CSC 5991 – Special Topic: Network Programmability and Applications

Instructor: Rhongho Jang

Location: Zoom Meeting

Course Description

This class will cover the foundations and advanced topics in network programmability. By the end of the course, students are expected to know 1) the fundamental knowledge of network programmability, 2) router architecture and working flow, 3) state-of-the-art applications, and 4) opportunities and challenges.

Course Objectives

Upon successful completion, you will:

- Understand the concept of network programmability
- Study a novel programming language that is designed for switch's data plane
- Learn real-world network issues and their solutions with the network programmability

Prerequisites

- Knowledge on basic concepts of computer networks, including IPv4/IPv6, protocols, routing, access control list (ACL), and quality of service (QoS)
- Programming skills in C/C++

Textbook

No textbook is required for this course.

Schedule (tentative)

Week 1	Introduction
Week 2	Network in the Wild (background knowledge and issues)
Week 3	Software-defined Networking
Week 4	Protocol-independent Packet Processing (P4) I - PISA and RMT
Week 5	Protocol-independent Packet Processing (P4) II - P4 Language
Week 6	Protocol-independent Packet Processing (P4) III - P4 Runtime
Week 7	Data Structures for P4 (CM, BF, and QC)

Week 8	Midterm Exam
Week 9	Load Balancing with P4
Week 10	Buffer Scheduling with P4
Week 11	Security with P4
Week 12	Machine Learning Applications with P4
Week 13	In-network Applications with P4
Week 14	Data Center Applications with P4
Week 15	Special Topics and Final Exam