Data Verification and Validation Process in the Management System Development

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Abstract: Data validation and verification are vital components for newly developing data management systems. Since, a research study was carried out with an objective; to find out the important validation and verification methods for the management system development. Different validation and verification methods were tested using newly developed systems of Jaffna Public Library Management System and Jaffna; College of Technology Management System. Results revealed, empty field validation, numeric field validation, text field validation, email address validation, range validation and compare validation were found as most important validation and verification methods than other methods.

Key words: Data Verification and Validation · Library Management System (LMS) · College of Technology Management System (COTMS)

INTRODUCTION

Verification and validation are very important in the software development process. It is helpful to avoid duplicate and wrong data entry to the data basis. Usually, software systems were implemented to maintain the organization, shops and company to schedule the job in an easier manner. In a software testing process, verification and validation identify important errors or flaws which categorized based on the severity level in the application that must be fixed [1].

Verification is "are we building the product right?" and validation is "are we building the right product?" [2]. Upadhyay, (2012) mentions that role of verifying and validating for each product must be determined by a project-by-project basis. This determination will be influenced by the criticality of the product, its constraints and its complexity. In general, the objective of the verifying and validating function is to insure that the product satisfies the user needs. Thus, everything in the product's requirements and specifications must be the target of some verifying and validating activity. In order to limit the scope of this module, however, the verifying and validating approaches described, will concentrate on the functional and performance portions of the requirements and specifications with respect to safety,

portability, usability, maintainability, serviceability, security, etc., although very important for many systems [3].

The software industry carried out so many projects relevant to management system like college management system, super market management system and hospital management system. These management related systems were implemented web based and the windows based. Such applications are playing major roles in the business industry, but in this application data, validation part is very important, so many data validation methods are carried out by the developers. In this case, study elaborates the need of the basic validations for the system development with the proper database. The most important validation methods were identified by using Automated Certificate Issuing and Students' Management System for College of Technology, Jaffna: Sri Lanka[4] and Secured Library Management System (LMS) for Public Library of Jaffna, Sri Lanka [5].

MATERIALS AND METHODS

Validation methods were applied in two different ways. One was validating data into database level [6] and the other one was validating data into application level using codings [7]. But validating data into application

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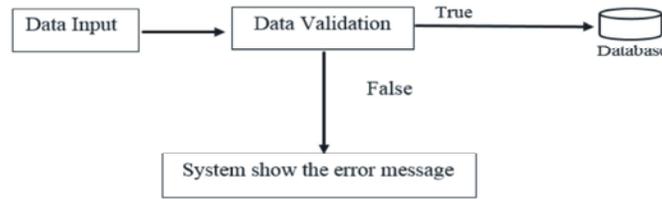
Fig. 1: Basic concept of data validation

level is a highly recommended way [6, 7]. Duplication was easily avoided and the error messages were easily generated by using codes. The information system life cycle e's major integral component was validation and acceptance testing. The acceptability of the system in meeting users' requirements and performance criteria was validated [3].

Figure 1 showed the process of the data from the user to the database. The validity of the data should be checked by the system when the data was entered into a database using the relevant system. If the data is correct, then the only system will allow the data into the database. There are so many validation methods available such as required field validation, range validation, compare validation, regular expression validation, custom validation, field validation and property validation [9, 10]. These data validation methods were very important to develop a software, but mainly management systems focus on following validations such as Empty field validation, numeric field validation, text field validation, email address validation, range validation and compare validation.

Table 1: Summarise the validations methods

Data Field	Data Type	Validation
Name	Varchar	Text field validation
Mobile Number	Integer	Numeric field validation
Email	Varchar	Email field validation
Duration	Date	Range validation
Before insert data	All data type	Empty field validation

Coding which is shown below were used to develop the text field validation using the C#.net

```
private void textBox1_KeyPress(object sender, KeyPressEventArgs e)
{
try
{
if (Char.IsNumber(e.KeyChar) || Char.IsSymbol(e.KeyChar) || Char.IsPunctuation(e.KeyChar) && e.KeyChar != ' ')
{
 e.Handled = true;
MessageBox.Show("Enter only Characters.", "Alert!");
}
if (e.KeyChar == ' '&& (sender as TextBox).Text.IndexOf(' ') > -1)
{
e.Handled = true;
MessageBox.Show("Enter Space only one time. ", "Alert!");
}
}
catch
{
MessageBox.Show("Error");
}
}
```

