Proposed Architecture Diagrams for Analyzing Semantic Web Search Engine for E-Learning Environments

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ABSTRACT

Learners need search and retrieval systems to help them find and analyze E-Learning documents on the web. These systems can be used to support the E-Learning being developed by Developers of e-learning whose knowledge comes from the semantic web.

We have described a proposed crawler-based indexing and retrieval system for the semantic web, i.e., E-Learning documents written in RDF or OWL. The proposed system is analyzed semantic web documents and E-Learning documents. The proposed system has been shown how to adapt E-Learning documents to Semantic Web data

General Terms

Systems Analysis

Keywords

E-Learning- retrieval system- Semantic Web- Search Engine

1. INTRODUCTION

The Semantic Web is an extension of the current Web. It is constructed by linking current Web pages to a structured data set that indicates the semantics of this linked page. A smart agent, who is able to understand this structure data set, will then be able to conduct intelligent actions and make educated decisions on a global scale.

The Semantic Web comprises a layered framework: an XML layer for expressing the web content; a Resource Description Framework (RDF) layer for representing the semantics of the content; an ontology layer for describing the vocabulary of the domain; and a logic layer to enable intelligent reasoning with meaningful data.[1].

E-learning can be defined as the use of search engines as mediator in the process of learning and teaching as cognitive tool to promote higher order thinking skills and to deliver learning materials[2].

E-learning Environments is one of the areas that can benefit from Semantic Web technologies. This technology has enabled the Semantic Web by a group of appropriate factors, which appear to be strong enough to meet the requirements of E-learning a quick, fair, timely and relevant learning[3].

Search Engines have become a crucial part of Educational tools for learners to connect them a vast source of information and enables interactivity with others which requires the expansion of the use of semantic web technologies for educational purposes [4].

2. PROBLEM OF THE RESEARCH

Current web search engines do not work well with Documents of E-learning environments encoded in the semantic web languages Resource Description Framework (RDF) and Ontology Web Language (OWL). These retrieval systems are designed to work with natural languages and expect documents to contain unstructured text composed of words. They do a poor job of tokenizing semantic web documents and do not understand conventions such as those involving XML namespace

Also search engines lack use of modern techniques that help to automatic searching such as Semantic Web technologies and failure to provide correct feedback to the Learner during search process and showing the results related to the search keywords

The problem can be determined in the following main question:-

What stages of Architecture Diagrams for Analyzing Semantic Web search engine for E-Learning Environments?

3. RESEARCH OBJECTIVES

1) The importance of using and employing Semantic Web technologies in e-learning environments systems.
2) Finding instance data. In order to help learners to integrate Semantic Web data with E-Learning environments

4. SEMANTIC WEB (SW)

The SW is defined as A web of data that can be processed directly and indirectly by machines, which takes the apparently infinite amount of data on the World Wide Web and connects this data in relational databases to fulfill the needs of the user by providing the right information. To accomplish this task, SW uses the number of techniques like Resource Description Framework (RDF) , Ontology Web Language (OWL), XML and SPARQL. [5] [6]

E-learning environments can benefit from Semantic Web Technologies where the recent advances in technologies for web-based education provide learners variety of learning content available numerous resources may be used during E-learning , they also offers to learners the possibility of having a wealth of related content delivered to their desktop without explicitly identifying or requesting it and can utilize this rich content to enhance the learning experience, allowing them to deliver engaging and relevant courses.[7]

The Semantic Web proposes that web contents are defined and linked not only for visualization but also to be used by applications. That is why the Semantic Web represents a promising technology to implement e-learning systems. The Semantic Web meets the basic e-learning requirements, namely: speed, just-in -time and pertinent learning. The appropriateness of Semantic Web technologies for developing eLearning systems is also supported by the research work undertaken in the last years from different perspectives. [8]

The Semantic Web is a collection of standards, data structures, and software that make the online experience more detailed. First, language of HTML was developed in a way that people would understand the information rather than giving meaning to the information presented. Next, the languages of XML, RDF and OWL were developed to meet the need of giving meaning to the information and to add structural information for describing all ideas and concepts in the web environment and then relating these to each particular subject area. The Semantic Web standards include the tools of XML, RDF, OWL and URIs. Semantic portals technology is built in a layered manner. It is processed in steps; each step built on top of another is show in figure.1, figure2

