Objectives

- Comparing Programming Languages

Review: Extensions to

Consider what happens when **searchlist** is a list of *Persons,* **key** is a **str** representing the *name*
- Goal: find a Person with a certain name

```
def search(searchlist, key):
    low=0
    high = len(searchlist)-1
    while low <= high :
        mid = (low+high)//2
        if searchlist[mid] == key:
            return mid
        elif key > searchlist[mid]:
            # look in upper half
            low = mid+1
        else:
            # look in lower half
            high = mid-1
    return -1
```

Good capstone problem: Brings together
- Algorithms
- Classes/Objects
- Lists
- Methods
- While loops
- Functions

0	1	2	3	4
Person Id: "4" "Ben"	Person Id:"3" "Chris"	Person Id: "1" "Henry"	Person Id:"2" "Natalie"	Person Id:"5" "Samuel"

Review: Summary of Modifications to Binary Search

- Add a search method
  - Takes as parameter the name to search for
    - Need to lowercase that name
  - Original binary search function took a list as a parameter; where should we get our list to search?
- Check the *name* of the Person that is at the midpoint, lowercased
- If we have a match, return that Person
- Represent (in method) and handle (in UI) when no person has that name

Review

- How do you create a 2D list?
- How do you get the 2nd element in the 3rd "row" of a list?
- How do you find the number of lists in a 2D list?
- How do you find the number of elements in one of those lists?

Applying What You Know To Other Languages

- At the beginning of the semester, some of you wondered
  - ➤ "Why the Python programming language?"
  - ➤ "Will I be able to read/write programs in other programming languages?"

- We'll answer the first question by showing that you can do the second

Applying What You Know To Other Languages

- **Syntax**: symbols used
- **Semantics**: what the symbols *mean*

What is the Python3 Program Doing?

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- Getting a line of input from "standard in" (from the user)
- Splitting the input into integers
- Calculating the result to a formula
- Deciding if a student is admitted, based on the result of the formula

Admissions Problem

- Binary University decides to admit students based on a formula that weighs various factors
  - ➤ Scores of 70 or better are admitted
- Input: single line, 4 integers, in order below

Category	Range	Weight Factor (Multiplier)
AP Courses	0-10	10
Intangibles	1-10	8
High School GPA	0 - 10	0.25
SAT score	600-2400	.01

Example Input/Expected Output

Input	Expected Output
0 1 0 300	DENY
6 10 99 2390	ADMIT
0 7 82 1500	ADMIT
2 5 0 990	DENY
2 5 0 1000	ADMIT
2 5 0 1010	ADMIT

What is the Python Program Doing?

- Getting a line of input from "standard in" (from the user)
- Splitting the input into integers
- Calculating the result to a formula
- Deciding if a student is admitted, based on the result of the formula

> **Identify these pieces in the other programs**

Comparing Programming Languages

- How is the syntax/semantics of these languages different from Python?

- What is easier or harder to do in these other programming languages than in Python?

Comparing Programming Languages

- Benefits of Python:
  - ➢ Simpler syntax (e.g., fewer {} and ())
  - ➢ Can cover some content with less overhead
- Drawbacks
  - ➢ Data types aren't explicit (static)
    - Can be harder for you to remember and keep straight
  - ➢ Not compiled explicitly beforehand
    - Keep executing to find all the syntax bugs
    - Doesn't check: "you're passing a file instead of a string"
  - ➢ Allows you to do some things that won't work in other programming languages

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Bash

- Scripting language
  - ➢ Can call Unix commands
- Example program:
  - ➢ `createPrintableLab.sh`

Who Uses Python?

- Google
  - ➢ Backends of Gmail and Google Maps and search-engine internals
- NASA
  - ➢ Collaborative engineering
- Yahoo
  - ➢ Groups: Maintain discussion groups; Maps
- RedHat Linux
  - ➢ System infrastructure
- Original BitTorrent client; Youtube; Civilization IV

Source: `http://wiki.python.org/moin/OrganizationsUsingPython`

Tiobe Index

Based on number of hits on web

Mar 2017	Mar 2016	Change	Programming Language		Ratings	Change
1	1		Java	CSCI209	16.384%	-4.14%
2	2		C	CSCI210	7.742%	-6.86%
3	3		C++		5.184%	-1.54%
4	4		C#		4.409%	+0.14%
5	5		Python	CSCI111, 112	3.919%	-0.34%
6	7	ᴧ	Visual Basic .NET		3.174%	+0.61%
7	6	ᴠ	PHP		3.009%	+0.24%
8	8		JavaScript	CSCI335	2.667%	+0.33%
9	11	ᴧ	Delphi/Object Pascal		2.544%	+0.54%
10	14	ᴧ	Swift		2.268%	+0.68%

`http://www.tiobe.com/tiobe_index`

Course Evaluations

- On Sakai, due Sunday
- Incentive
  - ➤ If 60% of students complete evaluation, 1% Extra Credit on lab grades
  - ➤ For each additional 10% of students who complete evaluation, 1% EC on lab grades
  - ➤ Total possible EC: 5%

Looking Ahead: Friday

- Lab 11 due
- BI write up due
- Review computer science
  - ➤ Where we've been and where you can go
- Bring your exam questions and envelopes
  - ➤ Practice

Exam 2 Results

- Lots of good, still rough patches
- Hope more practice will improve the rough patches

	A	B	C	Total
Average	76.19	77.91	70.86	**79.11**
Median	77.27	80.00	81.25	**82.00**

Exam 2: Analysis of Code

```python
def helper1(word, letter):
    for i in range(len(word)):
        if word[i] == letter:
            return i
    return -1
```

What values do the loop variables take on?

```python
def helper2(word, letter):
    total = 0
    for ch in word:
        if ch == letter:
            total += 1
    return total
```