AITS Newsletter

Declarative or Imperative Language
[Abraham John, Executive Director, AITS]

The first computer mouse was unveiled in 1968 by Douglas Engelbart.

I have been toying with the idea of picking up another language and the usual path would have been an imperative language. However, after some consideration and my penchant for opting for "pain for the gain" I have decided to go down the path that I have not travelled since last century and learn a declarative language.

You may be wondering about the differences between the two types. At a very high level, declarative languages are typically cleaner, better specified, and far more powerful once you have more than just a passing familiarity. Think of this as a set of true statements about something. Examples of declarative languages would be Haskell, Prolog, SQL, CSS, HTML, and XML among others. Conversely, imperative languages leave more of the work for the programmer to define the sequence of steps, like a recipe. Examples of imperative languages are C, C++, PHP, and Assembly among many others.

An example using Java, an imperative language, to sum the values from 1 to n. We get the result by changing stored values i.e. a sequence of assignments.

```
int total=0;
int n=5;
for (int count =1; count <= n; count++)
        total = total + count
```

Performing something similar in Haskell, a declarative language, looks markedly different. The difference here is applying functions to arguments.

```
n = 5
sum[1..n]
```

Since completing a PowerShell course a bit ago and continuing to use it productively in the work environment, I admit to feeling a certain yearning for newness that, surely, learning a declarative language will fill ☺. I am certain, the reader has felt similar yearnings for such endeavors and will agree with me! If you are wondering what my choice for declarative languages will be… it will be Haskell, which is also a purely functional language and comes under the declarative programming style. I look forward to exploring all the wonderful qualities of the Haskell language – nice holiday treat-   Yaaay for me ☺.

I want to take this opportunity to congratulate and thank the EIS team and the functional areas under Enrollment Management, Student Accounting, and others involved with the Campus Solutions 9.2 upgrade. Thank you for a complex job well done!

As you read the articles included in this issue of our newsletter, get a chuckle out of fluff pieces like this one, and take a swing at the brainteaser, we in Administrative Information Technology Services (AITS) wish you a happy and safe holiday season.
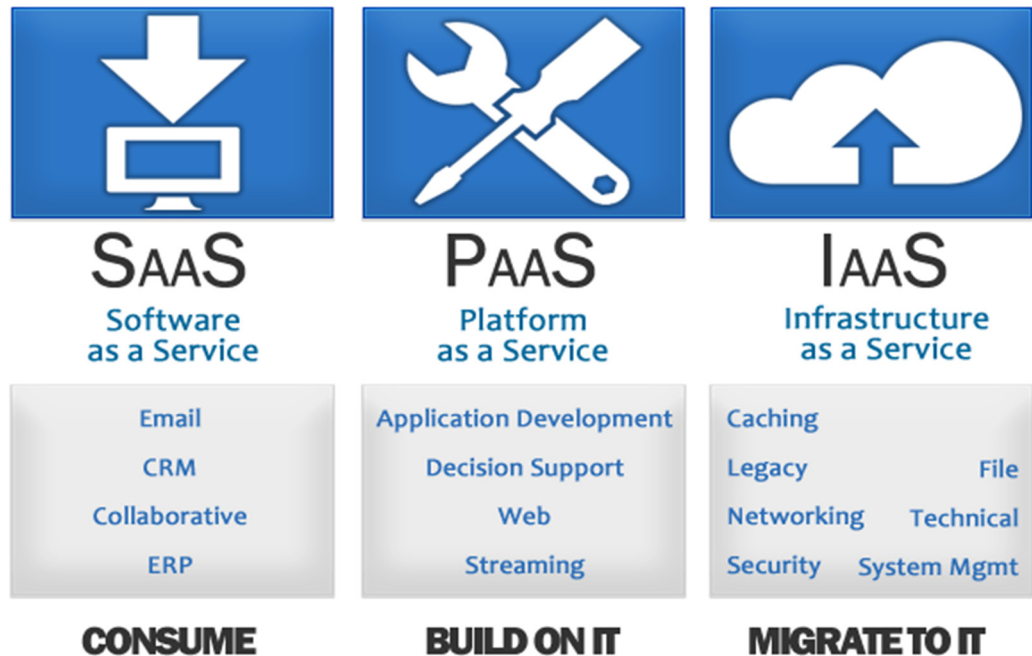
Platform as a Service (PaaS)
[Dorothy Flores]

So, what is PaaS? It is a cloud-based, integrated solution platform stack for application development, generally hosted by a third-party service provider. Basically, it's a set of technology components combined together into a platform that are needed to deliver a fully functioning software application, including databases and application management tools, utilizing cloud-based "Infrastructure as a Service" (IaaS) for storage, servers, network core, etc. It may also include programming code version-control (storing all prior versions of a program) and a means to migrate code from a development to a testing environment, and then deploying to production for business use.

The following is a high-level representation of PaaS relative to "Software as a Service" (SaaS) and "Infrastructure as a Service" (IaaS), which shows that it's really just a tool, or set of tools, to build software applications.

SaaS	PaaS	IaaS
Software as a Service	**Platform as a Service**	**Infrastructure as a Service**
Email	Application Development	Caching
CRM	Decision Support	Legacy / File
Collaborative	Web	Networking / Technical
ERP	Streaming	Security / System Mgmt
CONSUME	**BUILD ON IT**	**MIGRATE TO IT**

Source: Bing Image Search via MSWord

Most current PaaS solutions are designed to provide ease of use and flexibly in the design of the desired application. Many of them will give the developer the ability to build simple applications using "drag and drop" features, or more complex functionality like integrating with other software applications and other organizational technologies, like Active Directory, LDAP, Shibboleth, etc. Potentially, use of a platform like this could also reduce the time from development to delivery to the customer.

To provide some context, most of the application development work performed by ITSS Enterprise Applications has been done within the confines of our ERP system (EIS), called Oracle PeopleSoft, which includes the student information system (Campus Solutions), financial system, HR/payroll/ELM systems, and portal (my.unt.edu). Although not a cloud-based solution, PeopleSoft does provide some of the same capabilities as a PaaS because it is a vendor delivered solution, and provides structured tools for development, as well as routine patches to keep the application functionality and security maintained. Since not all business needs can be addressed using something like PeopleSoft, a PaaS solution may be an answer for handling other types of needs, like those unique to a specific department or business function.

Platform as a Service can be a great tool for addressing business needs, while

providing the guardrails to ensure development is done in a secure, structured, and maintained environment, but it's not panacea that will magically solve all the potential application development problems. Because it is still possible to write bad code and create poorly designed applications, it will take competent and trained technical staff to understand and utilize the tools effectively.
Careful planning, detailed requirements, and good design leading up to that development work are key to delivering a successful application.

One great benefit for using a PaaS is the maintenance of the solution provided by the vendor. As can happen in any organization, the potential exists for application development to be done by a staff member or contractor that may meet the business need but isn't necessarily secure, compliant, or maintainable for the long-term…especially when those individuals leave the organization. Running a business critical, independently developed application on someone's desktop can be a risk to the organization and potentially introduce a vulnerability to hacking, leaving business critical data or other systems exposed to the outside world. Without the option to use a PaaS solution, developers also open themselves up to creating software applications that won't run on existing hardware or operating systems, over time. A vendor- managed solution helps to reduce these risks to the business.

PaaS technology has been around for a few years now and continues to grow in popularity for obvious reasons; primarily for its flexibility, reduced maintenance risk, and potential reduced cost. It is the wave of the future for application development outside of an ERP system, like PeopleSoft, or other vendor software products that may not be designed to allow for enhancement or customization. All PaaS solutions are designed to quickly and efficiently deliver software applications; some come with IaaS included, and some without. However, one thing is for sure, there are many PaaS to choose from and the list keeps growing, so this approach to application development will be around for many years to come, fostering the ability for innovation to address ever-changing business needs.

ITSS Enterprise Applications
News Briefs

Campus Solutions 9.2 Technical Upgrade – Success!
As I'm sure you are all aware, the upgrade of the Student Information System (PeopleSoft Campus Solutions) from version 9.0 to 9.2 was a complete success. Months of preplanning and preparation leading up to a nine-month long project resulted in a successful go-live by Monday morning, November 26. It was truly a team effort, which included functional staff across all three campuses in Admissions, Registrar's Offices, Financial Aid, Student Accounting, and Advising, as well as EA technical teams from Student Administration Systems and EA Technology Services. But, this doesn't account for all of the groups and other individuals who had some part in this project, so I would sincerely like to thank all who had some role in the upgrade and contributed to its success. All of your efforts, no matter how large or small, were greatly appreciated. We have some of the best partners at UNT, who brought a wealth of knowledge, expertise, and commitment to this project. Thank you, again, for your hard work and support. It truly was a team effort…!

Update on Fluid – The New User Interface for PeopleSoft
For those who read the article this past spring about the PeopleSoft upgrade, you may remember some information about the new Fluid user interface being delivered now by Oracle for all PeopleSoft applications. The Campus Solutions Steering Committee has made the decision to have Fluid rolled out for student and faculty self-service through MyUNT in the Fall of 2019, so watch for more communications about that initiative starting mid-next year. If you want to see a preview of what Fluid looks like, log into MyUNT and click on the Learning Portal in the Human Resources tab to see Fluid in action.

