



Collaborative Tools 1

Project Management and Workflow

Mark Miesch

(JCSDA)

JEDI Academy - 4-7 June 2018

The Way of a JEDI



▶ Collaborative

◆ A Joint Center (**JCSDA**)

- **Partners, collaborators, stakeholders, community**

◆ A Joint Effort (**JEDI**)

- **Distributed team of software developers, with varying objectives and time commitments**

▶ Agile

◆ Innovative

◆ Flexible and Limitless (future-proof)

◆ Responsive to users and developers

◆ Continuous delivery of functional software

Outline



▶ **git/GitHub**

- ◆ **Version control**
- ◆ **Enhancements and bug fixes immediately available to distributed community of developers**
- ◆ **Code review, issue tracking**
- ◆ **Community exports (Code distribution)
...and imports (ecbuild, eckit, fckit)**

▶ **Git-Flow**

- ◆ **Innovation**
- ◆ **Continuous Delivery**

▶ **ZenHub**

- ◆ **Agile project management**
- ◆ **Enhances GitHub's issue tracking and code review functionality**



Dashboard

GitHub, Inc. [US] <https://github.com/orgs/JCSDA/dashboard>

Apps JEDI Software Engineering Mac Meetings Outdoors Garden Transition Colleges Travel »

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JCSDA

Repositories [New repository](#)

Find a repository...

- JCSDA/ufo
- JCSDA/fv3-jedi
- JCSDA/fioda
- JCSDA/mpas
- JCSDA/jedi-docs
- JCSDA/lftrc
- JCSDA/lftrc-bundle
- JCSDA/soca
- JCSDA/ufo-bundle
- JCSDA/fv3-bundle
- JCSDA/oops
- JCSDA/crtm
- JCSDA/mpas-bundle
- JCSDA/docker
- JCSDA/docker_base
- JCSDA/bufr2nc
- JCSDA/fms
- JCSDA/fv3
- JCSDA/wrf-jedi
- JCSDA/singularity

Show more

Browse activity [View organization](#)

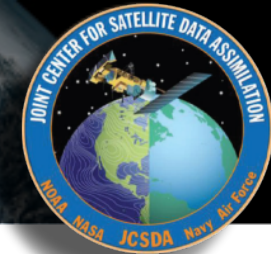
Recent activity

- Eliminated reference to UCAR repos and clarified FC environment varia...
JCSDA/jedi-docs · You opened this pull request
- Feature/refac obs opr
JCSDA/ufo · Your review was requested
- Feature/interp test bump
JCSDA/fv3-jedi · You opened this pull request

All activity

- xinzhang8noaa pushed to JCSDA/ufo 7 hours ago
 - 1 commit to `feature/refac_Obs0pr`
 - eb35684 one can't override a nonaccessible deferred binding per F08...
- danholiday pushed to JCSDA/fv3-jedi 7 hours ago
 - 2 commits to `feature/radianceread`
 - bed7934 working holx for radiances
 - df854f5 towards bilin for crtm
 - 14 more commits »
- danholiday created a branch `feature/radian...` in JCSDA/ufo
 - JCSDA/ufo
 - Updated Apr 9
 - ★ Star
- xinzhang8noaa left 2 comments on pull request JCSDA/ufo#63 7 hours ago
 - xinzhang8noaa commented 7 hours ago
 - Googled following things: one can't override a nonaccessible deferred binding per F08/0052. (Intel Fortran doesn't yet recognize that.) Therefore, ...
- victordottir left 3 comments on pull request JCSDA/ufo#63 8 hours ago

GitHub Teams



JEDI - JCSDA Teams List

GitHub, Inc. [US] | <https://github.com/orgs/JCSDA/teams/jedi/teams>

Apps JEDI Software Engineering Mac Meetings Outdoors Garden Transition Colleges

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Find a team...

