

UNIX primer

Some tips and tricks on the **Command Line**

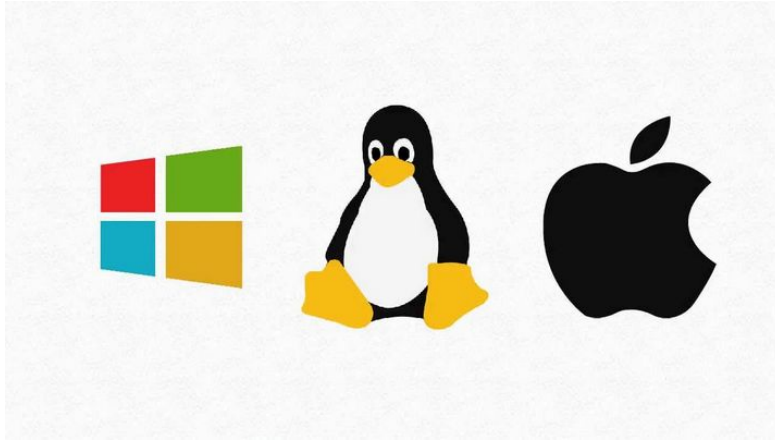
Jakub Vlček & Daniela Souza-Costa
Angélica Cuevas & Angela P. Fuentes-Pardo

January 19, 2025



What is UNIX?

- Operating system



Why UNIX?

- Scripting
- Powerful tools
- Easy remote access
- A GUI (Graphical User Interface) is not available for many programs
- Compatibility



Learning goals

- Navigate in the UNIX environment
- Create, move and delete directories
- Create, move, delete and edit files
- Use basic UNIX commands
- Know where to find help



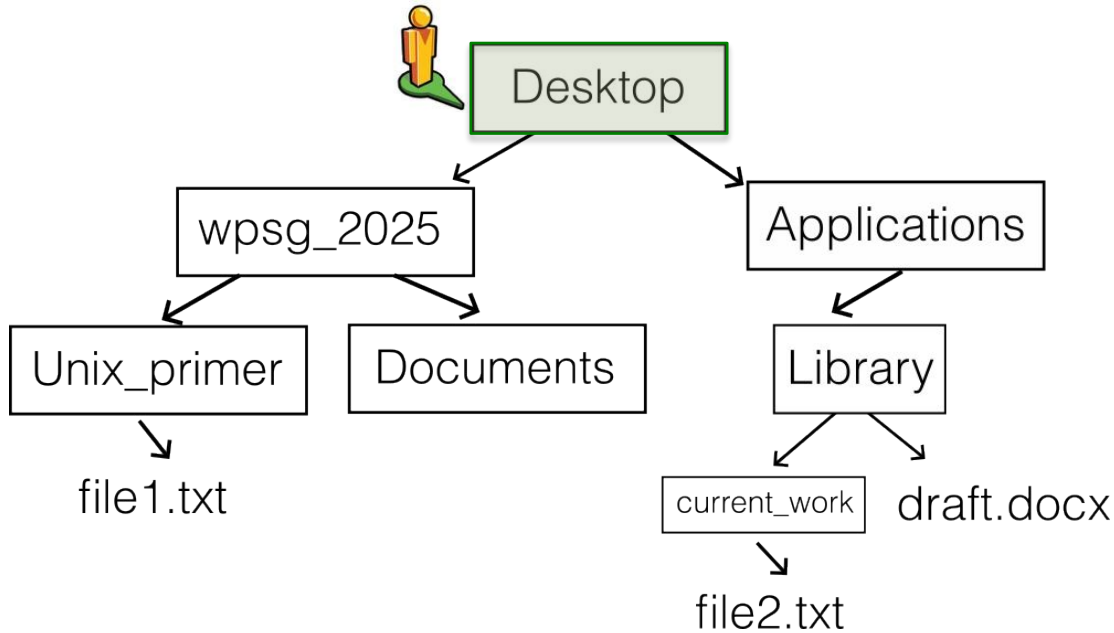
The Terminal

```
vikofly@vikofly-ThinkPad-X13-Gen-1: ~
vikofly@vikofly-ThinkPad-X13-Gen-1: ~
vikofly@vikofly-ThinkPad-X13-Gen-1: ~
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vikofly@vikofly-ThinkPad-X13-Gen-1: ~
```

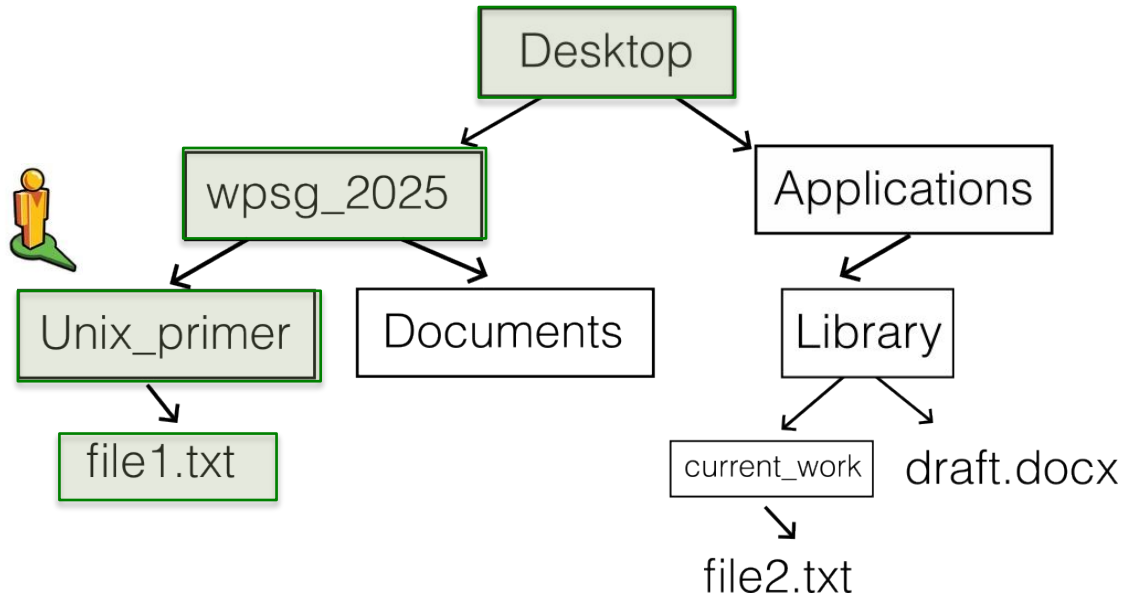
(the Command Line, Shell, Prompt)



