Rising Stars of Linux Distros and

Mini-Linux Users Factfile   21.11.23

Home   http://nofrillstech.net/

The Rising Stars of Linux Distros:

When you have had experience of a Linux OS demo, and thenceforth know what to look for, and, where to look, there is a wide choice of freeware Linux OSs that astound and amaze, and they are rapidly getting better in performance, plus increasingly tailored for easy use by non-afficionados. Speed, stability, simplicity are dominant, especially if you just need no-frills Web access, and, just online email. A new computer, and vast, complex, Apple or Win OSs, are simply not needed just for these purposes. Your older, still useful system, either laptop or PC, can be matched with a Linux OS that will rapidly boot, have good video, sound, speed, and, generally easy useability. **Nofrillstech** has mixed and matched anything from Pentium 3s to dual-core systems, both laptops and PCs, with Linux OSs, and all performed with ease, including when connecting to the Internet, using either cable or wifi. Smartfone tethering to Linux OSs is a breeze as well.

There are respective **Linux online updates** required at installation, including for security, but, never to the extent of using vital bandwidth and time, as do Win OSs, nor is there any validation to contend with. **Support for these Open Source distros** is up to you, so, if you like them, then either publicise them, and/or, send your favourites some useful $$$. They do such a great job, as well as freeing you from the software hegemonies of both Apple and Microsoft, and, their respective hardware exigencies. **You may need to test-install for different hardware systems,** especially older laptops, as heuristics may apply as regards compatibility, but, this will be a small inconvenience for the resulting ongoing ease of Linux OS use, and, the Linux OSs will install and update quite quickly.

Note that Linux OSs can be installed on Intel-based Apple systems. This should still be the case in the age of UEFI booting, check before you buy a modern system for use with Linux.   Unchecking Secure Boot in BIOS should work.

Re peripherals, such as printers, at this stage, you would be advised to check online for Linux printer drivers available for given brands, and, plan your printer purchase accordingly, although the general rule seems to favour more recent models. Note also, that, unless you need an inkjet printer for specialized printing, laser printing is much more economical, and reliable, check online to see if you can get generic refilled cartridges for your prospective laser printer. Cameras and smartfones should connect/tether automatically, though in general, heuristics may also apply for scanners, printers, media centres, etc. Linux OSs now have a large driver component, so there should be no problem with hardware recognition.

Linux Mint, Linux Lite, PeppermintOS, PCLinux OS, Ubuntu, Ubuntu Remix, Lubuntu, Kubuntu, Xubuntu, Lxle, Lite, and **Puppy**, are all Open Source Linux OSs that **Nofrillstech** has tested. **Linux Mint** is now the Nft favourite, especially since a true dual monitors state is provided, and Mint also comes in **Cinnamon, and XFCE versions, plus Linux Mint Debian.** See **DistroWatch** for the current top consumer choices. Some, such as **Linux Mint,** have **SMART technology** apps already present, making HDD checks much easier, because, after all, if the HDD is failing, a timely warning of this event is surely worth having.

Finally, **Nofrillstech** has been able to duplicate all Ms Win apps, via Linux OSs, necessary for basic Internet access, and, Web page support. When the wheels finally fell off XP, for **Nofrillstech, Linux OSs have fully taken over**.

Troubleshooting is also made possible by using particular Boot CDs/DVDs for troubleshooting hardware, beyond SSD/HDD checks with **Disk Utility.** Plus, for disk cloning, partition management, erasing, and security checks. These include **Nofrillstech's** own choices of **Memtest Boot CD, Hiren's Boot CD, Ultimate Boot CD, Parted Magic Boot CD,** (especially as Disk Utility is incorporated), **Gparted Boot CD,** and, **Linux-Boot-Repair CD. ClamAV will be useful, too.**

Those wanting to study actual hardware and hardware peripherals in greater detail, plus troubleshooting, should avail themselves of any of **Scott Mueller's** Que publications, especially **Upgrading and Repairing PCs. If the hardware, et al, does not work, then nothing will, being the First Basic Law of Computing Function..?**

Finally, those wanting to know more about the evolution of, and, the vast public-spirited collaboration for continuing development of, **Free Software, Open Source Software**, and, of **Linux** itself, should consult these references:

Free Software, Free Society, R Stallman GNU 2001 ISBN 978-0-9831592

Open Sources, Voices from the Open Source Revolution, O'Reilly 1999 ISBN 1565925823

