

BNLBox

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70 YEARS OF
DISCOVERY

A CENTURY OF SERVICE



Cloud storage

- Commercial providers (\$/GB/month, \$ per access, \$ for the data rate, etc....)
 - DropBox
 - MS OneDrive/Azure Cloud storage
 - Google Drive/Cloud Storage
 - Box
 - Amazon S3/Glacier
 - Etc...
- Software (must provide own hardware)
 - **Owncloud** (BNLBox)
 - Nextcloud
 - Seafile
 - Pydio
 - Etc...



Google Drive

Reason for Cloud Storage

- Ease of use
 - Easy Web access.
 - Ssh keys and/or x509 certs are too difficult for the most of users.
 - Automatic transfers of data to the storage
 - Don't have resources or man power to monitor the data transfer.
- Availability of clients
 - Many of them offer clients in various OSs.
 - Many users and experiments use different OSs.

Features of BNLBox



Username

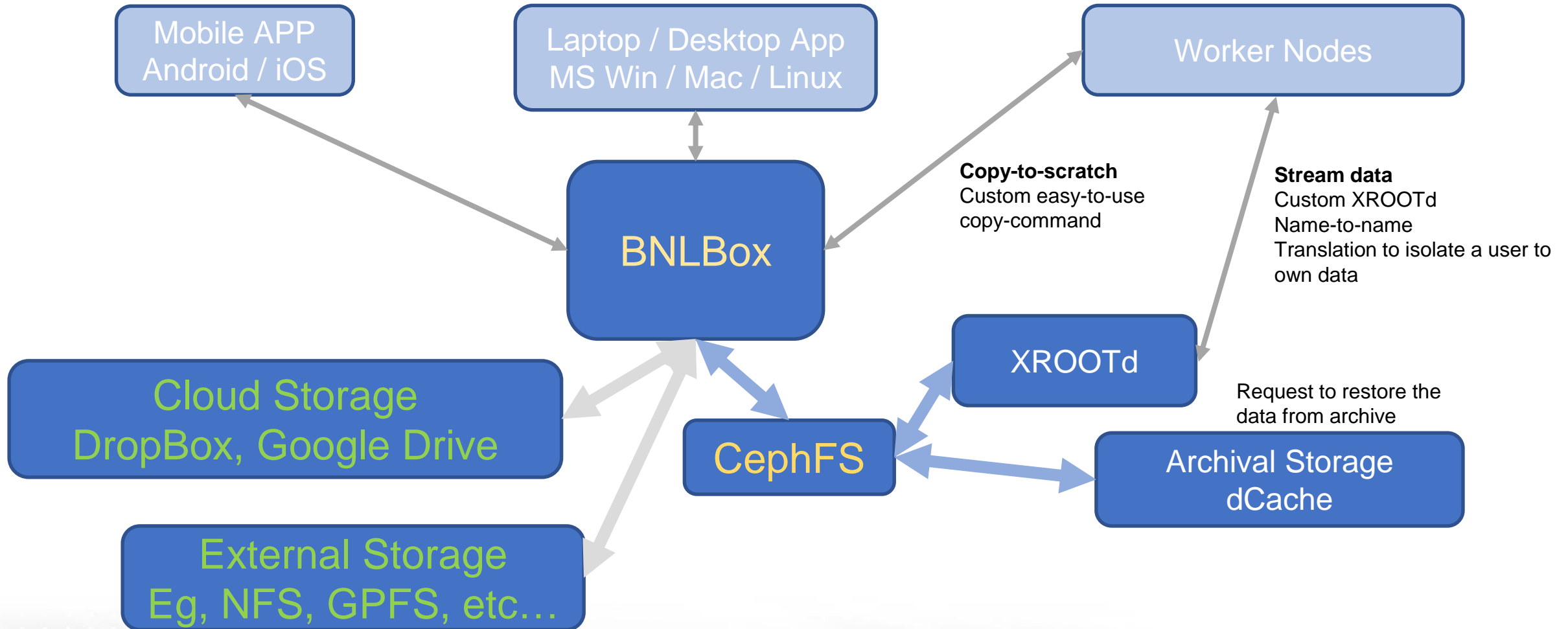
..... →

Stay logged in

ownCloud – web services under your control

- Clients are available in many popular platforms;
 - Linux, Mac OS, MS Win, Android and IOS, etc...
- Extremely easy to use.
 - Synchronize data automatically
 - **NOTE:**
 - Requires the **same amount of storage** in local and remote storage if the **Sync** program is used.
 - **Push** command won't require the same amount of storage.
- Quota for each users
- Users can share data
 - With the other BNLBox users
 - Any other users by URL link with password, expiration date, etc...
- Allow access to the external storage
 - GPFS, NFS, etc...
- Extensible for other storage
 - Archival storage
- Scalable
 - More users
 - More throughput
 - More data

Diagram



Performance of data transfers

- Default sync app can synchronize data at ~100MB/s per client. (100MB/s -> 360GB/Hr -> 8.6TB/day)
 - Sufficient for small data ~ TB.
 - Most users typically won't need or physically have higher throughputs in their systems.
 - Single spinning disk I/O on desktop (~100MB/s).
 - Wifi N (max 300Mbps ~40MB/s)
 - LAN (1Gbps=120MB/s)
 - The largest single disk at 12~14TB.
 - High demand users require higher throughput.
 - 10TB or more.
 - High performance storage at the remote clients
 - Large raid storage
