## Practical Paranoia macOS 10.13

### Security Essentials

- ✓ The Easiest
- Step-By-Step
- ✓ Most Comprehensive
- ☑ Guide To Securing Data and Communications
- On Your Home and Office macOS Computer



Practical Paranoia: macOS 10.13 Security Essentials

Author: Marc Mintz

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#### **Dedication**

To Candace, without whose support and encouragement this work would not be possible

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# PRACTICAL PARANOIA MACOS 10.13 SECURITY ESSENTIALS

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No matter how paranoid or conspiracy-minded you are, what the government is actually doing is worse than you imagine.

-William Blum<sup>1</sup>, American author, and former State Department employee

#### What You Will Learn In This Chapter

- Password protect a document in its application
- Encrypt a PDF document
- Encrypt a folder for only macOS use
- Encrypt a folder for cross-platform use with zip
- Encrypt files or folders for cross-platform use with VeraCrypt

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<sup>&</sup>lt;sup>1</sup> https://en.wikiquote.org/wiki/William\_Blum

#### 17.1 Document Security

If your documents never leave your computer, and you have encrypted your storage devices using FileVault 2, there is no need to go the extra step to encrypt your documents. But should you ever need to email your sensitive data to someone else, or pass a sensitive document via any storage device, encrypting the document goes a long way to a good night of sleep.

There are several options to document encryption, each with its own benefits and drawbacks. We will discuss each here.

#### 17.2 Password Protect a Document Within Its Application

A few applications are designed with document security in mind, and offer their own encryption scheme. Microsoft Office and Adobe Acrobat Pro are common examples.

Although Microsoft Office products make it an easy process to password protect your documents, prior to Office 2007 (Windows) and 2011 (Mac), it was an equally easy process to break the encryption. There are many freeware and commercial utilities that can bypass the password and open the document for reading in older versions.

Starting with Microsoft Office 2007 and 2011, Microsoft changed the encryption standard to use the secure AES-128<sup>2</sup> algorithm. Microsoft Office 2016 (Office 365) uses AES-256<sup>3</sup>. Assuming an adequate password length has been selected, it is estimated by some researchers that it would take millions of years to brute-force crack an AES-256 password with current computing power. For security during this lifetime (famous last words), the AES-256 encryption standard should be enough to protect your documents if an adequate password has been chosen.

#### 17.2.1 Assignment: Encrypt an MS Word Document

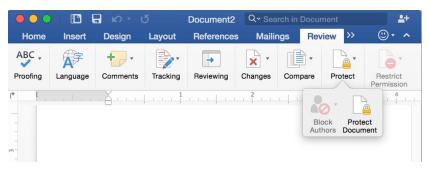
In this assignment, you encrypt a Microsoft Word 2016 (Office 365) file. Although this assignment uses a Word file, the process is identical for Excel and PowerPoint files.

- Prerequisite: Microsoft Word 2016 (365) installed and activated.
- 1. Open the target document in Microsoft Word.

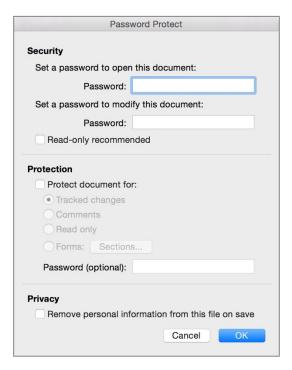
<sup>&</sup>lt;sup>2</sup> https://en.wikipedia.org/wiki/Advanced\_Encryption\_Standard

<sup>3</sup> https://technet.microsoft.com/enus/library/cc179125%28v=office.16%29.aspx?f=255&MSPPError=-2147217396 -About

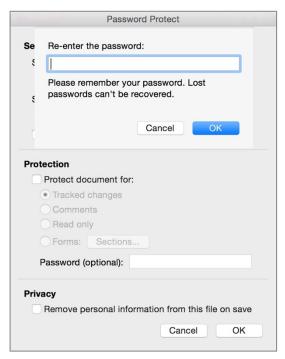
2. Select *Review* tab > *Protect* > *Protect* Document.



