Fuzzy Algorithm Based Approach to Larger Enterprise Service Specification

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Abstract: Web services is the Interact relationship between a Service provider and Service requestor. Web services describes a standardized way of integrating Web based applications using the XML, SOAP, WSDL and UDDI open standards over an Internet protocol backbone. This paper make use of web ontology language for communication between customer and service provider. WSDL and UDDI standards arose for the definition of service interfaces and service registries. In existing work, Ψ- Theory do not provide enough basis for a service consumer to get a full understanding of the behaviour of a service. To overcome these drawbacks, the proposed work is based on fuzzy algorithm with Ψ-Theory. Through this algorithm, the customer satisfaction is satisfied and better services are provided to the customer and can be implemented in the organization to improve their quality.

I. INTRODUCTION

A. Web Services:

A Web service is a software system designed to support interoperable machine-to machine interaction over a network. It has an interface described in a machine-processable format (specifically WSDL). A web service is a piece of business logic, located somewhere on the Internet, that is accessible through standard-based Internet protocols such as HTTP or SMTP.

Figure: 1

Block Diagram of Web Service Layers The web services layer consists of:

a. *Service Transport* – Network protocols that include, but are not limited to HTTP and HTTPS that enable Service Requester and Provider components to exchange Service Messages

b. *Service Messaging* – Mechanism for encoding and decoding Web services messages to be transported between Service Providers and Requesters. Messages are encoded via XML in accordance with the Simple Object Access Protocol (SOAP) specification.

c. *Service Description* – Mechanism that allows a Web Service to define the actions it is capable of performing via messages it can receive and/or send. This information is readily available to Service Requesters and is defined in accordance with the Web Services Description Language (WSDL). The

Service Description layer may also include Universal Description and Discovery Interface (UDDI) software that makes Web Service and Service Provider WSDL information available in a published and searchable format. The Service Description layer is not a required layer in a Web services environment.

d. *Service Provider* - Software that hosts access to a service such as an Application Server.

e. *Service Requester* – Any application that requires specific data or functionality offered by a Service Provider and ultimately presents the results to the consumer such as a portal, for example.

The interactions between the roles and operations are defined as follows:

a) A Service Provider host defines a service description for a Web service and then publishes it to a service requestor or service registry (registry can be private or public depending on the intended usage of the service).

b) The Service Requestor is an organization that requires certain functions to be satisfied or an application that is looking for and invoking or initiating an interaction with a Web service. A Service Requestor seeks to find the service description (also known as metadata) of Web services via the Service Registry. The Registry contains enough information for a Requestor to bind to a Provider. The bind operation is the process that allows an application to connect to a Web Service at a particular network address and start interacting with it.

c) The Service Registry is accessible and searchable by Requestors and contains service descriptions published by Providers. Requestors use the Registry to find the service descriptions of Web services. The descriptions provide the information necessary for Providers and Requestors to bind.

The characteristics of web services includes XML-based, Loosely coupled, Ability to be synchronous or asynchronous, supports remote procedure calls(RPC), supports document exchange. The advantages of web services include interoperability, usability, reusability, deployability. The disadvantages of web services includes
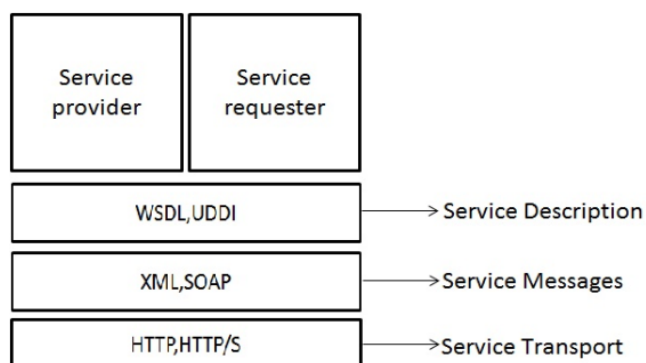
Overhead, Lack of versatility, larger requests over low speed connections, simple core web protocols, stateless protocols.

