

A User-oriented Secure Filesystem on the Grid

Background

Grid is a promising technology to realize large-scale data sharing over the Internet. Currently and however, most of data access services provided by the grid lack user convenience and therefore make it difficult to benefit from the grid.

Purpose

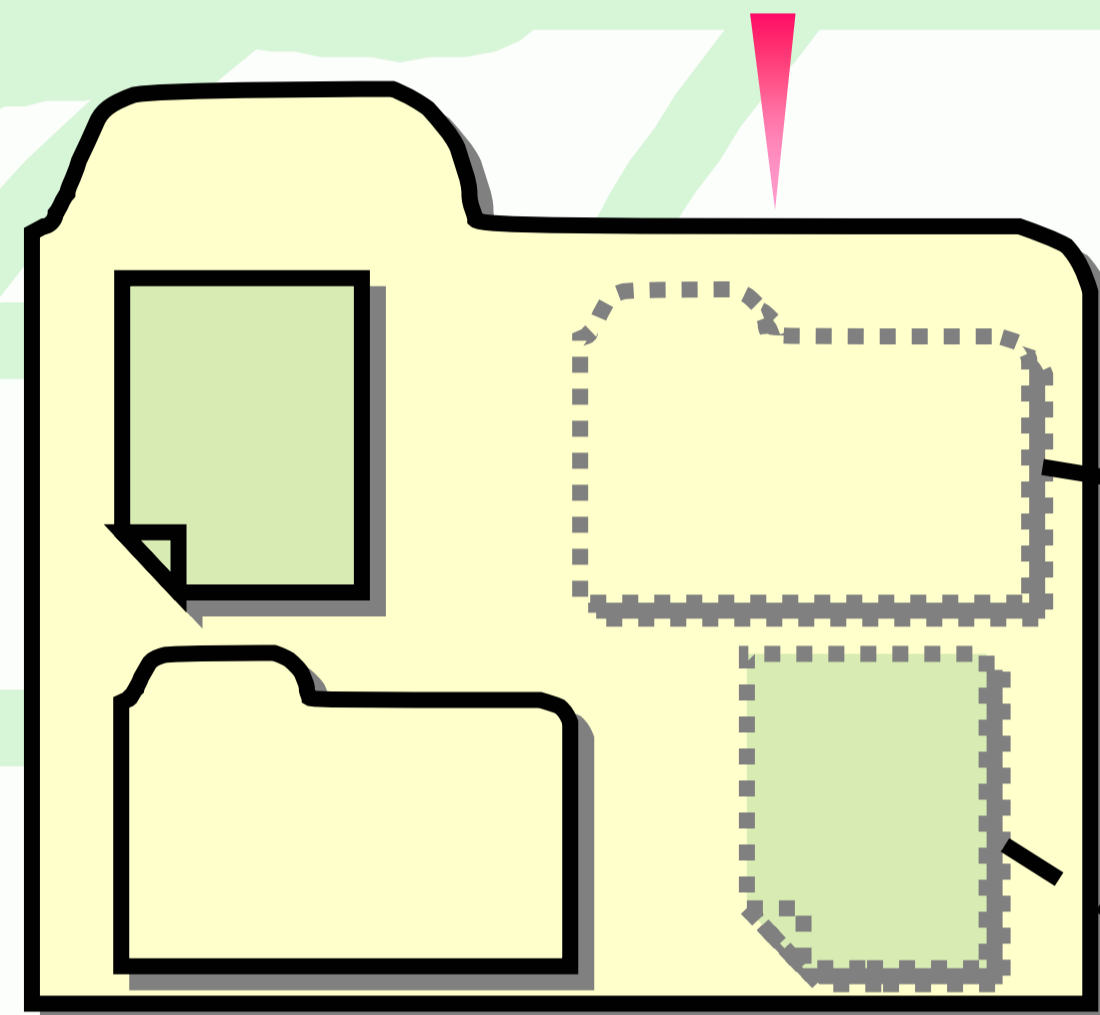
We aim to provide a convenient and secure method of sharing data for the users without detailed knowledge of the grid. As the grid is built via the untrusted public network, encryption and cryptographic authentication are indispensable to secure data.