Enterprise Apps EIS Fun Facts

Number of student accounting journal entries **processed in** FY18: **16,290,929.**

UNT **received over** 50,000 **applications for** admission **in the past year.**

There were 23,532 PO requisitions **entered and approximately** 54,600 accounts payable checks **produced in** FY18 **out of the Finance system.**

In FY18, **there were** 33,402 **ePARs processed and over** 190,000 **payroll checks issued to faculty, staff, and student workers.**

The History of Wi-Fi at least at UNT
[CR Chevli]

In 2003, UNT began a pilot project for Wi-Fi for our campus. Originally, a small number of Cisco access points and a couple of Bluesocket wireless controllers were installed in order to support various designated "hotspots" on campus. These "hotspots" were large gathering areas used by students, such as hallways and lounging areas. The Wi-Fi system was invoked as a "convenience" network accessibility system where students could use their personal devices without having to attach to the campus network or use the machines within a number of crowded labs across the campus.   This service quickly became popular, not only with students but faculty and staff as well.

During the spring of 2006, we were approached by our current Wi-Fi vendor Aruba, whose products brought a number of features and flexibility to our Wi-Fi implementation. The first Aruba controller and access points were installed at the then new UNT Dallas campus. All areas of the building were covered with Wi-Fi and now used within the classrooms. With the number of personal devices doubling and later tripling, it then became clear for the need of Wi-Fi throughout all of our campuses.

By the beginning of 2009, we had installed 750 access points throughout our main UNT campus, UNT Discovery Park, and UNT Dallas. At that time, funding for a three million dollar campus-wide upgrade of Wi-Fi was allocated. This was to enhance all classrooms to a capacity and performance level second to none with most of the larger universities across the US.   Along with a technology refresh during the upgrade project, we have now increased our number of access points to over 2100. We currently have active construction projects which will push this number over 2500 by the end of spring semester of 2019. We also have multiple controllers which have been set up to handle many of our changing needs. Though the system has a lot of varied moving parts, it has been carefully designed to provide a seamless feel for connectivity across all of our campuses. We now provide campus Wi-Fi for not only the main UNT campus, but also UNT Dallas, UNT System and Law Office (downtown Dallas), Frisco campus along with Inspire Park, Woodhill Square, and UNT Discovery Park.

Today, a number of new applications are being used across Wi-Fi for instructors to teach classes. Reef Polling, a mobile polling technology is just one example. It allows students to use their laptops, smart phones, or mobile devices to respond to questions posed by their instructors in class. Many spaces on campus which were unused before are now used as study areas, impromptu group meeting and collaboration areas, and even extensions of space for many campus labs. While the bulk of the clients we see on the system are phones, laptops, and tablets, we also have robots, sensors, cameras, media displays, mechanical and lighting controls, ticketing scanners, etc. On average, we are seeing over 20,000 clients simultaneously using the campus Wi-Fi system. This has grown approximately by 2000 clients each semester over the past few years as illustrated in the graph below.

Clients ⌄   Sources ⌄   Max   Avg

Total Clients
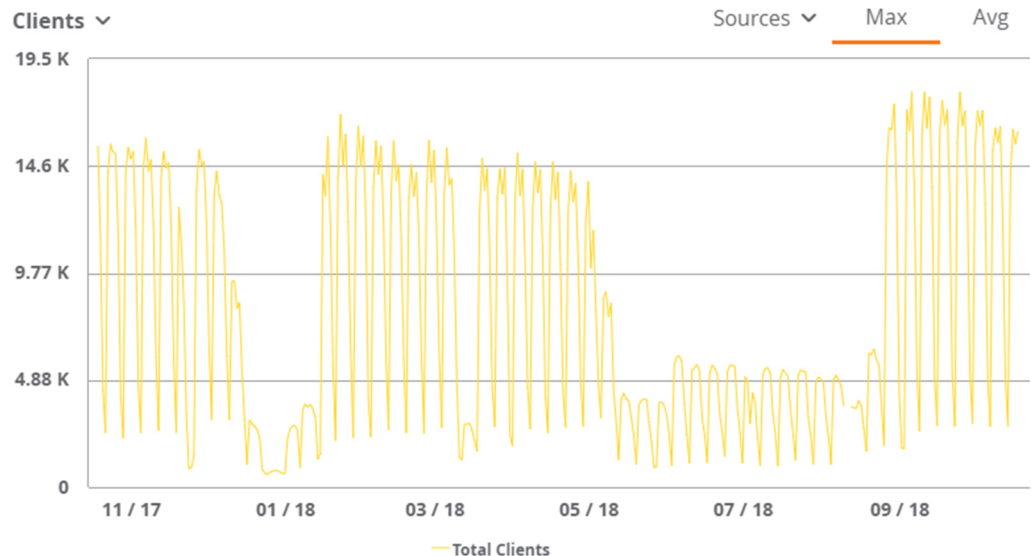
As the changing of technology marches on, we consider the UNT Wi-Fi system to be an "ever evolving entity". Changes to security/encryption and authentication methods have changed over the years and will continue to do so. Many changes have come about with the radio design and enhancements adding both speed and capacity to the system. New things are already on the horizon, such as the introduction of WPA3. Rest assured that as these changes arrive, UNT will be in the forefront to stay current with our campus Wi-Fi system.

Some "Best Practices" for using Wi-Fi are:
- Go to wifi.unt.edu for the latest updates and configuration information.
- Don't set static IPs or DNS servers
- Refrain from using a My-Fi device or "tethering" of your phone while on campus
- When reporting an issue, always provide the time, date, and location of the issue, as well as the EUID of the person experiencing difficulties. This will help us to isolate any log data that may help to resolve the report.
- If possible, adding the MAC address of the device to a ticket will help isolate issues more quickly. This information is usually found in the device settings. For example, on an iPhone go to "Settings>General>About" to find the Wi-Fi address (MAC) of the iPhone. It will be twelve alpha-numeric characters separated by colons like this 6C:72:E7:9F:88:6B
- If you are new to the University you may be able to connect to Wi-Fi, but not get internet due to processing delays. Send us a ticket and we can fix this issue immediately.
- Guest accounts are available for UNT events. Please contact the Helpdesk.
- Eduroam is available for students, faculty, and staff who are traveling to a participating university. Please see our webpage for details, wifi.unt.edu.
- Devices like laptops for the visually impaired can be set up to auto-authenticate to eaglenet.

We strive to resolve all trouble tickets as quickly as possible. Sometimes an issue may be system wide but many times it is localized to the client's machine. Please check your wireless settings with the suggested settings on the Wi-Fi website. Also, it is good to run a virus scan on your system (Apple and Windows OS). Also, check with the helpdesk to verify that your EUID is correct and active.
UNT Wi-Fi Team

Neural Networks and Deep Learning Systems
[Daniel Griffith]

Computers have been assisting humanity with tedious tasks for more than half a century and we would not recognize the world without them. Nearly every powered appliance in our homes is programmed by someone to perform its specific task very efficiently. They are seemingly applicable in every career field and help us organize our everyday activities. Complicated mechanical systems have been replaced by digital devices that replace many of the task's humans were required to do, and although computers have changed our world and are very efficient at their specific tasks, they are limited to what their programming allows. A computer can carry out its functions with amazing speed, but it's limited to a small set of actions it can perform. It is seemingly capable of running a lot of tasks but is very slow when compared to an organic brain. Each one needs to be directly programmed by a human programmer and typically cannot learn new tasks. A programmer typically specifies and defines each task for a program, and each decision is based on manually input parameters. The end program is static and cannot grow or adapt on its own. It was thought that all programs would be static, like mechanical systems before them, until a couple of researchers in the 1940's proposed a new way of creating artificial intelligence,

Warren McCullough and Walter Pitts began their research in Chicago studying cognitive science and would go on to work as directors of the Artificial Intelligence Laboratory at MIT. Though their research on machine learning would prove to be invaluable towards the end of the century and beyond, they were unable to put their theories to the test during the mid-20th's century because of the lack of computing power at the time. Their research became the basis for neural networks and AI learning, which continued for a few decades until was finally able to be put to the test. In the 1980's CPU's became much faster and were finally capable of processing millions of nodes that make up a neural network. Neural networks are layers of nodes that can learn by running though millions of simulations until a goal is achieved. The nodes are set in layers and are given thresholds that need to be met before passing data along to the next layer. Connecting the nodes, are adjustable values called weights. Each of the nodes makes a small, random calculation based of the weight given, then passes the data to the next level of nodes. The weights are constantly adjusted, and these simulations are run over and over until the result is consistent with the given goal. This process was how McCullough and Pitt thought an organic brain learned and processed information, with our organic neurons acting as the nodes.

McCullough and Pitt's field of research, which started in the 1940's, is now being put to use creating programs that perform tasks that were once thought near impossible for a computer to carry out. Machine learning and neural networks can be used for a multitude of purposes. Machine learning was originally tested by training a program to master traditional games, such as checkers and chess without someone entering each possible decision. Impressive as that was at the time, Neural Networks have become much more useful in our everyday lives in recent years. Speech recognition on our mobile devices is a good example of using neural networks to improve a program. Artificial chatbots use similar algorithms as well, learning with every new conversation. Each conversation is stored, and the data used to create a more, believable AI that users can chat with. These AI's are designed to improve over time, using the dialog we give them, so they can recognize patterns in how we converse. Soon, AI chat could be a responsive and adaptable as a human.

