Fossil: New Ideas In Version Control

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What Is Fossil?

- Distributed version control
- Distributed bugs tracking
- Distributed wiki
- Built-in web interface
- “Autosync” mode
- Self-contained
- HTTP for all network traffic
- CGI-enabled
- Embedded Documentation
- Robust & Reliable

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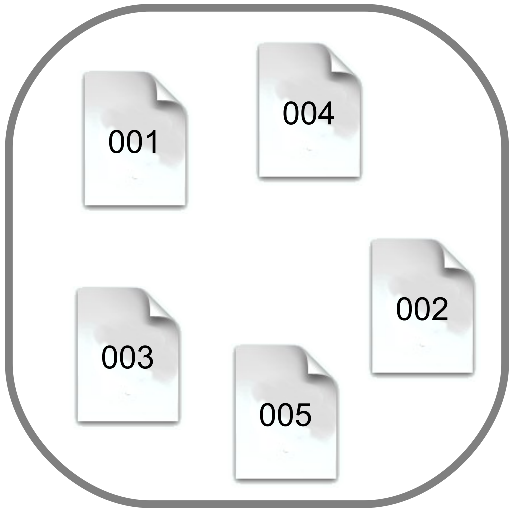
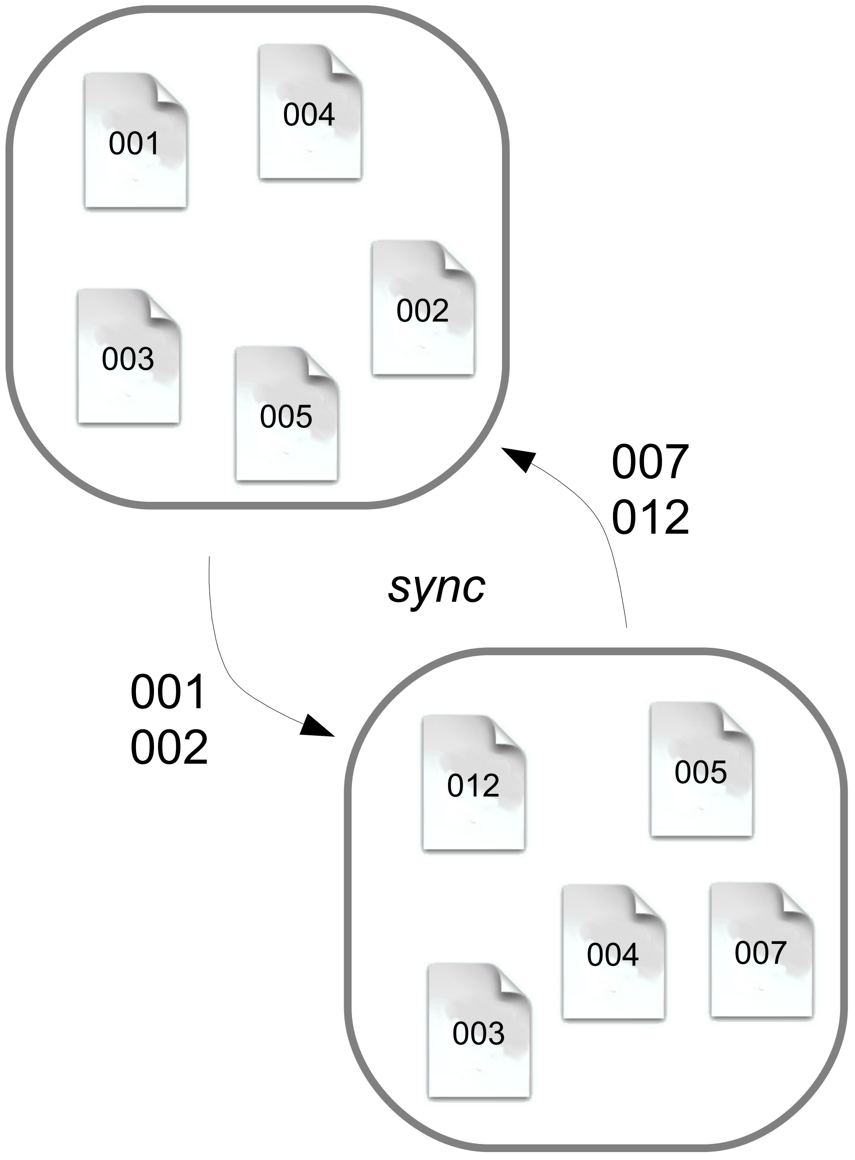
🟥 Common 🟩 Unusual 🟦 Unique

