Milwaukee Computer Society

Monthly Meeting Dates:

Meetings are usually on the third Saturday of the month and start at 12:00 Noon.
Monthly 3rd Saturdays for the next year are:

This month's meeting Saturday May 21st

Location:

Greenfield Park Lutheran Church
1236 S. 115th St.
West Allis, WI
One block North of West Greenfield Avenue on 115th Street - Parking is not a problem.

CHECK OUT OUR NEW TV

Greetings all,

Like a bad penny I keep coming back! After my 33rd tax season, I will be at the meeting Saturday after a three month hiatus. I hope you didn't break anything while I was gone.

Free Windows 10 Upgrade

Well, time is running out for all of us in regards to updating to Windows 10. The update notices are becoming more frequent as well as insistent. There are only a couple more months left to get the update free of charge. I haven't been following the drama around preventing the update but if I am correct in my understanding, time is also running out on support from Microsoft for any OS before Win 10.

So what is everyone doing about it? I'm looking forward to your opinions on this.

So…who in the room has actually bought or at least tried some form of VR equipment, either stand alone or to go with your smartphone? Bueller, JJ, anyone? I was the recipient of Google cardboard from a friend and while I haven't put it together, I had previously tried it on another occasion. I see Google is coming out soon

Membership in MCS is open to all individuals and families interested in personal computing. Annual dues are $30 for an individual or family membership. Dues include a one year subscription to this newsletter and access to all club libraries. Applications for membership may be obtained at the monthly meeting, or by writing us at this address:

Milwaukee Computer Society
12249 West James Ave.
Franklin, WI 53132

MCS Officers

President
Rick Janowski   329-1971
E-mail: mcs1club-rick@yahoo.com

Vice President
Dean Berglund   321-1039
E-mail: deanberg@wi.rr.com

Secretary
Dave Landskron   253-4085
E-mail: dlandskron@naspa.net

Treasurer
Mark Thomas
E-mail: mjthomas@wi.rr.com

Newsletter Editor
Dave Glish   784-9053
E-mail: dave@encorei.com

Conference Services Secretary
Joyce (Isenberg) Lydon   246-0053

MCS Home Page
http://mcs.wauknet.com

MCS advertising rates available on request.

THE VISION STATEMENT

The MILWAUKEE COMPUTER SOCIETY assists the membership in achieving their individual personal computer objectives through the utilization of membership expertise and other resources. Providing companionship, camaraderie, and the opportunity to increase computer knowledge, computer skills, computer expertise and computer applications.

with a new improved version and of course, Samsung and others have their versions available as well. I recently ran across a VR device particularly made for iPhones but I can't remember where I saw it. I will need to find it again because I think this will be the next big thing if it can be affordable and especially if NOT tethered to a phone (or a computer/console for that matter).

Moving on, I hope to be seeing Captain America: Civil War soon. It seemed to get pretty good reviews. Anyone see it? I'd like to hear what you thought. X-men Apocalypse is hitting theaters soon as well and I hope this non-Marvel movie holds up as well as X-men Days of Future Past. And let's not forget that a new Star Trek tv show debuts next year but only on CBS as a subscription. I wonder how well that's going to be received.

I've included an article elsewhere in the newsletter about SD cards. Although the main focus was how Android phones use flash memory, it was interesting as well in regards to computer usage of the storage.

Until Apple comes out with the always much anticipated next gen iPhone, that's all the ramblings I have for now. See you at the meeting.

Rick

_____

Editor's note:
I saw Captain America Civil War and thought it was very well done. Much better than Batman vs Superman.

We also purchased a new 40" TV to perform the demos on. It was much less expensive than buying a new projector. I've had a chance to play with it for the past week and the picture is great.

Dave

High capacity microSD cards and Android

May 9th 2016

Gary Sims – AndroidAuthority.com

The whole 'does an Android smartphone need expandable storage' debate has been raging for many years and it has been a real roller-coaster of a ride. One year Samsung's flagships have microSD card slots, the next year they don't, then support is back again. Up and down, up and down. Google never seems to want to include microSD card support in its Nexus line, but the individual OEMs who manufacture the Nexus devices do include support on other handsets they make!

