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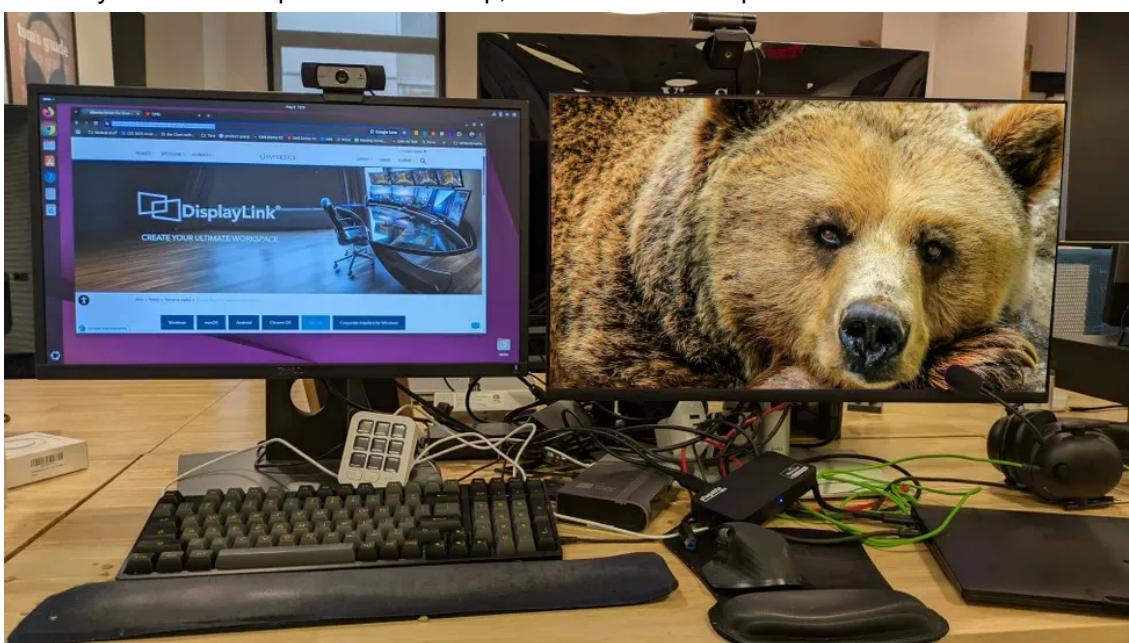
How To Hibernate your Linux computer: Unlike sleep, it uses no battery

How-to By [Les Pounder](#) published 2 days ago

Extend your battery life by not sucking up juice during sleep.



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(Image credit: Pexels, Tom's Hardware)

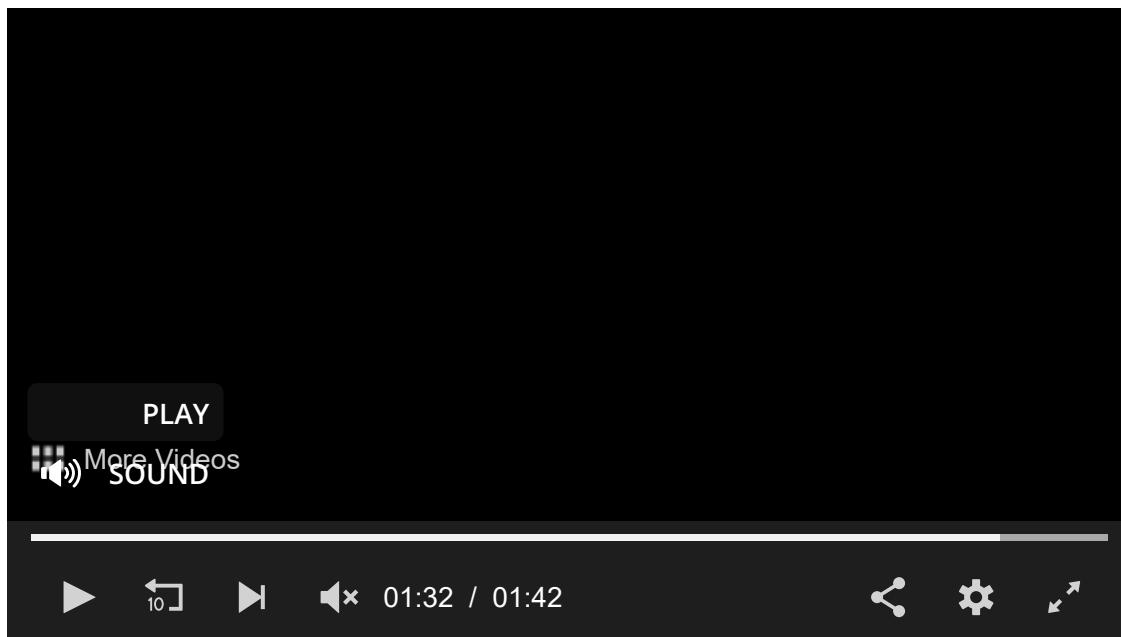
Hibernation is a power-saving measure where a laptop or desktop has the current state is saved to a hard drive (or more likely one of the best SSDs). Powering on the computer will trigger it to load the state and get us back to work. That would've been the case for Editor-in-Chief Avram Piltch, who has undertaken [a week with Linux](#) and hit an issue.

The Issue?

It seems that hibernation is not enabled by default. We can close the lid on our laptop, but it doesn't power down, merely waiting for Avram to open the laptop lid for more work, or for its battery to drain down to zero after several hours or days of sleep mode. The latter is what happened to Avram and that is what triggered the creation of this how to.

The problem that we will solve is triggering hibernation on a laptop running Ubuntu. This will either be via the power menu, or by closing the laptop lid. To do that we need to first create a swap image, then test that we can hibernate the machine.

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Before progressing any further, ensure that you have up-to-date backups. With projects like this there is always a slight risk of data loss, and you should take all the necessary precautions before attempting.

Creating a Swap Image and Testing Hibernation

The swap image is where the OS will store the current state of the system. It will dump the contents of RAM to the image, and then use that image to store the state until we power on the laptop. The size of the swap image will be the same as the amount of installed RAM.

So let's get started!

1. Open a terminal and check how much RAM is in your machine using the "free" command. We should already know this, but this is a "belt and braces" step to be certain. By default, free will show the RAM in Kilobytes, passing -m will show it in Megabytes. This will also show any swapfiles / images that are in use.