 - BNLBox supports standard WebDAV API
 - Easy to write own client for data transfer.
 - No limit of data rate.
 - Increase the data rate by increasing concurrency
 - Won't require the same amount of data locally.
 - Add any other data management codes.

Copying without sync clients

- `copy_bnl_box.rb -h`

Usage: `copy_bnl_box.rb [options] source destination`

NOTE: to specify the owncloud storage, you need to append 'box:' to your path seen in your bnl box service

<code>-h, --help</code>	Display help message
<code>-s, --https_proxy ProxyHost</code>	Set https proxy
<code>-r, --url URL</code>	Set none-default url
<code>-p, --password password</code>	Set User Password
<code>-u, --username username</code>	Set User Name

- Copy from local to BNLBox

```
ruby copy_bnl_box.rb vomses box:/Documents/testcopy.1
Username:
Password:
Source: vomses
Destination:
/owncloud/remote.php/dav/files/hiroito/Documents/testcopy.1
```

- Copy from BNLBox to local

```
ruby copy_bnl_box.rb box:/Documents/testcopy.1
/home/hiroito/testcopy.1
Username:
Password:
Source:
/owncloud/remote.php/dav/files/hiroito/Documents/testcopy.1
Destination: /home/hiroito/testcopy.1
```

Stream Access










- XROOTd and WebDAV can stream data
- Separation or isolation of the data-write/sync services and the data-read access allows higher scalability and stability for all users.
- XROOTd can cleverly map user data in BNLBox in a very simple way.
 - Owncloud web URL maps a user data by `https://host/owncloud/index.php/apps/files/MYDATA`
 - This is different from how Owncloud physically stores user data in its storage as `/base-directory/username/files/MYDATA`
 - XROOTd can cleverly hide “username” of physical files by providing access by `root://host/files/MYDATA`
 - Courtesy of Andrew Hanushevsky from XROOTd

External Storage

- BNLBox currently supports the following external storage.
 - Data is stored in the external storage and not in BNLBox.
 - FTP, SFTP, Owncloud(remote), Google Drive, Dropbox, Amazon S3, SAMBA/CIFS, WebDAV, OpenStack Object Storage.
 - Using SFTP option, BNLBox is possible to serve the data stored in GPFS or NFS without copying to its own storage (CephFS).

