Objectives

- Comparing Programming Languages

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Review: Extensions to searchlist

> 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
> • Lists
> • Functions
> • Methods
> • While loops

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"

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Review: Summary of Modifications to Binary Search

- Add a search method
  - Takes as parameter the name to search for
- Check the *name* of the Person that is at the midpoint, lowercased
- After found, add to the list of Persons who match
  - Get the Persons before and after that person in the list that have the same name and add to list
- Represent (in method) and handle (in UI) when no people with that name
- For "most intuitive" results:
  - Lowercase the key
    - Changes algorithm again slightly

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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?

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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

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Applying What You Know To Other Languages

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

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What is the Python3 Program Doing?

- Page 1 of handouts

What is the Python3 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

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)
High School GPA	0 - 10	0.25
SAT score	600-2400	.01
AP Courses	0-10	10
Intangibles	1-10	8

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

Example Bash Program

- `printLab.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 2016	Mar 2015	Change	Programming Language		Ratings	Change
1	2	^	Java	CSCI209	20.528%	+4.95%
2	1	v	C	CSCI210	14.600%	-2.04%
3	4	^	C++		6.721%	+0.09%
4	5	^	C#		4.271%	-0.65%
5	8	^	Python	CSCI111, 112	4.257%	+1.64%
6	6		PHP		2.768%	-1.23%
7	9	^	Visual Basic .NET		2.561%	+0.24%
8	7	v	JavaScript	CSCI335	2.333%	-1.30%
9	12	^	Perl		2.251%	+0.92%
10	18	^^	Ruby		2.238%	+1.21%

`http://www.tiobe.com/tiobe_index?page=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
- Friday: review computer science
  - Where we've been and where you can go
- Friday – bring your exam questions and envelopes
  - Practice