robertson	38%	Windows 7 Pro	00:00:00	Default
Windows 7 Pro	0 ms		Danny Hamilton	38%	Windows 7 Pro	00:00:00	Default
Windows Vista	0 ms		Felix Walker	37%	Windows 8.1 Pro	00:00:00	Default
Windows Vista	0 ms		M&oline Roy	37%	Windows 8.1 Pro	00:00:01	Default
Windows Vista	0 ms		Magdalena Gomez	37%	Windows 8.1 Pro	00:00:00	Default
Windows Vista	0 ms		Abigail Liu	38%	Windows 8.1 Pro	00:00:00	Default
Windows Vista	0 ms		Rose Li	38%	Windows 8.1 Pro	00:00:00	Default
Windows Vista	0 ms		Reena Schieler	37%	Windows Vista	00:00:00	Default
Windows Vista	0 ms		Christian Jensen	38%	Windows Vista	00:00:00	Default

Connected Clients: 21 [View Offline Clients](#)

ORCUS ADMINISTRATION							PLUGINS	SETTINGS	X
Build	Crowd Control	Exceptions	Data Manager	World Map	Statistics	Activity	Plugins		
ONLINE	USERNAME	IP ADDRESS / LAST S	ID	OPERATING SYSTEM	VERSION	ADMINISTRATOR	COUNTRY		
✓	Harry Bennett	127.0.0.1	CI-103	Windows Vista	14	X	Germany		
✓	Denise Phillips	127.0.0.1	CI-104	Windows 7 Professional	14	X	Germany		
✗	Douglas Taylor	11/30/2016 8:53:17 PM	CI-26	Windows Vista			Germany		
✓	John Richardson	127.0.0.1	CI-93	Windows Vista	14	X	Germany		
✗	Alice Murphy	11/30/2016 8:53:17 PM	CI-25	Windows 7 Professional			Germany		
✓	Joyce Bell	127.0.0.1	CI-95	Windows 7 Professional	14	✓	Germany		
✓	Norma Gray	127.0.0.1	CI-90	Windows 7 Professional	14	X	Germany		
✗	Anne Ross	11/30/2016 8:53:18 PM	CI-24	Windows 7 Professional			Germany		
✓	Eric Bailey	127.0.0.1	CI-85	Windows 7 Home Premium	14	X	Germany		
✓	Louise Sanchez	127.0.0.1	CI-86	Windows Vista	14	✓	Germany		
✓	Tammy Barnes	127.0.0.1	CI-87	Windows Vista	14	X	Germany		

```

30-11-2016 20:53:55.7060 INFO] <----- Version: 1.7.0.37275 ||| Developer: Sorzus (Orcus Technologies) ----->
[30-11-2016 20:53:57.5057 RECEIVE] 14 plugins loaded
[30-11-2016 20:53:57.5057 RECEIVE] Connection successful
[30-11-2016 20:53:57.5117 RECEIVE] Server offers named pipe
[30-11-2016 20:53:57.5172 RECEIVE] Connected to named pipe
[30-11-2016 20:53:57.6732 RECEIVE] Get password
[30-11-2016 20:53:57.8363 SEND] Send password ***
[30-11-2016 20:53:57.8363 RECEIVE] Authentication successful, welcome!

```

OmniRat

Omni is the most user-friendly out of the 3, allowing the user to customise the theme and colour of the control interface that they interact with. The software boasts a six different theme base that the user can select from, in addition to allowing the user to create their own if they know.

This makes it a nicer user experience, but it comes with its downside that it still processes requests like the other two - performing actions one at a time with a right click window that contains an array of submenus. This software is a lot simpler in its layout, but still not the most intuitive for Encrypted Laser staff to use for node management.

Orcus

Orcus has a design that would better fit a piece of software from around 2007 and would fit in nicely with Windows Vista. The software is intended to be built for a purpose, and that is it. This means that the user experience is a little hindered with the graphics being very basic and the buttons not being styled at all. That being said, the layout of the program is relatively simple to use and intuitive for a user to pick up; allowing for commands to be issued quickly to each node. There are no fancy graphics, graphs or status icons on this program.



Subsection 3.2.2.iii - Advantages and disadvantages

ImminentMonitor

Advantages

- Imminent has fast response times for ticket support if a feature doesn't work as expected, something breaks or the install of the RAT fails.
- The software has the nicest Windows Desktop viewer, with a 60FPS smooth user experience when controlling the program.
- Has a lot of advanced features in a very compact form factor allowing for the user to navigate around very quickly and to perform actions.

Disadvantages

- Imminent has been waiting for an update for the last seven months that will enable the software to support control of Linux Desktop and Linux Dedicated server control. The company hasn't given an expected time frame but seems to be going down the route of getting the program to only run on Linux using Mono rather than creating an SH file for it.
- The software is not the most user-friendly and is licensed to a per-computer account. This means that if you wish to login to your account on another computer that isn't possible without either paying for another license or by contacting their support to delete your license from your original computer.
- The software isn't the best for file management, with file transfers and viewing being very slow.

Orcus

Advantages

- Orcus is very basic, simple and allows the user to perform actions a lot quicker than Imminent (even though the commands are harder to find originally).
- Orcus does have a remote Android app for remotely controlling computers.
- Node statistics are very advanced with the ability to filter by date.

Disadvantages

- The software looks like it is for the early 2000's, is not very user-friendly for beginners and has a locked theme.
- The software can control Windows computers only.
- The English translation of the German software is not the best in some aspects.

OmniRat

Advantages

- Extremely user-friendly with changeable colours and themes.
- Can remotely control Windows, Linux (all Flavours), OSX and Android, in addition to being able to be controlled by an Android app.
- Has a lot more features designed for phone monitoring.

Disadvantages

- Very costly
- The software seems to be focusing on phone control rather than Linux control meaning that there are some missing features from this aspect of the program.

Section 3.2.3 - Current Stakeholders

Subsection 3.2.3.i - Organisational stakeholders

--Redacted Name--

--Redacted Name-- is the Public Relations officer for Encrypted Laser but also plays a major role in staff management and marketing. This requires constant monitoring of statistics, logs and feedback from customers and staff member, and to then take action on that. --Redacted Name--'s main requirement and request for the project is to have a permission-based system with very detailed logs of all actions performed by every user on the system. Therefore, users need to have different ranks depending on their position with the exact permissions being able to be tweaked and managed by a member of the company management team. I hope to also include information from each mouse click including window navigation for each user.

- Incredibly Detailed Logs
 - Every action users perform, even window navigation needs to be logged to the database to be able to track their actions extensively. Including commands. These logs must be displayed from within the panel with a filter.
- Ranking Structure
 - The ability for different users to be classed as different ranks which in turn can mean that they can have different access to the software than others. Being able to assign users to a group is required.
- Changeable Permissions
 - Being able to change what each rank can do, from viewing a page about permission to being able to perform a specific command through the command prompt. Being able to restrict permissions and grant them with immediate effect from inside the program.
- Lock Accounts
 - A system to restrict the login ability to an account, for example when an employee is on holiday set their account to a suspended state where they cannot log in.

--Redacted Name--

Michael is the Technical Support Supervisor at Encrypted Laser and is in charge of ensuring that customer satisfaction for support remains high, in addition to managing every single node on the company network. This requires Michael to monitor statistics, watch for errors and keep everything up to date. After having a chat with Michael, the following requirements were proposed to me through our interview. His main requirement was to be able to perform a mass system update across every node without massive amounts of windows becoming visible on the screen.

- Mass operating system update
 - There needs to be a feature whereby the program can run an SSH command on every single node on the network to perform an update. This will need to take into consideration the operating system of the node and to send a command relevant to that node so it can be performed. This needs to be performed simultaneously while being able to keep the screen clean from popups.
- Defining other mass commands
 - Be able to create a command which can be executed across the entire network at the same time, just like the update but a custom command created by a user or company. The command will need to allow different variations to target different operating systems while also not containing certain sets of words for security such as mv, del, rm or shutdown
- Automated Backups
 - Being able to perform backups of each node automatically is a must, all performed quickly without popup windows and giving notifications when the system has finished.

Subsection 3.2.3.ii - External stakeholders**--Redacted Competitor Name--**

--Redacted Competitor Name-- is a direct competitor to Encrypted Laser, however, has expressed interest in utilising the same software once it gets developed. This will be great for EL as they can sell to a competitor. I reached out to --Redacted Name--, the Company Director of --Redacted Competitor Name-- to see what requirements they would like to see the program to make it worth their time purchasing. In the conversation, he expressed that they would like to see a couple of features that have already been mentioned in addition to a couple that hasn't been previously suggested.

- Securely but remotely accessible
 - Remote access is required for all staff to be able to remotely access the software when on laptops travelling but are still required to make technical support requests. Being able to access their account remotely is a must, but the software needs to be highly secure with only admins able to authorise a password reset.
- Support tickets for lower ranks
 - A support system within the software that allows lower level support to contact a system administrator to request assistance if something errors, or to confirm that they can process a certain command.

Section 3.2.4 - Data and input and processing by the current system (include a DFD in this section)

Subsection 3.2.4.i - Explanation of current inputs

Current inputs to the program are very limited due to the simplicity of it. The main aspect of the system is the server and backup processing which contains most of the input data.

Software Inputs

- Node Name
- Hostname
- Datacentre
 - New York
 - Bristol
 - London
 - Chicago
 - Nuremberg
- Username
- Password
- Operating System
 - Ubuntu 16.04
 - CentOS 7
- CPU Type
- RAM Amount
- Storage Amount
- Network Port

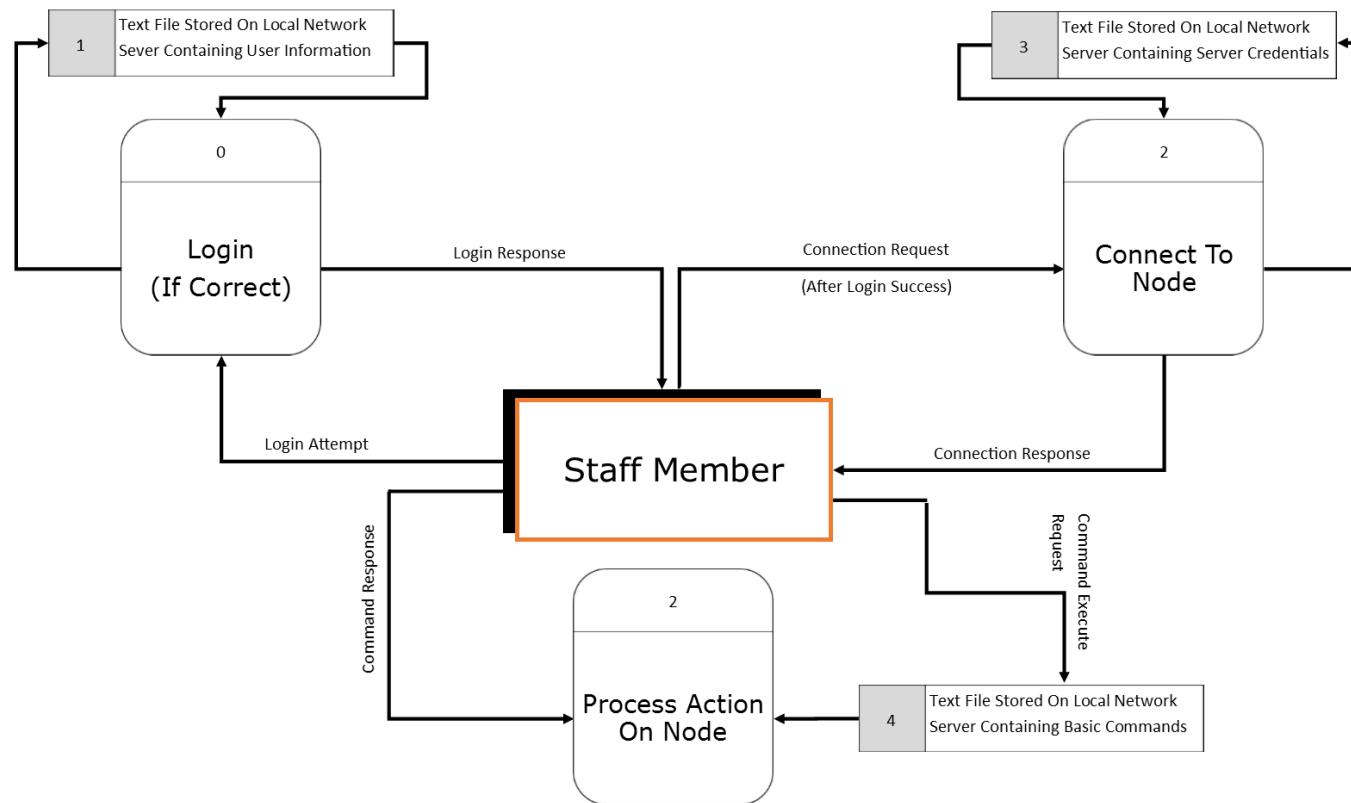
Backup Server Configuration

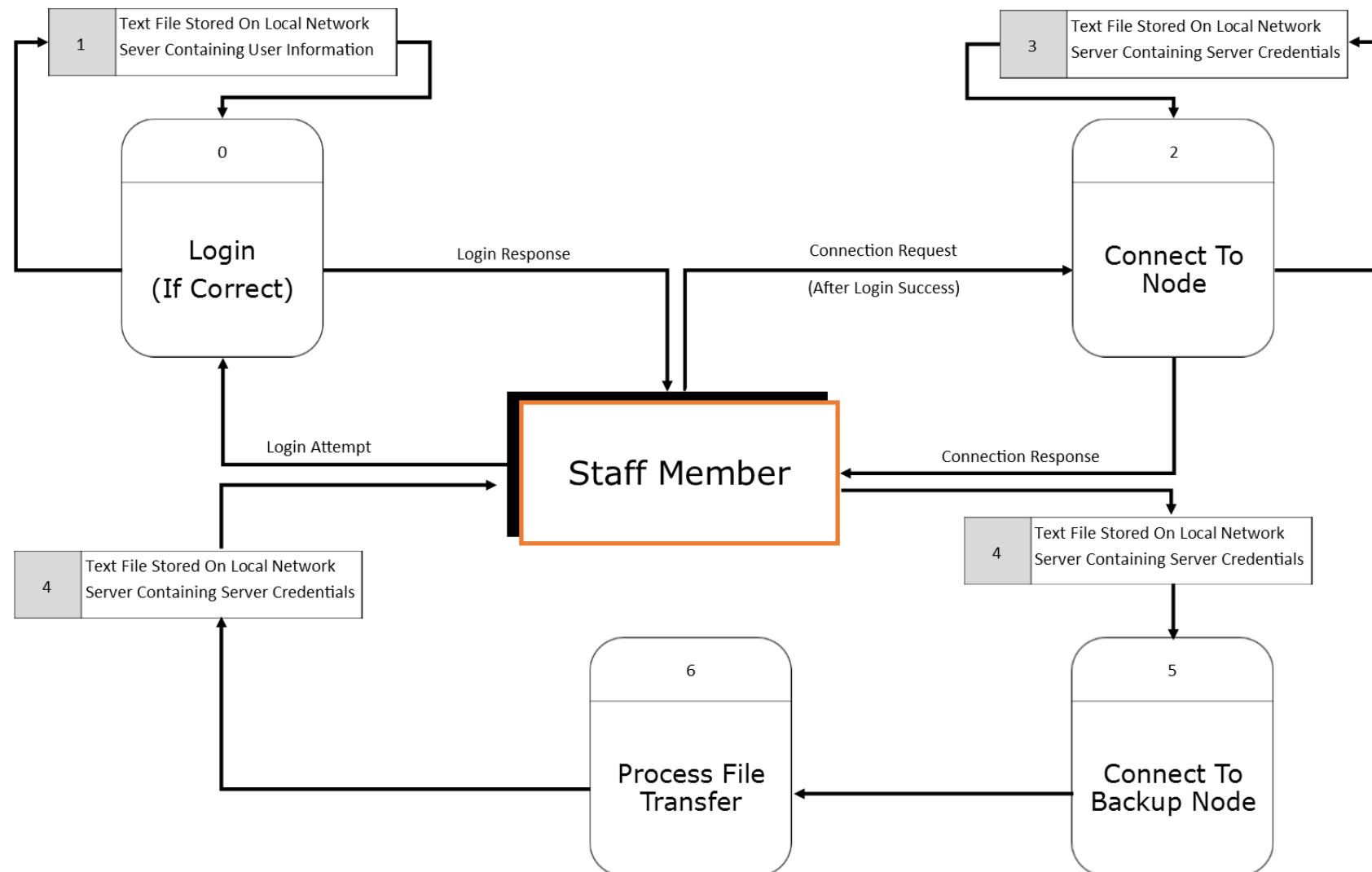
- Location
- Storage Limit
- Username
- Password
- File Directory For Backups

Subsection 3.2.4.ii - Explanation of current processes

The current process of the system is very basic and simple, a one-page window which users can enter and perform a set of actions on all nodes configured in the system. The VB.net program can be started by anyone who has access to the file, and can then proceed to running an action on it. The actions consist of running an update on all Ubuntu servers in addition to performing a backup of all nodes.

The program executes a shortcut file in the background which in turn runs a bash script on the machine, this is what is used to perform a backup as the commands within the shortcut are such like ftp and copy.

Subsection 3.2.4.iii - Data Flow diagram of current system



Section 3.2.5 - Outputs from the current system

The outputs from the interface are very cluttered, but are designed to alert the user to any problem during the process of executing the bash script within the program.

Interface Outputs

- SSH Console Log
- SSH Errors
- Login Failed Notifications

The server outputs are outputs which are performed onto the server, such outputs are the server becoming updated or backed up to another location by running the program.

Server Outputs

- SSH Commands
- Backups

All of the following outputs are relating to logging, all of which are very basic and comprise of a few areas of the user activity such as what command is run and what user is logged into the computer running the program.

Log Outputs

- User
- Command
- Node Targeted

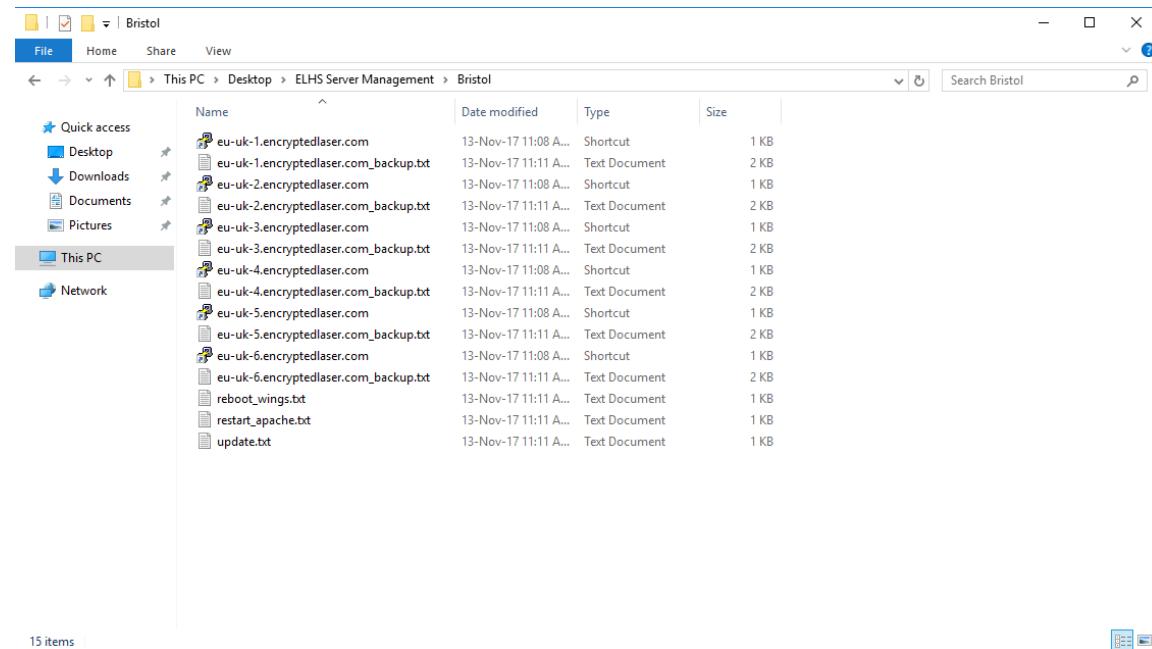
Section 3.2.6 - Limitations of the current system

The current system has a lot of limitations, the main ones include:

Adding additional mass executable commands.

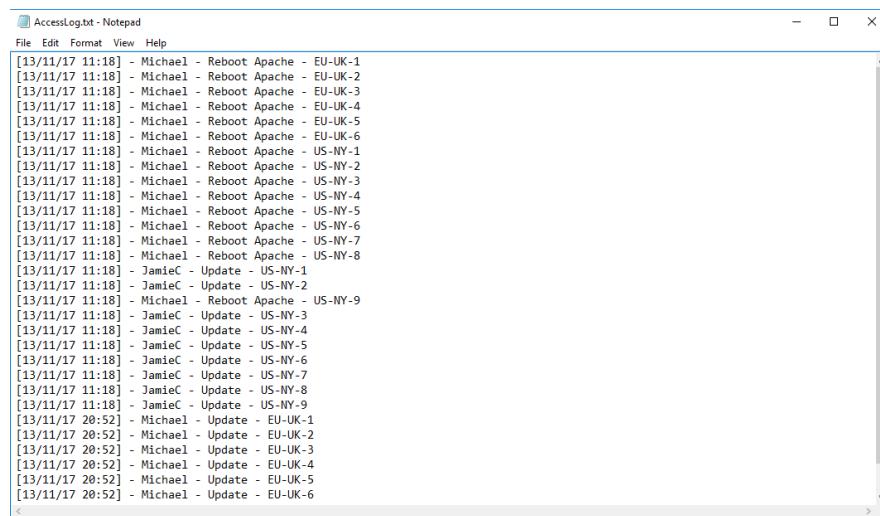
Currently, the program is designed so that the commands executed are all stored within files which contain bash script. Each button on the panel goes through and remotely executes the code within the bash script by running a modified start-up shortcut for putty which will remotely log in and run. This means, that whenever a new command needs to be added a shortcut and text file containing bash script needs to be created for every node currently able to be controlled and then for the program to be re-compiled and updated to include a new button that will go and execute the new shortcut.

This is massively time-consuming, unoptimized and rather stupid, requiring the program to be updated every time a new button needs to be added, in addition to duplicating shortcuts to Putty to just run a different bash script.



Restrictive Logging

Currently, the program is designed so that the commands executed are all stored within files which contain bash script. Each button executes a Putty shortcut to automatically login to the machine stored within the shortcut, the logging only shows the time that the command is run, the user logged into Windows that is running it in addition to the actual command and node that it was run on. No other information is given such as IP addresses, permission, rank or time that the command took to execute.



The screenshot shows a Notepad window titled "AccessLog.txt - Notepad". The menu bar includes File, Edit, Format, View, and Help. The content of the text file is a log of command executions, with each entry consisting of a timestamp, a user name, a command, and a node identifier. The log entries are as follows:

```
[13/11/17 11:18] - Michael1 - Reboot Apache - EU-UK-1
[13/11/17 11:18] - Michael1 - Reboot Apache - EU-UK-2
[13/11/17 11:18] - Michael1 - Reboot Apache - EU-UK-3
[13/11/17 11:18] - Michael1 - Reboot Apache - EU-UK-4
[13/11/17 11:18] - Michael1 - Reboot Apache - EU-UK-5
[13/11/17 11:18] - Michael1 - Reboot Apache - EU-UK-6
[13/11/17 11:18] - Michael1 - Reboot Apache - US-NY-1
[13/11/17 11:18] - Michael1 - Reboot Apache - US-NY-2
[13/11/17 11:18] - Michael1 - Reboot Apache - US-NY-3
[13/11/17 11:18] - Michael1 - Reboot Apache - US-NY-4
[13/11/17 11:18] - Michael1 - Reboot Apache - US-NY-5
[13/11/17 11:18] - Michael1 - Reboot Apache - US-NY-6
[13/11/17 11:18] - Michael1 - Reboot Apache - US-NY-7
[13/11/17 11:18] - Michael1 - Reboot Apache - US-NY-8
[13/11/17 11:18] - JamieC - Update - US-NY-1
[13/11/17 11:18] - JamieC - Update - US-NY-2
[13/11/17 11:18] - Michael1 - Reboot Apache - US-NY-9
[13/11/17 11:18] - JamieC - Update - US-NY-3
[13/11/17 11:18] - JamieC - Update - US-NY-4
[13/11/17 11:18] - JamieC - Update - US-NY-5
[13/11/17 11:18] - JamieC - Update - US-NY-6
[13/11/17 11:18] - JamieC - Update - US-NY-7
[13/11/17 11:18] - JamieC - Update - US-NY-8
[13/11/17 11:18] - JamieC - Update - US-NY-9
[13/11/17 20:52] - Michael1 - Update - EU-UK-1
[13/11/17 20:52] - Michael1 - Update - EU-UK-2
[13/11/17 20:52] - Michael1 - Update - EU-UK-3
[13/11/17 20:52] - Michael1 - Update - EU-UK-4
[13/11/17 20:52] - Michael1 - Update - EU-UK-5
[13/11/17 20:52] - Michael1 - Update - EU-UK-6
```

Section 3.2.7 - Project working specification

ELHostingServices Server Management Project Specification

System has secure password protected hierarchical account system for remote access.

- Remote access database for access around the world.

- Encrypted accounted passwords.

- Display different buttons for access depending on permission.

Server Location Management

- Creation, editing and deletion of datacentre locations.

- Map view of datacentre locational information.

- Simple format and view of the dashboard.

Management of Operating Systems

- Assign OS to servers.

Server Management

- Creation, editing and deletion of servers within locations.

- Modification of computer hardware information

- Modification of operating systems.

Command Management

- Creating OS-Specific Automated Commands

- Different ranks can view and use different commands

User Control

- Ability to force set user password, emails and usernames.

- Viewing of failed login attempts and IPs related to them.

- Creation and deletion of accounts.

Permission Management

Certain users within a company to adjust permissions of others.

Support Ticket System

Users with permissions creating support tickets with subject and message.

User with admin perms can respond and close tickets.

SuperAdmin control & Company Management

Ability to create, edit and delete companies.

Capability to limit company servers under control.

Ability to view every user, server and location and edit them.

Extensive Logging

Users with permission can view extensive logs, changing windows, running commands, failed logins, servers selected and information viewed.

Automated Backups

Automatically backup to a set of nodes which have sFTP login information provided to a backup server only saving critical data or data which is selected by the user.

Section 3.2.8 - Methods used in the problem solution

The software which will be developed will be written in C# using Visual Studio to assist with the graphical aspect of the program; enabling the program to look decent and user friendly. A massive part of the project will be security, utilising variable phasing to the SQL commands run throughout the program will attempt to combat any SQL injection in addition to encrypted data stored in the database should ensure that it is locked down. The database system I will be using is MySQL, run on a remote server based in Bristol with the engine running the tables being InnoDB to give the ability for referential integrity for foreign keys.

The first aspect of the project is the login stage where accounts need to be protected, I intend on using SHA512 over SHA256 to encrypt the passwords to just further protect the passwords stored. Failed logins will be automatically logged to the remote database with the IP address of the computer attempting to gain access to the account. One extra feature to this will be a brute force protection addition, whereby after an IP has failed to login to an account 3 times that IP will be blocked for 1 hour unless unlocked by an administrator.

One feature that is needed within the project is Server Location Management, allowing specific users with the correct permissions to view, adjust and delete locations from a company. The settings will be laid out with a simple dashboard menu with simple, easy to read buttons that perform database queries to update information.

Another feature of the project is the operating systems; this should be a simple one to explain. A list of operating systems will be built into the program; the admin can assign an operating system to a node. Commands sent to that node will be correct for that type of OS which prevents Ubuntu commands being run on CentOS and therefore failing. Users will not be able to edit the list, but an extensive list will be available for server dropdowns in the settings.

An aspect of the program I would like to develop would be the server management section, a window that allows for the user to update the specifications of a node so that it can be tracked and kept under control. Being able to manage the hardware configurations on a global database within a company allows for greater understanding of the infrastructure.

Being able to create OS-Specific commands is a high priority, allowing for a specific task to be automatically completed on multiple systems that are running different operating systems. By using the same update command across every server would mean that some operating systems wouldn't run the command and would just return an error. This can be completed using data from a database that gets dynamically loaded onto the form allowing for a dynamic set of commands to be created.

Each user within a company needs to have the ability to change the details stored about them, for example, their username, password, email address or profile photo. Administrators need to have the ability to force reset a password in addition to creating accounts for new employees and deleting accounts of staff members moving on. This would require another window to be created and for the permission system to be developed fully.

There needs to be a module within the program that allows the administrators to restrict access for different groups of people to be able to do specific things. A technical support staff member needs to be able to run commands, but they don't need to be able to create new locations or specify new commands for the system. This can be done by calling on a global database for permissions per role.

A feature within the program will be a ticket system for offering support to other members of staff if they have a problem with a feature of the panel or a node on the system. This will be completed by dynamically creating elements within C# to create the ticket replies on screen and to be able to be responded to, all being stored within a database.

There has to be extensive logging for everything on the panel which will require the panel to write to a database every time an action is completed. This will result in a lot of queries being sent to the database, but it allows for the logs to then be viewed globally and without being edited.

Automatic backups are a feature within the panel that will require a lot of configuration. A backup node will need to be created with a directory for files to be written to when a server is backed up. Once configured, a thread will be initialised to begin the backup procedure by SSHing into one server and copying the files to the backup node with the file directory already set.

Section 3.2.9 - Objectives and measurable success criteria

Subsection 3.2.9.i - List of objectives

My list of objectives that need to be completed for the project to be deemed completed or usable.

- Time taken for a user to login, navigate to the server control page and perform a network wide system update must be less than 30 seconds.
- 80% of the tests performed on the system must pass, this assures that the system is almost fully free from errors and usable by all members of staff and customers on the program.
- 95% of the failed tests performed on the system must be corrected fully.
- 8 out of the 11 points in the specification being completed fully and to a useable standard.
- 70% or higher of the staff members must agree that the interface is much more user friendly and that they would like to continue using it.
- 80% of staff deeming that the project is a large improvement on the existing system.
- All staff that begin using the software find the layout, settings and navigation intuitive, regardless of their computational expertise.

Section 3.2.10 - Measurable success criteria

Functionality

The system must be fully functional, operational and with little to no bugs within the software as possible while still completing most of the features mentioned within the broad aims and the system specification. This is required for the software to be deemed a success and to meet the client's requirements in regards to functionality. Failing to create a fully functional program would result in the program being classed as a failure as the specifications for the project will not have been met. This should not be the place due to the extensive testing that I will be performing and correcting errors that are presented within the testing stage. This means that for my target, the program will be fully functional and bug free after the testing stage so that it is in a fully production ready situation. If more than 80% of the staff members deem the project to be an improvement over their existing system, and that 80% of the tests have passed (with 95% of the tests that failed being corrected) then this project will be a success and I will be satisfied that it will be up to the standards required.

Usability and Performance

To be able to be considered a success for the usability and performance, the system must run smoothly with minimal delay in load times. This can be achieved due to the lack of data and files being loaded as all information is in the remote database. All events must respond to the user within 2 seconds otherwise the system will be considered slow. The software must also include try and catch statements allowing for helpful errors to be presented to the user rather than having the program crash without explanation. This makes sure all the features don't hinder or break others if an error were to occur at any point during its use. To display the message box a display box will be used to popup to the user. The time it takes the user to login and run an update across multiple servers must be less than 30 seconds, if this can be achieved without panicking or rushing then the usability of it will allow staff members to complete set tasks quickly, allowing the usability and performance of the system to be up to standard.

Overall Satisfaction of the Client

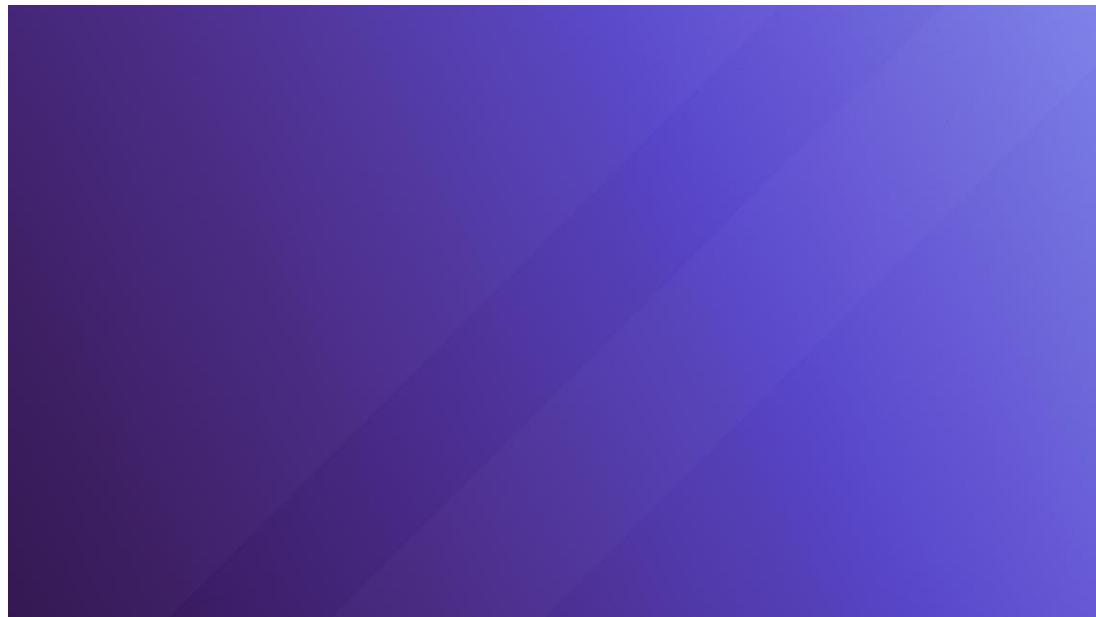
For this project to be deemed a success in any regard, the customer must be thoroughly satisfied with the program to a very high standard. They must approve of the visual interface as well as the functionality of the software, being able to complete tasks without any error or assistance from the developer. The program must be able to be configured and setup from any computer the customer chooses to use, and be able to setup company account from scratch that their staff can then login to. They must be able to view and adjust all user accounts, while being able to use all the features smoothly. 80% of staff within the company must confirm that it is a massive improvement, with 70% confirming that the user interface is much nicer taking into consideration that people have different tastes.

Chapter CS3.3 - DESIGN (15 MARKS)

Section 3.3.1 - Input and Output

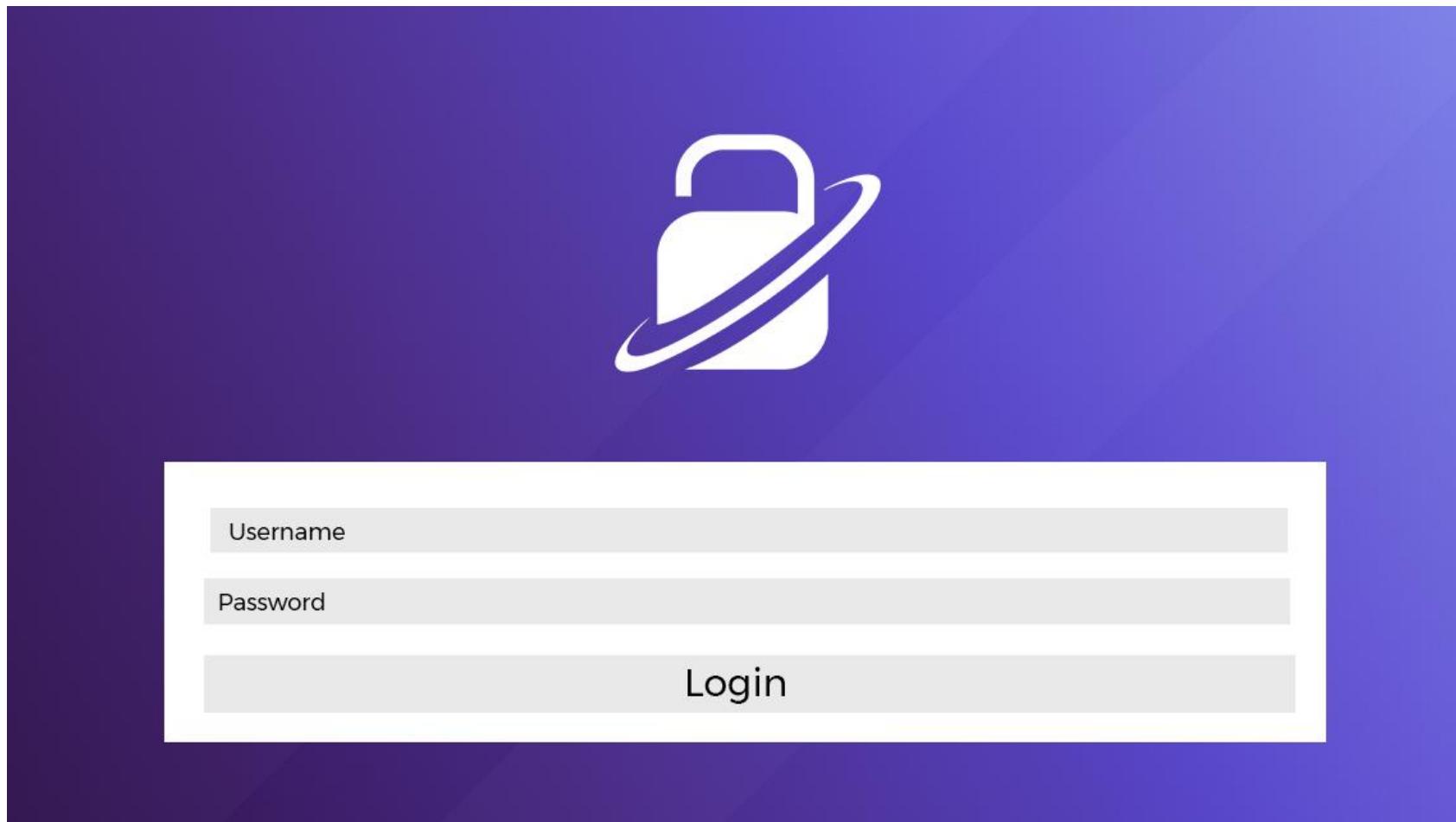
Subsection 3.3.1.i - Screen layouts

Main Background



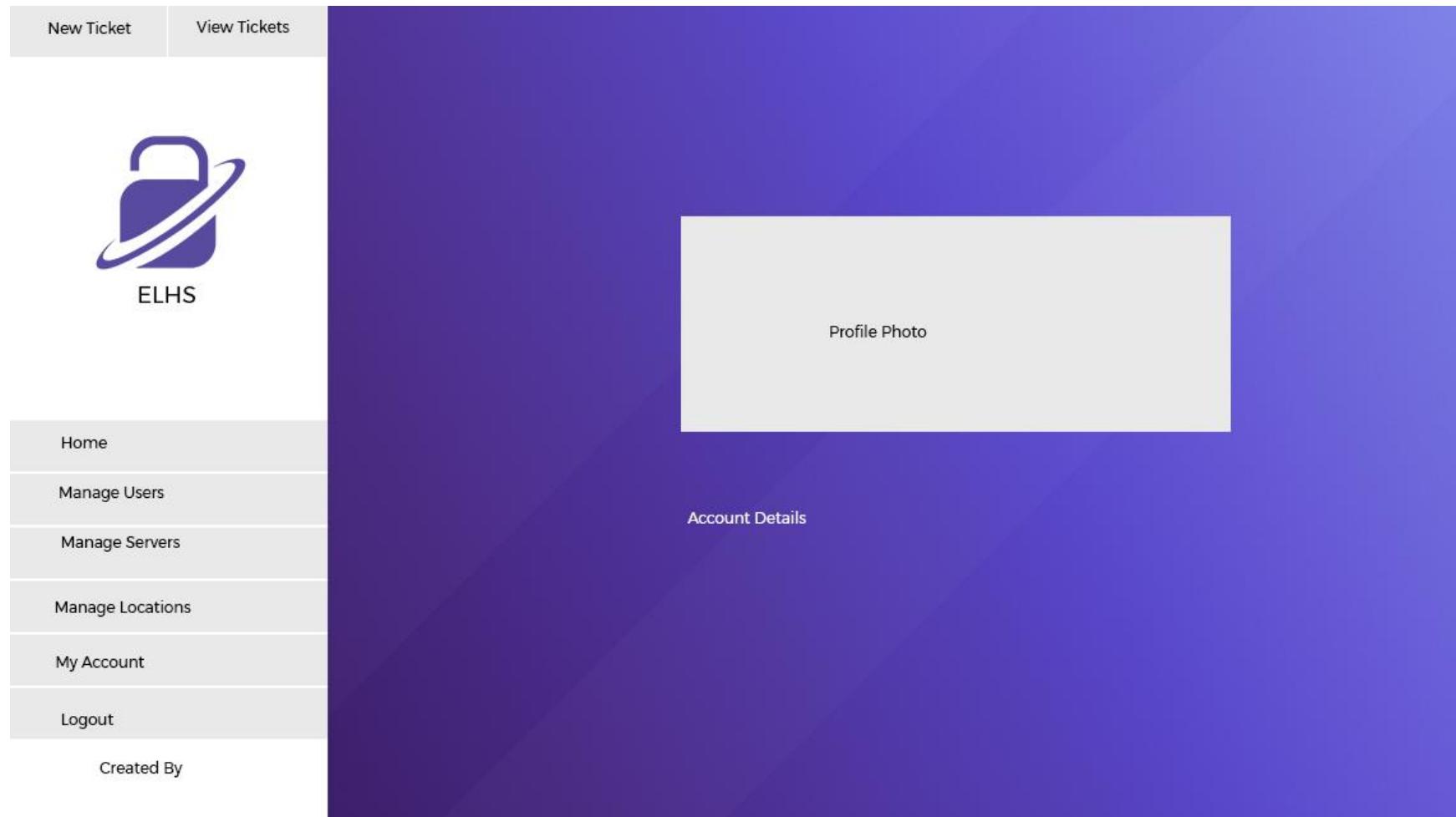
The image above shows the background that will be present on every window within the program to keep a uniform finish to the program. Multiple pages will have a sidebar which will be represented below, but regardless of a sidebar the purple fade background will be on every screen. This is a design used by Encrypted Laser Limited a lot allowing the program to fit right into their branding.

Login Window



This screen accepts two inputs from the user, the username and the password to enable access to the rest of the program. I have no intention of having a way to reset the password since the company I am developing for, Encrypted Laser Limited, forces all staff to use a password manager LastPass. In the event that a password were to be forgotten or misplaced, the staff member would have to contact a manager to get it reset to ensure optimal security.

Dashboard



The image above shows the predicted dashboard layout that I will use when developing the program. The dashboard itself will contain only information about the user allowing for them to navigate to the appropriate form that they intend to use. The layout for the buttons and logo will be relative to the size configured for the form.

Manage Location

The screenshot shows a web application interface. At the top left, there is a navigation bar with two buttons: "New Ticket" and "View Tickets". Below this is a sidebar on the left containing the ELHS logo and a list of menu items: Home, Manage Users, Manage Servers, Manage Locations (which is highlighted in blue), My Account, and Logout. At the bottom of the sidebar, it says "Created By". The main content area has a purple header with the title "Manage Locations". Below the header is a large white rectangular area, likely a placeholder for a data grid or form. At the bottom of this area, there are three buttons: "Add Location", "Edit Location", and "Delete Location".

In the image above, it can be seen that this form also has the same sidebar that will adjust depending on the permission granted to the user signed in. On the main form there will be a data grid view which will display all the data currently in the database allowing for the user to then create a location, edit a location or to delete it. This would again be dependant on the permissions assigned to the user.

Manage Backup Nodes

New Ticket View Tickets

 ELHS

Home
Manage Users
Manage Servers
Manage Locations
My Account
Logout

Created By

Manage Backup Nodes

Create Server Edit Server Delete Server

Run a Backup

This screen is similar in its layout to the manage location form, with an additional option to execute a backup that.

Subsection 3.3.1.ii - Other forms of input and output

Create Command

The screenshot shows a 'Create Command' dialog box. At the top, there is a label 'Command Name:' followed by a large white input field. Below this, there is a section containing three checkboxes with labels: 'Ubuntu', 'CentOS', and 'CloudLinux'. At the bottom of the dialog box, there are two buttons: 'Create New Command' on the left and 'Cancel' on the right.

The image above shows the form which is presented when the user creates a command to be executed. It will have a section allowing the user to enter the name they wished to call the command, in addition to two buttons. One to create the command and the other to cancel the creation. The middle section will be dynamically created by the form with data it retrieves from the database, generating a checkbox, label and textbox allowing for lots of user input.
Server Create / Edit

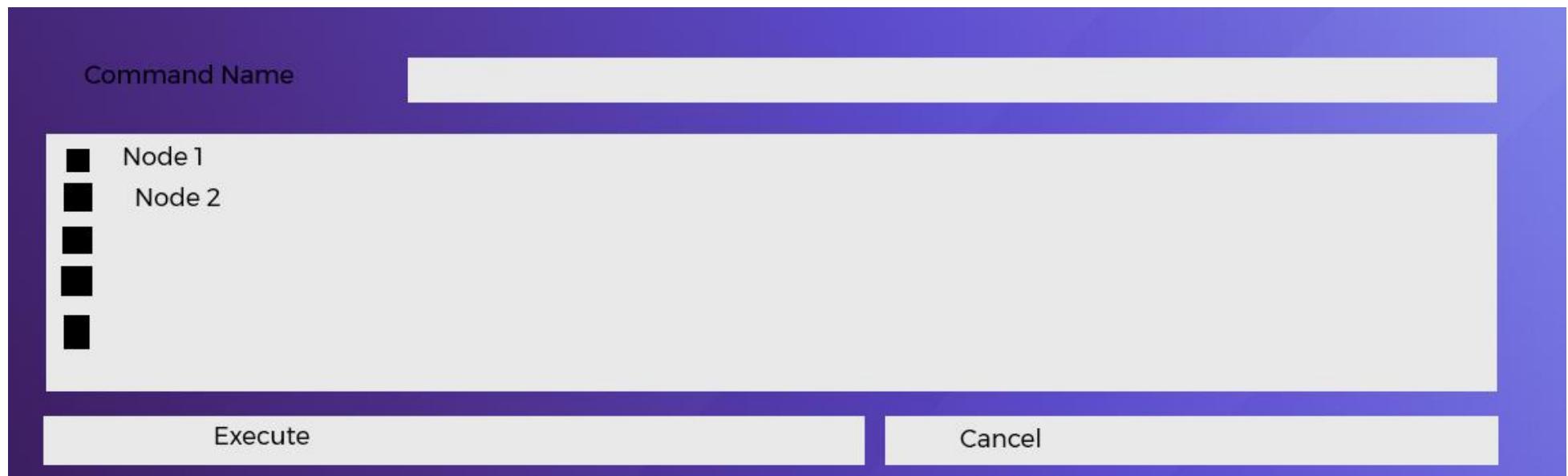
The image shows a dark-themed user interface for a server configuration tool. It features a vertical list of configuration parameters on the left, each followed by a white input field. At the bottom, there are two large white buttons labeled 'Submit' and 'Cancel'. The parameters listed are: Hostname, Username, Password, IP Address, Operating System, Network Port, CPU, RAM, and Transfer.

Hostname	
Username	
Password	
IP Address	
Operating System	
Network Port	
CPU	
RAM	
Transfer	

Submit Cancel

The image above displays the form that will be used during the creation and editing of a server. With multiple input areas in the form of text boxes, it accepts input data regarding all fields of the node. When editing a node, these boxes will be pre-filled allowing for only the data that needs editing to be edited.

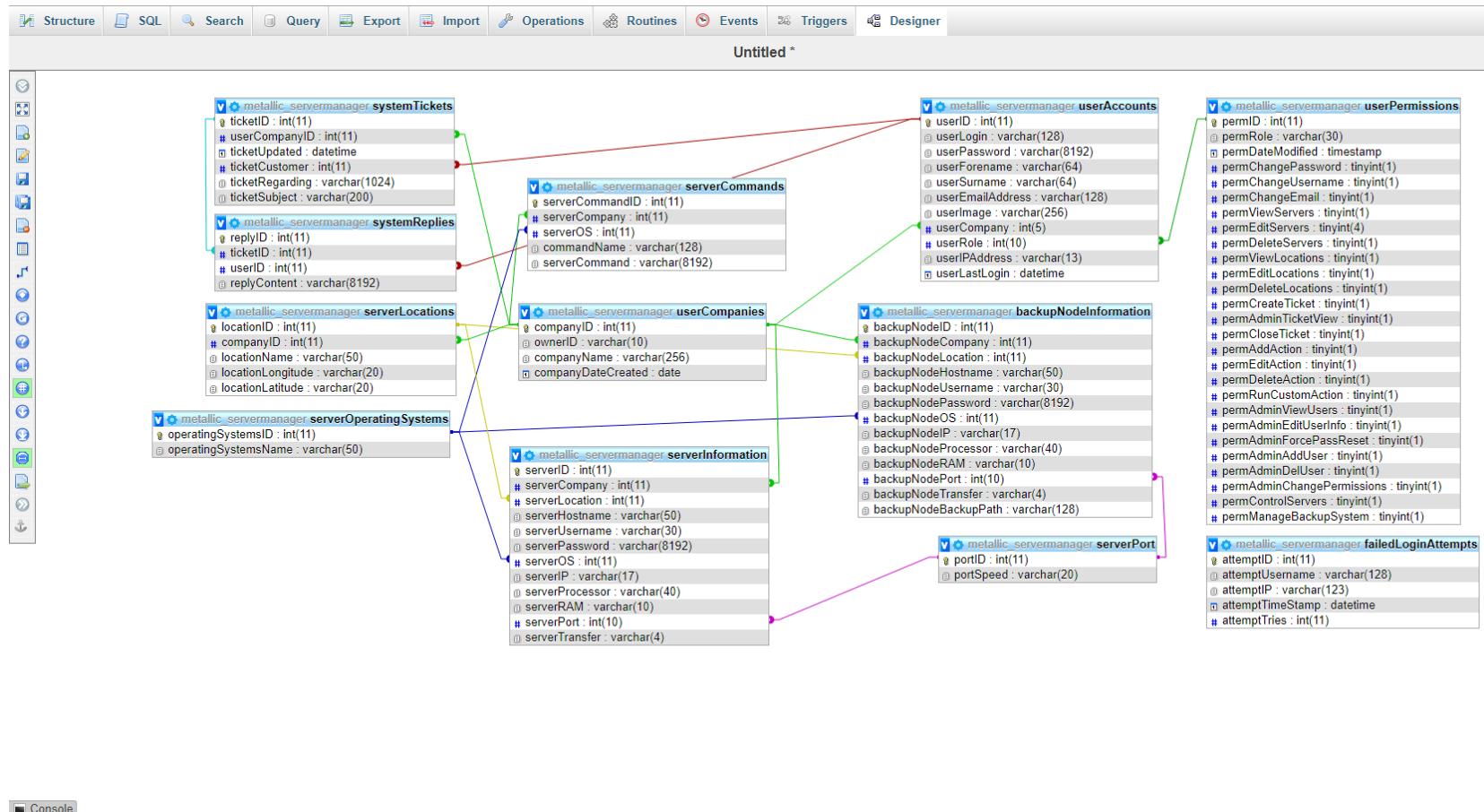
Execute Command



Within the photo above displays the input form allowing the user to execute a command on multiple different servers with one press of a button. It allows people to have servers selected, in addition to a dropdown to select the command.

Section 3.3.2 - Data structures and methods of access (including ERDs and Standard notation)

Subsection 3.3.2.i - Entity Relationship diagrams



Subsection 3.3.2.ii - Standard Notation

BACKUPNODEINFORMATION (**backupNodeID**, **backupNodeCompany**, backupNodeLocation, backupNodeHostname, backupNodeUsername, backupNodePassword, **backupNodeOS**, backupNodeIP, backupNodeProcessor, backupNodeRAM, **backupNodePort**, backupNodeTransfer, backupNodeBackupPath)

FAILEDLOGINATTEMPS (**attemptID**, attemptUsername, attemptIP, attemptTimeStamp, attemptTries)

SERVERCOMMANDS (**serverCommandID**, serverCompany, serverOS, commandName, serverCommand)

SERVERINFORMATION (**serverID**, **serverCompany**, **serverLocation**, serverHostname, serverUsername, serverPassword, **serverOS**, serverIP, serverProcessor, serverRAM, **serverPort**, serverTransfer)

SERVERLOCATIONS (**locationID**, **companyID**, locationName, locationLongitude, locationLatitude)

SERVEROPERATINGSYSTEMS (**operatingSystemsID**, operatingSystemsName)

SERVERPORT (**portID**, portSpeed)

SYSTEMREPLIES (**replyID**, **ticketID**, **userID**, replyContent)

SYSTEMTICKETS (**ticketID**, **userCompanyID**, ticketUpdated, **ticketCustomer**, ticketRegarding, ticketSubject)

USERACCOUNTS (**userID**, userLogin, userPassword, userForename, userSurname, userEmailAddress, userImage, userCompany, userRole, userIPAddress, userLastLogin)

USERCOMPANIES (**companyID**, **ownerID**, companyName, companyDateCreated)

USERPERMISSIONS (**permID**, permRole, permDateModified, permChangePassword, permChangeUsername, permChangeEmail, permViewServers, permEditServers, permDeleteServers, permViewLocations, permEditLocations, permDeleteLocations, permCreateTicket, permAdminTicketView, permCloseTicket, permAddAction, permEditAction, permDeleteAction, permRunCustomAction, permAdminViewUsers, permAdminEditUserInfo, permAdminForcePassReset, permAdminAddUser, permAdminDelUser, permAdminChangePermissions, permControlServers, permManageBackupSystem)

KEY

Bold & Underline – Primary Key

Bold – Foreign Key

No Formatting – Standard Field

Subsection 3.3.2.iii - Data structures

Data Structure Name		Description	Estimated Number of Records
Backup Node (backupNodeInformation)		Table to store details and connection information about the backup nodes available.	5-20
Estimated Size in KBytes	Type of Data Structure (Table, File, Array, Record)		Links With Other Data Structures
320	Table		userCompanies, serverLocations, serverOperatingSystems, serverPort
Access method (Serial / Sequential / Indexed Sequential / Random / None)		Foreign Keys	
Serial		backupNodeCompany, backupNodeLocation, backupNodeOS, backupNodePort	

Field Name	Data Type	Required (Yes/No)	Key Field (Yes/No)	Indexed (Yes/No)	Type Of Validation Required	Default Value	Description
backupNodeID	int(11)	Yes	Yes	Yes	None – Auto Set	-	Unique identifier to identify the record that contains information about a specific backup node.
backupNodeCompany	int(11)	Yes	No	Yes	Data is Int Data is <=11 Chars	-	A foreign key to link a backup node to a specific company.
backupNodeLocation	int(11)	Yes	No	Yes	Data is Int Data is <=11 Chars	-	A foreign key to link a backup node to a specific location.
backupNodeHostname	varchar(50)	Yes	No	No	Data is <=50 Chars	-	Hostname for the backup node.
backupNodeUsername	varchar(30)	Yes	No	No	Data is <=30 Chars	-	Username used to login to the backup node.
backupNodePassword	varchar(8192)	Yes	No	No	Data is <=8192 Chars	-	Password used to login to the backup node.
backupNodeOS	int(11)	Yes	No	Yes	Data is Int Data is <=11 Chars	-	A foreign key to link a backup node to a specific operating system.
backupNodeIP	varchar(17)	Yes	No	No	Data is <=17 Chars	-	IP used to connect to the backup node.
backupNodeProcessor	varchar(40)	Yes	No	No	Data is <=40 Chars	-	The type of processor that is used in the backup node.
backupNodeRAM	varchar(10)	Yes	No	No	Data is <=10 Chars	-	The amount of RAM that is contained within the backup node.
backupNodePort	int(10)	Yes	No	Yes	Data is Int Data is <=10 Chars	-	A foreign key to link a backup node to a specific network port.
backupNodeTransfer	varchar(4)	Yes	No	No	Data is <=4 Chars	-	The amount of data transfer allocated to the backup node.
backupNodeBackupPath	varchar(128)	Yes	No	No	Data is <=128 Chars	-	The file path within the backup node to store data.

Data Structure Name		Description	Estimated Number of Records
Failed Login Attempts (failedLoginAttempts)		Table to store details about failed login attempts.	50+
Estimated Size in KBytes	Type of Data Structure (Table, File, Array, Record)	Links With Other Data Structures	
128	Table	None	
Access method (Serial / Sequential / Indexed Sequential / Random / None)			Foreign Keys
Serial			None

Field Name	Data Type	Required (Yes/No)	Key Field (Yes/No)	Indexed (Yes/No)	Type Of Validation Required	Default Value	Description
attemptID	int(11)	Yes	Yes	Yes	None – Auto Set	-	Unique identifier to identify the record that contains information about an attempt.
attemptUsername	varchar(128)	Yes	No	No	Data is <=128 Chars	-	The username used in the attempt.
attemptIP	varchar(123)	Yes	No	No	Data is <=123 Chars	-	The IP used in the attempt.
attemptTimeStamp	datetime	Yes	No	No	DateTime	CURRENT_TIMESTAMP	The TimeDate that the attempt occurred
attemptTries	varchar(30)	Yes	No	No	Data is <=30 Chars	-	The number of tries attempted.

Data Structure Name		Description	Estimated Number of Records
Server Commands (serverCommands)		Table to store details about the commands that can be executed.	25+
Estimated Size in KBytes	Type of Data Structure (Table, File, Array, Record)	Links With Other Data Structures	
320	Table	userCompanies serverOperatingSystems	
Access method (Serial / Sequential / Indexed Sequential / Random / None)			Foreign Keys
Serial			serverCompany serverOS

Field Name	Data Type	Required (Yes/No)	Key Field (Yes/No)	Indexed (Yes/No)	Type Of Validation Required	Default Value	Description
serverCommandID	int(11)	Yes	Yes	Yes	None - Auto Set	-	Unique identifier to identify the record that contains information about command.
serverCompany	int(11)	Yes	No	Yes	Data is Int Data is <=11 Chars	-	A foreign key to link a backup node to a specific company.
serverOS	int(11)	Yes	No	Yes	Data is Int Data is <=11 Chars	-	A foreign key to link a backup node to a specific operating system.
commandName	varchar(128)	Yes	No	No	Data is <=50 Chars	-	The name of the command.
serverCommand	varchar(8192)	Yes	No	No	Data is <=30 Chars	-	The content of the command.

Data Structure Name		Description	Estimated Number of Records
Server Information (serverInformation)		Table to store details and connection information about the servers available.	5-20
Estimated Size in KBytes	Type of Data Structure (Table, File, Array, Record)	Links With Other Data Structures	
320	Table	userCompanies, serverLocations, serverOperatingSystems, serverPort	
Access method (Serial / Sequential / Indexed Sequential / Random / None)			Foreign Keys
Serial			backupNodeCompany

Field Name	Data Type	Required (Yes/No)	Key Field (Yes/No)	Indexed (Yes/No)	Type Of Validation Required	Default Value	Description
serverID	int(11)	Yes	Yes	Yes	None – Auto Set	-	Unique identifier to identify the record that contains information about a server.
serverCompany	int(11)	Yes	No	Yes	Data is Int Data is <=11 Chars	-	A foreign key to link a server to a specific company.
serverLocation	int(11)	Yes	No	Yes	Data is Int Data is <=11 Chars	-	A foreign key to link a server to a specific location.
serverHostname	varchar(50)	Yes	No	No	Data is <=50 Chars	-	Hostname for the server.
serverUsername	varchar(30)	Yes	No	No	Data is <=30 Chars	-	Username used to login to the server.
serverPassword	varchar(8192)	Yes	No	No	Data is <=8192 Chars	-	Password used to login to the server.
serverOS	int(11)	Yes	No	Yes	Data is Int Data is <=11 Chars	-	A foreign key to link a server to a specific operating system.
serverIP	varchar(17)	Yes	No	No	Data is <=17 Chars	-	IP used to connect to the backup node.
serverProcessor	varchar(40)	Yes	No	No	Data is <=40 Chars	-	The type of processor that is used in the server.
serverRAM	varchar(10)	Yes	No	No	Data is <=10 Chars	-	The amount of RAM that is contained within the server.
serverPort	int(10)	Yes	No	Yes	Data is Int Data is <=10 Chars	-	A foreign key to link a server to a specific network port.
serverTransfer	varchar(4)	Yes	No	No	Data is <=4 Chars	-	The amount of data transfer allocated to the server.

Data Structure Name		Description	Estimated Number of Records
Server Locations (serverLocations)		Table to store details about the locations servers and backup nodes can be in.	5-20
Estimated Size in KBytes		Type of Data Structure (Table, File, Array, Record)	Links With Other Data Structures
320	Table		userCompanies,
Access method (Serial / Sequential / Indexed Sequential / Random / None)		Foreign Keys	
Serial		companyID	

Field Name	Data Type	Required (Yes/No)	Key Field (Yes/No)	Indexed (Yes/No)	Type Of Validation Required	Default Value	Description
locationID	int(11)	Yes	Yes	Yes	None - Auto Set	-	Unique identifier to identify the record that contains information about a location.
companyID	int(11)	Yes	No	Yes	Data is Int Data is <=11 Chars	-	A foreign key to link a location to a specific company.
locationName	varchar(50)	Yes	No	Yes	Data is <=50 Chars	-	The name of the location.
locationLongitude	varchar(20)	Yes	No	No	Data is <=20 Chars	-	The longitude of the location.
locationLatitude	varchar(20)	Yes	No	No	Data is <=20 Chars	-	The latitude of the location.

Data Structure Name		Description	Estimated Number of Records
Server Operating System (serverOperatingSystems)		Table to store about the operating systems within the server configuration.	40+
Estimated Size in KBytes		Type of Data Structure (Table, File, Array, Record)	Links With Other Data Structures
32	Table		None
Access method (Serial / Sequential / Indexed Sequential / Random / None)		Foreign Keys	
Serial		None	

Field Name	Data Type	Required (Yes/No)	Key Field (Yes/No)	Indexed (Yes/No)	Type Of Validation Required	Default Value	Description
operatingSystemsID	int(11)	Yes	Yes	Yes	None - Auto Set	-	Unique identifier to identify the record that contains information about the operating system.
operatingSystemsName	varchar(50)	Yes	No	No	Data is <=50 Chars	-	The name of the operating system.

Data Structure Name		Description					Estimated Number of Records
Server Network Port (serverPort)		Table to store details regarding the network port.					5-10
Estimated Size in KBytes		Type of Data Structure (Table, File, Array, Record)					Links With Other Data Structures
32	Table						None
Access method (Serial / Sequential / Indexed Sequential / Random / None)							Foreign Keys
Serial							None

Field Name	Data Type	Required (Yes/No)	Key Field (Yes/No)	Indexed (Yes/No)	Type Of Validation Required	Default Value	Description
portID	int(11)	Yes	Yes	Yes	None - Auto Set	-	Unique identifier to identify the record that contains information about the network port.
portSpeed	varchar(20)	Yes	No	No	Data is <=20 Chars	-	The name of the network port.

Data Structure Name		Description					Estimated Number of Records
System Replies (systemReplies)		Table to store replies to tickets.					100+
Estimated Size in KBytes		Type of Data Structure (Table, File, Array, Record)					Links With Other Data Structures
320+	Table						userAccounts, systemTickets
Access method (Serial / Sequential / Indexed Sequential / Random / None)							Foreign Keys
Serial							userID, ticketID

Field Name	Data Type	Required (Yes/No)	Key Field (Yes/No)	Indexed (Yes/No)	Type Of Validation Required	Default Value	Description
replyID	int(11)	Yes	Yes	Yes	None - Auto Set	-	Unique identifier to identify the record that contains information about a reply.
ticketID	int(11)	Yes	No	Yes	Data is Int Data is <=11 Chars	-	A foreign key to link a reply to a specific ticket.
userID	int(11)	Yes	No	Yes	Data is Int Data is <=11 Chars	-	A foreign key to link a reply to a specific user.
replyContent	varchar(20)	Yes	No	No	Data is <=8192 Chars	-	The content of the reply.

Data Structure Name	Description	Estimated Number of Records
System Tickets (systemTickets)	Table to store information about tickets.	50+
Estimated Size in KBytes	Type of Data Structure (Table, File, Array, Record)	Links With Other Data Structures
320	Table	userCompanies, userAccounts
Access method (Serial / Sequential / Indexed Sequential / Random / None)	Foreign Keys	
Serial		userCompanyID, ticketCustomer

Field Name	Data Type	Required (Yes/No)	Key Field (Yes/No)	Indexed (Yes/No)	Type Of Validation Required	Default Value	Description
ticketID	int(11)	Yes	Yes	Yes	None – Auto Set	-	Unique identifier to identify the record that contains information about a ticket.
userCompanyId	int(11)	Yes	No	Yes	Data is Int Data is <=11 Chars	-	A foreign key to link a ticket to a specific company.
ticketUpdated	datetime	Yes	No	No	DateTime Format	-	The datetime the ticket was last updated.
ticketCustomer	int(11)	Yes	No	Yes	Data is Int Data is <=11 Chars	-	A foreign key to link a ticket to a specific user.
ticketRegarding	varchar(1024)	Yes	No	No	Data is <=1024 Chars	-	The node name that it is regarding.
ticketSubject	varchar(200)	Yes	No	No	Data is <=200 Chars		The subject of the ticket.

Data Structure Name	Description	Estimated Number of Records
User Accounts (userAccounts)	Table to store details about each user.	10+
Estimated Size in KBytes	Type of Data Structure (Table, File, Array, Record)	Links With Other Data Structures
320	Table	userPermissions, userCompanies
Access method (Serial / Sequential / Indexed Sequential / Random / None)	Foreign Keys	
Serial		userRole, userCompany

Field Name	Data Type	Required (Yes/No)	Key Field (Yes/No)	Indexed (Yes/No)	Type Of Validation Required	Default Value	Description
userID	int(11)	Yes	Yes	Yes	None - Auto Set	-	Unique identifier to identify the record that contains information about a user.
userLogin	varchar(128)	Yes	No	No	Data is <=128 Chars	-	The username for the user.
userPassword	varchar(8192)	Yes	No	No	Data is <=8192 Chars	-	The password for the user.
userForename	varchar(64)	Yes	No	No	Data is <=64 Chars	-	The forename of the user.
userSurname	varchar(64)	Yes	No	No	Data is <=64 Chars	-	The surname of the user.
userEmailAddress	varchar(128)	Yes	No	No	Data is <=128 Chars	-	The email address of the user.
userImage	varchar(256)	Yes	No	No	Data is <=256 Chars	-	The profile image url of the user.
userCompany	int(5)	Yes	No	Yes	Data is Int Data is <=5 Chars	-	A foreign key to link the user to a specific company.
userRole	int(10)	Yes	No	Yes	Data is Int Data is <=10 Chars	-	A foreign key to link the user to a specific permission role.
userIPAddress	varchar(13)	Yes	No	No	Data is 13 Chars	-	The last IP address of the user.
userLastLogin	datetime	Yes	No	No	Date is DateTime	CURRENT_TIMESTAMP	The datetime of last login.

Data Structure Name	Description	Estimated Number of Records
User Companies (userCompanies)	Table to store details about each company.	1-3
Estimated Size in KBytes	Type of Data Structure (Table, File, Array, Record)	Links With Other Data Structures
320	Table	userAccounts
Access method (Serial / Sequential / Indexed Sequential / Random / None)	Foreign Keys	
Serial	ownerID	

Field Name	Data Type	Required (Yes/No)	Key Field (Yes/No)	Indexed (Yes/No)	Type Of Validation Required	Default Value	Description
companyID	int(11)	Yes	Yes	Yes	None – Auto Set	-	Unique identifier to identify the record that contains information about a user.
ownerID	int(11)	Yes	No	No	Data is Int Data is <=11 Chars	-	A foreign key to link the company to a specific owner.
companyName	varchar(256)	Yes	No	No	Data is <=256 Chars	-	The name of the company.
companyDateCreated	varchar(64)	Yes	No	No	DateTime	CURRENT_TIMESTAMP	The date the company was created.

Data Structure Name	Description	Estimated Number of Records
User Companies (userCompanies)	Table to store details about each company.	1-3
Estimated Size in KBytes	Type of Data Structure (Table, File, Array, Record)	Links With Other Data Structures
320	Table	userAccounts
Access method (Serial / Sequential / Indexed Sequential / Random / None)	Foreign Keys	
Serial		ownerID

Field Name	Data Type	Required (Yes/No)	Key Field (Yes/No)	Indexed (Yes/No)	Type Of Validation Required	Default Value	Description
permID	Int(11)	Yes	Yes	Yes	None – Auto Set	-	Unique identifier to identify the record that contains information about the permission role.
permRole	varchar(30)	Yes	No	No	Data is <=30 Chars	-	The name of the role.
permDateModified	timestamp	Yes	No	No	DateTime	CURRENT_TIMESTAMP	Date the permission group was last modified.
permChangePassword	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permChangeUsername	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permChangeEmail	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permViewServers	tinyint(4)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permEditServers	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permDeleteServers	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permViewLocations	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permEditLocations	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permDeleteLocations	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permCreateTicket	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.

permAdminTicketView	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permCloseTicket	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permAddAction	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permEditAction	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permDeleteAction	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permRunCustomAction	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permAdminViewUsers	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permAdminEditUserInfo	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permAdminForcePassReset	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permAdminAddUser	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permAdminDelUser	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permAdminChangePermissions	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permControlServers	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permManageBackupSystem	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.

Data Structure Name		Description	Estimated Number of Records
Config File (setup.xml)		File to store database connection information	1-3
Estimated Size in KBytes	Type of Data Structure (Table, File, Array, Record)		Links With Other Data Structures
320	File		None
Access method (Serial / Sequential / Indexed Sequential / Random / None)		Foreign Keys	
Serial		None	

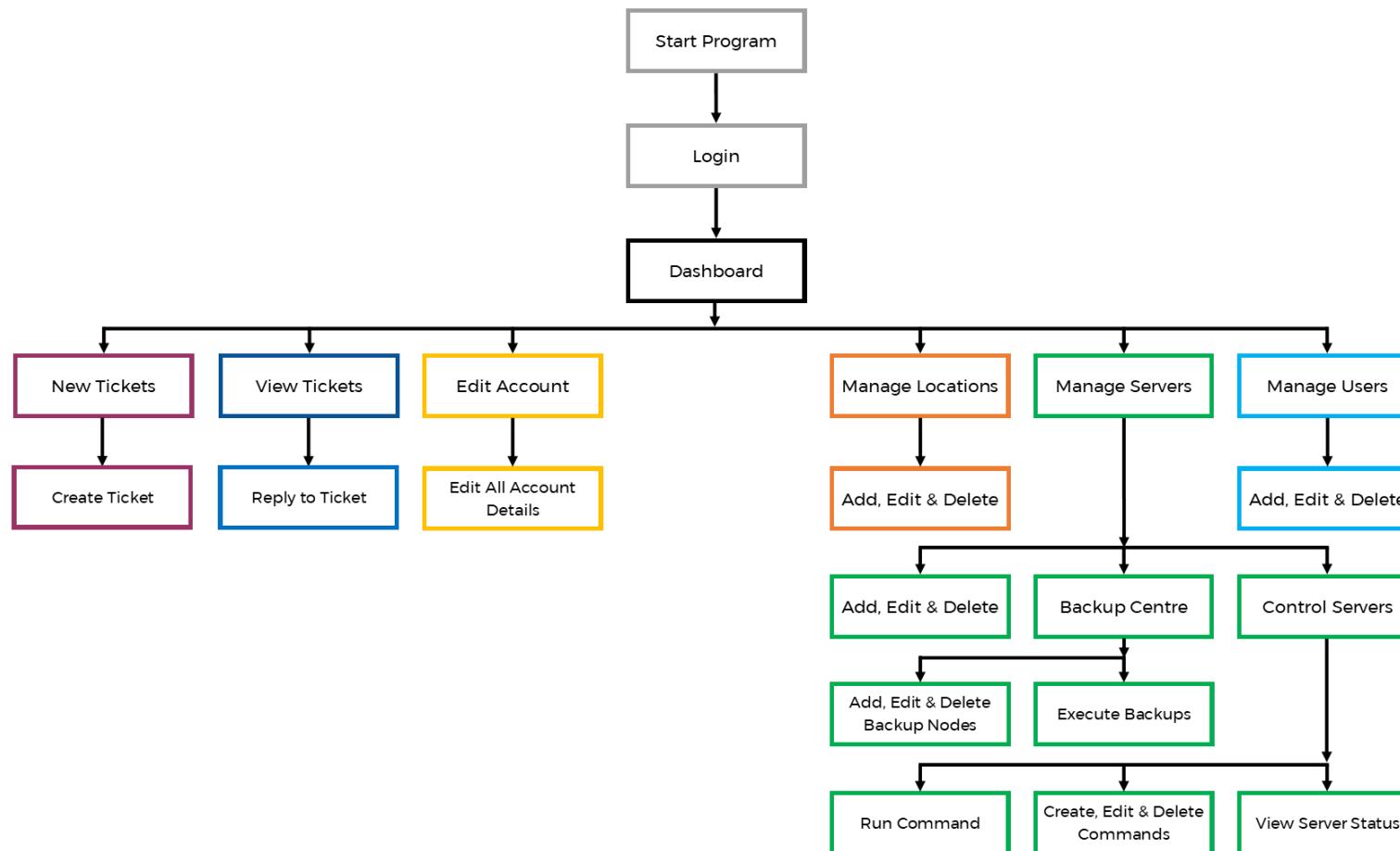
Field Name	Data Type	Required (Yes/No)	Key Field (Yes/No)	Indexed (Yes/No)	Type Of Validation Required	Default Value	Description
Setup	String	No	No	No	-	-	Has the setup been completed.
IP	String	No	No	No	-	-	The Database IP.
Database	String	No	No	No	-	-	The Database Name.
Username	String	No	No	No	-	-	The Database Username.
Password	String	No	No	No	-	-	The Database Password.

Subsection 3.3.2.iv - Validation

Validation Procedure Type	Pseudo Code For The Routine	Information About Procedure	Error / Information Messages Generated
Presence	If (field == null) Show message "Please enter data." Else Proceed	Used in multiple locations around the program to verify that there is data being entered into the program.	If field blank show error requesting data to be entered. Otherwise continue the program.
Email Check	try { var addr = new System.Net.Mail.MailAddress(txtNewEmail.Text); Proceed } Catch () { Show Message "Please enter a valid email address." }	Used when configuring a new user or changing an email address to confirm that the text can be parsed into the format of an email.	If email address able to be inserted into the format of an address, proceed the code, otherwise catch the error and show a message.
Length Check	If (field Less Than X) Show message "Please enter a larger value." Else Proceed	Used to ensure that the data entered is longer than a character value.	If value is shorter than defined value output a message, otherwise proceed with program.

Section 3.3.3 - Processing stages

Subsection 3.3.3.i - Overview of processing stages described graphically using JSP/Structure Diagram or DFD



Subsection 3.3.3.ii - Detailed descriptions of separate processes (link to each objective)

Processing Task (described or using a Flowchart)	Pseudo Code
Login Process	<pre>Username = txtUsername.Text Password = txtPassword.Text If (Username == Found) { EncryptPassword = SHA512(Salt + Password) If (EncryptPassword == DBPassword) { MsgBox("Access Granted") } Else { MsgBox("Your username or password is incorrect.") } Else { MsgBox("Your username or password is incorrect.") }</pre>
First Program Startup	<pre>Setup = XMLValue_Setup Host = XMLValue_Host Database = XMLValue_Database Username = XMLValue_Username Password = XMLValue_Password If (Setup != Yes) { Display SetupDatabase } Else { Display Login }</pre>

Execute Command	<pre>}</pre> <pre>While (Loopnum != Finished)</pre> <pre>{</pre> <pre> If (LoopnumCheckBox = checked)</pre> <pre>{</pre> <pre> GetDatabase Server Operating System</pre> <pre> GetDatabase Server Operating System</pre> <pre> try</pre> <pre>{</pre> <pre> using (SSH)</pre> <pre>{</pre> <pre> Connect()</pre> <pre> RunCommand(commandData)</pre> <pre> Disconnect()</pre> <pre> }</pre> <pre>}</pre> <pre> catch (Exception)</pre> <pre>{</pre> <pre> MsgBox("Error")</pre> <pre> }</pre> <pre>}</pre> <pre>}</pre>
Dynamic Element Creation	<pre>For Each (Database Value)</pre> <pre>{</pre> <pre> Create Element Box</pre> <pre> Box.Height XXX</pre> <pre> Box.Name XXX</pre> <pre> Box.Text XXX+Loopnum</pre> <pre> Loopnum += 1</pre> <pre>}</pre>
Check Box Event	<pre>if (finished == true)</pre> <pre>{</pre> <pre> string name = Sender.Name</pre>

	<pre>name = Removed "chkOS" int OSNumber = To Int name OSNumber -= 1 string inputname = "txtInput" + OSNumber Find textbox inputname CheckBox chbxName = Sender if (chbxName.Checked == true) { inputname.Enabled = true } else { inputname.Enabled = false inputname.Text = "" }</pre>
Command Loading Operating System	<pre>while (CommandOS (Loopnum) != null) { if (OperatingSystemID == CommandOSID) { checkbox.Checked = true textbox.Enabled = true textbox.Text = ToString(CommandText) yes = "Yes" } temploop += 1 } if (yes != "Yes") { checkbox.Checked = false textbox.Enabled = false }</pre>
Loading Permission	<pre>if (loginMenu.permViewLocations == false)</pre>

	<pre>{ btnManageLocations.Enabled = false; } if (loginMenu.permAdminViewUsers == false) { btnManageUsers.Enabled = false; } if (loginMenu.permViewServers == false) { btnManageServers.Enabled = false; }</pre>
Sending Email	<pre>try { MailMessage (fromEmail, Email, "ELSM Management System Installed", "This is confirmation that your installation of your server management panel has been completed."); Open New SMTP Connection New SMTP Port Use SSL Use Credentials (Username, Password) New Email (mailMessage) } catch (Exception ex) { System.Windows.Forms.MessageBox.Show(Convert.ToString(ex)); }</pre>

Chapter CS3.4 - PROTOTYPE (10 MARKS)

Section 3.4.1 - Areas included in the prototype

Login System

The login system will be the initial function that I develop into the program. This is because all functions, SQL queries and data displayed are dependant on the user details entered in the initial stage. It will be the first screen that gets loaded on program boot and will remain open until correct user login credentials are entered.

When allowing the user to login to the program, sensitive account information such as their password needs to be stored in a format that cannot be easily viewed. I'll begin by hashing the password to ensure that it cannot be reverse engineered, with the possibility later of switching it to encryption or also adding salt to the hashed password. The data that is accessible within the program should not be able to be accessed without the decrypted version of the password being entered the form allowing access. Encrypted Laser Limited must comply with the DPA, soon to be replaced by the GDPR which has additional security requirements. Storing user information securely is a must.

Location Management

The location management system within the program will be another core aspect of it and will allow all servers added to be assigned a location. These servers need to have an identifier that allows for them to be classified, and location is a great one.

This section of the program will display all locations currently loaded within the system and allow for the user to edit details such as the location longitude and latitude that will hopefully be used as an extra finishing feature at the end of the program's development to display on a map, in addition to the location name.

Server Management

The second core aspect to the whole system is the server management. I expect to allow the user to create a server within the prototype but not execute a command on it. It will be the section of the program that the user interacts with most often, being able to view information about each node and edit SSH login details.

The form will be simple, displaying all information that is needed and allowing for it all to be edited.

Command Creation

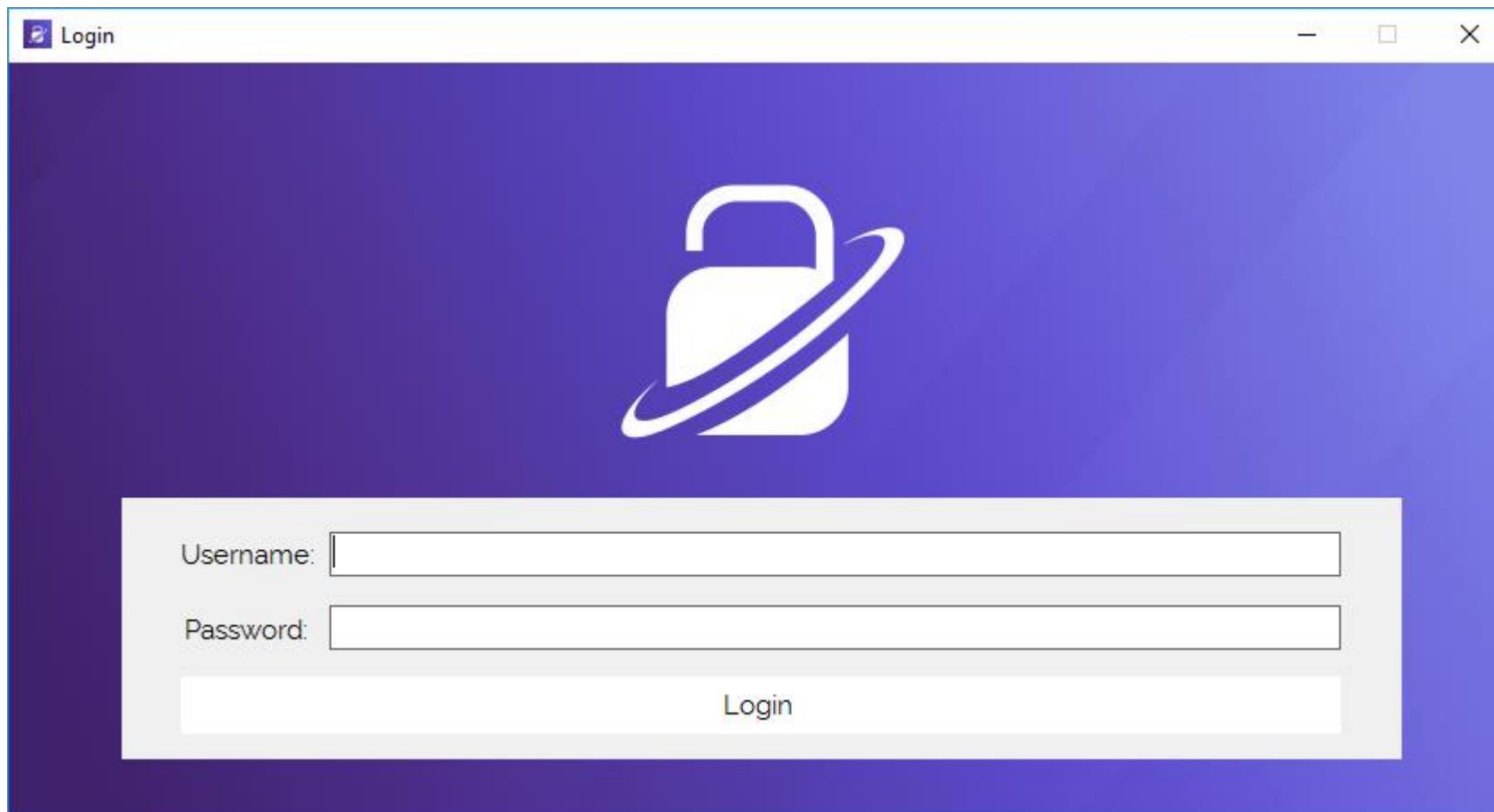
The command creation aspect will allow me to get one step closer to having a fully functional system that is able to automatically perform commands across multiple nodes. The command section will be critical to the project, allowing for the admin team to specify commands for different operating systems that can be executed.

This feature will be very time consuming to complete due to the dynamic generation of elements to display all of the available options within the OS table and allowing a variant of the command to be specified for each one. It will allow the user to select the operating systems that they use, and enter a command. This can be used later to run OS-specific commands on each node.

Conclusion

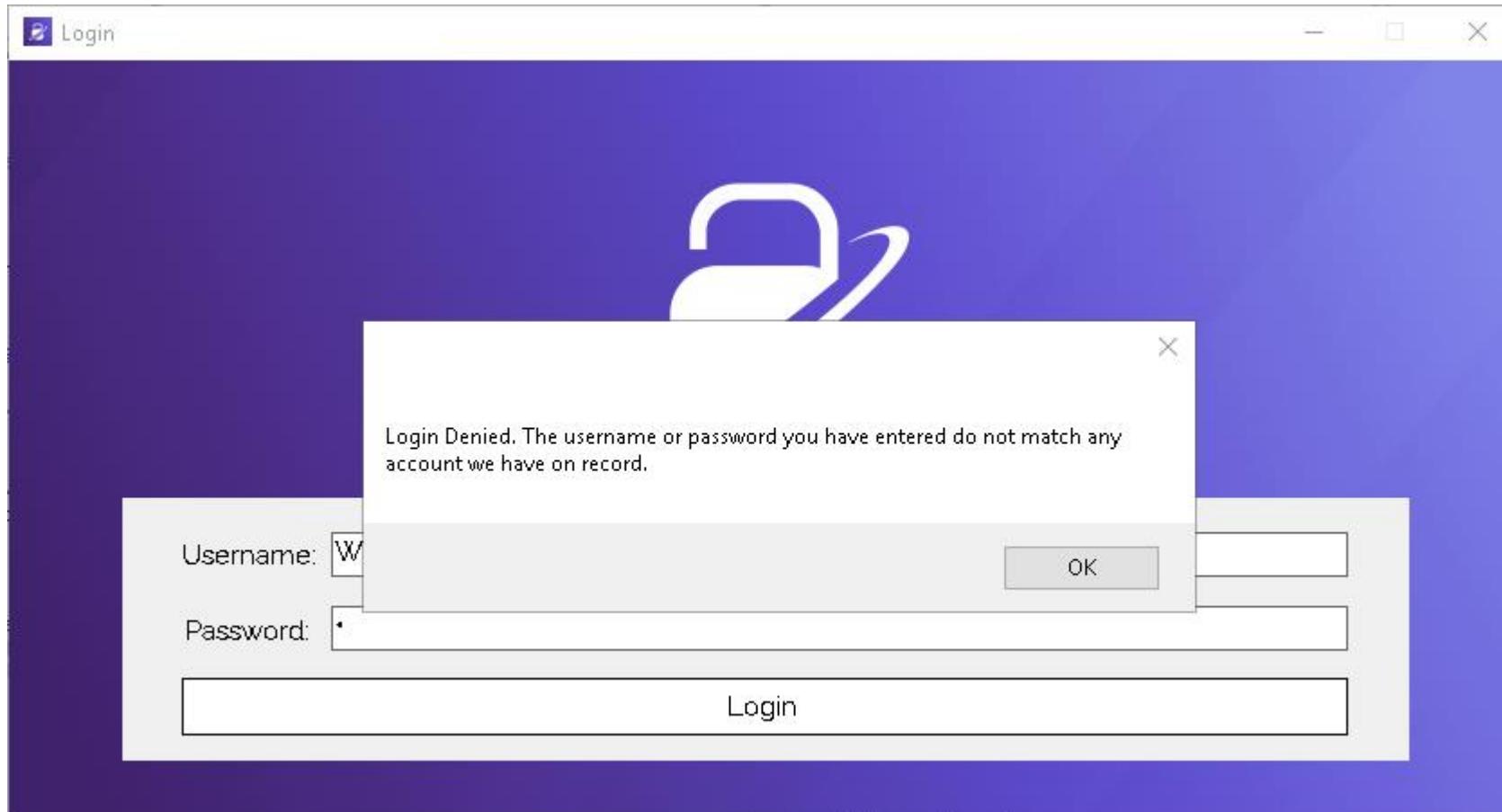
The tasks I am aiming to complete will be time consuming due to them being the framework of the whole program, I think that if these aspects will be completed within the prototype it will be a perfect start to the program and set me off on a good direction of what to work on next. Developing into the program the largest features that will be used frequently and will set a groundwork for all other features is a great first step, and will also allow me to reflect, monitor and adjust areas of the program throughout the development so that the final system can be a production ready piece of software.

Section 3.4.2 - Screens and outputs for the prototype solution



Explanation:

The image above shows the login form for the program that matches my original design. The form itself remains simple and to the point.

**Explanation:**

When an incorrect username or password combination is entered and submitted, an error will be presented to the user. The message box shows them what the problem is without being a complex MySQL error. In this instance, there is a wrong username supplied.

mainDashboard

Welcome Back!

Position: Owner
Company: Encrypted Laser Limited
IP Address: 88. [REDACTED]

Home

Server Control

Manage Servers

Manage Locations

My Account

Logout

Originally developed by William Phillips.
MetallicGloss.com

Explanation:

The screenshot displayed above is the temporary dashboard within the program that will be the home interface for the user. It displays a simple set of data at the minute that can then be extended later.

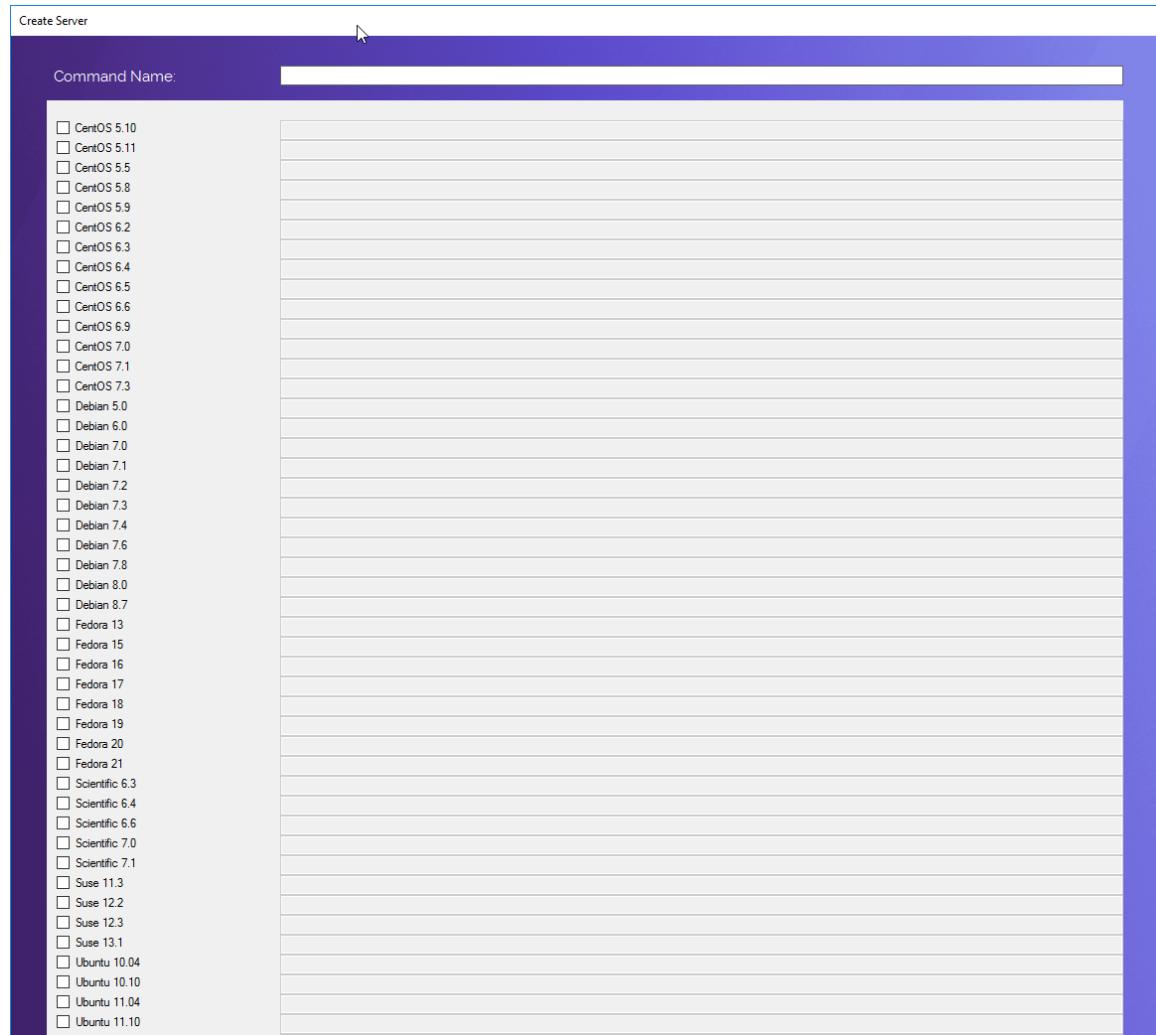
The screenshot shows a web-based server management application. On the left is a sidebar with a purple lock icon and the text "Encrypted Laser Server Management". The main area has a blue header "Server Control". Below the header is a table with four columns: serverID, serverHostname, serverOS, and serverIP. Two rows of data are shown:

serverID	serverHostname	serverOS	serverIP
1	elhs.co	12	elhs.co
2	144.2	53	144.2

Below the table are several buttons: "Create Command", "Edit Command", "Delete Command", "Run Command", and "Server Status". On the far left of the sidebar, there is a link to "Originally developed by William Phillips MetallicGloss.com".

Explanation:

The photo above displays the command creation window with the list of servers that the commands can be executed on listed above. This is the main command creation page that links to the creation and editing of the commands.



Explanation:

The image above shows the command creation window when loaded displaying the dynamic set of operating systems that does push the bottom two buttons off the page.

Manage Servers

Manage Servers

serverID	serverHostname	serverOS	serverIP
1	elhs.co	12	elhs.co
2		53	

Home
Server Control
Manage Servers
Manage Locations
Manage Account
Logout

Originally developed by William Phillips,
MetallicGloss.com

Create Server Edit Server Delete Server

Server Note Management Server Specifications

Explanation:

The image above displays the landing page for the server creation screen that links to the create, edit and delete server pages.

Create Server

Server Name:	<input type="text"/>
Location:	<input type="text"/>
Hostname:	<input type="text"/>
Username:	<input type="text"/>
Password:	<input type="text"/>
Key:	<input type="text"/>
Operating System:	<input type="text"/>
Server IP Address:	<input type="text"/>
Server Processor:	<input type="text"/>
RAM:	<input type="text"/>
Network Port:	<input type="text"/>
Transfer:	<input type="text"/>

Explanation:

The image above shows the window that is displayed when creating a new server, allowing for input of all the different configuration aspects with a dropdown to validate the operating system that can be selected to make sure that it corresponds to an OS that is defined for the command.

The screenshot shows a web-based application interface. On the left, a sidebar menu lists navigation options: Home, Server Control, Manage Servers, Manage Locations (which is currently selected), Manage Account, and Logout. Below the menu, a note states "Originally developed by William Phillips MetallicGloss.com". The main content area has a purple header with the title "Manage Datacentre Locations". Below the header is a table with four columns: locationID, locationName, locationLongitude, and locationLatitude. A single row is present in the table, showing data for a location named "Bristol" with coordinates "00000" for both longitude and latitude. At the bottom of the main content area are three buttons: "Add Location", "Edit Location", and "Delete Location".

locationID	locationName	locationLongitude	locationLatitude
1	Bristol	00000	00000

Explanation:

The image shows the landing page for the location management within the program, allowing for the user to create a location, edit a location and delete a location while also displaying the current locations in the table above.

Create Location

Location Name:

Longitude:

Latitude:

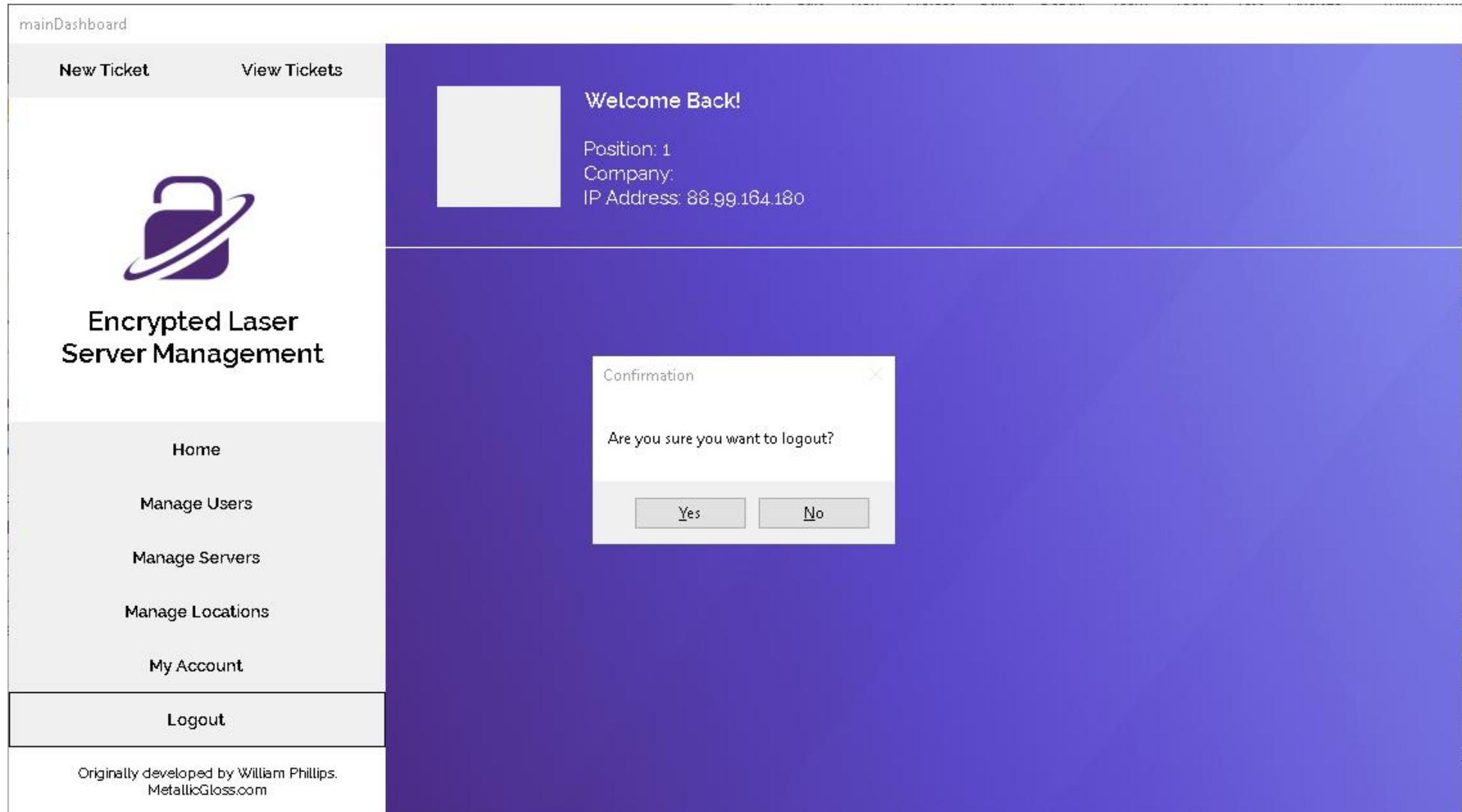
Explanation:

The image shows the window that is displayed to the user allowing them to create a new location providing them the option to name the location while also setting both the longitude and latitude for it.

The screenshot shows a modal dialog box titled "Delete Location". It contains a dropdown menu labeled "Location:" with the option "Bristol" selected. Below the dropdown are two buttons: "Process Location Deletion" and "Cancel".

Explanation:

The screenshot above displays a the form that is presented allowing the user to delete the location with a dropdown to validate the available options.



Explanation:

The photo above shows the logout confirmation that is available on every screen currently developed which enables the user to logout of the program and return to the login form. It clears the data and resets the program ready for the next user.

The screenshot shows a MySQL Workbench table editor for a 'users' table. The table has columns: userID, userLogin, userPassword, userForename, userSurname, userEmailAddress, userImage, userCompany, userRole, userIPAddress, and userLastLogin. A new row is being inserted with the following values:

userID	userLogin	userPassword	userForename	userSurname	userEmailAddress	userImage	userCompany	userRole	userIPAddress	userLastLogin
1	w	AA66509891AD28030349BA9581E8C92528FAAB6A34349061A4...	William	William	william@metallicgloss.com	William	1	1	88.99.	15:06:13

Below the table, there are toolbar buttons for 'Edit', 'Copy', 'Delete', 'Check all', 'With selected:', and 'Export'.

Explanation:

The screencapture above shows the data being inserted into the database correctly and the formatting of the password in an encrypted format.

Section 3.4.3 - Evidence of a functioning prototype system

Subsection 3.4.3.i - Code listing for the prototype

loginMenu.cs

```
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
using System.Windows.Forms;
using System.Data.SqlClient;
using MySql.Data.MySqlClient;
using System.Net;
using System.Text.RegularExpressions;

namespace ELSM_Project
{
    public partial class loginMenu : Form
    {

        public static string IPAddress, Forename, Surname, CompanyID, CompanyName, EmailAddress, ProfileImage, Role, UserID, Username,
        Password;
        public static Boolean permChangePassword, permChangeUsername, permChangeEmail, permViewServers, permEditServers,
        permDeleteServers, permViewLocations, permEditLocations, permDeleteLocations, permCreateTicket, permAdminTicket, permCloseTicket,
        permViewServerPass, permEditServerPass, permAddAction, permEditAction, permDeleteAction, permRunUpdate, permRunReboot,
        permAddServerNote, permRunCustomAction, permAdminViewUsers, permAdminEditUserInfo, permAdminForcePassReset, permAdminAddUser,
        permAdminDelUser, permAdminChangePermissions, permControlServers;
        public static string ConnectionString =
"SERVER=[REDACTED];DATABASE=metallic_elsm_test;UID=metallic_testing;PASSWORD=[REDACTED];";

        public loginMenu()
        {
            InitializeComponent();
        }

        private void loginBtn_Click(object sender, EventArgs e)
        {
            var userLogin = txtUsername.Text;
            var userPassword = txtPassword.Text;
            var checkpointReached = false;
```

```
MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
conn.Open();
string sql = "SELECT * FROM userAccounts WHERE userLogin = @userLogin";
MySqlCommand cmd = new MySqlCommand(sql, conn);
cmd.Parameters.AddWithValue("@userLogin", userLogin);
MySqlDataReader rdr = cmd.ExecuteReader();
rdr.Read();

try
{
    var Valid = Convert.ToString(rdr[0]);
    checkpointReached = true;
}
catch (Exception)
{
    System.Windows.Forms.MessageBox.Show("Login Denied. The username or password you have entered do not match any account
we have on record.");
    txtUsername.Text = "";
    txtPassword.Text = "";
    rdr.Close();
    conn.Close();
}
if (checkpointReached == true)
{
    var databasePassword = Convert.ToString(rdr[2]);
    loginMenu.UserID = Convert.ToString(rdr[0]);
    loginMenu.Username = Convert.ToString(rdr[1]);
    loginMenu.Password = Convert.ToString(rdr[2]);
    loginMenu.Forename = Convert.ToString(rdr[3]);
    loginMenu.Surname = Convert.ToString(rdr[4]);
    loginMenu.EmailAddress = Convert.ToString(rdr[5]);
    loginMenu.ProfileImage = Convert.ToString(rdr[6]);
    loginMenu.CompanyID = Convert.ToString(rdr[7]);
    loginMenu.Role = Convert.ToString(rdr[8]);
    conn.Close();
    String EnteredPassword = SHA.GenerateSHA512String(txtPassword.Text);

    rdr.Close();
    if (EnteredPassword != databasePassword)
    {
        System.Windows.Forms.MessageBox.Show("Login Denied. The username or password you have entered do not match any
account we have on record.");
        txtUsername.Text = "";
        txtPassword.Text = "";
        conn.Open();
        MySqlCommand failedCMD = new MySqlCommand("INSERT INTO failedLoginAttempts (attemptUsername, attemptIP,
attemptTimeStamp) VALUES (@attemptUsername, @attemptIP, @attemptTimeStamp)", conn);
    }
}
```

```
failedCMD.Parameters.AddWithValue("@attemptUsername", txtUsername.Text);
failedCMD.Parameters.AddWithValue("@attemptIP", loginMenu.IPAddress);
failedCMD.Parameters.AddWithValue("@attemptTimeStamp", DateTime.Now);
failedCMD.ExecuteNonQuery();

}

else
{
    conn.Open();
    MySqlCommand accountCMD = new MySqlCommand("UPDATE `userAccounts` SET userIPAddress = @attemptIP, userLastLogin = @attemptTimeStamp", conn);
    accountCMD.Parameters.AddWithValue("@attemptIP", ELSM_Project.loginMenu.IPAddress);
    accountCMD.Parameters.AddWithValue("@attemptTimeStamp", DateTime.Now);
    accountCMD.ExecuteNonQuery();

    MySqlCommand permissionCommand = new MySqlCommand("SELECT * FROM userPermissions WHERE permID = @permid", conn);
    permissionCommand.Parameters.AddWithValue("@permid", Role);
    MySqlDataReader permissionRDR = permissionCommand.ExecuteReader();
    permissionRDR.Read();
    permChangePassword = Convert.ToBoolean(permissionRDR[4]);
    permChangeUsername = Convert.ToBoolean(permissionRDR[5]);
    permChangeEmail = Convert.ToBoolean(permissionRDR[6]);
    permViewServers = Convert.ToBoolean(permissionRDR[7]);
    permEditServers = Convert.ToBoolean(permissionRDR[8]);
    permDeleteServers = Convert.ToBoolean(permissionRDR[9]);
    permViewLocations = Convert.ToBoolean(permissionRDR[10]);
    permEditLocations = Convert.ToBoolean(permissionRDR[11]);
    permDeleteLocations = Convert.ToBoolean(permissionRDR[12]);
    permCreateTicket = Convert.ToBoolean(permissionRDR[13]);
    permAdminTicket = Convert.ToBoolean(permissionRDR[14]);
    permCloseTicket = Convert.ToBoolean(permissionRDR[15]);
    permViewServerPass = Convert.ToBoolean(permissionRDR[16]);
    permEditServerPass = Convert.ToBoolean(permissionRDR[17]);
    permAddAction = Convert.ToBoolean(permissionRDR[18]);
    permEditAction = Convert.ToBoolean(permissionRDR[19]);
    permDeleteAction = Convert.ToBoolean(permissionRDR[20]);
    permRunUpdate = Convert.ToBoolean(permissionRDR[21]);
    permRunReboot = Convert.ToBoolean(permissionRDR[22]);
    permAddServerNote = Convert.ToBoolean(permissionRDR[23]);
    permRunCustomAction = Convert.ToBoolean(permissionRDR[24]);
    permAdminViewUsers = Convert.ToBoolean(permissionRDR[25]);
    permAdminEditUserInfo = Convert.ToBoolean(permissionRDR[26]);
    permAdminForcePassReset = Convert.ToBoolean(permissionRDR[27]);
    permAdminAddUser = Convert.ToBoolean(permissionRDR[28]);
    permAdminDelUser = Convert.ToBoolean(permissionRDR[29]);
    permAdminChangePermissions = Convert.ToBoolean(permissionRDR[30]);
    permControlServers = Convert.ToBoolean(permissionRDR[31]);
    permissionRDR.Close();
}
```

```
MySqlCommand companyCMD = new MySqlCommand("SELECT * FROM userCompanies WHERE companyID = @companyID", conn);
companyCMD.Parameters.AddWithValue("@companyID", CompanyID);
MySqlDataReader companyRDR = companyCMD.ExecuteReader();
companyRDR.Read();
CompanyName = Convert.ToString(companyRDR[2]);
conn.Close();
companyRDR.Close();

Hide();

mainDashboard loginMenu = new mainDashboard();
loginMenu.ShowDialog();

txtUsername.Text = "";
txtPassword.Text = "";

Show();
}

conn.Close();
}

private void loginFRM_Load(object sender, EventArgs e)
{
    string externalIP;
    externalIP = (new WebClient()).DownloadString("http://checkip.dyndns.org/");
    externalIP = (new Regex(@"\d{1,3}\.\d{1,3}\.\d{1,3}\.\d{1,3}")).Matches(externalIP)[0].ToString();
    loginMenu.IPAddress = externalIP;
}
}
```

mainDashboard.cs

```
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
using System.Windows.Forms;
using System.Data.SqlClient;
using MySql.Data.MySqlClient;

namespace ELSM_Project {
    public partial class mainDashboard: Form {

        public mainDashboard() {
            InitializeComponent();
        }

        private void DashboardFRM_Load(object sender, EventArgs e) {
            lblCurrentIP.Text = "IP Address: " + loginMenu.IPAddress;
            lblPosition.Text = "Position: " + loginMenu.Role;
            if ((loginMenu.permControlServers == false) && (loginMenu.permViewLocations == false) && (loginMenu.permViewServers == false)) {
                btnHome.Top += 129;
                btnManageLocations.Visible = false;
                btnManageServers.Visible = false;
                btnServerControl.Visible = false;
            } else if ((loginMenu.permControlServers == false) && (loginMenu.permViewLocations == false)) {
                btnHome.Top += 129;
                btnManageServers.Top += 86;
                btnServerControl.Visible = false;
                btnManageLocations.Visible = false;
            } else if ((loginMenu.permControlServers == false) && (loginMenu.permViewServers == false)) {
                btnHome.Top += 86;
                btnServerControl.Visible = false;
                btnManageServers.Visible = false;
            } else if ((loginMenu.permViewServers == false) && (loginMenu.permViewLocations == false)) {
                btnHome.Top += 86;
                btnServerControl.Top += 86;
                btnManageLocations.Visible = false;
                btnManageServers.Visible = false;
            } else if (loginMenu.permControlServers == false) {
                btnHome.Top += 43;
                btnServerControl.Visible = false;
            }
        }
    }
}
```

```
        } else if (loginMenu.permViewServers == false) {
            btnHome.Top += 43;
            btnServerControl.Top += 43;
            btnManageServers.Visible = false;
        } else if (loginMenu.permViewLocations == false) {
            btnHome.Top += 43;
            btnServerControl.Top += 43;
            btnManageServers.Top += 43;
            btnManageLocations.Visible = false;
        }
    }

    private void lblMetallicGloss_Click(object sender, EventArgs e) {
        System.Diagnostics.Process.Start("https://www.metallicgloss.com"); //www.metallicgloss.com");
    }

    private void btnHome_Click(object sender, EventArgs e) {
        MessageBox.Show("You're already here!", "Notice", MessageBoxButtons.OK);
    }

    private void btnServerControl_Click(object sender, EventArgs e) {
        Hide();
        serverControl Servers = new serverControl();
        Servers.ShowDialog();
    }

    private void btnManageServers_Click(object sender, EventArgs e) {
        Hide();
        manageServers manageS = new manageServers();
        manageS.ShowDialog();
    }

    private void btnManageLocations_Click(object sender, EventArgs e) {
        Hide();
        manageLocations manageL = new manageLocations();
        manageL.ShowDialog();
    }

    private void btnManageAccount_Click(object sender, EventArgs e) {
        Hide();
        manageAccount Account = new manageAccount();
        Account.ShowDialog();
    }

    private void btnLogout_Click(object sender, EventArgs e) {
        if (MessageBox.Show("Are you sure you want to logout?", "Confirmation", MessageBoxButtons.YesNo) != DialogResult.No) {

```

```
        this.Close();  
    }  
}  
}
```

manageLocations.cs

```
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
using System.Windows.Forms;
using System.Data.SqlClient;
using MySql.Data.MySqlClient;

namespace ELSM_Project
{
    public partial class manageLocations : Form
    {
        public manageLocations()
        {
            InitializeComponent();
        }

        private void lblMetallicGloss_Click(object sender, EventArgs e)
        {
            System.Diagnostics.Process.Start("https://www.metallicgloss.com");
        }

        private void btnHome_Click(object sender, EventArgs e)
        {
            Hide();
            mainDashboard Dashboard = new mainDashboard();
            Dashboard.ShowDialog();
        }

        private void btnServerControl_Click(object sender, EventArgs e)
        {
            Hide();
            serverControl Servers = new serverControl();
            Servers.ShowDialog();
        }

        private void btnManageServers_Click(object sender, EventArgs e)
        {
            Hide();
            manageServers manageS = new manageServers();
            manageS.ShowDialog();
        }
    }
}
```

```
}

private void btnManageLocations_Click(object sender, EventArgs e)
{
    MessageBox.Show("You're already here!", "Notice", MessageBoxButtons.OK);
}

private void btnManageAccount_Click(object sender, EventArgs e)
{
    Hide();
    manageAccount Account = new manageAccount();
    Account.ShowDialog();
}

private void btnLogout_Click(object sender, EventArgs e)
{
    if (MessageBox.Show("Are you sure you want to logout?", "Confirmation", MessageBoxButtons.YesNo) != DialogResult.No)
    {
        this.Close();
    }
}

private void manageLocations_Load(object sender, EventArgs e)
{
    if ((loginMenu.permControlServers == false) && (loginMenu.permViewLocations == false) && (loginMenu.permViewServers ==
false))
    {
        btnHome.Top += 129;
        btnManageLocations.Visible = false;
        btnManageServers.Visible = false;
        btnServerControl.Visible = false;
    }
    else if ((loginMenu.permControlServers == false) && (loginMenu.permViewLocations == false))
    {
        btnHome.Top += 129;
        btnManageServers.Top += 86;
        btnServerControl.Visible = false;
        btnManageLocations.Visible = false;
    }
    else if ((loginMenu.permControlServers == false) && (loginMenu.permViewServers == false))
    {
        btnHome.Top += 86;
        btnServerControl.Visible = false;
        btnManageServers.Visible = false;
    }
    else if ((loginMenu.permViewServers == false) && (loginMenu.permViewLocations == false))
    {
        btnHome.Top += 86;
    }
}
```

```
btnServerControl.Top += 86;
btnManageLocations.Visible = false;
btnManageServers.Visible = false;
}
else if (loginMenu.permControlServers == false)
{
    btnHome.Top += 43;
    btnServerControl.Visible = false;
}
else if (loginMenu.permViewServers == false)
{
    btnHome.Top += 43;
    btnServerControl.Top += 43;
    btnManageServers.Visible = false;
}
else if (loginMenu.permViewLocations == false)
{
    btnHome.Top += 43;
    btnServerControl.Top += 43;
    btnManageServers.Top += 43;
    btnManageLocations.Visible = false;
}
MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
conn.Open();
try
{
    MySqlDataAdapter MyDA = new MySqlDataAdapter();
    MyDA.SelectCommand = new MySqlCommand("SELECT locationID, locationName, locationLongitude, locationLatitude FROM serverLocations WHERE companyID = " + loginMenu.CompanyID + "", conn);
    DataTable table = new DataTable();
    MyDA.Fill(table);

    BindingSource bSource = new BindingSource();
    bSource.DataSource = table;

    dataGridView1.DataSource = bSource;
}
catch (MySql.Data.MySqlClient.MySqlException ex)
{
    MessageBox.Show(ex.Message);
    Close();
}
}

private void lblManageAccountTitle_Click(object sender, EventArgs e)
{
```

```
}

private void btnAddLocation_Click(object sender, EventArgs e)
{
    manageLocationsCreate Create = new manageLocationsCreate();
    Create.ShowDialog();
    MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
    conn.Open();
    try
    {
        MySqlDataAdapter MyDA = new MySqlDataAdapter();
        MyDA.SelectCommand = new MySqlCommand("SELECT locationID, locationName, locationLongitude, locationLatitude FROM
serverLocations WHERE companyID = " + loginMenu.CompanyID + "", conn);
        DataTable table = new DataTable();
        MyDA.Fill(table);

        BindingSource bSource = new BindingSource();
        bSource.DataSource = table;

        dataGridView1.DataSource = bSource;

    }
    catch (MySql.Data.MySqlClient.MySqlException ex)
    {
        MessageBox.Show(ex.Message);
        Close();
    }
}

private void btnEditLocation_Click(object sender, EventArgs e)
{
    manageLocationsEdit Edit = new manageLocationsEdit();
    Edit.ShowDialog();
    MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
    conn.Open();
    try
    {
        MySqlDataAdapter MyDA = new MySqlDataAdapter();
        MyDA.SelectCommand = new MySqlCommand("SELECT locationID, locationName, locationLongitude, locationLatitude FROM
serverLocations WHERE companyID = " + loginMenu.CompanyID + "", conn);
        DataTable table = new DataTable();
        MyDA.Fill(table);

        BindingSource bSource = new BindingSource();
        bSource.DataSource = table;

        dataGridView1.DataSource = bSource;
    }
```

```
        }

    catch (MySql.Data.MySqlClient.MySqlException ex)
    {
        MessageBox.Show(ex.Message);
        Close();
    }
}

private void btnDeleteLocation_Click(object sender, EventArgs e)
{
    manageLocationsDelete Delete = new manageLocationsDelete();
    Delete.ShowDialog();

    MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
    conn.Open();

    try
    {
        MySqlDataAdapter MyDA = new MySqlDataAdapter();
        MyDA.SelectCommand = new MySqlCommand("SELECT locationID, locationName, locationLongitude, locationLatitude FROM
serverLocations WHERE companyID = " + loginMenu.CompanyID + "", conn);
        DataTable table = new DataTable();
        MyDA.Fill(table);

        BindingSource bSource = new BindingSource();
        bSource.DataSource = table;

        dataGridView1.DataSource = bSource;
    }
    catch (MySql.Data.MySqlClient.MySqlException ex)
    {
        MessageBox.Show(ex.Message);
        Close();
    }
}
}
```

manageLocationsCreate.cs

```
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
using System.Windows.Forms;
using System.Data.SqlClient;
using MySql.Data.MySqlClient;

namespace ELSM_Project
{
    public partial class manageLocationsCreate : Form
    {
        public manageLocationsCreate()
        {
            InitializeComponent();
        }

        private void btnNewLocation_Click(object sender, EventArgs e)
        {
            MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
            conn.Open();
            MySqlCommand locationCMD = new MySqlCommand("INSERT INTO serverLocations (locationName, companyID, locationLongitude, locationLatitude) VALUES (@locationName, @companyID, @locationLongitude, @locationLatitude)", conn);
            locationCMD.Parameters.AddWithValue("@locationName", txtLocationName.Text);
            locationCMD.Parameters.AddWithValue("@locationLongitude", txtLongitude.Text);
            locationCMD.Parameters.AddWithValue("@companyID", loginMenu.CompanyID);
            locationCMD.Parameters.AddWithValue("@locationLatitude", txtLatitude.Text);
            locationCMD.ExecuteNonQuery();
            conn.Close();
            txtLatitude.Text = "";
            txtLongitude.Text = "";
            txtLocationName.Text = "";
        }

        private void btnCancel_Click(object sender, EventArgs e)
        {
            Hide();
        }
    }
}
```

manageLocationsDelete.cs

```
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
using System.Windows.Forms;
using System.Data.SqlClient;
using MySql.Data.MySqlClient;

namespace ELSM_Project
{
    public partial class manageLocationsDelete : Form
    {
        public manageLocationsDelete()
        {
            InitializeComponent();
        }

        private void btnCancel_Click(object sender, EventArgs e)
        {
            Hide();
        }

        private void btnDeleteLocation_Click(object sender, EventArgs e)
        {
            MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
            conn.Open();
            MySqlCommand locationCMD = new MySqlCommand("DELETE FROM serverLocations WHERE locationName = @locationName", conn);
            locationCMD.Parameters.AddWithValue("@locationName", cmboExisting.Text);
            locationCMD.ExecuteNonQuery();
            conn.Close();
        }

        private void manageLocationsDelete_Load(object sender, EventArgs e)
        {
            MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
            conn.Open();
            string sql = "SELECT * FROM serverLocations WHERE companyID = @companyID";
            MySqlCommand cmd = new MySqlCommand(sql, conn);
            cmd.Parameters.AddWithValue("@companyID", loginMenu.CompanyID);
            MySqlDataReader rdr = cmd.ExecuteReader();
```

```
    while (rdr.Read())
    {
        cmboExisting.Items.Add(rdr.GetString("locationName"));
    }
    conn.Close();
    Hide();
}
}
```

manageServers.cs

```
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
using System.Windows.Forms;
using System.Data.SqlClient;
using MySql.Data.MySqlClient;

namespace ELSM_Project
{
    public partial class manageServers : Form
    {
        public manageServers()
        {
            InitializeComponent();
        }

        private void lblMetallicGloss_Click(object sender, EventArgs e)
        {
            System.Diagnostics.Process.Start("https://www.metallicgloss.com");
        }

        private void btnHome_Click(object sender, EventArgs e)
        {
            Hide();
            mainDashboard Dashboard = new mainDashboard();
            Dashboard.ShowDialog();
        }

        private void btnServerControl_Click(object sender, EventArgs e)
        {
            Hide();
            serverControl Servers = new serverControl();
            Servers.ShowDialog();
        }

        private void btnManageServers_Click(object sender, EventArgs e)
        {
            MessageBox.Show("You're already here!", "Notice", MessageBoxButtons.OK);
        }
    }
}
```

```
private void btnManageLocations_Click(object sender, EventArgs e)
{
    Hide();
    manageLocations manageL = new manageLocations();
    manageL.ShowDialog();
}

private void btnManageAccount_Click(object sender, EventArgs e)
{
    Hide();
    manageAccount Account = new manageAccount();
    Account.ShowDialog();
}

private void btnLogout_Click(object sender, EventArgs e)
{
    if (MessageBox.Show("Are you sure you want to logout?", "Confirmation", MessageBoxButtons.YesNo) != DialogResult.No)
    {
        this.Close();
    }
}

private void manageServers_Load(object sender, EventArgs e)
{
    if ((loginMenu.permControlServers == false) && (loginMenu.permViewLocations == false) && (loginMenu.permViewServers ==
false))
    {
        btnHome.Top += 129;
        btnManageLocations.Visible = false;
        btnManageServers.Visible = false;
        btnServerControl.Visible = false;
    }
    else if ((loginMenu.permControlServers == false) && (loginMenu.permViewLocations == false))
    {
        btnHome.Top += 129;
        btnManageServers.Top += 86;
        btnServerControl.Visible = false;
        btnManageLocations.Visible = false;
    }
    else if ((loginMenu.permControlServers == false) && (loginMenu.permViewServers == false))
    {
        btnHome.Top += 86;
        btnServerControl.Visible = false;
        btnManageServers.Visible = false;
    }
    else if ((loginMenu.permViewServers == false) && (loginMenu.permViewLocations == false))
    {
        btnHome.Top += 86;
    }
}
```

```
        btnServerControl.Top += 86;
        btnManageLocations.Visible = false;
        btnManageServers.Visible = false;
    }
    else if (loginMenu.permControlServers == false)
    {
        btnHome.Top += 43;
        btnServerControl.Visible = false;
    }
    else if (loginMenu.permViewServers == false)
    {
        btnHome.Top += 43;
        btnServerControl.Top += 43;
        btnManageServers.Visible = false;
    }
    else if (loginMenu.permViewLocations == false)
    {
        btnHome.Top += 43;
        btnServerControl.Top += 43;
        btnManageServers.Top += 43;
        btnManageLocations.Visible = false;
    }
    MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
    conn.Open();
    try
    {
        MySqlDataAdapter MyDA = new MySqlDataAdapter();
        MyDA.SelectCommand = new MySqlCommand("SELECT serverID, serverHostname, serverOS, serverIP FROM serverInformation WHERE serverCompany = " + loginMenu.CompanyID + "", conn);
        DataTable table = new DataTable();
        MyDA.Fill(table);
        BindingSource bSource = new BindingSource();
        bSource.DataSource = table;
        dataGridView1.DataSource = bSource;
    }
    catch (MySql.Data.MySqlClient.MySqlException ex)
    {
        MessageBox.Show(ex.Message);
        Close();
    }
}

private void btnCreateServer_Click(object sender, EventArgs e)
{
    manageServersCreate Create = new manageServersCreate();
    Create.ShowDialog();
    MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
    conn.Open();
```

```
try
{
    MySqlDataAdapter MyDA = new MySqlDataAdapter();
    MyDA.SelectCommand = new MySqlCommand("SELECT serverID, serverHostname, serverOS, serverIP FROM serverInformation
WHERE serverCompany = " + loginMenu.CompanyID + "", conn);
    DataTable table = new DataTable();
    MyDA.Fill(table);

    BindingSource bSource = new BindingSource();
    bSource.DataSource = table;

    dataGridView1.DataSource = bSource;

}
catch (MySql.Data.MySqlClient.MySqlException ex)
{
    MessageBox.Show(ex.Message);
    Close();
}
}

private void btnEditServer_Click(object sender, EventArgs e)
{
    manageServersEdit Edit = new manageServersEdit();
    Edit.ShowDialog();
    MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
    conn.Open();
    try
    {
        MySqlDataAdapter MyDA = new MySqlDataAdapter();
        MyDA.SelectCommand = new MySqlCommand("SELECT serverID, serverHostname, serverOS, serverIP FROM serverInformation
WHERE serverCompany = " + loginMenu.CompanyID + "", conn);
        DataTable table = new DataTable();
        MyDA.Fill(table);

        BindingSource bSource = new BindingSource();
        bSource.DataSource = table;

        dataGridView1.DataSource = bSource;

    }
    catch (MySql.Data.MySqlClient.MySqlException ex)
    {
        MessageBox.Show(ex.Message);
        Close();
    }
}
}
```

manageServersCreate.cs

```
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
using System.Windows.Forms;
using System.Data.SqlClient;
using MySql.Data.MySqlClient;

namespace ELSM_Project
{
    public partial class manageServersCreate : Form
    {
        public manageServersCreate()
        {
            InitializeComponent();
        }

        private void manageServersCreate_Load(object sender, EventArgs e)
        {
            MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
            conn.Open();
            string locations = "SELECT * FROM serverLocations WHERE companyID = @companyID";
            MySqlCommand locationscmd = new MySqlCommand(locations, conn);
            locationscmd.Parameters.AddWithValue("@companyID", loginMenu.CompanyID);
            MySqlDataReader locationrdr = locationscmd.ExecuteReader();
            while (locationrdr.Read())
            {
                cmboLocation.Items.Add(locationrdr.GetString("locationName"));
            }
            locationrdr.Close();
            string os = "SELECT * FROM serverOperatingSystems";
            MySqlCommand oscmd = new MySqlCommand(os, conn);
            MySqlDataReader osrdr = oscmd.ExecuteReader();
            while (osrdr.Read())
            {
                cmboOS.Items.Add(osrdr.GetString("operatingSystemsName"));
            }
            osrdr.Close();
            string port = "SELECT * FROM serverPort";
            MySqlCommand portcmd = new MySqlCommand(port, conn);
            MySqlDataReader portrdr = portcmd.ExecuteReader();
```

```
        while (portrdr.Read())
    {
        cmboNetwork.Items.Add(portrdr.GetString("portSpeed"));
    }
    portrdr.Close();
    conn.Close();
}

private void btnCancel_Click(object sender, EventArgs e)
{
    Hide();
}

private void btnNewServer_Click(object sender, EventArgs e)
{
    MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
    conn.Open();
    MySqlCommand locationcmd = new MySqlCommand("SELECT * FROM serverLocations WHERE locationName = @location", conn);
    locationcmd.Parameters.AddWithValue("@location", cmboLocation.Text);
    MySqlDataReader locationrdr = locationcmd.ExecuteReader();
    locationrdr.Read();
    var location = Convert.ToString(locationrdr[0]);
    locationrdr.Close();
    MySqlCommand oscmd = new MySqlCommand("SELECT * FROM serverOperatingSystems WHERE operatingSystemsName = @os", conn);
    oscmd.Parameters.AddWithValue("@os", cmboOS.Text);
    MySqlDataReader osrdr = oscmd.ExecuteReader();
    osrdr.Read();
    var os = Convert.ToString(osrdr[0]);
    osrdr.Close();
    MySqlCommand networkcmd = new MySqlCommand("SELECT * FROM serverPort WHERE portSpeed = @port", conn);
    networkcmd.Parameters.AddWithValue("@port", cmboNetwork.Text);
    MySqlDataReader networkrdr = networkcmd.ExecuteReader();
    networkrdr.Read();
    var network = Convert.ToString(networkrdr[0]);
    networkrdr.Close();
    MySqlCommand serverCMD = new MySqlCommand("INSERT INTO serverInformation (serverCompany, serverLocation, serverHostname, serverUsername, serverPassword, serverKey, serverOS, serverIP, serverProcessor, serverRAM, serverPort, serverTransfer) VALUES (@serverCompany, @serverLocation, @serverHostname, @serverUsername, @serverPassword, @serverKey, @serverOS, @serverIP, @serverProcessor, @serverRAM, @serverPort, @serverTransfer)", conn);
    serverCMD.Parameters.AddWithValue("@serverCompany", loginMenu.CompanyID);
    serverCMD.Parameters.AddWithValue("@serverLocation", location);
    serverCMD.Parameters.AddWithValue("@serverHostname", txtHostname.Text);
    serverCMD.Parameters.AddWithValue("@serverUsername", txtUsername.Text);
    serverCMD.Parameters.AddWithValue("@serverPassword", txtPassword.Text);
    serverCMD.Parameters.AddWithValue("@serverKey", txtKey.Text);
    serverCMD.Parameters.AddWithValue("@serverOS", os);
    serverCMD.Parameters.AddWithValue("@serverIP", txtIP.Text);
    serverCMD.Parameters.AddWithValue("@serverProcessor", txtProcessor.Text);
```

```
serverCMD.Parameters.AddWithValue("@serverRAM", txtRAM.Text);
serverCMD.Parameters.AddWithValue("@serverPort", network);
serverCMD.Parameters.AddWithValue("@serverTransfer", txtTransfer.Text);
serverCMD.ExecuteNonQuery();
conn.Close();
txtHostname.Text = "";
txtIP.Text = "";
txtKey.Text = "";
txtPassword.Text = "";
txtProcessor.Text = "";
txtRAM.Text = "";
txtServerName.Text = "";
txtTransfer.Text = "";
txtUsername.Text = "";
}
}
}
```

serverControl.cs

```
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
using System.Windows.Forms;
using System.Data.SqlClient;
using MySql.Data.MySqlClient;

namespace ELSM_Project
{
    public partial class serverControl : Form
    {
        public serverControl()
        {
            InitializeComponent();
        }

        private void lblMetallicGloss_Click(object sender, EventArgs e)
        {
            System.Diagnostics.Process.Start("https://www.metallicgloss.com");
        }

        private void btnHome_Click(object sender, EventArgs e)
        {
            Hide();
            mainDashboard Dashboard = new mainDashboard();
            Dashboard.ShowDialog();
        }

        private void btnServerControl_Click(object sender, EventArgs e)
        {
            MessageBox.Show("You're already here!", "Notice", MessageBoxButtons.OK);
        }

        private void btnManageServers_Click(object sender, EventArgs e)
        {
            Hide();
            manageServers manageS = new manageServers();
            manageS.ShowDialog();
        }
    }
}
```

```
private void btnManageLocations_Click(object sender, EventArgs e)
{
    Hide();
    manageLocations manageL = new manageLocations();
    manageL.ShowDialog();
}

private void btnManageAccount_Click(object sender, EventArgs e)
{
    Hide();
    manageAccount Account = new manageAccount();
    Account.ShowDialog();
}

private void btnLogout_Click(object sender, EventArgs e)
{
    if (MessageBox.Show("Are you sure you want to logout?", "Confirmation", MessageBoxButtons.YesNo) != DialogResult.No)
    {
        this.Close();
    }
}

private void serverControl_Load(object sender, EventArgs e)
{
    if ((loginMenu.permControlServers == false) && (loginMenu.permViewLocations == false) && (loginMenu.permViewServers ==
false))
    {
        btnHome.Top += 129;
        btnManageLocations.Visible = false;
        btnManageServers.Visible = false;
        btnServerControl.Visible = false;
    }
    else if ((loginMenu.permControlServers == false) && (loginMenu.permViewLocations == false))
    {
        btnHome.Top += 129;
        btnManageServers.Top += 86;
        btnServerControl.Visible = false;
        btnManageLocations.Visible = false;
    }
    else if ((loginMenu.permControlServers == false) && (loginMenu.permViewServers == false))
    {
        btnHome.Top += 86;
        btnServerControl.Visible = false;
        btnManageServers.Visible = false;
    }
    else if ((loginMenu.permViewServers == false) && (loginMenu.permViewLocations == false))
    {
        btnHome.Top += 86;
    }
}
```

```
        btnServerControl.Top += 86;
        btnManageLocations.Visible = false;
        btnManageServers.Visible = false;
    }
    else if (loginMenu.permControlServers == false)
    {
        btnHome.Top += 43;
        btnServerControl.Visible = false;
    }
    else if (loginMenu.permViewServers == false)
    {
        btnHome.Top += 43;
        btnServerControl.Top += 43;
        btnManageServers.Visible = false;
    }
    else if (loginMenu.permViewLocations == false)
    {
        btnHome.Top += 43;
        btnServerControl.Top += 43;
        btnManageServers.Top += 43;
        btnManageLocations.Visible = false;
    }

    MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
    conn.Open();
    try
    {
        MySqlDataAdapter MyDA = new MySqlDataAdapter();
        MyDA.SelectCommand = new MySqlCommand("SELECT serverID, serverHostname, serverOS, serverIP FROM serverInformation WHERE serverCompany = " + loginMenu.CompanyID + "", conn);
        DataTable table = new DataTable();
        MyDA.Fill(table);
        BindingSource bSource = new BindingSource();
        bSource.DataSource = table;
        dataGridView1.DataSource = bSource;
    }
    catch (MySql.Data.MySqlClient.MySqlException ex)
    {
        MessageBox.Show(ex.Message);
        Close();
    }
}

private void btncreateCommand_Click(object sender, EventArgs e)
{
    serverControlCreate Create = new serverControlCreate();
    Create.ShowDialog();
}
```

```
private void btnEditCommand_Click(object sender, EventArgs e)
{
    serverControlEdit Edit = new serverControlEdit();
    Edit.ShowDialog();
}

private void btnDeleteCommand_Click(object sender, EventArgs e)
{
    serverControlDelete Delete = new serverControlDelete();
    Delete.ShowDialog();
}

private void btnRunCommand_Click(object sender, EventArgs e)
{
    serverControlRunCommand Run = new serverControlRunCommand();
    Run.ShowDialog();
}
}
```

serverControlCreate.cs

```
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
using System.Windows.Forms;
using System.Data.SqlClient;
using MySql.Data.MySqlClient;

namespace ELSM_Project
{
    public partial class serverControlCreate : Form
    {
        public serverControlCreate()
        {
            InitializeComponent();
        }

        public static int loopnum, createloop;

        private void serverControlCreate_Load(object sender, EventArgs e)
        {
            MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
            conn.Open();
            string os = "SELECT * FROM serverOperatingSystems ORDER BY operatingSystemsID";
            MySqlCommand oscmd = new MySqlCommand(os, conn);
            MySqlDataReader osrdr = oscmd.ExecuteReader();
            int height, width, button1x, button1y, button2x, button2y;
            width = 1182;
            height = 206;
            button1x = 36;
            button1y = 111;
            button2x = 579;
            button2y = 111;
            loopnum = 1;

            int boxnum = 0;
            string value;
            pnlConfiguration.Height += 40;
            this.Height += 40;
            while (osrdr.Read())
            {
```

```
        value = Convert.ToString(osrdr[1]);
        height += 20;
        this.Height += 5;
        pnlConfiguration.Height += 20;
        CheckBox box;
        box = new CheckBox();
        box.Name = "chkOS" + Convert.ToString(loopnum);
        box.Text = value;
        box.CheckedChanged += new System.EventHandler(valueChecked);
        box.AutoSize = true;
        box.Location = new Point(10, loopnum * 20);
        pnlConfiguration.Controls.Add(box);
        loopnum += 1;
    }
    int pointX = 235;
    int pointY = 20;
    int loopnum2 = 0;
    for (int i = 0; i < loopnum - 1; i++)
    {
        TextBox a = new TextBox();
        a.Location = new Point(pointX, pointY);
        a.Name = "txtInput" + loopnum2;
        a.Width = 849;
        a.Enabled = false;
        pnlConfiguration.Controls.Add(a);
        pnlConfiguration.Show();
        pointY += 20;
        boxnum += 1;
        loopnum2 += 1;
    }
    osrdr.Close();
    btnNewCommand.Top += loopnum2 * 23;
    btnCancel.Top += loopnum2 * 23;
}

private void btnCancel_Click(object sender, EventArgs e)
{
    Hide();
}

private void valueChecked(object sender, EventArgs e)
{
    string name = ((CheckBox)sender).Name;
    name = name.Replace("chkOS", string.Empty);
    int OSNumber = Convert.ToInt16(name);
    OSNumber -= 1;
    string inputname = "txtInput" + OSNumber;
```

```
var text = this.Controls.Find(inputname, true).FirstOrDefault() as TextBox;

CheckBox chbxName = (CheckBox)sender;
if (chbxName.Checked == true)
{
    text.Enabled = true;
}
else
{
    text.Enabled = false;
    text.Text = "";
}

private void btnNewCommand_Click(object sender, EventArgs e)
{
    MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
    conn.Open();
    createloop = 0;
    while (loopnum != createloop)
    {
        string chkname = "chkOS" + Convert.ToString(createloop);
        string inputname = "txtInput" + Convert.ToString(createloop - 1);
        var os = "";
        var text = this.Controls.Find(inputname, true).FirstOrDefault() as TextBox;
        var checkBox = this.Controls.Find(chkname, true).FirstOrDefault() as CheckBox;
        try
        {
            string checkBoxText = checkBox.Text;
            MySqlCommand oscmd = new MySqlCommand("SELECT * FROM serverOperatingSystems WHERE operatingSystemsName = @os",
conn);
            oscmd.Parameters.AddWithValue("@os", checkBoxText);
            MySqlDataReader osrdr = oscmd.ExecuteReader();
            osrdr.Read();
            os = Convert.ToString(osrdr[0]);
            osrdr.Close();
        }
        catch (Exception exception)
        {

        }

        try
        {
            if (text.Text != "")
            {
                MySqlCommand newCommand = new MySqlCommand("INSERT INTO `serverCommands`(`serverCompany`, `serverOS`,
`commandName`, `serverCommand`) VALUES (@serverCompany, @serverOS, @commandName, @serverCommand)", conn);

```

```
        newCommand.Parameters.AddWithValue("@serverCommand", text.Text);
        newCommand.Parameters.AddWithValue("@commandName", txtCommandName.Text);
        newCommand.Parameters.AddWithValue("@serverOS", os);
        newCommand.Parameters.AddWithValue("@serverCompany", loginMenu.CompanyID);
        newCommand.ExecuteNonQuery();
    }

}
catch (Exception exception)
{
}

createLoop += 1;
}

conn.Close();
Hide();
}
}
}
```

Subsection 3.4.3.ii - Evidence of data output & storage for the prototype

The screenshot shows a web-based application interface. At the top left is a purple logo featuring a stylized lock with a gear-like swirl around it. To its right, the text "Encrypted Laser Server Management" is displayed. On the far left, a vertical sidebar contains links: "Home", "Manage Users", "Manage Servers" (which is the active link, indicated by a grey background), "Manage Locations", "Manage Account", and "Logout". Below the sidebar, a note reads "Originally developed by William Phillips. MetallicGloss.com". The main content area has a blue header bar with the title "Manage Servers". Below the header is a table with four columns: "serverID", "serverHostname", "serverOS", and "serverIP". Underneath the table are three buttons: "Create Server", "Edit Server", and "Delete Server". At the bottom of the main content area are two more buttons: "Control Servers" and "Backup Centre".

