

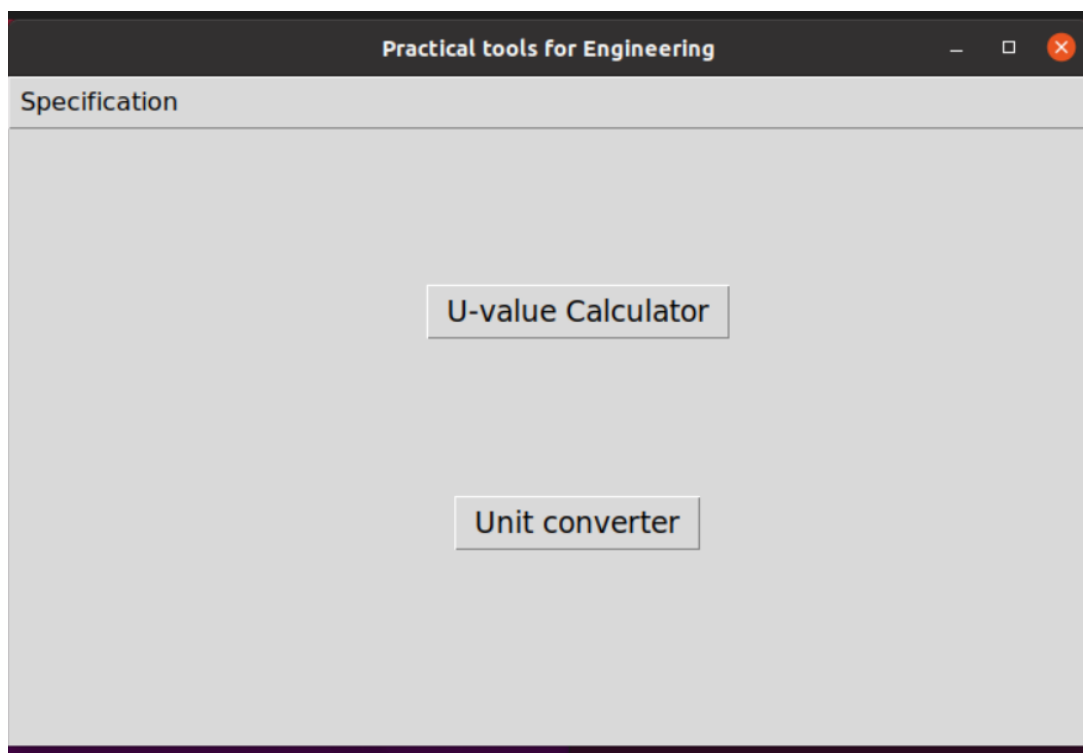
User's Guide

Environment dependencies:

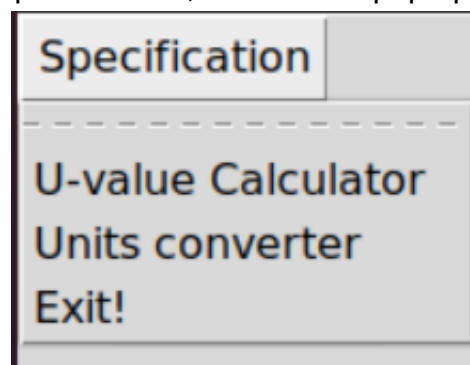
The Practical tools of Engineering only can be run in Ubuntu 20.04 and Linux system. Different with other products in the market, our software should be run by using Terminal. In order to make it runnable, users have to install python3 and "tkinter" package on computer.

Description of functions:

When users open the software successfully, a start window as shown below will popped up:



There are two buttons at the center of this page, which are "U-Value Calculator" and "Unit converter". At the upper left corner, there is a button called "Specification". If click the "Specification", a menu will pop up:



There are three options in the menu: “U-value Calculator”, “Units converter” and “Exit!”. When users click the first two buttons, then it will be able to check the specific user’s guide, which explain the usages in details. When click the “Exit!” button, then it will quit the software.

If you click the “U-value Calculator” button, then a new window will pop up:

The screenshot shows a window titled "U-value Calculator". It contains the following elements:

- Equations: $U = 1/R_t$ and $R_t = R_1 + R_2 + R_3 + \dots + R_n$
- Table with 4 columns: R, Material, Thickness(m), and λ (W/K.m). There are 5 rows labeled R1 through R5. Each row has a dropdown for Material, a text input for Thickness (all set to 0), and a text input for λ (all set to 1).
- A "Calculate" button.
- Result display: "U-value = 0 W/K.m^2".

