PharmaSUG
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How to Use Git with Your SAS Projects

Chris Hemedinger is the Director of SAS User Engagement. His talented team looks after SAS online communities, SAS user groups, developer experience and GitHub, tech newsletters, expert webinars and tutorials.

Chris is a recovering software developer who helped build popular SAS products such as SAS Enterprise Guide. Inexplicably, Chris is still coasting on the limited fame he earned as an author of *SAS For Dummies*.

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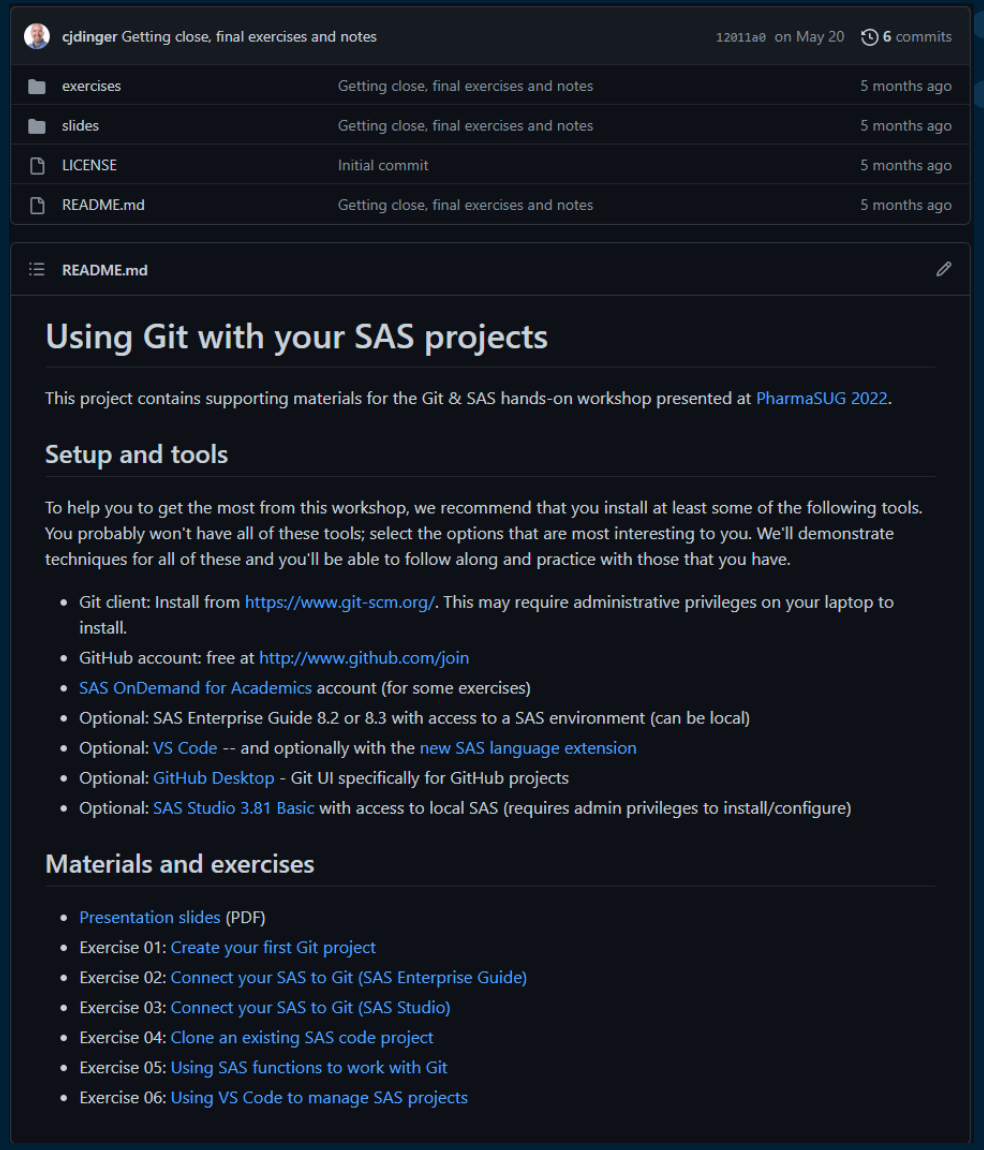
Workshop available on GitHub

github.com/sascommunities

git-workshop-pharmasug



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Today's topics

- What is Git™?
- Using Git with SAS tools
- Git functions in SAS programming language
- DevOps opportunities: collaboration and continuous integration
- Where to learn more

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youtube.com/sasusers

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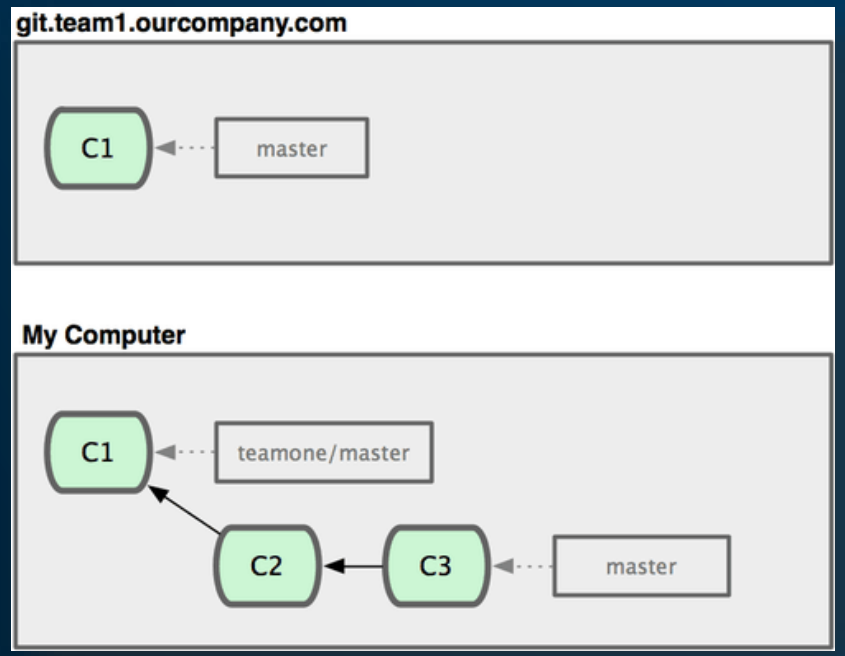
What is Git?



