CS101 - Data Abstraction

An Introduction

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Allegheny College

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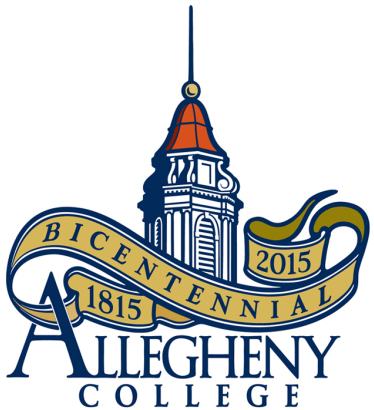
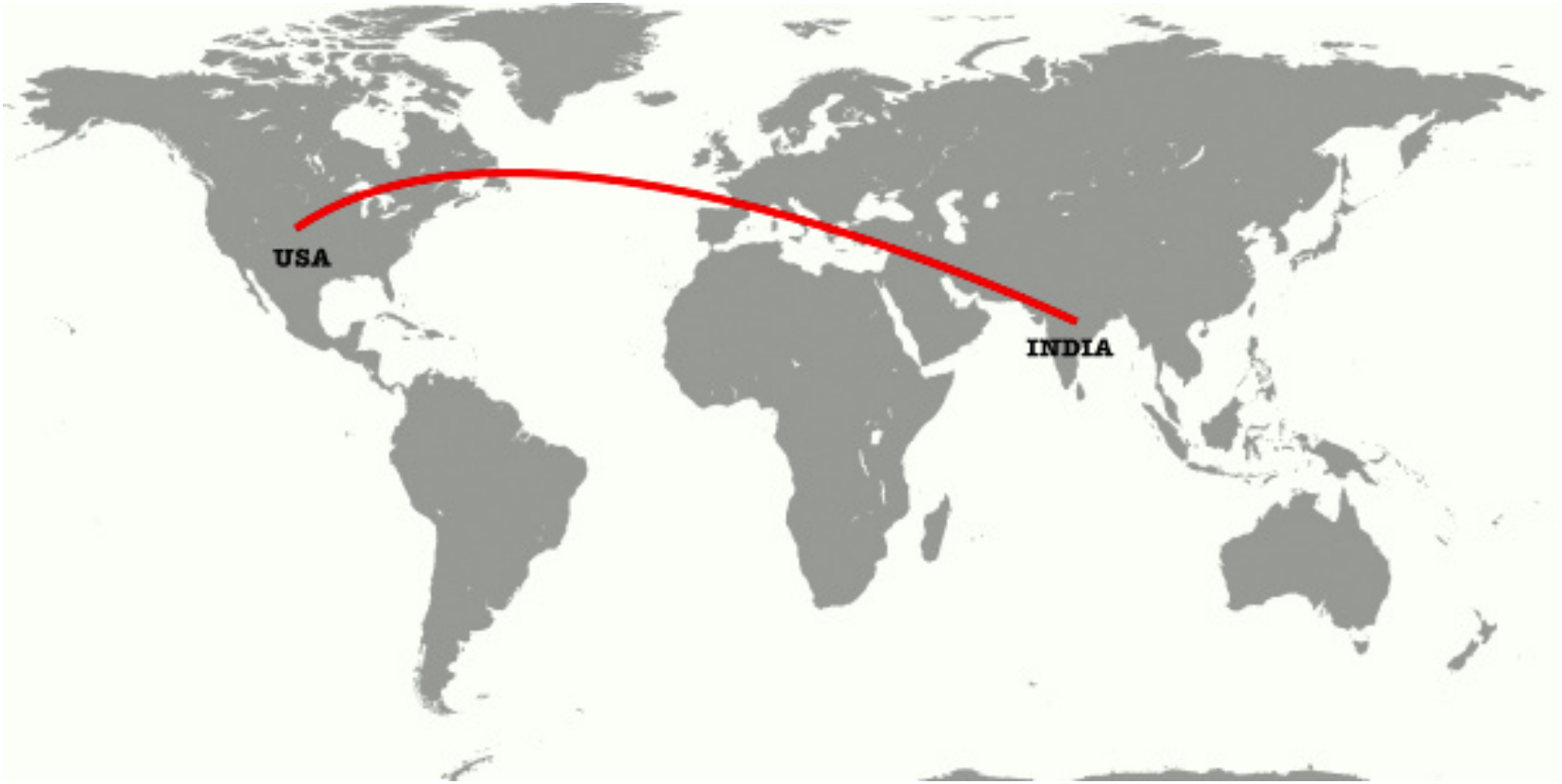


About me...

- My name is Aravind Mohan. Student's call me Mohan or Professor Mohan.
- Teaching at Allegheny since 2017.
- Worked as a programmer in companies such as Kaiser Permanente and Union Bank for 5 years between 2006 and 2011.
- Research in the field of Big Data and Cloud Computing last 10 years.

About me...



Roughly 10,000 miles...

About you...

- Tell us something about you.
- For example: tell us your name, the year you are in, your favorite movie and/or food, your hobby, or maybe about an interesting computer program you had written ...

