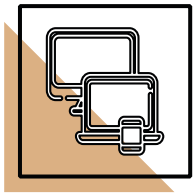
REC/HPC Website Revamp Project



Hu Cheng Sea, FOE Year 3

Intern

HU CHENG SEA

Year 3 Electrical Engineering

HPC/REC Website redesign &
Research on HPC

PROJECT OUTLINE

01 GOAL

Problems from current HPC website design

02 DESIGN SOLUTION

Main areas of change

03 CONCLUSION

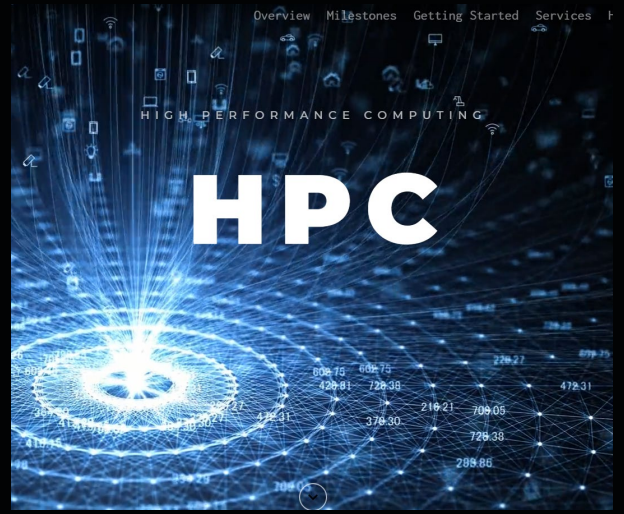
Internship Learning Takeaway

01/02

GOAL

Featuring the comparison between old and new website design

★★★★★



About HPC

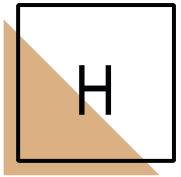
In a research environment, High Performance Computing (HPC) is the use of hardware, software, tools and programming techniques to accelerate research computation, which in turn will enable the execution of large cutting-edge research simulation that accelerates new discoveries. At the National University of Singapore, a combination of centralized and distributed approaches has been adopted in the provisioning and support of High Performance Computing (HPC) for research computation.

In this hybrid environment, some departments and research groups are providing local resources to support their users, whereas the HPC team at the NUS IT is focusing on providing central HPC resources and services to support all staff and student researchers across campus. NUS IT is also collaborating with the National Supercomputing Centre (NSCC) in providing high-end HPC resources to NUS researchers to enable large-scale and complex research simulations.

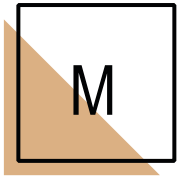
About NUS IT HPC

Central HPC support at NUS IT began in 1989 when a shared vector supercomputer was made available to the NUS research com
technologies had been introduced to meet wide range of research computing requirements. In our recent development, we have be
environment since the beginning of 2010s. From mid-2010s, additional focus on AI related resources and technologies has been in
Learning/Deep Learning research requirements. We are expecting the HPC-AI era in research computing to be in full swing in 202

