ChRIS Virtualization Project

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Guidance and Mentorship: Rudolph Pienaar
PhD Researcher Boston Children's Hospital

Whereby /rudolphpienaar 6/12 ... Log in Sign up

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File  Edit  View  Bookmarks  Settings  Help
src: docker  (rudolphpienaar) localhost  fshack: vim  (rudolph) localhost
chris_env  rudolph  pangea  SSH  neuro  users  rudolphpienaar  data  $ recon-all -i SAG-anon/0001-1.3.12.2.1107.5.2.19.45152.20130308081102589291860 35.dcm -all -notalaraich -s ou
tput
ERROR: Flag -notalaraich unrecognized.
-i SAG-anon/0001-1.3.12.2.1107.5.2.19.45152.20130308081102589291860 35.dcm -all -notalaraich -s output
Linux pangea 5.4.0-7624-generic #28~1586790353~20.04~9e10e31-Ubuntu SMP Mon Apr 13 19:56:56 UTC  x86_64 x86_64 x86_64 GNU/Linux

recon-all -s  exited with ERRORS at Wed 06 May 2020 12:31:44 PM EDT

For more details, see the log file
To report a problem, see http://surfer.nmr.mgh.harvard.edu/fswiki/BugReporting

chris_env  rudolph  pangea  SSH  neuro  users  rudolphpienaar  data  $ recon-all -i SAG-anon/0001-1.3.12.2.1107.5.2.19.45152.20130308081102589291860 35.dcm -all -notalairach -s ou
tput
Subject Stamp: freesurfer-Linux-centos6_x86_64-stable-pub-v5.3.0
Current Stamp: freesurfer-Linux-centos6_x86_64-stable-pub-v5.3.0
INFO: SUBJECTS_DIR is /net/rc-fs-nfs/ifs/data/NoSync/FNNDSC-NR/neuro/labs/grantlab/users/rudolphpienaar/data
Actual FREESURFER_HOME /net/rc-fs-nfs/ifs/data/NoSync/FNNDSC-NR/neuro/arch/Linux64/packages/freesurfer/stable-5.3
Linux pangea 5.4.0-7624-generic #28~1586790353~20.04~9e10e31-Ubuntu SMP Mon Apr 13 19:56:56 UTC  x86_64 x86_64 x86_64 GNU/Linux
/net/rc-fs-nfs/ifs/data/NoSync/FNNDSC-NR/neuro/labs/grantlab/users/rudolphpienaar/data/output

 mri_convert /net/rc-fs-nfs/ifs/data/NoSync/FNNDSC-NR/neuro/labs/grantlab/users/rudolphpienaar/data/SAG-anon/0001-1.3.12.2.1107.5.2.19.45152.20130308081102589291860 35.dcm /net/rc-fs-nfs/ifs
/data/NoSync/FNNDSC-NR/neuro/labs/grantlab/users/rudolphpienaar/data/output/mri/orig/001.mgz

mri_convert /net/rc-fs-nfs/ifs/data/NoSync/FNNDSC-NR/neuro/labs/grantlab/users/rudolphpienaar/data/SAG-anon/0001-1.3.12.2.1107.5.2.19.45152.20130308081102589291860 35.dcm /net/rc-fs-nfs/ifs/
data/NoSync/FNNDSC-NR/neuro/labs/grantlab/users/rudolphpienaar/data/output/mri/orig/001.mgz
-------------------------------------------------------------------------
ERROR: Invalid FreeSurfer license key found in license file /neuro/arch/x86_64-Linux/packages/freesurfer/stable/.license
  If you are outside the NMR-Martinos Center,
  go to http://surfer.nmr.mgh.harvard.edu to
  get a valid license file (it's free).
  If you are inside the NMR-Martinos Center,
  make sure to source the standard environment.
-------------------------------------------------------------------------
$Id: mri_convert.c,v 1.179.2.7 2012/09/05 21:55:16 nreuter Exp $
reading from /net/rc-fs-nfs/ifs/data/NoSync/FNNDSC-NR/neuro/labs/grantlab/users/rudolphpienaar/data/SAG-anon/0001-1.3.12.2.1107.5.2.19.45152.20130308081102589291860 35.dcm ...
Linux pangea 5.4.0-7624-generic #28~1586790353~20.04~9e10e31-Ubuntu SMP Mon Apr 13 19:56:56 UTC  x86_64 x86_64 x86_64 GNU/Linux

