



Syncany

Secure open-source file sync

Contact the Syncany Team
via team@syncany.org

Agenda



- **What is Syncany?**
- How does it work?
- Focus Topics:
 - Deduplication & Versioning
 - Conflict Resolution
 - Cryptography Concept

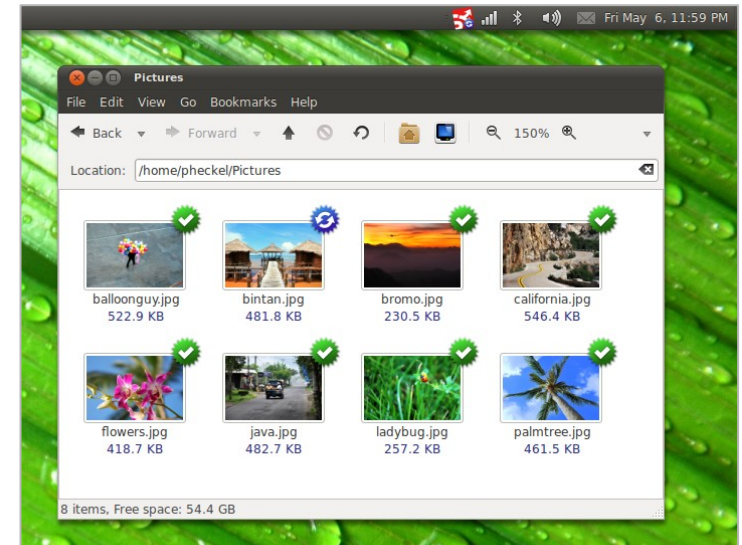
What is Syncany?



Syncany is an open source Dropbox-like file sync and backup tool. It synchronizes files and folders between computers either manually or automatically. Users can define certain folders on their machine and keep them in sync with friends or colleagues.

So what makes Syncany **awesome**? What makes it **different**?

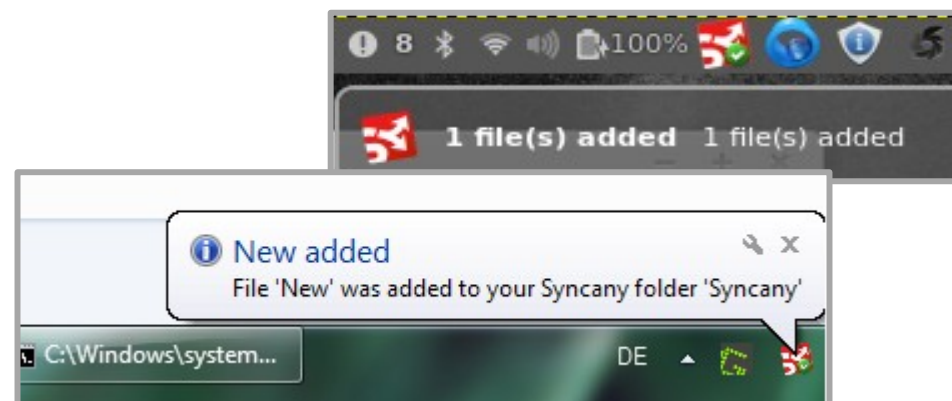
- Syncany is **open-source** software
- **Use-your-own** storage (FTP, S3, WebDAV, ...)
- Files are **encrypted** before upload (don't trust anybody but yourself)
- Files are **deduplicated** locally (space savings on remote storage)
- Files are intelligently **versioned** (restoring old versions is easy)



Manual version control-like sync

```
/bin/bash
pheckel@platop ~/Syncany $ sy status
? Germany.jpg
? The Netherlands.jpg
pheckel@platop ~/Syncany $ sy up
A Germany.jpg
A The Netherlands.jpg
Sync up finished.
pheckel@platop ~/Syncany $ sy down
A Canada.jpg
Sync down finished.
pheckel@platop ~/Syncany $
```

Automatic Dropbox-like sync



Agenda

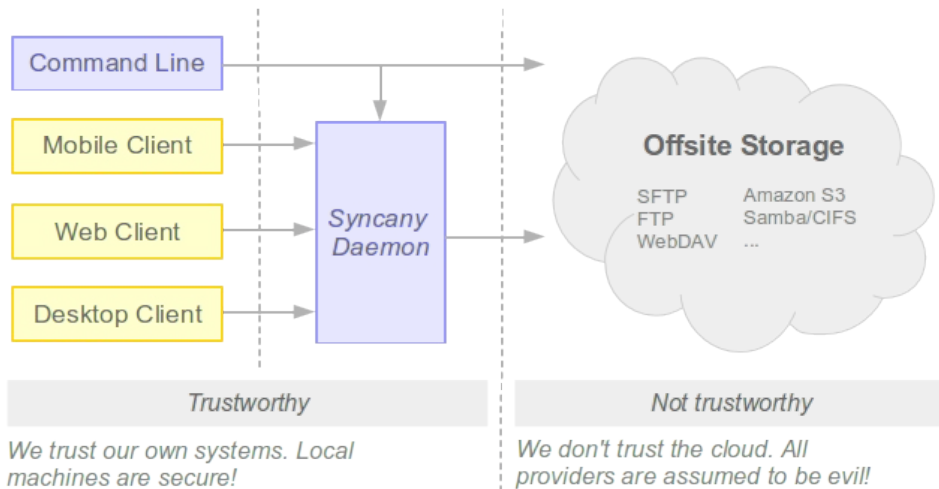


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How does it work?