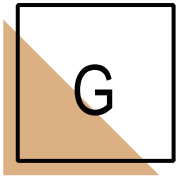
MENU



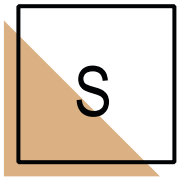
Homepage



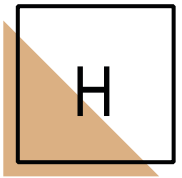
Milestone



Getting Started

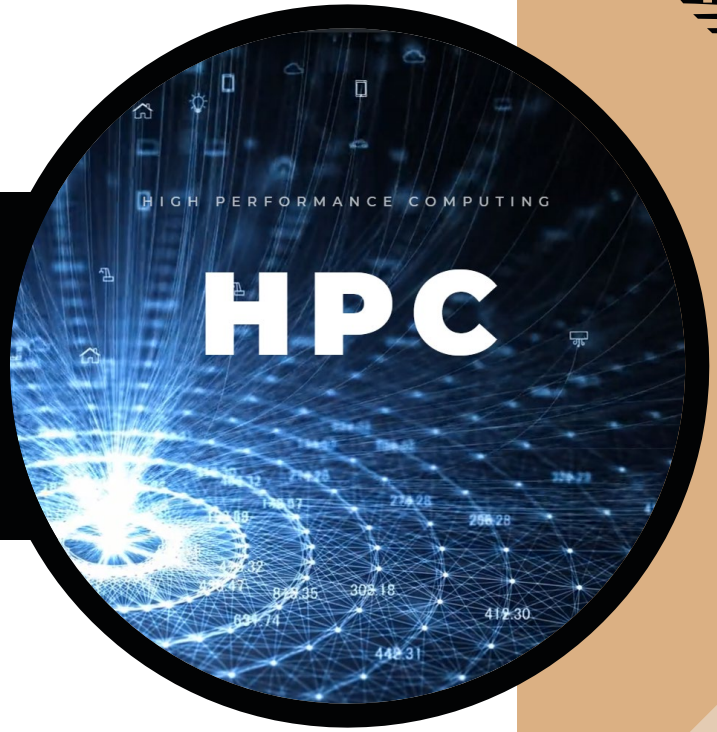


Services



HPC Newsletter

HOMEPAGE

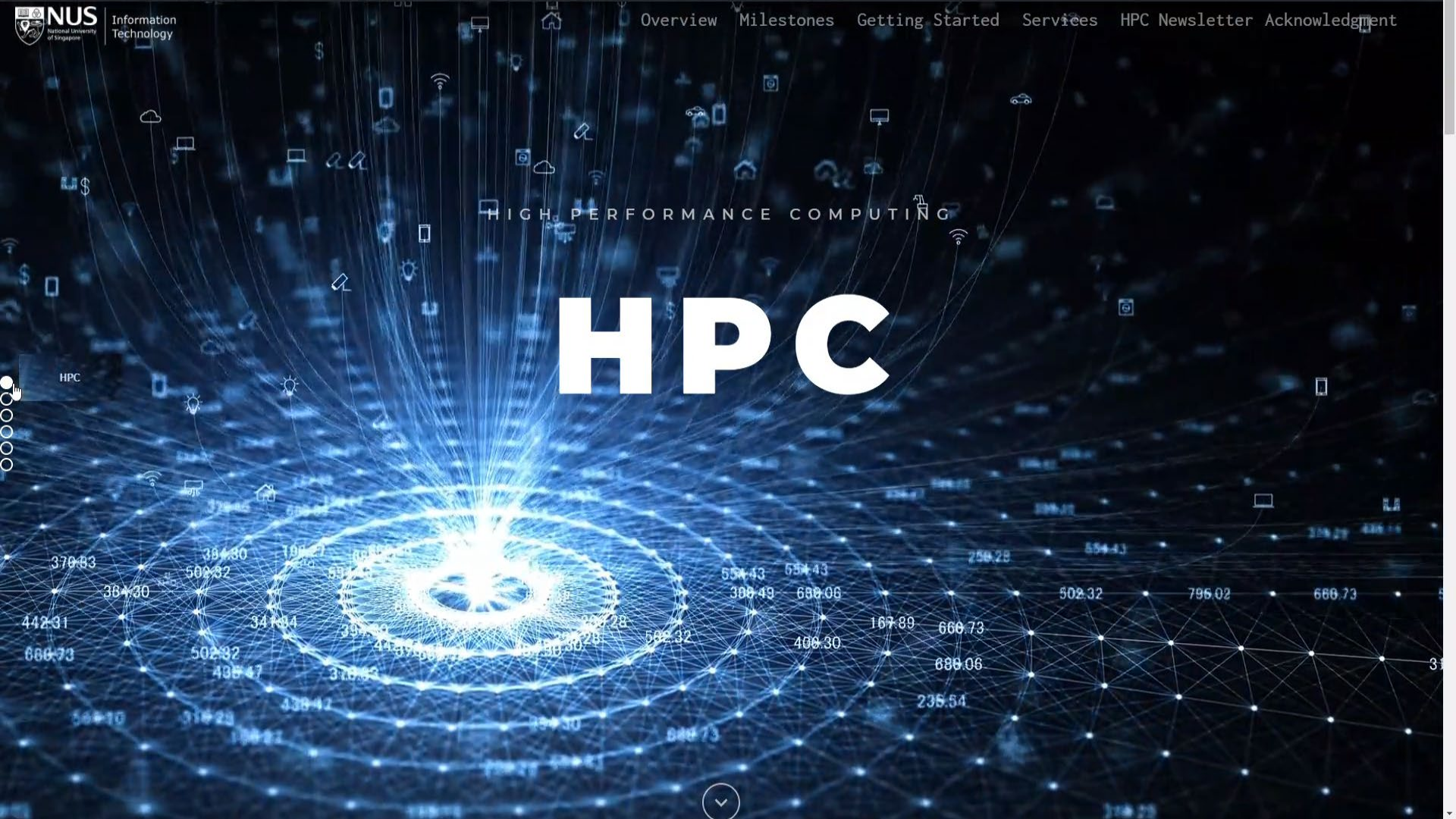


environment since the beginning of 2010s. From mid-2010s, additional focus on AI related resources and technologies has been initiated to keep pace with emerging Machine Learning/Deep Learning research requirements. We are expecting the HPC-AI era in research computing to be in full swing in 2020s.

