An Implementation of SAGE Bridge for Sharing Visualized Contents on Multiple Tiled Display Wall Systems

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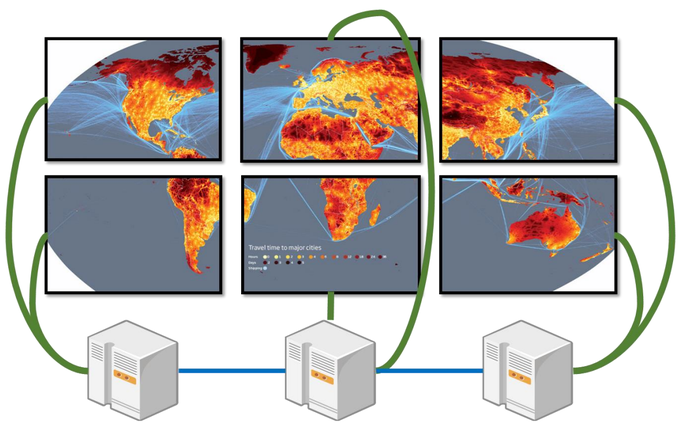
Background

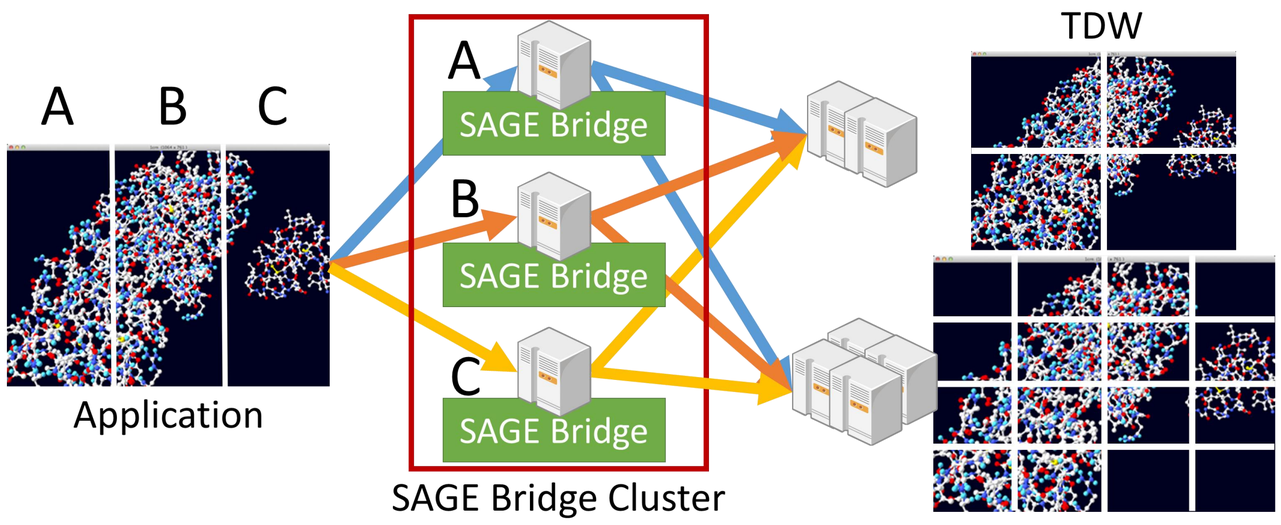
e-Science is receiving a lot of attention as the infrastructure for efficient discussion between researchers in remote sites.
Tiled Display Wall (TDW) is a visualization technique to build a large and high-resolution display monitor. The sharing of visualization contents on multiple TDW systems is needed for e-Science infrastructure because TDW facilitates researchers to understand and analyze visualization contents.

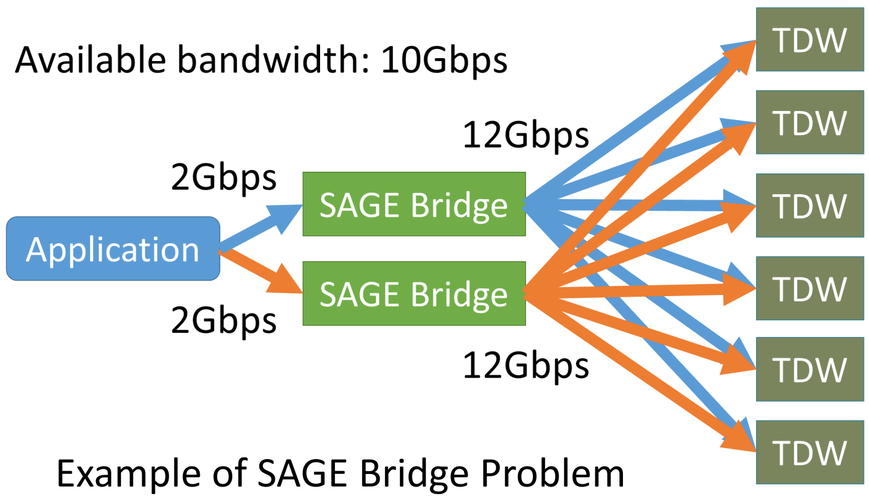


Example of general constitution of TDW

SAGE (Scalable Adaptive Graphics Environment)

SAGE is a middleware designed to control TDW. One of components is **SAGE Bridge** that realizes the share of visualization contents between multiple TDWs. Visualization contents streams from application to each TDW via **SAGE Bridge Cluster** that is constructed by SAGE Bridge. In the cluster, each node has SAGE Bridge process and relays parts of visualization contents.
SAGE Bridge does not have high scalability for the number of TDWs because the architecture of SAGE Bridge Cluster is static.

