Using Git and GitHub for Your Project Assignments

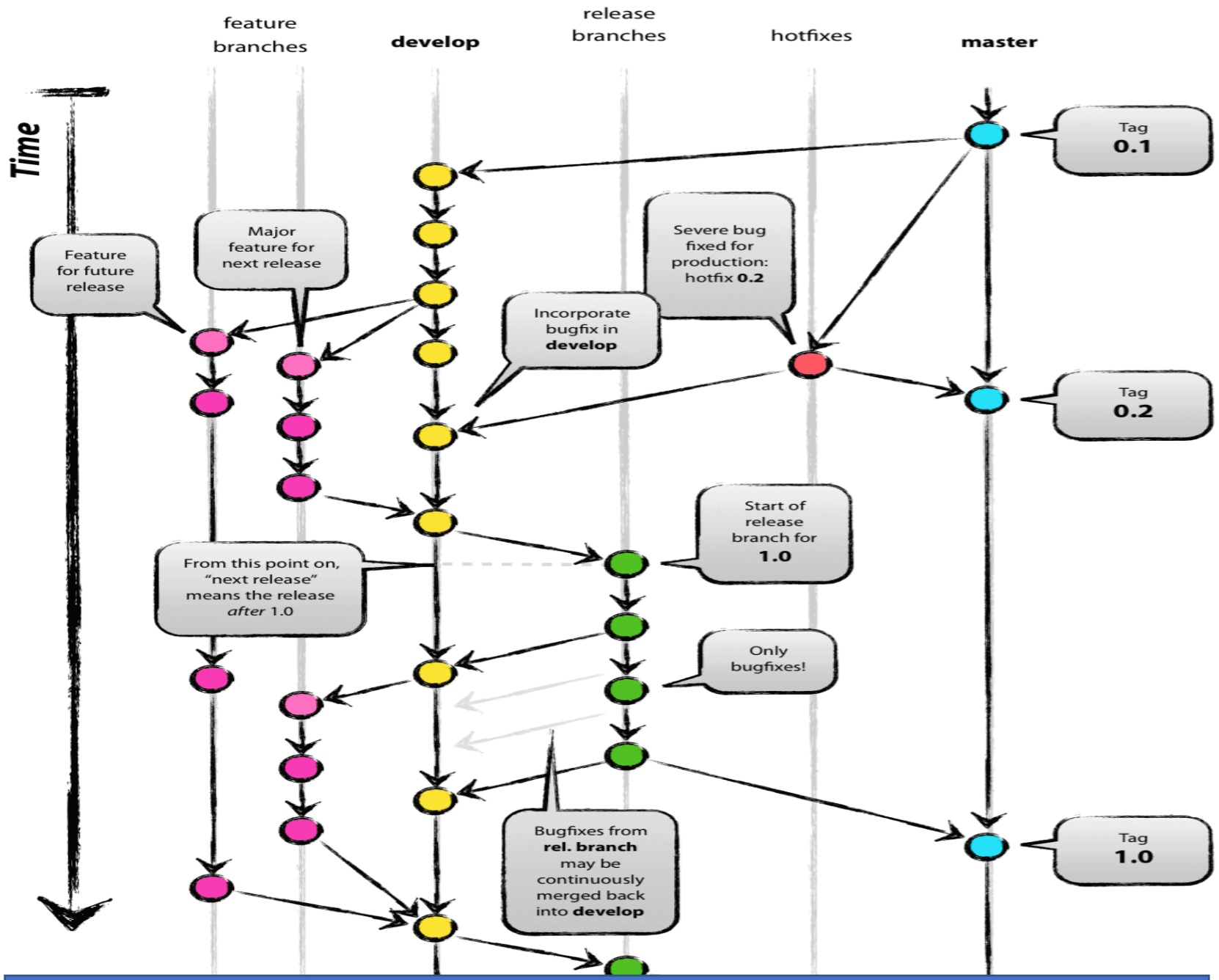
Tools for collaborative team coding

What is Git?

