

June 25, 2017, Beginners SIG

Activity Monitor (Part 1 of 2)

Note: This discussion is based on MacOS, 10.12.5 (Sierra). Some illustrations may differ when using other versions of macOS or OS X.

Credit 1: Activity Monitor Help

Credit 2: Use Activity Monitor on your Mac (<https://support.apple.com/en-us/HT201464>)

Credit 3: How to Use macOS' Activity Monitor Like a Power User

(<http://www.applegazette.com/mac/macos-activity-monitor-like-power-user/>)

Credit 4: Activity Monitor Demystified

(<https://computers.tutsplus.com/tutorials/activity-monitor-demystified--mac-30611>)

Credit 5: Using Activity Monitor (<https://macmost.com/using-activity-monitor.html>)

Over the next few presentations, I'm going to review several macOS utility apps that you may find useful. **Activity Monitor** is the topic this month along with the first three of its monitoring functions: **CPU**, **Memory**, and **Energy**. Next month, we'll review the **Disk** and **Network** functions, some additional information, and discuss using Activity Monitor to troubleshoot performance problems.

Activity Monitor is found in the **Utilities folder** inside the **Applications folder** (**Finder > Applications folder > Utilities folder**). Alternative: **Finder > Go menu > Utilities menu item**. Of course, you can also search for it with **Spotlight**.



Activity Monitor Icon

The app name, **Activity Monitor**, describes exactly what it does: it monitors the activity on your Mac, keeping track of the system resources that Mac apps are using.

The information provided by Activity Monitor can be valuable in troubleshooting, such as finding an app that's slowing down your Mac's responsiveness. In a pinch, you can even use it to force quit an app.

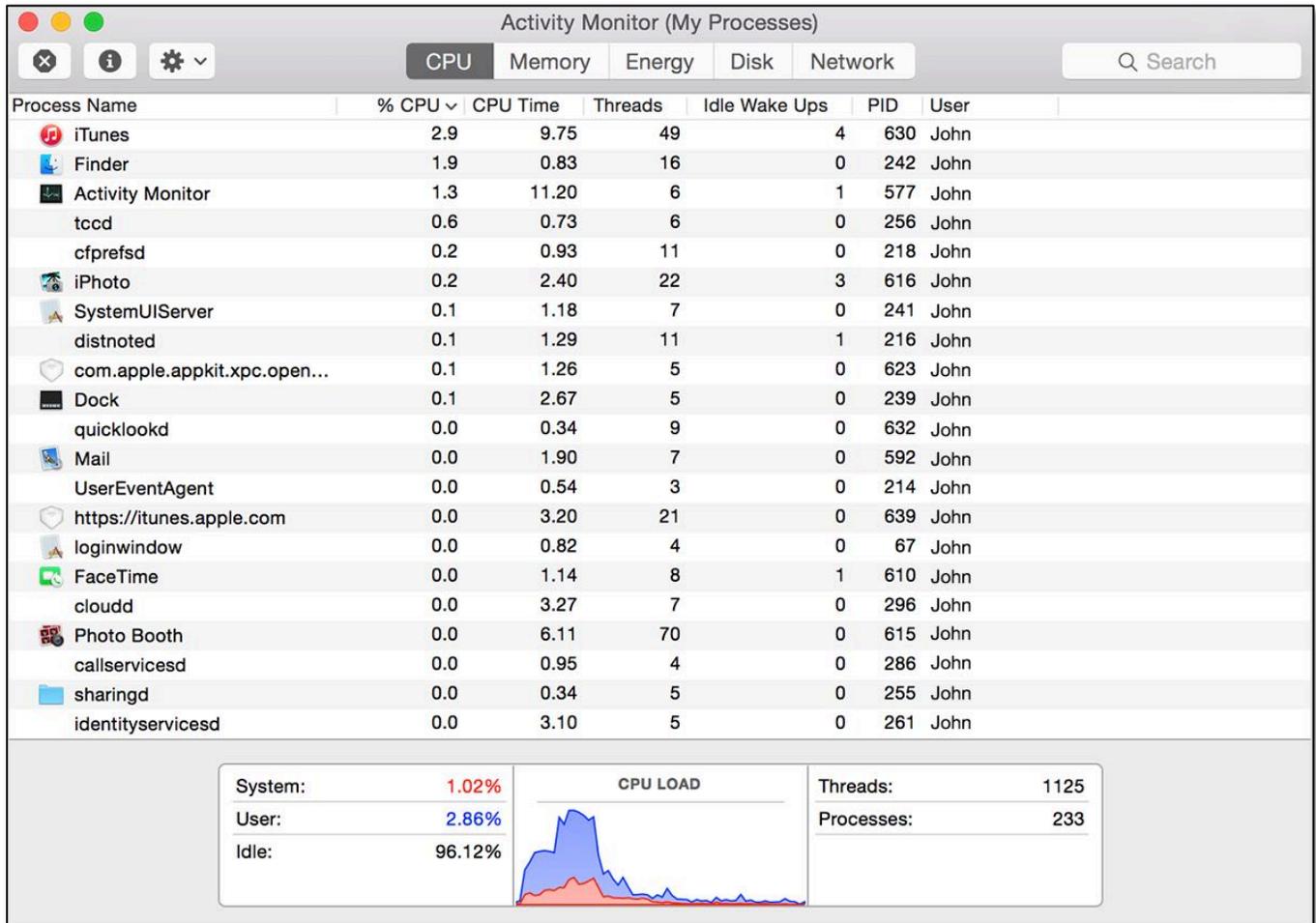
Main Window

Activity Monitor's main window default view (illustration on the next page) provides a table of all the currently running applications and information about them such as the percentage of CPU capacity that each one is using. It also shows all the processes running on your Mac. Processes can be your user apps, system apps used by macOS, and daemons. (Daemons are invisible processes or programs that run in the background to handle requests for services, such as print spooling and file transfers, and is dormant when not required.) You'll find that your Mac runs a *lot* of processes. I found almost 400 of them running on my iMac.

