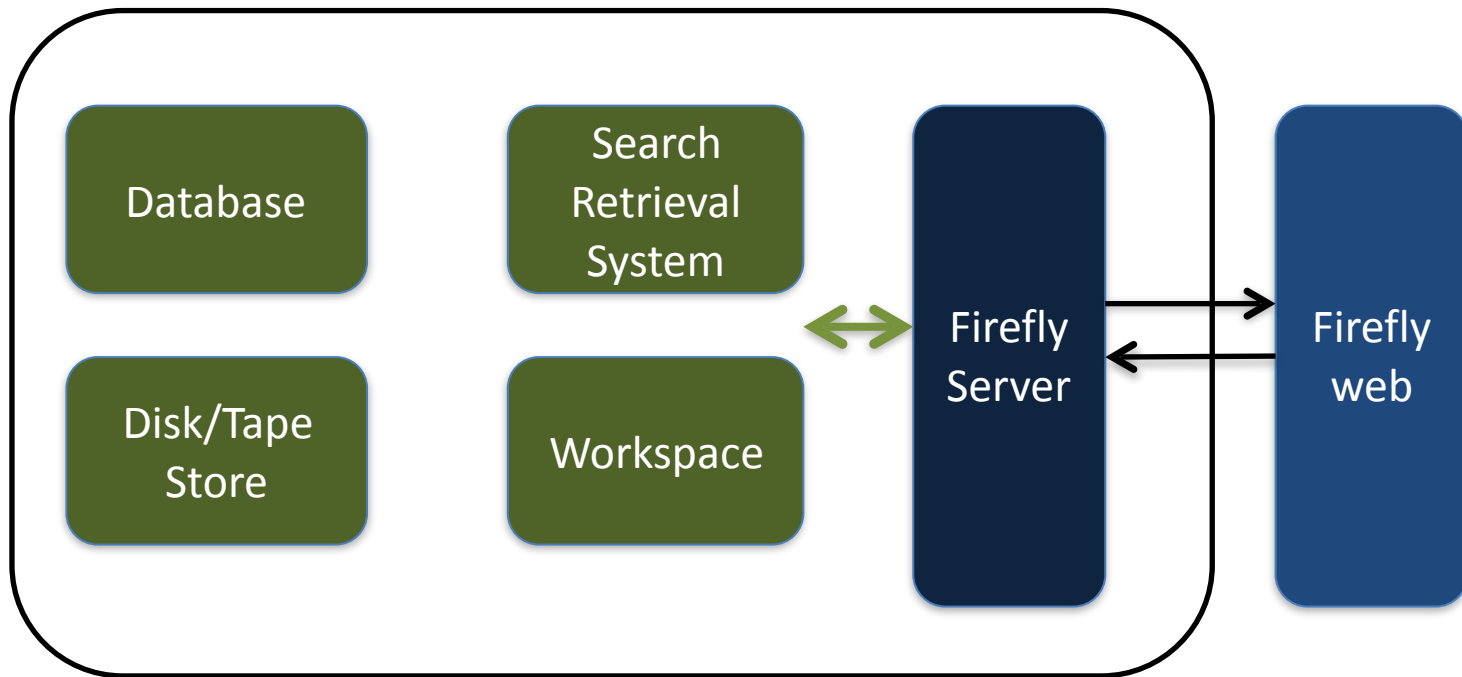


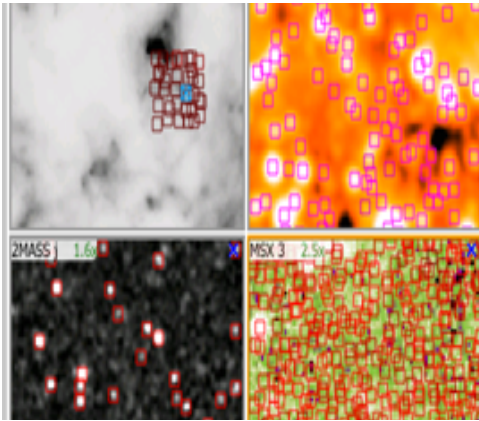
Next Generation Firefly for Web Application