As AI learns to become more reliable, the applications are seemingly endless. AI driven machines are replacing the work people used to do all the time. The limitations of AI today are mostly jobs that involve a lot of mental and physical dexterity. There are many jobs where we cannot trust a pre-programmed machine, such as surgery. These are tasks which have so many variables that they are even hard to predict for a human without a lot of training. They require much more adaptability and that is where deep learning AI specializes. One such system, named Dactyl, is designed to learn how to manipulate various objects with a robotic hand until they are aligned in a desired way. The alignment is the goal and the hand

perform many, seemly random actions until the object is set in the correct state. Every attempt, the system learns a little more about how to efficiently manipulate the object until it can perform it as fast as possible. Neural Networks like this are also even being used to train AI to create unique images from simple words or drawings. These types of AI are specialized in image processing and are able perform amazing tasks. A system called Image to Image can take a simple drawing and create a realistic image. Another system, Plug n Play generative networks, can create a unique image from just a short description.

System's like Dactyl are moving us closer to a world with robots that perform jobs only a human could before, but they certainly have a far way to go before they mimic true, human intelligence and perform all the various tasks we can. The tasks they are given can be carried out very efficiently, and although we may one day get to live in a world where just about everything can be done by a computer, they can still only achieve the goal we set for them. The freedom of each AI is always limited to the capabilities we give it to carry out their task. Neural Networks and Deep Learning AI may seem complicated, but the truth of the matter is, just as humans need fail and learn over and over to perfect a task, so does a flexible AI system.

The first 1GB hard drive was announced by IBM in 1980 and it had a price tag of $40,000.

The Impact of Smart Home Technology
[Leah Atinda]

"Smart Home" is the term commonly used to define a residence that has appliances, lighting, heating, air conditioning, TVs, computers, entertainment audio & video systems, security, and camera systems that are capable of communicating with one another and can be controlled remotely by a time schedule, from any room in the home, as well as remotely from any location in the world by phone or internet. How does this impact our day to day live? It does greatly change how we do our duties as an end user of the smart of and the people who happen to be involved to make it to work.

A decade ago smart home where you can control many appliances, lighting and security systems remotely via smartphone seemed to be futuristic science fiction. In the Forbs Magazine of Jan 12, 2018, says 2017 proved to be the year of smart home, technology in this market of smart home continues to grow and it is predicted that by 2022 the technology in will reach $53.45 billion. As we see all this go on they are many questions and expectations that will need to be addressed, interestingly development has its own challenge and impact to various areas. On this article I will address a few of them. In fact, a 2015 survey by YouGov found that only 37 percent of respondents who own smart home devices felt adequately secure with them. Before smart homes can be truly embraced, security needs to be improved dramatically. Ultimately, there is no doubt that consumers want what smart home technology offers, but there are many challenges that must still be solved.

The other concern that seems to be a concern homeowner data sharing and security of data sent in the process. For example If your fridge is set up to order the food you need or setting lights, or setting your crock pot or oven to cook your food so that it is ready when you get home, and preferred temperature for your arrival, the list is long but for sure these data will be of great interest for many companies, at the same with all the security breaches being experienced lately how does that affect the homeowners? As the smart home tech will continue to become more accessible and inexpensive to the mainstream there is more commercial smart building which will greatly have an impact on technology will be implemented.

Many times, people look at the smart home as a convenience but as much as the smart devices do add to convenience the key benefit or impact is energy saving which in turn will safe home owners money. Just a thought if home owner confirms they have saved in their electric bill for having smart thermostat and light, is it possible they will be spending more to get more smart devices? Just a thought and this brings a second question how does the new device interact with the smart system set up?

The help desk strategies and how to troubleshoot is greatly going to be impact as we get to better understand smart home and be prepared to address issues that come up because of the smart home set up. We have more devices coming up to support and make the smart home more affordable to the middle class and lower class economic levels. This includes google home, Alexa and Amazon Echo to name just a few. The integration can easily break or make this much better. This is food for thought on how IT is changing every day and especially the security side of it needs to address issues a raising from this technology. This also will affect the way policy makers will lay rules and regulation to be able mitigate the perceived risks and operating standards. The future of smart home is no longer a hoax it is transforming how people live all this becomes the IoT or the Internet of things as Prof. John Barrett on TED talk (interesting to listen to him). He confirms how IoT is improving lives and society, smart house is part of this innovation and it is unstoppable, we need to be ready to face it or adapt to fit in, in this new world.

The Mirai Botnet: An Origin Story
[Hayden Samuel]

Malware has existed since shortly after the dawn of the computer era, in fact the first self-spreading virus was created in 1971 by Bob Thomas of BBN Technologies. Since then, millions of different pieces of malware have been discovered. Stuxnet, WannaCry, Cryptolocker, Zeus and Mirai are a few examples of malware that have reached infamy. On October 12, 2016 the Mirai botnet took down a major DNS provider using a DDoS attack which brought down hundreds of websites such as Twitter, Reddit, Amazon and others. So how did the inception of Mirai come about? It all starts with a broke college kid, his two friends, and Minecraft.

Paras Jha was a student at Rutgers University in the Fall of 2016. At the beginning of that semester Jha decided to test his homebrewed botnet against Rutgers' central authentication system. In an attempt to be paid for his work, Jha offered to 'fix' the University's problem in exchange for a job. After that plan fell through, Jha used his botnet to DDoS Minecraft servers for profit. Later that semester, Jha and his friends found the secret to creating a botnet so powerful that it can take thousands of the top websites down simultaneously.

Jha knew something that many people have overlooked: The Internet of Things had no security standards. Millions of internet enabled devices such as home routers, IP cameras, wirelessly controlled lights have minimal to no security systems and are shipped using common default passwords. Mirai targeted these devices, and with a list of only 61 default usernames and passwords it was able to take over 8.4 million devices. Jha was eventually caught and sentenced, but the gates had already been opened. The source code for Mirai was publicly published before Jha's arrest and since then it has spread like wildfire.

What can be done about this? How do we stop this from happening in the future? For starters, manufacturers should stop shipping devices with publicly known passwords.

Sources:
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https://www.incapsula.com/blog/malware-analysis-mirai-ddos-botnet.html
 https://money.cnn.com/2016/10/21/technology/ddos-attack-popular-sites/index.html

The Water Integrator was an early analog computer built in the Soviet Union in 1936 by Vladimir Lukyanov.

Need a lift?
[Deana Currier]

Have you ever left your house, got a few blocks away and wondered "Did I close the garage door?" Or perhaps you've had family show up unexpectedly at your house while you were at work and needed to figure out how to let them inside. If so, then a smart garage door opener may be for you.

There are several options available that you can install to make your existing opener "smart". These usually include a controller that you attach to the opener as well as a sensor that will tell the controller whether your door is open or closed. Or you could opt to replace the whole unit with an opener with built-in Wi-Fi capabilities.

After connecting the opener to your home network, you'll be able to monitor your garage door away from home, open or close it remotely or get notified if the door was opened unexpectedly. Some models even work with Alexa and Google Home to let you open and close the door with voice commands or can automatically adjust your smart thermostat when you leave.

Whichever route you choose, smart garage openers can give you peace of mind and are an added layer of home security.

The first word to be transmitted over the Internet was "lo" – meant to denote "login" but the system crashed before transmitting the complete message.

Is your Home's Wi-Fi ready for the Holidays?
[Frank Oliver, Jr.]

It's that time of year. The time of year for holiday festivities and family visits. If it's your turn to host the holiday dinner the last thing you want to worry about it the Wi-Fi. Did you know the average person has 5 Wi-Fi devices? Ok, Ok, Ok… I know you're thinking "no one person will bring 5 devices to the holiday dinner" Maybe not 5 per person but 5 devices per family is not out of the realm of possibility. You got the cell phones for the adults and teens, IPad and tablets for the kids. And the first thing everyone wants to know is the Wi-Fi password. Wait a minute…don't forget you still have your own devices on the network (i.e. Fire stick, Apple TV, Smart TV, laptops, ect…). With all these extra devices it could seriously affect your Wi-Fi speed.

I introduce to you the Tri-Band Wi-Fi router. I know you're thinking "What's the differences between a Dual-Band and Tri-Band router?" Well the Dual-Band router has one 2.4 GHz and one 5 GHz band. The Tri-Band router has one 2.4 GHz band and two 5 GHz bands. With two 5 GHz bands the device acts as a load balancer. Let's say you have two devices in your home and both are using a lot of bandwidth at the same time — the router would place each of them onto a separate 5 GHz bands and neither would interfere with each other. More bands means less interference. After all, each of those 5 GHz networks can be on a different wireless channel. Which can be a game changer when you have family and friends over.

Is the Tri-Band router right for you? Well, if you have multiple devices that use Wi-Fi in your home network that stream simultaneously, this maybe the device for you. I have a Mesh Wi-Fi Tri-Band router at my home and conducted a very unscientific comparison. I tested network speeds with a Dual-Band and a Tri-Band device speed under my family's normal load vs. when we have guest, with a 150 Mbps FIOS internet connection. We have 20 Wi-Fi devices normally connected to my home network under normal conditions. I had some family and friends over which added an additional 18 devices. I tested the Wi-Fi speeds before and after my guest arrived.

With so many new devices added to the network you can see there was a clear difference. Kids streaming Netflix, on-line gaming, and of course You Tube. The Tri-Band device performed much better than the Dual-Band device under the increased load. With the Dual-Band router there was a noticeable speed difference and at times we experienced that dreaded buffing icon, which didn't happen with the Tri-band device.

Do you really need this? Maybe, maybe not… but I know the last thing I want someone complaining about is the Wi-Fi. Yes I know "First World Problems" but it is one less thing to worry about this holiday season. These routers can be a little pricey, so do your research before investing in a Tri-Band device. Take note of that last bit—if you're in a studio apartment rocking a laptop, a smartphone, and a

The first computer, which was a mechanical computer, had no RAM.

gaming console, sticking with your dual-band router is probably a safe bet. But if you plan on Netflix-ing 4K movies downstairs while your spouse streams recipe videos from a tablet in the kitchen, your kid's Pandora station never stops, and your guest harbors a World of Warcraft addiction, it might just be time to add that third traffic lane to your home's Wi-Fi freeway. Under normal conditions a Dual-Band router will work just fine but under heavier loads the Tri-Band router performs better.

