

ELECTORAL SUPPORT TO MOLDOVA

TECHNICAL SPECIFICATIONS ON CEC WEBSITE INTEGRATION INTO SAISE

LIST OF ABBREVIATIONS

Abbr.	Description
UNDP	United Nations Development Program
IOM	International Organization for Migration
CEC	Central Election Commission
DEC	District Election Commission
PS	Polling Station
MID	Ministry of Information and Development
MICT	Ministry of Information and Communications Technology (previously MID)
CTS	Centre of Special Telecommunications
SAISE	State Automated Information System – Elections
ROV	Register of Voters
ROP	Register of Population
GUI	Graphical User Interface
RTS	Result Tabulation System
VS	Microsoft Visual Studio
EVR	Electronic Voters Register
OCV	Out-of-Country Voting
Doc Nr	The passport or ID Card's number. For example, every passport issued to the same person, will have a different number. A Voter can potentially have a ID card with Doc Nr, Russian Passport with Doc Nr and Moldova Passport with Doc Nr, or even previous Documents with Doc Nr, all of them different numbers, but the same person.
IDNP	Identity Number for Natural Person. Unique number for each person. Every Moldovan citizen might not have an IDNP yet. Citizens are allowed to refuse such a number for religious reasons.

INTRODUCTION

PURPOSE

The State Automated Information System – Elections (SAISE) is a comprehensive Election System which integrates all the IT tools and functions needed by an Election Management Body (EMB) to conduct Elections.

This document is the Technical Specifications Manual describing how the CEC Website should be developed to integrate with the SAISE in a seamless manner.

The CEC is required to adapt their IT Systems to fit into the State Automated Information System – Elections (SAISE). One of which is the Official CEC Website www.cec.md

SAISE requires that the CEC will have one automated IT System to support the CEC in carrying out their line of duty. This includes displaying Polling Stations, Election Results, Voter Lists, Legal Documents etc. Part of SAISE would be the CEC Website.

Few Terms of Reference were identified for the CEC Website. Content, Layout and Branding, Technical requirements.

STATE AUTOMATED INFORMATION SYSTEM – ELECTIONS

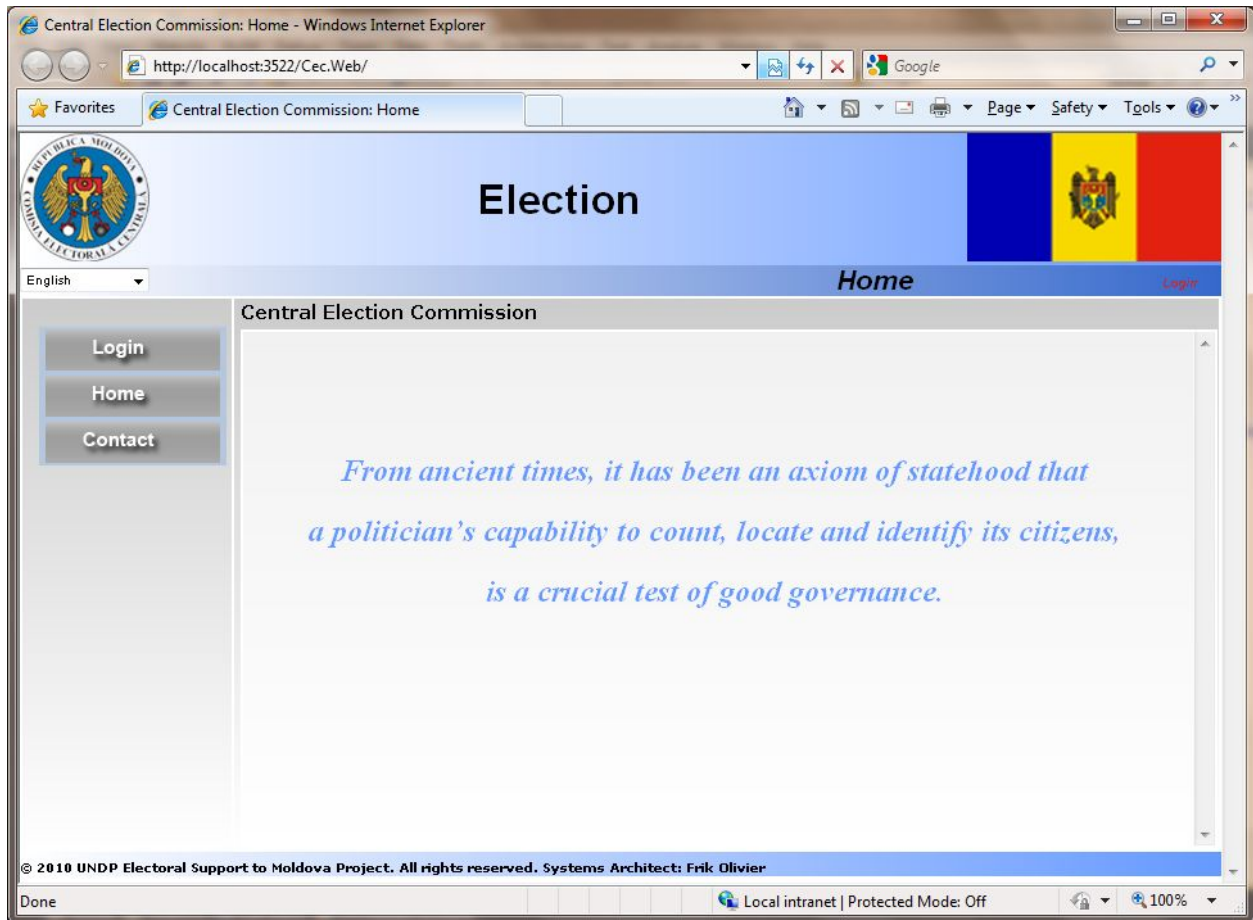


Figure 1: Home Page of SAISE

The State Automated Information System – Elections (SAISE) consists of a few modules directly linking certain activities of Elections to form one integrated system.

The core of the SAISE is built around audit, security and accountability. All web pages, functions and displayed information are protected by the system on the Web Server side.

SUMMARY INTEGRATION TASK LIST

- A Silverlight beta CEC Website (<http://beta.cec.md>) was developed according to the needs of the CEC. The Integration should have at least the same functionality as a minimum requirement. In essence: In order to integrate into SAISE, the Silverlight beta site needs to be converted to ASPX.NET technology.
- The CEC Website will be developed using the existing framework developed by the CEC. The source code will be made available in a Microsoft Visual Studio skeleton project. This will include the User Management System, Home Page, Reports, master page and other customized controls and tools needed to get a clear picture of how to integrate the CEC Website seamlessly.

- The current SAISE Menu System needs to be adjusted to fit into the Website methodology whereby the User can add, edit or remove menu items.
- The current Master Page and the CSS should be adapted to look more like the Silverlight beta CEC Website.
- Deviation on beta Silverlight site: System User, Roles and Permissions should be adapted to use the SAISE User Management.
- Deviation on beta Silverlight site: The number of list items on a page (the page length) should be configurable.
- Deviation on beta Silverlight site: The viewed item should be like an accordion pane. The list items should be pushed down and the viewed item details should be viewed below the selected item. The details should be hidden when the selected item is toggled or when another item is selected.
- Deviation on beta Silverlight site: Menu Levels should be more than two.
- Deviation on beta Silverlight site: The Archive Menu Item will contain all the previous Elections with the sub menu items as configured at the time of the said Election. In other words, the last or latest Election will appear in the main menu automatically and the User can add, edit or remove sub menu items. All the previous Elections and their sub menu items as the User defined them will be moved automatically to the Archive Menu Item.
- Deviation on beta Silverlight site: Menu detail items may contain a mixture of item detail templates.
- Deviation on beta Silverlight site: Pictures should be able to have a title and description.
- Working with the UNDP/CEC Webmaster on content management. The Webmaster is responsible of transferring all content to the new CEC Website. One such task would be to advise the Webmaster on how to transfer MS Word documents for the new CEC Website to be able to search the documents too. One such task could be to copy and paste all previous documents into the new Website and store the information as text in the MS SQL database for easy search.

SYSTEM ARCHITECTURE

Application Software	Developed in C# .NET Framework 4.0 as a Web Based Application using Visual Studio 2010
Database	SQL Server 2008
Central Operating System	Windows 7 Server with IIS 7 or higher
Client Side	Any OS capable of running Internet Explorer 6 and higher

The Application will connect to the Database Server using a connection string defined inside the web.config file found in the root folder of the website.

The connection string should be named "CecConnectionString". There should also be only ONE connection string named "CecConnectionString". The application uses only ONE connection string named "CecConnectionString". The other connection strings with suffixes are examples of how the string can be used in different environments.

The section in the web.config file looks like this:

```
<connectionStrings>
  <add name="CecConnectionString" connectionString="Data Source=localhost;Initial
Catalog=SAISE;Integrated Security=True;Connect Timeout=30;"
providerName="System.Data.SqlClient" />
```

`</connectionStrings>`

Where “localhost” should point to the Database Server and “SAISE” is the Database Instance.

Normally this section of the file would be encrypted and can only be seen from the IIS Server tool with the correct access permissions such as Administrator.

GENERAL NAVIGATION



- A. **Language Selection** – The User can click on the drop down box to select from a variety of Languages in which the User feels most comfortable with.
- B. **Status Line** – The SAISE will give timely feedback on the User’s action. The color of the line will also indicate the severity of the error:
 - a. **Black** – General information such as a confirmation of the User’s action.
 - b. **Blue** – Some issues were picked up and the User needs to pay closer attention, such as a warning that the Voter found is not from the User’s Polling Station.
 - c. **Red** – And error occurred and the SAISE could not process the request, such as Duplicate Polling Station Name was entered. In these cases, the User should rectify the problem and resubmit the request.
- C. **Page Title** – The current selected Menu (F) item will be displayed as the Page Title. This is an indication of the tasks or an action the Users is currently busy with, such as Election, Voter or Delimitation.
- D. **Login User** – The current Login User Name is displayed. All actions and changes will be logged against this User’s name.
- E. **Logout** – The User should logout whenever the User leaves the SAISE system unattended. This will prevent unauthorized users to use the SAISE.
- F. **Menu Options** – Only the authorized actions for the login User (D) will be displayed in the Menu.
- G. **Main Area** – Most of the actions will happen in the main display area.
- H. **Contact** – All necessary contact information can be found here should any problem arise with the SAISE.

SOURCE CODE NAMING CONVENTION

The general Naming Convention of this project is based on the Microsoft Naming Convention for .NET. More can be read at the following Website: <http://msdn.microsoft.com/en-us/library/ms229042.aspx>

The following general guidelines should apply throughout the project:

- The property names should match the table column names
- The property names should match the Graphical User Interface (GUI) input fields or buttons

DATABASE

Each table will:

- All Tables and Columns names will follow the same naming convention as described below
- Be named after the entity it holds and it should be singular (e.g. *Voter*)
- Have an auto increment Primary Key with the same name as the table with *Id* as a Suffix (e.g. *VoterId*)
- Each table will have accountability columns (e.g. *EditUserId*, *EditDate*)
- Each table will have version control and concurrency column (e.g. *Version*)
- The field names should match the properties of the business objects exactly.
- Foreign Keys should match the Primary Key of the foreign table, except when two Foreign Key links exists for the same foreign table. In such a case the Foreign Keys name should reflect the purpose. (e.g. Two Foreign Keys linking to Village could be named *Villageld* to indicate the normal delimitation link and *RopVillageld* to reflect the Register of Population Village reference link.

SYSTEM SECURITY

OVERVIEW

This is an existing module and placed in this specification for completeness and clarity. This should be used in the integrated CEC Website exactly as it is used in SAISE.

The core of the SAISE is built around audit, security and accountability. All web pages, functions and displayed information are protected by the SAISE on the Web Server side. This manual will show and describe all functionalities available, but it should be noted that the functionality will not be visible to the Logon User if the User does not have the permission to use the said functionality certain functionality. The Permission System is similar to the Windows environment where permissions are assigned to roles and roles assigned to persons. This makes the Permission System very flexible and configurable for any situation or function.

This section will describe the following:

Logon Page – All Users need to logon before the SAISE can be accessed and used.

Registration of New Users – A User needs to be registered before they can logon. This is the page where Users register by entering their details into the SAISE for approval by an Administrator.

User Management – Administrators use this screen to approve or unlock Users.

Role Management – Administrators use this page to assign or remove Roles to or from Users.

Permission Management – SAISE Administrators use this page to create Roles and assign specific Permissions to the Roles.

All Roles will be assigned a certain level. A User will be at the same level as the highest role level. Users cannot see Roles or Users at a higher level. The function of this is to be able to delegate administrative roles to lower level EMB's without the opportunity to assign themselves higher privileges of accessing higher level User accounts.

LAW 101

“23. The security and protection of information are ensured through a complex system of regulatory, organizational and technical measures, aimed at ensuring the necessary level of integrity, confidentiality and accessibility of information resources.

24. SAIS “Elections” is organized and managed in accordance with the standards in the area of information security, approved by the Republic of Moldova. “– Page 5, LAW No. 101 from 15.05.2008

Although Law 101 most certainly describes wider security concepts including firewall, hardware security, premises security, operating system security and database security, is the aim of the System User Security module to give an additional protection layer to the data from an Application point.

