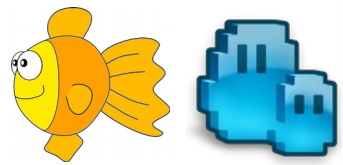
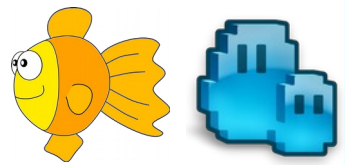
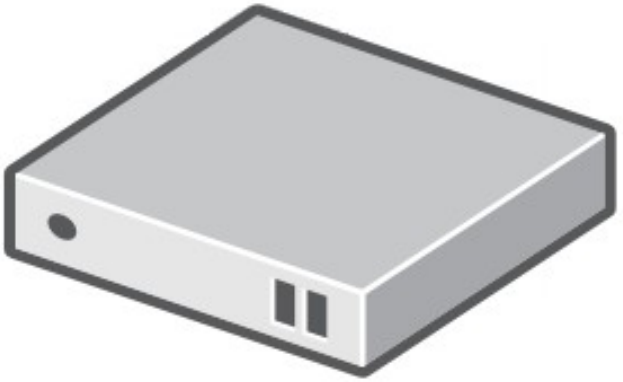


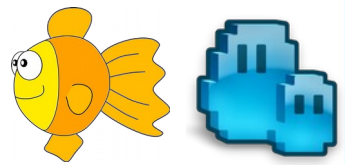
Toward exploring virtual disks using a file manager!

