The Adaptive Authentication in the Collaborative Systems: Applying the Time Authentication into the Certified Originality of Digital Contents

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Abstract

We would like to discuss the Adaptive Collaborative Learning (ACL) on the Cloud Services, which integrates different systems and applications into one comprehensive system. It is expected that time-stamp will be effective in 1. Evidence of the existence, 2. Proof of delivery, 3. Long storage of electrically signed contents. The purpose of our study is to incorporate the authentication roaming technology with existing social infrastructures from the perspective of users instead of that of service providers. The experimental pilot studies conduct on the ACL and provide further observation for applying the ACL. And we discuss the ACL would affect the Learning Fields.

1. Introduction

Currently, there are various services available that utilize the Internet. Additionally, more and more services are newly created to meet users' diverse needs by incorporating existing services and social infrastructures. Nonetheless, many of the existing services are often provided with specifications unique to each service provider, making it difficult or even impossible to integrate them with existing social infrastructures. Therefore, it is essential to develop a scheme that incorporates different services and infrastructures without boundaries of specifications.

Traditionally, many services were provided by locally connecting computers. However, with the rapid and widespread diffusion of the Internet, the demand for integration remotely or globally has increased. Consequently, there emerges an increasing need for the development of technologies that incorporate different systems. However, implementing the same technology used for connecting computers locally into a system connecting computers globally is costly and time consuming.

The social infrastructure is a wide concept, and it includes so many various entities. Today, not only information and communications technologies (ICT) including broadband networks and mobile phones but also the logistics and sales systems are prevailed as social infrastructures. Nonetheless, there are still few models that transcend the difference of business types and industries and connect them altogether to provide a new service.

For the demonstration experiment, we selected the Business to Consumer (B to C) model. The model we built aims to utilize different social infrastructures, and coordinates with other services regardless of their business types and industries to offer convenient and effective services for users. We developed the Adaptive Authentication System that provides user-centric services as well as the authentication system essential for coordinating different systems.

Project Based Learning (PBL) is an innovative instructional strategy that has been widely applied at educational institutions of variety of levels. PBL encourages students to engage in "real world" problem-solving investigations. It also allows students to autonomously conduct their study in a more constructive manner as well as develop the critical thinking skills of causal reasoning. Likewise, current Knowledge Management (KM) theories and practices have in many ways played equally important roles in corporations and educational institutions. KM and education share the same philosophies that play critical roles at many organizational levels that require an efficient understanding of their collective information and knowledge.

In this article, we would like to emphasize the importance of combination of PBL, KM, and Collaborative Learning on the Cloud and the incorporation of technology into education. We also would like to demonstrate how our approach enhances student skills and abilities by introducing case studies conducted at Chuo University in Japan. We describe the mechanism of human intellectual development and knowledge structuralizing process by studying topics in cognitive science as possible aids for new knowledge creation – categorization, metaphor, and metonymy.

In this paper, we introduce the Adaptive Authentication System and discuss its potentials in the new paradigm of the 21st century networked society. It is an innovative information technology system for knowledge creation based on the Cloud Computing and Time Authentication. It is a new system that produces dynamic and valuable interactions among human resources through sharing, interlocking, and collaborating with different types of knowledge.

2. Basic Concept of ACL and XML Web Services

We can envision a future business world where an organization no longer functions on its own but collaborates with a variety of other organizations. In other words, organizations will no longer need to stick to specific data or applications. Rather, they will need to be flexible enough to adopt appropriate objects according to each business model and project. Likewise, in the Ubiquitous Society, continuous innovations are always required, and collaboration and sharing knowledge within and outside of the organization are essential for survival. We can realize this knowledge sharing and management system-Adaptive Collaboration(AC)-by incorporation XML Web Services and iDC.

In terms of applying AC into e-Government and e-Local Governments, it is imperative to build a system as a Social System with the perspectives of users in mind instead of those of the system or service providers. The XML Web Services based e-Government and e-Local Government system will enable AC with utilizing SOAP/XML data sharing, dynamic data linking among governmental bodies, automatic linking and execution between application modules on the Web [8].

The purpose of this study is to confirm the validity of the Web Service we developed. Through the experiment conducted in the B to C environment, we aim to demonstrate the effectiveness of the Web Service which incorporates various social infrastructures being developed by enterprises in the private sector, and to proclaim that this is the new business model requiring less time and cost.

Another purpose of this study is to prove the effectiveness of the new roaming technology which shares authentication results among existing systems, as well as between different certificate authorities (CAs). In our experiment, the server of a convenience store and a mobile phone work together through a one-stop authentication process via the Internet connection. Our authentication roaming technology enables users to enjoy different Internet services by having different certificate authorities share their ID information.

