CSCI 204: Data Structures & Algorithms

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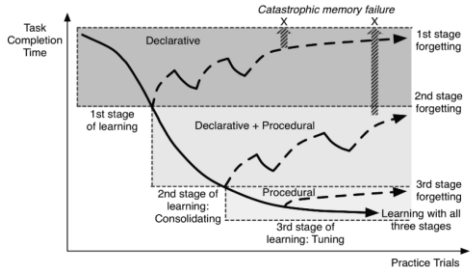
What will we do in class this semester?

Lectures (but just to get the declarative knowledge down)
- PowerPoints

Active Learning
- Group activities
- Discussion and reflection

I may repeat things you may have seen before (e.g., in a lab)!



Course Documents

Course website — **http://www.eg.bucknell.edu/~csci204/**
Syllabus, schedule, lab, projects, …

Course Moodle site — **http://moodle.bucknell.edu/course/view.php?id=37628**
Submit work, check grades

Prof Meng's posted notes — **http://www.eg.bucknell.edu/~csci204/2020-spring/meng/notes/index.html**
Lecture notes, code examples, exercises

Syllabus

Lectures — **MWF: 8 am**
Key skills, topics, and their motivation
I'd like to see you! Let me know if you'll be absent…

Labs — **Th:** 1-3 pm or 3-5 pm
Guided work on the material.
You are required to attend your section.
Let the lab instructor know if you'll be absent…

Office Hours — **MWF:** 2-4 PM, **TR:** 10-11 AM; 212 Dana

Syllabus

Grading

Projects	16%	Labs	16%
Professionalism	8%	Mid-term exams	30%
HW/Activities	10%	Final exam	20%

Honor Code

As a student and citizen of the Bucknell University community:
1. I will not lie, cheat, or steal in my academic endeavors.
2. I will forthrightly oppose each and every instance of academic dishonesty.
3. I will let my conscience guide my decision to communicate directly with any person or persons I believe to have been dishonest in academic work.
4. I will let my conscience guide my decision on reporting breaches of academic integrity to the appropriate faculty or deans.

Access Statement

Any student who needs an accommodation based on the impact of a disability please feel free to talk to me as well as submit the Disability Accommodation Request Form or contact the Office of Accessibility Resources at OAR@bucknell.edu, 570-577-1188 or in room 107 Carnegie Building so that such accommodations may be arranged.

Basic Needs Security

Any student who has difficulty affording groceries or accessing sufficient food to eat every day, or who lacks a safe and stable place to live, and believes this may affect their performance in the course, is urged to contact the Dean of Students for support. Furthermore, please notify the professor if you are comfortable in doing so. This will enable them to provide any resources that they may possess.

What will we cover?

Data Structures
- Particular way to organize and manipulate data, e.g., lists, arrays, stacks, queues, and trees

Data Abstraction
- Data type *properties* (independent of implementation)

Algorithms & Algorithm Analysis
- Common algorithms, searching, sorting

Advanced Python Programming
- OOP, classes, inheritance, exceptions, etc.

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What will we cover?

Program design and style will be important!

- ***https://google.github.io/styleguide/pyguide.html***
- ***https://www.python.org/dev/peps/pep-0008/***

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Tools to be used

- spyder
- idle (idle3)
- repl.it
- command line

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List Review

Python Lists are **Mutable**
- What does *mutable* mean?

test_list = [14, 2, 42, 3, 24]

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List Review

Accessing and manipulating Python Lists

Some useful list operators
- + (concat), * (mult), : (slicing)

List methods
- append, extend, insert, pop

Comprehensions
- Build lists from existing lists
- Ex:

```
my_list  = [2, 3, 1, 5]
new_list = [x*2 for  x in my_list ]
```

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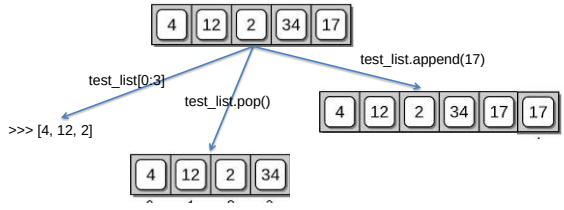
List Review (Examples)



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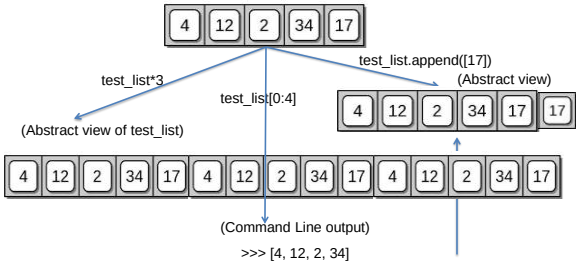
List Review (Examples)



What happens when we use * with this version of test_list?

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Strings Review

Strings operate in a very similar way to lists, but they are **immutable**

- Lets say test_string = 'team'
- What happens when I execute test_string[1] = 'l' ?

Several methods

- split, upper, lower, count, find, …
  https://docs.python.org/3/library/stdtypes.html#textseq

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Dictionaries Review

Dictionaries contain a *key* and a corresponding *value*

- ***Ex.*** B10FB = {'PSU' : 'Penn State', 'OSU' : 'Ohio State', 'MSU' : 'Michigan State', 'Mary' : 'Maryland', 'Rut' : 'Rutgers', 'Ind': 'Indiana'}

- B10FB['PSU'] returns…..'Penn State'
- What if we didn't know which B10 teams were in B10FB?
- B10FB['Umich'] throws an error, BUT B10FB.get('Umich') simply returns *None*

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Classroom exercise

Take as inputs from the user a sequence of nick names, and a sequence of full names, both groups separated by commas. Build a dictionary with the nick names as key and full names as value. Sample program behavior (program printing in green, user input in red):

```
Enter nicknames separated by commas: bb, cc, dd
Enter full names separated by commas: bob barker,chris christie,
donny darko

bob barker or bb for short.
chris christie or cc for short.
donny darko or dd for short.
```

Retrieve the starting source code from the course website
www.eg.bucknell.edu/~csci204/2020-spring/meng/notes/

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