Here is the list of HPC-AI resources and services NUS IT provides to accelerate research discovery in the next era of data- and AI-centric research computing development:

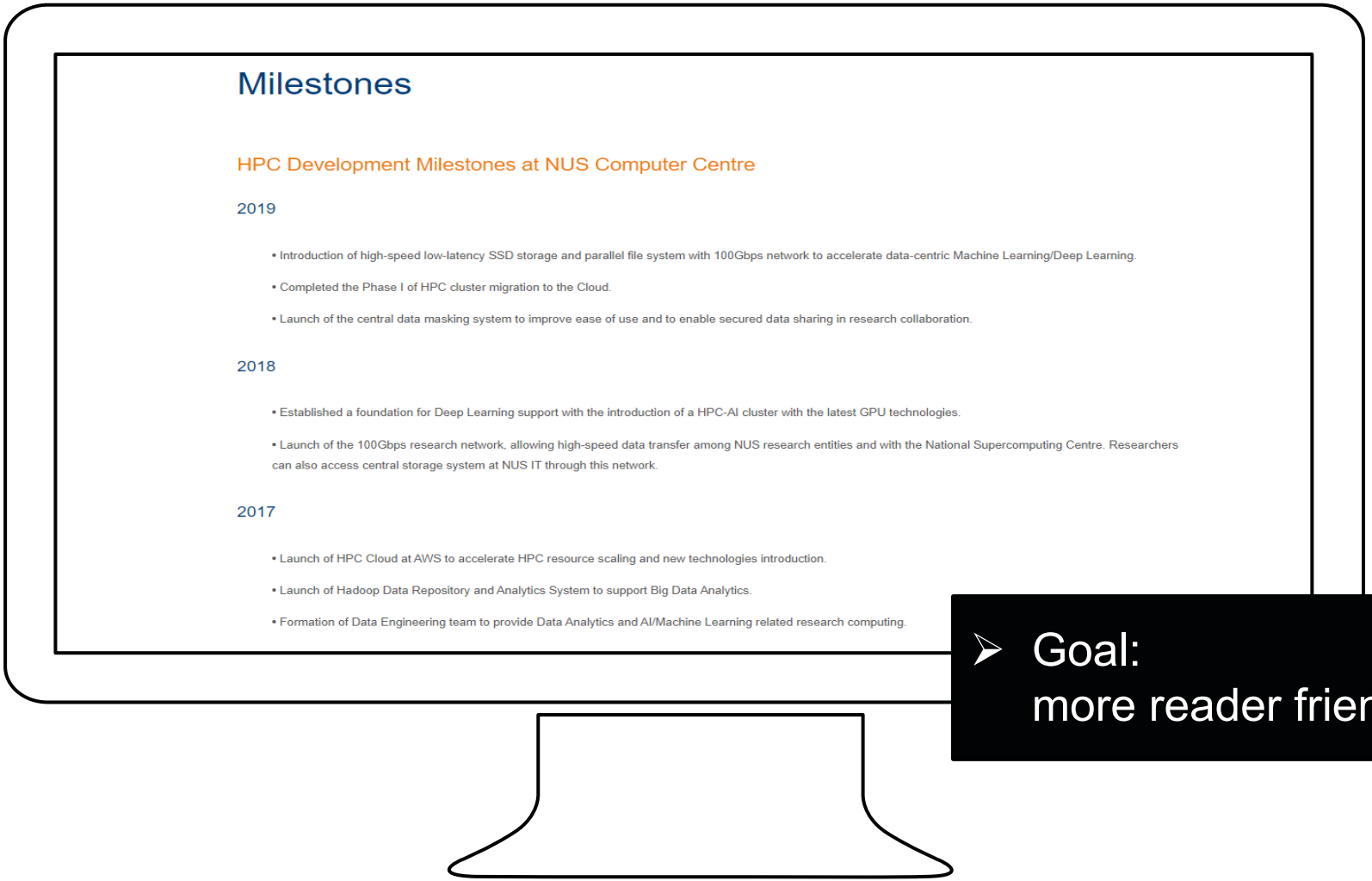
- HPC Cluster with accelerators (CPU, GPU)
- On-demand Storage (for data archiving or backup)
- Data Repository & Analytics System (Hadoop, Sparks)
- HPC Cloud
- High-speed Data Transfer (100Gbps research network)
- Computational Science & Engineering Software
- Data Analytics & AI Computing Platform (R, Matlab, Python, Tensorflow, PyTorch, etc)
- Data Engineering Support
- Coding, Modelling & Optimization Support

