Blocks

ext4 allocates storage space in units of "blocks". A block is a group of sectors between 1KiB and 64KiB, and the number of sectors must be an integral power of 2. Blocks are in turn grouped into larger units called block groups. Block size is specified at mkfs time and typically is 4KiB. You may experience mounting problems if block size is greater than page size (i.e. 64KiB blocks on a i386 which only has 4KiB memory pages). By default a filesystem can contain 2^32 blocks; if the '64bit' feature is enabled, then a filesystem can have 2^64 blocks. The location of structures is stored in terms of the block number the structure lives in and not the absolute offset on disk.

For 32-bit filesystems, limits are as follows:

Item	**1KiB**	**2KiB**	**4KiB**	**64KiB**
Blocks	2^32	2^32	2^32	2^32
Inodes	2^32	2^32	2^32	2^32
File System Size	4TiB	8TiB	16TiB	256TiB
Blocks Per Block Group	8,192	16,384	32,768	524,288
Inodes Per Block Group	8,192	16,384	32,768	524,288
Block Group Size	8MiB	32MiB	128MiB	32GiB
Blocks Per File, Extents	2^32	2^32	2^32	2^32
Blocks Per File, Block Maps	16,843,020	134,480,396	1,074,791,436	4,398,314,962,956 (really 2^32 due to field size limitations)
File Size, Extents	4TiB	8TiB	16TiB	256TiB
File Size, Block Maps	16GiB	256GiB	4TiB	256TiB

For 64-bit filesystems, limits are as follows:

Item	**1KiB**	**2KiB**	**4KiB**	**64KiB**
Blocks	2^64	2^64	2^64	2^64
Inodes	2^32	2^32	2^32	2^32
File System Size	16ZiB	32ZiB	64ZiB	1YiB
Blocks Per Block Group	8,192	16,384	32,768	524,288
Inodes Per Block Group	8,192	16,384	32,768	524,288
Block Group Size	8MiB	32MiB	128MiB	32GiB
Blocks Per File, Extents	2^32	2^32	2^32	2^32
Blocks Per File, Block Maps	16,843,020	134,480,396	1,074,791,436	4,398,314,962,956 (really 2^32 due to field size limitations)
File Size, Extents	4TiB	8TiB	16TiB	256TiB
File Size, Block Maps	16GiB	256GiB	4TiB	256TiB

Note: Files not using extents (i.e. files using block maps) must be placed within the first 2^32 blocks of a filesystem. Files with extents must be placed within the first 2^48 blocks of a filesystem. It's not clear what happens with larger filesystems.