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Selected Use Case Descriptions

UC01: Start Interaction Recorder

Priority : Essential

Primary Actor : Student

Trigger : Successful student login to the system

Pre Condition: User is logged in to the system.

Basic Path:

1. Starts automatically when the student logs in to the eLearning system.
2. Invoke the following usecases
 - 2.1. Record Keystrokes Use Case
 - 2.2. Record Mouse Interactions Use Case[These two uses record application usage usecase]
3. Send interactions to server Use Case within specified time intervals.

Alternate Path :

N/A

Post Condition :

Interactions and application usage details are stored in hard disk with date and time stamps, and sent to server on request

Exception Path :

1. If connection is lost out from the system, that details together are recorded and sent to the server on next login.
2. If Student logs out from the system, final set of recorded interactions are sent before logging out.

Special Requirements :

1. Interaction recording module is installed on student's computer.

Technical and Data Verification List :

N/A

UC02 : Record Key Strokes

Priority : Essential

Primary Actor : N/A

Trigger : Usecase "Start Interaction Recorder" is started

Pre Condition :

1. Start Interaction Recorder usecase should be started.

Basic Path :

1. This use case should record all the keystrokes the student enters after he logs on to the system.
2. This is carried out concurrently with Record Mouse Interaction usecase
3. Application usage details resulting from key strokes are recorded.

Alternate Path :

N/A

Post Condition :

Interactions are saved on student's computer

Exception Path :

N/A

Special Requirements :

1. Interaction recording module is up and running on student's computer.

Technical and Data Verification List :

N/A

UC03 : Record Mouse Interactions

Priority : Essential

Primary Actor : N/A

Trigger : Usecase "Start Interaction Recorder" is started

Pre Condition :

1. Interaction Recorder should be started.

Basic Path :

1. This use case should record all the keystrokes the student enters after he logs on to the system.
2. This is carried out concurrently with Record Key Strokes usecase
3. Application usage details resulting from mouse moves are recorded.

Alternate Path :

N/A

Post Condition :

Interactions are saved on student's computer

Exception Path :

N/A

Special Requirements :

1. Interaction recording module is up and running on student's computer.

Technical and Data Verification List :

N/A

UC04 : Record Application Usage

Priority : Essential

Primary Actor : N/A

Trigger : Usecase Start Interaction Recorder is started and the user changed the application he is using

Pre Condition :

1. Record Key Strokes and Record Mouse Interactions usecases must be started.

Basic Path :

1. Interaction recorder shall record the active application that is focused, when the user changes the window using either the keyboard or mouse.

Alternate Path :

N/A

Post Condition : A record is saved in the data store with the focused application whenever application in use is changed.

Exception Path :

N/A

Special Requirements :

1. Interaction recording module is up and running on student's computer.

Technical and Data Verification List :

N/A

UC06 : Provide eLearning Material

Priority : Essential

Primary Actor: Student

Trigger : Student requests course material

Pre Conditions :

1. Student is logged on to the system
2. Requested Course details, Subject details, Student Profile and Subject Profile are available in the system

Basic Path :

1. Accept request from student
2. Checks student and subject profiles and provide material

Alternate Path:

N/A

Post Condition:

1. Student gets the requested material

Exception Path:

N/A

Special Requirements:

N/A

Technical and Data Verification List:

N/A



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Activity Diagrams



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e-Learning : UOM - Windows Internet Explorer

http://localhost/eLearningTest/index.php?page=26

File Edit View Favorites Tools Help

e-Learning : UOM

Norton™

Fraud monitoring is on

Options ▾

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e-Learning system to capture experiment data

**Lesson 10:
Introduction to
Object Oriented
Programming**

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Inheritance

The idea of inheritance is that an entity can inherit, extend, override and add behaviors from another entity.

This inheritance relationship is expressed in terms of the parent-child relationship.

To inherit means that the child also has the same behaviors as the parent.

When information systems are modeled as objects, they can use the powerful inheritance capability easily.

```
graph BT; Child[Child] --> Parent[Parent];
```

Child inherits features from parent
E.g. Blood Type, Hair Color

Internet | Protected Mode: Off

100%

Sample web interface – eLearning content provided

e-Learning : UOM - Windows Internet Explorer

http://localhost/eLearningAdmin%20-%20Copy/new_page.php?subj=12

Yahool Search

Web Search

e-Learning : UOM

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e-Learning system to capture experiment data

Lesson 10: Introduction to Object Oriented Programming

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TestSubject

- TestPage

+ Add a new subject

Logout

Adding New Page

Page name:

Position:

Visible: ☐ No ☒ Yes

Content:

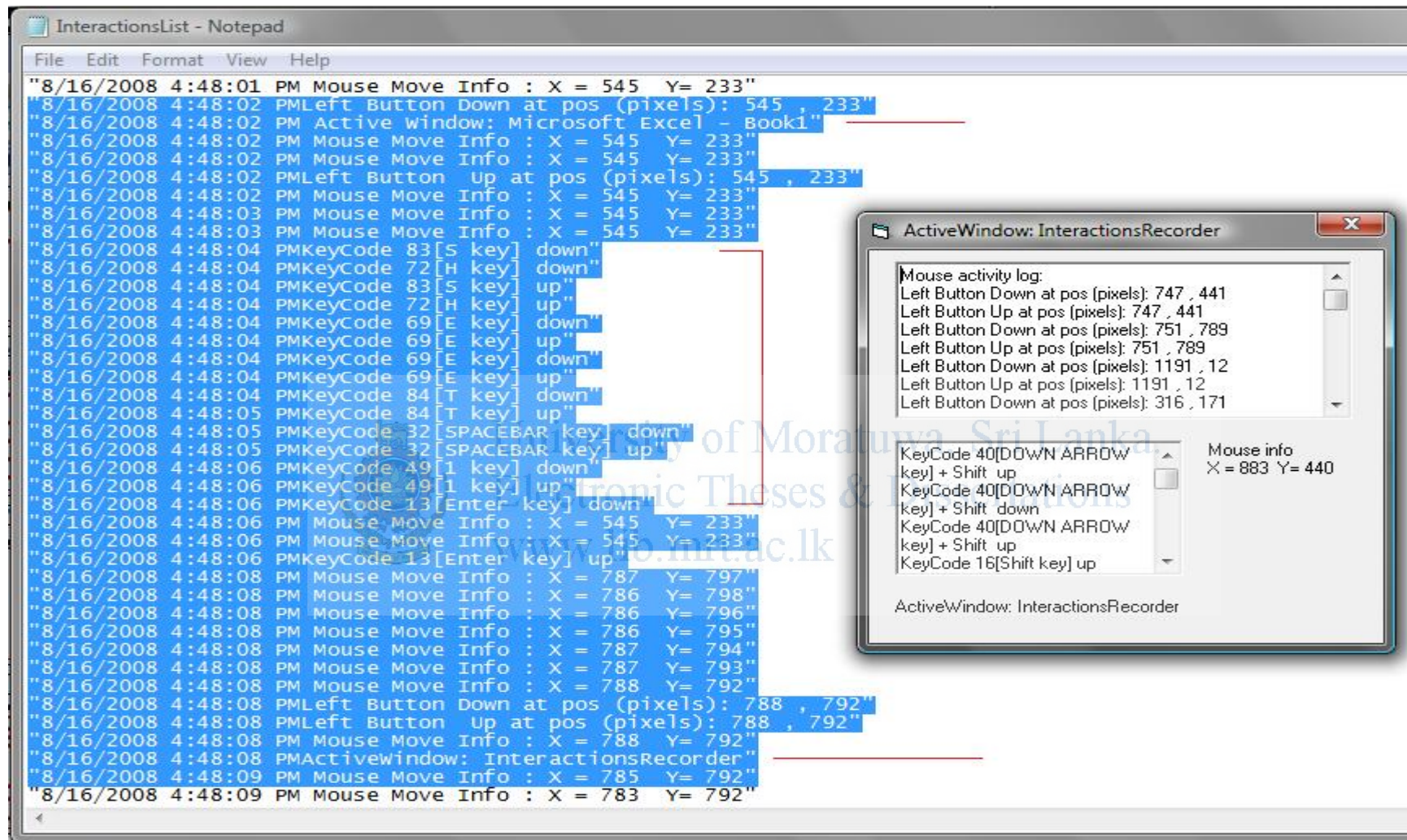
```
<table width="870" border="0">
<tr>
<td width="738"><h3 align="center"><strong>Lesson 10.1 Introduction
</strong></h3></td>
<td width="116"> </td>
</tr>
<tr>
<td height="138"><p>In this lesson, you will learn main concepts in object
oriented technology, </p>
<ol>
<li><strong>Encapsulation</strong></li>
<li><strong> Inheritance</strong></li>
<li><strong> Abstraction </strong></li>
<li><strong>Polymorphism. </strong></li>
</ol></td>
<td> </td>
</tr>
<tr>
<td><p>Object Oriented Programming centers of the development of small
reusable program routines (modules) that are link together and to other
```