PATHS: Absolute vs. Relative



PATHS: Absolute vs. Relative

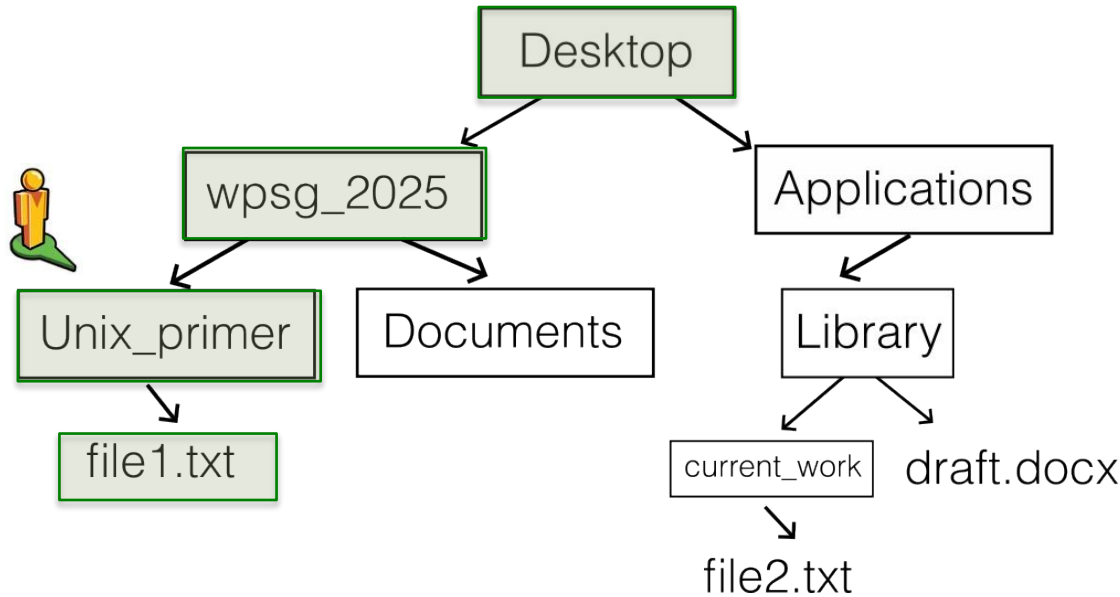


PATHS: Absolute vs. Relative

In the **Command Line**

ls = list

cd = change directory

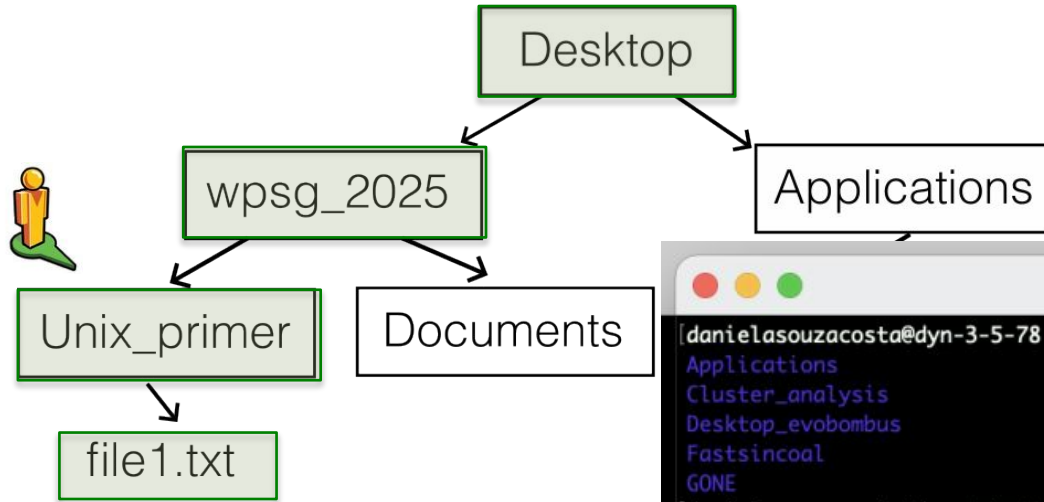


PATHS: Absolute vs. Relative

In the **Command Line**

ls = list

cd = change directory



```
Unix_primer -- -zsh -- 114x24
[danielasouzacosta@dyn-3-5-78 Desktop % ls
Applications          PCA_2024              currentNe
Cluster_analysis     Relate_All_samples   wpsg_2025
Desktop_evobombus
Fastsincoal
GONE
[danielasouzacosta@dyn-3-5-78 Desktop % cd wpsg_2025/Unix_primer
[danielasouzacosta@dyn-3-5-78 Unix_primer % ls
file1.txt
danielasouzacosta@dyn-3-5-78 Unix_primer %
```

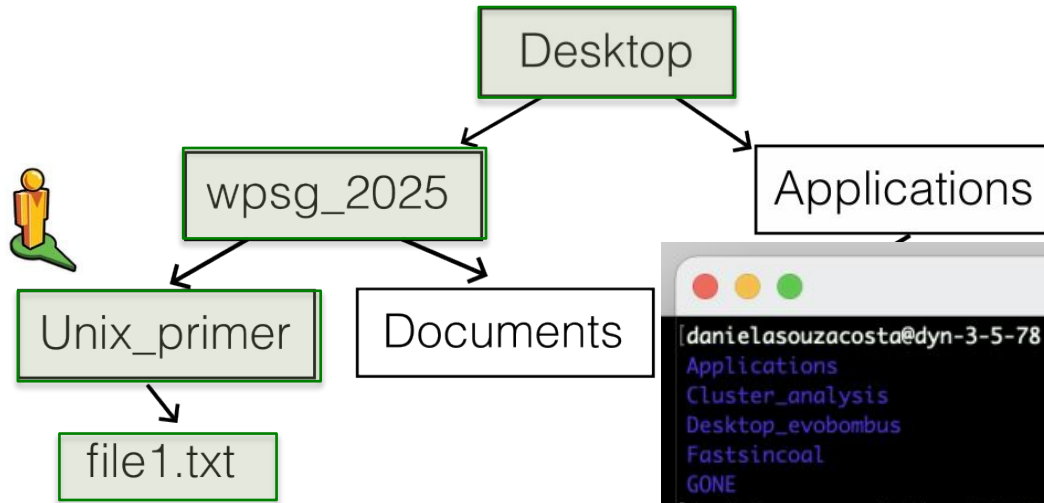


PATHS: Absolute vs. Relative

In the **Command Line**

ls = list

cd = change directory



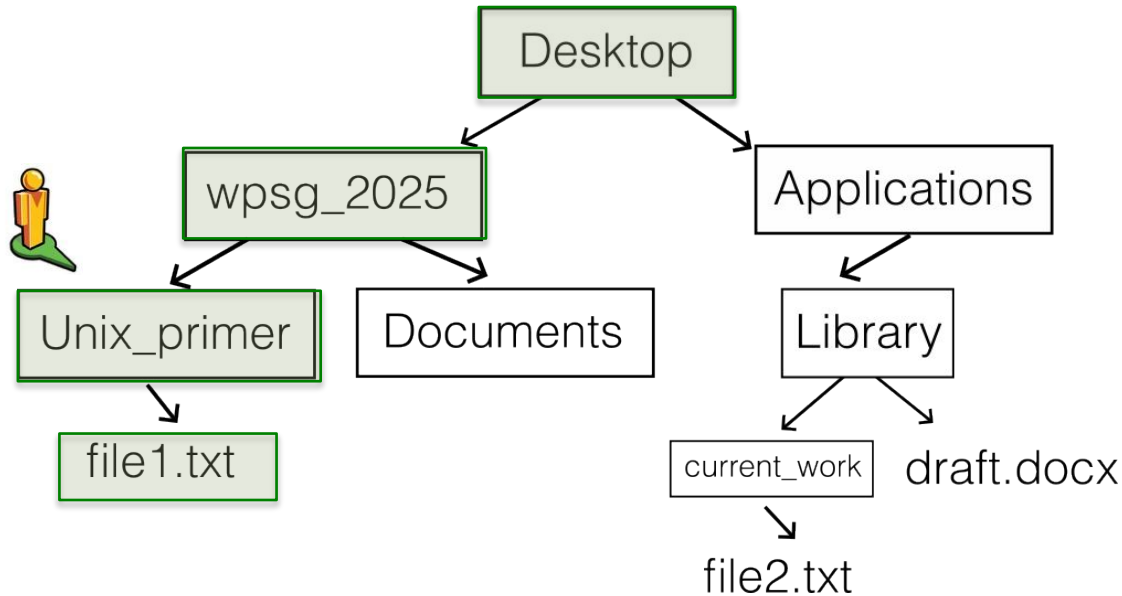
```
Unix_primer -- -zsh -- 114x24
[danielasouzacosta@dyn-3-5-78 Desktop % ls
Applications          PCA_2024              currentNe
Cluster_analysis     Relate_All_samples    wpsg_2025
Desktop_evobombus
Fastsincoal
GONE
[danielasouzacosta@dyn-3-5-78 Desktop % cd wpsg_2025/Unix_primer
[danielasouzacosta@dyn-3-5-78 Unix_primer % ls
file1.txt
danielasouzacosta@dyn-3-5-78 Unix_primer %
```

