# Chapter 4 – Implementation

## 4.1 – Chapter Introduction

In comparison to the previously described analysis and design of the system, implementation was the phase in which U-Star Digital carried out developing and real-world testing of the Web-Based Computer Hardware Purchasing and Troubleshooting Assistant Management System. In order to maintain the system's quality and security, best practices were followed during implementation and development.

## 4.2 – Implementation Environment

There are two primary implementation environments for a system when it comes to implementation. There are two types of implementation environments: software and hardware. To keep implementation and maintenance costs low, it was mostly done with free and open source software and tools. The tools and procedures utilized in this phase are listed below.

### 4.2.1 – Software Environment

The work is done on a computer that runs the Microsoft Windows operating system. As a result, a software environment that is compatible with Windows was established. The XAMPP server was utilized because it comes with Apache, MySQL, and PHP on Windows. Visual Studio Code IDE has been used as the primary design tool for development. Visual Studio Code is an open-source integrated development environment (IDE) for programming languages such as Java, PHP, C++, and others. Bootstrap 5 is the most recent version of the most popular HTML, CSS, and JavaScript framework for creating responsive, mobile-first websites.

Although PHP is the primary development language, it is supported by several other languages.

- HTML – to create the web pages' content
- Javascript – for content validation and filtering
- CSS – to make the web pages styles

- JQuery – Code libraries that can be reused
- Ajax – to make changes to the content without having to reload the page
- diagrams.net – to sketch a design diagram
- GanttPRO – to create a project timeline
- Microsoft Word – to compose a documents

## 4.2.2 – Hardware Environment

This system was created using a computer with the features shown in Figure 4.1.