- 3. The *Password Protect* dialog opens. You may set a separate password to *Open*, and to *Modify* this document. Enter a password for the desired function.
  - Note: Passwords for Microsoft Office products are limited to 15 characters.



4. Re-enter the password, and then click OK.



5. Click the *OK* button at the bottom right of the *Password Protect* dialog. Your document is now protected.

#### 17.3 Encrypt a PDF Document

As there are only a few applications that can encrypt their own documents, chances are you will be working with a file whose application cannot perform the encryption. macOS can "print" any document to pdf format, and in the process, add password-protected encryption to the pdf.

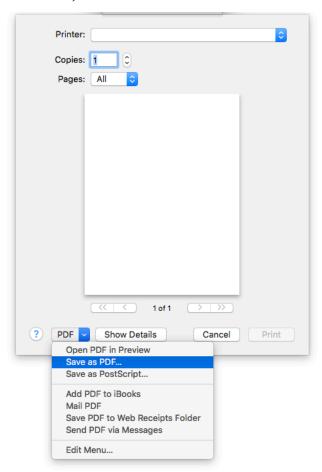
- As of macOS 10.12.3 (perhaps earlier) print to pdf services saves the file in Acrobat 7 format. This format uses AES-128 encryption, which is considered strong and may be used for HIPAA, SEC, legal, and other high-security needs.
- Earlier versions of macOS print to pdf services save the file in pdf version 1.4/Acrobat 5 format. This format uses RC4 128-bit encryption, which is considered weak, and should not be used for HIPAA, SEC, legal, or other high-security needs.
- Adobe Acrobat 7 and higher use AES 128-bit encryption. Adobe Acrobat 9 and higher use AES-256-bit encryption. These are considered secure, as long as strong passwords are used.

#### 17.3.1 Assignment: Convert a Document to PDF for Password Protection

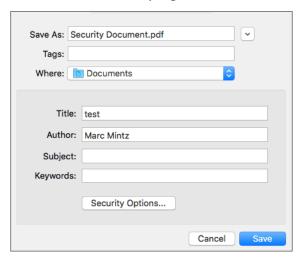
In this assignment, you convert a file into a PDF for encryption.

- 1. Open any printable document currently on your computer.
- 2. Select *File* menu > *Print*.

3. From the *Print* window, select the *PDF* button > *Save as PDF*.



4. In the window that opens, in the *Save As* field, name the pdf version of the document, and then select the *Security Options...* button.



5. In the *PDF Security Options* window, enable the *Require password to open document* check box, enter a desired password in the *Password* and *Verify* fields, and then select the *OK* button.



6. Quit the current document and application.

The pdf version of the document is now encrypted. If the original document is no longer needed, it may be trashed.

#### 17.4 Encrypt a Folder for Only macOS Use

Perhaps you need to securely send an entire folder of files. An easy way to accomplish this is to use a utility to archive (compress to a single file) the files or folder, and have that same utility protect the archive with a password.

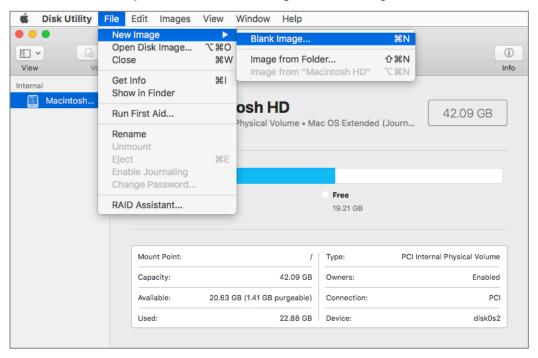
macOS has a built-in utility to do this for you–*Disk Utility*. The only downside is that the archives created with Disk Utility are only readable on another macOS/OS X computer–they are not cross-platform compatible. However, if your documents will be passed along only to others using macOS/OS X, it is an excellent tool.

