Version Control *with Git*

Instructor: Emmanouil (Manos) Farsarakis
University of Portsmouth, December 2015

Reusing this material

Lesson Plan

- What is version control?
- Why use it?
- Why “Git”?
- **How does it work?**

What is Version Control?

What is Version Control?

Revision control, also known as version control and source control (and an aspect of software configuration management), is the management of changes to documents, computer programs, large web sites, and other collections of information. Changes are usually identified by a number or letter code, termed the "revision number", "revision level", or simply "revision". For example, an initial set of files is "revision 1". When the first change is made, the resulting set is "revision 2", and so on. Each revision is associated with a timestamp and the person making the change. Revisions can be compared, restored, and with some types of files, merged.

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Revisions can be compared, restored, and with some types of files, merged.

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What is
Version Control?

Think “Time-capsule”,
but… “with benefits”.

`add`

`push`

`branch`

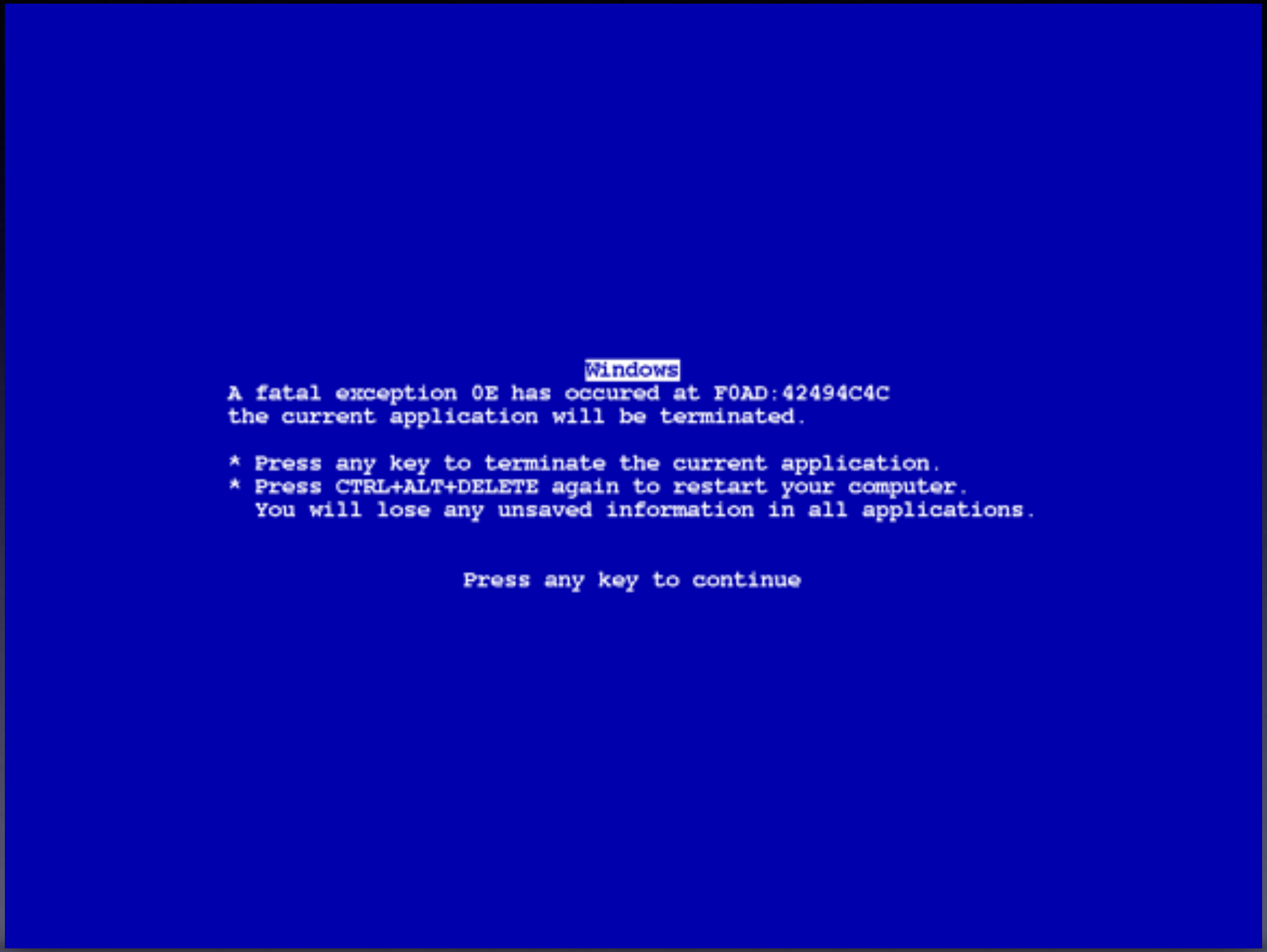
`pull`

`revert`

`commit`

Why use it?

