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On

SHARED ACCESS LAYER – SERVICE ORIENTED ARCHITECTURE FOR E-GOVERNANCE

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DECLARATION

I hereby declare that the Major Project work entitled "**SHARED ACCESS LAYER – SERVICE ORIENTED ARCHITECTURE FOR E-GOVERNANCE**" which is being submitted to Delhi Technological University, in partial fulfilment of requirements for the award of Degree of Master of Technology (Computer Science and Engineering) is a bona-fide report of Major Project carried out by me. The material contained in the report has not been submitted to any university or institution for the award of any Degree.

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This is to certify that the dissertation titled "**Shared Access Layer – Service Oriented Architecture for e-Governance**" is a bona-fide record of work done at **Delhi Technological University** by **Sandeep Jain, Roll No. 2K13/CSE/29** for partial fulfilment of the requirements for the degree of Master of Technology in Computer Science & Engineering. This project was carried out under my supervision and has not been submitted elsewhere, either in part or full, for the award of any other degree or diploma to the best of my knowledge and belief.

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ABSTRACT

The e-Governance is basically an electronic channel through which CITIZENS and GOVERNMENT can interact with one each other. There will be no constrained of the locations and limitation of time. This all improves in the delivery of the Government Services in a effective manner. The vision is strictly depending on the ability of diverse computing systems which are owned and managed by various government departments. These systems are able to interact with each other across all departmental boundaries. This ability of the systems is known as e-government interoperability.

During the last few years, e-government interoperability is continuously an important research area for each. SERVICE ORIENTED ARCHITECTURE FOR E-GOVERNANCE approach had provided an acceptable solution in this direction. Various models based upon SOA had been proposed. Here we are proposing a new model known as SHARED ACCESS LAYER – SERVICE ORIENTED ARCHITECTURE FOR E-GOVERNANCE . This model will provide efficient services to the citizens as well as to the departments by providing the shared access layer, i.e. every citizen or any other user will access the required information through this layer, this layer will provide the authentication, redirection to the concerned service and access to the commonly shareable data without actually accessing the departmental server.

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CHAPTER - 1

1.0 INTRODUCTION:

Electronic Governance is basically an application by the intelligent use of Information and Communication Technology (ICT) for delivering government services to citizens, facilitating information exchange among the stakeholders and integrating different stand-alone systems with a view to deliver best governance. It is an approach in which the Government and citizens and other arms of government can interact for certain activities using different various ICT tools and techniques. The basic main objective of e-Governance is to make government services available to the citizens on the click of the button anywhere and every-time and also to the employees, businesses, and other non-governmental agencies in an efficient and transparent way.

e-Governance attempts to reach out to the stakeholders to provide information in real time. It enhances operational efficiency, transparency and productivity among government departments and concerned agencies. The e-government initiatives aim for the sharing of information and improving government processes by cutting process costs. It also manages performance of the processes and making strategic connections in government and it is also aiming for creating empowerment within the government architecture. The interaction between governments and citizens can be improved with all such initiatives.

The successful implementation of e-governance initiatives depends not only on the availability of “resources” but also on the adoption of proper implementation.

1.1 OVERVIEW

This chapter discusses the overall structure for application with reference to the logical & physical grouping of components. The separate shared layers communicate with other clients and applications. The layers are concerned with the logical and physical divisions of these components and their functionalities. Physical location of these layers are taken into account. These layers can be located or reside on the same tier or different tiers. This chapter also discusses about the how to synchronize applications into single unit and also how to choose an appropriate functional layout for the applications. This also discusses about how applications can support multiple client types and multiple application requests.

This objective of this study is for developing guidelines and process which may be used for introducing service oriented architecture through use of different services. This especially helps for migrating different government services into single frame. This is pertinent to mention here that adopting any form of technology or architecture or services especially in the government department requires not only serious but delicate thoughts.

The ultimate objective of the e-Governance is to focus on maximizing towards the citizens convenience, to imbibe operational efficiency, improvisation of the quality standards and deliver the services in a time bound and hassle free way and more important to this is that it may be provided from a single place.

1.2 BACKGROUND

The SOA is becoming the backbone of the e-Governance, now it is very important to set the stage for the e-Governance with understanding of SOA. It is also important that everything comes with some of its own challenges so is with the deployment of the SOA. It also come its own challenges and over the last few years the following are the major challenges.

- Identification of the Service in single frame
- Coordination for the Cross-organization
- Meticulous re-usability of data
- Management of Services and their flows
- Integration of the web based-delivered services
- Proliferation of services in a controlled way

The SOA also heightens the importance of addressing existing IT challenges that are the integral part of e-governance for years such as functional ownership, standard compliance etc. Hence the organizations should ensure the following points.

- Correctness of services and solutions are built these should meet the requirements of the process.
- Approach to discovery should be consistent to the consumption, design, development and implementation.
- Properly checked and approved services are deployed.
- Services should be designed and run in a secure manner in single place.
- Services should be managed in a scalable way.
- Service Level Agreements (SLAs) are validated for new consumers
- There should be appropriate and pragmatic SOA governance roles and responsibilities.
- There should be provision for the service developers to easily publish and discover services.
- SOA reference architecture should stays relevant.

1.3 CHALLENGES IN E-GOVERNANCE

There are several challenges that needs to be addressed to achieve the goal of effective e-governance are

- Business Challenges

    a) Information sharing
    b) There is a lack of real-time visibility for the approvals of workflows.
    c) Processes for legal framework to support e-governance are lengthy.
    d) Lack of infrastructure to support e-governance
    e) High price of internet services for private sector and citizens
    f) Limited ICT human capacity

- Technical Challenges

    a) Lack of service centricity, data duplication, and redundancy
    b) Search and retrieve information in a seamless manner
    c) Integrating different business applications into common workflow
    d) Enforcement of the security
    e) Lack of integration between systems and also within and across departments which is leading to manual overhead and lower productivity.
    f) Management of the IT complexity and change of the requirements
    g) Change management
    h) Internet bandwidth constraints

There is a one obvious and common challenge being faced involves managing of the services metadata into the single frame. The SOA-based environments may include many services which exchange messages to another application to perform various tasks. Depending upon the design of the architecture, a single SOA application may generate lakhs of messages.

Managing and providing information with regard to the how services can interact among themselves can become complex. This scenario becomes even more complicated when these services are delivered by different organizations. This situation creates huge trust based issues across organizations hence SOA Governance comes into the picture.

The another major challenge is the lack of testing in SOA space. There is scarcity of sophisticated tools that provide testability of all services which includes message and database as well as web services. There is also a lack of horizontal trust that requires that both producers and consumers to test the services continuously.

The main goal of the SOA is to deliver agility to businesses. The business agility requires that these services to be controlled by the business goals and directives as these are predefined in the Business Motivation Model (BMM).

One of the more challenge relates to providing appropriate levels of security. The security models built in the applications may no longer suffice the requirements when an application exposes its capabilities. The application managed security may not be the right model for security of the services. Large number of new technologies and technical standards has emerged and may provide more appropriate models for security in SOA.

The most important benefit of SOA is its ease of use in the reuse. Thus accountability and funding models ultimately evolve within the organization. A business unit is to be encouraged to create reusable services that other units may use. In other words units must be encouraged to reuse services. This requires a few new governance components:

- Each business creating services have an appropriate support structure in place to deliver on its service-level obligations, and also to support enhancing existing services for the benefit of others.
- Each business unit consuming services should accepts the apparent risk involved in the reusing of services outside their control.

1.4 E-FORMS – A PAPERLESS APPROACH

The paper-based forms remain the main data gathering interface. These forms are manually intensive and expensive to process. There is a need of the government officials to handle large volume of forms and respond to all the requests in time bound manner.

The main goal of E-Governance is to enable the citizens and private/public sectors to access government services in effective and efficient services delivery. That too in a time bound manner and also at any time in a form convenient to the users through internet and other channels like mobile phones, etc.

CHAPTER - 2

2.0 SERVICE ORIENTED E-GOVERNANCE

The solutions based on the Service Oriented E-governance (SOE) needs to rapidly transform existing applications, data, and content into the web services. Such approach should be completely non intrusive approach which requires no changes to the existing applications.

The SOA based solution will reduce dependency on back-end applications and the need to write code every time there is a change in policy. It also introduces new software that promotes the direct collaboration of citizens and government departments that too irrespective of the delivery model.

The various steps involved in executing SOE are

a) Identification of the Service
b) Identification of forms,
c) Modelling / re-engineering of the Business process,
d) Integrating various stakeholders,
f) Centralized deployment.

The Service-oriented architecture e-governance is a major component among the best practices to define how organization and process tie together with the other components e.g. architecture, business, and technology. The focus of services is not on core administrative functioning but also on the development of a service that will be consumed by internal and external processes to the firm.

The government can deploy a governance framework that includes the service ownership, service administration, service alignment, service delivery, and service value.

2.1 EMERGENCE OF SOA

One of the major reason for the emergence of SOA is it is very simple and starts with a simple idea, more and more ideas can be built in it. To remain competitive it is necessary for the businesses to be adapted quickly to internal factors such as acquisition and restructuring, or external factors like competitive forces, customer requirements or government regulations. It should be Cost-effective, it should be flexible, the IT infrastructure is highly needed to support the business. The service oriented architecture can help organizations to succeed in the today dynamic business landscapes. This all can be achieved through primary characteristic of SOA.

When the SOA is properly implemented, it makes reusability extremely cost-effective. The most common motivations of the SOA are agility, flexibility, reusability, data rationalization, integration, and reduced costs.

Feature	Benefits
Service	Improved flow of the information Ability to expose internal functionality flexibility
Service Re-use	Low cost of the software development and management costs
Messaging	flexibility in the Configuration
Message Monitoring	Business intelligence in messaging Security attack detection capability
Message Control	Management policy Security policy
Message Transformation	Data translation
Message Security	Confidentiality and integrity of data
Complex Event Processing	Simplified software structure Ability to adapt external environments Improved manageability and security
Service Composition	Ability to develop new function combinations rapidly
Service Discovery	Ability to optimize performance and functionality Easier introduction of system upgrades
Asset Wrapping	Ability to integrate assets
Virtualization	Improved reliability
Model-driven Implementation	Ability to develop new functions rapidly

2.2 EXISTING DESIGN & ARCHITECTURE

2.2.1 Service Oriented Architecture

Service Oriented Architecture (SOA) is basically a collection of services. These services communicate with each other. The communication involves simple data passing. This could also involve two or more services coordinating some activity. Service-Oriented Architecture (SOA) is the architectural style that supports service-orientation.

Service-orientation is basically a means for the services and service-based development.

What is a service?

- It is a logical representation of a business process that has a predefined outcome.
- It is a self-contained process.
- It may be composed of many other services
- It is a “black box” to consumers of the service.

The Service-oriented architecture is actually the evolution of business processes its applications and services. It is different from today's legacy-ridden and smooth integration of disparate applications. It is basically a set of general design principles which enables departments to change business processes.

SOA can also be viewed as methodology or approach for building IT systems in which business services i.e. services provided by government to citizens are the key organizing principles used to align IT systems with the needs of the business. Earlier approaches used for building IT systems were focussing on direct use of implementation environments such as object to solve business problems. Such approaches resulted in the systems that are tied to the features and functions of a particular environment technology. From all the above description, it shows clearly that service is a key component.

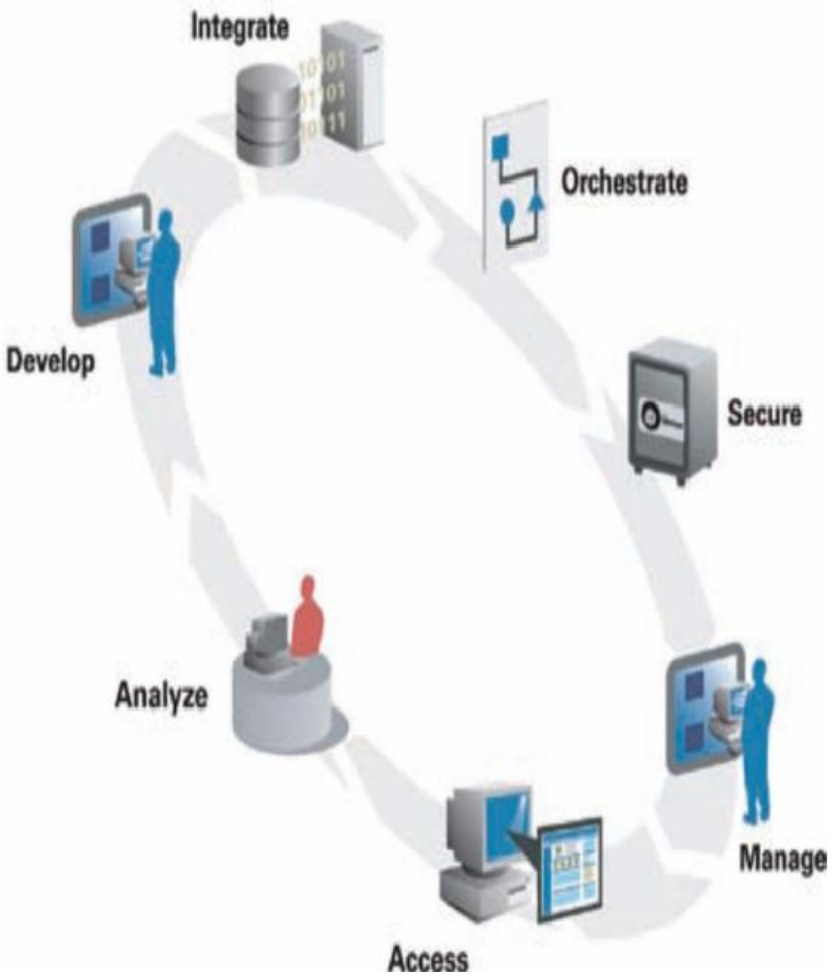

Figure 1: Service Oriented Life Cycle Phases

2.2.2 SOA Framework

SOA-based solutions are to enable objectives while building an enterprise-quality system. SOA architecture can be viewed as five horizontal layers.