/Desktop/wpsg_2025/Unix_primer



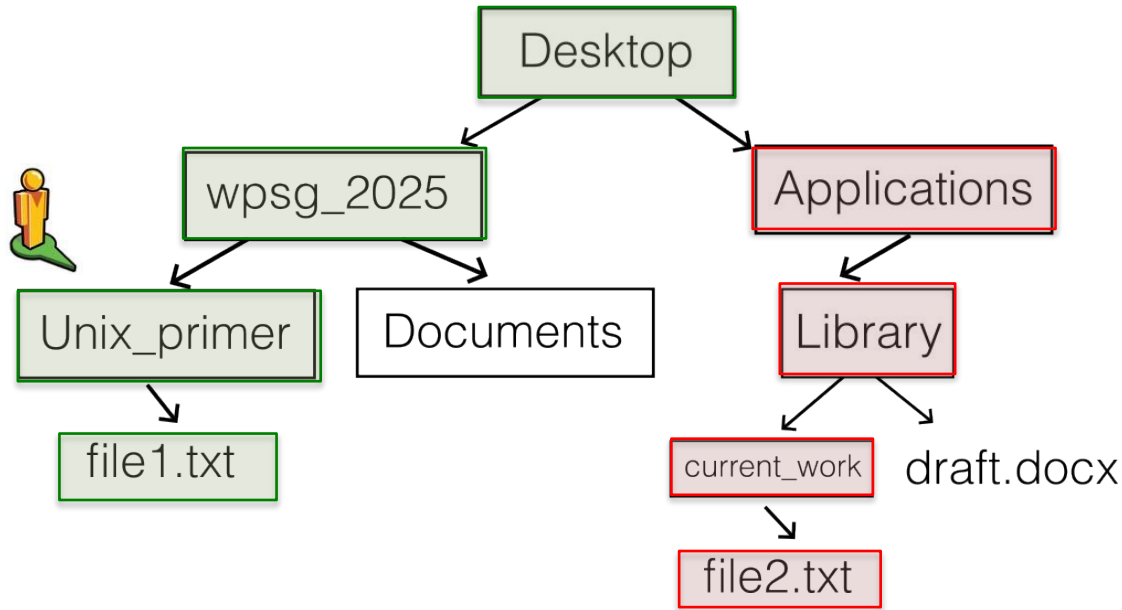
PATHS: Absolute vs. Relative

In the **Command Line**



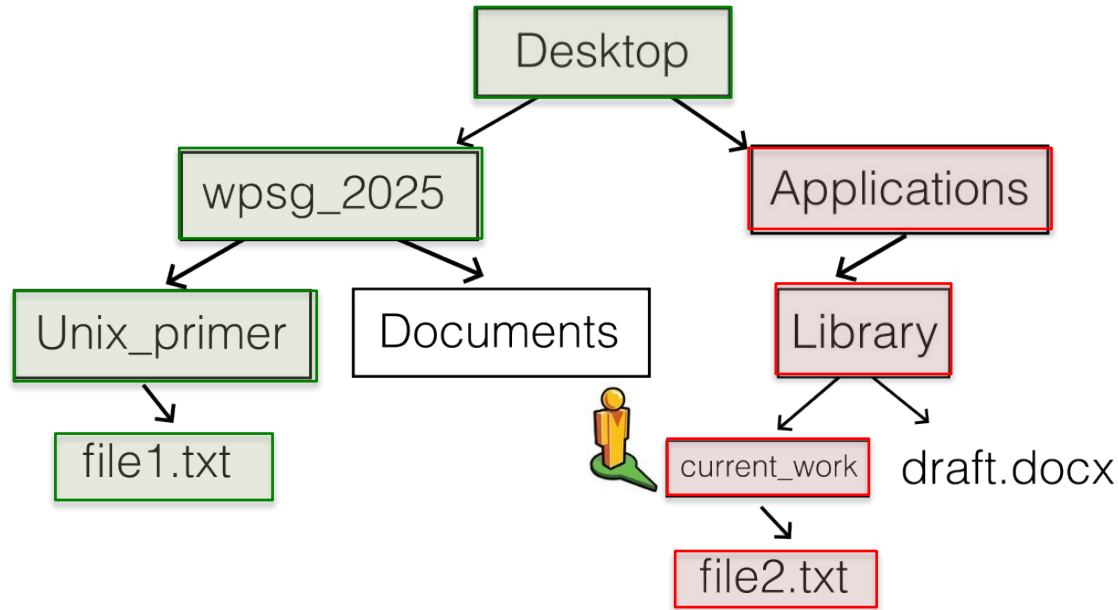
PATHS: Absolute vs. Relative

In the **Command Line**



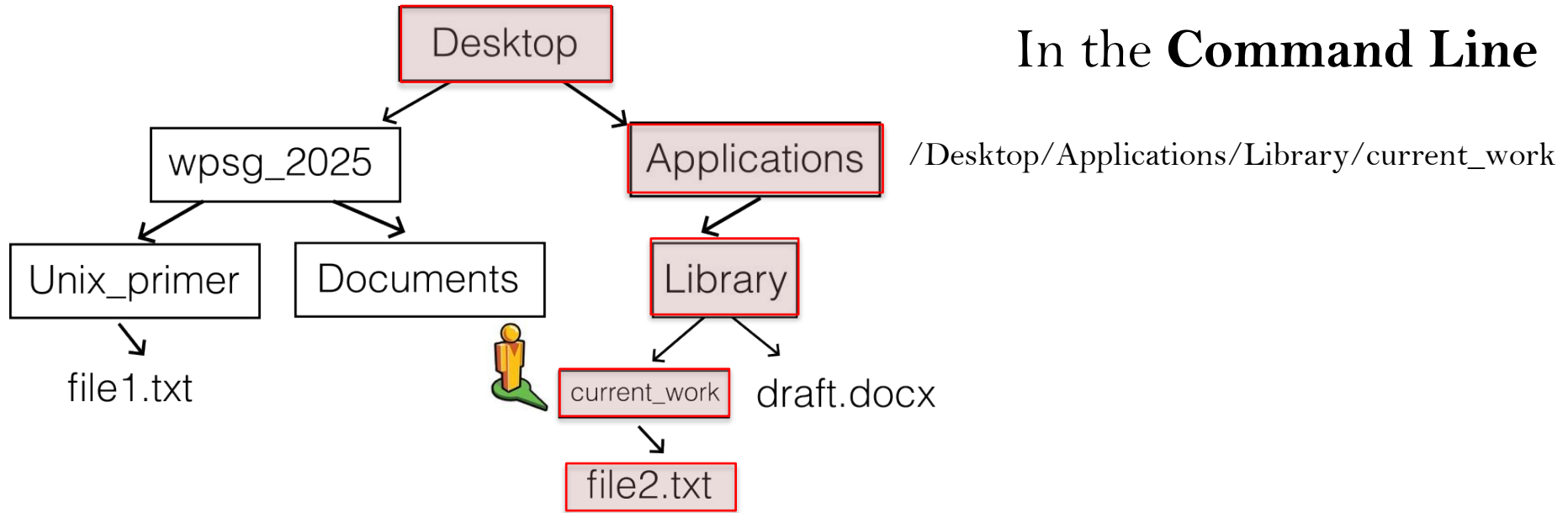
PATHS: Absolute vs. Relative

In the **Command Line**



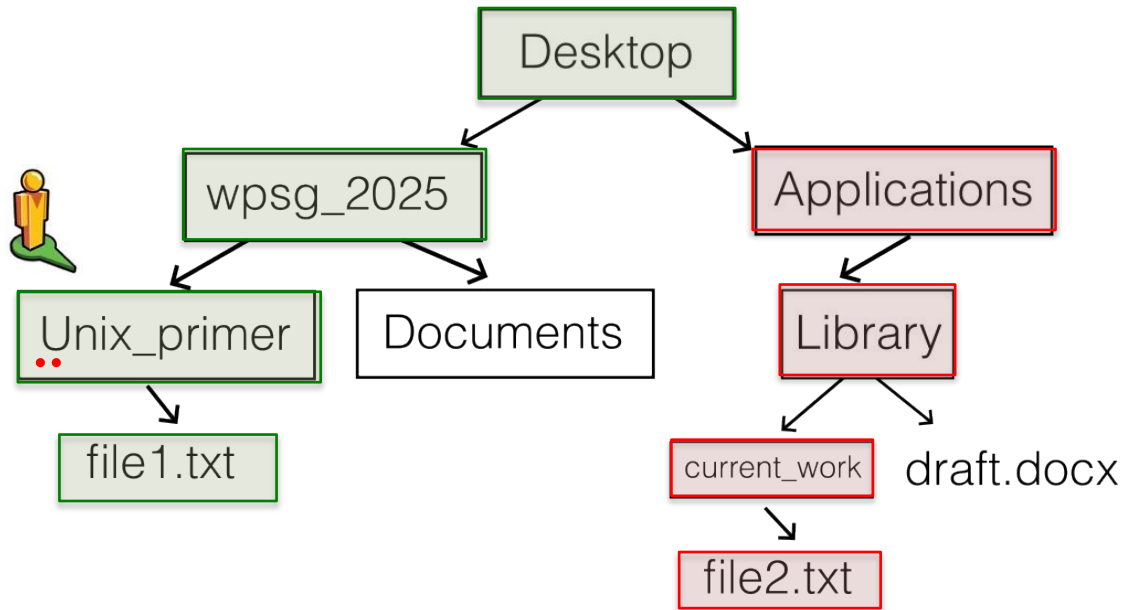
PATHS: Absolute vs. Relative

In the **Command Line**



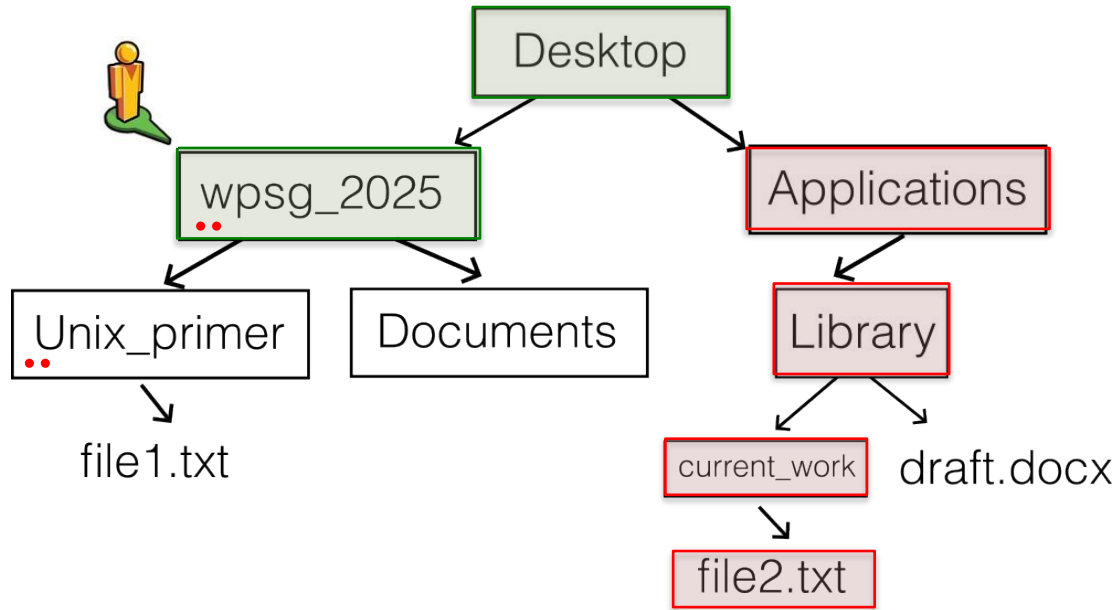
PATHS: Absolute vs. Relative

In the **Command Line**



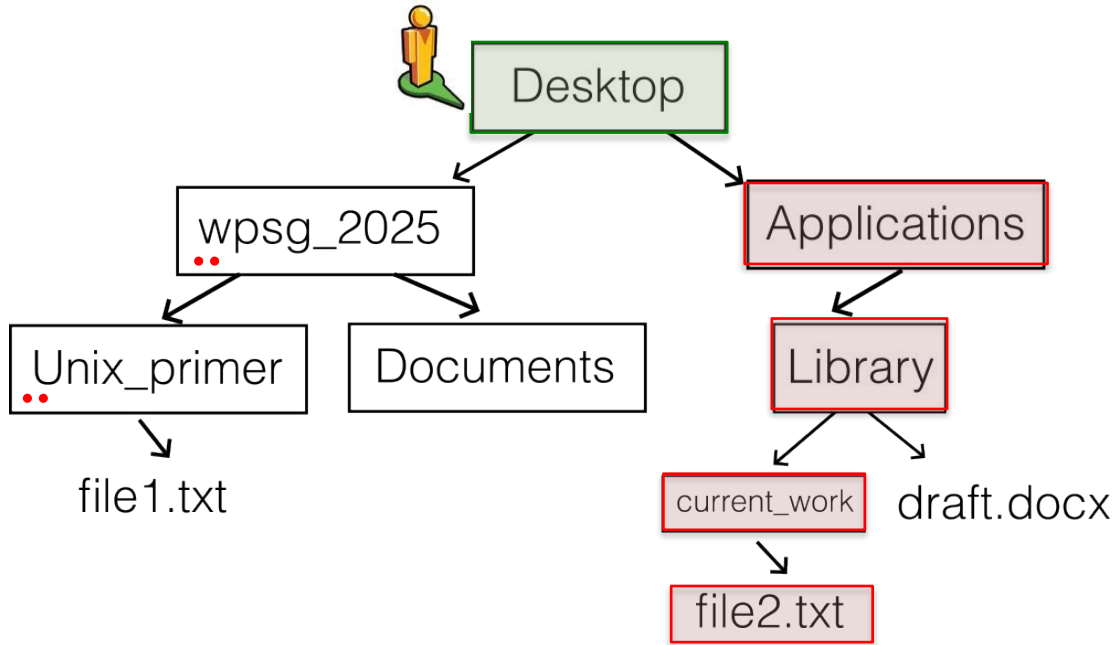
PATHS: Absolute vs. Relative

In the **Command Line**



