HPC Everyday & Everywhere

Kevin A. Brown, PhD
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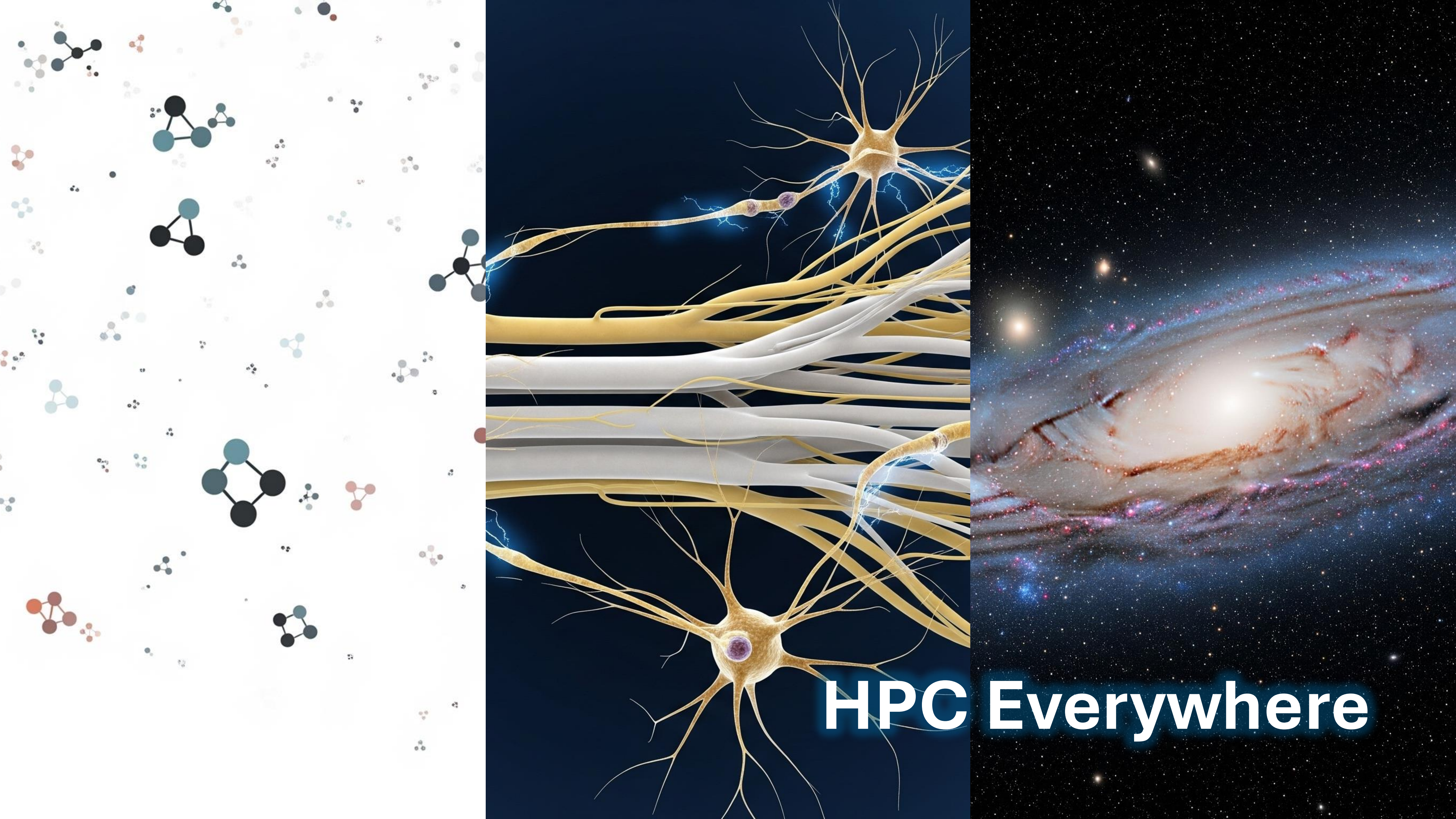
HPC Everyday


HPC Everywhere

Kevin A. Brown

Researcher?

Research is my medium,
not my passion.

Where my passion lies:

- Event Planning
- Program Development
- Community Building

Department of Entertainment (DOE)
Fun Opportunity Announcement (FOA)

Halloween Costume Party!
FOA Number: HW2024.10.25-B240

Application Deadline (party date):
October 25, 2024 at 4:30pm - 6:00pm

Follow-on fun (after party) is available starting 6:30pm @ ReNEW Westmont

Point of Contact (POC): Kevin B.