Explanation:

The image above shows a cleared form with no servers saved in the data.

Create Server

Hostname:	testing.elhs.co
Location:	Bristol, United Kingdom
Username:	Testing
Password:	*****
Operating System:	CentOS 7.0
Server IP Address:	127.0.0.1
Server Processor	Intel i7 8700k
RAM:	64GB
Network Port:	10Gbps
Transfer:	10TB

Explanation:

The screencapture above displays the process of inserting a server into the database and system, the data entered will be copied across correctly.

The screenshot shows a web-based application titled "Manage Servers". On the left, there is a sidebar with a purple lock icon and the text "Encrypted Laser Server Management". The main content area has a purple header with the title "Manage Servers". Below the header is a table with four columns: "serverID", "serverHostname", "serverOS", and "serverIP". A single row is visible, containing the values 1, testing.elhs.co, 12, and 127.0.0.1 respectively. At the bottom of the page, there are several navigation links: Home, Manage Users, Manage Servers, Manage Locations, Manage Account, Logout, Create Server, Edit Server, Delete Server, Control Servers, and Backup Centre. A footer note at the bottom left states "Originally developed by William Phillips, MetallicGloss.com".

serverID	serverHostname	serverOS	serverIP
1	testing.elhs.co	12	127.0.0.1

Explanation:

The screenshot above displays the server with the information entered in the previous screenshot which confirms that it is loading correctly and is actively inserting/pulling from the database.

The screenshot shows the phpMyAdmin interface for a MySQL database named 'metallic_test'. The current table is 'serverInformation'. The top navigation bar includes links for Browse, Structure, SQL, Search, Insert, Export, Import, Operations, and Triggers. A message at the top indicates 'Showing rows 0 - 0 (1 total, Query took 0.0001 seconds.)'.

The SQL query displayed is:

```
SELECT * FROM `serverInformation`
```

Below the query are several action buttons: Profiling, Edit inline, Edit, Explain SQL, Create PHP code, and Refresh.

The main content area displays the table structure and a single row of data:

	serverID	serverCompany	serverLocation	serverHostname	serverUsername	serverPassword	serverOS	serverIP	serverProcessor	serverRAM	serverPort	serverTrait
<input type="checkbox"/>	1	1	1	testing.elhs.co	Testing	Testing	12	127.0.0.1	Intel i7 8700k	64GB	5	10TB

Action buttons for this row include Edit, Copy, Delete, and Export. Below the table are additional 'Show all' and 'Number of rows' filters, and a search bar.

A 'Query results operations' panel at the bottom contains buttons for Print, Copy to clipboard, Export, Display chart, and Create view.

A 'Console' tab is visible at the bottom left.

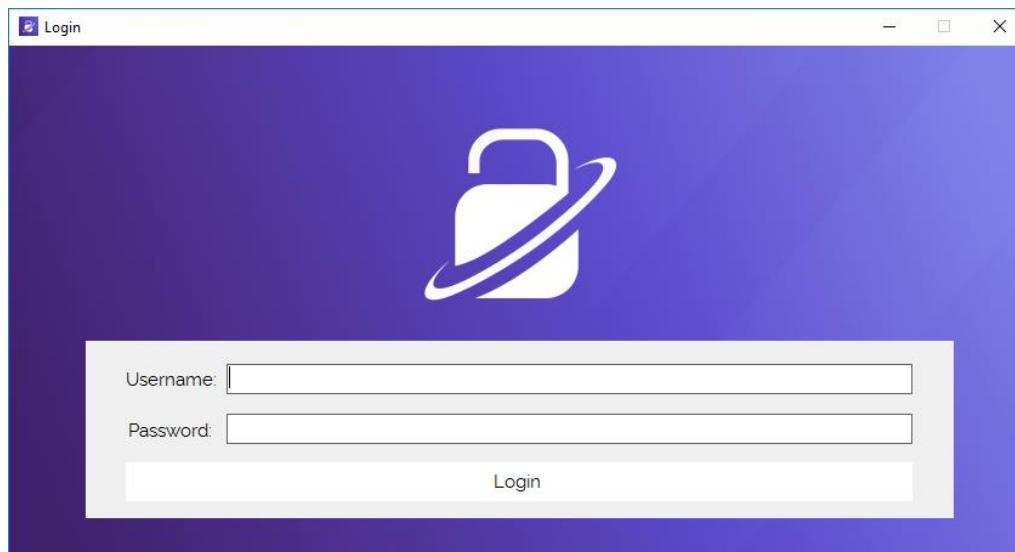
Explanation:

The screenshot above displays the data inputted into the system being stored correctly so that it can be used in when performing SSH processes.

Section 3.4.4 - Prototype Evaluation

The prototype in its entirety is a massive success and performs every action that I set out to complete. Each form displays the correct design that is clean and that matches the designs originally created. This allows the system to be able to be user friendly even in its alpha stage. It lets the user easily navigate the program and fine the features that they need to use. The purple and white theme when converted into a program works well with the contrast between the background and the content being fantastic and making text very easy to read, improving the user experience while following the company's colour scheme.

Login System



The login system present within the prototype is working well allowing the password used to be hashed with SHA512, with the hope to be able to also throw in a salt within a later build to assist with the security of the software. I've decided to use a hash rather than encryption because encryption is two ways, passwords to login to the user account doesn't need to be two-way. There is error trapping which allow for a popup message to occur letting the user know that the password didn't match, or the username wasn't found. I hope in a future version to also add validation into the program to allow it to be

able to determine if the fields are blank. It is developed so that all the global variables needed globally are located on this form to keep it centralised.

I do not feel the form itself needs any changes, other than to adjust it to store additional global variables and to also make the password a little more secure which would just combine a salt with the password before getting hashed.

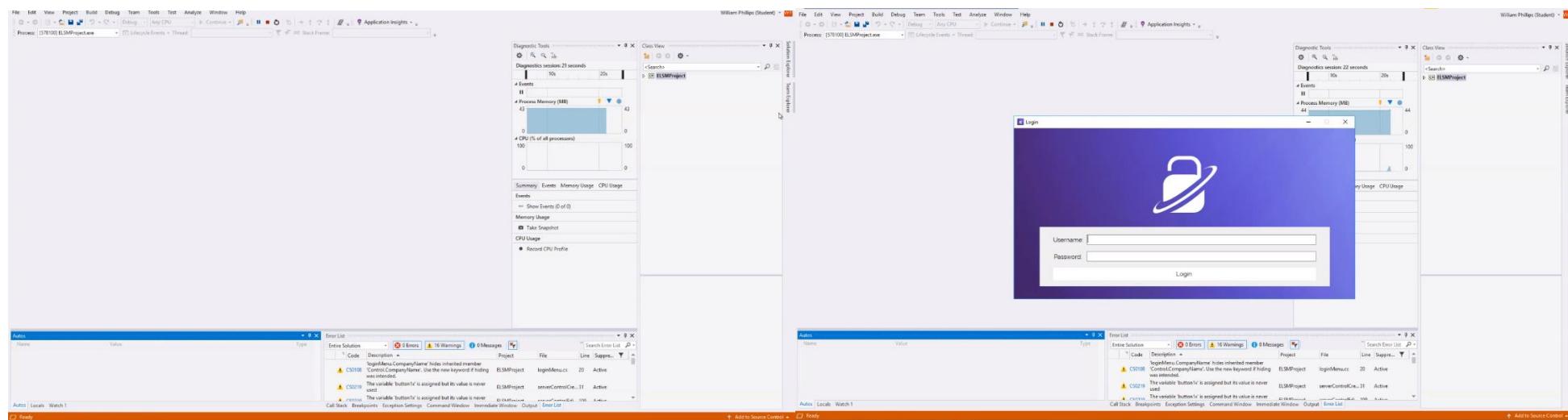
Server Management

The screenshot shows a web-based application titled "Server Control". On the left, there's a sidebar with a logo of a lock and the text "Encrypted Laser Server Management". The main area has a purple header with the title "Server Control". Below the header is a table with four columns: "serverID", "serverHostname", "serverOS", and "serverIP". There are two rows of data: Row 1 has values 1, elhs.co, 12, and elhs.co; Row 2 has values 2, 144.2, 53, and 144.2. At the bottom of the main area, there are several buttons: "Create Command", "Edit Command", "Delete Command", "Run Command", and "Server Status". The sidebar also contains links for "Home", "Server Control", "Manage Servers", "Manage Locations", "Manage Account", and "Logout". At the very bottom of the sidebar, there's a small note: "Originally developed by William Phillips MetalicGloss.com".

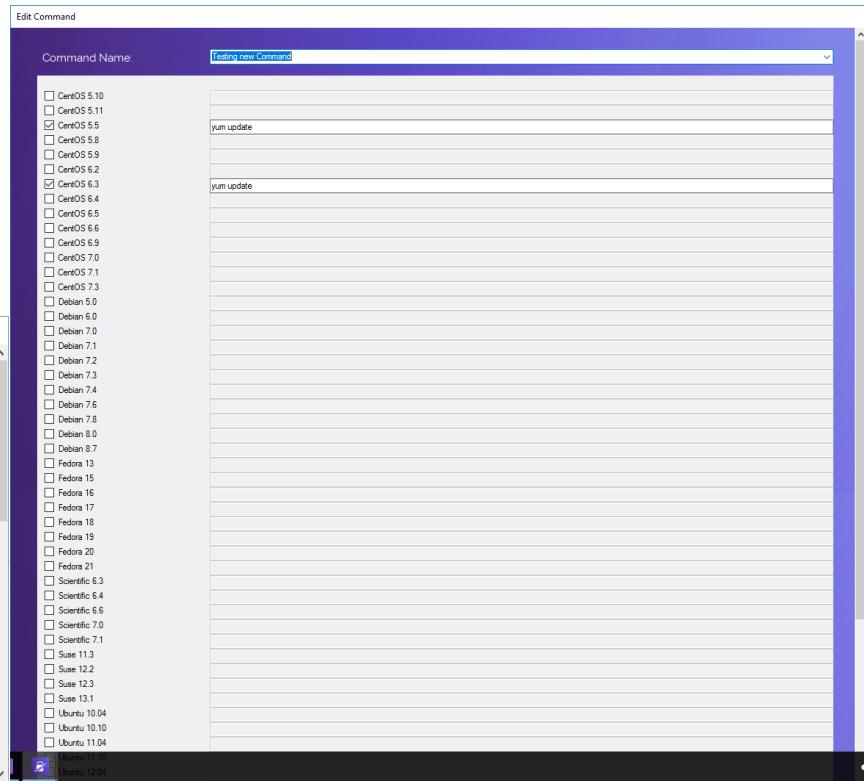
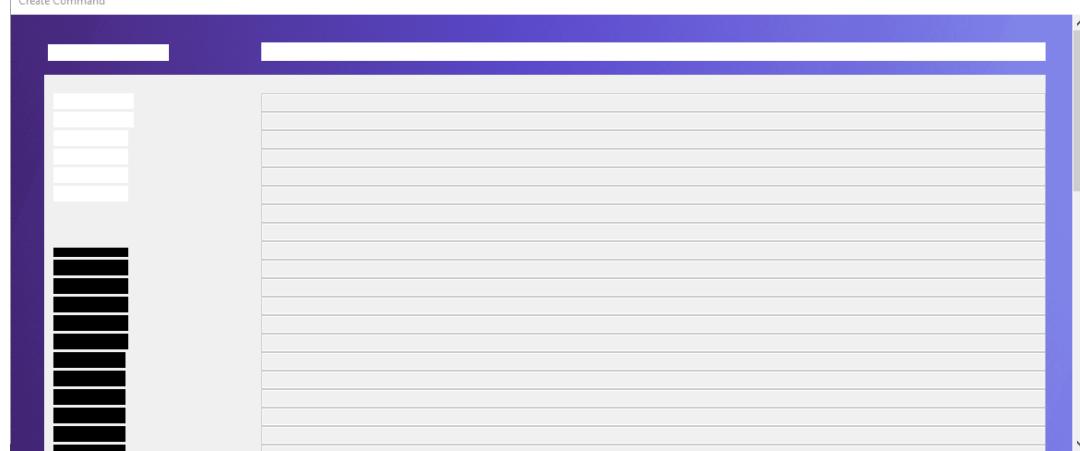
The server management section of the prototype was a success, being very simple while also being fully functional with an automatic refresh after editing the data so that the information displayed to the user is correct. This form is easy to use and designed cleanly. Validation will need to be applied to the forms to ensure that incorrect data is not inserted into the program, but data is correctly formatted and stored in the database.

I don't feel this window needs any changes as it is simplistic and has all of the functions easily accessible for the user to then proceed to perform the action they require.

Section 3.4.5 - Improvements to the prototype system



The first major improvement that needs to be performed is the start-up time. Querying a third-party service to get the IP address that was being used to login required the program to take up to 20 seconds to start-up. This lead to the program taking a long time to boot up or on occasions not boot up at all and to just output an error stating it had timed out. This is not desirable. One method to bypass this would be to host the IP grab on one of the servers managed by Encrypted Laser, allowing for the software to connect without waiting in a queue for the third-party service or taking a long time to connect when it is under heavy load.



The command creation and editing window will need to be improved and corrected. Both windows can take up to 10 seconds to load and generate due to the look that is being run which causes the form to look very broken while being generated. When it finally loads, it extends off the page so that you cannot access the bottom of it to be able to cancel or continue. One method to correct this would be adjusting the group box and setting it to a fixed size so that the scroll element is of the box, not the window.

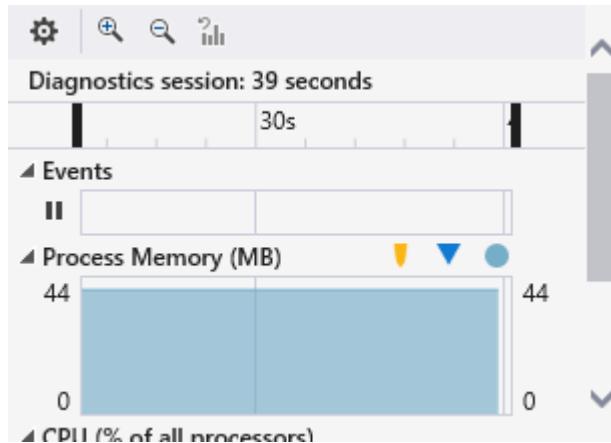
Chapter CS3.5 - POST-PROTOTYPE REFINEMENT OF DESIGN (5 MARKS)

Section 3.5.1 - Feedback and its implications

I was provided detailed and complete feedback from my subject lecturer regarding my program and its operations. For my feedback, they will be my third party to provide me with both positive and negative feedback that I can take into consideration when finalising the program in the software development phase. All feedback from users is critical to making a successful, usable program, as the users that will interact with a new system will be the ones it must work for. This means that any negative feedback will enable me to design my program and improve upon its weakest areas so that it will become a system that can be used by all users regardless of their competency regarding software and computer programs. I have taken all feedback on board and developed on them so that the final software can be as complete as possible.

Conan, my subject lecturer, was pleased with the progress I had made with the development of the program. He touched upon the fact that the interface I had designed and focused on was very strong and was incredibly user-friendly. It was created with a consideration of the user requirements and conveyed a professional design that stayed true to the theme and branding that the company used. At the point of the review, the visual aspects of most of the program had been completed to a very high standard so that after receiving small feedback changes can be implemented without the requirement to then focus on actually creating a design. Taking into consideration all aspects of the program, it implies that the program has been very well thought out and has had a lot of elements taken into account when creating the program. Because of this, the design of the program will not be tweaked very much.

Conan liked the style of the design that was used in the program, and that the contrast of colours worked well. There were, however, a few recommendations that were made to improve further the way that the program operated and functioned that would be massively beneficial for the user when they are interacting with the program.

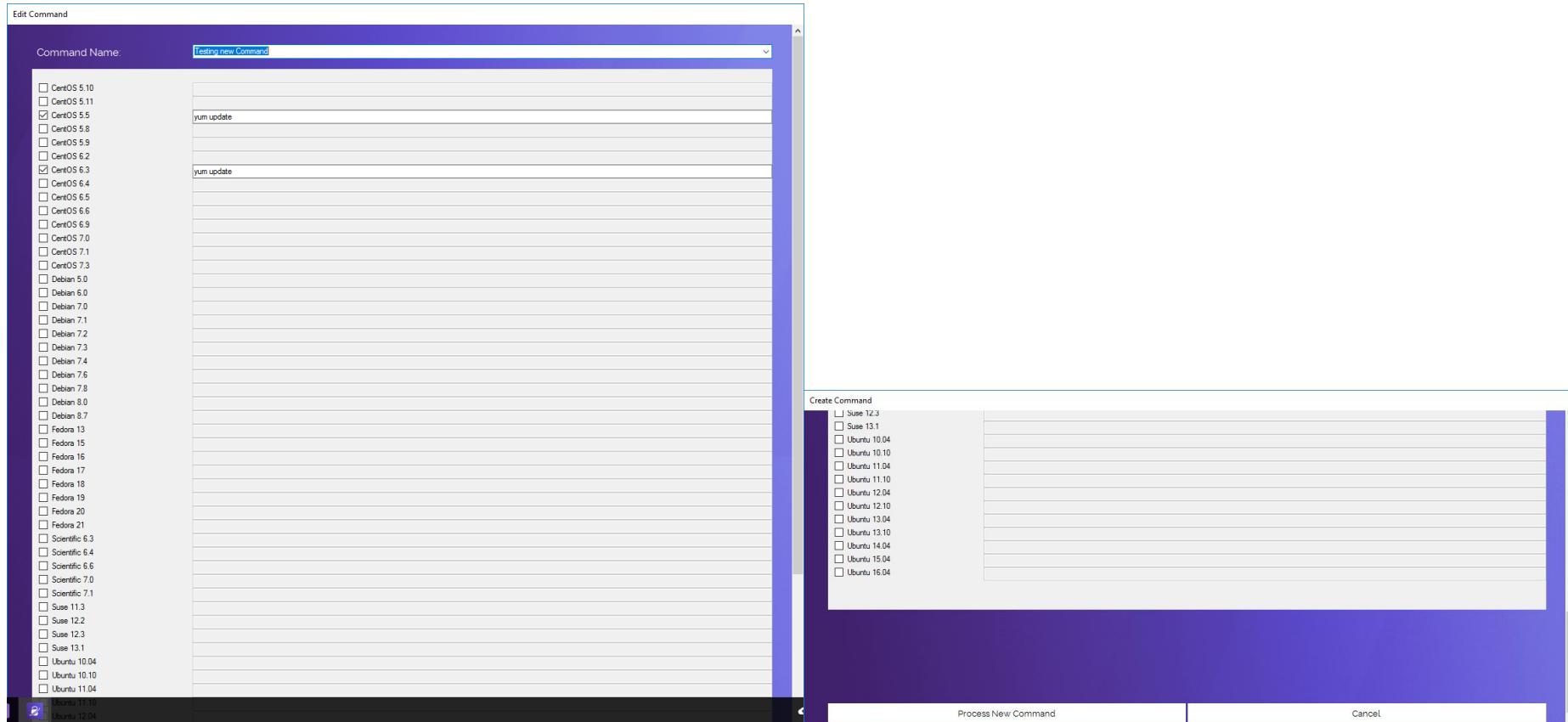


The first recommendation was to reduce the slowness of the program opening and the processing of commands. This was caused due to the IP grab when initially opening the program taking upwards of 10 seconds to open the program and to then display the login form. This problem was present throughout the development phase and was caused by the website that was used to get the IP address of the user. It was a third party application that rate-limited connections meaning when the service was at full capacity the connection were delayed.

```
string externalIP;
externalIP = (new WebClient()).DownloadString("http://checkip.dyndns.org/");
externalIP = (new Regex(@"\d{1,3}\.\d{1,3}\.\d{1,3}\.\d{1,3}")).Matches(externalIP)[0].ToString();
loginMenu.IPAddress = externalIP;
```

To combat this problem, I whipped up a web server with a PHP script that would echo the IP of the user accessing the page so that the program can get the value from the site that the company can host rather than depending on an unreliable third-party site.

Conan liked the idea that the program was entirely remote, connecting and interacting with a MySQL database that is hosted on a web server, allowing for any member of staff to be able to access the central system and to be able to access the updated information to be able to work instantly. One recommendation when working with MySQL was to attempt to optimise the number of new MySQL connections that were made to the web server. This would result with me having to adjust how it interacted with the server allowing for new SQL commands to be able to be executed without already closing the connection, leading with the connection having to be re-opened.



Another aspect of the program that Conan touched on upon the dynamic element creation for the command creation and editing. He loved the idea that it was dynamically generated dependant on the operating systems within the database. This would allow the company to be able to display the operating systems that they use, or to leave the option for them to be able to work with all different operating systems. The existing problem was that because there were too many elements contained within the database, the window would extend off the screen due to the loop that was repeating and increasing the window size recurring too many times. The suggestion offered was to adjust the circuit to be able to alter the design so that it didn't extend off the page and instead had a scroll bar on the elements rather than the window form.

Create Server

Server Name:	<input type="text"/>
Location:	Bristol, United Kingdom
Hostname:	<input type="text"/>
Username:	<input type="text"/> 
Password:	<input type="text"/>
Key:	<input type="text"/>
Operating System:	CentOS 6.9
Server IP Address:	<input type="text"/>
Server Processor	<input type="text"/>
RAM:	<input type="text"/>
Network Port:	<input type="text"/>
Transfer:	<input type="text"/>
<input type="button" value="Process New Server"/> <input type="button" value="Cancel"/>	

The screenshot above shows another area that Conan touched upon. He liked the simplicity of the program to created new servers and new commands but commented about the cursor setting that was configured for a few elements of the window that displayed the field as being unable to be edited. This wasn't the case, so some tweaks would need to be performed.

Section 3.5.2 - Detailed re-design evidence

Subsection 3.5.2.i - Changes to program

The first primary change to the program will be the updating of the boot problem. This is achievable by moving the link to one hosted on a web server managed by myself or the company that is not rate limited and is fully under the control of someone connected to the project. A third-party application is not needed for this simple task and can be replaced simply. I completed this change to the program's core design so that it would be able to run quicker, and by performing the changes brought the program's start time to just under 2 seconds rather than the 20+ that it was taking before.

The code that will be uploaded to the web server is PHP code, consisting of just:

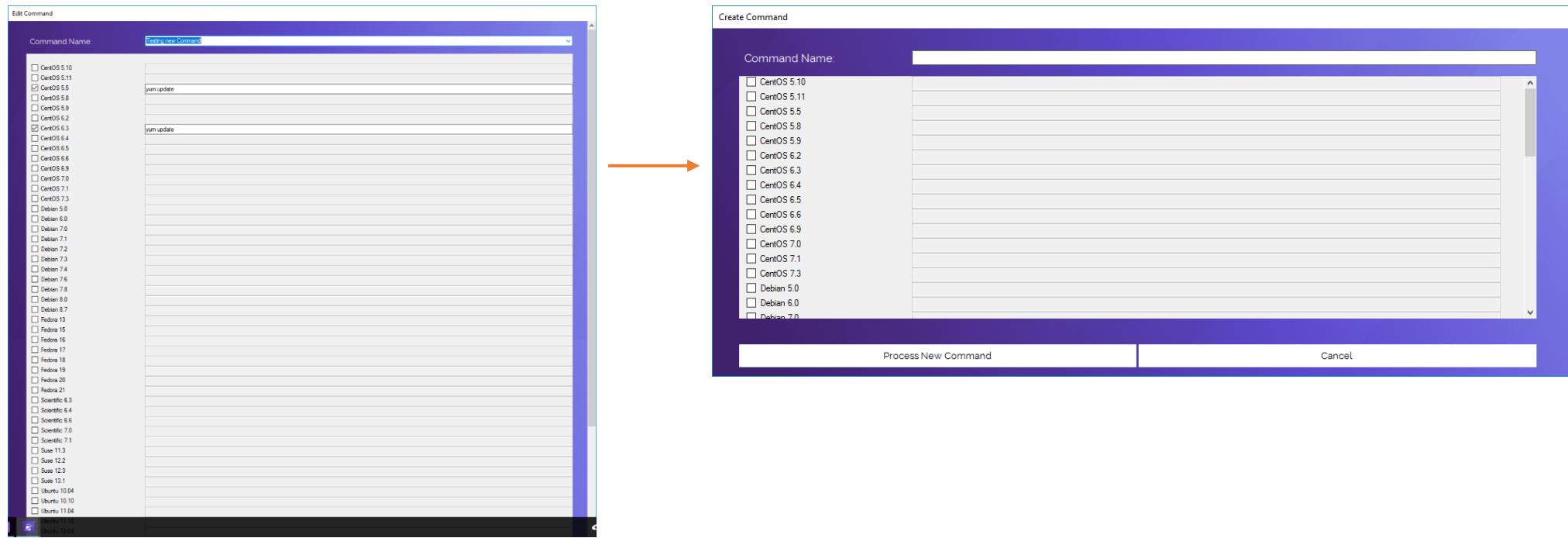
```
<?
```

```
echo $_SERVER["REMOTE_ADDR"];
```

```
?>
```

This means that the code within the program gets updated to:

```
//Get IP address of computer being used to access the program.  
externalIP = (new Regex(@"\d{1,3}\.\d{1,3}\.\d{1,3}\.\d{1,3}")).Matches((new  
WebClient()).DownloadString("http://www.metallicgloss.com/functions/ip.php"))[0].ToString();  
loginMenu.IPAddress = externalIP;
```



The design for the command create and edit windows has been corrected so that it now only displays the form in a fixed size with all additional operating systems forming within a scrollable group box. This allows the user to be able to quickly access the cancel command without having to move the form up from behind the taskbar and then scroll to be able to reach it. The design change also allowed the form to load significantly faster with less visual lag as the code attempted to render the boxes, as they're done off-screen in the group box.

Create Server

Hostname:	<input type="text"/>
Location:	<input type="text"/>
Username:	<input type="text"/>
Password:	<input type="text"/>
Operating System:	<input type="text"/>
Server IP Address:	<input type="text"/>
Server Processor	<input type="text"/>
RAM:	<input type="text"/>
Network Port:	<input type="text"/>
Transfer:	<input type="text"/>

The small mis-set text fields around the program have been corrected so that they no longer show the “No” cursor symbol that appeared when being hovered over. This has been replaced with a standard text icon.

Since the design was a massive factor for the prototype, there aren’t any other adjustments that need to be made as they followed the initial designs and were corrected along the way to improve usability. This means that there are not that many changes that are required.

Chapter CS3.6 - SOFTWARE DEVELOPMENT (25 MARKS)

Section 3.6.1 - Normalised data model (include the database data dictionary)

BACKUPNODEINFORMATION (**backupNodeID**, **backupNodeCompany**, backupNodeLocation, backupNodeHostname, backupNodeUsername, backupNodePassword, **backupNodeOS**, backupNodeIP, backupNodeProcessor, backupNodeRAM, **backupNodePort**, backupNodeTransfer, backupNodeBackupPath)
FAILEDLOGINATTEMPS (**attemptID**, attemptUsername, attemptIP, attemptTimeStamp, attemptTries)
SERVERCOMMANDS (**serverCommandID**, serverCompany, serverOS, commandName, serverCommand)
SERVERINFORMATION (**serverID**, **serverCompany**, **serverLocation**, serverHostname, serverUsername, serverPassword, **serverOS**, serverIP, serverProcessor, serverRAM, **serverPort**, serverTransfer)
SERVERLOCATIONS (**locationID**, **companyID**, locationName, locationLongitude, locationLatitude)
SERVEROPERATINGSYSTEMS (**operatingSystemsID**, operatingSystemsName)
SERVERPORT (**portID**, portSpeed)
SYSTEMREPLIES (**replyID**, **ticketID**, **userID**, replyContent)
SYSTEMTICKETS (**ticketID**, **userCompanyID**, ticketUpdated, **ticketCustomer**, ticketRegarding, ticketSubject)
USERACCOUNTS (**userID**, userLogin, userPassword, userForename, userSurname, userEmailAddress, userImage, userCompany, userRole, userIPAddress, userLastLogin)
USERCOMPANIES (**companyId**, **ownerID**, companyName, companyDateCreated)
USERPERMISSIONS (**permID**, permRole, permDateModified, permChangePassword, permChangeUsername, permChangeEmail, permViewServers, permEditServers, permDeleteServers, permViewLocations, permEditLocations, permDeleteLocations, permCreateTicket, permAdminTicketView, permCloseTicket, permAddAction, permEditAction, permDeleteAction, permRunCustomAction, permAdminViewUsers, permAdminEditUserInfo),

permAdminForcePassReset, permAdminAddUser, permAdminDelUser, permAdminChangePermissions,
permControlServers, permManageBackupSystem, permCreateLocation, permCreateServer)

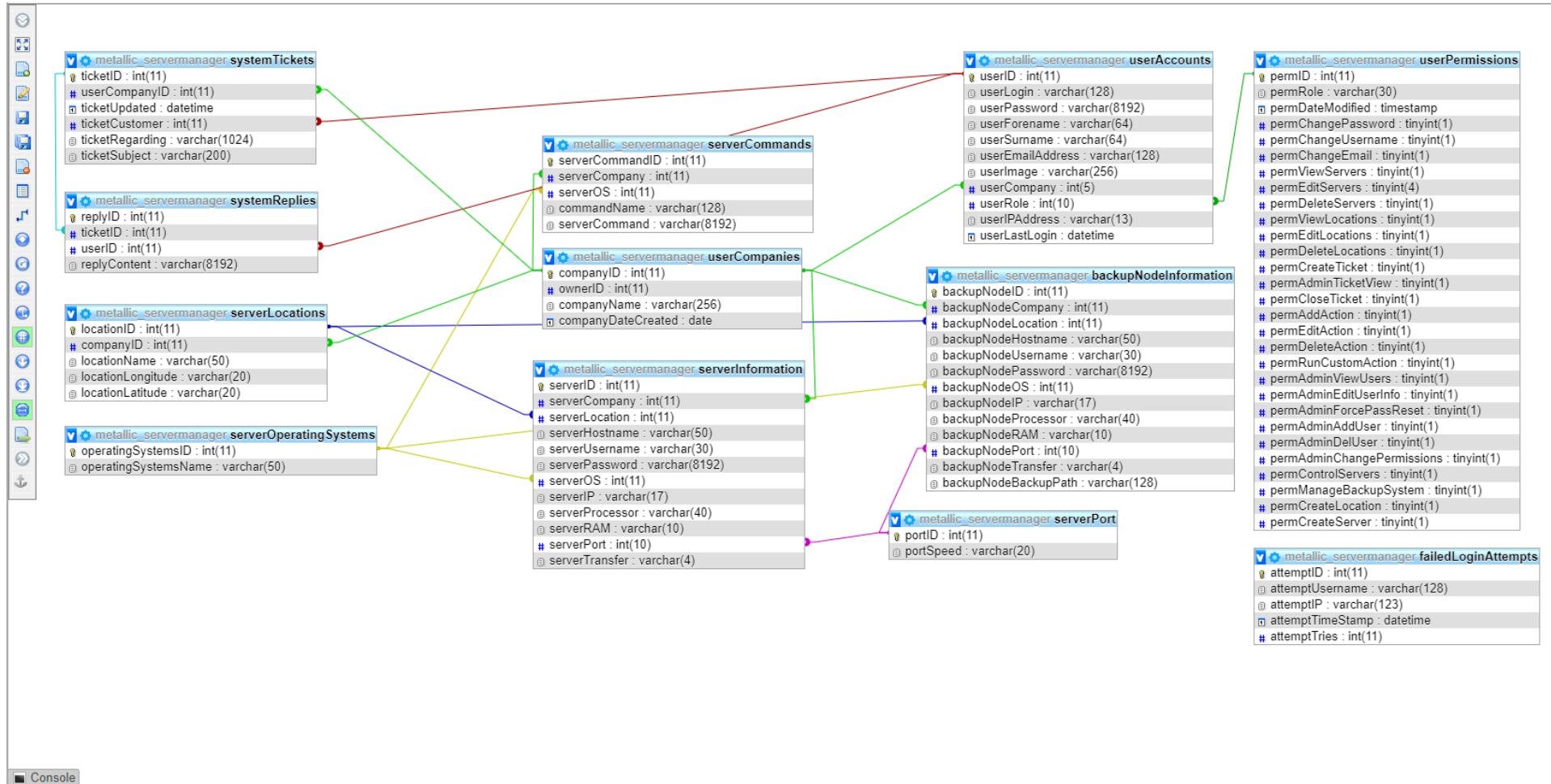
KEY

Bold & Underline - Primary Key

Bold - Foreign Key

No Formatting - Standard Field

Relationships



phpMyAdmin Data Dictionary

backupNodeInformation

Column	Type	Null	Default
backupNodeID <i>(Primary)</i>	int(11)	No	
backupNodeCompany	int(11)	No	
backupNodeLocation	int(11)	No	
backupNodeHostname	varchar(50)	No	
backupNodeUsername	varchar(30)	No	
backupNodePassword	varchar(8192)	No	
backupNodeOS	int(11)	No	
backupNodeIP	varchar(17)	No	
backupNodeProcessor	varchar(40)	No	
backupNodeRAM	varchar(10)	No	
backupNodePort	int(10)	No	
backupNodeTransfer	varchar(4)	No	
backupNodeBackupPath	varchar(128)	No	

Indexes

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	backupNodeID	0	A	No	
backupNodeCompany	BTREE	No	No	backupNodeCompany	0	A	No	
backupNodeLocation	BTREE	No	No	backupNodeLocation	0	A	No	
backupNodeOS	BTREE	No	No	backupNodeOS	0	A	No	
backupNodePort	BTREE	No	No	backupNodePort	0	A	No	

failedLoginAttempts

Column	Type	Null	Default
attemptID (<i>Primary</i>)	int(11)	No	
attemptUsername	varchar(128)	No	
attemptIP	varchar(123)	No	
attemptTimeStamp	datetime	No	
attemptTries	int(11)	No	

Indexes

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	attemptID	0	A	No	

serverCommands

Column	Type	Null	Default
serverCommandID (<i>Primary</i>)	int(11)	No	
serverCompany	int(11)	No	
serverOS	int(11)	No	
commandName	varchar(128)	No	
serverCommand	varchar(8192)	No	

Indexes

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	serverCommandID	0	A	No	
serverCompany	BTREE	No	No	serverCompany	0	A	No	
serverOS	BTREE	No	No	serverOS	0	A	No	

serverInformation

Column	Type	Null	Default
serverID (Primary)	int(11)	No	
serverCompany	int(11)	No	
serverLocation	int(11)	No	
serverHostname	varchar(50)	No	
serverUsername	varchar(30)	No	
serverPassword	varchar(8192)	No	
serverOS	int(11)	No	
serverIP	varchar(17)	No	
serverProcessor	varchar(40)	No	
serverRAM	varchar(10)	No	
serverPort	int(10)	No	
serverTransfer	varchar(4)	No	

Indexes

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	serverID	0	A	No	
serverLocation	BTREE	No	No	serverLocation	0	A	No	
serverOS	BTREE	No	No	serverOS	0	A	No	
serverCompanyOwner	BTREE	No	No	serverCompany	0	A	No	

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
serverPort	BTREE	No	No	serverPort	0	A	No	

serverLocations

Column	Type	Null	Default
locationID (<i>Primary</i>)	int(11)	No	
companyID	int(11)	No	
locationName	varchar(50)	No	
locationLongitude	varchar(20)	No	
locationLatitude	varchar(20)	No	

Indexes

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	locationID	0	A	No	
companyID	BTREE	No	No	companyID	0	A	No	
locationName	BTREE	No	No	locationName	0	A	No	

serverOperatingSystems

Column	Type	Null	Default
operatingSystemsID (<i>Primary</i>)	int(11)	No	
operatingSystemsName	varchar(50)	No	

Indexes

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	operatingSystemsID	53	A	No	
operatingSystemsName	BTREE	No	No	operatingSystemsName	53	A	No	

serverPort

Column	Type	Null	Default
portID (<i>Primary</i>)	int(11)	No	
portSpeed	varchar(20)	No	

Indexes

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	portID	6	A	No	
portSpeed	BTREE	No	No	portSpeed	6	A	No	

systemReplies

Column	Type	Null	Default
replyID (<i>Primary</i>)	int(11)	No	
ticketID	int(11)	No	
userID	int(11)	No	
replyContent	varchar(8192)	No	

Indexes

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	replyID	0	A	No	
ticketID	BTREE	No	No	ticketID	0	A	No	
userID	BTREE	No	No	userID	0	A	No	

systemTickets

Column	Type	Null	Default
ticketID (<i>Primary</i>)	int(11)	No	
userCompanyID	int(11)	No	
ticketUpdated	datetime	No	
ticketCustomer	int(11)	No	
ticketRegarding	varchar(1024)	No	
ticketSubject	varchar(200)	No	

Indexes

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	ticketID	0	A	No	
userCompanyID	BTREE	No	No	userCompanyID	0	A	No	
ticketCustomer	BTREE	No	No	ticketCustomer	0	A	No	

userAccounts

Column	Type	Null	Default
userID (<i>Primary</i>)	int(11)	No	
userLogin	varchar(128)	No	
userPassword	varchar(8192)	No	
userForename	varchar(64)	No	
userSurname	varchar(64)	No	
userEmailAddress	varchar(128)	No	
userImage	varchar(256)	No	
userCompany	int(5)	No	
userRole	int(10)	No	
userIPAddress	varchar(13)	No	
userLastLogin	datetime	No	

Indexes

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	userID	0	A	No	
userRole	BTREE	No	No	userRole	0	A	No	

userCompanies

Column	Type	Null	Default
companyID (<i>Primary</i>)	int(11)	No	
ownerID	int(11)	No	
companyName	varchar(256)	No	
companyDateCreated	date	No	

Indexes

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	companyID	0	A	No	

userPermissions

Column	Type	Null	Default
permID (Primary)	int(11)	No	
permRole	varchar(30)	No	
permDateModified	timestamp	No	CURRENT_TIMESTAMP
permChangePassword	tinyint(1)	No	
permChangeUsername	tinyint(1)	No	
permChangeEmail	tinyint(1)	No	
permViewServers	tinyint(1)	No	
permEditServers	tinyint(4)	No	
permDeleteServers	tinyint(1)	No	
permViewLocations	tinyint(1)	No	
permEditLocations	tinyint(1)	No	
permDeleteLocations	tinyint(1)	No	
permCreateTicket	tinyint(1)	No	
permAdminTicketView	tinyint(1)	No	
permCloseTicket	tinyint(1)	No	
permAddAction	tinyint(1)	No	
permEditAction	tinyint(1)	No	
permDeleteAction	tinyint(1)	No	
permRunCustomAction	tinyint(1)	No	

permAdminViewUsers	tinyint(1)	No	
permAdminEditUserInfo	tinyint(1)	No	
permAdminForcePassReset	tinyint(1)	No	
permAdminAddUser	tinyint(1)	No	
permAdminDelUser	tinyint(1)	No	
permAdminChangePermissions	tinyint(1)	No	
permControlServers	tinyint(1)	No	
permManageBackupSystem	tinyint(1)	No	
permCreateLocation	tinyint(1)	No	
permCreateServer	tinyint(1)	No	

Indexes

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	permID	1	A	No	

Section 3.6.2 - List of variables and description of data structures used

Variable Name	Global/Local	Unit Declared	Data Type	Description	Forms Used In
a	Local	ticketReply	Label	Used to store the dynamic element that is a label.	-
accountCMD	Local	loginMenu	MySqlCommand	Used to store MySQL command to update user details.	-
activeLoop	Local	backupRunProcess	Int	Used to store the active loop number.	-
addr	Local	accountEmail	MailAddress Var	Used to store a formatted email address.a	-
backupIP	Local	backupRunProcess	String	Used to store the IP of the backup node.	-
backupNodeInfoUpdateCMD	Local	backupNodeEdit	MySqlCommand	Used to update the backup node with a command using user input.	-
backupNodeLocation	Local	backupNodeEdit	String	Used to store the location of the backup node from the database	-
backupNodeLocationCMD	Local	backupNodeEdit	MySqlCommand	Used to select the name of the location that the backup node is assigned.	-
backupNodeLocationRDR	Local	backupNodeEdit	MySqlDataReader	Used to store the output of the location name to where the backup node is assigned.	-
backupNodeNetworkPortCMD	Local	backupNodeEdit	MySqlCommand	Used to select all network port speeds from the database.	-
backupNodeNetworkPortRDR	Local	backupNodeEdit	MySqlDataReader	Used to store the output for all the	-

				network speeds in the database.	
backupNodeOS	Local	backupNodeEdit	String	Used to store the operating system of the backup node from the database.	-
backupNodeOSCMD	Local	backupNodeEdit	MySqlCommand	Used to select all operating systems available in the database.	-
backupNodeOSRDR	Local	backupNodeEdit	MySqlDataReader	Used to store the output of the operating systems in the database.	-
backupNodePort	Local	backupNodeEdit	String	Used to store the network port of the backup node from the database.	-
backupPassword	Local	backupRunProcess	String	Used to store the password of the backup node.	-
backupPath	Local	backupRunProcess	String	Used to store the directory on the backup node to place backups.	-
backupUsername	Local	backupRunProcess	String	Used to store the username of the backup node.	-
box	Local	ticketReply	Label	Used to store the dynamic element that is a label.	-
boxnum	Local	controlCommandEdit, controlCommandCreate	Int	Used to store the box number for the programs operation.	-
bSource	Local	ticketView	BindingSource	Used to target data in a table.	-
bytes	Local	loginMenu	Byte	Used in the generation of an SHA512 hash.	-

checkBox	Local	controlCommandEdit, controlCommandCreate	Control	Used to convert the temp inputbox name to a control element.	-
checkBoxText	Local	controlCommandEdit, controlCommandCreate	String	Used to store the text of the checkbox.	-
checkBoxText	Local	backupRunProcess	String	Used to store the checkbox text.	-
checkpointReached	Global	loginMenu	Boolean	Used to store a Boolean value for a temp value if a checkpoint has been reached.	-
chkBoxName	Local	backupRunProcess	String	Used to store the check box name.	-
chkname	Local	controlCommandEdit, controlCommandCreate	String	Used to store the temporary name used for the checkbox.	-
cmd	Local	locationEdit, loginMenu	MySqlCommand	Used to store MySQL command to select all locations.	-
command	Local	accountSurname, accountUsername, accountEmail. accountForename, accountPassword	MySqlCommand	Used to store MySQL command to update user details.	-
commandData	Local	backupRunProcess	String	Used to store the command that gets executed.	-
commandOSID	Local	controlCommandEdit, backupRunProcess	String Array	Used to store values throughout the dynamic item creation process.	-
commandText	Local	controlCommandEdit, backupRunProcess	String Array	Used to store values throughout the dynamic item creation process.	-
companyCMD	Local	loginMenu	MySqlCommand	Used to store MySQL command to select a company row.	-

CompanyId	Global	loginMenu	String	Used to store the ID of the company the user works for.	-
CompanyName	Global	loginMenu	String	Used to store the name of the company the user works for.	mainDashboard
conn	Local	ticketView, locationEdit, accountSurname, accountUsername, accountEmail, accountForename, accountPassword, backupNodeList, locationCreate, locationDelete, locationManagement, controlCommandEdit, controlCommandCreate	MySqlConnection	Used to allow MySQL connection.	-
connectionMySQL	Local	userDelete, userCreate, setupCompanyCreate, loginMenu, userEdit, backupNodeCreate, backupNodeDelete, serverCreate, serverDelete, setupUserCreate, ticketReply, serverEdit, backupNodeEdit	MySqlConnection	Used to allow MySQL connection.	-
ConnectionString	Global	loginMenu	String	Used to store the string value for MySQL to connect to the database.	-
createAdmin	Local	setupUserCreate	MySqlCommand	Used to insert new user into MySQL table.	-
createCompany	Local	setupCompanyCreate	MySqlCommand	Used to store MySQL command to insert value into userCompanies.	-

createloop	Local	controlCommandEdit, controlCommandCreate	Int	Used to store the loopnum for the programs operation.	-
DATABASE	Local	loginMenu	String	Used to store a value from the setup.xml file that is the database name.	-
deleteServerCMD	Local	backupNodeDelete, serverDelete	MySqlCommand	Used to delete row from MySQL table.	-
deleteUserCMD	Local	userDelete	MySqlCommand	Used to store MySQL command to delete user.	-
EmailAddress	Global	loginMenu	String	Used to store the email address of the user.	-
EmailPass	Global	setupEmailConfiguration	String	Used to store the password of the email account.	-
EmailUsername	Global	setupEmailConfiguration	String	Used to store the username of the email account.	-
externalIP	Global	loginMenu	String	Used to store the IP of the user temporarily.	-
failedCMD	Local	loginMenu	MySqlCommand	Used to store MySQL command to insert value to failed login.	-
finished	Local	controlCommandEdit	Bool	Used to store boolean flags for use throughout the program.	-
firstrun	Local	controlCommandEdit	Bool	Used to store boolean flags for use throughout the program.	-
Forename	Global	loginMenu	String	Used to store the forename of the user.	accountForename
forename	Local	ticketReply	String	Used to store the forename of the user replying.	-

fromEmail	Local	setupUserCreate	String	Used to store the email entered into the form.	-
hash	Local	loginMenu	Byte	Used in the generation of an SHA512 hash.	-
Height	Local	controlCommandCreate	Int	Used to store the height value of items.	-
i	Local	controlCommandCreate	Int	Used to store a count value.	-
inputname	Local	controlCommandEdit, controlCommandCreate	String	Used to store the temporary name used for the input box.	-
IP	Local	loginMenu, backupRunProcess	String	Used to store a value from the setup.xml file that is used for the IP to connect to the database.	
IPAddress	Global	loginMenu	String	Used to store the IP address of the user.	mainDashboard
Location	Local	serverCreate	String	Used to store the value of the location selected.	-
location	Local	backupRunProcess	String	Used to store the location value.	-
location	Local	backupNodeEdit, serverEdit	String	Used to store the location selected.	-
locationCMD	Local	locationEdit, backupNodeCreate, locationCreate, locationDelete	MySqlCommand	MySQL command for locations.	-
locationName	Local	locationEdit	String	Used to store the value selected in the combobox.	-
locationsCMD	Local	backupNodeCreate, serverCreate	MySqlCommand	MySQL command for locations.	-
locationsRDR	Local	backupNodeCreate, serverCreate	MySqlCommand	Used to store MySQL command to select location name.	-

loopnum	Local	controlCommandEdit, controlCommandCreate, backupRunProcess, ticketReply	Int	Used to store the loopnum for the programs operation.	-
Loopnum2	Local	controlCommandCreate	Int	Used to store a secondary loop number to match to the first.	-
loopnum2	Local	ticketReply	Int	Used to store the running total of the loopnum.	-
name	Local	controlCommandEdit, controlCommandCreate	String	Used to store the sender name.	-
Network	Local	serverCreate	String	Used to store the value of the network port select.	-
network	Local	backupNodeEdit, serverEdit	String	Used to store the network port selected.	-
networkPortCMD	Local	backupNodeCreate, serverCreate	MySqlCommand	Used to store MySQL command to select network ports.	-
networkPortRDR	Local	backupNodeCreate, serverCreate	MySqlCommand	Used to store MySQL command to select network ports.	-
NewPassword	Local	accountPassword	String	Used to store entered data or a password.	-
NewPasswordConfirm	Local	accountPassword	String	Used to store entered data or a password.	-
newTicket	Local	ticketNew	MySqlCommand	Used to insert row into MySQL database table.	-
newTicketReply	Local	ticketNew	MySqlCommand	Used to insert row into MySQL database table.	-
newTicketReply	Local	ticketReply	MySqlCommand	Used to insert a new ticket reply into the database.	-
operatingSystems	Local	controlCommandEdit, backupRunProcess	String Array	Used to store values throughout the dynamic item creation process.	-

operatingSystemsID	Local	controlCommandEdit, backupRunProcess	String Array	Used to store values throughout the dynamic item creation process.	-
Os	Local	serverCreate	String	Used to store the value of the Os entered.	-
os	Local	controlCommandEdit, backupRunProcess	String	Used to store the name of the operating system.	-
os	Local	backupNodeEdit, serverEdit	String	Used to store the operating system.	-
osCMD	Local	backupNodeCreate, serverCreate, controlCommandEdit, controlCommandCreate	MySqlCommand	Used to store MySQL command to select operating systems.	-
OSNumber	Local	controlCommandEdit, controlCommandCreate	Int	Used to store the number within the sender name.	-
osRDR	Local	backupNodeCreate, serverCreate, controlCommandEdit, controlCommandCreate	MySqlCommand	Used to store MySQL command to select operating system.	-
password	Global	userCreate,	String	Used to store hashed and salted value of password.	-
Password	Global	loginMenu	String	Used to store the database value for password.	accountPassword
PASSWORD	Local	loginMenu	String	Used to store a value from the setup.xml file that is the password to the database.	-
Password	Global	userEdit	String	Used to store the password during the editing phase.	-
Password	Local	backupRunProcess, backupNodeEdit, serverEdit	String	Used to store the password of the server.	-

permAddAction	Global	loginMenu	Boolean	Used to store a Boolean value for creating a command.	-
permAdminAddUser	Global	loginMenu	Boolean	Used to store a Boolean value for creating a user.	userList
permAdminChangePermissions	Global	loginMenu	Boolean	Used to store a Boolean value for updating a user permissions.	userEdit
permAdminDelUser	Global	loginMenu	Boolean	Used to store a Boolean value for deleting a user.	userList
permAdminEditUserInfo	Global	loginMenu	Boolean	Used to store a Boolean value for editing user information.	userList
permAdminForcePassReset	Global	loginMenu	Boolean	Used to store a Boolean value for force setting of user passwords.	userEdit
permAdminTicket	Global	loginMenu	Boolean	Used to store a Boolean value for being able to view all tickets and reply.	mainDashboard
permAdminViewUsers	Global	loginMenu	Boolean	Used to store a Boolean value for viewing user information.	mainDashboard, accountManagement, backupNodeList, userList, locationManagement, serverManagement, ticketView
permChangeEmail	Global	loginMenu	Boolean	Used to store a Boolean value for changing email address.	accountManagement
permChangePassword	Global	loginMenu	Boolean	Used to store a Boolean value for changing passwords.	accountManagement

permChangeUsername	Global	loginMenu	Boolean	Used to store a Boolean value for changing usernames.	accountManagement
permCloseTicket	Global	loginMenu	Boolean	Used to store a Boolean value for closing tickets.	-
permCMD	Local	userCreate	MySqlCommand	Used to store MySQL command to get permission roles.	-
permCMD	Local	userEdit	MySqlCommand	Used to store MySQL command to select permission details	-
permControlServers	Global	loginMenu	Boolean	Used to store a Boolean value for controlling the servers.	serverManagement
permCreateLocation	Global	loginMenu	Boolean	Used to store a Boolean value for creating a location.	locationManagement
permCreateServers	Global	loginMenu	Boolean	Used to store a Boolean value for creating a server.	serverManagement
permCreateTicket	Global	loginMenu	Boolean	Used to store a Boolean value for creating a ticket.	mainDashboard, accountManagement, backupNodeList, userList, locationManagement, serverManagement
permDeleteAction	Global	loginMenu	Boolean	Used to store a Boolean value for deleting a command.	-
permDeleteLocations	Global	loginMenu	Boolean	Used to store a Boolean value for deleting locations.	locationManagement
permDeleteServers	Global	loginMenu	Boolean	Used to store a Boolean value for deleting servers.	serverManagement
permEditAction	Global	loginMenu	Boolean	Used to store a Boolean value for editing a command.	-

permEditLocations	Global	loginMenu	Boolean	Used to store a Boolean value for editing locations.	locationManagement
permEditServers	Global	loginMenu	Boolean	Used to store a Boolean value for editing servers.	serverManagement
permID	Local	userCreate	String	Used to store the output from SQL of the ID of the permission group.	-
permID	Local	userEdit	String	Used to store the ID of the permission group.	-
permManageBackupSystem	Global	loginMenu	Boolean	Used to store a Boolean value for managing the backup system.	serverManagement
permRDR	Local	userCreate	MySqlDataReader	Used to store MySQL SQL output of permission roles.	-
permRDR	Local	userEdit	MySqlDataReader	Used to store MySQL SQL output of permission details.	-
permRoleCMD	Local	userCreate	MySqlCommand	Used to store MySQL command to get permission ID and roles.	-
permRunCustomAction	Global	loginMenu	Boolean	Used to store a Boolean value for executing a command.	-
permViewLocations	Global	loginMenu	Boolean	Used to store a Boolean value for viewing locations.	mainDashboard, accountManagement, backupNodeList, userList, locationManagement, serverManagement, ticketView
permViewServers	Global	loginMenu	Boolean	Used to store a Boolean value for viewing servers.	mainDashboard, accountManagement, backupNodeList,

					<code>userList, locationManagement, serverManagement, ticketView</code>
<code>pointX</code>	Local	<code>controlCommandEdit, controlCommandCreate, ticketReply</code>	Int	Used to store the x coordinates for the programs operation.	-
<code>pointY</code>	Local	<code>controlCommandEdit, controlCommandCreate, ticketReply</code>	Int	Used to store the y coordinates for the programs operation.	-
<code>proceed</code>	Local	<code>backupRunProcess</code>	Bool	Used to flag proceed with SSH command execution.	-
<code>ProfileImage</code>	Global	<code>loginMenu</code>	String	Used to store the URL of the user's profile image.	-
<code>rdr</code>	Local	<code>locationEdit, locationDelete</code>	MySqlDataReader	Used to store MySQL SQL output of locations.	-
<code>repliesReader</code>	Local	<code>ticketReply</code>	MySqlDataReader	Used to store the output of the ticket replies.	-
<code>replyContent</code>	Local	<code>ticketReply</code>	String Array	Used to store the content of each reply to a ticket.	-
<code>result</code>	Local	<code>loginMenu</code>	StringBuilder	Used in the generation of an SHA512 hash.	-
<code>Role</code>	Global	<code>loginMenu</code>	String	Used to store the name of the role.	<code>mainDashboard</code>
<code>serverCMD</code>	Local	<code>backupNodeCreate, serverCreate</code>	MySqlCommand	Used to insert node into MySQL table.	-
<code>serverInformationCMD</code>	Local	<code>backupNodeDelete serverDelete</code>	MySqlCommand	Used to select from from MySQL table.	-
<code>serverInformationRDR</code>	Local	<code>backupNodeDelete serverDelete</code>	MySqlCommand	Used to store MySQL command to select server/node information	-
<code>serverLocation</code>	Local	<code>serverEdit</code>	String	Used to store the location of the server from the database	-

serverOS	Local	serverEdit	String	Used to store the operating system of the server from the database.	-
serverPort	Local	serverEdit	String	Used to store the network port of the server from the database.	-
Setup	Local	loginMenu	String	Used to store a value from the setup.xml file, regarding the status of the setup.	-
sha512	Local	loginMenu	SHA512	Used in the generation of an SHA512 hash.	-
SMTPPort	Global	setupEmailConfiguration	String	Used to store the SMTP Port.	-
SMTPServer	Global	setupEmailConfiguration	String	Used to store the hostname of the SMTP server.	-
Surname	Global	loginMenu	String	Used to store the surname of the user.	accountSurname
surname	Local	ticketReply	String	Used to store the surname of the user replying.	-
systemRepliesCMD	Local	ticketReply	MySqlCommand	Used to store the command to select all system replies that match the ticket ID.	-
temploop	Local	controlCommandEdit	Int	Used to store the loopnum for the programs operation.	-
text	Local	controlCommandEdit, controlCommandCreate	Control	Used to convert the temp checkbox name to a control element.	-
ticketID	Global	ticketView	String	Used to store the output from the value that the user clicked.	-
ticketID	Local	ticketNew	String	Used to store the last insert ID of the ticket after creation.	-

totalloop	Local	ticketReply	Int	Used to store the total loopnum.	-
UID	Local	loginMenu	String	Used to store a value from the setup.xml file that is the database user.	-
userAccountsCMD	Local	userEdit	MySqlCommand	Used to store MySQL command to select user details.	-
userAccountsRDR	Local	userEdit	MySqlDataReader	Used to store MySQL SQL output of user details.	-
userCMD	Local	userEdit	MySqlCommand	Used to store MySQL command to select user details.	-
userDetailReader	Local	ticketReply	MySqlDataReader	Used to store the output of the command to get user details.	-
userDetailsCMD	Local	ticketReply	MySqlCommand	Used to store the command to select details about the user replying to the ticket.	-
UserID	Global	loginMenu	String	Used to store the ID of the user.	-
userIDList	Local	ticketReply	String Array	Used to store the IDs of the users that reply to a ticket.	-
userInformationCMD	Local	userDelete	MySqlCommand	Used to store MySQL command to get user accounts.	-
userInformationRDR	Local	userDelete	MySqlDataReader	Used to store MySQL SQL output of user accounts.	-
userInfoUpdateCMD	Local	userEdit	MySqlCommand	Used to update MySQL user details.	-
userLogin	Global	loginMenu	String	Used to store the input username.	-

Username	Global	loginMenu	String	Used to store the database value for username.	accountUsername
Username	Local	backupRunProcess	String	Used to store the username of the server.	-
userPassword	Global	loginMenu	String	Used to store the input password.	-
userRDR	Local	userEdit	MySQLDataReader	Used to store MySQL SQL output of user details.	-
userSalt	Global	loginMenu	String	Used to combine to the front of strings to be able to salt the password.	-
value	Local	controlCommandEdit, controlCommandCreate, backupRunProcess	String	Used to sure values throughout the dynamic item creation.	-
yes	Local	controlCommandEdit	String	Used to sure values throughout the dynamic item creation.	-

Data Structure Name		Description				Estimated Number of Records
Backup Node (backupNodeInformation)		Table to store details and connection information about the backup nodes available.				5-20
Estimated Size in KBytes		Type of Data Structure (Table, File, Array, Record)			Links With Other Data Structures	
320	Table					userCompanies, serverLocations, serverOperatingSystems, serverPort
Access method (Serial / Sequential / Indexed Sequential / Random / None)				Foreign Keys		
Serial				backupNodeCompany, backupNodeLocation, backupNodeOS, backupNodePort		

Field Name	Data Type	Required (Yes/No)	Key Field (Yes/No)	Indexed (Yes/No)	Type Of Validation Required	Default Value	Description
backupNodeID	int(11)	Yes	Yes	Yes	None – Auto Set	-	Unique identifier to identify the record that contains information about a specific backup node.
backupNodeCompany	int(11)	Yes	No	Yes	Data is Int Data is <=11 Chars	-	A foreign key to link a backup node to a specific company.
backupNodeLocation	int(11)	Yes	No	Yes	Data is Int Data is <=11 Chars	-	A foreign key to link a backup node to a specific location.
backupNodeHostname	varchar(50)	Yes	No	No	Data is <=50 Chars	-	Hostname for the backup node.
backupNodeUsername	varchar(30)	Yes	No	No	Data is <=30 Chars	-	Username used to login to the backup node.
backupNodePassword	varchar(8192)	Yes	No	No	Data is <=8192 Chars	-	Password used to login to the backup node.
backupNodeOS	int(11)	Yes	No	Yes	Data is Int Data is <=11 Chars	-	A foreign key to link a backup node to a specific operating system.
backupNodeIP	varchar(17)	Yes	No	No	Data is <=17 Chars	-	IP used to connect to the backup node.
backupNodeProcessor	varchar(40)	Yes	No	No	Data is <=40 Chars	-	The type of processor that is used in the backup node.
backupNodeRAM	varchar(10)	Yes	No	No	Data is <=10 Chars	-	The amount of RAM that is contained within the backup node.

backupNodePort	int(10)	Yes	No	Yes	Data is Int Data is <=10 Chars	-	A foreign key to link a backup node to a specific network port.
backupNodeTransfer	varchar(4)	Yes	No	No	Data is <=4 Chars	-	The amount of data transfer allocated to the backup node.
backupNodeBackupPath	varchar(128)	Yes	No	No	Data is <=128 Chars	-	The file path within the backup node to store data.

Data Structure Name	Description	Estimated Number of Records
Failed Login Attempts (failedLoginAttempts)	Table to store details about failed login attempts.	50+
Estimated Size in KBytes	Type of Data Structure (Table, File, Array, Record)	Links With Other Data Structures
128	Table	None
Access method (Serial / Sequential / Indexed Sequential / Random / None)	Foreign Keys	
Serial	None	

Field Name	Data Type	Required (Yes/No)	Key Field (Yes/No)	Indexed (Yes/No)	Type Of Validation Required	Default Value	Description
attemptID	int(11)	Yes	Yes	Yes	None - Auto Set	-	Unique identifier to identify the record that contains information about an attempt.
attemptUsername	varchar(128)	Yes	No	No	Data is <=128 Chars	-	The username used in the attempt.
attemptIP	varchar(123)	Yes	No	No	Data is <=123 Chars	-	The IP used in the attempt.
attemptTimeStamp	datetime	Yes	No	No	DateTime	CURRENT_TIMESTAMP	The TimeDate that the attempt occurred
attemptTries	varchar(30)	Yes	No	No	Data is <=30 Chars	-	The number of tries attempted.

Data Structure Name		Description				Estimated Number of Records				
Server Commands (serverCommands)		Table to store details about the commands that can be executed.				25+				
Estimated Size in KBytes	Type of Data Structure (Table, File, Array, Record)					Links With Other Data Structures				
320	Table					userCompanies serverOperatingSystems				
Access method (Serial / Sequential / Indexed Sequential / Random / None)					Foreign Keys					
Serial					serverCompany serverOS					

Field Name	Data Type	Required (Yes/No)	Key Field (Yes/No)	Indexed (Yes/No)	Type Of Validation Required	Default Value	Description
serverCommandID	int(11)	Yes	Yes	Yes	None - Auto Set	-	Unique identifier to identify the record that contains information about command.
serverCompany	int(11)	Yes	No	Yes	Data is Int Data is <=11 Chars	-	A foreign key to link a backup node to a specific company.
serverOS	int(11)	Yes	No	Yes	Data is Int Data is <=11 Chars	-	A foreign key to link a backup node to a specific operating system.
commandName	varchar(128)	Yes	No	No	Data is <=50 Chars	-	The name of the command.
serverCommand	varchar(8192)	Yes	No	No	Data is <=30 Chars	-	The content of the command.

Data Structure Name		Description					Estimated Number of Records
Server Information (serverInformation)		Table to store details and connection information about the servers available.					5-20
Estimated Size in KBytes		Type of Data Structure (Table, File, Array, Record)				Links With Other Data Structures	
320	Table						userCompanies, serverLocations, serverOperatingSystems, serverPort
Access method (Serial / Sequential / Indexed Sequential / Random / None)					Foreign Keys		
Serial					backupNodeCompany		

Field Name	Data Type	Required (Yes/No)	Key Field (Yes/No)	Indexed (Yes/No)	Type Of Validation Required	Default Value	Description
serverID	int(11)	Yes	Yes	Yes	None - Auto Set	-	Unique identifier to identify the record that contains information about a server.
serverCompany	int(11)	Yes	No	Yes	Data is Int Data is <=11 Chars	-	A foreign key to link a server to a specific company.
serverLocation	int(11)	Yes	No	Yes	Data is Int Data is <=11 Chars	-	A foreign key to link a server to a specific location.
serverHostname	varchar(50)	Yes	No	No	Data is <=50 Chars	-	Hostname for the server.
serverUsername	varchar(30)	Yes	No	No	Data is <=30 Chars	-	Username used to login to the server.
serverPassword	varchar(8192)	Yes	No	No	Data is <=8192 Chars	-	Password used to login to the server.
serverOS	int(11)	Yes	No	Yes	Data is Int Data is <=11 Chars	-	A foreign key to link a server to a specific operating system.
serverIP	varchar(17)	Yes	No	No	Data is <=17 Chars	-	IP used to connect to the backup node.
serverProcessor	varchar(40)	Yes	No	No	Data is <=40 Chars	-	The type of processor that is used in the server.
serverRAM	varchar(10)	Yes	No	No	Data is <=10 Chars	-	The amount of RAM that is contained within the server.
serverPort	int(10)	Yes	No	Yes	Data is Int Data is <=10 Chars	-	A foreign key to link a server to a specific network port.

serverTransfer	varchar(4)	Yes	No	No	Data is <=4 Chars	-	The amount of data transfer allocated to the server.
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Data Structure Name		Description					Estimated Number of Records
Server Locations (serverLocations)		Table to store details about the locations servers and backup nodes can be in.				5-20	
Estimated Size in KBytes		Type of Data Structure (Table, File, Array, Record)				Links With Other Data Structures	
320	Table					userCompanies,	
Access method (Serial / Sequential / Indexed Sequential / Random / None)						Foreign Keys	
Serial						companyID	

Field Name	Data Type	Required (Yes/No)	Key Field (Yes/No)	Indexed (Yes/No)	Type Of Validation Required	Default Value	Description
locationID	int(11)	Yes	Yes	Yes	None – Auto Set	-	Unique identifier to identify the record that contains information about a location.
companyID	int(11)	Yes	No	Yes	Data is Int Data is <=11 Chars	-	A foreign key to link a location to a specific company.
locationName	varchar(50)	Yes	No	Yes	Data is <=50 Chars	-	The name of the location.
locationLongitude	varchar(20)	Yes	No	No	Data is <=20 Chars	-	The longitude of the location.
locationLatitude	varchar(20)	Yes	No	No	Data is <=20 Chars	-	The latitude of the location.

Data Structure Name		Description					Estimated Number of Records
Server Operating System (serverOperatingSystems)		Table to store about the operating systems within the server configuration.				40+	
Estimated Size in KBytes		Type of Data Structure (Table, File, Array, Record)				Links With Other Data Structures	
32	Table					None	
Access method (Serial / Sequential / Indexed Sequential / Random / None)						Foreign Keys	

Serial	None						
Field Name	Data Type	Required (Yes/No)	Key Field (Yes/No)	Indexed (Yes/No)	Type Of Validation Required	Default Value	Description
operatingSystemsID	int(11)	Yes	Yes	Yes	None - Auto Set	-	Unique identifier to identify the record that contains information about the operating system.
operatingSystemsName	varchar(50)	Yes	No	No	Data is <=50 Chars	-	The name of the operating system.

Data Structure Name		Description					Estimated Number of Records			
Server Network Port (serverPort)		Table to store details regarding the network port.					5-10			
Estimated Size in KBytes		Type of Data Structure (Table, File, Array, Record)				Links With Other Data Structures				
32	Table					None				
Access method (Serial / Sequential / Indexed Sequential / Random / None)						Foreign Keys				
Serial						None				

Field Name	Data Type	Required (Yes/No)	Key Field (Yes/No)	Indexed (Yes/No)	Type Of Validation Required	Default Value	Description
portID	int(11)	Yes	Yes	Yes	None – Auto Set	-	Unique identifier to identify the record that contains information about the network port.
portSpeed	varchar(20)	Yes	No	No	Data is <=20 Chars	-	The name of the network port.

Data Structure Name		Description					Estimated Number of Records			
System Replies (systemReplies)		Table to store replies to tickets.					100+			
Estimated Size in KBytes		Type of Data Structure (Table, File, Array, Record)				Links With Other Data Structures				
320+	Table					userAccounts, systemTickets				
Access method (Serial / Sequential / Indexed Sequential / Random / None)						Foreign Keys				
Serial						userID, ticketID				

Field Name	Data Type	Required (Yes/No)	Key Field (Yes/No)	Indexed (Yes/No)	Type Of Validation Required	Default Value	Description
replyID	int(11)	Yes	Yes	Yes	None – Auto Set	-	Unique identifier to identify the record that contains information about a reply.

ticketID	int(11)	Yes	No	Yes	Data is Int Data is <=11 Chars	-	A foreign key to link a reply to a specific ticket.
userID	int(11)	Yes	No	Yes	Data is Int Data is <=11 Chars	-	A foreign key to link a reply to a specific user.
replyContent	varchar(20)	Yes	No	No	Data is <=8192 Chars	-	The content of the reply.

Data Structure Name	Description			Estimated Number of Records
System Tickets (systemTickets)	Table to store information about tickets.			50+
Estimated Size in KBytes	Type of Data Structure (Table, File, Array, Record)			Links With Other Data Structures
320	Table			userCompanies, userAccounts
Access method (Serial / Sequential / Indexed Sequential / Random / None)				Foreign Keys
Serial				userCompanyID, ticketCustomer

Field Name	Data Type	Required (Yes/No)	Key Field (Yes/No)	Indexed (Yes/No)	Type Of Validation Required	Default Value	Description
ticketID	int(11)	Yes	Yes	Yes	None – Auto Set	-	Unique identifier to identify the record that contains information about a ticket.
userCompanyID	int(11)	Yes	No	Yes	Data is Int Data is <=11 Chars	-	A foreign key to link a ticket to a specific company.
ticketUpdated	datetime	Yes	No	No	DateTime Format	-	The datetime the ticket was last updated.
ticketCustomer	int(11)	Yes	No	Yes	Data is Int Data is <=11 Chars	-	A foreign key to link a ticket to a specific user.
ticketRegarding	varchar(1024)	Yes	No	No	Data is <=1024 Chars	-	The node name that it is regarding.
ticketSubject	varchar(200)	Yes	No	No	Data is <=200 Chars		The subject of the ticket.

Data Structure Name	Description			Estimated Number of Records
User Accounts (userAccounts)	Table to store details about each user.			10+
Estimated Size in KBytes	Type of Data Structure (Table, File, Array, Record)			Links With Other Data Structures
320	Table			userPermissions, userCompanies
Access method (Serial / Sequential / Indexed Sequential / Random / None)				Foreign Keys
Serial				userRole, userCompany

Field Name	Data Type	Required (Yes/No)	Key Field (Yes/No)	Indexed (Yes/No)	Type Of Validation Required	Default Value	Description
userID	int(11)	Yes	Yes	Yes	None - Auto Set	-	Unique identifier to identify the record that contains information about a user.
userLogin	varchar(128)	Yes	No	No	Data is <=128 Chars	-	The username for the user.
userPassword	varchar(8192)	Yes	No	No	Data is <=8192 Chars	-	The password for the user.
userForename	varchar(64)	Yes	No	No	Data is <=64 Chars	-	The forename of the user.
userSurname	varchar(64)	Yes	No	No	Data is <=64 Chars	-	The surname of the user.
userEmailAddress	varchar(128)	Yes	No	No	Data is <=128 Chars	-	The email address of the user.
userImage	varchar(256)	Yes	No	No	Data is <=256 Chars	-	The profile image url of the user.
userCompany	int(5)	Yes	No	Yes	Data is Int Data is <=5 Chars	-	A foreign key to link the user to a specific company.
userRole	int(10)	Yes	No	Yes	Data is Int Data is <=10 Chars	-	A foreign key to link the user to a specific permission role.
userIPAddress	varchar(13)	Yes	No	No	Data is 13 Chars	-	The last IP address of the user.
userLastLogin	datetime	Yes	No	No	Date is DateTime	CURRENT_TIMESTAMP	The datetime of last login.

Data Structure Name	Description			Estimated Number of Records
User Companies (userCompanies)	Table to store details about each company.			1-3
Estimated Size in KBytes	Type of Data Structure (Table, File, Array, Record)	Links With Other Data Structures		
320	Table	userAccounts		
Access method (Serial / Sequential / Indexed Sequential / Random / None)	Foreign Keys			
Serial	ownerID			

Field Name	Data Type	Required (Yes/No)	Key Field (Yes/No)	Indexed (Yes/No)	Type Of Validation Required	Default Value	Description
companyID	int(11)	Yes	Yes	Yes	None - Auto Set	-	Unique identifier to identify the record that contains information about a user.
ownerID	int(11)	Yes	No	No	Data is Int Data is <=11 Chars	-	A foreign key to link the company to a specific owner.
companyName	varchar(256)	Yes	No	No	Data is <=256 Chars	-	The name of the company.
companyDateCreated	varchar(64)	Yes	No	No	DateTime	CURRENT_TIMESTAMP	The date the company was created.

Data Structure Name	Description				Estimated Number of Records
User Companies (userCompanies)	Table to store details about each company.				1-3
Estimated Size in KBytes	Type of Data Structure (Table, File, Array, Record)	Links With Other Data Structures			
320	Table	userAccounts			
Access method (Serial / Sequential / Indexed Sequential / Random / None)					Foreign Keys
Serial					ownerID

Field Name	Data Type	Required (Yes/No)	Key Field (Yes/No)	Indexed (Yes/No)	Type Of Validation Required	Default Value	Description
permID	Int(11)	Yes	Yes	Yes	None – Auto Set	-	Unique identifier to identify the record that contains information about the permission role.
permRole	varchar(30)	Yes	No	No	Data is <=30 Chars	-	The name of the role.
permDateModified	timestamp	Yes	No	No	DateTime	CURRENT_TIMESTAMP	Date the permission group was last modified.
permChangePassword	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permChangeUsername	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permChangeEmail	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permViewServers	tinyint(4)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permEditServers	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permDeleteServers	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permViewLocations	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permEditLocations	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.

permDeleteLocations	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permCreateTicket	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permAdminTicketView	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permCloseTicket	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permAddAction	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permEditAction	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permDeleteAction	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permRunCustomAction	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permAdminViewUsers	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permAdminEditUserInfo	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permAdminForcePassReset	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permAdminAddUser	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permAdminDelUser	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permAdminChangePermissions	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permControlServers	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permManageBackupSystem	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permCreateLocation	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.
permCreateServer	tinyint(1)	Yes	No	No	Data is Boolean	-	Boolean value for permission.

Data Structure Name	Description			Estimated Number of Records
Config File (setup.xml)	File to store database connection information			1-3
Estimated Size in KBytes	Type of Data Structure (Table, File, Array, Record)	Links With Other Data Structures		
320	File	None		
Access method (Serial / Sequential / Indexed Sequential / Random / None)				Foreign Keys
Serial	None			

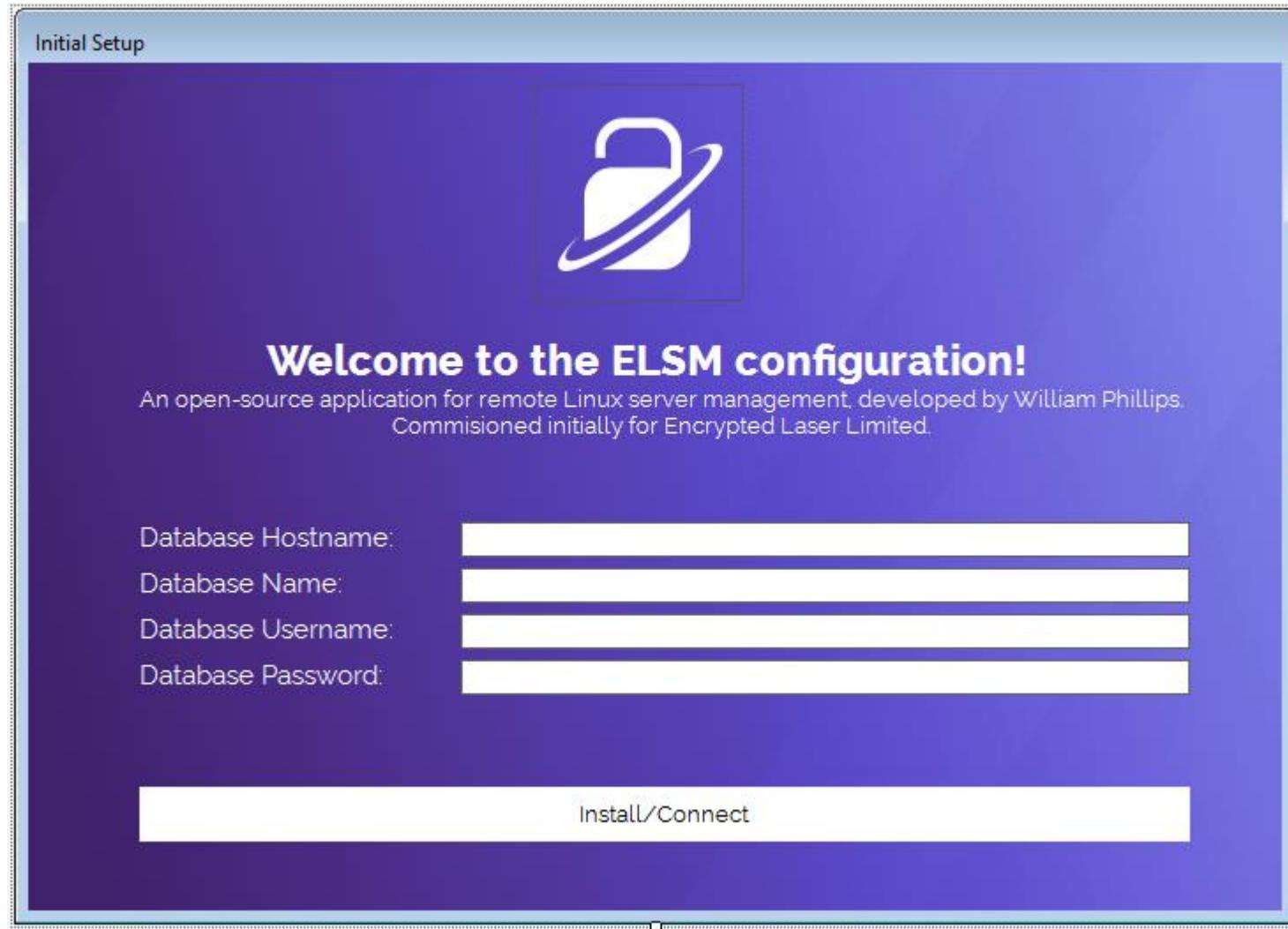
Field Name	Data Type	Required (Yes/No)	Key Field (Yes/No)	Indexed (Yes/No)	Type Of Validation Required	Default Value	Description
Setup	String	No	No	No	-	-	Has the setup been completed.
IP	String	No	No	No	-	-	The Database IP.
Database	String	No	No	No	-	-	The Database Name.
Username	String	No	No	No	-	-	The Database Username.
Password	String	No	No	No	-	-	The Database Password.

Section 3.6.3 - Fully annotated code listing

Subsection 3.6.3.i - Project file - unannotated - program.cs

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Threading.Tasks;
using System.Windows.Forms;
using System.Data.SqlClient;
using MySql.Data.MySqlClient;
using System.Data;

namespace ELSM_Project
{
    static class Program
    {
        /// <summary>
        /// The main entry point for the application.
        /// </summary>
        [STAThread]
        static void Main()
        {
            Application.EnableVisualStyles();
            Application.SetCompatibleTextRenderingDefault(false);
            Application.Run(new loginMenu());
        }
    }
}
```

Subsection 3.6.3.ii - setupDatabase.cs [design] - design view

Subsection 3.6.3.iii - setupDatabase.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class setupDatabase
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            System.ComponentModel.ComponentResourceManager resources = new
System.ComponentModel.ComponentResourceManager(this.GetType());
            this.logoImage = new System.Windows.Forms.PictureBox();
            this.lblWelcome = new System.Windows.Forms.Label();
            this.lblDescription = new System.Windows.Forms.Label();
            this.txtHostname = new System.Windows.Forms.TextBox();
            this.lblHostname = new System.Windows.Forms.Label();
        }
}
```

```
this.txtDatabaseName = new System.Windows.Forms.TextBox();
this.lblDatabaseName = new System.Windows.Forms.Label();
this.txtDatabaseUsername = new System.Windows.Forms.TextBox();
this.lblDatabaseUsername = new System.Windows.Forms.Label();
this.txtDatabasePassword = new System.Windows.Forms.TextBox();
this.lblDatabasePassword = new System.Windows.Forms.Label();
this.btnInstall = new System.Windows.Forms.Button();
((System.ComponentModel.ISupportInitialize)(this.logoImage)).BeginInit();
this.SuspendLayout();
//
// logoImage
//
this.logoImage.BackColor = System.Drawing.Color.Transparent;
this.logoImage.BackgroundImage = global::ELSM_Project.Properties.Resources.imgLogo;
this.logoImage.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.logoImage.Location = new System.Drawing.Point(287, 12);
this.logoImage.Name = "logoImage";
this.logoImage.Size = new System.Drawing.Size(118, 123);
this.logoImage.TabIndex = 1;
this.logoImage.TabStop = false;
//
// lblWelcome
//
this.lblWelcome.AutoSize = true;
this.lblWelcome.BackColor = System.Drawing.Color.Transparent;
this.lblWelcome.Font = new System.Drawing.Font("Raleway ExtraBold", 18F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblWelcome.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblWelcome.Location = new System.Drawing.Point(130, 154);
this.lblWelcome.Name = "lblWelcome";
this.lblWelcome.Size = new System.Drawing.Size(444, 29);
this.lblWelcome.TabIndex = 44;
this.lblWelcome.Text = "Welcome to the ELSM configuration!";
//
// lblDescription
//
this.lblDescription.AutoSize = true;
this.lblDescription.BackColor = System.Drawing.Color.Transparent;
this.lblDescription.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblDescription.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblDescription.Location = new System.Drawing.Point(60, 183);
this.lblDescription.Name = "lblDescription";
this.lblDescription.Size = new System.Drawing.Size(598, 30);
```

```
this.lblDescription.TabIndex = 45;
this.lblDescription.Text = "An open-source application for remote Linux server management, developed by Willi" +
"am Phillips.\r\nCommissioned initially for Encrypted Laser Limited.";
this.lblDescription.TextAlign = System.Drawing.ContentAlignment.TopCenter;
//
// txtHostname
//
this.txtHostname.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtHostname.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtHostname.Location = new System.Drawing.Point(245, 260);
this.txtHostname.Name = "txtHostname";
this.txtHostname.Size = new System.Drawing.Size(413, 20);
this.txtHostname.TabIndex = 47;
//
// lblHostname
//
this.lblHostname.AutoSize = true;
this.lblHostname.BackColor = System.Drawing.Color.Transparent;
this.lblHostname.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblHostname.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblHostname.Location = new System.Drawing.Point(60, 260);
this.lblHostname.Name = "lblHostname";
this.lblHostname.Size = new System.Drawing.Size(152, 18);
this.lblHostname.TabIndex = 46;
this.lblHostname.Text = "Database Hostname:";
//
// txtDatabaseName
//
this.txtDatabaseName.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtDatabaseName.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtDatabaseName.Location = new System.Drawing.Point(245, 286);
this.txtDatabaseName.Name = "txtDatabaseName";
this.txtDatabaseName.Size = new System.Drawing.Size(413, 20);
this.txtDatabaseName.TabIndex = 49;
//
// lblDatabaseName
//
this.lblDatabaseName.AutoSize = true;
this.lblDatabaseName.BackColor = System.Drawing.Color.Transparent;
this.lblDatabaseName.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblDatabaseName.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblDatabaseName.Location = new System.Drawing.Point(60, 286);
```

```
this.lblDatabaseName.Name = "lblDatabaseName";
this.lblDatabaseName.Size = new System.Drawing.Size(123, 18);
this.lblDatabaseName.TabIndex = 48;
this.lblDatabaseName.Text = "Database Name:";
//
// txtDatabaseUsername
//
this.txtDatabaseUsername.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtDatabaseUsername.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtDatabaseUsername.Location = new System.Drawing.Point(245, 312);
this.txtDatabaseUsername.Name = "txtDatabaseUsername";
this.txtDatabaseUsername.Size = new System.Drawing.Size(413, 20);
this.txtDatabaseUsername.TabIndex = 51;
//
// lblDatabaseUsername
//
this.lblDatabaseUsername.AutoSize = true;
this.lblDatabaseUsername.BackColor = System.Drawing.Color.Transparent;
this.lblDatabaseUsername.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblDatabaseUsername.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblDatabaseUsername.Location = new System.Drawing.Point(60, 312);
this.lblDatabaseUsername.Name = "lblDatabaseUsername";
this.lblDatabaseUsername.Size = new System.Drawing.Size(152, 18);
this.lblDatabaseUsername.TabIndex = 50;
this.lblDatabaseUsername.Text = "Database Username:";
//
// txtDatabasePassword
//
this.txtDatabasePassword.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtDatabasePassword.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtDatabasePassword.Location = new System.Drawing.Point(245, 338);
this.txtDatabasePassword.Name = "txtDatabasePassword";
this.txtDatabasePassword.PasswordChar = '*';
this.txtDatabasePassword.Size = new System.Drawing.Size(413, 20);
this.txtDatabasePassword.TabIndex = 53;
//
// lblDatabasePassword
//
this.lblDatabasePassword.AutoSize = true;
this.lblDatabasePassword.BackColor = System.Drawing.Color.Transparent;
this.lblDatabasePassword.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblDatabasePassword.ForeColor = System.Drawing.SystemColors.ControlLightLight;
```

```
this.lblDatabasePassword.Location = new System.Drawing.Point(60, 338);
this.lblDatabasePassword.Name = "lblDatabasePassword";
this.lblDatabasePassword.Size = new System.Drawing.Size(146, 18);
this.lblDatabasePassword.TabIndex = 52;
this.lblDatabasePassword.Text = "Database Password:";
//
// btnInstall
//
this.btnInstall.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnInstall.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnInstall.FlatAppearance.BorderSize = 0;
this.btnInstall.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnInstall.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnInstall.Location = new System.Drawing.Point(63, 410);
this.btnInstall.Name = "btnInstall";
this.btnInstall.Size = new System.Drawing.Size(595, 31);
this.btnInstall.TabIndex = 54;
this.btnInstall.Text = "Install/Connect";
this.btnInstall.UseVisualStyleBackColor = false;
this.btnInstall.Click += new System.EventHandler(this.btnInstall_Click);
//
// setupDatabase
//
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(710, 480);
this.ControlBox = false;
this.Controls.Add(this.btnInstall);
this.Controls.Add(this.txtDatabasePassword);
this.Controls.Add(this.lblDatabasePassword);
this.Controls.Add(this.txtDatabaseUsername);
this.Controls.Add(this.lblDatabaseUsername);
this.Controls.Add(this.txtDatabaseName);
this.Controls.Add(this.lblDatabaseName);
this.Controls.Add(this.txtHostname);
this.Controls.Add(this.lblHostname);
this.Controls.Add(this.lblDescription);
this.Controls.Add(this.lblWelcome);
this.Controls.Add(this.logoImage);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.Icon = ((System.Drawing.Icon)(resources.GetObject("$this.Icon")));
```

```
this.MinimumSize = new System.Drawing.Size(544, 178);
this.Name = "setupDatabase";
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "Initial Setup";
this.Load += new System.EventHandler(this.initialSetup_Load);
((System.ComponentModel.ISupportInitialize)(this.logoImage)).EndInit();
this.ResumeLayout(false);
this.PerformLayout();

}

#endregion

private System.Windows.Forms.PictureBox logoImage;
private System.Windows.Forms.Label lblWelcome;
private System.Windows.Forms.Label lblDescription;
private System.Windows.Forms.TextBox txtHostname;
private System.Windows.Forms.Label lblHostname;
private System.Windows.Forms.TextBox txtDatabaseName;
private System.Windows.Forms.Label lblDatabaseName;
private System.Windows.Forms.TextBox txtDatabaseUsername;
private System.Windows.Forms.Label lblDatabaseUsername;
private System.Windows.Forms.TextBox txtDatabasePassword;
private System.Windows.Forms.Label lblDatabasePassword;
private System.Windows.Forms.Button btnInstall;
}

}
```

Subsection 3.6.3.iv - setupDatabase.cs - Code file - annotated

```
using System;
using System.Xml;
using System.Windows.Forms;
using MySql.Data.MySqlClient;

namespace ELSM_Project
{
    public partial class setupDatabase : Form
    {
        public setupDatabase()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        public static string ConnectionString;

        private void initialSetup_Load(object sender, EventArgs e)
        {
            XmlDocument doc = new XmlDocument();
            doc.Load("setup.xml");
            string Setup = doc.SelectSingleNode("Settings/Setup").InnerText;
            if (Setup != "No")
            {
                string IP = doc.SelectSingleNode("Settings/IP").InnerText;
                string DATABASE = doc.SelectSingleNode("Settings/Database").InnerText;
                string UID = doc.SelectSingleNode("Settings/Username").InnerText;
                string PASSWORD = doc.SelectSingleNode("Settings/Password").InnerText;
                ConnectionString = "SERVER=" + IP + ";DATABASE=" + DATABASE + ";UID=" + UID + ";PASSWORD=" + PASSWORD + ";";
                loginMenu login = new loginMenu();
                login.ShowDialog();
            }
        }

        private void btnInstall_Click(object sender, EventArgs e)
        {
            //If all values entered aren't blank, execute.
            if ((txtHostname.Text != "") && (txtDatabaseName.Text != "") && (txtDatabaseUsername.Text != "") &&
(txtDatabasePassword.Text != ""))
            {
                //Set variables to input.
```

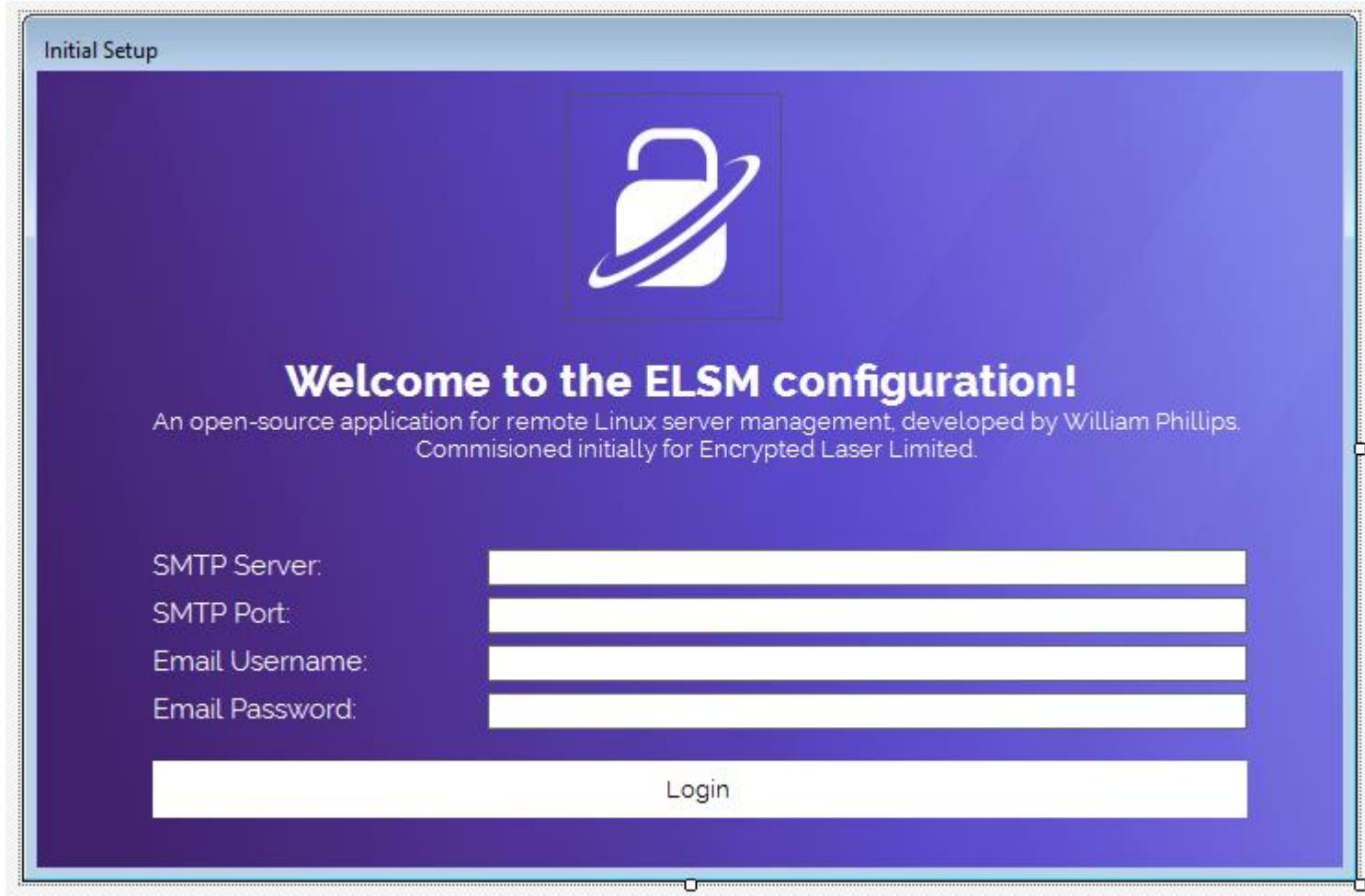
```
        string Hostname, Name, Username, Password, Connection;
        Hostname = txtHostname.Text;
        Name = txtDatabaseName.Text;
        Username = txtDatabaseUsername.Text;
        Password = txtDatabasePassword.Text;
        Connection = "SERVER=" + Hostname + ";DATABASE=" + Name + ";UID=" + Username + ";PASSWORD=" + Password + ";";
        MySqlConnection connectionMySQL = new MySqlConnection(Connection);
        connectionMySQL.Open();
        //If content exists in database, proceed setting database information. Else, execute SQL to create database.
        try
        {
            MySqlCommand checkIfExists = new MySqlCommand("SELECT * FROM serverOperatingSystems", connectionMySQL);
            MySqlDataReader rdr = checkIfExists.ExecuteReader();
        }
        catch (Exception)
        {
            MySqlCommand installIfNotFound = new MySqlCommand("SET SQL_MODE = 'NO_AUTO_VALUE_ON_ZERO';SET AUTOCOMMIT = 0;START TRANSACTION;SET time_zone = '+00:00';/*!40101 SET @OLD_CHARACTER_SET_CLIENT=@@CHARACTER_SET_CLIENT */;/*!40101 SET @OLD_CHARACTER_SET_RESULTS=@@CHARACTER_SET_RESULTS */;/*!40101 SET @OLD_COLLATION_CONNECTION=@@COLLATION_CONNECTION */;/*!40101 SET NAMES utf8mb4 */;CREATE TABLE `backupNodeInformation` ( `backupNodeID` int(11) NOT NULL, `backupNodeCompany` int(11) NOT NULL, `backupNodeLocation` int(11) NOT NULL, `backupNodeHostname` varchar(50) COLLATE utf8_unicode_ci NOT NULL, `backupNodeUsername` varchar(30) COLLATE utf8_unicode_ci NOT NULL, `backupNodePassword` varchar(8192) COLLATE utf8_unicode_ci NOT NULL, `backupNodeOS` int(11) NOT NULL, `backupNodeIP` varchar(17) COLLATE utf8_unicode_ci NOT NULL, `backupNodeProcessor` varchar(40) COLLATE utf8_unicode_ci NOT NULL, `backupNodeRAM` varchar(10) COLLATE utf8_unicode_ci NOT NULL, `backupNodePort` int(10) NOT NULL, `backupNodeTransfer` varchar(4) COLLATE utf8_unicode_ci NOT NULL, `backupNodeBackupPath` varchar(128) COLLATE utf8_unicode_ci NOT NULL) ENGINE=InnoDB DEFAULT CHARSET=utf8 COLLATE=utf8_unicode_ci;CREATE TABLE `failedLoginAttempts` ( `attemptID` int(11) NOT NULL, `attemptUsername` varchar(128) COLLATE utf8_unicode_ci NOT NULL, `attemptIP` varchar(123) COLLATE utf8_unicode_ci NOT NULL, `attemptTimeStamp` datetime NOT NULL, `attemptTries` int(11) NOT NULL) ENGINE=InnoDB DEFAULT CHARSET=utf8 COLLATE=utf8_unicode_ci;CREATE TABLE `serverCommands` ( `serverCommandID` int(11) NOT NULL, `serverCompany` int(11) NOT NULL, `serverOS` int(11) NOT NULL, `commandName` varchar(128) COLLATE utf8_unicode_ci NOT NULL, `serverCommand` varchar(8192) COLLATE utf8_unicode_ci NOT NULL) ENGINE=InnoDB DEFAULT CHARSET=utf8 COLLATE=utf8_unicode_ci;CREATE TABLE `serverInformation` ( `serverID` int(11) NOT NULL, `serverCompany` int(11) NOT NULL, `serverLocation` int(11) NOT NULL, `serverHostname` varchar(50) COLLATE utf8_unicode_ci NOT NULL, `serverUsername` varchar(30) COLLATE utf8_unicode_ci NOT NULL, `serverPassword` varchar(8192) COLLATE utf8_unicode_ci NOT NULL, `serverOS` int(11) NOT NULL, `serverIP` varchar(17) COLLATE utf8_unicode_ci NOT NULL, `serverProcessor` varchar(40) COLLATE utf8_unicode_ci NOT NULL, `serverRAM` varchar(10) COLLATE utf8_unicode_ci NOT NULL, `serverPort` int(10) NOT NULL, `serverTransfer` varchar(4) COLLATE utf8_unicode_ci NOT NULL) ENGINE=InnoDB DEFAULT CHARSET=utf8 COLLATE=utf8_unicode_ci;CREATE TABLE `serverLocations` ( `locationID` int(11) NOT NULL, `companyID` int(11) NOT NULL, `locationName` varchar(50) COLLATE utf8_unicode_ci NOT NULL, `locationLongitude` varchar(20) COLLATE utf8_unicode_ci NOT NULL, `locationLatitude` varchar(20) COLLATE utf8_unicode_ci NOT NULL) ENGINE=InnoDB DEFAULT CHARSET=utf8 COLLATE=utf8_unicode_ci;CREATE TABLE `serverOperatingSystems` ( `operatingSystemsID` int(11) NOT NULL, `operatingSystemsName` varchar(50) COLLATE utf8_unicode_ci NOT NULL) ENGINE=InnoDB DEFAULT CHARSET=utf8 COLLATE=utf8_unicode_ci;INSERT INTO `serverOperatingSystems` (`operatingSystemsID`, `operatingSystemsName`) VALUES(1, 'CentOS 5.10'),(2, 'CentOS 5.11'),(3, 'CentOS 5.5'),(4, 'CentOS 5.8'),(5, 'CentOS 5.9'),(6, 'CentOS 6.2'),(7, 'CentOS 6.3'),(8, 'CentOS 6.4'),(9, 'CentOS 6.5'),(10, 'CentOS 6.6'),(11, 'CentOS 6.9'),(12, 'CentOS 7.0'),(13, 'CentOS 7.1'),(14, 'CentOS 7.3'),(15,
```



```
(`attemptID`);ALTER TABLE `serverCommands` ADD PRIMARY KEY (`serverCommandID`), ADD KEY `serverCompany`(`serverCompany`), ADD KEY `serverOS`(`serverOS`);ALTER TABLE `serverInformation` ADD PRIMARY KEY (`serverID`), ADD KEY `serverLocation`(`serverLocation`), ADD KEY `serverOS`(`serverOS`), ADD KEY `serverCompanyOwner`(`serverCompany`), ADD KEY `serverPort`(`serverPort`);ALTER TABLE `serverLocations` ADD PRIMARY KEY (`locationID`), ADD KEY `companyID`(`companyID`), ADD KEY `locationName`(`locationName`);ALTER TABLE `serverOperatingSystems` ADD PRIMARY KEY (`operatingSystemsID`), ADD KEY `operatingSystemsName`(`operatingSystemsName`);ALTER TABLE `serverPort` ADD PRIMARY KEY (`portID`), ADD KEY `portSpeed`(`portSpeed`);ALTER TABLE `systemReplies` ADD PRIMARY KEY (`replyID`), ADD KEY `ticketID`(`ticketID`), ADD KEY `userID`(`userID`);ALTER TABLE `systemTickets` ADD PRIMARY KEY (`ticketID`), ADD KEY `userCompanyID`(`userCompanyID`), ADD KEY `ticketCustomer`(`ticketCustomer`);ALTER TABLE `userAccounts` ADD PRIMARY KEY (`userID`), ADD KEY `userRole`(`userRole`);ALTER TABLE `userCompanies` ADD PRIMARY KEY (`companyID`);ALTER TABLE `userPermissions` ADD PRIMARY KEY (`permID`);ALTER TABLE `backupNodeInformation` MODIFY `backupNodeID` int(11) NOT NULL AUTO_INCREMENT;ALTER TABLE `failedLoginAttempts` MODIFY `attemptID` int(11) NOT NULL AUTO_INCREMENT;ALTER TABLE `serverCommands` MODIFY `serverCommandID` int(11) NOT NULL AUTO_INCREMENT;ALTER TABLE `serverInformation` MODIFY `serverID` int(11) NOT NULL AUTO_INCREMENT;ALTER TABLE `serverLocations` MODIFY `locationID` int(11) NOT NULL AUTO_INCREMENT;ALTER TABLE `serverOperatingSystems` MODIFY `operatingSystemsID` int(11) NOT NULL AUTO_INCREMENT, AUTO_INCREMENT=54;ALTER TABLE `serverPort` MODIFY `portID` int(11) NOT NULL AUTO_INCREMENT, AUTO_INCREMENT=7;ALTER TABLE `systemReplies` MODIFY `replyID` int(11) NOT NULL AUTO_INCREMENT;ALTER TABLE `systemTickets` MODIFY `ticketID` int(11) NOT NULL AUTO_INCREMENT;ALTER TABLE `userAccounts` MODIFY `userID` int(11) NOT NULL AUTO_INCREMENT;ALTER TABLE `userCompanies` MODIFY `companyID` int(11) NOT NULL AUTO_INCREMENT;ALTER TABLE `userPermissions` MODIFY `permID` int(11) NOT NULL AUTO_INCREMENT, AUTO_INCREMENT=5;ALTER TABLE `backupNodeInformation` ADD CONSTRAINT `backupNodeInformation_ibfk_1` FOREIGN KEY (`backupNodeCompany`) REFERENCES `userCompanies`(`companyID`), ADD CONSTRAINT `backupNodeInformation_ibfk_2` FOREIGN KEY (`backupNodeLocation`) REFERENCES `serverLocations`(`locationID`), ADD CONSTRAINT `backupNodeInformation_ibfk_3` FOREIGN KEY (`backupNodeOS`) REFERENCES `serverOperatingSystems`(`operatingSystemsID`), ADD CONSTRAINT `backupNodeInformation_ibfk_4` FOREIGN KEY (`backupNodePort`) REFERENCES `serverPort`(`portID`);ALTER TABLE `serverCommands` ADD CONSTRAINT `serverCommands_ibfk_1` FOREIGN KEY (`serverCompany`) REFERENCES `userCompanies`(`companyID`), ADD CONSTRAINT `serverCommands_ibfk_2` FOREIGN KEY (`serverOS`) REFERENCES `serverOperatingSystems`(`operatingSystemsID`);ALTER TABLE `serverInformation` ADD CONSTRAINT `serverInformation_ibfk_1` FOREIGN KEY (`serverCompany`) REFERENCES `userCompanies`(`companyID`), ADD CONSTRAINT `serverInformation_ibfk_2` FOREIGN KEY (`serverLocation`) REFERENCES `serverLocations`(`locationID`), ADD CONSTRAINT `serverInformation_ibfk_3` FOREIGN KEY (`serverOS`) REFERENCES `serverOperatingSystems`(`operatingSystemsID`), ADD CONSTRAINT `serverInformation_ibfk_4` FOREIGN KEY (`serverPort`) REFERENCES `serverPort`(`portID`);ALTER TABLE `serverLocations` ADD CONSTRAINT `serverLocations_ibfk_1` FOREIGN KEY (`companyID`) REFERENCES `userCompanies`(`companyID`);ALTER TABLE `systemReplies` ADD CONSTRAINT `systemReplies_ibfk_1` FOREIGN KEY (`ticketID`) REFERENCES `systemTickets`(`ticketID`), ADD CONSTRAINT `systemReplies_ibfk_2` FOREIGN KEY (`userID`) REFERENCES `userAccounts`(`userID`);ALTER TABLE `systemTickets` ADD CONSTRAINT `systemTickets_ibfk_1` FOREIGN KEY (`ticketCustomer`) REFERENCES `userAccounts`(`userID`), ADD CONSTRAINT `systemTickets_ibfk_2` FOREIGN KEY (`userCompanyID`) REFERENCES `userCompanies`(`companyID`);ALTER TABLE `userAccounts` ADD CONSTRAINT `userAccounts_ibfk_2` FOREIGN KEY (`userRole`) REFERENCES `userPermissions`(`permID`);COMMIT;/*!40101 SET CHARACTER_SET_CLIENT=@OLD_CHARACTER_SET_CLIENT */;/*!40101 SET CHARACTER_SET_RESULTS=@OLD_CHARACTER_SET_RESULTS */;/*!40101 SET COLLATION_CONNECTION=@OLD_COLLATION_CONNECTION */;
```

connectionMySQL);
installIfNotFound.ExecuteNonQuery();
}
string xmlFile = "setup.xml";
//Set lines of XML file.
System.Xml.XmlDocument xmlDoc = new System.Xml.XmlDocument();
xmlDoc.Load(xmlFile);

```
        xmlDoc.SelectSingleNode("Settings/Setup").InnerText = "Yes";
        xmlDoc.SelectSingleNode("Settings/IP").InnerText = Hostname;
        xmlDoc.SelectSingleNode("Settings/Database").InnerText = Name;
        xmlDoc.SelectSingleNode("Settings/Username").InnerText = Username;
        xmlDoc.SelectSingleNode("Settings>Password").InnerText = Password;
        xmlDoc.Save(xmlFile);
        ConnectionString = "SERVER=" + Hostname + ";DATABASE=" + Name + ";UID=" + Username + ";PASSWORD=" + Password +
";";
        Hide();
        setupEmailConfiguration email = new setupEmailConfiguration();
        email.ShowDialog();
    }
else
{
    System.Windows.Forms.MessageBox.Show("Please enter data into the form.");
}
}
}
```

Subsection 3.6.3.v - setupEmailConfiguration.cs [design] - design view

Subsection 3.6.3.vi - setupEmailConfiguration.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class setupEmailConfiguration
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            System.ComponentModel.ComponentResourceManager resources = new
System.ComponentModel.ComponentResourceManager(this);
            this.logoImage = new System.Windows.Forms.PictureBox();
            this.lblWelcome = new System.Windows.Forms.Label();
            this.lblDescription = new System.Windows.Forms.Label();
            this.txtSMTPServer = new System.Windows.Forms.TextBox();
            this.lblHostname = new System.Windows.Forms.Label();
            this.txtSMTPPort = new System.Windows.Forms.TextBox();
            this.lblDatabaseName = new System.Windows.Forms.Label();
            this.btnInstall = new System.Windows.Forms.Button();
            this.txtEmailPassword = new System.Windows.Forms.TextBox();
            this.lblDatabasePassword = new System.Windows.Forms.Label();
        }
    }
}
```

```
this.txtEmailUsername = new System.Windows.Forms.TextBox();
this.lblEmailUsername = new System.Windows.Forms.Label();
((System.ComponentModel.ISupportInitialize)(this.logoImage)).BeginInit();
this.SuspendLayout();
//
// logoImage
//
this.logoImage.BackColor = System.Drawing.Color.Transparent;
this.logoImage.BackgroundImage = global::ELSM_Project.Properties.Resources.imgLogo;
this.logoImage.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.logoImage.Location = new System.Drawing.Point(287, 12);
this.logoImage.Name = "logoImage";
this.logoImage.Size = new System.Drawing.Size(118, 123);
this.logoImage.TabIndex = 1;
this.logoImage.TabStop = false;
//
// lblWelcome
//
this.lblWelcome.AutoSize = true;
this.lblWelcome.BackColor = System.Drawing.Color.Transparent;
this.lblWelcome.Font = new System.Drawing.Font("Raleway ExtraBold", 18F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblWelcome.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblWelcome.Location = new System.Drawing.Point(130, 154);
this.lblWelcome.Name = "lblWelcome";
this.lblWelcome.Size = new System.Drawing.Size(444, 29);
this.lblWelcome.TabIndex = 44;
this.lblWelcome.Text = "Welcome to the ELSM configuration!";
//
// lblDescription
//
this.lblDescription.AutoSize = true;
this.lblDescription.BackColor = System.Drawing.Color.Transparent;
this.lblDescription.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblDescription.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblDescription.Location = new System.Drawing.Point(60, 183);
this.lblDescription.Name = "lblDescription";
this.lblDescription.Size = new System.Drawing.Size(598, 30);
this.lblDescription.TabIndex = 45;
this.lblDescription.Text = "An open-source application for remote Linux server management, developed by Willi" +
"am Phillips.\r\nCommissioned initially for Encrypted Laser Limited.";
this.lblDescription.TextAlign = System.Drawing.ContentAlignment.TopCenter;
//
```

```
// txtSMTPServer
//
this.txtSMTPServer.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtSMTPServer.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtSMTPServer.Location = new System.Drawing.Point(245, 260);
this.txtSMTPServer.Name = "txtSMTPServer";
this.txtSMTPServer.Size = new System.Drawing.Size(413, 20);
this.txtSMTPServer.TabIndex = 47;
//
// lblHostname
//
this.lblHostname.AutoSize = true;
this.lblHostname.BackColor = System.Drawing.Color.Transparent;
this.lblHostname.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblHostname.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblHostname.Location = new System.Drawing.Point(60, 260);
this.lblHostname.Name = "lblHostname";
this.lblHostname.Size = new System.Drawing.Size(100, 18);
this.lblHostname.TabIndex = 46;
this.lblHostname.Text = "SMTP Server:";
//
// txtSMTPPort
//
this.txtSMTPPort.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtSMTPPort.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtSMTPPort.Location = new System.Drawing.Point(245, 286);
this.txtSMTPPort.Name = "txtSMTPPort";
this.txtSMTPPort.Size = new System.Drawing.Size(413, 20);
this.txtSMTPPort.TabIndex = 49;
//
// lblDatabaseName
//
this.lblDatabaseName.AutoSize = true;
this.lblDatabaseName.BackColor = System.Drawing.Color.Transparent;
this.lblDatabaseName.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblDatabaseName.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblDatabaseName.Location = new System.Drawing.Point(60, 286);
this.lblDatabaseName.Name = "lblDatabaseName";
this.lblDatabaseName.Size = new System.Drawing.Size(83, 18);
this.lblDatabaseName.TabIndex = 48;
this.lblDatabaseName.Text = "SMTP Port:";
//
```

```
// btnInstall
//
this.btnInstall.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnInstall.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnInstall.FlatAppearance.BorderSize = 0;
this.btnInstall.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnInstall.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnInstall.Location = new System.Drawing.Point(63, 375);
this.btnInstall.Name = "btnInstall";
this.btnInstall.Size = new System.Drawing.Size(595, 31);
this.btnInstall.TabIndex = 54;
this.btnInstall.Text = "Login";
this.btnInstall.UseVisualStyleBackColor = false;
this.btnInstall.Click += new System.EventHandler(this.btnInstall_Click);
//
// txtEmailPassword
//
this.txtEmailPassword.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtEmailPassword.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtEmailPassword.Location = new System.Drawing.Point(245, 338);
this.txtEmailPassword.Name = "txtEmailPassword";
this.txtEmailPassword.PasswordChar = '*';
this.txtEmailPassword.Size = new System.Drawing.Size(413, 20);
this.txtEmailPassword.TabIndex = 53;
//
// lblDatabasePassword
//
this.lblDatabasePassword.AutoSize = true;
this.lblDatabasePassword.BackColor = System.Drawing.Color.Transparent;
this.lblDatabasePassword.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblDatabasePassword.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblDatabasePassword.Location = new System.Drawing.Point(60, 338);
this.lblDatabasePassword.Name = "lblDatabasePassword";
this.lblDatabasePassword.Size = new System.Drawing.Size(119, 18);
this.lblDatabasePassword.TabIndex = 52;
this.lblDatabasePassword.Text = "Email Password:";
//
// txtEmailUsername
//
this.txtEmailUsername.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtEmailUsername.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtEmailUsername.Location = new System.Drawing.Point(245, 312);
```

```
this.txtEmailUsername.Name = "txtEmailUsername";
this.txtEmailUsername.Size = new System.Drawing.Size(413, 20);
this.txtEmailUsername.TabIndex = 51;
//
// lblEmailUsername
//
this.lblEmailUsername.AutoSize = true;
this.lblEmailUsername.BackColor = System.Drawing.Color.Transparent;
this.lblEmailUsername.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblEmailUsername.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblEmailUsername.Location = new System.Drawing.Point(60, 312);
this.lblEmailUsername.Name = "lblEmailUsername";
this.lblEmailUsername.Size = new System.Drawing.Size(125, 18);
this.lblEmailUsername.TabIndex = 55;
this.lblEmailUsername.Text = "Email Username:";
//
// setupEmailConfiguration
//
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(710, 433);
this.ControlBox = false;
this.Controls.Add(this.lblEmailUsername);
this.Controls.Add(this.btnInstall);
this.Controls.Add(this.txtEmailPassword);
this.Controls.Add(this.lblDatabasePassword);
this.Controls.Add(this.txtEmailUsername);
this.Controls.Add(this.txtSMTPPort);
this.Controls.Add(this.lblDatabaseName);
this.Controls.Add(this.txtSMTPServer);
this.Controls.Add(this.lblHostname);
this.Controls.Add(this.lblDescription);
this.Controls.Add(this.lblWelcome);
this.Controls.Add(this.logoImage);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.Icon = ((System.Drawing.Icon)(resources.GetObject("$this.Icon")));
this.MinimumSize = new System.Drawing.Size(544, 178);
this.Name = "setupEmailConfiguration";
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "Initial Setup";
((System.ComponentModel.ISupportInitialize)(this.logoImage)).EndInit();
```

```
this.ResumeLayout(false);
this.PerformLayout();

}

#endregion

private System.Windows.Forms.PictureBox logoImage;
private System.Windows.Forms.Label lblWelcome;
private System.Windows.Forms.Label lblDescription;
private System.Windows.Forms.TextBox txtSMTPServer;
private System.Windows.Forms.Label lblHostname;
private System.Windows.Forms.TextBox txtSMTPPort;
private System.Windows.Forms.Label lblDatabaseName;
private System.Windows.Forms.Button btnInstall;
private System.Windows.Forms.TextBox txtEmailPassword;
private System.Windows.Forms.Label lblDatabasePassword;
private System.Windows.Forms.TextBox txtEmailUsername;
private System.Windows.Forms.Label lblEmailUsername;

}
```

Subsection 3.6.3.vii - setupEmailConfiguration.cs - Code file - annotated

```
using System;
using System.Windows.Forms;

namespace ELSM_Project
{
    public partial class setupEmailConfiguration : Form
    {
        public setupEmailConfiguration()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        public static string SMTPServer, SMTPPort, EmailUsername, EmailPass;

        private void btnInstall_Click(object sender, EventArgs e)
        {
            //If entered text isn't blank, set variables to match data inserted into the form. Else, output messagebox.
            if ((txtSMTPPort.Text != "") && (txtSMTPServer.Text != "") && (txtEmailPassword.Text != "") && (txtEmailUsername.Text != ""))
            {
                SMTPPort = txtSMTPPort.Text;
                SMTPServer = txtSMTPServer.Text;
                EmailPass = txtEmailPassword.Text;
                EmailUsername = txtEmailUsername.Text;
                Hide();
                setupCompanyCreate company = new setupCompanyCreate();
                company.ShowDialog();
            }
            else
            {
                System.Windows.Forms.MessageBox.Show("Please enter data into the form.");
            }
        }
    }
}
```

Subsection 3.6.3.viii - setupCompanyCreate.cs [design] - design view



Subsection 3.6.3.ix - setupCompanyCreate.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class setupCompanyCreate
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            System.ComponentModel.ComponentResourceManager resources = new
System.ComponentModel.ComponentResourceManager(resources = new
this.logoImage = new System.Windows.Forms.PictureBox();
this.lblWelcome = new System.Windows.Forms.Label();
this.lblDescription = new System.Windows.Forms.Label();
this.txtName = new System.Windows.Forms.TextBox();
this.lblHostname = new System.Windows.Forms.Label();
this.btnCreate = new System.Windows.Forms.Button();
((System.ComponentModel.ISupportInitialize)(this.logoImage)).BeginInit();
this.SuspendLayout();
//
// logoImage
//
```

```
//  
this.logoImage.BackColor = System.Drawing.Color.Transparent;  
this.logoImage.BackgroundImage = global::ELSM_Project.Properties.Resources.imgLogo;  
this.logoImage.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;  
this.logoImage.Location = new System.Drawing.Point(287, 12);  
this.logoImage.Name = "logoImage";  
this.logoImage.Size = new System.Drawing.Size(118, 123);  
this.logoImage.TabIndex = 1;  
this.logoImage.TabStop = false;  
//  
// lblWelcome  
//  
this.lblWelcome.AutoSize = true;  
this.lblWelcome.BackColor = System.Drawing.Color.Transparent;  
this.lblWelcome.Font = new System.Drawing.Font("Raleway ExtraBold", 18F, System.Drawing.FontStyle.Bold,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.lblWelcome.ForeColor = System.Drawing.SystemColors.ControlLightLight;  
this.lblWelcome.Location = new System.Drawing.Point(196, 154);  
this.lblWelcome.Name = "lblWelcome";  
this.lblWelcome.Size = new System.Drawing.Size(311, 29);  
this.lblWelcome.TabIndex = 44;  
this.lblWelcome.Text = "Configuring a Company";  
//  
// lblDescription  
//  
this.lblDescription.AutoSize = true;  
this.lblDescription.BackColor = System.Drawing.Color.Transparent;  
this.lblDescription.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.lblDescription.ForeColor = System.Drawing.SystemColors.ControlLightLight;  
this.lblDescription.Location = new System.Drawing.Point(60, 183);  
this.lblDescription.Name = "lblDescription";  
this.lblDescription.Size = new System.Drawing.Size(598, 30);  
this.lblDescription.TabIndex = 45;  
this.lblDescription.Text = "An open-source application for remote Linux server management, developed by Willi" +  
"am Phillips.\r\nCommissioned initially for Encrypted Laser Limited.";  
this.lblDescription.TextAlign = System.Drawing.ContentAlignment.TopCenter;  
//  
// txtName  
//  
this.txtName.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;  
this.txtName.Cursor = System.Windows.Forms.Cursors.IBeam;  
this.txtName.Location = new System.Drawing.Point(245, 260);  
this.txtName.Name = "txtName";
```

```
this.txtName.Size = new System.Drawing.Size(413, 20);
this.txtName.TabIndex = 47;
//
// lblHostname
//
this.lblHostname.AutoSize = true;
this.lblHostname.BackColor = System.Drawing.Color.Transparent;
this.lblHostname.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblHostname.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblHostname.Location = new System.Drawing.Point(60, 260);
this.lblHostname.Name = "lblHostname";
this.lblHostname.Size = new System.Drawing.Size(125, 18);
this.lblHostname.TabIndex = 46;
this.lblHostname.Text = "Company Name:";
//
// btnCreate
//
this.btnCreate.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnCreate.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnCreate.FlatAppearance.BorderSize = 0;
this.btnCreate.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnCreate.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCreate.Location = new System.Drawing.Point(63, 310);
this.btnCreate.Name = "btnCreate";
this.btnCreate.Size = new System.Drawing.Size(595, 31);
this.btnCreate.TabIndex = 54;
this.btnCreate.Text = "Create";
this.btnCreate.UseVisualStyleBackColor = false;
this.btnCreate.Click += new System.EventHandler(this.btnCreate_Click);
//
// setupCompanyCreate
//
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(710, 373);
this.ControlBox = false;
this.Controls.Add(this.btnCreate);
this.Controls.Add(this.txtName);
this.Controls.Add(this.lblHostname);
this.Controls.Add(this.lblDescription);
```

```
this.Controls.Add(this.lblWelcome);
this.Controls.Add(this.logoImage);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.Icon = ((System.Drawing.Icon)(resources.GetObject("$this.Icon")));
this.MinimumSize = new System.Drawing.Size(544, 178);
this.Name = "setupCompanyCreate";
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "Initial Setup";
((System.ComponentModel.ISupportInitialize)Initialize(this.logoImage)).EndInit();
this.ResumeLayout(false);
this.PerformLayout();

}

#endregion

private System.Windows.Forms.PictureBox logoImage;
private System.Windows.Forms.Label lblWelcome;
private System.Windows.Forms.Label lblDescription;
private System.Windows.Forms.TextBox txtName;
private System.Windows.Forms.Label lblHostname;
private System.Windows.Forms.Button btnCreate;
}
```

Subsection 3.6.3.x - setupCompanyCreate.cs - Code file - annotated

```
using System;
using System.Windows.Forms;
using MySql.Data.MySqlClient;

namespace ELSM_Project
{
    public partial class setupCompanyCreate : Form
    {
        public setupCompanyCreate()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        private void btnCreate_Click(object sender, EventArgs e)
        {
            //If entered text isn't blank, insert new row into the database table userCompanies. Else, output messagebox.
            if (txtName.Text != "")
            {
                MySqlConnection connectionMySQL = new MySqlConnection(setupDatabase.ConnectionString);
                connectionMySQL.Open();
                MySqlCommand createCompany = new MySqlCommand("INSERT INTO userCompanies (companyName, OwnerID) VALUES (@CompanyName, '1')", connectionMySQL);
                createCompany.Parameters.AddWithValue("@CompanyName", txtName.Text);
                createCompany.ExecuteNonQuery();
                connectionMySQL.Close();
                Hide();
                setupUserCreate user = new setupUserCreate();
                user.ShowDialog();
            }
            else
            {
                System.Windows.Forms.MessageBox.Show("Please enter data into the form.");
            }
        }
    }
}
```

Subsection 3.6.3.xi - setupUserCreate.cs [design] - design view

Initial Setup



Configuring an Admin Account

An open-source application for remote Linux server management, developed by William Phillips.
Commissioned initially for Encrypted Laser Limited.