B. Techniques:

The Four fundamental technologies of web services are XML,WSDL,SOAP,UDDI.

a. ***XML (eXtensible Markup Language)*** – XML is a W3C (World Wide Web Consortium) specification that defines a meta-language for describing data. In XML applications, data is described by surrounding it with customizable, text-based tags that give information about the data itself as well as its hierarchical structure.

b. ***WSDL (Web Services Description Language)*** – A WSDL file is an XML document that describes a Web service using six main elements:

a) ***Port type*** – groups and describes the operations performed by the service through the defined interface.

b) ***Port*** – specifies an address for a binding, i.e., defines a communication port.

c) ***Message*** – describes the names and format of the messages supported by the service.

d) ***Types*** – defines the data types (as defined in an XML Schema) used by the service for sending messages between the client and server.

e) ***Binding*** – defines the communication protocols supported by the operations provided by the service.

f) ***Service*** – specifies the address (URL) for accessing the service.

c. ***SOAP (Simple Object Access Protocol)*** - SOAP messages are XML documents that contain some or all of the following elements:

a) ***Envelope*** – specifies that the XML document is a SOAP message; enclose the message itself.

b) ***Header (optional)*** – contains information relevant to the message, e.g., the date the message was sent, authentication data, etc.

c) ***Body*** – includes the message payload.

d) ***Fault (optional)*** – carries information about a client or server error within a SOAP message.

d. ***UDDI (Universal Description Discovery and Integration)-*** UDDI is a specification for creating an XML-based registry that lists information about businesses and the Web services they offer. UDDI provides businesses a uniform way of listing their services and discovering services offered by other organizations. Though implementations vary, UDDI often describes services using WSDL and communicates via SOAP messaging. Registering a Web service in a UDDI registry is an optional step, and UDDI registries can be public or private (i.e. isolated behind a corporate firewall).

C. Applications:

The applications of web services includes
a. Social network(Face book, whatsup)
b. Instant messaging(Twitter, email)
c. Blogging (MySpace, Blogger)
d. Maps (Google maps, Mappy)
e. Video sharing (YouTube)

II. ONTOLOGY

An ontology is an explicit specification of a conceptualization. An ontology is a logical theory accounting for the intended meaning of a formal vocabulary. A theory concerning the kinds of entities and specifically the kinds of abstract entities that are to be admitted to a language system. An ontology is a formal definition of a body of knowledge.

Ontology is used to enable semantics of documents to be used by applications and agents It is used to standardize metadata terms within a community. It is used to enable reuse of domain knowledge. It is used to make domain assumptions explicit. It is used to share common understanding of the structure of information among people and among software agents.It is used to enable reuse of domain knowledge to avoid "re-inventing the wheel" and to introduce standards to allow interoperability.

Ontologies allow to access and share more data. Ontologies improve accuracy, promote completeness. They are more flexible than simple tags. Ontologies provide semantics to the information "between tags". It improves the accuracy of web searches by searching for concepts instead of keywords. It allows systems that were independently developed to work together to exchange information. It is used to facilitates the use of agents to collect, process, and exchange information. It helps tackle complicated questions whose answers do not reside on a single web page.

In this paper, OWL is used for communication in an enterprise. Web Ontology Language(OWL) categorised into three species or sub languages: OWL-Lite, OWL-DL and OWL-Full.

OWL-Lite is the syntactically simplest sub-language. It is intended to be used in situations where only a simple class hierarchy and simple constraints are needed. OWL-DL is much more expressive than OWL-Lite and is based on Description Logics. Description Logics are a decidable fragment of First Order Logic and are therefore amenable to automated reasoning. It is therefore possible to automatically compute the classification hierarchy and check for inconsistencies in an ontology that conforms to OWL-DL.

OWL-Full is the most expressive OWL sub-language. It is intended to be used in situations where very high expressiveness is more important than being able to guarantee the decidability or computational completeness of the language. It is therefore not possible to perform automated reasoning on OWL-Full ontologies.

An OWL ontology consists of Individuals, Properties, and Classes. Individuals are the objects of the knowledge domain. Properties can be used to link individuals in binary relations. Classes are the sets of individuals with common characteristics.

