Yoda
Agile Project Management with GitHub

Jens Vedel Markussen, Engineering Manager

Hewlett Packard Enterprise

Introduction

Yoda was developed during 2017 at **Hewlett Packard Enterprise** to support **Agile Project planning** and execution for development of a new innovative product.

GitHub was already in place for **source code versioning** and **issue tracking** (bugs and features).

The ambition was to **enhance GitHub** to become an **all-in-one solution** for Agile Project Planning and Execution.

Yoda **augments GitHub** by adding **estimates** and **sprint planning** to issues. Further, Yoda brings various tools for **issue reporting** and management.

Yoda was **Open-Sourced** using an MIT license in January 2018.

Content

- Agile Project Management
- Stories, Features, Epics, … in GitHub (issues)
- Sprints in GitHub (milestones)
- Story point estimation in Github Issues
- GitHub issue labelling convention
- Yoda Reporting Tools
    - Issue Time Statistics, CFD, Issue Exporter
- Yoda Agile Project Management Tools
    - Burndown Chart, Velocity Chart, Kanban Board
- Other Yoda tools
    - Label Manager, Admin, Task Copy
- Yoda Architecture

Agile Project Management

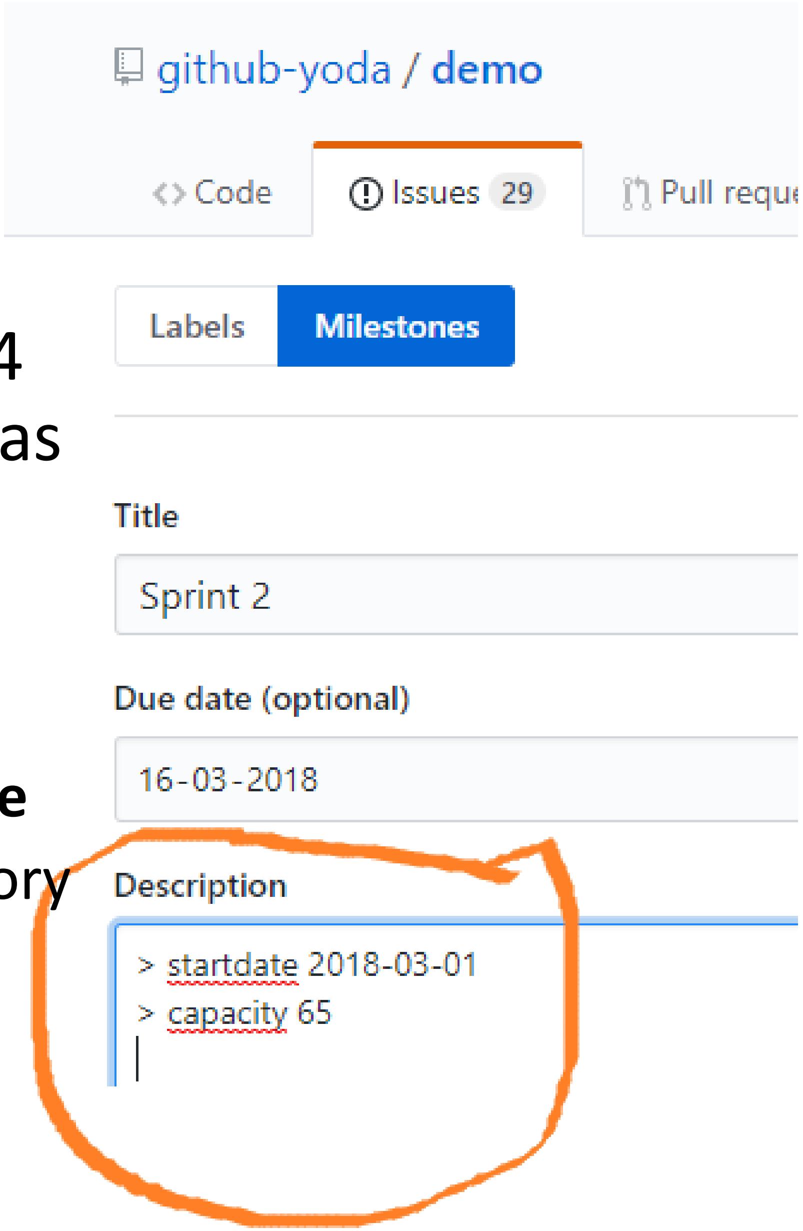
- Agile project management is becoming an industry de-facto standard
- Project- and product-development happens as a series of **sprints**.
- Software is **released** either at the end of each sprint, or every *n'th* sprints as a **product increment.**
- Sprints address (user) **stories**, which are estimates using **story points***.*
- Often **SCRUM** methodology drives development.
- Different frameworks, e.g. **SAFe** (Scaled Agile Framework) add descriptions at higher level than (user) stories to capture required functionality (**Epics**, **Capabilities, Features**).

(User) Stories, etc. in GitHub

- GitHub **issues** can be used to represent (User) **Stories** – and as well Epics, Capabilities, and Features
- GitHub Issues bring many **relevant features** for this, e.g.
  - Web UI, Markdown, graphics, discussions, assignments, labels, lists, file attachments, references, milestones, etc.…
- GitHub **issue references** can be used to link descriptions (e.g. stories *x* and *y* required to implement Epic *z* gives references *x<->z* and *y<->z*).

Sprints in Github

- A **sprint** defines a time period (typically 2-4 weeks) in which a number of user stories (as broken down into tasks) are delivered.
- **Yoda** uses Github **milestones** for sprints
  - Milestones already have an end/due date.
  - Yoda expects to have as well a sprint **start date**
  - Optionally, a team sprint capacity figure (in story points)



Title

Sprint 2

Due date (optional)

16-03-2018

Description

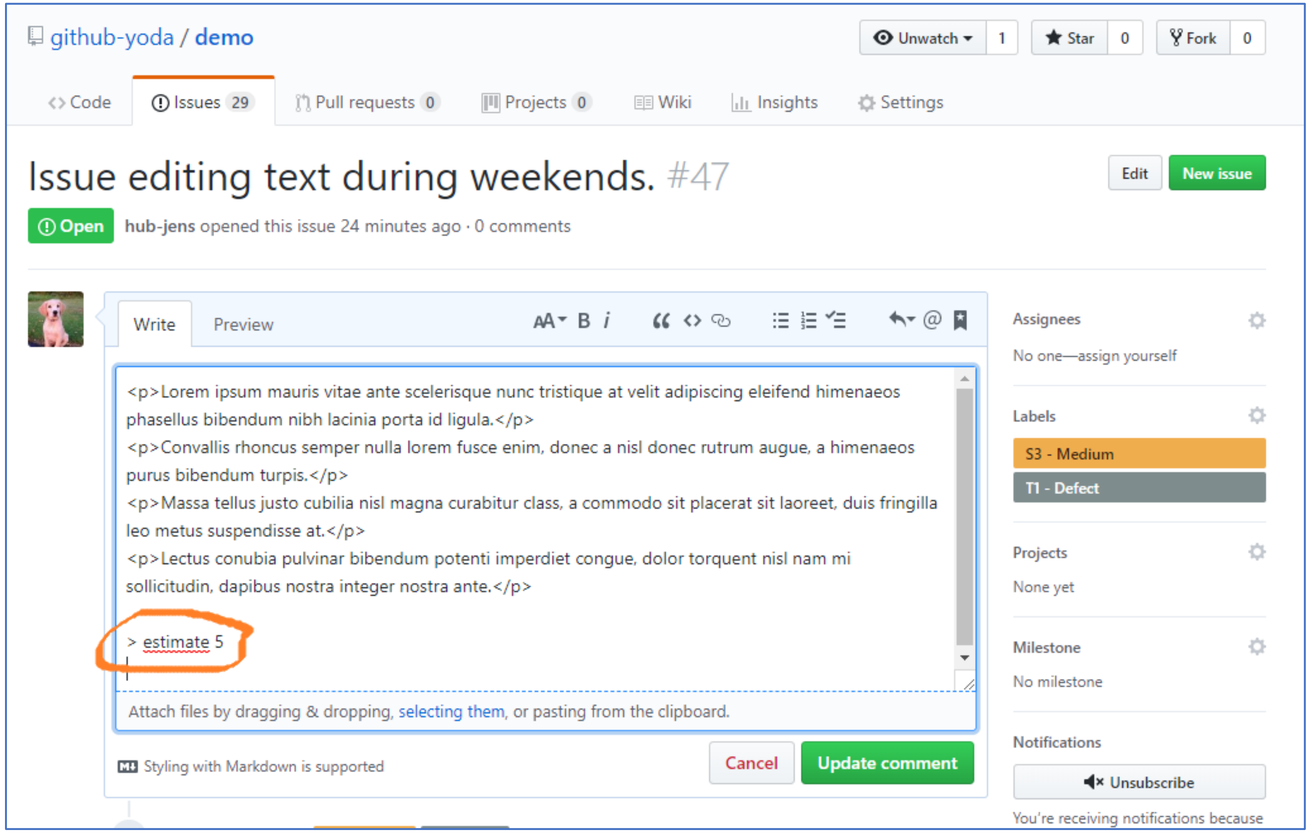
> startdate 2018-03-01
> capacity 65

Story point estimation in Github Issues

- Github issues for (User) Stories **do not have** a dedicated **field** to store estimates (story points).
  - Similarly, no features exists for **summing up estimates** (into milestones, projects, etc.)
- Instead Yoda introduces **two options** for handling estimates into issues:
  1. As s**pecial text** "> estimate (story points)", in the body (first comment) of the issue
  2. Using one of several fixed **story point labels**.
- If using labels, suggest to create labels with **Fibonacci-like** values (1,2,3,5,8,13,20,40) as typically done for Story Points.
- Yoda considers as well the **remaining effort** for an issue. If not provided the **remaining effort** is assumed to be **equal** to the **estimate** while the issue is **open** and **zero** when it is **closed**.
  - If using option 1 above (estimate into issue body), it is possible to specify as well one or more explicit remaining values using a ”> remaining YYYY-MM-DD (story point value)" syntax.

