QuakeCoRE
NZ Centre for Earthquake Resilience
Te Hiranga Rū

Automated Earthquake Simulation Workflow on NeSI's New HPC

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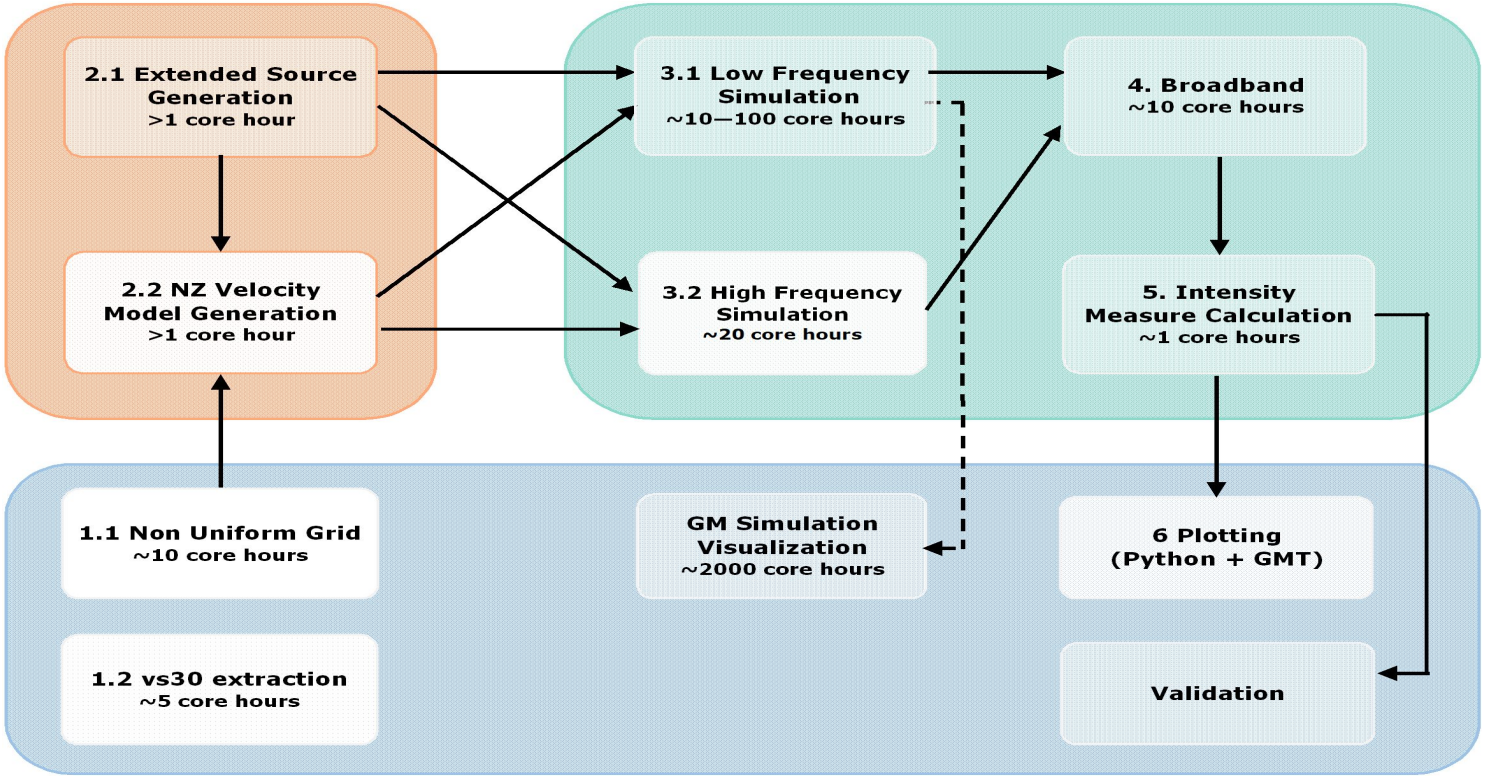
Motivation

- CyberShake NZ
  - V18p6 has around 12,000 simulations



Requirements

- Easy to use
- Light-weight
- Robust
- Extendable

Benefits

- Reduce human error.
- Increase throughput.

