MORE STRINGS AND FILE PROCESSING

CSSE 120 – Rose-Hulman Institute of Technology

Bonus Points

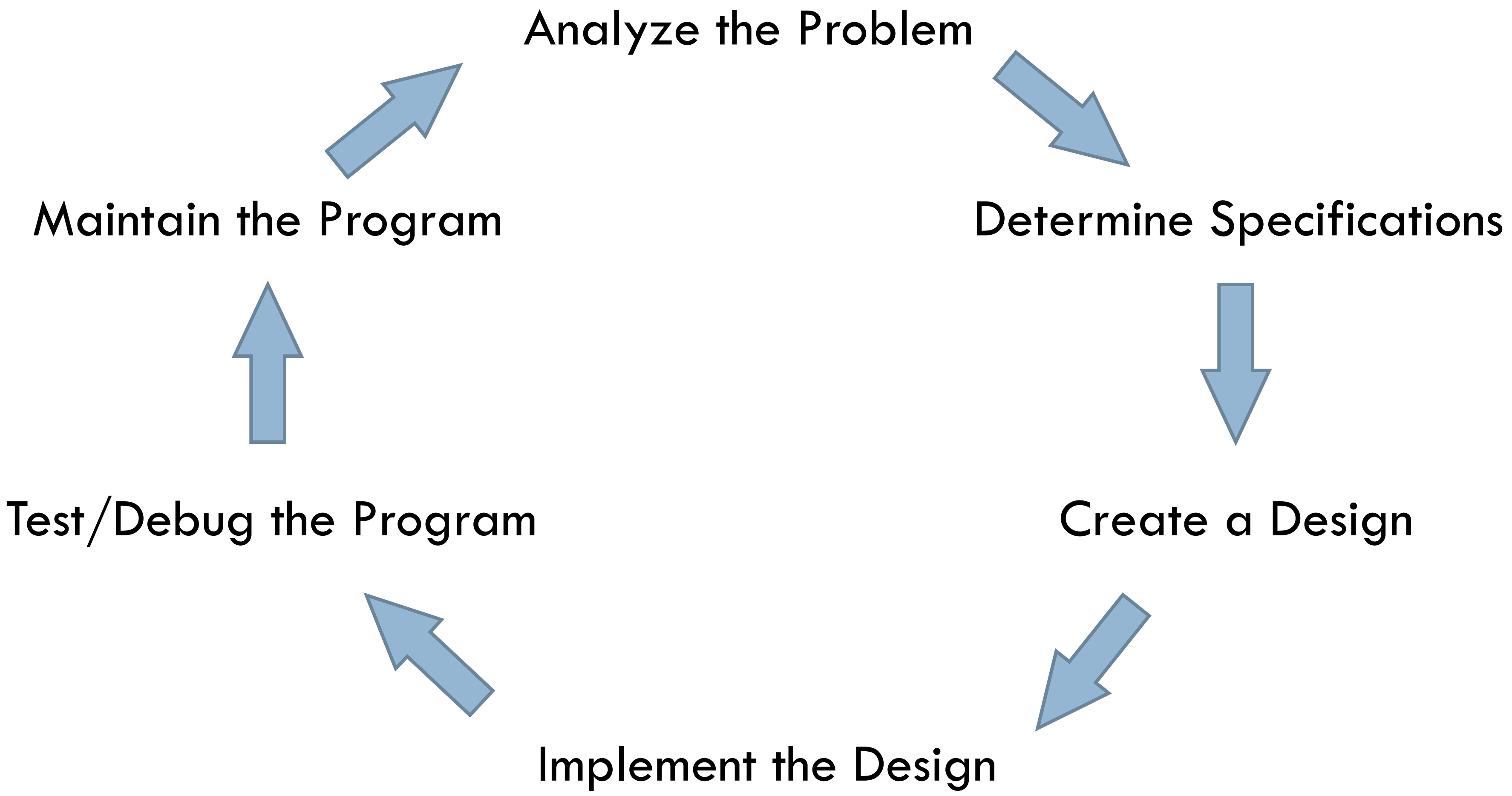
- If you did the Eclipse configuration for today, show me:
  - The output of either spam.py or greeting.py
  - spam.py source code if you have it
- While I am checking people's code, please do question 1 on the quiz (review)