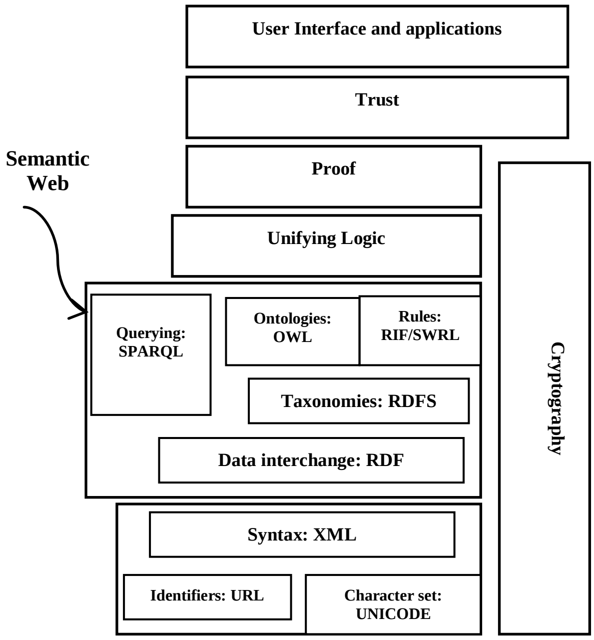

Fig. 1: Semantic Web Architecture [6]

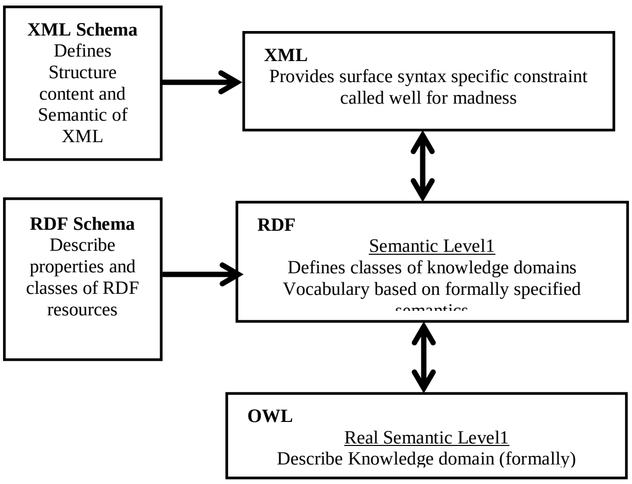

Fig. 2: Semantic Technologies [9]

Extensible Markup Language (XML) defines a set of rules for encoding documents in a practice that is human readable as well as machine readable and is designed only to carry data and not for displaying it. In XML the user gets the privilege to define its own tags because XML does not make use of predefined tags. Generally the user defines a tag with a name which gives idea about the content enclosed within those tags. [10]

The Resource Description Framework (RDF) provides a means for adding semantics to a document. RDF is an infrastructure that enables encoding, exchange and reuse of structured metadata. RDF, in combination with RDFS, offers modeling primitives that can be extended according to the needs at hand. Basic class hierarchies and relations between classes and objects are expressible in RDFS. Some parts of the RDF and RDFS vocabularies are not assigned any formal meaning, and in some cases, notably the reification and container vocabularies, it assigns less meaning than one might expect.

The Simple Protocol (SP) and Resource Description Framework (RDF) Query Language (SPARQL) is a SQL like RDF query language for databases, able to retrieve and manipulate for any data stored in Resource Description Framework format. [6]

Universal Resource Locator (URI) is the main component of semantic web layer, and is used to identify the resource like webpage, country code etc. XML and JAVA uses the Unicode model to represent the fundamental text. [11]

5. RELATIONSHIP BETWEEN SEMANTIC WEB AND E-LEARNING

E-learning facilitated and supported through the use of information and communications technology, But most of the e-learning applications are highly monolithic and lacking flexibility because self-describing materials and intelligent software agents which are the integral part of semantic web, were not considered into the designing. The Semantic Web offers learners the scope of having a wealth of related content delivered to their desktop without explicitly requesting it.

