# Class Intro

2025 Fall

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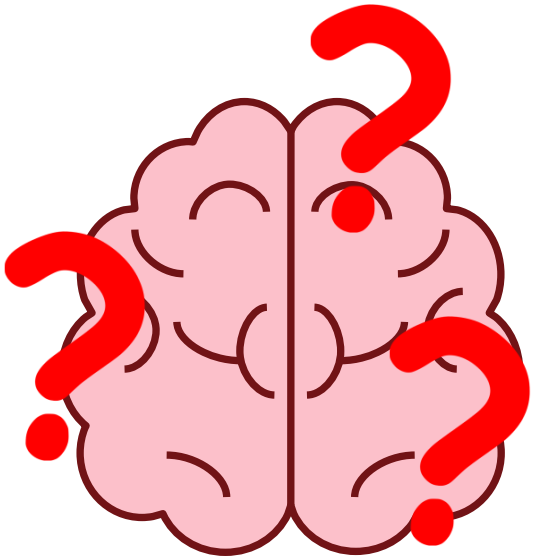
Hanyang University

# About Me

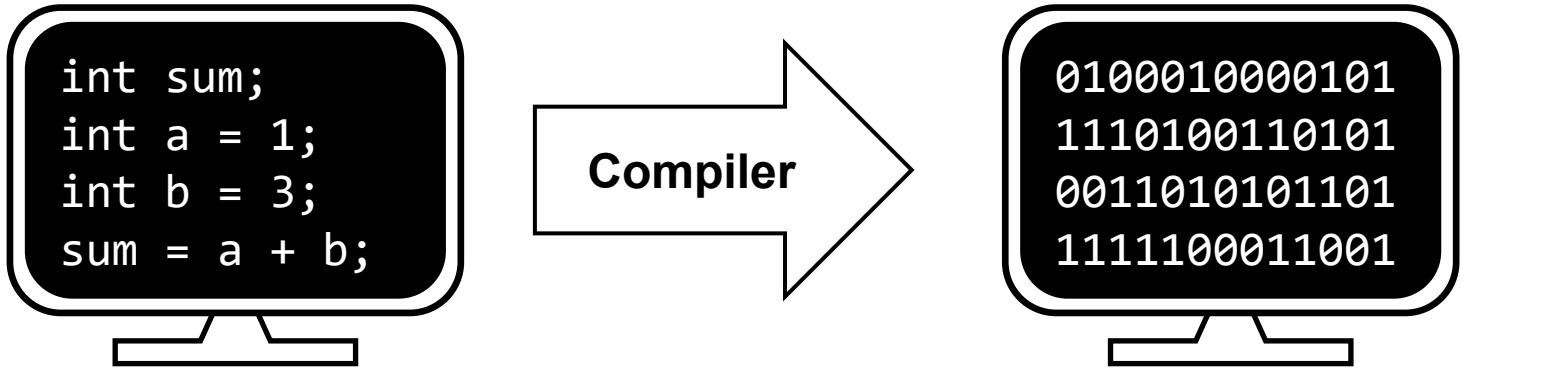
- **이헌준 (Hunjun Lee)**
  - Working on Computer Architecture
  - Assistant Professor @ HYU (2024.09 ~)
  - Senior Researcher @ SNU
  - Grad Student @ SNU ECE Department



- **Our Lab: Computer Architecture Lab (CArch)**
  - We are working on various topics!
    - Brain-Computer Interface (BCI)
    - System for AI
    - Process-in-memory architecture (PIM)

# What is Compiler?

- **The overall compilation toolchain translates your program into a computer-executable form**
  - Your program is human-understandable language
  - But, computers can execute binary instructions
  - The compiler is there to fill the gap!

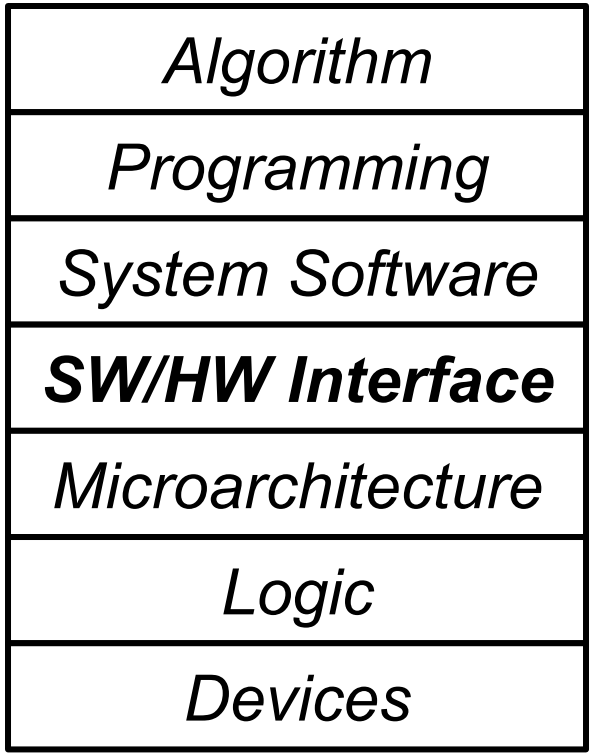



**How you describe the program (Program)**

**What computer understands (Executable)**

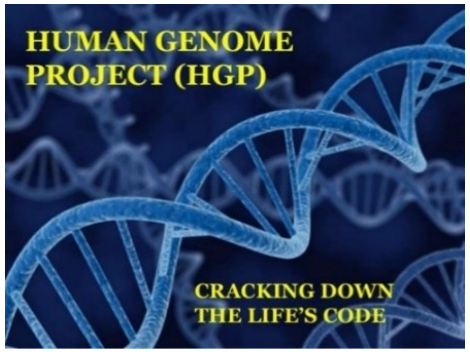
# Why is Compiler Important?