1. Citizen/Consumer Interface Layer – These are GUI for end users or apps.
2. Business Logic Process Layer – These are services representing business logic use-cases in terms of applications.
3. Services – These are the consolidated for whole-enterprise in-service.
4. Service Components –Components used to develop the services such as functional or technical libraries, technological interfaces.
5. Operational Systems – This layer basically contains the data models, data repository, technological platforms etc.

There are also four cross-cutting vertical layers.

1. Integration Layer – This layer starts with integration of protocols support, data integration, service integration, application integration supporting B2B and B2C.
2. Quality of Service – The Security, availability and performance etc. it constitute the quality of service parameters.
3. Informational – This layer provides the business information.
4. Governance – The IT strategy is governed to each horizontal layer in order to achieve required operating and capability model.

The basic purpose of SOA is to facilitate users to combine large chunks of functionality to form an ad-hoc application which are built almost entirely from existing software services.

The SOA architecture relies on service-orientation. If a service in SOA presents a simple interface that abstracts away its underlying complexity then users can access independent services without knowledge of the service's platform implementation

2.2.3 Suitability of SOA for developing e-Governance System

A large number of E-governance Systems have been implemented by various governments all over the world. The most prominent can be categorized as G2C, G2E, G2G and G2B. The G2C refers to a services exchanged between government and the citizen, G2E is services exchanged between government and government employees, G2G is a services exchanged between government agencies, and G2B is services exchanged between government and the business community.

The common aspect in all these applications is basically the delivery of service. Thus, the service is already inherent to the E-governance Systems. This is the characteristic of E-governance Systems which makes it suitable to be modelled using service oriented design approach. Further one can extend or change the design objects on demand under the SOA. The SOA based solutions are basically composed of reusable services, with well-defined, published interfaces.

2.2.4 Existing Stage Model

The e-government interoperability and service oriented architecture maturity models, the existing model integrates all interoperability aspects and e-government interoperability stages with SOA maturity.

This model works as follows

In stage 1, a government department identifies web services within the government in other words, it is called vertical web services under which they are provided end-to-end by one government department but their integration pattern may use some of the shared services such as authorization, authentication, notification and online payment.

In Stage 2, cross organizational web services are to be integrated to the e-government central platform as it requires the sharing and involvement of the other government department's web services to be delivered. Further the redesign and mapping of the existing various other workflows and processes within and between government departments will be done in this stage.

In stage 3, the data from the web service flows across multiple government departments based on their defined business process of interoperating government agencies. The composite web services of all the government department will be orchestrated together to create a measured value in the cost reduction as well as for the task performance because there is a high interoperability in higher stages.

In Stage 4, this is the final stage in this the e-governance portal will be enabled for the all stake holders the access is allowed to citizens, businesses and government departments. The access is limited to governmental information and services in a single consolidated browser to view to enjoy for the convenience at one stop government services. In addition to the above there is a provision for the automated business processes and aligned strategy, goals, policies, rules and technical and other standards across the whole government departments.

2.2.5 Limitations of the Existing Model

The stage model works in an intelligent manner, it integrates the information of the various government departments through web services communication. The main benefit of this model is that it separates the presentation and business logic. The high level security features are also available in this stage model.

There is a major limitation of this model is that this model is highly dependent on the web server and database server of the department. When there are high number of users and the information which is required again and again i.e. static in nature or we can say is not going to be changed for a long time is also accessed from the database server of the department every time and again and again this all results in the network congestion. This model also does not provide one stop functionality to the citizens or departments.

CHAPTER 3

3.0 Proposed Model

As mentioned above the existing stage model intelligently integrates the information of the various departments' information by the means of web services. This model also benefits by separating the presentation and business logic. Now in order to overcome the limitation as detailed above we are introducing a new model "SHARED ACCESS LAYER – SERVICE ORIENTED ARCHITECTURE FOR E-GOVERNANCE".

In the new proposed model we will introduce ***new layer which will be shared by all the users of the system***. This layer will be just below the presentation layer and just above the application layer. This layer will also be supplemented by the database.

1. Users visiting the e-governance website will be filtered through this layer.
2. Users will be directed to the application layer only if they are required otherwise functionality which can be served by this layer will be provided without actually going to the application layer.

3.1 Proposed Functionality of the new Shared Layer

1. It will provide the common authentication & registration services to the citizens and other departmental users.
2. It will have a separate database layer accessible to this shared layer.
3. This database layer will also be shareable to the application layer of various departments with certain read/write permissions.
4. The database layer will store the information which would be static after a certain time elapse e.g. a citizen had visited to the one stop e-governance portal, he registers himself with some basic personal information like his Aadhaar No. or Voter ID Card and Name, Gender and Date of Birth. On validating this information, this information becomes static for a certain period of time i.e. till the user specifically changes this information with the concerned department.
5. The database layer will also store some more information which also becomes static e.g. a person had applied for the issuance of the Caste Certificate at the SDM Office. The department on the basis of the pre-defined procedures issued him a caste certificate. Now the information like the date of issue of the

certificate, issuing authority, caste of the beneficiary, address etc. becomes static.

6. It will provide informational services to the citizens and government departments without interacting to the actual department server. This will be done through the database layer for the shared layer.
7. It will provide the redirection services to the users on the basis of the request.
8. It will get data populated from the application layer whenever a data is to become static in nature.

3.2 Proposed framework with the new Shared Layer

The graphical depiction of the proposed framework for the e-governance on the SOA is given below, a new shared access layer with database support has been introduced in this framework to reduce the congestion at the department's server, it will also alleviate the problem of the dependency solely on the department's server. This is being achieved at the little cost of the data redundancy and extra processing time requirements by the department's server at the time of the generation of the data.

The proposed framework for the e-governance on SOA has been divided into five layers namely:

1. the client layer,
2. the presentation layer,
3. **the shared layer**
4. the application layer,
5. the data layer

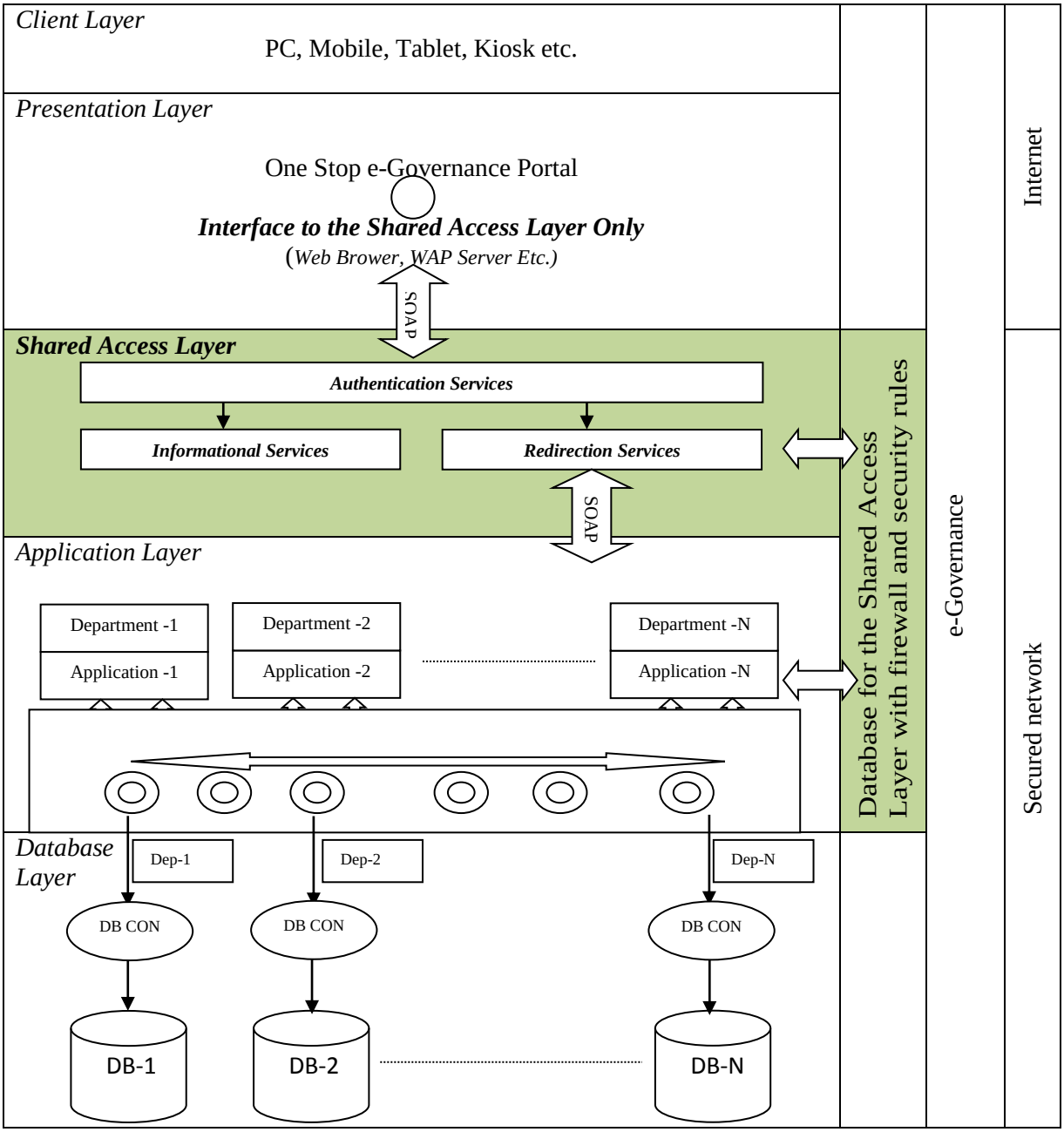

Figure 2 :*Proposed New Framework for the e-Governance on SOA*

The architecture for the SOA is to be implemented by means of a secured government network accessible within government and on internet for citizens that provides connectivity to government entities, inter-application communication and file sharing or exchange between government entities and access to the citizens. The whole architecture will lead to e-governance.

1. Client layer

The client layer is the first layer in the proposed framework, it represents the resources by which the e-governance applications can be accessed. There are various e-governance application access channels such as Personal Computer (PC), laptop, Mobiles, tablet, kiosks etc.

2. The presentation layer

The presentation layer in this model provides the one stop interface proposed for the citizens and other uses interacting with the e-governance applications. For example, this layer will contain a web server for the various users connected via a web browser, a WAP browser server for the users connected via Mobile phones or PDAs. The major benefit of separating this presentation layer from the application layer is that the application is accessible through various means such as web browsers and cellular phones this all is achieved without having to change the application's implementation.

3. The Shared Layer

It will provide the common authentication & registration services to the citizens and other departmental users. It will have a separate database layer accessible to this shared layer. This database layer will also be shareable to the application layer of various departments with certain read/write permissions. The database layer will store the information which would be static after a certain time elapse e.g. a citizen had visited to the one stop e-governance portal, he registers himself with some basic personal information like his Aadhaar No. or Voter ID Card and Name, Gender and Date of Birth. On validating this information, this information becomes static for a certain period of time i.e. till the user specifically changes this information with the concerned department. The database layer will also store some more information which also becomes static e.g. a person had applied for the issuance of the Caste Certificate at the SDM Office. The department on the basis of the pre-defined procedures issued him a caste certificate. Now the information like the date of issue of the certificate, issuing authority, caste of the beneficiary, address etc. becomes static.

It will provide informational services to the citizens and government departments without interacting to the actual department server. This will be done through the database layer for the shared layer. It will provide the redirection services to the users on the basis of the request.

