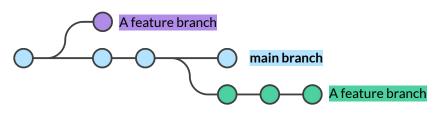
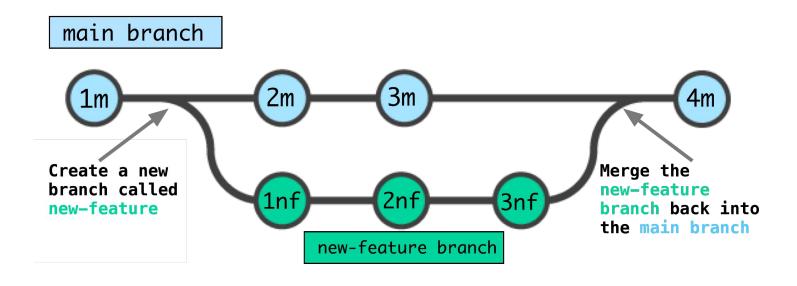
Working with branches in Git

Childhood Cancer Data Lab

Branches in git



- Branches are like "repositories within repositories"
- Useful when you want to make changes (maybe experimental!) but you don't want to break the rest of your code
 - You can always switch back to a "clean" branch!
- Keep related changes together
 - All commits for a given new analysis or "feature" can be made within the same branch for easier tracking
 - Helps you to identify which commits are relevant to a given analysis
- If you wreck code in a branch, you've only wrecked that branch! Just delete it!
- Branches provide a great framework for collaboration and team science



Time (project progression)

main branch history after merge



Modified from https://www.atlassian.com/git/tutorials/using-branches/git-merge

Creating a new branch

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	2/2				Apply suggestions from code review 5 days ago
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Because we are currently on the main branch, this new branch will be created off of the main branch's history.

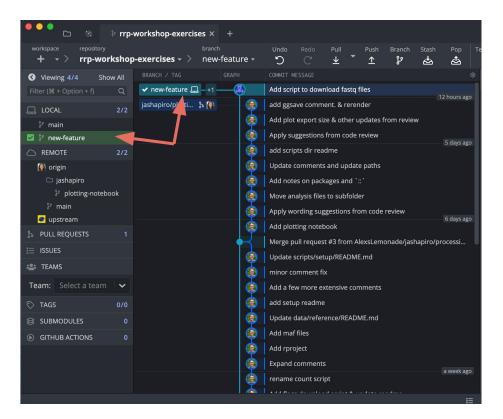
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Name your new branch by typing it in here

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Now you're in your new branch!



Note the different *icons* associated with **local** vs. **remote** repositories

- Local is a laptop icon
- In this case, remote is Stephanie's GitHub profile picture (but you aren't Stephanie!)

We created new-feature *locally*, so it does not (yet!) exist on our *remote*.

We can switch between branches with checkout

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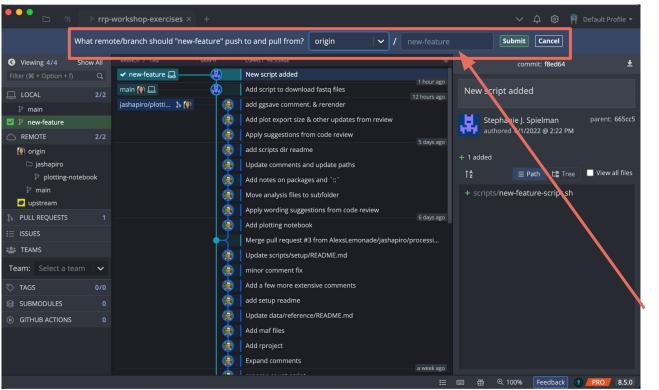
You can also double-click on a branch in GitKraken!

Hurray for GitKraken!

Make commits within your new branch as usual

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Pushing prompts you to specify the remote branch



Because this new-feature branch doesn't exist (yet!) on the remote, Git needs more info about where to push to.

This prompt will always occur the first time you push from a brand new branch.

GitKraken helpfully guesses what you want your remote branch to be named! Click "Submit."

Pushing has created a corresponding remote branch

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Have a look at the icons! new-feature is now fully "synced" between local and remote.

Viewing branches on GitHub

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Merge into your main branch

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But note!! You have to be in the branch you are merging into (see how main is highlighted?)

Bonus!! You can also point-and-click drag branches to merge them. Here, drag new-feature into main in the sidebar

Voila, your local histories have merged!

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The merge itself is a commit to the main branch, with an automatic commit message

You can now safely delete your branch

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C TAGS 0/0	Push main and start a pull request to o	origin/new-feature	e comments	
SUBMODULES 0				
GITHUB ACTIONS 0	Delete origin/new-feature		README.md	
	Copy branch name			
	Copy commit sha			
	Copy link to branch: origin/new-featur Copy link to this commit on remote: or			
	copy link to this commit on femole. of	igin		=

Importantly, deleting branches that have been merged *does not* delete their commits! Those commits are part of the main branch's history now.

