Status of DS9 Region in Firefly

April 6, 2017
Cindy Wang and Yi Mei

Firefly uses DS9 region mainly at two areas: Parse DS9 region files/strings and use DS9 region GUI functions.

1. Parse DS9 region files/strings

   In IRSAViewer, Firefly can load DS9 region file and draw the regions on an image. Some Firefly GUI applications allow users to type in the DS9 regions and draw the regions on an image. Firefly currently has two DS9 region parsers: the client parser and the server parser.

   When a user loads a DS9 region file in IRSAViewer, the client passes the request to the server. The server parser reads the region file, parses it into a long string and passes the string to the client. The client parser parses the string into DS9 region elements, for example, a circle's center coordinates and radius. Then the client will draw the regions on an image.

   When a user inputs the DS9 regions in a GUI function (see some of those functions in firefly/html/demo), the client reads the region strings and parses into DS9 region elements and then draws them on an image.

   When a user saves an image with regions on it as a PNG file or regions on the plot as a region file, the client makes a long string of the regions and passes it to the server. The server parses the string into DS9 region elements and saves out a PNG file or a region file.

   The table below shows which DS9 region shapes and the properties can be parsed by the client parser and the server parser, which shapes and properties are ignored by the parsers (i.e., the parsers are not failed/choked by them but do not include them in the region string or region elements) and what are the parsers' limitations.

DS9 Region Shapes	Firefly client parser (javascript)	Firefly server parser (java gwt)
Circle	Yes	Yes
Ellipse	Yes	Yes (the implementation is not complete)
Box	Yes	Yes
Polygon	Yes	Yes
Point (circle, box, diamond, cross, x, arrow, boxcircle)	Yes	Yes
Line	Yes	Yes
Vector	Ignored	Ignored
Ruler	Ignored (Firefly has its	Ignored

		own ruler.)
Compass	Ignored (Firefly has own compass so doesn't need to parse DS9 region compass.)	Ignored (Firefly has own compass so doesn't need to parse DS9 region compass.)
Projection	Ignored	Ignored
Annulus	Yes	Yes but only two circles. The rest are ignored.
Ellipse Annulus	Yes	Yes but only two ellipses. The rest are ignored. (The implementation is not complete.)
Box Annulus	Yes	Yes but only two boxes. The rest are ignored.
Text	Yes	Yes
Panda	Ignored	Ignored
Epanda	Ignored	Ignored
Bpanda	Ignored	Ignored
Composite	Ignored	Ignored

DS9 Region Properties	Firefly client parser (javascript)	Firefly server parser (java gwt)
Text	Yes	Yes
Color	Yes	Yes
Dash List	Yes	Ignored
Dash	Yes	Ignored
Width	Yes	Yes
Font	Yes	Yes
Can Select	Yes	Yes
Can Highlite	Yes	Yes
Fixed in Size	Yes	Yes
Can Edit	Yes	Yes
Can Move	Yes	Yes
Can Rotate	Yes	Yes
Can Delete	Yes	Yes
Include/Exclude	Yes	Yes
Source/Background	Yes	Ignored
Tag	Yes	Ignored
Line	Yes	Ignored
Ruler	Yes	Ignored
Point	Yes	Yes

Some known issues in the server parser (maybe also in the client parser) are captured in the ticket DM-5896. The parser(s) may not interpret the DS9 regions rules about the coordinate system, fonts, and so on properly. See detail in the ticket.

2. Use DS9 region GUI functions

   DS9 GUI has many functions to handle regions. For example, it allows a user to add a region or an instrument FOV to an image, to edit a region on an image (color, font, line style, and so on), select a region on an image, delete a region from an image, save regions out.

   Currently Firefly only allows users to add a marker or instrument FOVs to images. Firefly doesn't support other DS9 GUI functions about regions. Firefly provides some region APIs to select, delete, and save regions. See details in the table below.

DS9 GUI functions	Firefly functions
Add a region to an image (Circle, Ellipse, Box, Polygon, Line, Vector, Projection, Segment, Text, Point, Ruler, Compass, Annulus, Elliptical Annulus, Box Annulus, Panda, Elliptical Panda, Box Panda)	GUI function is not implemented. API: dispatchAddRegionEntry RegionFactory.addAllRegions
Create/Dissolve Composite	Not implemented.
Add Instrument FOV	Firefly GUI allows adding foot prints/FOVs and markers to images.
Add template	Not implemented.
Edit region (Change a region's color, width, line style, font; Centroid a region; Move regions to Front or Back)	Not implemented for the regions loaded from a region file (but Firefly can allow color or symbol change to some drawing components, say FOVs, ruler, etc. Firefly has potential to change other properties like line style and font.)
Select a region Select all regions Select none Invert Selection	Firefly GUI can allow highlite/unhighlite and select/deselect a region; API: dispatchSelectRegion
Delete Selected Regions; Delete All Regions	API functions: dispatchRemoveRegionEntry dispatchDeleteRegionLayer
Get region information; List regions	Not implemented.
Save regions	Firefly GUI saves all the regions on an image in a region file or saves the image with regions to a PNG file.

More Region properties to control the followings: Show Show Text Auto Plot 2D Auto Plot 3D Auto Plot Statistics Auto Centroid Centroid Parameters…	Not implemented.