



DSI AITS Newsletter

DECEMBER 2021

Memories, Thanksgiving and Musings [Abraham John, Executive Director, DSI AITS]

My “fluff” article for this issue delves into memories, expressions of thanksgiving, life lessons, and some random musings. While there are no bits, bytes, science, or math, there is a hint of that in the random musings ☺.

As human beings the constant flow of time can be disorienting, at least it is for this human. We create markers to make sense of something that is constant and inexorable in its flow. A random observation about speed and time: in Einstein’s paper on special relativity, he proved that when traveling at speeds approaching the speed of light, time moves much slower for the traveler than for the rest of the universe thus making such travel impractical within the known laws of physics – more time would have passed in the regular universe than on the traveler’s ship thereby creating a time dilation effect for the traveler. The musing later in this article is sure to excite the Trekkies in the readership since we may be approaching a day when things in the Star Trek universe may become reality without the inconveniences of time dilation!

It is impossible to avoid some brief reflection during the last few days of any year and this year is no exception. It has been over 21 months since the world was thrown into turmoil and we all had to reconcile ourselves to changed and changing realities. The tragedies that have surrounded us have caused many of us to reflect on our world, our place in it and our relatively short journey through time.

Recently I have been increasingly driven to memories of my experiences and the people who have had a positive impact and through their active or passive examples and contributions made me want to be better or made me better. I stand on the shoulders of incredible people: how could I not strive but to be better. If you have seen the movie “Kingdom of Heaven” you will find this snippet of thought expressed better by the Hospitaller knight. Perhaps this nostalgic thought journey is my way of reaching for reserves as a fellow traveler in this muddled time.

During these trying times, I consider my grandson, my little knight: his joy, his unfettered curiosity and fearless actions take me back to younger, carefree days when all seemed possible, curiosity was life, there was always time to for exploration and the word ‘fear’ was not in my vocabulary! When I think about my little knight, I wonder if we would not all be better off if we were able to hang on to that childlike curiosity and fearlessness. I think some of us do retain this childlike quality and we laud them as heroes and great spirits.

Memories weave connections that are not linear in the narration. I think about my first two bosses who were also my mentors as I just starting out. I learnt from them important life lessons of sacrifice, diligence, dedication, caring, courage, and consideration of others in the workplace. I consider the team that I have the privilege of leading and in them I see qualities of sacrifice, diligence, dedication, caring and consideration of others in the workplace and for the people placed in their path.

I am thankful for the managers/leaders in my team. Each one exhibits character qualities that reinforces the lessons I learned from my first two bosses and their respective character humbles me when I consider that I have the privilege of leading



I am a prime number less than 100. If you add my two digits and multiply me by the number that results from it, you get the same number as the number of weeks in a year. What number am I?

them. Across my team, I have seen my team members step into places where their contribution and sacrifice made us all better and knit us closer in the pursuit of our university's mission. From the help desk to the departmental support units, I have seen my team members step into roles that made everyone around them better! In this I see the proverb of "iron sharpening iron" become reality and I believe this holds true for teams of all sizes and shapes.

At the close of this year, I am thankful for my current boss, Dr. Fein. We became part of the Digital Strategy and Innovation (DSI) division earlier this year. In Dr. Fein I find a kindred spirit, a leader who cares for the people who are part of his division, a leader who cares about our students, a leader to whom the education mission is paramount, and a character quality that takes me back to the days with my first two bosses and mentors when I started as a full-time employee at UNT or NTSU as it was called in those days 😊.

As we close out this year, we are also dealing with a new threat on the IT front with the Log4J vulnerability that started making itself into a real threat around the December 9th, 2021 timeframe. My team and I, along with the many other IT teams at UNT will be working tirelessly this holiday season. This is a worldwide threat, and it will take quite some time before it is not considered a critical concern. When faced with circumstances like this, I am thankful for the character traits the managers and leaders in my team exhibit since that is what will enable us to overcome this and future crises.

The past 21 months have been nothing if not eventful. We saw the widespread usage of mRNA vaccines, which hopefully, will bring many life-saving medicines to all parts of our world.

I am glad I waited a few days before sending out this newsletter since as fate would have it, I came across an article that Dr. Sonny White was successful in creating the first micro-scale warp bubble ([Paging Zefram Cochrane: Humans have figured out how to make a warp bubble - TechRepublic](#)).

This news is quite exciting to us Trekkies since the applications for space travel, when we get to it, are tremendous. Forgetting technicalities for the moment, when the day arrives when faster than light travel might be possible because of this discovery it will also mean we would be able to travel without the inconveniences of time dilation that I alluded to earlier in this article.

The shape of the vehicle is sure to bring a smile on the face of the Trekkies in the readership: the vehicle shape that works best in this warp bubble looks like a Vulcan starship 😊. Who knows, my grandson may set foot on a planet in another star system! There are many other applications that could potentially come from this discovery before the space travel possibility. Feel free to peruse the article about the micro-scale warp bubble at your leisure.

Memories are brought to the fore by odd catalysts. I had an interesting discussion with Alexandra Martinez, one of my team members, about how toddlers associate and learn the world around them. She was commenting on how her nephew interacted and learned while I made similar statements about my grandson. This discussion took me back to my younger days when I had a passing exposure to artificial neural networks (ANS) and the ideas of how deep learning can be achieved through a backpropagation ANS. We use this type of deep learning each day when we use pattern recognition software. Well, those were the early 90's and life caught up as job necessities took me down other roads. It was pleasant to reflect on this topic that I had not thought about for a very long time. Maybe this will prompt me to author a future article on backpropagation ANS 😊

I look forward to the year 2022 with hope and how can I not! When I look at the shoulders I stand upon, the lessons that I have learned from the counsel of wise people who I had the privilege of meeting and associating with and many who are still a part of my daily life, how can I not be hopeful?



D'Kyr type
Vulcan starship



I hope as you read this article, the thoughts expressed here are ones that allow you to pause and reflect on your own experiences and the roads that brought you to this point. I hope you find strength in the experiences of the past and hope for the future.

As you read the articles included in this issue of our newsletter, maybe get misty eyed by pieces like this one 😊, and take a swing at the brainteaser, we in DSI Administrative Information Technology Services (DSI AITS) wish you a happy and safe holiday season. To the Trekkies in the group: "Live Long and Prosper!"



Martin Luther King Jr. talked Nichelle Nicols (Lt. Uhura) out of leaving Star Trek: The Original Series

There's a Map for That!

[Peter Palacios and Jason McMullen]

Facilities and AITS have completed phase one of our new web-mapping platform. This paves the way to make self-service web maps available to campus users.

- We built an internal platform for web maps and GIS applications
For many years, Facilities has been quietly developing capabilities to generate digital, web-based maps of all UNT property – what is technically known as a geographic information system, aka GIS. Facilities and AITS are embarking on an exciting new chapter in the evolution of this system. The two departments successfully performed a significant upgrade to the existing technology that now allows for direct access to interactive web maps and applications through an internal portal. Before this advancement, the only way to engage with this information was through desktop software. Now, anyone on the UNT network will be able to access the data through a web-hosted service.

To keep up to date with our progress and when this will roll out to your department, please visit <https://facilities.unt.edu/gis>

- What kind of data is in GIS?
The database behind this system is extensive and contains over 100 layers of data, such as the hardscape and landscape areas of campus (referred to as the campus basemap), utility infrastructure, parking lots, and site amenities such as waste bins and bicycle parking areas – to name a few. Facilities GIS staff are currently working to transform these layers into focused applications that can support the mission of multiple departments across UNT.
- What's next?
In the near future, we will be reaching out to departments to explore how to build GIS applications for their use. First up is the Facilities electrical shop. With this first application, updates to light pole information would be feed directly back into our GIS system. This replaces a manual paper process for the electrical shop.
- The Future
Look for these new features to increase visibility to on-campus assets. Internal self-service maps: UNT employees will be able to directly login and view a variety of GIS information that will help them locate a variety of resources:
 - Role-based security for published layers
 - Situational awareness & operations data
 - General campus information like bike/walking paths, artwork, benches, etc.
 - Event management for outdoor special events and athletic events
- A recognizable interface
Google Maps have exposed everyone to the power of GIS and using maps as an interface. Now, we will bring that same ability to UNT departments. Depending on their role, users of the GIS system will be able to layer several points of data for a variety of views into our campus and buildings.

Please stay tuned for our next update coming soon to the DSI-AITS newsletter.



The original Star Trek was originally marketed as "Wagon Train to the Stars" after the popular 1957 western "Wagon Train"

Windows 11 – Why this version of Windows will be different

[Christopher Horiates]

Since 1985 Microsoft has been releasing new versions of Windows every 5-10 years on average. Each one brought new features, updates, enhancements, changes, and overall improvements, some welcomed and some not. With this, one thing has always stayed the same, the Start Button location. While the look of it might have changed, the button was always on the bottom left and that is what Windows users the world over were accustomed too for the longest time. That all changed with Windows 8 (anyone remember that?) where the start button went away in favor of a more touch friendly version. It all came back to what we know in Windows 10 and now with Windows 11 the Start button once again has moved.

