

INF 503 Homework 1

Problem #1 and Problem #2

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Problem #1 (of 2): Monsoon account creation and workshop

Exercise 1:

```
<  ondemand.hpc.nau.edu/pun/sys/dashboard/files/fs/scratch/ps747/exercise1.out
Tue Jan 30 11:55:49 MST 2024
Python 3.6.8
/scratch/ps747
Tue Jan 30 11:56:19 MST 2024
The secret code for exercise1 is: 2d258c28fcc62c60b969bbcf0d544f38
```

```
Tue Jan 30 11:55:49 MST 2024
Python 3.6.8
/scratch/ps747
Tue Jan 30 11:56:19 MST 2024
The secret code for exercise1 is: 2d258c28fcc62c60b969bbcf0d544f38
```

Exercise 2:

```
<  ondemand.hpc.nau.edu/pun/sys/dashboard/files/fs/scratch/ps747/long.txt
Tue Jan 30 14:39:02 MST 2024
The secret code for exercise2 is: 5108b7ad84a2bcb2808ef90415fcf1b9
```

```
Tue Jan 30 14:39:02 MST 2024
The secret code for exercise2 is: 5108b7ad84a2bcb2808ef90415fcf1b9
```

```
ondemand.hpc.nau.edu/pun/sys/shell/ssh/ondemand.hpc.nau.edu

Host: ondemand.hpc.nau.edu
Themes: Default

The authenticity of host 'rain.hpc.nau.edu (10.15.108.28)' can't be established.
ECDSA key fingerprint is SHA256:cdk5VtK5e400k3tsKwFgHvLVoi12uYiuVYrBiRU+Ue/M.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'rain.hpc.nau.edu,10.15.108.28' (ECDSA) to the list of known hosts.
ps747@rain.hpc.nau.edu's password:

#####
#
# Welcome to Monsoon - login node: [rain]
#
# Red Hat Enterprise Linux release 8.9 (Ootpa) - Kernel: 4.18.0-513.11.1.el8_9.x86_64
# slurm 23.11.1
#
# You are logged in as ps747
#
# Information:
# - Monsoon now running Enterprise Linux 8
# - /scratch : files auto DELETED after 30 days
#
# Issues or questions: ask-arc@nau.edu
#
# Maintenance:
# - None at this time
#
# Random tip:
# Read additional monsoon documentation here: http://nau.edu/hpc/docs
#
#####

[ps747@rain ~]$
```

Exercise 3: Via cli

```
ondemand.hpc.nau.edu/pun/sys/shell/ssh/ondemand.hpc.nau.edu

Host: ondemand.hpc.nau.edu
Themes: Default

#
#####

[ps747@rain ~]$ srun -p all gcc hello.c -o a.out
srun: error: invalid partition specified: all
srun: error: Unable to allocate resources: Invalid partition name specified
[ps747@rain ~]$ "sinfo
-bash: "sinfo: command not found
[ps747@rain ~]$ sinfo
PARTITION AVAIL  TIMELIMIT  NODES  STATE MODELIST
core*      up 14-00:00:0  1      drng  cn67
core*      up 14-00:00:0  2      drain cn[97,101]
core*      up 14-00:00:0  1      resv  cn31
core*      up 14-00:00:0  95      mix  cn[1,4-5,8-9,11,13-26,28,30,32-33,35-66,68-96,98-100,102-108]
core*      up 14-00:00:0  5      alloc cn[6-7,10,12,29]
core*      up 14-00:00:0  1      idle  cn3
gpu        up 14-00:00:0  1      resv  cn31
gpu        up 14-00:00:0  3      mix  cn[1,32-33]
gpu        up 14-00:00:0  1      idle  cn3
[ps747@rain ~]$ squeue -t R
JOBID PARTITION  NAME      USER ST  TIME  NODES MODELIST(REASON)
7374744 core seq_per_ kn766 R 4-22:35:42 1 cn6
7431668 core od_rstud  ak2386 R 3:00:39 1 cn17
7430176 core od_rstud  pd324 R 4:16:30 1 cn28
7374748 core seq_per_ kn766 R 4-22:34:23 1 cn10
7432810 core mcmc      ds565 R 2:18:51 1 cn5
7436604 core standalo mpe32 R 1:40 1 cn30
7434551 core bash      sgk56 R 1:11:46 1 cn12
7131476 core b20.0     drs444 R 10-03:36:56 1 cn69
7415244 core CheetahD vn229 R 21:21:04 1 cn30
7415292 core ColgueDB vn229 R 21:18:04 1 cn19
7415471_1 core SIFT_DB  vn229 R 20:45:02 1 cn30
7433820 core flu-pred yc424 R 1:42:48 1 cn8
7433821 core flu-pred yc424 R 1:42:48 1 cn8
```

1. How many nodes make up a monsoon? – Hint: use “sinfo”

Ans: The Monsoon cluster has 105 nodes in total. The GPU division consists of five nodes.

2. How many nodes are in the GPU partition?

Ans: The GPU division consists of five nodes.

3. How many jobs are currently running? – Hint: use “squeue -t R”

Ans: On the cluster, 420 jobs are executing right now.