Estimate example (body text)

Markdown ”> estimate (story point)” format)



Issue editing text during weekends. #47

hub-jens opened this issue 24 minutes ago · 0 comments

```
<p>Lorem ipsum mauris vitae ante scelerisque nunc tristique at velit adipiscing eleifend himenaeos
phasellus bibendum nibh lacinia porta id ligula.</p>
<p>Convallis rhoncus semper nulla lorem fusce enim, donec a nisl donec rutrum augue, a himenaeos
purus bibendum turpis.</p>
<p>Massa tellus justo cubilia nisl magna curabitur class, a commodo sit placerat sit laoreet, duis fringilla
leo metus suspendisse at.</p>
<p>Lectus conubia pulvinar bibendum potenti imperdiet congue, dolor torquent nisl nam mi
sollicitudin, dapibus nostra integer nostra ante.</p>

> estimate 5
```

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

Styling with Markdown is supported

Assignees: No one—assign yourself

Labels: S3 - Medium; T1 - Defect

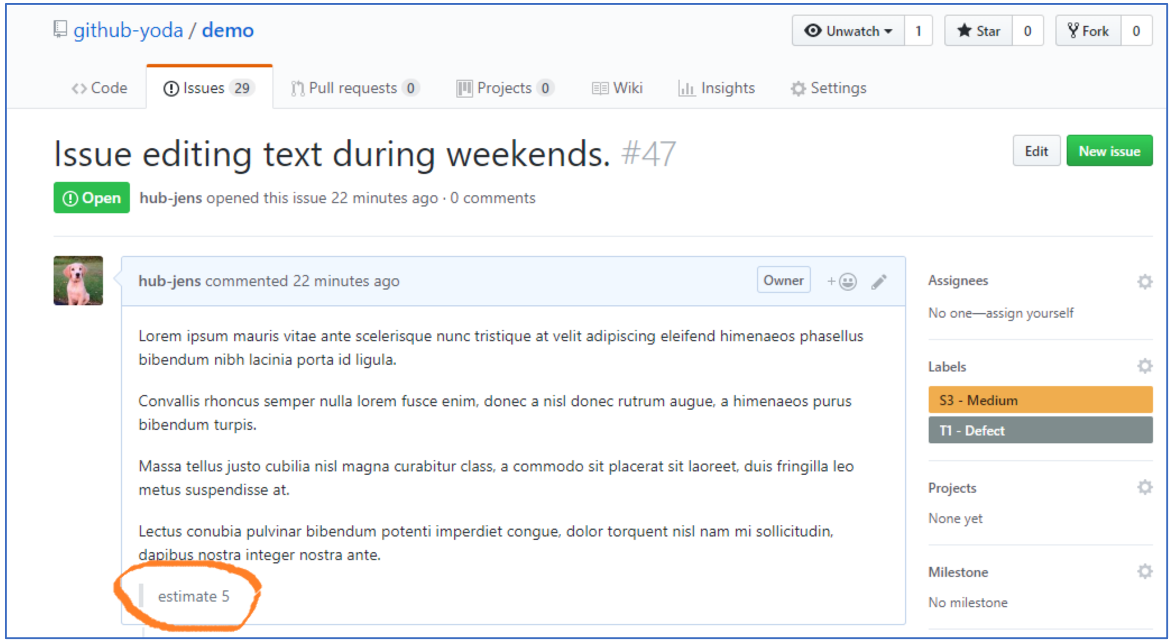
Projects: None yet

Milestone: No milestone

Notifications

You're receiving notifications because

Resulting preview/HTML



Issue editing text during weekends. #47

hub-jens opened this issue 22 minutes ago · 0 comments

hub-jens commented 22 minutes ago

Lorem ipsum mauris vitae ante scelerisque nunc tristique at velit adipiscing eleifend himenaeos phasellus bibendum nibh lacinia porta id ligula.

Convallis rhoncus semper nulla lorem fusce enim, donec a nisl donec rutrum augue, a himenaeos purus bibendum turpis.

Massa tellus justo cubilia nisl magna curabitur class, a commodo sit placerat sit laoreet, duis fringilla leo metus suspendisse at.

Lectus conubia pulvinar bibendum potenti imperdiet congue, dolor torquent nisl nam mi sollicitudin, dapibus nostra integer nostra ante.

> estimate 5

Assignees: No one—assign yourself

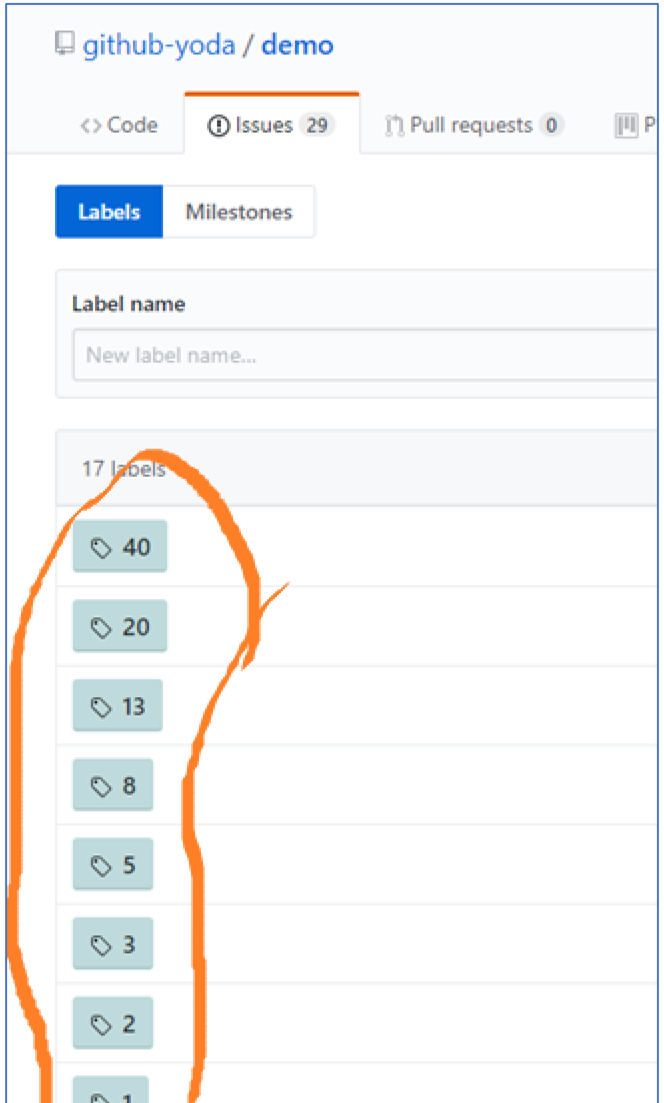
Labels: S3 - Medium; T1 - Defect

Projects: None yet

Milestone: No milestone

Estimate example (using labels)

Fibonacci Labels



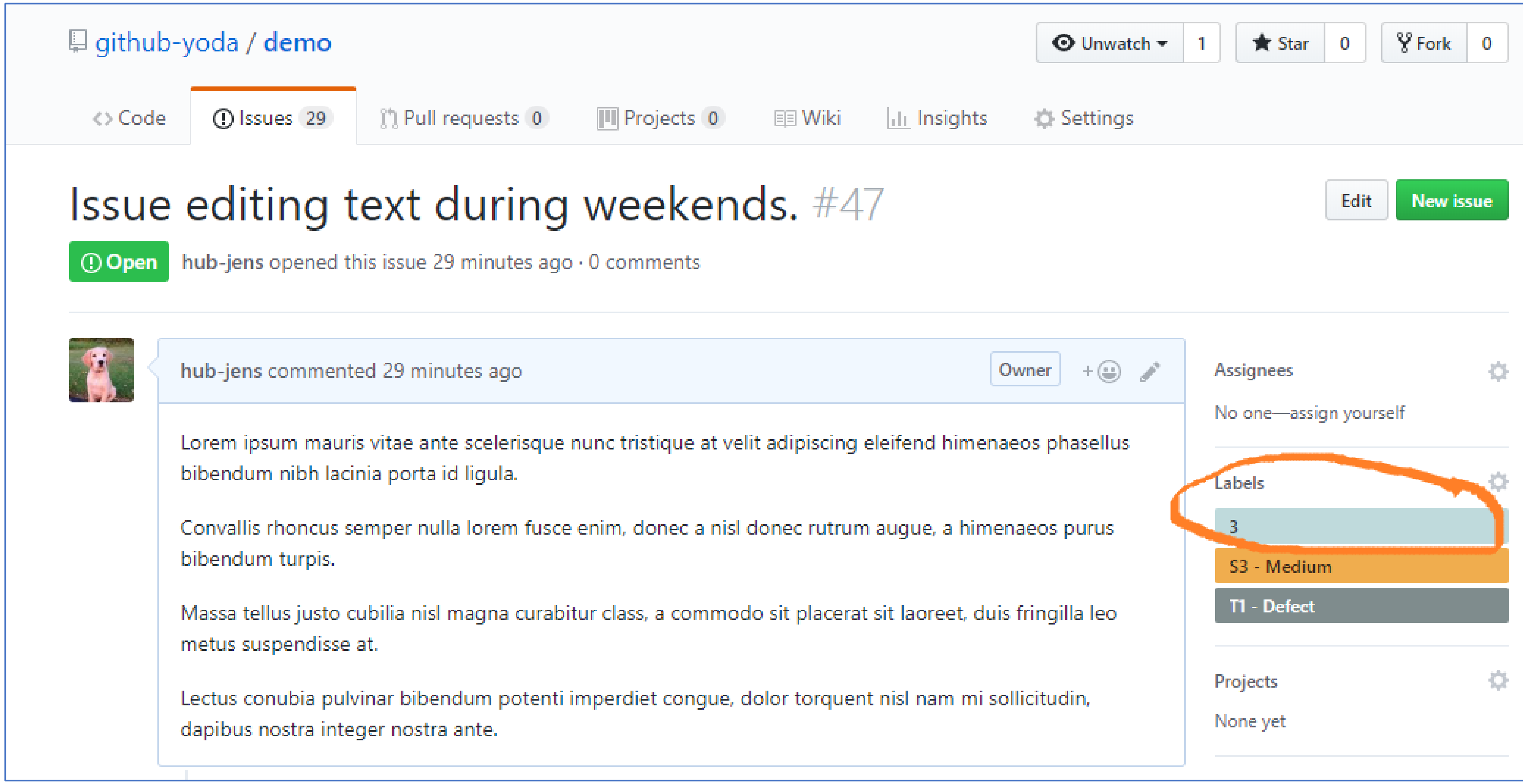
Label name

New label name...

17 labels

- 40
- 20
- 13
- 8
- 5
- 3
- 2
- 1

Issue with label estimate



Issue editing text during weekends. #47

Open hub-jens opened this issue 29 minutes ago · 0 comments

hub-jens commented 29 minutes ago

Lorem ipsum mauris vitae ante scelerisque nunc tristique at velit adipiscing eleifend himenaeos phasellus bibendum nibh lacinia porta id ligula.

Convallis rhoncus semper nulla lorem fusce enim, donec a nisl donec rutrum augue, a himenaeos purus bibendum turpis.

Massa tellus justo cubilia nisl magna curabitur class, a commodo sit placerat sit laoreet, duis fringilla leo metus suspendisse at.

Lectus conubia pulvinar bibendum potenti imperdiet congue, dolor torquent nisl nam mi sollicitudin, dapibus nostra integer nostra ante.

