Alertsim - Serbian contribution to the LSST

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Belgrade group

- •We got involved fairly -early interest in '09/'10
- MOA's for 4 Pl in 2013
- Aleksić (astronomy);
- in astronomy + VO and astroinformatics



 Veljko Vujčić (CS – CEP/esper); Miodrag Malović (EE, Walsh, period-shape detection); Yana Khusanova (astromundus) obs sofi; Vladimir Srećković (databases&services); Jovan

•Background stellar atmospheres, stellar flares, use of HPC

LSST movie

'home/darko/eniama 1189 n25 n3001.mp4 group





Thx to Lynne Jones and Peter Yoachim – LSST Simulation

AlertSim

- •Alerts Level 1 (nightly) data products
- Anything that changes on sky goes in alert
- Release 60 seconds after the visit to the world wide community
- Expect many alerts (10k/visit)
- 2-4 public brokers(due to bandwidth constraints)
- Simulator necessary for validating & testing brokers



ta products ky goes in alert he visit to the world wide

sit) andwidth constraints) idating & testing brokers ^E



AlertSim - requirements

- Generating realistic streams of LSST transient alerts
- •Simulating various failures or exceptional/extreme operations modes: +Y
 - -Unexpectedly large numbers of spurious detections
 - -Large number of detections (dense fields)
 - -Disruptions of event stream
 - -Corruption of event stream
 - -Network connectivity interruptions



s of LSST transient alerts or exceptional/extreme

rious detections fields)



AlertSim - requirements

- Provide facilities to ease troubleshooting problems with broker end-points
- configurable, automated and capable of keeping provenance
- Written following LSST software standards, conventions and development processes and executable on LSST Data Acess Center hardware

Developed in coordination with capabilities provided by LSST Simulations group and DM team



