

Moving and Storing Data

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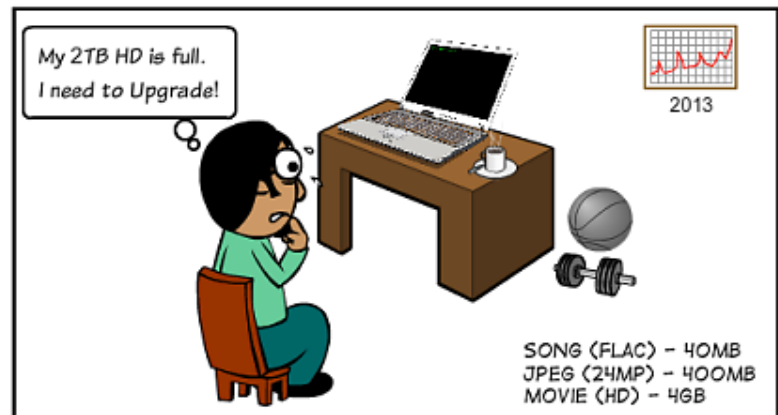
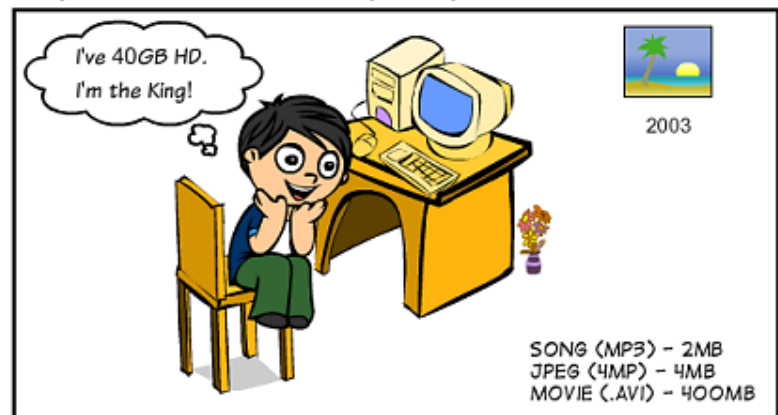
Slides:

https://github.com/ResearchComputing/Basics_Supercomputing

Outline

- The meaning of data transfer
- How much is too much data?
- Data sizes
- Various transfer methods
- Globus

TERABYTE - BY SUNILPARASHAR

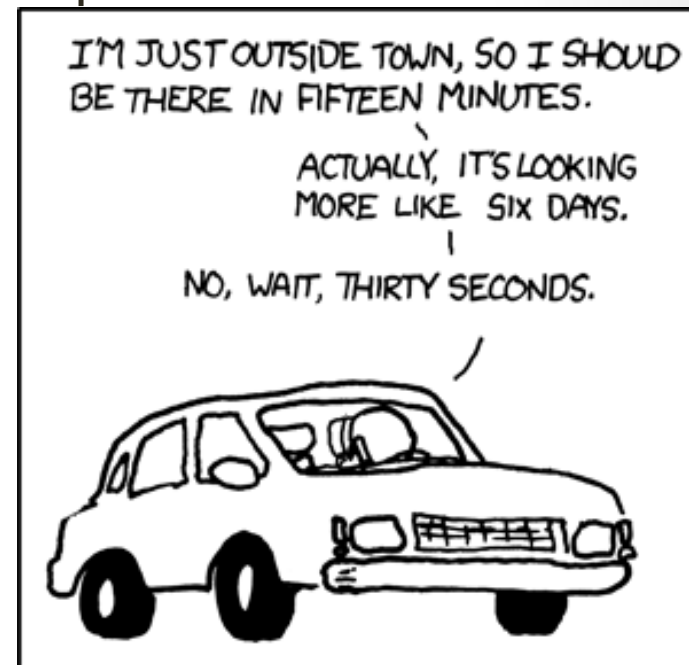


Transferring Data

- This talk will outline the various and most common methods of transferring data between locations
- What is data?
 - Anything!
 - Text documents, Excel spreadsheets, Powerpoint files, binary files, images...anything that is being moved
- What is important for data transfer?
 - Speed
 - Security
 - Integrity

Transferring Data

- Here we are discussing the movement of a file or files from one location to another
 - Generally one computer to another computer at a remote location
 - Either on the same network or separate
- The files are converted to packets then transferred over the network



XKCD

THE AUTHOR OF THE WINDOWS FILE COPY DIALOG VISITS SOME FRIENDS.