Why use it?



```
                            Windows
A fatal exception 0E has occured at F0AD:42494C4C
the current application will be terminated.

* Press any key to terminate the current application.
* Press CTRL+ALT+DELETE again to restart your computer.
  You will lose any unsaved information in all applications.

                     Press any key to continue
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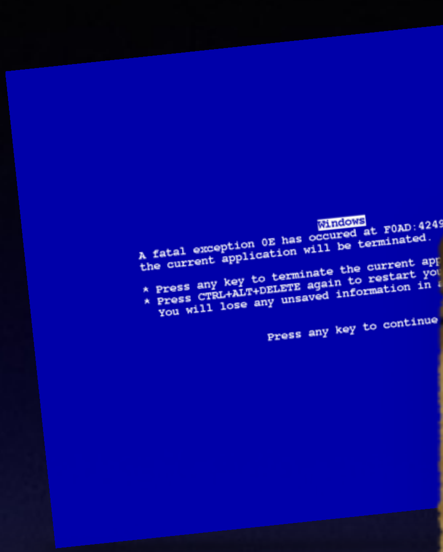

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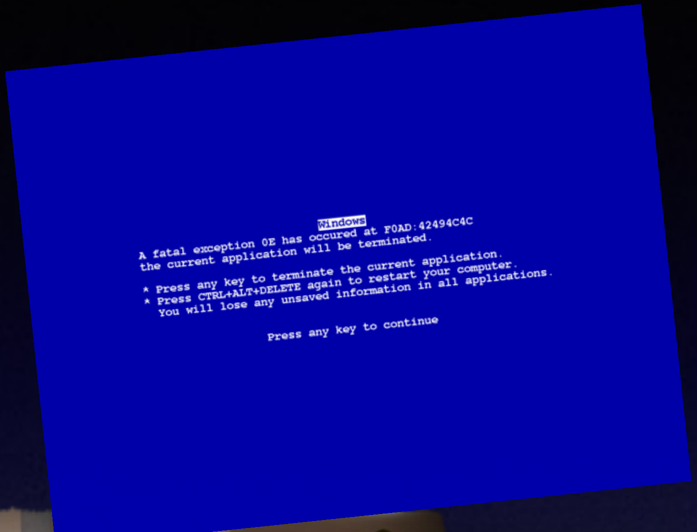

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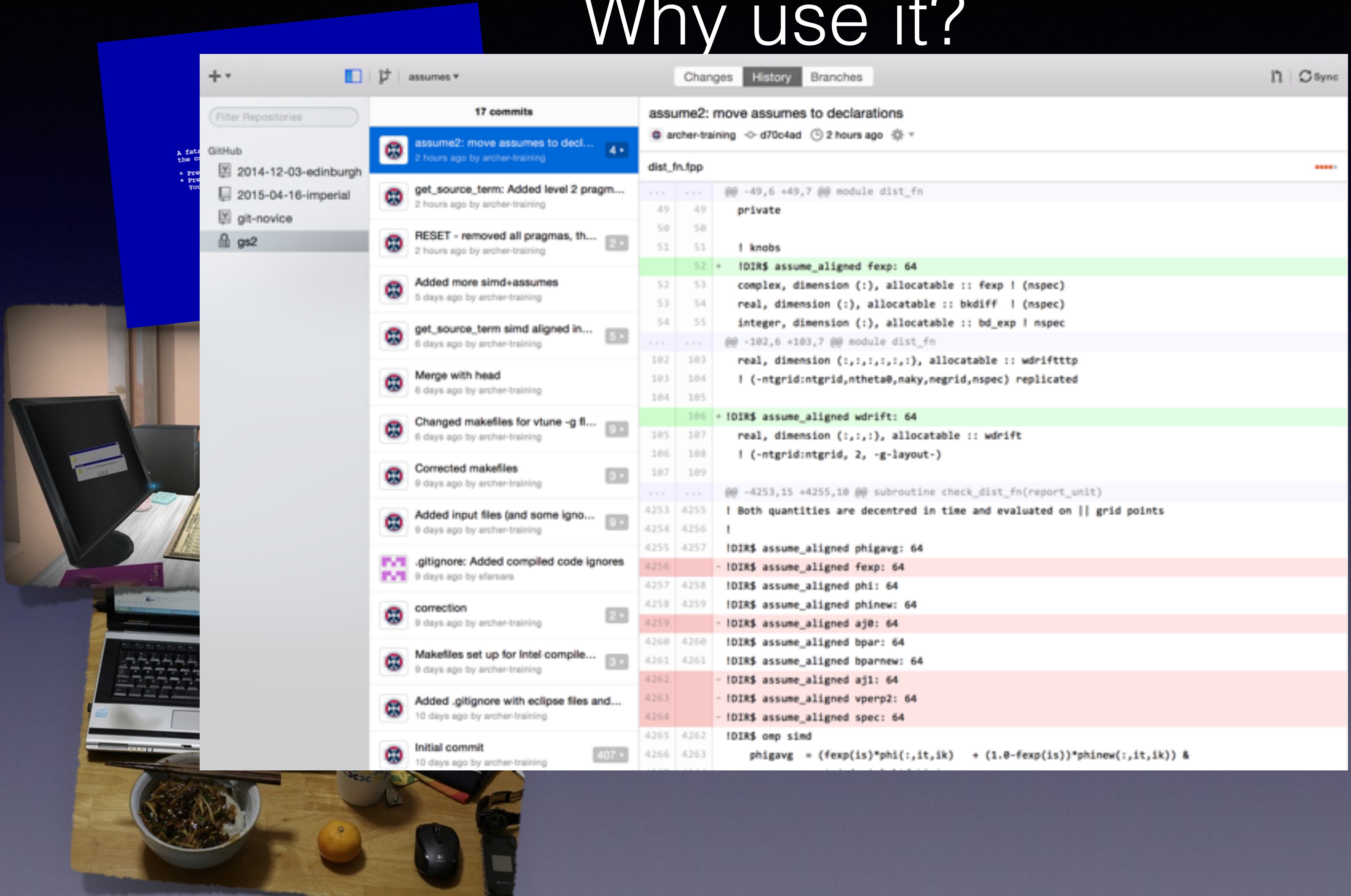

17 commits

Commit	Author and time	Files
assume2: move assumes to decl...	2 hours ago by archer-training	4
get_source_term: Added level 2 pragm...	2 hours ago by archer-training	
RESET - removed all pragmas, th...	2 hours ago by archer-training	2
Added more simd+assumes	5 days ago by archer-training	
get_source_term simd aligned in...	6 days ago by archer-training	5
Merge with head	6 days ago by archer-training	
Changed makefiles for vtune -g fl...	6 days ago by archer-training	9
Corrected makefiles	9 days ago by archer-training	3
Added input files (and some igno...	9 days ago by archer-training	9
.gitignore: Added compiled code ignores	9 days ago by efarsara	
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Added .gitignore with eclipse files and...	10 days ago by archer-training	
Initial commit	10 days ago by archer-training	407

assume2: move assumes to declarations

archer-training d70c4ad 2 hours ago

dist_fn.fpp