- Allow users to mount external storage
 - Allow users to mount the following external storage
 - FTP
 - WebDAV
 - ownCloud
 - SFTP
 - Amazon S3
 - Dropbox
 - Google Drive
 - OpenStack Object Storage
 - SMB / CIFS

Examples of external storage

	Name	Size	Modified
	CFNGFTP External GPFS	7.5 MB	4 months ago
	Codes	11 KB	a year ago
	Data	5.5 GB	a year ago
	Documents	5.2 GB	4 days ago
	Photos	194.9 MB	3 days ago
	PNFStest External very large (~40PB) dCache Storage (including TAPE over 100PB)	Pending	3 months ago
	RFTPtest	Pending	5 months ago
	subdir	< 1 KB	a year ago
	Tapes	72 KB	5 months ago

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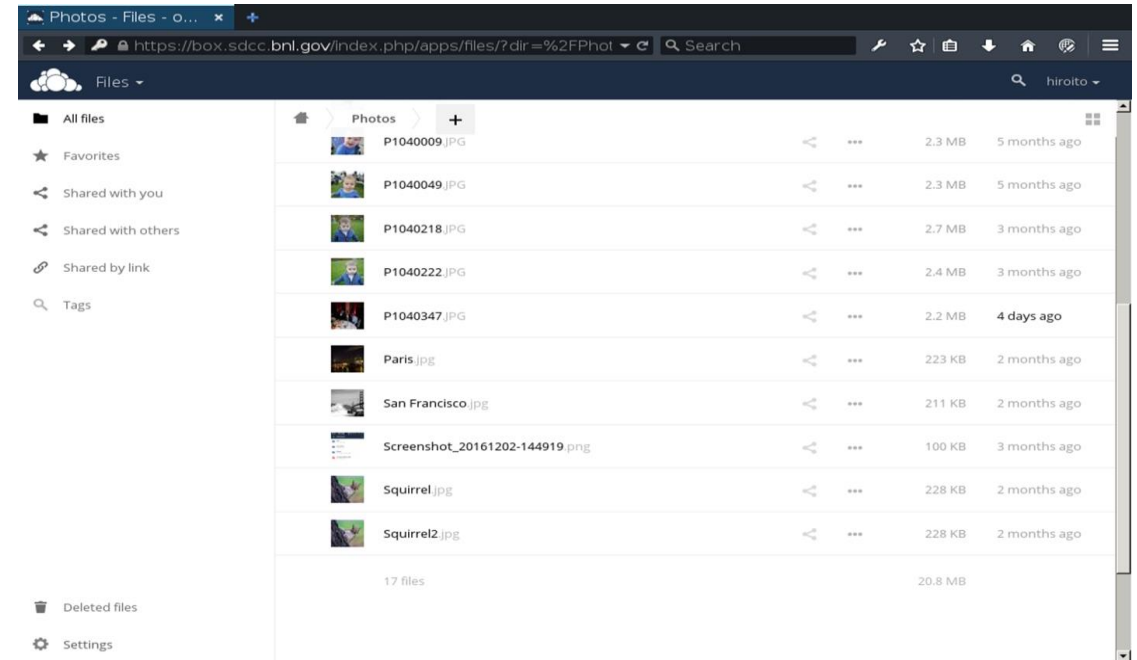
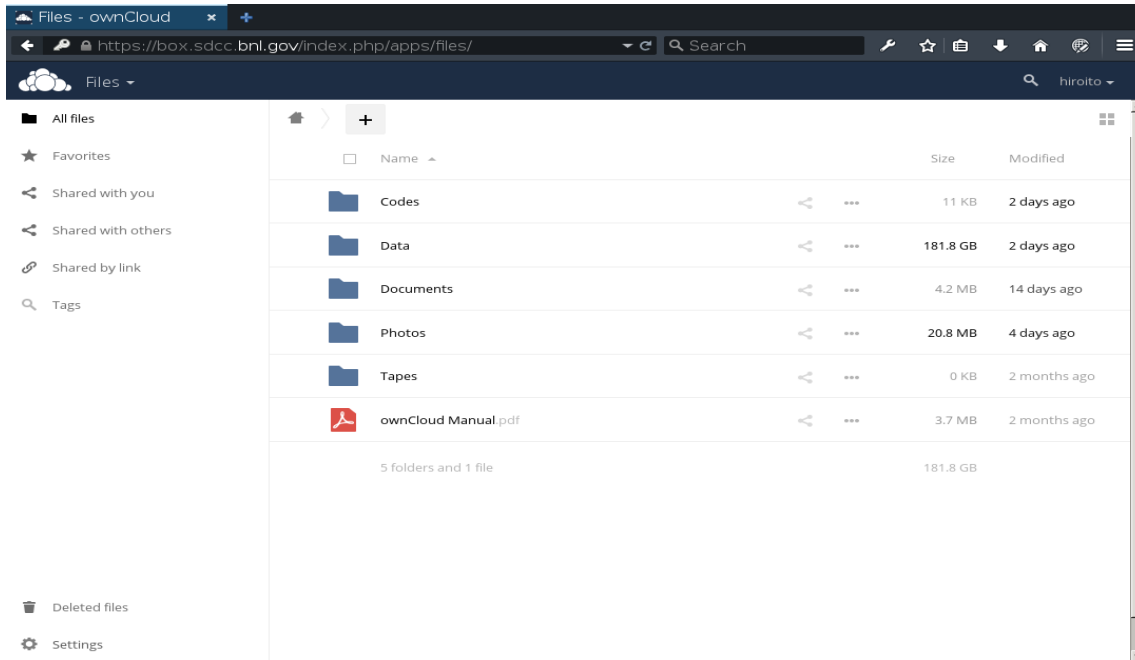
Shared with another user

