- Overview
- Credits
- Charging/Refunding
- Usage Resetting
- Decayed time/credits
- Charge Rates
- Time-based credits
Overview

- Customers switching from Gold/MAM
- Discuss how it's done in Slurm
- Wrappers have been written to mimic banking nomenclature
  - SLURM Bank
Credits

- Credits == Limits
  - GrpTRESMins=<TRES>=# (# of credits)

- Add credits
  - sacctmgr modify <entity> set grptresmins=<TRES>=(current + new)

- Usage/Balance
  - scontrol show assoc
    - GrpTRESMins=TRES=LIMIT(USAGE),...
    - N == No Limit
    - GrpTRESMins=cpu=10(2),mem=N(1200)
$ scontrol show assoc users=brian accounts=stuff flags=assoc

ClusterName=lappy Account=stuff UserName= Priority=0 ID=3
  SharesRaw/Norm/Level/Factor=2147483647/0.00/5/0.00
  UsageRaw/Norm/Efctv=20612.12/1.00/1.00
  ParentAccount=root(1) Lft=86 DefAssoc=No
  GrpJobs=N(40) GrpJobsAccrue=N(29)
  GrpSubmitJobs=N(69) GrpWall=N(69.59)
  GrpTRES=cpu=500(80),mem=N(16000),energy=N(0),node=N(10),billing=N(160),
  GrpTRESMins=cpu=1000(171),mem=N(34350),energy=N(0),node=N(69),billing=N(343),...
  GrpTRESRunMins=cpu=N(80),mem=N(16000),energy=N(0),node=N(40),billing=N(160),...

ClusterName=lappy Account=stuff UserName=brian(1003) Partition= Priority=0 ID=4
  SharesRaw/Norm/Level/Factor=1/0.20/5/0.20
  UsageRaw/Norm/Efctv=20612.12/1.00/1.00
  ParentAccount= Lft=91 DefAssoc=Yes
  GrpJobs=N(40) GrpJobsAccrue=N(29)
  GrpSubmitJobs=N(69) GrpWall=N(69.59)
  GrpTRES=cpu=N(80),mem=N(16000),energy=N(0),node=N(10),billing=N(160),
  GrpTRESMins=cpu=N(171),mem=N(34350),energy=N(0),node=N(69),billing=N(343),...
  GrpTRESRunMins=cpu=N(80),mem=N(16000),energy=N(0),node=N(40),billing=N(160),...

MaxJobs= MaxJobsAccrue= MaxSubmitJobs= MaxWallPJ= ...
Charging/Refunding

● Charging
  ○ Jobs are charged for use
  ○ AccountingStorageEnforce=associations,limits,qos,safe
    ■ Only run job if the job can run to completion with available GrpTRESMins
    ■ Otherwise, the job could be killed after the job is launched and exceeds the limit

● Refunding
  ○ Find how much time the job used
    ■ (sacct -j <jobid> -o CPUPTimeRaw) / 60
  ○ Increase limit by time used
Usage Reset

● PriorityResetUsagePeriod
  ○ **NONE** - Never clear historic usage. The default value.
  ○ **NOW** - Clear the historic usage now. Executed at startup and reconfiguration time.
  ○ **DAILY** - Cleared every day at midnight.
  ○ **WEEKLY** - Cleared every week on Sunday at time 00:00.
  ○ **MONTHLY** - Cleared on the first day of each month at time 00:00.
  ○ **QUARTERLY** - Cleared on the first day of each quarter at time 00:00.
  ○ **YEARLY** - Cleared on the first day of each year at time 00:00.

● Manually with sacctmgr
  ○ `sacctmgr mod account acctA set rawusage=0`
Decayed time/credits

- By default GrpTRESMins is decayed
- A couple of ways to handle hard limits
  - PriorityDecayHalfLife=0
    - No decay at all -- including fairshare
  - Use QOS with NoDecay QOS flag
    - QOS usage not decayed
    - Account/User usage still decayed
Billing TRES

- Use Billing TRES to define what a "credit" is.
- Limit against Billing TRES
  - sacctmgr mod account acctA set grptresmins=billing=#
- TRESBillingWeights == Charge Rates
  - Per partition
  - PartitionName=gpu ... TRESBillingWeights=cpu=1,gres/gpu=2 # gpus charged at 2x
  - Note that a QOS's UsageFactor can also affect the rate
Time-based credits

- Slurm doesn't natively do this
- Have to write an external program/db to manage this
  - and any other policies related to credits (e.g. roll over)