Worldwide service for parametric transient localization using open GW data for multi-messenger community

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Service concept

The service provides a parametrised intersection of the skymap with the sky area visible from an observatory of interest as Multi-Order Coverage (MOC) map.
ET case

- average rate ~1.8 event/min alerts number should rarely exceed 6 events/min
- given the anticipated merger alert, we can assume >>10 updates per event
- how many updates per event we can expect?

Worse case prediction: 32 updates/min (assuming 10 updates per event)
Worse case prediction: 250 updates/min (assuming 100 updates per event)

Public

Clients:
- automatic users/scripts
- higher level services e.g.:
  - customized alert channel
  - RSS feed
  - ET sky monitoring
- website interface

~50 active groups performing MM counterpart search
Server load analysis

MOC generation from HEALPix skymap

- has to be calculated after GCN for each level credibility requested
- average computation time 175ms
- can be stored and reused

Intersection between MOCs

- must be computed for each request
- this computation lasts ~1.6ms

*timing analysis were performed on the same machine

Server throughput

Single core server performance

- HEALPix2MOC conversion 5.7 operations/s
- MOC intersection 625 operations/s
- MOC area calculation 370 operations/s

Web server is not a bottleneck (may handle >100k connections/s)
Implementation sketch

GCN input daemon:
- receives automatic notifications from detectors
- updates local database
- triggers local workers for data pre-processing

Local database:
- stores arriving GCNs and corresponding skymaps
- stores preprocessed data

Web server:
- provides web service
- provides web site