DREAMWORKS
ANIMATION SKG

DreamWorks Animation SKG

Only studio to release 3 CG animated features in one year

Consistently in top 5 each year

Collaboration and Innovation with partners

Scale of Digital Resources

Each Film Takes 4-5 Years To Make

- 200+ Workstations
- 65+ Million CPU Hours
- Peak use of 15,000 cores of 22,000 total cores
- 200+ TB's of data
- 500+ Million files
- 10Gb/s WAN, 12% of Mad3 rendered remotely

Imagine Having a DOZEN Films in Production at ONCE!

Renderfarm Scale

Hundreds of thousands of jobs per night

Up to 20,000 jobs running concurrently

Deadline-based turnaround on priority order

Average runtime ~ 15 min, >90% utilization

DreamWorks And Open Source

DWA helped lead industry toward Linux and open source

Enterprise class solution - Linux-based HP workstations

With Red Hat we helped to enable commodity computing for our industry...which still uses proprietary grid middleware

- Expensive in $$$ and effort

We followed the open source path for our grid middleware

Renderfarm Requirements

Dynamic Slots	HGQ	Round-Robin Rate
Job Group Priority Order	FCFS (PostJobPrio1)	Progressive Rendering
Job Policies and Steering	Resource Limits	Suspend/ Continue
Schedd Scaleout	Multi-target VIEW_HOST	Negotiator & Schedd Stats

Looking Forward

Improved schedd HA	Multiple default concurrency limits
Startd-local limits	Cgroups & FS namespace isolation
"Claim Partitionable Leftovers" - but....	Plumage & add'l statistics

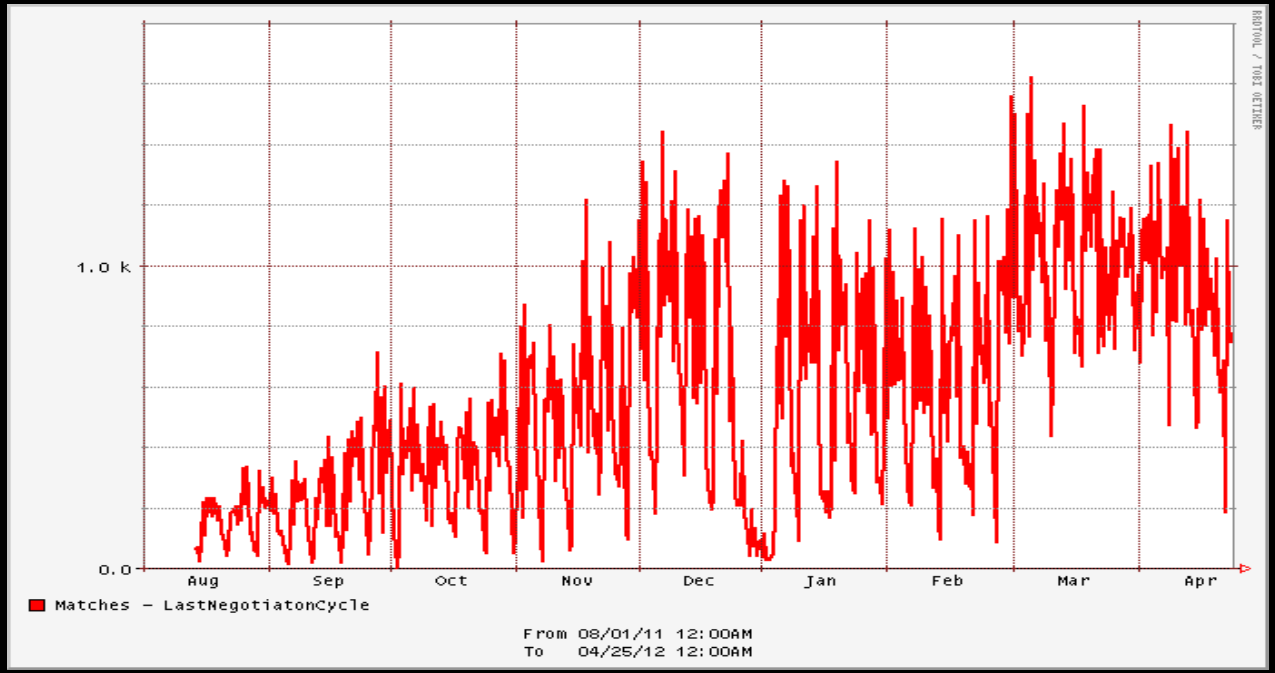
Operational Visibility

Our artists need much more than a "black box"