Create Page

Internet | Protected Mode: Off

100%

Edit Subject Page from Admin Module



Interactions capture module – Data Captured and Test Interface

Appendix C – Implementation: Code Listing Samples

Code Listing – Example: Interactions Capture Module

```
' create object of the class in the syshook.dll
Dim WithEvents sh As cSystemHook

'API Function call declarations
Private Declare Function GetForegroundWindow& Lib "user32" ()
Private Declare Function GetWindowThreadProcessId& Lib "user32" (ByVal hwnd As Long, lpdwProcessId As Long)
Private Declare Function GetKeyboardLayout& Lib "user32" (ByVal dwLayout As Long)
Private Declare Function MapVirtualKeyEx Lib "user32" Alias
"MapVirtualKeyExA" (ByVal uCode As Long, ByVal uMapType As Long, ByVal
dwhkl As Long) As Long
Private Declare Function SetWindowPos Lib "user32" (ByVal hwnd As Long, ByVal
hWndInsertAfter As Long, ByVal x As Long, ByVal y As Long, ByVal cx As Long,
ByVal cy As Long, ByVal wFlags As Long) As Long
Private Declare Function GetWindowText Lib "user32" Alias "GetWindowTextA"
(ByVal hwnd As Long, ByVal lpString As String, ByVal cch As Long) As Long

' Variables used toFind Active Window

Dim lCurHwnd As Long 'Current window handle
Dim lHwnd As Long 'Last window handle
Dim sText As String * 255

Private Sub Form_Load()
    txtMouse = "Mouse activity log:"
    txtKeyBD = "Keyboard activity log:"
    Set sh = New cSystemHook
    sh.SetHook
```

```

' Me.Hide
End Sub

Private Sub sh_KeyDown(KeyCode As Integer, Shift As Integer)
    Dim s As String
    s = "KeyCode " & KeyCode
    s = s + CharFromKeyCode(KeyCode)
    If Shift = vbShiftMask Then s = s & " + Shift "
    If Shift = vbCtrlMask Then s = s & " + Ctrl "
    If Shift = vbAltMask Then s = s & " + Alt "
    txtKeyBD = txtKeyBD & vbCrLf & s & " down"
' Uncomment following string and all your input will be replaced with "a"
' KeyCode = vbKeyA
    Open App.Path & "\InteractionsList.txt" For Append As #1 ' Open file for output.
    Write #1, Date & " " & Time & s & " down"
    'Find Application in foreground
    lCurHwnd = GetForegroundWindow
    If lCurHwnd = lHwnd Then
        Close #1
        Exit Sub
    End If
    lHwnd = lCurHwnd
    If lHwnd <> hwnd Then
        Caption = " Active Window: " & Left$(sText, GetWindowText(lHwnd, ByVal
sText, 255))
    Else
        Caption = "ActiveWindow: InteractionsRecorder"
    End If
    lblActiveWindow = Caption
    Write #1, Date & " " & Time & CStr(Caption)
    Close #1 ' Close file.
End Sub

```

```

Private Sub sh_KeyUp(KeyCode As Integer, Shift As Integer)
    Dim s As String
    s = "KeyCode " & KeyCode
    s = s + CharFromKeyCode(KeyCode)
    If Shift = vbShiftMask Then s = s & " + Shift "
    If Shift = vbCtrlMask Then s = s & " + Ctrl "
    If Shift = vbAltMask Then s = s & " + Alt "
    txtKeyBD = txtKeyBD & vbCrLf & s & " up"

    Open App.Path & "\InteractionsList.txt" For Append As #1 ' Open file for output.
    Write #1, Date & " " & Time & s & " up"

    'Find Application in foreground
    lCurHwnd = GetForegroundWindow
    If lCurHwnd = lHwnd Then
        Close #1
        Exit Sub
    End If
    lHwnd = lCurHwnd
    If lHwnd <> hwnd Then
        Caption = " Active Window: " & Left$(sText, GetWindowText(lHwnd, ByVal
sText, 255))
    Else
        Caption = "ActiveWindow: InteractionsRecorder"
    End If
    lblActiveWindow = Caption
    Write #1, Date & " " & Time & CStr(Caption)

    Close #1 ' Close file.

End Sub

```

```

Private Sub sh_MouseDown(Button As Integer, Shift As Integer, x As Single, y As
Single)
    Dim s As String
    If Button = vbLeftButton Then s = "Left Button "
    If Button = vbRightButton Then s = "Right Button "
    If Button = vbMiddleButton Then s = "Middle Button "
    If Shift = vbShiftMask Then s = s & "+ Shift "
    If Shift = vbCtrlMask Then s = s & "+ Ctrl "
    If Shift = vbAltMask Then s = s & "+ Alt "
    txtMouse = txtMouse & vbCrLf & s & "Down at pos (pixels): " & CStr(x) & ", " &
CStr(y)

```

```

Open App.Path & "\InteractionsList.txt" For Append As #1 ' Open file for output.
Write #1, Date & " " & Time & s & "Down at pos (pixels): " & CStr(x) & ", " &
CStr(y)

```

```

'Find Application in foreground
lCurHwnd = GetForegroundWindow
If lCurHwnd = lHwnd Then
    Close #1
    Exit Sub
End If
lHwnd = lCurHwnd
If lHwnd <> hwnd Then
    Caption = " Active Window: " & Left$(sText, GetWindowText(lHwnd, ByVal
sText, 255))
Else
    Caption = "ActiveWindow: InteractionsRecorder"
End If
lblActiveWindow = Caption
Write #1, Date & " " & Time & CStr(Caption)
Close #1 ' Close file.
End Sub

