

Version Control Introduction

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Paper Workflow

A typical workflow of writing a paper:

- Start with an idea/outline
- Make a draft
- Proof
- Edit
- Repeat until done

Workflow Shortcomings

Individual paper:

- Forget what changes were and were not made
- Make big changes but like the way it was
- Want to use the material again but alter for a different audience, journal, etc.

Group paper:

- Don't know what changes were and were not made
- Not sure what version of the paper you or others have
- Not sure who or what was added to the version in-use

Solution

A common solution not using a version control system (VCS):

- Make a new directory and name appropriately
 - NuclearEngineeringAndDesign
 - AnnalsOfNuclearEnergy
- Make a new copy of the file and name it something different
 - AwesomePaper-Draft1.docx
 - AwesomePaper-AdvisorsNotes.docx
 - AwesomePaper-Draft2NeedCitations.docx
 - AwesomePaper-Final.docx
 - AwesomePaper-FinalAdvisorNotes.docx
 - AwesomePaper-FinalFinal.docx

Solution Shortcomings

- Proliferation of files and directories
- No automatic list of changes; “proper” naming attempts to correct this (e.g., Draft2NeedCitations)
- Ability to go back to an earlier version would complicate naming
- Collaboration issues still not addressed

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RELAP/MELCOR Inputs:

- Build the model by slowly adding control volumes and heat structures
- Adjust geometry input as more information becomes available
- Correct issues as they're discovered
- Might break things and need to find a older, working version
- **Re-use the input for multiple different simulations or numerical experiments**

Writing Programs

- Start simple and add more functionality
- Fix bugs as they're discovered
- Might break things and need to find a older, working version
- Someone else might want to leap off of the work already done but apply it differently

Same Problems

- These examples, and many more, all have the problems presented by the paper example.
- The problems only become worse as the work becomes larger or more people become involved.

What's the solution?

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What is it?

Definition A system that records changes to a file or set of files over time so that you can recall specific versions later. `src`

Features:

- Revert a file or an entire project back to a previous state
- Review changes made over time
- See who last modified something
- Create an off-shoot from a current project state (branching)
- Create a brand new project from a current project (forking)
- Work locally and save to an online system (distributed systems)

Advantages / Disadvantages

Advantages

- History of the project is automatically cataloged
- All versions of the project are saved and ID-ed automatically
- Line-by-line and person-by-person reviewable history.

Disadvantages:

- Can't see line-by-line changes for binary files (e.g., *.docx or *.pdf)
- Not good for saving humongous files (large binary data files shouldn't be versioned)
- Requires discipline and effort to log and sync changes
- Becomes much, much more complicated for larger projects (not a worry for us)

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Definitions (Examples to follow)

Repository A directory that hold all project files and VCS information.

Commit A submission changes from the user to the VCS; this creates a new version and save the previous state earlier in the history

Commit Message A short/long description of the changes present in the commit.

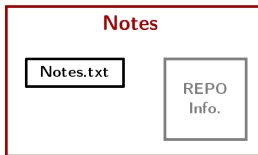
Branch A new, separate line of history starting from a certain version; changes can be made to a branch without affecting what it was branched from

Diff A comparison of two files with line-by-line difference highlighted

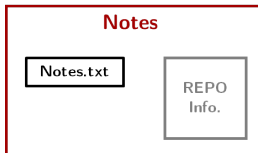
Sync/Push A synchronization of a local repository with a non-local one

History/Commit Example

Create repository called
"Notes".



Add a new file Notes.txt

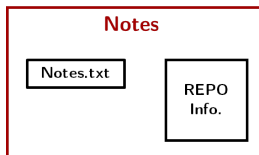


History:

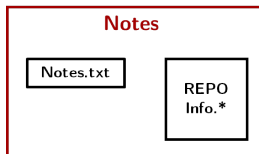
REPO Info. initially empty

History/Commit Example

Commit new file to VCS.



Add a new note to file.

