Exercise

1) Build a project consisting of
   - a class Rectangle, implementing separately the header file Rectangle.h and the source file Rectangle.C
   - a main program myprog.C that uses the Rectangle class

Compile the Rectangle object, the main object, and link them

```
class Rectangle
{
 public:
  Rectangle(double b=1, double h=1);  //constructor

  void setBaseHeight(double,double);  //set base and heigth of the rectangle
  double getDiag(void);               //get the rectangle diagonal
  double getArea(void);               //get the rectangle area
  double getB(void);                  //get the rectangle base
  double getH(void);                  //get the rectangle heigth

 private:
  double base; double height;
  ~Rectangle();                       //destructor

 };
```

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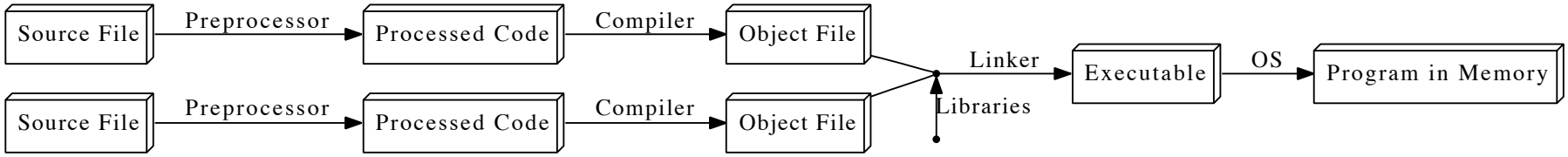

Exercise

2) Use an external library to implement the `getDiag` function

We could use:

- GSL (GNU Scientific Library) is a library that provides basic and advanced math and analysis tools.

  ```
  double gsl_hypot( double x, double y)
  ```

  (that basically returns `sqrt(x*x+y*y)`)

  GSL libraries `libgsl` and `libgslcblas` and the headers are available in the lab computers
  `/usr/include/gsl`
  `/usr/lib64`

- from ROOT libMathCore

  ```
  double TMath::Sqrt(double a)
  double TMath::Power(double a, double b)
  ```

  instead of using the "standard" `sqrt()` and `pow()`

Exercise

3) Write a Makefile to automatically compile your code

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```
CXX             := g++
CXXFLAGS        := -O -Wall -pedantic
SRC             :=./src/
INC             :=-I./inc -I/usr/include/gsl
LIB             :=-L/usr/lib64 -lgsl -lgslcblas
OBJ             :=./obj/
EXE             :=./exe/

default: $(EXE)/myexe

$(OBJ)%.o: $(SRC)%.C
        @echo Compiling  $< ...
        @if ! [ -d $(OBJ) ] ; then mkdir -pv $(OBJ); fi
        $(CXX) $(CXXFLAGS) $(INC) -c -o $@ $<

$(EXE)/myexe: $(OBJ)rectangle.o $(OBJ)myprog.o
        @echo Linking  $^ to $@
        @if ! [ -d $(EXE) ] ; then mkdir -pv $(EXE); fi
        $(CXX) $(CXXFLAGS) $(INC) $(LIB) -o $@ $^

clean:
        rm -fv $(OBJ)*
        rm -fv $(EXE)*
```

Exercise

4) Implement, for the Rectangle class and for the main function, some debug printouts via a Preprocessor Directive

```
#include <iostream>
using namespace std;

class Rectangle
{
   public:
     Rectangle();  //constructor
};

Rectangle::Rectangle(){
#ifdef _DEBUG_
    printf("Creating-Rectangle\n");
#endif
    base=1; height=1;
    return;
}
```

```
bozzo@bozzomac $ g++ -D_DEBUG_ -c -o file.o file.C
```

Exercise

5) Implement a ‘static’ method, Rectangle::Merge(), that accepts two Rectangle instances as inputs, checks if one of the two sides (base or height) is equal and, if yes, returns a new Rectangle object, sum of the two inputs.
In the main function, compute the Area and the Diagonal for this new Rectangle.
What happen if both the sides of the two inputs are different? What to return?

Exercise

6) Implement a method, overloading the '+' operator (*), acting on one Rectangle instance and *adding* to it another Rectangle instance:

```
Rectangle a;
Rectangle b;
Rectangle c = a+b;
```

(*) let's define "sum" as the sum of both the *base* and *height*.