```

```

Private Sub sh_MouseUp(Button As Integer, Shift As Integer, x As Single, y As
Single)
    Dim s As String
    If Button = vbLeftButton Then s = "Left Button "
    If Button = vbRightButton Then s = "Right Button "
    If Button = vbMiddleButton Then s = "Middle Button "
    If Shift = vbShiftMask Then s = s & "+ Shift "
    If Shift = vbCtrlMask Then s = s & "+ Ctrl "
    If Shift = vbAltMask Then s = s & "+ Alt "
    txtMouse = txtMouse & vbCrLf & s & "Up at pos (pixels): " & CStr(x) & ", " &
CStr(y)
    Open App.Path & "\InteractionsList.txt" For Append As #1 ' Open file for output.
    Write #1, Date & " " & Time & s & " Up at pos (pixels): " & CStr(x) & ", " &
CStr(y)
    'Find Application in foreground
    lCurHwnd = GetForegroundWindow
    If lCurHwnd = lHwnd Then
        Close #1
        Exit Sub
    End If

    lHwnd = lCurHwnd
    If lHwnd <> hwnd Then
        Caption = " Active Window: " & Left$(sText, GetWindowText(lHwnd, ByVal
sText, 255))
    Else
        Caption = "ActiveWindow: InteractionsRecorder"
    End If
    lblActiveWindow = Caption
    Write #1, Date & " " & Time & CStr(Caption)
    Close #1 ' Close file.
End Sub

```

```

Private Sub sh_MouseMove(Button As Integer, Shift As Integer, x As Single, y As
Single)
    Dim s As String
    If Button = vbLeftButton Then s = "Left Button "
    If Button = vbRightButton Then s = "Right Button "
    If Button = vbMiddleButton Then s = "Middle Button "
    If Shift = vbShiftMask Then s = s & "+ Shift "
    If Shift = vbCtrlMask Then s = s & "+ Ctrl "
    If Shift = vbAltMask Then s = s & "+ Alt "
    lblMouseMove = "Mouse info" & vbCrLf & "X = " & x & " Y= " & y & vbCrLf
    If s <> "" Then lblMouseMove = lblMouseMove & "Extra Info: " & vbCrLf & s &
"pressed"

    Open App.Path & "InteractionsList.txt" For Append As #1 ' Open file for output.
    Write #1, Date & " " & Time & " Mouse Move Info : X = " & x & " Y= " & y
    'Find Application in foreground
    lCurHwnd = GetForegroundWindow
    If lCurHwnd = lHwnd Then
        Close #1
        Exit Sub
    End If
    lHwnd = lCurHwnd
    If lHwnd <> hwnd Then
        Caption = " Active Window: " & Left(sText, GetWindowText(lHwnd, ByVal
sText, 255))
    Else
        Caption = "ActiveWindow: InteractionsRecorder"
    End If
    lblActiveWindow = Caption
    Write #1, Date & " " & Time & CStr(Caption)
    Close #1 ' Close file.
End Sub

```

```
Private Sub Form_Unload(Cancel As Integer)
```

```
    sh.RemoveHook
```

```
    Set sh = Nothing
```

```
End Sub
```

```
Private Function CharFromKeyCode(k As Integer) As String
```

```
    Dim s As String
```

```
    Select Case k
```

```
        Case vbKeyBack:    s = "BackSpace"
```

```
        Case vbKeyTab:     s = "Tab"
```

```
        Case vbKeyClear:   s = "Clear"
```

```
        Case vbKeyReturn:  s = "Enter"
```

```
        Case vbKeyShift:   s = "Shift"
```

```
        Case vbKeyControl: s = "Ctrl"
```

```
        Case vbKeyMenu:    s = "Alt"
```

```
        Case vbKeyPause:   s = "Pause"
```

```
        Case vbKeyCapital: s = "CapsLock"
```

```
        Case vbKeyEscape:  s = "ESC"
```

```
        Case vbKeySpace:   s = "SPACEBAR"
```

```
        Case vbKeyPageUp:  s = "PAGE UP"
```

```
        Case vbKeyPageDown: s = "PAGE DOWN"
```

```
        Case vbKeyEnd:     s = "END"
```

```
        Case vbKeyHome:    s = "HOME"
```

```
        Case vbKeyLeft:    s = "LEFT ARROW"
```

```
        Case vbKeyUp:      s = "UP ARROW"
```

```
        Case vbKeyRight:   s = "RIGHT ARROW"
```

```
        Case vbKeyDown:    s = "DOWN ARROW"
```

```
        Case vbKeySelect:  s = "SELECT"
```

```
        Case vbKeyPrint:   s = "PRINT SCREEN"
```

```
        Case vbKeyExecute: s = "EXECUTE"
```

```
        Case vbKeySnapshot: s = "SNAPSHOT"
```

```
        Case vbKeyInsert:  s = "INS"
```

```
        Case vbKeyDelete:  s = "DEL"
```

```

Case vbKeyHelp: s = "HELP"
Case vbKeyNumlock: s = "NUM LOCK"
Case vbKey0 To vbKey9: s = Chr$(k)
Case vbKeyA To vbKeyZ: s = Chr$(MapVirtualKeyEx(k, 2,
GetKeyboardLayout(GetWindowThreadProcessId(GetForegroundWindow, 0))))
Case vbKeyF1 To vbKeyF16: s = "F" & CStr(k - 111)
Case vbKeyNumpad0 To vbKeyNumpad9: s = "Numpad " & CStr(k - 95)
Case vbKeyMultiply: s = "Numpad {*}"
Case vbKeyAdd: s = "Numpad {+}"
Case vbKeySeparator: s = "Numpad {ENTER}"
Case vbKeySubtract: s = "Numpad {-}"
Case vbKeyDecimal: s = "Numpad {."}"
Case vbKeyDivide: s = "Numpad {/}"
Case Else s = Chr$(MapVirtualKeyEx(k, 2,
GetKeyboardLayout(GetWindowThreadProcessId(GetForegroundWindow, 0))))
End Select
CharFromKeyCode = "[" & s & " key]"
End Function

```

```

Private Sub sh_SystemKeyDown(KeyCode As Integer)
Dim s As String
s = "SystemKey " & KeyCode
s = s + CharFromKeyCode(KeyCode)
txtKeyBD = txtKeyBD & vbCrLf & s & " down"

If KeyCode = vbKeyF4 Then KeyCode = 0
Open App.Path & "\InteractionsList.txt" For Append As #1
' Open file for output.
Write #1, Date & " " & Time & s & " down"
'Find Application in foreground
lCurHwnd = GetForegroundWindow
If lCurHwnd = lHwnd Then
Close #1
Exit Sub

```

```

End If
lHwnd = lCurHwnd
If lHwnd <> hwnd Then
    Caption = " Active Window: " & Left$(sText, GetWindowText(lHwnd, ByVal
sText, 255))
Else
    Caption = "ActiveWindow: InteractionsRecorder"
End If
lblActiveWindow = Caption
Write #1, Date & " " & Time & CStr(Caption)

Close #1 ' Close file.
End Sub