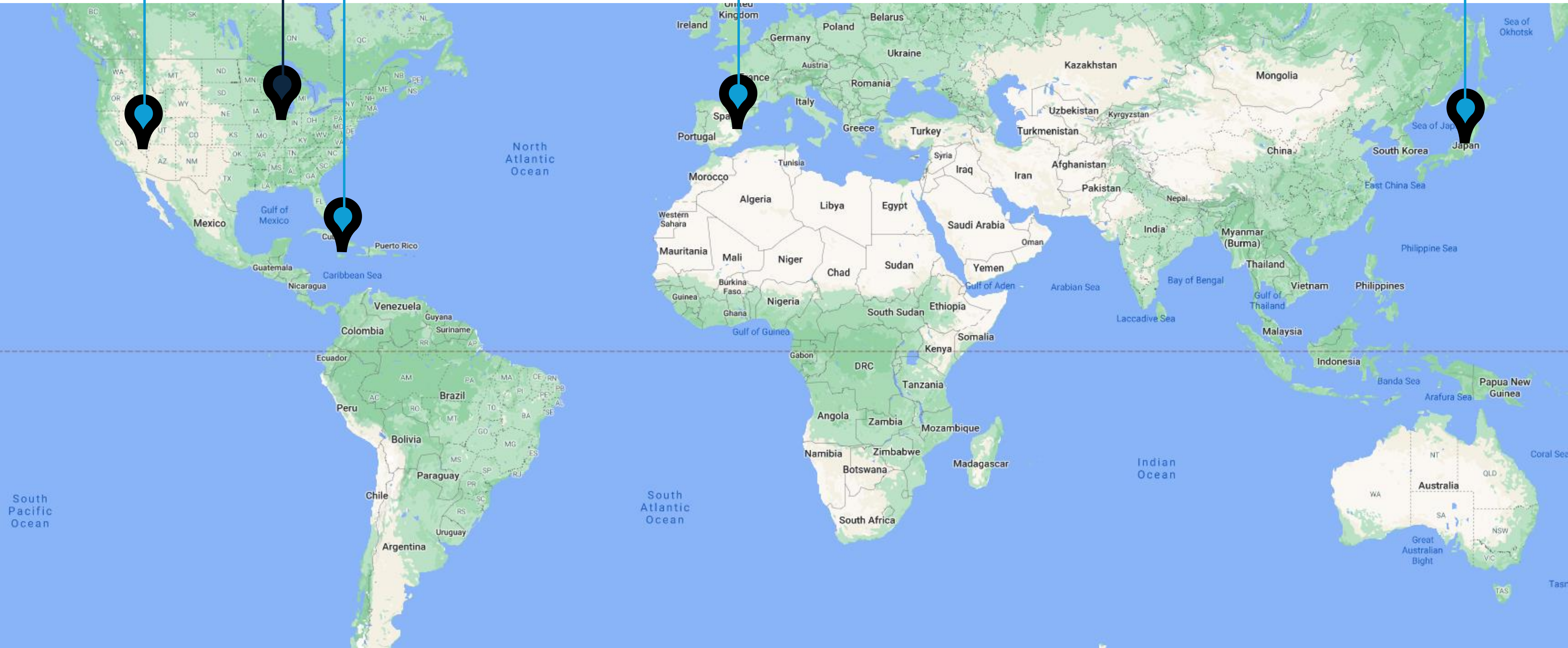
Argonne 2019

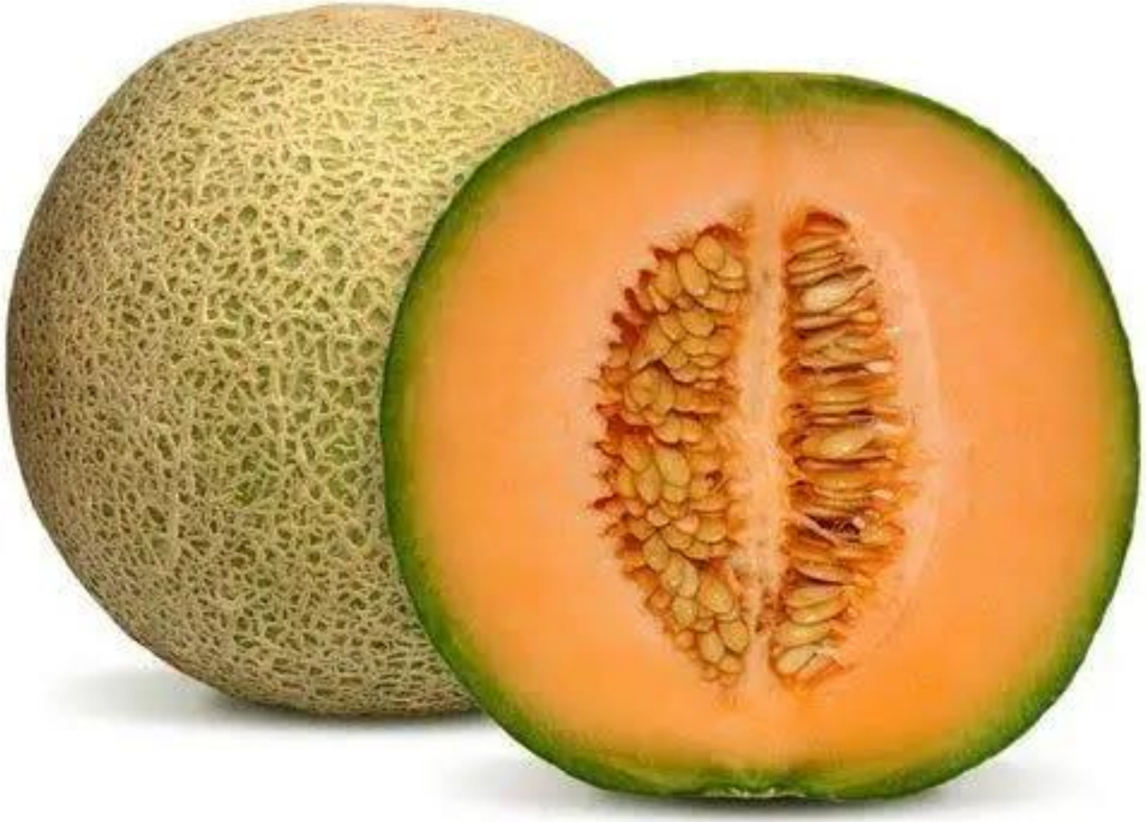
Tokyo Institute of Technology (Tokyo Tech)

Lawrence Livermore National Lab

Barcelona Supercomputing Center (BSC)

Digicel, Jamaica [mobile network co.]





My Background

No Job Offer – PNNL, USA | English Teacher, Japan | Others

MANY Rejected Papers – Various conferences

Not Selected – Prime Minister Youth Award, Jamaica

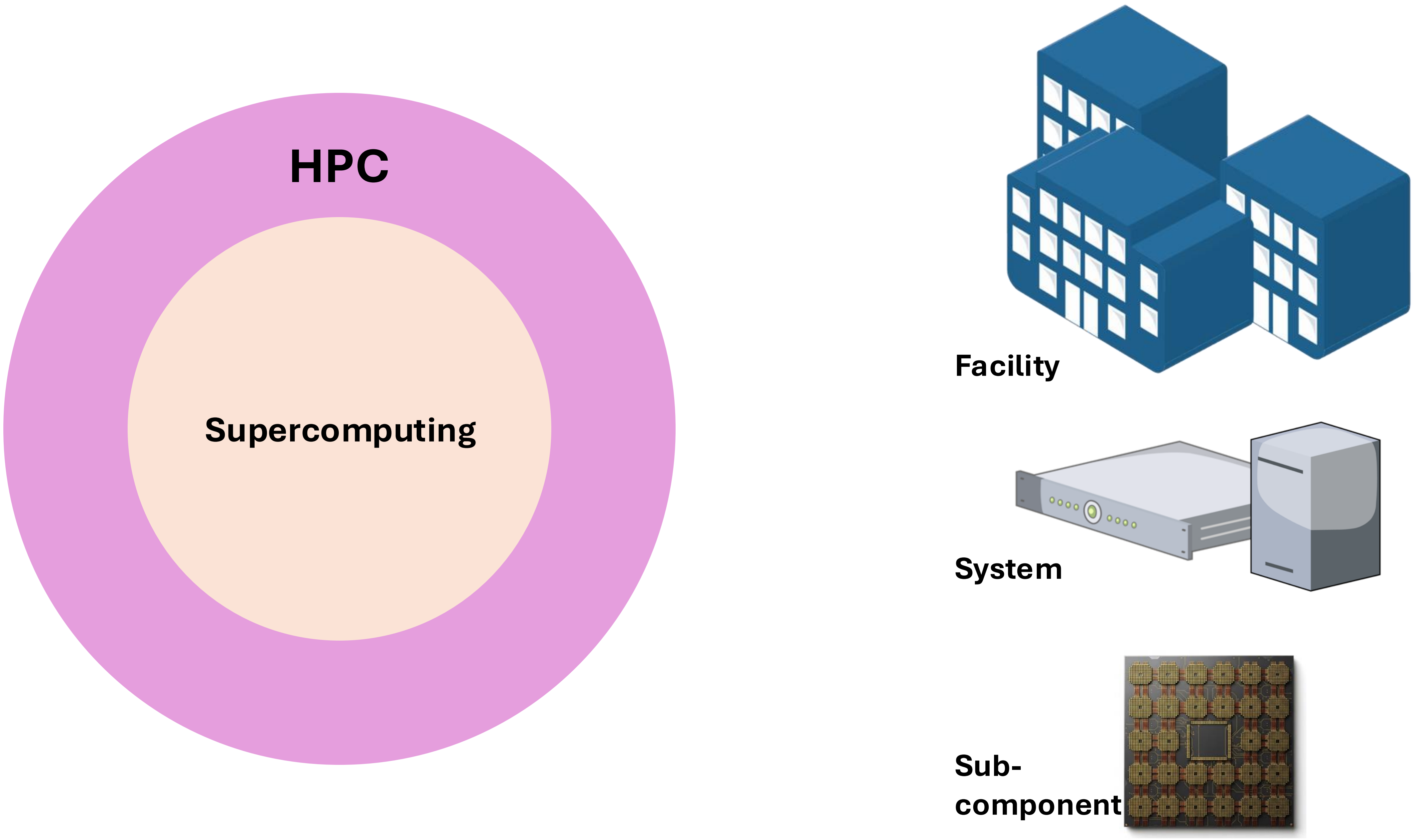
No Scholarship for 1st Year Undergrad – Jamaica

Lost Scholarship in Final Year Undergrad – Jamaica

Lost Friendships & Relationships – Jamaica, USA, Japan

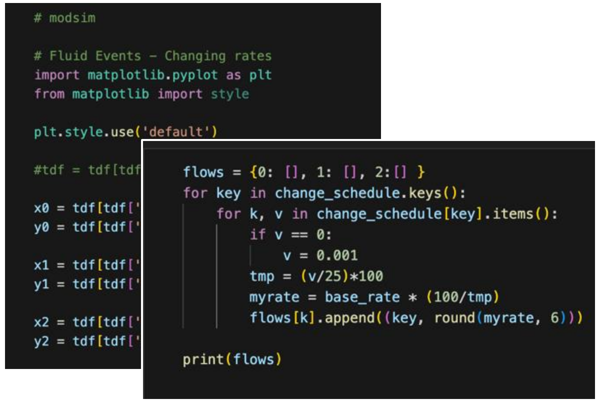
Lost Election – Student Union President, University of Technology, Jamaica

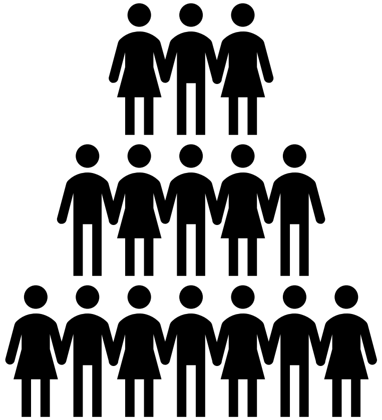
Major Research Mistakes – Too many to count