By default, the Start button is now more centered, as is the taskbar icons. While this can be adjusted back to the left, the default is the to center. Why you ask? There seems to be a thought that we now have more touch screens in use and that this might be a benefit for quicker and easier access.

As you can see in the two screenshots below the difference is there, but is it life changing or a deal breaker? That really is a question one must answer on their own. Since you can move it to the left, the overall take is "meh, whatever." Just something to know about when you finally get the update or a new computer that has it already running.

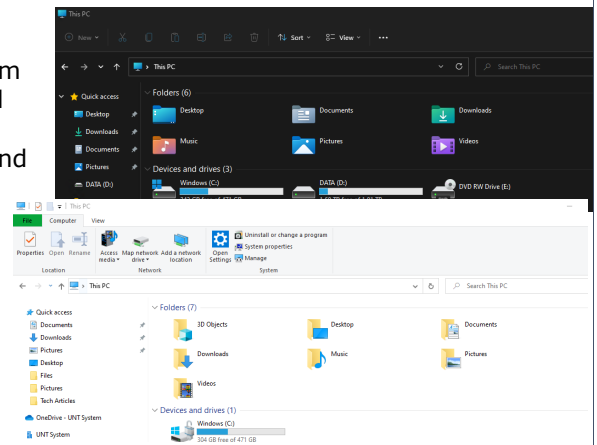


Star Trek: TNG had the highest ratings of any Star Trek series.



One other item of note is the change in how menus and folders look. While it looks different, in my time of testing I am not really be bothered by it. The overall look of Windows has changed over the years too. Windows 11 is no different and has some new looks you will notice as you begin to use it on your PC.

It's a more modern look that does away with the older more known look you might be accustomed too. Most everything you are used to seeing is there, it might take a few extra clicks to find them or figure it out but once you do it's tolerable.



Now for the big reason why this version of Windows is different than any before it and why it could very well cost consumers and businesses big money. Unlike with previous Windows OS releases Windows 11 has very strict requirements for what hardware it can run on.

The catch is most machines will meet most requirements as they stand today, but two of them are catching a few users and businesses off guard as they look to upgrade. For instance, my personal 5-year-old laptop I have at home runs Windows 10 without an issue.



Most male Vulcan names begin with "S" and most female names with a "T" followed by an apostrophe.

The only requirement is does not meet in the processor generation of 8th Gen and above for my Intel model. Because of this, again this might change, when October 14, 2025 rolls around ,I will need to have bought a new laptop.

The other part is the TPM that most consumers either don't have or don't have on by default or know how to turn it on. It's something that enterprise has had that goes back quite some time, and in this case, I have a

robust work machine that the processor is holding back the upgrade. This basically has given most hardware bought over the last 5-7 years in use today possibly an earlier than expected expiration date. Microsoft's statement in a nutshell in my own words *is we have telemetry from testing reported by users that tells us Windows 11 runs best on these generations of processors and because of security and performance considerations we must hold this requirement for all upgrades. While users might be able to force update to Windows 11, we will not guarantee security updates on those systems.* You can see where this will cause lots of issues for people and or companies. Reality is Apple does the same thing with OS updates and kills off old hardware. If you are an Apple user, I am sure this happened to you at some point. Microsoft has been more forgiving from that point, but this is a change. For consumers it's a cost issue of when they want to buy a new machine. For a large business it's a huge undertaking and when to consider the purchase of machines is something to factor in since a large business can't wait to upgrade in October 2025 as the logistics of ordering, imaging, replacing and de-commissioning old hardware takes time. Within in the next year or two I predict a run-on hardware or a major pushback on Microsoft to relax the requirements for at least the enterprise version of Windows 11.

Further reading:

[Windows 11 System Requirements \(microsoft.com\)](#)

[Update on Windows 11 minimum system requirements and the PC Health Check app | Windows Insider Blog](#)

Minimum System Requirements and your PC

These are the minimum system requirements your PC must meet to help enable a great computing experience:

Processors/CPUs (Central Processing Units): 1 Ghz or faster with 2 or more cores and appearing on our [list of approved CPUs](#). The processor in your PC will be a main determining factor for running Windows 11. The clock speed (the 1 Ghz or faster requirement) and number of cores (2 or more) are inherent to the processor design as it was manufactured and are not considered upgradable components.

RAM: 4 GB. If your PC has less than 4GB of memory, there are sometimes options for upgrading to get additional RAM. You may want to consult your PC manufacturer's website or with a retailer to see if there are easy and affordable options to meet the minimum requirements for Windows 11.

Storage: 64 GB or larger storage device. If your PC does not have a large enough storage drive, there are sometimes options for upgrading the drive. You may want to consult your PC manufacturer's website or with a retailer to see if there are easy and affordable options to meet the minimum requirements for Windows 11.

System Firmware: UEFI (for Unified Extensible Firmware Interface, a modern version of the PC BIOS) and Secure Boot capable. If your device does not meet the minimum requirements because it is not Secure Boot capable, you may want to [read this article](#) to see if there are steps you can take to enable this. Secure Boot can only be enabled with UEFI and this article helps you understand potential options to change settings to make this possible.

TPM: Trusted Platform Module (TPM) version 2.0. If your device does not meet the minimum requirements because of TPM, you may want to [read this article](#) to see if there are steps you can take to remediate this.

Graphics Card: Compatible with DirectX 12 or later with WDDM 2.0 driver.

Display: High definition (720p) display that is greater than 9" diagonally, 8 bits per color channel. If your screen size is less than 9", the intended user interface of Windows may not be fully visible.

Internet Connectivity and Microsoft Accounts: Windows 11 Home edition requires internet connectivity and a Microsoft Account to complete device setup on first use.

Windows Version for Upgrade: Your device must be running Windows 10, version 2004 or later, to upgrade through Windows Update. Free updates are available through Windows Update in **Settings > Update and Security**.

Phishing Attacks

[Alexandra Martinez]

What is Phishing?

Phishing attacks are social engineering attacks, and they can have a great range of targets depending on the hacker.

An example that can we relate to as a University is ransomware attack on Howard University.

"On September 3, 2021, the Howard University information technology team detected unusual activity on the University's network. In accordance with our cyber response protocol, and to mitigate potential criminal activity, Enterprise Technology Services (ETS) intentionally shut down the University's network to investigate the situation," said the University in a press release detailing the incident.

In the ransomware attack, hackers use a phishing email to steal user credentials to gain access to Howard network system. By gaining access to the system the hackers were able to block the institutions' access to the network and leverage stolen information. This attacked forced Howard University to cancel all online, hybrid, and face-to-face classes until they were able to restore their systems.

With a better understanding of the types of phishing attacks and how to identify them, organizations can protect their users and their data more effectively.

Types of Phishing

Phishing emails is one of the most known used techniques, which is designed to get users into performing a specific action. Typically clicking on a malicious link or attachment. The difference is between the types of phishing is primarily the target. Here are some other methods used:

1. Smishing/Vishing

Smishing is a type of attack that is carried out by sending customized messages on a mobile device with a link. Vishing is another form that works the same as smishing but through a voice call.

2. Spear Phishing

Spear Phishing is an email or electronic communication aimed at a particular person, company, or business. Hackers start by using open-source intelligence to gather information from published or publicly available sources like social media or a company's website. All the hacker needs to know is their name, place of employment, job title, email address, and specific information about their job role.

A great example of spear phishing is the data breach of the Democratic National Committee.

3. Whaling

Whaling attacks use the same techniques as spear phishing. Hackers use social media or the corporate website to find the name of the organization's CEO or another senior leadership member. Then impersonate that person

using a similar email address. A whaling email might state that the company is facing legal consequences and that you need to click on the link to get more information.

The link takes you to a page where you are asked to enter critical data about the company such as tax ID and bank account numbers.

4. Search-Engine Phishing

Search-Engine phishing is when a hacker successfully grabs the top position on a search engine. Users may find deals or notifications that invite them to



On impulse drive, it would take 400,000 years for the Enterprise to cross the galaxy.



The
Enterprise in The
Original Series is
953.7 feet long.

check the site. The search process may be valid, but the site is bogus and is only met to capture the user's information.

Ways of Detecting Phishing Attacks

1. The URL displayed in the email and the URL shown when you move over the link vary from each other.
2. The "From" address in the email is an emulation of a valid address, particularly from a corporation.
3. Layout and structure are distinct from what you usually get from a company. Perhaps the logo appears pixelated, or the buttons are of various colors. Or maybe there are odd paragraph gaps or additional spaces between phrases.
4. There are links from obscure sources in the email that you were not anticipating.

Avoiding Phishing Attacks

Phishing attacks are one of the most used tools by hackers due to the simplicity and ease of the process. Here are best security practices to prevent these scams.

1. Keep Your Up to Date

Having the knowledge about all the new and old phishing methods is one of the best ways to protect yourself from scams. It will allow you to detect the scam easier.

2. Click Wisely

Before clicking on a links or attachment on emails or text you receive from confirm that is safe to open. If the link or attachment is from an unknow source do not click on it. Also, avoid clicking on pop-ups or other links on other websites (even authentic sites).