```
@@ -49,6 +49,7 @@ module dist_fn
   private

   ! knobs
+  !DIR$ assume_aligned fexp: 64
   complex, dimension (:), allocatable :: fexp ! (nspec)
   real, dimension (:), allocatable :: bkdiff  ! (nspec)
   integer, dimension (:), allocatable :: bd_exp ! nspec
@@ -102,6 +103,7 @@ module dist_fn
   real, dimension (:,:,:,:,:,:), allocatable :: wdriftttp
   ! (-ntgrid:ntgrid,ntheta0,naky,negrid,nspec) replicated

+ !DIR$ assume_aligned wdrift: 64
   real, dimension (:,:,:), allocatable :: wdrift
   ! (-ntgrid:ntgrid, 2, -g-layout-)

@@ -4253,15 +4255,10 @@ subroutine check_dist_fn(report_unit)
  ! Both quantities are decentred in time and evaluated on || grid points
  !
  !DIR$ assume_aligned phigavg: 64
- !DIR$ assume_aligned fexp: 64
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  !DIR$ assume_aligned phinew: 64
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- !DIR$ assume_aligned spec: 64
  !DIR$ omp simd
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on Control *with Git*

Why it?

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Makefiles
9 days ago by archer-training

Added .gitignore with eclipse files and...
10 days ago by archer-training

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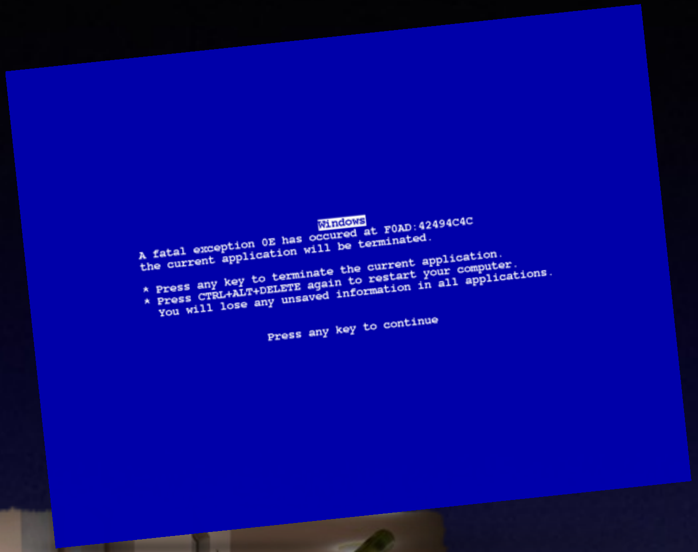

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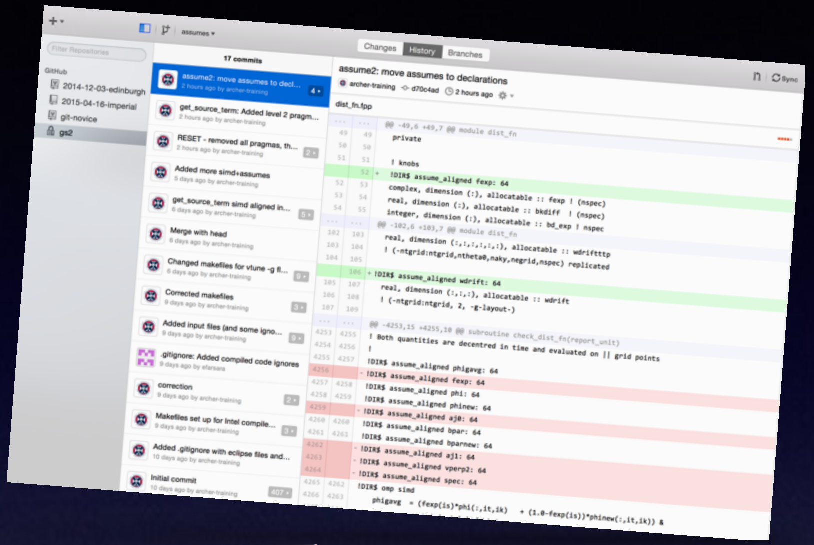

