Selecting previously unselected package parted.
Preparing to unpack .../parted_3.2-15_amd64.deb ...
Unpacking parted (3.2-15) ...
Processing triggers for libc-bin (2.23-0ubuntu3) ...
Setting up libparted2:amd64 (3.2-15) ...
Setting up parted (3.2-15) ...
Processing triggers for libc-bin (2.23-0ubuntu3) ...

Joe@node1:~$ sudo parted /dev/sda
GNU Parted 3.2
Using /dev/sda
Welcome to GNU Parted! Type 'help' to view a list of commands.
(parted) p
Model: ATA WDC WD1002FBYS-0 (scsi)
Disk /dev/sda: 1000GB
Sector size (logical/physical): 512B/512B
Partition Table: gpt
Disk Flags:

<table>
<thead>
<tr>
<th>Number</th>
<th>Start</th>
<th>End</th>
<th>Size</th>
<th>File system</th>
<th>Name</th>
<th>Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1049KB</td>
<td>538MB</td>
<td>537MB</td>
<td>fat32</td>
<td></td>
<td>boot, esp</td>
</tr>
<tr>
<td>2</td>
<td>538MB</td>
<td>1050MB</td>
<td>512MB</td>
<td>ext2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1050MB</td>
<td>1000GB</td>
<td>999GB</td>
<td>lvm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(parted)
With UEFI, we can see and manipulate the boot order with the following command:

```
$ efibootmgr -v
```

Current:
- BootCurrent: 0000
- Timeout: 65535 seconds
- BootOrder: 0000,0001,0003,0004
- Boot0000: ubuntu
  - HD(1,GPT,00d028ec-4669-4448-ac3d-e089314488ad,0x800,0x100000)/File(\EFI\ubuntu\shimx64.efi)
- Boot0001: Hard Drive
- Boot0003: Network Card
- Boot0004: Built-in EFI Shell
  - VenMedia(5023b95c-db26-429b-a648-bd47664c8012)/File(c57ad6b7-0515-40a8-9d21-551652854e37)

```
$ echo "ubuntu will be booted"
```

```
ubuntu will be booted
```

gdisk is kinda like fdisk, but can see gpt partitions better

sudo gdisk -l /dev/sda

GPT fdisk (gdisk) version 1.0.1

Partition table scan:
  MBR: protective
  BSD: not present
  APM: not present
  GPT: present

Found valid GPT with protective MBR; using GPT.
Disk /dev/sda: 1953525168 sectors, 931.5 GiB
Logical sector size: 512 bytes
Disk identifier (GUID): F48FDD67-518D-47A3-BD63-D759EC4EBEA0
Partition table holds up to 128 entries
First usable sector is 34, last usable sector is 1953525134
Partitions will be aligned on 2048-sector boundaries
Total free space is 3437 sectors (1.7 MiB)

<table>
<thead>
<tr>
<th>Number</th>
<th>Start (sector)</th>
<th>End (sector)</th>
<th>Size</th>
<th>Code</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2048</td>
<td>1050623</td>
<td>512.0 MiB</td>
<td>EF00</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1050624</td>
<td>2050047</td>
<td>488.0 MiB</td>
<td>8300</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>2050048</td>
<td>1953523711</td>
<td>930.5 GiB</td>
<td>8E00</td>
<td></td>
</tr>
</tbody>
</table>
The MBR partitioning system uses a combination of cylinder/head/sector (CHS) addressing and logical block addressing (LBA). The former is klunky and limiting. GPT drops CHS addressing and uses 64-bit LBA mode exclusively. Thus, GPT data structures, and therefore gdisk, do not need to deal with CHS geometries and all the problems they create. Users of fdisk will note that gdisk lacks the options and limitations associated with CHS geometries.

For best results, you should use an OS-specific partition table program whenever possible. For example, you should make Mac OS X partitions with the Mac OS X Disk Utility program and Linux partitions with the Linux gdisk or GNU Parted program.