Computer operating systems are complex, and most of what's displayed by Activity Monitor probably won't be of much use to you (unless you're a developer, programmer or software engineer) and can be ignored. Because Activity Monitor provides a great deal of information, it's easy to become overwhelmed with all these processes and what each one does. So, don't let yourself get mired down in all the technical details.

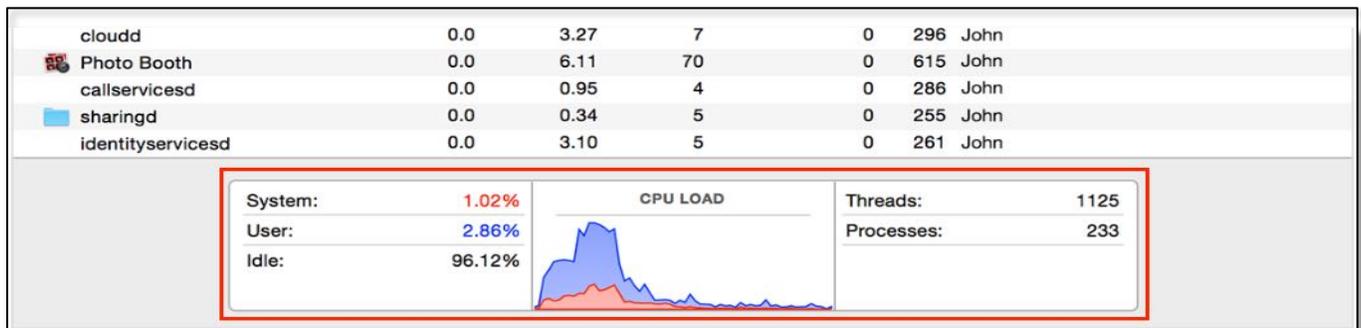
June 25, 2017, Beginners SIG Activity Monitor (Part 1 of 2)

Activity Monitor does have several useful items for the majority of users, and you can use the [View menu](#) to help select them. (More on this later.)



Activity Monitor Window (CPU Pane) (Credit: Apple Support – Use Activity Monitor on your Mac)

At the bottom of the window pane for each tab (see below), is some high level summary data. This information can be useful to quickly see how much of your system is currently being used. The summary changes as you click on different tabs.



Activity Monitor Window – Summary Information (Credit: Apple Support – Use Activity Monitor on your Mac)

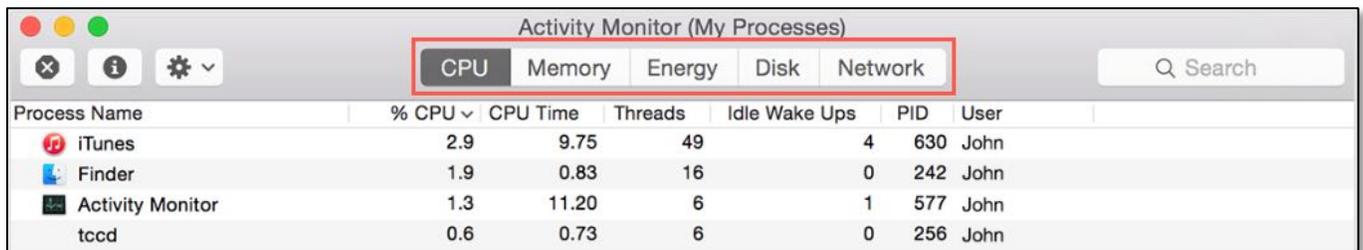
For example, in the pane for the CPU tab above, there's a table showing the percentage of CPU capacity (load) that system and user processes are using, along with a graph showing the same data. There's also a table of Threads and Processes.

June 25, 2017, Beginners SIG Activity Monitor (Part 1 of 2)

Category Panes

As you can see below, there are five category resource tabs at the top of the Activity Monitor window.

Each one changes the window view (pane) to show a different category of resources being monitored: [CPU](#) (shown in the illustration), [Memory](#), [Energy](#), [Disk](#) and [Network](#). These provide information about a particular set of resources, and how much of it an app or other process is using.



Process Name	% CPU	CPU Time	Threads	Idle	Wake Ups	PID	User
iTunes	2.9	9.75	49	4	630	John	
Finder	1.9	0.83	16	0	242	John	
Activity Monitor	1.3	11.20	6	1	577	John	
tccd	0.6	0.73	6	0	256	John	

Activity Monitor Window (CPU Category Pane) – Summary Information

(Credit: Apple Support – Use Activity Monitor on your Mac)

As you click on each category tab, the window's contents change to show you a different set of resources and how much of a given resource all running processes are using.

