Azure
Hand on Lab

HPC
Machine Learning
Cognitive Services

Hands-On Lab

SLURM Linux Cluster HOL.html

Docker and Azure Container Service HOL.html

doAzureParallel: Take advantage of Azure’s flexible compute directly from R session

- https://azure.microsoft.com/en-us/blog/doazureparallel/

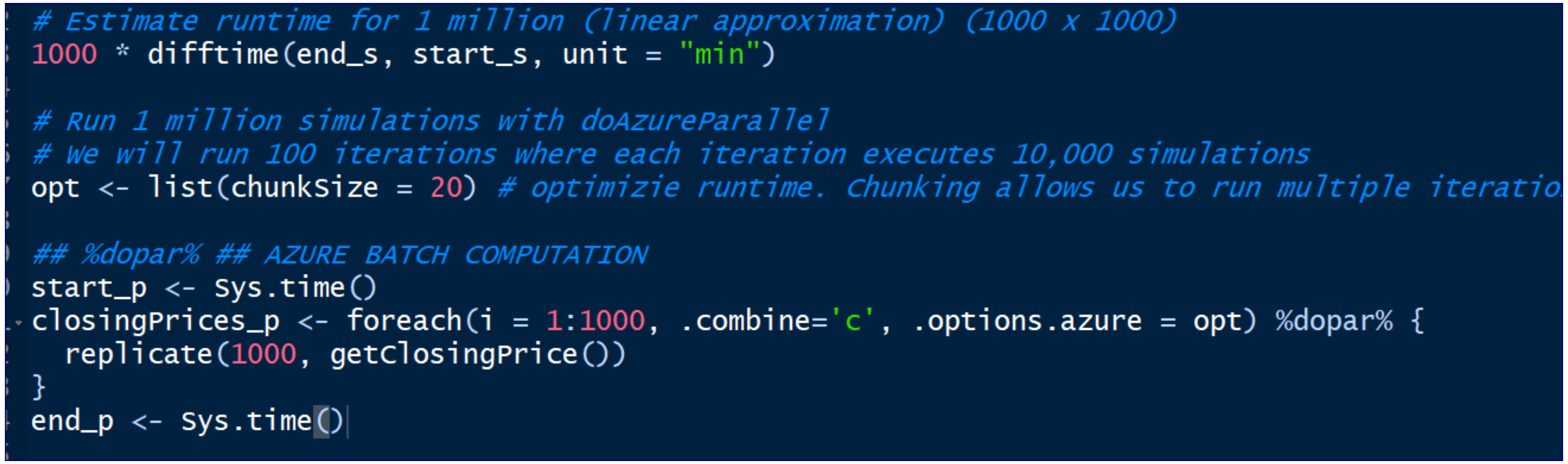
- doAzureParallel – a lightweight R package built on top of Azure Batch, that allows you to easily use Azure’s flexible compute resources right from your R session. doAzureParallel compliments Microsoft R Server by providing the infrastructure for running massive compute parallel simulations.
- At its core, the doAzureParallel package is a parallel backend, for the widely popular foreach package, that lets you execute multiple processes across a cluster of Azure virtual machines. In just a few lines of code, the package helps you create and manage a cluster in Azure, and register it as a parallel backend to be used with the foreach package

- https://github.com/Azure/doAzureParallel/tree/master/samples

Monte Carlo Pricing - HPC Simulation - %dopar%

8-node cluster (standard D2v2: 2 vCPU, 7 Gb)