Fundamental Concepts



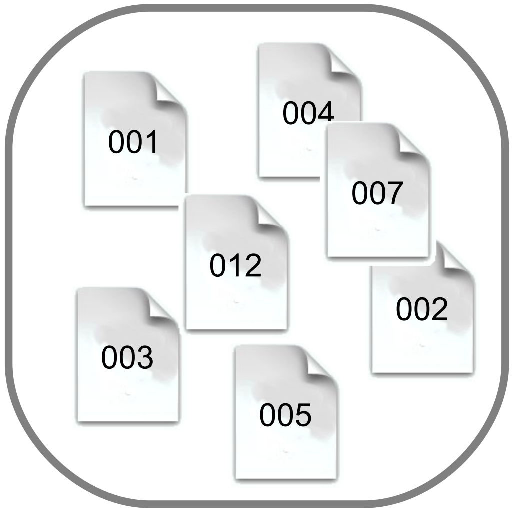
- A “repository” is a bag of “artifacts”
- Artifacts identified by SHA1 hash
- Artifacts are unordered

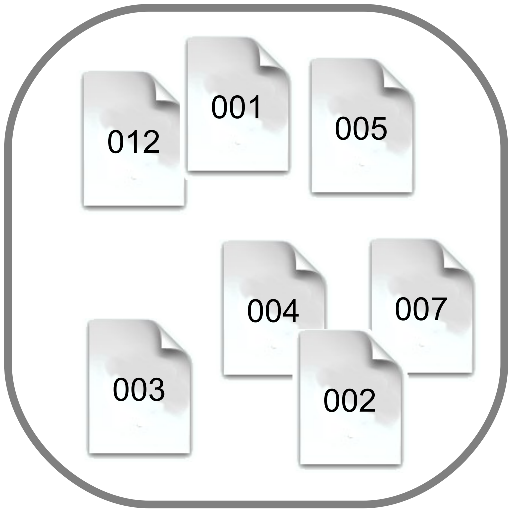
Fundamental Concepts



- Sync by sharing artifacts
- Sync mechanism has no knowledge of versions, wiki, or tickets
- HTTP used for sync transport