Username:

Password:

Confirm Password:

Forename:

Surname:

Email Address:

Profile Image URL:

Subsection 3.6.3.xii - setupUserCreate.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class setupUserCreate
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            System.ComponentModel.ComponentResourceManager resources = new
System.ComponentModel.ComponentResourceManager(this);
            this.logoImage = new System.Windows.Forms.PictureBox();
            this.lblWelcome = new System.Windows.Forms.Label();
            this.lblDescription = new System.Windows.Forms.Label();
            this.txtUsername = new System.Windows.Forms.TextBox();
            this.lblUsername = new System.Windows.Forms.Label();
            this.btnCreate = new System.Windows.Forms.Button();
            this.txtPassword = new System.Windows.Forms.TextBox();
            this.lblPassword = new System.Windows.Forms.Label();
            this.txtConfirmPass = new System.Windows.Forms.TextBox();
            this.lblConfirm = new System.Windows.Forms.Label();
        }
    }
}
```

```
this.txtForename = new System.Windows.Forms.TextBox();
this.lblForname = new System.Windows.Forms.Label();
this.txtSurname = new System.Windows.Forms.TextBox();
this.lblSurname = new System.Windows.Forms.Label();
this.txtEmail = new System.Windows.Forms.TextBox();
this.lblEmail = new System.Windows.Forms.Label();
this.txtProfileImage = new System.Windows.Forms.TextBox();
this.lblProfileImage = new System.Windows.Forms.Label();
((System.ComponentModel.ISupportInitialize)(this.logoImage)).BeginInit();
this.SuspendLayout();
//
// logoImage
//
this.logoImage.BackColor = System.Drawing.Color.Transparent;
this.logoImage.BackgroundImage = global::ELSM_Project.Properties.Resources.imgLogo;
this.logoImage.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.logoImage.Location = new System.Drawing.Point(287, 12);
this.logoImage.Name = "logoImage";
this.logoImage.Size = new System.Drawing.Size(118, 123);
this.logoImage.TabIndex = 1;
this.logoImage.TabStop = false;
//
// lblWelcome
//
this.lblWelcome.AutoSize = true;
this.lblWelcome.BackColor = System.Drawing.Color.Transparent;
this.lblWelcome.Font = new System.Drawing.Font("Raleway ExtraBold", 18F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblWelcome.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblWelcome.Location = new System.Drawing.Point(153, 154);
this.lblWelcome.Name = "lblWelcome";
this.lblWelcome.Size = new System.Drawing.Size(393, 29);
this.lblWelcome.TabIndex = 44;
this.lblWelcome.Text = "Configurating an Admin Account";
//
// lblDescription
//
this.lblDescription.AutoSize = true;
this.lblDescription.BackColor = System.Drawing.Color.Transparent;
this.lblDescription.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblDescription.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblDescription.Location = new System.Drawing.Point(60, 183);
this.lblDescription.Name = "lblDescription";
```

```
this.lblDescription.Size = new System.Drawing.Size(598, 30);
this.lblDescription.TabIndex = 45;
this.lblDescription.Text = "An open-source application for remote Linux server management, developed by Willi" +
"am Phillips.\r\nCommissioned initially for Encrypted Laser Limited.";
this.lblDescription.TextAlign = System.Drawing.ContentAlignment.TopCenter;
//
// txtUsername
//
this.txtUsername.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtUsername.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtUsername.Location = new System.Drawing.Point(245, 260);
this.txtUsername.Name = "txtUsername";
this.txtUsername.Size = new System.Drawing.Size(413, 20);
this.txtUsername.TabIndex = 47;
//
// lblUsername
//
this.lblUsername.AutoSize = true;
this.lblUsername.BackColor = System.Drawing.Color.Transparent;
this.lblUsername.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblUsername.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblUsername.Location = new System.Drawing.Point(60, 260);
this.lblUsername.Name = "lblUsername";
this.lblUsername.Size = new System.Drawing.Size(83, 18);
this.lblUsername.TabIndex = 46;
this.lblUsername.Text = "Username:";
//
// btnCreate
//
this.btnCreate.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnCreate.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnCreate.FlatAppearance.BorderSize = 0;
this.btnCreate.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnCreate.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCreate.Location = new System.Drawing.Point(63, 476);
this.btnCreate.Name = "btnCreate";
this.btnCreate.Size = new System.Drawing.Size(595, 31);
this.btnCreate.TabIndex = 54;
this.btnCreate.Text = "Create";
this.btnCreate.UseVisualStyleBackColor = false;
this.btnCreate.Click += new System.EventHandler(this.btnCreate_Click);
//
```

```
// txtPassword
//
this.txtPassword.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtPassword.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtPassword.Location = new System.Drawing.Point(245, 286);
this.txtPassword.Name = "txtPassword";
this.txtPassword.PasswordChar = '*';
this.txtPassword.Size = new System.Drawing.Size(413, 20);
this.txtPassword.TabIndex = 56;
//
// lblPassword
//
this.lblPassword.AutoSize = true;
this.lblPassword.BackColor = System.Drawing.Color.Transparent;
this.lblPassword.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblPassword.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblPassword.Location = new System.Drawing.Point(60, 286);
this.lblPassword.Name = "lblPassword";
this.lblPassword.Size = new System.Drawing.Size(77, 18);
this.lblPassword.TabIndex = 55;
this.lblPassword.Text = "Password:";
//
// txtConfirmPass
//
this.txtConfirmPass.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtConfirmPass.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtConfirmPass.Location = new System.Drawing.Point(245, 312);
this.txtConfirmPass.Name = "txtConfirmPass";
this.txtConfirmPass.PasswordChar = '*';
this.txtConfirmPass.Size = new System.Drawing.Size(413, 20);
this.txtConfirmPass.TabIndex = 58;
//
// lblConfirm
//
this.lblConfirm.AutoSize = true;
this.lblConfirm.BackColor = System.Drawing.Color.Transparent;
this.lblConfirm.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblConfirm.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblConfirm.Location = new System.Drawing.Point(60, 312);
this.lblConfirm.Name = "lblConfirm";
this.lblConfirm.Size = new System.Drawing.Size(136, 18);
this.lblConfirm.TabIndex = 57;
```

```
this.lblConfirm.Text = "Confirm Password:";  
//  
// txtForename  
//  
this.txtForename.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;  
this.txtForename.Cursor = System.Windows.Forms.Cursors.IBeam;  
this.txtForename.Location = new System.Drawing.Point(245, 338);  
this.txtForename.Name = "txtForename";  
this.txtForename.Size = new System.Drawing.Size(413, 20);  
this.txtForename.TabIndex = 60;  
//  
// lblForename  
//  
this.lblForename.AutoSize = true;  
this.lblForename.BackColor = System.Drawing.Color.Transparent;  
this.lblForename.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.lblForename.ForeColor = System.Drawing.SystemColors.ControlLightLight;  
this.lblForename.Location = new System.Drawing.Point(60, 338);  
this.lblForename.Name = "lblForename";  
this.lblForename.Size = new System.Drawing.Size(82, 18);  
this.lblForename.TabIndex = 59;  
this.lblForename.Text = "Forename:";  
//  
// txtSurname  
//  
this.txtSurname.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;  
this.txtSurname.Cursor = System.Windows.Forms.Cursors.IBeam;  
this.txtSurname.Location = new System.Drawing.Point(245, 364);  
this.txtSurname.Name = "txtSurname";  
this.txtSurname.Size = new System.Drawing.Size(413, 20);  
this.txtSurname.TabIndex = 62;  
//  
// lblSurname  
//  
this.lblSurname.AutoSize = true;  
this.lblSurname.BackColor = System.Drawing.Color.Transparent;  
this.lblSurname.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.lblSurname.ForeColor = System.Drawing.SystemColors.ControlLightLight;  
this.lblSurname.Location = new System.Drawing.Point(60, 364);  
this.lblSurname.Name = "lblSurname";  
this.lblSurname.Size = new System.Drawing.Size(74, 18);  
this.lblSurname.TabIndex = 61;
```

```
this.lblSurname.Text = "Surname:";  
//  
// txtEmail  
//  
this.txtEmail.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;  
this.txtEmail.Cursor = System.Windows.Forms.Cursors.IBeam;  
this.txtEmail.Location = new System.Drawing.Point(245, 390);  
this.txtEmail.Name = "txtEmail";  
this.txtEmail.Size = new System.Drawing.Size(413, 20);  
this.txtEmail.TabIndex = 64;  
//  
// lblEmail  
//  
this.lblEmail.AutoSize = true;  
this.lblEmail.BackColor = System.Drawing.Color.Transparent;  
this.lblEmail.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.lblEmail.ForeColor = System.Drawing.SystemColors.ControlLightLight;  
this.lblEmail.Location = new System.Drawing.Point(60, 390);  
this.lblEmail.Name = "lblEmail";  
this.lblEmail.Size = new System.Drawing.Size(109, 18);  
this.lblEmail.TabIndex = 63;  
this.lblEmail.Text = "Email Address:";  
//  
// txtProfileImage  
//  
this.txtProfileImage.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;  
this.txtProfileImage.Cursor = System.Windows.Forms.Cursors.IBeam;  
this.txtProfileImage.Location = new System.Drawing.Point(245, 416);  
this.txtProfileImage.Name = "txtProfileImage";  
this.txtProfileImage.Size = new System.Drawing.Size(413, 20);  
this.txtProfileImage.TabIndex = 66;  
//  
// lblProfileImage  
//  
this.lblProfileImage.AutoSize = true;  
this.lblProfileImage.BackColor = System.Drawing.Color.Transparent;  
this.lblProfileImage.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.lblProfileImage.ForeColor = System.Drawing.SystemColors.ControlLightLight;  
this.lblProfileImage.Location = new System.Drawing.Point(60, 416);  
this.lblProfileImage.Name = "lblProfileImage";  
this.lblProfileImage.Size = new System.Drawing.Size(137, 18);  
this.lblProfileImage.TabIndex = 65;
```

```
this.lblProfileImage.Text = "Profile Image URL:";  
//  
// setupUserCreate  
//  
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);  
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;  
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;  
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;  
this.ClientSize = new System.Drawing.Size(710, 533);  
this.ControlBox = false;  
this.Controls.Add(this.txtProfileImage);  
this.Controls.Add(this.lblProfileImage);  
this.Controls.Add(this.txtEmail);  
this.Controls.Add(this.lblEmail);  
this.Controls.Add(this.txtSurname);  
this.Controls.Add(this.lblSurname);  
this.Controls.Add(this.txtForename);  
this.Controls.Add(this.lblForename);  
this.Controls.Add(this.txtConfirmPass);  
this.Controls.Add(this.lblConfirm);  
this.Controls.Add(this.txtPassword);  
this.Controls.Add(this.lblPassword);  
this.Controls.Add(this.btnCreate);  
this.Controls.Add(this.txtUsername);  
this.Controls.Add(this.lblUsername);  
this.Controls.Add(this.lblDescription);  
this.Controls.Add(this.lblWelcome);  
this.Controls.Add(this.logoImage);  
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;  
this.Icon = ((System.Drawing.Icon)(resources.GetObject("$this.Icon")));  
this.MinimumSize = new System.Drawing.Size(544, 178);  
this.Name = "setupUserCreate";  
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;  
this.Text = "Initial Setup";  
this.Load += new System.EventHandler(this.setupUserCreate_Load);  
((System.ComponentModel.ISupportInitialize)(this.logoImage)).EndInit();  
this.ResumeLayout(false);  
this.PerformLayout();  
  
}  
  
#endregion  
  
private System.Windows.Forms.PictureBox logoImage;
```

```
private System.Windows.Forms.Label lblWelcome;
private System.Windows.Forms.Label lblDescription;
private System.Windows.Forms.TextBox txtUsername;
private System.Windows.Forms.Label lblUsername;
private System.Windows.Forms.Button btnCreate;
private System.Windows.Forms.TextBox txtPassword;
private System.Windows.Forms.Label lblPassword;
private System.Windows.Forms.TextBox txtConfirmPass;
private System.Windows.Forms.Label lblConfirm;
private System.Windows.Forms.TextBox txtForename;
private System.Windows.Forms.Label lblForename;
private System.Windows.Forms.TextBox txtSurname;
private System.Windows.Forms.Label lblSurname;
private System.Windows.Forms.TextBox txtEmail;
private System.Windows.Forms.Label lblEmail;
private System.Windows.Forms.TextBox txtProfileImage;
private System.Windows.Forms.Label lblProfileImage;
}

}
```

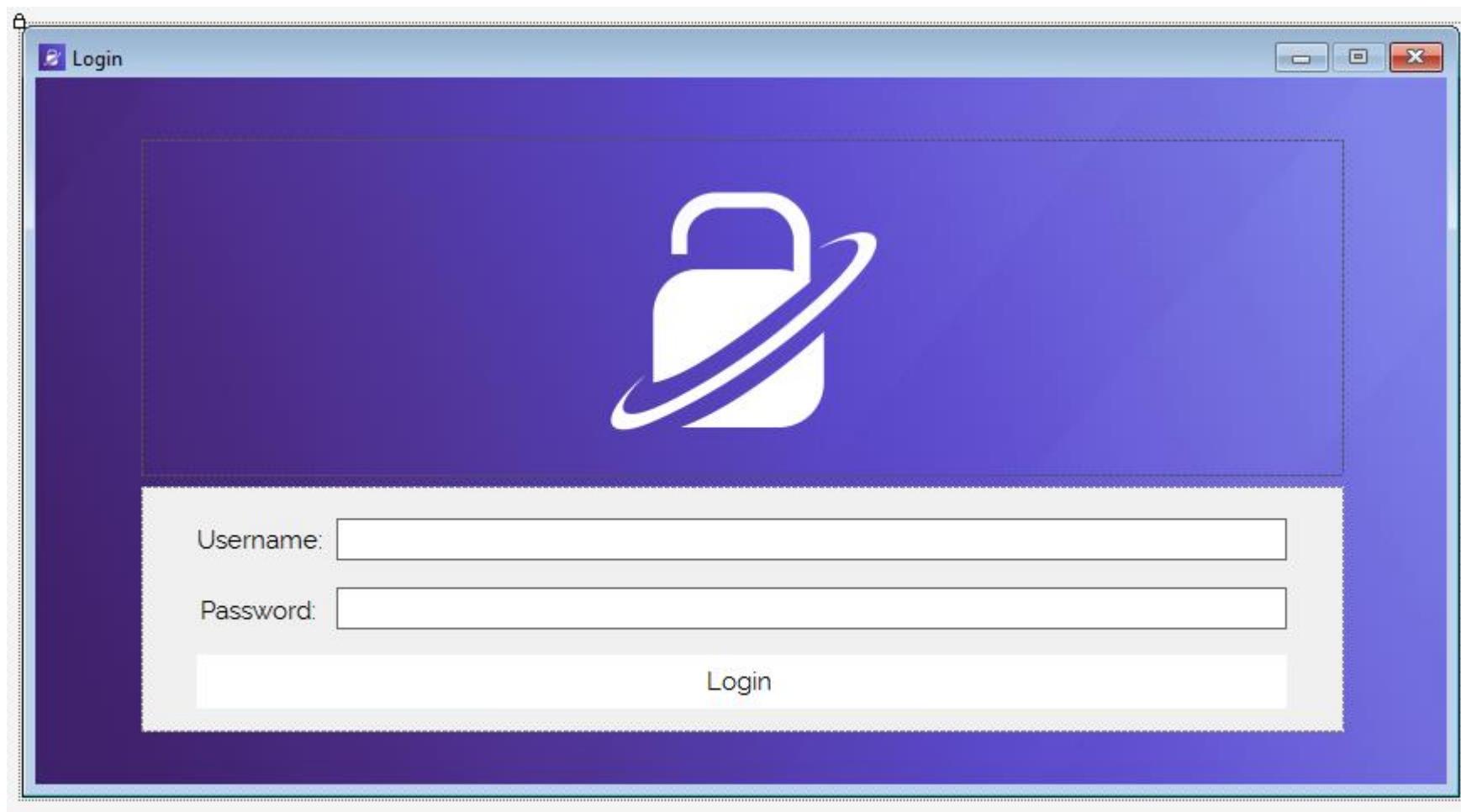
Subsection 3.6.3.xiii - setupUserCreate.cs - Code file - annotated

```
using System;
using System.Windows.Forms;
using MySql.Data.MySqlClient;
using System.Net;
using System.Net.Mail;
using Hashing.PasswordManagement;

namespace ELSM_Project
{
    public partial class setupUserCreate : Form
    {
        public setupUserCreate()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        private void btnCreate_Click(object sender, EventArgs e)
        {
            //If two values entered match, and txtPassword is not blank execute. Else output messagebox.
            if ((txtPassword.Text == txtConfirmPass.Text) && (txtPassword.Text != ""))
            {
                //Connect to MySQL and insert row into userAccounts as admin.
                MySqlConnection connectionMySQL = new MySqlConnection(setupDatabase.ConnectionString);
                connectionMySQL.Open();
                MySqlCommand createAdmin = new MySqlCommand("INSERT INTO userAccounts (userLogin, userPassword, userForename, userSurname, userEmailAddress, userImage, userCompany, userRole) VALUES (@userLogin, @userPassword, @userForename, @userSurname, @userEmailAddress, @userImage, @userCompany, @userRole)", connectionMySQL);
                String EnteredPassword = SHA.GenerateSHA512String(loginMenu.userSalt + txtPassword.Text);
                createAdmin.Parameters.AddWithValue("@userLogin", txtUsername.Text);
                createAdmin.Parameters.AddWithValue("@userPassword", EnteredPassword);
                createAdmin.Parameters.AddWithValue("@userForename", txtForename.Text);
                createAdmin.Parameters.AddWithValue("@userSurname", txtSurname.Text);
                createAdmin.Parameters.AddWithValue("@userEmailAddress", txtEmail.Text);
                createAdmin.Parameters.AddWithValue("@userImage", txtProfileImage.Text);
                createAdmin.Parameters.AddWithValue("@userCompany", "1");
                createAdmin.Parameters.AddWithValue("@userRole", "1");
                string fromEmail = txtEmail.Text;
                // Try emailing user with login details for SMTP server. Else display messagebox.
                try
                {
```

```
        MailMessage mailMessage = new MailMessage(fromEmail, txtEmail.Text, "ELSM Management System Installed", "This  
is confirmation that your installation of your server management panel has been completed.");  
        SmtpClient smtpClient = new SmtpClient(setupEmailConfiguration.SMTPServer,  
Convert.ToInt16(setupEmailConfiguration.SMTPPort));  
        smtpClient.EnableSsl = true;  
        smtpClient.UseDefaultCredentials = false;  
        smtpClient.Credentials = new NetworkCredential(fromEmail, setupEmailConfiguration.EmailPass);  
        smtpClient.Send(mailMessage);  
    }  
    catch (Exception ex)  
{  
        System.Windows.Forms.MessageBox.Show(Convert.ToString(ex));  
}  
    createAdmin.ExecuteNonQuery();  
    connectionMySQL.Close();  
    Hide();  
    loginMenu login = new loginMenu();  
    login.ShowDialog();  
}  
else  
{  
    System.Windows.Forms.MessageBox.Show("Passwords did not match.");  
}  
}  
}
```

Subsection 3.6.3.xiv - loginMenu.cs [design] – design view

Subsection 3.6.3.xv - loginMenu.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class loginMenu
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            System.ComponentModel.ComponentResourceManager resources = new
System.ComponentModel.ComponentResourceManager(resources = new
this.loginBackgroundBox = new System.Windows.Forms.PictureBox();
this.txtPassword = new System.Windows.Forms.TextBox();
this.txtUsername = new System.Windows.Forms.TextBox();
this.btnLogin = new System.Windows.Forms.Button();
this.ELHSLogo = new System.Windows.Forms.PictureBox();
this.lblPassword = new System.Windows.Forms.Label();
this.lblUsername = new System.Windows.Forms.Label();
((System.ComponentModel.ISupportInitialize)(this.loginBackgroundBox)).BeginInit();
((System.ComponentModel.ISupportInitialize)(this.ELHSLogo)).BeginInit();
this.SuspendLayout();

```

```
//  
// loginBackgroundBox  
//  
this.loginBackgroundBox.Location = new System.Drawing.Point(63, 243);  
this.loginBackgroundBox.Name = "loginBackgroundBox";  
this.loginBackgroundBox.Size = new System.Drawing.Size(715, 146);  
this.loginBackgroundBox.TabIndex = 0; // Set variable to 0  
this.loginBackgroundBox.TabStop = false;  
//  
// txtPassword  
//  
this.txtPassword.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;  
this.txtPassword.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.txtPassword.HideSelection = false;  
this.txtPassword.Location = new System.Drawing.Point(179, 303);  
this.txtPassword.Name = "txtPassword";  
this.txtPassword.PasswordChar = '*';  
this.txtPassword.ShortcutsEnabled = false;  
this.txtPassword.Size = new System.Drawing.Size(565, 25);  
this.txtPassword.TabIndex = 2;  
this.txtPassword.WordWrap = false;  
//  
// txtUsername  
//  
this.txtUsername.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;  
this.txtUsername.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.txtUsername.Location = new System.Drawing.Point(179, 262);  
this.txtUsername.Name = "txtUsername";  
this.txtUsername.Size = new System.Drawing.Size(565, 25);  
this.txtUsername.TabIndex = 1;  
this.txtUsername.WordWrap = false;  
//  
// btnLogin  
//  
this.btnLogin.BackColor = System.Drawing.SystemColors.ControlLightLight;  
this.btnLogin.Cursor = System.Windows.Forms.Cursors.Hand;  
this.btnLogin.FlatAppearance.BorderSize = 0; // Set variable to 0  
this.btnLogin.FlatStyle = System.Windows.Forms.FlatStyle.Flat;  
this.btnLogin.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.btnLogin.Location = new System.Drawing.Point(96, 343);  
this.btnLogin.Name = "btnLogin";
```

```
this.btnLogin.Size = new System.Drawing.Size(648, 32);
this.btnLogin.TabIndex = 3;
this.btnLogin.Text = "Login";
this.btnLogin.UseVisualStyleBackColor = false;
this.btnLogin.Click += new System.EventHandler(this.loginBtn_Click);
//
// ELHSLogo
//
this.ELHSLogo.BackColor = System.Drawing.Color.Transparent;
this.ELHSLogo.BackgroundImage = global::ELSM_Project.Properties.Resources.imgLogo;
this.ELHSLogo.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Zoom;
this.ELHSLogo.Location = new System.Drawing.Point(63, 37);
this.ELHSLogo.Name = "ELHSLogo";
this.ELHSLogo.Size = new System.Drawing.Size(715, 200);
this.ELHSLogo.TabIndex = 4;
this.ELHSLogo.TabStop = false;
//
// lblPassword
//
this.lblPassword.AutoSize = true;
this.lblPassword.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblPassword.Location = new System.Drawing.Point(95, 308);
this.lblPassword.Name = "lblPassword";
this.lblPassword.Size = new System.Drawing.Size(77, 18);
this.lblPassword.TabIndex = 5;
this.lblPassword.Text = "Password:";
//
// lblUsername
//
this.lblUsername.AutoSize = true;
this.lblUsername.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblUsername.Location = new System.Drawing.Point(93, 266);
this.lblUsername.Name = "lblUsername";
this.lblUsername.Size = new System.Drawing.Size(83, 18);
this.lblUsername.TabIndex = 6;
this.lblUsername.Text = "Username:";
//
// loginMenu
//
this.AutoScaleDimensions = new System.Drawing.SizeF(8F, 17F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
```

```
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(839, 420);
this.Controls.Add(this.lblUsername);
this.Controls.Add(this.lblPassword);
this.Controls.Add(this.EHHSLogo);
this.Controls.Add(this.btnLogin);
this.Controls.Add(this.txtUsername);
this.Controls.Add(this.txtPassword);
this.Controls.Add(this.loginBackgroundBox);
this.Font = new System.Drawing.Font("Arial", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.Icon = ((System.Drawing.Icon)(resources.GetObject("$this.Icon")));
this.Margin = new System.Windows.Forms.Padding(4);
this.MaximizeBox = false;
this.MaximumSize = new System.Drawing.Size(855, 459);
this.MinimumSize = new System.Drawing.Size(855, 459);
this.Name = "loginMenu";
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "Login";
this.Load += new System.EventHandler(this.loginFRM_Load);
((System.ComponentModel.ISupportInitialize)loginBackgroundBox).EndInit();
((System.ComponentModel.ISupportInitialize)EHHSLogo).EndInit();
this.ResumeLayout(false);
this.PerformLayout();

}

#endif

private System.Windows.Forms.PictureBox loginBackgroundBox;
private System.Windows.Forms.TextBox txtPassword;
private System.Windows.Forms.TextBox txtUsername;
private System.Windows.Forms.Button btnLogin;
private System.Windows.Forms.PictureBox EHHSLogo;
private System.Windows.Forms.Label lblPassword;
private System.Windows.Forms.Label lblUsername;
}
```

Subsection 3.6.3.xvi - loginMenu.cs - Code file - annotated

```
using System;
using System.Windows.Forms;
using MySql.Data.MySqlClient;
using System.Net;
using System.Xml;
using System.Text.RegularExpressions;
using System.Security.Cryptography;
using System.IO;
using System.Text;
using Hashing.PasswordManagement;

namespace ELSM_Project
{
    public partial class loginMenu : Form
    {
        //Define global variables for use within the program.
        public static string IPAddress, Forename, Surname, CompanyID, CompanyName, EmailAddress, ProfileImage, Role, UserID,
        Username, Password, externalIP, userLogin, userPassword;
        public static Boolean permChangePassword, permChangeUsername, permChangeEmail, permViewServers, permEditServers,
        permDeleteServers, permViewLocations, permEditLocations, permDeleteLocations, permCreateTicket, permAdminTicket, permCloseTicket,
        permViewServerPass, permEditServerPass, permAddAction, permEditAction, permDeleteAction, permAddServerNote, permRunCustomAction,
        permAdminViewUsers, permAdminEditUserInfo, permAdminForcePassReset, permAdminAddUser, permAdminDelUser,
        permAdminChangePermissions, permControlServers, checkpointReached, permManageBackupSystem, permCreateLocation, permCreateServer;
        public static string ConnectionString;
        public static string userSalt =
"pFMQk3VmLdES6rw9bzJFyrh2422cyZCpWT9nzNxBAZEKWgc7vnbhFLxPsp4hcYX2FWRQtRVQm6quQ2EtvgRs9kZjB4pTPvmMGMgZqFFggxUG5TzXGtMHKP7F9svCxnj
kTpxyudQVLgKr77UnUwEauLpu9ybmaDyuZpjW95dT5ReE5qU4s68jC8sbtZNda2s8rZ2RdA3Lcyfkmqh5EMjFZsZXD9kFRFvhkwGFD2Y6NJwNy3RxBMkW6b8qjnhe7uNN
QUv7rL6eMWUWDytZBgwP4DbX9XxDpuJHPFtxzvTLh6rrrFzmKcBy8hCspcPnGDwkShr8A48yKwtMHpdCv85BJajFJtyEXWjkGfpLeWNT3dLBT6RRadvxRv5u25tvdB8LE
56y2468xLhpCDSmxWFNfACnHmkZY2MSKeChJDwNjss27yY8vqlmmmWGf2L6wgUuXngPTLRnAU6jnajF3ZgqsP9G6JutgHmnYxJDJ6rNg5Zwc7hNzFZwnZ6w2eDYTgvzQV
W2vWBhwCbhTz2KRX5uj63buW7HEun8KWzfYdCQQWazLHGL5KxE4aggQWKnD8Dr5Z23rptegS7n3YN5gwkxKnt5VwxWgtUBLcsGdjP3bdZF94ZH2V7yvkvj8n6PPuqHzy
Wxp6FD2bt6ZkEeAaUhsHwLKqHpntYdPwRN84NvscqzrWtDV3n39KudrJtc5y42gfNR44XCT4Jp2PW3rPcDg7NY2tjBtt4ANe4zRq8v83sa99s6sxmWgSaT4MnrqTgMgs2
CuvJYn9RWh5gBzTdeG4nnEuNhpnfBjLPQCu6B3hB2qM3hNvVZkBs56E2YyNPtSKvrXMXdNafsPDkpSUYjY2qjvfYfa2SYY34j3rVGdCHWBsH5sq2tVFJHEzjqWwy8Uvc
hGpUauJeMrh7F4E9M9dR6ak5JvLaCcYcLPBq3fWn3NETrHWSY58T4WpNzMc2BuMC4hDQeuQFZjSXuHfyZk6mTU69Z2dpd7emB2TRZ8LYV3Bg6zczdUpWXsJ96A";

        public loginMenu()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        private void loginFRM_Load(object sender, EventArgs e)
```

```
{  
    //Configure program to use updated version of TLS.  
    ServicePointManager.Expect100Continue = true;  
    ServicePointManager.SecurityProtocol = SecurityProtocolType.Tls12;  
    //Get IP address of computer being used to access the program.  
    externalIP = (new Regex(@"\d{1,3}\.\d{1,3}\.\d{1,3}\.\d{1,3}")).Matches((new  
    WebClient()).DownloadString("http://www.metallicgloss.com/functions/ip.php"))[0].ToString();  
    loginMenu.IPAddress = externalIP;  
    //Define new XML document and load setup.xml.  
    XmlDocument doc = new XmlDocument();  
    doc.Load("setup.xml");  
    //Set lines of XML to variables, if setup has not been configured open setup form.  
    string Setup = doc.SelectSingleNode("Settings/Setup").InnerText;  
    if (Setup == "No")  
    {  
        Hide();  
        setupDatabase setupDatabaseFRM = new setupDatabase();  
        setupDatabaseFRM.ShowDialog();  
    }  
    string IP = doc.SelectSingleNode("Settings/IP").InnerText;  
    string DATABASE = doc.SelectSingleNode("Settings/Database").InnerText;  
    string UID = doc.SelectSingleNode("Settings/Username").InnerText;  
    string PASSWORD = doc.SelectSingleNode("Settings>Password").InnerText;  
    ConnectionString = "SERVER=" + IP + ";DATABASE=" + DATABASE + ";UID=" + UID + ";PASSWORD=" + PASSWORD + ";";  
}  
  
private void loginBtn_Click(object sender, EventArgs e)  
{  
    //If username and password aren't blank, select all from the database that matches the username entered.  
    userLogin = txtUsername.Text;  
    userPassword = txtPassword.Text;  
    checkpointReached = false;  
    if ((userLogin != "") || (userPassword != ""))  
    {  
        MySqlConnection connectionMySQL = new MySqlConnection(ConnectionString);  
        connectionMySQL.Open();  
        MySqlCommand cmd = new MySqlCommand("SELECT * FROM userAccounts WHERE userLogin = @userLogin", connectionMySQL);  
        cmd.Parameters.AddWithValue("@userLogin", userLogin);  
        MySqlDataReader rdr = cmd.ExecuteReader();  
        rdr.Read();  
        //Try to set variables to data from select. If error, no data found. Output login denied.  
        try  
        {  
            var Valid = Convert.ToString(rdr[0]);  
        }  
    }  
}
```

```
var databasePassword = Convert.ToString(rdr[2]);
UserID = Convert.ToString(rdr[0]);
Username = Convert.ToString(rdr[1]);
Password = Convert.ToString(rdr[2]);
Forename = Convert.ToString(rdr[3]);
Surname = Convert.ToString(rdr[4]);
EmailAddress = Convert.ToString(rdr[5]);
ProfileImage = Convert.ToString(rdr[6]);
CompanyID = Convert.ToString(rdr[7]);
Role = Convert.ToString(rdr[8]);
//Hash and salt user input.
String EnteredPassword = SHA.GenerateSHA512String(userSalt + txtPassword.Text);
rdr.Close();
//If hashed and salted password doesn't match data stored in the database, insert into the
failedLoginAttempts table a log of the details.
if (EnteredPassword != databasePassword)
{
    System.Windows.Forms.MessageBox.Show("Login Denied. The username or password you have entered do not
match any account we have on record.");
    MySqlCommand failedCMD = new MySqlCommand("INSERT INTO failedLoginAttempts (attemptUsername, attemptIP,
attemptTimeStamp) VALUES (@attemptUsername, @attemptIP, @attemptTimeStamp)", connectionMySQL);
    failedCMD.Parameters.AddWithValue("@attemptUsername", txtUsername.Text);
    failedCMD.Parameters.AddWithValue("@attemptIP", IPAddress);
    failedCMD.Parameters.AddWithValue("@attemptTimeStamp", DateTime.Now);
    failedCMD.ExecuteNonQuery();
}
//Else update the last login IP and date. Set variables to match permissions for the role that the user is
set.
else
{
    MySqlCommand accountCMD = new MySqlCommand("UPDATE `userAccounts` SET userIPAddress = @attemptIP,
userLastLogin = @attemptTimeStamp", connectionMySQL);
    accountCMD.Parameters.AddWithValue("@attemptIP", IPAddress);
    accountCMD.Parameters.AddWithValue("@attemptTimeStamp", DateTime.Now);
    accountCMD.ExecuteNonQuery();
    MySqlCommand permissionCommand = new MySqlCommand("SELECT * FROM userPermissions WHERE permID = @permid",
connectionMySQL);
    permissionCommand.Parameters.AddWithValue("@permid", Role);
    MySqlDataReader permissionRDR = permissionCommand.ExecuteReader();
    permissionRDR.Read();
    loginMenu.Role = Convert.ToString(permissionRDR[1]);
    permChangePassword = Convert.ToBoolean(permissionRDR[3]);
    permChangeUsername = Convert.ToBoolean(permissionRDR[4]);
    permChangeEmail = Convert.ToBoolean(permissionRDR[5]);
```

```
permViewServers = Convert.ToBoolean(permissionRDR[6]);
permEditServers = Convert.ToBoolean(permissionRDR[7]);
permDeleteServers = Convert.ToBoolean(permissionRDR[8]);
permViewLocations = Convert.ToBoolean(permissionRDR[9]);
permEditLocations = Convert.ToBoolean(permissionRDR[10]);
permDeleteLocations = Convert.ToBoolean(permissionRDR[11]);
permCreateTicket = Convert.ToBoolean(permissionRDR[12]);
permAdminTicket = Convert.ToBoolean(permissionRDR[13]);
permCloseTicket = Convert.ToBoolean(permissionRDR[14]);
permAddAction = Convert.ToBoolean(permissionRDR[15]);
permEditAction = Convert.ToBoolean(permissionRDR[16]);
permDeleteAction = Convert.ToBoolean(permissionRDR[17]);
permRunCustomAction = Convert.ToBoolean(permissionRDR[18]);
permAdminViewUsers = Convert.ToBoolean(permissionRDR[19]);
permAdminEditUserInfo = Convert.ToBoolean(permissionRDR[20]);
permAdminForcePassReset = Convert.ToBoolean(permissionRDR[21]);
permAdminAddUser = Convert.ToBoolean(permissionRDR[22]);
permAdminDelUser = Convert.ToBoolean(permissionRDR[23]);
permAdminChangePermissions = Convert.ToBoolean(permissionRDR[24]);
permControlServers = Convert.ToBoolean(permissionRDR[25]);
permManageBackupSystem = Convert.ToBoolean(permissionRDR[26]);
permCreateLocation = Convert.ToBoolean(permissionRDR[27]);
permCreateServer = Convert.ToBoolean(permissionRDR[28]);
permissionRDR.Close();
//Get data about the company.
MySqlCommand companyCMD = new MySqlCommand("SELECT * FROM userCompanies WHERE companyID = @companyID",
connectionMySQL);
companyCMD.Parameters.AddWithValue("@companyID", CompanyID);
MySqlDataReader companyRDR = companyCMD.ExecuteReader();
companyRDR.Read();
CompanyName = Convert.ToString(companyRDR[2]);
companyRDR.Close();
//Hide the form, and open mainDashboard. If something errors in the program display the error.
Hide();
try
{
    mainDashboard mainDashboardDisplay = new mainDashboard();
    mainDashboardDisplay.ShowDialog();
}
catch (Exception ex)
{
    System.Windows.Forms.MessageBox.Show(Convert.ToString(ex));
}
Show();
```

```
        }
    }
    catch
    {
        System.Windows.Forms.MessageBox.Show("Login Denied. The username or password you have entered do not match
any account we have on record.");
        rdr.Close();
    }
    txtUsername.Text = "";
    txtPassword.Text = "";
    connectionMySQL.Close();
}
else
{
    System.Windows.Forms.MessageBox.Show("The username or password cannot be blank.");
}

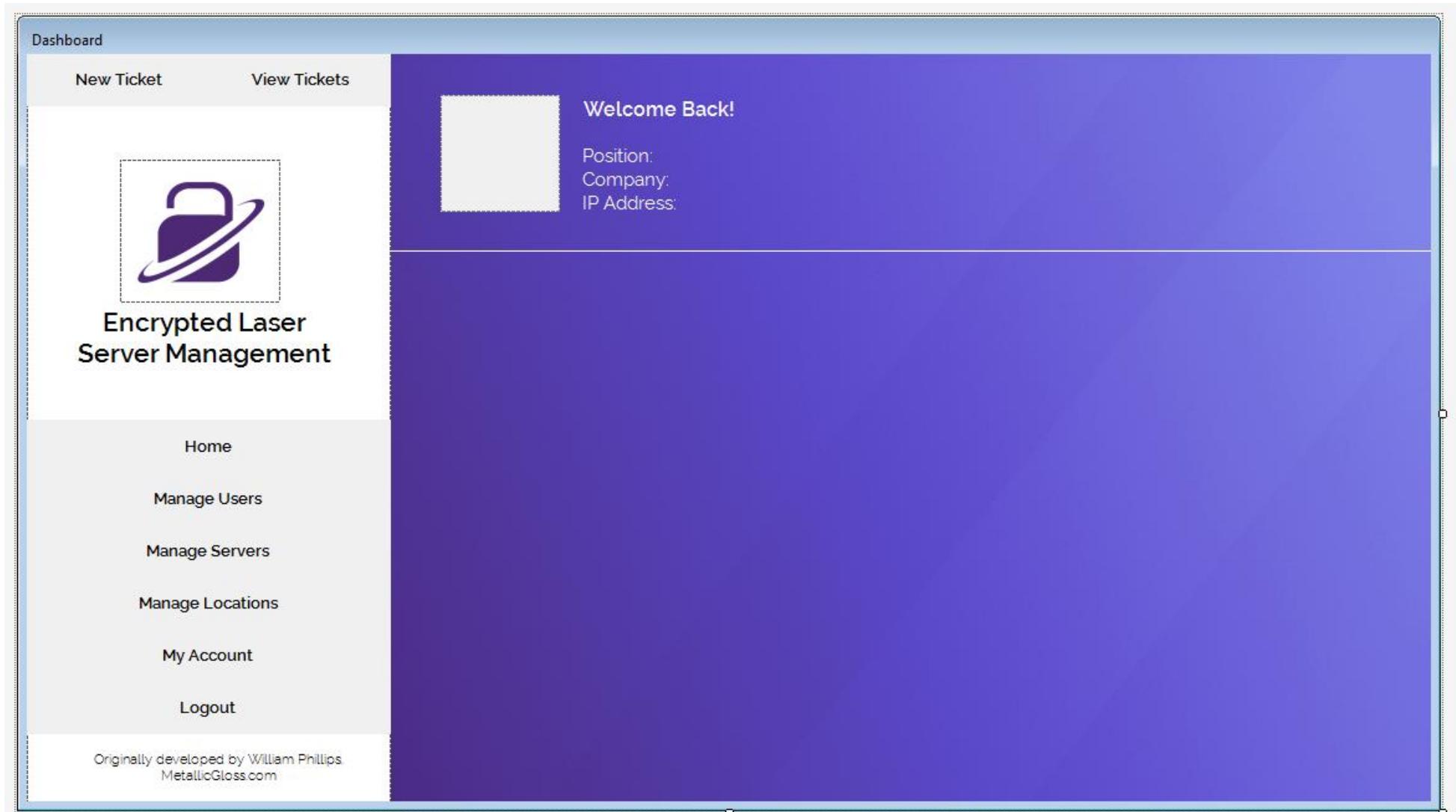
}

}

//Define a hasing function for SHA512
namespace Hashing.PasswordManagement
{
    public static class SHA
    {
        public static string GenerateSHA512String(string inputString)
        {
            SHA512 sha512 = SHA512Managed.Create();
            byte[] bytes = Encoding.UTF8.GetBytes(inputString);
            byte[] hash = sha512.ComputeHash(bytes);
            return GetStringFromHash(hash);
        }

        private static string GetStringFromHash(byte[] hash)
        {
            StringBuilder result = new StringBuilder();
            for (int i = 0; i < hash.Length; i++)
            {
                result.Append(hash[i].ToString("X2"));
            }
            return result.ToString();
        }
    }
}
```

}

Subsection 3.6.3.xvii - mainDashboard.cs [design] - design view

Subsection 3.6.3.xviii - mainDashboard.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class mainDashboard
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            System.ComponentModel.ComponentResourceManager resources = new
System.ComponentModel.ComponentResourceManager(this);
            this.ELHSLogo = new System.Windows.Forms.PictureBox();
            this.lblWelcomeBack = new System.Windows.Forms.Label();
            this.lblCurrentIP = new System.Windows.Forms.Label();
            this.lblCurrentCompany = new System.Windows.Forms.Label();
            this.pictureBoxMenu = new System.Windows.Forms.PictureBox();
            this.btnExit = new System.Windows.Forms.Button();
            this.btnExitManageAccount = new System.Windows.Forms.Button();
            this.btnExitLogout = new System.Windows.Forms.Button();
            this.lblTitle = new System.Windows.Forms.Label();
            this.lblMetallicGloss = new System.Windows.Forms.Label();
        }
    }
}
```

```
this.lblPosition = new System.Windows.Forms.Label();
this.pictureBox1 = new System.Windows.Forms.PictureBox();
this.pctProfilePhoto = new System.Windows.Forms.PictureBox();
this.btnManageServers = new System.Windows.Forms.Button();
this.btnManageLocations = new System.Windows.Forms.Button();
this.btnTicketReply = new System.Windows.Forms.Button();
this.btnCreateTicket = new System.Windows.Forms.Button();
this.btnManageUsers = new System.Windows.Forms.Button();
((System.ComponentModel.ISupportInitialize) (this.ELHSLogo)).BeginInit();
((System.ComponentModel.ISupportInitialize) (this.pictureBoxMenu)).BeginInit();
((System.ComponentModel.ISupportInitialize) (this.pictureBox1)).BeginInit();
((System.ComponentModel.ISupportInitialize) (this.pctProfilePhoto)).BeginInit();
this.SuspendLayout();
//
// ELHSLogo
//
this.ELHSLogo.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.ELHSLogo.BackgroundImage = global::ELSM_Project.Properties.Resources.imgLogoPurple;
this.ELHSLogo.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ELHSLogo.Location = new System.Drawing.Point(75, 85);
this.ELHSLogo.Name = "ELHSLogo";
this.ELHSLogo.Size = new System.Drawing.Size(129, 115);
this.ELHSLogo.TabIndex = 2;
this.ELHSLogo.TabStop = false;
//
// lblWelcomeBack
//
this.lblWelcomeBack.AutoSize = true;
this.lblWelcomeBack.BackColor = System.Drawing.Color.Transparent;
this.lblWelcomeBack.Font = new System.Drawing.Font("Raleway SemiBold", 12F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblWelcomeBack.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblWelcomeBack.Location = new System.Drawing.Point(444, 35);
this.lblWelcomeBack.Name = "lblWelcomeBack";
this.lblWelcomeBack.Size = new System.Drawing.Size(131, 19);
this.lblWelcomeBack.TabIndex = 3;
this.lblWelcomeBack.Text = "Welcome Back!";
//
// lblCurrentIP
//
this.lblCurrentIP.AutoSize = true;
this.lblCurrentIP.BackColor = System.Drawing.Color.Transparent;
this.lblCurrentIP.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
```

```
this.lblCurrentIP.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblCurrentIP.Location = new System.Drawing.Point(444, 111);
this.lblCurrentIP.Name = "lblCurrentIP";
this.lblCurrentIP.Size = new System.Drawing.Size(84, 18);
this.lblCurrentIP.TabIndex = 4;
this.lblCurrentIP.Text = "IP Address:";
//
// lblCurrentCompany
//
this.lblCurrentCompany.AutoSize = true;
this.lblCurrentCompany.BackColor = System.Drawing.Color.Transparent;
this.lblCurrentCompany.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblCurrentCompany.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblCurrentCompany.Location = new System.Drawing.Point(444, 92);
this.lblCurrentCompany.Name = "lblCurrentCompany";
this.lblCurrentCompany.Size = new System.Drawing.Size(78, 18);
this.lblCurrentCompany.TabIndex = 6;
this.lblCurrentCompany.Text = "Company:";
//
// pictureBoxMenu
//
this.pictureBoxMenu.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.pictureBoxMenu.Location = new System.Drawing.Point(0, -1);
this.pictureBoxMenu.Name = "pictureBoxMenu";
this.pictureBoxMenu.Size = new System.Drawing.Size(293, 609);
this.pictureBoxMenu.TabIndex = 7;
this.pictureBoxMenu.TabStop = false;
//
// btnHome
//
this.btnHome.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnHome.FlatAppearance.BorderSize = 0;
this.btnHome.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnHome.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnHome.Location = new System.Drawing.Point(0, 294);
this.btnHome.Name = "btnHome";
this.btnHome.Size = new System.Drawing.Size(293, 43);
this.btnHome.TabIndex = 1;
this.btnHome.Text = "Home";
this.btnHome.UseVisualStyleBackColor = true;
this.btnHome.Click += new System.EventHandler(this.btnHome_Click);
//
```

```
// btnManageAccount
//
this.btnManageAccount.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnManageAccount.FlatAppearance.BorderSize = 0;
this.btnManageAccount.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnManageAccount.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnManageAccount.Location = new System.Drawing.Point(0, 462);
this.btnManageAccount.Name = "btnManageAccount";
this.btnManageAccount.Size = new System.Drawing.Size(293, 43);
this.btnManageAccount.TabIndex = 5;
this.btnManageAccount.Text = "My Account";
this.btnManageAccount.UseVisualStyleBackColor = true;
this.btnManageAccount.Click += new System.EventHandler(this.btnManageAccount_Click);
//
// btnLogout
//
this.btnLogout.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnLogout.FlatAppearance.BorderSize = 0;
this.btnLogout.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnLogout.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnLogout.Location = new System.Drawing.Point(0, 504);
this.btnLogout.Name = "btnLogout";
this.btnLogout.Size = new System.Drawing.Size(293, 43);
this.btnLogout.TabIndex = 6;
this.btnLogout.Text = "Logout";
this.btnLogout.UseVisualStyleBackColor = true;
this.btnLogout.Click += new System.EventHandler(this.btnLogout_Click);
//
// lblTitle
//
this.lblTitle.AutoSize = true;
this.lblTitle.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.lblTitle.Font = new System.Drawing.Font("Raleway SemiBold", 15.75F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblTitle.Location = new System.Drawing.Point(36, 203);
this.lblTitle.Name = "lblTitle";
this.lblTitle.Size = new System.Drawing.Size(216, 50);
this.lblTitle.TabIndex = 14;
this.lblTitle.Text = "Encrypted Laser\r\nServer Management";
this.lblTitle.TextAlign = System.Drawing.ContentAlignment.MiddleCenter;
//
// lblMetallicGloss
```

```
//  
this.lblMetallicGloss.AutoSize = true;  
this.lblMetallicGloss.BackColor = System.Drawing.SystemColors.ControlLightLight;  
this.lblMetallicGloss.Cursor = System.Windows.Forms.Cursors.Hand;  
this.lblMetallicGloss.Font = new System.Drawing.Font("Raleway Light", 8.24999F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.lblMetallicGloss.Location = new System.Drawing.Point(51, 561);  
this.lblMetallicGloss.Name = "lblMetallicGloss";  
this.lblMetallicGloss.Size = new System.Drawing.Size(208, 26);  
this.lblMetallicGloss.TabIndex = 16;  
this.lblMetallicGloss.Text = "Originally developed by William Phillips.\r\nMetallicGloss.com";  
this.lblMetallicGloss.TextAlign = System.Drawing.ContentAlignment.MiddleCenter;  
this.lblMetallicGloss.Click += new System.EventHandler(this.lblMetallicGloss_Click);  
//  
// lblPosition  
//  
this.lblPosition.AutoSize = true;  
this.lblPosition.BackColor = System.Drawing.Color.Transparent;  
this.lblPosition.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.lblPosition.ForeColor = System.Drawing.SystemColors.ControlLightLight;  
this.lblPosition.Location = new System.Drawing.Point(444, 73);  
this.lblPosition.Name = "lblPosition";  
this.lblPosition.Size = new System.Drawing.Size(65, 18);  
this.lblPosition.TabIndex = 17;  
this.lblPosition.Text = "Position:";  
//  
// pictureBox1  
//  
this.pictureBox1.BackColor = System.Drawing.SystemColors.ControlLightLight;  
this.pictureBox1.Location = new System.Drawing.Point(292, 158);  
this.pictureBox1.Name = "pictureBox1";  
this.pictureBox1.Size = new System.Drawing.Size(838, 1);  
this.pictureBox1.TabIndex = 18;  
this.pictureBox1.TabStop = false;  
//  
// pctProfilePhoto  
//  
this.pctProfilePhoto.ImageLayout = System.Windows.Forms.ImageLayout.Zoom;  
this.pctProfilePhoto.Location = new System.Drawing.Point(333, 33);  
this.pctProfilePhoto.Name = "pctProfilePhoto";  
this.pctProfilePhoto.Size = new System.Drawing.Size(96, 94);  
this.pctProfilePhoto.TabIndex = 0;  
this.pctProfilePhoto.TabStop = false;
```

```
//  
// btnManageServers  
//  
this.btnManageServers.Cursor = System.Windows.Forms.Cursors.Hand;  
this.btnManageServers.FlatAppearance.BorderSize = 0;  
this.btnManageServers.FlatStyle = System.Windows.Forms.FlatStyle.Flat;  
this.btnManageServers.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.btnManageServers.Location = new System.Drawing.Point(0, 378);  
this.btnManageServers.Name = "btnManageServers";  
this.btnManageServers.Size = new System.Drawing.Size(293, 43);  
this.btnManageServers.TabIndex = 3;  
this.btnManageServers.Text = "Manage Servers";  
this.btnManageServers.UseVisualStyleBackColor = true;  
this.btnManageServers.Click += new System.EventHandler(this.btnManageServers_Click);  
//  
// btnManageLocations  
//  
this.btnManageLocations.Cursor = System.Windows.Forms.Cursors.Hand;  
this.btnManageLocations.FlatAppearance.BorderSize = 0;  
this.btnManageLocations.FlatStyle = System.Windows.Forms.FlatStyle.Flat;  
this.btnManageLocations.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.btnManageLocations.Location = new System.Drawing.Point(0, 420);  
this.btnManageLocations.Name = "btnManageLocations";  
this.btnManageLocations.Size = new System.Drawing.Size(293, 43);  
this.btnManageLocations.TabIndex = 4;  
this.btnManageLocations.Text = "Manage Locations";  
this.btnManageLocations.UseVisualStyleBackColor = true;  
this.btnManageLocations.Click += new System.EventHandler(this.btnManageLocations_Click);  
//  
// btnTicketReply  
//  
this.btnTicketReply.Cursor = System.Windows.Forms.Cursors.Hand;  
this.btnTicketReply.FlatAppearance.BorderSize = 0;  
this.btnTicketReply.FlatStyle = System.Windows.Forms.FlatStyle.Flat;  
this.btnTicketReply.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.btnTicketReply.Location = new System.Drawing.Point(148, -1);  
this.btnTicketReply.Name = "btnTicketReply";  
this.btnTicketReply.Size = new System.Drawing.Size(145, 43);  
this.btnTicketReply.TabIndex = 19;  
this.btnTicketReply.Text = "View Tickets";  
this.btnTicketReply.UseVisualStyleBackColor = true;
```

```
this.btnAddTicket.Click += new System.EventHandler(this.btnAddTicket_Click);
//
// btnCreateTicket
//
this.btnAddTicket.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnAddTicket.FlatAppearance.BorderSize = 0;
this.btnAddTicket.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnAddTicket.Font = new System.Drawing.Font("Raleway SemiBold", 9.74999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnAddTicket.Location = new System.Drawing.Point(0, -1);
this.btnAddTicket.Name = "btnCreateTicket";
this.btnAddTicket.Size = new System.Drawing.Size(149, 43);
this.btnAddTicket.TabIndex = 20;
this.btnAddTicket.Text = "New Ticket";
this.btnAddTicket.UseVisualStyleBackColor = true;
this.btnAddTicket.Click += new System.EventHandler(this.btnAddTicket_Click);
//
// btnManageUsers
//
this.btnManageUsers.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnManageUsers.FlatAppearance.BorderSize = 0;
this.btnManageUsers.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnManageUsers.Font = new System.Drawing.Font("Raleway SemiBold", 9.74999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnManageUsers.Location = new System.Drawing.Point(0, 336);
this.btnManageUsers.Name = "btnManageUsers";
this.btnManageUsers.Size = new System.Drawing.Size(293, 43);
this.btnManageUsers.TabIndex = 2;
this.btnManageUsers.Text = "Manage Users";
this.btnManageUsers.UseVisualStyleBackColor = true;
this.btnManageUsers.Click += new System.EventHandler(this.btnManageUsers_Click);
//
// mainDashboard
//
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(1130, 601);
this.ControlBox = false;
this.Controls.Add(this.btnAddTicket);
this.Controls.Add(this.btnAddTicket);
this.Controls.Add(this.pictureBox1);
this.Controls.Add(this.lblPosition);
```

```
this.Controls.Add(this.lblMetallicGloss);
this.Controls.Add(this.lblTitle);
this.Controls.Add(this.btnExit);
this.Controls.Add(this.btnAddAccount);
this.Controls.Add(this.btnAddServers);
this.Controls.Add(this.btnAddLocations);
this.Controls.Add(this.btnAddUsers);
this.Controls.Add(this.btnExit);
this.Controls.Add(this.lblCurrentCompany);
this.Controls.Add(this.lblCurrentIP);
this.Controls.Add(this.lblWelcomeBack);
this.Controls.Add(this.EHHSLogo);
this.Controls.Add(this.pctProfilePhoto);
this.Controls.Add(this.pictureBoxMenu);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.Icon = ((System.Drawing.Icon)(resources.GetObject("$this.Icon")));
this.MaximizeBox = false;
this.MaximumSize = new System.Drawing.Size(1146, 640);
this.MinimumSize = new System.Drawing.Size(1146, 640);
this.Name = "mainDashboard";
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "mainDashboard";
this.Load += new System.EventHandler(this.DashboardFRM_Load);
((System.ComponentModel.ISupportInitialize)(this.EHHSLogo)).EndInit();
((System.ComponentModel.ISupportInitialize)(this.pictureBoxMenu)).EndInit();
((System.ComponentModel.ISupportInitialize)(this.pictureBox1)).EndInit();
((System.ComponentModel.ISupportInitialize)(this.pctProfilePhoto)).EndInit();
this.ResumeLayout(false);
this.PerformLayout();

}

#endregion
private System.Windows.Forms.PictureBox EHHSLogo;
private System.Windows.Forms.Label lblWelcomeBack;
private System.Windows.Forms.Label lblCurrentIP;
private System.Windows.Forms.Label lblCurrentCompany;
private System.Windows.Forms.PictureBox pictureBoxMenu;
private System.Windows.Forms.Button btnHome;
private System.Windows.Forms.Button btnAddAccount;
private System.Windows.Forms.Button btnLogout;
private System.Windows.Forms.Label lblTitle;
private System.Windows.Forms.Label lblMetallicGloss;
private System.Windows.Forms.Label lblPosition;
```

```
    private System.Windows.Forms.PictureBox pictureBox1;
    private System.Windows.Forms.PictureBox pctProfilePhoto;
    private System.Windows.Forms.Button btnManageServers;
    private System.Windows.Forms.Button btnManageLocations;
    private System.Windows.Forms.Button btnTicketReply;
    private System.Windows.Forms.Button btnCreateTicket;
    private System.Windows.Forms.Button btnManageUsers;
}
}
```

Subsection 3.6.3.xix - mainDashboard.cs - Code file - annotated

```
using System;
using System.Windows.Forms;

namespace ELSM_Project
{
    public partial class mainDashboard : Form
    {
        public mainDashboard()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        private void btnHome_Click(object sender, EventArgs e)
        {
            //Display message box informing the user that they're already on the page that they attempted to navigate to.
            MessageBox.Show("You're already here!", "Notice", MessageBoxButtons.OK);
        }

        private void btnManageUsers_Click(object sender, EventArgs e)
        {
            //On button event, hide current form and open userList.
            Hide();
            userList userListForm = new userList();
            userListForm.ShowDialog();
        }

        private void btnManageServers_Click(object sender, EventArgs e)
        {
            //On button event, hide current form and open serverManagement.
            Hide();
            serverManagement manageServers = new serverManagement();
            manageServers.ShowDialog();
        }

        private void btnManageLocations_Click(object sender, EventArgs e)
        {
            //On button event, hide current form and open locationManagement.
            Hide();
            locationManagement manageL = new locationManagement();
            manageL.ShowDialog();
        }
    }
}
```

```
private void btnManageAccount_Click(object sender, EventArgs e)
{
    //On button event, hide current form and open accountManagement.
    Hide();
    accountManagement Account = new accountManagement();
    Account.ShowDialog();
}

private void btnLogout_Click(object sender, EventArgs e)
{
    //On button event, trigger a message box confirming logout. If the user input is Yes, close the form.
    if (MessageBox.Show("Are you sure you want to logout?", "Confirmation", MessageBoxButtons.YesNo) != DialogResult.No)
    {
        this.Close();
    }
}

private void lblMetallicGloss_Click(object sender, EventArgs e)
{
    //Create process to open the link www.metallicgloss.com in the default browser.
    System.Diagnostics.Process.Start("https://www.metallicgloss.com");
}

private void btnCreateTicket_Click(object sender, EventArgs e)
{
    //On button event, hide current form and open ticketNew.
    ticketNew ticket = new ticketNew();
    ticket.ShowDialog();
}

private void btnTicketReply_Click(object sender, EventArgs e)
{
    //On button event, hide current form and open ticketView.
    Hide();
    ticketView ticket = new ticketView();
    ticket.ShowDialog();
}

private void DashboardFRM_Load(object sender, EventArgs e)
{
    //On load, set text of 3 text boxes to display information relevant to the user.
    lblCurrentIP.Text = "IP Address: " + loginMenu.IPAddress;
    lblPosition.Text = "Position: " + loginMenu.Role;
```

```
lblCurrentCompany.Text = "Company: " + loginMenu.CompanyName;
//Initialize permissions by using boolean variables on the loginMenu form to disable buttons if the permission is not
granted.
if (loginMenu.permViewLocations == false)
{
    btnManageLocations.Enabled = false;
}
if (loginMenu.permAdminViewUsers == false)
{
    btnManageUsers.Enabled = false;
}
if (loginMenu.permViewServers == false)
{
    btnManageServers.Enabled = false;
}
if (loginMenu.permCreateTicket == false)
{
    btnCreateTicket.Enabled = false;
}
if (loginMenu.permAdminTicket == false)
{
    btnTicketReply.Enabled = false;
}
}
}
}
```

Subsection 3.6.3.xx - accountManagement.cs [design] - design view

Manage Account

New Ticket View Tickets

 Encrypted Laser Server Management

Home
Manage Users
Manage Servers
Manage Locations
Manage Account
Logout

Originally developed by William Phillips
MetallicGloss.com

Manage Account Information

User ID:
Username:
Forename:
Surname:
Email Address:
Company:
URL:
Position:

Change Username Change Password Change Email Address

Edit Forename Edit Surname

Subsection 3.6.3.xxi - accountManagement.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class accountManagement
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            System.ComponentModel.ComponentResourceManager resources = new
System.ComponentModel.ComponentResourceManager(resources = new
this.lblMetallicGloss = new System.Windows.Forms.Label();
this.lblTitle = new System.Windows.Forms.Label();
this.btnExit = new System.Windows.Forms.Button();
this.btnExitManageAccount = new System.Windows.Forms.Button();
this.btnExitManageServers = new System.Windows.Forms.Button();
this.btnExitManageLocations = new System.Windows.Forms.Button();
this.btnExitManageUsers = new System.Windows.Forms.Button();
this.btnExitHome = new System.Windows.Forms.Button();
this.EHSLLogo = new System.Windows.Forms.PictureBox();
this.menuBackground = new System.Windows.Forms.PictureBox();
this.btnExitChangeUsername = new System.Windows.Forms.Button();
this.lblManageAccountTitle = new System.Windows.Forms.Label();
```



```
this.lblTitle.Name = "lblTitle";
this.lblTitle.Size = new System.Drawing.Size(216, 50);
this.lblTitle.TabIndex = 14;
this.lblTitle.Text = "Encrypted Laser\r\nServer Management";
this.lblTitle.TextAlign = System.Drawing.ContentAlignment.MiddleCenter;
//
// btnLogout
//
this.btnLogout.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnLogout.FlatAppearance.BorderSize = 0;
this.btnLogout.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnLogout.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnLogout.Location = new System.Drawing.Point(0, 504);
this.btnLogout.Name = "btnLogout";
this.btnLogout.Size = new System.Drawing.Size(293, 43);
this.btnLogout.TabIndex = 6;
this.btnLogout.Text = "Logout";
this.btnLogout.UseVisualStyleBackColor = true;
this.btnLogout.Click += new System.EventHandler(this.btnLogout_Click);
//
// btnManageAccount
//
this.btnManageAccount.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnManageAccount.FlatAppearance.BorderSize = 0;
this.btnManageAccount.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnManageAccount.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnManageAccount.Location = new System.Drawing.Point(0, 462);
this.btnManageAccount.Name = "btnManageAccount";
this.btnManageAccount.Size = new System.Drawing.Size(293, 43);
this.btnManageAccount.TabIndex = 5;
this.btnManageAccount.Text = "Manage Account";
this.btnManageAccount.UseVisualStyleBackColor = true;
this.btnManageAccount.Click += new System.EventHandler(this.btnManageAccount_Click);
//
// btnManageServers
//
this.btnManageServers.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnManageServers.FlatAppearance.BorderSize = 0;
this.btnManageServers.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnManageServers.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnManageServers.Location = new System.Drawing.Point(0, 378);
```

```
this.btnManageServers.Name = "btnManageServers";
this.btnManageServers.Size = new System.Drawing.Size(293, 43);
this.btnManageServers.TabIndex = 3;
this.btnManageServers.Text = "Manage Servers";
this.btnManageServers.UseVisualStyleBackColor = true;
this.btnManageServers.Click += new System.EventHandler(this.btnManageServers_Click);
//
// btnManageLocations
//
this.btnManageLocations.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnManageLocations.FlatAppearance.BorderSize = 0;
this.btnManageLocations.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnManageLocations.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnManageLocations.Location = new System.Drawing.Point(0, 420);
this.btnManageLocations.Name = "btnManageLocations";
this.btnManageLocations.Size = new System.Drawing.Size(293, 43);
this.btnManageLocations.TabIndex = 4;
this.btnManageLocations.Text = "Manage Locations";
this.btnManageLocations.UseVisualStyleBackColor = true;
this.btnManageLocations.Click += new System.EventHandler(this.btnManageLocations_Click);
//
// btnManageUsers
//
this.btnManageUsers.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnManageUsers.FlatAppearance.BorderSize = 0;
this.btnManageUsers.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnManageUsers.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnManageUsers.Location = new System.Drawing.Point(0, 336);
this.btnManageUsers.Name = "btnManageUsers";
this.btnManageUsers.Size = new System.Drawing.Size(293, 43);
this.btnManageUsers.TabIndex = 2;
this.btnManageUsers.Text = "Manage Users";
this.btnManageUsers.UseVisualStyleBackColor = true;
this.btnManageUsers.Click += new System.EventHandler(this.btnManageUsers_Click);
//
// btnHome
//
this.btnHome.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnHome.FlatAppearance.BorderSize = 0;
this.btnHome.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnHome.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0))');
```

```
this.btnHome.Location = new System.Drawing.Point(0, 294);
this.btnHome.Name = "btnHome";
this.btnHome.Size = new System.Drawing.Size(293, 43);
this.btnHome.TabIndex = 1;
this.btnHome.Text = "Home";
this.btnHome.UseVisualStyleBackColor = true;
this.btnHome.Click += new System.EventHandler(this.btnHome_Click);
//
// ELHSLogo
//
this.ELHSLogo.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.ELHSLogo.BackgroundImage = global::ELSM_Project.Properties.Resources.imgLogoPurple;
this.ELHSLogo.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ELHSLogo.Location = new System.Drawing.Point(75, 85);
this.ELHSLogo.Name = "ELHSLogo";
this.ELHSLogo.Size = new System.Drawing.Size(129, 115);
this.ELHSLogo.TabIndex = 17;
this.ELHSLogo.TabStop = false;
//
// menuBackground
//
this.menuBackground.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.menuBackground.Location = new System.Drawing.Point(0, -1);
this.menuBackground.Name = "menuBackground";
this.menuBackground.Size = new System.Drawing.Size(293, 609);
this.menuBackground.TabIndex = 18;
this.menuBackground.TabStop = false;
//
// btnChangeUsername
//
this.btnChangeUsername.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnChangeUsername.FlatAppearance.BorderSize = 0;
this.btnChangeUsername.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnChangeUsername.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnChangeUsername.Location = new System.Drawing.Point(361, 408);
this.btnChangeUsername.Name = "btnChangeUsername";
this.btnChangeUsername.Size = new System.Drawing.Size(240, 46);
this.btnChangeUsername.TabIndex = 19;
this.btnChangeUsername.Text = "Change Username";
this.btnChangeUsername.UseVisualStyleBackColor = true;
this.btnChangeUsername.Click += new System.EventHandler(this.btnChangeUsername_Click);
//
// lblManageAccountTitle

```

```
//  
this.lblManageAccountTitle.AutoSize = true;  
this.lblManageAccountTitle.BackColor = System.Drawing.Color.Transparent;  
this.lblManageAccountTitle.Font = new System.Drawing.Font("Raleway ExtraBold", 18F, System.Drawing.FontStyle.Bold,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.lblManageAccountTitle.ForeColor = System.Drawing.SystemColors.ControlLightLight;  
this.lblManageAccountTitle.Location = new System.Drawing.Point(554, 66);  
this.lblManageAccountTitle.Name = "lblManageAccountTitle";  
this.lblManageAccountTitle.Size = new System.Drawing.Size(354, 29);  
this.lblManageAccountTitle.TabIndex = 20;  
this.lblManageAccountTitle.Text = "Manage Account Information";  
//  
// btnChangePassword  
//  
this.btnChangePassword.Cursor = System.Windows.Forms.Cursors.Hand;  
this.btnChangePassword.FlatAppearance.BorderSize = 0;  
this.btnChangePassword.FlatStyle = System.Windows.Forms.FlatStyle.Flat;  
this.btnChangePassword.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.btnChangePassword.Location = new System.Drawing.Point(603, 408);  
this.btnChangePassword.Name = "btnChangePassword";  
this.btnChangePassword.Size = new System.Drawing.Size(240, 46);  
this.btnChangePassword.TabIndex = 21;  
this.btnChangePassword.Text = "Change Password";  
this.btnChangePassword.UseVisualStyleBackColor = true;  
this.btnChangePassword.Click += new System.EventHandler(this.btnChangePassword_Click);  
//  
// btnChangeEmailAddress  
//  
this.btnChangeEmailAddress.Cursor = System.Windows.Forms.Cursors.Hand;  
this.btnChangeEmailAddress.FlatAppearance.BorderSize = 0;  
this.btnChangeEmailAddress.FlatStyle = System.Windows.Forms.FlatStyle.Flat;  
this.btnChangeEmailAddress.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.btnChangeEmailAddress.Location = new System.Drawing.Point(845, 408);  
this.btnChangeEmailAddress.Name = "btnChangeEmailAddress";  
this.btnChangeEmailAddress.Size = new System.Drawing.Size(240, 46);  
this.btnChangeEmailAddress.TabIndex = 22;  
this.btnChangeEmailAddress.Text = "Change Email Address";  
this.btnChangeEmailAddress.UseVisualStyleBackColor = true;  
this.btnChangeEmailAddress.Click += new System.EventHandler(this.btnChangeEmailAddress_Click);  
//  
// largeProfileImage  
//
```

```
this.largeProfileImage.Location = new System.Drawing.Point(361, 162);
this.largeProfileImage.Name = "largeProfileImage";
this.largeProfileImage.Size = new System.Drawing.Size(206, 206);
this.largeProfileImage.TabIndex = 23;
this.largeProfileImage.TabStop = false;
//
// lblUserID
//
this.lblUserID.AutoSize = true;
this.lblUserID.BackColor = System.Drawing.Color.Transparent;
this.lblUserID.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblUserID.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblUserID.Location = new System.Drawing.Point(596, 173);
this.lblUserID.Name = "lblUserID";
this.lblUserID.Size = new System.Drawing.Size(62, 18);
this.lblUserID.TabIndex = 25;
this.lblUserID.Text = "User ID:";
//
// lblUsername
//
this.lblUsername.AutoSize = true;
this.lblUsername.BackColor = System.Drawing.Color.Transparent;
this.lblUsername.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblUsername.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblUsername.Location = new System.Drawing.Point(596, 198);
this.lblUsername.Name = "lblUsername";
this.lblUsername.Size = new System.Drawing.Size(83, 18);
this.lblUsername.TabIndex = 26;
this.lblUsername.Text = "Username:";
//
// lblSurname
//
this.lblSurname.AutoSize = true;
this.lblSurname.BackColor = System.Drawing.Color.Transparent;
this.lblSurname.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblSurname.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblSurname.Location = new System.Drawing.Point(596, 248);
this.lblSurname.Name = "lblSurname";
this.lblSurname.Size = new System.Drawing.Size(74, 18);
this.lblSurname.TabIndex = 28;
this.lblSurname.Text = "Surname:";
```

```
//  
// lblForename  
//  
this.lblForename.AutoSize = true;  
this.lblForename.BackColor = System.Drawing.Color.Transparent;  
this.lblForename.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.lblForename.ForeColor = System.Drawing.SystemColors.ControlLightLight;  
this.lblForename.Location = new System.Drawing.Point(596, 223);  
this.lblForename.Name = "lblForename";  
this.lblForename.Size = new System.Drawing.Size(82, 18);  
this.lblForename.TabIndex = 27;  
this.lblForename.Text = "Forename:";  
//  
// lblProfileURL  
//  
this.lblProfileURL.AutoSize = true;  
this.lblProfileURL.BackColor = System.Drawing.Color.Transparent;  
this.lblProfileURL.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.lblProfileURL.ForeColor = System.Drawing.SystemColors.ControlLightLight;  
this.lblProfileURL.Location = new System.Drawing.Point(596, 323);  
this.lblProfileURL.Name = "lblProfileURL";  
this.lblProfileURL.Size = new System.Drawing.Size(41, 18);  
this.lblProfileURL.TabIndex = 31;  
this.lblProfileURL.Text = "URL:";  
//  
// lblCompany  
//  
this.lblCompany.AutoSize = true;  
this.lblCompany.BackColor = System.Drawing.Color.Transparent;  
this.lblCompany.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.lblCompany.ForeColor = System.Drawing.SystemColors.ControlLightLight;  
this.lblCompany.Location = new System.Drawing.Point(596, 298);  
this.lblCompany.Name = "lblCompany";  
this.lblCompany.Size = new System.Drawing.Size(78, 18);  
this.lblCompany.TabIndex = 30;  
this.lblCompany.Text = "Company:";  
//  
// lblEmailAddress  
//  
this.lblEmailAddress.AutoSize = true;  
this.lblEmailAddress.BackColor = System.Drawing.Color.Transparent;
```

```
this.lblEmailAddress.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblEmailAddress.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblEmailAddress.Location = new System.Drawing.Point(596, 273);
this.lblEmailAddress.Name = "lblEmailAddress";
this.lblEmailAddress.Size = new System.Drawing.Size(109, 18);
this.lblEmailAddress.TabIndex = 29;
this.lblEmailAddress.Text = "Email Address:";
//
// lblCompanyPosition
//
this.lblCompanyPosition.AutoSize = true;
this.lblCompanyPosition.BackColor = System.Drawing.Color.Transparent;
this.lblCompanyPosition.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblCompanyPosition.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblCompanyPosition.Location = new System.Drawing.Point(596, 348);
this.lblCompanyPosition.Name = "lblCompanyPosition";
this.lblCompanyPosition.Size = new System.Drawing.Size(65, 18);
this.lblCompanyPosition.TabIndex = 32;
this.lblCompanyPosition.Text = "Position:";
//
// pictureBox2
//
this.pictureBox2.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.pictureBox2.Location = new System.Drawing.Point(361, 112);
this.pictureBox2.Name = "pictureBox2";
this.pictureBox2.Size = new System.Drawing.Size(723, 1);
this.pictureBox2.TabIndex = 38;
this.pictureBox2.TabStop = false;
//
// btnSurname
//
this.btnSurname.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnSurname.FlatAppearance.BorderSize = 0;
this.btnSurname.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnSurname.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnSurname.Location = new System.Drawing.Point(725, 456);
this.btnSurname.Name = "btnSurname";
this.btnSurname.Size = new System.Drawing.Size(359, 46);
this.btnSurname.TabIndex = 54;
this.btnSurname.Text = "Edit Surname";
this.btnSurname.UseVisualStyleBackColor = true;
```

```
this.btnSurname.Click += new System.EventHandler(this.btnSurname_Click);
//
// btnForename
//
this.btnForename.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnForename.FlatAppearance.BorderSize = 0;
this.btnForename.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnForename.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnForename.Location = new System.Drawing.Point(361, 456);
this.btnForename.Name = "btnForename";
this.btnForename.Size = new System.Drawing.Size(361, 46);
this.btnForename.TabIndex = 53;
this.btnForename.Text = "Edit Forename";
this.btnForename.UseVisualStyleBackColor = true;
this.btnForename.Click += new System.EventHandler(this.btnForename_Click);
//
// btnCreateTicket
//
this.btnCreateTicket.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnCreateTicket.FlatAppearance.BorderSize = 0;
this.btnCreateTicket.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnCreateTicket.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCreateTicket.Location = new System.Drawing.Point(0, -1);
this.btnCreateTicket.Name = "btnCreateTicket";
this.btnCreateTicket.Size = new System.Drawing.Size(149, 43);
this.btnCreateTicket.TabIndex = 56;
this.btnCreateTicket.Text = "New Ticket";
this.btnCreateTicket.UseVisualStyleBackColor = true;
this.btnCreateTicket.Click += new System.EventHandler(this.btnCreateTicket_Click);
//
// btnTicketReply
//
this.btnTicketReply.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnTicketReply.FlatAppearance.BorderSize = 0;
this.btnTicketReply.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnTicketReply.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnTicketReply.Location = new System.Drawing.Point(148, -1);
this.btnTicketReply.Name = "btnTicketReply";
this.btnTicketReply.Size = new System.Drawing.Size(145, 43);
this.btnTicketReply.TabIndex = 55;
this.btnTicketReply.Text = "View Tickets";
```

```
this.btnTicketReply.UseVisualStyleBackColor = true;
//
// accountManagement
//
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(1130, 601);
this.ControlBox = false;
this.Controls.Add(this.btnCreateTicket);
this.Controls.Add(this.btnTicketReply);
this.Controls.Add(this.btnSurname);
this.Controls.Add(this.btnForename);
this.Controls.Add(this.pictureBox2);
this.Controls.Add(this.lblCompanyPosition);
this.Controls.Add(this.lblProfileURL);
this.Controls.Add(this.lblCompany);
this.Controls.Add(this.lblEmailAddress);
this.Controls.Add(this.lblSurname);
this.Controls.Add(this.lblForename);
this.Controls.Add(this.lblUsername);
this.Controls.Add(this.lblUserID);
this.Controls.Add(this.largeProfileImage);
this.Controls.Add(this.btnChangeEmailAddress);
this.Controls.Add(this.btnChangePassword);
this.Controls.Add(this.lblManageAccountTitle);
this.Controls.Add(this.btnChangeUsername);
this.Controls.Add(this.lblMetallicGloss);
this.Controls.Add(this.lblTitle);
this.Controls.Add(this.btnLogout);
this.Controls.Add(this.btnManageAccount);
this.Controls.Add(this.btnManageServers);
this.Controls.Add(this.btnManageLocations);
this.Controls.Add(this.btnManageUsers);
this.Controls.Add(this.btnHome);
this.Controls.Add(this.EHLSLogo);
this.Controls.Add(this.menuBackground);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.Icon = ((System.Drawing.Icon)(resources.GetObject("$this.Icon")));
this.MaximizeBox = false;
this.MaximumSize = new System.Drawing.Size(1146, 640);
this.MinimumSize = new System.Drawing.Size(1146, 640);
this.Name = "accountManagement";
```

```
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "Manage Account";
this.Load += new System.EventHandler(this.manageAccount_Load);
((System.ComponentModel.ISupportInitialize)(this.ELHSLogo)).EndInit();
((System.ComponentModel.ISupportInitialize)(this.menuBackground)).EndInit();
((System.ComponentModel.ISupportInitialize)(this.largeProfileImage)).EndInit();
((System.ComponentModel.ISupportInitialize)(this.pictureBox2)).EndInit();
this.ResumeLayout(false);
this.PerformLayout();

}

#endregion
private System.Windows.Forms.Label lblMetallicGloss;
private System.Windows.Forms.Label lblTitle;
private System.Windows.Forms.Button btnLogout;
private System.Windows.Forms.Button btnManageAccount;
private System.Windows.Forms.Button btnManageServers;
private System.Windows.Forms.Button btnManageLocations;
private System.Windows.Forms.Button btnManageUsers;
private System.Windows.Forms.Button btnHome;
private System.Windows.Forms.PictureBox ELHSLogo;
private System.Windows.Forms.PictureBox menuBackground;
private System.Windows.Forms.Button btnChangeUsername;
private System.Windows.Forms.Label lblManageAccountTitle;
private System.Windows.Forms.Button btnChangePassword;
private System.Windows.Forms.Button btnChangeEmailAddress;
private System.Windows.Forms.PictureBox largeProfileImage;
private System.Windows.Forms.Label lblUserID;
private System.Windows.Forms.Label lblUsername;
private System.Windows.Forms.Label lblSurname;
private System.Windows.Forms.Label lblForename;
private System.Windows.Forms.Label lblProfileURL;
private System.Windows.Forms.Label lblCompany;
private System.Windows.Forms.Label lblEmailAddress;
private System.Windows.Forms.Label lblCompanyPosition;
private System.Windows.Forms.PictureBox pictureBox2;
private System.Windows.Forms.Button btnSurname;
private System.Windows.Forms.Button btnForename;
private System.Windows.Forms.Button btnCreateTicket;
private System.Windows.Forms.Button btnTicketReply;
}
```

Subsection 3.6.3.xxii - accountManagement.cs - Code file - annotated

```
using System;
using System.Windows.Forms;

namespace ELSM_Project
{
    public partial class accountManagement : Form
    {
        public accountManagement()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        private void btnHome_Click(object sender, EventArgs e)
        {
            //On button event, hide current form and open mainDashboard.
            Hide();
            mainDashboard Dashboard = new mainDashboard();
            Dashboard.ShowDialog();
        }

        private void btnManageUsers_Click(object sender, EventArgs e)
        {
            //On button event, hide current form and open userList.
            Hide();
            userList userListForm = new userList();
            userListForm.ShowDialog();
        }

        private void btnManageServers_Click(object sender, EventArgs e)
        {
            //On button event, hide current form and open serverManagement.
            Hide();
            serverManagement manageS = new serverManagement();
            manageS.ShowDialog();
        }

        private void btnManageLocations_Click(object sender, EventArgs e)
        {
            //On button event, hide current form and open locationManagement.
            Hide();
            locationManagement manageL = new locationManagement();
```

```
        manageL.ShowDialog();
    }

    private void btnManageAccount_Click(object sender, EventArgs e)
    {
        //Display message box informing the user that they're already on the page that they attempted to navigate to.
        MessageBox.Show("You're already here!", "Notice", MessageBoxButtons.OK);
    }

    private void btnLogout_Click(object sender, EventArgs e)
    {
        //On button event, trigger a message box confirming logout. If the user input is Yes, close the form.
        if (MessageBox.Show("Are you sure you want to logout?", "Confirmation", MessageBoxButtons.YesNo) != DialogResult.No)
        {
            this.Close();
        }
    }

    private void lblMetallicGloss_Click(object sender, EventArgs e)
    {
        //Create process to open the link www.metallicgloss.com in the default browser.
        System.Diagnostics.Process.Start("https://www.metallicgloss.com");
    }

    private void manageAccount_Load(object sender, EventArgs e)
    {
        largeProfileImage.ImageLocation = loginMenu.ProfileImage;
        largeProfileImage.SizeMode = PictureBoxSizeMode.CenterImage;
        largeProfileImage.SizeMode = PictureBoxSizeMode.StretchImage;

        lblUserID.Text = "User ID: " + loginMenu.UserID;
        lblUsername.Text = "Username: " + loginMenu.Username;
        lblForename.Text = "Forename: " + loginMenu.Forename;
        lblSurname.Text = "Surname: " + loginMenu.Surname;
        lblEmailAddress.Text = "Email Address: " + loginMenu.EmailAddress;
        lblProfileURL.Text = "URL: " + loginMenu.ProfileImage;
        lblCompany.Text = "Company: " + loginMenu.CompanyName;
        lblCompanyPosition.Text = "Position: " + loginMenu.Role;
        if (loginMenu.permViewLocations == false)
        {
            btnManageLocations.Enabled = false;
        }
        if (loginMenu.permAdminViewUsers == false)
        {
```

```
        btnManageUsers.Enabled = false;
    }
    if (loginMenu.permViewServers == false)
    {
        btnManageServers.Enabled = false;
    }
    if (loginMenu.permCreateTicket == false)
    {
        btnCreateTicket.Enabled = false;
    }
    if (loginMenu.permChangeEmail == false)
    {
        btnChangeEmailAddress.Enabled = false;
    }
    if (loginMenu.permChangeUsername == false)
    {
        btnChangeUsername.Enabled = false;
    }
    if (loginMenu.permChangePassword == false)
    {
        btnChangePassword.Enabled = false;
    }
}

private void btnChangeUsername_Click(object sender, EventArgs e)
{
    //On button event open accountUsername & Update after form closure.
    accountUsername username = new accountUsername();
    username.ShowDialog();
    lblUsername.Text = "Username: " + loginMenu.Username;
}

private void btnChangePassword_Click(object sender, EventArgs e)
{
    //On button event open accountPassword.
    accountPassword password = new accountPassword();
    password.ShowDialog();
}

private void btnChangeEmailAddress_Click(object sender, EventArgs e)
{
    //On button event open accountEmail & Update after form closure.
    accountEmail Email = new accountEmail();
    Email.ShowDialog();
```

```
        lblEmailAddress.Text = "Email Address: " + loginMenu.EmailAddress;
    }

    private void btnForename_Click(object sender, EventArgs e)
    {
        //On button event open accountForename.
        accountForename forename = new accountForename();
        forename.ShowDialog();
    }

    private void btnSurname_Click(object sender, EventArgs e)
    {
        //On button event open accountSurname.
        accountSurname surname = new accountSurname();
        surname.ShowDialog();
    }

    private void btnCreateTicket_Click(object sender, EventArgs e)
    {
        //On button event open ticketNew.
        ticketNew ticket = new ticketNew();
        ticket.ShowDialog();
    }

    private void btnTicketReply_Click(object sender, EventArgs e)
    {
        //On button event, hide current form and open ticketView.
        Hide();
        ticketView ticket = new ticketView();
        ticket.ShowDialog();
    }
}
```

Subsection 3.6.3.xxiii - accountUsername.cs [design] - design view

The image shows a window titled "Change Account Username". It contains three text input fields: "Current Username:", "New Username:", and "Confirm Username:". Below these fields are two buttons: "Process Username Change" and "Cancel". The entire window has a light blue header bar and a white background.

Change Account Username

Current Username:

New Username:

Confirm Username:

Subsection 3.6.3.xxiv - accountUsername.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class accountUsername
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            System.ComponentModel.ComponentResourceManager resources = new
System.ComponentModel.ComponentResourceManager(typeof(accountUsername));
            this.lblCurrentUsername = new System.Windows.Forms.Label();
            this.lblNewUsername = new System.Windows.Forms.Label();
            this.lblConfirmUsername = new System.Windows.Forms.Label();
            this.txtCurrentUsername = new System.Windows.Forms.TextBox();
            this.txtNewUsername = new System.Windows.Forms.TextBox();
            this.txtConfirmNewUsername = new System.Windows.Forms.TextBox();
            this.btnChangeUsername = new System.Windows.Forms.Button();
            this.btnCancel = new System.Windows.Forms.Button();
            this.SuspendLayout();
        }
    }
}
```

```
// lblCurrentUsername
//
this.lblCurrentUsername.AutoSize = true;
this.lblCurrentUsername.BackColor = System.Drawing.Color.Transparent;
this.lblCurrentUsername.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblCurrentUsername.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblCurrentUsername.Location = new System.Drawing.Point(33, 34);
this.lblCurrentUsername.Name = "lblCurrentUsername";
this.lblCurrentUsername.Size = new System.Drawing.Size(139, 18);
this.lblCurrentUsername.TabIndex = 26;
this.lblCurrentUsername.Text = "Current Username:";
//
// lblNewUsername
//
this.lblNewUsername.AutoSize = true;
this.lblNewUsername.BackColor = System.Drawing.Color.Transparent;
this.lblNewUsername.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblNewUsername.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblNewUsername.Location = new System.Drawing.Point(33, 73);
this.lblNewUsername.Name = "lblNewUsername";
this.lblNewUsername.Size = new System.Drawing.Size(120, 18);
this.lblNewUsername.TabIndex = 27;
this.lblNewUsername.Text = "New Username:";
//
// lblConfirmUsername
//
this.lblConfirmUsername.AutoSize = true;
this.lblConfirmUsername.BackColor = System.Drawing.Color.Transparent;
this.lblConfirmUsername.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblConfirmUsername.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblConfirmUsername.Location = new System.Drawing.Point(33, 110);
this.lblConfirmUsername.Name = "lblConfirmUsername";
this.lblConfirmUsername.Size = new System.Drawing.Size(142, 18);
this.lblConfirmUsername.TabIndex = 28;
this.lblConfirmUsername.Text = "Confirm Username:";
//
// txtCurrentUsername
//
this.txtCurrentUsername.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtCurrentUsername.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtCurrentUsername.Location = new System.Drawing.Point(178, 33);
```

```
this.txtCurrentUsername.Name = "txtCurrentUsername";
this.txtCurrentUsername.ReadOnly = true;
this.txtCurrentUsername.Size = new System.Drawing.Size(310, 20);
this.txtCurrentUsername.TabIndex = 29;
//
// txtNewUsername
//
this.txtNewUsername.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtNewUsername.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtNewUsername.Location = new System.Drawing.Point(178, 71);
this.txtNewUsername.Name = "txtNewUsername";
this.txtNewUsername.Size = new System.Drawing.Size(310, 20);
this.txtNewUsername.TabIndex = 30;
//
// txtConfirmNewUsername
//
this.txtConfirmNewUsername.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtConfirmNewUsername.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtConfirmNewUsername.Location = new System.Drawing.Point(178, 109);
this.txtConfirmNewUsername.Name = "txtConfirmNewUsername";
this.txtConfirmNewUsername.Size = new System.Drawing.Size(310, 20);
this.txtConfirmNewUsername.TabIndex = 31;
//
// btnChangeUsername
//
this.btnChangeUsername.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnChangeUsername.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnChangeUsername.FlatAppearance.BorderSize = 0;
this.btnChangeUsername.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnChangeUsername.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnChangeUsername.Location = new System.Drawing.Point(36, 145);
this.btnChangeUsername.Name = "btnChangeUsername";
this.btnChangeUsername.Size = new System.Drawing.Size(206, 31);
this.btnChangeUsername.TabIndex = 32;
this.btnChangeUsername.Text = "Process Username Change";
this.btnChangeUsername.UseVisualStyleBackColor = false;
this.btnChangeUsername.Click += new System.EventHandler(this.btnChangeUsername_Click);
//
// btnCancel
//
this.btnCancel.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnCancel.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnCancel.FlatAppearance.BorderSize = 0;
```

```
this.btnCancel.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnCancel.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCancel.Location = new System.Drawing.Point(281, 145);
this.btnCancel.Name = "btnCancel";
this.btnCancel.Size = new System.Drawing.Size(207, 31);
this.btnCancel.TabIndex = 37;
this.btnCancel.Text = "Cancel";
this.btnCancel.UseVisualStyleBackColor = false;
this.btnCancel.Click += new System.EventHandler(this.btnCancel_Click);
//
// accountUsername
//
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(528, 203);
this.ControlBox = false;
this.Controls.Add(this.btnCancel);
this.Controls.Add(this.btnChangeUsername);
this.Controls.Add(this.txtConfirmNewUsername);
this.Controls.Add(this.txtNewUsername);
this.Controls.Add(this.txtCurrentUsername);
this.Controls.Add(this.lblConfirmUsername);
this.Controls.Add(this.lblNewUsername);
this.Controls.Add(this.lblCurrentUsername);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.Icon = ((System.Drawing.Icon)(resources.GetObject("$this.Icon")));
this.MaximizeBox = false;
this.MaximumSize = new System.Drawing.Size(544, 242);
this.MinimumSize = new System.Drawing.Size(544, 242);
this.Name = "accountUsername";
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "Change Account Username";
this.Load += new System.EventHandler(this.manageAccountUsername_Load);
this.ResumeLayout(false);
this.PerformLayout();

}

#endregion

private System.Windows.Forms.Label lblCurrentUsername;
```

```
    private System.Windows.Forms.Label lblNewUsername;
    private System.Windows.Forms.Label lblConfirmUsername;
    private System.Windows.Forms.TextBox txtCurrentUsername;
    private System.Windows.Forms.TextBox txtNewUsername;
    private System.Windows.Forms.TextBox txtConfirmNewUsername;
    private System.Windows.Forms.Button btnChangeUsername;
    private System.Windows.Forms.Button btnCancel;
}
}
```

Subsection 3.6.3.xxv - accountUsername.cs - Code file - annotated

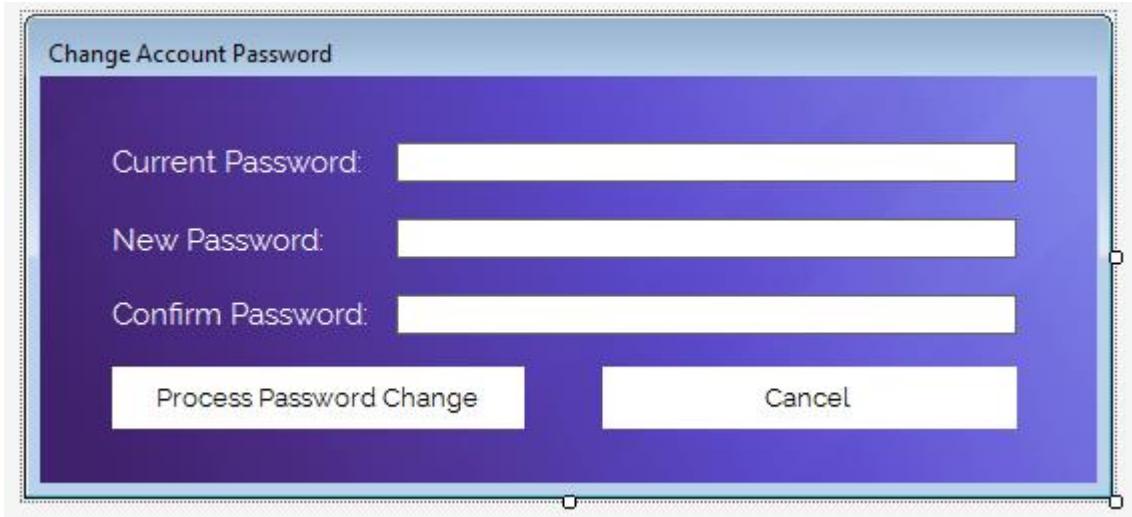
```
using System;
using System.Windows.Forms;
using MySql.Data.MySqlClient;

namespace ELSM_Project
{
    public partial class accountUsername : Form
    {
        public accountUsername()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        private void manageAccountUsername_Load(object sender, EventArgs e)
        {
            //Set the username text box to the variable.
            txtCurrentUsername.Text = loginMenu.Username;
        }
        private void btnCancel_Click(object sender, EventArgs e)
        {
            //On button event, hide the form.
            Hide();
        }
        private void btnChangeUsername_Click(object sender, EventArgs e)
        {
            //If the two new values are the same, and aren't blank execute.
            if ((txtNewUsername.Text == txtConfirmNewUsername.Text) && (txtNewUsername.Text != ""))
            {
                //Update user username.
                MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
                conn.Open();
                MySqlCommand command = new MySqlCommand("UPDATE `userAccounts` SET userLogin = @newUsername", conn);
                command.Parameters.AddWithValue("@newUsername", txtNewUsername.Text);
                command.ExecuteNonQuery();
                loginMenu.Username = txtNewUsername.Text;
                Hide();
            }
            else
            {
                System.Windows.Forms.MessageBox.Show("The data you have entered doesn't match or is blank. Please check your
username and try again.");
            }
        }
    }
}
```

```
        }  
    }  
}
```

Subsection 3.6.3.xxvi - accountPassword.cs [design] - design view



Subsection 3.6.3.xxvii - accountPassword.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class accountPassword
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            System.ComponentModel.ComponentResourceManager resources = new
System.ComponentModel.ComponentResourceManager(this);
            this.lblNewPassword = new System.Windows.Forms.Label();
            this.lblConfirmPassword = new System.Windows.Forms.Label();
            this.txtNewPassword = new System.Windows.Forms.TextBox();
            this.txtConfirmPassword = new System.Windows.Forms.TextBox();
            this.btnChangePassword = new System.Windows.Forms.Button();
            this.btnCancel = new System.Windows.Forms.Button();
            this.lblCurrentPassword = new System.Windows.Forms.Label();
            this.txtCurrentPassword = new System.Windows.Forms.TextBox();
            this.SuspendLayout();
        }
    }
}
```

```
// lblNewPassword
//
this.lblNewPassword.AutoSize = true;
this.lblNewPassword.BackColor = System.Drawing.Color.Transparent;
this.lblNewPassword.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblNewPassword.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblNewPassword.Location = new System.Drawing.Point(33, 73);
this.lblNewPassword.Name = "lblNewPassword";
this.lblNewPassword.Size = new System.Drawing.Size(114, 18);
this.lblNewPassword.TabIndex = 27;
this.lblNewPassword.Text = "New Password:";
//
// lblConfirmPassword
//
this.lblConfirmPassword.AutoSize = true;
this.lblConfirmPassword.BackColor = System.Drawing.Color.Transparent;
this.lblConfirmPassword.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblConfirmPassword.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblConfirmPassword.Location = new System.Drawing.Point(33, 110);
this.lblConfirmPassword.Name = "lblConfirmPassword";
this.lblConfirmPassword.Size = new System.Drawing.Size(136, 18);
this.lblConfirmPassword.TabIndex = 28;
this.lblConfirmPassword.Text = "Confirm Password:";
//
// txtNewPassword
//
this.txtNewPassword.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtNewPassword.Location = new System.Drawing.Point(178, 71);
this.txtNewPassword.Name = "txtNewPassword";
this.txtNewPassword.PasswordChar = '*';
this.txtNewPassword.Size = new System.Drawing.Size(310, 20);
this.txtNewPassword.TabIndex = 30;
//
// txtConfirmPassword
//
this.txtConfirmPassword.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtConfirmPassword.Location = new System.Drawing.Point(178, 109);
this.txtConfirmPassword.Name = "txtConfirmPassword";
this.txtConfirmPassword.PasswordChar = '*';
this.txtConfirmPassword.Size = new System.Drawing.Size(310, 20);
this.txtConfirmPassword.TabIndex = 31;
//
```

```
// btnChangePassword
//
this.btnChangePassword.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnChangePassword.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnChangePassword.FlatAppearance.BorderSize = 0;
this.btnChangePassword.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnChangePassword.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnChangePassword.Location = new System.Drawing.Point(36, 145);
this.btnChangePassword.Name = "btnChangePassword";
this.btnChangePassword.Size = new System.Drawing.Size(206, 31);
this.btnChangePassword.TabIndex = 32;
this.btnChangePassword.Text = "Process Password Change";
this.btnChangePassword.UseVisualStyleBackColor = false;
this.btnChangePassword.Click += new System.EventHandler(this.btnChangePassword_Click);
//
// btnCancel
//
this.btnCancel.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnCancel.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnCancel.FlatAppearance.BorderSize = 0;
this.btnCancel.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnCancel.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCancel.Location = new System.Drawing.Point(281, 145);
this.btnCancel.Name = "btnCancel";
this.btnCancel.Size = new System.Drawing.Size(207, 31);
this.btnCancel.TabIndex = 35;
this.btnCancel.Text = "Cancel";
this.btnCancel.UseVisualStyleBackColor = false;
this.btnCancel.Click += new System.EventHandler(this.btnCancel_Click);
//
// lblCurrentPassword
//
this.lblCurrentPassword.AutoSize = true;
this.lblCurrentPassword.BackColor = System.Drawing.Color.Transparent;
this.lblCurrentPassword.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblCurrentPassword.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblCurrentPassword.Location = new System.Drawing.Point(33, 34);
this.lblCurrentPassword.Name = "lblCurrentPassword";
this.lblCurrentPassword.Size = new System.Drawing.Size(133, 18);
this.lblCurrentPassword.TabIndex = 26;
this.lblCurrentPassword.Text = "Current Password:";
```

```
//  
// txtCurrentPassword  
//  
this.txtCurrentPassword.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;  
this.txtCurrentPassword.Location = new System.Drawing.Point(178, 33);  
this.txtCurrentPassword.Name = "txtCurrentPassword";  
this.txtCurrentPassword.PasswordChar = '*';  
this.txtCurrentPassword.Size = new System.Drawing.Size(310, 20);  
this.txtCurrentPassword.TabIndex = 29;  
//  
// accountPassword  
//  
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);  
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;  
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;  
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;  
this.ClientSize = new System.Drawing.Size(528, 203);  
this.ControlBox = false;  
this.Controls.Add(this.btnCancel);  
this.Controls.Add(this.txtConfirmPassword);  
this.Controls.Add(this.txtNewPassword);  
this.Controls.Add(this.txtCurrentPassword);  
this.Controls.Add(this.lblConfirmPassword);  
this.Controls.Add(this.lblNewPassword);  
this.Controls.Add(this.lblCurrentPassword);  
this.Controls.Add(this.btnChangePassword);  
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;  
this.Icon = ((System.Drawing.Icon)(resources.GetObject("$this.Icon")));  
this.MaximizeBox = false;  
this.MaximumSize = new System.Drawing.Size(544, 242);  
this.MinimumSize = new System.Drawing.Size(544, 242);  
this.Name = "accountPassword";  
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;  
this.Text = "Change Account Password";  
this.ResumeLayout(false);  
this.PerformLayout();  
  
}  
  
#endregion  
private System.Windows.Forms.Label lblNewPassword;  
private System.Windows.Forms.Label lblConfirmPassword;  
private System.Windows.Forms.TextBox txtNewPassword;  
private System.Windows.Forms.TextBox txtConfirmPassword;
```

```
    private System.Windows.Forms.Button btnChangePassword;
    private System.Windows.Forms.Button btnCancel;
    private System.Windows.Forms.Label lblCurrentPassword;
    private System.Windows.Forms.TextBox txtCurrentPassword;
}
}
```

Subsection 3.6.3.xxviii - accountPassword.cs - Code file - annotated

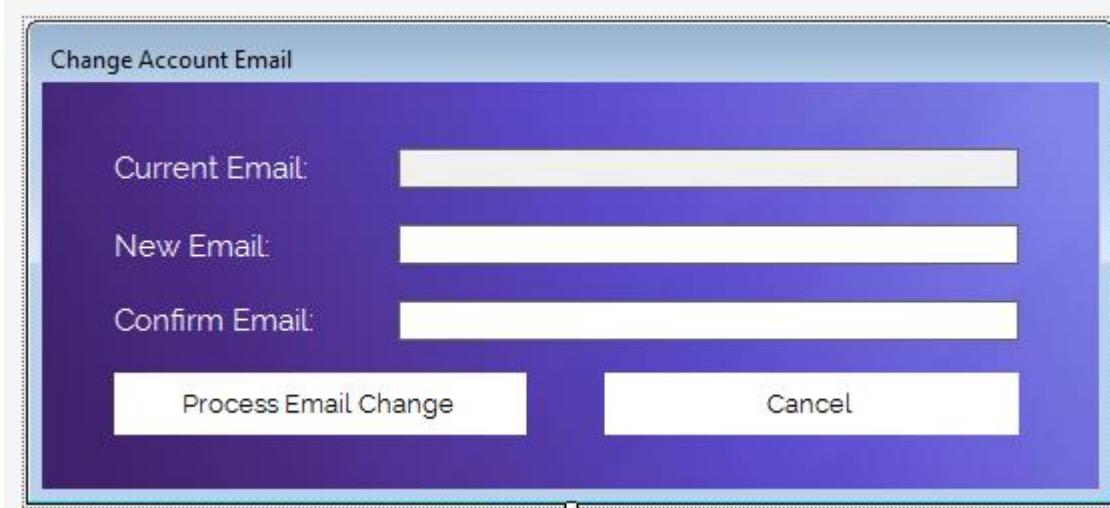
```
using System;
using System.Windows.Forms;
using MySql.Data.MySqlClient;
using Hashing.PasswordManagement;

namespace ELSM_Project
{

    public partial class accountPassword : Form
    {
        public accountPassword()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        private void btnCancel_Click(object sender, EventArgs e)
        {
            //On button event, hide the form.
            Hide();
        }
        private void btnChangePassword_Click(object sender, EventArgs e)
        {
            //Hash and salt the two new passwords.
            String NewPassword = SHA.GenerateSHA512String(loginMenu.userSalt + txtNewPassword.Text);
            String NewPasswordConfirm = SHA.GenerateSHA512String(loginMenu.userSalt + txtConfirmPassword.Text);
            //If the two new values are the same, and aren't blank execute.
            if ((NewPassword == NewPasswordConfirm) && (txtNewPassword.Text != ""))
            {
                //Update user password.
                MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
                conn.Open();
                MySqlCommand command = new MySqlCommand("UPDATE `userAccounts` SET userPassword = @pass", conn);
                command.Parameters.AddWithValue("@pass", NewPassword);
                command.ExecuteNonQuery();
                loginMenu.Password = txtNewPassword.Text;
                Hide();
            }
            else
            {
                System.Windows.Forms.MessageBox.Show("The data you have entered doesn't match. Please check your email address and try again.");
            }
        }
    }
}
```

}
}
}

Subsection 3.6.3.xxix - accountEmail.cs [design] - design view

Subsection 3.6.3.xxx - accountEmail.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class accountEmail
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            this.lblCurrentUsername = new System.Windows.Forms.Label();
            this.lblNewUsername = new System.Windows.Forms.Label();
            this.lblConfirmUsername = new System.Windows.Forms.Label();
            this.txtCurrentEmail = new System.Windows.Forms.TextBox();
            this.txtNewEmail = new System.Windows.Forms.TextBox();
            this.txtConfirmEmail = new System.Windows.Forms.TextBox();
            this.btnChangeEmail = new System.Windows.Forms.Button();
            this.btnCancel = new System.Windows.Forms.Button();
            this.SuspendLayout();
            // 
            // lblCurrentUsername
            // 
```

```
this.lblCurrentUsername.AutoSize = true;
this.lblCurrentUsername.BackColor = System.Drawing.Color.Transparent;
this.lblCurrentUsername.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblCurrentUsername.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblCurrentUsername.Location = new System.Drawing.Point(33, 34);
this.lblCurrentUsername.Name = "lblCurrentUsername";
this.lblCurrentUsername.Size = new System.Drawing.Size(105, 18);
this.lblCurrentUsername.TabIndex = 26;
this.lblCurrentUsername.Text = "Current Email:";
//
// lblNewUsername
//
this.lblNewUsername.AutoSize = true;
this.lblNewUsername.BackColor = System.Drawing.Color.Transparent;
this.lblNewUsername.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblNewUsername.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblNewUsername.Location = new System.Drawing.Point(33, 73);
this.lblNewUsername.Name = "lblNewUsername";
this.lblNewUsername.Size = new System.Drawing.Size(86, 18);
this.lblNewUsername.TabIndex = 27;
this.lblNewUsername.Text = "New Email:";
//
// lblConfirmUsername
//
this.lblConfirmUsername.AutoSize = true;
this.lblConfirmUsername.BackColor = System.Drawing.Color.Transparent;
this.lblConfirmUsername.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblConfirmUsername.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblConfirmUsername.Location = new System.Drawing.Point(33, 110);
this.lblConfirmUsername.Name = "lblConfirmUsername";
this.lblConfirmUsername.Size = new System.Drawing.Size(108, 18);
this.lblConfirmUsername.TabIndex = 28;
this.lblConfirmUsername.Text = "Confirm Email:";
//
// txtCurrentEmail
//
this.txtCurrentEmail.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtCurrentEmail.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtCurrentEmail.Location = new System.Drawing.Point(178, 33);
this.txtCurrentEmail.Name = "txtCurrentEmail";
this.txtCurrentEmail.ReadOnly = true;
```

```
this.txtCurrentEmail.Size = new System.Drawing.Size(310, 20);
this.txtCurrentEmail.TabIndex = 29;
//
// txtNewEmail
//
this.txtNewEmail.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtNewEmail.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtNewEmail.Location = new System.Drawing.Point(178, 71);
this.txtNewEmail.Name = "txtNewEmail";
this.txtNewEmail.Size = new System.Drawing.Size(310, 20);
this.txtNewEmail.TabIndex = 30;
//
// txtConfirmEmail
//
this.txtConfirmEmail.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtConfirmEmail.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtConfirmEmail.Location = new System.Drawing.Point(178, 109);
this.txtConfirmEmail.Name = "txtConfirmEmail";
this.txtConfirmEmail.Size = new System.Drawing.Size(310, 20);
this.txtConfirmEmail.TabIndex = 31;
//
// btnChangeEmail
//
this.btnChangeEmail.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnChangeEmail.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnChangeEmail.FlatAppearance.BorderSize = 0;
this.btnChangeEmail.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnChangeEmail.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnChangeEmail.Location = new System.Drawing.Point(36, 145);
this.btnChangeEmail.Name = "btnChangeEmail";
this.btnChangeEmail.Size = new System.Drawing.Size(206, 31);
this.btnChangeEmail.TabIndex = 32;
this.btnChangeEmail.Text = "Process Email Change";
this.btnChangeEmail.UseVisualStyleBackColor = false;
this.btnChangeEmail.Click += new System.EventHandler(this.btnChangeEmail_Click);
//
// btnCancel
//
this.btnCancel.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnCancel.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnCancel.FlatAppearance.BorderSize = 0;
this.btnCancel.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
```

```
this.btnCancel.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCancel.Location = new System.Drawing.Point(281, 145);
this.btnCancel.Name = "btnCancel";
this.btnCancel.Size = new System.Drawing.Size(207, 31);
this.btnCancel.TabIndex = 33;
this.btnCancel.Text = "Cancel";
this.btnCancel.UseVisualStyleBackColor = false;
this.btnCancel.Click += new System.EventHandler(this.btnCancel_Click);
//
// accountEmail
//
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(528, 203);
this.ControlBox = false;
this.Controls.Add(this.btnCancel);
this.Controls.Add(this.btnChangeEmail);
this.Controls.Add(this.txtConfirmEmail);
this.Controls.Add(this.txtNewEmail);
this.Controls.Add(this.txtCurrentEmail);
this.Controls.Add(this.lblConfirmUsername);
this.Controls.Add(this.lblNewUsername);
this.Controls.Add(this.lblCurrentUsername);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.MaximizeBox = false;
this.MaximumSize = new System.Drawing.Size(544, 242);
this.MinimumSize = new System.Drawing.Size(544, 242);
this.Name = "accountEmail";
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "Change Account Email";
this.Load += new System.EventHandler(this.manageAccountEmail_Load);
this.ResumeLayout(false);
this.PerformLayout();

}

#endregion

private System.Windows.Forms.Label lblCurrentUsername;
private System.Windows.Forms.Label lblNewUsername;
private System.Windows.Forms.Label lblConfirmUsername;
```

```
    private System.Windows.Forms.TextBox txtCurrentEmail;
    private System.Windows.Forms.TextBox txtNewEmail;
    private System.Windows.Forms.TextBox txtConfirmEmail;
    private System.Windows.Forms.Button btnChangeEmail;
    private System.Windows.Forms.Button btnCancel;
}
```

Subsection 3.6.3.xxi - accountEmail.cs - Code file - annotated

```
using System;
using System.Windows.Forms;
using MySql.Data.MySqlClient;

namespace ELSM_Project
{
    public partial class accountEmail : Form
    {
        public accountEmail()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        private void btnCancel_Click(object sender, EventArgs e)
        {
            //On button event, hide the form.
            Hide();
        }

        private void manageAccountEmail_Load(object sender, EventArgs e)
        {
            //Set the email text box to the variable.
            txtCurrentEmail.Text = loginMenu.EmailAddress;
        }

        private void btnChangeEmail_Click(object sender, EventArgs e)
        {
            //If the two new values are the same, and aren't blank execute.
            if ((txtNewEmail.Text == txtConfirmEmail.Text) && (txtNewEmail.Text != ""))
            {
                //Try parsing the text into the format of an email, if it fails inform the user the formatting is incorrect.
                try
                {
                    var addr = new System.Net.Mail.MailAddress(txtNewEmail.Text);
                    //Update user email address.
                    MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
                    conn.Open();
                    MySqlCommand command = new MySqlCommand("UPDATE `userAccounts` SET userEmailAddress = @email", conn);
                    command.Parameters.AddWithValue("@email", txtNewEmail.Text);
                    command.ExecuteNonQuery();
                    loginMenu.EmailAddress = txtNewEmail.Text;
                }
                catch (FormatException)
                {
                    MessageBox.Show("The email address is not valid.", "Error", MessageBoxButtons.OK, MessageBoxIcon.Error);
                }
            }
        }
    }
}
```

```
        Hide();
    }
    catch
    {
        System.Windows.Forms.MessageBox.Show("You must enter an email address in the correct format.");
    }
    else
    {
        System.Windows.Forms.MessageBox.Show("The data you have entered doesn't match. Please check your email address  
and try again.");
    }
}
}
```

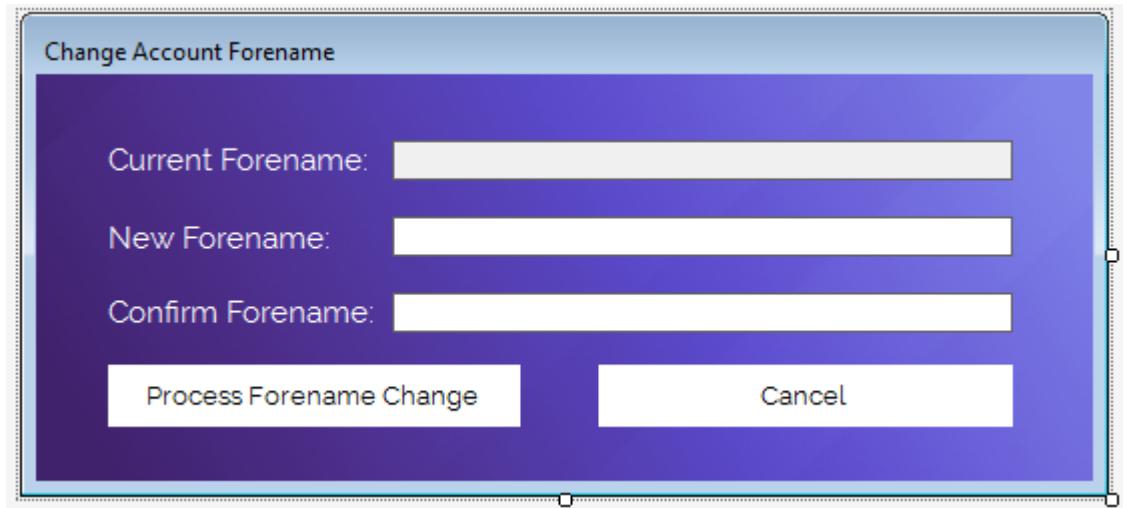
Subsection 3.6.3.xxi - accountForename.cs [design] - design view

Change Account Forename

Current Forename:

New Forename:

Confirm Forename:



Subsection 3.6.3.xxxiii - accountForename.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class accountForename
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            this.lblCurrentUsername = new System.Windows.Forms.Label();
            this.lblNewUsername = new System.Windows.Forms.Label();
            this.lblConfirmUsername = new System.Windows.Forms.Label();
            this.txtCurrentForename = new System.Windows.Forms.TextBox();
            this.txtNewForename = new System.Windows.Forms.TextBox();
            this.txtConfirmForename = new System.Windows.Forms.TextBox();
            this.btnChangeForename = new System.Windows.Forms.Button();
            this.btnCancel = new System.Windows.Forms.Button();
            this.SuspendLayout();
            // 
            // lblCurrentUsername
            // 
```

```
this.lblCurrentUsername.AutoSize = true;
this.lblCurrentUsername.BackColor = System.Drawing.Color.Transparent;
this.lblCurrentUsername.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblCurrentUsername.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblCurrentUsername.Location = new System.Drawing.Point(33, 34);
this.lblCurrentUsername.Name = "lblCurrentUsername";
this.lblCurrentUsername.Size = new System.Drawing.Size(138, 18);
this.lblCurrentUsername.TabIndex = 26;
this.lblCurrentUsername.Text = "Current Forename:";
//
// lblNewUsername
//
this.lblNewUsername.AutoSize = true;
this.lblNewUsername.BackColor = System.Drawing.Color.Transparent;
this.lblNewUsername.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblNewUsername.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblNewUsername.Location = new System.Drawing.Point(33, 73);
this.lblNewUsername.Name = "lblNewUsername";
this.lblNewUsername.Size = new System.Drawing.Size(119, 18);
this.lblNewUsername.TabIndex = 27;
this.lblNewUsername.Text = "New Forename:";
//
// lblConfirmUsername
//
this.lblConfirmUsername.AutoSize = true;
this.lblConfirmUsername.BackColor = System.Drawing.Color.Transparent;
this.lblConfirmUsername.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblConfirmUsername.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblConfirmUsername.Location = new System.Drawing.Point(33, 110);
this.lblConfirmUsername.Name = "lblConfirmUsername";
this.lblConfirmUsername.Size = new System.Drawing.Size(141, 18);
this.lblConfirmUsername.TabIndex = 28;
this.lblConfirmUsername.Text = "Confirm Forename:";
//
// txtCurrentForename
//
this.txtCurrentForename.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtCurrentForename.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtCurrentForename.Location = new System.Drawing.Point(178, 33);
this.txtCurrentForename.Name = "txtCurrentForename";
this.txtCurrentForename.ReadOnly = true;
```

```
this.txtCurrentForename.Size = new System.Drawing.Size(310, 20);
this.txtCurrentForename.TabIndex = 29;
//
// txtNewForename
//
this.txtNewForename.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtNewForename.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtNewForename.Location = new System.Drawing.Point(178, 71);
this.txtNewForename.Name = "txtNewForename";
this.txtNewForename.Size = new System.Drawing.Size(310, 20);
this.txtNewForename.TabIndex = 30;
//
// txtConfirmForename
//
this.txtConfirmForename.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtConfirmForename.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtConfirmForename.Location = new System.Drawing.Point(178, 109);
this.txtConfirmForename.Name = "txtConfirmForename";
this.txtConfirmForename.Size = new System.Drawing.Size(310, 20);
this.txtConfirmForename.TabIndex = 31;
//
// btnChangeForename
//
this.btnChangeForename.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnChangeForename.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnChangeForename.FlatAppearance.BorderSize = 0;
this.btnChangeForename.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnChangeForename.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnChangeForename.Location = new System.Drawing.Point(36, 145);
this.btnChangeForename.Name = "btnChangeForename";
this.btnChangeForename.Size = new System.Drawing.Size(206, 31);
this.btnChangeForename.TabIndex = 32;
this.btnChangeForename.Text = "Process Forename Change";
this.btnChangeForename.UseVisualStyleBackColor = false;
this.btnChangeForename.Click += new System.EventHandler(this.btnChangeForename_Click);
//
// btnCancel
//
this.btnCancel.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnCancel.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnCancel.FlatAppearance.BorderSize = 0;
this.btnCancel.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
```

```
this.btnCancel.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCancel.Location = new System.Drawing.Point(281, 145);
this.btnCancel.Name = "btnCancel";
this.btnCancel.Size = new System.Drawing.Size(207, 31);
this.btnCancel.TabIndex = 33;
this.btnCancel.Text = "Cancel";
this.btnCancel.UseVisualStyleBackColor = false;
this.btnCancel.Click += new System.EventHandler(this.btnCancel_Click);
//
// accountForename
//
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(528, 203);
this.ControlBox = false;
this.Controls.Add(this.btnCancel);
this.Controls.Add(this.btnChangeForename);
this.Controls.Add(this.txtConfirmForename);
this.Controls.Add(this.txtNewForename);
this.Controls.Add(this.txtCurrentForename);
this.Controls.Add(this.lblConfirmUsername);
this.Controls.Add(this.lblNewUsername);
this.Controls.Add(this.lblCurrentUsername);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.MaximizeBox = false;
this.MaximumSize = new System.Drawing.Size(544, 242);
this.MinimumSize = new System.Drawing.Size(544, 242);
this.Name = "accountForename";
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "Change Account Forename";
this.Load += new System.EventHandler(this.accountForename_Load);
this.ResumeLayout(false);
this.PerformLayout();

}

#endregion

private System.Windows.Forms.Label lblCurrentUsername;
private System.Windows.Forms.Label lblNewUsername;
private System.Windows.Forms.Label lblConfirmUsername;
```

```
    private System.Windows.Forms.TextBox txtCurrentForename;
    private System.Windows.Forms.TextBox txtNewForename;
    private System.Windows.Forms.TextBox txtConfirmForename;
    private System.Windows.Forms.Button btnChangeForename;
    private System.Windows.Forms.Button btnCancel;
}
}
```

Subsection 3.6.3.xxiv - accountForename.cs - Code file - annotated

```
using System;
using System.Windows.Forms;
using MySql.Data.MySqlClient;

namespace ELSM_Project
{
    public partial class accountForename : Form
    {
        public accountForename()
        {
            //On form load initialize component.
            InitializeComponent();
        }
        private void btnCancel_Click(object sender, EventArgs e)
        {
            //On button event, hide the form.
            Hide();
        }

        private void accountForename_Load(object sender, EventArgs e)
        {
            //Set the forename text box to the variable.
            txtCurrentForename.Text = loginMenu.Forename;
        }
        private void btnChangeForename_Click(object sender, EventArgs e)
        {
            //If the two new values are the same, and aren't blank execute.
            if ((txtNewForename.Text == txtConfirmForename.Text) && (txtNewForename.Text != ""))
            {
                //Update user forename.
                MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
                conn.Open();
                MySqlCommand command = new MySqlCommand("UPDATE `userAccounts` SET userForename = @Forename", conn);
                command.Parameters.AddWithValue("@Forename", txtNewForename.Text);
                command.ExecuteNonQuery();
                loginMenu.Forename = txtNewForename.Text;
                Hide();
            }
            else
            {
                System.Windows.Forms.MessageBox.Show("The data you have entered doesn't match and not blank. Please check your forename field and try again.");
            }
        }
    }
}
```

}
}
}

Subsection 3.6.3.xxxv - accountSurname.cs [design] - design view

The screenshot shows a Windows-style dialog box titled "Change Account Surname". The dialog has a light blue header bar. Inside, there are three text input fields stacked vertically: "Current Surname:", "New Surname:", and "Confirm Surname:". Below these fields are two buttons: "Process Surname Change" on the left and "Cancel" on the right. The entire dialog is set against a white background.

