CS 115 - Introduction to Programming in Python

Lab Guide 09

Lab Objectives: Searching and Sorting

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1. Write a program that has the following functionality:
   a. Download the `Friend.py` class from Moodle and update the following:
      i. Add a `set_birthday()` method that takes a string birthdate as a parameter (assume the format is YYYY-MM-DD), and creates a `datetime` object, and sets the `self.__birthday` attribute with the given datetime. Update the `__init__` method to set the birthday using the set method.

      Note: `datetime.datetime.strptime(var, '%Y-%m-%d').date()` converts the given string `var` string to a `datetime`, where `%Y` indicates the position of the 4 digit year, `%m` the two digit month, and `%d` the two digit date, with dashes between. See examples below for working with system dates:

      ```
      aDate = datetime.datetime.strptime('2019-01-23', '%Y-%m-%d').date()
      aDate
      Out[45]: datetime.date(2019, 1, 23)
      aDate.year
      Out[46]: 2019
      aDate.month
      Out[47]: 1
      aDate.day
      Out[48]: 23
      import calendar
      calendar.month_name[aDate.month]
      Out[50]: 'January'
      datetime.datetime.today()
      Out[51]: datetime.datetime(2019, 9, 18, 9, 27, 31, 143983)
      datetime.datetime.today().month
      Out[52]: 9
      ```

      ii. Add a `__lt__()` method that compares two `Friend` objects, and returns `True` if the first `Friend(self)` has a birthday before the `Friend` passed as a parameter.
      iii. Add a `__repr__` method to return the string representation of a Friend. See sample run for format.

b. Write a the following functions in python file, `Lab09_A.py`:
   i. **sort_surname ()**: takes a list of Friends as a parameter. Using the selection sort algorithm sorts the `Friends` in descending order of their surname (Z-A)
   ii. **find_friend ()**: takes a list of Friends, a starting index and the month (`int`) as parameters. Using a **recursive linear search algorithm**, searches the list and displays all Friends who have birthdays in the given month. Remember the `__birthday` is a `datetime` object, so you will access its `.month` attribute.
   iii. **load_friends ()**: function takes a filename and an empty list as parameters. The function should read the data from the file, create `Friends` from the file and add them to the list.
c. Write a script that does the following:
   i. Create an empty list, and read load the list with data from the file `birthday_list.txt`.
   ii. Display the list of Friends.
   iii. Sort and display the list of `Friends` by their birthdays in descending order.
   iv. Sort and display the list of `Friends` by their surnames in descending order.
   v. Display all Friends in the list with birthdays in the current month. (**Hint**: use the `datetime.datetime.today()` to get the current date, and the `calendar.month_name[num]` to get the string month.

Sample Run:

```
Friends:
 [
(Kirkdal)       Shirley 1996-08-21      (5055557937),
(Mackie)        Inaayah 1997-09-05      (5455542677),
(Freeman)       Keenan  1991-03-17      (5055506397),
(Woolley)       Janine  1994-05-30      (5355509390),
(Michael)       Eadie   2000-03-29      (5555559014),
(Dermott)       Kris    1996-03-19      (5455597511),
(Terrell)       Melvin  1998-11-22      (5555535779),
(Allison)       Naeem   1997-09-07      (5555508157),
(Johnson)       Trey    1995-02-21      (5055539795),
(Plummer)       Elana   1990-10-17      (5055595102)]

Friends by descending birthday:
  [
(Michael)       Eadie   2000-03-29      (5555559014),
(Terrell)       Melvin  1998-11-22      (5555535779),
(Allison)       Naeem   1997-09-07      (5555508157),
(Mackie)        Inaayah 1997-09-05      (5455542677),
(Kirkdal)       Shirley 1996-08-21      (5055557937),
(Dermott)       Kris    1996-03-19      (5455597511),
(Johnson)       Trey    1995-02-21      (5055539795),
(Woolley)       Janine  1994-05-30      (5355509390),
(Freeman)       Keenan  1991-03-17      (5055506397),
(Plummer)       Elana   1990-10-17      (5055595102)]
```

Friends by descending surname:
 [
(Woolley)   Janine 1994-05-30   (5355509390),
(Terrell)   Melvin 1998-11-22   (5555535779),
(Plummer)   Elana   1990-10-17   (5055595102),
(Michael)   Eadie   2000-03-29   (5555559014),
(Mackie)   Inaayah 1997-09-05   (5455542677),
(Kirkdal)   Shirley 1996-08-21   (5055557937),
(Johnson)   Trey   1995-02-21   (5055539795),
(Freeman)   Keenan 1991-03-17   (5055506397),
(Dermott)   Kris   1996-03-19   (5455597511),
(Allison)   Naeem   1997-09-07   (5555508157)]

Friends with birthdays in: September

(Mackie)   Inaayah 1997-09-05   (5455542677)

(Allison)   Naeem   1997-09-07   (5555508157)