HPC
Supercomputing
Facility
System
Sub-
component

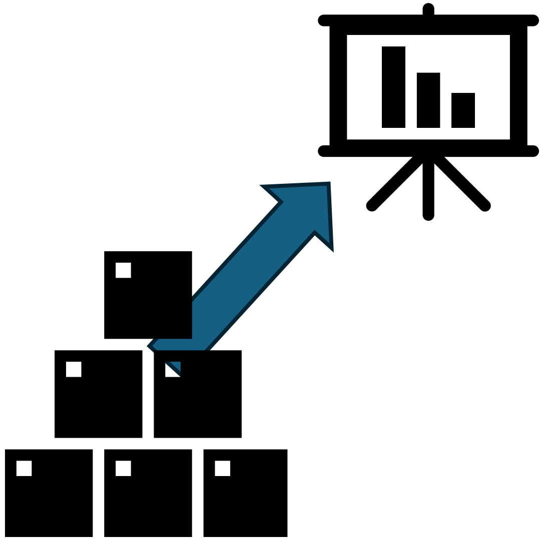
Infrastructure

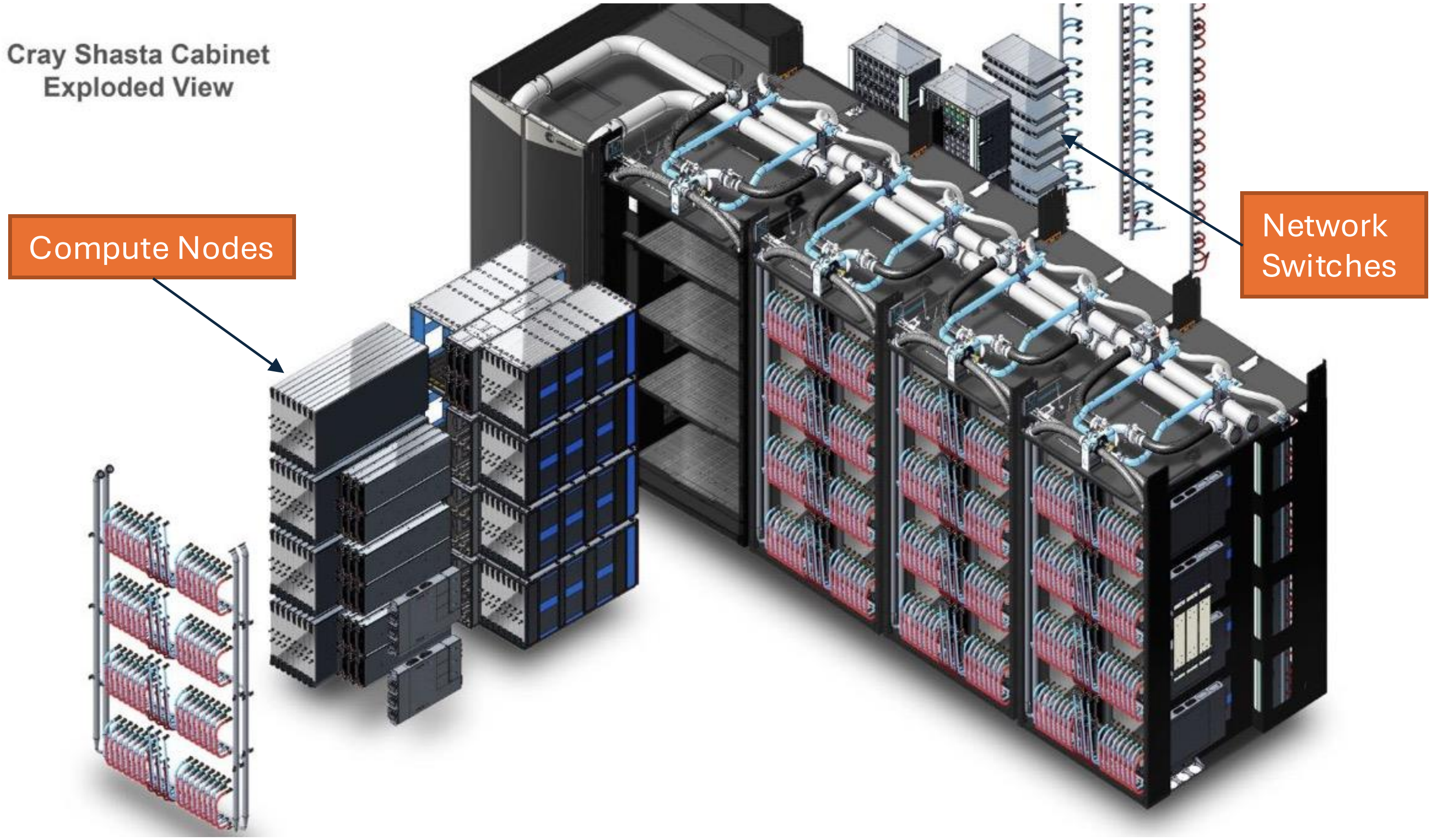
Application



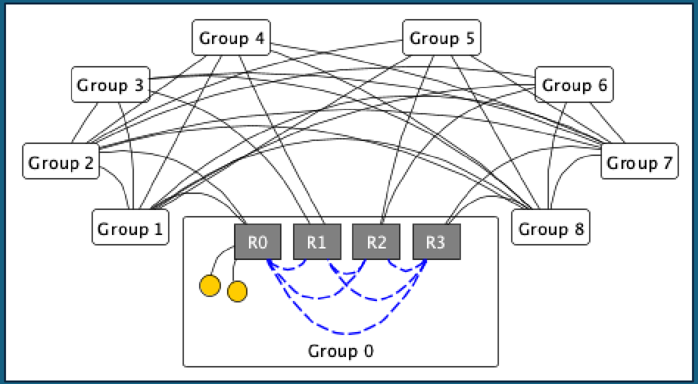


Goal