Meaning and associated relationships between content in disparate systems will be continuously evolving. Related content from learning objects to content stored within Virtual Worlds would provide a web of complex learning interactions both relevant and interesting to the learner. E-learning facilitators (teachers or advisors) can utilize this rich content to enhance the learning experience, allowing them to deliver engaging and relevant courses. However e-learning frame work should take the benefits of semantic services, interoperability and ontology. Semantic web could offer huge flexibility in fast, just-in-time learning by the use of collaborative/discussion, annotations tools. [12]

6. EFFECTS OF SEMANTIC WEB ON E-LEARNING

The most successful online educators and their home institutions will want to take advantage of the capabilities of these new semantic web technologies to ensure that their course materials are the most desirable for the largest possible audience. This can be achieved by addressing of the following possibilities [13]:-

1) Personalized study materials – Based on prior knowledge and individual interests, study materials

will be designed specifically to meet each individual's goals and needs. Past experience of a learner's success rate in understanding and applying information from various styles of presentation can influence the ways in which current information is presented .

2) Formation of similar groups – Background knowledge , intellectual learning capacity and current understanding should be utilized to group students so that they can help each other learn in a best possible manner .
3) Background knowledge of the learner – Teachers often struggle with understanding the prior knowledge of all of their students. This technology makes it possible to adjust study materials to accommodate for specific previous learning experiences .
4) Smarter assessment method- Based on present and previous learning experiences if students have shown previous proficiency in a particular area, assessments can account for that and change themselves to match a student's current level of knowledge.. These changes in course organization, resource management, design, and teaching are significant and, from our current technological perspective, may seem overwhelming

