A Future Image for Web Services' Discovery with a Client Web based Interface

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ABSTRACT

Web Services' discovery is a very important issue related to Web Services. From Syntax and using match-making words to semantic web and taking QoS parameters into account for selecting between Web Services having the same functionality for finding the best service that fulfills the customer's requirements . In this paper we put a future image for Web Services' Discovery by merging both UDDI and Search Engines, as the new trend in Web Services' Discovery is building a central repository storing all Web Services after collecting them from UDDI , different UBRs … ,this central point will be a reference to the client for searching the required Web Service .Two datasets one contains 365 WS and the other 2500 WS used in the experimental work .Our work will cover two phases from the suggested model phase4 and phase6 fig.(3).Classifying Web Services before storing them will enhance the search process and it could be a step for building open web directory contain all Web Services like used for searching web sites for a specified issue(ODP,DMOZ..), Online databases maintain a collection of structured domain-specific documents dynamically generated in response to users' queries instead of being accessed by static URLs. We also proposed a client GUI that will enable the Web Service consumer easily access data stored inside these databases contain updated frequently data of Web Services information collected ,classified and stored using different crawlers. This will facilitate and enhance the Web Services' Discovery process ,client will be able to select between Web Services due to QoS requirements and find the best Web Service that fulfills his/her requirements.

Keywords: Web Services Discovery , Semantics Web Services , WSCE,GUI, UDDI, WSDL , Search Engines , Crawlers , QoS, Classification.

1. INTRODUCTION

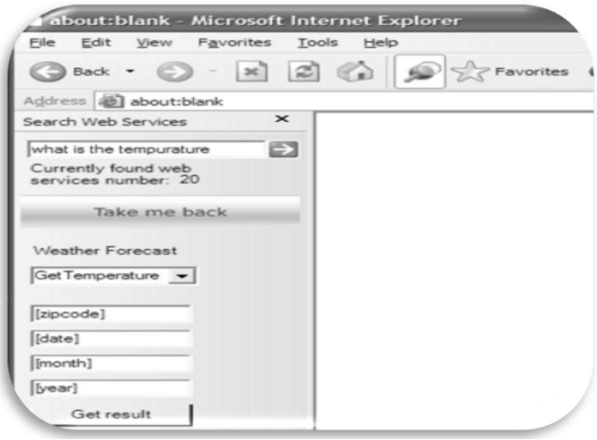
The service discovery process can be divided into two phases: the first one is based on the functional aspects of the service (i.e. input and output parameters, what the service does, preconditions) while the second one deals with non-functional parameters (i.e. QoS). Web Service, the magic word which will give a bright future for communications through the internet, Web Services are hardware, programming language, and operating system independent, it will move us from hardware distributed systems to software distributed systems , It is the newest branch in web engineering , we can differ between service and Web Service in a few words service is a provision of value in some domain (i.e. when somebody wants to book a flight ticket for travelling from Riyadh to Cairo it doesn't matter whether the requester goes to an airline tickets office or uses the airline Web site to book his flight)fig.(1), where Web Service is a computational entity accessible over the Internet.

Service provider
Service consumer
service request
service response

Fig 1 : Web Service

Talking about Web Services' Discovery problem given a repository of Web services , and a query, automatically finding a service from the repository that matches these requirements is the Web Services' Discovery problem. This problem comes in two flavors: Syntactic and Semantic[9], depending on the type of service descriptions provided in the repository, In a Syntactic Discovery WSDL provides syntactic description of Web Services which can be provided in a repository. Given a query with requirements of the requested service, the discovery problem involves finding a specific service that can fulfill the given input and output criteria in the query based on a syntactical equivalence of the input and output names. In Semantic Discovery We assume that a directory of services has already been compiled, and that this directory includes a USDL description document for each service. A USDL description of the desired service can be written, a query processor can then search the service directory for a "matching" service Quality of Service, or QoS, is "a combination of several qualities or properties of a service" and helps us to select a proper Web-service from the web applications.

It is a set of non-functional attributes that may influence the quality of the service provided by a Web service like Availability, Capacity, Reliability, Performance, Cost, Response Time. There are two major problems in dynamic Web Services' discovery with QoS. The first involves the specification of QoS information. How should the QoS information be expressed and/or stored? A standard format must be agreed upon and used in order for the information to be exchanged and interpreted. The second problem is one of matching the customer's requirements with that of the provider. For example, if a customer is looking for services that matches its QoS requirements of 2ms response time, 400Kbps throughput and 99.9% availability, how can services be found whose QoS advertisement satisfies these requirements? [13].Our work is considered with the second problem . Collecting Web Services data is not the key element that leads to an effective Web Services' discovery, but how it is stored. The fact that Web Services data is spread all over existing search engines databases, accessible UBRs, or file sharing platforms does not mean that clients are able to find these Web Services without difficulties. However, making this Web services data available from a standard, universal access point that is capable of aggregating this data from various sources and providing clients to execute search queries tailored to their requirements via a search engine facilitated by a Web Service crawler engine or WSCE is a key element to enhancing Web Services' discovery and accelerating the adoption of Web services[25] . No one before manipulated constructing a GUI which will help client side for Web Services' Discovery except at[33] fig.(2) which is a A programmable Explorer Bar for Microsoft's Internet Explorer Web Browser. The GUI will support the client side , Searching for Web Services based on QoS parameters, schema properties, service reputation, trust, and semantic matching will considerably increase the relevancy of finding and selecting appropriate Web Services.



what is the tempurature

Currently found web services number: 20

Fig 2: A programmable Explorer Bar for Microsoft's Internet Explorer Web Browser[33]