Subsection 3.6.3.xxxvi - accountSurname.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class accountSurname
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            this.lblCurrentUsername = new System.Windows.Forms.Label();
            this.lblNewUsername = new System.Windows.Forms.Label();
            this.lblConfirmUsername = new System.Windows.Forms.Label();
            this.txtCurrentSurname = new System.Windows.Forms.TextBox();
            this.txtNewSurname = new System.Windows.Forms.TextBox();
            this.txtConfirmSurname = new System.Windows.Forms.TextBox();
            this.btnChangeSurname = new System.Windows.Forms.Button();
            this.btnCancel = new System.Windows.Forms.Button();
            this.SuspendLayout();
            // 
            // lblCurrentUsername
            // 
```

```
this.lblCurrentUsername.AutoSize = true;
this.lblCurrentUsername.BackColor = System.Drawing.Color.Transparent;
this.lblCurrentUsername.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblCurrentUsername.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblCurrentUsername.Location = new System.Drawing.Point(33, 34);
this.lblCurrentUsername.Name = "lblCurrentUsername";
this.lblCurrentUsername.Size = new System.Drawing.Size(130, 18);
this.lblCurrentUsername.TabIndex = 26;
this.lblCurrentUsername.Text = "Current Surname:";
//
// lblNewUsername
//
this.lblNewUsername.AutoSize = true;
this.lblNewUsername.BackColor = System.Drawing.Color.Transparent;
this.lblNewUsername.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblNewUsername.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblNewUsername.Location = new System.Drawing.Point(33, 73);
this.lblNewUsername.Name = "lblNewUsername";
this.lblNewUsername.Size = new System.Drawing.Size(111, 18);
this.lblNewUsername.TabIndex = 27;
this.lblNewUsername.Text = "New Surname:";
//
// lblConfirmUsername
//
this.lblConfirmUsername.AutoSize = true;
this.lblConfirmUsername.BackColor = System.Drawing.Color.Transparent;
this.lblConfirmUsername.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblConfirmUsername.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblConfirmUsername.Location = new System.Drawing.Point(33, 110);
this.lblConfirmUsername.Name = "lblConfirmUsername";
this.lblConfirmUsername.Size = new System.Drawing.Size(133, 18);
this.lblConfirmUsername.TabIndex = 28;
this.lblConfirmUsername.Text = "Confirm Surname:";
//
// txtCurrentSurname
//
this.txtCurrentSurname.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtCurrentSurname.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtCurrentSurname.Location = new System.Drawing.Point(178, 33);
this.txtCurrentSurname.Name = "txtCurrentSurname";
this.txtCurrentSurname.ReadOnly = true;
```

```
this.txtCurrentSurname.Size = new System.Drawing.Size(310, 20);
this.txtCurrentSurname.TabIndex = 29;
//
// txtNewSurname
//
this.txtNewSurname.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtNewSurname.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtNewSurname.Location = new System.Drawing.Point(178, 71);
this.txtNewSurname.Name = "txtNewSurname";
this.txtNewSurname.Size = new System.Drawing.Size(310, 20);
this.txtNewSurname.TabIndex = 30;
//
// txtConfirmSurname
//
this.txtConfirmSurname.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtConfirmSurname.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtConfirmSurname.Location = new System.Drawing.Point(178, 109);
this.txtConfirmSurname.Name = "txtConfirmSurname";
this.txtConfirmSurname.Size = new System.Drawing.Size(310, 20);
this.txtConfirmSurname.TabIndex = 31;
//
// btnChangeSurname
//
this.btnChangeSurname.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnChangeSurname.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnChangeSurname.FlatAppearance.BorderSize = 0;
this.btnChangeSurname.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnChangeSurname.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnChangeSurname.Location = new System.Drawing.Point(36, 145);
this.btnChangeSurname.Name = "btnChangeSurname";
this.btnChangeSurname.Size = new System.Drawing.Size(206, 31);
this.btnChangeSurname.TabIndex = 32;
this.btnChangeSurname.Text = "Process Surname Change";
this.btnChangeSurname.UseVisualStyleBackColor = false;
this.btnChangeSurname.Click += new System.EventHandler(this.btnChangeSurname_Click);
//
// btnCancel
//
this.btnCancel.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnCancel.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnCancel.FlatAppearance.BorderSize = 0;
this.btnCancel.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
```

```
this.btnCancel.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCancel.Location = new System.Drawing.Point(281, 145);
this.btnCancel.Name = "btnCancel";
this.btnCancel.Size = new System.Drawing.Size(207, 31);
this.btnCancel.TabIndex = 33;
this.btnCancel.Text = "Cancel";
this.btnCancel.UseVisualStyleBackColor = false;
this.btnCancel.Click += new System.EventHandler(this.btnCancel_Click);
//
// accountSurname
//
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(528, 203);
this.ControlBox = false;
this.Controls.Add(this.btnCancel);
this.Controls.Add(this.btnChangeSurname);
this.Controls.Add(this.txtConfirmSurname);
this.Controls.Add(this.txtNewSurname);
this.Controls.Add(this.txtCurrentSurname);
this.Controls.Add(this.lblConfirmUsername);
this.Controls.Add(this.lblNewUsername);
this.Controls.Add(this.lblCurrentUsername);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.MaximizeBox = false;
this.MaximumSize = new System.Drawing.Size(544, 242);
this.MinimumSize = new System.Drawing.Size(544, 242);
this.Name = "accountSurname";
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "Change Account Surname";
this.Load += new System.EventHandler(this.accountSurname_Load);
this.ResumeLayout(false);
this.PerformLayout();

}

#endregion

private System.Windows.Forms.Label lblCurrentUsername;
private System.Windows.Forms.Label lblNewUsername;
private System.Windows.Forms.Label lblConfirmUsername;
```

```
    private System.Windows.Forms.TextBox txtCurrentSurname;
    private System.Windows.Forms.TextBox txtNewSurname;
    private System.Windows.Forms.TextBox txtConfirmSurname;
    private System.Windows.Forms.Button btnChangeSurname;
    private System.Windows.Forms.Button btnCancel;
}
}
```

Subsection 3.6.3.xxxvii - accountSurname.cs - Code file - annotated

```
using System;
using System.Windows.Forms;
using MySql.Data.MySqlClient;

namespace ELSM_Project
{
    public partial class accountSurname : Form
    {
        public accountSurname()
        {
            //On form load initialize component.
            InitializeComponent();
        }
        private void btnCancel_Click(object sender, EventArgs e)
        {
            //On button event, hide the form.
            Hide();
        }
        private void accountSurname_Load(object sender, EventArgs e)
        {
            //Set the surname text box to the variable.
            txtCurrentSurname.Text = loginMenu.Surname;
        }
        private void btnChangeSurname_Click(object sender, EventArgs e)
        {
            //If the two new values are the same, and aren't blank execute.
            if ((txtNewSurname.Text == txtConfirmSurname.Text) && (txtNewSurname.Text != ""))
            {
                //Update user surname.
                MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
                conn.Open();
                MySqlCommand command = new MySqlCommand("UPDATE `userAccounts` SET userSurname = @Surname", conn);
                command.Parameters.AddWithValue("@Surname", txtNewSurname.Text);
                command.ExecuteNonQuery();
                loginMenu.Surname = txtNewSurname.Text;
                Hide();
            }
            else
            {
                System.Windows.Forms.MessageBox.Show("The data you have entered doesn't match or is blank. Please check your Surname and try again.");
            }
        }
    }
}
```

}
}
}

Subsection 3.6.3.xxxviii - backupNodeList.cs [design] - design view

Manage Backup Nodes

New Ticket View Tickets

 Encrypted Laser Server Management

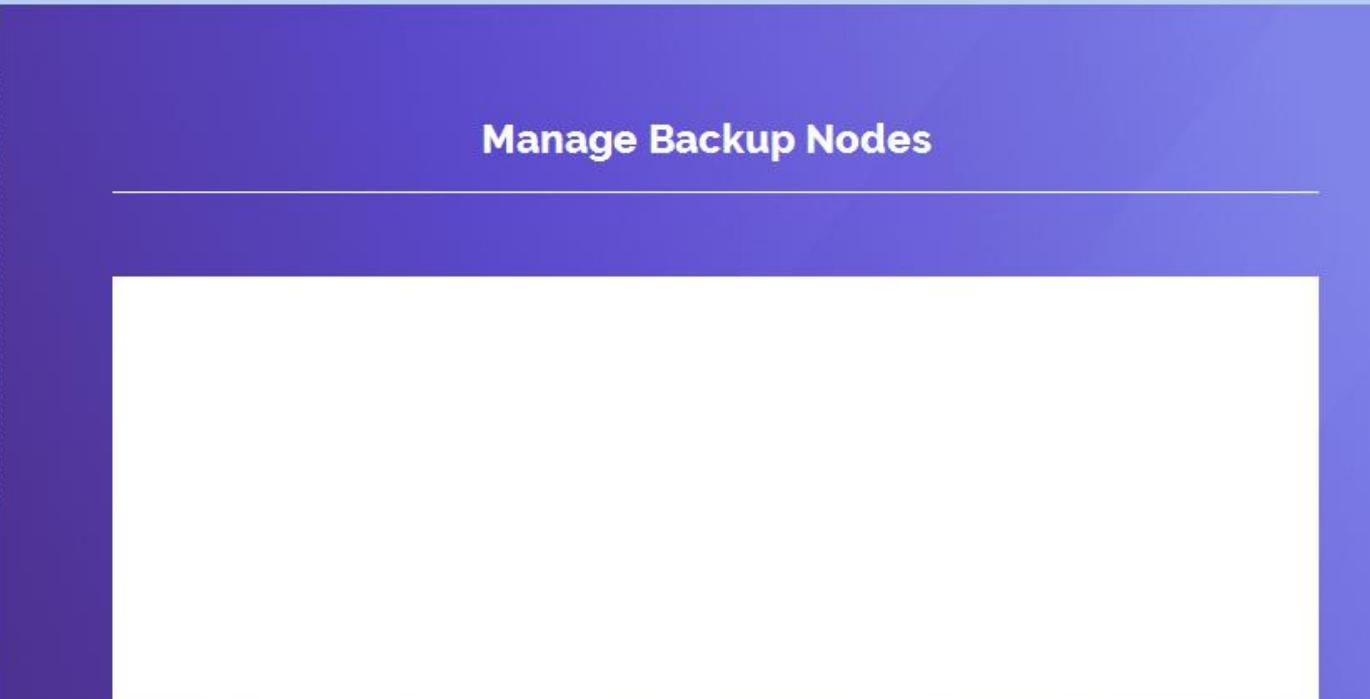
Home
Manage Users
Manage Servers
Manage Locations
Manage Account
Logout

Originally developed by William Phillips
MetallicGloss.com

Manage Backup Nodes

Create Server Edit Server Delete Server

Run Backup



Subsection 3.6.3.xxxix - backupNodeList.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class backupNodeList
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            System.Windows.Forms.DataGridViewCellStyle dataGridViewCellStyle1 = new System.Windows.Forms.DataGridViewCellStyle();
            System.ComponentModel.ComponentResourceManager resources = new
System.ComponentModel.ComponentResourceManager(typeof(backupNodeList));
            this.lblMetallicGloss = new System.Windows.Forms.Label();
            this.lblTitle = new System.Windows.Forms.Label();
            this.btnExit = new System.Windows.Forms.Button();
            this.btnManageAccount = new System.Windows.Forms.Button();
            this.btnManageServers = new System.Windows.Forms.Button();
            this.btnManageLocations = new System.Windows.Forms.Button();
            this.btnManageUsers = new System.Windows.Forms.Button();
            this.btnExit = new System.Windows.Forms.Button();
            this.EHSLLogo = new System.Windows.Forms.PictureBox();
        }
    }
}
```

```
this.menuBackground = new System.Windows.Forms.PictureBox();
this.pictureBox2 = new System.Windows.Forms.PictureBox();
this.lblManageServers = new System.Windows.Forms.Label();
this.dataGridView1 = new System.Windows.Forms.DataGridView();
this.btnDeleteServer = new System.Windows.Forms.Button();
this.btnEditServer = new System.Windows.Forms.Button();
this.btnCreateServer = new System.Windows.Forms.Button();
this.btnBackup = new System.Windows.Forms.Button();
this.btnCreateTicket = new System.Windows.Forms.Button();
this.btnTicketReply = new System.Windows.Forms.Button();
((System.ComponentModel.ISupportInitialize) (this.ELHSLogo)).BeginInit();
((System.ComponentModel.ISupportInitialize) (this.menuBackground)).BeginInit();
((System.ComponentModel.ISupportInitialize) (this.pictureBox2)).BeginInit();
((System.ComponentModel.ISupportInitialize) (this.dataGridView1)).BeginInit();
this.SuspendLayout();
//
// lblMetallicGloss
//
this.lblMetallicGloss.AutoSize = true;
this.lblMetallicGloss.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.lblMetallicGloss.Cursor = System.Windows.Forms.Cursors.Hand;
this.lblMetallicGloss.Font = new System.Drawing.Font("Raleway Light", 8.24999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblMetallicGloss.Location = new System.Drawing.Point(51, 561);
this.lblMetallicGloss.Name = "lblMetallicGloss";
this.lblMetallicGloss.Size = new System.Drawing.Size(208, 26);
this.lblMetallicGloss.TabIndex = 16;
this.lblMetallicGloss.Text = "Originally developed by William Phillips.\r\nMetallicGloss.com";
this.lblMetallicGloss.TextAlign = System.Drawing.ContentAlignment.MiddleCenter;
this.lblMetallicGloss.Click += new System.EventHandler(this.lblMetallicGloss_Click);
//
// lblTitle
//
this.lblTitle.AutoSize = true;
this.lblTitle.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.lblTitle.Font = new System.Drawing.Font("Raleway SemiBold", 15.75F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblTitle.Location = new System.Drawing.Point(36, 203);
this.lblTitle.Name = "lblTitle";
this.lblTitle.Size = new System.Drawing.Size(216, 50);
this.lblTitle.TabIndex = 14;
this.lblTitle.Text = "Encrypted Laser\r\nServer Management";
this.lblTitle.TextAlign = System.Drawing.ContentAlignment.MiddleCenter;
//
```

```
// btnLogout
//
this.btnExit.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnExit.FlatAppearance.BorderSize = 0;
this.btnExit.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnExit.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnExit.Location = new System.Drawing.Point(0, 504);
this.btnExit.Name = "btnLogout";
this.btnExit.Size = new System.Drawing.Size(293, 43);
this.btnExit.TabIndex = 6;
this.btnExit.Text = "Logout";
this.btnExit.UseVisualStyleBackColor = true;
this.btnExit.Click += new System.EventHandler(this.btnExit_Click);
//
// btnManageAccount
//
this.btnManageAccount.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnManageAccount.FlatAppearance.BorderSize = 0;
this.btnManageAccount.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnManageAccount.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnManageAccount.Location = new System.Drawing.Point(0, 462);
this.btnManageAccount.Name = "btnManageAccount";
this.btnManageAccount.Size = new System.Drawing.Size(293, 43);
this.btnManageAccount.TabIndex = 5;
this.btnManageAccount.Text = "Manage Account";
this.btnManageAccount.UseVisualStyleBackColor = true;
this.btnManageAccount.Click += new System.EventHandler(this.btnManageAccount_Click);
//
// btnManageServers
//
this.btnManageServers.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnManageServers.FlatAppearance.BorderSize = 0;
this.btnManageServers.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnManageServers.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnManageServers.Location = new System.Drawing.Point(0, 378);
this.btnManageServers.Name = "btnManageServers";
this.btnManageServers.Size = new System.Drawing.Size(293, 43);
this.btnManageServers.TabIndex = 3;
this.btnManageServers.Text = "Manage Servers";
this.btnManageServers.UseVisualStyleBackColor = true;
this.btnManageServers.Click += new System.EventHandler(this.btnManageServers_Click);
```

```
//  
// btnManageLocations  
//  
this.btnManageLocations.Cursor = System.Windows.Forms.Cursors.Hand;  
this.btnManageLocations.FlatAppearance.BorderSize = 0;  
this.btnManageLocations.FlatStyle = System.Windows.Forms.FlatStyle.Flat;  
this.btnManageLocations.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.btnManageLocations.Location = new System.Drawing.Point(0, 420);  
this.btnManageLocations.Name = "btnManageLocations";  
this.btnManageLocations.Size = new System.Drawing.Size(293, 43);  
this.btnManageLocations.TabIndex = 4;  
this.btnManageLocations.Text = "Manage Locations";  
this.btnManageLocations.UseVisualStyleBackColor = true;  
this.btnManageLocations.Click += new System.EventHandler(this.btnManageLocations_Click);  
//  
// btnManageUsers  
//  
this.btnManageUsers.Cursor = System.Windows.Forms.Cursors.Hand;  
this.btnManageUsers.FlatAppearance.BorderSize = 0;  
this.btnManageUsers.FlatStyle = System.Windows.Forms.FlatStyle.Flat;  
this.btnManageUsers.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.btnManageUsers.Location = new System.Drawing.Point(0, 336);  
this.btnManageUsers.Name = "btnManageUsers";  
this.btnManageUsers.Size = new System.Drawing.Size(293, 43);  
this.btnManageUsers.TabIndex = 2;  
this.btnManageUsers.Text = "Manage Users";  
this.btnManageUsers.UseVisualStyleBackColor = true;  
this.btnManageUsers.Click += new System.EventHandler(this.btnManageUsers_Click);  
//  
// btnHome  
//  
this.btnHome.Cursor = System.Windows.Forms.Cursors.Hand;  
this.btnHome.FlatAppearance.BorderSize = 0;  
this.btnHome.FlatStyle = System.Windows.Forms.FlatStyle.Flat;  
this.btnHome.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.btnHome.Location = new System.Drawing.Point(0, 294);  
this.btnHome.Name = "btnHome";  
this.btnHome.Size = new System.Drawing.Size(293, 43);  
this.btnHome.TabIndex = 1;  
this.btnHome.Text = "Home";  
this.btnHome.UseVisualStyleBackColor = true;
```

```
this.btnHome.Click += new System.EventHandler(this.btnHome_Click);
//
// ELHSLogo
//
this.ELHSLogo.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.ELHSLogo.BackgroundImage = global::ELSM_Project.Properties.Resources.imgLogoPurple;
this.ELHSLogo.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ELHSLogo.Location = new System.Drawing.Point(75, 85);
this.ELHSLogo.Name = "ELHSLogo";
this.ELHSLogo.Size = new System.Drawing.Size(129, 115);
this.ELHSLogo.TabIndex = 27;
this.ELHSLogo.TabStop = false;
//
// menuBackground
//
this.menuBackground.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.menuBackground.Location = new System.Drawing.Point(0, -1);
this.menuBackground.Name = "menuBackground";
this.menuBackground.Size = new System.Drawing.Size(293, 609);
this.menuBackground.TabIndex = 28;
this.menuBackground.TabStop = false;
//
// pictureBox2
//
this.pictureBox2.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.pictureBox2.Location = new System.Drawing.Point(361, 112);
this.pictureBox2.Name = "pictureBox2";
this.pictureBox2.Size = new System.Drawing.Size(723, 1);
this.pictureBox2.TabIndex = 47;
this.pictureBox2.TabStop = false;
//
// lblManageServers
//
this.lblManageServers.AutoSize = true;
this.lblManageServers.BackColor = System.Drawing.Color.Transparent;
this.lblManageServers.Font = new System.Drawing.Font("Raleway ExtraBold", 18F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblManageServers.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblManageServers.Location = new System.Drawing.Point(577, 66);
this.lblManageServers.Name = "lblManageServers";
this.lblManageServers.Size = new System.Drawing.Size(283, 29);
this.lblManageServers.TabIndex = 46;
this.lblManageServers.Text = "Manage Backup Nodes";
//
```

```
// dataGridView1
//
this.dataGridView1.AllowUserToAddRows = false;
this.dataGridView1.AllowUserToDeleteRows = false;
this.dataGridView1.AllowUserToResizeColumns = false;
this.dataGridView1.AllowUserToResizeRows = false;
this.dataGridView1AutoSizeColumnsMode = System.Windows.Forms.DataGridViewAutoSizeColumnsMode.Fill;
this.dataGridView1.BackgroundColor = System.Drawing.SystemColors.ControlLightLight;
this.dataGridView1.BorderStyle = System.Windows.Forms.BorderStyle.None;
this.dataGridView1.CellBorderStyle = System.Windows.Forms.DataGridViewCellBorderStyle.None;
this.dataGridView1.ColumnHeadersBorderStyle = System.Windows.Forms.DataGridViewColumnBorderStyle.Single;
dataGridViewCellStyle1.Alignment = System.Windows.Forms.DataGridViewContentAlignment.MiddleCenter;
dataGridViewCellStyle1.BackColor = System.Drawing.SystemColors.Control;
dataGridViewCellStyle1.Font = new System.Drawing.Font("Microsoft Sans Serif", 8.25F,
System.Drawing.FontStyle.Regular, System.Drawing.GraphicsUnit.Point, ((byte)(0)));
dataGridViewCellStyle1.ForeColor = System.Drawing.SystemColors.WindowText;
dataGridViewCellStyle1.SelectionBackColor = System.Drawing.SystemColors.Highlight;
dataGridViewCellStyle1.SelectionForeColor = System.Drawing.SystemColors.HighlightText;
dataGridViewCellStyle1.WrapMode = System.Windows.Forms.DataGridViewTriState.True;
this.dataGridView1.ColumnHeadersDefaultCellStyle = dataGridViewCellStyle1;
this.dataGridView1.ColumnHeadersHeightMode =
System.Windows.Forms.DataGridViewColumnHeadersHeightSizeModeHeadersHeightSizeMode.AutoSize;
this.dataGridView1.GridColor = System.Drawing.SystemColors.ButtonFace;
this.dataGridView1.Location = new System.Drawing.Point(361, 163);
this.dataGridView1.Name = "dataGridView1";
this.dataGridView1.ReadOnly = true;
this.dataGridView1.RowHeadersVisible = false;
this.dataGridView1.RowHeadersWidthSizeMode =
System.Windows.Forms.DataGridViewColumnHeadersHeightSizeMode.AutoSizeMode;
this.dataGridView1.SelectionMode = System.Windows.Forms.DataGridViewSelectionMode.FullRowSelect;
this.dataGridView1.ShowCellErrors = false;
this.dataGridView1.ShowCellToolTips = false;
this.dataGridView1.ShowEditingIcon = false;
this.dataGridView1.ShowRowErrors = false;
this.dataGridView1.Size = new System.Drawing.Size(723, 258);
this.dataGridView1.TabIndex = 45;
this.dataGridView1.VirtualMode = true;
//
// btnDeleteServer
//
this.btnDeleteServer.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnDeleteServer.FlatAppearance.BorderSize = 0;
this.btnDeleteServer.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
```

```
this.btnDeleteServer.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnDeleteServer.Location = new System.Drawing.Point(845, 453);
this.btnDeleteServer.Name = "btnDeleteServer";
this.btnDeleteServer.Size = new System.Drawing.Size(240, 46);
this.btnDeleteServer.TabIndex = 50;
this.btnDeleteServer.Text = "Delete Server";
this.btnDeleteServer.UseVisualStyleBackColor = true;
this.btnDeleteServer.Click += new System.EventHandler(this.btnDeleteServer_Click);
//
// btnEditServer
//
this.btnEditServer.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnEditServer.FlatAppearance.BorderSize = 0;
this.btnEditServer.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnEditServer.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnEditServer.Location = new System.Drawing.Point(603, 453);
this.btnEditServer.Name = "btnEditServer";
this.btnEditServer.Size = new System.Drawing.Size(240, 46);
this.btnEditServer.TabIndex = 49;
this.btnEditServer.Text = "Edit Server";
this.btnEditServer.UseVisualStyleBackColor = true;
this.btnEditServer.Click += new System.EventHandler(this.btnEditServer_Click);
//
// btnCreateServer
//
this.btnCreateServer.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnCreateServer.FlatAppearance.BorderSize = 0;
this.btnCreateServer.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnCreateServer.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCreateServer.Location = new System.Drawing.Point(361, 453);
this.btnCreateServer.Name = "btnCreateServer";
this.btnCreateServer.Size = new System.Drawing.Size(240, 46);
this.btnCreateServer.TabIndex = 48;
this.btnCreateServer.Text = "Create Server";
this.btnCreateServer.UseVisualStyleBackColor = true;
this.btnCreateServer.Click += new System.EventHandler(this.btnCreateServer_Click);
//
// btnBackup
//
this.btnBackup.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnBackup.FlatAppearance.BorderSize = 0;
```

```
this.btnBackup.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnBackup.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnBackup.Location = new System.Drawing.Point(361, 501);
this.btnBackup.Name = "btnBackup";
this.btnBackup.Size = new System.Drawing.Size(724, 46);
this.btnBackup.TabIndex = 51;
this.btnBackup.Text = "Run Backup";
this.btnBackup.UseVisualStyleBackColor = true;
this.btnBackup.Click += new System.EventHandler(this.btnBackup_Click);
//
// btnCreateTicket
//
this.btnCreateTicket.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnCreateTicket.FlatAppearance.BorderSize = 0;
this.btnCreateTicket.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnCreateTicket.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCreateTicket.Location = new System.Drawing.Point(0, -1);
this.btnCreateTicket.Name = "btnCreateTicket";
this.btnCreateTicket.Size = new System.Drawing.Size(149, 43);
this.btnCreateTicket.TabIndex = 53;
this.btnCreateTicket.Text = "New Ticket";
this.btnCreateTicket.UseVisualStyleBackColor = true;
this.btnCreateTicket.Click += new System.EventHandler(this.btnCreateTicket_Click);
//
// btnTicketReply
//
this.btnTicketReply.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnTicketReply.FlatAppearance.BorderSize = 0;
this.btnTicketReply.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnTicketReply.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnTicketReply.Location = new System.Drawing.Point(148, -1);
this.btnTicketReply.Name = "btnTicketReply";
this.btnTicketReply.Size = new System.Drawing.Size(145, 43);
this.btnTicketReply.TabIndex = 52;
this.btnTicketReply.Text = "View Tickets";
this.btnTicketReply.UseVisualStyleBackColor = true;
this.btnTicketReply.Click += new System.EventHandler(this.btnTicketReply_Click);
//
// backupNodeList
//
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
```

```
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(1130, 601);
this.ControlBox = false;
this.Controls.Add(this.btnCreateTicket);
this.Controls.Add(this.btnTicketReply);
this.Controls.Add(this.btnBackup);
this.Controls.Add(this.btnDeleteServer);
this.Controls.Add(this.btnEditServer);
this.Controls.Add(this.btnCreateServer);
this.Controls.Add(this.pictureBox2);
this.Controls.Add(this.lblManageServers);
this.Controls.Add(this.dataGridView1);
this.Controls.Add(this.lblMetallicGloss);
this.Controls.Add(this.lblTitle);
this.Controls.Add(this.btnExit);
this.Controls.Add(this.btnLogout);
this.Controls.Add(this.btnManageAccount);
this.Controls.Add(this.btnManageServers);
this.Controls.Add(this.btnManageLocations);
this.Controls.Add(this.btnManageUsers);
this.Controls.Add(this.btnHome);
this.Controls.Add(this.EHHSLogo);
this.Controls.Add(this.menuBackground);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.Icon = ((System.Drawing.Icon)(resources.GetObject("$this.Icon")));
this.MaximizeBox = false;
this.MaximumSize = new System.Drawing.Size(1146, 640);
this.MinimumSize = new System.Drawing.Size(1146, 640);
this.Name = "backupNodeList";
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "Manage Backup Nodes";
this.Load += new System.EventHandler(this.manageServers_Load);
((System.ComponentModel.ISupportInitialize)(this.EHHSLogo)).EndInit();
((System.ComponentModel.ISupportInitialize)(this.menuBackground)).EndInit();
((System.ComponentModel.ISupportInitialize)(this.pictureBox2)).EndInit();
((System.ComponentModel.ISupportInitialize)(this.dataGridView1)).EndInit();
this.ResumeLayout(false);
this.PerformLayout();

}

#endif
```

```
    private System.Windows.Forms.Label lblMetallicGloss;
    private System.Windows.Forms.Label lblTitle;
    private System.Windows.Forms.Button btnLogout;
    private System.Windows.Forms.Button btnManageAccount;
    private System.Windows.Forms.Button btnManageServers;
    private System.Windows.Forms.Button btnManageLocations;
    private System.Windows.Forms.Button btnManageUsers;
    private System.Windows.Forms.Button btnHome;
    private System.Windows.Forms.PictureBox ELHSLogo;
    private System.Windows.Forms.PictureBox menuBackground;
    private System.Windows.Forms.PictureBox pictureBox2;
    private System.Windows.Forms.Label lblManageServers;
    private System.Windows.Forms.DataGridView dataGridView1;
    private System.Windows.Forms.Button btnDeleteServer;
    private System.Windows.Forms.Button btnEditServer;
    private System.Windows.Forms.Button btnCreateServer;
    private System.Windows.Forms.Button btnBackup;
    private System.Windows.Forms.Button btnCreateTicket;
    private System.Windows.Forms.Button btnTicketReply;
}
}
```

Subsection 3.6.3.x/ - backupNodeList.cs - Code file - annotated

```
using System;
using System.Data;
using System.Windows.Forms;
using MySql.Data.MySqlClient;

namespace ELSM_Project
{
    public partial class backupNodeList : Form
    {
        public backupNodeList()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        private void btnHome_Click(object sender, EventArgs e)
        {
            //On button event, hide current form and open mainDashboard.
            Hide();
            mainDashboard Dashboard = new mainDashboard();
            Dashboard.ShowDialog();
        }

        private void btnManageUsers_Click(object sender, EventArgs e)
        {
            //On button event, hide current form and open userList.
            Hide();
            userList userListForm = new userList();
            userListForm.ShowDialog();
        }

        private void btnManageServers_Click(object sender, EventArgs e)
        {
            //On button event, hide current form and open serverManagement.
            Hide();
            serverManagement serverManagementForm = new serverManagement();
            serverManagementForm.ShowDialog();
        }

        private void btnManageLocations_Click(object sender, EventArgs e)
        {
            //On button event, hide current form and open locationManagement.
        }
    }
}
```

```
        Hide();
        locationManagement manageL = new locationManagement();
        manageL.ShowDialog();
    }

    private void btnManageAccount_Click(object sender, EventArgs e)
    {
        //On button event, hide current form and open accountManagement.
        Hide();
        accountManagement Account = new accountManagement();
        Account.ShowDialog();
    }

    private void btnLogout_Click(object sender, EventArgs e)
    {
        //On button event, trigger a message box confirming logout. If the user input is Yes, close the form.
        if (MessageBox.Show("Are you sure you want to logout?", "Confirmation", MessageBoxButtons.YesNo) != DialogResult.No)
        {
            this.Close();
        }
    }

    private void lblMetallicGloss_Click(object sender, EventArgs e)
    {
        //Create process to open the link www.metallicgloss.com in the default browser.
        System.Diagnostics.Process.Start("https://www.metallicgloss.com");
    }

    private void manageServers_Load(object sender, EventArgs e)
    {
        //Initialize permissions by using boolean variables on the loginMenu form to disable buttons if the permission is not granted.
        if (loginMenu.permViewLocations == false)
        {
            btnManageLocations.Enabled = false;
        }
        if (loginMenu.permAdminViewUsers == false)
        {
            btnManageUsers.Enabled = false;
        }
        if (loginMenu.permViewServers == false)
        {
            btnManageServers.Enabled = false;
        }
    }
}
```

```
if (loginMenu.permCreateTicket == false)
{
    btnCreateTicket.Enabled = false;
}
UpdateData();
}

private void btnCreateServer_Click(object sender, EventArgs e)
{
    //On button event open backupNodeCreate.
    backupNodeCreate Create = new backupNodeCreate();
    Create.ShowDialog();
    UpdateData();
}

private void btnEditServer_Click(object sender, EventArgs e)
{
    //On button event open backupNodeEdit.
    backupNodeEdit Edit = new backupNodeEdit();
    Edit.ShowDialog();
    UpdateData();
}

private void btnDeleteServer_Click(object sender, EventArgs e)
{
    //On button event open backupNodeDelete.
    backupNodeDelete delete = new backupNodeDelete();
    delete.ShowDialog();
    UpdateData();
}

public void UpdateData()
{
    //Connect to MySQL and fill datagridview with data outputted from the SQL command.
    MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
    conn.Open();
    try
    {
        MySqlDataAdapter MyDA = new MySqlDataAdapter();
        MyDA.SelectCommand = new MySqlCommand("SELECT backupNodeID, backupNodeHostname, backupNodeOS, backupNodeIP FROM backupNodeInformation WHERE backupNodeCompany = " + loginMenu.CompanyID + "", conn);
        DataTable table = new DataTable();
        MyDA.Fill(table);
    }
}
```

```
        BindingSource bSource = new BindingSource();
        bSource.DataSource = table;

        dataGridView1.DataSource = bSource;

    }
    catch (MySql.Data.MySqlClient.MySqlException ex)
    {
        MessageBox.Show(ex.Message);
        Close();
    }
    conn.Close();
}

private void btnBackup_Click(object sender, EventArgs e)
{
    //On button event open backupRunProcess.
    backupRunProcess backupRunProcessForm = new backupRunProcess();
    backupRunProcessForm.ShowDialog();
}

private void btnCreateTicket_Click(object sender, EventArgs e)
{
    //On button event open ticketNew.
    ticketNew ticket = new ticketNew();
    ticket.ShowDialog();
}

private void btnTicketReply_Click(object sender, EventArgs e)
{
    //On button event, hide current form and open ticketView.
    Hide();
    ticketView ticket = new ticketView();
    ticket.ShowDialog();
}
}
```

Subsection 3.6.3.x/i - backupNodeCreate.cs [design] - design view

Create Backup Node

Hostname:	<input type="text"/>
Location:	<input type="text"/>
Username:	<input type="text"/>
Password:	<input type="text"/>
Operating System:	<input type="text"/>
Server IP Address:	<input type="text"/>
Server Processor:	<input type="text"/>
RAM:	<input type="text"/>
Network Port:	<input type="text"/>
Transfer:	<input type="text"/>
Backup Path:	<input type="text"/>

Subsection 3.6.3.x/ii - backupNodeCreate.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class backupNodeCreate
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            this.btnCancel = new System.Windows.Forms.Button();
            this.btnNewServer = new System.Windows.Forms.Button();
            this.txtHostname = new System.Windows.Forms.TextBox();
            this.lblHostname = new System.Windows.Forms.Label();
            this.lblLocation = new System.Windows.Forms.Label();
            this.txtPassword = new System.Windows.Forms.TextBox();
            this.txtUsername = new System.Windows.Forms.TextBox();
            this.lblPassword = new System.Windows.Forms.Label();
            this.lblUsername = new System.Windows.Forms.Label();
            this.txtIP = new System.Windows.Forms.TextBox();
            this.lblProcessor = new System.Windows.Forms.Label();
            this.lblIP = new System.Windows.Forms.Label();
        }
    }
}
```

```
this.lblOS = new System.Windows.Forms.Label();
this.lblTransfer = new System.Windows.Forms.Label();
this.lblPort = new System.Windows.Forms.Label();
this.lblRAM = new System.Windows.Forms.Label();
this.cmboLocation = new System.Windows.Forms.ComboBox();
this.cmboOS = new System.Windows.Forms.ComboBox();
this.cmboNetwork = new System.Windows.Forms.ComboBox();
this.txtProcessor = new System.Windows.Forms.TextBox();
this.txtRAM = new System.Windows.Forms.TextBox();
this.txtTransfer = new System.Windows.Forms.TextBox();
this.txtBackupPath = new System.Windows.Forms.TextBox();
this.lblBackupPath = new System.Windows.Forms.Label();
this.SuspendLayout();
//
// btnCancel
//
this.btnCancel.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnCancel.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnCancel.FlatAppearance.BorderSize = 0;
this.btnCancel.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnCancel.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCancel.Location = new System.Drawing.Point(281, 453);
this.btnCancel.Name = "btnCancel";
this.btnCancel.Size = new System.Drawing.Size(207, 31);
this.btnCancel.TabIndex = 45;
this.btnCancel.Text = "Cancel";
this.btnCancel.UseVisualStyleBackColor = false;
this.btnCancel.Click += new System.EventHandler(this.btnCancel_Click);
//
// btnNewServer
//
this.btnNewServer.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnNewServer.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnNewServer.FlatAppearance.BorderSize = 0;
this.btnNewServer.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnNewServer.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnNewServer.Location = new System.Drawing.Point(36, 453);
this.btnNewServer.Name = "btnNewServer";
this.btnNewServer.Size = new System.Drawing.Size(206, 31);
this.btnNewServer.TabIndex = 44;
this.btnNewServer.Text = "Process New Backup Server";
this.btnNewServer.UseVisualStyleBackColor = false;
```

```
this.btnAddServer.Click += new System.EventHandler(this.btnAddServer_Click);
//
// txtHostname
//
this.txtHostname.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtHostname.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtHostname.Location = new System.Drawing.Point(178, 34);
this.txtHostname.Name = "txtHostname";
this.txtHostname.Size = new System.Drawing.Size(310, 20);
this.txtHostname.TabIndex = 43;
//
// lblHostname
//
this.lblHostname.AutoSize = true;
this.lblHostname.BackColor = System.Drawing.Color.Transparent;
this.lblHostname.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblHostname.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblHostname.Location = new System.Drawing.Point(33, 35);
this.lblHostname.Name = "lblHostname";
this.lblHostname.Size = new System.Drawing.Size(83, 18);
this.lblHostname.TabIndex = 40;
this.lblHostname.Text = "Hostname:";
//
// lblLocation
//
this.lblLocation.AutoSize = true;
this.lblLocation.BackColor = System.Drawing.Color.Transparent;
this.lblLocation.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblLocation.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblLocation.Location = new System.Drawing.Point(33, 73);
this.lblLocation.Name = "lblLocation";
this.lblLocation.Size = new System.Drawing.Size(71, 18);
this.lblLocation.TabIndex = 39;
this.lblLocation.Text = "Location:";
//
// txtPassword
//
this.txtPassword.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtPassword.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtPassword.Location = new System.Drawing.Point(178, 148);
this.txtPassword.Name = "txtPassword";
this.txtPassword.PasswordChar = '*';
```

```
this.txtPassword.Size = new System.Drawing.Size(310, 20);
this.txtPassword.TabIndex = 50;
//
// txtUsername
//
this.txtUsername.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtUsername.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtUsername.Location = new System.Drawing.Point(178, 110);
this.txtUsername.Name = "txtUsername";
this.txtUsername.Size = new System.Drawing.Size(310, 20);
this.txtUsername.TabIndex = 49;
//
// lblPassword
//
this.lblPassword.AutoSize = true;
this.lblPassword.BackColor = System.Drawing.Color.Transparent;
this.lblPassword.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblPassword.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblPassword.Location = new System.Drawing.Point(33, 150);
this.lblPassword.Name = "lblPassword";
this.lblPassword.Size = new System.Drawing.Size(77, 18);
this.lblPassword.TabIndex = 47;
this.lblPassword.Text = "Password:";
//
// lblUsername
//
this.lblUsername.AutoSize = true;
this.lblUsername.BackColor = System.Drawing.Color.Transparent;
this.lblUsername.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblUsername.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblUsername.Location = new System.Drawing.Point(33, 111);
this.lblUsername.Name = "lblUsername";
this.lblUsername.Size = new System.Drawing.Size(83, 18);
this.lblUsername.TabIndex = 46;
this.lblUsername.Text = "Username:";
//
// txtIP
//
this.txtIP.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtIP.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtIP.Location = new System.Drawing.Point(178, 224);
this.txtIP.Name = "txtIP";
```

```
this.txtIP.Size = new System.Drawing.Size(310, 20);
this.txtIP.TabIndex = 56;
//
// lblProcessor
//
this.lblProcessor.AutoSize = true;
this.lblProcessor.BackColor = System.Drawing.Color.Transparent;
this.lblProcessor.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblProcessor.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblProcessor.Location = new System.Drawing.Point(33, 263);
this.lblProcessor.Name = "lblProcessor";
this.lblProcessor.Size = new System.Drawing.Size(125, 18);
this.lblProcessor.TabIndex = 54;
this.lblProcessor.Text = "Server Processor";
//
// lblIP
//
this.lblIP.AutoSize = true;
this.lblIP.BackColor = System.Drawing.Color.Transparent;
this.lblIP.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblIP.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblIP.Location = new System.Drawing.Point(33, 226);
this.lblIP.Name = "lblIP";
this.lblIP.Size = new System.Drawing.Size(133, 18);
this.lblIP.TabIndex = 53;
this.lblIP.Text = "Server IP Address:";
//
// lblOS
//
this.lblOS.AutoSize = true;
this.lblOS.BackColor = System.Drawing.Color.Transparent;
this.lblOS.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblOS.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblOS.Location = new System.Drawing.Point(33, 187);
this.lblOS.Name = "lblOS";
this.lblOS.Size = new System.Drawing.Size(135, 18);
this.lblOS.TabIndex = 52;
this.lblOS.Text = "Operating System:";
//
// lblTransfer
//
```

```
this.lblTransfer.AutoSize = true;
this.lblTransfer.BackColor = System.Drawing.Color.Transparent;
this.lblTransfer.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblTransfer.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblTransfer.Location = new System.Drawing.Point(33, 375);
this.lblTransfer.Name = "lblTransfer";
this.lblTransfer.Size = new System.Drawing.Size(66, 18);
this.lblTransfer.TabIndex = 61;
this.lblTransfer.Text = "Transfer:";
//
// lblPort
//
this.lblPort.AutoSize = true;
this.lblPort.BackColor = System.Drawing.Color.Transparent;
this.lblPort.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblPort.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblPort.Location = new System.Drawing.Point(33, 336);
this.lblPort.Name = "lblPort";
this.lblPort.Size = new System.Drawing.Size(103, 18);
this.lblPort.TabIndex = 60;
this.lblPort.Text = "Network Port:";
//
// lblRAM
//
this.lblRAM.AutoSize = true;
this.lblRAM.BackColor = System.Drawing.Color.Transparent;
this.lblRAM.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblRAM.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblRAM.Location = new System.Drawing.Point(33, 300);
this.lblRAM.Name = "lblRAM";
this.lblRAM.Size = new System.Drawing.Size(44, 18);
this.lblRAM.TabIndex = 58;
this.lblRAM.Text = "RAM:";
//
// cmboLocation
//
this.cmboLocation.FormattingEnabled = true;
this.cmboLocation.Location = new System.Drawing.Point(178, 70);
this.cmboLocation.Name = "cmboLocation";
this.cmboLocation.Size = new System.Drawing.Size(310, 21);
this.cmboLocation.TabIndex = 62;
```

```
//  
// cmboOS  
//  
this.cmboOS.FormattingEnabled = true;  
this.cmboOS.Location = new System.Drawing.Point(178, 186);  
this.cmboOS.Name = "cmboOS";  
this.cmboOS.Size = new System.Drawing.Size(310, 21);  
this.cmboOS.TabIndex = 63;  
//  
// cmboNetwork  
//  
this.cmboNetwork.FormattingEnabled = true;  
this.cmboNetwork.Location = new System.Drawing.Point(178, 335);  
this.cmboNetwork.Name = "cmboNetwork";  
this.cmboNetwork.Size = new System.Drawing.Size(310, 21);  
this.cmboNetwork.TabIndex = 66;  
//  
// txtProcessor  
//  
this.txtProcessor.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;  
this.txtProcessor.Cursor = System.Windows.Forms.Cursors.IBeam;  
this.txtProcessor.Location = new System.Drawing.Point(178, 261);  
this.txtProcessor.Name = "txtProcessor";  
this.txtProcessor.Size = new System.Drawing.Size(310, 20);  
this.txtProcessor.TabIndex = 68;  
//  
// txtRAM  
//  
this.txtRAM.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;  
this.txtRAM.Cursor = System.Windows.Forms.Cursors.IBeam;  
this.txtRAM.Location = new System.Drawing.Point(178, 298);  
this.txtRAM.Name = "txtRAM";  
this.txtRAM.Size = new System.Drawing.Size(310, 20);  
this.txtRAM.TabIndex = 69;  
//  
// txtTransfer  
//  
this.txtTransfer.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;  
this.txtTransfer.Cursor = System.Windows.Forms.Cursors.IBeam;  
this.txtTransfer.Location = new System.Drawing.Point(178, 373);  
this.txtTransfer.Name = "txtTransfer";  
this.txtTransfer.Size = new System.Drawing.Size(310, 20);  
this.txtTransfer.TabIndex = 70;  
//
```

```
// txtBackupPath
//
this.txtBackupPath.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtBackupPath.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtBackupPath.Location = new System.Drawing.Point(178, 409);
this.txtBackupPath.Name = "txtBackupPath";
this.txtBackupPath.Size = new System.Drawing.Size(310, 20);
this.txtBackupPath.TabIndex = 72;
//
// lblBackupPath
//
this.lblBackupPath.AutoSize = true;
this.lblBackupPath.BackColor = System.Drawing.Color.Transparent;
this.lblBackupPath.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblBackupPath.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblBackupPath.Location = new System.Drawing.Point(33, 411);
this.lblBackupPath.Name = "lblBackupPath";
this.lblBackupPath.Size = new System.Drawing.Size(98, 18);
this.lblBackupPath.TabIndex = 71;
this.lblBackupPath.Text = "Backup Path:";
//
// backupNodeCreate
//
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(542, 496);
this.ControlBox = false;
this.Controls.Add(this.txtBackupPath);
this.Controls.Add(this.lblBackupPath);
this.Controls.Add(this.txtTransfer);
this.Controls.Add(this.txtRAM);
this.Controls.Add(this.txtProcessor);
this.Controls.Add(this.cmboNetwork);
this.Controls.Add(this.cmboOS);
this.Controls.Add(this.cmboLocation);
this.Controls.Add(this.lblTransfer);
this.Controls.Add(this.lblPort);
this.Controls.Add(this.lblRAM);
this.Controls.Add(this.txtIP);
this.Controls.Add(this.lblProcessor);
this.Controls.Add(this.lblIP);
```

```
this.Controls.Add(this.lblOS);
this.Controls.Add(this.txtPassword);
this.Controls.Add(this.txtUsername);
this.Controls.Add(this.lblPassword);
this.Controls.Add(this.lblUsername);
this.Controls.Add(this.btnCancel);
this.Controls.Add(this.btnNewServer);
this.Controls.Add(this.txtHostname);
this.Controls.Add(this.lblHostname);
this.Controls.Add(this.lblLocation);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.MinimumSize = new System.Drawing.Size(544, 242);
this.Name = "backupNodeCreate";
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "Create Backup Node";
this.Load += new System.EventHandler(this.manageServersCreate_Load);
this.ResumeLayout(false);
this.PerformLayout();
this.PerformLayout();

}

#endregion

private System.Windows.Forms.Button btnCancel;
private System.Windows.Forms.Button btnNewServer;
private System.Windows.Forms.TextBox txtHostname;
private System.Windows.Forms.Label lblHostname;
private System.Windows.Forms.Label lblLocation;
private System.Windows.Forms.TextBox txtPassword;
private System.Windows.Forms.TextBox txtUsername;
private System.Windows.Forms.Label lblProcessor;
private System.Windows.Forms.Label lblIP;
private System.Windows.Forms.Label lblOS;
private System.Windows.Forms.Label lblTransfer;
private System.Windows.Forms.Label lblPort;
private System.Windows.Forms.Label lblRAM;
private System.Windows.Forms.ComboBox cmboLocation;
private System.Windows.Forms.ComboBox cmboOS;
private System.Windows.Forms.ComboBox cmboNetwork;
private System.Windows.Forms.TextBox txtProcessor;
private System.Windows.Forms.TextBox txtRAM;
```

```
    private System.Windows.Forms.TextBox txtTransfer;
    private System.Windows.Forms.TextBox txtBackupPath;
    private System.Windows.Forms.Label lblBackupPath;
}
}
```

Subsection 3.6.3.xliii - backupNodeCreate.cs - Code file - annotated

```
using System;
using System.Windows.Forms;
using MySql.Data.MySqlClient;

namespace ELSM_Project
{
    public partial class backupNodeCreate : Form
    {
        public backupNodeCreate()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        private void manageServersCreate_Load(object sender, EventArgs e)
        {
            //Connect to MySQL and execute an SQL command. Set output as items of cmboLocation.
            MySqlConnection connectionMySQL = new MySqlConnection(loginMenu.ConnectionString);
            connectionMySQL.Open();
            MySqlCommand locationsCMD = new MySqlCommand("SELECT * FROM serverLocations WHERE companyID = @companyID",
connectionMySQL);
            locationsCMD.Parameters.AddWithValue("@companyID", loginMenu.CompanyID);
            MySqlDataReader locationsRDR = locationsCMD.ExecuteReader();
            while (locationsRDR.Read())
            {
                cmboLocation.Items.Add(locationsRDR.GetString("locationName"));
            }
            locationsRDR.Close();
            //Connect to MySQL and execute an SQL command. Set output as items of cmboOS.
            MySqlCommand osCMD = new MySqlCommand("SELECT * FROM serverOperatingSystems", connectionMySQL);
            MySqlDataReader osRDR = osCMD.ExecuteReader();
            while (osRDR.Read())
            {
                cmboOS.Items.Add(osRDR.GetString("operatingSystemsName"));
            }
            osRDR.Close();
            //Connect to MySQL and execute an SQL command. Set output as items of cmboNetwork.
            MySqlCommand networkPortCMD = new MySqlCommand("SELECT * FROM serverPort", connectionMySQL);
            MySqlDataReader networkPortRDR = networkPortCMD.ExecuteReader();
            while (networkPortRDR.Read())
            {
                cmboNetwork.Items.Add(networkPortRDR.GetString("portSpeed"));
            }
        }
    }
}
```

```
        }

        networkPortRDR.Close();
        connectionMySQL.Close();
    }

    private void btnCancel_Click(object sender, EventArgs e)
    {
        //On button event, hide the form.
        Hide();
    }

    private void btnNewServer_Click(object sender, EventArgs e)
    {
        //If field on form is blank, generate a message box informing the user of the blank field.
        if (txtHostname.Text != "")
        {
            if (txtBackupPath.Text != "")
            {
                if (txtIP.Text != "")
                {
                    if (txtPassword.Text != "")
                    {
                        if (txtProcessor.Text != "")
                        {
                            if (txtRAM.Text != "")
                            {
                                if (txtTransfer.Text != "")
                                {
                                    if (txtUsername.Text != "")
                                    {
                                        if (cmboLocation.Text != "")
                                        {
                                            if (cmboNetwork.Text != "")
                                            {
                                                if (cmboOS.Text != "")
                                                {
                                                    MySqlConnection connectionMySQL = new
MySqlConnection(loginMenu.ConnectionString);
                                                    connectionMySQL.Open();
                                                    //Connect to MySQL, execute SQL and set output field to variable.
                                                    MySqlCommand locationCMD = new MySqlCommand("SELECT * FROM
serverLocations WHERE locationName = @location", connectionMySQL);
                                                    locationCMD.Parameters.AddWithValue("@location", cmboLocation.Text);
                                                    MySqlDataReader locationRDR = locationCMD.ExecuteReader();
                                                }
                                            }
                                        }
                                    }
                                }
                            }
                        }
                    }
                }
            }
        }
    }
```

```
locationRDR.Read();
var location = Convert.ToString(locationRDR[0]);
locationRDR.Close();
//Connect to MySQL, execute SQL and set output field to variable.
MySqlCommand osCMD = new MySqlCommand("SELECT * FROM
serverOperatingSystems WHERE operatingSystemsName = @os", connectionMySQL);
osCMD.Parameters.AddWithValue("@os", cmboOS.Text);
MySqlDataReader osRDR = osCMD.ExecuteReader();
osRDR.Read();
var os = Convert.ToString(osRDR[0]);
osRDR.Close();
//Connect to MySQL, execute SQL and set output field to variable.
MySqlCommand networkCMD = new MySqlCommand("SELECT * FROM serverPort
WHERE portSpeed = @port", connectionMySQL);

networkCMD.Parameters.AddWithValue("@port", cmboNetwork.Text);
MySqlDataReader networkRDR = networkCMD.ExecuteReader();
networkRDR.Read();
var network = Convert.ToString(networkRDR[0]);
networkRDR.Close();
//Connect to MySQL, execute SQL and insert row into backupNodeInformation
with values inserted from the form to create a new backup node.
MySqlCommand serverCMD = new MySqlCommand("INSERT INTO
backupNodeInformation (backupNodeCompany, backupNodeLocation, backupNodeHostname, backupNodeUsername, backupNodePassword,
backupNodeOS, backupNodeIP, backupNodeProcessor, backupNodeRAM, backupNodePort, backupNodeTransfer, backupNodeBackupPath) VALUES
(@serverCompany, @serverLocation, @serverHostname, @serverUsername, @serverPassword, @serverOS, @serverIP, @serverProcessor,
@serverRAM, @serverPort, @serverTransfer, @backupPath)", connectionMySQL);
serverCMD.Parameters.AddWithValue("@serverCompany", loginMenu.CompanyID);
serverCMD.Parameters.AddWithValue("@serverLocation", location);
serverCMD.Parameters.AddWithValue("@serverHostname", txtHostname.Text);
serverCMD.Parameters.AddWithValue("@serverUsername", txtUsername.Text);
serverCMD.Parameters.AddWithValue("@serverPassword", txtPassword.Text);
serverCMD.Parameters.AddWithValue("@serverOS", os);
serverCMD.Parameters.AddWithValue("@serverIP", txtIP.Text);
serverCMD.Parameters.AddWithValue("@serverProcessor", txtProcessor.Text);
serverCMD.Parameters.AddWithValue("@serverRAM", txtRAM.Text);
serverCMD.Parameters.AddWithValue("@serverPort", network);
serverCMD.Parameters.AddWithValue("@serverTransfer", txtTransfer.Text);
serverCMD.Parameters.AddWithValue("@backupPath", txtBackupPath.Text);
serverCMD.ExecuteNonQuery();
connectionMySQL.Close();
System.Windows.Forms.MessageBox.Show("Created Successfully.");
Hide();
}
else
```

```
        {
            System.Windows.Forms.MessageBox.Show("You haven't selected an operating
system. Please do so.");
        }
    }
    else
    {
        System.Windows.Forms.MessageBox.Show("You haven't selected a network port.
Please do so.");
    }
}
else
{
    System.Windows.Forms.MessageBox.Show("You haven't selected a location. Please do
so.");
}
else
{
    System.Windows.Forms.MessageBox.Show("The user entered is blank. Please enter
data.");
}
else
{
    System.Windows.Forms.MessageBox.Show("The transfer amount entered is blank. Please enter
data.");
}
else
{
    System.Windows.Forms.MessageBox.Show("The RAM amount entered is blank. Please enter data.");
}
else
{
    System.Windows.Forms.MessageBox.Show("The processor entered is blank. Please enter data.");
}
else
{
    System.Windows.Forms.MessageBox.Show("The password entered is blank. Please enter data.");
}
}
```

```
        else
        {
            System.Windows.Forms.MessageBox.Show("The IP entered is blank. Please enter data.");
        }
    else
    {
        System.Windows.Forms.MessageBox.Show("The backup path entered is blank. Please enter data.");
    }
else
{
    System.Windows.Forms.MessageBox.Show("Your hostname is blank.");
}
}
```

Subsection 3.6.3.x/iv - backupNodeEdit.cs [design] - design view

Edit Server

Hostname:	<input type="text"/>
Location:	<input type="text"/>
Username:	<input type="text"/>
Password:	<input type="text"/>
Operating System:	<input type="text"/>
Server IP Address:	<input type="text"/>
Server Processor	<input type="text"/>
RAM:	<input type="text"/>
Network Port:	<input type="text"/>
Transfer:	<input type="text"/>
Backup Path:	<input type="text"/>

Subsection 3.6.3.x/v - backupNodeEdit.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class backupNodeEdit
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            this.btnCancel = new System.Windows.Forms.Button();
            this.btnUpdateServer = new System.Windows.Forms.Button();
            this.lblHostname = new System.Windows.Forms.Label();
            this.lblLocation = new System.Windows.Forms.Label();
            this.txtPassword = new System.Windows.Forms.TextBox();
            this.txtUsername = new System.Windows.Forms.TextBox();
            this.lblPassword = new System.Windows.Forms.Label();
            this.lblUsername = new System.Windows.Forms.Label();
            this.txtIP = new System.Windows.Forms.TextBox();
            this.lblProcessor = new System.Windows.Forms.Label();
            this.lblIP = new System.Windows.Forms.Label();
            this.lblOS = new System.Windows.Forms.Label();
        }
    }
}
```

```
this.lblTransfer = new System.Windows.Forms.Label();
this.lblPort = new System.Windows.Forms.Label();
this.lblRAM = new System.Windows.Forms.Label();
this.cmboLocation = new System.Windows.Forms.ComboBox();
this.cmboOS = new System.Windows.Forms.ComboBox();
this.cmboNetwork = new System.Windows.Forms.ComboBox();
this.txtProcessor = new System.Windows.Forms.TextBox();
this.txtRAM = new System.Windows.Forms.TextBox();
this.txtTransfer = new System.Windows.Forms.TextBox();
this.cmboHostNames = new System.Windows.Forms.ComboBox();
this.txtBackupPath = new System.Windows.Forms.TextBox();
this.lblBackupPath = new System.Windows.Forms.Label();
this.SuspendLayout();
//
// btnCancel
//
this.btnCancel.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnCancel.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnCancel.FlatAppearance.BorderSize = 0;
this.btnCancel.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnCancel.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCancel.Location = new System.Drawing.Point(281, 441);
this.btnCancel.Name = "btnCancel";
this.btnCancel.Size = new System.Drawing.Size(207, 31);
this.btnCancel.TabIndex = 45;
this.btnCancel.Text = "Cancel";
this.btnCancel.UseVisualStyleBackColor = false;
this.btnCancel.Click += new System.EventHandler(this.btnCancel_Click);
//
// btnUpdateServer
//
this.btnUpdateServer.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnUpdateServer.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnUpdateServer.FlatAppearance.BorderSize = 0;
this.btnUpdateServer.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnUpdateServer.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnUpdateServer.Location = new System.Drawing.Point(36, 441);
this.btnUpdateServer.Name = "btnUpdateServer";
this.btnUpdateServer.Size = new System.Drawing.Size(206, 31);
this.btnUpdateServer.TabIndex = 44;
this.btnUpdateServer.Text = "Process Server Update";
this.btnUpdateServer.UseVisualStyleBackColor = false;
```

```
this.btnAddServer.Click += new System.EventHandler(this.btnAddServer_Click);
//
// lblHostname
//
this.lblHostname.AutoSize = true;
this.lblHostname.BackColor = System.Drawing.Color.Transparent;
this.lblHostname.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblHostname.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblHostname.Location = new System.Drawing.Point(33, 38);
this.lblHostname.Name = "lblHostname";
this.lblHostname.Size = new System.Drawing.Size(83, 18);
this.lblHostname.TabIndex = 40;
this.lblHostname.Text = "Hostname:";
//
// lblLocation
//
this.lblLocation.AutoSize = true;
this.lblLocation.BackColor = System.Drawing.Color.Transparent;
this.lblLocation.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblLocation.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblLocation.Location = new System.Drawing.Point(33, 73);
this.lblLocation.Name = "lblLocation";
this.lblLocation.Size = new System.Drawing.Size(71, 18);
this.lblLocation.TabIndex = 39;
this.lblLocation.Text = "Location:";
//
// txtPassword
//
this.txtPassword.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtPassword.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtPassword.Location = new System.Drawing.Point(178, 138);
this.txtPassword.Name = "txtPassword";
this.txtPassword.PasswordChar = '*';
this.txtPassword.Size = new System.Drawing.Size(310, 20);
this.txtPassword.TabIndex = 50;
//
// txtUsername
//
this.txtUsername.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtUsername.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtUsername.Location = new System.Drawing.Point(178, 104);
this.txtUsername.Name = "txtUsername";
```

```
this.txtUsername.Size = new System.Drawing.Size(310, 20);
this.txtUsername.TabIndex = 49;
//
// lblPassword
//
this.lblPassword.AutoSize = true;
this.lblPassword.BackColor = System.Drawing.Color.Transparent;
this.lblPassword.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblPassword.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblPassword.Location = new System.Drawing.Point(33, 140);
this.lblPassword.Name = "lblPassword";
this.lblPassword.Size = new System.Drawing.Size(77, 18);
this.lblPassword.TabIndex = 47;
this.lblPassword.Text = "Password:";
//
// lblUsername
//
this.lblUsername.AutoSize = true;
this.lblUsername.BackColor = System.Drawing.Color.Transparent;
this.lblUsername.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblUsername.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblUsername.Location = new System.Drawing.Point(33, 105);
this.lblUsername.Name = "lblUsername";
this.lblUsername.Size = new System.Drawing.Size(83, 18);
this.lblUsername.TabIndex = 46;
this.lblUsername.Text = "Username:";
//
// txtIP
//
this.txtIP.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtIP.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtIP.Location = new System.Drawing.Point(178, 211);
this.txtIP.Name = "txtIP";
this.txtIP.Size = new System.Drawing.Size(310, 20);
this.txtIP.TabIndex = 56;
//
// lblProcessor
//
this.lblProcessor.AutoSize = true;
this.lblProcessor.BackColor = System.Drawing.Color.Transparent;
this.lblProcessor.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
```

```
this.lblProcessor.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblProcessor.Location = new System.Drawing.Point(33, 250);
this.lblProcessor.Name = "lblProcessor";
this.lblProcessor.Size = new System.Drawing.Size(125, 18);
this.lblProcessor.TabIndex = 54;
this.lblProcessor.Text = "Server Processor";
//
// lblIP
//
this.lblIP.AutoSize = true;
this.lblIP.BackColor = System.Drawing.Color.Transparent;
this.lblIP.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblIP.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblIP.Location = new System.Drawing.Point(33, 213);
this.lblIP.Name = "lblIP";
this.lblIP.Size = new System.Drawing.Size(133, 18);
this.lblIP.TabIndex = 53;
this.lblIP.Text = "Server IP Address:";
//
// lblOS
//
this.lblOS.AutoSize = true;
this.lblOS.BackColor = System.Drawing.Color.Transparent;
this.lblOS.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblOS.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblOS.Location = new System.Drawing.Point(33, 174);
this.lblOS.Name = "lblOS";
this.lblOS.Size = new System.Drawing.Size(135, 18);
this.lblOS.TabIndex = 52;
this.lblOS.Text = "Operating System:";
//
// lblTransfer
//
this.lblTransfer.AutoSize = true;
this.lblTransfer.BackColor = System.Drawing.Color.Transparent;
this.lblTransfer.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblTransfer.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblTransfer.Location = new System.Drawing.Point(33, 362);
this.lblTransfer.Name = "lblTransfer";
this.lblTransfer.Size = new System.Drawing.Size(66, 18);
this.lblTransfer.TabIndex = 61;
```

```
this.lblTransfer.Text = "Transfer:";  
//  
// lblPort  
//  
this.lblPort.AutoSize = true;  
this.lblPort.BackColor = System.Drawing.Color.Transparent;  
this.lblPort.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.lblPort.ForeColor = System.Drawing.SystemColors.ControlLightLight;  
this.lblPort.Location = new System.Drawing.Point(33, 323);  
this.lblPort.Name = "lblPort";  
this.lblPort.Size = new System.Drawing.Size(103, 18);  
this.lblPort.TabIndex = 60;  
this.lblPort.Text = "Network Port:";  
//  
// lblRAM  
//  
this.lblRAM.AutoSize = true;  
this.lblRAM.BackColor = System.Drawing.Color.Transparent;  
this.lblRAM.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.lblRAM.ForeColor = System.Drawing.SystemColors.ControlLightLight;  
this.lblRAM.Location = new System.Drawing.Point(33, 287);  
this.lblRAM.Name = "lblRAM";  
this.lblRAM.Size = new System.Drawing.Size(44, 18);  
this.lblRAM.TabIndex = 58;  
this.lblRAM.Text = "RAM:";  
//  
// cmboLocation  
//  
this.cmboLocation.Cursor = System.Windows.Forms.Cursors.No;  
this.cmboLocation.Enabled = false;  
this.cmboLocation.FormattingEnabled = true;  
this.cmboLocation.Location = new System.Drawing.Point(178, 70);  
this.cmboLocation.Name = "cmboLocation";  
this.cmboLocation.Size = new System.Drawing.Size(310, 21);  
this.cmboLocation.TabIndex = 62;  
//  
// cmboOS  
//  
this.cmboOS.Cursor = System.Windows.Forms.Cursors.No;  
this.cmboOS.Enabled = false;  
this.cmboOS.FormattingEnabled = true;  
this.cmboOS.Location = new System.Drawing.Point(178, 173);
```

```
this.cmboOS.Name = "cmboOS";
this.cmboOS.Size = new System.Drawing.Size(310, 21);
this.cmboOS.TabIndex = 63;
//
// cmboNetwork
//
this.cmboNetwork.Cursor = System.Windows.Forms.Cursors.No;
this.cmboNetwork.Enabled = false;
this.cmboNetwork.FormattingEnabled = true;
this.cmboNetwork.Location = new System.Drawing.Point(178, 322);
this.cmboNetwork.Name = "cmboNetwork";
this.cmboNetwork.Size = new System.Drawing.Size(310, 21);
this.cmboNetwork.TabIndex = 66;
//
// txtProcessor
//
this.txtProcessor.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtProcessor.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtProcessor.Location = new System.Drawing.Point(178, 248);
this.txtProcessor.Name = "txtProcessor";
this.txtProcessor.Size = new System.Drawing.Size(310, 20);
this.txtProcessor.TabIndex = 68;
//
// txtRAM
//
this.txtRAM.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtRAM.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtRAM.Location = new System.Drawing.Point(178, 285);
this.txtRAM.Name = "txtRAM";
this.txtRAM.Size = new System.Drawing.Size(310, 20);
this.txtRAM.TabIndex = 69;
//
// txtTransfer
//
this.txtTransfer.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtTransfer.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtTransfer.Location = new System.Drawing.Point(178, 360);
this.txtTransfer.Name = "txtTransfer";
this.txtTransfer.Size = new System.Drawing.Size(310, 20);
this.txtTransfer.TabIndex = 70;
//
// cmboHostNames
//
this.cmboHostNames.FormattingEnabled = true;
```

```
this.cmboHostNames.Location = new System.Drawing.Point(178, 35);
this.cmboHostNames.Name = "cmboHostNames";
this.cmboHostNames.Size = new System.Drawing.Size(310, 21);
this.cmboHostNames.TabIndex = 71;
this.cmboHostNames.SelectedIndexChanged += new System.EventHandler(this.cmboHostNames_SelectedIndexChanged);
//
// txtBackupPath
//
this.txtBackupPath.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtBackupPath.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtBackupPath.Location = new System.Drawing.Point(178, 397);
this.txtBackupPath.Name = "txtBackupPath";
this.txtBackupPath.Size = new System.Drawing.Size(310, 20);
this.txtBackupPath.TabIndex = 73;
//
// lblBackupPath
//
this.lblBackupPath.AutoSize = true;
this.lblBackupPath.BackColor = System.Drawing.Color.Transparent;
this.lblBackupPath.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblBackupPath.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblBackupPath.Location = new System.Drawing.Point(33, 399);
this.lblBackupPath.Name = "lblBackupPath";
this.lblBackupPath.Size = new System.Drawing.Size(98, 18);
this.lblBackupPath.TabIndex = 72;
this.lblBackupPath.Text = "Backup Path:";
//
// backupNodeEdit
//
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(542, 484);
this.ControlBox = false;
this.Controls.Add(this.txtBackupPath);
this.Controls.Add(this.lblBackupPath);
this.Controls.Add(this.cmboHostNames);
this.Controls.Add(this.txtTransfer);
this.Controls.Add(this.txtRAM);
this.Controls.Add(this.txtProcessor);
this.Controls.Add(this.cmboNetwork);
this.Controls.Add(this.cmboOS);
```

```
this.Controls.Add(this.cmboLocation);
this.Controls.Add(this.lblTransfer);
this.Controls.Add(this.lblPort);
this.Controls.Add(this.lblRAM);
this.Controls.Add(this.txtIP);
this.Controls.Add(this.lblProcessor);
this.Controls.Add(this.lblIP);
this.Controls.Add(this.lblOS);
this.Controls.Add(this.txtPassword);
this.Controls.Add(this.txtUsername);
this.Controls.Add(this.lblPassword);
this.Controls.Add(this.lblUsername);
this.Controls.Add(this.btnCancel);
this.Controls.Add(this.btnUpdateServer);
this.Controls.Add(this.lblHostname);
this.Controls.Add(this.lblLocation);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.MaximumSize = new System.Drawing.Size(558, 542);
this.MinimumSize = new System.Drawing.Size(544, 242);
this.Name = "backupNodeEdit";
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "Edit Server";
this.Load += new System.EventHandler(this.managebackupNodesEdit_Load);
this.ResumeLayout(false);
this.PerformLayout();

}

#endregion

private System.Windows.Forms.Button btnCancel;
private System.Windows.Forms.Button btnUpdateServer;
private System.Windows.Forms.Label lblHostname;
private System.Windows.Forms.Label lblLocation;
private System.Windows.Forms.TextBox txtPassword;
private System.Windows.Forms.TextBox txtUsername;
private System.Windows.Forms.Label lblPassword;
private System.Windows.Forms.Label lblUsername;
private System.Windows.Forms.TextBox txtIP;
private System.Windows.Forms.Label lblProcessor;
private System.Windows.Forms.Label lblIP;
private System.Windows.Forms.Label lblOS;
private System.Windows.Forms.Label lblTransfer;
private System.Windows.Forms.Label lblPort;
```

```
    private System.Windows.Forms.Label lblRAM;
    private System.Windows.Forms.ComboBox cmboLocation;
    private System.Windows.Forms.ComboBox cmboOS;
    private System.Windows.Forms.ComboBox cmboNetwork;
    private System.Windows.Forms.TextBox txtProcessor;
    private System.Windows.Forms.TextBox txtRAM;
    private System.Windows.Forms.TextBox txtTransfer;
    private System.Windows.Forms.ComboBox cmboHostNames;
    private System.Windows.Forms.TextBox txtBackupPath;
    private System.Windows.Forms.Label lblBackupPath;
}
}
```

Subsection 3.6.3.x/vi - backupNodeEdit.cs - Code file - annotated

```
using System;
using System.Windows.Forms;
using MySql.Data.MySqlClient;

namespace ELSM_Project
{
    public partial class backupNodeEdit : Form
    {
        public backupNodeEdit()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        public static string password, key;

        private void managebackupNodesEdit_Load(object sender, EventArgs e)
        {
            //Connect to MySQL, execute SQL and set output as items of cmboHostNamescmboUserID.
            MySqlConnection connectionMySQL = new MySqlConnection(loginMenu.ConnectionString);
            connectionMySQL.Open();
            MySqlCommand backupNodeCMD = new MySqlCommand("SELECT * FROM backupNodeInformation", connectionMySQL);
            MySqlDataReader backupNodeRDR = backupNodeCMD.ExecuteReader();
            while (backupNodeRDR.Read())
            {
                cmboHostNames.Items.Add(backupNodeRDR.GetString("backupNodeHostname"));
            }
            backupNodeRDR.Close();
            connectionMySQL.Close();
        }

        private void cmboHostNames_SelectedIndexChanged(object sender, EventArgs e)
        {
            MySqlConnection connectionMySQL = new MySqlConnection(loginMenu.ConnectionString);
            connectionMySQL.Open();
            //Execute SQL and set output as different variables that correspond to the value for use later in the program.
            MySqlCommand backupNodeInformationCMD = new MySqlCommand("SELECT * FROM backupNodeInformation WHERE
backupNodeHostname = @Hostname", connectionMySQL);
            backupNodeInformationCMD.Parameters.AddWithValue("@Hostname", cmboHostNames.Text);
            MySqlDataReader backupNodeInformationRDR = backupNodeInformationCMD.ExecuteReader();
            backupNodeInformationRDR.Read();
            txtUsername.Text = Convert.ToString(backupNodeInformationRDR[4]);
        }
    }
}
```

```
txtIP.Text = Convert.ToString(backupNodeInformationRDR[7]);
txtProcessor.Text = Convert.ToString(backupNodeInformationRDR[8]);
txtRAM.Text = Convert.ToString(backupNodeInformationRDR[9]);
txtTransfer.Text = Convert.ToString(backupNodeInformationRDR[11]);
backupNodeEdit.password = Convert.ToString(backupNodeInformationRDR[5]);
var backupNodeLocation = Convert.ToString(backupNodeInformationRDR[2]);
var backupNodeOS = Convert.ToString(backupNodeInformationRDR[6]);
var backupNodePort = Convert.ToString(backupNodeInformationRDR[10]);
txtBackupPath.Text = Convert.ToString(backupNodeInformationRDR[12]);
txtPassword.Text = "";
backupNodeInformationRDR.Close();
//Execute SQL and set output as items of cmboLocation.
MySqlCommand backupNodeLocationCMD = new MySqlCommand("SELECT * FROM backupNodeLocations WHERE companyID =
@companyID", connectionMySQL);
backupNodeLocationCMD.Parameters.AddWithValue("@companyID", loginMenu.CompanyID);
MySqlDataReader backupNodeLocationRDR = backupNodeLocationCMD.ExecuteReader();
while (backupNodeLocationRDR.Read())
{
    cmboLocation.Items.Add(backupNodeLocationRDR.GetString("locationName"));
}
backupNodeLocationRDR.Close();
//Execute SQL and set output as items of cmboOS.
MySqlCommand backupNodeOSCMD = new MySqlCommand("SELECT * FROM serverOperatingSystems", connectionMySQL);
MySqlDataReader backupNodeOSRDR = backupNodeOSCMD.ExecuteReader();
while (backupNodeOSRDR.Read())
{
    cmboOS.Items.Add(backupNodeOSRDR.GetString("operatingSystemsName"));
}
backupNodeOSRDR.Close();
//Execute SQL and set output as items of cmboNetwork.
MySqlCommand backupNodeNetworkPortCMD = new MySqlCommand("SELECT * FROM backupNodePort", connectionMySQL);
MySqlDataReader backupNodeNetworkPortRDR = backupNodeNetworkPortCMD.ExecuteReader();
while (backupNodeNetworkPortRDR.Read())
{
    cmboNetwork.Items.Add(backupNodeNetworkPortRDR.GetString("portSpeed"));
}
backupNodeNetworkPortRDR.Close();
//Execute SQL and set output as active text of cmboLocation.
MySqlCommand backupNodeLocationDisplayCMD = new MySqlCommand("SELECT * FROM serverLocations WHERE locationID =
@locationID", connectionMySQL);
backupNodeLocationDisplayCMD.Parameters.AddWithValue("@locationID", backupNodeLocation);
MySqlDataReader backupNodeLocationDisplayRDR = backupNodeLocationDisplayCMD.ExecuteReader();
backupNodeLocationDisplayRDR.Read();
cmboLocation.Text = Convert.ToString(backupNodeLocationDisplayRDR.GetString("locationName"));
```

```
        backupNodeLocationDisplayRDR.Close();
        //Execute SQL and set output as active text of cmboOS.
        MySqlCommand backupNodeOSDisplayCMD = new MySqlCommand("SELECT * FROM serverOperatingSystems WHERE operatingSystemsID
= @operatingSystemsID", connectionMySQL);
        backupNodeOSDisplayCMD.Parameters.AddWithValue("@operatingSystemsID", backupNodeOS);
        MySqlDataReader backupNodeOSDisplayRDR = backupNodeOSDisplayCMD.ExecuteReader();
        backupNodeOSDisplayRDR.Read();
        cmboOS.Text = Convert.ToString(backupNodeOSDisplayRDR[1]);
        backupNodeOSDisplayRDR.Close();
        //Execute SQL and set output as active text of cmboNetwork.
        MySqlCommand backupNodeNetworkPortDisplayCMD = new MySqlCommand("SELECT * FROM serverPort WHERE portID = @portID",
connectionMySQL);
        backupNodeNetworkPortDisplayCMD.Parameters.AddWithValue("@portID", backupNodePort);
        MySqlDataReader backupNodeNetworkPortDisplayRDR = backupNodeNetworkPortDisplayCMD.ExecuteReader();
        backupNodeNetworkPortDisplayRDR.Read();
        cmboNetwork.Text = Convert.ToString(backupNodeNetworkPortDisplayRDR[1]);
        backupNodeNetworkPortDisplayRDR.Close();

        connectionMySQL.Close();
    }

    private void btnNewbackupNode_Click(object sender, EventArgs e)
    {
        //If fields entered is blank, output message box to user informing them of no data.
        if (cmboHostNames.Text != "")
        {
            if (txtBackupPath.Text != "")
            {
                if (txtIP.Text != "")
                {
                    if (txtProcessor.Text != "")
                    {
                        if (txtRAM.Text != "")
                        {
                            if (txtTransfer.Text != "")
                            {
                                if (txtUsername.Text != "")
                                {
                                    if (cmboLocation.Text != "")
                                    {
                                        if (cmboNetwork.Text != "")
                                        {
                                            if (cmboOS.Text != "")
                                            {

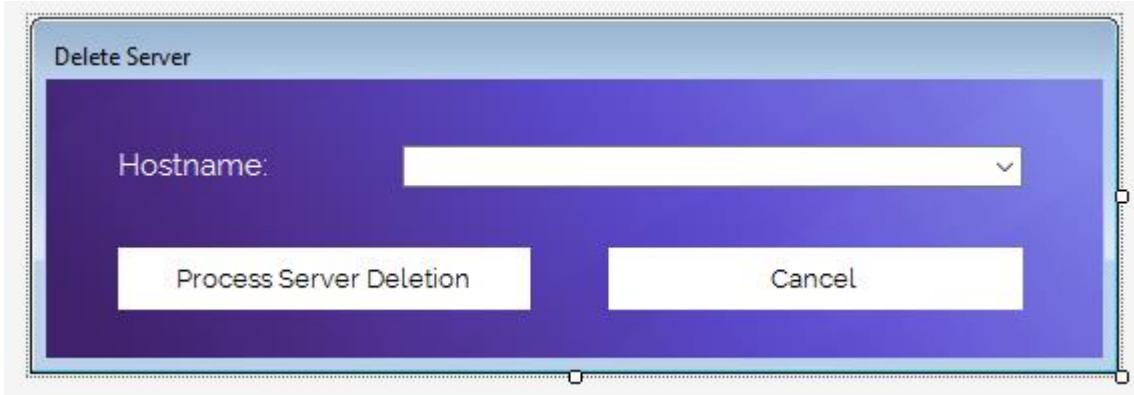
```

```
MySqlConnection connectionMySQL = new  
MySqlConnection(loginMenu.ConnectionString);  
  
WHERE locationName = @location", connectionMySQL);  
  
serverOperatingSystems WHERE operatingSystemsName = @os", connectionMySQL);  
  
portSpeed = @port", connectionMySQL);  
  
password entered.  
  
backupNodeInformation.  
  
backupNodeInformation SET backupNodeLocation = @backupNodeLocation, backupNodeHostname = @backupNodeHostname, backupNodeUsername  
= @backupNodeUsername, backupNodePassword = @backupNodePassword, backupNodeOS = @backupNodeOS, backupNodeIP = @backupNodeIP,  
backupNodeProcessor = @backupNodeProcessor, backupNodeRAM = @backupNodeRAM, backupNodePort = @backupNodePort, backupNodeTransfer  
= @backupNodeTransfer, backupNodeBackupPath = @backupNodePath WHERE backupNodeHostname = @Hostname", connectionMySQL);  
backupNodeInfoUpdateCMD.Parameters.AddWithValue("@backupNodeLocation",  
location);  
backupNodeInfoUpdateCMD.Parameters.AddWithValue("@backupNodeHostname",  
cmboHostNames.Text);  
  
MySqlConnection connectionMySQL = new  
connectionMySQL.Open();  
//Execute SQL and set output as variable "location".  
MySqlCommand locationsdCMD = new MySqlCommand("SELECT * FROM serverLocations  
locationsdCMD.Parameters.AddWithValue("@location", cmboLocation.Text);  
MySqlDataReader locationRDR = locationsdCMD.ExecuteReader();  
locationRDR.Read();  
var location = Convert.ToString(locationRDR[0]);  
locationRDR.Close();  
//Execute SQL and set output as variable "os".  
MySqlCommand operatingSystemsCMD = new MySqlCommand("SELECT * FROM  
operatingSystemsCMD.Parameters.AddWithValue("@os", cmboOS.Text);  
MySqlDataReader osRDR = operatingSystemsCMD.ExecuteReader();  
osRDR.Read();  
var os = Convert.ToString(osRDR[0]);  
osRDR.Close();  
//Execute SQL and set output as variable "network".  
MySqlCommand networkCMD = new MySqlCommand("SELECT * FROM serverPort WHERE  
networkCMD.Parameters.AddWithValue("@port", cmboNetwork.Text);  
MySqlDataReader networkRDR = networkCMD.ExecuteReader();  
networkRDR.Read();  
var network = Convert.ToString(networkRDR[0]);  
networkRDR.Close();  
//If password is blank, use password already set one. Otherwise, use the  
  
if (txtPassword.Text != "")  
{  
    var password = txtPassword.Text;  
}  
//Execute SQL to update information about a backup node in table  
  
MySqlCommand backupNodeInfoUpdateCMD = new MySqlCommand("UPDATE  
backupNodeInfoUpdateCMD.Parameters.AddWithValue("@backupNodeLocation",  
location);  
backupNodeInfoUpdateCMD.Parameters.AddWithValue("@backupNodeHostname",  
cmboHostNames.Text);
```



```
        else
        {
            System.Windows.Forms.MessageBox.Show("The transfer amount entered is blank. Please enter
data.");
        }
    }
    else
    {
        System.Windows.Forms.MessageBox.Show("The RAM amount entered is blank. Please enter data.");
    }
}
else
{
    System.Windows.Forms.MessageBox.Show("The processor entered is blank. Please enter data.");
}
}
else
{
    System.Windows.Forms.MessageBox.Show("The IP entered is blank. Please enter data.");
}
}
else
{
    System.Windows.Forms.MessageBox.Show("The backup path entered is blank. Please enter data.");
}
}
else
{
    System.Windows.Forms.MessageBox.Show("Your hostname is blank.");
}
}

private void btnCancel_Click(object sender, EventArgs e)
{
    //On button event, hide the form.
    Hide();
}
}
```

Subsection 3.6.3.x/vii - backupNodeDelete.cs [design] - design view

Subsection 3.6.3.x/viii - backupNodeDelete.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class backupNodeDelete
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            this.btnCancel = new System.Windows.Forms.Button();
            this.btnDeleteServer = new System.Windows.Forms.Button();
            this.lblHostname = new System.Windows.Forms.Label();
            this.cmboHostname = new System.Windows.Forms.ComboBox();
            this.SuspendLayout();
            //
            // btnCancel
            //
            this.btnCancel.BackColor = System.Drawing.SystemColors.ControlLightLight;
            this.btnCancel.Cursor = System.Windows.Forms.Cursors.Hand;
            this.btnCancel.FlatStyle.BorderSize = 0; // Set variable to 0
            this.btnCancel.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
```

```
this.btnCancel.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCancel.Location = new System.Drawing.Point(281, 84);
this.btnCancel.Name = "btnCancel";
this.btnCancel.Size = new System.Drawing.Size(207, 31);
this.btnCancel.TabIndex = 45;
this.btnCancel.Text = "Cancel";
this.btnCancel.UseVisualStyleBackColor = false;
this.btnCancel.Click += new System.EventHandler(this.btnCancel_Click);
//
// btnDeleteServer
//
this.btnDeleteServer.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnDeleteServer.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnDeleteServer.FlatAppearance.BorderSize = 0; // Set variable to 0
this.btnDeleteServer.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnDeleteServer.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnDeleteServer.Location = new System.Drawing.Point(36, 84);
this.btnDeleteServer.Name = "btnDeleteServer";
this.btnDeleteServer.Size = new System.Drawing.Size(206, 31);
this.btnDeleteServer.TabIndex = 44;
this.btnDeleteServer.Text = "Process Server Deletion";
this.btnDeleteServer.UseVisualStyleBackColor = false;
this.btnDeleteServer.Click += new System.EventHandler(this.btnDeleteServer_Click);
//
// lblHostname
//
this.lblHostname.AutoSize = true;
this.lblHostname.BackColor = System.Drawing.Color.Transparent;
this.lblHostname.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblHostname.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblHostname.Location = new System.Drawing.Point(33, 34);
this.lblHostname.Name = "lblHostname";
this.lblHostname.Size = new System.Drawing.Size(83, 18);
this.lblHostname.TabIndex = 38;
this.lblHostname.Text = "Hostname:";
//
// cmboHostname
//
this.cmboHostname.FormattingEnabled = true;
this.cmboHostname.Location = new System.Drawing.Point(178, 33);
this.cmboHostname.Name = "cmboHostname";
```

```
this.cmboHostname.Size = new System.Drawing.Size(310, 21);
this.cmboHostname.TabIndex = 46;
//
// backupNodeDelete
//
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(528, 139);
this.ControlBox = false;
this.Controls.Add(this.btnCancel);
this.Controls.Add(this.btnDeleteServer);
this.Controls.Add(this.lblHostname);
this.Controls.Add(this.cmboHostname);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.MaximumSize = new System.Drawing.Size(544, 178);
this.MinimumSize = new System.Drawing.Size(544, 178);
this.Name = "backupNodeDelete";
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "Delete Server";
this.Load += new System.EventHandler(this.backupNodeDelete_Load);
this.ResumeLayout(false);
this.PerformLayout();
this.PerformLayout();

}

#endregion

private System.Windows.Forms.Button btnCancel;
private System.Windows.Forms.Button btnDeleteServer;
private System.Windows.Forms.Label lblHostname;
private System.Windows.Forms.ComboBox cmboHostname;
}
```

Subsection 3.6.3.x/ix - backupNodeDelete.cs - Code file - annotated

```
using System;
using System.Windows.Forms;
using MySql.Data.MySqlClient;

namespace ELSM_Project
{
    public partial class backupNodeDelete : Form
    {
        public backupNodeDelete()
        {
            //On form load initialize component.
            InitializeComponent();
        }

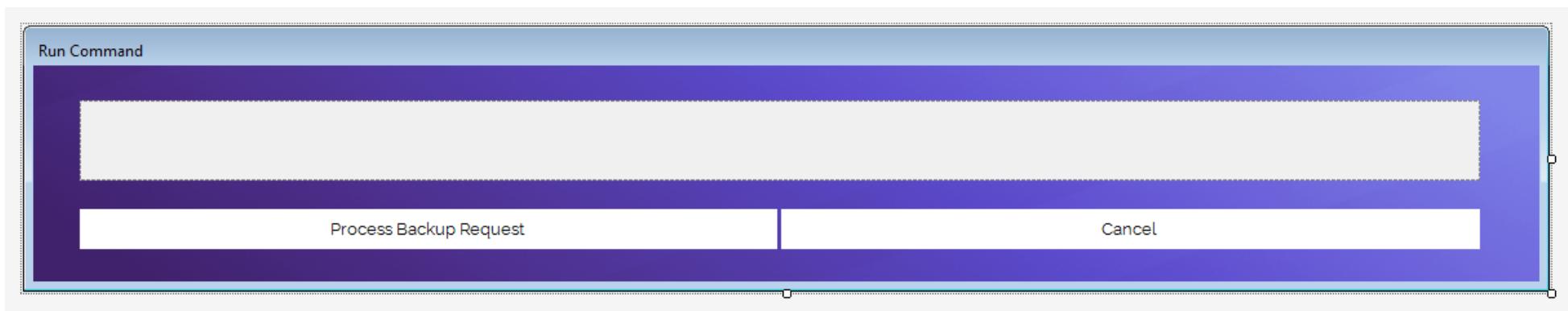
        private void btnCancel_Click(object sender, EventArgs e)
        {
            //On button event, hide the form.
            Hide();
        }

        private void backupNodeDelete_Load(object sender, EventArgs e)
        {
            //Connect to MySQL and set output as items of cmboHostname.
            MySqlConnection connectionMySQL = new MySqlConnection(loginMenu.ConnectionString);
            connectionMySQL.Open();
            MySqlCommand serverInformationCMD = new MySqlCommand("SELECT * FROM backupNodeInformation WHERE backupNodeCompany = @companyID", connectionMySQL);
            serverInformationCMD.Parameters.AddWithValue("@companyID", loginMenu.CompanyID);
            MySqlDataReader serverInformationRDR = serverInformationCMD.ExecuteReader();
            while (serverInformationRDR.Read())
            {
                cmboHostname.Items.Add(serverInformationRDR.GetString("backupNodeHostname"));
            }
            connectionMySQL.Close();
        }

        private void btnDeleteServer_Click(object sender, EventArgs e)
        {
            //Delete row from backupNodeInformation where hostname matches selected.
            MySqlConnection connectionMySQL = new MySqlConnection(loginMenu.ConnectionString);
            connectionMySQL.Open();
```

```
        MySqlCommand deleteServerCMD = new MySqlCommand("DELETE FROM backupNodeInformation WHERE backupNodeHostname = @Hostname", connectionMySQL);
        deleteServerCMD.Parameters.AddWithValue("@Hostname", cmboHostname.Text);
        deleteServerCMD.ExecuteNonQuery();
        cmboHostname.Items.Clear();
        //Update information. Connect to MySQL and set output as items of cmboHostname.
        MySqlCommand serverInformationCMD = new MySqlCommand("SELECT * FROM backupNodeInformation WHERE backupNodeCompany = @companyID", connectionMySQL);
        serverInformationCMD.Parameters.AddWithValue("@companyID", loginMenu.CompanyID);
        MySqlDataReader serverInformationRDR = serverInformationCMD.ExecuteReader();
        while (serverInformationRDR.Read())
        {
            cmboHostname.Items.Add(serverInformationRDR.GetString("backupNodeHostname"));
        }
        connectionMySQL.Close();
    }

}
```

Subsection 3.6.3.1 - backupRunProcess.cs [design] - design view

Subsection 3.6.3.i - backupRunProcess.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class backupRunProcess
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            this.btnCancel = new System.Windows.Forms.Button();
            this.btnRunBackup = new System.Windows.Forms.Button();
            this.pnlConfiguration = new System.Windows.Forms.Panel();
            this.SuspendLayout();
            //
            // btnCancel
            //
            this.btnCancel.BackColor = System.Drawing.SystemColors.ControlLightLight;
            this.btnCancel.Cursor = System.Windows.Forms.Cursors.Hand;
            this.btnCancel.FlatAppearance.BorderSize = 0;
            this.btnCancel.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
```

```
this.btnCancel.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCancel.Location = new System.Drawing.Point(579, 111);
this.btnCancel.Name = "btnCancel";
this.btnCancel.Size = new System.Drawing.Size(541, 31);
this.btnCancel.TabIndex = 45;
this.btnCancel.Text = "Cancel";
this.btnCancel.UseVisualStyleBackColor = false;
this.btnCancel.Click += new System.EventHandler(this.btnCancel_Click);
//
// btnRunBackup
//
this.btnRunBackup.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnRunBackup.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnRunBackup.FlatAppearance.BorderSize = 0;
this.btnRunBackup.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnRunBackup.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnRunBackup.Location = new System.Drawing.Point(36, 111);
this.btnRunBackup.Name = "btnRunBackup";
this.btnRunBackup.Size = new System.Drawing.Size(540, 31);
this.btnRunBackup.TabIndex = 44;
this.btnRunBackup.Text = "Process Backup Request";
this.btnRunBackup.UseVisualStyleBackColor = false;
this.btnRunBackup.Click += new System.EventHandler(this.btnRunCommand_Click);
//
// pnlConfiguration
//
this.pnlConfiguration.AutoScroll = true;
this.pnlConfiguration.Location = new System.Drawing.Point(36, 27);
this.pnlConfiguration.Name = "pnlConfiguration";
this.pnlConfiguration.Size = new System.Drawing.Size(1084, 62);
this.pnlConfiguration.TabIndex = 50;
//
// backupRunProcess
//
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.AutoScroll = true;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(1166, 167);
this.ControlBox = false;
this.Controls.Add(this.pnlConfiguration);
```

```
this.Controls.Add(this.btnCancel);
this.Controls.Add(this.btnRunBackup);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.Name = "backupRunProcess";
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "Run Command";
this.Load += new System.EventHandler(this.serverControlRunCommand_Load);
this.ResumeLayout(false);

}

#endregion

private System.Windows.Forms.Button btnCancel;
private System.Windows.Forms.Button btnRunBackup;
private System.Windows.Forms.Panel pnlConfiguration;
}
```

Subsection 3.6.3.ii - backupRunProcess.cs - Code file - annotated

```
using System;
using System.Drawing;
using System.Linq;
using System.Threading;
using System.Windows.Forms;
using MySql.Data.MySqlClient;
using Renci.SshNet;

namespace ELSM_Project
{
    public partial class backupRunProcess : Form
    {
        public backupRunProcess()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        private static int loopNum, activeLoop = 0;
        private static bool proceed;
        private static string os, ip, username, password, chkBoxName, checkBoxText, commandData, value, location, backupIP,
backupUsername, backupPassword, backupPath;
        private string[] operatingSystemsID = new string[100], operatingSystems = new string[100], commandOSID = new string[100],
commandText = new string[100];

        private void btnCancel_Click(object sender, EventArgs e)
        {
            //On button event, hide the form.
            Hide();
        }

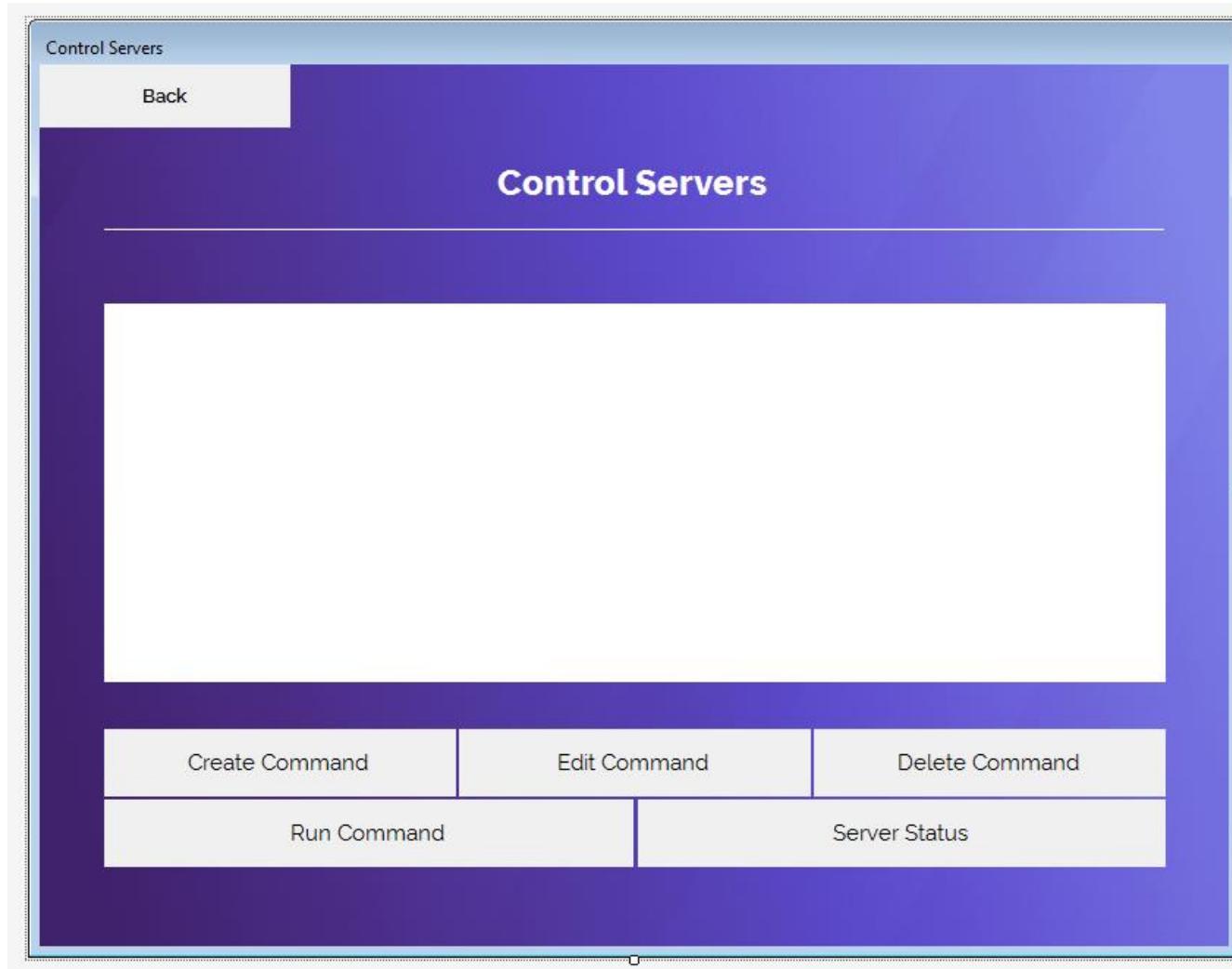
        private void btnRunCommand_Click(object sender, EventArgs e)
        {
            MySqlConnection runCommandConnection = new MySqlConnection(loginMenu.ConnectionString);
            runCommandConnection.Open();
            while (loopNum != activeLoop)
            {
                //Create string to combine the ID and the name to be able to target the checkbox.
                chkBoxName = "chkServer" + Convert.ToString(activeLoop);
                var checkBox = this.Controls.Find(chkBoxName, true).FirstOrDefault() as CheckBox;
                checkBoxText = checkBox.Text;
                //If Checkbox is ticked, execute code.
            }
        }
    }
}
```

```
if (checkBox.Checked == true)
{
    //Run SQL to get data about servers stored in the table serverInformation and save output as variables to be
used.
    MySqlCommand serverCMD = new MySqlCommand("SELECT * FROM serverInformation WHERE serverHostname = @hostname",
runCommandConnection);
    serverCMD.Parameters.AddWithValue("@hostname", checkBoxText);
    MySqlDataReader serverInformationRDR = serverCMD.ExecuteReader();
    serverInformationRDR.Read();
    ip = Convert.ToString(serverInformationRDR[7]);
    username = Convert.ToString(serverInformationRDR[4]);
    password = Convert.ToString(serverInformationRDR[5]);
    os = Convert.ToString(serverInformationRDR[6]);
    location = Convert.ToString(serverInformationRDR[2]);
    serverInformationRDR.Close();
    //Try to get the login details to a backup node in the same location as the server selected. Else, try to
find a backup node available. If nothing available, output error.
    try
    {
        MySqlCommand osCMD = new MySqlCommand("SELECT * FROM backupNodeInformation WHERE backupNodeCompany =
@backupNodeCompany AND backupNodeLocation = @backupNodeLocation", runCommandConnection);
        osCMD.Parameters.AddWithValue("@backupNodeCompany", loginMenu.CompanyID);
        osCMD.Parameters.AddWithValue("@backupNodeLocation", location);
        MySqlDataReader osRDR = osCMD.ExecuteReader();
        osRDR.Read();
        backupIP = Convert.ToString(osRDR[7]);
        backupUsername = Convert.ToString(osRDR[4]);
        backupPassword = Convert.ToString(osRDR[5]);
        backupPath = Convert.ToString(osRDR[12]);
        proceed = true;
    }
    catch
    {
        try
        {
            MySqlCommand osCMD = new MySqlCommand("SELECT * FROM backupNodeInformation WHERE backupNodeCompany =
@backupNodeCompany", runCommandConnection);
            osCMD.Parameters.AddWithValue("@backupNodeCompany", loginMenu.CompanyID);
            MySqlDataReader osRDR = osCMD.ExecuteReader();
            osRDR.Read();
            backupIP = Convert.ToString(osRDR[7]);
            backupUsername = Convert.ToString(osRDR[4]);
            backupPassword = Convert.ToString(osRDR[5]);
            backupPath = Convert.ToString(osRDR[12]);
        }
    }
}
```

```
        proceed = true;
    }
    catch
    {
        System.Windows.Forms.MessageBox.Show("Please configure a backup node.");
    }
}
//If a backup node has been found, create a background thread to execute an rsync command to backup a node to
a the backup server.
if (proceed == true)
{
    new Thread(() =>
    {
        Thread.CurrentThread.IsBackground = true;
        try
        {
            string SSHCommand = "sshpass -p '" + backupPassword + "' rsync -az / " + backupUsername + "@" +
backupIP + ":" + backupPath + "/" + DateTime.Now.ToString("yyyy-dd-M--HH-mm-ss");
            using (var client = new SshClient(ip, username, password))
            {
                client.Connect();
                client.RunCommand(Convert.ToString(SSHCommand));
                client.Disconnect();
            }
        }
        catch (Exception ex)
        {
            System.Windows.Forms.MessageBox.Show(Convert.ToString(ex));
        }
    }).Start();
}
activeLoop += 1;
}
runCommandConnection.Close();
Hide();
}

private void serverControlRunCommand_Load(object sender, EventArgs e)
{
    MySqlConnection commandLoadConnection = new MySqlConnection(loginMenu.ConnectionString);
    commandLoadConnection.Open();
    //Execute SQL command to get the IDs of the operating systems used.
    MySqlCommand osIDCommand = new MySqlCommand("SELECT * FROM serverInformation", commandLoadConnection);
```

```
osIDCommand.Parameters.AddWithValue("@companyID", loginMenu.CompanyID);
MySqlDataReader operatingSystemRDR = osIDCommand.ExecuteReader();
loopNum = 0;
while (operatingSystemRDR.Read())
{
    operatingSystemsID[loopNum] = Convert.ToString(operatingSystemRDR[3]);
    loopNum += 1;
}
operatingSystemRDR.Close();
loopNum = 0;
//Create a checkbox for each server.
while (operatingSystemsID[loopNum] != null)
{
    value = Convert.ToString(operatingSystemsID[loopNum]);
    CheckBox box = new CheckBox();
    box.Name = "chkServer" + Convert.ToString(loopNum);
    box.Text = value;
    box.AutoSize = true;
    box.Location = new Point(10, (loopNum + 1) * 20);
    pnlConfiguration.Controls.Add(box);
    loopNum += 1;
}
this.Height += (loopNum * 20) + 40;
pnlConfiguration.Height += (loopNum * 20) + 40;
btnRunBackup.Top += (loopNum * 20) + 40;
btnCancel.Top += (loopNum * 20) + 40;
}
```

Subsection 3.6.3.iiii - controlManagement.cs [design] - design view

Subsection 3.6.3.1iv - controlManagement.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class controlManagement
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            System.Windows.Forms.DataGridViewCellStyle dataGridViewCellStyle1 = new System.Windows.Forms.DataGridViewCellStyle();
            System.ComponentModel.ComponentResourceManager resources = new
System.ComponentModel.ComponentResourceManager(typeof(controlManagement));
            this.btnAdd = new System.Windows.Forms.Button();
            this.btnDeleteCommand = new System.Windows.Forms.Button();
            this.btnAddCommand = new System.Windows.Forms.Button();
            this.btnAddStatus = new System.Windows.Forms.Button();
            this.pictureBox2 = new System.Windows.Forms.PictureBox();
            this.lblServerControl = new System.Windows.Forms.Label();
            this.btnAddRun = new System.Windows.Forms.Button();
            this.btnAddGrid = new System.Windows.Forms.DataGridView();
        }
    }
}
```

```
((System.ComponentModel.ISupportInitialize)(this.pictureBox2)).BeginInit();
((System.ComponentModel.ISupportInitialize)(this.dataGridView1)).BeginInit();
this.SuspendLayout();
//
// btnBack
//
this.btnBack.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnBack.FlatAppearance.BorderSize = 0;
this.btnBack.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnBack.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnBack.Location = new System.Drawing.Point(0, 0);
this.btnBack.Name = "btnBack";
this.btnBack.Size = new System.Drawing.Size(171, 43);
this.btnBack.TabIndex = 4;
this.btnBack.Text = "Back";
this.btnBack.UseVisualStyleBackColor = true;
this.btnBack.Click += new System.EventHandler(this.btnBack_Click);
//
// btnDeleteCommand
//
this.btnDeleteCommand.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnDeleteCommand.FlatAppearance.BorderSize = 0;
this.btnDeleteCommand.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnDeleteCommand.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnDeleteCommand.Location = new System.Drawing.Point(528, 453);
this.btnDeleteCommand.Name = "btnDeleteCommand";
this.btnDeleteCommand.Size = new System.Drawing.Size(240, 46);
this.btnDeleteCommand.TabIndex = 57;
this.btnDeleteCommand.Text = "Delete Command";
this.btnDeleteCommand.UseVisualStyleBackColor = true;
this.btnDeleteCommand.Click += new System.EventHandler(this.btnDeleteCommand_Click);
//
// btnEditCommand
//
this.btnEditCommand.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnEditCommand.FlatAppearance.BorderSize = 0;
this.btnEditCommand.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnEditCommand.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnEditCommand.Location = new System.Drawing.Point(286, 453);
this.btnEditCommand.Name = "btnEditCommand";
this.btnEditCommand.Size = new System.Drawing.Size(240, 46);
```

```
this.btnAddCommand.TabIndex = 56;
this.btnAddCommand.Text = "Edit Command";
this.btnAddCommand.UseVisualStyleBackColor = true;
this.btnAddCommand.Click += new System.EventHandler(this.btnAddCommand_Click);
//
// btnCreateCommand
//
this.btnCreateCommand.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnCreateCommand.FlatAppearance.BorderSize = 0;
this.btnCreateCommand.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnCreateCommand.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCreateCommand.Location = new System.Drawing.Point(44, 453);
this.btnCreateCommand.Name = "btnCreateCommand";
this.btnCreateCommand.Size = new System.Drawing.Size(240, 46);
this.btnCreateCommand.TabIndex = 55;
this.btnCreateCommand.Text = "Create Command";
this.btnCreateCommand.UseVisualStyleBackColor = true;
this.btnCreateCommand.Click += new System.EventHandler(this.btnCreateCommand_Click);
//
// pictureBox2
//
this.pictureBox2.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.pictureBox2.Location = new System.Drawing.Point(44, 112);
this.pictureBox2.Name = "pictureBox2";
this.pictureBox2.Size = new System.Drawing.Size(723, 1);
this.pictureBox2.TabIndex = 54;
this.pictureBox2.TabStop = false;
//
// lblServerControl
//
this.lblServerControl.AutoSize = true;
this.lblServerControl.BackColor = System.Drawing.Color.Transparent;
this.lblServerControl.Font = new System.Drawing.Font("Raleway ExtraBold", 18F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblServerControl.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblServerControl.Location = new System.Drawing.Point(307, 66);
this.lblServerControl.Name = "lblServerControl";
this.lblServerControl.Size = new System.Drawing.Size(197, 29);
this.lblServerControl.TabIndex = 53;
this.lblServerControl.Text = "Control Servers";
//
// btnServerStatus
//
```

```
this.btnServerStatus.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnServerStatus.FlatAppearance.BorderSize = 0;
this.btnServerStatus.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnServerStatus.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnServerStatus.Location = new System.Drawing.Point(408, 501);
this.btnServerStatus.Name = "btnServerStatus";
this.btnServerStatus.Size = new System.Drawing.Size(360, 46);
this.btnServerStatus.TabIndex = 52;
this.btnServerStatus.Text = "Server Status";
this.btnServerStatus.UseVisualStyleBackColor = true;
this.btnServerStatus.Click += new System.EventHandler(this.btnServerStatus_Click);
//
// btnRunCommand
//
this.btnRunCommand.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnRunCommand.FlatAppearance.BorderSize = 0;
this.btnRunCommand.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnRunCommand.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnRunCommand.Location = new System.Drawing.Point(44, 501);
this.btnRunCommand.Name = "btnRunCommand";
this.btnRunCommand.Size = new System.Drawing.Size(361, 46);
this.btnRunCommand.TabIndex = 51;
this.btnRunCommand.Text = "Run Command";
this.btnRunCommand.UseVisualStyleBackColor = true;
this.btnRunCommand.Click += new System.EventHandler(this.btnRunCommand_Click);
//
// dataGridView1
//
this.dataGridView1.AllowUserToAddRows = false;
this.dataGridView1.AllowUserToDeleteRows = false;
this.dataGridView1.AllowUserToResizeColumns = false;
this.dataGridView1.AllowUserToResizeRows = false;
this.dataGridView1.AutoSizeColumnsMode = System.Windows.Forms.DataGridViewAutoSizeColumnsMode.Fill;
this.dataGridView1.BackgroundColor = System.Drawing.SystemColors.ControlLightLight;
this.dataGridView1.BorderStyle = System.Windows.Forms.BorderStyle.None;
this.dataGridView1.CellBorderStyle = System.Windows.Forms.DataGridViewCellBorderStyle.None;
this.dataGridView1.ColumnHeadersBorderStyle = System.Windows.Forms.DataGridViewHeaderBorderStyle.Single;
dataGridViewCellStyle1.Alignment = System.Windows.Forms.DataGridViewContentAlignment.MiddleCenter;
dataGridViewCellStyle1.BackColor = System.Drawing.SystemColors.Control;
dataGridViewCellStyle1.Font = new System.Drawing.Font("Microsoft Sans Serif", 8.25F,
System.Drawing.FontStyle.Regular, System.Drawing.GraphicsUnit.Point, ((byte)(0)));
dataGridViewCellStyle1.ForeColor = System.Drawing.SystemColors.WindowText;
```

```
dataGridViewCellStyle1.SelectionBackColor = System.Drawing.SystemColors.Highlight;
dataGridViewCellStyle1.SelectionForeColor = System.Drawing.SystemColors.HighlightText;
dataGridViewCellStyle1.WrapMode = System.Windows.Forms.DataGridViewAutoSizeColumnMode.True;
this.dataGridView1.ColumnHeadersDefaultCellStyle = dataGridViewCellStyle1;
this.dataGridView1.ColumnHeadersHeightSizeMode =
System.Windows.Forms.DataGridViewAutoSizeColumnMode.AutoSizeMode;
this.dataGridView1.GridColor = System.Drawing.SystemColors.ButtonFace;
this.dataGridView1.Location = new System.Drawing.Point(44, 163);
this.dataGridView1.Name = "dataGridView1";
this.dataGridView1.ReadOnly = true;
this.dataGridView1.RowHeadersVisible = false;
this.dataGridView1.RowHeadersWidthSizeMode =
System.Windows.Forms.DataGridViewAutoSizeColumnMode.AutoSizeMode;
this.dataGridView1.SelectionMode = System.Windows.Forms.DataGridViewAutoSizeColumnMode.FullRowSelect;
this.dataGridView1.ShowCellErrors = false;
this.dataGridView1.ShowCellToolTips = false;
this.dataGridView1.ShowEditingIcon = false;
this.dataGridView1.ShowRowErrors = false;
this.dataGridView1.Size = new System.Drawing.Size(724, 258);
this.dataGridView1.TabIndex = 58;
this.dataGridView1.VirtualMode = true;
//
// controlManagement
//
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(811, 601);
this.ControlBox = false;
this.Controls.Add(this.dataGridView1);
this.Controls.Add(this.btnDeleteCommand);
this.Controls.Add(this.btnEditCommand);
this.Controls.Add(this.btnCreateCommand);
this.Controls.Add(this.pictureBox2);
this.Controls.Add(this.lblServerControl);
this.Controls.Add(this.btnServerStatus);
this.Controls.Add(this.btnRunCommand);
this.Controls.Add(this.btnClose);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.Icon = ((System.Drawing.Icon)(resources.GetObject("$this.Icon")));
this.MaximizeBox = false;
this.MaximumSize = new System.Drawing.Size(1146, 640);
this.Name = "controlManagement";
```

```
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "Control Servers";
this.Load += new System.EventHandler(this.serverControl_Load);
((System.ComponentModel.ISupportInitialize)(this.pictureBox2)).EndInit();
((System.ComponentModel.ISupportInitialize)(this.dataGridView1)).EndInit();
this.ResumeLayout(false);
this.PerformLayout();

}

#endregion
private System.Windows.Forms.Button btnBack;
private System.Windows.Forms.Button btnDeleteCommand;
private System.Windows.Forms.Button btnEditCommand;
private System.Windows.Forms.Button btnCreateCommand;
private System.Windows.Forms.PictureBox pictureBox2;
private System.Windows.Forms.Label lblServerControl;
private System.Windows.Forms.Button btnServerStatus;
private System.Windows.Forms.Button btnRunCommand;
private System.Windows.Forms.DataGridView dataGridView1;
}
}
```

Subsection 3.6.3.1v - controlManagement.cs - Code file - annotated

```
using System;
using System.Data;
using System.Windows.Forms;
using MySql.Data.MySqlClient;

namespace ELSM_Project
{
    public partial class controlManagement : Form
    {
        public controlManagement()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        private void serverControl_Load(object sender, EventArgs e)
        {
```

```
//Connect to MySQL and fill datagridview with data outputted from the SQL command.
MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
conn.Open();
try
{
    MySqlDataAdapter MyDA = new MySqlDataAdapter();
    MyDA.SelectCommand = new MySqlCommand("SELECT serverID, serverHostname, serverOS, serverIP FROM serverInformation
WHERE serverCompany = " + loginMenu.CompanyID + "", conn);
    DataTable table = new DataTable();
    MyDA.Fill(table);
    BindingSource bSource = new BindingSource();
    bSource.DataSource = table;
    dataGridView1.DataSource = bSource;
}
catch (MySql.Data.MySqlClient.MySqlException ex)
{
    MessageBox.Show(ex.Message);
    Close();
}
//Initialize permissions by using boolean variables on the loginMenu form to disable buttons if the permission is not
granted.
if (loginMenu.permAddAction == false)
{
    btnCreateCommand.Enabled = false;
}
if (loginMenu.permEditAction == false)
{
    btnEditCommand.Enabled = false;
}
if (loginMenu.permDeleteAction == false)
{
    btnDeleteCommand.Enabled = false;
}
if (loginMenu.permRunCustomAction == false)
{
    btnRunCommand.Enabled = false;
}
}

private void btnCreateCommand_Click(object sender, EventArgs e)
{
    //On button event open controlCommandCreate.
    controlCommandCreate Create = new controlCommandCreate();
    Create.ShowDialog();
}
```

```
}

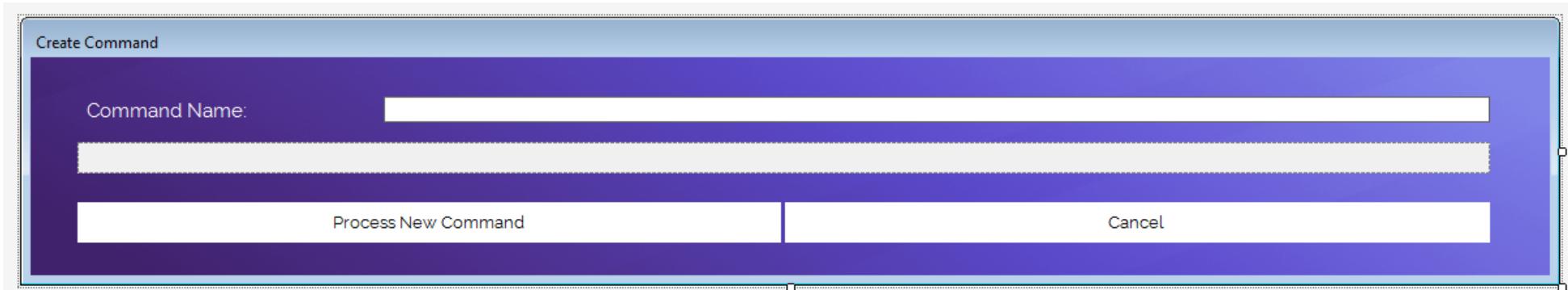
private void btnEditCommand_Click(object sender, EventArgs e)
{
    //On button event open controlCommandEdit.
    controlCommandEdit Edit = new controlCommandEdit();
    Edit.ShowDialog();
}

private void btnDeleteCommand_Click(object sender, EventArgs e)
{
    //On button event open controlCommandDelete.
    controlCommandDelete Delete = new controlCommandDelete();
    Delete.ShowDialog();
}

private void btnRunCommand_Click(object sender, EventArgs e)
{
    //On button event open controlCommandRun.
    controlCommandRun Run = new controlCommandRun();
    Run.ShowDialog();
}

private void btnServerStatus_Click(object sender, EventArgs e)
{
    //On button event open controlServerStatus.
    controlServerStatus Status = new controlServerStatus();
    Status.ShowDialog();
}

private void btnBack_Click(object sender, EventArgs e)
{
    //On button event open serverManagement.
    Hide();
    serverManagement serverManagementFRM = new serverManagement();
    serverManagementFRM.ShowDialog();
}
}
```

Subsection 3.6.3.lvi - controlCommandCreate.cs [design] - design view

Subsection 3.6.3.lvii - controlCommandCreate.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class controlCommandCreate
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            this.btnCancel = new System.Windows.Forms.Button();
            this.btnNewCommand = new System.Windows.Forms.Button();
            this.txtCommandName = new System.Windows.Forms.TextBox();
            this.lblCommandName = new System.Windows.Forms.Label();
            this.pnlConfiguration = new System.Windows.Forms.Panel();
            this.SuspendLayout();
            // 
            // btnCancel
            // 
            this.btnCancel.BackColor = System.Drawing.SystemColors.ControlLightLight;
            this.btnCancel.Cursor = System.Windows.Forms.Cursors.Hand;
            this.btnCancel.FlatAppearance.BorderSize = 0;
```

```
this.btnCancel.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnCancel.Font = new System.Drawing.Font("Raleway", 9.74999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCancel.Location = new System.Drawing.Point(579, 111);
this.btnCancel.Name = "btnCancel";
this.btnCancel.Size = new System.Drawing.Size(541, 31);
this.btnCancel.TabIndex = 45;
this.btnCancel.Text = "Cancel";
this.btnCancel.UseVisualStyleBackColor = false;
this.btnCancel.Click += new System.EventHandler(this.btnCancel_Click);
//
// btnNewCommand
//
this.btnNewCommand.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnNewCommand.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnNewCommand.FlatAppearance.BorderSize = 0;
this.btnNewCommand.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnNewCommand.Font = new System.Drawing.Font("Raleway", 9.74999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnNewCommand.Location = new System.Drawing.Point(36, 111);
this.btnNewCommand.Name = "btnNewCommand";
this.btnNewCommand.Size = new System.Drawing.Size(540, 31);
this.btnNewCommand.TabIndex = 44;
this.btnNewCommand.Text = "Process New Command";
this.btnNewCommand.UseVisualStyleBackColor = false;
this.btnNewCommand.Click += new System.EventHandler(this.btnNewCommand_Click);
//
// txtCommandName
//
this.txtCommandName.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtCommandName.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtCommandName.Location = new System.Drawing.Point(271, 30);
this.txtCommandName.Name = "txtCommandName";
this.txtCommandName.Size = new System.Drawing.Size(849, 20);
this.txtCommandName.TabIndex = 49;
//
// lblCommandName
//
this.lblCommandName.AutoSize = true;
this.lblCommandName.BackColor = System.Drawing.Color.Transparent;
this.lblCommandName.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblCommandName.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblCommandName.Location = new System.Drawing.Point(40, 32);
```

```
this.lblCommandName.Name = "lblCommandName";
this.lblCommandName.Size = new System.Drawing.Size(131, 18);
this.lblCommandName.TabIndex = 48;
this.lblCommandName.Text = "Command Name:";
//
// pnlConfiguration
//
this.pnlConfiguration.AutoScroll = true;
this.pnlConfiguration.Location = new System.Drawing.Point(36, 65);
this.pnlConfiguration.Name = "pnlConfiguration";
this.pnlConfiguration.Size = new System.Drawing.Size(1084, 24);
this.pnlConfiguration.TabIndex = 50;
//
// controlCommandCreate
//
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.AutoScroll = true;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(1166, 167);
this.ControlBox = false;
this.Controls.Add(this.pnlConfiguration);
this.Controls.Add(this.txtCommandName);
this.Controls.Add(this.lblCommandName);
this.Controls.Add(this.btnCancel);
this.Controls.Add(this.btnNewCommand);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.Name = "controlCommandCreate";
this.Text = "Create Command";
this.Load += new System.EventHandler(this.serverControlCreate_Load);
this.ResumeLayout(false);
this.PerformLayout();

}

#endregion

private System.Windows.Forms.Button btnCancel;
private System.Windows.Forms.Button btnNewCommand;
private System.Windows.Forms.TextBox txtCommandName;
private System.Windows.Forms.Label lblCommandName;
private System.Windows.Forms.Panel pnlConfiguration;
}
```

}

Subsection 3.6.3.lviii - controlCommandCreate.cs - Code file - annotated

```
using System;
using System.Drawing;
using System.Linq;
using System.Windows.Forms;
using MySql.Data.MySqlClient;

namespace ELSM_Project
{
    public partial class controlCommandCreate : Form
    {
        public controlCommandCreate()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        private static int loopnum = 1, createloop = 0, pointX = 235, pointY = 20;
        private static string value;

        private void serverControlCreate_Load(object sender, EventArgs e)
        {
            //Connect to MySQL and get all rows in serverOperatingSystems.
            MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
            conn.Open();
            MySqlCommand oscmd = new MySqlCommand("SELECT * FROM serverOperatingSystems ORDER BY operatingSystemsID", conn);
            MySqlDataReader osrdr = oscmd.ExecuteReader();
            int height;
            height = 206;
            loopnum = 0;
            int boxnum = 0;
            pnlConfiguration.Height += 40;
            this.Height += 40;
            //For each row in reader, execute code.
            while (osrdr.Read())
            {
                // Create a dynamic checkbox, set the name of the checkbox equal to the loopnum. Set the text to the output of
                // the read, create an event handler for it & set sizing and locations. Add it to the screen.
                CheckBox box = new CheckBox();
                box.Name = "chkOS" + Convert.ToString(loopnum);
                box.Text = Convert.ToString(osrdr[1]);
                box.CheckedChanged += new System.EventHandler(valueChecked);
                box.AutoSize = true;
            }
        }
    }
}
```

```
        box.Location = new Point(10, loopnum * 20);
        pnlConfiguration.Controls.Add(box);
        //Add 1 to loop.
        loopnum += 1;
    }
    int pointX = 235;
    int pointY = 0;
    int loopnum2 = 0;
    //For each line that read has processed, execute code.
    for (int i = 0; i < loopnum; i++)
    {
        //Create dynamic textbox, set the location, width and set it to enabled. Set the name of the text box to the
loopnum.
        TextBox a = new TextBox();
        a.Location = new Point(pointX, pointY);
        a.Name = "txtInput" + loopnum2;
        a.Width = 800;
        a.Enabled = false;
        pnlConfiguration.Controls.Add(a);
        pnlConfiguration.Show();
        pointY += 20;
        boxnum += 1;
        loopnum2 += 1;
    }
    osrdr.Close();
    //Set form heights.
    this.Height += loopnum2 * 5;
    pnlConfiguration.Height += (loopnum2 * 5);
    btnNewCommand.Top += loopnum2 * 6;
    btnCancel.Top += loopnum2 * 6;

}

private void btnCancel_Click(object sender, EventArgs e)
{
    //On button event, hide the form.
    Hide();
}

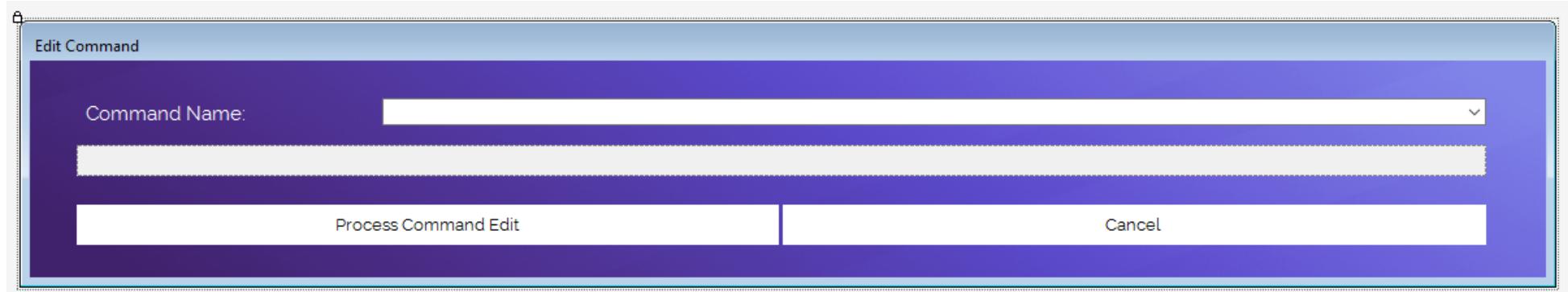
private void valueChecked(object sender, EventArgs e)
{
    //When a checkbox is checked or unchcked, split apart the name to get the ID, compile the ID to be able to target the
textbox and then enable the textbox if checked, clear and disable if unchecked.
    string name = ((CheckBox)sender).Name;
```

```
name = name.Replace("chkOS", string.Empty);
int OSNumber = Convert.ToInt16(name);
string inputname = "txtInput" + OSNumber;
var text = this.Controls.Find(inputname, true).FirstOrDefault() as TextBox;

CheckBox chbxName = (CheckBox)sender;
if (chbxName.Checked == true)
{
    text.Enabled = true;
}
else
{
    text.Enabled = false;
    text.Text = "";
}

private void btnNewCommand_Click(object sender, EventArgs e)
{
    MySqlConnection connectionMySQL = new MySqlConnection(loginMenu.ConnectionString);
    connectionMySQL.Open();
    while (loopnum != createloop)
    {
        //Compile a string to be able to then target the textbox and checkbox to see if it is checked and has text. Then
        connect to MySQL.
        string chkname = "chkOS" + Convert.ToString(createloop);
        string inputname = "txtInput" + Convert.ToString(createloop);
        var os = "";
        var text = this.Controls.Find(inputname, true).FirstOrDefault() as TextBox;
        var checkBox = this.Controls.Find(chkname, true).FirstOrDefault() as CheckBox;
        string checkBoxText = checkBox.Text;
        MySqlCommand osCMD = new MySqlCommand("SELECT * FROM serverOperatingSystems WHERE operatingSystemsName = @os",
connectionMySQL);
        osCMD.Parameters.AddWithValue("@os", checkBoxText);
        MySqlDataReader osRDR = osCMD.ExecuteReader();
        osRDR.Read();
        os = Convert.ToString(osRDR[0]);
        osRDR.Close();
        //If the textbox isn't blank, insert new command.
        if (text.Text != "")
        {
            MySqlCommand newCommandCMD = new MySqlCommand("INSERT INTO `serverCommands`(`serverCompany`, `serverOS`,
`commandName`, `serverCommand`) VALUES (@serverCompany, @serverOS, @commandName, @serverCommand)", connectionMySQL);
            newCommandCMD.Parameters.AddWithValue("@serverCommand", text.Text);
```

```
        newCommandCMD.Parameters.AddWithValue("@commandName", txtCommandName.Text);
        newCommandCMD.Parameters.AddWithValue("@serverOS", os);
        newCommandCMD.Parameters.AddWithValue("@serverCompany", loginMenu.CompanyID);
        newCommandCMD.ExecuteNonQuery();
    }
    createloop += 1;
}
connectionMySQL.Close();
Hide();
}
}
```

