

Allocator:

Data Allocation and Comparison for the Construction Field Profit and Loss

Honors Project Proposal by Jingyu Wang
CS 231 Advanced Python Programming
City College of San Francisco

Project Summary

This program can save a lot of time to run an analysis report of profit and loss for a construction project. It generates a data comparison chart from two resources of spreadsheets, one from Graph 1 and the other one from Graph 2.

See below steps to generate a report:

- A/ Summing up the numbers at Graph 1 for each category to fill Column C at Graph 3
- B/ Transferring data at Column C to Column B at Graph 3
- C/ Finally, allocating the data from Graph 2 to Column A at Graph 3

Without this program, manually generating the report is very time consuming, which takes at least one hour per proposal (project). Using this program, it will take 5-10 minutes to complete one report by two times of copying, two times of pasting, and one time of clicking a comparing button.

Background

One of my tasks in a construction company is to monitor the profit and loss for our ongoing projects. Every week, per project, I pull out the data of the actual cost from my Quick Book in a spreadsheet (See Graph 1) to compare the budget from a contract which is in another spreadsheet (See Graph 2). Under each project, there are tons of comparisons needed for different categories such as labor fee, materials fee, subcontractor fee, indirect fee, etc. Also, there are more comparisons for sub-categories under the sub-contractor such as drywall, plumbing, electrical, painting, and etc. I need to sum up the multiple rows of data for the same category from the QuickBook first then compare data from the budget of the contract according to the same category. This is a heavy task. So I wanted to create the program to help.

Interactivity

In this software project, there is only one single window as the user interface. See Graph 4. On the window, there are three data windows, two for source data, one for comparison chart displaying. Under the first two data windows, per each, there is a Paste button for data pasting in and a Clean Up button for cleaning up the old data. Under the third data window, there is a Comparing button for generating the comparison chart based on the two sources of data, Actual Cost (QuickBook) and Contract Budget . To input the data to the source data windows, the user can copy the data from two spreadsheets shown at Graph 1 & 2 to the operating system's Clipboard then click the Paste buttons. I believe this application is very easy to use even for people who have less computer skills. See the implementation details below:

See below 4 graphs:

Quick Book

Job Actual Cost Detail

08/25/2022

1125 Valencia St, Unit 1 San Francisco, CA 94110

Type	Account (Category)	Amount	Balance
Check	Automobile Insurance	19.05	19.05
Check	CalSavers (Retirement Plan)	30.00	49.05
Check	CalSavers (Retirement Plan)	50.00	99.05
Check	Citations	28.00	127.05
Check	Cleaning	280.00	407.05
Check	Sub-Contractor Drywall	3,750.00	4,157.05
Check	Sub-Contractor Drywall	3,500.00	7,657.05
Check	Dues and Subscriptions	27.80	7,684.85
Check	Dues and Subscriptions	37.84	7,722.69
Check	Sub-Contractor Electrical	7,000.00	14,722.69
Check	Sub-Contractor Electrical	2,290.00	17,012.69
Check	Sub-Contractor Flooring	2,500.00	19,512.69
Check	Gas	48.80	19,561.49
Check	Gas	4.44	19,565.93
Check	Gas	326.54	19,892.47
Check	Gas	30.00	19,922.47
Check	Gas	104.77	20,027.24
Check	Gas	58.90	20,086.14
Check	Gas	457.17	20,543.31
Check	Gas	63.19	20,606.50
Check	Gas	71.42	20,677.92
Check	General Liability Insurance	13.62	20,691.54
...			
Check	General Liability Insurance	26.28	20,717.82
Check	Wages	6,247.65	26,965.47
Check	Wages	766.44	27,731.91
Check	Wages	1,262.47	28,994.38
Check	Wages	1,865.17	30,859.55
Check	Wages	3,098.33	33,957.88
Check	Wages	100.80	34,058.68
Check	Wages	127.35	34,186.03
Check	Wages	5,978.40	40,164.43
Check	Wages	320.81	40,485.24
Check	Work Comp	15.10	40,500.34
Check	Work Comp	103.82	40,604.16
Check	Work Comp	38.48	40,642.64
Check	Work Comp	28.81	40,671.45
Check	Work Comp	157.85	40,829.30
		90,037.99	90,037.99

The categories at the QB have been running for long time. The names of the category can't be revised to match different clients' varied categories.