III. PREVIOUS WORK

Web services have been manual, thus slowing down the ever changing and dynamic businesses of today. In this paper[2], it contend that more expressive descriptions of Web services will lead to greater automation and thus provide more agility to businesses. It present the METEOR-S frontend tools for source code annotation and semantic Web service description generation. It also present WSDL-S, a language created for incorporating semantic

descriptions in the industry wide accepted WSDL, by extending WSDL 2.0. In this paper, it presented an approach, which allows software developers to incorporate semantic descriptions of Web services during code development. This approach leverages the annotation mechanism provided by the Java programming language. It have verified our ideas by implementing a Semantic Web Service designer for source code annotation and Semantic Description generator for generation of rich descriptions of Web services. In addition, it present the WSDL-S language, which has been created by extending WSDL 2.0. This work has been done as part of the METEOR-S project at the University of Georgia. It have endeavored to add more expressivity to Web service descriptions, while staying close to well accepted industry standards.

Future work in this area will involve deciding the annotations required in the other phases of Web service development like protocol specification, transaction management, security, etc. Capturing the behavioral aspects (process modeling) of Web services is also a part of future work. A validation framework to simulate and validate composed workflows will be developed as a part of METEOR-S.

Functional knowledge is sufficient if only to use or control an organization. Need knowledge of construction and operation of an organization, the language-action perspective (LAP) based DEMO1 methodology[3] reveals the essential structure of business processes unfortunately, the kind of understanding the need in profession cannot be drawn from the rich sources of the organizational and management sciences because of their predominant functional orientation. It shows very concise about some interesting things in construction and operation of organization and it is the ideal starting point for discussing current operational problems and suggesting solutions. C-acts and P-acts appear to occur as steps in a generic coordination pattern, called transaction. And there are two kinds of acts: production acts (P-acts for short) and coordination acts (C-acts for short). By performing P-acts the subjects contribute to bringing about the goods or services that are delivered to the environment.

First, Misunderstanding[4] is General, theoretical (context-independent) knowledge is more valuable than concrete, practical (context-dependent) knowledge. Second, misunderstanding is one cannot generalize on the basis of an individual case; therefore, the case study cannot contribute to scientific development. Third misunderstanding is the case study is most useful for generating hypotheses; that is, in the first stage of a total research process, whereas other methods are more suitable for hypotheses test and theory building. Fourth, misunderstanding is the case study contains a bias toward verification, that is, a tendency to confirm the researcher's preconceived notions. Fifth, misunderstanding is often difficult to summarize and develop general propositions and theories on the basis of specific case studies. Good social science is problem driven and not methodology driven in the sense that it employs Those methods that for a given problematic, best help answer the research questions at hand. More often than not, a combination of qualitative and quantitative methods will do the task best.

The service concept[5] defines the how and what of service design, and helps mediate between customer needs and an organization's strategic intent. In this paper, proposed that the service concept can be the key driver of service design decisions at all levels of planning First, define the service concept and how it drives design decisions for new and redesigned services. Second, describe how the service concept is useful at the operational level during service design planning Third, service recovery, one component of service design, is used to show the usefulness of applying the service concept in designing and enhancing service encounter interactions. The service concept defines the how and what of service design, and helps mediate between customer needs and an organization's strategic intent. It define the service concept and describe how it can be used to enhance a variety of service design processes. As illustrations here, apply the service concept to service design planning and service recovery design processes. It present a number of research questions related to the service concept, service design planning, and service recovery design that introduce the next step for research in each of these domains. Future opportunities for research in these areas lie not only in overcoming the limitations of previous research and incomplete modeling of these service design issues, but also in integrating the service concept into these designs.

The SOA environment[6] is divided into four general layers. The top layer describes business processes made up of a sequence of business activities. The second layer defines business services capable of automating specific business process activities. The third level defines software components and orchestrations that allow the business services to link to and call enterprise-level shared resources as needed. The lowest level illustrates applications, packages and databases that might be called upon by the various components. SOA is an architectural approach that seeks to align business processes with service protocols and the underlying software components and legacy applications that implement them. Both processes and services need to be carefully coordinated to assure an effective SOA implementation.