Built our own management tailored for rendering workflow

Built a realtime cache of farm data (stock + our metadata) inclusive of unreleased / dependent jobs

Using provided statistics, finding areas of improvement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Matches - LastNegotiatonCycle
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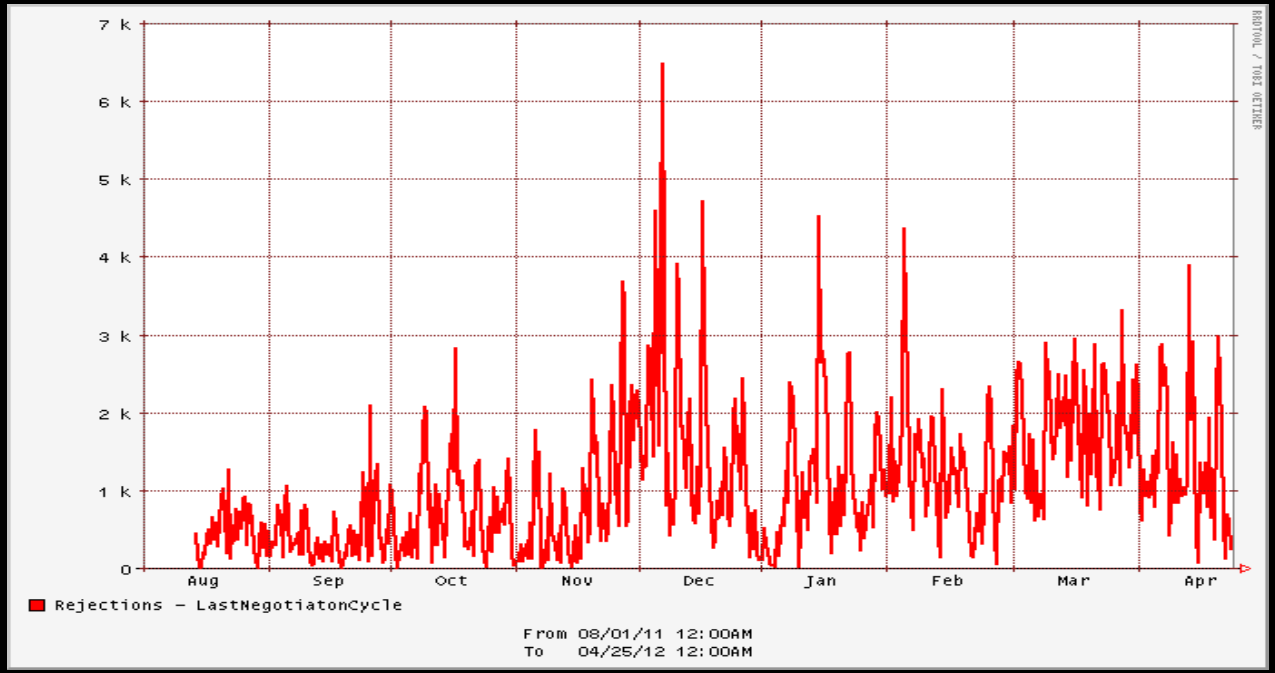