Source: https://git-scm.com

Git is a **distributed version control system** that supports several collaborative and standalone workflows

- **Distributed** – each developer has a "clone" of the code repository
- **Workflows** – feature-based, experiment branches, prod/test/dev, patch/cherry-pick
- **Open source –** Git software is free and open source.

  Several commercial systems (GitHub, GitLab, Bitbucket, and more) add features and enterprise-readiness.

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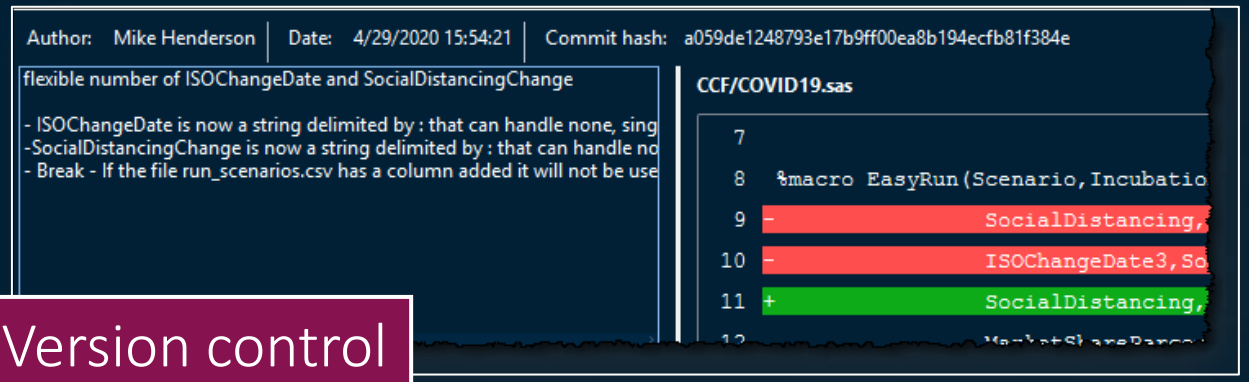
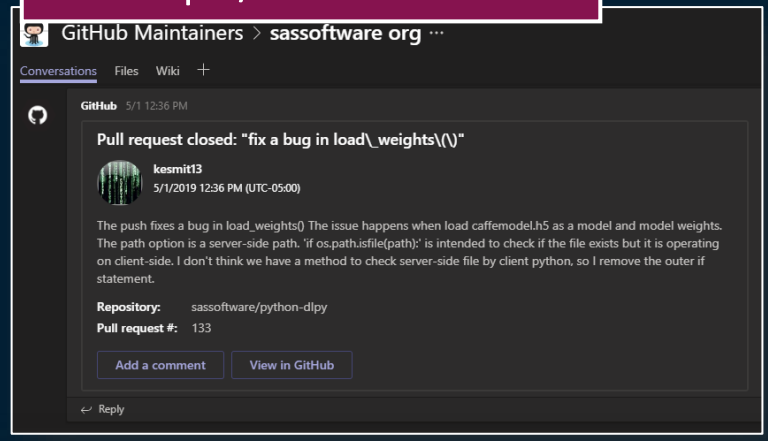
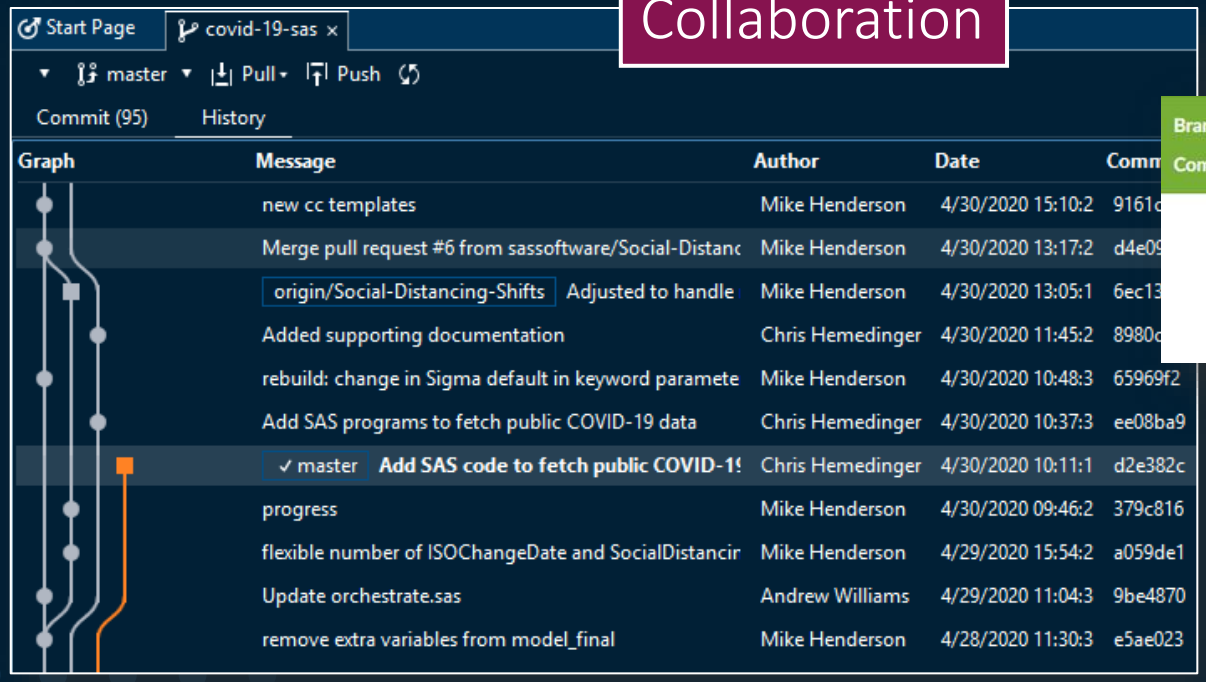
Benefits of using Git with SAS