USE CASE

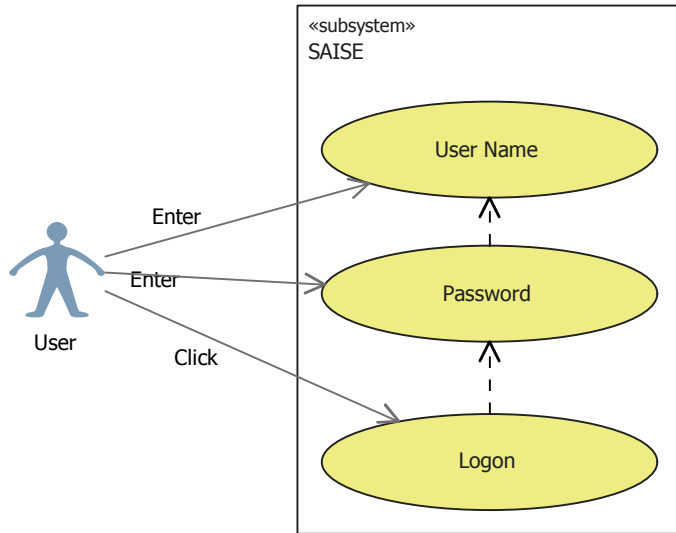


Figure 2: Use Case for System User Logon

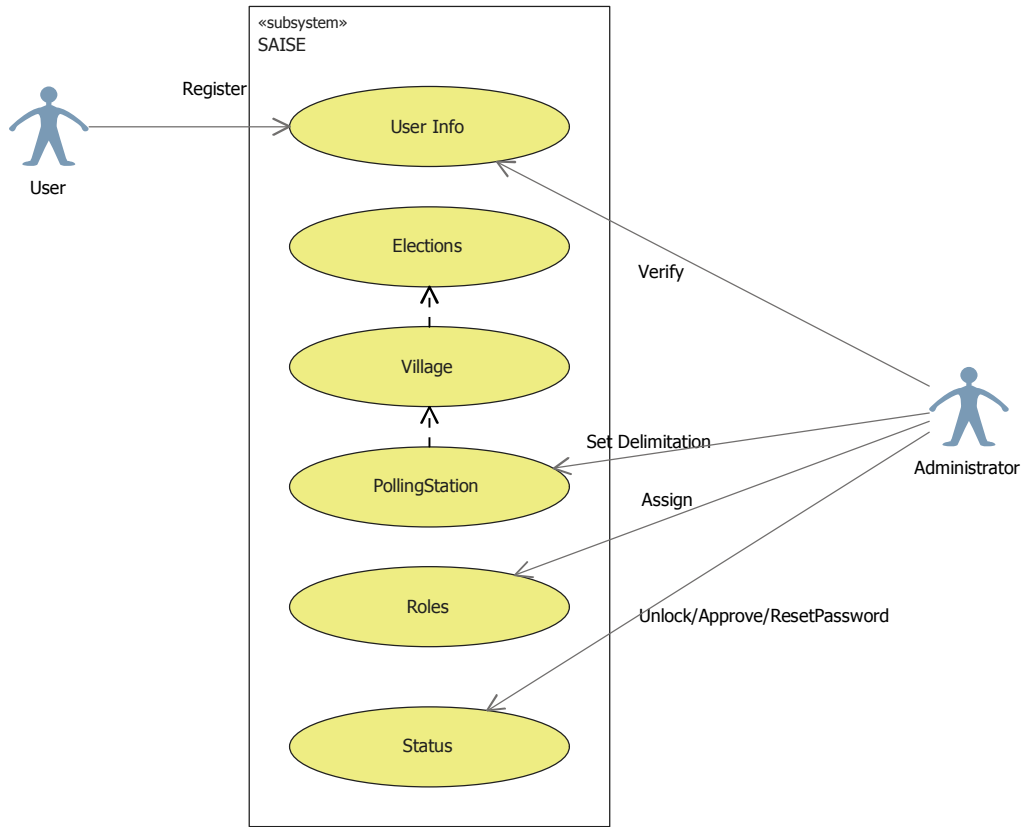


Figure 3: Use Case for User Registration

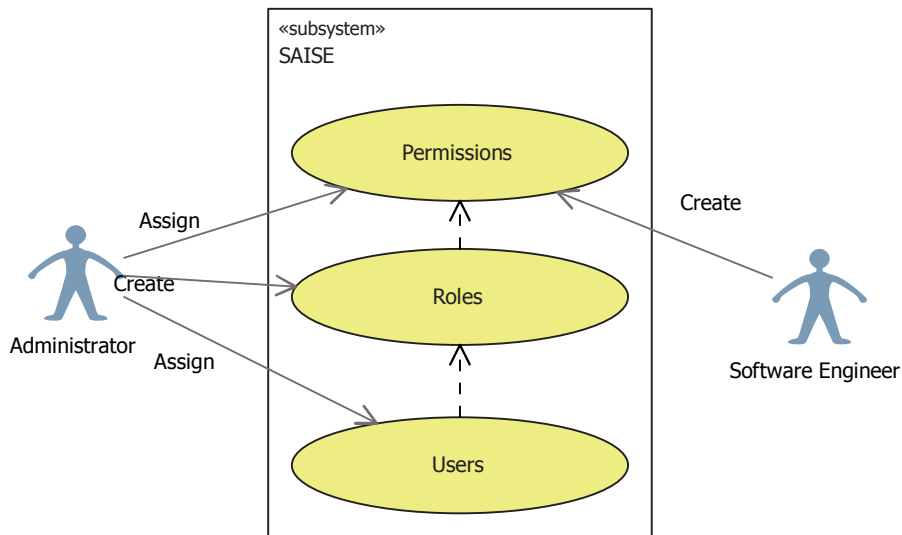


Figure 4: Use Case for Permissions, Roles and Users

ACTIVITY DIAGRAMS

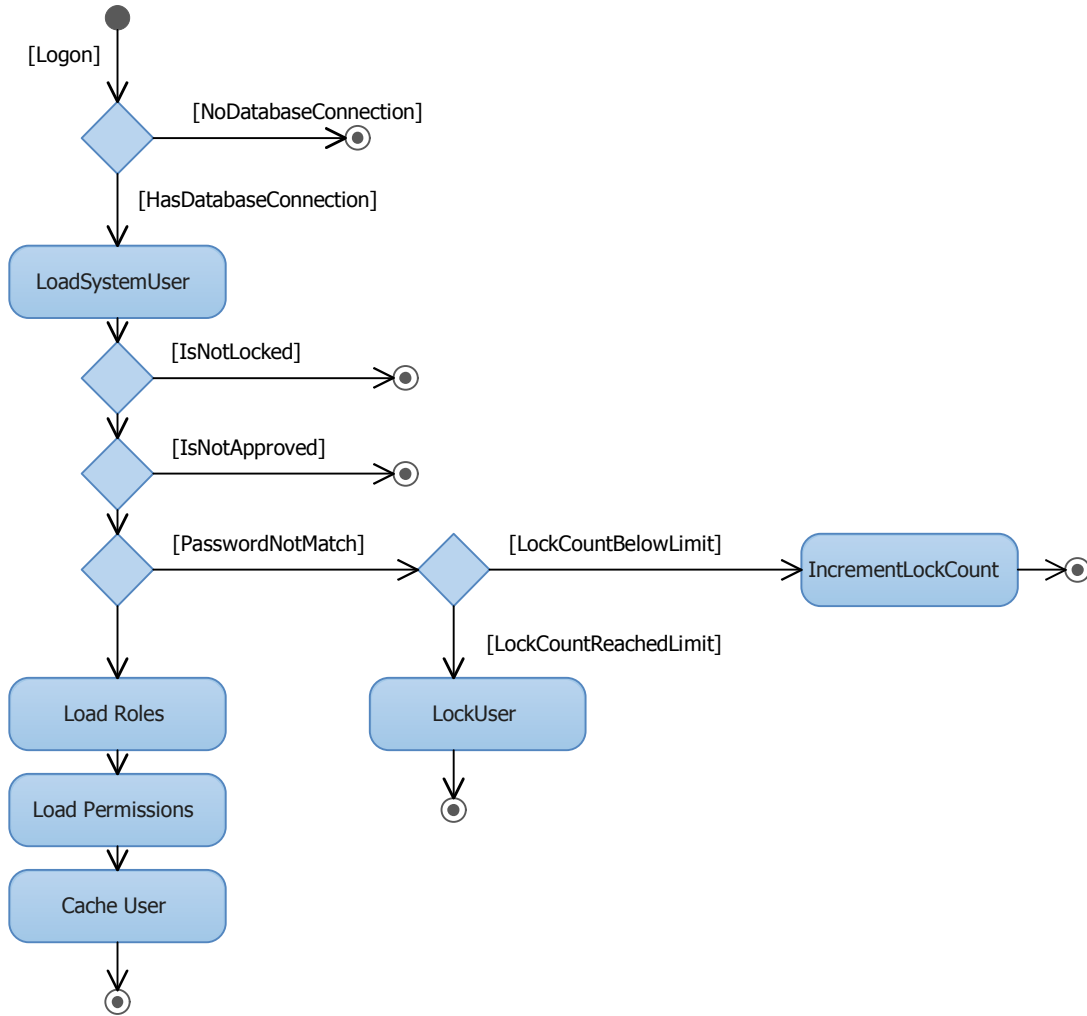


Figure 5: Logon Activity Diagram

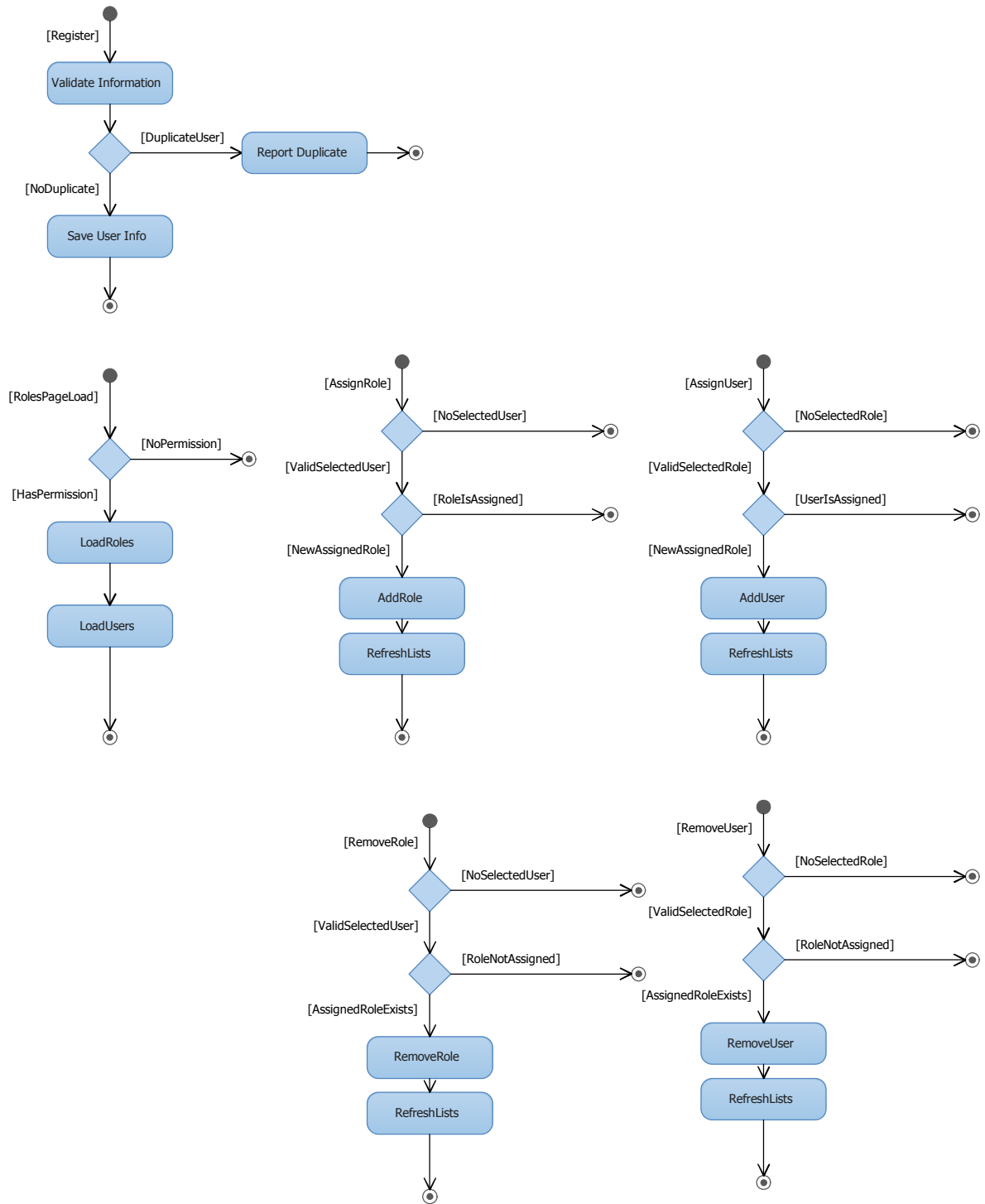


Figure 6: Assign Role Activities on Page Load, Assign Role, Assign User, Remove Role and Remove User

