

IPP TECHNOLOGIES WLL

and

CENTRAL INFORMATICS ORGANIZATION (CIO)



Software Design Document (SDD)

**For**

**Bahrain Locator Mobile, Bahrain – CIO**

**IPP Technologies W.L.L.**

**Suite 33, Building 1144, Road 3020, Block 330,**

**Al Zinj, Kingdom of Bahrain, P.O. Box 65052**

**Tel Direct: 973 77 111 066 / Mob: 973 34145734 / +91 8501047733**

**Document History**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Name** | **Date** | **Role in the Project** | **Signature** |
| **Prepared By** | Indra Bisen | 03rd June 2014 | BA IPP |  |
| **1st Reviewer** | K V Reddy | 17th June 2014 | PM IPP |  |
| **2nd Reviewer** | Biswatosh Roy | 19th June 2014 | PM CIO |  |
| **Approved by CIO** | Biswatosh Roy |  | PM CIO |  |

**Revision History**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Version (x.y)** | **Date of Revision** | **Description of Change** | **Reason for Change** | **Affected Sections** | **Approved By** |
| 1.0 | NA | Initial Version (Draft) | NA | NA | K.V.Reddy |
| 1.1 | 21-06-2014 | Updation based on CIO comments. | Incomplete sections | 2 High Level Design Summary  3 Global Data Structures and Shared Data Functions /Services  4.1 Launching of Application  4.2 User Registration  4.9.2 Address Search – Detailed Design  4.10.2 Admin Search – Detailed Design  4.11.2 Road Search – Detailed Design  4.12.2 POI Search Detailed Design  4.13.2 – Favourite Point – Sequence Diagram  4.16 Routing  4.17 Buffer Search  7 Traceability of Requirements  Annexure 1  Annexure II | Biswatosh Roy |
| 1.2 | 23rd June 2014 | Updation based on CIO comments |  | 4.14- Edit Favorite Point  Entire document get formatted |  |

**Affected Groups**

|  |
| --- |
| Development Team |
| Testing Team |

**List of Reference Documents**

|  |
| --- |
| 1. Use Case |
| 1. Need Assessment Report |
| 1. Technical Proposal submitted by IPP |

**Submission History**

|  |  |  |
| --- | --- | --- |
| **Version** | **Submission Date** | **Media** |
| SDD v1.0 | 17th June 2014 | E-Mail |
| SDD v1.1 | 22nd May 2014 | E-Mail |
| SDD v1.2 |  |  |

**PREFACE**

This document is the Software Requirements for the Bahrain Mobile Locator Application Development Project. This document contents all high level Functional & Nonfunctional requirements.

Contents

[1 Introduction 6](#_Toc391199370)

[2 High Level Design summary 7](#_Toc391199371)

[3 Global Data Structures and Shared Data Functions /Services 11](#_Toc391199372)

[4 Detailed Design 13](#_Toc391199373)

[**4.1** **Launching of Application** 13](#_Toc391199374)

[**4.1.1** **Design Alternatives** 13](#_Toc391199375)

[**4.1.2** **Design Details** 14](#_Toc391199376)

[**4.1.3** **External Interfaces** 17](#_Toc391199377)

[**4.1.4** **Assumptions** 17](#_Toc391199378)

[**4.2** **User Registration** 17](#_Toc391199379)

[**4.2.1** **Design Alternatives** 17](#_Toc391199380)

[**4.2.2** **Design Details** 17](#_Toc391199381)

[**4.2.3** **External Interfaces** 21](#_Toc391199382)

[**4.2.4** **Assumptions** 21](#_Toc391199383)

[**4.3** **User Activation** 21](#_Toc391199384)

[**4.3.1** **Design Alternatives** 21](#_Toc391199385)

[**4.3.2** **Design Details** 22](#_Toc391199386)

[**4.3.3** **External Interfaces** 24](#_Toc391199387)

[**4.3.4** **Assumptions** 24](#_Toc391199388)

[**4.4** **Recover Password** 24](#_Toc391199389)

[**4.4.1** **Design Alternatives** 24](#_Toc391199390)

[**4.4.2** **Design Details** 25](#_Toc391199391)

[**4.4.3** **External Interfaces** 27](#_Toc391199392)

[**4.4.4** **Assumptions** 27](#_Toc391199393)

[**4.5** **Change Password** 27](#_Toc391199394)

[**4.5.1** **Design Alternatives** 27](#_Toc391199395)

[**4.5.2** **Design Details** 28](#_Toc391199396)

[**4.5.3** **External Interfaces** 30](#_Toc391199397)

[**4.5.4** **Assumptions** 30](#_Toc391199398)

[**4.6** **Launch Home Screen** 30](#_Toc391199399)

[**4.6.1** **Design Alternatives** 30](#_Toc391199400)

[**4.6.2** **Design Details** 30](#_Toc391199401)

[**4.6.3** **External Interfaces** 33](#_Toc391199402)

[**4.6.4** **Assumptions** 33](#_Toc391199403)

[**4.7** **Select Layers** 33](#_Toc391199404)

[**4.7.1** **Design Alternatives** 33](#_Toc391199405)

[**4.7.2** **Design Details** 33](#_Toc391199406)

[**4.7.3** **External Interfaces** 35](#_Toc391199407)

[**4.7.4** **Assumptions** 36](#_Toc391199408)

[**4.8** **Generic Search** 36](#_Toc391199409)

[**4.8.1** **Design Alternatives** 36](#_Toc391199410)

[**4.8.2** **Design Details** 36](#_Toc391199411)

[4.8.3 **External Interfaces** 39](#_Toc391199412)

[**4.8.4** **Assumptions** 39](#_Toc391199413)

[**4.9** **Address Search** 39](#_Toc391199414)

[**4.9.1** **Design Alternatives** 39](#_Toc391199415)

[**4.9.2** **Design Details** 39](#_Toc391199416)

[**4.9.3** **External Interfaces** 43](#_Toc391199417)

[**4.9.4** **Assumptions** 43](#_Toc391199418)

[**4.10** **Administrative boundary Search** 43](#_Toc391199419)

[**4.10.1** **Design Alternatives** 43](#_Toc391199420)

[**4.10.2** **Design Details** 43](#_Toc391199421)

[**4.10.3** **External Interfaces** 47](#_Toc391199422)

[**4.10.4** **Assumptions** 47](#_Toc391199423)

[**4.11** **Road Search** 47](#_Toc391199424)

[4.11.1 Introduction 47](#_Toc391199425)

[**4.11.2** **Design Alternatives** 47](#_Toc391199426)

[**4.11.3** **Design Details** 47](#_Toc391199427)

[**4.11.4** **External Interfaces** 51](#_Toc391199428)

[**4.11.5** **Assumptions** 51](#_Toc391199429)

[**4.12** **POI Search** 51](#_Toc391199430)

[**4.12.1** **Design Alternatives** 51](#_Toc391199431)

[**4.12.2** **Design Details** 51](#_Toc391199432)

[**4.12.3** **External Interfaces** 54](#_Toc391199433)

[**4.12.4** **Assumptions** 54](#_Toc391199434)

[**4.13** **Add Favorite Point** 55](#_Toc391199435)

[**4.13.1** **Design Alternatives** 55](#_Toc391199436)

[**4.13.2** **Design Details** 55](#_Toc391199437)

[**4.13.3** **External Interfaces** 58](#_Toc391199438)

[**4.13.4** **Assumptions** 58](#_Toc391199439)

[**4.14** **Edit Favorite Point** 58](#_Toc391199440)

[**4.14.1** **Design Alternatives** 58](#_Toc391199441)

[**4.14.2** **Design Details** 58](#_Toc391199442)

[**4.14.3** **External Interfaces** 62](#_Toc391199443)

[**4.14.4** **Assumptions** 62](#_Toc391199444)

[**4.15** **GPS Location** 62](#_Toc391199445)

[**4.15.1** **Design Alternatives** 62](#_Toc391199446)

[**4.15.2** **Design Details** 62](#_Toc391199447)

[**4.15.3** **External Interfaces** 64](#_Toc391199448)

[**4.15.4** **Assumptions** 64](#_Toc391199449)

[**4.16** **Routing** 65](#_Toc391199450)

[**4.16.1** **Design Alternatives** 65](#_Toc391199451)

[**4.16.2** **Design Details** 65](#_Toc391199452)

[4.16.3 External Interfaces 69](#_Toc391199453)

[4.16.4 Assumptions 69](#_Toc391199454)

[**4.17** **BUFFER SEARCH** 70](#_Toc391199455)

[**4.17.1** **Design Alternatives** 70](#_Toc391199456)

[**4.17.2** **Design Details** 70](#_Toc391199457)

[4.17.3 External Interfaces 73](#_Toc391199458)

[4.17.4 Assumptions 74](#_Toc391199459)

[5 Critical Functions and Focus for Testing 74](#_Toc391199460)

[6 Limitations 74](#_Toc391199461)

[7 Traceability to Requirements 74](#_Toc391199462)

[8 Acronyms and Glossary 75](#_Toc391199463)

# Introduction

**Background**

The Directorate of GIS under Central Informatics Organization (CIO) is managing the geographical information database for Kingdom of Bahrain. To serve the data and various GIS related services a web based application “Bahrain Locator” is hosted. In view of growing use of Smartphones in day to day life, it was felt that the GIS data and allied services should also be available on the mobile for citizens and government officials apart from web. In view of this CIO had taken initiative to develop a mobile version of Bahrain Locator to target iPhone, Android & Blackberry OS.

**Scope**

The document includes architecture decision and design patters adopted for development of mobile variant of Bahrain Locator. The document also laydown the guiding principles for the designing to meet the functional and non-functional requirements drawn in the software requirements specifications. Further it also provides Physical and Deployment Architecture of the system and shall address reliability, scalability and performance issues related to the application.