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free

2. Run this command to show any active swap files or images.

swapon --show

3. Delete the swap image / file by first turning off the swap, then deleting the file.

swapoff -a

```
rm /swap.img  
rm swapfile
```

4. Run the “free” command and check that the swap now reports as zero.

```
free
```

```
root@les-ThinkPad-X390:/home/les# free  
total used free shared buff/cache available  
Mem: 7284324 3313732 2698008 455632 2038316 3970592  
Swap: 0 0 0  
root@les-ThinkPad-X390:/home/les#
```

(Image credit: Tom's Hardware)

5. Elevate your user to use sudo powers. Take extra care with commands using this power.

```
sudo su
```

6. Using dd, create a swap.img file in the root directory. Note that we are creating an 8GB swap image (count=8192), but this should be changed to match the RAM installed in your machine. So for 16GB it would be 16384, 32GB, 32768.

```
dd if=/dev/zero of=/swap.img count=8192 bs=1MiB
```

7. Set the permissions of the swap.img file so that it can be read and written by the owner (6), but not by groups (0) or by others (0).

```
chmod 600 /swap.img
```

8. Set up a Linux swap area using the freshly created swap.img file.

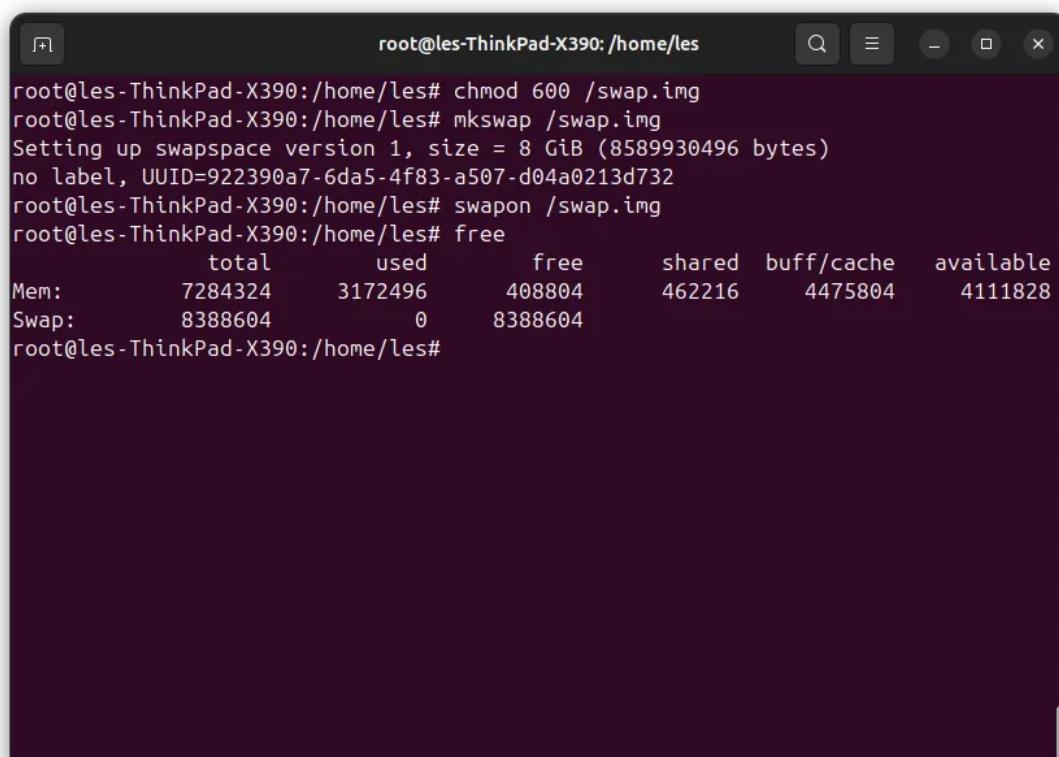
```
mkswap /swap.img
```

9. Enable the swap.

```
swapon /swap.img
```

10. Using free, check that the swap has been enabled.

```
free
```



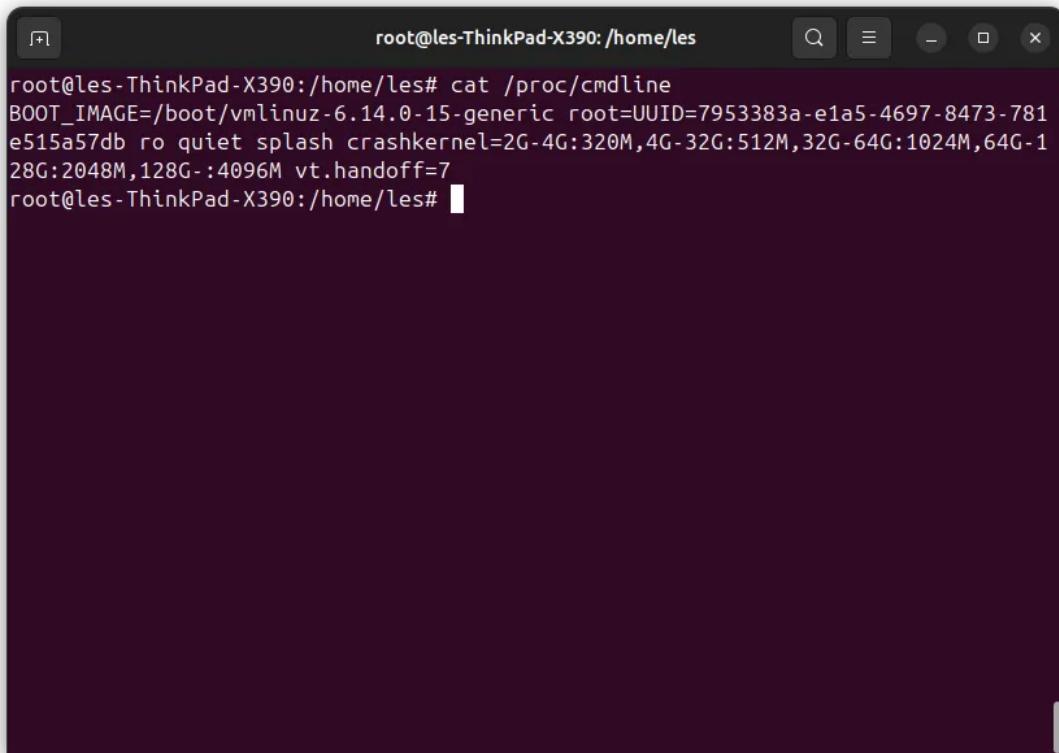
The screenshot shows a terminal window with the following session:

```
root@les-ThinkPad-X390:/home/les# chmod 600 /swap.img
root@les-ThinkPad-X390:/home/les# mkswap /swap.img
Setting up swapspace version 1, size = 8 GiB (8589930496 bytes)
no label, UUID=922390a7-6da5-4f83-a507-d04a0213d732
root@les-ThinkPad-X390:/home/les# swapon /swap.img
root@les-ThinkPad-X390:/home/les# free
              total        used        free      shared  buff/cache   available
Mem:       7284324     3172496     408804     462216     4475804     4111828
Swap:      8388604          0     8388604
root@les-ThinkPad-X390:/home/les#
```

