



Creating a Custom Contest Image

(based on the official ICPC distributed image)

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The instructions in this document assume you have downloaded the official ICPC contest image, installed it on a USB thumb drive and have made custom changes to that image for your site. The goal now is to create a new bootable contest image containing your site customizations.

Typically, the USB thumb drive you originally used has a larger capacity (sometimes MUCH larger) than the contest image actually uses (about 30GiB). So, you obviously do not want to copy all that extra space that is unused. It slows down the duplication process tremendously. The procedure described below must be done from a different Linux system that has enough disk space to hold the compressed contest image (about 8GiB). You can't do it using the contest image itself. It is also suggested that you install the Ubuntu "**pigz**" compression tool (look it up.) If you don't want to do that, you can use "**gzip**" but it will take longer.

You must first figure out the size actually used by the image on your customized thumb drive, and only copy that (and compress it at the same time). This is easily done using the **fdisk -l** command. But first you need to determine the name of the thumb drive device using "**lsblk**" (all these commands must be done as root):

```
root@icpc:/home/icpc# lsblk
NAME                                MAJ:MIN RM  SIZE RO TYPE MOUNTPOINTS
sda                                  8:0    0 232.9G  0 disk
├─sda1                              8:1    0    1M  0 part
├─sda2                              8:2    0  128M  0 part /boot/efi
├─sda3                              8:3    0  192M  0 part
└─sda4                              8:4    0  27.5G  0 part /var/lib/containers/storage/overlay
                                   /
nvme0n1                             259:0    0 476.9G  0 disk
├─nvme0n1p1                         259:1    0    1G  0 part
├─nvme0n1p2                         259:2    0 475.8G  0 part
└─nvme0n1p3                         259:3    0  128M  0 part
```

In this case, it's **/dev/sda** (the **/dev/nvme0n1** device is the internal hard disk and we don't want to screw with that). The names of the devices on your system may be different, so be sure you got the right one. Look for the "**27.5G**" partition 4 (**sda4** above); that is the Ubuntu contest partition size. Yours may be **/dev/sdb** or **/dev/sdc** depending on what other disks are in your system.

For the purposes of this document, we will assume it's **/dev/sda**.



Run the **fdisk -l** on the the thumb drive device to list its partition information:

```
root@icpc:/home/icpc# fdisk -l /dev/sda
GPT PMBR size mismatch (58367999 != 488397167) will be corrected by write.
The backup GPT table is not on the end of the device.
Disk /dev/sda: 232.89 GiB, 250059350016 bytes, 488397168 sectors
Disk model: USB 3.2.2 FD
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 4096 bytes / 4096 bytes
Disklabel type: gpt
Disk identifier: EB2AF218-C2CD-4A8D-A1DB-F1DD06B626C8
```

Device	Start	End	Sectors	Size	Type
/dev/sda1	2048	4095	2048	1M	BIOS boot
/dev/sda2	4096	266239	262144	128M	EFI System
/dev/sda3	266240	659455	393216	192M	Linux filesystem
/dev/sda4	659456	58365951	57706496	27.5G	Linux filesystem

In this case, the thumb drive being used here is ~256GiB, but the contest image is only using about ~30GiB. The first line tells it all:

```
GPT PMBR size mismatch (58367999 != 488397167) will be corrected by write.
```

This says we're only using **58367999** sectors out of **488397167**. Each sector is 512 bytes as shown by the "**Units:**" line above, so some quick math:

$(58367999 \times 512) / (1024 \times 1024) = \text{\#MiB used} = 28499$ (we ALWAYS round up one to make sure we get the last blocks, so 28500 MiB).

The size of the actual thumb drive is:

$(488397167 \times 512) / (1024 \times 1024) = \text{total disk size in MiB} = 238475 \text{ MiB}.$

You can see we are only using **28500** out of **238475** MiB in this case (your numbers may vary depending on your thumb drive). I think the **28500** number should be the same though... but verify that.

To make the new image, (again, be sure you're on a separate Linux system with enough space). Again, assuming the name of your thumb drive device is **/dev/sda** (yours may be different), you can use this command to create the compressed contest image:

```
dd if=/dev/sda bs=1M count=28500 | pigz -9 > /root/my-custom-contest.img.gz
```



(you can use "gzip" instead of "pigz -9". If you don't have **pigz** - we suggest you install **pigz** as it's much faster for what we're doing.) To break it down, the "dd" command does a raw fetch of the first 28500 1MiB blocks from **/dev/sda** and sends the output to the "**pigz -9**" compression command (using maximum compression). Then, the compressed output is sent to the file: **/root/my-custom-contest.img.gz** (you can change the name of the file to anything you like).

That process will take several minutes depending on the speed of your thumb drive and whatever PC you're using to do this. The **/root/my-custom-contest.img.gz** file should be about the same size as the original **icpcYYYY** image (8GiB or thereabouts).

You can then burn that image to a thumb drive using the same process described in the image building instructions.