High Level Architecture



Components

- **Core library:** Behavior logic (e.g. up/down operation), persistence, plugin architecture
- **Command line interface (CLI):** `$ sy <up | down | . . >`
- **Background daemon:** REST/WS API for GUI/Web/Mobile interface
- **Plugins:** Storage plugins & user interface plugins

Core Operations

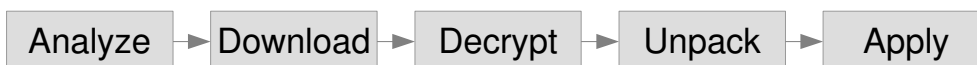
UpOperation ~ part of core library



`$ sy up`

When local changes occur & every 2min

DownOperation ~ part of core library



`$ sy down`



When remote changes occur & every 2 min

Storage Plugins

> Use-your-own storage, or even better: use any storage!



Storage plugins:

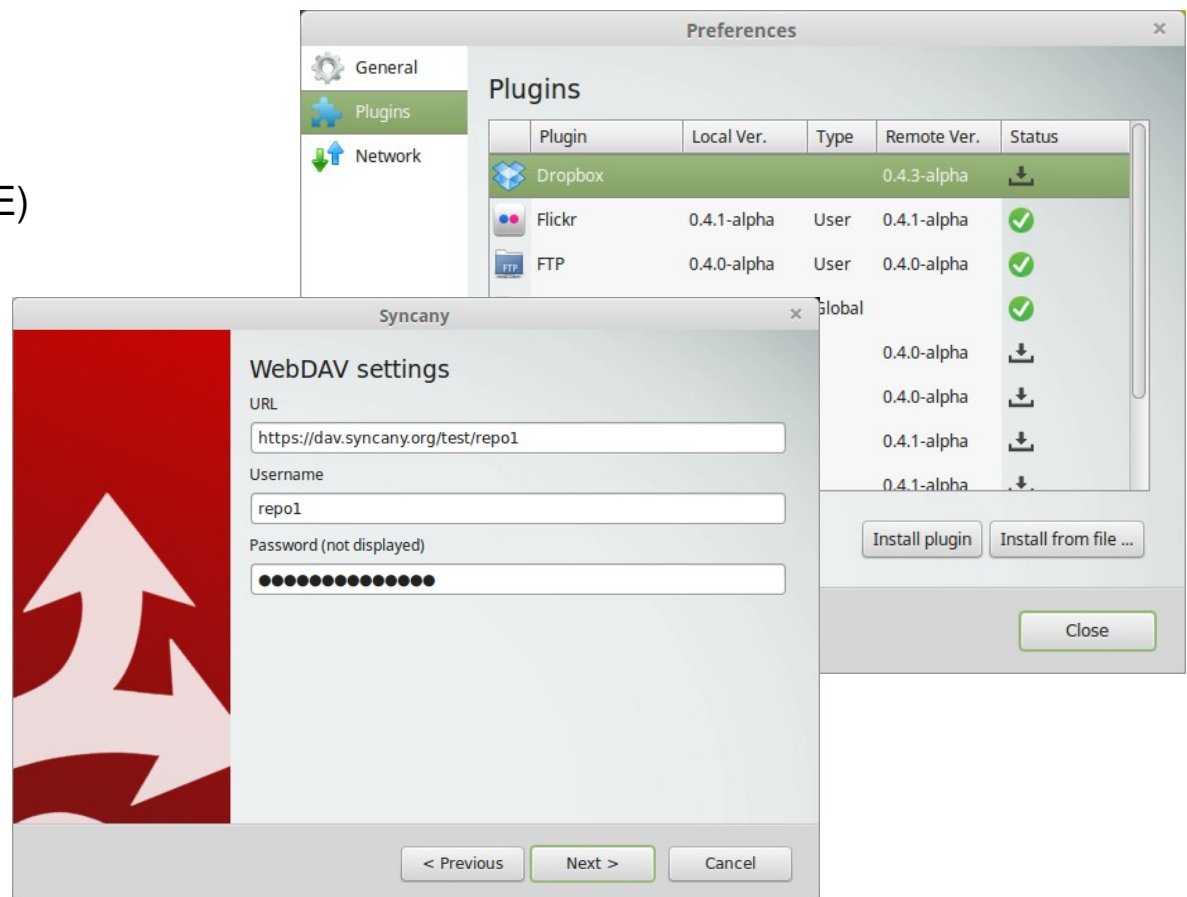
-  Amazon S3
-  Dropbox
-  Flickr
-  FTP
-  RAID0
-  Local (mounted drives; e.g. via FUSE)
-  OpenStack Swift
-  SFTP
-  Samba / CIFS
- PHP / REST (3rd party, incubating)
-  WebDAV

*(Easy to develop your own
in about 200-300 lines of code)*

Other plugins:

Graphical User Interface

Simple Web Interface (PoC, looking for dev)



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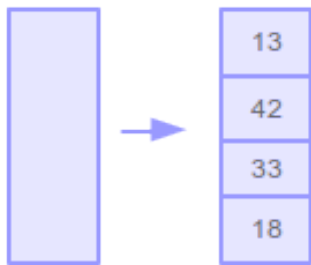
Deduplication & Versioning



