CLAD

Matchmaking for High Throughput Computing

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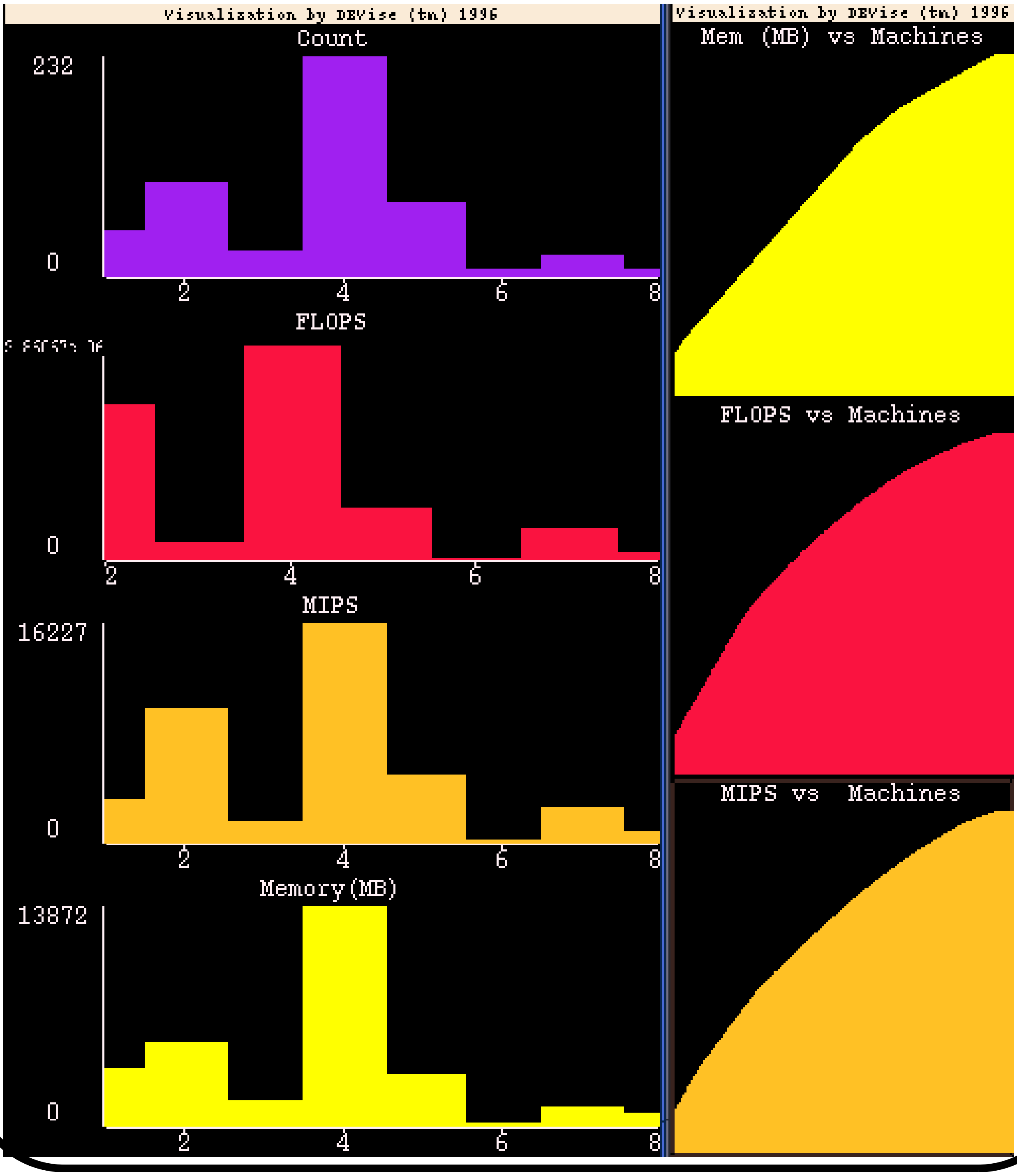
