



# The 3<sup>rd</sup> BRAIA Space Exploration Summer Camp - “High Performance Computing in Aeronautics”

14-24 July 2019, Islamabad, Pakistan

*Hosted by National University of Sciences & Technology (NUST)*

## **Introduction:**

High Performance Computing (HPC) is a fundamental technology used in solving scientific and commercial problems. Many grand challenges of science depend on simulations and models running on HPC facilities to make progress. In industry, sophisticated computer models are integral to the development of products such as jet engines, wind turbines and new drugs, etc. During this Belt & Road Aerospace Innovation Alliance (BRAIA) Space Exploration Summer Camp, hosted at National University of Sciences & Technology, Pakistan, we will discuss fundamentals of what an HPC cluster consists of, and how we can take advantage of such systems to solve large scale problems in wide-range applications like computational fluid dynamics, image processing, machine learning and analytics. The contents are divided into four categories namely foundations, methods, breadth and depth. The participants will gain exposure to the Linux command line, shell scripting, and architecture of HPC clusters along with compiling and running applications. In addition to classroom instruction / lectures and laboratory work, the participants will visit advanced aeronautics related industry that have due applications of large-scale HPC systems.

## **Eligibility:**

As it is desirable to have a mix of students, the course will not assume much background from students, though Linux experience would be helpful to complete projects. This course is typically designed for final year undergraduates or graduate students of engineering and computer science.

**Seats:** ~80 Participants

## **Logistics:**

**Local hospitality will be borne by NUST that include free accommodation, meals, pick & drop from airport and cultural and industrial visits.** The air-ticket will be borne by participants themselves.

## **Registration Fee:**

A nominal registration fee of USD 100 /person (in cash) will be charged from the participants on arrival.

## **Learning Outcomes:**

On completion of this course we would expect participants to:

- a) Understand the key components of HPC architectures and how they are put together to form complete systems.
- b) Be able to build and run code in a Linux/Unix environment, execute in parallel and understand the stages involved.
- c) Introduce the current applications of HPC in aeronautics and other fields of science & technology.



## Tentative Program

<b>Sunday 14 July</b>	
Whole Day	Arrival and airport pick-ups Hotels/hostels Check in
<b>Monday 15 July</b>	
10:00 ~ 13:00	Opening Ceremony; Get to know session
13:00 ~ 14:00	Lunch break
14:00 ~ 16:00	Foundation Session: Introductory Lectures on HPC
18:30 ~ 20:30	Dinner
<b>Tuesday 16 July</b>	
10:00 ~ 13:00	Foundation Session: Introductory Lectures on HPC
13:00 ~ 14:00	Lunch break
14:00 ~ 17:00	Method Session: Lab work in HPC
<b>Wednesday 17 July</b>	
10:00 ~ 13:00	Depth Session: Usage of HPC in Aeronautics: Research Talks
13:00 ~ 14:00	Lunch break
14:00 ~ 16:00	Breadth Session: Application of HPC in Science & Technology: Research Talks
<b>Thursday 18 July</b>	
09:00 ~ 16:00	Industry Visit: Pakistan Aeronautical Complex, Kamra
<b>Friday 19 July</b>	
10:00 ~ 13:00	Depth Session: Lab work in HPC – GPU Based Computing
13:00 ~ 14:30	Lunch break
14:30 ~ 17:00	Visit to Islamabad Local Attractions
<b>Saturday 20 July</b>	
09:00 ~ 19:00	Visit to Nearby Attractions
<b>Sunday 21 July</b>	
09:00 ~ 19:00	Visit to Islamabad Local Attractions
<b>Monday 22 July</b>	
10:00 ~ 12:30	Depth Session: Lab work in HPC – Aeronautics Application
12:30 ~ 13:30	Lunch break
13:30 ~ 16:00	Water Rocket Competition
<b>Tuesday 23 July</b>	
10:00 ~ 13:00	Talks by BRAIA / Interactive Panel Discussion about future of BRAIA
13:00 ~ 14:00	Lunch
14:00 ~ 16:00	Farewell address / Interaction by Rector NUST
<b>Wednesday 24 July</b>	
Whole Day	Airport shuttles and departure in morning