3. Use Antivirus

An antivirus program detects and blocks the downloading of suspicious software via the Internet, USB flash, etc.

4. Do not give personal information

Phishing is constantly evolving to adopt new forms and techniques. Hackers will continue trying different phishing methods to manipulate their targets. They will try to grab your attention and compel you to click on malicious links by creating a sense of urgency or can ask you to give information. With that in mind, organizations and users should practice good security techniques daily.

Helpful tools

[VirusTotal](#)

Analyze suspicious files and URLs to detect types of malware, automatically share them with the security community

Additional Articles

[Howard University suffers cyberattack, suspends online classes in aftermath](#)

[Howard Ransomware Updates](#)

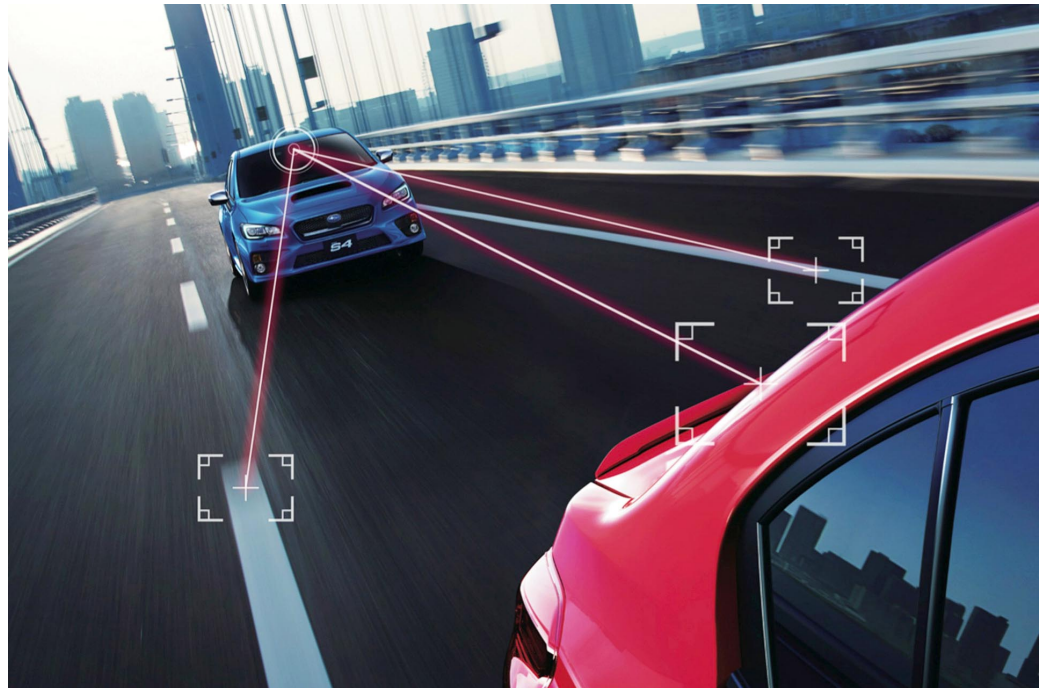
[The Emergence of Killware, the Lethal Malware](#)

[Robinhood Hack](#)

[Password manager hacked to launch wide-ranging cyberattack against businesses worldwide](#)

The Potential Danger of Safety Systems in Cars [Patrick Kennedy]

I recently had a conversation with someone in which we discussed what features they were looking for in a new car, and one of the things they mentioned that they wanted was automatic lane keeping assist. A few weeks ago, I drove a Subaru equipped with their EyeSight Driver Assist Technology and found the lane centering assistant to be a bit unnerving and invasive, taking control of the wheel in situations where it was unnecessary and causing some distraction (especially in situations where the lanes were not perfectly marked), so I asked them why they wanted this feature specifically. They explained that it would “help for when I need to quickly check my phone for something while driving.” Call me old fashioned, but I don’t think wanting to use your phone while driving is a particularly bright idea, but it got me thinking: Are there potential safety issues that arise from people relying on safety equipment?



Now I’m used to a very analogue driving experience, as my daily driver is a 40+ year old Mini, and my other cars are all fairly old as well, so I concede that my viewpoint as an idiotic car enthusiast isn’t exactly in tune with a modern car buyer. As much as I love to complain that newer cars have zero steering feel and are too isolated, cars are safer than they’ve ever been, easier to drive for more people, and feature safety technologies that have prevented countless accidents; Anti-lock braking systems, traction control, stability control, and more all contribute to safety when a driver makes a decision too late, misjudges throttle inputs, or fails to properly counteract a vehicle’s movements effectively. While many, including myself, will disable these systems for a car that sees heavy track duty, the truth of the matter is that cars are sold primarily for street use, and the streets are chaotic and unpredictable. As amazing as a Porsche 911 GT3 is on a racetrack, it likely will spend much of its life playing NPR for a lawyer sipping coffee on the way to the office, and those driver assists help keep the shiny side up when an inattentive driver pulls out in front it unexpectedly.

As much as I understand and respect the justification for these driver assists, I feel that there are some assists that people may rely too heavily on. I have been the passenger in a few different cars where the distracted driver had an automatic emergency braking system that reacted faster than they did, even with me in the passenger seat alerting them that they were about to rear end someone, but I have also seen it fail and result in an accident, as it isn’t a perfect system. Had the driver simply paid attention to where their 4000-pound hunk of metal was heading instead of looking elsewhere, it would have been avoided. I think it is wonderful that the



The
Enterprise-D in
The Next
Generation is
2,103 feet long.



Data's cat Spot was initially a long-haired male but became a short-haired female later in the series.

system was able to prevent the other accidents, but the drivers seemed to be less phased by their near-accident experience being a result of inattentiveness than I was, since they just always assumed that the car would stop for them in the event of an emergency. Why pay attention if your car does it for you, right? I've also driven another friend's car with lane-keep assist, a 2015 Hyundai Genesis sedan, and I noticed that the car would resist my inputs on a section of I-35 that was poorly marked when I just trying to maintain the new lane direction. The car instead wanted to follow some older markings that were no longer in use and would have sent me into the concrete barrier. The indicator is supposed to disable the system for a lane exit, but I still I found myself disabling it every time I got in the car because I was worried it would fight my inputs while performing an emergency maneuver if I didn't indicate properly (not to mention that it should be unnecessary to use at all if I simply pay attention). These are all personal anecdotes, yes, but my experience is that people tend to put just a little too much trust in imperfect technology. Sure, the manufacturers say that they're *assists* for emergency cases, but people tend to get too comfortable and allow themselves to get distracted more often and assume the car will pick up the slack.

In nearly all of the conversations I have had with people driving cars with advanced driver assists, they spoke wonders of how their car "can drive itself." The group that seems most prominent are Tesla drivers, and I can't exactly blame them with how the features are marketed. The advanced cruise control system that Tesla offers with their cars is named Autopilot, and Tesla repeatedly promises full self-driving in their vehicles, but it's simply a driver assist, not fully autonomous driving. If you go and enable Navigate in the Autopilot menu on your Model 3, you will be greeted with the warning, "Navigate on Autopilot does not make your Model 3 autonomous. Like other Autopilot features, the driver is still responsible for the car at all times." Despite this disclaimer, Tesla often mentions "Full Self-Driving" and "Autopilot" in the same sentence within their marketing. Go to configure a Tesla Model 3 on Tesla's website, and you will see the \$10,000 option for "Full Self-Driving Capability" featuring Navigate on Autopilot, Autopark, *Full Self-Driving Computer*, and more. However, if you look at the fine text immediately below that, it says, "The currently enabled features require active driver supervision and do not make the vehicle autonomous." This is because it isn't a full self-driving car; it is a car with advanced driver assists. With how it's marketed, can you really blame Tesla owners for thinking that their cars are fully autonomous and treating them as such?



SAE J3016™ LEVELS OF DRIVING AUTOMATION™

Learn more here: [sae.org/standards/content/j3016_202104](https://www.sae.org/standards/content/j3016_202104)

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	SAE LEVEL 0™	SAE LEVEL 1™	SAE LEVEL 2™	SAE LEVEL 3™	SAE LEVEL 4™	SAE LEVEL 5™
What does the human in the driver's seat have to do?	You are driving whenever these driver support features are engaged – even if your feet are off the pedals and you are not steering			You are not driving when these automated driving features are engaged – even if you are seated in "the driver's seat"		
	You must constantly supervise these support features; you must steer, brake or accelerate as needed to maintain safety			When the feature requests, you must drive	These automated driving features will not require you to take over driving	

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	These are driver support features			These are automated driving features		
What do these features do?	These features are limited to providing warnings and momentary assistance	These features provide steering OR brake/acceleration support to the driver	These features provide steering AND brake/acceleration support to the driver	These features can drive the vehicle under limited conditions and will not operate unless all required conditions are met		This feature can drive the vehicle under all conditions
Example Features	<ul style="list-style-type: none"> • automatic emergency braking • blind spot warning • lane departure warning 	<ul style="list-style-type: none"> • lane centering OR • adaptive cruise control 	<ul style="list-style-type: none"> • lane centering AND • adaptive cruise control at the same time 	<ul style="list-style-type: none"> • traffic jam chauffeur 	<ul style="list-style-type: none"> • local driverless taxi • pedals/steering wheel may or may not be installed 	<ul style="list-style-type: none"> • same as level 4, but feature can drive everywhere in all conditions



The Vulcan brain has been described as a “puzzle wrapped in an enigma, housed inside a cranium.”

