MPAS
Model for Prediction Across Scales

MPAS Development: Using git and GitHub

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Motivation

The MPAS code – as well as all tools used to set up simulations and to post-process model output – are distributed through GitHub

- You may suspect that GitHub is more than just a means of distributing source code for MPAS

Git and GitHub are not only used for distributing source code, but are central to the *open development* of the MPAS model and supporting tools

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Outline

This talk aims to give a *very* brief introduction to our development process, which may be helpful if you should ever want to:

- Report a bug in the code
- Contribute code changes

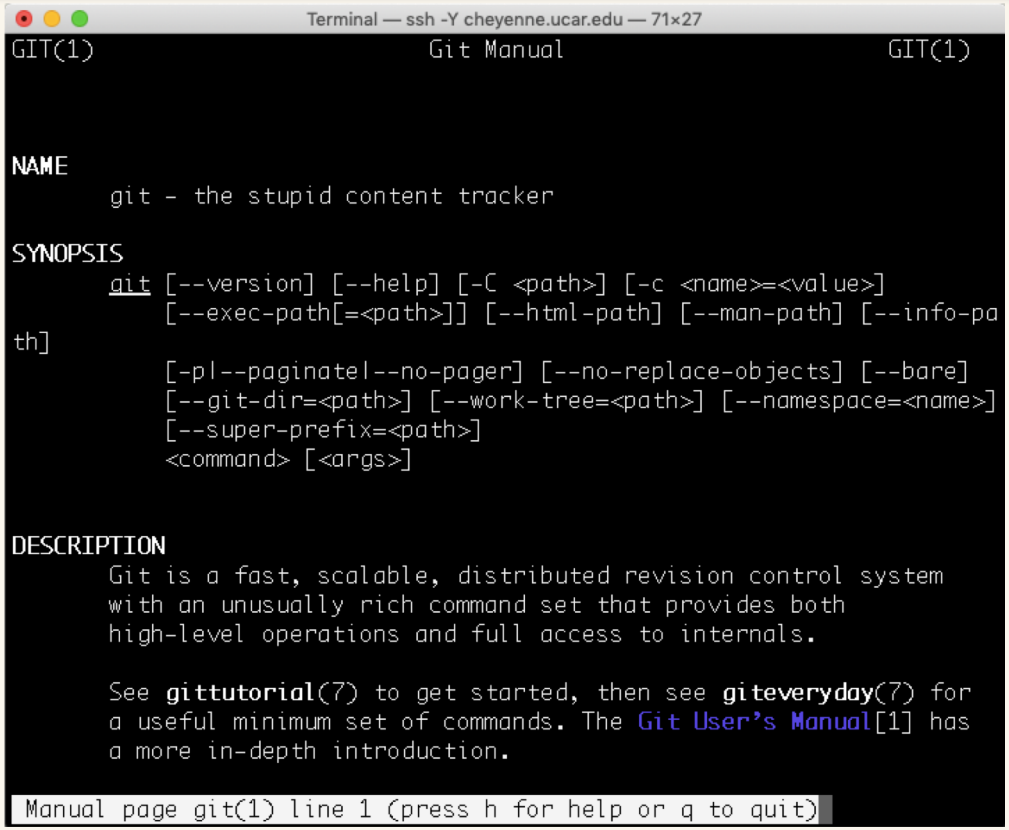
Outline of this talk

1. A quick summary of *git*
2. An introduction to GitHub
3. A high-level view of MPAS development process
4. What to do if you find a bug
5. How to contribute code changes

Git: The stupid content tracker

Git is an open-source, distributed version control system that supports a variety of workflows

- Most of us simply use the git command-line tools



Left: The first page of the git *man* page.

Git: commits and branches

Two of the key concepts in git (and version control in general) are:

- Commits
- Branches

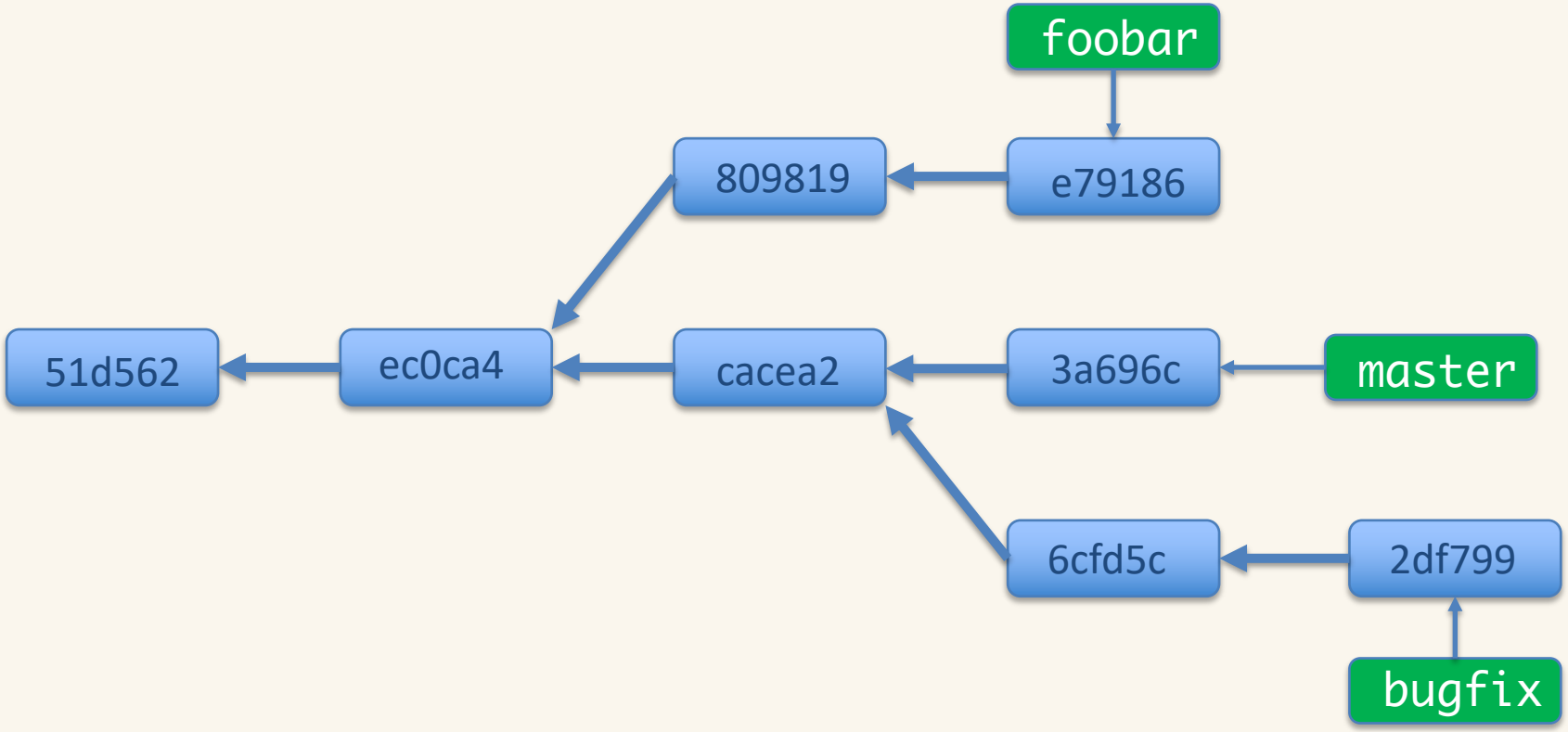
In a git repository, each commit consists of changes to one more files, and each commit has one or more *parent* commits

- Each commit is uniquely identified by a *hash*

A git *branch* is a pointer to a commit that can be updated as new commits are made