The below screenshot shows that the current running has 420 jobs that are executing right now.

```
ondemand.hpc.nau.edu/pun/sys/shell/ssh/ondemand.hpc.nau.edu
Host: ondemand.hpc.nau.edu
[ps747@rain ~]$ squeue -t R
```

JOBID	PARTITION	NAME	USER	ST	TIME	NODES	MODELIST(REASON)
7374744	core	seq_per_	kn766	R	4-22:57:41	1	cn6
7431668	core	od_rstud	ak2386	R	3:22:38	1	cn17
7430176	core	od_rstud	pd324	R	4:38:29	1	cn28
7436952	core	long	lk582	R	2:38	1	cn69
7374748	core	seq_per_	kn766	R	4-22:56:22	1	cn10
7432810	core	mcmc	ds565	R	2:40:50	1	cn5
7436838	core	spyder	mpe32	R	12:38	1	cn69
7434551	core	bash	sgk56	R	1:33:45	1	cn12
7131476	core	b20.0	drs444	R	10-03:58:55	1	cn69
7415244	core	CheetahD	vn229	R	21:43:03	1	cn30
7415292	core	ColgueDB	vn229	R	21:40:03	1	cn19
7415471_1	core	SIFT_DB	vn229	R	21:07:01	1	cn30
7433820	core	flu-pred	yc424	R	2:04:47	1	cn8
7433821	core	flu-pred	yc424	R	2:04:47	1	cn8
7433822	core	flu-pred	yc424	R	2:04:47	1	cn8
7433823	core	flu-pred	yc424	R	2:04:47	1	cn8
7433824	core	flu-pred	yc424	R	2:04:47	1	cn105
7433825	core	flu-pred	yc424	R	2:04:47	1	cn105
7433796	core	flu-pred	yc424	R	2:05:47	1	cn64
7433797	core	flu-pred	yc424	R	2:05:47	1	cn52
7433798	core	flu-pred	yc424	R	2:05:47	1	cn52
7433799	core	flu-pred	yc424	R	2:05:47	1	cn51
7433800	core	flu-pred	yc424	R	2:05:47	1	cn51
7433801	core	flu-pred	yc424	R	2:05:47	1	cn51
7433802	core	flu-pred	yc424	R	2:05:47	1	cn51
7433803	core	flu-pred	yc424	R	2:05:47	1	cn51
7433804	core	flu-pred	yc424	R	2:05:47	1	cn36
7433805	core	flu-pred	yc424	R	2:05:47	1	cn36
7433806	core	flu-pred	yc424	R	2:05:47	1	cn36
7433807	core	flu-pred	yc424	R	2:05:47	1	cn36
7433808	core	flu-pred	yc424	R	2:05:47	1	cn36
7433809	core	flu-pred	yc424	R	2:05:47	1	cn36

```
ondemand.hpc.nau.edu/pun/sys/shell/ssh/ondemand.hpc.nau.edu
Host: ondemand.hpc.nau.edu
```

7393543_3424	core	gedil1214	pb463	R	4:21:59	1	cn30
7393543_3407	core	gedil1214	pb463	R	4:48:02	1	cn78
7393543_3408	core	gedil1214	pb463	R	4:48:02	1	cn30
7393543_3404	core	gedil1214	pb463	R	4:52:02	1	cn86
7393543_3403	core	gedil1214	pb463	R	4:53:02	1	cn73
7393543_3402	core	gedil1214	pb463	R	4:54:02	1	cn35
7393543_3398	core	gedil1214	pb463	R	5:03:03	1	cn91
7393543_3397	core	gedil1214	pb463	R	5:05:03	1	cn29
7393543_3393	core	gedil1214	pb463	R	5:18:10	1	cn29
7393543_3389	core	gedil1214	pb463	R	5:28:11	1	cn87
7393543_3388	core	gedil1214	pb463	R	5:30:11	1	cn74
7393543_3381	core	gedil1214	pb463	R	5:31:11	1	cn76
7393543_3382	core	gedil1214	pb463	R	5:31:11	1	cn75
7393543_3383	core	gedil1214	pb463	R	5:31:11	1	cn70
7393543_3384	core	gedil1214	pb463	R	5:31:11	1	cn30
7393543_3385	core	gedil1214	pb463	R	5:31:11	1	cn30
7393543_3386	core	gedil1214	pb463	R	5:31:11	1	cn29
7393543_3387	core	gedil1214	pb463	R	5:31:11	1	cn29
7393543_3378	core	gedil1214	pb463	R	5:32:11	1	cn80
7393543_3377	core	gedil1214	pb463	R	5:36:11	1	cn83
7393543_3370	core	gedil1214	pb463	R	5:42:12	1	cn99
7393543_3369	core	gedil1214	pb463	R	5:45:12	1	cn4
7393543_3365	core	gedil1214	pb463	R	5:51:12	1	cn20
7393543_3362	core	gedil1214	pb463	R	5:52:12	1	cn66
7393543_3359	core	gedil1214	pb463	R	6:00:13	1	cn46
7393543_3353	core	gedil1214	pb463	R	6:37:20	1	cn29
7393543_3352	core	gedil1214	pb463	R	6:39:20	1	cn11
7393543_3347	core	gedil1214	pb463	R	6:47:20	1	cn30
7393543_3345	core	gedil1214	pb463	R	6:48:20	1	cn19
7393543_3346	core	gedil1214	pb463	R	6:48:20	1	cn92
7393543_3341	core	gedil1214	pb463	R	6:53:20	1	cn49

```
[ps747@rain ~]$ squeue -t R | grep -c "R"
420
[ps747@rain ~]$
```

```
[ps747@rain ~]$ squeue -t R | grep -c "R"
```

