Computational Cost for Stochastic GW Background Search

PyStoch* makes maps of the entire sky in different frequencies of the GW.

PyStoch Features

- Python based code.
- Dependencies: `gwpy`, `lalframes`.
- Primarily does matrix multiplications.
- Can use multi-threading.
- Scalable, Memory requirement can be tuned at the cost of (real) time.
- Works for any baseline (HL,LV,LVK etc.)

There are a few other SGWB search pipelines (e.g. isotropic). But PyStoch is the most demanding one.

Testing on

ldas-pcdev2.gw.iucaa.in

A 32 Cores (Intel Xeon Gold 6142) machine with 200 GB RAM

Intel Xeon Gold 6142

Processor clock speed	2.6GHz
# of Cores	16
# of Threads	32
Double Precision (DP) FLOPS per cycle	32
Maximum node DP GFLOP/s	**2662.4****

* https://git.ligo.org/anirban.ain/PyStoch

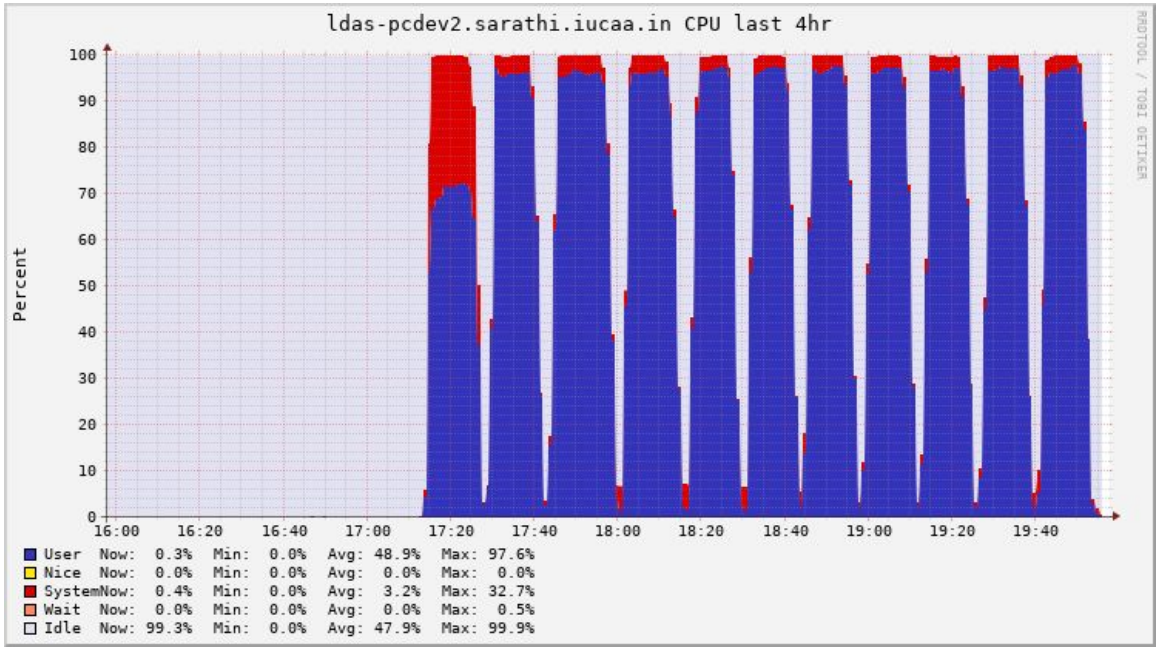
** https://arxiv.org/abs/1904.04250

All-Sky, All-Frequencies Radiometer Search (PyStoch)

O3A Analysis Cost

- O3A Data was split into 11 parts, each 2 weeks long.*
- Analysis was done in 32 threads.
- Time for an example run:
  - real 161m35.019s
  - user 3657m18.161s
  - sys 237m50.257s
- This is only HL baseline. Including Virgo will increase the time by a factor of 3.

*this is not the optimum way.



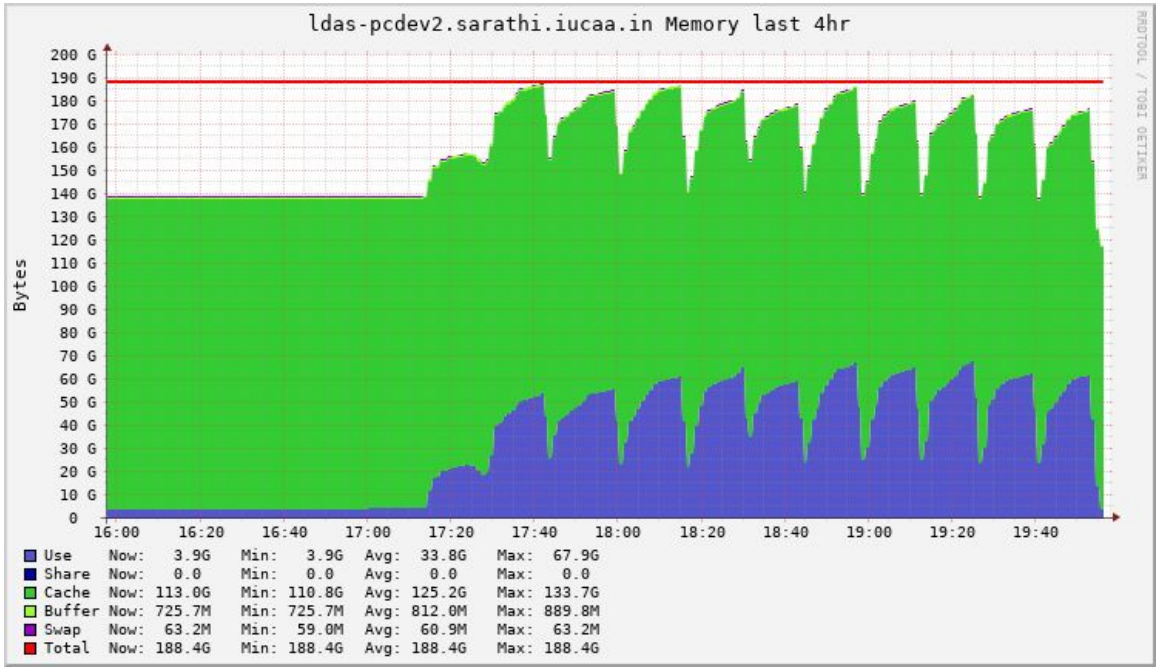
CPU Load (https://ldas-jobs.gw.iucaa.in/ganglia)

Intel Xeon Gold 6142 (2.6GHz, DP GFLOP/s 2662.4)

All-Sky, All-Frequencies Radiometer Search (PyStoch)

O3A Analysis Costs

- Memory used was within 70GB.
- Minimum Memory requirement 19GB.
- Memory requirement increases with number of threads.
- Memory requirement does not increase with baseline.
- Results are 6GB HDF5 files.
- 11 result files for 11 sets (66GB).



Memory Load (https://ldas-jobs.gw.iucaa.in/ganglia)

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