Graph 1

PROPOSAL (Contract)

1125 Valencia St, Unit 1 San Francisco, CA 94110

7/22/2022

Category	General Contractor		Note(H :In house)	Total
	Material	Labor		
Architect			Sub Contractor	\$0.00
Environmental Consultant			Sub Contractor	\$0.00
Permits and Fees		\$1,000.00	H	\$1,000.00
Final Cleaning	\$50.00	\$350.00	Sub Contractor	\$400.00
Demolition	\$400.00	\$4,500.00	H	\$4,900.00
Hauling	\$800.00	\$1,200.00	H	\$2,000.00
Abatement			Sub Contractor	\$0.00
Rough Carpentry/Framing	\$2,800.00	\$8,000.00	H	\$10,800.00
Cabinets		\$3,500.00	H	\$3,500.00
Countertop / Backsplash		\$2,600.00	H	\$2,600.00
Trim / Baseboard / Molding / Shelving	\$1,500.00	\$2,800.00	H	\$4,300.00
Insulation	\$425.00	\$600.00	H	\$1,025.00
Doors & Hardware	\$800.00	\$600.00	H	\$1,400.00
Window Repair	\$210.00	\$600.00	H	\$810.00
Drywall	\$1,600.00	\$12,000.00	Sub Contractor	\$13,600.00
Tile		\$3,500.00	Sub Contractor	\$3,500.00
Wood Flooring (New)		\$0.00	Sub Contractor	\$0.00
Floor Patch / Refinish Existing	\$410.00	\$5,000.00	Sub Contractor	\$5,410.00
Painting (Interior)	\$510.00	\$5,000.00	Sub Contractor	\$5,510.00
Bath Accessories		\$450.00	H	\$450.00
Appliances		\$200.00	H	\$200.00
Window Blinds	\$520.00	\$600.00	H	\$1,120.00
Rough Plumbing	\$1,700.00	\$12,000.00	Sub Contractor	\$13,700.00
Tub Replacement or Glazing	\$0.00	\$0.00	Sub Contractor	\$0.00
Finish Plumbing Fixtures/Trim		\$450.00	Sub Contractor	\$450.00
Heating System				\$0.00
Rough Electrical	\$1,600.00	\$13,000.00	Sub Contractor	\$14,600.00
Finish Electrical Fixtures / Trim		\$450.00	Sub Contractor	\$450.00
Low Voltage Systems (Fire/Security/Cable)	\$65.00	\$300.00	H	\$365.00
Contractor's Fee / Profit & Overhead	\$250.00	\$250.00	H	\$500.00
Construction Management Fee			H	\$0.00
Subtotal GC	\$13,640.00	\$78,950.00		\$92,590.00
Subtotal External Cost			\$0.00	\$0.00

The categories in this proposal are different from Graph 1, which the client designated.

Graph 2

Graph 1 and 2 are for the source data.

Interface Window

Actual Cost QuickBook

Category	Amount
WAGES	\$20,603.19
WORK COMP	\$344.06
PAYROLL EXPENSES MRA	\$535.00
PAYROLL PROCESSING FEES	\$66.60
LUMBER OR PLIE WOOD MATERIAL	\$2,392.95
MATERIALS	\$5,526.19
PERMIT FEE	\$19,714.02
AUTOMOBILE INSURANCE	\$19.05
CALSAVERS (RETIREMENT PLAN)	\$80.00
CITATIONS	\$28.00
DUES AND SUBSCRIPTIONS	\$65.64
GAS	\$1,165.23
GENERAL LIABILITY INSURANCE	\$545.81
HEALTH INSURANCE	\$1,009.54
INSURANCE	\$264.21