The Cathedral & the Bazaar, E S Raymond O'Reilly 2001, ISBN 1565927249

Rebel Code, G Moody, Basic 2001, ISBN 9780786745203

Just for Fun, L Torvalds, Harper 2001 ISBN 0066620732

Weaving the Web, T Berners-Lee, Harper 2000, ISBN 9780062515872

Google also offers a very wide range of **Linux** sites, and information, far beyone the scope of this small **Linux Mini-Factfile.**

The many uses and versions of Linux _DistroWatch_

Linux User's Mini-Factfile

Linux OSs are becoming increasingly diverse and refined, and thus, more readily acceptable to ordinary computer users, being stable, easy to install and to use, with plenty of drivers, which is especially important for printers, plus, good, sensible Desktop layouts. Linux diversity means extra mix-and-match OS choices to suit systems of any age and size, and, a world-wide community of programmers, enthusiasts, plus online forums, all contributing to continuing advancement of both Linux OSs, and thus, improved budget IT access for ordinary citizens.

Especially important is the fact that if you only want Internet and online email, then a compatible Linux OS on an older system, be it laptop or PC, is all you need, OK..!

Linux Mint has good User Manuals available, (just ask Google), which are very useful primers. (See **Distrowatch.com**) All the steps involved in downloading a Linux OS.iso, burning this to disc, then following the installation steps common to many Linux OSs, are included in these easy-to-use manuals. Read and apply info from these Manuals, is **Nofrillstech's** recommendation, and discover just how straightforward Linux OSs really are. (Also the main reason this Linux Mini-Factfile is so small...!)

Nofrillstech's first Linux Distro choice is **Linux Mint**, in all versions. **Peppermint** Linux is another good general-purpose OS that is compatible with older systems, laptop or PC, and, **older 64-bit systems may benefit from running 32-bit OSs.**

Most Linux Os, when installed on SSDs/HDDs, will be swappable between systems, however, if booting up is unsuccessful, check the BIOS/UEFI in the target system for the required boot setting, as in Legacy, Non-Secure, etc. There may also be a driver problem, although that would be rare. Make sure that you do not try to boot a 64-bit OS on a 32-bit system, although vice-versa will be OK.

Whichever you choose, **be sure to update during/after any Linux OS installation,** this being most important, including for security. Subsequent updates will not be onerous, and, can even be carried out at a local iCafe, monthly at most, to conserve home wifi resources, if this is at all necessary. Easiest, of course, when using a laptop, though SATA drive-swapping and/or portability also make this easy. **Linux Mint has sensible upgrade facilities, making OS upgrades very easy. Note that sudo apt-get update && sudo apt-get upgrade** is a useful command-line, for updates plus upgrades.

Note that particular Linux OSs may not initially engage the correct keyboard driver for laptops, if this is the case, just conect a standard USB keyboard, and then restart, the correct keyboard drivers should then be functioning. Also, with laptops, ensure that NumLock is switched OFF. If this does not work, then there are other Linux OSs to choose from, which is one of the main factors in favour of using Linux distros.

Note that zeroing HDDs and/or partitions is advisable, using third-party programs such as **D-Ban**, **KillDisk**, **GParted,** or **MirayHDDShredder**, etc, to ensure successive clean installations of **unlike OSs**, be they Linux, Apple, or Win, previous to a fresh Linux OS install, thus eliminating all partitions, hidden or otherwise. Plus, ensuring complete erasure of unwanted data, in all cases, that may cause subsequent problems and conflicts. Then, **prior to any Linux OS installation, the HDD is left unallocated.** The Linux OS disc will then carry out any partitioning and formatting. **Just ensuring a drive is fully non-allocated may also be sufficient, thus, heuristics will apply, OK! Gparted** provides '**Device/Create Partition Table',** which will effectively and quickly unallocate the HDD data area. For SSDs, removal of partitions should be sufficient, full wipes are unnecessarily wearing.

You can also use **PartitionMagic, Gparted, or similar,** to make **custom partitions** to your own specification, suggest that any **Swap** Partition, of at least 2 x Ram in Gbs, is made at the beginning of the drive, then, the Boot partition beside that, so that the HDD does not have to work so hard with data transfer between the two, tho this is not relevant with SSDs, note. Be sure to set the **boot flag**, and **** , to mark the OS installation target, plus, match file systems to the specifications of the OS, **eg, ext4 for Linux Mint.** Leave the rest of the drive unallocated, and later make a **Store Partition** via the installed OS, using **GParted**, or **Discs,** thus making partition ownership easier to instigate. **Note that Linix Mint requires a separate small partition for effective storage and use of Timeshift images. SSDs should have 10 Gb unallocated at the end of the drive for over-provisioning, although this should not be necessary with newer generation SSDs, and current Linux OSs.**