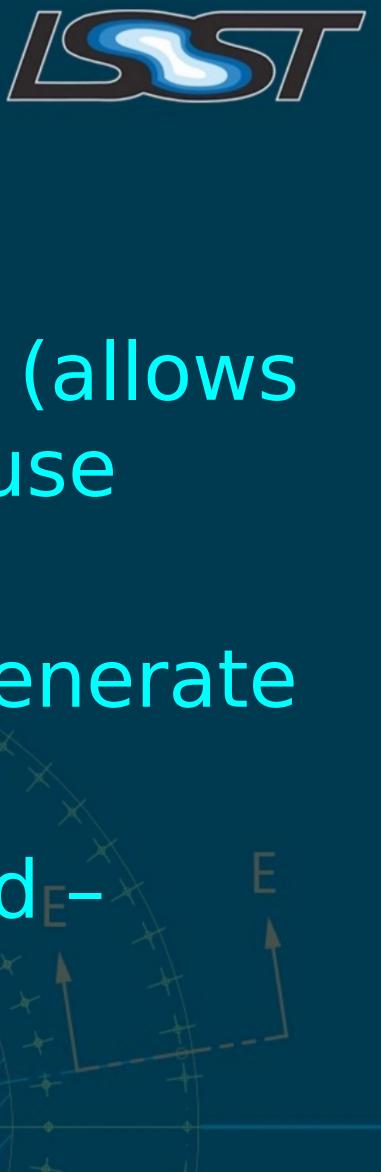


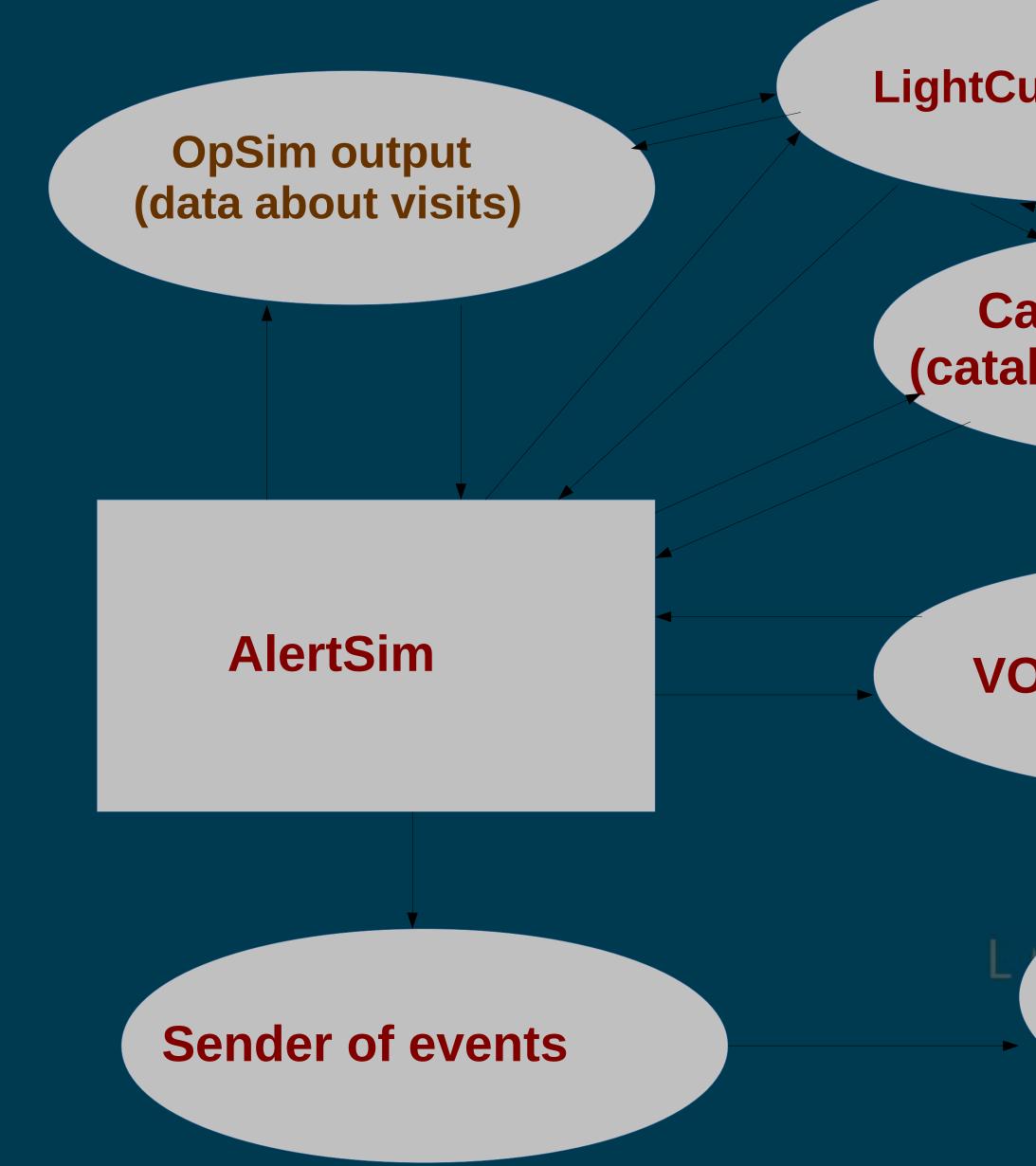




AlertSim - prototype

- First 'alert' end 2014
- Python based using low level functions from socket (allows) not only TCP/IP but multicast or similar – idea is to use streaming capabilities for alert stream)
- Query to opsim output and catsim database and generate alerts and DIASources
- Pack alerts to VOEvent (requirement about standard could be changed)
- VOEvent XML shema... very impractical
- Make it a service...







LightCurve generator

CatSim query (catalog of objects)

DIASource generator

VOEvent generator

DIAObject generator

Outer world Brokers (esper, Antares...)