2. RELATED WORK

Many studies , approaches and ontologies manipulated Web Services' Discovery with respect to QoS. The most of the proposed frameworks and architectures use UDDI registry for storing Web Service descriptions. When Web Services were in hundreds all approaches for Web Services' discovery were concerned with UDDI and URBs Registries when number of Web Services increased and become in thousands a new trend for Web Services' discovery depending on Search Engines, for solving the problems with Web Services' discovery and using UDDI a tModel[14] was suggested for storing values of QoS for each Web Service. A reputation-enhanced [16] model where service matching, ranking and selection algorithm is presented and evaluated . In spite of newer technologies, service registries still provide the foundation for cataloging and classifying Web Services. The UDDI Business Registry (UBR) is the central service directory for publishing technical information about Web Services, but the existing UDDI specification has some major technical limitations that make it an incomplete solution for Web Service discovery[17].Due to *UDDI* Limitations which are(i)UDDI wasn't intended to serve as a search engine for Web Service discovery.(ii) UDDI registration is voluntary and thus can easily become passive.(iii)UDDI doesn't provide any guarantee of the validity or quality of information it contains.(iv)A disconnection exists between UDDI and the current Web. UDDI is incapable of providing quality-of service (QoS) measurements for registered Web Services.(v)UDDI doesn't maintain or provide any Web Service life-cycle management. So, Search Engines might be a good alternative to using UBRs for Web Service discovery, particularly when considering information accuracy. Search Engines are trends for finding and discovering Web Services also emerged in recent years. Search Engines such as Google, Yahoo, AlltheWeb and Baidu have become a new source for finding Web services.[20] this new trend is due to limitations found with services registries like UDDI[23]. Search Engines have become a new major source for searching for Web Services. Yet, they are vulnerable to returning irrelevant results and only provide access points to WSDL documents while UDDI business registries provide a more business-centric model that can be used as the first step towards an application-centric Web , so merging between both UDDI and Search Engines in the process of Web Services discovery is the future trend. The UDDI registry can be supported with external database , which stores non-functional information about Web Services. Ran S. proposed a model by introducing a Web Service QoS Certifier module[26].Gang YE, Chanle WU, Jun YUE, Shi CHENG introduced A QoS-aware Model for Web Services' discovery by suggested a new UDDI registry which is a repository of registered Web Services with lookup facilities[27] ,the proposed new registry differs from the current UDDI model by having information about the functional description of the Web Service as well as its associated QoS registered in the repository, but their model does not modify the standard UDDI interface and the client side. Haihua Li, Xiaoyong Du, Xuan Tian[28] constructed a SAM-based service model for Web Services management, SAM-WS, and proposed an approach for users to explicitly describe their QoS requirements using QoS ontology. Eyhab Al-Masri and Qusay H. Mahmoud[29] proposed a novel exploration engine, the Web Service Crawler Engine (WSCE). WSCE is capable of crawling multiple UBRs, and enables for the establishment of a centralized Web Services' repository which can be used for large-scale discovery of Web Services they didn't cover the client side too. The proposed by Julian Day system [30] consist of two parts: augmented client and the QoS forums. Clients send their experiences to a central Web Service which stores this information inside an internal database. This Web Service can be thought of as a kind of forum system for QoS information. It can respond to requests about particular Web Services, sending all the data it knows about a particular service to a requesting client. Now when a client wants to pick a service, he/she gathers information from the QoS forums, and then reasons about which service is best. Authors at[31] suggested an ontology named DAML-QoS; it is a complementary ontology that provides detailed QoS information for DAML-S (Darpa Agent Markup Language for Services) users. A programmable Explorer Bar for Microsoft's Internet Explorer Web Browser[33] that uses Common Sense Reasoning to display contextually relevant tasks based on what the user is viewing , and allow users to find and directly query Web Services. The Web Services Explorer Bar contains two areas Search Web Services and Tasks. The Search Web Services area allows users to query SOAP based Web Services using natural language. The Tasks area displays contextually relevant tasks based on what Web page the user is viewing.

3. APROPOSED ENHANCED TECHNIQUE FOR WEB SERVICES' DISCOVERY

Collecting Web Services data is not the key element that leads to an effective Web Services' discovery, but how it is stored.Using data collected by crawlers our work could be summerized into three steps (1)Classifying Web Services due to URL or a function. (2)Storing Web Services information both functional and non functional(QoS).(3)building a client web based (GUI)for Web Services' discovery.

Fig.(3) represents a future image of Web Services' discovery process based on QoS by merging UDDI and Search Engines for enhancing the discovery process through six phases our research is concerned with phase four and six , phase4 is a WS-Classifier which classified the collected Web Services in phases one , two and three(crawlers) before storing them in the Web Services Storage, phase6 is a Web Service Storage Search Engine based on QoS which will be a GUI to the client for getting the best Web Service which he/she searches for. Classifying Web Services after fetching their WSDL documents and storing them will enhance Web Service discovery as Web Services with the same function grouped together after that the best Web Service which fulfill consumer requirements will be selected with respect to QoS (Quality of Services Parameters) according to URL or function. A new technique for managing the storage process of WSS.After classifying Web Services was implemented, the structure of the database that store data of Web Services like Name, Function, WSDL and QoS values must be changed to a new one for matching the decision tree classifier (Decision trees are powerful and popular tools for classification and prediction).

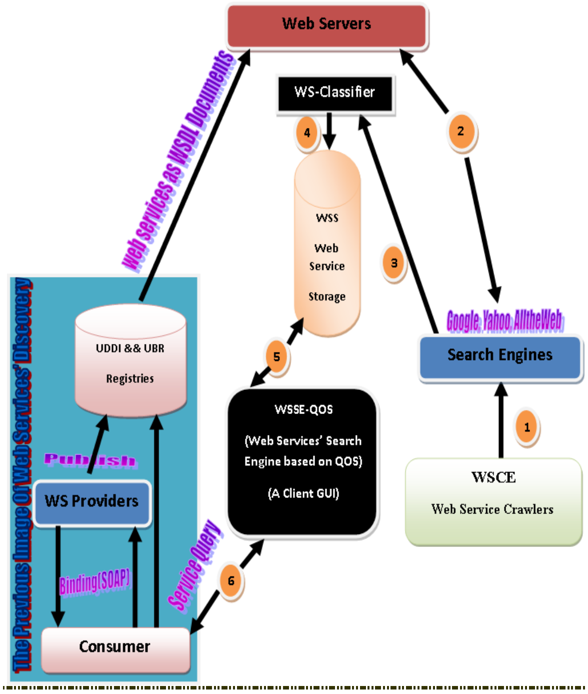


Fig 3:An Enhanced Model For Web Services' Discovery by Merging UDDI And Search Engine

The new technique will help in (i)Crawlers' function Support , using the new technique for WSS Management will support the function of crawlers , storing web services' information and metadata will be easier also help updating Web Services' information like QoS (ii)WSSSE-QoS' function Support ,WSSSE-QoS (Web Service Storage Search Engine based on QoS) is a system that will be established as an intermediate between WSS and consumer used for selecting the best web service that will fulfill the consumer requirements due to QoS, the new technique for WSS Management will support the operation of WSSSE-QoS, which will facilitate the Find and Select operations and make them easier which will enhance web service discovery.(iii)WSS Stability ,the new technique of WSS Management will affect stability of WSS because the new infrastructure could be implemented using data structure (using trees) as storing data inside WSS through the indexing module IM. IM is primarily responsible for building data structures over textual information contained within WSDL interfaces or UDDI objects(i.e. business Entity, business Service,binding Template, tModels, among others)[22].(v)Ability of Large Extension The new infrastructure of WSS will be able for large Extension, because tree structure has this advantage and this will be suitable for the future growth of web services numbers in the future.For implementing the new technique discussed above web directories are more suitable for storing web services data.Decision Trees was the most suitable algorithm for the suggested technique, which is a classifier in the form of a tree structure .Decision trees are powerful and popular tools for classification and prediction. The attractiveness of decision trees is due to the fact that, in contrast to neural networks, decision trees represent rules. Rules can readily be expressed so that humans can understand them or even directly used in a database access language like SQL so that records falling into a particular category may be retrieved fig.(4).

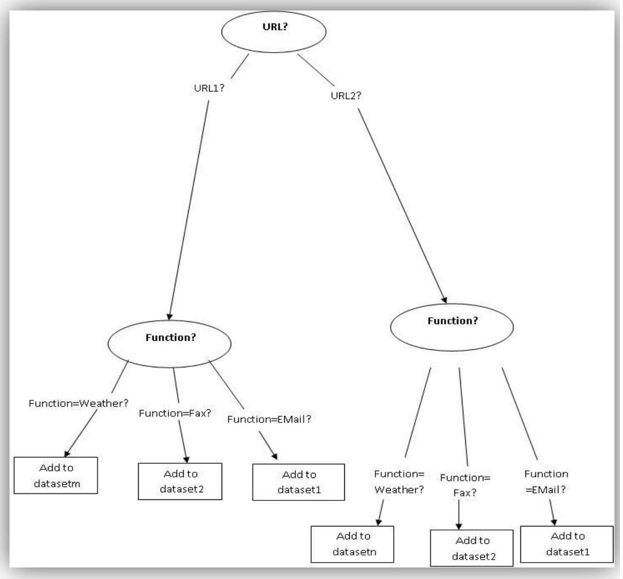


Fig 4: A decision tree for WS-Classifier

Taking into account phase6 which is a GUI based on QoS supported the client side QoS for Web Service applications is the ability of their services to provide added value to the best solution for requesters' enquiries, with a specific requirements. QoS parameters help determining which of the available Web Services is the best and meets clients' requirements. In a previous work we used two datasets one of them consists of 365 web services, and the other one contains more than 2000 web services ,two databases were built using data of these two datasets on MySQL Server.