4. The application layer

The application layer is a very important layer its communication will be done by the shared layer by using the SOAP protocol over HTTP. The business logics will be implemented in this layer. The application layer will be communicating to the database server through the connection or via web server or XML data exchanges or OLEDB or by any standard specified methods.

5. The data layer

The database layer is the last layer, it ensures proper storage and persistence of the governmental / citizen data. The core management access rights to the data is ensured by the Database Management System (DBMS). This layer is also protected from possible external intrusions by using a firewall rule implementation. The firewall will filter the exchanged data and will block all the communications except those with the presentation, application and administration layer pertaining to the governmental department.

3.3 Functions of the Proposed Layer

1. Authentication & Authorization of user.
2. Request filtering, processing & redirection.
3. Data synchronization with the departmental servers.

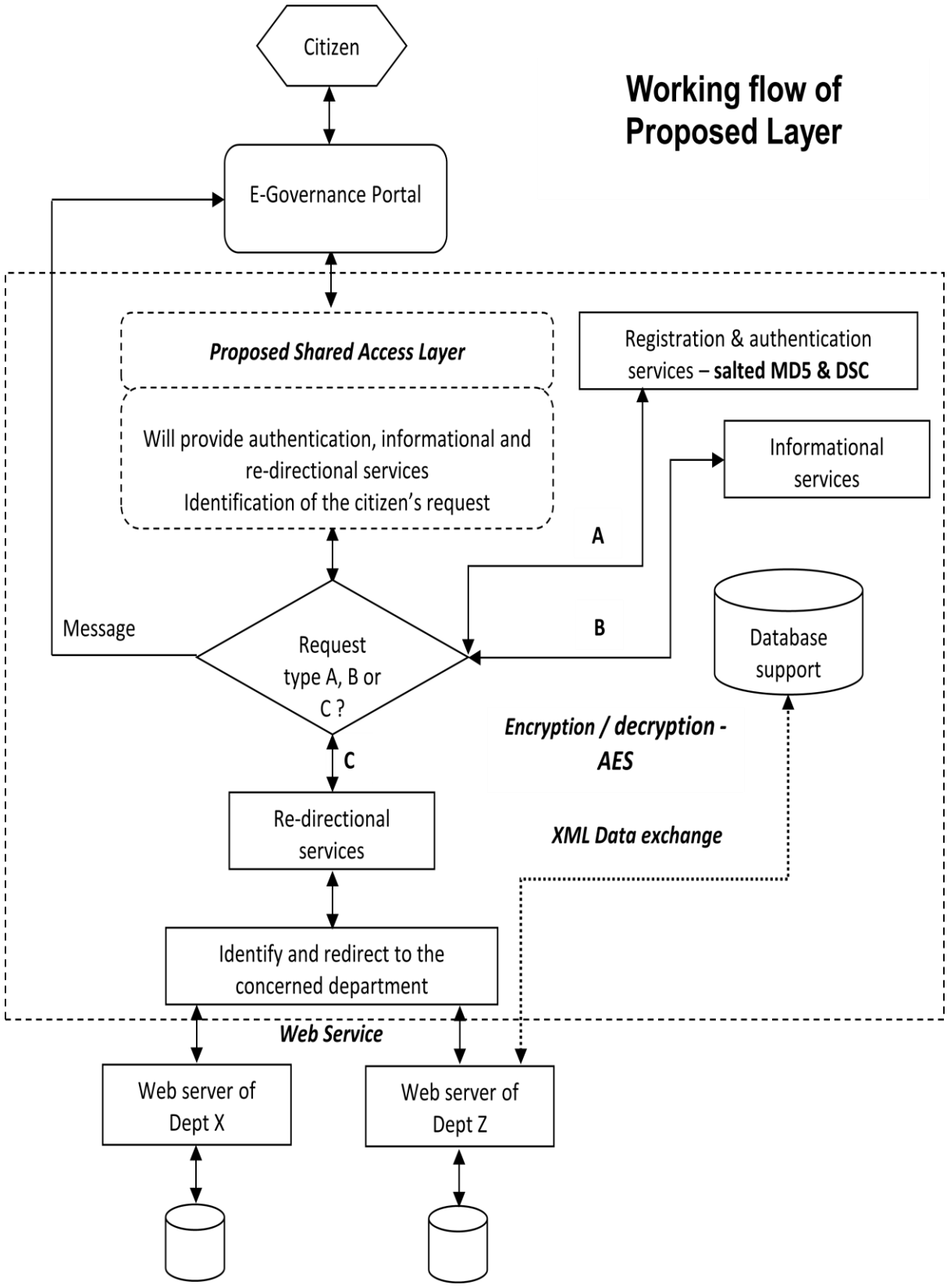

Figure 3 : Working Flow of Proposed Layer

3.4 Authentication & Authorization of user

The Authentication is the process of verifying the identity of a user, who can be a citizen of a departmental user, by means of some sort of credentials like User ID and Password. If the credentials are validated by the system, the authorization process starts. Authentication process always precedes to Authorization process. The Authorization is a process of to allow authenticated users to access the resources by checking whether the user has access rights to the system. Authorization supplements to control access rights by granting or denying specific permissions to an authenticated user.

The authentication process complete in some given below details:

3.4.1 Identify the type of user

In the user authentication & authorization, the first priority to processing the further, we have to indentify the type of user. In this scenario we create the mapping of user with their type and other additional details in user repository.

user_id	user_name	password	user_ type	user_per mission	last_login	whether _active
Suman001	Suman Kumai	Hash value	C	C	2016-06-27 14:05:05	Y
Karan001	Karan Singh	Hash value	C	C	2016-06-27 14:05:05	Y
Opt001	Rakesh Kumar	Hash Value	D	E	2016-06-26 14:05:05	Y
Opt002	Rakesh Kumar	Hash Value	D	E	2016-06-26 14:05:05	Y
App001	Dinesh Kumar	Hash Value	D	A	2016-06-26 15:05:05	Y
App002	Lakhan Kumar	Hash Value	D	A	2016-06-26 15:05:05	Y

Table 1 : Sample user repository for authentication & authorization process

The above mentioned table shows the user repository with all mandatory details of users. By help of this we can indentify easily the user identity and type of user. Also we can easily indentify which part of the section/process/module can user has permission to access or not. We can control the access over module through

authorization and can easily implement the authorization on every module through help of above repository.

3.4.2 Identify the algorithm to be used for authentication:

The second part comes in authentication it is a selection of different type of algorithm. We continue with MD5 with salt which is one-way function algorithm, it will be more secure as compare to any simple or custom authentication type. Also in additional we can apply the DSC authentication type for additional security process like approval of service, rejection of any service, objection on service and digitally document signing. We can manage the above all through user repository.

user_id	user_name	Serial_number	Certificate_chain	Valid_to	whether_active
Opt001	Rakesh Kumar	2268347	Hash value	E	Y
App001	Dinesh Kumar	2268348	Hash value	A	Y
App002	Lakhan Kumar	2268349	Hash value	A	Y

Table 2 : DSC mapping with users

The above mentioned table shows the mapping of DSC with users. By help of above details we can easily identify whether DSC authentication will be applied or not. In case of DSC authentication we can easily verify the current user with existing records.

3.4.3 Identify the access and authorization of user

After successfully login to the system, the user can enter in portal using their identification. Authentication just identify the user not their permission. In the portal there is different kind of section or process available for users but how the application will know that which part can accessible the user or which part cannot. So with the help of authorization we can easily track down the access or permission of user and easily provide the available module for that particular user.

