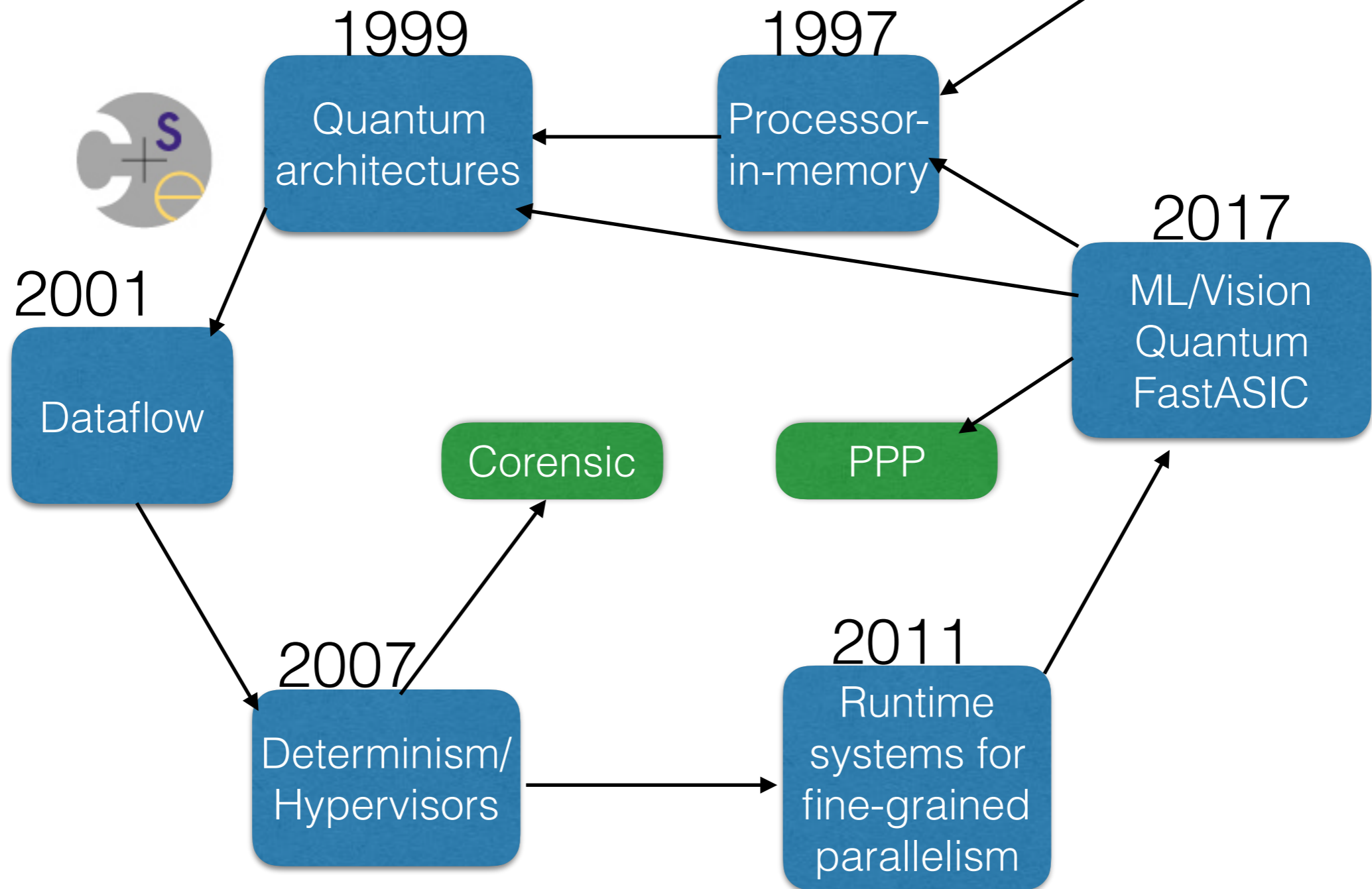# CSE/EE 470

