# DISTRIBUTED SYSTEMS!

Introduction

May 4, 2020

# WOW! so *THAT* happened…

- All we can do is *MAKE THE MOST OF IT*!

- Our **goals** are to
  - understand key principles in designing and implementing distributed systems
  - reason about problems that involve distributed components
  - become familiar with important techniques for solving problems that arise in distributed contexts
  - build distributed system prototypes using the Go programming language

# THE definitive quote on distributed systems…

Leslie Lamport, 2013 ACM Turing Award winner

*“A distributed system is one in which the failure of a computer you didn't even know existed can render your own computer unusable.”*

# WHY is *that* hard???

- distributed systems can fail in complex ways and these systems are more difficult to build, test, and understand than centralized systems

- but we WANT to do it!
  - more fault tolerant if there are fewer points of failure and it has no centralized components
  - more physical nodes the system gains performance and becomes more scalable, capable of handling more load
  - improves latency, by improving geographic diversity, by placing resources closer to clients who use the system.

- emphasis of this course will be on building distributed system prototypes, small and large

# Let’s GO (v 1.13)!

- Go is a systems language designed at Google
- It is especially well suited to building distributed systems, but there is a learning curve, so…
  - Go tutorial (start here) https://tour.golang.org/welcome/1
  - How to Write Go Code https://golang.org/doc/code.html
  - Effective Go https://golang.org/doc/effective_go.html
  - Go by Example https://gobyexample.com/
  - More Go resources https://github.com/golang/go/wiki/Learn
- Pick your fav IDE!
  - Goland has some nice reviews

# LABS! (start next week!)

- Go v1.13 is installed on the linux servers
- Install it locally too, be ready to share your screen
- You need to be online and working during the labs!
  - Your code MUST run on the server to get full marks
- TAs will be “circulating”
  - Can answer questions
  - Help with ideas
- YES!  Video conferencing the whole semester!
- More on this soon…

# How do we think about distributed systems?

- Google http://www.hpcs.cs.tsukuba.ac.jp/~tatebe/lecture/h23/dsys/dsd-tutorial.html
- Nodes*?*
  - Properties?
  - Processing units on a multicore machine?
- Networks?
  - What are they?
  - Why are they important?

# TO DO!

- Read the Google Tutorial
  - Post your answers 2 of the 11 exercises on the forum [participation marks!]
- Check out this AWS talk
  - Post your thoughts on the forum [participation marks!]
- Get familiar with Go!