The window display for each tab shows different columns of information. Each of these corresponds to a different attribute (characteristic) of the Process being examined.

Note: Depending on how your Activity Monitor has been configured, the display of resources may differ from those shown in this presentation.

The [Process Name](#) column (App Name in the Energy tab) is common to all the tabs. Click on a column header to change the sort order. The [User](#) column is also frequently present as well.

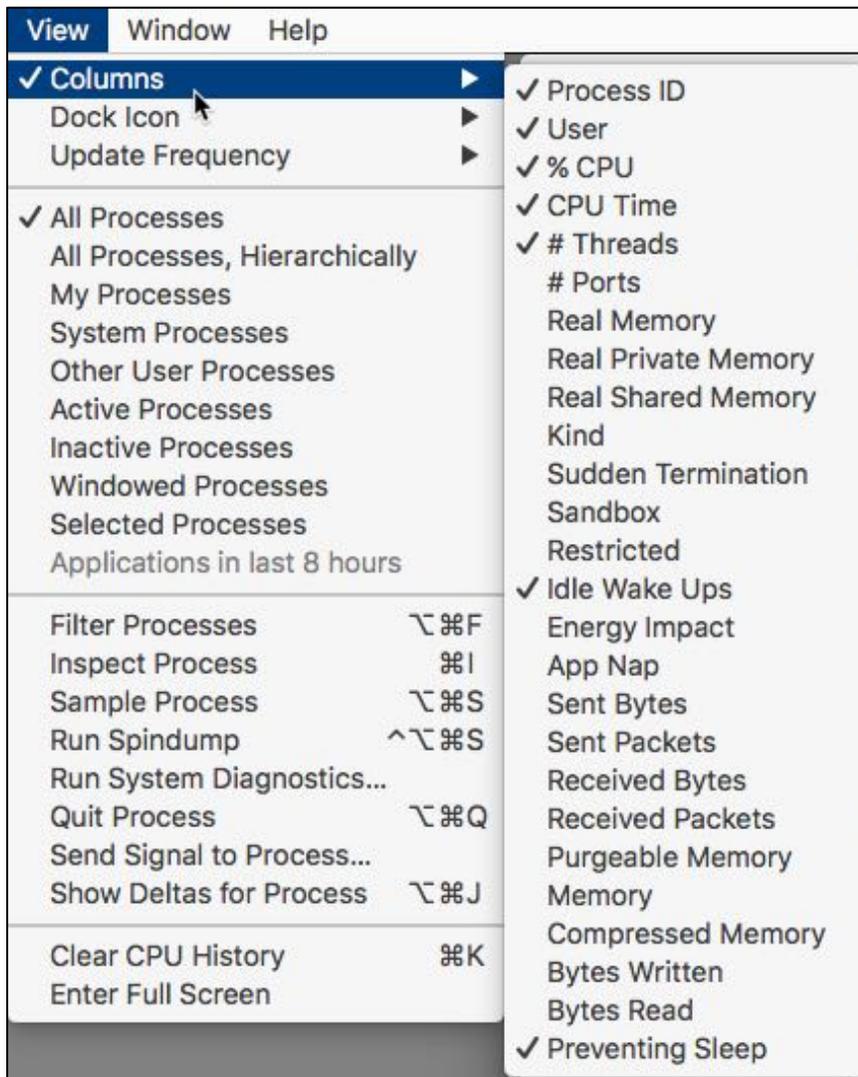
View Menu

You can add or remove columns in each of these panes by choosing [Columns](#) from the [View menu](#) the menu bar. (See the illustration on the next page.)

As you can see, the View menu offers a *lot* of viewing configuration options to control what is displayed in each pane:

- Columns
- Dock Icon (CPU Usage, CPU History, Network Usage, Disk Activity, Application Icon)
- Update Frequency (Very often/1 sec, Often/2 sec, Normal/5 sec)
- Processes

June 25, 2017, Beginners SIG Activity Monitor (Part 1 of 2)



Activity Monitor – View Menu

The [View menu](#) allows you to choose which processes are shown in each pane:

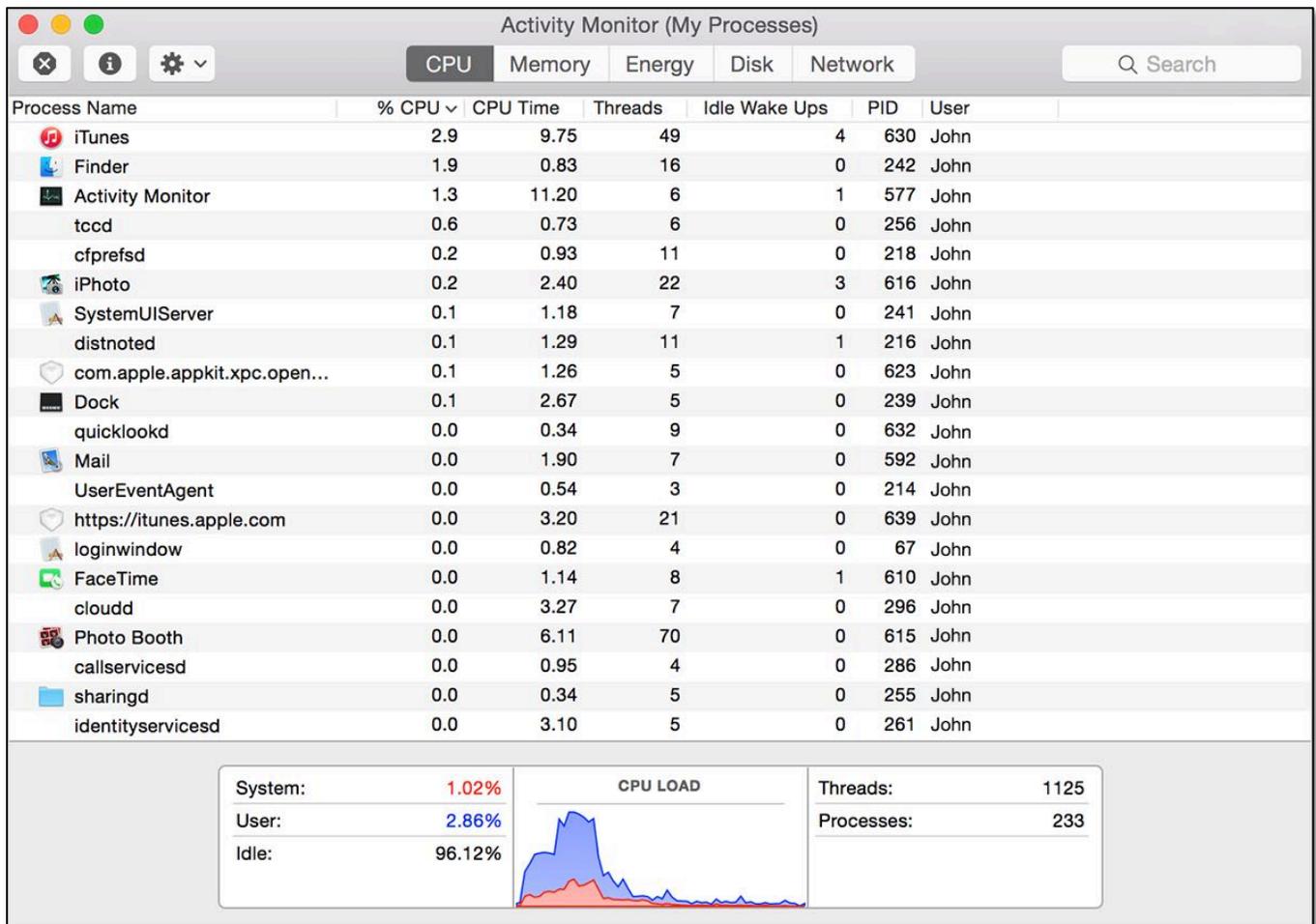
- [All Processes](#)
- [All Processes Hierarchically](#): Processes that belong to other processes, so you can see the parent/child relationship between them.
- [My Processes](#): Processes owned by your macOS user account.
- [System Processes](#): Processes owned by macOS.
- [Other User Processes](#): Processes not owned by the root user or current user.
- [Active Processes](#): Running processes that aren't sleeping.
- [Inactive Processes](#): Running processes that are sleeping.
- [Windowed Processes](#): Processes that can create a window (usually apps).
- [Selected Processes](#): Processes that you selected in the Activity Monitor window.
- [Applications in the last 8 hours](#): Apps that were running processes in the last 8 hours.

June 25, 2017, Beginners SIG Activity Monitor (Part 1 of 2)

CPU Pane

The [CPU pane](#) (see below) shows the processes that are affecting CPU (processor) activity. This pane is one of the three most important ones ([CPU](#), [Memory](#) and [Energy](#) panes being the others) and will be discussed in more detail.

[CPU](#) information and the information in the [Memory](#) and [Energy](#) panes can help identify processes that are affecting the performance of your Mac, as well as battery runtime, temperature, and fan activity.



CPU Pane (Credit: Apple Support – Use Activity Monitor on your Mac)

Display. As shown in the illustration above, the CPU pane displays seven columns: [Process Name](#), [% CPU](#), [CPU Time](#), [Threads](#), [Idle Wake Ups](#), [PID](#), and [User](#).

The most useful of these attributes are: [% CPU](#), [CPU Time](#), and [User](#). Click a column header to sort the data (for example: the percentage of CPU capability used by each process).

- [% CPU](#): How much of the Mac’s CPU (Central Processing Unit) is being used by a given process.
- [CPU Time](#): How long a particular process has been actively using the CPU while it's been running.
- [User](#): Which Mac “user” has been using the process. There will always be at

June 25, 2017, Beginners SIG Activity Monitor (Part 1 of 2)

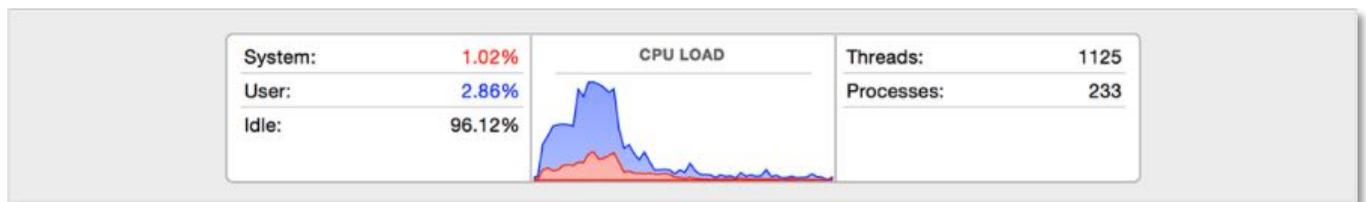
least one user (you), and several other “users,” such as root, which are other processes that use resources. (User is present in most panes.)