Flexibility and Privacy

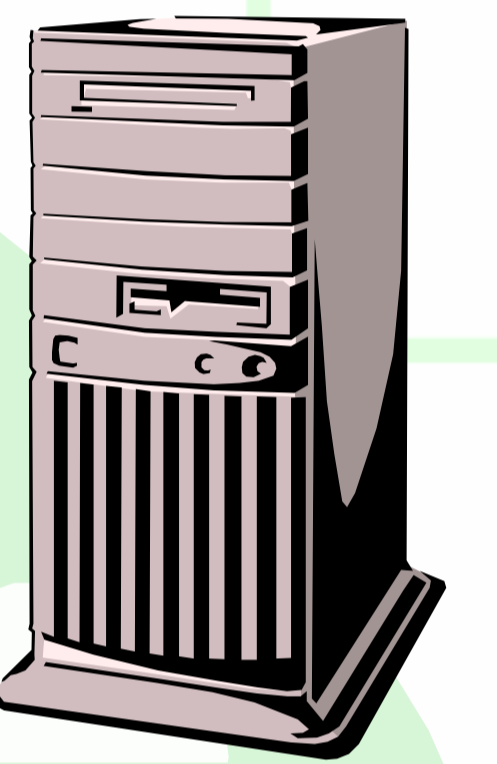
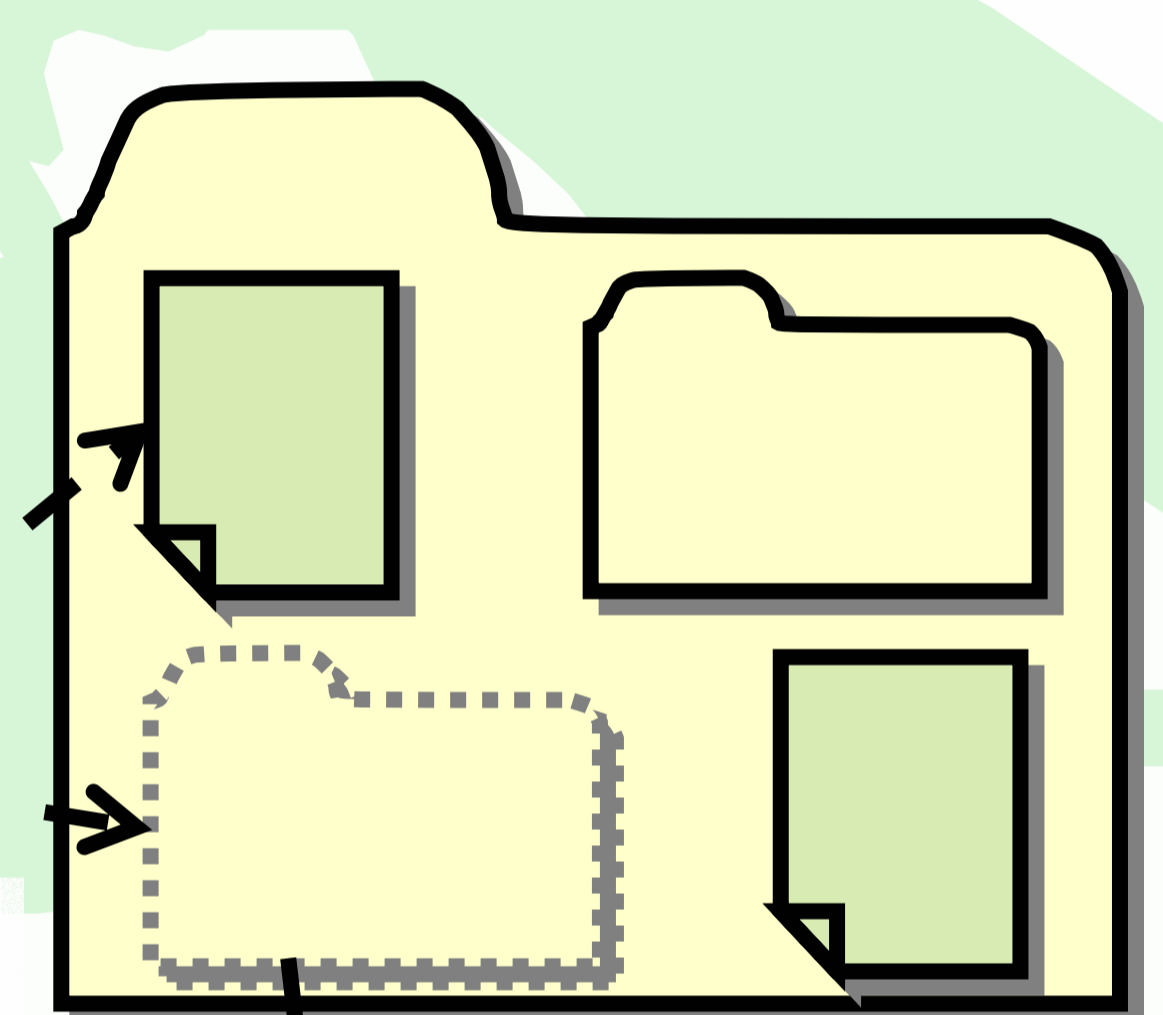
Each user can create an exclusive virtual directory structure without an administrative privilege.