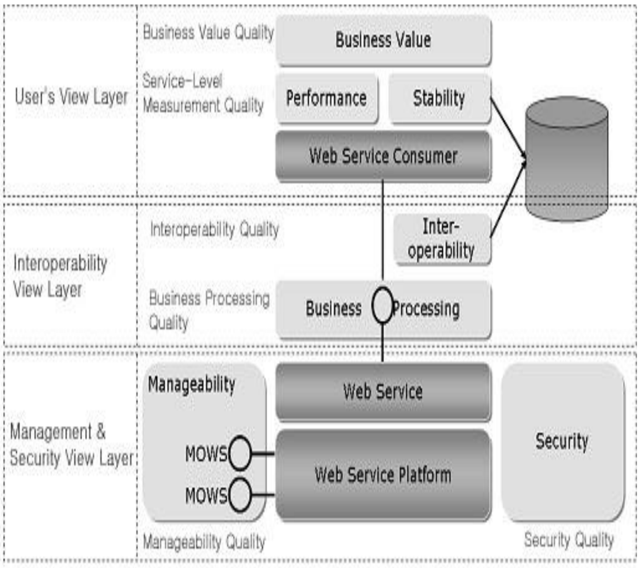


Fig 5:Web Service Quality Factors

Taking into account User's View Layer in fig.(5), the service discovery process adopts keyword-matching technology to locate published Web Services, basing this matchmaking on syntax level, that is, matching according to a set of weighted keywords, a less-than-desirable situation. The returned discovery result might not satisfy the requester's intended requirements. This leads to a bit of manual work to choose the proper service according to its semantics. From the Web Services point of view, the selection criteria should at least include the service's functional and non-functional requirements. To fully integrate service discovery, these domain-specific criteria should be clear and processed automatically. This requires domain-specific knowledge. QoS of any Web Service and for those which included into the datasets used[25] . fig(6) represents the discovery process where different service providers provide different Web Services with a same function but with different QoS attributes ,the functional and non-functional information of these Web Services are collected from different UBRs ,UDDI and web sites by crawlers that could be stored inside online databases, using the client interface service requester could easily get the best Web Service for him/her.

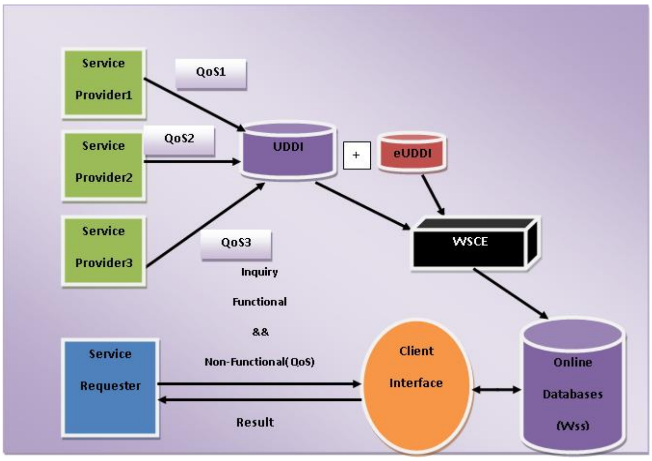


Fig 6: The discovery process based on QoS

Description of QWS dataset : QWS dataset consists of different rows of web service implementations and their attributes as presented below (http:// www.uogue/ph.ca/~qmahmoud/qws/index.html).
The attributes used in our dataset are as follows:

1. Response Time: time taken to send a request and receive a response (ms)
2. Availability: number of successful invocations/total invocations (%)
3. Throughput: total number of invocations for a given period of time (#/sec)
4. Successability: number of response / number of request messages (%)
5. Reliability: ratio of the number of error messages to total messages (%)
6. Compliance: extent a WSDL document follows WSDL spec. (%)
7. Best Practices: extent a Web service follows WS-I Basic Profile (%)
8. Latency: time taken for the server to process a given request (ms)
9.Documentation:measure of documentation (i.e. description tags) in WSDL (%)
10.WSRF:WebService Relevancy Function: a rank for Web Service Quality (%).
11.Class:levels representing service offering qualities(1 through 4).
12. Name: service name.
13. WSDL: WSDL file location.

Fig(7) is a flow chart represents the discovery process. Client could select between all Web Services due to a specified URL or a specified function then he/she could query from the returned result using QoS parameters to get Web Service that fulfills his/her requirements. The dashed area represents the discovery process ,client could select between all Web Services due to a specified URL or a specified function then he could query from the returned result using QoS parameters to get the best result.

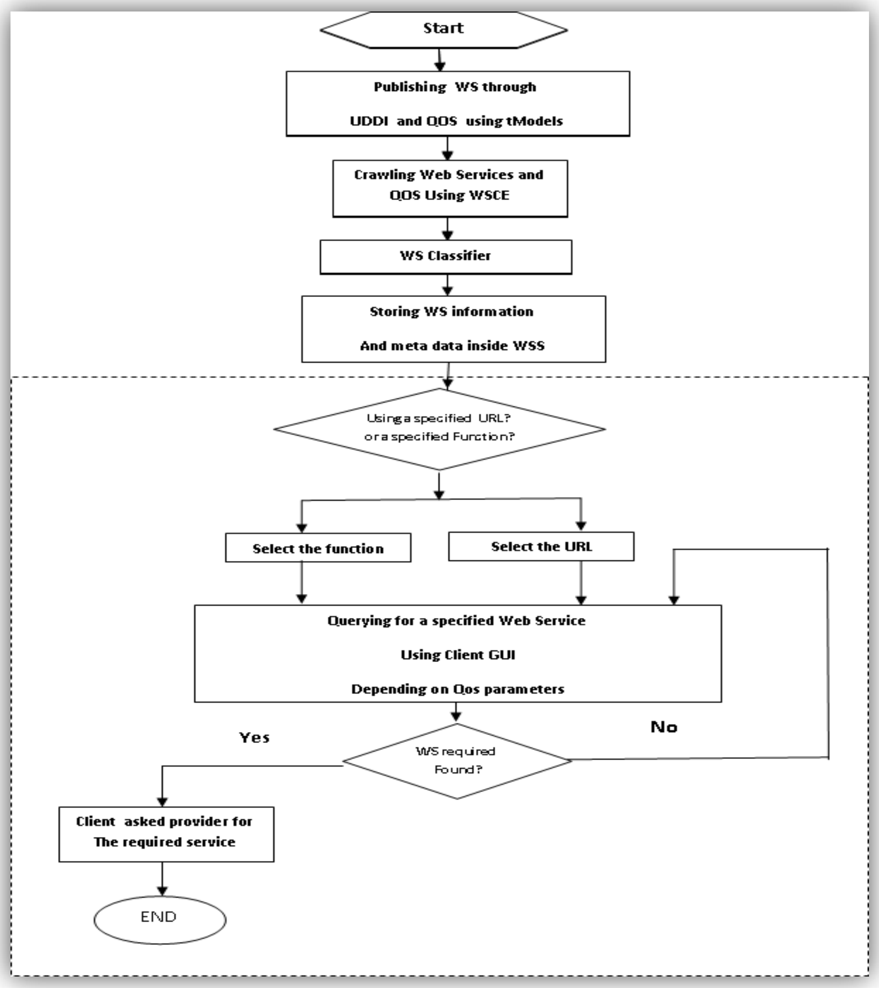


Fig7:A flow chart for Web Services' Discovery

4. EXPERIMENTAL WORK

The experimental work was done in two steps (i) Implementing Web Service's Classifier System ,testing the results (ii)Building a Graphical User Interface (GUI).