Fundamental Concepts





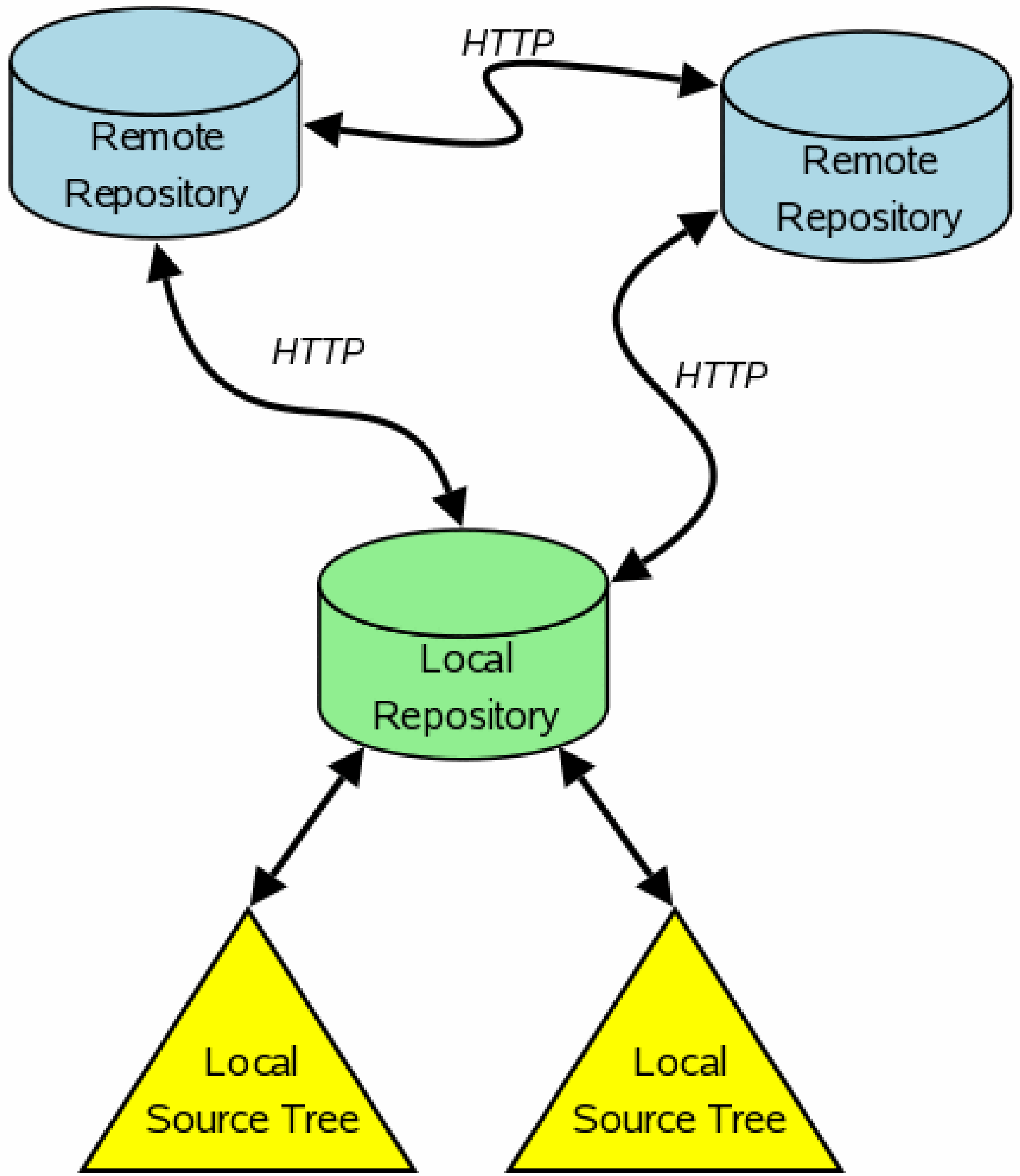
- After sync, repositories have the same set of artifacts
- Delta and zlib compression minimizes bandwidth
- Shunned and private files excluded from sync

Classes of Artifacts

- Manifest
  - List of files
  - Parent check-in
  - Check-in comment
- Wiki page edit
- Ticket change
- Cluster
- Control
- General content

Repository Implementation

- Artifacts stores as BLOBs in an SQLite database
  - Delta compression
  - Z-lib compression
- Cross-reference and summary data stored in auxiliary tables of the same database
- "`fossil rebuild`" scans artifacts to rebuild auxiliary tables


HTTP
Remote Repository
Remote Repository
HTTP
HTTP
Local Repository
Local Source Tree
Local Source Tree

`fossil new` *filename*

- Create a new repository

`fossil clone` *url* *filename*

- Make a copy of an existing repository
- Ex URL: http://userid:password@hostname:port/path
- Ex URL: file:///path

```
fossil open filename
```

- Open a local source tree

```
fossil info
fossil changes
fossil status
fossil extra
fossil ls
```

- Information about the local source tree

`fossil push` [*url*]
`fossil pull` [*url*]
`fossil sync` [*url*]

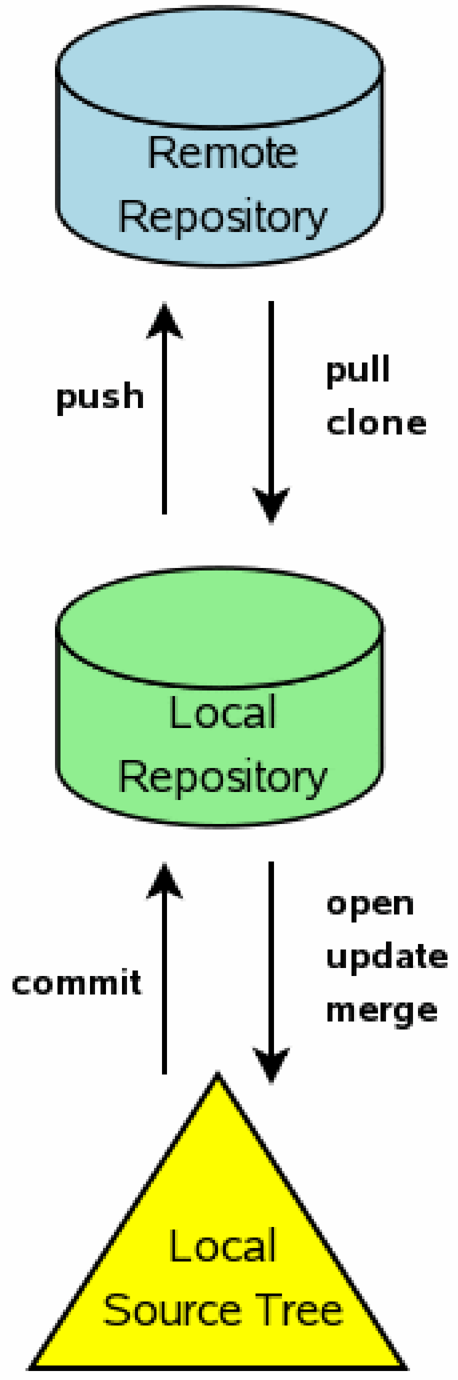
- Synchronize repositories

`fossil update` [*version*]
`fossil merge` *version*

- Synchronize local source tree

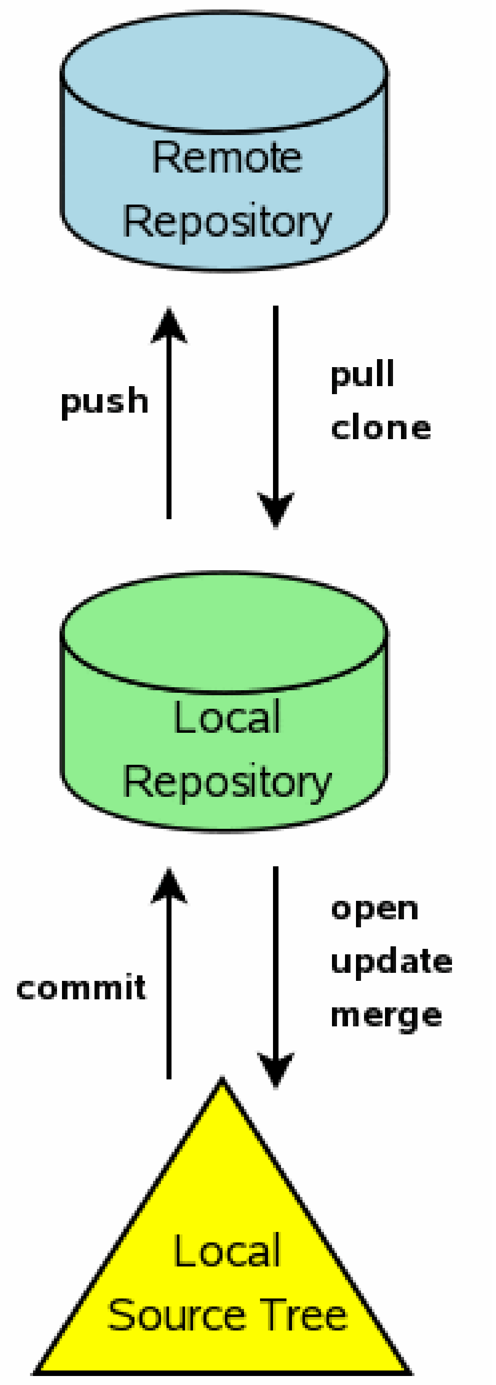
`fossil undo`

- Back out prior update or merge



fossil commit

- Create new version from local tree
- --private flag
- --branch flag



`fossil server` [*filename*]

- Starts an HTTP server on the repository given
- --port flag
- Works on both unix and windows

`fossil ui` [*filename*]

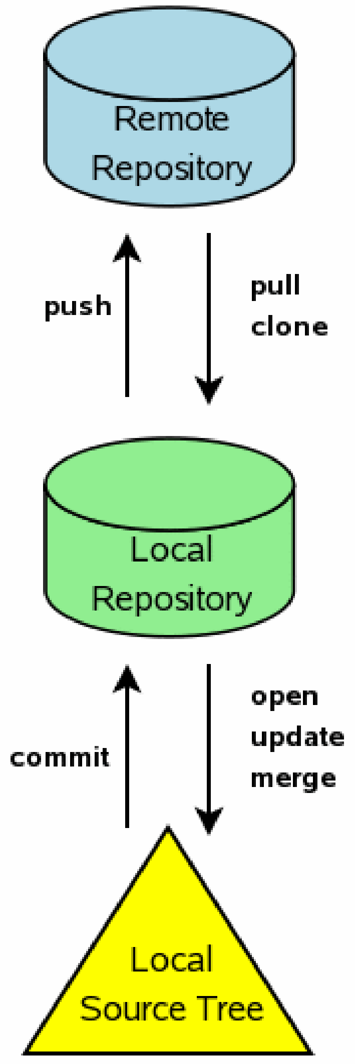
- Automatically finds an open TCP port
- Automatically launches web browser

Web interface supports....

- Timelines of changes
- File browsing
- diffs and “annotate”
- wiki & ticket viewing and editing
- Editing check-in comments and display colors
- User management
- “Shunning” inappropriate content
- Appearance (CSS, headers, footers, etc)

Autosync mode

- Pull before update
- Pull before commit
- Push after commit
- Helps prevent needless forking and branching
- Enabled by default



Self-contained

- Single binary: fossil or fossil.exe
  - Client & server code
  - Diff & merge logic
  - built-in web server
- Download one file and put on your PATH
- No other required software (zero, nada, nil)
- Chroot ready
- Optional: GPG, custom diff programs

HTTP Data Transport

- Remote repositories specified by URL
- Works from behind restrictive firewalls
- Full support for proxies
- Deploy on economical shared host account
- Bandwidth efficient
  - Suitable for use over a dial-up connection
  - Typical check-in generates ~5KB of traffic

CGI Server Setup

The actual 2-line CGI script that runs the canonical self-hosting fossil repository:

```
#!/usr/bin/fossil
repository: /fossil/fossil.fossil
```

Simple Wiki Formatting Rules

- Blank line for paragraph break
- “*” for bullets
- “1.” for enumerations
- Indented line for indented paragraph
- Hyperlinks in [...]
- Safe subset of HTML for advanced markup
- <verbatim>...</verbatim>
- <nowiki>..</nowiki>

Embedded Documentation

http://*baseurl*/doc/*version*/*filepath*

- The fossil website is implemented this way
- *version* can be any version prefix, branch name, "**tip**", or "**ckout**"
  - "**ckout**" allows viewing website before check-in
- MIME-Type from *filepath* suffix
- The ".wiki" suffix renders using wiki rules

Robust & Reliable

- Extensive use of MD5 and SHA1 checksums
  - Each artifact identified by SHA1
  - Control artifacts contain an MD5 checksum
  - Entire content of a check-in verified by MD5
  - Sync messages checked by MD5
- Recoverability checked prior to SQLite transaction commit
- No content has ever been lost from a fossil repository

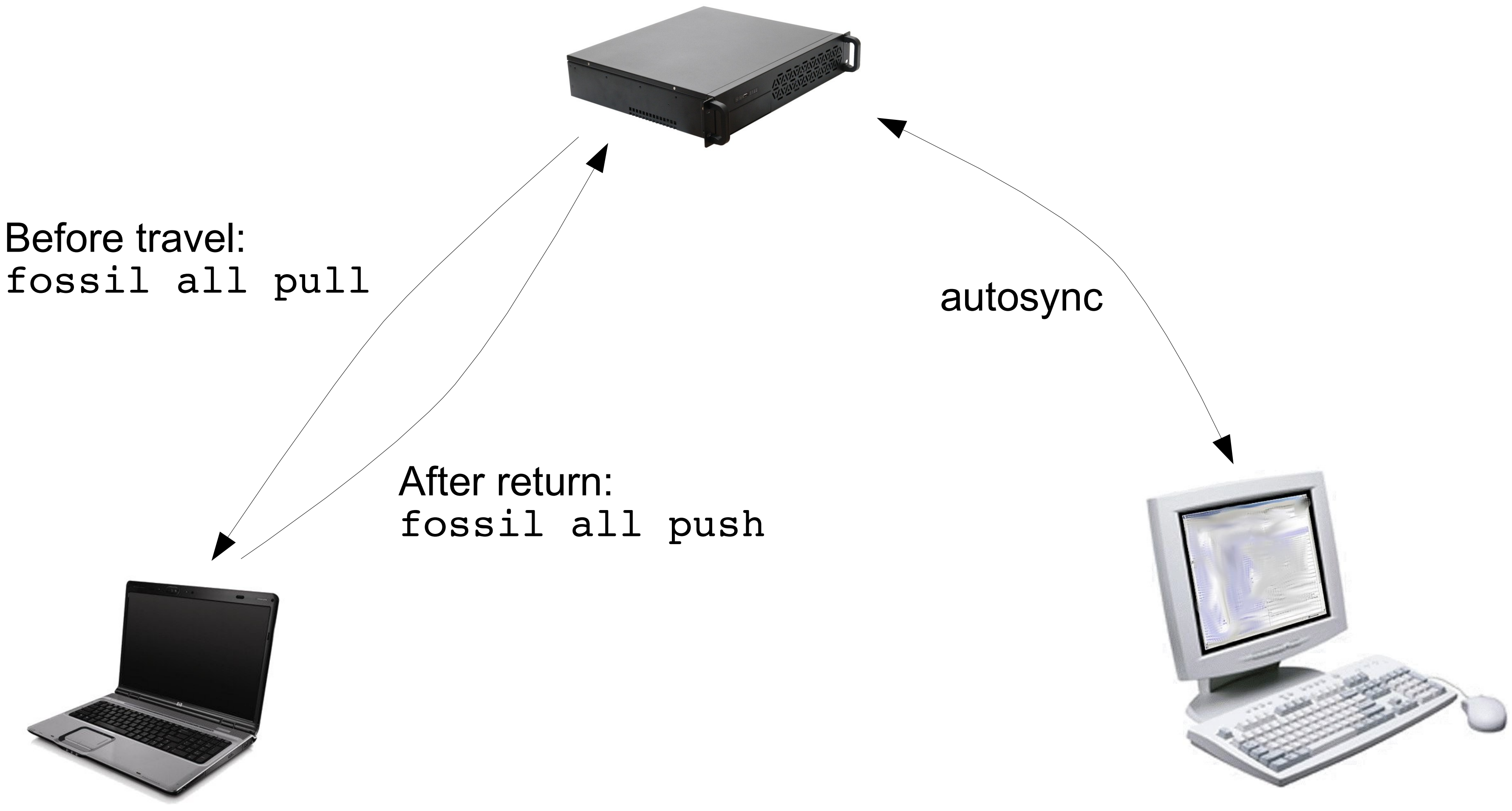
Additional Noteworthy Features

```
fossil help [commandname]
```

- Built-in help

```
fossil all push
fossil all pull
fossil all sync
fossil all rebuild
```

- Run commands against all repositories



```
fossil all pull
```

```
fossil all push
```

Self-hosting since 2007-07-21

- http://www.fossil-scm.org/
- 1356 check-ins
- 310 files in the source tree
- 5366 artifacts
- 161 MB of content in a 9.2 MB repository
  - 17:1 compression ratio
- 4.8 MB network traffic to clone

As of 2009-09-26 21:00 UTC

Complete SQLite Source History

- http://www.sqlite.org/src
- 6863 check-ins over 9.25 years
- 923 files in the source tree
- 29252 artifacts
- 1.3 GB of content in a 22 MB repository
  - CVS required ~320 MB
  - 56:1 compression ratio
- 13.8 MB network traffic to clone

As of 2009-09-26 21:00 UTC

Review

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Summary

- Pushing the state of the art in distributed version control
- Stable and ready to use
- Questions?
- Live Demo?

http://www.fossil-scm.org/