Single disk image

The directory structure in the GSI-SFS looks the same for the user wherever the user works. The path name contains the host name of the GSI-SFS server.



`/sfs/gsi/host.biogrid.jp/home/`



On-demand authentication

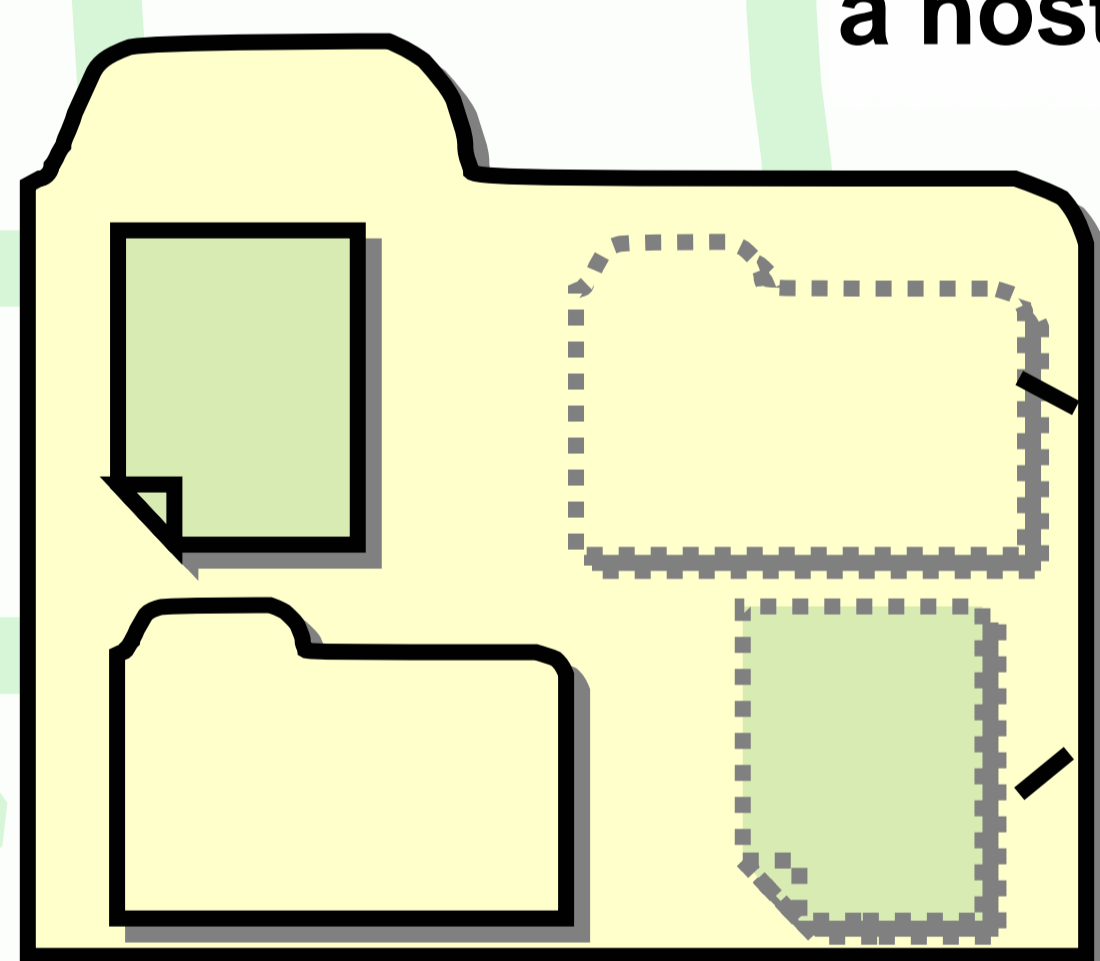
Mutual authentication between a user and a host is performed on demand.