If you reference the SAE J3016 Levels of Driving Automation graphic above, you can see that there are six levels (numbered 0-5) of driving automation, and Tesla’s Full Self-Driving system is only SAE Level 2. The disclaimer exists because you are required to constantly monitor the vehicle and ensure that it is operating safely, and this means keeping your eyes on the road, hands on the wheel, and feet in the pedal box. No matter how advanced Autopilot seems, it is the same SAE level of automation that a \$20,000 Subaru Impreza equipped with EyeSight is: Level 2. I’m not saying that Autopilot is unimpressive, but it should not in any way be marketed as a full self-driving because of the safety risks that occur when users misunderstand the marketing brochure, switch on Autopilot, and boot up Netflix while barreling down the interstate. According to NBC News, a 2021 Tesla Model Y owner claimed that they crashed while using this system when the car turned into the incorrect lane on November 3rd, 2021. The owner said the car alerted halfway through the turn, they then attempted to correct, and were unsuccessful. I can’t assume that I know all of the details of the crash, but any driver paying attention *should* have noticed that the car was veering into the wrong lane before being alerted.

Therein lies my confliction. Despite being a car enthusiast that likes driving old hunks of junk, I am glad that cars are safer than ever before, as people deserve the upmost safety. Even I benefit from them, as my motorcycles and small sports cars are more difficult to spot at a glance, so I feel a bit better when I see someone’s blind spot monitoring system light up an indicator light in their mirror as I pass by. However, there are a lot of people misunderstanding that the intended function of their vehicles’ safety systems are supplementary to driving and not replacements for it. I don’t think it is a bad decision to use Autopilot or advanced cruise control features, but you should never in any way remove your attention from your surroundings or driving if you can help it. Driving a car is an inherently dangerous activity that is a major part of most our lives day in and day out, and just because your car *can* save you from making a mistake, does not mean it will every time. Unfortunately, it only takes one failure, one miscalculation of imperfect code written by an imperfect human, to take a life. So the next time you’re in your 4,000+ pound vehicle traveling at 75MPH, remember that before grabbing your phone to send a text.

Relevant Links:

<https://www.sae.org/blog/sae-j3016-update>

<https://www.nbcnews.com/news/us-news/regulators-looking-complaint-teslas-full-self-driving-software-rcna5537>

Why I think everyone should have a password manager

[Mikayla Jones]

In 2021, our society relies heavily on technology and its integration with every-day systems. For a lot of people, their banking, housing, work, and personal information are fully integrated with the online world. As time goes on, this will only continue (no matter how hard you try to fight it). Whether or not you are looking forward to our society's fall to Skynet, it is of *utmost* importance to learn (and implement) strong security practices. First things first, you should have secure passwords.

This one is important, folks. A lot of important data and information is stored online and in our accounts. Banking and financial documents, Social Security Numbers, addresses, etc. can all be found within our online accounts. While companies try to implement strong security standards for protecting this information, breaches and hacks can be inevitable. This is increasingly true for companies that focus on other services. Therefore, even large name and vetted companies have experienced data breaches. So, while it's important to verify the reliability of services that we use, it is also important to make solid steps towards protecting our own data and information. As the Fourth Industrial Revolution progresses, people will need to continue to practice positive security habits. One of the best ways (and in my opinion, one of the most important ways) to do this is to use strong passwords.

So, what makes a strong password? The National Institute of Standards and Technology (NIST) provides guidelines for best password practices in their Digital Identity Guidelines publication, otherwise known as [NIST Special Publication 800-63, Revision 3](#). These guidelines are "considered the gold standard for password security by many experts because of how well researched, vetted, and widely applicable they are for the private sector" ([Diego Poza](#), 2021). When creating passwords, the NIST guidelines state that length matters more than complexity due to how long it takes to decrypt longer passwords. Now, complexity is still important. Just not as important as length. The NIST recommends an 8-character password minimum, but 14-16 characters is more standard.

Another standard that has been popularized is to use a different password for every website and account. This way, if a website's data *is* breached, thus comprising your password, you don't have to worry about any of your other accounts being compromised too because you did not reuse that password. This is especially true for your email. Your email account should have a very strong password, as access to an email account provides the ability to reset passwords for other accounts. So, the best password is one that is long (at least 14 characters), complex (a mixture of upper-case, lower-case, numbers, and special characters), and unique (a different password across all accounts). How is one supposed to remember their growing list of long, random, unique passwords? That's where password managers come in (and trust me, they will change your life).

Password managers are services that store your account credentials (and sometimes other information) in an encrypted vault. They are either cloud-based or locally based. It's sort of like a giant safe for your passwords. All you need to access the password manager is a single set of credentials, which is usually a username or identifier and the master password. Now, password managers aren't the end all be all to password security. You still need to have a super strong master password, and you should also implement other positive security habits such as multi-factor authentication. However, password managers make it a lot easier to use long, complex, and unique passwords because you don't have to worry about remembering them. You just have to remember the single master password. Personally, I feel better about my accounts being secure and that I don't have to go through the frustrating process of forgetting and resetting passwords.

I believe that they're a great tool for storing those passwords that you will probably never be able to remember. Since password managers have become more popular, there are many great choices to choose from. I personally use [Bitwarden](#) and find it to be an easy-to-understand manager that gets the job done (and done well). The thing I typically look for in password managers is if it is free or relatively cheap to



Lieutenant
Uhura's name
means "freedom"
in Swahili.

use, open source, allows for self-hosting, and has been security audited by a third-party. Bitwarden meets all these standards and has some other features that I find really useful (such as a password generator, url integration, and device syncing). Some other managers that I have heard good things about are [1Password](#), [KeePassXC](#), and [Enpass](#). Whichever manager you decided to use is completely up to your preference. But I just hope you choose one as I sincerely think it will make your life just slightly easier.

Here's some other resources for relevant information regarding password security and password managers:

[Beyond Password Length and Complexity](#)

[5 reasons why you should use a password manager](#)

[The only secure password is the one you can't remember](#)



**Most Vulcans
are vegetarians
and do not touch
food with their
hands unless
they are wearing
special gloves.**

Pay Up Sucker [Josh Edelman]

According to the FBI, "On average, more than 4,000 ransomware attacks have occurred daily since January 1, 2016. This is a 300-percent increase over the approximately 1,000 attacks per day seen in 2015." Since the mid-2000's, ransomware attacks have seen billions and billions of dollars be extorted out of companies, governments, and charity organizations with the latest headline about the attack on the privately-held Colonial Pipeline. This pipeline company supplies roughly 45% of the East Coast's fuel. Notice I said privately-held. This is important because the group Darkside, who perpetrated the attack, has strict rules involving who they will attack. "Wait. Did you say strict rules? Why would a criminal organization that hacks networks have rules that they follow?" Well, let's look a little closer.

Darkside, the group responsible for the Colonial Pipeline ransomware attack was first noticed on the cybercrime scene back in 2020. They are a relatively new group added to the long list of known cybercriminal groups. But don't let that fool you. Just because they are the new kids on the block doesn't mean they are inexperienced. They have successfully hacked and extorted several oil and gas companies since coming to face in 2020. One such was the headline Colonial Pipeline hack. But what's different about Darkside is that they have published and guaranteed a certain service even though they are considered cybercriminals. For instance, they guarantee to decrypt data and provide feedback as to how they were able to penetrate a network while also providing insight as to how to prevent such an attack in the future. This organization is one of the first to provide ransomware-as-a-service. This means that they work with clients to infiltrate a competing company, or will attack companies and exploit the network to gain a monetary compensation. Especially with the rise of cryptocurrencies, the ability for law enforcement to track the currency back to the malicious actor has declined. This is due to the way that crypto is encrypted virtually making it impossible to follow. The rise of the information age has created the ability for criminals to now exploit data as something worthy of a monetary compensation to retrieve. Although they are criminals, one of the rules they follow is once the ransom has been paid they guarantee to decrypt data. Most of the attacks that they have claimed, they have announced that they usually receive less than what they asked. In other words they will negotiate. This does not allude the fact that these actions are harmful and malicious. It is theft. The Colonial Pipeline breach was ultimately paid in a steep number of \$4.4 million dollars. Luckily law enforcement was able to recover roughly \$2.3 million but it still caused infrastructure issues that required President Biden to declare a state of emergency.