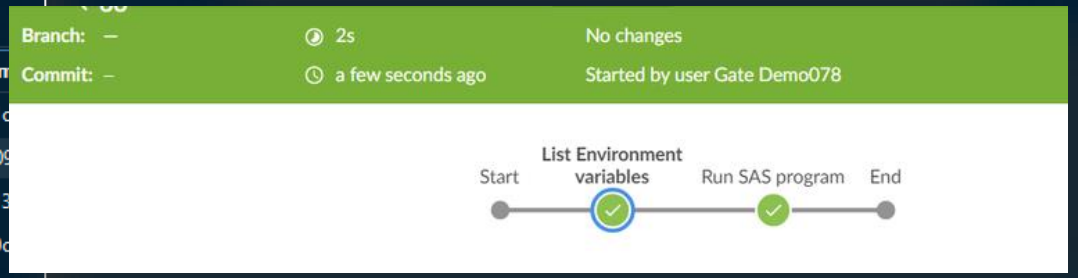


Version control



Collaboration





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Git has its own lingo

Clone

- Create a local copy of a repository

Fork

- Make a local copy of a repo where you don't have push access

Pull request

- Open a discussion with proposed code changes to be merged to upstream repo

Branch

- A logical location to divert from the "main line" of code to stage changes

Blame

- Annotated code listing with revision/author for each line

Commit

- Record a set of changes to the local repo

Commit History

- Log that shows chronological list of changes to the repo

Push / Pull

- Update a remote repo with local changes, or sync/merge local repo with remote changes

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SAS tools that integrate with Git

SAS Enterprise Guide

SAS Studio

SAS programming

SAS Data Integration Studio

And more!
SAS Viya products add more Git integration

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SAS Enterprise Guide and Git

Supports Git **internal** to project and/or with **external** repos

Project file (EGP)

.git repo

- EmbeddedProgram1.sas
  Revisions / history
- EmbeddedProgram2.sas
  Revisions / history
- EmbeddedProgram3.sas
  Revisions / history

Project file (EGP) | No project

- LinkedProgram1.sas
- LinkedProgram2.sas
- LinkedProgram3.sas

File system

.git repo

- LinkedProgram1.sas
  Revisions / history
- LinkedProgram2.sas
  Revisions / history
- LinkedProgram3.sas
  Revisions / history

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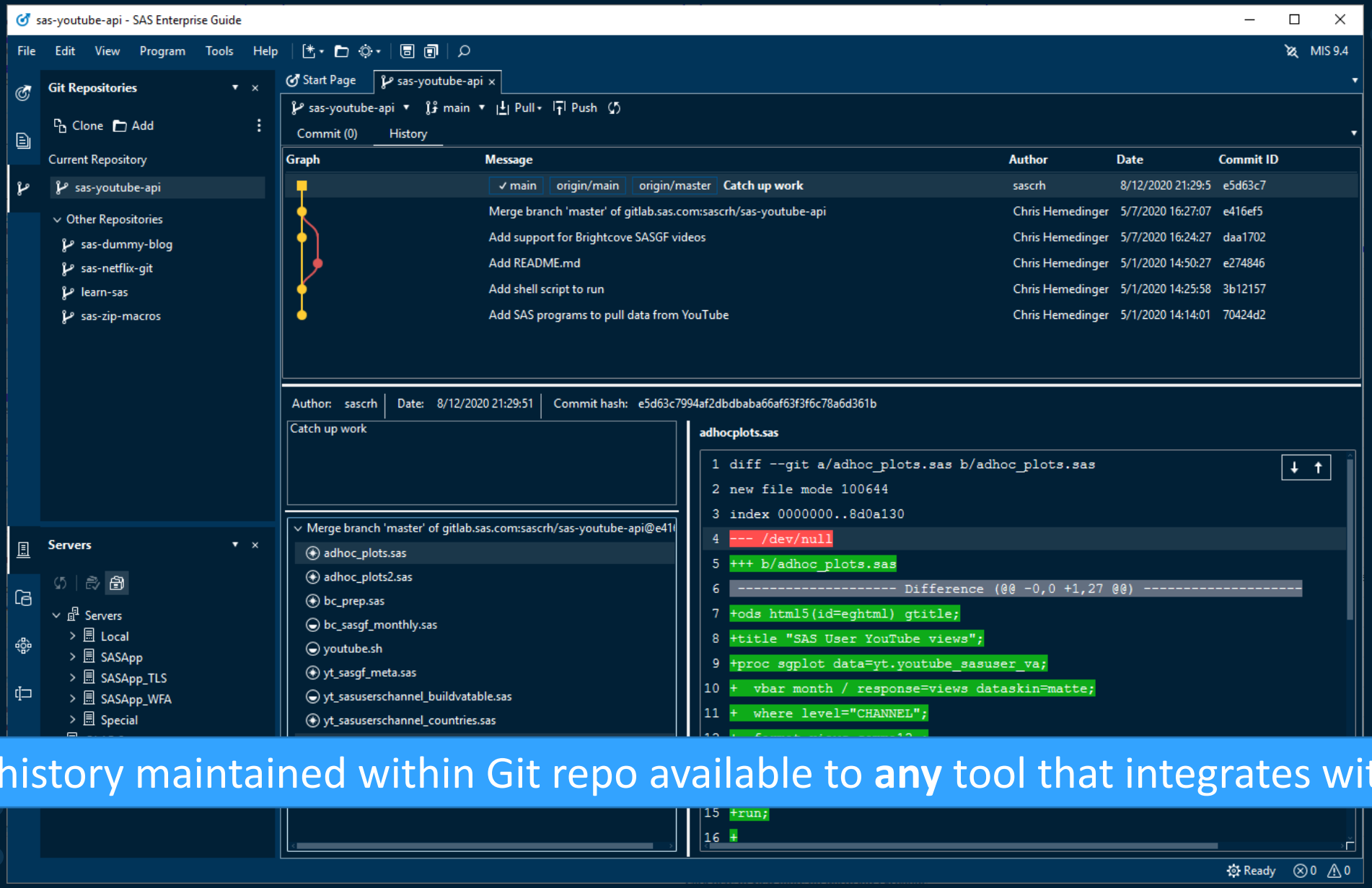
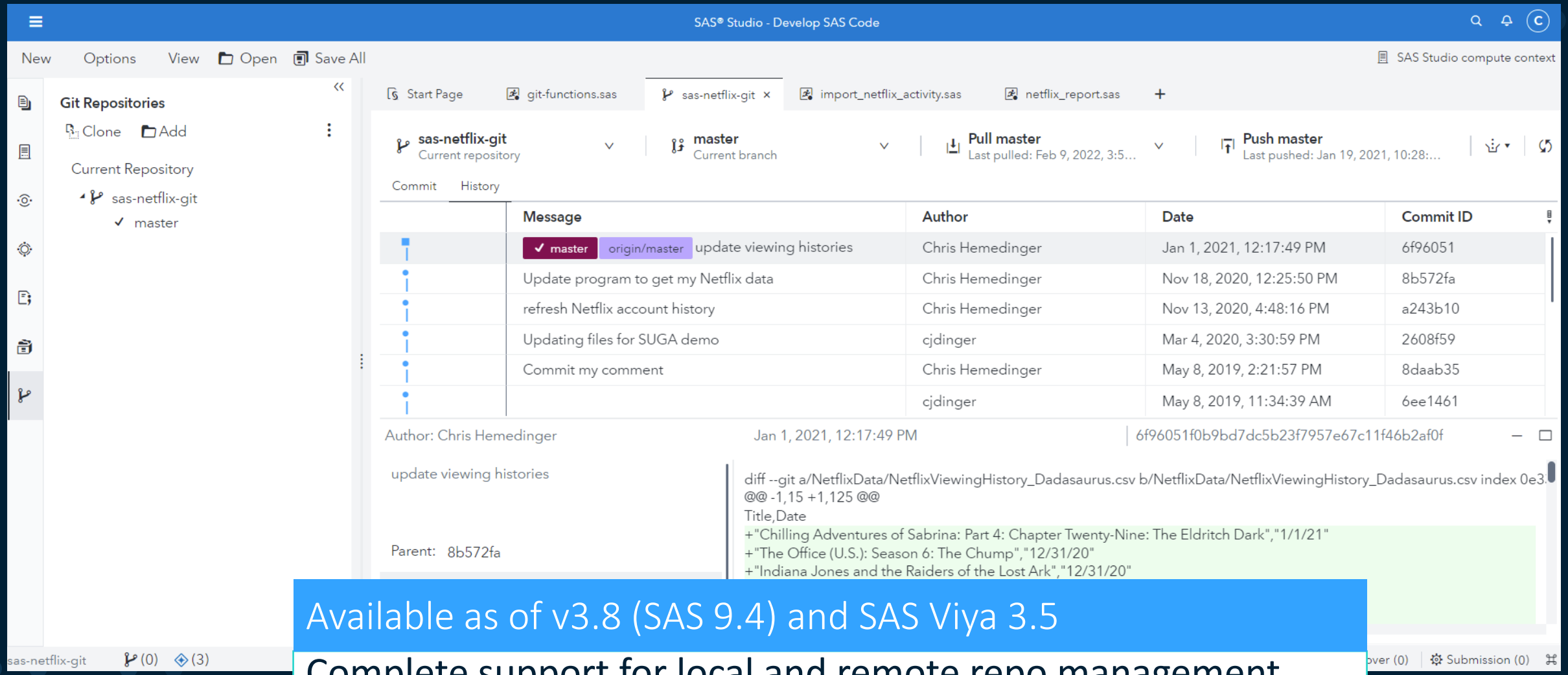
SAS Enterprise Guide with external repo