Computer Architecture II
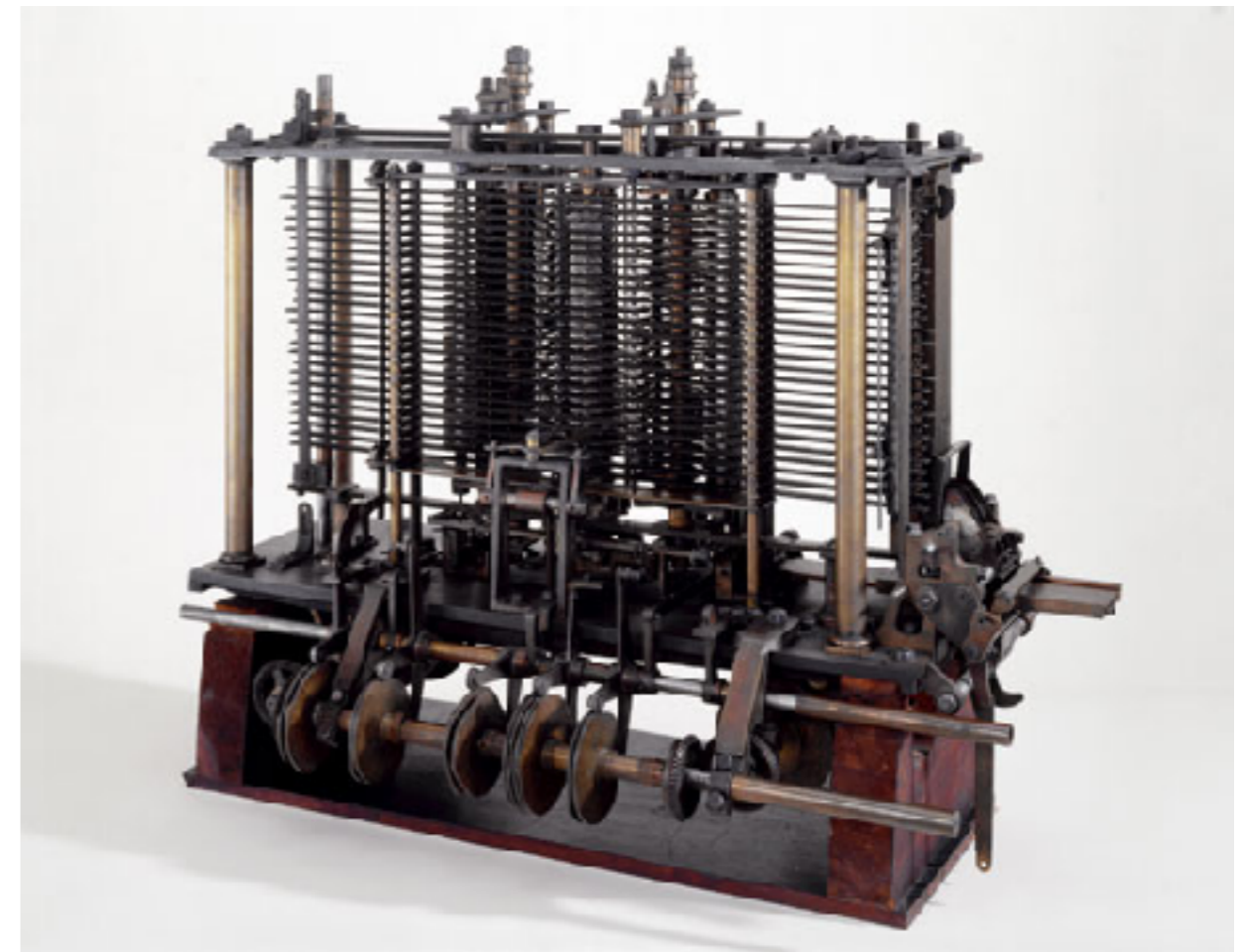