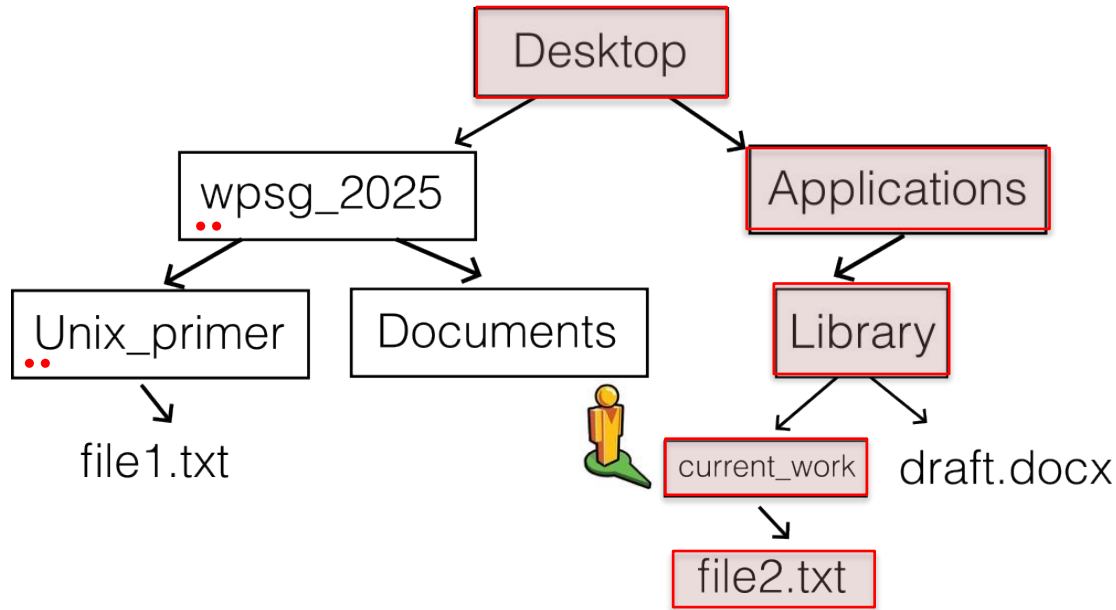
PATHS: Absolute vs. Relative

In the **Command Line**

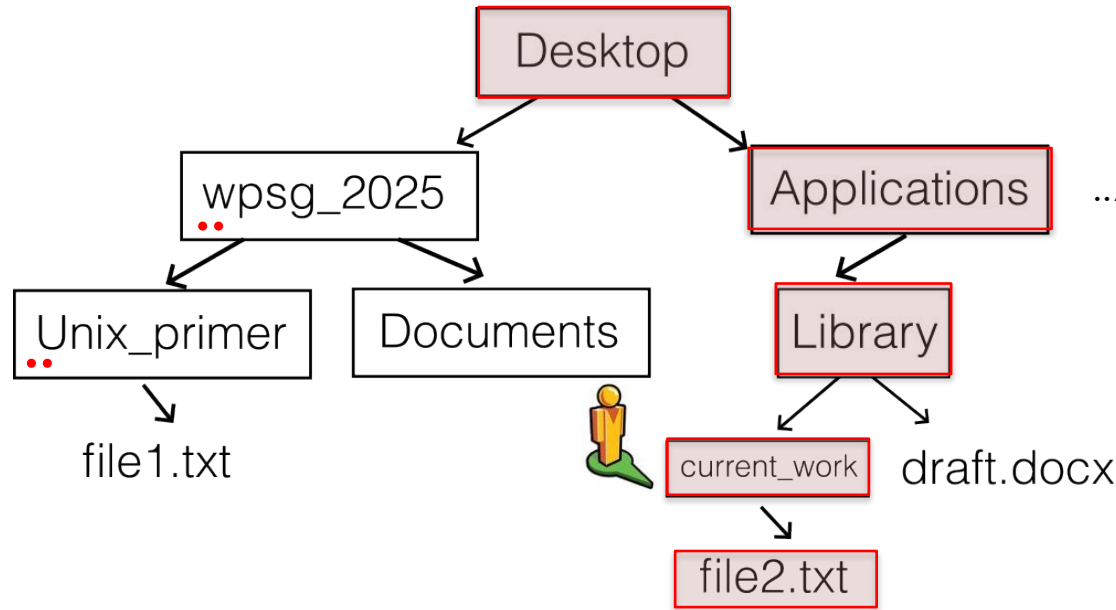


PATHS: Absolute vs. Relative

In the **Command Line**



PATHS: Absolute vs. Relative

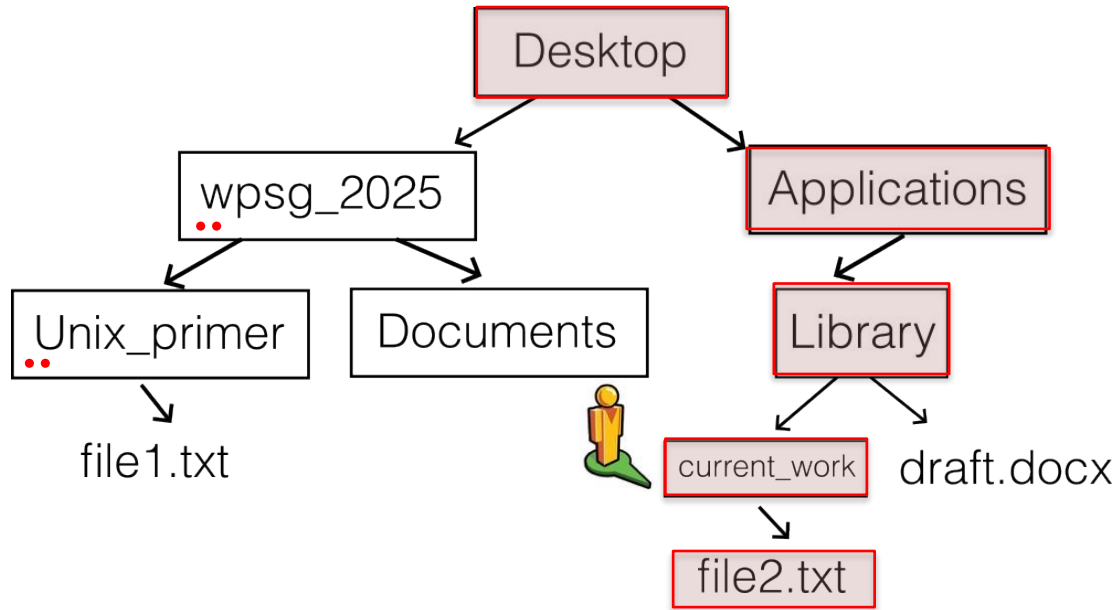


In the **Command Line**

`../../Applications/Library/current_work`



PATHS: Absolute vs. Relative



In the **Command Line**

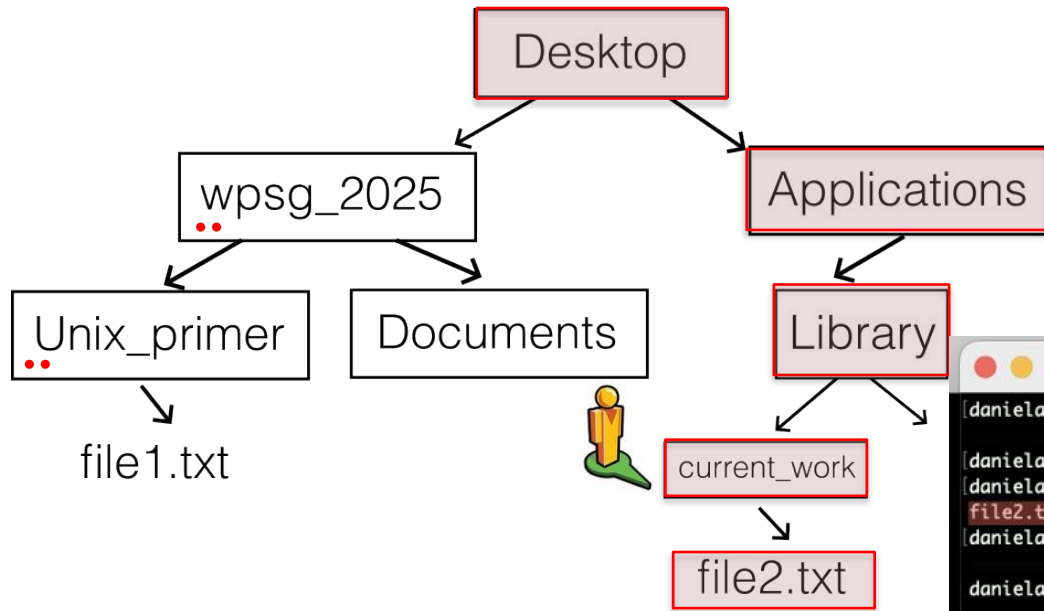
ls = list

cd = change directory

pwd = print working directory



PATHS: Absolute vs. Relative



In the **Command Line**

ls = list

cd = change directory

pwd = print working directory

```
current_work -- -zsh -- 114x24
[danielasouzacosta@dyn-3-5-78 Unix_primer % pwd
/Desktop/wpsg_2025/Unix_primer
[danielasouzacosta@dyn-3-5-78 Unix_primer % cd ../../Applications/Library/current_work
[danielasouzacosta@dyn-3-5-78 current_work % ls
file2.txt
[danielasouzacosta@dyn-3-5-78 current_work % pwd
/Desktop/Applications/Library/current_work
[danielasouzacosta@dyn-3-5-78 current_work %
```



PATHS: Absolute vs. Relative

Absolute

`/Desktop/Applications/Library/current_work`

Relative

`../Applications/Library/current_work`



A CHEAT SHEET ... and the internet is your best friend!