Contract Budget

Category	Amount
Labor (Wage) Fee	\$ 24,350.00
Materials:	\$10,120.00
Cleaning	\$400.00
Drywall	\$13,600.00
Tile	\$3,500.00
Flooring	\$5,410.00
Painting (Interior)	\$5,510.00
Plumbing	\$14,150.00
Electircal	\$15,050.00
Indirect Cost	\$500.00

Comparison Chart

Category	Amount (Actual)	Amount (Budget)	Difference:
Labor (Wage) Fee	\$ 21,548.85	\$ 24,350.00	\$2,801.15
Materials:	\$ 27,633.16	\$10,120.00	(\$17,513.16)
Cleaning	\$ 280.00	\$400.00	\$120.00
Drywall	\$ 7,250.00	\$13,600.00	\$6,350.00
Tile	\$ 2,500.00	\$3,500.00	\$1,000.00
Flooring	\$ 2,500.00	\$5,410.00	\$2,910.00
Painting (Interior)	\$ 4,980.00	\$5,510.00	\$530.00
Plumbing	\$ 9,000.00	\$14,150.00	\$5,150.00
Electircal	\$ 9,290.00	\$15,050.00	\$5,760.00
Indirect Cost	\$ 5,055.98	\$500.00	(\$4,555.98)

Graph 4

Graph 4 is the interface of the application

Implementation:

1. Actual cost (Quick Book) data input:

1) Select and Copy the data including column Account(Category) and column Amount (See Graph 1) to a Clipboard of the operation system.

2) At Graph 4, click the Paste button under the Actual Cost (QB) data window, Python code takes below actions:

- To extract the text from the Clipboard to a List
- Basing on the List to generate a Dictionary by summing up the duplicated data for each category.
- To export the Dictionary to the Actual Cost (QB) data window

2. Contract Budget Input:

1) Select and Copy the whole form (See Graph 2) to the Clipboard of the operation system.

2) At Graph 4, click the Paste button under the Contract Budget data window, Python code takes below actions:

- To extract the text from the Clipboard to a List
- For the tasks labeled with H at Graph 2 are for the in house task. Others are for the sub contracts. The inhouse budget will be summed up and allocated to two categories, wage(labor) cost and materials cost.
- Basing on the List and a Category Translating Dictionary to generate a Dictionary (called Budget Dictionary) with the same categories shown at the Comparing Chart at Graph 4. The description of the Category Translating Dictionary at below item 3.
- Export the Budget Dictionary to the Comparing Chart.

3. Category Translating Dictionary:

To keep the Comparing Chart simple, we just need ten Standard Categories. But in Quick Book, for accounting purposes, there were a lot of categories and sub-categories. Also, from the contract, the client designated a lot of different names of categories. To allocate the data from QuickBook (Actual Cost) and from the contract (Budget) correctly to the Comparing Chart against the ten categories, we need the Category Translating Dictionary (maybe two) before the code runs. The structure of the dictionary like below:

{ QB Category#1 : Standard Category#3, QB Category#2 : Standard Category#3,
QB

Category#3 : Standard Category#10,..., QB Category#300 : Standard Category#8,... }

{ Budget Category#1 : Standard Category#3, Budget Category#2 : Standard
Category#3,

Budget Category#3 : Standard Category#10,..., Budget Category#150 : Standard Category#7,... }

The rule for the dictionary setting will be on two spreadsheets in CSV form. See below Graph 5 & 6. Once the users save the rules at the spreadsheets in the designated folder, the program will create the dictionaries by reading the spreadsheets.