AlertSim - service

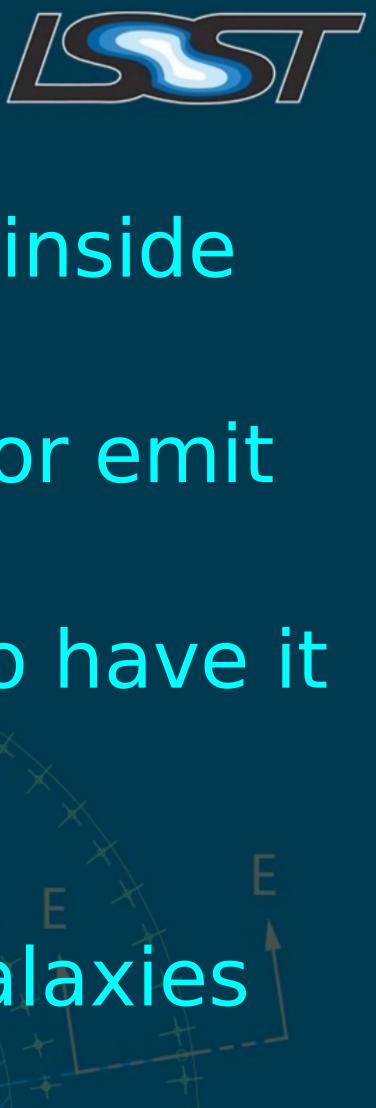
- Basic idea is to provide brokers (Antares etc.) heads up playground
- Django based (experience with VAMDC!)
- Easily adaptable for machine queries (requests)!
- Simple form to fill to choose: -ip address and port
 - -Different local or remote opsim databases
 - -Diferent catsim tables
 - -Parameters for querying databases



• (we had to calculate too many light curves for Antares...)

AlertSim - service

- catsim (slow, problems with single magnitude...)
- complete diasources)
- as a service??)
- For how long we want service to run?
- &sso in the future



 History calculated from opsim and variability mixin inside • Pack history(ical light curves) in diasource chunks (or emit

Necessary connection to UW databases (is it wise to have it

Note that we connect mainly to the stellar stuff – galaxies

AlertSim - problems

- Lot of hacks to achieve service problems with environment variables end setting up eups from outside the shell
- •Queries may return huge outputs
- should we make lcg a separate package? Problems with distribution sky for particular types of objects....
- •Older routers may cut messages(need to repeat or divide)
- Proxy problems ports are closed
- •VOEvent/XML does not like mages
- Possible to encode images in XML but consider separate mechanism
- (problems are good force us to think outside of the box)





AlertSim and DM end-to-end simulations

- Connection with results of end-to-end simulations
- (using phosim or galsim and some level of noise)
- other images)
- VOEvent format and forward it further...



Idea is to generate simulated images out of what is in catsim

Process those images with LSST Stack (imdiff on simulated or

 DM Stack should in (not too distant) future become capable of generating alerts or at least DIASources for detected features If DMstack sends us DIASource(s) we are able to pack it in



AlertSim - todo

- Cutouts i.e. force galsim to do small patches
- Esper playing with aggregates and other functionalities (control of what is happening)
- Collect engineering simulated data (through opsim or otherwise) and use in decision making process or at least simulate and test several byte quality stamp??
- Detecting readiness of clients (at the moment we ignore just emit)
- Paralelization (brute force vs. clever)
- Build DSL (and classifiers) on top of esper which will be understandable to astronomers and make their life easy in LSST era



- Control parameters
- •We use RRLyrae/allstars
- sending and receiving xml
- Esper
- "-ip 147.91.240.29 --no header