Subsection 3.6.3.lix - controlCommandEdit.cs [design] - design view

Subsection 3.6.3.1x - controlCommandEdit.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class controlCommandEdit
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            this.btnCancel = new System.Windows.Forms.Button();
            this.btnEditCommand = new System.Windows.Forms.Button();
            this.lblCommandName = new System.Windows.Forms.Label();
            this.pnlConfiguration = new System.Windows.Forms.Panel();
            this.cmboCommands = new System.Windows.Forms.ComboBox();
            this.SuspendLayout();
            //
            // btnCancel
            //
            this.btnCancel.BackColor = System.Drawing.SystemColors.ControlLightLight;
            this.btnCancel.Cursor = System.Windows.Forms.Cursors.Hand;
            this.btnCancel.FlatAppearance.BorderSize = 0;
```

```
this.btnCancel.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnCancel.Font = new System.Drawing.Font("Raleway", 9.74999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCancel.Location = new System.Drawing.Point(579, 111);
this.btnCancel.Name = "btnCancel";
this.btnCancel.Size = new System.Drawing.Size(541, 31);
this.btnCancel.TabIndex = 45;
this.btnCancel.Text = "Cancel";
this.btnCancel.UseVisualStyleBackColor = false;
this.btnCancel.Click += new System.EventHandler(this.btnCancel_Click);
//
// btnEditCommand
//
this.btnEditCommand.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnEditCommand.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnEditCommand.FlatAppearance.BorderSize = 0;
this.btnEditCommand.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnEditCommand.Font = new System.Drawing.Font("Raleway", 9.74999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnEditCommand.Location = new System.Drawing.Point(36, 111);
this.btnEditCommand.Name = "btnEditCommand";
this.btnEditCommand.Size = new System.Drawing.Size(540, 31);
this.btnEditCommand.TabIndex = 44;
this.btnEditCommand.Text = "Process Command Edit";
this.btnEditCommand.UseVisualStyleBackColor = false;
this.btnEditCommand.Click += new System.EventHandler(this.btnNewCommand_Click);
//
// lblCommandName
//
this.lblCommandName.AutoSize = true;
this.lblCommandName.BackColor = System.Drawing.Color.Transparent;
this.lblCommandName.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblCommandName.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblCommandName.Location = new System.Drawing.Point(40, 32);
this.lblCommandName.Name = "lblCommandName";
this.lblCommandName.Size = new System.Drawing.Size(131, 18);
this.lblCommandName.TabIndex = 48;
this.lblCommandName.Text = "Command Name:";
//
// pnlConfiguration
//
this.pnlConfiguration.AutoScroll = true;
this.pnlConfiguration.Location = new System.Drawing.Point(36, 65);
```

```
this.pnlConfiguration.Name = " pnlConfiguration";
this.pnlConfiguration.Size = new System.Drawing.Size(1084, 24);
this.pnlConfiguration.TabIndex = 50;
//
// cmboCommands
//
this.cmboCommands.Cursor = System.Windows.Forms.Cursors.IBeam;
this.cmboCommands.FormattingEnabled = true;
this.cmboCommands.Location = new System.Drawing.Point(271, 29);
this.cmboCommands.Name = "cmboCommands";
this.cmboCommands.Size = new System.Drawing.Size(849, 21);
this.cmboCommands.TabIndex = 51;
this.cmboCommands.SelectedIndexChanged += new System.EventHandler(this.cmboCommands_SelectedIndexChanged);
//
// controlCommandEdit
//
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.AutoScroll = true;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(1166, 167);
this.ControlBox = false;
this.Controls.Add(this.cmboCommands);
this.Controls.Add(this.pnlConfiguration);
this.Controls.Add(this.lblCommandName);
this.Controls.Add(this.btnCancel);
this.Controls.Add(this.btnEditCommand);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.Name = "controlCommandEdit";
this.Text = "Edit Command";
this.Load += new System.EventHandler(this.serverControlEdit_Load);
this.ResumeLayout(false);
this.PerformLayout();

}

#endif

private System.Windows.Forms.Button btnCancel;
private System.Windows.Forms.Button btnEditCommand;
private System.Windows.Forms.Label lblCommandName;
private System.Windows.Forms.Panel pnlConfiguration;
private System.Windows.Forms.ComboBox cmboCommands;
```

}

Subsection 3.6.3.1xi - controlCommandEdit.cs - Code file - annotated

```
using System;
using System.Drawing;
using System.Linq;
using System.Windows.Forms;
using MySql.Data.MySqlClient;

namespace ELSM_Project
{
    public partial class controlCommandEdit : Form
    {
        public controlCommandEdit()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        private static int loopnum, createloop, pointX = 235, pointY = 20, boxnum = 0, temploop;
        private static bool finished, firstrun;
        private static string value, yes = "No";
        string[] operatingSystemsID = new string[100];
        string[] operatingSystems = new string[100];
        string[] commandOSID = new string[100];
        string[] commandText = new string[100];

        private void serverControlEdit_Load(object sender, EventArgs e)
        {
            firstrun = true;
            MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
            conn.Open();
            //Run SQL to get the name of commands that are unique and set the output as items of cmboCommands.
            MySqlCommand serverCommandCMD = new MySqlCommand("SELECT DISTINCT * FROM serverCommands WHERE serverCompany =
@company GROUP BY commandName", conn);
            serverCommandCMD.Parameters.AddWithValue("@company", loginMenu.CompanyID);
            MySqlDataReader serverCommandRDR = serverCommandCMD.ExecuteReader();
            while (serverCommandRDR.Read())
            {
                cmboCommands.Items.Add(serverCommandRDR.GetString("commandName"));
            }
            serverCommandRDR.Close();
            //Run SQL to list the name and Id of the operating system in array.
            MySqlCommand osCMD = new MySqlCommand("SELECT * FROM serverOperatingSystems ORDER BY operatingSystemsID ASC", conn);
            MySqlDataReader osRDR = osCMD.ExecuteReader();
```

```
loopnum = 0;
while (osRDR.Read())
{
    operatingSystemsID[loopnum] = Convert.ToString(osRDR[0]);
    operatingSystems[loopnum] = Convert.ToString(osRDR[1]);
    loopnum += 1;
}
osRDR.Close();
finished = false;
}

private void btnCancel_Click(object sender, EventArgs e)
{
    //On button event, hide the form.
    Hide();
}

private void valueChecked(object sender, EventArgs e)
{
    if (finished == true)
    {
        //Get the name of the checkbox, split it to get the ID.
        string name = ((CheckBox)sender).Name;
        name = name.Replace("chkOS", string.Empty);
        int OSNumber = Convert.ToInt16(name);
        OSNumber -= 1;
        //Get the name of the textbox, split it to get the ID.
        string inputname = "txtInput" + OSNumber;
        var text = this.Controls.Find(inputname, true).FirstOrDefault() as TextBox;
        //Target the checkbox, if it is checked, enable the textbox. If it is not checked, disable and clear the
checkbox.
        CheckBox chbxName = (CheckBox)sender;
        if (chbxName.Checked == true)
        {
            text.Enabled = true;
        }
        else
        {
            text.Enabled = false;
            text.Text = "";
        }
    }
}
```

```
private void cmboCommands_SelectedIndexChanged(object sender, EventArgs e)
{
    MySqlConnection connectionMySQL = new MySqlConnection(loginMenu.ConnectionString);
    connectionMySQL.Open();
    //Execute SQL to get the OS ID for different operating systems where it matches the commandname.
    MySqlCommand serverCommandCMD = new MySqlCommand("SELECT * FROM serverCommands WHERE serverCompany = @company AND
    commandName = @Name", connectionMySQL);
    serverCommandCMD.Parameters.AddWithValue("@company", loginMenu.CompanyID);
    serverCommandCMD.Parameters.AddWithValue("@Name", cmboCommands.Text);
    MySqlDataReader setCommandIDS = serverCommandCMD.ExecuteReader();
    loopnum = 0;
    while (setCommandIDS.Read())
    {
        commandOSID[loopnum] = Convert.ToString(setCommandIDS[2]);
        loopnum += 1;
    }
    setCommandIDS.Close();
    //Execute SQL to get the command content for different operating systems where it matches the commandname.
    MySqlDataReader setCommandText = serverCommandCMD.ExecuteReader();
    loopnum = 0;
    while (setCommandText.Read())
    {
        commandText[loopnum] = Convert.ToString(setCommandText[4]);
        loopnum += 1;
    }
    setCommandText.Close();
    loopnum = 0;
    pointX = 235;
    pointY = 20;
    pnlConfiguration.Controls.Clear();
    while (operatingSystemsID[loopnum] != null)
    {
        //Create a dynamic checkbox, set different properties such as the location, event handler and size. Named with
        the ID of the loop.
        value = Convert.ToString(operatingSystems[loopnum]);
        temploop = 0;
        CheckBox dynamicCheckbox = new CheckBox();
        dynamicCheckbox.Name = "chkOS" + Convert.ToString(loopnum);
        dynamicCheckbox.Text = value;
        dynamicCheckbox.CheckedChanged += new System.EventHandler(valueChecked);
        dynamicCheckbox.AutoSize = true;
        dynamicCheckbox.Location = new Point(10, (loopnum + 1) * 20);
        pnlConfiguration.Controls.Add(dynamicCheckbox);
    }
}
```

```
//Create a dynamic textbox, set different properties such as the location and width. Named with the ID of the
loop.
TextBox dynamicTextbox = new TextBox();
dynamicTextbox.Location = new Point(pointX, pointY);
dynamicTextbox.Name = "txtInput" + (loopnum - 1);
dynamicTextbox.Width = 800;
pnlConfiguration.Controls.Add(dynamicTextbox);
pnlConfiguration.Show();
while (commandOSID[temploop] != null)
{
    if (Convert.ToString(operatingSystemsID[loopnum]) == Convert.ToString(commandOSID[temploop]))
    {
        dynamicCheckbox.Checked = true;
        dynamicTextbox.Enabled = true;
        dynamicTextbox.Text = Convert.ToString(commandText[temploop]);
        yes = "Yes";
    }
    temploop += 1;
}
if (yes != "Yes")
{
    dynamicCheckbox.Checked = false;
    dynamicTextbox.Enabled = false;
}
yes = "No";
loopnum += 1;
pointY += 20;
boxnum += 1;

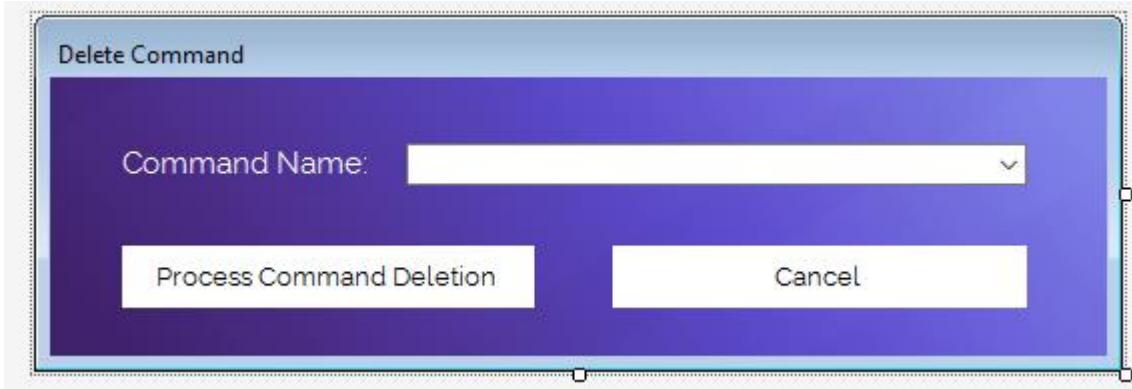
}
//If not the first time loading the page, set the window height accordingly.
if (firstrun != false)
{
    this.Height += loopnum * 5;
    pnlConfiguration.Height += loopnum * 5;
    finished = true;
    btnEditCommand.Top += loopnum * 5;
    btnCancel.Top += loopnum * 5;
}
firstrun = false;

connectionMySQL.Close();
}
```

```
private void btnNewCommand_Click(object sender, EventArgs e)
{
    MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
    conn.Open();
    createloop = 0;
    //Delete all entries for the command with different OS configurations.
    MySqlCommand newDeleteCommand = new MySqlCommand("DELETE FROM `serverCommands` WHERE `commandName` = @commandName AND serverCompany = @serverCompany", conn);
    newDeleteCommand.Parameters.AddWithValue("@commandName", cmboCommands.Text);
    newDeleteCommand.Parameters.AddWithValue("@serverCompany", loginMenu.CompanyID);
    newDeleteCommand.ExecuteNonQuery();
    while (loopnum != createloop)
    {
        //For each operating system selected, combine string to be able to target the textbox and the checkbox.
        string chkname = "chkOS" + Convert.ToString(createloop);
        string inputname = "txtInput" + Convert.ToString(createloop - 1);
        var os = "";
        var text = this.Controls.Find(inputname, true).FirstOrDefault() as TextBox;
        var checkBox = this.Controls.Find(chkname, true).FirstOrDefault() as CheckBox;
        string checkBoxText = checkBox.Text;
        //Get the ID of the operating system that is selected in the checkbox selected.
        MySqlCommand oscmd = new MySqlCommand("SELECT * FROM serverOperatingSystems WHERE operatingSystemsName = @os", conn);
        oscmd.Parameters.AddWithValue("@os", checkBoxText);
        MySqlDataReader osrdr = oscmd.ExecuteReader();
        osrdr.Read();
        os = Convert.ToString(osrdr[0]);
        osrdr.Close();
        //If the command text isn't equal to blank, insert into the table.
        if (text.Text != "")
        {
            MySqlCommand newCommand = new MySqlCommand("INSERT INTO `serverCommands`(`serverCompany`, `serverOS`, `commandName`, `serverCommand`) VALUES (@serverCompany, @serverOS, @commandName, @serverCommand)", conn);
            newCommand.Parameters.AddWithValue("@serverCommand", text.Text);
            newCommand.Parameters.AddWithValue("@commandName", cmboCommands.Text);
            newCommand.Parameters.AddWithValue("@serverOS", os);
            newCommand.Parameters.AddWithValue("@serverCompany", loginMenu.CompanyID);
            newCommand.ExecuteNonQuery();
        }
        createloop += 1;
    }
    conn.Close();
    Hide();
}
```

}

Subsection 3.6.3.lxii - controlCommandDelete.cs [design] - design view



Subsection 3.6.3.lxiii - controlCommandDelete.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class controlCommandDelete
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            this.btnCancel = new System.Windows.Forms.Button();
            this.btnDeleteCommand = new System.Windows.Forms.Button();
            this.lblCommandName = new System.Windows.Forms.Label();
            this.cmboName = new System.Windows.Forms.ComboBox();
            this.SuspendLayout();
            //
            // btnCancel
            //
            this.btnCancel.BackColor = System.Drawing.SystemColors.ControlLightLight;
            this.btnCancel.Cursor = System.Windows.Forms.Cursors.Hand;
            this.btnCancel.FlatAppearance.BorderSize = 0;
            this.btnCancel.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
```

```
this.btnCancel.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCancel.Location = new System.Drawing.Point(281, 84);
this.btnCancel.Name = "btnCancel";
this.btnCancel.Size = new System.Drawing.Size(207, 31);
this.btnCancel.TabIndex = 45;
this.btnCancel.Text = "Cancel";
this.btnCancel.UseVisualStyleBackColor = false;
this.btnCancel.Click += new System.EventHandler(this.btnCancel_Click);
//
// btnDeleteCommand
//
this.btnDeleteCommand.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnDeleteCommand.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnDeleteCommand.FlatAppearance.BorderSize = 0;
this.btnDeleteCommand.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnDeleteCommand.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnDeleteCommand.Location = new System.Drawing.Point(36, 84);
this.btnDeleteCommand.Name = "btnDeleteCommand";
this.btnDeleteCommand.Size = new System.Drawing.Size(206, 31);
this.btnDeleteCommand.TabIndex = 44;
this.btnDeleteCommand.Text = "Process Command Deletion";
this.btnDeleteCommand.UseVisualStyleBackColor = false;
this.btnDeleteCommand.Click += new System.EventHandler(this.btnDeleteCommand_Click);
//
// lblCommandName
//
this.lblCommandName.AutoSize = true;
this.lblCommandName.BackColor = System.Drawing.Color.Transparent;
this.lblCommandName.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblCommandName.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblCommandName.Location = new System.Drawing.Point(33, 34);
this.lblCommandName.Name = "lblCommandName";
this.lblCommandName.Size = new System.Drawing.Size(131, 18);
this.lblCommandName.TabIndex = 38;
this.lblCommandName.Text = "Command Name:";
//
// cmboName
//
this.cmboName.FormattingEnabled = true;
this.cmboName.Location = new System.Drawing.Point(178, 33);
this.cmboName.Name = "cmboName";
```

```
this.cmboName.Size = new System.Drawing.Size(310, 21);
this.cmboName.TabIndex = 46;
//
// controlCommandDelete
//
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(528, 139);
this.ControlBox = false;
this.Controls.Add(this.btnCancel);
this.Controls.Add(this.btnDeleteCommand);
this.Controls.Add(this.lblCommandName);
this.Controls.Add(this.cmboName);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.MaximumSize = new System.Drawing.Size(544, 178);
this.MinimumSize = new System.Drawing.Size(544, 178);
this.Name = "controlCommandDelete";
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "Delete Command";
this.Load += new System.EventHandler(this.serverControlDelete_Load);
this.ResumeLayout(false);
this.PerformLayout();
this.PerformLayout();

}

#endregion

private System.Windows.Forms.Button btnCancel;
private System.Windows.Forms.Button btnDeleteCommand;
private System.Windows.Forms.Label lblCommandName;
private System.Windows.Forms.ComboBox cmboName;
}
```

Subsection 3.6.3.lxiv - controlCommandDelete.cs - Code file - annotated

```
using System;
using System.Windows.Forms;
using MySql.Data.MySqlClient;

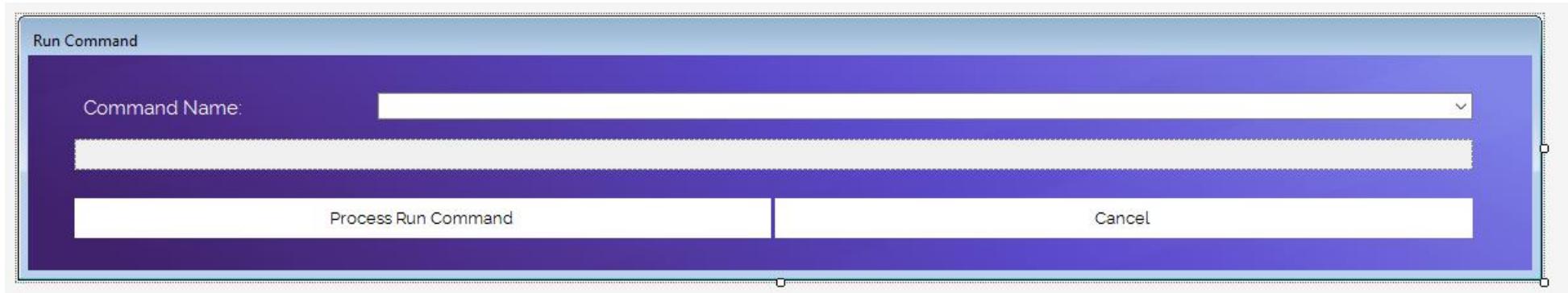
namespace ELSM_Project
{
    public partial class controlCommandDelete : Form
    {
        public controlCommandDelete()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        private void btnCancel_Click(object sender, EventArgs e)
        {
            //On button event, hide the form.
            Hide();
        }

        private void serverControlDelete_Load(object sender, EventArgs e)
        {
            //Connect to MySQL and set output as items of cmboName.
            MySqlConnection connectionMySQL = new MySqlConnection(loginMenu.ConnectionString);
            connectionMySQL.Open();
            MySqlCommand commandNameCMD = new MySqlCommand("SELECT DISTINCT commandName FROM serverCommands WHERE serverCompany = @companyID", connectionMySQL);
            commandNameCMD.Parameters.AddWithValue("@companyID", loginMenu.CompanyID);
            MySqlDataReader commandNameRDR = commandNameCMD.ExecuteReader();
            while (commandNameRDR.Read())
            {
                cmboName.Items.Add(commandNameRDR.GetString("commandName"));
            }
            connectionMySQL.Close();
        }

        private void btnDeleteCommand_Click(object sender, EventArgs e)
        {
            //Delete row from serverCommands where the command name matches selected.
            MySqlConnection connectionMySQL = new MySqlConnection(loginMenu.ConnectionString);
            connectionMySQL.Open();
```

```
        MySqlCommand deleteCommandCMD = new MySqlCommand("DELETE FROM serverCommands WHERE commandName = @Name, serverCompany  
= @Company", connectionMySQL);  
        deleteCommandCMD.Parameters.AddWithValue("@Name", cmboName.Text);  
        deleteCommandCMD.Parameters.AddWithValue("@Company", loginMenu.CompanyID);  
        deleteCommandCMD.ExecuteNonQuery();  
        cmboName.Items.Clear();  
        //Update information. Connect to MySQL and set output as items of cmboName.  
        MySqlCommand commandNameCMD = new MySqlCommand("SELECT * FROM serverCommands WHERE serverCompany = @companyID",  
connectionMySQL);  
        commandNameCMD.Parameters.AddWithValue("@companyID", loginMenu.CompanyID);  
        MySqlDataReader commandNameRDR = commandNameCMD.ExecuteReader();  
        while (commandNameRDR.Read())  
        {  
            cmboName.Items.Add(commandNameRDR.GetString("commandName"));  
        }  
        connectionMySQL.Close();  
    }  
}
```

Subsection 3.6.3.lxv - controlCommandRun.cs [design] - design view

Subsection 3.6.3.lxvi - controlCommandRun.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class controlCommandRun
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            this.btnCancel = new System.Windows.Forms.Button();
            this.btnRunCommand = new System.Windows.Forms.Button();
            this.lblCommandName = new System.Windows.Forms.Label();
            this.pnlConfiguration = new System.Windows.Forms.Panel();
            this.cmboCommands = new System.Windows.Forms.ComboBox();
            this.SuspendLayout();
            //
            // btnCancel
            //
            this.btnCancel.BackColor = System.Drawing.SystemColors.ControlLightLight;
            this.btnCancel.Cursor = System.Windows.Forms.Cursors.Hand;
            this.btnCancel.FlatAppearance.BorderSize = 0;
```

```
this.btnCancel.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnCancel.Font = new System.Drawing.Font("Raleway", 9.74999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCancel.Location = new System.Drawing.Point(579, 111);
this.btnCancel.Name = "btnCancel";
this.btnCancel.Size = new System.Drawing.Size(541, 31);
this.btnCancel.TabIndex = 45;
this.btnCancel.Text = "Cancel";
this.btnCancel.UseVisualStyleBackColor = false;
this.btnCancel.Click += new System.EventHandler(this.btnCancel_Click);
//
// btnRunCommand
//
this.btnRunCommand.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnRunCommand.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnRunCommand.FlatAppearance.BorderSize = 0;
this.btnRunCommand.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnRunCommand.Font = new System.Drawing.Font("Raleway", 9.74999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnRunCommand.Location = new System.Drawing.Point(36, 111);
this.btnRunCommand.Name = "btnRunCommand";
this.btnRunCommand.Size = new System.Drawing.Size(540, 31);
this.btnRunCommand.TabIndex = 44;
this.btnRunCommand.Text = "Process Run Command";
this.btnRunCommand.UseVisualStyleBackColor = false;
this.btnRunCommand.Click += new System.EventHandler(this.btnRunCommand_Click);
//
// lblCommandName
//
this.lblCommandName.AutoSize = true;
this.lblCommandName.BackColor = System.Drawing.Color.Transparent;
this.lblCommandName.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblCommandName.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblCommandName.Location = new System.Drawing.Point(40, 32);
this.lblCommandName.Name = "lblCommandName";
this.lblCommandName.Size = new System.Drawing.Size(131, 18);
this.lblCommandName.TabIndex = 48;
this.lblCommandName.Text = "Command Name:";
//
// pnlConfiguration
//
this.pnlConfiguration.AutoScroll = true;
this.pnlConfiguration.Location = new System.Drawing.Point(36, 65);
```

```
this.pnlConfiguration.Name = " pnlConfiguration";
this.pnlConfiguration.Size = new System.Drawing.Size(1084, 24);
this.pnlConfiguration.TabIndex = 50;
//
// cmboCommands
//
this.cmboCommands.Cursor = System.Windows.Forms.Cursors.IBeam;
this.cmboCommands.FormattingEnabled = true;
this.cmboCommands.Location = new System.Drawing.Point(271, 29);
this.cmboCommands.Name = "cmboCommands";
this.cmboCommands.Size = new System.Drawing.Size(849, 21);
this.cmboCommands.TabIndex = 51;
//
// controlCommandRun
//
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.AutoScroll = true;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(1166, 167);
this.ControlBox = false;
this.Controls.Add(this.cmboCommands);
this.Controls.Add(this.pnlConfiguration);
this.Controls.Add(this.lblCommandName);
this.Controls.Add(this.btnCancel);
this.Controls.Add(this.btnRunCommand);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.Name = "controlCommandRun";
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "Run Command";
this.Load += new System.EventHandler(this.serverControlRunCommand_Load);
this.ResumeLayout(false);
this.PerformLayout();

}

#endregion

private System.Windows.Forms.Button btnCancel;
private System.Windows.Forms.Button btnRunCommand;
private System.Windows.Forms.Label lblCommandName;
private System.Windows.Forms.Panel pnlConfiguration;
private System.Windows.Forms.ComboBox cmboCommands;
```

}

Subsection 3.6.3.lxvii - controlCommandRun.cs - Code file - annotated

```
using System;
using System.Drawing;
using System.Linq;
using System.Threading;
using System.Windows.Forms;
using MySql.Data.MySqlClient;
using Renci.SshNet;

namespace ELSM_Project
{
    public partial class controlCommandRun : Form
    {
        public controlCommandRun()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        private static int loopNum, activeLoop = 0;
        private static string os, ip, username, password, chkBoxName, checkBoxText, commandData, value;
        private string[] operatingSystemsID = new string[100], operatingSystems = new string[100], commandOSID = new string[100],
commandText = new string[100];

        private void btnCancel_Click(object sender, EventArgs e)
        {
            //On button event, hide the form.
            Hide();
        }

        private void btnRunCommand_Click(object sender, EventArgs e)
        {
            MySqlConnection runCommandConnection = new MySqlConnection(loginMenu.ConnectionString);
            runCommandConnection.Open();
            while (loopNum != activeLoop)
            {
                //Compile a string with the loopnum and then target the checkbox.
                chkBoxName = "chkServer" + Convert.ToString(activeLoop);
                var checkBox = this.Controls.Find(chkBoxName, true).FirstOrDefault() as CheckBox;
                checkBoxText = checkBox.Text;
                //If checked execute.
                if (checkBox.Checked == true)
                {
```

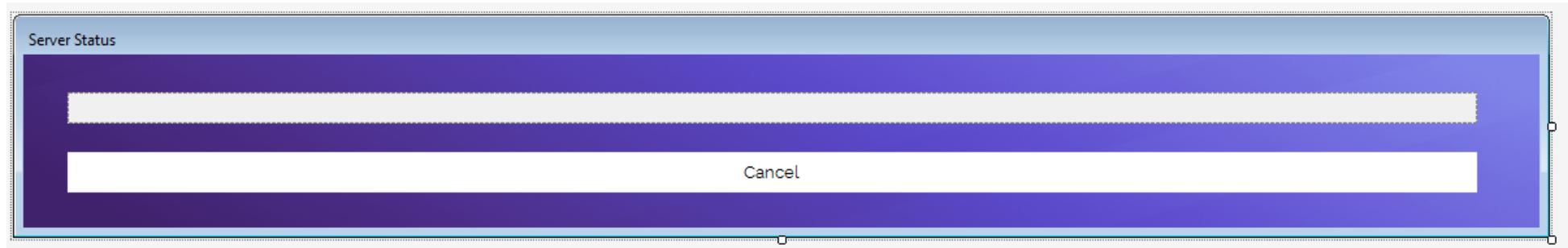
```
//Run SQL to get the hostname of the server that the hostname matches.
MySqlCommand serverCMD = new MySqlCommand("SELECT * FROM serverInformation WHERE serverHostname = @hostname",
runCommandConnection);
serverCMD.Parameters.AddWithValue("@hostname", checkBoxText);
MySqlDataReader serverInformationRDR = serverCMD.ExecuteReader();
serverInformationRDR.Read();
//Store output from SQL as variables.
ip = Convert.ToString(serverInformationRDR[7]);
username = Convert.ToString(serverInformationRDR[4]);
password = Convert.ToString(serverInformationRDR[5]);
os = Convert.ToString(serverInformationRDR[6]);
serverInformationRDR.Close();
//SQL Select the command where the commandname matches that selected and the OS matches - to ensure that the
OS has been configured.
MySqlCommand osCMD = new MySqlCommand("SELECT * FROM serverCommands WHERE serverOS = @os AND commandName =
@CommandName", runCommandConnection);
osCMD.Parameters.AddWithValue("@os", os);
osCMD.Parameters.AddWithValue("@CommandName", cmboCommands.Text);
MySqlDataReader osRDR = osCMD.ExecuteReader();
osRDR.Read();
commandData = Convert.ToString(osRDR[4]);
//Create new thread to run in the background. Attempt to SSH into the node with the hostname selected in the
loop, execute the command that matches the OS then disconnect.
new Thread(() =>
{
    Thread.CurrentThread.IsBackground = true;
    try
    {
        using (var client = new SshClient(ip, username, password))
        {
            client.Connect();
            client.RunCommand(Convert.ToString(commandData));
            client.Disconnect();
        }
    }
    catch (Exception)
    {
        System.Windows.Forms.MessageBox.Show("Error");
    }
}).Start();
osRDR.Close();
}
activeLoop += 1;
}
```

```
runCommandConnection.Close();
Hide();
}

private void serverControlRunCommand_Load(object sender, EventArgs e)
{
    MySqlConnection commandLoadConnection = new MySqlConnection(loginMenu.ConnectionString);
    commandLoadConnection.Open();
    //Connect to MySQL, execute SQL and set output as items of cmboCommands.
    MySqlCommand commandName = new MySqlCommand("SELECT DISTINCT * FROM serverCommands WHERE serverCompany = @company
GROUP BY commandName", commandLoadConnection);
    commandName.Parameters.AddWithValue("@company", loginMenu.CompanyID);
    MySqlDataReader commandNameRDR = commandName.ExecuteReader();
    while (commandNameRDR.Read())
    {
        cmboCommands.Items.Add(commandNameRDR.GetString("commandName"));
    }
    commandNameRDR.Close();
    //Run SQL statement to get the names of the operating systems used
    MySqlCommand osIDCommand = new MySqlCommand("SELECT * FROM serverInformation WHERE serverCompany = @companyID ORDER
BY serverID ASC", commandLoadConnection);
    osIDCommand.Parameters.AddWithValue("@companyID", loginMenu.CompanyID);
    MySqlDataReader operatingSystemRDR = osIDCommand.ExecuteReader();
    loopNum = 0;
    while (operatingSystemRDR.Read())
    {
        operatingSystemsID[loopNum] = Convert.ToString(operatingSystemRDR[3]);
        loopNum += 1;
    }
    operatingSystemRDR.Close();
    //Run SQL statement to get the IDs of the operating systems used.
    MySqlCommand cmdIDCommand = new MySqlCommand("SELECT * FROM serverInformation WHERE serverCompany = @company ORDER BY
serverID", commandLoadConnection);
    cmdIDCommand.Parameters.AddWithValue("@company", loginMenu.CompanyID);
    MySqlDataReader commandIDRDR = cmdIDCommand.ExecuteReader();
    loopNum = 0;
    while (commandIDRDR.Read())
    {
        commandOSID[loopNum] = Convert.ToString(commandIDRDR[2]);
        loopNum += 1;
    }
    commandIDRDR.Close();
    //While values, dynamically create checkboxes for servers.
    loopNum = 0;
```

```
while (operatingSystemsID[loopNum] != null)
{
    value = Convert.ToString(operatingSystemsID[loopNum]);
    CheckBox box = new CheckBox();
    box.Name = "chkServer" + Convert.ToString(loopNum);
    box.Text = value;
    box.AutoSize = true;
    box.Location = new Point(10, (loopNum + 1) * 20);
    pnlConfiguration.Controls.Add(box);
    loopNum += 1;
}
this.Height += (loopNum * 20) + 40;
pnlConfiguration.Height += (loopNum * 20) + 40;
loopNum += 1;
btnRunCommand.Top += loopNum * 23;
btnCancel.Top += loopNum * 23;
}
```

Subsection 3.6.3.lxviii - controlCommandStatus.cs [design] - design view



Subsection 3.6.3.lxix - controlCommandStatus.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class controlServerStatus
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            this.btnCancel = new System.Windows.Forms.Button();
            this.pnlConfiguration = new System.Windows.Forms.Panel();
            this.SuspendLayout();
            //
            // btnCancel
            //
            this.btnCancel.BackColor = System.Drawing.SystemColors.ControlLightLight;
            this.btnCancel.Cursor = System.Windows.Forms.Cursors.Hand;
            this.btnCancel.FlatAppearance.BorderSize = 0;
            this.btnCancel.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
            this.btnCancel.Font = new System.Drawing.Font("Raleway", 9.74999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
            System.Drawing.GraphicsUnit.Point, ((byte)(0)));
        }
    }
}
```

```
this.btnCancel.Location = new System.Drawing.Point(34, 75);
this.btnCancel.Name = "btnCancel";
this.btnCancel.Size = new System.Drawing.Size(1084, 31);
this.btnCancel.TabIndex = 45;
this.btnCancel.Text = "Cancel";
this.btnCancel.UseVisualStyleBackColor = false;
this.btnCancel.Click += new System.EventHandler(this.btnCancel_Click);
//
// pnlConfiguration
//
this.pnlConfiguration.AutoScroll = true;
this.pnlConfiguration.Location = new System.Drawing.Point(34, 29);
this.pnlConfiguration.Name = "pnlConfiguration";
this.pnlConfiguration.Size = new System.Drawing.Size(1084, 24);
this.pnlConfiguration.TabIndex = 50;
//
// controlServerStatus
//
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.AutoScroll = true;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(1166, 133);
this.ControlBox = false;
this.Controls.Add(this.pnlConfiguration);
this.Controls.Add(this.btnCancel);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.Name = "controlServerStatus";
this.Text = "Server Status";
this.Load += new System.EventHandler(this.serverControlStatus_Load);
this.ResumeLayout(false);

}

#endregion

private System.Windows.Forms.Button btnCancel;
private System.Windows.Forms.Panel pnlConfiguration;
}
```

Subsection 3.6.3.lxx - controlCommandStatus.cs - Code file - annotated

```
using System;
using System.Drawing;
using System.Windows.Forms;
using MySql.Data.MySqlClient;
using System.Net.NetworkInformation;

namespace ELSM_Project
{
    public partial class controlServerStatus : Form
    {
        public controlServerStatus()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        //Declare variables.
        private static int loopnum = 1, pointY = 20, pointX = 235;
        private static string value, pingOutcomeData;
        private static PingReply pingResponse;

        private void btnCancel_Click(object sender, EventArgs e)
        {
            //On button event, hide the form.
            Hide();
        }

        private void serverControlStatus_Load(object sender, EventArgs e)
        {
            //Connect to MySQL, for each row found, dynamically create two labels. One with the name of the server, the other with
            the result. During the process, the program pings the server.
            MySqlConnection connectionMySQL = new MySqlConnection(loginMenu.ConnectionString);
            connectionMySQL.Open();
            MySqlCommand statusExecute = new MySqlCommand("SELECT * FROM serverInformation ORDER BY serverID", connectionMySQL);
            MySqlDataReader statusOutput = statusExecute.ExecuteReader();
            while (statusOutput.Read())
            {
                value = Convert.ToString(statusOutput[3]);
                Label statusLabel = new Label();
                statusLabel.Name = "lblServerHostname" + Convert.ToString(loopnum);
                statusLabel.Text = value;
```

```
statusLabel.AutoSize = true;
statusLabel.Location = new Point(10, loopnum * 20);
pnlConfiguration.Controls.Add(statusLabel);
Label statusResult = new Label();
statusResult.Location = new Point(pointX, pointY);
statusResult.Name = "lblStatusOutcome" + loopnum;
statusResult.Width = 800;
statusResult.Height -= 5;
statusResult.ForeColor = Color.Black;
pingOutcomeData = Convert.ToString(statusOutput[7]);
Ping pingProcess = new Ping();
pingResponse = pingProcess.Send(pingOutcomeData);
if (pingResponse.Status == IPStatus.Success)
{
    statusResult.Text = "Ping to " + pingOutcomeData.ToString() + " Successful! "
        + " Response Time " + pingResponse.RoundtripTime.ToString() + "ms";
}
else
{
    statusResult.Text = "Server Offline";
}
pnlConfiguration.Controls.Add(statusResult);
pnlConfiguration.Height += 40;
pointY += 20;
loopnum += 1;
}
statusOutput.Close();
connectionMySQL.Close();
this.Height += 40 + (loopnum * 5);
pnlConfiguration.Height += (loopnum * 5);
btnCancel.Top += ((loopnum + 5) * 6);
}
}
```

Subsection 3.6.3.lxxi - locationManagement.cs [design] - design view

Manage Locations

New Ticket View Tickets

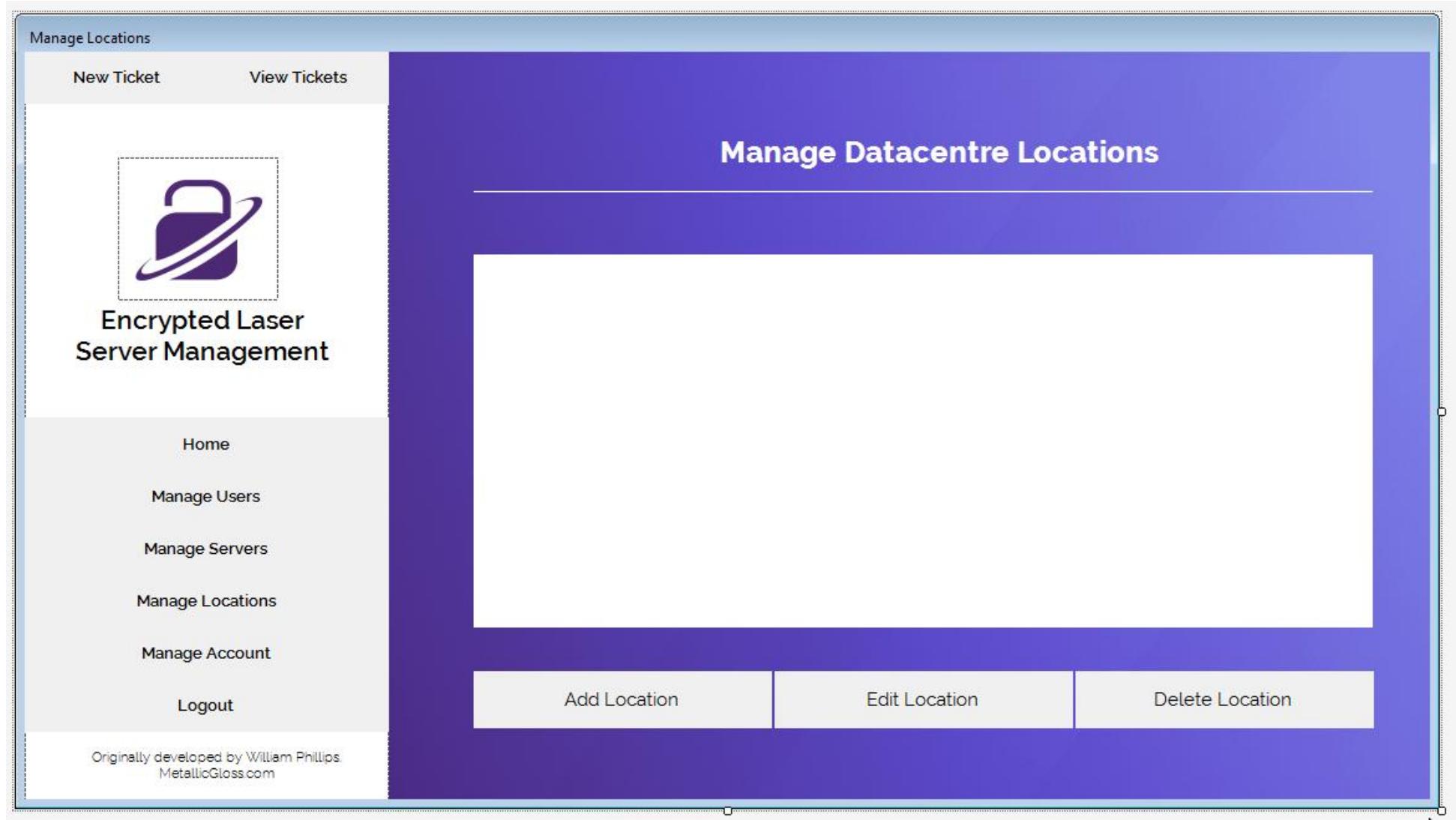
 Encrypted Laser Server Management

Home
Manage Users
Manage Servers
Manage Locations
Manage Account
Logout

Originally developed by William Phillips
MetallicGloss.com

Manage Datacentre Locations

Add Location Edit Location Delete Location



Subsection 3.6.3.lxxii - locationManagement.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class locationManagement
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            System.Windows.Forms.DataGridViewCellStyle dataGridViewCellStyle1 = new System.Windows.Forms.DataGridViewCellStyle();
            System.ComponentModel.ComponentResourceManager resources = new
System.ComponentModel.ComponentResourceManager(typeof(locationManagement));
            this.lblMetallicGloss = new System.Windows.Forms.Label();
            this.lblTitle = new System.Windows.Forms.Label();
            this.btnExit = new System.Windows.Forms.Button();
            this.btnManageAccount = new System.Windows.Forms.Button();
            this.btnManageServers = new System.Windows.Forms.Button();
            this.btnManageLocations = new System.Windows.Forms.Button();
            this.btnManageUsers = new System.Windows.Forms.Button();
            this.btnExit = new System.Windows.Forms.Button();
            this.EHSLLogo = new System.Windows.Forms.PictureBox();
        }
    }
}
```

```
this.menuBackground = new System.Windows.Forms.PictureBox();
this.dataGridLocation = new System.Windows.Forms.DataGridView();
this.btnDeleteLocation = new System.Windows.Forms.Button();
this.btnEditLocation = new System.Windows.Forms.Button();
this.btnAddLocation = new System.Windows.Forms.Button();
this.pictureBox2 = new System.Windows.Forms.PictureBox();
this.lblManageLocations = new System.Windows.Forms.Label();
this.btnCreateTicket = new System.Windows.Forms.Button();
this.btnTicketReply = new System.Windows.Forms.Button();
((System.ComponentModel.ISupportInitialize)(this.ELHSLogo)).BeginInit();
((System.ComponentModel.ISupportInitialize)(this.menuBackground)).BeginInit();
((System.ComponentModel.ISupportInitialize)(this.dataGridLocation)).BeginInit();
((System.ComponentModel.ISupportInitialize)(this.pictureBox2)).BeginInit();
this.SuspendLayout();
//
// lblMetallicGloss
//
this.lblMetallicGloss.AutoSize = true;
this.lblMetallicGloss.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.lblMetallicGloss.Cursor = System.Windows.Forms.Cursors.Hand;
this.lblMetallicGloss.Font = new System.Drawing.Font("Raleway Light", 8.249999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblMetallicGloss.Location = new System.Drawing.Point(51, 561);
this.lblMetallicGloss.Name = "lblMetallicGloss";
this.lblMetallicGloss.Size = new System.Drawing.Size(208, 26);
this.lblMetallicGloss.TabIndex = 16;
this.lblMetallicGloss.Text = "Originally developed by William Phillips.\r\nMetallicGloss.com";
this.lblMetallicGloss.TextAlign = System.Drawing.ContentAlignment.MiddleCenter;
this.lblMetallicGloss.Click += new System.EventHandler(this.lblMetallicGloss_Click);
//
// lblTitle
//
this.lblTitle.AutoSize = true;
this.lblTitle.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.lblTitle.Font = new System.Drawing.Font("Raleway SemiBold", 15.75F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblTitle.Location = new System.Drawing.Point(36, 203);
this.lblTitle.Name = "lblTitle";
this.lblTitle.Size = new System.Drawing.Size(216, 50);
this.lblTitle.TabIndex = 14;
this.lblTitle.Text = "Encrypted Laser\r\nServer Management";
this.lblTitle.TextAlign = System.Drawing.ContentAlignment.MiddleCenter;
//
// btnLogout
//
```

```
//  
this.btnExit.Cursor = System.Windows.Forms.Cursors.Hand;  
this.btnExit.FlatAppearance.BorderSize = 0;  
this.btnExit.FlatStyle = System.Windows.Forms.FlatStyle.Flat;  
this.btnExit.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.btnExit.Location = new System.Drawing.Point(0, 504);  
this.btnExit.Name = "btnLogout";  
this.btnExit.Size = new System.Drawing.Size(293, 43);  
this.btnExit.TabIndex = 6;  
this.btnExit.Text = "Logout";  
this.btnExit.UseVisualStyleBackColor = true;  
this.btnExit.Click += new System.EventHandler(this.btnExit_Click);  
//  
// btnManageAccount  
//  
this.btnManageAccount.Cursor = System.Windows.Forms.Cursors.Hand;  
this.btnManageAccount.FlatAppearance.BorderSize = 0;  
this.btnManageAccount.FlatStyle = System.Windows.Forms.FlatStyle.Flat;  
this.btnManageAccount.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.btnManageAccount.Location = new System.Drawing.Point(0, 462);  
this.btnManageAccount.Name = "btnManageAccount";  
this.btnManageAccount.Size = new System.Drawing.Size(293, 43);  
this.btnManageAccount.TabIndex = 5;  
this.btnManageAccount.Text = "Manage Account";  
this.btnManageAccount.UseVisualStyleBackColor = true;  
this.btnManageAccount.Click += new System.EventHandler(this.btnManageAccount_Click);  
//  
// btnManageServers  
//  
this.btnManageServers.Cursor = System.Windows.Forms.Cursors.Hand;  
this.btnManageServers.FlatAppearance.BorderSize = 0;  
this.btnManageServers.FlatStyle = System.Windows.Forms.FlatStyle.Flat;  
this.btnManageServers.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.btnManageServers.Location = new System.Drawing.Point(0, 378);  
this.btnManageServers.Name = "btnManageServers";  
this.btnManageServers.Size = new System.Drawing.Size(293, 43);  
this.btnManageServers.TabIndex = 3;  
this.btnManageServers.Text = "Manage Servers";  
this.btnManageServers.UseVisualStyleBackColor = true;  
this.btnManageServers.Click += new System.EventHandler(this.btnManageServers_Click);  
//
```

```
// btnManageLocations
//
this.btnManageLocations.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnManageLocations.FlatAppearance.BorderSize = 0;
this.btnManageLocations.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnManageLocations.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnManageLocations.Location = new System.Drawing.Point(0, 420);
this.btnManageLocations.Name = "btnManageLocations";
this.btnManageLocations.Size = new System.Drawing.Size(293, 43);
this.btnManageLocations.TabIndex = 4;
this.btnManageLocations.Text = "Manage Locations";
this.btnManageLocations.UseVisualStyleBackColor = true;
this.btnManageLocations.Click += new System.EventHandler(this.btnManageLocations_Click);
//
// btnManageUsers
//
this.btnManageUsers.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnManageUsers.FlatAppearance.BorderSize = 0;
this.btnManageUsers.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnManageUsers.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnManageUsers.Location = new System.Drawing.Point(0, 336);
this.btnManageUsers.Name = "btnManageUsers";
this.btnManageUsers.Size = new System.Drawing.Size(293, 43);
this.btnManageUsers.TabIndex = 2;
this.btnManageUsers.Text = "Manage Users";
this.btnManageUsers.UseVisualStyleBackColor = true;
this.btnManageUsers.Click += new System.EventHandler(this.btnManageUsers_Click);
//
// btnHome
//
this.btnHome.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnHome.FlatAppearance.BorderSize = 0;
this.btnHome.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnHome.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnHome.Location = new System.Drawing.Point(0, 294);
this.btnHome.Name = "btnHome";
this.btnHome.Size = new System.Drawing.Size(293, 43);
this.btnHome.TabIndex = 1;
this.btnHome.Text = "Home";
this.btnHome.UseVisualStyleBackColor = true;
this.btnHome.Click += new System.EventHandler(this.btnHome_Click);
```

```
//  
// ELHSLogo  
//  
this.ELHSLogo.BackColor = System.Drawing.SystemColors.ControlLightLight;  
this.ELHSLogo.BackgroundImage = global::ELSM_Project.Properties.Resources.imgLogoPurple;  
this.ELHSLogo.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;  
this.ELHSLogo.Location = new System.Drawing.Point(75, 85);  
this.ELHSLogo.Name = "ELHSLogo";  
this.ELHSLogo.Size = new System.Drawing.Size(129, 115);  
this.ELHSLogo.TabIndex = 37;  
this.ELHSLogo.TabStop = false;  
//  
// menuBackground  
//  
this.menuBackground.BackColor = System.Drawing.SystemColors.ControlLightLight;  
this.menuBackground.Location = new System.Drawing.Point(0, -1);  
this.menuBackground.Name = "menuBackground";  
this.menuBackground.Size = new System.Drawing.Size(293, 609);  
this.menuBackground.TabIndex = 38;  
this.menuBackground.TabStop = false;  
//  
// dataGridLocation  
//  
this.dataGridLocation.AllowUserToAddRows = false;  
this.dataGridLocation.AllowUserToDeleteRows = false;  
this.dataGridLocation.AllowUserToResizeColumns = false;  
this.dataGridLocation.AllowUserToResizeRows = false;  
this.dataGridLocation.AutoSizeColumnsMode = System.Windows.Forms.DataGridViewAutoSizeColumnsMode.Fill;  
this.dataGridLocation.BackgroundColor = System.Drawing.SystemColors.ControlLightLight;  
this.dataGridLocation.BorderStyle = System.Windows.Forms.BorderStyle.None;  
this.dataGridLocation.CellBorderStyle = System.Windows.Forms.DataGridViewCellBorderStyle.None;  
this.dataGridLocation.ColumnHeadersBorderStyle = System.Windows.Forms.DataGridViewHeaderBorderStyle.Single;  
dataGridViewCellStyle1.Alignment = System.Windows.Forms.DataGridViewContentAlignment.MiddleCenter;  
dataGridViewCellStyle1.BackColor = System.Drawing.SystemColors.Control;  
dataGridViewCellStyle1.Font = new System.Drawing.Font("Microsoft Sans Serif", 8.25F,  
System.Drawing.FontStyle.Regular, System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
dataGridViewCellStyle1.ForeColor = System.Drawing.SystemColors.WindowText;  
dataGridViewCellStyle1.SelectionBackColor = System.Drawing.SystemColors.Highlight;  
dataGridViewCellStyle1.SelectionForeColor = System.Drawing.SystemColors.HighlightText;  
dataGridViewCellStyle1.WrapMode = System.Windows.Forms.DataGridViewAutoSizeColumnsMode.True;  
this.dataGridLocation.ColumnHeadersDefaultCellStyle = dataGridViewCellStyle1;  
this.dataGridLocation.ColumnHeadersHeightSizeMode =  
System.Windows.Forms.DataGridViewAutoSizeColumnsMode.AutoSizeMode;  
this.dataGridLocation.GridColor = System.Drawing.SystemColors.ButtonFace;
```

```
this.dataGridLocation.Location = new System.Drawing.Point(361, 163);
this.dataGridLocation.Name = "dataGridLocation";
this.dataGridLocation.ReadOnly = true;
this.dataGridLocation.RowHeadersVisible = false;
this.dataGridLocation.RowHeadersWidthSizeMode =
System.Windows.Forms.DataGridViewAutoSizeRowMode.AutoSize;
this.dataGridLocation.SelectionMode = System.Windows.Forms.DataGridViewSelectionMode.FullRowSelect;
this.dataGridLocation.ShowCellErrors = false;
this.dataGridLocation.ShowCellToolTips = false;
this.dataGridLocation.ShowEditingIcon = false;
this.dataGridLocation.ShowRowErrors = false;
this.dataGridLocation.Size = new System.Drawing.Size(723, 300);
this.dataGridLocation.TabIndex = 39;
this.dataGridLocation.VirtualMode = true;
//
// btnDeleteLocation
//
this.btnDeleteLocation.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnDeleteLocation.FlatAppearance.BorderSize = 0;
this.btnDeleteLocation.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnDeleteLocation.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnDeleteLocation.Location = new System.Drawing.Point(845, 498);
this.btnDeleteLocation.Name = "btnDeleteLocation";
this.btnDeleteLocation.Size = new System.Drawing.Size(240, 46);
this.btnDeleteLocation.TabIndex = 42;
this.btnDeleteLocation.Text = "Delete Location";
this.btnDeleteLocation.UseVisualStyleBackColor = true;
this.btnDeleteLocation.Click += new System.EventHandler(this.btnDeleteLocation_Click);
//
// btnEditLocation
//
this.btnEditLocation.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnEditLocation.FlatAppearance.BorderSize = 0;
this.btnEditLocation.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnEditLocation.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnEditLocation.Location = new System.Drawing.Point(603, 498);
this.btnEditLocation.Name = "btnEditLocation";
this.btnEditLocation.Size = new System.Drawing.Size(240, 46);
this.btnEditLocation.TabIndex = 41;
this.btnEditLocation.Text = "Edit Location";
this.btnEditLocation.UseVisualStyleBackColor = true;
this.btnEditLocation.Click += new System.EventHandler(this.btnEditLocation_Click);
```

```
//  
// btnAddLocation  
//  
this.btnAddLocation.Cursor = System.Windows.Forms.Cursors.Hand;  
this.btnAddLocation.FlatAppearance.BorderSize = 0;  
this.btnAddLocation.FlatStyle = System.Windows.Forms.FlatStyle.Flat;  
this.btnAddLocation.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.btnAddLocation.Location = new System.Drawing.Point(361, 498);  
this.btnAddLocation.Name = "btnAddLocation";  
this.btnAddLocation.Size = new System.Drawing.Size(240, 46);  
this.btnAddLocation.TabIndex = 40;  
this.btnAddLocation.Text = "Add Location";  
this.btnAddLocation.UseVisualStyleBackColor = true;  
this.btnAddLocation.Click += new System.EventHandler(this.btnAddLocation_Click);  
//  
// pictureBox2  
//  
this.pictureBox2.BackColor = System.Drawing.SystemColors.ControlLightLight;  
this.pictureBox2.Location = new System.Drawing.Point(361, 112);  
this.pictureBox2.Name = "pictureBox2";  
this.pictureBox2.Size = new System.Drawing.Size(723, 1);  
this.pictureBox2.TabIndex = 44;  
this.pictureBox2.TabStop = false;  
//  
// lblManageLocations  
//  
this.lblManageLocations.AutoSize = true;  
this.lblManageLocations.BackColor = System.Drawing.Color.Transparent;  
this.lblManageLocations.Font = new System.Drawing.Font("Raleway ExtraBold", 18F, System.Drawing.FontStyle.Bold,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.lblManageLocations.ForeColor = System.Drawing.SystemColors.ControlLightLight;  
this.lblManageLocations.Location = new System.Drawing.Point(554, 66);  
this.lblManageLocations.Name = "lblManageLocations";  
this.lblManageLocations.Size = new System.Drawing.Size(366, 29);  
this.lblManageLocations.TabIndex = 43;  
this.lblManageLocations.Text = "Manage Datacentre Locations";  
//  
// btnCreateTicket  
//  
this.btnCreateTicket.Cursor = System.Windows.Forms.Cursors.Hand;  
this.btnCreateTicket.FlatAppearance.BorderSize = 0;  
this.btnCreateTicket.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
```

```
this.btnCreateTicket.Font = new System.Drawing.Font("Raleway SemiBold", 9.74999F, System.Drawing.FontStyle.Bold, System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCreateTicket.Location = new System.Drawing.Point(0, -1);
this.btnCreateTicket.Name = "btnCreateTicket";
this.btnCreateTicket.Size = new System.Drawing.Size(149, 43);
this.btnCreateTicket.TabIndex = 46;
this.btnCreateTicket.Text = "New Ticket";
this.btnCreateTicket.UseVisualStyleBackColor = true;
this.btnCreateTicket.Click += new System.EventHandler(this.btnCreateTicket_Click);
//
// btnTicketReply
//
this.btnTicketReply.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnTicketReply.FlatAppearance.BorderSize = 0;
this.btnTicketReply.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnTicketReply.Font = new System.Drawing.Font("Raleway SemiBold", 9.74999F, System.Drawing.FontStyle.Bold, System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnTicketReply.Location = new System.Drawing.Point(148, -1);
this.btnTicketReply.Name = "btnTicketReply";
this.btnTicketReply.Size = new System.Drawing.Size(145, 43);
this.btnTicketReply.TabIndex = 45;
this.btnTicketReply.Text = "View Tickets";
this.btnTicketReply.UseVisualStyleBackColor = true;
this.btnTicketReply.Click += new System.EventHandler(this.btnTicketReply_Click);
//
// locationManagement
//
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(1130, 601);
this.ControlBox = false;
this.Controls.Add(this.btnCreateTicket);
this.Controls.Add(this.btnTicketReply);
this.Controls.Add(this.pictureBox2);
this.Controls.Add(this.lblManageLocations);
this.Controls.Add(this.btnDeleteLocation);
this.Controls.Add(this.btnEditLocation);
this.Controls.Add(this.btnAddLocation);
this.Controls.Add(this.dataGridLocation);
this.Controls.Add(this.lblMetallicGloss);
this.Controls.Add(this.lblTitle);
this.Controls.Add(this.btnExit);
```

```
this.Controls.Add(this.btnAddAccount);
this.Controls.Add(this.btnAddServers);
this.Controls.Add(this.btnAddLocations);
this.Controls.Add(this.btnAddUsers);
this.Controls.Add(this.btnHome);
this.Controls.Add(this.EHHSLogo);
this.Controls.Add(this.menuBackground);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.Icon = ((System.Drawing.Icon)(resources.GetObject("$this.Icon")));
this.MaximizeBox = false;
this.MaximumSize = new System.Drawing.Size(1146, 640);
this.MinimumSize = new System.Drawing.Size(1146, 640);
this.Name = "locationManagement";
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "Manage Locations";
this.Load += new System.EventHandler(this.manageLocations_Load);
((System.ComponentModel.ISupportInitialize)IInitialize)(this.EHHSLogo).EndInit();
((System.ComponentModel.ISupportInitialize)IInitialize)(this.menuBackground).EndInit();
((System.ComponentModel.ISupportInitialize)IInitialize)(this.dataGridLocation).EndInit();
((System.ComponentModel.ISupportInitialize)IInitialize)(this.pictureBox2).EndInit();
this.ResumeLayout(false);
this.PerformLayout();

}

#endregion

private System.Windows.Forms.Label lblMetallicGloss;
private System.Windows.Forms.Label lblTitle;
private System.Windows.Forms.Button btnLogout;
private System.Windows.Forms.Button btnManageAccount;
private System.Windows.Forms.Button btnManageServers;
private System.Windows.Forms.Button btnManageLocations;
private System.Windows.Forms.Button btnManageUsers;
private System.Windows.Forms.Button btnHome;
private System.Windows.Forms.PictureBox EHHSLogo;
private System.Windows.Forms.PictureBox menuBackground;
private System.Windows.Forms.DataGridView dataGridLocation;
private System.Windows.Forms.Button btnDeleteLocation;
private System.Windows.Forms.Button btnEditLocation;
private System.Windows.Forms.Button btnAddLocation;
private System.Windows.Forms.PictureBox pictureBox2;
private System.Windows.Forms.Label lblManageLocations;
private System.Windows.Forms.Button btnCreateTicket;
```

```
    private System.Windows.Forms.Button btnTicketReply;  
}
```

Subsection 3.6.3.lxxiii - locationManagement.cs - Code file - annotated

```
using System;
using System.Data;
using System.Windows.Forms;
using MySql.Data.MySqlClient;

namespace ELSM_Project
{
    public partial class locationManagement : Form
    {
        public locationManagement()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        private void btnHome_Click(object sender, EventArgs e)
        {
            //On button event, hide current form and open mainDashboard.
            Hide();
            mainDashboard Dashboard = new mainDashboard();
            Dashboard.ShowDialog();
        }

        private void btnManageUsers_Click(object sender, EventArgs e)
        {
            //On button event, hide current form and open userList.
            Hide();
            userList userListForm = new userList();
            userListForm.ShowDialog();
        }

        private void btnManageServers_Click(object sender, EventArgs e)
        {
            //On button event, hide current form and open serverManagement.
            Hide();
            serverManagement manageS = new serverManagement();
            manageS.ShowDialog();
        }

        private void btnManageLocations_Click(object sender, EventArgs e)
        {
            //Display message box informing the user that they're already on the page that they attempted to navigate to.
        }
    }
}
```

```
        MessageBox.Show("You're already here!", "Notice", MessageBoxButtons.OK);
    }

    private void btnManageAccount_Click(object sender, EventArgs e)
    {
        //On button event, hide current form and open accountManagement.
        Hide();
        accountManagement Account = new accountManagement();
        Account.ShowDialog();
    }

    private void btnLogout_Click(object sender, EventArgs e)
    {
        //On button event, trigger a message box confirming logout. If the user input is Yes, close the form.
        if (MessageBox.Show("Are you sure you want to logout?", "Confirmation", MessageBoxButtons.YesNo) != DialogResult.No)
        {
            this.Close();
        }
    }

    private void lblMetallicGloss_Click(object sender, EventArgs e)
    {
        //Create process to open the link www.metallicgloss.com in the default browser.
        System.Diagnostics.Process.Start("https://www.metallicgloss.com");
    }

    private void manageLocations_Load(object sender, EventArgs e)
    {
        //Initialize permissions by using boolean variables on the loginMenu form to disable buttons if the permission is not granted.
        if (loginMenu.permViewLocations == false)
        {
            btnManageLocations.Enabled = false;
        }
        if (loginMenu.permAdminViewUsers == false)
        {
            btnManageUsers.Enabled = false;
        }
        if (loginMenu.permViewServers == false)
        {
            btnManageServers.Enabled = false;
        }
        if (loginMenu.permCreateTicket == false)
        {
```

```
        btnCreateTicket.Enabled = false;
    }
    if (loginMenu.permEditLocations == false)
    {
        btnEditLocation.Enabled = false;
    }
    if (loginMenu.permDeleteLocations == false)
    {
        btnDeleteLocation.Enabled = false;
    }
    if (loginMenu.permCreateLocation == false)
    {
        btnCreateTicket.Enabled = false;
    }
    UpdateData();
}

private void btnAddLocation_Click(object sender, EventArgs e)
{
    //Open locationCreate, when form closed clear datagridview and repopulate with new data.
    locationCreate Create = new locationCreate();
    Create.ShowDialog();
    UpdateData();
}

private void btnEditLocation_Click(object sender, EventArgs e)
{
    //Open locationEdit, when form closed clear datagridview and repopulate with new data.
    locationEdit Edit = new locationEdit();
    Edit.ShowDialog();
    UpdateData();
}

private void btnDeleteLocation_Click(object sender, EventArgs e)
{
    //Open locationDelete, when form closed clear datagridview and repopulate with new data.
    locationDelete Delete = new locationDelete();
    Delete.ShowDialog();
    UpdateData();
}

private void btnCreateTicket_Click(object sender, EventArgs e)
```

```
//On button event open ticketNew.  
ticketNew ticket = new ticketNew();  
ticket.ShowDialog();  
}  
  
private void btnTicketReply_Click(object sender, EventArgs e)  
{  
    //On button event, hide current form and open ticketView.  
    Hide();  
    ticketView ticket = new ticketView();  
    ticket.ShowDialog();  
}  
  
public void UpdateData()  
{  
    //Connect to MySQL and fill datagridview with data outputted from the SQL command.  
    MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);  
    conn.Open();  
    try  
    {  
        MySqlDataAdapter MyDA = new MySqlDataAdapter();  
        MyDA.SelectCommand = new MySqlCommand("SELECT locationID, locationName, locationLongitude, locationLatitude FROM serverLocations WHERE companyID = " + loginMenu.CompanyID + "", conn);  
        DataTable table = new DataTable();  
        MyDA.Fill(table);  
  
        BindingSource bSource = new BindingSource();  
        bSource.DataSource = table;  
  
        dataGridViewLocation.DataSource = bSource;  
    }  
    catch (MySql.Data.MySqlClient.MySqlException ex)  
    {  
        MessageBox.Show(ex.Message);  
    }  
    conn.Close();  
}  
}
```

Subsection 3.6.3.lxxiv - locationCreate.cs [design] - design view

The screenshot shows a Windows-style dialog box titled "Create Location". Inside the dialog, there are three text input fields: "Location Name:", "Longitude:", and "Latitude:". Below these fields are two buttons: "Process New Location" on the left and "Cancel" on the right. The dialog has a standard blue header bar and a light gray background.

Subsection 3.6.3.lxxv - locationCreate.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class locationCreate
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            this.btnCancel = new System.Windows.Forms.Button();
            this.btnNewLocation = new System.Windows.Forms.Button();
            this.txtLatitude = new System.Windows.Forms.TextBox();
            this.txtLongitude = new System.Windows.Forms.TextBox();
            this.txtLocationName = new System.Windows.Forms.TextBox();
            this.lblLatitude = new System.Windows.Forms.Label();
            this.lblLongitude = new System.Windows.Forms.Label();
            this.lblLocationName = new System.Windows.Forms.Label();
            this.SuspendLayout();
            // 
            // btnCancel
            // 
```

```
this.btnCancel.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnCancel.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnCancel.FlatAppearance.BorderSize = 0;
this.btnCancel.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnCancel.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCancel.Location = new System.Drawing.Point(281, 145);
this.btnCancel.Name = "btnCancel";
this.btnCancel.Size = new System.Drawing.Size(207, 31);
this.btnCancel.TabIndex = 45;
this.btnCancel.Text = "Cancel";
this.btnCancel.UseVisualStyleBackColor = false;
this.btnCancel.Click += new System.EventHandler(this.btnCancel_Click);
//
// btnNewLocation
//
this.btnNewLocation.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnNewLocation.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnNewLocation.FlatAppearance.BorderSize = 0;
this.btnNewLocation.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnNewLocation.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnNewLocation.Location = new System.Drawing.Point(36, 145);
this.btnNewLocation.Name = "btnNewLocation";
this.btnNewLocation.Size = new System.Drawing.Size(206, 31);
this.btnNewLocation.TabIndex = 44;
this.btnNewLocation.Text = "Process New Location";
this.btnNewLocation.UseVisualStyleBackColor = false;
this.btnNewLocation.Click += new System.EventHandler(this.btnNewLocation_Click);
//
// txtLatitude
//
this.txtLatitude.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtLatitude.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtLatitude.Location = new System.Drawing.Point(178, 109);
this.txtLatitude.Name = "txtLatitude";
this.txtLatitude.Size = new System.Drawing.Size(310, 20);
this.txtLatitude.TabIndex = 43;
//
// txtLongitude
//
this.txtLongitude.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtLongitude.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtLongitude.Location = new System.Drawing.Point(178, 71);
```

```
this.txtLongitude.Name = "txtLongitude";
this.txtLongitude.Size = new System.Drawing.Size(310, 20);
this.txtLongitude.TabIndex = 42;
//
// txtLocationName
//
this.txtLocationName.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtLocationName.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtLocationName.Location = new System.Drawing.Point(178, 33);
this.txtLocationName.Name = "txtLocationName";
this.txtLocationName.Size = new System.Drawing.Size(310, 20);
this.txtLocationName.TabIndex = 41;
//
// lblLatitude
//
this.lblLatitude.AutoSize = true;
this.lblLatitude.BackColor = System.Drawing.Color.Transparent;
this.lblLatitude.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblLatitude.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblLatitude.Location = new System.Drawing.Point(33, 110);
this.lblLatitude.Name = "lblLatitude";
this.lblLatitude.Size = new System.Drawing.Size(68, 18);
this.lblLatitude.TabIndex = 40;
this.lblLatitude.Text = "Latitude:";
//
// lblLongitude
//
this.lblLongitude.AutoSize = true;
this.lblLongitude.BackColor = System.Drawing.Color.Transparent;
this.lblLongitude.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblLongitude.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblLongitude.Location = new System.Drawing.Point(33, 73);
this.lblLongitude.Name = "lblLongitude";
this.lblLongitude.Size = new System.Drawing.Size(82, 18);
this.lblLongitude.TabIndex = 39;
this.lblLongitude.Text = "Longitude:";
//
// lblLocationName
//
this.lblLocationName.AutoSize = true;
this.lblLocationName.BackColor = System.Drawing.Color.Transparent;
```

```
this.lblLocationName.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblLocationName.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblLocationName.Location = new System.Drawing.Point(33, 34);
this.lblLocationName.Name = "lblLocationName";
this.lblLocationName.Size = new System.Drawing.Size(118, 18);
this.lblLocationName.TabIndex = 38;
this.lblLocationName.Text = "Location Name:";
//
// locationCreate
//
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(528, 203);
this.ControlBox = false;
this.Controls.Add(this.btnCancel);
this.Controls.Add(this.btnNewLocation);
this.Controls.Add(this.txtLatitude);
this.Controls.Add(this.txtLongitude);
this.Controls.Add(this.txtLocationName);
this.Controls.Add(this.lblLatitude);
this.Controls.Add(this.lblLongitude);
this.Controls.Add(this.lblLocationName);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.MaximumSize = new System.Drawing.Size(544, 242);
this.MinimumSize = new System.Drawing.Size(544, 242);
this.Name = "locationCreate";
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "Create Location";
this.ResumeLayout(false);
this.PerformLayout();
this.PerformLayout();

}

#endif

private System.Windows.Forms.Button btnCancel;
private System.Windows.Forms.Button btnNewLocation;
private System.Windows.Forms.TextBox txtLatitude;
private System.Windows.Forms.TextBox txtLongitude;
private System.Windows.Forms.TextBox txtLocationName;
private System.Windows.Forms.Label lblLatitude;
```

```
    private System.Windows.Forms.Label lblLongitude;
    private System.Windows.Forms.Label lblLocationName;
}
}
```

Subsection 3.6.3.lxxvi - locationCreate.cs - Code file - annotated

```
using System;
using System.Windows.Forms;
using MySql.Data.MySqlClient;

namespace ELSM_Project
{
    public partial class locationCreate : Form
    {
        public locationCreate()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        private void btnNewLocation_Click(object sender, EventArgs e)
        {
            //If input is blank, output messagebox error informing the user that the field is blank.
            if (txtLocationName.Text != "")
            {
                if (txtLongitude.Text != "")
                {
                    if (txtLatitude.Text != "")
                    {
                        //Insert row into the database with the new location information.
                        MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
                        conn.Open();
                        MySqlCommand locationCMD = new MySqlCommand("INSERT INTO serverLocations (locationName, companyID, locationLongitude, locationLatitude) VALUES (@locationName, @companyID, @locationLongitude, @locationLatitude)", conn);
                        locationCMD.Parameters.AddWithValue("@locationName", txtLocationName.Text);
                        locationCMD.Parameters.AddWithValue("@locationLongitude", txtLongitude.Text);
                        locationCMD.Parameters.AddWithValue("@companyID", loginMenu.CompanyID);
                        locationCMD.Parameters.AddWithValue("@locationLatitude", txtLatitude.Text);
                        locationCMD.ExecuteNonQuery();
                        conn.Close();
                        System.Windows.Forms.MessageBox.Show("Location Created.");
                        Hide();
                    }
                }
            }
            else
            {
                System.Windows.Forms.MessageBox.Show("The latitude is blank. Please enter data.");
            }
        }
    }
}
```

```
        else
        {
            System.Windows.Forms.MessageBox.Show("The longitude entered is blank. Please enter data.");
        }
    else
    {
        System.Windows.Forms.MessageBox.Show("Your location name is blank.");
    }
}

private void btnCancel_Click(object sender, EventArgs e)
{
    //On button event, hide the form.
    Hide();
}
}
```

Subsection 3.6.3.lxxvii - locationEdit.cs [design] - design view

The screenshot shows a Windows-style dialog box titled "Edit Location". The dialog has a light blue header bar. Inside, there are four input fields: "Existing Location" with a dropdown menu showing "Select Location", "Location Name" (empty), "Longitude" (empty), and "Latitude" (empty). At the bottom are two buttons: "Process Location Edit" on the left and "Cancel" on the right.

Subsection 3.6.3.lxxviii - locationEdit.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class locationEdit
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            System.ComponentModel.ComponentResourceManager resources = new
System.ComponentModel.ComponentResourceManager(locationEdit);
            this.btnCancel = new System.Windows.Forms.Button();
            this.btnEditLocation = new System.Windows.Forms.Button();
            this.txtLongitude = new System.Windows.Forms.TextBox();
            this.txtLocationName = new System.Windows.Forms.TextBox();
            this.lblNewLongitude = new System.Windows.Forms.Label();
            this.lblNewLocation = new System.Windows.Forms.Label();
            this.lblLocation = new System.Windows.Forms.Label();
            this.cmboExisting = new System.Windows.Forms.ComboBox();
            this.txtLatitude = new System.Windows.Forms.TextBox();
            this.lblLatitude = new System.Windows.Forms.Label();
        }
    }
}
```

```
this.SuspendLayout();
//
// btnCancel
//
this.btnCancel.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnCancel.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnCancel.FlatAppearance.BorderSize = 0; // Set variable to 0
this.btnCancel.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnCancel.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCancel.Location = new System.Drawing.Point(281, 186);
this.btnCancel.Name = "btnCancel";
this.btnCancel.Size = new System.Drawing.Size(207, 31);
this.btnCancel.TabIndex = 45;
this.btnCancel.Text = "Cancel";
this.btnCancel.UseVisualStyleBackColor = false;
this.btnCancel.Click += new System.EventHandler(this.btnCancel_Click);
//
// btnEditLocation
//
this.btnEditLocation.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnEditLocation.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnEditLocation.FlatAppearance.BorderSize = 0; // Set variable to 0
this.btnEditLocation.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnEditLocation.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnEditLocation.Location = new System.Drawing.Point(36, 186);
this.btnEditLocation.Name = "btnEditLocation";
this.btnEditLocation.Size = new System.Drawing.Size(206, 31);
this.btnEditLocation.TabIndex = 44;
this.btnEditLocation.Text = "Process Location Edit";
this.btnEditLocation.UseVisualStyleBackColor = false;
this.btnEditLocation.Click += new System.EventHandler(this.btnEditLocation_Click);
//
// txtLongitude
//
this.txtLongitude.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtLongitude.Location = new System.Drawing.Point(178, 109);
this.txtLongitude.Name = "txtLongitude";
this.txtLongitude.Size = new System.Drawing.Size(310, 20);
this.txtLongitude.TabIndex = 43;
//
// txtLocationName
//
```

```
this.txtLocationName.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtLocationName.Location = new System.Drawing.Point(178, 71);
this.txtLocationName.Name = "txtLocationName";
this.txtLocationName.Size = new System.Drawing.Size(310, 20);
this.txtLocationName.TabIndex = 42;
//
// lblNewLongitude
//
this.lblNewLongitude.AutoSize = true;
this.lblNewLongitude.BackColor = System.Drawing.Color.Transparent;
this.lblNewLongitude.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblNewLongitude.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblNewLongitude.Location = new System.Drawing.Point(33, 110);
this.lblNewLongitude.Name = "lblNewLongitude";
this.lblNewLongitude.Size = new System.Drawing.Size(82, 18);
this.lblNewLongitude.TabIndex = 40;
this.lblNewLongitude.Text = "Longitude:";
//
// lblNewLocation
//
this.lblNewLocation.AutoSize = true;
this.lblNewLocation.BackColor = System.Drawing.Color.Transparent;
this.lblNewLocation.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblNewLocation.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblNewLocation.Location = new System.Drawing.Point(33, 73);
this.lblNewLocation.Name = "lblNewLocation";
this.lblNewLocation.Size = new System.Drawing.Size(118, 18);
this.lblNewLocation.TabIndex = 39;
this.lblNewLocation.Text = "Location Name:";
//
// lblLocation
//
this.lblLocation.AutoSize = true;
this.lblLocation.BackColor = System.Drawing.Color.Transparent;
this.lblLocation.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblLocation.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblLocation.Location = new System.Drawing.Point(33, 34);
this.lblLocation.Name = "lblLocation";
this.lblLocation.Size = new System.Drawing.Size(128, 18);
this.lblLocation.TabIndex = 38;
this.lblLocation.Text = "Existing Location:";
```

```
//  
// cmboExisting  
//  
this.cmboExisting.FormattingEnabled = true;  
this.cmboExisting.Location = new System.Drawing.Point(178, 33);  
this.cmboExisting.Name = "cmboExisting";  
this.cmboExisting.Size = new System.Drawing.Size(310, 21);  
this.cmboExisting.TabIndex = 47;  
this.cmboExisting.Text = "Select Location";  
this.cmboExisting.SelectedIndexChanged += new System.EventHandler(this.cmboExisting_SelectedIndexChanged);  
//  
// txtLatitude  
//  
this.txtLatitude.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;  
this.txtLatitude.Location = new System.Drawing.Point(178, 147);  
this.txtLatitude.Name = "txtLatitude";  
this.txtLatitude.Size = new System.Drawing.Size(310, 20);  
this.txtLatitude.TabIndex = 49;  
//  
// lblLatitude  
//  
this.lblLatitude.AutoSize = true;  
this.lblLatitude.BackColor = System.Drawing.Color.Transparent;  
this.lblLatitude.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.lblLatitude.ForeColor = System.Drawing.SystemColors.ControlLightLight;  
this.lblLatitude.Location = new System.Drawing.Point(33, 148);  
this.lblLatitude.Name = "lblLatitude";  
this.lblLatitude.Size = new System.Drawing.Size(68, 18);  
this.lblLatitude.TabIndex = 48;  
this.lblLatitude.Text = "Latitude:";  
//  
// manageLocationsEdit  
//  
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);  
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;  
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;  
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;  
this.ClientSize = new System.Drawing.Size(528, 241);  
this.ControlBox = false;  
this.Controls.Add(this.txtLatitude);  
this.Controls.Add(this.lblLatitude);  
this.Controls.Add(this.btnCancel);  
this.Controls.Add(this.btnEditLocation);
```

```
this.Controls.Add(this.txtLongitude);
this.Controls.Add(this.txtLocationName);
this.Controls.Add(this.lblNewLongitude);
this.Controls.Add(this.lblNewLocation);
this.Controls.Add(this.lblLocation);
this.Controls.Add(this.cmboExisting);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.Icon = ((System.Drawing.Icon)(resources.GetObject("$this.Icon")));
this.MaximumSize = new System.Drawing.Size(544, 280);
this.MinimumSize = new System.Drawing.Size(544, 280);
this.Name = "manageLocationsEdit";
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "Edit Location";
this.Load += new System.EventHandler(this.manageLocationsEdit_Load);
this.ResumeLayout(false);
this.PerformLayout();
this.PerformLayout();

}

#endregion

private System.Windows.Forms.Button btnCancel;
private System.Windows.Forms.Button btnEditLocation;
private System.Windows.Forms.TextBox txtLongitude;
private System.Windows.Forms.TextBox txtLocationName;
private System.Windows.Forms.Label lblNewLongitude;
private System.Windows.Forms.Label lblNewLocation;
private System.Windows.Forms.Label lblLocation;
private System.Windows.Forms.ComboBox cmboExisting;
private System.Windows.Forms.TextBox txtLatitude;
private System.Windows.Forms.Label lblLatitude;
}
```

Subsection 3.6.3.lxxix - locationEdit.cs - Code file - annotated

```
using System;
using System.Windows.Forms;
using MySql.Data.MySqlClient;

namespace ELSM_Project
{
    public partial class locationEdit : Form
    {
        public locationEdit()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        private void btnCancel_Click(object sender, EventArgs e)
        {
            //On button event, hide the form.
            Hide();
        }

        private void manageLocationsEdit_Load(object sender, EventArgs e)
        {
            //Connect to MySQL and set output to items in cmboExisting.
            MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
            conn.Open();
            MySqlCommand cmd = new MySqlCommand("SELECT * FROM serverLocations WHERE companyID = @companyID", conn);
            cmd.Parameters.AddWithValue("@companyID", loginMenu.CompanyID);
            MySqlDataReader rdr = cmd.ExecuteReader();
            while (rdr.Read())
            {
                cmboExisting.Items.Add(rdr.GetString("locationName"));
            }
            conn.Close();
        }

        private void btnEditLocation_Click(object sender, EventArgs e)
        {
            //If input is blank display a message box informing the user of the problem.
            if (txtLocationName.Text != "")
            {
                if (txtLongitude.Text != "")
                {

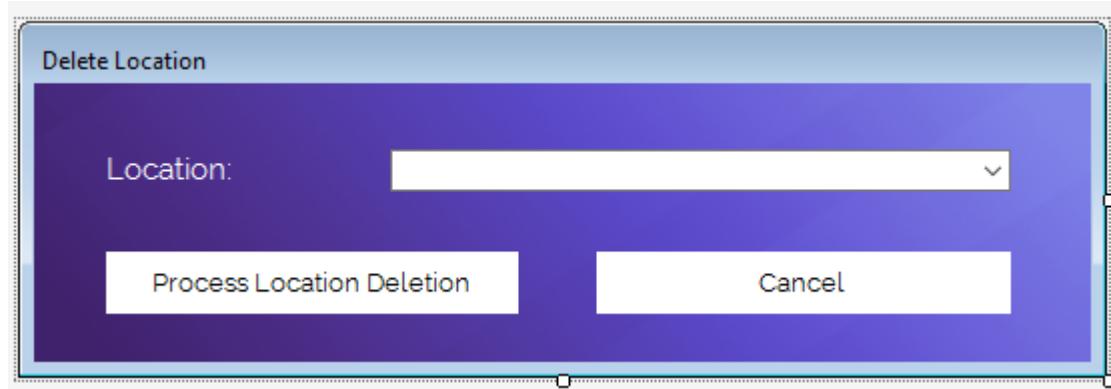
```

```
if (txtLatitude.Text != "")  
{  
    //Update server location with new input information.  
    MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);  
    conn.Open();  
    MySqlCommand locationCMD = new MySqlCommand("UPDATE serverLocations SET locationName = @locationName,  
locationLongitude = @locationLongitude, locationLatitude = @locationLatitude WHERE locationName = @oldLocationName", conn);  
    locationCMD.Parameters.AddWithValue("@locationName", txtLocationName.Text);  
    locationCMD.Parameters.AddWithValue("@locationLongitude", txtLongitude.Text);  
    locationCMD.Parameters.AddWithValue("@oldLocationName", cmboExisting.Text);  
    locationCMD.Parameters.AddWithValue("@locationLatitude", txtLatitude.Text);  
    locationCMD.ExecuteNonQuery();  
    txtLatitude.Text = "";  
    txtLongitude.Text = "";  
    txtLocationName.Text = "";  
    //Update cmboExisting with new information.  
    MySqlCommand cmd = new MySqlCommand("SELECT * FROM serverLocations WHERE companyID = @companyID", conn);  
    cmd.Parameters.AddWithValue("@companyID", loginMenu.CompanyID);  
    MySqlDataReader rdr = cmd.ExecuteReader();  
    while (rdr.Read())  
    {  
        cmboExisting.Items.Add(rdr.GetString("locationName"));  
    }  
    conn.Close();  
}  
else  
{  
    System.Windows.Forms.MessageBox.Show("The latitude is blank. Please enter data.");  
}  
}  
else  
{  
    System.Windows.Forms.MessageBox.Show("The longitude entered is blank. Please enter data.");  
}  
}  
else  
{  
    System.Windows.Forms.MessageBox.Show("Your location name is blank.");  
}  
}  
  
private void cmboExisting_SelectedIndexChanged(object sender, EventArgs e)  
{  
    //On update run function.
```

```
    var locationName = Convert.ToString(cmboExisting.Text);
    LocationDetails(locationName);
}

private void LocationDetails(string name)
{
    //Get data from SQL output and fill text boxes with data from the row.
    MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
    conn.Open();
    MySqlCommand cmd = new MySqlCommand("SELECT * FROM serverLocations WHERE locationName = @locationName", conn);
    cmd.Parameters.AddWithValue("@locationName", name);
    MySqlDataReader rdr = cmd.ExecuteReader();
    while (rdr.Read())
    {
        if (!rdr.HasRows)
            return;
        txtLocationName.Text = rdr.GetString("locationName").ToString();
        txtLongitude.Text = rdr.GetString("locationLongitude").ToString();
        txtLatitude.Text = rdr.GetString("locationLatitude").ToString();
    }
}
}
```

Subsection 3.6.3.lxxx - locationDelete.cs [design] - design view



Subsection 3.6.3.lxxi - locationDelete.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class locationDelete
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            System.ComponentModel.ComponentResourceManager resources = new
System.ComponentModel.ComponentResourceManager(locationDelete);
            this.btnCancel = new System.Windows.Forms.Button();
            this.btnDeleteLocation = new System.Windows.Forms.Button();
            this.lblCurrentUsername = new System.Windows.Forms.Label();
            this.cmboExisting = new System.Windows.Forms.ComboBox();
            this.SuspendLayout();
            //
            // btnCancel
            //
            this.btnCancel.BackColor = System.Drawing.SystemColors.ControlLightLight;
            this.btnCancel.Cursor = System.Windows.Forms.Cursors.Hand;
```

```
this.btnCancel.FlatAppearance.BorderSize = 0; // Set variable to 0
this.btnCancel.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnCancel.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCancel.Location = new System.Drawing.Point(281, 84);
this.btnCancel.Name = "btnCancel";
this.btnCancel.Size = new System.Drawing.Size(207, 31);
this.btnCancel.TabIndex = 45;
this.btnCancel.Text = "Cancel";
this.btnCancel.UseVisualStyleBackColor = false;
this.btnCancel.Click += new System.EventHandler(this.btnCancel_Click);
//
// btnDeleteLocation
//
this.btnDeleteLocation.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnDeleteLocation.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnDeleteLocation.FlatAppearance.BorderSize = 0; // Set variable to 0
this.btnDeleteLocation.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnDeleteLocation.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnDeleteLocation.Location = new System.Drawing.Point(36, 84);
this.btnDeleteLocation.Name = "btnDeleteLocation";
this.btnDeleteLocation.Size = new System.Drawing.Size(206, 31);
this.btnDeleteLocation.TabIndex = 44;
this.btnDeleteLocation.Text = "Process Location Deletion";
this.btnDeleteLocation.UseVisualStyleBackColor = false;
this.btnDeleteLocation.Click += new System.EventHandler(this.btnDeleteLocation_Click);
//
// lblCurrentUsername
//
this.lblCurrentUsername.AutoSize = true;
this.lblCurrentUsername.BackColor = System.Drawing.Color.Transparent;
this.lblCurrentUsername.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblCurrentUsername.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblCurrentUsername.Location = new System.Drawing.Point(33, 34);
this.lblCurrentUsername.Name = "lblCurrentUsername";
this.lblCurrentUsername.Size = new System.Drawing.Size(71, 18);
this.lblCurrentUsername.TabIndex = 38;
this.lblCurrentUsername.Text = "Location:";
//
// cmboExisting
//
this.cmboExisting.FormattingEnabled = true;
this.cmboExisting.Location = new System.Drawing.Point(33, 102);
this.cmboExisting.Name = "cmboExisting";
this.cmboExisting.Size = new System.Drawing.Size(206, 28);
this.cmboExisting.TabIndex = 39;
```

```
this.cmboExisting.Location = new System.Drawing.Point(178, 33);
this.cmboExisting.Name = "cmboExisting";
this.cmboExisting.Size = new System.Drawing.Size(310, 21);
this.cmboExisting.TabIndex = 46;
//
// manageLocationsDelete
//
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(528, 139);
this.ControlBox = false;
this.Controls.Add(this.btnCancel);
this.Controls.Add(this.btnDeleteLocation);
this.Controls.Add(this.lblCurrentUsername);
this.Controls.Add(this.cmboExisting);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.Icon = ((System.Drawing.Icon)(resources.GetObject("$this.Icon")));
this.MaximumSize = new System.Drawing.Size(544, 178);
this.MinimumSize = new System.Drawing.Size(544, 178);
this.Name = "manageLocationsDelete";
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "Delete Location";
this.Load += new System.EventHandler(this.manageLocationsDelete_Load);
this.ResumeLayout(false);
this.PerformLayout();
}

#endregion

private System.Windows.Forms.Button btnCancel;
private System.Windows.Forms.Button btnDeleteLocation;
private System.Windows.Forms.Label lblCurrentUsername;
private System.Windows.Forms.ComboBox cmboExisting;
}
```

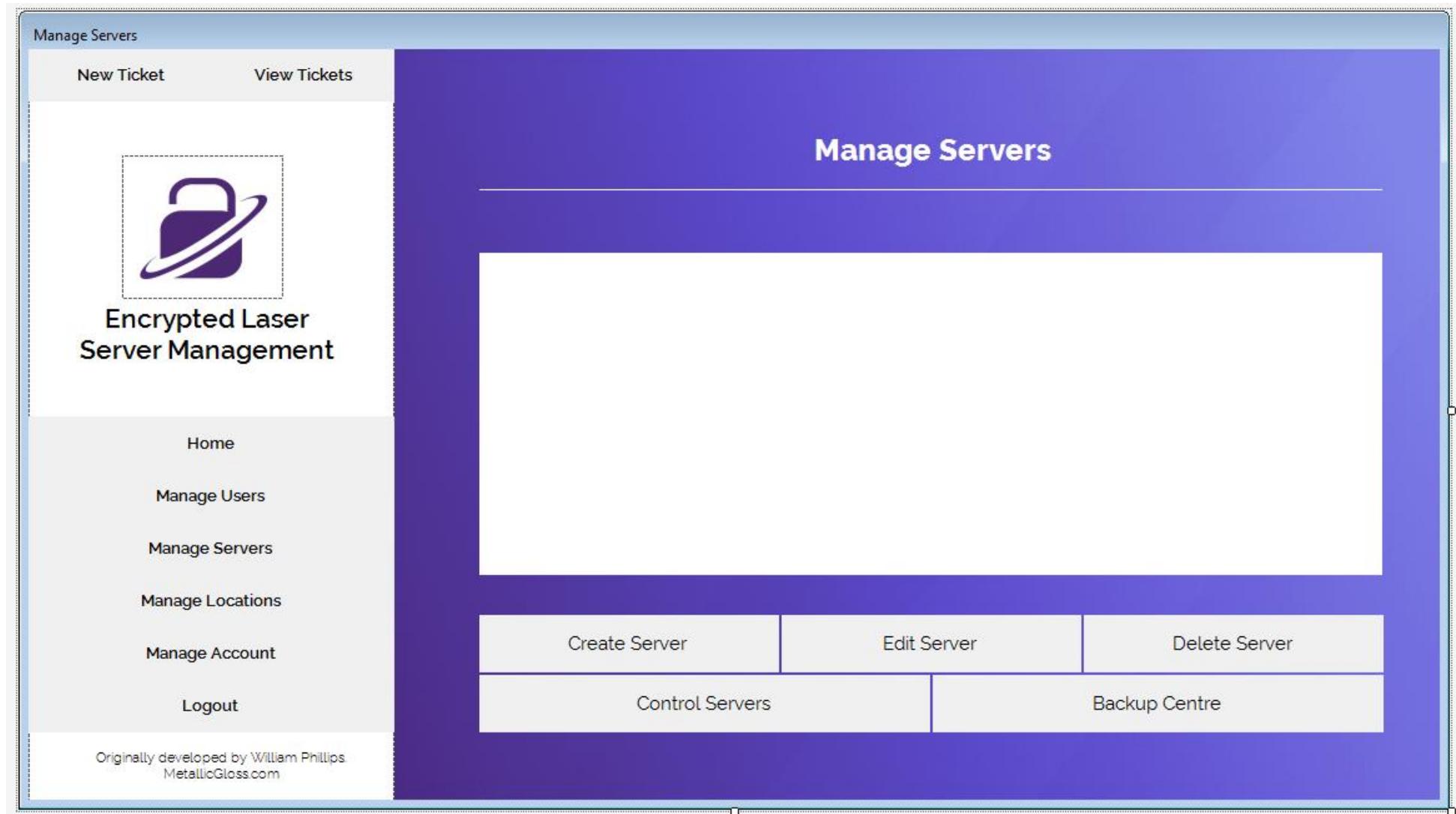
Subsection 3.6.3.lxxxii - locationDelete.cs - Code file - annotated

```
using System;
using System.Windows.Forms;
using MySql.Data.MySqlClient;

namespace ELSM_Project
{
    public partial class locationDelete : Form
    {
        public locationDelete()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        private void btnCancel_Click(object sender, EventArgs e)
        {
            //On button event, hide the form.
            Hide();
        }
        private void btnDeleteLocation_Click(object sender, EventArgs e)
        {
            //Delete row from table serverLocations where the locationName matches the one that has been set.
            MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
            conn.Open();
            MySqlCommand locationCMD = new MySqlCommand("DELETE FROM serverLocations WHERE locationName = @locationName", conn);
            locationCMD.Parameters.AddWithValue("@locationName", cmboExisting.Text);
            locationCMD.ExecuteNonQuery();
            conn.Close();
        }
        private void manageLocationsDelete_Load(object sender, EventArgs e)
        {
            //Connect to MYSQL and set output as items in cmboExisting.
            MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
            conn.Open();
            MySqlCommand cmd = new MySqlCommand("SELECT * FROM serverLocations WHERE companyID = @companyID", conn);
            cmd.Parameters.AddWithValue("@companyID", loginMenu.CompanyID);
            MySqlDataReader rdr = cmd.ExecuteReader();
            while (rdr.Read())
            {
                cmboExisting.Items.Add(rdr.GetString("locationName"));
            }
            conn.Close();
        }
    }
}
```

```
        Hide();  
    }  
}  
}
```

Subsection 3.6.3.lxxxiii - serverManagement.cs [design] - design view

Subsection 3.6.3.lxxxiv - serverManagement.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class serverManagement
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            System.Windows.Forms.DataGridViewCellStyle dataGridViewCellStyle1 = new System.Windows.Forms.DataGridViewCellStyle();
            System.ComponentModel.ComponentResourceManager resources = new
System.ComponentModel.ComponentResourceManager(typeof(serverManagement));
            this.lblMetallicGloss = new System.Windows.Forms.Label();
            this.lblTitle = new System.Windows.Forms.Label();
            this.btnExit = new System.Windows.Forms.Button();
            this.btnManageAccount = new System.Windows.Forms.Button();
            this.btnManageServers = new System.Windows.Forms.Button();
            this.btnManageLocations = new System.Windows.Forms.Button();
            this.btnManageUsers = new System.Windows.Forms.Button();
            this.btnExit = new System.Windows.Forms.Button();
            this.EHSLLogo = new System.Windows.Forms.PictureBox();
        }
    }
}
```

```
this.menuBackground = new System.Windows.Forms.PictureBox();
this.pictureBox2 = new System.Windows.Forms.PictureBox();
this.lblManageServers = new System.Windows.Forms.Label();
this.dataGridServers = new System.Windows.Forms.DataGridView();
this.btnDeleteServer = new System.Windows.Forms.Button();
this.btnEditServer = new System.Windows.Forms.Button();
this.btnCreateServer = new System.Windows.Forms.Button();
this.btnControlServers = new System.Windows.Forms.Button();
this.btnBackupCentre = new System.Windows.Forms.Button();
this.btnCreateTicket = new System.Windows.Forms.Button();
this.btnTicketReply = new System.Windows.Forms.Button();
((System.ComponentModel.ISupportInitialize)(this.ELHSLogo)).BeginInit();
((System.ComponentModel.ISupportInitialize)(this.menuBackground)).BeginInit();
((System.ComponentModel.ISupportInitialize)(this.pictureBox2)).BeginInit();
((System.ComponentModel.ISupportInitialize)(this.dataGridServers)).BeginInit();
this.SuspendLayout();
//
// lblMetallicGloss
//
this.lblMetallicGloss.AutoSize = true;
this.lblMetallicGloss.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.lblMetallicGloss.Cursor = System.Windows.Cursors.Hand;
this.lblMetallicGloss.Font = new System.Drawing.Font("Raleway Light", 8.249999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblMetallicGloss.Location = new System.Drawing.Point(51, 561);
this.lblMetallicGloss.Name = "lblMetallicGloss";
this.lblMetallicGloss.Size = new System.Drawing.Size(208, 26);
this.lblMetallicGloss.TabIndex = 16;
this.lblMetallicGloss.Text = "Originally developed by William Phillips.\r\nMetallicGloss.com";
this.lblMetallicGloss.TextAlign = System.Drawing.ContentAlignment.MiddleCenter;
this.lblMetallicGloss.Click += new System.EventHandler(this.lblMetallicGloss_Click);
//
// lblTitle
//
this.lblTitle.AutoSize = true;
this.lblTitle.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.lblTitle.Font = new System.Drawing.Font("Raleway SemiBold", 15.75F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblTitle.Location = new System.Drawing.Point(36, 203);
this.lblTitle.Name = "lblTitle";
this.lblTitle.Size = new System.Drawing.Size(216, 50);
this.lblTitle.TabIndex = 14;
this.lblTitle.Text = "Encrypted Laser\r\nServer Management";
this.lblTitle.TextAlign = System.Drawing.ContentAlignment.MiddleCenter;
```

```
//  
// btnLogout  
//  
this.btnExit.Cursor = System.Windows.Forms.Cursors.Hand;  
this.btnExit.FlatAppearance.BorderSize = 0;  
this.btnExit.FlatStyle = System.Windows.Forms.FlatStyle.Flat;  
this.btnExit.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.btnExit.Location = new System.Drawing.Point(0, 504);  
this.btnExit.Name = "btnLogout";  
this.btnExit.Size = new System.Drawing.Size(293, 43);  
this.btnExit.TabIndex = 6;  
this.btnExit.Text = "Logout";  
this.btnExit.UseVisualStyleBackColor = true;  
this.btnExit.Click += new System.EventHandler(this.btnExit_Click);  
//  
// btnManageAccount  
//  
this.btnManageAccount.Cursor = System.Windows.Forms.Cursors.Hand;  
this.btnManageAccount.FlatAppearance.BorderSize = 0;  
this.btnManageAccount.FlatStyle = System.Windows.Forms.FlatStyle.Flat;  
this.btnManageAccount.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.btnManageAccount.Location = new System.Drawing.Point(0, 462);  
this.btnManageAccount.Name = "btnManageAccount";  
this.btnManageAccount.Size = new System.Drawing.Size(293, 43);  
this.btnManageAccount.TabIndex = 5;  
this.btnManageAccount.Text = "Manage Account";  
this.btnManageAccount.UseVisualStyleBackColor = true;  
this.btnManageAccount.Click += new System.EventHandler(this.btnManageAccount_Click);  
//  
// btnManageServers  
//  
this.btnManageServers.Cursor = System.Windows.Forms.Cursors.Hand;  
this.btnManageServers.FlatAppearance.BorderSize = 0;  
this.btnManageServers.FlatStyle = System.Windows.Forms.FlatStyle.Flat;  
this.btnManageServers.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.btnManageServers.Location = new System.Drawing.Point(0, 378);  
this.btnManageServers.Name = "btnManageServers";  
this.btnManageServers.Size = new System.Drawing.Size(293, 43);  
this.btnManageServers.TabIndex = 3;  
this.btnManageServers.Text = "Manage Servers";  
this.btnManageServers.UseVisualStyleBackColor = true;
```

```
this.btnManageServers.Click += new System.EventHandler(this.btnManageServers_Click);
//
// btnManageLocations
//
this.btnManageLocations.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnManageLocations.FlatAppearance.BorderSize = 0;
this.btnManageLocations.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnManageLocations.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnManageLocations.Location = new System.Drawing.Point(0, 420);
this.btnManageLocations.Name = "btnManageLocations";
this.btnManageLocations.Size = new System.Drawing.Size(293, 43);
this.btnManageLocations.TabIndex = 4;
this.btnManageLocations.Text = "Manage Locations";
this.btnManageLocations.UseVisualStyleBackColor = true;
this.btnManageLocations.Click += new System.EventHandler(this.btnManageLocations_Click);
//
// btnManageUsers
//
this.btnManageUsers.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnManageUsers.FlatAppearance.BorderSize = 0;
this.btnManageUsers.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnManageUsers.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnManageUsers.Location = new System.Drawing.Point(0, 336);
this.btnManageUsers.Name = "btnManageUsers";
this.btnManageUsers.Size = new System.Drawing.Size(293, 43);
this.btnManageUsers.TabIndex = 2;
this.btnManageUsers.Text = "Manage Users";
this.btnManageUsers.UseVisualStyleBackColor = true;
this.btnManageUsers.Click += new System.EventHandler(this.btnManageUsers_Click);
//
// btnHome
//
this.btnHome.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnHome.FlatAppearance.BorderSize = 0;
this.btnHome.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnHome.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnHome.Location = new System.Drawing.Point(0, 294);
this.btnHome.Name = "btnHome";
this.btnHome.Size = new System.Drawing.Size(293, 43);
this.btnHome.TabIndex = 1;
this.btnHome.Text = "Home";
```

```
this.btnHome.UseVisualStyleBackColor = true;
this.btnHome.Click += new System.EventHandler(this.btnHome_Click);
//
// ELHSLogo
//
this.ELHSLogo.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.ELHSLogo.BackgroundImage = global::ELSM_Project.Properties.Resources.imgLogoPurple;
this.ELHSLogo.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ELHSLogo.Location = new System.Drawing.Point(75, 85);
this.ELHSLogo.Name = "ELHSLogo";
this.ELHSLogo.Size = new System.Drawing.Size(129, 115);
this.ELHSLogo.TabIndex = 27;
this.ELHSLogo.TabStop = false;
//
// menuBackground
//
this.menuBackground.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.menuBackground.Location = new System.Drawing.Point(0, -1);
this.menuBackground.Name = "menuBackground";
this.menuBackground.Size = new System.Drawing.Size(293, 609);
this.menuBackground.TabIndex = 28;
this.menuBackground.TabStop = false;
//
// pictureBox2
//
this.pictureBox2.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.pictureBox2.Location = new System.Drawing.Point(361, 112);
this.pictureBox2.Name = "pictureBox2";
this.pictureBox2.Size = new System.Drawing.Size(723, 1);
this.pictureBox2.TabIndex = 47;
this.pictureBox2.TabStop = false;
//
// lblManageServers
//
this.lblManageServers.AutoSize = true;
this.lblManageServers.BackColor = System.Drawing.Color.Transparent;
this.lblManageServers.Font = new System.Drawing.Font("Raleway ExtraBold", 18F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblManageServers.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblManageServers.Location = new System.Drawing.Point(624, 66);
this.lblManageServers.Name = "lblManageServers";
this.lblManageServers.Size = new System.Drawing.Size(203, 29);
this.lblManageServers.TabIndex = 46;
this.lblManageServers.Text = "Manage Servers";
```

```
//  
// dataGridServers  
//  
this.dataGridServers.AllowUserToAddRows = false;  
this.dataGridServers.AllowUserToDeleteRows = false;  
this.dataGridServers.AllowUserToResizeColumns = false;  
this.dataGridServers.AllowUserToResizeRows = false;  
this.dataGridServers.AutoSizeColumnsMode = System.Windows.Forms.DataGridViewAutoSizeColumnsMode.Fill;  
this.dataGridServers.BackgroundColor = System.Drawing.SystemColors.ControlLightLight;  
this.dataGridServers.BorderStyle = System.Windows.Forms.BorderStyle.None;  
this.dataGridServers.CellBorderStyle = System.Windows.Forms.DataGridViewAutoSizeCellBorderStyle.None;  
this.dataGridServers.ColumnHeadersBorderStyle = System.Windows.Forms.DataGridViewAutoSizeHeaderBorderStyle.Single;  
dataGridViewCellStyle1.Alignment = System.Windows.Forms.DataGridViewAutoSizeContentAlignment.MiddleCenter;  
dataGridViewCellStyle1.BackColor = System.Drawing.SystemColors.Control;  
dataGridViewCellStyle1.Font = new System.Drawing.Font("Microsoft Sans Serif", 8.25F,  
System.Drawing.FontStyle.Regular, System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
dataGridViewCellStyle1.ForeColor = System.Drawing.SystemColors.WindowText;  
dataGridViewCellStyle1.SelectionBackColor = System.Drawing.SystemColors.Highlight;  
dataGridViewCellStyle1.SelectionForeColor = System.Drawing.SystemColors.HighlightText;  
dataGridViewCellStyle1.WrapMode = System.Windows.Forms.DataGridViewAutoSizeTriState.True;  
this.dataGridServers.ColumnHeadersDefaultCellStyle = dataGridViewCellStyle1;  
this.dataGridServers.ColumnHeadersHeightSizeMode =  
System.Windows.Forms.DataGridViewAutoSizeColumnHeadersHeightSizeMode.AutoSizeMode;  
this.dataGridServers.GridColor = System.Drawing.SystemColors.ButtonFace;  
this.dataGridServers.Location = new System.Drawing.Point(361, 163);  
this.dataGridServers.Name = "dataGridServers";  
this.dataGridServers.ReadOnly = true;  
this.dataGridServers.RowHeadersVisible = false;  
this.dataGridServers.RowHeadersWidthSizeMode =  
System.Windows.Forms.DataGridViewAutoSizeRowHeadersHeightSizeMode.AutoSizeMode;  
this.dataGridServers.SelectionMode = System.Windows.Forms.DataGridViewAutoSizeSelectionMode.FullRowSelect;  
this.dataGridServers.ShowCellErrors = false;  
this.dataGridServers.ShowCellToolTips = false;  
this.dataGridServers.ShowEditingIcon = false;  
this.dataGridServers.ShowRowErrors = false;  
this.dataGridServers.Size = new System.Drawing.Size(723, 258);  
this.dataGridServers.TabIndex = 45;  
this.dataGridServers.VirtualMode = true;  
//  
// btnDeleteServer  
//  
this.btnDeleteServer.Cursor = System.Windows.Forms.Cursors.Hand;  
this.btnDeleteServer.FlatAppearance.BorderSize = 0;  
this.btnDeleteServer.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
```

```
this.btnDeleteServer.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnDeleteServer.Location = new System.Drawing.Point(845, 453);
this.btnDeleteServer.Name = "btnDeleteServer";
this.btnDeleteServer.Size = new System.Drawing.Size(240, 46);
this.btnDeleteServer.TabIndex = 50;
this.btnDeleteServer.Text = "Delete Server";
this.btnDeleteServer.UseVisualStyleBackColor = true;
this.btnDeleteServer.Click += new System.EventHandler(this.btnDeleteServer_Click);
//
// btnEditServer
//
this.btnEditServer.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnEditServer.FlatAppearance.BorderSize = 0;
this.btnEditServer.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnEditServer.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnEditServer.Location = new System.Drawing.Point(603, 453);
this.btnEditServer.Name = "btnEditServer";
this.btnEditServer.Size = new System.Drawing.Size(240, 46);
this.btnEditServer.TabIndex = 49;
this.btnEditServer.Text = "Edit Server";
this.btnEditServer.UseVisualStyleBackColor = true;
this.btnEditServer.Click += new System.EventHandler(this.btnEditServer_Click);
//
// btnCreateServer
//
this.btnCreateServer.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnCreateServer.FlatAppearance.BorderSize = 0;
this.btnCreateServer.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnCreateServer.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCreateServer.Location = new System.Drawing.Point(361, 453);
this.btnCreateServer.Name = "btnCreateServer";
this.btnCreateServer.Size = new System.Drawing.Size(240, 46);
this.btnCreateServer.TabIndex = 48;
this.btnCreateServer.Text = "Create Server";
this.btnCreateServer.UseVisualStyleBackColor = true;
this.btnCreateServer.Click += new System.EventHandler(this.btnCreateServer_Click);
//
// btnControlServers
//
this.btnControlServers.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnControlServers.FlatAppearance.BorderSize = 0;
```

```
this.btnControlServers.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnControlServers.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnControlServers.Location = new System.Drawing.Point(361, 501);
this.btnControlServers.Name = "btnControlServers";
this.btnControlServers.Size = new System.Drawing.Size(361, 46);
this.btnControlServers.TabIndex = 54;
this.btnControlServers.Text = "Control Servers";
this.btnControlServers.UseVisualStyleBackColor = true;
this.btnControlServers.Click += new System.EventHandler(this.btnControlServers_Click);
//
// btnBackupCentre
//
this.btnBackupCentre.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnBackupCentre.FlatAppearance.BorderSize = 0;
this.btnBackupCentre.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnBackupCentre.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnBackupCentre.Location = new System.Drawing.Point(724, 501);
this.btnBackupCentre.Name = "btnBackupCentre";
this.btnBackupCentre.Size = new System.Drawing.Size(361, 46);
this.btnBackupCentre.TabIndex = 55;
this.btnBackupCentre.Text = "Backup Centre";
this.btnBackupCentre.UseVisualStyleBackColor = true;
this.btnBackupCentre.Click += new System.EventHandler(this.btnBackupCentre_Click);
//
// btnCreateTicket
//
this.btnCreateTicket.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnCreateTicket.FlatAppearance.BorderSize = 0;
this.btnCreateTicket.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnCreateTicket.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCreateTicket.Location = new System.Drawing.Point(0, -1);
this.btnCreateTicket.Name = "btnCreateTicket";
this.btnCreateTicket.Size = new System.Drawing.Size(149, 43);
this.btnCreateTicket.TabIndex = 57;
this.btnCreateTicket.Text = "New Ticket";
this.btnCreateTicket.UseVisualStyleBackColor = true;
this.btnCreateTicket.Click += new System.EventHandler(this.btnCreateTicket_Click);
//
// btnTicketReply
//
this.btnTicketReply.Cursor = System.Windows.Forms.Cursors.Hand;
```

```
this.btnTicketReply.FlatAppearance.BorderSize = 0;
this.btnTicketReply.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnTicketReply.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnTicketReply.Location = new System.Drawing.Point(148, -1);
this.btnTicketReply.Name = "btnTicketReply";
this.btnTicketReply.Size = new System.Drawing.Size(145, 43);
this.btnTicketReply.TabIndex = 56;
this.btnTicketReply.Text = "View Tickets";
this.btnTicketReply.UseVisualStyleBackColor = true;
this.btnTicketReply.Click += new System.EventHandler(this.btnTicketReply_Click);
//
// serverManagement
//
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(1130, 601);
this.ControlBox = false;
this.Controls.Add(this.btnCreateTicket);
this.Controls.Add(this.btnTicketReply);
this.Controls.Add(this.btnBackupCentre);
this.Controls.Add(this.btnControlServers);
this.Controls.Add(this.btnDeleteServer);
this.Controls.Add(this.btnEditServer);
this.Controls.Add(this.btnCreateServer);
this.Controls.Add(this.pictureBox2);
this.Controls.Add(this.lblManageServers);
this.Controls.Add(this.dataGridServers);
this.Controls.Add(this.lblMetallicGloss);
this.Controls.Add(this.lblTitle);
this.Controls.Add(this.btnExit);
this.Controls.Add(this.btnManageAccount);
this.Controls.Add(this.btnManageServers);
this.Controls.Add(this.btnManageLocations);
this.Controls.Add(this.btnManageUsers);
this.Controls.Add(this.btnExit);
this.Controls.Add(this.EHLogo);
this.Controls.Add(this.menuBackground);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.Icon = ((System.Drawing.Icon)(resources.GetObject("$this.Icon")));
this.MaximizeBox = false;
this.MaximumSize = new System.Drawing.Size(1146, 640);
```

```
this.MinimumSize = new System.Drawing.Size(1146, 640);
this.Name = "serverManagement";
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "Manage Servers";
this.Load += new System.EventHandler(this.manageServers_Load);
((System.ComponentModel.ISupportInitialize)(this.ELHSLogo)).EndInit();
((System.ComponentModel.ISupportInitialize)(this.menuBackground)).EndInit();
((System.ComponentModel.ISupportInitialize)(this.pictureBox2)).EndInit();
((System.ComponentModel.ISupportInitialize)(this.dataGridServers)).EndInit();
this.ResumeLayout(false);
this.PerformLayout();

}

#endregion

private System.Windows.Forms.Label lblMetallicGloss;
private System.Windows.Forms.Label lblTitle;
private System.Windows.Forms.Button btnLogout;
private System.Windows.Forms.Button btnManageAccount;
private System.Windows.Forms.Button btnManageServers;
private System.Windows.Forms.Button btnManageLocations;
private System.Windows.Forms.Button btnManageUsers;
private System.Windows.Forms.Button btnHome;
private System.Windows.Forms.PictureBox ELHSLogo;
private System.Windows.Forms.PictureBox menuBackground;
private System.Windows.Forms.PictureBox pictureBox2;
private System.Windows.Forms.Label lblManageServers;
private System.Windows.Forms.DataGridView dataGridServers;
private System.Windows.Forms.Button btnDeleteServer;
private System.Windows.Forms.Button btnEditServer;
private System.Windows.Forms.Button btnCreateServer;
private System.Windows.Forms.Button btnControlServers;
private System.Windows.Forms.Button btnBackupCentre;
private System.Windows.Forms.Button btnCreateTicket;
private System.Windows.Forms.Button btnTicketReply;
}

}
```

Subsection 3.6.3./xxxv - serverManagement.cs - Code file - annotated

```
using System;
using System.Data;
using System.Windows.Forms;
using MySql.Data.MySqlClient;
```

```
namespace ELSM_Project
{
    public partial class serverManagement : Form
    {
        public serverManagement()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        private void btnHome_Click(object sender, EventArgs e)
        {
            //On button event, hide current form and open mainDashboard.
            Hide();
            mainDashboard Dashboard = new mainDashboard();
            Dashboard.ShowDialog();
        }

        private void btnManageUsers_Click(object sender, EventArgs e)
        {
            //On button event, hide current form and open userList.
            Hide();
            userList userListForm = new userList();
            userListForm.ShowDialog();
        }

        private void btnManageServers_Click(object sender, EventArgs e)
        {
            //Display message box informing the user that they're already on the page that they attempted to navigate to.
            MessageBox.Show("You're already here!", "Notice", MessageBoxButtons.OK);
        }

        private void btnManageLocations_Click(object sender, EventArgs e)
        {
            //On button event, hide current form and open locationManagement.
            Hide();
            locationManagement manageL = new locationManagement();
            manageL.ShowDialog();
        }

        private void btnManageAccount_Click(object sender, EventArgs e)
        {
            //On button event, hide current form and open accountManagement.
        }
    }
}
```

```
        Hide();
        accountManagement Account = new accountManagement();
        Account.ShowDialog();
    }

    private void btnLogout_Click(object sender, EventArgs e)
    {
        //On button event, trigger a message box confirming logout. If the user input is Yes, close the form.
        if (MessageBox.Show("Are you sure you want to logout?", "Confirmation", MessageBoxButtons.YesNo) != DialogResult.No)
        {
            this.Close();
        }
    }

    private void lblMetallicGloss_Click(object sender, EventArgs e)
    {
        //Create process to open the link www.metallicgloss.com in the default browser.
        System.Diagnostics.Process.Start("https://www.metallicgloss.com");
    }

    private void manageServers_Load(object sender, EventArgs e)
    {
        //Initialize permissions by using boolean variables on the loginMenu form to disable buttons if the permission is not granted.
        if (loginMenu.permControlServers == false)
        {
            btnControlServers.Enabled = false;
        }
        if (loginMenu.permViewLocations == false)
        {
            btnManageLocations.Enabled = false;
        }
        if (loginMenu.permAdminViewUsers == false)
        {
            btnManageUsers.Enabled = false;
        }
        if (loginMenu.permViewServers == false)
        {
            btnManageServers.Enabled = false;
        }
        if (loginMenu.permCreateTicket == false)
        {
            btnCreateTicket.Enabled = false;
        }
    }
```

```
if (loginMenu.permCreateServer == false)
{
    btnCreateServer.Enabled = false;
}
if (loginMenu.permCreateTicket == false)
{
    btnCreateTicket.Enabled = false;
}
if (loginMenu.permEditServers == false)
{
    btnEditServer.Enabled = false;
}
if (loginMenu.permDeleteServers == false)
{
    btnDeleteServer.Enabled = false;
}
if (loginMenu.permManageBackupSystem == false)
{
    btnBackupCentre.Enabled = false;
}
UpdateData();
}

private void btnCreateServer_Click(object sender, EventArgs e)
{
    //On button event, open serverCreate form.
    serverCreate Create = new serverCreate();
    Create.ShowDialog();
    UpdateData();
}

private void btnEditServer_Click(object sender, EventArgs e)
{
    //On button event, open serverEdit form.
    serverEdit Edit = new serverEdit();
    Edit.ShowDialog();
    UpdateData();
}

private void btnDeleteServer_Click(object sender, EventArgs e)
{
    //On button event, open serverDelete form.
    serverDelete Delete = new serverDelete();
    Delete.ShowDialog();
}
```

```
        UpdateData();
    }

    public void UpdateData()
    {
        //When serverDelete form is closed, connect to MySQL, run SQL command and output result to datagridview.
        MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
        conn.Open();
        try
        {
            MySqlDataAdapter MyDA = new MySqlDataAdapter();
            MyDA.SelectCommand = new MySqlCommand("SELECT serverID, serverHostname, serverOS, serverIP FROM serverInformation
WHERE serverCompany = " + loginMenu.CompanyID + "", conn);
            DataTable table = new DataTable();
            MyDA.Fill(table);

            BindingSource bSource = new BindingSource();
            bSource.DataSource = table;

            dataGridServers.DataSource = bSource;

        }
        //If MySQL error, display messagebox with error.
        catch (MySql.Data.MySqlClient.MySqlException ex)
        {
            MessageBox.Show(ex.Message);
            Close();
        }
        conn.Close();
    }

    private void btnControlServers_Click(object sender, EventArgs e)
    {
        //On button event, hide current form and open controlManagement.
        Hide();
        controlManagement controlServerFRM = new controlManagement();
        controlServerFRM.ShowDialog();
    }

    private void btnBackupCentre_Click(object sender, EventArgs e)
    {
        //On button event, hide current form and open backupNodeList.
        Hide();
        backupNodeList backupNodeListForm = new backupNodeList();
```

```
        backupNodeListForm.ShowDialog();  
    }  
  
    private void btnCreateTicket_Click(object sender, EventArgs e)  
    {  
        //On button event, hide current form and open ticketNew.  
        ticketNew ticket = new ticketNew();  
        ticket.ShowDialog();  
    }  
  
    private void btnTicketReply_Click(object sender, EventArgs e)  
    {  
        //On button event, hide current form and open ticketView.  
        Hide();  
        ticketView ticket = new ticketView();  
        ticket.ShowDialog();  
    }  
}
```

Subsection 3.6.3.lxxxvi - serverCreate.cs [design] - design view

Create Server

Hostname:	<input type="text"/>
Location:	<input type="text"/>
Username:	<input type="text"/>
Password:	<input type="text"/>
Operating System:	<input type="text"/>
Server IP Address:	<input type="text"/>
Server Processor	<input type="text"/>
RAM:	<input type="text"/>
Network Port:	<input type="text"/>
Transfer:	<input type="text"/>

Subsection 3.6.3.lxxxvii - serverCreate.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class serverCreate
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            this.btnCancel = new System.Windows.Forms.Button();
            this.btnNewServer = new System.Windows.Forms.Button();
            this.txtHostname = new System.Windows.Forms.TextBox();
            this.lblHostname = new System.Windows.Forms.Label();
            this.lblLocation = new System.Windows.Forms.Label();
            this.txtPassword = new System.Windows.Forms.TextBox();
            this.txtUsername = new System.Windows.Forms.TextBox();
            this.lblPassword = new System.Windows.Forms.Label();
            this.lblUsername = new System.Windows.Forms.Label();
            this.txtIP = new System.Windows.Forms.TextBox();
            this.lblProcessor = new System.Windows.Forms.Label();
            this.lblIP = new System.Windows.Forms.Label();
        }
    }
}
```

```
this.lblOS = new System.Windows.Forms.Label();
this.lblTransfer = new System.Windows.Forms.Label();
this.lblPort = new System.Windows.Forms.Label();
this.lblRAM = new System.Windows.Forms.Label();
this.cmboLocation = new System.Windows.Forms.ComboBox();
this.cmboOS = new System.Windows.Forms.ComboBox();
this.cmboNetwork = new System.Windows.Forms.ComboBox();
this.txtProcessor = new System.Windows.Forms.TextBox();
this.txtRAM = new System.Windows.Forms.TextBox();
this.txtTransfer = new System.Windows.Forms.TextBox();
this.SuspendLayout();
//
// btnCancel
//
this.btnCancel.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnCancel.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnCancel.FlatStyle.Appearance.BorderSize = 0;
this.btnCancel.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnCancel.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCancel.Location = new System.Drawing.Point(281, 415);
this.btnCancel.Name = "btnCancel";
this.btnCancel.Size = new System.Drawing.Size(207, 31);
this.btnCancel.TabIndex = 45;
this.btnCancel.Text = "Cancel";
this.btnCancel.UseVisualStyleBackColor = false;
this.btnCancel.Click += new System.EventHandler(this.btnCancel_Click);
//
// btnNewServer
//
this.btnNewServer.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnNewServer.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnNewServer.FlatStyle.Appearance.BorderSize = 0;
this.btnNewServer.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnNewServer.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnNewServer.Location = new System.Drawing.Point(36, 415);
this.btnNewServer.Name = "btnNewServer";
this.btnNewServer.Size = new System.Drawing.Size(206, 31);
this.btnNewServer.TabIndex = 44;
this.btnNewServer.Text = "Process New Server";
this.btnNewServer.UseVisualStyleBackColor = false;
this.btnNewServer.Click += new System.EventHandler(this.btnNewServer_Click);
//
```

```
// txtHostname
//
this.txtHostname.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtHostname.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtHostname.Location = new System.Drawing.Point(178, 34);
this.txtHostname.Name = "txtHostname";
this.txtHostname.Size = new System.Drawing.Size(310, 20);
this.txtHostname.TabIndex = 43;
//
// lblHostname
//
this.lblHostname.AutoSize = true;
this.lblHostname.BackColor = System.Drawing.Color.Transparent;
this.lblHostname.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblHostname.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblHostname.Location = new System.Drawing.Point(33, 35);
this.lblHostname.Name = "lblHostname";
this.lblHostname.Size = new System.Drawing.Size(83, 18);
this.lblHostname.TabIndex = 40;
this.lblHostname.Text = "Hostname:";
//
// lblLocation
//
this.lblLocation.AutoSize = true;
this.lblLocation.BackColor = System.Drawing.Color.Transparent;
this.lblLocation.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblLocation.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblLocation.Location = new System.Drawing.Point(33, 73);
this.lblLocation.Name = "lblLocation";
this.lblLocation.Size = new System.Drawing.Size(71, 18);
this.lblLocation.TabIndex = 39;
this.lblLocation.Text = "Location:";
//
// txtPassword
//
this.txtPassword.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtPassword.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtPassword.Location = new System.Drawing.Point(178, 148);
this.txtPassword.Name = "txtPassword";
this.txtPassword.PasswordChar = '*';
this.txtPassword.Size = new System.Drawing.Size(310, 20);
this.txtPassword.TabIndex = 50;
```

```
//  
// txtUsername  
//  
this.txtUsername.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;  
this.txtUsername.Cursor = System.Windows.Forms.Cursors.IBeam;  
this.txtUsername.Location = new System.Drawing.Point(178, 110);  
this.txtUsername.Name = "txtUsername";  
this.txtUsername.Size = new System.Drawing.Size(310, 20);  
this.txtUsername.TabIndex = 49;  
//  
// lblPassword  
//  
this.lblPassword.AutoSize = true;  
this.lblPassword.BackColor = System.Drawing.Color.Transparent;  
this.lblPassword.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.lblPassword.ForeColor = System.Drawing.SystemColors.ControlLightLight;  
this.lblPassword.Location = new System.Drawing.Point(33, 150);  
this.lblPassword.Name = "lblPassword";  
this.lblPassword.Size = new System.Drawing.Size(77, 18);  
this.lblPassword.TabIndex = 47;  
this.lblPassword.Text = "Password:";  
//  
// lblUsername  
//  
this.lblUsername.AutoSize = true;  
this.lblUsername.BackColor = System.Drawing.Color.Transparent;  
this.lblUsername.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.lblUsername.ForeColor = System.Drawing.SystemColors.ControlLightLight;  
this.lblUsername.Location = new System.Drawing.Point(33, 111);  
this.lblUsername.Name = "lblUsername";  
this.lblUsername.Size = new System.Drawing.Size(83, 18);  
this.lblUsername.TabIndex = 46;  
this.lblUsername.Text = "Username:";  
//  
// txtIP  
//  
this.txtIP.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;  
this.txtIP.Cursor = System.Windows.Forms.Cursors.IBeam;  
this.txtIP.Location = new System.Drawing.Point(178, 224);  
this.txtIP.Name = "txtIP";  
this.txtIP.Size = new System.Drawing.Size(310, 20);  
this.txtIP.TabIndex = 56;
```

```
//  
// lblProcessor  
//  
this.lblProcessor.AutoSize = true;  
this.lblProcessor.BackColor = System.Drawing.Color.Transparent;  
this.lblProcessor.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.lblProcessor.ForeColor = System.Drawing.SystemColors.ControlLightLight;  
this.lblProcessor.Location = new System.Drawing.Point(33, 263);  
this.lblProcessor.Name = "lblProcessor";  
this.lblProcessor.Size = new System.Drawing.Size(125, 18);  
this.lblProcessor.TabIndex = 54;  
this.lblProcessor.Text = "Server Processor";  
//  
// lblIP  
//  
this.lblIP.AutoSize = true;  
this.lblIP.BackColor = System.Drawing.Color.Transparent;  
this.lblIP.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.lblIP.ForeColor = System.Drawing.SystemColors.ControlLightLight;  
this.lblIP.Location = new System.Drawing.Point(33, 226);  
this.lblIP.Name = "lblIP";  
this.lblIP.Size = new System.Drawing.Size(133, 18);  
this.lblIP.TabIndex = 53;  
this.lblIP.Text = "Server IP Address:";  
//  
// lblOS  
//  
this.lblOS.AutoSize = true;  
this.lblOS.BackColor = System.Drawing.Color.Transparent;  
this.lblOS.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.lblOS.ForeColor = System.Drawing.SystemColors.ControlLightLight;  
this.lblOS.Location = new System.Drawing.Point(33, 187);  
this.lblOS.Name = "lblOS";  
this.lblOS.Size = new System.Drawing.Size(135, 18);  
this.lblOS.TabIndex = 52;  
this.lblOS.Text = "Operating System:";  
//  
// lblTransfer  
//  
this.lblTransfer.AutoSize = true;  
this.lblTransfer.BackColor = System.Drawing.Color.Transparent;
```

```
this.lblTransfer.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblTransfer.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblTransfer.Location = new System.Drawing.Point(33, 375);
this.lblTransfer.Name = "lblTransfer";
this.lblTransfer.Size = new System.Drawing.Size(66, 18);
this.lblTransfer.TabIndex = 61;
this.lblTransfer.Text = "Transfer:";
//
// lblPort
//
this.lblPort.AutoSize = true;
this.lblPort.BackColor = System.Drawing.Color.Transparent;
this.lblPort.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblPort.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblPort.Location = new System.Drawing.Point(33, 336);
this.lblPort.Name = "lblPort";
this.lblPort.Size = new System.Drawing.Size(103, 18);
this.lblPort.TabIndex = 60;
this.lblPort.Text = "Network Port:";
//
// lblRAM
//
this.lblRAM.AutoSize = true;
this.lblRAM.BackColor = System.Drawing.Color.Transparent;
this.lblRAM.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblRAM.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblRAM.Location = new System.Drawing.Point(33, 300);
this.lblRAM.Name = "lblRAM";
this.lblRAM.Size = new System.Drawing.Size(44, 18);
this.lblRAM.TabIndex = 58;
this.lblRAM.Text = "RAM:";
//
// cmboLocation
//
this.cmboLocation.FormattingEnabled = true;
this.cmboLocation.Location = new System.Drawing.Point(178, 70);
this.cmboLocation.Name = "cmboLocation";
this.cmboLocation.Size = new System.Drawing.Size(310, 21);
this.cmboLocation.TabIndex = 62;
//
// cmboOS