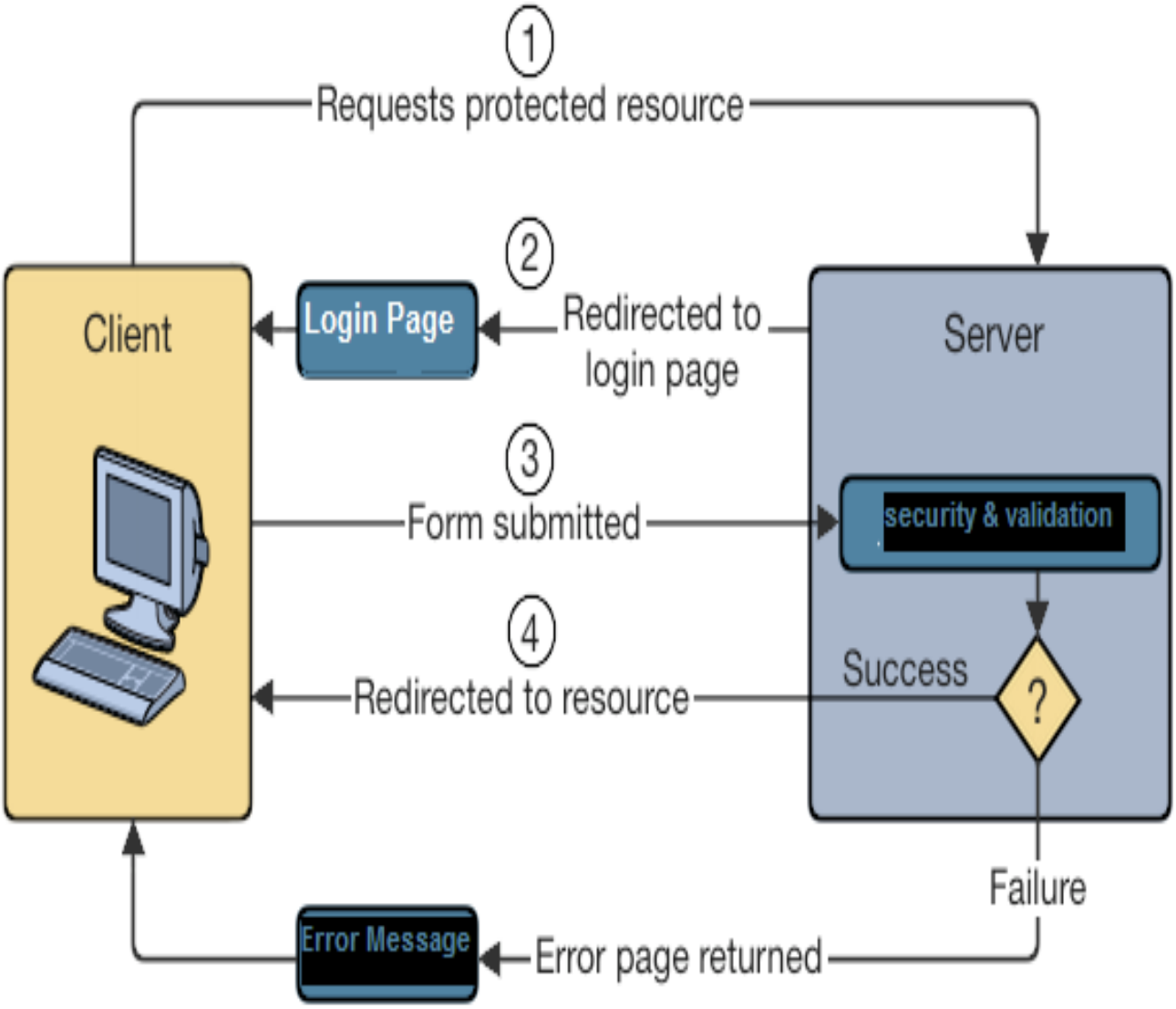

Figure 4 : Diagram showing the authentication process of user

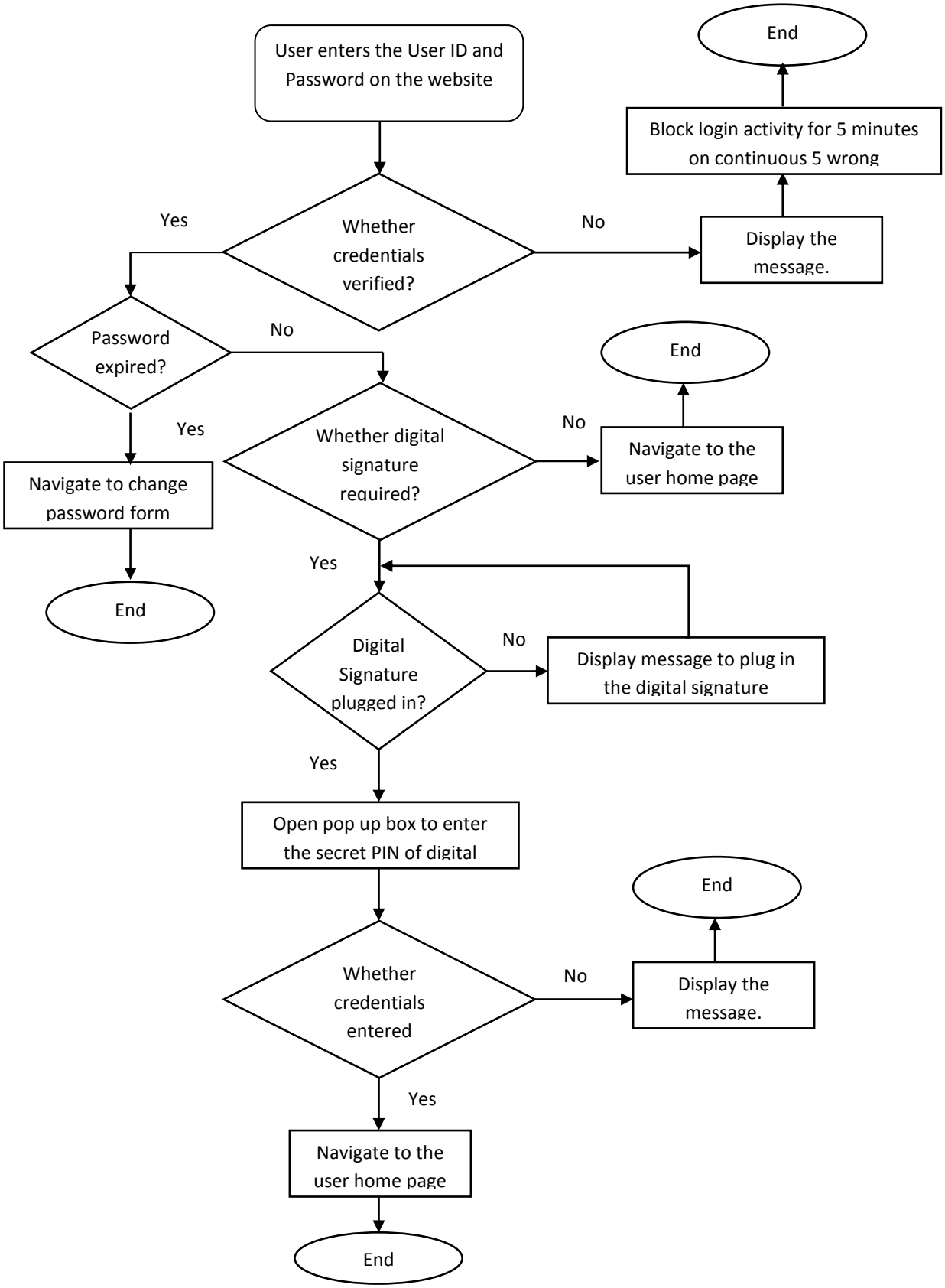

Figure 5: Flow chart for showing authentication process

3.5 Request filtering, processing & redirection:

Now we move to another section which is filtering and process the request getting from user. If user is connected to portal and wants to consume different part of module and if some module is connected to different department, then with the help of filtration & redirection we can easily process the user request.

The three level of services/module will be available on website at the same time, which is:

1. Informational Services
2. Authentication Services
3. Authentication & Redirection Services

With the help of mapping module we can easily manage the above declared points otherwise we cannot manage the every request. In case of mapping, we can easily indentify the type of request, processing of request and target point where we want to move the response after completion of current request.

Information Type	Authentication Required?	Redirection Required?	Target URI
Eligibility Criteria	No	No	
Track Application	No	No	
Verify Certificate	No	No	
Apply Application	Yes	Yes	http://domainname.com/application/recieve
Fill complaint	No	No	
Print Certificate	Yes	No	
Process Application	Yes	No	

Table 3 : Mapping module for filter the request

Above mentioned table shows the details of type of information and details. With the help of it we can easily identify the request, process the request on the basis of type and provide the response accordingly**.**

In first scenario if user wants to check the eligibility criteria of any service then application automatically manage the request and provide the response without authentication.

In second scenario, if user wants to print the certificate then application automatically manages the request and user will redirected to authentication form. After that user will provide the user credential in the form of user id and password and then submit the form. Application will verify the user credential and provide the response accordingly. If user credential is wrong, application will show the appropriate message to user and if credential is correct then user get authenticate automatically. After that user will navigate the print application link and print the application with the help of providing some unique reference number.

In third scenario, if user wants to apply application then first he will complete the second scenario. Once if user logged-in and user will try to apply any service then application will automatically redirect to their concerned department.

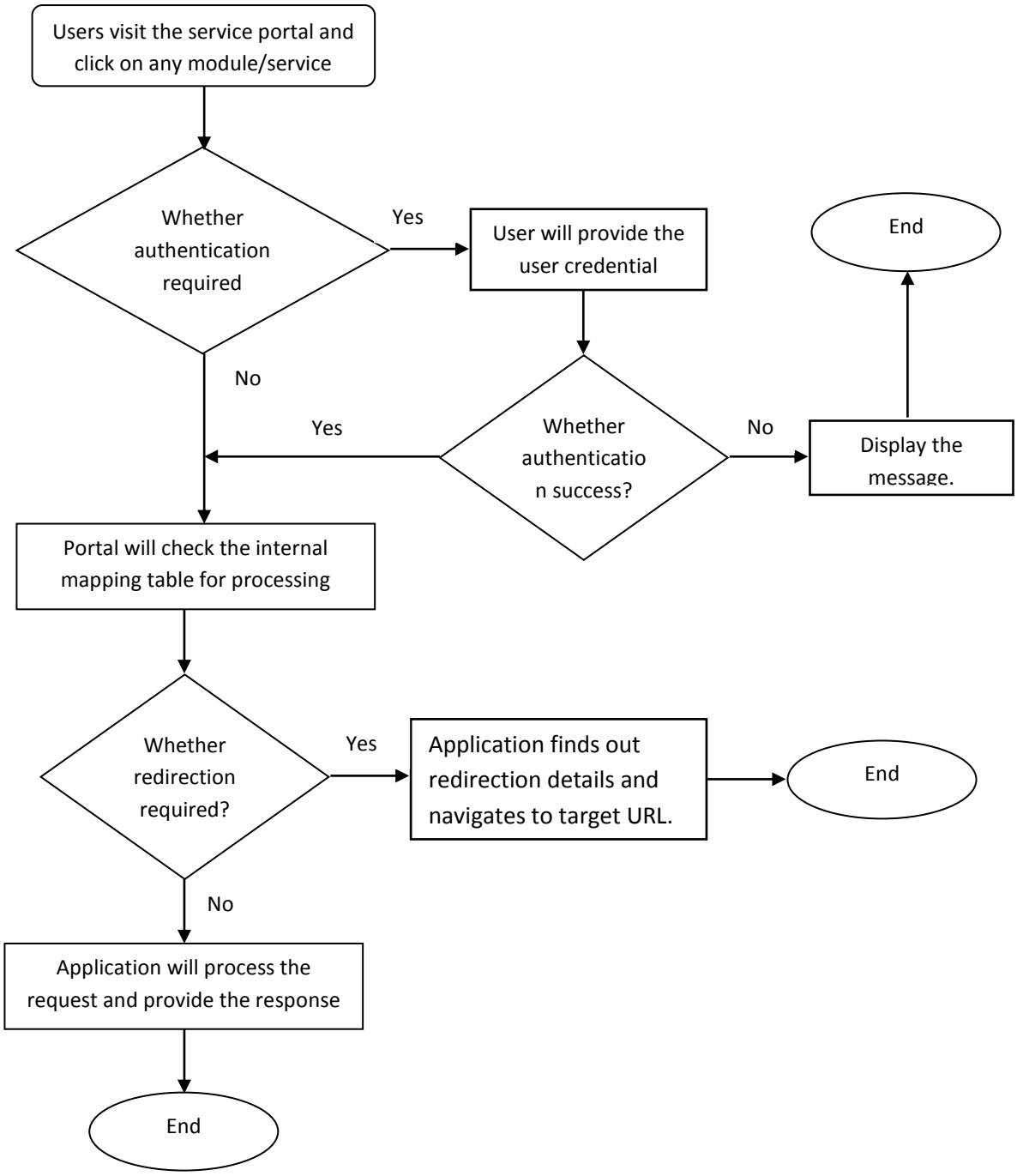

Figure 6 : Flow chart of Request filtering, processing & redirection

3.6 Data Synchronization with the Departmental Servers

Now come to main part of application that is belong to management of data. The synchronization of data between service portal and multiple departments is very important & top priority task under shared layer integration. Data synchronization can happen in two way process, e.g.

- Service Portal to Department level
- Department to Service Portal

The above mentioned point will cover the all requirement of data management between service portal and department level. Data either synchronized from service portal to department database or department database to service portal database.

In first scenario, this mythology will be required when the data will be synchronized from service portal to department portal. In this case data will be transport from main server (service portal) to multiple department servers. This section covers the given below two steps:

- ✓ Transfer input details to concerned department
- ✓ Transfer existing details to concerned department

In first case we transfer the input details from common server to their concerned server. We have given different module for accepting of details from users like feedback of service, grievance entry form and requesting a additional details from department. For all above cases we have given the input entry form to users. Users can enter the details in specific format described in form and save for further details. In this action the copy of data entered by the citizen will be saved in common server and as well send for their concerned department for further processing of data. All the data entered by the citizen will be transport through WCF services in secured manner.

In second case we transfer the existing details from common server to their concerned department. We have provided some module which is required to navigate to their concerned department and department server also required authentication from the user. In case if user already registered with their concerned department then process will go fine and user can continue with their existing session to target department. But in case if user not listed in their concerned department repository then target server required the user authentication details from source server. In this case we have to provide the some defined details to target server for processing of request. All of this

process going internally and their wills no requirement of entry of single details form user.

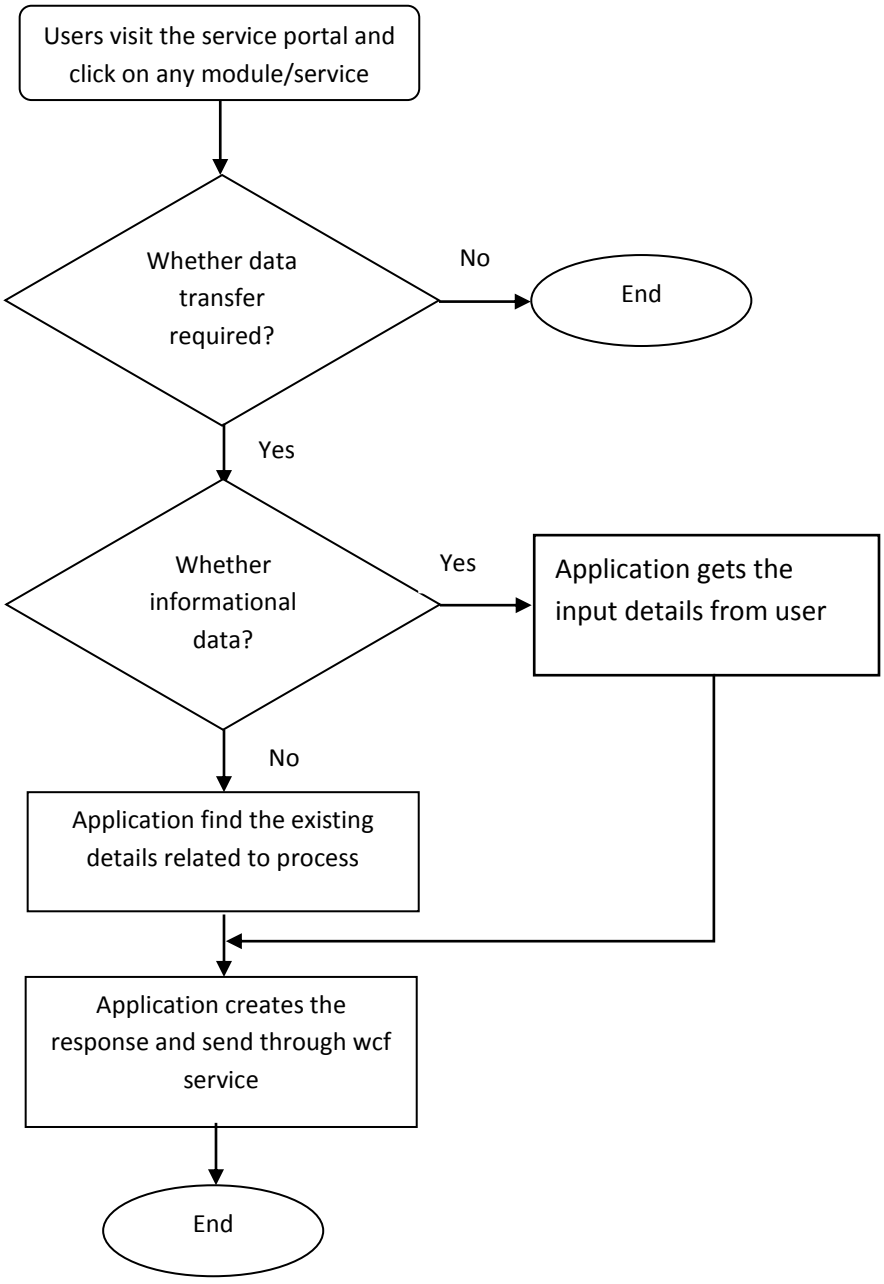

Figure 7 : Flow chart of transfer data from service portal to department level

In second scenario, the data will be synchronized from multiple departments to common server. In this case the data will be transferred from department to common server. This process is required for data integrity, validation on data, latest data and

data authenticity. Whatever department process in their end, it has to be updated at common server. Reason being provided the latest and authenticate data to user for their suitability and information. It is very important task to both server for reliability of information and details. Given below two points covers in this section:

- ✓ Informational details of service
- ✓ Processing Details of service

In first case, if department modify any existing informational details or add some new details for any service, it has to be added at common server. Department may push the details at common server for any cause of changes in their existing details. Data will be transferred from department to common server through WCF services. It is the secure manner to transfer details from source server to target server. Many modules will cover in this section like eligibility criteria, fee details of service and processing details of service.