4.1 WS-Classifier System

Table 1. Software Requirement

Local Server	*WAMP*
Programming Language	*Java Language*
DataBase Management System	*My SQL*
Programming Environment	*Net Beans(version 6.9.1)*
GUI design	*PHP Runner 5.2*

Connecting between WAMP Server and Netbeans environment through MySQL driver as a local host and classifying data imported from a dataset contains 365 web services using SQL statements and phpmyAdmin.The output from the classifier system was 221 categories when classifying data due to URL and similar functions fig.(8).

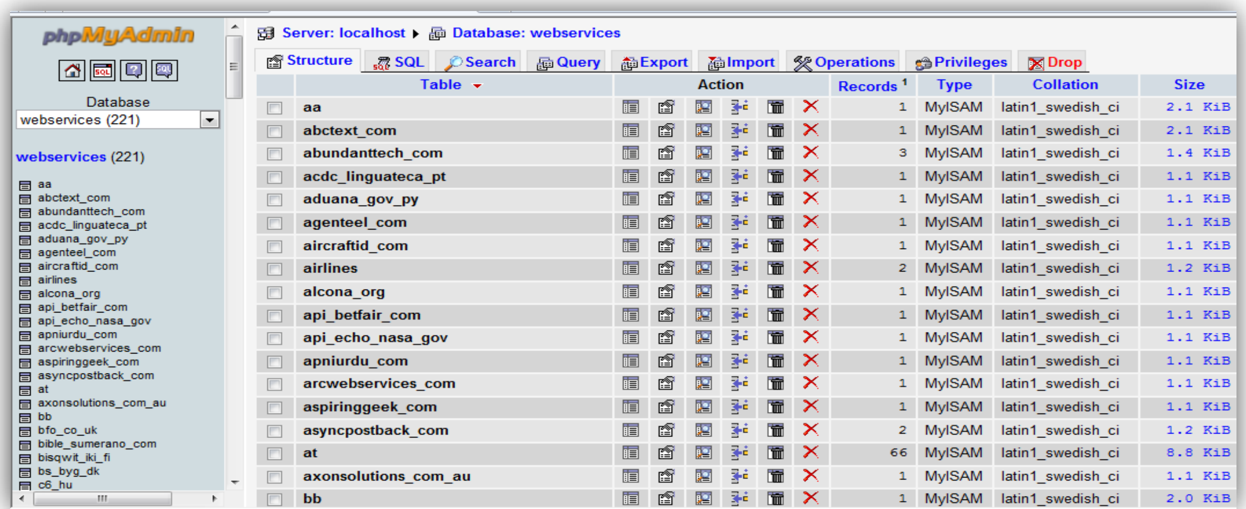


Table	Action	Records ¹	Type	Collation	Size
aa		1	MyISAM	latin1_swedish_ci	2.1 KiB
abctext_com		1	MyISAM	latin1_swedish_ci	2.1 KiB
abundanttech_com		3	MyISAM	latin1_swedish_ci	1.4 KiB
acdc_linguateca_pt		1	MyISAM	latin1_swedish_ci	1.1 KiB
aduana_gov_py		1	MyISAM	latin1_swedish_ci	1.1 KiB
agenteel_com		1	MyISAM	latin1_swedish_ci	1.1 KiB
aircraftid_com		1	MyISAM	latin1_swedish_ci	1.1 KiB
airlines		2	MyISAM	latin1_swedish_ci	1.2 KiB
alcona_org		1	MyISAM	latin1_swedish_ci	1.1 KiB
api_betfair_com		1	MyISAM	latin1_swedish_ci	1.1 KiB
api_echo_nasa_gov		1	MyISAM	latin1_swedish_ci	1.1 KiB
apniurdu_com		1	MyISAM	latin1_swedish_ci	1.1 KiB
arcwebservices_com		1	MyISAM	latin1_swedish_ci	1.1 KiB
aspiringgeek_com		1	MyISAM	latin1_swedish_ci	1.1 KiB
asyncpostback_com		2	MyISAM	latin1_swedish_ci	1.2 KiB
at		66	MyISAM	latin1_swedish_ci	8.8 KiB
axonsolutions_com_au		1	MyISAM	latin1_swedish_ci	1.1 KiB
bb		1	MyISAM	latin1_swedish_ci	2.0 KiB

Fig 8:Transfering Dataset1 into a database after classification process

Using the other dataset containing more than 2000 Web Services , the output from the classifier system was 28 categories when classifying data due to URL and similar functions , it becomes more specified and easily dealing with as it reduced from 221 category to 28 only fig.(9)

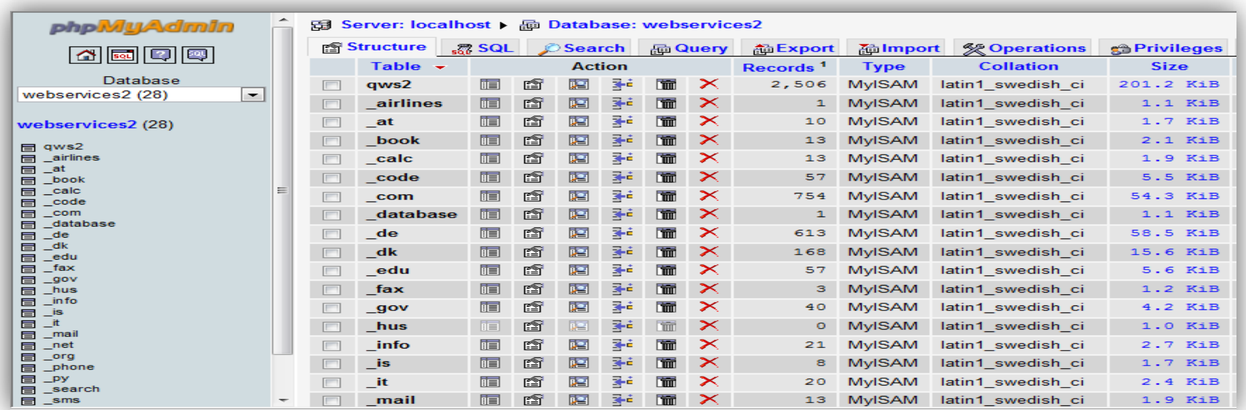


Table	Action	Records ¹	Type	Collation	Size
qws2		2,506	MyISAM	latin1_swedish_ci	201.2 KiB
_airlines		1	MyISAM	latin1_swedish_ci	1.1 KiB
_at		10	MyISAM	latin1_swedish_ci	1.7 KiB
_book		13	MyISAM	latin1_swedish_ci	2.1 KiB
_calc		13	MyISAM	latin1_swedish_ci	1.9 KiB
_code		57	MyISAM	latin1_swedish_ci	5.5 KiB
_com		754	MyISAM	latin1_swedish_ci	54.3 KiB
_database		1	MyISAM	latin1_swedish_ci	1.1 KiB
_de		613	MyISAM	latin1_swedish_ci	58.5 KiB
_dk		168	MyISAM	latin1_swedish_ci	15.6 KiB
_edu		57	MyISAM	latin1_swedish_ci	5.6 KiB
_fax		3	MyISAM	latin1_swedish_ci	1.2 KiB
_gov		40	MyISAM	latin1_swedish_ci	4.2 KiB
_hus		0	MyISAM	latin1_swedish_ci	1.0 KiB
_info		21	MyISAM	latin1_swedish_ci	2.7 KiB
_is		8	MyISAM	latin1_swedish_ci	1.7 KiB
_it		20	MyISAM	latin1_swedish_ci	2.4 KiB
_mail		13	MyISAM	latin1_swedish_ci	1.9 KiB

Fig 9:Transfering Dataset2 into a database after classification process

Table(2) displays Web Services' Capacity due to URL , first column represents the output from the experimental results using two different datasets (dataset1 which contains 365 different web services , and the second column using dataset2 contains 2500 different Web Services),the third one shows the percentage of the differential between them.