(Image credit: Tom's Hardware)

11. Take a look at the Linux boot command line instruction. This is the command used to start the boot process.

```
cat /proc/cmdline
```



A screenshot of a terminal window titled "root@les-ThinkPad-X390:/home/les". The window shows the command "cat /proc/cmdline" being run, and its output is displayed. The output includes the kernel version (6.14.0-15-generic), root UUID (7953383a-e1a5-4697-8473-781e515a57db), and various boot parameters like quiet, splash, and memory settings. The terminal has a dark background and light-colored text.

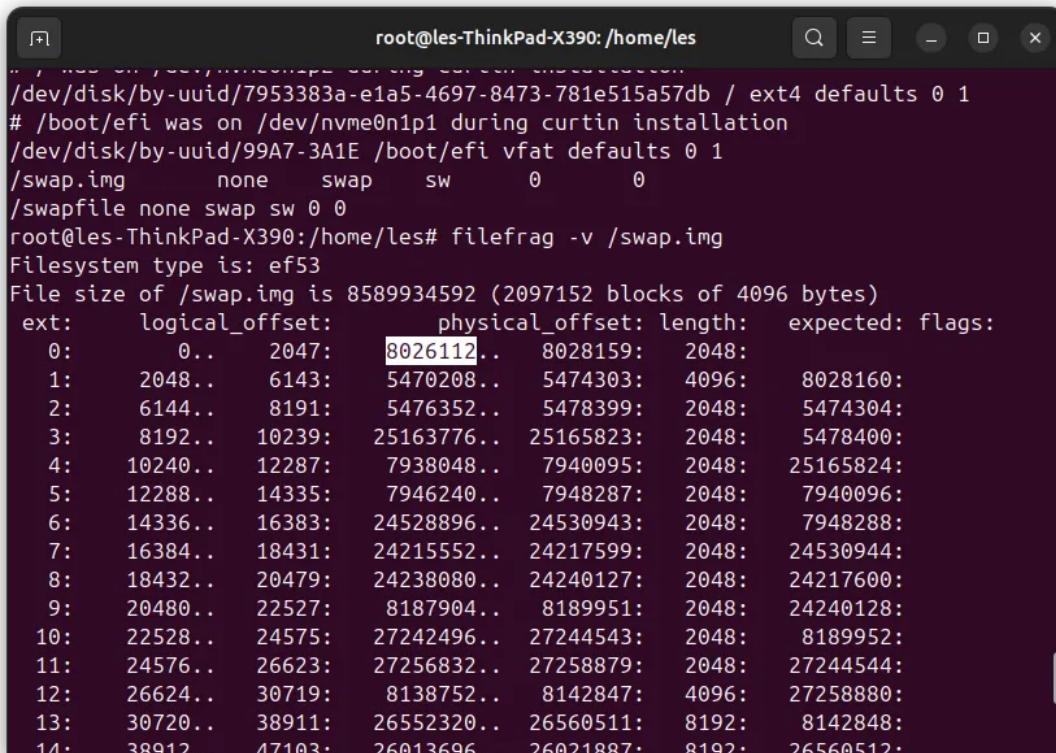
```
root@les-ThinkPad-X390:/home/les# cat /proc/cmdline
BOOT_IMAGE=/boot/vmlinuz-6.14.0-15-generic root=UUID=7953383a-e1a5-4697-8473-781e515a57db ro quiet splash crashkernel=2G-4G:320M,4G-32G:512M,32G-64G:1024M,64G-128G:2048M,128G-:4096M vt.handoff=7
root@les-ThinkPad-X390:/home/les#
```

(Image credit: Tom's Hardware)

12. Open a text editor, and copy the UUID from the output of the cmdline, and paste it into a text file. Save the file as hibernation_details.txt. Don't forget the UUID=//IMAGE//

13. In the terminal, locate the physical offset, the specific location in physical memory where a file is located on the partition. The number that we need is located at the top of the fourth column in the returned table.

```
filefrag -v /swap.img
```



The terminal window shows the command `filefrag -v /swap.img` being run. The output displays the physical layout of the swap image, showing logical offsets, physical offsets, lengths, and expected values for each sector.

ext:	logical_offset:	physical_offset:	length:	expected:	flags:
0:	0.. 2047:	8026112..	8028159:	2048:	
1:	2048.. 6143:	5470208..	5474303:	4096:	8028160:
2:	6144.. 8191:	5476352..	5478399:	2048:	5474304:
3:	8192.. 10239:	25163776..	25165823:	2048:	5478400:
4:	10240.. 12287:	7938048..	7940095:	2048:	25165824:
5:	12288.. 14335:	7946240..	7948287:	2048:	7940096:
6:	14336.. 16383:	24528896..	24530943:	2048:	7948288:
7:	16384.. 18431:	24215552..	24217599:	2048:	24530944:
8:	18432.. 20479:	24238080..	24240127:	2048:	24217600:
9:	20480.. 22527:	8187904..	8189951:	2048:	24240128:
10:	22528.. 24575:	27242496..	27244543:	2048:	8189952:
11:	24576.. 26623:	27256832..	27258879:	2048:	27244544:
12:	26624.. 30719:	8138752..	8142847:	4096:	27258880:
13:	30720.. 38911:	26552320..	26560511:	8192:	8142848:
14:	38912.. 47103:	26013696..	26021887:	8192:	26560512:

(Image credit: Tom's Hardware)

14. Copy the number to the text file and save.

15. Edit the grub file in Nano.

```
nano /etc/default/grub
```

16. Navigate to the line which starts

`GRUB_CMDLINE_LINUX_DEFAULT="quiet splash"` and make a space after `splash`, but inside the `" "`.