Arik Hadas
Principal Software Engineer
Red Hat
02/02/2019

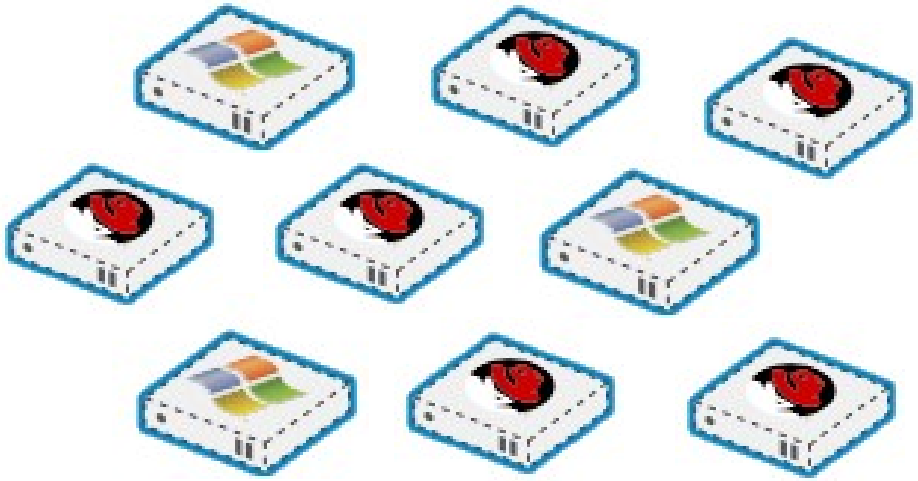


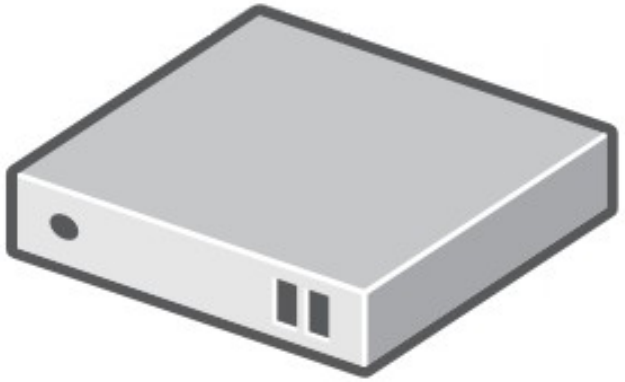
Virtualization

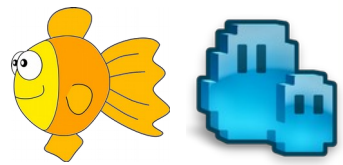




Virtualization

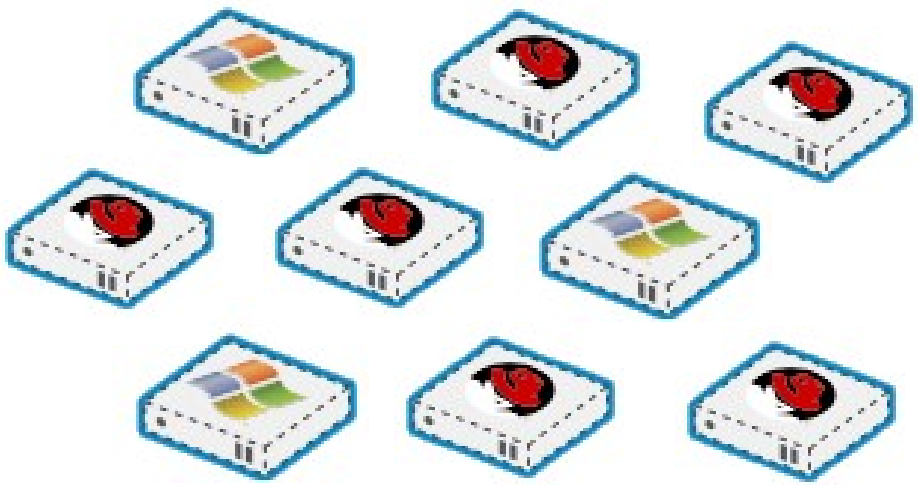


