ochin_CM4 Hardware test number 4

USBs r/w speed test

Devices used for tests

1. ochin CM4 carrier board
2. Raspberry Pi CM4 module with eMMC
3. Power Supply 0-30Vdc
4. Transcend Jetflash 760 USB3.0

Test description

This test is intended to measure the speed of USB 2.0 ports.

The test consists of writing or reading a certain amount of data on a USB disk by measuring the time to read and the time to write. The test is carried out sequentially on each of the 4 USB ports.

It should be noted that the reading and writing speed does not depend only on the CM4 module and the USB hub but also on the reading and writing speed of the USB disk. These values should therefore not be considered as absolute values.

For the sake of the test, the /dev/zero source will be used since it's a device file which generates a continuous stream of zeros. It could be also used as destination path, in which case it will accept ad discards all data written to it.

Test execution

The writing test is performed by means of the following "dd" command:

```
dd if=/dev/zero of=./speedTestFile bs=500M count=2 oflag=direct
```

The command will write 2 blocks of 500MBytes to "/dev/zero".

The reading test is performed by means of the following "dd" command:

```
dd if=./speedTestFile of=/dev/zero iflag=dsync
```

The "iflag=dsync" and "oflag=dsync" options set the synchronized I/O for data, this forces a physical read/write of data on each operation (not using cache).

The USB memory stick used for the tests is a Transcend Jetflash 760 USB3.0 .

Test result

The following lines is the report of the read and write speed tests, made on each USB 2.0 port.

```
USB1 (sda1)

     sudo mount /dev/sda1 /media/usb -o uid=pi,gid=pi

     Write Test

     dd if=/dev/zero of=/media/usb/output.file bs=500M count=2 oflag=dsync

     1048576000 bytes (1.0 GB, 1000 MiB) copied, 40.7486 s, 25.7 MB/s

     Read Test

     dd if=/media/usb/output.file of=/dev/zero iflag=dsync

     1048576000 bytes (1.0 GB, 1000 MiB) copied, 22.6864 s, 46.2 MB/s

USB2 (sdb1)

     sudo mount /dev/sdb1 /media/usb -o uid=pi,gid=pi

     Write Test

     dd if=/dev/zero of=/media/usb/output.file bs=500M count=2 oflag=dsync

     1048576000 bytes (1.0 GB, 1000 MiB) copied, 40.781 s, 25.7 MB/s

     Read Test

     dd if=/media/usb/output.file of=/dev/zero iflag=dsync

     1048576000 bytes (1.0 GB, 1000 MiB) copied, 22.75 s, 46.1 MB/s

USB3 (sdc1)
```

```
sudo mount /dev/sdc1 /media/usb -o uid=pi,gid=pi

Write Test

dd if=/dev/zero of=/media/usb/output.file bs=500M count=2 oflag=dsync

1048576000 bytes (1.0 GB, 1000 MiB) copied, 40.4118 s, 25.9 MB/s

Read Test

dd if=/media/usb/output.file of=/dev/zero iflag=dsync

1048576000 bytes (1.0 GB, 1000 MiB) copied, 21.9964 s, 47.7 MB/s
```

USB4 (sdd1)

```
sudo mount /dev/sdd1 /media/usb -o uid=pi,gid=pi

Write Test

dd if=/dev/zero of=/media/usb/output.file bs=500M count=2 oflag=dsync

1048576000 bytes (1.0 GB, 1000 MiB) copied, 45.5359 s, 23.0 MB/s

Read Test

dd if=/media/usb/output.file of=/dev/zero iflag=dsync

1048576000 bytes (1.0 GB, 1000 MiB) copied, 21.748 s, 48.2 MB/s
```

From the results of the tests carried out, it can be seen that speeds around 23MB / sec in writing and 48MB / sec in reading are reached. Keep in mind that the purpose of the test is not to measure the speed of the USB device, but the maximum speed reached by the USB bus. We can therefore refer to the speed reached during the reading. The reading operation, for reasons related to the architecture of solid state memories, is less complicated than writing and therefore generally reaches higher speeds. In these tests the reading speed is very close to the theoretical maximum speed of the USB2.0 bus, so we can say that the system is working at full speed.

Test Passed