**Objectives**

This document provides the details of the system under design. It is intended to capture and convey the all classes, interfaces, relationships, and algorithms significant to the use-cases being realized. The intended audience of this document is the design review team and the developers and testers who will be implementing this design.

# High Level Design summary

The existing WebGIS application of Bahrain Locator is built on ArcGIS Server environment and backend spatial & non-spatial database is stored on Oracle. The map services are being assessed through ArcGIS REST APIs. As the mobile GIS application will be the part of the same setup and have to be tightly integrated with the existing setup so the application will be 3-tier and service oriented architecture. The presentation layers consisted of mobile native applications developed on ArcGIS APIs for Smartphone. The ASP.NET based web services will take care of Business Logics but limited to user administration level only. All map related data and GIS operations will be done through ArcGIS Server REST Services. As ArcSDE is already placed at middle tier so no direct communication will be done with the database for all GIS related services. The high level design of system will be as below –



**Presentation Layer**

This presentation layer will be a kind of offline native mobile application which will run on its own process. Java for Android and XCODE will be used to develop the presentation layer for Android & iOS respectively with combination of ArcGIS ArcGIS Runtime SDK for Android and ArcGIS Runtime SDK for iOS to communicating with ArcGIS Server. As no specific API/SDK available for Blackberry platform from ESRI so combination of HTML5, Jquery Mobile, PhoneGap & ArcGIS Javascript API will be used to target Blackberry devices. This presentation layer will also communicate with secured ASP.NET web services for user authentication, taking map service credentials and e-mail communication or any other non-GIS stuff over the HTTPS. The presentation layer will have pages and forms responsible for displaying the content in a user-friendly manners and invoking appropriate Business Service calls / REST Service call to perform business activity.

**Design Considerations**

The design considerations for this layer are:

* Appropriate and high quality images/ icons suitable for mobile devices.
* Home screen navigation on single tap.
* User friendly viewing of maps.
* User Interface and form validations.
* Alerts, Confirmation and Error message display.
* Separation of presentation and business layer to emphasis on presentation.
* Display of dynamic form fields based on user role.

**Design Decisions**

The following table summarizes the decisions made for the presentation layer:

|  |  |
| --- | --- |
| **Design Consideration** | **Design Decision** |
| Rendering and viewing of maps | Use of ArcGIS Map Control |
| Data display | Listview with combination of images |
| UI and form validations | Using native language; Java of Android, Objective C for iOS and JavaScript for Blackberry. |
| Alert, Notification, Message, and Error message Display | Embedded text in the form or popup message box. |
| Separation of Presentation Logic | All the requests to process business logic and manage data access objects will be routed through either WebAdapter or asp.net web services hosted on IIS. |

**Web Service Layer**

This layer consists of web methods to handle client request related to user administration, map queries and data updation (both spatial & non-spatial) related tasks. The map related processes will be handled through REST services and other processes will be handled through asp.net web services. The business class shall make calls to various other components of the application to authenticate, authorize user request and execute a sequence of activity to accomplish a business process. After business processing is done this layer returns the data objects to the caller mobile application. To access non-spatial data this layer will not establish direct connection to database; the data will accessed through data access layer and to access spatial data ArcGIS Web Adapter will be used at middle tier.

**Design Considerations**

The design considerations for this layer are:

* This layer is maintained as thin as possible for better performance.
* Application security like SSL.
* Invoke various integrated components of the application (like authentication, authorization, making calls to database).
* Embed all the business logic to accomplish business rules.
* Act as a middle tier layer for the entire application.
* Exception Handling, tracing and Logging for asp.net web services. The map query & map operation related logging will be handled by GIS Application Server.

**Design Decisions**

|  |  |  |
| --- | --- | --- |
| **S.No** | **Design Consideration** | **Design Decision** |
| 1 | Handling of client Request and Response | Maintain the layer thin. |
| 2 | Exception Handling and Logging | Develop application exception framework. |
| 3 | Embed all the business logic | Easy to manage business logic. |
| 4 | Initialize application and environment variables | Read Application settings files. |

**Data Access Layer**

The physical connection with database will be accomplished through this layer and it will comprises by class objects. It will be available to BAL as compiled class library. It regulates access to database and manage database connection efficiently. But it will be limited for non-spatial data operations. All the spatial data access will be done through ArcGIS REST services via web adapter.

**Design Considerations**

The design considerations for this layer are:

* Establishing and releasing database pooled connections.
* Minimum impact of changes in the data provider

**Design Decisions**

|  |  |  |
| --- | --- | --- |
| **S.No** | **Design Consideration** | **Design Decision** |
| 1 | Minimum impact of changes in the data provider | Database calls to be made through the Interface provided by the data access layer. |
| 2 | Increase speed of database transactions | Pooled database connections and Releasing Resources after every transaction. |

**Logging**

All the service requests (limited upto non-spatial data operations) will be logged at Service Layer. Log trace can be set to different severity level. This is to help maintain consistent logging; instrumentation practices in the application and provides implementations to solve common application logging and helps in debugging. Administrator should set the logs level in the Application Settings file for changing the trace to desired level depending on the environment and debugging needs of the developers.

**Exception Handling**

Exception Handling Framework lets developers to efficiently handle processing exceptions that are thrown by the applications during runtime. Commonly used exception-handling functions will be provided to catch user defined exception as well as fatal system exceptions.

* Custom exception handlers will be created.
* Exception Handler will be used to handle exception in a consistent manner across the entire application.
* The exception occurred at mobile devices will be logged and can be submitted to the server if user permits it.

**User Groups & Characteristics**

Primarily three user groups will use the application, the details of the users and its privileges are given in the below table.

|  |  |  |
| --- | --- | --- |
| **S No.** | **Actor** | **Description** |
| 1 | Citizen User | The citizen user can view and query the map, make routing request with or without login to the system. If user logged-in into the system then he/she can also add his/her favorite points. |
| 2 | CIO User | The CIO user will have all the privileges available with citizen user with additional facilities to see and update more attributes related to POI and citizens favorite points. |
| 3 | Admin User | The admin user is responsible for user request management and web service configuration management. |

# Global Data Structures and Shared Data Functions /Services

Broadly the data structures are categorized in two part (1) Spatial Data (2) Non-Spatial / MIS Data. The spatial data is served through secured ArcGIS Map Service and mobile application shall make connection to display and query map data. The application will use already published ArcGIS Map services and no separate feature layers will be created except for favorite points.

Following table shows the list of various services used by the mobile application –

| **Service Name** | **Category** | **Type** | **Remark** |
| --- | --- | --- | --- |
| MOB\_ARA\_SAT | Cached Map Service | REST | To serve satellite map data in Arabic language. The cached map is created for 1000, 2000, 4000, 8000, 16000, 32000, 64000,125000, 250000, 400000 scales |
| MOB\_ENG\_SAT | Cached Map Service | REST | To serve satellite map data in English language. The cached map is created for 1000, 2000, 4000, 8000, 16000, 32000, 64000,125000, 250000, 400000 scales |
| MOB\_ENG\_HYB | Cached Map Service | REST | To serve hybrid map data in English language. |
| MOB\_ENG\_VEC | Cached Map Service | REST | To serve English base map as cached map service. |
| MOB\_ARA\_HYB | Cached Map Service | REST | To serve hybrid map data in Arabic language. |
| MOB\_ARA\_VEC | Cached Map Service | REST | To serve Arabic base map as cached map service. |
| MOB\_ENG\_ROUTING | Network Analysis | REST | For routing related tasks. |
| MOB\_QUERY | Dynamic Map Service | REST | To query (attribute & spatial) various feature layers. |
| MOB\_GEOMETRY | Geometry | REST | Perform buffering |
| USER\_AUTH | Web Service / web handler | WCF / ASP.NET Handler | To perform user authentication, authorization, logging and getting map service credentials related task. |
| USER\_MGT | Web Service/ web handler | WCF / ASP.NET Handler | To perform user management (add/ update/ recover password) task |

\* - All cached map are served at 1000, 2000, 4000, 8000, 16000, 32000, 64000,125000, 250000, 400000 scales

Details of operations / web-methods are available in annexure-I.

As per above table dynamic map service MOB\_QUERY will be used for query operations and network service MOB\_ENG\_ROUTING will be used for all routing relating queries.

List of entities / feature layer/ tables used in system are as below –

| **Sr** | **Feature Layer** | **Category** | **Used In Processes** | **Remark** |
| --- | --- | --- | --- | --- |
|  | POIs (Point of Interest) | Spatial | Point of Interest Search, General Search, Buffer Search | Already exist |
|  | Addresses | Spatial | Address Search, General Search, Buffer Search | Already exist |
|  | Highways | Spatial | Road Search | Already exist |
|  | Avenues | Spatial | Road Search | Already exist |
|  | Roads\_Lanes | Spatial | Road Search | Already exist |
|  | Blocks | Spatial | Administrative Boundary Search, General Search, Buffer Search | Already exist |
|  | Areas | Spatial | Administrative Boundary Search, General Search, Buffer Search | Already exist |
|  | Governorate | Spatial | Administrative Boundary Search, General Search, Buffer Search | Already exist |
|  | BLK\_AREA\_GOV | Non-Spatial | Any process which uses Administrative filtering | Already exist |
|  | POI\_TYPE\_SUBTYPE | Non-Spatial | Any process which uses POI filtering | Already exist |
|  | ROADNO\_ROAD\_NAME | Non-Spatial | Any process that requires Road Number Road Name mapping. |  |
|  | Route | Spatial | Routing |  |
|  | Favorite Point | Spatial | Create & Search Favorite Point, General Search, Buffer Search | New Feature Layer |
|  | MobileAppUser | Non-Spatial | User Registration, Authentication, Authorization, Favorite Point management | New Table |
|  | UserLog | Non-Spatial | To maintain user log, User authentication | New Table |

Detailed structure of feature layers/ data tables is attached in annexure-II.