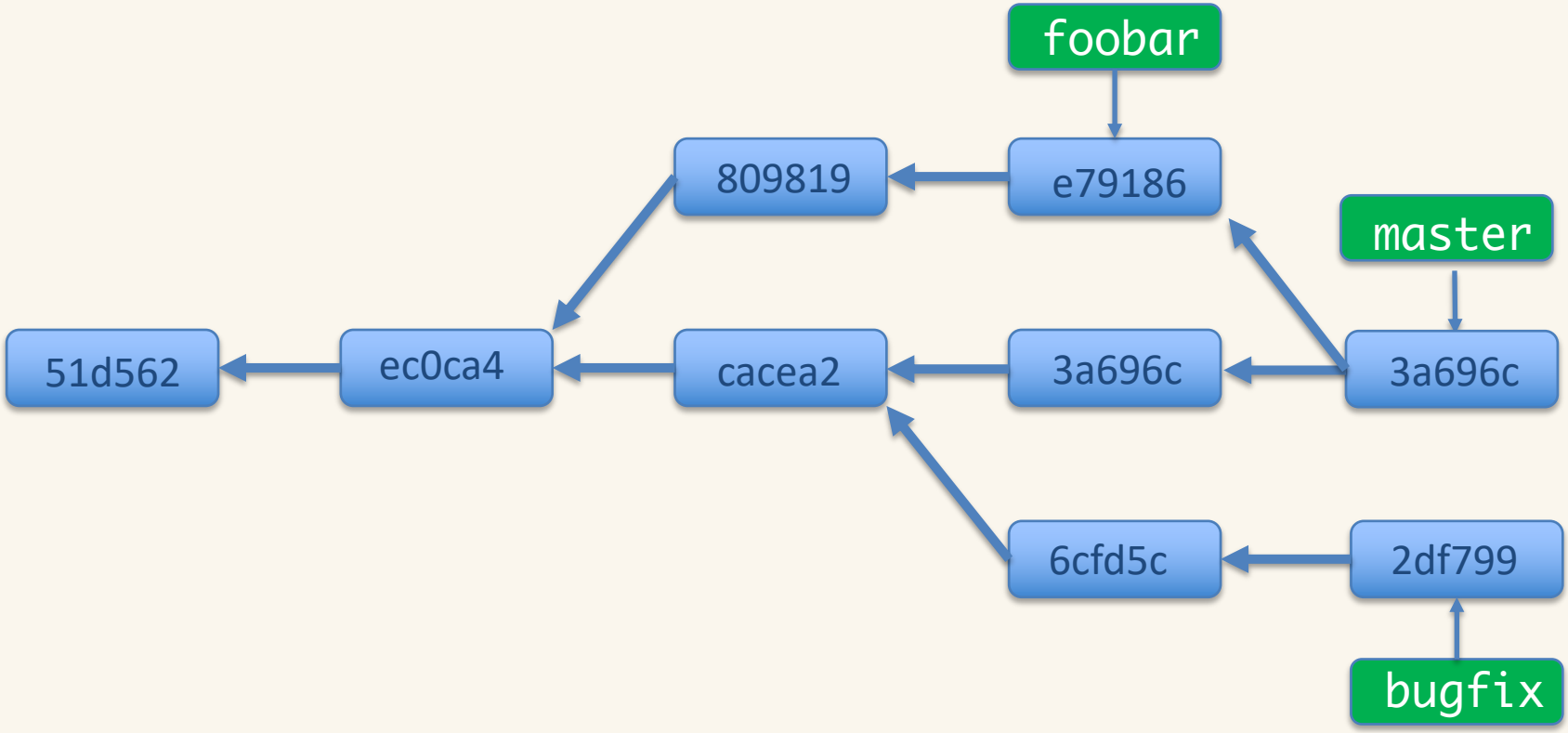
It can be helpful to visualize git repositories as directed, acyclic graphs!

Git: commits and branches



Above: A cartoon depiction of a git repository with three branches (foobar, master, and bugfix) and eight commits (f1d562, ec0ca4, etc.)

Git: merging branches



Above: The changes from the “foobar” branch have been *merged* onto the “master” branch.

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GitHub: Hosting for git repositories, plus…

GitHub provides hosting for git repositories, plus helpful features:

- Issue tracking
- Pull Requests
- Forks
- Wikis, task management, feature requests, and a few other things that MPAS-Atmosphere developers don't tend to use much…

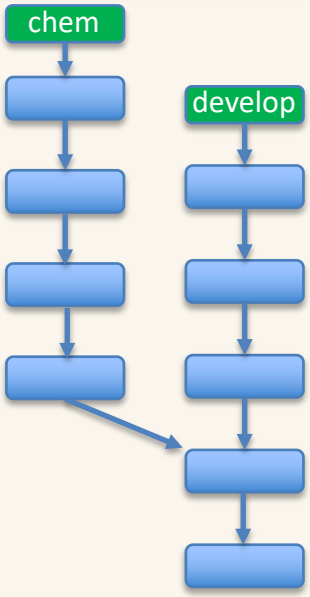
Pull Requests provide a web-based mechanism to request that one branch be merged into another

- Reviewers can be assigned
- Discussion of the changes can take place
- Approval of the changes is made explicit

GitHub: Hosting for git repositories, plus…

Forks are *clones* of a repository on GitHub in which an individual can create their own branches, and independently do development work