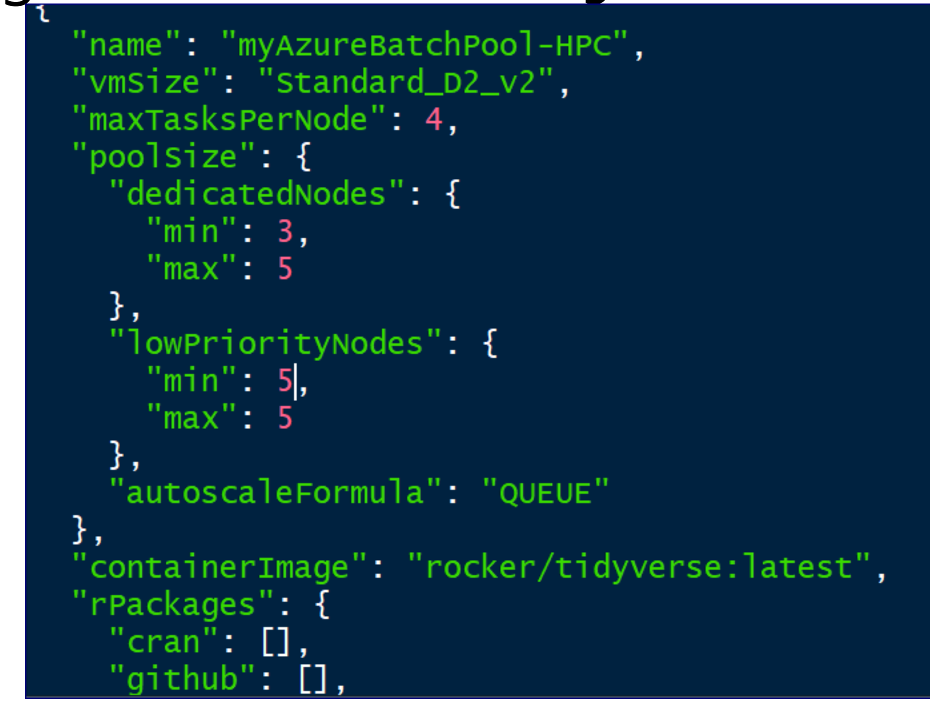
- specify VM class in `cluster.json`
- specify credentials for Azure Batch and Azure Storage in `credentials.json`



```
# Estimate runtime for 1 million (linear approximation) (1000 x 1000)
1000 * difftime(end_s, start_s, unit = "min")

# Run 1 million simulations with doAzureParallel
# We will run 100 iterations where each iteration executes 10,000 simulations
opt <- list(chunkSize = 20) # optimizie runtime. Chunking allows us to run multiple iteratio

## %dopar% ## AZURE BATCH COMPUTATION
start_p <- Sys.time()
closingPrices_p <- foreach(i = 1:1000, .combine='c', .options.azure = opt) %dopar% {
  replicate(1000, getClosingPrice())
}
end_p <- Sys.time()
```



```
{
  "name": "myAzureBatchPool-HPC",
  "vmSize": "Standard_D2_v2",
  "maxTasksPerNode": 4,
  "poolSize": {
    "dedicatedNodes": {
      "min": 3,
      "max": 5
    },
    "lowPriorityNodes": {
      "min": 5,
      "max": 5
    },
    "autoscaleFormula": "QUEUE"
  },
  "containerImage": "rocker/tidyverse:latest",
  "rPackages": {
    "cran": [],
    "github": [],
```

Azure Machine Learning Pipeline with AzureBatchStep

This Jupyter notebook is used to demonstrate the use of AzureBatchStep in Azure Machine Learning Pipeline. An AzureBatchStep will submit a job to an AzureBatch Compute to run a simple windows executable.

- https://github.com/Azure/MachineLearningNotebooks/blob/master/how-to-use-azureml/machine-learning-pipelines/intro-to-pipelines/aml-pipelines-how-to-use-azurebatch-to-run-a-windows-executable.ipynb

Guidance and framework for running HPC applications on Azure

- https://github.com/az-cat/az-hpcapps

- This repository provides automation scripts for creating Azure Batch pools and Azure CycleCloud clusters that you can use to run common high-performance computing (HPC) applications. This repo also serves as a catalog of HPC applications that you can use for testing. More than a dozen common HPC applications are currently supported, including several ANSYS solvers and Star-CCM+, and you can add more as needed as described in this guide.

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