If you do have a smartphone that does include a microSD card then one of the first questions you are likely to ask is this: What is the highest capacity microSD card that I can use on my phone? And it is a good question, but the answer may not be as simple as you were hoping. To get to the bottom of this we are going to need to look at the different microSD standards, the different file systems supported by Android and by desktop OSes like Windows & OS X, plus we will need to take a peek into the murky world of patents.

microSD cards and the SD Association

Let's start with the basics. The standards for SD cards and microSD cards are defined by the SD Association. It was set up in 2000 by Panasonic, SanDisk and Toshiba to develop and promote memory card storage standards. Basically the SD Association makes sure all SD related technology (readers, cards etc) are compatible. At present there are three standards when it comes to the capacity of SD and microSD cards:

Type of card	Max Capacity	File System	Backwards Compatibility
SD	2GB	FAT32	SD
SDHC	32GB	FAT32	SD, SDHC
SDXC	2TB	exFAT	SD, SDHC, SDXC

So basically the original SD card standard supported cards up to 2GB. Then came SDHC which extended the capacity to 32GB and then more recently the SDXC standard was released to boost the capacity to 2TB. All the standards are backwards compatible, which means that a device with a SDXC support can use all three types of SD card, but a device with a SDHC support can only read SDHC and SD, but not SDXC.

When it comes to handsets you may have noticed that some OEMs will says something like this, "expandable storage via microSD card up to 32GB." what that probably means is that device has a SDHC compatible card reader. Technically any Android device which supports SDXC could advertise "expandable storage via microSD card up to 2TB." But because 2TB microSD cards don't exist (yet), most OEMs will say something like "expandable storage via microSD card up to 128GB" where the "*128GB*" bit could be a different capacity depending on when the device was released and what is the highest current microSD capacity that is commercially available.

FAT32, exFAT and Microsoft

As well as defining the physical characteristics of the memory cards, the SD Association also recommends how data is stored on the cards. If you imagine that the SD card is a block of storage space, any device that wants to read a file from that block needs to know where the file starts on the block and where it ends. It needs to be able to find that data from the file name (actually the full path name) and it also needs to know some information about the file's permissions, etc. The way the files are organized on a storage device is controlled by the file system. There are lots of different file systems. On Windows you are probably using NTFS, on OS X it is HFS+ and on Linux most likely ext4.

Back in the late 1970s Microsoft produced its first version of a file system called FAT (File Allocation Table). It was originally developed for use on floppy disks, however over the years it has found its way onto hard disks, DVDs, USB flash drives and SD cards. It was the default file system for Windows until Windows XP. There have been several different variations of FAT (mainly based around the size of the table elements in the allocation table). These different variations are known by the number of bits that can be stored in each table location. The original FAT used 8 bit entries, and is today referred to as FAT8, then came FAT12, and with the inclusion of a hard disk in the IBM PC AT we got FAT16. For Windows 95 OSR2 Microsoft released FAT32.

As you can see from the table above, FAT32 is the recommended file system for SD and SDHC cards. However FAT32 does have some limitations including a maximum file size of 4GB. While the idea of a 4GB file was probably unimaginable to people installing Windows 95 (from floppy or 650MB CDROM), today recording high quality video can easily create a 4GB file. To overcome these limitations a new filesystem was adopted, exFAT.

The Extended File Allocation Table (exFAT) file system is another Microsoft design, that was first introduced in 2006 as part of Windows CE 6.0. It allows for files that are larger that 4GB and it was adopted by the SD Card Association as the default file system for SDXC cards. For the testing section below I bought a 128GB microSD card from Kingston, and by default it was formatted using exFAT.

