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Web Service Selection with QoS Parameter

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Abstract: ***In order for web services to be able to work well together, they must participate in a set of shared organizing principles known as Service Oriented Architecture (SOA).REST is one such architectural solution because many of its elements and constraints are derived from Representational State Transfer (REST). RESTful services are based on REST architecture. The RESTful services are attractive to the end users because of low resource consumption (i.e., battery, processor speed, and memory). Additionally, the RESTful services do not involve complex standards and diverse operations. The number of services published over the internet is growing at an explosive speed. So it is difficult for service requesters to select satisfactory web services. The Quality of service is considered the most important criterion for service selection and filtering. This paper focuses on service selection based on QoS parameter.***

Keywords: QoS, REST, Linked open Data (LOD), Service Oriented Architecture (SOA), Best First Search(BFS).

I. INTRODUCTION

"A Web service is a method of communications between two electronic devices over the World Wide Web. It is a software function provided at a network address over the web with the service always on as in the concept of utility computing".[1]

Web services are classified into following two categories:

1) Communication based on standard XML messaging system (SOAP)- SOAP Web services
2) Communication based on an architectural style(REST)- RESTful Web services.

RESTful web services are based on the way how our web works. Our very own world wide web (www) – the largest distributed application – is based on an architectural style called REST – Representational State Transfer. REST is neither a standard nor a protocol. It is just an architectural style like say for example client-server architecture (client-server is neither a standard nor a protocol). Web services following this architectural style are said to be RESTful Web services.

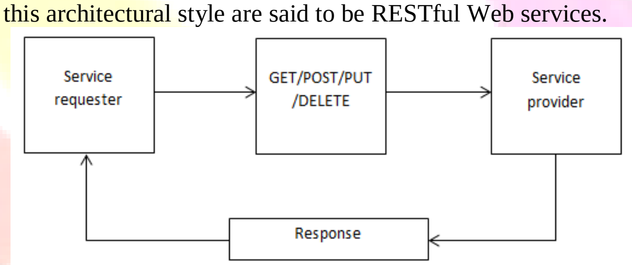

Figure 1.RESTFULL Web Service (Architectural Approach).

1.1 Linked Open Data

Linked Data is a new Web concept that promotes a paradigm shift in how information is modeled and accessed. Complex information may be built aggregating simpler information units, but unlike the current Web paradigm, which conceives complex information as a whole, the information units are individually addressable and linkable. Principles of linked data are: [10]

- Use URI as names for things.
- Use HTTP URIs so that people can look up those names.
- When someone looks up a URI, provide useful information, using standards (RDF, SPARQL).
- Include links to other URIs, so that they can discover more things".

1.2Linked Open Services

Linked Open Services provide a Linked Open interface for data services. To make these services adhere to Linked Open principles a number of requirements have to be fulfilled:

- The input for a service invocation with given parameter bindings must be identified by a URI
- Resolving that URI must return a description of the input entity, relating it to the service output data
- The description must be returned in RDF format.

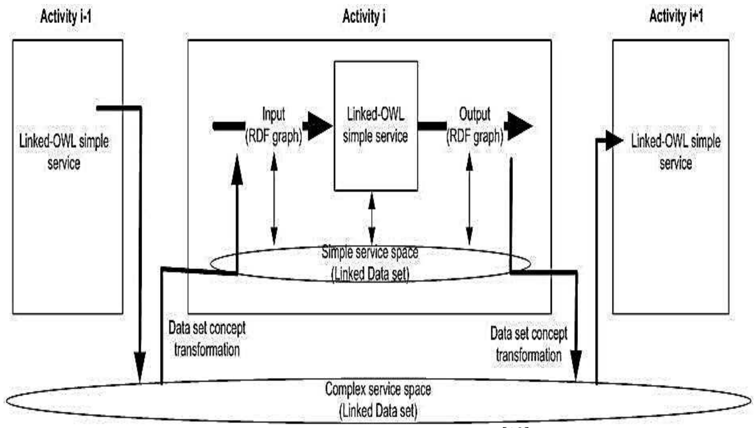

Figure 2. Linked Open Services[10]

II. ALGORITHM

Initially for selecting web services there were no parameters which were to be considered. That is after discovering the service any service was selected which did considered any parameters.

This research paper shows how QoS Parameter is used in web service Selection.

Calculation of QoS parameter:-[22]
The Overall QoS Score can be obtained by following the Simple Additive Weighting (SAW) technique. This technique consists of two phases:

A. Scaling: First, it is necessary to put all criteria in the same scale. We can define scaling into two categories (i) Positive Scaling and (ii) Negative Scaling.