#### 17.4.1 Assignment: Create an Encrypted Disk image

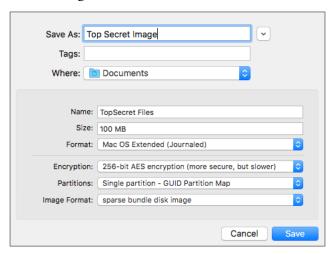
In this assignment you create an encrypted disk image to store sensitive files and folders.

1. Open Disk Utility, located in / Applications/Utilities.

2. Select Disk Utility File menu > New Image > Blank Image...



3. Configure the New Image screen as below.



• *Save As*: The desired name for the archive that will hold all your files to be password protected.

- *Where*: Navigate to where you want the archive to be saved.
- *Name*: Enter the name of the mounted disk image. To avoid confusion, this is normally named the same as the *Save As* field. For demonstration purposes, we are naming them differently in this example.
- *Size*: This should be somewhat larger than the total size of files the archive will hold. It can be much larger, as the archive will compress out all unused space.
- Format: Mac OS Extended (Journaled). This is the macOS standard format.
- *Encryption*: 256-bit takes more time to encrypt and decrypt than 128-bit, but is also more secure. When selecting this option, you are prompted to provide a password. Enter your desired password, and then click *OK*.
- *Partitions*: Single Partition, GUID Partition Map. This is the macOS standard.
- *Image Format: Sparse Bundle Disk Image*. This is the format that will compress out all unused space.
- 4. Select the *Save* button.
- 5. The archive is saved, and the Disk Image (the opened format of the archive) is displayed in the Finder Window Sidebar, and depending on your *Finder Preferences* menu > *General* > *Hard Disks*, may display as mounted on the Desktop. You now have an encrypted, password protected archive, but it's currently empty. Time to fill it.
- 6. Locate the mounted disk image on the Desktop. In our example, it will be called *Top Secret Files*.
- 7. Drag the various files and folder that you have targeted for password protection into the mounted image.
- 8. Eject/unmount the mounted image. It will close, remove itself from the Desktop, leaving just the password protected archive in the location you specified in step 3 above (Desktop).

This archive may be securely passed to macOS/OS X users by any method. If they know the password, double-clicking the archive will mount the disk image to their Desktop, and they will have full read and write access to the documents inside.

#### 17.5 Encrypt A Folder for Cross Platform Use With Zip

If you need to exchange a file or files with others and they do not use macOS/OS X, we can use the same strategy as we did with Disk Utility, but this time we need to password protect our archive in a format that is readable by any OS. Although there are over a dozen cross-platform compression formats, *zip* has become the most common standard.

Although macOS has the built-in ability to create zip archives, it uses the default format which lacks encryption. To encrypt our zip archives, you will need a 3<sup>rd</sup>-party utility. We recommend using *Keka* for macOS.

Once you have created an encrypted archive of your file or files, the archive can be uploaded to a file server, shared by email, or passed along via drive, disc, or thumb drive. As long as the other party knows the (strong) password, your data is safe from spying eyes.

• Note: The encryption protocol used in zip is considered weak, and should not be used for HIPAA, SEC, legal, or other high-security needs unless using a 3<sup>rd</sup>-party zip utility that provides AES 256-bit encryption. *WinZIP* is the industry leader for commercial software providing this level of zip security. 7-zip is the industry leader for open source software with this level of zip security. *Keka* uses 7-zip as well as zip with AES 256.

#### 17.5.1 Assignment: Encrypt A File or Folder Using Zip

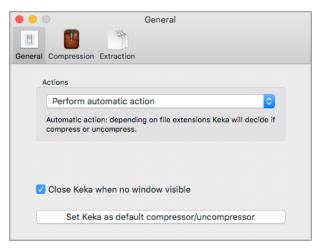
In this assignment, you encrypt a file using Keka. The same process can be used to encrypt a folder full of items.