5 teams in the JEDI team		Members
JEDI-core		5 members 0 teams
JEDI-dev		3 members 0 teams
JEDI-models Models interfacing in JEDI		31 members 5 teams
FV3 Development		14 members 0 teams
LFRic JEDI-LFRic interfacing		7 members 0 teams
MPAS JEDI-MPAS interfacing		9 members 0 teams
Navy		4 members 0 teams
WRF Interfacing WRF with JEDI		2 members 0 teams
JEDI-obs Observation-related interfacing in JEDI		20 members 4 teams
UFO Unified Forward Operator development		18 members 3 teams
SOCA Sea-ice Ocean Coupled Assimilation		13 members 0 teams

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JEDI-models · JCSDA Discussi...

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JCSDA / JEDI / JEDI-models Discussions Members (31) Teams (5) Repositories (17) Projects (0)

JEDI-models
@JCSDA/jedi-models
Models interfacing in JEDI
1 member
31 are members of child teams

[Unwatch](#)

Teams 5

- [FV3 Development](#)
14 members • 0 teams
- [LFRic](#)
JEDI-LFRic interfacing
7 members • 0 teams
- [MPAS](#)
JEDI-MPAS interfacing
9 members • 0 teams
- [Navy](#)
4 members • 0 teams
- [WRF](#)
Interfacing WRF with JEDI
2 members • 0 teams

Start a discussion with @JCSDA/jedi-models

Would a radiosonde with a single observation be useful for data assimilation interface tests?

MarekWasak 21 hours ago • edited -

That way we would be able to see the structure of B coming out in the analysis increments.

ytremolet 19 hours ago
Yes, as we develop more tests that should be included.

[Reply...](#)

Changes to IODA/UFO that affects all models running DA

danheldaway 3 days ago

Since the changes to UFO and IODA just merged everyone will need to replace "obsvalue": "ObsVal" with "obsvalue": "Observation" in your DA json files E.g. [JCSDA/fv3-jedi@7e88179](#) @ss421 @guillaumevernieres @byyoung-joo

Show earlier comments

srherbener 2 days ago
@byyoung-joo, @ytremolet

I got mpas-bundle to compile and I can see the test failure, but I'm not clear on how to resolve this. The problem is that the amsua_n19_obs.nc4 file says nobs = 12090 (860 records X 15 channels), and the amsua_n19_geovals.nc4 files says nobs = 806. I changed the obs reader for Radiance to record that nobs = 12090 and nlocs = 806 (one location per record that holds 15 obs, 1 for each channel). This was done so that nobs represents the number of unique observations and nlocs represents the number of unique locations. Also, this allows all 12090 observations to be placed into an ObsVector.

I can get the code to run past the interp_check routine by making the request to ObsSpace for the locations return every 15th location value (Lat, Lon, Time) which returns the 806 unique locations values. A down side of this "solution" is that you lose which locations are associated with which observations.

Unfortunately, the test crashes later on, perhaps because it thinks that nobs is 12090 and it's running past the end of the locations arrays (which are only 806 long), and the geovals arrays which are also 806 long. If I make it so that nlocs = 12090, then the association between obs and locations is preserved but the test still crashes supposedly because the geovals arrays are only 806 long.

Is it okay to use the "return every 15th location" solution for now, despite the need to assume that location 1 goes with obs 1 - 15, location 2 goes with obs 16 - 30, etc. The actual code for this solution figures out a step value based on nobs / nlocs so it automatically adjusts according to that ratio.

If we do go with this, something downstream is not right. Would this be as

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git/GitHub (JEDI tips)



▶ **Work with JEDI bundles**

- ◆ **Clone bundle repo**
- ◆ **Let ebuild do the rest**
- ◆ **If that doesn't work, read the README file**
- ◆ **Get in the habit of running *make update* after ebuild**
- ◆ **Edit the *CMakeLists.txt* file to use your local version**

```
#ebuild_bundle( PROJECT ufo GIT "https://github.com/JCSDA/ufo.git" BRANCH develop UPDATE )  
ebuild_bundle( PROJECT ufo SOURCE "~/jedi/src/ufo-bundle/ufo" )
```

▶ **Cache your GitHub credentials**

```
git config --global credential.helper 'cache --timeout=3600'
```