Main tools

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- Python
- SQLite
- Bash
- Slurm
- SSH

Automated submission

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Run on local computer (using SSH to communicate)

```
ykh22@maui01:/nesi/nobackup/nesi00213/RunFolder/Cybershake/v18p6_rerun> $gmsim/workflow/scripts/cybershake/run_queue_and_auto_submit.sh
 /nesi/nobackup/nesi00213/RunFolder/Cybershake/v18p6_rerun 10 /nesi/nobackup/nesi00213/RunFolder/Cybershake/v18p6_rerun/cybershake_conf
ig.json
ls: cannot access '/nesi/nobackup/nesi00213/RunFolder/Cybershake/v18p6_rerun/mgmt_db_queue/*': No such file or directory
python /nesi/project/nesi00213/test_multi_user/workflow/scripts/cybershake/auto_submit.py /nesi/nobackup/nesi00213/RunFolder/Cybershake
/v18p6_rerun --config /nesi/nobackup/nesi00213/RunFolder/Cybershake/v18p6_rerun/cybershake_config.json
!!!!!!!!!!!!! /nesi/nobackup/nesi00213/RunFolder/Cybershake/v18p6_rerun/cybershake_config.json
/nesi/nobackup/nesi00213/RunFolder/Cybershake/v18p6_rerun
{u'hf_seed': 0, u'stat_file_path': u'/nesi/project/nesi00213/StationInfo/non_uniform_whole_nz_with_real_stations-hh400_v18p6.ll', u'ext
ended_period': False, u'v_1d_mod': u'/nesi/project/nesi00213/VelocityModel/Mod-1D/Cant1D_v3-midQ_OneRay.1d', u'hf_dt': 0.005, u'dt': 0.
02, u'global_root': u'/nesi/project/nesi00213', u'rand_reset': True}
('hf_seed', 0)
queued task:
subbed task: []
retry_max 2
0
15
ls: cannot access '/nesi/nobackup/nesi00213/RunFolder/Cybershake/v18p6_rerun/mgmt_db_queue/*': No such file or directory
python /nesi/project/nesi00213/test_multi_user/workflow/scripts/cybershake/auto_submit.py /nesi/nobackup/nesi00213/RunFolder/Cybershake
/v18p6_rerun --config /nesi/nobackup/nesi00213/RunFolder/Cybershake/v18p6_rerun/cybershake_config.json
!!!!!!!!!!!!! /nesi/nobackup/nesi00213/RunFolder/Cybershake/v18p6_rerun/cybershake_config.json
/nesi/nobackup/nesi00213/RunFolder/Cybershake/v18p6_rerun
{u'hf_seed': 0, u'stat_file_path': u'/nesi/project/nesi00213/StationInfo/non_uniform_whole_nz_with_real_stations-hh400_v18p6.ll', u'ext
ended_period': False, u'v_1d_mod': u'/nesi/project/nesi00213/VelocityModel/Mod-1D/Cant1D_v3-midQ_OneRay.1d', u'hf_dt': 0.005, u'dt': 0.
02, u'global_root': u'/nesi/project/nesi00213', u'rand_reset': True}
('hf_seed', 0)
queued task:
subbed task: []
retry_max 2
0
15
```

Basic Steps

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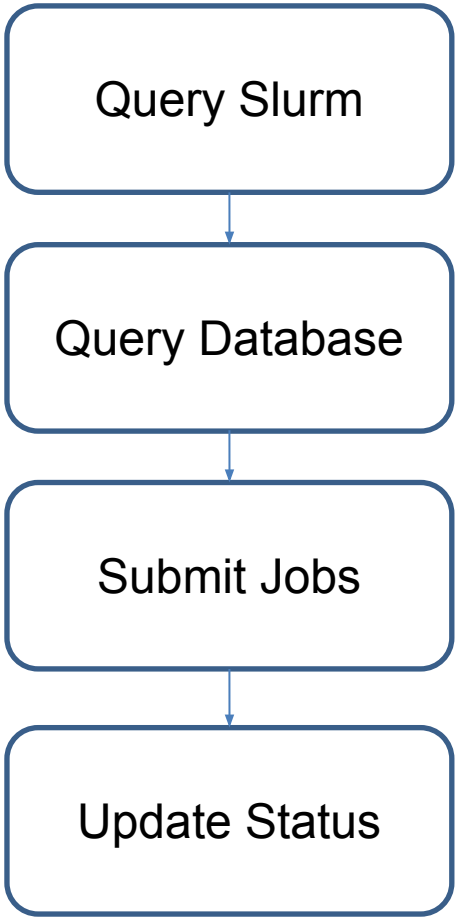
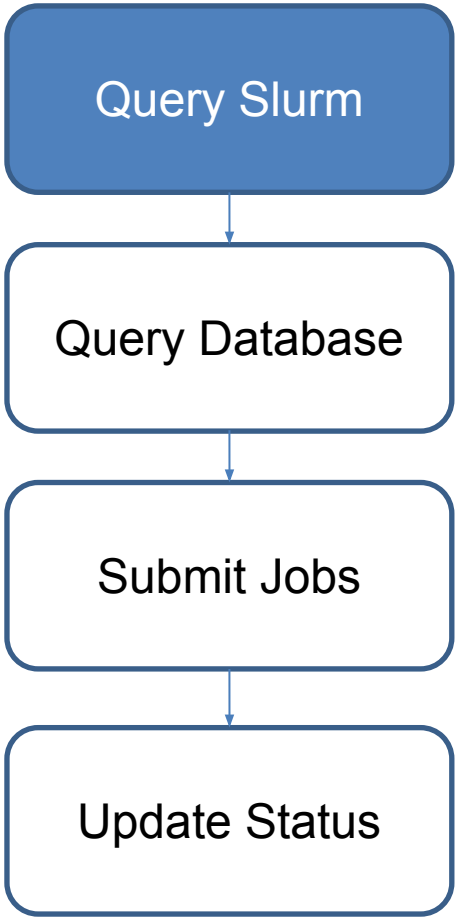
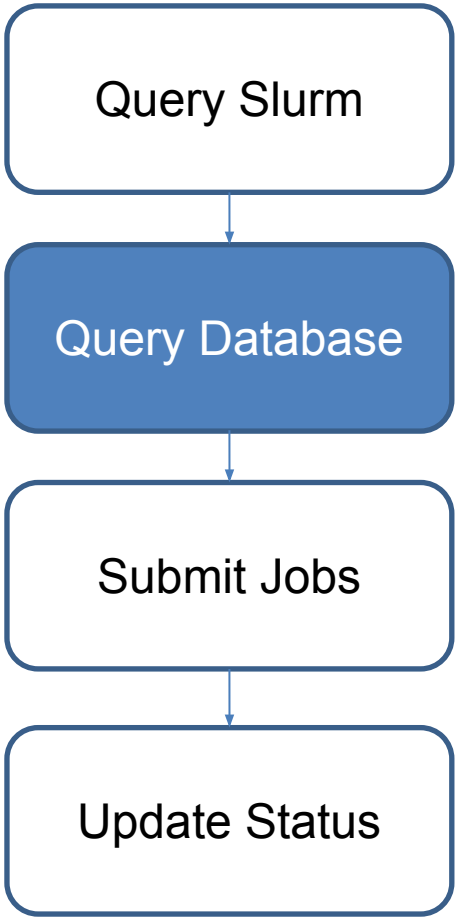


Query Slurm



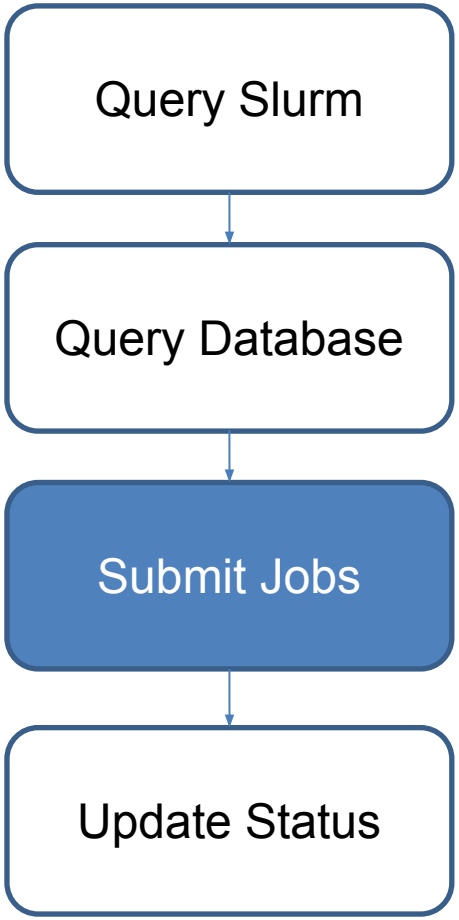
- Prevent flooding the queue
- Monitor Jobs
- Trace errors

Query Database



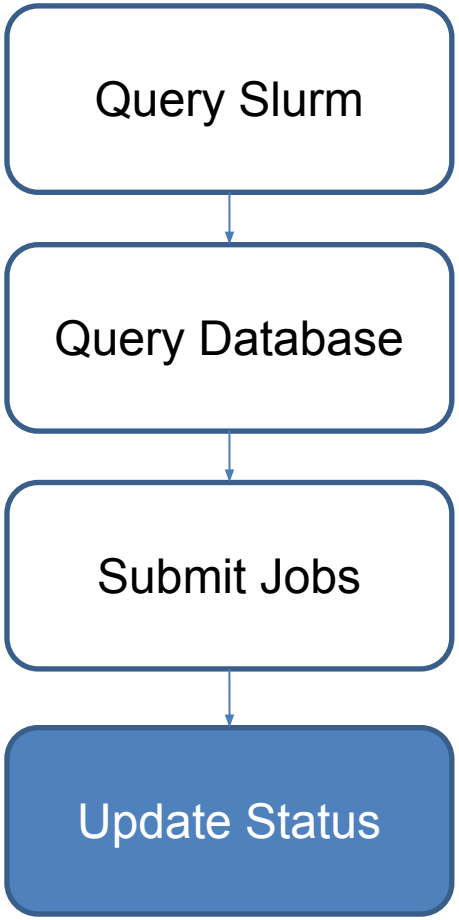
- Check for steps/jobs that are waiting
- Check for dependencies
  - E.g. Post-processing can only run when Simultaion is completed

Submitting Jobs



- Estimate the Runtime
- Determine Hardware requirements (Cores, partition etc.)

Update Status



- Automated testing
- Updates a job's status
- Log Errors

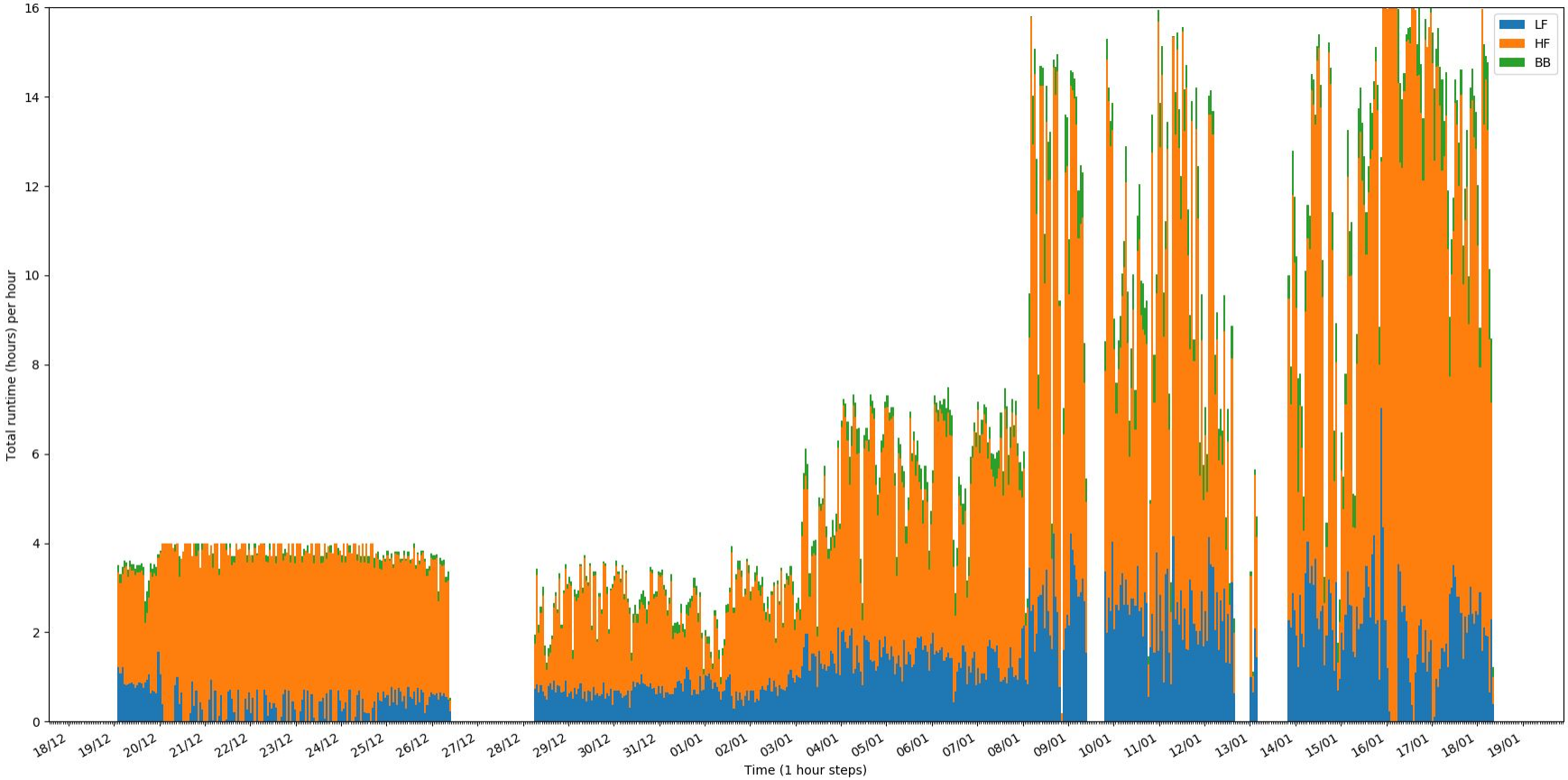
Results

- 25 times more throughput

	v17p9	v18p6
Simulations	547	12226
Run Time (Days)	35	31
Coef	15.628	394.38

Future works

- Improve throughput
- Increase Consistency



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Thank you!

www.quakecore.nz

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