Since FAT32 and exFAT belong to Microsoft here we actually find how Microsoft is managing to make billions of dollars from Android. If an OEM wants to use FAT32 or exFAT it needs to pay a license fee to Microsoft. I am not one for conspiracy theories, but it is "interesting" how the SD Association used exFAT for SDXC. FAT32 is possibly understandable, it was the dominant industry standard, but exFAT was not used by anyone other than Microsoft, then all of a sudden every smartphone OEM, digital camera maker, media player manufacturer might need to pay Microsoft a royalty to support SDXC and exFAT… hmmm…
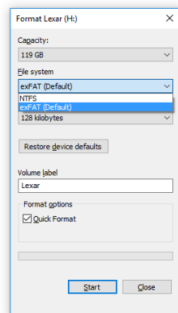
Interestingly Windows won't format SD cards bigger than 32GB using FAT32. However it is possible using third party tools. If you try to format a 64GB (or larger) USB flash drive or SD card under Windows you will have to choose between NTFS and exFAT.

Adoptable storage

Since we are talking about microSD cards, it is worth mentioning adoptable storage. Once a microSD has been inserted into a smartphone, the question aris-

es, how should Android use it? The simplest way is for the extra storage to be used for media like photos, music or videos, and treated in a similar way to a USB flash drive on Windows. The phone isn't dependent on the card in anyway and can operate with or without the card. This allows the user the freedom of taking out the card and using it on a PC, and then popping it back into the phone when needed.

However it would also be nice to have the option to use the extra storage as if it was internal storage and install apps on to it, plus store app data on it. This has been possible in the past with the various "move to SD" mechanisms; however it has one major pitfall, security. If I move an app over to the SD card and start storing my personal private data on that card then I open myself up to data theft. If someone removes the SD card from your smartphone they only need to plug the card into a SD card reader on a PC or laptop to get access to your unencrypted data.

Android 6.0 Marshmallow introduced the idea of *adopting* external storage so that it acts like internal storage. When a microSD card is adopted, it is formatted and encrypted to only work with that device. Now you can safely store both apps and private data on the card. One interesting feature of adoptable storage is that it isn't limited to 2TB like SDXC, but can actually use media up to 9 Zettabytes… Now, where did I put that 9 Zettabyte microSD card, I know it is here somewhere!!!

Flash drives and USB OTG

Although we have been talking about SD cards, it is interesting to note that much of our discussion also applies to USB flash drives. Many Android devices can connect to USB flash drives via a microUSB to USB OTG adapter. Like SD cards, USB flash drives can be formatted as either (but not limited to) FAT32 or as exFAT. Also the restrictions about file size etc apply equally to FAT32 formatted USB flash drives.

As I mentioned earlier, Windows won't format large USB drives as FAT32, you need to pick exFAT, rather than NTFS, if you want to have any chance of the drive working with Android. Having said all that, my 128GB USB flash drive (from Lexar) came pre-formatted as FAT32, which means it wasn't formatted using the built-in Windows format tool!

Testing some devices

To test the support for FAT32, exFAT, and SDXC I got hold of a 128GB microSD card and a 128GB USB flash drive. Then I tried to use them on a variety of different devices from the Raspberry Pi to a Sony TV along with lots of Android devices. This is what I found out:

USB flash drive formatted exFAT

For this test and the next one, I took my 128GB USB flash drive, copied some files onto it and connected it to a selection of devices, using a OTG adapter when necessary (i.e. for the Android phones).

Let's start with what didn't work. The Raspberry Pi running Linux won't read exFAT files and neither does a laptop running Linux. This is due to the licensing issues around exFAT, it belongs to Microsoft and while there are some open source exFAT drivers they aren't in the mainstream for legal reasons. However the exFAT formatted USB drive is recognized by Chrome OS running on my ARM based Samsung Chromebook. As you would expect Google and Microsoft have a wide ranging set of patent and cross licensing deals (which probably cover FAT32 and exFAT). They even recently agreed to stop complaining to the regulators about each other.

There were two other devices which I tried which didn't work with exFAT. One was my Sony Bravia (non-Android) TV and the other was a Motorola Moto G (2015) running CM 12. All the other devices I tested work fine including the Samsung Galaxy S7, Kindle Fire, Samsung Galaxy Note Edge (AKA Note 4 Edge), Asus Zenfone 2, OPPO F1 Plus, and Huawei Mate 8.