> Syncany: Fixed-size, client-side dedup. with additional multichunking

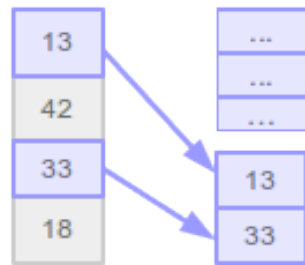
1. File chunking

Index all files and divide them into unique chunks



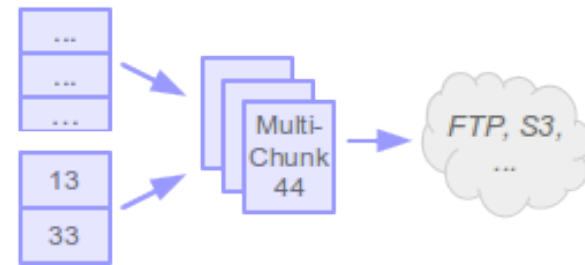
2. Create multichunks

Compare chunks to database and combine new chunks to multichunks



3. Upload multichunks

Encrypt and upload multichunks to offsite storage using a storage plugin

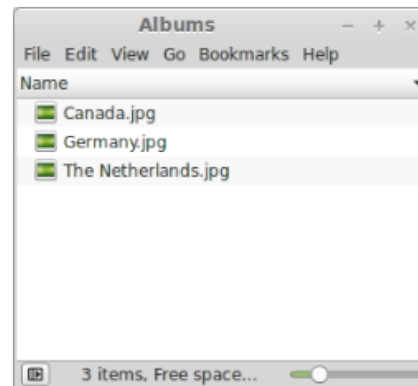


Current implementation:

- Fixed-size chunking, 512 KB chunks
- 4 MB multichunks

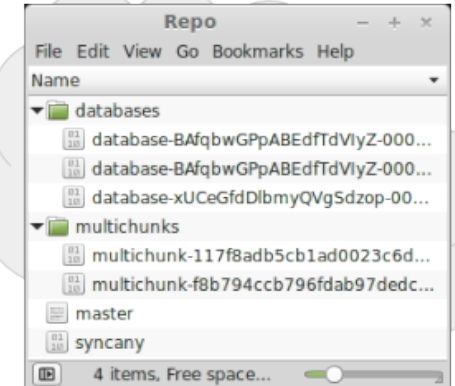
Also implemented, but not active:

- Variable-size chunking with TTTD algorithm, via Adler-32 fingerprinting



Local Syncany Folder

Syncany's local files are not encrypted, but are encrypted before upload.



Offsite Repository





Syncany stores file data in multichunks, and metadata in database files

Deduplication & Versioning



> Dedup. makes versioning easy, Syncany just keeps track of chunks

File 1a8a8dfeea4

| | | | | |
|---|------------------------------|----------------|--|-------------|
|  | Presentation.ppt (version 1) | NEW | <div>Chunks</div> <div>5aa.. b2d.. f61.. 81a.. 71a.. ff7..</div> | + 3.1 MB |
|  | Presentation.ppt (version 2) | CHANGED | <div>5aa.. 88a.. f61.. 81a.. 71a.. ff7..</div> | + 512 KB |
|  | Syncany.ppt (version 3) | MOVED | <div>5aa.. 88a.. f61.. 81a.. 71a.. ff7..</div> | +/- 0 Bytes |
|  | Syncany.ppt (version 4) | DELETED | | +/- 0 Bytes |

File dfa818e192ad

| | | | | |
|---|--------------------------|------------|--|----------|
|  | Products.ppt (version 1) | NEW | <div>Chunks</div> <div>5aa.. b2d.. 9ae.. e78.. aa1.. 79e..</div> | + 2.1 MB |
|---|--------------------------|------------|--|----------|



*Free copies (copies of files add 0 byte to the repo)
Small file changes add minimal additional repo space
Restoring old/deleted files is easy*

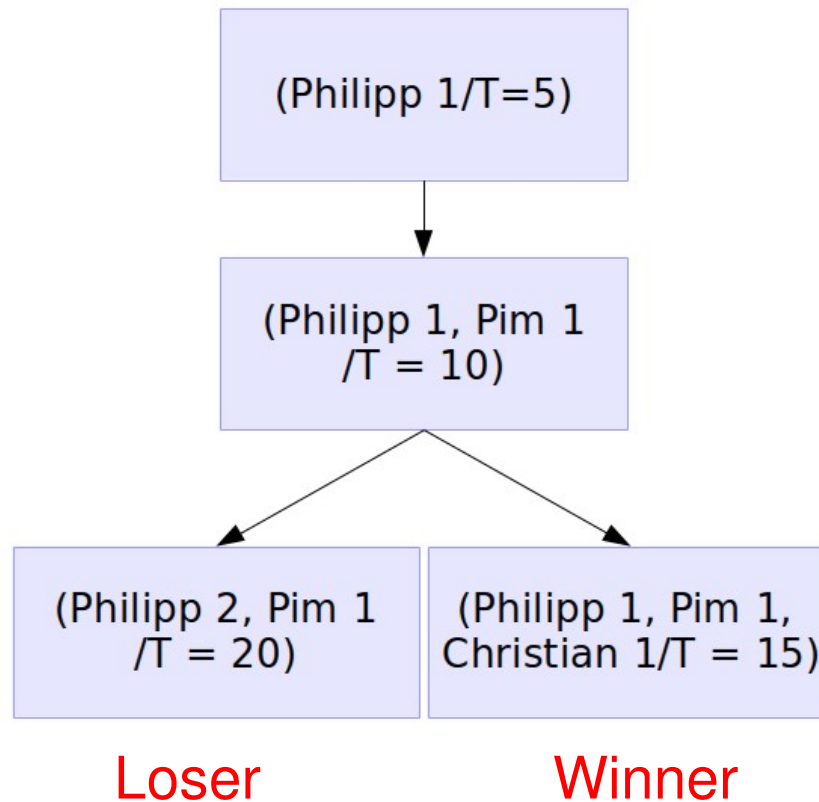
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 - **Conflict Resolution**
 - Cryptography Concept

Conflict Resolution

> Using vectorclocks, this can be done client side



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Cryptography Concept

> Assumptions and Algorithms



Security Assumptions

- Storage provider cannot be trusted with read access
- The local machine is secure
- Users sharing a repository trust each other completely
- Storage provider is trusted with providing availability