You can now safely delete your branch

· · · ·	rrp-workshop-exerci	ses × +								
workspace repository + -> rrp-work	shop-exercises - >	branch main -	Undo C		^{Pull} ▼	Push	Branch ပို	Stash	Pop 🐴	Term
Viewing 5/5 Show	All BRANCH / TAG									¢
Filter (೫ + Option + f)	Q 🗸 main 🗔		Merge	branch 'ne	ew-feature	' into ma	iin			
	2/2 new-feature 👰 [⊒ ֎	New s	cript added	I					ago
🗹 🎙 main	2↑ main 👰		Add so	ript to dow	nload fast	q files				
^{ဖွ} new-feature	jashapiro/plotti	h 🕅 🛛 🎯	add gg	save comn	nent. & rei	render				
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EAMS	Checkout origin/n Create branch he				orr	n AlexsLe	monade/ja	ashapiro/	processi.	
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		ch: origin/new-featur commit on remote: o								
	Copy link to this c	commit on remote: o	ngin							≣

Deleting branches that have been merged *does not* delete their commits! Those commits are part of the main branch's history now.

You can also conveniently delete both remote and local branches at once by right-clicking the joint label in the source graph.

Are you sure?? If you've merged: yes, you're sure.

· · ·	rrp-	workshop-exercises $ imes$	+				V 🗘 🕸 😭 D	efault Profile 🔻
		This is a destructive	e operation	, are you sure you want to delete "origin/new-fea	ature"? D	elete Cancel	7	
Viewing 5/5 Show A	All	BRANCH / TAG	зКАРН	CUMMLI MESSAGE	1		commit: b28c7d	ŧ
Filter (೫ + Option + f)	Q	🗸 main 🖵	-	Merge branch 'new-feature' into main				
口 LOCAL 2	2/2	new-feature 👰 🖵		New script added	1 hour ago	Merge bra	nch 'new-feature' int	o main
	2↑	main 👰	ل	Add script to download fastq files				
l new-feature		jashapiro/plotti		add ggsave comment. & rerender	12 hours ago			: 665cc5,f8ed64
C REMOTE 3	3/3		۲	Add plot export size & other updates from review		Authore PM	ed 6/1/2022 @ 2:23	
🚺 origin				Apply suggestions from code review	E dava and			
🗀 jashapiro				add scripts dir readme	5 days ago	+ 1 added		
₽ plotting-notebook				Update comments and update paths		† ≙	≡ Path La Tree	View all files
ဖို main				Add notes on packages and `::`		+ corinte/p	ew-feature-script.sh	_
》 new-feature 🥏 upstream				Move analysis files to subfolder		+ scripts/rit	ew-reature-script.sir	
b PULL REQUESTS				Apply wording suggestions from code review				
				Add plotting notebook	6 days ago			
			- L	Merge pull request #3 from AlexsLemonade/jashapiro	o/processi			
TEAMS				Update scripts/setup/README.md				
Team: Select a team	~			minor comment fix				
🖏 TAGS 🛛 🖉	0/0			Add a few more extensive comments				
				add setup readme				
GITHUB ACTIONS				Update data/reference/README.md				
				Add maf files				
				Add rproject				
			1	Principal and a second second				
							100% Feedback	PRO 8.5.0

A quick note about merging branches

• When you are working *independently*, merging directly into main on your own is probably fine!

- When you are working *collaboratively*, it can get dangerous because your collaborators won't be in the loop, and conflicts will probably emerge
 - We recommend using *pull requests* (and maybe code review!) to merge code into main in collaborative projects. Learn more:
 - Pull Requests
 - Preprint about collaborative coding: <u>Parker 2017</u>
 - Slack blog: <u>"On empathy and pull requests"</u>

Branches and merging on the command line

Make new branches, and change branches

Step 1: Create new branch called `feature`
git branch feature

Step 2: Go to your new branch
git switch feature # git >=2.23
git checkout feature

OR, do it all in one step!!
git switch -c feature # git >=2.23
git checkout -b feature

Merge `feature` into `main`

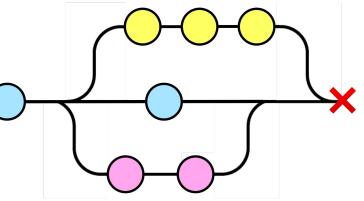
Step 1: Be in `main`
git switch main # git >=2.23
git checkout main