Web Services protocol[7] for establishing agreement between two parties, such as between a service provider and consumer, using an extensible XML language for specifying the nature of the agreement, and agreement templates to facilitate discovery of compatible agreement parties. The specification consists of three parts which may be used in a compostable manner: a schema for specifying an agreement, a schema for specifying an agreement template, and a set of port types and operations for managing agreement life-cycle, including creation, expiration, and monitoring of agreement states. The goal of WS-Agreement is to standardize the terminology, concepts, overall agreement structure with types of agreement terms, agreement template with creation constraints and a set of port types and operations for creation, expiration and monitoring of agreements, including WSDL needed to express the message exchanges and resources needed to express the state.

IV. EXISTING SYSTEM

Web Service Definition Language (WSDL) and Universal Description Discovery Integration (UDDI) standards do not provide enough basis for a service consumer to get a full understanding of the behaviour of a service. This practice often leads to a serious mismatch

between the provider's intent and the consumer's expectations concerning the functionality of the corresponding service.

To overcome this, it proposes a service definition, a service classification, and service specification framework, all based on a founded theory, the Ψ-theory. The Ψ-theory originates from the scientific fields of Language Philosophy and Systemic Ontology. According to this theory, the operation of organizations is all about communication between and production by social actors. The service specification framework can be applied both for specifying human services, i.e., services executed by human beings, and IT services (i.e., services executed by IT systems).
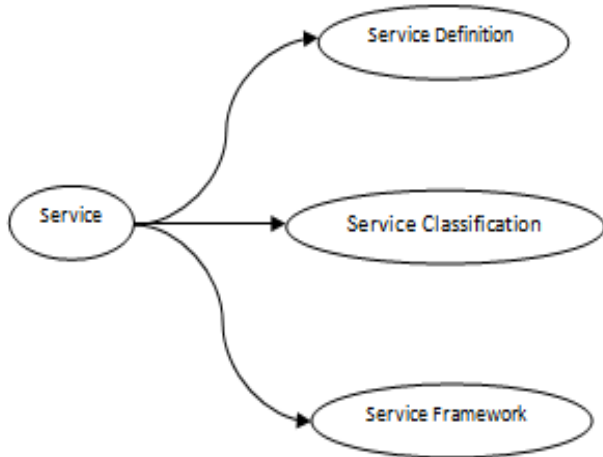
Figure: 2 Diagram for Service Specification

The function of the specification of a service is to give all stakeholders the information about the service they need, e.g., for service discovering, selection, and usage. Solely by specifying the input and output aspects of a service, as is the current practice, the service consumer does not get sufficient information to determine whether the service fits their needs. These specification aspects only reflect part of the total externally visible behavior of a service. In this project, going to implement in IT services.

The Ψ- Theory finds its roots in the scientific fields of Language Philosophy, in particular the Language Action Perspective (LAP) and in Systemic Ontology. It focuses on the use of language to achieve agreement and mutual understanding.

The p art of the Ψ-Theory that need for developing a service specification framework, viz.: the operation axiom, the transaction axiom, the distinction axiom, and the organization theorem.

The Operation Axiom states: Actors perform two kinds of acts: production acts and coordination acts. These acts have definite results: production facts and coordination facts respectively. By performing production acts, actors contribute to bringing about the function of the organization. By performing coordination acts, actors enter into and comply with commitments regarding production acts. An actor is a subject fulfilling an actor role. Actor roles are elementary chunks of authority and responsibility.

