

A Study on Construction Site of Virtual Desktop Infrastructure (VDI) System Model for Cloud Computing BIM Service

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Abstract: Recently BIM technology has been expanded for using in construction project. However its spread has been delayed than the initial expectations, due to the high-cost of BIM infrastructure development, the lack of regulations, the lack of process and so forth. In construction site phase, especially the analysis of current research trend about IT technologies, virtualization and BIM service, data exchange such as drawing, 3D model, object data, properties using cloud computing and virtual server system is defined as a most successful solution. The purpose of this study is enable the cloud computing BIM server to provide several main function such as edit a model, 3D model viewer and checker, mark-up, snapshot in high-performance quality by proper design of VDI system. Concurrent client connection performance is a main technical index of VDI. Through test-bed server client, developed VDI system's multi-connect control will be evaluated. The performance-test result of BIM server VDI will effect to development direction of cloud computing BIM service for commercialization.

Keywords: VDI (Virtual Desktop Infrastructure), Cloud Computing, BIM, BIM Collaboration, Virtualization

I. INTRODUCTION

The introduction of BIM in the construction industry has caused many changes in the existing process that had been used in the construction industry. The communication tools are available to allow designers and constructors to discuss through the introduction of BIM in construction environment. It can reduce the errors and changes associated therewith. Moreover, it supports for construction process and cost reduction while minimizing legal conflicts. Also, it facilitates implementing an entire project successfully.

However, the introduction BIM in construction site causes many problems due to the diversity of construction site environments. The problem types resulting from the introduction process of BIM are as shown in Table I.

Of these problems, this study aims to focus on the systematic shortcomings in terms of BIM based cooperation. As for the previous studies related to the cooperation of BIM, they include "the Difficulty of Utilizing BIM in a Large-Scale Project (Chi Joo Lee 2009), "the Inadequate Configuration of BIM Based Cooperation System (Jung Wook Park 2009), "the Cost of Software/Hardware Burden for Use of BIM (Smart Market Report 2008), just to name a few. Summarizing the aforementioned problems, the current BIM based cooperation system has the important problem resulting from the adequate sharing configuration system. Thus, much emphasis has been given to the importance of study on the relevant areas.

This paper aims to conduct a study as to "A Study on Construction Site of Virtual Desktop Infrastructure (VDI) System Model for Cloud Computing BIM Service" as a

measure to improve the aforementioned problem associated with the cooperation system.

TABLE I

Problems when introducing BIM
Lack of standards and guidelines
Compatibility issues with BIM Software
BIM process fixation problem
BIM tools utilizing professional shortage
The initial cost of risk when introducing BIM

II. THEORETICAL CONSIDERATIONS

A. Virtual Desktop Infrastructure

VDI service generates virtual machine (virtual PC) to be operated in a cloud data server. Moreover, it is a service that allows a user to use desktop environment anytime and anywhere through a device connected to a network all the time whenever a user needs. "To use desktop environment through a device connected to a network all the time" in the field of VDI is called "virtualization".

The VDI (virtual desktop infrastructure) technology was first introduced in 2008. It has been growing rapidly with virtualization technology, cloud computing and increased use of mobile devices in the corporate, financial, telecommunication and public institute computer markets for the several years. Currently, the most prominent VDI companies are Citrix and VMware. Approximately 20 VDI companies, such as Microsoft that owns Windows OS, Quest and Virtual Bridges, have released the relevant products.

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III. THE FACTORS OF ADAPTING TO BIM AREA

A. BIM-based information system building

The introduction of BIM (building information modelling) in the field of construction has caused a significant change in many areas of construction. CAD (computer aided design) work, which implemented BIM, has resulted in reduction of work time, reutilization of workforce, improvement in design quality, economic profit, etc. Also, it has brought about a significant change across the construction industry.

As for small-sized buildings, a variety of variables influence them. Thus, there are many difficulties for the management of construction sites. However, the introduction of BIM in the remodeling sites of small-sized buildings has resulted in an improvement in the quality of buildings. Furthermore, it makes it possible to conduct an economical construction by eliminating those factors of construction delay such as design change and reconstruction.

In particular, designing an atypical structure with the conventional 2D design method has caused a lot of errors on a floor plan. This is because an atypical structure has many areas that cannot be represented with 2D drawing. However, 3D based BIM reviews an inconsistency between the structural members; thus, it has a smaller number of design errors requiring additional review compared to 2D drawing. On this account, it has many improvements in such areas as additional construction cost, responsibility issue for an increased construction cost and maintenance and management issue, which take place in the construction process of an atypical structure.

B. Advantage of BIM virtualization

In general, the reason for introducing VDI is that one can build an environment in which one can process tasks anywhere as though one uses one's own PC.

Users are able to process tasks by accessing personal virtual desktop environment in other departments or sites. They are able to implement smart work by conducting VDI with their PC used for their work.

IV. PROPOSAL OF BIM CLOUD SYSTEM FRAMEWORK

The BIM based information exchange framework, which is proposed in this study, is built on the basis of the system model that is ideal for VDI supporting cloud system and virtual environment simultaneously. Therefore, the proposed BIM service framework model of virtual desktop environment is as follows.

The framework of figure 1 is the type that integrates BIM with the conventional cloud. The purposes thereof are to minimize excessive network construction cost by reflecting the latest cloud technologies and construction tasks and also to improve speed and work efficiency through information exchange primarily based on required data.

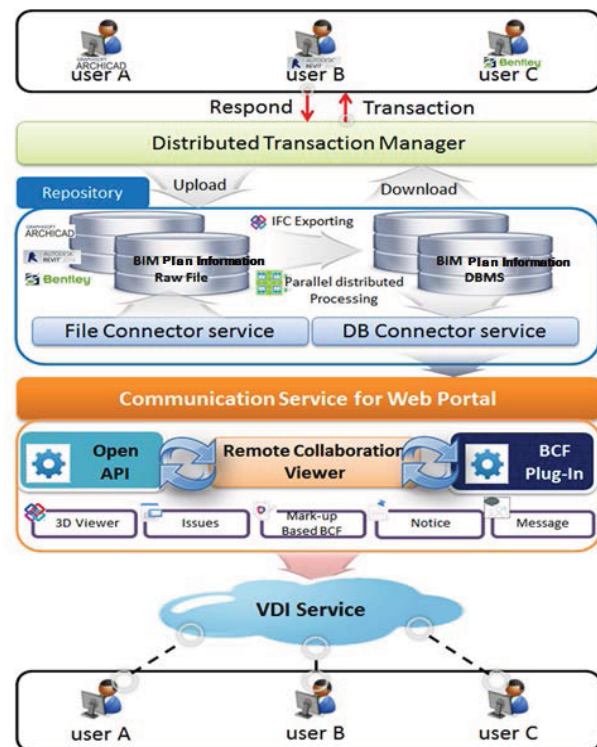


Figure 1 VDI based BIM CLOUD system framework

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