- Note: Keka is available for free directly from the developer website, and for \$1.99 from the Apple App Store. There is currently no difference between the two products. Buying from the App Store supports development of Keka, and ensures your software is kept up to date.
- 1. Download Keka.
  - To download Keka from the developer site, open a browser to <a href="https://www.kekaosx.com/">https://www.kekaosx.com/</a>.

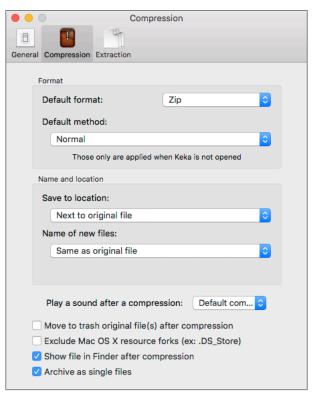
• To download from the Apple App Store, open the *App Store app*, search for *Keka*, and then download.

#### **Configure Keka Preferences**

- 2. Select the *Keka* menu > *Preferences*.
- 3. Select the *General* tab, configure to your taste. Shown below are my preferences.



4. Select the *Compression* tab, configure to your taste. Shown below are my preferences.



5. Select the *Extraction* tab, configure to your taste. Shown below are my preferences.



- 6. Close Keka Preferences window.
- 7. Quit Keka.

#### **Enable AES 256-bit encryption**

By default, Keka does not encrypt using AES 256. It is vital to your security and privacy that your documents have the highest level of protection, and AES 256 should be enabled

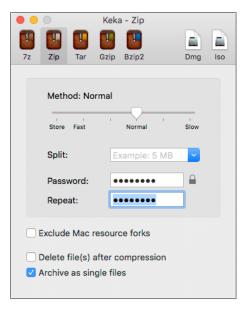
- 8. Open *Terminal*, located in /*Applications/Utilities*. Terminal is the built-in utility that provides a Command Line Interface (CLI) for macOS.
- 9. In Terminal, enter: defaults write com.aone.keka ZipUsingAES -bool TRUE



- 10. Tap the *Return* or *Enter* key.
- 11. Quit Terminal.

#### Compress and encrypt a file

- 12. Open Keka.
- 13. In the Keka *Main window* toolbar, select the *Zip* tab, and then verify the *Method* is set to *Normal, Archive as single files* is enabled, and then enter *password* in the *Password* and *Repeat* fields as the password for the file you will be encrypting.



- 14. Locate a document file on your computer to be compressed and encrypted, and then drag and drop it onto the *Keka* Dock icon. For my example, the file is named *Keka test original file.png*.
- 15. A Finder window will open, displaying the new compressed and encrypted file, with the same name as the original, with a *.zip* file extension.

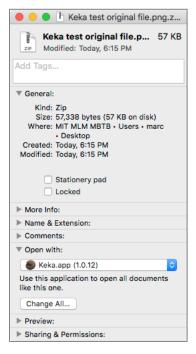
#### Set Keka as the default application to open zip files

macOS 10.13 cannot recognize AES 256 encrypted files, but Keka can! To be able to open these files, macOS 10.13 must be trained to use Keka to open them, instead of the built-in default zip utility.

- 16. Single-click to select the encrypted zip file create a minute ago.
- 17. Select the *File* menu > *Get Info*.
- 18. If not currently visible, expand to view the *Open with* area. Note that the default *Archive Utility.app* is selected.



19. Click the Archive Utility.app pop-up menu, to select Keka.app



- 20. Click the *Change All...* button. From now on, all zip files will be opened with Keka.
- 21. Close the Get Info window.

#### 17.5.2 Assignment: Open an Encrypted Zip Archive

In this assignment, you open the encrypted zip archive created in the previous assignment.

- Prerequisite: Completion of the previous assignment. If performing this assignment on a different computer than the previous assignment, Keka must be installed.
- 1. Locate the encrypted zip archive created in the previous assignment.
- 2. Double-click on the encrypted zip archive.