The Transaction Axiom states: Coordination acts and production acts always occur in particular patterns. These patterns are paths through one universal pattern, called transaction. The result of carrying through a transaction is the creation of a production fact.
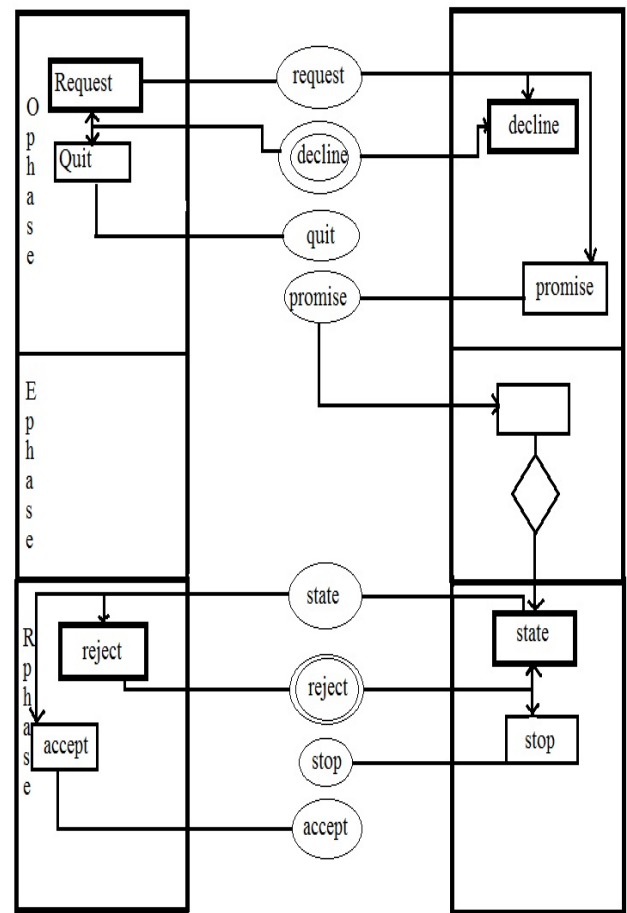
Figure: 3 Standard transaction pattern

The Distinction Axiom states: Three distinct human abilities play a role in the performance of coordination acts and production acts: the forma, informa, and performa abilities. The forma ability is concerned with the form aspects of information in terms of information transmission and storage. This type of production act is known as a datalogical act. A transaction that contains a datalogical act is called a datalogical transaction (D-transaction). The informa ability states that information can be reasoned, computed or deduced. This type of activity is known as an infological act. A transactions is called an infological transaction (I-transaction) if it includes this type of production act. The performa ability concerns making decisions, judgements, or creating material things such as products. This is what call an ontological act. A transaction that includes an ontological act is known as an ontological transaction (B-transaction).

The Organization Theorem states: The organization of an enterprise is the layered integration of three aspect organizations: the B-organization, the I-organization, and the D-organization. The B organization concerns the essence of the enterprise. It consists of actors who directly contribute to the enterprise's goals and functions by performing ontological production acts. These actors are known as B-actors and are able to perform B-transactions. B-actors are, for instance, consultants or sales persons. The I-organization braces the content aspects of information and knowledge in the enterprise. Actors in the I-organization, who are called I-actors, bring changes to information and knowledge by performing infological production acts. In other words, I-actors perform I-transactions. Business controllers are

typical actors in the I-organization producing infological things. The D-organization deals with the documentation of information in the enterprise and only takes into account the form of information. To achieve this, actors in the Dorganization perform datalogical production acts and thus D-transactions. These actors are known as D-actors, who are for instance archivists.
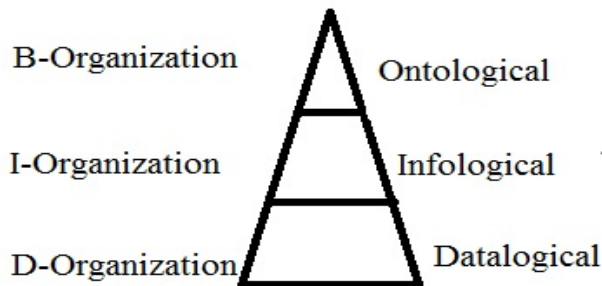

