Chapter-4

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4.1 Proposed Software Architecture

The Goal of the developed Web Based Service Oriented Architecture deal with the following Web Services:

1) Develop Client that Register themselves and authorized to access the Web Services

2) Develop Services that talk with other services or linked with other services - middle layer or Interface

3) Develop the Server side client that can receive, process and sent back the data to and from web services.

1) Client Side Web Based Services:

Client side web Based Service is responsible to easily access on client browser, so client can register themselves to authorized for access other required services. Main responsibility of the client is send data to the middle level services to reach the destination (linked with other web
based services – n level) and receive the augmented data from directly from server side client or middle level services.

Architecture for Mobile Augmented Reality System

Develop Web Service for client using any of the web tools because Web Services has an open standard so any device for client as well as server side client can access it without any problem of OS or with minimum Installation or Processes. Authorized user has given different rights to send video, audio or 3D image data to middle level services.
Following specification are conceder’s when to develop the client side Web Services:

**Design:** access from any device [like Nokia, Sony Ericson, Motorola, etc.] and compatibility for any mobile or pda’s OS [e.g. Symbian, UIQ, Palm OS, Brew], activate camera and for sending data through services.

**Role:** Send/Receive authorized data to and from client, linked with middle level services

**Responsibility:** Bi-Directional means at the same time sending data and display augmented data.

2) **Middle Level Web Services:**

Middle level web services are very important because it’s will communicate with both client side web services and server side web services or other traditional web services for his different type of category and data. Main responsibility of middle level services is receive the data from client and send them to appropriate server to process them, and also receive the augmented data from server side web services, and Also linked with other web services for reaching to the remote place. So design the middle level web services this all point should be consider for the architect.
After successfully registered of client side web services, he access the other services require by his choice’s e.g. category of application like entertainment, Medical Surgery, or type of data wants to processed like video, image, or audio and data from client.

Middle level architecture should be flexible for creating web services using them and linked.

**Design** : Directly talk with client/server, design other services using client.

**Roles** : Find the remote server, link with other middle level or server side services.

**Responsibility** : data send/receive to and from server side services.

3) **Server side Web Services** :

The Server Side should be responsible for receiving data from middle level web services, also this data should processed that’s the main goal because data should be augmented. The Server Client Web Service can access & sent back and also calling process service resides at own or at remote server. After finishing augmentation, augmented data sent back using Server side client and this server side client can send data to the middle level or directly to the client.
So this point are strictly consider when to design the Server Side Web Services.

**Design**: communicate with any middle level services, compatible for any mobile OS web server like IIS, Apache etc..

**Roles**: find the remote server, link with other middle level or server side services.

**Responsibility**: data send/receive to and from other Web Services.

### 4.2 Propose Algorithm

**Algorithm Steps**:

**Start Algorithm**

1. Client Page for Registration
2. Send data to server for identifying client devices e.g. Android, iPone
3. Check for Wi-Fi, GPS, GPRS, EGDE, Browser multitasking, Camera, Audio/Video Type Support as per client device type
4. Store all the details to server in database for giving services as runtime or installable for client suitability e.g. Camera start, GPS Services start, Wi-Fi after completing the registration, now client device can authenticate for augmentation.
5. Using type of augmentation services, client will augment for this category. E.g. Navigation, Searching ATM’s, Restaurants, Coffe shops, Advertisement, Event Promotion, Browsing 3D Models.

6. After selection, Client will update his location to server using Push Notification services for continuously get the updated data from server so type of middle level service will provide to cater the client device.

7. Middle level service’s will load the data to client e.g. Google Maps for his personal Navigation guidance using by walk etc. as per client device position middle level service will load data to client.

8. Also client data will continually send to server and augmented data will back to client device location.

9. Server will process the data as per client will select the services

10. Augmented data will receive by client for viewer

End Algorithm

4.3 Algorithms in Details

Client Side :

⇒ Client Registration

⇒ Client Required Data for Augmentation

⇒ Client Send/Receive data using browser
• Client Registration

■ Client Primary Details

e.g. Name, Userid, Password, Emailid, Address, His current Location for Client Authentication and Authorization for Augmentation

■ Client Device Network Support Details:

○ Wi-Fi, EDGE, GPRS, For Data Communication in Network

○ GPS For his Location share, Push Notification Web Services will check using client Device GPS for updating current location to server for every minutes or seconds.

○ All details are required for server because of client type device server will start services for client camera, GPS, GPRS for Augmentation. E.g Android Device, iPhone Device, Windows Device all are using different Services.

■ Client Device Camera Details (Camera Type, Capacity, etc.) for Capturing and Comparing Image, Video or Audio or Text Data for Object Recognition.

■ Client Device Memory/Storage Capacity and Processing Capacity for Send data to server and received data view on client device

■ Client Device OS Compatibility e.g. Multitasking Support

■ Client Selection of Web Services for Augmentation
After Completing Registration, Client will authenticate for augmentation. Before start the augmentation, client device will select the type of augmentation will provide by service provider.

- e.g. Person’s Navigation systems

  - Client Device will share his current location to server using client GPS and Push Notification services provided by server for every Minutes or seconds.

  - As per User’s Location, Server will provide locations to the client so client will select the destination to mention the searching parameter.

  - Client will also select the type of services will choose for Navigation e.g. By Walk, By Car, By Train etc. as per this parameter Push Notification will update the server with client location for provide next data for Navigation.

  - As per searching location data and User’s Location client will navigate continuously guided by server using arrow to indicate his current position for every seconds until client reach to the destination.

    - e.g 3D Model Browsing

  - Client will search the different model from web provided by service Provider.
→ Client will select the different type and size for the same model as per choice.

→ After searching, model will load to client device using web services for Augmentation.

→ After Loading Process, Augmentation Process will start and user’s can interact with another object for activating 3D Model to Client’s Screen. So As per augmentation type client data will change and service is dynamically provide by service provider.

**Middle Level**

- Middle Level Web Services will use for communicate With Server to send data and Augmented data get back to client.

- As per Client type and Augmentation Type Middle Level Service will design e.g. Services for Android Device, Services for iPhone Devices, Services for Windows Devices

- Service will type of Client devices so communication with the server and client devices for send/Receive data is very smoothly.

- Also communicate with the Other Web Services or Loosely Coupled with client as well as server.
Server Level

- Server will authenticate client for augmentation.
- Server will receive the client data for augmentation.
- Server architecture is based on providing services to client type devices. e.g. same service provider will give services to android devices, iPhone devices, windows devices, blackberry devices separately or combined as per his choice.
- Server Software architecture is design as per client requirement to provide augmented data to client so various types of web services will design as per client type. E.g. Google Maps data provide to client for Navigation.
- Using Different algorithms or technique provided by OpenCV or Custom algorithm design by others server will augment the data for client.
- Server will store data and identify the objects or Dynamic Object Recognition matching with them for sent back to client as per the area provided services to client.
- Server will continuously update the client position to his database until the client is exit from augmentation.
- Push Notification Services will continuously track the position of client and should send the notification, so current position and data will send by client to server and server to client.

- Capacity of server to processing large number of user’s and large number of data e.g. image, calculation of client, video capturing, audio etc. so required good processor, memory, and storage capacity.