All history maintained within Git repo available to **any** tool that integrates with Git.

Git integration with SAS Studio



Available as of v3.8 (SAS 9.4) and SAS Viya 3.5

Complete support for local and remote repo management

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New Git functions in SAS language

Functions added in SAS 9.4 Maint 6 and SAS Viya

New SAS functions that mirror most of the Git commands that users are familiar with.

Select functions - All documented by searching "Git functions" on support.sas.com.

GITFN_CLONE	Clones a Git repository (for example, from GitHub) into a directory on the SAS server.
GITFN_COMMIT	Commits staged files to the local repository
GITFN_DIFF	Returns the number of diffs between two commits in the local repository and creates a diff record object for the local repository.
GITFN_PUSH	Pushes the committed files in the local repository to the remote repository.
GITFN_NEW_BRANCH	Creates a Git branch

Name change: GITFN* → GIT* in SAS Viya

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Demo

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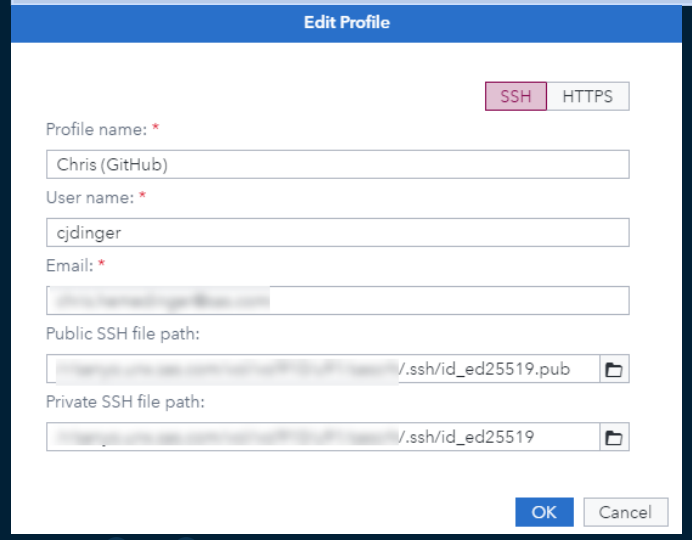
Connecting SAS to Git

SSH or HTTPS

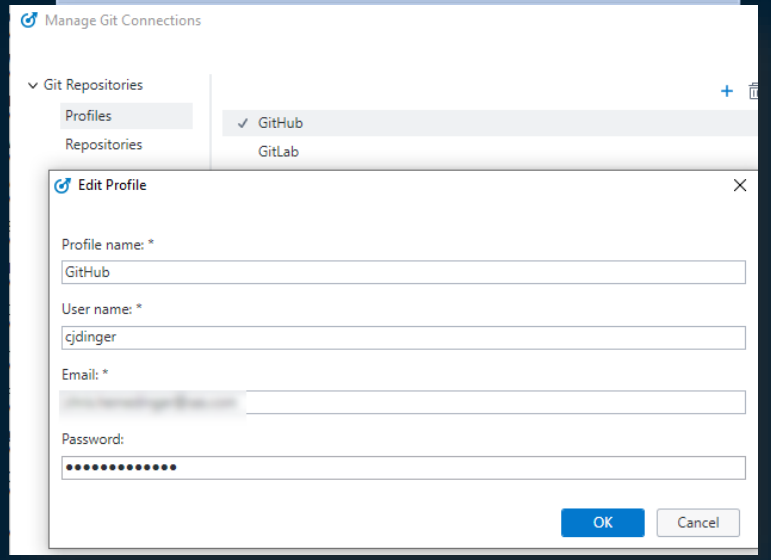
SAS Studio

Supports SSH or HTTPS



SAS Enterprise Guide 8.2

Supports HTTPS



SAS GIT* functions

Supports SSH or HTTPS

```
/* Fetch latest code from GitHub */
data _null_;
 rc = gitfn_clone(
   "git@github.com:sascommunities/sas-dummy-blog.git",
   "&repoPath.",
   "cjdinger",""
   "/u/sascrh/.ssh/id_rsa.pub",
   "/u/sascrh/.ssh/id_rsa");
 put rc=;
run;
```