DATABASE DIAGRAMS

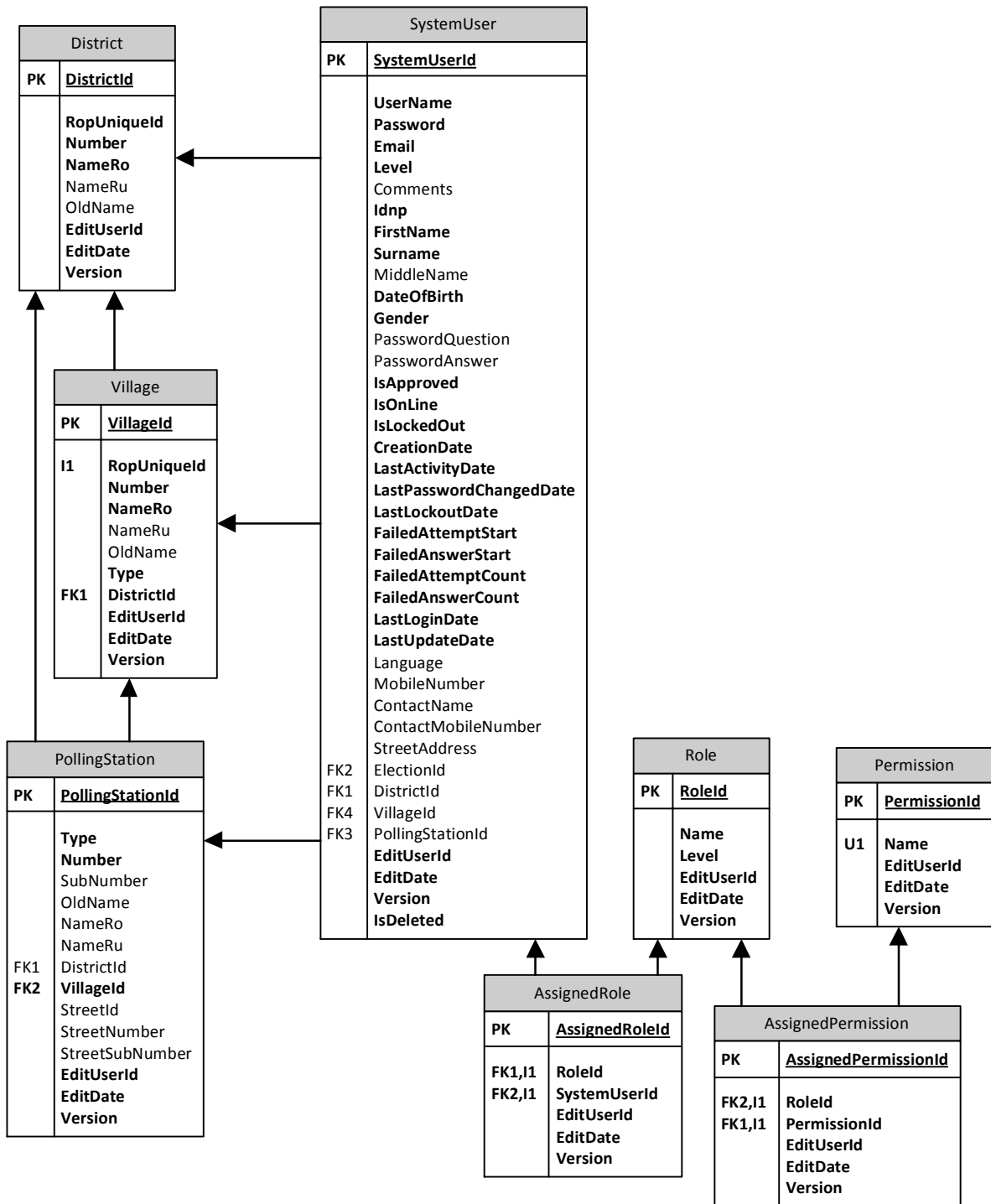


Figure 7: Database Diagram of tables used for System User

BUSINESS OBJECTS

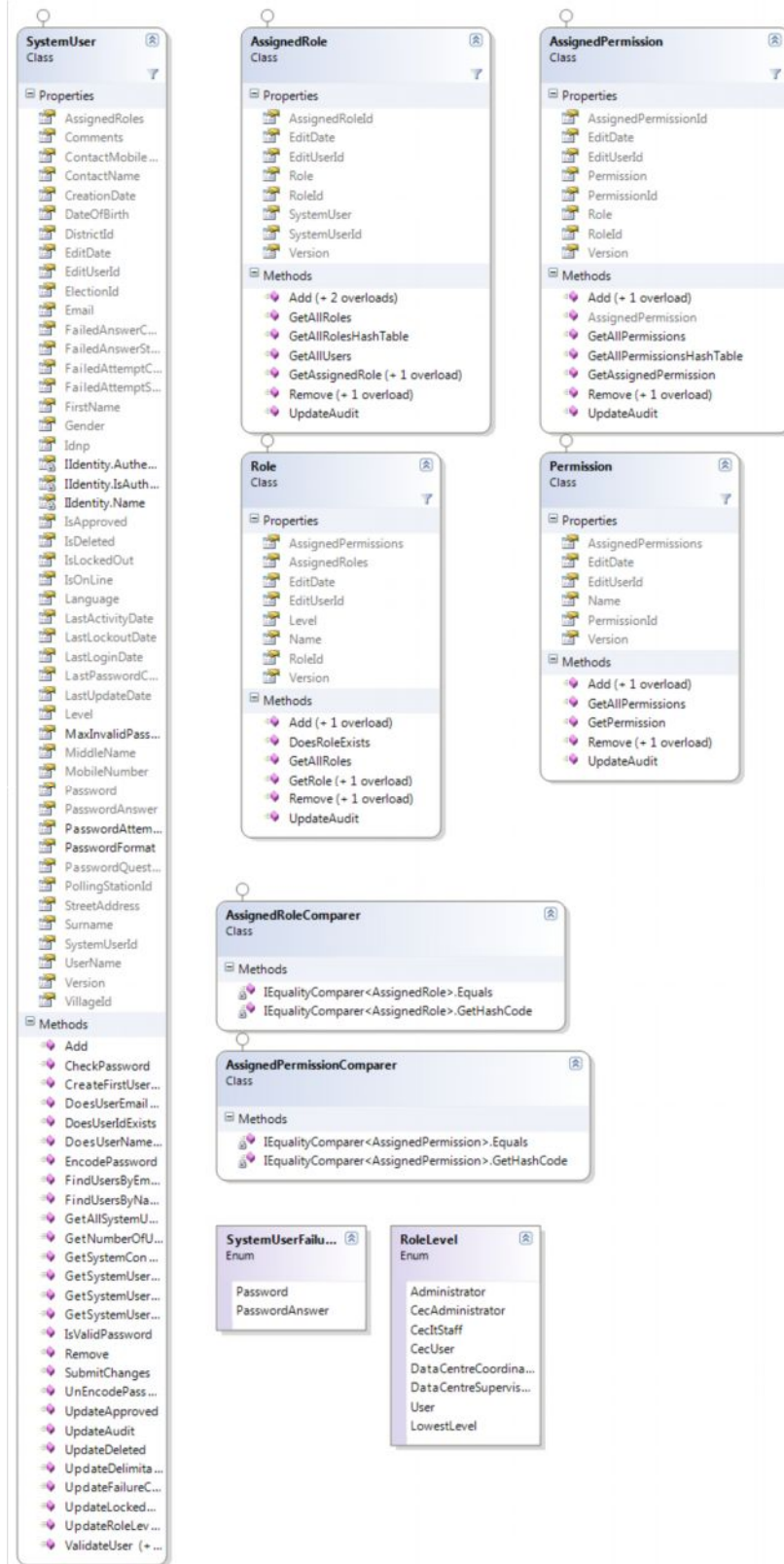


Figure 8: Business Objects showing properties and Methods

THE LOGIN PAGE

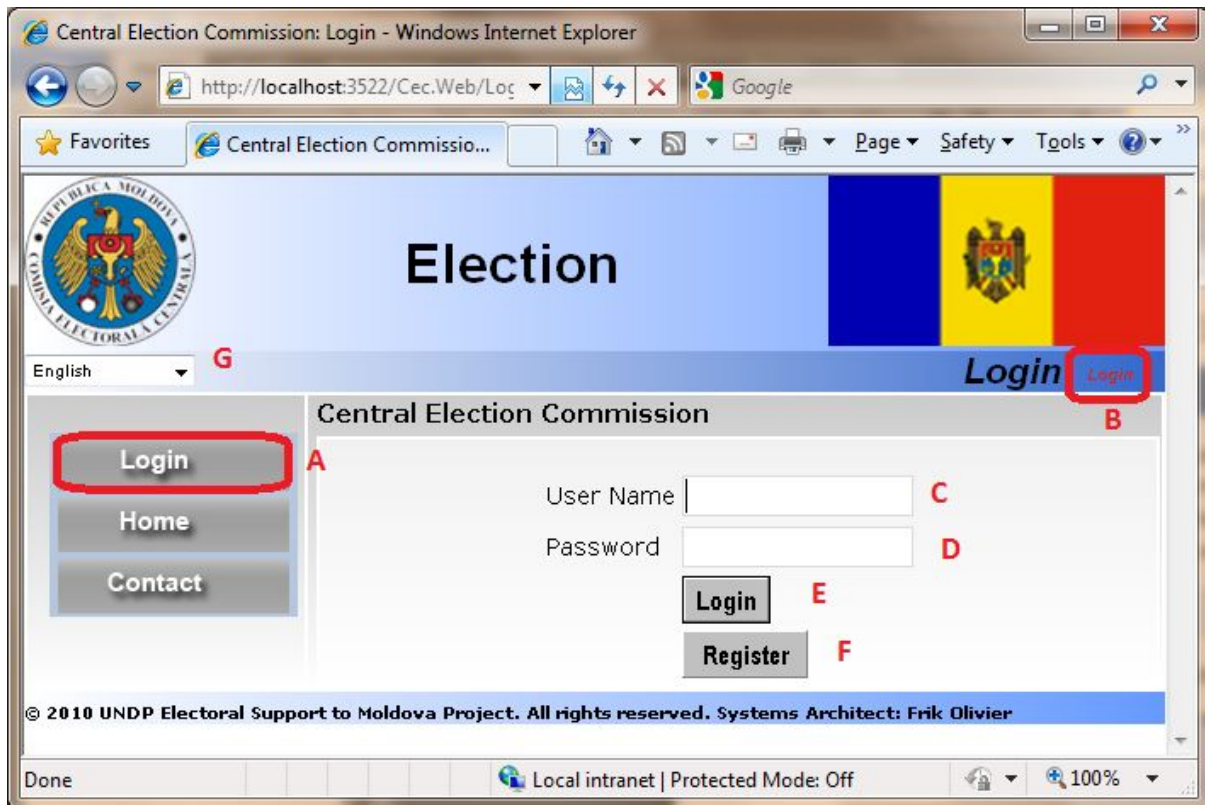


Figure 9: The Login Page

The User can select a language from the top left corner (G) to change the SAISE into a language more comfortable for the User. The User can use either the *Login* button (A) or the *Login* link (B) to access the login page.

The User should type his/her name into the space provided next to *User Name* (C). This field is not case sensitive. The next step is for the User to type in his *Password* (D) and click on *Login* button (E). The *Password* (D) field is case sensitive. This means that the system can distinguish between capital and small letters, i.e., for example, if the password is DfeF_asdf, the first and fourth letters must be entered with the Shift key pressed on your keyboard. If the *User Name* and *Password* is correctly entered, then the SAISE will log the User in and all the options permitted to the User will be shown.

The SAISE will lock the User's account if the *Password* is entered incorrectly after 5 times. The SAISE Administrator needs to be notified to unlock the User's account.

Click on *Register* button (F) if the User has not been registered before.

Every action or modification is logged against the login User.

REGISTRATION OF NEW USER

Election

Register

A

Welcome To CEC !
 All changes to these details will be recorded.
 All Data Change In The System Will Also Be Recorded Against The Login User
 All Performance Figures And Reports Will Be Calculated Against The Login User.

B

User Name	<input type="text"/>	System Id	<input type="text"/>
New Password	<input type="text"/>	Confirm Password	<input type="text"/>
Label	<input type="text"/>		
First Name	<input type="text"/>	Surname	<input type="text"/>
Language	English ▾	IDNP	<input type="text"/>
Gender	{Select} ▾	Mobile Number	<input type="text"/>
Contact Person Name	<input type="text"/>	Contact Mobile	<input type="text"/>
Street Address	<input type="text"/>		

C

Systems Architect: Frik Olivier

Figure 10: Registration Page

All Users of the SAISE needs to be registered before a user can access and use the SAISE. The new User can access the Registration page only from the Login page as described earlier in the *Login Page* section.

Please take time to read and understand the responsibility and accountability statement (A).

The User should fill in all the details in section B. It is important to fill in all the fields in order for the System Administrator to be able to identify you when the System Administrator needs to approve your account and assign you permissions.

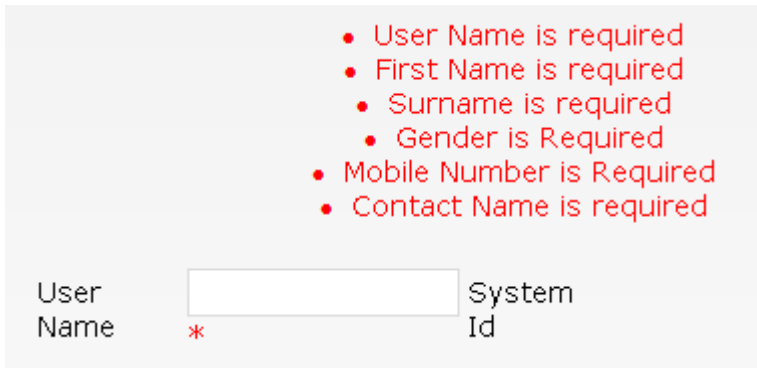


Figure 11: List of Errors in fields is clearly displayed at the top with red * next to field in question

The *User Name* will be the name the User uses to Login to SAISE. This can be any name of the User’s choosing. This name should be unique in SAISE and SAISE will notify the User if a duplicate name is detected.

Be careful with the choice of *Password*. This should be kept secret and should not be easily breakable. See *Recommendations for selecting a Password* later in the manual.

The SAISE will use the language selected by the User as a default language next time the User login.

After successfully registering, the User should contact the SAISE Administrator to approve the User and to assign appropriate permissions to the User. The User will not be able to login before the SAISE Administrator has performed these functions.

RECOMMENDATIONS FOR SELECTING A PASSWORD

The password is encrypted (scrambled) and stored in encrypted hash format. No one, not even the Database Administrators will know your password. Please remember your password since SAISE Administrators will not be able to retrieve your password. Should the User completely forget the login password then the SAISE Administrator will be able to reset your password agreed by you and the administrator.

Here are a few recommendations on selecting a password:

1. Case Sensitivity – Should contain at least one (1) upper and one (1) lower case character.
Example: Fst34#221
2. Alphanumeric Characters – Should contain at least one (1) digit and one (1) letter. It may contain special characters, but avoid double-quotes, quotes, colons, semicolons, minus signs, etc.
Example: Ts2%#54
3. Character String Length – Should be between eight (8) and fourteen (14) characters long.
Example: PR3#567YUOP22)
4. Password Expiration – Should be changed every sixty (60) days.
5. Password Re-use – Should not be set to any of the five (5) previously-used passwords.
6. Lockouts (Duration) – Should remain locked for fifteen (15) minutes or until a SAISE Administrator manually unlocks the account.
7. Lockouts (Access Attempts) – Will be locked after five (5) incorrect attempts.
8. Dictionary Words – Should NOT be common words found in a dictionary such as nouns, family, friend, or computer names, etc.
Example: do not use names like GrandmaJo, Rumpelstilskin, or MicrosoftExchange.

9. Personal Information – Should NOT be based on personal information such as birthdays, addresses, pet names, phone numbers, etc.
Example: do not use June272008, BearlockHolmes, or KensingtonGardens77, etc.
10. Word or Number Patterns – Should NOT contain patterns.
Example: do not use strings like aaabbb, qwerty, zyxwvuts, 123321, etc.
11. Character String Reversals – Should NOT simply reverse common dictionary phrases or names.
Example: do not use strings like nedragrednik, 321namtaB, 10drowssaP, etc.
12. Appended Digits – Should NOT simply append a digit to a dictionary word.
Example: secret1, 1secret, Password123, 678Password.
13. Password Secrecy- Must never be shared with anyone (this includes Helpdesk staff, supervisors, spouses, etc.).
14. Weak Characters – Must avoid 'L' 'O' '1' '0' '-' etc.
15. Password Recall – Must be easy to remember and global to all personal passwords.
16. Password Transmission - Must not send via email or other electronic devices.
17. Password Storage - Must not be written down or stored online.
18. Strong Password Examples
Ratyrpt23% or TmB1w2RmbR? - (This May Be One Way to Remember) or
2manyAPPLEPIES2littletime!
19. Password Examples that Fail the System and should not be used
Password or July251978 or Lassie or 1234567
20. Weak Password Examples that Pass the System but should not be used
Password123 or ABCJuly251978 or Lassie234 or A1234567

SAISE ADMINISTRATOR USER MANAGEMENT FUNCTIONS

ADMINISTRATIVE FUNCTIONS OVERVIEW

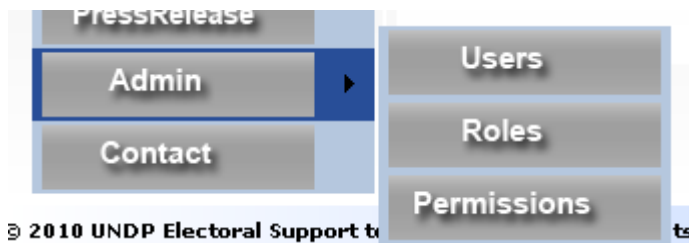


Figure 12: SAISE Administrative functions

The administrative functions for SAISE Administrators can be found at the bottom of the *Menu*. Only Users with *Administrative Authorization* will be able to see these functions.

User – This page will enable the SAISE Administrator to edit Users Information, reset passwords, set delimitation rights, unlock the users, approve users and see their online statistics.