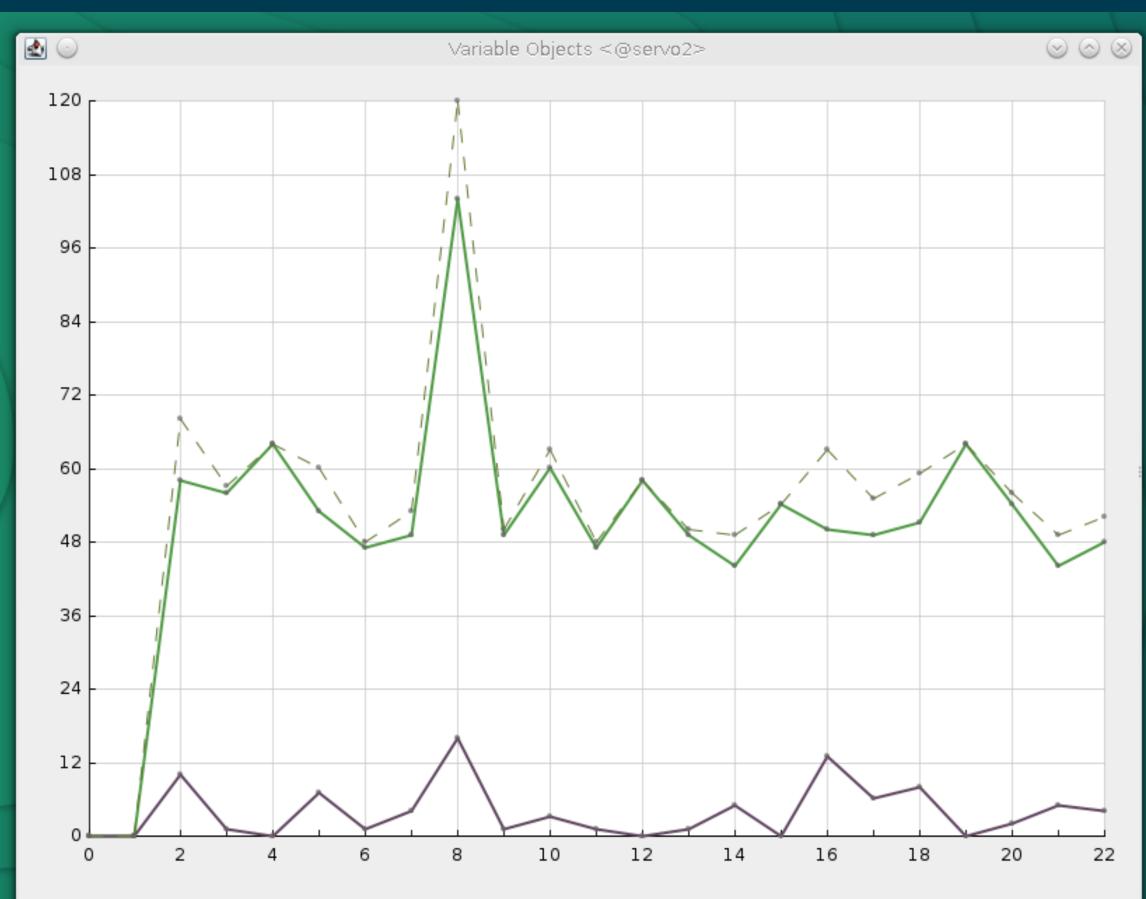
AlertSim – demo of service

•python example_parser.py -c "allstars" -r "1.75" -oc "(night between 21 and 210 and fieldra between 1.3 and 1.5 and fielddec between -0.32 and -0.01 and filter like 'r')" =cc "rmag between 10 and 30 and varParamStr not like 'None'





