# Project #1. Resource Management

Operating systems manage the hardware and software resources on computers. Most operating systems come with built-in tools for monitoring the usage of the resources. Following are some of the well-known tools on Windows platform.

## A. Task manager (工作管理員)

You can right click on the Windows tool bar and select 'task manager' to launch the Windows Task Manager as shown in Figure 1 and Figure 2.

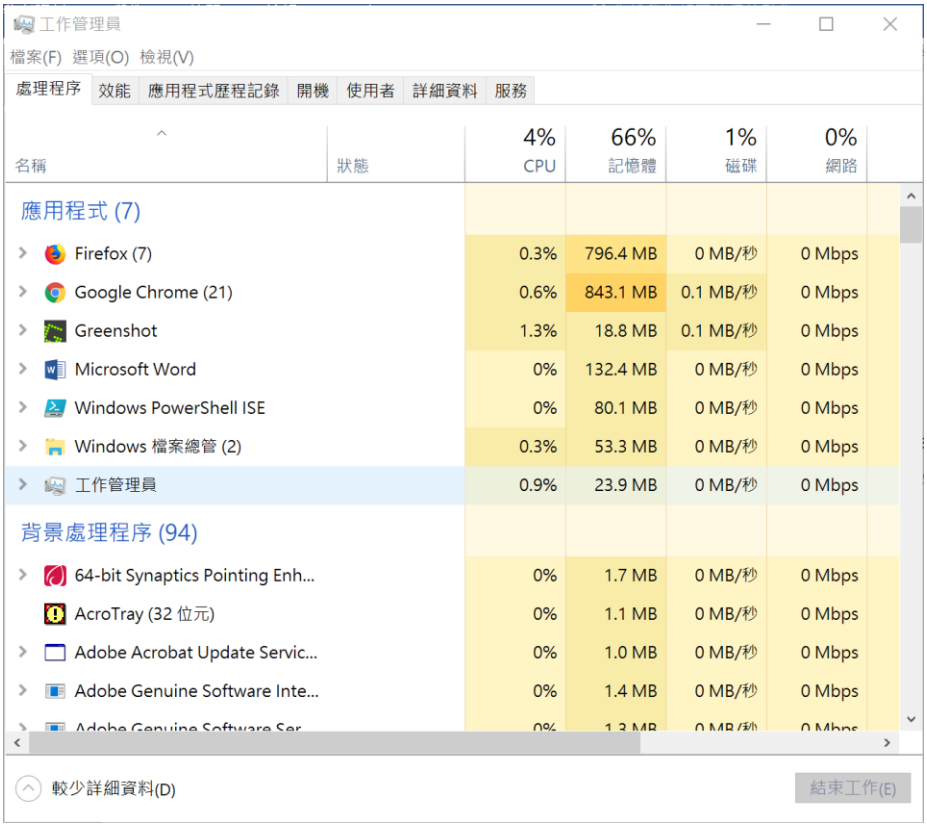



**Figure 1. Windows Task Manager showing the list of running processes and their respective resource usages**

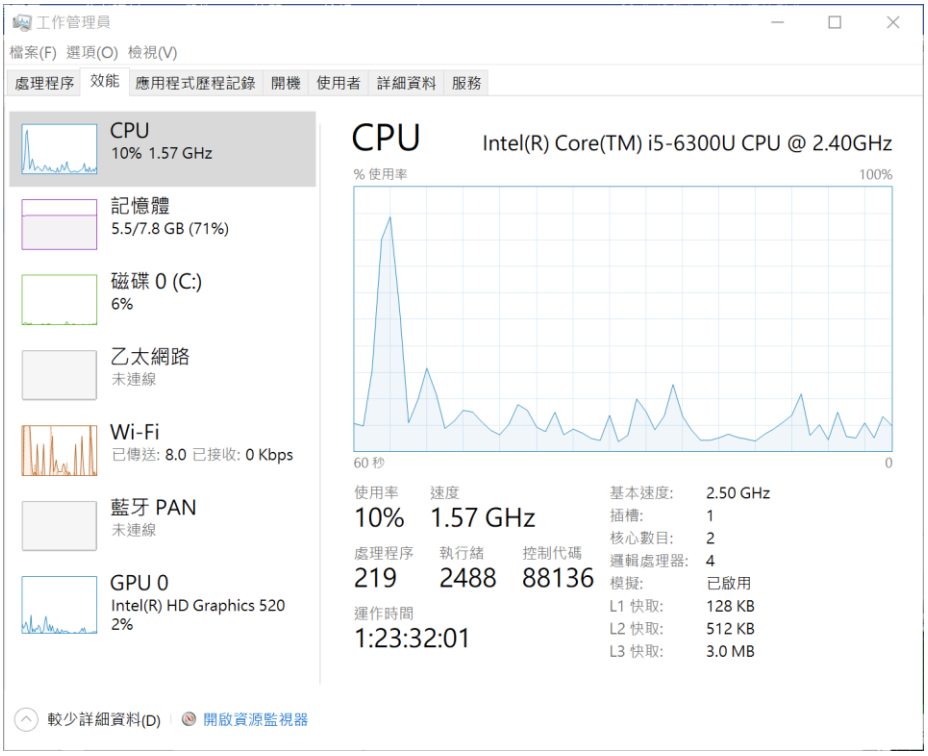



**Figure 2. Windows Task Manager showing the overall resource usages on the system**

You may find walkthrough articles on the Internet:

https://www.lifewire.com/task-manager-walkthrough-4029769

https://www.howtogeek.com/108742/how-to-use-the-new-task-manager-in-windows-8/

## B. Resource Monitor (資源監視器)

The Windows resource monitor (Figure 3) shows how the resources (CPU, memory, Disk I/O) are consumed by each process.