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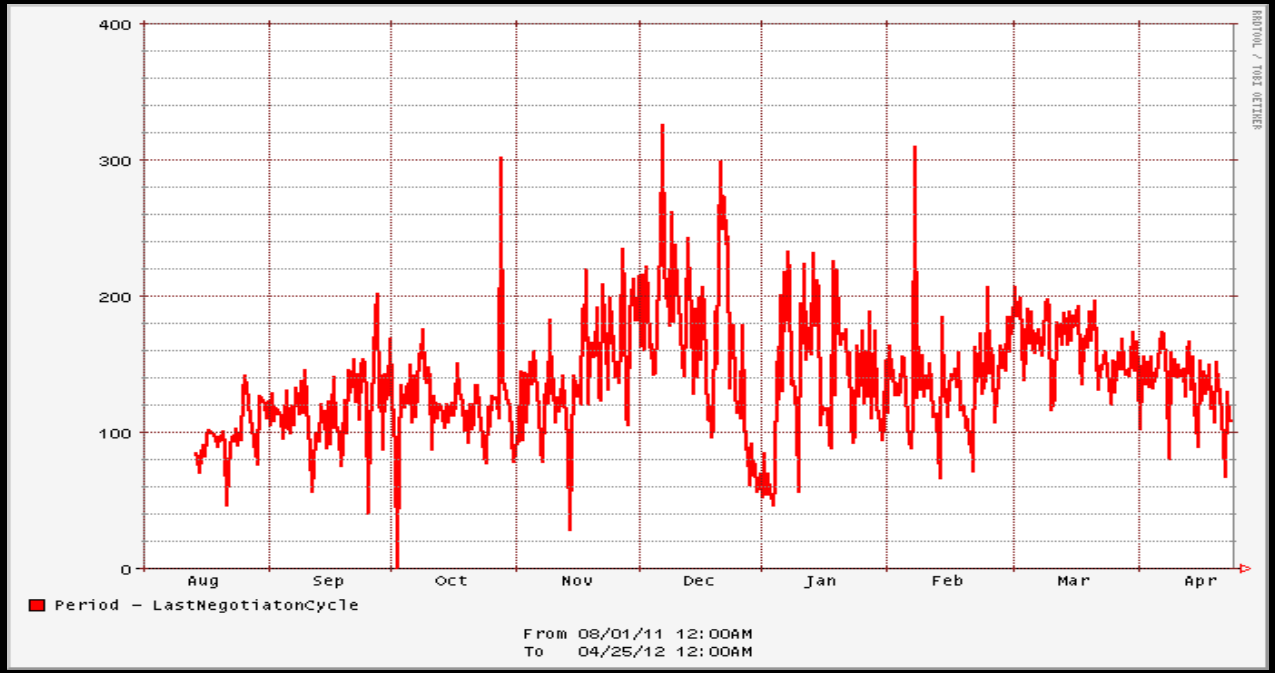
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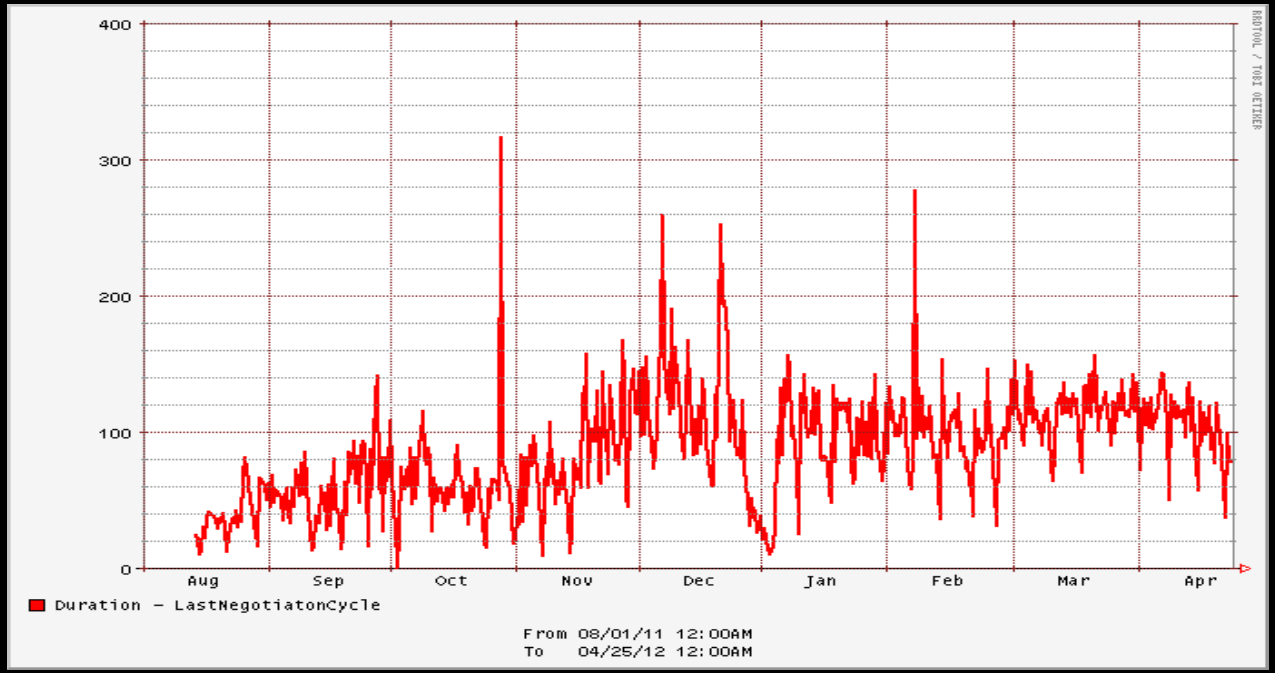
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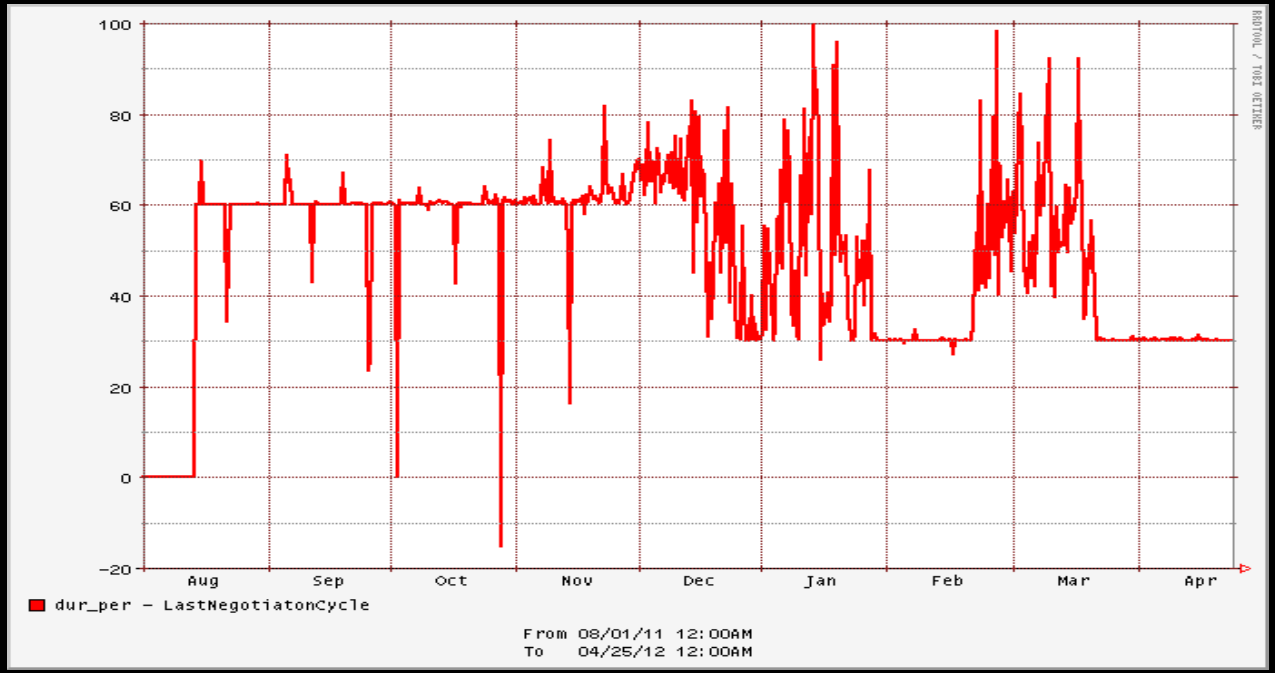
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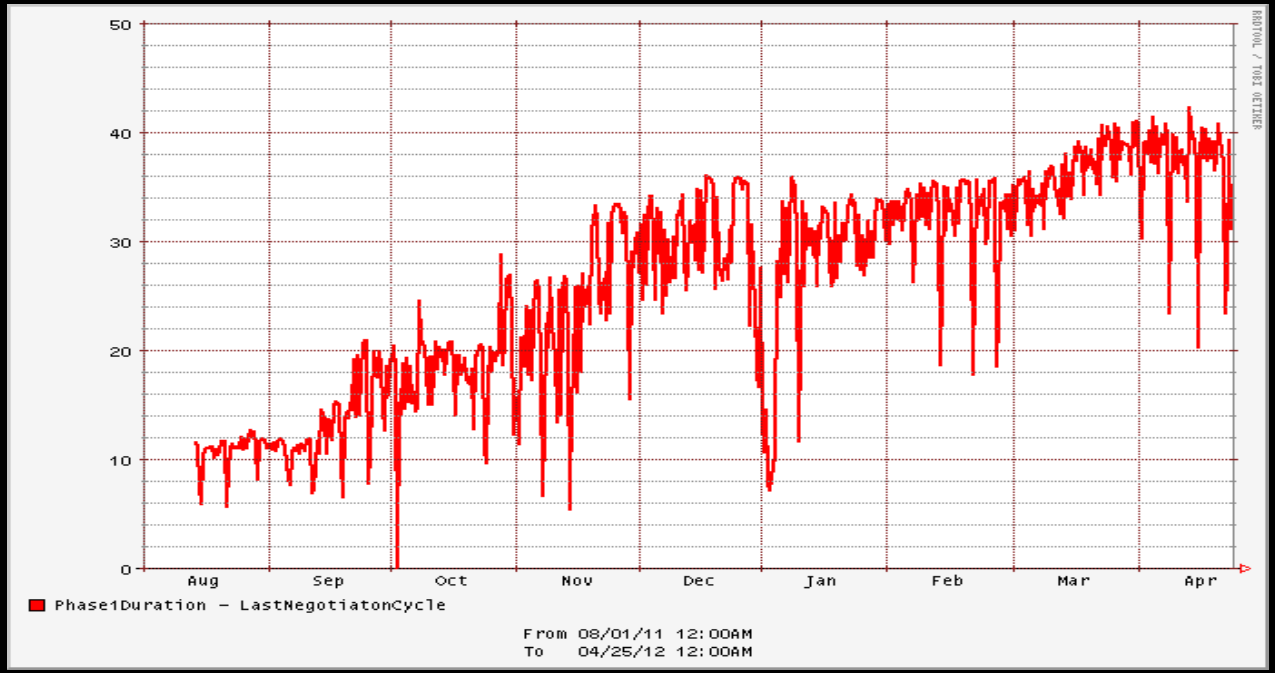