The trackball, invented in 1946 by Ralph Benjamin, was originally designed for a fire control radar plotting system.

The Kids can Teach Themselves
[Jason McMullen]

While at Educause a few years ago, I was fortunate to attend a talk hosted by Sugata Mitra. A researcher and educator from Calcutta, India.

While working at a research facility in New Delhi in 1999, He took great interest in how society felt regarding the lower income families that lived in poverty directly outside the facility. As an educator, he wanted to provide education to the children of the village, but was discouraged by his contemporaries. They felt that it would be a waste of effort because most of the village was illiterate, involved in gangs, and he was told they didn't have a desire to learn.

It was Dr. Mitra's assertion that remote areas, like where this village was located, could not attract or retain good teachers. Dr. Mitra saw this as an issue because he felt these areas would especially benefit from better educational opportunities. He constructed an idea he hoped would solve the problem:

Dr. Mitra decided to cut a hole in a large wall that separated the facility that he worked at from the village. He embedded a computer, monitor, and peripherals into the hole and connected the computer to the Internet. He put no restrictions on the use of the computer and gave no instruction. The children in the village previously had little education and hadn't seen a computer before. He watched as the children taught themselves and then each other how to use the computer. They wildly advanced over days, weeks, and months in their ability to recall information through the Internet.

After reproducing the experiment at various places all over the world, his conclusion was plainly seen: Groups of children can learn to use computers and the Internet on their own wherever they lived.

When author Arthur C. Clarke heard of these experiments, he knew that a very simple and powerful concept had been succinctly demonstrated: If children have interest, then education happens.

While unmonitored access to the Internet for children isn't advisable in today's age. Some of the results from these experiments are extraordinary. It demonstrated a self-organizing system. For further details on the outcomes and other stories from Dr. Mitra, please see his various Ted talks and publications.

The Scroll Lock (ScrlLck) key is the least utilized key on a keyboard.

Buying a new TV anytime soon?
[Christopher Horiates]

One of the mainstays in most American households is a TV. Since the first TV in 1926, to the first color TV in 1951, TV's have come quite a ways from the early days. From a simple TV that had "rabbit ears with aluminum foil" to now Digital, 3D, HD, UHD, HDR, 1080, 4K, 8K, Smart TV, LCD, DLP, QLED and OLED….. The tech and features seem ever expanding. As a consumer, you have so many options to choose from and if you are not up on what all this means you might over buy or under buy what you are needing or wanting to meet your TV needs.

If you simply want a TV and the picture quality (color, contrast, refresh rate, screen size etc….) are not important to you, then any new TV for a few hundred dollars will meet your needs most likely. However, if you are one who enjoys researching and having knowledge and information before a large purchase then the point of this article is to help educate you in buying your next TV.

When buying diamonds the industry rule is look for the 4 C's. Cut, Color, Clarity and Carat. That is what makes a diamond. Go to a jeweler and look at some low end and high end based off the 4 C's and you will see a difference.

Now when it comes to TV's there is no rule that I am aware of, but when I shop, I consider these what I am looking for. Size, Screen, Technology and Features. In addition, where you buy is important. Going to just any store that sells TV's, sure you can find one and buy it on your own. However, going to a higher end retailer who have trained professionals on all of the products is worth the time and perhaps slight increase in money to get what you truly need and want.

Size – Yes, screen size does make a huge difference when buying a TV. Bigger is not always better. You need to buy a screen that fits your room. If you get a TV that is too big and you sit too close to it the picture will not look as crisp as it should. Of course, budget is the deciding factor, but if you go to certain electronic stores, they have trained staff who will be able to determine the right screen size for the room. There are also websites, the TV manufactures and such, which have this information.

Screen – When HD TV arrived to the masses and 1080P became the standard we asked could it truly get any better? Well yes, now we have 4K and 8K will be coming out soon. While this sounds great and the newer TV's will upscale content to a higher resolution you are not truly getting native 4K or 8K unless the original content was recorded in that resolution. 4K is just now starting to show up on broadcast based services. You can also get it with Ultra HD players. Some online services like Netflix and YouTube offer 4K content too. So for now a 1080P TV with the correct setup will suffice for the vast majority of content. If you want to spend the money on 4K and be ready for some current and future content, I would say as of today it would not be a bad investment. In fact in today's market, it is almost hard not find a 4K TV. 8K, unless you just have to have the latest is not worth the purchase quite yet, in my opinion, when it hits the market. Now if you really want to get technical when buying, not that this is much of an issue anymore, but contrast ratio and refresh rate do matter. I will leave that up to you to discuss with the person helping with your purchase if you want to discuss this. Small secret, the best-uncompressed HD Content you can get is using an antenna on your TV and picking up the local HD Broadcasts. If you have not tried antenna TV in quite some time I highly recommend it for the quality and the sheer amount of channels there are now. Moreover, it is free!

Technology – I broke this out from the screen paragraph because I am not talking about resolution and contrast but instead talking about the technology that makes your TV work and the type of screen you have. CRT, remember those large 100lb TVs that were only 30" in size? Those giant computer monitors that took up half your desk? When is the last time you saw one of those? Not too long ago Plasma, LCD and DLP were all the rage. This allowed TVs to get thinner, larger and started the HD boom. While those are still around if you go looking, if you want to go with the latest and newer technologies are QLED and OLED. Quantum Dot Light Emitting Diode (QLED) tends to have a better value for screen size and good colors, but for

the best picture Organic Light Emitting Diode screens are where you will see the greatest increase in price but you get what you pay for. While both look great, see if you can get two side by side running the same content for a comparison. If they are setup correctly and running the same content there will be a difference. It really comes down to what looks best to you, as you cannot go wrong with either one. One advantage both of these technologies offer is very large screen sizes and extremely thin and lite weight screens. They also consume much less power than older TV's and do not get hot. Overall if you have your TV on for extended periods these will save you on your electric usage over time.

Features – This all comes down to how connected you want your TV. Most TV's now have built in Apps and other services like mirror casting and such. Some have more than others do and different features. If you happen to have a Samsung Products at your home, like a newer Samsung Phone, if you get a Samsung TV, you can natively control it with the Smart Things app. I have also been able to stream the TV picture to my phone and watch TV on it. Of course other TV's might have apps you can download onto your phone that do the same. That being the case this all comes down to are you needing a TV to be the center of your home and have everything hook into it or are you looking for something to put out in a garage to have background on while working on something. You really cannot go wrong with all the features but sometimes too many is too confusing for some.

I hope you have found this article informational and helpful. Who knows what the next big thing in TV watching will be? Maybe it will not be a TV we place on the wall but instead we wear on our head like a VR or MR unit. That or we just all are placed into pods like in the Matrix and live our lives virtually. Until then enjoy the technologies we have out as there has never been a better time to enjoy movies, sports and live TV in the comfort of your home.

Protecting Your Kids from Technology
[Matthew Trammell]

Technology is an extremely fast-growing field and each day it continues to become more a part of our lives whether for the good or for the bad. It is indeed interesting to stop and think about how far technology has come over the years and how it has benefited us as a society. When new technologies emerge, we are eager to use them how they most benefit us. We are quick to learn new technology and apply it to our lives… well, reasonably.

Our kids, the next generation, are much quicker and more adept at this. I have a 3-year-old son and a 1.5-year-old daughter. It still intrigues me how they can pick up an iPhone or tablet and start interacting with their apps. My son has mastered our TV and Roku remotes. He can turn on the TV, grab the Roku remote, pick the app he wants (between Netflix, Hulu, or Noggin), log on to the Kids profile, select and play his show. My daughter loves the Starfall app and oh my goodness if you try to pull the phone away! I agree that technology is awesome too! Kids should continue to learn about it and immerse themselves in it. After all, it is my livelihood. However, **it is said that with great power comes great responsibility.**

 Technology is indeed powerful, especially at connecting people together. Unfortunately, there are people out there that aim to abuse it. As a parent, one of our responsibilities is to protect our children. So, I feel that a discussion on protecting your kids from technology is warranted. I do not claim to be a parenting expert, but I do hope that you will find this information useful and that it encourages you to do some research to find out what works best for your family.

Daily, I see people immersed in their phone and not focused on what is going on in the world around them. I am guilty of this myself… sometimes! Kids especially notice this because they are looking up to you and following what you do. You can definitely learn a lot about yourself by watching your kids! With iOS 12 we have a new feature called Screen Time. Thanks Apple! Now, I know how often I pick up my phone, what my favorite apps are, and how much time I spend in them.
If you have an iOS 12 device, check it out. Settings → Screen Time. Immediately noticeable is how much time you have spent on your phone today. You can even see your weekly average. Other options include setting downtime, app limits, and the ability to restrict content. This is all cool and maybe even a little bit frightening. Nevertheless, the even cooler part is that you can set up family sharing and all this information and restrictions is available to you, for all of your family iOS devices. Sorry kids. In all seriousness, I do encourage you to check out this feature. We could all use time away from our phone and spend that extra time with our kids.