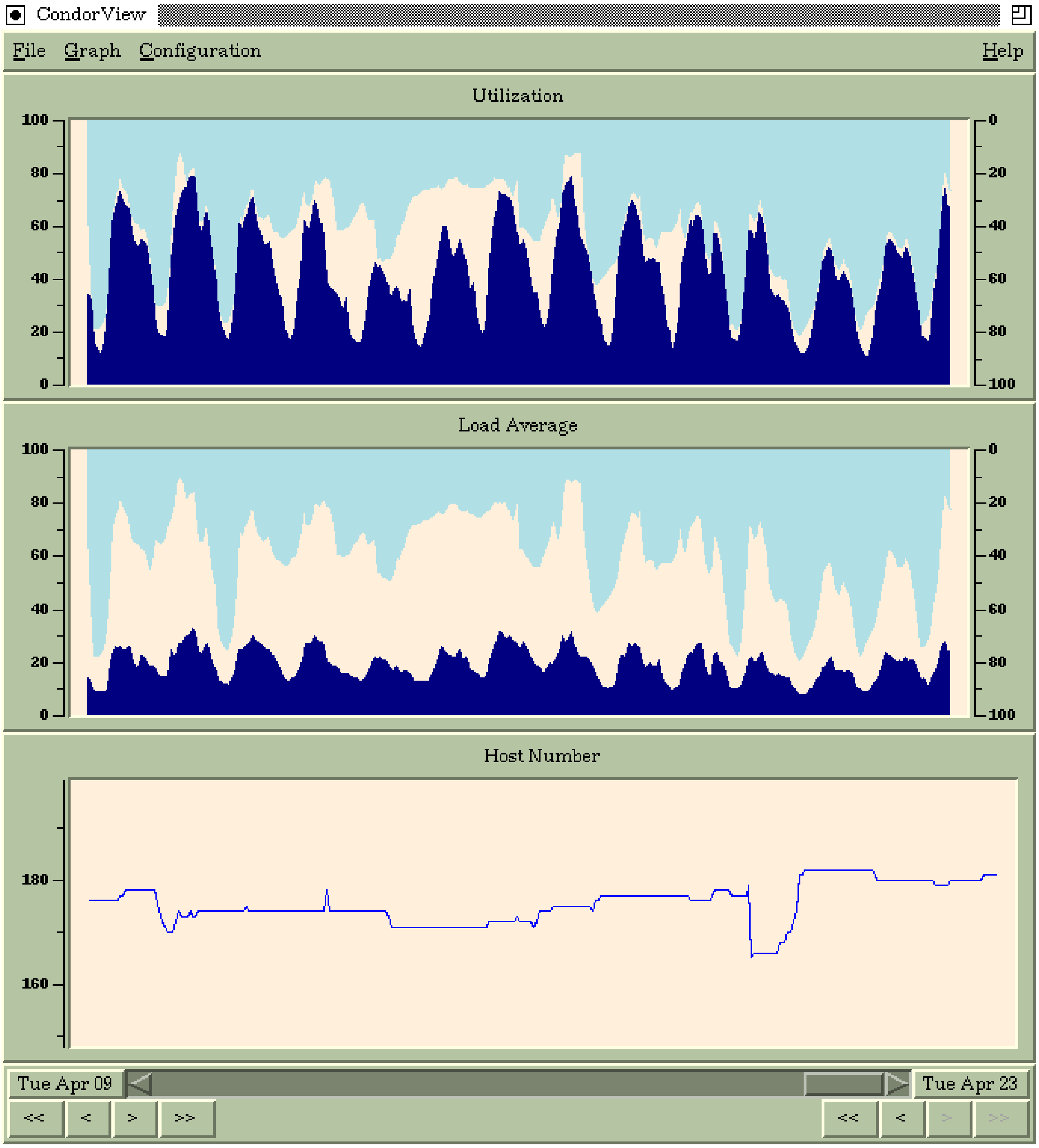
Condor - High Throughput Computing on Distributively Owned Resources