```



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Sample code listing from Web Application

functions.php – holds common functions used in the system

```
<?php
// This file is the place to store all basic functions
function mysql_prep( $value ) {
    $magic_quotes_active = get_magic_quotes_gpc();
    $new_enough_php = function_exists( "mysql_real_escape_string" );
    // i.e. PHP >= v4.3.0
    if( $new_enough_php ) { // PHP v4.3.0 or higher
        // undo any magic quote effects so
        // mysql_real_escape_string can do the work
        if( $magic_quotes_active ) { $value = stripslashes( $value ); }
        $value = mysql_real_escape_string( $value );
    } else { // before PHP v4.3.0
        // if magic quotes aren't already on then add slashes manually
        if( !$magic_quotes_active ) { $value = addslashes( $value ); }
        // if magic quotes are active, then the slashes already exist
    }
    return $value;
}

function record_navigation(){
    global $connection;
    $user_id = mysql_prep($_SESSION['user_id']);
    $dt = mysql_prep($_SERVER['REQUEST_TIME']);
    $from=mysql_prep($_SERVER['HTTP_REFERER']);
    $to=mysql_prep($_SERVER['REQUEST_URI']);
    $query = "INSERT INTO navigation_record(
        id, user_id,time_stamp,from_url,to_url
    )
    VALUES (
        NULL, {$user_id},'{ $dt}','{ $from}','{ $to}'
    )";
}
```

```

        );

$result = mysql_query($query, $connection);
if ($result) {
    // Success!
    //redirect_to("new_app.php");
    //echo "ok";
} else {
    // Display error message.
    echo "<p>Please click the link again</p>";
    //echo "<p>" . mysql_error() . "</p>";
}
}

function redirect_to( $location = NULL ) {
    if ($location != NULL) {
        header("Location: {$location}");
        exit;
    }
}

function getopt($val){
    global $options;
    $options = $options . $val ;
    //return $options;
}

function confirm_query($result_set) {
    if (!$result_set) {
        die("Database query failed: " . mysql_error());
    }
}

function get_all_subjects($public = true) {
    global $connection;
    $query = "SELECT *"

```

```

        FROM subjects ";
    if ($public) {
        $query .= "WHERE visible = 1 ";
    }
    $query .= "ORDER BY position ASC";
    $subject_set = mysql_query($query, $connection);
    confirm_query($subject_set);
    return $subject_set;
}

function get_pages_for_subject($subject_id, $public = true) {
    global $connection;
    $query = "SELECT *
        FROM pages ";
    $query .= "WHERE subject_id = {$subject_id} ";
    if ($public) {
        $query .= "AND visible = 1 ";
    }
    $query .= "ORDER BY position ASC";
    $page_set = mysql_query($query, $connection);
    confirm_query($page_set);
    return $page_set;
}

function get_all_usertypes($public = false) {
    global $connection;
    $query = "SELECT *
        FROM usertypes ";
    //$query .= "ORDER BY position ASC";
    $usertype_set = mysql_query($query, $connection);
    confirm_query($usertype_set);
    return $usertype_set;
}

```

```

function get_student_by_id($student_id) {
    global $connection;
    $query = "SELECT * ";
    $query .= "FROM students ";
    $query .= "WHERE id=" . $student_id . " ";
    $query .= "LIMIT 1";
    $result_set = mysql_query($query, $connection);
    confirm_query($result_set);
    // REMEMBER:
    // if no rows are returned, fetch_array will return false
    if ($student = mysql_fetch_array($result_set)) {
        return $student;
    } else {
        return NULL;
    }
}

```



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```

function get_all_pages() {
    global $connection;
    $query = "SELECT *
            FROM pages ";
    $query .= "ORDER BY id ASC";
    $page_set = mysql_query($query, $connection);
    confirm_query($page_set);
    return $page_set;
}

function navigation($sel_subject, $sel_page, $public = false) {
    $output = "<ul class=\"subjects\">";
    $subject_set = get_all_subjects($public);
    while ($subject = mysql_fetch_array($subject_set)) {
        $output .= "<br><li>";
        if ($subject["id"] == $sel_subject["id"]) { $output .= "
class=\"selected\""; }
    }
}

```

```

        $output .= "><h5><a href=\"edit_subject.php?subj=\" .
urlencode($subject["id"]) .
        \">{$subject["menu_name"]}</a></h5></li>";
        $page_set = get_pages_for_subject($subject["id"], $public);
        $output .= "<ul class=\"pages\">";
        while ($page = mysql_fetch_array($page_set)) {
            $output .= "<li";
            if ($page["id"] == $sel_page['id']) { $output .= "
class=\"selected\""; }
            $output .= "><a href=\"content.php?page=" .
urlencode($page["id"]) .
            \">{$page["menu_name"]}</a></li>";
        }
        $output .= "</ul>";
    }
    $output .= "</ul>";
}
return $output;
}

```



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```

function public_navigation($sel_subject, $sel_page, $public = true) {
    $output = "<ul class=\"subjects\">";
    $subject_set = get_all_subjects($public);
    while ($subject = mysql_fetch_array($subject_set)) {
        $output .= "<li";
        if ($subject["id"] == $sel_subject['id']) { $output .= "
class=\"selected\""; }
        $output .= "><h5><a href=\"index.php?subj=" .
urlencode($subject["id"]) .
        \">{$subject["menu_name"]}</a></h5></li>";
        $page_set = get_pages_for_subject($subject["id"], $public);
        $output .= "<ul class=\"pages\">";
    }
}

```

```

while ($page = mysql_fetch_array($page_set)) {
    $output .= "<li";
    if ($page["id"] == $sel_page['id']) { $output .= "
class=\"selected\""; }

    $output .= "><a ";
    //if($page["id"] == 20){$output .= " onClick=
\"popupq()\"";}    call js function
    $output .= "href=\"index.php?page=" .
urlencode($page["id"]) .

    ">{$page["menu_name"]}";

    "</a></li>";

}
$output .= "</ul>";
}
$output .= "</ul>";
return $output;
}

```



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```

function show_logout_link(){
    $output .= "<br><hr><ul><a href=\"logout.php\">\" . Logout .
\"</a></ul>";
    return $output;
}

```

```

function navigation_student(){
    $output .= "<br><ul><a href=\"select_student.php\">\" . Edit .
\"</a></ul>";
    $output .= "<br><hr><ul><a href=\"staff.php\">\" . Menu .
\"</a></ul>";
    return $output;
}
?>

