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Agent for E-Commerce on the Semantic Web

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<Abstract>

The practical use of semantic web must cover all the fields with respect to the current web.

Specially, systematic efforts for electronic commerce framework based on various standards have gone between users concerned in electronic commerce field. Semantic web technology that allows RDF resources description and ontology-based knowledge representation and agents, has been deeply related with electronic commerce framework. This paper examines the role of agents for electronic commerce on the current web and agents for electronic commerce on the semantic web which is observed by the next generation web, and proposes electronic commerce platform that apply semantic web technology.

1. Introduction

As the number of users on the web and the quantity of information increase, user's utilization level and requirement are various and become complicated gradually. According as quantity of information increases as percentage flood of information, the problem that extracts the correct and suitable information efficiently and processes those information occurs seriously. It is more essential that it satisfy the requirement for users effectively[1,2,3].

Current web is only focusing on the displaying method of external form of information rather than user's requirement effectively. In other words, it is to find out the location of information using the web navigation and search engine by the tedious clicks. In most cases, user must navigate, search, click and confirm the information repeatedly to get the one which they want[1,8].

Because much information is wrapped well using hypertext markup language, a person can need and work easily those information. But this web only emphasized not the content of information but the external form of it. In next generation of web, it is

necessary for an automatic program that takes the place of a person. It emphasizes the more contents of information so that "machine" may can read and work in the web instead of a person, and make new information. It is known as an agent[6].

2. Background and related work

2.1 Concept of agent

If we examine a comprehension about agent technology and agent services shortly, characteristics which an agent is different from existing applications, are autonomy that do ones action, elevation ability of intelligence through experience-study, and contact part with human necessary for sociality, etc. If we summarize agent's special quality, they are as follows[1,4,6].

- Autonomous
- Personalized
- Adaptive
- Cooperative
- Reactivity

2.2 Electronic commerce with agent

With the above characteristics, we can vigorously apply the agent technology to the web. But, because comparison shopping agent offers information in very limited ways, agent can't work on those information efficiently. Also, these agent technologies have not been paid attention for the users. That is, because knowledge for goods itself is not supporting users effectively, comparison shopping agent does not receive much attention by actual users.

3. Problems in agent application service

Problems that the above application service agent couldn't be accepted widely, are as follows [3,7,9].

- HCI problem
- Ontology problem
- Heterogeneity of information problem

3.1 HCI(Human-Computer Interaction) problem

Agent must possess intelligence. Speech act which possesses intelligence is what the agent studies. The methods to study are as follows:

- When user takes action, interface agent sees constantly for user shoulder beyond and studies.
- Direct or indirect user feedback.
- Study from examples that user gives.
- Method to ask agent which experiences are helping as is or does the same work to other user.

3.2 Ontology problem

Ontologies have proven to be an essential element in many applications. They are used in agent systems, knowledge management systems, and e-commerce platforms. They can also generate natural language, integrate intelligent information, provide semantic-based access to the Internet, and extract information from texts in addition to being used in many other applications to explicitly declare the knowledge embedded in them. However, not only are ontologies useful for applications in which knowledge plays a key role, but they can also trigger a major change in current Web contents[1,9].

