Skyalert Data I/O

Presenting on behalf of the large team of members
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St. Thomas College,
Kozhencheri
What is Skyalert?

- A **web-based event broker**, allowing subscription so that events are delivered in near-real time.

- A **web-based publishing system**, so that authenticated users can inject events that may be delivered to others.

- An **event repository**, storing all events that come through the broker, and allowing bulk queries and drill-down.

- An **interoperable event broker**, conforming to international (IVOA) standards for event services.

- Allow authorised users to create **streams** – define events of interest.

- Storing a collection of data relating to an event called **portfolio** through a citation mechanism.

- Use **annotators** to analyse existing portfolios and add new data to it.

- Open-source software to **allow local implementations** as well as the web-based application.
How to get data?

Skyalert.org

Recent Events

In the picture below, time is measured with "right now" at the right. Ages of recent events -- the last 200 received -- are shown by stream. Click on an event to bring up a new window with detailed portfolio.

About Skyalert

SkyAlert collects and distributes astronomical events in near-real-time. Each event belongs to a stream of events that come from a common source, with a common vocabulary of parameters for each event. You can browse event streams and the events themselves, as the links below. You can set up "alerts" which decide which events you find interesting, that comes with an Atom feed of those that pass the selection. You get only the events you want -- no more, no less.

- Skyalert News
- Feeds of interesting astronomical events
- Browse event streams that skyalert is monitoring
- Recent events as a table
- Build a custom feed
- Get email when an interesting event occurs
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- Validate an VOEvent or author an event
- Resolve an event identifier (VOFN)
- Guide to Running Skyalert (PDF)
- Install your own Skyalert
- Contact us at help@skyalert.org

Browse Event Streams | Browse Skyalert Feeds | my Feeds and Alerts
You can view it online
Can I get it as a table?
## Portfolios

This page lists event portfolios whose first event is from this stream.

### All portfolios

Click on the column header to sort. Table rows with gray background represent 'test' events that do not represent anything in the sky.

<table>
<thead>
<tr>
<th>detail meta.link</th>
<th>NORN meta.id</th>
<th>RA pos.eq.m (deg)</th>
<th>Dec pos.eq.dec (deg)</th>
<th>ISO time epoch</th>
</tr>
</thead>
<tbody>
<tr>
<td>detail</td>
<td>1110171090534127312</td>
<td>146.9028</td>
<td>10.63126</td>
<td>2011-10-17T12:04:18</td>
</tr>
<tr>
<td>detail</td>
<td>1110171203841038451</td>
<td>122.19251</td>
<td>31.51883</td>
<td>2011-10-17T11:03:08</td>
</tr>
<tr>
<td>detail</td>
<td>1110171320414383866</td>
<td>130.87556</td>
<td>33.72479</td>
<td>2011-10-17T11:00:37</td>
</tr>
<tr>
<td>detail</td>
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<td>52.82682</td>
<td>-4.47526</td>
<td>2011-10-17T08:20:07</td>
</tr>
<tr>
<td>detail</td>
<td>11101712301141424208</td>
<td>30.84585</td>
<td>24.32598</td>
<td>2011-10-17T08:21:09</td>
</tr>
<tr>
<td>detail</td>
<td>11101712301141424222</td>
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<td>24.32202</td>
<td>2011-10-17T08:21:09</td>
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<tr>
<td>detail</td>
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<td>31.01292</td>
<td>24.17724</td>
<td>2011-10-17T08:21:09</td>
</tr>
<tr>
<td>detail</td>
<td>111017120104112838</td>
<td>28.74408</td>
<td>20.73849</td>
<td>2011-10-17T08:17:10</td>
</tr>
<tr>
<td>detail</td>
<td>1110170040134212551</td>
<td>33.93879</td>
<td>-3.87201</td>
<td>2011-10-17T06:27:43</td>
</tr>
<tr>
<td>detail</td>
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<td>33.94067</td>
<td>-3.87003</td>
<td>2011-10-17T06:27:43</td>
</tr>
<tr>
<td>detail</td>
<td>111017101014102330</td>
<td>38.79836</td>
<td>0.18239</td>
<td>2011-10-17T05:44:31</td>
</tr>
<tr>
<td>detail</td>
<td>111017101014102385</td>
<td>30.56305</td>
<td>4.79931</td>
<td>2011-10-17T04:59:43</td>
</tr>
<tr>
<td>detail</td>
<td>1110171150094128930</td>
<td>23.6982</td>
<td>16.39967</td>
<td>2011-10-17T04:58:56</td>
</tr>
<tr>
<td>detail</td>
<td>1110170181134103889</td>
<td>329.0932</td>
<td>-19.45125</td>
<td>2011-10-17T04:04:59</td>
</tr>
<tr>
<td>detail</td>
<td>1110170941194139877</td>
<td>334.23308</td>
<td>-3.26527</td>
<td>2011-10-17T02:30:27</td>
</tr>
<tr>
<td>detail</td>
<td>BAT_3GB_Pos_505646-011</td>
<td>153.806</td>
<td>27.4756</td>
<td>2011-10-16T18:37:04:52</td>
</tr>
</tbody>
</table>
How to set an alert stream?