# Detailed Design

## **Launching of Application**

**Introduction**

The launching of application is initiated by opening the application from device. However, application can be initiated without internet but cannot be continue without internet connection. On initiation of application user will be prompted to continue as registered user or non-registered user. If user logged in as registered user successfully then managing favorite point functionality will be available additionally. System will not prompt if user successfully logged in as registered user in previous attempt. Also, the preferable language selection (Arabic/English) option will be available at selection of log-in type.

### **Design Alternatives**

User can continue without login to the application.

### **Design Details**

The process / activity flow diagram for this activity is as below –



**Step 1 – Initiate Application Launch**

User initiate the application by tapping on app icon on mobile device. Application loaded on mobile device memory and splash screen come on front.

**Step 2 –Option for Logged in Reg/Non-Registered User**

During loading of application splash screen system will check whether the application is opened first time or it is opened earlier. If application launched first time then system will show option to select log-in type and the preferred language option. If user opt for log-in as registered user then system will prompt for userid/pwd otherwise flow goes directly to web service to log application, then flow goes to step 4. If user logged in with application earlier then system will read earlier preferences from local cache and move ahead without showing login & language selection option. However, this bypassing will be available only if last visit preferences are available in local cache.

**Step 3 – Authenticate User**

If user opt for log-in as registered user then flow will goes to this step. Here, encrypted userid/pwd will be sent to UserAuth webservice to authenticate the user. If user authenticated then system will check whether the logging in user is a normal user or he/she is a CIO user and flag the user object. System will also provide a check box to save user preferences including credentials in local cache to avoid repetition of the login process on next visit. All these activities will be added in table RegisteredUserLog.

**Step 4 – Getting MapService Credentials**

Once the user visit activity logged in (either for logged in or for non-registered user), system will get map service credentials to access the map service from application or from web.config. It is required to access the map service from ArcGIS Server. The credentials will be send back to mobile device in encrypted mode and will be stored on volatile memory till the user working on the application. Once user exit from the application the credentials will be erased.

Class Diagram – Application Launch



Sequence Diagram – Application launch



Input Parameters (Applicable when user opts log-in as registered user)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Field** | **reference table** | **Validation** | **Data Source** | **Remarks** |
| USER\_EMAIL | MobileAppUser | Valid e-mail / mandatory | User |  |
| USER\_PWD | MobileAppUser | Mandatory | User |  |
| USER\_IP | MobileAppUser | Mandatory | System(Mobile) |  |
| USER\_LOC\_LATD | RegisteredUserLog | Mandatory | System(Mobile) |  |
| USER\_LOC\_LONGT | RegisteredUserLog | Mandatory | System (Mobile) |  |
| LOGGING\_IN\_AT | RegisteredUserLog | Mandatory | System |  |

Input Parameters (Applicable when user opts log-in as non-registered user)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Field** | **reference table** | **Validation** | **Data Source** | **Remarks** |
| USER\_IP | MobileAppUser | Mandatory | System(Mobile) |  |
| USER\_LOC\_LATD | RegisteredUserLog | Mandatory | System(Mobile) |  |
| USER\_LOC\_LONGT | RegisteredUserLog | Mandatory | System (Mobile) |  |
| LOGGING\_IN\_AT | RegisteredUserLog | Mandatory | System |  |

Output Parameters

At the end of process mobile application will get map service credentials.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Field** | **reference table** | **Validation** | **Data Source** | **Remarks** |
| MAP\_SERVICE\_CREDENTIAL | IN-MEMORY VARIABLE | NA | WEB.CONFIG | Map service credentials are required to communicate with server |

### **External Interfaces**

NA

### **Assumptions**

It is assumed that mobile device is connected with internet.

## **User Registration**

**Introduction**

The user registration is the optional activity which may be performed by the application user. The user interface will be designed in mobile native application and all the business logics will be residing on web service layer. Once the user registered the activation e-mail will be sent to the user to activate it.

### **Design Alternatives**

Not applicable.

### **Design Details**

The process / activity flow diagram for this activity is as below –



**Step 1 – Initiate User Registration**

This is to start the user registration process. It will be initiated at mobile native application, as output user registration form will be open to capture user details.

**Step 2 – Fill registration form**

Users fills the registration form, client side validation will be done here like valid e-mail address, minimum passwords length, valid CPR number etc. At the end user submits the form to web method published on asp.net web service.

**Step 3 – Submit to Web Service**

On the form submission, mobile application establishes connection with web handler and made synchronous call to **Authenticate**web operation of USER\_AUTH web handler. At this level following processes will be started in given sequence –

1. Adding User - First of all user registration procedure called through DAL to register the user and user added if all input data found valid and e-mail registered earlier then back to control with success / failed flag. Also, if user registered with CIO official e-mail then user will be marked as CIO user otherwise user will be marked as citizen user.
2. Sending Verification e-mail – If user registered successfully then verification e-mail will be sent to user for activating user.
3. Returning success/ fail message as response text.

Class Diagram – User Registration



Sequence Diagram – User Registration



Input Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Field** | **reference table** | **Validation** | **Data Source** | **Remarks** |
| USER\_EMAIL | MobileAppUser | Text Field/Not Null/ Valid e-mail | User |  |
| USER\_DISP\_NAME | MobileAppUser | Text Field / not null | User |  |
| USER\_PWD | MobileAppUser | Text Field / not null / not less than 6 char | User |  |
| CPR\_NO | MobileAppUser | Text Field | User | optional |
| USER\_COUNTRY | MobileAppUser | Drop Down | User | Drop down should be filled with all countries name, default should Bahrain |
| MOBILE\_NO | MobileAppUser | Text Field | User | optional |
| USER\_CREATED\_ON | MobileAppUser | NA | System | Date time stamp of user creation should be captured automatically |
| USER\_IP | MobileAppUser | NA | System | IP of user’s mobile device |
| STATUS | MobileAppUser | NA | System / Database | Default value will be “N” (N-Not activated) |
| IS\_CIO\_USER | MobileAppUser | NA | System | If user registering with CIO official e-mail then he/she will be marked as CIO User. |

Output Parameters

At the end of process user will be notified whether he/she has been registered or not. If registered then application will display the login page & allow the user to login.

### **External Interfaces**

NA

### **Assumptions**

Application should be connecting to the internet.

## **User Activation**

**Introduction**

The user activation process is required to activate the user. This process will be performed by the user by clicking on hyperlink sent through user activation mail.

### **Design Alternatives**

Not applicable.

### **Design Details**

The process / activity flow diagram for this activity is as below –



**Step 1 – Initiate User Activation**

User initiates the user activation process by clicking the activation hyperlink sent over e-mail. A web request will be generated to the server.

**Step 2 – Link verification**

The original link has encrypted query string which contains userid to be verified and timestamp. If web handler will check its validity and return if found invalid request otherwise user will be activated.

**Step 3 – Send Back Response & Confirmation e-mail**

As a webrequest response, system send clear text message over browser regarding user activation followed by confirmation e-mail if user activated successfully.

Class Diagram – User Registration



Sequence Diagram – User Activation



Input Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Field** | **reference table** | **Validation** | **Data Source** | **Remarks** |
| USER\_EMAIL | MobileAppUser | NA | Activation hyperlink |  |

**Output Parameters**

At the end of process user will be notified whether he/she has been activated or not.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Field** | **reference table** | **Validation** | **Data Source** | **Remarks** |
| STATUS | MobileAppUser | NA | System | Flaged as “A” if activated |

### **External Interfaces**

### **Assumptions**

1. Notification must be available in the DB.

## **Recover Password**

**Introduction**

This process can be initiated if user lost/forgot his/her password. The process will be initiated by sending request to web handler from mobile application.

### **Design Alternatives**

Not applicable.

### **Design Details**

The process / activity flow diagram for this activity is as below –



**Step 1 – Initiate Forgot Password/Reset Password**

User initiate the password reset process from mobile login page. An encrypted querystring will be generated and web request will be sent to web handler.

**Step 2 – Request verification**

Query string will decrypt and request will be processed if valid query string found.

**Step 3 – Check UserID**

In query string userid for which password has to be reset will be received, so check the requested userid that it is valid and activated. For genuine userid, password will be reset.

**Step 4 – Send Notification e-mail**

After resetting the password, e-mail will be sent to user on his/her registered e-mail.

Class Diagram – Password Recovery



Sequence Diagram – Password Recovery



Input Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Field** | **reference table** | **Validation** | **Data Source** | **Remarks** |
| USER\_EMAIL | MobileAppUser | Valid e-mail address, mandatory | User Input |  |

Output Parameters

At the end of process user will be notified whether he/she has been activated or not.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Field** | **reference table** | **Validation** | **Data Source** | **Remarks** |
| USER\_PWD | MobileAppUser | NA | SYSTEM | System generated random password |

### **External Interfaces**

### **Assumptions**

Server will be facilitated with required services.

SMTP server must be configure

## **Change Password**

Introduction

This process is part of user management module and user can change his/her password using this process.

### **Design Alternatives**

Not applicable.

### **Design Details**

The process / activity flow diagram for this activity is as below –



**Step 1 – Initiate Change Password process**

Application launch activity transfer the map service credentials to this activity. An encrypted querystring will be generated and web request will be sent to web handler.

**Step 2 – Request verification**

Querystring will decrypted and request will be processed for query string validity.