3. At the prompt, enter the password used to encrypt it.



4. The archive will open, saving the contents to the same folder as the zip file.

# 17.6 Cross-Platform Disk Encryption

Many in the IT security fields think the ultimate in document encryption comes with *VeraCrypt*<sup>4</sup>. VeraCrypt is free encryption software developed by *IDRIX*<sup>5</sup>, who specialize in security solutions. It is based on *TrueCrypt*<sup>6</sup> that ceased development in 2014.

Although Linux, macOS/OS X, and Windows versions are available, no Android or iOS support is directly offered. Android users may create and decrypt, as well as read and write to TrueCrypt files using *EDS* (Encrypted Data Store), available from Google Play. iOS users may use *Disk Decipher*, available from the App Store, to create and decrypt, as well as read and write to TrueCrypt files.

VeraCrypt is a disk encryption utility, as opposed to file encryption. It creates an encrypted virtual disk, or as it is referred to by VeraCrypt, a container.

VeraCrypt presents a very high level of security, with a resultant greater complexity to the end-user. Given the speed of current systems and a strong password, data stored in a container may be considered immune from brute-force attacks.

As VeraCrypt creates a container, you can place anything within the container for secure storage. The container may reside only on the local drive, or be placed on a server for network access, or within a cloud storage solution (such as DropBox, Google Drive, etc.) to provide Internet access to files and folders, without the cloud provider (or hacker, malware, or government) being able to view the contents.

# 17.6.1 Assignment: Download and Install VeraCrypt

In this assignment, you install VeraCrypt.

1. Open a web browser to https://www.veracrypt.fr/en/Downloads.html

<sup>&</sup>lt;sup>4</sup> http://veracrypt.codeplex.com

<sup>&</sup>lt;sup>5</sup> https://www.idrix.fr

<sup>&</sup>lt;sup>6</sup> http://en.wikipedia.org/wiki/TrueCrypt

2. Click the Downloads tab (not the Downloads button). Selecting the tab allows you to select which version to download. Select *Mac OS X VeraCrypt*. The installer will download. We will come back to it after we install OSXFUSE.



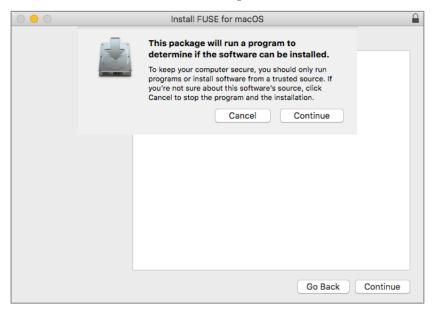
3. Once this begins downloading, select *OSXFUSE*. This takes you to *https://osxfuse.github.io*. From the sidebar *> Stable Releases*, select the most current version for macOS. The installer will download.



4. Locate the downloaded OSXFUSE installer (by default, located in your *Home Folder > Downloads*). Double-click to open the installer.



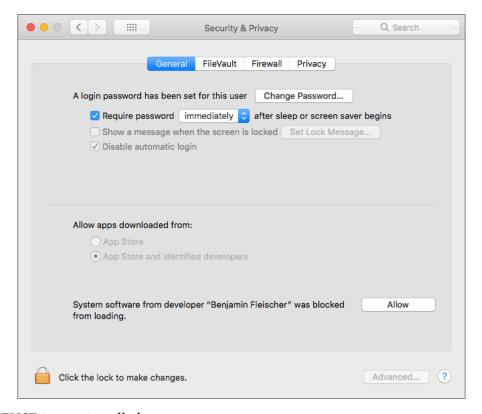
5. In the *Install FUSE for macOS* window, click the *Continue* button, and then follow the on-screen instructions to complete installation.



6. As of this writing, FUSE has not registered with Apple. At the end of the installation process, an alert will appear regarding blocking this installation. Click the *OK* button.



7. Following the instructions of the alert, open *Apple Menu > System Preferences > Security & Privacy > General*, and then click the *Allow* button. Installation of FUSE will complete. Close System Preferences. Click the *Close* button in the installer window.