- Importantly, *Pull Requests* may be used to merge branches across forks of a repository



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mgduda/MPAS-Model

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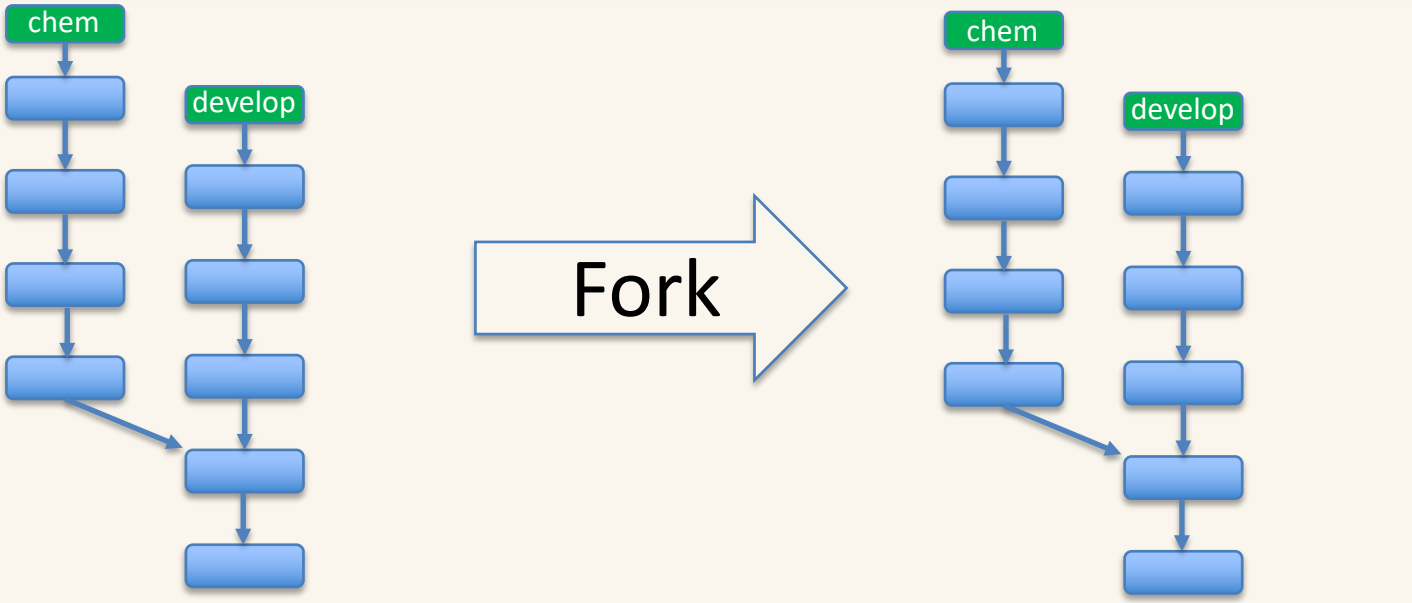

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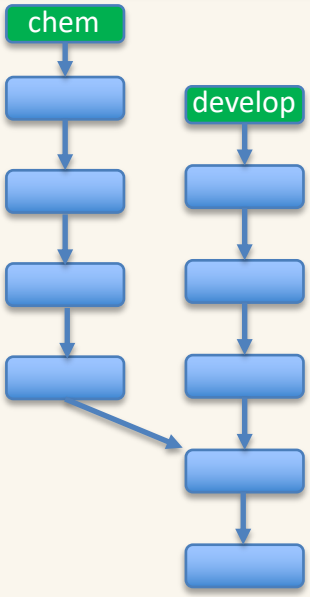

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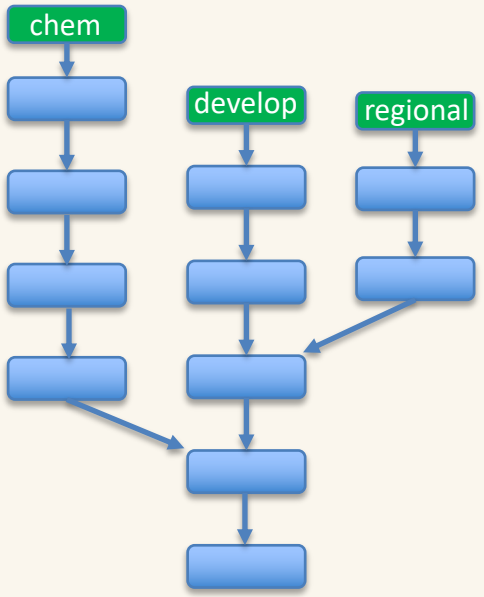