Data Sizes

- What's a GB? TB?
- 1 byte: 8 bits, the size of one alphanumeric character
- 1 KB: 1024 bytes
- 1 MB: 1024 KB
- 1 GB: 1024 MB
- 1 TB: 1024 GB
- 1 PB: 1024 TB



Data Sizes - Representation

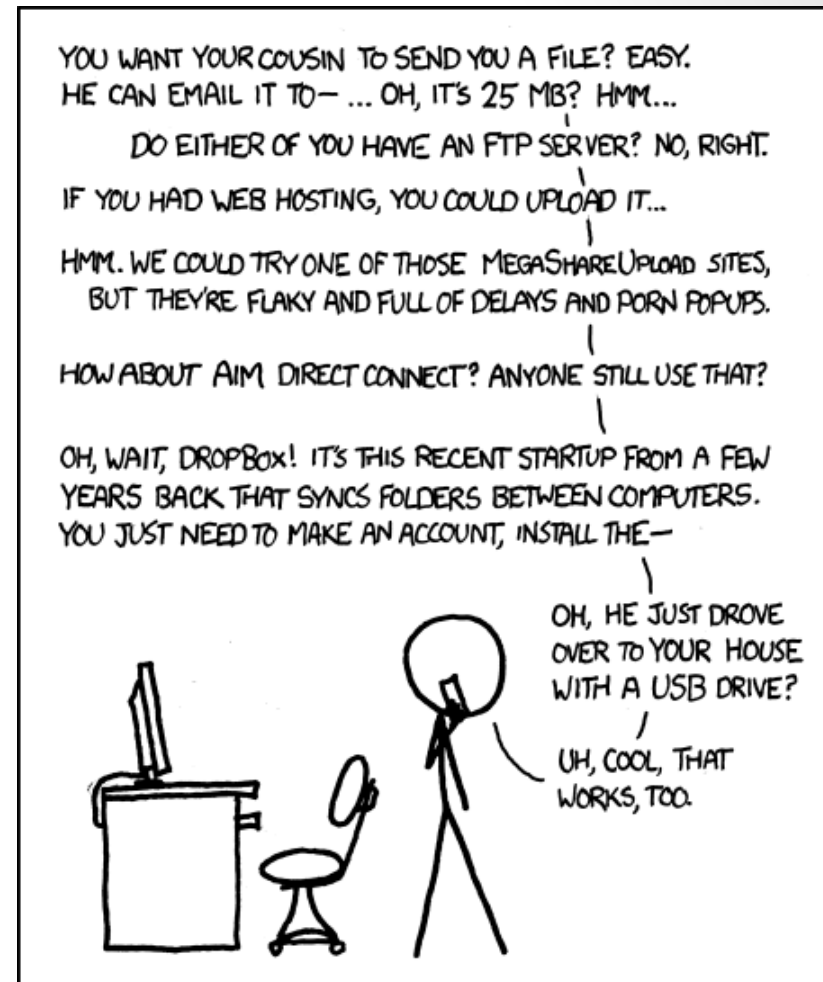
- The average size of a single keystroke is 1 byte (8 bits)
- A line of text is 70 bytes
- 5 page word document is ~30 KB
- A typical iPhone photo: 500 KB
- 1 minute of CD quality audio: 1 MB
- Typical maximum email size: 10 MB
- MODIS Level 1B satellite file: 700 MB



<http://www.gn.apc.org/support/understanding-file-sizes>

Typical Data Transfer Rates

- Morse code: 0.05 Kbit/s
- Dial up modem: 40 Kbit/s
- DSL: 40 Mbit/s
- Cable modem: 1 Gbit/s
- Ethernet: 1 Gbit/s
- Wifi: 1.3 Gbit/s
- 4G Cell phone: 12 Mbit/s



XKCD

I LIKE HOW WE'VE HAD THE INTERNET FOR DECADES, YET "SENDING FILES" IS SOMETHING EARLY ADOPTERS ARE STILL FIGURING OUT HOW TO DO.