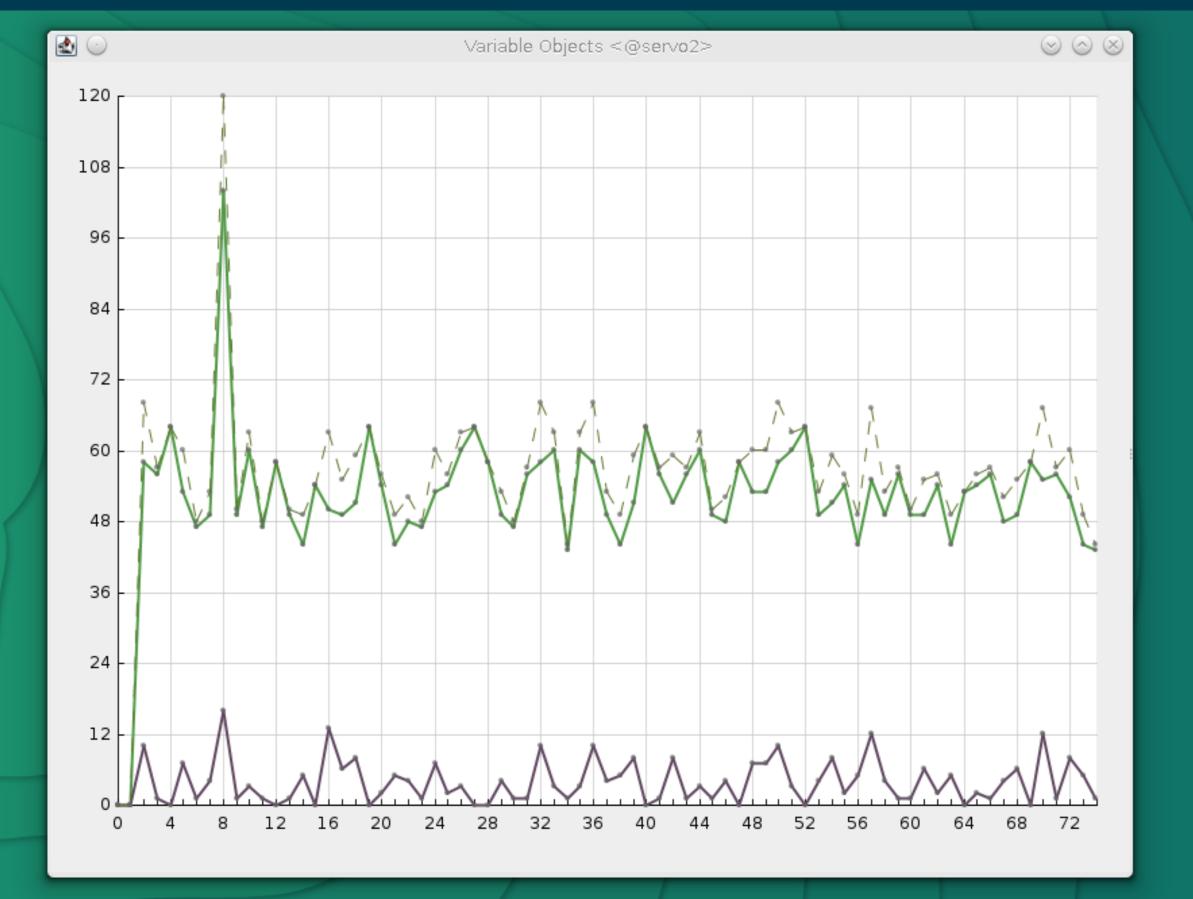
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ename":"rrly_lc/RRab/4133965_ MethodName":"applyRRly"} [java] 22:24:33,562 INFC [java] 22:24:33,562 INFC	_per.txt", "tStartMjd":3.335797781497854e+004]) EVOEventListener] Lyrae!) EVOEventListener] true_positive! ra: 1.4144	F, "var
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ename":"rrly_lc/RRab/4133965_ MethodName":"applyRRly"} [java] 22:24:33,562 INFC [java] 22:24:33,562 INFC [java] 22:24:33,562 INFC [java] TPCount: 3942	_per.txt", "tStartMjd":3.335797781497854e+004]) EVOEventListener] Lyrae!) EVOEventListener] true_positive! ra: 1.4144 L FPCount: 0 FNCount: 307	F, "var 180 dec
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<pre>ename":"rrly_lc/RRab/4133965_ MethodName":"applyRRly"} [java] 22:24:33,562 INF([java] 22:24:33,562 INF([java] 22:24:33,562 INF([java] 22:24:33,562 INF([java] TPCount: 3942 [java] Completeness: 0.9 ename":"rrly_lc/RRc/2779194_p ethodName":"applyRRly"} [java] 22:24:36,615 INF([java] 22:24:36,615 INF([java] 22:24:36,615 INF([java] TPCount: 3943 [java] TPCount: 3943 [java] Completeness: 0.9 ename":"rrly_lc/RRab/1652999_ MethodName":"applyRRly"} [java] 22:24:36,658 INF([java] 22:24:36,658 INF</pre>	<pre>_per.txt", "tStartMjd":3.335797781497854e+0043) [V0EventListener] Lyrae!) [V0EventListener] true_positive! ra: 1.4144 i FPCount: 0 FNCount: 307 927748 Contamination: 0.000000 {"pars" ber.txt", "tStartMjd":3.364375507515414e+0043,) [V0EventListener] Lyrae!) [V0EventListener] true_positive! ra: 1.38314 FPCount: 0 FNCount: 307 927765 Contamination: 0.000000 {"pars" _per.txt", "tStartMjd":3.350036413919062e+0043) [V0EventListener] Lyrae!) [V0EventListener] Lyrae!</pre>	480 dec 180 dec 13 dec 13 dec 13 dec
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<pre>ename":"rrly_lc/RRab/4133965_ MethodName":"applyRRly"} [java] 22:24:33,562 INF([java] 22:24:33,562 INF([java] 22:24:33,562 INF([java] TPCount: 3942 [java] TPCount: 3942 [java] Completeness: 0.9 ename":"rrly_lc/RRc/2779194_p ethodName":"applyRRly"} [java] 22:24:36,615 INF([java] 22:24:36,615 INF([java] 22:24:36,615 INF([java] TPCount: 3943 [java] TPCount: 3943 [java] Completeness: 0.9 ename":"rrly_lc/RRab/1652999_ MethodName":"applyRRly"} [java] 22:24:36,658 INF([java] 22:24:36,658 INF([java] 22:24:36,658 INF([java] 22:24:36,658 INF([java] TPCount: 3944 [java] TPCount: 3944 [java] TPCount: 3944 [java] TPCount: 3944 [java] Completeness: 0.9 ename":"rrly_lc/RRab/2369144_</pre>	<pre>_per.txt", "tStartMjd":3.335797781497854e+004]) [V0EventListener] Lyrae!) [V0EventListener] true_positive! ra: 1.4144 FPCount: 0 FNCount: 307 927748 Contamination: 0.000000 {"pars" ber.txt", "tStartMjd":3.364375507515414e+004},) [V0EventListener] Lyrae!) [V0EventListener] true_positive! ra: 1.3831 4 FPCount: 0 FNCount: 307 927765 Contamination: 0.000000 {"pars" _per.txt", "tStartMjd":3.350036413919062e+004}) [V0EventListener] Lyrae!) [V0EventListener] true_positive! ra: 1.4070 7 FPCount: 0 FNCount: 307</pre>	<pre>*, "var 480 dec ':{"fil , "varM 13 dec ':{"fil *, "var 50 dec ':{"fil</pre>
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🔆 🖸	darko@servo9.aob.rs:	~ <5>
darko@servo9;~> s Password: Password: Read from socket	ssh servo3 failed: Connection reset by pe	er
darko@servo9:~> s Password:	ssh servo3	
mcastbusiness.net	· · · · · · · · · · · · · · · · · · ·	
	ed login attempt since the last Feb 23 19:56:17 2016 from 75-14	
Have a lot of fur darko@servo3:~> s teway.astro.washi	ssh -L 51433:fatboy-private.phy ington.edu	ys.washington.edu:1
	reaug in use _listener: cannot listen to po t local forwarding.	ort: 51433
Last login: Mon F	Feb 22 02:09:10 2016 from servo 43 ~]\$ Write failed: Broken pip	



