Web UI System of TWAREN High-Speed Data Transfer Network

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ABSTRACT

This paper demonstrates the construction of a Web UI system of Data Transfer Network (DTN) on TWAREN. On the hardware aspect, via the TWAREN backbone, we connect 6 access nodes for high-speed data transfer through dedicated broadband lines. On the software aspect, we adopt widely-used tools, such as Fast Data Transfer (FDT) and GridFTP so that effective utilization of network bandwidth can be yielded. We also develop a Web UI system for users instead of Command Line Interface (CLI). Using the proposed system, which can be easily studied and operated, users can share research data more efficiently and effectively.

INTRODUCTION

The Taiwan Advanced Research and Education Network (TWAREN)[1] is a high-speed network backbone for research and education in Taiwan. The infrastructure of TWAREN is shown in Fig. 1. There are 5 core nodes, connected with 100 Gbps optical fibers, while 12 GigaPop nodes, connecting with 50 Gbps optical fibers.

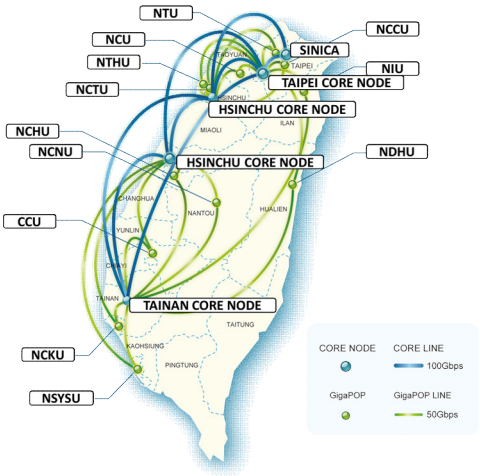

Fig. 1 TWAREN infrastructure

In this paper, we would like to construct a Data Transfer Network using the backbone of TWAREN among 6 selected nodes, such as NTU, NTHU, NCTU, NCKU, Hshinchu core node (HC), and Taichung Core node (TC).

As shown in Fig. 2, The Web UI system is a client-server architecture, including the Linux OS, the Apache server, the MySQL database, and the PHP web pages. In general, PHP web pages use system calls to communicate with the OS the perform related operations. However, since the PHP system call functions cannot control remote functions, we use the SSH functions instead.

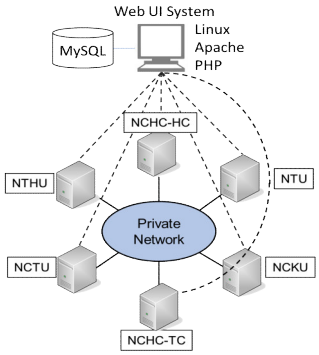

Fig. 2 TWAREN infrastructure

Since both FDT[2] and GridFTP[3] can support SSH connections, it is suitable for the proposed system to integrate these tools for high-speed data transfering.

THE PROPOSED SYSTEM

For the sake of usability, we develop a user-end application for users. Considering the convenience distributing and the updating the application, we develop a Web UI instead of a stand-alone application. The architecture is demonstrated in Fig. 3.

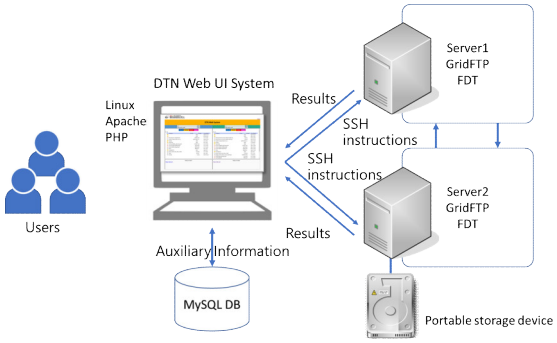

Fig. 3 Web UI DTN system architecture

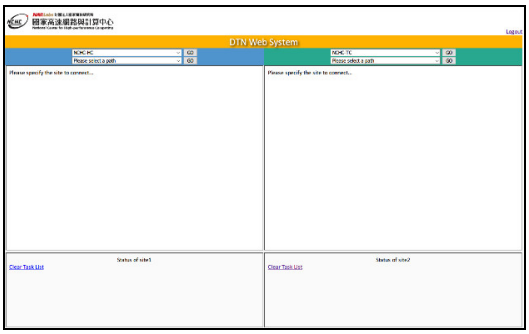

Fig. 4 Main page of the DTN Web-UI system

All users should inquire a user account for logging to the proposed system. After the user successfully login to the system, the system will redirect to the main page, as shown in Fig. 4. This page is divided into left and right portions so that users can connect to two DTN servers simultaneously. For each portion, there are 3 frames, such as server list, file list, and transferring status frames in the top-down direction.

In the file list frame, users can click the drop-down list to select the DTN server to connect, as shown in Fig. 5.

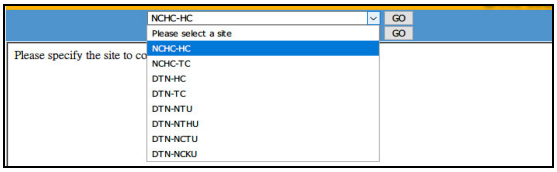

Fig. 5 the DTN server list in Drop-down form

Next, the middle frames are the file lists. As shown in Fig. 6, the left portion shows the file list of the DTN server in Hsinchu, while the right portion shows the file list of the DTN server in Taichung. There are four labels, such as File list, Transfer, Delete, and Logout labels with hyperlinks to perform related functions.