In second case, if department process the service application, latest status and information will be updated at common server. It is more important process in this section for provide the latest service status details to user. In this case if any modification or process will happens on application, another internal trigger will be active and the latest information will be send to common server for that specific service. Data will be transferred from department to common server through WCF services. It is the secure manner to transfer details from source server to target server. Many module covers in this sections like approval on application, rejection of application and send to verification of application.

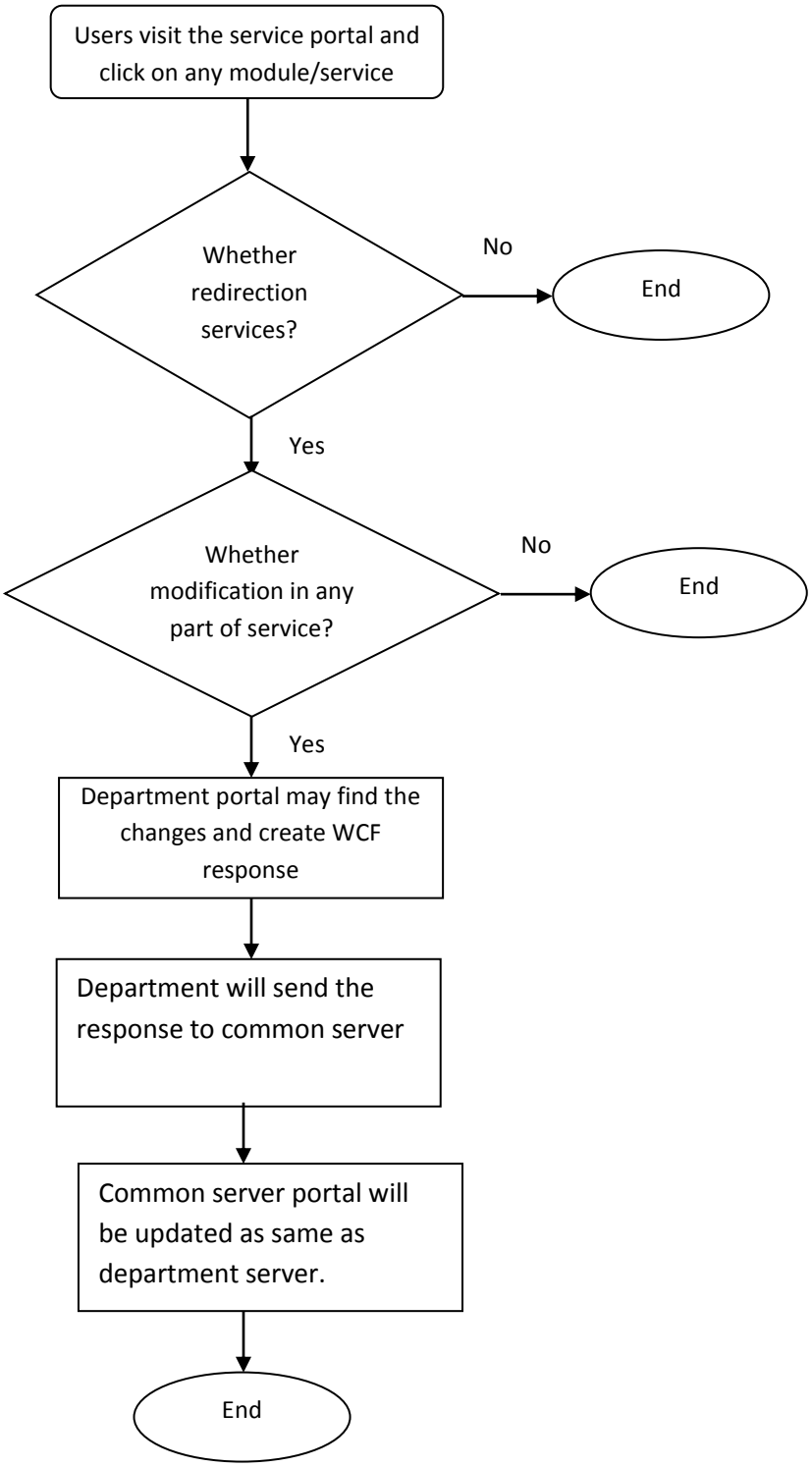

Figure 8 : Flow chart of transfer data from department to service portal

CHAPTER 4

4.0 IMPLEMENTATION

We are highlighting the project implementation into three categories.

- GUI implementation
- Database sync implementation
- Code and business logic implementation

4.1 GUI Implementation

Citizen/Department user visits the home page of shared access layer. Here is the first landing page of shared access layer.

Figure 9 : Home Page for the Shared Layer – e Gov portal

For authentication of user, user credentials required for processing of login module.

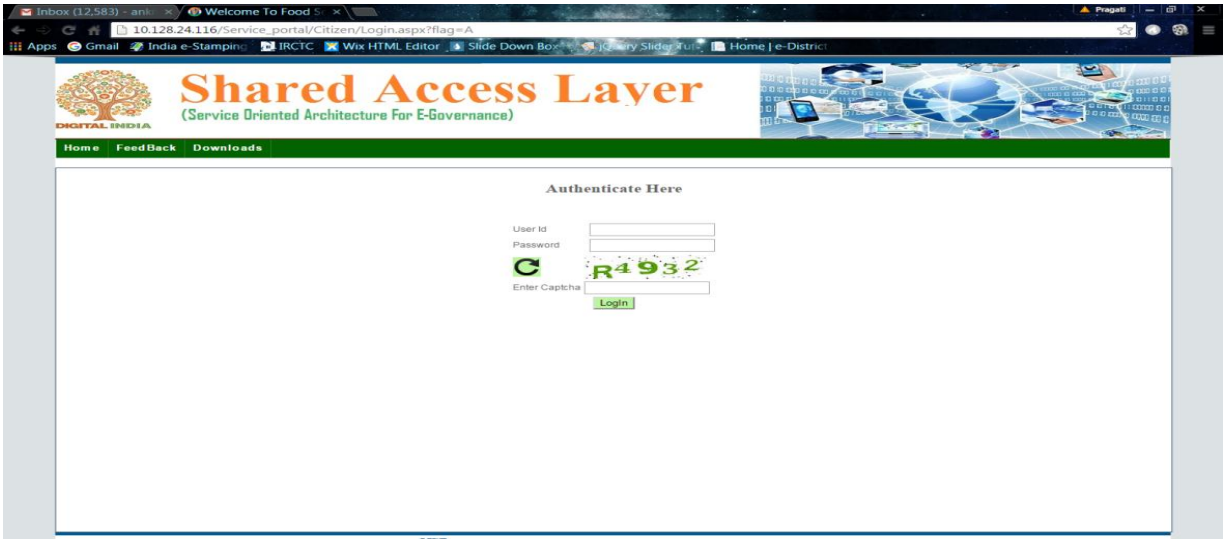

Figure 10 : Login / authentication page for the users

In case of new user, the registration will be required for further processing at shared access layer. The registration page for the users of the shared access layer model is given below

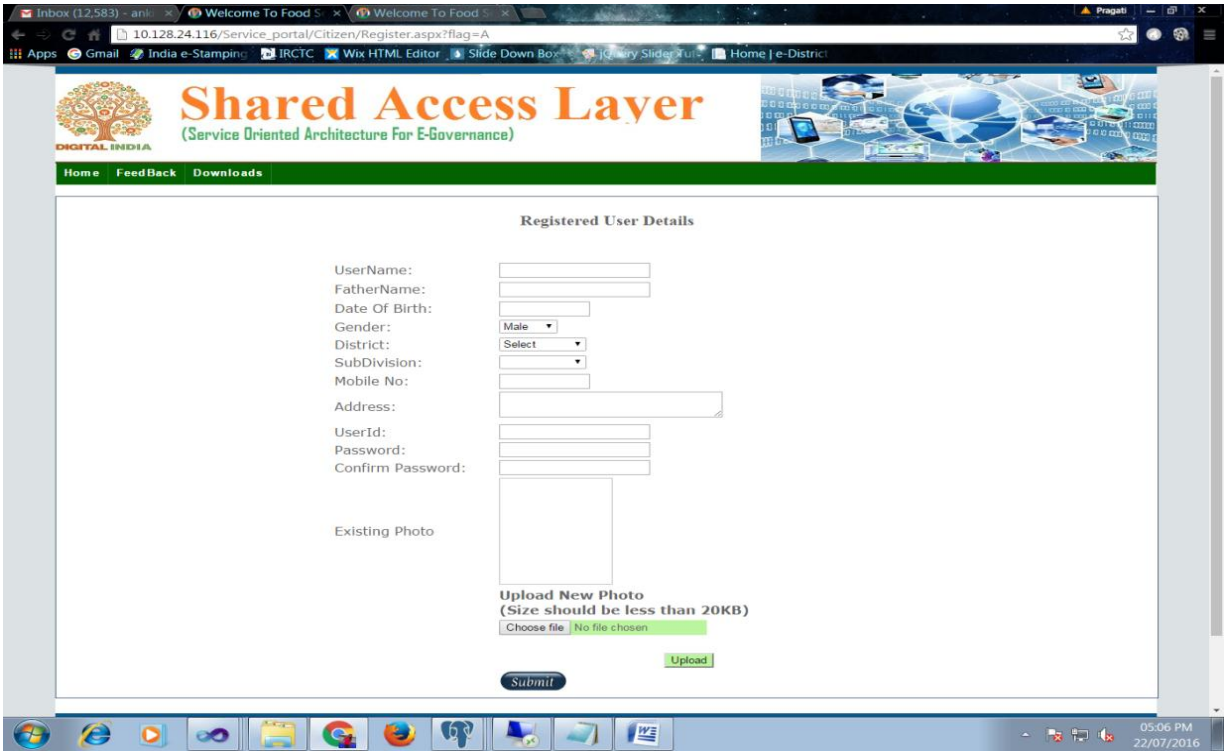

Figure 11 : Common Registration page for the users

Once the authentication at shared access layer for processing of service is completed, the user may visit the given below page. This page will be displaying the actual services or facilities available to the users.

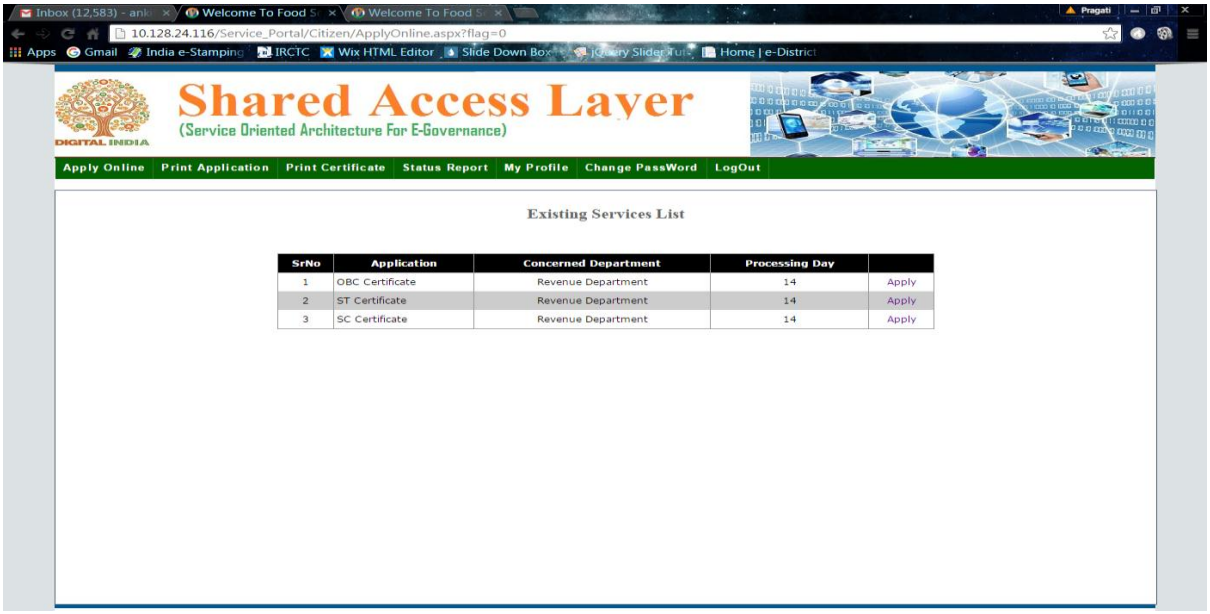

Figure 12 : Service Delivery Selection page for the users

In case of apply service user may enter their basic details, service specific details and photo for completion of application. Here is the input entry form for processing of application at shared access slayer.