➢ Goal: interactive


HIGH PERFORMANCE COMPUTING
HPC
HPC

MILESTONE


Overview
Milestones
MILESTONES
HPC Development Milestones at NUS Computer Centre
Press the button to see more
2007 - 2009
2015 - 2017
2020 - 202
71 - 2006
2010 - 2014
2018 - 2019


Milestones
HPC Development Milestones at NUS Computer Centre
2019
• Introduction of high-speed low-latency SSD storage and parallel file system with 100Gbps network to accelerate data-centric Machine Learning/Deep Learning.
• Completed the Phase I of HPC cluster migration to the Cloud.
• Launch of the central data masking system to improve ease of use and to enable secured data sharing in research collaboration.
2018
• Established a foundation for Deep Learning support with the introduction of a HPC-AI cluster with the latest GPU technologies.
• Launch of the 100Gbps research network, allowing high-speed data transfer among NUS research entities and with the National Supercomputing Centre. Researchers can also access central storage system at NUS IT through this network.
2017
• Launch of HPC Cloud at AWS to accelerate HPC resource scaling and new technologies introduction.
• Launch of Hadoop Data Repository and Analytics System to support Big Data Analytics.
• Formation of Data Engineering team to provide Data Analytics and AI/Machine Learning related research computing.
➢ Goal:
more reader friendly