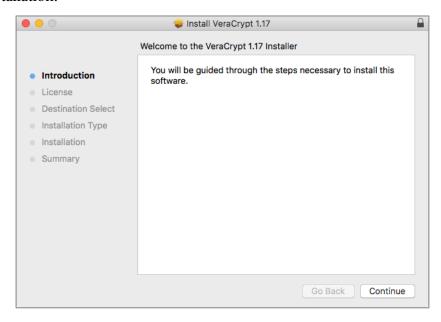


8. FUSE is now installed.

9. Locate the VeraCrypt installer (by default, in the *Home Folder > Downloads* folder). Double-click to launch the *VeraCrypt\_Installer.pkg* inside of the mounted disk image.



10. The installer opens. Follow the on-screen instructions to complete the installation.



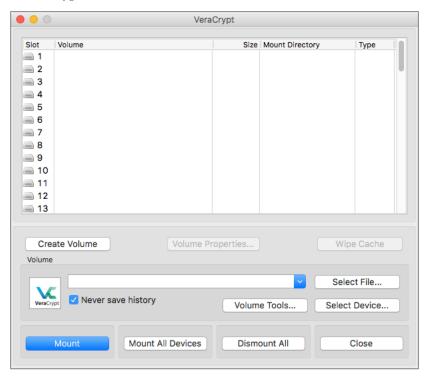
That's all there is to the installation.

# 17.6.2 Assignment: Configure VeraCrypt

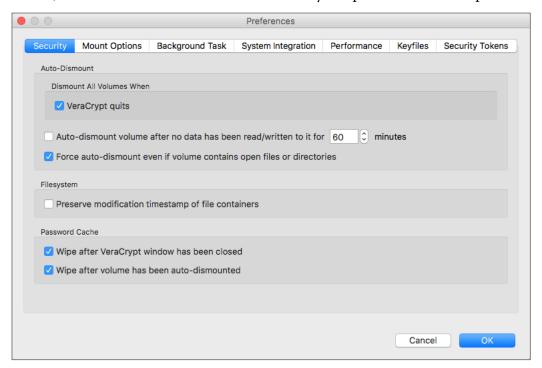
As with most applications, it helps to view and configure VeraCrypt preferences before using it.

In this assignment, you examine and configure VeraCrypt preferences.

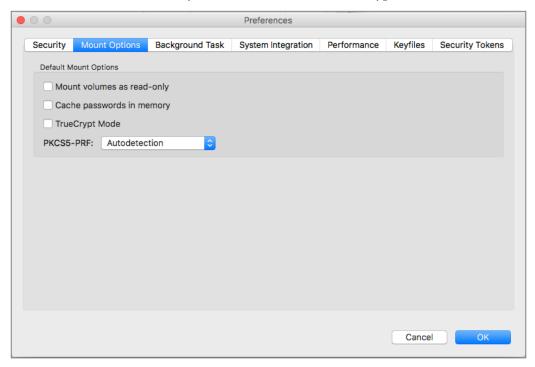
1. Open VeraCrypt.



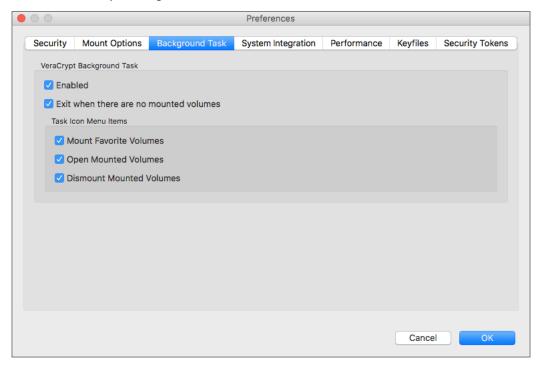
2. Select the *VeraCrypt* menu > *Preferences*. Select the *Security* tab. Most of the options may be configured to taste. The exception is *Preserve modification timestamp of file containers*, which should be *disabled* if the containers will be used with cloud-based file storage service (DropBox, Google Drive, SugarSync, etc.) as it will conflict with the service's ability to update the timestamp.