Figure: 4 The three aspect organizations

A service is a universal pattern of coordination and production acts, performed by the executor of a transaction for the benefit of its initiator, in the order as stated in the standard pattern of a transaction. When implemented it has the ability to get to know the coordination facts produced by the initiator and to make available to the initiator the coordination facts produced by itself.
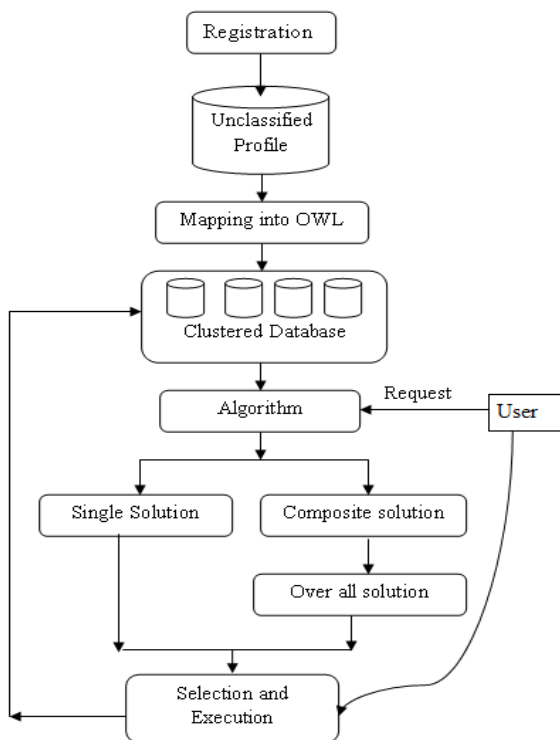

Figure: 5 Diagram for Service Definition and Classification

In an organization, the registration of employees are done first. Then it is added to the unclassified profile which is mapped to Web Ontology Language. After mapping, it is stored in clustered database. When the user request for the input, the algorithm used in existing system is Ψ-Theory, which gives the solution for searching. The searching leads to selection and execution of the result in the database and user got their outputs. After the service is defined and classified, Generic Service Specification Framework have to be done.
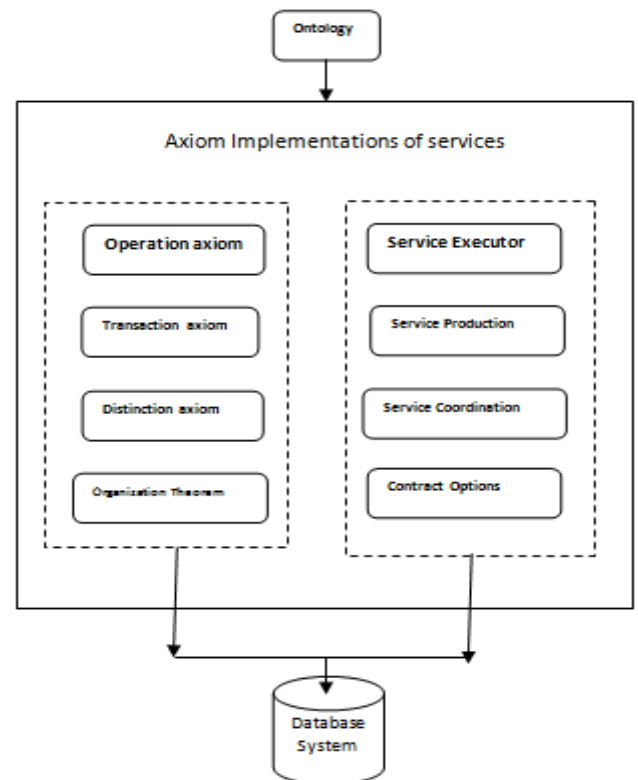

Figure: 6 Diagram for Service Framework

In Ψ -Theory, first step is to add new branches and branch manager's names. Check the permission. If permission selection granted, then give the permission to manager, generate branch name, generate manager name, generate manager password. If manager name already exists in database, then view the details.

Ψ-Theory do not provide enough basis for a service consumer to get a full understanding of the behavior of a service. In practice, this often leads to a serious mismatch between the provider's intent and the consumer's expectations concerning the functionality of the corresponding service. Though many standards exist for specifying certain aspects of a service, a holistic approach is still missing.