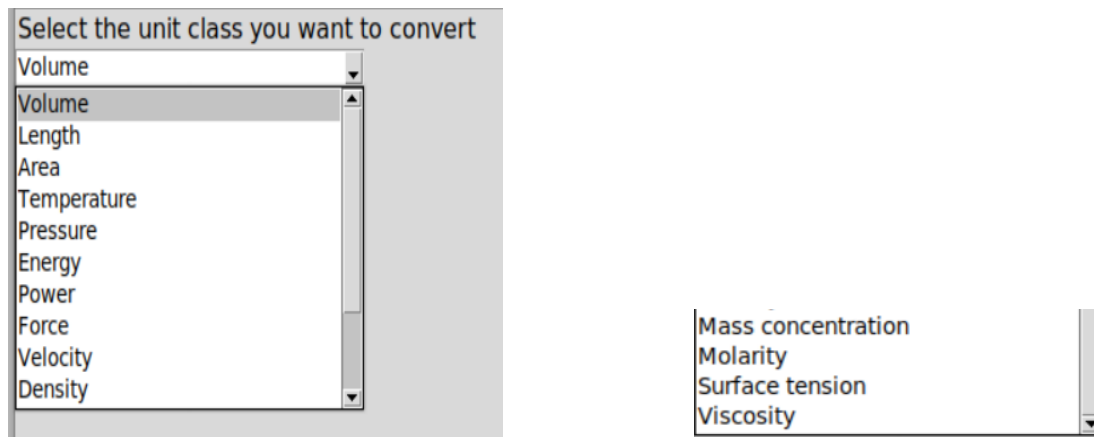
At the first row of this window, there are two equations, which are used to calculate the U-value. In addition to this, there are another 5 rows in this page, which represents 5 layers of constructional structures. Users can choose the material type of each layer, and also can input the thickness of them. When the material has been chosen, the λ value of it will appear in the third column. After these procedures, click “Calculate”, then the result will arise at the lower right corner.

If you click the “unit converter” button, then a new window like this will appear:

The screenshot shows a window titled "Engineering unit converter". It contains the following elements:

- A dropdown menu labeled "Select the unit class you want to convert" with "Volume" selected.
- An "Input" section with a text input field containing "Please enter the value here" and a dropdown menu.
- An "Equal" section with a text input field containing "0" and a dropdown menu.

On this page, there are three rows. The first one is to choose the unit class. We provided 14 classes of units in this module, and they are listed in the menu:

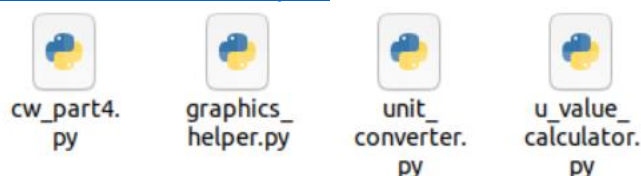


The second row is used to input the origin data, and after users choosing the original unit and the new unit, the converted data will be automatically showed in the third row.

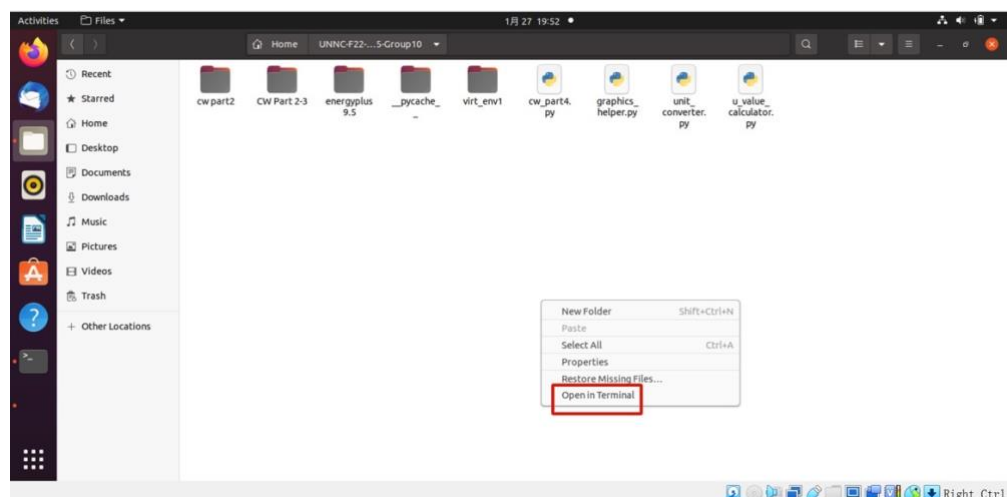
Step by step guidelines:

First, users should set up the suitable environment (as the first part mentioned) on their computers.