Upon start, gdisk attempts to identify the partition type in use on the disk. If it finds valid GPT data, gdisk will use it. If gdisk finds a valid MBR or BSD disklabel but no GPT data, it will attempt to convert the MBR or disklabel into GPT form. (BSD disklabels are likely to have unusable first and/or final partitions because they overlap with the GPT data structures, though.) GPT fdisk can identify, but not use data in, Apple Partition Map (APM) disks, which are used on 680x0- and PowerPC-based Macintoshes. Upon exiting with the 'w' option, gdisk replaces the MBR or disklabel with a GPT. This action is potentially...
Create gpt partition table on device

sudo parted /dev/sdc mklabel gpt

Warning: The existing disk label on /dev/sdc will be destroyed and all data on this disk will be lost. Do you want to continue?

Yes/No? Yes

Information: You may need to update /etc/fstab.
joe@node1:~$ sudo parted /dev/sdc p
Model: ATA ST2000NM0011 (scsi)
Disk /dev/sdc: 2000GB
Sector size (logical/physical): 512B/512B
Partition Table: gpt
Disk Flags:

Number  Start  End  Size  File system  Name  Flags

joe@node1:~$
$ echo "Make partition"

$ sudo parted /dev/sdc mkpart
Partition name? []? firstp
File system type? [ext2]? ext4
Start? 1MiB
End? 20MiB
Information: You may need to update /etc/fstab.

$ sudo parted /dev/sdc p
Model: ATA ST2000NM0011 (scsi)
Disk /dev/sdc: 2000GB
Sector size (logical/physical): 512B/512B
Partition Table: gpt
Disk Flags:

+-----------------+-------+-------+-----------------+---------------+-------------------+----------------+-----------------+-----------------+
| Number | Start | End   | Size            | File system   | Name             | Flags          | Number | Start | End   | Size            | File system   | Name             | Flags          | Number | Start | End   | Size            | File system   | Name             | Flags          |
|---------+-------+-------+-----------------+---------------+-----------------+----------------+-----------------+-----------------+-----------------+-----------------+---------------+-----------------+----------------+-----------------+-----------------+-----------------+----------------+-----------------+-----------------+---------------+-----------------+-----------------+-----------------+-----------------+-----------------+-----------------+-----------------+-----------------+-----------------|
| 1       | 1049kB| 21.0MB | 19.9MB          |               | firstp          |                | 1               | 1049kB | 21.0MB | 19.9MB |               |               |                 |                |                 |                 |               |                 |                |                 |                 | 1              |                 |                 | 1              |                 | 1              | 1              |                 |                |                 |                |                 |                 |                 |                 |                 |                 |
|         |       |       |                 |               |                 |                |                 |        |        |        |              |               |                 |                |                 |                 |                 |               |                 |                |                 |                 |               |                 |                 |              |                 |                 |               |                 |                |                 |                 |                 |                 |                 |

$
or another way

```
$ echo "Or another way"
```

```
$ sudo parted /dev/sdc mkpart secondp 20MiB 1GiB
Information: You may need to update /etc/fstab.
```

```
$ sudo parted /dev/sdc p
Model: ATA ST2000NM0011 (scsi)
Disk /dev/sdc: 2000GB
Sector size (logical/physical): 512B/512B
Partition Table: gpt
Disk Flags:

<table>
<thead>
<tr>
<th>Number</th>
<th>Start</th>
<th>End</th>
<th>Size</th>
<th>File system</th>
<th>Name</th>
<th>Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1049kB</td>
<td>21.0MB</td>
<td>19.9MB</td>
<td></td>
<td>firstp</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>21.0MB</td>
<td>1074MB</td>
<td>1053MB</td>
<td></td>
<td>secondp</td>
<td></td>
</tr>
</tbody>
</table>
```

```
$ 
```
Whoops, those are too small

Information: You may need to update /etc/fstab.

Information: You may need to update /etc/fstab.

