SLURMFS

Resource Manager File System for SLURM

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Slurmfs is:

- a file system view into slurm state
  - using the published slurm api, only
- a file system interface to effect slurm state change
- an interface rationalizer for diverse tools and user communities
- an enabler for other tools

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Slurmfs is not:

- authoritative for slurm state
  - slurm itself is
- a plugin or filter
  - although it may be used as a means to connect to them

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slurmfs

slurm.conf - emacs@build.officelink (or

File Edit Options Buffers Tools Conf Help

Save Undo

```
# slurm.conf

ControlMachine=xx0
ControlAddr=10.11.43.226

SlurmUser=root
SlurmdUser=root

SlurmdTimeout=300
SlurmctldTimeout=300

ClusterName=xx

# COMPUTE NODES

NodeName=DEFAULT CPUs=1 Sockets=1 RealMemory=3328
NodeName=xx1 Feature=render,compute
NodeName=xx[2-4] Feature=compute

PartitionName=standard Nodes=xx[1-4] Default=YES MaxTime=5-00:00:00 Oversubscribe=EXCLUSIVE

NodeName=xx0 NodeAddr=10.11.43.226 Feature=color=orange State=FUTURE
DownNodes=xx3 Reason=borked State=FUTURE
DownNodes=xx0 Reason="permanently-colorized submission-only node"
```