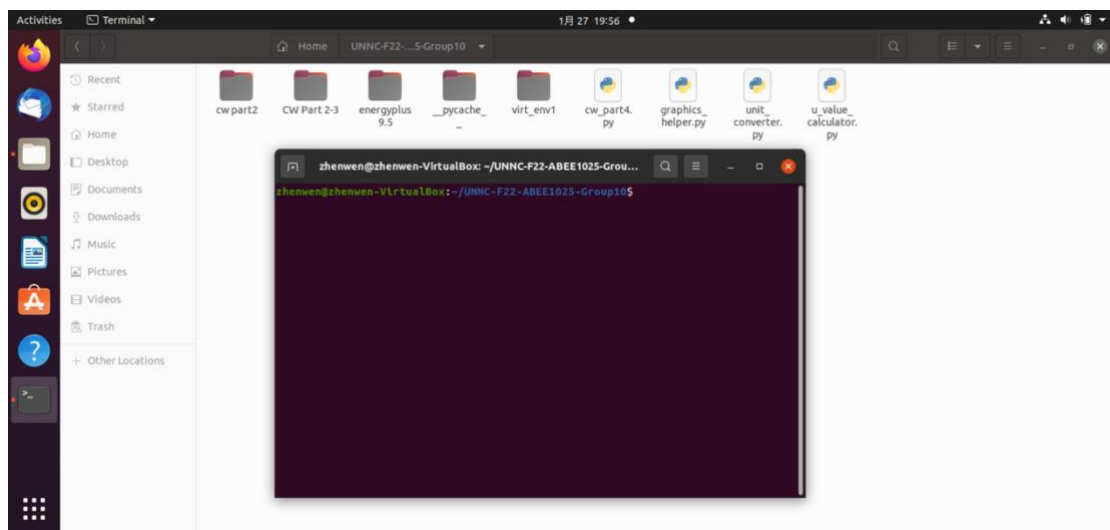
After you are on the right environment, you are required to download the following four python files by using this link: <https://github.com/ssyyy11/UNNC-F22-ABEE1025-Group10>.



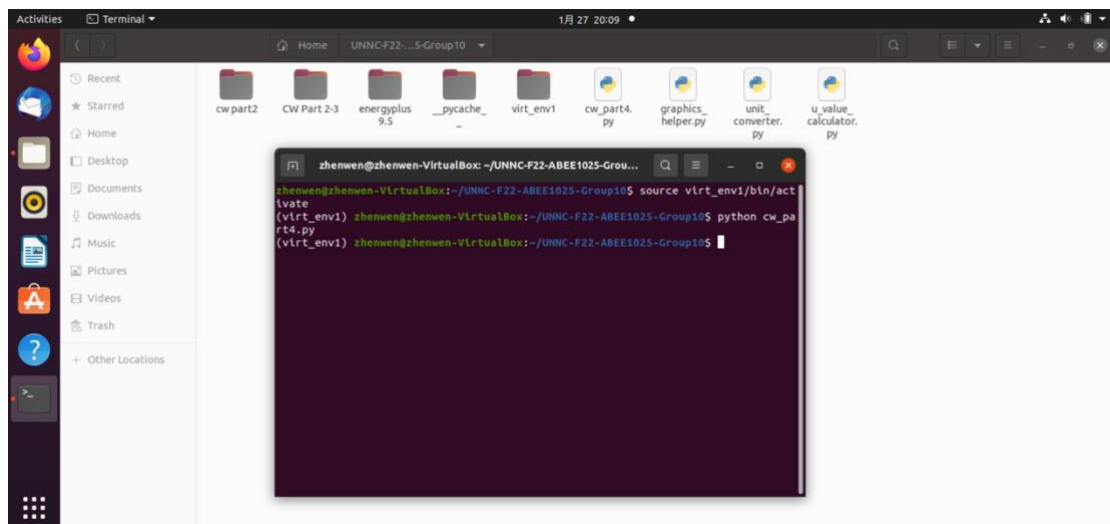
Then, open the folder that you have downloaded the files, and click the right button of the mouse, choose “open in terminal”.



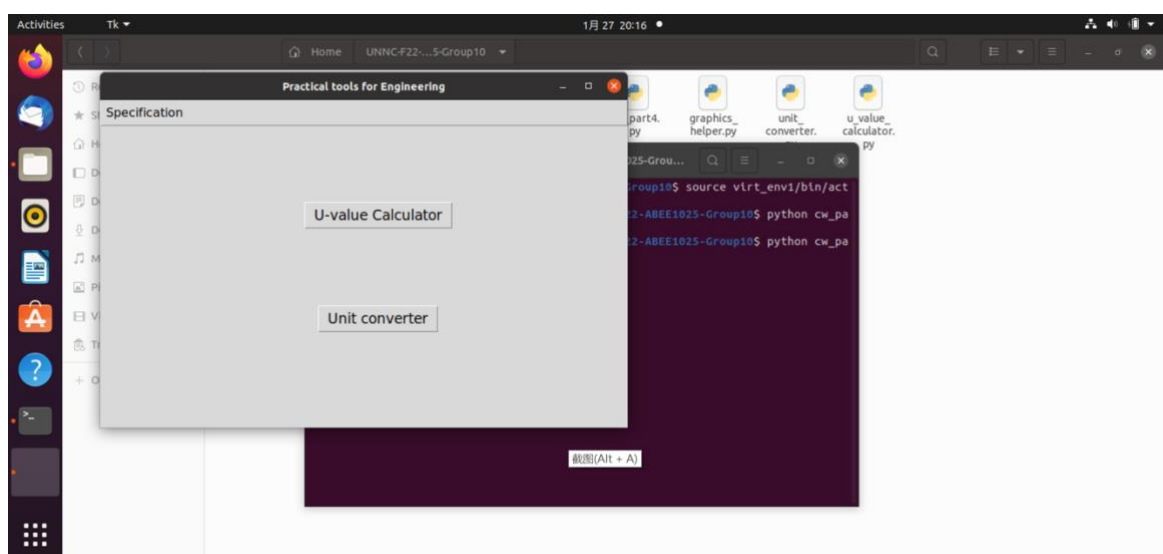
After that, you will see this window:



Change to the environment where python is able to use. Then run “python cw_part4.py”.



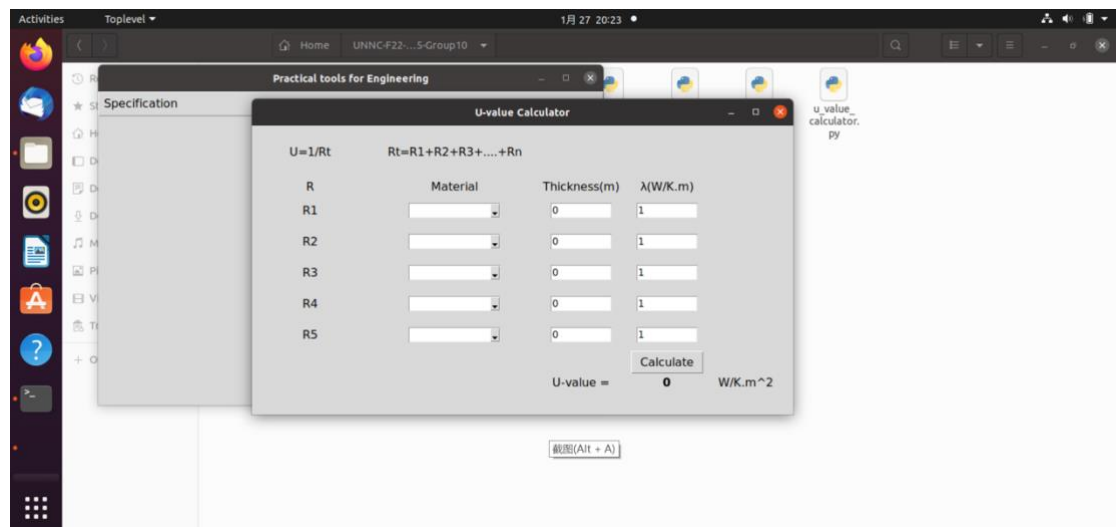
Click “Enter”, and you will see a new window pop up:



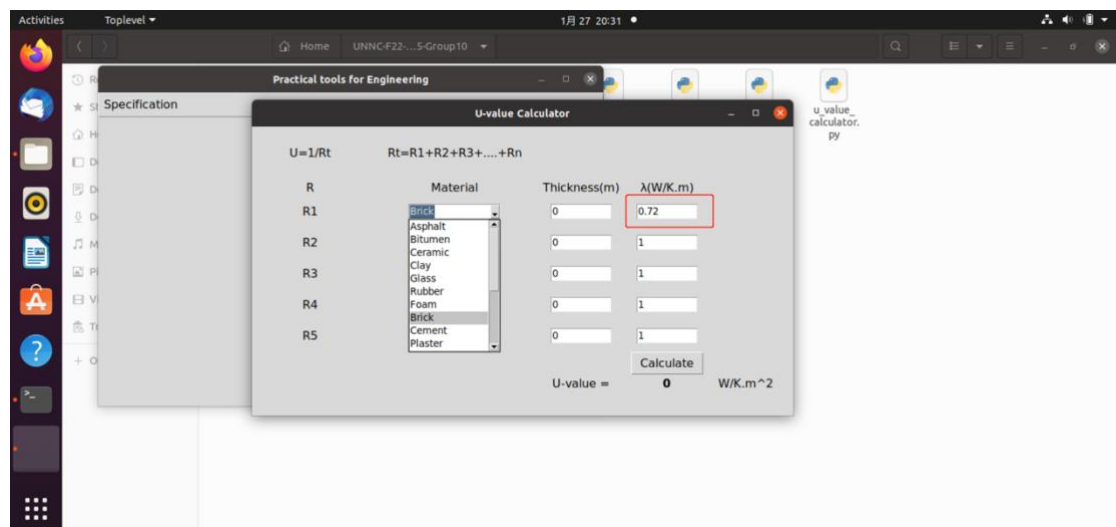
This is the initial page of this software. Then users can choose any function that they want to use.