USB flash drive formatted FAT32

I reformatted the USB drive as FAT32 (using a third party tool, as Windows won't do it) and tried it again on the devices that had problems with exFAT. The good news is that the Raspberry Pi and my laptop running Ubuntu were able to read the USB drive without any problem. Which is to be expected really. Also my Sony TV had no trouble with the FAT32 formatted USB drive. I did a quick couple of tests to make sure that some of the Android devices could still read the flash drive using an OTG cable, and they could. The only device that still didn't want to read the drive was the Moto G running CM 12.

microSD card formatted exFAT

For the next two tests I used a 128GB SDXC microSD card. For the first test it was formatted as exFAT. I copied over some files and then tested the card in a range of different devices. Starting with what didn't work, the SD card wasn't recognized by the Xiaomi RedMi Note 2, the ZTE Star 2 nor the Elephone P6000. The latter two are running Android 4.4. KitKat.
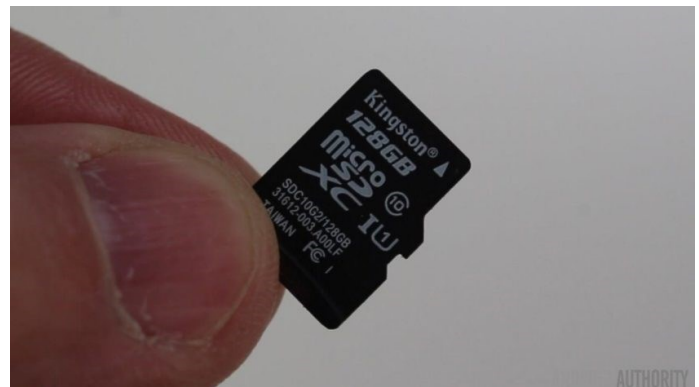
However the card worked perfectly on a bunch of other Android devices including the Huawei P9, the Samsung Galaxy S7, the Huawei Mate 8, the Galaxy Note Edge, the Moto G (2015) running CM 12, the ASUS Zenfone 2, the OPPO F1 Plus, Samsung Galaxy S3 Neo, and my Samsung Chromebook.

microSD card formatted FAT32

I changed the format of the microSD to FAT32 and tried the devices that didn't previously recognize the card and the good news is that they worked!

The Xiaomi RedMi Note 2, ZTE Star 2, and the Elephone P6000 all mounted the card and where able to read the files on it. As a side test, I reformatted the card again as exFAT an put it back into the Xiaomi RedMi Note 2. As before the card wasn't recognized, however there was a option to reformat it. When I did the RedMi Note 2 reformatted it as FAT32 and it worked!

I tried the FAT32 formatted card on a Raspberry Pi 3. The Pi was able to boot and install Raspbian (via NOOBS) from the card without any problems.

Wrap-up

So what does all this mean? Basically it seems that support for exFAT is the stumbling block for some devices. For a device to officially support large SDXC cards it must be capable of reading and writing to exFAT formatted media. During my tests I found several devices that don't support exFAT and so don't officially support SDXC cards over 32GB. However in every case where a device couldn't access the 128GB card with exFAT, I was able to reformat the card as FAT32 and it worked, even in phones that were 2 years old and running Android 4.4 KitKat.

Bottom line, if you have a microSD card slot in your phone it will probably work with large (>32GB) SDXC cards and if it doesn't then a quick reformat of the card to FAT32 will likely solve your problems. As for 2TB cards, when they do eventually come out, your phone should support those as well!

When water, coffee, or liquid spills on your laptop, do this

Work quickly and you might be able to save it.

Spilling water on a laptop may not be a disaster, if you act quickly.

Lincoln Spector | @LincolnSpector
Contributing Editor, PCWorld

An 11-year-old (whose name I won't reveal) accidentally spilled water on a laptop, and wanted to know how to clean it up before any parents found out.

