Agenda

- 8:30am Welcome
- 8:35am Shaheen III Hardware Overview
- 8:55am How to apply on Shaheen III
- 9:05am Getting Started on Shaheen III
- 9:15am Software Environment
- 9:35am Job Scheduling
- 10:00am Coffee Break
- 10:15am Storage overview & Best practices
- 10:30am Applications software example: VASP workflow
- **10:50 am Applications software example: CFD applications**
- 11:10 am Applications software example: Bio informatics workflow

Shaheen III Survey

KSL Training HPC101

HPC Applications on Shaheen

CFD Basic Module

How to Run Various Test Cases on Shaheen?

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Supercomputing Laboratory
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CFD Services

- Software: Maintaining and Upgrading Software and Test Cases
- Training: Basic, Intermediate and Advanced
- Helpline: cfd-helpline@hpc.kaust.edu.sa
- CFD Consulting Projects
- ANSYS Workshop Series
- CFD User Group Meetings
- Student Certification
- 1-week Summer & Winter CFD School

Basic CFD Module

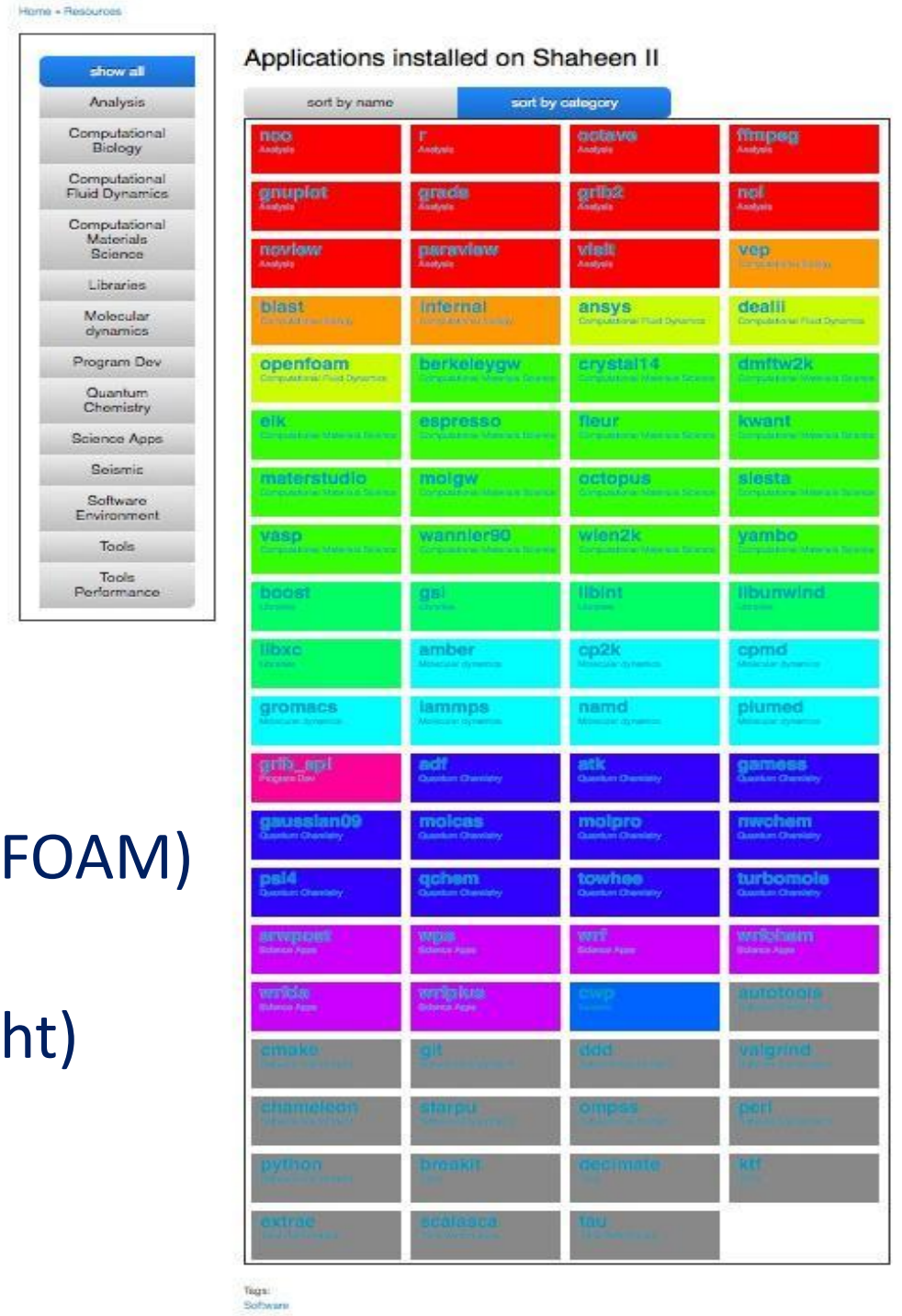
- Quick Overview of Applications on Shaheen
- Typical CFD workflow
- CFD Example Cases
  - Ansys/Fluent
  - CONVERGE
  - OpenFOAM
  - Paraview
  - Tecplot
  - Strong Scalability
  - Interactive Computing in Batch Mode
- Shaheen users can find all material here:

/sw/ex111genoa/openfoam/cfd_module

Applications on Shaheen

CFD Applications:

- Commercial codes (Fluent, CONVERGE)
- Open source codes (OpenFOAM)
- Code development tools (dealii, FEniCS, OpenFOAM)
- Mesh generation (ANSYS)
- Post processing (Tecplot, visit, paraview, Ensight)



Typical CFD Workflow

Solver

Equations solved on mesh

Pre-Processing

- Solid Modeler
- Mesh Generator

- Transport Equations
  - mass
    - species mass fraction
    - phasic volume fraction
  - momentum
  - energy
- Equation of State
- Supporting Physical Models

- Physical Models
  - Turbulence
  - Combustion
  - Radiation
  - Multiphase
  - Phase Change
  - Moving Zones
  - Moving Mesh

- Solver Settings

- Material Properties
- Boundary Conditions
- Initial Conditions

- Post-Processing

Hands-on Demo

- Log into Shaheen
- cd /scratch/$USER
- cp –r **/sw/ex111genoa/openfoam/cfd_module .**
- cd cfd_module

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