PA1: 實體電路設計視覺化

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大綱

- 作業講解
- Gnuplot安裝教學
- Input file格式說明
- Gnuplot格式說明與執行
- 作業繳交說明

作業講解

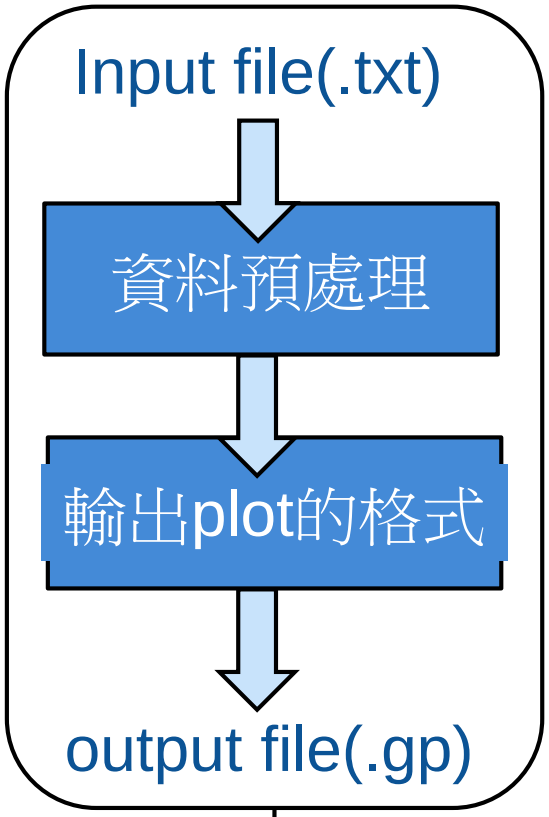
作業概覽(1/2)

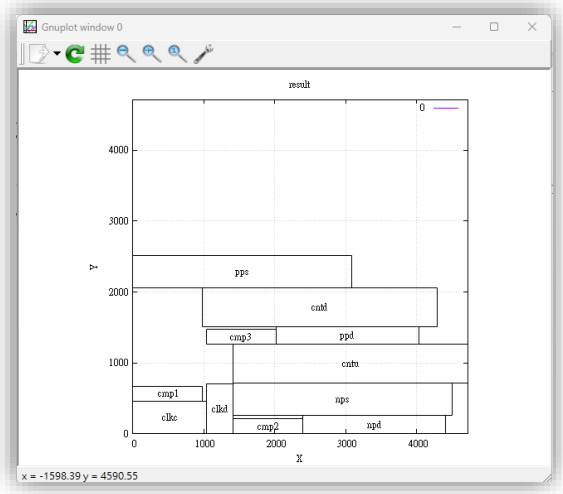
- 電腦的運作是利用0/1編碼或字串進行溝通，但對於人類來說，要讀懂這些編碼是一件費力的事，所以我們利用其他的輔助方式，來幫助我們檢查演算法執行的結果，或是幫助我們方便debug。

- 本次作業要透過資料處理與輔助軟體，讓同學們將冷冰冰的文字變成可視覺化的物件。

作業概覽(2/2)