MILESTONES

HPC Development Milestones at NUS Computer Centre

Press the button to see more

1995 - 2000 ›

2001 - 2006 ›

2007 - 2009 ›

2010 - 2014 ›

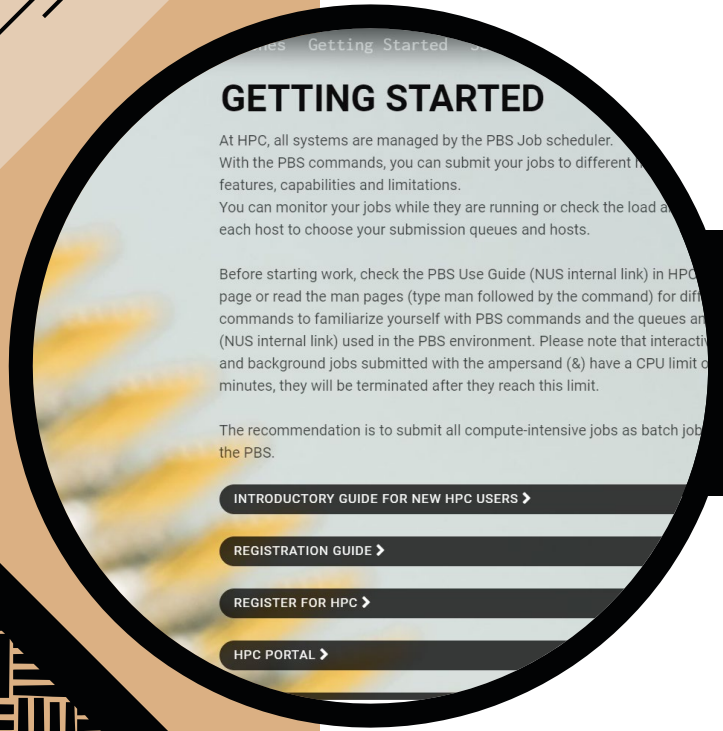
2015 - 2017 ›

2018 - 2019 ›

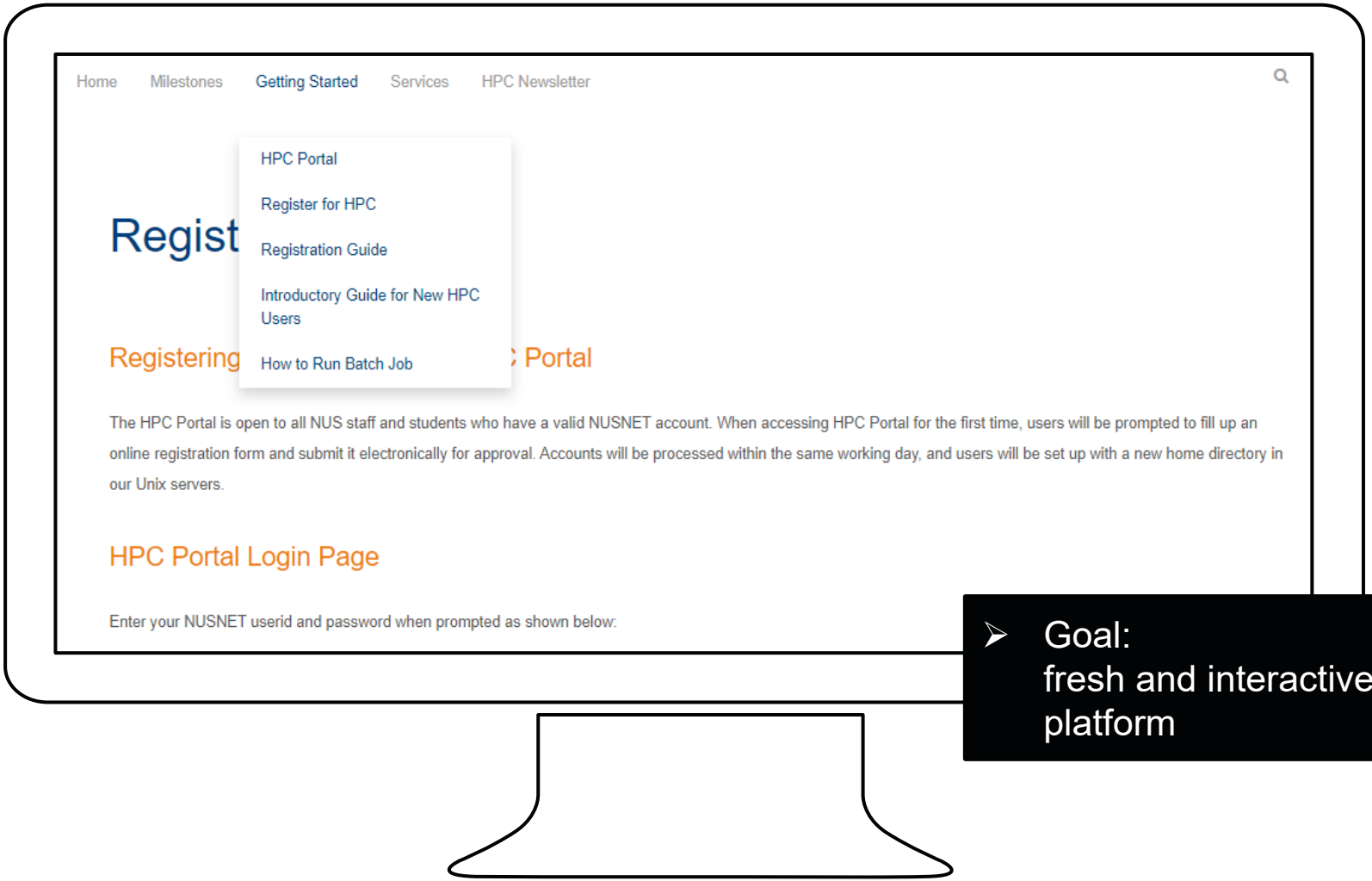
2020 - 2021 ›

2022 ›

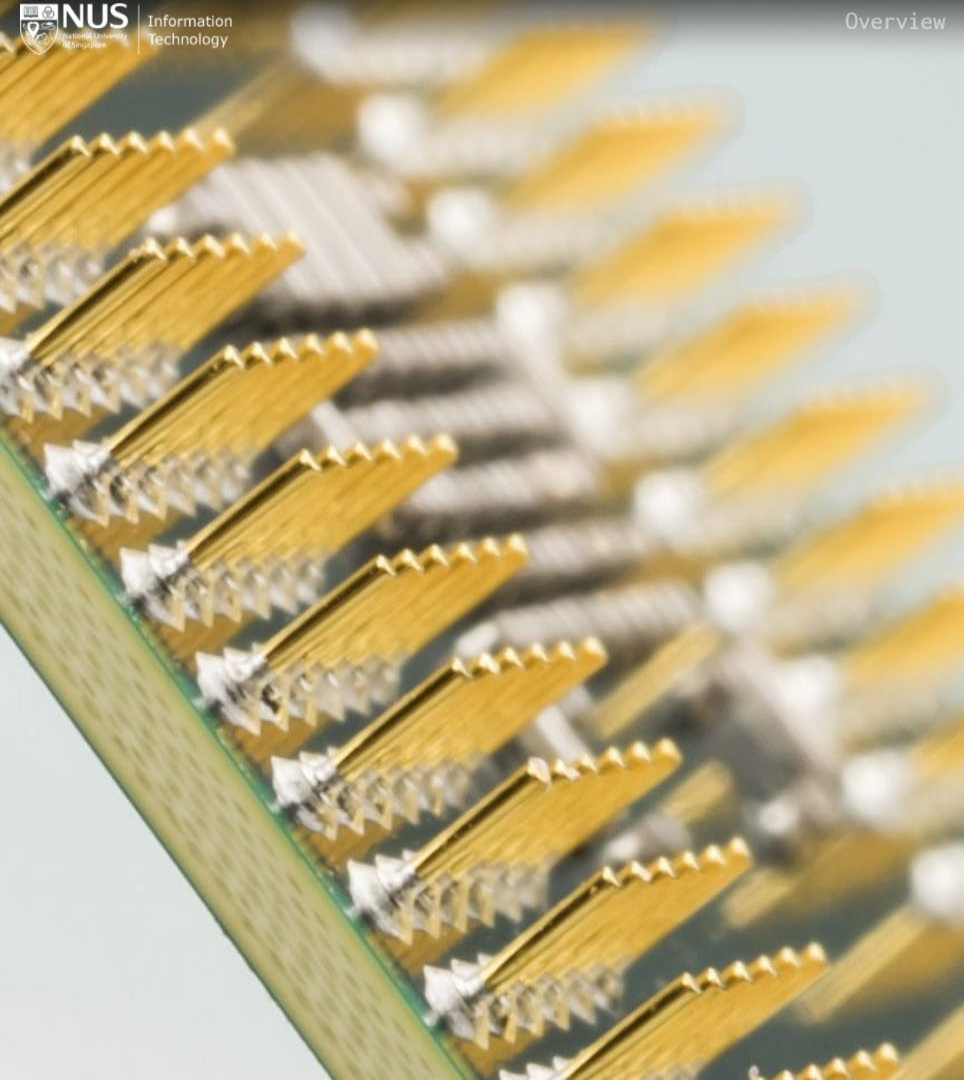
GETTING STARTED



Getting Started



- Goal:
  fresh and interactive platform



GETTING STARTED

At HPC, all systems are managed by the PBS Job scheduler.
With the PBS commands, you can submit your jobs to different hosts with different features, capabilities and limitations.
You can monitor your jobs while they are running or check the load and status of each host to choose your submission queues and hosts.

Before starting work, check the PBS Use Guide (NUS internal link) in HPC home page or read the man pages (type man followed by the command) for different commands to familiarize yourself with PBS commands and the queues and hosts (NUS internal link) used in the PBS environment. Please note that interactive jobs and background jobs submitted with the ampersand (&) have a CPU limit of 30 minutes, they will be terminated after they reach this limit.

The recommendation is to submit all compute-intensive jobs as batch jobs through the PBS.