**Step 3 – Verify Old Password & Updation of New password**

To change password it is necessary to check current password to confirm the user validity. System will prompt for old password and new password. If user enter correct old password then system will update old password with new password.

**Step 4 – Send Message Back**

The appropriate message (successfully / failed) will be sent back to mobile client.

Class Diagram –



Sequence Diagram – Home Screen



Input Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Field** | **reference table** | **Validation** | **Data Source** | **Remarks** |
| USER\_EMAIL | MobileAppUser | Valid e-mail address, mandatory | User Input | USER\_EMAIL |
| USER\_PASSWORD | MobileAppUser |  | User Input |  |
| NEW\_PASSWORD | - | Valid Pasword, mandatory | User Input |  |

Output Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Field** | **reference table** | **Validation** | **Data Source** | **Remarks** |
| USER\_PASSWORD | MobileAppUser |  | System | Old password will be replaced with NEW\_PASSWORD |

### **External Interfaces**

### **Assumptions**

Server will be facilitated with required services.

## **Launch Home Screen**

**Introduction**

This process is successor of Application Launch Process in which mobile application gets Map Service credentials after successful login (either as registered user or as non-registered user). Using these credentials ArcGIS Map Services are accessed and map will be displayed on the screen. Also, if user is opening the map inside Bahrain country then the tentative location of his/her is shown on the map.

### **Design Alternatives**

Not applicable.

### **Design Details**

The process / activity flow diagram for this activity is as below –



**Step 1 – Take control from Application Launch Activity**

Application launch activity transfer the map service credentials to this activity.

**Step 2 – Map Data Query Operation**

Mobile application sent request through Query Operation of ArcGIS REST API for map data. The bounding box for which data is requested is dependent on the user’s GPS Location. If mobile device made the request from inside the country then query operation is performed for map data at scale 1:10000 for current location. If user is outside the country then map at full extent is returned.

Class Diagram –



Sequence Diagram – Home Screen



Input Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Field** | **reference table** | **Validation** | **Data Source** | **Remarks** |
| MapService Credential | ArcGIS Server Internal Security System | NA | System |  |
| GPS\_LOCATION | Mobile Device Internal H/w | NA | System (GPS) |  |

**Output Parameters**

As an output map data through REST service will be received.

### **External Interfaces**

NA

### **Assumptions**

* Notification must be available in the DB.
* Application should be connecting to the internet.
* Bahrain locator app must be available in mobile market/play store.

## **Select Layers**

**Introduction**

Using this process user can change the base map. The available base maps are fused cached map of all vector layers, satellite image of Bahrain and hybrid map (satellite image + vector layers). There will be 3 iconic buttons showing vector, satellite & hybrid map symbols and user has to tap on desired icon to change the basemap.

### **Design Alternatives**

Not applicable.

### **Design Details**

The process / activity flow diagram for this activity is as below –



**Step 1 – Initiate Select Layer**

User tap on icon to initiate select layer activity.

**Step 2 – Map Data Request**

Mobile app made request to ArcGIS Server through WebAdapter for desired map.

**Step 3 – Process Request**

WebAdapter forward the request to ArcGIS Server. Map Service credentials are checked and map tiles returned from desired map service if credentials matched.

Class Diagram –



Sequence Diagram – Select Layer



Input Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Field** | **reference table** | **Validation** | **Data Source** | **Remarks** |
| MapService Credential | ArcGIS Server Internal Security System | NA | System |  |
| MapServiceID | NA | NA | System | Based on user selected layer |

Output Parameters

As an output map data through REST service will be received and base map will be changed.

### **External Interfaces**

NA

### **Assumptions**

* Server holding various types of data for the use.
* Server will be facilitated with required ArcGISREST services.
* Bahrain locator app must have registered in mobile market/play store.

## **Generic Search**

**Introduction**

Generic search process is used to made search on all layers for desired keyword.

### **Design Alternatives**

Not applicable.

### **Design Details**

The process / activity flow diagram for this activity is as below –



**Step 1 – Initiate Generic Search**

This process can be initiated by tapping on generic search text box available on top of home screen and entering the desired keyword. It would be autocomplete in which after typing the 4 character application should fetch the auto complete list from the server

**Step 2 – Map Data Request**

Mobile app made request to ArcGIS Server through WebAdapter to search in queryable layers (POIs, Addresses, Highways, Avenues, Roads\_Lanes, Blocks, Areas and Governorate) of MOB\_QUERY map service.

**Step 3 – Process Request**

WebAdapter forward the request to ArcGIS Server. Map Service credentials are checked then query operation performed through REST API.

**Step 4 – Returning Result**

REST API returns the result as JSON object which forwarded back to mobile client app.

**Step 5 – Showing Result**

If result contains more than one object then it will be shown on a list view box segregated based on the Feature layer, if it contains only one record than directly shown onto the map through graphic object and appropriate map tips. If no result returned then proper message is shown to the user.

Class Diagram –



Sequence Diagram – Generic Search



Input Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Field** | **reference table** | **Validation** | **Data Source** | **Remarks** |
| MapService Credential | ArcGIS Server Internal Security System | NA | System |  |
| Keyword\_Tobe\_Search | NA | Mandatory, minimum 4 | Input Box |  |
| Layers ID in Mapservice | NA | NA | System (hardcoded) | Layers on which search have to be performed |

Output Parameters

As an output feature list (segregated) of searched keyword will be received.

### **External Interfaces**

NA

### **Assumptions**

* Server holding various types of data for the use.
* Server will be facilitated with required ArcGIS REST services.
* Bahrain locator app must have registered in mobile market/play store.

## **Address Search**

**Introduction**

Address search process is used to specifically search on Address layer.

### **Design Alternatives**

Not applicable.

### **Design Details**

The process / activity flow diagram for this activity is as below –



**Step 1 – Initiate Address Search**

This process can be initiated by tapping on Address search icon available on context menu.

**Step 2– Entering Search Criteria**

User enters Building Number, Road No/Name & Block number as search criteria and all fields are mandatory. In Road section User has to select either road No or road name. Default will be road No & it will be a numeric text with range between 1 to 5 characters. If user select the road name then app will allow the alphanumeric character in the road name text box with auto complete functionality. To fill the autocomplete list GetList webhandler is used. On selection of road name application will display only the highway & avenues name as user start entering the characters in the text box (auto complete). Road name will be retrieve from the Layers HIGHWAYS (2) & AVENUES (3) from MOB\_QUERY service through web handler.

Block number text field is a free text field range between 1 to 4 characters.

**Step 3 – Map Data Request**

Mobile app made request to ArcGIS Server through WebAdapter to search in Addresses layer of MOB\_QUERY map service.

**Step 4 – Process Request**

WebAdapter forward the request to ArcGIS Server. Map Service credentials are checked then query operation performed through REST API.

**Step 5 – Returning Result**

REST API returns the result as JSON object which forwarded back to mobile client app.

**Step 6– Showing Result**

If result contains more than one object then it will be shown on a list view box, if it contains only one record than directly shown onto the map through graphic object and appropriate map tips (Block No, Road No, Building No). If no result returned then proper message is shown to the user.

**Step 7 – Showing Buffer Search Tool**

If user selects anyone searched item comes in list view box then it will be appeared on map windows and a buffer search toolbar will be appeared on top of map windows. If user logged in as Registered User then the favorite point search will also be available in Buffer search tool bar otherwise it will not come.

Class Diagram –



Sequence Diagram – Address Search



Input Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Field | reference table | Validation | Data Source | Remarks |
| MapService Credential | ArcGIS Server Internal Security System | NA | System |  |
| ROAD\_NO /ROAD\_NAMEE/ ROAD\_NAMEA | Highways/Avenue / Road\_Lane | Mandatory | Input Box | Autofill input in case of road name |
| Block | Blocks | Mandatory | Input Box/ List Box |  |
| Address | Addresses | Mandatory | Input Box | Address to be search |

Output Parameters

As an output feature list of searched keyword will be received.

### **External Interfaces**

NA

### **Assumptions**

* Server holding various types of data for the use.
* Server will be facilitated with required ArcGIS services.
* Bahrain locator app must have registered in mobile market/play store.

## **Administrative boundary Search**

Introduction

This process is used to specifically search on Administrative boundaries layer Block. To narrow down the search user can select Governorate and / or Area from dropdown box.

### **Design Alternatives**

Not applicable.

### **Design Details**

The process / activity flow diagram for this activity is as below –



Step 1 – Initiate Administrative Boundary Search

This process can be initiated by tapping on Administrative Boundary search icon available on context menu followed by entering the desired administrative unit type. The hierarchy of admin unit is Governorate -> Area -> Block. The first list box will contains Governorate, second will be of Area & third one will be for Block. The Area names will be filtered based on the selected Governorate name. If user want to select only for selected Governorate then he/she can tap on Search button without further selecting the Area name. The same is applicable for Area to Block i.e. the Block names will be filtered based on the selected Area name and If user want to search only for selected Area then it can be done without further selecting Block name.

**Step 2 – Map Data Request**

Mobile app made request to ArcGIS Server through WebAdapter to search in Governorate, Area or Block layer of MOB\_QUERY map service based on the selection.

**Step 3 – Process Request**

WebAdapter forward the request to ArcGIS Server. Map Service credentials are checked then query operation performed through REST API.

**Step 4 – Returning Result**

REST API returns the result as JSON object which forwarded back to mobile client app.

**Step 5 – Showing Result**

If result contains more than one object then it will be shown on a list view box, if it contains only one record than directly shown onto the map through graphic object. If no result returned then proper message is shown to the user.

**Step 6 – Showing Buffer Search Tool**

If user select anyone searched item comes in list view box then it will be appeared on map windows and a buffer search toolbar will be appeared on top of map windows. If user logged in as Registered User then the favorite point search will also be available in Buffer search tool bar otherwise it will not come.