Assignees

No one—assign yourself

Labels

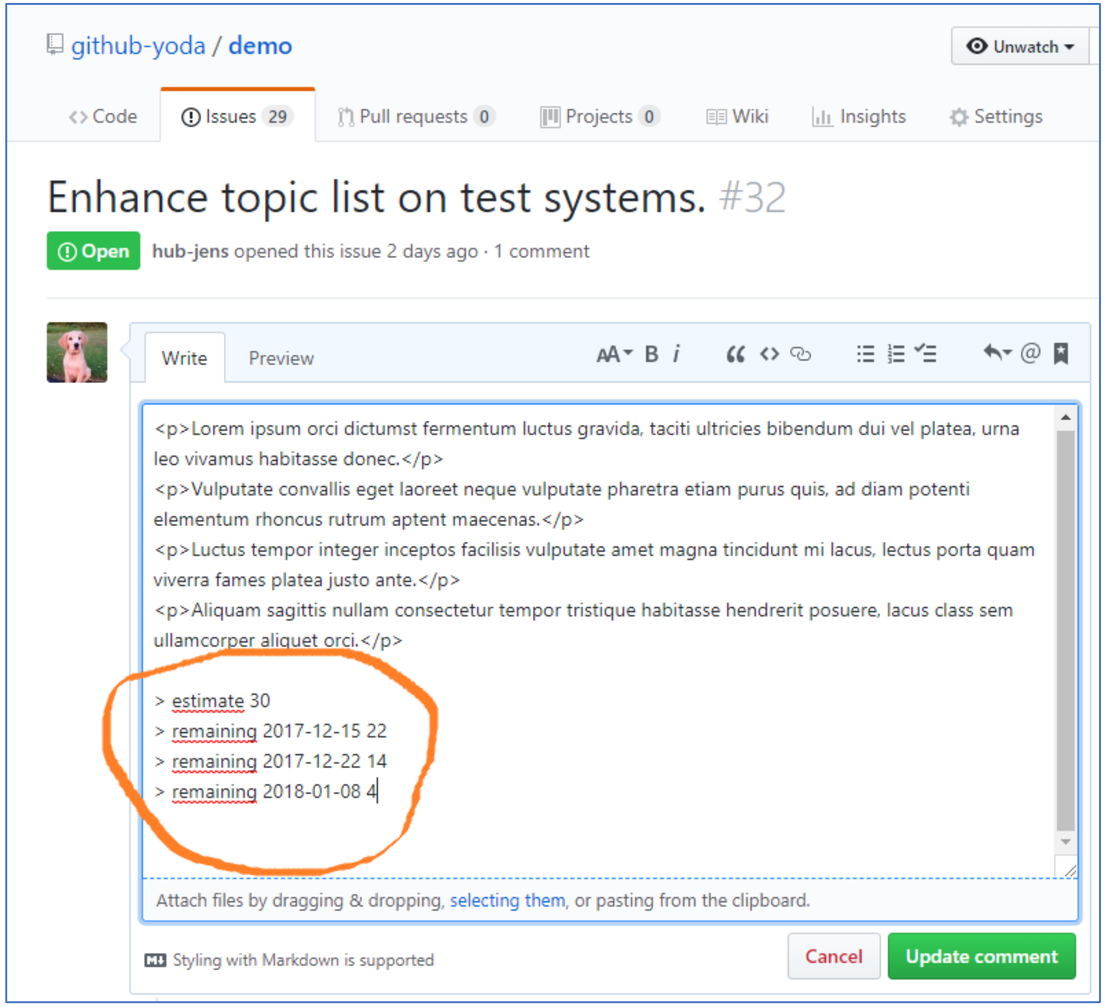
- 3
- S3 - Medium
- T1 - Defect

Projects

None yet

Remaining example

Markdown ”> remaining YYYY-MM-DD (story point)” format)



Enhance topic list on test systems. #32

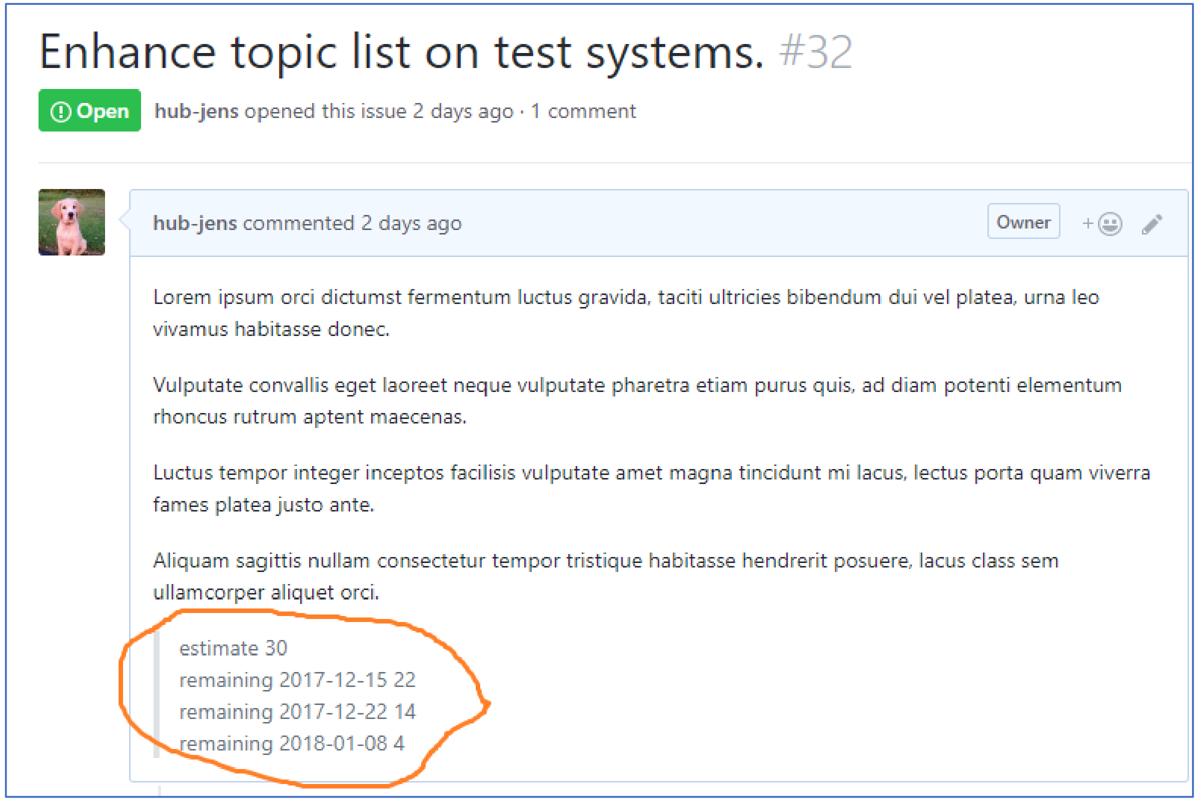
Open hub-jens opened this issue 2 days ago · 1 comment

```
<p>Lorem ipsum orci dictumst fermentum luctus gravida, taciti ultricies bibendum dui vel platea, urna
leo vivamus habitasse donec.</p>
<p>Vulputate convallis eget laoreet neque vulputate pharetra etiam purus quis, ad diam potenti
elementum rhoncus rutrum aptent maecenas.</p>
<p>Luctus tempor integer inceptos facilisis vulputate amet magna tincidunt mi lacus, lectus porta quam
viverra fames platea justo ante.</p>
<p>Aliquam sagittis nullam consectetur tempor tristique habitasse hendrerit posuere, lacus class sem
ullamcorper aliquet orci.</p>

> estimate 30
> remaining 2017-12-15 22
> remaining 2017-12-22 14
> remaining 2018-01-08 4
```

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

Resulting preview/HTML



Enhance topic list on test systems. #32

Open hub-jens opened this issue 2 days ago · 1 comment

hub-jens commented 2 days ago

Lorem ipsum orci dictumst fermentum luctus gravida, taciti ultricies bibendum dui vel platea, urna leo vivamus habitasse donec.

Vulputate convallis eget laoreet neque vulputate pharetra etiam purus quis, ad diam potenti elementum rhoncus rutrum aptent maecenas.

Luctus tempor integer inceptos facilisis vulputate amet magna tincidunt mi lacus, lectus porta quam viverra fames platea justo ante.

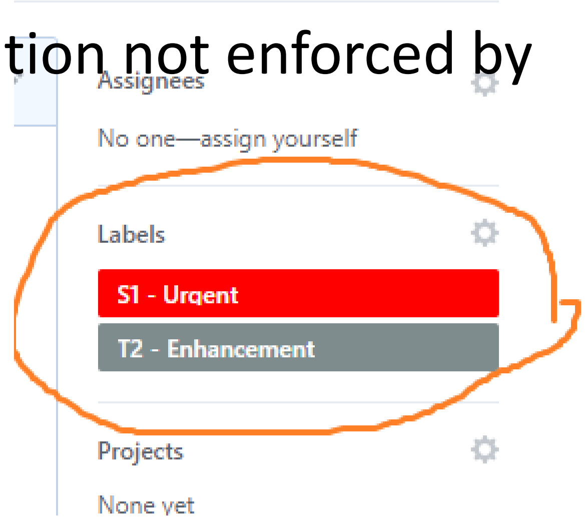
Aliquam sagittis nullam consectetur tempor tristique habitasse hendrerit posuere, lacus class sem ullamcorper aliquet orci.

> estimate 30
> remaining 2017-12-15 22
> remaining 2017-12-22 14
> remaining 2018-01-08 4

GitHub issue labelling convention

- To get maximum benefit from Yoda, it is important to be **consistent** on the **use of labels**. This is best done by having a **labelling** convention.
- Suggestion for a labelling convention is to assign to issues:
  - A **type label** (e.g. Defect, Enhancement, Tasks).
  - A **severity label** (e.g. Urgent, High, Medium, Low).
  - **Note:** These labels are mutually exclusive by convention not enforced by Github.
  - Optionally, use a prefix (e.g. T or S) for different label enumerations.