Model: ATA ST2000NM0011 (scsi)
Disk /dev/sdc: 2000GB
Sector size (logical/physical): 512B/512B
Partition Table: gpt
Disk Flags:

<table>
<thead>
<tr>
<th>Number</th>
<th>Start</th>
<th>End</th>
<th>Size</th>
<th>File system</th>
<th>Name</th>
<th>Flags</th>
</tr>
</thead>
</table>


Recreating partitions again

```bash
root@node1:~# parted /dev/sdc
GNU Parted 3.2
Using /dev/sdc
Welcome to GNU Parted! Type 'help' to view a list of commands.
(parted) mkpart
Partition name? []? partone
File system type? [ext2]? ext4
Start? 1MiB
End? 20GiB
(parted) p
Model: ATA ST2000NM0011 (scsi)
Disk /dev/sdc: 2000GB
Sector size (logical/physical): 512B/512B
Partition Table: gpt
Disk Flags:

Number  Start   End   Size    File system  Name    Flags
  1  1049kB  21.5GB  21.5GB  ext4       partone
```

(parted)
(parted) mkpart
Partition name? []? parttwo
File system type? [ext2]? ext4
Start? 20GiB
End? 40GiB
(parted) p
Model: ATA ST2000NM0011 (scsi)
Disk /dev/sdc: 2000GB
Sector size (logical/physical): 512B/512B
Partition Table: gpt
Disk Flags:

<table>
<thead>
<tr>
<th>Number</th>
<th>Start</th>
<th>End</th>
<th>Size</th>
<th>File system</th>
<th>Name</th>
<th>Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1049kB</td>
<td>21.5GB</td>
<td>21.5GB</td>
<td>ext4</td>
<td>partone</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>21.5GB</td>
<td>42.9GB</td>
<td>21.5GB</td>
<td>ext4</td>
<td>parttwo</td>
<td></td>
</tr>
</tbody>
</table>

(parted)
(parted) mkpart
Partition name? []? part3
File system type? [ext2]? ext4
Start? 40GiB
End? 20%
(parted) p
Model: ATA ST2000NM0011 (scsi)
Disk /dev/sdc: 2000GB
Sector size (logical/physical): 512B/512B
Partition Table: gpt
Disk Flags:

<table>
<thead>
<tr>
<th>Number</th>
<th>Start</th>
<th>End</th>
<th>Size</th>
<th>File system</th>
<th>Name</th>
<th>Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1049kB</td>
<td>21.5GB</td>
<td>21.5GB</td>
<td>ext4</td>
<td>partone</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>21.5GB</td>
<td>42.9GB</td>
<td>21.5GB</td>
<td>ext4</td>
<td>parttwo</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>42.9GB</td>
<td>400GB</td>
<td>357GB</td>
<td>ext4</td>
<td>part3</td>
<td></td>
</tr>
</tbody>
</table>

(parted)
(parted) resizepart 3 60GiB
Warning: Shrinking a partition can cause data loss, are you sure you want to continue?
Yes/No? Yes
(parted) p
Model: ATA ST2000NM0011 (scsi)
Disk /dev/sdc: 2000GB
Sector size (logical/physical): 512B/512B
Partition Table: gpt
Disk Flags:

<table>
<thead>
<tr>
<th>Number</th>
<th>Start</th>
<th>End</th>
<th>Size</th>
<th>File system</th>
<th>Name</th>
<th>Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1049KB</td>
<td>21.5GB</td>
<td>21.5GB</td>
<td>ext4</td>
<td>partone</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>21.5GB</td>
<td>42.9GB</td>
<td>21.5GB</td>
<td>ext4</td>
<td>parttwo</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>42.9GB</td>
<td>64.4GB</td>
<td>21.5GB</td>
<td>ext4</td>
<td>part3</td>
<td></td>
</tr>
</tbody>
</table>