▶ **LFS = Large File service**

- ◆ **Increases GitHub size limits for individual files from 100 MB to 2GB**
- ◆ **Cumulative storage purchased in 50 GB data packs**
- ◆ **Used for anything that isn't code (*data files, restart files, etc*)**

▶ **Transparent to the user**

- ◆ **When you push to GitHub, any files that are tracked by LFS will go to a remote server (the LFS Store)**
- ◆ **The GitHub repo will only contain a pointer to that file**
- ◆ **When you fetch/pull/clone an LFS-enabled repo from GitHub, LFS will check to see if you have the large files on your computer (local LFS cache). If not, it will retrieve them from the LFS Store as needed.**

Using Git-LFS



1) Extension to git

- ▶ brew install git-lfs

2) See if git-lfs is already enabled for that repo

- ▶ git lfs track

3) If not already sufficient, then add appropriate tracking patterns

- ▶ git lfs install # only if step 2 returns nothing
- ▶ git lfs track *.nc4

4) Add your large files to the repo

5) Make sure your files and patterns are tracked by git

- ▶ git add .gittattributes
- ▶ git add * # new files

6) commit, push, pull, fetch, clone and proceed as you would with any other repo

Git-Flow



Git Flow is:

▶ **A Philosophy**

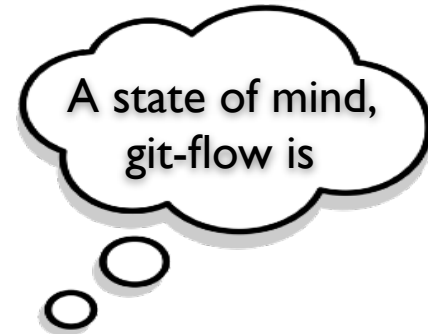
- ◆ **Optimal for Agile Software Development**
 - **Innovation**
 - **Continuous Delivery**

▶ **A Working Principle**

- ◆ **Enforcement of branch naming conventions soon to come**

▶ **An Application (*extension to git*)**

- ◆ **Already installed in Singularity Container**
- ◆ **brew install git-flow-avh # (Mac)**
- ◆ **sudo apt-get install git-flow # (linux)**
- ◆ **<https://github.com/petervanderdoes/gitflow-avh>**



The Git-Flow Manifesto



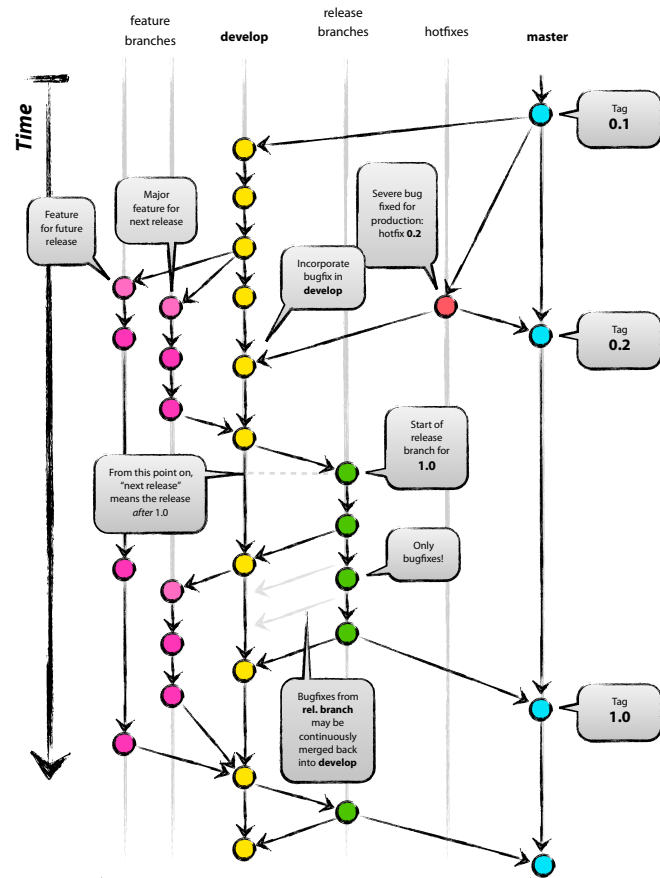
<http://nvie.com/posts/a-successful-git-branching-model/>

Vincent Driessen (2010)



git branching model

Highly Recommended!



