
IACS
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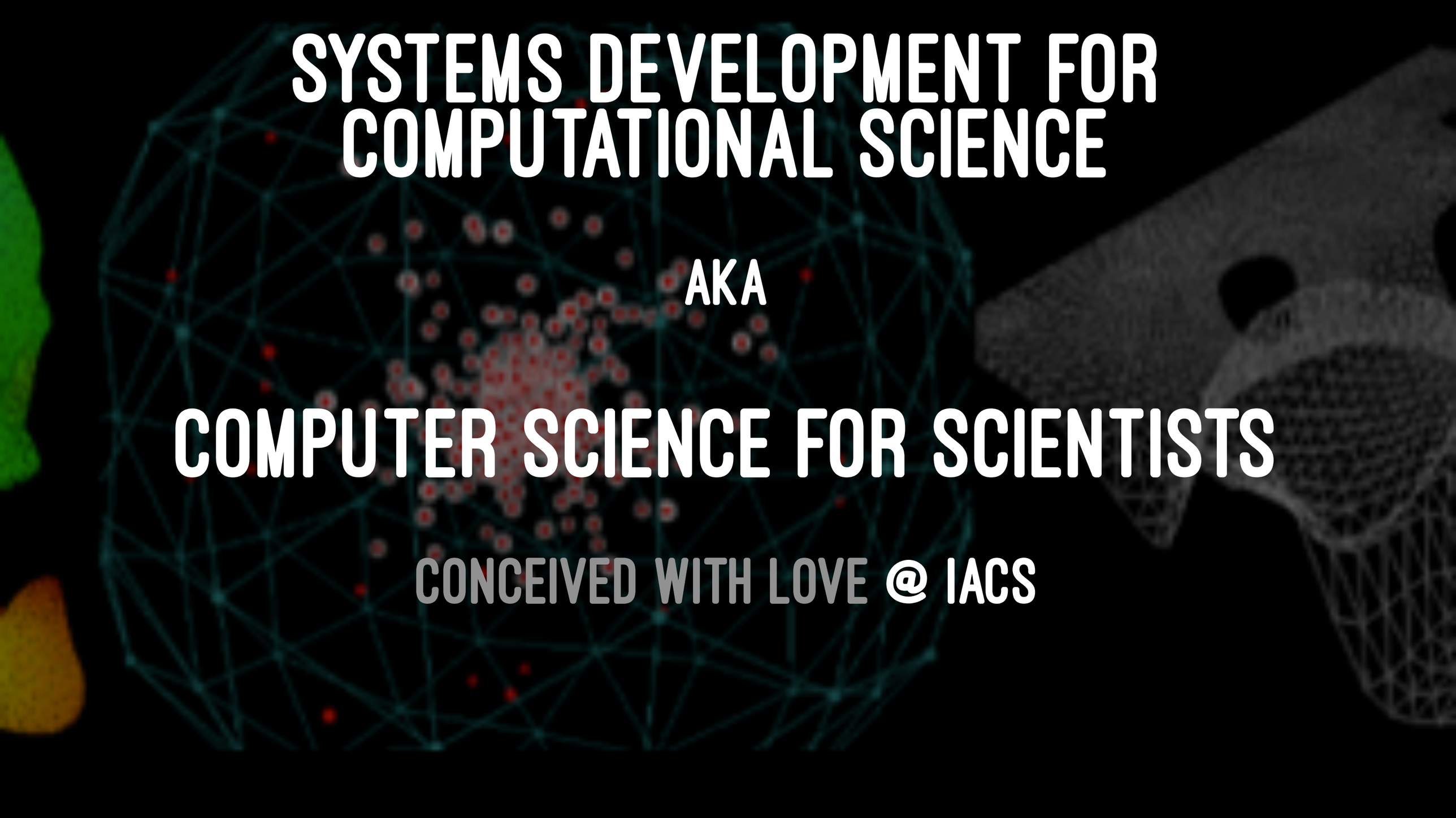
HARVARD
School of Engineering
and Applied Sciences

# CS207



# SYSTEMS DEVELOPMENT FOR COMPUTATIONAL SCIENCE

AKA

# COMPUTER SCIENCE FOR SCIENTISTS

CONCEIVED WITH LOVE @ IACS


A COURSE IN 3 ACTS (MILESTONES):

# I. THE SCAFFOLDING

# II. ACCESS TO THE DATA

# III. THE INDIVIDUAL GLORY


...AND WITH 3 SIMULTANEOUS SCENES...

1. ENGINEERING A TIGHT SHIP

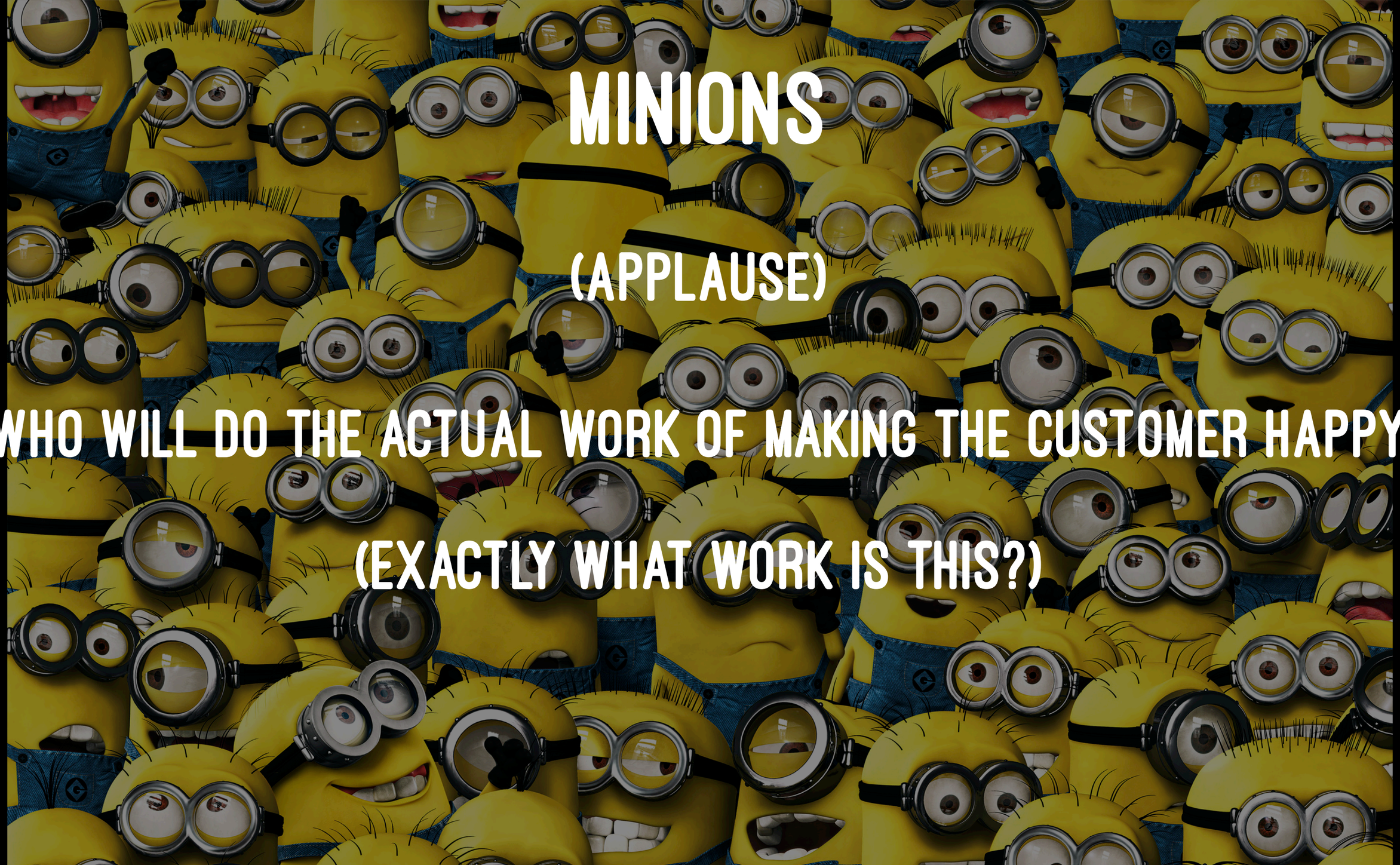
2. WHAT'S IN THE LANGUAGE

3. MUHAMMAD IBN MUSA AL-KHWARIZMI FINDS DATA.

# DRAMATIS PERSONAE

- PAVLOS PROTOPAPAS (THE CUSTOMER)
- RAHUL DAVE (THE TALKATIVE OFFICE MANAGER)
- BOB ADOLF (THE HEAD ADVISER)
- CHENHUI HU AND … (THE ADVISERS)

AND FEATURING THE…


MINIONS
(APPLAUSE)
WHO WILL DO THE ACTUAL WORK OF MAKING THE CUSTOMER HAPPY
(EXACTLY WHAT WORK IS THIS?)