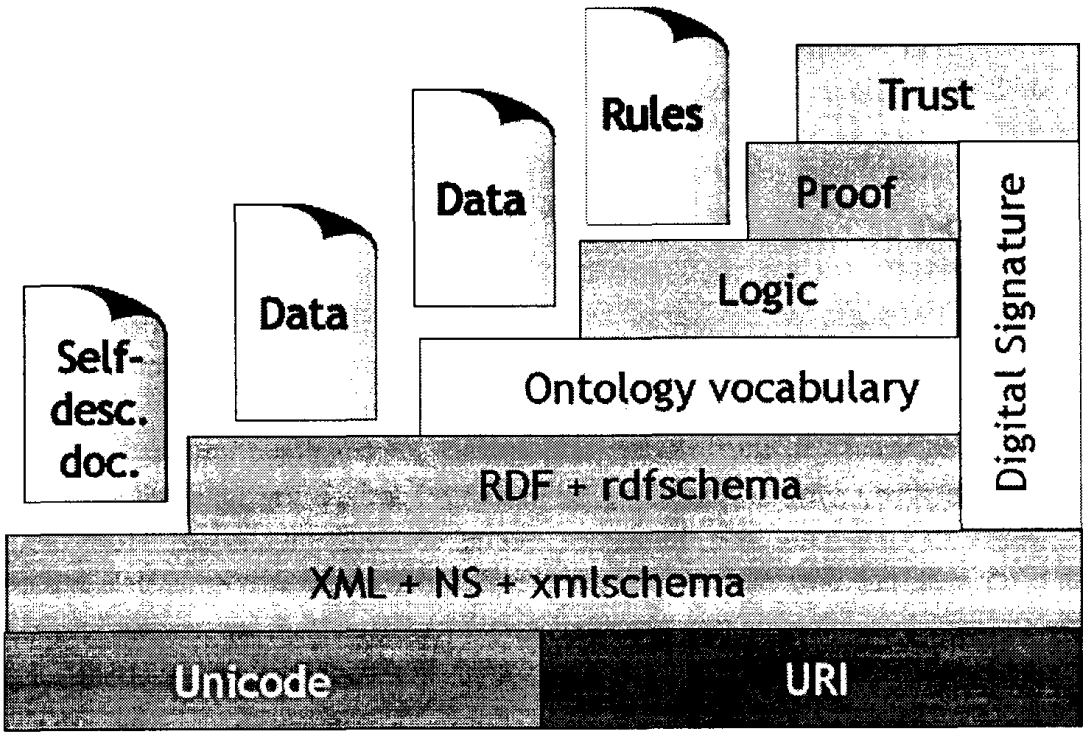
This change is leading to the third generation of the Web known as the Semantic Web which has been defined as the conceptual structuring of the Web in an explicit machine-readable way.

3.3 Heterogeneity of information problem

Because many information resources of current internet are heterogeneous, information abstraction that utilizes agent need rules that display location and structure, format of information that wish to draw about each document. It is usually known that these rules are wrapper. Because of structural inhomogeneity of document form that shows between acquisition and difficulty of expression, and several information of domain knowledge in part research that create wrapper automatically, correct information abstraction did not exist from information source of complicated form. If problems that refer over are solved, we may approach little more on semantic web to be next generation web [5].

4. Semantic web

4.1 Hierarchical structure of semantic web and core technology



<Fig.1> hierarchical structure of semantic web

By core technology that compose semantic web, there are RDF, ontology, and agent [1,2,9].

RDF is a way to express relation for other resources with nature of resources on the web and the ontology is the artifacts for representing the truth or the states of objects by defining objects and their relations. Agent is a computer program that reasons using ontology and executes usefulness autonomously instead of users. These element technologies are based on XML that supports all existent Unicode.

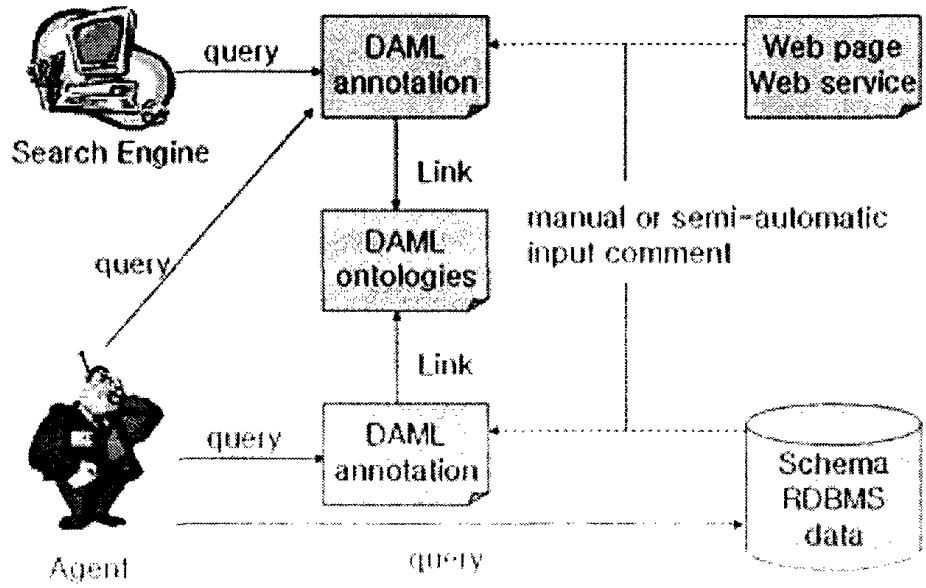
4.2 Service in semantic web

The way that semantic web offers by intermediary method to connect consumer and producer of service is using philosophy of existent document oriented web just as it is. If technologies for semantic web are developed gradually, we may perhaps approach directly with contents to resources of web without using keyword sooner or later. It is DAML(DARPA Agent Markup Language) that is guiding center of this motion[1,2,4,8].