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Why Git?

Why Git?

...and not subversion?

...or mercurial?

Why Git?

- Some may prefer other VC systems

BUT

- Knowing Git WILL help you use any other VC system.
- Git Hub is becoming increasingly popular

Why Bitbucket?

Why Bitbucket?

- It offers PRIVATE repositories by default

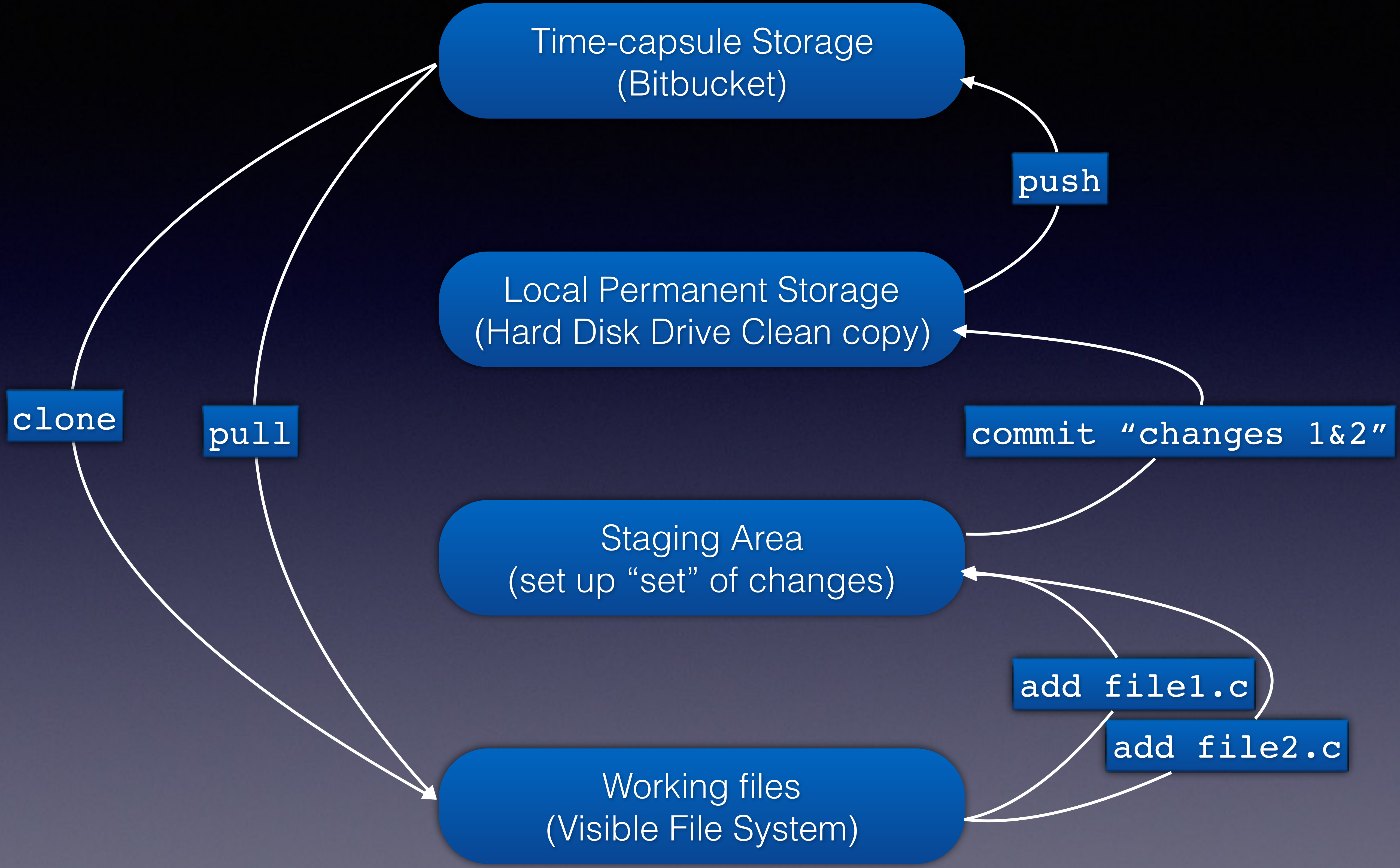
You can use others (as do we):