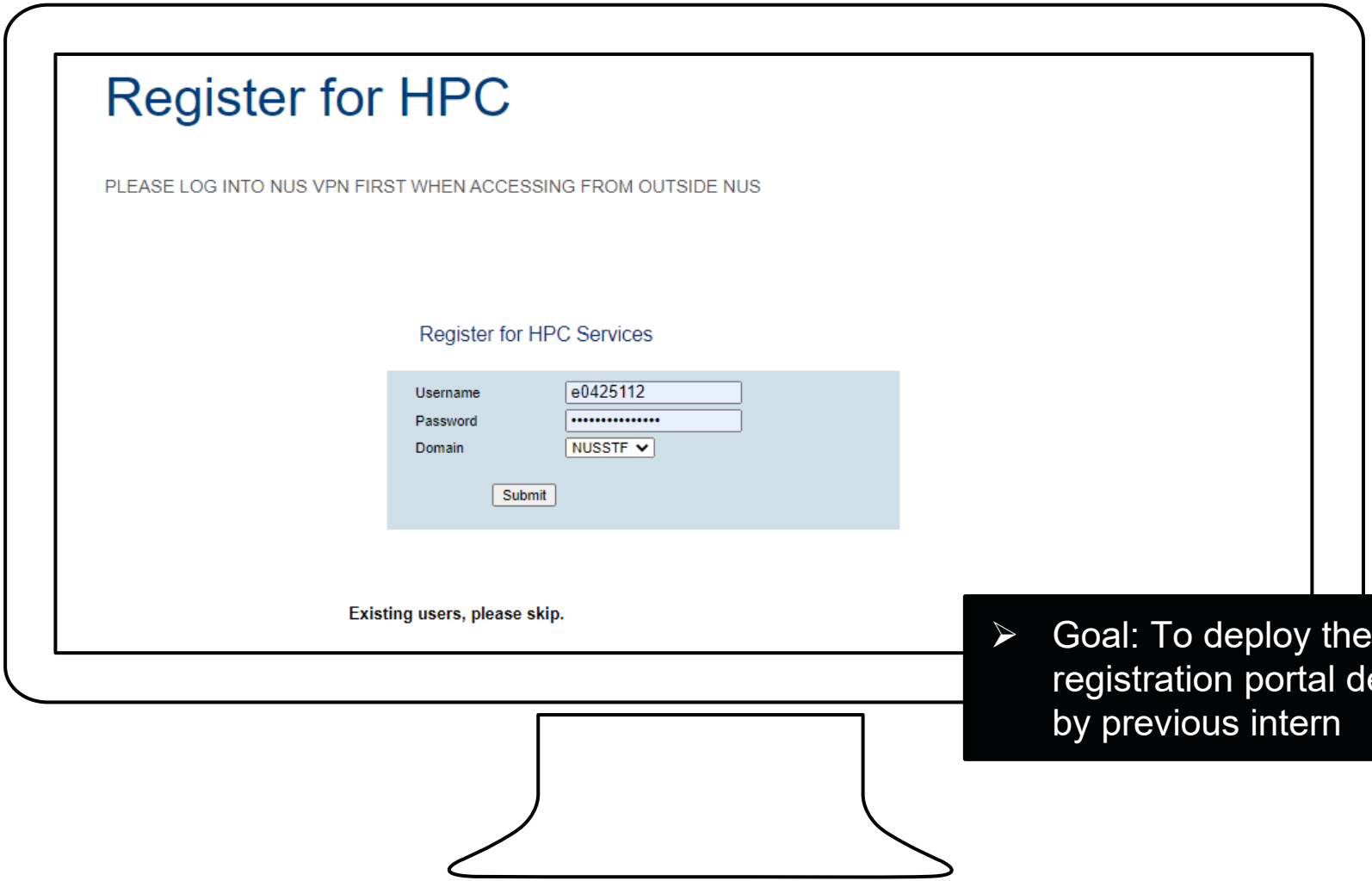
INTRODUCTORY GUIDE FOR NEW HPC USERS >

REGISTRATION GUIDE >

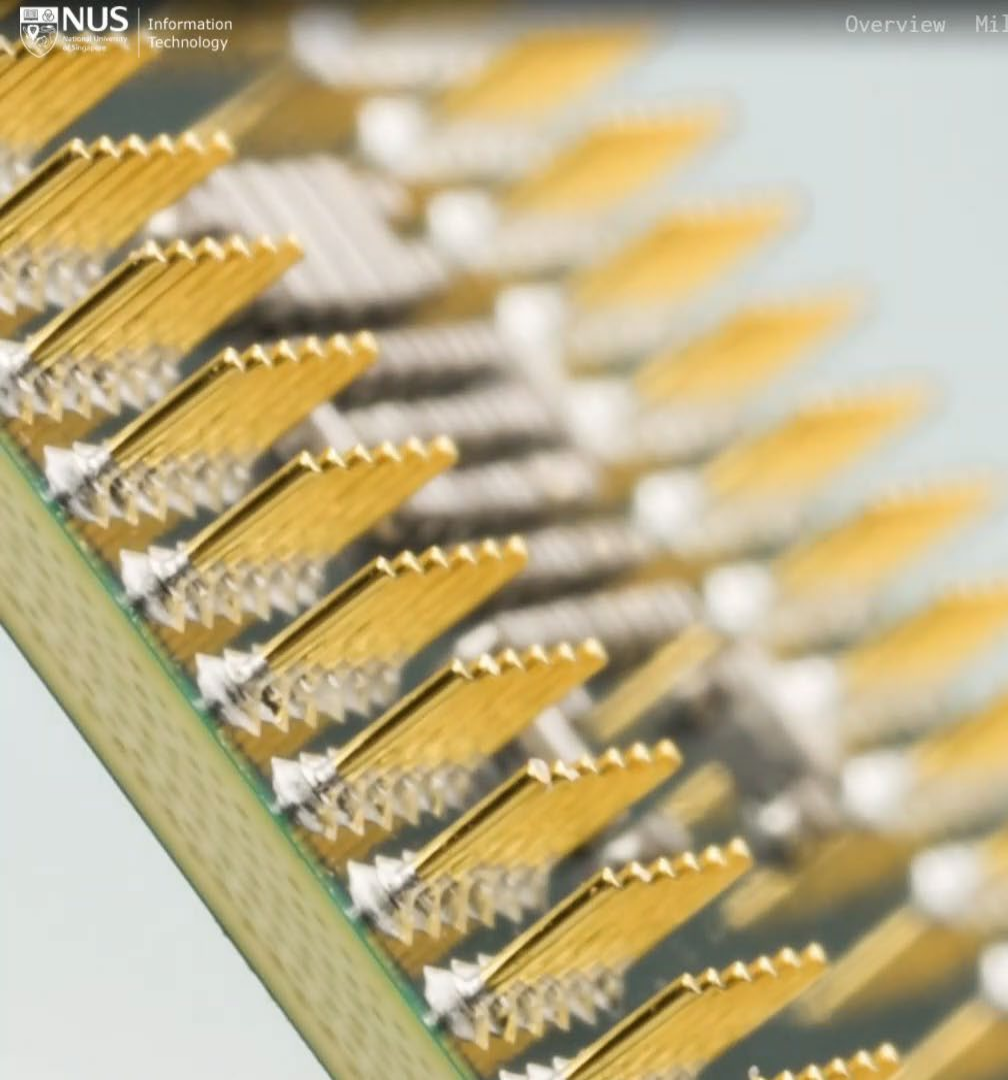
REGISTER FOR HPC >

HPC PORTAL >

HOW TO RUN BATCH JOB >



