RCC Hadoop Cluster

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- RCC Hadoop cluster was paid for by MSCA program in 2017 and is managed by Research Computing Center
- Currently it consists of 3 management nodes, 6 data nodes, the rack and 10G switch.
- On the internal network the corresponding host names are md01-3, hd01-6
- Originally there were 4 data nodes, 2 more were added in 2019
- The total cost of the cluster was about $100k
- About $5k per year is paid for Cloudera software support
- One of the management nodes also serves as a login node for users
- The login node's hostname on the internal network is md01, that's what you see when you log into it, and on the UChicago network it is hadoop.rcc.uchicago.edu - you use this address for ssh, jupyter hub, Hue

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- Each management node has 256G of RAM, two mirrored 300G SSDs for OS, 24 CPU cores
- Each data node has 256G of RAM, two mirrored 300G SSDs for OS, 24 CPU cores, 14 4T HDDs that are part of HDFS
- The total HDFS storage that is built on top of $6 * 14$ 4T disks spread accross data nodes is 300T
- Hadoop software consists of many different services running on management and data nodes.
- As a user, you only interact directly with a login node and submit a job to the cluster using YARN scheduler
- The actual computation is spread by YARN over data nodes in a way transparent to the user.
- The cluster is currently running Cloudera 6.3 distribution

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- The nodes are connected to each other with 10G ethernet network
- Each node is running CentOS 7.6 distribution of Linux. This is slightly different from Scientific Linux 7.4 used on midway but for a user there is very little difference: all the same commands should work on both systems
- The only thing to be careful about: if you build a binary on one cluster it might not necessarily run on the other cluster because the libraries that are loaded at run time might not be available or might be of incompatible version.
- Same applies to python: despite the fact that python programs are text files and are not explicitly compiled by a user, under the hood, when you install a python package on your account, sometimes some compilation might happen.

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- Besides HDFS and the local file system on which OS is installed, the same GPFS file systems as on midway are mounted on each node:
  - /home
  - /project2
  - /scratch/midway2
  - /software
- In particular, when you login, you get into the same home file system as on midway. Midway, however, does not have access to HDFS.
- So, if you need to copy data between GPFS and HDFS, do it on Hadoop cluster using HDFS commands
- Hadoop cluster is only visible on UChicago network. When you are off-campus, you need to use VPN to access it.
- By default, Hadoop programs like Spark, can access data in HDFS only. If you also want Hadoop programs to access data on GPFS file systems, you need to do chmod o+x $HOME since some of the Hadoop daemons, like YARN, are not owned by the user but need some extra permissions to $HOME when using GPFS.