**Recent Events**

In the picture below, time is measured with "right now" at the right. Ages of recent events -- the last 200 received -- are shown by stream. Click on an event to bring up a new window with detailed portfolio.

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How to set an alert stream?

Sample VOEvent for Skyalert
The example below is a typical VOEvent. If you would like to construct your own, with your own information, please look carefully, especially the yellow boxes. The XML version is available here.

Please be sure to mouse-over the yellow highlights as these have instructive text.
How to set an alert request?

Alert Detail

for the alert named newCRTS

Primary Stream: CRTS (ivo://ivo caliente voeventnet/cato)

Name of Alert: newCRTS

Active alert?: 1

Action type: alert_email

Action detail: nwp@iisc.ac.in

Private alert?: 1

What can I do here?

You can create a decision trigger in the box below, which is an expression that evaluates to true or false, for example: `SWIFT("Dec") > 70`, which is true only for events from the SWIFT stream whose declination is greater than 70. When an event comes in, it is run immediately against your trigger, and if it passes, then the action is executed. Currently the only action available is sending email ("alert_email"). Another decision formula might be `CAO11["First Detection parms"]["magnitude"] < 18` to select by magnitude.

How to make an alert:

- **Step 1:** Give your alert a name, and make sure the email address is correct. Click the `Save` button.
- **Step 2:** Change the default trigger ("True") to the criterion you want. Clicking on the red dots by names of parameters will insert the correct code. Make sure your expression is a boolean expression.
- **Step 3:** Click "Save"
- **Step 4:** Click on "See Events" to see which historical events satisfy your trigger.

Trigger Expression

```
True
```

This button first checks the syntax of the expression above, then saves the whole alert. The form of the trigger is python syntax. Each event type (stream) is given a dictionary of its parameters. The 'math' and 'string' libraries are also available in trigger construction.
How to set an alert request?

Step 3: Click to save → Save

This button lets you see past events that would satisfy your trigger; if executed now.
Note you must “Save” the alert with the button above before using this function.
Step 4: Click to see past events that satisfy this alert → See past events

Primary Stream: CRTS

Click on a red dot to insert that parameter into your Decision Formula above. When you are happy with the formula, click Save.

<table>
<thead>
<tr>
<th>group</th>
<th>Name</th>
<th>UCD</th>
<th>data Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA</td>
<td>pos.eq.ra</td>
<td>float</td>
<td></td>
<td>Right Ascension of event</td>
</tr>
<tr>
<td>Dec</td>
<td>pos.eq.dec</td>
<td>float</td>
<td></td>
<td>Declination of event</td>
</tr>
<tr>
<td>positionalError</td>
<td>stat.error,pos.eq</td>
<td>float</td>
<td></td>
<td>Positional error of event</td>
</tr>
<tr>
<td>isoTime</td>
<td>time.epoch</td>
<td>float</td>
<td></td>
<td>Time (UTC) of event</td>
</tr>
<tr>
<td>muTime</td>
<td>time.epoch</td>
<td>float</td>
<td></td>
<td>Time (MJD) of event</td>
</tr>
<tr>
<td>role</td>
<td>meta.code</td>
<td></td>
<td></td>
<td>Is this event test or observation</td>
</tr>
</tbody>
</table>