420

```
[ps747@rain ~]$
```

4. How many jobs are currently pending? Why? – Hint: use “squeue –t PD”

```
ondemand.hpc.nau.edu/pun/sys/shell/ssh/ondemand.hpc.nau.edu
Host: ondemand.hpc.nau.edu
7393543_3341 core gedil214 pb463 R 7:06:17 1 cn49
[ps747@rain ~]$ squeue -t PD
JOBID PARTITION NAME USER ST TIME NODES MODELIST(REASON)
7413105 core Jag_kern zk64 PD 0:00 1 (Resources)
7437208 [2-92] core DumpHead coc25 PD 0:00 1 (Priority)
7437221 [1-35] core DumpHead coc25 PD 0:00 1 (Priority)
7437220 [1-12%10] core COCpipe2 coc25 PD 0:00 1 (Priority)
7437219 [2] core Archival coc25 PD 0:00 1 (Priority)
7437218_1 core Archival coc25 PD 0:00 1 (Priority)
7437217_3 core Archival coc25 PD 0:00 1 (Priority)
7341623 core update_f hpc_phen PD 0:00 1 (BeginTime)
7341633 core provisio hpc_phen PD 0:00 1 (BeginTime)
7341627 core summary hpc_phen PD 0:00 1 (BeginTime)
7341628 core nvd_i_upd hpc_phen PD 0:00 1 (BeginTime)
7341636 core no_data hpc_phen PD 0:00 1 (BeginTime)
7341632 core cl_figs hpc_phen PD 0:00 1 (BeginTime)
7341629 core ts_plots hpc_phen PD 0:00 1 (BeginTime)
7341637 core shiftFOV hpc_phen PD 0:00 1 (BeginTime)
7341626 core roi_time hpc_phen PD 0:00 1 (BeginTime)
7341622 core logrotat hpc_phen PD 0:00 1 (BeginTime)
7341634 core metadata hpc_phen PD 0:00 1 (BeginTime)
7341624 core update_f hpc_phen PD 0:00 1 (BeginTime)
7341635 core postproc hpc_phen PD 0:00 1 (BeginTime)
7341630 core midday_i hpc_phen PD 0:00 1 (BeginTime)
7341631 core overlays hpc_phen PD 0:00 1 (BeginTime)
7341625 core update_l hpc_phen PD 0:00 1 (BeginTime)
7415471 [5-11] core SIFT_DB vn229 PD 0:00 1 (AssocGrpMemRunMinutes)
7428642 core 80C_100n bmr298 PD 0:00 1 (Priority)
7428643 core 80C_400n bmr298 PD 0:00 1 (Priority)
7428644 core 80C_800n bmr298 PD 0:00 1 (Priority)
7436423 core index lf579 PD 0:00 1 (Priority)
7278146 [2539-3240] core Ice_08 sp2358 PD 0:00 1 (AssocGrpMemRunMinutes)
7393543_3618-5075 core gedil214 pb463 PD 0:00 1 (AssocGrpMemRunMinutes)
[ps747@rain ~]$
```

```
ondemand.hpc.nau.edu/pun/sys/shell/ssh/ondemand.hpc.nau.edu
Host: ondemand.hpc.nau.edu
28
[ps747@rain ~]$ squeue -t PD
JOBID PARTITION NAME USER ST TIME NODES MODELIST(REASON)
7413105 core Jag_kern zk64 PD 0:00 1 (Resources)
7437208 [72-92] core DumpHead coc25 PD 0:00 1 (Priority)
7437220 [1-12] core COCpipe2 coc25 PD 0:00 1 (Priority)
7437221 [1-35] core DumpHead coc25 PD 0:00 1 (Priority)
7437219_2 core Archival coc25 PD 0:00 1 (Priority)
7341623 core update_f hpc_phen PD 0:00 1 (BeginTime)
7341633 core provisio hpc_phen PD 0:00 1 (BeginTime)
7341627 core summary hpc_phen PD 0:00 1 (BeginTime)
7341628 core nvd_i_upd hpc_phen PD 0:00 1 (BeginTime)
7341636 core no_data hpc_phen PD 0:00 1 (BeginTime)
7341632 core cl_figs hpc_phen PD 0:00 1 (BeginTime)
7341629 core ts_plots hpc_phen PD 0:00 1 (BeginTime)
7341637 core shiftFOV hpc_phen PD 0:00 1 (BeginTime)
7341626 core roi_time hpc_phen PD 0:00 1 (BeginTime)
7341622 core logrotat hpc_phen PD 0:00 1 (BeginTime)
7341634 core metadata hpc_phen PD 0:00 1 (BeginTime)
7341624 core update_f hpc_phen PD 0:00 1 (BeginTime)
7341635 core postproc hpc_phen PD 0:00 1 (BeginTime)
7341630 core midday_i hpc_phen PD 0:00 1 (BeginTime)
7341631 core overlays hpc_phen PD 0:00 1 (BeginTime)
7341625 core update_l hpc_phen PD 0:00 1 (BeginTime)
7415471 [5-11] core SIFT_DB vn229 PD 0:00 1 (AssocGrpMemRunMinutes)
7428642 core 80C_100n bmr298 PD 0:00 1 (Priority)
7428643 core 80C_400n bmr298 PD 0:00 1 (Priority)
7428644 core 80C_800n bmr298 PD 0:00 1 (Priority)
7436423 core index lf579 PD 0:00 1 (Priority)
7278146 [2539-3240] core Ice_08 sp2358 PD 0:00 1 (AssocGrpMemRunMinutes)
7393543_3622-5075 core gedil214 pb463 PD 0:00 1 (AssocGrpMemRunMinutes)
[ps747@rain ~]$ squeue -t PD | grep -c "PD"
28
[ps747@rain ~]$
```

```
[ps747@rain ~]$ squeue -t PD | grep -c "PD"
```

28

- 28 jobs are currently pending.