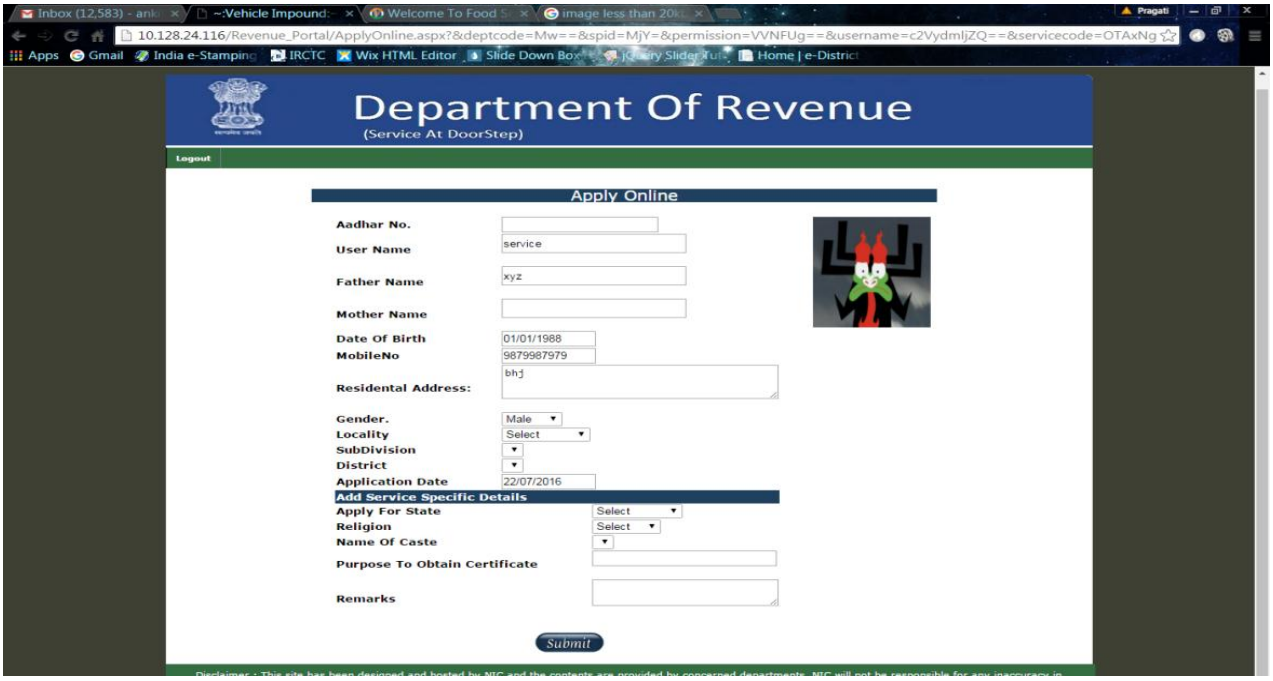

Figure 13 : Service specific page for the users

4.2 Database sync implementation

The database level architecture for processing of application is given below.

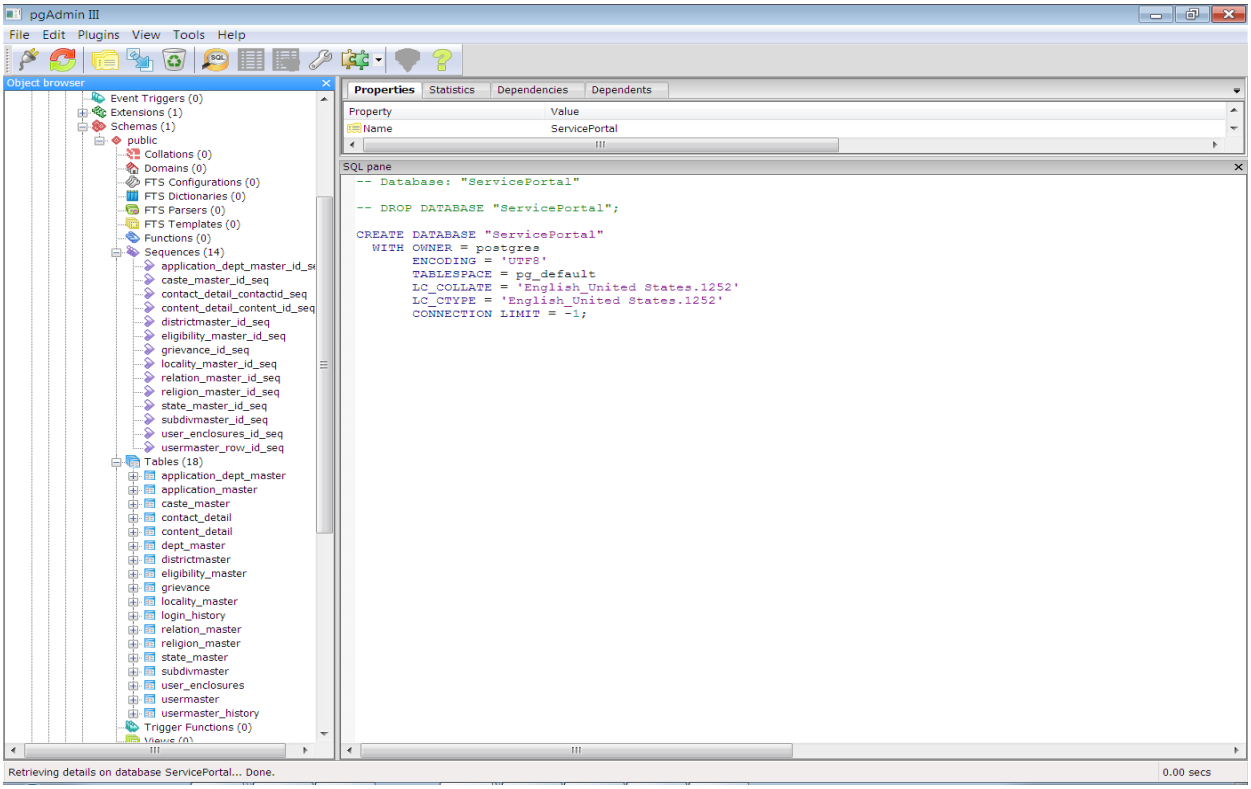

Figure 14 : Database architecture for the shared layer model

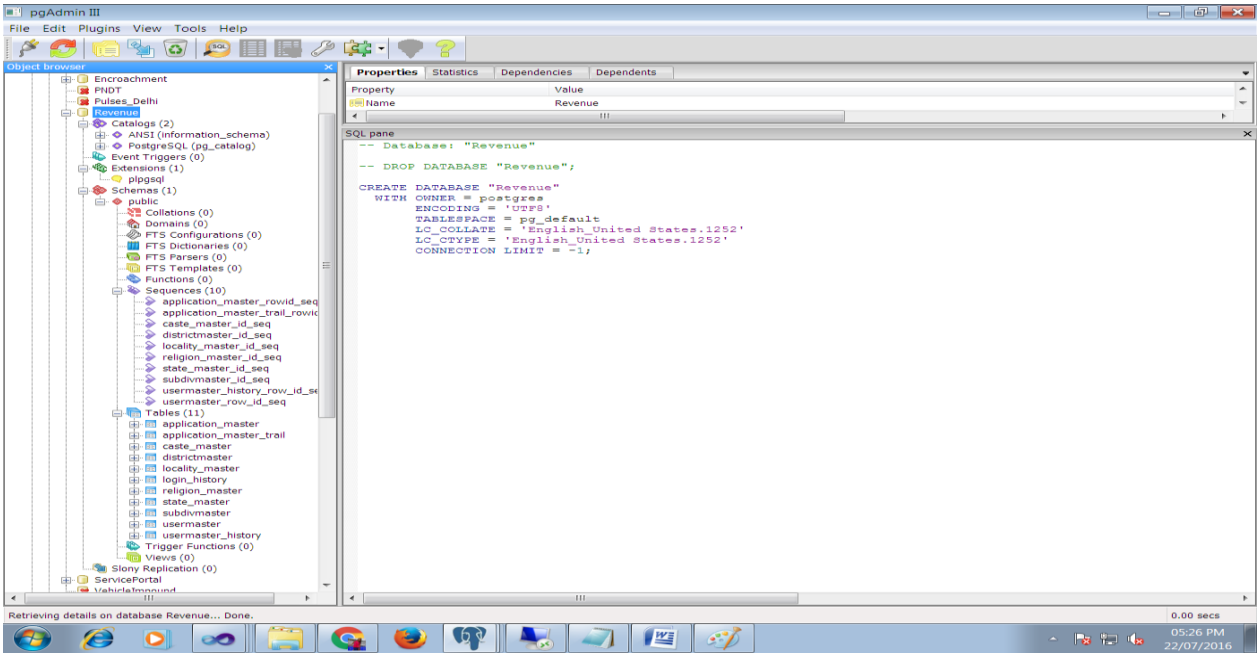

Figure 15 : Database architecture for the department server

4.3 Code and business logic implementation

The one of the most important part is the coding and business logic implementation. We had used Microsoft technology with .NET framework 4.0 and C#, we are creating a highly robust, secure, efficient and scalable application. In the report we are providing few sample codes which are the core of the entire application's design and development.

The given below sample code is showing how the authentication ticket is generated to the users to access the shared layer e-Gov portal. Once authenticated, the user can access the entire features of the portal, however his/her accessibility will be limited to the permissions assigned to him at the time of registration at the portal.

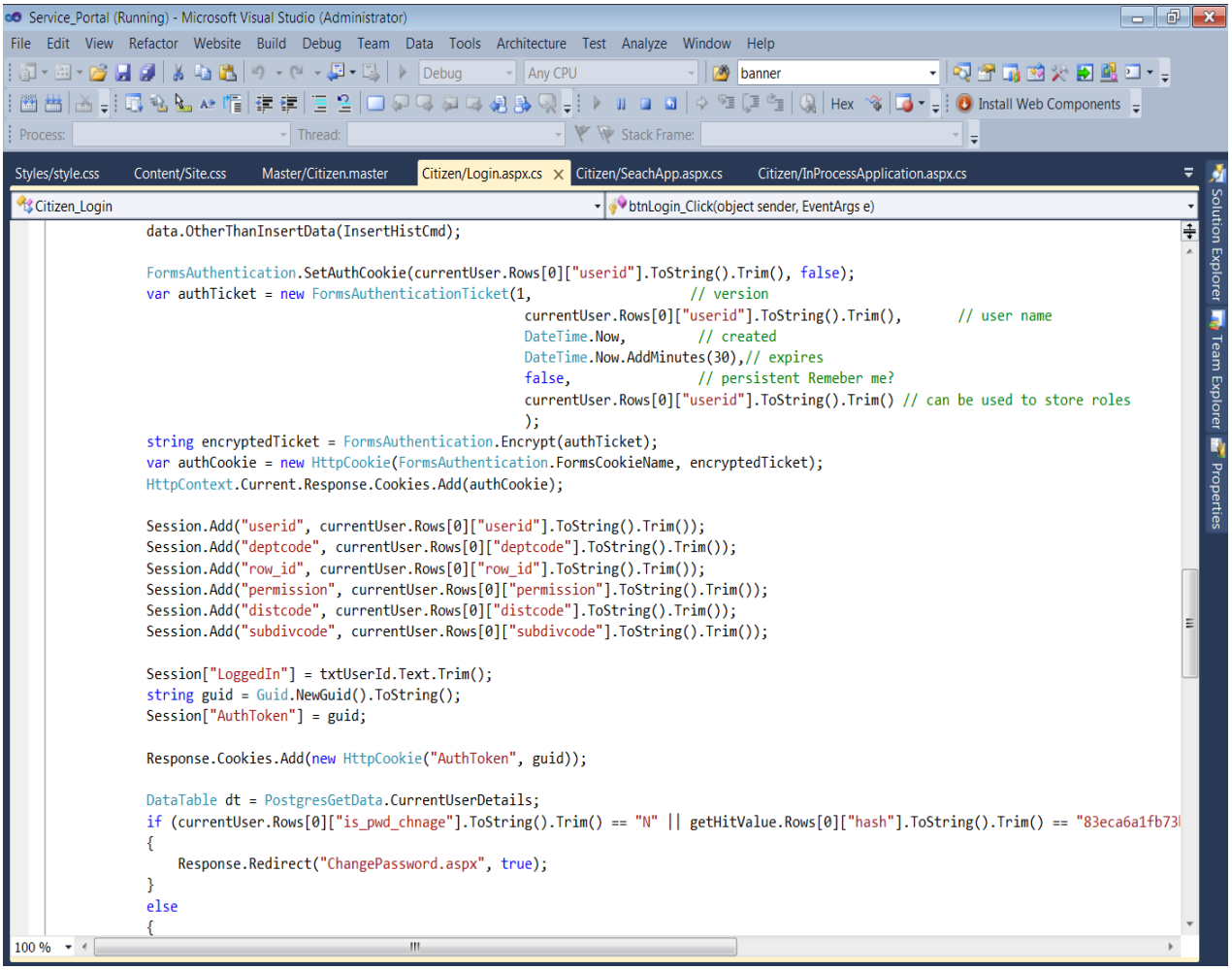

Figure 16 : Sample code to generate the authentication ticket at the Shared Layer