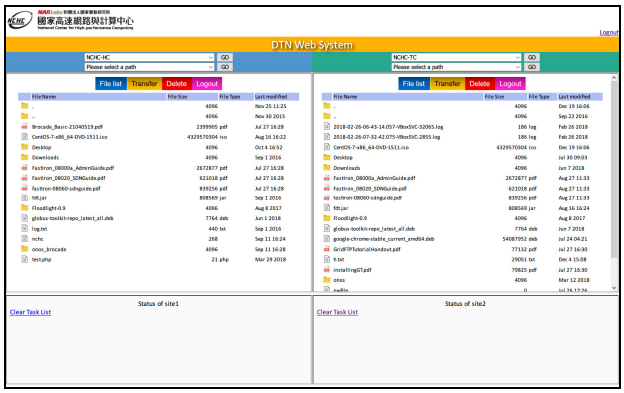

Fig. 6 The snapshot of the Web UI system connected to 2 DTN servers

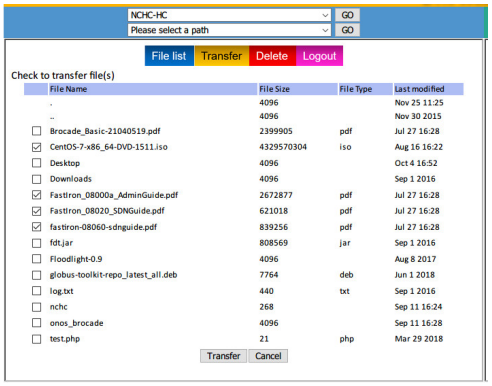

Fig. 7 Transferring Process of multiple items

As shown in Fig.7, after clicking the “Transfer” label, the checkboxes of all items will appear for users to select. When Users check the items, and click the “Transfer” button, the selected items can be transferred to the other server.

As shown in Fig. 8, the transferring status frame demonstrates the transferring percentage of current amount.

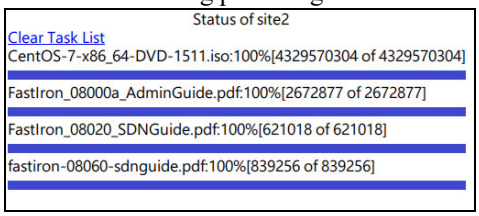

Fig. 8 Status frame

PERFORMANCE TESTING

A. *Paper Identification Line*

In this section, we mainly test the performance between Taichung and HsinChu. This connection is the experimental connection with 1G bandwidth. We transfer the .iso file of CentOS with file size 4,329,570,304 bytes.

```
16/08 17:31:32  Net In: 941.483 Mb/s     Avg: 941.483 Mb/s
16/08 17:31:37  Net In: 928.429 Mb/s     Avg: 934.862 Mb/s
16/08 17:31:42  Net In: 935.409 Mb/s     Avg: 935.044 Mb/s
16/08 17:31:47  Net In: 941.443 Mb/s     Avg: 936.644 Mb/s 59.12% ( 15s )
16/08 17:31:52  Net In: 941.575 Mb/s     Avg: 937.592 Mb/s 72.71% ( 10s )
16/08 17:31:57  Net In: 938.950 Mb/s     Avg: 937.819 Mb/s 86.27% ( 05s )
16/08 17:32:02  Net In: 941.458 Mb/s     Avg: 938.339 Mb/s 99.85% ( 00s )
Aug 16, 2018 5:32:07 PM lia.util.net.copy.transport.ControlChannel run
INFO:  ControlThread for ( 25549753-27e0-44ef-9566-b7946c37f4c9 ) /[redacted] FINISHED
16/08 17:32:07  Net In: 8.023 Mb/s      Avg: 822.052 Mb/s 100.00% ( 00s )
```

Fig. 9 Transferring time using Fast Data Transfer

```
[redacted]@TC-NODE:~$ time globus-url-copy -vb sshftp://[redacted]/
DVD-1511.iso
Source: sshftp://[redacted]/home/[redacted]/
Dest:   file:///home/[redacted]/
  CentOS-7-x86_64-DVD-1511.iso

   4300210176 bytes       107.92 MB/sec avg       112.00 MB/sec inst

real    0m38.257s
user    0m0.436s
sys     0m8.924s
```

Fig. 10 Transferring time using GridFTP

The transferring time for the same file using FDT and GridFTP are shown in Fig. 9 and Fig. 10 respectively. The former takes 35 seconds, while the latter takes 28 seconds. Both tools can yield the transfer rate of about 100MB/s.

CONCLUSIONS

This paper demonstrates the construction of a visualized Web-UI system of the DTN of TWAREN. On the hardware aspect, we connect 6 TWAREN nodes via dedicated Optical Fibers. On the software aspect, we adopt two high-speed transfer tools, such as Fast Data Transfer and Grid FTP, to make the bandwidth usage more effectively. We also demonstrate the developed Web UI system to help users use this system in a user-friendly way. Experiments show that both FDT and Grid FTP perform well when transferring data. In the future, we will continue constructing the whole system, and determine the optimal parameters to yield maximal benefits of the DTN system.

[1] TaiWan Advanced Research and Education Network (TWAREN), http://www.twaren.net/english/

[2] Fast Data Transfer – FDT, http://monalisa.cern.ch/FDT/

[3] GT 6.0 GridFTP, http://toolkit.globus.org/toolkit/docs/latest-stable/gridftp/