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EMIT VOEVENT STREAM FROM ALERTSIM

Opsim table:

output_opsim3_61

Catsim table:

All stars

Opsim constraint:

Ira between 1.3 and 1.5 and fielddec between -0.32 and -0

Catsim constraint:

rmag between 10 and 30 and varParamStr not like 'None'

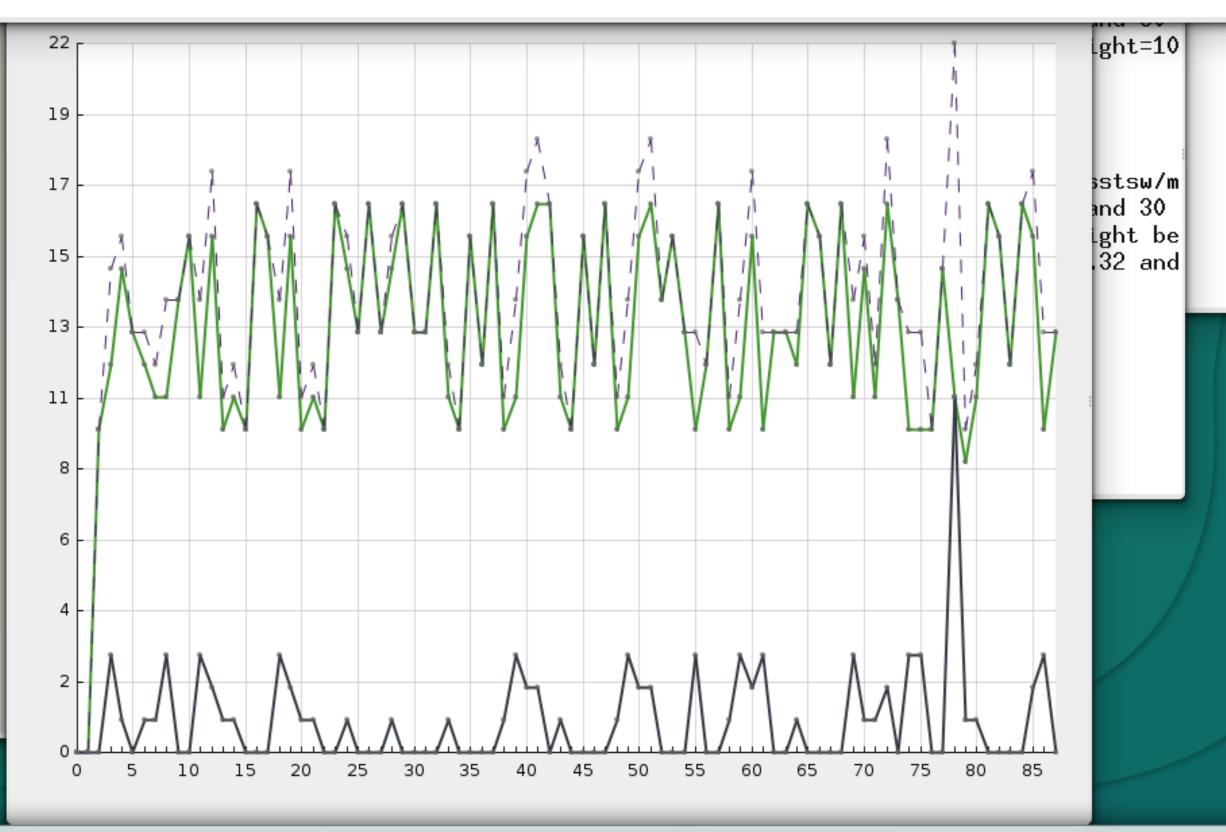
Radius:

1.75

Maintained by Darko Jevremović. Questions or Comments? Click here to send an email.



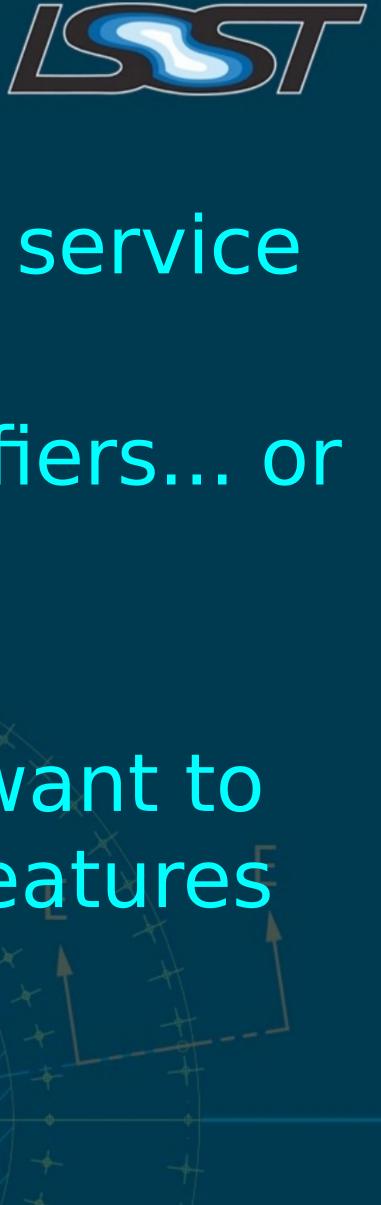
	veljko@servo2:space/voevent-test
[java]	
[java]	<position2d></position2d>
[java]	<value2></value2>
[java]	<c1>1.290246</c1> RA
[java]	<c2>-0.132507</c2> Dec
[java]	
[java]	<error2radius>0.010000</error2radius>
[java]	
[java]	<citations></citations>
[java]	<eventivorn cite="followup">ivo:lsst.org/resource#89474</eventivorn>
[java]	<eventivorn cite="followup">ivo:lsst.org/resource#89475</eventivorn>
[java]	
[java]	<description></description>
[java]	
[java]	
[java]	10:40:20,770 INFO [VOEventListener] Lyrae!



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Few things to remember

- of LSST alert stream
- students
- More functionalities will come with time
- •So talk to us -
- Complete talk recorded at
- https://www.youtube.com/watchv=mtE0BvBTXMU&feature=youtu.be



•Alertsim is(will be) capable to provide near realistic service

•Good starting point to train different brokers, classifiers... or

if you want to use the service or would like to see some specific features