17. Enter the following text after `splash` and inside the `" "`. Remember to change the UUID and offset to match your own values saved in the text file. It should look like the image for this step.

```
resume=UUID=YOUR UUID HERE resume_offset=YOUR OFFSET HERE
```

```

root@les:~# nano /etc/default/grub
GRUB_DEFAULT=0
GRUB_TIMEOUT_STYLE=hidden
GRUB_TIMEOUT=0
GRUB_DISTRIBUTOR='Ubuntu' # for legacy echo $NAME Ubuntu > /etc/lsb-release || echo Ubuntu
GRUB_CMDLINE_LINUX_DEFAULT="quiet splash resume=UUID=7953383a-e1e5-4697-8473-781e515a57db resume_offset=8026112"
GRUB_CMDLINE_LINUX=""

# If your computer has multiple operating systems installed, then you
# probably want to run os-prober. However, if your computer is a host
# for guest OSes installed via LVM or raw disk devices, running
# os-prober can cause damage to those guest OSes as it mounts
# filesystems to look for things.
#GRUB_DISABLE_OS_PROBER=false

# Uncomment to enable BadRAM filtering, modify to suit your needs
# This works with Linux (no patch required) and with any kernel that obtains
# the memory map information from GRUB (GNU Mach, kernel of FreeBSD ...)
#GRUB_BADRAM=0x1234567,0xfefefef,0x89abcdef,0xefefefef

# Uncomment to disable graphical terminal
#GRUB_TERMINAL=console

# The resolution used on graphical terminal
# note that you can use only modes which your graphic card supports via VBE/GOP/IGA
# you can see them in real GRUB with the command 'videoinfo'
#GRUB_GFXMODE=640x480

# Uncomment if you don't want GRUB to pass "root=UUID=xxx" parameter to Linux
#GRUB_DISABLE_LINUX_UUID=true

# Uncomment to disable generation of recovery mode menu entries
#GRUB_DISABLE_RECOVERY=true

# Uncomment to get a beep at grub start
#GRUB_INIT_TUNE="480 440 1"

```

(Image credit: Tom's Hardware)

18. Close the grub file by pressing CTRL+X, then Y and Enter.

19. Update the grub file for the changes to take effect.

update-grub

20. Reboot your computer.

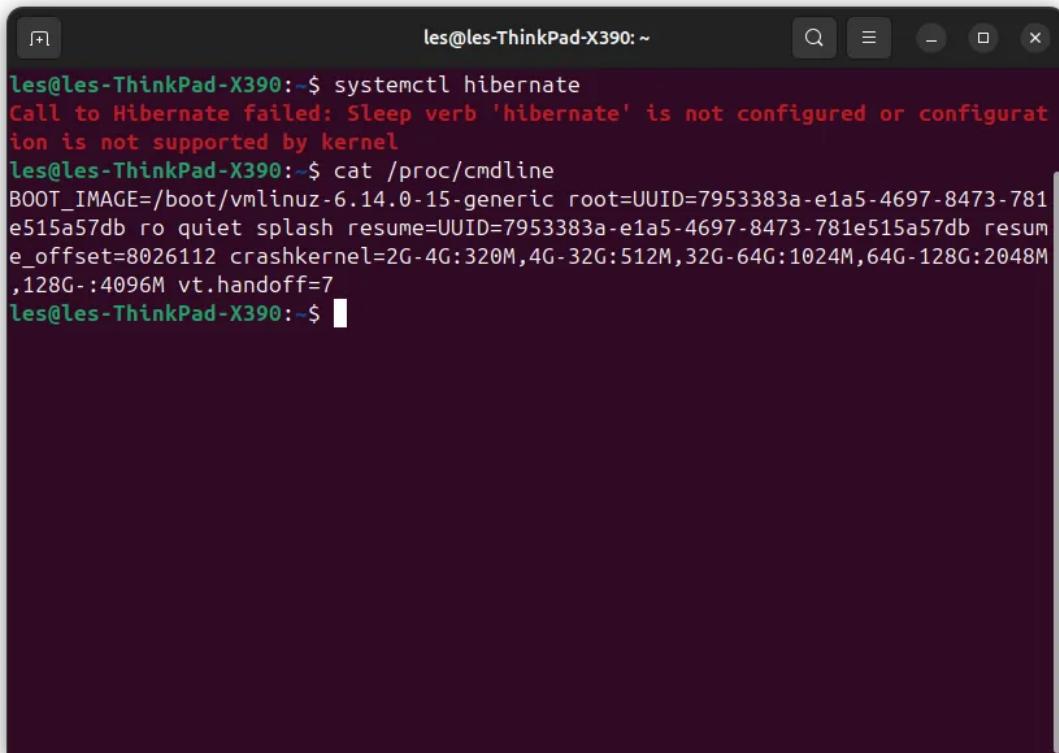
reboot

21. Log back into your computer and in a new terminal check that the cmdline changes have stuck.

cat /proc/cmdline

22. In the terminal check that hibernation is now enabled on your system. Note, if it is, then the system will power down. Save any work before trying this.