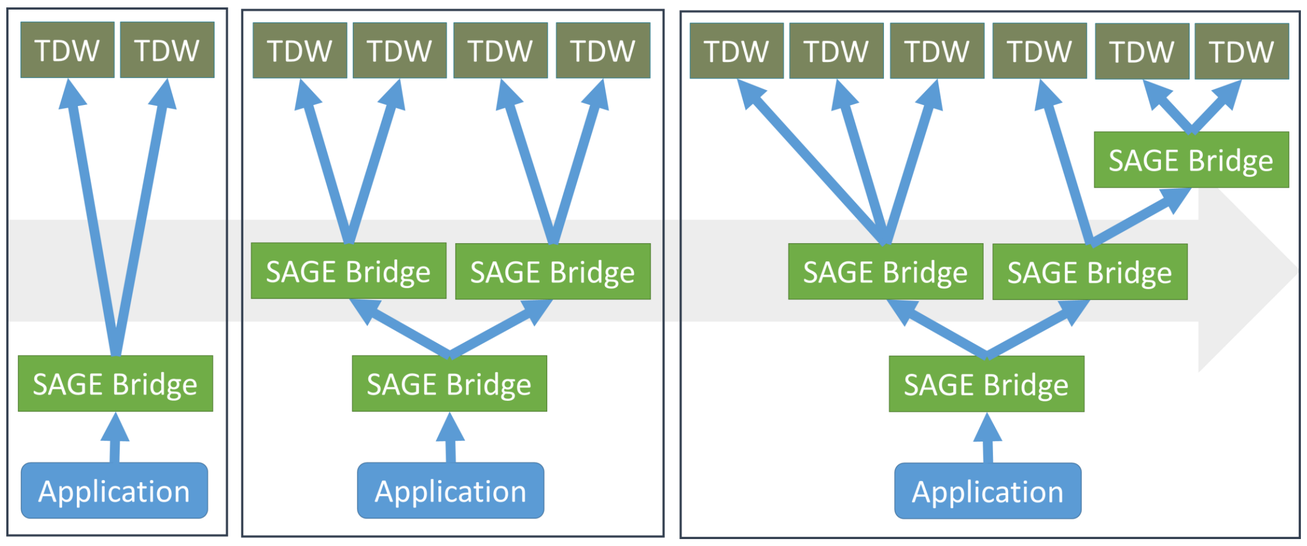




Example of SAGE Bridge Problem

Proposal

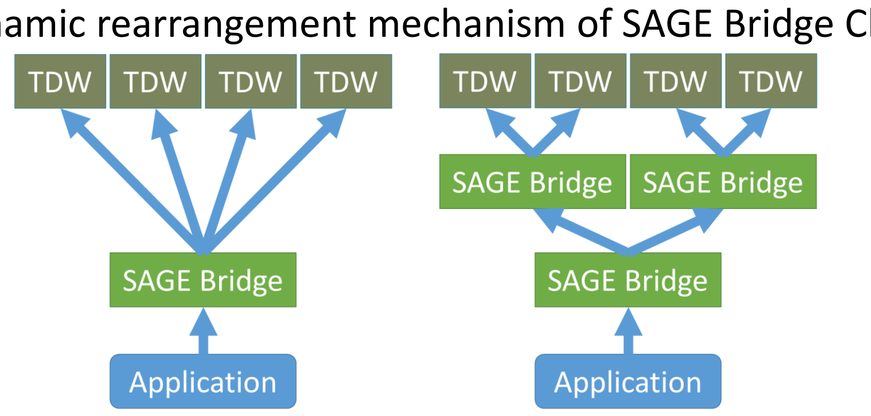
We propose **the dynamic rearrangement mechanism** of SAGE Bridge Cluster. The proposed mechanism enables to add nodes that has SAGE Bridge process to SAGE Bridge Cluster hierarchically for improving scalability. In prototype implementation, the nodes are dynamically added according to binary tree.



The dynamic rearrangement mechanism of SAGE Bridge Cluster

Experiment

In each of proposed method and conventional method, the used bandwidth from nodes that has SAGE Bridge process to TDW systems is measured while the number of destination of TDWs is increased dynamically.
The graph is formed by arranging the average of the bandwidth for each number of destination of TDWs. From the result, though conventional method causes the drop of used bandwidth, proposed method avoids it.



Conventional method Proposal method

Conclusion

Our proposed dynamic rearrangement mechanism of SAGE Bridge was able to improve the scalability for the number of TDWs sharing visualization contents. As future work, there is implementation of the method that dynamically decreases nodes that has SAGE Bridge process for decreasing the number of TDWs and the implementation is required in which nodes are added according to optimal tree for the used bandwidth in each node.

The last state of each SAGE Bridge