Managing shared physics projects with git

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Originally developed by Linus Torvalds to organize the development of the Linux kernel, git has become a popular tool for version control and collaboration. Unlike comparable tools (e.g., subversion), it doesn't rely on a central repository or require that participants lock files during editing. Instead, the files are distributed, with each editor working from her own copy of the repository and having responsibility for merging changes when conflicts arise. Even for a single author working alone (no collaboration), git can help by tracking file changes and keeping files up-to-date across multiple computers. This is useful if you want to roll back to earlier versions of a project. And it's very convenient if you split your time between work and home computers. Git is quite efficient. Changes are stored as diffs (differences between adjacent versions of each file). And it is very flexible. The system is file-type agnostic, and is just as good at tracking a dissertation document as it is tracking source code. In this talk/workshop, I will show how to set up a repository and to carry out basic git operations from the command line. I will give examples of an integrated workflow (consistent with best practices for data provenance) that keeps source files, data, batch scripts, and manuscripts in one place.

I. WHAT IS GIT?

- version control system
- designed to track changes in code (any text files really, not just software)
- created by Linus Torvalds for Linux kernel development
- distributed (not a client-server model)
- later evolved into a collaboration tool and software management system

II. WHY DO PEOPLE LIKE IT SO MUCH?

- fast (runs locally)
- only sometimes requires network access
- flexible workflows (branching/merging, nonlinear)
- data integrity (complete history, file snapshots)
- ability to unwind changes
- revert to any previous version at will
- facilitates collaboration (workflow-agnostic)

III. HOW IS THIS DIFFERENT FROM OTHER SCHEMES?

- Torvals has a kernel / filesystem point of view
- git = hash value file system + changes list
- each local repository contains all the data and a complete history of all changes
- no checkout or exclusion via locks
- merging resolved by hand if it cannot be done algorithmically
- git stores entire snapshots so files never need to be assembled (but eventually builds "packs" of binary diffs for old commits to save space)
- non-restrictive licence

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