- Bitbucket
- GitHub
- GitLab

A quick overview

before we get started

Version Control *with Git*



Time-capsule Storage (Bitbucket)

Local Permanent Storage (Hard Disk Drive Clean copy)

Staging Area (set up "set" of changes)

Working files (Visible File System)

`push`

`commit "changes 1&2"`

`add file1.c`

`add file2.c`

`clone`

`pull`

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Open Science. Basics!

(or… "I'm not a lawyer".)

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The old way:

A scientist:

- Collects data on local machine
- Writes or modifies a program to analyse that data
- From results, writes and submits paper (may include data - probably not code)
- Time passes…..
- The journal sends her reviews -anonymous handful of people in her field
- She makes changes accordingly - resubmits
- More time……
- The paper is eventually published

The old way:

In the end…

- The paper may include a link to an online copy of her data
- The paper is behind a paywall
    - Only users with personal or institutional access will be able to read it
- Where is her code? How can I build on this?

A new way:

A scientist:

- Stores data in open access repo like figshare or Dryad - gets DOI (digital object identifier).
- Creates an online repo on GitHub (or the like) for her work.
- As she does analysis, she pushes changes and some results to her repo. She also uses the repo for her paper. The repo becomes a hub for collaboration.
- When she's happy with the paper, she submits it to arXiv (or other pre-print server) and invites feedback from peers.
- Feedback may lead to several revisions before paper is submitted to journal.
- Published paper includes links to preprint, repo and figshare.

A new way:

This way:

- Other scientists can use her work as a starting point for their own research.
- Discovery is accelerated.
- Open work is more widely cited and re-used.

But…

- What does “Open” mean exactly?

Licenses

Software:

- GPL
- MIT
- BSD

Unrestricted sharing and modification of code

Licenses

Software:

- **GPL**
- MIT
- BSD

Modified code must reuse GPL

- Re-contribution to community
- Using many codes gets complicated
- Necessary to force this?

Licenses

Software:

- **GPL**
- MIT
- BSD

U.S. Law -> May be important to you.

Licenses

Software:

Most important of all:

- Use a license: State it in a file in your project's home directory named LICENSE or LICENSE.TXT
- **Don't write your own license!** (unless maybe you ARE a lawyer…)

Licenses

Data and publications:

Six “Creative Commons” (CC) licenses available.

They use combinations of these four basic restrictions:

- BY: Attribution
- ND: No Derivatives
- SA: Share Alike
- NC: NonCommercial

Example: Software Carpentry

Software (code): MIT

Data (lessons): CC-BY

…with the purpose or encouraging the widest possible re-use.