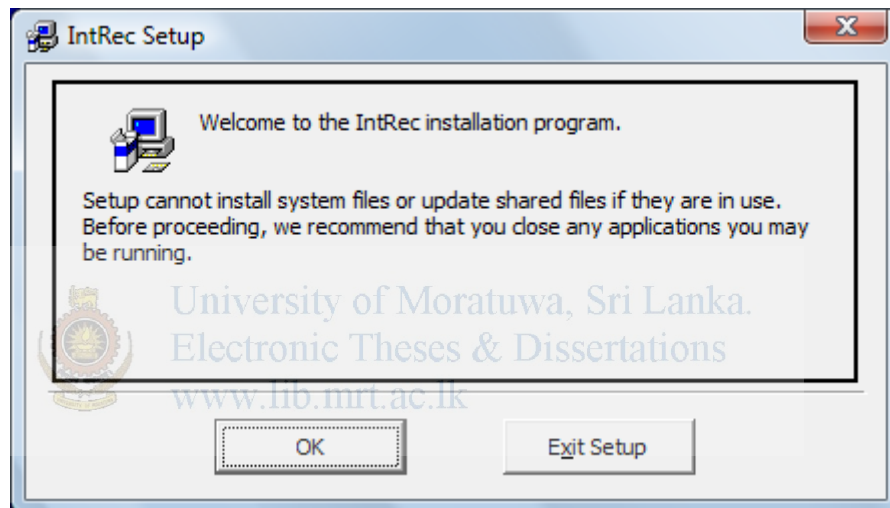
```

Installation Guide to System Administrators

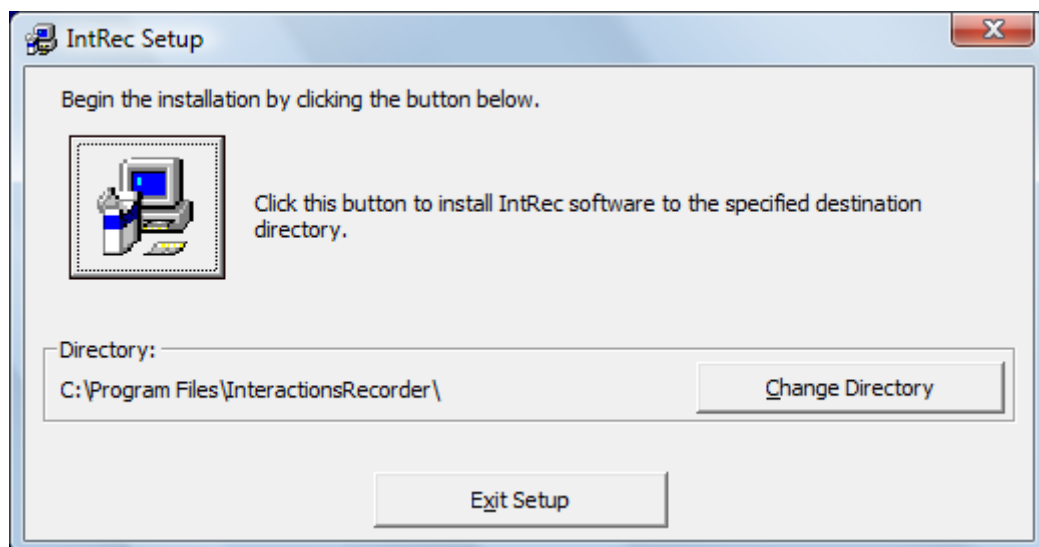
Installing Interactions Capturing System

Interactions Capturing System is in IntRec Folder.

1. Login to windows with a user that has administration privileges
2. Run Setup.exe file. It will install the Interactions Capturing System in your computer. Following screen appears on the screen.



Click OK and choose the installation path in the next screen.

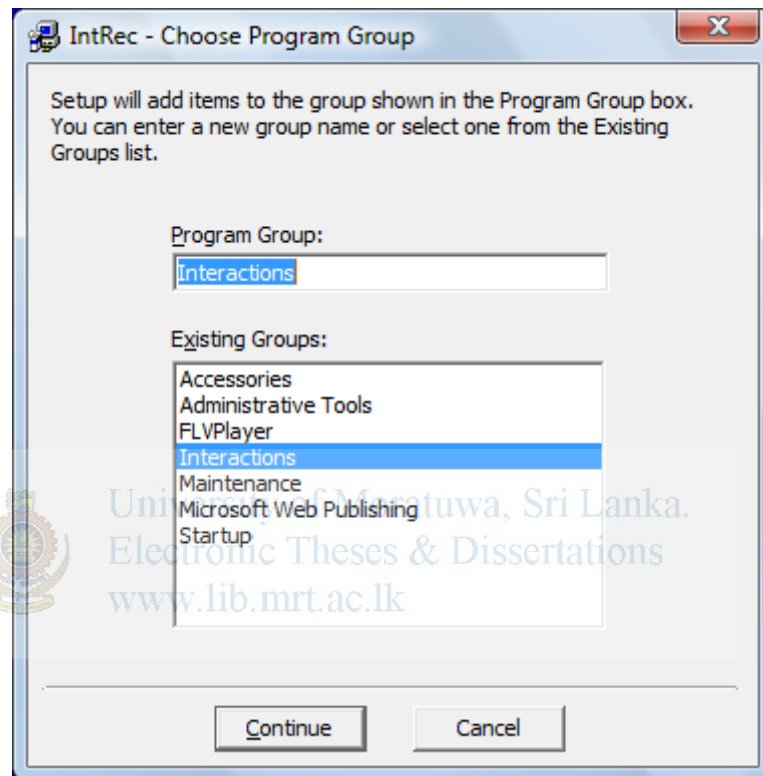


C:\Program Files\InteractionsRecorder\ is the default directory. You can change the path to a specific location by clicking 'Change Directory'.



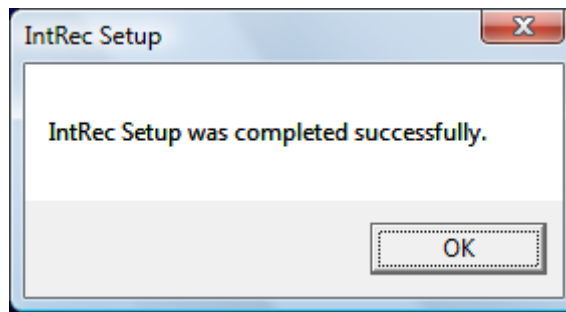
Next, click to start installation.

3. In the next screen click 'Continue'.



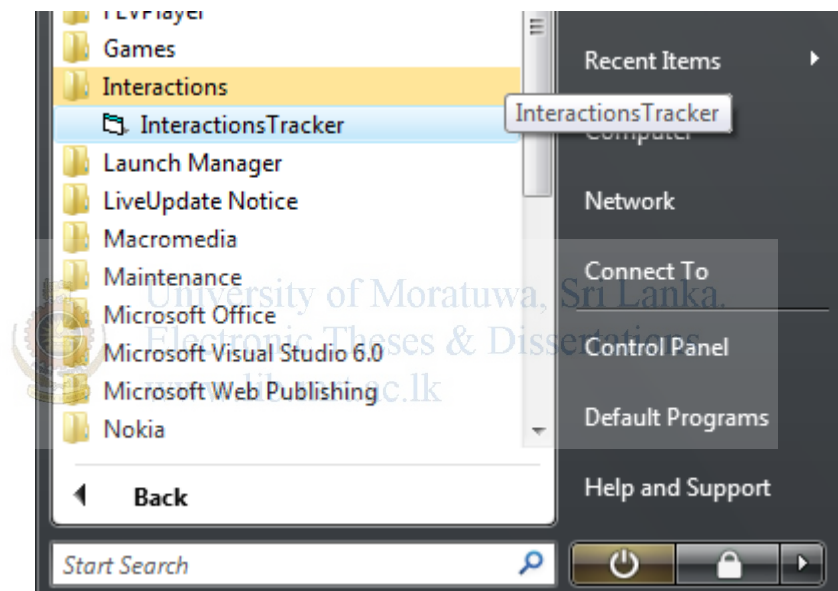
The installation proceeds with 'Interactions' as the program group in the windows start menu.

4. With successful installation of the Interactions Capture System, following verification screen appears



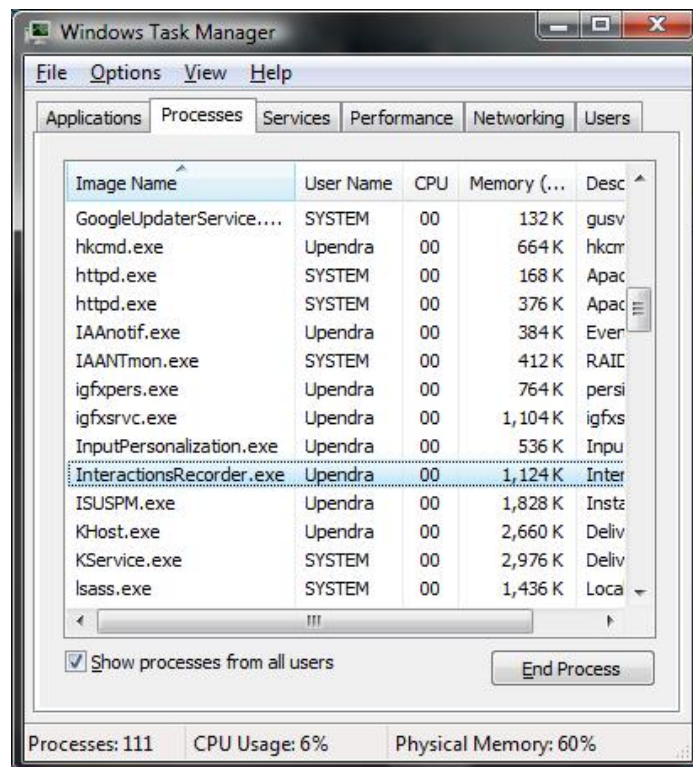
Running Interactions Capturing System

Start the Interactions Capturing System choosing 'Start' 'Interactions' 'Interactions Tracker'



Interactions Tracker software is run as a background process. You will not be shown any interface.

To close the application, you have to go to 'Task Manager' by pressing 'Ctrl+Alt+Delete' keys and ending the 'InteractionsRecorder.exe' (See screenshot below)



Following procedure can be adopted to verify the proper operation of the program.

- Run the 'Interaction Tracker' as mentioned above.
- Right click on the desktop and create a new folder.
- Name it as 'TestFolder'.
- Close the application using task manager.
- Go to the installation folder of the application. If default path is kept while installing - C:\Program Files\InteractionsRecorder\
- Open the 'InteractionsList.txt' file
- The text file will contain some texts as shown in the screen below with the date time stamps corresponding to the date and time of your system while you carried out the above process.

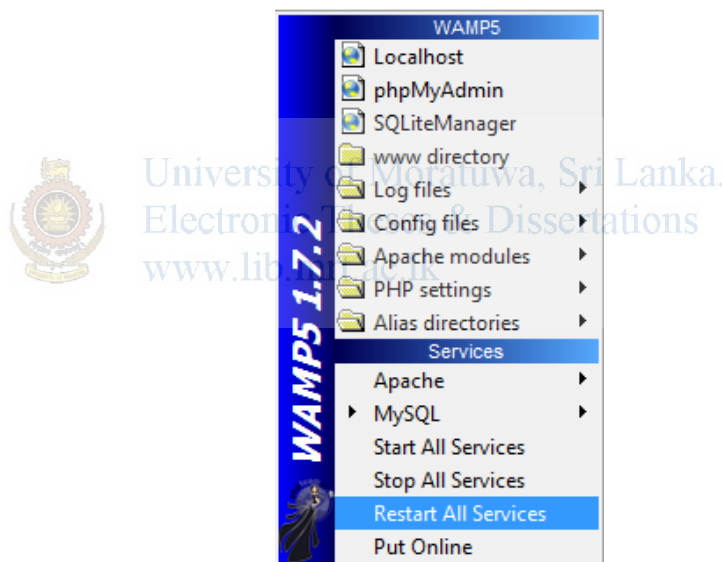
```
InteractionsList.txt - Notepad
File Edit Format View Help
"04/12/2008!17:30:33!Right Button !Down:187 , 358"
"04/12/2008!17:30:33!App: Program Manager"
"04/12/2008!17:30:33!Right Button !Up:187 , 358"
"04/12/2008!17:30:39!Left Button !Down:447 , 236"
"04/12/2008!17:30:40!Left Button !Up:447 , 236"
"04/12/2008!17:30:41!KeyCode 16[shift key] + Shift !down"
"04/12/2008!17:30:42!KeyCode 84[T key] + Shift !down"
"04/12/2008!17:30:42!KeyCode 84[T key] + Shift !up"
"04/12/2008!17:30:42!KeyCode 16[shift key]!up"
"04/12/2008!17:30:42!KeyCode 69[E key]!down"
"04/12/2008!17:30:42!KeyCode 69[E key]!up"
"04/12/2008!17:30:42!KeyCode 83[S key]!down"
"04/12/2008!17:30:42!KeyCode 83[S key]!up"
"04/12/2008!17:30:43!KeyCode 84[T key]!down"
"04/12/2008!17:30:43!KeyCode 84[T key]!up"
"04/12/2008!17:30:43!KeyCode 16[shift key] + shift !down"
"04/12/2008!17:30:43!KeyCode 16[shift key] + Shift !down"
"04/12/2008!17:30:43!KeyCode 16[shift key] + shift !down"
"04/12/2008!17:30:43!KeyCode 16[shift key] + shift !down"
"04/12/2008!17:30:43!KeyCode 70[F key] + Shift !down"
"04/12/2008!17:30:43!KeyCode 70[F key] + shift !up"
"04/12/2008!17:30:44!KeyCode 16[shift key]!up"
