Purple Milestone Report
System Software and Scalability

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A report on items 40 through 44 of the Purple Milestone Report
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Auspices Statement

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Item 40 - LCRM/SLURM collect and report computing resource usage statistics for every job run on Purple

The following resource usage statistics are collected for every job run on Purple:

- User
- Bank
- Execution Host
- Node Partition
- CPU*seconds Used
- Memory Integral Used

Evidence: Users can invoke the lrmusage tool on the SCF to retrieve this data.

Item 41 - Users invoke the same commands and follow the same conventions for running LCRM/SLURM on Purple as they do for all other machines in the Center

Normal LCRM and SLURM commands are used to submit, monitor, and cancel jobs. Task launch is performed using IBM's poe command rather than SLURM's srun command. poe is needed to interface with IBM's Federation switch and IBM's version of MPI.

Evidence: Users invoke the following LCRM commands to run batch jobs on purple:

- psub to submit their jobs to purple
- palter to alter their purple job attributes
- pstat to see their purple job statistics
- prm to cancel or terminate their purple jobs

Users invoke the following SLURM commands to run interactive (in the viz partition) jobs on purple:

- poe to submit their job
- scancel to cancel or terminate their job
- squeue to status their jobs

Users man pages for all the above are installed on purple.
Item 42 - Job launch times are under a minute or two (excluding factors outside the control of LCRM/SLURM)

Evidence: Test results show typical time for 12000 task job launch on idle system (by component):

- 5 sec LCRM
- 30 sec SLURM
- 50 sec POE
- 65 sec MPI
- 150 sec Total (sum of above)
- 35 sec Total time attributed to LCRM/SLURM

Item 43 - LCRM/SLURM enforce the computing resource usage policy defined by the CCCs

Evidence: Bank administrators use LCRM’s lrmmgr tool to assign shares (proportional usage targets) to each of the CCC banks. The CCC banks are allocated 85% of purple. The ASC Exec banks are allocated 5% to each lab.

LCRM prioritizes jobs to run in an order that achieves the target usage: jobs of users who have used less of their share are granted higher priority.

LCRM administrators use LCRM’s lrmmgr tool to configure job limits that LCRM imposes:
- Maximum number of jobs that purple will run at any given time
- Maximum number of jobs a user can run on purple at any given time
- Maximum number of nodes a user can request for a job
- Maximum wall clock time duration for a job

Item 44 - Jobs terminate cleanly (without leaving orphaned processes) in less than one or two minutes (again, excluding factors outside the control of LCRM/SLURM)

Evidence: Typical time for SLURM to terminate and clean-up a 12000 task job: 12 sec. Typical time for LCRM to process a job termination is under 30 seconds. In addition, LCRM employs a mechanism to detect and terminate job processes once the job completes or is removed.