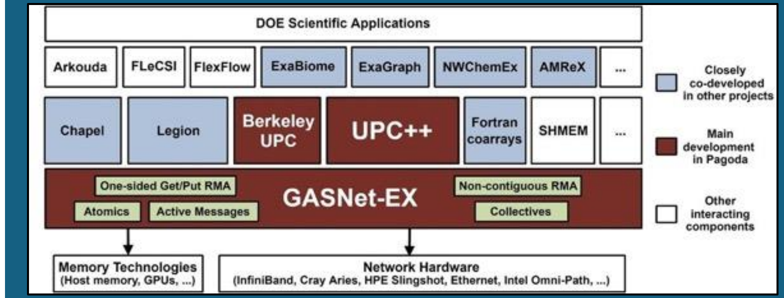




Network Topology View



Software Stack View



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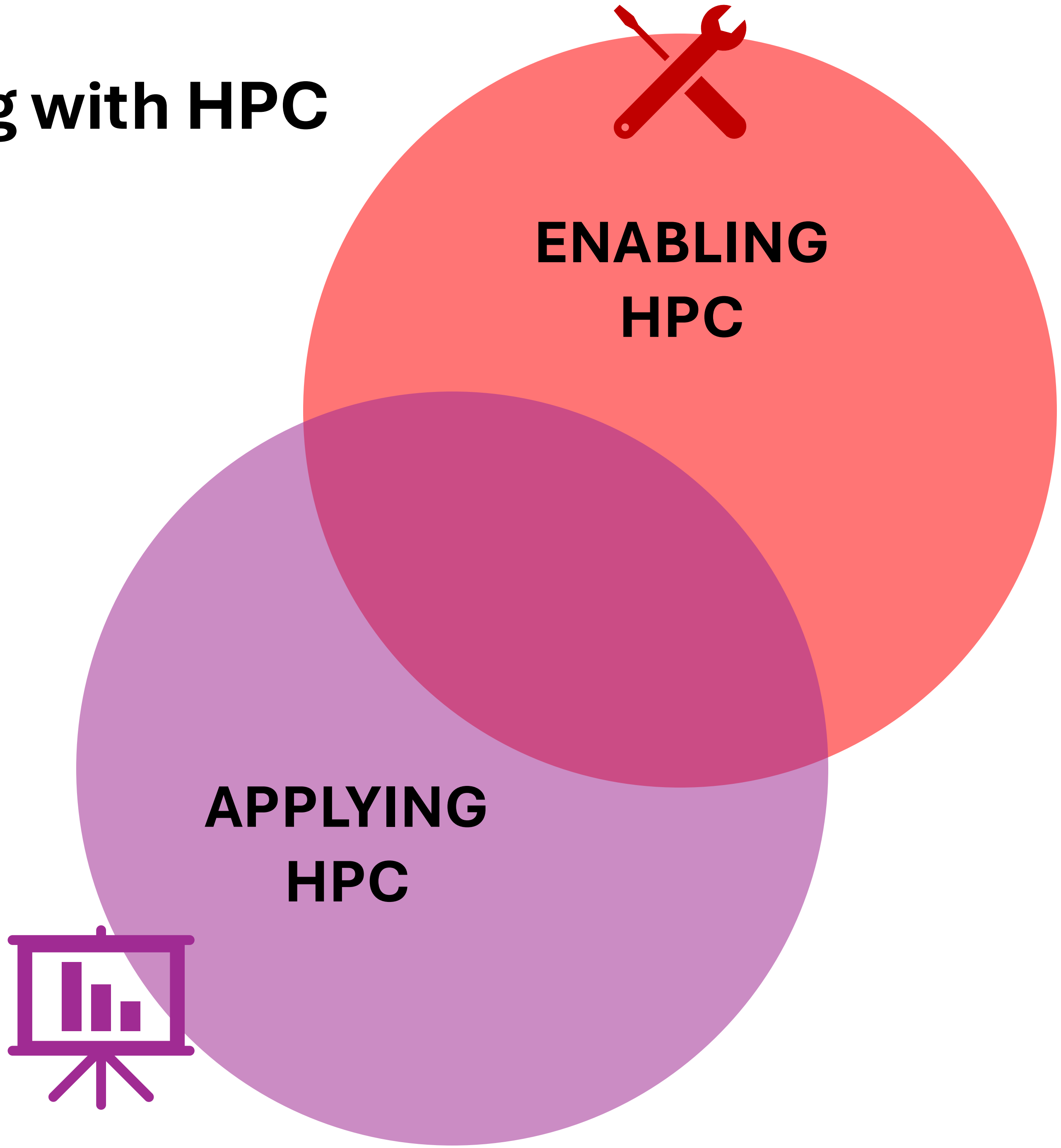
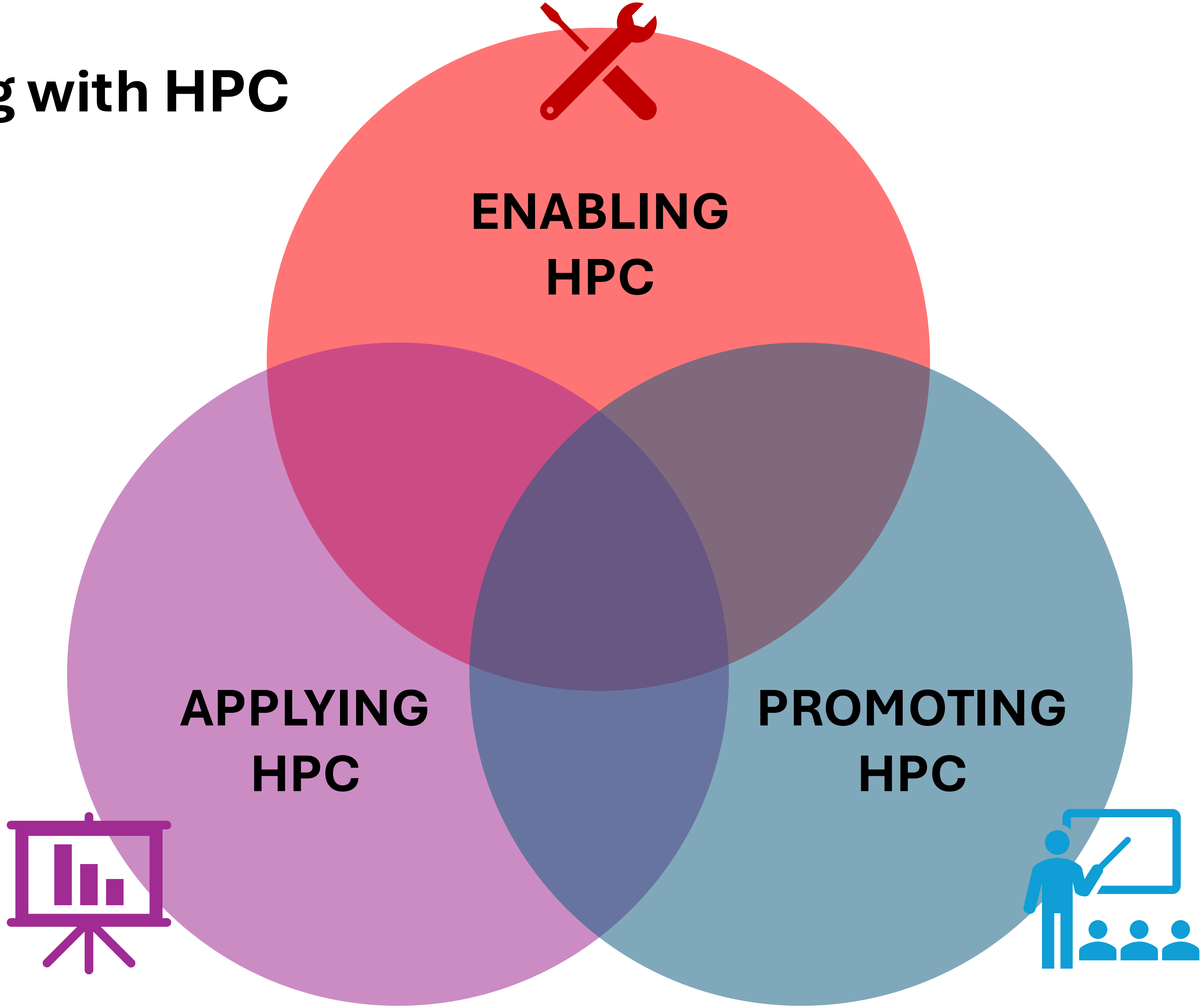
Engaging with HPC