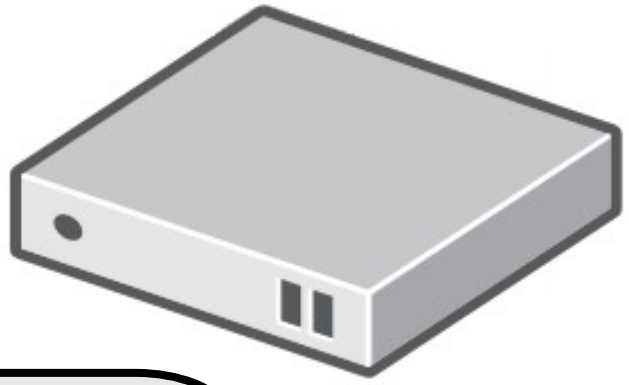




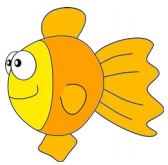
Benefits of Virtualization

- Security
- Emulation of other OSs
- Easier to back up
- Easier to clone to another machine
- ...





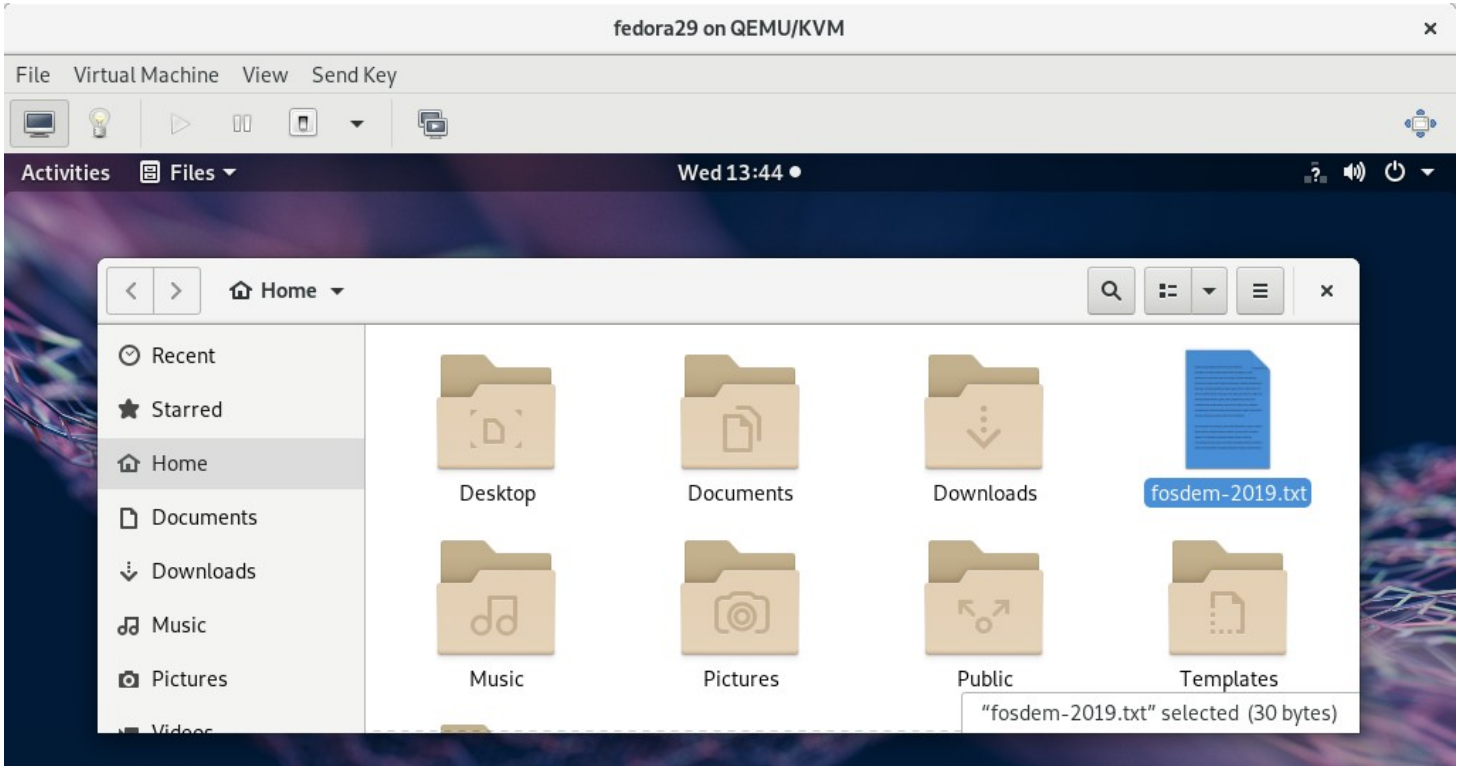
Abstraction!