Xiuqin Wu

Firefly

A frame work for astronomy web application

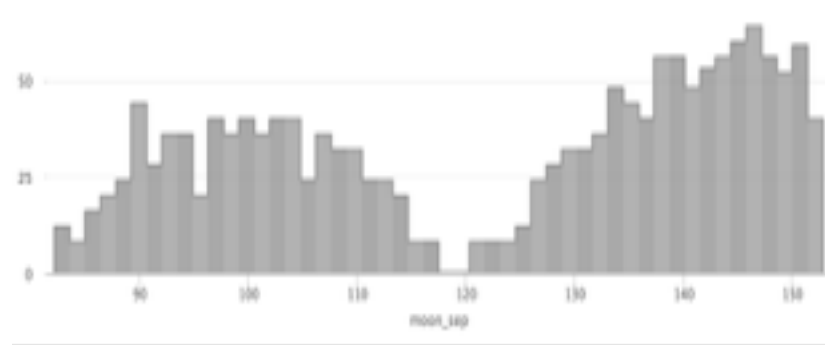




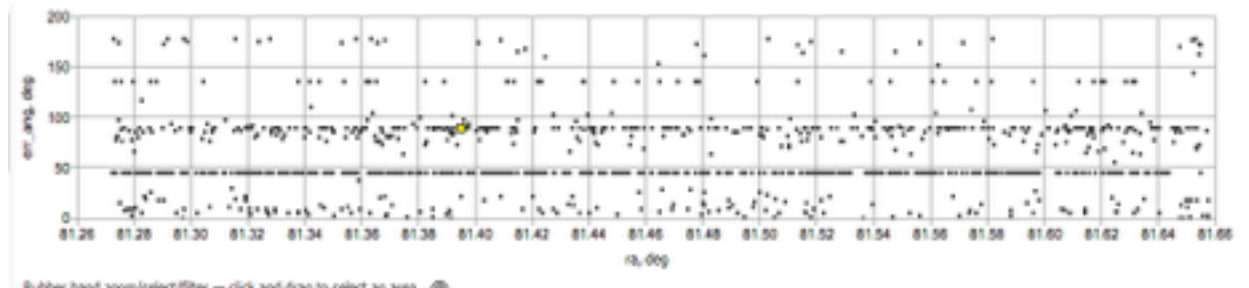
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1	81.270004	-68.310001	010125+07.01a	-68475+09.83a	0.104	0.103	2	0101250104-68310001	16.587	0.089	0.089
2	81.270000	-68.310004	010125+08.00a	-68475+11.80a	0.108	0.108	13	0101250000-68310004	16.584	0.107	0.107
3	81.412009	-68.310004	010125+09.01a	-68475+12.01a	0.201	0.198	84	0101250109-68310004	16.580	0.197	0.197
4	81.437003	-68.310001	010125+10.12a	-68475+13.40a	0.117	0.117	125	0101250103-68310001	16.574	0.123	0.123
5	81.514001	-68.310001	010125+11.41a	-68475+14.70a	0.107	0.107	40	0101250141-68310001	16.566	0.104	0.104
6	81.368000	-68.310001	010125+12.01a	-68475+14.01a	0.108	0.108	3	0101250100-68310001	16.550	0.103	0.104
7	81.368000	-68.310001	010125+12.01a	-68475+14.01a	0.108	0.107	83	0101250100-68310001	16.548	0.103	0.103
8	81.410007	-68.310001	010125+12.01a	-68475+14.01a	0.108	0.108	40	0101250100-68310001	16.504	0.102	0.104
9	81.501176	-68.310004	010125+13.00a	-68475+15.10a	0.108	0.108	40	0101250100-68310004	16.498	0.106	0.106
10	81.508001	-68.310004	010125+13.00a	-68475+15.10a	0.108	0.108	40	0101250100-68310001	16.470	0.108	0.104
11	81.316002	-68.310001	010125+13.00a	-68475+15.10a	0.107	0.107	40	0101250100-68310001	16.458	0.102	0.104
12	81.368000	-68.310001	010125+14.01a	-68475+16.10a	0.108	0.108	90	0101250100-68310001	16.442	0.104	0.106
13	81.408007	-68.310001	010125+15.01a	-68475+17.10a	0.201	0.198	127	0101250100-68310001	16.470	0.103	0.103
14	81.408000	-68.310001	010125+15.01a	-68475+17.10a	0.198	0.198	126	0101250100-68310001	16.450	0.104	0.105
15	81.500000	-68.310001	010125+16.01a	-68475+18.10a	0.108	0.107	83	0101250100-68310001	16.422	0.108	0.105
16	81.410007	-68.310001	010125+17.01a	-68475+19.10a	0.107	0.107	17	0101250100-68310001	16.400	0.104	0.105
17	81.410000	-68.310001	010125+17.01a	-68475+19.10a	0.107	0.107	40	0101250100-68310001	16.420	0.100	0.107
18	81.410000	-68.310001	010125+17.01a	-68475+19.10a	0.107	0.108	6	0101250100-68310001	16.384	0.107	0.106
19	81.501176	-68.310004	010125+18.01a	-68475+20.10a	0.107	0.107	84	0101250100-68310004	16.340	0.104	0.104
20	81.508001	-68.310004	010125+18.01a	-68475+20.10a	0.107	0.108	86	0101250100-68310001	16.302	0.107	0.108