- Goal: To deploy the new registration portal designed by previous intern



GETTING STARTED

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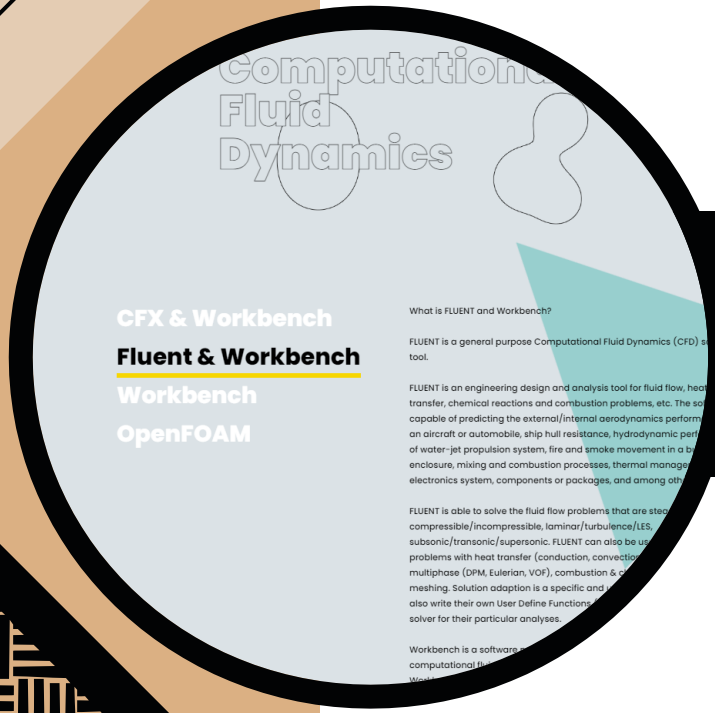
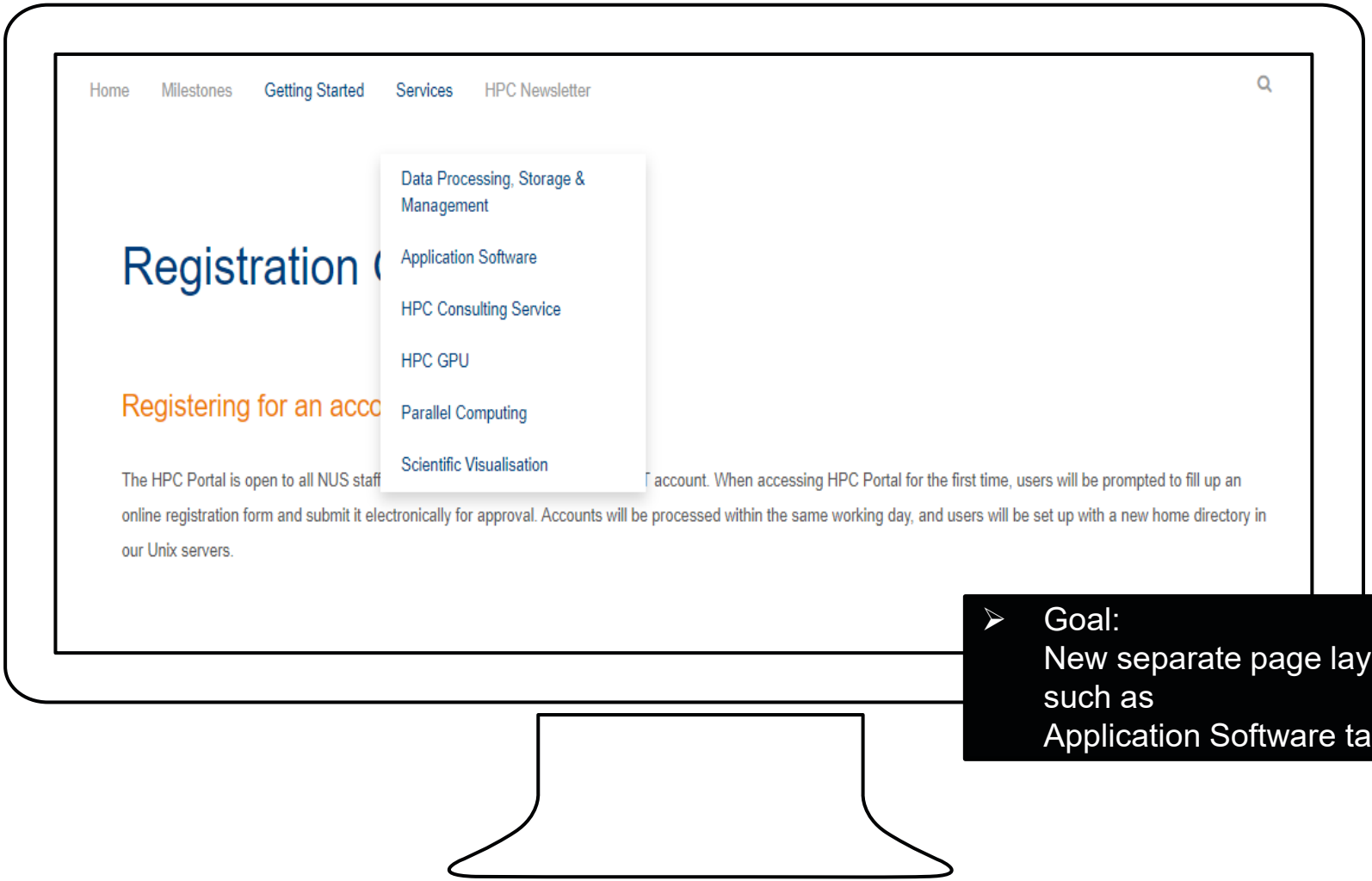
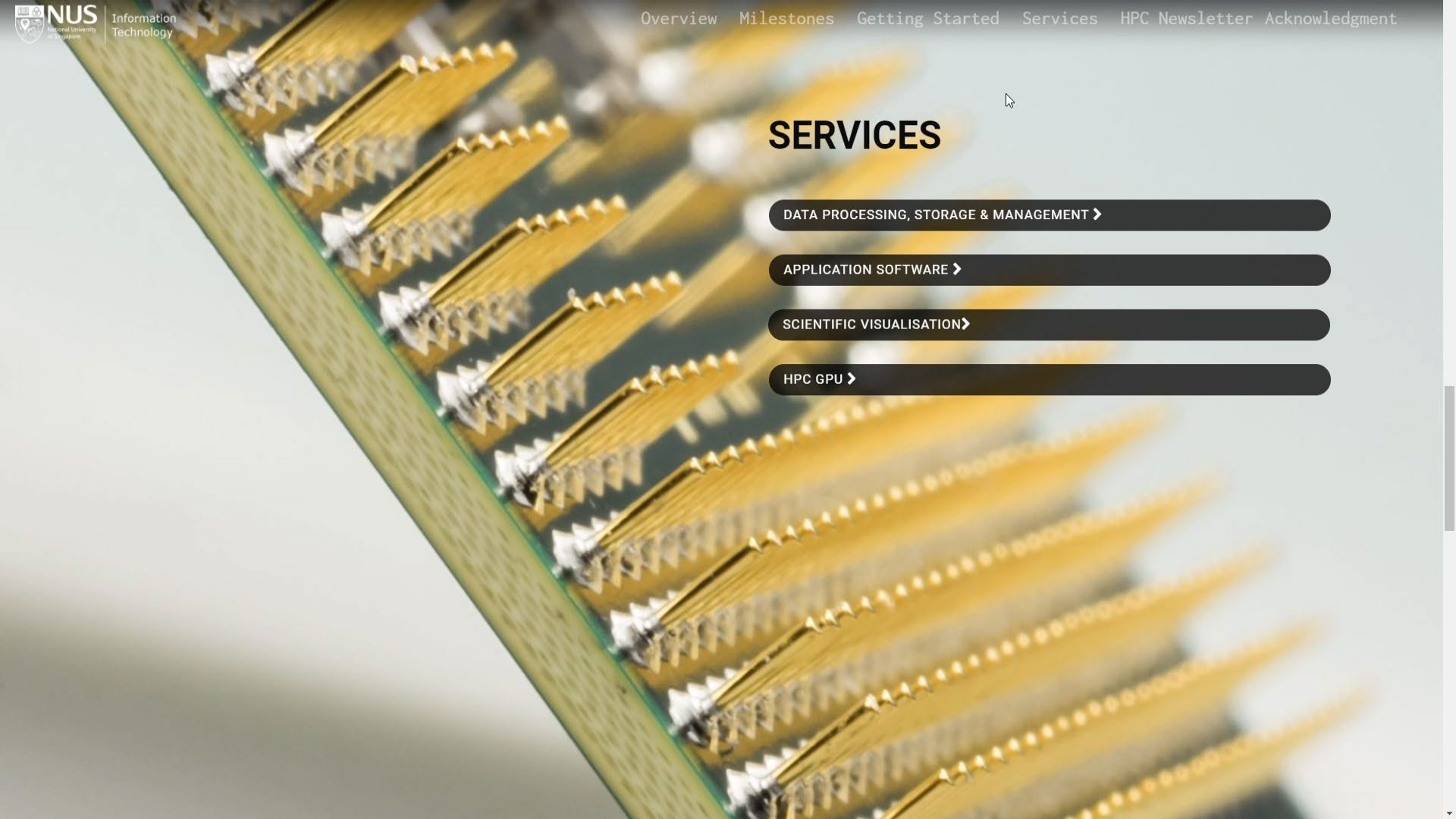