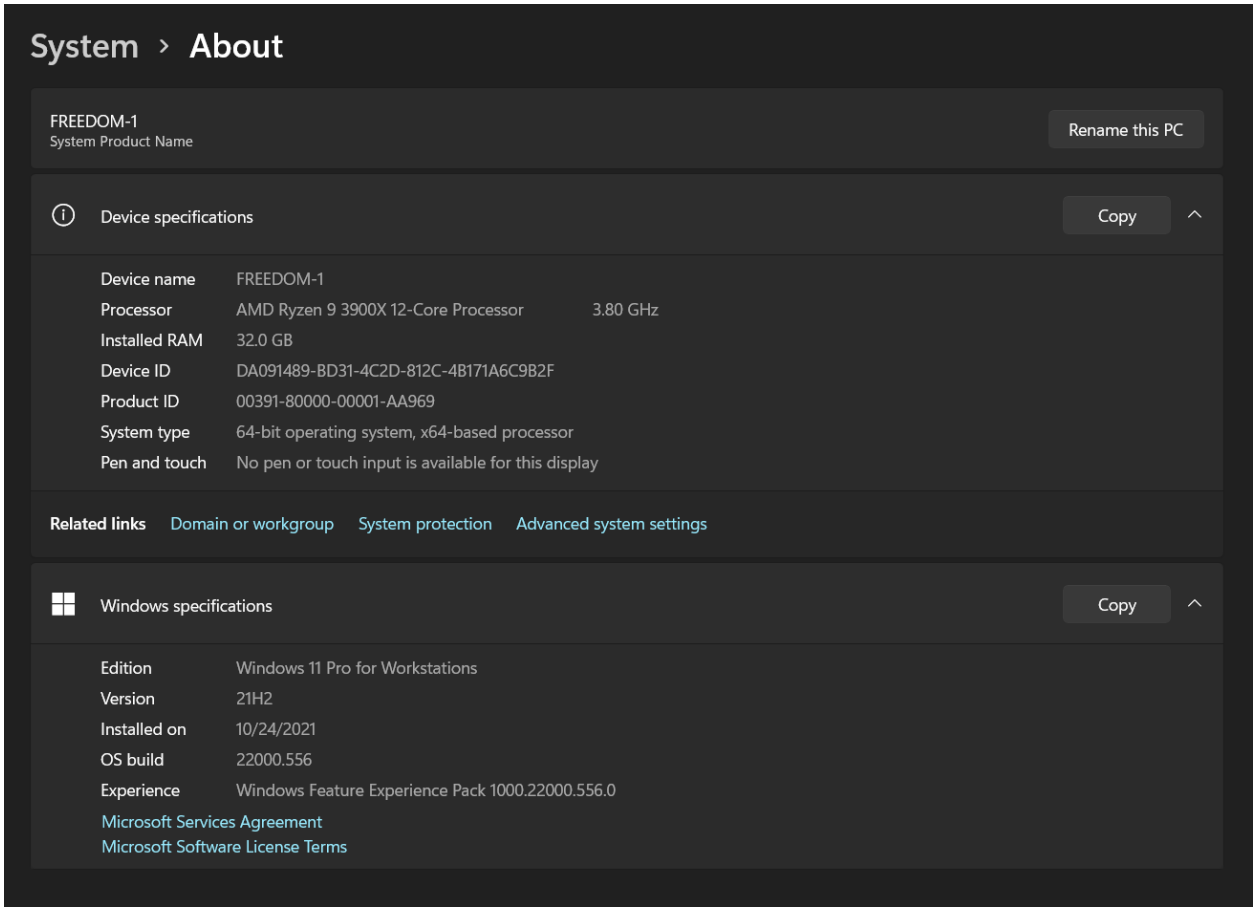


*Figure 4.1 - Hardware Environment*

## 4.2.3 – Other Softwares and Development Tools

Was used authoring tools such as Adobe Photoshop CC for designing graphics and web browsers such as Firefox, Google Chrome, and Internet Explorer for testing the system, in addition to software development tools.

## 4.3 – Justification for the choice of the implementation platform

- **Web Server**

  The project's dedicated server, XAMPP Server, was utilized to manage the application using phpMyAdmin. The web server was handled by Apache, which is another part of its solution stack.

- **Database Server**

  The software's database server was MySQL, which is also part of the XAMPP solution stack. MySQL is a relational database management system that is free and open-source.

- **PHP**

  PHP, a server-side scripting language developed primarily for web development but also used as a general-purpose programming language, was used to construct the system.PHP is a popular, efficient, and free server programming language that may be used to create dynamic and interactive Web pages.

- **HTML**

  HTML, which is the standard markup language for building web pages and web applications, was utilized as the system's basic web language.

- **CSS**

  The system was styled with CSS. CSS is a language for describing how an HTML document should appear.

- **Bootstrap 5**

  Bootstrap is the most widely used HTML, CSS, and JS framework for creating responsive, mobile-first websites.

- **JavaScript**

  JavaScript is a high-level, interpreted programming language that is utilized in the construction of the system for code validation and filtering.

- **JQuery**

  When employing reusable components, jQuery is a quick, compact, and feature-rich JavaScript library that was used to construct the system.

- **Microsoft Word**

  Microsoft Word, a simple text editor produced by Microsoft, was utilized.

- **Adobe Photoshop CC**

  Adobe Photoshop CC is a significant update that includes a new Object Selection Tool, improved Warp Transformation, updated Preset Library, and a slew of new keyboard shortcuts and timesavers.

### 4.3.1 System File Structure

Figure 4.2 depicts the file structure of the produced system.