- Sort
- Filter
- Column controls

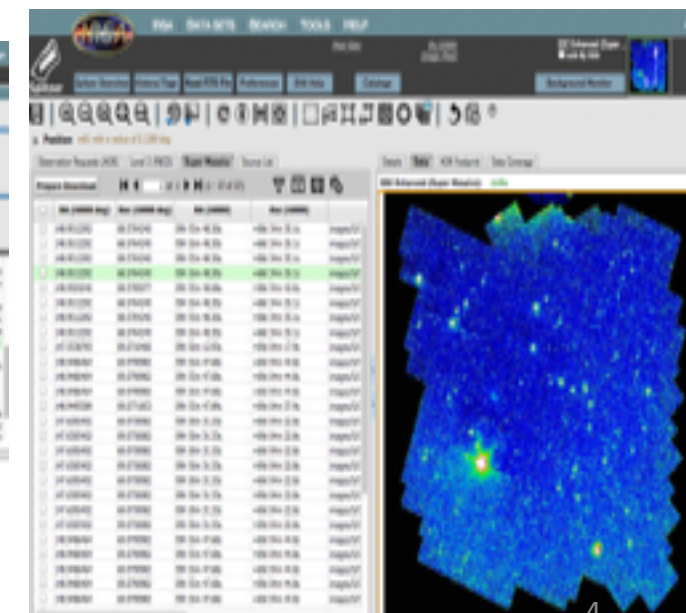
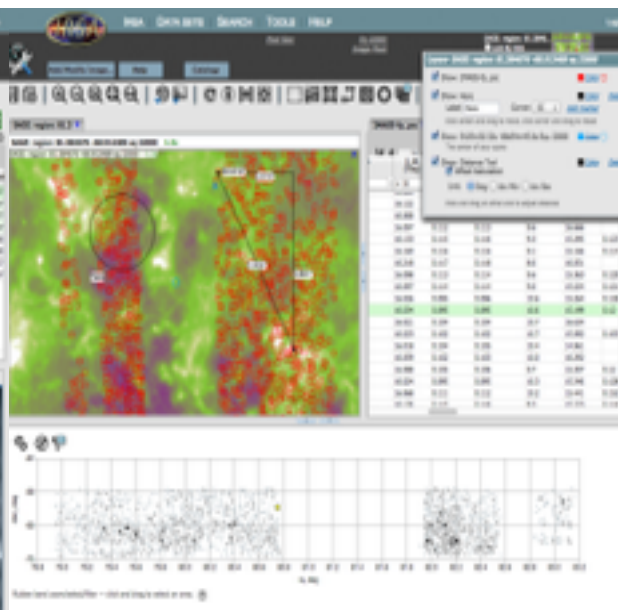
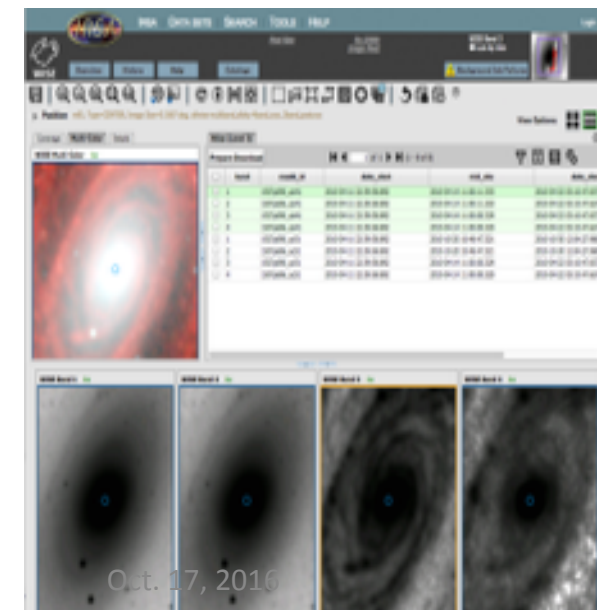
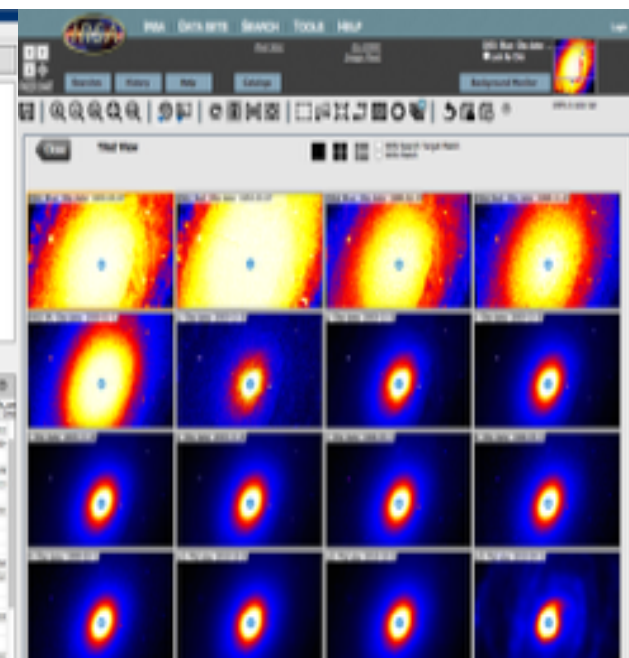