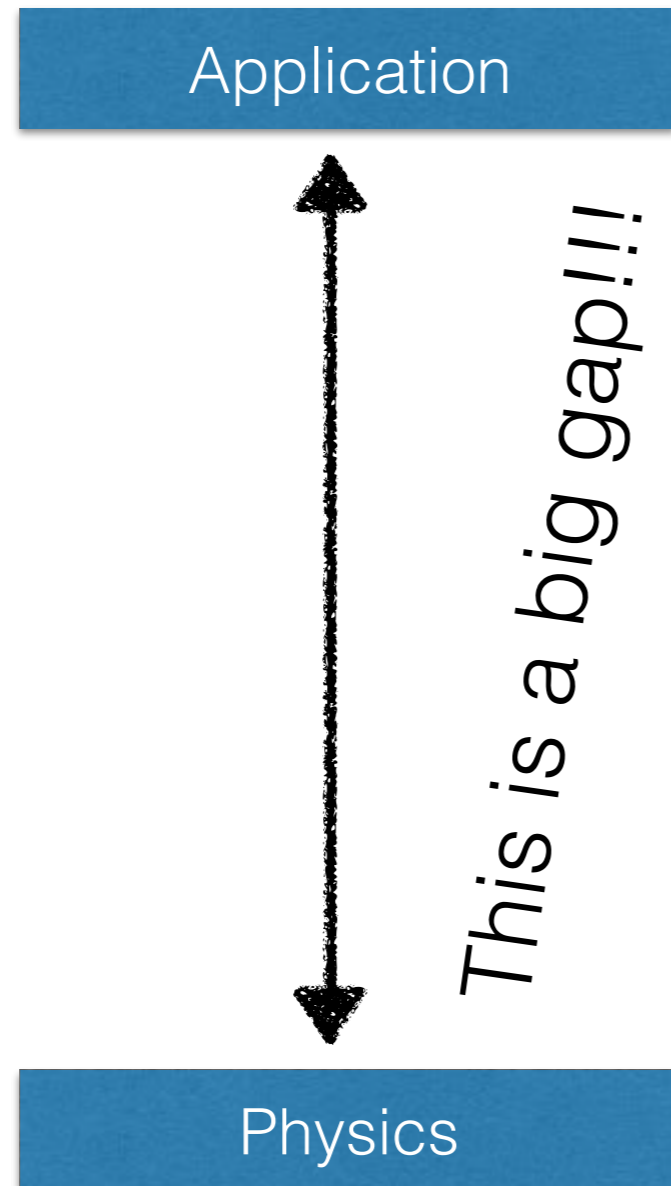
Who am I?!?

