#### **CSCI 120** Introduction to CompSci and **Programming** I Lec 0: Introduction



#### Jetic Gū



### Overview

- Focus: Python Programming
- Architecture: von Neumann
- Core Ideas:
  - 1. Administration
  - 2. Review some Data Structures
  - 3. It will be quick today



#### Administration



## Course Arrangement

- Week 8-13: Jetic
- Zoom Link

**P0** 

Admin

- Well, you are already here
- Lectures: the sooner we finish, the sooner we finish
- Course Website
  - https://jetic.org/kurs/csci-120/

Instructor @Columbia College, PhD Candidate in Computational Neuroscience





# Grading Scheme

- 5 Labs, released on Wednesday
- 1 Assignment
- Small Test
- Final Exam
  - code to see if it is copied.

 About tests and exams, I DO NOT require you to turn on your camera. Most likely I will be working on **stuff** when you take the test, but I will check your





Questions?



#### Data Structures Lists, Strings, Tuple, Dictionary, etc.

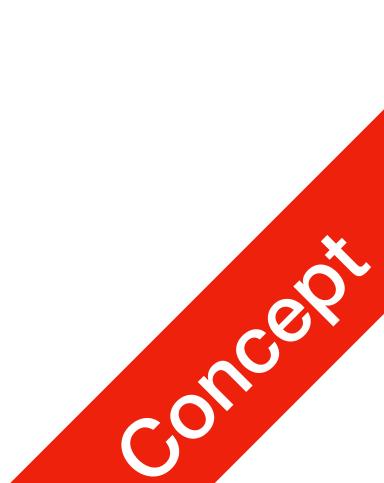


### Data Structures

- easier or more efficient. That is, they are tuned for certain tasks
- associated with algorithms.

• Data structures are particular ways of storing data to make some operation

• Data structures are suited to solving certain problems, and they are often





## Kinds of data structures

Roughly two kinds of data structures:

- by default
- designed for a particular task

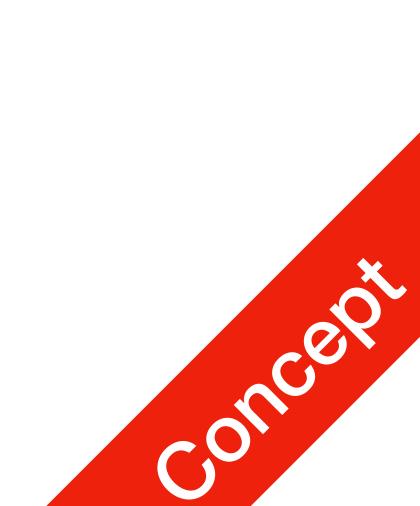
• built-in data structures, data structures that are so common as to be provided

user-defined data structures (classes in object oriented programming) that are



### Data Structures P2 Python built in data structures

- Python comes with a general set of built in data structures:
  - lists
  - tuples
  - string
  - dictionaries
  - sets
  - others...



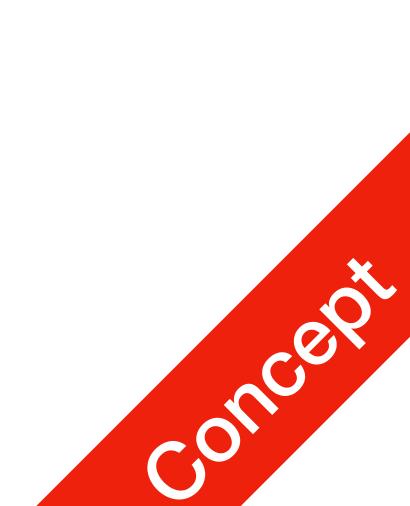


- An ordered group of items
- Does not need to be the same type
- List notation

$$A = [1, "This is a list",$$

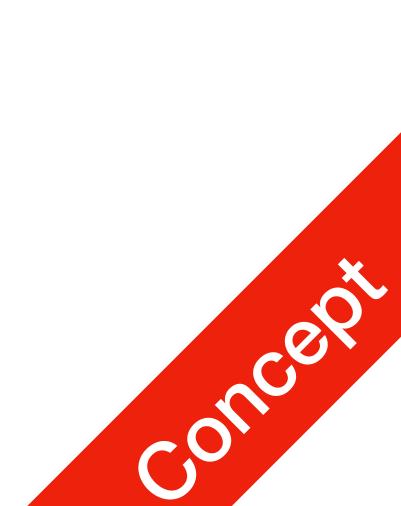
#### Lists

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### Methods of Lists

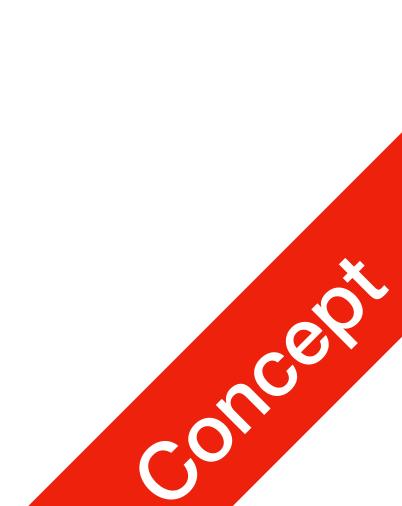
- alist.append(x)
  - adds an item to the end of the list
- alist.extend(L)
  - Extend the list by appending all in the given list L
- alist.insert(I,x)
  - Inserts an item at index I
- alist.remove(x)
  - Removes the first item from the list whose value is x