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Generating an SSH key

SSH for passwordless access

- To generate a key for use with SAS Studio or SAS GIT functions:
  ```
  ssh-keygen -t ecdsa -b 521 -C <email>
  ```
- Will generate two files – a public and private key
  - Ex: id_rsa.pub and id_rsa
- Register the **public** key file with Git service
- **Protect** the **private** key file (readable by your account only)

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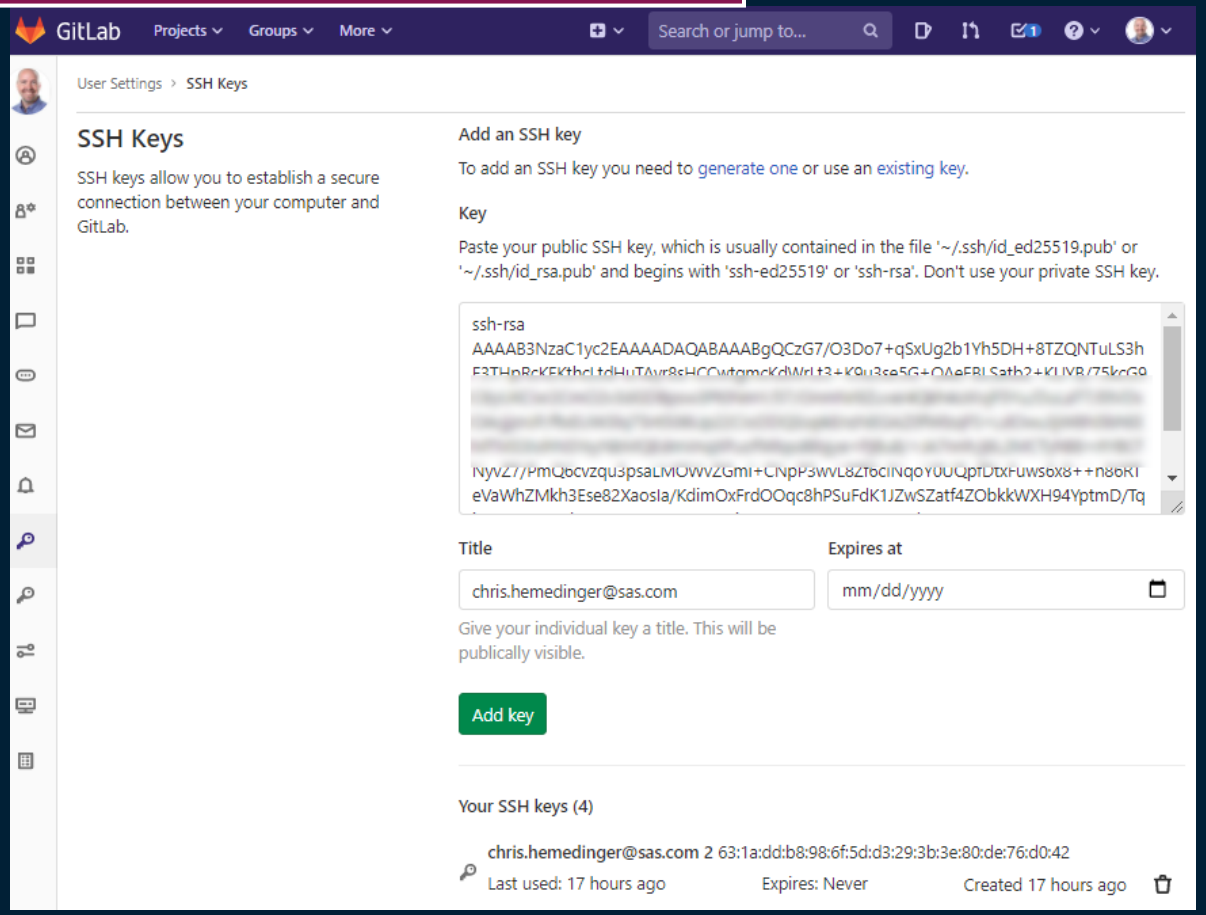
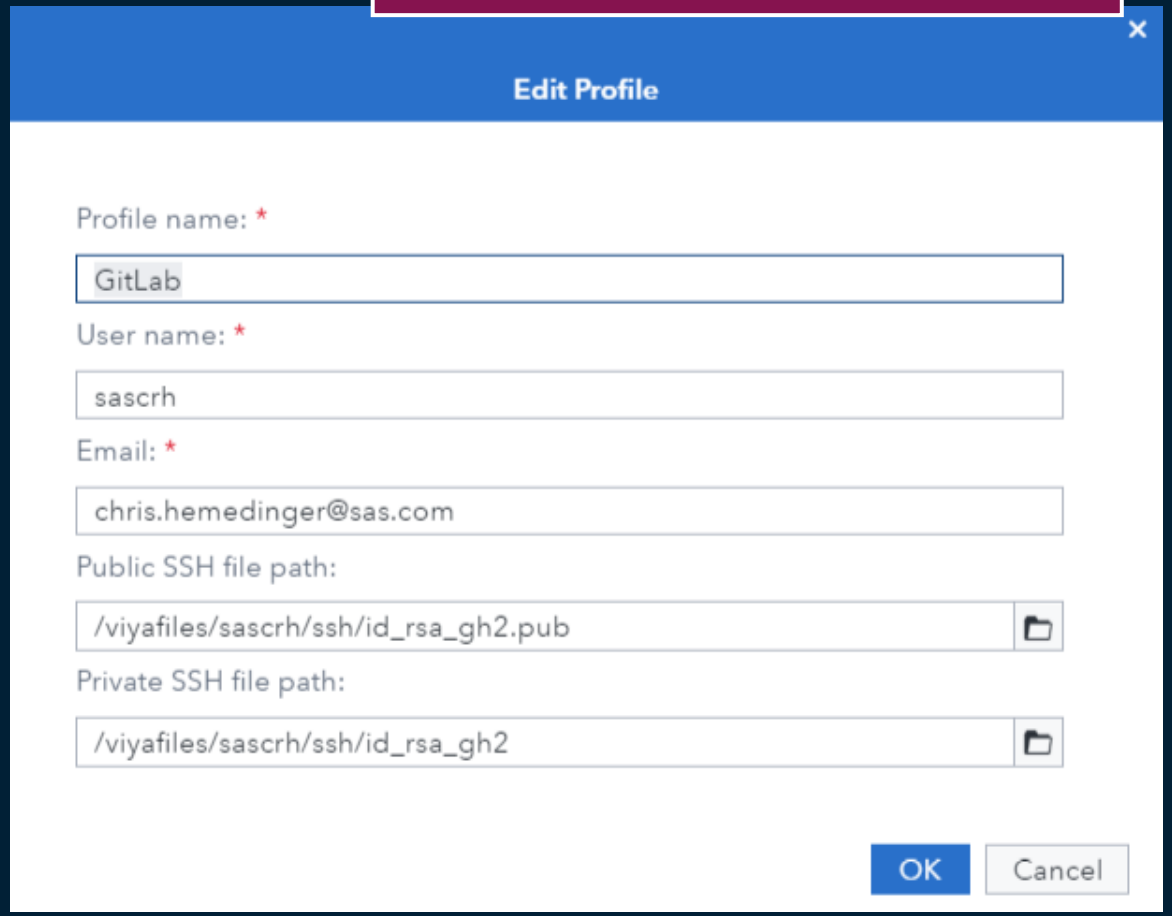
Register SSH key