Exercise 4 via CLI

```
[ps747@rain ~]$  
[ps747@rain ~]$ cp /common/contrib/examples/job_scripts/lazyjob.sh .  
[ps747@rain ~]$ nano lazyjob.sh  
[ps747@rain ~]$ sbatch lazyjob.sh  
Submitted batch job 7438968  
[ps747@rain ~]$ sstat -j 7438968  
JobID      MaxVMSize  MaxVMSizeNode  MaxVMSizeTask  AveVMSize  MaxRSS  MaxRSSNode  MaxRSSTask  AveRSS  MaxPages  MaxPagesNode  MaxPagesTask  AveP  
ages       MinCPU    MinCPUNode    MinCPUTask     AveCPU     NTasks  AveCPUFreq  ReqCPUFreqMin  ReqCPUFreqMax  ReqCPUFreqGov  ConsumedEnergy  MaxDiskRead  MaxDiskReadNo  
de  MaxDiskReadTask  AveDiskRead  MaxDiskWrite  MaxDiskWriteNode  MaxDiskWriteTask  AveDiskWrite  TRESUsageInAve  TRESUsageInMax  TRESUsageInMaxNode  TRESUsageIn  
MaxTask  TRESUsageInMin  TRESUsageInMinNode  TRESUsageInMinTask  TRESUsageInTot  TRESUsageOutAve  TRESUsageOutMax  TRESUsageOutMaxNode  TRESUsageOutMaxTask  TRES  
UsageOutMin  TRESUsageOutMinNode  TRESUsageOutMinTask  TRESUsageOutTot  
-----  
-----  
-----  
7438968.0  441272K  cn51          0  00:00:12  0  441272K  441272K  cn51          0  441272K  0  cn51          0  293774  0  cn  
51  00:00:12  0  293774  1394  cn51          0  1394  cpu=00:00:12,+  cpu=00:00:12,+  cpu=cn51,energy=c+  cpu=00:00:0  
0,fs/d+  energy=cn51,fs/di+  fs/disk=0  energy=0,fs/di+  energy=0,fs/di+  energy=cn51,fs/di+  fs/disk=0 ener  
gy=0,fs/di+  energy=cn51,fs/di+  fs/disk=0  energy=0,fs/di+  energy=0,fs/di+  energy=cn51,fs/di+  fs/disk=0 ener  
[ps747@rain ~]$ squeue -u ps747  
JOBID PARTITION  NAME  USER ST  TIME  NODES NODELIST(REASON)  
7438968  core      lazy  ps747 R  0:40  1 cn51  
[ps747@rain ~]$
```

```
[ps747@rain ~]$ jobstats -r  
JobID      JobName  ReqMem  MaxRSS  ReqCPUS  UserCPU  Timelimit  Elapsed  State  JobEff  
=====
```

7430215	exercise1	1.95G	4.04M	1	00:00.252	00:20:00	00:00:33	COMPLETED	1.48
7434228	long	0.98G	4.05M	1	00:00.149	03:00:00	00:05:01	COMPLETED	1.6
7437678	hostname	500M	0.1M	1	00:00.001	02:00:00	00:00:30	FAILED	-
7438759	lazy	3.91G	453M	4	00:02.002	00:30:00	00:01:06	COMPLETED	5.25
7438925	lazy	3.91G	560M	4	00:01.626	00:30:00	00:01:06	COMPLETED	6.1
7438931	lazy	3.91G	454M	4	00:01.581	00:30:00	00:01:05	COMPLETED	5.19
7438968	lazy	3.91G	454M	4	00:01.650	00:30:00	00:01:06	COMPLETED	5.22

```
=====
```

Memory : 10.16%
CPU : 00.65%
Time Limit : 03.11%
=====

Efficiency Score: 4.64
=====

```
[ps747@rain ~]$
```

```
[ps747@rain ~]$ jobstats -rJobID JobName ReqMem MaxRSS ReqCPUS UserCPU Timelimit  
Elapsed State JobEff
```

```
=====
```

7430215	exercise1	1.95G	4.04M	1	00:00.252	00:20:00	00:00:33	COMPLETED	1.48
7434228	long	0.98G	4.05M	1	00:00.149	03:00:00	00:05:01	COMPLETED	1.6
7437678	hostname	500M	0.1M	1	00:00.001	02:00:00	00:00:30	FAILED	-
7438759	lazy	3.91G	453M	4	00:02.002	00:30:00	00:01:06	COMPLETED	5.25
7438925	lazy	3.91G	560M	4	00:01.626	00:30:00	00:01:06	COMPLETED	6.1
7438931	lazy	3.91G	454M	4	00:01.581	00:30:00	00:01:05	COMPLETED	5.19
7438968	lazy	3.91G	454M	4	00:01.650	00:30:00	00:01:06	COMPLETED	5.22

```
=====
```