- **Note: Preventing Sleep:** This column will likely be present for portable Macs, and it’s just what it says. This process is preventing your Mac from going to sleep (yes or no).

Just to be complete, the others are:

- **Threads:** A Thread is the smallest set of instructions that can be managed by a Process.
- **Idle Wake Ups:** Number of times a thread caused the system to wake up from an idle state to begin executing the thread.
- **PID:** Process Identification Number (Process ID)

Summary Information. As discussed previously, there’s more information available at the bottom of the CPU pane. This is the best place for an overall understanding about CPU performance.



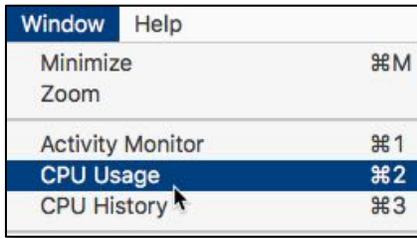
CPU Pane (Summary Information) (Credit: Apple Support – Use Activity Monitor on your Mac)

- **System:** The percentage of CPU capability currently used by system processes (those that belong to macOS).
- **User:** The percentage of CPU capability currently used by apps opened by you or by the processes those apps opened.
- **Idle:** The percentage of CPU capability not being used.
- **CPU Load:** The percentage of CPU capability currently used by all System and User processes.
 - The graph moves from right to left. It updates according to the intervals set by the **Update Frequency** menu item in the **View menu (View > Update Frequency)**. This setting is the same for all Activity Monitor window panes.
 - The **blue** color shows the percentage of total CPU capability currently used by user processes.
 - The **red** color shows the percentage of total CPU capability currently used by system processes.
- **Threads:** The total number of threads used by all processes combined.
- **Processes:** The total number of processes currently running.

Current CPU Usage Display. If you’re particularly interested in **current** CPU usage, you can display it in a separate window or in the Dock:

- To open a window showing **current** CPU activity, choose **CPU Usage** from the **Window menu (Window > CPU Usage)**. Keyboard Shortcut: **Command-2**. (See the illustration on the next page.)

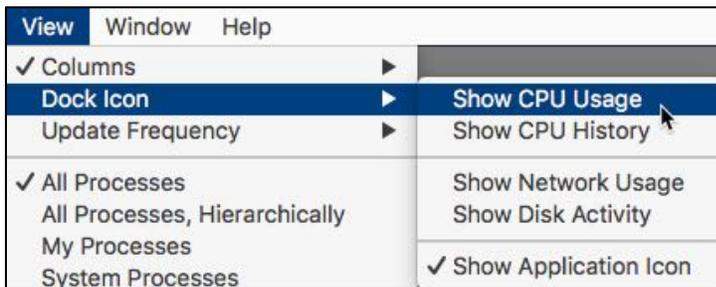
June 25, 2017, Beginners SIG Activity Monitor (Part 1 of 2)



Window Menu > CPU Usage

CPU Usage Window (i7 Processor With 8 Cores)

- Show a [graph](#) of this information in your Dock by changing Activity Monitor's Dock icon for to one that shows CPU Usage instead. Choose [Dock Icon](#) from the [View menu](#) and then select the [Show CPU Usage](#) sub-menu ([View > Dock Icon > Show CPU Usage](#)).



View Menu > Dock Icon > Show CPU Usage

Dock Icon

Recent CPU Usage Display. Similar to current CPU usage, you can display [recent CPU usage](#) in a separate window or in the Dock. You can also show a [graph](#) of this information in your Dock by changing the Dock icon for Activity Monitor to one that shows CPU History instead.

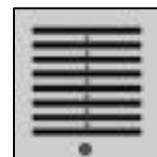
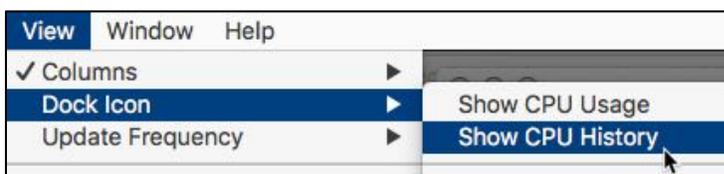
- To open a window showing [recent CPU activity](#), choose [CPU History](#) from the [Window menu](#) ([Window > CPU History](#)). Keyboard Shortcut: [Command-3](#).



Window Menu > CPU History

CPU History Window (i7 Processor With 8 Cores)

- Show a [graph](#) of this information in your Dock by changing the Dock icon for Activity Monitor to one that shows [CPU History](#) instead. Choose [Dock Icon](#) from the [View menu](#) and then select the [Show CPU History](#) sub-menu ([View > Dock Icon > Show CPU History](#)).