Roles – This page will enable the SAISE Administrator to assign *Roles* to Users. The SAISE Administrator will also be able to see what users is assigned to what roles and what roles are assigned to users.

Permission – This page will allow SAISE Super Administrators to create *Roles*, assign *Permissions* to *Roles*. This page can also be used by Developers to create new *Permissions*.

USER MANAGEMENT

Only when the logged on user (B) has the "SystemUserView" permission to access this page, will the Admin->User button (H) be displayed. Users or Supervisors who have permission will be able to navigate to the following page (A).

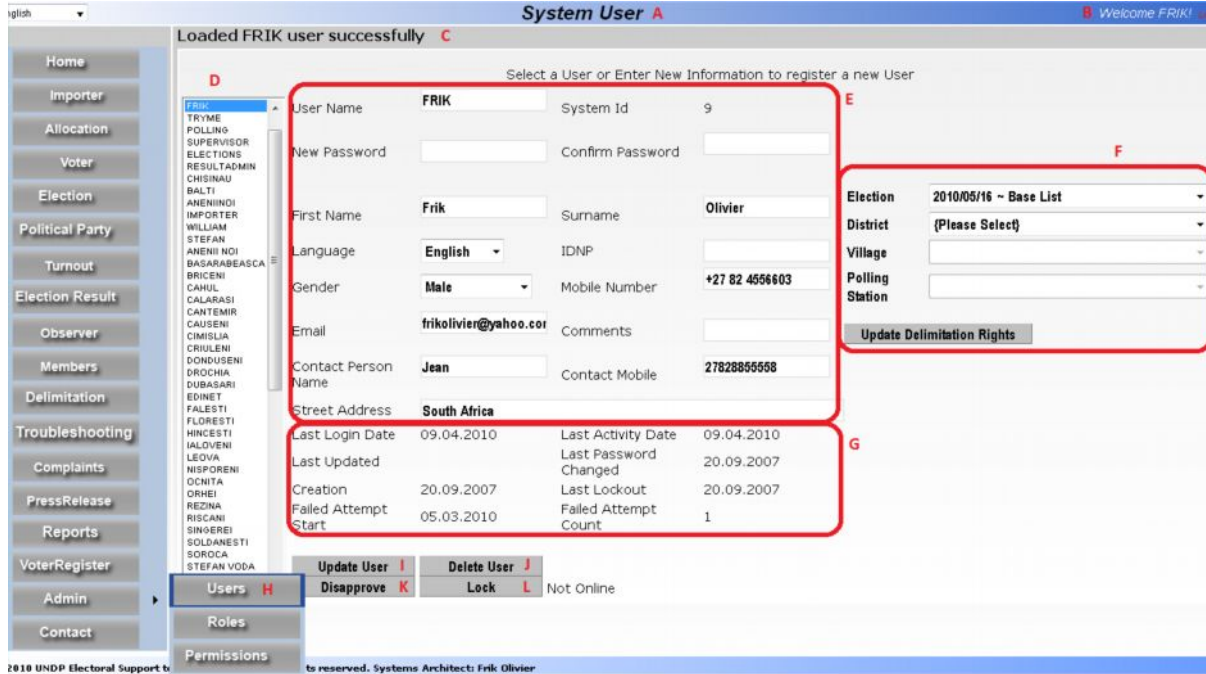


Figure 13: User Management Page

- A. **Page Title** – Indicates that the SAISE Administrator is currently busy with the *System User* management functions.
- B. **Login User** - Shows the current login user.
- C. **Status Line** – Shows the feedback for the User’s actions from the SAISE.
- D. **List of Registered Users** – The SAISE Administrator should select n user from this list to update.
- E. **User Information** – The selected user’s editable information will be displayed here. The SAISE Administrator can change the user’s information, including resetting the password, here.
- F. **Delimitation Permission** – The SAISE Administrator can restrict the selected user to see or edit only certain delimitation. For example, if the SAISE Administrator wants to limit the User to see a certain District including all Villages and Polling Stations, for a certain Election, then the Administrator should select the authorized Election and District and leave the Village and Polling Station blank.
- G. **Statistical Information** – This section contains useful information about the User’s activities.
- H. **Users Menu Button** – Menu button to access this page.
- I. **Update User** – Click on this button to save any changes (such as resetting the User’s password) made to the User’s Information. This function is protected by the "SystemUserUpdate" permission.
- J. **Delete User** – Click on this button to delete the User. This function is protected by the "SystemUserDelete" permission.
- K. **Approve/Disapprove User** – Click on this button to delete the User. This function is protected by the "SystemUserApprove" permission.
- L. **Lock/Unlock User** – Click on this button to lock or unlock the User. This function is protected by the "SystemUserLock" permission.

APPROVING OR UNLOCKING NEW USERS

The SAISE Administrator needs to access the Admin->User page (see previous section *Administrative Functions Overview*) for this administrative function.



Figure 14: Selected user needs to be approved and unlocked

Important! The user would not be able to login if the user is not Approved (button is red) OR if the user is Locked (button is red).



Figure 15: Selected user can be disapproved or locked

From the above two figures the SAISE Administrator can clearly distinguish the selected user's *Approval* and *Lock* status.

Figure 14 shows the status if the User is created or registered for the first time. The user needs to be *Approve* and *Unlocked*. In Figure 15 is the state after the user is approved and unlocked. The user can now be *Disapproved* or *Locked*.

ROLE MANAGEMENT

Only when the logged on user (B) has the "RoleView" permission to access this page, will the Admin->Role button (K) be displayed. Users or Supervisors who have permission will be able to navigate to the following page (A).

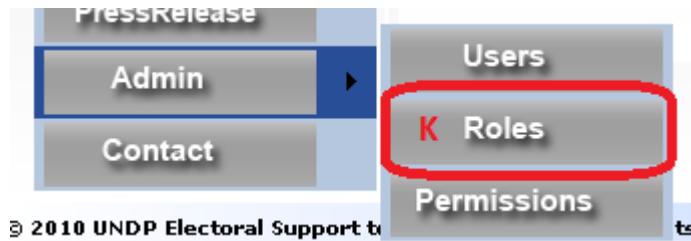


Figure 16: Menu button to access Role Management

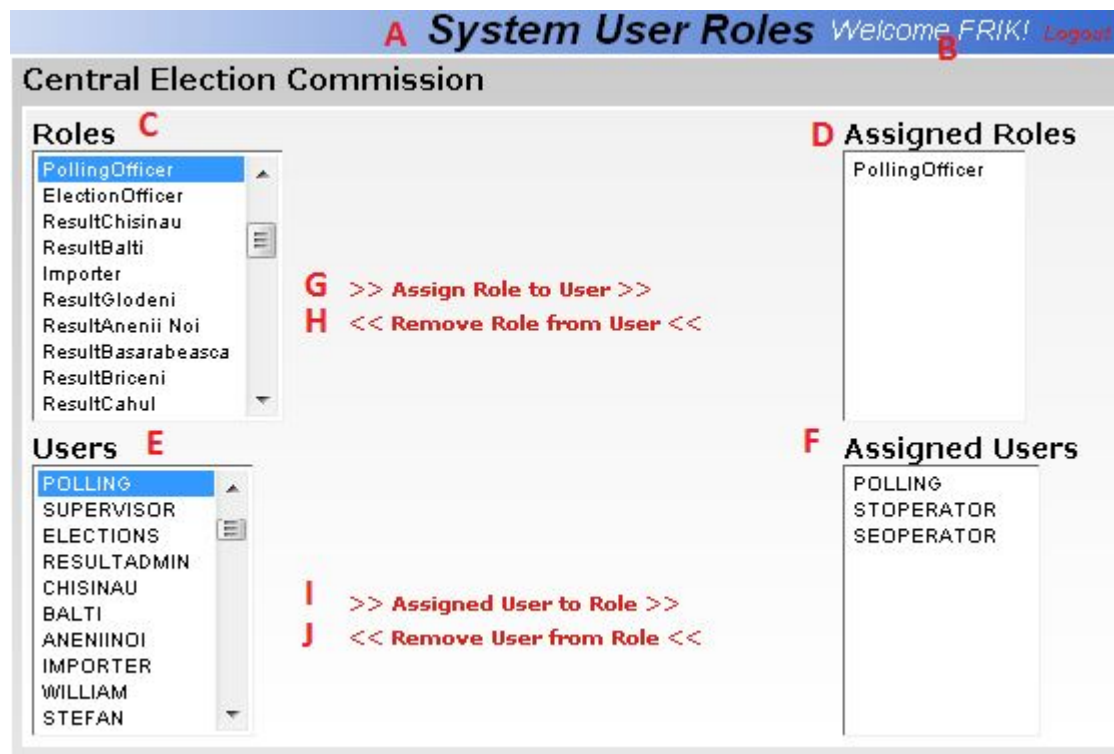


Figure 17: Role Management Page

- A. **Page Title** – Indicates that the SAISE Administrator is currently busy with the *Role* management functions.
- B. **Login User** - Shows the current login user.
- C. **Role list** – A list of available Roles. All the selected role’s (C) assigned users (F) will be displayed when a Role is selected. The SAISE Administrator should select the Role (C) AND a User (E) they want to add or remove Users (E) from.
- D. **Assigned Roles** – List of assigned roles (D) for selected User (E). This function is protected by the "RoleAssign" permission.

- E. **User list** - A list of available Users. All the selected user's (E) assigned roles (D) will be displayed when a User is selected. The SAISE Administrator should select the Role (C) AND a User (E) if they want to add or remove Roles (E) from each other.
- F. **Assigned Users** – List of assigned users (F) for selected Role (C).
- G. **Assign Role to User** – Both Role (C) and User (E) should be selected. The User and the Role will then be assigned to each other when clicked on Assign Role to User (G). The SAISE Administrator will see the Role (C) appear in the Assigned Roles list (D) as well as the User (E) in the Assigned Users list (F). This function is protected by the "RoleAssign" permission.
- H. **Remove Role from User** – Both Assigned Role (D) and User (E) should be selected. The User and the Role will then be removed from each other when clicked on Remove Role from User (H). The SAISE Administrator will see the Role (C) disappears in the Assigned Roles list (D). This function is protected by the "RoleRemove" permission.
- I. **Assign User to Role** – Both Role (C) and User (E) should be selected. The User and the Role will then be assigned to each other when clicked on Assign User to Role (I). The SAISE Administrator will see the Role (C) appear in the Assigned Roles list (D) as well as the User (E) in the Assigned Users list (F).
- J. **Remove User from Role** – Both Assigned User (F) and Role (C) should be selected. The User and the Role will then be removed from each other when clicked on Remove User from Role (J). The SAISE Administrator will see the User (E) disappears in the Assigned User list (F). This function is protected by the "RoleRemove" permission.

PERMISSION MANAGEMENT

Only when the logged on user (B) has the "PermissionView" permission to access this page, will the Admin->Permission button (O) be displayed. Users or Supervisors who have permission will be able to navigate to the following page (A).

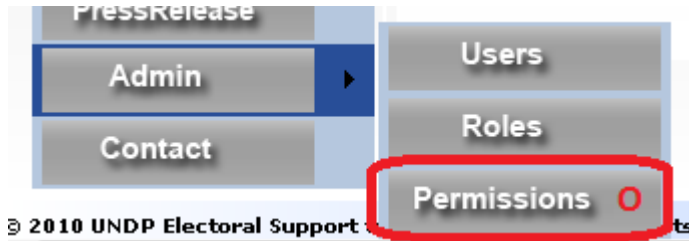


Figure 18: Menu button to access Permission Management

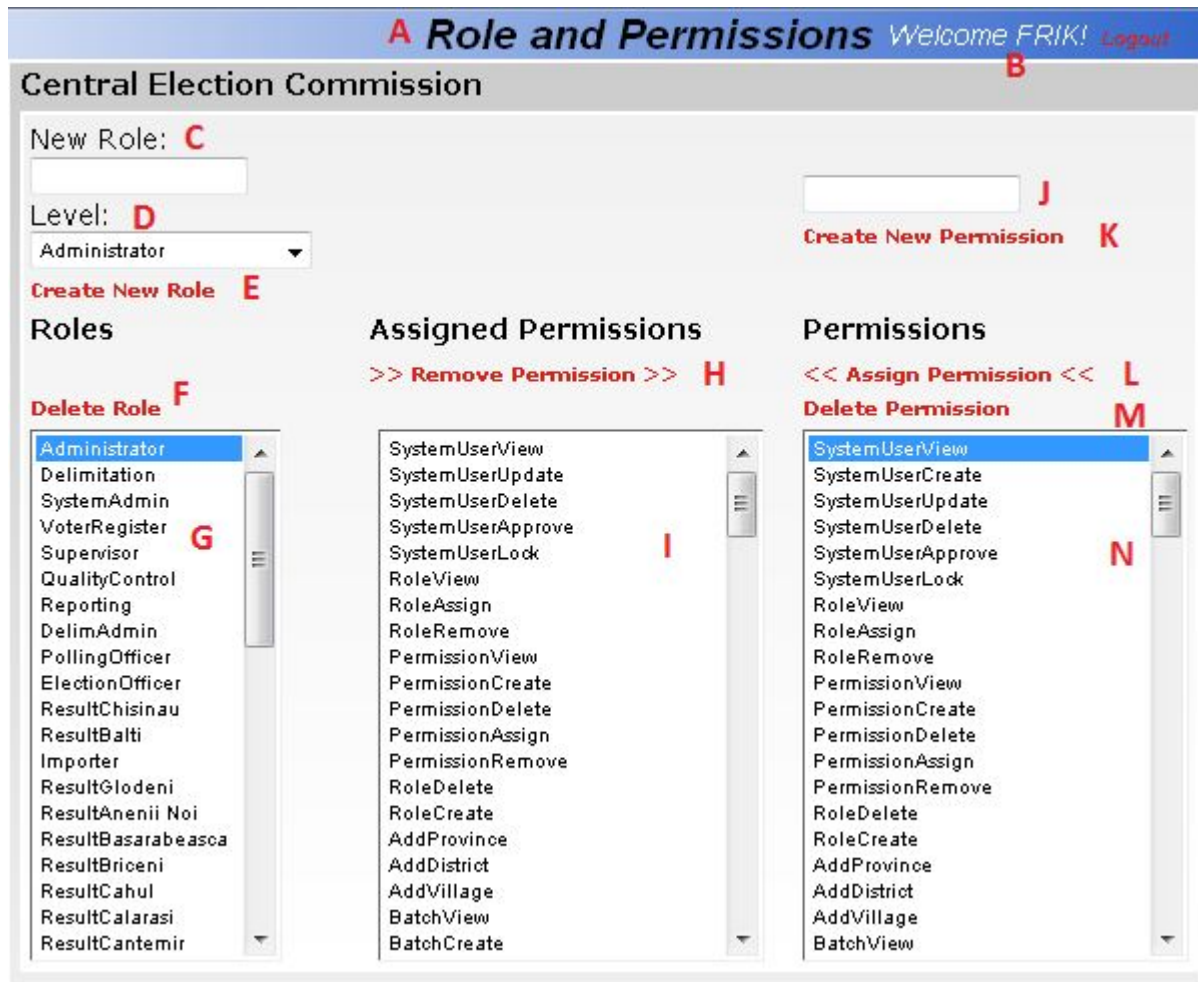


Figure 19: Permission Management Page

- A. **Page Title** – Indicates that the SAISE Administrator is currently busy with the *Permission* management functions.
- B. **Login User** - Shows the current login user.