Step 2: Merge `feature` into `main`
git merge feature

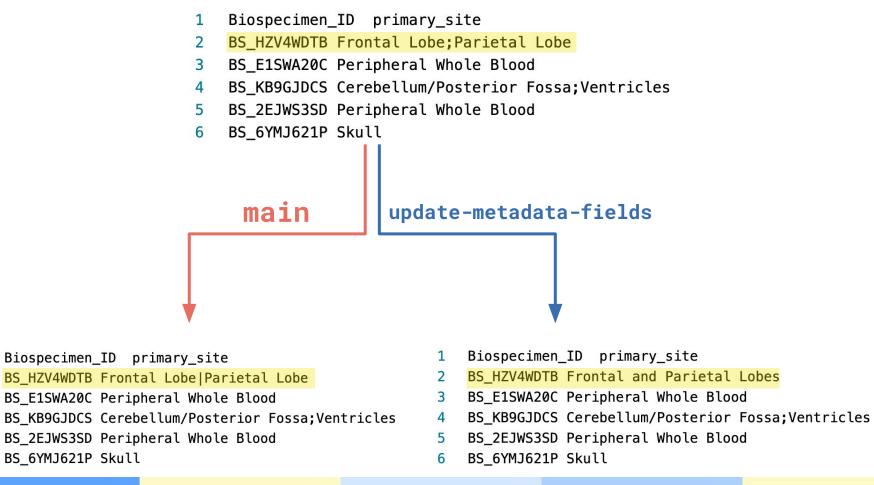
Merge conflicts can happen!

- If a given file has been *heavily* modified, git may not be able to merge the different file versions across branches together automatically
 - This is especially a problem if there are many branches floating around getting merged into each other
 - Imagine if each of these branches modified the same file in drastically incompatible ways......

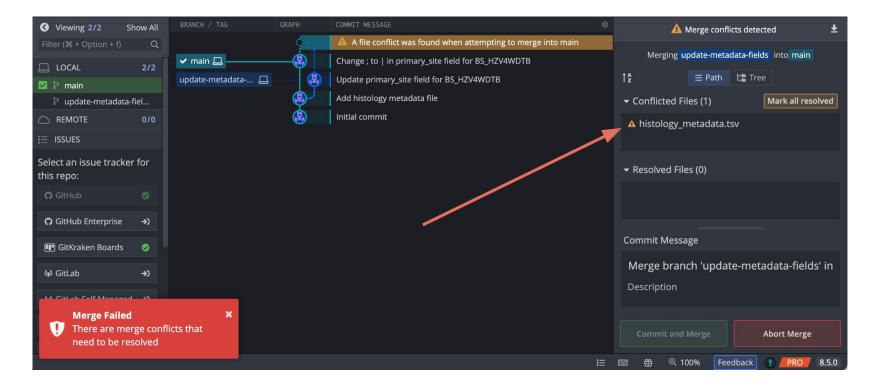
 \rightarrow You will have to manually fix the merge conflicts!