"04/12/2008!17:30:44!KeyCode 79[o key]!down"
"04/12/2008!17:30:44!KeyCode 79[o key]!up"
"04/12/2008!17:30:44!KeyCode 76[L key]!down"
"04/12/2008!17:30:44!KeyCode 76[L key]!up"
"04/12/2008!17:30:46!KeyCode 68[D key]!down"
"04/12/2008!17:30:46!KeyCode 68[D key]!up"
"04/12/2008!17:30:46!KeyCode 69[E key]!down"
"04/12/2008!17:30:46!KeyCode 69[E key]!up"
"04/12/2008!17:30:46!KeyCode 82[R key]!down"
"04/12/2008!17:30:46!KeyCode 82[R key]!up"
"04/12/2008!17:30:47!KeyCode 13[Enter key]!down"
"04/12/2008!17:30:47!KeyCode 13[Enter key]!up"
"04/12/2008!17:30:50!KeyCode 17[ctrl key] + Ctrl !down"
"04/12/2008!17:30:50!KeyCode 18[Alt key]!down"
"04/12/2008!17:30:51!KeyCode 46[DEL key]!up"
"04/12/2008!17:30:51!KeyCode 18[Alt key] + Ctrl !up"
"04/12/2008!17:30:51!App: "
"04/12/2008!17:30:55!Left Button !Down:343 , 293"
"04/12/2008!17:30:55!App: windows Task Manager"
"04/12/2008!17:30:55!Left Button !Up:343 , 293"
"04/12/2008!17:30:56!KeyCode 73[I key]!down"
"04/12/2008!17:30:56!KeyCode 73[I key]!up"
"04/12/2008!17:30:58!Left Button !Down:339 , 307"
"04/12/2008!17:30:58!Left Button !Up:339 , 307"
"04/12/2008!17:30:59!Left Button !Down:585 , 493"
"04/12/2008!17:30:59!Left Button !Up:585 , 493"
"04/12/2008!17:31:00!Left Button !Down:691 , 420"
"04/12/2008!17:31:00!App: windows Task Manager"
"04/12/2008!17:31:00!Left Button !Up:691 , 420"
```

e-Learning Web Application User Guide

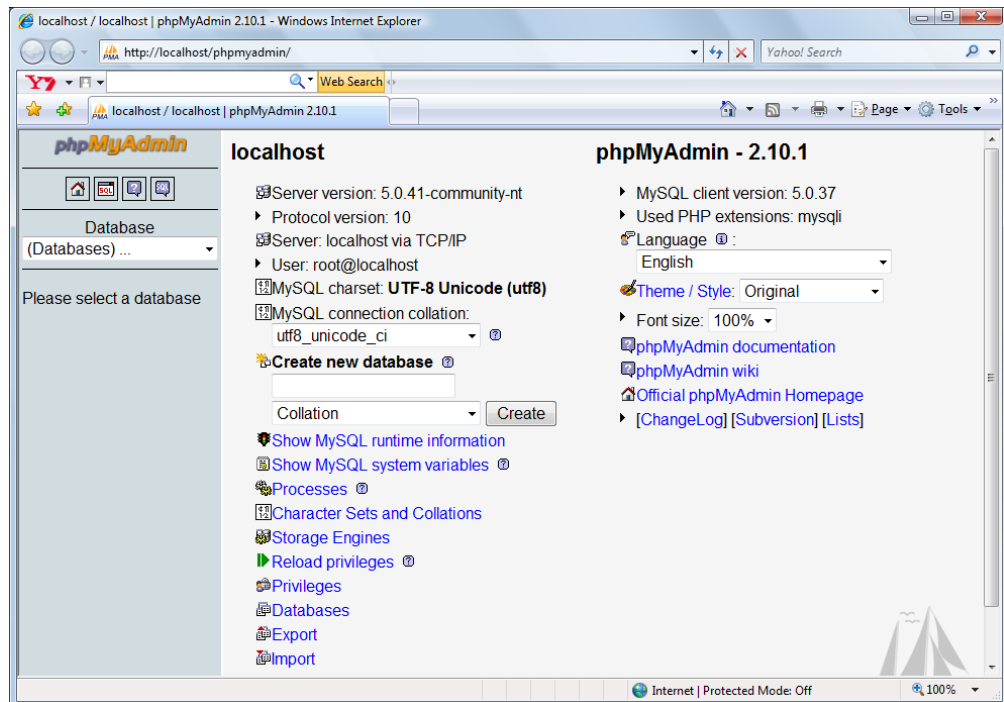
The e-Learning web application is run on Apache web server. We recommend to use wamp5 or xamp webserver with php and mysql. You can download the latest version of wamp server from www.wampserver.com/en/index.php. Its installation instructions are available in the website.. When Wamp5 is running, Wamp server icon  appears on the windows taskbar notification area.

Instructions for configuration of the web application database are as follows.

1. Copy the two subfolders 'eLearningAdminSurvey' and 'eLearningSurvey' 'in 'OO System' folder to the document root of Wamp. With default installation followed, this is C:\wamp\www\.
2. Click on  icon in notification area



3. In the menu, click 'Restart All Services'. The icon change to .
4. Click on  and click 'Put Online'. This puts the wamp sever online and icon changes to .
5. Click on the sever icon again and click 'phpMyAdmin'. Resulting window is as shown in the screen shot below.

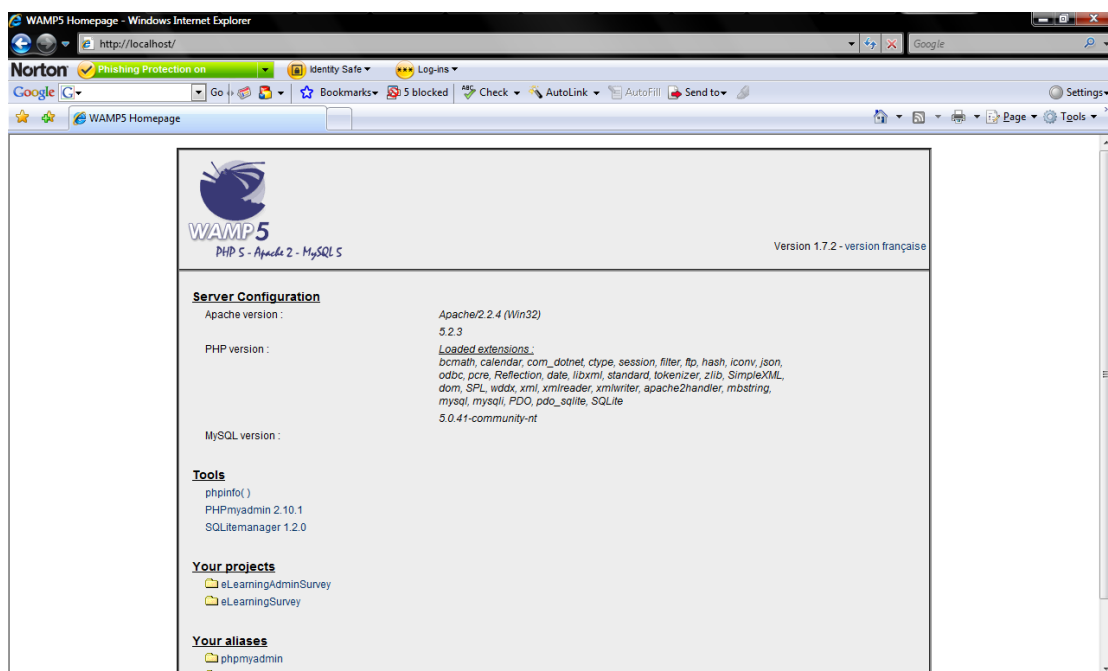


6. To create the database you must use the name given in 'System Details for OO.txt' file in OO System directory. Insert the database name given

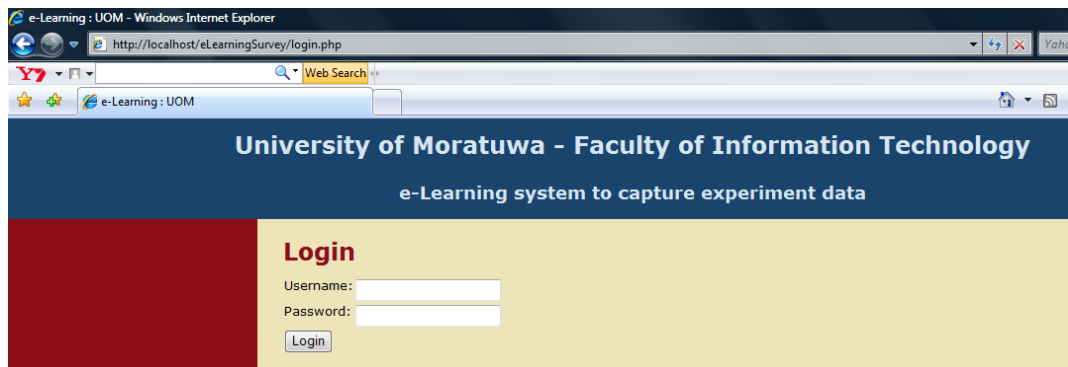
in the 'Create new database' textbox and create the database.

7. Now the e-Learning web application is ready for use.

To run the web application, click on the server icon and click 'localhost'. The application opens in the default web browser. A screen shot of the browser window is given below.



With ‘eLearningSurvey’ selected, the browser window should change to the log in screen,



You may start the same by accessing the url <http://localhost/eLearningSurvey/login.php> on the web browser address box.



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Appendix E – Sample Questions and Questionnaire

Question 01

- I found _____ to understand the study material?
- Very easy