Author: Vincent Driessen
Original blog post: <http://nvie.com/posts/a-successful-git-branching-model/>
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The Git-Flow Manifesto: Takaways



- ▶ **master is for releases only**
- ▶ **develop**
 - **Not ready for public consumption but compiles and passes all tests**
- ▶ **Feature branches**
 - **Where most development happens**
 - **Branch off of develop**
 - **Merge into develop**
- ▶ **Release branches**
 - **Branch off of develop**
 - **Merge into master and develop**
- ▶ **Hotfix**
 - **Branch off of master**
 - **Merge into master and develop**
- ▶ **Bugfix**
 - **Branch off of develop**
 - **Merge into develop**

Life Cycle of a Feature branch



- 1) Enable git flow for the repo
 - **git flow init -d**
- 2) Start the feature branch
 - **git flow feature start newstuff**
 - Creates a new branch called feature/newstuff that branches off of develop
- 3) Push it to GitHub for the first time
 - Make changes and commit them locally
 - **git flow feature publish newstuff**
- 4) Additional (normal) commits and pushes as needed
 - **git commit -a**
 - **git push**
- 5) Bring it up to date with develop (to minimize big changes on the ensuing pull request)
 - **git checkout develop**
 - **git pull origin develop**
 - **git checkout feature/newstuff**
 - **git merge develop**
- 6) Finish the feature branch (**don't use git flow feature finish**)
 - Do a pull request on GitHub from feature/newstuff to develop
 - When successfully merged the remote branch will be deleted
 - **git remote update -p**
 - **git branch -d feature/newstuff**

Git-Flow: Lingerin Questions



▶ **What about forks?**

- ◆ **For now, developers can work off the central repo**
- ◆ **As the project grows, each partner/collaborator institution will maintain a fork (merge with central repo as needed)**
- ◆ **Forking may also be useful for public releases**

▶ **What if I can't install git-flow?**




- ◆ **Just be sure to use the proper naming and branching conventions**
 - feature/mybranch
 - release/mybranch
 - bugfix/mybranch
 - hotfix/mybranch

▶ **More?**

Agile Software Development



► 12 Agile Principles


 <p>Early and continuous delivery of valuable software</p> <p>1</p>	 <p>Welcome changing requirements even late in development</p> <p>2</p>	 <p>Deliver working software frequently</p> <p>3</p>	 <p>Business people and developers working together daily</p> <p>4</p>	 <p>Build projects around motivated individuals and trust them to get the job done</p> <p>5</p>	 <p>The most effective method of conveying information is face-to-face conversation</p> <p>6</p>
 <p>Working software is the primary measure of progress</p> <p>7</p>	 <p>Sustainable development: maintain a constant pace indefinitely</p> <p>8</p>	 <p>Continuous attention to technical excellence</p> <p>9</p>	 <p>Simplicity: maximize the amount of work not done</p> <p>10</p>	 <p>Teams self-organize</p> <p>11</p>	 <p>Teams regularly reflect and adjust behaviour</p> <p>12</p>