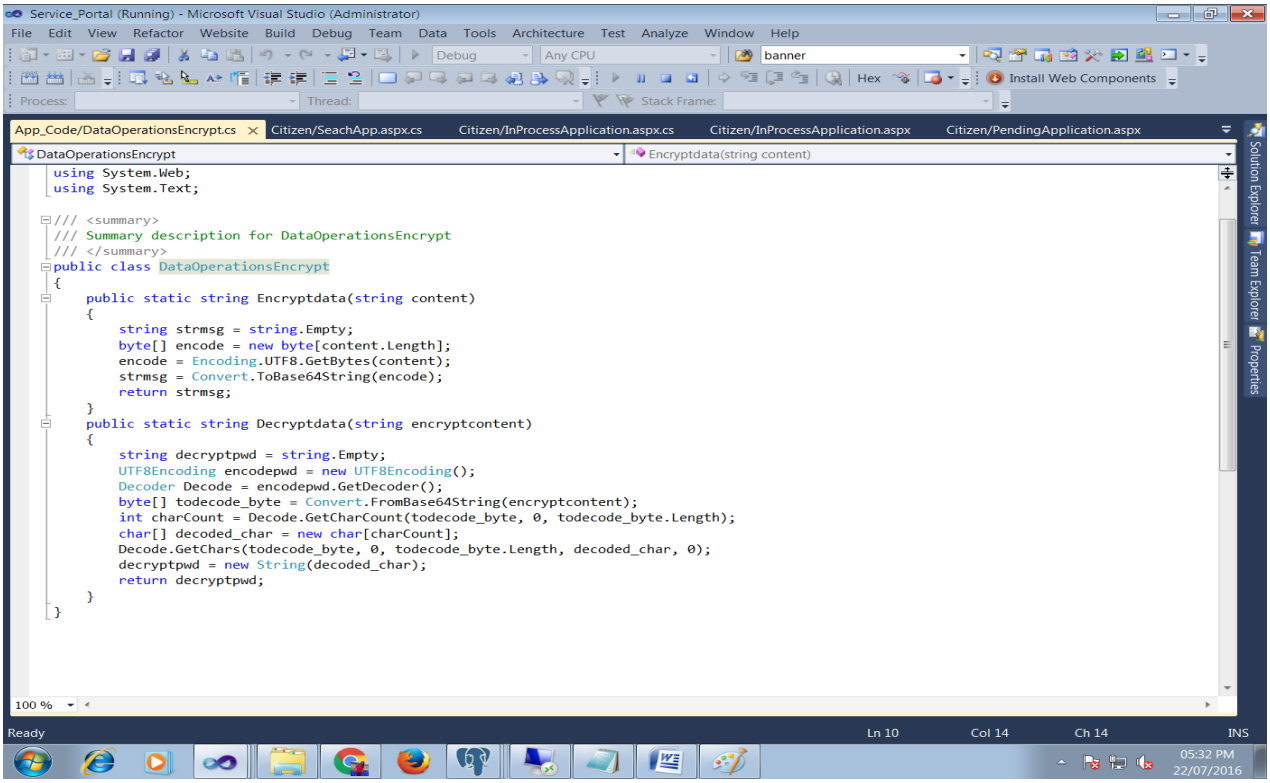

Figure 17 : Sample code to encrypt / decrypt the request of the user.

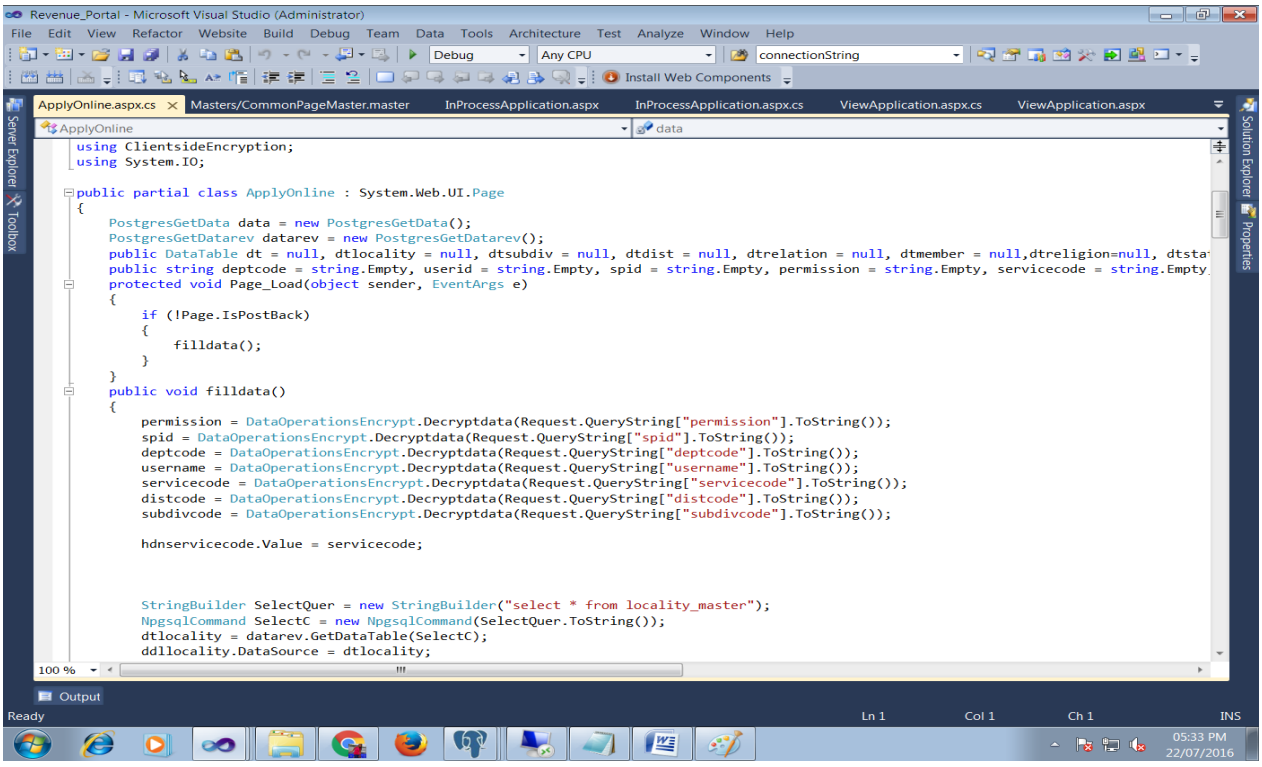

Figure 18 : Sample code to process the request of the user.

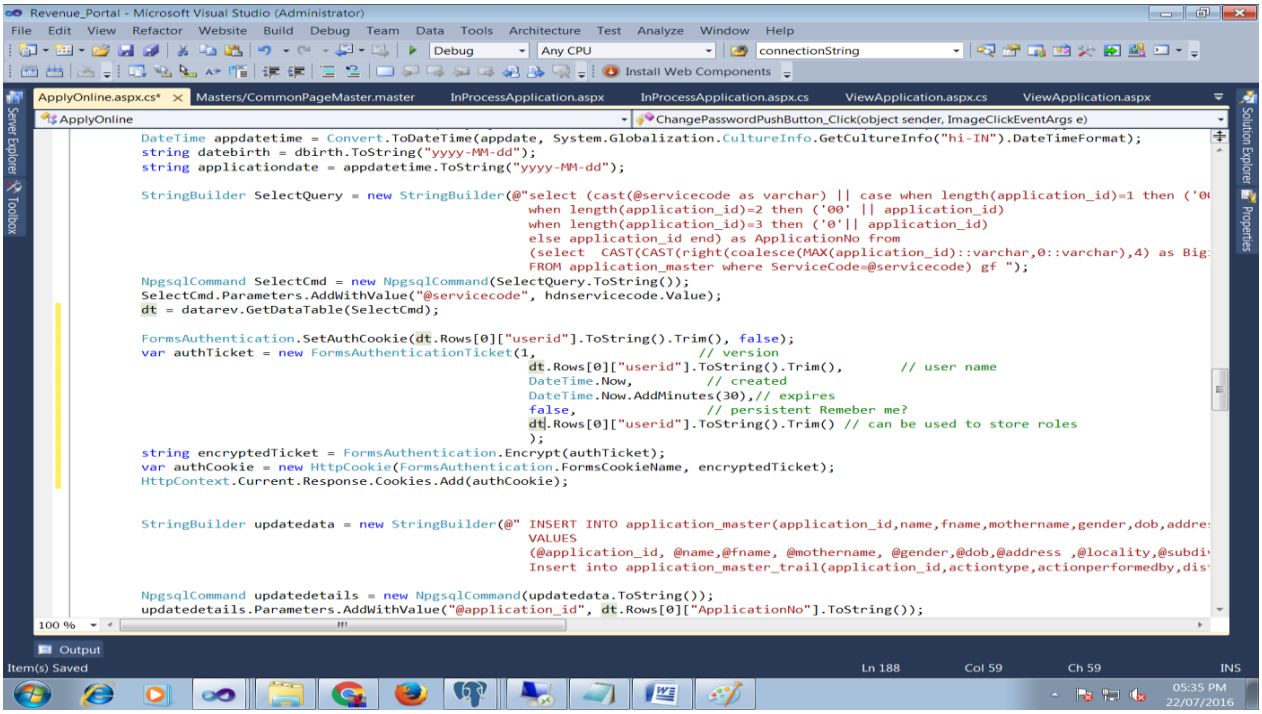

Figure 19 : Sample code for auto generate authentication ticker in case of user land into another domain (concerned department) using shared access layer.

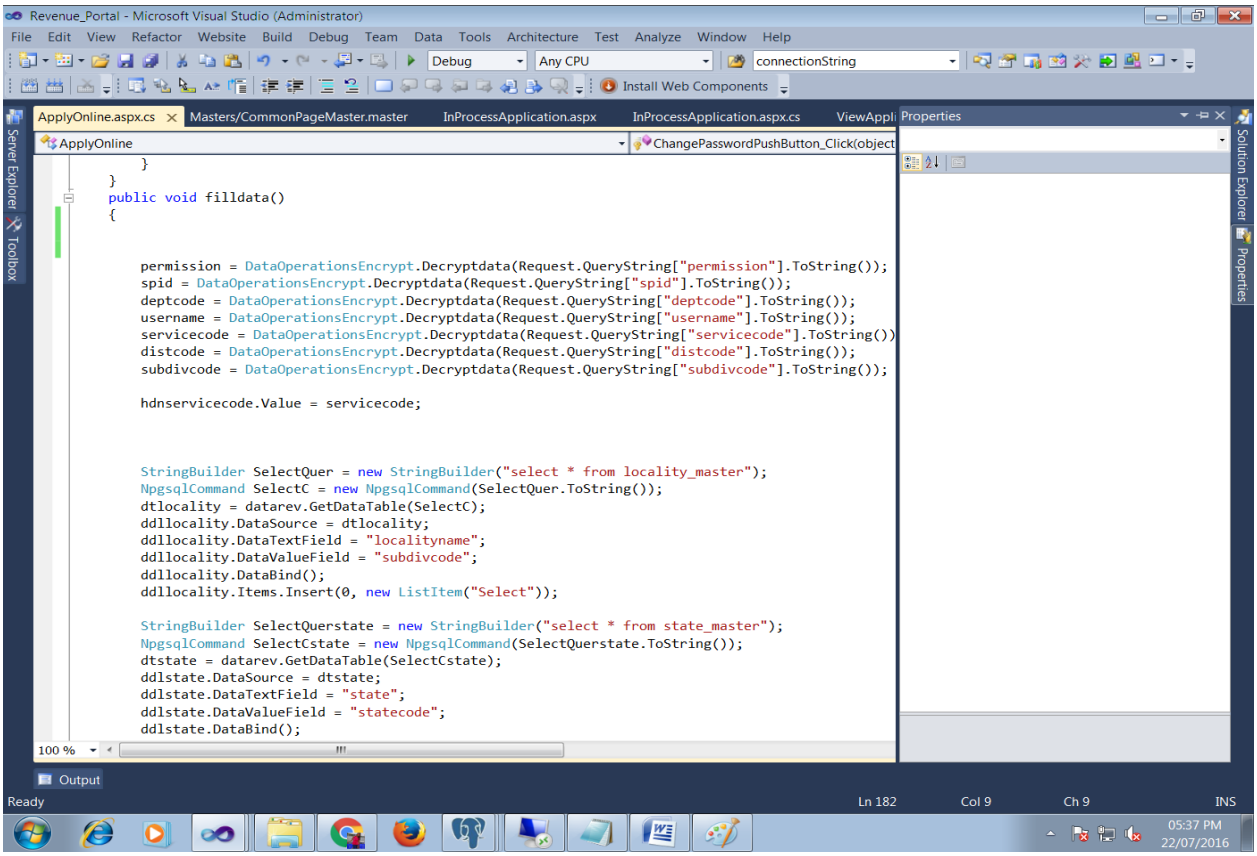

Figure 20 : Sample code for new service input.