Archive data

- Some users would like to archive or store data in the tape system.
 - Will the data be read again?
- Difficulties
 - Efficiency
 - Read throughput
 - Reading small fraction in many different tapes will result in low throughput.
 - Seek is slow.
 - Mounting a tape is slow.
 - **Must write in a way to read fast**

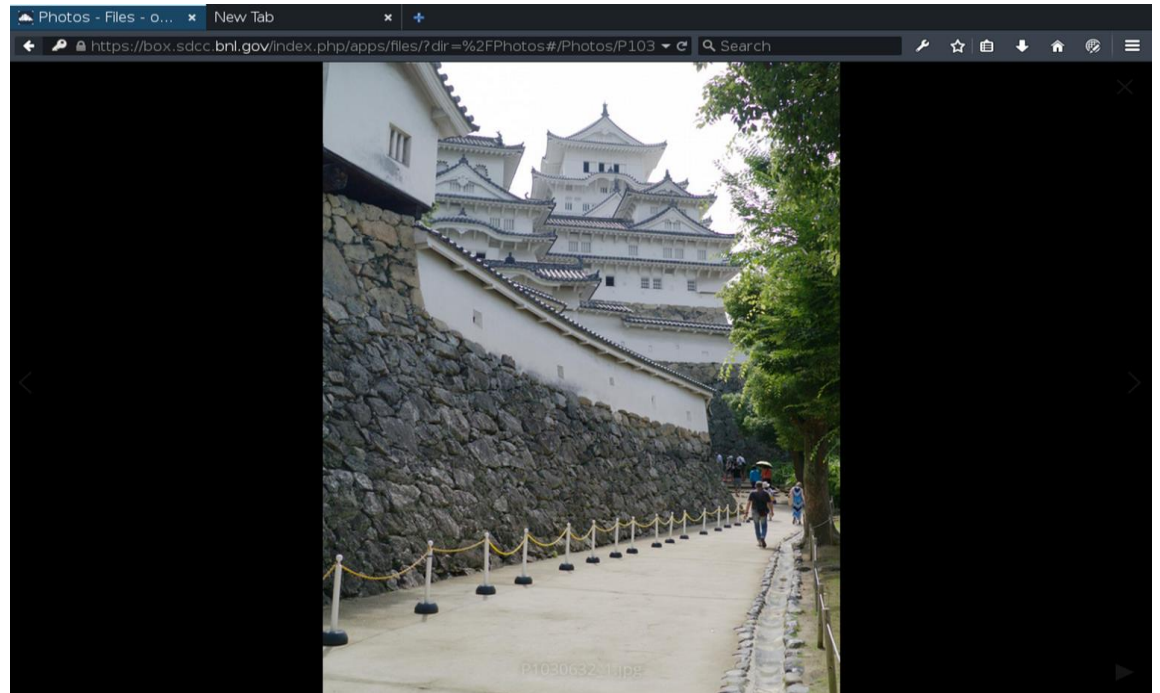
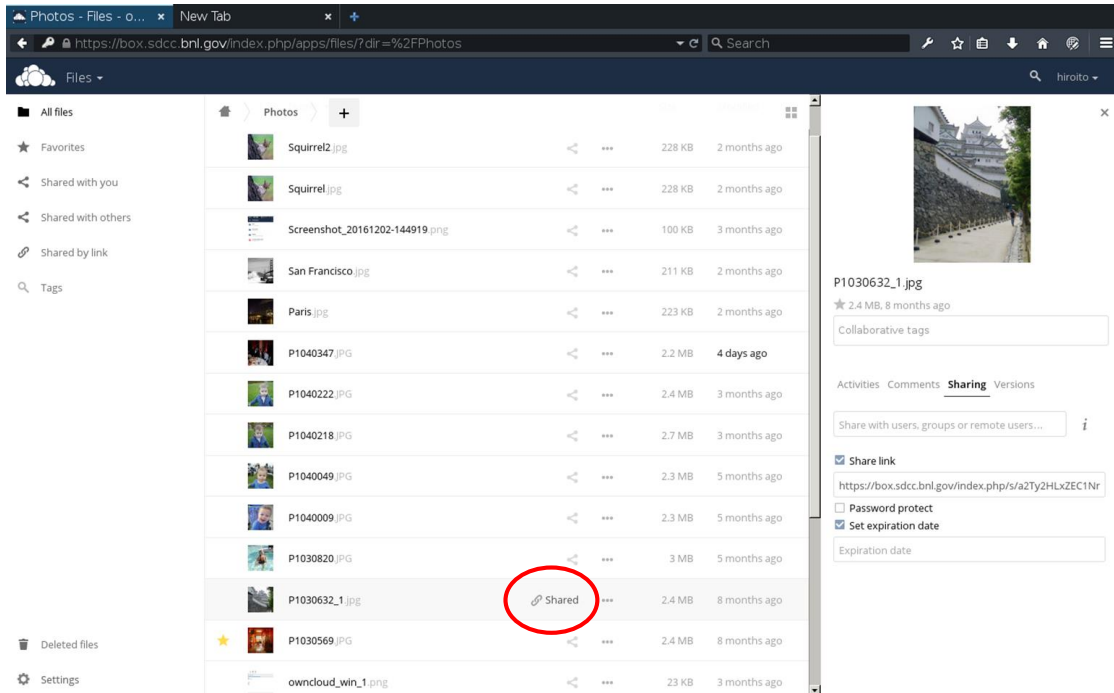
- Rule
 - “/Tapes/” directory will be used to indicate data to be stored to the tape system.
 - Files small than certain size (1GB) will be tarred to produce a large file
 - Tar files smaller than 1GB will be archived to tape only after certain period.
 - Once files are transferred to the archival system, they will be removed from “/Tapes/” directory.
 - Reduce the usage of quota.
 - Create index or individual local catalog file to record the data in the archival system.
 - The above index will be synchronized by the BNLBox to their local machine.
 - Also update the central catalog for archived data
 - Restore requests will be made through Web interface.
 - Data will be restored to different directory.