Security Concepts

- Pre-upload encryption
- HTTPS-only daemon/server



What Syncany can do for you

> And what you can do for Syncany

Research

- Chunking
- Abstraction

Business

- Providing customers with absolute privacy
- Plausible deniability

Contribute

- Adopt a plugin
- Test and report/fix bugs

Links & Resources



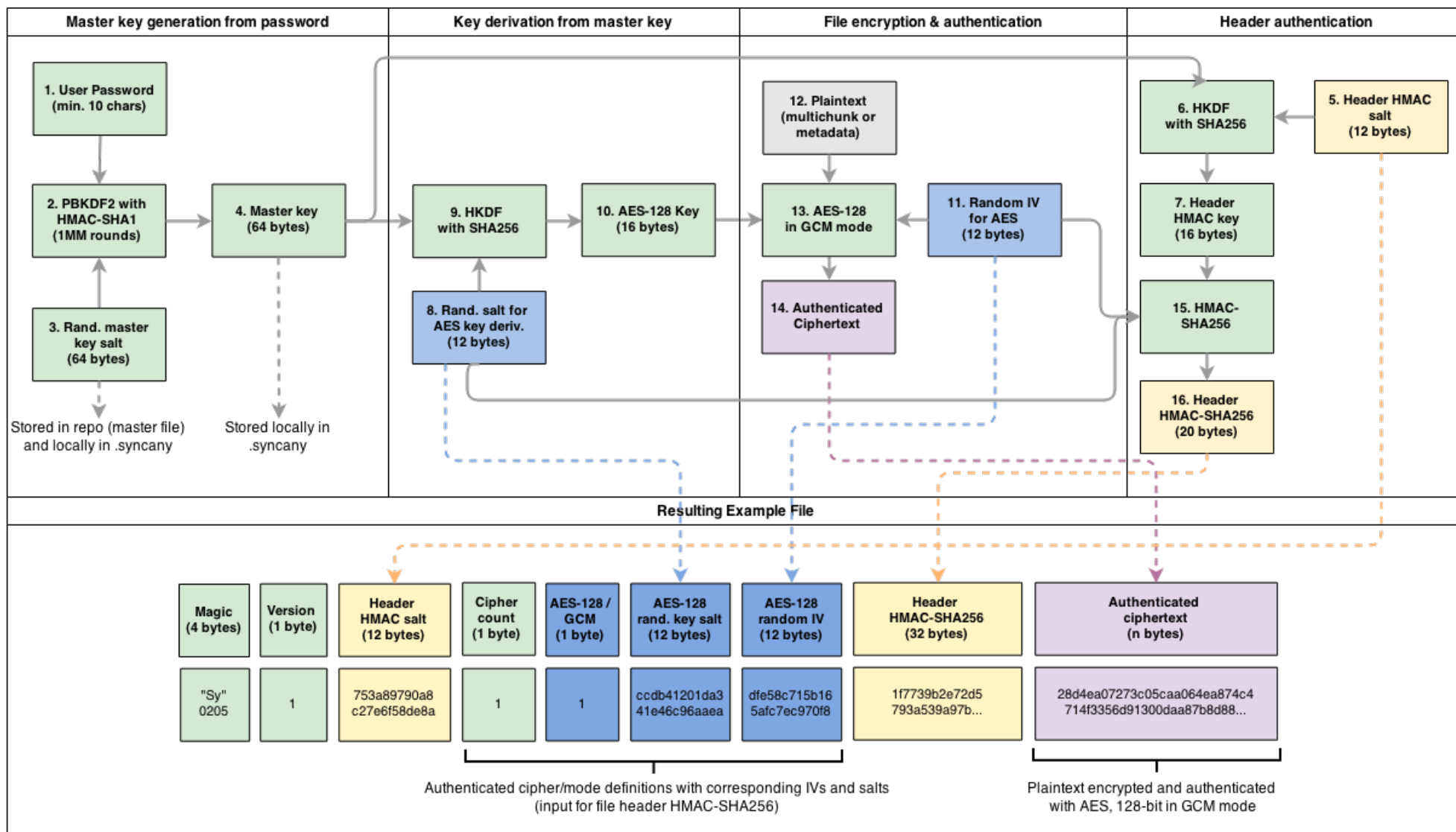
- Website - <https://www.syncany.org/>
- User Guide - <https://www.syncany.org/r/guide>
- Code & Issues - <https://github.com/syncany/syncany>
- Wiki - <https://github.com/syncany/syncany/wiki>
- IRC - #syncany on Freenode - <https://webchat.freenode.net/?channels=syncany>
(active, 20-30 people hang around here; 5-6 actually talk, my nick is “aureianimus”)
- Videos on YouTube - <https://www.youtube.com/channel/UCzegH3dpTK5HHQx6jJ5yhdQ>
- Videos on Asciinema - <https://asciinema.org/~binwiederhier>
- Talk to me! Questions?