- **The compiler bridges the gap between the hardware and user!**
- **We cannot utilize the hardware in the absence of compiler**



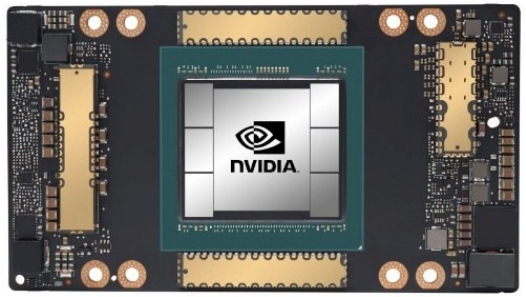
# Why is Compiler Important?

- There are various emerging applications

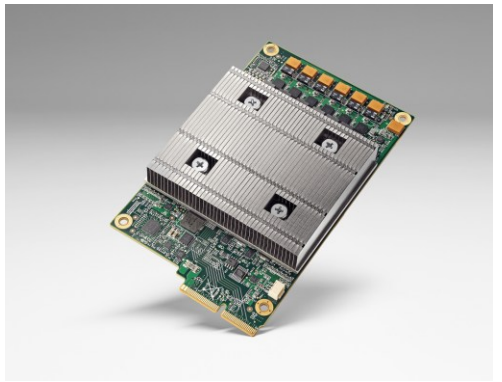



Human Brain Project


- There are innovative computing hardware




IBM Q™

# Another Example

- **AMD GPUs are competitive against NVIDIA GPUs**

| | NVIDIA H200 | AMD MI300X |
|---|---|---|
| Release date | Q2 @ 2024 | Q4 @ 2023 |
| Compute Throughput | ~ 4 PFLOPS | ~ 2.61 PFLops |
| Memory Bandwidth | 4.8 TB / s | 5.3 TB / s |
| Memory Capacity | 141 GB | 192 GB |
| GPU-to-GPU | NVLink | Infinity Fabric Link |
| PRICE! | **US $30,000** | **US $15,000** |

- **But, NVIDIA dominates the SW (and network) ecosystem**

| | NVIDIA H200 | AMD MI300X |
|---|---|---|
| Software | **CUDA ☺** | **RoCM ☹** |
| Rack-Scale | **NVSwitch** | - |

# Syllabus

- **Class overview**
  - You will learn the basics of compiler and implement a simple working compiler
- **Class Structure**
  - Lecture and three “light-weight” project
- **Grades**
  - Attendance: 5%, Project: 30%, Midterm: 30%, and Final: 35%
- **Contact**
  - Email: hunjunlee@hanyang.ac.kr
  - Please send an email if you have questions

# There Are Some Excuses

- **Even for this year's compiler class**
  - Lecture: **Hunjun Lee**
  - HW Grading: **Hunjun Lee**
  - Exam Grading: **Hunjun Lee**
  - Teaching Assistant / QnA: **Hunjun Lee**

  ➔ I hope you obey the rules (ex) HW submission format, read exam questions carefully, …

- **I know that I talk a bit fast and skip some details**
  - Feel free to interrupt if you have any questions
  - Ask me to slow down I'm going too fast

# Class Rules [Important] - 1

- **There are some RULES! (MUST follow and no excuse)**
  - If you don’t like the rules, take other classes

- **Exam dates**
  - We will take exams from pm 6 ~ 9 or pm 7 ~ 10 (three-hour exam)
  - I will upload a survey next week and fix the schedule where the **“most” students are available (not necessarily all)**
    - I don’t care for personal issues (only official class schedules)
    - The exam will be held on **Saturday** if there is no available date at weekdays

# Class Rules [Important] - 2

- **Grading policy**
  - I give “F” to students (Don’t expect to pass the course without studying at all)
    - If you do not take (either) midterm or final exam
    - If you get extremely poor grades
      - **Zero point in either midterm, final, or project**
    - If you miss too much classes (according to department rule)
  - I won’t change your grades due to your situations
    - e.g., scholarship, graduation, … (this is not for me, but for fairness)

**I won’t change the rules (drop now … your final chance)**

# Prerequisites

- **Sufficient Programming Skills for Project**
  - C/C++ Programming (No Python ☹)
  - Linux, gcc, gdb, vim, Makefile, Docker
- **Basics of How Computers Operate (I'll get to this in the first week)**
  - RISC architecture, fetch & decode, etc
- **Basic Theory of Computation (we will also discuss the concepts in the class)**
  - Automata, regular expression, etc

# Textbook & Important References

- **Class textbook**
  - Compilers: Principles, Techniques, and Tools, Aho, Sethi, Ullman

- **It would help you better understand the details, but not necessary to read all the books**

# Questions?

- **This is the first class, so I'll make it short!**