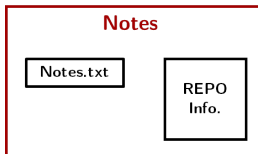


History:

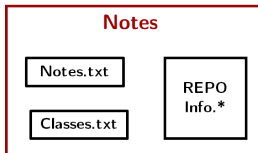
- ① 'Notes.txt' created.

History/Commit Example

Commit new line to VCS.



Add a new file.

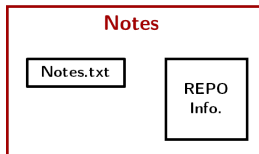


History:

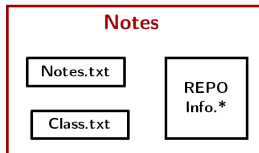
- ① 'Notes.txt' created.
- ② Added new note to 'Notes.txt'.

History/Commit Example

Commit new file to VCS.



And so on ...













History:

- ① 'Notes.txt' created.
- ② Added new note to 'Notes.txt'.
- ③ Added new file 'Classes.txt'.

History of This Presentation

History

	Troy Haskin Created Graphics directory; finished Workflow.	just now
	Troy Haskin Started VCS How it works; added workflow PNGs	25 minutes ago
	Troy Haskin Adjusted WiscRed definition	1 hour ago
	Troy Haskin Completed subsection: VCS->Intro	1 hour ago
	Troy Haskin Removed Section: Outline	21 hours ago
	Troy Haskin Completed section: Motivation	21 hours ago
	Troy Haskin Added crests/logos and changed the footline	1 day ago
	Troy Haskin Updated .gitignore	1 day ago
	Troy Haskin Created UWMadBeamer class	1 day ago
	Troy Haskin Initial push to GitHub	1 day ago

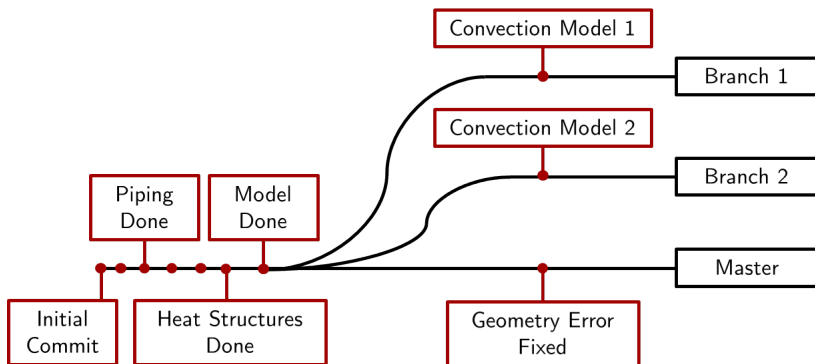
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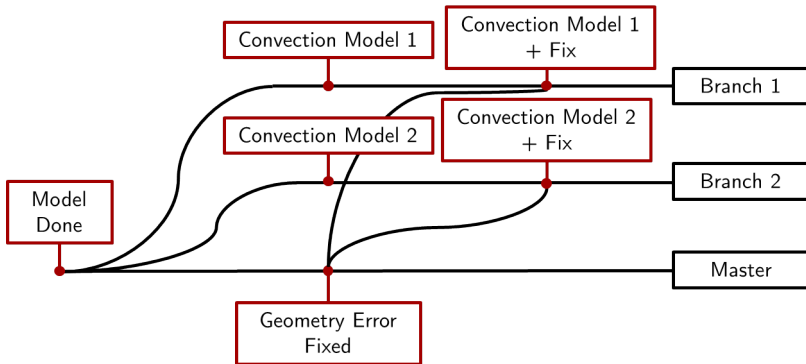
Branching Example

Branches share a common ancestor but can have different histories after the branch commit.



Merge Example

It is possible to **merge** histories in branches but can lead to **conflicts** (mismatched or ambiguous histories that require resolution).



That's it

And that covers the broad introduction.

There is more, of course, but that will be investigated later.

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