Backup



Cryptography Concept

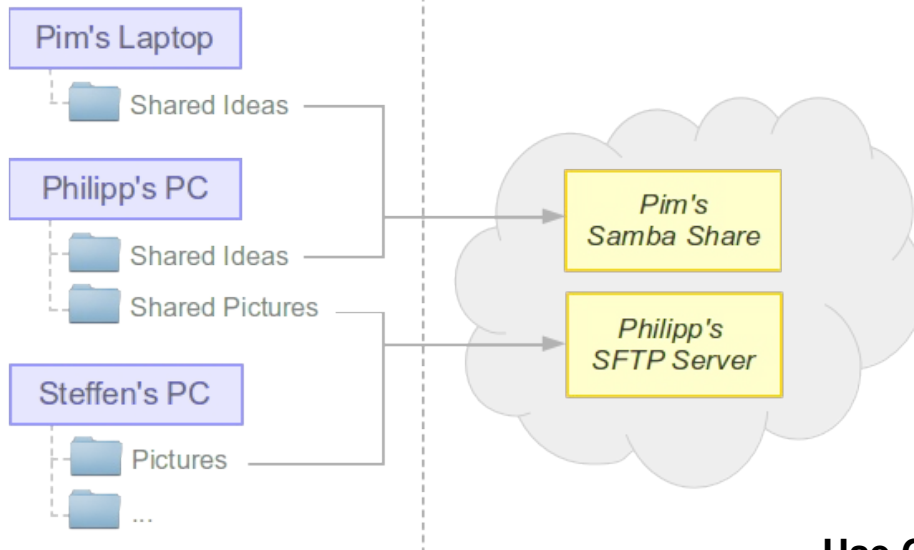
> Encryption file format and used algorithms



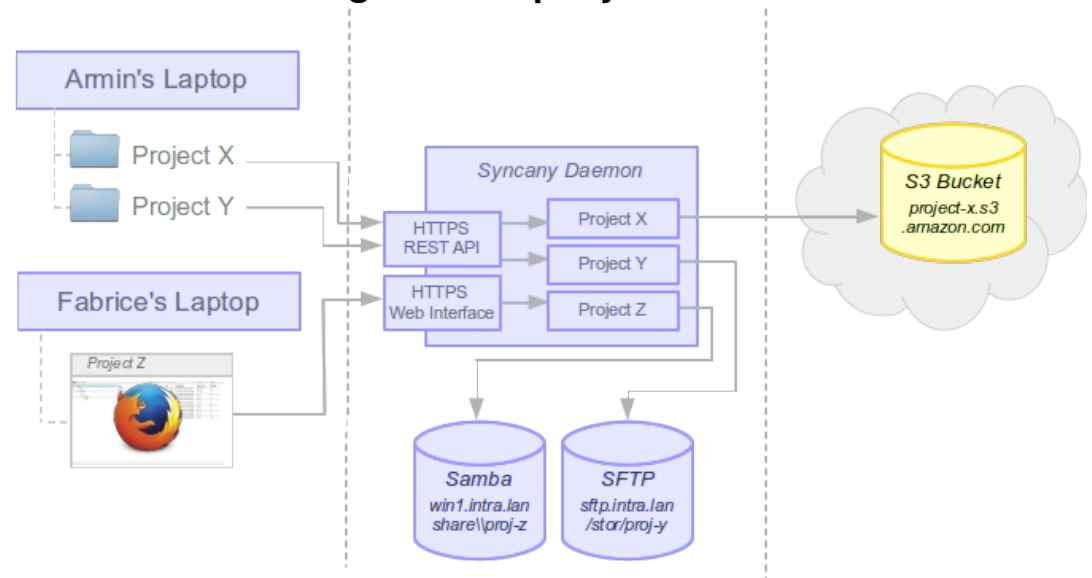
Use Cases



Use Case 1: Friends sharing files

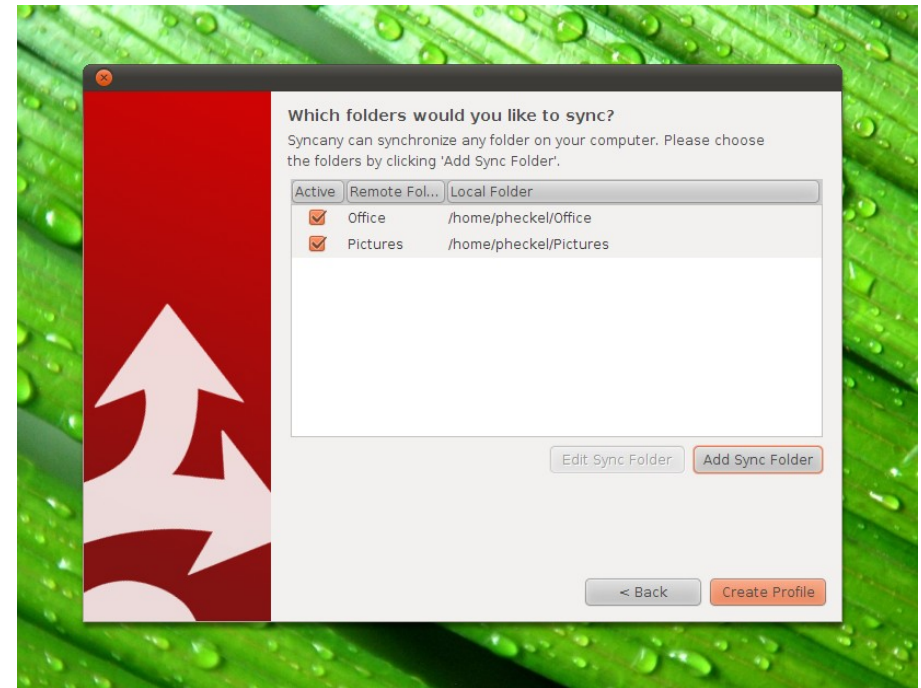
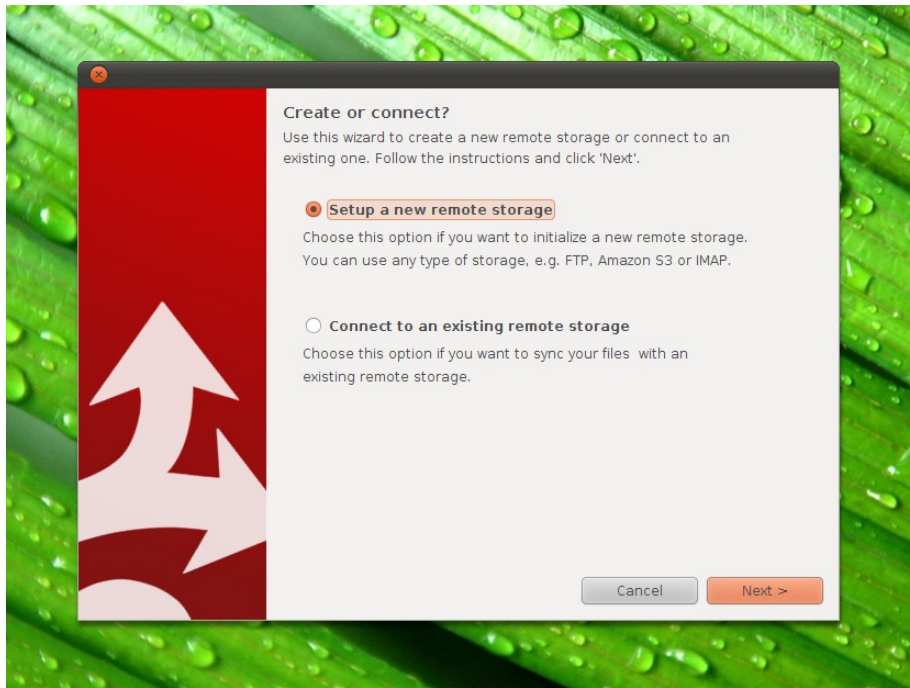