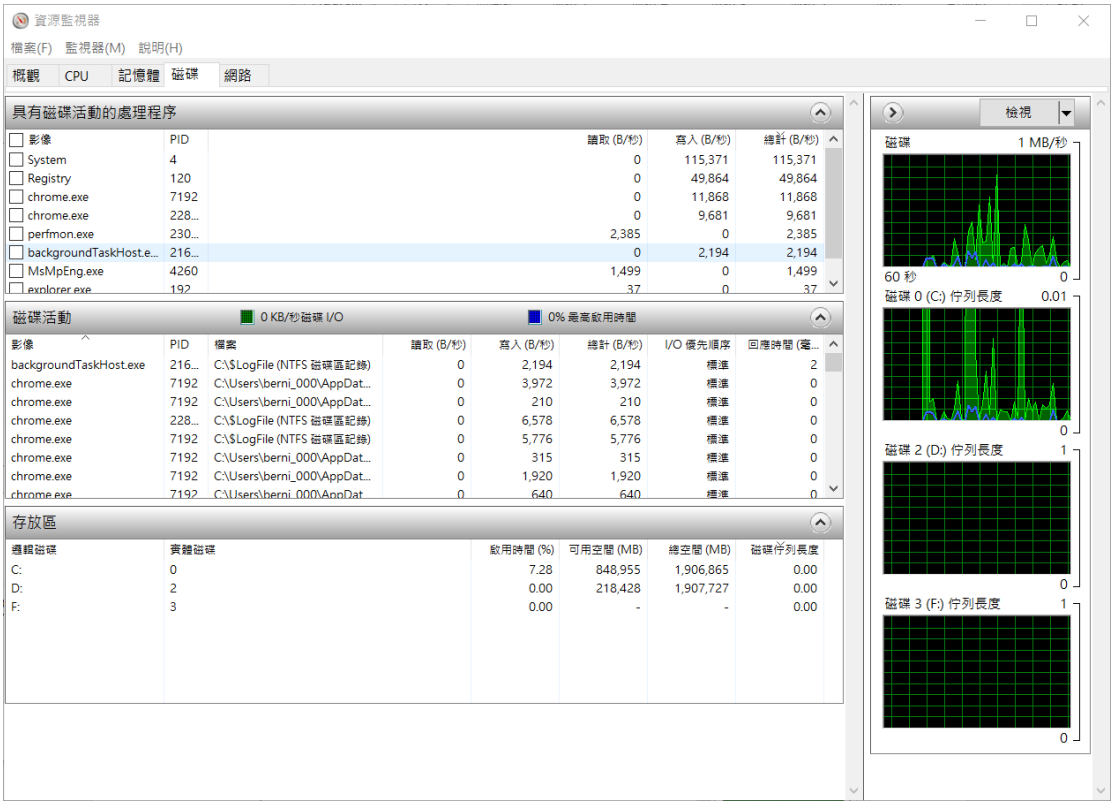
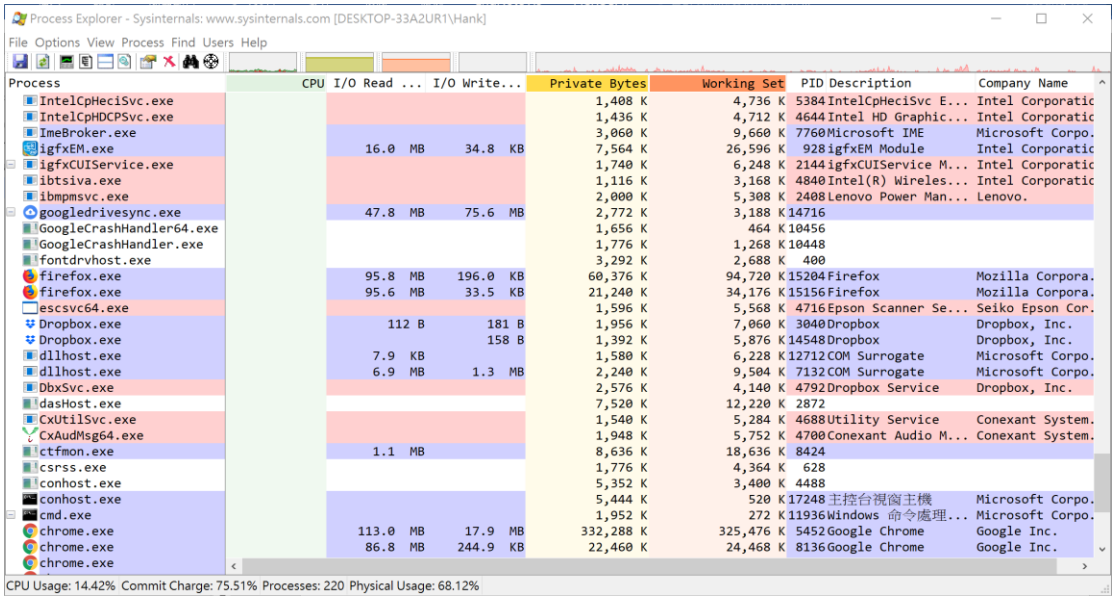



**Figure 3. Resource Monitor showing the detailed resource usages**

## C. Process Explorer

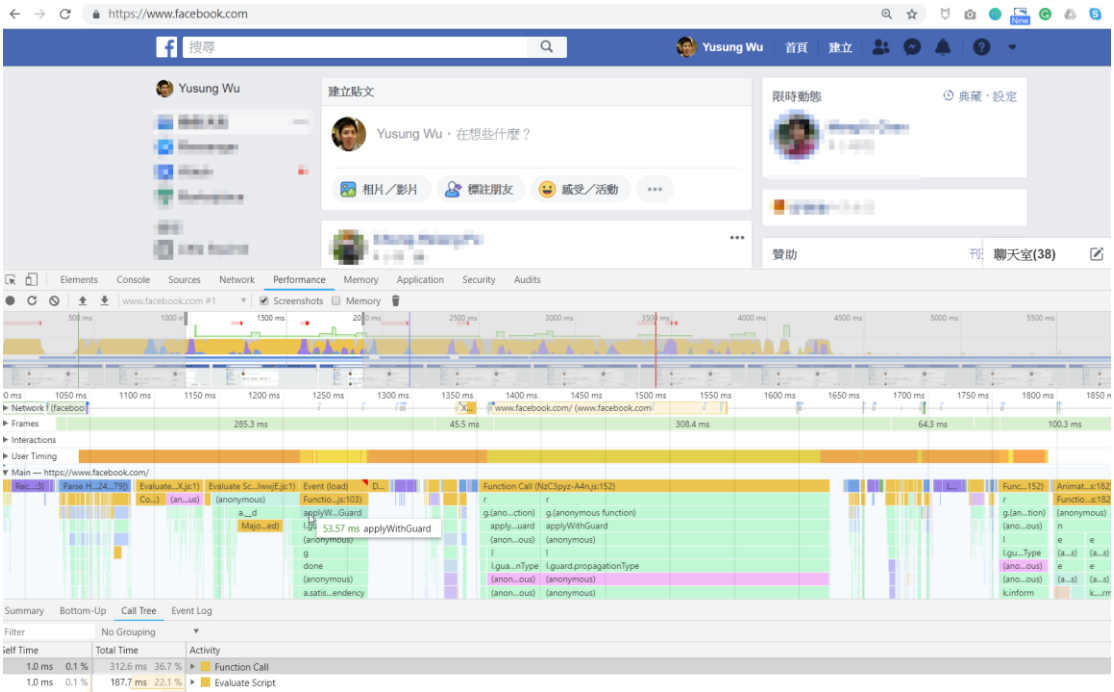
Process explorer is a very popular third-party tool for showing the resource usages by the running processes. It provides a lot more details in which we will cover later in this course. A neat feature is that you can save the monitoring data by clicking File -> Save.