Portability

The GSI-SFS works on many systems supporting NFS functionality.

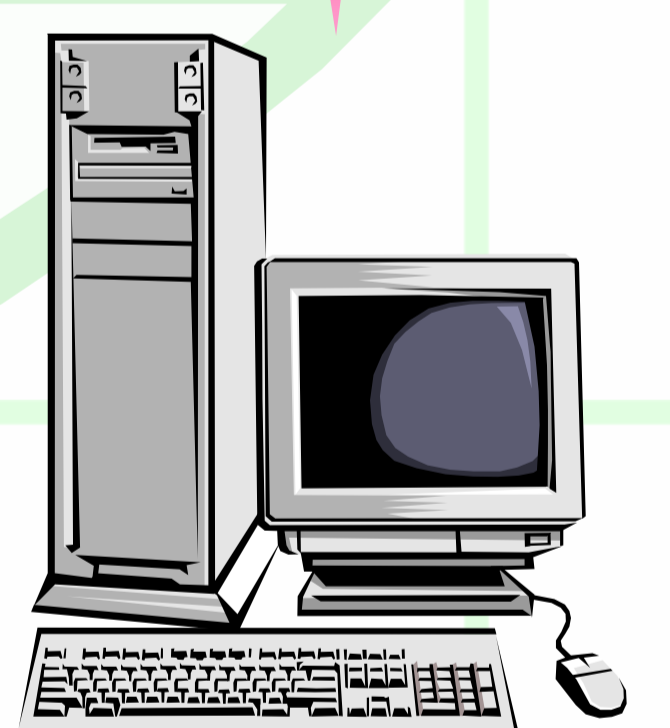
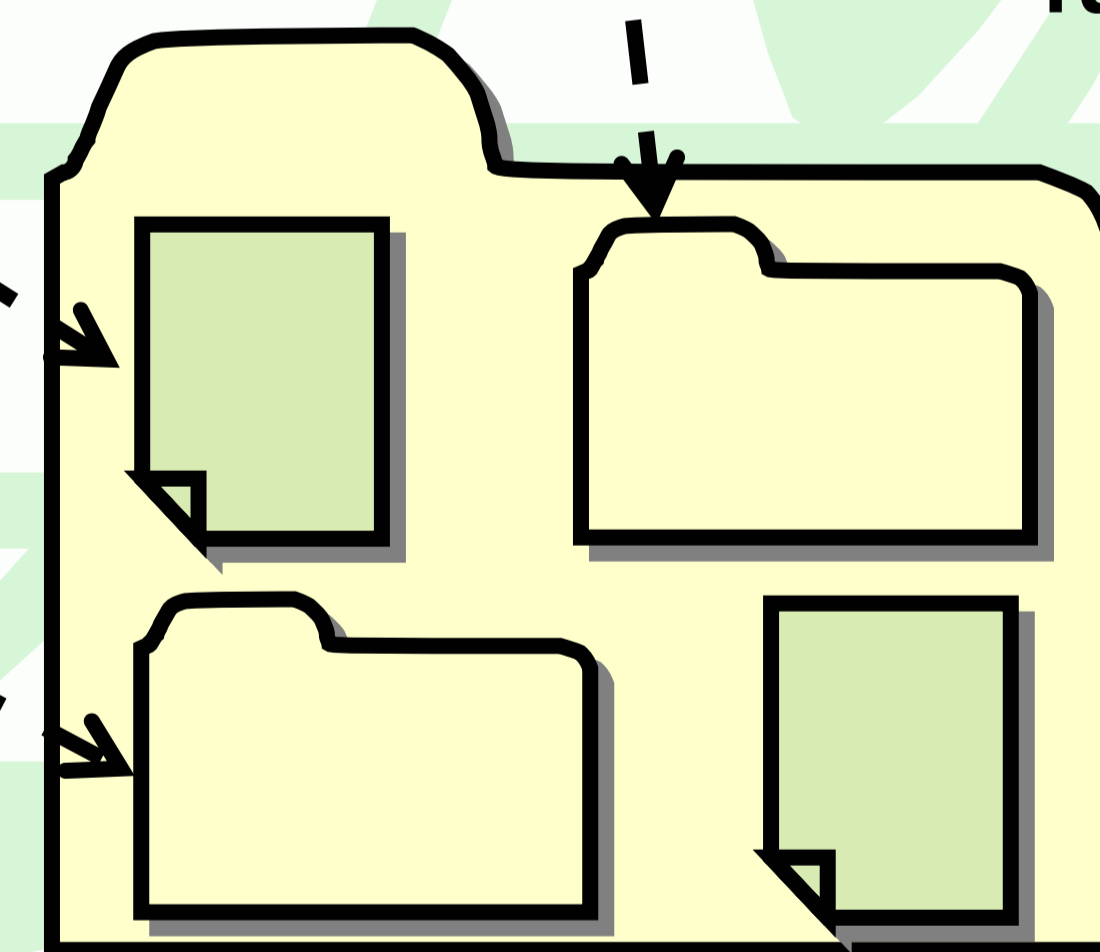
Single sign-on