ENABLING
HPC

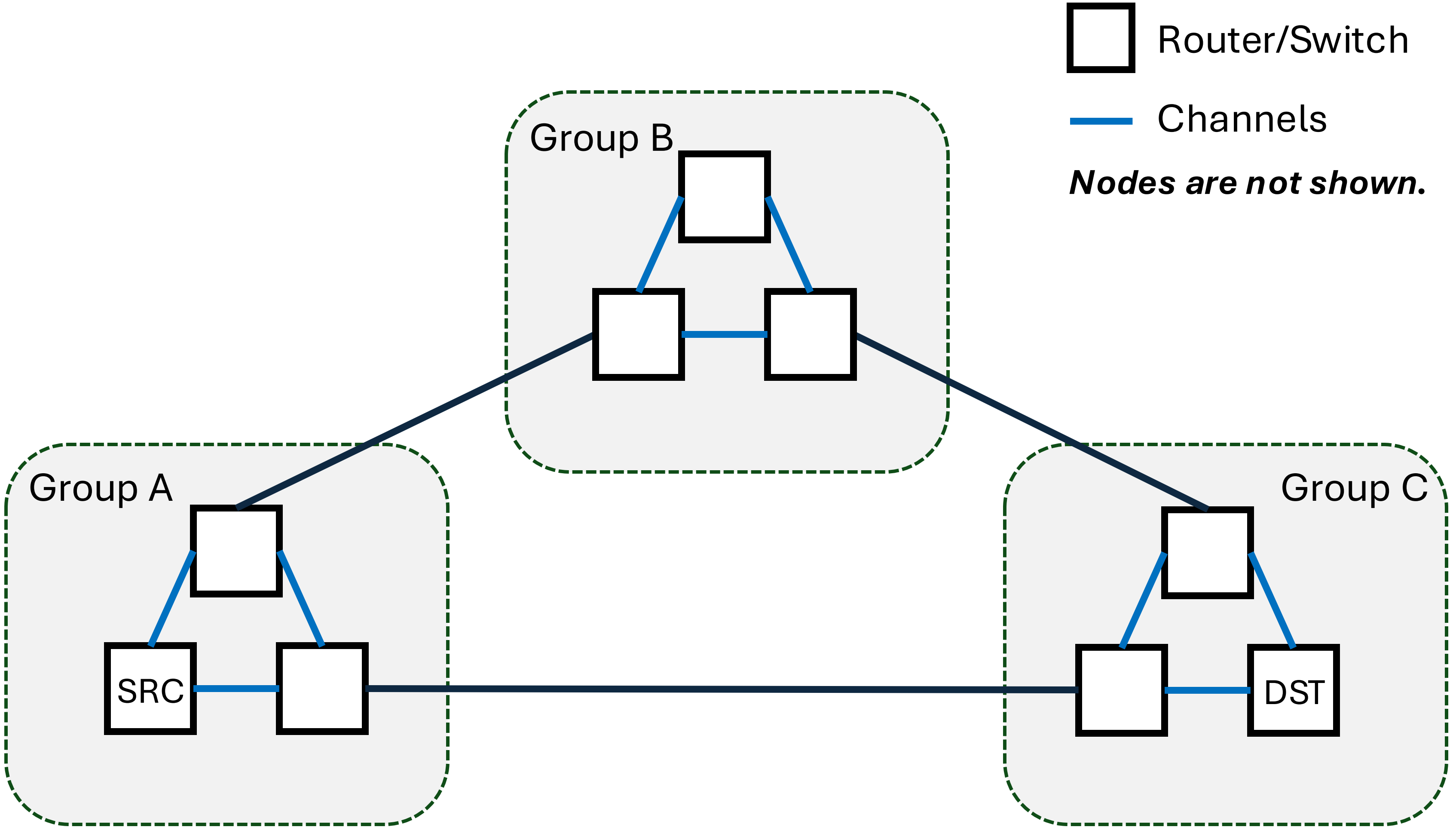
Engaging with HPC



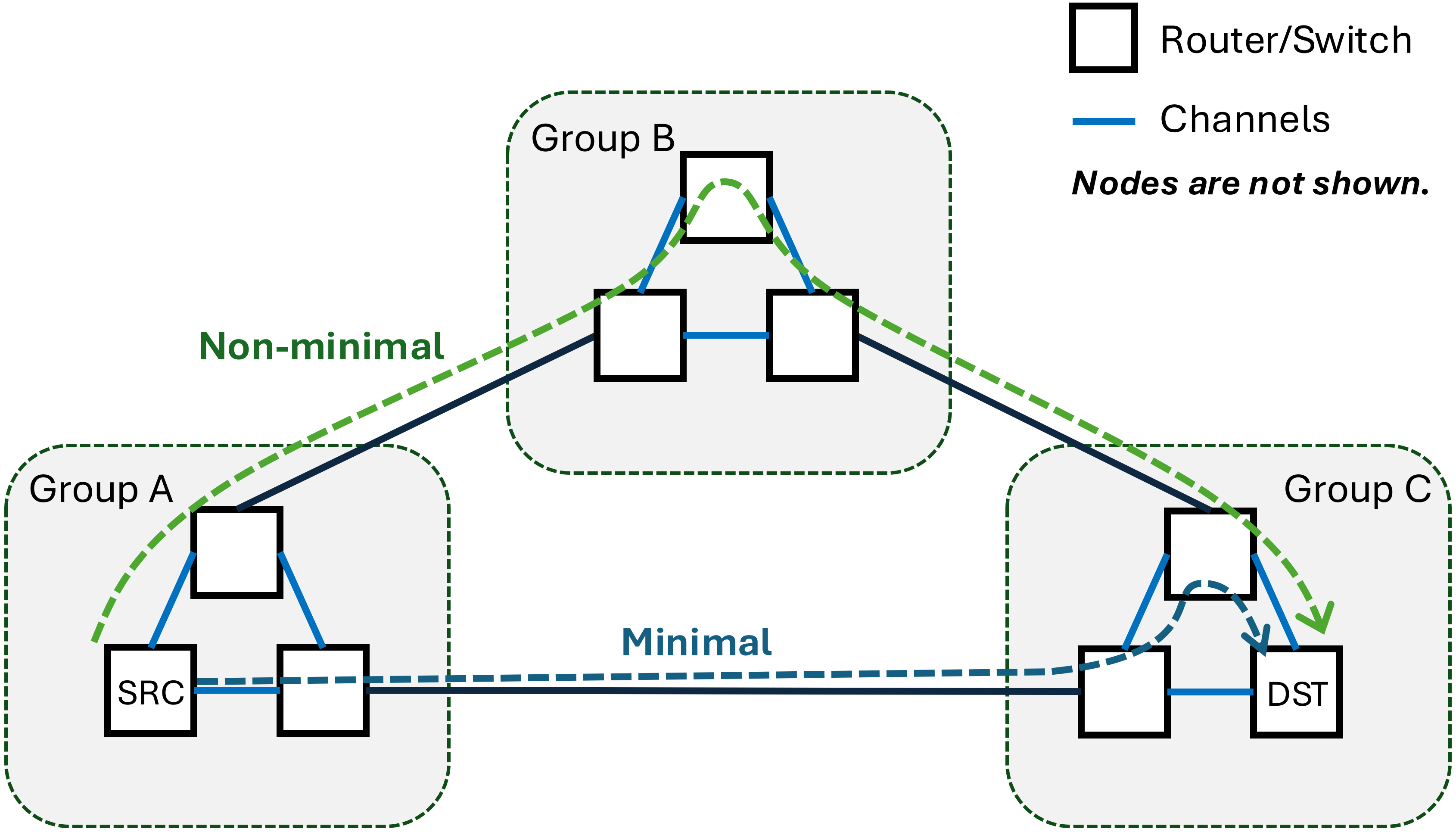
Engaging with HPC



Network Topology

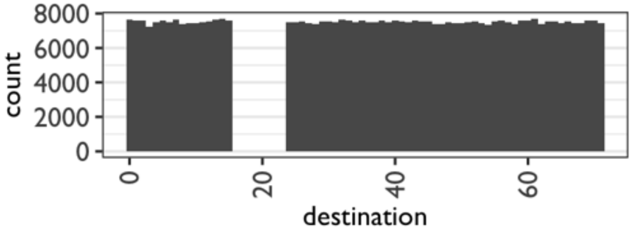


Network Topology



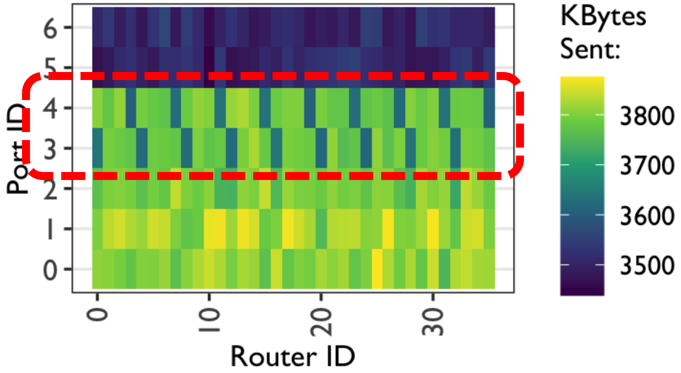
Performance Analysis

Count Messages Sent

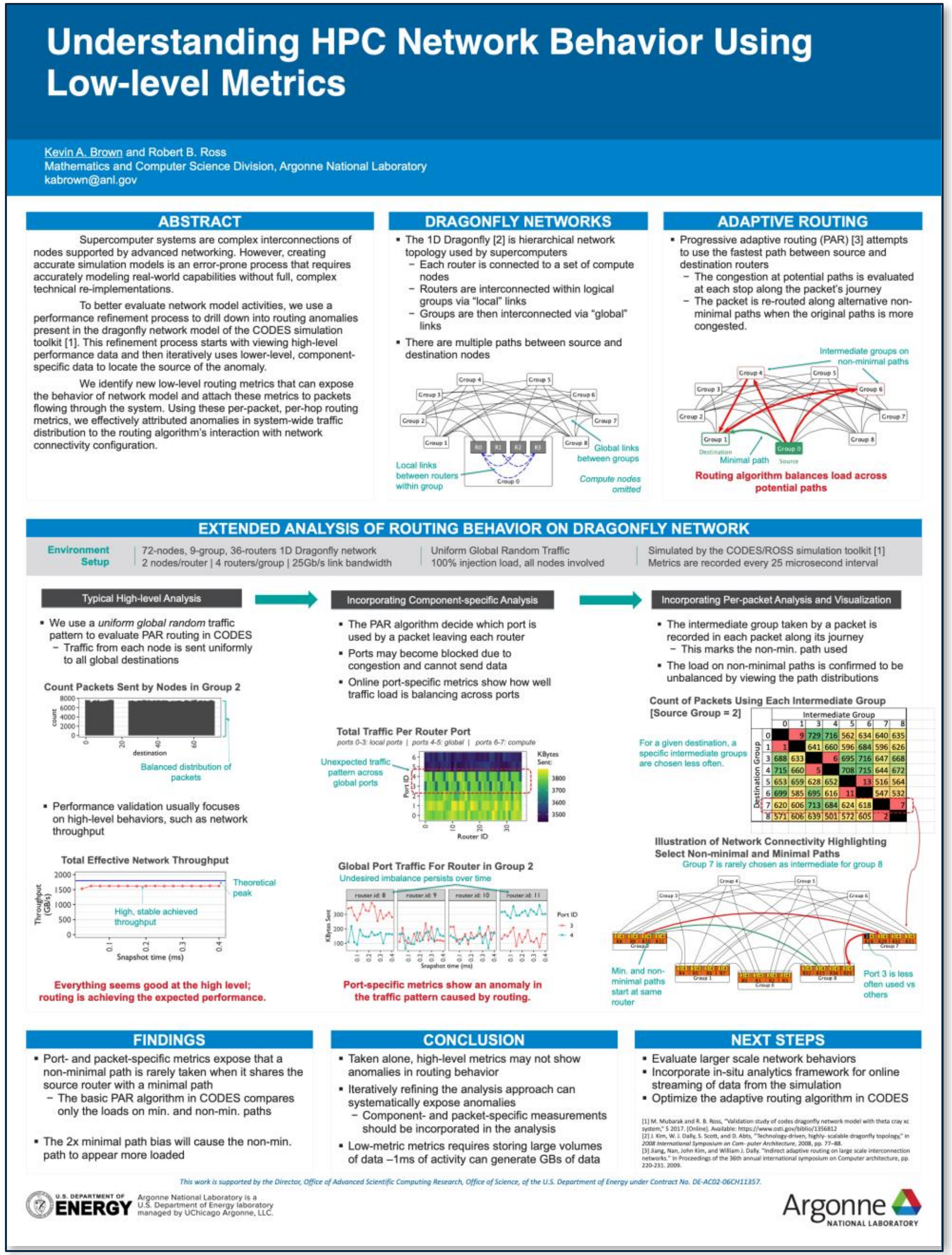


Balanced distribution of packets

Total Traffic Per Switch Port

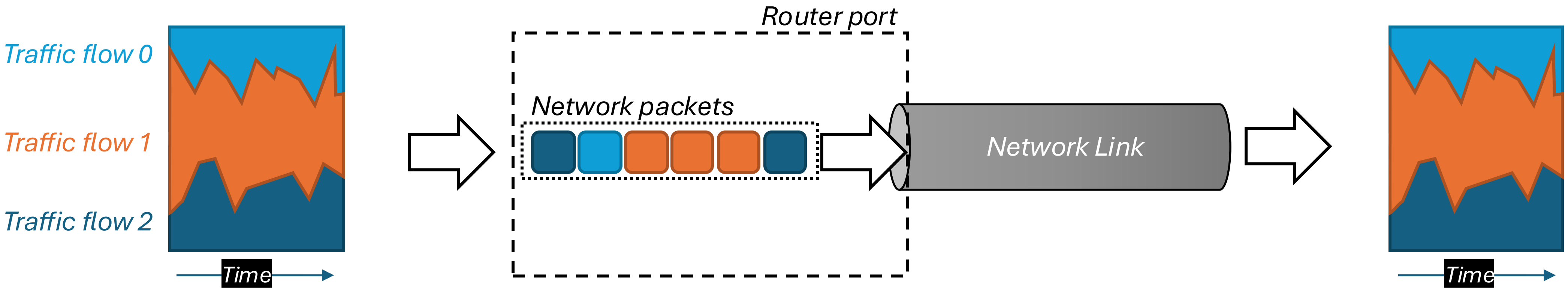


