

Calculator: Shared C libraries in Python

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Abstract—This manual shows how to build a calculator using Python and shared C libraries. Through this, even beginners can learn how to build some simple software applications with graphical user interfaces (GUIs).

1 PYTHON CALCULATOR

Problem 1. Download the python code from <http://tlc.iith.ac.in/resources/tkcalc.py> and execute it.

2 SHARED LIBRARIES IN GCC

Problem 2. Write a C function to multiply two given numbers. Save it in the file titled as **mul.c**

Solution:

```
//function to multiply two numbers
float mul(float num1, float num2)
{
    return num1*num2; //function
    returns multiplication of
    num1 and num2
}

//Run the following commnad for
generating the .so file
//cc -fPIC -shared -o mul.so mul.c
```

Problem 3. Open the Terminal and go to the directory where the **mul.c** file is saved.

Problem 4. Type the following command in the Terminal.

Solution:

```
cc -fPIC -shared -o mul.so mul.c
```

Problem 5. Type the following program in **main.c**

Solution:

```
#include <stdio.h>

float mul(float , float );

int main(void)
{
    printf("%f\n", mul(4,5));
    return 0;
}

//gcc main.c mul.so -Wl,-rpath=$(
pwd)
```

Problem 6. Run the above program

Solution:

```
gcc main.c mul.so -Wl,-rpath=$(pwd
)
./a.out
```

The advantage of using **mul.so** is that the multiplication function needs to be compiled only once. It can then be used in any C program.

Problem 7. Repeat the above exercises for adding two numbers.

Problem 8. Write all the required C routines for the calculator in Problem 1 and generate the shared libraries.

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3 SHARED LIBRARIES IN PYTHON

Problem 9. Write a Python script to multiply two numbers using C function.

Solution:

```
#Calling C function in Python
from ctypes import *

#load the shared object file
multip = CDLL('./mul.so')

a=2.0
b=8.0

#Find multiplication of floats

mul = multip.mul
mul.restype = c_float

print "Multiplication of",a,b,"=",
      mul(c_float(a), c_float(b))
```

Problem 10. Call the function written above in the Python GUI calculator to perform multiplication.

Solution: Download **calc_mul.py** file from the http://tlc.iith.ac.in/img/LA1400/calc_mul.py and save it in directory where **mul.c** is saved. Execute **calc_mul.py**.

Problem 11. Download **calc_sol.py** from http://tlc.iith.ac.in/img/LA1400/calc_sol.py and use C routines in **calc_sol.py** for all arithmetic operations in the calculator.