

# Lab Courses in a Pandemic

*Does it work? If so, how?*

Professor Jorg Liebeherr



The Edward S. Rogers Sr. Department  
of Electrical & Computer Engineering  
**UNIVERSITY OF TORONTO**

# Why do networking labs?

I hear and I forget.  
I see and I remember.  
I do and I understand.  
*- Confucius*

What we have to do,  
we learn by doing.  
*- Aristotle*

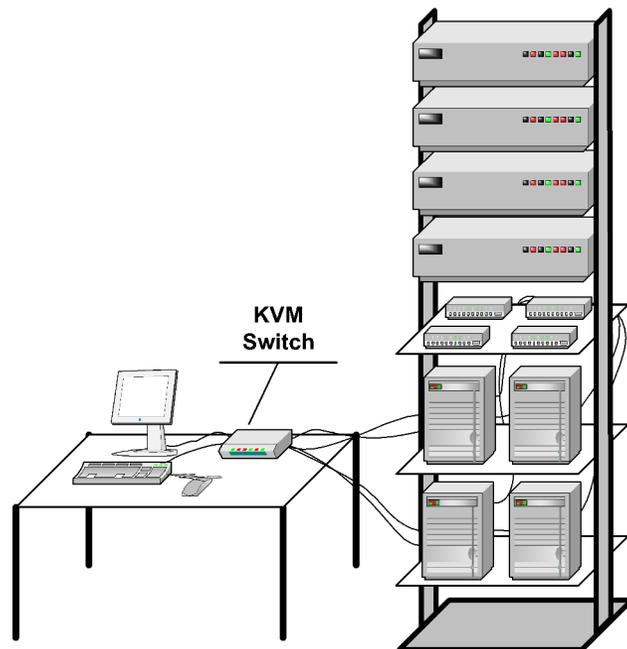
Learning is an active process. We learn  
by doing. Only knowledge that is used  
sticks in your mind.  
*- Dale Carnegie*

*Labs are 25% of the final grade.*  
*-course syllabus*

# Revising a lab manual during a pandemic

## Pre-pandemic

- Hands-on Internet labs with Linux PCs and routers
- Needs an update (badly!)



## Pandemic hits...

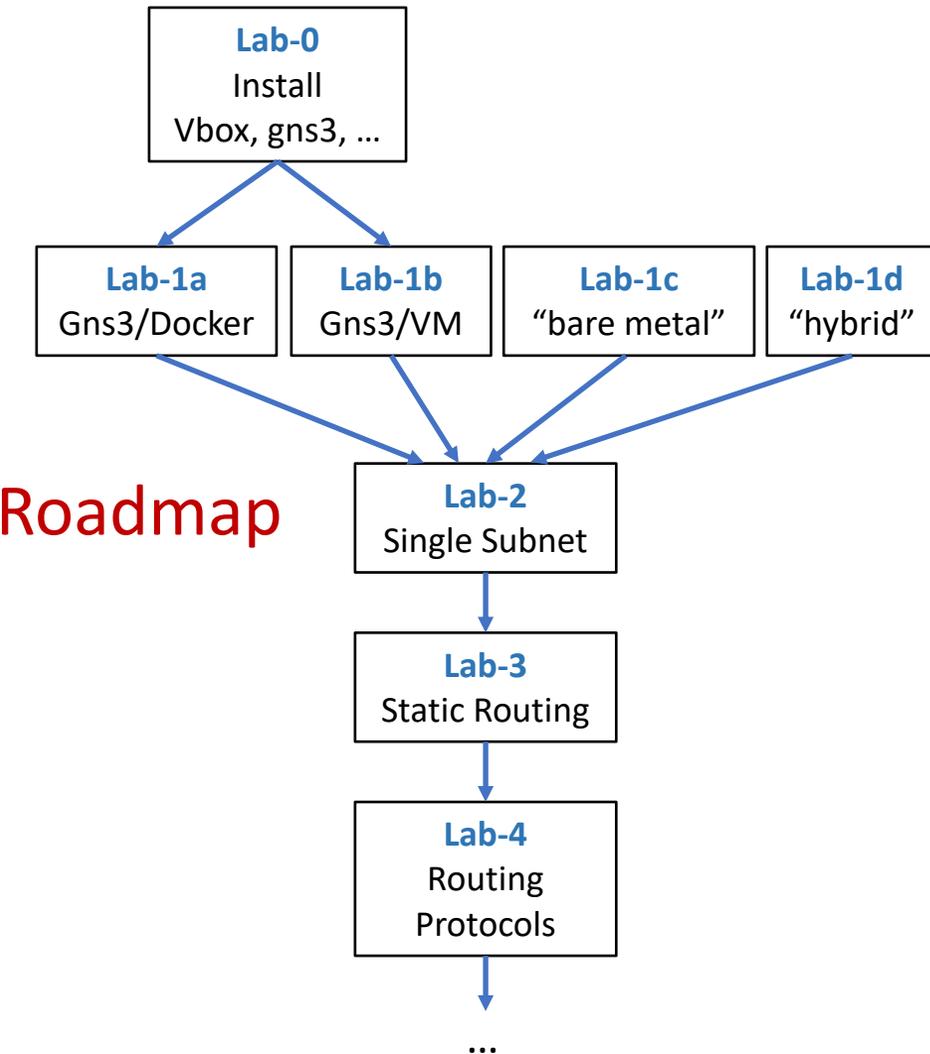
- ✗ Cancel labs? **No.**
- ✓ Virtualize labs (GNS3, Docker, Virtualbox)
- ✓ Revise labs at the same time
- ✗ But then: multiple versions? **No.**

