



ICOP
intelligent control on processor

ICOP TECHNOLOGY INC.
昭營科技股份有限公司

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User's reference for Ubuntu Base 18.04.5 LTS (Bionic Beaver) on Vortex86EX2

This document shows you the steps of creating Ubuntu base image.

Linux kernel and Vortex86 driver modules are from our Builtroot project.

Please get Buildroot to build your kernel and driver.

Or, build kernel and driver by yourself.

We also provide ubimg script to make text Ubuntu base image.

User also can follow below steps manually to create image, too.

```
// Create empty image file.  
// 2GiB is recommended for graphic interface and 1GiB for text mode.  
// You can run "expand-rootfs" after first boot to extend root partition.  
dd if=/dev/zero of=ubuntu_base.img bs=100M count=20  
sudo losetup -fP ubuntu_base.img  
losetup -a
```

```
// Make dos and ext4 partition  
// Create a 32MB FAT partition for SysLinux  
sudo fdisk ./ubuntu_base.img < fdisk.in > /dev/null  
sudo fdisk ./ubuntu_base.img -l
```

Device	Boot	Start	End	Sectors	Size	Id	Type
./ubuntu_base.img1 *	2048	67583	65536	32M	1	FAT12	
./ubuntu_base.img2	67584	3139583	3072000	1.5G	83	Linux	

```
// Load 2 partitions via kpartx  
// Loop device number depends on your Linux system. It may be loop7 or else.  
sudo apt-get install -y kpartx  
sudo kpartx -av ./ubuntu_base.img
```

```
add map loop0p1 (253:0): 0 65536 linear 7:0 2048
```



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add map loop0p2 (253:1): 0 3072000 linear 7:0 67584

// Format and install syslinux

```
sudo mkdosfs /dev/mapper/loop0p1
```

```
sudo apt-get install syslinux -y
```

```
sudo syslinux -i /dev/mapper/loop0p1
```

// Copy bzImage and syslinux.cfg onto 1st partition

```
mkdir tmpfs
```

```
sudo mount /dev/mapper/loop0p1 ./tmpfs
```

```
sudo cp bzImage ./tmpfs
```

```
sudo cp syslinux.cfg ./tmpfs
```

```
sudo umount ./tmpfs
```

// Reset MBR

```
sudo apt install -y mbr
```

```
sudo install-mbr -i n -p D -t 0 /dev/loop0 --force
```

-or-

```
sudo dd if=./mbr.bin of=/dev/mapper/loop0
```

// Extract Ubuntu base files

```
sudo mkfs.ext4 /dev/mapper/loop0p2
```

```
sudo mount /dev/mapper/loop0p2 ./tmpfs
```

```
sudo tar zxvf ubuntu-base-18.04.5-base-i386.tar.gz -C ./tmpfs
```

// Modify network settings

```
sudo cp -R /etc/network ./tmpfs/etc/
```

```
sudo cp -R /etc/wpa_supplicant ./tmpfs/etc/
```

```
sudo gedit ./tmpfs/etc/resolv.conf
```

to add below line:

```
nameserver 8.8.8.8
```



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```
sudo gedit ./tmpfs/etc/network/interfaces
```

to add below lines:

```
auto eth0
```

```
iface eth0 inet dhcp
```

```
// Copy extend rootfs service
```

```
sudo cp expand-rootfs ./tmpfs/usr/sbin/
```

```
sudo cp expand-rootfs.service ./tmpfs/lib/systemd/system/
```

```
sudo chmod 644 ./tmpfs/lib/systemd/system/expand-rootfs.service
```

```
// Copy Vortex86 modules
```

```
sudo mkdir ./tmpfs/lib/modules
```

```
sudo cp *.ko ./tmpfs/lib/modules/
```

```
sudo cp wdt-test* ./tmpfs/usr/sbin/
```

```
sudo cp spi-test* ./tmpfs/usr/sbin/
```

```
sudo cp ins-vx-mod ./tmpfs/usr/sbin/
```

```
sudo chmod 744 ./tmpfs/usr/sbin/ins-vx-mod
```

```
sudo cp install-vortex86-modules.service ./tmpfs/lib/systemd/system/
```

```
sudo chmod 644 ./tmpfs/lib/systemd/system/install-vortex86-modules.service
```

```
// change root to ubuntu base filesystem
```

```
sudo mount -t proc /proc ./tmpfs/proc
```

```
sudo mount -t sysfs /sys ./tmpfs/sys
```

```
sudo mount -o bind /dev ./tmpfs/dev
```

```
sudo mount -o bind /dev/pts ./tmpfs/dev/pts
```

```
sudo chroot ./tmpfs
```

```
// use apt to update
```

```
apt-get update
```

```
apt-get upgrade -y
```

```
apt-get install -y sudo vim net-tools ethtool ifupdown iputils-ping language-pack-en-base
```

```
openssh-server kmod parted
```

```
systemctl enable expand-rootfs.service
```

```
useradd -s '/bin/bash' -m -G adm,sudo ubuntu
```



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passwd ubuntu

passwd root

// Run below line to use all disk space after first boot.

// Or, use fdisk to use remainder disk space for data else.

systemctl enable expand-rootfs.service

// User also can run "expand-rootfs" manually to extend disk size

// Run below line to load Vortex86 driver modules after boot.

systemctl enable install-vortex86-modules.service

// Or, user can run above line manually once

// If you need graphic, try xfce4 with below line

apt-get install -y xfce4 xfce4-goodies xorg dbus-x11 x11-xserver-utils xfce4-terminal

// Try browser with one of below lines:

apt-get install -y firefox

apt-get install -y chromium-browser

// exit chroot

exit

sudo umount ./tmpfs/proc

sudo umount ./tmpfs/sys

sudo umount ./tmpfs/dev/pts

sudo umount ./tmpfs/dev

// umount image file

sudo umount ./tmpfs

sudo kpartx -d ./ubuntu_base.img

sync

Use dd or other disk tools to dump ubuntu_base.img onto your storage: sd card, USB mass storage or SATA DOM.

We use dd in Linux and rufus (<https://rufus.ie/en/>) in Windows to write disk image.

For Vortex86 driver usage, get more information from Vortex86 Buildroot BSP..