Q1

Day, Month → Day of year

- When calculating the amount of money required to pay off a loan, banks often need to know what the "ordinal value" of a particular date is
  - For example, March 6 is the 65th day of the year (in a non-leap year)
- We need a program to calculate the day of the year when given a particular month and day

The Software Development Process



Phases of Software Development

- **Analyze:** figure out exactly what the problem to be solved is
- **Specify:** WHAT will program do? NOT HOW.
- **Design:** SKETCH how your program will do its work, design the algorithm
- **Implement:** translate design to computer language
- **Test/debug:** See if it works as expected.
  bug == error, debug == find and fix errors
- **Maintain:** continue developing in response to needs of users

String Representation

- Computer stores 0s and 1s
  - Numbers stored as 0s and 1s
  - What about text?
- Text also stored as 0s and 1s
  - Each character has a code number
  - Strings are sequences of characters
  - Strings are stored as sequences of code numbers
  - Does it matter what code numbers we use?
- Translating: ord(<char>)   chr(<int>)

Reminder: input() and raw_input() are related through the eval function

- Syntax:
  - eval(<string>)
- Semantics
  - Input: any string
  - Output: result of evaluating the string as if it were a Python expression
- How does eval relate them?

Consistent String Encodings

- Needed to share data between computers
- Examples:
  - ASCII—American Standard Code for Info. Interchange
    - "Ask-ee"
    - Standard US keyboard characters plus "control codes"
    - 8 bits per character
  - Extended ASCII encodings (8 bits)
    - Add various international characters
  - Unicode (16+ bits)
    - Tens of thousands of characters
    - Nearly every written language known

Q4

String Formatting

- The % operator is *overloaded*
  - Multiple meanings depending on types of operands
- What does it mean for numbers?
- Other meaning for <string> % <tuple>
  - Plug values from tuple into “slots” in string
  - Slots given by *format specifiers*
  - Each format specifier begins with % and ends with a letter
  - Length of tuple must match number of slots in the string

Format Specifiers

- Syntax:
  - %<width>.<precision><typeChar>
- Width gives total spaces to use
  - 0 (or width omitted) means as many as needed
  - 0*n* means pad with leading 0s to *n* **total** spaces
  - -*n* means “left justify” in the *n* spaces
- Precision gives digits after decimal point, rounding if needed.
- TypeChar is:
  - f for float, s for string, or d for decimal (i.e., int)
- Note: this RETURNS a string that we can print
  - Or write to a file using write(string), as you’ll need to do on today’s homework

Q5

File Processing

- Manipulating data stored on disk
- Key steps:
  - *Open* file
    - For reading or writing
    - Associates file on disk with a *file variable* in program
  - *Manipulate* file with operations on file variable
    - Read or write information
  - *Close* file
    - Causes final "bookkeeping" to happen

Q6

File Writing in Python

- Open file:
  - Syntax: <filevar> = open(<name>, <mode>)
  - Example: `outFile = open('average.txt', 'w')`
    - Replaces contents!
- Write to file:
  - Syntax: <filevar>.write(<string>)
- Close file:
  - Syntax: <filevar>.close()
  - Example: `outFile.close()`

File Reading in Python

- Open file: inFile = open('grades.txt', 'r')
- Read file:
  - <filevar>.read() Returns one **BIG** string
  - <filevar>.readline() Returns next line, including \n
  - <filevar>.readlines() Returns **BIG** list of strings, 1 per line
  - for <ind> in <filevar> Iterates over lines efficiently
- Close file: inFile.close()

- Create a program that reads and prints itself

A “Big” Difference

- Consider:
  -
    ```
    inFile = open ('grades.txt', 'r‘)
    for line in inFile.readlines():
        # process line
    inFile.close()
    ```
  -
    ```
    inFile = open ('grades.txt', 'r‘)
    for line in inFile:
        # process line
    inFile.close()
    ```
- Which takes the least memory?

Q7

Up Next: Objects

- Why do we apply some operations like this:
  - infile = open('file.txt','r')
  - abs(-1.2)
- and others like this:
  - infile.read()
  - circle.draw(win)
- Files and circles are *objects*—data plus operations
- <object>.<methodName>() is a *method call*
  - Tells object to do something

Practice

- Hand in quiz
- Start working on HW5
- On Angel
  - Lessons → Homework → Homework 5 → Homework 5 Instructions