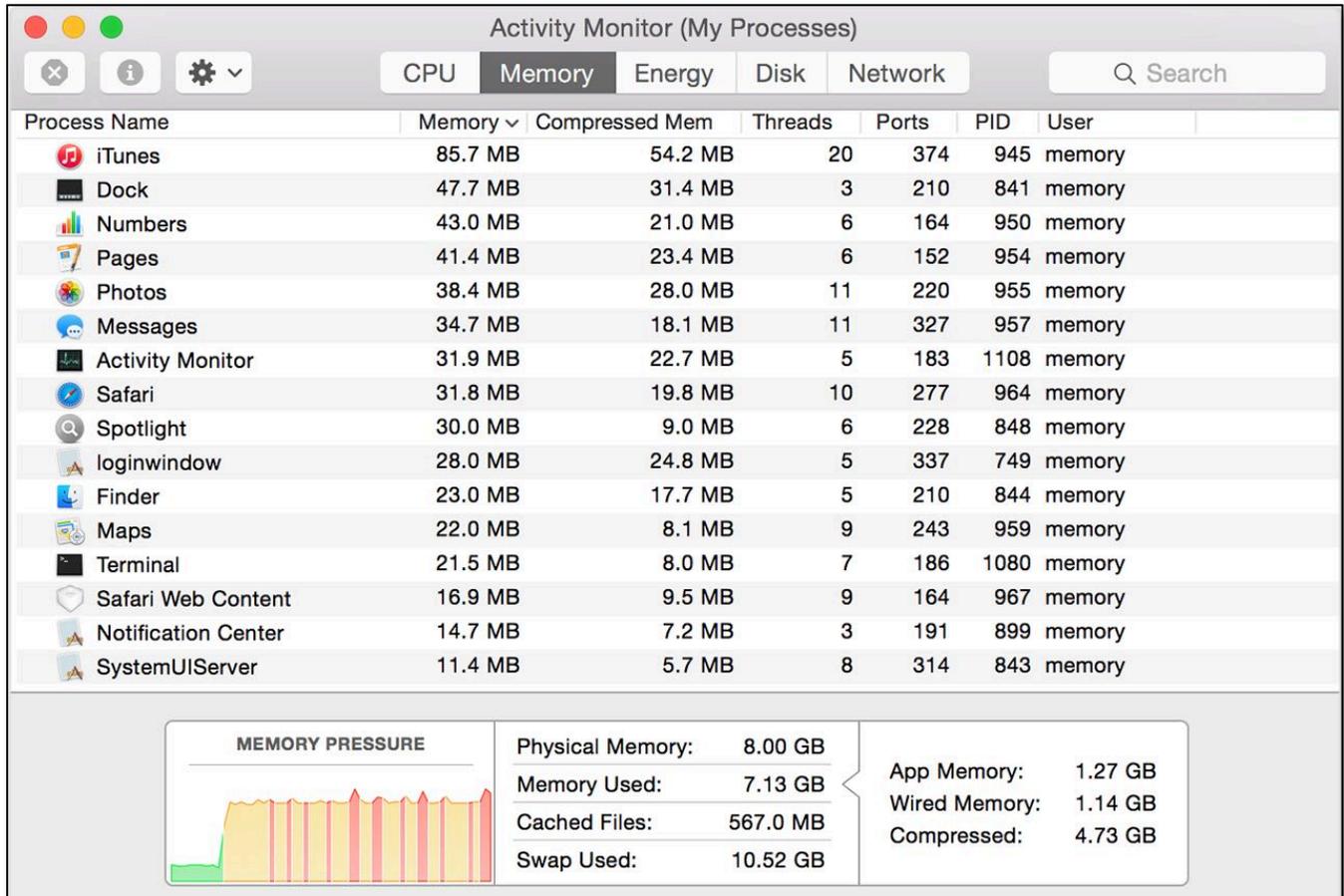
View Menu > Dock Icon > Show CPU History

Dock Icon

June 25, 2017, Beginners SIG Activity Monitor (Part 1 of 2)

Memory Pane

For information about how memory (RAM) is being used, choose the [Memory pane](#):

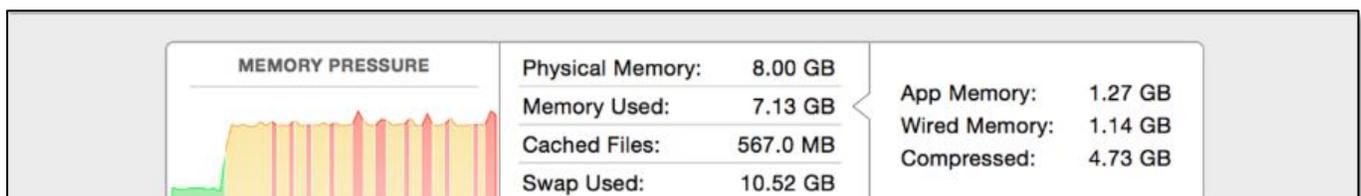


Memory Pane (Credit: Apple Support – Use Activity Monitor on your Mac)

Display. As shown in the illustration above, the Memory pane displays five information columns (excluding Process Name and User): [Memory](#), [Compressed Mem](#), [Threads](#), [Ports](#), and [PID](#). The most useful of these are [Memory](#) and [Compressed Mem](#):

- [Memory](#): Memory that's actively being used by a process, such as an app.
- [Compressed Mem](#): As free memory is used up, macOS starts looking for inactive memory (memory that isn't currently in active use but still holds data that will be used by an app) to compress and take up less space.