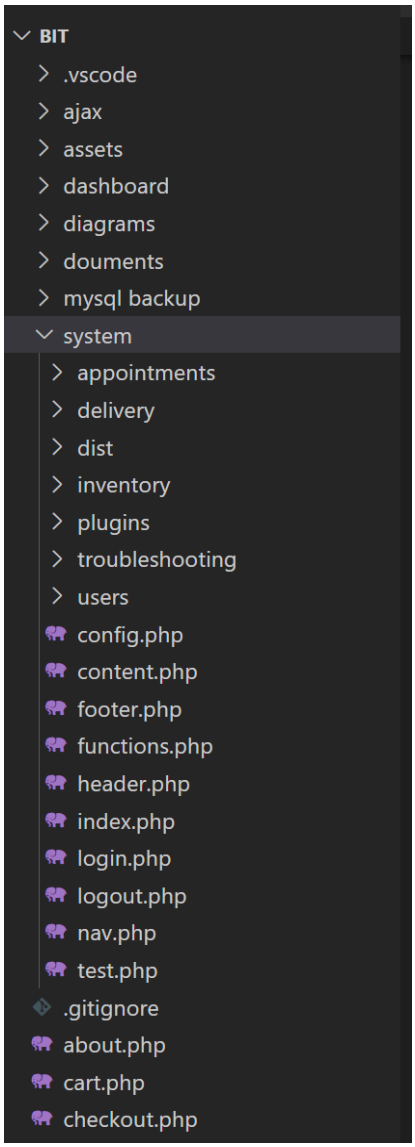


*Figure 4.2 – File Structure*

## 4.4 – High Level Module Structure

Computer Hardware Assistant Module – Accessed by Technician

Troubleshooting Assistant Module – Accessed by Technician

Inventory Management Module – Accessed by Inventory Manager

Delivery Management Module – Accessed by Delivery Manager

Report Management Module – Accessed by Shop Manager

User Management Module – Accessed by Administrator

## 4.5 – Major Code Segments

### 4.5.1 – Customer Registration Code Segments

- Member Registration Form

```
<form action="<?php echo htmlspecialchars($_SERVER['PHP_SELF']); ?>" method="post">
    <div class="input-group mb-3">
        <input type="text" class="form-control" placeholder="First Name"
        name="reg_first_name" value="<?php echo @$reg_first_name ?>">
    </div>
    <div>
        <p style="color: red;"> <?php echo @$error['reg_first_name'] ?> </p>
    </div>
    <div class="input-group mb-3">
        <input type="text" class="form-control" placeholder="Last Name"
        name="reg_last_name" value="<?php echo @$reg_last_name ?>">
    </div>
    <div>
        <p style="color: red;"> <?php echo @$error['reg_last_name'] ?> </p>
    </div>
    <div class="input-group mb-3">
        <input type="text" class="form-control" placeholder="Username"
        name="reg_username" value="<?php echo @$reg_username ?>">
    </div>
    <div>
        <p style="color: red;"> <?php echo @$error['reg_username'] ?> </p>
    </div>
    <div class="input-group mb-3">
        <input type="email" class="form-control" placeholder="Email"
        name="reg_email" value="<?php echo @$reg_email ?>">
    </div>
    <div>
        <p style="color: red;"> <?php echo @$error['reg_email'] ?> </p>
    </div>
    <div class="input-group mb-3">
        <input type="password" class="form-control" placeholder="Password"
        name="reg_password">
    </div>
    <div>
        <p style="color: red;"> <?php echo @$error['reg_password'] ?> </p>
    </div>
    <div class="input-group mb-3">
        <input type="password" class="form-control" placeholder="Retype password"
        name="reg_con_password">
    </div>
    <div>
        <p style="color: red;"> <?php echo @$error['reg_con_password'] ?> </p>
    </div>
```

```
    <div class="row">
        <div class="col-8">
        </div>
        <!-- /.col -->
        <div class="col-4" style="display: flex; flex-direction: row; justify-content: flex-end;">
            <button type="submit" class="btn btn-secondary btn-block"
            name="action" value="register">Register</button>
        </div>
        <!-- /.col -->
    </div>
</form>
```

- Basic Validation of Customer Registration Form

```
// register form
if ($_SERVER['REQUEST_METHOD'] == 'POST' && @$action == 'register') {

    $reg_username = data_clean($reg_username);
    $reg_first_name = data_clean($reg_first_name);
    $reg_last_name = data_clean($reg_last_name);
    $reg_username = data_clean($reg_username);
    $reg_email = data_clean($reg_email);
    $reg_password = data_clean($reg_password);
    $reg_con_password = data_clean($reg_con_password);

    // basic validation Billing Details
    if (empty($reg_first_name)) {
        $error['reg_first_name'] = "First Name Should Not Be Empty";
    }

    if (empty($reg_last_name)) {
        $error['reg_last_name'] = "Last Name Should Not Be Empty";
    }

    if (empty($reg_username)) {
        $error['reg_username'] = "User Name Should not be empty";
    }

    if (empty($reg_email)) {
        $error['reg_email'] = "email Should Not Be Empty";
    }

    if (empty($reg_password)) {
        $error['reg_password'] = "Password not empty";
    }

    if (empty($reg_con_password)) {
        $error['reg_con_password'] = "Password not empty";
    }

    //password typo check
    if (!empty($reg_password and $reg_con_password)) {

        if ($reg_password != $reg_con_password) {
            $error['reg_con_password'] = "Password not match";
        }
    }
```