Agile Software Development



► 12 Agile Principles

**Git-Flow helps with many of these
For the rest, we have ZenHub**




Early and continuous delivery of valuable software

1 ✓




Welcome changing requirements even late in development

2 ✓




Deliver working software frequently

3 ✓




Business people and developers working together daily

4




Build projects around motivated individuals and trust them to get the job done

5 ✓




The most effective method of conveying information is face-to-face conversation

6




Working software is the primary measure of progress

7 ✓




Sustainable development: maintain a constant pace indefinitely

8



Continuous attention to technical excellence

9 ✓




Simplicity: maximize the amount of work not done

10 ✓



Teams self-organize

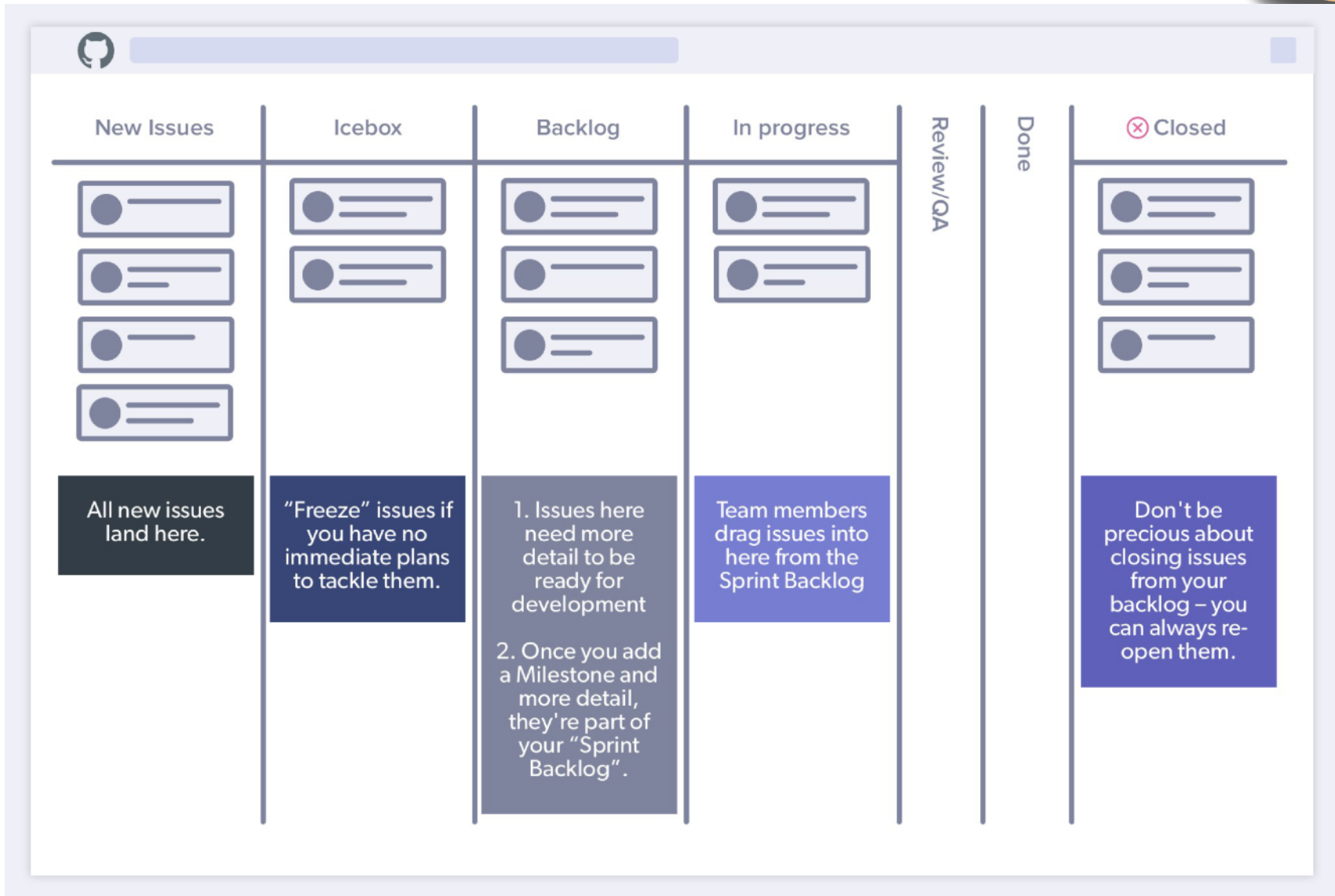
11



Teams regularly reflect and adjust behaviour

12 ✓

ZenHub (Sample board)



