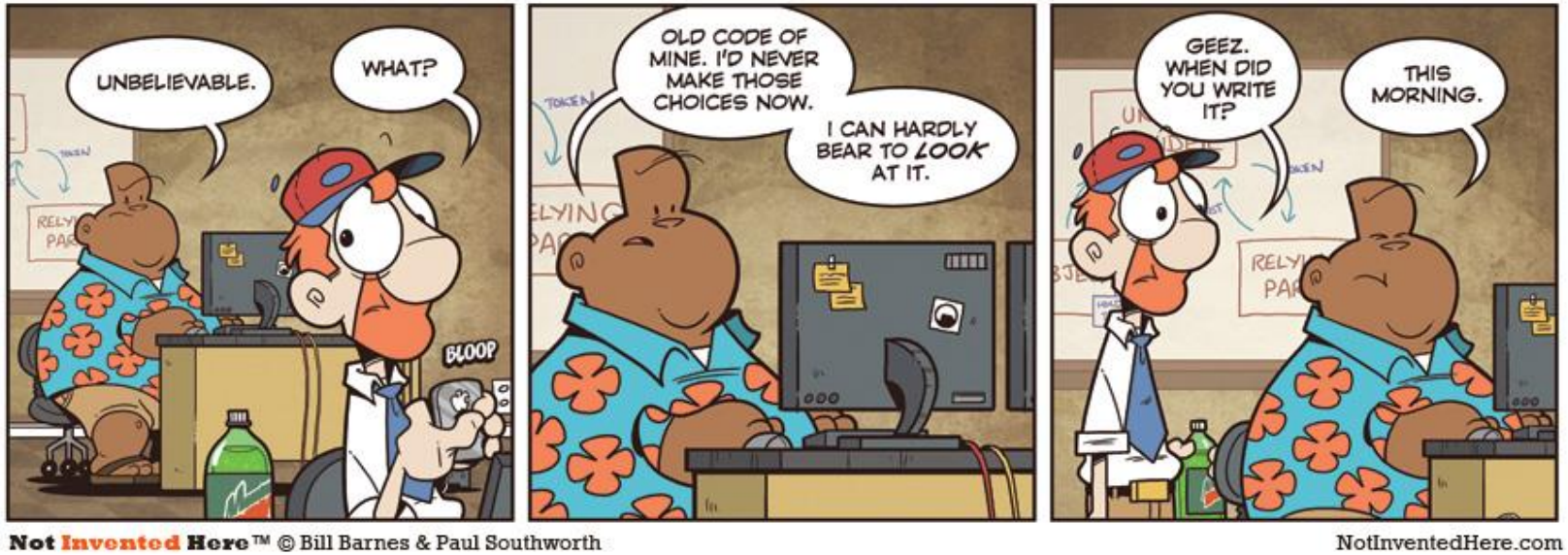
CSc 110, Spring 2018

Lecture 35: 2D Structures

Adapted from slides by Marty Stepp and Stuart Reges



Exercise

Consider the following function:

```
def mystery(alls, letters):
    for i in range(len(alls)):
        if alls[i] in letters.values():
            if alls[i] not in letters.keys():
                letters[alls[i]] = i
            else:
                letters[alls[i]] = i + 1
```

What is in the dictionary after calls with the following parameters?

all: [b, l, u, e] letters:{s:b, p:t, o:u, t:t}

dictionary: _{'o': 'u', 'p': 't', 'b': 0, 's': 'b', 'u': 2, 't': 't'} __

all:[k, e, e, p] letters: {s:y, a:k, f:e, e:f}

dictionary:_{'s': 'y', 'a': 'k', 'f': 'e', 'e': 3, 'k': 0} ____

all:[s, o, b, e, r] letters: {b:b, o:o, o:o, k:k, s:s}

dictionary:__ {'o': 2, 'k': 'k', 's': 1, 'b': 3} __

What is the right structure?

- The grades for all students in a class
- All books in a store arranged by category
- Many recipes each containing many steps
- Phone numbers that have been called this month on a phone plan divided by area and country code for billing simplicity

Exercise

- We would like to store data for the class so that we can:
  - Access the entire class list easily
  - Access a section list easily

- What structure is appropriate for this problem?
  - Sometimes it can be helpful to store a structure inside another structure

2d Structure Access

- Given the following structure:

```
grades = {'Ali':[10, 16, 20, 13, 3, 17],
          'Ken':[9, 16, 8, 19, 20, 20],
          'Daniel':[8, 10, 20, 20, 20, 20]}
```

- How can I access Ken's grade on project 3?
- How can I find out how many students are in my class / grades?
- How can I find out how many projects a student has done?

Exercise

- What does the following code produce?

```
def main():
    grades = {'Ali':[10, 16, 20, 13, 3, 17],
              'Ken':[9, 16, 8, 19, 20, 20],
              'Daniel':[8, 10, 20, 20, 20, 20]}
    print(mystery(grades, 2))

def mystery(grades, i):
    total = 0
    for student in grades:
        total += grades[student][i]
    return total / len(grades)
```

Exercise

- Write a function to calculate the average grade of all students on all assignments.
  - How can we get access to each grade?
  - How can we know how many grades we need to sum?

Exercise

- Write a function that returns a list where each element in the list is the average score for that particular assignment number.

Exercise

- Write a function that takes a student name as a parameter and returns the project number that the student scored highest on.