Example



Assignees

No one—assign yourself

Labels

S1 - Urgent

T2 - Enhancement

Projects

None yet

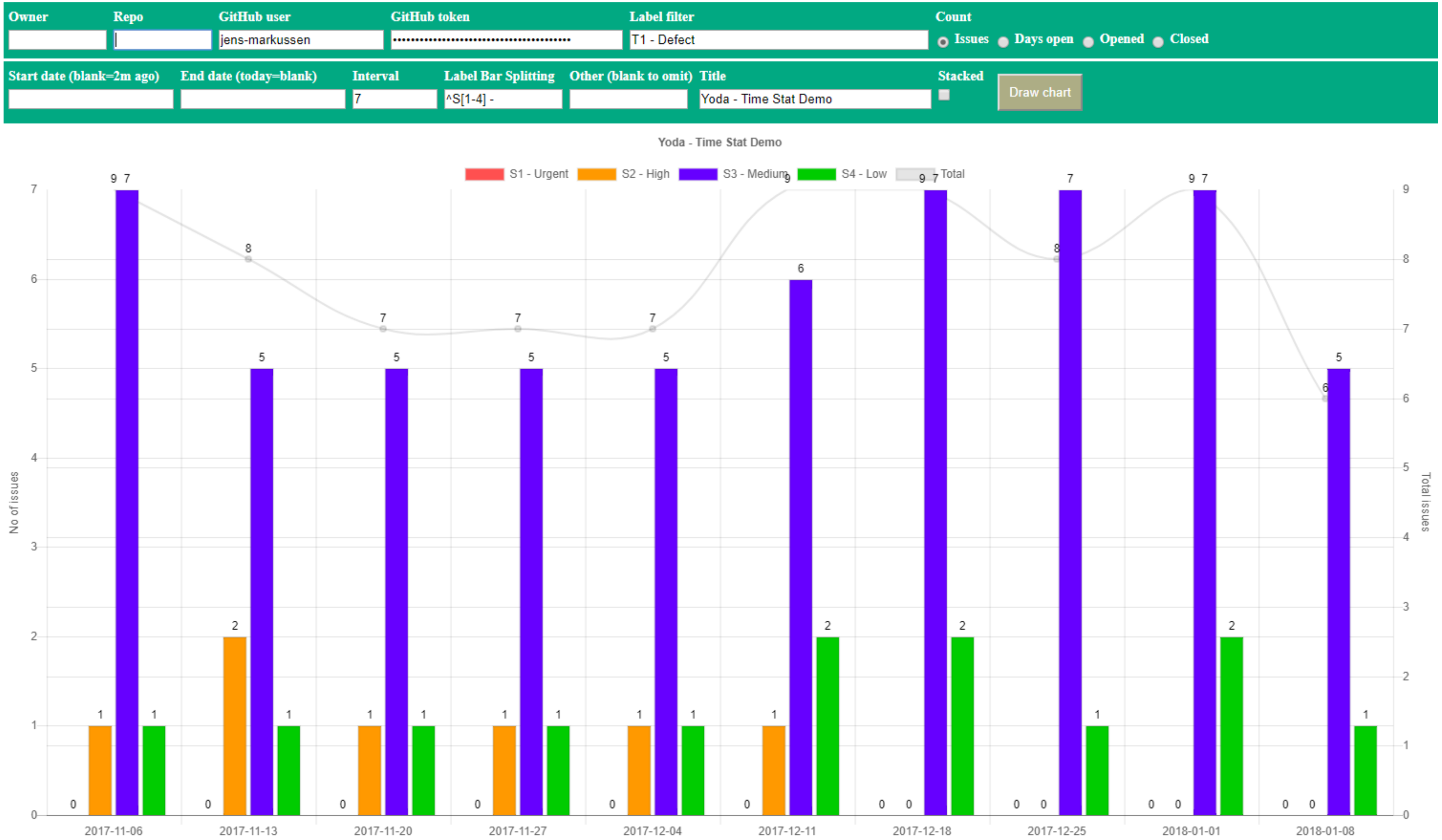
Yoda Reporting Tools

Issue Time Statistics, CFD, Issue Exporter

Issue Time Statistics

- This report shows open GitHub **issues over time** in a **bar-chart**
- Issues can be **split** into different **bars** based on **labels** (e.g. Severity)
- Issue **label filters** can be applied
- **Start-** and **end-dates,** reporting **interval**, etc. can be adjusted
- Optionally, number of **opened** or **closed** reports during an interval can be **reported** instead of # of open issues.

Example: Issue Time Statistics



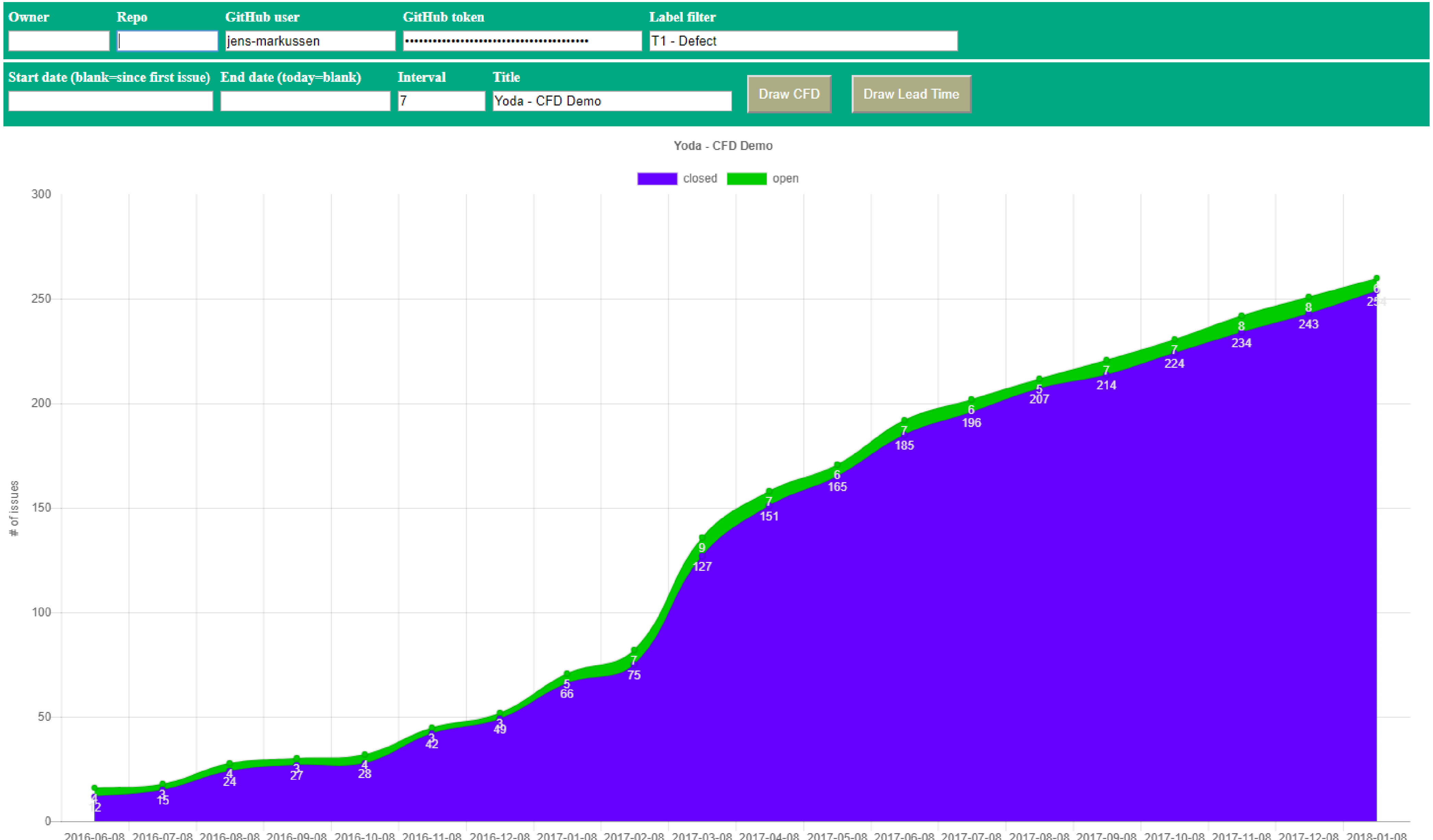
Owner	Repo	GitHub user	GitHub token	Label filter	Count
		jens-markussen	••	T1 - Defect	● Issues ○ Days open ○ Opened ○ Closed

Start date (blank=2m ago)	End date (today=blank)	Interval	Label Bar Splitting	Other (blank to omit)	Title	Stacked	
		7	^S[1-4] -		Yoda - Time Stat Demo	□	Draw chart

CFD (Cumulative Flow Diagram)

- A **CFD** shows **cumulative** number of **issues over time** split by state (open/closed)
  - **Normally** CFD charts may consider **more than just two states** (e.g. Open, In design, in development, in test, done/closed).
  - As GitHub only has two issue states (open and closed). **Yoda CFD only** uses these **two states**.
- Yoda can also draw the related **lead-time graph**.
  - This shows the **average** number of **days** an issue remained in the **open state**.

CFD Example



Owner

Repo

GitHub user: jens-markussen

GitHub token: ••

Label filter: T1 - Defect

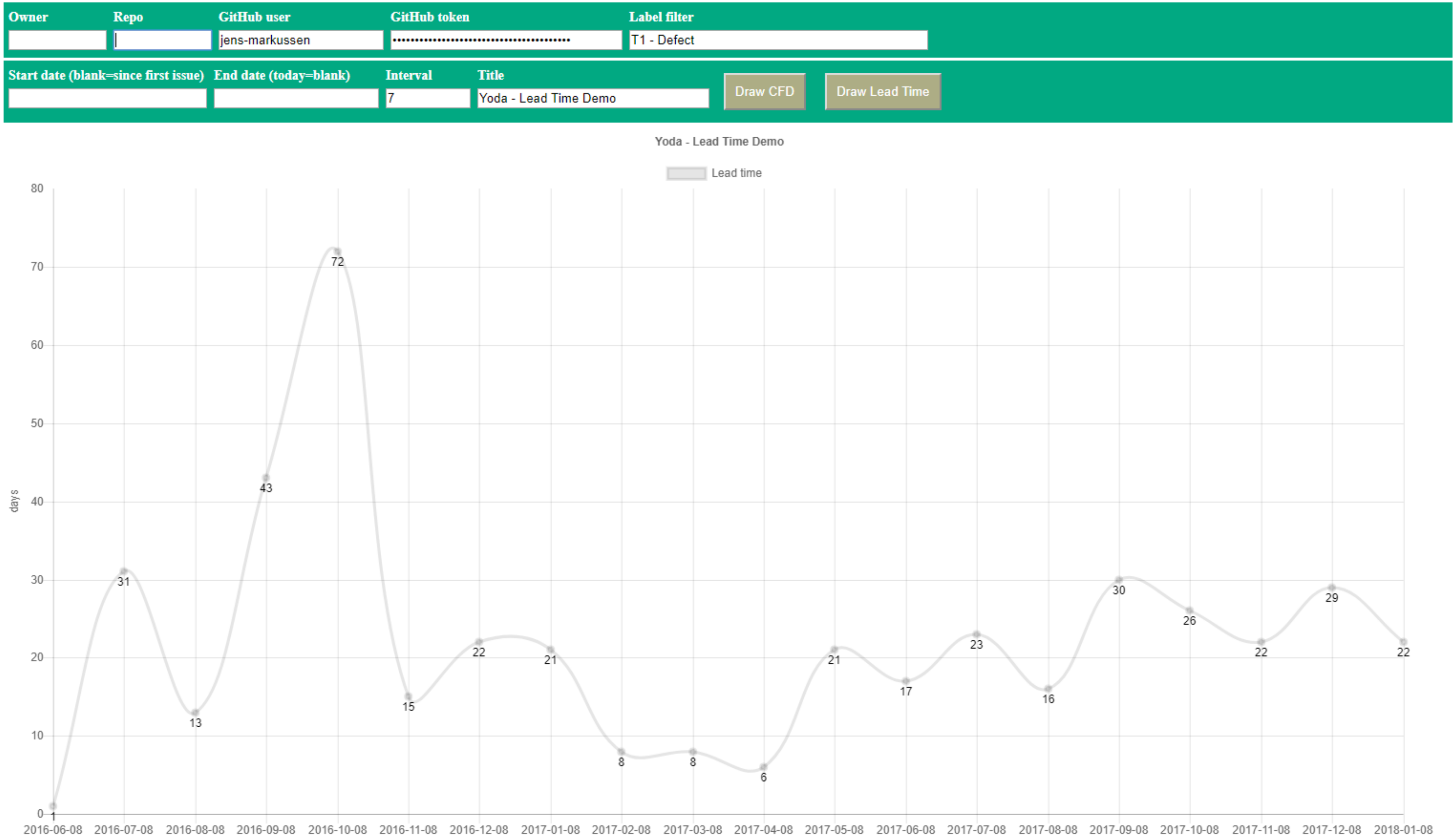
Start date (blank=since first issue)