https://docs.microsoft.com/en-us/sysinternals/downloads/process-explorer




## D. Web Browser Console (網頁主控台)

The web browser by itself is also an operating system. A web application typically consist of multiple components (HTML, Javascript, CSS, plugins, Flash, etc.) from many sources. The web browser console can show the details of the components and resource usages. The console can be invoked by pressing F12 or Ctrl+Shift+I on most browsers (e.g., Firefox, Chrome, etc.)




https://developers.google.com/web/tools/chrome-devtools/?hl=zh-tw

https://developers.google.com/web/tools/chrome-devtools/evaluate-performa

nce/timeline-tool?hl=zh-tw

https://developer.mozilla.org/zh-TW/docs/Tools

## E. Application Workload

For the tasks of this homework, we will use the following application workloads:

**[AW_Download].** Download Windows ISO image from CA.nctu.edu.tw

ftp://ca.nctu.edu.tw/For_Windows/System/Windows/10_64bit/Chinese/%28C%29Windows_10_1511_Education_64bit.ISO

**[AW_Decompress].** Decompress the Firefox source code[1]

```
7z  x  firefox-65.0b9.source.tar.xz
```

**[AW_Untar].** Untar the Firefox source code

```
7z  x  firefox-65.0b9.source.tar.xz
```

**[AW_Mining].** Run Monero miner on your web browser. Following are a few miners you may give a try

https://minexmr.stream/
https://coinhive.com/

**Use as many 'threads' as the number of processor cores on your system**. You can use CPU-Z[2] to determine the number of processor cores.

The miner may require you to enter your Monero address for receiving earnings from the mining. If you don't want to bother creating your own address, you may just use the follow address:

```
4B7evqALRhWGnTvQYP1iQBWbLEcwkXkYN52Jf4Eo1EBKW6rEbKkXk
DsJNfojPxWCL2jPSU6AioPKqghYZMrziivNP5VeTVJ
```

[1] https://archive.mozilla.org/pub/firefox/releases/65.0b9/source/firefox-65.0b9.source.tar.xz

[2] https://www.cpuid.com/softwares/cpu-z.html

## Tasks

### A. Run [AW_Download].

1. Observe and report the resource usages (CPU, Memory, I/O) on your system.
2. Measure the execution time.

### B. Run [AW_Decompress].

1. Observe and report the resource usages (CPU, Memory, I/O) on your system.
2. Measure the execution time.

### C. Run [AW_Untar].

Observe and report the resource usages (CPU, Memory, I/O) on your system.

### D. Run [AW_Mining].

Observe and report the resource usages (CPU, Memory, I/O) on your system.

### E. Run [AW_Download] and [AW_Mining] at the same time.

Report whether the execution time of [AW_Download] is affected as compared to the measurement in Task A

### F. Run [AW_Decompress] and [AW_Mining] at the same time.

Report whether the execution time of [AW_Decompress] is affected as compared to the measurement in Task B