

# 作業06： 量測CPU的溫度



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創作共用-姓名 標示-非商業性-相同方式分享  
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# 作業目標

- 🍏 作業系統掌管了許多資訊，例如記憶體的使用量、系統溫度等等
- 🍏 如果對所有的資訊設計一組system call，會讓系統的複雜度大幅提高，可擴充性降低
- 🍏 在Linux中使用pseudo file system的方式將資訊以檔案的形式呈現
- 🍏 對於該資訊最常見的操作是：開檔、讀檔，有些資訊還提供「寫入」，例如：使用swap space的程度（swapness）

# 作業目標

- 🍏 透過已知的軟體（例如：某個看CPU溫度的軟體），並查看這個軟體做了哪些system call，我們就可以得知他如何獲得系統資訊
- 🍏 仿造已知軟體，我們可以自行撰寫程式，得知系統資訊

# 透過指令知道CPU目前的溫度

```
shiwulo@numa1:~$ sudo apt install lm-sensors
```

```
shiwulo@numa1:~$ sensors
```

```
k10temp-pci-00db
```

```
Adapter: PCI adapter
```

```
Tdie:          +30.1°C (high = +70.0°C)
```

```
Tctl:          +57.1°C
```

```
k10temp-pci-00cb
```

```
Adapter: PCI adapter
```

```
Tdie:          +29.9°C (high = +70.0°C)
```

```
Tctl:          +56.9°C
```

```
i350bb-pci-0700
```

```
Adapter: PCI adapter
```

```
loc1:          +47.0°C (high = +120.0°C, crit =  
+110.0°C)
```

```
iwlwifi-virtual-0
```

```
Adapter: Virtual device
```

```
temp1:         +46.0°C
```

```
k10temp-pci-00d3
```

```
Adapter: PCI adapter
```

```
Tdie:          +31.5°C (high = +70.0°C)
```

```
Tctl:          +58.5°C
```

```
k10temp-pci-00c3
```

```
Adapter: PCI adapter
```

```
Tdie:          +31.5°C (high = +70.0°C)
```

```
Tctl:          +58.5°C
```

# 上網查了一下AMD的處理器 只有底下四個是CPU

k10temp-pci-00db

Adapter: PCI adapter

Tdie: +30.1°C (high = +70.0°C)

Tctl: +57.1°C

k10temp-pci-00cb

Adapter: PCI adapter

Tdie: +29.9°C (high = +70.0°C)

Tctl: +56.9°C

i350bb-pci-0700

Adapter: PCI adapter

loc1: +47.0°C (high = +120.0°C, crit = +110.0°C)

iwlwifi-virtual-0

Adapter: Virtual device

temp1: +46.0°C

k10temp-pci-00d3

Adapter: PCI adapter

Tdie: +31.5°C (high = +70.0°C)

Tctl: +58.5°C

k10temp-pci-00c3

Adapter: PCI adapter

Tdie: +31.5°C (high = +70.0°C)

Tctl: +58.5°C

# 困境：我想要自己寫一支程式 隨時監控CPU溫度

🍏 程式碼的功能是：

- 如果不接任何參數，那麼就是會等到CPU的溫度降低到35度
- 如果接了參數，等到CPU的溫度降到指定的溫度

🍏 如果沒有到指定的溫度，程式碼不會停止，會一直執行，因此當程式碼執行結束時，可以確保CPU的溫度夠低

# 使用strace

```
$ strace sensors
```

```
/*...*/
```

```
/*覺得底下的程式碼很可疑*/
```

```
lstat("/sys", {st_mode=S_IFDIR|0555, st_size=0, ...}) = 0
```

```
lstat("/sys/class", {st_mode=S_IFDIR|0755, st_size=0, ...}) = 0
```

```
lstat("/sys/class/hwmon", {st_mode=S_IFDIR|0755, st_size=0, ...}) = 0
```

```
lstat("/sys/class/hwmon/hwmon6", {st_mode=S_IFLNK|0777, st_size=0, ...})  
= 0
```

```
/*...*/
```

# 進入目錄一個一個看

*/\*底下很可疑\*/*

```
shiwulo@numa1:/sys/class/hwmon/hwmon1$ ls  
device power    temp1_input temp1_max  temp2_label  
name  subsystem temp1_label temp2_input uevent
```

*/\*看一下內容\*/*

```
shiwulo@numa1:/sys/class/hwmon/hwmon1$ cat name  
K10temp
```

```
shiwulo@numa1:/sys/class/hwmon/hwmon1$ cat temp1_label  
Tdie
```





🍏 shiwulo@numa1:/sys/class/hwmon/hwmon1\$ googler k10temp

🍏 果然是

## Description

-----  
This driver permits reading of the internal temperature sensor of AMD Family 10h/11h/12h/14h/15h/16h/17h processors.

All these processors have a sensor, but on those for Socket F or AM2+, the sensor may return inconsistent values (erratum 319). The driver will refuse to load on these revisions unless you specify the "force=1" module parameter.

Due to technical reasons, the driver can detect only the mainboard's socket type, not the processor's actual capabilities. Therefore, if you are using an AM3 processor on an AM2+ mainboard, you can safely use the "force=1" parameter.

There is one temperature measurement value, available as temp1\_input in sysfs. It is measured in degrees Celsius with a resolution of 1/8th degree. Please note that it is defined as a relative value; to quote the AMD manual

Tctl is the processor temperature control value, used by the platform to control cooling systems. Tctl is a non-physical temperature on an arbitrary scale measured in degrees. It does not represent an actual physical temperature like die or case temperature. Instead, it specifies the processor temperature relative to the point at which the system must supply the maximum cooling for the processor's specified maximum case temperature and maximum thermal power dissipation.

The maximum value for Tctl is available in the file temp1\_max.

If the BIOS has enabled hardware temperature control, the threshold at which the processor will throttle itself to avoid damage is available in temp1\_crit and temp1\_crit\_hyst.


# 撰寫程式碼的參考

- 🍏 請打開dropbox裡面的資料夾
- 🍏 請注意：大家的處理器可能有不一樣的sensors，例如：Intel和AMD就會不同，請使用「指令strace sensors」以了解倒底如何「模仿sensors取得資訊」的方法

# 作業

- 🍏 使用strace在你的處理器上追蹤sensors這個指令
- 🍏 列出sensors從哪邊讀取CPU的溫度
  - 🍋 附上截圖
- 🍏 請依照範例程式，寫出一支程式可以不斷的讀取溫度，直到抵達指定的溫度
  - 🍋 附上截圖

# 繳交方式

 請參考「作業06-system\_info.docx」