7. PROPOSED ARCHITECTURE DIAGRAMS: Analysis

Steps of Semantic Text Based Search Engine Analysis

7.1 Context Diagram ((High Level Overview)

This is diagram System and subsystems thereof as shown in figure 3

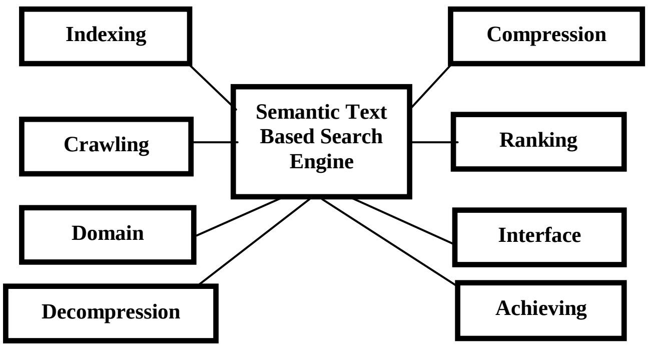

Fig. 3: Context Diagram

7.2 States Diagram

7.2.1 Crawling States

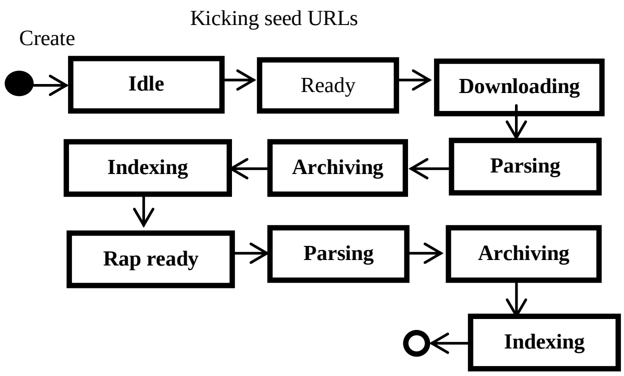

Fig. 4: Crawling States

7.2.2 Query States

Shown in figure 5

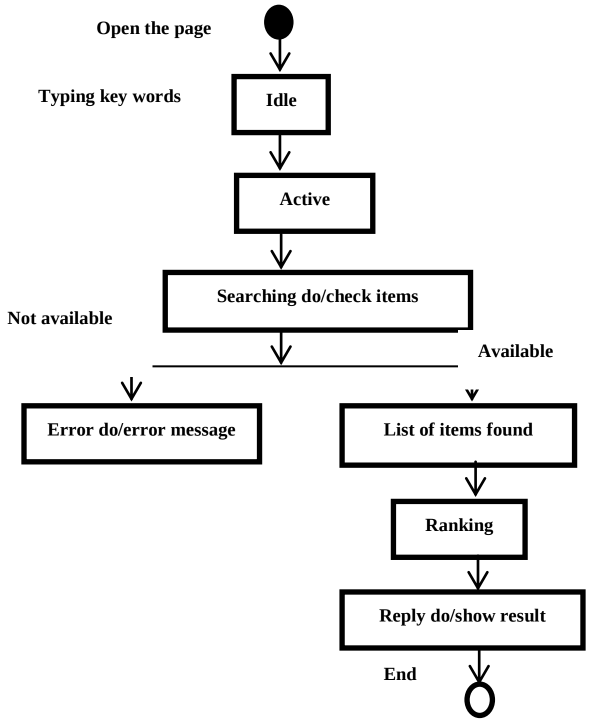

Fig. 5: Query States

7.2.3 System States

Shown in figure 6

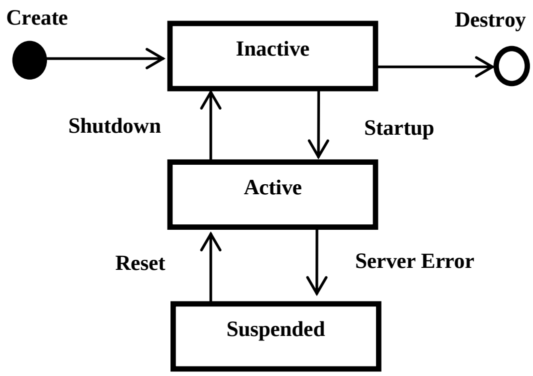

Fig. 6: Query States

7.3 Use Case Diagram

7.3.1 Crawler Use Case

Shown in figure 7

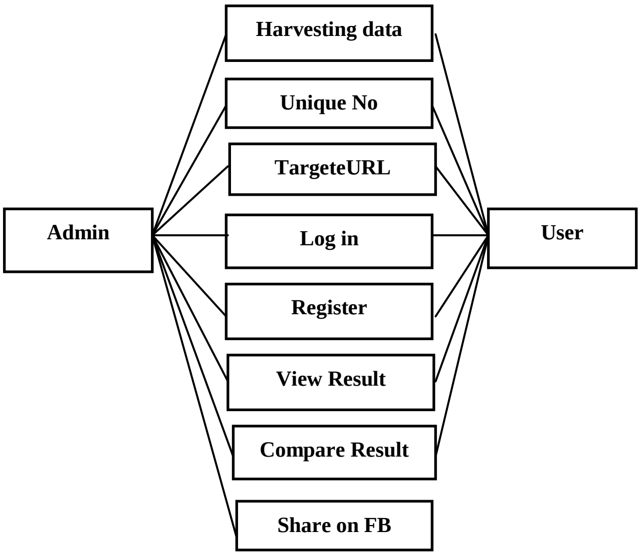

Fig. 7: Crawler Use Case

7.3.2 Search Use Case

Search Use Case Shown in figure 8

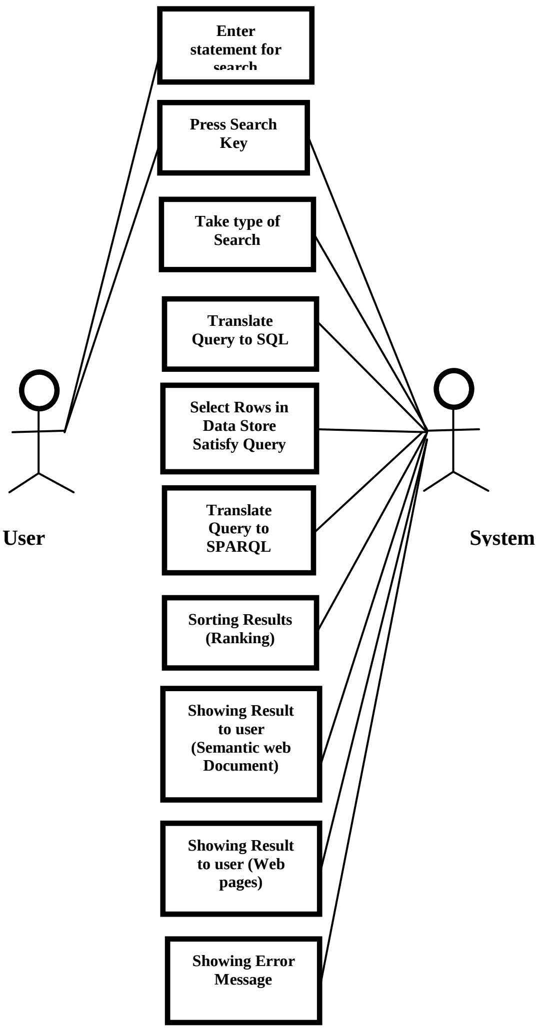

Fig. 8: Search Use Case

7.4 Class Diagram

7.4.1 All Classes

Table 1: All Classes

Crawler	**Context**	**<<Interface>> Control**
Id:int Condition:string="active or idle" lastDateOfWork:datetime lastUpdate:datetime modle:object speed:int	type:string alignment:string size:double height:double decoration:string width:double	
harvest_links($url):string[ ] archive_links($spider_array ,$penetration_level,$temp_link_array): void increaseSpeed($speed): void get_Domain($url):string excluded_link($spider_array,$link):boolen	view():void hidden():void download():void edit():void	**<<Interface>> model**
Page	**MarkupFile**	**RapParser**
Content:object Controls:list Format:object Forward:string backWord:string Header:map Messages:ressourcebundle Model:map Path:string Redirect:string Domain:string dateUpdate:datetime dateAdd:datetime markup:Boolean markUpFileUrl:string	url:string type:string dateUpdate:datetime dateAdd:datetime