Various Transfer Methods

- There have been many means for transferring data over the years:
 - rcp
 - scp
 - ftp
 - wget
 - sftp
 - Bit torrent
 - rsync
- Some are still in use and some are past their lifetime
- Let's cover some of these protocols in more detail

scp

- Secure copy
- Transfers files using encryption
- Example code:

```
scp file.txt username@remote_host.com:/home/username
```

Or, in reverse:

```
scp username@remote_host.com:/home/username/file.txt  
/home/username/
```

SFTP

- Secure File Transfer Protocol
- Like scp uses ssh to transfer files
- More secure and encrypted
- Transfer files, plus:
 - List files in directories
 - Resume uninterrupted transfers
 - Remote file manipulation
- Web browser or command line
- FileZilla

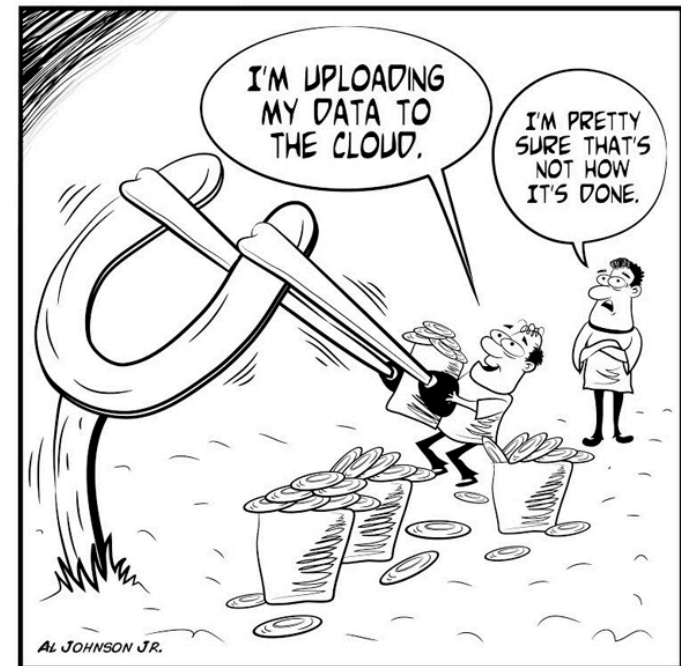
rsync

- rsync is a way to copy and synchronize two computers
- Faster than scp because it downloads only the differences between files (after initial download)
- Can use encryption
- Uses compression to move files
- Tons of options
- If lost connection, will resume where left off
 - Scp will not
- Uses checksums to verify transfer integrity

Rsync options source destination

“The Cloud”

- What is this ambiguous cloud?
 - It's a network of servers that run applications, deliver services, or store data
 - It is a good way to keep costs down and have data available wherever, whenever
 - Security issues?
 - Who owns your data?
 - Cost savings
 - Hardware, buildings, IT staff



©CloudTweaks.com

Globus

- Globus is our preferred method of data transfer
- Designed with researchers in mind
- End points between computers make for easy data transfer with an easy to use interface
 - Endpoints are different locations that data can be moved to/from
 - Personal or multi-user
- Scripting in use also if don't want to use GUI

www.globus.org

Globus

- Preserves the integrity of data
 - Compares checksums
 - Resumes data transfer if interrupted
- Fast transfer of large data sets
- Globus can be set up to easily share data among collaborators

Transfer Files

RECENT ACTIVITY 0 0 0

Endpoint
Path
Go

select all

up one folder

refresh list

1p

3dnlexc

A00081L6

LAMMPS

NAMD

PLbackups

ansys

ansys-tmp

athena4.1_large_box

backup

benchmark

bigfiles

collecti.data.2432303

csu-tests

from-work-ics

globus-test

ibroutes

kybe-testing

lagrange

mathworks_downloads

Folder

Folder

Folder

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Folder

Folder

Folder

Folder

Folder

Folder

Folder

Endpoint
Path
Go

select all

up one folder

refresh list

1p

HPL

LAMMPS

alltoall

f10l24t24ls16b410m000_3stout_aaaa

testing

README.mdwn

local-lib-1.008004.tar

lotazeros2

lotazeros2b

Folder

Folder

Folder

Folder

Folder

Folder

536 B

200.70 KB

822.65 MB

822.65 MB

Let's look at the process.

<https://www.globus.org/>

References Used:

- <http://www.tecmint.com/rsync-local-remote-file-synchronization-commands/>
- <http://www.admin-magazine.com/HPC/Articles/Moving-Your-Data-It-s-Not-Always-Pleasant>
- <http://www.gn.apc.org/support/understanding-file-sizes>
- compnetworking.about.com
- <http://dem.nv.gov/uploadedFiles/demnvgov/content/NCSC/LTE-BroadbandAndPublicSafetyPrimer.pdf>

Survey: <http://goo.gl/forms/8VidcwOhRT>

Questions?

- Email rc-help@colorado.edu

- Link to survey on this topic:
<http://tinyurl.com/curc-survey16>

Speaker: Shelley Knuth

Title: Moving and Storing Data? July 2017 BSW

- Slides:
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