- `contactName`: Contact name
- `contactEmail`: Contact email
- `contactPhone`: Contact phone

 CRTS Specific Parameters

<table>
<thead>
<tr>
<th>Asteroid params</th>
<th>Aperture reject</th>
<th>stat.probability</th>
<th>float</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asteroid params</td>
<td>Apparent motion</td>
<td>pos,pm</td>
<td>float</td>
</tr>
<tr>
<td>Asteroid params</td>
<td>CSSID</td>
<td>meta.id</td>
<td>string</td>
</tr>
<tr>
<td>Asteroid params</td>
<td>Epoch Inclination</td>
<td>pos, posAng</td>
<td>float</td>
</tr>
<tr>
<td>Asteroid params</td>
<td>Epoch Latitude</td>
<td>pos, ecliptic.lat</td>
<td>float</td>
</tr>
<tr>
<td>Asteroid params</td>
<td>Epoch Longitude</td>
<td>pos, ecliptic.lon</td>
<td>float</td>
</tr>
<tr>
<td>Asteroid params</td>
<td>size</td>
<td>meta.size</td>
<td>float</td>
</tr>
<tr>
<td>Asteroid params</td>
<td>Inner motion</td>
<td>pos,pm</td>
<td>float</td>
</tr>
<tr>
<td>Asteroid params</td>
<td>Known Asteroid</td>
<td>stat.probability</td>
<td>float</td>
</tr>
<tr>
<td>Asteroid params</td>
<td>Motion uncertainty Dec</td>
<td>stat.error.sys</td>
<td>float</td>
</tr>
<tr>
<td>Asteroid params</td>
<td>Motion uncertainty RA</td>
<td>stat.error.sys</td>
<td>float</td>
</tr>
<tr>
<td>Asteroid params</td>
<td>New Asteroid</td>
<td>meta.anomaly</td>
<td>float</td>
</tr>
<tr>
<td>Asteroid params</td>
<td>Opposition angle</td>
<td>pos, posAng</td>
<td>float</td>
</tr>
<tr>
<td>Asteroid params</td>
<td>Other motion</td>
<td>pos,pm</td>
<td>float</td>
</tr>
</tbody>
</table>
How to set an alert request?
Getting data

```python
#!/usr/bin/python
import simplejson
import sys
import urllib

# CRTS and CRTSCircular["First"]["eventClass"] == "Supernova"
if (len(sys.argv) < 2):
    query = "353"
else:
    query = sys.argv[1]
url = "http://skyalert.org/events/jtable/%s/" % query
fout = open("CRTS_tmp.list", "w")
while 1:
    f = urllib.urlopen(url)
    result = f.read()
    jsonresult = simplejson.loads(result)
    list = jsonresult["list"]
    print "Found %d portfolios" % len(list)
    for pf in list:
        ivorn = pf[1]
        tok = ivorn.split('#')
        # print tok[1]
        fout.write(tok[1]+"\n")
    url = jsonresult["next"]
    if url == "finished": break
print "Finished"
fout.close()
```
Publish VOEvents

How to Publish VOEvents to Skyalert

VOEvents are XML documents containing information about astronomical events. More precisely, it is a report about an observation of an astronomical event. Some examples of astronomical events are Gamma Ray Bursts, Supernovae, Microlensing events, or variable star outbursts. VOEvents are structured reports about such things that can be sent to Skyalert. Further, there is an inference that rapid follow-up observation is what is needed. The Skyalert system connects producers with consumers, gives each event a portfolio and a web page, and allows complete automation of decision.

There is a lot of information at http://howweworks.universe.org, including What is VOEvent? and Event Handling with SkyAlert.

This document assumes that you have a source of events now or in the future, and want to load them into a Skyalert server.