Summary Information. More information is available at the bottom of the Memory pane, providing a nice overview of memory usage:



Memory Pane (Summary Information) (Credit: Mac Activity Help)

June 25, 2017, Beginners SIG

Activity Monitor (Part 1 of 2)

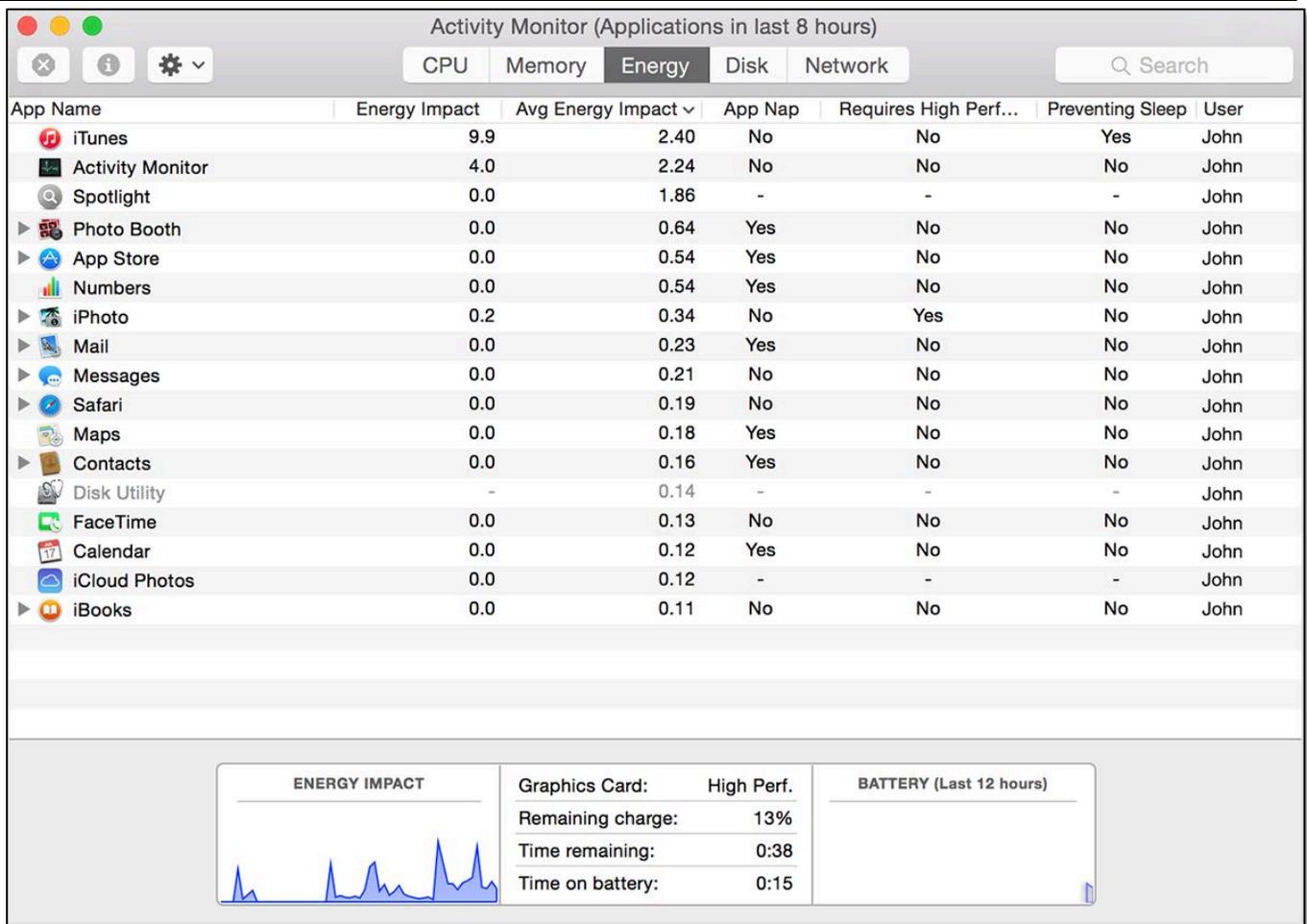
- **Memory Pressure:** The Memory Pressure graph helps illustrate the availability of memory resources. The graph moves from right to left and updates at the intervals set in [View > Update](#) Frequency. The current state of memory resources is indicated by the color at the right side of the graph:
 - **Green:** Memory resources are available.
 - **Yellow:** Memory resources are still available but are being tasked/stressed by memory-management processes, such as compression.
 - **Red:** Memory resources are depleted, and macOS is using your startup drive (often a much slower hard disk drive) for memory by being “paged out” (temporarily stored) to the drive. To make more RAM available, you can quit one or more apps or install more RAM.
Memory Pressure in the **Red** is the most important indicator that your Mac may need more RAM.
- **Physical Memory:** The amount of RAM installed in your Mac.
- **Memory Used:** The total amount of memory currently used by all apps and macOS processes.
 - **App Memory:** The total amount of memory currently used by apps and their processes.
 - **Wired Memory:** Memory that can’t be compressed or paged out (moved) to your startup drive, so it must stay in RAM. Wired memory used by a process can’t be borrowed by other processes. The app's programmer determines how much wired memory must be used.
 - **Compressed:** The amount of memory in RAM that is compressed to make more RAM memory available to other processes.
- **Swap Used:** The space used on your startup drive by macOS memory management. It's normal to see some activity here. As long as memory pressure is not in the red state, macOS has memory resources available.
- **Cached Files:** Memory that was recently used by apps and is now available for use by other apps. If you've been using an app and then quit using it, the RAM that it was using then becomes available to other apps. If you open the app again before its cached-files memory is used (overwritten) by another app, it opens more quickly.