This coding was used to develop the numeric field validation in the C#.net

```
private void textBox1_KeyPress(object sender, KeyPressEventArgs e)
{
try
```

```
            {
            if (!(char.IsDigit(e.KeyChar) || char.IsControl(e.KeyChar) || char.IsPunctuation(e.KeyChar)))
            {
            e.Handled = true;
            MessageBox.Show("Enter only Numeric and decimal point.", "Alert!");
        }
    }
    catch { MessageBox.Show("Error"); }
}
```

Below mentioned coding was used to develop the numeric range validation in the C#.net

```
    privatevoid txtMrk1_Leave(object sender, EventArgs e)
    {
    try
    {
    int m;
    m = (Convert.ToInt32(txtMrk1.Text));
    if (m >= 0 && m <= 100)
    {
    if (m >= 40)
    {
    txtGrd1.Text = "Pass";
    }
    else {
    txtGrd1.Text = "Fail";
    }
    }
    else {
    MessageBox.Show("Invaild Marks. Please enter correct Marks");
    txtMrk1.Text = "";
    txtGrd1.Text = "";
    }
    }
    catch
    {
    txtGrd1.Text = "";
    }
    }
```

Under mentioned coding was used to develop the email validation in the C#.net

```
    private void textBox1_Leave(object sender, EventArgs e)
        {
        System.Text.RegularExpressions.Regex rEMail = new System.Text.RegularExpressions.Regex(@"^[a-zA-Z][\w\.-
]{2,28}[a-zA-Z0-9]@[a-zA-Z0-9][\w\.-]*[a-zA-Z0-9]\.[a-zA-Z][a-zA-Z\.]*[a-zA-Z]$");

        if (textBox1.Text.Length > 0)
        {
        if (!rEMail.IsMatch(textBox1.Text))
        {
        MessageBox.Show("invalid   E-Mail.   Eg:-'someone@example.com'.",   "Error",   MessageBoxButtons.OK,
MessageBoxIcon.Error);
```

```
            textBox1.Text = "";
        }
    }

}
```

The empty field validation in the C#.net was developed by using below coding.

```
    privatevoid piclogin_Click(object sender, EventArgs e)

    {
    try
    {
    if (txtuser.Text == ""&& txtpasswd.Text == "")

    {
    MessageBox.Show("Please Enter the User Name & Password.","Alert!");
    }

    elseif (txtuser.Text == "")
    {
    MessageBox.Show("Please Enter the User Name.","Alert!");
    }

    elseif (txtpasswd.Text == "")
    {
    MessageBox.Show("Please Enter the Password.", "Alert!");
    }

    }
    }
```

RESULTS AND DISCUSSION

Validation and verification were most important to maintain the proper database [10] (Martín, E. and G. Ballard. 2010). Here by using COTMS and LMS identified the most important validation methods needed to improve the database management system.

Usually, the management system login form was very important for the security of the entire system. This form contained so many validations such as empty field, range validation and compare validation. Login page comprised text box for user ID, password & button for login, cancellation. The user had access to the account only if the correct user id and password are given.

When both of details were not given, the message was appeared as "Alert-please enter the user name" as mentioned in the (Figure 2). If the user entered user ID and not the password, the message was appeared as "Alert-please enter the password" as mentioned in the (Figure 3). This two types of alert messages were generated from the empty field validation. The message conveyed that the field was empty, the user wants to enter some data.

Fig. 2: Empty field validation alert message for username

Fig. 3: Empty field validation alert message for password

Fig. 4: Empty field validation alert message for user ID and password

Fig. 5: Empty field validation alert message for user ID

Fig. 6: Empty field validation alert message for password

Fig. 7: Alert message for invalid ID

Fig. 8: Alert message for incorrect password

In the secured library management system for Jaffna public library Login page user id, the password is given correctly, the user able to access the account. When user kept user name and password field both empty the system generate the message "Enter the user ID and password" as mentioned in the (Figure 4). If the user not given the user ID the message was generated as mentioned (Figure 5) "Enter the user ID". If the user entered user id and not entered the password the message was generated as mentioned (Figure 6) "Enter the password" to give the password detail. These messages were generated from the empty field validation. If the user id field was not empty, but the given details were incorrect the message was generated as mentioned in the (Figure 7) "Invalid user ID". Finally, if the username and password were kept empty and entered wrong values, a message was generated by the system as mentioned. (Figure 8)" Password is incorrect please enter the correct password."
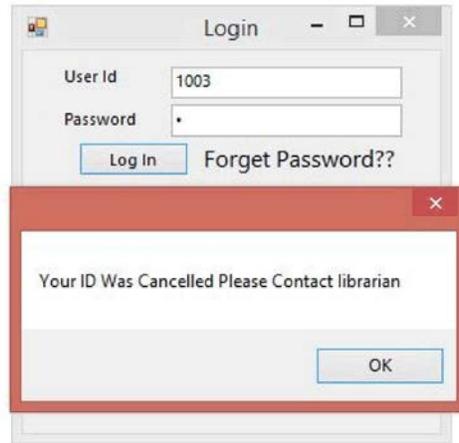
Fig. 9: Alert message for ID cancelation