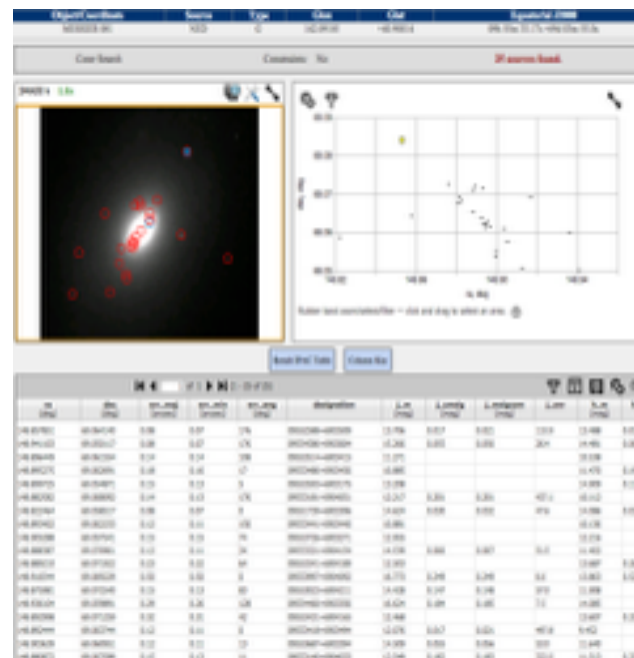
- WCS and image values
- Readout
- FITS header
- Zoom/Pan/Magnifier
- Flip/Rotate
- Color/Stretch
- Statistics
- Crop
- Grid/Region overlay
- Markers
- Distance tools