Meanwhile, keep a log of your activities, as with all your computer usage, especially when installing and uninstalling apps, and, be sure to use the **Update Manager,** which, apart from aiding ongoing optimal performance, can correct software faults by overwriting with new/updated software. Forget defragging, file cleaning, and fussing with security and anti-malware, all is taken care of by Linux OSs, which are also not a target like Microsoft is, and now, even Apple, for malware. The public-spiritedness of Linux is well-respected. **Judicious online use is still advisable, however, regardless of OS choice.**

Some useful extra programs for average users, and even tinkerers, if not already installed, are:

Firefox, especially in relation to Bookmarks, recommend using either in conjunction with **Ghostery, HTTP Everywhere, and NoScript Suite. Thunderbird** for email is also recommended.

psensor, useful for monitoring temperatures and CPU usage.

hardinfo, useful for system info, including battery state checker

gparted, easy-to-use partition manager

gnome-system-monitor, moniors disk space, processes, network traffic
gkrellm, a useful system monitor, light on RAM, eg, **especially useful for online traffic rates.**

libreoffice, very useful Office program, that will read many formats, including MS Office.

Composer html editor, as part of Seamonkey, is easy to use for non-professional website-building, **amaya** is complicated, **bluefish** even more so.

justgetflux, very useful for controlling monitor colour and 'heat', definitely recommended, **via Google.**   If **f.lux** does not install, there is **redshift, sudo apt-get install redshift redshift-gtk** then **sudo apt-get install geoclue-2.0.** Just **redshift -O 3500** works well, too.

xbacklight, (for laptops), to control screen brightness if required.

filezilla, for uploading files.

Google Earth is available via **http://community.linuxmint.com/tutorial/view/1710**

clamav can be used if any malware is suspected, using with **clamtk** interface if a GUI is required. **Especially useful to remove PUAs that may hinder performance, note.**

bleachbit will clean the few files that need this in Linux OSs, **tho not backup files,** these are best left unchecked, as are **free disk space, (for SSDs), passwords,** and **memory. Set accordingly, both versions.**

Note also that TENDA wifi dongles generally work with Linux OSs, if others do not.

Terminal can be useful, without being complicated, eg, when looking to install a program, as per preceding examples, above. Certainly, there is an availability of apps via **Software Manager,** or directly online, but, if you know what you want, **Terminal** usage is quite quick, given that the required app is available from the software repository of a particular **Linux Distro**, viz:

sudo apt get-install xyz. To uninstall, **apt-get remove xyz, sudo apt-get purge xyz, sudo snap remove xyz, (as applicable),** or, via **Synaptic Packet Manager, note that Terminal Commands supersede SPM. How to Uninstall Software Using the Command Line in Linux**

Eg, **sudo apt-get install gnome-disk-utility** will obtain for you that very useful app to test your HDD SMART, etc, when this is not present in any Linux OS that you may be using.   **('sudo' being the 'superuser' prefix)**

Nft's own Program Installation List, **which includes website use:**

psensor, gkrellm, bleachbit, hardinfo, gparted, gsmartcontrol, composer, (as part of Seamonkey), filezilla, brasero,

pdfshuffler/arranger, pdfmaster, pdfsam, trimage, pinta,

ghostery, https everywhere, noscriptsuite, Firefox/Thunderbird/Seamonkey *plus tweaks,* **clamav,**

smplayer, vlc, celluloid, for videos, et al.

Damaged Update files:

sudo apt-get update –fix-missing

sudo dpkg –configure -a   then:

sudo apt-get update   ....to recheck. Plus, always leave the system connected to the Internet until all updates are finished, with any Linux distro.

sudo apt-get install exfat-fuse exfat-utils ....for reading exFat drives

history -c ....will clear Terminal history

setxkbmap -option caps:none ....will turn off Caps Lock, add to Startup Applications as **Disable Caps Lock**

Linux driver info is available via **http://www.howtogeek.com/213488/how-to-install-hardware-drivers-on-linux/**

Linux TRIM control setup is available via http://www.howtogeek.com/176978/ubuntu-doesnt-trim-ssds-by-default-why-not-and-how-to-enable-it-yourself/ Note that TRIM may be present, and preset, in current Linux Oss.