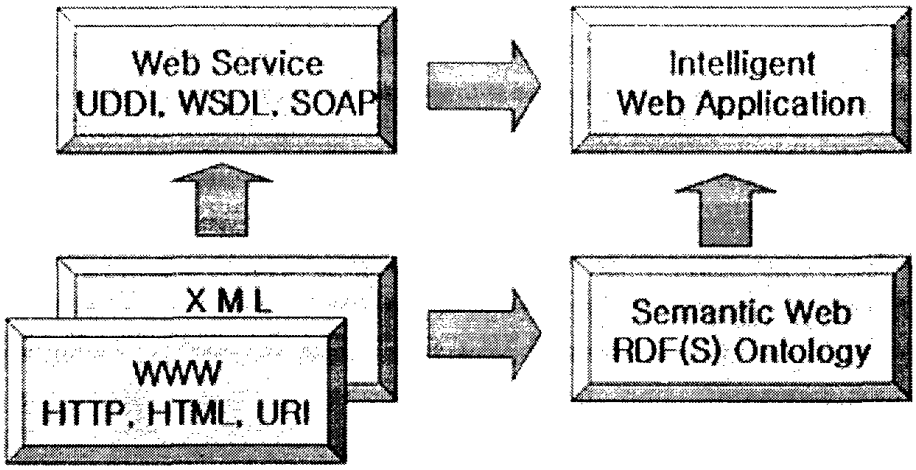
The most important web resource is service. For practical use of web service, software agent needs technology of construable service and means that can approach

here.

The important purpose of DAML makes the framework permit and share these technologies. Fig. 2 marks a scenario that agent supports DAML in semantic web and finds description contents of web service.



<Fig.2> Agent who connects finding description contents of web service



<Fig.3> Integration of present web service and semantic web

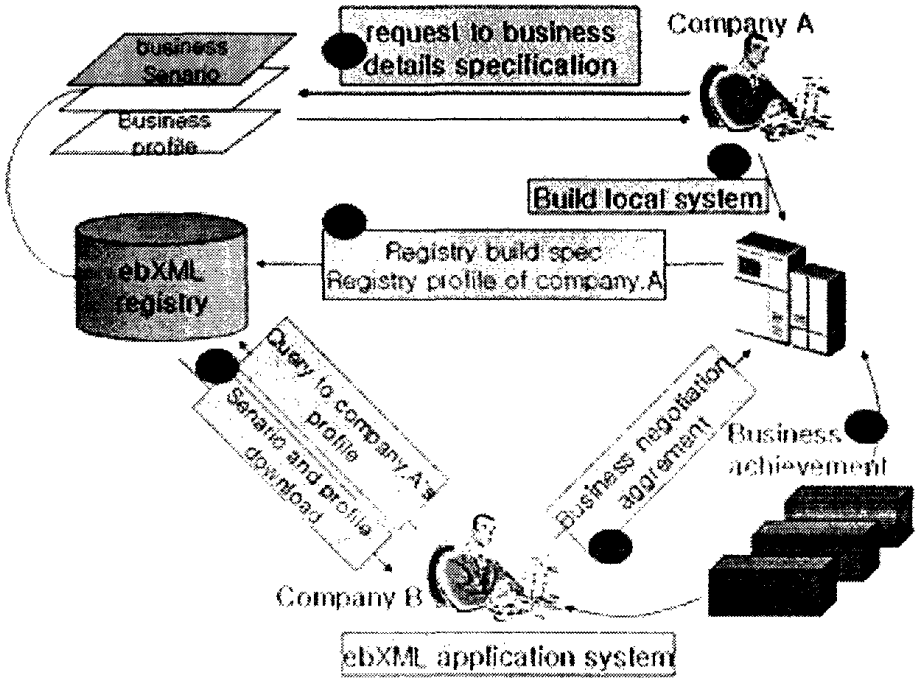
Fig. 3 represents integration of present web service and semantic web. That is, by the integrated semantic web service, it may be a trustable reusable web.