Table 2. Web Services' capacity comparison due to URL

URL	*No of Web Services (Dataset1)*	*No of Web Services (Dataset2)*	*Percentage (%)*
.com	*233*	*745*	*3.19*
.de	*64*	*613*	*9.58*
.net	*57*	*151*	*2.65*
.org	*16*	*167*	*10.44*
.gov	*7*	*40*	*5.7*
.edu	*7*	*57*	*8.14*
.info	*6*	*21*	*3.5*
.dk	*4*	*168*	*42*

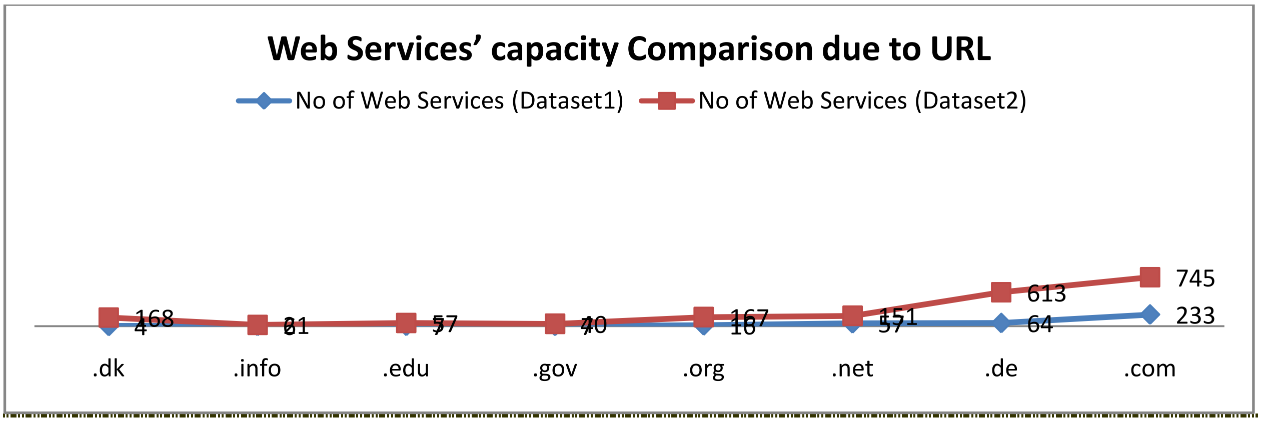


Fig 10:Changing in Web Services' Capacity due to URL

Table3. No of Web Services capacity due to their function

Function	Web Services' Capacity (Dataset1)	Web Services' Capacity (Dataset2)	Percentage %
Calculator	3	13	4.33
Code	12	57	4.75
Email	4	13	3.25
Fax	3	3	0
Phone	7	16	2.29
Search	11	56	5.1
SMS	6	23	3.83
SOAP	11	1018	92.6
Weather	6	14	2.33
Airlines	2	2	0

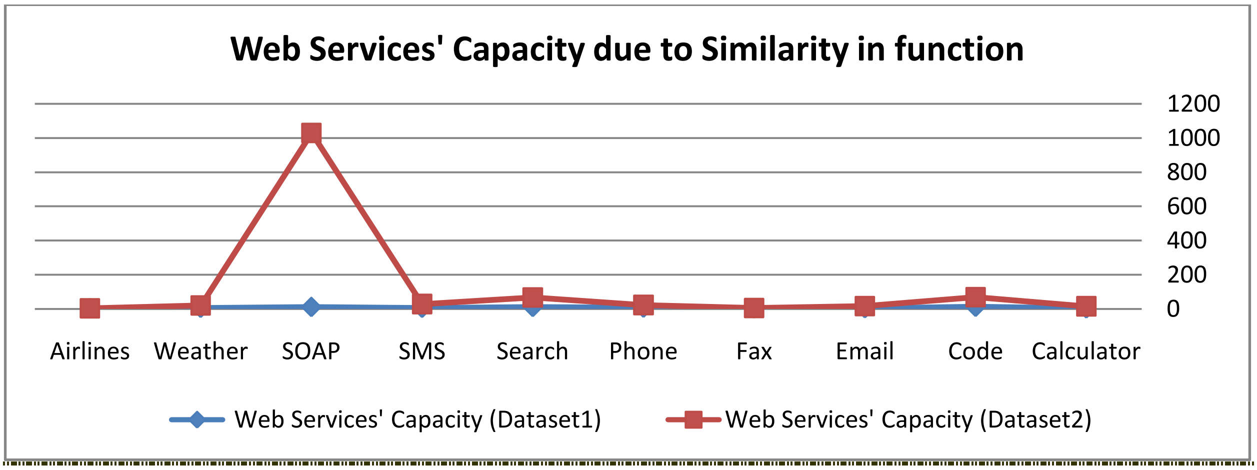
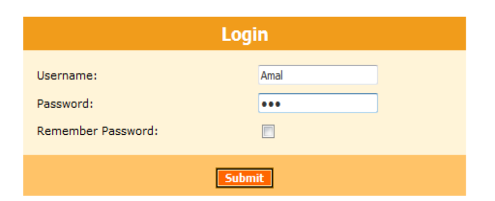


Fig 11:Web Services capacity due to similarity in function

4.2 A Graphical Web Based Interface (GUI)

Query forms presented on HTML pages are the only interfaces that users can access the content hidden in online databases, and therefore they are also called deep web or hidden web. as we assumed before that the future image of Web Services' Discovery will be through the web depending on the model of authors at[6] ,we constructed a web site that will be an a login page fig(13):