Use Case 2: Sharing in a company



Syncany Desktop User Interface

> Wizard Style Setup

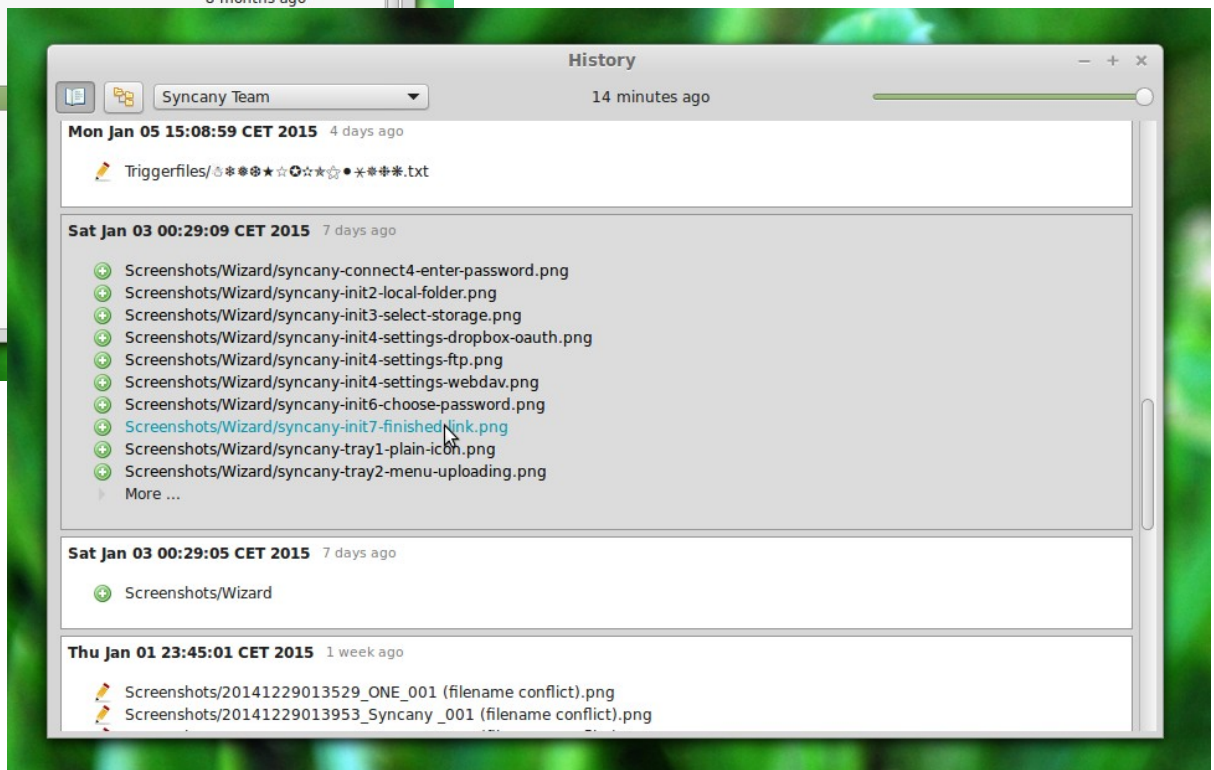
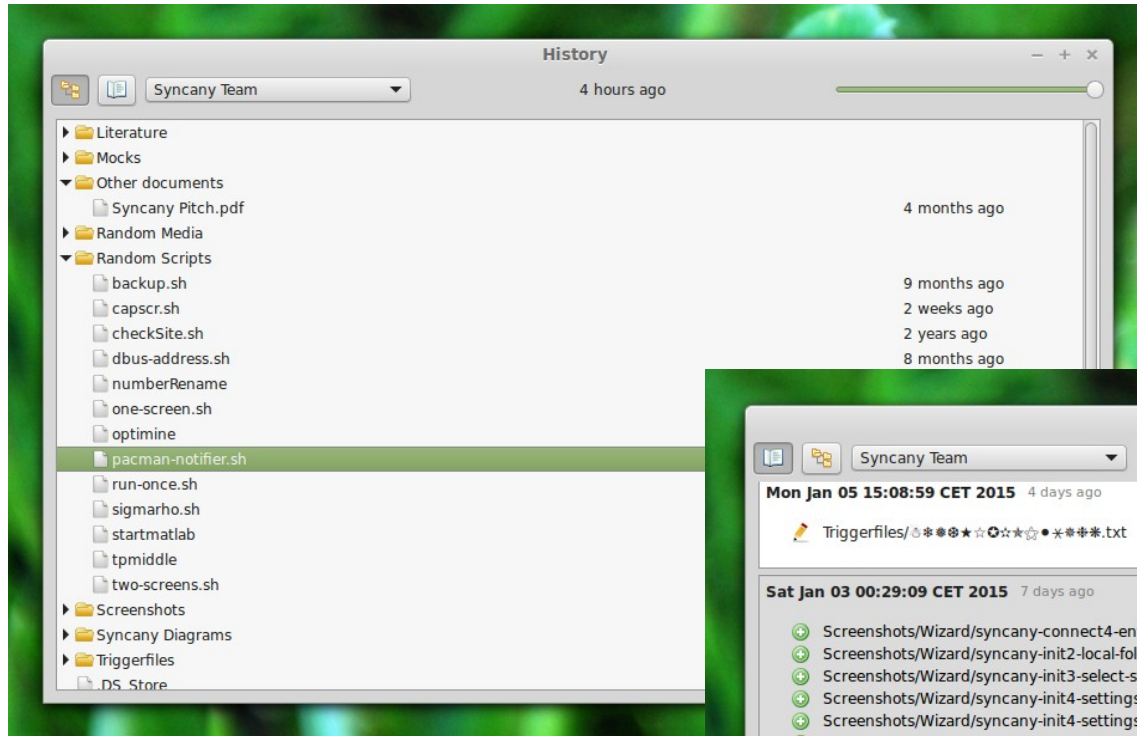