numberOfResource:double metadatatype:string importanceFactor:double addStatement():string deleteStatement():void updateStatement():void	id:int version:double Parse(markupfile):string[] Kick(newurl,crawler):void fetchInSideMarkupFile():string send(subject,predicate,object):void
addControl(control):void addModel(string,object):void getTemplate():string onSecurityCheck():Boolean onGet():void onPost():void onPost():void	**Rank** name:string sort(string[],importancefactor ,metadata):string[] classification():void filtering:void	**Indexing** type:string="mysql" totalsize:double usedSize:double freeSize:double location:string responseTime:string machineResource:string[] numberOfResource:double Store(subject,predicate,object) Test() Search(string):string[] collectRecords() countRecords():double

7.4.2 Association

Association Shown in figure 9

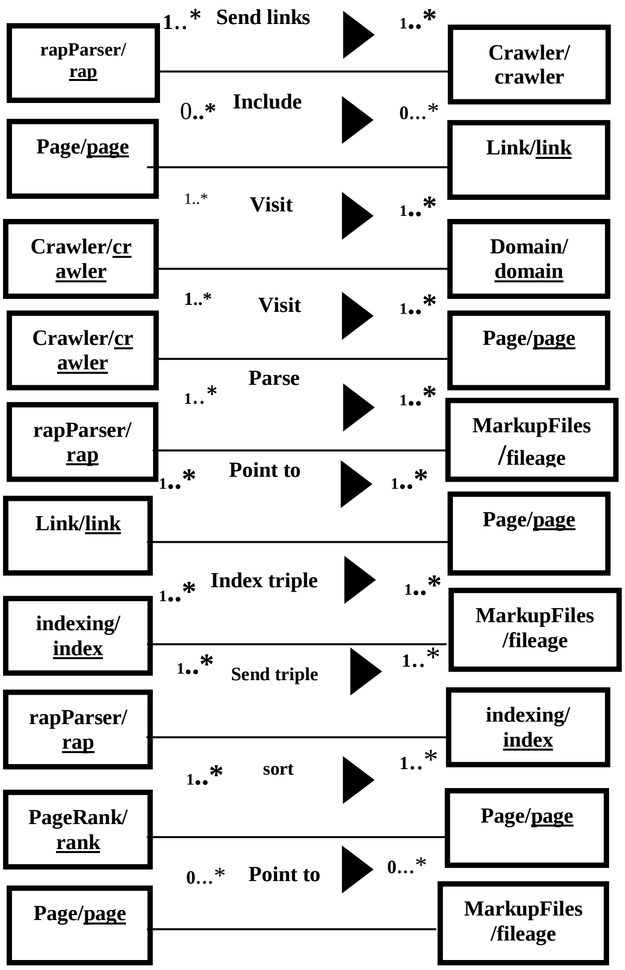

Fig. 9: Association

7.4.3 Inheritance

Inheritance Shown in Table 2

Table 2: Inheritance

Domain
url:string ip:string domainName:string author:string year:string location:string hostname:string language:string language:string numberOfResources:string category:string dateUpdate:datetime dateAdd:datetime maxLevel:int
Add(resource):void Delete(resource):void Update(resource):void View() Query()
Authentication() Publish() countLinks():int checkLinkSecurity():boolean

page
Content:object Controls:list Format:object Forward:string backWord:string header:map messages:resourcebundle model:map path:string redirect:string domain:string dateUpdate:datetime dateAdd:datetime makedUp:Boolean makeUpFileUrl:string
addControl(control):void addModels(string,object):void getTemplete():string onSecurityCheck():Boolean OnGet():void onPost():void onDestroy():void