My kids are at the age where they can do some damage to a phone. Maybe that does not change? They will randomly touch the screen and perhaps your favorite app or important file suddenly disappears, or the order of your applications that you spent hours arranging, is all out of whack. This is where Guided Access comes into play. I simply open the app that I want my kid to play and triple tap the home button. Tap start and hand the phone to your kid. They cannot exit the app. The only way to exit the app is to triple tap the home button and enter a passcode, if you have one set. My kids are also notorious for hanging up on grandparents while using FaceTime. Simple. Guided Access. Triple tap the home button. This time, before tapping Start, circle areas of the screen that you do not want your kid to touch, like the hang up button. Tap start. Now you are safe from accidently disconnecting your call.

I mentioned TV earlier. I previously wrote an article on streaming TV and we still enjoy our Internet only service with the Roku Streaming Stick and a Netflix and Hulu subscription. Since then we have added Noggin… and Hallmark. For Netflix and Hulu, I set up two profiles: one for my wife and I and one for my kids. I use the basic Kids profile, which does a decent job displaying content for kids. Be sure to set age and content restrictions appropriately inside your streaming apps where possible. Moreover, do not forget to password protect your profile. Yet, do not let the filters be the only control on TV for your kids.

Ada Lovelace, an English mathematician and writer, is considered to be the first computer programmer.

I am a proponent of keeping TVs and computers in common areas of the house and for being involved in your kid's shows and computing interests for that matter. Some shows deemed appropriate for kids can include violence, bullying, inappropriate bodily sounds, and other behaviors that you definitely do not want to see reciprocated by your kids. Some shows are more appropriate for older kids. And some shows are just strange. Weird. Not like the ones we grew up watching. Thus, I encourage you to watch TV with your kids or at least be working in the area that the TV is in so that you can pause a show and talk with your kid about what is happening or simply change the show all together.

I would like to spend a little time on computers, the Internet, and protecting your kids as they explore online. As, I mentioned earlier, I believe that TVs and computers should be in a common location at home. When we built our home, I purposely did not put network drops or TV ports in the kids' rooms. We should know that the Internet is a dangerous place and that the wrong keypress or click can pop up inappropriate content or an attempt to steal identities or important account information. With the numerous social media apps now available, I argue that the Internet is even more treacherous for kids. Social pressures outside of the home now can follow them at home. As with TV shows, I feel the same way about computer programs. So, be involved in the computer programs that your kids find interesting. Ask them questions about what they are learning. Should one or both of my kids get interested in World of Warcraft, you had better believe it that I am reactivating my account and defending Azeroth alongside them!

Finally, I wanted to highlight a cool product that I do not currently own, but I definitely plan to once my kids develop more of an online presence. It is Circle. I learned about this product watching a Kirk Cameron documentary that came out in theaters. Circle allows you to manage any device on your Wi-Fi network without installing software or an app on that device. You can filter Internet content, pause the Internet, set time limits, bedtimes, view usage, and even send rewards. There is even a subscription service, Circle Go, designed to protect your family's devices outside of the home.

In conclusion, I believe that it is important to talk about technology with your kids and protect them to the best of your ability. Our best defense as parents is to be involved in what our kids are doing and not simply use technology as a babysitting tool. Take an interest in and talk to your kids about what they are doing on the phone, TV, and computer. I know that limits and restrictions are no fun. I am sure that there will be times where my kids will not appreciate it, but I am a parent first. I hope that you found the above information helpful. As always, please research and do what works for your family.

Cybersecurity
[Mickie Tate]

Cybersecurity! That is what we will be talking about in this article. It seems today everyone is talking about cybersecurity, but not everyone is talking about the same thing. When you've had conversations about cybersecurity, has anyone ever mentioned any of the following:

- Inventory of authorized and unauthorized devices;
- Inventory of authorized and unauthorized software;
- Secure configurations for hardware and software;
- Continuous vulnerability assessment and remediation;
- Controlled use of administrative privileges, maintenance, monitoring and analysis of audit logs;
- Email and web browser protections;
- Malware defenses;
- Limitation and control of network ports;
- Data recovery capability;
- Secure configurations for network devices;
- Boundary defense;
- Data protection;
- Controlled access based on the need to know;
- Wireless access control;
- Account monitoring and control;
- Security skills assessment and appropriate training to fill gaps;
- Application software security;
- Incident response and management; or
- Penetration tests and red team exercises?

I imagine probably not. Most of the time when people talk about cybersecurity they focus on State Sponsored Terrorism or Corporate Espionage, in other words, external threats – and they are real. But, the internal threat is also real and we as individuals and our use of social media are very real targets. Lately I've attended several cybersecurity conferences/seminars with top security professionals and that is their message. Cybersecurity is a broad topic that includes many aspects of traditional information security that includes internal threats. Every year Verizon provides an annual report that summarizes data breach investigations. The 2018 report (covering 2017) showed 28% of the breaches involved internal actors (www.verizonenterprise.com/verizon-insights-lab/dbir/).

Cybersecurity is the state of being protected against the criminal or unauthorized use of electronic data, or the measures taken to achieve this. And, measures taken to protect a computer or computer system (as on the internet) against unauthorized attack.

We as individuals must ensure we don't make it easier for the attackers, whether internal or external. We must exercise good security controls. We should not do things like share our passwords with anyone, including "trusted" colleagues. We should not click on links or attachments we are unsure of. And we should be careful as to what we expose in social media as attackers will use this information against us in phishing attacks that will make the attacks more personal and feel more real. Their goal is to use whatever tactics necessary to gain more information that will enable them to exploit our systems.

Don't let your guard down, we all have a role in cybersecurity. Cybersecurity is not just IT's responsibility, it is all of our responsibility.

In 2005 Sony illegally installed rootkits on 22 million computers to prevent users from ripping copyrighted music.

Using File Containers with VeraCrypt
[James Taylor]

Occasionally in our personal lives, we find ourselves dealing with paperwork and private information that we would prefer to keep safe from prying eyes. Mortgage documents, doctor bills, bank statements, and even Social Security cards or passports are all examples of documents that we might keep locked up in a safe or filing cabinet. However, in today's "digital age", it is sometimes necessary to keep electronic copies of documents that contain the same sort of sensitive information. The question is, how does one store digital documents safely? While many Cloud-based storage providers tout strong web security and encryption, there is never a real guarantee that a site will never be compromised or that a person's username and password will not somehow end up in the hands of a cyber-criminal. For those that would prefer to take a more hands-on approach to securing their data, encrypted file containers offer a good alternative.

A file container is essentially a virtual disk contained within a single file, usually encrypted. When the container file is mounted using special software, the virtual disk becomes accessible and it is then possible to open, edit, or delete the files that reside within. A popular example of such a program, and the one this tutorial will focus on, is VeraCrypt.

The latest VeraCrypt client can be found for free on the company's web site at https://www.veracrypt.fr. Once the program has been installed and launched, we will be presented with a screen like the one below:
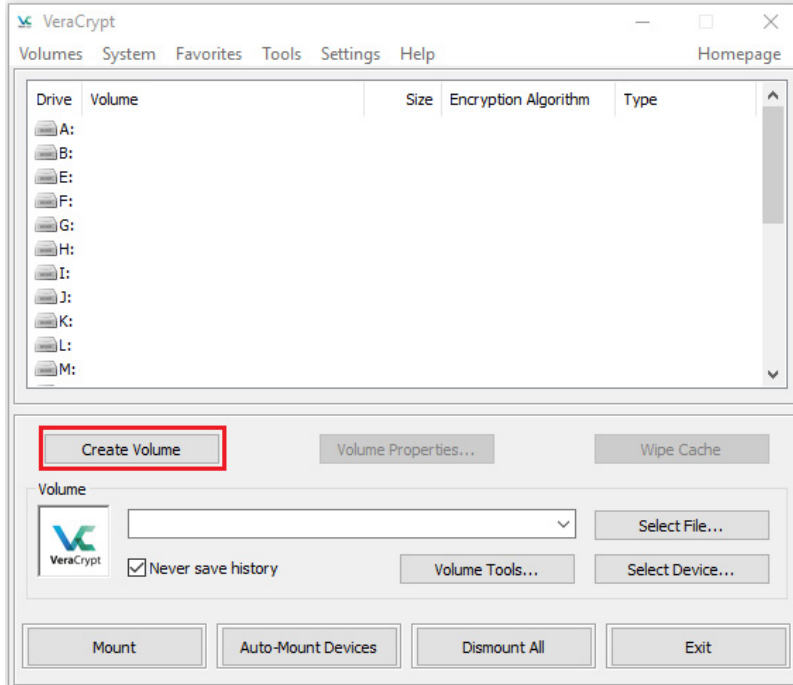
In order to create a new volume to store all of our digital files in, we need to start by clicking **Create Volume**.