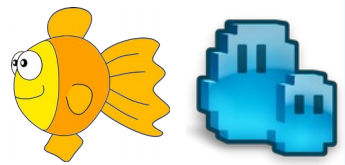
But Abstraction Comes with a Cost

How can I copy data to or from within a virtual machine?

Case #1: From a Running VM



How to copy a file from this guest?



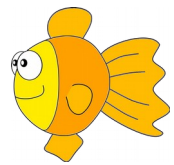
Case #1: Possible Solutions

- Internet-based solutions
  - Email / File-sharing service (e.g., dropbox) / ...
- Lan-based solutions
  - SCP / NFS share / ...
- Guest agent-based solutions
  - Shared-folder / Exposing a service

Slow

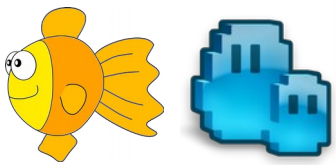
Complex

Vendor Specifc



Case #2: From a Virtual Disk

How can I copy to/from a disk?



Case #2: Possible Solutions

How can I copy to/from a disk?

Non-bootable disk

Attach to a VM

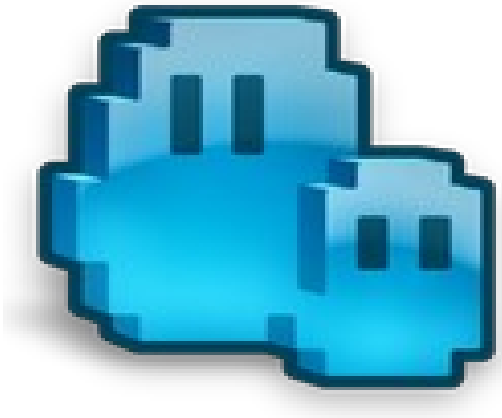
Bootable disk

Attach to a VM /
Start a VM

Slow and more complicated

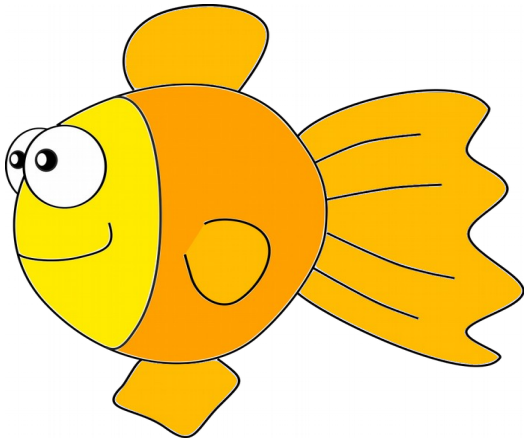
Cannot write to the disk

Main Idea



muCommander

+

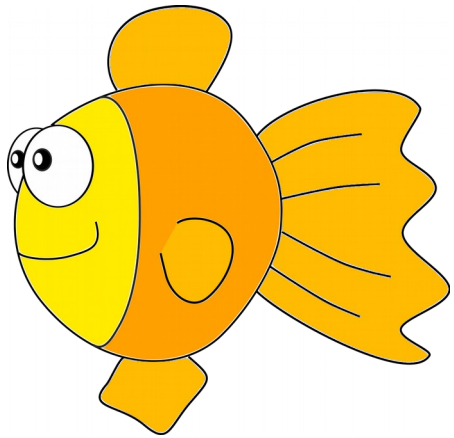


Libguestfs

↓

Browsing and modifying virtual disks using a file manager

Tools for accessing and modifying virtual machine disk images

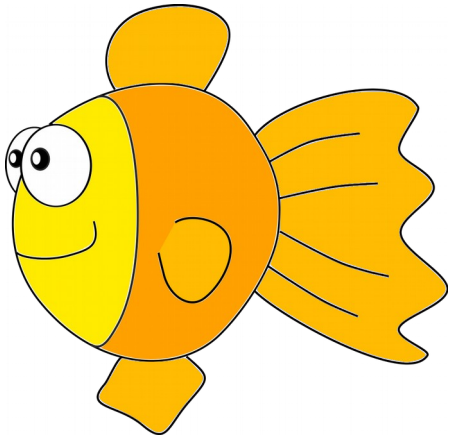


Capabilities of Libguestfs

Can access almost any disk image imaginable

secure — does not need root and with multiple layers of defence against rogue disk images

Can access disk images on remote machines or on CDs/USB sticks



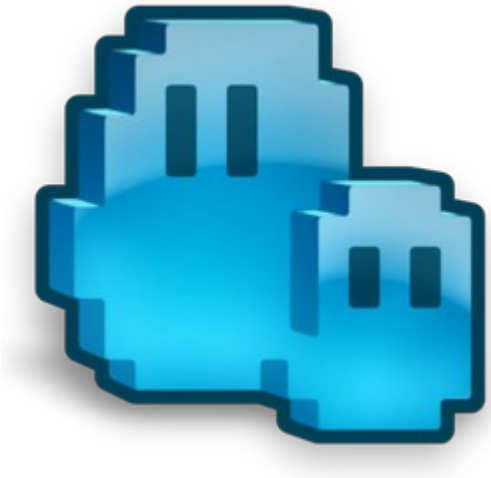
Can access proprietary systems like VMware and Hyper-V.

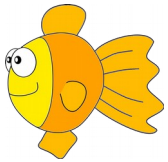
All this functionality is available through a scriptable shell called guestfish, or an interactive rescue shell virt-rescue.

muCommander – The Short Form

"I have found jesus. He came to me in the form of muCommander."

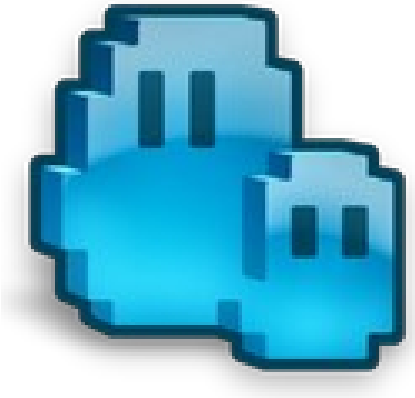
- A happy user



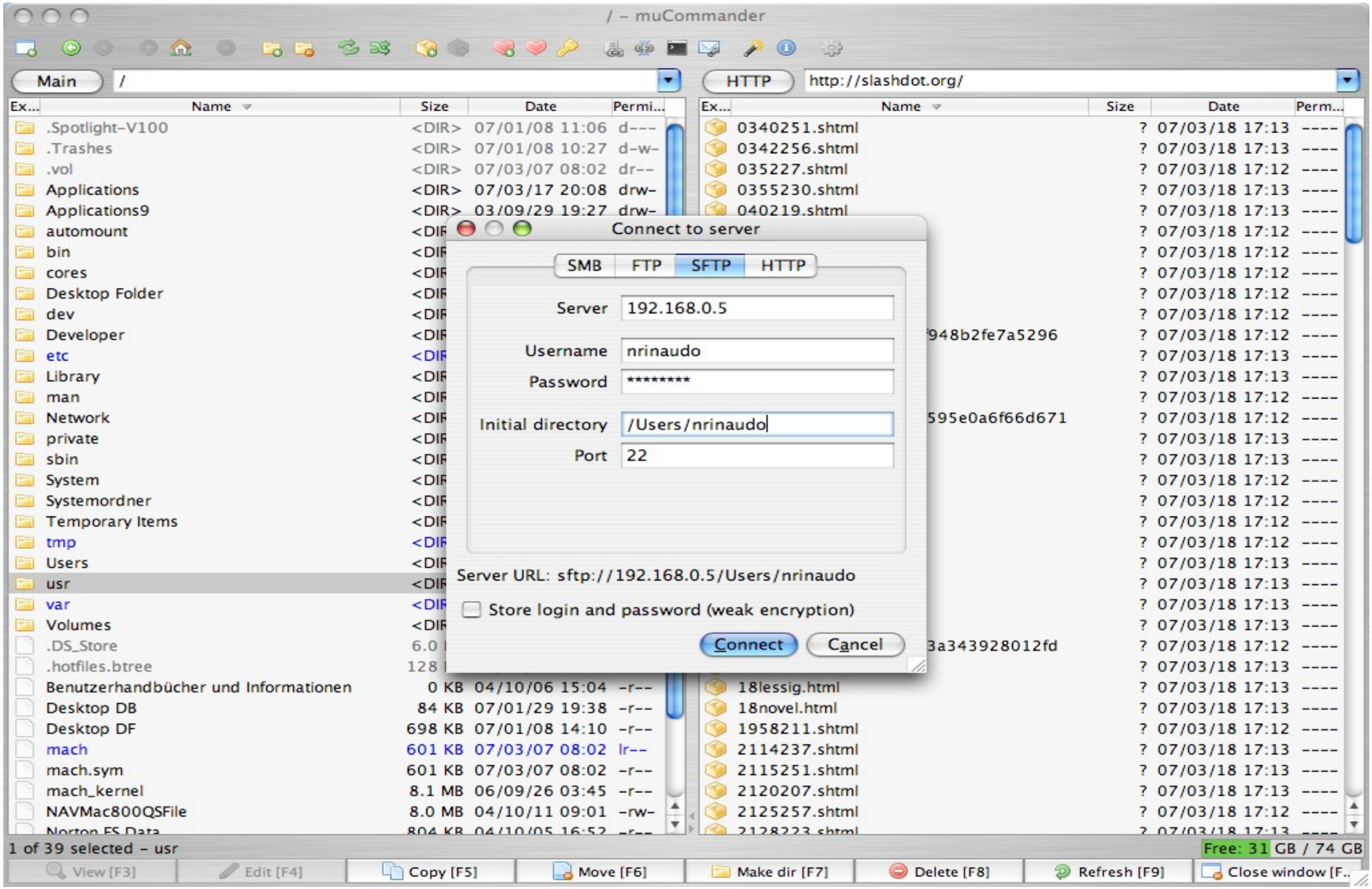


muCommander – The Long Form

*muCommander is a lightweight, cross-platform file manager with a dual-pane interface. It runs on any operating system with Java support (macOS, Windows, Linux, *BSD, Solaris...)*



muCommander – Screenshot



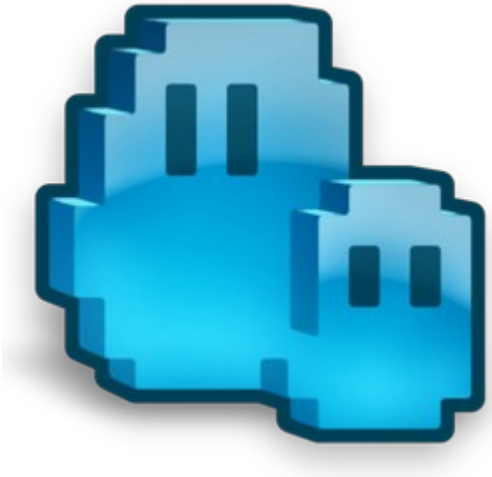
muCommander – Major Features

Virtual filesystem with support for local volumes, **FTP, SFTP, SMB, NFS, HTTP, Amazon S3, Hadoop HDFS and Bonjour**

Quickly copy, move, rename files, create directories, email files...

Browse, create and uncompress **ZIP, RAR, 7z, TAR, GZip, BZip2, ISO/NRG, AR/Deb** and **LST** archives

ZIP files can be modified on-the-fly, without having to recompress the whole archive



Universal bookmarks and credentials manager

Tabbed navigation

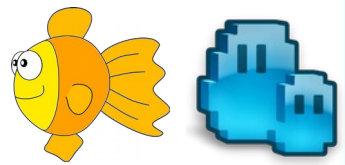
Multiple windows support

Full keyboard access

Highly configurable

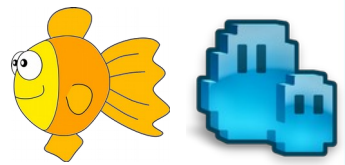
Available in 27 (!) languages

Free and open source (GPL)



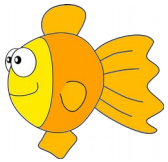
Let’s See It in Action

```
/]$ Demonstration
```



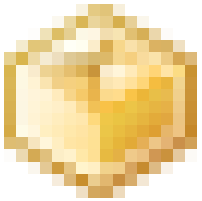
Challenges

- How to model virtual disks (in muCommander)
  - Local as archive files
  - Need lazy inspection as protocol files
- How bridge different APIs
  - For listing the content of a virtual disk
  - For reading and writing data to the disk
- How to ship it



Challenge #1: Model Virtual Disks

Archive Files



Within a file-system,
No authenication

Query their
entire structure

Protocol Files

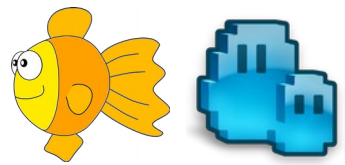
Remote,
Authenication needed

Query their structure in
a lazy way

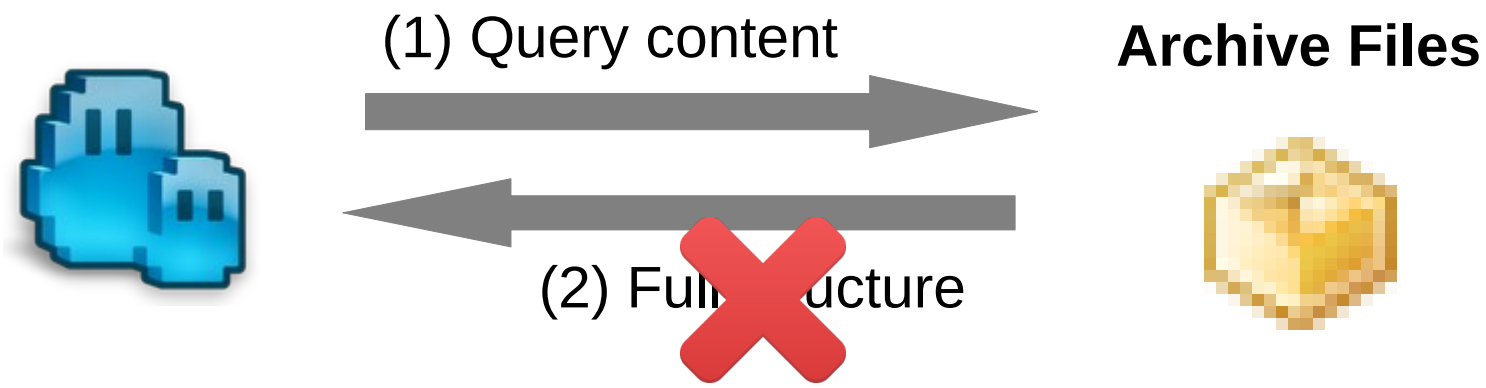
Local Files

Within a file-system,
No authenication

Virtual disks fit neither of these groups

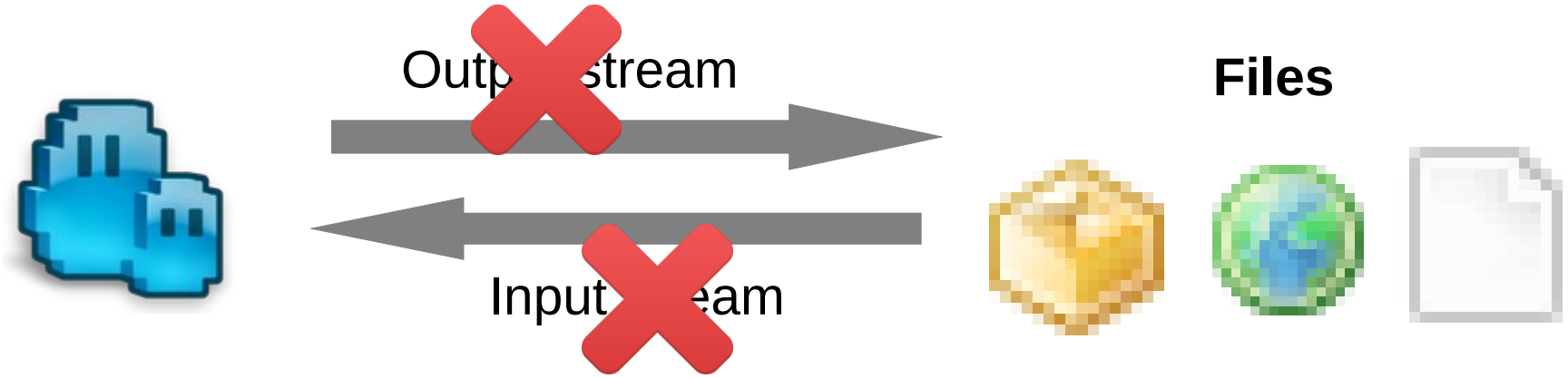


Challenge #2: Bridge Different APIs



Libguestfs does not support querying full structure

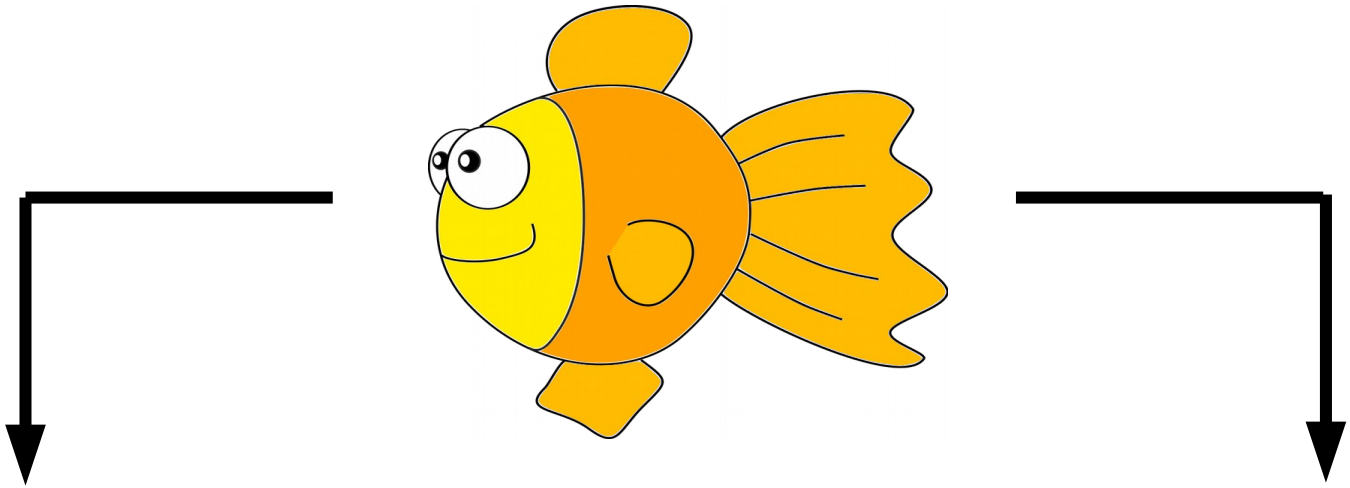
Bridge the difference using the *visitor* pattern