(parted)
(parted) resizepart 1 30GiB
Error: Can't have overlapping partitions.
<table>
<thead>
<tr>
<th>Number</th>
<th>Start</th>
<th>End</th>
<th>Size</th>
<th>File system</th>
<th>Name</th>
<th>Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1049kB</td>
<td>21.5GB</td>
<td>21.5GB</td>
<td>ext4</td>
<td>partone</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>21.5GB</td>
<td>42.9GB</td>
<td>21.5GB</td>
<td>ext4</td>
<td>parttwo</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>42.9GB</td>
<td>64.4GB</td>
<td>21.5GB</td>
<td>ext4</td>
<td>part3</td>
<td></td>
</tr>
</tbody>
</table>
```bash
root@node1:~# partprobe
root@node1:~# gdisk -l /dev/sdc
GPT fdisk (gdisk) version 1.0.1

Partition table scan:
  MBR: protective
  BSD: not present
  APM: not present
  GPT: present

Found valid GPT with protective MBR; using GPT.
Disk /dev/sdc: 3907029168 sectors, 1.8 TiB
Logical sector size: 512 bytes
Disk identifier (GUID): 9850BC40-C708-4C52-B314-28CAAED50EAF
Partition table holds up to 128 entries
First usable sector is 34, last usable sector is 3907029134
Partitions will be aligned on 2048-sector boundaries
Total free space is 3781202028 sectors (1.8 TiB)

<table>
<thead>
<tr>
<th>Number</th>
<th>Start (sector)</th>
<th>End (sector)</th>
<th>Size</th>
<th>Code</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2048</td>
<td>41943039</td>
<td>20.0 GiB</td>
<td>8300</td>
<td>partone</td>
</tr>
<tr>
<td>2</td>
<td>41943040</td>
<td>83886079</td>
<td>20.0 GiB</td>
<td>8300</td>
<td>parttwo</td>
</tr>
<tr>
<td>3</td>
<td>83886080</td>
<td>125829120</td>
<td>20.0 GiB</td>
<td>8300</td>
<td>part3</td>
</tr>
</tbody>
</table>
# ls

# mkdir testmount

# mount /dev/sdc1 testmount/
mount: /dev/sdc1 is write-protected, mounting read-only
mount: wrong fs type, bad option, bad superblock on /dev/sdc1,
missing codepage or helper program, or other error

In some cases useful info is found in syslog - try
dmesg | tail or so.

# mkfs.ext4 /dev/sdc1
mke2fs 1.42.13 (17-May-2015)
Creating filesystem with 5242624 4k blocks and 1310720 inodes
Filesystem UUID: 336fd84e-5457-4d76-89b5-e8652609371f
Superblock backups stored on blocks:
32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208,
4096000

Allocating group tables: done
Writing inode tables: done
Creating journal (32768 blocks): done
Writing superblocks and filesystem accounting information: done

# mount /dev/sdc1 testmount/

#
```
root@node1:~$ cd testmount/
root@node1:~/testmount# ls
lost+found
root@node1:~/testmount# df -h
Filesystem Size Used Avail Use% Mounted on
udev 7.9G 0 7.9G 0% /dev
tmpfs 1.6G 8.8M 1.6G 1% /run
/dev/mapper/node1--vg-root 901G 1.7G 853G 1% /
tmpfs 7.9G 0 7.9G 0% /dev/shm
tmpfs 5.0M 0 5.0M 0% /run/lock
tmpfs 7.9G 0 7.9G 0% /sys/fs/cgroup
/dev/sda2 473M 116M 333M 26% /boot
/dev/sda1 511M 3.6M 508M 1% /boot/efi
tmpfs 100K 0 100K 0% /run/lxcfs/controllers
tmpfs 1.6G 0 1.6G 0% /run/user/1000
/dev/sdc1 20G 44M 19G 1% /home/joe/testmount
root@node1:~/testmount# ```
root@node1:~/testmount# parted /dev/sdb mklabel gpt
Warning: The existing disk label on /dev/sdb will be destroyed and all data on
this disk will be lost. Do you want to continue?
Yes/No? Yes
Information: You may need to update /etc/fstab.

root@node1:~/testmount# parted /dev/sdb mkpart p1 1024MiB 10%
Information: You may need to update /etc/fstab.

root@node1:~/testmount# parted /dev/sdb p
Model: ATA WDC WD7501AALS-0 (scsi)
Disk /dev/sdb: 750GB
Sector size (logical/physical): 512B/512B
Partition Table: gpt
Disk Flags:

Number  Start  End      Size    File system  Name  Flags
1  1074MB   75.0GB    73.9GB      p1

root@node1:~/testmount#
root@node1:~/testmount# pvcreate /dev/sdb1 /dev/sdc2
Physical volume "/dev/sdb1" successfully created
Physical volume "/dev/sdc2" successfully created
root@node1:~/testmount#
vgcreate
Please provide volume group name and physical volumes
Run `vgcreate --help` for more information.

vgcreate ^C

pvs
PV         VG  Fmt Attr  PSize  PFree
/dev/sda3  node1-vg lvm2 a-  930.53g  0
/dev/sdb1  lvm2 ---   68.86g  68.86g
/dev/sdc2  lvm2 ---   20.00g  20.00g

vgcreate testvol /dev/sdb1 /dev/sdc2
Volume group "testvol" successfully created

vgs
VG  #PV  #LV #SN Attr  VSize  VFree
node1-vg  1  2  0 wz--n-  930.53g  0
testvol  2  0  0 wz--n-  88.86g  88.86g
root@node1:~/testmount# vgs
VG   #PV #LV #SN Attr  VSize  VFree
node1-vg 1  2  0 wz--n-  930.53g  0
testvol 2  0  0 wz--n-  88.86g  88.86g

root@node1:~/testmount# lvcreate -l 20%FREE -n lv-awesome testvol
Logical volume "lv-awesome" created.

root@node1:~/testmount# lvs
LV   VG  Attr  LSize  Pool Origin Data%  Meta%  Move Log  Cpy%
Sync  Convert
root node1-vg -wi-ao----  914.55g
swap_1 node1-vg -wi-ao----  15.98g
lv-awesome testvol -wi-a-----  17.77g
root@node1:~$ lvcreate --type raid1 -m 1 -L 1G -n awesome-raid testvol
Logical volume "awesome-raid" created.
root@node1:~$
root@node1:~# lvs
LV VG Attr LSize Pool Origin Data% Meta% Move Log Cp
y%Sync Convert
root node1-vg -wi-ao---- 914.55g
swap_1 node1-vg -wi-ao---- 15.98g
awesome-raid testvol rwi-a-r--- 1.00g
0.00
lv-awesome testvol -wi-a----- 17.77g

root@node1:~# mkdir mount_for_lv-awesome
root@node1:~# mkdir mount_for_awesome-raid
root@node1:~# ```
Creating filesystem with 262144 4k blocks and 65536 inodes
Filesystem UUID: ea7efa4d-ddc8-4974-8a34-df5ae2705657
Superblock backups stored on blocks:
    32768, 98304, 163840, 229376

Allocating group tables: done
Writing inode tables: done
Creating journal (8192 blocks): done
Writing superblocks and filesystem accounting information: done

root@node1:~# mkfs.ext4 /dev/testvol/lv-awesome
mke2fs 1.42.13 (17-May-2015)
Creating filesystem with 4658176 4k blocks and 1164592 inodes
Filesystem UUID: 520b094b-ecda-43f6-a907-a3150bd33c1b
Superblock backups stored on blocks:
    32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208,
    4096000

Allocating group tables: done
Writing inode tables: done
Creating journal (32768 blocks): done
Writing superblocks and filesystem accounting information: done

root@node1:~#
mount /dev/testvol/awesome-raid mount_for_awesome-raid/
mount /dev/testvol/

awesome-raid   lv-awesome

mount /dev/testvol/lv-awesome mount_for_awesome-raid/ mount_for_lv-awesome/
mount /dev/testvol/lv-awesome mount_for_lv-awesome/
#
# mount | grep -E 'mapper|sdc'
/dev/mapper/node1--vg-root on / type ext4 (rw,relatime,errors=remount-ro,data=ordered)
/dev/sdc1 on /home/joe/testmount type ext4 (rw,relatime,data=ordered)
/dev/mapper/testvol-awesome--raid on /home/joe/mount_for_awesome-raid type ext4 (rw,relatime,data=ordered)
/dev/mapper/testvol-lv--awesome on /home/joe/mount_for_lv-awesome type ext4 (rw,relatime,data=ordered)

root@node1:~#