3. Key Technologies on Adaptive Collaboration Systems

3.1. Implications of the study

In the Ubiquitous Society, open networked information systems are vital as they enable people to collaborate with others regardless of location and type of business. In that environment, we will experience shifts in our communications both in terms of quantity and quality. Not only "Human-to-PC," but a new pattern of "PC-to-PC" will expand the dimension of communications. The information we share with others will include not only textual information but a disparate range of data and information and including knowledge that is essential for decision making.

Therefore, the primal benefit of collaboration is the sharing of knowledge, information, and data with others. In order to realize this, there needs to be a space or "ba" where a variety of applications help users to produce new knowledge, information, and data that are appropriately shared and re-used among users. We conducted a demonstration experiment to examine technologies that are essential to build this knowledge sharing environment.

The information and knowledge sharing space has two distinctive attributions – static and dynamic. One is that it statically unifies the management of information and related behaviors, and the other is that it adds actions to make it adaptive to the dynamic operation processes. The stored data are structured for the purpose of re-use; hence it is also the "ba" that encourages knowledge recycling.

Since there are many possible operations imaginable that are suited for the Adaptive Collaboration, its goal is to provide users with a workspace to accomplish their own tasks instead of simply offering functions such as word processing or spreadsheet applications. The workspace may offer email and bulletin board services or document management services. The possibilities are infinite as it is also able to integrate specialized applications for each operation into the user interface.

3.2. Requirement and Purpose of the Study

For successful collaboration, it is essential that data, information, and knowledge are continuously stored and can be shared among many individuals. In order to do so, it is critical not only to build a reliable infrastructure and developed network, but also to consider how the data should flow on the network along with how the data should be applied and utilized. For certain fields, it is strongly preferred that contents still be usable without depending on specific applications or software, or when values are changed 100-200 years from today. That is, data and content need to be constantly viewed, utilized, and processed by many users. Furthermore, the system needs to be flexible enough for the distribution and re-use of data and content as they might be stored at dispersed locations at different times.

Therefore, the essential requirements for AC are the following: 1) users are geographically-dispersed and belong to different organizations, 2) knowledge information is easy to store and retrieve, and long-term information storage needs to be safe and secure, 3) knowledge information needs to be available for high-level statistical processing and analysis, and 4) it operates uninterruptedly, and it is low in cost and highly-reliable.

The purpose of the study is to realize the real-time AC environment through data sharing. For this purpose, we conducted the following experiments: 1) a demonstration experiment on the Storage Management which enables users to share information located in the iDC storage, 2) a demonstration experiment on data management by applying XML Web Services into the real-time collaborative work system through data sharing [13], [19].

3.3. Experimental Methods

For ensuring the durability and universality of data, it is important to standardize a character encoding scheme and data structure as well as a system that reconstructs and personalizes data according to the need of a user. In terms of data structure, it is necessary to standardize data format that is both open and global for the purpose of information transmission and distribution across the world. In terms of personalization, it is indispensable to consider how to systemize knowledge so that a system could tailor and reconfigure data for each user depending on a situation to utilize stored data. Collaboration can be divided into three categories from the perspectives of a long-term use, "ba" on the Internet, and application of the XML Web services technology into digital data: 1) intensive utilization of network infrastructure, 2) network utilization for information and knowledge, and 3) integrated utilization of distributed data in a large area.

3.3.1. Authentication Roaming: When integrating different systems with the Web Service, some systems require authentication of users. Therefore, we implemented the authentication roaming technology which is currently under development by the NiCT. The authentication roaming is the technology that shares the information being authenticated by one Website with other Websites.
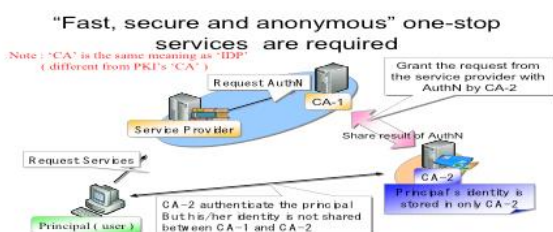

Figure 1. "Fast, secure and anonymous one-stop" services are required [18]

3.3.2. Time Authentication: For security of transactions and procedures taking place on the digital network, evidence of the existence of relevant facts and proof of document delivery are also necessary.

Therefore, along with digital signature, time-stamp is essential to authenticate (guarantee) that a digital document existed at a certain time.

It is expected that time-stamp will be effective in the following functions and services:

- Evidence of the existence

To guarantee that digital contents existed at a certain point of time.

- Proof of delivery

To prove that a transmitted document has reached the recipient, as well as that the recipient have received the document. Also known as "delivery evidence" which is equivalent to delivery certificate used in existing postal service. This contributes to avoiding repudiation threat.