ZenHub Features



- ▶ **Customizable Project boards**
 - ◆ **Prioritize and organize tasks**
 - ◆ **Reviews/Feedback**
 - ◆ **Sprints (Milestones) and Epics**
- ▶ **Closely integrated with GitHub**
 - ◆ **Access boards directly from GitHub repos**
 - ◆ **ZenHub tasks are GitHub issues and vice versa**
- ▶ **Tasks/Issues**
 - ◆ **Assign up to 10 individuals**
 - ◆ **Labels, difficulty estimates, etc.**
 - ◆ **Can be linked to pull requests**
 - ◆ **Markdown supported (boldface, checklists...)**
- ▶ **Monitoring progress**
 - ◆ **Burndown charts**
 - ◆ **Velocity tracking**
 - ◆ **Release reports**
 - **Time estimate to deliver a specified set of features**

ZenHub Pipelines



▶ ***New Issues***

- ◆ ***Default landing spot***
- ◆ ***Issues should not stay here long***

▶ ***Backlog***

- ◆ ***Main “To Do” List***
- ◆ ***Arrange in order of priority (reviewed regularly by teams)***

▶ ***IceBox***

- ◆ ***Low-priority items that should be done at some point but do not require immediate attention***

▶ ***In Progress***

- ◆ ***Lets others know what you are doing to promote collaboration and avoid redundancy***

▶ ***Review/QA***

- ◆ ***Solicit feedback before you mark something as...***

▶ ***Closed***

ZenHub Issues/Tasks



JCSDA/jedi-docs#14 **Sphinx - unit testing**

powered by | ZenHub



mmiesch commented on Apr 10



No description provided.

Sphinx - unit testing has no dependencies

+ add dependency

ytremolet changed the pipeline from **New Issues** to **Backlog** on Apr 15

mmiesch changed the pipeline from **Backlog** to **In Progress** on Apr 17

mmiesch self-assigned this on Apr 17

mmiesch connected this issue to **JCSDA/jedi-docs#55 Develop** 21 days ago

mmiesch changed the pipeline from **In Progress** to **Review/QA** via a connected PR **JCSDA/jedi-docs#55 Develop** 21 days ago

mmiesch added the **enhancement** label a minute ago

mmiesch set the estimate to **5** a minute ago

Pipeline

Review/QA

Assignees

mmiesch

Labels

enhancement

Milestone

No milestone

Estimate

5

Releases

Not inside a Release

Epics

Not inside an Epic

Notifications

Unsubscribe

You're receiving notifications because you were assigned.

1 participant



Lock conversation

Move Issue

Write Preview

AA B i “ <> ☰ ☷ ☹ ↶ @ 📌

Leave a comment

Attach files by dragging & dropping, [selecting them](#), or pasting from the clipboard.

Styling with Markdown is supported

Close issue

Comment

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Estimate

How complex is this issue?

Filter estimates (or type to create one)

0.5

1

3

5

8

13

21

40

75

Suggestion:
1 unit = 1/2 day
dedicated work

ZenHub Issues/Tasks



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Leave a comment

Attach files by dragging & dropping, selecting them, or pasting from

Styling with Markdown is supported



This pull request is connected to



Sphinx - unit testing

jedi-docs#14 opened 2 months ago by mmiesch

Disconnect

Estimate

How complex is this issue?

Filter estimates (or type to create one)

0.5
1
3
5
8
13
21
40
75

Suggestion:
1 unit = 1/2 day
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ZenHub: Milestones and Epics



▶ **Milestones (Sprints)**

- ◆ **Short-term (~ 2 weeks)**
- ◆ **Focused work, often on 1-2 repos**
- ◆ **Deliverables = specific functionality/features**

▶ **Epics**

- ◆ **Long-term (indefinite)**
- ◆ **Typically span multiple repos**
- ◆ **Deliverables = releases, guiding vision**

Project boards include *filters* to view only issues associated with Milestones, Epics or other attributes (assignee, label, repo, release...)