Unix/Linux Command Reference

FOSSwire.com

File Commands	System Info
ls - directory listing	date - show the current date and time
ls -al - formatted listing with hidden files	cal - show this month's calendar
cd dir - change directory to <i>dir</i>	wtime - show current uptime
cd - change to home	w - display who is online
pwd - show current directory	whoami - who you are logged in as
mkdir dir - create a directory <i>dir</i>	finger user - display information about user
rm file - delete <i>file</i>	uname -a - show kernel information
rm -r dir - delete directory <i>dir</i>	cat /proc/cpuinfo - cpu information
rm -f file - force remove <i>file</i>	cat /proc/meminfo - memory information
rm -rf dir - force remove directory <i>dir</i> *	man command - show the manual for <i>command</i>
cp file1 file2 - copy <i>file1</i> to <i>file2</i>	df - show disk usage
cp -r dir1 dir2 - copy <i>dir1</i> to <i>dir2</i> ; create <i>dir2</i> if it doesn't exist	du - show directory space usage
mv file1 file2 - rename or move <i>file1</i> to <i>file2</i>	free - show memory and swap usage
<i>file1</i> is an existing directory, moves <i>file1</i> into directory <i>file2</i>	whereis app - show possible locations of <i>app</i>
ln -s file link - create symbolic link <i>link</i> to <i>file</i>	which app - show which <i>app</i> will be run by default
touch file - create or update <i>file</i>	
cat > file - places standard input into <i>file</i>	
more file - output the contents of <i>file</i>	
head file - output the first 10 lines of <i>file</i>	
tail file - output the last 10 lines of <i>file</i>	
tail -f file - output the contents of <i>file</i> as it grows, starting with the last 10 lines	
Process Management	Compression
ps - display your currently active processes	tar cf file.tar files - create a tar named <i>file.tar</i> containing <i>files</i>
top - display all running processes	tar xf file.tar - extract the files from <i>file.tar</i>
kill pid - kill process id <i>pid</i>	tar czf file.tar.gz files - create a tar with Gzip compression
killall proc - kill all processes named <i>proc</i> *	tar xzf file.tar.gz - extract a tar using Gzip
bg - lists stopped or background jobs; resume a stopped job in the background	tar qf file.tar.bz2 - create a tar with Bzip2 compression
fg - brings the most recent job to foreground	tar xjf file.tar.bz2 - extract a tar using Bzip2
fg n - brings job <i>n</i> to the foreground	gzip file - compresses <i>file</i> and renames it to <i>file.gz</i>
	gzip -d file.gz - decompresses <i>file.gz</i> back to <i>file</i>
File Permissions	Network
chmod octal file - change the permissions of <i>file</i> to <i>octal</i> , which can be found separately for user, group, and world by adding: # 4 - read (r) # 2 - write (w) # 1 - execute (x)	ping host - ping <i>host</i> and output results
Examples: chmod 777 - read, write, execute for all chmod 755 -rwx for owner, rx for group and world For more options, see man chmod	whois domain - get whois information for <i>domain</i>
	dig domain - get DNS information for <i>domain</i>
	dig -x host - reverse lookup <i>host</i>
	wget file - download <i>file</i>
	wget -c file - continue a stopped download
SSH	Installation
ssh user@host - connect to <i>host</i> as <i>user</i>	Install from source: ./configure make make install
ssh -p port user@host - connect to <i>host</i> on port <i>port</i> as <i>user</i>	dpkg -i pkg.deb - install a package (Debian)
ssh-copy-id user@host - add your key to <i>host</i> for <i>user</i> to enable a keyed or passwordless login	rpm -Uvh pkg.rpm - install a package (RPM)
Searching	Shortcuts
grep pattern files - search for <i>pattern</i> in <i>files</i>	Ctrl+C - halts the current command
grep -r pattern dir - search recursively for <i>pattern</i> in <i>dir</i>	Ctrl+Z - stops the current command, resume with fg in the foreground or bg in the background
command grep pattern - search for <i>pattern</i> in the output of <i>command</i>	Ctrl+D - log out of current session, similar to exit
locate file - find all instances of <i>file</i>	Ctrl+W - erases one word in the current line
	Ctrl+U - erases the whole line
	Ctrl+R - type to bring up a recent command
	!! - repeats the last command
	exit - log out of current session

* Use with extreme caution.



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Extract sample data from VCF files

Ask Question

Asked 10 years, 11 months ago Modified 4 years, 3 months ago Viewed 15k times Part of R Language Collective

- I have a large Variant Call format (VCF) file (> 4GB) which has data for several samples.
- 14 I have browsed Google, Stackoverflow as well as tried the VariantAnnotation package in R to somehow extract data only for a particular sample, but have not found any information on how to do that in R.
- Did anybody try anything like that, or maybe knows of another package that would enable this?

R r bioinformatics vcf-variant-call-format

Share Improve this question

edited Oct 2, 2020 at 14:58

asked Feb 6, 2014 at 9:03

Follow

Timur Shtatland
12.3k ● 2 ● 37 ● 61

rokosir
155 ● 1 ● 1 ● 7

If you use `scan`, you can specify on which line you would like to start reading the file (`skip`) and how many lines to read (`nlines`). I have no experience with VCF files, but this could help you. – Zbynek Feb 6, 2014 at 9:13

The tag vcf does not pertain to the vcf that you are talking about in the question.. – Ank Feb 13, 2014 at 20:17

1 Have you considered just using the unix utility cut? – tommy.carstensen Oct 27, 2014 at 2:50

Use a dedicated tool: samtools.github.io/bcftools/bcftools.html – zx8754 Apr 5, 2023 at

Linked

9 [How to read vcf file in R](#)

0 [Automated process for formatting in R](#)



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VCF record format error when trying to run Beagle 5.4

Hi everyone,

0

I am trying to run the Beagle 5.4 software where it needs to read a VCF file. The error message I have is:

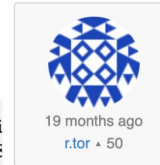


```
Exception in thread "main" java.lang.IllegalArgumentException:
at vcf.VcfRecGTParser.ninthTabPos(VcfRecGTParser.java:8
at vcf.VcfHeader.isDiploid(VcfHeader.java:73)
at vcf.RefIt.<init>(RefIt.java:130)
at vcf.RefIt.create(RefIt.java:97)
at vcf.RefTargSlidingWindow.refIt(RefTargSlidingWindow.
at vcf.RefTargSlidingWindow.<init>(RefTargSlidingWindow
at vcf.RefTargSlidingWindow.instance(RefTargSlidingWinc
at main.Main.slidingWindow(Main.java:129)
at main.Main.main(Main.java:107)
```

What I get from the message is that the VCF record format in the 9th column (FORMAT) is not what the software expects. The Beagle software manual addresses:

`gt=[file]` specifies a VCF file containing genotypes for the study samples. Each VCF record must contain a GT (genotype) format field.