- Interaction
- Filter
- Zoom
- Column math



Many faces of Firefly



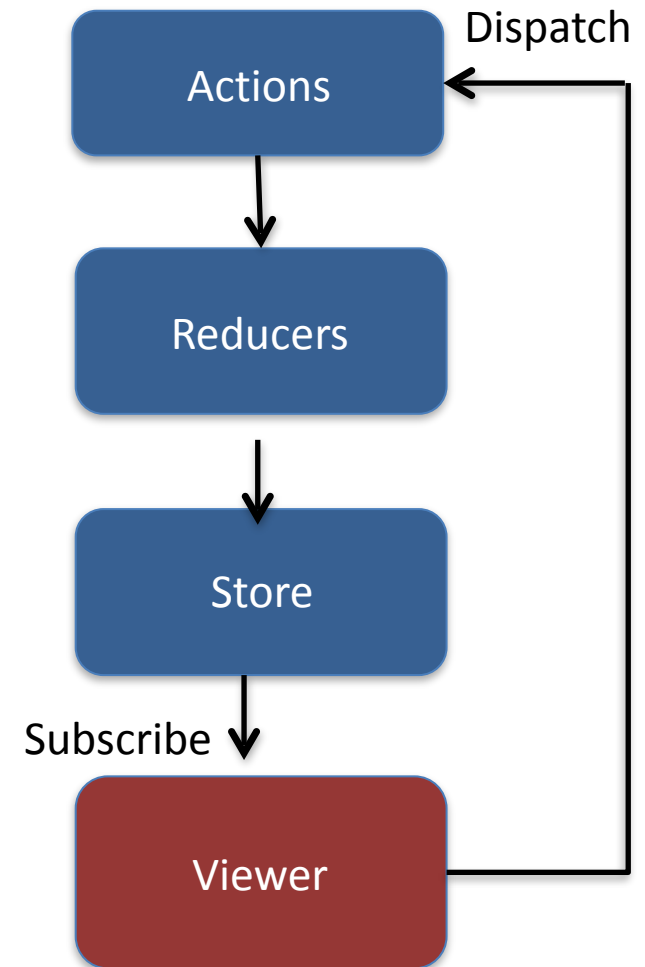
Oct. 17, 2016

Rewrite the client side in JavaScript

- Google support for GWT dwindled
- Browser support for JavaScript matured
 - Auto update
- Web development frameworks mushroomed
 - Backbone
 - Ember
 - JQuery
 - Bootstrap
 - Angular
 - React ✓
- Tools matured
 - Babel
 - Node
 - NPM

Why React (+Redux)?

- Natural for large applications
- Very flexible
- Scales
- Reusable components
- Fast
- Cutting edge data paradigm
- Easy to use



EcmaScript 6

(ES6, ES 2015)

- Arrow functions
- Let constant
- Enhanced object literals
- Iterators and generators
- Promises
- Math, Number, String, Array, and Object APIs

Firefly Rewrite Status

- Java/GWT to JavaScript/React/Redux
- 150,000 lines of code to 75,000
- 9 months research and planning
- 4 – 5 developers
- 10 months of development
 - 3 months to come up to speed
- The first application will be released next month.

Challenges

- Steep learning curve
 - Seasoned Java developers
 - Object-oriented vs. functional programming
 - Average three months coming up to speed
- New concepts
 - Closures
 - Promises
 - Saga
- Under estimation of the work load
 - Firefly features developed in 7 to 8 years
 - Details, special cases, dependencies

Procedures Adopted

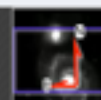
- ESLint
 - Discussed and adopted the rules as a team
- Code review, 100%
 - LSST practice
 - A great learning process
 - New/better ways to achieve the same result
 - Good coding habit and practice
 - Readability improvement
 - Team building and mentoring
 - Developers are happy

Comments from Code Review

- String templates are awesome for your use cases.
 - good point, i'll change it to use template string instead.
- I think we still need a check on the input parameters of `parseDouble`. `StringUtils` was basically checking 'NaN' and returning `Double.NaN`. Why removing it?
 - Your right, I will fix it.
- Looks great. I am glad you figured out how to use flex boxes: I learned from you.
- Thank you for the review!