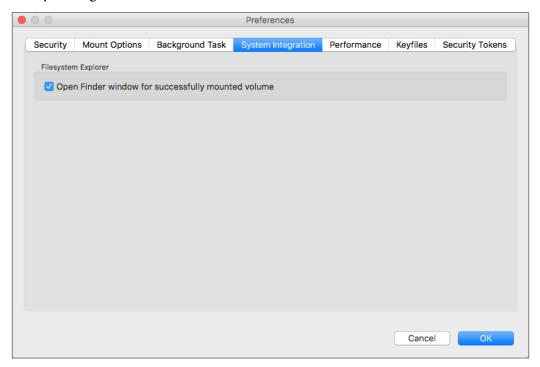
- 3. Select the Mount Options tab.
  - *Mount volumes as read-only* if left unchecked will prevent accidental editing or deletion of the container contents.
  - *Cache passwords in memory* if left unchecked will provide higher security against hackers gaining access to container passwords.
  - *TrueCrypt Mode* option should be left unchecked unless you will be using software that can only work with the older TrueCrypt mode.



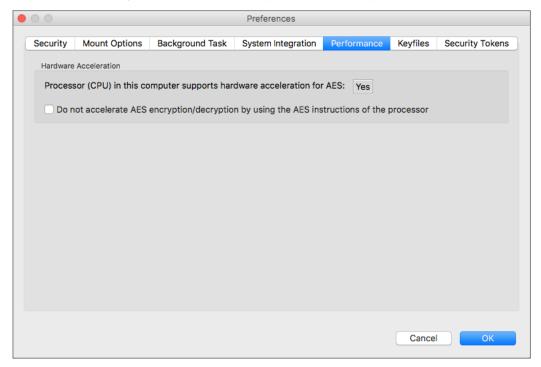
4. Select the *Background Task* tab. All options may be configured to taste. Listed below are my settings.



5. Select the *System Integration* tab. You may configure to taste. Listed below is my setting.



6. Select the *Performance* tab. If your computer supports hardware acceleration of AES encryption protocols, you probably want to leave the checkbox disabled. Doing so will improve encryption and decryption up to 4-fold.



- 7. The Keyfiles tab is an advanced option. Please see the VeraCrypt online documentation <a href="https://veracrypt.codeplex.com/documentation">https://veracrypt.codeplex.com/documentation</a> for additional information.
- 8. The *Security Tokens* tap is an advanced option. Please see the VeraCrypt online documentation *https://veracrypt.codeplex.com/documentation* for additional information.
- 9. Click the *OK* button to close the VeraCrypt Preferences window.

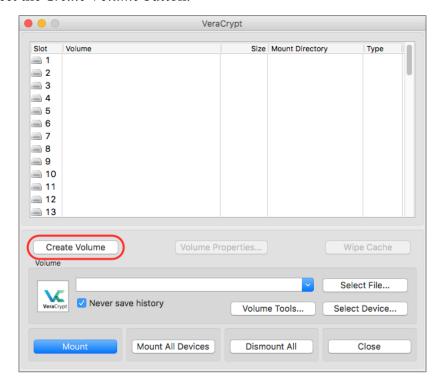
You are now ready to create your first encrypted VeraCrypt container!

# 17.6.3 Assignment: Create a VeraCrypt Container

Although we will cover the basics of using VeraCrypt, you may find it useful to dive deeper into the topic<sup>7</sup>.

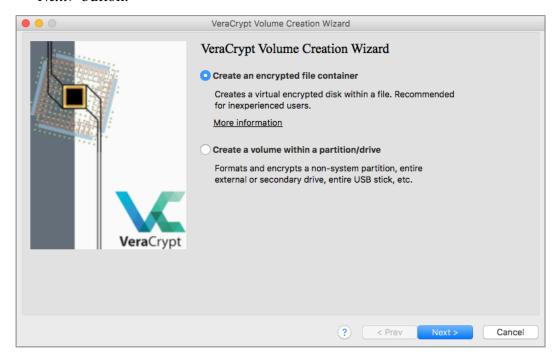
In this assignment, you create your first encrypted container

1. *Open* the *VeraCrypt* application, located in the /Applications folder. Then select the *Create Volume* button.