While VeraCrypt offers a variety of encryption features, we are going to focus solely on file containers. After clicking **Create Volume**, we will see the screen below:
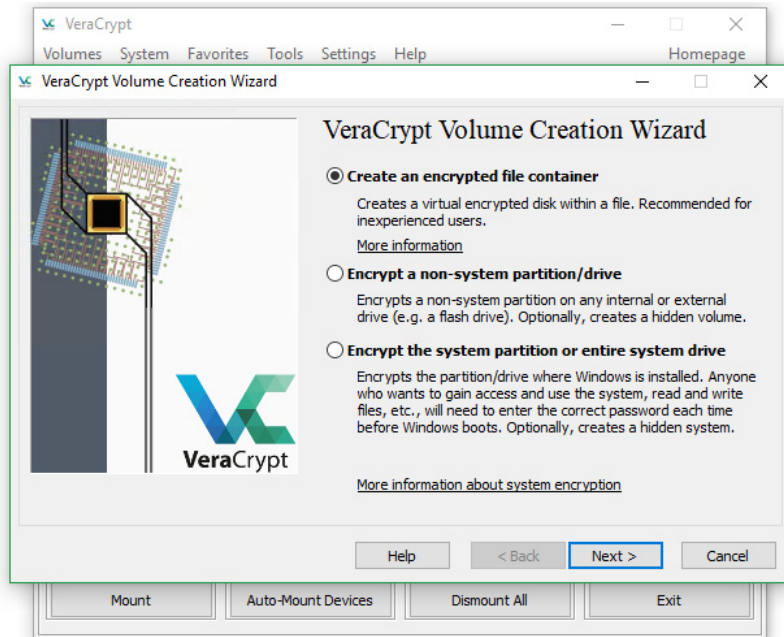
We need to select **Create an encrypted file container** and then click **Next**. On the next screen, we will choose to create a **Standard VeraCrypt volume** and click **Next**.
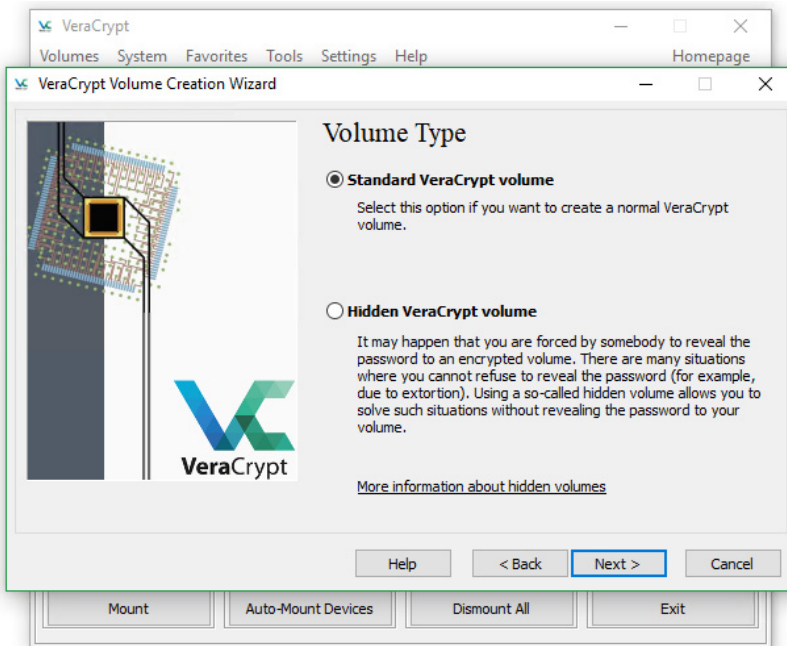
We will now be asked to choose a location and name for our file container. Click **Select File...** and save the file with the name of your choice. This file can be moved later on like any other file. Afterwards, click **Next**.
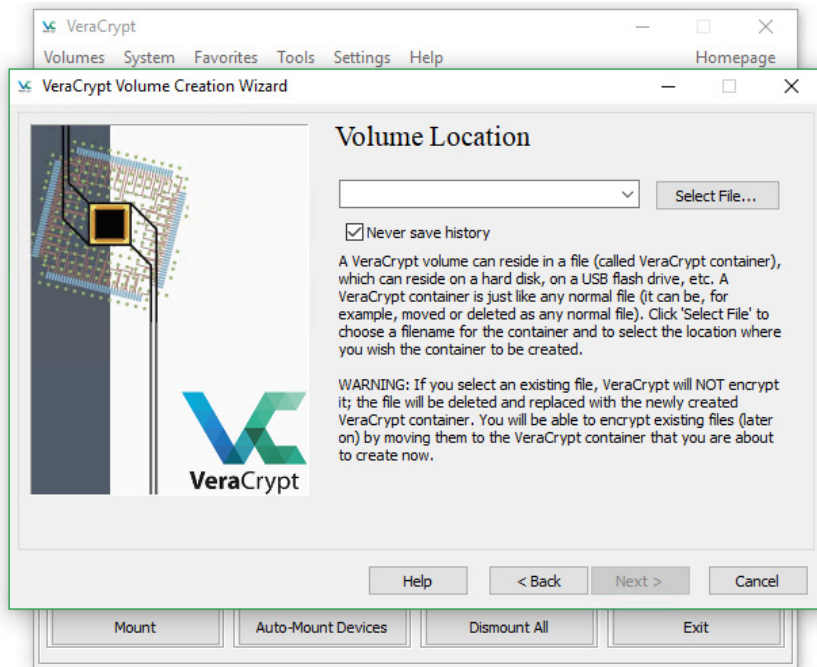
On the next screen, we will need to choose our encryption options. The default selections are good choices but more can be learned about encryption algorithms and hash algorithms by clicking on the links on this screen. Once we are satisfied with our selections, we will click **Next**.
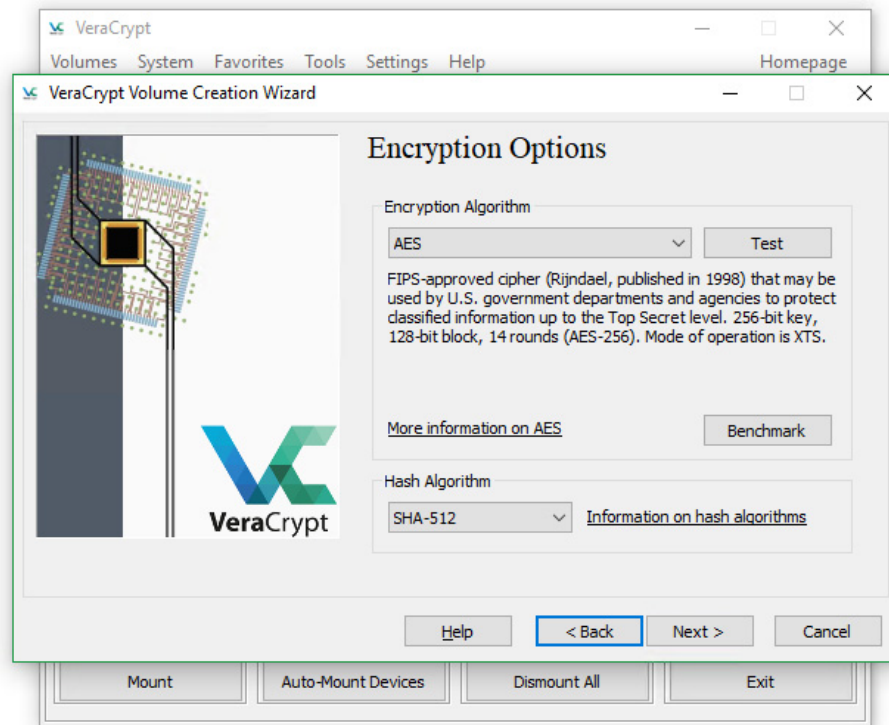