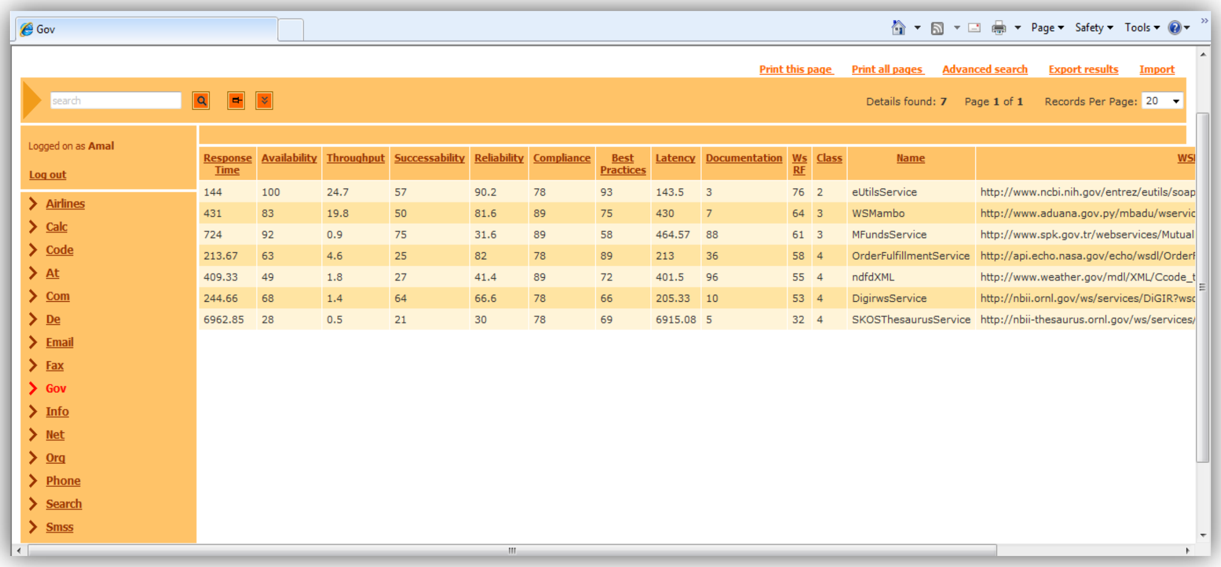
Username: Amal

Password: •••

Remember Password: □

Fig 13:Login Page

After logging in the client will be able to access the GUI fig.(14) which will enable him/her to display Web Services due to URL or due to the function of the Web Service as follow:

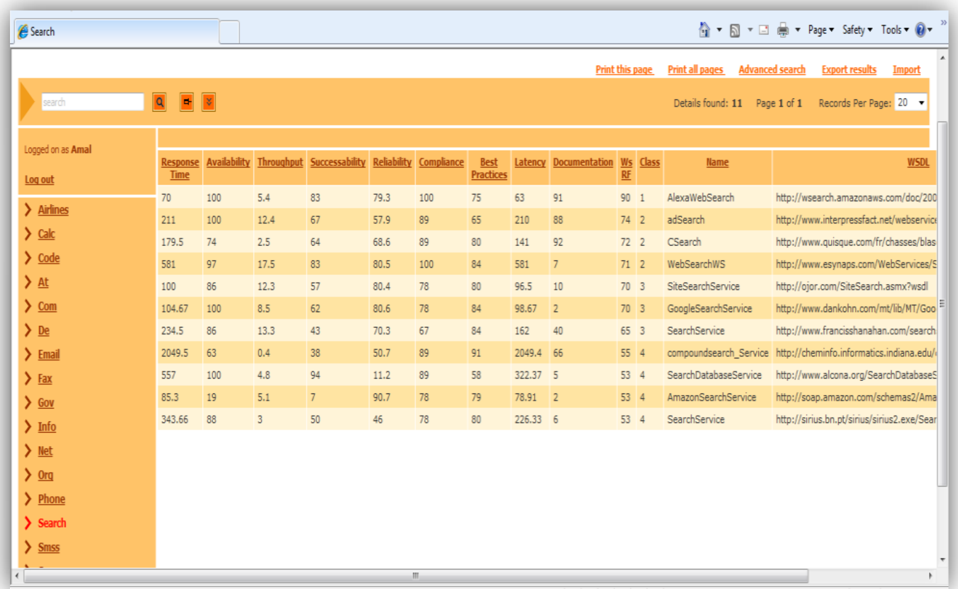


Details found: **7** Page **1** of **1** Records Per Page: 20

Response Time	Availability	Throughput	Successability	Reliability	Compliance	Best Practices	Latency	Documentation	Ws RF	Class	Name	WSI
144	100	24.7	57	90.2	78	93	143.5	3	76	2	eUtilsService	http://www.ncbi.nih.gov/entrez/eutils/soap
431	83	19.8	50	81.6	89	75	430	7	64	3	WSMambo	http://www.aduana.gov.py/mbadu/wservic
724	92	0.9	75	31.6	89	58	464.57	88	61	3	MFundsService	http://www.spk.gov.tr/webservices/Mutual
213.67	63	4.6	25	82	78	89	213	36	58	4	OrderFulfillmentService	http://api.echo.nasa.gov/echo/wsdl/OrderF
409.33	49	1.8	27	41.4	89	72	401.5	96	55	4	ndfdXML	http://www.weather.gov/mdl/XML/Ccode_t
244.66	68	1.4	64	66.6	78	66	205.33	10	53	4	DigirwsService	http://nbii.ornl.gov/ws/services/DiGIR?wsc
6962.85	28	0.5	21	30	78	69	6915.08	5	32	4	SKOSThesaurusService	http://nbii-thesaurus.ornl.gov/ws/services/

Fig 14:The output from Gov URL Search

For example when client asked for "search" Web Service , he/she can easily select search from the list and the result will be like this:

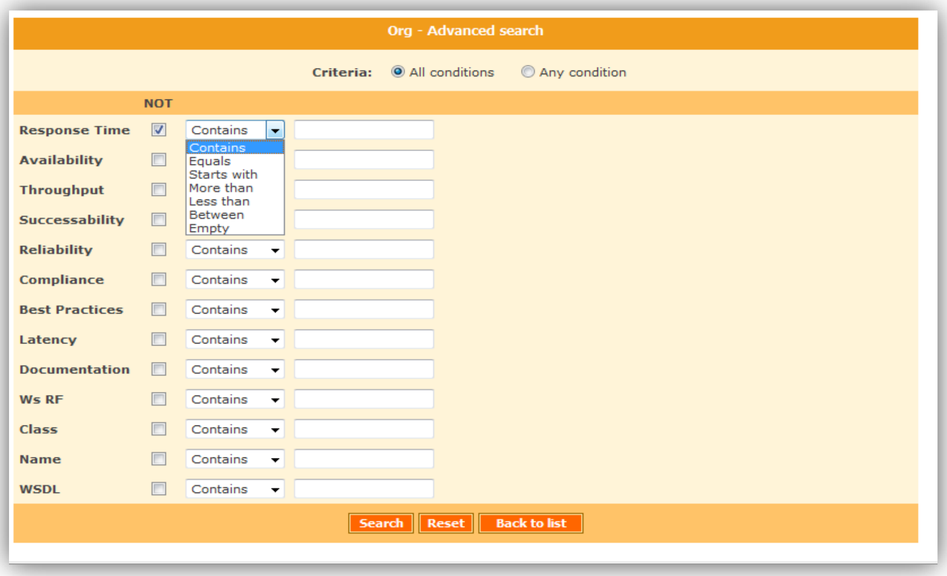


Details found: **11** Page **1** of **1** Records Per Page: 20

Response Time	Availability	Throughput	Successability	Reliability	Compliance	Best Practices	Latency	Documentation	Ws RF	Class	Name	WSDL
70	100	5.4	83	79.3	100	75	63	91	90	1	AlexaWebSearch	http://wsearch.amazonaws.com/doc/200
211	100	12.4	67	57.9	89	65	210	88	74	2	adSearch	http://www.interpressfact.net/webservice
179.5	74	2.5	64	68.6	89	80	141	92	72	2	CSearch	http://www.quisque.com/fr/chasses/blas
581	97	17.5	83	80.5	100	84	581	7	71	2	WebSearchWS	http://www.esynaps.com/WebServices/S
100	86	12.3	57	80.4	78	80	96.5	10	70	3	SiteSearchService	http://ojor.com/SiteSearch.asmx?wsdl
104.67	100	8.5	62	80.6	78	84	98.67	2	70	3	GoogleSearchService	http://www.dankohn.com/mt/lib/MT/Goo
234.5	86	13.3	43	70.3	67	84	162	40	65	3	SearchService	http://www.francisshanahan.com/search
2049.5	63	0.4	38	50.7	89	91	2049.4	66	55	4	compoundsearch_Service	http://cheminfo.informatics.indiana.edu/
557	100	4.8	94	11.2	89	58	322.37	5	53	4	SearchDatabaseService	http://www.alcona.org/SearchDatabaseS
85.3	19	5.1	7	90.7	78	79	78.91	2	53	4	AmazonSearchService	http://soap.amazon.com/schemas2/Ama
343.66	88	3	50	46	78	80	226.33	6	53	4	SearchService	http://sirius.bn.pt/sirius/sirius2.exe/Sear