Our Condor Resources



Condor View


CondorView
File Graph Configuration Help
Utilization
100
80
60
40
20
0
0
20
40
60
80
100
Load Average
100
80
60
40
20
0
0
20
40
60
80
100
Host Number
180
160
Tue Apr 09
Tue Apr 23
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Performance vs. Throughput

- ***High Performance***

  Very large amounts of processing capacity for relatively short periods of time - Floating Point Operations per second.

- ***High Throughput***

  Large amounts of processing capacity for very long periods of time - Floating Point Operations per week.

Distributed

Ownership

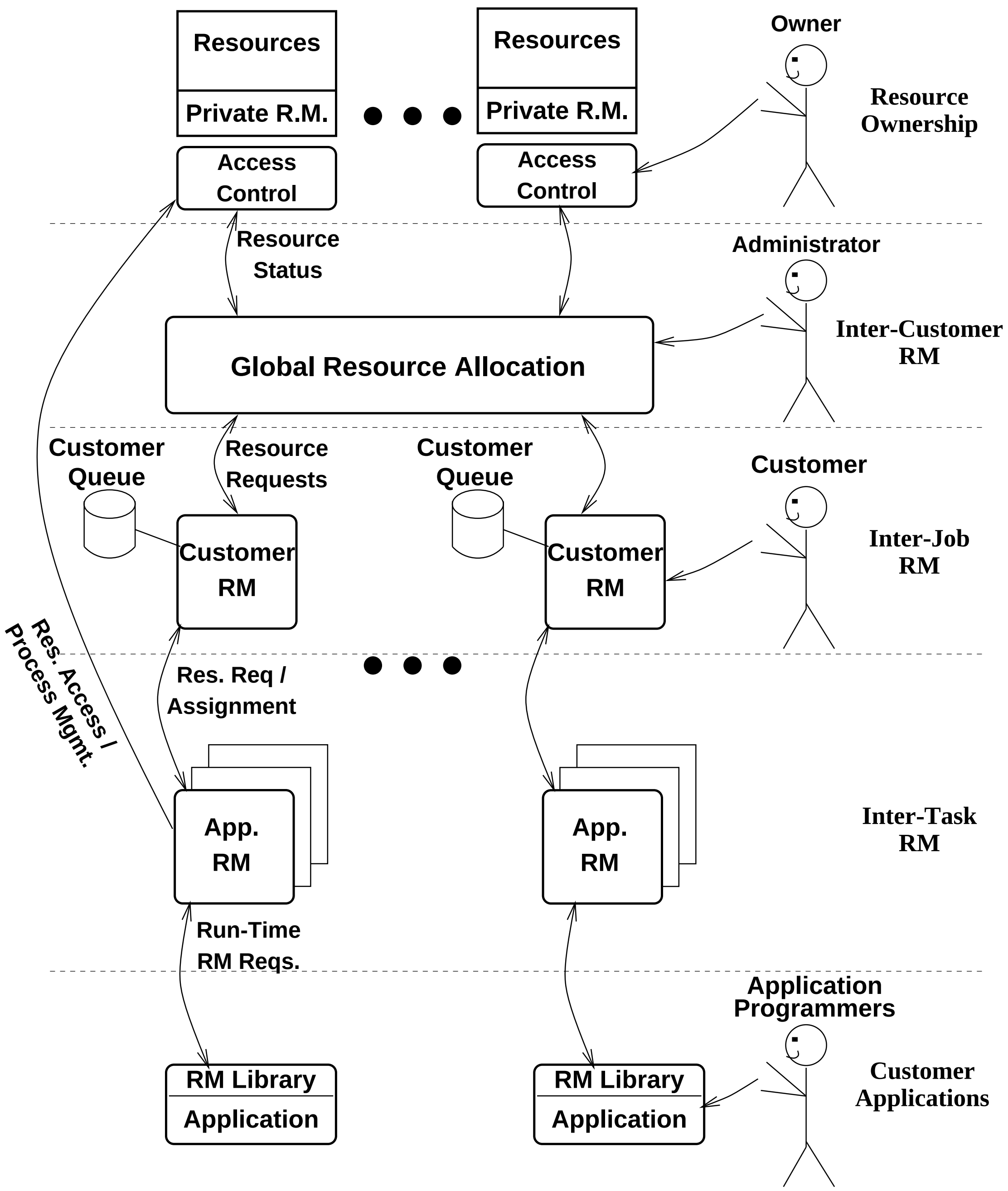
Powerful computing resources are owned by individuals, groups, departments, and institutes.

