# HPC cluster @ProtoLab

A computational infrastructure for ANSYS Fluent and Mechanical using Remote Service Manager (RSM)

#### Goals

1. Share a small HPC cluster to solve CFD and structural analyses with Ansys directly from your laptop.

2. Optimal usage of machines present in ProtoLab by means of a smart management of the queues using Ansys RSM.

3. Limit the usage of Ansys license on your laptop. The problem will be solved remotely using only one licence.

## Remote Service Manager (RSM)

Start > ANSYS 20.1 > RSM Configuration 2020 R1.

#### What is RSM?

- Allows to run simulation in background both on your laptop or on a remote cluster
- Automatically handles process queues (similar to Slurm queue management on Tomato)

#### Which kind of analyses I can do?

• Any kind of solver available with our current licence (Academic Mechanical and CFD) can be used.



#### Current servers available

- RedOrange: Dell PowerEdge R740 Server, 2xIntel Xenon Gold 6248, 16 cores, 256 Gb RAM. (ABAQUS dedicated)
- 2. Ortho cluster: One master node + 4 computational nodes
  - a. Tomato (master): Dell PowerEdge R820 4x Intel Xeon E5-4620 @ 2.20 GHz, 32 cores, 252 Gb RAM.
  - Artichoke, Cauliflower, Carrot, and Eggplant (computational): Dell PowerEdge R815 4x
     AMD Opteron 6272 @ 2.1GHz, 64 cores, 252 Gb RAM.
- Blackmamba: Dell Precision 5820 Tower, Intel Xeon W-2125 @ 4.0 GHz,
   256 Gb RAM. (Open source/in-house softwares)

## Coming soon... BigBlackMama



8 Cores 192 Gb RAM 14 Cores 256 Gb RAM

Total resources 22 Cores 448 Gb RAM

#### **Remote Service Manager Tutorial**

- 1. In the left column click the "+" icon and add a new HPC resource
- 2. In the first window "HPC Resource" specify the HPC configuration setting:
  - a. Name: BigBlackMama
  - b. HPC type: ARC

c. Submit host: 193.206.66.75 Windows 64

| KSIVI Configuration (C. Osers (Wassimo (AppData (Koamin | g(Ansys(v201(RSIVI)   |   |                       |                 |  |           |   |
|---|---|---|-----------------------|-----------------|--|-----------|---|
| File View Help  |   |   |                       |                 |  |           |   |
|   | HPC Resource  |   |                       | File Management |  | Queues    |   |
| HPC Resources   | HPC Configuration<br>Name<br>HPC type<br>Submit host<br>ARC Job submission<br>IV Use SSH protoc | BigBlackMama       ARC       193.206.66.75       arguments (optional)       ol for inter and intra-node community | nication (Linux only) |                 |  | Windows 6 | 0 |

3. In Client-to-HPC File Management check the box "RSM internal file transfer mechanism" and insert the directory path "D:\\RSM"

4. In HPC Side File Management check "HPC staging directory" and "Keep job

| files" | SM Configuration (C:\Users\Massimo\AppData\Roaming\Ansys\v201\RSM)  View Help             |  |   |                 |  |        |  |  |  |  |
|--------|---|--|---|-----------------|--|--------|--|--|--|--|
|        |   | HPC Resource   |   | File Management |  | Queues |  |  |  |  |
|        | (1) HPC Resources<br>응답 BiplickMana<br>나내 Default<br>응답 Default<br>나내 Local<br>않 Settings | Client-to-HPC File Management<br>How do files get from the client directory to clust<br>C Operating system file transfer to an exis<br>No file transfer needed. Client files will a<br>RSM internal file transfer mechanism<br>Septify the cluster staging director<br>Staging directory path on cluster | Client-to-HPC File Management How do files get from the client directory to cluster staging directory? C Operating system file transfer to an existing network share (Samba, CIFS, NFS) C No file transfer needed. Client files will already be in a staging directory. RSM Internal file transfer mechanism R Specify the cluster staging directory as visible to the HPC resource Staging directory path on cluster D:\ViSM |                 |  |        |  |  |  |  |
|        |   | C External mechanism for file transfer (SCP  | , Custom)   |                 |  |        |  |  |  |  |
|        |   | HPC Side File Management   |   |                 |  |        |  |  |  |  |
|        |   | Select job execution working directory for the H   | Select job execution working directory for the HPC job:   |                 |  |        |  |  |  |  |
|        |   | HPC staging directory  | C HPC staging directory   |                 |  |        |  |  |  |  |
|        |   | <ul> <li>Scratch directory local to the execution</li> </ul>   | node(s)   |                 |  |        |  |  |  |  |
|        |   | ₩ Keep job files in staging directory when job i   | s complete  |                 |  |        |  |  |  |  |

5. Finally "Import queues" will generate the queues to handle the jobs on the server. Please, use the "Default" queue.

| SRM Configuration (C:\Users\Massimo\AppData\Roaming\Ansys\v201\RSM) |               |                       |  |  |       |         |        | -      | ٥      | ) |
|---|---------------|-----------------------|--|--|-------|---------|--------|--------|--------|---|
| File View Help  |               |                       |  |  |       |         |        |        |        |   |
|   | HPC Resource  |                       |  |  | Queue | Queues  |        |        |        |   |
|   | Queues from A | IRC on 'BigBlackMama' |  |  |       |         |        |        |        | 0 |
|   | Enabled       | DSM Quouo             |  |  |       |         | Tort   | Status | Boport |   |
|   |               | Default               |  |  |       | default | Submit | ?      | Report | 1 |
|   |               | Local (1)             |  |  |       | local   | Submit | ?      |        |   |
|   |               |                       |  |  |       |         |        |        |        |   |

6. To complete the setup you need to fulfill the "Credentials". Once step 1-5 have been successfully completed please write to the cluster Administrators for obtaining your credentials.

#### Administrators:

- Gianluca Alaimo gianluca.alaimo@unipv.it
- Massimo Carraturo <u>massimo.carraturo@unipv.it</u>

#### How to solve an analysis using RSM

In File->Solver Process Setting select Remote, the queue (Default), the Job Name, and the specific Ansys licence (ANSYS Academic Research Mechanical and CFD)



#### How to solve an analysis using RSM

Set up the Ansys project locally on your PC. When you have to run the analysis select in the drop down menu on the top left "Remote" and specify the max number of cores to be used.



#### How to solve an analysis using RSM

We can now save the project locally, close Ansys Workbench, and free the licence.

If the job is not finished, when we open it back Ansys will send us a warning.

Otherwise, we can download the result files on our PC using the function "Get Results".

#### Timeline

1. Next week: RSM available for ANSYS Fluent and Mechanical

1. December 2020: Full cluster available for HPC analyses

#### Questions?