Sample images



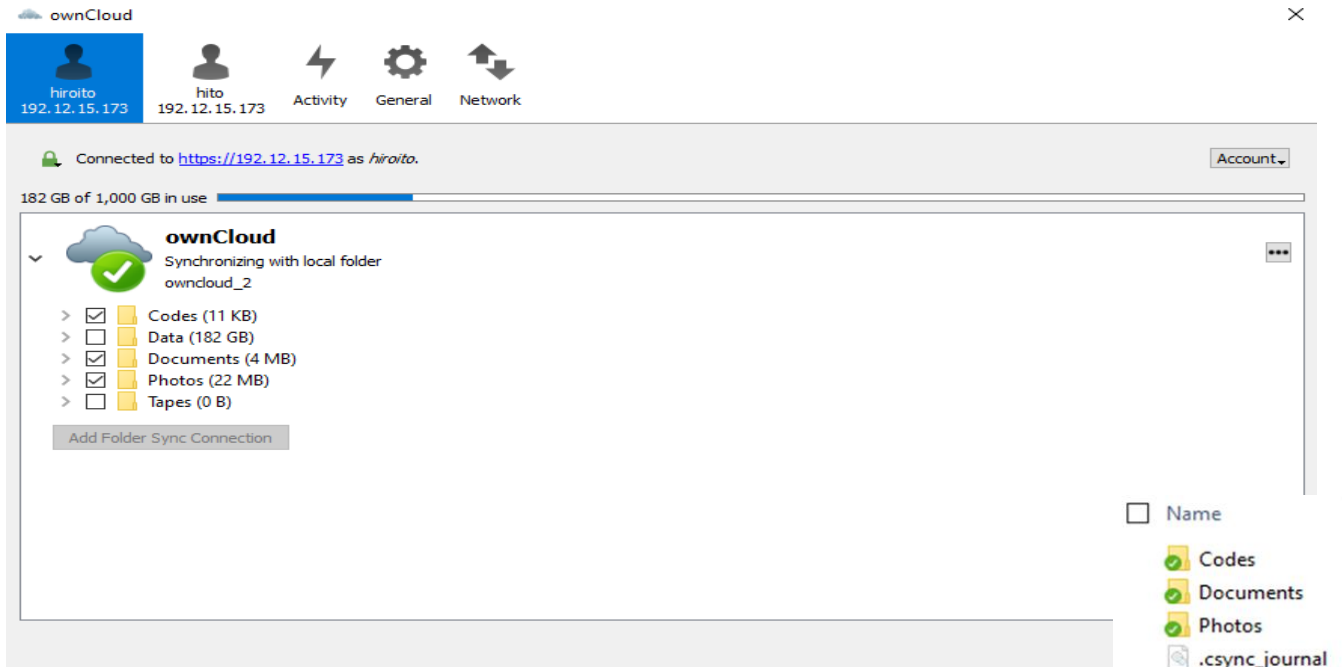
- Users only see their own directory.

Share data with anyone



- Users can share their data publicly or privately with password.

Only synchronize the data you want



Desktop/Laptop apps are available in MS Win, Mac and Linux.

Using the provided app, users can decide what to sync automatically.

For an example

- Data and Tapes directories are not synchronized.
- Codes, Documents, Photos directories are synchronized automatically.

<input type="checkbox"/> Name	Date modified	Type	Size
<input checked="" type="checkbox"/> Codes	3/2/2017 10:26 AM	File folder	
<input checked="" type="checkbox"/> Documents	3/1/2017 4:51 AM	File folder	
<input checked="" type="checkbox"/> Photos	3/3/2017 10:15 AM	File folder	
<input type="checkbox"/> .csync_journal	3/3/2017 10:15 AM	Data Base File	92 KB
<input type="checkbox"/> .csync_journal.db-shm	3/3/2017 10:15 AM	DB-SHM File	32 KB
<input type="checkbox"/> .csync_journal.db-wal	3/3/2017 10:15 AM	DB-WAL File	0 KB
<input type="checkbox"/> .owncloudsync	3/3/2017 10:15 AM	Text Document	65 KB
<input type="checkbox"/> ownCloud Manual	12/29/2016 2:18 PM	Adobe Acrobat D...	3,822 KB

Conclusion

- Cloud storage could be potentially useful for data intensive scientific communities.
- BNLBox will provide our users with ability to store and access their data anywhere by the easy-to-use applications on various platforms.
- BNLBox allows the owners of the data to share with anyone they desire with automated data replication
- BNLBox will allow the archival of the data.