	A	B	C
1	Dictionary Rule for Budget Task Name to Standard Category		
2		Architect	Sub Architect
3		Environmental Consultant	Sub Environmental Consultant
4		Permits and Fees	Permit Fee
5		Final Cleaning	Sub Cleaning
6	@	Demolition	Wage&Materials
7	@	Hauling	Wage&Materials
8		Abatement	Sub Abatement
9	@	Rough Carpentry/Framing	Wage&Materials
10	@	Cabinets	Wage&Materials
11	@	Countertop / Backsplash	Wage&Materials
12	@	Trim / Baseboard / Molding / Shelving	Wage&Materials
13	@	Insulation	Wage&Materials
14	@	Doors & Hardware x 2 - doors	Wage&Materials
15	@	Window Repair	Wage&Materials
16		Drywall	Sub Drywall
17		Tile	Sub Tile
18		Wood Flooring (New)	Sub Flooring
19		Floor Patch / Refinish Existing	Sub Flooring
20		Painting (Interior)	Sub Painting
21	@	Bath Accessories	Wage&Materials
22	@	Appliances	Wage&Materials
23	@	Window Blinds	Wage&Materials
24		Rough Plumbing	Sub Plumbing
25	@	Tub Replacement or Glazing	Wage&Materials
26		Finish Plumbing Fixtures/Trim	Sub Plumbing
27	@	Heating System	Wage&Materials
28		Rough Electrical	Sub Electrical
29		Finish Electrical Fixtures / Trim	Sub Electrical
30	@	Low Voltage Systems (Fire/Security/Cable)	Wage&Materials
31	@	Contractor's Fee / Profit & Overhead	Indirect Cost
32	@	Construction Management Fee	Indirect Cost
33			
34		Name from proposal of bid (Budget)	Standard Category Name
35			
36	In House Task labelled with @		
37	Graph 5		

1	Dictionary rule for Actual Cost to Standard Category	
2		
3	Automobile Expense	Indirect Cost
4	Drywall	Sub Drywall
5	Dues and Subscriptions	Indirect Cost
6	Electrical	Sub Electrical
7	Flooring	Sub Flooring
8	Gas	Indirect Cost
9	General Liability Insurance	Indirect Cost
10	Health Insurance	Indirect Cost
11	Health Plan Insurance	Indirect Cost
12	Insurance	Indirect Cost
13	Lumber or plie Wood Material	Materials
14	Materials	Materials
15	Paint Material	Materials
16	Painting	Sub Painting
17	Parking	Indirect Cost
18	Payroll Expenses MRA	Indirect Cost
19	Payroll Processing Fees	Indirect Cost
20	Permit Fee	Permit Fee
21	Plumbing	Sub Plumbing
22	Rent	Indirect Cost
23	Repairs & Maintenance	Indirect Cost
24	Tiling	Sub Tile
25	Transportation	Indirect Cost
26	Wages	Wages
27	Work Comp	Wages
28		
29		
30		
31	Name from QuickBook	Standard Category Name
32		
33		
34		
35	Graph 6	

4. Generating the Comparing Chart:

When the user clicks on the comparing button, the Python code takes below actions:

- Generate a dictionary according to the standard categories for the Actual Cost and export to the Comparing chart.
- Calculating the result of the differences.
- Export the Comparing Chart to the system's Clipboard

The user can paste the result back to a spreadsheet or somewhere he/she likes. The procedure is completed.

Stretch Goals

- 1) The setting of the **Category Translating Dictionary** will be at an extra setting window in the future. Now, before running this program, users are allowed to set and save the rules of the dictionaries on two spreadsheets in CSV form.
- 2) To deal with the difference of the formation from different clients' proposals, more translation dictionaries and the Regular Expression package from Python may be needed to extend the functionality.

Implementation Details

- Tkinter
 - What: Python library for GUI
 - Where: <https://www.python.org>
 - Familiarity: I used it one time in 2020 for my first Python class' project
- PyCharm

- What: IDE
 - Where: <https://www.jetbrains.com/pycharm/>
 - Familiarity: This is my first time to use this IDE
- Github
 - What: Code Stored place
 - Where: <https://github.com/>
 - Familiarity: I don't know how to use it correctly

Programming Environment

- PyCharm - new user
- Python - took CS 131B
- HTML - played around with basic HTML layout in high school
- JavaScript - copy/pasted some short 1-line or 2-line scripts into my HTML

Git Proficiency

I don't know how to use it .

Implementation Concerns

The usage of the widgets for the interface, I am not familiar with Tkinter.

Tasks

- 1) Figure out the widget of the datawindows by the middle of October 2022
- 2) Make the whole frame of the project by the end of October 2022 by naming the function group
- 3) Write all the functions by the middle of November 2022
- 4) Make sure the program run properly by the end of November 2022