Table 2: Test case for Login form (LMS)

Test Case Id	Description	Expected Out put	Actual Output	Pass/ Fail	Figure No
1	User ID and password are blank	"Enter the User id and Password" Error message should be display	message displayed	Pass	4
2	User ID is blank	"Enter the User id" Error message should be display	message displayed	Pass	5
3	Password is blank	"Enter the Password" Error message should be display	message displayed	Pass	6
4	Wrong ID	"This ID is invalid" Error message should be display	message displayed	Pass	7
5	Wrong Password	"Password is incorrect. Please enter correct Password " Data should save in the database	message displayed	Pass	8
6	Cancelled User ID	" Your ID Was Cancelled Please Contact librarian" Blank data should be display	message displayed	Pass	9
7	Correct User ID And Password	The main form should be display and login history Data should save in the database	The main form displayed and Saved in database	Pass	
8	Press Forget "Password Button"	Forget Password Form Should Be Display	Forget Password Form Displayed	Pass	

These messages came from the compare validation. If wrong passwords were entered more than five times, user ID was cancelled automatically and a message was generated as mentioned below. (Figure 9) "Your ID was cancelled please contact the librarian ".

Table 2 reveals that the test case of the login form was tested by using black book testing techniques. The accurate input and output were verified to give several inputs to the system [11].

Text Field Validation: This process was done in the (Figure 10) student full name field in the COTMS and it was done in the (Figure 11) LMS first name, last name and job fields. These fields were only accepting character values if the user entered any numeric values the error message was appeared as "Enter the only character".

Numeric Field Validation: This process was done in the (Figure 12) contact number, mobile number, index number fields in the COTMS and it was done in the (Figure 13)

LMS mobile number field. These fields were only accepting numeric and decimal point values in these fields, if the user tried to enter any alphabet characters the error message was appeared as "Enter only numeric and decimal point values".

Empty Field Validation: Some of the fields were mandatory and needed to be filled up. In such case, empty field validation makes sure that user has not left any mandatory fields empty and the error message appeared as mentioned in the (Figure 14).