GitLab example

GitLab settings



SAS Studio settings



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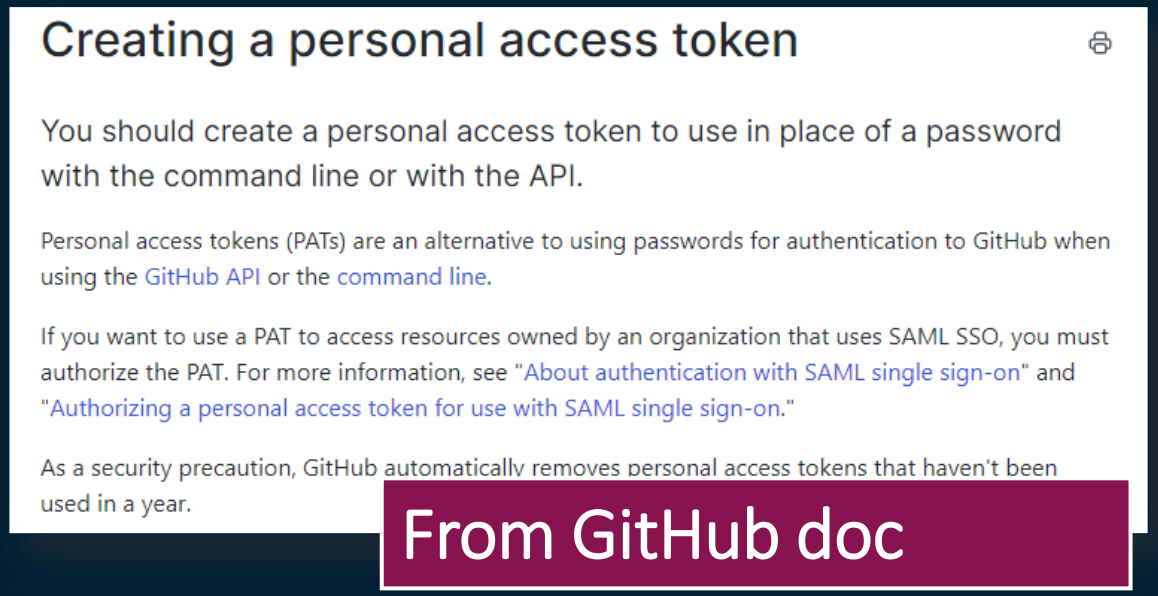
Generate an access token for HTTPS

Required for single-signon (SSO) or 2-factor auth

- HTTPS access requires username and password
- Instead of account password, use access token
- Access tokens convey specific permissions (**api**, **read_repository**, **write_repository**, etc.)
- **Protect** your access token!