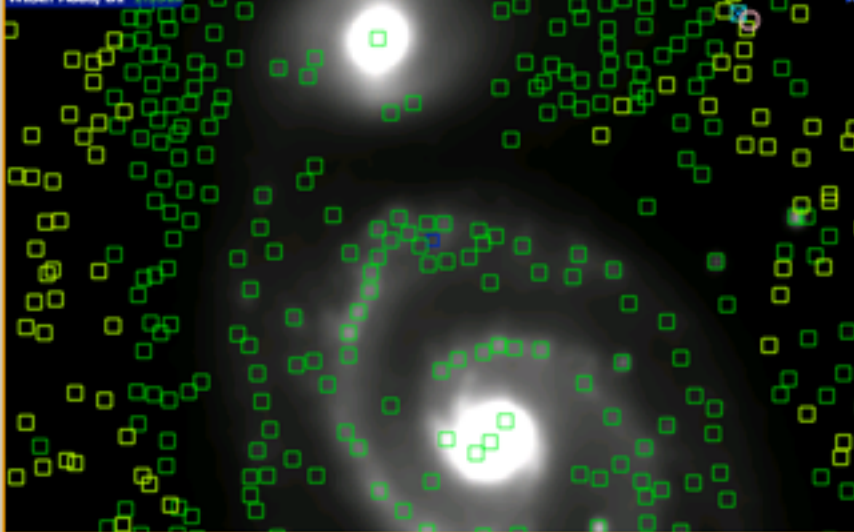
Improvements Due to Rewrite

- ds9 region overlay
- Better control of JWST and HST field of view overlays on image
- Easier JS API exposure
 - Pure JavaScript code
 - Parameters and controls could be exposed directly
- Jupyter widgets development
- More flexible control for Python API



Fits Data

WISE: Atlas, B1 1.551x



WISE-wise_allwise_p3as_psd ...

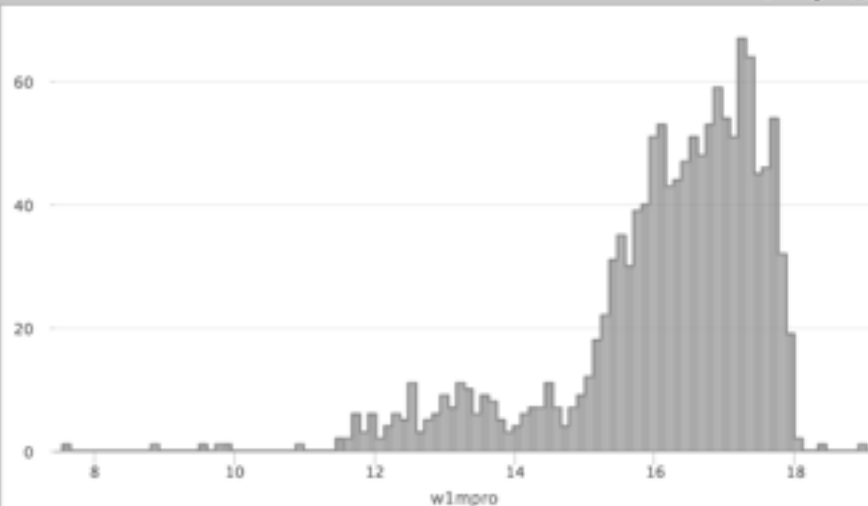
8 of 14

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Drawing Layers

☒ Show: m51 ■ Color ☐ Delete☒ Show: Catalog: tbl_id-10 ■ Color ☐ Delete

Click on point to highlight

☒ Show: Selected Point ■ Color ☐ Delete

Projects Use and Support Firefly