sudo systemctl hibernate



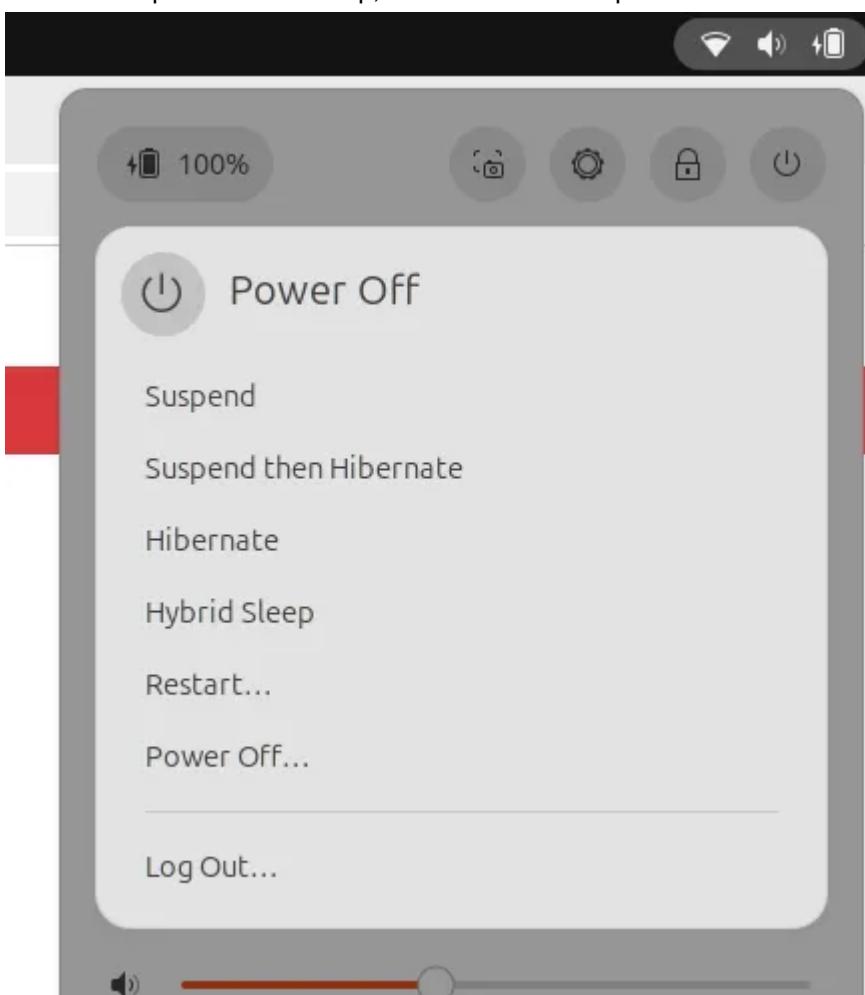
A screenshot of a terminal window titled "les@les-ThinkPad-X390: ~". The terminal shows the following text:

```
les@les-ThinkPad-X390:~$ systemctl hibernate
Call to Hibernate failed: Sleep verb 'hibernate' is not configured or configuration is not supported by kernel
les@les-ThinkPad-X390:~$ cat /proc/cmdline
BOOT_IMAGE=/boot/vmlinuz-6.14.0-15-generic root=UUID=7953383a-e1a5-4697-8473-781e515a57db ro quiet splash resume=UUID=7953383a-e1a5-4697-8473-781e515a57db resume_offset=8026112 crashkernel=2G-4G:320M,4G-32G:512M,32G-64G:1024M,64G-128G:2048M,128G-:4096M vt.handoff=7
les@les-ThinkPad-X390:~$
```

(Image credit: Tom's Hardware)

We can now hibernate the system from the terminal, but this isn't very useful, so now we move on to triggering hibernation via the power menu and when the laptop lid is closed.

Calling Hibernation From the Menu



(Image credit: Tom's Hardware)

From the standard power menu (top right of the desktop) we have a quick means to power off, reboot or log out of the laptop, but there isn't an option for hibernation. In this section we will add that feature and then test that it works.

1. Open a terminal and run the following command to create a new file which contains the hibernation rules.

```
sudo nano /etc/polkit-1/rules.d/10-enable-hibernate.rules
```

2. Copy the following text and paste into nano by pressing SHIFT + CTRL + V.

```
polkit.addRule(function(action, subject) {
    if (action.id == "org.freedesktop.login1.hibernate" |
        action.id == "org.freedesktop.login1.hibernate-mu
    action.id == "org.freedesktop.upower.hibernate" |
    action.id == "org.freedesktop.login1.handle-hiber
    action.id == "org.freedesktop.login1.hibernate-ig
    {
        return polkit.Result.YES;
    }
});
```

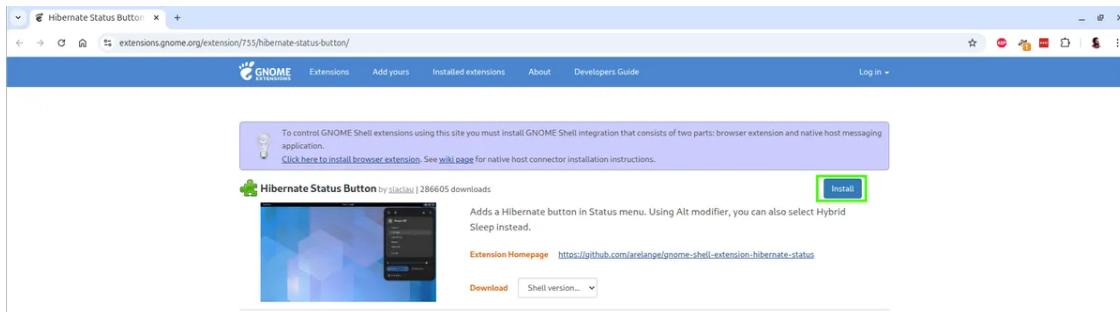
```
});
```

3. Save the file and exit by pressing CTRL +X , then Y and Enter.

4. For Ubuntu users (GNOME) you will need to install GNOME Shell, as we need to install a GNOME Shell extension. Open a terminal and enter the following command.

```
sudo apt update  
sudo apt install chrome-gnome-shell
```