ZenHub: Sprint Retrospective



Sprint Retrospectives and other agile workflow components (Sprint Review, Release Planning, etc) are best done face-to-face, but one could in principle dedicate an issue or a pipeline to solicit further perspectives

The screenshot shows a ZenHub issue page for a retrospective. The issue is titled "Retrospective --> August 1-15 #64" and is in an "Open" state. It was opened by "paigepaquette" 26 days ago. The issue content includes sections for "Points to discuss", "Things to start:", "Things to stop:", "Things to continue doing:", and "Actionables and keepers:". The "Points to discuss" section has a list of items with checkboxes: "QA wait times", "Refactor updates?", "Social media update schedule", and "...". The "Things to start:", "Things to stop:", and "Things to continue doing:" sections each have three empty checkboxes. The "Actionables and keepers:" section is currently empty. On the right side of the issue, there is a sidebar with various settings and filters, including "Pipeline", "Labels" (with "Discussion" selected), "Milestone", "Estimate", "Assignees" (listing several team members), and "Epics".

ZenHub: Burndown chart



Sprint 10 - V2 Improvements

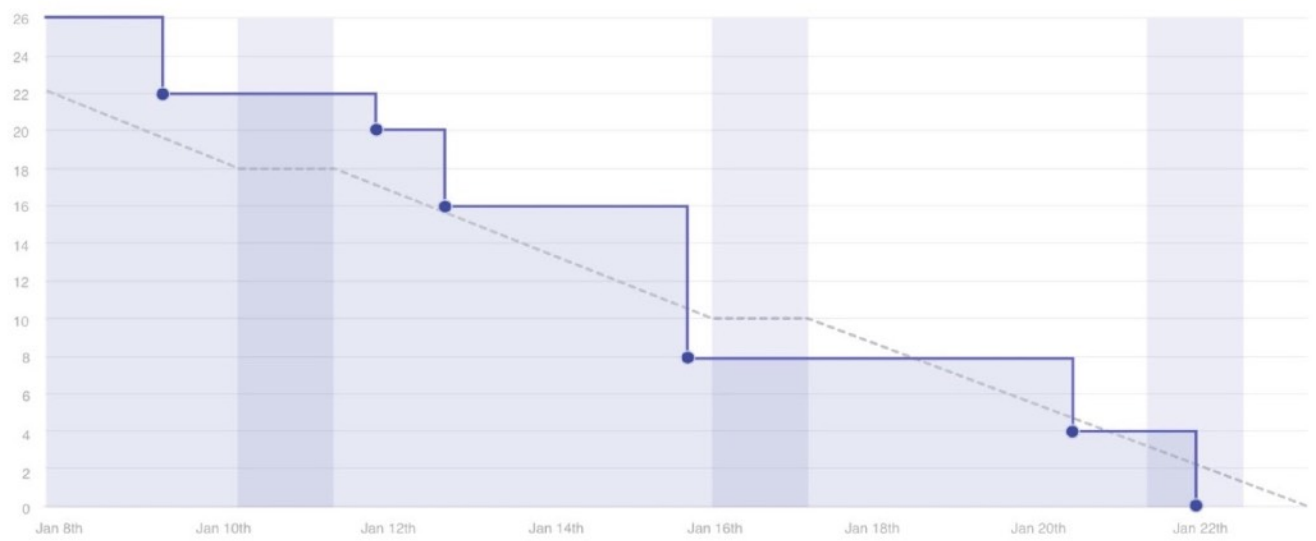
[Edit Milestone](#) [Change Milestone](#)

[Labels](#) [Hide Pull Requests](#)

[Burn Pipelines](#)

Start: **Jan 3, 2017** [Edit](#) Due: **Feb 28, 2017** [Edit](#)

Weekends Ideal Completed



26 Total Story Points
18 Completed Story Points / 8 Remaining Story Points

34 Total Issues and Pull Requests
28 Completed Issues and PRs / 6 Remaining Issue and PRs

ZenHub: Release Report



Project X

Combined projects across Q1 and Q2, working towards the next chapter of AppX.