Memory: 10.16%

CPU: 00.65%

Time Limit: 03.11%

Efficiency Score: 4.64

```
=====
```

=====

Edit the lazy job script, comment out the first srun command, and uncomment the second srun command.

```

ondemand.hpc.nau.edu/pun/sys/shell/ssh/ondemand.hpc.nau.edu
Host: ondemand.hpc.nau.edu
Themes: Default

Efficiency Score: 6.49
=====
[ps747@rain ~]$ nano lazyjob.sh
[ps747@rain ~]$ sbatch lazyjob.sh
Submitted batch job 7439047
[ps747@rain ~]$ sstat -j 7439047
JobID      MaxVMSize  MaxVMSizeNode  AveVMSize  MaxRSS  MaxRSSNode  MaxRSSTask  AveRSS  MaxPages  MaxPagesNode  MaxPagesTask  AvePages  Mi
nCPU  MinCPUNode  MinCPUTask  AveCPU  NTasks  AveCPUFreq  ReqCPUFreqMin  ReqCPUFreqMax  ReqCPUFreqGov  ConsumedEnergy  MaxDiskRead  MaxDiskReadNode  MaxDiskReadTask  Av
eDiskRead  MaxDiskWrite  MaxDiskWriteNode  MaxDiskWriteTask  AveDiskWrite  TRESUsageInAve  TRESUsageInMax  TRESUsageInMaxNode  TRESUsageInMaxTask  TRESUsageInMin  TRESUsageI
nMinNode  TRESUsageInMinTask  TRESUsageInTot  TRESUsageOutAve  TRESUsageOutMax  TRESUsageOutMaxNode  TRESUsageOutMaxTask  TRESUsageOutMin  TRESUsageOutMinNode  TRESUsageOut
MinTask  TRESUsageOutTot
-----
-----
-----
sstat: error: No steps running for job 7439047
[ps747@rain ~]$ nano lazyjob.sh
[ps747@rain ~]$ jobstats -r
JobID      JobName      ReqMem      MaxRSS      ReqCPUS      UserCPU      Timelimit      Elapsed      State      JobEff
-----
7430215      exercise1      1.95G      4.04M      1      00:00.252      00:20:00      00:00:33      COMPLETED      1.48
7434228      long      0.98G      4.05M      1      00:00.149      03:00:00      00:05:01      COMPLETED      1.6
7437678      hostname      500M      0.1M      1      00:00.001      02:00:00      00:00:30      FAILED      -
7438759      lazy      3.91G      453M      4      00:02.002      00:30:00      00:01:06      COMPLETED      5.25
7438925      lazy      3.91G      560M      4      00:01.626      00:30:00      00:01:06      COMPLETED      6.1
7438931      lazy      3.91G      454M      4      00:01.581      00:30:00      00:01:05      COMPLETED      5.19
7438968      lazy      3.91G      454M      4      00:01.650      00:30:00      00:01:06      COMPLETED      5.22
7439015      lazy      3.91G      596M      4      00:01.583      00:30:00      00:01:06      COMPLETED      6.39
7439047      lazy      3.91G      375M      4      00:02:58      00:30:00      00:00:45      RUNNING      36.92
=====

Memory      : 10.75%
CPU          : 12.46%
Time Limit  : 03.11%
=====
Efficiency Score: 8.77
=====
[ps747@rain ~]$

```

```

ondemand.hpc.nau.edu/pun/sys/dashboard/files/fs/scratch/ps747/lazy.txt
stress: info: [3865701] dispatching hogs: 3 cpu, 0 io, 1 vm, 0 hdd
stress: info: [3865701] successful run completed in 65s
The secret code for exercise4 is: 27553e929e2fd07a22382b0d911d98a7

```

secret code from lazy.txt:

```

stress: info: [3865701] dispatching hogs: 3 cpu, 0 io, 1 vm, 0 hdd
stress: info: [3865701] successful run completed in 65s
The secret code for exercise4 is: 27553e929e2fd07a22382b0d911d98a7

```



```
ondemand.hpc.nau.edu/pun/sys/shell/ssh/ondemand.hpc.nau.edu
Host: ondemand.hpc.nau.edu
Themes: Default

7438968      lazy      3.91G    454M    4      00:01.650  00:30:00  00:01:06  COMPLETED  5.22
7439015      lazy      3.91G    596M    4      00:01.583  00:30:00  00:01:06  COMPLETED  6.39
7439047      lazy      3.91G    375M    4      00:02:58  00:30:00  00:00:45  RUNNING    36.92

=====
Memory      : 10.75%
CPU         : 12.46%
Time Limit  : 03.11%
=====
Efficiency Score: 8.77
=====
[ps747@rain ~ ]$ ls
lazyjob.sh  ondemand
[ps747@rain ~ ]$ cd lazy.txt
-bash: cd: lazy.txt: No such file or directory
[ps747@rain ~ ]$ cd scratch/ps747
-bash: cd: scratch/ps747: No such file or directory
[ps747@rain ~ ]$ module load workshop
[ps747@rain ~ ]$ $ confirm_user
-bash: $: command not found
[ps747@rain ~ ]$ confirm_user
exercise 1 code: 2d258c28fcc62c60b969bbcf0d544f38
exercise 2 code: 5108b7ad84a2bcb2808ef90415fcf1b9
exercise 4 code: 27553e929e2fd07a22382b0d911d98a7

email = 'ps747@nau.edu'

Sent confirmation email to ps747@nau.edu

You've successfully confirmed your account!

Press Enter to Exit
```

```
[ps747@rain ~ ]$ module load workshop
```

```
[ps747@rain ~ ]$ $ confirm_user
-bash: $: command not found
```

```
[ps747@rain ~ ]$ confirm_user
```

```
exercise 1 code: 2d258c28fcc62c60b969bbcf0d544f38
```

```
exercise 2 code: 5108b7ad84a2bcb2808ef90415fcf1b9
```