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```
123% scontrol show node xx0
NodeName=xx0 CoresPerSocket=1
   CPUAlloc=0 CPUErr=0 CPUTot=1 CPULoad=N/A
   AvailableFeatures=color=orange
   ActiveFeatures=color=orange
   Gres=(null)
   NodeAddr=10.11.43.226 NodeHostName=xx0
   RealMemory=11855 AllocMem=0 FreeMem=N/A Sockets=1 Boards=1
   State=DOWN* ThreadsPerCore=1 TmpDisk=8705 Weight=1 Owner=N/A MCS_label=N/A
   BootTime=None SlurmdStartTime=None
   CfgTRES=cpu=1,mem=11855M
   AllocTRES=
   CapWatts=n/a
   CurrentWatts=0 LowestJoules=0 ConsumedJoules=0
   ExtSensorsJoules=n/s ExtSensorsWatts=0 ExtSensorsTemp=n/s
   Reason=permanently-colorized submission-only node [root@2017-09-08T14:21:28]
```

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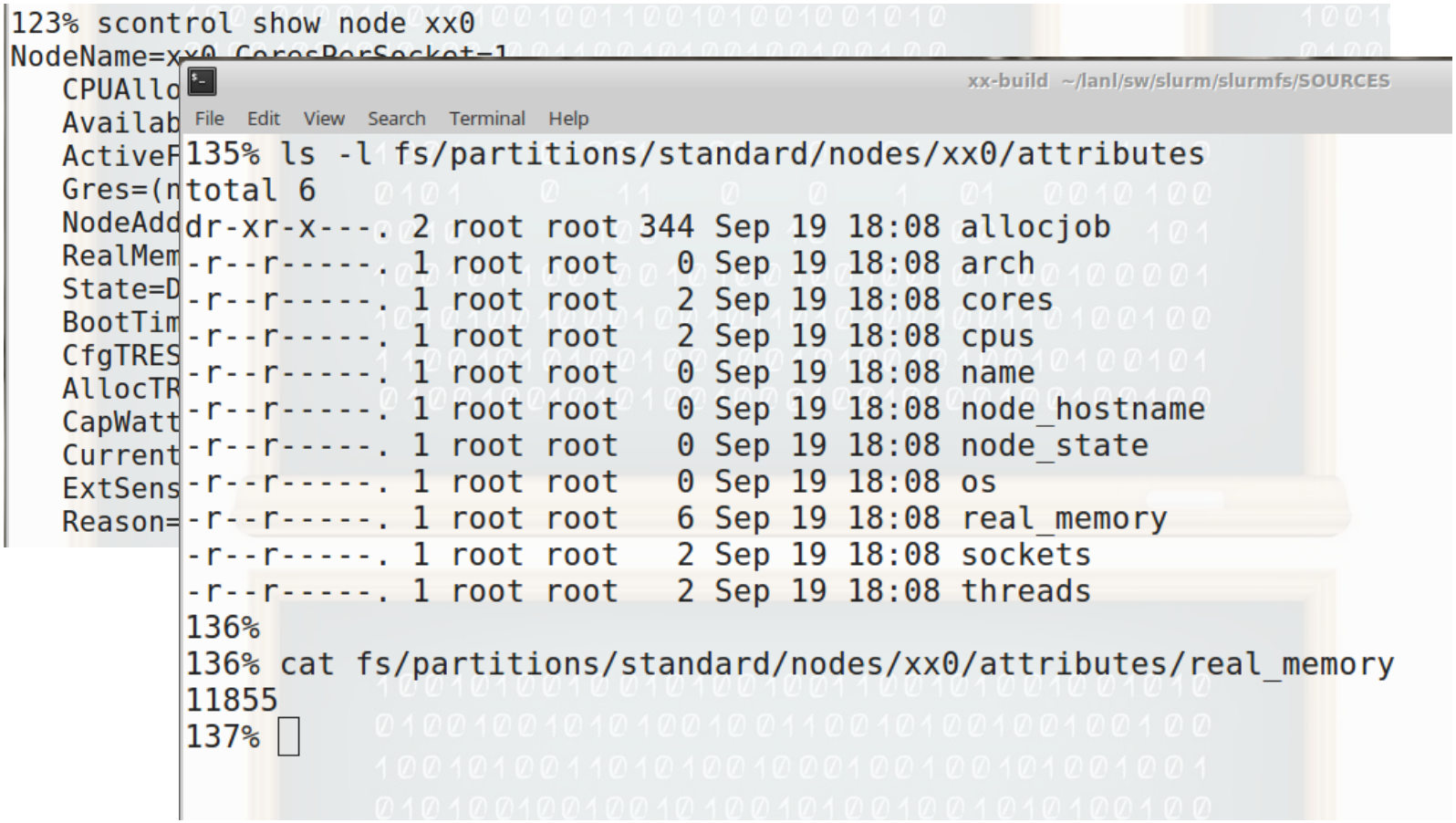
slurmfs


123% scontrol show node xx0
NodeName=xx0 CoresPerSocket=1
CPUAllo
Availab
ActiveF
Gres=(n
NodeAdd
RealMem
State=D
BootTim
CfgTRES
AllocTR
CapWatt
Current
ExtSens
Reason=
xx-build ~/lanl/sw/slurm/slurmfs/SOURCES
File Edit View Search Terminal Help
135% ls -l fs/partitions/standard/nodes/xx0/attributes
total 6
dr-xr-x---. 2 root root 344 Sep 19 18:08 allocjob
-r--r-----. 1 root root 0 Sep 19 18:08 arch
-r--r-----. 1 root root 2 Sep 19 18:08 cores
-r--r-----. 1 root root 2 Sep 19 18:08 cpus
-r--r-----. 1 root root 0 Sep 19 18:08 name
-r--r-----. 1 root root 0 Sep 19 18:08 node_hostname
-r--r-----. 1 root root 0 Sep 19 18:08 node_state
-r--r-----. 1 root root 0 Sep 19 18:08 os
-r--r-----. 1 root root 6 Sep 19 18:08 real_memory
-r--r-----. 1 root root 2 Sep 19 18:08 sockets
-r--r-----. 1 root root 2 Sep 19 18:08 threads
136%
136% cat fs/partitions/standard/nodes/xx0/attributes/real_memory
11855
137%

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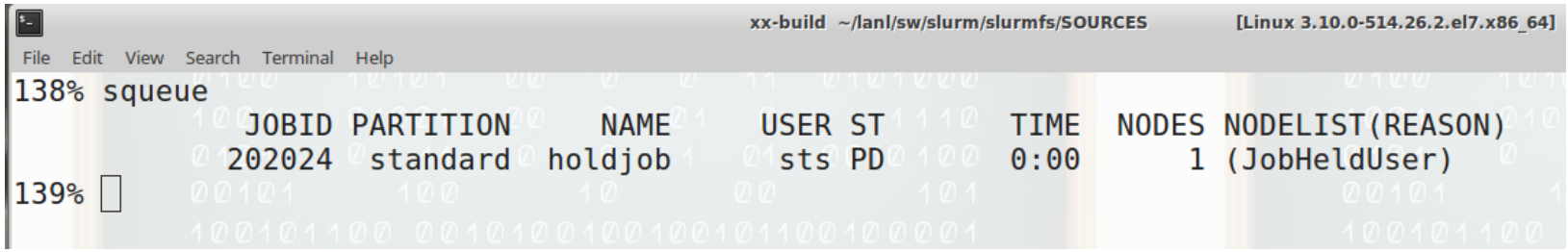
xx-build ~/lanl/sw/slurm/slurmfs/SOURCES [Linux 3.10.0-514.26.2.el7.x86_64]
File Edit View Search Terminal Help
138% squeue
JOBID PARTITION NAME USER ST TIME NODES NODELIST(REASON)
202024 standard holdjob sts PD 0:00 1 (JobHeldUser)
139%

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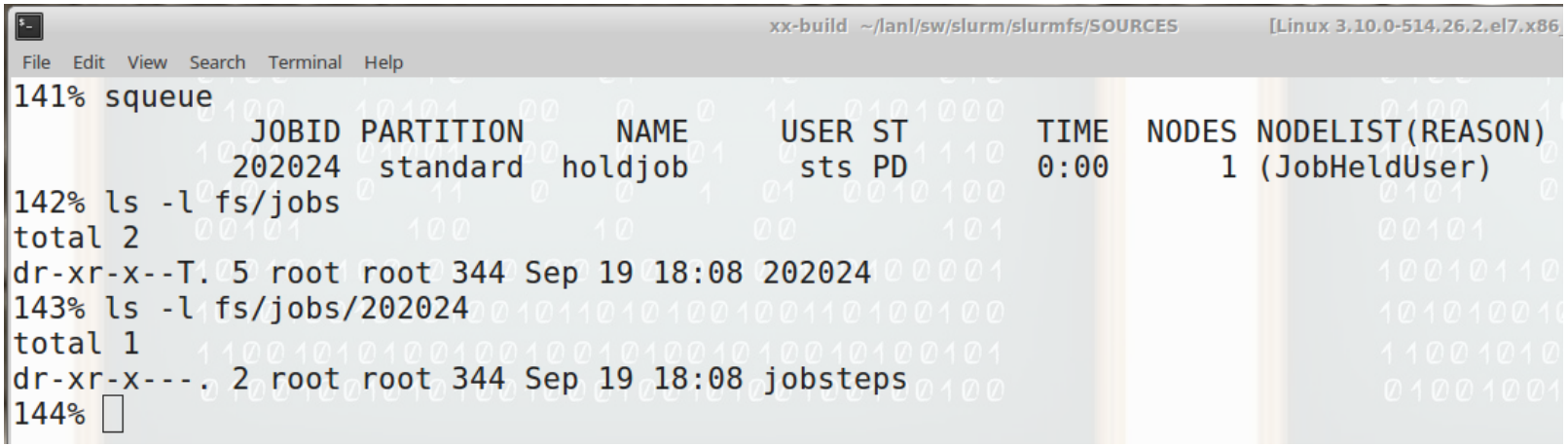
xx-build ~/lanl/sw/slurm/slurmfs/SOURCES [Linux 3.10.0-514.26.2.el7.x86
File Edit View Search Terminal Help
141% squeue
JOBID PARTITION NAME USER ST TIME NODES NODELIST(REASON)
202024 standard holdjob sts PD 0:00 1 (JobHeldUser)
142% ls -l fs/jobs
total 2
dr-xr-x--T. 5 root root 344 Sep 19 18:08 202024
143% ls -l fs/jobs/202024
total 1
dr-xr-x---. 2 root root 344 Sep 19 18:08 jobsteps
144%

slurmfs