- Long storage of electrically signed documents

To secure authenticity of a digital contents over time by providing existential evidence. The proper time of document verification information is authenticated in order to cope with digital documents exceeding the PKC validity period or key algorithm compromised.

In order to realize this open and flexible data structure and information distribution, it is necessary to conduct demonstration experiments in the following ways:

- Providing and integrating an Active utilization environment and a Static, long term environment on the network, an Adaptive space.

MAN (Metropolitan Area Network + iDC (Internet Data Center)

- Building an environment with the XML Web Services technology that is independent of a system and application.
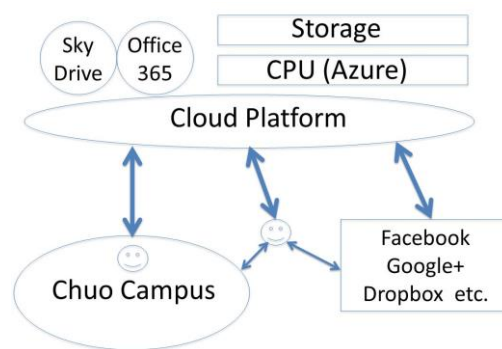

Figure 2. Adaptive Collaborative Learning System1

In order to examine the feasibility of these mentioned above, we conducted the demonstration experiment. First, we examined the possibility of collaboration among corporations, universities, and research institutions by building an information sharing environment prior to applying XML Web Services into the data management system which utilizes the information stored within the iDC. Second, we examined the effectiveness of the data

storage system and evaluated whether the external applications are capable of high-level utilization such as its proficiency of producing knowledge out of information, presenting data effectively, and storing know-how (see Figures 2 and 3).
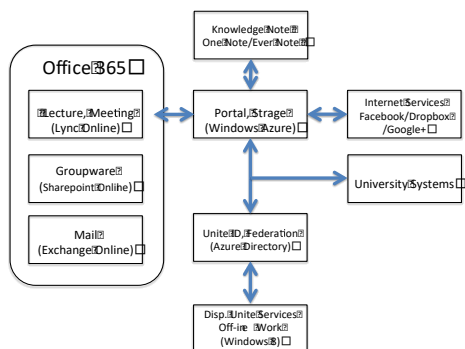

Figure 3. Adaptive Collaborative Learning System 2

3.4. Results of the Experiment

The demonstration experiment proved that real-time discussion with sharing data and resources among the geographically-dispersed teams was possible. Furthermore, we confirmed that it is possible to collaboratively edit and process image data between remote locations using a high-speed network.

For the future agenda, if we plan the long-term use of the system, it is necessary to consider how to manage the Web services and how to develop and spread its computer architecture in corporations. In other words, in order to administer the relationship between different Web services on the multivendor delivery platform, it is necessary to consider how to manage many different components involved in this system such as network operation management, service management, and Web Services management including ERP, CRM, SCM, EAI, and, EC.

Physically storing files and data and keeping them readable for a long time do

not necessarily mean keeping them understandable for a long time. It is critical for a variety of systems to be able to cooperate in order to process diverse data while extensively accessing meaningful data. To facilitate this, it is essential to utilize a unified meta-standard technology such as XML, and to add autological, self-explanative description onto data themselves.

4. Conclusion

The Adaptive Collaborative Learning, which has drawn attention as a new network system that supports the future Ubiquitous Society. The ACL is capable of functioning with the legacy system that has been widely utilized in organizations while integrating a number of different applications seamlessly. With these beneficial features, more innovative business activities can be conducted such as sharing the order information across the organization, improving efficiency in CRM, risk management, delivery management, profit-cost management, cash flow accounting, balance sheet adjustment, account receivable factoring, updating and comparing the transition of sales, and making strategic decision and setting practical business goals.

The ACL is the most versatile system that facilitates to realize the AC in the Ubiquitous Society. For instance, of incorporating the XML Web Services, since it is solely application/system independent, this also assists the flexible coordination with other systems and creates a seamless environment for the user hence it is highly functional as a core system.

We successfully proved the validity and effectiveness of the B to C model and Authentication Roaming Technology through the experiment that connected the multi-copying machine at a Seven-Eleven store and the system of Chuo University via the Internet. Though the incorporation of social infrastructures has been led by the service providers with the advent of the Authentication Roaming Technology, we can finally take a user-centric approach to incorporate social infrastructures and provide safe and convenient services for users. This new approach will enhance the efficiency of various services and allow us to create new business models.

The Ubiquitous Society is a society grounded upon the collaboration around human knowledge within organizations and individuals. The biggest bottleneck of the ACL might not be the difficulties in developing the technologies and infrastructures. Rather, it might be the introverted and closed nature of human beings.

5. References

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