We have all gotten those pesky emails where the sender tries to get you to click a link. When it comes to ransomware, these emails are the top way that hackers are able to gain access. The majority of attackers are looking for a person to disclose a password or other information to be used to infect and encrypt the data. Ransomware targets home users, businesses and often times government agencies. Once an actor is able to gain access to information, a lot of times they will gain data over a long period of time. This allows them to negotiate a ransom in terms of the value of the data. More data = more money. The first known attack is considered to be by Joseph Popp. He used 20,000 floppy disks that claimed to have an AIDS research program but imbedded on the discs was also malware. This malware laid dormant on the discs until the 90th time the machine was powered on. On the 90th time, the machine would display a message that required a payment in order to retrieve the data. Although considered rudimentary, this laid the cornerstone for the ransomware industry. As technology advances hackers with find more and more sophisticated ways of extorting data.

There is no happy ending to this story. Malicious actors will continue to attack and wreak havoc on businesses and our homes. The key factors for prevention is to stay up to speed on current cybersecurity recommendations. Companies should have a training program instituted in order to educate employees on current cybersecurity policies and good practices. Also keeping devices up to date on firmware and antivirus software are good ways to snuff out possible malicious attacks. There are



James Doohan (Scotty) did not have a right middle finger. He lost it during WWII.

more ways to protect data from being breached but always maintain backups can help alleviate incidents from degradation by allowing to revert back to a known good timeframe. Data and networks are never 100% protected. As hackers change and new technologies come to market, the protection must change. In order to prevent from having to pay up, maintain vigilance and we will conquer the day!!



Spock was originally conceived as a red-skinned alien with a plate in the middle of his stomach.

HIPAA: Safeguarding your Protected Health Information since 1996

[Chris Stoermer]

The Health Insurance Portability and Accountability Act of 1996 (HIPAA) was enacted to give health care providers acceptable rules and standards for communicating health insurance information and for holding these Covered Entities (CEs) accountable for the protection of patient records, known in the regulation as Protected Health Information (PHI). Unfortunately, in 1996, the technologies needed for the portability aspects of this regulation were still in the early stages of development and a great deal of the details were still hotly debated. As a result, the act settled on a semi-standard dataset that describes PHI but lacked a functional interop technology which would allow PHI to be shared across the Internet between CEs.

Over the last 15 years HIPAA has experienced a few significant changes driven by the industry's lag in implementation and the federal government's desire for more security and more transparency in PHI protection failures. The initial regulation had three goals; administrative compliance—meant to clearly define covered actions and improve communication, physical compliance—governing access control to data and technical compliance—covering the electronic storage and communication of data. These goals were simplified into two categories known as the Privacy Rule and Security Rule with effective dates of 2003 and 2005 respectively.

In 2006, primarily due to very sluggish adoption of the regulation, the Enforcement Rule was enacted which gave the [Office of Civil Rights \(OCR\)](#) enforcement powers and provided significant civil, federal, and probably most importantly, stiff monetary penalties for non-compliance. As of August 2021, the OCR has resolved more than 80% of their 272,923 HIPAA complaints resulting in more than \$130 million in penalties to CEs and more than 1,180 referrals to the Department of Justice for criminal offenses. Current enforcement activities can be found on the [Health and Human Services website](#).

In 2009, as part of the American Recovery and Reinvestment Act, the legislature attempted to get the health care industry to push further into “meaningful use” of Health Information Technology (HIT) by earmarking approximately \$40 billion in incentive payments to CEs that implemented, or expanded, the use of electronic medical records systems ([read more on HHS HITECH](#)). The legislature also included the Breach Notification Rule which established requirements for notifying patients when their PHI is disclosed inappropriately. Additional reporting requirements are included for larger disclosure violations including notice to local media outlets and to the HHS and OCR.

Because these regulations were somewhat disjointed in passage over the years, the legislature took a corrective action in 2013 and passed the [Omnibus Rule](#). Other than some minor edits, updates and corrections to the regulation, the major change from the Omnibus Rule was that Business Associates—people, or entities, performing covered functions for CEs dealing with PHI—are now required to fully comply with all HIPAA regulations as well.

Even though there have been no significant changes since 2013, the Secretary of Health and Human Services isn't done with HIPAA, yet. The HHS continually reviews feedback from CEs and all enforcement actions from the OCR. There are many changes being considered in the coming legislative sessions. Some of the more notable (and supported) proposals include improved patient access to PHI, promotion of parent/caregiver roles, encouraging the use of HIT and may others. If you would like to learn more about these proposals, or just stay current with enforcement news and other actions related to HIPAA, check out the [HHS HIPAA News Release page](#).



An October 1967 TV Guide ad by RCA cited Star Trek: The Original Series as the reason to buy a color TV.

A Beginner's Guide to Mechanical Keyboards

[Sharukh Mithani]

While browsing your local electronics store, you may have come across a growing selection of mechanical keyboards. Whether for gaming or general computer use, mechanical keyboards are continuing to gain popularity thanks to widespread adoption with gamers and a growing enthusiast community.

But what exactly is a mechanical keyboard? A mechanical keyboard is a high-performance keyboard with a mechanical switch under every key. These switches provide a less "mushy" feel than a traditional membrane switch and can improve your typing or gaming by providing a satisfying tactile and/or audible experience.

Switches



The most important part of choosing a mechanical keyboard is the type of key switch. The switch rests under the keycap and changes the unique feel of the keyboard. Mechanical keyboard switches come in three types: **Linear, Tactile, and Clicky**

Linear Switches - Smooth, consistent keystroke with a quiet noise

Linear switches provide a smooth, consistent keystroke without any tactile feedback. Linear switches can be difficult to use for beginners because they have little to no resistance. This makes them ideally suited for gaming or experienced touch typists, as they require less force to activate than a standard keyboard.

Linear switches are typically labeled as "Red," or "Yellow." Example Switches: Cherry MX Red, Gateron Yellow, NovelKeys Cream, Logitech GX Red

Tactile Switches - Small tactile bump on each keystroke with a moderate noise

Tactile switches provide a small tactile bump with each keystroke. Tactile switches are ideal for beginners who want to get a feel for mechanical keyboards. They are also great in an office environment as they provide good tactile feedback for long typing sessions and are still relatively quiet.

Tactile switches are typically labeled as "Brown" or "Clear." Example Switches: Gateron Brown, Drop Halo Clear, Glorious Panda, Logitech Romer-G

Clicky Switches - Small tactile bump on each keystroke with a loud, audible click

Clicky switches are akin to the typewriters of old and are what most people think of when referencing mechanical keyboards. These switches provide the best feedback when a key is pressed. However, they tend to be the least liked by the enthusiast community due to their loud, often springy noise. Still, if you can work in an isolated environment, clicky switches can be a great option.



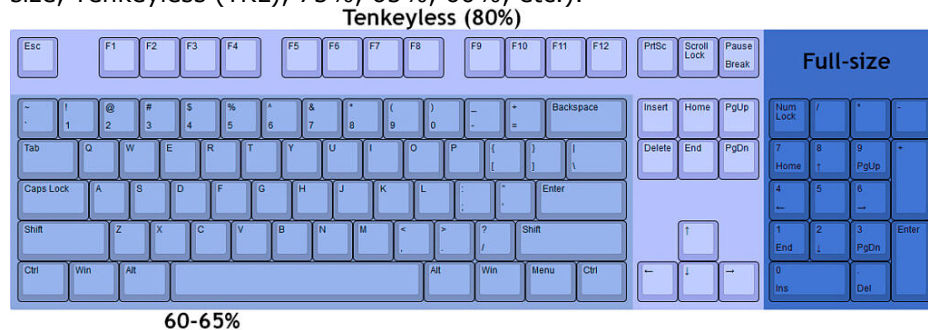
DeForest
Kelley (Dr.
McCoy) was
originally offered
the role of Spock.

Clicky switches are typically labeled as “Blue” or “Green.” Example Switches: Cherry MX Blue, Razer Green, Kailh BOX Jade, NovelKeys Sherbet
If you are unsure where to start, you can buy a switch tester to test out various switch types. Big box retailers like Best Buy or Micro Center also have a selection of mechanical keyboards on display to test.

Customization Options

Size and Layout

A great advantage of most mechanical keyboards is the wide variety of customization options available. Multiple custom sizes are available, including Full-size, Tenkeyless (TKL), 75%, 65%, 60%, etc.).



Custom Keycaps

Most mechanical keyboards allow you to easily replace the keycaps, which lets you to change the look of your keyboard. [Drop.com](https://www.drop.com) has a broad selection of custom keycaps that are high quality and fit most mechanical keyboards.



Hotswap Sockets

Additionally, there are mechanical keyboards that have **hotswap sockets**, which allow you to easily change the switches that your keyboard uses. This is an excellent feature to have if you are new to the mechanical keyboard hobby and want to try out different switches with your board. The [Keychron K2](https://www.keychron.com) is a great beginner keyboard that has hot-swappable switches for an affordable price. Switches can be purchased from multiple vendors, including [Amazon](https://www.amazon.com).



The U.S.S Enterprise NCC-1701 from the original series has a crew compliment of 430.

