USB Flash Drive Speed and Usability Tests for SEEDUbuntu9

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PURPOSE: The purpose of this document is to show some informal usability testing of several USB Flash Drives for storing the SEEDUbuntu9 and running its virtual machine (VM) within VMware Player. The results below will demonstrate that not all USB Flash Drives with similar read / write speeds are suitable for running the SEEDUbuntu9 VM, and that read speeds may possibly be more important than write speeds.

SETUP: All USB Flash Drives tested are USB 2.0 rated. Read / write speeds were tested with Crystal Disk Mark v3.0.1c for sequential reads / writes with 2 passes of a 500MB data file. The testing machine was running Windows XP SP 3 OS on an Intel Core2 Duo E3700 2.66GHz processor with 2GB RAM. Identical SEEDUbuntu9 VMX image and files, built under VMware Workstation 6.05, were used to test the VM using VMware Player 4.0.2 build-591240. The SEEDUbuntu9 VM's RAM was increased from the default of 512 MB to 1024 GB and VMware Tool was installed.

READ / WRITE SPEED AND USABILITY TESTS

1. PNY Attaché 8GB USB 2.0 Flash Drive (P-FD8GBATT2-EF)

This model is over 2 years old - it is not the current PNY Attaché model. It has a light so you can gauge disk access (very beneficial when using SEEDUbuntu9 during startup).

Current Usage: 44% (3438/7731MB) (SEEDUbuntu9 VMX was previously installed)
Read: 20.02 MB/s
Write: 5.275 MB/s

SEEDUbuntu9: This drive loads and runs the VMX fairly quickly. There is some slight freezing / stuttering afterwards but it usable.

2. PNY 8 GB Micro Sleek USB Drive (P-FDU8GBSLK/PRP-EF)

This model is currently available as it is listed on PNY’s website: [http://www3.pny.com/category_buymulti.aspx?Category_ID=459](http://www3.pny.com/category_buymulti.aspx?Category_ID=459)

Current Usage: 45% (3438/7712MB) (SEEDUbuntu9 VMX was previously installed)
Read: 17.11 MB/s
Write: 10.05 MB/s

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**SEEDUbuntu9:** Loading the VMX is slower as compared to PNY Attaché. Also, not having the disk light makes a big difference in gauging the status of the load. Ubuntu desktop takes much longer to load. There is noticeable freezing and stuttering; you must be patient and wait several minutes for SEEDUbuntu9 to complete loading. There is noticeable delay between clicking on items to open and then waiting for them to open. This drive "could" be used but it will require patience; it will be frustrating.

3. **SanDisk Cruzer Edge 8 GB (SDCZ51-008G-B35)**

Widely available in Korea (check Gmarket); prices vary 7,000 - 14,000; tested in original state of purchase. It feels cheap; the USB plug is plastic and can be difficult to insert into “tight” USB ports.

**Current Usage:** 1% (51/7630MB)
**Read:** 17.58 MB/s
**Write:** 4.323 MB/s

**SEEDUbuntu9:** Deleted all files and copied over VMX image and folder (painfully slow at 20 minutes). Start up is quick; maybe because I copied over the files from the PNY after I ran the VM on this machine, thus the caches did not have to be rebuilt (this proved to be false after a clean install was performed (see below)). Very fast - no freezing or stuttering; a joy to use.

4. **Samsung Slim and Simple 8 GB (SUM-GWB8)**

New drive; purchased locally in Chungju and expensive.

**Current Usage:** 0% (0/7641MB)
**Read:** 16.50 MB/s
**Write:** 10.19 MB/s

**SEEDUbuntu9:** Copied over VMX image and folder (in about half the time of the SanDisk; which makes sense the Samsung's writespeed is more than double - *I am expecting the performance of this drive to be equal to or better than the SanDisk*). Startup is not as quick as the SanDisk (Why?). The window manager is taking a long time to load – wait, wait, wait – finally on the desktop but performance is bad; no response errors, freezing, and stuttering.

Going to try to shutdown and start the VM again and see what happens. Shutdown is taking a long time; more waiting.

Second attempt. Startup is slow again; waiting for window manager, again. Yet again, performance is really bad; worse than the PNY Micro Sleek.

Also, I think this drive is doing some strange caching to my local drive because while plugged in my local drive is being pounded with R/W activity (shame on you Samsung doing such trickery).
Third attempt. I reboot the host machine. Startup is a bit quicker but after the login screen same as before - waiting for the window manager to start; local disk starting to be hit again. Everything just runs slower with this USB disk - honestly I do not understand why. Windows in Ubuntu are not responsive. This was the most expensive disk that I purchased and it very bad.

5. Imation USB 2.0 Micro Swing 8 GB (Micro Swing)


New drive; purchased locally in Chungju

**Current Usage:** 0% (0/7632MB)

**Read:** 23.56 MB/s

**Write:** 7.558 MB/s

**SEEDUbuntu9:** Copied over VMX image and folder. Startup to window manager is OK - not as fast as the SanDisk. There is some slight freezing and stuttering; but this disk is usable - it is not as fast as the SanDisk; similar to the PNY Attaché maybe a bit faster.

**CLEAN INSTALL TEST**

Performing a clean install of SEEDUbuntu9 and VMware Tool on the SanDisk and Imation Micro Swing since both are available here in Korea and, moreover, both performed relatively well on the tests above.

After the clean install the Imation Micro Swing performs as stated above (maybe with a little less freezing - but it is very stable); still, not as fast as the SanDisk. This is a good drive to consider using for the course.

After the clean install on the SanDisk Cruzer results are even better than before; wickedly fast and responsive with SEEDUbuntu9 – *highly recommended*.

**SUMMARY / RECOMMENDATIONS**

As the tests demonstrate the usability of a USB Flash Drive for SEEDUbuntu9 cannot only be based on the read / write speeds. This is clearly evident in the case of the Samsung Slim and Simple drive whose read speeds are close to the SanDisk Cruzer and its writes speeds are more than double, yet it essentially unusable for SEEDUbuntu9. The tests also show that the best way to test usability is to load SEEDUbuntu9 on to the disk and then try to run it; this takes a good amount of time to complete but I recommend you do it if; clearly not all USB drives are suitable and you cannot solely rely on manufacturer’s R / W speed listings.

I *highly recommend* a SanDisk Cruzer Edge 8 GB (SDCZ51-008G-B35) – it is inexpensive, fast, and will make the SEED labs and assignments much easier and enjoyable to complete. I have since purchased 3 of these drives and most of my students have purchased it also; we have experienced no problems to date.