- C. **New Role** – New Role name to be created.
- D. **Role Level** – The visibility level of the Role. Lower level Roles will not be able to see higher level Roles or Users. This will aid in delegation of Administrators. For example: If Super Administrators want to delegate Administrator rights to lower level administrators, then they can create a Role “Low Administrator” and assign a lower level access to that Role. When users with the “Low Administrator” login, they will not be able to see the Super Administrator with higher privileges who created their role.
- E. **Create Role** – When the SAISE Administrator clicks on this button, they will create the Role (C) with the Role Level (D). The Role (C) will appear in the Role List (G). This function is protected by the **"RoleCreate"** permission.
- F. **Delete Role** – The SAISE Administrator should first select a Role from the Role List (G). They can then click on Delete Role (F) to delete the Role. This function is protected by the **"RoleDelete"** permission.
- G. **Role List** – This is a list of Roles available. The Assigned Permissions (I) will be displayed when a Role is selected from this list.
- H. **Remove Permission** – The SAISE Administrator should select a Role (G) and then select a Assigned Permission (I). The assigned permission will then be removed. This function is protected by the **"PermissionRemove"** permission.
- I. **Assigned Permission list** – The list of permissions assigned to the selected Role (G). This function is protected by the **"PermissionAssign"** permission.
- J. **Create Permission** – Enter the name for the permission to create. This name must be **exactly** spelled (**case sensitive**) as it is been used inside the SAISE source code. *Only for SAISE Developer use!*
- K. **Create Permission Button** – The Permission (J) will be created. This function is protected by the **"PermissionCreate"** permission. *Only for SAISE Developer use!*
- L. **Assign Permission** – The selected Permission (N) will be assigned to the selected Role (G). This function is protected by the **"PermissionAssign"** permission.
- M. **Delete Permission** – The selected Permission (N) will be deleted. The SAISE will also remove the selected Permission (N) from any role it was assigned to. This function is protected by the **"PermissionDelete"** permission. *Only for SAISE Developer use!*
- N. **Permission list** – List of available permissions.

Important! All assigned permissions and assigned users will be removed by the SAISE before deleting the role itself.

USAGE IN SOURCE CODE

IN PAGE LOAD FUNCTION

The following code should be used in the Page_Load() function of every web page to avoid any user to enter the address manually into the address field of a browser.

```
#region Permissions
// Check whether the login user has the right permissions
SystemPrincipal systemPrincipal = Context.User as SystemPrincipal;
if (systemPrincipal == null || !systemPrincipal.HasPermission("MemberView"))
{
    Response.Write("<hr><font class=\"Error\">" +
        Resources.Resource.InsufficientPermission.ToString() + "</font><hr/>");
    Response.End();
    return;
}
#endregion
```

TO PROTECT BUTTONS, FIELDS OR ACTIONS

The following code is an example how the integrated security can be used to protect action buttons and entry fields for users not authorized to see or use the button or action.

```
#region Permissions
// Check whether the login user has the right permissions
SystemPrincipal systemPrincipal = Context.User as SystemPrincipal;

if (systemPrincipal != null && systemPrincipal.HasPermission("MemberAdd"))
    AddButton.Visible = true;
else
    AddButton.Visible = false;
if (systemPrincipal != null && systemPrincipal.HasPermission("MemberUpdate"))
    UpdateButton.Visible = true;
else
    UpdateButton.Visible = false;
if (systemPrincipal != null && systemPrincipal.HasPermission("MemberDelete"))
    DeleteButton.Visible = true;
else
    DeleteButton.Visible = false;

#endregion
```

TO PROTECT MENU ACTIONS

The following code is an example to see which menu items should be loaded.

```
// Check whether the login user has the right permissions
SystemPrincipal systemPrincipal = Context.User as SystemPrincipal;
if (systemPrincipal != null && systemPrincipal.HasPermission("MemberView"))
    NavigationMenu.Items.Add(new MenuItem("", "", imageUrl,
        "~/AspRegister/Member.aspx"));
```

ELECTION

OVERVIEW

This is an existing module and placed in this specification for completeness and clarity. This should be used in the integrated CEC Website exactly as it is used in SAISE.

All information related to a specific Election should be stored using the information stored by the Election Module. The latest Election Item should be a first level Menu Item with all related materials or information such as Decisions, Meetings, Notes, Voter Turnout and Election Results for that Election on the second level under the latest Election Menu Item. The rest of the previous Elections should be shown under the "Archive" Menu Item on the second level with the respective related information on the third level.

The Election Module a very simple module but a core of the SAISE history. All configurations and data will be stored for each Election. All other Modules reference a specific Election.

ELECTION LAW 101

"5. The basic tasks of SAIS "Elections" are:

- a) Informational assistance in the preparation and conduct of elections;
- b) establishing immediately, on election day, the rate of participation in voting;
- c) promptly obtaining preliminary information on the results of voting just after the end of the voting procedure;
- d) processing and statistical analysis of the results of conducted elections and referendum." – Page 4, LAW No. 101 from 15.05.2008

USE CASE

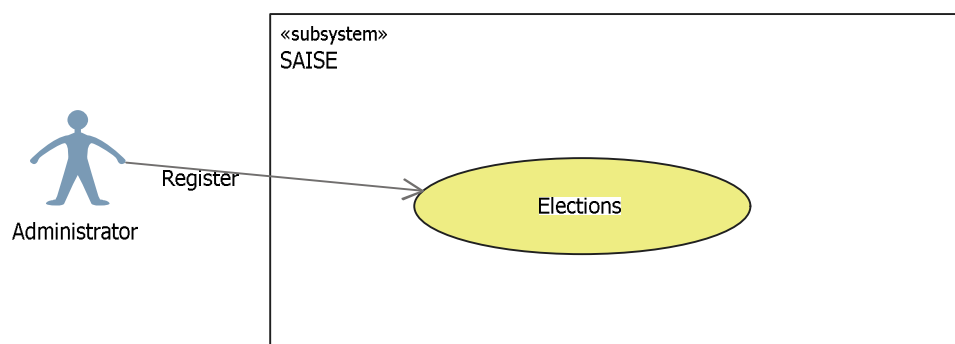


Figure 20: Use Case for Election Registration

ACTIVITY DIAGRAMS

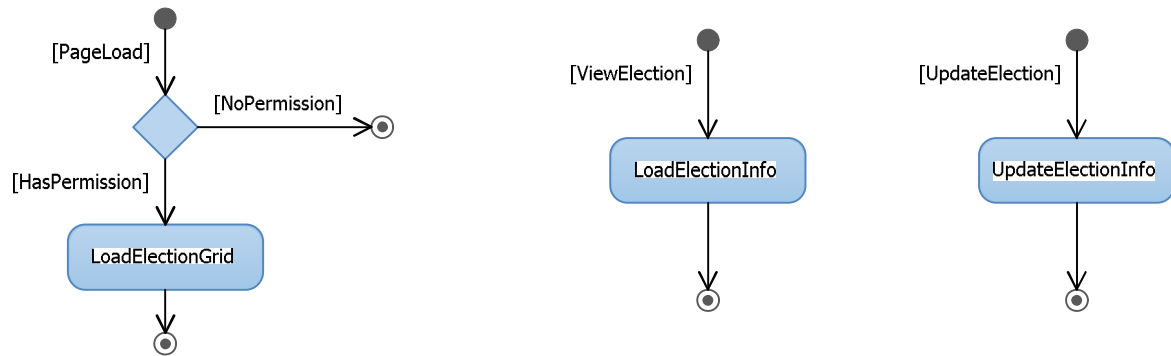


Figure 21: Activity Diagram for Page Load, View and Update Election

DATABASE DIAGRAMS

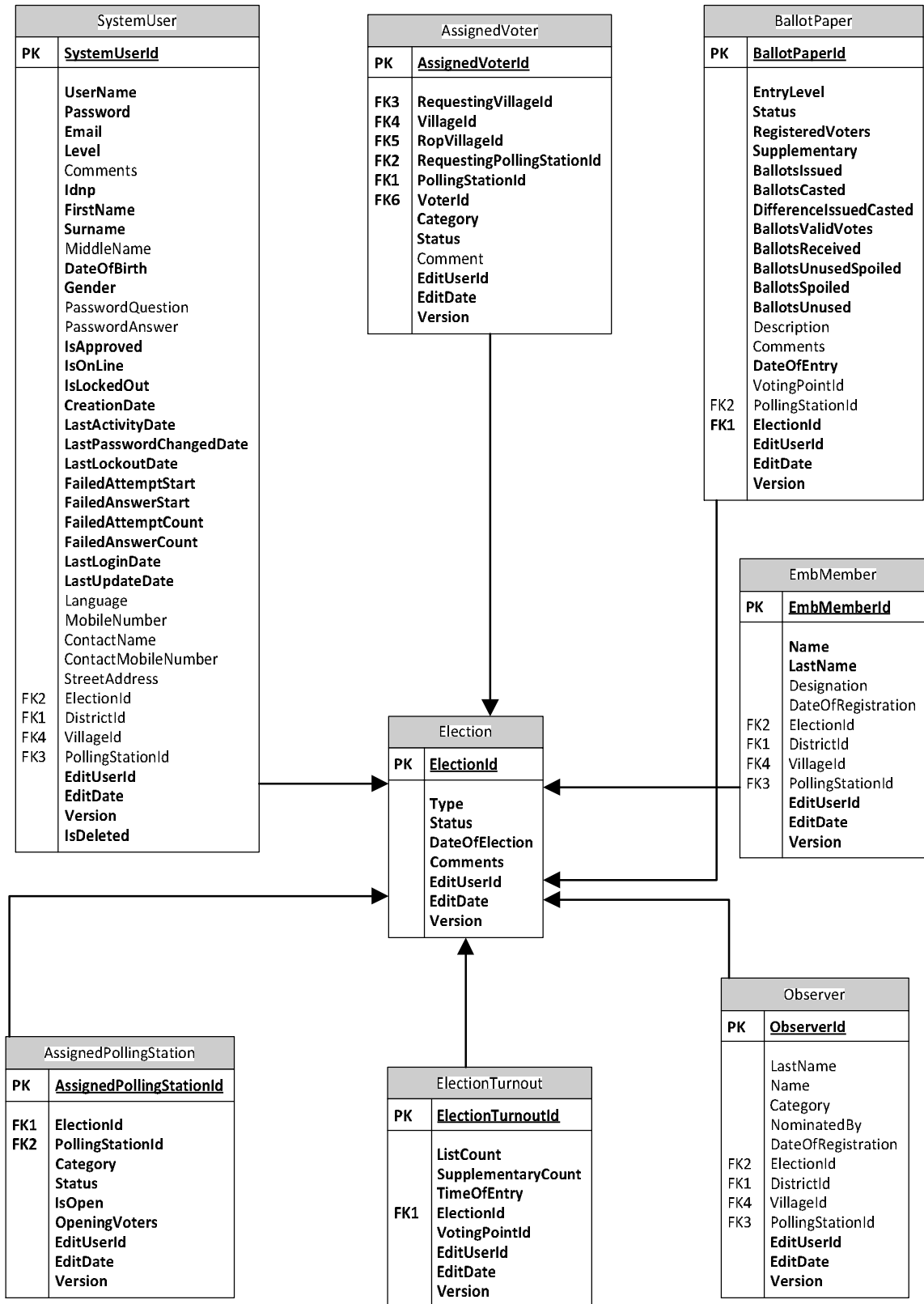


Figure 22: Database Diagram of tables used for Election and Related tables

BUSINESS OBJECTS

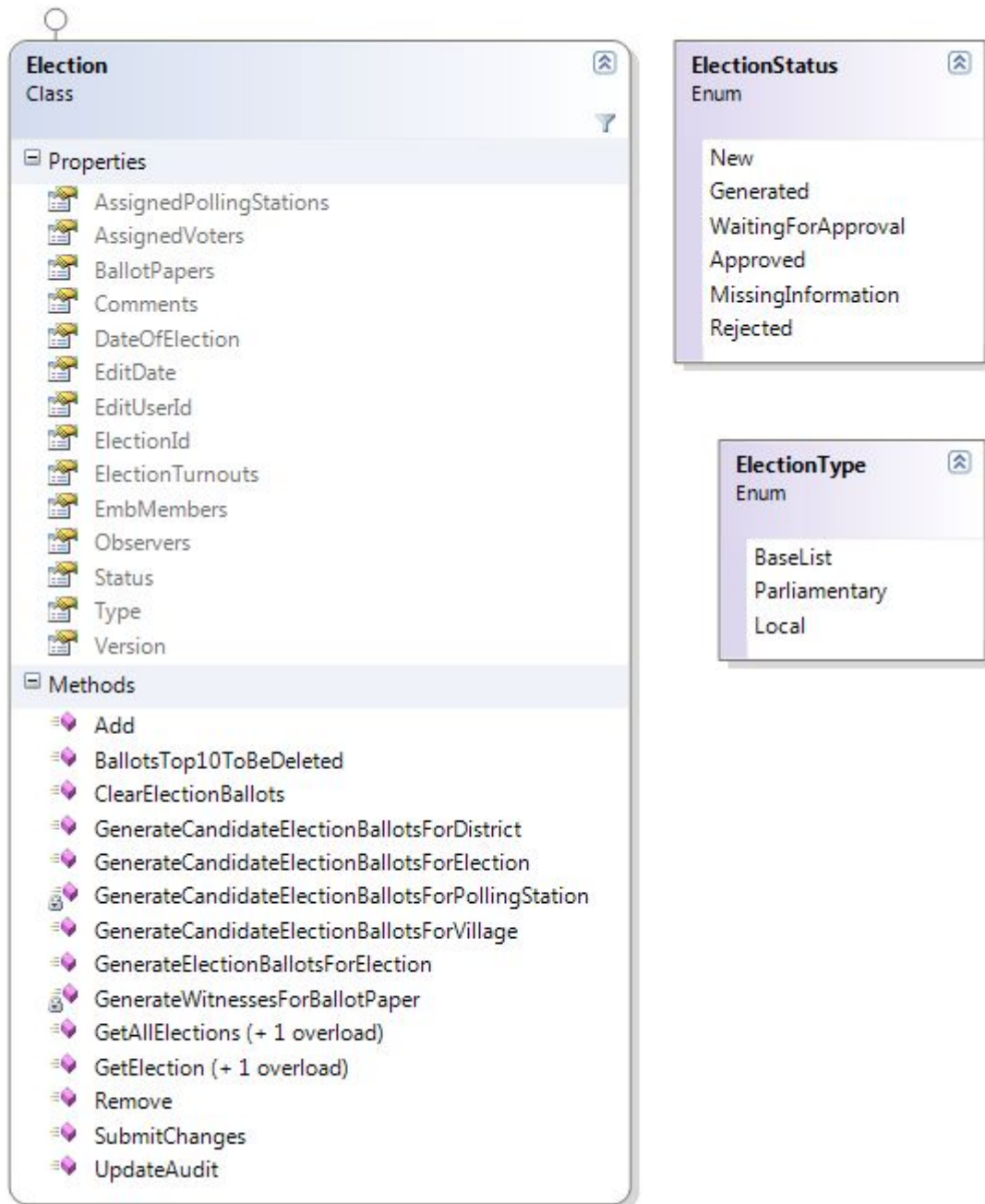


Figure 23: Business Objects showing properties and Methods

USER INTERFACE

Only when the logged on user (B) has the "ElectionView" permission to access this page, will the *Election* button (C) be displayed. Users or Supervisors who have permission will be able to navigate to the following page (A).