Cross-Platform Desktop Demo

https://www.youtube.com/watch?v=eHoA5_8gRBc

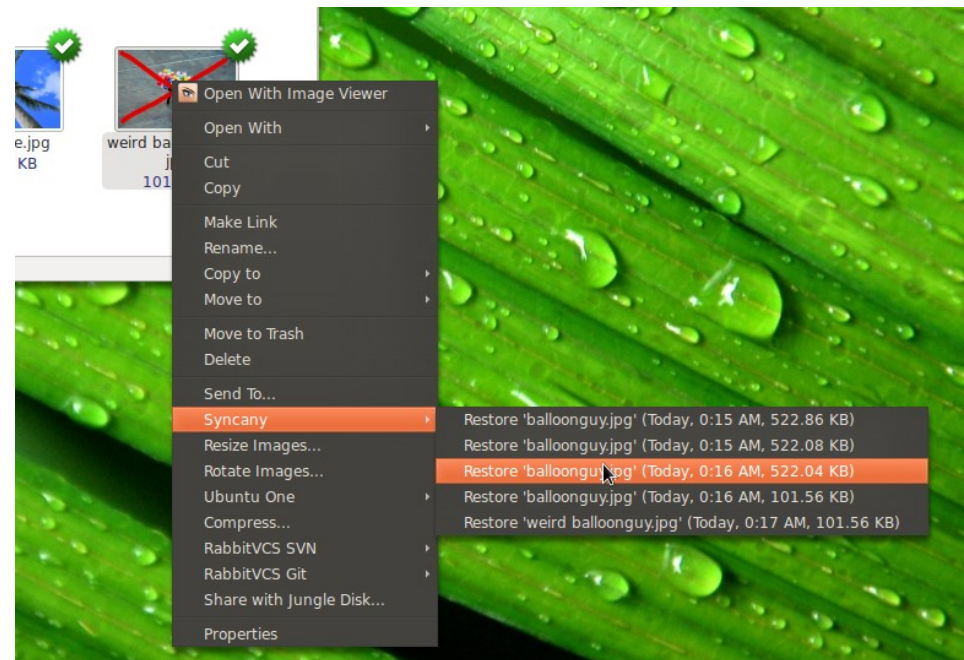
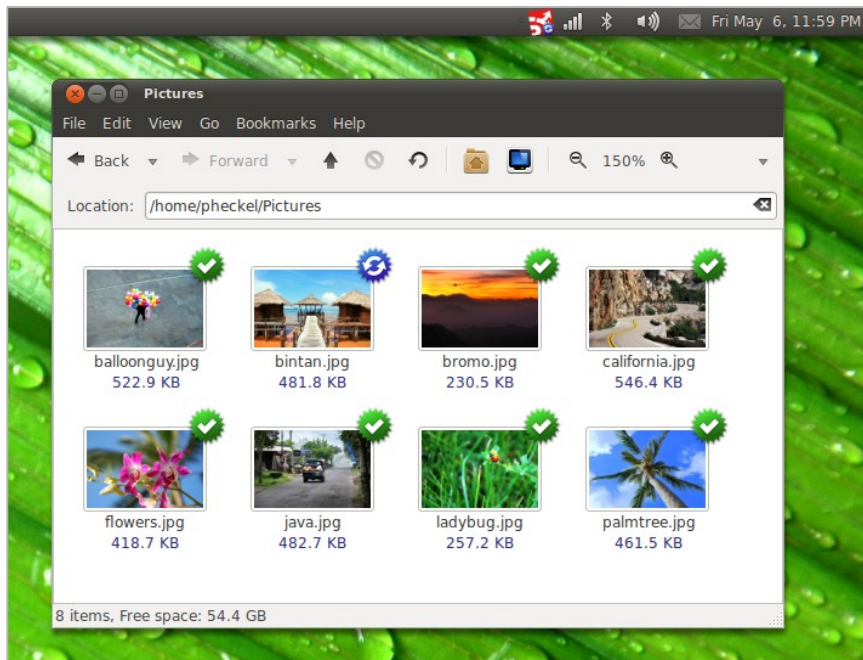
Syncany Desktop User Interface