5. Open [this page](#) in a browser and install the GNOME Shell extension.

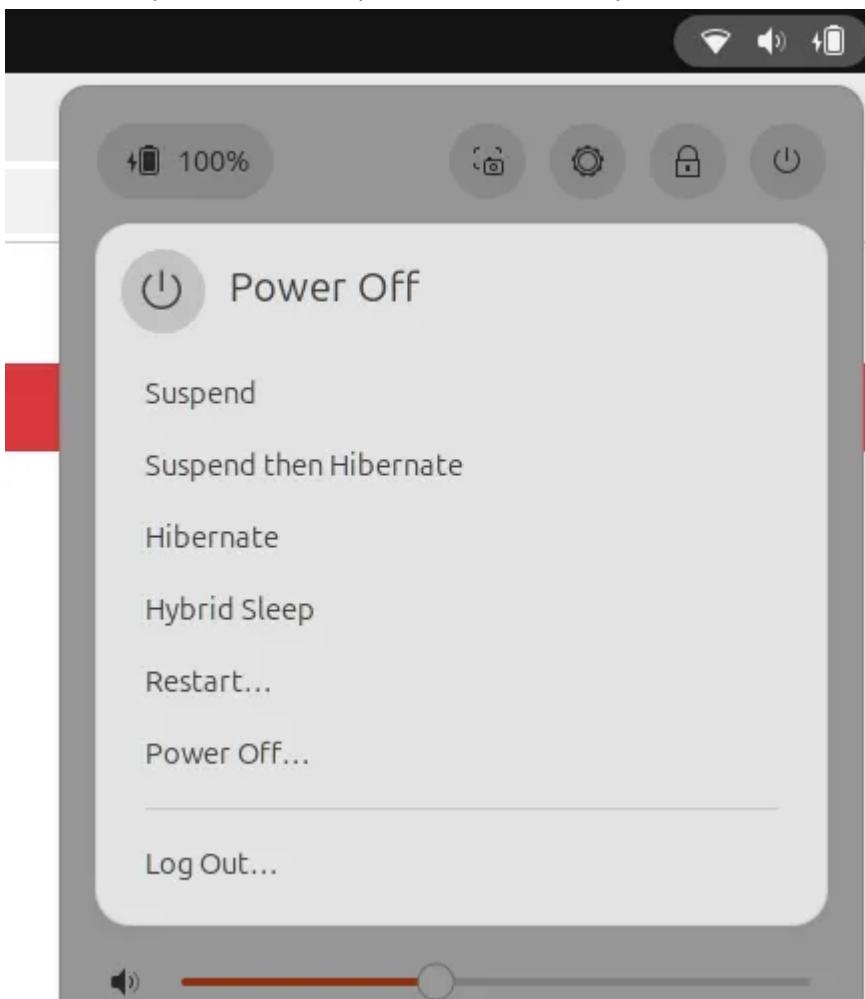


(Image credit: Tom's Hardware)

6. Reboot the laptop for the changes to take effect.

7. Log back in and open a few applications. We'll use this to prove that the hibernation works as expected.

8. Go to the top right menu and click on the icons, then click on the power icon. From the list select Hibernate. The laptop will go into hibernation and the power button / LED may flicker to show that the system is powering down.

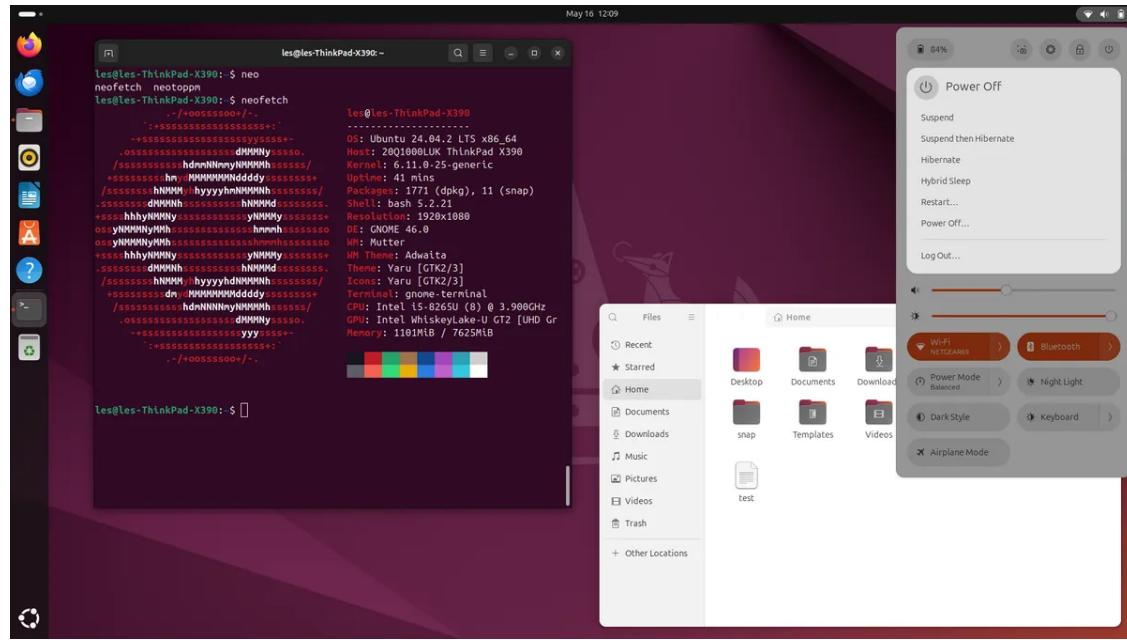


(Image credit: Tom's Hardware)

9. Press the power button to wake the laptop from hibernation.

10. Log back in and you will see that all of the applications are as we left them.

How to Suspend then Hibernate



(Image credit: Tom's Hardware)

In the Power menu you've probably noticed options for:

Suspend: Puts the system into a low-power mode, saving the current state to RAM.

Suspend then Hibernate: This will put your system into a low-power mode, saving the current state to RAM for a pre-determined amount of time. Then the system will hibernate, saving the state to disk.

Hibernate: Saving the current state to disk.

Hybrid Sleep: Your computer will suspend to disk and to RAM at the same time. Providing you with a fast resume speed (suspend to RAM) but your session is protected should the power run out.

Restart: Reboot your computer.

Power Off: Powers off your computer.

Log Out: Logs the current user out and returns to the login screen.

The most interesting entry on this list is Suspend then Hibernate. As mentioned, this has the speed benefit of suspend to RAM, but after a while the system will hibernate and save the state to disk. Useful for when we are moving from the meeting room to office and when we pack up at the end of the day.