End date (today=blank)

Interval: 7

Title: Yoda - CFD Demo

Lead Time Example



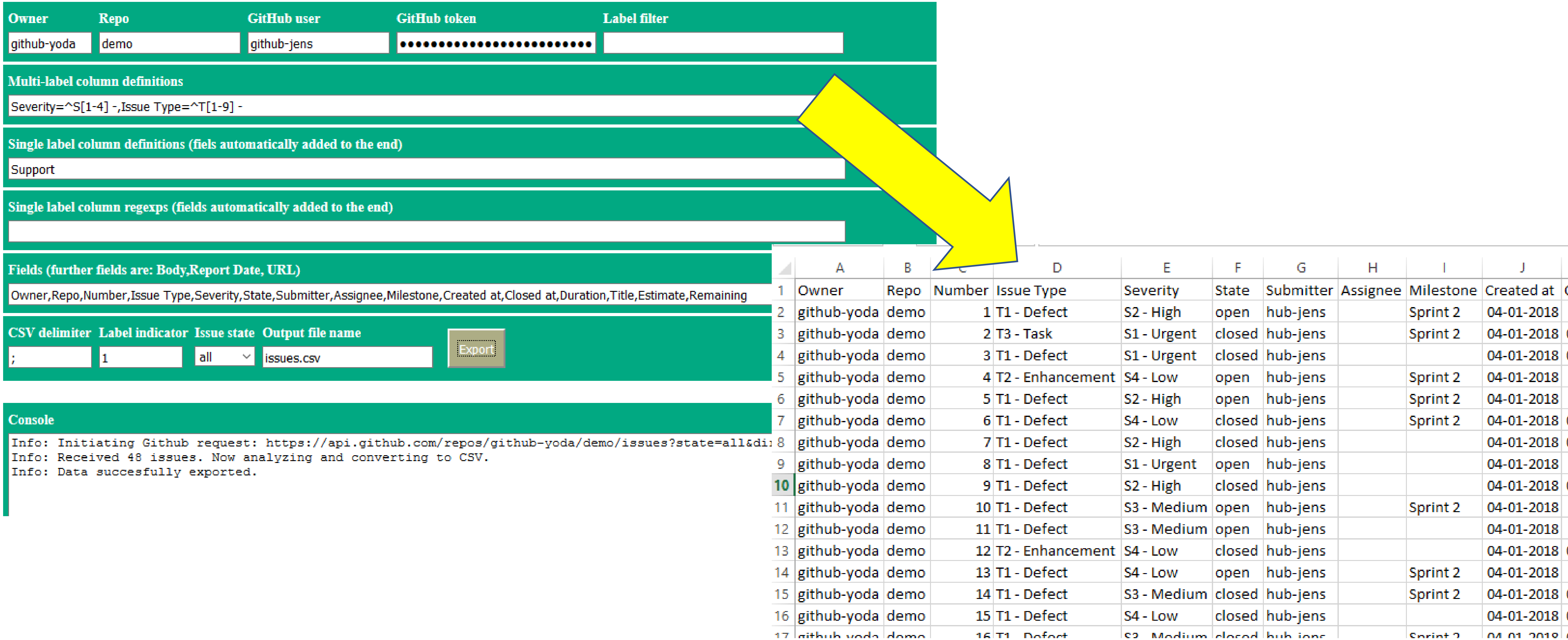
Owner	Repo	GitHub user	GitHub token	Label filter
		jens-markussen	••	T1 - Defect

Start date (blank=since first issue)	End date (today=blank)	Interval	Title
		7	Yoda - Lead Time Demo

Issue Exporter

- Yoda Issue Exporter can **export issues** (all or filtered) to a **CSV file**, which can e.g. be **imported** into **Excel**.
- Exporter can export from a **single repo**, or across repos for an **entire** GitHub **Organization**.
- Set of exported **fields** are **highly configurable**.
- The use of a good **labelling convention** helps (e.g. as the tool supports merging Severity labels into a **single column**).

Issue Exporter Example



Owner github-yoda

Repo demo

GitHub user github-jens

GitHub token ••••••••••••••••••••••••••

Label filter

Multi-label column definitions

Severity=^S[1-4] -,Issue Type=^T[1-9] -

Single label column definitions (fiels automatically added to the end)

Support

Single label column regexps (fields automatically added to the end)

Fields (further fields are: Body,Report Date, URL)

Owner,Repo,Number,Issue Type,Severity,State,Submitter,Assignee,Milestone,Created at,Closed at,Duration,Title,Estimate,Remaining

CSV delimiter ;

Label indicator 1

Issue state all

Output file name issues.csv

Console

```
Info: Initiating Github request: https://api.github.com/repos/github-yoda/demo/issues?state=all&di
Info: Received 48 issues. Now analyzing and converting to CSV.
Info: Data succesfully exported.
```

	A	B	C	D	E	F	G	H	I	J
1	Owner	Repo	Number	Issue Type	Severity	State	Submitter	Assignee	Milestone	Created at
2	github-yoda	demo	1	T1 - Defect	S2 - High	open	hub-jens		Sprint 2	04-01-2018
3	github-yoda	demo	2	T3 - Task	S1 - Urgent	closed	hub-jens		Sprint 2	04-01-2018
4	github-yoda	demo	3	T1 - Defect	S1 - Urgent	closed	hub-jens			04-01-2018
5	github-yoda	demo	4	T2 - Enhancement	S4 - Low	open	hub-jens		Sprint 2	04-01-2018
6	github-yoda	demo	5	T1 - Defect	S2 - High	open	hub-jens		Sprint 2	04-01-2018
7	github-yoda	demo	6	T1 - Defect	S4 - Low	closed	hub-jens		Sprint 2	04-01-2018
8	github-yoda	demo	7	T1 - Defect	S2 - High	closed	hub-jens			04-01-2018
9	github-yoda	demo	8	T1 - Defect	S1 - Urgent	open	hub-jens			04-01-2018
10	github-yoda	demo	9	T1 - Defect	S2 - High	closed	hub-jens			04-01-2018
11	github-yoda	demo	10	T1 - Defect	S3 - Medium	open	hub-jens		Sprint 2	04-01-2018
12	github-yoda	demo	11	T1 - Defect	S3 - Medium	open	hub-jens			04-01-2018
13	github-yoda	demo	12	T2 - Enhancement	S4 - Low	closed	hub-jens			04-01-2018
14	github-yoda	demo	13	T1 - Defect	S4 - Low	open	hub-jens		Sprint 2	04-01-2018
15	github-yoda	demo	14	T1 - Defect	S3 - Medium	closed	hub-jens		Sprint 2	04-01-2018
16	github-yoda	demo	15	T1 - Defect	S4 - Low	closed	hub-jens			04-01-2018
17	github-yoda	demo	16	T1 - Defect	S3 - Medium	closed	hub-jens		Sprint 2	04-01-2018

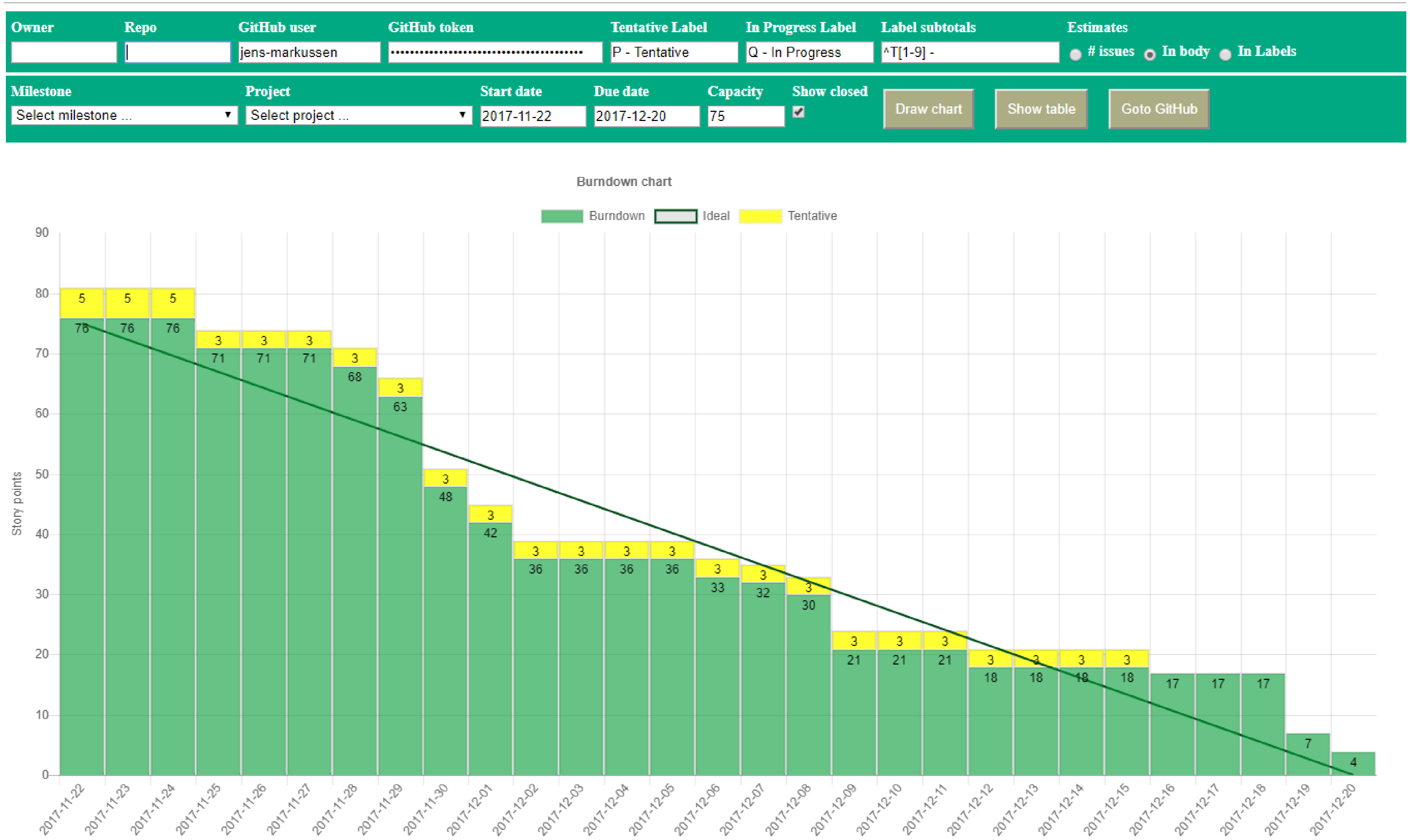
Yoda Agile Project Management Tools

Burndown Chart, Velocity Chart, Kanban Board

Burndown Chart

- A **Burndown Chart** is a **bar chart** showing the **remaining effort** over time for a given **sprint**
- An **ideal burndown** line is drawn for comparison
- Yoda uses **remaining estimates** (see earlier) for this purpose.
- It is possible to attribute some issues as **tentative** (aka **stretch goal**). These will be drawn in Yellow on top of committed issues
- Yoda Burndown tools further includes a table view containing the relevant sprint issues and their planning data.