histologies_metadata.tsv

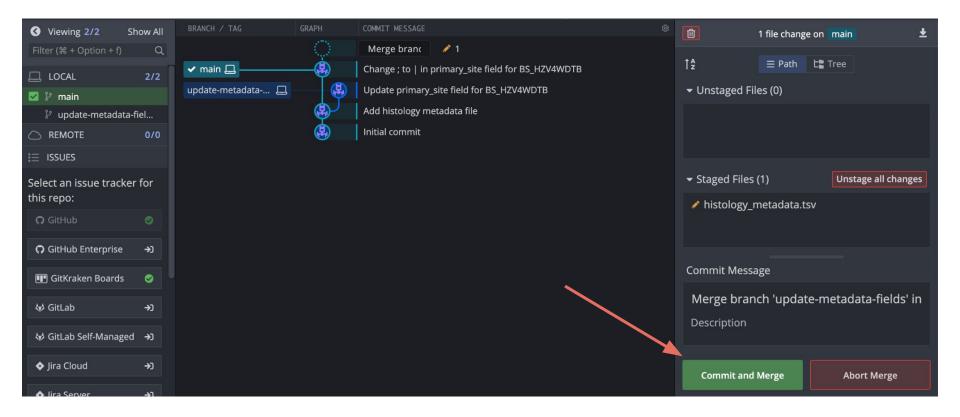


Merging update-metadata-fields into main causes a merge conflict



🛕 histolog	y_metadata.tsv (1 conflict)	Open in external merge tool C Save 🖺
Co	ommit da3fc9 on main	B Commit 004eac on update-metadata-fields
2 3 4 5	Biospecimen_ID primary_site BS_HZV4WDTB Frontal Lobe Parietal Lobe BS_E1SWA20C Peripheral Whole Blood BS_KB9GJDCS Cerebellum/Posterior Fossa;Ventricles BS_2EJWS3SD Peripheral Whole Blood BS_6YMJ621P Skull	1 Biospecimen_ID primary_site 2 BS_HZV4WDTB Frontal and Parietal Lobes 3 BS_E1SWA20C Peripheral Whole Blood 4 BS_KB9GJDCS Cerebellum/Posterior Fossa;Ventricles 5 BS_2EJWS3SD Peripheral Whole Blood 6 BS_6YMJ621P Skull 7 8 9 9
Output		conflict 1 of 1 🔨 👻
2 3 4 5	Biospecimen_ID primary_site BS_HZV4WDTB Frontal Lobe;Parietal Lobe BS_E1SWA20C Peripheral Whole Blood BS_KB9GJDCS Cerebellum/Posterior Fossa;Ventricles BS_2EJWS3SD Peripheral Whole Blood BS_6YMJ621P Skull	The result of a fixed merged conflict will appear here

histology_metadata.tsv (1 conflict)	Open in external merge tool 🖉 Save
. 🗹 🔼 Commit da3fc9 on main	B Commit 004eac on update-metadata-fields
1 Biospecimen_ID primary_site	1 Biospecimen_ID primary_site
2 📀 BS_HZV4WDTB Frontal Lobe Parietal Lobe	2 BS_HZV4WDTB Frontal and Parietal Lobes
3 BS_E1SWA20C Peripheral Whole Blood	3 BS_E1SWA20C Peripheral Whole Blood
BS_KB9GJDCS Cerebellum/Posterior Fossa;Ventricles	4 BS_KB9GJDCS Cerebellum/Posterior Fossa;Ventricles
BS_2EJWS3SD Peripheral Whole Blood	5 BS_2EJWS3SD Peripheral Whole Blood
6 BS_6YMJ621P Skull	6 BS_6YMJ621P Skull
	8
	9
Output conflict	1 of 1 🔨 👻
Biospecimen_ID primary_site	
A BS_HZV4WDTB Frontal Lobe Parietal Lobe	
3 BS_E1SWA20C Peripheral Whole Blood	
4 BS_KB9GJDCS Cerebellum/Posterior Fossa;Ventricles	
5 BS_2EJWS3SD Peripheral Whole Blood	
6 BS_6YMJ621P Skull	
8	
9	



VS Code also has helpful git integration!

1 Biospecimen_ID primary_site

Accept Current Change | Accept Incoming Change | Accept Both Changes | Compare Changes

- 2 <<<<< HEAD (Current Change)
- 3 BS_HZV4WDTB Frontal Lobe|Parietal Lobe

4 ======

- 5 BS_HZV4WDTB Frontal and Parietal Lobes
- 6 >>>>>> update-metadata-fields (Incoming Change)
- 7 BS_E1SWA20C Peripheral Whole Blood
- 8 BS_KB9GJDCS Cerebellum/Posterior Fossa;Ventricles
- 9 BS_2EJWS3SD Peripheral Whole Blood
- **10** BS_6YMJ621P Skull

A reminder: Everyone agrees Git is tricky.

• You will make mistakes

- That's ok! So do we, and so does everyone else!
- Git and GitKraken error messages will try to help you
- But sometimes you will just want to curse

Dangit, Git!?!

Git is hard: messing up is easy, and figuring out how to fix your mistakes is impossible. Git documentation has this chicken and egg problem where you can't search for how to get yourself out of a mess, *unless you already know the name of the thing you need to know about* in order to fix your problem.

So here are some bad situations I've gotten myself into, and how I eventually got myself out of them *in plain english*.

https://dangitgit.com/en

Many thanks to everyone who has volunteered to translate the site into new languages, you rock! Michael Botha (af) · Khaja Md Sher E Alam (bn) · Eduard Tomek (cs) · Moritz Stückler (de) · Franco Fantini (es) · Hamid Moheb (fa) · Senja Jarva (fi) · Michel (fr) · Alex Tzimas (gr) · Elad Leev (he) · Aryan Sarkar (hi) · Ricky Gultom (id) · fedemcmac (it) · Meiko Hori (ja) · Zhunisali Shanabek (kk) · Gyeongjae Choi (ko) · Rahul Dahal (ne) · Martijn ten Heuvel (nl) · Łukasz Wójcik (pl) · Davi Alexandre (pt_BR) · Catalina Focsa (ro) · Daniil Golubev (ru) · Nemanja Vasić (sr) · Björn Söderqvist (sv) · Kitt Tientanopajai (th) · Taha Paksu (tr) · Andriy Sultanov (ua) · Tao Jiayuan (zh) . With additional help from Allie Jones · Artem Vorotnikov · David Fyffe · Frank Taillandier · Iain Murray · Lucas Larson · Myrzabek Azil

Translated into over 20 languages, and counting!

(and its other version, <u>https://ohs**tgit.com</u>, but with those letters filled in!)