On this screen, we will determine how large the file will be, which will in turn determine how much storage this file container will have. For this example, we will choose 1 GB and then click **Next**.
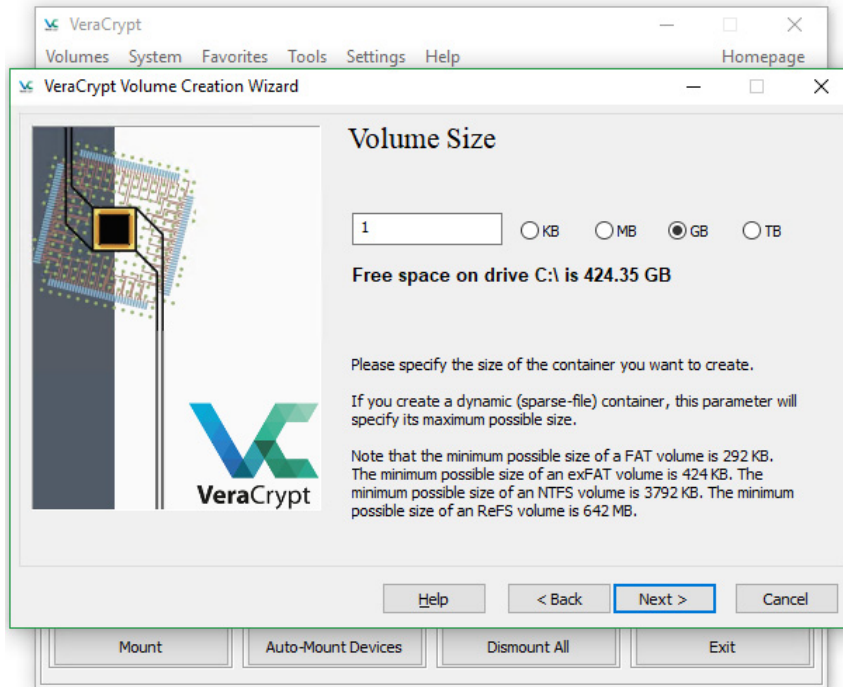
Since this will be an encrypted container file, it is necessary to choose a password that will be used when mounting the file later on. It is very important to choose a strong password that we will not forget in order to protect the sensitive files that will be reside within this file container.
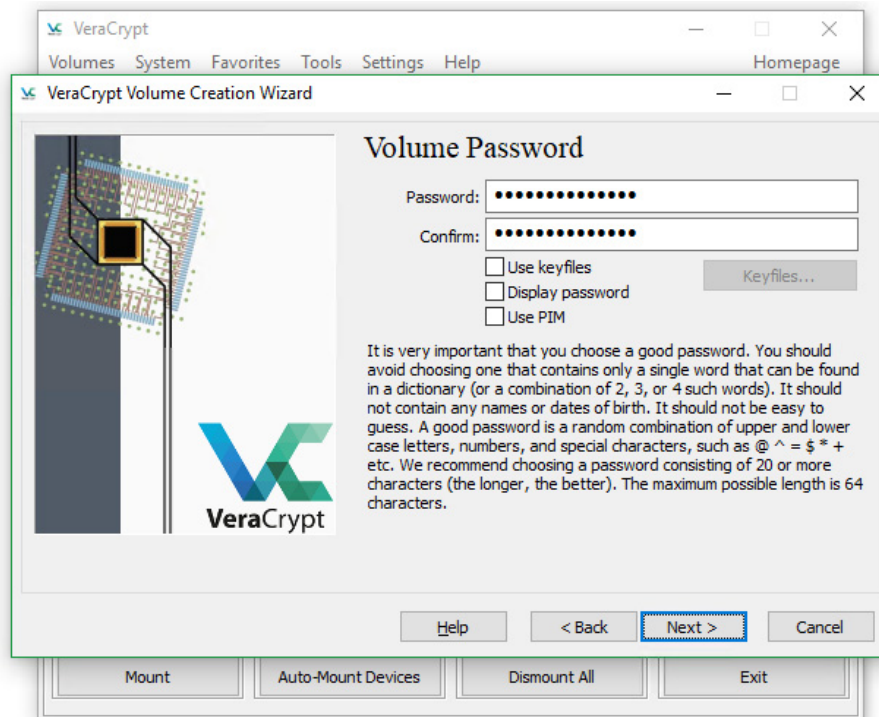
After clicking **Next**, we will be asked to randomize the keys by making random movements with the mouse. It is recommended to move the mouse around until the bar at the bottom turns green and fills up completely. Once that is accomplished, we will click **Format** to complete the creation of our file container.
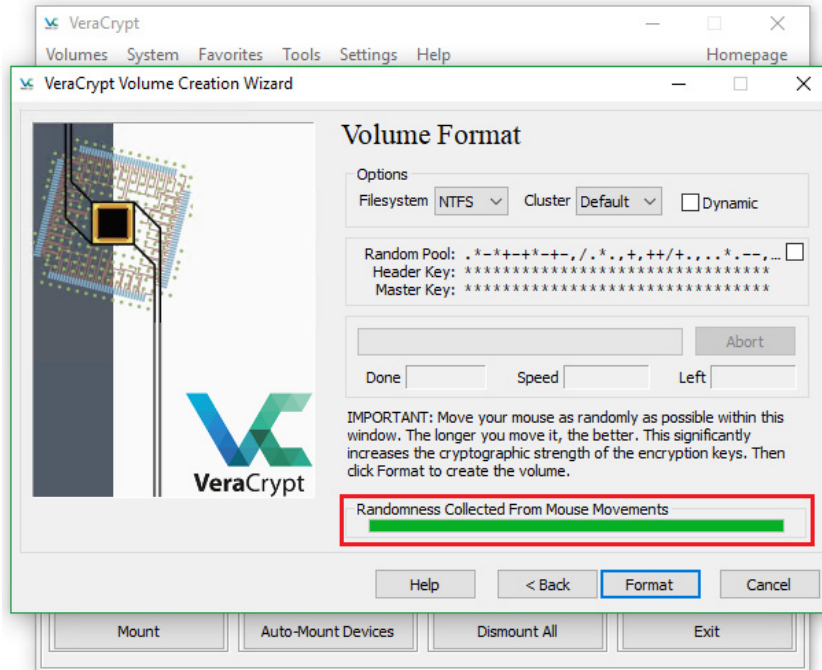
At this point, we can click **Exit** to return to the main program interface.
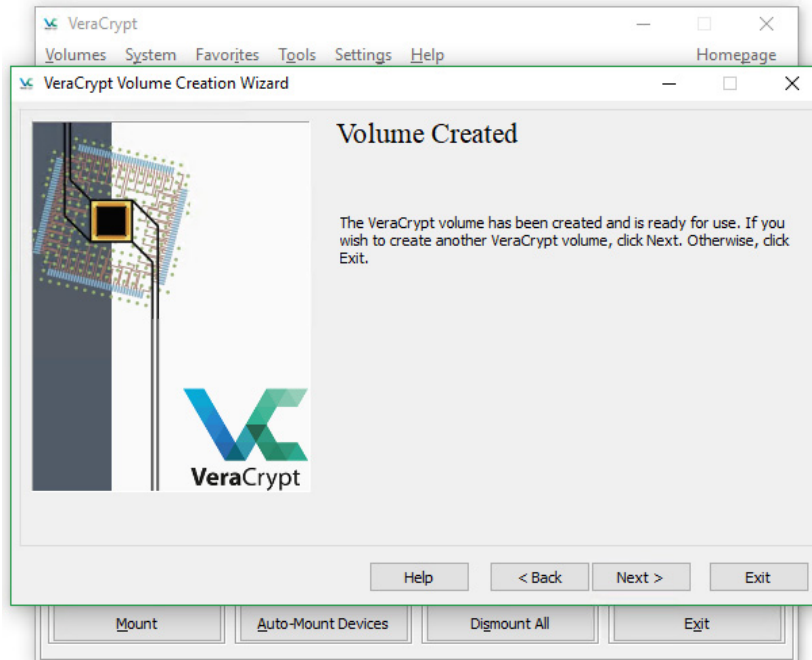
Now that we have gone through all the hard work to create this file container, we can finally use VeraCrypt to mount it and begin storing our files.