```

```
//  
this.cmboOS.FormattingEnabled = true;  
this.cmboOS.Location = new System.Drawing.Point(178, 186);  
this.cmboOS.Name = "cmboOS";  
this.cmboOS.Size = new System.Drawing.Size(310, 21);  
this.cmboOS.TabIndex = 63;  
//  
// cmboNetwork  
//  
this.cmboNetwork.FormattingEnabled = true;  
this.cmboNetwork.Location = new System.Drawing.Point(178, 335);  
this.cmboNetwork.Name = "cmboNetwork";  
this.cmboNetwork.Size = new System.Drawing.Size(310, 21);  
this.cmboNetwork.TabIndex = 66;  
//  
// txtProcessor  
//  
this.txtProcessor.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;  
this.txtProcessor.Cursor = System.Windows.Forms.Cursors.IBeam;  
this.txtProcessor.Location = new System.Drawing.Point(178, 261);  
this.txtProcessor.Name = "txtProcessor";  
this.txtProcessor.Size = new System.Drawing.Size(310, 20);  
this.txtProcessor.TabIndex = 68;  
//  
// txtRAM  
//  
this.txtRAM.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;  
this.txtRAM.Cursor = System.Windows.Forms.Cursors.IBeam;  
this.txtRAM.Location = new System.Drawing.Point(178, 298);  
this.txtRAM.Name = "txtRAM";  
this.txtRAM.Size = new System.Drawing.Size(310, 20);  
this.txtRAM.TabIndex = 69;  
//  
// txtTransfer  
//  
this.txtTransfer.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;  
this.txtTransfer.Cursor = System.Windows.Forms.Cursors.IBeam;  
this.txtTransfer.Location = new System.Drawing.Point(178, 373);  
this.txtTransfer.Name = "txtTransfer";  
this.txtTransfer.Size = new System.Drawing.Size(310, 20);  
this.txtTransfer.TabIndex = 70;  
//  
// serverCreate  
//
```

```
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(542, 457);
this.ControlBox = false;
this.Controls.Add(this.txtTransfer);
this.Controls.Add(this.txtRAM);
this.Controls.Add(this.txtProcessor);
this.Controls.Add(this.cmboNetwork);
this.Controls.Add(this.cmboOS);
this.Controls.Add(this.cmboLocation);
this.Controls.Add(this.lblTransfer);
this.Controls.Add(this.lblPort);
this.Controls.Add(this.lblRAM);
this.Controls.Add(this.txtIP);
this.Controls.Add(this.lblProcessor);
this.Controls.Add(this.lblIP);
this.Controls.Add(this.lblOS);
this.Controls.Add(this.txtPassword);
this.Controls.Add(this.txtUsername);
this.Controls.Add(this.lblPassword);
this.Controls.Add(this.lblUsername);
this.Controls.Add(this.btnCancel);
this.Controls.Add(this.btnNewServer);
this.Controls.Add(this.txtHostname);
this.Controls.Add(this.lblHostname);
this.Controls.Add(this.lblLocation);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.MinimumSize = new System.Drawing.Size(544, 242);
this.Name = "serverCreate";
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "Create Server";
this.Load += new System.EventHandler(this.manageServersCreate_Load);
this.ResumeLayout(false);
this.PerformLayout();

}

#endregion

private System.Windows.Forms.Button btnCancel;
private System.Windows.Forms.Button btnNewServer;
private System.Windows.Forms.TextBox txtHostname;
```

```
    private System.Windows.Forms.Label lblHostname;
    private System.Windows.Forms.Label lblLocation;
    private System.Windows.Forms.TextBox txtPassword;
    private System.Windows.Forms.TextBox txtUsername;
    private System.Windows.Forms.Label lblPassword;
    private System.Windows.Forms.Label lblUsername;
    private System.Windows.Forms.TextBox txtIP;
    private System.Windows.Forms.Label lblProcessor;
    private System.Windows.Forms.Label lblIP;
    private System.Windows.Forms.Label lblOS;
    private System.Windows.Forms.Label lblTransfer;
    private System.Windows.Forms.Label lblPort;
    private System.Windows.Forms.Label lblRAM;
    private System.Windows.Forms.ComboBox cmboLocation;
    private System.Windows.Forms.ComboBox cmboOS;
    private System.Windows.Forms.ComboBox cmboNetwork;
    private System.Windows.Forms.TextBox txtProcessor;
    private System.Windows.Forms.TextBox txtRAM;
    private System.Windows.Forms.TextBox txtTransfer;
}
}
```

Subsection 3.6.3.lxxxviii - serverCreate.cs - Code file - annotated

```
using System;
using System.Windows.Forms;
using MySql.Data.MySqlClient;

namespace ELSM_Project
{
    public partial class serverCreate : Form
    {
        public serverCreate()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        private void manageServersCreate_Load(object sender, EventArgs e)
        {
            //Connect to MySQL, set output data to items in cmboLocation.
            MySqlConnection connectionMySQL = new MySqlConnection(loginMenu.ConnectionString);
            connectionMySQL.Open();
            MySqlCommand locationsCMD = new MySqlCommand("SELECT * FROM serverLocations WHERE companyID = @companyID",
connectionMySQL);
            locationsCMD.Parameters.AddWithValue("@companyID", loginMenu.CompanyID);
            MySqlDataReader locationsRDR = locationsCMD.ExecuteReader();
            while (locationsRDR.Read())
            {
                cmboLocation.Items.Add(locationsRDR.GetString("locationName"));
            }
            locationsRDR.Close();
            //Set output data to items in cmboOS.
            MySqlCommand osCMD = new MySqlCommand("SELECT * FROM serverOperatingSystems", connectionMySQL);
            MySqlDataReader osRDR = osCMD.ExecuteReader();
            while (osRDR.Read())
            {
                cmboOS.Items.Add(osRDR.GetString("operatingSystemsName"));
            }
            osRDR.Close();
            //Set output data to items in cmboNetwork.
            MySqlCommand networkPortCMD = new MySqlCommand("SELECT * FROM serverPort", connectionMySQL);
            MySqlDataReader networkPortRDR = networkPortCMD.ExecuteReader();
            while (networkPortRDR.Read())
            {
                cmboNetwork.Items.Add(networkPortRDR.GetString("portSpeed"));
            }
        }
    }
}
```

```
        }

        networkPortRDR.Close();
        connectionMySQL.Close();
    }

    private void btnNewServer_Click(object sender, EventArgs e)
    {
        //If a field required is blank, output error message informing the user that they need to enter data.
        if (txtHostname.Text != "")
        {
            if (txtIP.Text != "")
            {
                if (txtProcessor.Text != "")
                {
                    if (txtRAM.Text != "")
                    {
                        if (txtTransfer.Text != "")
                        {
                            if (txtUsername.Text != "")
                            {
                                if (cmbLocation.Text != "")
                                {
                                    if (cmbNetwork.Text != "")
                                    {
                                        if (cmbOS.Text != "")
                                        {
                                            //Connect to MySQL.
                                            MySqlConnection connectionMySQL = new

                                            connectionMySQL.Open();
                                            //Set variable 'location' to value outputted from SQL statement.
                                            MySqlCommand locationCMD = new MySqlCommand("SELECT * FROM serverLocations WHERE
                                            locationCMD.Parameters.AddWithValue("@location", cmbLocation.Text);
                                            MySqlDataReader locationRDR = locationCMD.ExecuteReader();
                                            locationRDR.Read();
                                            var location = Convert.ToString(locationRDR[0]);
                                            locationRDR.Close();
                                            //Set variable 'os' to value outputted from SQL statement.
                                            MySqlCommand osCMD = new MySqlCommand("SELECT * FROM serverOperatingSystems WHERE
                                            osCMD.Parameters.AddWithValue("@os", cmbOS.Text);
                                            MySqlDataReader osRDR = osCMD.ExecuteReader();
                                            osRDR.Read();

                                            MySqlConnection(loginMenu.ConnectionString);

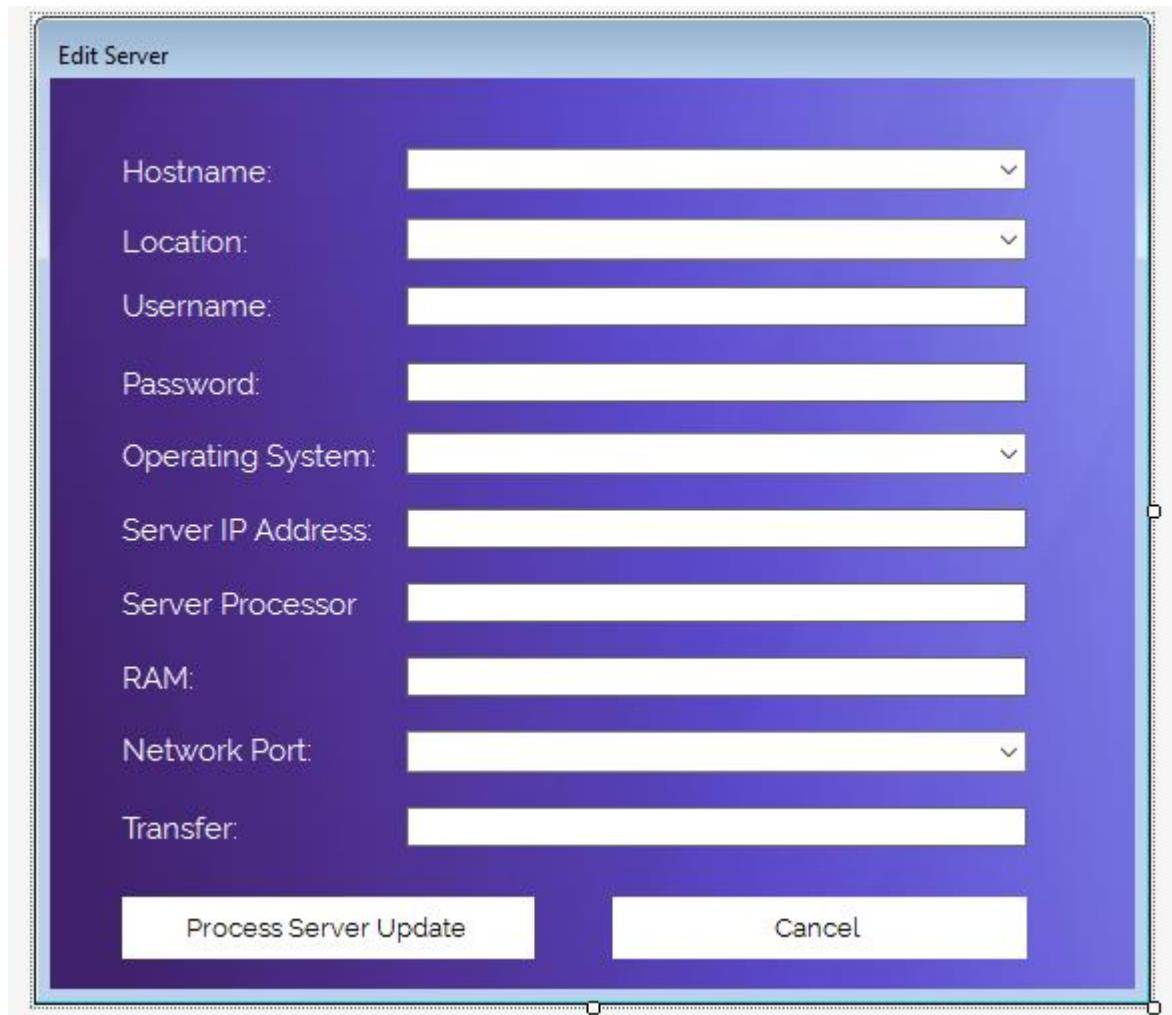
                                            locationName = @location", connectionMySQL;

                                            operatingSystemsName = @os", connectionMySQL;
                                        }
                                    }
                                }
                            }
                        }
                    }
                }
            }
        }
    }
}
```

```
var os = Convert.ToString(osRDR[0]);
osRDR.Close();
//Set variable 'network' to value outputted from SQL statement.
MySqlCommand networkCMD = new MySqlCommand("SELECT * FROM serverPort WHERE
portSpeed = @port", connectionMySQL);
networkCMD.Parameters.AddWithValue("@port", cmboNetwork.Text);
MySqlDataReader networkRDR = networkCMD.ExecuteReader();
networkRDR.Read();
var network = Convert.ToString(networkRDR[0]);
networkRDR.Close();
//Insert new server into the database using entered date and variables set.
MySqlCommand serverCMD = new MySqlCommand("INSERT INTO serverInformation
(serverCompany, serverLocation, serverHostname, serverUsername, serverPassword, serverOS, serverIP, serverProcessor, serverRAM,
serverPort, serverTransfer) VALUES (@serverCompany, @serverLocation, @serverHostname, @serverUsername, @serverPassword,
@serverOS, @serverIP, @serverProcessor, @serverRAM, @serverPort, @serverTransfer)", connectionMySQL);
serverCMD.Parameters.AddWithValue("@serverCompany", loginMenu.CompanyID);
serverCMD.Parameters.AddWithValue("@serverLocation", location);
serverCMD.Parameters.AddWithValue("@serverHostname", txtHostname.Text);
serverCMD.Parameters.AddWithValue("@serverUsername", txtUsername.Text);
serverCMD.Parameters.AddWithValue("@serverPassword", txtPassword.Text);
serverCMD.Parameters.AddWithValue("@serverOS", os);
serverCMD.Parameters.AddWithValue("@serverIP", txtIP.Text);
serverCMD.Parameters.AddWithValue("@serverProcessor", txtProcessor.Text);
serverCMD.Parameters.AddWithValue("@serverRAM", txtRAM.Text);
serverCMD.Parameters.AddWithValue("@serverPort", network);
serverCMD.Parameters.AddWithValue("@serverTransfer", txtTransfer.Text);
serverCMD.ExecuteNonQuery();
connectionMySQL.Close();
System.Windows.Forms.MessageBox.Show("Server created.");
Hide();
}
else
{
    System.Windows.Forms.MessageBox.Show("You haven't selected an operating system.
Please do so.");
}
}
else
{
    System.Windows.Forms.MessageBox.Show("You haven't selected a network port. Please do
so.");
}
else
```

```
        {
            System.Windows.Forms.MessageBox.Show("You haven't selected a location. Please do so.");
        }
    }
}
else
{
    System.Windows.Forms.MessageBox.Show("The user entered is blank. Please enter data.");
}
else
{
    System.Windows.Forms.MessageBox.Show("The transfer amount entered is blank. Please enter data.");
}
else
{
    System.Windows.Forms.MessageBox.Show("The RAM amount entered is blank. Please enter data.");
}
else
{
    System.Windows.Forms.MessageBox.Show("The processor entered is blank. Please enter data.");
}
else
{
    System.Windows.Forms.MessageBox.Show("The IP entered is blank. Please enter data.");
}
else
{
    System.Windows.Forms.MessageBox.Show("Your hostname is blank.");
}

private void btnCancel_Click(object sender, EventArgs e)
{
    //On button event, hide the form.
    Hide();
}
}
```

Subsection 3.6.3.lxxxix - serverEdit.cs [design] - design view

Subsection 3.6.3.xc - serverEdit.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class serverEdit
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            this.btnCancel = new System.Windows.Forms.Button();
            this.btnUpdateServer = new System.Windows.Forms.Button();
            this.lblHostname = new System.Windows.Forms.Label();
            this.lblLocation = new System.Windows.Forms.Label();
            this.txtPassword = new System.Windows.Forms.TextBox();
            this.txtUsername = new System.Windows.Forms.TextBox();
            this.lblPassword = new System.Windows.Forms.Label();
            this.lblUsername = new System.Windows.Forms.Label();
            this.txtIP = new System.Windows.Forms.TextBox();
            this.lblProcessor = new System.Windows.Forms.Label();
            this.lblIP = new System.Windows.Forms.Label();
            this.lblOS = new System.Windows.Forms.Label();
        }
    }
}
```

```
this.lblTransfer = new System.Windows.Forms.Label();
this.lblPort = new System.Windows.Forms.Label();
this.lblRAM = new System.Windows.Forms.Label();
this.cmboLocation = new System.Windows.Forms.ComboBox();
this.cmboOS = new System.Windows.Forms.ComboBox();
this.cmboNetwork = new System.Windows.Forms.ComboBox();
this.txtProcessor = new System.Windows.Forms.TextBox();
this.txtRAM = new System.Windows.Forms.TextBox();
this.txtTransfer = new System.Windows.Forms.TextBox();
this.cmboHostNames = new System.Windows.Forms.ComboBox();
this.SuspendLayout();
//
// btnCancel
//
this.btnCancel.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnCancel.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnCancel.FlatStyle.Appearance.BorderSize = 0;
this.btnCancel.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnCancel.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCancel.Location = new System.Drawing.Point(281, 409);
this.btnCancel.Name = "btnCancel";
this.btnCancel.Size = new System.Drawing.Size(207, 31);
this.btnCancel.TabIndex = 45;
this.btnCancel.Text = "Cancel";
this.btnCancel.UseVisualStyleBackColor = false;
this.btnCancel.Click += new System.EventHandler(this.btnCancel_Click);
//
// btnUpdateServer
//
this.btnUpdateServer.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnUpdateServer.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnUpdateServer.FlatStyle.Appearance.BorderSize = 0;
this.btnUpdateServer.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnUpdateServer.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnUpdateServer.Location = new System.Drawing.Point(36, 409);
this.btnUpdateServer.Name = "btnUpdateServer";
this.btnUpdateServer.Size = new System.Drawing.Size(206, 31);
this.btnUpdateServer.TabIndex = 44;
this.btnUpdateServer.Text = "Process Server Update";
this.btnUpdateServer.UseVisualStyleBackColor = false;
this.btnUpdateServer.Click += new System.EventHandler(this.btnNewServer_Click);
//
```

```
// lblHostname
//
this.lblHostname.AutoSize = true;
this.lblHostname.BackColor = System.Drawing.Color.Transparent;
this.lblHostname.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblHostname.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblHostname.Location = new System.Drawing.Point(33, 38);
this.lblHostname.Name = "lblHostname";
this.lblHostname.Size = new System.Drawing.Size(83, 18);
this.lblHostname.TabIndex = 40;
this.lblHostname.Text = "Hostname:";
//
// lblLocation
//
this.lblLocation.AutoSize = true;
this.lblLocation.BackColor = System.Drawing.Color.Transparent;
this.lblLocation.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblLocation.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblLocation.Location = new System.Drawing.Point(33, 73);
this.lblLocation.Name = "lblLocation";
this.lblLocation.Size = new System.Drawing.Size(71, 18);
this.lblLocation.TabIndex = 39;
this.lblLocation.Text = "Location:";
//
// txtPassword
//
this.txtPassword.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtPassword.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtPassword.Location = new System.Drawing.Point(178, 142);
this.txtPassword.Name = "txtPassword";
this.txtPassword.PasswordChar = '*';
this.txtPassword.Size = new System.Drawing.Size(310, 20);
this.txtPassword.TabIndex = 50;
//
// txtUsername
//
this.txtUsername.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtUsername.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtUsername.Location = new System.Drawing.Point(178, 104);
this.txtUsername.Name = "txtUsername";
this.txtUsername.Size = new System.Drawing.Size(310, 20);
this.txtUsername.TabIndex = 49;
```

```
//  
// lblPassword  
//  
this.lblPassword.AutoSize = true;  
this.lblPassword.BackColor = System.Drawing.Color.Transparent;  
this.lblPassword.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.lblPassword.ForeColor = System.Drawing.SystemColors.ControlLightLight;  
this.lblPassword.Location = new System.Drawing.Point(33, 144);  
this.lblPassword.Name = "lblPassword";  
this.lblPassword.Size = new System.Drawing.Size(77, 18);  
this.lblPassword.TabIndex = 47;  
this.lblPassword.Text = "Password:";  
//  
// lblUsername  
//  
this.lblUsername.AutoSize = true;  
this.lblUsername.BackColor = System.Drawing.Color.Transparent;  
this.lblUsername.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.lblUsername.ForeColor = System.Drawing.SystemColors.ControlLightLight;  
this.lblUsername.Location = new System.Drawing.Point(33, 105);  
this.lblUsername.Name = "lblUsername";  
this.lblUsername.Size = new System.Drawing.Size(83, 18);  
this.lblUsername.TabIndex = 46;  
this.lblUsername.Text = "Username:";  
//  
// txtIP  
//  
this.txtIP.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;  
this.txtIP.Cursor = System.Windows.Forms.Cursors.IBeam;  
this.txtIP.Location = new System.Drawing.Point(178, 215);  
this.txtIP.Name = "txtIP";  
this.txtIP.Size = new System.Drawing.Size(310, 20);  
this.txtIP.TabIndex = 56;  
//  
// lblProcessor  
//  
this.lblProcessor.AutoSize = true;  
this.lblProcessor.BackColor = System.Drawing.Color.Transparent;  
this.lblProcessor.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.lblProcessor.ForeColor = System.Drawing.SystemColors.ControlLightLight;  
this.lblProcessor.Location = new System.Drawing.Point(33, 254);
```

```
this.lblProcessor.Name = "lblProcessor";
this.lblProcessor.Size = new System.Drawing.Size(125, 18);
this.lblProcessor.TabIndex = 54;
this.lblProcessor.Text = "Server Processor";
//
// lblIP
//
this.lblIP.AutoSize = true;
this.lblIP.BackColor = System.Drawing.Color.Transparent;
this.lblIP.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblIP.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblIP.Location = new System.Drawing.Point(33, 217);
this.lblIP.Name = "lblIP";
this.lblIP.Size = new System.Drawing.Size(133, 18);
this.lblIP.TabIndex = 53;
this.lblIP.Text = "Server IP Address:";
//
// lblOS
//
this.lblOS.AutoSize = true;
this.lblOS.BackColor = System.Drawing.Color.Transparent;
this.lblOS.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblOS.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblOS.Location = new System.Drawing.Point(33, 180);
this.lblOS.Name = "lblOS";
this.lblOS.Size = new System.Drawing.Size(135, 18);
this.lblOS.TabIndex = 52;
this.lblOS.Text = "Operating System:";
//
// lblTransfer
//
this.lblTransfer.AutoSize = true;
this.lblTransfer.BackColor = System.Drawing.Color.Transparent;
this.lblTransfer.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblTransfer.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblTransfer.Location = new System.Drawing.Point(33, 366);
this.lblTransfer.Name = "lblTransfer";
this.lblTransfer.Size = new System.Drawing.Size(66, 18);
this.lblTransfer.TabIndex = 61;
this.lblTransfer.Text = "Transfer:";
//
```

```
// lblPort
//
this.lblPort.AutoSize = true;
this.lblPort.BackColor = System.Drawing.Color.Transparent;
this.lblPort.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblPort.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblPort.Location = new System.Drawing.Point(33, 327);
this.lblPort.Name = "lblPort";
this.lblPort.Size = new System.Drawing.Size(103, 18);
this.lblPort.TabIndex = 60;
this.lblPort.Text = "Network Port:";
//
// lblRAM
//
this.lblRAM.AutoSize = true;
this.lblRAM.BackColor = System.Drawing.Color.Transparent;
this.lblRAM.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblRAM.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblRAM.Location = new System.Drawing.Point(33, 291);
this.lblRAM.Name = "lblRAM";
this.lblRAM.Size = new System.Drawing.Size(44, 18);
this.lblRAM.TabIndex = 58;
this.lblRAM.Text = "RAM:";
//
// cmboLocation
//
this.cmboLocation.Cursor = System.Windows.Forms.Cursors.Hand;
this.cmboLocation.FormattingEnabled = true;
this.cmboLocation.Location = new System.Drawing.Point(178, 70);
this.cmboLocation.Name = "cmboLocation";
this.cmboLocation.Size = new System.Drawing.Size(310, 21);
this.cmboLocation.TabIndex = 62;
//
// cmboOS
//
this.cmboOS.Cursor = System.Windows.Forms.Cursors.Hand;
this.cmboOS.FormattingEnabled = true;
this.cmboOS.Location = new System.Drawing.Point(178, 177);
this.cmboOS.Name = "cmboOS";
this.cmboOS.Size = new System.Drawing.Size(310, 21);
this.cmboOS.TabIndex = 63;
//
```

```
// cmboNetwork
//
this.cmboNetwork.Cursor = System.Windows.Forms.Cursors.No;
this.cmboNetwork.Enabled = false;
this.cmboNetwork.FormattingEnabled = true;
this.cmboNetwork.Location = new System.Drawing.Point(178, 326);
this.cmboNetwork.Name = "cmboNetwork";
this.cmboNetwork.Size = new System.Drawing.Size(310, 21);
this.cmboNetwork.TabIndex = 66;
//
// txtProcessor
//
this.txtProcessor.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtProcessor.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtProcessor.Location = new System.Drawing.Point(178, 252);
this.txtProcessor.Name = "txtProcessor";
this.txtProcessor.Size = new System.Drawing.Size(310, 20);
this.txtProcessor.TabIndex = 68;
//
// txtRAM
//
this.txtRAM.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtRAM.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtRAM.Location = new System.Drawing.Point(178, 289);
this.txtRAM.Name = "txtRAM";
this.txtRAM.Size = new System.Drawing.Size(310, 20);
this.txtRAM.TabIndex = 69;
//
// txtTransfer
//
this.txtTransfer.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtTransfer.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtTransfer.Location = new System.Drawing.Point(178, 364);
this.txtTransfer.Name = "txtTransfer";
this.txtTransfer.Size = new System.Drawing.Size(310, 20);
this.txtTransfer.TabIndex = 70;
//
// cmboHostNames
//
this.cmboHostNames.FormattingEnabled = true;
this.cmboHostNames.Location = new System.Drawing.Point(178, 35);
this.cmboHostNames.Name = "cmboHostNames";
this.cmboHostNames.Size = new System.Drawing.Size(310, 21);
this.cmboHostNames.TabIndex = 71;
```

```
this.cmboHostNames.SelectedIndexChanged += new System.EventHandler(this.cmboHostNames_SelectedIndexChanged);
//
// serverEdit
//
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(542, 455);
this.ControlBox = false;
this.Controls.Add(this.cmboHostNames);
this.Controls.Add(this.txtTransfer);
this.Controls.Add(this.txtRAM);
this.Controls.Add(this.txtProcessor);
this.Controls.Add(this.cmboNetwork);
this.Controls.Add(this.cmboOS);
this.Controls.Add(this.cmboLocation);
this.Controls.Add(this.lblTransfer);
this.Controls.Add(this.lblPort);
this.Controls.Add(this.lblRAM);
this.Controls.Add(this.txtIP);
this.Controls.Add(this.lblProcessor);
this.Controls.Add(this.lblIP);
this.Controls.Add(this.lblOS);
this.Controls.Add(this.txtPassword);
this.Controls.Add(this.txtUsername);
this.Controls.Add(this.lblPassword);
this.Controls.Add(this.lblUsername);
this.Controls.Add(this.btnCancel);
this.Controls.Add(this.btnUpdateServer);
this.Controls.Add(this.lblHostname);
this.Controls.Add(this.lblLocation);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.MaximumSize = new System.Drawing.Size(558, 542);
this.MinimumSize = new System.Drawing.Size(544, 242);
this.Name = "serverEdit";
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "Edit Server";
this.Load += new System.EventHandler(this.manageServersEdit_Load);
this.ResumeLayout(false);
this.PerformLayout();

}
```

```
#endregion

private System.Windows.Forms.Button btnCancel;
private System.Windows.Forms.Button btnUpdateServer;
private System.Windows.Forms.Label lblHostname;
private System.Windows.Forms.Label lblLocation;
private System.Windows.Forms.TextBox txtPassword;
private System.Windows.Forms.TextBox txtUsername;
private System.Windows.Forms.Label lblPassword;
private System.Windows.Forms.Label lblUsername;
private System.Windows.Forms.TextBox txtIP;
private System.Windows.Forms.Label lblProcessor;
private System.Windows.Forms.Label lblIP;
private System.Windows.Forms.Label lblOS;
private System.Windows.Forms.Label lblTransfer;
private System.Windows.Forms.Label lblPort;
private System.Windows.Forms.Label lblRAM;
private System.Windows.Forms.ComboBox cmboLocation;
private System.Windows.Forms.ComboBox cmboOS;
private System.Windows.Forms.ComboBox cmboNetwork;
private System.Windows.Forms.TextBox txtProcessor;
private System.Windows.Forms.TextBox txtRAM;
private System.Windows.Forms.TextBox txtTransfer;
private System.Windows.Forms.ComboBox cmboHostNames;
}

}
```

Subsection 3.6.3.xci - serverEdit.cs - Code file - annotated

```
using System;
using System.Windows.Forms;
using MySql.Data.MySqlClient;

namespace ELSM_Project
{
    public partial class serverEdit : Form
    {
        public serverEdit()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        public static string password;

        private void manageServersEdit_Load(object sender, EventArgs e)
        {
            //Connect to MySQL, execute SQL and set output as items of cmboHostNames.
            MySqlConnection connectionMySQL = new MySqlConnection(loginMenu.ConnectionString);
            connectionMySQL.Open();
            MySqlCommand serverCMD = new MySqlCommand("SELECT * FROM serverInformation", connectionMySQL);
            MySqlDataReader serverRDR = serverCMD.ExecuteReader();
            while (serverRDR.Read())
            {
                cmboHostNames.Items.Add(serverRDR.GetString("serverHostname"));
            }
            serverRDR.Close();
            connectionMySQL.Close();
        }

        private void cmboHostNames_SelectedIndexChanged(object sender, EventArgs e)
        {
            //Connect to MySQL, run SQL and set textbox text and variables to values from the output.
            MySqlConnection connectionMySQL = new MySqlConnection(loginMenu.ConnectionString);
            connectionMySQL.Open();
            MySqlCommand serverInformationCMD = new MySqlCommand("SELECT * FROM serverInformation WHERE serverHostname = @Hostname", connectionMySQL);
            serverInformationCMD.Parameters.AddWithValue("@Hostname", cmboHostNames.Text);
            MySqlDataReader serverInformationRDR = serverInformationCMD.ExecuteReader();
            serverInformationRDR.Read();
            txtUsername.Text = Convert.ToString(serverInformationRDR[4]);
        }
    }
}
```

```
txtIP.Text = Convert.ToString(serverInformationRDR[7]);
txtProcessor.Text = Convert.ToString(serverInformationRDR[8]);
txtRAM.Text = Convert.ToString(serverInformationRDR[9]);
txtTransfer.Text = Convert.ToString(serverInformationRDR[11]);
serverEdit.password = Convert.ToString(serverInformationRDR[5]);
var serverLocation = Convert.ToString(serverInformationRDR[2]);
var serverOS = Convert.ToString(serverInformationRDR[6]);
var serverPort = Convert.ToString(serverInformationRDR[10]);
txtPassword.Text = "";
serverInformationRDR.Close();
//Connect to MySQL, execute SQL and set output as items of cmboLocation.
MySqlCommand serverLocationCMD = new MySqlCommand("SELECT * FROM serverLocations WHERE companyID = @companyID",
connectionMySQL);
serverLocationCMD.Parameters.AddWithValue("@companyID", loginMenu.CompanyID);
MySqlDataReader serverLocationRDR = serverLocationCMD.ExecuteReader();
while (serverLocationRDR.Read())
{
    cmboLocation.Items.Add(serverLocationRDR.GetString("locationName"));
}
serverLocationRDR.Close();
//Connect to MySQL, execute SQL and set output as items of cmboOS.
MySqlCommand serverOSCMD = new MySqlCommand("SELECT * FROM serverOperatingSystems", connectionMySQL);
MySqlDataReader serverOSRDR = serverOSCMD.ExecuteReader();
while (serverOSRDR.Read())
{
    cmboOS.Items.Add(serverOSRDR.GetString("operatingSystemsName"));
}
serverOSRDR.Close();
//Connect to MySQL, execute SQL and set output as items of cmboNetwork.
MySqlCommand serverNetworkPortCMD = new MySqlCommand("SELECT * FROM serverPort", connectionMySQL);
MySqlDataReader serverNetworkPortRDR = serverNetworkPortCMD.ExecuteReader();
while (serverNetworkPortRDR.Read())
{
    cmboNetwork.Items.Add(serverNetworkPortRDR.GetString("portSpeed"));
}
serverNetworkPortRDR.Close();
//Connect to MySQL, execute SQL and set output as the text of cmboLocation.
MySqlCommand serverLocationDisplayCMD = new MySqlCommand("SELECT * FROM serverLocations WHERE locationID =
@locationID", connectionMySQL);
serverLocationDisplayCMD.Parameters.AddWithValue("@locationID", serverLocation);
MySqlDataReader serverLocationDisplayRDR = serverLocationDisplayCMD.ExecuteReader();
serverLocationDisplayRDR.Read();
cmboLocation.Text = Convert.ToString(serverLocationDisplayRDR.GetString("locationName"));
serverLocationDisplayRDR.Close();
```

```
//Connect to MySQL, execute SQL and set output as the text of cmboOS.
MySqlCommand serverOSDisplayCMD = new MySqlCommand("SELECT * FROM serverOperatingSystems WHERE operatingSystemsID = @operatingSystemsID", connectionMySQL);
serverOSDisplayCMD.Parameters.AddWithValue("@operatingSystemsID", serverOS);
MySqlDataReader serverOSDisplayRDR = serverOSDisplayCMD.ExecuteReader();
serverOSDisplayRDR.Read();
cmboOS.Text = Convert.ToString(serverOSDisplayRDR[1]);
serverOSDisplayRDR.Close();
//Connect to MySQL, execute SQL and set output as the text of cmboNetwork.
MySqlCommand serverNetworkPortDisplayCMD = new MySqlCommand("SELECT * FROM serverPort WHERE portID = @portID", connectionMySQL);
serverNetworkPortDisplayCMD.Parameters.AddWithValue("@portID", serverPort);
MySqlDataReader serverNetworkPortDisplayRDR = serverNetworkPortDisplayCMD.ExecuteReader();
serverNetworkPortDisplayRDR.Read();
cmboNetwork.Text = Convert.ToString(serverNetworkPortDisplayRDR[1]);
serverNetworkPortDisplayRDR.Close();
connectionMySQL.Close();
}

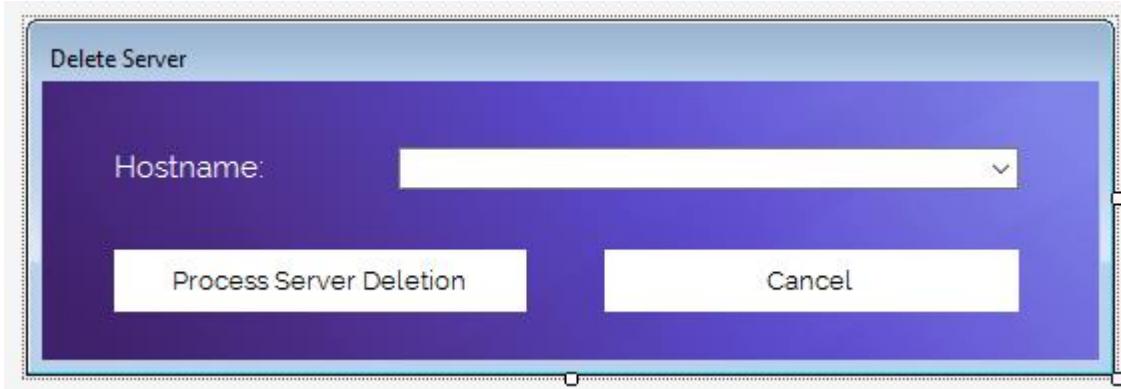
private void btnNewServer_Click(object sender, EventArgs e)
{
    //If field entered is blank, output messagebox informing the user that they need to enter data.
    if (cmboHostNames.Text != "")
    {
        if (txtIP.Text != "")
        {
            if (txtProcessor.Text != "")
            {
                if (txtRAM.Text != "")
                {
                    if (txtTransfer.Text != "")
                    {
                        if (txtUsername.Text != "")
                        {
                            if (cmboLocation.Text != "")
                            {
                                if (cmboNetwork.Text != "")
                                {
                                    if (cmboOS.Text != "")
                                    {
                                        MySqlConnection connectionMySQL = new
MySqlConnection(loginMenu.ConnectionString);
connectionMySQL.Open();
//Connect to MySQL, execute SQL and set output to variable "location".
```

```
        MySqlCommand locationsdCMD = new MySqlCommand("SELECT * FROM serverLocations  
WHERE locationName = @location", connectionMySQL);  
        locationsdCMD.Parameters.AddWithValue("@location", cmboLocation.Text);  
        MySqlDataReader locationRDR = locationsdCMD.ExecuteReader();  
        locationRDR.Read();  
        var location = Convert.ToString(locationRDR[0]);  
        locationRDR.Close();  
        //Connect to MySQL, execute SQL and set output to variable "os".  
        MySqlCommand operatingSystemsCMD = new MySqlCommand("SELECT * FROM  
serverOperatingSystems WHERE operatingSystemsName = @os", connectionMySQL);  
        operatingSystemsCMD.Parameters.AddWithValue("@os", cmboOS.Text);  
        MySqlDataReader osRDR = operatingSystemsCMD.ExecuteReader();  
        osRDR.Read();  
        var os = Convert.ToString(osRDR[0]);  
        osRDR.Close();  
        //Connect to MySQL, execute SQL and set output to variable "network".  
        MySqlCommand networkCMD = new MySqlCommand("SELECT * FROM serverPort WHERE  
portSpeed = @port", connectionMySQL);  
        networkCMD.Parameters.AddWithValue("@port", cmboNetwork.Text);  
        MySqlDataReader networkRDR = networkCMD.ExecuteReader();  
        networkRDR.Read();  
        var network = Convert.ToString(networkRDR[0]);  
        networkRDR.Close();  
        //If password entered is blank, use password already in database. Else, use  
input from textbox.  
  
        if (txtPassword.Text == "")  
        {  
            var password = serverEdit.password;  
        }  
        else  
        {  
            var password = txtPassword.Text;  
        }  
        //Insert row into serverInformation with values from the form to create a new  
server.  
        MySqlCommand serverInfoUpdateCMD = new MySqlCommand("UPDATE serverInformation SET  
serverLocation = @serverLocation, serverHostname = @serverHostname, serverUsername = @serverUsername, serverPassword =  
@serverPassword, serverOS = @serverOS, serverIP = @serverIP, serverProcessor = @serverProcessor, serverRAM = @serverRAM,  
serverPort = @serverPort, serverTransfer = @serverTransfer WHERE serverHostname = @Hostname", connectionMySQL);  
        serverInfoUpdateCMD.Parameters.AddWithValue("@serverLocation", location);  
        serverInfoUpdateCMD.Parameters.AddWithValue("@serverHostname",  
cmboHostNames.Text);  
        serverInfoUpdateCMD.Parameters.AddWithValue("@Hostname", cmboHostNames.Text);  
        serverInfoUpdateCMD.Parameters.AddWithValue("@serverUsername", txtUsername.Text);
```

```
serverInfoUpdateCMD.Parameters.AddWithValue("@serverPassword", password);
serverInfoUpdateCMD.Parameters.AddWithValue("@serverOS", os);
serverInfoUpdateCMD.Parameters.AddWithValue("@serverIP", txtIP.Text);
serverInfoUpdateCMD.Parameters.AddWithValue("@serverProcessor",
txtProcessor.Text);
serverInfoUpdateCMD.Parameters.AddWithValue("@serverRAM", txtRAM.Text);
serverInfoUpdateCMD.Parameters.AddWithValue("@serverPort", network);
serverInfoUpdateCMD.Parameters.AddWithValue("@serverTransfer", txtTransfer.Text);
serverInfoUpdateCMD.ExecuteNonQuery();
connectionMySQL.Close();
Hide();
}
else
{
    System.Windows.Forms.MessageBox.Show("You haven't selected an operating system.
Please do so.");
}
}
else
{
    System.Windows.Forms.MessageBox.Show("You haven't selected a network port. Please do
so.");
}
}
else
{
    System.Windows.Forms.MessageBox.Show("You haven't selected a location. Please do so.");
}
}
else
{
    System.Windows.Forms.MessageBox.Show("The user entered is blank. Please enter data.");
}
}
else
{
    System.Windows.Forms.MessageBox.Show("The transfer amount entered is blank. Please enter data.");
}
}
else
{
    System.Windows.Forms.MessageBox.Show("The RAM amount entered is blank. Please enter data.");
}
}
```

```
        else
        {
            System.Windows.Forms.MessageBox.Show("The processor entered is blank. Please enter data.");
        }
    else
    {
        System.Windows.Forms.MessageBox.Show("The IP entered is blank. Please enter data.");
    }
else
{
    System.Windows.Forms.MessageBox.Show("Your hostname is blank.");
}
}

private void btnCancel_Click(object sender, EventArgs e)
{
    //On button event, hide the form.
    Hide();
}
}
```

Subsection 3.6.3.xcii - serverDelete.cs [design] - design view

Subsection 3.6.3.xciii - serverDelete.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class serverDelete
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            this.btnCancel = new System.Windows.Forms.Button();
            this.btnDeleteServer = new System.Windows.Forms.Button();
            this.lblHostname = new System.Windows.Forms.Label();
            this.cmboHostname = new System.Windows.Forms.ComboBox();
            this.SuspendLayout();
            //
            // btnCancel
            //
            this.btnCancel.BackColor = System.Drawing.SystemColors.ControlLightLight;
            this.btnCancel.Cursor = System.Windows.Forms.Cursors.Hand;
            this.btnCancel.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
            this.btnCancel.FormBorderStyle = System.Windows.Forms.FormBorderStyle.None;
```

```
this.btnCancel.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCancel.Location = new System.Drawing.Point(281, 84);
this.btnCancel.Name = "btnCancel";
this.btnCancel.Size = new System.Drawing.Size(207, 31);
this.btnCancel.TabIndex = 45;
this.btnCancel.Text = "Cancel";
this.btnCancel.UseVisualStyleBackColor = false;
this.btnCancel.Click += new System.EventHandler(this.btnCancel_Click);
//
// btnDeleteServer
//
this.btnDeleteServer.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnDeleteServer.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnDeleteServer.FlatAppearance.BorderSize = 0;
this.btnDeleteServer.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnDeleteServer.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnDeleteServer.Location = new System.Drawing.Point(36, 84);
this.btnDeleteServer.Name = "btnDeleteServer";
this.btnDeleteServer.Size = new System.Drawing.Size(206, 31);
this.btnDeleteServer.TabIndex = 44;
this.btnDeleteServer.Text = "Process Server Deletion";
this.btnDeleteServer.UseVisualStyleBackColor = false;
this.btnDeleteServer.Click += new System.EventHandler(this.btnDeleteServer_Click);
//
// lblHostname
//
this.lblHostname.AutoSize = true;
this.lblHostname.BackColor = System.Drawing.Color.Transparent;
this.lblHostname.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblHostname.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblHostname.Location = new System.Drawing.Point(33, 34);
this.lblHostname.Name = "lblHostname";
this.lblHostname.Size = new System.Drawing.Size(83, 18);
this.lblHostname.TabIndex = 38;
this.lblHostname.Text = "Hostname:";
//
// cmboHostname
//
this.cmboHostname.FormattingEnabled = true;
this.cmboHostname.Location = new System.Drawing.Point(178, 33);
this.cmboHostname.Name = "cmboHostname";
```

```
this.cmboHostname.Size = new System.Drawing.Size(310, 21);
this.cmboHostname.TabIndex = 46;
//
// serverDelete
//
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(528, 139);
this.ControlBox = false;
this.Controls.Add(this.btnCancel);
this.Controls.Add(this.btnDeleteServer);
this.Controls.Add(this.lblHostname);
this.Controls.Add(this.cmboHostname);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.MaximumSize = new System.Drawing.Size(544, 178);
this.MinimumSize = new System.Drawing.Size(544, 178);
this.Name = "serverDelete";
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "Delete Server";
this.Load += new System.EventHandler(this.manageServersDelete_Load);
this.ResumeLayout(false);
this.PerformLayout();
this.PerformLayout();

}

#endregion

private System.Windows.Forms.Button btnCancel;
private System.Windows.Forms.Button btnDeleteServer;
private System.Windows.Forms.Label lblHostname;
private System.Windows.Forms.ComboBox cmboHostname;
}
```

Subsection 3.6.3.xciv - serverDelete.cs - Code file - annotated

```
using System;
using System.Windows.Forms;
using MySql.Data.MySqlClient;

namespace ELSM_Project
{
    public partial class serverDelete : Form
    {
        public serverDelete()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        private void manageServersDelete_Load(object sender, EventArgs e)
        {
            //Connect to MySQL and set output to items in cmboHostname.
            MySqlConnection connectionMySQL = new MySqlConnection(loginMenu.ConnectionString);
            connectionMySQL.Open();
            MySqlCommand serverInformationCMD = new MySqlCommand("SELECT * FROM serverInformation WHERE serverCompany =
@companyID", connectionMySQL);
            serverInformationCMD.Parameters.AddWithValue("@companyID", loginMenu.CompanyID);
            MySqlDataReader serverInformationRDR = serverInformationCMD.ExecuteReader();
            while (serverInformationRDR.Read())
            {
                cmboHostname.Items.Add(serverInformationRDR.GetString("serverHostname"));
            }
            connectionMySQL.Close();
        }

        private void btnDeleteServer_Click(object sender, EventArgs e)
        {
            //Connect to MySQL and delete from table row that matches selected value in cmboHostname.
            MySqlConnection connectionMySQL = new MySqlConnection(loginMenu.ConnectionString);
            connectionMySQL.Open();
            MySqlCommand deleteServerCMD = new MySqlCommand("DELETE FROM serverInformation WHERE serverHostname = @Hostname",
connectionMySQL);
            deleteServerCMD.Parameters.AddWithValue("@Hostname", cmboHostname.Text);
            deleteServerCMD.ExecuteNonQuery();
            //Clear cmboHostname
            cmboHostname.Items.Clear();
            //Connect to MySQL and set output to items in cmboHostname.
```

```
        MySqlCommand serverInformationCMD = new MySqlCommand("SELECT * FROM serverInformation WHERE serverCompany = @companyID", connectionMySQL);
        serverInformationCMD.Parameters.AddWithValue("@companyID", loginMenu.CompanyID);
        MySqlDataReader serverInformationRDR = serverInformationCMD.ExecuteReader();
        while (serverInformationRDR.Read())
        {
            cmboHostname.Items.Add(serverInformationRDR.GetString("serverHostname"));
        }
        connectionMySQL.Close();
    }

    private void btnCancel_Click(object sender, EventArgs e)
    {
        //On button event, hide the form.
        Hide();
    }
}
```

Subsection 3.6.3.xcv - ticketNew.cs [design] - design view

New Ticket

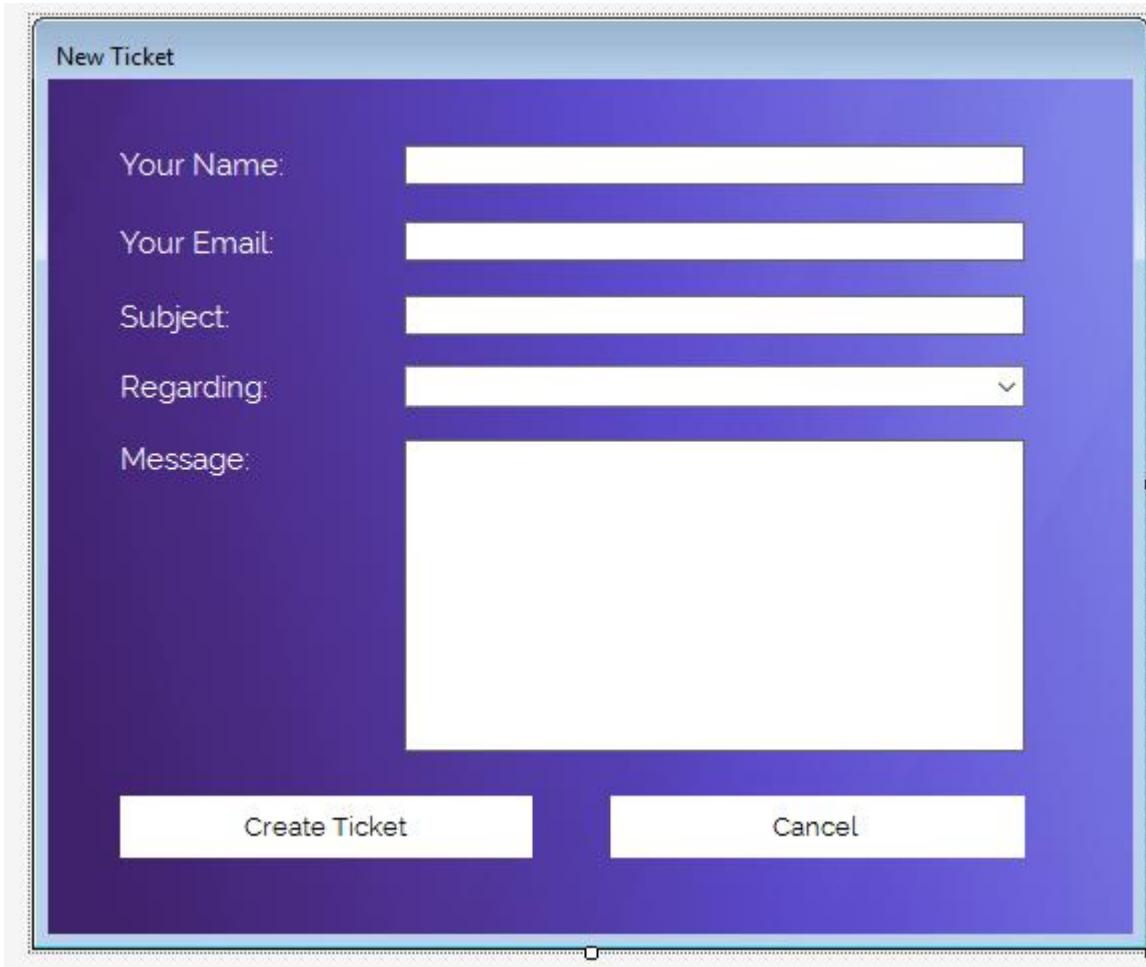
Your Name:

Your Email:

Subject:

Regarding:

Message:



Subsection 3.6.3.xcv - ticketNew.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class ticketNew
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            System.ComponentModel.ComponentResourceManager resources = new
System.ComponentModel.ComponentResourceManager(this);
            this.btnCancel = new System.Windows.Forms.Button();
            this.btnNewTicket = new System.Windows.Forms.Button();
            this.txtEmail = new System.Windows.Forms.TextBox();
            this.txtName = new System.Windows.Forms.TextBox();
            this.lblRegarding = new System.Windows.Forms.Label();
            this.lblEmail = new System.Windows.Forms.Label();
            this.lblName = new System.Windows.Forms.Label();
            this.txtContent = new System.Windows.Forms.TextBox();
            this.lblMessage = new System.Windows.Forms.Label();
            this.cmboRegarding = new System.Windows.Forms.ComboBox();
        }
    }
}
```

```
this.txtSubject = new System.Windows.Forms.TextBox();
this.lblSubject = new System.Windows.Forms.Label();
this.SuspendLayout();
//
// btnCancel
//
this.btnCancel.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnCancel.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnCancel.FlatAppearance.BorderSize = 0;
this.btnCancel.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnCancel.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCancel.Location = new System.Drawing.Point(281, 358);
this.btnCancel.Name = "btnCancel";
this.btnCancel.Size = new System.Drawing.Size(207, 31);
this.btnCancel.TabIndex = 45;
this.btnCancel.Text = "Cancel";
this.btnCancel.UseVisualStyleBackColor = false;
this.btnCancel.Click += new System.EventHandler(this.btnCancel_Click);
//
// btnNewTicket
//
this.btnNewTicket.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnNewTicket.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnNewTicket.FlatAppearance.BorderSize = 0;
this.btnNewTicket.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnNewTicket.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnNewTicket.Location = new System.Drawing.Point(36, 358);
this.btnNewTicket.Name = "btnNewTicket";
this.btnNewTicket.Size = new System.Drawing.Size(206, 31);
this.btnNewTicket.TabIndex = 44;
this.btnNewTicket.Text = "Create Ticket";
this.btnNewTicket.UseVisualStyleBackColor = false;
this.btnNewTicket.Click += new System.EventHandler(this.btnNewTicket_Click);
//
// txtEmail
//
this.txtEmail.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtEmail.Enabled = false;
this.txtEmail.Location = new System.Drawing.Point(178, 71);
this.txtEmail.Name = "txtEmail";
this.txtEmail.Size = new System.Drawing.Size(310, 20);
this.txtEmail.TabIndex = 42;
```

```
//  
// txtName  
//  
this.txtName.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;  
this.txtName.Cursor = System.Windows.Forms.Cursors.No;  
this.txtName.Enabled = false;  
this.txtName.Location = new System.Drawing.Point(178, 33);  
this.txtName.Name = "txtName";  
this.txtName.Size = new System.Drawing.Size(310, 20);  
this.txtName.TabIndex = 41;  
//  
// lblRegarding  
//  
this.lblRegarding.AutoSize = true;  
this.lblRegarding.BackColor = System.Drawing.Color.Transparent;  
this.lblRegarding.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.lblRegarding.ForeColor = System.Drawing.SystemColors.ControlLightLight;  
this.lblRegarding.Location = new System.Drawing.Point(33, 145);  
this.lblRegarding.Name = "lblRegarding";  
this.lblRegarding.Size = new System.Drawing.Size(82, 18);  
this.lblRegarding.TabIndex = 40;  
this.lblRegarding.Text = "Regarding:";  
//  
// lblEmail  
//  
this.lblEmail.AutoSize = true;  
this.lblEmail.BackColor = System.Drawing.Color.Transparent;  
this.lblEmail.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.lblEmail.ForeColor = System.Drawing.SystemColors.ControlLightLight;  
this.lblEmail.Location = new System.Drawing.Point(33, 73);  
this.lblEmail.Name = "lblEmail";  
this.lblEmail.Size = new System.Drawing.Size(85, 18);  
this.lblEmail.TabIndex = 39;  
this.lblEmail.Text = "Your Email:";  
//  
// lblName  
//  
this.lblName.AutoSize = true;  
this.lblName.BackColor = System.Drawing.Color.Transparent;  
this.lblName.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.lblName.ForeColor = System.Drawing.SystemColors.ControlLightLight;
```

```
this.lblName.Location = new System.Drawing.Point(33, 34);
this.lblName.Name = "lblName";
this.lblName.Size = new System.Drawing.Size(90, 18);
this.lblName.TabIndex = 38;
this.lblName.Text = "Your Name:";
//
// txtContent
//
this.txtContent.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtContent.Location = new System.Drawing.Point(178, 180);
this.txtContent.Multiline = true;
this.txtContent.Name = "txtContent";
this.txtContent.Size = new System.Drawing.Size(310, 156);
this.txtContent.TabIndex = 47;
//
// lblMessage
//
this.lblMessage.AutoSize = true;
this.lblMessage.BackColor = System.Drawing.Color.Transparent;
this.lblMessage.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblMessage.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblMessage.Location = new System.Drawing.Point(33, 181);
this.lblMessage.Name = "lblMessage";
this.lblMessage.Size = new System.Drawing.Size(73, 18);
this.lblMessage.TabIndex = 46;
this.lblMessage.Text = "Message:";
//
// cmboRegarding
//
this.cmboRegarding.FormattingEnabled = true;
this.cmboRegarding.Location = new System.Drawing.Point(178, 143);
this.cmboRegarding.Name = "cmboRegarding";
this.cmboRegarding.Size = new System.Drawing.Size(310, 21);
this.cmboRegarding.TabIndex = 48;
//
// txtSubject
//
this.txtSubject.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtSubject.Location = new System.Drawing.Point(178, 108);
this.txtSubject.Name = "txtSubject";
this.txtSubject.Size = new System.Drawing.Size(310, 20);
this.txtSubject.TabIndex = 50;
//
```

```
// lblSubject
//
this.lblSubject.AutoSize = true;
this.lblSubject.BackColor = System.Drawing.Color.Transparent;
this.lblSubject.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblSubject.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblSubject.Location = new System.Drawing.Point(33, 110);
this.lblSubject.Name = "lblSubject";
this.lblSubject.Size = new System.Drawing.Size(63, 18);
this.lblSubject.TabIndex = 49;
this.lblSubject.Text = "Subject:";
//
// ticketNew
//
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(542, 427);
this.ControlBox = false;
this.Controls.Add(this.txtSubject);
this.Controls.Add(this.lblSubject);
this.Controls.Add(this.cmboRegarding);
this.Controls.Add(this.txtContent);
this.Controls.Add(this.lblMessage);
this.Controls.Add(this.btnCancel);
this.Controls.Add(this.btnNewTicket);
this.Controls.Add(this.txtEmail);
this.Controls.Add(this.txtName);
this.Controls.Add(this.lblRegarding);
this.Controls.Add(this.lblEmail);
this.Controls.Add(this.lblName);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.Icon = ((System.Drawing.Icon)(resources.GetObject("$this.Icon")));
this.MinimumSize = new System.Drawing.Size(544, 242);
this.Name = "ticketNew";
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "New Ticket";
this.Load += new System.EventHandler(this.newTicket_Load);
this.ResumeLayout(false);
this.PerformLayout();

}
```

```
#endregion

private System.Windows.Forms.Button btnCancel;
private System.Windows.Forms.Button btnNewTicket;
private System.Windows.Forms.TextBox txtEmail;
private System.Windows.Forms.TextBox txtName;
private System.Windows.Forms.Label lblRegarding;
private System.Windows.Forms.Label lblEmail;
private System.Windows.Forms.Label lblName;
private System.Windows.Forms.TextBox txtContent;
private System.Windows.Forms.Label lblMessage;
private System.Windows.Forms.ComboBox cmboRegarding;
private System.Windows.Forms.TextBox txtSubject;
private System.Windows.Forms.Label lblSubject;
}

}
```

Subsection 3.6.3.xcvii - ticketNew.cs - Code file - annotated

```
using System;
using System.Windows.Forms;
using MySql.Data.MySqlClient;

namespace ELSM_Project
{
    public partial class ticketNew : Form
    {
        public ticketNew()
        {
            //On form load initialize component.
            InitializeComponent();
        }

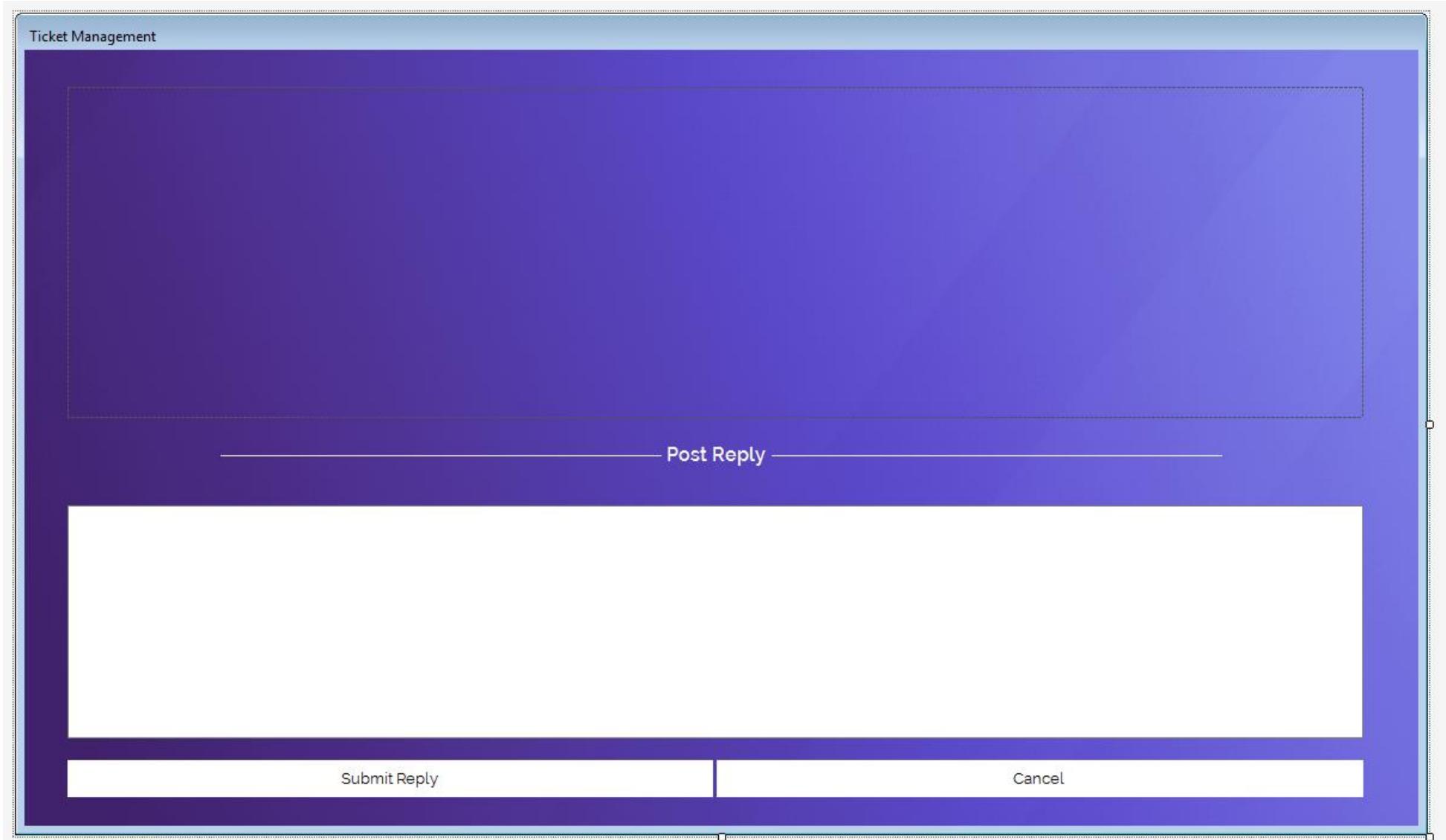
        private void newTicket_Load(object sender, EventArgs e)
        {
            //Set textboxes to customised text.
            txtName.Text = loginMenu.Forename + " " + loginMenu.Surname;
            txtEmail.Text = loginMenu.EmailAddress;
            //Connect to MySQL, set output from sql and set as items of cmboRegarding.
            MySqlConnection connectionMySQL = new MySqlConnection(loginMenu.ConnectionString);
            connectionMySQL.Open();
```

```
MySqlCommand serverCMD = new MySqlCommand("SELECT * FROM serverInformation", connectionMySQL);
MySqlDataReader serverRDR = serverCMD.ExecuteReader();
while (serverRDR.Read())
{
    cmboRegarding.Items.Add(serverRDR.GetString("serverHostname"));
}
serverRDR.Close();
connectionMySQL.Close();
}

private void btnCancel_Click(object sender, EventArgs e)
{
    //On button event, hide the form.
    Hide();
}

private void btnNewTicket_Click(object sender, EventArgs e)
{
    //Insert row into systemTickets using values.
    MySqlConnection connectionMySQL = new MySqlConnection(loginMenu.ConnectionString);
    connectionMySQL.Open();
    MySqlCommand newTicket = new MySqlCommand("INSERT INTO systemTickets (ticketCustomer, ticketRegarding, userCompanyID,
ticketSubject) VALUES (@ticketCustomer, @ticketRegarding, @userCompanyID, @ticketSubject);", connectionMySQL);
    newTicket.Parameters.AddWithValue("@ticketCustomer", loginMenu.UserID);
    newTicket.Parameters.AddWithValue("@ticketRegarding", cmboRegarding.Text);
    newTicket.Parameters.AddWithValue("@ticketSubject", txtSubject.Text);
    newTicket.Parameters.AddWithValue("@userCompanyID", loginMenu.CompanyID);
    newTicket.ExecuteNonQuery();
    //Get the LastInsertId of the last insert.
    var ticketID = newTicket.LastInsertedId;
    //Insert row into systemReplies using values.
    MySqlCommand newTicketReply = new MySqlCommand("INSERT INTO systemReplies (ticketID, userID, replyContent) VALUES
(@ticketID, @userID, @replyContent)", connectionMySQL);
    newTicketReply.Parameters.AddWithValue("@ticketID", ticketID);
    newTicketReply.Parameters.AddWithValue("@userID", loginMenu.UserID);
    newTicketReply.Parameters.AddWithValue("@replyContent", txtContent.Text);
    newTicketReply.ExecuteNonQuery();
    Hide();
}
}
```

Subsection 3.6.3.xcviii - ticketReply.cs [design] - design view



Subsection 3.6.3.xcix - ticketReply.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class ticketReply
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            System.ComponentModel.ComponentResourceManager resources = new
System.ComponentModel.ComponentResourceManager(this);
            this.btnCancel = new System.Windows.Forms.Button();
            this.btnPostReply = new System.Windows.Forms.Button();
            this.pnlConfiguration = new System.Windows.Forms.Panel();
            this.txtReply = new System.Windows.Forms.TextBox();
            this.pictureBox1 = new System.Windows.Forms.PictureBox();
            this.lblPostReply = new System.Windows.Forms.Label();
            ((System.ComponentModel.ISupportInitialize)(this.pictureBox1)).BeginInit();
            this.SuspendLayout();
            // 
            // btnCancel
            // 
```

```
//  
this.btnCancel.BackColor = System.Drawing.SystemColors.ControlLightLight;  
this.btnCancel.Cursor = System.Windows.Forms.Cursors.Hand;  
this.btnCancel.FlatAppearance.BorderSize = 0;  
this.btnCancel.FlatStyle = System.Windows.Forms.FlatStyle.Flat;  
this.btnCancel.Font = new System.Drawing.Font("Raleway", 9.74999F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.btnCancel.Location = new System.Drawing.Point(579, 594);  
this.btnCancel.Name = "btnCancel";  
this.btnCancel.Size = new System.Drawing.Size(541, 31);  
this.btnCancel.TabIndex = 45;  
this.btnCancel.Text = "Cancel";  
this.btnCancel.UseVisualStyleBackColor = false;  
this.btnCancel.Click += new System.EventHandler(this.btnCancel_Click);  
//  
// btnPostReply  
//  
this.btnPostReply.BackColor = System.Drawing.SystemColors.ControlLightLight;  
this.btnPostReply.Cursor = System.Windows.Forms.Cursors.Hand;  
this.btnPostReply.FlatAppearance.BorderSize = 0;  
this.btnPostReply.FlatStyle = System.Windows.Forms.FlatStyle.Flat;  
this.btnPostReply.Font = new System.Drawing.Font("Raleway", 9.74999F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.btnPostReply.Location = new System.Drawing.Point(36, 594);  
this.btnPostReply.Name = "btnPostReply";  
this.btnPostReply.Size = new System.Drawing.Size(540, 31);  
this.btnPostReply.TabIndex = 44;  
this.btnPostReply.Text = "Submit Reply";  
this.btnPostReply.UseVisualStyleBackColor = false;  
this.btnPostReply.Click += new System.EventHandler(this.btnNewCommand_Click);  
//  
// pnlConfiguration  
//  
this.pnlConfiguration.AutoScroll = true;  
this.pnlConfiguration.BackColor = System.Drawing.Color.Transparent;  
this.pnlConfiguration.Location = new System.Drawing.Point(36, 31);  
this.pnlConfiguration.Name = "pnlConfiguration";  
this.pnlConfiguration.Size = new System.Drawing.Size(1084, 277);  
this.pnlConfiguration.TabIndex = 50;  
//  
// txtReply  
//  
this.txtReply.Location = new System.Drawing.Point(36, 381);  
this.txtReply.Multiline = true;
```

```
this.txtReply.Name = "txtReply";
this.txtReply.Size = new System.Drawing.Size(1084, 195);
this.txtReply.TabIndex = 52;
//
// pictureBox1
//
this.pictureBox1.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.pictureBox1.Location = new System.Drawing.Point(164, 339);
this.pictureBox1.Name = "pictureBox1";
this.pictureBox1.Size = new System.Drawing.Size(838, 1);
this.pictureBox1.TabIndex = 53;
this.pictureBox1.TabStop = false;
//
// lblPostReply
//
this.lblPostReply.AutoSize = true;
this.lblPostReply.BackColor = System.Drawing.Color.Transparent;
this.lblPostReply.Font = new System.Drawing.Font("Raleway SemiBold", 12F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblPostReply.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblPostReply.Location = new System.Drawing.Point(533, 329);
this.lblPostReply.Name = "lblPostReply";
this.lblPostReply.Size = new System.Drawing.Size(92, 19);
this.lblPostReply.TabIndex = 54;
this.lblPostReply.Text = "Post Reply";
//
// ticketReply
//
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.AutoScroll = true;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(1166, 649);
this.ControlBox = false;
this.Controls.Add(this.lblPostReply);
this.Controls.Add(this.pictureBox1);
this.Controls.Add(this.txtReply);
this.Controls.Add(this.pnlConfiguration);
this.Controls.Add(this.btnCancel);
this.Controls.Add(this.btnPostReply);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.Icon = ((System.Drawing.Icon)(resources.GetObject("$this.Icon")));
this.MaximumSize = new System.Drawing.Size(1182, 688);
```

```
this.MinimumSize = new System.Drawing.Size(1182, 688);
this.Name = "ticketReply";
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "Ticket Management";
this.Load += new System.EventHandler(this.serverControlEdit_Load);
((System.ComponentModel.ISupportInitialize)(this.pictureBox1)).EndInit();
this.ResumeLayout(false);
this.PerformLayout();

}

#endregion

private System.Windows.Forms.Button btnCancel;
private System.Windows.Forms.Button btnPostReply;
private System.Windows.Forms.Panel pnlConfiguration;
private System.Windows.Forms.TextBox txtReply;
private System.Windows.Forms.PictureBox pictureBox1;
private System.Windows.Forms.Label lblPostReply;
}
}
```

Subsection 3.6.3.c - ticketReply.cs - Code file - annotated

```
using System;
using System.Drawing;
using System.Linq;
using System.Windows.Forms;
using MySql.Data.MySqlClient;

namespace ELSM_Project
{
    public partial class ticketReply : Form
    {
        public ticketReply()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        private static int loopnum, pointX = 235, pointY = 20;

        private void serverControlEdit_Load(object sender, EventArgs e)
        {
            //Create variables and arrays for use in program.
            string[] userIDList = new string[100];
            string[] replyContent = new string[100];
            string forename = "", surname = "";
            loopnum = 0;
            //Connect to MySQL and execute SQL to get all rows from system replies.
            MySqlConnection connectionMySQL = new MySqlConnection(loginMenu.ConnectionString);
            connectionMySQL.Open();
            MySqlCommand systemRepliesCMD = new MySqlCommand("SELECT * FROM systemReplies WHERE ticketID = @ticketID",
connectionMySQL);
            systemRepliesCMD.Parameters.AddWithValue("@ticketID", ticketView.ticketID);
            MySqlDataReader repliesReader = systemRepliesCMD.ExecuteReader();
            //While there are rows left in the output, add the ID of the user and the content of the reply to an array.
            while (repliesReader.Read())
            {
                userIDList[loopnum] = Convert.ToString(repliesReader[2]);
                replyContent[loopnum] = Convert.ToString(repliesReader[3]);
                loopnum = loopnum + 1;
            }
            repliesReader.Close();
            int totalloop = loopnum;
```

```
loopnum = 0;
pnlConfiguration.Height += 40;
this.Height += 40;
while (loopnum != totalloop)
{
    //Run SQL command to get the values from userAccounts where the ID matches the value in the array.
    MySqlCommand userDetailsCMD = new MySqlCommand("SELECT * FROM userAccounts WHERE userID = @userID",
connectionMySQL);
    userDetailsCMD.Parameters.AddWithValue("@userID", userIDList[loopnum]);
    MySqlDataReader userDetailReader = userDetailsCMD.ExecuteReader();
    userDetailReader.Read();
    //Set forename and surname to the corresponding values from the read output.
    forename = Convert.ToString(userDetailReader[3]);
    surname = Convert.ToString(userDetailReader[4]);
    userDetailReader.Close();
    //Create a new dynamic label, set the name and the text of the label. Configure it to have autosize to true, and
set its position & text color. Then, display it on the form and add 1 to the loopnum.
    Label box = new Label();
    box.Name = "chkOS" + Convert.ToString(loopnum);
    box.Text = forename + " " + surname;
    box.AutoSize = true;
    box.Location = new Point(10, loopnum * 20);
    box.ForeColor = Color.White;
    pnlConfiguration.Controls.Add(box);
    loopnum += 1;
}
//Set values
int pointX = 235;
int pointY = 0;
int loopnum2 = 0;
//Repeat code for the same amount of time that the reader output.
for (int i = 0; i < loopnum; i++)
{
    //Create a new dynamic label, set the name and the text of the label. Configure it to have autosize to true, and
set its position & text color. Then, display it on the form and add 1 to the loopnum.
    Label a = new Label();
    a.Location = new Point(pointX, pointY);
    a.Name = "lblContent" + loopnum2;
    a.Text = replyContent[loopnum2];
    a.AutoSize = true;
    a.ForeColor = Color.White;
    pnlConfiguration.Controls.Add(a);
    pnlConfiguration.Show();
    pointY += 20;
```

```
        loopnum2 += 1;
    }
    //Set window height, box height and disconnect from MySQL.
    this.Height += loopnum2 * 5;
    pnlConfiguration.Height += (loopnum2 * 5);
    connectionMySQL.Close();
}

private void btnNewCommand_Click(object sender, EventArgs e)
{
    //Insert new reply into the database.
    MySqlConnection connectionMySQL = new MySqlConnection(loginMenu.ConnectionString);
    connectionMySQL.Open();
    MySqlCommand newTicketReply = new MySqlCommand("INSERT INTO systemReplies (ticketID, userID, replyContent) VALUES (@ticketID, @userID, @replyContent)", connectionMySQL);
    newTicketReply.Parameters.AddWithValue("@ticketID", ticketView.ticketID);
    newTicketReply.Parameters.AddWithValue("@userID", loginMenu.UserID);
    newTicketReply.Parameters.AddWithValue("@replyContent", txtReply.Text);
    newTicketReply.ExecuteNonQuery();

    //Hide the form.
    Hide();
}

private void btnCancel_Click(object sender, EventArgs e)
{
    //On button event, hide the form.
    Hide();
}
}
```

Subsection 3.6.3.ci - ticketView.cs [design] - design view

Active Tickets

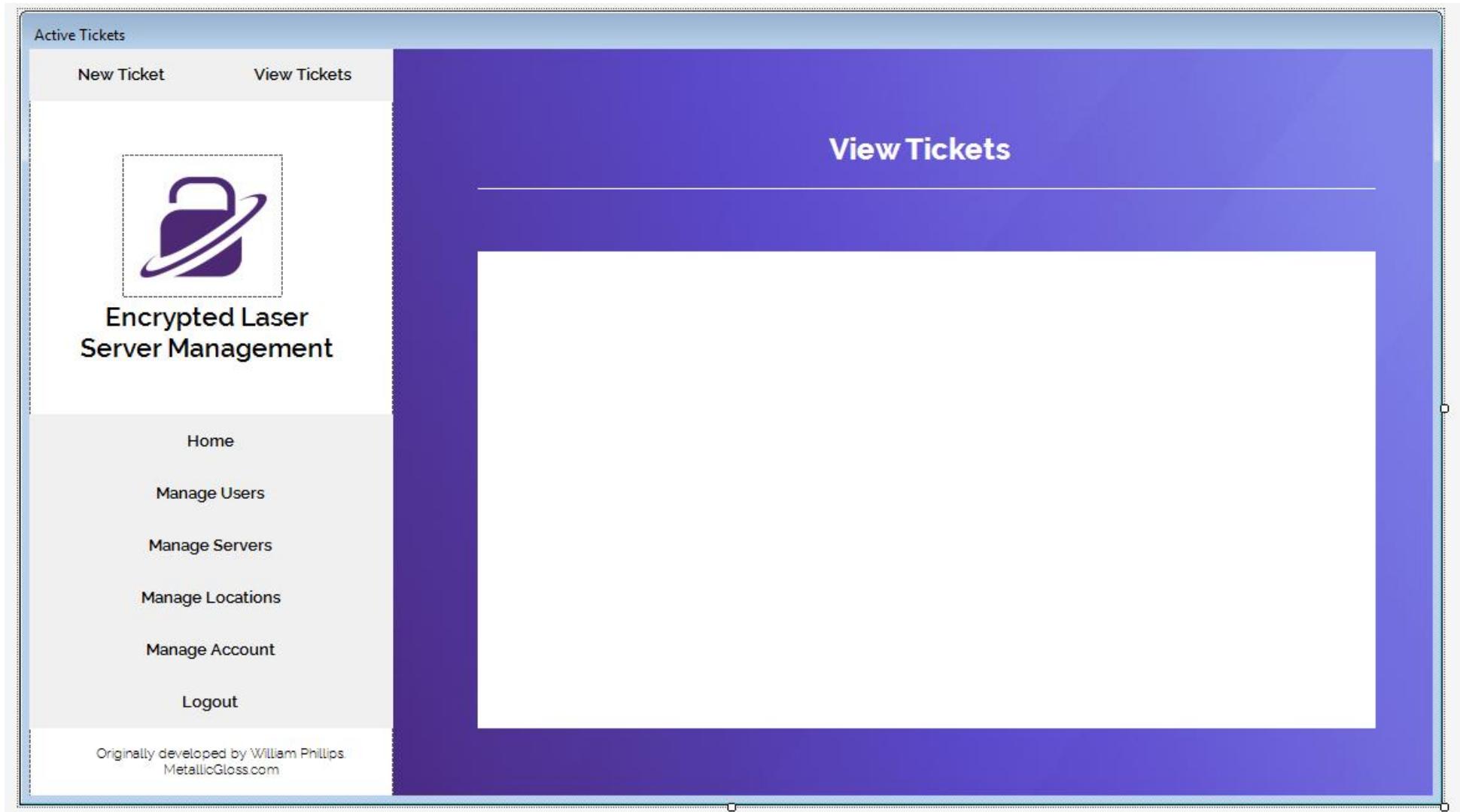
New Ticket View Tickets

 Encrypted Laser Server Management

Home
Manage Users
Manage Servers
Manage Locations
Manage Account
Logout

Originally developed by William Phillips
MetallicGloss.com

View Tickets



Subsection 3.6.3.cii - ticketView.designer.cs - Object file - unannotated

```
this.menuBackground = new System.Windows.Forms.PictureBox();
this.pictureBox2 = new System.Windows.Forms.PictureBox();
this.lblManageServers = new System.Windows.Forms.Label();
this.ticketViewDGV = new System.Windows.Forms.DataGridView();
this.btnCreateTicket = new System.Windows.Forms.Button();
this.btnTicketReply = new System.Windows.Forms.Button();
((System.ComponentModel.ISupportInitialize) (this.ELHSLogo)).BeginInit();
((System.ComponentModel.ISupportInitialize) (this.menuBackground)).BeginInit();
((System.ComponentModel.ISupportInitialize) (this.pictureBox2)).BeginInit();
((System.ComponentModel.ISupportInitialize) (this.ticketViewDGV)).BeginInit();
this.SuspendLayout();
//
// lblMetallicGloss
//
this.lblMetallicGloss.AutoSize = true;
this.lblMetallicGloss.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.lblMetallicGloss.Cursor = System.Windows.Forms.Cursors.Hand;
this.lblMetallicGloss.Font = new System.Drawing.Font("Raleway Light", 8.24999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblMetallicGloss.Location = new System.Drawing.Point(51, 561);
this.lblMetallicGloss.Name = "lblMetallicGloss";
this.lblMetallicGloss.Size = new System.Drawing.Size(208, 26);
this.lblMetallicGloss.TabIndex = 16;
this.lblMetallicGloss.Text = "Originally developed by William Phillips.\r\nMetallicGloss.com";
this.lblMetallicGloss.TextAlign = System.Drawing.ContentAlignment.MiddleCenter;
this.lblMetallicGloss.Click += new System.EventHandler(this.lblMetallicGloss_Click);
//
// lblTitle
//
this.lblTitle.AutoSize = true;
this.lblTitle.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.lblTitle.Font = new System.Drawing.Font("Raleway SemiBold", 15.75F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblTitle.Location = new System.Drawing.Point(36, 203);
this.lblTitle.Name = "lblTitle";
this.lblTitle.Size = new System.Drawing.Size(216, 50);
this.lblTitle.TabIndex = 14;
this.lblTitle.Text = "Encrypted Laser\r\nServer Management";
this.lblTitle.TextAlign = System.Drawing.ContentAlignment.MiddleCenter;
//
// btnLogout
//
this.btnExit.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnExit.FlatStyle = FlatAppearance.BorderSize;
```

```
this.btnExit.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnExit.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnExit.Location = new System.Drawing.Point(0, 504);
this.btnExit.Name = "btnLogout";
this.btnExit.Size = new System.Drawing.Size(293, 43);
this.btnExit.TabIndex = 6;
this.btnExit.Text = "Logout";
this.btnExit.UseVisualStyleBackColor = true;
this.btnExit.Click += new System.EventHandler(this.btnExit_Click);
//
// btnManageAccount
//
this.btnManageAccount.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnManageAccount.FlatAppearance.BorderSize = 0;
this.btnManageAccount.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnManageAccount.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnManageAccount.Location = new System.Drawing.Point(0, 462);
this.btnManageAccount.Name = "btnManageAccount";
this.btnManageAccount.Size = new System.Drawing.Size(293, 43);
this.btnManageAccount.TabIndex = 5;
this.btnManageAccount.Text = "Manage Account";
this.btnManageAccount.UseVisualStyleBackColor = true;
this.btnManageAccount.Click += new System.EventHandler(this.btnManageAccount_Click);
//
// btnManageServers
//
this.btnManageServers.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnManageServers.FlatAppearance.BorderSize = 0;
this.btnManageServers.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnManageServers.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnManageServers.Location = new System.Drawing.Point(0, 378);
this.btnManageServers.Name = "btnManageServers";
this.btnManageServers.Size = new System.Drawing.Size(293, 43);
this.btnManageServers.TabIndex = 3;
this.btnManageServers.Text = "Manage Servers";
this.btnManageServers.UseVisualStyleBackColor = true;
this.btnManageServers.Click += new System.EventHandler(this.btnManageServers_Click);
//
// btnManageLocations
//
this.btnManageLocations.Cursor = System.Windows.Forms.Cursors.Hand;
```

```
this.btnManageLocations.FlatAppearance.BorderSize = 0;
this.btnManageLocations.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnManageLocations.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnManageLocations.Location = new System.Drawing.Point(0, 420);
this.btnManageLocations.Name = "btnManageLocations";
this.btnManageLocations.Size = new System.Drawing.Size(293, 43);
this.btnManageLocations.TabIndex = 4;
this.btnManageLocations.Text = "Manage Locations";
this.btnManageLocations.UseVisualStyleBackColor = true;
this.btnManageLocations.Click += new System.EventHandler(this.btnManageLocations_Click);
//
// btnManageUsers
//
this.btnManageUsers.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnManageUsers.FlatAppearance.BorderSize = 0;
this.btnManageUsers.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnManageUsers.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnManageUsers.Location = new System.Drawing.Point(0, 336);
this.btnManageUsers.Name = "btnManageUsers";
this.btnManageUsers.Size = new System.Drawing.Size(293, 43);
this.btnManageUsers.TabIndex = 2;
this.btnManageUsers.Text = "Manage Users";
this.btnManageUsers.UseVisualStyleBackColor = true;
this.btnManageUsers.Click += new System.EventHandler(this.btnManageUsers_Click);
//
// btnHome
//
this.btnHome.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnHome.FlatAppearance.BorderSize = 0;
this.btnHome.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnHome.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnHome.Location = new System.Drawing.Point(0, 294);
this.btnHome.Name = "btnHome";
this.btnHome.Size = new System.Drawing.Size(293, 43);
this.btnHome.TabIndex = 1;
this.btnHome.Text = "Home";
this.btnHome.UseVisualStyleBackColor = true;
this.btnHome.Click += new System.EventHandler(this.btnHome_Click);
//
// ELHSLogo
//
```

```
this.ElhsLogo.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.ElhsLogo.BackgroundImage = global::ELSM_Project.Properties.Resources.imgLogoPurple;
this.ElhsLogo.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ElhsLogo.Location = new System.Drawing.Point(75, 85);
this.ElhsLogo.Name = "ELHSLogo";
this.ElhsLogo.Size = new System.Drawing.Size(129, 115);
this.ElhsLogo.TabIndex = 27;
this.ElhsLogo.TabStop = false;
//
// menuBackground
//
this.menuBackground.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.menuBackground.Location = new System.Drawing.Point(0, -1);
this.menuBackground.Name = "menuBackground";
this.menuBackground.Size = new System.Drawing.Size(293, 609);
this.menuBackground.TabIndex = 28;
this.menuBackground.TabStop = false;
//
// pictureBox2
//
this.pictureBox2.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.pictureBox2.Location = new System.Drawing.Point(361, 112);
this.pictureBox2.Name = "pictureBox2";
this.pictureBox2.Size = new System.Drawing.Size(723, 1);
this.pictureBox2.TabIndex = 47;
this.pictureBox2.TabStop = false;
//
// lblManageServers
//
this.lblManageServers.AutoSize = true;
this.lblManageServers.BackColor = System.Drawing.Color.Transparent;
this.lblManageServers.Font = new System.Drawing.Font("Raleway ExtraBold", 18F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblManageServers.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblManageServers.Location = new System.Drawing.Point(639, 66);
this.lblManageServers.Name = "lblManageServers";
this.lblManageServers.Size = new System.Drawing.Size(159, 29);
this.lblManageServers.TabIndex = 46;
this.lblManageServers.Text = "View Tickets";
//
// ticketViewDGV
//
this.ticketViewDGV.AllowUserToAddRows = false;
this.ticketViewDGV.AllowUserToDeleteRows = false;
```

```
this.ticketViewDGV.AllowUserToResizeColumns = false;
this.ticketViewDGV.AllowUserToResizeRows = false;
this.ticketViewDGV.AutoSizeColumnsMode = System.Windows.Forms.DataGridViewAutoSizeColumnsMode.Fill;
this.ticketViewDGV.BackgroundColor = System.Drawing.SystemColors.ControlLightLight;
this.ticketViewDGV.BorderStyle = System.Windows.Forms.BorderStyle.None;
this.ticketViewDGV.CellBorderStyle = System.Windows.Forms.DataGridViewCellBorderStyle.None;
this.ticketViewDGV.ColumnHeadersBorderStyle = System.Windows.Forms.DataGridViewColumnBorderStyle.Single;
dataGridViewCellStyle1.Alignment = System.Windows.Forms.DataGridViewAutoSizeColumnsMode.MiddleCenter;
dataGridViewCellStyle1.BackColor = System.Drawing.SystemColors.Control;
dataGridViewCellStyle1.Font = new System.Drawing.Font("Microsoft Sans Serif", 8.25F,
System.Drawing.FontStyle.Regular, System.Drawing.GraphicsUnit.Point, ((byte)(0)));
dataGridViewCellStyle1.ForeColor = System.Drawing.SystemColors.WindowText;
dataGridViewCellStyle1.SelectionBackColor = System.Drawing.SystemColors.Highlight;
dataGridViewCellStyle1.SelectionForeColor = System.Drawing.SystemColors.HighlightText;
dataGridViewCellStyle1.WrapMode = System.Windows.Forms.DataGridViewAutoSizeTriState.True;
this.ticketViewDGV.ColumnHeadersDefaultCellStyle = dataGridViewCellStyle1;
this.ticketViewDGV.ColumnHeadersHeightSizeMode =
System.Windows.Forms.DataGridViewAutoSizeColumnsMode.AutoSizeMode;
this.ticketViewDGV.GridColor = System.Drawing.SystemColors.ButtonFace;
this.ticketViewDGV.Location = new System.Drawing.Point(361, 163);
this.ticketViewDGV.Name = "ticketViewDGV";
this.ticketViewDGV.ReadOnly = true;
this.ticketViewDGV.RowHeadersVisible = false;
this.ticketViewDGV.RowHeadersWidthSizeMode =
System.Windows.Forms.DataGridViewAutoSizeColumnsMode.AutoSizeMode;
this.ticketViewDGV.SelectionMode = System.Windows.Forms.DataGridViewAutoSizeSelectionMode.FullRowSelect;
this.ticketViewDGV.ShowCellErrors = false;
this.ticketViewDGV.ShowCellToolTips = false;
this.ticketViewDGV.ShowEditingIcon = false;
this.ticketViewDGV.ShowRowErrors = false;
this.ticketViewDGV.Size = new System.Drawing.Size(723, 384);
this.ticketViewDGV.TabIndex = 45;
this.ticketViewDGV.VirtualMode = true;
this.ticketViewDGV.CellClick += new System.Windows.Forms.DataGridViewAutoSizeCellEventHandler(this.ticketViewDGV_CellClick);
//
// btnCreateTicket
//
this.btnCreateTicket.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnCreateTicket.FlatAppearance.BorderSize = 0;
this.btnCreateTicket.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnCreateTicket.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCreateTicket.Location = new System.Drawing.Point(0, -1);
this.btnCreateTicket.Name = "btnCreateTicket";
```

```
this.btnCreateTicket.Size = new System.Drawing.Size(149, 43);
this.btnCreateTicket.TabIndex = 49;
this.btnCreateTicket.Text = "New Ticket";
this.btnCreateTicket.UseVisualStyleBackColor = true;
this.btnCreateTicket.Click += new System.EventHandler(this.btnCreateTicket_Click);
//
// btnTicketReply
//
this.btnTicketReply.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnTicketReply.FlatAppearance.BorderSize = 0;
this.btnTicketReply.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnTicketReply.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnTicketReply.Location = new System.Drawing.Point(148, -1);
this.btnTicketReply.Name = "btnTicketReply";
this.btnTicketReply.Size = new System.Drawing.Size(145, 43);
this.btnTicketReply.TabIndex = 48;
this.btnTicketReply.Text = "View Tickets";
this.btnTicketReply.UseVisualStyleBackColor = true;
this.btnTicketReply.Click += new System.EventHandler(this.btnTicketReply_Click);
//
// ticketView
//
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(1130, 601);
this.ControlBox = false;
this.Controls.Add(this.btnCreateTicket);
this.Controls.Add(this.btnTicketReply);
this.Controls.Add(this.pictureBox2);
this.Controls.Add(this.lblManageServers);
this.Controls.Add(this.ticketViewDGV);
this.Controls.Add(this.lblMetallicGloss);
this.Controls.Add(this.lblTitle);
this.Controls.Add(this.btnExit);
this.Controls.Add(this.btnManageAccount);
this.Controls.Add(this.btnManageServers);
this.Controls.Add(this.btnManageLocations);
this.Controls.Add(this.btnManageUsers);
this.Controls.Add(this.btnExit);
this.Controls.Add(this.ELHSLogo);
this.Controls.Add(this.menuBackground);
```

```
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.Icon = ((System.Drawing.Icon)(resources.GetObject("$this.Icon")));
this.MaximizeBox = false;
this.MaximumSize = new System.Drawing.Size(1146, 640);
this.MinimumSize = new System.Drawing.Size(1146, 640);
this.Name = "ticketView";
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "Active Tickets";
this.Load += new System.EventHandler(this.manageServers_Load);
((System.ComponentModel.ISupportInitialize) (this.ELHSLogo)).EndInit();
((System.ComponentModel.ISupportInitialize) (this.menuBackground)).EndInit();
((System.ComponentModel.ISupportInitialize) (this.pictureBox2)).EndInit();
((System.ComponentModel.ISupportInitialize) (this.ticketViewDGV)).EndInit();
this.ResumeLayout(false);
this.PerformLayout();

}

#endregion

private System.Windows.Forms.Label lblMetallicGloss;
private System.Windows.Forms.Label lblTitle;
private System.Windows.Forms.Button btnLogout;
private System.Windows.Forms.Button btnManageAccount;
private System.Windows.Forms.Button btnManageServers;
private System.Windows.Forms.Button btnManageLocations;
private System.Windows.Forms.Button btnManageUsers;
private System.Windows.Forms.Button btnHome;
private System.Windows.Forms.PictureBox ELHSLogo;
private System.Windows.Forms.PictureBox menuBackground;
private System.Windows.Forms.PictureBox pictureBox2;
private System.Windows.Forms.Label lblManageServers;
private System.Windows.Forms.DataGridView ticketViewDGV;
private System.Windows.Forms.Button btnCreateTicket;
private System.Windows.Forms.Button btnTicketReply;
}

}
```

Subsection 3.6.3.ciii - ticketView.cs - Code file - annotated

```
using System;
using System.Data;
using System.Windows.Forms;
using MySql.Data.MySqlClient;

namespace ELSM_Project
{
    public partial class ticketView : Form
    {
        public ticketView()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        public static string ticketID;

        private void btnHome_Click(object sender, EventArgs e)
        {
            //On button event, hide current form and open mainDashboard.
            Hide();
            mainDashboard Dashboard = new mainDashboard();
            Dashboard.ShowDialog();
        }

        private void btnManageUsers_Click(object sender, EventArgs e)
        {
            //On button event, hide current form and open userList.
            Hide();
            userList userListForm = new userList();
            userListForm.ShowDialog();
        }

        private void btnManageServers_Click(object sender, EventArgs e)
        {
            //On button event, hide current form and open serverManagement.
            Hide();
            serverManagement manageS = new serverManagement();
            manageS.ShowDialog();
        }

        private void btnManageLocations_Click(object sender, EventArgs e)
```

```
{  
    //On button event, hide current form and open locationManagement.  
    Hide();  
    locationManagement manageL = new locationManagement();  
    manageL.ShowDialog();  
}  
  
private void btnManageAccount_Click(object sender, EventArgs e)  
{  
    //On button event, hide current form and open accountManagement.  
    Hide();  
    accountManagement Account = new accountManagement();  
    Account.ShowDialog();  
}  
  
private void btnLogout_Click(object sender, EventArgs e)  
{  
    //On button event, trigger a message box confirming logout. If the user input is Yes, close the form.  
    if (MessageBox.Show("Are you sure you want to logout?", "Confirmation", MessageBoxButtons.YesNo) != DialogResult.No)  
    {  
        this.Close();  
    }  
}  
  
private void lblMetallicGloss_Click(object sender, EventArgs e)  
{  
    //Create process to open the link www.metallicgloss.com in the default browser.  
    System.Diagnostics.Process.Start("https://www.metallicgloss.com");  
}  
  
private void manageServers_Load(object sender, EventArgs e)  
{  
    //Initialize permissions by using boolean variables on the loginMenu form to disable buttons if the permission is not  
    granted.  
    if (loginMenu.permViewLocations == false)  
    {  
        btnManageLocations.Enabled = false;  
    }  
    if (loginMenu.permAdminViewUsers == false)  
    {  
        btnManageUsers.Enabled = false;  
    }  
    if (loginMenu.permViewServers == false)  
    {  
    }
```

```
        btnManageServers.Enabled = false;
    }
    //Connect to MySQL and fill datagridview with data outputted from the SQL command.
    MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
    conn.Open();
    try
    {
        MySqlDataAdapter MyDA = new MySqlDataAdapter();
        MyDA.SelectCommand = new MySqlCommand("SELECT ticketID, ticketSubject, ticketUpdated, ticketCustomer,
ticketRegarding FROM systemTickets WHERE userCompanyID = " + loginMenu.CompanyID + "", conn);
        DataTable table = new DataTable();
        MyDA.Fill(table);
        BindingSource bSource = new BindingSource();
        bSource.DataSource = table;
        ticketViewDGV.DataSource = bSource;
    }
    catch (MySql.Data.MySqlClient.MySqlException ex)
    {
        MessageBox.Show(ex.Message);
        Close();
    }
}

private void ticketViewDGV_CellClick(object sender, DataGridViewCellEventArgs e)
{
    //On click set variable and open ticketReply.
    ticketID = ticketViewDGV.Rows[ticketViewDGV.SelectedRows[0].Index].Cells[0].Value.ToString();
    ticketReply ticketReplyWindow = new ticketReply();
    ticketReplyWindow.ShowDialog();
}

private void btnCreateTicket_Click(object sender, EventArgs e)
{
    //On button event open ticketNew.
    ticketNew ticket = new ticketNew();
    ticket.ShowDialog();
}

private void btnTicketReply_Click(object sender, EventArgs e)
{
    //On button event, hide current form and open ticketView.
    Hide();
    ticketView ticket = new ticketView();
    ticket.ShowDialog();
```

}
}

Subsection 3.6.3.civ - userList.cs [design] - design view

User List

New Ticket View Tickets

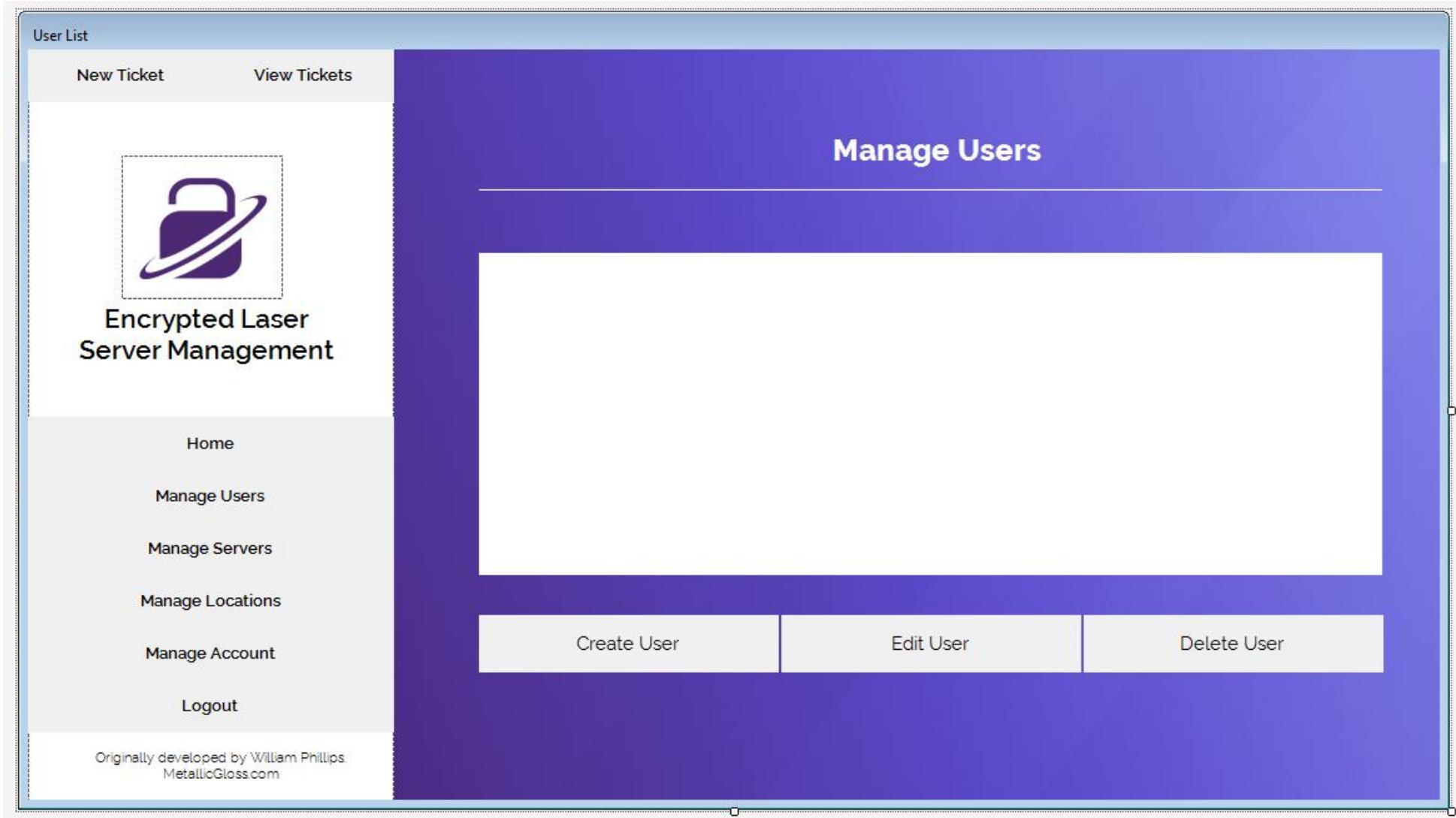
 Encrypted Laser Server Management

Home
Manage Users
Manage Servers
Manage Locations
Manage Account
Logout

Originally developed by William Phillips
MetallicGloss.com

Manage Users

Create User Edit User Delete User



Subsection 3.6.3.cv - userList.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class userList
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            System.Windows.Forms.DataGridViewCellStyle dataGridViewCellStyle1 = new System.Windows.Forms.DataGridViewCellStyle();
            System.ComponentModel.ComponentResourceManager resources = new
System.ComponentModel.ComponentResourceManager(typeof(userList));
            this.lblMetallicGloss = new System.Windows.Forms.Label();
            this.lblTitle = new System.Windows.Forms.Label();
            this.btnExit = new System.Windows.Forms.Button();
            this.btnManageAccount = new System.Windows.Forms.Button();
            this.btnManageServers = new System.Windows.Forms.Button();
            this.btnManageLocations = new System.Windows.Forms.Button();
            this.btnManageUsers = new System.Windows.Forms.Button();
            this.btnExit = new System.Windows.Forms.Button();
            this.EHLogo = new System.Windows.Forms.PictureBox();
        }
    }
}
```

```
this.menuBackground = new System.Windows.Forms.PictureBox();
this.pictureBox2 = new System.Windows.Forms.PictureBox();
this.lblManageServers = new System.Windows.Forms.Label();
this.userListDGV = new System.Windows.Forms.DataGridView();
this.btnDeleteUser = new System.Windows.Forms.Button();
this.btnEditUser = new System.Windows.Forms.Button();
this.btnAddUser = new System.Windows.Forms.Button();
this.btnAddTicket = new System.Windows.Forms.Button();
this.btnTicketReply = new System.Windows.Forms.Button();
((System.ComponentModel.ISupportInitialize) (this.ELHSLogo)).BeginInit();
((System.ComponentModel.ISupportInitialize) (this.menuBackground)).BeginInit();
((System.ComponentModel.ISupportInitialize) (this.pictureBox2)).BeginInit();
((System.ComponentModel.ISupportInitialize) (this.userListDGV)).BeginInit();
this.SuspendLayout();
//
// lblMetallicGloss
//
this.lblMetallicGloss.AutoSize = true;
this.lblMetallicGloss.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.lblMetallicGloss.Cursor = System.Windows.Forms.Cursors.Hand;
this.lblMetallicGloss.Font = new System.Drawing.Font("Raleway Light", 8.249999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblMetallicGloss.Location = new System.Drawing.Point(51, 561);
this.lblMetallicGloss.Name = "lblMetallicGloss";
this.lblMetallicGloss.Size = new System.Drawing.Size(208, 26);
this.lblMetallicGloss.TabIndex = 16;
this.lblMetallicGloss.Text = "Originally developed by William Phillips.\r\nMetallicGloss.com";
this.lblMetallicGloss.TextAlign = System.Drawing.ContentAlignment.MiddleCenter;
this.lblMetallicGloss.Click += new System.EventHandler(this.lblMetallicGloss_Click);
//
// lblTitle
//
this.lblTitle.AutoSize = true;
this.lblTitle.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.lblTitle.Font = new System.Drawing.Font("Raleway SemiBold", 15.75F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblTitle.Location = new System.Drawing.Point(36, 203);
this.lblTitle.Name = "lblTitle";
this.lblTitle.Size = new System.Drawing.Size(216, 50);
this.lblTitle.TabIndex = 14;
this.lblTitle.Text = "Encrypted Laser\r\nServer Management";
this.lblTitle.TextAlign = System.Drawing.ContentAlignment.MiddleCenter;
//
// btnLogout
//
```

```
//  
this.btnExit.Cursor = System.Windows.Forms.Cursors.Hand;  
this.btnExit.FlatAppearance.BorderSize = 0;  
this.btnExit.FlatStyle = System.Windows.Forms.FlatStyle.Flat;  
this.btnExit.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.btnExit.Location = new System.Drawing.Point(0, 504);  
this.btnExit.Name = "btnLogout";  
this.btnExit.Size = new System.Drawing.Size(293, 43);  
this.btnExit.TabIndex = 6;  
this.btnExit.Text = "Logout";  
this.btnExit.UseVisualStyleBackColor = true;  
this.btnExit.Click += new System.EventHandler(this.btnExit_Click);  
//  
// btnManageAccount  
//  
this.btnManageAccount.Cursor = System.Windows.Forms.Cursors.Hand;  
this.btnManageAccount.FlatAppearance.BorderSize = 0;  
this.btnManageAccount.FlatStyle = System.Windows.Forms.FlatStyle.Flat;  
this.btnManageAccount.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.btnManageAccount.Location = new System.Drawing.Point(0, 462);  
this.btnManageAccount.Name = "btnManageAccount";  
this.btnManageAccount.Size = new System.Drawing.Size(293, 43);  
this.btnManageAccount.TabIndex = 5;  
this.btnManageAccount.Text = "Manage Account";  
this.btnManageAccount.UseVisualStyleBackColor = true;  
this.btnManageAccount.Click += new System.EventHandler(this.btnManageAccount_Click);  
//  
// btnManageServers  
//  
this.btnManageServers.Cursor = System.Windows.Forms.Cursors.Hand;  
this.btnManageServers.FlatAppearance.BorderSize = 0;  
this.btnManageServers.FlatStyle = System.Windows.Forms.FlatStyle.Flat;  
this.btnManageServers.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.btnManageServers.Location = new System.Drawing.Point(0, 378);  
this.btnManageServers.Name = "btnManageServers";  
this.btnManageServers.Size = new System.Drawing.Size(293, 43);  
this.btnManageServers.TabIndex = 3;  
this.btnManageServers.Text = "Manage Servers";  
this.btnManageServers.UseVisualStyleBackColor = true;  
this.btnManageServers.Click += new System.EventHandler(this.btnManageServers_Click);  
//
```

```
// btnManageLocations
//
>this.btnManageLocations.Cursor = System.Windows.Forms.Cursors.Hand;
>this.btnManageLocations.FlatAppearance.BorderSize = 0;
>this.btnManageLocations.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
>this.btnManageLocations.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
>this.btnManageLocations.Location = new System.Drawing.Point(0, 420);
>this.btnManageLocations.Name = "btnManageLocations";
>this.btnManageLocations.Size = new System.Drawing.Size(293, 43);
>this.btnManageLocations.TabIndex = 4;
>this.btnManageLocations.Text = "Manage Locations";
>this.btnManageLocations.UseVisualStyleBackColor = true;
this.btnManageLocations.Click += new System.EventHandler(this.btnManageLocations_Click);
//
// btnManageUsers
//
>this.btnManageUsers.Cursor = System.Windows.Forms.Cursors.Hand;
>this.btnManageUsers.FlatAppearance.BorderSize = 0;
>this.btnManageUsers.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
>this.btnManageUsers.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
>this.btnManageUsers.Location = new System.Drawing.Point(0, 336);
>this.btnManageUsers.Name = "btnManageUsers";
>this.btnManageUsers.Size = new System.Drawing.Size(293, 43);
>this.btnManageUsers.TabIndex = 2;
>this.btnManageUsers.Text = "Manage Users";
>this.btnManageUsers.UseVisualStyleBackColor = true;
this.btnManageUsers.Click += new System.EventHandler(this.btnManageUsers_Click);
//
// btnHome
//
>this.btnHome.Cursor = System.Windows.Forms.Cursors.Hand;
>this.btnHome.FlatAppearance.BorderSize = 0;
>this.btnHome.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
>this.btnHome.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
>this.btnHome.Location = new System.Drawing.Point(0, 294);
>this.btnHome.Name = "btnHome";
>this.btnHome.Size = new System.Drawing.Size(293, 43);
>this.btnHome.TabIndex = 1;
>this.btnHome.Text = "Home";
>this.btnHome.UseVisualStyleBackColor = true;
this.btnHome.Click += new System.EventHandler(this.btnHome_Click);
```

```
//  
// ELHSLogo  
//  
this.ELHSLogo.BackColor = System.Drawing.SystemColors.ControlLightLight;  
this.ELHSLogo.BackgroundImage = global::ELSM_Project.Properties.Resources.imgLogoPurple;  
this.ELHSLogo.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;  
this.ELHSLogo.Location = new System.Drawing.Point(75, 85);  
this.ELHSLogo.Name = "ELHSLogo";  
this.ELHSLogo.Size = new System.Drawing.Size(129, 115);  
this.ELHSLogo.TabIndex = 27;  
this.ELHSLogo.TabStop = false;  
//  
// menuBackground  
//  
this.menuBackground.BackColor = System.Drawing.SystemColors.ControlLightLight;  
this.menuBackground.Location = new System.Drawing.Point(0, -1);  
this.menuBackground.Name = "menuBackground";  
this.menuBackground.Size = new System.Drawing.Size(293, 609);  
this.menuBackground.TabIndex = 28;  
this.menuBackground.TabStop = false;  
//  
// pictureBox2  
//  
this.pictureBox2.BackColor = System.Drawing.SystemColors.ControlLightLight;  
this.pictureBox2.Location = new System.Drawing.Point(361, 112);  
this.pictureBox2.Name = "pictureBox2";  
this.pictureBox2.Size = new System.Drawing.Size(723, 1);  
this.pictureBox2.TabIndex = 47;  
this.pictureBox2.TabStop = false;  
//  
// lblManageServers  
//  
this.lblManageServers.AutoSize = true;  
this.lblManageServers.BackColor = System.Drawing.Color.Transparent;  
this.lblManageServers.Font = new System.Drawing.Font("Raleway ExtraBold", 18F, System.Drawing.FontStyle.Bold,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.lblManageServers.ForeColor = System.Drawing.SystemColors.ControlLightLight;  
this.lblManageServers.Location = new System.Drawing.Point(639, 66);  
this.lblManageServers.Name = "lblManageServers";  
this.lblManageServers.Size = new System.Drawing.Size(180, 29);  
this.lblManageServers.TabIndex = 46;  
this.lblManageServers.Text = "Manage Users";  
//  
// userListDGV
```

```
//  
this.userListDGV.AllowUserToAddRows = false;  
this.userListDGV.AllowUserToDeleteRows = false;  
this.userListDGV.AllowUserToResizeColumns = false;  
this.userListDGV.AllowUserToResizeRows = false;  
this.userListDGV.AutoSizeColumnsMode = System.Windows.Forms.DataGridViewAutoSizeColumnsMode.Fill;  
this.userListDGV.BackgroundColor = System.Drawing.SystemColors.ControlLightLight;  
this.userListDGV.BorderStyle = System.Windows.Forms.BorderStyle.None;  
this.userListDGV.CellBorderStyle = System.Windows.Forms.DataGridViewCellBorderStyle.None;  
this.userListDGV.ColumnHeadersBorderStyle = System.Windows.Forms.DataGridViewColumnBorderStyle.Single;  
dataGridViewCellStyle1.Alignment = System.Windows.Forms.DataGridViewContentAlignment.MiddleCenter;  
dataGridViewCellStyle1.BackColor = System.Drawing.SystemColors.Control;  
dataGridViewCellStyle1.Font = new System.Drawing.Font("Microsoft Sans Serif", 8.25F,  
System.Drawing.FontStyle.Regular, System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
dataGridViewCellStyle1.ForeColor = System.Drawing.SystemColors.WindowText;  
dataGridViewCellStyle1.SelectionBackColor = System.Drawing.SystemColors.Highlight;  
dataGridViewCellStyle1.SelectionForeColor = System.Drawing.SystemColors.HighlightText;  
dataGridViewCellStyle1.WrapMode = System.Windows.Forms.DataGridViewTriState.True;  
this.userListDGV.ColumnHeadersDefaultCellStyle = dataGridViewCellStyle1;  
this.userListDGV.ColumnHeadersHeightSizeMode = System.Windows.Forms.DataGridViewColumnHeadersHeightSizeModeHeadersHeightSizeMode.AutoSize;  
this.userListDGV.GridColor = System.Drawing.SystemColors.ButtonFace;  
this.userListDGV.Location = new System.Drawing.Point(361, 163);  
this.userListDGV.Name = "userListDGV";  
this.userListDGV.ReadOnly = true;  
this.userListDGV.RowHeadersVisible = false;  
this.userListDGV.RowHeadersWidthSizeMode =  
System.Windows.Forms.DataGridViewRowHeadersWidthSizeMode.AutoSizeToAllHeaders;  
this.userListDGV.SelectionMode = System.Windows.Forms.DataGridViewSelectionMode.FullRowSelect;  
this.userListDGV.ShowCellErrors = false;  
this.userListDGV.ShowCellToolTips = false;  
this.userListDGV.ShowEditingIcon = false;  
this.userListDGV.ShowRowErrors = false;  
this.userListDGV.Size = new System.Drawing.Size(723, 258);  
this.userListDGV.TabIndex = 45;  
this.userListDGV.VirtualMode = true;  
//  
// btnDeleteUser  
//  
this.btnDeleteUser.Cursor = System.Windows.Forms.Cursors.Hand;  
this.btnDeleteUser.FlatAppearance.BorderSize = 0;  
this.btnDeleteUser.FlatStyle = System.Windows.Forms.FlatStyle.Flat;  
this.btnDeleteUser.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.btnDeleteUser.Location = new System.Drawing.Point(845, 453);
```

```
this.btnAddUser.Name = "btnAddUser";
this.btnAddUser.Size = new System.Drawing.Size(240, 46);
this.btnAddUser.TabIndex = 50;
this.btnAddUser.Text = "Add User";
this.btnAddUser.UseVisualStyleBackColor = true;
this.btnAddUser.Click += new System.EventHandler(this.btnAddUser_Click);
//
// btnDeleteUser
//
this.btnDeleteUser.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnDeleteUser.FlatAppearance.BorderSize = 0;
this.btnDeleteUser.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnDeleteUser.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnDeleteUser.Location = new System.Drawing.Point(603, 453);
this.btnDeleteUser.Name = "btnDeleteUser";
this.btnDeleteUser.Size = new System.Drawing.Size(240, 46);
this.btnDeleteUser.TabIndex = 49;
this.btnDeleteUser.Text = "Delete User";
this.btnDeleteUser.UseVisualStyleBackColor = true;
this.btnDeleteUser.Click += new System.EventHandler(this.btnDeleteUser_Click);
//
// btnEditUser
//
this.btnEditUser.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnEditUser.FlatAppearance.BorderSize = 0;
this.btnEditUser.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnEditUser.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnEditUser.Location = new System.Drawing.Point(603, 453);
this.btnEditUser.Name = "btnEditUser";
this.btnEditUser.Size = new System.Drawing.Size(240, 46);
this.btnEditUser.TabIndex = 49;
this.btnEditUser.Text = "Edit User";
this.btnEditUser.UseVisualStyleBackColor = true;
this.btnEditUser.Click += new System.EventHandler(this.btnEditUser_Click);
//
// btnCreateUser
//
this.btnCreateUser.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnCreateUser.FlatAppearance.BorderSize = 0;
this.btnCreateUser.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnCreateUser.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCreateUser.Location = new System.Drawing.Point(361, 453);
this.btnCreateUser.Name = "btnCreateUser";
this.btnCreateUser.Size = new System.Drawing.Size(240, 46);
this.btnCreateUser.TabIndex = 48;
this.btnCreateUser.Text = "Create User";
this.btnCreateUser.UseVisualStyleBackColor = true;
this.btnCreateUser.Click += new System.EventHandler(this.btnCreateUser_Click);
//
// btnCreateTicket
//
this.btnCreateTicket.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnCreateTicket.FlatAppearance.BorderSize = 0;
this.btnCreateTicket.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnCreateTicket.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0))');
```

```
this.btnCreateTicket.Location = new System.Drawing.Point(0, -1);
this.btnCreateTicket.Name = "btnCreateTicket";
this.btnCreateTicket.Size = new System.Drawing.Size(149, 43);
this.btnCreateTicket.TabIndex = 52;
this.btnCreateTicket.Text = "New Ticket";
this.btnCreateTicket.UseVisualStyleBackColor = true;
this.btnCreateTicket.Click += new System.EventHandler(this.btnCreateTicket_Click);
//
// btnTicketReply
//
this.btnTicketReply.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnTicketReply.FlatAppearance.BorderSize = 0;
this.btnTicketReply.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnTicketReply.Font = new System.Drawing.Font("Raleway SemiBold", 9.749999F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnTicketReply.Location = new System.Drawing.Point(148, -1);
this.btnTicketReply.Name = "btnTicketReply";
this.btnTicketReply.Size = new System.Drawing.Size(145, 43);
this.btnTicketReply.TabIndex = 51;
this.btnTicketReply.Text = "View Tickets";
this.btnTicketReply.UseVisualStyleBackColor = true;
this.btnTicketReply.Click += new System.EventHandler(this.btnTicketReply_Click);
//
// userList
//
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(1130, 601);
this.ControlBox = false;
this.Controls.Add(this.btnCreateTicket);
this.Controls.Add(this.btnTicketReply);
this.Controls.Add(this.btnDeleteUser);
this.Controls.Add(this.btnEditUser);
this.Controls.Add(this.btnCreateUser);
this.Controls.Add(this.pictureBox2);
this.Controls.Add(this.lblManageServers);
this.Controls.Add(this.userListDGV);
this.Controls.Add(this.lblMetallicGloss);
this.Controls.Add(this.lblTitle);
this.Controls.Add(this.btnExit);
this.Controls.Add(this.btnManageAccount);
this.Controls.Add(this.btnManageServers);
```

```
this.Controls.Add(this.btnAddLocations);
this.Controls.Add(this.btnAddUsers);
this.Controls.Add(this.btnExit);
this.Controls.Add(this.EHLSLogo);
this.Controls.Add(this.menuBackground);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.Icon = ((System.Drawing.Icon)(resources.GetObject("$this.Icon")));
this.MaximizeBox = false;
this.MaximumSize = new System.Drawing.Size(1146, 640);
this.MinimumSize = new System.Drawing.Size(1146, 640);
this.Name = "userList";
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "User List";
this.Load += new System.EventHandler(this.manageServers_Load);
((System.ComponentModel.ISupportInitialize) (this.EHLSLogo)).EndInit();
((System.ComponentModel.ISupportInitialize) (this.menuBackground)).EndInit();
((System.ComponentModel.ISupportInitialize) (this.pictureBox2)).EndInit();
((System.ComponentModel.ISupportInitialize) (this.userListDGV)).EndInit();
this.ResumeLayout(false);
this.PerformLayout();

}

#endregion

private System.Windows.Forms.Label lblMetallicGloss;
private System.Windows.Forms.Label lblTitle;
private System.Windows.Forms.Button btnLogout;
private System.Windows.Forms.Button btnManageAccount;
private System.Windows.Forms.Button btnManageServers;
private System.Windows.Forms.Button btnManageLocations;
private System.Windows.Forms.Button btnManageUsers;
private System.Windows.Forms.Button btnHome;
private System.Windows.Forms.PictureBox EHLSLogo;
private System.Windows.Forms.PictureBox menuBackground;
private System.Windows.Forms.PictureBox pictureBox2;
private System.Windows.Forms.Label lblManageServers;
private System.Windows.Forms.DataGridView userListDGV;
private System.Windows.Forms.Button btnDeleteUser;
private System.Windows.Forms.Button btnEditUser;
private System.Windows.Forms.Button btnCreateUser;
private System.Windows.Forms.Button btnCreateTicket;
private System.Windows.Forms.Button btnTicketReply;
}
```

}

Subsection 3.6.3.cvi - userList.cs - Code file - annotated

```
using System;
using System.Data;
using System.Windows.Forms;
using MySql.Data.MySqlClient;

namespace ELSM_Project
{
    public partial class userList : Form
    {
        public userList()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        private void btnHome_Click(object sender, EventArgs e)
        {
            //On button event, hide current form and open mainDashboard.
            Hide();
            mainDashboard Dashboard = new mainDashboard();
            Dashboard.ShowDialog();
        }

        private void btnManageUsers_Click(object sender, EventArgs e)
        {
            //Display message box informing the user that they're already on the page that they attempted to navigate to.
            MessageBox.Show("You're already here!", "Notice", MessageBoxButtons.OK);
        }

        private void btnManageServers_Click(object sender, EventArgs e)
        {
            //On button event, hide current form and open serverManagement.
            Hide();
            serverManagement manageS = new serverManagement();
            manageS.ShowDialog();
        }

        private void btnManageLocations_Click(object sender, EventArgs e)
        {
            //On button event, hide current form and open locationManagement.
            Hide();
            locationManagement manageL = new locationManagement();
```

```
        manageL.ShowDialog();
    }

    private void btnManageAccount_Click(object sender, EventArgs e)
    {
        //On button event, hide current form and open accountManagement.
        Hide();
        accountManagement Account = new accountManagement();
        Account.ShowDialog();
    }

    private void btnLogout_Click(object sender, EventArgs e)
    {
        //On button event, trigger a message box confirming logout. If the user input is Yes, close the form.
        if (MessageBox.Show("Are you sure you want to logout?", "Confirmation", MessageBoxButtons.YesNo) != DialogResult.No)
        {
            this.Close();
        }
    }

    private void lblMetallicGloss_Click(object sender, EventArgs e)
    {
        //Create process to open the link www.metallicgloss.com in the default browser.
        System.Diagnostics.Process.Start("https://www.metallicgloss.com");
    }

    private void manageServers_Load(object sender, EventArgs e)
    {
        //Initialize permissions by using boolean variables on the loginMenu form to disable buttons if the permission is not granted.
        if (loginMenu.permViewLocations == false)
        {
            btnManageLocations.Enabled = false;
        }
        if (loginMenu.permAdminViewUsers == false)
        {
            btnManageUsers.Enabled = false;
        }
        if (loginMenu.permViewServers == false)
        {
            btnManageServers.Enabled = false;
        }
        if (loginMenu.permCreateTicket == false)
        {
```

```
        btnCreateTicket.Enabled = false;
    }
    if (loginMenu.permAdminAddUser == false)
    {
        btnCreateUser.Enabled = false;
    }
    if (loginMenu.permAdminDelUser == false)
    {
        btnDeleteUser.Enabled = false;
    }
    if (loginMenu.permAdminEditUserInfo == false)
    {
        btnEditUser.Enabled = false;
    }
    UpdateData();
}

private void btnCreateUser_Click(object sender, EventArgs e)
{
    //Open userCreate, when form closed clear datagridview and repopulate with new data.
    userCreate Create = new userCreate();
    Create.ShowDialog();
    UpdateData();
}

private void btnEditUser_Click(object sender, EventArgs e)
{
    //Open userEdit, when form closed clear datagridview and repopulate with new data.
    userEdit Edit = new userEdit();
    Edit.ShowDialog();
    UpdateData();
}

private void btnDeleteUser_Click(object sender, EventArgs e)
{
    //Open userDelete, when form closed clear datagridview and repopulate with new data.
    userDelete delete = new userDelete();
    delete.ShowDialog();
    UpdateData();
}

public void UpdateData()
{
    //Connect to MySQL and fill datagridview with data outputted from the SQL command.
```