A user can transparently access to the grid services by activating a proxy with the user's passphrase.



Confidentiality and Integrity

All data in transit on the network are encrypted and authenticated automatically.



Approach

To provide transparent access to the storages on the grid, we propose a new filesystem. We have combined the de facto standard authentication method of the grid (GSI) and the secure network filesystem (SFS) so that the synergy of the two technologies is produced.

Achievement

We have developed a new filesystem, **GSI-SFS**. It allows users to access transparently and securely to the storages distributed across the grid. We expect the GSI-SFS enables global-scale data sharing and enhances interorganizational collaboration.

Acknowledgements

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Researchers

Shingo Takeda <stakeda@ais.cmc.osaka-u.ac.jp>
Susumu Date <date@ais.cmc.osaka-u.ac.jp>
Shinji Shimojo <shimojo@cmc.osaka-u.ac.jp>
Osaka University, Japan

Supporters



bioGrid

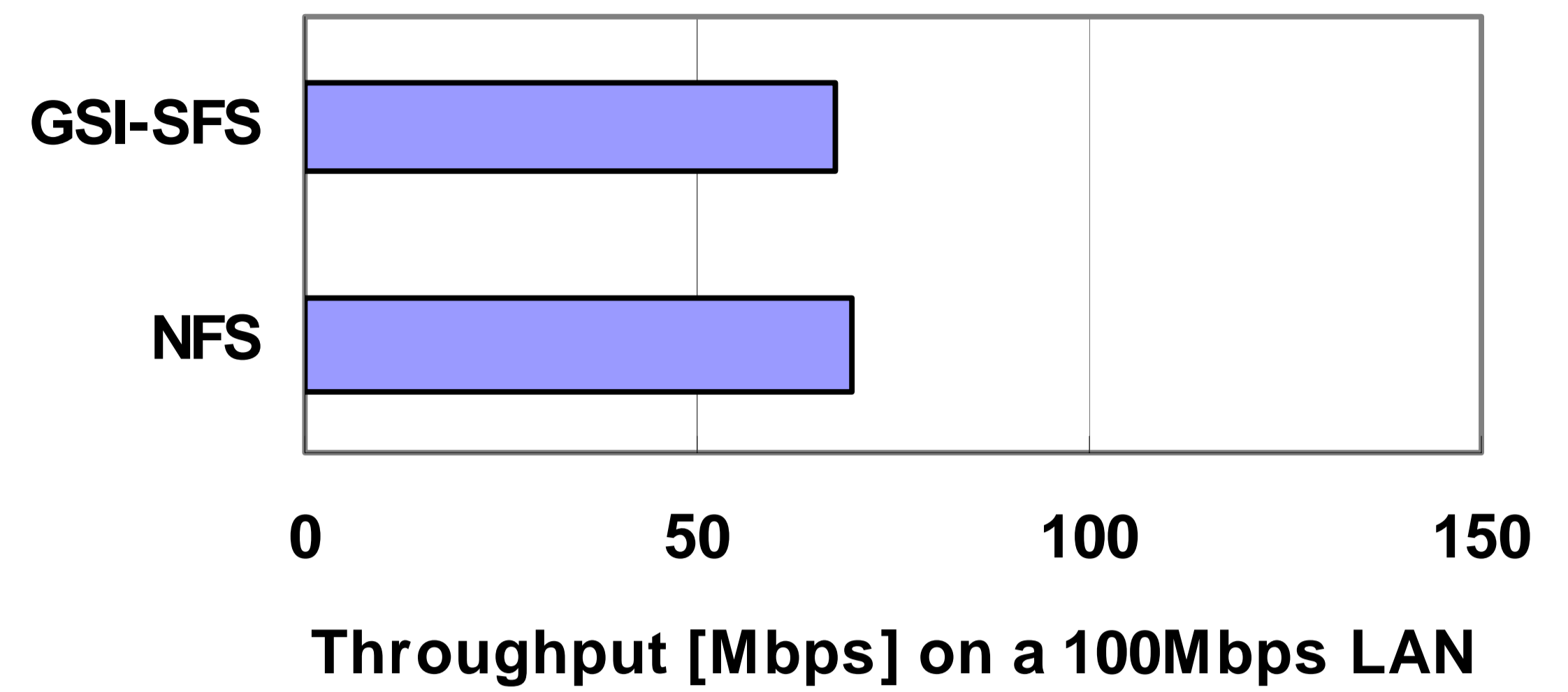
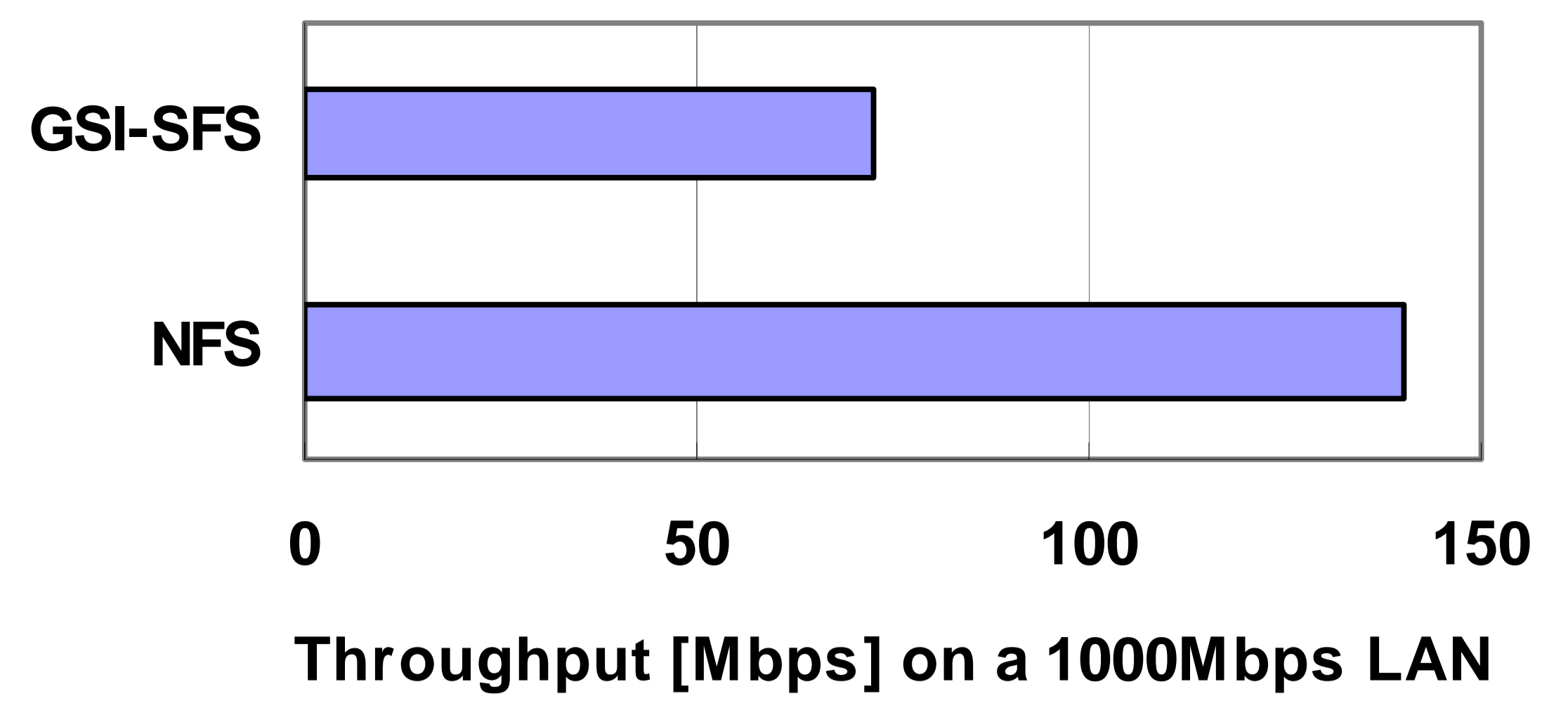
<http://www.biogrid.jp/>