1) Positive Scaling: It means we want to maximize the value of QoS criteria. It defines the scaling for positive criteria (i.e. when the higher value the higher the quality) e.g.: Throughput.

SCp = (qos - QoSmin) / (QoSmax - QoSmin)

2) Negative Scaling: It means we want to minimize the value of QoS criteria. It defines the scaling for positive criteria (i.e. when the higher value the lower the quality) e.g.: Execution Time

SCn = (Qmax - qos) / (QoSmax - QoSmin)

Where qos is QoS value of respective service, SCp is positive scaling, SCn is Negative scaling, QoSmin is minimum QoS value of respective Criteria associated with service, QoSmax is maximum QoS value of respective Criteria associated with service.

B. Weighting: This phase computes the overall score taking into account all the involved criteria and the weight assigned to each one of them.

Overall QoS score of single service can be defined by equation 3 as follows:

$$overallQos\left(\frac{Sqos}{Rqos}\right) = \sum_{i=0}^{n}\left(\frac{SCp}{SCn}\right) * w$$

Here Overall QoS (Sqos) is overall QoS score of all Criteria of a Single Service, Overall QoS(Rqos) is overall QoS score of all Criteria of User Request.

III. PROPOSED ALGORITHM

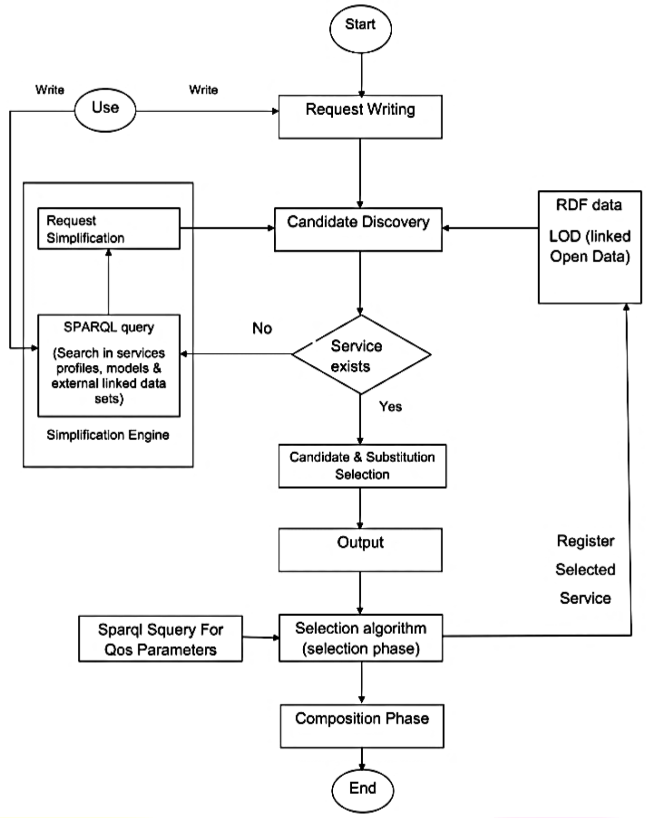

Figure: 3 proposed Flow Chart

3. Steps for proposed work.

Step1: User enter input

Step2:User input will convert to the sparql formats and request simplification and perform the discovery with the Linked Open RDF.

Step3: If service exit then go for the candidate substitution and selection store output variable.

Step4: Discovered service will go for the selection phase with matching with QoS parameter, in this we are apply QoS parameter through sparql format.

If match parameter then selected service will be stored in RDF data set and give to the composition phase.

For QoS matching we are use the graph base technique.

IV. IMPLEMENTATION AND RESULTS

Result of selection process

Input Parameter
Symptoms=Nasal
City = Ahmedabad

Base Uri

http://www.semanticweb.org/healthcare/h1n1/ontology
http://dbpedia.org/ontology/

SparqlQuary

String queryString =

```
"PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#> "+
"PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>  "+
```

```
"PREFIX Ontology: <http://www.semanticweb.org/healthcare/h1n1/ontology#>"
"select ?uri " +
"where { "+
"?ind a Ontology:Nasal. ?indOntology:is_a_symptom_of ?uri" +

"} \n ";
```

Symptoms related disease

Disease ::http://www.semanticweb.org/healthcare/h1n1/ontology#h1n1_b

Result With QOS Parameter

No. symptoms to disease result=:1
QoS response time= 684
QoS Throughput=684
QoS score=1368