Range Validation: Figure 15 module was used to enter marks in the marks sheet. While a marks sheet was prepared, the type, of course, had to be selected. First, without selection, it did not allow enter into the other text boxes in figure 15. But after entering the Student ID user able to select the courses. After selecting the course user able to enter the marks, then the grade was given automatically.
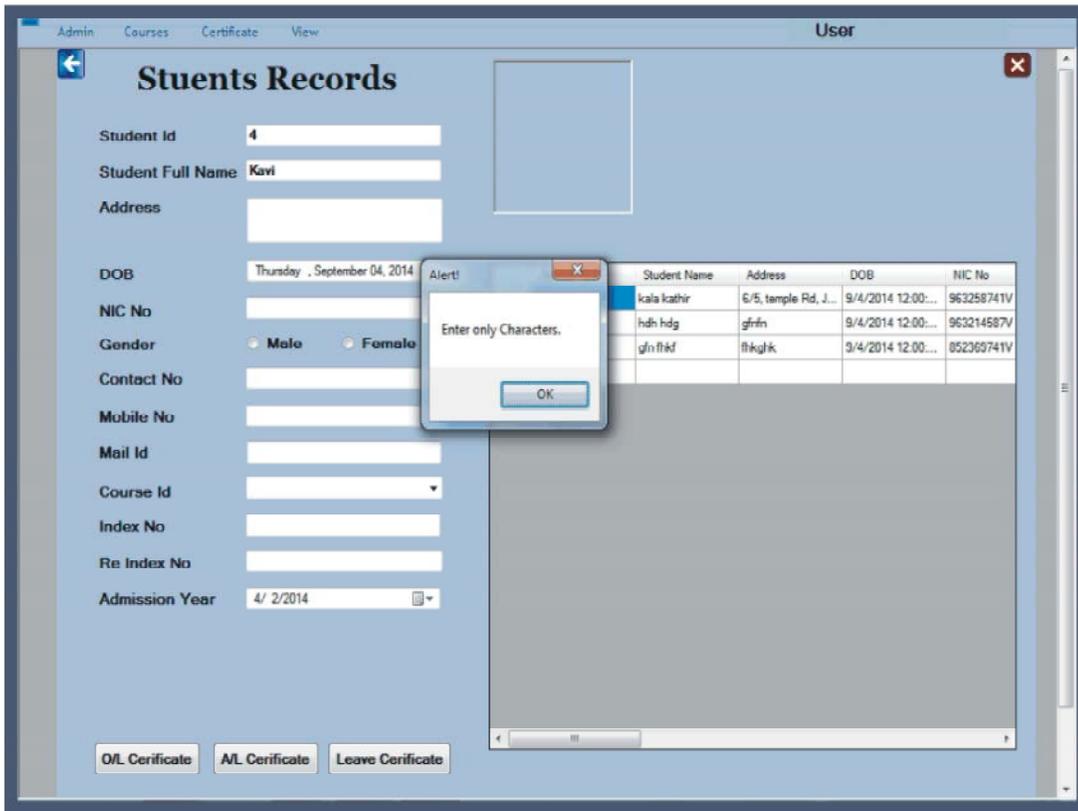
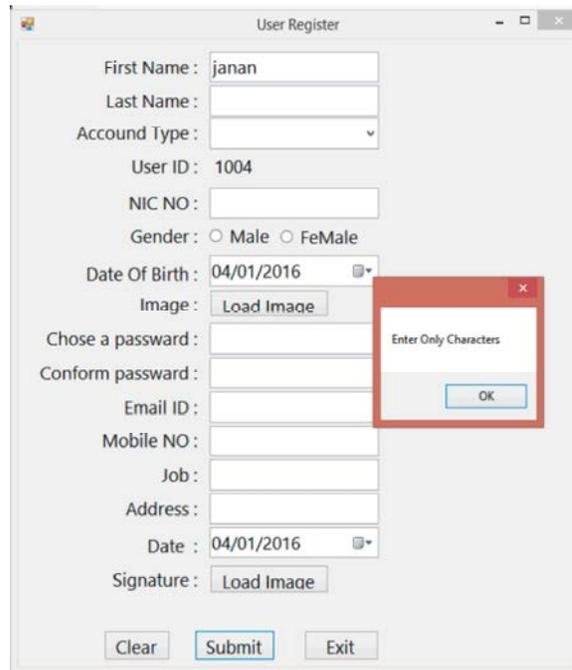Fig. 10: Text field validation alert message in COTMS

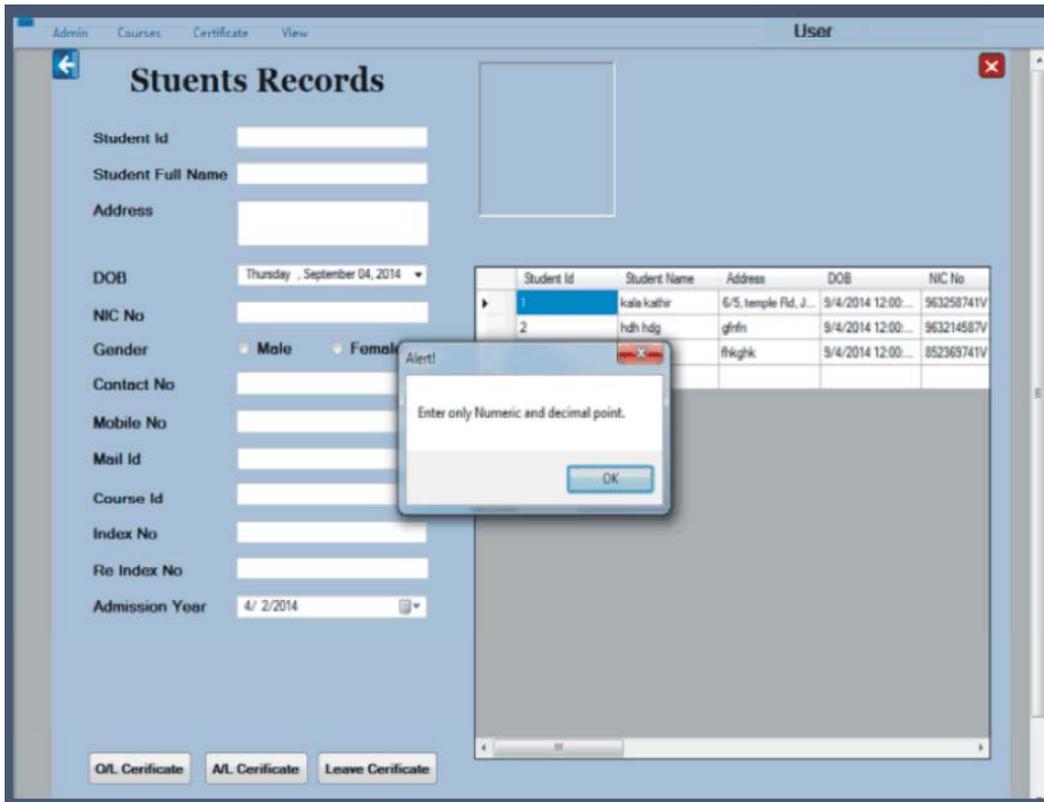Fig. 11: Text field validation alert message in LMS