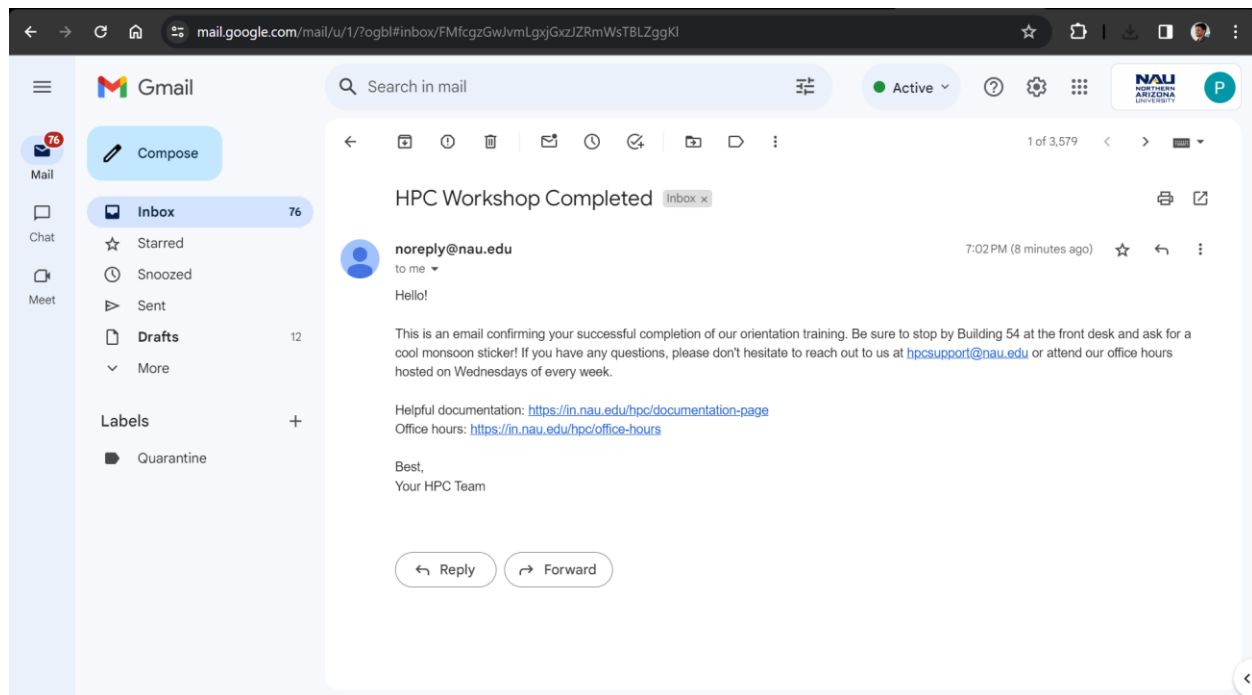
```
exercise 4 code: 27553e929e2fd07a22382b0d911d98a7
```

```
email = 'ps747@nau.edu'
```

```
Sent confirmation email to ps747@nau.edu
```

```
You've successfully confirmed your account!
```

```
Press Enter to Exit
```

Problem #2 (of 2): basic text processing

Below is the execution process and steps with commands for problem 2 of homework assignment 1:

Commands:

Use the command '**g++ gnome1.cpp -o gnome**' to compile the genome.cpp file.

Next, run the code by executing the below command to run the executable file:

./gnome 1 /common/contrib/classroom/inf503/genomes/human.txt

```
[ps747@rain ~/Homeworks]$ g++ gnome1.cpp -o gnome
```

```
[ps747@rain ~/Homeworks]$ ./gnome 1 /common/contrib/classroom/inf503/genomes/human.txt
```

Output screenshot for problem 1:

```
ondemand.hpc.nau.edu/pun/sys/shell/ssh/ondemand.hpc.nau.edu
Host: ondemand.hpc.nau.edu
Themes: Default

#####
#
# Welcome to Monsoon - login node: [rain]
#
# Red Hat Enterprise Linux release 8.9 (Ootpa) - Kernel: 4.18.0-513.11.1.el8_9.x86_64
# slurm 23.11.1
#
# You are logged in as ps747
#
# Information:
# - Monsoon now running Enterprise Linux 8
# - /scratch : files auto DELETED after 30 days
#
# Issues or questions: ask-arc@nau.edu
#
# Maintenance:
# - None at this time
#
# Random tip:
# For moving large data sets, use our data transfer node! Simply do: ssh dtn1
#
#####

[ps747@rain ~]$ cd /home/ps747/Homeworks
[ps747@rain ~/Homeworks]$ g++ gnome1.cpp -o gnome
[ps747@rain ~/Homeworks]$ ./gnome 1 /common/contrib/classroom/inf503/genomes/human.txt

Data read successfully: 3057196364
Total scaffolds: 607
First longest scaffold: 568815346-9606, size: 147687515
Second longest scaffold: 568815332-9606, size: 131283175
Average scaffold length: 5036552
[ps747@rain ~/Homeworks]$
```

To execute part 2 of homework 1, please use the below command.

