[Linux File Systems: Ext2 vs Ext3 vs Ext4](http://shabbathster.blogspot.com/2013/09/linux-file-systems-ext2-vs-ext3-vs-ext4.html)

ext2, ext3 and ext4 are all filesystems created for Linux. This article explains the following:

* High level difference between these filesystems.
* How to create these filesystems.
* How to convert from one filesystem type to another.

Ext2

* Ext2 stands for second extended file system.
* It was introduced in 1993. Developed by Rémy Card.
* This was developed to overcome the limitation of the original ext file system.
* Ext2 does not have journaling feature.
* On flash drives, usb drives, ext2 is recommended, as it doesn’t need to do the over head of journaling.
* Maximum individual file size can be from 16 GB to 2 TB
* Overall ext2 file system size can be from 2 TB to 32 TB

Ext3

* Ext3 stands for third extended file system.
* It was introduced in 2001. Developed by Stephen Tweedie.
* Starting from Linux Kernel 2.4.15 ext3 was available.
* The main benefit of ext3 is that it allows journaling.
* Journaling has a dedicated area in the file system, where all the changes are tracked. When the system crashes, the possibility of file system corruption is less because of journaling.
* Maximum individual file size can be from 16 GB to 2 TB
* Overall ext3 file system size can be from 2 TB to 32 TB
* There are three types of journaling available in ext3 file system.
  + Journal – Metadata and content are saved in the journal.
  + Ordered – Only metadata is saved in the journal. Metadata are journaled only after writing the content to disk. This is the default.
  + Writeback – Only metadata is saved in the journal. Metadata might be journaled either before or after the content is written to the disk.
* You can convert a ext2 file system to ext3 file system directly (without backup/restore).

Ext4

* Ext4 stands for fourth extended file system.
* It was introduced in 2008.
* Starting from Linux Kernel 2.6.19 ext4 was available.
* Supports huge individual file size and overall file system size.
* Maximum individual file size can be from 16 GB to 16 TB
* Overall maximum ext4 file system size is 1 EB (exabyte). 1 EB = 1024 PB (petabyte). 1 PB = 1024 TB (terabyte).
* Directory can contain a maximum of 64,000 subdirectories (as opposed to 32,000 in ext3)
* You can also mount an existing ext3 fs as ext4 fs (without having to upgrade it).
* Several other new features are introduced in ext4: multiblock allocation, delayed allocation, journal checksum. fast fsck, etc. All you need to know is that these new features have improved the performance and reliability of the filesystem when compared to ext3.
* In ext4, you also have the option of turning the journaling feature “off”.

Creating an ext2, or ext3, or ext4 filesystem

Once you’ve partitioned your hard disk using [fdisk command](http://www.thegeekstuff.com/2010/09/linux-fdisk/), use mke2fs to create either ext2, ext3, or ext4 file system.

Create an ext2 file system:

mke2fs /dev/sda1

Create an ext3 file system:

mkfs.ext3 /dev/sda1

(or)

mke2fs –j /dev/sda1

Create an ext4 file system:

mkfs.ext4 /dev/sda1

(or)

mke2fs -t ext4 /dev/sda1

Converting ext2 to ext3

For example, if you are upgrading /dev/sda2 that is mounted as /home, from ext2 to ext3, do the following.

umount /dev/sda2

tune2fs -j /dev/sda2

mount /dev/sda2 /home

Note: You really don’t need to umount and mount it, as ext2 to ext3 conversion can happen on a live file system. But, I feel better doing the conversion offline.

Converting ext3 to ext4

If you are upgrading /dev/sda2 that is mounted as /home, from ext3 to ext4, do the following.

umount /dev/sda2

tune2fs -O extents,uninit\_bg,dir\_index /dev/sda2

e2fsck -pf /dev/sda2

mount /dev/sda2 /home

Again, try all of the above commands only on a test system, where you can afford to lose all your data.

############################################################################  
Converting ext2 file system to ext3 file system and vice-a-versa.  
================================================================  
  
Create a partition eg. /dev/hda8  
  
#mkfs.ext3 /dev/hda8  
  
#mkdir /mnt/data  
  
#mount /dev/hda8 /mnt/data  
  
Create a data in /mnt/data partition  
  
Steps to convert a file system from ext3 to ext2  
-----------------------------------------------  
  
#umount /mnt/data  
  
#e2fsck -f /dev/hda8  < scan a disk  
  
#tune2fs -O ^has\_journal /dev/hda8   <- ext3="" feature="" journaling="" nbsp="" of="" p="" remove=""> like ext2 file system.  
  
#mount /dev/hda8 /mnt/data  
  
#ls /mnt/data      <- created="" data.="" p="" show="">  
#df -hT      <- as="" ext2.="" file="" it="" p="" show="" system="" will="">  
Steps to convert ext2 to ext3  
-----------------------------  
  
#umount /mnt/data  
  
#e2fsck -f /dev/hda8  
  
#tune2fs -j /dev/hda8  
  
#mount /dev/hda8 /mnt/data  
  
#df -hT <- as="" ext3.="" file="" it="" p="" show="" system="" will="">  
  
  
Journaling Effect:- The file system writes a journal that keeps track of where data has been  
------------------- written or removed  
             
                     
                 eg:- meaning that if you turn the computer off without properly shutting down, you shouldn't lose any data