
**Python for Computational Problem-Solving**

**LABORATORY MANUAL**

**Week 9 and Week 10**

Semester: I

Course Code: UE23CS151A

Course Anchor: Prof. Sindhu R Pai

Lab Anchor: Dr. Divyashree N

Session: September 2023 – December 2023

**Instructions to Faculty**

1. All faculty members shall be in the Lab on time.
2. Faculty members should not leave lab sessions unattended, when students are present, and Lab sessions should be engaged fully.
3. Faculty should explain all the lab programs during the lab hours only and make students execute all the lab programs given for that week.
4. Faculty should not share the faculty copy of the lab manual to students.
5. Insist students to use lab systems only and not their laptops.

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|---|---|
| To Learn and Solve | • Program questions on reading strings from CSV files<br>• Programs on Recursion and callbacks |
| | • Program solutions for mandatory questions should be submitted for evaluation.<br>• Additional programs are only for practice, and not for grading |

**13-11-2023 (Monday) to 17-11-2023(Friday):**

**Sections – L, W, X, Y:**

You are given a CSV file called "Articles.csv" that contains news articles' information in rows, including the article, date, heading, and news type. Write Python programs for the following questions.

1) **Problem Statement:** For the given file, write programs to:
   a) Write all the rows which have “Cape Town” in the headings onto a csv file named as “Output.csv.
   b) Open the same file in append, append those rows which have date > 2/1/2016.

**Solution:**

```
input_csv_file = "News_Articles.csv"
output_txt_file = "Output.csv"

cape_town_rows = []
filtered_rows = []

with open(input_csv_file, "r") as csv_file:
  lines = csv_file.readlines()
  #print(lines)
  cape_town_rows.append(lines[0])
  for line in lines[1:]:
    parts = line.strip().split(',')
    article = parts[0]
    date = parts[1]
    day, month, year = date.split('-')
    day = int(day)
    month = int(month)
    year = int(year)
```

```
        #print(day, month, year)

        if "CAPE TOWN" in article.upper():
            cape_town_rows.append(line)
        elif day > 2 and month > 1 and year > 2015:
            filtered_rows.append(line)

with open(output_txt_file, "w") as txt_file:
    txt_file.writelines(cape_town_rows)

with open(output_txt_file, "a") as txt_file:
    txt_file.writelines(filtered_rows)
```

**Output:**

| | Article | Date | Heading | NewsType |
|---|---|---|---|---|
| 2 | Cape Town: Ben Stoke | 01-03-2016 | England d | sports |
| 3 | CAPE TOWN: Ben Stok | 01-03-2016 | Stokes bat | sports |
| 4 | CAPE TOWN: Jonny Ba | 01-04-2016 | Tearful Ba | sports |
| 5 | CAPE TOWN: England | 01-05-2016 | Bavumas r | sports |
| 6 | CAPE TOWN: Captain | 01-05-2016 | Amla lead | sports |
| 7 | CAPE TOWN: Captain | 01-04-2016 | Amla mak | sports |
| 8 | London: Pakistan Yasi | 16-07-2016 | Yasir stars | sports |
| 9 | LONDON: Yasir Shah t | 16-07-2016 | Yasir Shah | sports |
| 10 | KARACHI: State Bank ( | 30-07-2016 | State Bank | business |
| 11 | LONDON: Pakistan cap | 16-07-2016 | Misbah ou | sports |
| 12 | LONDON: Pakistan Ya | 16-07-2016 | Yasir Shah | sports |

2) **Problem Statement:** Write a Python program that takes an integer 'n' as input and determines whether it is a power of 2. The program should return True if the input number is a power of 2 or False otherwise using recursion

**Solution:**

```
def is_power_of_two(n):
    if n <= 0:
        return False
    elif n == 1:
        return True
    elif n % 2 == 0:
        return is_power_of_two(n // 2)
    else:
        return False

# Input from the user
num = int(input("Enter a number: "))
result = is_power_of_two(num)

if result:
    print("True")
else:
    print("False")
```

**Sample Input and Output:**

1) Sample Input 1: 16
   Sample Output 1: True
2) Sample Input 2: 18
   Sample Output 2: False

3) **Problem Statement:** Write a Python program that takes an integer as input 'n' and counts the number of digits in the binary representation of 'n' using recursion.

**Solution:**

```
def count_binary_digits(n):
    if n <= 1:
        return 1
    else:
        return 1 + count_binary_digits(n // 2)
```

```
# Example usage:
n = int(input("Enter a number: "))
result = count_binary_digits(n)
print(result)
```

**Sample Input and Output:**

1) Sample Input 1: 13
   Sample Output 1: 4

2) Sample Input 2: 6
   Sample Output 2: 3

**4) Bonus Question**

**Problem Statement:** Write a program to read a csv file and filter out the rows which belong to News Type "sports" and were published between March 2016 and April 2016. Write these rows on to a new csv file named "sports.csv", sorted in ascending order by the published date.

**Solution:**

```
with open('News_Articles.csv', 'r') as file:
    data = file.readlines()
header = data[0]
data = [row.split(',') for row in data[1:] if row]

filtered_rows = []
for row in data:
    columns = row
    if len(columns) == 4 and columns[3].lower().strip() == "sports":
        date = columns[1].strip().split('-')
        if len(date) == 3:
            year = int(date[2])
            month = int(date[1])
            if year == 2016 and 3 <= month <= 4:
                filtered_rows.append(','.join(columns))

filtered_rows.sort(key=lambda x: x.split(',')[1].strip())
filtered_rows.insert(0,header)
```

```
with open('sports.csv', 'w') as file:
   file.write(''.join(filtered_rows))
```

**Output:**

| | Article | Date | Heading | NewsType |
|---|---|---|---|---|
| 2 | Cape Town: Ben Stol | 01-03-2016 | England d | sports |
| 3 | CAPE TOWN: Ben Stc | 01-03-2016 | Stokes bat | sports |
| 4 | SYDNEY: Australia sp | 01-03-2016 | Australias | sports |
| 5 | SYDNEY: Carlos Brat | 01-04-2016 | Brathwait | sports |
| 6 | CAPE TOWN: Jonny E | 01-04-2016 | Tearful Ba | sports |
| 7 | CAPE TOWN: Captair | 01-04-2016 | Amla mak | sports |

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