4.3 Electronic commerce applying semantic web technology

Thus, we propose an electronic commerce framework that applies semantic web technology. This framework prescribes functions that permit commercial transactions

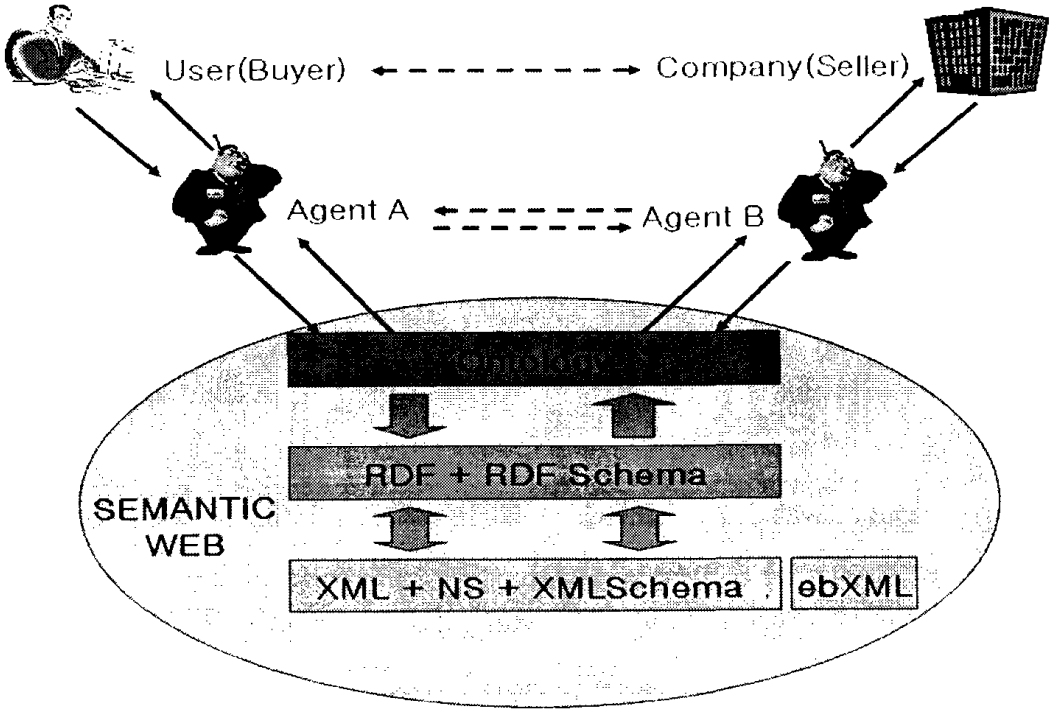
with transaction competition using computer and computer network and many parts of present electronic commerce process, which are using XML.

Consortium of W3C, ebXML, UN/CEFACT and so on or other organization also led development of these electronic commerce framework. Fig. 4 is displaying transactions in the electronic commerce that uses ebXML.



<Fig. 4> Transactions between the two company that use ebXML

The proposed framework in Fig. 5 is displaying an agent's role for electronic commerce in semantic Web. Agent A connects to the semantic web and finds goods on ontology base, and agent A buys goods instead of user's request. That is, agent A finds thing that user wants. Agent uses RDF, RDF Schema, which present information that user wants little more concretely, and help agent to find goods in the web. The company which has goods that user are searching for, assigns the work to agent B. And thus, agent A and agent B communicate, i.e., agent A and agent B take the place of the user and the company each.



<Fig. 5> Agent for Electronic commerce on the semantic web

As see in Fig.5, electronic commerce is an interaction between persons in transactions concerned usually. Persons in transaction can be different by organization or individual or corporation or government etc., but it is essential that persons in transaction concern about the various information that is involved in electronic commerce. Also, because interaction between agents can naturally consist in the automatic agents in semantic web, transaction person's convenience is amplified sharply. Therefore, realization possibility of transaction is augmented together and electronic commerce and E - business may be augmented epochal.

5. Conclusion

This paper examined the role of agent connected with electronic commerce in present web and agents for electronic commerce in semantic web which is observed by next generation web, and proposed electronic commerce platform that apply semantic web technology.

To activate electronic commerce that utilizes an agent in semantic web still more, agent technologies, knowledge representation, and knowledge engineering that is studied in artificial intelligence field, must be studied continuously. Agent technologies, security problems that happen on the commercial transaction should be solved.

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