- 流程圖&結果

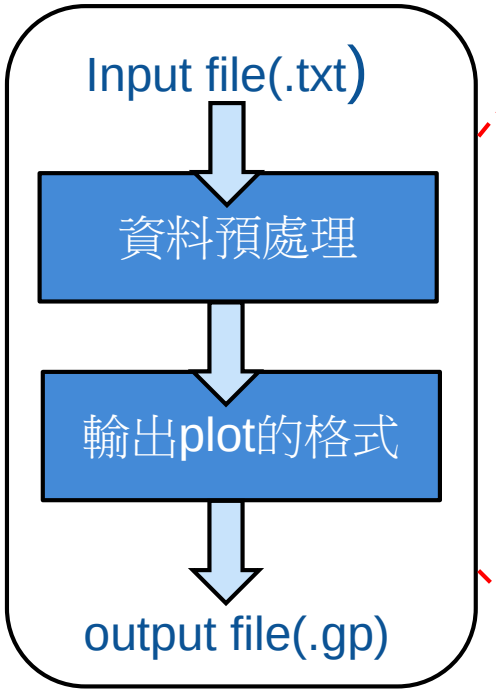




使用Gnuplot開啟輸出的檔案

題目

- 將 框框內的流程圖，利用(C++/C)語言進行撰寫以及編譯
- 根據給定的input data，輸出gnuplot規定的格式，並執行gnuplot檔案




```
…..
…..
int main(int argc, char **argv){

   // open the input file
   fstream fin;
   fin.open(argv[1], fstream::in);
   if( !fin.is_open() ){
       cout << "Error: the input file is not opened!!" << endl;
       exit(1);
   }
  …
  …
  // write the output file
  fstream fout;
  fout.open(argv[2], fstream::out);
  if(!fout.is_open()){
       cout << "Error: the output file is not opened!!" << endl;
                    exit(1);
   }
  …
   fout << … << Rectangle.x << Rectangle.y << ….


 return 0;
}
```

←這不是完整版，請寫出你的版本

實作引導

- **Step 1 : 寫一個簡易的class或struct，來存取想要的資訊 。**
- **Step 2 : 利用fstream進行Input File 讀取。**
- **Step 3 : 根據gnuplot語法，利用fstream 輸出一個檔案。**
- **Step 4 : 開啟剛剛輸出的檔案，即可獲得想要的可視化結果。**

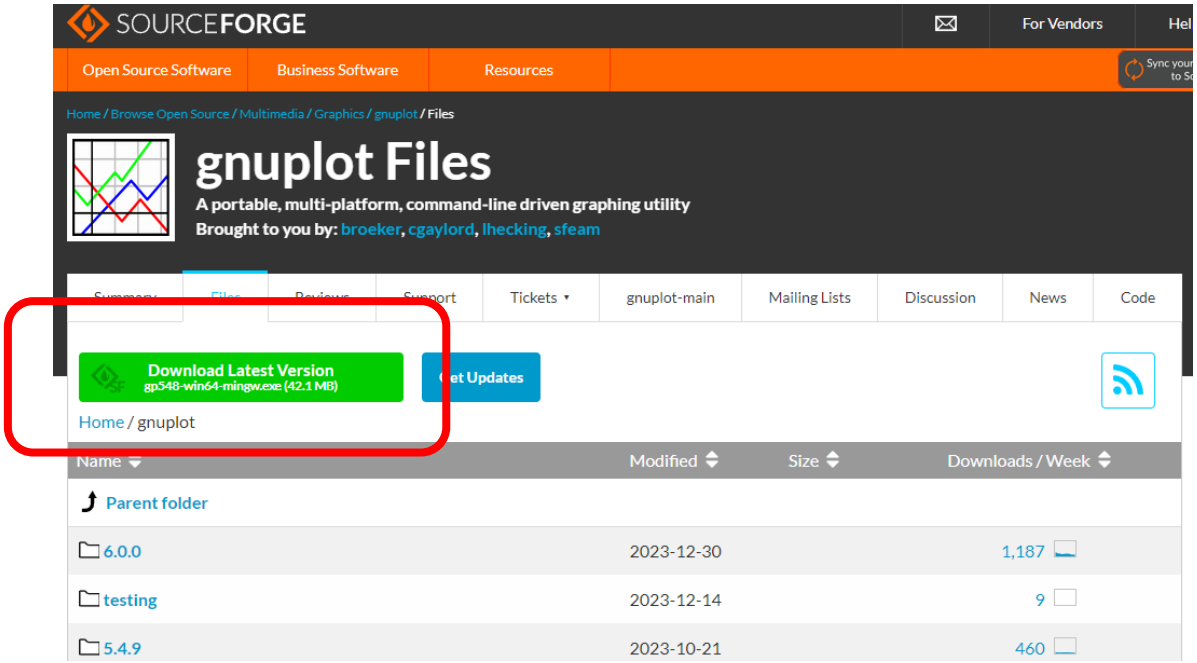
(search keywords):