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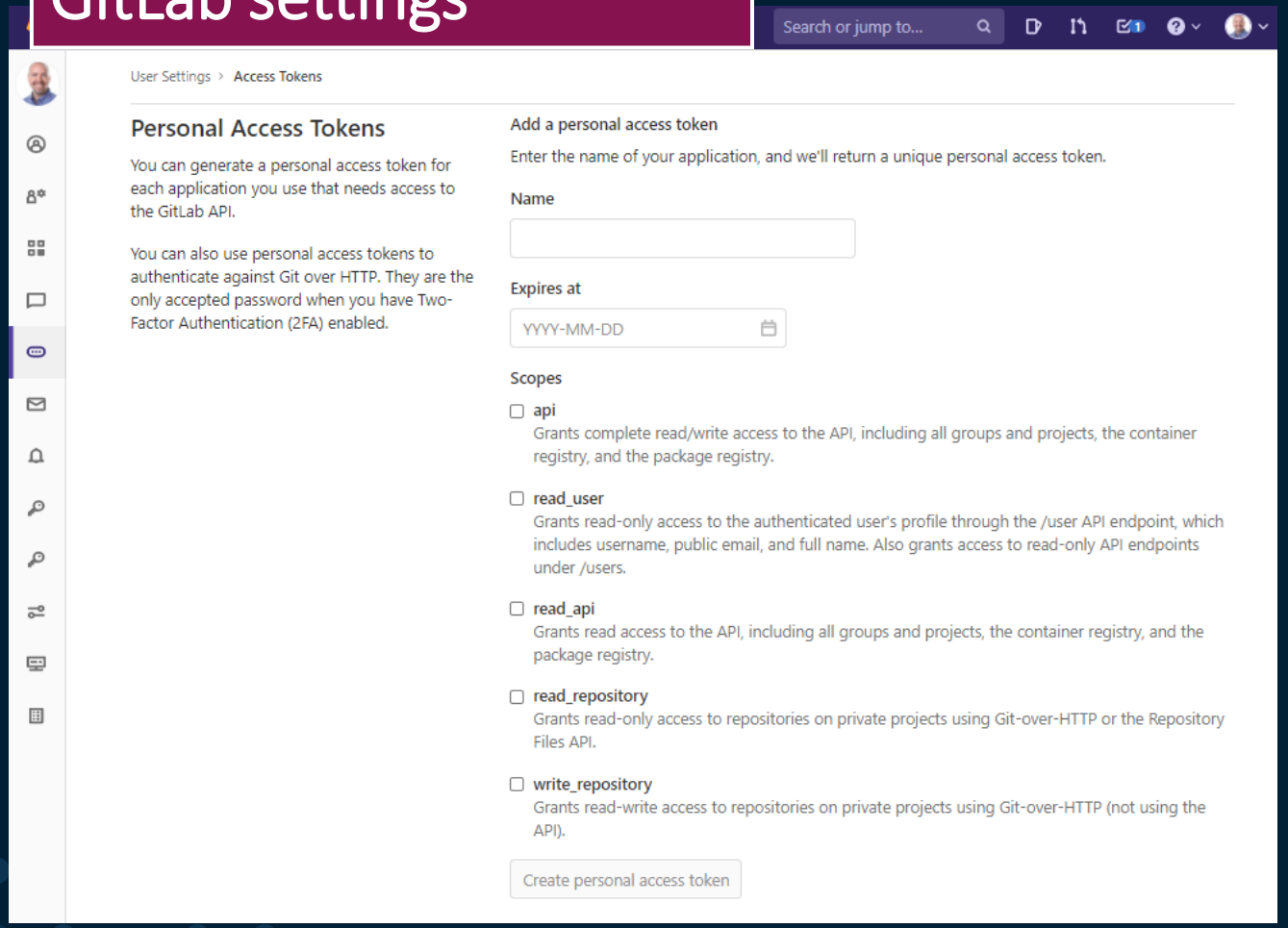
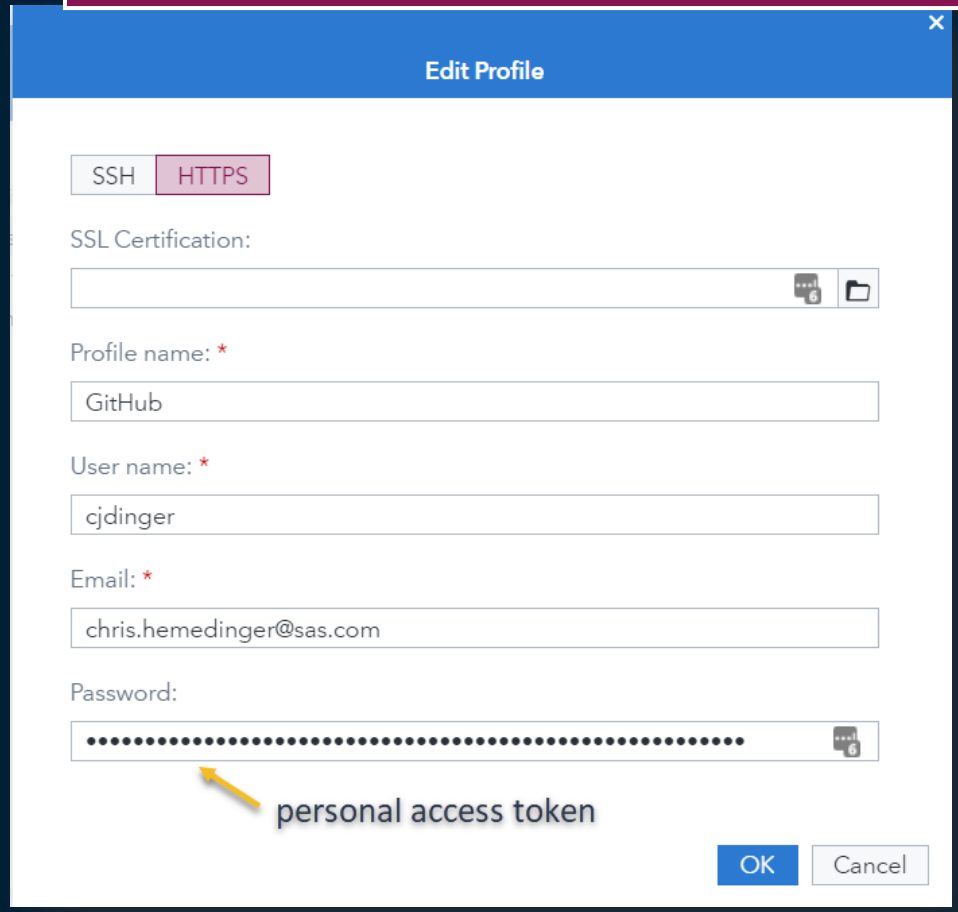
Register access token