`./gnome 2 /common/contrib/classroom/inf503/genomes/human.txt`

Output screenshot for problem 2:

```
ondemand.hpc.nau.edu/pun/sys/shell/ssh/ondemand.hpc.nau.edu
Host: ondemand.hpc.nau.edu
Themes: Default

# You are logged in as ps747
#
# Information:
# - Monsoon now running Enterprise Linux 8
# - /scratch : files auto DELETED after 30 days
#
# Issues or questions: ask-arc@nau.edu
#
# Maintenance:
# - None at this time
#
# Random tip:
# For moving large data sets, use our data transfer node! Simply do: ssh dtn1
#
#####

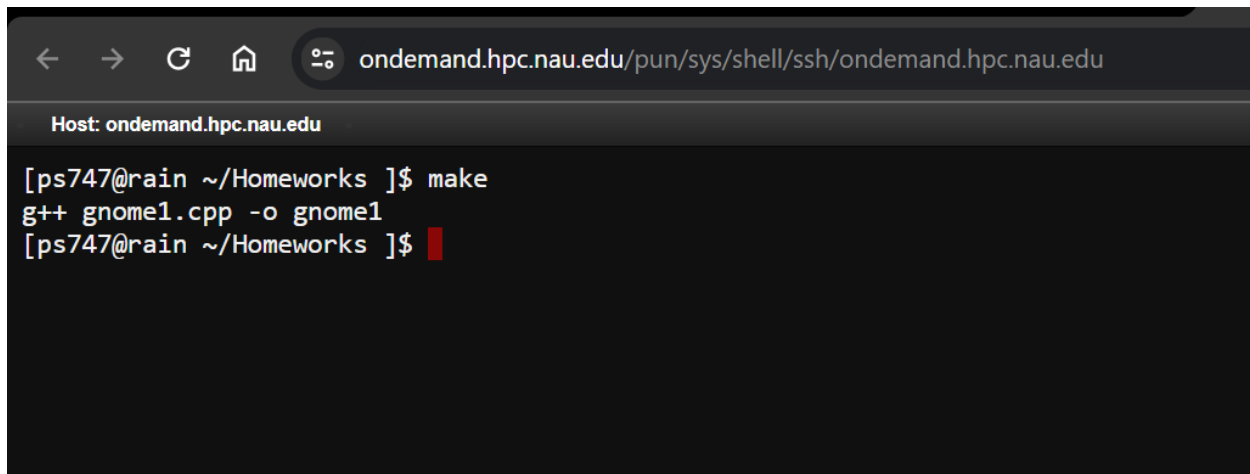
[ps747@rain ~]$ cd /home/ps747/Homeworks
[ps747@rain ~/Homeworks]$ g++ gnome1.cpp -o gnome
[ps747@rain ~/Homeworks]$ ./gnome 1 /common/contrib/classroom/inf503/genomes/human.txt

Data read successfully: 3057196364
Total scaffolds: 607
First longest scaffold: 568815346-9606, size: 147687515
Second longest scaffold: 568815332-9606, size: 131283175
Average scaffold length: 5036552
[ps747@rain ~/Homeworks]$
[ps747@rain ~/Homeworks]$
[ps747@rain ~/Homeworks]$ ./gnome 2 /common/contrib/classroom/inf503/genomes/human.txt

Data read successfully: 3057196364
Time taken: 43.7118s
The percentage(%) of GC content is: 40.9955%
[ps747@rain ~/Homeworks]$
```

Execution using makefile:

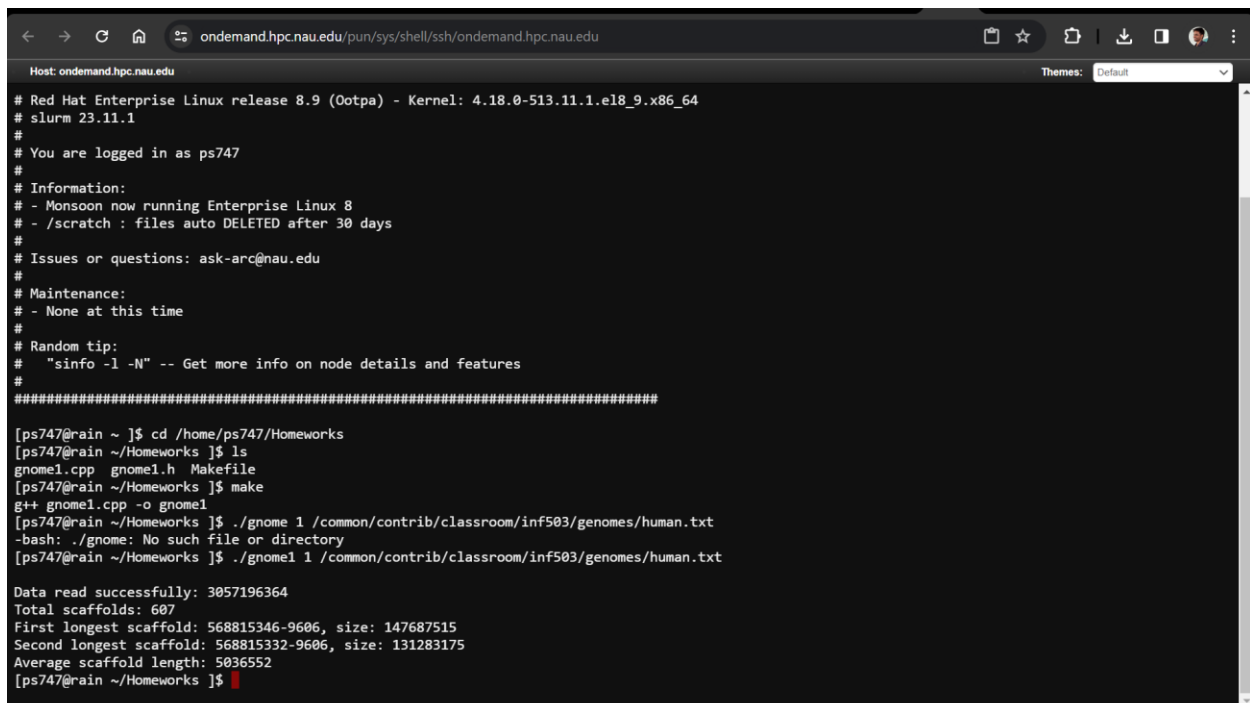
Enter the **make** command to run the **Makefile** as below in the command line:

A terminal window with a dark background. The address bar at the top shows 'ondemand.hpc.nau.edu/pun/sys/shell/ssh/ondemand.hpc.nau.edu'. Below the address bar, it says 'Host: ondemand.hpc.nau.edu'. The terminal text shows a user prompt '[ps747@rain ~/Homeworks]\$' followed by the command 'make'. The next line shows the command being executed: 'g++ gnome1.cpp -o gnome1'. The final line shows the prompt again: '[ps747@rain ~/Homeworks]\$' with a red cursor.

```
[ps747@rain ~/Homeworks ]$ make
g++ gnome1.cpp -o gnome1
[ps747@rain ~/Homeworks ]$
```