Class, (argv argc), fstream, string process

Gnuplot安裝教學

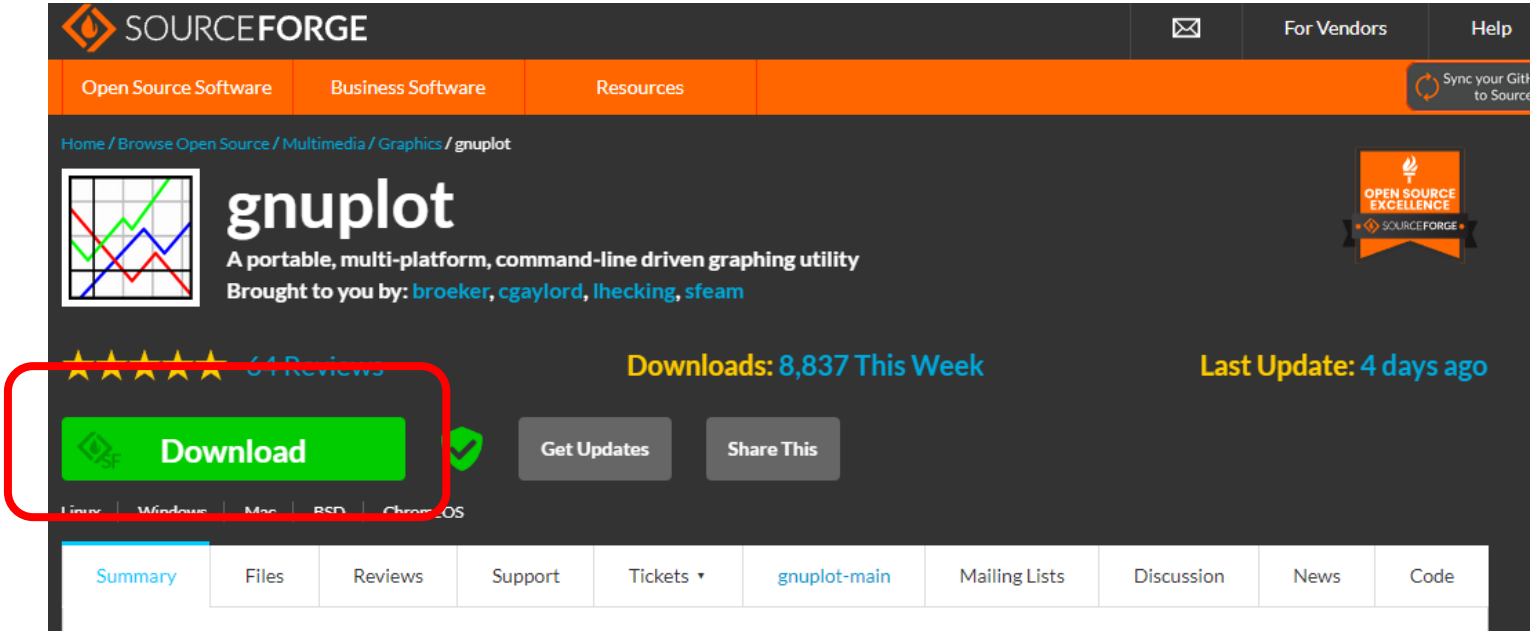
安裝gnuplot

- 網站:
  https://sourceforge.net/projects/gnuplot/files/gnuplot/
- 點選”Download Latest Version”



安裝gnuplot

- 理路上剛剛那一步就會自動下載了，不然就是等個幾秒，可以點選”Download”