Speed up your Mint! - Easy Linux tips project Useful tips for Linux, tho, at your own risk, note. Easy Linux Projects also has tips to speed up drives, marked improvements can result, especially for SSDs, look for the 'swappiness' and 'noatime', TRIM, and over-provisioning entries. Note that Linux OSs since 2014 should have TRIM incorporated.
For SSDs, regular use of the trim **Terminal** command line **sudo fstrim -v /** will be needed, if not automatic. Note that **bleachbit** will clean free space on platter **HDDs,** though is not recommended for **SSDs,** which have the **TRIM** facility, anyway, as the solid state components will be unnecessarily overworked, thus reducing useful life span. This also applies to defragging. **(See Mueller, re SSDs, URPCs 22nd Ed)**

sudo badblocks -w -s -o usbstick.log /dev/sd(..)   for scanning for USB drive bad sectors

sudo e4defrag -c /dev/sda/b... , for defragging hard drives, tho not usually necessary for home computers

sudo badblocks -sv /dev/sd(..) for scanning for HDD/SSD drive bad sectors

fsck.ext4 -cDfty -C 0 /dev/sd(..)   for HDD/SSD file check and bad blocks **as Root** via **sudo su**

fsck.ext4 /dev/sd(..)   **HDD/SSD** file check, also as **Root** via **sudo su**

Tips for using Linux include not being impatient with the mouse and keyboard, and especially, being aware of which icons need one click or two, plus, not having too many Windows open at once, and, allow full opening and closing of apps before or after use. When updating, be sure to spread any little windows apart and read each carefully, plus, do not restart immediately, even if requested, until all updates are fully downloaded and installed. **Uninterrupted updates/upgrades are recommended, as well.   Shutdowns, before a coffee, also work for Linux, just as they do for Windows,** to calm operator, re-jig functions, bleed RAM, or, to cure frozen systems. **Ctrl/Alt/Esc** should shut down, or, reset the system, if required, this works for **Linux Mint,** anyway.

For overheating Linux laptops, see this link: https://itsfoss.com/reduce-overheating-laptops-linux/

https://www.howtogeek.com/55185/how-to-maximize-the-battery-life-on-your-linux-laptop/

as well as:

https://www.macissues.com/2014/12/29/radical-fix-drill-holes-in-your-mac-to-make-it-run-cooler/ which is applicable to any model of laptop, not just Mac. Also USB fan devices are available.

If there are other recurrent problems such as jamming, or sudden restarts, it is important to test for hardware problems first, because Linux OSs are inherently very stable. Test RAM with Memtest via a bootable disc, using a portable CD/DVD if necessary. **Plus, try a bootable Linux disc,** distro and/or troubleshooter, and, if this step shows performance problems, then hardware should be further checked, starting with turning everything off, and then re-plugging all connections. Electrical contact spray for connections, including RAM, is recommended, especially in damp or humid climates. **Testing peripheral hardware on other non-critical systems is also advised, if practicable.**

In addition, connect the HDD/SSD to another PC, if necessary, to check HDD SMART details. Seek advice if needed, and/or if the problem persists, after these initial steps, as a hardware fault is then most likely. Note also, that warming a system case interior with a hair-dryer may help with reluctant booting, in an emergency, when all else has been tried. This is itself a sign of impending motherboard failure, because material stress over time has caused some conductive filament to finally fail, with repeated shrinkage, at a cool or cold temperature.

Finally, **boot problems** that are definitely related to OS boot function, and file disruption, can usually be fixed by using **Linux Boot-Repair-CD**, which supplies an automatic remedy for the most common boot problems, including file and boot repair.

Some computer and Internet security notes, and also power security, using UPSs, et al:

1) **Recommend using a good-quality surge monitor powerboard, and a UPS.** 'The three major types of UPS system configurations are online double conversion, **line-interactive** and **offline**(also called **standby** and **battery** backup). These UPS systems are defined by how power moves through the unit.' (See also: **https://www.vertiv.com/en-emea/about/news-and-insights/articles/educational-articles/what-are-the-different-types-of-ups-systems/**

A quality powerboard with surge monitoring capabilities will, in turn, protect the UPS, and, anything else plugged in it.   Note that **laser printers** should not be on this particular board, as they **draw a lot of power when switched on**, **and should be directly plugged to the mains, via a separate circuit/oulet, if practicable, or, switch on before switching on the rest of your electronic system(s).**

2) **Re data security and The Cloud,** The Cloud also has its rackets, sadly, and cheap or no-charge sign-up soon changes....and you definitely get what you pay for. Google Drive has 10 Gb free, which must be regularly accessed, to be 'live'. **Cloud security will always be an issue online.** Meanwhile, email repositories can also be useful, and/or, a personal website could suffice to store extra current files which you can retrieve as you want, ie, stored without links ..?