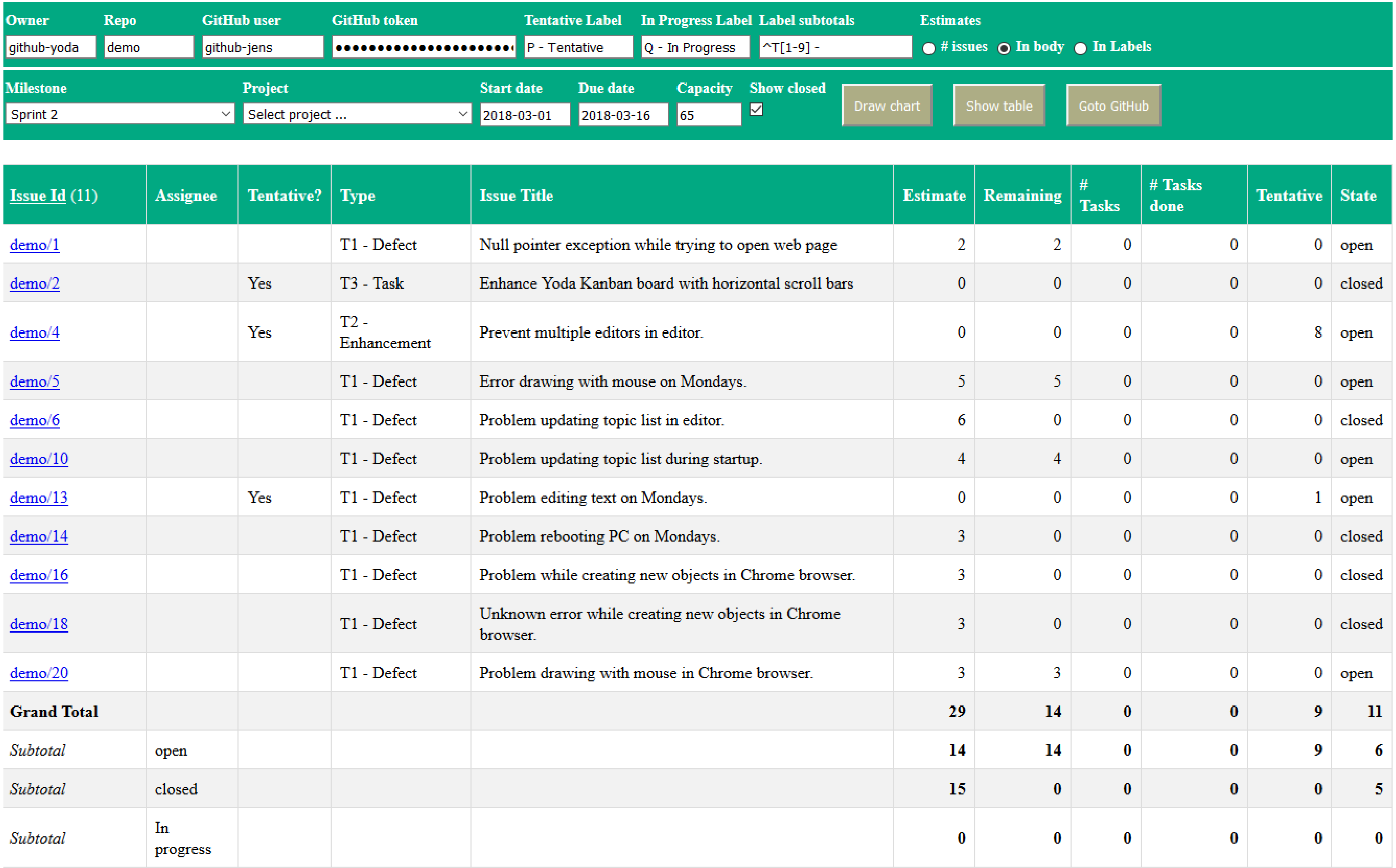
Burndown Example



Owner	Repo	GitHub user	GitHub token	Tentative Label	In Progress Label	Label subtotals	Estimates
		jens-markussen	••	P - Tentative	Q - In Progress	^T[1-9] -	○ # issues ● In body ○ In Labels

Milestone	Project	Start date	Due date	Capacity	Show closed
Select milestone ... ▾	Select project ... ▾	2017-11-22	2017-12-20	75	☑

Burndown Table Example



Owner	Repo	GitHub user	GitHub token	Tentative Label	In Progress Label	Label subtotals	Estimates
github-yoda	demo	github-jens	●●●●●●●●●●●●●●●●●●●●●●	P - Tentative	Q - In Progress	^T[1-9] -	○ # issues ● In body ○ In Labels

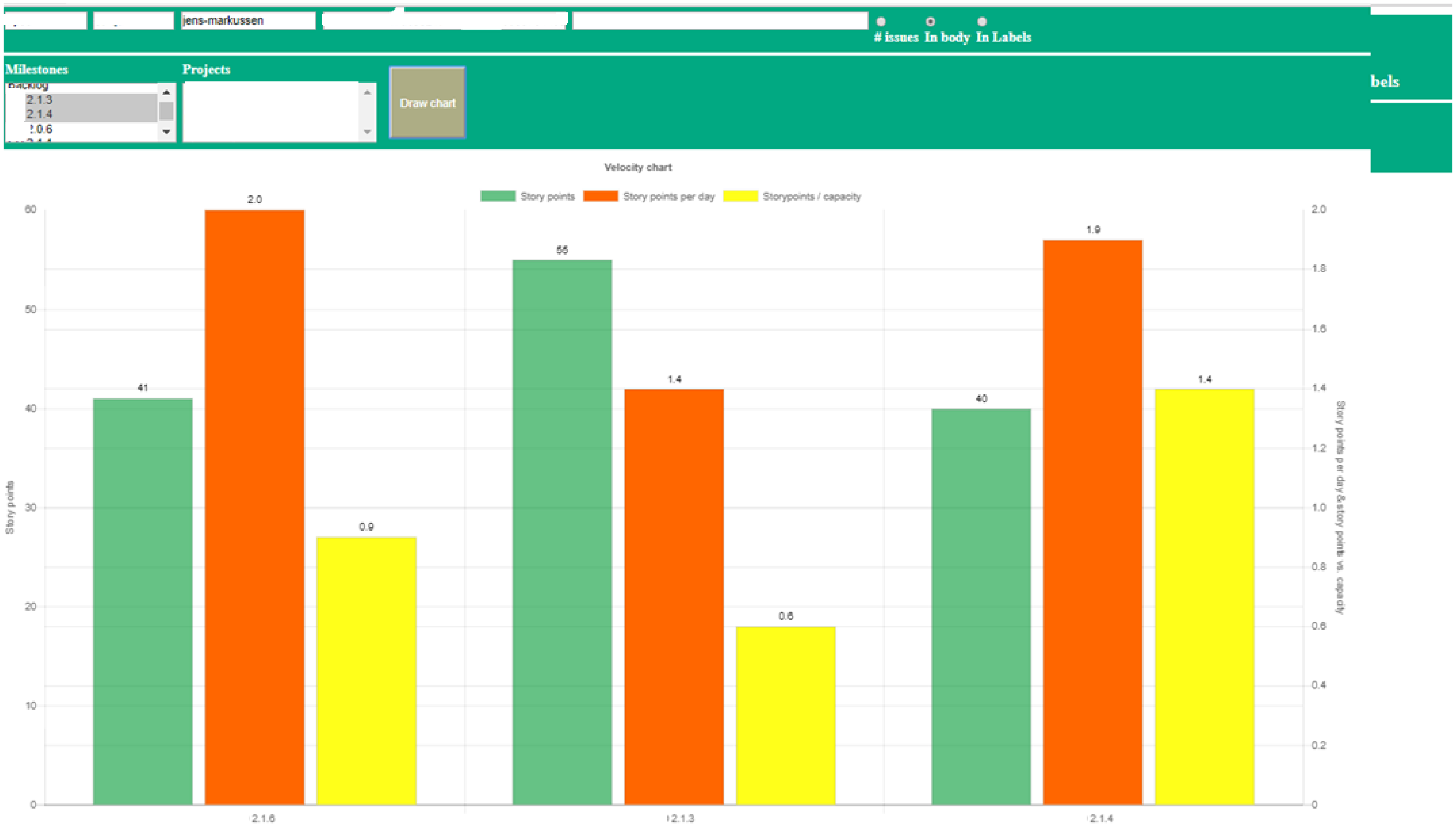
Milestone	Project	Start date	Due date	Capacity	Show closed
Sprint 2	Select project ...	2018-03-01	2018-03-16	65	☑

Issue Id (11)	Assignee	Tentative?	Type	Issue Title	Estimate	Remaining	# Tasks	# Tasks done	Tentative	State
demo/1			T1 - Defect	Null pointer exception while trying to open web page	2	2	0	0	0	open
demo/2		Yes	T3 - Task	Enhance Yoda Kanban board with horizontal scroll bars	0	0	0	0	0	closed
demo/4		Yes	T2 - Enhancement	Prevent multiple editors in editor.	0	0	0	0	8	open
demo/5			T1 - Defect	Error drawing with mouse on Mondays.	5	5	0	0	0	open
demo/6			T1 - Defect	Problem updating topic list in editor.	6	0	0	0	0	closed
demo/10			T1 - Defect	Problem updating topic list during startup.	4	4	0	0	0	open
demo/13		Yes	T1 - Defect	Problem editing text on Mondays.	0	0	0	0	1	open
demo/14			T1 - Defect	Problem rebooting PC on Mondays.	3	0	0	0	0	closed
demo/16			T1 - Defect	Problem while creating new objects in Chrome browser.	3	0	0	0	0	closed
demo/18			T1 - Defect	Unknown error while creating new objects in Chrome browser.	3	0	0	0	0	closed
demo/20			T1 - Defect	Problem drawing with mouse in Chrome browser.	3	3	0	0	0	open
Grand Total					**29**	**14**	**0**	**0**	**9**	**11**
Subtotal	open				**14**	**14**	**0**	**0**	**9**	**6**
Subtotal	closed				**15**	**0**	**0**	**0**	**0**	**5**
Subtotal	In progress				**0**	**0**	**0**	**0**	**0**	**0**