Energy Pane

The [Energy pane](#) shows overall energy use and the energy used by each app. (See the illustration on the next page.)

The Energy pane can be especially pertinent and useful for Mac portable computers because it shows how much battery your apps are using. This can help you make sure you’re getting as much life out of your Mac portable as possible. The more energy your computer uses, the lower battery life you’ll get.

June 25, 2017, Beginners SIG Activity Monitor (Part 1 of 2)



Energy Pane (Credit: Mac Activity Help)

Display. As shown in the illustration above, the Energy pane displays five columns (excluding Process Name and User): **Energy Impact**, **Avg Energy Impact**, **App Nap**, **Requires High Perf GPU** (*only available for portable computers*), and **Preventing Sleep**. All of them can be particularly useful for portable computer users to help maximize battery life.

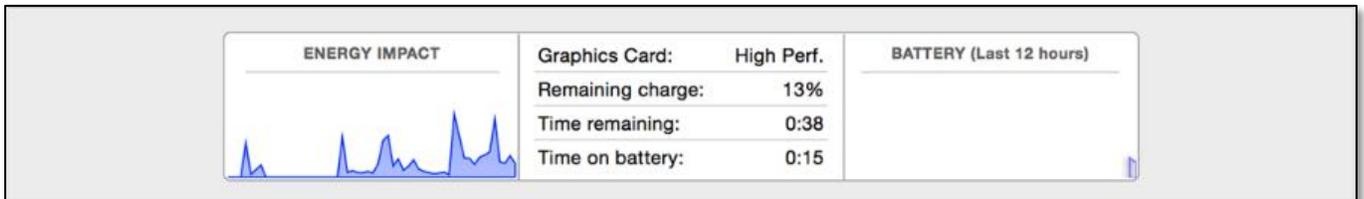
- **Energy Impact**: A relative measure of the app's current energy consumption. Lower numbers are better. A triangle to the left of an app's name means that the app consists of multiple processes. Click the triangle to see details about each process.
- **Avg Energy Impact**: The average energy impact for the past 8 hours or since the Mac started up, whichever is shorter. Average energy impact is also shown for apps that were running during that time, but have since been quit. The names of those apps are dimmed.
- **App Nap**: Apps that support App Nap consume very little energy when they are open but not being used. For example, an app might nap when it's hidden behind other windows, or when it's open in a space that you aren't currently viewing.

June 25, 2017, Beginners SIG

Activity Monitor (Part 1 of 2)

- **Requires High Perf GPU:** If your portable computer has the high-performance GPU (graphics processing unit), such as a Radeon GPU, and the app that you're using requires it, then the indicator in this column will be **yes**. Such a GPU can place a high demand on your battery, reducing battery life.
- **Preventing Sleep:** As noted previously, this indicates whether the app is preventing your Mac from going to sleep.

Summary Information. More information is available at the bottom of the Energy pane:



Energy Pane (Summary Information) (Credit: Apple Support – Use Activity Monitor on your Mac)

- **Energy Impact:** A relative measure of the total energy used by all apps. The graph moves from right to left and updates at the intervals set in [View > Update Frequency](#).

The remaining items are also displayed on [Mac portable computers](#):

- **Graphics Card:** The type of graphics card currently used. As noted previously, high-performance cards use more energy.
 - Macs that support a feature known as “automatic graphics switching” save power by using integrated graphics. They switch to a higher-performance graphics chip only when an app needs it.
 - “Integrated” means your Mac is currently using integrated graphics. “High Perf.” means your Mac is currently using high-performance graphics.
 - To identify apps that are using high-performance graphics, look for apps that show “Yes” in the [Requires High Perf GPU](#) column.
- **Remaining Charge:** The percentage of charge remaining on the battery.
- **Time Until Full:** The amount of time your Mac must be plugged into an AC power outlet to become fully charged.
- **Time on AC:** The time elapsed since your Mac was plugged into an AC power outlet.
- **Time Remaining:** The estimated amount of battery time remaining on your Mac. (Before macOS Sierra, this information was available from the Battery menu bar item.)
- **Time on Battery:** The time elapsed since your Mac was unplugged from AC power.
- **Battery (Last 12 hours):** The battery charge level of your Mac over the last 12 hours. The color green shows times when the Mac was getting power from a power adapter.

June 25, 2017, Beginners SIG
Activity Monitor (Part 1 of 2)

Next Presentation

Next month, we'll finish in Part 2 the review of Activity Monitor by discussing the [Disk](#) and [Network](#) functions, some additional information, and how to use this app to troubleshoot performance problems.

If you have any suggestions for presentation topics, please contact me at slp4668@gmail.com.

-Steve Parker