A separate working storage partition on your main system hard-drive is a must, also, as well as any other offline storage. Good quality portable HDDs, for main backup storage at home, cannot be bettered, especially if you have a lockable fireproof repository.   Also, consider another backup set at a different physical location..?

If not backed up at least 3x, then not backed up at all, is the realistic motto these days.

3) **Use a separate Internet interface system,** (a reliable laptop would do), if online security is an issue, and keep your main processing system air-gapped, as much as possible, only go online for updates, when not otherwise in use, plus, usual virus-checker, et al, must be installed.

4) **Consider local wifi providers, rather than major telecom providers**. Eg, your landline number retained, and unlimited data for approx $80 pm..? Personal service, better security, and less outages..?

5) **For reliable system,** as always, buy from established, dedicated, computer businesses of good reputation.   **Never trust a department store bargain, or online trading, unless you really know what you are doing...**

6) **Meanwhile, a further tip for your computer security, recommend that your main Internet interface system has a Linux OS,** very easy to use, (eg, Mint, being very much like XP), can read/format to NTFS, re external drives, so, passing files for uploading from your main processing computer to your Linux interface system will pose no problems, and then upload to your website with Clonezilla. Takes about 15 mins to clone any Linux OS partition to a given HDD/SSD, using live Gparted, no problems there.   Also, ClamAV is a useful Open Source antivirus, compatible with Mint, that can also read Microsoft data hard drives plugged as slaves, or via USB. **Nft prefers cloning to Timeshift images, especially with a program like Gparted, this can easily be done partition to partition, given compatible partition sizes.**

Storage Partitions using Linux OSs:

To make a Storage Partition within a Linux OS, without head-scratching configuration trials, be sure to try installing an OS incorporating a Linux **Disk Utility,** such as Mint, (**Gnome-Disk-Utility** can be downloaded post-OS install using the Terminal Command Line as above.) This app then generally enables Partition/Disk Ownership changes within its Disk Format facility. If this capability is not evident in any given Disk Utility, **you can make a storage partition after installing the Linux OS, using a bootable Partition Manager,** (**such as GParted**, to resize an existing Boot Partition, or taking over an unallocated zone of the HDD.

Then, after rebooting, use the native OS **Disk Utility,** or, **gnome-disk-utility,** for Labels and Flag Management, as well as for **Taking Ownership,** if present, of that particular partition.   **The Boot Partition should also have a Boot Flag, plus / for boot point, and, the Store Partition can be flagged LVM, or, left unflagged, for general use**. **The Swap Partition does not have a flag. Note that, when using any Disk Utility, you will need to Unmount target partitions before these steps can be taken, even to the extent of connecting the drive to another Linux system, or using a Linux OS CD/DVD.**

Note also that setting up a NEW partition, with Discs, after the OS is installed, re-formatting an existing one, or, even deleting and re-making a new partition, should render that partition automatically accessible.

If a Disk Utility cannot be thus utilised for Taking Ownership, partition permissions can be otherwise altered, in general, to allow access to the storage partition, viz, add the new **Store Partition Ownership,** eg **'root'**, to Admin/User Group Ownership, then **right click within the opened Store partition, go to the partition Properties/Permissions,** and then change the ownership of the Store partition to the main ownership name, eg, Nft always uses Linux as the Account Name, so, there needs to be a change from 'root' that will be the default partition ownership, to the new 'linux' ownership.
When this change happens, right click in the new Store Partition, another window will open for **Special Privileges**, so, right click again for **Properties/Permissions**, confirm the new ownership and group name, plus, impose 'change and delete files'. The partition should now be accessible; **otherwise a reboot may also be necessary.**

Individual files and folders may still require alterations to their Permissions, so, reconfigure via right-clicking the **icon,** thence to Properties/Permissions, and, confirm the new ownership/group name, plus, 'change and delete files'. In respect of other Linux OSs, your own heuristic trials will decide their capabilities, regarding incorporating useable Storage Partitions on any connected HDDs, Boot or otherwise. Also, recommend looking for additional solutions, such as for **Permissions**, *within the individual OSs*, before trying Online Forums, as some of that info can be both prolix, complicated, and, even outdated.

Note also, that flash drives are useful for temporary storage or transfer purposes, but, they do have a limited life, and, if used daily, be sure to discard and replace them yearly..? SSDs perform well, but, like standard flash drives tend to do, they can fail catastrophically, so, safe longterm data storage is best achieved using good-quality platter HDDs, or optical CDs/DVDs. The Cloud is yet another storage option.