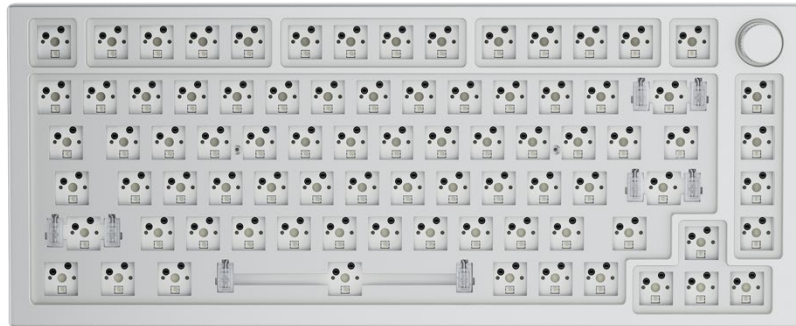


The Enterprise NCC 1701-D from The Next Generation has a crew complement of 1,012.



Barebones Kits

If you are feeling adventurous, you can get a barebones kit, like the [Glorious GMMK Pro](#) and build the keyboard yourself. Glorious offers a selection of switches and keycaps, but you can also source your own and put together the keyboard using the included instructions.



Other Customization Options

There are countless other customization options available, including completely custom builds, modifications, and more. The Reddit [r/MechanicalKeyboards](#) community has a great wiki with more information about the basics of mechanical keyboards and customization options: [r/mk Wiki](#)

Conclusion

While the number of options can be daunting, mechanical keyboards provide an unmatched typing experience with a whole host of customization options. If you are looking to learn more, check out the resources below:

[Switch and Click](#) - Blog with great guides and info about mechanical keyboards
[Reddit r/MechanicalKeyboards](#) - The largest mechanical keyboard community online
[Drop.com](#) - Retailer with a large selection of Mechanical keyboards, switches, keycaps, and more.

Useful Keyboard Shortcuts - For Windows

[James Taylor]

"How the heck did you do that?" This is something an IT person inevitably hears at one time or another after fixing a problem with a rapid flurry of keystrokes while nary touching the mouse. It's also something I've exclaimed after watching one of my colleagues perform some rapid-fire troubleshooting.

For this article, I have compiled a brief list of what I consider to be some of the most useful shortcuts for Windows. Some of these shortcuts may only be useful in specific situations and a few have actions that can be accomplished with entirely different key combinations.

Many of these will likely be very familiar to you but hopefully you'll find some new ones that will make your life just a little bit easier.

Ctrl + C	Copy
Ctrl + X	Cut
Ctrl + V	Paste
Ctrl + A	Select all items in a window
Alt + Tab	Swap between windows
Alt (hold) + Tab	Swap between any other open window
Alt (hold) + Shift + Tab	Swap between any other open window in reverse order
⊞ + Tab	Open the task view
⊞ + L	Lock your screen
⊞ + D	Minimize all windows and show desktop
⊞ + R	Open the 'Run' dialog box
⊞ + E	Open Computer/File Explorer
⊞ + ↑	Maximize the window
⊞ + ↓	Restore the window (to its non-maximized size)
⊞ + ↓ (twice)	Restore and then minimize the window
⊞ + ←	Snap the window to the left side of the screen
⊞ + →	Snap the window to the right side of the screen
⊞ + Shift + ← or →	Move the window to another screen
⊞ + PrtScn	Take a screenshot of your monitors (stored in the clipboard)
⊞ + Shift + S	Take a screenshot of part of your screen
⊞ + P	Open the presentation mode menu
Alt + space	Open the window menu of the currently open application
(Alt + space) + N	Minimize the window
(Alt + space) + X	Maximize the window
(Alt + space) + R	Restore the window (to its non-maximized size)
(Alt + space) + C	Close the window/application (can also use Alt + F4)
(Alt + space) + M	Move the window with the arrow keys if not maximized
Ctrl + Esc	Open the Start Menu
Ctrl + Shift + Esc	Open the Task Manager
F6	Cycle through the sections of a window or the desktop
Shift + F10	Perform a "right-click" on the selected file or item



The Enterprise was initially a French sailing ship in 1671. A later ship was captured by the British royal navy in 1705 and renamed HMS Enterprise.



The first Earth Starfleet vessel commissioned Enterprise NX-01 launched in 2151 under the command of Captain Jonathan Archer.

Intro to Programming: The Odd Magic Square Program

[Matthew Trammell]

Magic squares are fascinating logic puzzles that originated thousands of years ago. They are amongst the simplest of logic puzzles and a great introduction into solving problems outside of traditional mathematical equations. What makes them magic you may ask? Well, a long time ago in a galaxy far, far away... or in ancient China, Japan, and India, magic squares originated as mathematical art symbols of divinity and astrology. A Chinese legend tells of Emperor Yu and his discovery of a magical turtle with a curious square pattern inscribed on its shell, alongside the Luo River. This particular square, known as the Lo Shu Square, was integral to city planning, designing temples and tombs, and marking places of religious and political importance. I imagine that magic squares may still serve similar purposes today, however; you can also describe a magic square as a square with an identical, even or odd, number of sides, where all of the numbers in the rows, columns, and diagonals add up to the same, or magic, sum.

I still have fond memories of coding an odd magic square program in my high computer science class with Pascal. We coded an odd magic square because the pattern is easy to programmatically create. The fact that I still remember it today should tell you how much fun I had learning about magic squares! So, open your Pascal compiler and let us learn how to write the program! Wait, do you not have Pascal? Okay then, how about a more modern programming language then... like PowerShell? Good! I hope that you enjoy following along in the process. Perhaps, you can help me find the sum of the magic square with 49 rows and columns?

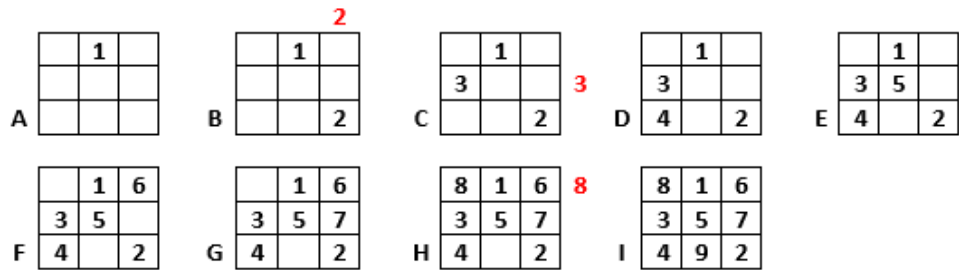
We will write our PowerShell script in the PowerShell ISE (integrated scripting environment). Good news! Windows already has this compiler; it does not require an additional download. There is no need to navigate those sketchy free compiler sites with malware infected ads! Search the Start Menu for Windows PowerShell ISE and you will find the application. If for some reason you do not have PowerShell, you can download it from here: <https://docs.microsoft.com/en-us/powershell/scripting/install/installing-powershell-on-windows/>.

Note: You may need to allow PowerShell scripts to run on your computer. Type **Set-ExecutionPolicy Unrestricted** in the console window. Once you finish running this program, I recommend that you restrict PowerShell scripts from running again. Type **Set-ExecutionPolicy Restricted** in the console window. You must be an Administrator to set the PowerShell script execution policies.

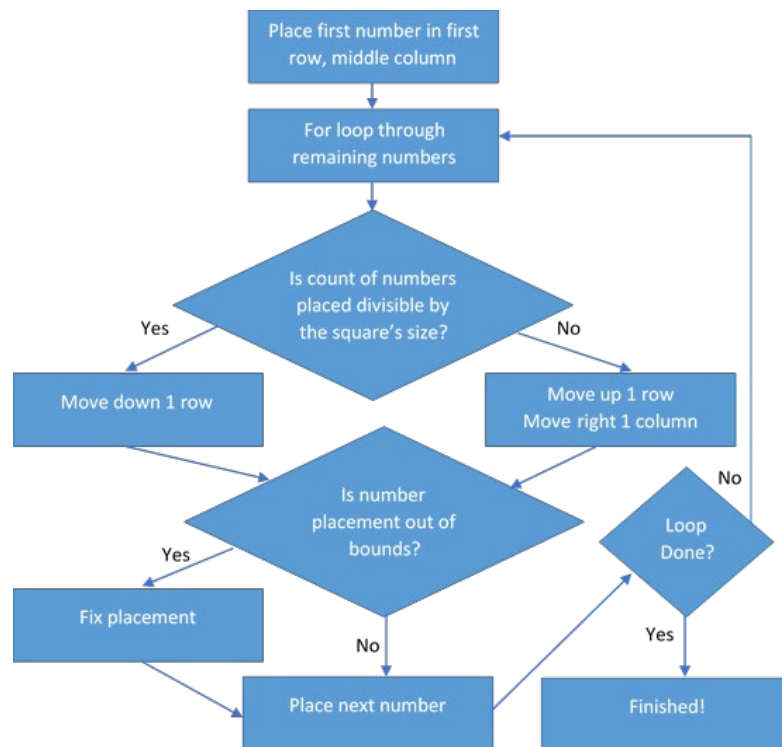
I know that you are eager to jump right into programming, however; it is always good to start any project with a little bit of planning. First, I need to explain the odd magic square pattern. Place the first number in the top row, middle column. Place the remaining numbers using the standard magic pattern of move up one row and move right one column. The exception to the pattern is that if the count of numbers placed is divisible by the size of the square, then you move down one row. Lastly, if your placement happens to be out of bounds, or off the square, you must fix your placement. If you are outside the top row, you move to the bottom row. If you are past the bottom row, you move to the top row. If you are outside the leftmost column, you move to the rightmost column. Lastly if you are past the rightmost column, you move to the leftmost column. Phew! I know that is a lot of rules. Now, we certainly did not get this help, but because I am a nice person, I will show you this figure below that walks you through generating the 3x3 odd magic square. Grab some paper, draw an empty 3x3 square, and follow along!