Let us get to know about each other ...

Meeting Time

- Lecture Session:
  - Tuesday and Thursday
    8:30 AM - 10:00 AM, (remote)
- Lab Session:
  - Wednesday 2:50 PM - 4:40 PM, (remote)

Professor's Office Hours

- Mondays, Tuesdays, Wednesdays, and Thursdays:
  10:30 AM - 12:00 PM

Email/slack to schedule time outside office hours.

To schedule an office hours time slot, please visit my website [teaching page] and click on the
Schedule Meeting link located on the top right-hand corner to schedule 15 mins slots.
Let us connect with each other and enjoy our time together...

Website Details

- Professor's Website:

  `https://www.cs.allegheny.edu/sites/amohan/`

- Course Website:

  `https://www.cs.allegheny.edu/sites/amohan/course.php?cid=MTI=`

Administrative Stuff!

- No Lab this week.

  First lab next week on Wed, 3rd Mar 2021.
- No Lab on March 10th, 2021 (college break)
- No Class on April 13th, 2021 (college break)
- No Lab on March 24th, 2021 (midterm prep)
- Midterm Exam during lab time, on March 31st, 2021
- Finals at 2:00 PM, on May 18th, 2021 (exam code - E)
- Please verify if you are correctly registered for the course using Self Service.

More Administrative Stuff!

Lab Assignments	**30%**
Skill Tests	**10%**
Midterm Exam	**10%**
Final Exam	**15%**
Course Project	**20%**
Class Participation	**15%**

Please read the **Syllabus** to get an overview of the course.

Tips for Success

- Attentively listen to classes and try to participate in all class discussions.
- Take detailed notes during every class period.
- Clarify with the Professor, if a lesson is confusing.
- Complete all the reading assignments thoroughly.
- Do the in-class exercises thoroughly.

Be ready to **think**, **process**, and **code** in this course!

Interaction between us...

- Any question is a valid question. There is no question which is good and bad. So, questions are always welcome.
- Interaction is the best way to get rid of long lectures. So, let us try to interact more so that the communication is a two way process and the class is not boring.

Let us work together to make sure we retain **Programming Knowledge** from this course.

What is a Program?

- A program is a collection of instructions (algorithm) that performs a specific task when executed by a computer.
- Program is written using any programming languages such as Python, Java, C, C++, C#, and so on ...

A program is usually written to manipulate data.

What is Data?

- Data is just raw fact. It has no meaning.
- For example, **20** is data, no meaning right?
- The statement `age = 20` is called an assignment. This is information.
- ```
  age = 20
  print(age)
  ```
  is a program.

Data is useless without a program.
  ```

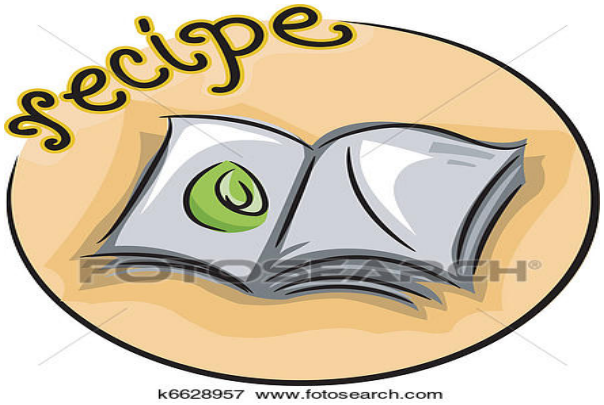
What is Data Structure?

- Data Structure is a representation of the logical relationship existing between individual elements of data.
- This specialized representation is used to store and organize the data in memory that considers not only the elements stored but also their relationship to each other.
- **Program = Algorithm + Data Structure**
- For example: array, list, linked list, stacks, queues, etc, ...
- `fruits = ['apple','banana', 'cherry', 'orange','grapes', 'pineapple']`

Data Structure makes the data easy to process inside a program.

A Practical Example ...

(a) Ingredients **(Input Data)**



(b) Recipe **(Program)**

(c) Indian Chicken Biriyani **(Output Data)**

(d) Cook **(Programmer)**

Learning Goals

By end of this course, you'll in general

- Be prepared to take any programmatic requirement and solve it the Object-Oriented way.
- Master a variety of data representation techniques.
- Learn how to assess performance of a program.
- Be well equipped to program in advanced courses such as Algorithms, Software Engineering, Robotics, Databases, Cloud Computing, and so on ...
- Sharpen your coding skills.

A simple example ...

- We will mainly use Python in this class.
- Do you have Python installed on your laptop? If not no issues. You can use an online compiler for today.

  `https://repl.it/languages/python3`
- Please install Python by watching the videos shared in Welcome Email, before next class. Connect with me if you have issues.

Ready to do a simple program?

Things to do!

Think and come up with at least one problem that you like to develop a computer program for?

- Sign up for course slack channel. (Link accessible in the course webpage!)
- Post your first Slack message. Individually summarize your Programmatic idea and post a message in the #class-activity channel.
- Install Python on your laptop.
- Read the Syllabus before next class.