Fig 15:The output from search Web Service

Which shows that there are eleven Web Services for "search" and now it is the role of QoS to select between the different Web Services that have the same functions. Advanced search criteria is applied to the web site ,client can easily enters his/her QoS requirements easily as shown fig.(16):



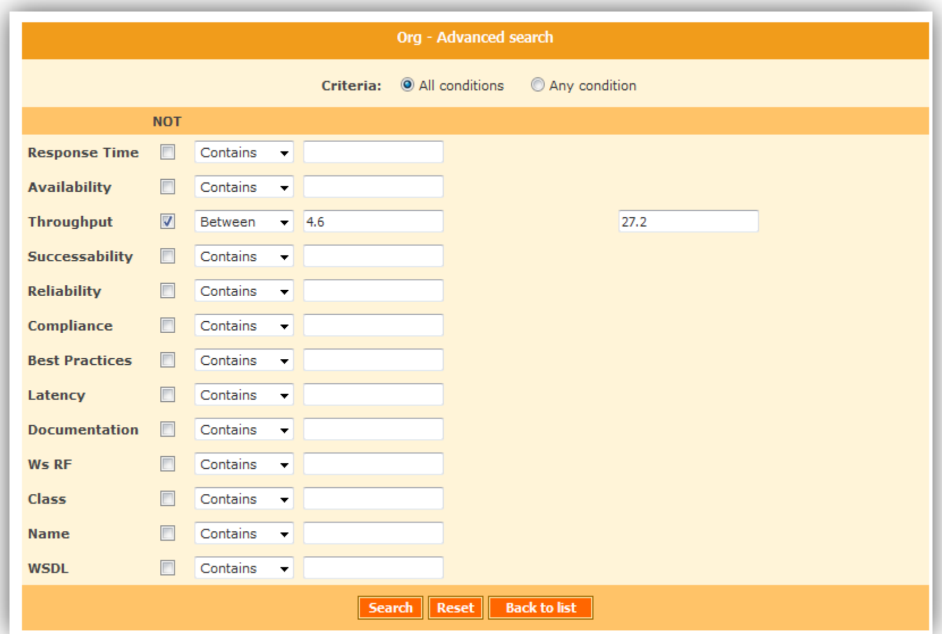
Org - Advanced search

Criteria: ● All conditions ○ Any condition

	NOT		
Response Time	☑	Contains Contains Equals Starts with More than Less than Between Empty	
Availability	☐		
Throughput	☐		
Successability	☐		
Reliability	☐	Contains	
Compliance	☐	Contains	
Best Practices	☐	Contains	
Latency	☐	Contains	
Documentation	☐	Contains	
Ws RF	☐	Contains	
Class	☐	Contains	
Name	☐	Contains	
WSDL	☐	Contains	

Fig 16:The advanced search for QoS

Figure(17) shows the output from the advanced search which client can use after having different services with a similar function and he/she has to select between them due to QoS requirements.Using interface in fig.(17) Web Service consumer could enter restricted values of QoS parameters to get the Web Service that fulfills his/her requirements.



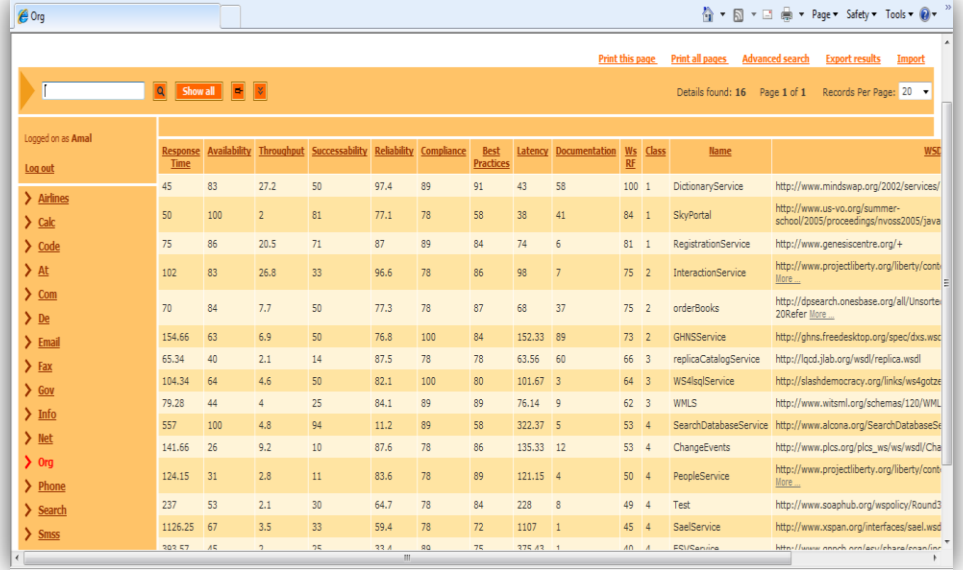
Org - Advanced search

Criteria: ● All conditions ○ Any condition

	NOT			
Response Time	☐	Contains		
Availability	☐	Contains		
Throughput	☑	Between	4.6	27.2
Successability	☐	Contains		
Reliability	☐	Contains		
Compliance	☐	Contains		
Best Practices	☐	Contains		
Latency	☐	Contains		
Documentation	☐	Contains		
Ws RF	☐	Contains		
Class	☐	Contains		
Name	☐	Contains		
WSDL	☐	Contains		

Fig 17:The advanced search after selecting QoS values

And the output will be like this:



Print this page | Print all pages | Advanced search | Export results | Import

Details found: **16** Page **1** of **1** Records Per Page: 20

Logged on as **Amal**

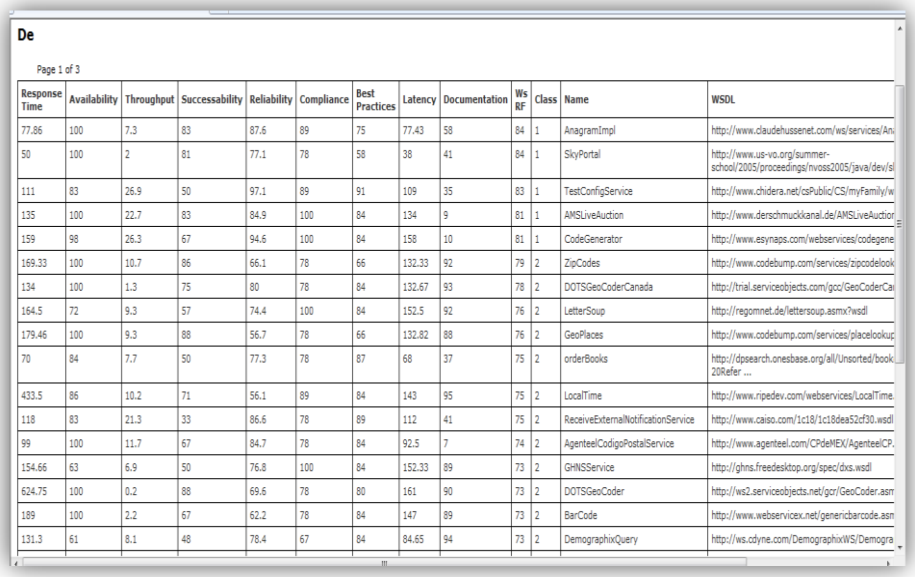
Log out

- Airlines
- Calc
- Code
- At
- Com
- De
- Email
- Fax
- Gov
- Info
- Net
- Org
- Phone
- Search
- Smss