Velocity Chart

- A **velocity chart** compares the team **velocity across** different **sprints**
- Over time, a velocity chart will **help teams** to set the **correct capacity** for upcoming sprints
- Yoda does this by reporting per sprint
  - number of **story points** completed
  - story points **per day**
  - story points **vs.** predefined sprint **capacity**

Velocity Chart Example



jens-markussen

○ # issues ● In body ○ In Labels

bels

Milestones

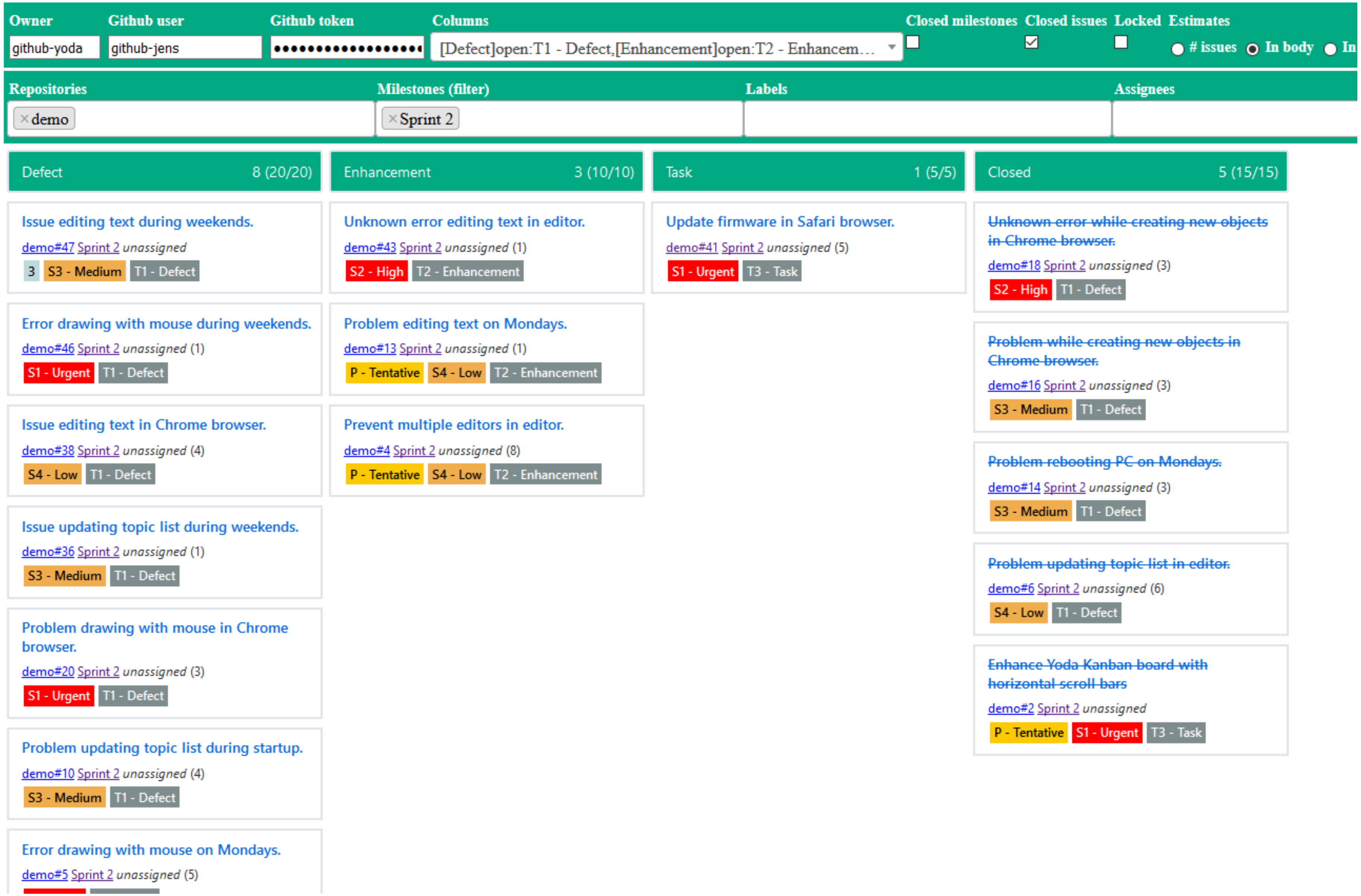
Backlog
2.1.3
2.1.4
!.0.6

Projects

Kanban Board

- A **Kanban Board** shows **sprint activities** across various states, thus allowing an intuitive view of progress
- **GitHub** natively supports Kanban Boards as part of **projects**, where issues can be placed in configurable columns
- **Yoda** does not use this mechanism, but instead supports **Kanban Board** views of issues based on **issue labels** (e.g. Severities, defined Sub-states, issue types)
- **Issues** may be further **filtered** based on **milestones**, **labels**, and **assignee**
- Yoda Kanban boards can include **issues** from **multiple repos** inside the same organization.
- **Drag and drop** between columns **change labels** and can close (or reopen) issues
- **Note**: While Yoda Kanban boards provides label and state (open/closed) consistency, GitHub projects do not. Here issue to column is manually maintained.

Kanban Board Example



Owner: github-yoda
Github user: github-jens
Github token: ••••••••••••••••••
Columns: [Defect]open:T1 - Defect,[Enhancement]open:T2 - Enhancem…
Closed milestones ☐
Closed issues ☑
Locked ☐
Estimates ○ # issues ● In body ○ In

Repositories: × demo
Milestones (filter): × Sprint 2
Labels
Assignees

Defect 8 (20/20)

- Issue editing text during weekends.
  demo#47 Sprint 2 *unassigned*
  3 | S3 - Medium | T1 - Defect
- Error drawing with mouse during weekends.
  demo#46 Sprint 2 *unassigned* (1)
  S1 - Urgent | T1 - Defect
- Issue editing text in Chrome browser.
  demo#38 Sprint 2 *unassigned* (4)
  S4 - Low | T1 - Defect
- Issue updating topic list during weekends.
  demo#36 Sprint 2 *unassigned* (1)
  S3 - Medium | T1 - Defect
- Problem drawing with mouse in Chrome browser.
  demo#20 Sprint 2 *unassigned* (3)
  S1 - Urgent | T1 - Defect
- Problem updating topic list during startup.
  demo#10 Sprint 2 *unassigned* (4)
  S3 - Medium | T1 - Defect
- Error drawing with mouse on Mondays.
  demo#5 Sprint 2 *unassigned* (5)

Enhancement 3 (10/10)

- Unknown error editing text in editor.
  demo#43 Sprint 2 *unassigned* (1)
  S2 - High | T2 - Enhancement
- Problem editing text on Mondays.
  demo#13 Sprint 2 *unassigned* (1)
  P - Tentative | S4 - Low | T2 - Enhancement
- Prevent multiple editors in editor.
  demo#4 Sprint 2 *unassigned* (8)
  P - Tentative | S4 - Low | T2 - Enhancement

Task 1 (5/5)

- Update firmware in Safari browser.
  demo#41 Sprint 2 *unassigned* (5)
  S1 - Urgent | T3 - Task

Closed 5 (15/15)

- ~~Unknown error while creating new objects in Chrome browser.~~
  demo#18 Sprint 2 *unassigned* (3)
  S2 - High | T1 - Defect
- ~~Problem while creating new objects in Chrome browser.~~
  demo#16 Sprint 2 *unassigned* (3)
  S3 - Medium | T1 - Defect
- ~~Problem rebooting PC on Mondays.~~
  demo#14 Sprint 2 *unassigned* (3)
  S3 - Medium | T1 - Defect
- ~~Problem updating topic list in editor.~~
  demo#6 Sprint 2 *unassigned* (6)
  S4 - Low | T1 - Defect
- ~~Enhance Yoda Kanban board with horizontal scroll bars~~
  demo#2 Sprint 2 *unassigned*
  P - Tentative | S1 - Urgent | T3 - Task

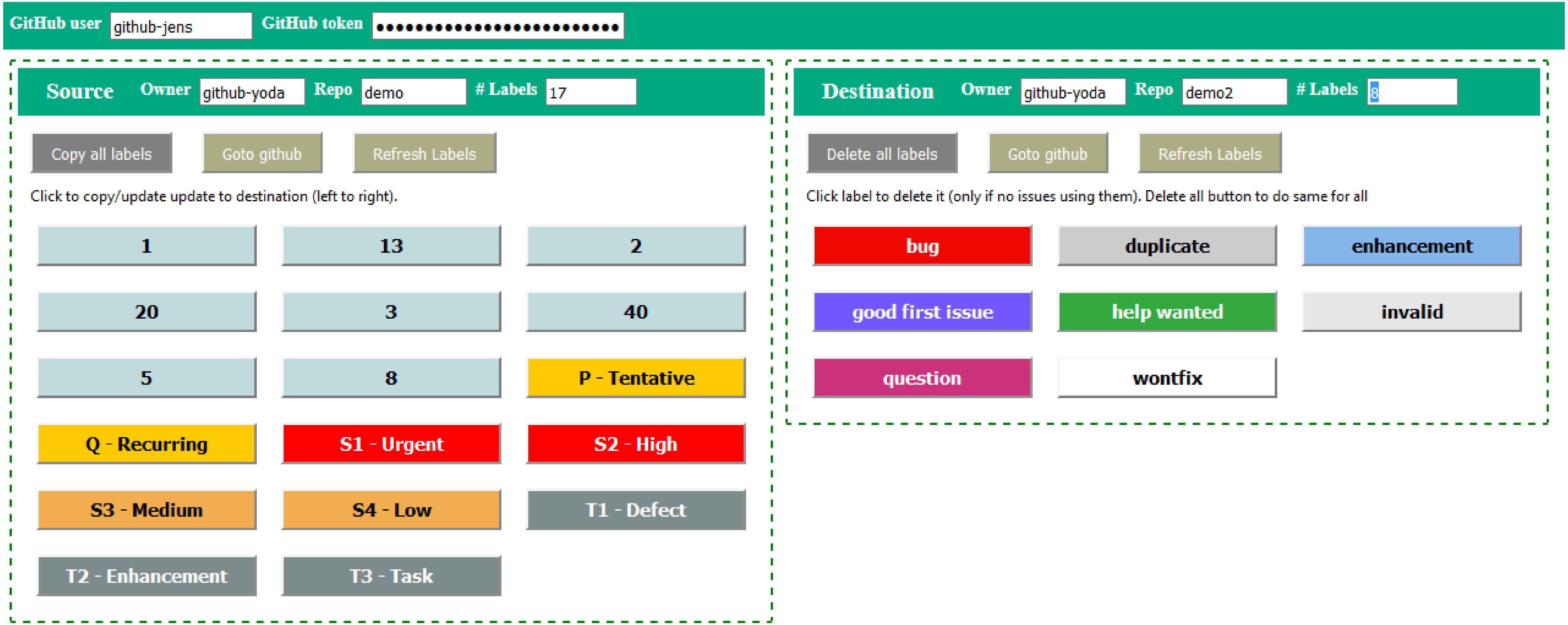
Other Yoda tools

Label Manager, Admin, Task Copy

Label Manager

- In support of managing **labelling conventions** across **different repos**, Yoda includes a **label manager**
- The label manager can **copy labels** (all or some) from **one repo** to **another**.
- Label manager does **not allow deletion** of labels that are **in use**
- **Hint**: When creating a new repo, press ”Delete all labels” to get rid of the standard GitHub labels. Next press ”Copy all Labels” to get label definitions from your favorite repo.