- Advacne Validation of Customer Registration Form

```php
// Advance validation
if (!preg_match("/^[a-zA-Z ]*$/", $reg_first_name)) {
    $error['reg_first_name'] = "Only Letters allowed for First Name";
}

if (!preg_match("/^[a-zA-Z ]*$/", $reg_last_name)) {
    $error['reg_last_name'] = "Only Letters allowed for Last Name";
}

if (!empty($reg_email) && @$reg_previous_email != $reg_email) {

    if (!filter_var($reg_email, FILTER_VALIDATE_EMAIL)) {

        $error['reg_email'] = "Email Address is not valid";
    } else {

        $sql_e = "SELECT * FROM users WHERE email = '$reg_email'";
        $result_e = $db->query($sql_e);
        if ($result_e->num_rows > 0) {
            $error['reg_email'] = "Email Already Exists";
        }
    }
}

if (!empty($reg_username)) {

    $sql = "SELECT * FROM users WHERE user_name = '$reg_username'";

    $result = $db->query($sql);

    if ($result->num_rows > 0) {
        $error['reg_username'] = "<b> $reg_username </b> User Already Exists";
    }
}

if (!empty($reg_password)) {
    if (strlen($reg_password) < 8) {
        $error['reg_password'] = "Password Should be at least 8 characters";
    }
}
```

## 4.5.1 – Customer Checkout Code Segments

```php
if (empty($error)) {

    $discount = $_SESSION['grand_total_sale'];
    $user_id = $_SESSION['user_id'];
    $order_total = $_SESSION['grand_total'];
    $time = date("H:i:s");
    $grand_total =  $_SESSION['order_grand_total'];

    // insert order
    $sql_order = "INSERT INTO `orders` (`order_id`, `order_number`, `order_total`, `total_discount`,
                  `delivery_charge`, `order_date`, `order_time`, `user_id`, `payment_id`, `grand_total`)
                  VALUES (NULL, '$order_number', '$order_total', '$discount', '$d_province', '$date',
                  '$time','$user_id', '$payment_method', '$grand_total');";
    // run database query
    $query = $db->query($sql_order);

    // capture last insert ID
    $order_id = $db->insert_id;

    $_SESSION['order_id'] = $order_id;

    // change order number
    $order_number = $order_number . sprintf('%04d', $order_id);
    // order number update
    $sql = "UPDATE orders SET order_number = '$order_number' WHERE order_id = '$order_id'";
    // run database query
    $query = $db->query($sql);
```

```php
    // insert billing
    $sql_billing = "INSERT INTO `billing_details` (`id`, `first_name`, `last_name`, `phone`, `email`,
                   `address_line_1`, `address_line_2`, `provinces`, `city`, `zip`, `order_id`)
                   VALUES (NULL, '$frist_name', '$last_name', '$phone', '$email', '$address_line_1',
                   '$address_line_2', '$province', '$city', '$zip', '$order_id');";
    // run database query
    $query = $db->query($sql_billing);

    // insert delivery
    $sql_delivery = "INSERT INTO `delivery_details` (`id`, `frist_name`, `last_name`, `phone`, `email`,
                    `address_line_1`, `address_line_2`, `city`, `province_id`, `zip`, `order_id`)
                    VALUES (NULL, '$d_frist_name', '$d_last_name', '$d_phone', '$d_email', '$d_address_line_1',
                    '$d_address_line_2', '$d_city', '$d_province', '$d_zip', '$order_id');";
    // run database query
    $query = $db->query($sql_delivery);

    // session cart extract
    foreach ($_SESSION['cart'] as $product) {

        $item_id =  $product['item_id'];
        $item_price = $product['item_price'];
        $item_sale_price = $product['sales_price'];
        $grn_price = $product['grn_price'];
        $item_qty = $product['item_qty'];

        $sql = "INSERT INTO `orders_items` (`orders_items_id`, `order_id`, `item_id`, `item_qty`,
                `grn_price`, `unit_price`, `sale_price`) VALUES (NULL, '$order_id', '$item_id',
                '$item_qty', '$grn_price', '$item_price', '$item_sale_price');";
        // run database query
        $db->query($sql);
    }
}
```

## 4.6 – Reused Existing Codes

When implementing the system, several of the well-tested re-usable components were added in order to maximize efficiency and provide more interest to the system.