Therefore I supposed that I prepared the data correctly, you see the the first two rows of the VCF file:



19 months ago
r.tor • 50

Similar Posts

[vcf file has an empty sample id](#) • updated 4.9 years ago by [lakhujanivijay](#) • 5.9k • written 4.9 years ago by [yh362](#) • 50

It seems like my VCF's header contains at least an empty smaple ID. I am not sure how to figure out where it goes wrong because, if I run a...

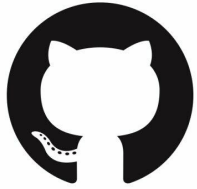
[How to Convert Fasta format or .aln format to PIR format ??](#) •

updated 3.8 years ago by [Ram](#) • 44k • written 10.2 years ago by [rajkishore.ouatbi](#) • 10

I have fasta format. Can anyone say how to convert the fasta format to pir format. Also, I have clustalw alignment format, then how to con...



Where should you look for help ... your best friends!



GitHub

Product Solutions Resources Open Source Enterprise Pricing

MyersGroup / relate Public

Code Pull requests 3 Actions Projects Security Insights

master 1 Branch 0 Tags

Go to file Code

leospaidel added cstring 9b1715b · 3 months ago 245 Commits

bin	Fixed small bug in memory allocation of Relate	6 years ago
build	Fixed small bug in memory allocation of Relate	6 years ago
docs	Updated to v1.2.2	6 months ago
example	Updated to v1.2.2	6 months ago
include	added cstring	3 months ago
old_versions	Updated to v1.2.2	6 months ago
scripts	script changes	6 months ago
.gitignore	tags	11 months ago
20180411_15670_RELATE_Academic_Us...	updated	7 years ago
CMakeLists.txt	updated cmake	2 years ago
README.md	Update README.md	4 years ago

About

Software for estimating genome-wide genealogies for thousands of samples

- Readme
- Activity
- Custom properties
- 29 stars
- 5 watching
- 12 forks

Report repository

Releases

No releases published

Packages

No packages published

Languages



Population and Speciation Genomics Workshop - Cesky Krumlov 2025

Where should you look for help ... your best friends!



The screenshot shows the GitHub interface for the repository `MyersGroup/relate`. The top navigation bar includes links for Product, Solutions, Resources, Open Source, Enterprise, and Pricing, along with search, sign in, and sign up buttons. The repository name and "Public" status are displayed. Below the repository name, there are buttons for Notifications, Fork (12), and Star (29). The main navigation bar shows "Code", "Pull requests" (with a count of 3), "Actions", "Projects", "Security", and "Insights". A search bar contains the query "is:pr is:open". To the right of the search bar are buttons for "Labels" (8) and "Milestones" (0), and a green "New pull request" button. The pull request list shows 3 open and 1 closed pull request. The list items are:

- 3 Open** ✓ 1 Closed
- 1 PrepareInputFiles bugfix, add "EstimatePopulationSize.sh --noplots"**
#4 opened on Dec 11, 2024 by dcdehaas
- 1 Update input_data.html - dropping non-biallelic SNPs in ConvertFromVcf**
#3 opened on Nov 13, 2024 by gregorjanc
- 1 Added zsh completions into project root directory**
#2 opened on Dec 28, 2021 by Ddfulton

At the bottom, there is a "ProTip!" section: "Add `no:assignee` to see everything that's not assigned."



Now it's your turn to dig into UNIX



Important Information

PRE-WORKSHOP INFORMATION AND MAP

- [Preparation material: suggested reading and activities to get ready for the 2025 workshop!](#)
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COMPUTING

- [AMI IP addresses](#)



SCHEDULE

Week 1 : 19 – 25 January, 2025

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		10:30a – 12p	Michael Matschiner	Likelihood and Probability	Town Theater
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		3:30p – 5p	Workshop Team	Probability Activity	Prelate
		7p – 10p	Everyone	Participant introduction	Prelate