Example: This lesson

BY NC SA

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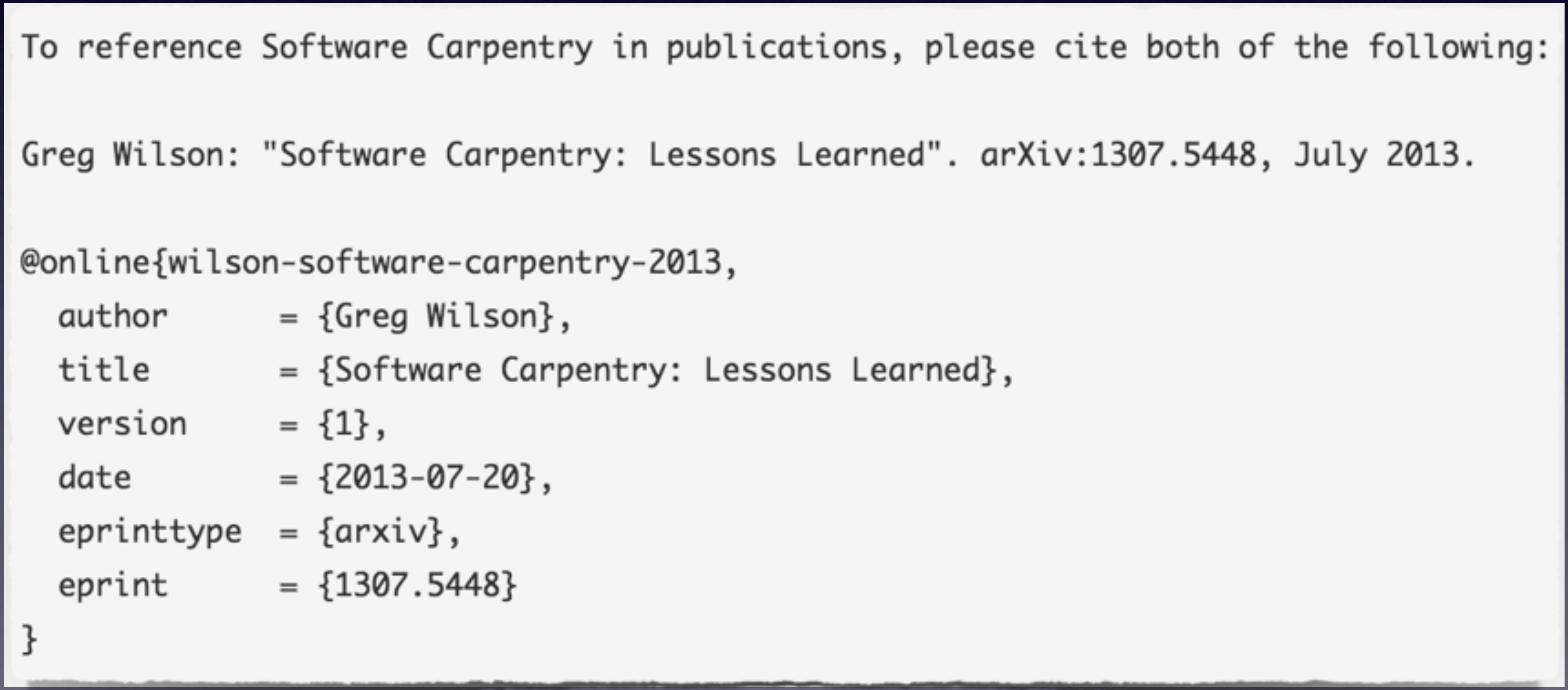
Citation note

CITATION or CITATION.txt



```
To reference Software Carpentry in publications, please cite both of the following:

Greg Wilson: "Software Carpentry: Lessons Learned". arXiv:1307.5448, July 2013.

@online{wilson-software-carpentry-2013,
  author      = {Greg Wilson},
  title       = {Software Carpentry: Lessons Learned},
  version     = {1},
  date        = {2013-07-20},
  eprinttype  = {arxiv},
  eprint      = {1307.5448}
}
```

Thank you!

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