- **Reusable CSS Files**

```
<!-- Font Awesome -->
<link rel="stylesheet" href="<?php echo SITE_URL; ?>plugins/fontawesome-free/css/all.min.css">
<!-- Ionicons -->
<link rel="stylesheet" href="https://code.ionicframework.com/ionicons/2.0.1/css/ionicons.min.css">
<!-- Tempusdominus Bootstrap 4 -->
<link rel="stylesheet" href="<?php echo SITE_URL; ?>plugins/tempusdominus-bootstrap-4/css/tempusdominus-bootstrap-4.min.css">
<!-- iCheck -->
<link rel="stylesheet" href="<?php echo SITE_URL; ?>plugins/icheck-bootstrap/icheck-bootstrap.min.css">
<!-- JQVMap -->
<link rel="stylesheet" href="<?php echo SITE_URL; ?>plugins/jqvmap/jqvmap.min.css">
<!-- DataTables -->
<link rel="stylesheet" href="<?php echo SITE_URL; ?>plugins/datatables-bs4/css/dataTables.bootstrap4.min.css">
<link rel="stylesheet" href="<?php echo SITE_URL; ?>plugins/datatables-responsive/css/responsive.bootstrap4.min.css">
<link rel="stylesheet" href="<?php echo SITE_URL; ?>plugins/datatables-buttons/css/buttons.bootstrap4.min.css">
<!-- Theme style -->
<link rel="stylesheet" href="<?php echo SITE_URL; ?>dist/css/adminlte.min.css">
<!-- overlayScrollbars -->
<link rel="stylesheet" href="<?php echo SITE_URL; ?>plugins/overlayScrollbars/css/OverlayScrollbars.min.css">
<!-- Daterange picker -->
<link rel="stylesheet" href="<?php echo SITE_URL; ?>plugins/daterangepicker/daterangepicker.css">
<!-- summernote -->
<link rel="stylesheet" href="<?php echo SITE_URL; ?>plugins/summernote/summernote-bs4.min.css">
```

- **Reusable JavaScript Files**

```
<!-- jQuery -->
<script src="<?php echo SITE_URL; ?>plugins/jquery/jquery.min.js"></script>
<!-- jQuery UI 1.11.4 -->
<script src="<?php echo SITE_URL; ?>plugins/jquery-ui/jquery-ui.min.js"></script>
<!-- Resolve conflict in jQuery UI tooltip with Bootstrap tooltip -->
<script>
    $.widget.bridge('uibutton', $.ui.button)
</script>
<!-- Bootstrap 4 -->
<script src="<?php echo SITE_URL; ?>plugins/bootstrap/js/bootstrap.bundle.min.js"></script>
<!-- DataTables  & Plugins -->
<script src="<?php echo SITE_URL; ?>plugins/datatables/jquery.dataTables.min.js"></script>
<script src="<?php echo SITE_URL; ?>plugins/datatables-bs4/js/dataTables.bootstrap4.min.js"></script>
<script src="<?php echo SITE_URL; ?>plugins/datatables-responsive/js/dataTables.responsive.min.js"></script>
<script src="<?php echo SITE_URL; ?>plugins/datatables-responsive/js/responsive.bootstrap4.min.js"></script>
<script src="<?php echo SITE_URL; ?>plugins/datatables-buttons/js/dataTables.buttons.min.js"></script>
<script src="<?php echo SITE_URL; ?>plugins/datatables-buttons/js/buttons.bootstrap4.min.js"></script>
<script src="<?php echo SITE_URL; ?>plugins/jszip/jszip.min.js"></script>
<script src="<?php echo SITE_URL; ?>plugins/pdfmake/pdfmake.min.js"></script>
<script src="<?php echo SITE_URL; ?>plugins/pdfmake/vfs_fonts.js"></script>
<script src="<?php echo SITE_URL; ?>plugins/datatables-buttons/js/buttons.html5.min.js"></script>
<script src="<?php echo SITE_URL; ?>plugins/datatables-buttons/js/buttons.print.min.js"></script>
<script src="<?php echo SITE_URL; ?>plugins/datatables-buttons/js/buttons.colVis.min.js"></script>
<!-- ChartJS -->
<script src="<?php echo SITE_URL; ?>plugins/chart.js/Chart.min.js"></script>
```