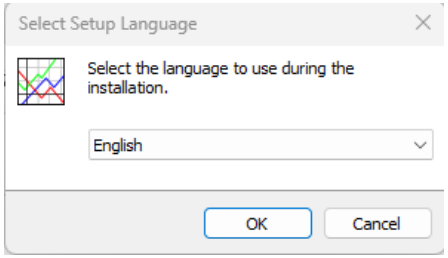


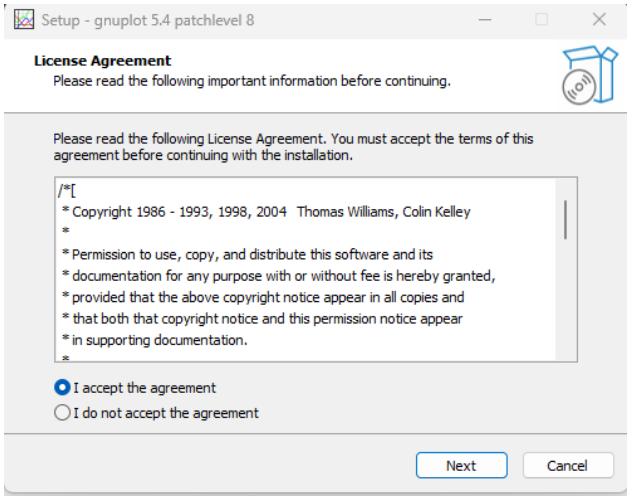
安裝gnuplot

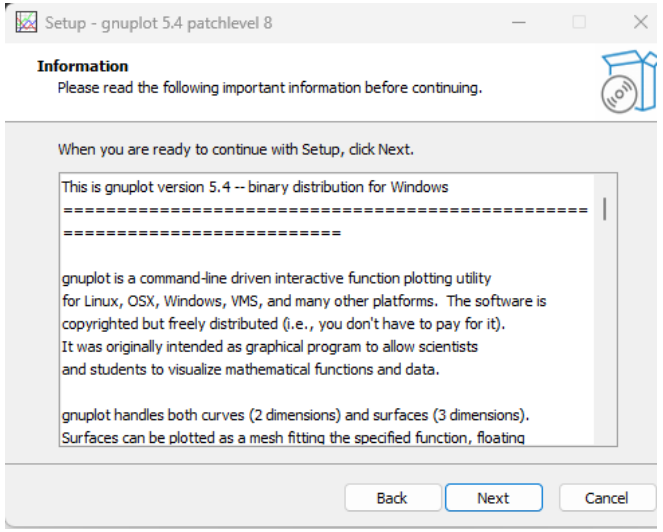
- 到電腦系統的下載→點開gp….-mingw→即可安裝gnuplot

安裝gnuplot

- 根據預設的步驟，點選”Next”