```
MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString);
conn.Open();
try
{
    MySqlDataAdapter MyDA = new MySqlDataAdapter();
    MyDA.SelectCommand = new MySqlCommand("SELECT userID, userLogin, userForename, userSurname, userEmailAddress FROM
userAccounts WHERE userCompany = " + loginMenu.CompanyID + "", conn);
    DataTable table = new DataTable();
    MyDA.Fill(table);

    BindingSource bSource = new BindingSource();
    bSource.DataSource = table;

    userListDGV.DataSource = bSource;

}
catch (MySql.Data.MySqlClient.MySqlException ex)
{
    MessageBox.Show(ex.Message);
}
conn.Close();
}

private void btnCreateTicket_Click(object sender, EventArgs e)
{
    //On button event open ticketNew.
    ticketNew ticket = new ticketNew();
    ticket.ShowDialog();
}

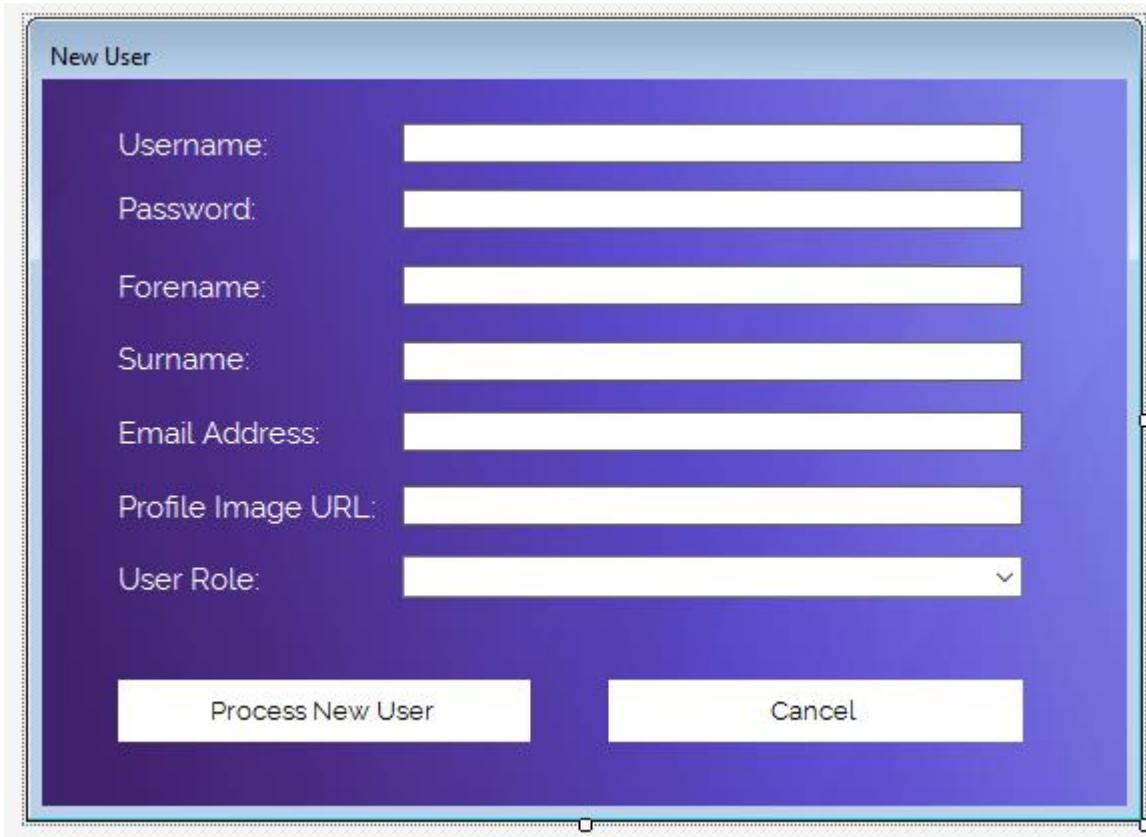
private void btnTicketReply_Click(object sender, EventArgs e)
{
    //On button event, hide current form and open ticketView.
    Hide();
    ticketView ticket = new ticketView();
    ticket.ShowDialog();
}

}
```

Subsection 3.6.3.cvii - userCreate.cs [design] - design view

New User

Username:	<input type="text"/>
Password:	<input type="password"/>
Forename:	<input type="text"/>
Surname:	<input type="text"/>
Email Address:	<input type="text"/>
Profile Image URL:	<input type="text"/>
User Role:	<input type="text"/>



Subsection 3.6.3.cviii - userCreate.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class userCreate
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            System.ComponentModel.ComponentResourceManager resources = new
System.ComponentModel.ComponentResourceManager(this);
            this.btnCancel = new System.Windows.Forms.Button();
            this.btnNewUser = new System.Windows.Forms.Button();
            this.lblLocation = new System.Windows.Forms.Label();
            this.txtForename = new System.Windows.Forms.TextBox();
            this.txtPassword = new System.Windows.Forms.TextBox();
            this.lblPassword = new System.Windows.Forms.Label();
            this.lblUsername = new System.Windows.Forms.Label();
            this.txtEmailAddress = new System.Windows.Forms.TextBox();
            this.lblProcessor = new System.Windows.Forms.Label();
            this.lblIP = new System.Windows.Forms.Label();
        }
    }
}
```

```
this.lblOS = new System.Windows.Forms.Label();
this.txtProfileImage = new System.Windows.Forms.TextBox();
this.txtUsername = new System.Windows.Forms.TextBox();
this.txtSurname = new System.Windows.Forms.TextBox();
this.lblUserRole = new System.Windows.Forms.Label();
this.cmboUserPerm = new System.Windows.Forms.ComboBox();
this.SuspendLayout();
//
// btnCancel
//
this.btnCancel.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnCancel.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnCancel.FlatAppearance.BorderSize = 0;
this.btnCancel.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnCancel.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCancel.Location = new System.Drawing.Point(283, 300);
this.btnCancel.Name = "btnCancel";
this.btnCancel.Size = new System.Drawing.Size(207, 31);
this.btnCancel.TabIndex = 45;
this.btnCancel.Text = "Cancel";
this.btnCancel.UseVisualStyleBackColor = false;
this.btnCancel.Click += new System.EventHandler(this.btnCancel_Click);
//
// btnNewUser
//
this.btnNewUser.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnNewUser.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnNewUser.FlatAppearance.BorderSize = 0;
this.btnNewUser.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnNewUser.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnNewUser.Location = new System.Drawing.Point(38, 300);
this.btnNewUser.Name = "btnNewUser";
this.btnNewUser.Size = new System.Drawing.Size(206, 31);
this.btnNewUser.TabIndex = 44;
this.btnNewUser.Text = "Process New User";
this.btnNewUser.UseVisualStyleBackColor = false;
this.btnNewUser.Click += new System.EventHandler(this.btnNewuser_Click);
//
// lblLocation
//
this.lblLocation.AutoSize = true;
this.lblLocation.BackColor = System.Drawing.Color.Transparent;
```

```
this.lblLocation.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblLocation.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblLocation.Location = new System.Drawing.Point(35, 24);
this.lblLocation.Name = "lblLocation";
this.lblLocation.Size = new System.Drawing.Size(83, 18);
this.lblLocation.TabIndex = 39;
this.lblLocation.Text = "Username:";
//
// txtForename
//
this.txtForename.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtForename.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtForename.Location = new System.Drawing.Point(180, 93);
this.txtForename.Name = "txtForename";
this.txtForename.Size = new System.Drawing.Size(310, 20);
this.txtForename.TabIndex = 50;
//
// txtPassword
//
this.txtPassword.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtPassword.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtPassword.Location = new System.Drawing.Point(180, 55);
this.txtPassword.Name = "txtPassword";
this.txtPassword.PasswordChar = '*';
this.txtPassword.Size = new System.Drawing.Size(310, 20);
this.txtPassword.TabIndex = 49;
//
// lblPassword
//
this.lblPassword.AutoSize = true;
this.lblPassword.BackColor = System.Drawing.Color.Transparent;
this.lblPassword.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblPassword.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblPassword.Location = new System.Drawing.Point(35, 95);
this.lblPassword.Name = "lblPassword";
this.lblPassword.Size = new System.Drawing.Size(82, 18);
this.lblPassword.TabIndex = 47;
this.lblPassword.Text = "Forename:";
//
// lblUsername
//
this.lblUsername.AutoSize = true;
```

```
this.lblUsername.BackColor = System.Drawing.Color.Transparent;
this.lblUsername.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblUsername.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblUsername.Location = new System.Drawing.Point(35, 56);
this.lblUsername.Name = "lblUsername";
this.lblUsername.Size = new System.Drawing.Size(77, 18);
this.lblUsername.TabIndex = 46;
this.lblUsername.Text = "Password:";
//
// txtEmailAddress
//
this.txtEmailAddress.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtEmailAddress.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtEmailAddress.Location = new System.Drawing.Point(180, 166);
this.txtEmailAddress.Name = "txtEmailAddress";
this.txtEmailAddress.Size = new System.Drawing.Size(310, 20);
this.txtEmailAddress.TabIndex = 56;
//
// lblProcessor
//
this.lblProcessor.AutoSize = true;
this.lblProcessor.BackColor = System.Drawing.Color.Transparent;
this.lblProcessor.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblProcessor.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblProcessor.Location = new System.Drawing.Point(35, 205);
this.lblProcessor.Name = "lblProcessor";
this.lblProcessor.Size = new System.Drawing.Size(137, 18);
this.lblProcessor.TabIndex = 54;
this.lblProcessor.Text = "Profile Image URL:";
//
// lblIP
//
this.lblIP.AutoSize = true;
this.lblIP.BackColor = System.Drawing.Color.Transparent;
this.lblIP.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblIP.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblIP.Location = new System.Drawing.Point(35, 168);
this.lblIP.Name = "lblIP";
this.lblIP.Size = new System.Drawing.Size(109, 18);
this.lblIP.TabIndex = 53;
this.lblIP.Text = "Email Address:";
```

```
//  
// lblOS  
//  
this.lblOS.AutoSize = true;  
this.lblOS.BackColor = System.Drawing.Color.Transparent;  
this.lblOS.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.lblOS.ForeColor = System.Drawing.SystemColors.ControlLightLight;  
this.lblOS.Location = new System.Drawing.Point(35, 131);  
this.lblOS.Name = "lblOS";  
this.lblOS.Size = new System.Drawing.Size(74, 18);  
this.lblOS.TabIndex = 52;  
this.lblOS.Text = "Surname:";  
//  
// txtProfileImage  
//  
this.txtProfileImage.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;  
this.txtProfileImage.Cursor = System.Windows.Forms.Cursors.IBeam;  
this.txtProfileImage.Location = new System.Drawing.Point(180, 203);  
this.txtProfileImage.Name = "txtProfileImage";  
this.txtProfileImage.Size = new System.Drawing.Size(310, 20);  
this.txtProfileImage.TabIndex = 68;  
//  
// txtUsername  
//  
this.txtUsername.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;  
this.txtUsername.Cursor = System.Windows.Forms.Cursors.IBeam;  
this.txtUsername.Location = new System.Drawing.Point(180, 22);  
this.txtUsername.Name = "txtUsername";  
this.txtUsername.Size = new System.Drawing.Size(310, 20);  
this.txtUsername.TabIndex = 72;  
//  
// txtSurname  
//  
this.txtSurname.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;  
this.txtSurname.Cursor = System.Windows.Forms.Cursors.IBeam;  
this.txtSurname.Location = new System.Drawing.Point(180, 131);  
this.txtSurname.Name = "txtSurname";  
this.txtSurname.Size = new System.Drawing.Size(310, 20);  
this.txtSurname.TabIndex = 73;  
//  
// lblUserRole  
//  
this.lblUserRole.AutoSize = true;
```

```
this.lblUserRole.BackColor = System.Drawing.Color.Transparent;
this.lblUserRole.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblUserRole.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblUserRole.Location = new System.Drawing.Point(35, 241);
this.lblUserRole.Name = "lblUserRole";
this.lblUserRole.Size = new System.Drawing.Size(79, 18);
this.lblUserRole.TabIndex = 74;
this.lblUserRole.Text = "User Role:";
//
// cmboUserPerm
//
this.cmboUserPerm.FormattingEnabled = true;
this.cmboUserPerm.Location = new System.Drawing.Point(180, 238);
this.cmboUserPerm.Name = "cmboUserPerm";
this.cmboUserPerm.Size = new System.Drawing.Size(310, 21);
this.cmboUserPerm.TabIndex = 76;
//
// userCreate
//
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(542, 363);
this.ControlBox = false;
this.Controls.Add(this.cmboUserPerm);
this.Controls.Add(this.lblUserRole);
this.Controls.Add(this.txtSurname);
this.Controls.Add(this.txtUsername);
this.Controls.Add(this.txtProfileImage);
this.Controls.Add(this.txtEmailAddress);
this.Controls.Add(this.lblProcessor);
this.Controls.Add(this.lblIP);
this.Controls.Add(this.lblOS);
this.Controls.Add(this.txtForename);
this.Controls.Add(this.txtPassword);
this.Controls.Add(this.lblPassword);
this.Controls.Add(this.lblUsername);
this.Controls.Add(this.btnCancel);
this.Controls.Add(this.btnNewUser);
this.Controls.Add(this.lblLocation);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.Icon = ((System.Drawing.Icon)(resources.GetObject("$this.Icon")));
```

```
this.MaximumSize = new System.Drawing.Size(558, 542);
this.MinimumSize = new System.Drawing.Size(544, 242);
this.Name = "userCreate";
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "New User";
this.Load += new System.EventHandler(this.userCreate_Load);
this.ResumeLayout(false);
this.PerformLayout();

}

#endregion

private System.Windows.Forms.Button btnCancel;
private System.Windows.Forms.Button btnNewUser;
private System.Windows.Forms.Label lblLocation;
private System.Windows.Forms.TextBox txtForename;
private System.Windows.Forms.TextBox txtPassword;
private System.Windows.Forms.Label lblPassword;
private System.Windows.Forms.Label lblUsername;
private System.Windows.Forms.TextBox txtEmailAddress;
private System.Windows.Forms.Label lblProcessor;
private System.Windows.Forms.Label lblIP;
private System.Windows.Forms.Label lblOS;
private System.Windows.Forms.TextBox txtProfileImage;
private System.Windows.Forms.TextBox txtUsername;
private System.Windows.Forms.TextBox txtSurname;
private System.Windows.Forms.Label lblUserRole;
private System.Windows.Forms.ComboBox cmboUserPerm;
}

}
```

Subsection 3.6.3.cix - userCreate.cs - Code file - annotated

```
using System;
using System.Windows.Forms;
using MySql.Data.MySqlClient;
using Hashing.PasswordManagement;

namespace ELSM_Project
{
    public partial class userCreate : Form
    {
        public userCreate()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        public static string password;

        private void userCreate_Load(object sender, EventArgs e)
        {
            //Connect to MySQL, run SQL command and output result of the field 'permRole' to cmboUserPerm.
            MySqlConnection connectionMySQL = new MySqlConnection(loginMenu.ConnectionString);
            connectionMySQL.Open();
            MySqlCommand permCMD = new MySqlCommand("SELECT * FROM userPermissions", connectionMySQL);
            MySqlDataReader permRDR = permCMD.ExecuteReader();
            while (permRDR.Read())
            {
                cmboUserPerm.Items.Add(permRDR.GetString("permRole"));
            }
            connectionMySQL.Close();
        }

        private void btnNewuser_Click(object sender, EventArgs e)
        {
            //If a field required is blank, output error message informing the user that they need to enter data.
            if (txtForename.Text != "")
            {
                if (txtSurname.Text != "")
                {
                    if (txtUsername.Text != "")
                    {
                        if (txtEmailAddress.Text != "")
                        {

```

```
//Attempt to parse the address data into the format of an email address. If it fails & errors, output
error message informing the user that they need to enter data.
try
{
    var addr = new System.Net.Mail.MailAddress(txtEmailAddress.Text);
    if (txtProfileImage.Text != "")
    {
        //Connect to MySQL. Proceed with running an SQL command to get the ID of the role selected in
the combo box, hash and salt the password entered and then inserting a field into the userAccounts table.
        MySqlConnection connectionMySQL = new MySqlConnection(loginMenu.ConnectionString);
        connectionMySQL.Open();
        userCreate.password = SHA.GenerateSHA512String(loginMenu.userSalt + txtPassword.Text);
        MySqlCommand permRoleCMD = new MySqlCommand("SELECT permID, permRole FROM userPermissions
WHERE permRole = @permRole", connectionMySQL);
        permRoleCMD.Parameters.AddWithValue("@permRole", cmboUserPerm.Text);
        MySqlDataReader permRDR = permRoleCMD.ExecuteReader();
        permRDR.Read();
        string permID = Convert.ToString(permRDR.GetString("permID"));
        permRDR.Close();
        MySqlCommand userInfoUpdateCMD = new MySqlCommand("INSERT INTO userAccounts (userForename,
userSurname, userLogin, userPassword, userEmailAddress, userImage, userCompany, userRole) VALUES (@userForename, @userSurname,
@userLogin, @userPassword, @userEmailAddress, @userImage, @userCompany, @userPerm)", connectionMySQL);
        userInfoUpdateCMD.Parameters.AddWithValue("@userForename", txtForename.Text);
        userInfoUpdateCMD.Parameters.AddWithValue("@userSurname", txtSurname.Text);
        userInfoUpdateCMD.Parameters.AddWithValue("@userLogin", txtUsername.Text);
        userInfoUpdateCMD.Parameters.AddWithValue("@userPassword", password);
        userInfoUpdateCMD.Parameters.AddWithValue("@userEmailAddress", txtEmailAddress.Text);
        userInfoUpdateCMD.Parameters.AddWithValue("@userImage", txtProfileImage.Text);
        userInfoUpdateCMD.Parameters.AddWithValue("@userCompany", loginMenu.CompanyID);
        userInfoUpdateCMD.Parameters.AddWithValue("@userPerm", permID);
        userInfoUpdateCMD.ExecuteNonQuery();

        connectionMySQL.Close();

        Hide();
    }
    else
    {
        System.Windows.Forms.MessageBox.Show("Please enter a valid profile photo link.");
    }
}
catch
{
    System.Windows.Forms.MessageBox.Show("You must enter an email address in the correct format.");
}
```

```
        }

    }
    else
    {
        System.Windows.Forms.MessageBox.Show("Please enter an email address.");
    }
}
else
{
    System.Windows.Forms.MessageBox.Show("Please enter a username.");
}
else
{
    System.Windows.Forms.MessageBox.Show("Please enter a surname.");
}
else
{
    System.Windows.Forms.MessageBox.Show("Please enter a forename.");
}
}

private void btnCancel_Click(object sender, EventArgs e)
{
    //On button event, hide the form.
    Hide();
}
}
```

Subsection 3.6.3.cx - userEdit.cs [design] - design view

Edit User

UserID:	<input type="text"/>
Username:	<input type="text"/>
Password:	<input type="text"/>
Forename:	<input type="text"/>
Surname:	<input type="text"/>
Email Address:	<input type="text"/>
Profile Image URL:	<input type="text"/>
User Role:	<input type="text"/>
<input type="button" value="Process User Update"/> <input type="button" value="Cancel"/>	

Subsection 3.6.3.cxi - userEdit.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class userEdit
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            System.ComponentModel.ComponentResourceManager resources = new
System.ComponentModel.ComponentResourceManager(this);
            this.btnCancel = new System.Windows.Forms.Button();
            this.btnUpdateUser = new System.Windows.Forms.Button();
            this.lblUserID = new System.Windows.Forms.Label();
            this.lblLocation = new System.Windows.Forms.Label();
            this.txtForename = new System.Windows.Forms.TextBox();
            this.txtPassword = new System.Windows.Forms.TextBox();
            this.lblPassword = new System.Windows.Forms.Label();
            this.lblUsername = new System.Windows.Forms.Label();
            this.txtEmailAddress = new System.Windows.Forms.TextBox();
            this.lblProcessor = new System.Windows.Forms.Label();
        }
    }
}
```

```
this.lblIP = new System.Windows.Forms.Label();
this.lblOS = new System.Windows.Forms.Label();
this.txtProfileImage = new System.Windows.Forms.TextBox();
this.cmboUserID = new System.Windows.Forms.ComboBox();
this.txtUsername = new System.Windows.Forms.TextBox();
this.txtSurname = new System.Windows.Forms.TextBox();
this.cmboUserPerm = new System.Windows.Forms.ComboBox();
this.lblUserRole = new System.Windows.Forms.Label();
this.SuspendLayout();
//
// btnCancel
//
this.btnCancel.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnCancel.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnCancel.FlatStyle.BorderSize = 0;
this.btnCancel.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnCancel.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCancel.Location = new System.Drawing.Point(281, 324);
this.btnCancel.Name = "btnCancel";
this.btnCancel.Size = new System.Drawing.Size(207, 31);
this.btnCancel.TabIndex = 45;
this.btnCancel.Text = "Cancel";
this.btnCancel.UseVisualStyleBackColor = false;
this.btnCancel.Click += new System.EventHandler(this.btnCancel_Click);
//
// btnUpdateUser
//
this.btnUpdateUser.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnUpdateUser.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnUpdateUser.FlatStyle.BorderSize = 0;
this.btnUpdateUser.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnUpdateUser.Font = new System.Drawing.Font("Raleway", 9.749999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnUpdateUser.Location = new System.Drawing.Point(36, 324);
this.btnUpdateUser.Name = "btnUpdateUser";
this.btnUpdateUser.Size = new System.Drawing.Size(206, 31);
this.btnUpdateUser.TabIndex = 44;
this.btnUpdateUser.Text = "Process User Update";
this.btnUpdateUser.UseVisualStyleBackColor = false;
this.btnUpdateUser.Click += new System.EventHandler(this.btnNewuser_Click);
//
// lblUserID
//
```

```
this.lblUserID.AutoSize = true;
this.lblUserID.BackColor = System.Drawing.Color.Transparent;
this.lblUserID.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblUserID.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblUserID.Location = new System.Drawing.Point(33, 38);
this.lblUserID.Name = "lblUserID";
this.lblUserID.Size = new System.Drawing.Size(58, 18);
this.lblUserID.TabIndex = 40;
this.lblUserID.Text = "UserID:";
//
// lblLocation
//
this.lblLocation.AutoSize = true;
this.lblLocation.BackColor = System.Drawing.Color.Transparent;
this.lblLocation.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblLocation.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblLocation.Location = new System.Drawing.Point(33, 73);
this.lblLocation.Name = "lblLocation";
this.lblLocation.Size = new System.Drawing.Size(83, 18);
this.lblLocation.TabIndex = 39;
this.lblLocation.Text = "Username:";
//
// txtForename
//
this.txtForename.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtForename.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtForename.Location = new System.Drawing.Point(178, 142);
this.txtForename.Name = "txtForename";
this.txtForename.Size = new System.Drawing.Size(310, 20);
this.txtForename.TabIndex = 50;
//
// txtPassword
//
this.txtPassword.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtPassword.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtPassword.Location = new System.Drawing.Point(178, 106);
this.txtPassword.Name = "txtPassword";
this.txtPassword.PasswordChar = '*';
this.txtPassword.Size = new System.Drawing.Size(310, 20);
this.txtPassword.TabIndex = 49;
//
// lblPassword

```

```
//  
this.lblPassword.AutoSize = true;  
this.lblPassword.BackColor = System.Drawing.Color.Transparent;  
this.lblPassword.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.lblPassword.ForeColor = System.Drawing.SystemColors.ControlLightLight;  
this.lblPassword.Location = new System.Drawing.Point(33, 144);  
this.lblPassword.Name = "lblPassword";  
this.lblPassword.Size = new System.Drawing.Size(82, 18);  
this.lblPassword.TabIndex = 47;  
this.lblPassword.Text = "Forename:";  
//  
// lblUsername  
//  
this.lblUsername.AutoSize = true;  
this.lblUsername.BackColor = System.Drawing.Color.Transparent;  
this.lblUsername.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.lblUsername.ForeColor = System.Drawing.SystemColors.ControlLightLight;  
this.lblUsername.Location = new System.Drawing.Point(33, 107);  
this.lblUsername.Name = "lblUsername";  
this.lblUsername.Size = new System.Drawing.Size(77, 18);  
this.lblUsername.TabIndex = 46;  
this.lblUsername.Text = "Password:";  
//  
// txtEmailAddress  
//  
this.txtEmailAddress.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;  
this.txtEmailAddress.Cursor = System.Windows.Forms.Cursors.IBeam;  
this.txtEmailAddress.Location = new System.Drawing.Point(178, 215);  
this.txtEmailAddress.Name = "txtEmailAddress";  
this.txtEmailAddress.Size = new System.Drawing.Size(310, 20);  
this.txtEmailAddress.TabIndex = 56;  
//  
// lblProcessor  
//  
this.lblProcessor.AutoSize = true;  
this.lblProcessor.BackColor = System.Drawing.Color.Transparent;  
this.lblProcessor.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,  
System.Drawing.GraphicsUnit.Point, ((byte)(0)));  
this.lblProcessor.ForeColor = System.Drawing.SystemColors.ControlLightLight;  
this.lblProcessor.Location = new System.Drawing.Point(33, 251);  
this.lblProcessor.Name = "lblProcessor";  
this.lblProcessor.Size = new System.Drawing.Size(137, 18);
```

```
this.lblProcessor.TabIndex = 54;
this.lblProcessor.Text = "Profile Image URL:";
//
// lblIP
//
this.lblIP.AutoSize = true;
this.lblIP.BackColor = System.Drawing.Color.Transparent;
this.lblIP.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblIP.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblIP.Location = new System.Drawing.Point(33, 217);
this.lblIP.Name = "lblIP";
this.lblIP.Size = new System.Drawing.Size(109, 18);
this.lblIP.TabIndex = 53;
this.lblIP.Text = "Email Address:";
//
// lblOS
//
this.lblOS.AutoSize = true;
this.lblOS.BackColor = System.Drawing.Color.Transparent;
this.lblOS.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblOS.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblOS.Location = new System.Drawing.Point(33, 178);
this.lblOS.Name = "lblOS";
this.lblOS.Size = new System.Drawing.Size(74, 18);
this.lblOS.TabIndex = 52;
this.lblOS.Text = "Surname:";
//
// txtProfileImage
//
this.txtProfileImage.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtProfileImage.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtProfileImage.Location = new System.Drawing.Point(178, 249);
this.txtProfileImage.Name = "txtProfileImage";
this.txtProfileImage.Size = new System.Drawing.Size(310, 20);
this.txtProfileImage.TabIndex = 68;
//
// cmboUserID
//
this.cmboUserID.FormattingEnabled = true;
this.cmboUserID.Location = new System.Drawing.Point(178, 35);
this.cmboUserID.Name = "cmboUserID";
this.cmboUserID.Size = new System.Drawing.Size(310, 21);
```

```
this.cmboUserID.TabIndex = 71;
this.cmboUserID.SelectedIndexChanged += new System.EventHandler(this.cmboHostNames_SelectedIndexChanged);
//
// txtUsername
//
this.txtUsername.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtUsername.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtUsername.Location = new System.Drawing.Point(178, 71);
this.txtUsername.Name = "txtUsername";
this.txtUsername.Size = new System.Drawing.Size(310, 20);
this.txtUsername.TabIndex = 72;
//
// txtSurname
//
this.txtSurname.BorderStyle = System.Windows.Forms.BorderStyle.FixedSingle;
this.txtSurname.Cursor = System.Windows.Forms.Cursors.IBeam;
this.txtSurname.Location = new System.Drawing.Point(178, 178);
this.txtSurname.Name = "txtSurname";
this.txtSurname.Size = new System.Drawing.Size(310, 20);
this.txtSurname.TabIndex = 73;
//
// cmboUserPerm
//
this.cmboUserPerm.FormattingEnabled = true;
this.cmboUserPerm.Location = new System.Drawing.Point(178, 282);
this.cmboUserPerm.Name = "cmboUserPerm";
this.cmboUserPerm.Size = new System.Drawing.Size(310, 21);
this.cmboUserPerm.TabIndex = 78;
//
// lblUserRole
//
this.lblUserRole.AutoSize = true;
this.lblUserRole.BackColor = System.Drawing.Color.Transparent;
this.lblUserRole.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblUserRole.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblUserRole.Location = new System.Drawing.Point(33, 285);
this.lblUserRole.Name = "lblUserRole";
this.lblUserRole.Size = new System.Drawing.Size(79, 18);
this.lblUserRole.TabIndex = 77;
this.lblUserRole.Text = "User Role:";
//
// userEdit
//
```

```
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(542, 396);
this.ControlBox = false;
this.Controls.Add(this.cmboUserPerm);
this.Controls.Add(this.lblUserRole);
this.Controls.Add(this.txtSurname);
this.Controls.Add(this.txtUsername);
this.Controls.Add(this.cmboUserID);
this.Controls.Add(this.txtProfileImage);
this.Controls.Add(this.txtEmailAddress);
this.Controls.Add(this.lblProcessor);
this.Controls.Add(this.lblIP);
this.Controls.Add(this.lblOS);
this.Controls.Add(this.txtForename);
this.Controls.Add(this.txtPassword);
this.Controls.Add(this.lblPassword);
this.Controls.Add(this.lblUsername);
this.Controls.Add(this.btnCancel);
this.Controls.Add(this.btnUpdateUser);
this.Controls.Add(this.lblUserID);
this.Controls.Add(this.lblLocation);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.Icon = ((System.Drawing.Icon)(resources.GetObject("$this.Icon")));
this.MaximumSize = new System.Drawing.Size(558, 542);
this.MinimumSize = new System.Drawing.Size(544, 242);
this.Name = "userEdit";
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "Edit User";
this.Load += new System.EventHandler(this.manageusersEdit_Load);
this.ResumeLayout(false);
this.PerformLayout();

}

#endregion

private System.Windows.Forms.Button btnCancel;
private System.Windows.Forms.Button btnUpdateUser;
private System.Windows.Forms.Label lblUserID;
private System.Windows.Forms.Label lblLocation;
private System.Windows.Forms.TextBox txtForename;
```

```
    private System.Windows.Forms.TextBox txtPassword;
    private System.Windows.Forms.Label lblPassword;
    private System.Windows.Forms.Label lblUsername;
    private System.Windows.Forms.TextBox txtEmailAddress;
    private System.Windows.Forms.Label lblProcessor;
    private System.Windows.Forms.Label lblIP;
    private System.Windows.Forms.Label lblOS;
    private System.Windows.Forms.TextBox txtProfileImage;
    private System.Windows.Forms.ComboBox cmboUserID;
    private System.Windows.Forms.TextBox txtUsername;
    private System.Windows.Forms.TextBox txtSurname;
    private System.Windows.Forms.ComboBox cmboUserPerm;
    private System.Windows.Forms.Label lblUserRole;
}
}
```

Subsection 3.6.3.cxii - userEdit.cs - Code file - annotated

```
using System;
using System.Windows.Forms;
using MySql.Data.MySqlClient;
using Hashing.PasswordManagement;

namespace ELSM_Project
{
    public partial class userEdit : Form
    {
        public userEdit()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        public static string password;

        private void manageusersEdit_Load(object sender, EventArgs e)
        {
            //Initialize permissions by using boolean variables on the loginMenu form to disable buttons if the permission is not granted.
            if (loginMenu.permAdminForcePassReset == false)
            {
                txtPassword.Enabled = false;
            }
            if (loginMenu.permAdminChangePermissions == false)
            {
                cmboUserPerm.Enabled = false;
            }
            //Connect to MySQL, execute SQL and set output as items of cmboUserID.
            MySqlConnection connectionMySQL = new MySqlConnection(loginMenu.ConnectionString);
            connectionMySQL.Open();
            MySqlCommand userCMD = new MySqlCommand("SELECT * FROM userAccounts", connectionMySQL);
            MySqlDataReader userRDR = userCMD.ExecuteReader();
            while (userRDR.Read())
            {
                cmboUserID.Items.Add(userRDR.GetString("userID"));
            }
            userRDR.Close();
            //Connect to MySQL, execute SQL and set output as items of cmboUserPerm.
            MySqlCommand permCMD = new MySqlCommand("SELECT * FROM userPermissions", connectionMySQL);
```

```
MySqlDataReader permRDR = permCMD.ExecuteReader();
while (permRDR.Read())
{
    cmboUserPerm.Items.Add(permRDR.GetString("permRole"));
}
connectionMySQL.Close();
}

private void cmboHostNames_SelectedIndexChanged(object sender, EventArgs e)
{
    //Connect to MySQL and execute SQL command.
    MySqlConnection connectionMySQL = new MySqlConnection(loginMenu.ConnectionString);
    connectionMySQL.Open();
    MySqlCommand userAccountsCMD = new MySqlCommand("SELECT * FROM userAccounts WHERE userID = @userID",
connectionMySQL);
    userAccountsCMD.Parameters.AddWithValue("@userID", cmboUserID.Text);
    MySqlDataReader userAccountsRDR = userAccountsCMD.ExecuteReader();
    userAccountsRDR.Read();
    //Set text boxes to display content from the output of userAccounts.
    txtUsername.Text = Convert.ToString(userAccountsRDR[1]);
    userEdit.password = Convert.ToString(userAccountsRDR[2]);
    txtForename.Text = Convert.ToString(userAccountsRDR[3]);
    txtSurname.Text = Convert.ToString(userAccountsRDR[4]);
    txtEmailAddress.Text = Convert.ToString(userAccountsRDR[5]);
    txtProfileImage.Text = Convert.ToString(userAccountsRDR[6]);
    cmboUserPerm.Text = Convert.ToString(userAccountsRDR[8]);
    userAccountsRDR.Close();
    //Execute SQL command to get the role name that matches the permission ID from last SQL query.
    MySqlCommand permCMD = new MySqlCommand("SELECT * FROM userPermissions WHERE permID = @permID", connectionMySQL);
    permCMD.Parameters.AddWithValue("@permID", cmboUserPerm.Text);
    MySqlDataReader permRDR = permCMD.ExecuteReader();
    permRDR.Read();
    cmboUserPerm.Text = Convert.ToString(permRDR[1]);
    permRDR.Close();
    connectionMySQL.Close();
}

private void btnNewuser_Click(object sender, EventArgs e)
{
    //If text entered is blank, output message box informing user of no data entered.
    if (cmboUserID.Text != "")
    {
        if (txtForename.Text != "")
```

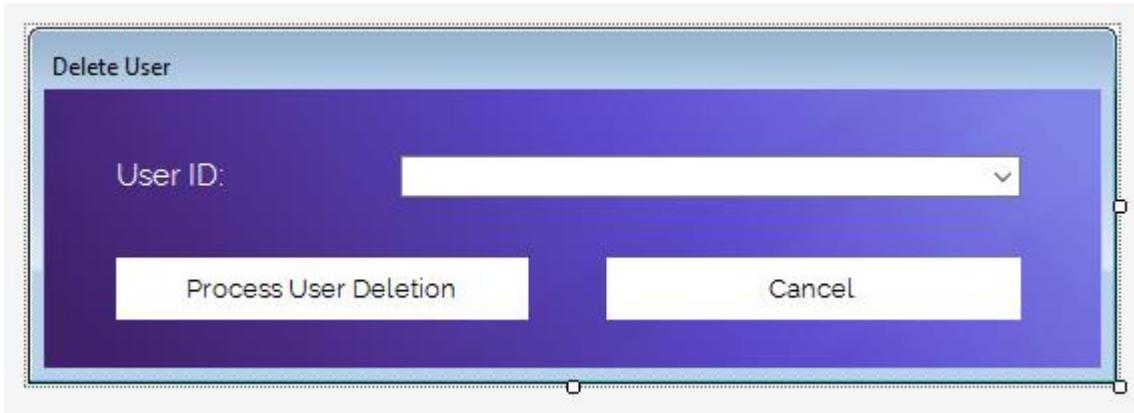
```
if (txtSurname.Text != "")  
{  
    if (txtUsername.Text != "")  
    {  
        if (txtEmailAddress.Text != "")  
        {  
            //Attempt to parse txtEmailAddress into email format. If failed and errored, output message box  
informing user of incorrectly formatted email.  
            try  
            {  
                var addr = new System.Net.Mail.MailAddress(txtEmailAddress.Text);  
                if (txtProfileImage.Text != "")  
                {  
                    //Connec to MySQL, if password is blank use data already entered, else use password  
entered after hash and salt.  
                    MySqlConnection connectionMySQL = new MySqlConnection(loginMenu.ConnectionString);  
                    connectionMySQL.Open();  
                    if (txtPassword.Text == "")  
                    {  
                        userEdit.password = userEdit.password;  
                    }  
                    else  
                    {  
                        userEdit.password = SHA.GenerateSHA512String(loginMenu.userSalt + txtPassword.Text);  
                    }  
                    //Execute SQL to get the ID of the permission group selected.  
                    MySqlCommand permRoleCMD = new MySqlCommand("SELECT permID, permRole FROM userPermissions  
WHERE permRole = @permRole", connectionMySQL);  
                    permRoleCMD.Parameters.AddWithValue("@permRole", cmboUserPerm.Text);  
                    MySqlDataReader permRDR = permRoleCMD.ExecuteReader();  
                    permRDR.Read();  
                    string permID = Convert.ToString(permRDR.GetString("permID"));  
                    permRDR.Close();  
                    //Execute SQL to update user account details in table userAccounts.  
                    MySqlCommand userInfoUpdateCMD = new MySqlCommand("UPDATE userAccounts SET userForename =  
@userForename, userSurname = @userSurname, userLogin = @userLogin, userPassword = @userPassword, userEmailAddress =  
@userEmailAddress, userImage = @userImage WHERE userID = @userID", connectionMySQL);  
                    userInfoUpdateCMD.Parameters.AddWithValue("@userID", cmboUserID.Text);  
                    userInfoUpdateCMD.Parameters.AddWithValue("@userForename", txtForename.Text);  
                    userInfoUpdateCMD.Parameters.AddWithValue("@userSurname", txtSurname.Text);  
                    userInfoUpdateCMD.Parameters.AddWithValue("@userLogin", txtUsername.Text);  
                    userInfoUpdateCMD.Parameters.AddWithValue("@userPassword", password);  
                    userInfoUpdateCMD.Parameters.AddWithValue("@userEmailAddress", txtEmailAddress.Text);  
                    userInfoUpdateCMD.Parameters.AddWithValue("@userImage", txtProfileImage.Text);
```

```
userInfoUpdateCMD.Parameters.AddWithValue("@userCompany", loginMenu.CompanyID);
userInfoUpdateCMD.Parameters.AddWithValue("@userPerm", permID);
userInfoUpdateCMD.ExecuteNonQuery();
connectionMySQL.Close();
Hide();
}
else
{
    System.Windows.Forms.MessageBox.Show("Please enter a valid profile photo link.");
}
}
catch
{
    System.Windows.Forms.MessageBox.Show("You must enter an email address in the correct
format.");
}
}
else
{
    System.Windows.Forms.MessageBox.Show("Please enter an email address.");
}
}
else
{
    System.Windows.Forms.MessageBox.Show("Please enter a username.");
}
}
else
{
    System.Windows.Forms.MessageBox.Show("Please enter a surname.");
}
}
else
{
    System.Windows.Forms.MessageBox.Show("Please enter a forename.");
}
}
else
{
    System.Windows.Forms.MessageBox.Show("Please select a user.");
}
}

private void btnCancel_Click(object sender, EventArgs e)
```

```
{  
    //On button event, hide the form.  
    Hide();  
}  
}  
}
```

Subsection 3.6.3.cxiii - userDelete.cs [design] - design view



Subsection 3.6.3.cxiv - userDelete.designer.cs - Object file - unannotated

```
namespace ELSM_Project
{
    partial class userDelete
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            System.ComponentModel.ComponentResourceManager resources = new
System.ComponentModel.ComponentResourceManager(this);
            this.btnCancel = new System.Windows.Forms.Button();
            this.btnDeleteUser = new System.Windows.Forms.Button();
            this.lblUserID = new System.Windows.Forms.Label();
            this.cmboUserID = new System.Windows.Forms.ComboBox();
            this.SuspendLayout();
            // 
            // btnCancel
            // 
            this.btnCancel.BackColor = System.Drawing.SystemColors.ControlLightLight;
            this.btnCancel.Cursor = System.Windows.Forms.Cursors.Hand;
```

```
this.btnCancel.FlatAppearance.BorderSize = 0;
this.btnCancel.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnCancel.Font = new System.Drawing.Font("Raleway", 9.74999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnCancel.Location = new System.Drawing.Point(281, 84);
this.btnCancel.Name = "btnCancel";
this.btnCancel.Size = new System.Drawing.Size(207, 31);
this.btnCancel.TabIndex = 45;
this.btnCancel.Text = "Cancel";
this.btnCancel.UseVisualStyleBackColor = false;
this.btnCancel.Click += new System.EventHandler(this.btnCancel_Click);
//
// btnDeleteUser
//
this.btnDeleteUser.BackColor = System.Drawing.SystemColors.ControlLightLight;
this.btnDeleteUser.Cursor = System.Windows.Forms.Cursors.Hand;
this.btnDeleteUser.FlatAppearance.BorderSize = 0;
this.btnDeleteUser.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
this.btnDeleteUser.Font = new System.Drawing.Font("Raleway", 9.74999F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.btnDeleteUser.Location = new System.Drawing.Point(36, 84);
this.btnDeleteUser.Name = "btnDeleteUser";
this.btnDeleteUser.Size = new System.Drawing.Size(206, 31);
this.btnDeleteUser.TabIndex = 44;
this.btnDeleteUser.Text = "Process User Deletion";
this.btnDeleteUser.UseVisualStyleBackColor = false;
this.btnDeleteUser.Click += new System.EventHandler(this.btnDeleteUser_Click);
//
// lblUserID
//
this.lblUserID.AutoSize = true;
this.lblUserID.BackColor = System.Drawing.Color.Transparent;
this.lblUserID.Font = new System.Drawing.Font("Raleway", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
this.lblUserID.ForeColor = System.Drawing.SystemColors.ControlLightLight;
this.lblUserID.Location = new System.Drawing.Point(33, 34);
this.lblUserID.Name = "lblUserID";
this.lblUserID.Size = new System.Drawing.Size(62, 18);
this.lblUserID.TabIndex = 38;
this.lblUserID.Text = "User ID:";
//
// cmboUserID
//
this.cmboUserID.FormattingEnabled = true;
this.cmboUserID.Location = new System.Drawing.Point(33, 102);
this.cmboUserID.Name = "cmboUserID";
this.cmboUserID.Size = new System.Drawing.Size(187, 21);
this.cmboUserID.TabIndex = 39;
```

```
this.cmboUserID.Location = new System.Drawing.Point(178, 33);
this.cmboUserID.Name = "cmboUserID";
this.cmboUserID.Size = new System.Drawing.Size(310, 21);
this.cmboUserID.TabIndex = 46;
//
// userDelete
//
this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.BackgroundImage = global::ELSM_Project.Properties.Resources.imgBackground;
this.BackgroundImageLayout = System.Windows.Forms.ImageLayout.Stretch;
this.ClientSize = new System.Drawing.Size(528, 139);
this.ControlBox = false;
this.Controls.Add(this.btnCancel);
this.Controls.Add(this.btnDeleteUser);
this.Controls.Add(this.lblUserID);
this.Controls.Add(this.cmboUserID);
this.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedSingle;
this.Icon = ((System.Drawing.Icon)(resources.GetObject("$this.Icon")));
this.MaximumSize = new System.Drawing.Size(544, 178);
this.MinimumSize = new System.Drawing.Size(544, 178);
this.Name = "userDelete";
this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
this.Text = "Delete User";
this.Load += new System.EventHandler(this.manageUsersDelete_Load);
this.ResumeLayout(false);
this.PerformLayout();
}

#endregion

private System.Windows.Forms.Button btnCancel;
private System.Windows.Forms.Button btnDeleteUser;
private System.Windows.Forms.Label lblUserID;
private System.Windows.Forms.ComboBox cmboUserID;
}
```

Subsection 3.6.3.cvx - userDelete.cs - Code file - annotated

```
using System;
using System.Windows.Forms;
using MySql.Data.MySqlClient;

namespace ELSM_Project
{
    public partial class userDelete : Form
    {
        public userDelete()
        {
            //On form load initialize component.
            InitializeComponent();
        }

        private void btnCancel_Click(object sender, EventArgs e)
        {
            //On button event, hide the form.
            Hide();
        }

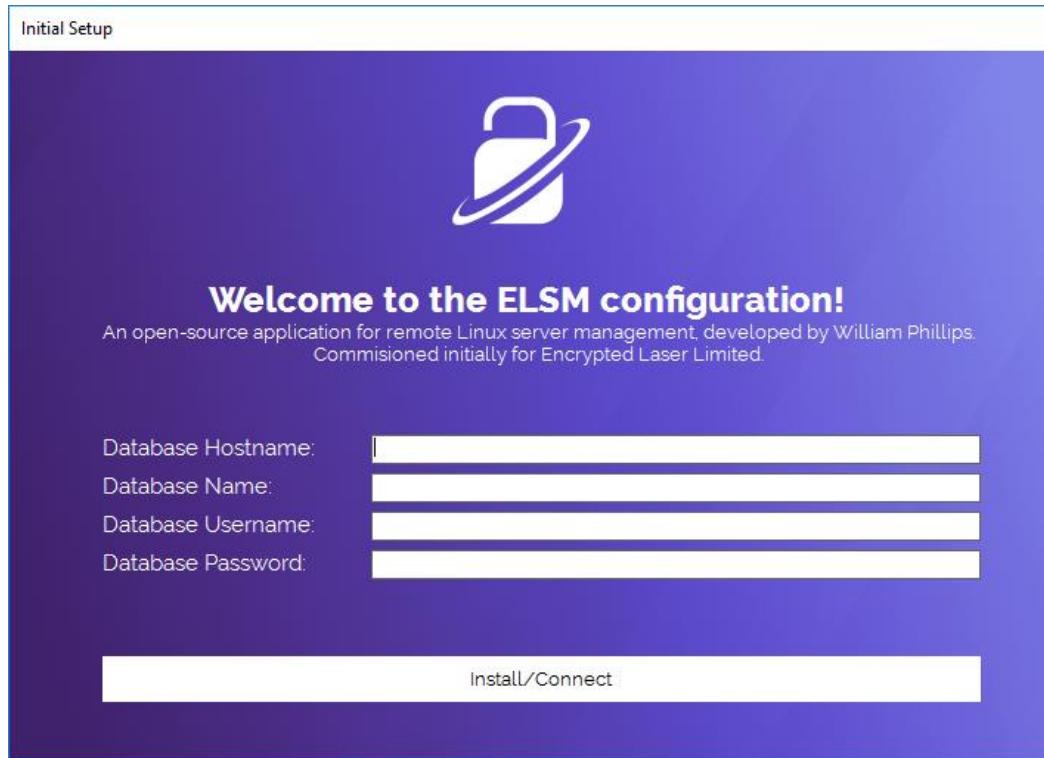
        private void manageUsersDelete_Load(object sender, EventArgs e)
        {
            //Connect to MySQL and set output as items of cmboUserID.
            MySqlConnection connectionMySQL = new MySqlConnection(loginMenu.ConnectionString);
            connectionMySQL.Open();
            MySqlCommand UserInformationCMD = new MySqlCommand("SELECT * FROM userAccounts WHERE userCompany = @companyID",
connectionMySQL);
            UserInformationCMD.Parameters.AddWithValue("@companyID", loginMenu.CompanyID);
            MySqlDataReader UserInformationRDR = UserInformationCMD.ExecuteReader();
            while (UserInformationRDR.Read())
            {
                cmboUserID.Items.Add(UserInformationRDR.GetString("userID"));
            }
            connectionMySQL.Close();
        }

        private void btnDeleteUser_Click(object sender, EventArgs e)
        {
            //Delete row from userAccounts where userID matches selected.
            MySqlConnection connectionMySQL = new MySqlConnection(loginMenu.ConnectionString);
            connectionMySQL.Open();
            MySqlCommand deleteUserCMD = new MySqlCommand("DELETE FROM userAccounts WHERE userID = @userID", connectionMySQL);
```

```
deleteUserCMD.Parameters.AddWithValue("@userID", cmboUserID.Text);
deleteUserCMD.ExecuteNonQuery();
cmboUserID.Items.Clear();
//Update information. Connect to MySQL and set output as items of cmboUserID.
MySqlCommand UserInformationCMD = new MySqlCommand("SELECT * FROM userAccounts WHERE userCompany = @companyID",
connectionMySQL);
UserInformationCMD.Parameters.AddWithValue("@companyID", loginMenu.CompanyID);
MySqlDataReader UserInformationRDR = UserInformationCMD.ExecuteReader();
while (UserInformationRDR.Read())
{
    cmboUserID.Items.Add(UserInformationRDR.GetString("userID"));
}
connectionMySQL.Close();
}
}
}
```

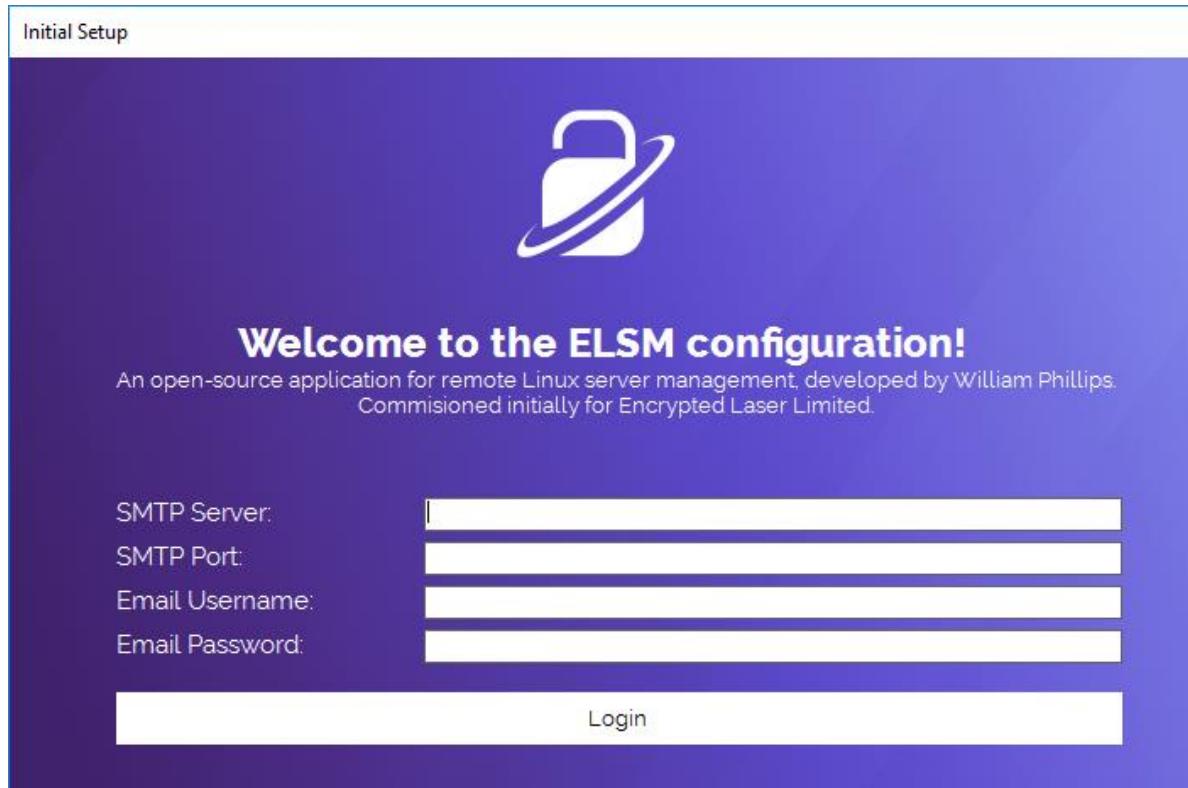
Section 3.6.4 - Completed user interface including full description of features that make it fit for audience and purpose

Database Configuration



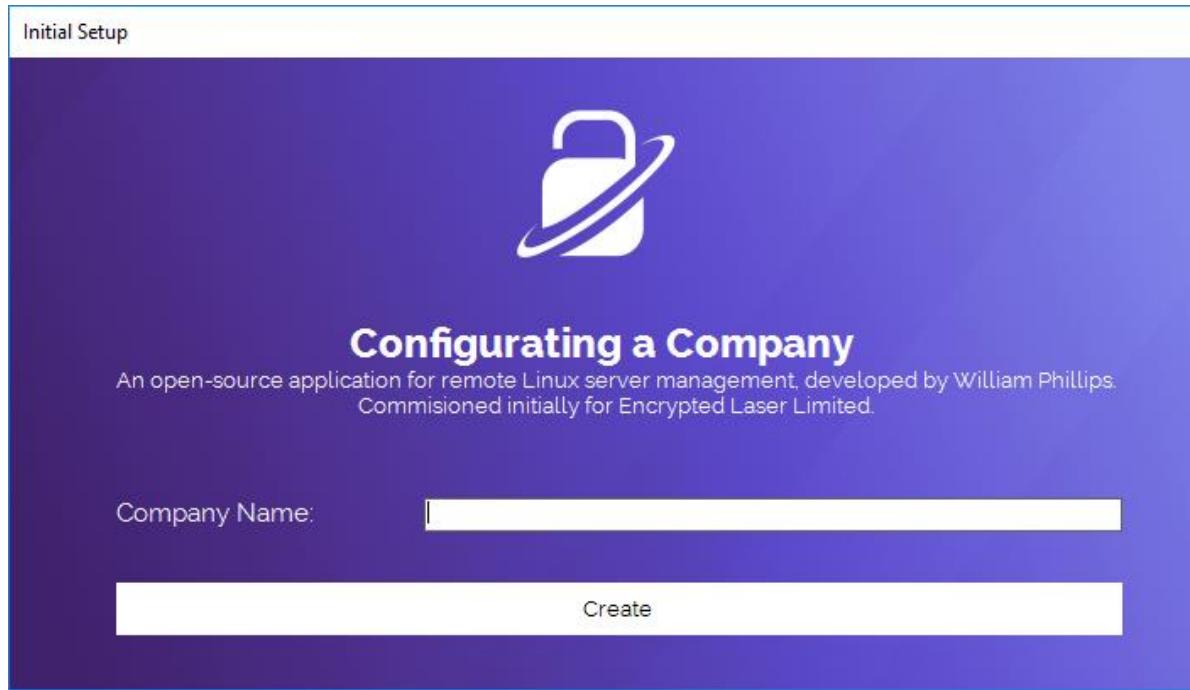
This is the database configuration window, and it is the first screen users are presented with when they first load the program. It loads in the centre of the screen, with no ability to close it prompting the user to proceed through the database setup process to be able to use the program then.

Email Configuration



This is the email server configuration window. Its use is to take the input for an SMTP server so that after the initial configuration it can send the user an email confirming that it installed correctly. The function temporarily stores the data to use on another form.

Company Configuration



This is the company configuration screen, taking input from the user for the company name that they are configuring so that their experience while using the software can be a little more customised while also providing a method for grouping data together when multiple companies exist from the same database. The function will process the input into the database.

Account Configuration

Initial Setup



Configuring an Admin Account

An open-source application for remote Linux server management, developed by William Phillips.
Commissioned initially for Encrypted Laser Limited.

Username:

Password:

Confirm Password:

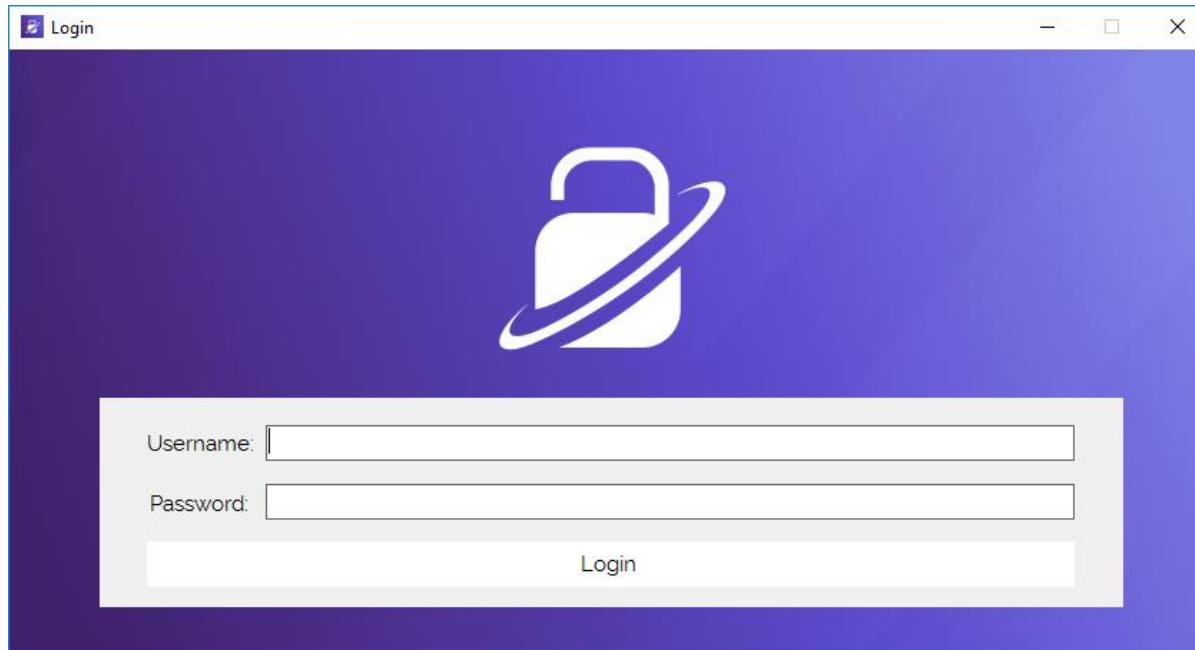
Forename:

Surname:

Email Address:

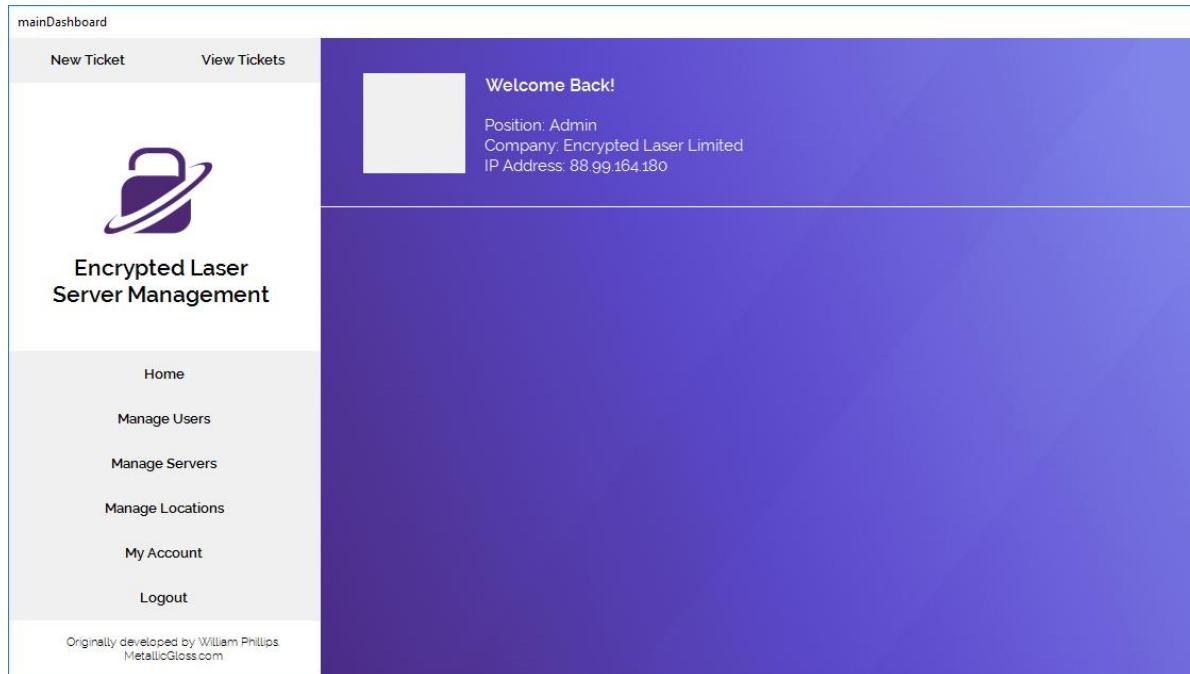
Profile Image URL:

This screen is the admin account configuration screen that accepts user input for a range of fields, processes them through multiple format and presence validation rules before hashing and salting the password using SHA512 and inserting the data into the database to create the user.

Login Menu

This is the login menu screen. It accepts input from the user for their username and password before running a function to allow them access to the program. It pulls and stores permission values as well as saving their details for use on other forms. If the username is not found, or the password does not match the user will be presented with an error and proceed to deny entry and logging the attempt in the database.

Main Dashboard



This is the main dashboard, the hub of the program. It is presented to the user initially allowing them to easily select which place in the program they wished to go.

Manage Account

The screenshot shows the 'Manage Account' screen of a web application. The left sidebar has a light gray background with the title 'Manage Account' at the top. It contains links for 'New Ticket' and 'View Tickets'. Below these are several menu items: 'Home', 'Manage Users', 'Manage Servers', 'Manage Locations', 'Manage Account' (which is highlighted in blue), and 'Logout'. At the bottom of the sidebar, there is a note: 'Originally developed by William Phillips
MetallicGloss.com'. The main content area has a dark purple background. At the top, it says 'Manage Account Information'. Below this is a large white rectangular input field with a red 'X' button in the top right corner. To the right of the input field, user information is displayed: User ID: 1, Username: William, Forename: William, Surname: William, Email Address: testing@test.com, Company: Encrypted Laser Limited, URL: https://www.google.com, and Position: Admin. Below this information are three buttons: 'Change Username', 'Change Password', and 'Change Email Address'. At the bottom of the main content area are two more buttons: 'Edit Forename' and 'Edit Surname'.

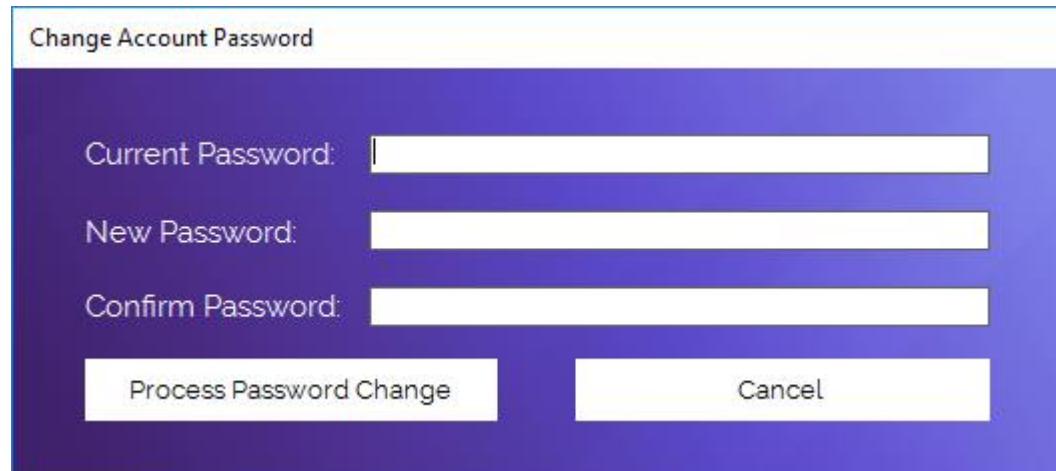
This is the manage account screen. It displays all the user information that is currently set for their account while also presenting options for them to be able to edit details about their account. Each option is permission variable, meaning if they are not permitted to change a setting it will disable and lock the button. Different positions get different access.

Change Account Username

The screenshot shows a dialog box titled "Change Account Username". It contains three input fields: "Current Username" with the value "William", "New Username", and "Confirm Username". Below the inputs are two buttons: "Process Username Change" and "Cancel".

Change Account Username	
Current Username:	William
New Username:	
Confirm Username:	
<input type="button" value="Process Username Change"/>	<input type="button" value="Cancel"/>

This function is the change account username screen. It prefills the current username into the form for the user that is logged in, and checks that the username entered is valid and correct before processing the change into the database.

Change Account Password

The screenshot shows a user interface titled "Change Account Password". It features three input fields: "Current Password", "New Password", and "Confirm Password", each with a corresponding text input box. Below these fields are two buttons: "Process Password Change" on the left and "Cancel" on the right.

This function is the change account password screen. It accepts three inputs. The first input field is the current password if this password does not match that which is stored on the account the password change won't process. If it does, it will check that the two other fields match and are valid. If they are, it will handle the update to the database.

Change Account Email

Change Account Email

Current Email:

New Email:

Confirm Email:

This function is the change account email screen. It prefills the current email into the form for the user that is logged in, and checks that the email address entered is valid, in the correct format of an email and match before processing the change into the database.

Change Account Forename

Change Account Forename

Current Forename:

New Forename:

Confirm Forename:

This function is the change account forename screen. It prefills the current forename into the form for the user that is logged in, and checks that the forename entered is valid and matches before processing the change into the database.

Change Account Surname

Change Account Surname

Current Surname: William

New Surname:

Confirm Surname:

Process Surname Change Cancel

This function is the change account surname screen. It prefills the current surname into the form for the user that is logged in, and checks that the surname entered is valid and matches before processing the change into the database.

Manage Backup Nodes

The screenshot shows a web-based management interface for backup nodes. The header reads "Manage Backup Nodes". On the left, there's a sidebar with a logo of a padlock and the text "Encrypted Laser Server Management". The sidebar contains links for Home, Manage Users, Manage Servers, Manage Locations, Manage Account, and Logout. At the bottom of the sidebar, it says "Originally developed by William Phillips MetallicGloss.com". The main content area has a blue header "Manage Backup Nodes" and a table with columns: backupNodeID, backupNodeHostname, backupNodeOS, and backupNodeIP. Below the table are buttons for Create Server, Edit Server, Delete Server, and Run Backup.

This is the backup node management page, displaying all current backup nodes created on the system and allowing the user to navigate to act if they permission set permits.

Create Backup Node

Create Backup Node

Hostname:	<input type="text"/>
Location:	<input type="text"/>
Username:	<input type="text"/>
Password:	<input type="text"/>
Operating System:	<input type="text"/>
Server IP Address:	<input type="text"/>
Server Processor:	<input type="text"/>
RAM:	<input type="text"/>
Network Port:	<input type="text"/>
Transfer:	<input type="text"/>
Backup Path:	<input type="text"/>

This function is used to create a backup server. It will automatically fill in the name value of each location stored on the system, as well as the operating system name and the network ports. On the process button being pressed, it will validate each field before getting the numerical values for the location, OS and network port to be able to insert the entry into the database without duplication or data.

Edit Backup Server

Edit Server

Hostname:	<input type="text"/>
Location:	<input type="text"/>
Username:	<input type="text"/>
Password:	<input type="text"/>
Operating System:	<input type="text"/>
Server IP Address:	<input type="text"/>
Server Processor	<input type="text"/>
RAM:	<input type="text"/>
Network Port:	<input type="text"/>
Transfer:	<input type="text"/>
Backup Path:	<input type="text"/>

On form load, all dropdown boxes are disabled until the user selects from the hostname option. Once a server has been selected, it will fill in all the information relating to that server in the textboxes and combo boxes. On update, if a new password has been entered it will overwrite the existing one, otherwise, if it is left blank will be left to the one that is already in the database.

Delete Backup Server

The screenshot shows a web-based server management application. The left sidebar has a purple header "Encrypted Laser Server Management" with a lock icon. It includes links for Home, Manage Users, Manage Servers, Manage Locations, Manage Account, and Logout. The main content area has a blue header "Manage Backup Nodes". Below it is a table with columns: backupNodeID, backupNodeHostname, backupNodeOS, and backupNodeIP. A single row is selected, showing values: 1, testbackup.node.com, 53, and 127.0.0.2. A modal dialog titled "Delete Server" is open over the table, containing a "Hostname:" input field with "testbackup.node.com" and two buttons: "Process Server Deletion" and "Cancel". At the bottom of the main content area are buttons for "Create Server", "Edit Server", and "Delete Server". A "Run Backup" button is also present. The footer of the page says "Originally developed by William Phillips MetallicGloss.com".

The delete backup function screen allows the user with the correct permission to be able to remove a server from the list so that it is not used when going through the backup stage.

Run Backup Command



This is the backup run command function screen. It dynamically creates elements on the page for each server that is listed so that the user can select which servers they wish to backup. Once selected, the system will attempt to automatically make a connection to a backup server in the same location to make the backup as quickly as possible. If no backup node is available, it will attempt to search through the areas to find a backup server available for use, at which point it will create a thread that is executing the backup request.

Control Servers

The screenshot shows a web-based application interface titled "Control Servers". At the top left is a "Back" button. The main title "Control Servers" is centered above a table. The table has four columns: "serverID", "serverHostname", "serverOS", and "serverIP". A single row is present in the table, with values 1, testing.elhs.co, 12, and 127.0.0.1 respectively. Below the table are five navigation links: "Create Command", "Edit Command", "Delete Command", "Run Command", and "Server Status".

serverID	serverHostname	serverOS	serverIP
1	testing.elhs.co	12	127.0.0.1

This is the control servers page, listing all active servers inserted into the system and giving navigation options to the user to select depending on their permission set and role.

Create Command

The screenshot shows a software interface titled "Create Command". At the top, there is a field labeled "Command Name:" followed by a text input box. Below this is a list of operating systems, each preceded by a checkbox. The list includes: CentOS 5.10, CentOS 5.11, CentOS 5.5, CentOS 5.8, CentOS 5.9, CentOS 6.2, CentOS 6.3, CentOS 6.4, CentOS 6.5, CentOS 6.6, CentOS 6.9, CentOS 7.0, CentOS 7.1, CentOS 7.3, Debian 5.0, Debian 6.0, and Debian 7.0. A vertical scrollbar is visible on the right side of the list. At the bottom of the window, there are two buttons: "Process New Command" and "Cancel".

This is the command creation window function, dynamically creating elements for each operating systems within the database table. On the check of an operating system, the user is then prompted to insert data into the database for that specific operating system while leaving all of the unchecked items alone.

Edit Command

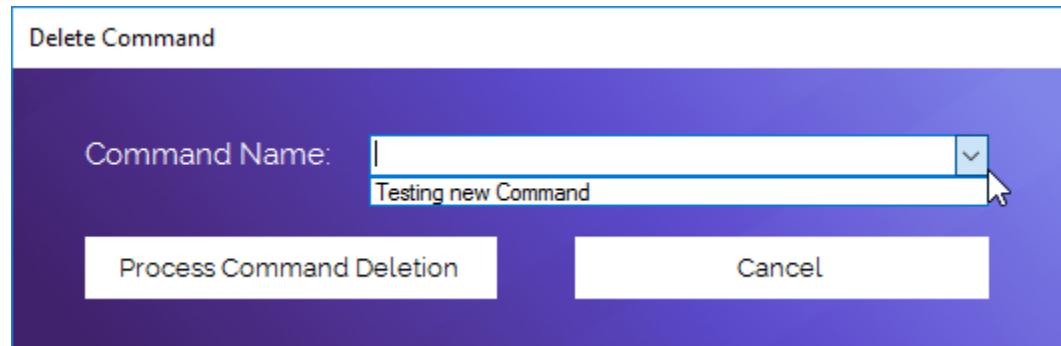
Edit Command

Command Name:	Testing new Command
Testing new Command	
<input type="checkbox"/> CentOS 5.10	
<input type="checkbox"/> CentOS 5.11	
<input checked="" type="checkbox"/> CentOS 5.5	
<input type="checkbox"/> CentOS 5.8	
<input type="checkbox"/> CentOS 5.9	
<input type="checkbox"/> CentOS 6.2	
<input checked="" type="checkbox"/> CentOS 6.3	yum update
<input type="checkbox"/> CentOS 6.4	
<input type="checkbox"/> CentOS 6.5	
<input type="checkbox"/> CentOS 6.6	
<input type="checkbox"/> CentOS 6.9	
<input type="checkbox"/> CentOS 7.0	
<input type="checkbox"/> CentOS 7.1	
<input type="checkbox"/> CentOS 7.3	

Process Command Edit Cancel

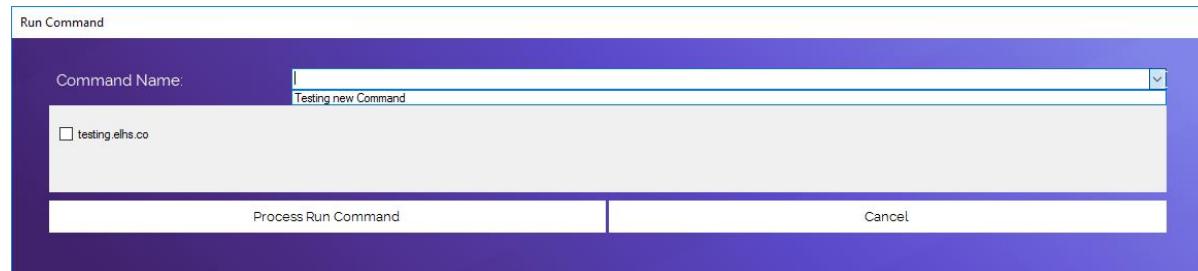
This is the command edit function, dynamically generating elements for each operating system in the database and automatically filling data in for the corresponding operating system allowing for the user to easily modify, update, add or delete operating systems supported for the command.

Delete Command



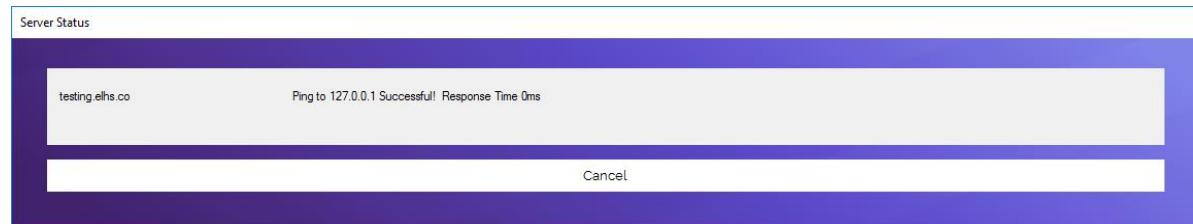
This window allows for the user to process the deletion of a command that removes the command and all of the operating system entries related to the command.

Run Command



This is the run command function window, allowing for the user to be able to select a command and a server that is installed on the system and to be able to execute the command on that server. The system will detect which operating system the server is running and use the command specified in the command creation to perform on that server in a thread so that the form can close and the program can be used like regular while it is executing in the background.

Server Status



This is the server status form, allowing for the user to see the status of all of the servers inserted into the database to check if they are online and if they are what their network response time is.

Manage Server Locations

The screenshot shows a web application interface titled "Manage Locations". On the left, there's a sidebar with a logo of a purple padlock and the text "Encrypted Laser Server Management". The sidebar contains links for "Home", "Manage Users", "Manage Servers", "Manage Locations" (which is highlighted in blue), "Manage Account", and "Logout". At the bottom of the sidebar, it says "Originally developed by William Phillips MetallicGloss.com". The main content area has a title "Manage Datacentre Locations" and a table with one row of data:

locationID	locationName	locationLongitude	locationLatitude
1	Bristol, United Kingdom	000000	000000

At the bottom of the main content area, there are three buttons: "Add Location", "Edit Location", and "Delete Location".

The image above shows the manage server locations window that displays the locations for each location in an orderly way that allows the user to add, edit and delete locations by easily navigating to small forms that serve a specific purpose.

Create Location

The screenshot shows a 'Create Location' window with a white header bar containing the title. Below the header is a dark blue content area. In this area, there are three text input fields: 'Location Name:' followed by a white input field, 'Longitude:' followed by a white input field, and 'Latitude:' followed by a white input field. At the bottom of the window are two buttons: 'Process New Location' on the left and 'Cancel' on the right.

The image above shows the create location window that allows the input of the name as well as two other location details for use to keep servers organised.

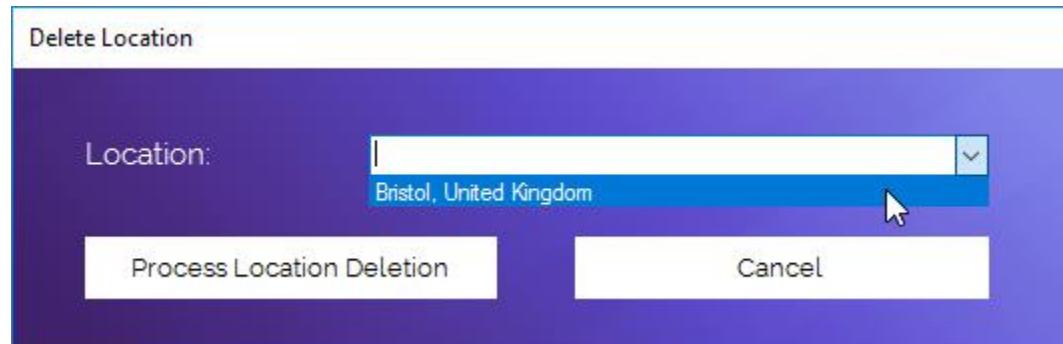
Edit Location

The screenshot shows a modal window titled "Edit Location". It contains the following fields:

- Existing Location: A dropdown menu showing "Bristol, United Kingdom".
- Location Name: A text input field showing "Bristol, United Kingdom".
- Longitude: A text input field showing "000000".
- Latitude: A text input field showing "000000".

At the bottom are two buttons: "Process Location Edit" on the left and "Cancel" on the right.

The image above displays the edit location function window. When a user selects from the existing location drop-down, the data automatically fill in allowing for the user to be able to edit the details.

Delete Location

The image above shows the deletion window, allowing for the user to delete the data from the database for the corresponding location.

Manage Servers

The screenshot shows a web-based server management application. The left sidebar contains links for New Ticket, View Tickets, Home, Manage Users, Manage Servers, Manage Locations, Manage Account, and Logout. The main content area has a purple header "Manage Servers". Below it is a table with four columns: serverID, serverHostname, serverOS, and serverIP. One row is visible, showing serverID 1, serverHostname testing.elhs.co, serverOS 3, and serverIP 127.0.0.1. At the bottom of the main area are buttons for Create Server, Edit Server, Delete Server, Control Servers, and Backup Centre. A footer note at the bottom left states "Originally developed by William Phillips MetallicGloss.com".

serverID	serverHostname	serverOS	serverIP
1	testing.elhs.co	3	127.0.0.1

The image above shows the server management window that lists details about the servers installed on a system in addition to allowing the user to be able to navigate to all the options available for server management.

Create Server

Create Server

Hostname:	<input type="text"/>
Location:	Bristol, United Kingdom <input type="button" value="▼"/>
Username:	<input type="text"/>
Password:	<input type="text"/>
Operating System:	CentOS 5.11 <input type="button" value="▼"/>
Server IP Address:	<input type="text"/>
Server Processor:	<input type="text"/>
RAM:	<input type="text"/>
Network Port:	<input type="button" value="▼"/>
Transfer:	<input type="text"/>
<input type="button" value="Process New Server"/> <input type="button" value="Cancel"/>	

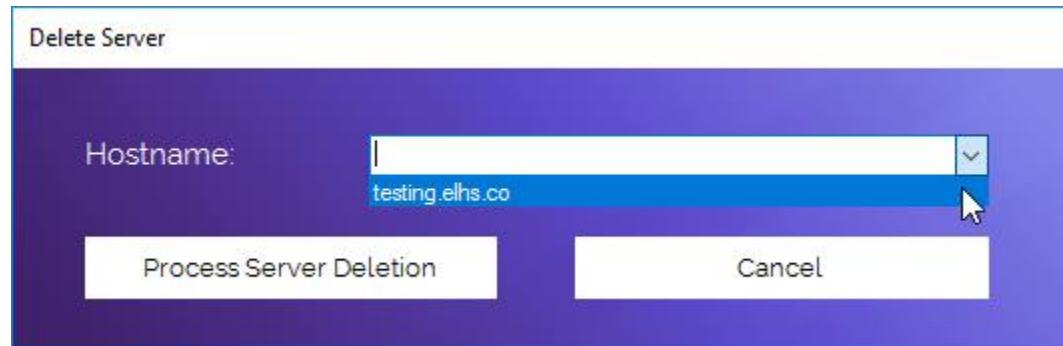
This function is used to create a server. It will automatically fill in the name value of each location stored on the system, as well as the operating system name and the network ports. On the process button being pressed, it will validate each field before getting the numerical values for the location, OS and network port to be able to insert the entry into the database without duplication or data.

Edit Server

Edit Server

Hostname:	testing.elhs.co
Location:	Bristol, United Kingdom
Username:	Testing
Password:	[Redacted]
Operating System:	CentOS 5.5
Server IP Address:	127.0.0.1
Server Processor	Intel i7 8700k
RAM:	64GB
Network Port:	10Gbps
Transfer:	10TB

On form load, all dropdown boxes are disabled until the user selects from the hostname option. Once a server has been selected, it will fill in all the information relating to that server in the textboxes and combo boxes. On update, if a new password has been entered it will overwrite the existing one, otherwise, if it is left blank will be set to the one that is already in the database.

Delete Server

The delete server function screen allows the user with the correct permission to be able to remove a server from the list so that it is not used when going through the backup stage.

Create New Ticket

New Ticket

Your Name: William William

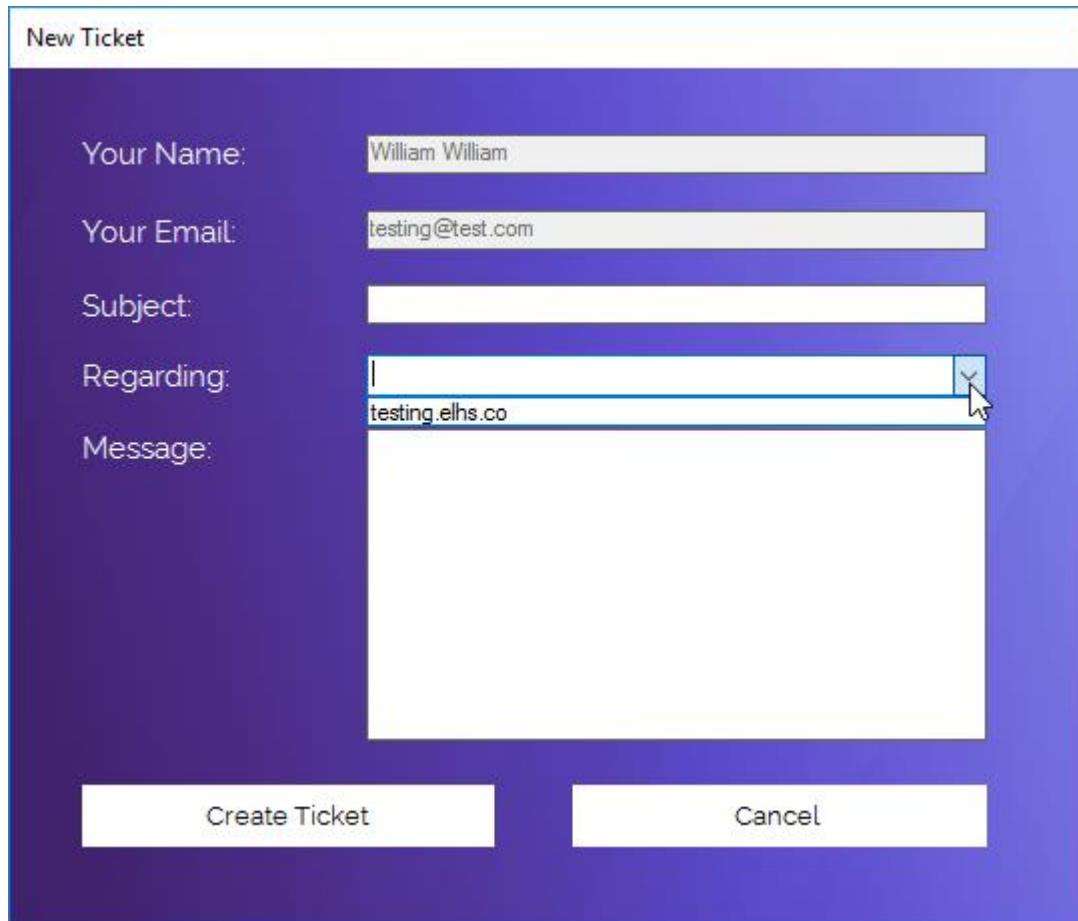
Your Email: testing@test.com

Subject:

Regarding: |
testing.elhs.co

Message:

Create Ticket Cancel



The image above shows the create ticket function, allowing the user to be able to create a ticket regarding a service that inserts into the database for that customer with a link to the server selected.

Ticket Reply

The screenshot shows a window titled "Ticket Management". Inside the window, there is a message from "William William" with the subject "Test" and the body "Testing reply.". Below the message area, there is a horizontal line with the text "Post Reply" in the center. At the bottom of the window, there are two buttons: "Submit Reply" on the left and "Cancel" on the right.

The image above shows the reply ticket form, automatically generating data from the database on the window for the user to be able to view, also, to be able to reply to a specific ticket.

View Tickets

The screenshot shows a web-based application interface. On the left, there is a sidebar with a logo of a padlock and the text "Encrypted Laser Server Management". Below the logo, the sidebar contains links: Home, Manage Users, Manage Servers, Manage Locations, Manage Account, and Logout. At the bottom of the sidebar, it says "Originally developed by William Phillips MetallicGloss.com". The main content area has a purple header with the title "View Tickets". Below the header is a table with the following data:

ticketID	ticketSubject	ticketUpdated	ticketCustomer	ticketRegarding
1	Test	14/03/2018 12:22	1	testing.elhs.co

The image above displays the ticket view page, allowing for admins to be able to see all active tickets and to be able to reply to them.

View Users

The screenshot shows a web-based application interface titled "Manage Users". On the left side, there is a sidebar with the following navigation links: Home, Manage Users, Manage Servers, Manage Locations, Manage Account, and Logout. At the bottom of the sidebar, it says "Originally developed by William Phillips MetallicGloss.com". The main content area has a purple header with the title "Manage Users". Below the header is a table with the following data:

userID	userLogin	userForename	userSurname	userEmailAddress
1	William	William	William	testing@test.com
4	Test	William	William	testing@test.com

At the bottom of the main content area, there are three buttons: "Create User", "Edit User", and "Delete User".

The image above shows the user view page, displaying active users on the system in addition to also giving the user access to create, edit and delete a user on the system if their permission allows for them to be able to perform such action.

Create User

New User

Username:

Password:

Forename:

Surname:

Email Address:

Profile Image URL:

User Role:

- Admin
- System Administrator
- Datacentre Manager
- Account Manager



The above image displays the function enabling users to be able to create a new account on the system, taking input about different information of the user before hashing and salting the password and inserting it into the database for use by another user in another location.

Edit User

Edit User

UserID:	<input type="text" value="1"/>
Username:	<input type="text" value="William"/>
Password:	<input type="password"/>
Forename:	<input type="text" value="William"/>
Surname:	<input type="text" value="William"/>
Email Address:	<input type="text" value="testing@test.com"/>
Profile Image URL:	<input type="text" value="https://www.google.com"/>
User Role:	<input type="text" value="Admin"/>

The image above displays the edit user function window, pre-filling in the IDs of the user accounts on the system within the drop-down. Once an item is selected, data is automatically filled into the fields allowing for the user to edit the information. If a new password is entered, it will overwrite the existing one. Otherwise no new password will be introduced.

Delete User

The screenshot shows a user interface titled "Delete User". It features a purple header bar with the title. Below it is a white input field labeled "User ID:" containing the number "1". To the right of the input field is a small dropdown arrow icon. At the bottom of the screen are two buttons: "Process User Deletion" on the left and "Cancel" on the right.

The above form allows the user to be able to remove an account from the system by selecting their user ID and allowing the system to execute the deletion.

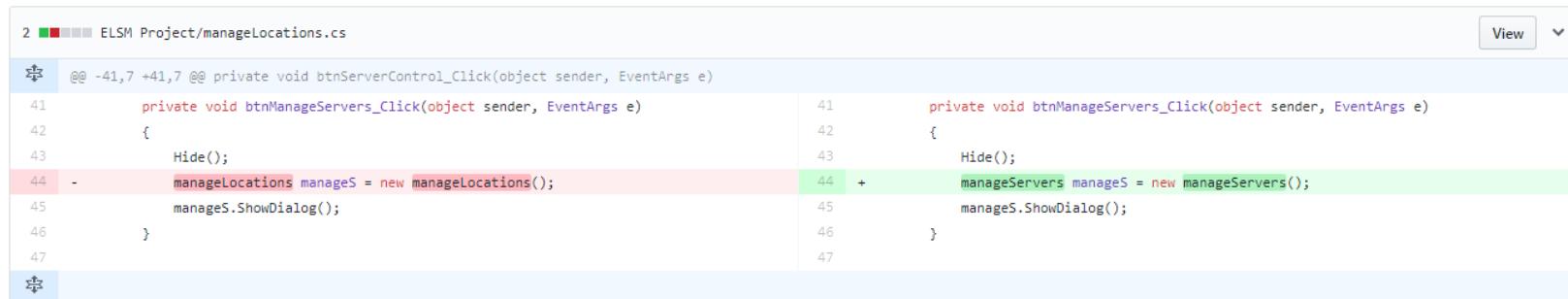
Chapter CS3.7 - TESTING (15 MARKS)

Section 3.7.1 - Developmental Testing [5 marks]

Subsection 3.7.1.i - Evidence of comprehensive testing at each stage of the development of the solution and problems encountered and actions taken

In the following section, I will display multiple screenshots of code development taking place during the development process. The examples include screenshots of errors being thrown by the system, to corrections of code and logic errors to ensure that the system is fully working for the client when the final version is generated.

Incorrect Buttons

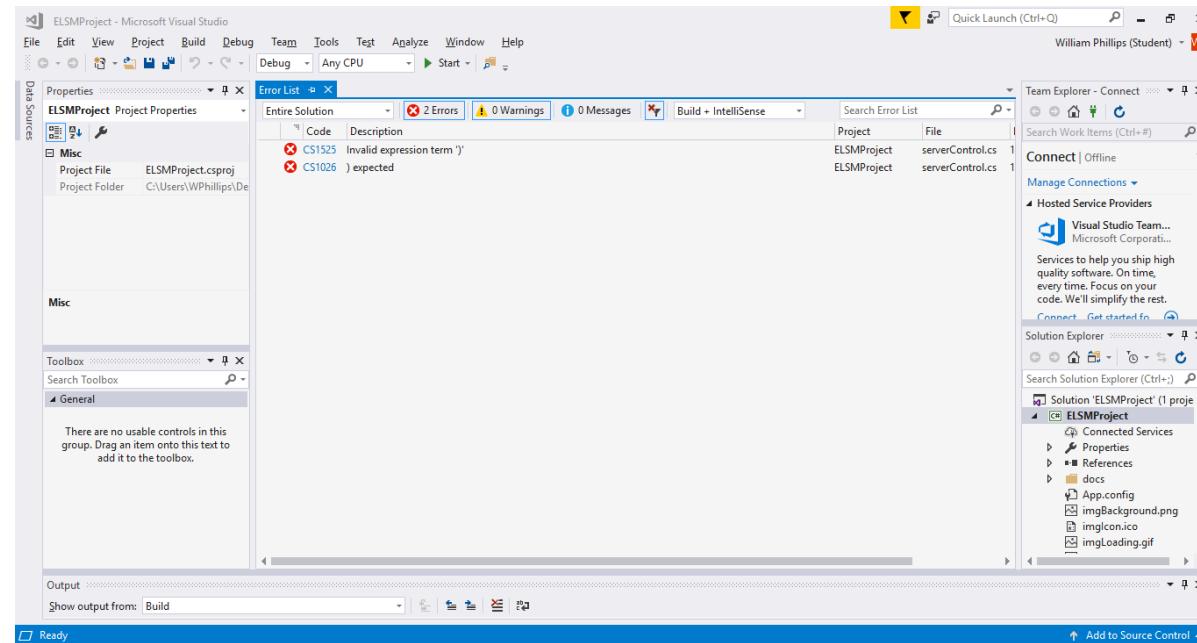


```
2  ELSM Project/manageLocations.cs View ▾
@@ -41,7 +41,7 @@ private void btnServerControl_Click(object sender, EventArgs e)
41     private void btnManageServers_Click(object sender, EventArgs e)
42     {
43         Hide();
44 -         manageLocations manageS = new manageLocations();
45         manageS.ShowDialog();
46     }
47
```

```
41     private void btnManageServers_Click(object sender, EventArgs e)
42     {
43         Hide();
44 +         manageServers manageS = new manageServers();
45         manageS.ShowDialog();
46     }
47
```

During the development process, an issue occurred whereby the incorrect button was configured for the navigation items that directed people to the locations management page rather than the server management page when the button was selected. Created from an accidental copy/paste mistake where the pasted value was never updated or corrected to point to the correct form. By pointing to the wrong form, it could cause a specific form being inaccessible for the user being able to navigate it. To correct it, I updated the name of form that it was pointing to. The image above displays the code changes that were logged to correct the problem. This problem aids to show that comprehensive testing was performed throughout the development to catch this issue that displayed no error.

Extra Bracket



An error that presented itself within the development state on multiple occasions was the error that is presented above. This was caused by a mistype when attempting to do two brackets. This left the program unable to start with the error throwing an 'Invalid Expression Term "')'.

The code editor shows a diff view of a file named 'serverControl.cs'. The changes are as follows:

```
@@ -146,7 +146,7 @@ private void btnEditCommand_Click(object sender, EventArgs e)
146
147     private void btnDeleteCommand_Click(object sender, EventArgs e)
148     {
149         -         serverControlDelete Delete = new serverControlDelete();
150         Delete.ShowDialog();
151     }
152 }
```

The line 'serverControlDelete Delete = new serverControlDelete();' has a minus sign before it, indicating it was deleted, and a plus sign after it, indicating it was added back.

The code change above highlights one of these errors being corrected whereby there was an extra "(" within the new form function.

Incorrect Insertion

The screenshot shows a code diff tool comparing two versions of a C# file, ELSMProject/NewTicket.cs. The left column shows the original code with several lines highlighted in red, indicating they have been removed. The right column shows the corrected code with new lines added in green, indicating they have been inserted. The changes involve modifying an SQL command from 'systemTickets' to 'systemReplies' and updating the parameters to reflect the correct table.

```
10  ELSMProject/NewTicket.cs
@@ -45,11 +45,11 @@ private void btnNewTicket_Click(object sender, EventArgs e)
45     var ticketID = newTicket.LastInsertedId;
46
47
48 -     MySqlCommand newTicketReply = new MySqlCommand("INSERT INTO systemTickets
49 -     (ticketID, userID, replyContent) VALUES (@ticketID, @userID, @replyContent)",
50 -     connectionMySQL);
51 -     newTicket.Parameters.AddWithValue("@ticketID", ticketID);
52 -     newTicket.Parameters.AddWithValue("@userID", loginMenu.UserID);
53 -     newTicket.Parameters.AddWithValue("@replyContent", txtContent.Text);
54 -     newTicket.ExecuteNonQuery();
55 }

```

```
45     var ticketID = newTicket.LastInsertedId;
46
47
48 +     MySqlCommand newTicketReply = new MySqlCommand("INSERT INTO systemReplies
49 +     (ticketID, userID, replyContent) VALUES (@ticketID, @userID, @replyContent)",
50 +     connectionMySQL);
51 +     newTicketReply.Parameters.AddWithValue("@ticketID", ticketID);
52 +     newTicketReply.Parameters.AddWithValue("@userID", loginMenu.UserID);
53 +     newTicketReply.Parameters.AddWithValue("@replyContent", txtContent.Text);
54 +     newTicketReply.ExecuteNonQuery();
55 }
```

The code correction above was made during the development process when it became known that the ticket reply page was inserting data into the wrong database table, and created a new ticket rather than a new ticket reply. This was a simple fix, by correcting the parameters that were being added as well as the command name that was being executed. Also, updating the SQL command itself so it targeted the correct database table allowed for this problem to be quickly fixed without much hassle of time being taken.

Data Returned Not Found

The screenshot shows a code diff interface comparing two versions of a C# file named controlServerStatus.cs. The left column shows the original code, and the right column shows the corrected code. The changes are highlighted with color-coded boxes: red for deleted code and green for added code.

Original Code (Left)	Corrected Code (Right)
@@ -45,7 +45,7 @@ private void serverControlStatus_Load(object sender, EventArgs e)	
45 statusResult.Width = 800; // Set width of label	45 statusResult.Width = 800; // Set width of label
46 statusResult.Height -= 5; // Set height of label	46 statusResult.Height -= 5; // Set height of label
47 statusResult.ForeColor = Color.Black; // Set text color to black	47 statusResult.ForeColor = Color.Black; // Set text color to black
48 - pingOutcomeData = Convert.ToString(statusOutput[8]); // Set pingOutcomeData variable from database equal to the IP address	48 + pingOutcomeData = Convert.ToString(statusOutput[7]); // Set pingOutcomeData variable from database equal to the IP address
49 Ping pingProcess = new Ping(); // Construct a ping variable	49 Ping pingProcess = new Ping(); // Construct a ping variable
50 pingResponse = pingProcess.Send(pingOutcomeData); // Ping variable containing server IP from database row	50 pingResponse = pingProcess.Send(pingOutcomeData); // Ping variable containing server IP from database row
51 if (pingResponse.Status == IPStatus.Success) // If ping request shows online	51 if (pingResponse.Status == IPStatus.Success) // If ping request shows online

The code correction listed above displays a variable attempting to be set to the 9th item in an array. This is incorrect, as the 9th item within array contains different data, causing the result to output that implied to the user that it had failed. To correct the issue, the position had to be updated so that the program attempts to target the correct value in the 8th position. The error caused by the problem above made the program unable to export the results of the ping test correct. This problem aids to show that comprehensive testing was performed throughout the development to catch this issue that displayed no error.

Button not connected & Incorrect SQL Value

```
8 ELSM Project/manageServersDelete.cs
@@ -28,7 +28,7 @@ private void manageServersDelete_Load(object sender, EventArgs e)
28     {
29         MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString); // Turn connection string into MySQL Connection form.
30         conn.Open();
31 -         string sql = "SELECT * FROM serverInformation WHERE companyID = @companyID"; // Create a string with the query command to run.
32         MySqlCommand cmd = new MySqlCommand(sql, conn);
33         cmd.Parameters.Add("@companyID", loginMenu.CompanyID); // Replace variable @userLogin with the variable collected earlier from the user.
34         MySqlDataReader rdr = cmd.ExecuteReader(); // Process the query command and feedback data to reader.
@@ -48,6 +48,12 @@ private void btnDeleteServer_Click(object sender, EventArgs e)
48         serverCMD.Parameters.Add("@Hostname", cmboHostname.Text);
49         serverCMD.ExecuteNonQuery(); // Process query.
50         conn.Close();
51     }
52 }
53 }
```

```
28     {
29         MySqlConnection conn = new MySqlConnection(loginMenu.ConnectionString); // Turn connection string into MySQL Connection form.
30         conn.Open();
31 +         string sql = "SELECT * FROM serverInformation WHERE serverCompany = @companyID"; // Create a string with the query command to run.
32         MySqlCommand cmd = new MySqlCommand(sql, conn);
33         cmd.Parameters.Add("@companyID", loginMenu.CompanyID); // Replace variable @userLogin with the variable collected earlier from the user.
34         MySqlDataReader rdr = cmd.ExecuteReader(); // Process the query command and feedback data to reader.
48         serverCMD.Parameters.Add("@Hostname", cmboHostname.Text);
49         serverCMD.ExecuteNonQuery(); // Process query.
50         conn.Close();
51 +         Hide();
52 +     }
53 +     private void btnCancel_Click_1(object sender, EventArgs e)
54 +     {
55 +         Hide();
56 +     }
57     }
58 }
59 }
```

The code correction above shows the correction of two problems and how a solution was added to overcome them. The button that was designed to hide the form performed no action, caused by there being no event handler currently on the form that could handle and process the hiding of the form to cancel the request. The event handler was added on lines 54 – 57 to correct the problem.

The other problem that was corrected within this file was the field within the database that the SQL statement was attempting to query. The field was incorrectly named, leading to no data being exported from the request.

Section 3.7.2 - Testing the final system

Subsection 3.7.2.i - Test plan

Function 1 - Setup Database Configuration

Test ID	Description	Test Data	Test Style	Expected outcome	Test Type
1.1	Test with valid database information inserted that the SQL runs fine.	Correct database login information for MySQL database.	Typical	Proceeds to next page.	Functional
1.2	Test with correct username, invalid password.	Correct database information with incorrect password.	Typical	Displays MySQL error of access denied.	Functional
1.3	Test with extreme length and complexity password.	4096 length random character password.	Extreme	Proceeds to next page.	Functional
1.4	Test of validation checks with invalid and incomplete data being inserted.	Database information with missing username.	Invalid	Informs the user of the incorrect data that hasn't been inserted	Logical

Function 2 - Setup Account Creation

Test ID	Description	Test Data	Test Style	Expected outcome	Test Type
2.1	Test with fully valid data to confirm if data is inserted correctly into the database.	Fully correct and valid data.	Typical	Data is inserted into the database correctly.	Functional
2.2	Test with fully correct information with an extra character at the end of the confirmation password.	Fully correct and valid data with an extra character at the end of the password entered.	Typical	An error is shown informing the user of the password mismatch.	Functional
2.3	Test with a very long username is entered.	A very long username that is 100+ characters long.	Extreme	Data is inserted into the database correctly.	Functional
2.4	Test with an invalid email address in an incorrect format is entered.	Data with an incorrect email address.	Invalid	An error is shown informing the user of the problem with the email address.	Logical

Function 3 - Create Server / Backup Node

Test ID	Description	Test Data	Test Style	Expected outcome	Test Type
3.1	Test attempts to create server with fully valid data that should be accepted.	Fully correct and valid data.	Typical	Server is inserted into the database.	Functional
3.2	Test attempts to create server with very long and complex password.	Fully correct and valid data with long password.	Extreme	Server is inserted into the database.	Functional
3.3	Test attempts to create server with missing fields.	Incomplete data with a field missing.	Invalid	User is presented with an error informing them about the incomplete field.	Logical
3.4	Test attempts to create server with invalid IP address.	Invalid IP address.	Invalid	User is presented with an error informing them about the invalid IP address.	Logical

Function 4 - Edit Server / Backup Node

Test ID	Description	Test Data	Test Style	Expected outcome	Test Type
4.1	Test attempts to edit server with fully valid data that should be accepted.	Fully correct and valid data.	Typical	Server is updated in the database.	Functional
4.2	Test attempts to edit server with fully valid data that should be accepted but does not update the password.	Fully correct and valid data with password field missing.	Typical	Server is updated in the database with the old password not touched.	Functional
4.3	Test attempts to edit server with a very long name with lots of special characters.	A long & special name.	Extreme	Server is updated in the database.	Functional
4.4	Test attempts to edit server by removing the username.	Removed username from data.	Invalid	User is presented with an error informing them about the invalid username.	Logical
4.5	Test attempts to edit server by pasting IPv6 address.	IPv6 address to replace existing IP.	Invalid	User is presented with an error informing them about the invalid IP address.	Logical

Function 5 - Delete Server / Backup Node

Test ID	Description	Test Data	Test Style	Expected outcome	Test Type
5.1	Test attempts to delete with no item selected.	No item from dropdown selected.	Typical	Does not delete anything and informs of problem.	Functional
5.2	Test attempts to delete a dropdown item that is selected.	Dropdown item selected	Typical	Deletes item from database.	Functional

Function 6 - Create Command

Test ID	Description	Test Data	Test Style	Expected outcome	Test Type
6.1	Test attempts to create command with fully valid data that should be accepted.	Fully correct and valid data.	Typical	Command is inserted into the database.	Functional
6.2	Test attempts to create command for every operating system.	Fully correct and valid data with long password.	Extreme	Command is inserted into the database.	Functional
6.3	Test attempts to create command with no operating system selected.	Incomplete data with no OS selected.	Invalid	User is presented with an error informing them about the incomplete fields.	Logical

Function 7 - Edit Command

Test ID	Description	Test Data	Test Style	Expected outcome	Test Type
7.1	Test attempts to edit command with fully valid data that should be accepted.	Fully correct and valid data.	Typical	Command is updated in the database.	Functional
7.2	Test attempts to edit command with no operating system selected.	Incomplete data with no OS selected.	Invalid	User is presented with an error informing them about the incomplete fields.	Functional

Function 8 - Delete Command

Test ID	Description	Test Data	Test Style	Expected outcome	Test Type
8.1	Test attempts to delete with no item selected.	No item from dropdown selected.	Typical	Does not delete anything and informs of problem.	Functional

Function 9 - Create Location

Test ID	Description	Test Data	Test Style	Expected outcome	Test Type
9.1	Test attempts to create location with fully valid data that should be accepted.	Fully correct and valid data.	Typical	Location is inserted into the database.	Functional
9.2	Test attempts to create location with very long name.	Fully correct and valid data with long name.	Extreme	Location is inserted into the database.	Functional

Function 10 - Edit Location

Test ID	Description	Test Data	Test Style	Expected outcome	Test Type
10.1	Test attempts to edit location with fully valid data that should be accepted.	Fully correct and valid data.	Typical	Location is inserted into the database.	Functional
10.2	Test attempts to edit location with very long name.	Fully correct and valid data with long name.	Extreme	Location is inserted into the database.	Functional

Function 11 - Delete Location

Test ID	Description	Test Data	Test Style	Expected outcome	Test Type
11.1	Test attempts to delete with no item selected.	No item from dropdown selected.	Typical	Does not delete anything and informs of problem.	Functional
11.2	Test attempts to delete a dropdown item that is selected.	Dropdown item selected	Typical	Deletes item from database.	Functional

Function 12 - Create User

Test ID	Description	Test Data	Test Style	Expected outcome	Test Type
12.1	Test attempts to create user with fully valid data that should be accepted.	Fully correct and valid data.	Typical	User is inserted into the database.	Functional
12.2	Test attempts to create user with very long and complex password.	Fully correct and valid data with long password.	Extreme	User is inserted into the database.	Functional
12.3	Test attempts to create user with missing fields.	Incomplete data with a field missing.	Invalid	User is presented with an error informing them about the incomplete field.	Logical
12.4	Test attempts to create user with invalid email address.	Invalid email address.	Invalid	User is presented with an error informing them about the invalid email address.	Logical

Function 13 - Edit User

Test ID	Description	Test Data	Test Style	Expected outcome	Test Type
13.1	Test attempts to update user with fully valid data that should be accepted.	Fully correct and valid data.	Typical	User is updated in the database.	Functional
13.2	Test attempts to update user with very long and complex password.	Fully correct and valid data with long password.	Extreme	User is updated in the database.	Functional
13.3	Test attempts to update user with missing fields.	Incomplete data with a field missing.	Invalid	User is presented with an error informing them	Logical

				about the incomplete field.	
--	--	--	--	-----------------------------	--

Function 14 - Delete User

Test ID	Description	Test Data	Test Style	Expected outcome	Test Type
14.1	Test attempts to delete with no item selected.	No item from dropdown selected.	Typical	Does not delete anything and informs of problem.	Functional
14.2	Test attempts to delete a dropdown item that is selected.	Dropdown item selected	Typical	Deletes item from database.	Functional

Function 15 - Execute Command

Test ID	Description	Test Data	Test Style	Expected outcome	Test Type
15.1	Test accepts to execute command across multiple servers at the same time for a command that is in the system.	Servers selected to have command executed on.	Typical	Window closes and in the background the SSH command is executed.	Functional

Function 16 – Server Status

Test ID	Description	Test Data	Test Style	Expected outcome	Test Type
16.1	Test attempts to load the page with valid data.	Valid server configurations.	Typical	Servers are displayed as online.	Functional
16.2	Test attempts to load the page with invalid IP address.	Invalid server configurations.	Invalid	Server is displayed as offline.	Logical

Function 17 – Create Ticket

Test ID	Description	Test Data	Test Style	Expected outcome	Test Type
17.1	Test attempts to create a ticket with valid and complete data.	Valid & complete data.	Typical	New ticket is created.	Functional
17.2	Test attempts to create a ticket with a very long subject.	Very long ticket subject.	Extreme	New ticket is created.	Functional

Function 18 – Reply To Ticket

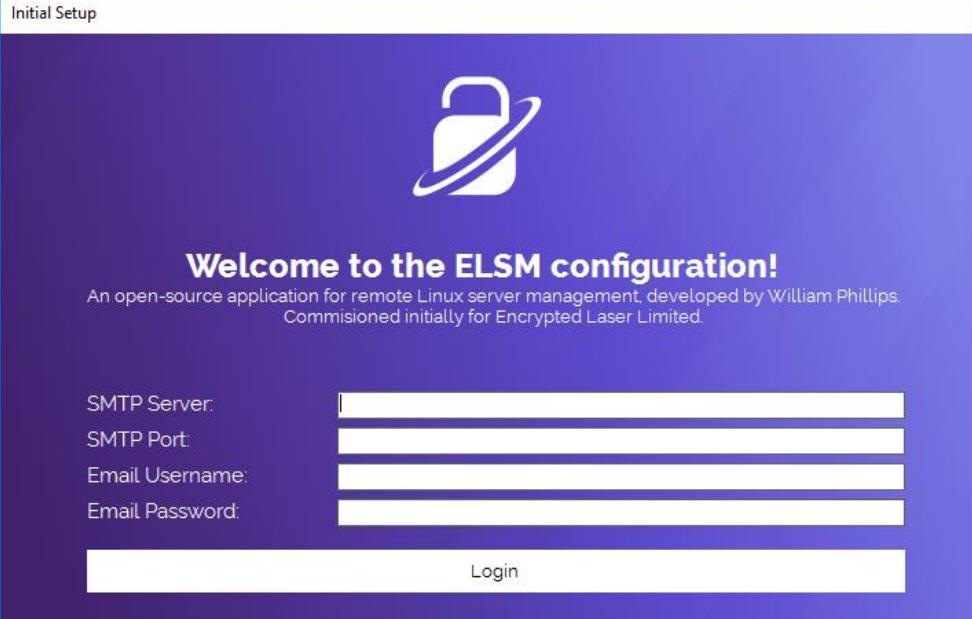
Test ID	Description	Test Data	Test Style	Expected outcome	Test Type
18.1	Test attempts to reply to an existing ticket with a valid reply.	Valid data	Typical	A new reply is created.	Functional
18.2	Test attempts to reply with a long and random character reply.	Random character ticket reply.	Extreme	A new reply is created.	Functional

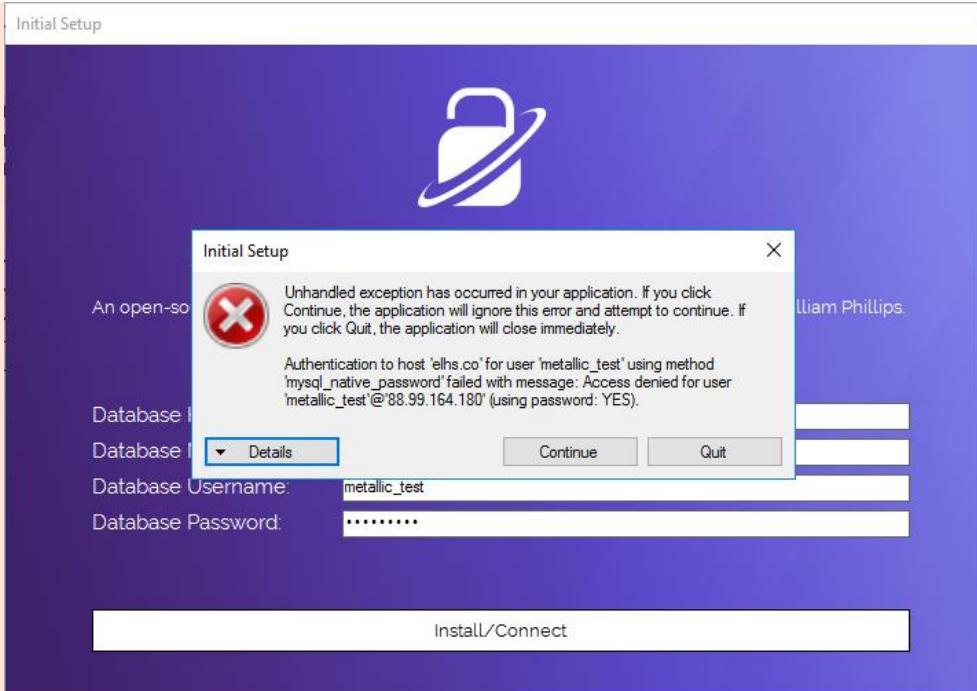
Function 19 - Login

Test ID	Description	Test Data	Test Style	Expected outcome	Test Type
19.1	Test attempts to allow login with valid and correct username and password.	Correct username and password.	Typical	User is allowed entry into the program.	Functional
19.2	Test attempts to allow login with valid username and invalid password.	Correct username and invalid password.	Typical	Error is presented to the user informing them that their password or username does not match.	Functional
19.3	Test attempts to allow login with long username and correct password	Extreme username length and characters.	Extreme	User is allowed entry into the program.	Functional
19.4	Test attempts to allow login with username that isn't in the database.	Invalid username but valid password.	Invalid	Error is presented to the user informing them that their password or username does not match.	Logical
19.5	Test attempts to allow login with no password entered.	No password entered.	Invalid	Error is presented to the user informing them that their password field cannot be blank.	Logical

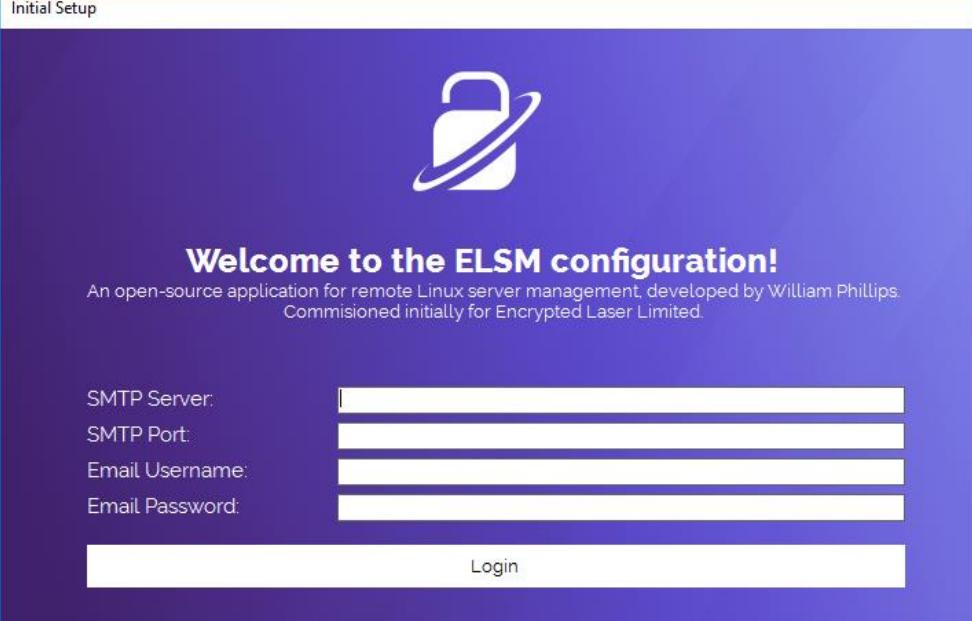
Subsection 3.7.2.ii - Actual test runs**Function 1 - Setup Database Configuration**

Test ID	Screenshot ID	Expected Result	Actual Result	Comments on test
1.1	1.1	Proceeds to next page.	Proceeds to next page.	Passed successfully and performed action as expected.
1.2	1.2	Displays MySQL error of access denied.	Displays MySQL error of access denied.	Passed successfully and performed action as expected.
1.3	1.3	Proceeds to next page.	Proceeds to next page.	Passed successfully and performed action as expected.
1.4	1.4	Informs the user of the incorrect data that hasn't been inserted	Informs the user of the incorrect data that hasn't been inserted	Passed successfully and performed action as expected.

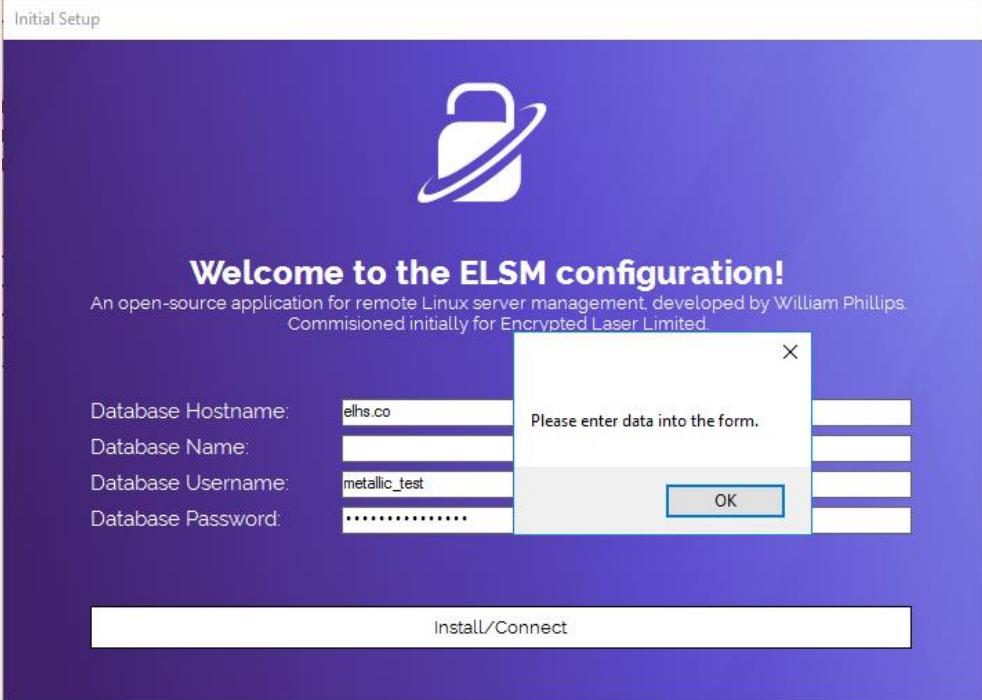
Screenshot ID	Screenshot Evidence	Test ID	Comment on screenshot
1.1	<p>Initial Setup</p>  <p>Welcome to the ELSM configuration!</p> <p>An open-source application for remote Linux server management, developed by William Phillips. Commissioned initially for Encrypted Laser Limited.</p> <p>SMTP Server: <input type="text"/></p> <p>SMTP Port: <input type="text"/></p> <p>Email Username: <input type="text"/></p> <p>Email Password: <input type="text"/></p> <p>Login</p>	1.1	After entering the correct database information to the system, it proceeded to perform the setup and navigated the user to the configuration for the next step in the configuration - the email setup.

1.2	 A screenshot of a Windows application window titled "Initial Setup". The window displays an error message: "Unhandled exception has occurred in your application. If you click Continue, the application will ignore this error and attempt to continue. If you click Quit, the application will close immediately." Below the message, it says: "Authentication to host 'elhs.co' for user 'metallic_test' using method 'mysql_native_password' failed with message: Access denied for user 'metallic_test'@'88.99.164.180' (using password: YES)." The application interface includes fields for "Database Username" (set to "metallic_test") and "Database Password" (redacted). A "Details" button is highlighted with a blue border. Buttons for "Continue" and "Quit" are also visible.	1.2	After entering the incorrect password for the configuration, the error was presented to the user informing them that access was denied for the user.
-----	--	-----	--

1.3	Initial Setup	1.3	After entering the correct database information to the system, with the password being very long, complex and containing multiple symbols, it proceeded to perform the setup and navigated the user to the configuration for the next step in the configuration – the email setup.
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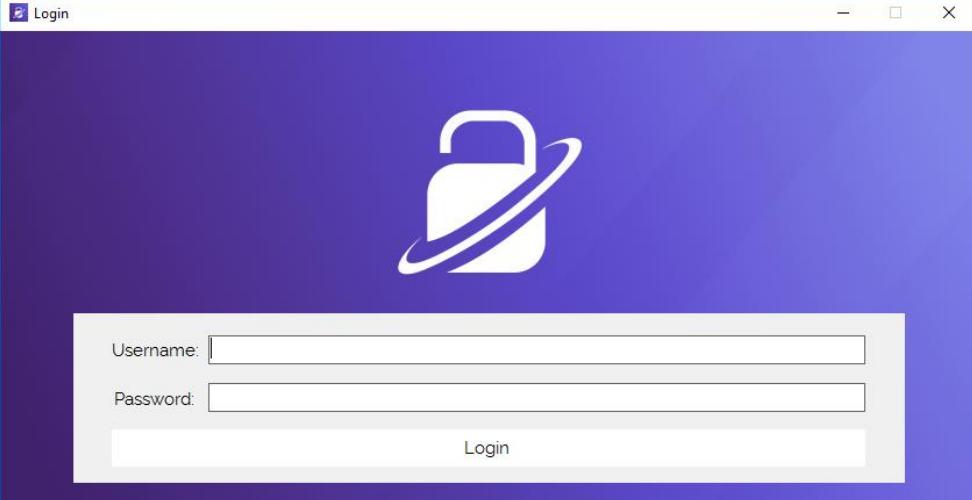


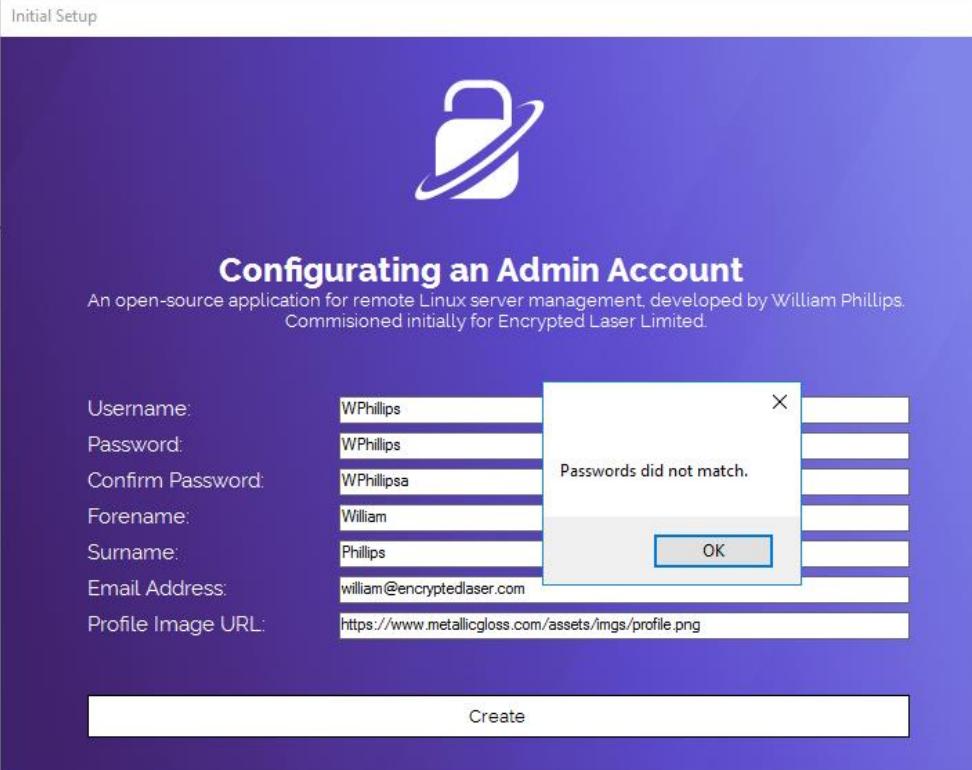
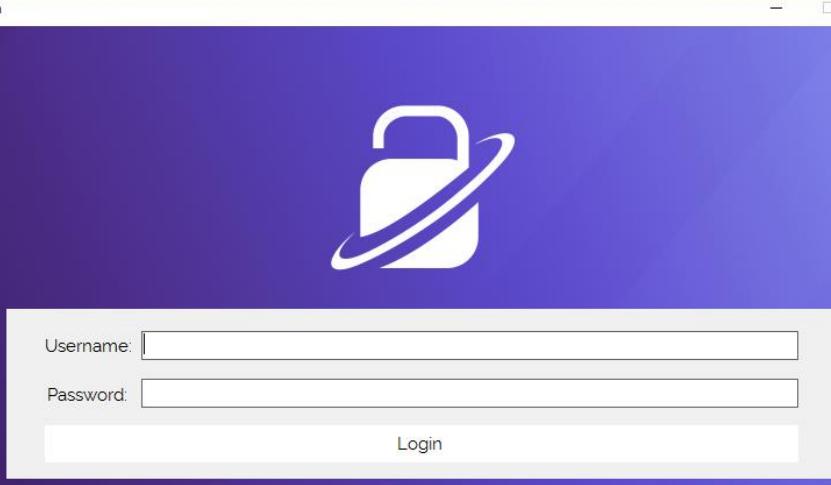
The screenshot shows the 'Initial Setup' page of the ELSM configuration application. At the top, there is a large blue header with a white padlock icon and the text 'Welcome to the ELSM configuration!'. Below this, there is a brief description: 'An open-source application for remote Linux server management, developed by William Phillips. Commissioned initially for Encrypted Laser Limited.' There are four input fields for configuration: 'SMTP Server', 'SMTP Port', 'Email Username', and 'Email Password', each represented by a white input box with a black border. Below these fields is a large white button labeled 'Login' in black text.

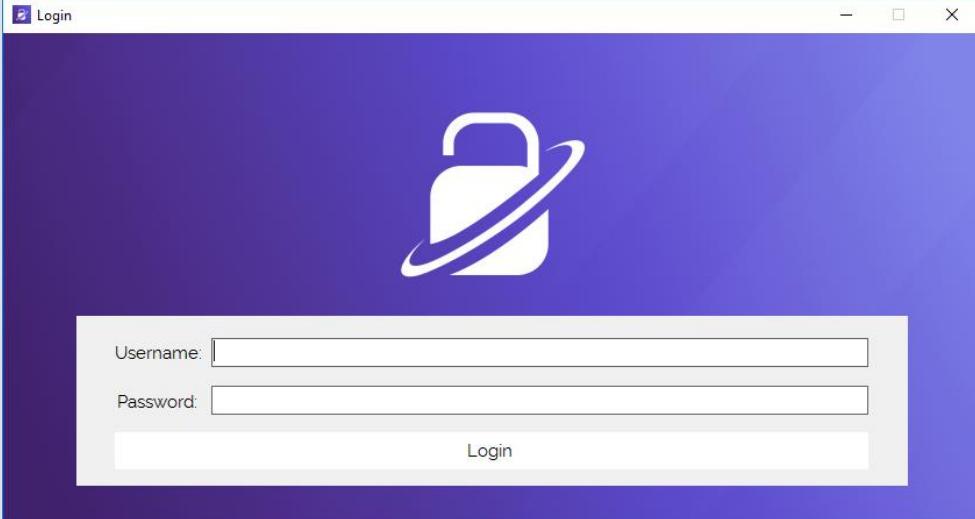
1.4	 Initial Setup <p>Welcome to the ELSM configuration! An open-source application for remote Linux server management, developed by William Phillips. Commissioned initially for Encrypted Laser Limited.</p> <p>Database Hostname: elhs.co Database Name: <input type="text"/> Database Username: metallic_test Database Password: <input type="password"/></p> <p>Please enter data into the form.</p> <p>OK</p> <p>Install/Connect</p>	1.4	After attempting to enter details into the account field, but leaving the database table name blank, an error was presented to the user.
-----	---	-----	--

Function 2 - Setup Account Creation

Test ID	Screenshot ID	Expected Result	Actual Result	Comments on test
2.1	2.1	Data is inserted into the database correctly.	Data is inserted into the database correctly.	Passed successfully and performed action as expected.
2.2	2.2	An error is shown informing the user of the password mismatch.	An error is shown informing the user of the password mismatch.	Passed successfully and performed action as expected.
2.3	2.3	Data is inserted into the database correctly.	Data is inserted into the database correctly.	Passed successfully and performed action as expected.
2.4	2.4	An error is shown informing the user of the problem with the email address.	Data was inserted into the database but the validation rule was not in place.	Didn't successfully pass due to validation rule not being applied.

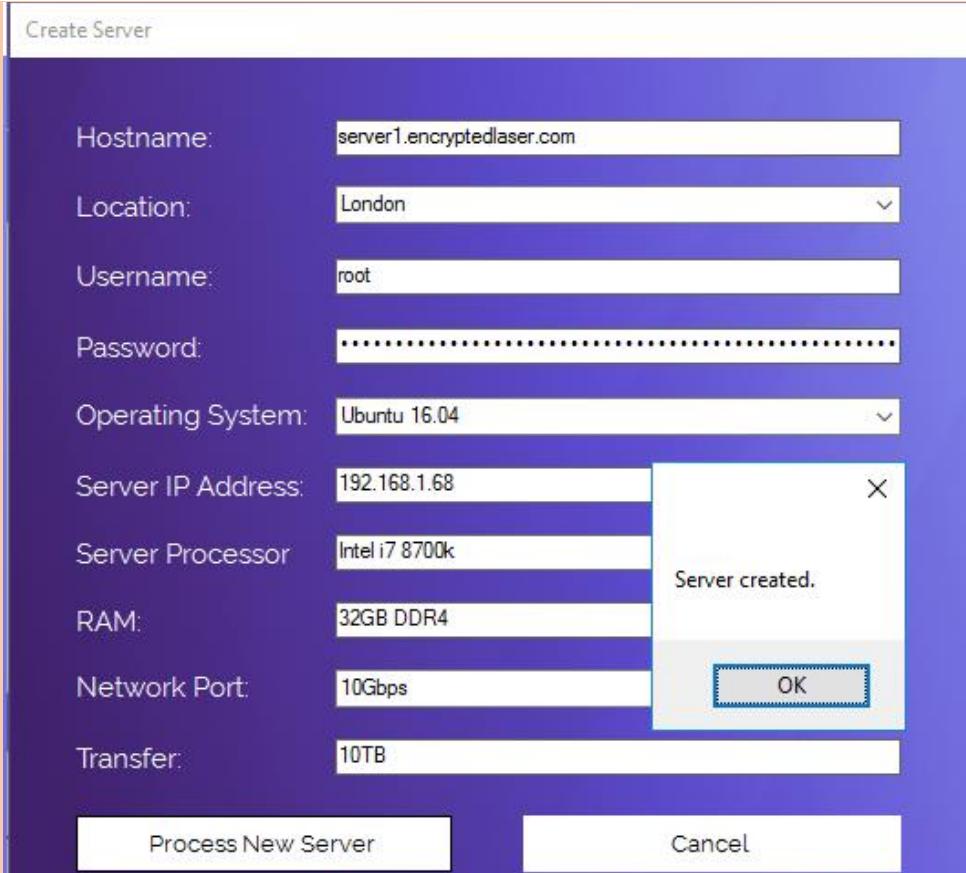
Screenshot ID	Screenshot Evidence	Test ID	Comment on screenshot
2.1		2.1	After entering data into the form, the user was correctly inserted into the database. The user was then navigated to the login screen.

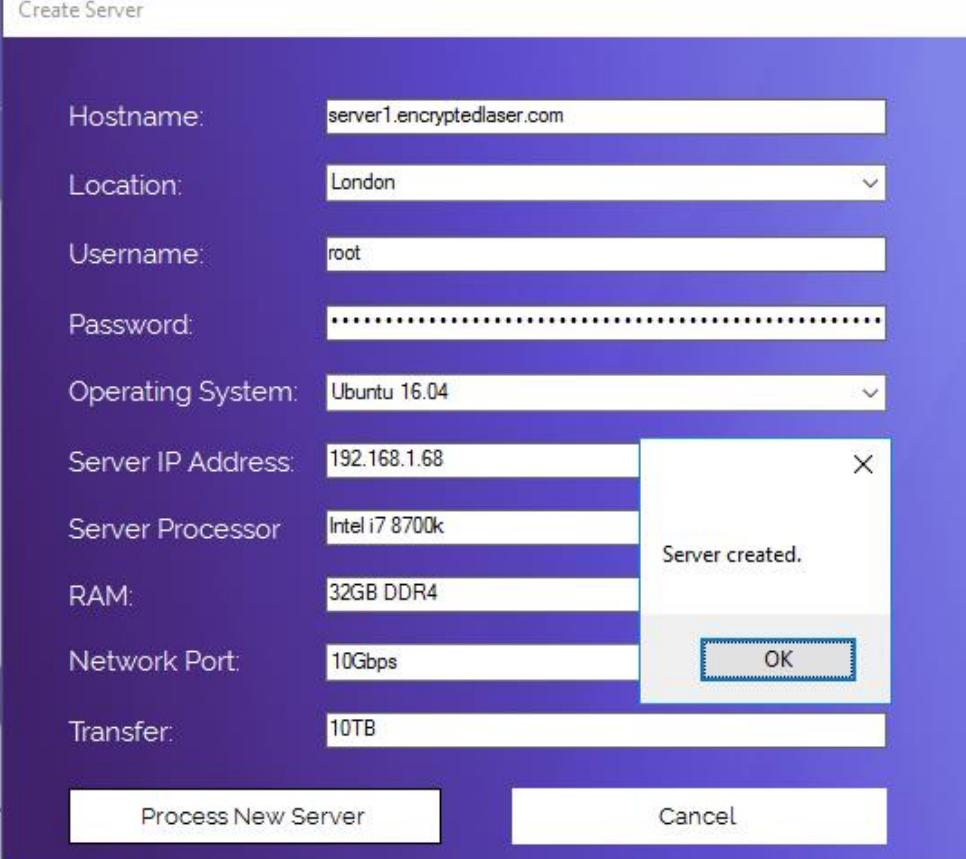
2.2		2.2	An error was presented to the user informing them that the passwords did not match.
2.3		2.3	After entering data into the form, the user was correctly inserted into the database. The user was then navigated to the login screen.

2.4		2.4	No error was presented and the data was inserted into the database. The user was then navigated to the login screen.
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Function 3 - Create Server / Backup Node

Test ID	Screenshot ID	Expected Result	Actual Result	Comments on test
3.1	3.1	Server is inserted into the database.	Server is inserted into the database.	Passed successfully and performed action as expected.
3.2	3.2	Server is inserted into the database.	Server is inserted into the database.	Passed successfully and performed action as expected.
3.3	3.3	User is presented with an error informing them about the incomplete field.	User is presented with an error informing them about the incomplete field.	Passed successfully and performed action as expected.
3.4	3.4	User is presented with an error informing them about the invalid IP address.	User is not presented with an error informing them about the invalid IP address.	Failed, inserted data with a truncated IPv6 address due to database limitation.

Screenshot ID	Screenshot Evidence	Test ID	Comment on screenshot
3.1	 A screenshot of a 'Create Server' dialog box. The form includes fields for Hostname (server1.encryptedlaser.com), Location (London), Username (root), Password (redacted), Operating System (Ubuntu 16.04), Server IP Address (192.168.1.68), Server Processor (Intel i7 8700k), RAM (32GB DDR4), Network Port (10Gbps), and Transfer (10TB). A modal window in the center displays the message 'Server created.' with an 'OK' button. At the bottom are 'Process New Server' and 'Cancel' buttons. <p>Hostname: server1.encryptedlaser.com</p> <p>Location: London</p> <p>Username: root</p> <p>Password:</p> <p>Operating System: Ubuntu 16.04</p> <p>Server IP Address: 192.168.1.68</p> <p>Server Processor: Intel i7 8700k</p> <p>RAM: 32GB DDR4</p> <p>Network Port: 10Gbps</p> <p>Transfer: 10TB</p> <p>Process New Server Cancel</p>	3.1	Inserted data correctly as expected and informed the user of the completion.

3.2	Create Server	3.2	Inserted data correctly as expected and informed the user of the completion.
			

3.3	<p>Create Server</p> <p>Hostname: server2.encryptedlaser.com</p> <p>Location: London</p> <p>Username: <input type="text"/></p> <p>Password: <input type="password"/></p> <p>Operating System: Ubuntu 16.04</p> <p>Server IP Address: 192.68.1.70</p> <p>Server Processor: Intel i7 8700k</p> <p>RAM: 32GB DDR4</p> <p>Network Port: 10Gbps</p> <p>Transfer: 10TB</p> <p><input type="button" value="Process New Server"/> <input type="button" value="Cancel"/></p> <p>The user entered is blank. Please enter data.</p>	3.3	Informed the user correctly that the username was blank.
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3.4	<p>Create Server</p> <p>Hostname: server2.encryptedlaser.com</p> <p>Location: London</p> <p>Username: root</p> <p>Password: [REDACTED]</p> <p>Operating System: Ubuntu 16.04</p> <p>Server IP Address: 2a00:23c4:a38b:3800:30d0:6130:555f:9182</p> <p>Server Processor: Intel i7 8700k</p> <p>RAM: 32GB DDR4</p> <p>Network Port: 10Gbps</p> <p>Transfer: 10TB</p> <p><input type="button" value="Process New Server"/> <input type="button" value="Cancel"/></p> <div style="position: absolute; top: 460px; left: 510px; border: 1px solid black; padding: 5px; background-color: white;"><p>Server created.</p><p><input type="button" value="OK"/></p></div>	3.4	Test failed, inserted data but truncated the IP address instead of informing the user that only IPv4 is accepted. Caused by the validation rule not being put in place to detect this.
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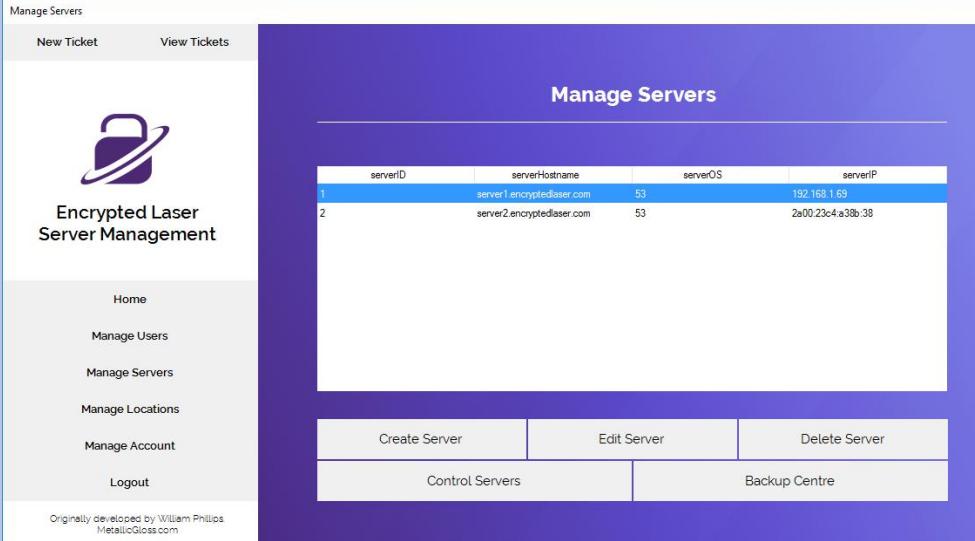
The screenshot shows a web-based server management application. The header includes links for 'Manage Servers', 'New Ticket', and 'View Tickets'. On the left, a sidebar lists navigation options: Home, Manage Users, Manage Servers (which is selected and highlighted in blue), Manage Locations, Manage Account, and Logout. A note at the bottom of the sidebar states 'Originally developed by William Phillips, MetallicGloss.com'. The main content area has a purple header titled 'Manage Servers' and displays a table of server data:

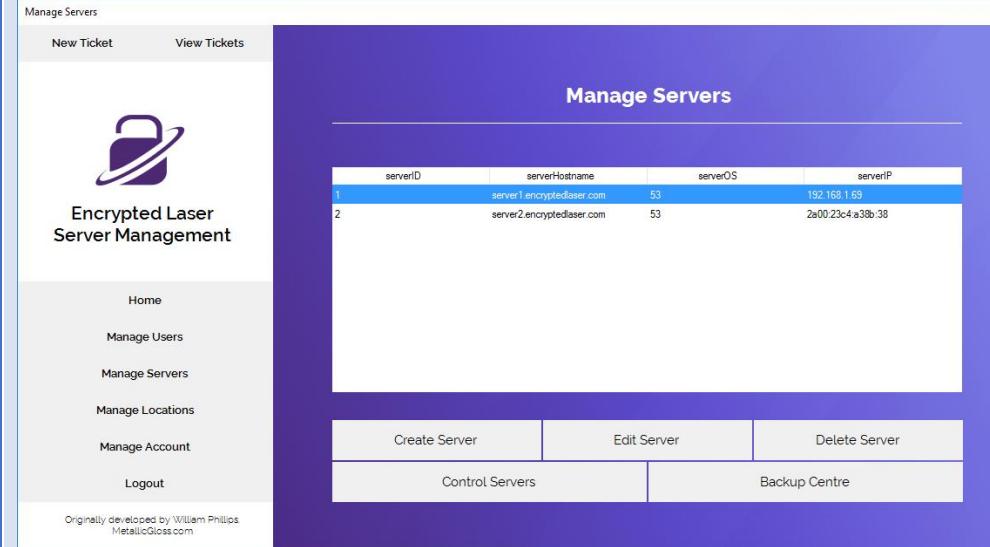
serverID	serverHostname	serverOS	serverIP
1	server1.encryptedlaser.com	53	192.168.1.68
2	server2.encryptedlaser.com	53	2a00:23c4:a30b:38

Below the table are several action buttons: 'Create Server', 'Edit Server', 'Delete Server', 'Control Servers', and 'Backup Centre'.

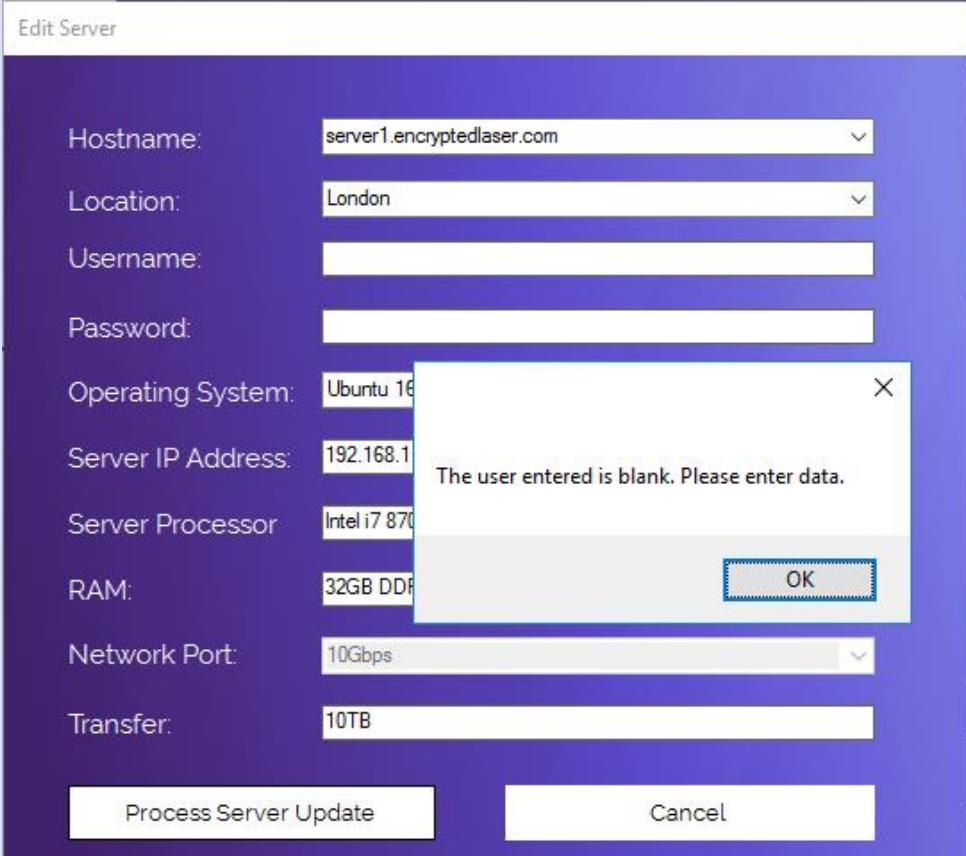
Function 4 - Edit Server / Backup Node

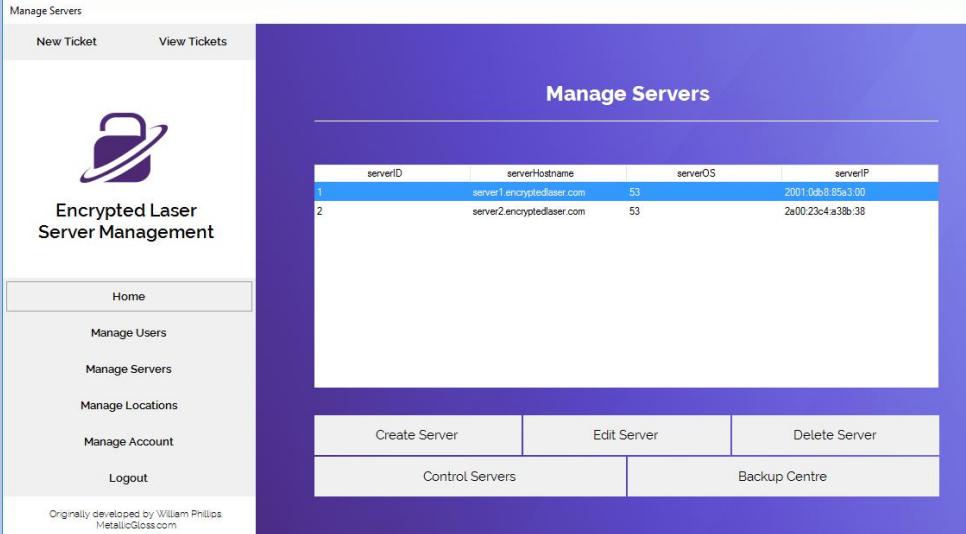
Test ID	Screenshot ID	Expected Result	Actual Result	Comments on test
4.1	4.1	Server is updated in the database.	Server is updated in the database.	Passed successfully and performed action as expected.
4.2	4.2	Server is updated in the database with the old password not touched.	Server is updated in the database with the old password not touched.	Passed successfully and performed action as expected.
4.3	4.3	Server is updated in the database.	Inserted truncated data.	Updated data but did truncate the data. No error in processing so test passed.
4.4	4.4	User is presented with an error informing them about the invalid username.	Alerted user to the problem and did not proceed with the insert.	Passed successfully and performed action as expected.
4.5	4.5	User is presented with an error informing them about the invalid IP address.	User is not presented with an error informing them about the invalid IP address.	Failed, inserted data with a truncated IPv6 address due to database limitation.

Screenshot ID	Screenshot Evidence	Test ID	Comment on screenshot												
4.1	 <table border="1"> <thead> <tr> <th>serverID</th> <th>serverHostname</th> <th>serverOS</th> <th>serverIP</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>server1.encryptedlaser.com</td> <td>53</td> <td>192.168.1.69</td> </tr> <tr> <td>2</td> <td>server2.encryptedlaser.com</td> <td>53</td> <td>2a00:23c4:a38b:38</td> </tr> </tbody> </table>	serverID	serverHostname	serverOS	serverIP	1	server1.encryptedlaser.com	53	192.168.1.69	2	server2.encryptedlaser.com	53	2a00:23c4:a38b:38	4.1	Server1 has successfully been updated to change the IP from 192.168.1.68 to 192.168.1.69.
serverID	serverHostname	serverOS	serverIP												
1	server1.encryptedlaser.com	53	192.168.1.69												
2	server2.encryptedlaser.com	53	2a00:23c4:a38b:38												

4.2	 <p>The screenshot shows the 'Manage Servers' section of the application. At the top, there are links for 'New Ticket' and 'View Tickets'. Below this is a logo for 'Encrypted Laser Server Management' featuring a stylized padlock icon. A sidebar on the left contains links for 'Home', 'Manage Users', 'Manage Servers' (which is highlighted), 'Manage Locations', 'Manage Account', 'Logout', and a credit line 'Originally developed by William Phillips MetalicGloss.com'. The main content area has a purple header 'Manage Servers' with a table below it. The table has columns for 'serverID', 'serverHostname', 'serverOS', and 'serverIP'. It contains two rows: Row 1 has serverID 1, serverHostname 'server1.encryptedlaser.com', serverOS '53', and serverIP '192.168.1.69'; Row 2 has serverID 2, serverHostname 'server2.encryptedlaser.com', serverOS '53', and serverIP '2a00:23c4:a38b:38'. Below the table are buttons for 'Create Server', 'Edit Server', and 'Delete Server'. At the bottom are buttons for 'Control Servers' and 'Backup Centre'.</p>	4.2	Server1 has successfully been updated with the password that is already set being left.
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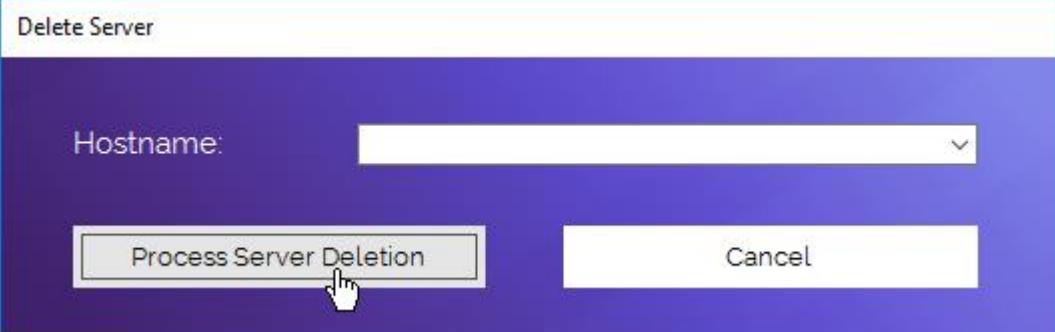
4.3	<p>Edit Server</p> <p>Hostname: server1.encryptedlaser.com</p> <p>Location: London</p> <p>Username: aHPZ099G2MIGKBdxLn8UbWNo&Jgozz </p> <p>Password: [redacted]</p> <p>Operating System: Ubuntu 16.04</p> <p>Server IP Address: 192.168.1.69</p> <p>Server Processor: Intel i7 8700k</p> <p>RAM: 32GB DDR4</p> <p>Network Port: 10Gbps</p> <p>Transfer: 10TB</p> <p><input type="button" value="Process Server Update"/> <input type="button" value="Cancel"/></p>	4.3	Username was updated but did truncate the data. No username should be this long, but it is something to take note of.
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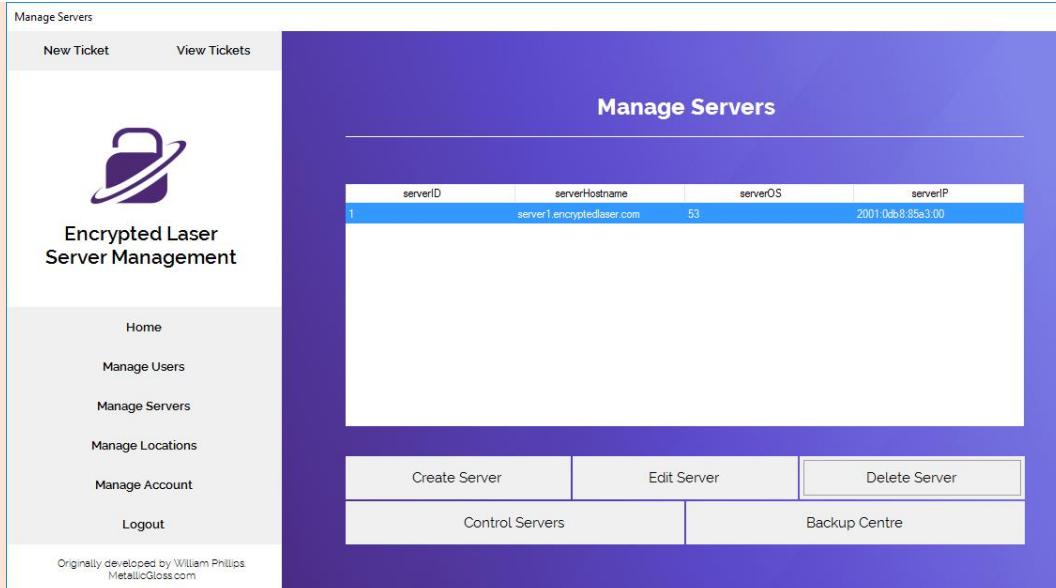
4.4	 <p>The screenshot shows a 'Edit Server' dialog box. The 'Hostname' field contains 'server1.encryptedlaser.com'. The 'Location' field contains 'London'. The 'Username' and 'Password' fields are empty. The 'Operating System' field contains 'Ubuntu 16'. The 'Server IP Address' field is empty and highlighted in red, with a tooltip message 'The user entered is blank. Please enter data.' The 'Server Processor' field contains 'Intel i7 870'. The 'RAM' field contains '32GB DDR4'. The 'Network Port' field contains '10Gbps'. The 'Transfer' field contains '10TB'. At the bottom are two buttons: 'Process Server Update' and 'Cancel'.</p>	4.4	Error was presented to the user informing them of the problem.
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4.5	 <p>The screenshot shows the 'Manage Servers' page of the application. At the top, there are links for 'New Ticket' and 'View Tickets'. Below this is a logo for 'Encrypted Laser Server Management' featuring a stylized padlock icon. A sidebar on the left contains links for 'Home', 'Manage Users', 'Manage Servers' (which is highlighted in blue), 'Manage Locations', 'Manage Account', and 'Logout'. At the bottom of the sidebar, it says 'Originally developed by William Phillips Metalicclass.com'. The main content area has a title 'Manage Servers' and a table with four columns: 'serverID', 'serverHostname', 'serverOS', and 'serverIP'. There are two rows of data:</p> <table border="1"><thead><tr><th>serverID</th><th>serverHostname</th><th>serverOS</th><th>serverIP</th></tr></thead><tbody><tr><td>1</td><td>server1.encryptedlaser.com</td><td>53</td><td>2001:db8:85a3:00</td></tr><tr><td>2</td><td>server2.encryptedlaser.com</td><td>53</td><td>2a00:23c4:a38b:38</td></tr></tbody></table> <p>Below the table are buttons for 'Create Server', 'Edit Server', 'Delete Server', 'Control Servers', and 'Backup Centre'.</p>	serverID	serverHostname	serverOS	serverIP	1	server1.encryptedlaser.com	53	2001:db8:85a3:00	2	server2.encryptedlaser.com	53	2a00:23c4:a38b:38	4.5	No error was presented but the data inserted was truncated.
serverID	serverHostname	serverOS	serverIP												
1	server1.encryptedlaser.com	53	2001:db8:85a3:00												
2	server2.encryptedlaser.com	53	2a00:23c4:a38b:38												

Function 5 - Delete Server / Backup Node

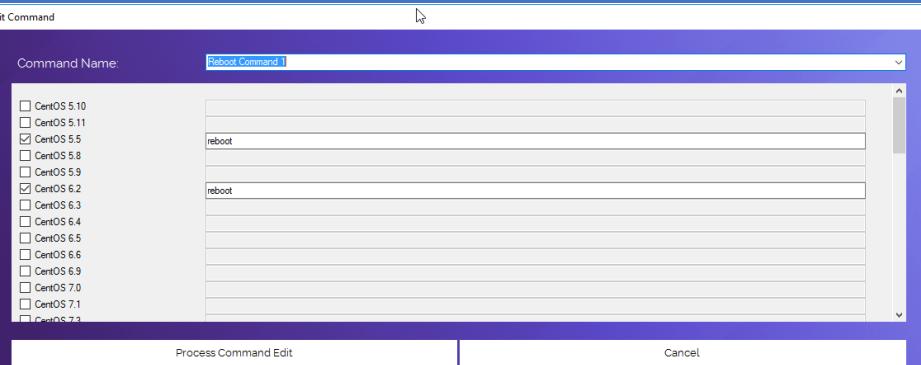
Test ID	Screenshot ID	Expected Result	Actual Result	Comments on test
5.1	5.1	Does not delete anything and informs of problem.	Does not delete anything but doesn't inform user of any problem.	Missed messagebox notification, presumes it was a misclick.
5.2	5.2	Deletes item from database.	Deletes item from database.	Passed successfully and performed action as expected.

Screenshot ID	Screenshot Evidence	Test ID	Comment on screenshot
5.1		5.1	No action occurred when clicked.

5.2	 <p>The screenshot shows the 'Manage Servers' page of the Encrypted Laser Server Management software. At the top, there are links for 'Manage Servers', 'New Ticket', and 'View Tickets'. Below this is a logo for 'Encrypted Laser Server Management' featuring a stylized blue and purple padlock icon. The main content area is titled 'Manage Servers' and displays a table with four columns: 'serverID', 'serverHostname', 'serverOS', and 'serverIP'. A single row is visible, showing serverID 1, serverHostname 'server1.encryptedlaser.com', serverOS '53', and serverIP '2001:0db8:85a3:00'. Below the table are several navigation links: Home, Manage Users, Manage Servers (which is highlighted in blue), Manage Locations, Manage Account, Logout, Create Server, Edit Server, Delete Server, Control Servers, and Backup Centre. At the bottom left, a small note reads 'Originally developed by William Phillips MetallicGloss.com'.</p>	5.2	<p>Server was deleted but not notification was given to the user that it had completed.</p>
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Function 6 - Create Command

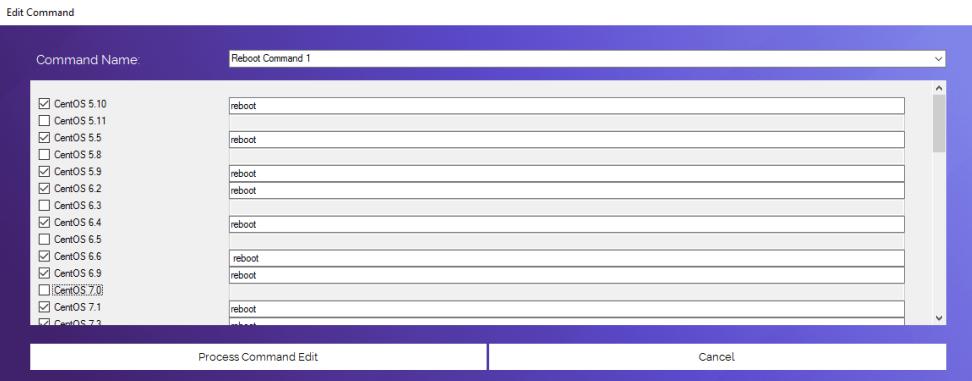
Test ID	Screenshot ID	Expected Result	Actual Result	Comments on test
6.1	6.1	Command is inserted into the database.	Command is inserted into the database.	Passed successfully and performed action as expected.
6.2	6.2	Command is inserted into the database.	Command is inserted into the database.	Passed successfully and performed action as expected.
6.3	6.3	User is presented with an error informing them about the incomplete fields.	User is not presented with an error informing them about the incomplete fields.	Success, did not inform user but didn't insert broken command into database.

Screenshot ID	Screenshot Evidence	Test ID	Comment on screenshot
6.1		6.1	Command inserted correctly and is able to be found in the dropdown list of the edit section.
6.2		6.2	Command inserted correctly and is able to be found in the dropdown list of the edit section.

6.3		6.3	Window closed and command not inserted - not able to be edited.
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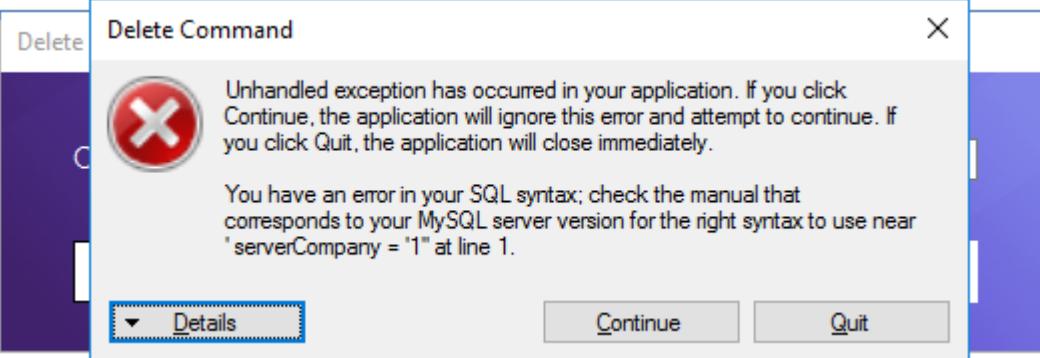
Function 7 - Edit Command

Test ID	Screenshot ID	Expected Result	Actual Result	Comments on test
7.1	7.1	Command is updated in the database.	Command is updated in the database.	Passed successfully and performed action as expected.
7.2	7.2	User is presented with an error informing them about the incomplete fields.	Command update without a name and removed all OS.	Test failed. Updated without validation, left command without OS configured and blank name.

Screenshot ID	Screenshot Evidence	Test ID	Comment on screenshot
7.1		7.1	Update successful.
7.2		7.2	Test failed. Updated without validation, left command without OS configured and blank name.

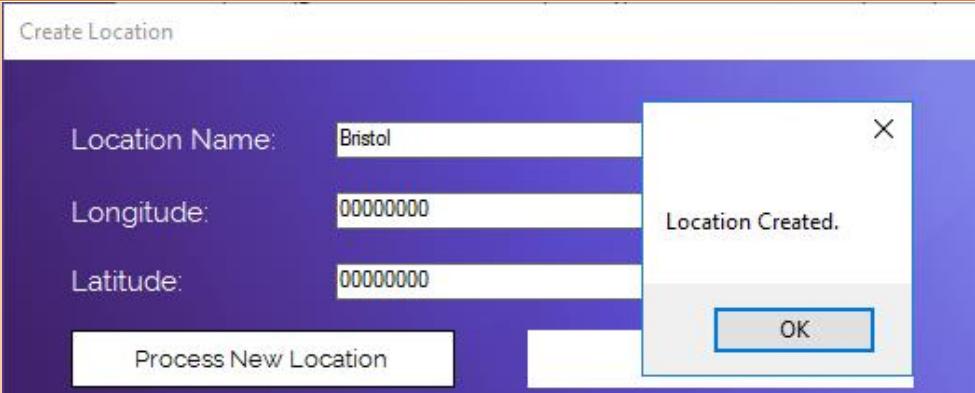
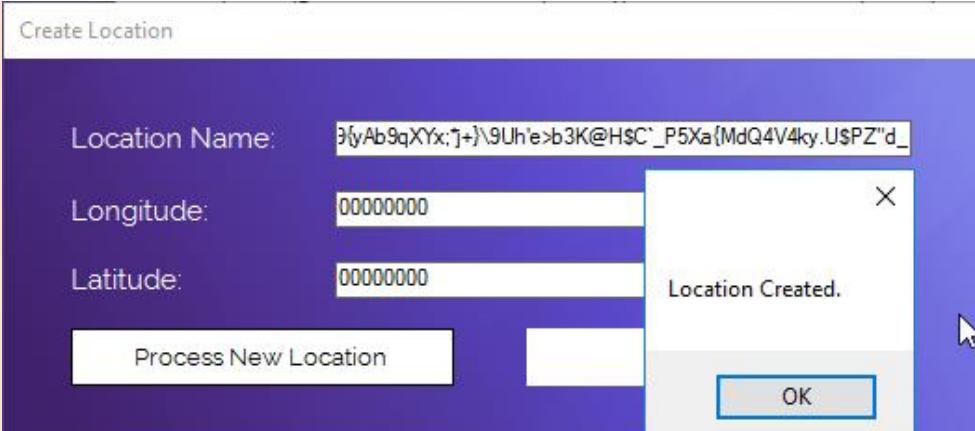
Function 8 - Delete Command

Test ID	Screenshot ID	Expected Result	Actual Result	Comments on test
8.1	8.1	Does not delete anything and informs of problem.	Error appeared and did not proceed.	Failed test due to incorrect SQL code targeting the incorrect field that wasn't updated before final compile.

Screenshot ID	Screenshot Evidence	Test ID	Comment on screenshot
8.1	 A screenshot of a 'Delete Command' dialog box. The dialog has a red 'X' icon at the top right. The text inside says: 'Unhandled exception has occurred in your application. If you click Continue, the application will ignore this error and attempt to continue. If you click Quit, the application will close immediately.' Below this, it says: 'You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near 'serverCompany = '1'' at line 1.' At the bottom are 'Details', 'Continue', and 'Quit' buttons. Screenshot ID: 8.1	8.1	Test failed. A SQL syntax error occurred while attempting to delete a command.

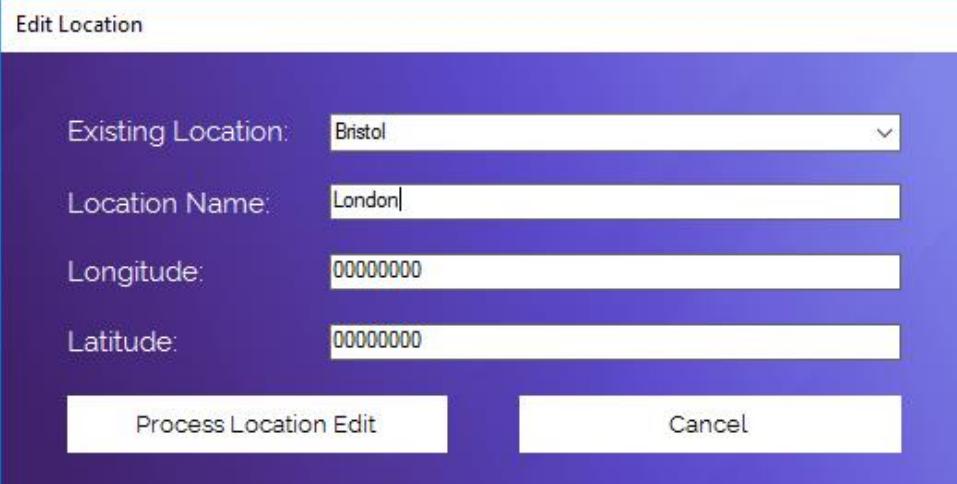
Function 9 - Create Location

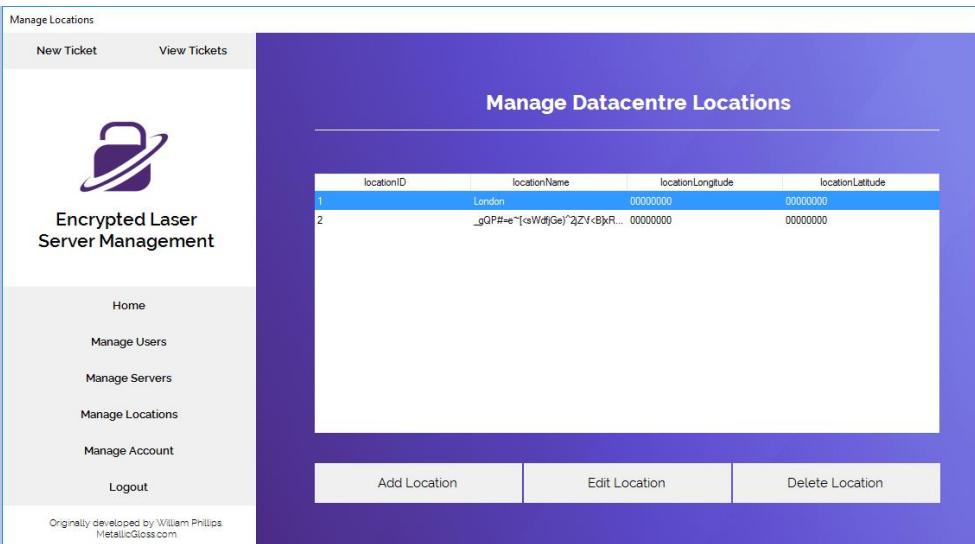
Test ID	Screenshot ID	Expected Result	Actual Result	Comments on test
9.1	9.1	Location is inserted into the database.	Location is inserted into the database.	Passed successfully and performed action as expected.
9.2	9.2	Location is inserted into the database.	Location is inserted into the database.	Passed successfully and performed action as expected.

Screenshot ID	Screenshot Evidence	Test ID	Comment on screenshot
9.1		9.1	Location was successfully created and a popup box appeared to inform the user of the completion.
9.2		9.2	Location was successfully created and a popup box appeared to inform the user of the completion.

Function 10 - Edit Location

Test ID	Screenshot ID	Expected Result	Actual Result	Comments on test
10.1	10.1	Location is inserted into the database.	Location is inserted into the database.	Passed successfully and performed action as expected.
10.2	10.2	Location is inserted into the database.	Location is inserted into the database.	Passed successfully and performed action as expected.

Screenshot ID	Screenshot Evidence	Test ID	Comment on screenshot
10.1		10.1	The test passed successfully, allowing the location name to be changed. This is also reflected in the screenshot below where the data has been updated in the list.

			
10.2		10.2	The test passed successfully, allowing the location name to be changed. This is also reflected in the screenshot below where the data has been updated in the list.

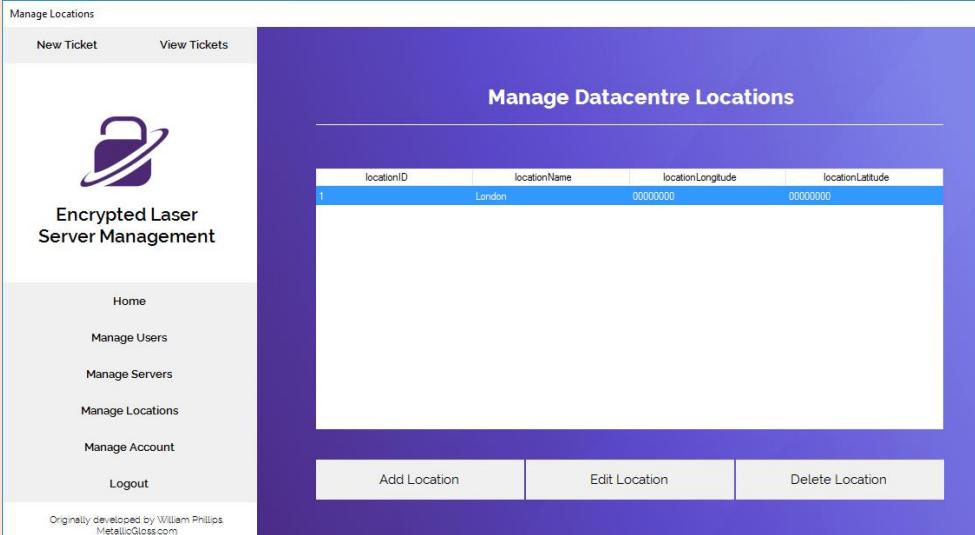
The screenshot shows a web-based management application with a purple header and sidebar. The sidebar on the left contains links for Home, Manage Users, Manage Servers, Manage Locations (which is the active link), Manage Account, and Logout. The main content area displays a table titled "Manage Datacentre Locations" with two rows of data. The columns are locationID, locationName, locationLongitude, and locationLatitude. Row 1 shows London with coordinates 00000000 and 00000000. Row 2 shows a long, illegible string of characters as the location name, with coordinates 00000000 and 00000000. At the bottom of the main content area are three buttons: Add Location, Edit Location, and Delete Location.

locationID	locationName	locationLongitude	locationLatitude
1	London	00000000	00000000
2	x.(h>U_Tj;jdY.%+T=wcokJARnf^...	00000000	00000000

Originally developed by William Phillips
MetallicGloss.com

Function 11 – Delete Location

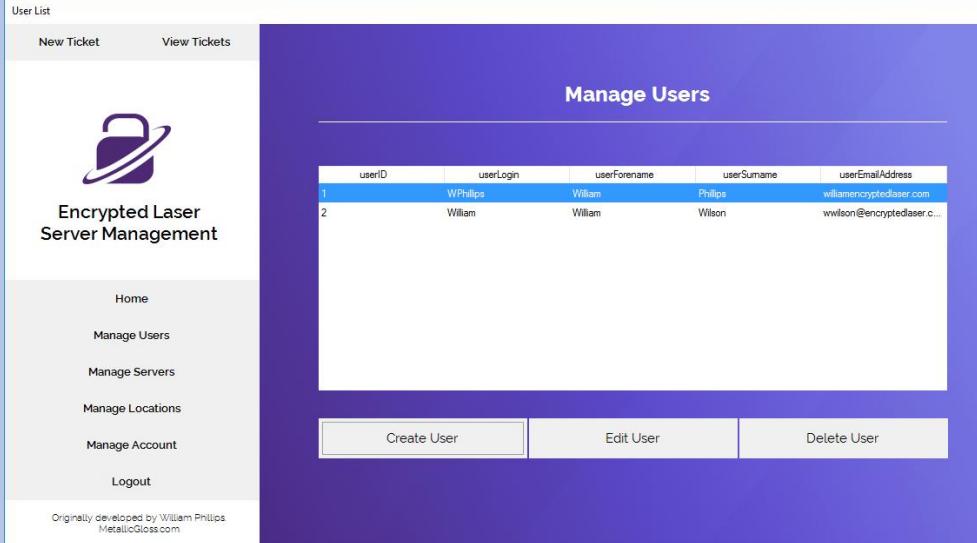
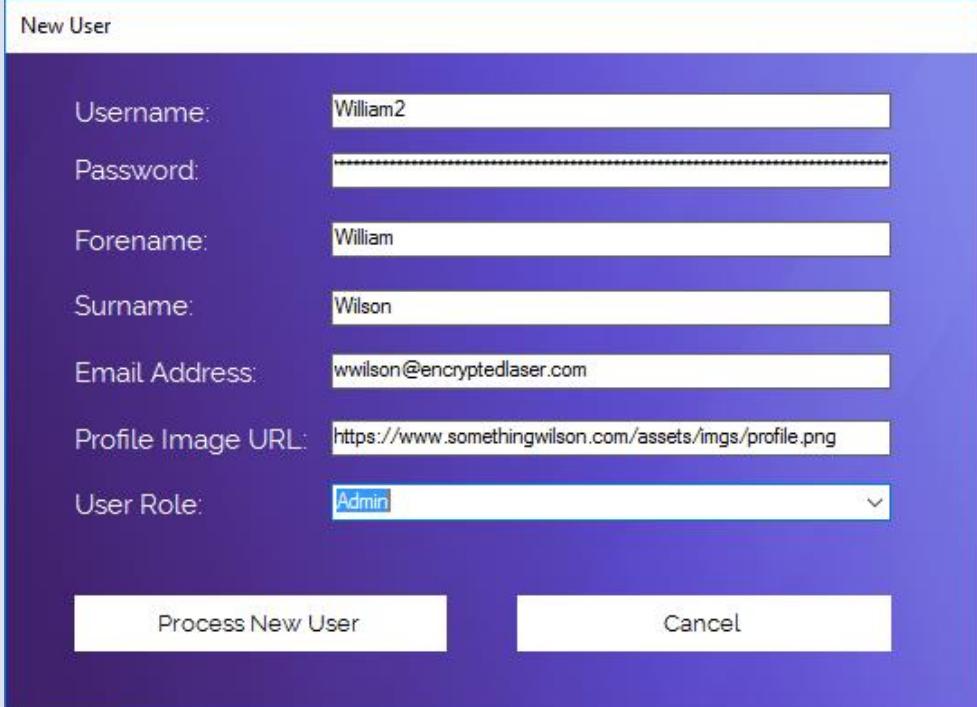
Test ID	Screenshot ID	Expected Result	Actual Result	Comments on test
11.1	11.1	Does not delete anything and informs of problem.	Does not delete anything and but does not inform user of any problem.	Passed, but does not inform user of it not processing a deletion. Acts as if button is not working.
11.2	11.2	Deletes item from database.	Deletes item from database.	Passed successfully and performed action as expected.

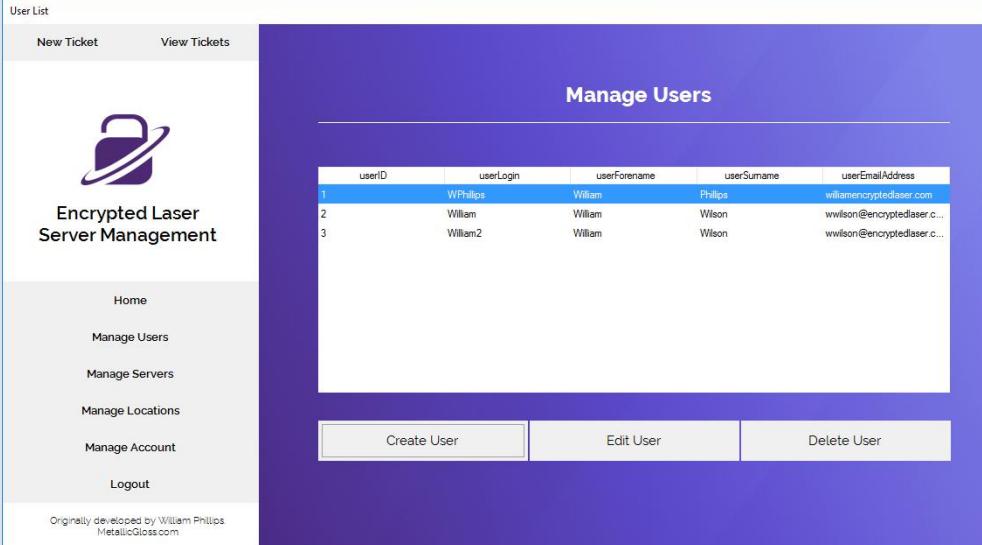
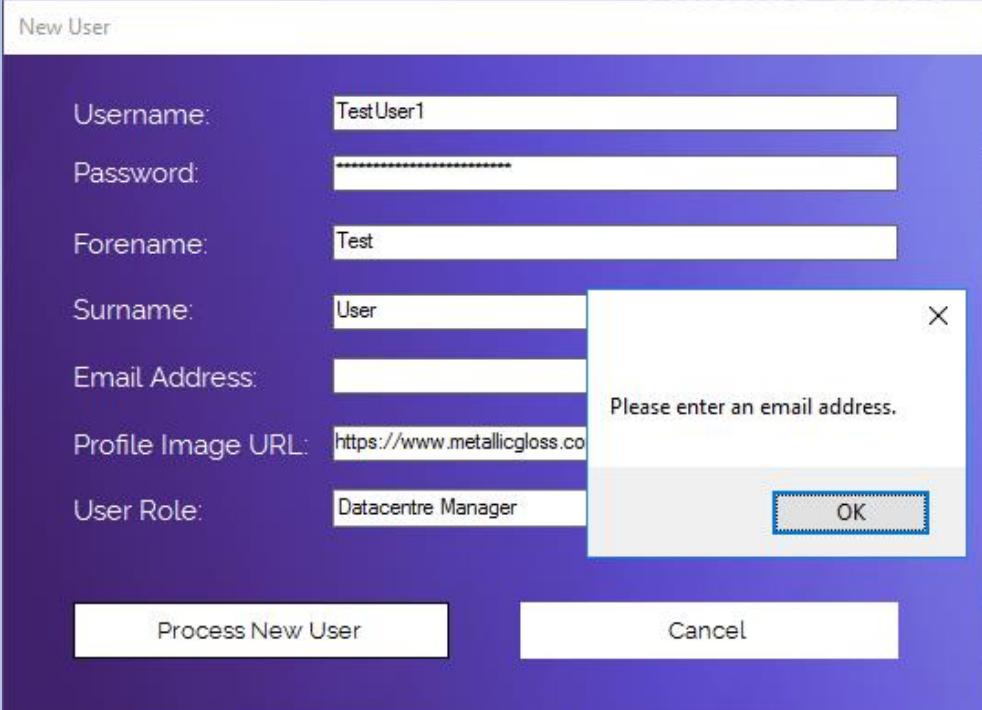
Screenshot ID	Screenshot Evidence	Test ID	Comment on screenshot
11.1		11.1	Acts as if nothing has been pressed when nothing selected.
11.2		11.2	Deletes item from the database and automatically is shown in the listings.

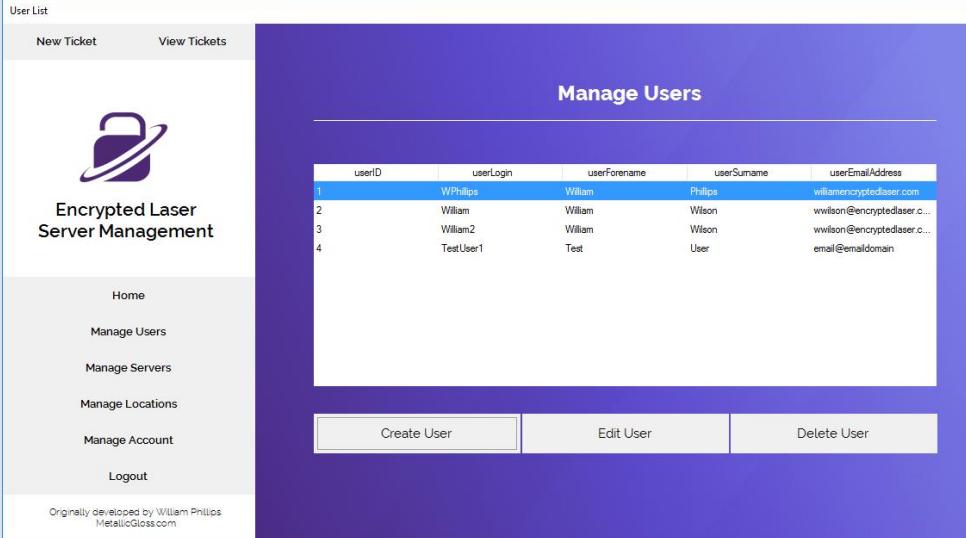
Function 12 - Create User

Test ID	Screenshot ID	Expected Result	Actual Result	Comments on test
12.1	12.1	User is inserted into the database.	User is inserted into the database.	Passed successfully and performed action as expected.
12.2	12.2	User is inserted into the database.	User is inserted into the database.	Passed successfully and performed action as expected.
12.3	12.3	User is presented with an error informing them about the incomplete field.	User is presented with an error informing them about the incomplete field.	Passed successfully and performed action as expected.
12.4	12.4	User is presented with an error informing them about the invalid email address.	User is not presented with an error informing them about the invalid email address.	Failed, did not present error when domain TDL not entered.

Screenshot ID	Screenshot Evidence	Test ID	Comment on screenshot
12.1	<p>New User</p> <p>Username: William</p> <p>Password: *****</p> <p>Forename: William</p> <p>Surname: Wilson</p> <p>Email Address: wwilson@encryptedlaser.com</p> <p>Profile Image URL: https://www.somethingwilson.com/assets/imgs/profile.png</p> <p>User Role: System Administrator</p> <p>Process New User Cancel</p>	12.1	User was created successfully on the system.

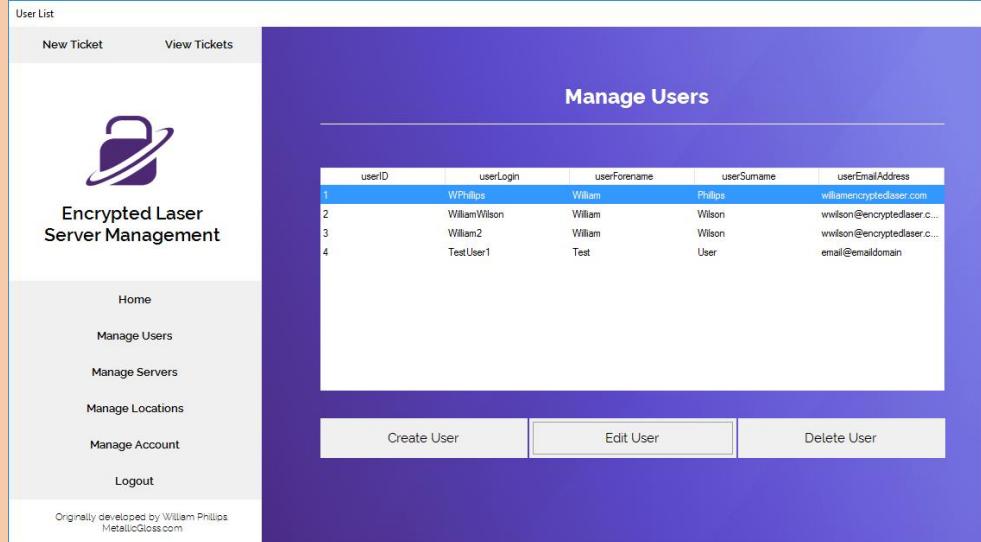
			
12.2		12.2	User was created successfully on the system.

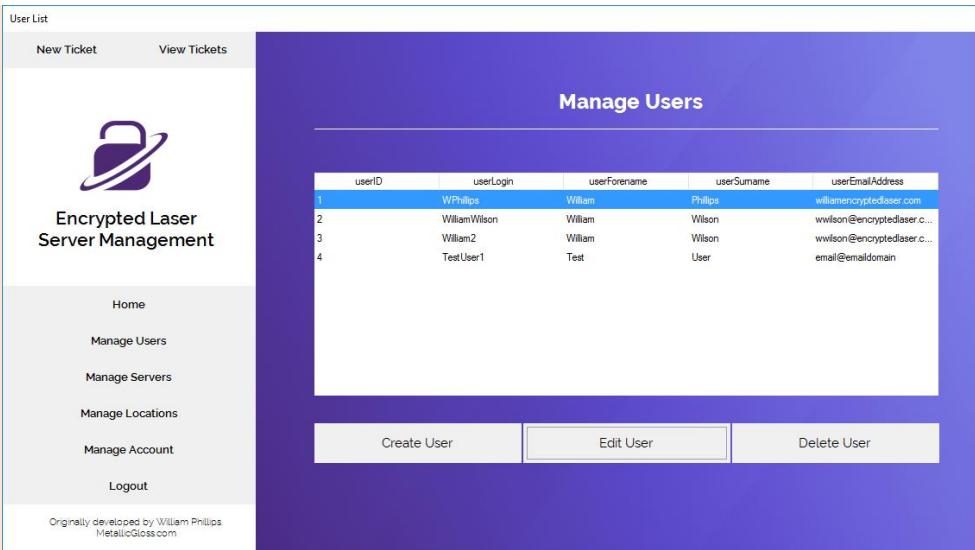
			
12.3		12.3	An error was presented to the user.

12.4	 <p>The screenshot shows the 'Manage Users' page of the application. At the top left is a navigation bar with 'User List', 'New Ticket', and 'View Tickets'. Below it is a logo for 'Encrypted Laser Server Management' featuring a stylized padlock icon. A sidebar on the left contains links for 'Home', 'Manage Users' (which is currently selected and highlighted in blue), 'Manage Servers', 'Manage Locations', 'Manage Account', and 'Logout'. At the bottom of the sidebar is a copyright notice: 'Originally developed by William Phillips Metalicclass.com'. The main content area is titled 'Manage Users' and displays a table of user data. The table has columns for UserID, userLogin, userForename, userSurname, and userEmailAddress. There are four rows of data:</p> <table border="1"><thead><tr><th>UserID</th><th>userLogin</th><th>userForename</th><th>userSurname</th><th>userEmailAddress</th></tr></thead><tbody><tr><td>1</td><td>WPhillips</td><td>William</td><td>Phillips</td><td>william@encryptedlaser.com</td></tr><tr><td>2</td><td>Willam</td><td>William</td><td>Wilson</td><td>wwilson@encryptedlaser.c...</td></tr><tr><td>3</td><td>Willam2</td><td>William</td><td>Wilson</td><td>wwilson@encryptedlaser.c...</td></tr><tr><td>4</td><td>TestUser1</td><td>Test</td><td>User</td><td>email@emaildomain</td></tr></tbody></table> <p>At the bottom of the main content area are three buttons: 'Create User', 'Edit User', and 'Delete User'.</p>	UserID	userLogin	userForename	userSurname	userEmailAddress	1	WPhillips	William	Phillips	william@encryptedlaser.com	2	Willam	William	Wilson	wwilson@encryptedlaser.c...	3	Willam2	William	Wilson	wwilson@encryptedlaser.c...	4	TestUser1	Test	User	email@emaildomain	12.4	Data was inserted, no error was presented.
UserID	userLogin	userForename	userSurname	userEmailAddress																								
1	WPhillips	William	Phillips	william@encryptedlaser.com																								
2	Willam	William	Wilson	wwilson@encryptedlaser.c...																								
3	Willam2	William	Wilson	wwilson@encryptedlaser.c...																								
4	TestUser1	Test	User	email@emaildomain																								

Function 13 - Edit User

Test ID	Screenshot ID	Expected Result	Actual Result	Comments on test
13.1	13.1	User is updated in the database.	User is updated in the database.	Passed successfully and performed action as expected.
13.2	13.2	User is updated in the database.	User is updated in the database.	Passed successfully and performed action as expected.
13.3	13.3	User is presented with an error informing them about the incomplete field.	User is presented with an error informing them about the incomplete field.	Passed successfully and performed action as expected.

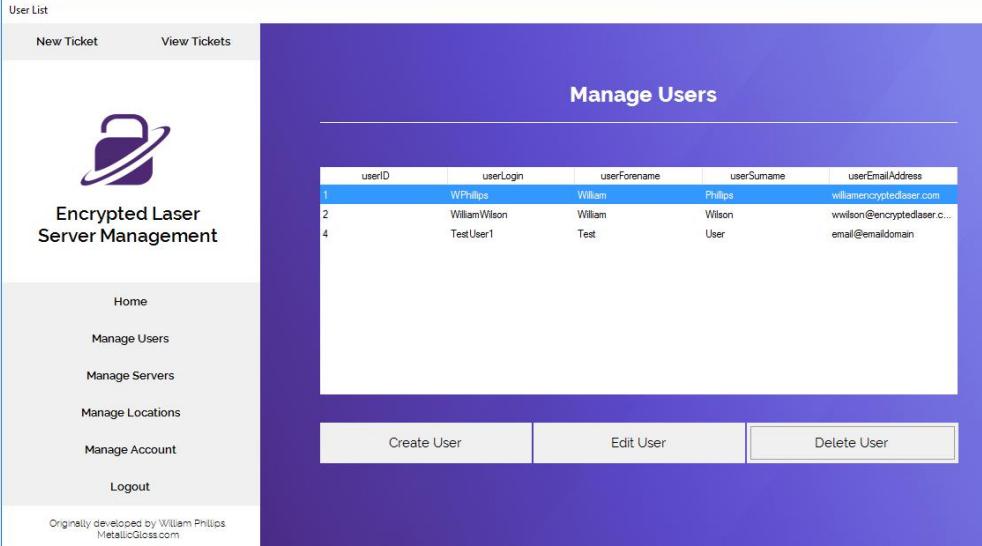
Screenshot ID	Screenshot Evidence	Test ID	Comment on screenshot
13.1	 A screenshot of a web application titled "Manage Users". The page has a purple header and footer. In the center, there is a table with columns: userID, userLogin, userForename, userSurname, and userEmailAddress. The table contains four rows of data. At the bottom of the page are three buttons: Create User, Edit User, and Delete User. On the left side, there is a sidebar with links: Home, Manage Users (which is currently selected), Manage Servers, Manage Locations, Manage Account, and Logout. The footer contains the text "Originally developed by William Phillips MetalicGloss.com".	13.1	User account was updated correctly with the changes being edited coming into effect.

13.2	 <p>The screenshot shows the 'Manage Users' page of the application. At the top, there is a navigation bar with links for 'User List', 'New Ticket', and 'View Tickets'. Below the navigation is a logo for 'Encrypted Laser Server Management' featuring a padlock icon. A sidebar on the left contains links for 'Home', 'Manage Users' (which is currently selected and highlighted in blue), 'Manage Servers', 'Manage Locations', 'Manage Account', and 'Logout'. At the bottom of the sidebar, there is a note: 'Originally developed by William Phillips Metalicclass.com'. The main content area has a purple header 'Manage Users'. Below the header is a table with the following data:</p> <table border="1"><thead><tr><th>userID</th><th>userLogin</th><th>userForename</th><th>userSurname</th><th>userEmailAddress</th></tr></thead><tbody><tr><td>1</td><td>WPhillips</td><td>William</td><td>Phillips</td><td>william@encryptedlaser.com</td></tr><tr><td>2</td><td>WilliamWilson</td><td>William</td><td>Wilson</td><td>wwilson@encryptedlaser.c...</td></tr><tr><td>3</td><td>William2</td><td>William</td><td>Wilson</td><td>wwilson@encryptedlaser.c...</td></tr><tr><td>4</td><td>TestUser1</td><td>Test</td><td>User</td><td>email@emaildomain</td></tr></tbody></table> <p>At the bottom of the main content area are three buttons: 'Create User', 'Edit User' (which is highlighted in a light blue box), and 'Delete User'.</p>	userID	userLogin	userForename	userSurname	userEmailAddress	1	WPhillips	William	Phillips	william@encryptedlaser.com	2	WilliamWilson	William	Wilson	wwilson@encryptedlaser.c...	3	William2	William	Wilson	wwilson@encryptedlaser.c...	4	TestUser1	Test	User	email@emaildomain	13.2	User account was updated correctly with the changes being edited coming into effect.
userID	userLogin	userForename	userSurname	userEmailAddress																								
1	WPhillips	William	Phillips	william@encryptedlaser.com																								
2	WilliamWilson	William	Wilson	wwilson@encryptedlaser.c...																								
3	William2	William	Wilson	wwilson@encryptedlaser.c...																								
4	TestUser1	Test	User	email@emaildomain																								

13.3	<p>Edit User</p> <p>UserID: 3</p> <p>Username: William2</p> <p>Password: <input type="password"/></p> <p>Forename: William</p> <p>Surname: <input type="text"/> X</p> <p>Email Address: wwilson@encryptedlaser.com</p> <p>Profile Image URL: https://www.somethingwilson.com/assets/images/placeholder-image.png</p> <p>User Role: Admin</p> <p><input type="button" value="Process User Update"/> <input type="button" value="Cancel"/></p> <p>Please enter a surname.</p> <p>OK</p>	13.3	User was presented an error informing them of the field that was not entered.
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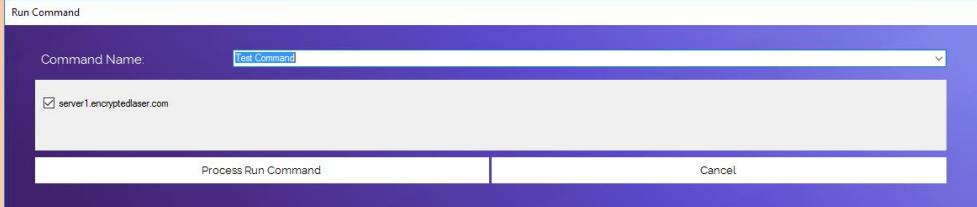
Function 14 - Delete User

Test ID	Screenshot ID	Expected Result	Actual Result	Comments on test
14.1	14.1	Does not delete anything and informs of problem.	Does not delete anything and informs of problem.	Passed successfully and performed action as expected.
14.2	14.2	Deletes item from database.	Deletes item from database.	Passed successfully and performed action as expected.

Screenshot ID	Screenshot Evidence	Test ID	Comment on screenshot																				
14.1		14.1	Acts as if it was an accidental input, does not annoy the user with an error and does not perform any action.																				
14.2	 <table border="1"> <thead> <tr> <th>userID</th> <th>userLogin</th> <th>userForename</th> <th>userSurname</th> <th>userEmailAddress</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>WPhillips</td> <td>William</td> <td>Phillips</td> <td>william@encryptedlaser.com</td> </tr> <tr> <td>2</td> <td>WillianWilson</td> <td>William</td> <td>Wilson</td> <td>wwilson@encryptedlaser.c...</td> </tr> <tr> <td>4</td> <td>TestUser1</td> <td>Test</td> <td>User</td> <td>email@emaildomain</td> </tr> </tbody> </table>	userID	userLogin	userForename	userSurname	userEmailAddress	1	WPhillips	William	Phillips	william@encryptedlaser.com	2	WillianWilson	William	Wilson	wwilson@encryptedlaser.c...	4	TestUser1	Test	User	email@emaildomain	14.2	User selected was deleted correctly and successfully.
userID	userLogin	userForename	userSurname	userEmailAddress																			
1	WPhillips	William	Phillips	william@encryptedlaser.com																			
2	WillianWilson	William	Wilson	wwilson@encryptedlaser.c...																			
4	TestUser1	Test	User	email@emaildomain																			

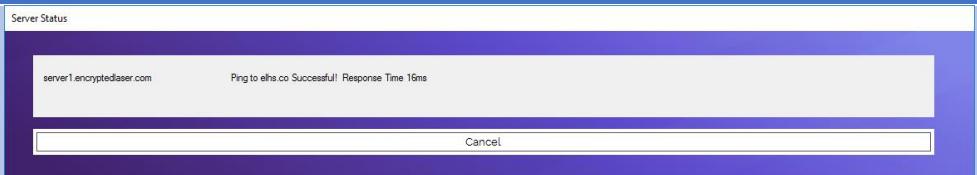
Function 15 - Execute Command

Test ID	Screenshot ID	Expected Result	Actual Result	Comments on test
15.1	15.1	Window closes and in the background the SSH command is executed.	Window closes and in the background the SSH command is executed.	Passed successfully and performed action as expected.

Screenshot ID	Screenshot Evidence	Test ID	Comment on screenshot
15.1		15.1	After selecting the server that has needs to have the command executed on it, the window closed and the command ran in the background.

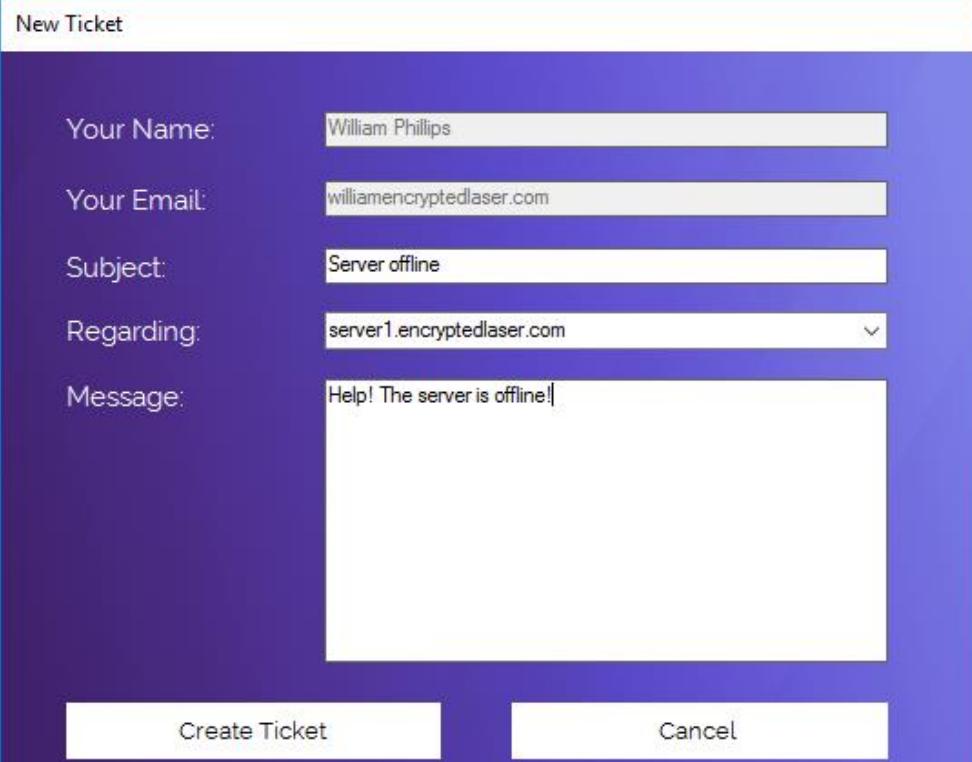
Function 16 - Server Status

Test ID	Screenshot ID	Expected Result	Actual Result	Comments on test
16.1	16.1	Servers are displayed as online.	Servers are displayed as online.	Passed successfully and performed action as expected.
16.2	16.2	Server is displayed as offline.	Server is displayed as offline.	Passed successfully and performed action as expected.

Screenshot ID	Screenshot Evidence	Test ID	Comment on screenshot
16.1		16.1	Displays the correct output, showing the MS time to ping the requested server.
16.2		16.2	Displays the correct output, showing that the server is offline.

Function 17 - Create Ticket

Test ID	Screenshot ID	Expected Result	Actual Result	Comments on test
17.1	17.1	New ticket is created.		Passed successfully and performed action as expected.
17.2	17.2	New ticket is created.		Passed successfully and performed action as expected.

Screenshot ID	Screenshot Evidence	Test ID	Comment on screenshot
17.1	 <p>New Ticket</p> <p>Your Name: William Phillips</p> <p>Your Email: williamencryptedlaser.com</p> <p>Subject: Server offline</p> <p>Regarding: server1.encryptedlaser.com</p> <p>Message: Help! The server is offline!</p> <p>Create Ticket Cancel</p>	17.1	Ticket was created successfully.

The screenshot displays a software application window titled "Active Tickets". At the top left, there are two buttons: "New Ticket" and "View Tickets". Below the buttons is a logo consisting of a blue padlock icon with a white swoosh around it, followed by the text "Encrypted Laser Server Management". On the left side of the main area, there is a vertical sidebar with the following menu items: "Home" (which is highlighted in a light gray box), "Manage Users", "Manage Servers", "Manage Locations", "Manage Account", and "Logout". At the bottom of the sidebar, there is a small note: "Originally developed by William Phillips MetalicGloss.com". The main content area has a purple header bar with the text "View Tickets". Below the header is a table with the following columns: "ticketID", "ticketSubject", "ticketUpdated", "ticketCustomer", and "ticketRegarding". There is one row of data in the table:

ticketID	ticketSubject	ticketUpdated	ticketCustomer	ticketRegarding
1	Server offline	16/04/2018 11:24	1	server1.encryptedlaser.com

17.2	<p>New Ticket</p> <p>Your Name: William Phillips</p> <p>Your Email: williamencryptedlaser.com</p> <p>Subject: e and I am not sure what to do can you please get it online asap!</p> <p>Regarding: server1.encryptedlaser.com</p> <p>Message: Server offline.]</p> <p>Create Ticket Cancel</p>	17.2	Ticket was created successfully.
------	--	------	----------------------------------

The screenshot shows a web application interface for managing server tickets. The header bar includes 'Active Tickets' with 'New Ticket' and 'View Tickets' buttons. Below the header is a logo for 'Encrypted Laser Server Management' featuring a stylized lock icon.

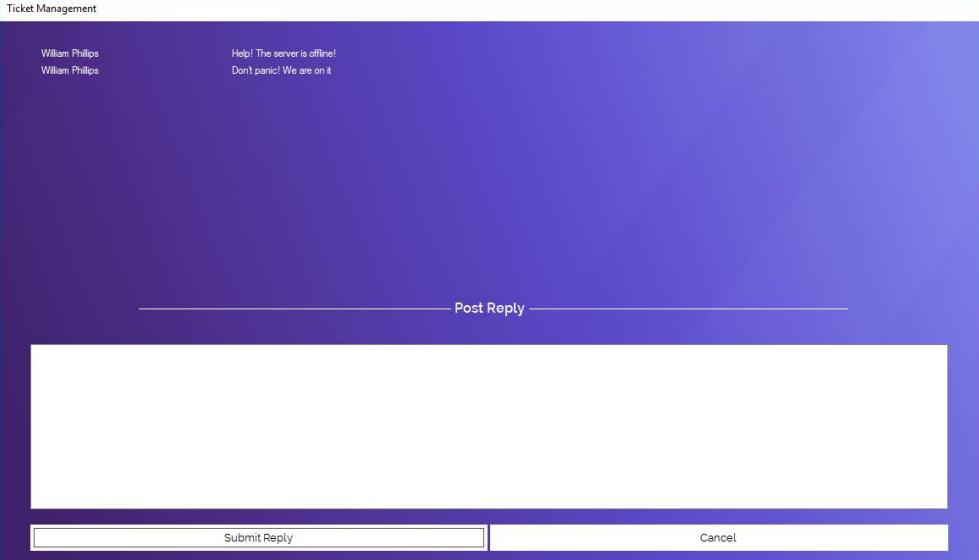
The main content area is titled 'View Tickets' and displays a table of two entries:

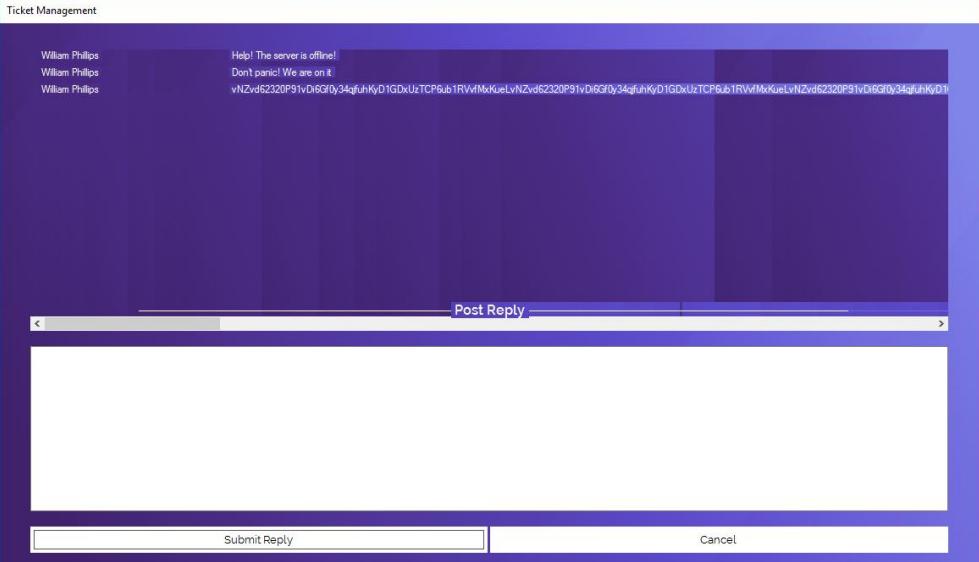
ticketID	ticketSubject	ticketUpdated	ticketCustomer	ticketRegarding
1	Server offline	16/04/2018 11:24	1	server1.encryptedlaser.com
2	Help! The server is offline ...	16/04/2018 11:25	1	server1.encryptedlaser.com

The left sidebar contains navigation links: Home (which is selected), Manage Users, Manage Servers, Manage Locations, Manage Account, and Logout. At the bottom of the sidebar, it says 'Originally developed by William Phillips MetallicGloss.com'.

Function 18 - Reply To Ticket

Test ID	Screenshot ID	Expected Result	Actual Result	Comments on test
18.1	18.1	A new reply is created.	A new reply is created.	Passed successfully and performed action as expected.
18.2	18.2	A new reply is created.	A new reply is created.	Passed successfully and performed action as expected.

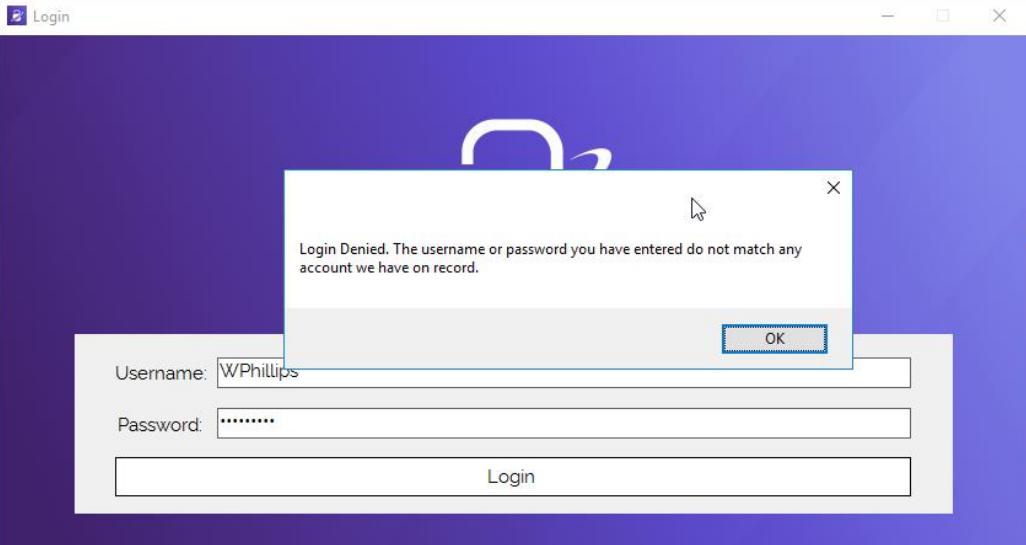
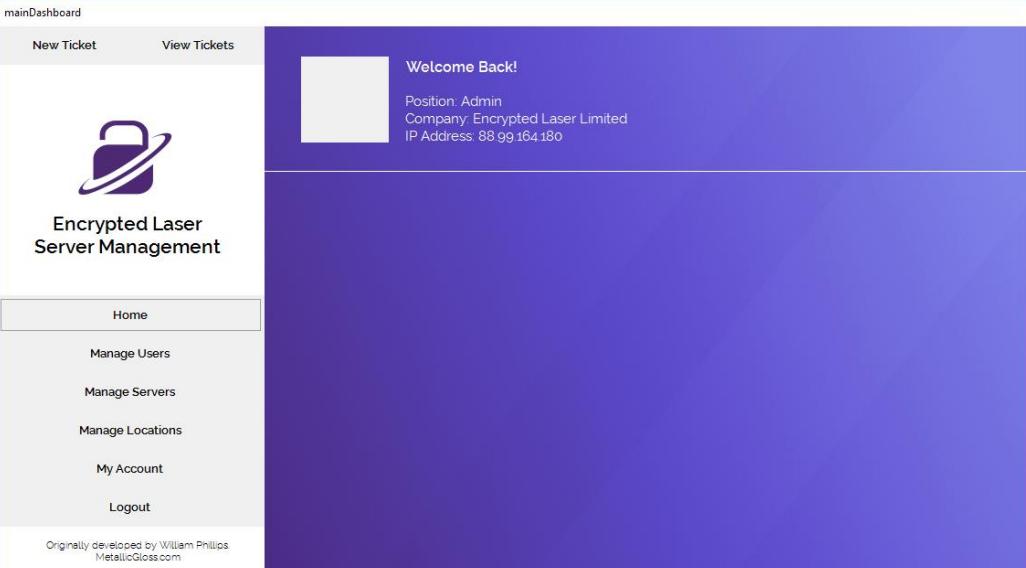
Screenshot ID	Screenshot Evidence	Test ID	Comment on screenshot
18.1	 A screenshot of a web-based ticket management system. The page title is "Ticket Management". On the left, there's a sidebar with two entries: "William Phillips" and "Help! The server is offline!". The main content area contains a text input field with the placeholder "Don't panic! We are on it". Below the input field is a horizontal line with the text "Post Reply" in the center. At the bottom of the screen, there are two buttons: "Submit Reply" on the left and "Cancel" on the right. <p>Ticket Management</p> <p>William Phillips Help! The server is offline! Don't panic! We are on it</p> <p>Post Reply</p> <p>Submit Reply Cancel</p>	18.1	Ticket reply was created successfully.

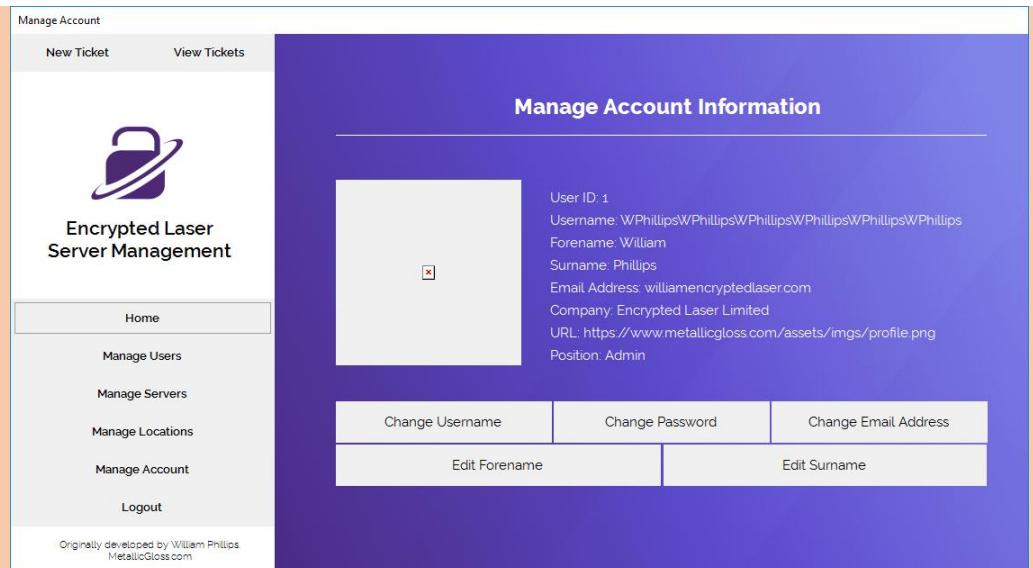
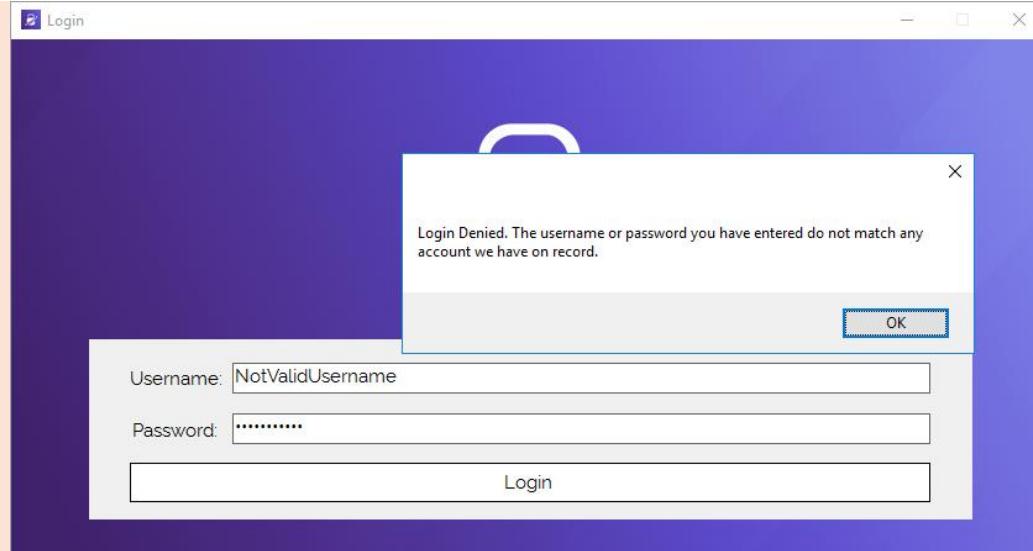
18.2	 <p>A screenshot of a ticket management application window titled "Ticket Management". The window shows a list of three items, all labeled "William Phillips". A message at the top right says "Help! The server is offline! Don't panic! We are on it". Below the list is a large white area for a reply, with a "Post Reply..." button above it. At the bottom are "Submit Reply" and "Cancel" buttons.</p>	18.2	Ticket reply was created successfully.
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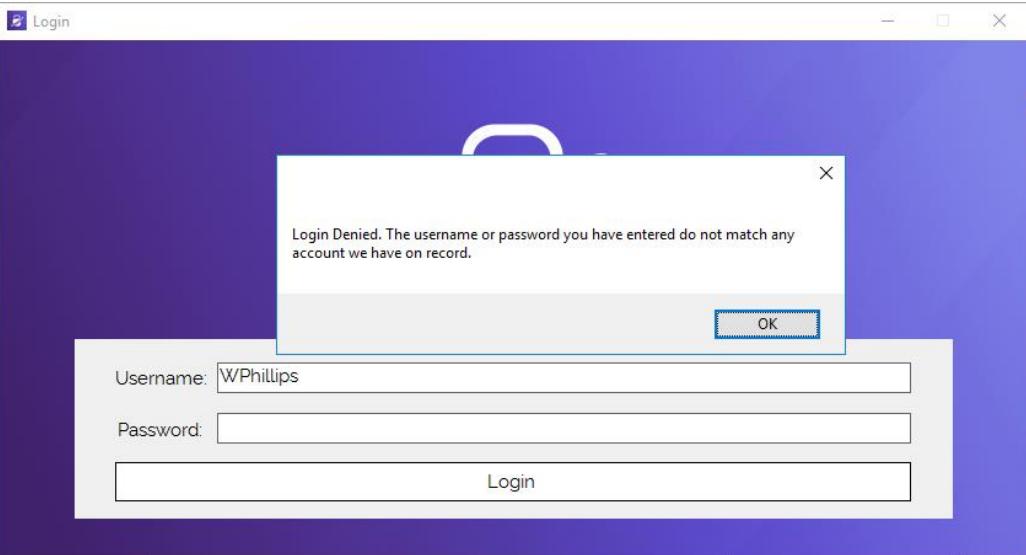
Function 19 - Login

Test ID	Screenshot ID	Expected Result	Actual Result	Comments on test
19.1	19.1	User is allowed entry into the program.	User is allowed entry into the program.	Passed successfully and performed action as expected.
19.2	19.2	Error is presented to the user informing them that their password or username does not match.	Error is presented to the user informing them that their password or username does not match.	Passed successfully and performed action as expected.
19.3	19.3	User is allowed entry into the program.	User is allowed entry into the program.	Passed successfully and performed action as expected.
19.4	19.4	Error is presented to the user informing them that their password or username does not match.	Error is presented to the user informing them that their password or username does not match.	Passed successfully and performed action as expected.
19.5	19.5	Error is presented to the user informing them that their password field cannot be blank.	Error is presented to the user informing them that their password field cannot be blank.	Passed successfully and performed action as expected.

Screenshot ID	Screenshot Evidence	Test ID	Comment on screenshot
19.1		19.1	User logged in successfully.

19.2	 A screenshot of a Windows-style login window titled "Login". It displays an error message: "Login Denied. The username or password you have entered do not match any account we have on record." Below the message are two input fields: "Username: WPhillips" and "Password:". A large "OK" button is visible at the bottom right of the error dialog.	19.2	User was presented with the correct error message.
19.3	 A screenshot of the "mainDashboard" page of the "Encrypted Laser Server Management" application. The header includes "mainDashboard", "New Ticket", and "View Tickets". The main content area features a purple background with a white sidebar on the left containing a lock icon and the text "Encrypted Laser Server Management". The sidebar lists navigation links: "Home", "Manage Users", "Manage Servers", "Manage Locations", "My Account", and "Logout". The right side of the screen displays a "Welcome Back!" message with the user's position ("Admin"), company ("Encrypted Laser Limited"), and IP address ("88.99.164.180"). At the bottom left, there is a copyright notice: "Originally developed by William Phillips MetalicGloss.com".	19.3	User logged in successfully.

	 <p>The screenshot shows the 'Manage Account' interface. On the left is a sidebar with a lock icon and the text 'Encrypted Laser Server Management'. The main area is titled 'Manage Account Information' and displays the following user details:</p> <table border="1"><tr><td>User ID: 1</td></tr><tr><td>Username: WPhillipsWPhillipsWPhillipsWPhillipsWPhillipsWPhillips</td></tr><tr><td>Forename: William</td></tr><tr><td>Surname: Phillips</td></tr><tr><td>Email Address: williamencryptedlaser.com</td></tr><tr><td>Company: Encrypted Laser Limited</td></tr><tr><td>URL: https://www.metallicgloss.com/assets/imgs/profile.png</td></tr><tr><td>Position: Admin</td></tr></table> <p>Below the details are buttons for 'Change Username', 'Change Password', and 'Change Email Address', followed by 'Edit Forename' and 'Edit Surname' links.</p>	User ID: 1	Username: WPhillipsWPhillipsWPhillipsWPhillipsWPhillipsWPhillips	Forename: William	Surname: Phillips	Email Address: williamencryptedlaser.com	Company: Encrypted Laser Limited	URL: https://www.metallicgloss.com/assets/imgs/profile.png	Position: Admin		
User ID: 1											
Username: WPhillipsWPhillipsWPhillipsWPhillipsWPhillipsWPhillips											
Forename: William											
Surname: Phillips											
Email Address: williamencryptedlaser.com											
Company: Encrypted Laser Limited											
URL: https://www.metallicgloss.com/assets/imgs/profile.png											
Position: Admin											
19.4	 <p>The screenshot shows a 'Login' window. At the top is a message box with the text 'Login Denied. The username or password you have entered do not match any account we have on record.' An 'OK' button is at the bottom of the message box. Below the message box are fields for 'Username' (containing 'NotValidUsername') and 'Password' (containing a masked password). A 'Login' button is at the bottom.</p>	19.4	User was presented with the correct error message.								

19.5	 A screenshot of a Windows operating system login screen. A modal dialog box is centered over the screen with the title "Login Denied". The message inside the box reads: "Login Denied. The username or password you have entered do not match any account we have on record." At the bottom right of the dialog is a blue "OK" button. Below the dialog, there is a login form with fields for "Username" containing "WPhillips" and "Password". At the bottom of the form is a "Login" button.	19.5	User was presented with the correct error message.
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Chapter CS3.8 - EVALUATION (15 MARKS)

Section 3.8.1 - Evaluate the system

Subsection 3.8.1.i - Evaluate the programming language

C# was an excellent language to use for the development of this program. It has multiple fantastic features that made the language very easy to use within the development of this program, while also allowing me to expand my coding knowledge, ability and skills as a programmer. With easy to understand code syntax that is colour coded, it's resemblance to plain English, and its simplicity & similarity to PHP allowed me to work with the language efficiently.

```
//Configure program to use updated version of TLS.  
ServicePointManager.Expect100Continue = true;  
ServicePointManager.SecurityProtocol = SecurityProtocolType.Tls12;  
//Get IP address of computer being used to access the program.  
externalIP = (new Regex(@"\d{1,3}\.\d{1,3}\.\d{1,3}\.\d{1,3}")).Matches((new  
WebClient()).DownloadString("http://www.metallicgloss.com/functions/ip.php"))[0].ToString();  
loginMenu.IPAddress = externalIP;  
//Define new XML document and load setup.xml.  
XmlDocument doc = new XmlDocument();  
doc.Load("setup.xml");  
//Set lines of XML to variables, if setup has not been configured open setup form.  
string Setup = doc.SelectSingleNode("Settings/Setup").InnerText;
```

Comments are easily distinguishable from the main code making it easier to note where I had missed comments and where I needed to expand upon existing ones. Linking to the comment colour coding, the language's general formatting made it ideal when attempting to proofreading the code before execution to avoid errors, and also to keep the code's format, layout and overall demeanour manageable and pleasant to work with. It is clear why C# is one of a few popular languages used for mass-produced applications that are used in personal and business applications around the world.

Due to its global adoption, support and simplicity, a lot of websites can be found online dedicated to providing C# support.

Other sites such as StackOverflow also contain an abundance of information, solutions and problems that have already been asked by others developing in the language, meaning that the solution to almost anything is only a few clicks away - it won't take you hours to search around for support. It also means that there are lots of libraries developed to support the language, saving a lot of time and effort



attempting to recode existing code, importing and using libraries such as the SSH library or MYSQL library allowed for the project to be completed on time.

The language, in general, is very strongly coded making passing variables between functions complicated at times, especially when attempting to transfer objects through functions and while trying to target public objects in other forms. The style of the language, forcing all variables to be declared, did, however, turn out to be a massive benefit allowing me to have relatively little operational issues throughout the development and testing, with the couple hiccups in the trial caused by a copy-paste SQL error or problem with missing a message box.

The screenshot shows the Microsoft Visual Studio interface during debugging. The main window displays the 'loginMenu.cs' code, which includes logic for handling the 'Load' event of a Windows Form. The code uses regular expressions to validate an IP address and loads an XML document named 'setup.xml'. It then sets lines of XML to variables and checks if 'Setup' has been configured. If not, it opens a setup form. The 'Setup' variable is checked for a value of 'No', and if true, the program hides and then shows itself. The 'setupDatabaseFRM' form is instantiated and shown. The 'externalIP' variable is set to '88.99.164.180'. The 'Error List' window shows 4 warnings, indicating potential issues with the code. The 'Diagnostic Tools' window provides real-time monitoring of the application's performance, showing memory usage and CPU usage over time. The 'Solution Explorer' shows the project structure with files like 'ELSMProject.csproj' and 'ELSMProject.cs'.

The development process of this application was made much more straightforward with C# as the language supported breakpoints which were a lifesaver when attempting to debug tricky logic errors that were causing a headache to resolve. Being able to slow the program down and seeing how variables are manipulated was fantastic and resulted in the program being almost entirely bug-free in its core operation.

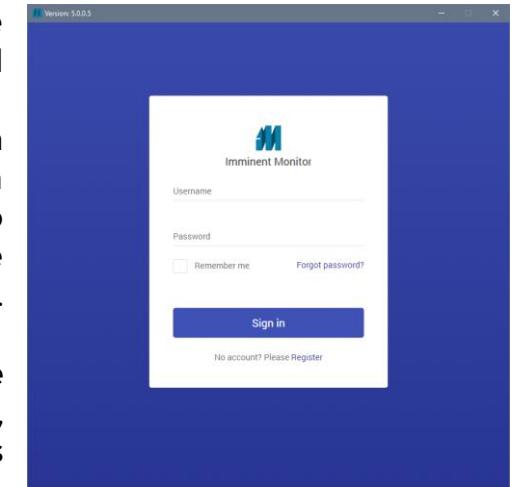
C# is an object-oriented programming language, making it very easy to maintain and design with most visual elements being drag and drop based. This made the designing of the program and linking of elements incredibly simple and was also the reason I was able to create dynamic elements on the page that interacted with each other and was able to fire events. A downside is that the design itself is quite limited, with default properties being able to be altered for the element being targeted, but the features, in general, was somewhat restrictive when it came to advanced customisations.

Subsection 3.8.1.ii - Compare your solution with commercially available systems

Commercial alternatives for this type of server administration were expected to be much more superior when it comes to the overall completeness of the program, but looking at each feature individually could mean that with some tweaks it is actually extremely close. While commercial software will be much more polished, the overall features don't differ very much, and I will not compare my system to two commercial available software.

When comparing my solution to Imminent Monitor, there are a few areas that my software solution is superior, primarily being that with my program, no software has to be installed on the node to be able to perform actions to it as it can all be performed through SSH commands. That software also is flagged as a virus on most systems due to its admin capabilities, allowing my software to be much safer when it comes to the administration aspect. Regrettably, I do prefer the design of the commercial software when compared to that which I designed, but do think that if professionally designed, both solutions could be improved further. The commercial software is clean, sleek and very optimised in comparison.

When it comes to features, Imminent has a lot of pre-defined actions whereas my software has the ability to allow the user to define any command they wish from rebooting the server, to restarting or emailing the stats of Apache or Nginx on any operating system they use. This software, while needing an internet connection verify the license does not allow you to control servers or computers that aren't pointing directly to your IP address meaning that you would have to install the software multiple times to point to different IPs. This means that you can't control servers on the fly.



Location	Latency	Note	Username	RAM	Operating System	Idle Time	Client
Windows 10 Pro	0 ms		Mathieu Clement	37%	Windows 10 Pro	00:00:00	Default
Windows 10 Pro	0 ms		Maurice Hart	37%	Windows 10 Pro	00:00:00	Default
Windows XP	0 ms		Kelly Holland	37%	Windows XP	00:00:00	Default
Windows XP	0 ms		Mathis Caron	37%	Windows XP	00:00:00	Default
Windows XP	0 ms		Julio Duran	37%	Windows XP	00:00:00	Default
Windows XP	0 ms		Tommi Haas	38%	Windows XP	00:00:00	Default
Windows 8 Pro	0 ms		Jessica White	37%	Windows 8 Pro	00:00:00	Default
Windows 7 Pro	0 ms		Benjamin Armstrong	37%	Windows 7 Pro	00:00:00	Default
Windows 7 Pro	0 ms		Paula Hidalgo	37%	Windows 7 Pro	00:00:00	Default
Windows 7 Pro	0 ms		Kirk White	37%	Windows 7 Pro	00:00:00	Default
Windows 7 Pro	0 ms		Nilo Kaupille	37%	Windows 7 Pro	00:00:00	Default
Windows 7 Pro	0 ms		Yolanda Soler	37%	Windows 7 Pro	00:00:00	Default
Windows 7 Pro	0 ms		Alexandra Robertson	38%	Windows 7 Pro	00:00:00	Default
Windows 7 Pro	0 ms		Danny Hamilton	38%	Windows 7 Pro	00:00:00	Default
Windows 8.1 Pro	0 ms		Felix Walker	37%	Windows 8.1 Pro	00:00:00	Default
Windows 8.1 Pro	0 ms		M&oline Roy	37%	Windows 8.1 Pro	00:00:01	Default
Windows 8.1 Pro	0 ms		Magdalena Gomez	37%	Windows 8.1 Pro	00:00:00	Default
Windows 8.1 Pro	0 ms		Abigail Liu	38%	Windows 8.1 Pro	00:00:00	Default
Windows 8.1 Pro	0 ms		Rose Li	38%	Windows 8.1 Pro	00:00:00	Default
Windows Vista	0 ms		Reena Schieler	37%	Windows Vista	00:00:00	Default
Windows Vista	0 ms		Christian Jensen	38%	Windows Vista	00:00:00	Default

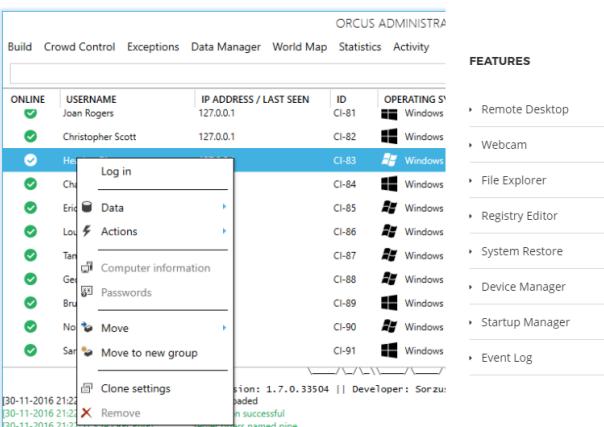
Connected Clients: 21 [View Offline Clients](#)

Another example of commercial available software that performs a similar job is Orcus. Orcus is however much more advanced with its capabilities, being able to be used via an Android app meaning it isn't just limited from being used and controlled via a Windows computer.

The interface for this application isn't up to the standard of Imminemt, and I would say that potentially the design for my software is a slight improvement over this commercially available solution.

Features

Orcus provides a lot features. A full list can be found [here](#)



The screenshot shows the 'ORCUS ADMINISTRATION' interface. On the left, there's a sidebar titled 'WHAT WE OFFER' with a list of features: Free Android App, Independent Server, Customer Service, Transparency, Open Plugin System, Security, 24/7 Support, and Light and Dark Design. The main area displays a table of online users:

ONLINE	USERNAME	IP ADDRESS / LAST SEEN	ID	OPERATING S
<input checked="" type="checkbox"/>	Joan Rogers	127.0.0.1	CI-81	Windows
<input checked="" type="checkbox"/>	Christopher Scott	127.0.0.1	CI-82	Windows
<input checked="" type="checkbox"/>	He		CI-83	Windows
<input checked="" type="checkbox"/>	Ch		CI-84	Windows
<input checked="" type="checkbox"/>	Eric	Data	CI-85	Windows
<input checked="" type="checkbox"/>	Lou	Actions	CI-86	Windows
<input checked="" type="checkbox"/>	Tan	Computer information	CI-87	Windows
<input checked="" type="checkbox"/>	Ge	Passwords	CI-88	Windows
<input checked="" type="checkbox"/>	Bru		CI-89	Windows
<input checked="" type="checkbox"/>	No	Move	CI-90	Windows
<input checked="" type="checkbox"/>	Sar	Move to new group	CI-91	Windows

On the right, there's a 'FEATURES' sidebar with a list of options: Remote Desktop, Webcam, File Explorer, Registry Editor, System Restore, Device Manager, Startup Manager, and Event Log. At the bottom, there are several log entries:

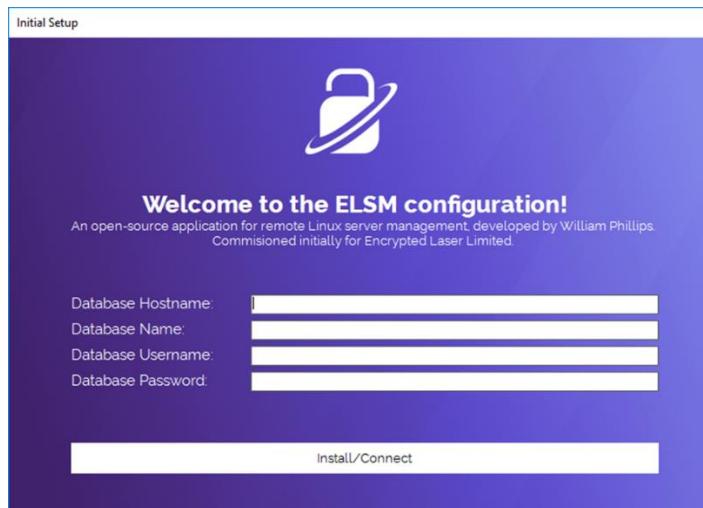
- [30-11-2016 21:22] [+] Log in successful
- [30-11-2016 21:22] [+] Remove successful
- [30-11-2016 21:22] [+] Server rebooted named nine

Orcus also is installed the same way that Imminent is, meaning that it can easily get flagged as a virus, allowing my solution to be much safer in that aspect. Due to it only accessing the server over SSH, it does not have file browsing capabilities or registry editor. While this software is designed for the masses, mine is more specified, with the customer not wanting those capabilities.

In conclusion, the differences between the goals of each software is difference, but the difference in quality between my solution and the other commercially available ones is smaller than expected even though the software was a custom design for Encrypted Laser.

Subsection 3.8.1.iii - Successful features of the system

The system in general has been a massive success, fulfilling the initial criteria substantially in the given timeframe. With features ranging from remote setup to background SSH command execution, the program is certainly an upgrade for Encrypted Laser over the existing system.



Having the ability to configure the system to work on any remote database gives the flexibility to have a centralised location for data with multiple version of the software interacting with it without having multiple version of data being stored on the device where the program is being run.

The trickiest feature that has been implemented is the dynamic generation of elements on the command creation and edit forms. Taking the most time to complete and having multiple problems with the time the generation took, the aspect of the program caused considerable problems but is now a massive success with operating system elements being generated very quickly on page load.

Create Command

Command Name	<input type="text"/>
CentOS 5.10	<input type="checkbox"/>
CentOS 5.11	<input type="checkbox"/>
CentOS 5.5	<input type="checkbox"/>
CentOS 5.8	<input type="checkbox"/>
CentOS 5.9	<input type="checkbox"/>
CentOS 6.2	<input type="checkbox"/>
CentOS 6.3	<input type="checkbox"/>
CentOS 6.4	<input type="checkbox"/>
CentOS 6.5	<input type="checkbox"/>
CentOS 6.6	<input type="checkbox"/>
CentOS 6.9	<input type="checkbox"/>
CentOS 7.0	<input type="checkbox"/>
CentOS 7.1	<input type="checkbox"/>
CentOS 7.3	<input type="checkbox"/>
Debian 5.0	<input type="checkbox"/>
Debian 6.0	<input type="checkbox"/>
Debian 7.0	<input type="checkbox"/>

```
//Create new thread to run in the background. Attempt to SSH into the node with the hostname selected in the loop, execute the command that matches the
OS then disconnect.
new Thread(() =>
{
    Thread.CurrentThread.IsBackground = true;
    try
    {
        using (var client = new SshClient(ip, username, password))
        {
            client.Connect();
            client.RunCommand(Convert.ToString(commandData));
            client.Disconnect();
        }
    }
    catch (Exception)
    {
        System.Windows.Forms.MessageBox.Show("Error");
    }
}).Start();
```

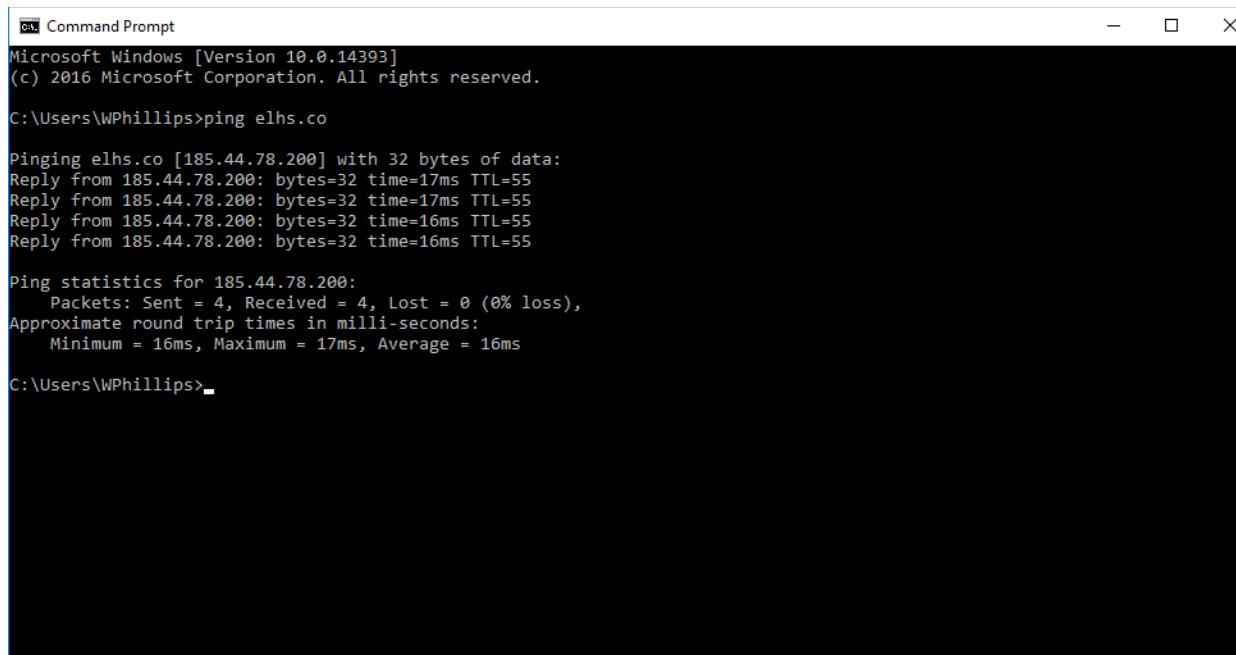
The feature that allows SSH and backup SSH commands to be executed in the background to allow the user to leave the program running in the background or to perform other actions on the program while it is being executed is one that I am proud of. It works flawlessly, and was a massive bonus to introduce after the prototype as it made the program feel in general much more responsive.

Overall, I am very proud of all features of the program being able to satisfy the requirements of the initial program. They took much longer than expected to code due to the fact I had to learn C# to a usable level while also research how to create dynamic elements and perform SSH connections.

Subsection 3.8.1.iv - Potential improvements to less successful features of the system

There are a few potential improvements that can be made to the system which will be listed below. Each improvement would make the program that little bit more complete and usable in a commercial environment.

The first area of the program that I would recommend improving upon would be to correct the few tests that failed during the testing phase. The failed tests were mainly caused by missing validation rules or an error in the SQL command that was used when selecting data from the database tables. Each correction would allow the program to function better with less chance of lowering data integrity.



A screenshot of a Microsoft Windows Command Prompt window titled "Command Prompt". The window shows the following output:

```
Microsoft Windows [Version 10.0.14393]
(c) 2016 Microsoft Corporation. All rights reserved.

C:\Users\WPhillips>ping elhs.co

Pinging elhs.co [185.44.78.200] with 32 bytes of data:
Reply from 185.44.78.200: bytes=32 time=17ms TTL=55
Reply from 185.44.78.200: bytes=32 time=17ms TTL=55
Reply from 185.44.78.200: bytes=32 time=16ms TTL=55
Reply from 185.44.78.200: bytes=32 time=16ms TTL=55

Ping statistics for 185.44.78.200:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 16ms, Maximum = 17ms, Average = 16ms

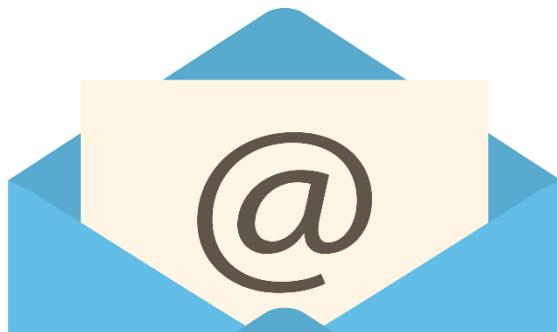
C:\Users\WPhillips>
```

Another area where I would focus on would be the overall optimisation of the program. The database that I used in the development stage was located in Bristol, United Kingdom while the test program was developed on a VPS located in Germany. Due to the connectivity latency between the two countries, switching forms and having to make new connections to the database could increase the load time by a couple seconds. It would be preferable to have a MySQL database in the country that the program is being used from for the best possible performance.

+ Options		attemptID	attemptUsername	attemptIP	attemptTimeStamp	attemptTries
<input type="checkbox"/>	  	1	WPhillips	88	2018-04-16 11:34:47	0
<input type="checkbox"/>	  	2	WPhillipsWPhillipsWPhillipsWPhillipsWPhillipsWPhil...	88	2018-04-16 11:35:21	0

One other feature that I feel is less successful is the logging. The system logs failed login attempts, but fails to be able to act upon them if someone is attempting to brute force an account. In addition to this, the account logs for what each user performs is non-existent and is a feature missing from the original specification that the system was to have. Due to the time constraints and optimisation requirements, this feature did not get added to the whole program.

Another feature that I would like to improve upon if I had the time would be to stop the program from exiting while a SSH command was being executed as there is nothing that currently stops the program from closing unexpectedly. This could cause problems for servers if they were executing a command that needed the SSH connection to be left open. This could be resolved by checking on program close to see if all threads opened have been closed and have set a value to false. This would prevent the program from closing while still attempting to execute a command.



The final improvement that I could say should have been added would be the use of the SMTP server details in more than 1 place. It currently only sends an email after setup, and discards the credentials for that mail server instead of storing them for use of notifying users when actions on the system occurs.

Src - https://marketingland.com/wp-content/ml-loads/2015/12/email_ss_1920.png

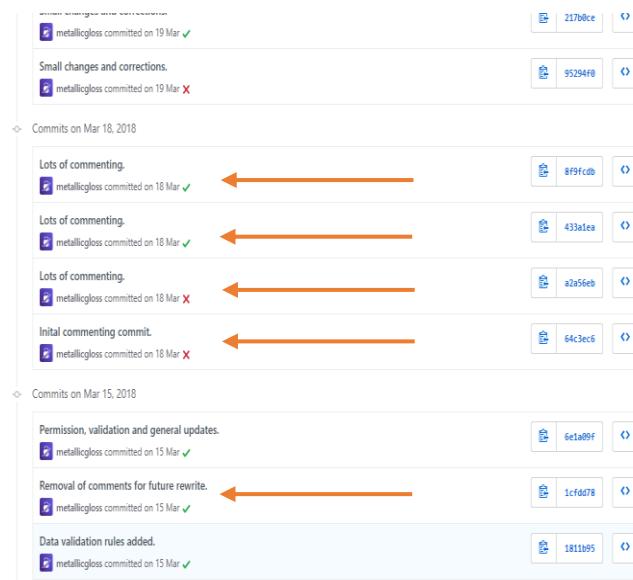
Overall, the program does have a few drawbacks with some features, but all can be improved quickly and easily with a few tweaks and code additions to allow the program to function fully.

Subsection 3.8.1.v - Strengths and weaknesses of your own performance

During the development of this program, I showed multiple strengths and weaknesses for being able to code in C#. Some strengths include by ability to code in a new language and be able to integrate multiple different features , functions and libraries into the program. Some strengths including unoptimized coding or incomplete validation rules within the program and disliking to comment thoroughly.

The screenshot shows a GitHub commit history for a repository. The commits are listed by date, with a focus on January 11, 2018. Each commit has a green checkmark next to it, indicating successful pushes. Orange arrows point from the commit descriptions to the commit details section on the right, highlighting specific actions taken during that period. The commits are as follows:

- Commits on Jan 15, 2018:
 - Code clean and commenting.
metallicgloss committed on 15 Jan ✓
- Commits on Jan 11, 2018:
 - Code clean and commenting.
metallicgloss committed on 11 Jan ✓
 - Code clean and commenting.
metallicgloss committed on 11 Jan ✓
 - Code clean and commenting.
metallicgloss committed on 11 Jan ✓
 - Code clean and commenting.
metallicgloss committed on 11 Jan ✘
 - Continued code clean and commenting.
metallicgloss committed on 11 Jan ✘
- Commits on Jan 9, 2018:
 - Beginning of mass program commenting and code optimisation.
metallicgloss committed on 9 Jan ✓
 - Code optimisation of serverControlStatus.
metallicgloss committed on 9 Jan ✘



I'll start with some weaknesses, primarily commenting. Throughout the prototyping stage of the program I added a lot of copy paste, irrelevant comments just to be able to satisfy the target of having comments in my code. This made the whole program look unoptimized, messy and confusing as some comments did not relate to what they were meant to do. This resulted in me on multiple occasions attempting to remove every single comment from my program so that the code would be clean and uncommented. It then allowed me to go and recomment every separate section which caused me to spend more time than I would have wanted to, instead of just doing an excellent job as I went along. After realising the value of comments within the code, I completed the full commenting of my program in multiple blocks so that the code could be complete.

The second weakness I will cover is the unoptimized nature of the program. In the initial prototype, I did not modularise anything meaning that there was a lot of repeated or sometimes unnecessary code within my program that I was able to remove from my final application.

The code listing below is an example of the code that was visible on every page that disabled the buttons depending on their permission. Repetitive, excessive and unnecessary.

```
if ((loginMenu.permControlServers == false) && (loginMenu.permViewLocations == false) && (loginMenu.permViewServers == false))
{
    btnHome.Top += 129;
    btnManageLocations.Visible = false;
    btnManageServers.Visible = false;
    btnServerControl.Visible = false;
}
else if ((loginMenu.permControlServers == false) && (loginMenu.permViewLocations == false))
{
    btnHome.Top += 129;
    btnManageServers.Top += 86;
    btnServerControl.Visible = false;
    btnManageLocations.Visible = false;
}
```

```
else if ((loginMenu.permControlServers == false) && (loginMenu.permViewServers == false))
{
    btnHome.Top += 86;
    btnServerControl.Visible = false;
    btnManageServers.Visible = false;
}
else if ((loginMenu.permViewServers == false) && (loginMenu.permViewLocations == false))
{
    btnHome.Top += 86;
    btnServerControl.Top += 86;
    btnManageLocations.Visible = false;
    btnManageServers.Visible = false;
}
else if (loginMenu.permControlServers == false)
{
    btnHome.Top += 43;
    btnServerControl.Visible = false;
}
else if (loginMenu.permViewServers == false)
{
    btnHome.Top += 43;
    btnServerControl.Top += 43;
    btnManageServers.Visible = false;
}
else if (loginMenu.permViewLocations == false)
{
    btnHome.Top += 43;
    btnServerControl.Top += 43;
    btnManageServers.Top += 43;
    btnManageLocations.Visible = false;
}
```



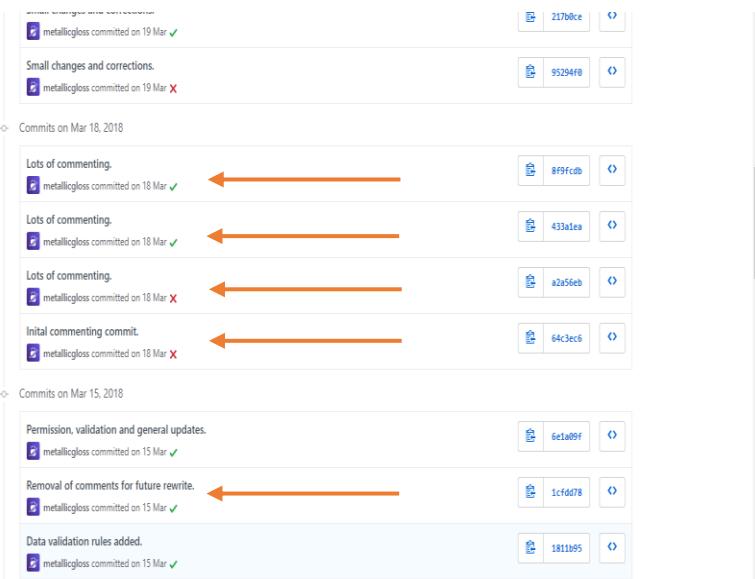
One of my strengths that I showed throughout the development of my program was my ability to be able to code and work with the C# coding language. I began the project wishing to challenge myself by developing in a language I had never used before to a degree that would be seen as being usable. My main strength within coding previously had been Visual Basic on the .NET framework, and had only used C# once the previous year to create a test application for computer science. I'm insanely proud of how easily and quickly I was able to pick up the new language and to complete a fully coded program that is developed to a high standard and that is almost fully functional. With the assistance of other developers asking the same questions I needed answered on StackOverflow, it made any problem that I got stuck on easily overcomeable.

Src - <https://camo.githubusercontent.com/0617f4657fef12e8d16db45b8d73def73144b09f/68747470733a2f2f646576656c6f7065722e6665646f726170726f6a6563742e6f72672f7374617469632f6c6f676f2f6373686172702e706e67>

Another strength that I am proud of during the design, prototyping and coding of this solution is the ability for me to integrate different modules to allow the program to be able to interact with servers over SSH, connect to MySQL databases and to be able to have some level of security when it comes to user accounts by hashing and salting the passwords using SHA512.

Subsection 3.8.1.vi - Changes of approach that would be adopted

Looking back at the piece of software I have developed and the project in general, there are multiple things that I would change regarding how I approached and performed tasks. These changes would include spending less time attempting to find a range of different software in the investigation section, commenting as I go to a quality standard where I don't have to delete all of them and redo them, and also to modularise more code. If I can improve my development practices, the next piece of software I develop will be completed to a much higher standard, and I won't have wasted as much time as I have. When I began the development, I attempted to start with a language I wasn't comfortable in and did more research than I needed to on areas.



The screenshot shows a GitHub commit history for a repository. At the top, two commits are listed: one from 'metalligloss' on March 19, 2018, with a green checkmark, and another from the same user on the same date with a red X. Below this, a section titled 'Commits on Mar 18, 2018' contains four commits, each preceded by an orange arrow pointing to its message: 'Lots of commenting.', 'Lots of commenting.', 'Lots of commenting.', and 'Initial commenting commit.'. Each commit has a green checkmark. To the right of each commit are three small icons: a file, a copy symbol, and a more options menu. Below this section, another titled 'Commits on Mar 15, 2018' shows three commits: 'Permission, validation and general updates.' (green checkmark), 'Removal of comments for future rewrite.' (orange arrow pointing to the message, red X), and 'Data validation rules added.' (green checkmark). Each commit has its corresponding icon set to the right.

The image to the left displays a few git commits where I was having to re-comment my whole code after removing every comment. This was caused by me being in the development mindset that I would be the only one who would ever have to work on this, and I would remember everything. Every developer retains knowledge of every bit of code they write, right? As I quickly learnt, when working on a project this scale it is easy to forget aspects of code and their function, leading to me understanding the importance of good comments so that you or anyone else can pick up the software at a later date and quickly familiarise themselves with it.

The screenshot shows a GitHub commit history for a repository named 'metallicgloss'. It displays several commits made by the user 'metallicgloss' on November 9, 2017. The commits are listed in chronological order from top to bottom:

- Merge branch 'master' of https://github.com/metallicgloss/Server-Mana... (commit d0ac36a)
- Development & Improvements of UI (commit 3d27979)
- Commits on Nov 9, 2017
 - Deletion of old file. (commit 5749330)
 - Deletion of old file. (commit 98ed578)
 - Upload additional dependencies and complete Login page (commit 89bcb79)
 - Upload of MySQL Dependency (commit 7d3a56a)

Touching on the time management aspect. The image displayed above highlights my time management shortfall, beginning the prototype development on November 9th. That means I had spent 2-3 months on the investigation and design section, both of which could have taken less than a couple weeks each. Time managing and monitoring is something that I've become painfully aware of during this project and is a skill I am confident in saying that I can portray in software development now.

The final area that I wish to improve upon, and would change if continuing with this project, or for future software projects would be to push modularisation as much as possible. I began to adopt it near the end of my software development section, but working to modules at the start of the prototype would have saved considerable amounts of time while developing the software.

Being able to adopt these changes in how I work is critical on becoming a more professional software developer and to improve myself as a person. Commenting is essential, so is time management and so is keeping code clean and organised from the start. This project has opened my eyes to the steps and processes required to be undertaken when creating a piece of software.

In my opinion, this project has been a massive success. The software fits almost all original criteria, and in the process I've not only learnt a new coding language but also learnt valuable life lessons for skills that I can now apply to future software development projects or to life in general. The software is developed to a high standard, with a great interface and I believe that fixing a few of the tests that failed and applying some improvements listed in the previous section would allow this software to become a usable piece for the company. In its current state, it is fully usable but adding an extra few validation rules and SQL corrections would polish the program off well.

Thank you very much for reading my Computer Science coursework and documentation of the piece of software developed for Encrypted Laser Limited.