### Solution:

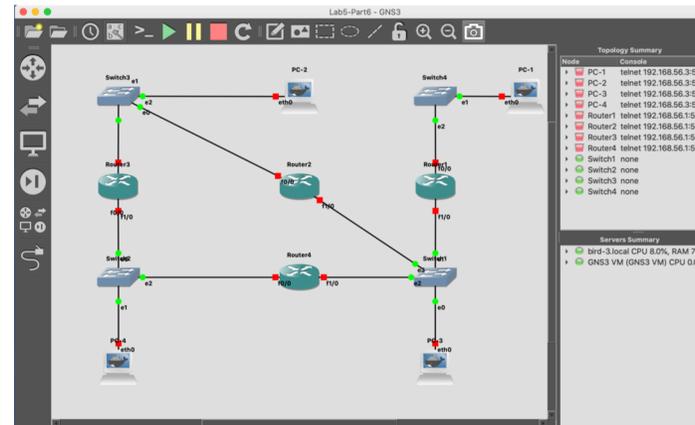
- Have multiple versions only for first lab
- Identical instructions for all other labs

Question: Can this work?

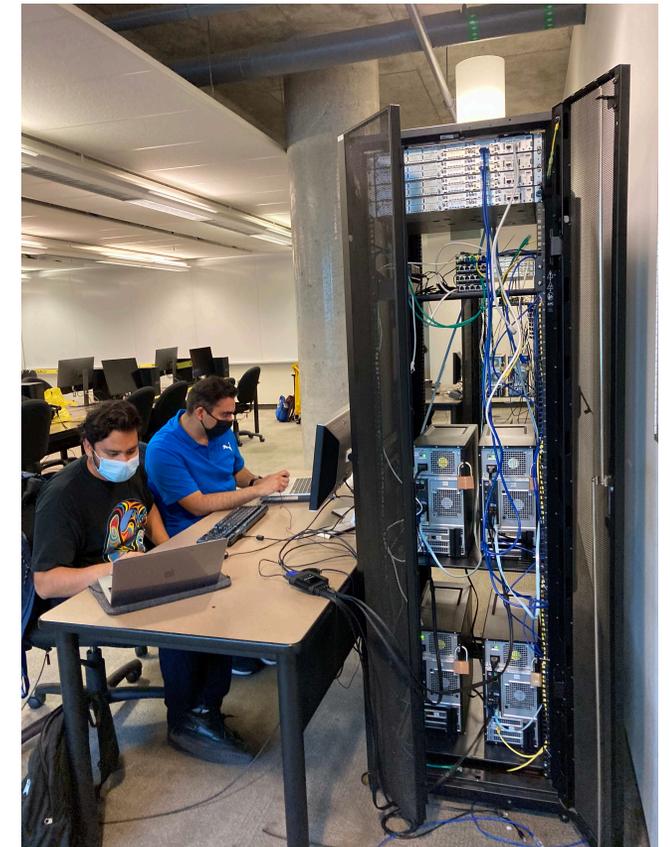
# Revising a lab manual during a pandemic



## Fall 2020: Virtual labs



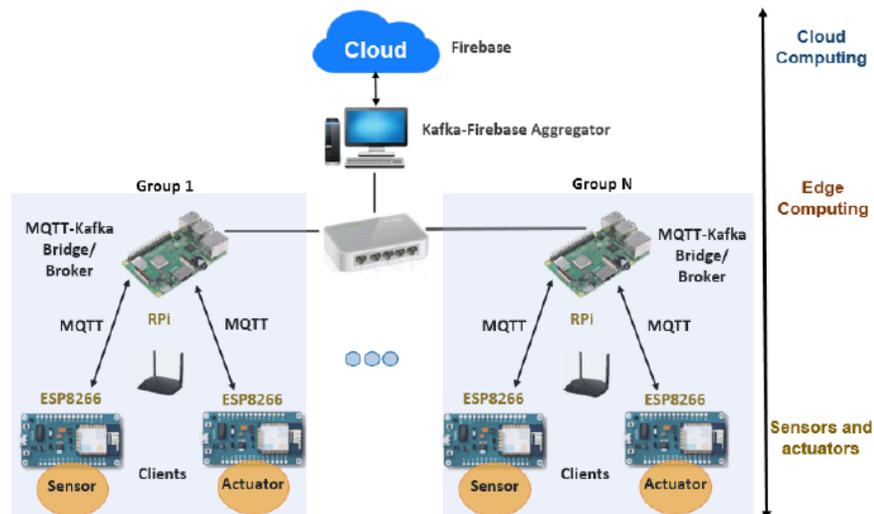
## Fall 2021: Back to in-person



# Starting a new lab course during a pandemic

- Starting point: A new course on IoT networking for [Summer 2020](#)
- Lab component: IoT lab manual by Prof. Admela Jukan (TU B'weig)
  - [In-person lab:](#)

- ESP8266 microcontrollers + sensors
- Raspberry Pi (edge device)
- Kafka aggregation server
- Google Firebase



## Pandemic still goes on...

- ✗ Cancel labs? **No.**
- ✗ Virtualize labs? **No.**

### Solution:

- Adapt labs for home use
- "Take-home" lab kits
- Lab kits are picked up or shipped



# Conclusions

Where there's a will, there's a way.

- Proverb

- With some imagination and a lot of effort, labs could continue
- Effort on “pandemic labs” is now being leveraged:
  - Revised Internet lab is now used for in-person use
  - Take-home lab kit for IoT course will continue in this fashion
- Open question about the virtual vs. in-person lab versions:  
*Is there a difference in student retention?*