Computational
Fluid
Dynamics
CFX & Workbench
Fluent & Workbench
Workbench
OpenFOAM
What is FLUENT and Workbench?
FLUENT is a general purpose Computational Fluid Dynamics (CFD)
tool.
FLUENT is an engineering design and analysis tool for fluid flow, heat
transfer, chemical reactions and combustion problems, etc. The so
capable of predicting the external/internal aerodynamics perform
an aircraft or automobile, ship hull resistance, hydrodynamic perf
of water-jet propulsion system, fire and smoke movement in a b
enclosure, mixing and combustion processes, thermal manage
electronics system, components or packages, and among oth
FLUENT is able to solve the fluid flow problems that are stea
compressible/incompressible, laminar/turbulence/LES,
subsonic/transonic/supersonic. FLUENT can also be us
problems with heat transfer (conduction, convectio
multiphase (DPM, Eulerian, VOF), combustion & c
meshing. Solution adaption is a specific and
also write their own User Define Functions
solver for their particular analyses.
Workbench is a software
computational fl

Services

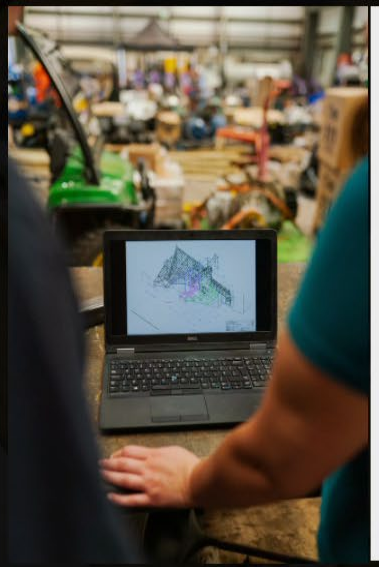


- Goal:
  New separate page layout such as
  Application Software tab



SERVICES

- DATA PROCESSING, STORAGE & MANAGEMENT >
- APPLICATION SOFTWARE >
- SCIENTIFIC VISUALISATION >
- HPC GPU >



SERVICES

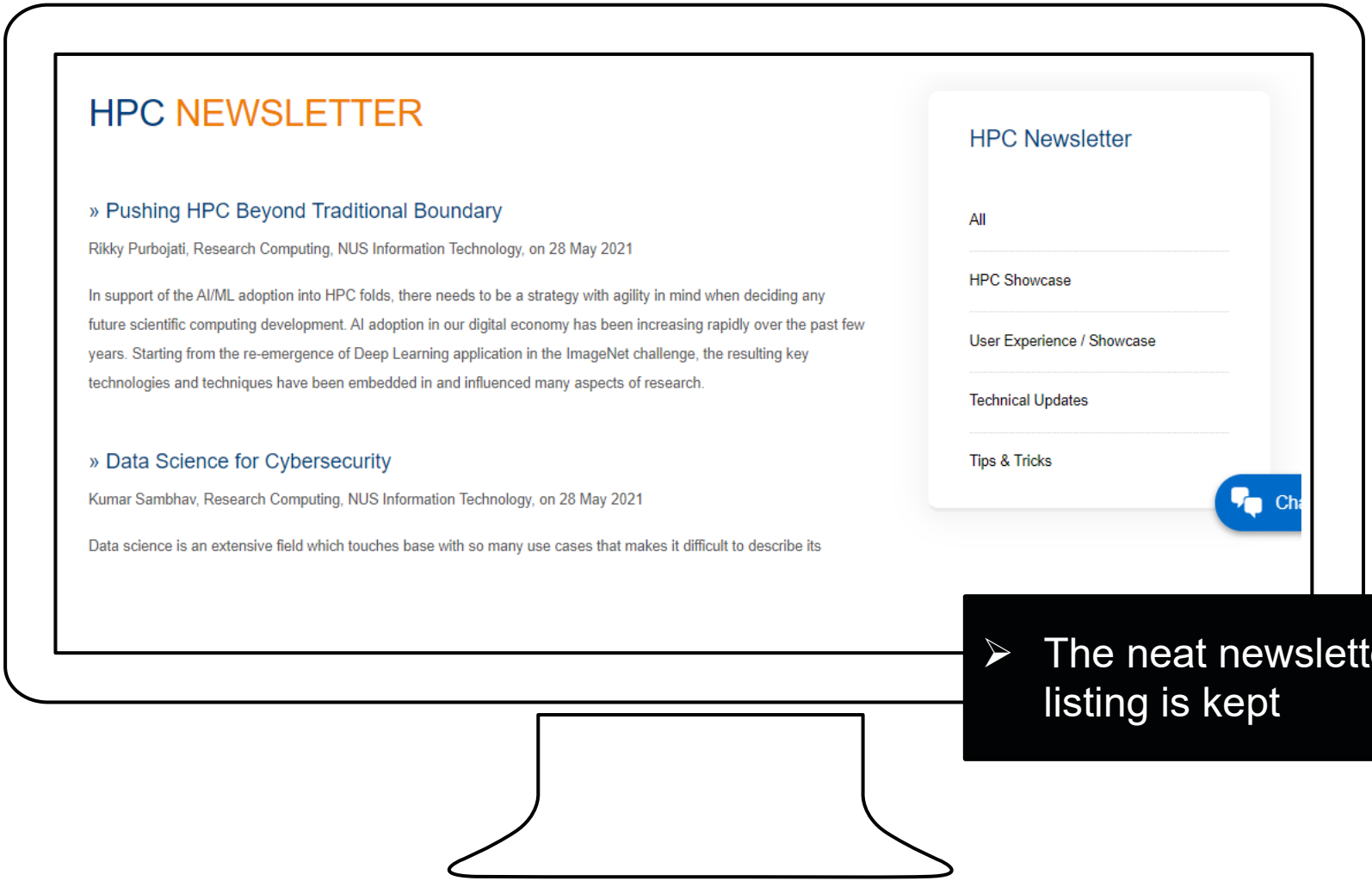
Application Software

Examples of application software resources include:

1. Life Science/Molecular Modeling
2. Computational Fluid Dynamics
3. Engineering Modeling & Design
4. Numerical & Symbolic Tools
5. Visualisation & Imaging
6. Parallel computing

KEEP READING

HPC Newsletter

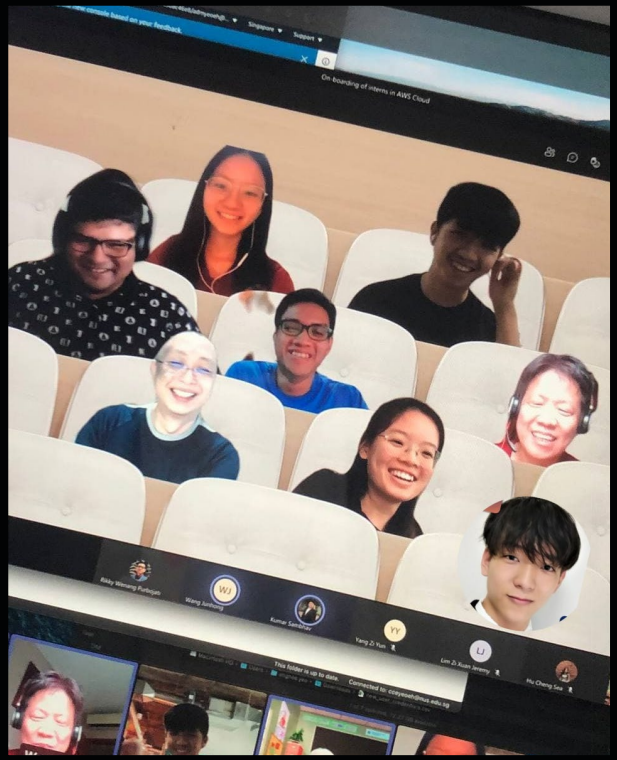

HPC NEWSLETTER
» Pushing HPC Beyond Traditional Boundary
Rikky Purbojati, Research Computing, NUS Information Technology, on 28 May 2021
In support of the AI/ML adoption into HPC folds, there needs to be a strategy with agility in mind when deciding any future scientific computing development. AI adoption in our digital economy has been increasing rapidly over the past few years. Starting from the re-emergence of Deep Learning application in the ImageNet challenge, the resulting key technologies and techniques have been embedded in and influenced many aspects of research.
» Data Science for Cybersecurity
Kumar Sambhav, Research Computing, NUS Information Technology, on 28 May 2021
Data science is an extensive field which touches base with so many use cases that makes it difficult to describe its
HPC Newsletter
All
HPC Showcase
User Experience / Showcase
Technical Updates
Tips & Tricks
➢ The neat newsletter listing is kept

03

CONCLUSION

Internship Learning Takeaway

★★★★★



Rewarding !

Through this internship, I have discovered a new interest in my life and made more friends...

Special thanks to:
Wong Chiaw Ding, Irhamny, Cindy Tan, Toh Wee Yeow, John Yap, Mak Hon Keat

Thank you.