- Huge increase in the processing capacity owned by the scientific community; (more power and more machines)
- Much smaller increase in the capacity accessible by a scientist; (privatization of processing capacity)

Mechanisms needed to support HTC

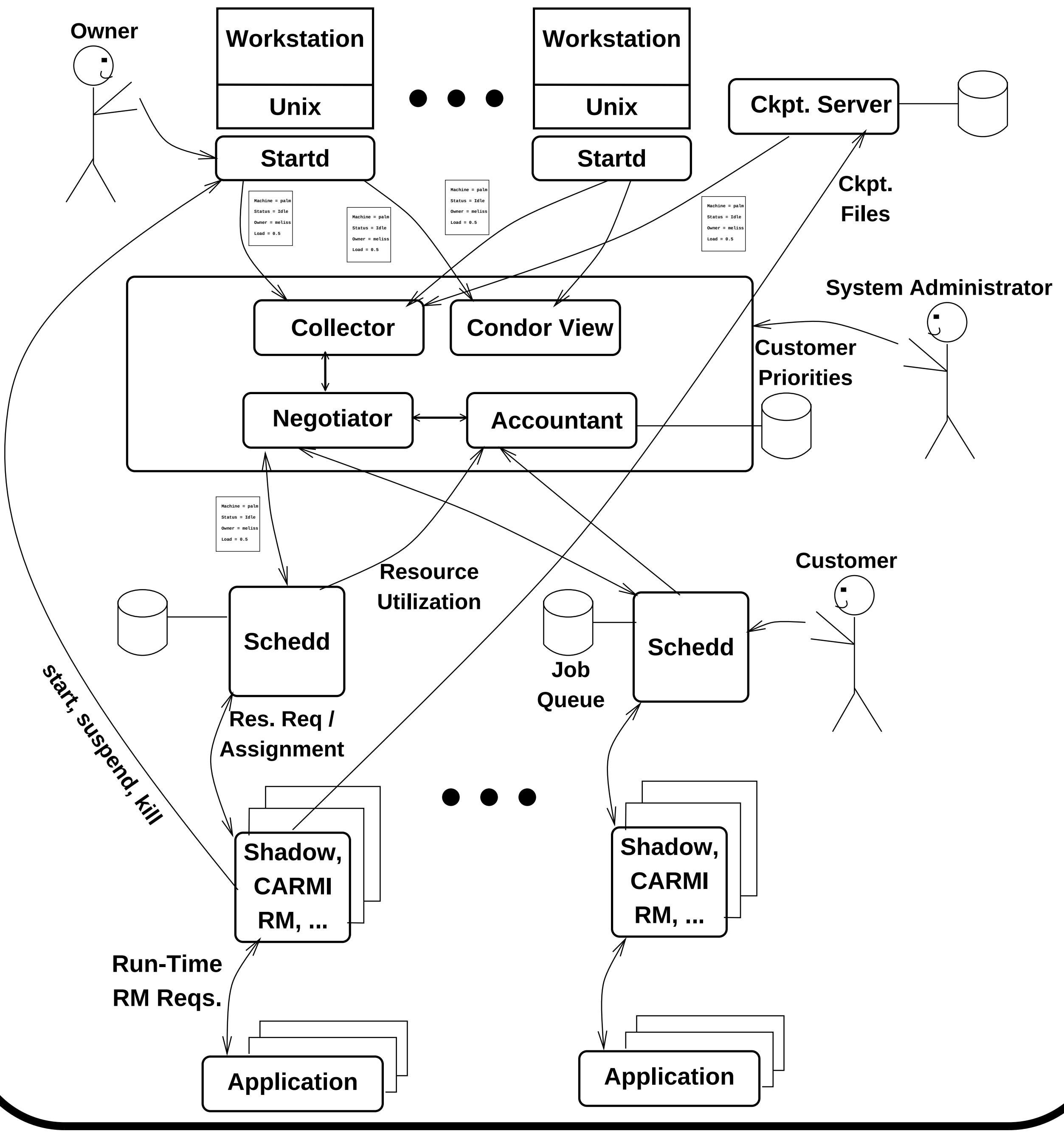
- Semantic free and flexible Matching services between Requests and Resources - Classified Adds
- Preemptive and resume scheduling - Checkpointing
- Remote access to data - Remote system calls
- Asynchronous Resource Management API - CARMI

Layers of RM in a HTC Environment



The Owner the Customer and the Matchmaker

RM Layers in Condor



Classified Ad I

An owner of a powerful NT with limited disk space and high speed access to the WWW is looking for customers from the English department who would like to use it for word processing when disk utilization is less then 20%. NS/ND preferred.