Response Time	Availability	Throughput	Successability	Reliability	Compliance	Best Practices	Latency	Documentation	Ws RF	Class	Name	WSD
45	83	27.2	50	97.4	89	91	43	58	100	1	DictionaryService	http://www.mindswap.org/2002/services/
50	100	2	81	77.1	78	58	38	41	84	1	SkyPortal	http://www.us-vo.org/summer-school/2005/proceedings/nvoss2005/java
75	86	20.5	71	87	89	84	74	6	81	1	RegistrationService	http://www.genesiscentre.org/+
102	83	26.8	33	96.6	78	86	98	7	75	2	InteractionService	http://www.projectliberty.org/liberty/cont More ...
70	84	7.7	50	77.3	78	87	68	37	75	2	orderBooks	http://dpsearch.onesbase.org/all/Unsorte 20Refer More ...
154.66	63	6.9	50	76.8	100	84	152.33	89	73	2	GHNSService	http://ghns.freedesktop.org/spec/dxs.wsd
65.34	40	2.1	14	87.5	78	78	63.56	60	66	3	replicaCatalogService	http://lqcd.jlab.org/wsdl/replica.wsdl
104.34	64	4.6	50	82.1	100	80	101.67	3	64	3	WS4lsqlService	http://slashdemocracy.org/links/ws4gotze
79.28	44	4	25	84.1	89	89	76.14	9	62	3	WMLS	http://www.witsml.org/schemas/120/WML
557	100	4.8	94	11.2	89	58	322.37	5	53	4	SearchDatabaseService	http://www.alcona.org/SearchDatabaseSe
141.66	26	9.2	10	87.6	78	86	135.33	12	53	4	ChangeEvents	http://www.plcs.org/plcs_ws/ws/wsdl/Cha
124.15	31	2.8	11	83.6	78	89	121.15	4	50	4	PeopleService	http://www.projectliberty.org/liberty/cont More ...
237	53	2.1	30	64.7	78	84	228	8	49	4	Test	http://www.soaphub.org/wspolicy/Round3
1126.25	67	3.5	33	59.4	78	72	1107	1	45	4	SaelService	http://www.xspan.org/interfaces/sael.wsd
393.57	45	2	25	33.4	89	75	375.43	1	40	4	ESVService	http://www.gnnch.org/esv/share/soap/inc

Fig 18:The output from the advanced search

Print the page criteria is also applied to the web site as seen in fig.(19)



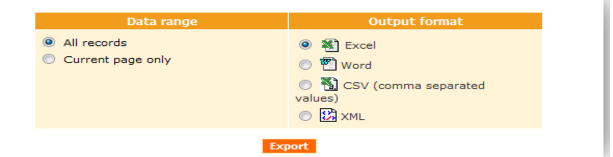
De

Page 1 of 3

Response Time	Availability	Throughput	Successability	Reliability	Compliance	Best Practices	Latency	Documentation	Ws RF	Class	Name	WSDL
77.86	100	7.3	83	87.6	89	75	77.43	58	84	1	AnagramImpl	http://www.claudehussenet.com/ws/services/An
50	100	2	81	77.1	78	58	38	41	84	1	SkyPortal	http://www.us-vo.org/summer-school/2005/proceedings/nvoss2005/java/dev/sl
111	83	26.9	50	97.1	89	91	109	35	83	1	TestConfigService	http://www.chidera.net/csPublic/CS/myFamily/w
135	100	22.7	83	84.9	100	84	134	9	81	1	AMSLiveAuction	http://www.derschmuckkanal.de/AMSLiveAuction
159	98	26.3	67	94.6	100	84	158	10	81	1	CodeGenerator	http://www.esynaps.com/webservices/codegene
169.33	100	10.7	86	66.1	78	66	132.33	92	79	2	ZipCodes	http://www.codebump.com/services/zipcodelook
134	100	1.3	75	80	78	84	132.67	93	78	2	DOTSGeoCoderCanada	http://trial.serviceobjects.com/gcc/GeoCoderCa
164.5	72	9.3	57	74.4	100	84	152.5	92	76	2	LetterSoup	http://regomnet.de/lettersoup.asmx?wsdl
179.46	100	9.3	88	56.7	78	66	132.82	88	76	2	GeoPlaces	http://www.codebump.com/services/placelookup
70	84	7.7	50	77.3	78	87	68	37	75	2	orderBooks	http://dpsearch.onesbase.org/all/Unsorted/book 20Refer ...
433.5	86	10.2	71	56.1	89	84	143	95	75	2	LocalTime	http://www.ripedev.com/webservices/LocalTime.
118	83	21.3	33	86.6	78	89	112	41	75	2	ReceiveExternalNotificationService	http://www.caiso.com/1c18/1c18dea52cf30.wsdl
99	100	11.7	67	84.7	78	84	92.5	7	74	2	AgenteelCodigoPostalService	http://www.agenteel.com/CPdeMEX/AgenteelCP.
154.66	63	6.9	50	76.8	100	84	152.33	89	73	2	GHNSService	http://ghns.freedesktop.org/spec/dxs.wsdl
624.75	100	0.2	88	69.6	78	80	161	90	73	2	DOTSGeoCoder	http://ws2.serviceobjects.net/gcr/GeoCoder.asm
189	100	2.2	67	62.2	78	84	147	89	73	2	BarCode	http://www.webservicex.net/genericbarcode.asm
131.3	61	8.1	48	78.4	67	84	84.65	94	73	2	DemographixQuery	http://ws.cdyne.com/DemographixWS/Demogra

Fig 19:Print the page criteria

Data could be exported fig(20) to other programs like word, excel and other



Data range	Output format
● All records ○ Current page only	● Excel ○ Word ○ CSV (comma separated values) ○ XML

Export

Fig 20:the Export criteria

5. CONCLUSION

From UDDI to Search Engine in the Web Services' Discovery process and merging between them is the future image. Classifying Web Services due to URLs they are published in and grouping them due to similarity in their functions before storing them in WSS could enhance Web Services discovery process .Constructing a web based interface (a client GUI) that could be used by the web services consumer to select between Web Services with the same function with respect to their QoS parameters will facilitate the Web Services' Discovery.

6. FUTURE WORK

After Classifying process a new structure of database depending on the relational entities and building an infrastructure for controlling the storage and retrieval processes will be implemented. Searching for Web Services[20] based on QoS parameters, schema properties, service reputation, trust, and semantic matching will considerably increase the relevancy of finding and selecting appropriate Web services , Some essential QoS parameters were missed from the dataset like cost ,which must be added to it ,studying the ability of frequently updating QoS values of web services must be studied in a future work. at the other side for consumer constructing Open Web Directories contain all published Web Services and their quality of services (QoS) will enhance the WS discovery process, and facilitate it for the consumer to easily fulfill his requirements.

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