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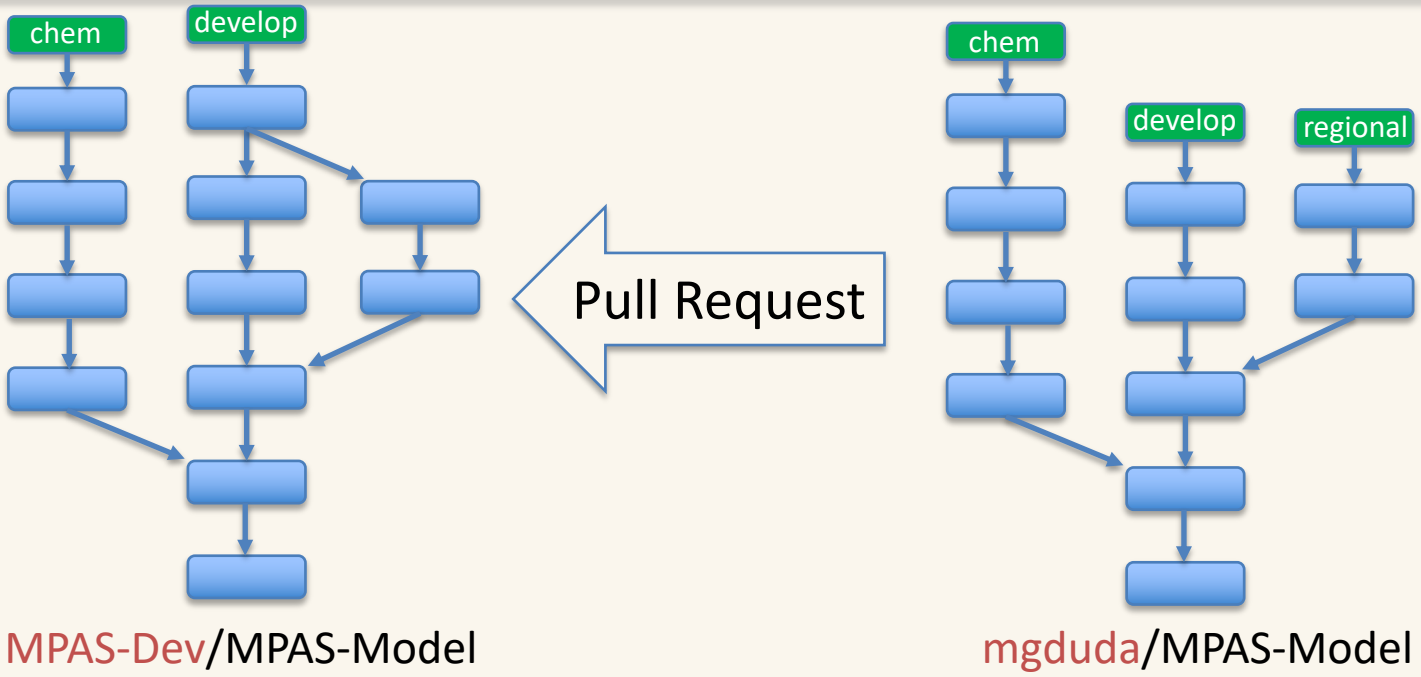

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GitHub: Hosting for git repositories, plus…

Let's look at some Pull Requests, a fork, and some branches in a web browser…

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Reporting bugs in MPAS-Atmosphere

First, make a new post to the forum… often times, so-called "bugs" are actually not bugs

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Contributing code changes

Talk to us first to get some guidance…

Summary

1. The development of all MPAS model and supporting tools/utilities uses *git* repositories hosted on GitHub
2. All code changes begin as *branches*, which are proposed for inclusion in the main development branch (and later, to a released version of the code) through *pull requests*
3. Each developer has their own *fork* of the MPAS repository, in which they do their individual development
4. If you suspect you've found a bug, begin by posting a question to the MPAS-Atmosphere support forum; if it is a bug, a GitHub *Issue* will be opened
   - http://forum.mmm.ucar.edu/
5. If you'd like to contribute to MPAS-Atmosphere, begin by creating a *fork* of the MPAS-Model repository, and contact us!