Classified Ad II

A Customer from the History department is looking for a VMS machine that is at least 15 years old and is available at lunch time on Mondays or Wednesdays. Machines with paper tape drives preferred.

What is a Classified Ad?

A Classified Ad is an object used by Owners and Customers to describe themselves and what they are looking for. It has the the following attributes:

- (my) Type
- Target Type
- Attribute List
- A Boolean Constraint
- An integer Ranking

The Matchmaker

Owners periodically send an Ad to the Matchmaker who periodically connects to customers (in a priority order) who indicated interest find match(s) for their Ads.

- A match takes place when both constraints are satisfied simultaneously
- The Matchmaker does not maintain a state in stable storage.
- Three value Logic - True, False, Undefined

Example (Owner)

```
Users 0 = ;
Running 0 = ;
Idle 0 = ;
Prio 0 = ;
OpSys HPUX905 = ;
Arch HPPAR = ;
Machine hp-122 = ;
START LoadAvg 0.300000 <= KeyboardIdle 15 60 * > ConsoleIdle 15 60 * > Nest MAF != && || && = ;
SUSPEND LoadAvg 3.750000 >= ConsoleIdle 5 < || KeyboardIdle 5 < Nest MAF == && || = ;
CONTINUE LoadAvg 0.300000 <= ConsoleIdle 4 60 * > Nest MAF != && KeyboardIdle 4 60 * > || && = ;
VACATE CurrentTime EnteredCurrentState - 8 60 * > Clock_Day 0 > Clock_Day 6 < && Clock_Min 449 > && Clock_Min 10
21 < && Nest Classrm == Nest Locked_Classrm == || && CurrentTime EnteredCurrentState - 20 > && || = ;
KILL CurrentTime EnteredCurrentState - 10 60 * > = ;
SUSPEND_VANILLA ConsoleIdle 5 < KeyboardIdle 5 < Nest MAF == && || = ;
CONTINUE_VANILLA LoadAvg 0.300000 <= ConsoleIdle 4 60 * > Nest MAF != && KeyboardIdle 4 60 * > || && = ;
VACATE_VANILLA CurrentTime EnteredCurrentState - 8 60 * > VirtualMemory
190000 < && CurrentTime EnteredCurrentSt
ate - 10 60 60 * * > || Clock_Day 0 > Clock_Day 6 < && Clock_Min 449 >
&& Clock_Min 1021 < && Nest Classrm == Nest Locked_Classrm == || && CurrentTime EnteredCurrentState - 20 > && || = ;
KILL_VANILLA CurrentTime EnteredCurrentState - 3 60 * > = ;
PRIO UserPrio 10 * Status 0 != + QDate 1000000000.000000 / - = ;
INACTIVE Users 0 <= = ;
UPDATE_PRIO Prio Users + Running - = ;
UidDomain cae.wisc.edu = ;
FilesystemDomain cae.wisc.edu = ;
Nest Classrm = ;
ClientMachine bambam.cae.wisc.edu = ;
State Running = ;
EnteredCurrentState 849709608 = ;
Memory 48 = ;
Disk 75435 = ;
ConsoleIdle 7911 = ;
KeyboardIdle 454 = ;
Cpus 1 = ;
LoadAvg 1.000008 = ;
IP_ADDR <144.92.242.22:9611> = ;
VirtualMemory 85136 = ;
MIPS 43 = ;
KFLOPS 6016 = ;
Subnet 144.92.242 = ;
Flavor 9000/715 = ;
MAX_JOBS_RUNNING 15 = ;
Clock_Day 3 = ;
Clock_Min 582 = ;
JobUniverse 1 = ;
JobStart 849709608 = ;
LastPeriodicCkpt 849709608 = ;
RemoteUser streifel = ;
```