Unexpected traffic pattern across global ports



Quality of Service

Network without QoS



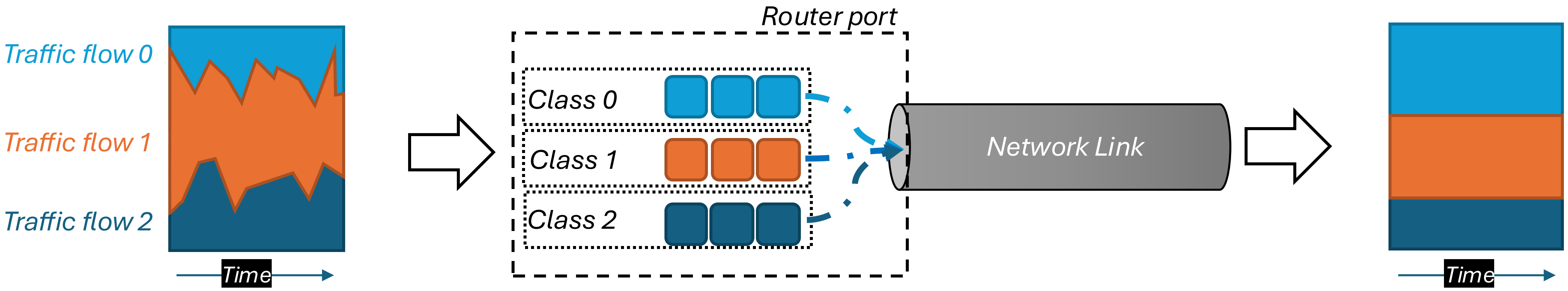
Variation in traffic load over time

No isolation; unregulated access to link

No performance guarantees

Quality of Service

Network with QoS

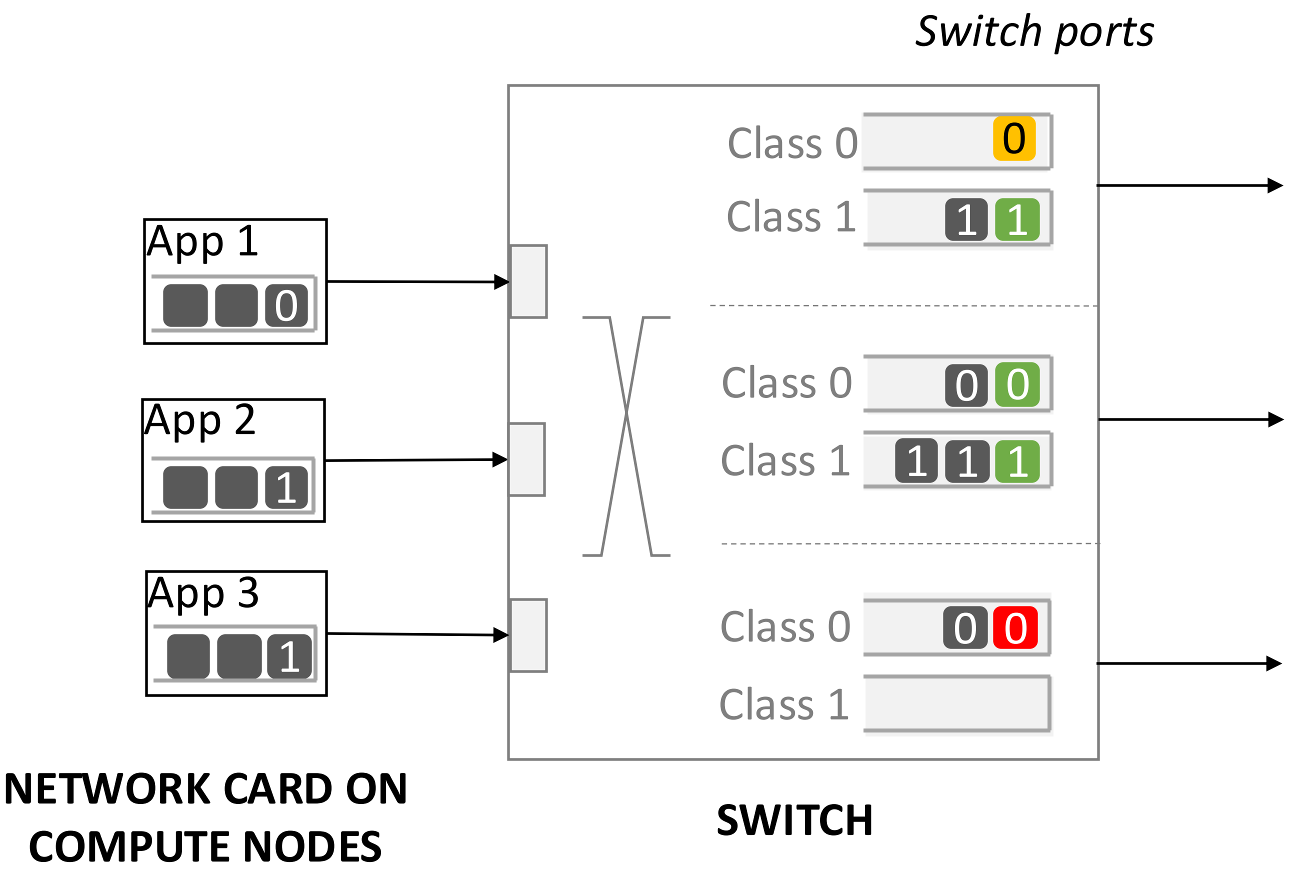


Variation in traffic load over time

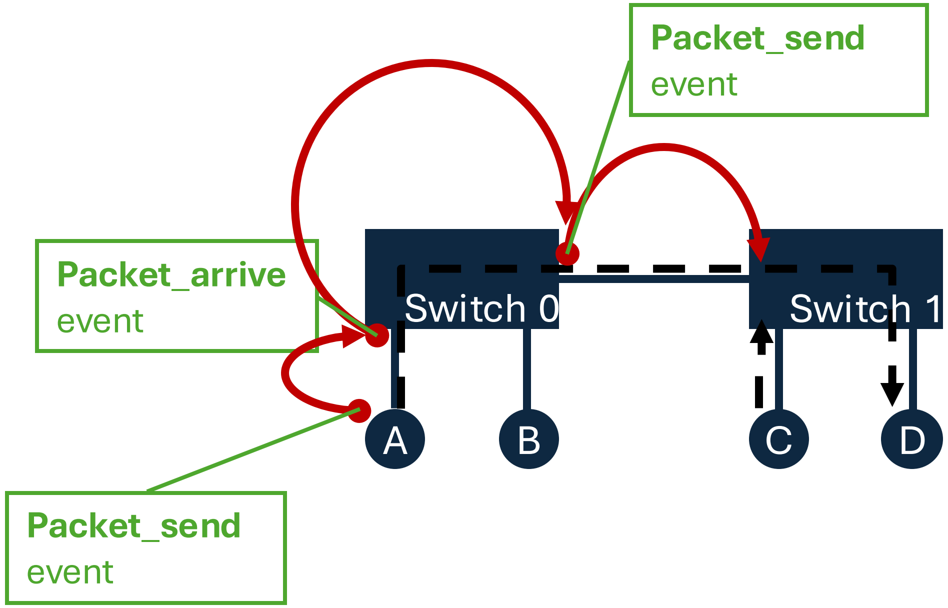
Isolation across multiple traffic classes; **QoS** policy regulates access to link

