Boot EndeavourOS on Raspberry Pi 4b from USB device

First I need to give credit where credit is due. XSystem252 has a guide for Rpi 4b USB boot with BTRFS format, full encryption with SSH unlock in the case of a headless SBC. His guide was helpful in the making of this guide. If you are interested in btrfs and/or encryption, give his site a visit.

This guide will Install EndeavourOS and set up the Raspberry Pi 4b for USB boot with ext4 format and no encryption. Be sure the USB 3 device supports booting from the device, and TRIM capabilities. A lot of the cheaper external USB 3 enclosures don't have either capability. Ensure your USB 3 enclosure has UASP support. The UASP standard is pretty loose, especially with TRIM, but it's better than nothing. USB 3 thumb drives usually work, but may not be the fastest flash memory. It is recommended to experiment with a USB 3 thumb drive, then once you are comfortable with the procedure, experiment with external SSDs.

The first thing that needs to be done, is update the EEPROM in the Raspberry Pi 4b. This only needs to be done once, then you are good to go. Raspberry Pi OS will be utilized to do this EEPROM upgrade. It is the official OS for RPi4, and the EEPROM update is now official and in their stable repository. This has to be the safest way to flash the EEPROM, but you still do this at your own risk.

Install Raspberry Pi OS Lite on a 16 GB or bigger micro SD card.

In a Operational Linux computer, in a internet browser go to:
https://www.raspberrypi.org/software/operating-systems/#raspberry-pi-os-32-bit
and click on the 'Raspberry Pi OS Lite' download button.

Using a file manager, go to the Downloads directory. Then right click on the downloaded file, and use an Archive Manager to extract the image file. Use gnome-disks or your favorite ISO burner to install the image on the micro SD card. When finished, insert the micro SD card in the Raspberry Pi 4b and power it up. Log in as username ' pi ' and password ' raspberry '. Update the image.

```
$ sudo apt update
$ sudo apt full-upgrade
$ sudo systemctl reboot
```

After reboot, as user ' pi ' edit the following config file using nano or vi
```
$ sudo nano /etc/default/rpi-eeprom-update
```
change
From: FIRMWARE_RELEASE_STATUS="critical"
To: FIRMWARE_RELEASE_STATUS="stable"
close file.

Update the firmware.
```
$ sudo rpi-eeprom-update -d -a
```

The EEPROM is now updated. Raspberry Pi OS and the micro SD card it is on are no longer needed.

Install EndeavourOS and your choice of a Desktop Manager

Back in a working Linux Computer, on a 16 GB or larger uSD card, install EndeavourOS and a DE. You can re-use the micro SD card that Raspberry Pi OS was installed on if you want.

Go to https://github.com/endeavouros-arm/image-install
and follow the instructions to install an Archlinux Arm base install on a Raspberry Pi 4b.

After the Archlinux 64 bit base install, insert the uSD card into the Raspberry Pi 4b and boot it up.
Go to https://github.com/endeavouros-arm/manuals/blob/master/EOS-desktop-instructions.pdf

Click on 'Download' and the instructions will be displayed in a browser image viewer where the instructions can then be printed or saved as .pdf You can skip to page 5, follow the instructions to install EndeavourOS with your choice of DE.

Prepare to transfer the uSD OS to the USB 3 device.

You should now be in your Raspberry Pi 4b with a working EndeavourOS and your favorite DE. First, install some necessary packages for the USB install. In a terminal window,

$ sudo pacman -S rsync uboot-tools mkinitcpio-utils

The current uboot-raspberrypi bootloader does not support USB booting. We will use a release candidate version which does support it. Go to
https://downgit.github.io/
Enter the following URL
https://github.com/archlinuxarm/PKGBUILDs/tree/master/alarm/uboot-raspberrypi
Then click download. The uboot-raspberrypi zip archive will be downloaded for you.