Start date: Jan 1st, 2017 Desired end date: Jun 30th, 2017

Labels ▾

Release report

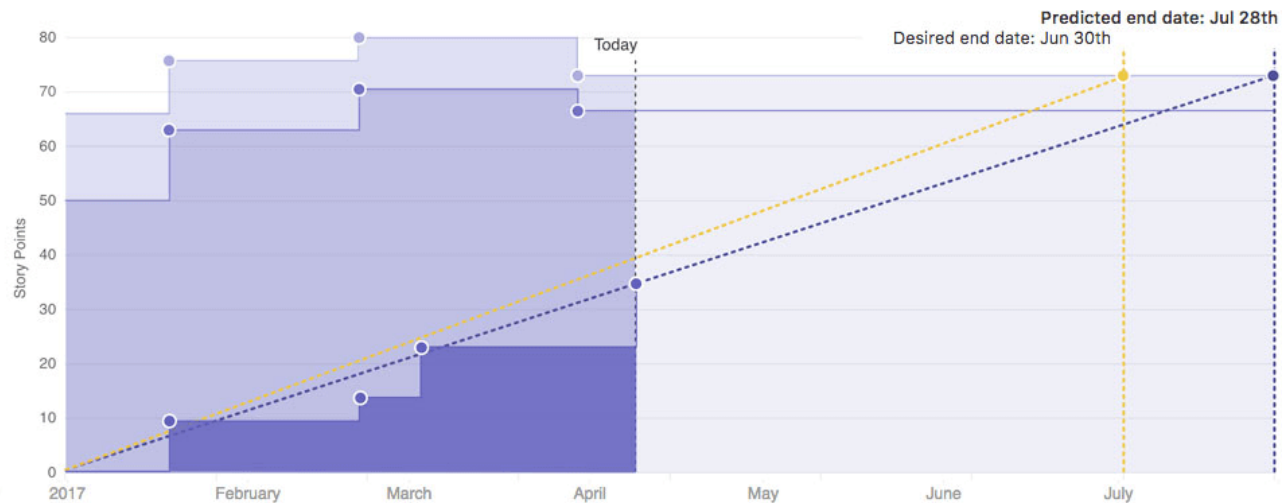
Completed points

Estimated scope

Total scope

Actual velocity

Desired velocity



The predicted end date is **Jul 28th** ⓘ

The predicted end date will be **28 days behind** the desired end date of Jun 30th

Total issues	7
Completed	3
Remaining	4

Total story points	30
Completed	21
Remaining	9

Resources: ZenHub / GitHub



ZenHub Guides

<https://www.zenhub.com/guides>

Extensive GitHub documentation & tutorials

<https://help.github.com>

Lots of Great Github Cheat Sheets

<https://education.github.com/git-cheat-sheet-education.pdf>

<https://jan-krueger.net/git-cheat-sheet-extended-edition>

<https://patrickzahnd.ch/uploads/git-transport-v1.png>

Resources: Git-Flow



JEDI Git Flow page

https://jointcenterforsatellitedataassimilation-jedi-docs.readthedocs-hosted.com/en/latest/developer/developer_tools/getting-started-with-gitflow.html

The Git Flow manifesto (all you need to know about the philosophy):

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

Git Flow cheat sheet:

<https://danielkummer.github.io/git-flow-cheatsheet/>

Git avh (a fork of the original, with added features):

<https://github.com/petervanderdoes/gitflow-avh>

Atlassian git-flow tutorial (philosophy and application):

<https://www.atlassian.com/git/tutorials/comparing-workflows/gitflow-workflow>

Resources: Git-LFS



JEDI Git-LFS page

https://jointcenterforsatellitedataassimilation-jedi-docs.readthedocs-hosted.com/en/latest/developer/developer_tools/gitlfs.html

GitHub's Help page:

<https://help.github.com/articles/about-git-large-file-storage/>

Tutorial:

<https://github.com/git-lfs/git-lfs/wiki/Tutorial>

Installation? Already installed in the JEDI singularity container

Binaries available for download on:

<https://git-lfs.github.com>

Or, on a Mac:

`brew install git-lfs`