Class Diagram –



Sequence Diagram – Administrative Boundary Search



Input Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Field | reference table | Validation | Data Source | Remarks |
| MapService Credential | ArcGIS Server Internal Security System | NA | System |  |
| Governorate | Governorate | Mandatory | List Box |  |
| Area | Area | Optional | List Box | If no selection made on Area then only Governorate will be search |
| Block | Block | Optional | Input Box | If no selection made on Block then only Area will be search |

Output Parameters

As an output feature list of searched keyword will be received.

### **External Interfaces**

NA

### **Assumptions**

* Server holding various types of data for the use.
* Server will be facilitated with required ArcGIS services.
* Bahrain locator app must have registered in mobile market/play store.

## **Road Search**

### Introduction

This process is used to specifically search on roads related layers Road\_Lane, Highways & Avenues. User can enter block number to narrow down the search.

### **Design Alternatives**

Not applicable.

### **Design Details**

The process / activity flow diagram for this activity is as below –



**Step 1 – Initiate Road Search**

This process can be initiated by tapping on Roads/Highway search icon available on context menu. Also, to narrow down the search Block Name can be entered in drop down box.

**Step 2 – Map Data Request**

Mobile app made request to ArcGIS Server through WebAdapter to search in Road\_Lane, Avenue or Highways layer of MOB\_QUERY map service based on the selected option. Block Number can also be provided to confine the search on a particular block.

**Step 3 – Process Request**

WebAdapter forward the request to ArcGIS Server. Map Service credentials are checked then query operation performed through REST API.

**Step 4 – Returning Result**

REST API returns the result as JSON object which forwarded back to mobile client app.

**Step 5 – Showing Result**

When a user searches a Road based on its number or name, without specifying a block, he would be provided with a list view segregating Road Segments by Block. Selecting a record group from the list view will display the road segments on the map. By selecting the Road name User can search the Highway & Avenues. If result contains more than one object then it will be shown on a list view box, if it contains only one record than directly shown onto the map through graphic object. If no result returned then proper message is shown to the user.

**Step 6 – Showing Buffer Search Tool**

If user select anyone searched item comes in list view box then it will be appeared on map windows and a buffer search toolbar will be appeared on top of map windows. If user logged in as Registered User then the favorite point search will also be available in Buffer search tool bar otherwise it will not come.

Class Diagram –



Sequence Diagram – Roads Search



**Input Parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **FIELD** | **REFERENCE TABLE** | **VALIDATION** | **DATA SOURCE** | **REMARKS** |
| MapService Credential | ArcGIS Server Internal Security System | NA | System |  |
| BLKNO | Road\_Lanes / Avenue/ Highways | Optional | Text Box |  |
| ROAD\_NO | Road\_Lanes / Avenue/ Highways | Mandatory | Text Box | Atleast one option should be selected. |
| ROAD\_NAMEA/ ROAD\_NAMEE | Avenue/ Highways | Optional | List BOx |

Output Parameters

As an output feature list of searched keyword will be received.

### **External Interfaces**

NA

### **Assumptions**

* Server holding various types of data for the use.
* Server will be facilitated with required ArcGIS services.
* Bahrain locator app must have registered in mobile market/play store.

## **POI Search**

**Introduction**

This process is used to specifically search on Point of Interests features which layer is POIs. User can enter block number or Area Name to narrow down the search (optional).

### **Design Alternatives**

Not applicable.

### **Design Details**

The process / activity flow diagram for this activity is as below –



**Step 1 – Initiate POI Search**

This process can be initiated by tapping on POI search icon available on context menu. All the POI type will be appeared in a pop-up window through its appropriate icon where user can select for which he/she want to query. On selection of POI all sub-type of selected POI will come as icon and user can select as per his/her choice. After selection of POI type and its sub-type, all the POIs will be filled in a list box from which user can select to search on map.

**Step 2 – Map Data Request**

Mobile app made request to ArcGIS Server through WebAdapter to search in POI layer of MOB\_QUERY map service for desired POI keyword and selected POI Type / SubType.

**Step 3 – Process Request**

WebAdapter forward the request to ArcGIS Server. Map Service credentials are checked then query operation performed through REST API.

**Step 4 – Returning Result**

REST API returns the result as JSON object which forwarded back to mobile client app.

**Step 5 – Showing Result**

If result contains more than one object then it will be shown on a list view box, if it contains only one record than directly shown onto the map through graphic object. If no result returned then proper message is shown to the user.

**Step 6 – Showing Buffer Search Tool**

If user select anyone searched item comes in list view box then it will be appeared on map windows and a buffer search toolbar will be appeared on top of map windows. If user logged in as Registered User then the favorite point search will also be available in Buffer search tool bar otherwise it will not come.

Class Diagram –



Sequence Diagram – POI Sea

Input Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Field** | **reference table** | **Validation** | **Data Source** | **Remarks** |
| MapService Credential | ArcGIS Server Internal Security System | NA | System |  |
| TYPE\_AR / TYPE\_EN | POI | Mandatory | ListBox | Type of POI |
| SUBTYPE\_AR /SUBTYPE\_EN | POI | Mandatory | ListBox | Sub Type of POI |
| NAME | POI | Mandatory | Text Box | POI to be search |

Output Parameters

As an output feature list of searched POI will be received.

### **External Interfaces**

NA

### **Assumptions**

* Server holding various types of data for the use.
* Server will be facilitated with required ArcGIS services.
* Bahrain locator app must have registered in mobile market/play store.

## **Add Favorite Point**

Introduction

This process is used to add user specific favorite points. It will be available to registered users only. CIO users can add more attributes compare to citizen users.

### **Design Alternatives**

Not applicable.

### **Design Details**

The process / activity flow diagram for this activity is as below –



**Step 1 – Initiate Add Favorite Point**

This process can be initiated by tapping on Favorite Point icon available on context menu. On tap on the icon a point will be added at current GPS location which can be shifted by moving through fingers. After fixing the location of favorite point, attribute form can be brought to top by tapping again on the newly added point. On attribute form user can add photo either through camera or through photo gallery.

**Step 2 – Saving Favorite Point**

On tap on save button of Favorite point attribute form, feature will be saved to Favorite Point feature layer. If at the time of saving internet is not working then it will be saved on local cache which will be synced with ArcGIS Server whenever device connected to server.

**Step 3 – Returning Result**

A message will be returned regarding success / failed.

Class Diagram –



Sequence Diagram – Add Favorite Point



Input Parameters

| **Field** | **reference table** | **Validation** | **Data Source** | **Remarks** |
| --- | --- | --- | --- | --- |
| OBJECTID | FAVORITE\_POINTS | NA | System |  |
| FV\_NAME\_A | FAVORITE\_POINTS | STRING (50) | User Input (Text Box) |  |
| FV\_NAME\_E | FAVORITE\_POINTS | STRING (50) | User Input (Text Box) |  |
| SHAPE | FAVORITE\_POINTS | POINT | System (GPS) |  |
| CREATED\_BY | FAVORITE\_POINTS | STRING (50) | System (Logged in user) |  |
| CREATED\_ON | FAVORITE\_POINTS | DATETIME | System (GPS DateTime) |  |
| STATUS | FAVORITE\_POINTS | STRING (1) Mandatory |  |  |
| DEVICEIMEI | FAVORITE\_POINTS | STRING (16) | System (Telephony) |  |
| ACCURACY | FAVORITE\_POINTS | INT | System GPS |  |
| DESCRIPTION | FAVORITE\_POINTS | STRING (500) | User Input  (Text Box) |  |
| TYPE\_EN | FAVORITE\_POINTS | STRING (50) | User Input (Combo Box) | POI Type |
| SUBTYPE\_EN | FAVORITE\_POINTS | STRING (50) | User Input (Combo Box) | POI Sub Type |
| BLOCK | FAVORITE\_POINTS | STRING(50) | User Input (Combo Box) |  |
| IS\_POI\_TYPE | FAVORITE\_POINTS | BOOLEAN | User Radio Button |  |
| ROAD | FAVORITE\_POINTS | STRING (50) | User Input (Combo Box) |  |
| BUILDING | FAVORITE\_POINTS | STRING (50) | User Input (radio) Button |  |
| PHOTO | FAVORITE\_POINTS | STRING (128) | System Camera |  |

Output Parameters

### **External Interfaces**

* Device camera will be interfaced to get image of favorite point.
* Device GPS will be used to get users current location.

### **Assumptions**

Favorites are saved in the DB

## **Edit Favorite Point**

**Introduction**

This process is used to edit favorite points created by user earlier.

### **Design Alternatives**

Not applicable.

### **Design Details**

The process / activity flow diagram for this activity is as below –



**Step 1 – Initiate Edit Favorite Point**

This process can be initiated by tapping on Edit Favorite Point icon available on context menu. On tap on the icon all favorite points added by user earlier will be shown on map. User can select favorite point which he/she want to edit.

**Step 2 – Editing Favorite Point**

On selection of favorite point attribute editor form will be opened on double tap. If user want to change the location of favorite point then it can be done via moving the FP by dragging. Now, user either can change location or attribute or both for selected FP. On attribute form user can change the photo either through camera or through photo gallery also.

**Step 3 – Saving Favorite Point**

On tap on save button of Favorite point attribute form, feature will be updated to Favorite Point feature layer. If at the time of saving internet is not working then it will be saved on local cache which will be synced with ArcGIS Server whenever device connected to server.

**Step 4 – Returning Result**

A message will be returned regarding success / failed.