Disease Related Hospitals:

http://www.semanticweb.org/healthcare/h1n1/ontology#sholapur_civil

http://www.semanticweb.org/healthcare/h1n1/ontology#geb_meddy

http://www.semanticweb.org/healthcare/h1n1/ontology#railway

http://www.semanticweb.org/healthcare/h1n1/ontology#sarojini_devi

http://www.semanticweb.org/healthcare/h1n1/ontology#m.g.

http://www.semanticweb.org/healthcare/h1n1/ontology#k.n.t.b

http://www.semanticweb.org/healthcare/h1n1/ontology#kasturba

http://www.semanticweb.org/healthcare/h1n1/ontology#sola_civil

http://www.semanticweb.org/healthcare/h1n1/ontology#k.g

http://www.semanticweb.org/healthcare/h1n1/ontology#b_j_medical

http://www.semanticweb.org/healthcare/h1n1/ontology#cantonments

http://www.semanticweb.org/healthcare/h1n1/ontology#civil_rajkot

http://www.semanticweb.org/healthcare/h1n1/ontology#civil_surat

http://www.semanticweb.org/healthcare/h1n1/ontology#medical_mysore

http://www.semanticweb.org/healthcare/h1n1/ontology#s.v.r.r

Result With QOS Parameter

```
No. Of disease related hospital:15
QoS total response time= 1257
QoS Throughput=83
QoS score=1340
```

Transportation service

http://www.semanticweb.org/healthcare/h1n1/ontology#sholapur_civil
Transportation Facilities::: Public_Transportation

http://www.semanticweb.org/healthcare/h1n1/ontology#geb_meddy

Transportation Facilities ::: Private Ambulance

http://www.semanticweb.org/healthcare/h1n1/ontology#railway
Transportation Facilities ::: Public Ambulance
Transportation Facilities ::: 040-2700-1134

http://www.semanticweb.org/healthcare/h1n1/ontology#sarojini_devi
Transportation Facilities ::: Private Ambulance.

http://www.semanticweb.org/healthcare/h1n1/ontology#m.g.
Transportation Facilities ::: Public.

http://www.semanticweb.org/healthcare/h1n1/ontology#k.n.t.b
Transportation Facilities ::: Public Ambulance.

http://www.semanticweb.org/healthcare/h1n1/ontology#kasturba
Transportation Facilities ::: Public Ambulance

http://www.semanticweb.org/healthcare/h1n1/ontology#sola_civil
Transportation Facilities ::: Public Ambulance

http://www.semanticweb.org/healthcare/h1n1/ontology#k.g
Transportation Facilities ::: Private Ambulance

http://www.semanticweb.org/healthcare/h1n1/ontology#b_j_medical
Transportation Facilities ::: Public Ambulance

http://www.semanticweb.org/healthcare/h1n1/ontology#cantonments
Transportation Facilities ::: Private Ambulance.

http://www.semanticweb.org/healthcare/h1n1/ontology#civil_rajkot
Transportation Facilities ::: Public Ambulance

http://www.semanticweb.org/healthcare/h1n1/ontology#civil_surat
Transportation Facilities ::: Public Ambulance

http://www.semanticweb.org/healthcare/h1n1/ontology#medical_mysore
Transportation Facilities ::: Public Ambulance.

http://www.semanticweb.org/healthcare/h1n1/ontology#s.v.r.r
Transportation Facilities ::: Private Ambulance

Result With QOS Parameter

```
total transportation service= 16
QoS total response time= 1253
QoS Throughput=78
QoS score=1331
```

Through this experiment we are focusing on total response time (MilliSecond),throughput, and calculate QoS score. Each type of service will have QoS parameter and comparing with the other service. Best one is selected and give output to the user.

User input disease and Location, based on this input we are find service and give output related to the user input. We are provide Other service like hospital and transportation facility to user.

We are use LOD for find Location of hospital and related to transportation. DBpedia is using to find Location.

V. SUMMARY

Today, the number of available services is continuously increasing on the Web. Web services(APIs) popularity leads to a new scenario in which increasing amount of information about services is available on the Web. All this information can be exploited to support users for discovering services.

In This report, RESTful Linked Open Service architecture has been presented for efficient web services selection with QoS in service oriented environment. We studied Linked Open Data, their architecture and how it is efficient compare to OWL and SPARQL query language that is used for RDF based linked data.

We proposed Selection algorithm using BFS (Best First Algorithm) for searching QoS parameter and give user best services to user requirement. We are giving rank to those services.

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