基礎
高效能計算叢集電腦實務

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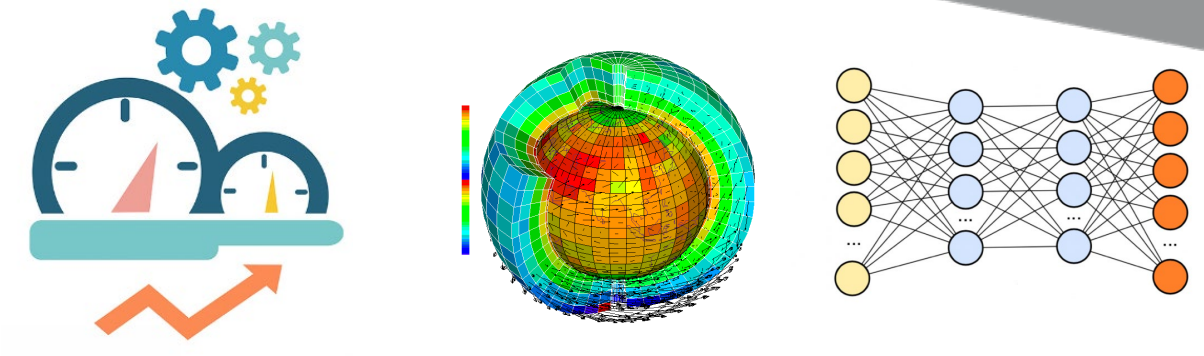
& 叢集電腦競賽團隊

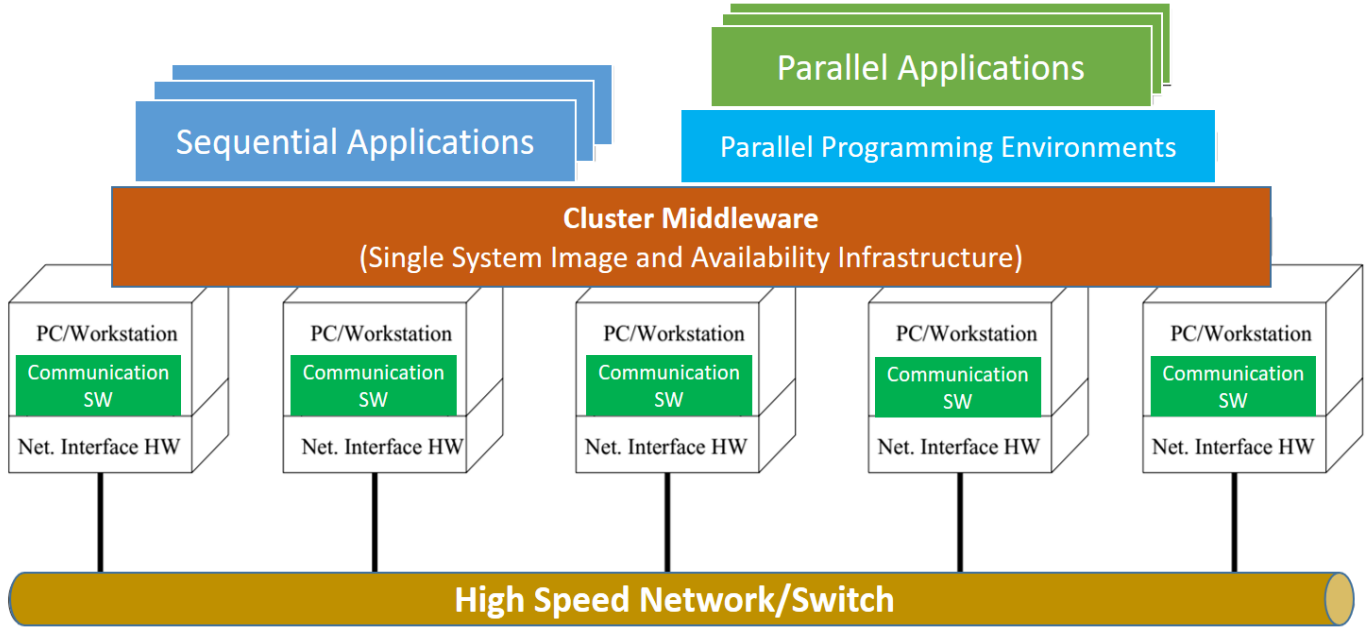
Who Should Take This Course

- 1st or 2nd Year Under-graduate Students (In principal)
- Students who are interested in the student cluster competition
- Students who has solid skills and knowledge in programming, linux, computer systems, but look for in-depth hands-on experiences
- Students who want to use cluster and parallel programming skills for solving problems