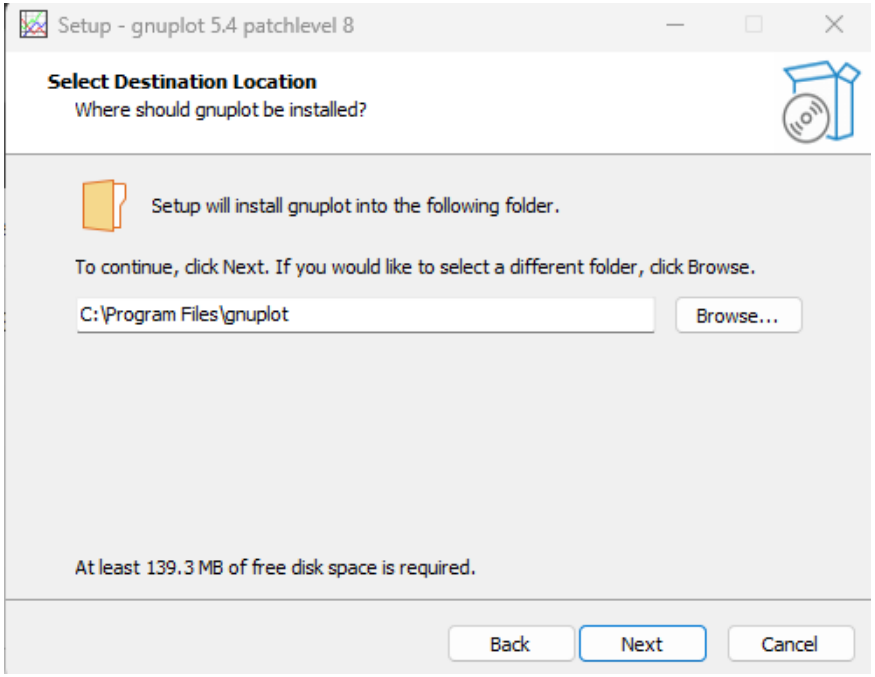


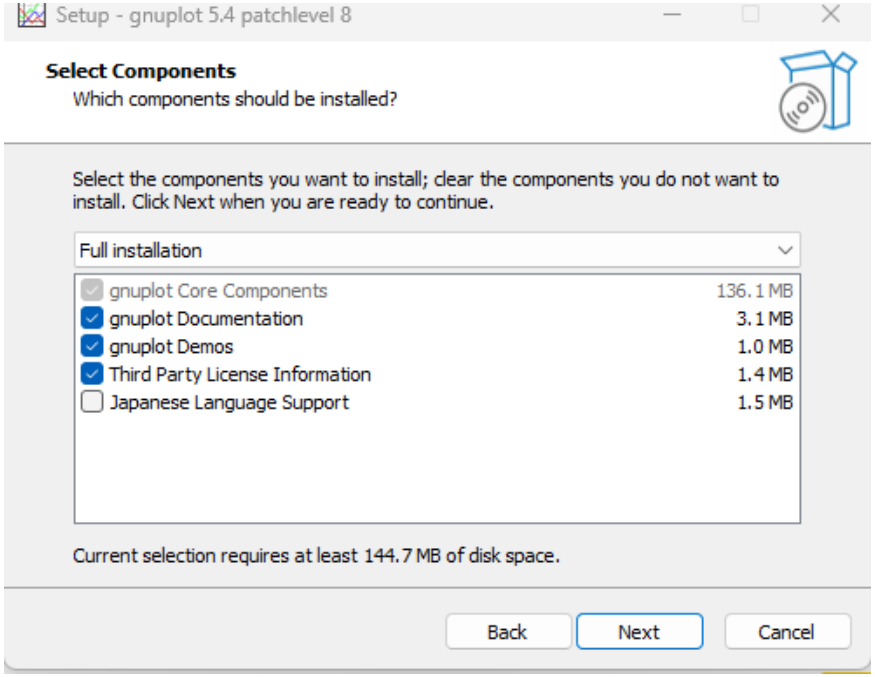




安裝gnuplot

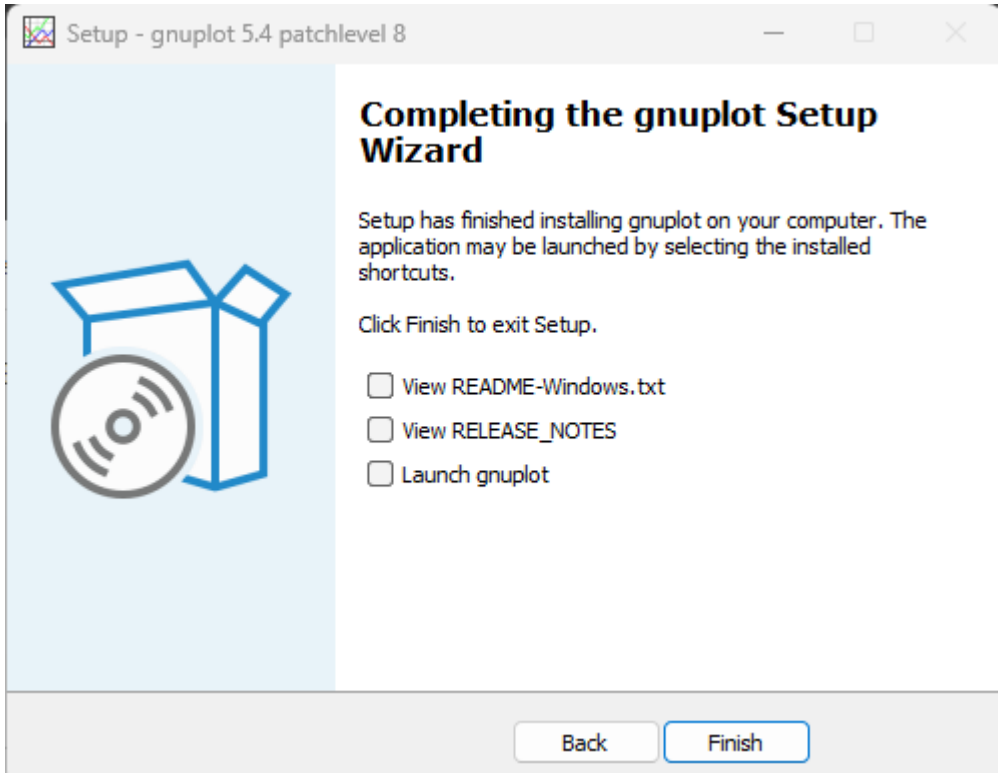
- 根據預設的步驟，點選”Next”





安裝gnuplot

- 安裝完成!!