In a file manager, create a temporary directory, such as ~/Temp and then move the zip archive to that directory. Right click on the zip file, use Archive Manager to extract the files into ~/Temp

In a terminal window, cd to the ~/Temp/uboot-raspberrypi directory and as user (don't use root)
Use vi or nano
$ nano PKGBUILD
change
pkgver FROM '2020.07' TO ' 2020.10rc2 '

change the first md5sum value from
86e51eeccd15e658ad1df943a0edf622 TO bae5280c7ce49961c3722fa9019535bf

Close nano
Make sure you are in the PKGBUILD's directory. Again, as user
$ makepkg -s (this will build the package but NOT install it)

Now we change from the old bootloader to the release candidate bootloader
$ sudo pacman -R uboot-raspberrypi
$ sudo pacman -U uboot-raspberrypi-2020.10rc2-2aarch64.pkg.tar.xz
$ sudo systemctl reboot

Edit the mkinitcpio.conf file

Use vi or nano to edit
$ sudo nano /etc/mkinitcpio.conf
In the MODULES section, add two modules ‘ pcie_brcmstb ‘ and ‘ broadcom ‘. It should look like this
MODULES=(pcie_brcmstb broadcom) plus any modules that were already there if any.
close nano and rebuild initramfs

$ sudo mkinitcpio -P (may see ‘ Possibly missing firmware ‘ warnings, ignore them)
$ sudo systemctl reboot

All the preparations are complete. Next is to copy our EndeavourOS install to the USB device.

Prepare the USB 3 device to receive EndeavourOS

Prepare the USB device by partitioning, and formatting it. There are several ways to accomplish this. I prefer Gparted. Click on "GParted" tab and select the USB SD READER (ensure the right device is selected) Note the Device Name of the SD READER, such as /dev/sda. Write this down.

Click on "Device" tab, and create a msdos Partition Table.
If an existing partition is mounted, this will fail. Highlight the partition with the key symbol, right click on it, select “unmount” then try again.
Click on "Partition" tab, then new

Free Space preceding MiB: 4	Create as: Primary Partition
New Size MiB: 250	Partition name:
Free Space following (MiB): XXXX	File System: fat32
Align to: MiB	Label: BOOT

Create a second partition

Free Space preceding MiB: 0	Create as: Primary Partition
New Size MiB: XXXXXX	Partition name:
Free Space following (MiB): 0	File System: ext4
Align to: MiB	Label: ROOT

Apply All Operations
Close GParted

Transfer EndeavourOS to the USB 3 device.

In a terminal window, create a new folder in your home directory
$ mkdir ~/rpi4-copy
$ cd ~/rpi4-copy
$ mkdir usb-boot usb-root
$ lsblk -f (to identify the device name of the USB, such as /dev/sda)
$ sudo mount /dev/sda1 usb-boot
$ sudo mount /dev/sda2 usb-root

To copy the system to the USB 3 device.
$ sudo rsync --info=progress2 -axHAX /boot/ usb-boot/ (the slashes are important as is)
$ sudo rsync --info=progress2 -axHAX / usb-root/ (this will take approx 5 min)
$ sudo sync

Use vi or nano to edit /etc/fstab
$ sudo nano usb-root/etc/fstab
comment out existing dev/mmcblk1p1 line
/dev/mmcblk1p1 /boot vfat defaults 0 0
create new entry
/dev/sda1 /boot vfat defaults 0 0
close nano

$ sudo umount usb-boot usb-root
Shutdown the system, remove the micro SD card, and boot into the USB device.

You should be running EndeavourOS from the USB device.

This process wipes out the /boot/config.txt file. EndeavourOS provides a /boot/config.txt.bkup file.
In a terminal window, sudo cp /boot/config.txt.bkup boot/config.txt to restore recommended config.

If you have a very good cooling solution, and want to overclock at your own risk,
In the config.txt file, there are three lines that are used for overclocking which are commented out.
over_voltage=5 (6 is absolute max - each point accounts for around .05 more volts)
arm_freq=2000 (Mhz 2147 is max cpu freq)
gpu_freq=750 (Mhz this is max gpu freq))

These are the settings I use. Over_voltage and arm_freq are not max, but let's not get greedy. For me, these settings seem to be stable over the long haul. Doesn't matter how fast it is if it isn't stable.

Save the micro SD card and use it as a seed. If your first install was a USB 3 thumb drive and you now want to install an external SSD instead. Remove the USB thumb drive. Put the micro SD card in the Rpi 4, hook up the USB external SSD, and boot. Go to the section
Prepare the USB 3 device to receive EndeavourOS
where the external device is partitioned and formatted and continue through page 4.