**Klingons
prefer to eat food
that's still alive.**



The first rule is straight forward. The first number goes in the top row, middle column. See Step A. Time to place the second number. Now, move up one row and right one column. Oh no, we are already off the square! We are still within the column, but we went outside the top row. So, we must move to the bottom row and place our number. See Step B. Continuing on, we move up one, right one. Ack, once again we are off the square. This time, we are good on the row, but past the rightmost column. The out of bounds rules state that we must therefore move to the leftmost column and place our number. See Step C. Up one, right one... wait a minute. We placed our third number! So, this time we move down one row instead and place our next number. See Step D. I think that you are starting to get a hang of the pattern. Good! Now continue to follow along and you should end up with the final square in Step I. Did you remember to move down one row after placing the sixth number? Awesome job! Now that we have worked out the logic on paper, let us think through the problem more programmatically. A common tool to help programmers do that is the flowchart. The rectangles represent processes, and the diamonds represent decision points. Feel free to sketch out this flowchart on the paper that you drew your 3x3 square on. I assure you that this chart helped me greatly when coding the for loop.



Without further ado, in 50 lines no less, I give you the odd magic square program! Please note that as you look through this program, I have removed some elements such as error handling, spacing, and debugging. I also added line numbers to help. Why did I do all this? For you! In my Introduction to Programming article, I wrote about how I would ask my youngest sister to type out the QBASIC code for me from a library book that I had checked out. Once she finished, I would come back to test it out, make changes, and add new functionality. I tried to be mindful of this as I put together this snippet of code. I am sure that you will appreciate this as you spend



A Romulan Warbird is nearly twice the length of the Enterprise in The Next Generation.

hours and hours transcribing this code. Never mind you that this being an electronic newsletter, you probably figured out that you can copy and paste the code right into the PowerShell Script Pane. Clever you! There goes my fun! You still will want to delete the line numbers after copying and pasting because the PowerShell compiler will not appreciate duplicate line numbers!

The Odd Magic Square Program

```
1 Clear-Host
2 # Get the square size from user
3 [int]$size = 0
4 $size = Read-Host -Prompt "Enter an odd magic square size [1-99]"
5 $places = $size * $size
6 $placed = 0
7 $sum = 0
8 # Create the magic square array object
9 $mySquare = New-Object "object[,] " $size, $size
10 # Set the boundaries values
11 $minRow = 0
12 $maxRow = $size - 1
13 $minCol = 0
14 $maxCol = $size - 1
15 # Place the first number
16 $row = 0
17 $col = [Math]::Floor($size / 2)
18 $mySquare[$row,$col] = 1
19 $placed++
20 # For loop to place the remaining numbers
21 for ($num = 2; $placed -le $places-1; $num++) {
22     # Is the count of numbers placed divisible by size of square?
23     if ($placed % $size -eq 0) {
24         # Yes, move down one row
25         $row++ } else {
26         # No, move up one row, move right one column
27         $row--
28         $col++ }
29     # Check and fix boundaries
30     if ($row -lt $minRow) {$row = $maxRow}
31     if ($row -gt $maxRow) {$row = $minRow}
32     if ($col -lt $minCol) {$col = $maxCol}
33     if ($col -gt $maxCol) {$col = $minCol}
34     # Place the next number
35     $mySquare[$row,$col] = $num
36     $placed++
37 }
38 Write-Host
39 Write-Host "Displaying the Odd Magic Square of $size"
40 Write-Host
41 for ($row = 0; $row -lt $size; $row++) {
42     for ($col = 0; $col -lt $size; $col++) {
43         Write-Host -NoNewline $mySquare[$row,$col].ToString().PadLeft(5)
44         $sum += $mySquare[$row,$col]
45     }
46     Write-Host
47 }
48 $sum = $sum / $size
49 Write-Host

50 Write-Host "The magic sum is $sum."
```

I would like to now highlight some areas of my code and conclude by suggesting some next steps to improve it. First, I want to note the `Clear-Host` command at the first line of my program. It is a simple command to clear all the previous output from the console window so that it clear where this program's output begins.

Secondly, I try to declare most of my variables at the start of my program and assign them a default value. This practice ensures that the starting value is not some garbage value and it makes it convenient to change the default value of a variable if needed. I define all my variables in Lines 3 – 17.



A Romulan Warbird is powered by "an artificial quantum singularity" or a black hole.

Our first key variable is the size variable. We need to know what size our square is. I also expect the size to be an integer. I expect it to be an odd number. And, as the prompt suggests, between 1 and 99. On Line 3, I used [int] in front of the variable name, \$size, to tell PowerShell that I am looking for an integer value. Keep in mind that this is not error handling. If I entered a letter at the prompt for example, I still would get an ugly error message telling me that I did not enter an integer and the poor program will error out and ultimately fail due to my bad input. Sad face.

```
Enter an odd magic square size [1-99]: h
Cannot convert value "h" to type "System.Int32". Error: "Input string was not in a correct format."
At C:\Users\mat0055\Desktop\MagicSquareTest.ps1:4 char:1
+ $size = Read-Host -Prompt "Enter an odd magic square size [1-99]"
+ ~~~~~
+ CategoryInfo          : MetadataError: (:) [], ArgumentTransformationMetadataException
+ FullyQualifiedErrorId : RuntimeException
```

If I enter an even integer, the program will run, but the output would be far from correct. Negative number? Ugly error. This is one area of the program where I strongly encourage you to add some error handling code. This also helps illustrate an important programming skill. That skill is the ability to predict all of the possible combinations of an input and make sure to handle each before an error becomes an ugly error. Take a look at the output below, where I wrote some error handling code. Much prettier right? Wrong value entered? No big deal. Simply let the user know and loop back to the prompt until you get the input that you expect.