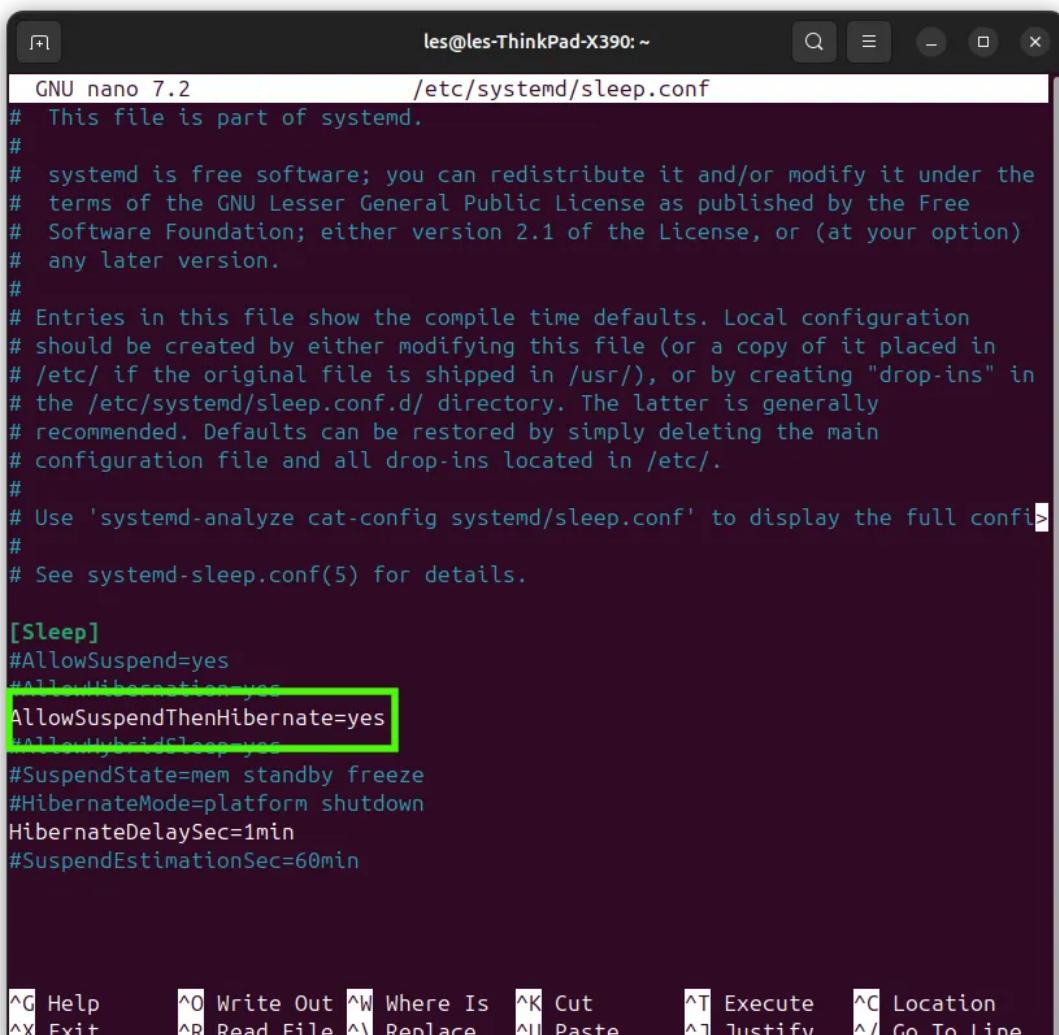
If you're not interested in this, then skip to the next section. But if you are, here are the steps to make it work.

To use Suspend then Hibernate we need to edit a configuration file.

1. Open a terminal and using sudo, edit the configuration file.

```
sudo nano /etc/systemd/sleep.conf
```

2. Scroll down the list and remove the # from
AllowSuspendThenHibernate.

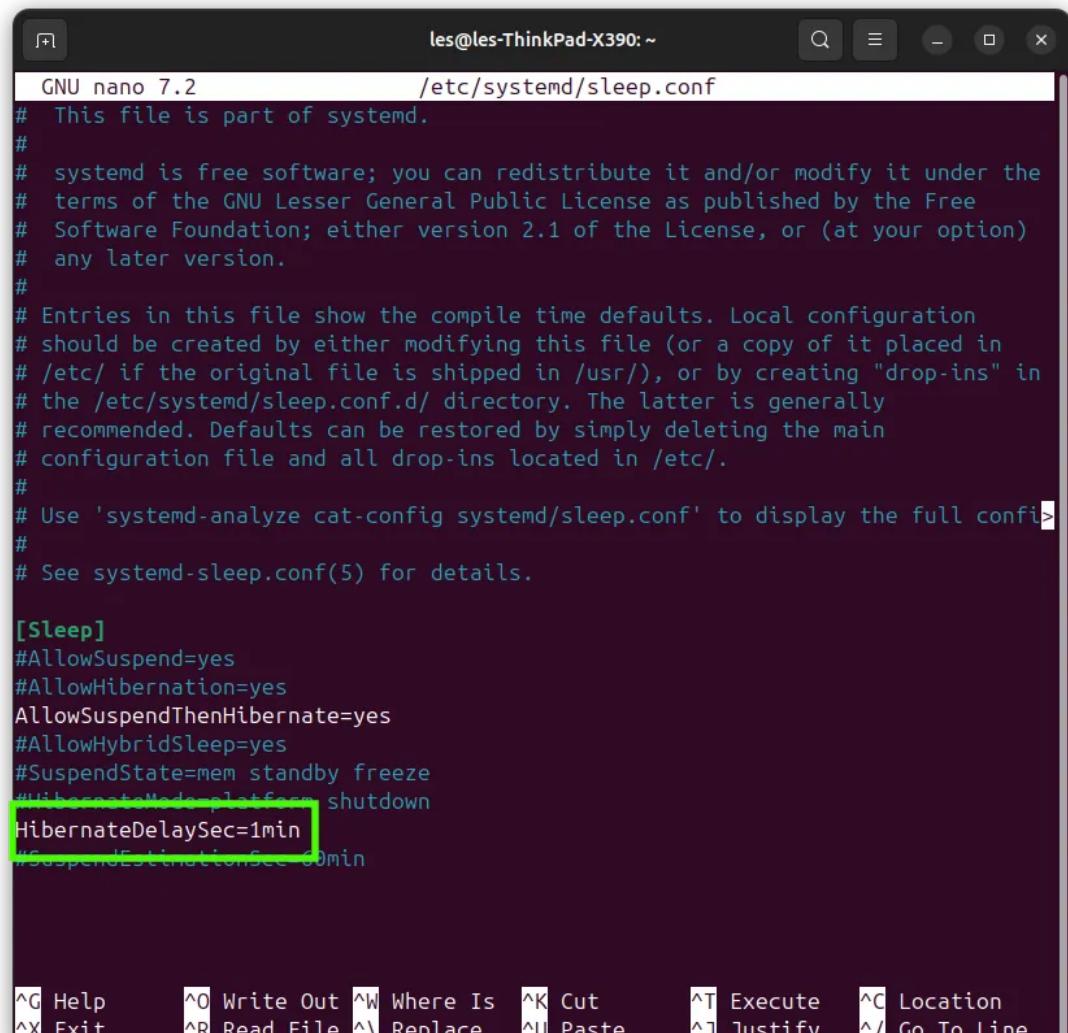


```
GNU nano 7.2          /etc/systemd/sleep.conf
# This file is part of systemd.
#
# systemd is free software; you can redistribute it and/or modify it under the
# terms of the GNU Lesser General Public License as published by the Free
# Software Foundation; either version 2.1 of the License, or (at your option)
# any later version.
#
# Entries in this file show the compile time defaults. Local configuration
# should be created by either modifying this file (or a copy of it placed in
# /etc/ if the original file is shipped in /usr/), or by creating "drop-ins" in
# the /etc/systemd/sleep.conf.d/ directory. The latter is generally
# recommended. Defaults can be restored by simply deleting the main
# configuration file and all drop-ins located in /etc/.
#
# Use 'systemd-analyze cat-config systemd/sleep.conf' to display the full config
#
# See systemd-sleep.conf(5) for details.

[Sleep]
#AllowSuspend=yes
#AllowHibernate=yes
AllowSuspendThenHibernate=yes
#AllowHybridSleep=yes
#SuspendState=mem standby freeze
#HibernateMode=platform shutdown
HibernateDelaySec=1min
#SuspendEstimationSec=60min
```