- Git is a collaborative, distributed version control system.
  - Everyone has their own branch of the code in a local repository.
  - Each branch has a unique ID
  - You can work entirely separately and never give back....
- If you want to work collaboratively, you have to combine (merge) branches.
  - GitHub provides tools for collaborative coding
- Teams need a strategy for how to merge their branches.
  - **Communities** choose and follow rules (conventions) on how they use tools

Some Useful Conventions and Principles

Foundations for the Apache Way



See http://nvie.com/posts/a-successful-git-branching-model/

1000 Words about Previous Picture

Branch	Description
Master	All other branches trace back to here. Final releases are here. Must always build and pass all tests.
Develop	Code for next version of Master. Integration Branch. Everyone's code goes back here. Must always build and pass all tests.
Feature	Working branches with code not ready for integration. May have 1 or more developers. Goes away when merged back into Develop.
Release	Code that is preparing to go back to the Master. Only bug fixes.
Hotfix	Code that fixes a bug discovered in Master that must be fixed immediately. Merged back to both Master and Develop branches.

Only the Master and Develop branches live forever!

Applying This for Your Assignments (1/2)

- Each project milestone should be a Release branch.
  - ”Project Milestone 1”, “Project Milestone 2”
  - This is tied to the CI/CD system that you use.
  - This is what you submit for grading
- Each team has a team-wide Develop branch
  - This is also tied to the CI/CD system that you use
- Each team member will have their own branch.
  - Make pull requests to merge with the Develop branch.
  - **Another team member handles the merge**
  - **Communicate any issues using GitHub Issues.**
- Note Git is not well set-up for microservices
  - Ideally you need multiple repositories (each project has its own GitHub organization)
  - Since we don’t have this, you need to choose a convention and stick with it
  - And document it on your project’s Wiki.

Apply This to Your Assignments (2/2)

- One team member serves as release manager
  - Choose using GitHub issues (document the selection process)
  - Rotate for each milestone
  - Release manager creates the Project Milestone N release branch from Develop
- After grading, merge the “Project Milestone N” branch back to Master.
  - GitHub Analytics only works on the Master branch
- Create new branch(es) for Project Milestone N+1

A Side Note on the Apache Way

- The above procedure is just one possible convention.
  - It works well with continuous integration while allowing feature development.
  - But it could be a lot of overhead for a small team.
- Apache projects decide their own branch and merge strategy.
  - Decisions are made on the developer discussion list.
  - Public votes if necessary
  - Conclusions are public
- What if this convention doesn’t work for the project?
  - That gets discussed on the mailing list as well, in public and on the record.
  - Public votes are cast if necessary.

GitHub

What Is GitHub?

- A public repository for open source code that is managed with Git.
- Tools for helping you manage your code and your community.
- And more
  - https://guides.github.com/
- GitHub also integrates with JIRA and other online tools
  - Connect a git commit to a JIRA issue.

Using GitHub Issues

- See https://guides.github.com/features/issues/ for a full guide.
  - See ”Milestones, Labels, and Assignees”
- Use this feature to discuss your project.
- Code commit comments tie commits to issues.
  - Include the issue number (#xxx) in your commit message.
  - See also https://help.github.com/articles/closing-issues-via-commit-messages/
- GitHub issues provide an audit trail for your work.

Using GitHub Issues for Assignments

- All work must be described using issues.
- Each commit is associated with one issue.
- Use Issues to make pull requests to merge your branch with Develop.
  - Identify team members using @mentions if you need help.
  - More on this below