```
Enter an odd magic square size [1-99]: h
Error. The entered size is not an integer.
Enter an odd magic square size [1-99]: -1
Error. The entered size is less than 1.
Enter an odd magic square size [1-99]: 4
Error. The entered size is even.
Enter an odd magic square size [1-99]: 100
Error. The entered size is even.
Error. The entered size is greater than 99.
Enter an odd magic square size [1-99]: 101
Error. The entered size is greater than 99.
Enter an odd magic square size [1-99]:
```

Now that we know our square size is correct and that it falls within the program's parameters, I want to spend a few moments on Line 9. \$mySquare is an important key, array variable of our program. This is where we store all of the square's numbers. If we define our square as a simple array, it will look like a straight line of numbers: [1, 2, 3, 4,

5, 6, 7, 8, 9]. I will admit that I toyed with this concept for a little while. However, I quickly found that it would not work very well. Ultimately, we need our numbers to end up like so: [8, 1, 6, 3, 5, 7, 4, 9, 2]. I am sure that we could code something to work for the 3x3 square. But would the same process work for the 5x5 square, the 7x7, or the 9x9 square? Most likely no. For our need, a multidimensional array works best. The best way to understand a multidimensional array is to think of a table. A table can have a different number of rows and columns. Likewise, a multidimensional array can differ in its rows and columns. In our case, we are working with squares and the number of rows and columns are the same. Regardless of the type of array that we are working with, the index starts at 0. The index is how we reference a value inside the array. We use the index along with the array variable name to retrieve or modify a value. If \$mySquare were a simple array, we would access each value as so: \$mySquare[0], \$mySquare[1], etc. Alas, our array is not simple. The 3x3 multidimensional array index map depicted below helps us visualize how to reference our array values.

	0	1	2
0	[0,0]	[0,1]	[0,2]
1	[1,0]	[1,1]	[1,2]
2	[2,0]	[2,1]	[2,2]

Now that is something that we can apply our magic square rules to! In PowerShell, we can reference a multidimensional array as so: \$mySquare[0,0], \$mySquare[0,1], etc. Refer to the array index map on the previous page. Do the numbers in brackets make sense now? Great! Arrays are an extremely helpful tool in programming.

Note: For more info on PowerShell arrays, visit <https://docs.microsoft.com/en-us/powershell/scripting/learn/deep-dives/everything-about-arrays>.



Spock was the first Vulcan to enlist in Starfleet.

Lines 10 – 14 of our code define the boundaries of our multidimensional array. It is important to stay within the boundaries of an array in order to avoid ugly errors. The array index map is very useful in helping us define these variables. In any of our multidimensional arrays, it is straight-forward to set \$minRow and \$minCol to 0. The \$maxRow and \$maxCol default values depend on the size of the array. In our example, \$size = 3. Therefore, \$maxRow and \$maxCol equal (\$size - 1), or 2.

Lines 15 – 37 make up the heart of our code. Remember the flowchart that we sketched out during the planning phase? Now would be a good time to reference that. Row 0 marks the first row. Like our max row and max column variables, the middle column depends on the size of our array. To find the middle of some number, you essentially divide the number by 2. Sticking with our \$size = 3 example, the middle column index equals 3 / 2 or 1.5. But 1.5 is not an integer! That is where the floor command from the math class comes in handy. Floor removes the decimal and returns the lower integer value. So \$row = 0 and \$col = 1. Now we place the first number. Thus, the for loop begins at 2 and loops through the remaining numbers.

Lines 22 – 28 determine which rules we follow. Do we move up 1 row and right 1 column or do we move down 1 row? One question that you may have is why do we pick the rule based on the count of numbers placed? Why not use the current number? Good question! In our program, we have explicitly defined the starting number as 1. What if the starting number is not 1? What if the increment is not 1? A cool fact about odd magic squares is that if you change the starting number and/or if you increment the next numbers by the same amount, the magic square will still

21	7	17
11	15	19
13	23	9

work! Let us stick to our 3x3 magic square example, change the starting number to 7, and change the increment by 2. Instead of [1, 2, 3, 4, 5, 6, 7, 8, 9], our numbers to place become [7, 9, 11, 13, 15, 17, 19, 21, 23]. If we relied on the number itself, protocol would incorrectly tell us to move up 1 row and right 1 column

because 11 is not divisible by 3. Fortunately, we went over the pattern in advance, and we know to move down one row after we place the third number. In the above left square, the magic sum is 45.

Lines 29 – 33 are the if statements that fix our boundaries and keep our index from going outside of the array’s boundaries. No ugly errors to see here! In Lines 34 – 36, we place the next number inside the array and move on until we place all of the numbers. In Lines 41 – 47, I use a nested for loop, or a for loop within a for loop, to display the contents of the magic square array. Note that I take the integer value from the magic square array and convert it to a string value. I do this so that I can use the string class PadLeft function. This allows me to create spacing between each value of the square to increase readability. Note Line 43. I typed *.PadLeft(5). How did I come up with 5? First, I arbitrarily decided that 99 is a large enough square for the purpose of this article. To get the max value, I calculated 99 x 99 or 9,801. That is 4 characters in length. I wanted one space in between each value, and voila, our pad left size is 5!. For fun, I used Excel to help me generate this chart:

Size of Square Range	Max Value Range	Pad Left Size
1 - 3	1 - 9	2
5 - 9	25 - 91	3
11 - 31	121 - 961	4
33 - 99	1,089 - 9,801	5
101 - 315	10,201 - 99,225	6
317 - 999	100,489 - 998,001	7

I do want to note that if you choose to adjust the starting number and increment, you will want to adjust the pad spacing accordingly. Also, for fun I ran the 999 x 999 square in the program and generated a few statistics. With 998,001 numbers to place, numbers ranging from 1 – 998,001, and an increment of 1, it took a little over 30 minutes to display the square. The magic sum came out to 498,501,999! A takeaway from this test is to consider the more sides your square has, the longer it will take to process and display the square. To time how long it took the display process to display the square, I used the Get-Date -DisplayHint Time command



Star Trek
2009 is dedicated
to Gene
Roddenberry and
his wife Majel
Barrett.

before and after the nested for loops and then I calculated the difference between the two times.

Lines 48-50 calculate the magic sum of the square. I am sure that there are several ways to accomplish this. Line 44 reads `$sum += $mySquare[$row,$col]`. Note the `+=` operator. For this implementation, the sum continues to build after each row. Because of that, Line 48 is very important. `$sum = $sum / $size`. To get the correct magic sum, you need to divide the running sum by the size of the magic square.

Phew, look at you! We made it through the program. I hope that you have found this very informative. Maybe a bit too much informative? I realized that as I started typing this article, I had a lot to share about magic squares. I am sure that I missed something. At the least, I hope that I inspired you to research and learn more about magic squares or even learn more about programming I learned a lot about programming through fun programs like this one.

Next Steps

As I mentioned previously, one thing that I like to do with programs is to add new features. And boy do I have a list of improvements! Here are a few new steps:

- Add error handling for the size input
- Add a starting number variable and input with error handling
- Add an increment number variable and input with error handling
- Modify the number placement loop based on the starting number and increment variables entered by user
- Update the pad size based on the size of the square
- Update the pad size based on the starting number and increment number
- As you display the square, craft a border around it using the ASCII border symbols. To enter an ASCII symbol press ALT along with the respective number code:
185 (⌈), 186 (⌋), 187 (⌌), 188 (⌍),
200 (⌎), 201 (⌏), 202 (⌐), 203 (⌑),
204 (⌒), 205 (⌓), 206 (⌔)
- Fix the magic sum variable so that it is only calculated once
- Any other improvement that you can think of!

Were you able to determine the magic sum of the odd magic square with 49 sides? The answer is... next article!

Until next time, happy programming!

Multi-Factor Authentication Brief

[Jonathan Hons]

Do you get messages from friends like, "Don't open anything sent from me recently. I've been hacked!" Have your online accounts been hacked, and you have had to struggle to get control of them again? One of the easiest ways to combat this security problem is by using multi-factor authentication, or MFA for short. MFA is a way for you to prove who you say you are when signing into an online account, service, or app. It uses something you know and something you have to authenticate yourself when logging in. The "something you know" is your username and password. The "something you have" would be your mobile phone. Here's a [short video from Microsoft explaining MFA](#).

To set up MFA, log into your online account, go to settings, security, and look for 2-factor, 2-step verification, or multi-factor. If your online account has a frequently-asked-questions page, that's a perfect place to get the details. Most sites offer multiple ways to enable MFA, like sending a code to your phone via text message or app or even calling you to give you the code. Using authenticator apps like Google Authenticator, Authy, Duo, or Microsoft Authenticator will help manage the MFA codes for your accounts. These apps generate codes that change every 30 seconds or so. Links to these apps are below.

- [Google Authenticator for iOS and Android](#)
- [Authy for iOS and Android](#)
- [Duo for iOS and Android](#)
- [Microsoft Authenticator for iOS and Android](#)

Surfing the Internet is only becoming more dangerous as the bad guys get smarter and better tools. Using MFA will add an extra layer of protection to your accounts. Unfortunately, personal security is a necessity of online life now. Yes, it can slow you down getting into your accounts, but that is a good trade-off, in my opinion.



Captain Kirk's dramatic pauses in speech have been called "The Shatnerian."

UNT Esports and RGB Custom PC [Dylan Wray]

UNT Esports and RGB Custom PC have collaborated to create a spectacularly designed UNT themed gaming PC.



RGB CUSTOM PC

Ryzen 5 3600 CPU w/ RTX 3060 & Lian Li Unifans
CPU: AMD Ryzen 5 3600 3.6 GHz 6-Core Processor
CPU Cooler: Lian Li GALAHAD AIO 240 RGB 69.17 CFM Liquid CPU Cooler (White)
Motherboard: Asus ROG STRIX B550-F GAMING (Wi-Fi) ATX AM4 Motherboard
Memory: OLOy Blade RGB 16 GB (2x8 GB) DDR4-3200 CL16 Memory (White)
Storage: Western Digital SN750 Black 500 GB M.2-2280 NVME Solid State Drive
Video Card: Zotac GeForce RTX 3060 12 GB GAMING Twin Edge OC Video Card
Case: Lian Li O11 Dynamic Mini Snow Edition ATX Mid Tower Case
Power Supply: Cooler Master V SFX Gold 750 W 80+ Gold Certified Fully Modular SFX Power Supply
Operating System: Microsoft Windows 10 Home OEM 64-bit
Case Fan: Lian Li UNI SL120 58.54 CFM 120 mm Fans x9
Extension Cables: Green, Grey, & White Extension Cable

The design will soon be available for anyone to purchase at <https://rgbcustompc.com/> in December with more customizable options for hardware.

Three units will be housed in the Pohl Rec Center for UNT Esport varsity athletes to compete and train on. Photographs by Thomas



Ferengi, the name of an alien race, is the Persian word for "foreigner."

Solution to last newsletter's brainteaser

If you have a great memory and a big vocabulary you might come up with at least 3 words that have all 5 vowels (A, E, I, O, and U). The vowels don't have to be in order but they can be and you don't have to include Y but you can. Can you come up with 6 words that have all 5 vowels? What is it?

Answer - provided by one of the readership - as you can see an overachiever ☺ :

1. *Education*
2. *Emulation*
3. *Evacuation*
4. *Augmentation*
5. *Preoccupation*
6. *Documentation*



The famous hand gesture "Live Long and Prosper" is a slight modification of the Hebrew gesture forming the letter "Shin" which represents the name "Shaddai"-one of the names for GOD meaning "Almighty" (GOD)