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Input File格式說明

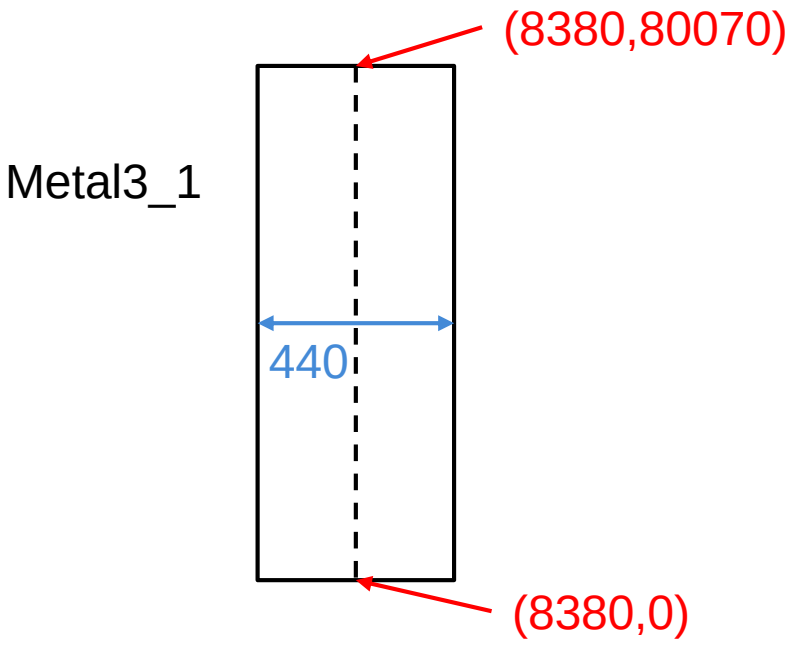
DEF Introduction

- **Design Exchange Format (DEF)**
  - An open specification for representing physical layout of an IC
- **DEF includes**
  - Die area
    - Draw a bounding box to represent the die area
    - Use a color you like
  - Components
    - Draw a bounding box to represent each MSBCS, whose width and height will be specified
    - Use a color you like

```
VERSION 5.6 ;
DIVIDERCHAR "/" ;
BUSBITCHARS "[]" ;
DESIGN CS_APR ;

UNITS DISTANCE MICRONS 1000 ;

PROPERTYDEFINITIONS
  COMPONENTPIN text STRING ;
END PROPERTYDEFINITIONS

DIEAREA ( 0 0 ) ( 82970 80070 ) ;


COMPONENTS 64 ;
- Transistor0 MSBCS
  + PLACED ( 0 2980 ) N ;
- Transistor1 MSBCS
  + PLACED ( 0 13050 ) N ;
- Transistor2 MSBCS
  + PLACED ( 0 23120 ) N ;
- Transistor3 MSBCS
  + PLACED ( 0 33190 ) N ;
- Transistor4 MSBCS
  + PLACED ( 0 43260 ) N ;
- Transistor5 MSBCS
  + PLACED ( 0 53330 ) N ;
- Transistor6 MSBCS
  + PLACED ( 0 63400 ) N ;
- Transistor7 MSBCS
```

DEF Introduction (cont'd)

- **DEF includes**
  - Special nets
    - Draw a bounding box for each metal segment
    - Use different colors for the two different layers (ME3 and ME4)