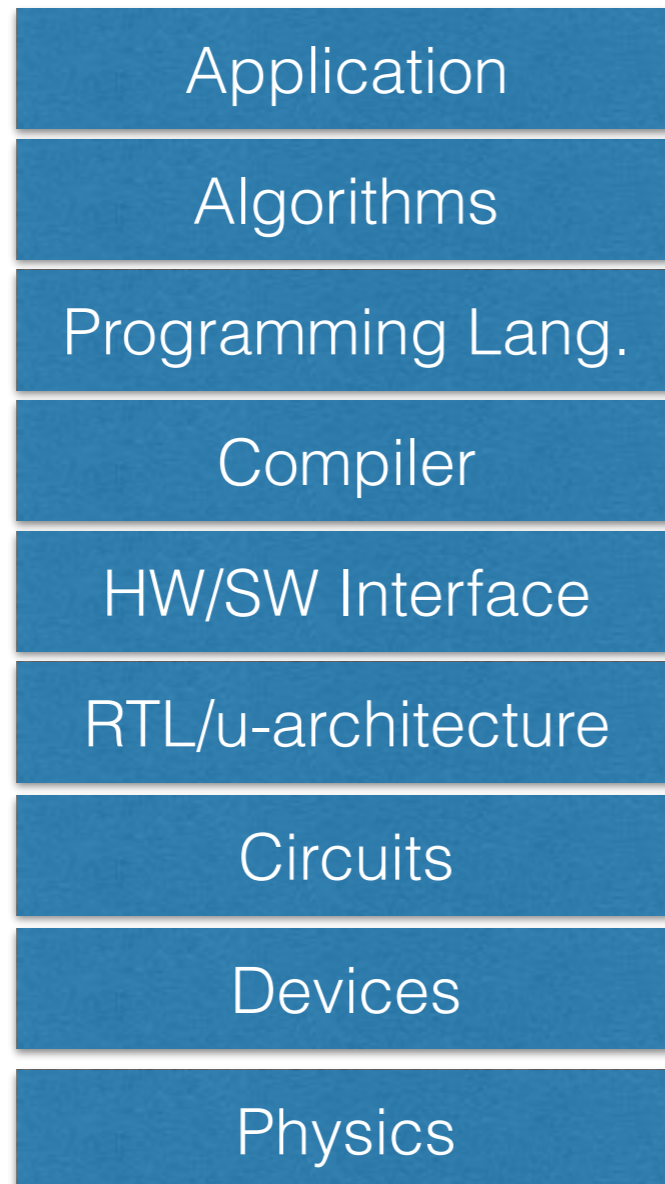# "my" research

Who are the ~30 of you!?!

- Almost all in EE, 3 in CSE

  - in EE, mostly D&E and a couple in VLSI

- 1 junior and the rest senior

- 1/2 WA, 1 Vancouver, 5 china, 1 India (northern), 2 Taipei, 1 FL, 1 OR

Programming Matter

Application

This is a big gap!!!

Physics

Charles Babbage difference engine
Designed 1812-1820, partially built by ~1871

Programming Matter

Application
Algorithms
Programming Lang.
Compiler
HW/SW Interface
RTL/u-architecture
Circuits
Devices
Physics

- Abstraction is your friend
- Difficult to create
  - Can be deceptively easy to use
    - e.g. VLSI required 30 years to figure out, and really it's just rotating your field of view 90 degrees.

Programming Matter

Application

HW/SW Interface

Circuits

Physics

- Abstraction comes in time.

- Here's how the world of computing looked in the 50's

What computer architects do

- Try and bridge the gap between application requirements and technological capabilities

- Try not to get lost in the bits, unless it matters

- It's a tough job because:

  - Application developers are hindered by reality

  - Predicting where technology is going is hard

  - There are many constraints to satisfy: cost, time to market, the actual application demands, changes in manufacturing

- A complex device (the CPU in your laptop for instance), takes about 500 people, 3-5 years. 200 of them design RTL/circuits. 200 of them verify the 200 of them doing RTL. 50 of them keep the tools running for the 400 RTL/verification folks. 40 of them push paper around. 10 of them architect the chip, typically with 1-2 lead architects.

  - But not anymore; have we built the last microprocessor?

Why should you care?

- You want to be a computer scientist. It's good to know how computers work.

- Computer architecture, as a field, is exploding in creativity right now.

  - "Just do nothing and it'll get better" no longer works. We have to do something, and we are.

    - This is going to effect you, no matter what field you are interested in.

- It is an old field. I hope you come away with a good understanding of the history of the field you've chosen to be in.

"Lack of experience diminishes our power of taking a comprehensive view of the admitted facts. Hence those who dwell in intimate association with nature and its phenomena grow more and more able to formulate, as the foundations of their theories, principles such as to admit of a wide and coherent development: while those whom devotion to abstract discussions has rendered unobservant of the facts are too ready to dogmatize on the basis of a few observations." - Aristotle, ~ 300BC

Logistics

- There is no book.

- There is a daily reading report due (individually).

- Homework can be done in pairs (this is different than the daily reading report).

- You must talk. No seriously, you *must* talk. You'll see.

- Grading is 40% homework, 40% midterms (there are two), 10% reading reports, **10% participation in class**.

  - Midterm I: roughly in the first week of may, *probably* May 1st

  - Midterm II: *definitely* May 31st

- In early May we'll go to the computer history museum. Day TBD but probably May 10th

- **THERE IS NO FINAL EXAM. THERE IS A MIDTERM ON THE LAST DAY OF CLASS**

- Office hours are by appointment only, 206-293-9456. Txt only.

Daily rhythm

- You present a 5-10 minute overview of the topic

- We discuss for the remaining time

What do you want to learn from this class?

- GPU architecture

- What's new? In 469 was build simple pipeline

- quantum architecture

- deep learning (TPU)

- FPGAs and other reconfigurable architecture