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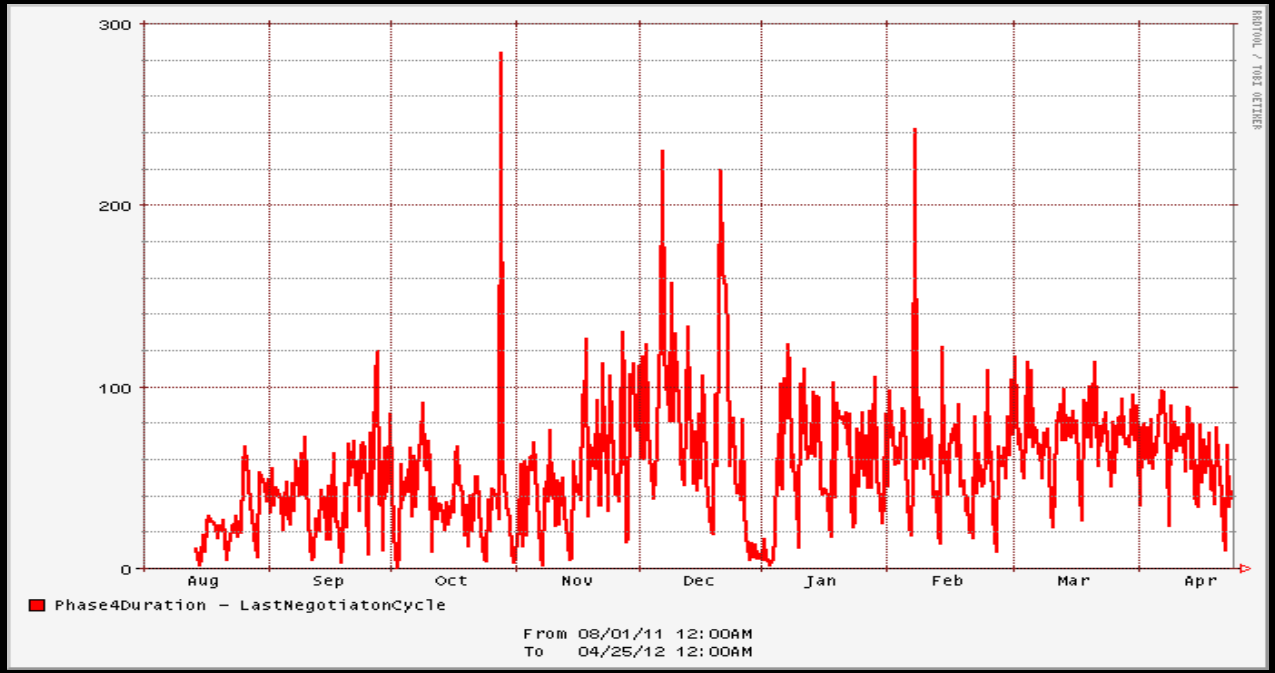
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Lessons Learned From Neg Stats

Consistent Matches = Duration-bound

Need deeper stats around Rejections, why 2X?

No reschedules/drop interval - but verify knobs

Phase1Duration has become 40%+ of Duration

Workflow Improvements

- DAGman Service Interface
  - Query submitted AND dependent jobs
  - Live editing (priority, kill a graph node)
- Accounting group role-based access
  - Team-lead manual (re)prioritization
  - Deadline-oriented workflow enablement
- DAG meta dependencies

Thank You!

Questions?

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