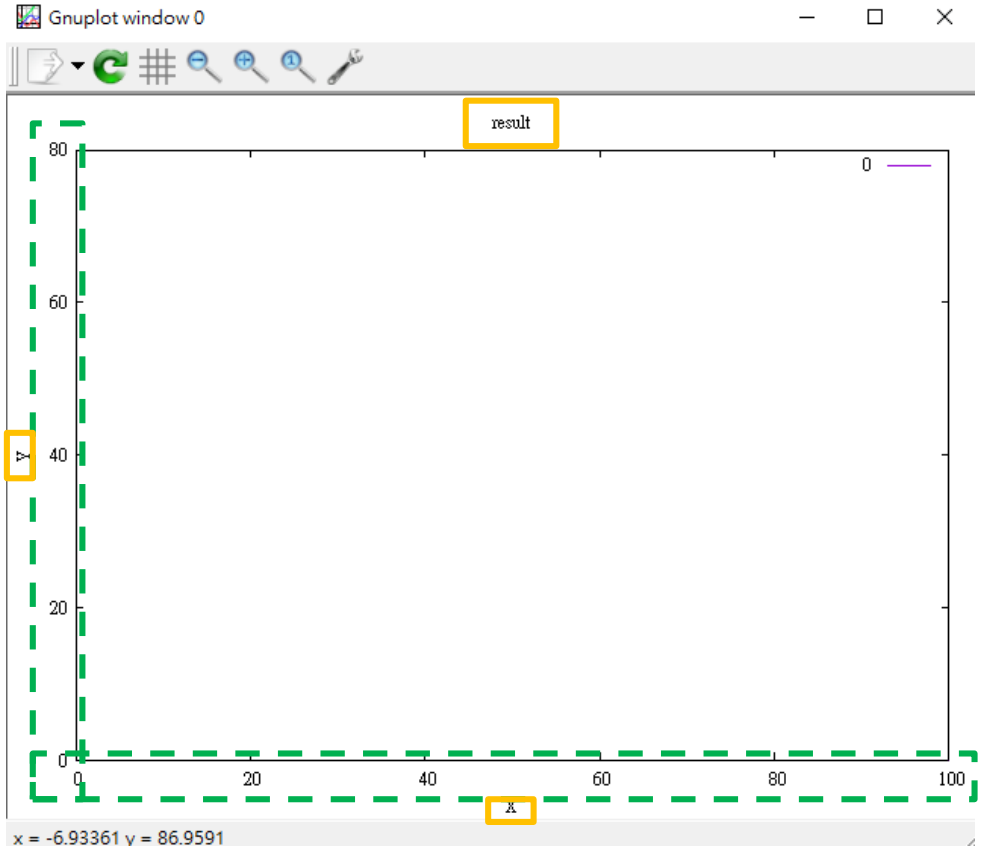



```
 + PLACED ( 72870 73470 ) N ;
END COMPONENTS

SPECIALNETS 112 ;
- Metal3_0
 + ROUTED ME3 440 ( 7630 0 ) ( * 80070 ) ;
- Metal3_1
 + ROUTED ME3 440 ( 8380 0 ) ( * 80070 ) ;
- Metal3_2
 + ROUTED ME3 440 ( 9130 0 ) ( * 80070 ) ;
- Metal3_3
 + ROUTED ME3 440 ( 9880 0 ) ( * 80070 ) ;
- Metal3_4
 + ROUTED ME3 440 ( 18040 0 ) ( * 80070 ) ;
- Metal3_5
 + ROUTED ME3 440 ( 18790 0 ) ( * 80070 ) ;
- Metal3_6
 + ROUTED ME3 440 ( 19540 0 ) ( * 80070 ) ;
- Metal3_7
 + ROUTED ME3 440 ( 20290 0 ) ( * 80070 ) ;
- Metal3_8
 + ROUTED ME3 440 ( 28450 0 ) ( * 80070 ) ;
- Metal3_9
 + ROUTED ME3 440 ( 29200 0 ) ( * 80070 ) ;
- Metal3_10
 + ROUTED ME3 440 ( 29950 0 ) ( * 80070 ) ;
- Metal3_11
 + ROUTED ME3 440 ( 30700 0 ) ( * 80070 ) ;
```

Gnuplot格式說明

語法解釋

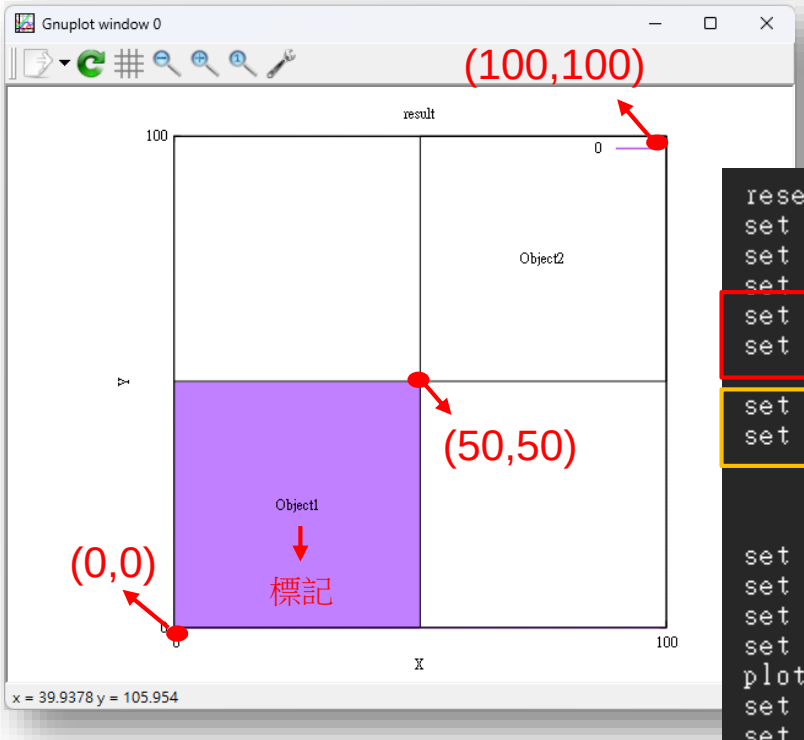
- 建立外框、刻度和標題
  - 根據右圖語法可以得到左圖結果
  - 綠框中變數根據input data為準，剩下的變數不需變動




```
reset
set title "result"
set xlabel "X"
set ylabel "Y"
see next page
set xtics 20
set ytics 20
plot [0:100][0:80]0
set terminal png size 1024,768
set output "output.png"
replot
```

