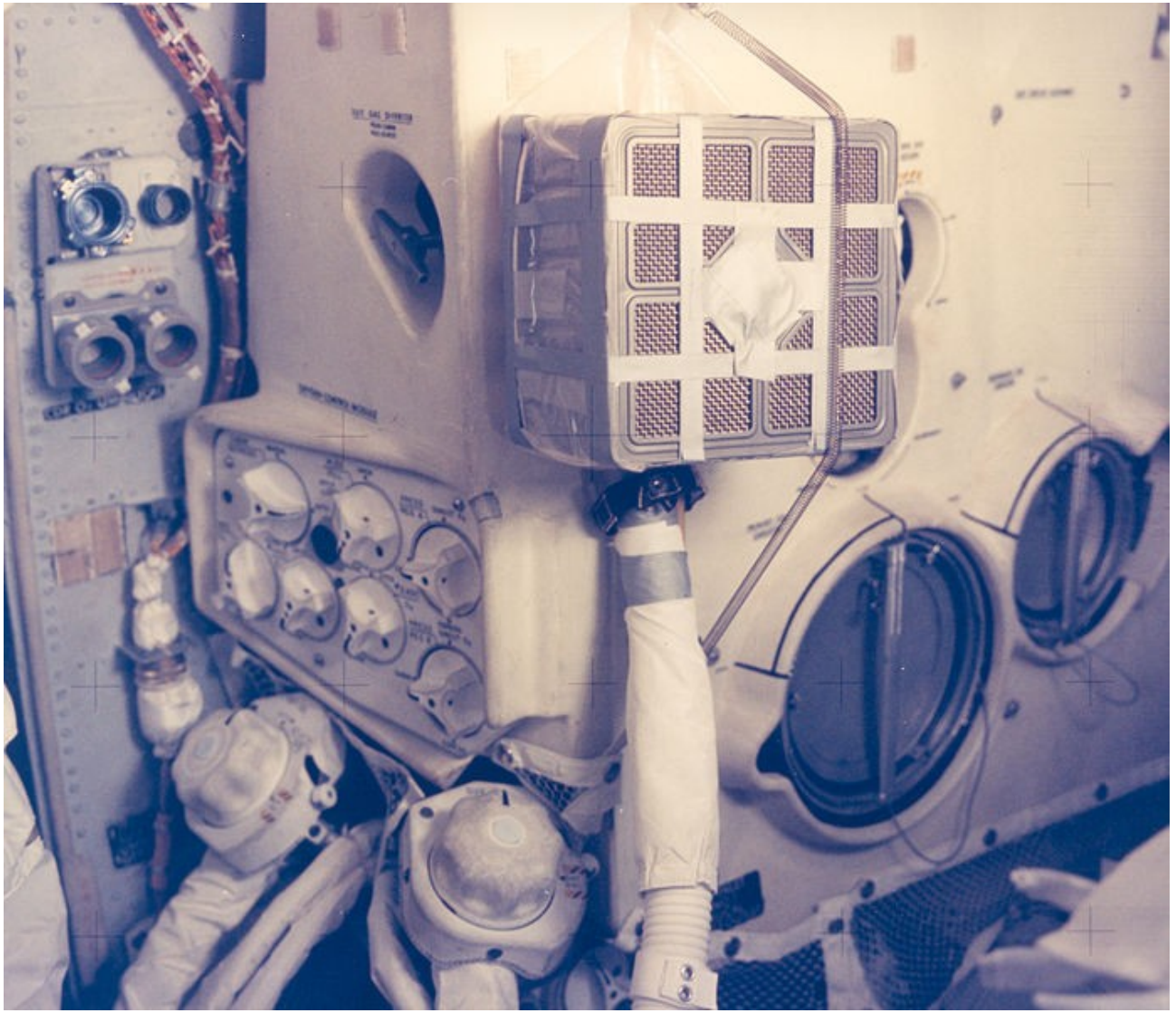
&

FUSE

Parts on the table

Parts on the table

Apollo 13



A neonatal incubator

Parts on the table

A car parts incubator

http://goo.gl/P9ftv

The problem

- You need an OMERO client to extract data
- When working with OMERO-unaware software, the data are duplicated
- The user interface is unfamiliar
- The OMERO client & server versions must match

Solution

More parts on the table!

A possible solution

Expose the data as a filesystem

- All software can access files
- Users are familiar with filesystems
- Data can be generated on-the-fly, avoiding duplication

FUSE

“Filesystems in User SpacE”

- Generate/access filesystems via a process running as a regular program
- Originally developed for the Linux kernel
- Available also for MacOSX

Proof-of-concept

- Written in Python
- Uses python-fuse
- Uses omero.gateway
- 111 lines of code (no documentation :-)
- quick 'n dirty prototype

Proof-of-concept

Implements:

- getattr() (file/directory, size)
- readdir()
- open()
- read()

Running on Ubuntu

- Install FUSE kernel module
- Install python-fuse
- Install ICE 3.3
- Extract lib/python/** from OMERO.server
- Add to PYTHONPATH
- Change host, user and password in script
- ./ome-fuse.py <mountpoint>

ENOSYS

- Does not implement reading images yet
- No caching
- No metadata
- Keeps connection alive until unmount
- Uses 4.2.2 API

Wish list

- Opening images
  - in multiple formats
  - possibly split into 2D images
- Importing images
- Reading/writing metadata
- Integration into LDAP/ActiveDirectory/etc
- Adoption by OME :-)

Limitations of OME-FUSE

- Does not work on Windows
- Is not integrated into OMERO, thus cannot benefit from server-side optimizations
- Additional dependencies (when we wanted less)
- Possible performance bottlenecks

Alternatives to FUSE

Local alternatives

- Custom filesystem
  - platform-dependent
  - technically challenging
- Interception through LD_PRELOAD
  - non-portable (only works on Linux/MacOSX)
  - requires special program startup

Alternatives to FUSE

Remote alternatives

- Samba
  - needs on-demand FUSE mounting
- SMB/CIFS
  - JLAN (AndroidSMB)
  - porting AzSMB
- NFS
  - JavaNFS

Supporters

Thank you!

The OME team http://www.openmicroscopy.org/

The Bio-Formats team http://www.openmicroscopy.org/

The ImageJ2 team http://imagejdev.org/

The Fiji team http://fiji.sc/