GitLab example

GitLab settings



SAS Studio settings



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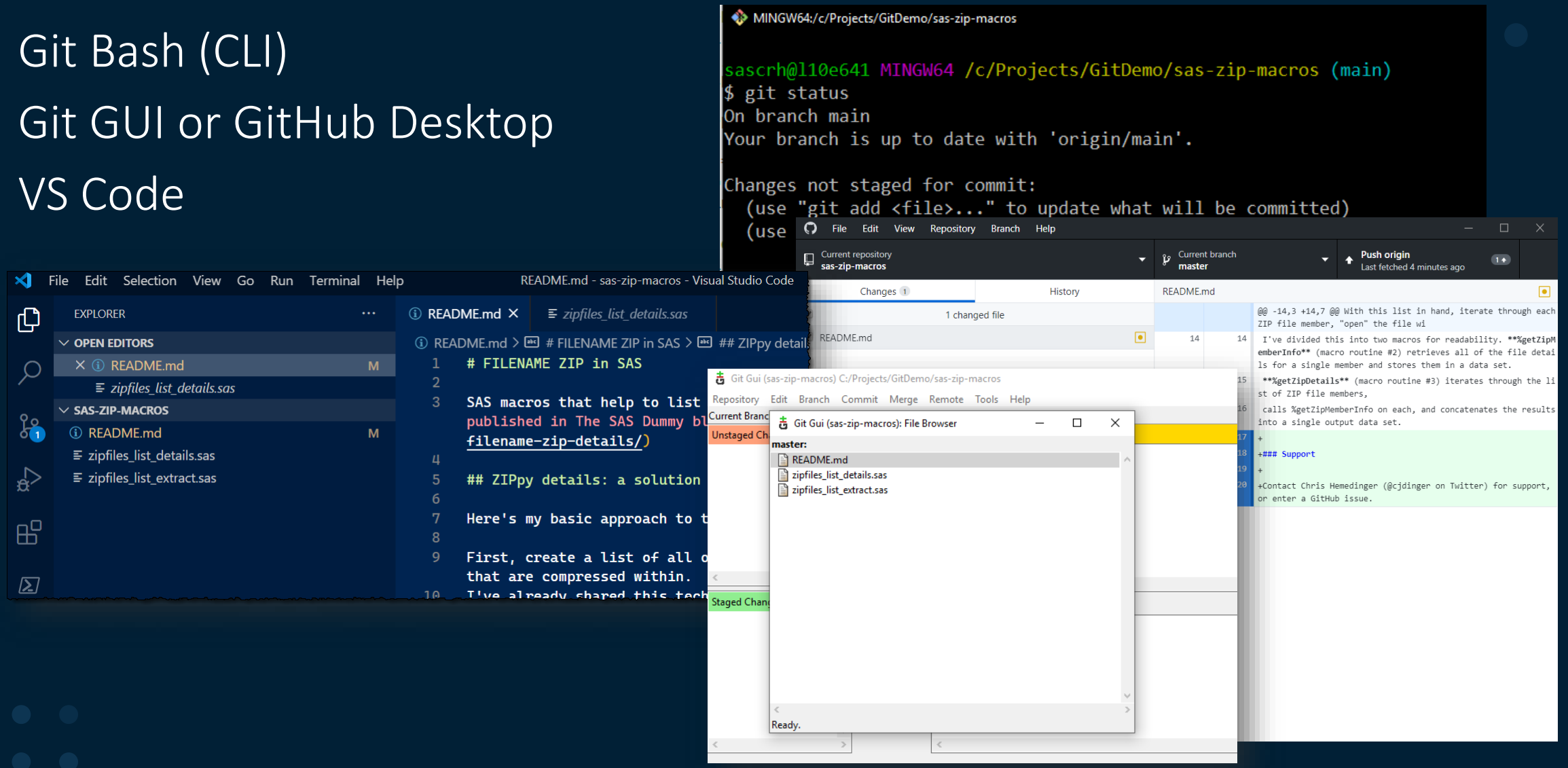
Use other tools alongside SAS

- Git Bash (CLI)
- Git GUI or GitHub Desktop
- VS Code



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How to organize your SAS projects in Git

Read the blog article

- Don't create one huge repo
- Don't organize based on dept org structure
- Design with collaboration in mind
- Re-use 👍, Ownership 👎
- Work **with** Git features, not against them

How to organize your SAS projects in Git

By Chris Hemedinger on The SAS Dummy | November 10, 2020

Topics | Programming Tips

The code and data that drive analytics projects are important assets to the organizations that sponsor them. As such, there is a growing trend to manage these items in the source management systems of record. For most companies these days, that means Git. The specific system might be GitHub Enterprise, GitLab, or Bitbucket -- all platforms that are based on Git.

Many SAS products support direct integration with Git. This includes SAS Studio, SAS Enterprise Guide, and the SAS programming language. (That last one checks **a lot** of boxes for ways to use Git and SAS together.) While we have good documentation and videos to help you learn about Git and SAS, we often get questions around "best practices" -- what is **the best/correct way** to organize your SAS projects in Git?

https://blogs.sas.com/content/sasdummy/sas-projects-git/

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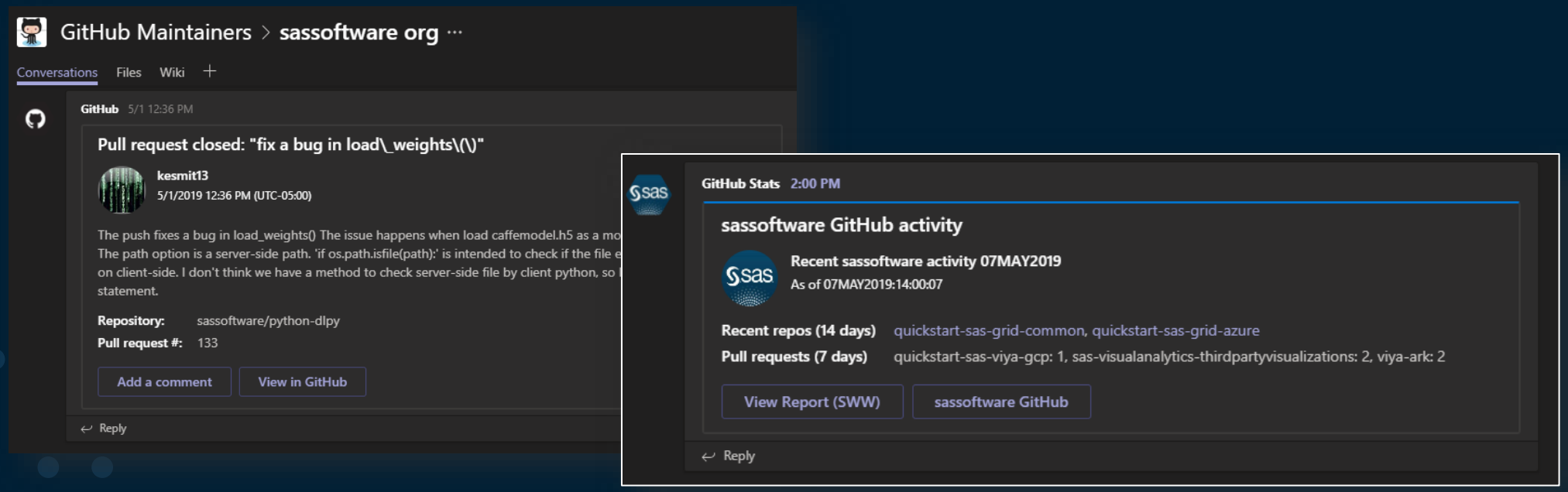
Git integration is just the beginning

From there, trigger other operations

- Gerrit for code review
- Jenkins or Travis CI for build, deployment, and other continuous integration
- Trigger notifications/alerts in Slack, Microsoft Teams



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Learn more

- Using Git with SAS (SAS Users YouTube)
- Git functions in SAS 9.4 and SAS Viya (doc)
- Using Git in SAS Enterprise Guide (doc)
- Git with SAS Studio and SAS Enterprise Guide (video)
- SAS Software on GitHub
- Using built-in Git operations in SAS (blog)
- How to organize your SAS projects in Git (blog)
- DevOps with SAS 9: SAS code, GitLab, and Jenkins (community)
- developer.sas.com for SAS app development
- *Pro Git* by Scott Chacon and Ben Straub, free online book about Git

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Q & A

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