Consistent performance guaranteed

Quality of Service



Simulating Supercomputer Networks

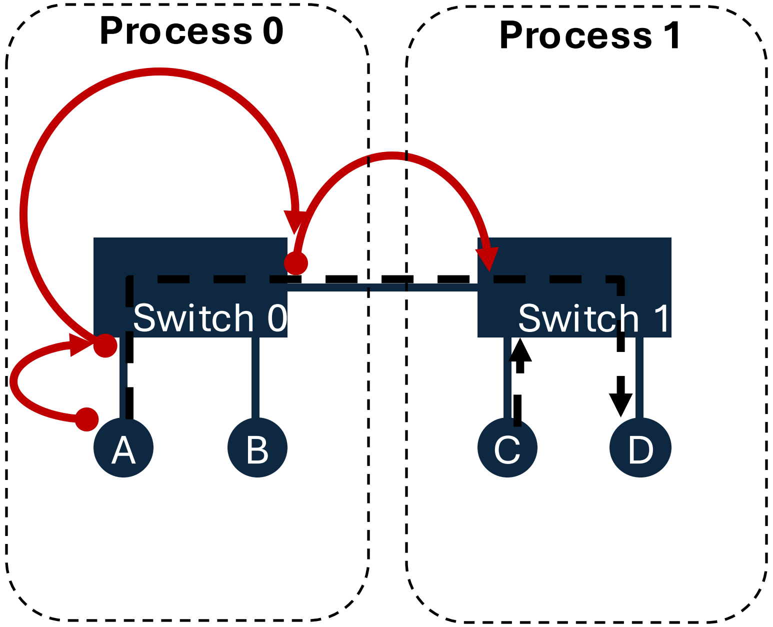


Network model

Time	Switch 0 events	Switch 1 events
5	Packet(A)Arrive*	-
10	Packet(A)Send	-
15	-	Packet(A)Arrive
16	-	Packet(C)Arrive*
20	-	Packet(A)Send
21	-	Packet(C)Send

Events in the network model

Simulating Supercomputer Networks



Network model

Process 0

Time	Switch 0 events
5	Packet(A)Arrive*
10	Packet(A)Send

Process 1

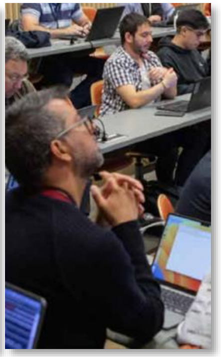
Time	Switch 1 events
15	Packet(A)Arrive
16	Packet(C)Arrive*
20	Packet(A)Send
21	Packet(C)Send

Events in the network model

Teaching and Supporting HPC

SC24 Early Career Program Chair

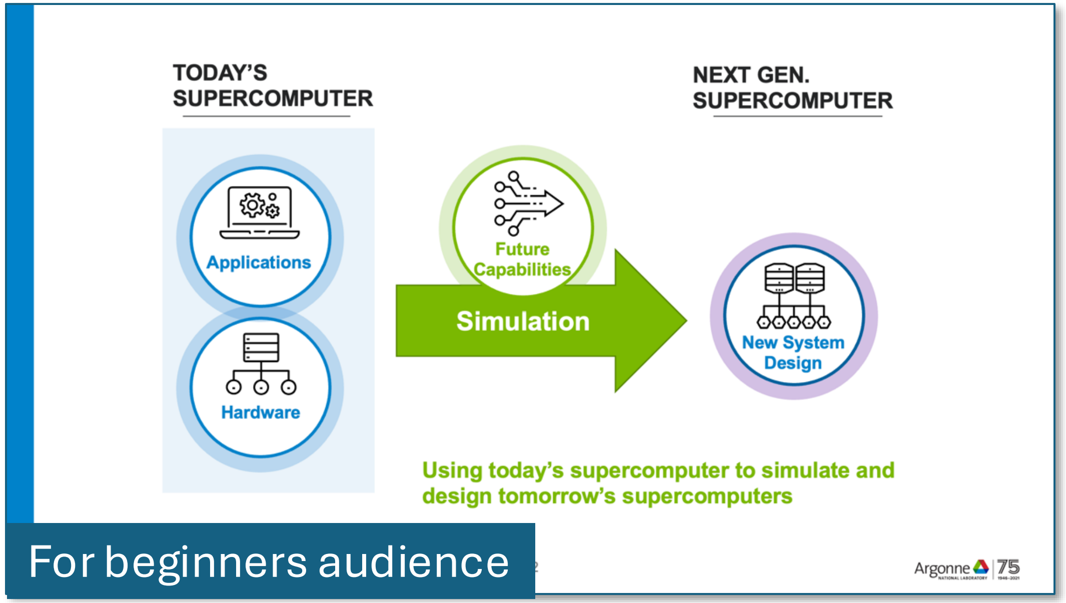
- Proposing Work
- Reporting Work
- Managing Work
- Career Paths Panel



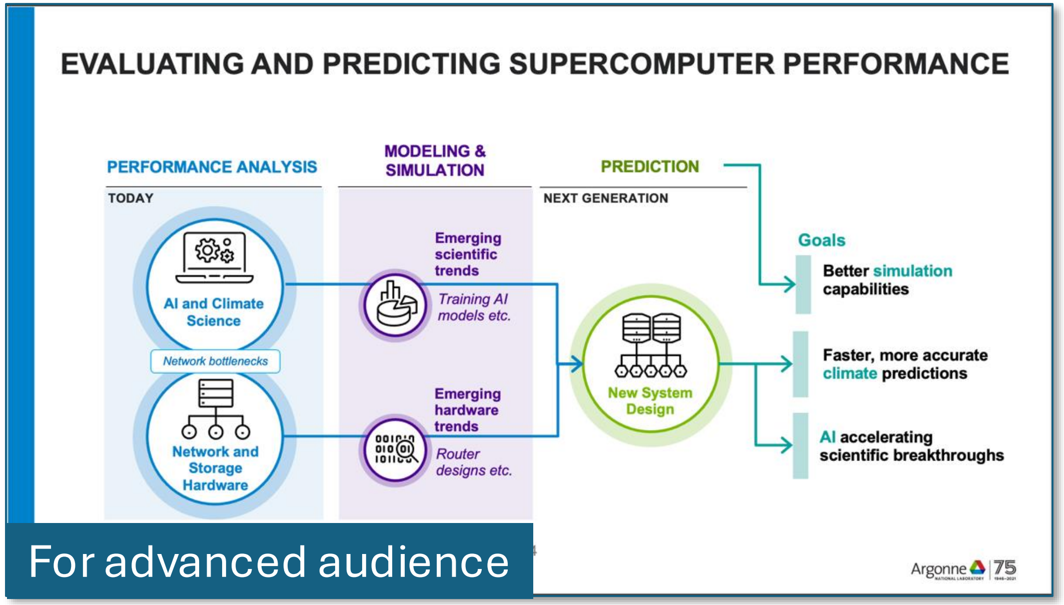
CARLA 2025General Co-chair

- Keynotes (NASA, Argonne Lab, etc.)
- HPC/AI workshops, tutorials, et al.
- Exhibitor booth
- Networking events

Promoting HPC



For beginners audience



For advanced audience

Supercomputer tour

Argonne 2019

Lawrence Livermore National Lab

Digicel, Jamaica [mobile network co.]