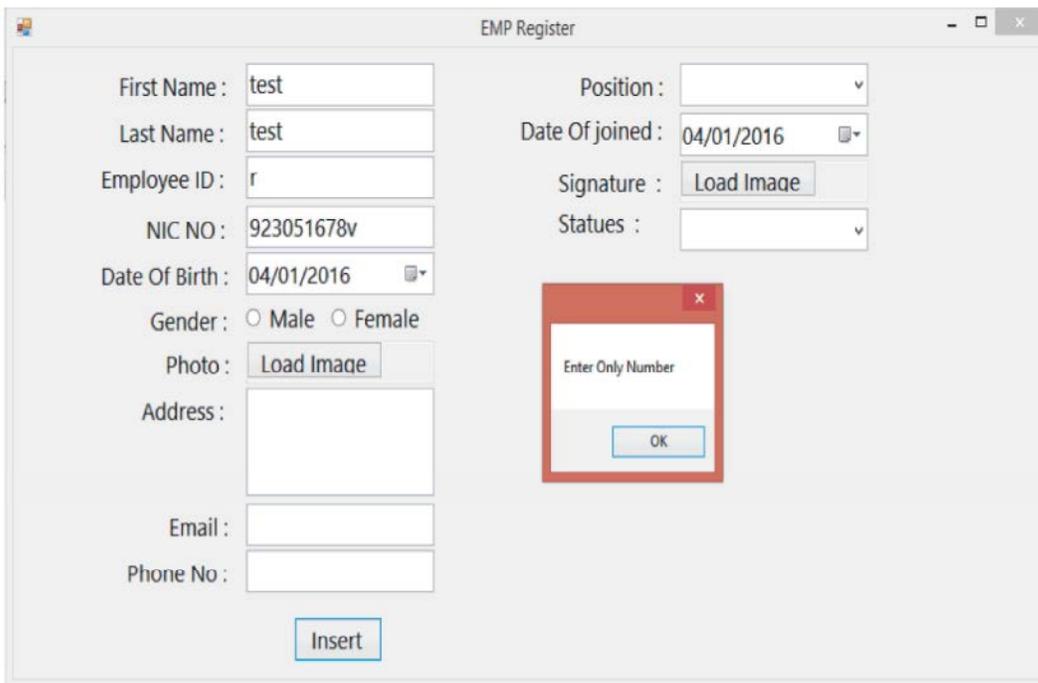Fig. 12: Numeric field validation alert message in COTMS