** Finally, do not overlook extra portable storage such as external HDDs, or, transfer files to other systems for safekeeping. Anything hardware can be fixed and replaced in a computer system, but never lost or broken data, and again, if data is not backed up 3 times, with any medium, it is not to be considered backed up at all...OK! **

SSD/HDD Usage Crib Sheet:

SSDs have been around for a while now, the technology has been improved considerably, to the extent that they are considered to be just as long-lasting as HDDs. As always, remember the caveat emptor maxim, that you get what you paid for.

1) **SSDs are not suitable for undisturbed long-term storage,** as they have capacitors that need re-charging at regular intervals, 3 x per annum at least. Thus, **HDDs are still the best for long-term storage**, in ideal conditions, viz, temperate, minimum humidity, no harsh handling treatment, et al.

2) **SSDs are *fast*, thus, ideal for boot drives,** given that they have regular use as such. They are also read, and are serviced by, existing apps such as CrystalDiskInfo, GSmartcontrol, et al, plus, partitioned, wiped, etc., by other existing apps within any operating system software.

3) **SSDs are ideal for transfer of data between systems,** as they can withstand reasonable physical handling, **unlike HDDs, which should always be unmoving whilst in operation.** In fact, SSDs are also superior to ordinary *flash* drives in operation, viz, speed, accuracy, and useful lifespan, although they still should be connected/disconnected via OS protocols, note. Use a USB3 port, via a USB3 system socket, if practicable, for best performance.

4) **SSDs/HDDs are just as vulnerable, as all micro-electronics components are, to power fluctuations,** up or down, so, they should always operate whilst protected by a UPS, or, at least a power conditioner, either of which should be protecting any important computing system, anyway. Laptops have batteries as UPSs, but, **always-on laptops should have their batteries removed/disconnected, note.**

5) **SSDs are more likely to catastrophically fail than HDDs,** so, should have regular SMART checks as they as they age, which, indeed, should be the case with HDDs anyway, although the latter will give more **SMART** preliminary warnings before actual operational failure. **Excess heat will also affect both SSDs and HDDs, in the form of extra material stress, both expansion and contraction, with normal use.**

6) **However, entire working OS backup should be a routine procedure, regardless of using SSDs or HDDs,** for any computer system, as whole-drive clones, images, or, even just copies or clones of individual boot partitions. All of these options are available, for modern systems, regardless of OS type, or brand. **Files should have additional backup**, noting the mantra '**if not backed up 3 times, then not backed up at all'**, thus, no sympathy for those who would choose to ignore this universal standard of effective computing.

7) **SSDs are lighter, and thus more portable, than HDDs**, especially the newest E-types, which no longer have any surrounding enclosures when installed. Note also, that the socket configuration may not now be SATA, however, which means specific enclosures are needed for external use, and, also when matching their corresponding USB cable connections.

8) **SSDs are not defragged, unlike HDDs, instead, they are trimmed**, in that the SSD is scanned by the TRIM command, to enable the release of specific unused space for further data deployment. Modern OSs should do this automatically, and/or via a command line, so, consult respective OS manuals. **Defragging causes unnecessary wear on SSDs,** which are much faster in all respects, anyway, being entirely electronic, and, regardless of where data resides.

9) **Troubleshooting an SSD/HDD,** that will not boot, and/or, is not recognised by the system, is by the usual heuristic methods. Firstly, apply **Magic Spray,** (aka electrical contact spray), at the plug-in connection point with the system. If this does not work, **replace** the SSD/HDD, and see if the system then enables initial booting, to at least read the BIOS. **A MemTest 86 boot disc RAM check** at this point may be useful, as an initial system function check. After which, a **Linux OS on a test SSD/HDD** is very useful, to enable booting up properly, and thus, to check the entire system in operation. (Linux Mint is a reliable choice.) **If the system itself is proven OK, after these basic testing procedures, consider the SSD/HDD defunct, and then resort to your backup resources and protocols.**

10) …..

Cloning Linux Partitions and HDDS:

Easiest is just to do two OS installations, one consecutively to a spare HDD, as Linux OSs install so quickly..? Update these additional HDDs when required. (See below.) **Note again, that Nft uses cloning in preference to Timeshift, having plenty of spare HDDs and/or SSDs. Timeshift is quite effective,** although make sure that you have ticked the **All Files** option before creating a Timeshift version that you will clone/transfer to another HDD/SSD. The target drive will need to have **Swap/EFI partitions** set up and functioning, and, a suitable target partition, beforehand. **Your own choice, of course....**