Before sending events, we need to know the meaning of the numbers and strings in your events. They are called Params.

Step 1: Design a Stream

Think carefully about what data you want to expose in the event. Some parameters are numbers and strings, and can be used to make decisions; some parameters are URLs that link to complex data objects (e.g. FITS). To help you design a stream:

- Look at the existing event streams at skyalert.org (GOLE, Catalina, Swift, etc.). At the bottom of each stream detail page is a sample event from that stream.
- Look at the annotated sample VOEvent. All the gray text is boilerplate, the essentials are highlighted in yellow. Make sure you move the mouse over each highlight to see the explanation.
- Work with the Skyalert Team (write to help@skyalert.org) to create a sample event that shows your parameters, each with description, unit, semantic descriptor (UCD), data type (int, float, string).
- You can include complex data objects with a Param whose value is a URL link. In this case, make sure the UCD of that Param is meta:code, url so that Skyalert knows it's a URL.
- Use the VOEvent validation tool to test your ideas and produce a valid VOEvent. You can also write to help@skyalert.org who can help you build a valid VOEvent that has your science content.

Step 2: Upload your stream

This will be done by Skyalert staff (write to help@skyalert.org), using the agreed sample event, which has all the metadata. You will be asked to check that your stream appears correctly in the web interface. If you are running your own Skyalert system, you can login as an account with staff status.

Step 3: Test Events

Build code that can create events from your event stream; it can of course be done with print statements, or with the VOEventLib python library. It is VERY IMPORTANT that test events be labeled role="test" in the first element of the VOEvent, so they are not mixed with real astronomy.

Step 4: Send events to Skyalert

There are two ways to ingest events to Skyalert:

- Local ingestion: You need 'staff' status in the Skyalert system in order to do this, and to log in to the server, then execute: python loader.py file <event.xml>, where the last argument is a file name for the VOEvent.
- Global ingestion: You can send events by arrangement to a remote Skyalert server, using the VOEvent submission tool; for security, there must be the short-name of the stream from which the event comes, and the username and password of the owner of this stream. This can be done from a program as an HTTP POST: see code snippets here.

Step 5: Annotators

You can now build rules against your stream that use the Params to make decisions and take actions. These can be, for example fetching archival data, follow up with a robotic telescope, or messaging (sending email). Here is a sample of an annotator to show the structure.
Publish VOEvents

VOEventLib

version 0.3
Roy Williams and Dave Kuhlmann
2011 April 23

VOEventLib is a reference implementation and parser for the VOEvent2 XML specification, now under discussion at the IVOA. For more information about VOEvent, see VOEvent in wikipedia, or read the book Hotwiring the Transient Universe or the draft specification of VOEvent 2.0. There is also the Skyalert web application for publishing and dissemination of real-time astronomical events.

The get and set methods of VOEventLib are all defined in the detailed documentation.

The software is available as:

http://lib.skyalert.org/VOEventLib/VOEventLib-0.3.tar.gz

Then unpack the archive and install as usual:

```
then run and modify the example programs.
```

The contents of the lib directory is:

- README.txt
- setup.py
- VOEventLib
  - VOEvent.py Main module, autogenerated from schema, documented here
  - Util.py Utility and helper methods, documented here
- doc
  - index.html Documentation for all the methods
  - VOEvent.html VOEvent2 draft specification
- examples: Example code for VOEventLib
  - README
  - buildVOEvent.py Create an event from scratch
  - format_to_html.py Make an HTML representation of an event
  - modify.py Modify an existing event
Publish VOEvents

Event checking and authoring form

Use this form to enter a VOEvent. With no authentication, it can be used for a syntax check, testing XML validation. If authenticated, it can be used to author events: the owner of the stream of the event must be logged in, or supply username/password; also the stream name must match the event. For more information on building VOEvents, see here.

- Validate XML VOEvent syntax against the schemas
- Author this event to my stream
- Run Alerts on this event when submitted

Username: sajeethphilip
Password: ********
Streamname:

Paste in the VOEvent below, and click the button. Use the selector above for some sample templates.

Click to Go

( Plais text output)