Liquid and electricity don't mix. When the two meet, the liquid can destroy a great deal of electronic circuits. It can also send you a serious shock if you're not careful.

I'm going to assume here that you're not reading this on the wet PC. Best not to use it until everything has dried up.

[Have a tech question? Ask PCWorld Contributing Editor Lincoln Spector. Send your query to answer@pcworld.com.]

Immediately after the spill, make sure your hands, and the laptop's power button, are dry. Use a towel if necessary.

Turn off the computer…and I don't mean shutting down Windows properly. Press and hold the power

button. The computer will shut down completely after five seconds.

Next, remove any source of electricity. Unplug the AC adapter from the wall socket. Then remove the battery, if the battery is removable.

You're now safe from shock. Unplug anything else that's plugged in—mouse, cables, flash drives, and so on. Open and remove anything that can be opened and removed with relative ease. For instance, remove the RAM and the hard drive or SSD.

If the liquid was something that dries sticky, such as alcohol or sugared drinks, send it a professional to give it a thorough cleaning.

But if you just spilled water, you have a chance of drying it out yourself.

First, dry the outside thoroughly with a towel. Then clear off a table and put a fresh towel over it. Open the laptop as wide as you can, so that the screen and keyboard are on the same plane. Then put it, face and keyboard down, on that towel-covered table. Leave it there for at least a couple of hours so that the water can drip out.

Then put it all back together and see if it works. If it doesn't, take it to a professional.

By the way, I gave entirely different advice to the young reader who asked the question. I recommended confessing and apologizing for the mishap.

The hidden challenges of booting from a USB flash drive

Windows and even your motherboard could be obstacles.

Lincoln Spector | @LincolnSpector
Contributing Editor, PCWorld
John O'Brien's PC can't boot from a USB drive.

Every PC needs a way to boot into something other than the installed operating system. Removable boot media allows you to repair your Windows installation when Windows itself has become unbootable. It provides a clean environment for malware scanning and removal. It also allows you to try out various flavors of Linux without having to install any of them.

Not that long ago, almost every PC had an optical drive, and booting from a CD or DVD was simple. But optical drives are becoming rare, and the only alternative boot media we have uses USB—usually a flash drive. And that can cause trouble.

[Have a tech question? Ask PCWorld Contributing Editor Lincoln Spector. Send your query to answer@pcworld.com.]

Today's PCs come with a lot of protection—which is good—but it can get in the way. Somewhere in your BIOS setup screen, you'll almost certainly find a Secure Boot option. If you can't boot from a flash drive, turn it off. (The method varies from PC to PC, but Chris Hoffman offers some general guidance in his article on installing Linux on a PC with Secure Boot.)

Another issue: Most of today's motherboards use UEFI instead of the old-fashioned BIOS, and an operating system that doesn't support UEFI may not boot. Most motherboards support a *legacy boot,* but some PCs lack that option.

Finally, most of today's PCs boot immediately from the internal hard drive or SSD, without looking for bootable external media first. You have to do something special to make them look, and what you have to do depends on your PC.

For instance, on my Lenovo X220 laptop, I press the power button, then repeatedly press and release **F12** until the boot menu comes up and I can pick the appropriate option. But before I could make *that* work, I had to enter the BIOS Setup (**F1**), make sure that that UEFI/Legacy Boot was set to *Both,* and that the UEFI/Legacy Boot Priority was set to *Legacy First.*

I have two other Windows PCs, and each has its own unique way of doing essentially the same thing. One of them, a ASUS Transformer Book T100, lacks legacy boot capabilities. I can boot a Windows 10 recovery drive, but not most Linux distros.

So what should you do? Go to your favorite search engine and look up the name and model of your PC (such as `Lenovo X220`) and either `"usb boot"` or `"flash drive boot"` including the quotation marks.

You'll likely find useful instructions. I strongly recommend that you do this search, and test the instructions, when your PC is healthy. Then save the instructions where they can be easily accessed even when your PC won't boot.