ssh wpsg@ec2-**XX-XXX-XXX-XXX**.compute-1.amazonaws.com

File Edit View Insert Format Data Tools Extensions Help

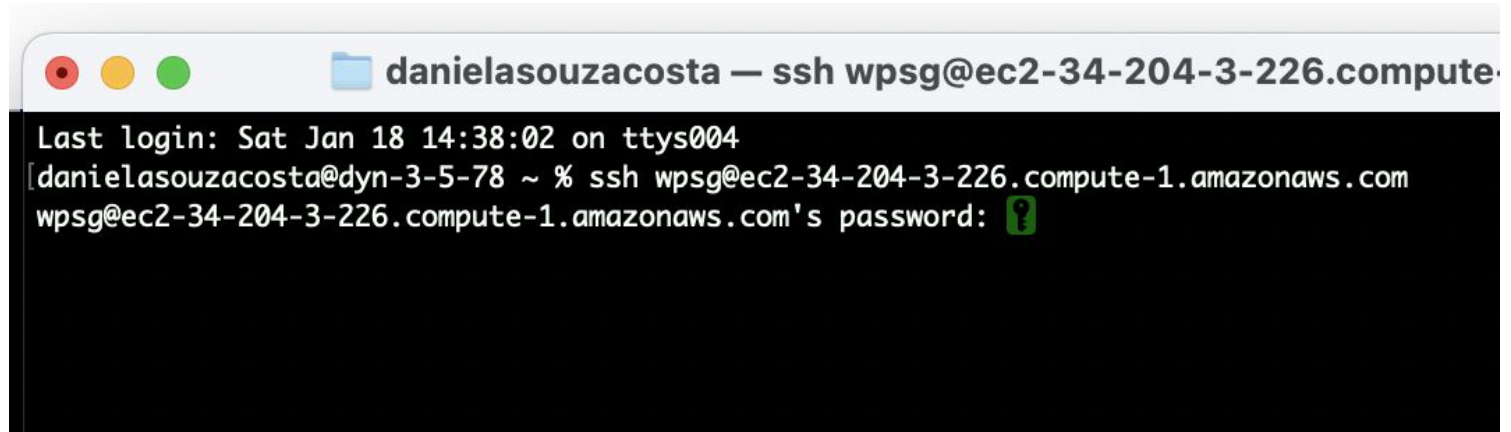
View only

A1 Last Name

	A	B	C	D	E	F	G	H	I
	Last Name	First Name	Instance name	Instance ID	Instance state	Instance type	Status check	Public DNS	Launch time
1	Abush	Zinaw	WPSG 1.0	i-0b8ebcee4c8afa4bb	Running	t3.xlarge	2/2 checks passed	ec2-44-200-40-67.compute-1.amazonaws.com	2022/05/31 14:34 GMT+2
2	Agnieszka	Lipinska	WPSG 1.0	i-0f508e5ee1c6f5af0	Running	t3.large	2/2 checks passed	ec2-44-203-148-243.compute-1.amazonaws.com	2022/06/04 17:18 GMT+2
3	Albertien	van Heerden	WPSG 1.0	i-0695fab01f918ac7b	Running	t3.large	2/2 checks passed	ec2-54-172-182-168.compute-1.amazonaws.com	2022/06/04 17:18 GMT+2
4	Alexander	Brandt	WPSG 1.0	i-0cc305fd706a4438d	Running	t3.large	2/2 checks passed	ec2-44-202-43-70.compute-1.amazonaws.com	2022/06/04 17:18 GMT+2
5	Alistair	Hudson	WPSG 1.0	i-0d17f868f7ab44ed2	Running	t3.large	2/2 checks passed	ec2-35-172-133-194.compute-1.amazonaws.com	2022/06/04 17:18 GMT+2
6	Amanda	Lazdina	WPSG 1.0	i-0bfe0452838268d85	Running	t3.large	2/2 checks passed	ec2-3-85-56-171.compute-1.amazonaws.com	2022/06/04 17:18 GMT+2
7	Anastasiia	Mykhailenko	WPSG 1.0	i-0b8ebcee4c8afa4bb	Running	t3.xlarge	2/2 checks passed	ec2-44-200-40-67.compute-1.amazonaws.com	2022/05/31 14:34 GMT+2
8	Annabelle	de Vries	WPSG 1.0	i-0f508e5ee1c6f5af0	Running	t3.large	2/2 checks passed	ec2-44-203-148-243.compute-1.amazonaws.com	2022/06/04 17:18 GMT+2
9	Bárbara	Rocha Venancio Meyer	WPSG 1.0	i-0695fab01f918ac7b	Running	t3.large	2/2 checks passed	ec2-54-172-182-168.compute-1.amazonaws.com	2022/06/04 17:18 GMT+2
10	Cecilia	Padilla Iglesias	WPSG 1.0	i-0cc305fd706a4438d	Running	t3.large	2/2 checks passed	ec2-44-202-43-70.compute-1.amazonaws.com	2022/06/04 17:18 GMT+2
11	Charlotte	Wright	WPSG 1.0	i-0d17f868f7ab44ed2	Running	t3.large	2/2 checks passed	ec2-35-172-133-194.compute-1.amazonaws.com	2022/06/04 17:18 GMT+2
12	Colette	Blyth	WPSG 1.0	i-0bfe0452838268d85	Running	t3.large	2/2 checks passed	ec2-3-85-56-171.compute-1.amazonaws.com	2022/06/04 17:18 GMT+2
13	Conor	Gilligan	WPSG 1.0	i-0b8ebcee4c8afa4bb	Running	t3.xlarge	2/2 checks passed	ec2-44-200-40-67.compute-1.amazonaws.com	2022/05/31 14:34 GMT+2
14	Daniela	Souza	WPSG 1.0	i-0f508e5ee1c6f5af0	Running	t3.large	2/2 checks passed	ec2-44-203-148-243.compute-1.amazonaws.com	2022/06/04 17:18 GMT+2
15	Darren	O'Connell	WPSG 1.0	i-0695fab01f918ac7b	Running	t3.large	2/2 checks passed	ec2-54-172-182-168.compute-1.amazonaws.com	2022/06/04 17:18 GMT+2
16	Emile	Cavalet-Giorsa	WPSG 1.0	i-0cc305fd706a4438d	Running	t3.large	2/2 checks passed	ec2-44-202-43-70.compute-1.amazonaws.com	2022/06/04 17:18 GMT+2
17	Emmanuel	Tergemina	WPSG 1.0	i-0d17f868f7ab44ed2	Running	t3.large	2/2 checks passed	ec2-35-172-133-194.compute-1.amazonaws.com	2022/06/04 17:18 GMT+2
18	Eva	Paulus	WPSG 1.0	i-0bfe0452838268d85	Running	t3.large	2/2 checks passed	ec2-3-85-56-171.compute-1.amazonaws.com	2022/06/04 17:18 GMT+2
19	Francesco	Giannelli	WPSG 1.0	i-0b8ebcee4c8afa4bb	Running	t3.xlarge	2/2 checks passed	ec2-44-200-40-67.compute-1.amazonaws.com	2022/05/31 14:34 GMT+2
20	Grégoire	Vernaz	WPSG 1.0	i-0f508e5ee1c6f5af0	Running	t3.large	2/2 checks passed	ec2-44-203-148-243.compute-1.amazonaws.com	2022/06/04 17:18 GMT+2
21	Hiranya	Sudasinghe	WPSG 1.0	i-0695fab01f918ac7b	Running	t3.large	2/2 checks passed	ec2-54-172-182-168.compute-1.amazonaws.com	2022/06/04 17:18 GMT+2
22	Isabel	Biasco-Costa	WPSG 1.0	i-0cc305fd706a4438d	Running	t3.large	2/2 checks passed	ec2-44-202-43-70.compute-1.amazonaws.com	2022/06/04 17:18 GMT+2
23	Jack	Harper	WPSG 1.0	i-0d17f868f7ab44ed2	Running	t3.large	2/2 checks passed	ec2-35-172-133-194.compute-1.amazonaws.com	2022/06/04 17:18 GMT+2
24									

Participant instance IPs - Organiser instance IPs - Hints - Explore



A screenshot of a terminal window. The title bar shows a folder icon and the text "danielasouzacosta — ssh wpsg@ec2-34-204-3-226.compute-1.amazonaws.com". The terminal content shows a successful SSH connection. The text in the terminal is: "Last login: Sat Jan 18 14:38:02 on ttys004", "[danielasouzacosta@dyn-3-5-78 ~ % ssh wpsg@ec2-34-204-3-226.compute-1.amazonaws.com", "wpsg@ec2-34-204-3-226.compute-1.amazonaws.com's password: [password icon]".

```
danielasouzacosta — ssh wpsg@ec2-34-204-3-226.compute-1.amazonaws.com
Last login: Sat Jan 18 14:38:02 on ttys004
[danielasouzacosta@dyn-3-5-78 ~ % ssh wpsg@ec2-34-204-3-226.compute-1.amazonaws.com
wpsg@ec2-34-204-3-226.compute-1.amazonaws.com's password: [password icon]
```



Last login: Sat Jan 18 14:38:02 on ttys004

[danielasouzacosta@dyn-3-5-78 ~ % ssh wpsg@ec2-34-204-3-226.compute-1.amazonaws.com

[wpsg@ec2-34-204-3-226.compute-1.amazonaws.com's password:

Connection closed by 34.204.3.226 port 22

[danielasouzacosta@dyn-3-5-78 ~ % ssh wpsg@ec2-34-204-3-226.compute-1.amazonaws.com

[wpsg@ec2-34-204-3-226.compute-1.amazonaws.com's password:

```
#####  
##                WPSG 2025                ##  
##                Cesky Krumlov             ##  
##                @evomics #evomics2025    ##  
#####
```

Welcome to Ubuntu 24.04.1 LTS (6.8.0-1021-aws).

* Documentation: <https://help.ubuntu.com>
* Management: <https://landscape.canonical.com>
* Support: <https://ubuntu.com/pro>

System information as of Sat Jan 18 15:07:11 CET 2025

System load:	0.11	Temperature:	-273.1 C
Usage of /:	40.9% of 484.63GB	Processes:	183
Memory usage:	17%	Users logged in:	1
Swap usage:	0%	IPv4 address for ens5:	172.31.92.108

Last login: Sat Jan 18 14:48:30 2025 from 131.152.231.234

wpsg@krumlov: [~]\$

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UNIX primer: tips, tricks, and more!

Jakub Vlček, Daniela Souza-Costa, Angelica Cuevas, Angela P. Fuentes-Pardo, Julia M.I. Barth. 19th January 2025

- [UNIX primer slides](#)

Background and Objectives

Welcome everyone!

We have prepared this UNIX activity to get all of you to the same level, as you will use the Terminal a lot during this workshop. Depending on your level, this activity will take more or less time.

Learning goals:

- Navigate in the UNIX environment
- Create, move and delete directories
- Create, move, delete and edit files
- Use basic UNIX commands and know where to find help

Why would we use the Terminal / shell in the first place?

Scripting: We can write down a sequence of commands to perform particular tasks or analyses;

when working with genomic data, a task usually takes minutes, sometimes hours or even days – it's no fun to sit and wait in front of your computer this long just for a mouse-click to initiate the next task.

Powerful Tools: In UNIX, powerful tools are available that enable you to work through large amounts of files, data, and tasks quite quickly and in an automated (that is, programmatic) way.