Link	Markup File
url:string	url:string type:string dateUpdate:datetime dateAdd:datetime numberOfResoyrce:double metadatatype:string importanceFactor:double
getDomain() point(pageid) update(string) check():Boolean page() isSecure():Boolean accessibility():boolean	addStatement():string deleteStatement():void updateStatement():void

7.4.4 Generalizations

Generalizations Shown in figure 10

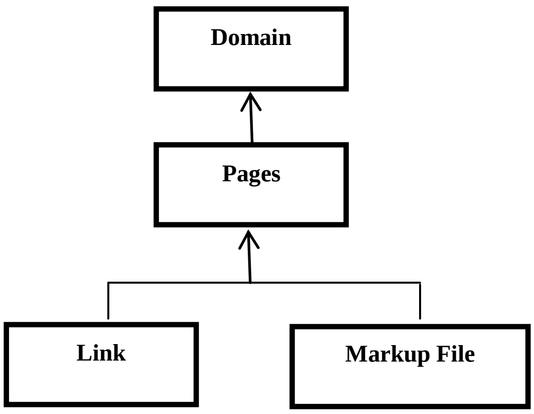

Fig. 10: Generalization

7.4.5 Aggregation
Aggregation Shown in figure 11

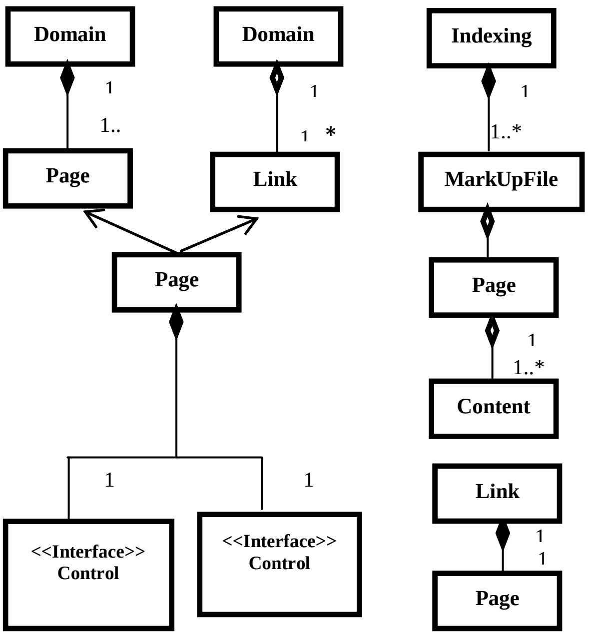

Fig. 11: Aggregation

7.5 Activity Diagram
7.5.1 Crawler Activity Diagram
Crawler Activity Diagram Shown in figure 12

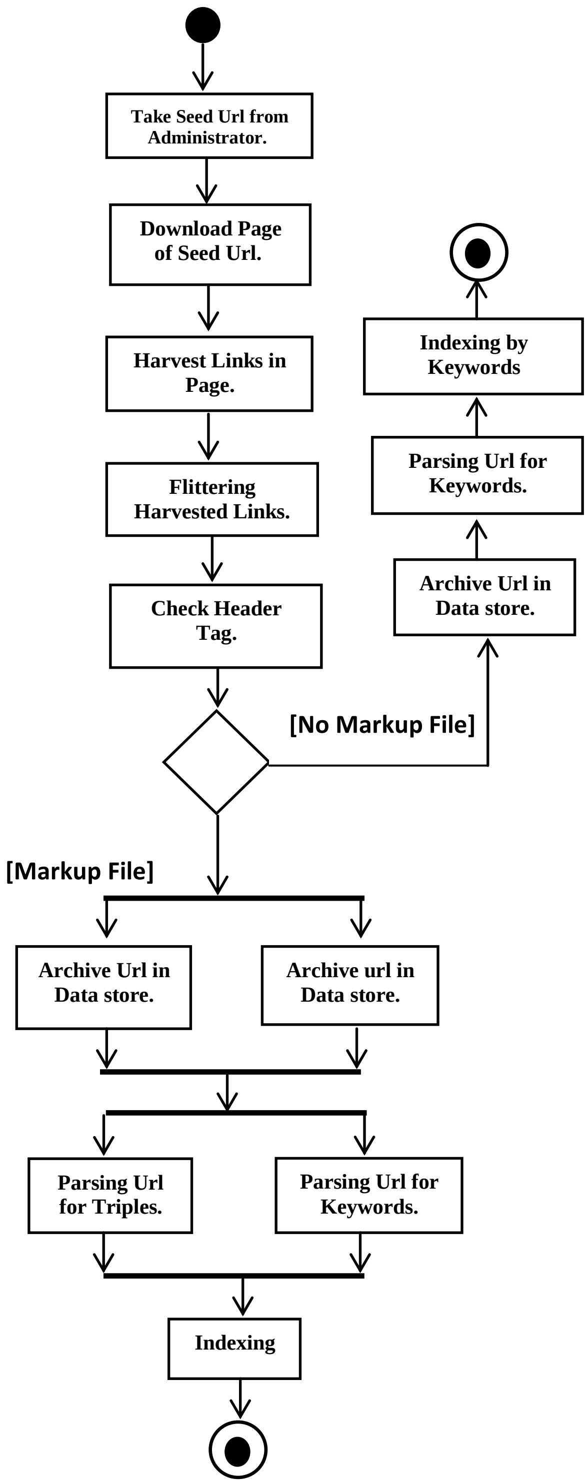

Fig. 12: Crawler Activity Diagram

7.5.2 Search Activity Diagram
Search Activity Diagram Shown in figure 13

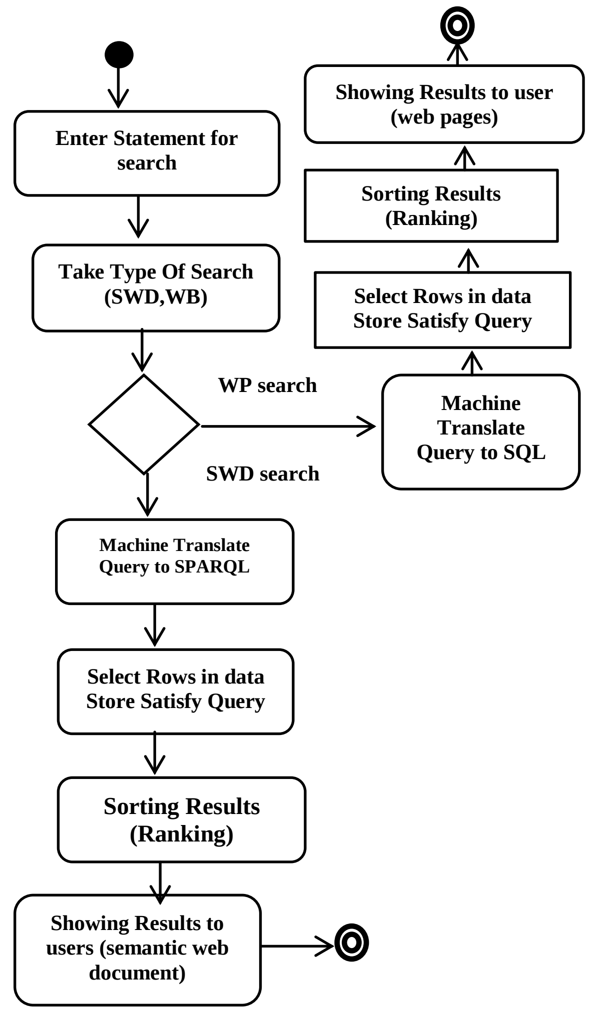

Fig. 13: Search Activity Diagram

8. DESIGN AND INTERFACE OF SEARCH ENGINE

8.1 Home Page
Home page Shown in figure 14

Fig. 14: Home Page

8.2 Admin Authentication
Admin Authentication Shown in Figure 16