Secondly, utilise a spare compatible HDD, and, use an enclosure, or SATA port, **plus a basic cloning boot program, such as Easeus Disk Clone, or GParted.** Do this when the OS is updated, and your chosen ancillary programs, storage partitions, etc, are all then secure on the spare HDD. Store the cloned HDD until a swap is required. Further such updates can be done when all is running well, at your own convenience, by again re-cloning. **Unused IDE HDDs now make convenient storage for this purpose.**

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Thirdly, use a Boot Partition program to make both a Storage Partition, and, an unallocated partition, on a spare HDD/SSD, to clone the original Boot Partition to, (**Swap** will be shared by default), using a partition cloning program to achieve ths effect. Reboot using **Linux-Repair-CD**, and a **dual boot** will then be created in Grub. Then, configure the **Storage Partition Permissions** within each **Boot Partition.**

Note that Linux OSs do not stress systems, including HDDs, as much as does Microsoft OSs, but even so, using dual booting to an OS Boot Partition set beyond the platter centre(s), will also help to spread the wear on a platter HDD, away from the beginning of the drive, and, **Grub** will thus enable this choice. **High usage systems with older platter HDDs could benefit in this way..?** Note also that there can only be four **Primary Partitions,** (this includes **SWAP)**.

Using Bootable USB Drives and Linux OSs:

Installation of Linux OSs is faster and easier if done via a USB flash drive, or flash SD card, plus, these OSs can also be installed and run from such drives. There are 2 types of installation, one being **a bootable installation version,** ie, a copy of the Linux .iso copied to the flash drive with a USB image writer,,and also, **installing a fully bootable normal non-installation OS**. The latter will need a larger flash drive, 16 Gb would be suitable for most purposes, depending on files, extra apps, etc, being incorporated. It is also even quicker to install a Linux OS this way, via an image on a flash drive, than via a disc drive. Also, the installed OS can also be transferred to an additional HDD, via a port or enclosure, by making a back-up disk clone, to be stored until needed. **Make a Store partition,** as well, after the OS installation is completed. (**Gparted,** et al, can be used to manipulate partition sizes on larger HDDs/SSDs.)

Thus, there is no real need to clone or image the entire original drive, being just as easy to install or clone the fully developed OS boot partition to a spare HDD, update, and then store for emergency. If required, this boot partition can then be cloned back to the original partition, given that you have all your files in the Store Partition, and backed-up elsewhere. This is useful when changing to an updated, or other OS, viz, just install the OS to a partition on a spare drive, fully developed with extra programs and updates, then clone, ad lib, to respective boot partitions on other target drives. **Just take care that the cloned partition is the same size or smaller than the target partition, if this is situated next to SWAP. GParted or Partition Magic**, etc, can be used for any partition resize alterations. **Plan for standard-size Boot partitions from the outset, if practicable..?** Similarly, you can just install, or clone, an OS to an existing OS Boot partition, if you have only one computer/laptop.

You can boot to the USB flash drive via the **F12 one-off boot order**, (**F9** for HP, plus there may be other exceptions), or, via **BIOS** boot settings, then install the OS from that USB flash drive, also, updates could be added concurrently if you are connected to wifi/cable (and, if modem drivers are present), the cable Internet will usually work anyway. But, do also **check updates post-install**, when all available drivers will be installed with any further updates, and then everything should work, wifi included. Likewise, the F12/F9/FX/Boot settings option is used whenever booting from an additional Linux OS, if not installed on the native HDD of a computer or laptop.

Similarly, SD cards usually cannot be booted to, unless in an SD card holder. Only motherboards such as Raspberry Pi have this direct boot facility. Heuristics may apply, OK! For the future...? Up to motherboard and BIOS manufacturers to change matters, and, OS software will also need changes. Only fast SD cards should be used..? Meanwhile, OSs that run easily in RAM, such as Puppy, will prolong the life of USB and SD card drives, when these are used in lieu of conventional HDDs. **Note that Puppy is quite fast when run as a normal OS installation from an SD flash card, via a USB holder, but, Linux Mint not so, being a much larger OS**.

Laptops and can usually boot quickly from USBs, BIOS may need configuring, Note that an HDD in an enclosure will be recognised, and function the same as, a USB flash drive, as long as the OS has drivers that recognise the drive. SSDs and SSHDs should also be recognised, just as platter HDDs are recognised. Recommend that dual booting with other OSs, especially non-Linux, is best done with BIOS/CMOS boot choices.