U-value Calculator guide:

1. Click “U-value Calculator” button, and you will see a new window.

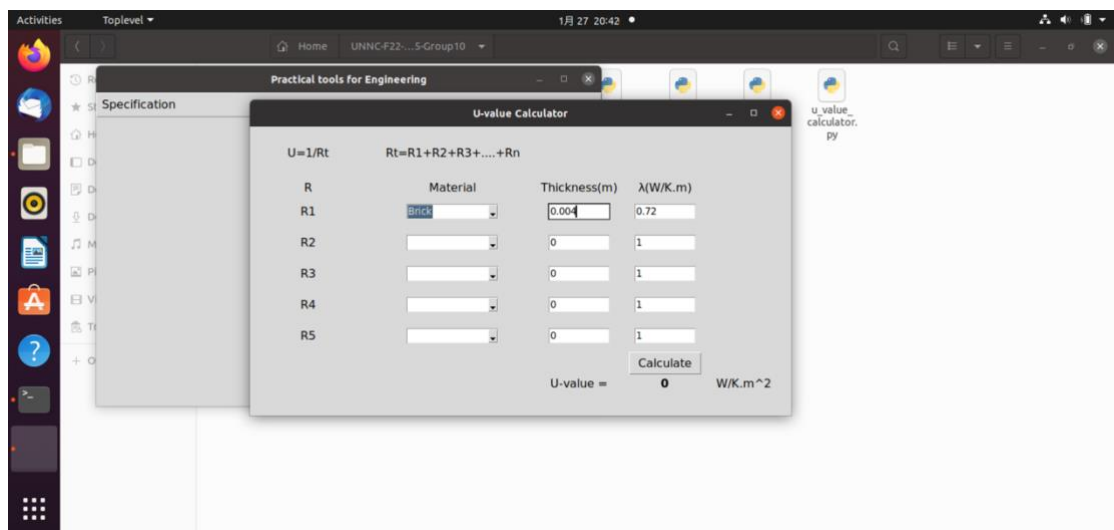


2. According to the structure you want to calculate, choose the materials and enter the thickness. For example, if I want to calculate a U-value of a wall, the structure of which is 0.004m brick + 0.009m plaster + 0.004m brick, then I just need to complete the following procedures:
 - i). Choose “Brick” in the “Material” box after R_1 .

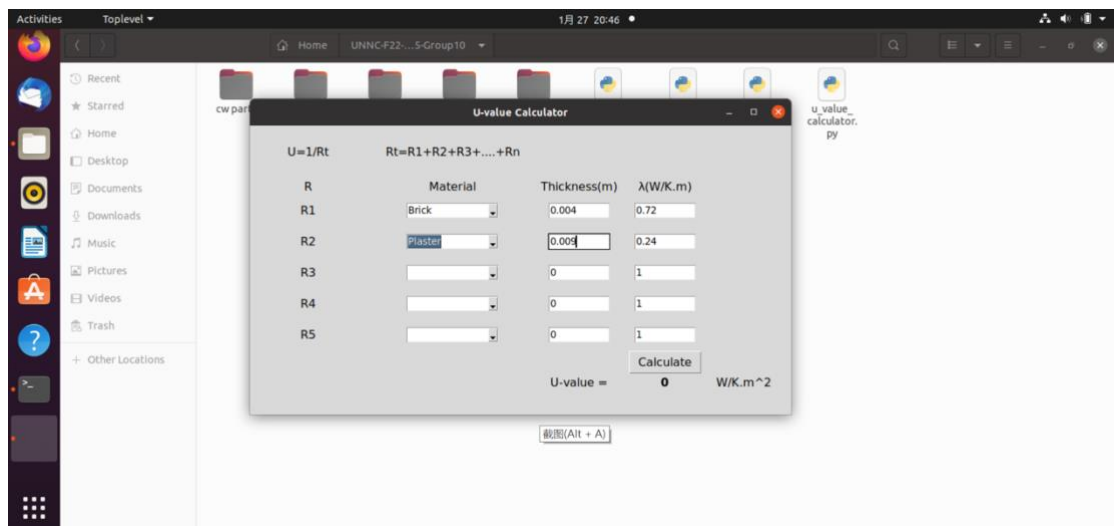


It is necessary to note that when you have chosen “Brick”, the λ value of brick will automatically appear in the third box. However, since this is just a simple calculator, the λ value that we provided may be not very detailed. If the λ value is not the one you wished, then you can change it manually.