### Data Structures Examples of other methods

- Define and print List, then count values a = [66.25, 333, 333, 1, 1234.5]print (a.count(333), a.count(66.25), a.count('x')) //calls method 2 1 0 //output
- Return the first index where the given value appears a.index(333) //output 1
- Reversing a list (in place) a.reverse() //Reverses order of list [333, 1234.5, 1, 333, -1, 66.25]

#### • Sorting (in place) a.sort() [-1, 1, 66.25, 333, 333, 1234.5]





- **Deleting at index:** del a[0]
- Deleting at index range: del a [2:5]

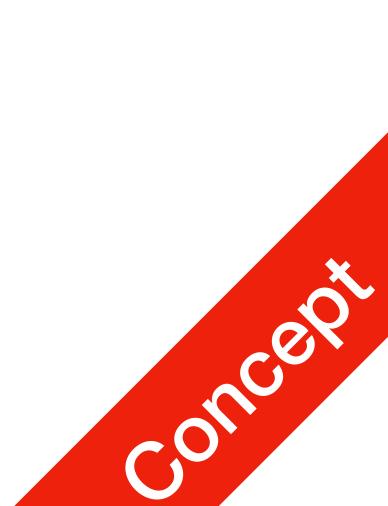
#### The del statement





- Tuple
  - A number of values separated by commas
  - Immutable
    - Cannot assign values to individual items of a tuple
    - However tuples can contain mutable objects such as lists
  - Single items must be defined using a comma  $\bullet$

### Tuples

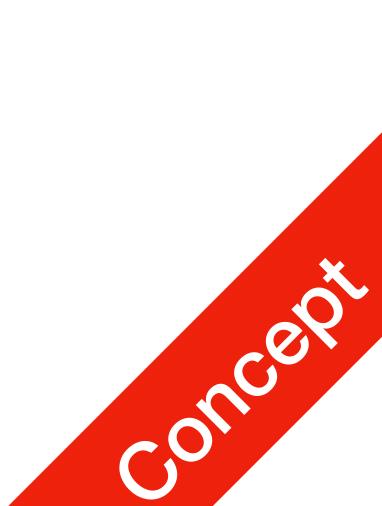






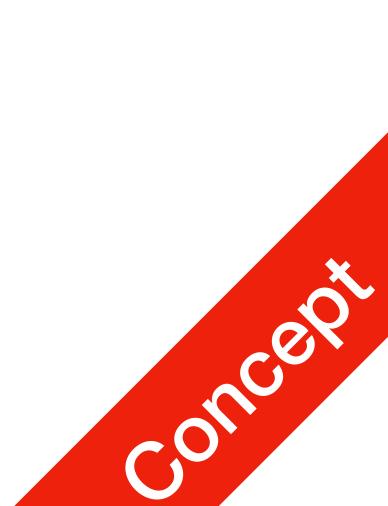
- An unordered collection with no duplicate elements
  - Basket = ['apple', 'orange', 'apple', 'pear']
  - Fruit = set(basket)
  - Fruit // Set(['orange', 'apple', 'pear'])

#### Sets



### Dictionaries

- Indexed by keys
  - This can be any immutable type (strings, numbers...)
  - Tuples can be used if they contain only immutable objects



• adict.items()

 for retrieving key and values through a dictionary  $stuff = \{$ 

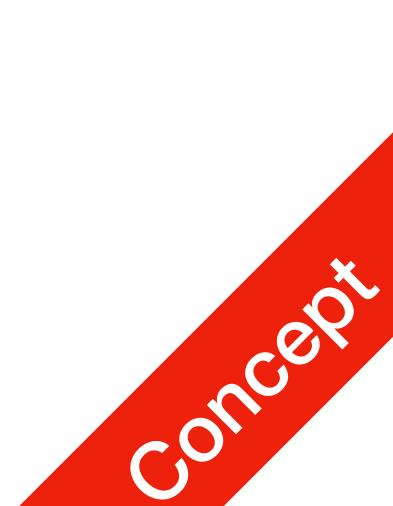
'name': 'Jetic',

'age': '44',

'favourite food': 'cheese'}

for k, v in stuff.items(): print("His " + k + " is " + v)

