ChOWDER: A VDA-Based Scalable Display System for Displaying High-Resolution Visualization Results

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1 INTRODUCTION

ChOWDER (COoperative Workspace DrivER) [1] is a simple web-based scalable display system that does not require any specialized hardware or software. The main characteristic is the virtual two-dimensional display space, called *VDA* (Virtual Display Area), which enables dynamic and flexible display system configuration. In this poster, we present the use of ChOWDER for displaying high-resolution visualization results generated from large-scale simulations by taking advantage of the technical characteristics of the ChOWDER. The display device only needs a modern web browser, and by displaying the full-screen web browser window, the entire physical display device can be used as the display area of the ChOWDER, and a large pixel space can be configured by arranging multiple display devices. Also the controller for this large pixel space works on the web browser. By using web browsers on multiple PCs at different places, the ChOWDER's large pixel space can be used to display simultaneously the visualization results in a cooperative manner. In the poster, we will present the use of mirroring functionality in order to simultaneously display the visualization results at different sites; the use of "large-scale image segmentation transmission function" to display an already rendered ultra-high-resolution visualization results stored as an image file; and a real-time displaying of the visualization results generated by the HIVE visualization system [3] via ChOWDER's Web-API.

2 CHOWDER, VDA, AND HIVE

VDA is a virtual two-dimensional display space managed by the server, which allows dynamic physical display placement, and represents the main difference to other web-based tiled display systems such as the well-known SAGE2 [2]. This functionality increases the flexibility of the system, and enables the dynamic change of the display configuration. In the case of SAGE2, it becomes necessary to arrange physical displays of the same size and resolution in a grid pattern. This setting information is described in the configuration file referred when the server is started, which means the configuration cannot be changed while the system is running. In addition, when mirroring displays among multiple sites, all participating sites need displays with the same physical configuration.

Figure 1 shows a system diagram of two ChOWDER display systems installed at different sites. By registering the content to be displayed on the ChOWDER display at an arbitrary position on the VDA, the server distributes the content data, the position on the VDA, and the magnification ratio to the physical display to be displayed. As same as the content, the position and magnification of the physical display can also be assigned ad hoc onto the VDA, and the so-called tiled display is assigned in a grid pattern. Furthermore, if the physical displays at different locations are superimposed on the VDA, it works as a display mirroring among multiple sites. This functionality can be used to share the same visualization results at different ChOWDER sites, even using different hardware configurations, for a collaborative analysis and discussion regarding the simulation results. (Fig. 1).

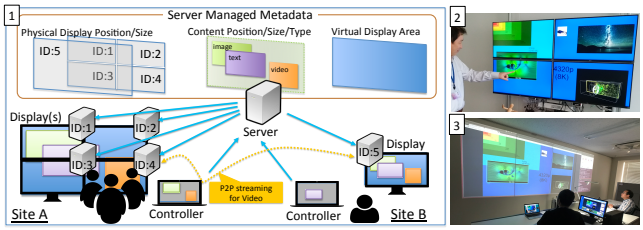

Figure 1: System diagram for a multi-site CHOWDER systems (1), and an example for displaying the same visualization results of CFD simulations at different sites (2) and (3).

The newly implemented "large-scale image segmentation transmission function" enables to display efficiently ultra high-resolution contents, and we observed that it is possible to achieve a speedup near 3 times compared to the SAGE2 when displaying 16K8K resolution image (pre-rendered visualization result of a computational climate simulation) (Right side of the Fig. 2). ChOWDER has also a Web-API that allows content registration from external applications, and we used this API to implement a plugin on the HIVE visualization system [3] for displaying the rendered image directly onto the ChOWDER (Left side of the Fig. 2). It is worth noting that the rendering image size on the HIVE side can be larger than the physical resolution of the local computer's display.

Figure 2: Displaying a visualization result of a CFD simulation directly from the HIVE (Left), and a pre-rendered 16K8K visualization result stored as an image file. (Right)

REFERENCES

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