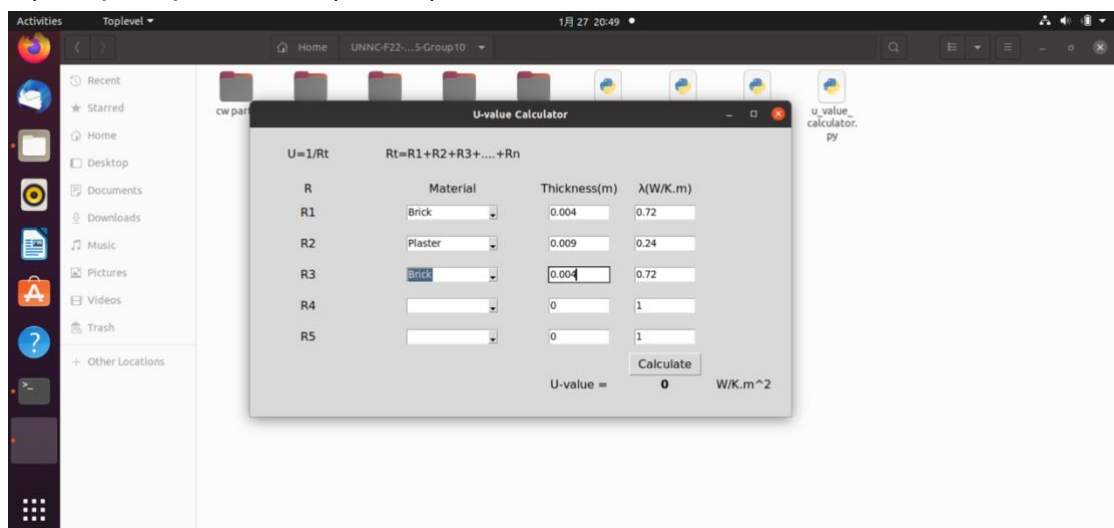
ii). Enter “0.004” in the “Thickness” box:



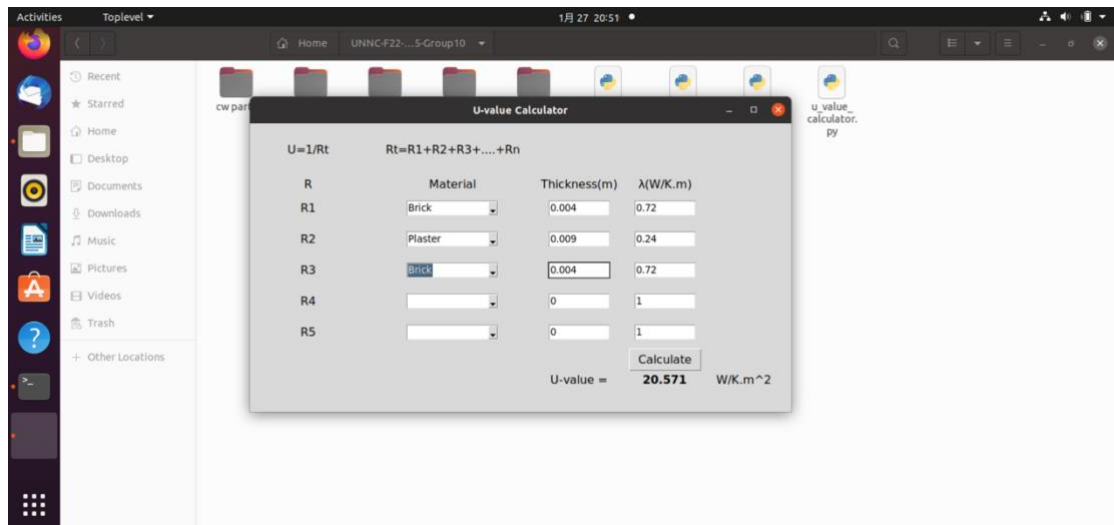
iii). Choose “plaster” in the “Material” box after R_2 , and enter “0.009” in the “Thickness” box:



iv). Repeat procedure i) and ii):