Course Content

- Fundamental Knowledge
  - Computer Architecture
  - Networking
  - Memory Hierarchy
- Cluster Build-up & Execution
  - Linux, SLURM, Spack, Container
- Performance Benchmarking & Analysis
  - Roofline model
  - Profiling
  - HPL, HPCG
- Parallel Programming
  - MPI, openMP
- Performance Optimization
  - Application tuning
  - Instruction Vectorization
  - Library Linking





Computer Cluster Architecture

Schedule: An extended version from the winter camp

Date	Subject	Content
3/6	Computer Architecture	Processor NUMA Architecture & Pipeline Memory hierarchy: RAID,NVME, RAM Disk I/O: DMA, BUS
3/13	Networking	IP, Router, Switch, Network Layers
3/20	Cluster Build-up	OS installation & configuration module management(Spack) Benchmarking
3/27	Application Building	Compilation & Linking
4/3	Application Profile	Amdahl's Law, Roofline model, TMA
4/10	Parallel Programming	Intro to Parallel Programming openMP & MPI
4/17	MPI	SLURM, MPI Command & Library, MPI Profiler (IPM)
4/24	GPU	GPU Arch & openACC
5/1	Code Optimization	Dimension Shape, Cache locality, Vector instruction
5/8	Application Optimization	Installation, Configuration & Tuning
5/15~5/29	Simulated Competition	
6/5	Tools	Container
6/12	Final Presentation	

Teaching Methodology

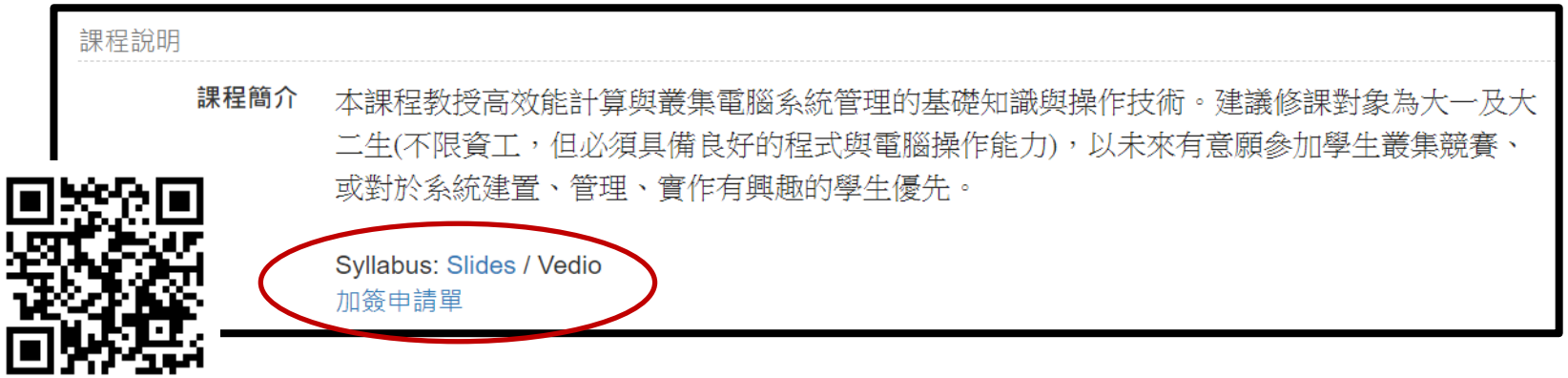
- Don’t Treat It as a Regular Course
  - Like 競技程式設計: Majority of the lectures given by the current members of SCC team
  - Learning by doing, multiple labs per week
  - Self-learning rather than teaching

Grading

- ~3 Person per Team
- Lab Checkpoint by Individual (mostly): 70%
  - ToDo during or after each class
- Simulated Competition by Team: 30%
  - Application Tuning
  - Oral Presentation
  - Coding Challenge

Class Sign-up Procedure

- All the information is available on eeclass webpage



- Fill in the sign-up form by 2/26
  - Also, submit the class sign-up e-form (校資系統)
- Complete and submit today's take-home assignment
  - The sooner you submit, the earlier you get notified
  - Last notification deadline on 3/2

Sign-up form

Contact US

EECLASS Website

NTHU SCC Website

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