 - Most parts were easy
 - Most parts were difficult
 - Very difficult

Question 02

- While learning, most of the time I felt
- Interested & Curious
 - Confused
 - Bored / Frustrated
 - Determined to explore the subject more

- Encapsulation
- Modeling
- Inheritance
- Abstraction

- Software object maintain states in methods and implements its behaviors with Variables
- Object is a blue print / template of classes
- It is an entity that combines descriptions of data and behavior
- Objects are not related to classes

Appendix F – Sample of Data Collected

id	user_id	Time_stamp	from_url	to_url	Student_id
778	8	1226574591	http://10.8.53.230/eLearningTest/login.php	/eLearningTest/staff.php	BSCSTU06
779	8	1226574593	http://10.8.53.230/eLearningTest/staff.php	/eLearningTest/index.php	BSCSTU06
780	8	1226574611	http://10.8.53.230/eLearningTest/index.php	/eLearningTest/index.php?page=11	BSCSTU06
781	8	1226574635	http://10.8.53.230/eLearningTest/index.php?page=11	/eLearningTest/index.php?page=13	BSCSTU06
782	8	1226574635	http://10.8.53.230/eLearningTest/index.php?page=13	/eLearningTest/index.php?page=16	BSCSTU06
783	8	1226574637	http://10.8.53.230/eLearningTest/index.php?page=16	/eLearningTest/index.php?page=19	BSCSTU06
784	8	1226574638	http://10.8.53.230/eLearningTest/index.php?page=19	/eLearningTest/index.php?page=29	BSCSTU06
785	8	1226574641	http://10.8.53.230/eLearningTest/index.php?page=29	/eLearningTest/index.php?page=11	BSCSTU06
786	8	1226574750	http://10.8.53.230/eLearningTest/index.php?page=11	/eLearningTest/index.php?page=12	BSCSTU06
787	8	1226574787	http://10.8.53.230/eLearningTest/index.php?page=12	/eLearningTest/index.php?page=13	BSCSTU06
788	8	1226574858	http://10.8.53.230/eLearningTest/index.php?page=13	/eLearningTest/index.php?page=28	BSCSTU06
789	8	1226574870	http://10.8.53.230/eLearningTest/index.php?page=28	/eLearningTest/index.php?page=14	BSCSTU06
790	8	1226574966	http://10.8.53.230/eLearningTest/index.php?page=14	/eLearningTest/index.php?page=15	BSCSTU06
791	8	1226575101	http://10.8.53.230/eLearningTest/index.php?page=15	/eLearningTest/index.php?page=16	BSCSTU06
792	8	1226575140	http://10.8.53.230/eLearningTest/index.php?page=16	/eLearningTest/index.php?page=17	BSCSTU06
793	8	1226575170	http://10.8.53.230/eLearningTest/index.php?page=17	/eLearningTest/index.php?page=18	BSCSTU06
794	8	1226575292	http://10.8.53.230/eLearningTest/index.php?page=18	/eLearningTest/index.php?page=19	BSCSTU06

Navigation records in the system

Extracted sample of data collected from client side interactions tracking program

"11/13/2008!3:10:23 PM!KeyCode 8[BackSpace key]!down"
"11/13/2008!3:10:23 PM!KeyCode 8[BackSpace key]!up"
"11/13/2008!3:10:23 PM!KeyCode 8[BackSpace key]!up"
"11/13/2008!3:10:23 PM!KeyCode 77[M key]!down"
"11/13/2008!3:10:23 PM!KeyCode 77[M key]!down"
"11/13/2008!3:10:23 PM!KeyCode 77[M key]!up"
"11/13/2008!3:10:23 PM!KeyCode 77[M key]!up"
"11/13/2008!3:10:24 PM!KeyCode 32[SPACEBAR key]!down"
"11/13/2008!3:10:24 PM!KeyCode 32[SPACEBAR key]!down"
"11/13/2008!3:10:24 PM!KeyCode 32[SPACEBAR key]!up"
"11/13/2008!3:10:24 PM!KeyCode 32[SPACEBAR key]!up"
"11/13/2008!3:10:25 PM!KeyCode 67[C key]!down"
"11/13/2008!3:10:25 PM!KeyCode 67[C key]!down"
"11/13/2008!3:10:26 PM!KeyCode 67[C key]!up"
"11/13/2008!3:10:26 PM!KeyCode 67[C key]!up"