(Image credit: Tom's Hardware)

3. Scroll down the list and remove the # from HibernateDelaySec= and add a value after the =. For test purposes I chose 1min, but this should be changed to your requirements, 60min for example.



```

GNU nano 7.2          /etc/systemd/sleep.conf
# This file is part of systemd.
#
# systemd is free software; you can redistribute it and/or modify it under the
# terms of the GNU Lesser General Public License as published by the Free
# Software Foundation; either version 2.1 of the License, or (at your option)
# any later version.
#
# Entries in this file show the compile time defaults. Local configuration
# should be created by either modifying this file (or a copy of it placed in
# /etc/ if the original file is shipped in /usr/), or by creating "drop-ins" in
# the /etc/systemd/sleep.conf.d/ directory. The latter is generally
# recommended. Defaults can be restored by simply deleting the main
# configuration file and all drop-ins located in /etc/.
#
# Use 'systemd-analyze cat-config systemd/sleep.conf' to display the full config
#
# See systemd-sleep.conf(5) for details.

[Sleep]
#AllowSuspend=yes
#AllowHibernation=yes
AllowSuspendThenHibernate=yes
#AllowHybridSleep=yes
#SuspendState=mem standby freeze
#HibernateMode platform shutdown
HibernateDelaySec=1min
#SuspendUntilActionSec=0min

```

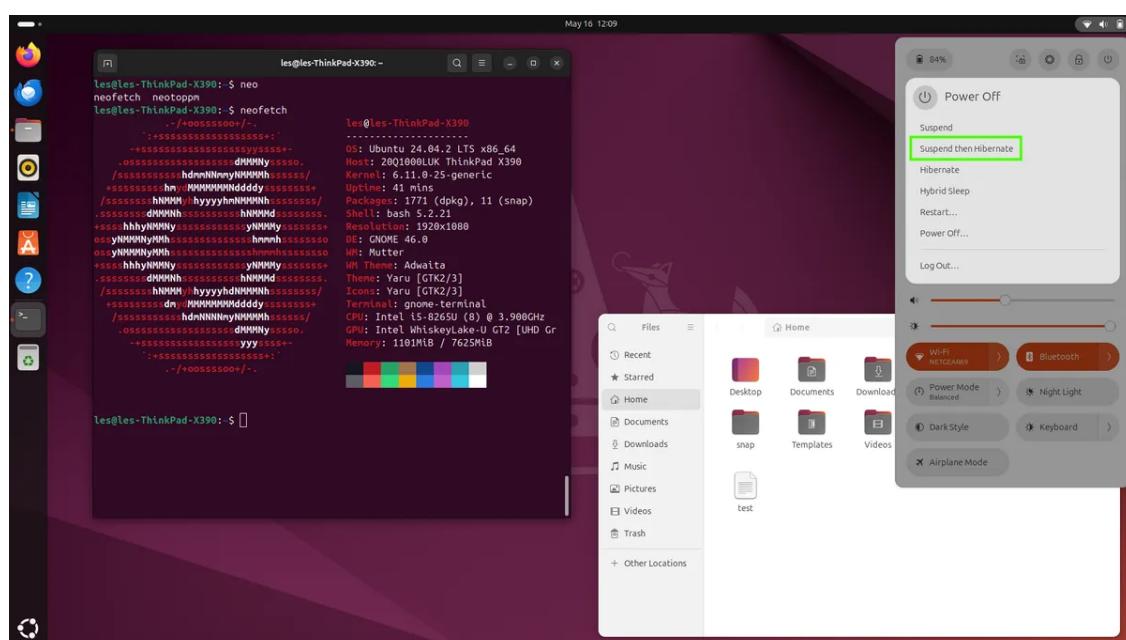
The screenshot shows a terminal window titled 'les@les-ThinkPad-X390: ~'. It displays the contents of the '/etc/systemd/sleep.conf' file in a nano text editor. A specific line, 'HibernateDelaySec=1min', is highlighted with a red rectangular box.

(Image credit: Tom's Hardware)

4. Save the file and exit by pressing CTRL +X , then Y and Enter.

5. Reboot the computer and log back in.

6. Open a few applications and then go to the power menu and select Suspend then Hibernate.



(Image credit: Tom's Hardware)

7. If you followed the one minute setting from step 3, then the computer will suspend to RAM, and then one minute later it will start the hibernation process. Remember to change this value to something relevant to your needs.

Hibernating When Closing the Laptop Lid

The most convenient way to trigger hibernation is to close the laptop lid. Think about all of the times we finish work, move to the next meeting. We want to shut the lid and move on. The dropdown menu option that we have previously configured is useful, but closing the laptop lid is almost a reflex action. So let's make it happen!

1. Open a terminal and use this command to create a new directory.

```
sudo mkdir -p /etc/systemd/logind.conf.d
```

2. Create a configuration file using nano.

```
sudo nano /etc/systemd/logind.conf.d/lid-close-action.con
```

3. Copy and paste the text below into nano. Pasting into nano is SHIFT + CTRL + V.

```
[Login]
HandleLidSwitch=hibernate
HandleLidSwitchExternalPower=ignore
HandleLidSwitchDocked=ignore
```

4. Save the file and exit by pressing CTRL +X , then Y and Enter.

5. Reboot for the changes to be applied.

6. Log in, open a few applications and then close the lid. On my Lenovo X390 I can see the Thinkpad "i" LED flicker as the laptop saves the state. Then it goes off, showing that the laptop has powered down.

7. Give it a few seconds, and then open the laptop lid. The Ubuntu startup process should appear and in a few seconds login.

8. The desktop should be as you left it.

[SEE ALL COMMENTS \(1\)](#)**Les Pounder**

Les Pounder is an associate editor at Tom's Hardware. He is a creative technologist and for seven years has created projects to educate and inspire minds both young and old. He has worked with the Raspberry Pi Foundation to write and deliver their teacher training program "Picademy".

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