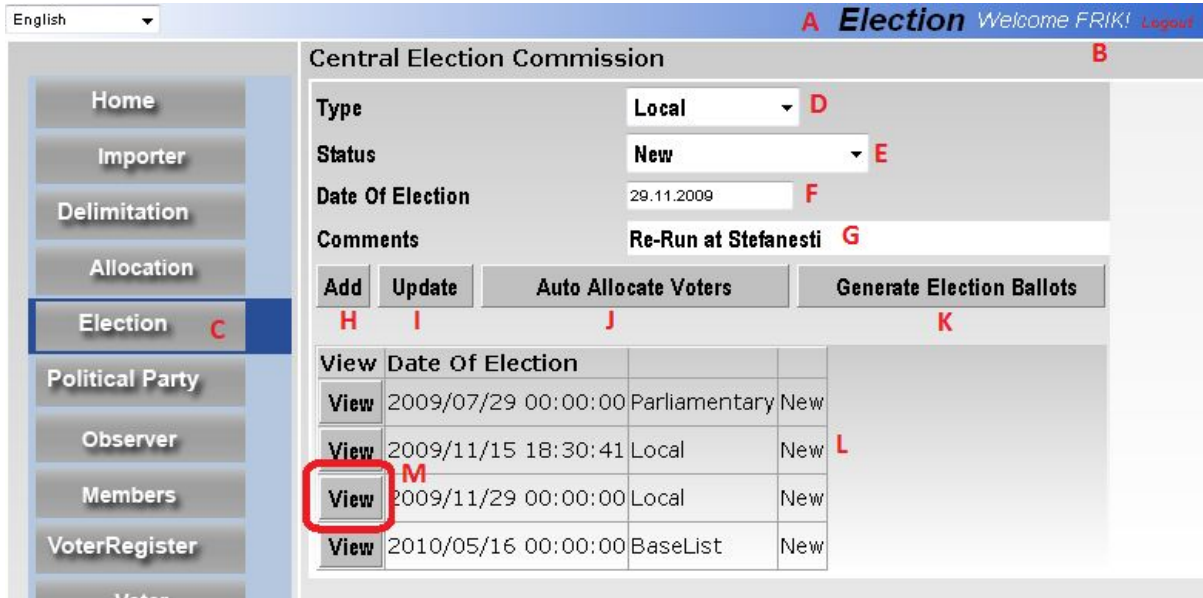


Figure 24: Election Management Page

- A. **Page Title** – Indicates that the User is currently busy with the *Election* management functions.
- B. **Login User** - Shows the current login user.
- C. **Election button** – Menu Button to access the page.
- D. **Election Type** – The type of the Election.
 - a. **Base List** – The User can create a ‘future’ Election for the Local Authorities to work with outside Election Campaign periods.
 - b. **Parliamentary** – This Election Type is executed nationally and will have one set of Ballot Papers to be used in *all* the Polling Stations.
 - c. **Local** – This Election Type can be created to indicate Local Elections for Mayor Elections in the Districts or Villages. A different set of Ballot Papers will be generated for each Polling Station.
- E. **Election Status** – The Election will go thru certain stages. The different stages will determine what can be done in that period.
 - a. **New** – The Election is in creation phase. In this phase Polling Stations and their Auto Allocation Information should be updated. Political Parties and their Candidates and Representatives should be updated. Citizens should be imported.
 - b. **Campaign** – The Election Campaign started. The main function now would be to update the Voter Lists. EMB Members lists and Observers lists should be updated.
 - c. **Display Closed** – Voter Lists has been closed for changes from the public. This is normally 5 days before Election. Final updates to Voter Lists should be made and the Final Voter List should be printed.

- d. **Election** – Election Day functions only. All changes to Register of Voters will be seen as Supplementary list changes.
- e. **Completed** – No changes other than Supplementary updates to the Election related information can be made.
- F. **Election Date** – Date of the Election. The User may create a future Election for which the date is not known yet. This will allow Local Authorities to work on the Voter List as if it is a Base List. However, the date should be changed the moment the Election Date is announced.
- G. **Comments** – Any comments related to the Election can be stored here.
- H. **Add Election** – This is to create a new Election and add it to the Election List (L).
- I. **Update Election** – The User should select (M) an Election from the list (L) to make changes. The User can click on *Update* (I) to update the changes.
- J. **Auto Allocate Voters** – This will run the SAISE Auto Update function according to the Auto Allocate Information and the information SAISE could retrieve from the Register of Population.
- K. **Generate Election Ballots** – The SAISE will generate for the selected Election, Election Type and for the Political Parties and their Candidates Ballot templates. This will set the Ballot order for the Election Result module too.
- L. **Election List** - List of available Elections in the System.
- M. **Election View** – The Users should click on the Election they want to view, update or perform Election Management functions.

Important! The Auto Allocate function will overwrite ALL previously allocation and locality updates of Voters for the selected Election!

EXISTING DATABASE STRUCTURE USED IN CEC WEBSITE

The current information used in www.cec.md is kept in various formats or databases hosted on the e-Centru servers. CEC Management arranged with e-Centru for the retrieval of all of the data related to the old CEC website. Much of the data has been migrated to new database structures inside MS SQL database tables hosted at the CEC Server Room. It is currently unclear how the data is stored at the e-Centru servers and in which formats.

All data should be consolidated into the MS SQL database hosted at the CEC Server Room. Below are the data tables and structures created for the CEC Web Site. The tables and structures can be changed by the developer to fit the integration better. One such table “cluster” or group is the User Management which should be migrated to the User Management used in SAISE.

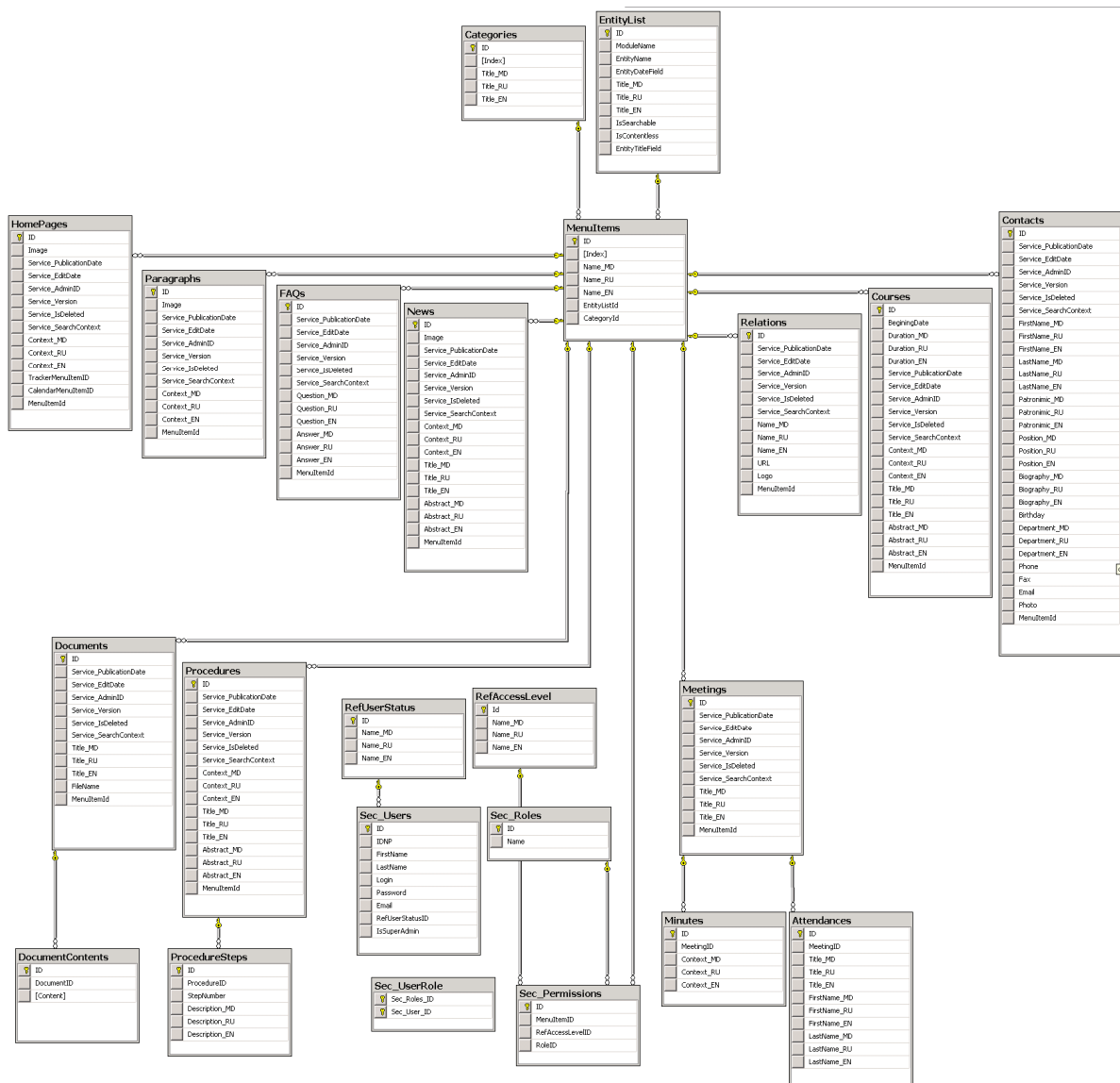


Figure 25: Tables currently in use in the MS SQL Database

LAYOUT AND BRANDING

Layout and Branding is how the content will be displayed and what color schemes would be used, etc. Most of the Layout and Branding can be left for RFP, but the main layout and screens should be determined for the Proposals to be considered objectively. The proposals should have a free hand to give ideas within the guidelines of this TOR. Preferable should it be a live mock site to display the layout and branding. No live data is needed; only sample or static data would be needed for evaluation.

The proposal should give at least one solution on the layout to indicate:

- Title (With rotating banner as background)
- Menu (horizontal or vertical, vertical can host more items and gives one more real estate on the screen for words)
- Main information
- CEC Coat of Arms
- Logon
- Language selection



Figure 26: Example of Layout

At least one color scheme should be proposed. Colors should be neutral. No definite connections to Political Parties, Religions, Bad-Vibe Colors, etc. It should use colors which blend the CEC Coat of Arms. Colors for the following Items should be defined with Normal, Focused / Selected, Mouse Hover, etc:

- Titles
- Menu
- Buttons
- Labels
- Hyperlinks
- Text Input Boxes, Combo Boxes
- Check Boxes, Radio Buttons
- Backgrounds of Windows and Controls

One font should be proposed and used throughout the Website.

Below is an example of the CEC Coat of Arms. The official logo in electronic format, can be requested from Ion.Pirojuc@cec.md



CONTENT

Content is the information that needs to be displayed on the internet.

The CEC Website should be available in three languages by selecting the language of choice in a drop down list. Languages should be Romanian (default), Russian and English. There should be a disclaimer stating that the Romanian language is the de-facto language and all disputes will refer back to Romanian.

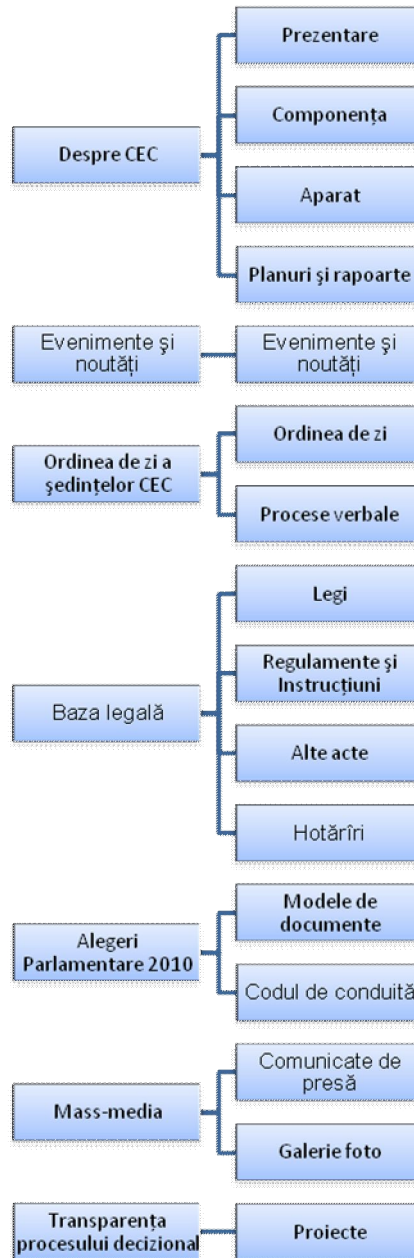
The Main Title should have a rotating banner displaying images from a certain pre-configured folder. The images dimensions are normally 1000px X 85px and can be in any picture format such as PNG, BMP, JPG, GIF or TIFF.

