# Assignment #4

## Objective

Introduction to HPC using Kamiak.

## Due

Before 9am on Tuesday April 14th.

## Available Resources

For this class, you have dedicated access to 6 computers (or nodes) on Kamiak for the class. The specification for these **nodes** on Kamiak are as follows.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Partition | # of Nodes | # of CPUs | Max Memory | Other Resources | Max Job Time Limit |
| ficklin\_class | 1 | 40 | 192GB | 1 NVIDIA V100 Tensor Core GPU | 30 Days |
| ficklin\_class | 5 | 24 | 256GB | 2 NVIDIA Tesla K80 (4 GPUs total) | 30 Days |

In summary, the *ficklin\_class* partition, to which you will be submitting jobs, allows you to submit to 6 maximum **nodes** and no more than 160 **tasks** one per CPU.

When reading the material below keep in mind these vocabulary terms:

* **node**: a single computer (we have 6 for the class)
* **job**: the submission of a Bash script (in SLURM format) for execution.
* **task**: a process created by the submission script. Your submission script can launch as many tasks (processes) per jobs as you are allowed CPUs.

## Tasks

Read through these online pages that document Kamiak. If you are already familiar with Kamiak take some time to go through these again as there may be new things for you to learn:

1. <https://hpc.wsu.edu/users-guide/quick-start-guide/>
2. <https://hpc.wsu.edu/users-guide/terminal-ssh/> (you have already looked at this one)
3. <https://hpc.wsu.edu/users-guide/the-unixlinux-environment/>
4. <https://hpc.wsu.edu/users-guide/unixlinux-commands/> (you’ve already learned this but review)
5. <https://hpc.wsu.edu/users-guide/file-editing-software/> (we will use nano for the class)
6. <https://hpc.wsu.edu/users-guide/file-transfers/>
7. <https://hpc.wsu.edu/users-guide/environment-modules/>
8. <https://hpc.wsu.edu/users-guide/job-submission/> (Skip OpenMP/MPI sections)
9. <https://hpc.wsu.edu/users-guide/storage/>
10. <https://hpc.wsu.edu/programmers-guide/python/> (Ignore Anaconda instructions for now)
11. While we won’t be covering R in this class, you use R you can learn to use it on Kamiak here: <https://hpc.wsu.edu/programmers-guide/r/>
12. <https://hpc.wsu.edu/support/drop-in-office-hours/>
13. <https://hpc.wsu.edu/events/> (Check-out upcoming training events on Kamiak.
14. You can use the Kamiak cheat sheet as a reference for the class: <https://s3.wp.wsu.edu/uploads/sites/1122/2018/02/kamiak_cheat_sheet.pdf>

Now that you know a bit about Kamiak, you will submit a job. The `hostname` command can be used on any computer to get the name of the computer. Give it a try on the login node of Kamiak. You should see the name: *login-p1n01.kamiak.wsu.edu* or *login-p1n02.kamiak.wsu.edu*.

To demonstrate how to launch a simple job on Kamiak, your task is to write a Bash submission script that simply runs `hostname`. Be sure to follow instructions described for the “Hello World” example on the User’s Guide (<https://hpc.wsu.edu/users-guide/job-submission/>). The SLURM scheduler should launch the job on as many computers (nodes) as necessary to meet the criteria you specify. The result will be the name of the nodes on which all jobs were scheduled to run. Because the nodes have multiple processors you will probably see the same machine listed multiple times in the output. Be sure your submission script meets the following criteria:

1. Requests 60 processes.
2. Uses the **account** named: *ficklin\_class*
3. Uses the **partition** named: *ficklin\_class*
4. Save the output from the job into a file named: *assignment4\_hostnames.txt*

**Hints:**

1. The number of nodes you request cannot exceed the number of nodes in the partition.
2. Because we want SLURM to execute the same process (e.g. hostname) 60 times you should use an array (see the section on Job Arrays)
3. Each task will create its own STDOUT/STDERR streams. Therefore, you will need to capture the output from each task into a separate file.
   1. To do this, take a look at the description of %A and %a in the Slurm documentation for Job Arrays (<https://slurm.schedmd.com/job_array.html>). This document is linked to from the Kamiak Tutorial documents.
   2. Combine all of the output from each task into a single file named *assignment4\_hostnames.txt* using your UNIX skills.

You are allowed to work together via Slack: ask questions to try to solve the problem and help others*. Do not post a full solution on Slack.*

Full credit will be awarded for either of the following cases:

1. A correct solution that generates proper output
2. A partial solution but documented interactions in a Word file listing any efforts you made to work with others that include:

* Questions you asked on Slack
* Responses you gave to others on Slack
* Solutions you found that were already posted on Slack and tagged by you with a thumbs up (or other emoji)

Partial credit will be awarded If you have attempted the assignment and turned in a solution but it does not work and you *do not* have documented interactions on Slack. Remember there is a 5-point per day penalty for each day late.

**What to Turn in**

Please send your completed Bash submission script and resulting output file to Dr. Ficklin via Slack.