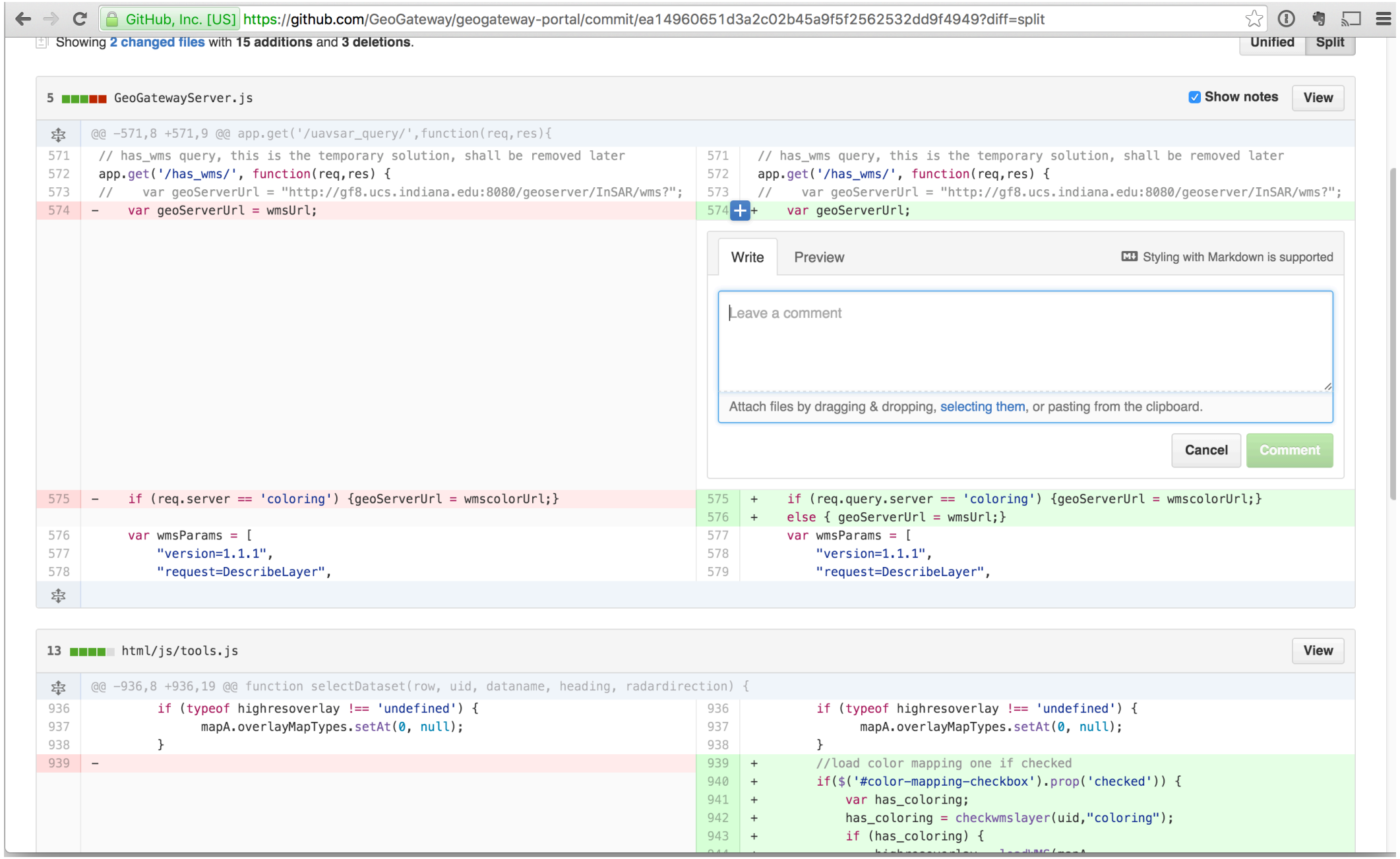
Pull Requests

- Notifies others of changes to a common branch.
  - Initiate reviews
- If you want to contribute a patch to a code branch that you don’t have write access to, use a **pull request**.
- In Apache projects, submitting pull requests (or patches) is the way to establish yourself with the project community.
- Submit enough accepted patches or pull requests and you will be voted into the project.
  - Given write access to the main code repository.