Why user-oriented?

GSI-SFS is developed to improve user convenience.

Each user can create an exclusive virtual directory structure without an administrative privilege of the client host.

GSI-SFS performs mutual authentication between a user and a host, not a host and a host like NFS.



How secure?

GSI-SFS utilizes widely used algorithms for encryption and authentication. The Grid Security Infrastructure (GSI) authenticates mutually by RSA key pairs. SFS also authenticates mutually by RSA key pairs, and encrypts the data in transit on the network by ARC4. These have enough strength for most of users.

It isn't slow?

GSI-SFS encrypts and authenticates the data for security. That incurs overhead and decreases throughput. However, as the charts show, that is not a serious problem on the relatively slow network such as 100BASE-TX. GSI-SFS is designed to be used over the untrusted and slow network, the Internet, so we consider security is more important than throughput.

How can I try?

GSI-SFS will be distributed soon at our web-site (<http://www.biogrid.jp/>) with an installation note.

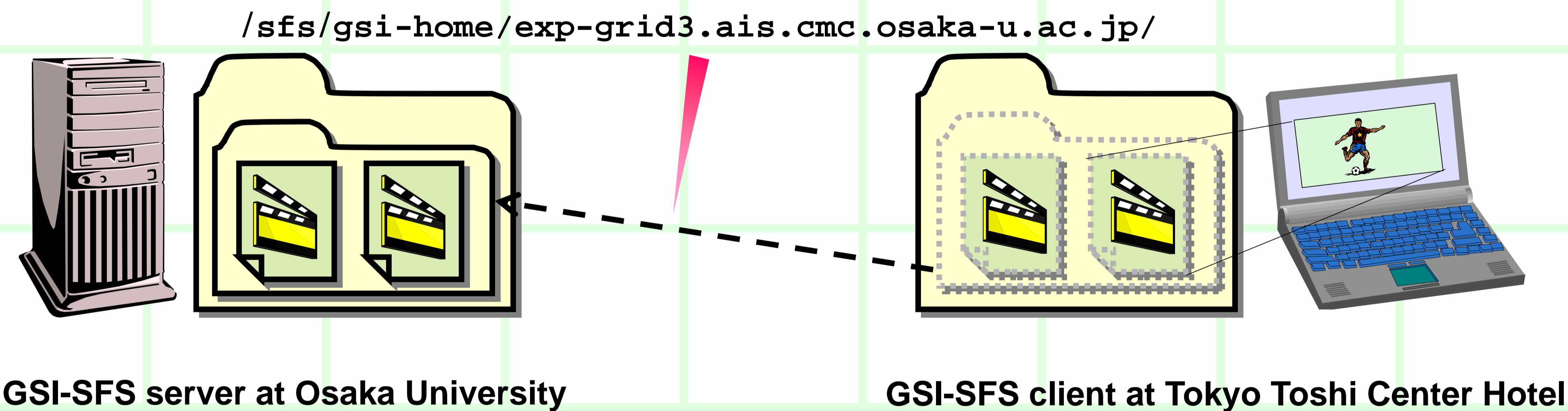
GSI-SFS requires two building block technologies:

Grid Security Infrastructure of Globus Toolkit (<http://www.globus.org/>)

Self-certifying File System (<http://www.fs.net/>)

Please visit our web-site for more information.

The demonstration



Movie Player

No special movie player program is needed to play a movie file on the grid. Users can access the file with a conventional UNIX path.

Structure of GSI-SFS