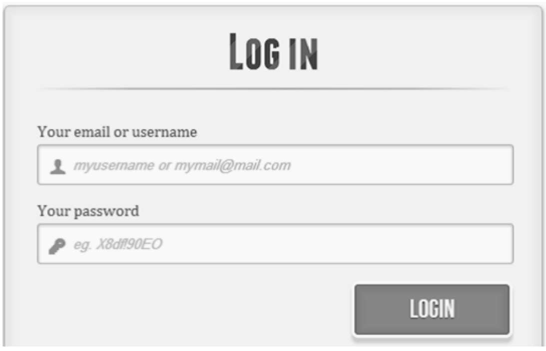

Fig. 15: Authentication

8.3 Manage Account
Manage Account Shown in Figure 16

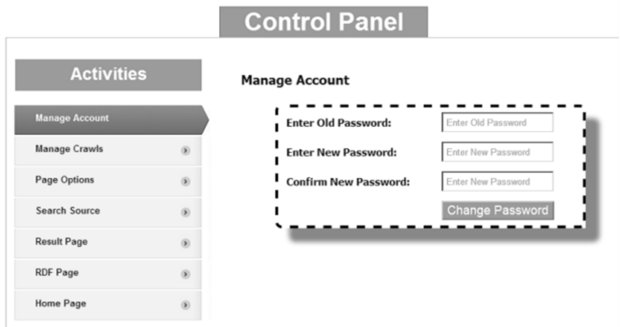

Fig. 16 Manage Account

8.4 Manage Crawler
Manage Crawler Shown in Figure 17

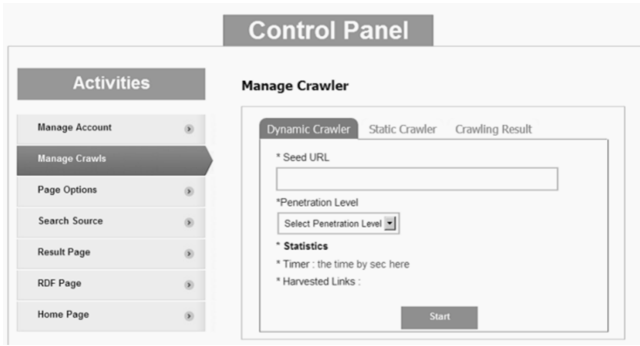

Fig. 17: Manage Crawler

8.5 Suggestion
Suggestion Shown in Figure 18

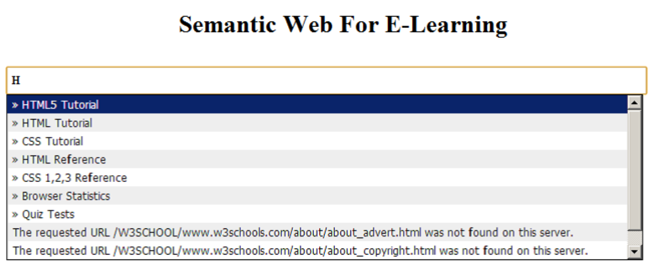

Fig. 18: Suggestion

8.6 Result Page

Result Page Shown in Figure 19

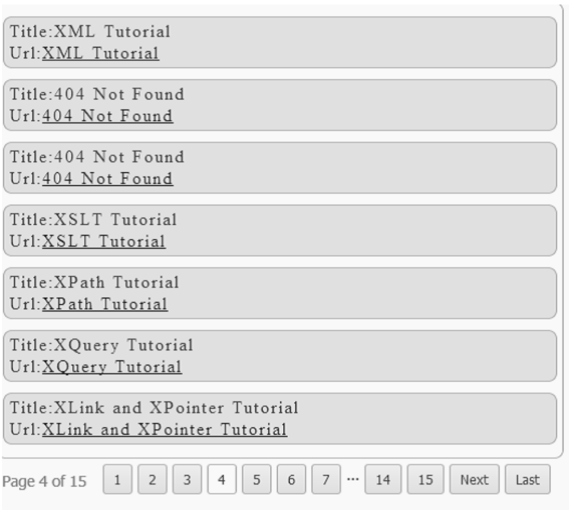

Fig. 19: Result Page

9. CONCLUSION AND FUTURE WORK

Current web search engines do not work well with Documents of E-learning environments encoded in the semantic web languages Resource Description Framework (RDF) and Ontology Web Language (OWL), where these retrieval systems are designed to work with natural languages and expect documents to contain unstructured text composed of words. They do a poor job of tokenizing semantic web documents and do not understand conventions such as those involving XML namespace. Moreover, they do not understand the structural information encoded in the documents and are thus unable to take advantage of it.

The suggest framework of Diagrams is a prototype analyzes semantic web documents and Web Pages of E-Learning Environments through many flowcharts to implement crawler-based indexing and retrieval system for the semantic web.

Finally, In order for the semantic web to be fully integrated with e-learning, it requires the integration of web specialists and e-learning to develop an e-learning strategy based on clear criteria for both electronic courses content and web security, ensuring that logical and high-quality content is provided to both learners and teachers, In addition to the integration of efforts to work on increasing semantic applications within e-learning.

The future work is to conduct an evaluation of the quality of the ranking results provided under this methodology for using within the Semantic Web Search Engine architecture, which upon being developed should allow users to evaluate the results ordering.

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