So, what use are all these extra hard drive notes..? Well, just having a good spare bootable USB flash drive, or hard drive enclosure, with an installed Linux Os.iso as backup, or, a fully bootable Linux OS drive, makes sense in case of HDD failure, or, just for using on any available compatible system. It is also possible to have a USB Linux.iso installed in **'persistence' mode** as well, to save settings, although it will start more slowly. **See also the 'persistence' note at pendrivelinux.com**
A bootable Linux installation .iso version can be copied to a USB flash drive, (or SD card if useable), in a just few minutes. **Linux Mint** has a native USB .iso installer, just copy the .iso to the flash drive using this, an 8 Gb minimum USB flash drive will be needed.

A normal bootable non-installation Linux OS is installed quickly via a USB flash drive, and, even quicker than via an installation disc. (The disk space required will be indicated at the beginning of the installation.) An entire operational Linux OS, including updates, will be installed, either way, in **30-45 minutes,** and ready to go, and even with any the extra attention and updates needed, versus **6 hours or more** for a Microsoft OS, especially with those large updates, driver requirements, and extra OS tweaks, that will be needed for installation completion. **Use a 16 Bb flash drive for this purpose, tho, for ample space.**

Note that, a MS OS.iso can install from a USB drive, or SD card, but, not *run* from either, as fully installed.

Linux Mint HDDs/SSDs, including as USB enclosures, should swap/interchange between respective PCs or laptops without problems, especially if the same type of CPU, and bit-rate capacity, are present, although other hardware differences can also affect function. Note that 32-bit OS will also boot on a 64-bit system, **but not vice-versa.** This HDD/SSD swapping, if compatible, is especially useful for updates, as usually, a Linux HDD/SSD can be booted from an enclosure, or by direct connection, to a system with Internet an connection, and then updated, after which you can reconnect it to the original, or, to a similarly-resourced system.

The true test of compatibility of given hardware and Linux OS software is, of course, whether the Linux OS boot medium, as in OS disc or USB, will boot to a given system, so, be sure to test thus for compatibilty, if test-swapping an Linux OS installed on an HDD is not satisfactory. If a straight swap will not work, when the OS disc does, then a fresh install will, with appropriate driver, et al, configuration. The most likely hardware clash would be with video cards, easy to deal with using a PC, anyway, if spares are handy.

Heuristics will apply with drive swapping, as is so common with computer affairs in general..! Just make sure that system core specs are the same, or, similar at least. Note that installed Linux Mint OSs can be readily swapped between PCs and laptops, ad lib, plus SSDs/HDDs connected directly or via enclosures, given hardware compatibility, as there are no validation requirements for free Open Source Linux Oss.

Note that **sudo apt-get update && sudo apt-get upgrade** is a useful command-line, given Internet access at the time, to ensure optimium OS compatibility with a hardware system, when cloning and swapping drives.

When/if an external monitor is blank on a booted system, (such as when the original monitor is faulty or missing), thus having no Icons or Panel, and Background only, the following action and command lines solve the problem:

Control-Alt-T   ....brings up Terminal,

xrandr -q   ....brings up monitors present, their nominal titles, et al,

xrandr -q --output [monitor name] --primary   ....designates primary monitor, note single spaces.

Then the Panel and icons will duly appear.

Go to Preferences/Display to check that the unused monitor is made inactive, if still physically present.

Peripheral monitors may need dimmi ng, commands for that include:

xrandr --listmonitors

xrandr --listmonitors -q

xrandr --output NAME --gamma .X

As of August 2021, Latest Mint 20.2 versions install differently, notably, with a small EFI partition, and, no Swap file.   Also, recommend auto login, and, a short password, then, when all installed, update, and then turn off Screensaver, et al, via System Settings, Power Management, and Privacy, for easiest access and use. Extra security can be imposed if needed, when you are more confident, though check that the Firewall is on. **As of October 2023, Peppermint also does not require a SWAP file.**

If you do not want an EFI partition, use Boot-Repair-CD to repair booting.

Everything else stays the same, and, for extra apps like gkrellm, psensor, bleachbit, sweeper, etc, use 'sudo apt-get install ....' in Terminal, or, via Software Manager. **Practice with a spare HDD/SSD, maybe, beforehand..?**

Extra partition(s) can be created with GParted on a booted CD, when you are ready, such as a Store, and, separate Timeshift, (?30Gb), though a liberal sized Boot partition is needed, because GParted will need to shift and redeploy files, recommend minimum 50Gb, or, 75-100Gb, if practicable.

Timeshift is useful as a system backup, which can then go to any repository you nominate...**also a useful cloning method,** given that a Swap file is made beforehand, if needed, and, Boot-Repair-CD used to repair the booting process, on the target HDD/SSD.   **Also, note that a Timeshift partition can also be trimmed,** ensure the partition is mounted, and use the command line **sudo fstrim -av.**