recon-all -s output exited with ERRORS at Wed 06 May 2020 12:33:18 PM EDT

For more details, see the log file /net/rc-fs-nfs/ifs/data/NoSync/FNNDSC-NR/neuro/labs/grantlab/users/rudolphpienaar/data/output/scripts/recon-all.log
To report a problem, see http://surfer.nmr.mgh.harvard.edu/fswiki/BugReporting

chris_env  rudolph  pangea  SSH  neuro  users  rudolphpienaar  data  $
```

Screenshare (Rudolph)

Michael Hajjar (you)

Huynh

Justin

Jaewoo

Rudolph

Henry Mayper

Boston Children's Hospital

Until every child is well

? Cam Mic Share Chat People Leave

We're Programmers, not MRI Technicians

Project Overview

- “Doctors cannot be expected to fire up a Linux terminal or use command lines to extract useful data.”
- The ChRIS (ChRIS Research Integration System) platform was designed to help medical professionals use computational medicine in as user-friendly a way as possible.
- This project is about creating a plugin that will fit into the ChRIS system and running a complicated tool in a container.
- This also provides more data that doctors and physicians can pull from rather than giving a “ballpark” diagnosis.
- Ultimately, to drive **medical innovation**.

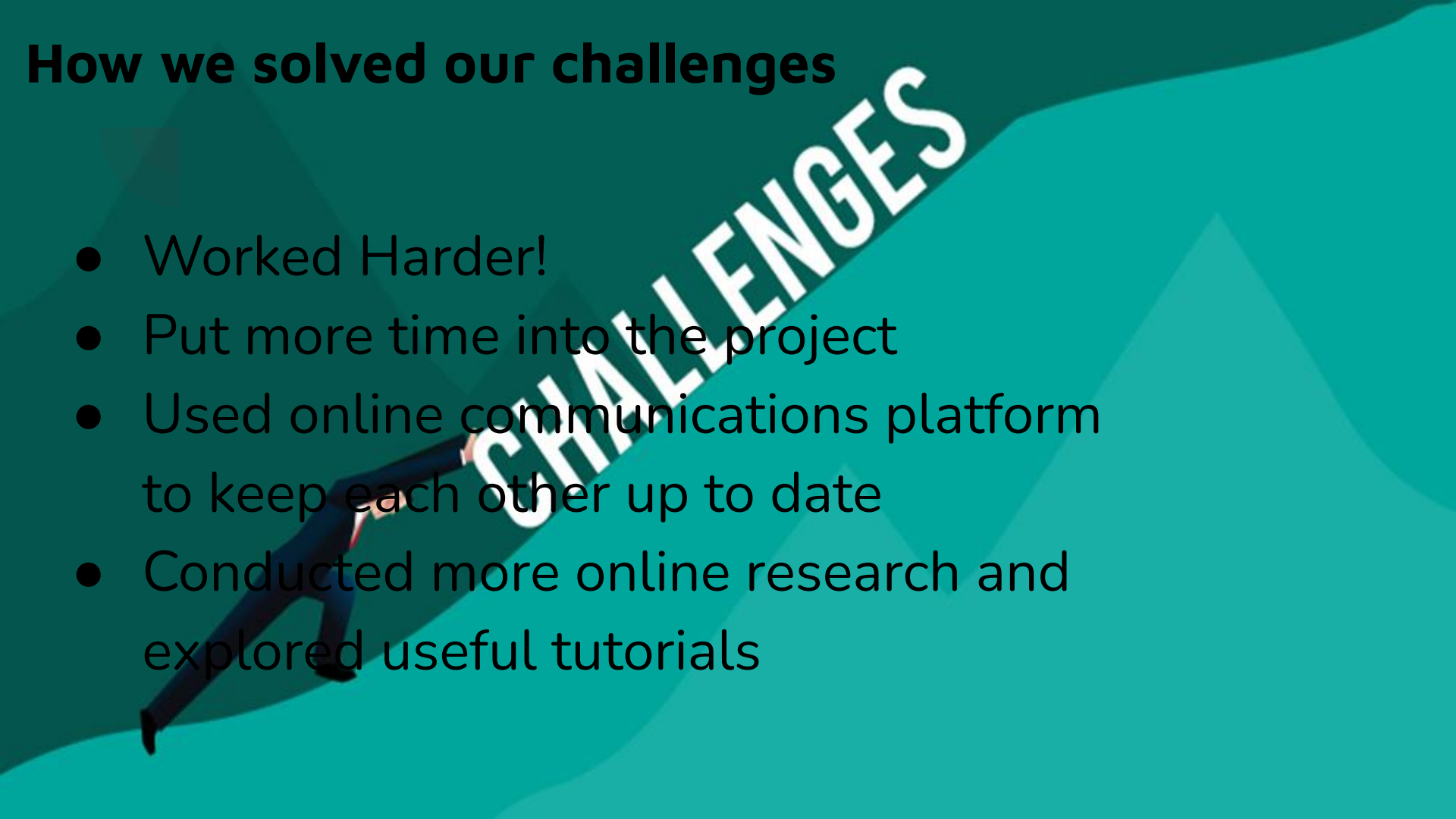
Initial Plan and Ideas

- Deploy technology onto a Docker container.
- Maybe we work on some kind of User Interface
- Revisioning and getting Freesurfer to run
- Use a cookie-cutter?
- Learn the environment on the titan server
- Explore cookie cutter and all it's commands