# I. A TIME SERIES LIBRARY

(WITH OPERATIONS BETWEEN, AND ALGORITHMS ON TIME SERIES)

- PYTHON AND C
- EXECUTION MODEL, PROGRAMMING PARADIGMS, OBJECT MODEL
- SEQUENCES, ITERATORS, LISTS, ARRAYS, TREES, HASHES
- TESTS, DEBUGGING, CI, AUTOMATING
- PROFILING AND PERFORMANCE

# II. A TIME SERIES DATABASE

(WITH INDEXING, SIMILARITY QUERIES, QUERY LANGUAGE, AND CONCURRENT ACCESS)

- WRITING A CLI, A REPL, A DSL, A COMPUTATIONAL GRAPH
- CONCURRENT ACCESS USING THREADS, ASYNCIO
- APPROPRIATE ON-DISK DATA STRUCTURES FOR THE INDEXES AND TS
- PERFORMANCE

# III. A REST INTERFACE TO THESE AND MORE

(THE MORE IS YOUR CHOICE. BUT YOU MUST DELIVER A DEMO)

- YOU WRITE AN EXTENSION OF YOUR CHOICE
- YOU PACKAGE EVERYTHING UP IN ONE OR MORE SERVERS. ACCESSED BY A WEB API. AND PROVIDE A DEMO

# HOW?

- ALL WORK IS ON GITHUB. ONE REPO FOR YOU LABS PER PERSON.
  - YOU WILL SUBMIT LABS INDIVIDUALLY. UPTO 3 A WEEK.
- YOU WILL WORK IN GROUPS OF 4-5. YOU CAN COLLABORATE AS MUCH AS YOU WANT WITHIN THE GROUP (INCLUDING LABS).
  - ONE REPO PER GROUP FOR YOUR PROJECT.

# HOW (CONTD)

- THE BASIC PART OF THE PROJECT (I AND II) WILL BE DONE BY ALL GROUPS.
- ONCE EVERY MILESTONE A GROUP WILL IMPLEMENT A FEATURE FOR ANOTHER GROUP
- GROUPS WILL DO DIFFERENT THINGS FOR THE ELECTIVE PART AND REST API
- THERE IS A (SMALL) PAPER ON OPTIMIZATION OF A SCIENCE ALGORITHM (GROUP)

# WHEN?

- MONDAYS 2.30PM - 5PM LECTURE AND LAB+GROUP MEETING. (BOTH COMPULSORY) PIERCE 301
- WEDNESDAYS 2.30PM - 4.30PM (LECTURE COMPULSORY. LAB HIGHLY RECOMMENDED) PIERCE 301
- FRIDAYS 4PM-6PM (LECTURE COMPULSORY. LAB HIGHLY RECOMMENDED) PIERCE 301 (THIS TIME MIGHT CHANGE)

MONDAY LABS ARE COMPULSORY.

WED AND FRI LABS HIGHLY RECOMMENDED.

IF YOU COME YOU WILL AT-MOST HAVE 1/2 HOUR TO 1 HOUR ADDITIONAL LAB WORK LATER.

NO LATE DAYS ON LABS. A WEEK'S LABS ARE DUE SUN 11.59 PM.

# GRADE

- LABS (30%): 15% JUST DOING THEM, 15% GRADING
  - PAPER (10%) IN M2
- PROJECT (50%): BASIC (30%), ADDITIONAL (20%)
- PARTICIPATION (10%): IN DISCUSSIONS, COMMITS, PEER REVIEW AND CODE REVIEW EXERCISE IN M1

YOU WILL PEER-REVIEW EACH OTHER.

- FUN IS GUARANTEED!
- LOTS OF COOL STUFF TO LEARN
- LEARN TO LEARN. NOT TO GET A GRADE

# UNICORN LEVEL 1 UNLOCKED.