Using Pull Requests for Assignments

- Each team member has her/his own “feature” branch
- Use Pull Requests to merge with Develop
- Feature branches must be merged back to the Develop branch by another team member.
  - Use GitHub’s Code Review tool to review
- All communications about merging take place using GitHub Issues

Code Review


GitHub, Inc. [US] https://github.com/GeoGateway/geogateway-portal/commit/ea14960651d3a2c02b45a9f5f2562532dd9f4949?diff=split
Showing 2 changed files with 15 additions and 3 deletions.
Unified
Split
5 GeoGatewayServer.js
Show notes
View
@@ -571,8 +571,9 @@ app.get('/uavsar_query/',function(req,res){
// has_wms query, this is the temporary solution, shall be removed later
app.get('/has_wms/', function(req,res) {
//   var geoServerUrl = "http://gf8.ucs.indiana.edu:8080/geoserver/InSAR/wms?";
- var geoServerUrl = wmsUrl;
+ var geoServerUrl;
Write
Preview
Styling with Markdown is supported
Leave a comment
Attach files by dragging & dropping, selecting them, or pasting from the clipboard.
Cancel
Comment
- if (req.server == 'coloring') {geoServerUrl = wmscolorUrl;}
+ if (req.query.server == 'coloring') {geoServerUrl = wmscolorUrl;}
+ else { geoServerUrl = wmsUrl;}
var wmsParams = [
"version=1.1.1",
"request=DescribeLayer",
13 html/js/tools.js
View
@@ -936,8 +936,19 @@ function selectDataset(row, uid, dataname, heading, radardirection) {
if (typeof highresoverlay !== 'undefined') {
mapA.overlayMapTypes.setAt(0, null);
}
-
+ //load color mapping one if checked
+ if($('#color-mapping-checkbox').prop('checked')) {
+ var has_coloring;
+ has_coloring = checkwmslayer(uid,"coloring");
+ if (has_coloring) {

Code Release Process

- Choose a Release Manager.
  - Discuss using Issues
- The Release Manager creates the Project Milestone N branch from Develop branch.
- Everyone votes on the release.
  - +1 for working, -1 for not working
- Fix bugs directly in the release branch
  - Release Manager manages these pull requests
- Release Manager also merges the Release branch with Develop

Using GitHub Wikis for Documentation

- Good code documents itself, but…
- https://guides.github.com/features/wikis/
- Use these to describe your project.
  - Minimally, anything the instructors need to know to check your milestones.
- Each project milestone has a Wiki entry that includes all instructions on how to build and test the assignment.
- Your grader will only look at the wiki.
  - Graders will not spend time trying to understand your setup.
  - Make your grader's life easy. Happy graders are your friends.

Make GitHub Announcement

- Announce your project milestones after they are approved by the grader.
  - https://guides.github.com/activities/citable-code/
- This gives you a Document Object Identifier (DOI)
- Useful for citing code
  - “This result was produced by this specific version of our code”

Summary

1. Divide up the work on your team, discuss and record using Issues.
2. Choose a Release Manager
3. Create Develop, Project Milestone 1 branches; Master already exists.
4. Work on your issues
5. Make pull request; Associate these with Issues
6. Another team member merges the request
7. When ready to release, Release Manager creates the Release Branch from Develop.
8. Document the release using GitHub's Wiki for the grader.
9. Everyone reviews the release, votes using Issue
10. Everyone submits the assignment using Canvas
11. After grading completed, use GitHub Announce and then merge the Release branch to Master

Some “Apache Way” Lessons

- Community over code.
- Discuss issues publically in an archived, citable manner.
- Assign yourself to issues.
  - Volunteer
- Cite the issue(s) associated with each commit.
- Review pull requests for code bases you can’t write to
  - Patches -> Apache
- Call votes on important decisions
  - Team policies with git branches, code review, issue organization, agile policies
  - Software releases
  - Granting write access to important branches.
- Make and announce your source code releases.
- And be prepared for what happens next
  - Documentation, build systems, bug handling, code licensing, code attributions, …