Class Diagram –



Sequence Diagram – Edit Favorite Point



Input Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Field** | **reference table** | **Validation** | **Data Source** | **Remarks** |
| FV\_NAME\_A | FAVORITE\_POINTS | STRING (50) | User Input (Text Box) |  |
| FV\_NAME\_E | FAVORITE\_POINTS | STRING (50) | User Input (Text Box) |  |
| SHAPE | FAVORITE\_POINTS | POINT | Taking from New Map Location |  |
| DEVICEIMEI | FAVORITE\_POINTS | STRING (16) | System (Telephony) |  |
| ACCURACY | FAVORITE\_POINTS | INT | System GPS |  |
| DESCRIPTION | FAVORITE\_POINTS | STRING (500) | User Input  (Text Box) |  |
| TYPE\_EN | FAVORITE\_POINTS | STRING (50) | User Input (Combo Box) | POI Type |
| SUBTYPE\_EN | FAVORITE\_POINTS | STRING (50) | User Input (Combo Box) | POI Sub Type |
| BLOCK | FAVORITE\_POINTS | STRING(50) | User Input (Combo Box) |  |
| IS\_POI\_TYPE | FAVORITE\_POINTS | BOOLEAN | User Radio Button |  |
| ROAD | FAVORITE\_POINTS | STRING (50) | User Input (Combo Box) |  |
| BUILDING | FAVORITE\_POINTS | STRING (50) | User Input (radio) Button |  |
| PHOTO | FAVORITE\_POINTS | String (128) | System Camera |  |

Output Parameters

Result flag will be returned to user.

### **External Interfaces**

Device camera will be interfaced to get image of favorite point.

### **Assumptions**

Device will be in the coverage area.

## **GPS Location**

Introduction

This process is used to show user location on map by getting own location through GPS.

### **Design Alternatives**

Not applicable.

### **Design Details**

The process / activity flow diagram for this activity is as below –



**Step 1 – Initiate GPS Location**

This process can be initiated by tapping on GPS icon available on the map.

**Step 2 – Showing Location**

Application will communicate with GPS to get device location and a graphic icon will be shown on map with a buffer showing current positional accuracy. Map tip of the GPS location would be shown.

**Step 3– Set Center**

On tap at GPS icon will set map center to GPS location.

**Step 4 – Stop GPS**

Double tapping on GPS icon will stop showing location.

**Class Diagram**

NA

**Sequence Diagram-**



Input Parameters

* LATITUDE / LONGITUDE FROM GPS

Output Parameters

* NA

Result flag will be returned to user.

### **External Interfaces**

* Device GPS will be used to get users current location.

### **Assumptions**

Device will be in the coverage area.

## **Routing**

Introduction

This process is used to get available routes between two points. These points may be combination of POIs, Address, Roads, FP, and Administrative Unit or may be directly entered lat/longt. Mobile application will consume network analysis service to solve the route problem and will show the available routes and textual driving direction on mobile.

### **Design Alternatives**

Not applicable.

### **Design Details**

The process / activity flow diagram for this activity is as below –



**Step 1: Initiate Routing**

The routing can be initiated from two places, the first one is direct from the context menu and second one is from buffer search panel of other search results. If the process initiated from the other buffer search then the source location will be set at other searched feature location and control goes directly to step 3 otherwise system will provide panel to select source location type (i.e. POI, Address, Road, Area, FP, UIP, Direct Location Entry).

**Step 2: Selecting Source Feature / Location**

At this step user selects the source location by searching the feature through concerning feature type. When user selects source location type (POI, Address, Road, Area, FP) then it will open its search window to search and select the feature. Once feature is selected control come back to this process with the selected feature geometry which will be set as source location for routing. But if user selects UIP then the map window will come where user can select source location by tapping on the map. If user selects direct entry of location then system will provide a window to enter latitude and longitude as source location.

**Step 3: Selecting Destination Feature / Location**

At this step user selects the destination location by searching the feature as per step 2. Once feature is selected control come back to this process with the selected feature geometry which will be set as destination location for routing.

**Step 4: Swapping locations**

This step is optional and can be used if user want to interchange the source and destination lcoations.

**Step 5: Solving Route**

Once the source and destination locations are fixed, mobile app will made request to ArcGIS Network Service to Solve the route through the web adapter and map service credentials.

**Step 6: Showing Results**

If route solved then Network Service will return the available routes and mobile application will display the route summary including option to show the route. In first option turn-by-turn direction will be displayed as simple text which can be displayed on map also. In second option user can select the route by shortest path or fastest time.

Class Diagram



Sequence Diagram-



Input Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Field** | **reference table** | **Validation** | **Data Source** | **Remarks** |
| NAME | POI | STRING | User Input (Text Box) |  |
| FV\_NAME\_E | FAVORITE\_POINTS | STRING | User Input (Text Box) |  |
| BUILDING\_NO | ADDRESS | INTEGER | User Input (Text Box) |  |
| ROAD\_NO | Highways/ Avenue/ Road\_Lane | STRING | User Input (Text Box) |  |
| ROAD\_NAMEE | Highways/ Avenue/ Road\_Lane | STRING | User Input (Text Box) |  |
| BLOCK\_NO | BLOCK | SmallInteger | User Input (Text Box) |  |
| AREA\_NAMEE / REA\_NAMEA | AREAS | String | User Input (Text Box) |  |
| LATITUDE & LONGITUDE | - | DOUBLE | User Input (Text Box) |  |

1. To Location (Anyone from following)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Field** | **reference table** | **Validation** | **Data Source** | **Remarks** |
| NAME | POI | STRING | User Input (Text Box) |  |
| FV\_NAME\_E | FAVORITE\_POINTS | STRING | User Input (Text Box) |  |
| BUILDING\_NO | ADDRESS | INTEGER | User Input (Text Box) |  |
| ROAD\_NO | Highways/ Avenue/ Road\_Lane | STRING | User Input (Text Box) |  |
| ROAD\_NAMEE | Highways/ Avenue/ Road\_Lane | STRING | User Input (Text Box) |  |
| BLOCK\_NO | BLOCK | SmallInteger | User Input (Text Box) |  |
| AREA\_NAMEE / REA\_NAMEA | AREAS | String | User Input (Text Box) |  |
| LATITUDE & LONGITUDE | - | DOUBLE | User Input (Text Box) |  |

Output Parameters

* Route as JSON object will be returned.

### **External Interfaces**

* Device GPS can be used to get users current location.

### **Assumptions**

* NA

## **BUFFER SEARCH**

The buffer search process is common process for all search functionalities. It will be initiated automatically immediate after user selects any search result feature to show it on the map. With buffer search user can select other POIs or Favorite points falling with-in the buffer of selected feature.

### **Design Alternatives**

Not applicable.

### **Design Details**

The process / activity flow diagram for this activity is as below –



**Step 1: Initiate Buffer Search**

The buffer search is initiated automatically by showing buffer search panel when user perform any search and result is displayed on the map. The displayed feature becomes reference point for buffer search.

**Step 2: Search Option and Buffer Distance**

User select either POI or Favorite Point for query. The Favorite Point selection will be available only if user category is CIO or Registered User. On buffer panel user enters the buffer distance in meter. Apart from this another icon will be available to user to go directly to Routing. If user selects routing option then this process will be terminated here and selected feature will be act as source location for routing.

**Step 3: Creating Buffer Polygon**

Based on the selected feature and the buffer distance a buffer polygon will be created by consuming ArcGIS Geometry service.

**Step 4: Querying POI/ FP**

When buffer polygon received from the geometry service the next query will be fired through ArcGIS REST service on either POI or Favorite Point layer (based on selection as per step 2) to select all the features falling inside the buffer polygon. The result is returned from the ArcGIS Server as JSON object which will be highlighted on the map. If user selects favorite point to be search in step 2 then only the favorite points created by the user will come in result and FP created by other users will not come.

Class Diagram



Sequence Diagram-



Input Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Field** | **reference table** | **Validation** | **Data Source** | **Remarks** |
| BUFFER REFERENCE FEAUTRE | POI, ROAD, AREA, ADDRESS, FAVORITE\_PNT | NA | Other Search Results |  |
| BUFFER DISTANCE | - | Above 0 but less than 5000 | USER INPUT |  |

Output Parameters

* Features from POI / Favorite Points falling under the buffer area.

### External Interfaces

NA

### Assumptions

NA

# Critical Functions and Focus for Testing

|  |  |
| --- | --- |
| **Functions** | **Testing** |
| Search (Address, Admin, Road, POI) | System testing/ Manual Testing |
| Routing | System testing/ Manual Testing |
| Favorite Point creation | System testing/ Manual Testing |
| Buffer search | System testing/ Manual Testing |

# Limitations

Application only can be download from the Apple Store or Google store

Application will not work offline.

