



CPSC 103

Introduction to Systematic Program Design 2021S

Lecture: Module 7 – HtDAP (Part 1)

Ashish Chopra

3 June, 2021



designed by freepik

Announcements

1. Project
 1. Project Milestone Submission due on 31 May, 10pm PDT.
 2. You can earn **BONUS** marks now!
2. Midterm grades will be released by end of this week.
3. Final Exam date announced **22 June, 12 pm PDT.**

Recap

1. One Task Per Function a.k.a Helper Functions

- 1. Recent Top-rated Books Problem
- 2. Cheapest School Problem

2. Guiding Principles (also called as Helper Rules)

- 1. Reference Rule
- 2. Composition
- 3. Knowledge Domain Shift

Learning Goals

- Understand and use HtDAP (How to Design Analysis Program) recipe to read information from file, store it as data in your program and analyze it in some way. ①
- Identify the information given in the file. ②
- Identify many possible outputs your program could generate given the information in the file.
- Identify what information you want to store in the program.

How to Design Analysis Program (HtDAP) Recipe

The steps in the HtDAP recipe are:

1. Planning

- Identify the information in the file your program will read
- Write a description of what your program will produce
- Write or draw examples of what your program will produce

2. Building the program

- Design data definitions
- Design a function to read the information and store it as data in your program
- Design functions to analyze the data

```
4 @typecheck
5 def main(filename: str) -> str:
6     """
7     Reads the university information from the file with the given name,
8     returns the name of the university with the biggest difference between international
9     and domestic tuition
10    """
11
12    # Template from HtDAP, based on function composition
13    return largest_tuition_difference(read(filename))
14
15 @typecheck
16 def read(filename: str) -> List[University]:
17     """
18     reads information from the specified file and returns a list of universities
19    """
20
21    #return [] # stub
22    # Template from HtDAP
23    # Lou contains the result so far
24    lou = [] # type: List[University]
25
26    with open(filename) as csvfile:
27        reader = csv.reader(csvfile)
28        next(reader) # skip header line
29
30        for row in reader:
31            u = University(row[0], parse_int(row[1]), parse_int(row[2]))
32            lou.append(u)
33
34    return lou
35
36 @typecheck
37 def largest_tuition_difference(lou: List[University]) -> str:
38     """
39     returns the name of the university that has the biggest difference between
40     domestic and international tuition cost. Returns '' if lou is empty.
41    """
42
43    #return "" # stub
44    # template from List[University]
45    if len(lou) == 0:
46        return ''
47
48    # acc contains the university with the largest tuition difference seen so far
49    acc = lou[0] # type: University
50    for u in lou:
51        if (tuition_difference(acc) < tuition_difference(u)):
52            acc = u
53    return acc.name
54
55 # Begin testing
56 start_testing()
57
58 # Examples and tests for main
59 expect(main('tuition_test1.csv'), 'Kwantlen Polytechnic University')
60 expect(main('tuition_test2.csv'), 'University of the Fraser Valley')
61
62 # Examples and tests for read
63 expect(read('tuition_test1.csv'), [U2, U3])
64 expect(read('tuition_test2.csv'), [U4, U5])
65
66 # Examples and tests for largest_tuition_difference
67 expect(largest_tuition_difference(read('tuition_test1.csv')),
```

What is

Analysis Program?

Imagine you have some data in tabular format, and you wanted to answer some questions on the data, e.g., you maintain an account of your expenses of every month for 2020. Now you want to know:

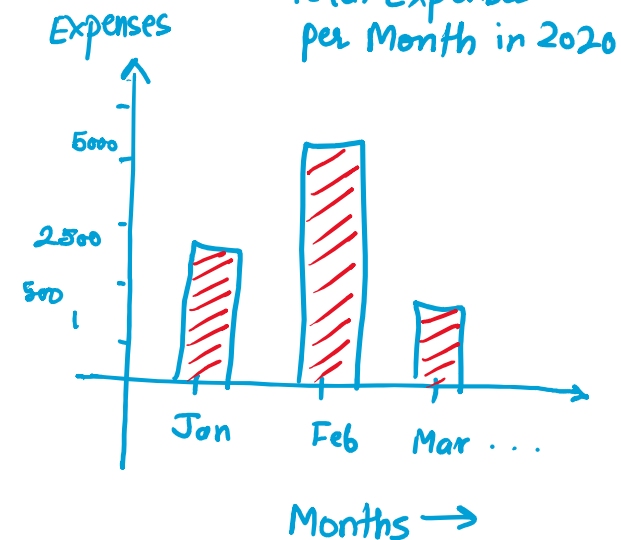
1. what is the average amount of money you spent in Food last year.
2. What is the total expense you did per month during last year.

Data

S.No.	Month	Expense Type	Amount(\$)
1	Jan	Food	200.00
2	Jan	Rent	1800.00
3	Jan	Utilities	350.00
4	Feb	Food	380.00
5	Feb	Rent	1800.00
⋮	⋮	⋮	⋮

Output

Total Expenses
per Month in 2020



Worksheet Activity Time!


Let's do
Question 1 - 4

See you in 15 minutes,
2.55pm

Module 7 (HtDAP): Worksheet

 Published  Edit 

Upload a scanned version of your [Analysis Programs worksheet](#)  . (For help on how to scan, see [Creating a PDF](#).)

You can find the worksheet questions in a .ipynb file and all the CSV files supplied by us for this worksheet (the full dataset and two small test files) in the [Module 7 folder on Syzygy](#)  .


In order to receive marks for your worksheet submission, we must be able to see the text you have written on the page. If we cannot make out what has been written, you will receive a 0 for your worksheet.


Worksheet Activity Time!

Let's do
Question 5 - 8

Module 7 (HtDAP): Worksheet

 Published  Edit 

Upload a scanned version of your [Analysis Programs worksheet](#)  . (For help on how to scan, see [Creating a PDF](#).)

You can find the worksheet questions in a .ipynb file and all the CSV files supplied by us for this worksheet (the full dataset and two small test files) in the [Module 7 folder on Syzygy](#)  .

In order to receive marks for your worksheet submission, we must be able to see the text you have written on the page. If we cannot make out what has been written, you will receive a 0 for your worksheet.