Next, run the code by executing the below command to run the executable file:

./gnome1 1 /common/contrib/classroom/inf503/genomes/human.txt

A terminal window with a dark background. The address bar at the top shows 'ondemand.hpc.nau.edu/pun/sys/shell/ssh/ondemand.hpc.nau.edu'. Below the address bar, it says 'Host: ondemand.hpc.nau.edu' and 'Themes: Default'. The terminal text shows system messages: '# Red Hat Enterprise Linux release 8.9 (Ootpa) - Kernel: 4.18.0-513.11.1.el8_9.x86_64', '# slurm 23.11.1', '# You are logged in as ps747', '# Information:', '# - Monsoon now running Enterprise Linux 8', '# - /scratch : files auto DELETED after 30 days', '# Issues or questions: ask-arc@nau.edu', '# Maintenance:', '# - None at this time', '# Random tip:', '# "sinfo -l -N" -- Get more info on node details and features', and a separator line '#####'. Then, the user runs 'cd /home/ps747/Homeworks', 'ls' (showing 'gnome1.cpp', 'gnome1.h', 'Makefile'), and 'make' (showing 'g++ gnome1.cpp -o gnome1'). Finally, the user runs './gnome1 1 /common/contrib/classroom/inf503/genomes/human.txt', which results in a '-bash: ./gnome: No such file or directory' error. The user then runs './gnome1 1 /common/contrib/classroom/inf503/genomes/human.txt' again, which produces output: 'Data read successfully: 3057196364', 'Total scaffolds: 607', 'First longest scaffold: 568815346-9606, size: 147687515', 'Second longest scaffold: 568815332-9606, size: 131283175', 'Average scaffold length: 5036552'. The prompt '[ps747@rain ~/Homeworks]\$' is at the bottom with a red cursor.

```
# Red Hat Enterprise Linux release 8.9 (Ootpa) - Kernel: 4.18.0-513.11.1.el8_9.x86_64
# slurm 23.11.1
#
# You are logged in as ps747
#
# Information:
# - Monsoon now running Enterprise Linux 8
# - /scratch : files auto DELETED after 30 days
#
# Issues or questions: ask-arc@nau.edu
#
# Maintenance:
# - None at this time
#
# Random tip:
# "sinfo -l -N" -- Get more info on node details and features
#
#####

[ps747@rain ~ ]$ cd /home/ps747/Homeworks
[ps747@rain ~/Homeworks ]$ ls
gnome1.cpp  gnome1.h  Makefile
[ps747@rain ~/Homeworks ]$ make
g++ gnome1.cpp -o gnome1
[ps747@rain ~/Homeworks ]$ ./gnome 1 /common/contrib/classroom/inf503/genomes/human.txt
-bash: ./gnome: No such file or directory
[ps747@rain ~/Homeworks ]$ ./gnome1 1 /common/contrib/classroom/inf503/genomes/human.txt

Data read successfully: 3057196364
Total scaffolds: 607
First longest scaffold: 568815346-9606, size: 147687515
Second longest scaffold: 568815332-9606, size: 131283175
Average scaffold length: 5036552
[ps747@rain ~/Homeworks ]$
```

To execute part 2 of homework 1, please use the below command.

./gnome1 2 /common/contrib/classroom/inf503/genomes/human.txt

```
ondemand.hpc.nau.edu/pun/sys/shell/ssh/ondemand.hpc.nau.edu
Host: ondemand.hpc.nau.edu
Themes: Default

#
# Issues or questions: ask-arc@nau.edu
#
# Maintenance:
# - None at this time
#
# Random tip:
# "sinfo -l -N" -- Get more info on node details and features
#
#####

[ps747@rain ~]$ cd /home/ps747/Homeworks
[ps747@rain ~/Homeworks]$ ls
gnome1.cpp  gnome1.h  Makefile
[ps747@rain ~/Homeworks]$ make
g++ gnome1.cpp -o gnome1
[ps747@rain ~/Homeworks]$ ./gnome1 /common/contrib/classroom/inf503/genomes/human.txt
-bash: ./gnome1: No such file or directory
[ps747@rain ~/Homeworks]$ ./gnome1 1 /common/contrib/classroom/inf503/genomes/human.txt

Data read successfully: 3057196364
Total scaffolds: 607
First longest scaffold: 568815346-9606, size: 147687515
Second longest scaffold: 568815332-9606, size: 131283175
Average scaffold length: 5036552
[ps747@rain ~/Homeworks]$
[ps747@rain ~/Homeworks]$
[ps747@rain ~/Homeworks]$
[ps747@rain ~/Homeworks]$ ./gnome1 2 /common/contrib/classroom/inf503/genomes/human.txt

Data read successfully: 3057196364
Time taken: 43.5763s
The percentage(%) of GC content is: 40.9955%
[ps747@rain ~/Homeworks]$
```

1. How many scaffolds were there?

A. Total scaffolds: 607

2. What was the longest and 2nd longest scaffold? Provide names of scaffolds and lengths.

A.

B. First longest scaffold: 568815346-9606, size: 147687515

Second longest scaffold: 568815332-9606, size: 131283175

3. What was the average scaffold length?

A. Average scaffold length: 5036552

4. How long does it take (in seconds) to execute this function? Hint: You will need to use system time within your code to get accurate time estimates.

A. Time taken: 43.5763s

5. What was the GC content of the human genome (percent of C's and G's in the genome)?

A. The percentage(%) of GC content is: 40.9955%