# Traceability to Requirements

| **Requirement Id** | **Requirement description** | **Use Case ID** | **SDD ID** |
| --- | --- | --- | --- |
| **FR 1** | Launching Application | 3.1.1.1 | 4.1/4.6 |
| **FR 2.1** | User Authentication - User Registration | 3.1.1.2.1 | 4.2/4.3 |
| **FR 2.2** | User Authentication - Forgot Password | 3.1.1.2.2 | 4.4 |
| **FR 2.3** | User Authentication - Change Password | 3.1.1.2.3 | 4.5 |
| **FR 3** | Select Layers | 3.1.1.3 | 4.7 |
| **FR 4** | Generic Search | 3.1.1.4 | 4.8 |
| **FR 5** | Address Search | 3.1.1.5 | 4.9 |
| **FR 6** | Administrative boundary search | 3.1.1.6 | 4.10 |
| **FR 7** | Road search | 3.1.1.7 | 4.11 |
| **FR 8** | POI Search | 3.1.1.8 | 4.12 |
| **FR 9.1** | Favorite point - Add Favorite points | 3.1.1.9.1 | 4.13 |
| **FR 9.2** | Favorite point - Edit Favorite points | 3.1.1.9.2 | 4.14 |
| **FR 10** | GPS Location | 3.1.1.10 | 4.15 |
| **FR 11.1** | Buffer search - POI Buffer Search | 3.1.1.11.1 | 4.17 |
| **FR 11.2** | Buffer search - FP Buffer Search | 3.1.1.11.2 |
| **FR 12.1** | Routing - Routing From Context Menu | 3.1.1.12.1 | 4.16 |
| **FR 12.2** | Routing - Initiate Routing from Buffer panel | 3.1.1.12.2 |
| **FR 13** | Social Media Integration (Map Screen Shot & Download Link) | 3.1.1.13 | Phase 2 |
| **FR 14** | User Feedback | 3.1.1.14 | Phase 2 |
| **FR 15.1** | Map Navigation – Toolbar | 3.1.1.15 |  |

# Acronyms and Glossary

|  |  |
| --- | --- |
| GPS | Global Positioning System |
| CIO | Central Informatics Organization |
| GIS | Geographical Information System |
| POI | Points of interest |
| SRS | Software Requirement Specification |

*Annexure-I*

List of web operations for custom web handler

Web Handler: USER\_MGT

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sr** | **Operation** | **Input Parameters** | **Return Type** | **Description** |
| 1 | AddUser | user\_email, user\_disp\_name, user\_pwd, cpr\_no, user\_country, mobile\_no, device\_ip | String | This operation is used to registering new user. Success / failed flag will be return as string. |
| 2 | RecoverPassword | User\_email, device\_ip | String | To recover the password of user id. |
| 3 | Activate | User\_email, user ip | String | To activate the user |

Web Handler: USER\_AUTH

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sr** | **Operation** | **Input Parameters** | **Return Type** | **Description** |
| 1 | Authenticate | User\_email, user\_pwd, device\_ip | String | To authenticate the user. The returned message will contain success / failed flag and type of user (citizen/ CIO) flag |

Web Handler: MAPSERVICE\_AUTH

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sr** | **Operation** | **Input Parameters** | **Return Type** | **Description** |
| 1 | GetMapServiceURLS | device\_ip, user\_id, device\_location\_latd, device\_location\_longt | Array of String | To get map service URLs including map service credentials. |

Web Handler: GetLists

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sr** | **Operation** | **Input Parameters** | **Return Type** | **Description** |
| 1 | GetRoadNames | Minimum 4 char to seach | Array of String | To fill autocomplete list on typing of road names |
| 2 | GetPOI\_Type | - | Array of string / JSON | Will return POI types |
| 3 | GetPOI\_SubType | POI\_Type | Array of string / JSON | Will return POI sub types for given POI Type |
| 4 |  |  |  |  |

*Annexure-II*

Data structures of feature layers / flat tables

**A. EXISTING FEATURE LAYERS - DYNAMIC MAP SERVICE**

|  |  |  |
| --- | --- | --- |
| **Service Name** | **url** | **Description** |
| Mob\_Eng\_Vec | https://www.locatorservices.gov.bh/arcgis/rest/services/LOCATORMOBILE/MOB\_ENG\_VEC/MapServer | English Vector Map tiled service |
| Mob\_Eng\_Sat | https://www.locatorservices.gov.bh/arcgis/rest/services/LOCATORMOBILE/MOB\_ENG\_SAT/MapServer | English Satellite Map tiles service |
| Mob\_Eng\_Hyb | https://www.locatorservices.gov.bh/arcgis/rest/services/LOCATORMOBILE/MOB\_ENG\_HYB/MapServer | English Hybrid Map tiles service |
| Mob\_Query | https://www.locatorservices.gov.bh/arcgis/rest/services/LOCATORMOBILE/MOB\_QUERY/MapServer | Query Service |
| Mob\_Eng\_Routing | https://www.locatorservices.gov.bh/arcgis/rest/services/LOCATORMOBILE/MOB\_ENG\_ROUTING/NAServer | ArcGIS Network Analyst dynamic service with Network data configured |

1. **POIs (Point of Interest)**
   1. Field List

| **Field Name** | **Type** | **Alias Name** | **Length** |
| --- | --- | --- | --- |
| OBJECTID | OID | OBJECTID |  |
| NAME | String | NAME | 255 |
| BUILDING | String | BUILDING | 255 |
| BLOCK | Integer | BLOCK |  |
| ROAD | Integer | ROAD |  |
| AREA\_NM\_EN | String | AREA NAME | 255 |
| NAME\_ARABIC | String | ARABIC NAME | 255 |
| GOVERNORATE | Integer | GOVERNORATE |  |
| TYPE\_AR | String | TYPE\_AR | 255 |
| SUBTYPE\_AR | String | SUBTYPE\_AR | 255 |
| ROAD\_NAME | String | ROAD\_NAME | 255 |
| FLAT | String | FLAT | 255 |
| TELEPHONE | String | TELEPHONE | 255 |
| CR | String | CR | 255 |
| TYPE\_EN | String | TYPE\_EN | 255 |
| SUBTYPE\_EN | String | SUBTYPE\_EN | 255 |
| ROAD\_NAME\_AR | String | ROAD\_NAME\_AR | 255 |
| AREA\_NM\_AR | String | AREA\_NM\_AR | 255 |
| POINT\_X | Double | POINT\_X |  |
| POINT\_Y | Double | POINT\_Y |  |
| DT\_CREATED | Date | DT\_CREATED | 36 |
| DT\_MODIFIED | Date | DT\_MODIFIED | 36 |
| ORGTYPE | String | ORGTYPE | 18 |
| CATEGORY\_EN | String | CATEGORY\_EN | 250 |
| CATEGORY\_AR | String | CATEGORY\_AR | 250 |
| POI\_ID | String | POI\_ID | 15 |
| SHAPE | Geometry | Shape |  |

* 1. Spatial Reference: 20439
  2. Geometry Type: Point

1. **Addresses** 
   1. Field List

|  |  |  |  |
| --- | --- | --- | --- |
| **Field Name** | **Type** | **Alias Name** | **Length** |
| OBJECTID | OID | OBJECTID |  |
| BUILDING\_NO | Integer | BUILDING NO |  |
| BLOCK\_NO | SmallInteger | BLOCK NO |  |
| ROAD\_NO | Integer | ROAD NO |  |
| SHAPE | Geometry | Shape |  |

* 1. Spatial Reference: 20439
  2. Geometry Type: Polyline

1. **Highways**
   1. Field List

|  |  |  |  |
| --- | --- | --- | --- |
| **Field Name** | **Type** | **Alias Name** | **Length** |
| OBJECTID | OID | OBJECTID |  |
| ROAD\_NO | Integer | ROAD NO |  |
| ROAD\_NAMEE | String | ROAD NAME ENGLISH | 50 |
| ROAD\_NAMEA | String | ROAD NAME ARABIC | 50 |
| BLKNO | Integer | BLOCK NO |  |
| ROAD\_TYPE | SmallInteger | ROAD TYPE |  |
| SHAPE | Geometry | Shape |  |
| SHAPE.LEN | Double | SHAPE.LEN |  |

* 1. Spatial Reference: 20439
  2. Geometry Type: Polyline

1. **Avenues**
   1. Field List

| **Field Name** | **Type** | **Alias Name** | **Length** |
| --- | --- | --- | --- |
| OBJECTID | OID | OBJECTID |  |
| ROAD\_NO | Integer | ROAD NO |  |
| ROAD\_NAMEE | String | ROAD NAME ENGLISH | 50 |
| ROAD\_NAMEA | String | ROAD NAME ARABIC | 50 |
| BLKNO | Integer | BLOCK NO |  |
| ROAD\_TYPE | SmallInteger | ROAD TYPE |  |
| SHAPE | Geometry | Shape |  |
| SHAPE.LEN | Double | SHAPE.LEN |  |

* 1. Spatial Reference: 20439
  2. Geometry Type: Polyline

1. **Roads\_Lanes**
   1. Field List

|  |  |  |  |
| --- | --- | --- | --- |
| **Field Name** | **Type** | **Alias Name** | **Length** |
| OBJECTID | OID | OBJECTID |  |
| ROAD\_NO | Integer | ROAD NO |  |
| ROAD\_NAMEE | String | ROAD NAME ENGLISH | 50 |
| ROAD\_NAMEA | String | ROAD NAME ARABIC | 50 |
| BLKNO | Integer | BLKNO |  |
| ROAD\_TYPE | SmallInteger | ROAD TYPE |  |
| SHAPE | Geometry | Shape |  |
| SHAPE.LEN | Double | SHAPE.LEN |  |

* 1. Spatial Reference: 20439
  2. Geometry Type: Polyline

1. **Blocks**
   1. Field List

|  |  |  |  |
| --- | --- | --- | --- |
| **Field Name** | **Type** | **Alias Name** | **Length** |
| OBJECTID | OID | OBJECTID |  |
| BLOCK\_NO | SmallInteger | BLOCK NO |  |
| SHAPE | Geometry | Shape |  |
| SHAPE.AREA | Double | SHAPE.AREA |  |
| SHAPE.LEN | Double | SHAPE.LEN |  |

* 1. Spatial Reference: 20439
  2. Geometry Type: Polygon

1. **Areas**

Field List

|  |  |  |  |
| --- | --- | --- | --- |
| **Field Name** | **Type** | **Alias Name** | **Length** |
| OBJECTID | OID | OBJECTID |  |
| AREA\_NAMEA | String | AREA NAME ARABIC | 100 |
| AREA\_NAMEE | String | AREA NAME ENGLISH | 50 |
| SHAPE | Geometry | Shape |  |
| SHAPE.AREA | Double | SHAPE.AREA |  |
| SHAPE.LEN | Double | SHAPE.LEN |  |

* 1. Spatial Reference: 20439
  2. Geometry Type: Polygon

1. **Governorate**
   1. Field List

|  |  |  |  |
| --- | --- | --- | --- |
| **Field Name** | **Type** | **Alias Name** | **Length** |
| OBJECTID | OID | OBJECTID |  |
| GOV\_NM\_AR | String | NAME ARABIC | 50 |
| MIN\_GOV\_NM\_EN | String | NAME ENGLISH | 50 |
| SHAPE | Geometry | SHAPE |  |
| SHAPE.AREA | Double | SHAPE.AREA |  |
| SHAPE.LEN | Double | SHAPE.LEN |  |

* 1. Spatial Reference: 20439
  2. Geometry Type: Polygon

**B. EXISTING FEATURE LAYERS - NETWORK SERVICE**

Only one routing service will be used to solve the routing queries.