- **Reusable Image Upload Function**

```php
// Image Upload Function-----------------------
function image_upload($image_upload = null, $target_dri = null, $previous_image = null)
{

    if (!empty($_FILES[$image_upload]['name'])) {
        $target_file = $target_dri . basename($_FILES[$image_upload]["name"]);
        $upload_ok = 1;
        $image_file_type = strtolower(pathinfo($target_file, PATHINFO_EXTENSION));
        $check = getimagesize($_FILES[$image_upload]['tmp_name']);
        if ($check !== false) {
            //Multi-purpose Internet Mail Extensions
            $upload_ok = 1;
        } else {
            $error[$image_upload] = "File is not an image.";
            $upload_ok = 0;
        }

        if (file_exists($target_file)) {
            //$error[$image_upload] = "Sorry, file already exists.";
            //$upload_ok = 0;
            unlink($target_file);
            $upload_ok = 1;
        }

        if ($_FILES[$image_upload]["size"] > 5000000000) {
            $error[$image_upload] = "Sorry, your file is too large.";
            $upload_ok = 0;
        }
```

```php
        if ($image_file_type != "jpg" && $image_file_type != "png" && $image_file_type != "jpeg" && $image_file_type != "gif") {
            $error[$image_upload] = "Sorry, only JPG, JPEG, PNG & GIF files are allowed.";
            $upload_ok = 0;
        }

        if ($upload_ok == 0) {
            echo "Sorry, your file was not uploaded.";
            // if everything is ok, try to upload file
        } else {
            if (move_uploaded_file($_FILES[$image_upload]["tmp_name"], $target_file)) {
                $error['photo'] = htmlspecialchars(basename($_FILES[$image_upload]["name"]));
            } else {
                $error[$image_upload] = "Sorry, there was an error uploading your file.";
            }
        }
    } else {
        $error['photo'] = $previous_image;
    }

    return @$error;
}
```

- **Reusable Data Clean Function**

```php
function data_clean($data = null)
{

    $data = trim($data);
    $data = stripslashes($data);
    $data = htmlspecialchars($data);

    return $data;
}
```

- **Reusable Main Menus Code in the Dashboard**

```php
<?php

  $sql = "SELECT m.module_id, m.description, m.path, m.view, m.icon, m.status
  FROM users_modules um
  INNER JOIN modules m ON m.module_id = um.module_id
  WHERE length(m.module_id) = '2' AND um.user_id ='" . $_SESSION['user_id'] . "' AND m.status = '1'";

  // database connection call
  $db = db_con();

  // assign the query
  $result = $db->query($sql);

  ?>

<?php

  // check the result grater than 1
  if ($result->num_rows > 0) {

      // assign the result to row variable
      while ($row = $result->fetch_assoc()) {

  ?>
        <li class="nav-item">
            <a href="#" class="nav-link">
                <i class="nav-icon <?php echo $row['icon'] ?>"></i>
                <p>

                    <?php
                      //   display module name
                      echo $row['description'];
                      ?>
                    <i class="right fas fa-angle-left"></i>
                </p>
            </a>
```

- **Reusable Sub Menus Code in the Dashboard**

```php
<ul class="nav nav-treeview">

    <?php

      $sql_sub = "SELECT m.module_id, m.description, m.path, m.view, m.icon, m.status
                  FROM users_modules um
                  INNER JOIN modules m ON m.module_id = um.module_id
                  WHERE length(m.module_id) = '4' AND um.user_id ='" . $_SESSION['user_id'] .
                  "' AND substr(m.module_id, 1,2) = '" . $row['module_id'] . "' AND m.status = '1'";

      // assign the query
      $result_sub = $db->query($sql_sub);

      ?>

    <?php

      if ($result_sub->num_rows > 0) {

          while ($row_sub = $result_sub->fetch_assoc()) {

              // create file path for sub menu
              $file = $row_sub['path'] . "/" . $row_sub['view'] . ".php";
      ?>
          <li class="nav-item">
              <a href="<?php echo SITE_URL; ?><?php echo $file; ?>" class="nav-link">
                  <i class="far fa-circle nav-icon"></i>
                  <p><?php echo $row_sub['description'] ?></p>
              </a>
          </li>

    <?php
          }
      }
      ?>
</ul>
```