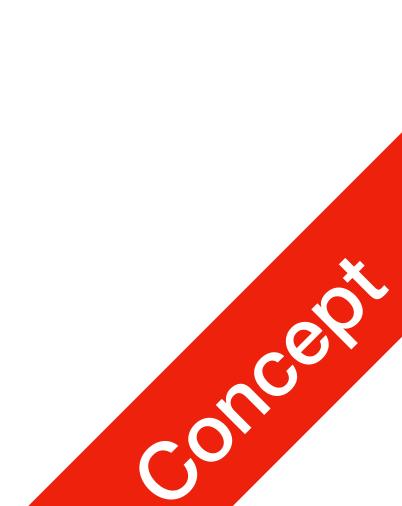
### Looping Techniques



• enumerate (alist)

- for the position index and values in a sequence for i, v in enumerate(['a', 'b', 'c']): print(i, v)
  - // Output 0 a 1 b 2 C

### Looping Techniques

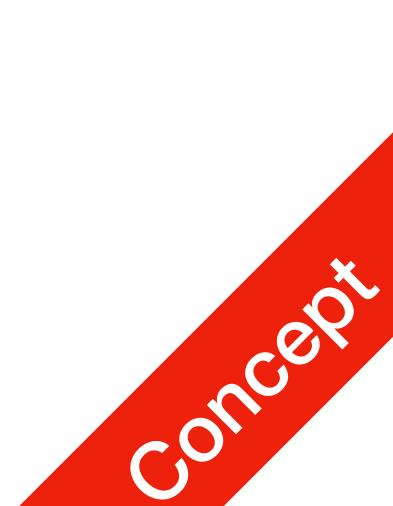


- zip()
  - for looping over two or more sequences key = ['name', 'age', 'favourite food'] val = ['Jetic', '44', 'cheese'] for k, v in zip(key, val): print("His " + k + " is " + v)

// Result His name is Jetic His age is 44 His favourite food is cheese

### Looping Techniques



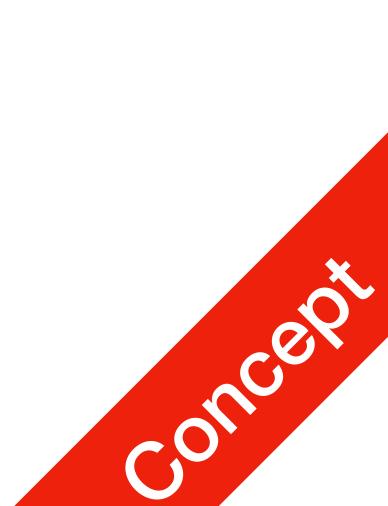


# Comparisons

- Comparisons can be chained

This tests whether a is less than b and that b equals c

• Operators "in" and "not in" can be used to see if an item exists in a sequence





## **Environmental Setup**

Linux, Command Line, Vim



#### **P3** Linux

### Introduction to Linux

- It's just another OS
- It's open source
  - You can see the kernel code here: <u>https://github.com/torvalds/linux</u>
- It's most useful in a wide-range of fields

  - Used in ALL software development except for Windows apps

• ALL major Online Servers, even Microsoft's own Webservers / cloud system

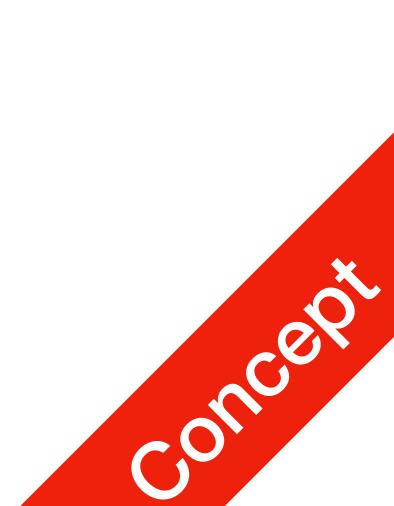
• ALL scientific computers, including smallest cluster to SFU's super computers



#### P3 Linux

## For This Course

- You will need access to Linux or Unix-based OS (macOS is Unix)
  - Use Linux/Unix as your primary desktop OS
  - Dual OS desktop
  - Install a Linux distribution in Virtual Machine
  - Install Windows 10's Linux subsystem (SLOWWWWWW)
- You need to be comfortable with command line





## **Common Questions**

- Do we have to?
  - Yes. In your later life, you can use whatever GUI based code editor. But you must know how to work using command line only, so for this course you must complete all coding assignments using command line.
- Why is macOS ok but not Windows?
  - macOS is a UNIX operating system which shares many common features with Linux, such as intuitive command line. In fact most commands and operations are identical, including the way we compile and debug everything.
  - Windows on the other hand is more cumbersome. Even Microsoft employees use linux/mac for webdev and building cloud services.



#### List of Linux commands you will need

- Open Terminal, a command line prompt will show up
  - ls: list present directory
  - cd: change directory

**P**3

Linux

- cat: view file as text
- man: see manual
- vim: text editor

#### We will have a short tutorial tmr.