**Network Analysis Classes**

* **Class Name :** Stops

|  |  |
| --- | --- |
| Field | Candidate Fields |
| Shape |  |
| Name | Name, Address, Label, Location, Stop, WayPoint, Description, Title, DepotName |
| RouteName | RouteName, Route, RouteID |
| Sequence |  |
| TimeWindowStart | TimeWindowStart1, TWStart1, FromTime1, FromTimeWindow1, FromTW1, From1, TimeWindowStart, TWStart, FromTime, FromTimeWindow, FromTW, From |
| TimeWindowEnd | TimeWindowEnd1, TWEnd1, ToTime1, ToTimeWindow1, ToTW1, To1, TimeWindowEnd, TWEnd, ToTime, ToTimeWindow, ToTW, To |
| SourceID | SourceID, SID, Source |
| SourceOID | SourceOID, SOID |
| PosAlong | PosAlong, PA, Pos |
| SideOfEdge | SideOfEdge, SOE |
| CurbApproach | CurbApproach, SideOfStreet, SideApproach, CurbSide, Curb |
| Attr\_Distance |  |
| Attr\_Minutes | Attr\_Minutes, Minutes, VisitTime, StopTime, Delay, ServiceTime, SrvTime, StartDepotServiceTime, StartSrvTime, StartSrv |
|  |  |

* **Class Name :** Barriers

|  |  |
| --- | --- |
| Shape |  |
| Name | Name, Address, Label, Location, Barrier, Description, Title |
| SourceID | SourceID, SID, Source |
| SourceOID | SourceOID, SOID |
| PosAlong | PosAlong, PA, Pos |
| SideOfEdge | SideOfEdge, SOE |
| CurbApproach | CurbApproach, SideOfStreet, SideApproach, CurbSide, Curb |
| FullEdge | FullEdge, IsFullEdge, BlockEntire |
| BarrierType | BarrierType, BarType, BarrierTyp |
| Attr\_Distance |  |
| Attr\_Minutes | Attr\_Minutes, Minutes, VisitTime, StopTime, Delay, ServiceTime, SrvTime, StartDepotServiceTime, StartSrvTime, StartSrv |
|  |  |

* **Class Name:** PolylineBarriers

|  |  |
| --- | --- |
| Shape |  |
| Name | Name, Label, Locations, Barrier, Description, Title |
| Locations | Locations, LocRanges |
| BarrierType | BarrierType, BarType, BarrierTyp |
| Attr\_Distance |  |
| Attr\_Minutes | Attr\_Minutes, Minutes, Scaled\_Cost, Scaled\_Time |
|  |  |

* **Class Name :** PolygonBarriers

|  |  |
| --- | --- |
| Shape |  |
| Name | Name, Label, Locations, Barrier, Description, Title |
| Locations | Locations, LocRanges |
| BarrierType | BarrierType, BarType, BarrierTyp |
| Attr\_Distance |  |
| Attr\_Minutes | Attr\_Minutes, Minutes, Scaled\_Cost, Scaled\_Time |

**C. NEW FEATURE LAYERS – DYNAMIC MAP SERVICE**

Only one feature layer will be added to create users favorite points. The structure of this layer is as below -

**Name: Favorite Points**

**Field List:**

| **Field Name** | **Type** | **Alias Name** | **Length** | **Description** |
| --- | --- | --- | --- | --- |
| OBJECTID | OID | OBJECTID |  |  |
| FV\_NAME\_A | String | NAME ARABIC | 50 | Favorite name in Arabic |
| FV\_NAME\_E | String | NAME ENGLISH | 50 | Favorite name in English |
| SHAPE | Geometry | SHAPE |  | Favorite Point Shape as Point type |
| Created\_By | String | Created By | 50 | User ID who created the favorite point |
| Created\_On | Date | Created On |  | Date time stamp when favorite point created |
| Status | Smallinteger | Status |  | Current status of FV. The domain value will be 1-Draft, 2-Approved, 3-Reject |
| DeviceIMEI | String | - | 16 | Device IMEI number through which favorite Point created |
| Accuracy | Smallinteger | - |  | Positional accuracy reported by mobile device at the time FV captured. |
| Description | String | Description | 50 | Description of FV |
| TYPE\_EN | String | Type | 255 | Reference to POI Type Master |
| SUBTYPE\_EN | String | Sub Type | 255 | Reference to POI Type Master |
| BLOCK | Integer | Block Number |  |  |
| Is\_POI\_TYPE | String | Feature Type | 1 | Available only to CIO User |
| ROAD | Integer | ROAD |  | Available only to CIO User |
| BUILDING | String |  | 255 | Available only to CIO User |
| Photo | Image | Photo |  |  |

Spatial Reference: 20439

Geometry Type: Point

**D. FLAT TABLES**

The data structures of non-spatial table are as below-

1. **MobileAppUser –** Thistable will be used to manage the registered mobile app users.

| **Field Name** | **Type** | **Length** | **Unique** | **Mandatory** | **Default** | **Remark** |
| --- | --- | --- | --- | --- | --- | --- |
| USER\_EMAIL | VARCHAR | 50 | YES | YES |  | Primary Key, act as User ID |
| USER\_DISP\_NAME | VARCHAR | 50 |  | YES |  | User display name |
| USER\_PWD | VARCHAR | 15 | YES | YES |  | Encrypted |
| CPR\_NO | VARCHAR | 10 | YES | NO |  |  |
| USER\_COUNTRY | VARCHAR | 20 |  | NO |  |  |
| MOBILE\_NO | VARCHAR | 12 | YES | NO |  |  |
| USER\_CREATED\_ON | DATETIME |  |  | YES | Current Date Time |  |
| USER\_IP | VARCHAR | 16 | NO | YES |  |  |
| STATUS | VARCHAR | 1 | NO | YES | Y | Activated / Not Activated /Suspended |
| IS\_CIO\_USER | BOOLEAN | 1 | NO | YES | N |  |

1. **RegisteredUserLog –** To log the registered users activities limited upto successful log-in hits.

| **Field Name** | **Type** | **Length** | **Unique** | **Mandatory** | **Default** | **Remark** |
| --- | --- | --- | --- | --- | --- | --- |
| USER\_LOG\_ID | BIGINT |  |  | YES | AUTO GEN | Primary Key |
| USER\_ID | VARCHAR | 50 |  | YES |  | Foreign Key |
| LOGGED\_IN\_AT | DATETIME |  |  | YES | Current Date Time | Users logged in date time |
| USER\_IP | VARCHAR | 16 | NO | YES |  | User IP Address |
| USER\_LOC\_LATD | FLOAT |  |  | YES |  | Latitude of user location |
| USER\_LOC\_LONGT | FLOAT |  |  | YES |  | Longitude of user location |

1. **NonRegisteredUsersLog –** To log the application usage.

| **Field Name** | **Type** | **Length** | **Unique** | **Mandatory** | **Default** | **Remark** |
| --- | --- | --- | --- | --- | --- | --- |
| APPUSE\_LOG\_ID | BIGINT |  |  | YES | AUTO GEN | Primary Key |
| APP\_USED\_AT | DATETIME |  |  | YES | Current Date Time | Application use started date time |
| FROM\_IP | VARCHAR | 16 | NO | YES |  | User IP Address |
| USER\_LOC\_LATD | FLOAT |  |  | YES |  | Latitude of user location |
| USER\_LOC\_LONGT | FLOAT |  |  | YES |  | Longitude of user location |

1. **BLK\_AREA\_GOV –** This table already exist and published. It contains relation between Blocks, Area & Governorate admin boundaries.

|  |  |  |  |
| --- | --- | --- | --- |
| **Field Name** | **Type** | **Length** | **Alias** |
| OBJECTID | Object ID |  | OBJECTID |
| BLOCK\_NO | Double |  | Block\_NO |
| AREA\_NAME\_ENG | String | 255 | Area\_Name\_Eng |
| AREA\_NAME\_ARA | String | 255 | Area\_Name\_Ara |
| GOVERNORATE\_NAME\_ENG | String | 255 | Governorate\_Name\_Eng |
| GOVERNORATE\_NAME\_ARA | String | 255 | Governorate\_Name\_Ara |

1. POI\_TYPE\_SUBTYPE **–** This table is also already exist and published which contains relation between Point of Interest and its sub types.

|  |  |  |  |
| --- | --- | --- | --- |
| **Field Name** | **Type** | **Length** | **Alias** |
| OBJECTID | Object ID |  | OBJECTID |
| TYPE\_ENG | String | 255 | Type\_Eng |
| SUBTYPE\_ENG | String | 255 | Subtype\_Eng |
| TYPE\_ARA | String | 255 | Type\_Ara |
| SUBTYPE\_ARA | String | 255 | Subtype\_Ara |