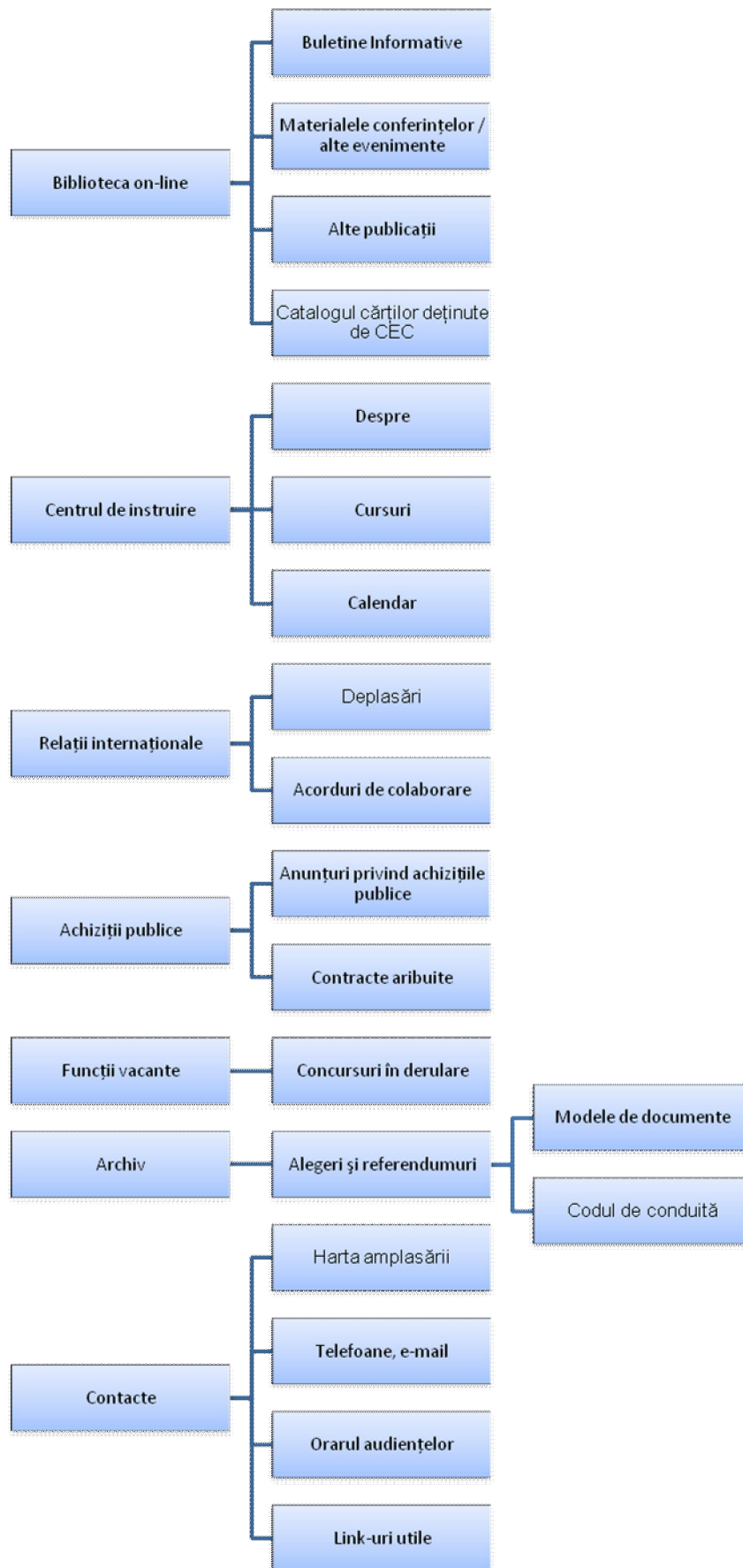
A logon button should be on the top left to allow persons to logon to the system. By logging onto the system, the user may or may not see more functions. A user with Menu Administrative rights can add items to the menu, change the order of menu items, edit the menu titles or assign user rights and permissions.

The main (Home Page) will have a summary in the main information region of the last edited items for categories (or main menu items) which is marked to display summary on Home Page. The number of items to be displayed on the main page from each category should be configurable.

The menu system should be loaded from Database Tables and should be configurable by persons with Administrative rights. The display order should also be configurable. The menu levels are envisaged being maximum three levels deep, but should not be limited to three. Each Menu Item should have a permission assigned to it and only be displayed if the logged User has the rights to see it.

The current Main Navigation topics or Navigation Menu of the Website are:





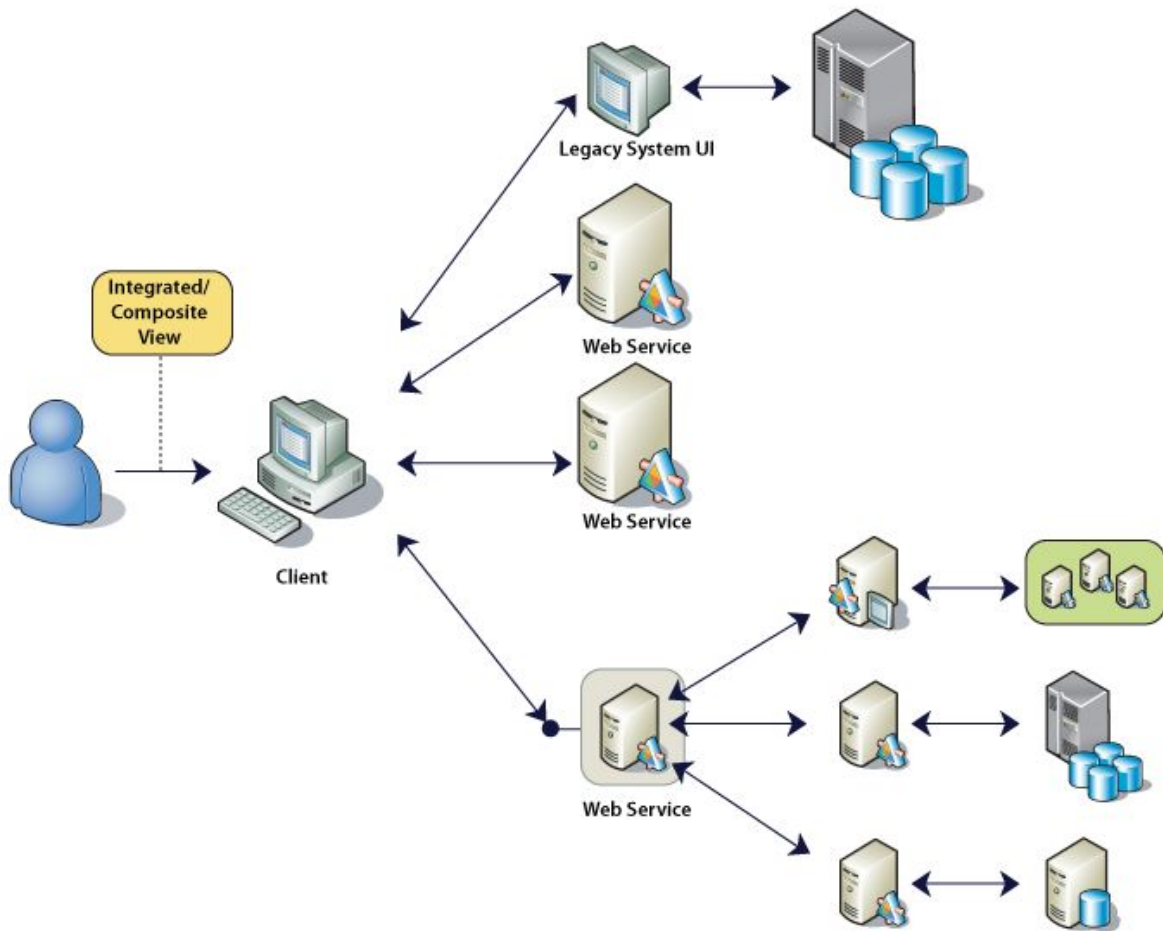
TECHNICAL REQUIREMENTS

Technical Requirements is the mechanism used to store the Content, filter the Content and enter the content.

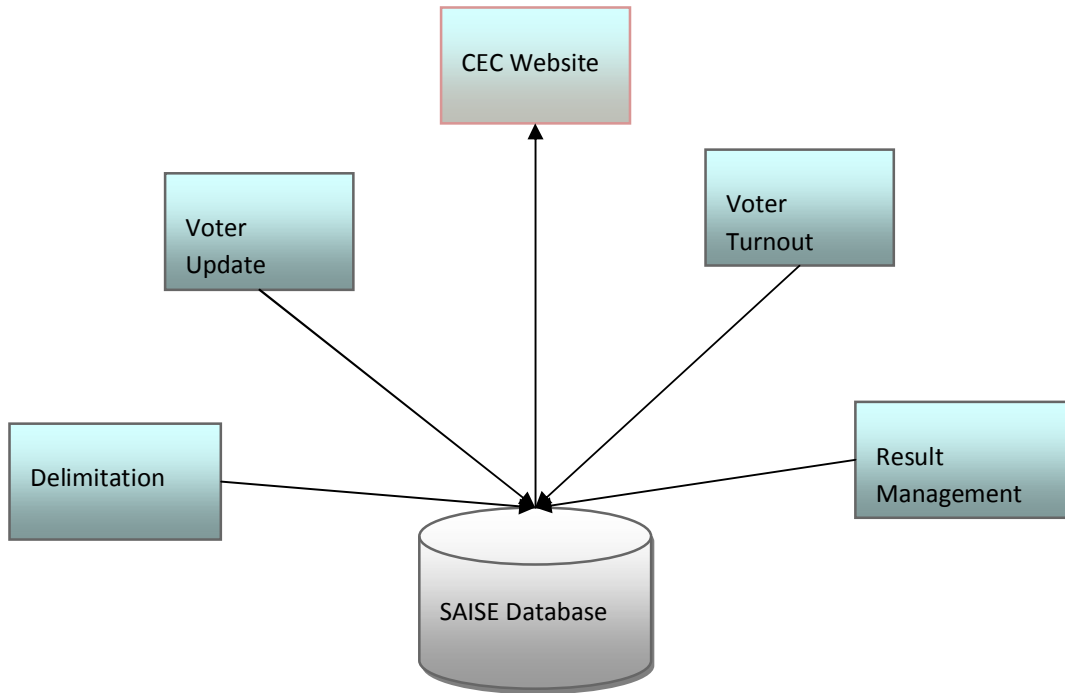
The following requirements will need the software house to have at least a Microsoft Certified Partner with Microsoft Certified Systems Engineers.

BACKGROUND

The CEC is required by LAW to automate the Elections of Moldova. The data is gathered from various sources and needs to be displayed in a consistent way. Some of these data will be displayed to the public thru the CEC Website.



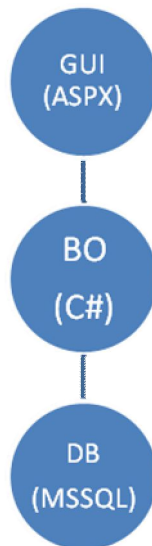
To fit seamlessly into the SAISE, especially with automated Election Results updates, it is recommended that the Web Site should be developed as a Module of SAISE. Below is a diagram to understand the overview of where the CEC Website will fit into the bigger picture. The CEC Website will only be one module inside the SAISE.



DESIGN PATTERN

The following describe the required technologies to be used in the development of the Website.

The Website will need to store and display data to and from a Microsoft SQL Database (provided by the CEC). It would then be required to develop the module using an N-Tier Application concept. The Diagram below shows the N-Tier Concept.



It is required to

- have a clear separation between the responsibilities of designers, developers and database administrators
- maximize the code that can be tested with automation
- share code between pieces of the user interface (UI) that require the same underlying behavior
- separate presentation and business logic from UI logic to make the code easier to understand and maintain
- allow a user interface designer to easily create or modify the UI for your application; by doing this, developers can focus on the application's logic and structure
- The data needs to be displayed requires some form of conversion or adaptation before it can be displayed in the user interface
- The data needs to be displayed will requires some form of validation before it can be updated by the user interface

There is a clear separation of responsibilities between the

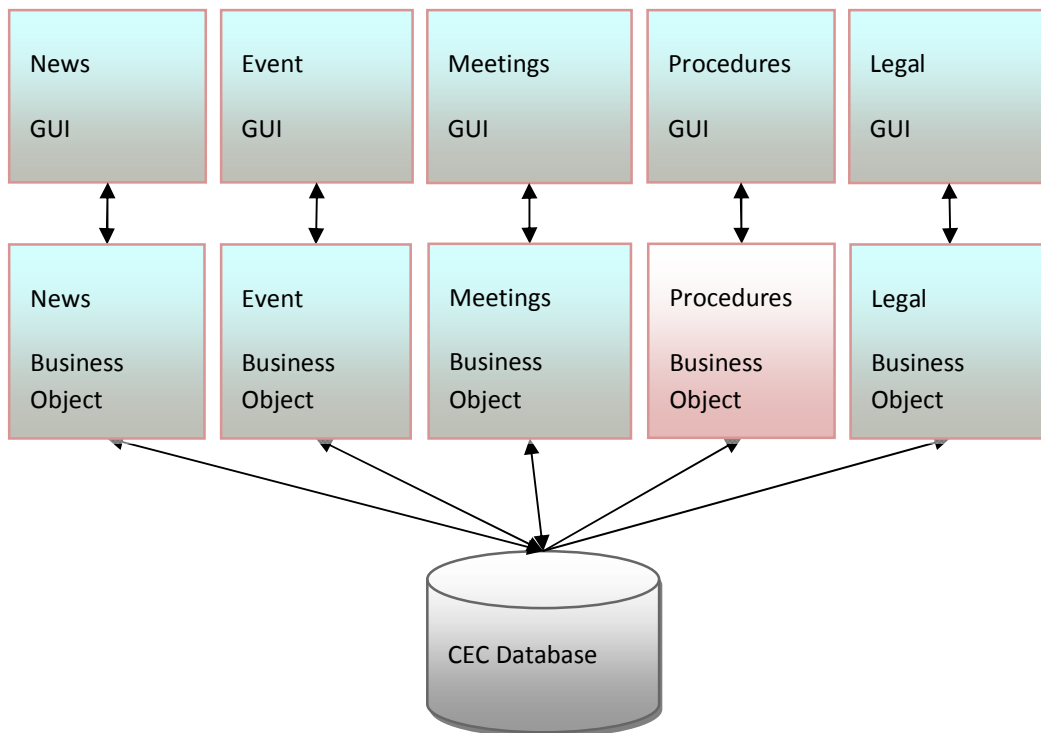
- GUI (Graphical User Interface - Graphics, Screen layouts, colors). Graphic designers can work independently on the colors and layout without the knowledge of any coding or Software Engineering.
- Business Objects (BO - Business Logic, Software Engineering).
- Database (Microsoft SQL Server - Database, Data).

MODULAR APPROACH

Modularity is designing a system that is divided into a set of functional units (named modules) that can be composed into a larger application. A module represents a set of related concerns. It can include a collection of related components, such as features, views, or business logic, and pieces of infrastructure, such as services for logging or authenticating users. Modules are independent of one another but can communicate with each other in a loosely coupled fashion.

A composite application exhibits modularity. For example, consider the CEC Website. The user can access a variety of functions, such as searching thru law or meetings, reading news or events, or if authorized, enters the next event to be displayed to the public and entering a press release from a single user interface (UI). However, behind the scenes, each of these functions is a discrete module. These modules communicate with each other and with back-end systems such as database servers. Application services integrate components within the different modules and handle the communication with the user. The user sees an integrated view that looks like a single application.

Every main Menu Item is actually one small module inside the CEC Website (which is a part of a larger module of SAISE). Below diagram some of the Menu Items seen as Modules.



AUTHENTICATION AND SECURITY MEASURES

It is required that for example the News and Press Release screen, some input functionality should exist for an authenticated user with the correct permissions, to enter the Press Release Data. More such examples would be the Login Screen, Events Calendar, Organizational chart, Law and Regulations, etc.

Every module or field that needs to input or enter data into the database needs to:

- Authenticate the User
- Ensure that the user has the correct permission
- Implement preventative measures for Denial of Service (DOS) attack mechanisms such as CAPTCHA
- Implement preventative measures for SQL Injection techniques

The CEC database and Web Server is part of the security zone. Every transaction to enter data should be authenticated. The preferred Data Method to use is LINQ to SQL.