```
145% tree fs
fs
├── attributes
│   ├── ClusterName
│   ├── ControlMachine
│   ├── slurm_api_version
│   ├── SlurmctldTimeout
│   ├── SlurmdTimeout
│   ├── SlurmdUser
│   ├── slurmd_user_name
│   ├── SlurmUser
│   └── slurm_user_name
├── jobs
│   └── 202024
│       └── jobsteps
└── partitions
    └── standard
        ├── attributes
        │   ├── flags
        │   ├── name
        │   ├── state_up
        │   ├── total_cpus
        │   └── total_nodes
        └── nodes
            ├── <node>
            │   └── attributes
            │       ├── allocjob
            │       ├── arch
            │       ├── cores
            │       ├── cpus
            │       ├── name
            │       ├── node_hostname
            │       ├── node_state
            │       ├── os
            │       ├── real_memory
            │       ├── sockets
            │       └── threads
```


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What broke when porting from slurm 2.3.3 to 17.02:

- individual nodes have limited view
-
- artifact: <node> directory
-
- control mechanisms:
  - `chmod +x jobs/<jobid>`
  - `chmod -x partitions/<partitionname>`
  - `echo “drain” > <nodename>/control/state`
  - `echo “exclusive” > partitions/<partitionname>/control/oversubscribe`
  -
- libcollect is not retrieving all attributes
  - type system needs extension and update
  -
- backing store & dependent functions
  - history tail / remounts
-
- selinux context

What's next:

- Job
  - attributes: complete `scontrol show job` parity
  - priority / queue position
-
- new* features:
  - Views of:
    - reservations
    - sacctmgr datums: accounts, qos, associations, users
    - scheduling attributes
  - slurmdb as backing store
  -
- examples and prototypes:
  - prolog mounts slurmfs on a node; epilog unmounts it
  - a non-slurm-aware client script can get/set state

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Questions, to the audience and community of interest:

- Associations
  - most useful fs structure? ...for which use cases?
    - sub-dir containing sym-links to entities
    - multiple groupings, to enable convenient queries
    - ordered by?
    -
- Job Priorities
  - within hierarchy
    - by job state sub-dir?
    - by partition?
    -
- Other entities
  - Gres & Tres, plugins, power
    - If, where & how could this be represented?
    -
- Federation

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What's next:

- sharing of the code with interested parties
- contribution to the community

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