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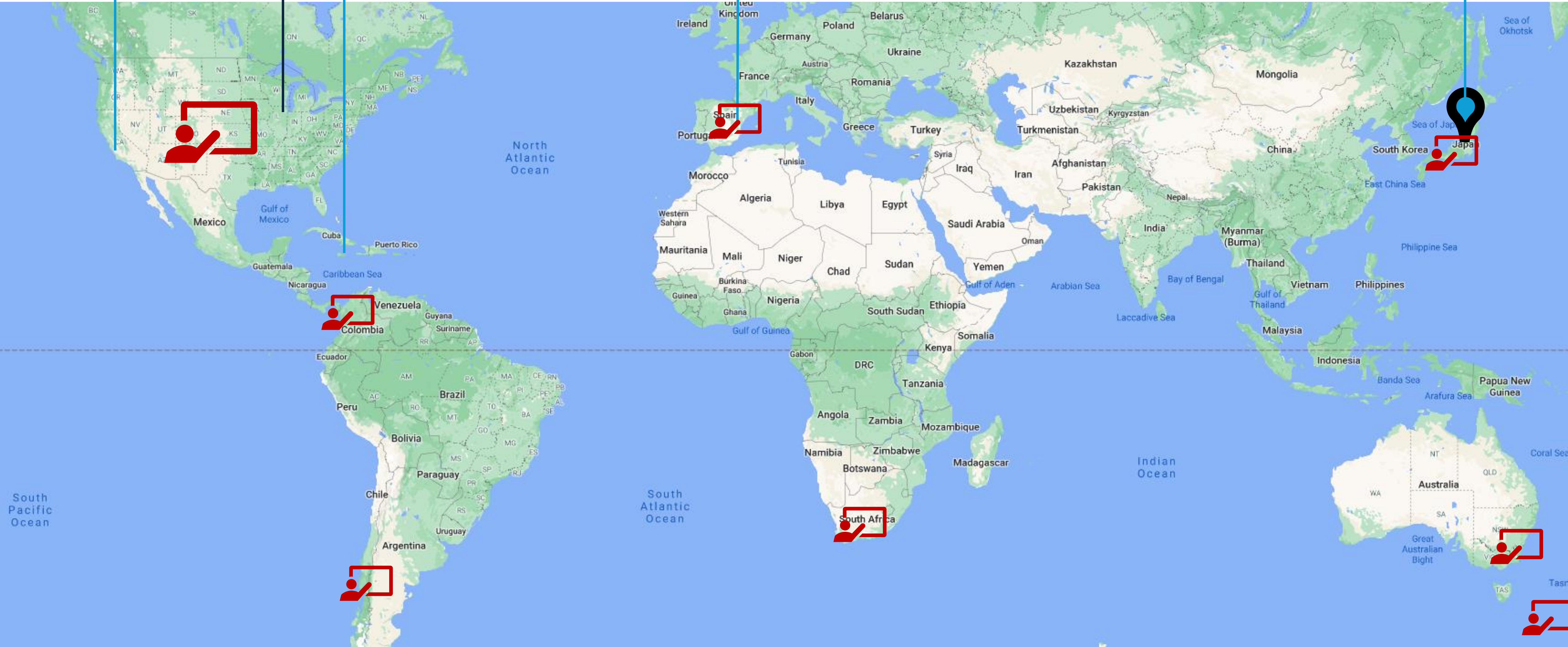
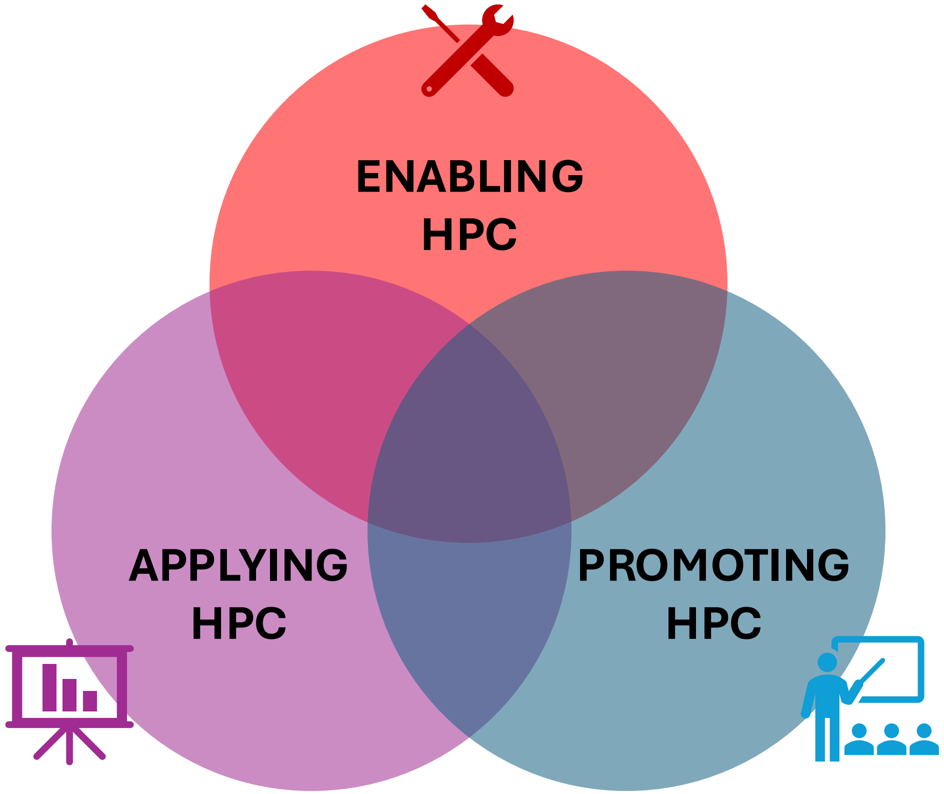
Tokyo Institute of Technology (Tokyo Tech)



Engaging with HPC

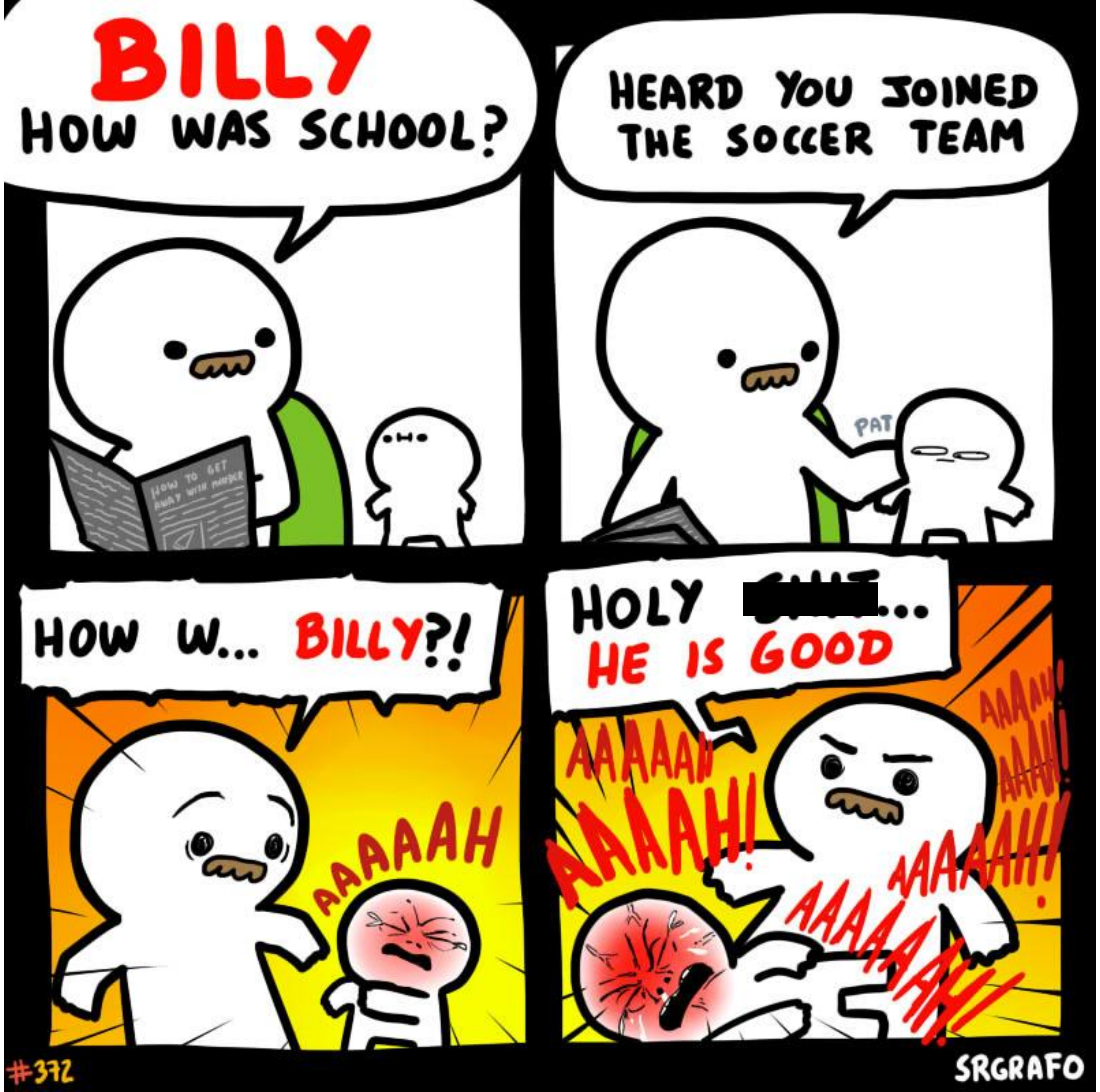


The Journey

1. It's OK to not know what you want to do
   - It may not exist yet

2. Your path to HPC may not be linear

3. Your work with HPC may not be well bounded


BILLY
HOW WAS SCHOOL?
HEARD YOU JOINED THE SOCCER TEAM
PAT
HOW W... BILLY?!
AAAAAH
HOLY [redacted]...
HE IS GOOD
AAAAAH
AAAAAH!
AAAAH!
AAAAAAH!
AAAAAAAH!!
#372
SRGRAFO