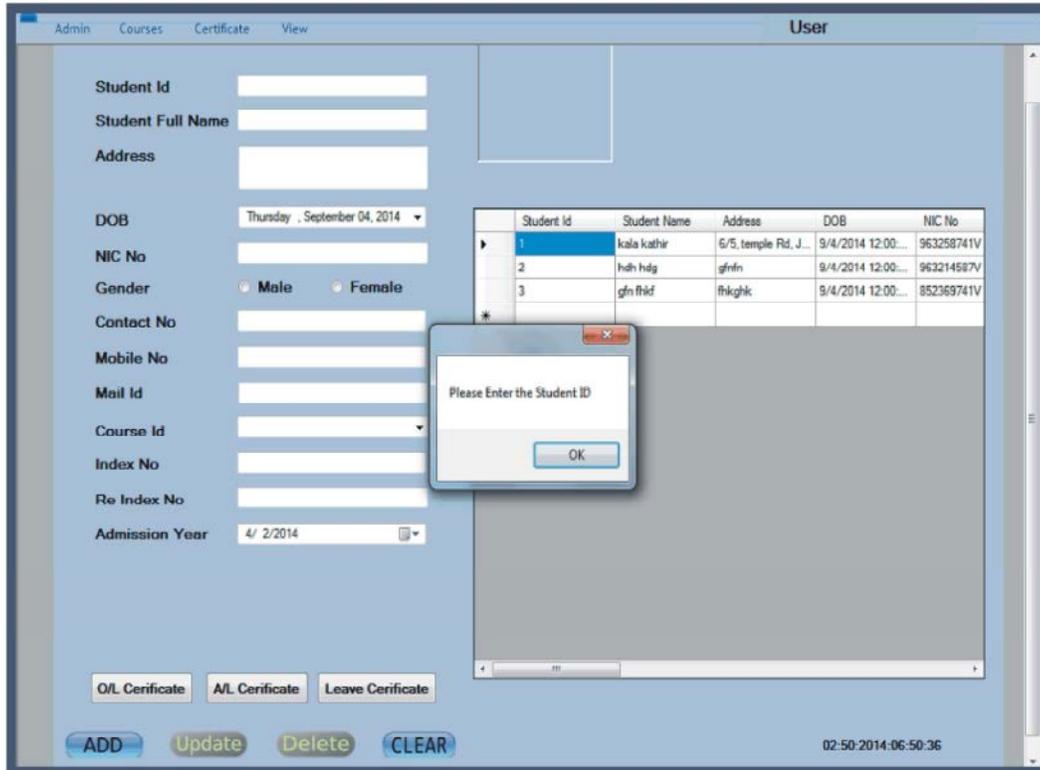Fig. 13: Numeric field validation alert message in LMS

Fig. 14: Empty field validation alert message

Fig. 15: Range field validation alert message

The marks validation was used in (Figure 15) all the marks required fields to check that the user entered input value that falls between 0-100 range numeric values. If the user entered any values, not in that range system generate the error message "Invalid marks".

CONCLUSION

We conclude from this study; mostly essential validation methods for the newly develop management systems are Empty field validation, numeric field validation, text field validation, email address validation, range validation and compare validation than other validations

REFERENCES

1. Bentley, J.E. and W. Bank, 2004. Software Testing Fundamental Concepts Roles and Terminology, Wachovia Bank, Charlotte NC, pp: 141-30.
2. Boehm, B.W., 1981. Software engineering economics (Vol. 197). Englewood Cliffs (NJ), Prentice-hall, pp: 193-197.
3. Upadhyay, P., 2012. The roles of Verification and Validation in System Development Life Cycle. IOSR Journal of Computer Engineering, 5(1): 17-20.
4. Thushyanthy, V., K. Thiruthanigesan, W.M.P.P. Wanninayake and N. Thiruchchelvan, 2016. Automated Certificate Issuing and Students' Management System for College of Technology, Jaffna, Sri Lanka. Middle-East Journal of Scientific Research, 24(7): 2204-2208.
5. Balalojanan, V., Jeyaperatha, T., Thiruthanigesan, T., Wanninayake, W, M, P, P., and N. Thiruchchelvan, 2016. Secured Library Management System (LMS) for Public Library of Jaffna, Sri Lanka. Middle-East Journal of Scientific Research 24 (7): 2209-2215.
6. https://www.simple-talk.com/sql/learn-sql-server/where-in-the-application-should-data-validation-be-done-/ (Access on 20.02.2016)
7. http://www.petesqbsite.com/sections/express/issue 10/datavalidation (Access on 20.02.2016)
8. http://www.tutorialspoint.com/asp.net/asp.net_validators.htm (Access on 20.02.2016)
9. https://msdn.microsoft.com/en-us/library/dn440720 (v=pandp.60).aspx (Access on 20.02.2016)
10. Martín, E. and G. Ballard, 2010. Data Management Best Practices and Standards for Biodiversity Data Applicable to Bird Monitoring Data. U.S. North American Bird Conservation Initiative Monitoring Subcommittee. Online at http://www.nabci-us.org/aboutnabci/bestdatamanagementpractices.pdf
11. Pahwa, P. and R. Miglani, 2015. Test Case Design using Black Box Testing Techniques for Data Mart. International Journal of Computer Applications, 109(3): 18-22.