We will begin by clicking **Select File...** and browsing to the file we just created and selecting it. We will also need to choose a drive a letter on the top half of the screen. When the file container is mounted, it will appear as a new drive with letter that we choose. Below, **J:** has been arbitrarily selected. Once that is done, click **Mount**.
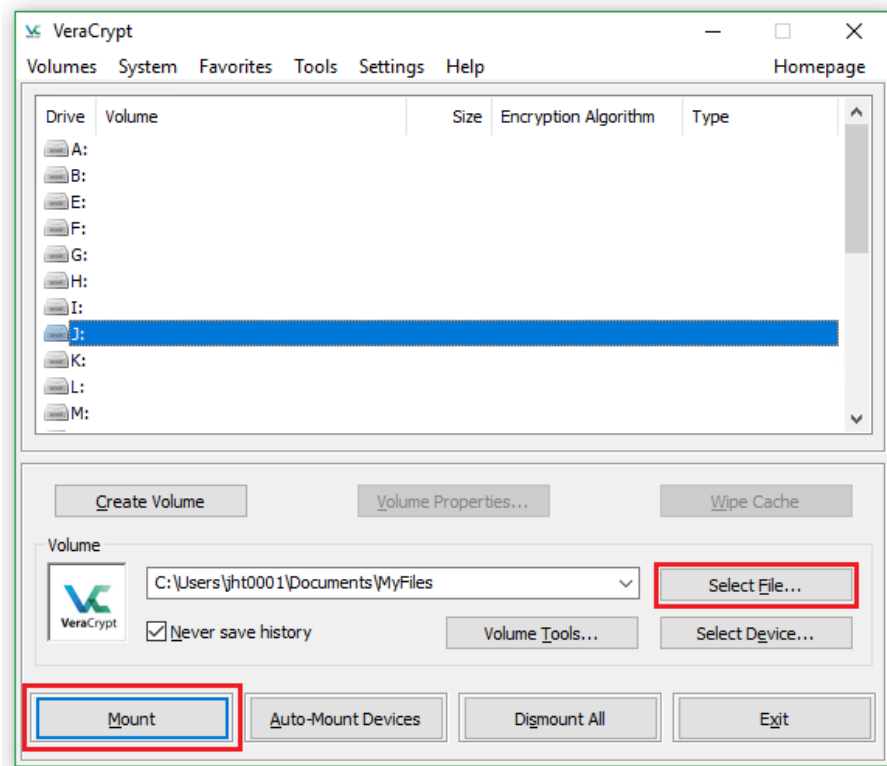
We will then be prompted for our password in order to "unlock" the file container and mount it.
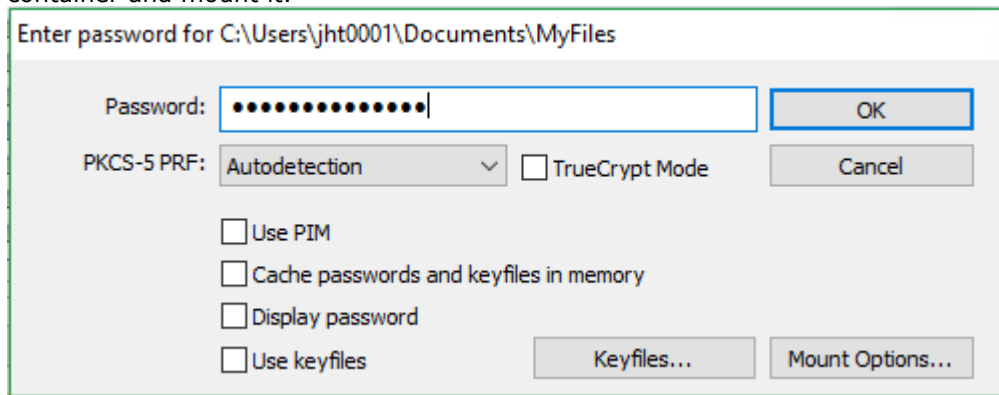
We should now see our file container mounted in VeraCrypt with the drive letter that we selected.
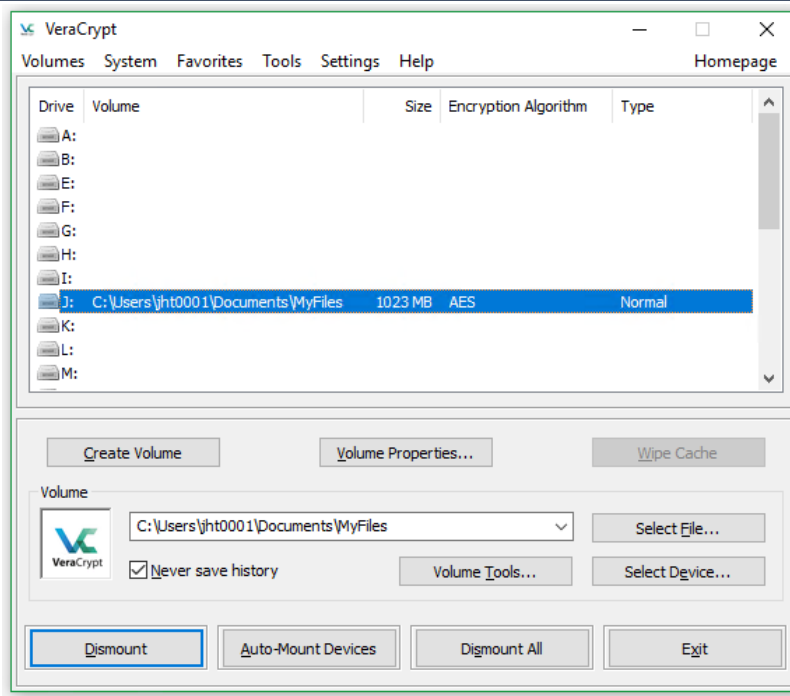
Now that we have mounted the file container, we can open File Explorer and see that there is a new disk listed there with that drive letter.
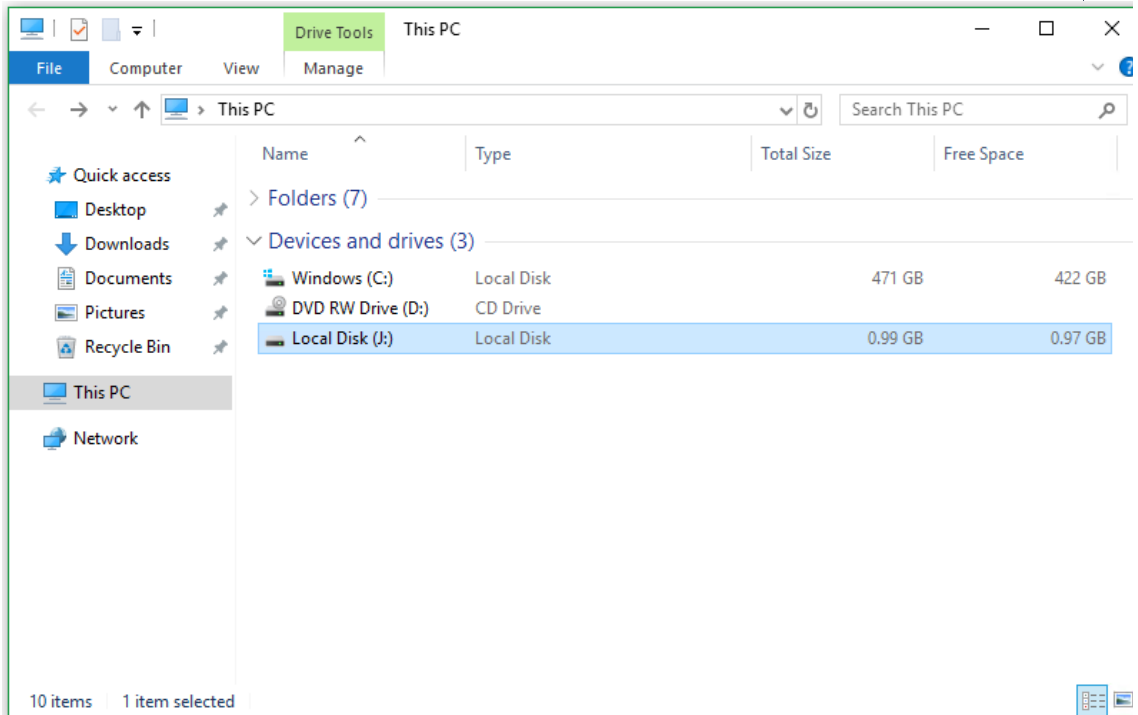
We are now ready to move files into the container. We can treat this like any other drive at this point and start creating or moving files and folders into the drive. It is important however, to **move** the files into the file container. If we copy those files but then leave the originals where they are, it will defeat the purpose of using an encrypted file container and the files will remain unsecured.
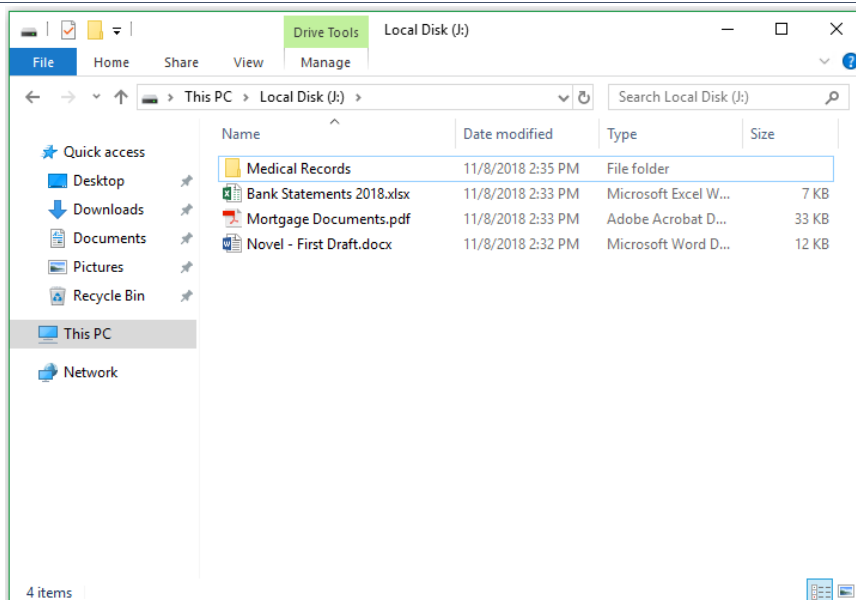
When are finished using the file container for the time being, it is important to dismount it in VeraCrypt which will in effect "lock" it and make it secure from anyone else who might use the computer. To do so, we simply close any files that we may have open from the file container and then go to VeraCrypt and click **Dismount**. Once we do that, we can exit the program.
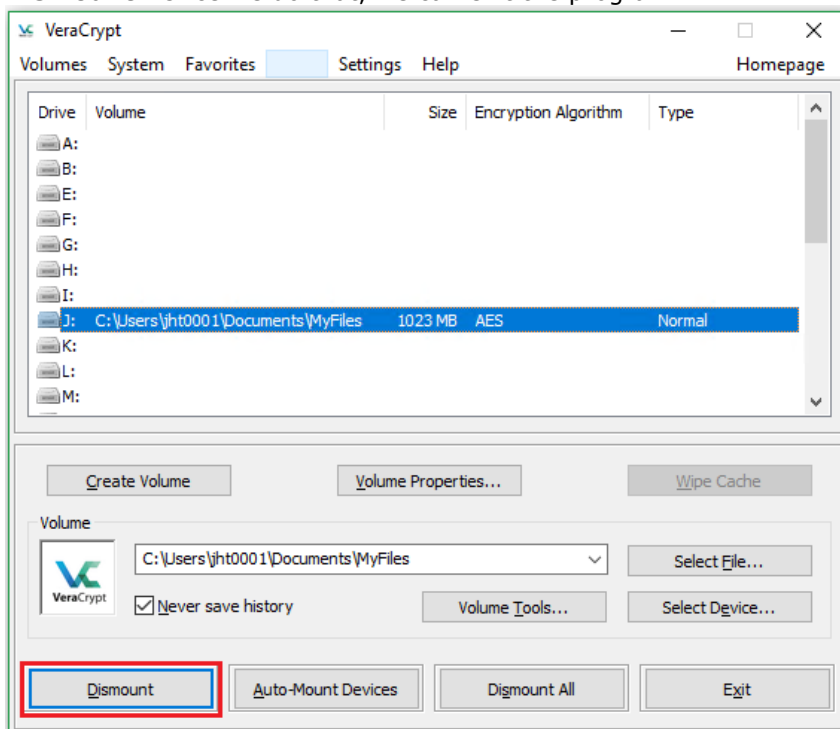
The process may seem daunting at first, but with repeated usage, it will become as routine and mundane as many of the other computer operations that we perform every day. However, it is very important to ensure that the password is never lost or forgotten. Without the password, there is no way to retrieve the files from the container and they will remain inaccessible forever.

This tutorial has been kept brief for simplicity but for those that wish to have more detail, I encourage you to read the beginner's tutorial on the VeraCrypt website at https://www.veracrypt.fr/en/Beginner%27s%20Tutorial.html.

Solution to last newsletter's brainteaser

Which number in the following series of numbers is least like the others?

1   3   5   7   11   13   15   17

If you said 15 because it is only number that isn't a prime you would be right **but** if you said that this was a trick question and the real answer is 1 and 15, you would be more right!

Your argument, I am sure, would be that a prime number is a positive integer greater than 1 and whose positive divisors are 1 and itself. Since 1 does not qualify as a prime number and neither does 15, the more correct answer would be to challenge the question! ☺

Lenovo stands for 'new legend'.