> History browser: Browse and restore old file versions



Syncany Desktop User Interface

> File Manager Integration (2011-version PoC, looking for devs)



Cross-Platform Desktop Demo

https://www.youtube.com/watch?v=eHoA5_8gRBc



Using Syncany

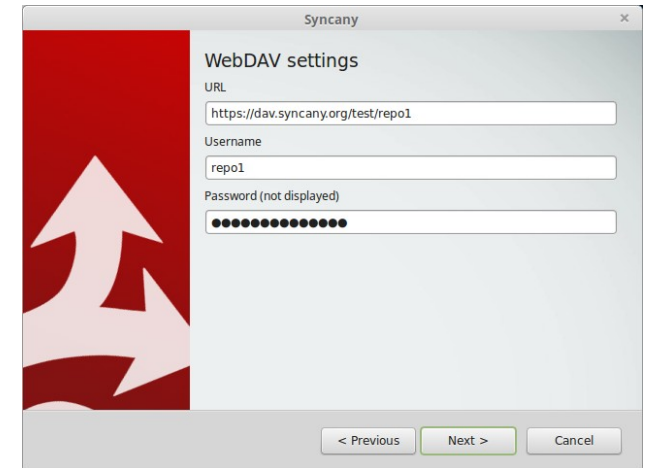
> Example: Syncing a local folder to a new WebDAV-based repository



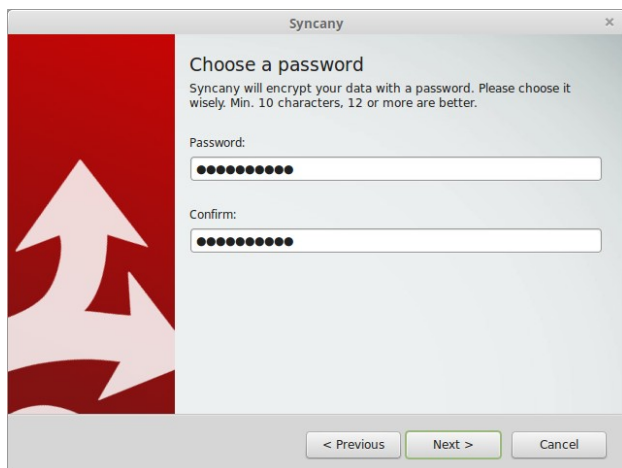
1. Choose the folder you want to sync



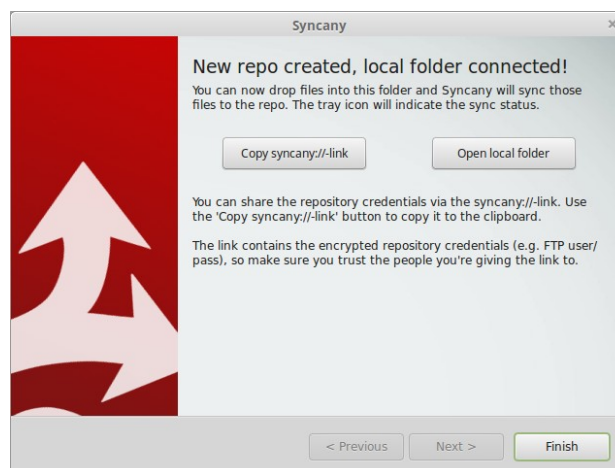
2. Choose a storage backend



3. Enter storage backend credentials



4. Choose password (used for encrypt.)



5. Done. Share a syncany://-link if you want.

Syncany Web Interface

> Web-based File Manager (proof-of-concept; looking for devs)



Syncany All files in sync ✓ Su, Aug 24, 9:09 pm aaa Menu

| Name | Version | Size | Last Modified | Posix Perms | DOS Attrs |
|---------------------|---------|---------|----------------------------|-------------|-----------|
| logs | 1 | 4.0 kB | 2014-08-24 21:08:01.0 CEST | rwxf-xf-x | --a- |
| plugins | 1 | 4.0 kB | 2014-08-22 16:05:29.0 CEST | rwxf-xf-x | --a- |
| lib | | | | | |
| Canada.jpg | 1 | 63.3 kB | 2014-08-24 02:05:48.0 CEST | rw-f-- | --a- |
| daemon.ctrl | 1 | 0 B | 2014-08-24 21:08:03.0 CEST | rw-f-- | --a- |
| daemon.pid | 1 | 5 B | 2014-08-24 21:08:02.0 CEST | rw-f-- | --a- |
| daemon.xml | 1 | 1.7 kB | 2014-08-24 21:07:54.0 CEST | rw-f-- | --a- |
| daemon.xml__ | 1 | 1.4 kB | 2014-08-12 23:12:44.0 CEST | rw-f-- | --a- |
| Germany.jpg | 1 | 63.3 kB | 2014-08-24 01:30:21.0 CEST | rw-f-- | --a- |
| keystore.jks | 1 | 2.1 kB | 2014-08-12 23:47:27.0 CEST | rw-f-- | --a- |
| The Netherlands.jpg | 1 | 29.6 kB | 2014-08-24 01:18:10.0 CEST | rw-f-- | --a- |
| truststore.jks | 1 | 3.6 kB | 2014-08-12 23:47:27.0 CEST | rw-f-- | --a- |
| userconfig.xml | 1 | 414 B | 2014-08-18 20:55:53.0 CEST | rw-f-- | --a- |



Web Interface Demo

<https://www.youtube.com/watch?v=2NPVffywZVs>