Monitoring Jobs

Careful examination of running times, memory usage and output files will allow you to ensure the job completed correctly and give you a good idea of what memory and time limits to request in the future.

Monitoring Completed Jobs:

To see the runtime and memory usage of a job that has completed, use the `sacct` command:

```
sacct
```

Lists all jobs by the current user and displays information such as JobID, JobName, State, and ExitCode.

```
JobID    JobName    Partition    Account    AllocCPUS    State    ExitCode
7957748  bash       devel        swanson     1            COMPLETED 0:0    
7957751  games       devel        swanson     1            FAILED    1:0     
7957751.bat batch    devel        swanson     1            FAILED    1:0     
7957779  games       devel        swanson     16           COMPLETED 0:0     
7957779.bat batch    batch       swanson     8            COMPLETED 0:0     
```

Coupling this command with the `--format` flag will allow you to see more than the default information about a job. Fields to display should be listed as a comma separated list after the `--format` flag (without spaces). For example, to see the Elapsed time and Maximum used memory by a job, this command can be used:

```
sacct --format JobID,JobName,Elapsed,MaxRSS
```

```
JobID    JobName    Elapsed    MaxRSS
7957748  bash       00:22:22  2448K
7957751  games      00:00:01  822K
7957751.bat batch    00:00:01  822K
7957779  games      00:00:06  882K
7957779.bat batch    00:00:06  882K
```

Additional arguments and format field information can be found in the SLURM documentation.

Monitoring Running Jobs:

There are two ways to monitor running jobs, the `top` command and monitoring the cgroup files. `Top` is helpful when monitoring multi-process jobs, whereas the cgroup files provide information on memory usage. Both of these tools require the use of an interactive job on the same node as the job to be monitored.

If the job to be monitored is using all available resources for a node, the user will not be able to obtain a simultaneous interactive job.

After the job to be monitored is submitted and has begun to run, request an interactive job on the same node using the `srun` command:
srun --jobid=<JOB_ID> --pty bash

Where <JOB_ID> is replaced by the job id for the monitored job as assigned by SLURM.

Alternately, you can request the interactive job by nodename as follows:

srun --nodelist=<NODE_ID> --pty bash

Where <NODE_ID> is replaced by the node name that the monitored job is running. This information can be found out by looking at the squeue output under the NODELIST column.

Once the interactive job begins, you can run top to view the processes on the node you are on:

top - 12:22:52 up 20 days, 1:08, 2 users, load average: 1.11, 0.29, 0.14
Tasks: 577 total, 1 running, 576 sleeping, 0 stopped, 0 zombie
Cpu(s): 47.6%us, 5.8%sy, 0.0%ni, 46.4%id, 0.1%wa, 0.0%hi, 0.0%si, 0.0%st
Mem: 65804336k total, 5362168k used, 60442168k free, 342228k buffers
Swap: 0k total, 0k used, 0k free, 2209352k cached

<table>
<thead>
<tr>
<th>PID</th>
<th>USER</th>
<th>PR</th>
<th>NI</th>
<th>VIRT</th>
<th>RES</th>
<th>SHR</th>
<th>%CPU</th>
<th>%MEM</th>
<th>TIME+</th>
<th>COMMAND</th>
</tr>
</thead>
<tbody>
<tr>
<td>192391</td>
<td>cathrine98</td>
<td>20</td>
<td>0</td>
<td>2310m</td>
<td>117m</td>
<td>70m</td>
<td>94.5</td>
<td>0.2</td>
<td>0:02.86</td>
<td>MATLAB</td>
</tr>
<tr>
<td>192386</td>
<td>cathrine98</td>
<td>20</td>
<td>0</td>
<td>2305m</td>
<td>105m</td>
<td>67m</td>
<td>92.5</td>
<td>0.2</td>
<td>0:02.80</td>
<td>MATLAB</td>
</tr>
<tr>
<td>192383</td>
<td>cathrine98</td>
<td>20</td>
<td>0</td>
<td>2231m</td>
<td>89m</td>
<td>61m</td>
<td>90.2</td>
<td>0.1</td>
<td>0:02.73</td>
<td>MATLAB</td>
</tr>
<tr>
<td>192384</td>
<td>cathrine98</td>
<td>20</td>
<td>0</td>
<td>2227m</td>
<td>81m</td>
<td>56m</td>
<td>90.2</td>
<td>0.1</td>
<td>0:02.73</td>
<td>MATLAB</td>
</tr>
<tr>
<td>192382</td>
<td>cathrine98</td>
<td>20</td>
<td>0</td>
<td>2227m</td>
<td>78m</td>
<td>55m</td>
<td>88.8</td>
<td>0.1</td>
<td>0:02.69</td>
<td>MATLAB</td>
</tr>
<tr>
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<td>0</td>
<td>2466m</td>
<td>140m</td>
<td>76m</td>
<td>87.2</td>
<td>0.2</td>
<td>0:02.64</td>
<td>MATLAB</td>
</tr>
<tr>
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<td>20</td>
<td>0</td>
<td>2232m</td>
<td>90m</td>
<td>61m</td>
<td>85.9</td>
<td>0.1</td>
<td>0:02.60</td>
<td>MATLAB</td>
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<td>2449m</td>
<td>125m</td>
<td>74m</td>
<td>83.6</td>
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<td>0:02.53</td>
<td>MATLAB</td>
</tr>
<tr>
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<td>0</td>
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<td>140m</td>
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<td>0</td>
<td>685m</td>
<td>57m</td>
<td>46m</td>
<td>42.3</td>
<td>0.1</td>
<td>0:01.28</td>
<td>MATLAB</td>
</tr>
</tbody>
</table>

Output for top displays each running process on the node. From the above image, we can see the various MATLAB processes being run by user cathrine98. To filter the list of processes, you can type `u` followed by the username of the user who owns the processes. To exit this screen, press `q`.

During a running job, the cgroup folder is created which contains much of the information used by sacct. These files can provide a live overview of resources used for a running job. To access the cgroup files, you will need to be in an interactive job on the same node as the monitored job. To view specific files, and information, use one of the following commands:

To view current memory usage:

```
less
/cgroup/memory/slurm/uid_<UID>/job_<SLURM_JOB_ID>/memory.usage_in_bytes
```

Where <UID> is replaced by your UID and <SLURM_JOB_ID> is replaced by the monitored job's Job ID as assigned by Slurm.
To view maximum memory usage from start of job to current point:

```
cat /cgroup/memory/slurm/uid_${UID}/job_${SLURM_JOBID}/memory.max_usage_in_bytes
```