Label Manager Example



GitHub user: github-jens GitHub token: ••••••••••••••••••••••••••

Source Owner: github-yoda Repo: demo # Labels: 17

Click to copy/update update to destination (left to right).

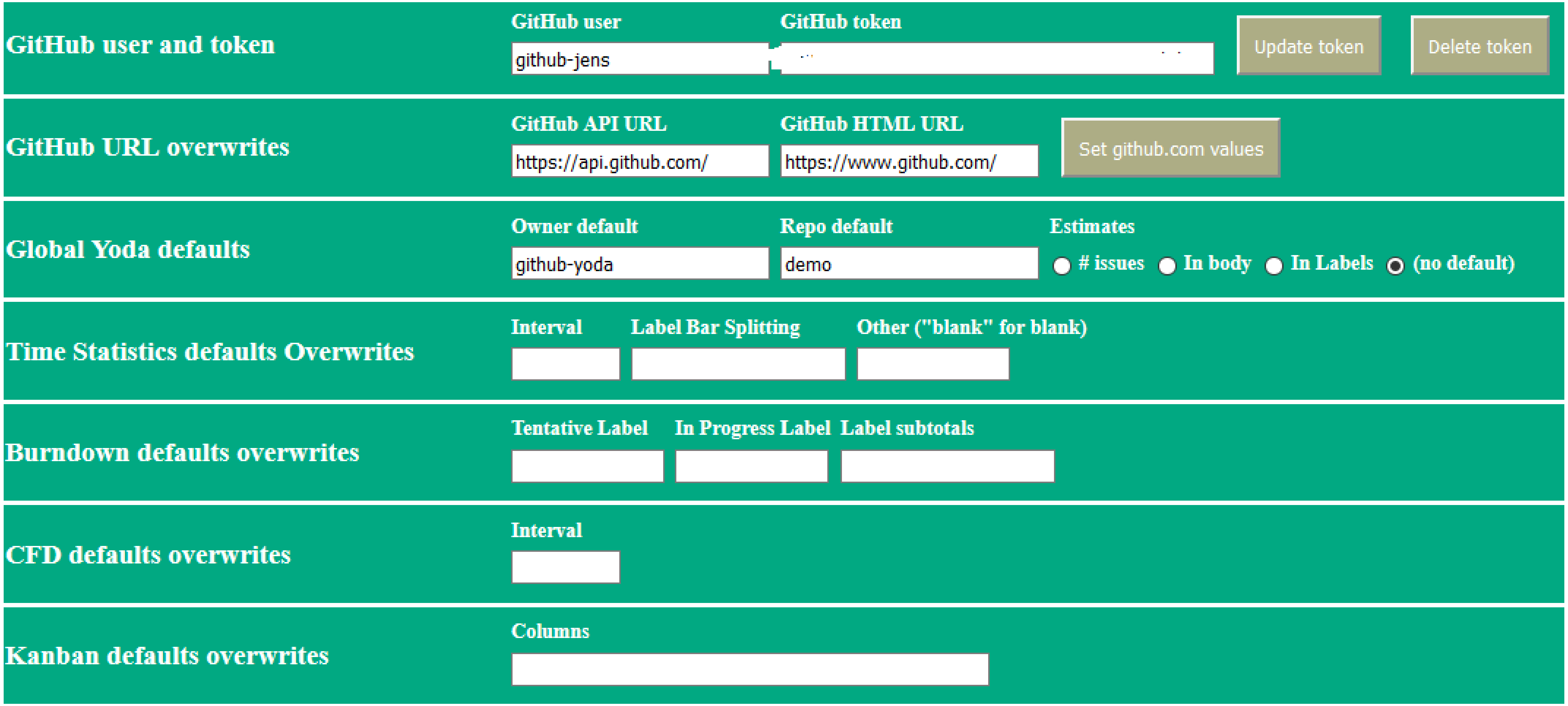
Destination Owner: github-yoda Repo: demo2 # Labels: 8

Click label to delete it (only if no issues using them). Delete all button to do same for all

Admin

- The Yoda **admin tool** allows the user to **store** various **defaults** into the **browser settings** (localStorage)
- Most notably, the **GitHub userId** and personal **access token** should be set here.

Yoda Admin Example



GitHub user and token

GitHub user: github-jens

GitHub token:

GitHub URL overwrites

GitHub API URL: https://api.github.com/

GitHub HTML URL: https://www.github.com/

Global Yoda defaults

Owner default: github-yoda

Repo default: demo

Estimates: ○ # issues ○ In body ○ In Labels ● (no default)

Time Statistics defaults Overwrites

Interval:

Label Bar Splitting:

Other ("blank" for blank):

Burndown defaults overwrites

Tentative Label:

In Progress Label:

Label subtotals:

CFD defaults overwrites

Interval:

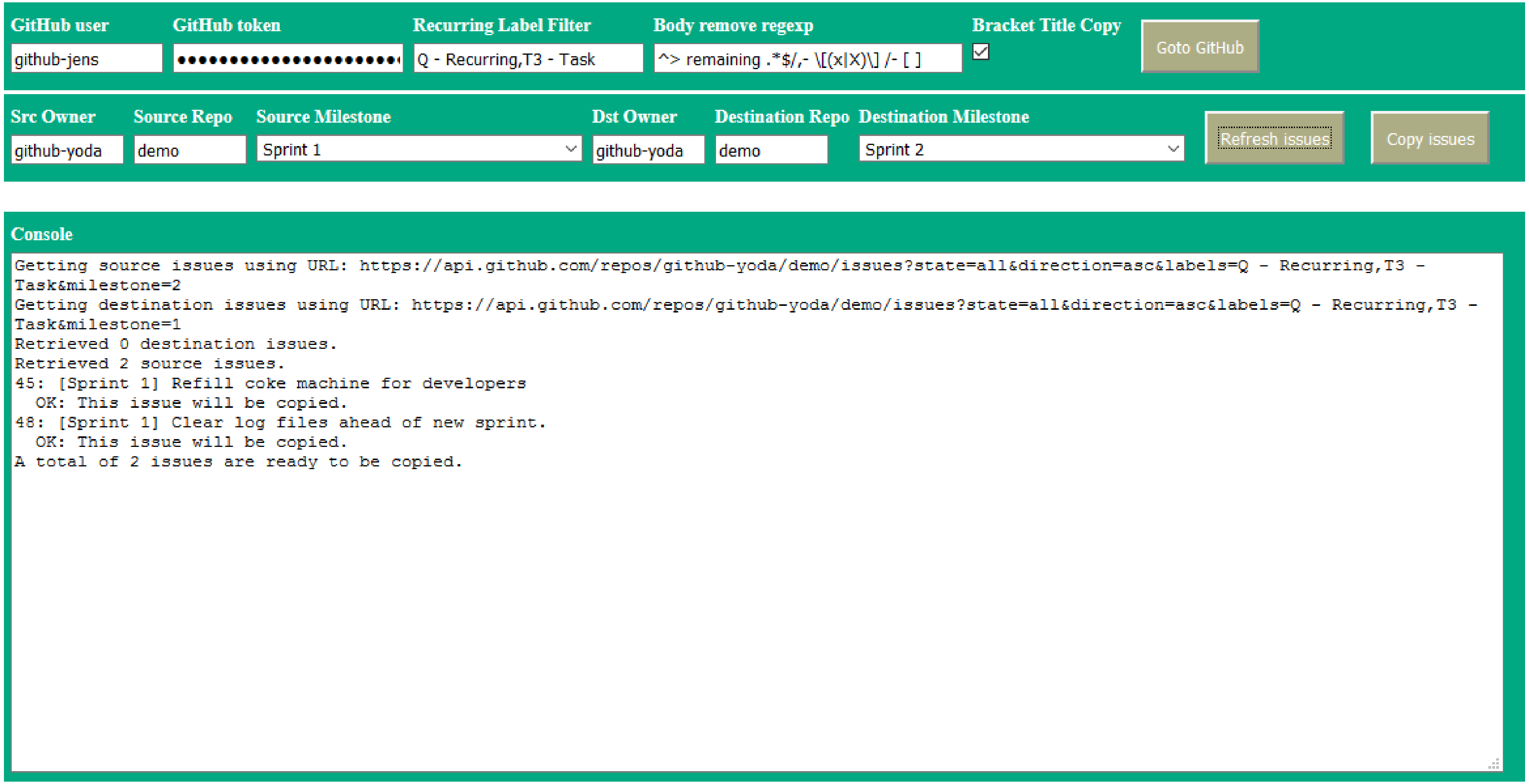
Kanban defaults overwrites

Columns:

Task Copy

- When executing **successive sprints**, you may have **recurring tasks** that you need to execute for **every sprint**.
- These **tasks** should naturally be handled (including estimates) as GitHub **issues**.
- The **task copy tool** allows you to copy such tasks **from one sprint** (milestone) **to the next**.
- If such recurring issues include **tasks lists** (GitHub notation ”– [x] text”), **check boxes** will be **cleared** in preparation for the next sprint (so ”- [x]” will become ”- [ ]”

Task Copy



GitHub user	GitHub token	Recurring Label Filter	Body remove regexp	Bracket Title Copy
github-jens	●●●●●●●●●●●●●●●●●●●●●	Q - Recurring,T3 - Task	^> remaining .*$/,- \[(x|X)\] /- [ ]	☑

Src Owner	Source Repo	Source Milestone	Dst Owner	Destination Repo	Destination Milestone
github-yoda	demo	Sprint 1	github-yoda	demo	Sprint 2

```
Getting source issues using URL: https://api.github.com/repos/github-yoda/demo/issues?state=all&direction=asc&labels=Q - Recurring,T3 -
Task&milestone=2
Getting destination issues using URL: https://api.github.com/repos/github-yoda/demo/issues?state=all&direction=asc&labels=Q - Recurring,T3 -
Task&milestone=1
Retrieved 0 destination issues.
Retrieved 2 source issues.
45: [Sprint 1] Refill coke machine for developers
  OK: This issue will be copied.
48: [Sprint 1] Clear log files ahead of new sprint.
  OK: This issue will be copied.
A total of 2 issues are ready to be copied.
```

Yoda Architecture

Yoda Architecture

- Yoda has a very **simple architecture** based on a few **key principles**:
    1. **All data** will be kept **in GitHub** – no auxiliary database will be used
    2. Yoda **executes** exclusively in the **browser**. Yoda has **no backend**, apart from GitHub.
    3. Yoda **communicates** with GitHub using the **standard API** (version 3)
    4. Yoda tools are written using only **HTML** and **Javascript**

Thank You