IEWS LAYOUT (GUI)

Where possible, the Module layout should be as depicted in diagram below:

Each menu item will open some content in the main page. Various types of content may be displayed.

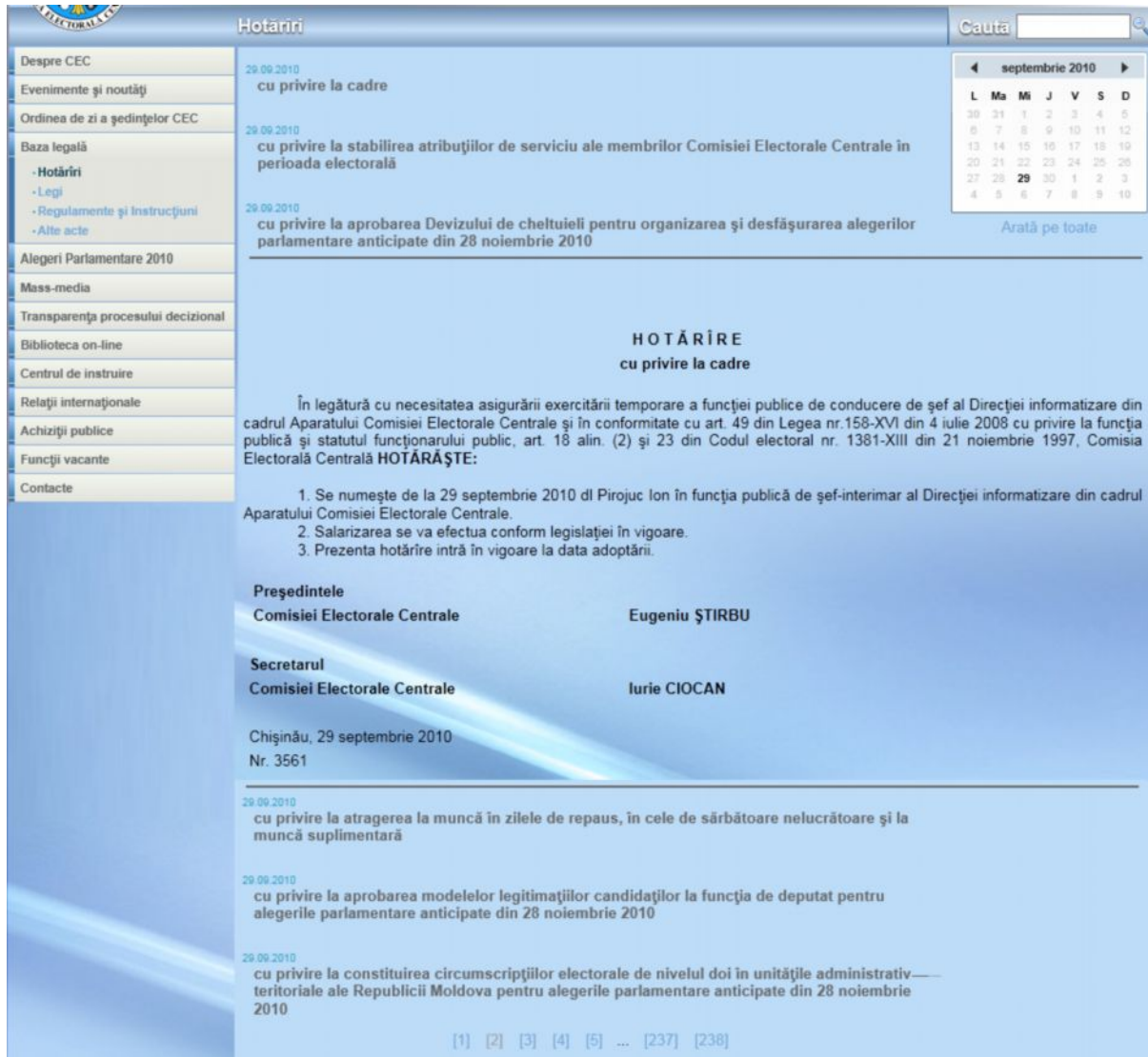


Figure 27: Example of Displaying Content

The above example is how “Decisions” are displayed. The Menu Item indicates that the “Decisions” item is selected. The Title displays “Decisions”. A list of decisions will be display. The number of items displayed should be configurable by the administrator. The content of the list item will be display in an “accordion” fashion when a Content Item is clicked. This means that the content (or body) of the item will push the other menu items down and be displayed.

There are various types or templates of items. Below are a summary of the template types:

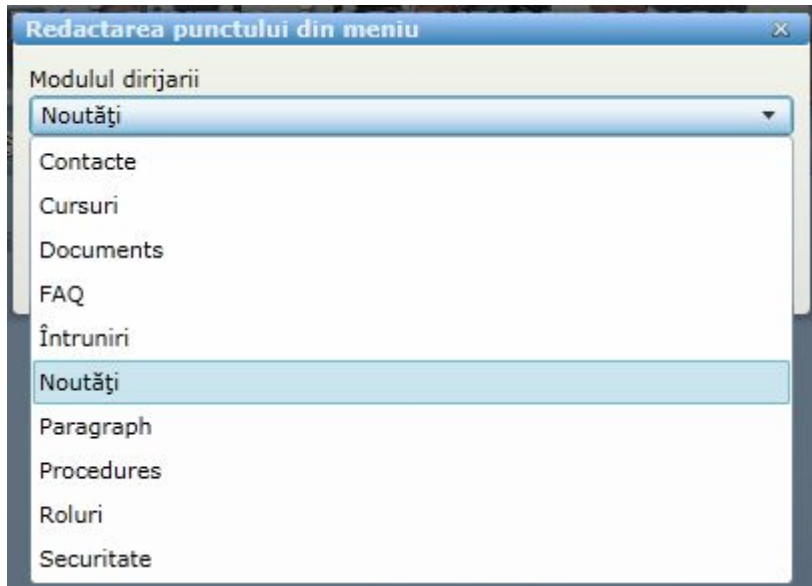


Figure 28: Template types for displaying Content

Every action should have feedback to the user in the Status Line Area. Errors will be reported in the “Error” color specified by CEC.

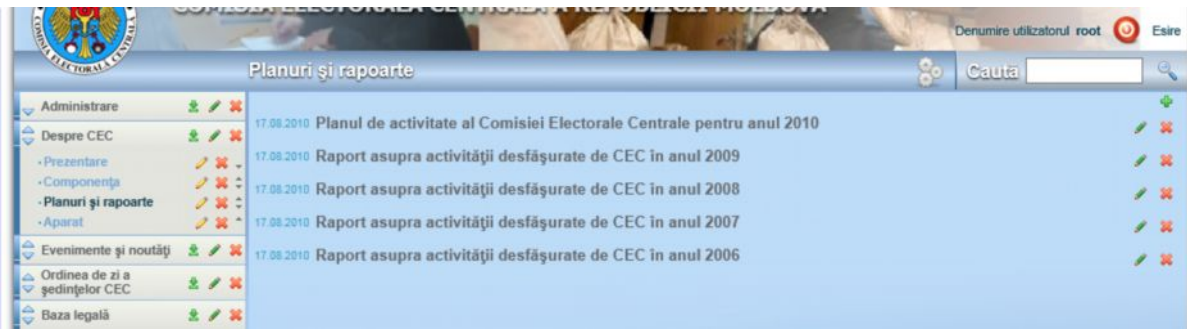
The search area can be seen as a filter of Grid area. When a user enters a certain search or filter and click on the ‘Search’ icon or button, the result grid will be showing the resulting search or filter.

The Grid or Information Area will list normally all the information in a “Grid” or “Grid-like” template, such as a list of Events or a list of Law articles. The sort order for each will be defaulted to a pre-determined sort order such as latest date on top or Law in article order, but could be changed by the User.

When the user is authenticated and has the correct permissions, the Data entry zone will be activated and the User can enter data to be appended to the Data Grid for publishing. It might be required that in certain circumstances, that the grid should provide to the authenticated user with permissions, a ‘Select’ button of the Grid Items. The selected Grid Item will then be loaded into the Data Entry Zone for editing.

Some modules will not be able to conform to this layout such as the “About” screens.

ADMINISTRATION



BUSINESS LOGIC (BUSINESS OBJECTS)

All menus, buttons, text, and functionalities should have a permission system and this permission should be able to be allocated to the logon user. Thus some features will only be available to authorized/authenticated users.

All database fields should be displayed in the View in the pre-defined grid template and be fully searchable to produce a filtered result set (if requested).

The Primary Key and the Audit fields EditUser, EditDate and Version should only be used internally and does not need to be displayed in the View.

Each of Database tables should have a corresponding 'Add', 'Update' and 'Delete' buttons with the respective data fields in the Data Entry Zone of the View and should only be displayed when an Authenticated User has the correct permission.

All data entered into the system should be searchable. For example, Law and Regulations should be able to be able search on one word and return all the Law and Regulations which contain that word.

DATABASE STRUCTURES

The following Menu Items or Sub Modules should have at least the following fields in the database:

- News or Press Releases
 - NewsId – Primary Key and Sequence
 - DateOfEntry – When the news is entered for publication (displayed after abstract as “ - dd.MM.yyyy”)
 - ReferenceNumber – CEC internal reference number
 - Title – Heading of the news (displayed in Bold)
 - Abstract – Short abstract (displayed in cursive)
 - Article – The news or press release article content (displayed in Website font)
 - EditUser – Logon User ID who added or changed the current record
 - EditDate– Date and Time when record was added or changed
 - Version – A database triggered sequence keeping track of the changes
- Event Calendar
 - EventId – Primary Key and Sequence
 - DateOfEntry – When the event will happen(ed) (displayed in bold before the Title “dd.MM.yyyy - “)
 - ReferenceNumber – CEC internal reference number

- Title – Heading of the event (displayed in Bold)
- Abstract – Short abstract (displayed in cursive)
- Event – The event content (displayed in Roman font)
- EditUser – Logon User ID who added or changed the current record
- EditDate– Date and Time when record was added or changed
- Version – A database triggered sequence keeping track of the changes
- Procedure
 - ProcedureId – Primary Key and Sequence
 - DateOfEntry – When the procedure was published or updated (displayed in bold before the Title “dd.MM.yyyy - “)
 - ReferenceNumber – CEC internal reference number
 - Title – Heading of the procedure (displayed in Bold)
 - Abstract – Short abstract (displayed in cursive)
 - Procedure – The procedure content (displayed in Roman font)
 - EditUser – Logon User ID who added or changed the current record
 - EditDate– Date and Time when record was added or changed
 - Version – A database triggered sequence keeping track of the changes
- Procedure Step
 - ProcedureStepId – Primary Key and Sequence
 - ProcedureId – Foreign Key to Procedure
 - Number – Sequence Number of step
 - Description – Short description of step
 - EditUser – Logon User ID who added or changed the current record
 - EditDate– Date and Time when record was added or changed
 - Version – A database triggered sequence keeping track of the changes
- Meeting
 - MeetingId – Primary Key and Sequence
 - DateOfMeeting – When the meeting was conducted (displayed after Title as “ - dd.MM.yyyy”)
 - ReferenceNumber – CEC internal reference number
 - Title – Heading of the meeting(displayed in Bold)
 - AttendanceList– People who attended the meeting(displayed in cursive)
 - MinutesOfMeeting – The news or press release article content (displayed in Website font)
 - EditUser – Logon User ID who added or changed the current record
 - EditDate– Date and Time when record was added or changed
 - Version – A database triggered sequence keeping track of the changes
- Minutes Of Meeting
 - MinutesOfMeetingId – Primary Key and Sequence
 - MeetingId – Foreign Key to Meeting
 - Description – Short description describing the discussion point
 - EditUser – Logon User ID who added or changed the current record
 - EditDate– Date and Time when record was added or changed
 - Version – A database triggered sequence keeping track of the changes
- Attendance to Meeting
 - MinutesOfMeetingId – Primary Key and Sequence
 - MeetingId – Foreign Key to Meeting
 - Title – Title of Person (Mr., Ms. ,etc)

- FirstName– First Name
- LastName– Last Name
- EditUser – Logon User ID who added or changed the current record
- EditDate– Date and Time when record was added or changed
- Version – A database triggered sequence keeping track of the changes
- Legal / Law Documents (This table needs to adapt and conform to store every title and article of the Election Law, Acts and other legal articles and to be verbatim reconstructed)
 - ArticleId – Primary Key and Sequence
 - DateOfAcceptance – When the Law was adopted (displayed in bold before the Title “dd.MM.yyyy - “)
 - ReferenceNumber – CEC internal reference number
 - ArticleNumber – LAW main article number (displayed in front of article)
 - ArticleSubNumber – LAW article sub number (displayed in front of article, might be more than one sub number)
 - Title – Heading of the article (displayed in Bold)
 - Abstract – Short abstract (displayed in cursive)
 - Article – The article content (displayed in Roman font)
 - EditUser – Logon User ID who added or changed the current record
 - EditDate– Date and Time when record was added or changed
 - Version – A database triggered sequence keeping track of the changes
- Frequently Asked Questions (FAQ)
 - FaqId – Primary Key and Sequence
 - DateOfEntry – When the FAQ was entered(displayed in bold before the Title “dd.MM.yyyy - “)
 - ReferenceNumber – CEC internal reference number
 - Question – Frequently Asked Question(displayed in Bold)
 - Answer– The answer to the FAQ(displayed in cursive)
 - EditUser – Logon User ID who added or changed the current record
 - EditDate– Date and Time when record was added or changed
 - Version – A database triggered sequence keeping track of the changes
- Training Centre
 - Various formats (PDF, DOC, JPG, etc) of documents can be stored as Binary Files in a folder on the Web Server with hyperlinks to View / Download the document
- Briefing Packs
 - Various formats (PDF, DOC, JPG, etc) of documents can be stored as Binary Files in a folder on the Web Server with hyperlinks to View / Download the document

SOURCE CODE

All rights and source code, except well-known libraries such as Microsoft API, should be transferred to the CEC. The full solution with all source code files with full design documents will be transferred to the CEC in Electronic format. The source code must be fully documented.

The CEC reserves the right to further develop the software for use in Moldova, to install it on other and/or more equipment, and to transfer the rights to other entities within Moldova but not to sell or distribute software it outside Moldova except for Moldova Embassies.

All Unit Tests for each module should be transferred to the CEC

CEC shall be entitled to all intellectual property and other proprietary rights including but not limited to patents, copyrights, and trademarks, with regard to products, or documents and other materials which bear a direct relation to or are produced or prepared or collected in consequence of or in the course of the execution of this Contract. At the CEC's request, the Contractor shall take all necessary steps, execute all necessary documents and generally assist in securing such proprietary rights and transferring them to CEC in compliance with the requirements of the applicable law.

Generic software must be delivered as licensed to the CEC.