Schema Architecture for Context Information

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Abstract - Next Generation Networks are forthcoming prominent networks systems with highly flexible, user-friendly, dynamically adoptable systems. Such new generation network system aim to support multi-interface mobiles, transport independent service paradigms, context based location aware support systems with a unified approach even at working in different scenarios. Keeping in this view, the concept of Context Awareness Framework is defined by ITU-T to provide the context based services meeting all the standards that are defined. In order to identify the context of the user and offer the service, it requires to have a source or database where the various factors of service, resource, contexts etc. are maintained and utilized to provide the various mechanisms of selection of service from the database either in static or dynamic manner. This paper is focused mainly on defining the basic structure of database for storing the context based info and manage the database in a systematic manner.

Keywords: NGN, schema, context information, context based services

I. INTRODUCTION

Main characteristics of next generation networks (NGN) is to offer the various services to the users in a highly sophisticated manner with the help of heterogeneous networks, heterogeneous services. Among the services offered by NGN, currently the focus is on providing the services based on the context of the user. The term context is any information, obtained either explicitly or implicitly, that can be used to characterize one certain aspect of entity that involve in a specific application or network service [1]. The identification of context is being so complex, a database where the definitions to various concepts related to context are stored and helps in identifying the context by matching the parameters at an instant.

II. CONTEXT AWARENESS FRAMEWORK IN NGN

The term 'Context Awareness' defined by ITU-T refer to "Context awareness is a capability to determine or influence a next action in telecommunication or process by referring to the status of relevant entities, which form a coherent environment as a context" [4], the important aspects of context awareness framework is to retrieve the info from the existing source and provide the info by predicting the next available source of context based service can be achieved by storing and retrieving with the help of a database.

The preliminary step in providing the context service is to gather the context and its related parameters to determine the appropriate context that suits the real context of the user. In general, in most of the location based services, the context can be gathered either statically or dynamically. These two may also be known as Push and Pull services respectively [3]. These services helps in collecting the context details from the services that are being utilized by the users statically, ie, selection of the service from the list of services or browsing for something on internet. Dynamic service in location based services is quite useful in identifying the context by means of considering the event occurs in the location, ie, waiting at the bus stop location or waiting at railway station or waiting at airport. At that point of time, the context can be considered as 'travelling' and identifying the corresponding parameter such as bus, train, flight etc. These context parameters in turn leads to figuring out the source, destination where the user may wanted to go. Based on this, any travelling service can be offered to the user instantly at that point of time. Likewise, many of the contexts can be determined dynamically from time to time and provide the appropriate service. For making these services effectively and provide in more optimized way, it is better to store these details in a database such that further details or information can be retrieved. Also, storage of the details in a database can further helps in doing the analytics and prepare the dynamic reports. This paper currently focused on designing and development of schema for storing the context information in the database.

III. SCHEMA ARCHITECTURE OF DATABASE

As per the recommendations suggested for Context Awareness Framework by ITU-T[2], the following entities are considered for the database used for Context Based Service. To reduce the high complexity, for now, these

are designed suitable for any SQL based standard databases whereas this can be further enhanced using any NoSQL based database to make the schema completely dynamic.

A. Database object details

Context Source : An entity that provides context information from time to time. eg., user, device, network, service, content etc.

ContextSourceUUID	ContextSource	….	…..	….
(PK)	(UK)			

Context : Holds a unique ID of context along with category it belongs to and the policy that matches for the context.

ContextUUID (PK)	ContextName (UK)	CategoryUUID (FK)	PolicyUUID (FK)	….

Policy : Decision making scheme for context prediction.

PolicyUUID (PK)	PolicyName (UK)	….	….	….

Context Category : Category of context for filtering the context type.

CategoryUUID (PK)	CategoryName (UK)	….	….	….

Context Parameters : Parameters help to identify the context in predicted manner.

ParameterUUID (PK)	ParameterName (UK)	DefaultValue	….	….

Context Resources : Resources used by the services as per the context.

ResourceUUID (PK)	ResourceName (UK)	….	….	….

Category-Parameters :Mapping between context category and parameters that eventually identify the context and plays a role in decision making.

CPUUID (PK)	CategoryUUID (FK)	ParameterUUID (FK)	….	….

IV. QUERYING THE DATABASE FOR CONTEXT AWARENESS MECHANISMS

The objects with various attributes stored in the database are queried based on the current context identification. After identifying the context, it will be filtered to figure out the context category from the table. And then, it is matched with context policy details available in a table that is matching the current context. The context policy is further helps in determining the parameters and then choosing the corresponding context resource and the context services list can be obtained from the database objects. The context based services list can be obtained from the database in the standard way of querying in any schema based database system.

V. CONCLUSION AND FUTURE WORK

This paper provides the basic concepts of context and identification of context, storing them in the schema based database to get the list of context based services from the context information available, that can be offered to the users who are subscribed for context based services. Although the determination of the context is highly complex and not fully achieved, this paper raises the need of having context information in the database. Further refinement to this schema based architecture is, making use of fully schema less structure for maintaining the database objects which can go on change based the various parameters of the context more

dynamically, using the latest databases and technologies, is the main future work. Further, we propose to publish the model for analytics based on the data stored in the form of context information in the database.

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