Challenges! 28 Days Later

- Project Proposal, did not have an adept understanding to get a good grade on the proposal.
- Everyone having a full running program on their local machines
- COVID-19, disrupted our multiple weekly meetings, had to switch to discord for communications and Whereby for video conferencing as well as slack for contacting Dr. Pienaar
- Setting up the environment was difficult
- Everyone attempting to do the project their own way

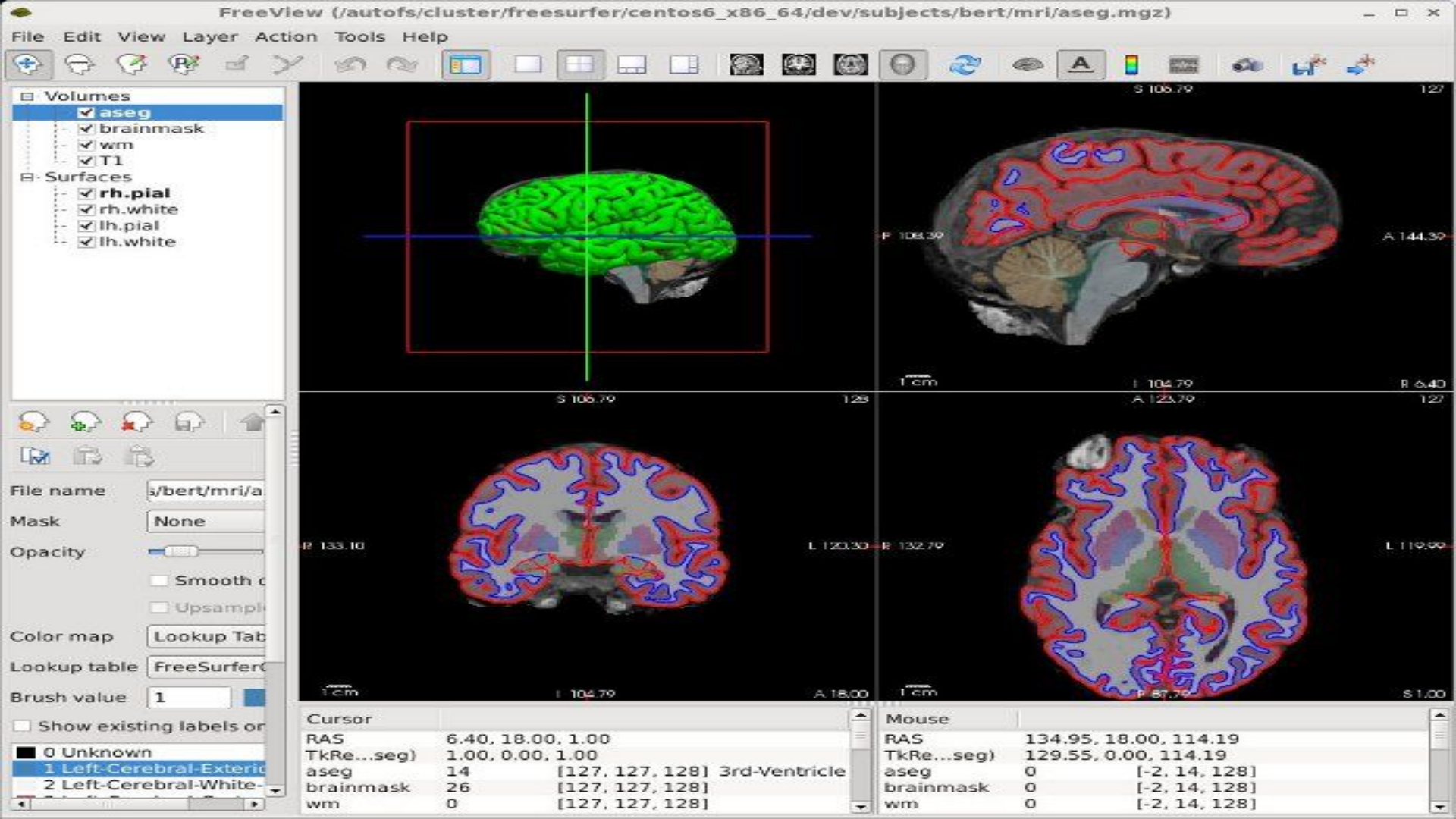
How we solved our challenges



- Worked Harder!
- Put more time into the project
- Used online communications platform to keep each other up to date
- Conducted more online research and explored useful tutorials

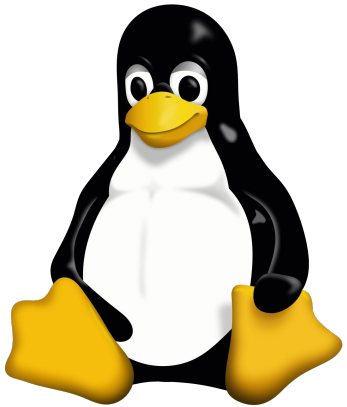
Live Show Action

Our Live action presentation of how our project runs


FreeView (/autofs/cluster/freesurfer/centos6_x86_64/dev/subjects/bert/mri/aseg.mgz)
File Edit View Layer Action Tools Help
Volumes
aseg
brainmask
wm
T1
Surfaces
rh.pial
rh.white
lh.pial
lh.white
File name
Mask
None
Opacity
Color map
Lookup table
Brush value
1
Show existing labels or
0 Unknown
1 Left-Cerebral-Exteric
2 Left-Cerebral-White-
Cursor
RAS 6.40, 18.00, 1.00
TkRe...seg) 1.00, 0.00, 1.00
aseg 14 [127, 127, 128] 3rd-Ventricle
brainmask 26 [127, 127, 128]
wm 0 [127, 127, 128]
Mouse
RAS 134.95, 18.00, 114.19
TkRe...seg) 129.55, 0.00, 114.19
aseg 0 [-2, 14, 128]
brainmask 0 [-2, 14, 128]
wm 0 [-2, 14, 128]

Technology Used

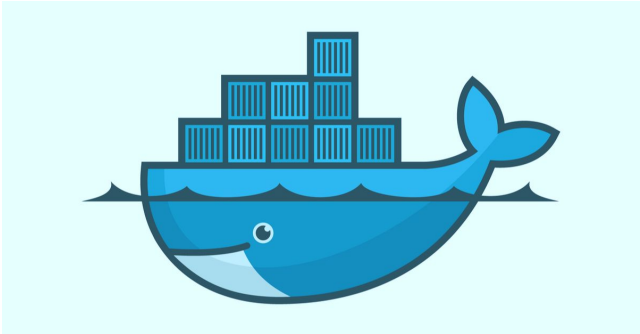
- In order to run this project, Linux was required whether it was run natively or on a virtual machine.
- FreeSurfer (Brain Imaging Software) that is obtained from the Harvard Educational website, must apply for license to run freely
- Docker, which gives us an O.S. level virtualization to deliver the software within a container
- Pl-fshack, a ChRIS app based platform that houses the complete FreeSurfer Install and runs it via a plugin
- Python! High level general purpose programming language



Shipping and Handling

- Installing Freesurfer from within the Docker container required running a setup script that sets up environment variables. These environment variables would disappear upon building the image.

- Instead, we pre-set the environment variables and got them to persist after Docker runs.



Lessons Learned

- How to use Docker
- Better understanding of Linux
- Using Linux over Windows is preferred.

https://slides.com/haehn/cs410_lecture22#/12/0/1

- With Linux, there's much less overhead!

"Never a failure, always a lesson"

Where ~~Do~~ Would We Go From Here?

- Update the Github Readme file for people who would like to learn more about running this who don't have experience and are new to this technology
- Initially, we used freesurfer version 6, but switched it to the more recent version 7
    - Latest version will be used in maintenance despite slight sacrifice in stability (small errors msgs, but program still works! That's okay, right?)

Thank You! Any Questions?

:)