V.   PROPOSED SYSTEM

Fuzzy algorithm for getting customer satisfaction is the proposed system. Here along with Ψ-theory, fuzzy algorithm is added to the database. Here, going to implement in IT services. User request are converted to Web Ontology language and then the algorithms are applied.
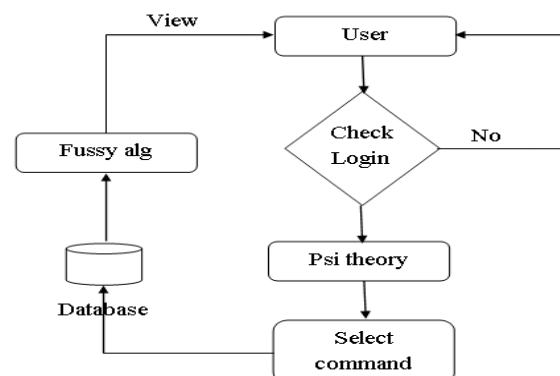

Figure: 7 Diagram for Proposed System

The module includes registration and login, types of users, Ψ- Theory, Fuzzy algorithm and selection and evaluation. The types of users include Stack Holder, Manager, Admin, Team Leader, Employee.

The stack holders view the company process and maintain the payment for the manager. The stack holders view the company information only. The stack holder process of Payment Details, View Information, Add Branch, Add Manager.

The Manager is the main part of system. The manager can control all the operations in system the main control chain is on the Manager hand. The whole system will be under control of one Manager. The Manager can control whole the system. And the Manager can create Team Leader for every Team. This Team Leader will handle the employee from the each particular Team. The operation of both admin and team leader are controlled by the main Manager. The main Manager can view the entire task that is performed by the admin and team leader. The Manager holds the process of Registration, Profile View and edit, Employee profile View and Edit, Payment process, Project details, Client Details.

The admin will handle the time sheet and information of company process. The admin can time sheet for ever team. The admin process holds the process of Timesheet Manage, Information View, Client Details, Post Info.

The team leader provides work to their team employee and manages their process details. The team leader only assigns the process to the employee. The team leaders holds the process of Time Sheet Manage, View Process Details, check Time sheet, Assign work.

The employee can view their information only but don't change viewed information. The employee posts their time sheet to the particular team leader and edits their profile details only. The employee can hold the process of View , Time sheet Fill, Post Info, Profile View and Edit.

In Fuzzy algorithm, first to get the branch name, then for that branch, get the user's ID, get the user's name, their type and their password. After the submission, check the authentication and permission. Get the session values and the permission to the valid user. If fields validated, then create and modify the account and save the record to database. If not, fields not validated.

After retrieving the data from database using Ψ-Theory and Fuzzy algorithm, it is selected by the user according to its rank given. And the output is evaluated by the user.

VI.   ENVIRONMENT SETUP

This application implementation requires the installation of visual studio 2010(.NET), server management system. The database for the IT should be updated at any time, when the data is added and can be viewed at any time.

VII.   IMPLEMENTATION & RESULT

The database maintained in the IT organization will consists of the details about the branches of various places, working people of that branch, posting information. The user give inputs to be searched in the database maintained. If the login id is correct, it is taken to the database. Or else, the user have to create login of their respective branch. The existing system Ψ-Theory is used for the working people in the IT organization to know their limitations. Here the communication between is not possible. So the fuzzy algorithm is used for the large database. Fuzzy algorithm is used for the communication between the people working in the IT organization. Both Ψ-Theory and Fuzzy algorithm is used in this project to know about their rights and to communicate with other peoples working with them. The database will search the results according to the principles of theory and algorithm.

VIII.   CONCLUSION

In this project, Fuzzy algorithm is proposed along with existing Ψ-Theory for better customer satisfaction. It have two main goals: to validate these algorithm in more real-life case studies, especially at enterprises that have a large amount of services(IT Services) and to map existing standards to the different aspects of framework. Service-oriented approaches are gaining more and more attention since they claim to provide new and flexible ways of supporting the activities in an organization. These algorithms solves the problem of a missing complete and clear understanding of the notion of service and missing of an appropriate framework for specifying services. Through this it achieves the determination of the service consumer's information whether the service fits their needs or not.

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