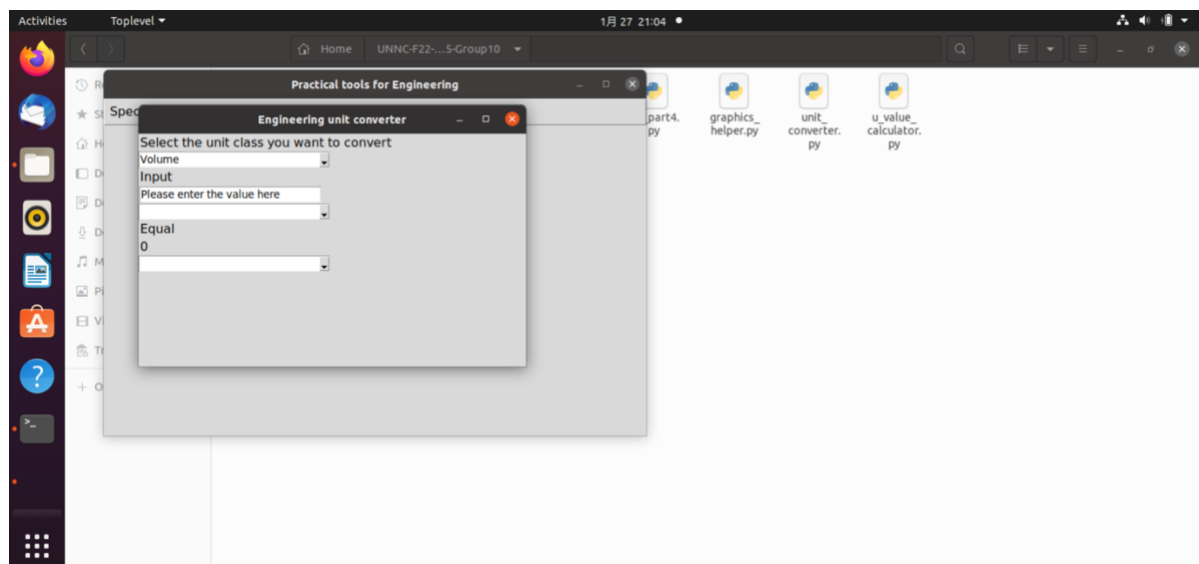


v). Click “Calculate” button, and I can get the U-value of this wall is $20.571 \text{ W/K} \cdot \text{m}^2$:

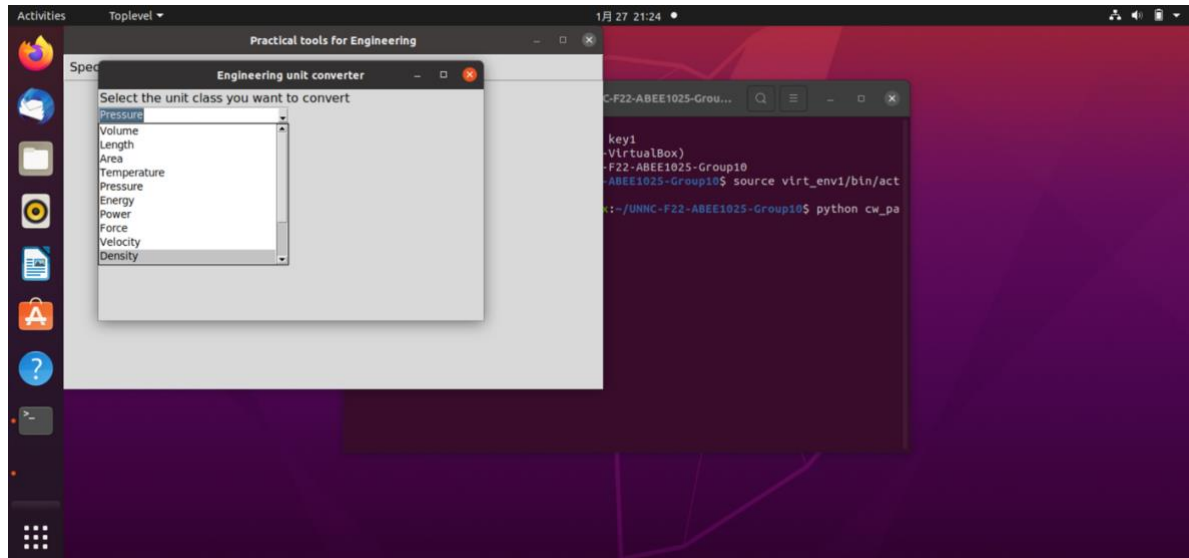


Unit converter user's guide:

1. Click the “unit converter” button, and you will see a new window:

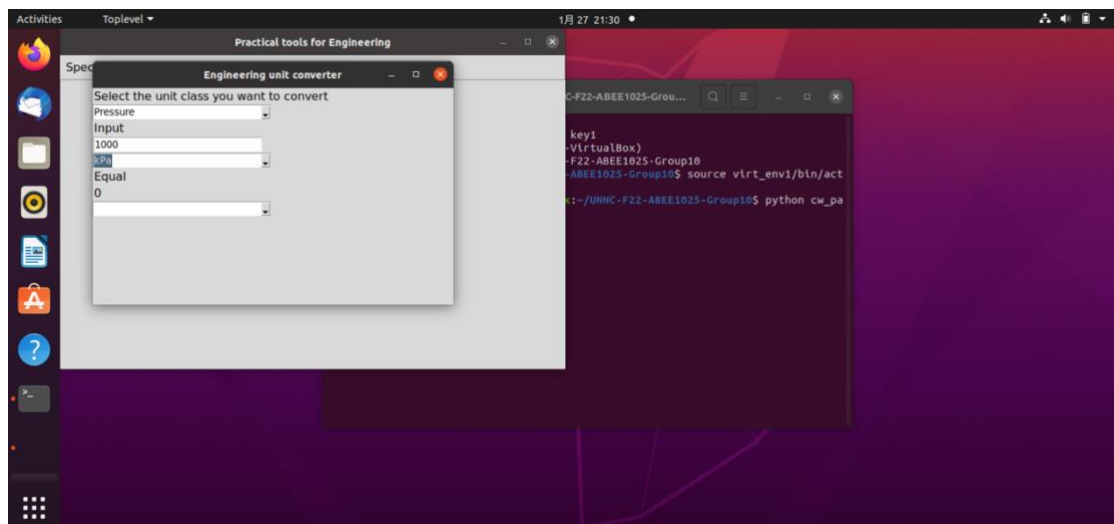


2. Select the initial unit class in the first combo box. For example, if I want to change the unit of pressure data 1000Kpa into pa , then I just choose “Pressure”:



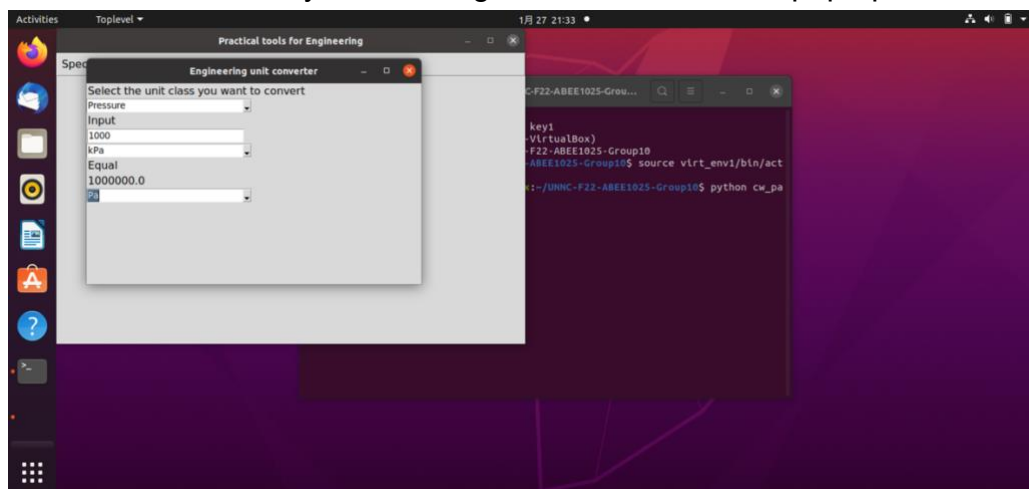
(According to the example, I need to choose “Pressure” here.)

3. Enter the original data in the next box, and choose the initial unit of it:



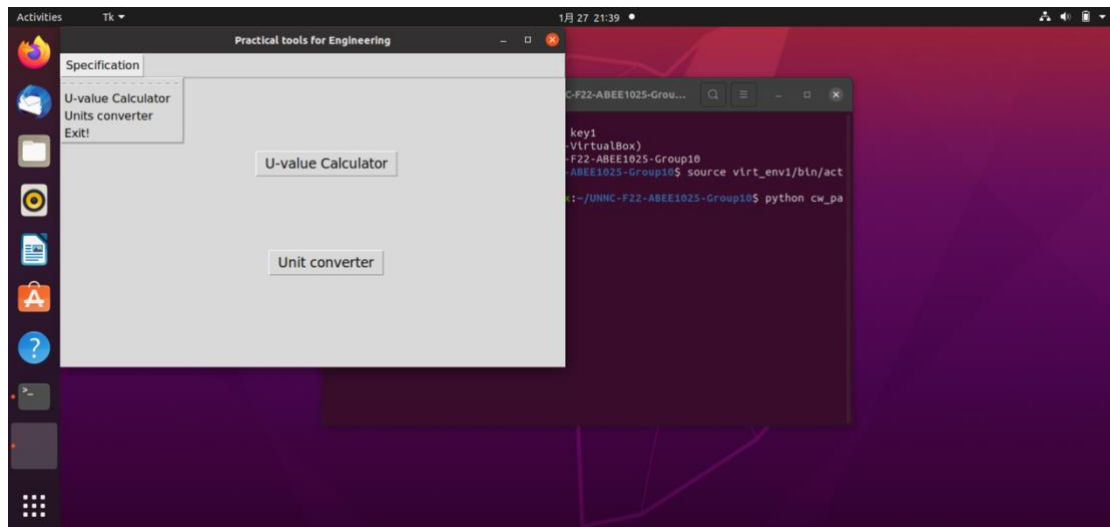
(According to the example, I just enter “1000” and choose “*kPa*”.)

4. Choose the unit that you wish to get, and the result will pop up:



(According to the example, I choose *pa*, and the result is 1000000.0)

Above is the detailed guide of the two modules of this software. If there's any problem during using the tools, you can click the "Specification" button on the initial page, and you will find a short guide there:



Once you want to finish this software, click "Exit!" button, and then it will be quitted:

