
CERN

HTCondor LXBatch

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Agenda

- LSF to HTCondor Status
- Priorities & Preemption
- Multicore & Draining
- Cloud Resources
- BEER

Background

- HTCondor introduced as new production batch service
- Replaces LSF, a proprietary product, with an Open Source product
- HTCondor now has more than double the capacity of LSF
  - 100k+ cores in HTCondor
  - 33k cores in LSF share, ~17k in ATLAS T0
- We haven't really started reducing LSF in anger (yet!)

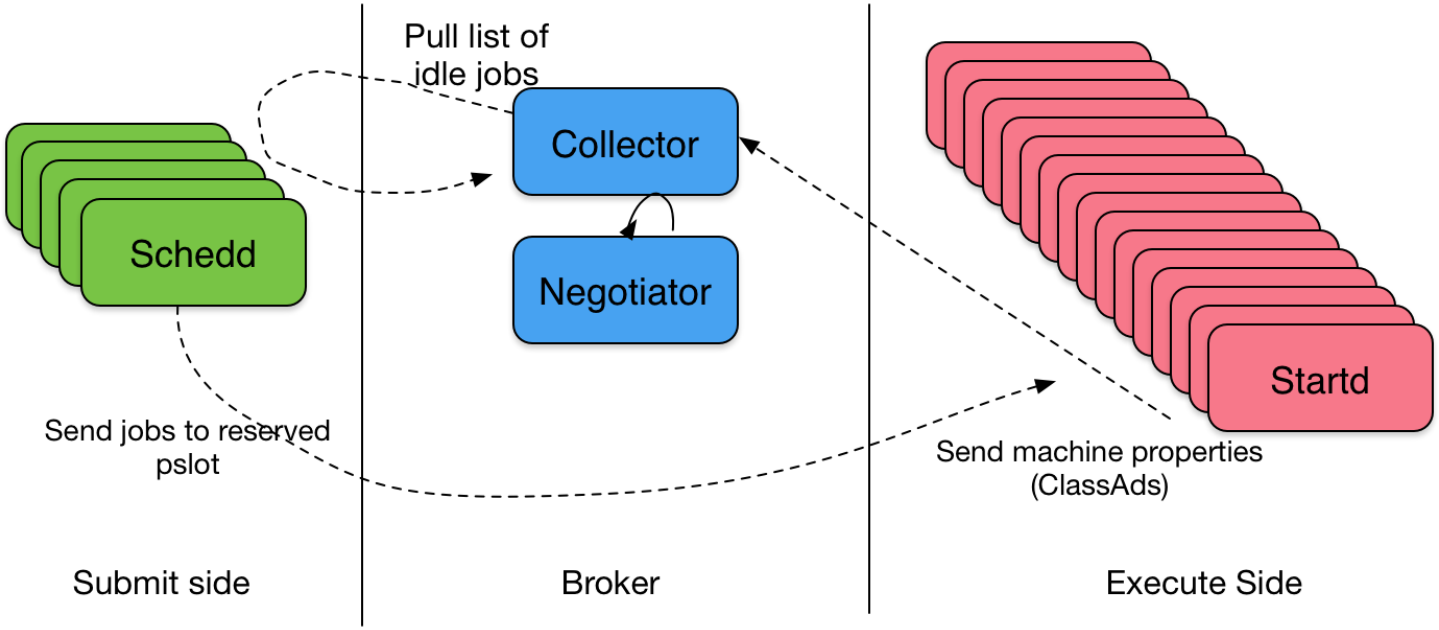
Scale

- LSF has a fixed maximum capacity of ~5k hosts
  - Due to limitation, LSF worker nodes are bigger (typically 16 core)
  - We know that “virtualisation overhead” for 16 core is ~3% whereas it’s negligible for 8 core
- HTCondor 100k+ cores with 8/10 core machines would be impossible with LSF
- CMS global pool bigger HTCondor scale, but we have different requirements (local kerberos submissions)

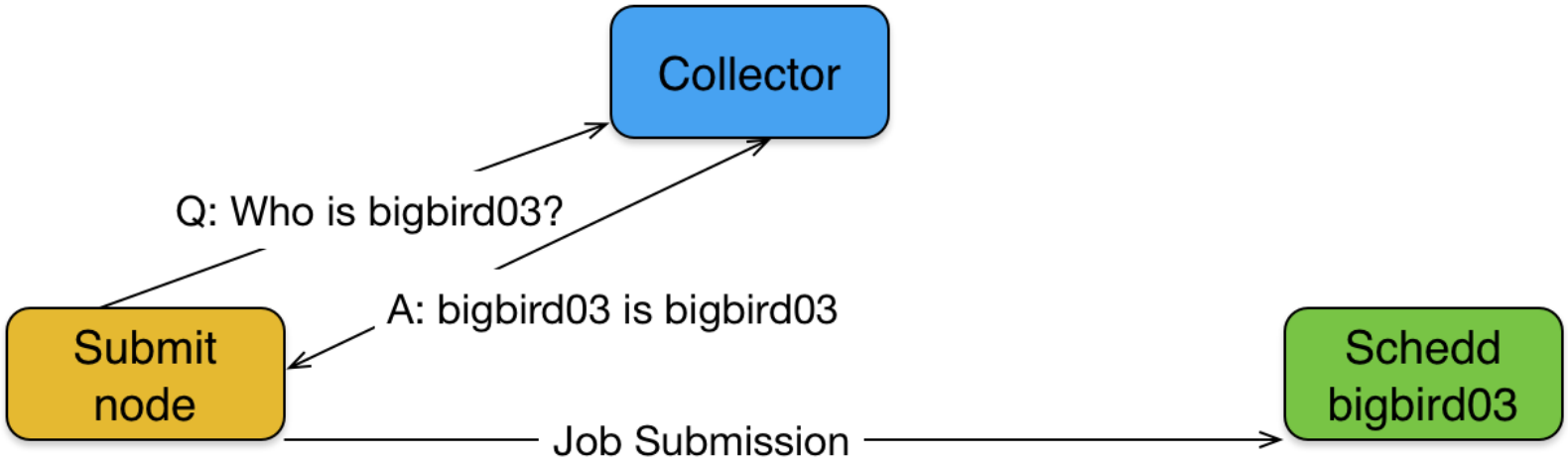
Production Experience

- Still very happy with htcondor-ce
  - Routing ability very helpful (and highly used)
  - Some issues around memory bloat resolved upstream
- CGroups used for memory (soft) limits
- Scaling service requiring work on Collectors & Negotiator
  - We are currently profiting from the work colleagues in CMS & Upstream have put into scale

Symmetric job matching

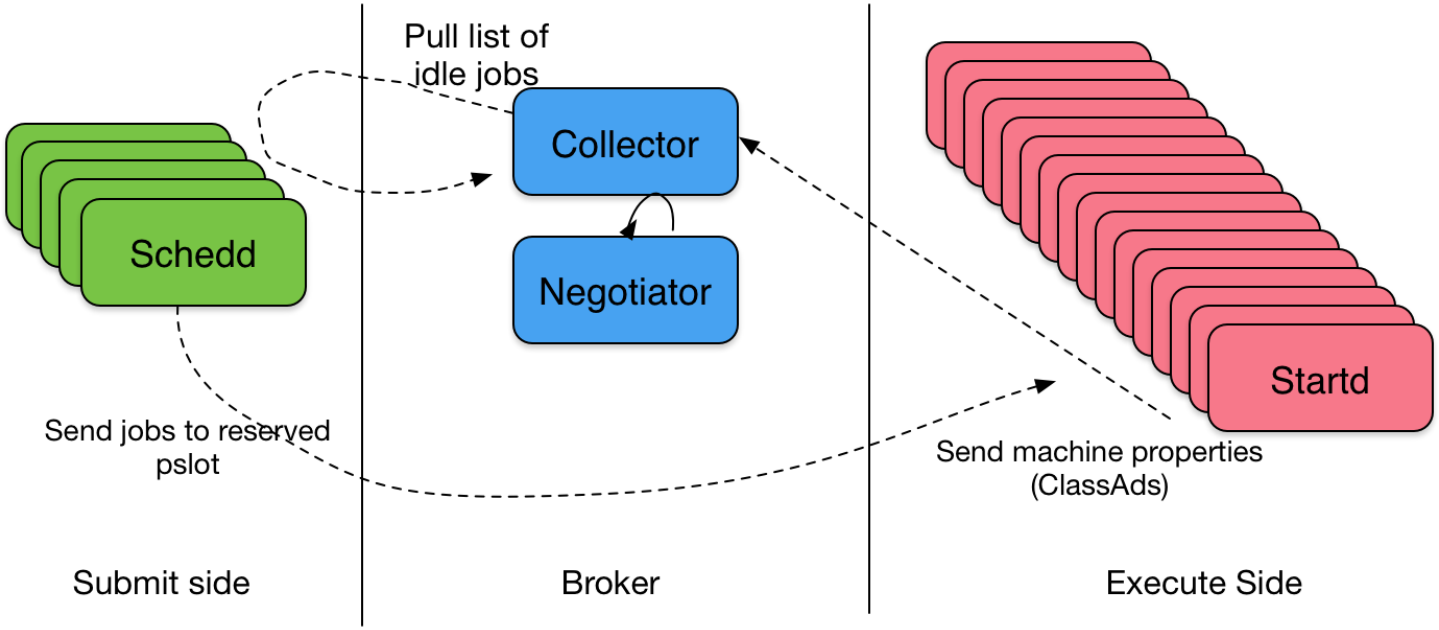


Submission requires Collector

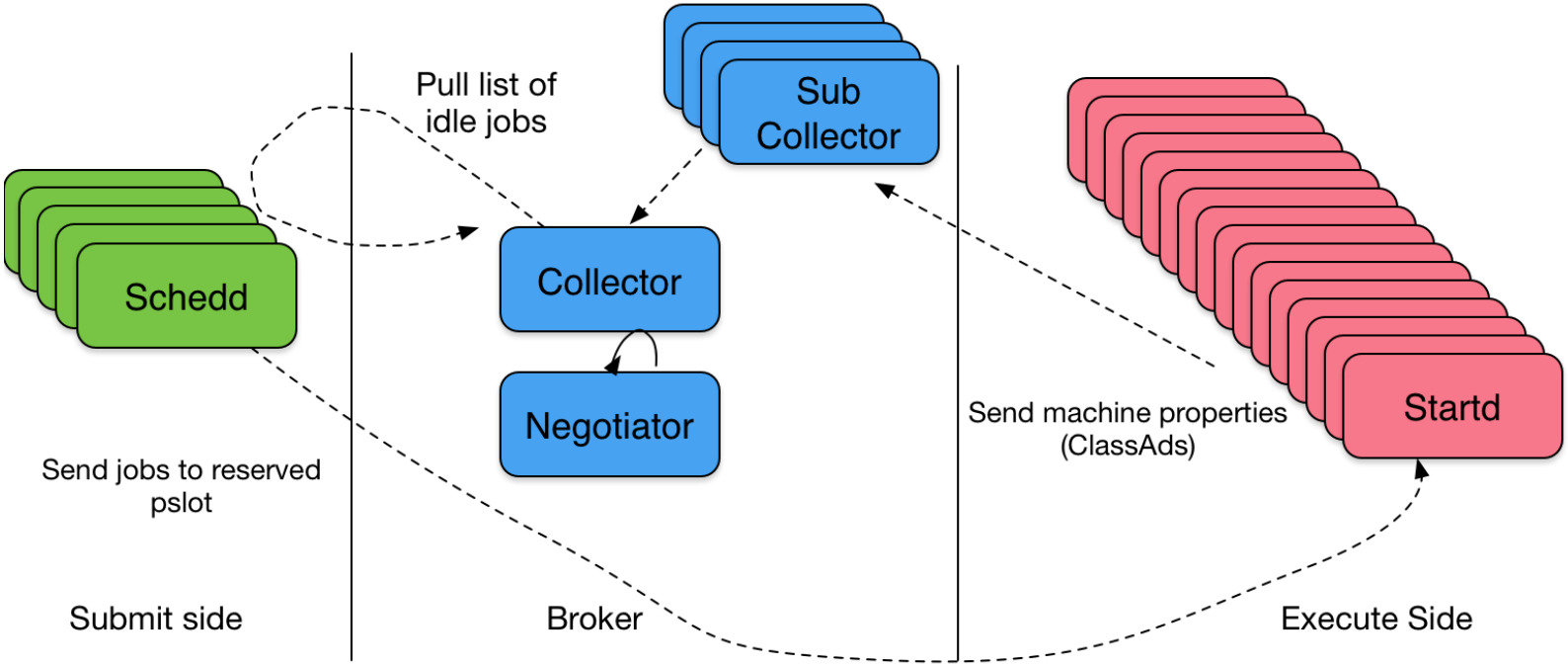


- Why query the Name if it's the same as the Schedd fqdn?
  - Because it isn't always – HA schedds publish names

Collector Bottleneck



Split the Collectors



Splitting infrastructure

- Moving to sub collectors has reduced the times when the Collector is too busy to reply with the name of the schedd
- Still work to do! The next step is to scale out the Negotiator
  - Negotiator does the matching of jobs to machines
  - Long negotiation cycle also affects the Collector
  - Splitting pool between two negotiators

Priorities & Preemption

- Currently in production we have no preemption
  - Historically the majority of experiment use cases don’t allow for preemption
- Job priorities used for scheduling / negotiation but not for preemption
- Equal priority for Accounting Groups
  - Fairshare changes effective priority
- What could we do with priorities / preemption?

Nice User jobs

```
[
    MaxJobs = 500;
    MaxIdleJobs = 100;
     TargetUniverse = 5;
    name = "AtlasT0";
     Requirements = (regexp("atlas",
x509UserProxyVoName)) && (TARGET.queue =?=
"AtlasT0");
     set_Requirements = (TARGET.Hostgroup =?=
"bi/condor/gridworker/atlast0");
     set_AtlasGridJob = True;
     set_NiceUser = True;
  ]
```

Nice User jobs

- Via direct submission:
  - condor_submit –nice_user
- Via ClassAd:
  - NiceUser = True
- Sets priority to a level that means all other jobs will have higher priority
- In T0 this (should) mean that nice jobs only run when there are no idle T0 jobs
- Can use this principle to fill other resources
  - Effectiveness depends on runtime!

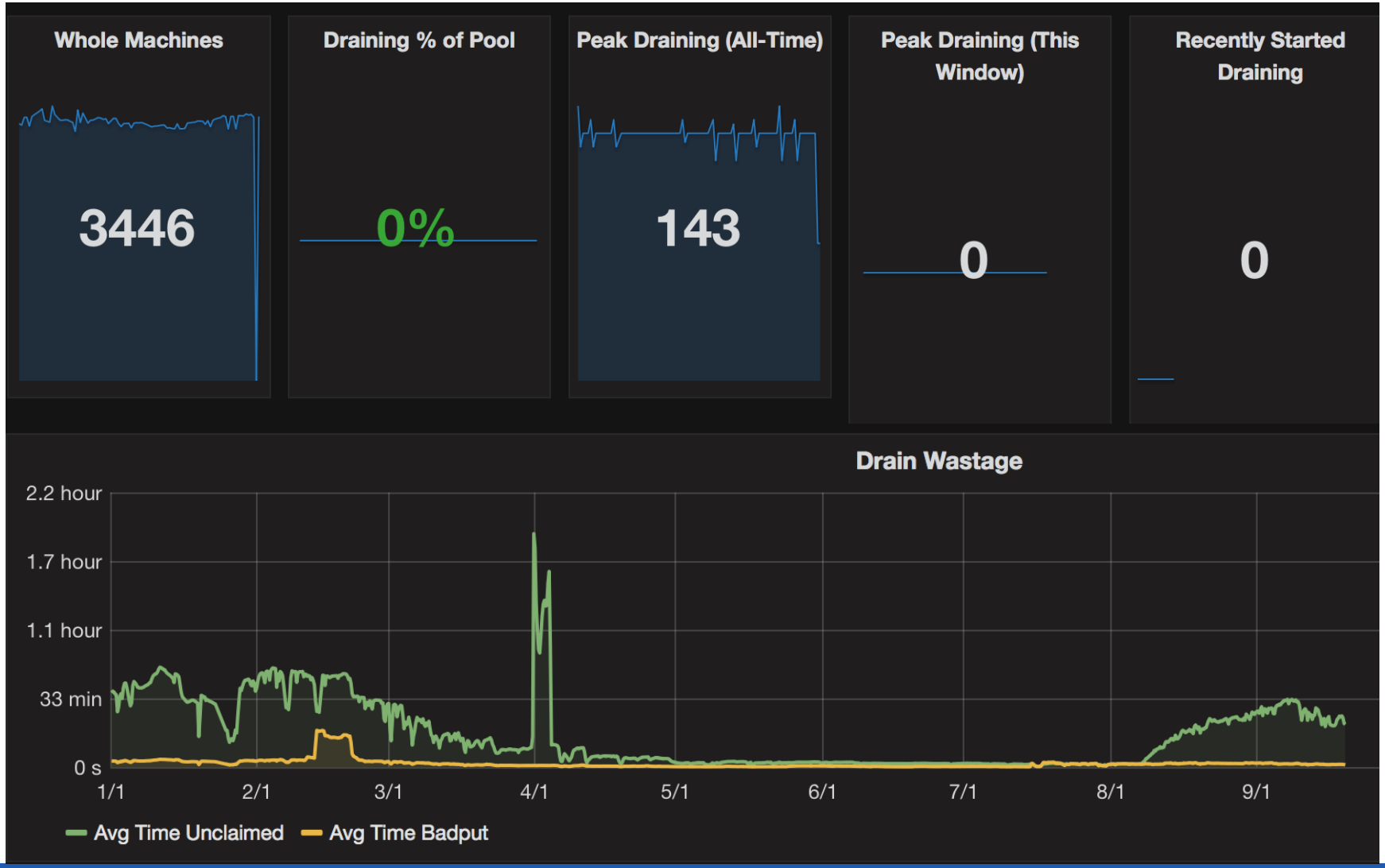
Preemption

- Can also preempt
- Job priority vs User priority
  - User priority might make sense for dedicated resources
- Preemption might be useful in similar cases to Nice Jobs (or in addition)
- ClassAds for “special” resources to take Nice & Preemptible jobs?
  - Send to (for example) machines draining for mcore?

Multicore & draining

- Use condor_defrag
  - Decide which machines to drain
  - must not be cloud machines
  - must be healthy
  - must be configured to actually start new jobs
  - must not be an xbatch node
- We only drain 8 cores
- We don’t look ahead into queue and change
- Currently humans & monitoring change amounts
- Steady queue of mcore better for us

Drain monitoring



Cloud Resources

- Continue to take advantage of Public Cloud Resources
- Oracle Bare Metal Cloud
  - Docker Universe on Bare Metal
  - Limited PoC of 9k cores
- HNScienceCloud
  - Current phase allows for some additional cores
- HTCondor-CE routes
  - remote_queue = externalcloud
  - +Xbatch = True

BEER (Batch on Eos Extra Resources)

- PoC / Pilot to investigate using additional CPUs disk servers don’t use
- Goal: ensure that jobs can’t intefere with EOS file server
- HTCondor service in CGroup with memory limit
- Limit cores available to HTCondor
  - Investigating pinning etc but might not be needed
- Docker universe for jobs
  - Decouple EOS host OS from execution

Questions?