# Chapter 1

# Applying Essential Troubleshooting Skills

## 1.1 Making Grub Changes persistent

### 1.1.1 Changes made during boot

After making changes in the boot menu, when we finally boot, we can make those changes persistent by rewriting the `/boot/grub2/grub.cfg` file.

```
1  # grub2-mkconfig -o /boot/grub2/grub.cfg
2  Generating grub configuration file ...
3  Found linux image: /boot/vmlinuz-3.10.0-693.el7.x86_64
4  Found initrd image: /boot/initramfs-3.10.0-693.el7.x86_64.img
5  Found linux image: /boot/vmlinuz-0-rescue-5cbfb880c0aa466ca7e3be91308fde5f
6  Found initrd image: /boot/initramfs-0-rescue-5cbfb880c0aa466ca7e3be91308fde5f.img
7  done
```

### 1.1.2 Changes made in Configuraiton File

The `/etc/default/grub` file is the configuration file for Grub2 that provides several boot options. These can be changed to affect several boot parameters, and the changes saved to the bootloader. There are also shell scripts in the `/etc/grub.d` directory that aren't meant to be touched by an administrator. These control grub boot procedure as well. Almost all the functionality that we need from grub is provided by a set of grub2 commands:

```
1   # grub2-
2   grub2-bios-setup          grub2-mkpasswd-pbkdf2
3   grub2-editenv             grub2-mkrelpath
4   grub2-file                grub2-mkrescue
5   grub2-fstest              grub2-mkstandalone
6   grub2-get-kernel-settings grub2-ofpathname
7   grub2-glue-efi            grub2-probe
8   grub2-install             grub2-reboot
9   grub2-kbdcomp             grub2-rpm-sort
10  grub2-menulst2cfg         grub2-script-check
11  grub2-mkconfig            grub2-set-default
```

```
12   grub2-mkfont              grub2-setpassword
13   grub2-mkimage             grub2-sparc64-setup
14   grub2-mklayout            grub2-syslinux2cfg
15   grub2-mknetdir
```

These commands can be used to accomplish tasks with grub such as install grub (`grub2-install`), make a new boot image (`grub2-mkimage`), set a grub boot password (`grub2-mkpasswd-pbkdf2`), to probe operating system configuration (`grub2-probe`), to reboot a specific boot image (`grub2-reboot`) and much more.

## 1.2   Using rd.break to Reset the Root Password

While on the previous versions of RHEL, resetting the root password or logging on to a system where the root password isn't know was relatively easy. After the introduction of systemd, breaking into the system is a lot harder to do.

First we have to enter the line `rd.break` and pass it as a kernel parameter in the boot menu (at the end of the kernel line). The **rd.break** parameter instructs the next part of the boot procedure, **initrd**, to break at a specific location of the image. This brings us to a system where all the supporting modules are available, but no file system has yet been mounted. This parameter bring us to a root shell without prompting for a root password.

We're in such an early point in the boot procedure that the system root hasn't been mounted to the usual / location yet, and is available at `/sysroot` in read-only mode. Now, we need to mount the system root in a read-write mode using:

```
1   # mount -o remount,rw /sysroot
```

Next, we make the content of `/sysroot` the current root directory using:

```
1   # chroot /sysroot
```

Now, we simply echo the new password to the passwd utility and reset the password for the user root. The syntax is: `echo <newPassword> | passwd --stdin root`. The root password thus has to be reset using the command:

```
1   # echo secret | passwd --stdin root
2   Changing password for the user root.
3   passwd: all authentication tokens updated successfully.
4   # touch /.autorelabel
```

Finally, in the last line, we instruct SELinux to auto-relable. Since we're so early in the boot procedure, SELinux isn't functional, and if we skip this command, our changes will be lost. Now, at this point, it is safe to *CTRL+D* a couple of times and let the OS reboot itself. Once done, we can enter the OS using the root password we just set (*secret* in our case). Now, after the reboot, we can login to the system as root using the new root password.

## 1.3   Resetting the Root Password Resumed