"11/13/2008!3:10:26 PM!KeyCode 76[L key]!down"
"11/13/2008!3:10:26 PM!KeyCode 76[L key]!down"
"11/13/2008!3:10:26 PM!KeyCode 76[L key]!up"
"11/13/2008!3:10:26 PM!KeyCode 76[L key]!up"
"11/13/2008!3:10:26 PM!KeyCode 65[A key]!down"
"11/13/2008!3:10:26 PM!KeyCode 65[A key]!down"
"11/13/2008!3:10:26 PM!KeyCode 65[A key]!up"
"11/13/2008!3:10:27 PM!KeyCode 65[A key]!up"
"11/13/2008!3:10:27 PM!KeyCode 83[S key]!down"
"11/13/2008!3:10:27 PM!KeyCode 83[S key]!down"
"11/13/2008!3:10:27 PM!KeyCode 83[S key]!up"
"11/13/2008!3:10:27 PM!KeyCode 83[S key]!up"
"11/13/2008!3:10:27 PM!KeyCode 83[S key]!down"
"11/13/2008!3:10:27 PM!KeyCode 83[S key]!down"
"11/13/2008!3:10:27 PM!KeyCode 83[S key]!up"
"11/13/2008!3:10:27 PM!KeyCode 83[S key]!up"
"11/13/2008!3:10:27 PM!KeyCode 13[Enter key]!down"
"11/13/2008!3:10:28 PM!KeyCode 13[Enter key]!down"
"11/13/2008!3:10:28 PM!KeyCode 13[Enter key]!up"
"11/13/2008!3:10:28 PM!KeyCode 13[Enter key]!up"
"11/13/2008!3:10:42 PM!Left Button !Down:474 , 757"
"11/13/2008!3:10:42 PM!Left Button !Down:474 , 757"
"11/13/2008!
"11/13/2008!3:12:48 PM!Left Button !Down:966 , 245"
"11/13/2008!3:12:48 PM!App: ST6UNST - Notepad"
"11/13/2008!3:12:48 PM!Left Button !Up:966 , 245"
"11/13/2008!3:12:48 PM!Left Button !Up:966 , 245"
"11/13/2008!3:12:50 PM!Left Button !Down:882 , 123"
"11/13/2008!3:12:52 PM!App: effective manipulations of Math.random class - Google Search "
"11/13/2008!3:12:52 PM!Left Button !Down:254 , 755"
"11/13/2008!3:12:52 PM!App: effective manipulations of Math.random class - Google Search "
"11/13/2008!3:12:52 PM!Left Button !Up:254 , 755"

Information Sheet for Participants

I, P.D. Dayaratne, am currently studying for MSc in Information Technology at Faculty of Information Technology, University of Moratuwa, Sri Lanka. As part of this award I am carrying out my research project titled ‘A Model to Identify Human Emotions in Human Computer Interaction in an e-Learning Environment’. Part of the project requires your corporation in participation in an online survey. This includes the study of several lessons in an eLearning environment related to IT and at the end, answering and submission of an online questioner based on the lessons. Your interaction with the PC will be monitored and recorded through a background program. If there is a need for you to access anything providing confidential information such as passwords, please make sure you insert these prior to starting the interaction tracking program.

A hard copy feedback form will be provided for completion.

Please be assured that any information you provide will remain confidential and will only be used for this research project.

Your participation is voluntary and you may withdraw at any time.

Thank you for your assistance.

P.D. Dayaratne

MSc Student,
Faculty of Information Technology,
University of Moratuwa,
E-mail: dineshd@gmail.com

Student information sheet was provided to obtain student’s feed back as well as test results

Student Information Sheet

Student Name:

Registration No:

Login Name:

BSCSTU24

Survey Answers

Question 01

Question 02

Quiz Answers

Question 01

Question 02

Question 03

Question 04

Question 05

Comments



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Problems Encountered

Page	Problem Description

Machine Number