CHAPTER 5

5.0 RESULTS

In this section the comparative simulation result of proposed model are given. We consider execution time of user and execution time of system as the main metrics. The is measured in milliseconds. The shared access layer with two department integrated to this layer.

In First Case the result of user registration module for common and multiple departments are given. Registration process is required for authentication of user identity for consumption of service. Once registration for shared layer module is completed the same will be used by other departments which are interconnected to the shared layer. By this there is no requirement of user input instead copy of shared registration will be used for registration at another department portal. Also department server will be free from to handle the direct request of registration process, so free resources will be used for better performance of server. Given below table is showing the execution time of user and server.

S No.	No. of users	Estimated time taken by users in registration at the department server i.e. for the Revenue Department	Estimated time taken by users in registration at the department server i.e. for the Food Supply Department	Total time take for registration at two departments by the same user
1	5	875	900	1775
2	10	1713	1758	3471
3	15	2525	2590	5115
4	20	3338	3423	6761
5	25	4050	4255	8305

Table 4 : Time taken in user registration in case of the direct registration at the department server

S No.	No. of users	Estimated time taken by users in registration at the Shared Layer Model	Total time take for registration at two departments by the same user in direct registration	Time saved with the implementation of the Shared Layer Model
1	5	1175	1775	**600**
2	10	2350	3471	**1121**
3	15	3400	5115	**1715**
4	20	4574	6761	**2187**
5	25	5679	8305	**2626**

Table 5 : Comparative Statement for Shared Level to Direct Registration

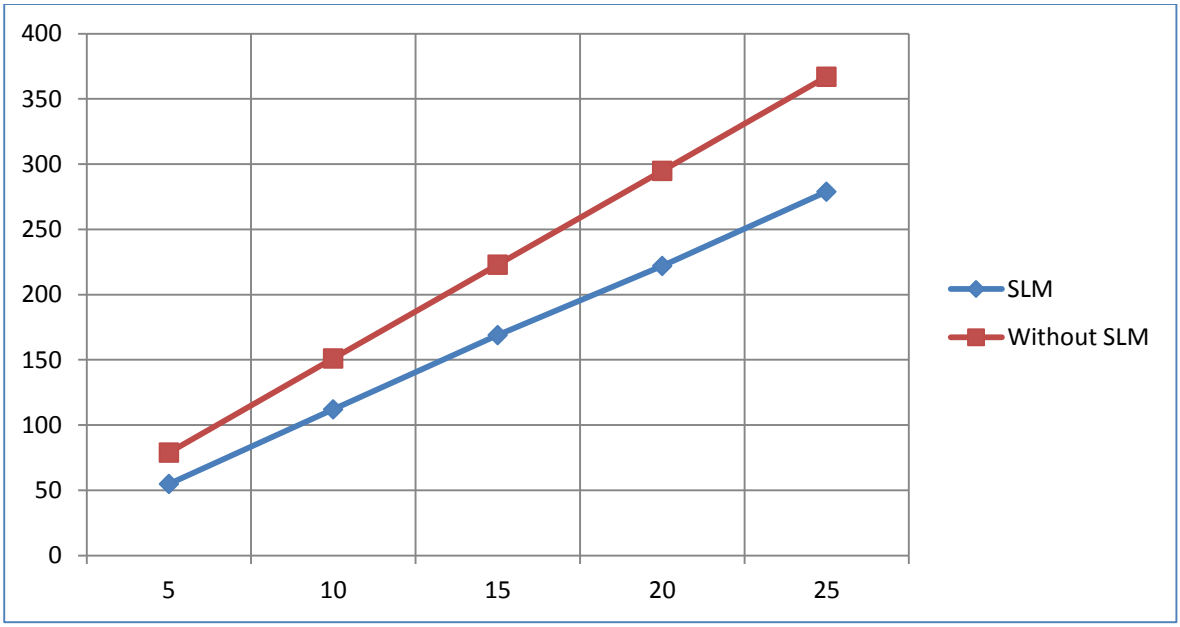

Chart 1 : Graphical Comparison of the time taken in milliseconds in Registration

In second case the results of the single sign policy of server using shared layer module are given. Once login at shared layer module is completed, this user is able to communicate to another department which is associated with shared layer with their shared layer module account. User can move to any department without providing his credential again and again and vice versa. This may help to create the department and platform independent user. This may also help for server providing a better performance for processing of services. Given below table is showing the execution time of user and server.

S No.	No. of users	Time taken by the users to login and authentication by the department server for department ONE	Time taken by the users to login and authentication by the department server for department Two	Total time taken by users in login and authentication without shared layer
1	5	41	38	79
2	10	78	73	151
3	15	115	108	223
4	20	152	143	295
5	25	189	178	367

Table 6 : Estimated time taken by the user in the login and authentication at the department servers without the implementation of the shared layer

S No.	No. of users	Estimated time taken by users in registration at the Shared Layer Model	Total time taken by users in login and authentication without shared layer	Time saved with the implementation of the Shared Layer Model
1	5	55	79	**24**
2	10	112	151	**39**
3	15	169	223	**54**
4	20	222	295	**73**
5	25	279	367	**88**

Table 7 : Comparative Statement for Shared Level to Direct login and authentication

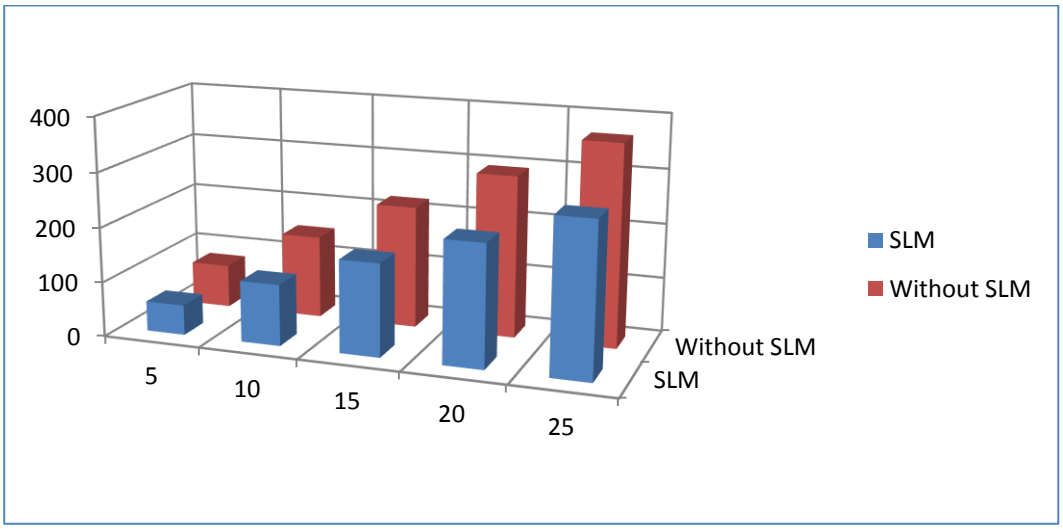

Chart 2 : Graphical Comparison of the time taken in milliseconds in login & authentication

In third case the focus is at consumption of informational details of service of various departments. User is able to consume information details of service like eligibility criteria, service timeline, fee structure of service and other service related details at single page of shared layer module. Also this may help to department server to avoid handling the additional user's hit and accept only selective request. So department server may give the better performance for avoiding these kinds of additional hits. Given below table is showing the execution time of user and server.

S No.	No. of users	Time taken by the users retrieve the static information from department server for department ONE	Time taken by the users retrieve the static information from department server for department TWO	Total time taken by users in retrieving the information without shared layer
1	5	11	13	24
2	10	23	27	50
3	15	34	42	76
4	20	47	56	103
5	25	59	69	128

Table 8 : Estimated time taken by the user in the retrieval of the information at the department servers without the implementation of the shared layer

S No.	No. of users	Total time taken by users in retrieving the information with shared layer	Total time taken by users in retrieving the information without shared layer	Time saved with the implementation of the Shared Layer Model
1	5	10	24	**14**
2	10	21	50	**29**
3	15	32	76	**44**
4	20	43	103	**60**
5	25	55	128	**73**

Table 9 : Comparative Statement for Shared Level to Direct information retrieval

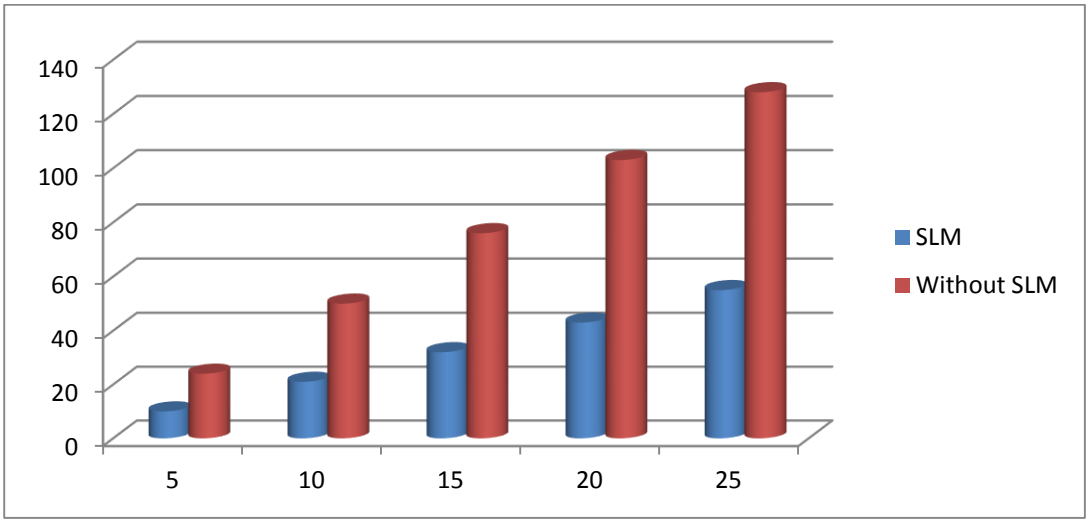

Chart 3 : Graphical Comparison of the time taken in milliseconds in information retrieval

CONCLUSION & FUTURE WORK

Citizen can consume services of various departments from single window with the single authentication and authorization, no other authentication is required to consume any another service. The authentication process is standardized for all the departments and users. With this model the processing time is highly reduced and the data consistency is maintained at the highest level. By help of this we can improve the mechanism of reusability of data and data transparency. Using shared access layer the citizens are served with quick results.

In this model, we implemented data transparency and data synchronization between common portal and multiple departments through shared access layer model. It will enhance the consistency in the databases up to the some extent. We get the better performance for processing of service and tracking details. By using shared access layer we separate the process and informational model. With separation of this module we can easily maintain the traffic between share portal and department portal.

For any kind of informational details no requirement for connection to concerned department but in case of processing of main part of service only department service may process the request. So balancing of these requests may enhance the performance of service processing and tracking across globally.

In the future we are proposing that there will be unified database for all the departments for a subset of the data related to the citizens. This will eliminate the need of keeping a redundant copy for the processing of the services. We are also planning to authenticate the users through biometric of aadhaar so that their mandatory visits to the office are also abolished.

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APPENDIX A

Abbreviations

AES-Advanced Encryption Standard

WCF-Windows Communication Foundation

URI-Uniform Resource Identifier

DSC-Digital Signature Certificates

HMAC-keyed-hash message authentication code

DBMS-database management system

HTTP-Hypertext Transfer Protocol

OLEDB-Object Linking and Embedding, Database

PDA-Personal digital assistant

SOA-service-oriented architecture

SDM-Sub-Divisional Magistrate

G2C-Government to Citizen

G2E-Government-to-employees

G2G-Government-to-government

G2B-Government-to-business

SLAs-Service-level agreement

BMM-Business Motivation Model