語法解釋

- 繪出Shape
  - 根據input data畫出對應的位置和名字
  - 名字需要在Shape內(中央為佳)



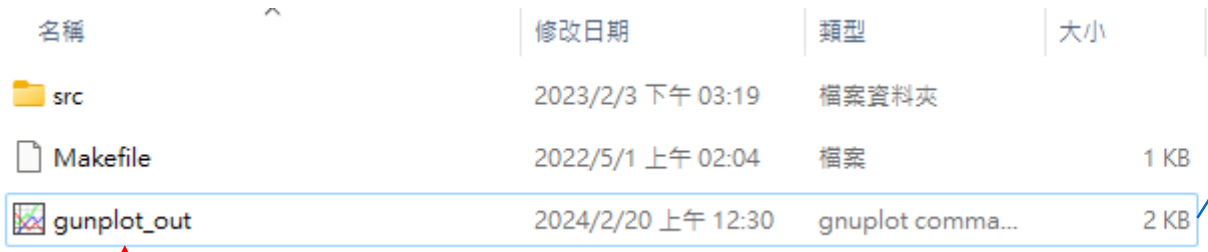
顏色參考表:
https://www.ifreesite.com/color/

```
reset
set title "result"
set xlabel "X"
set ylabel "Y"
set object 1 rect from 0,0 to 50,50 lw 1 fs solid fc rgb "#c080ff"
set label "Object1" at 25,25 center
set object 2 rect from 50,50 to 100,100 lw 1 fs empty
set label "Object2" at 75,75 center


set xtics 100
set ytics 100
set size square
set grid
plot [0:100][0:100]0
set terminal png size 1024,768
set output "output.png"
replot
replot
```

畫矩形 設定範圍 設定實心 設定顏色 設定空心 標記

如何開啟.gp檔案

- **尋找XXX.gp檔案**
  - 檔案路徑會與執行檔(.exe)路徑或你預設的路徑相同
- **打開檔案**
  - 理論上，附檔名".gp" + 前面已經灌了gnuplot應用程式，系統會自動抓到
- **若檔案無法開啟**
  - 可以按右線，選擇開啟方式，找到 圖示開啟，就有下一頁的圖了



執行這個檔案

如果打不開檔案。
可以去"內容"，
做變更。

作業繳交說明

Programming

- **Deadline: 3/16 (Sun.) 23:59:59**
- **Language/Platform**
  - Language: C or C++.
  - Platform: Unix/Linux. A tutorial for installing virtual Linux system on PC is available on Moodle.
- **Must use command-line parameters**

$$[executable\ file\ name][MSBCS\ width][MSB\ CS\ height]$$
$$[input\ file\ name]\ [output\ file\ name]$$

  - Ex: ./genPlot 7100 6600 input.txt output.gp
  - ***Ensure the executable file name to be "genPlot"*** (default setting in the provided Makefile)

Submission

- **Submit the following materials in a compressed [student id]-p1.tgz file (e.g., b11107000-p1.tgz) at the course website by the deadline:**
  - (1) source codes,
  - (2) Makefile,
  - (3) a text readme file (readme.txt) stating how to build and conduct your program.
- **Please carefully read the following instructions:**
  - The compressed file [student id]-p1.tgz file contains only a single folder named [student id]-p1 (e.g., b11107000-p1). Use only lowercase letters for the compressed file and folder names.
  - Only a compressed file in the *.tgz format will be accepted.
  - Do not submit files or folders other than those specified above.
  - Please ensure that your work can be successfully executed in the Linux environment.
  - **If the above requirements are not met, penalties will be imposed
- **Online Resources**
  - Sample input files (*.txt)
  - A sample submission file b11107000-p1.tgz including a sample Makefile and a sample readme.txt (no source codes)