Libguestfs does not support streams

Bridge the difference using temporary files

Challenge #3: How to Ship



libguestfs.jar

Needed at compile time

Part of libguestfs-java

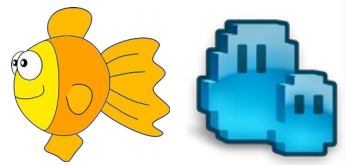
Provide as a plugin

libguestfs-java

Needed at run time

Might be missing

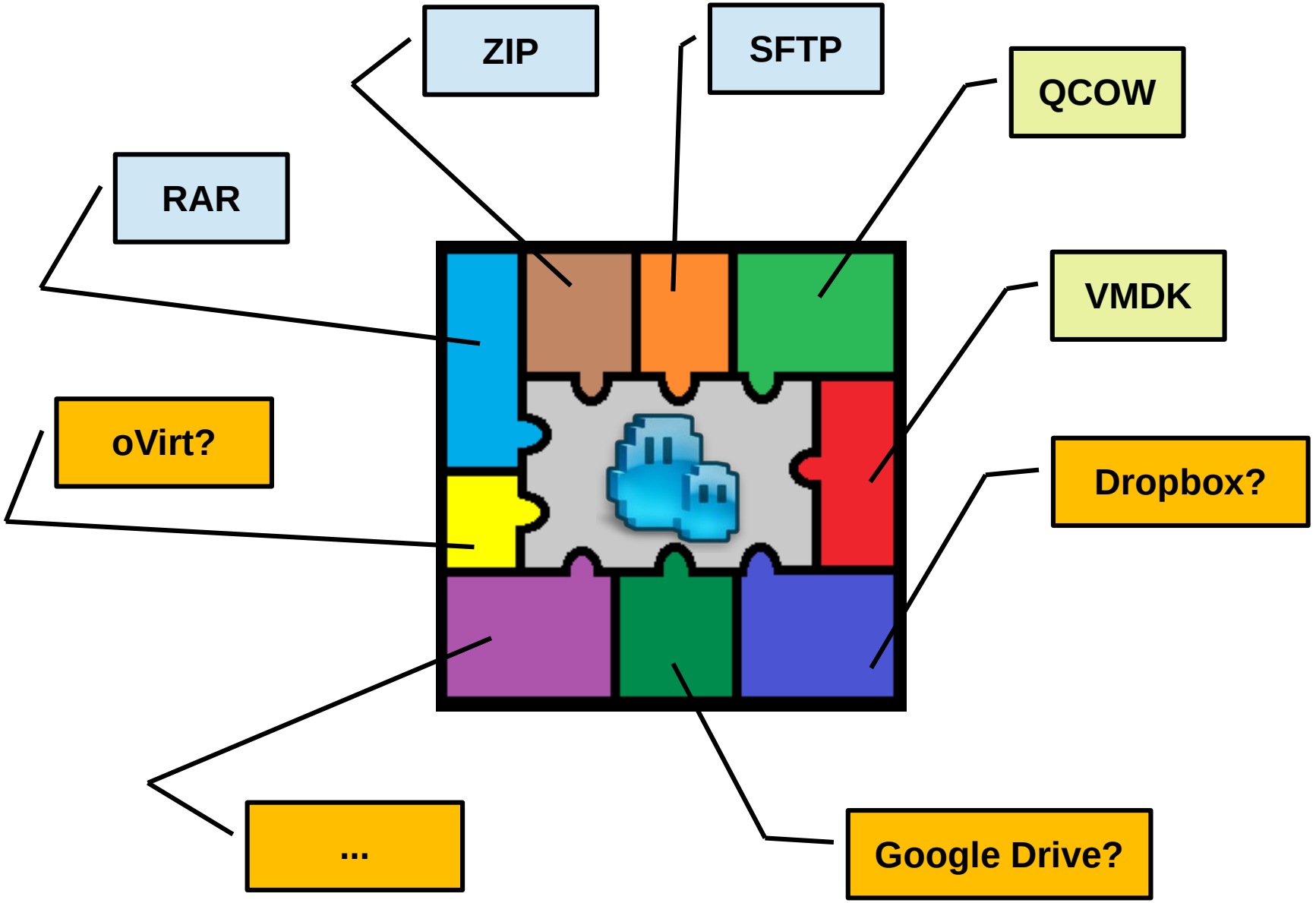
that requires libguestfs-java

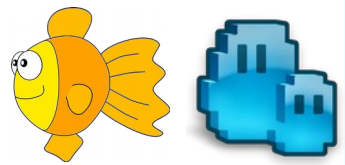


Open Questions

- How to present the content of the disk
  - Guest view – slow, requires OS & all disks
  - Filesystem view – harder to use
  - Maybe a combination of the two?
- Do we want to interact with Libvirt?
- How to implement caching
  - Cannot rely on the disk’s modification date

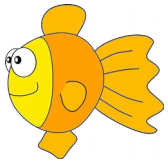
The Vision: Pluggable File Manager





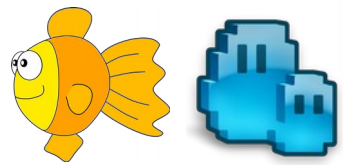
Roadmap

- ~~v0.9.0: Dec 19, 2015~~
- ~~v0.9.1: Oct 21, 2016~~
- ~~v0.9.2: Jun 7, 2017~~
- ~~v0.9.3: Nov 13, 2018~~
  - ~~v0.9.3-1: Dec 8, 2018~~
  - ~~v0.9.3-2: Dec 15, 2018~~
  - ~~v0.9.3-3: Jan 12, 2019~~
- **v0.9.4: TBD**



Summary

- Plugin for virtual disks in muCommander
  - Based on an integration with Libguestfs
  - Provides user-interface for Libguestfs
- Status: work-in-progress
  - Published a POC in Nov, 2018
  - Discussed on libguestfs mailing-list
  - Estimated release date: second half of 2019
  - Your feedback is welcome!



THANK YOU!

http://www.mucommander.com/
http://libguestfs.org/
https://github.com/mucommander/
https://gitter.im/mucommander
ahadas@redhat.com