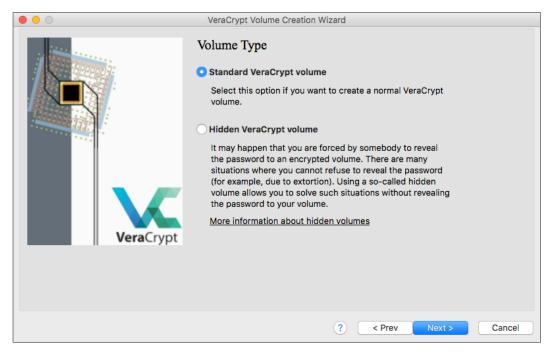


<sup>&</sup>lt;sup>7</sup> https://veracrypt.codeplex.com/documentation

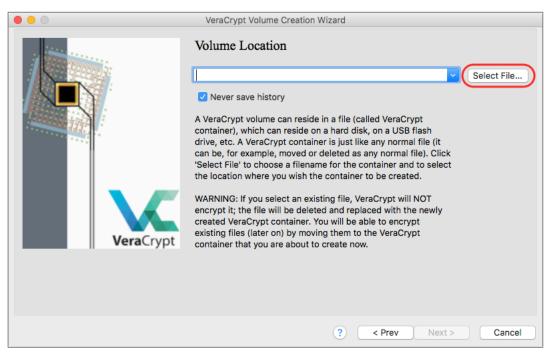
2. To create an encrypted container, at the *VeraCrypt Volume Creation Wizard*, select the *Create an encrypted file container* radio button, and then select the *Next>* button.



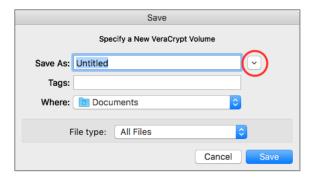
3. At the *Volume Type* window, select the *Standard VeraCrypt volume* radio button, and then select the *Next>* button.

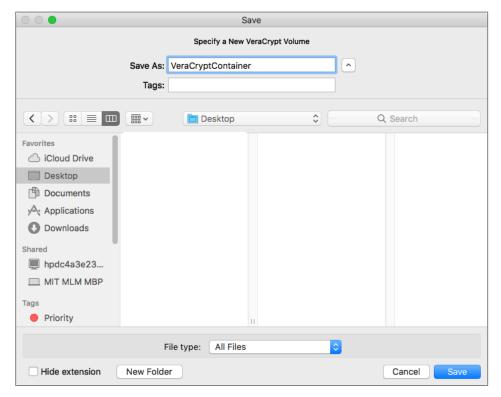


4. At the *Volume Location* window, select the *Select File*...button.



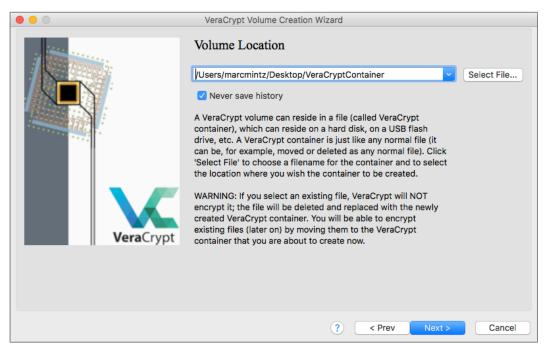
5. When the *Save* window appears, select the *Disclosure arrow* to the right of the *Save As* field. This will expand the window, making it easier to select where to save the container.





- 6. In the *Save As* field, enter a name for your container. For this assignment, use *VeraCryptContainer*.
  - Navigate to where you wish to save your container. For this assignment, use the *Desktop*.
- 7. Click the *Save* button.

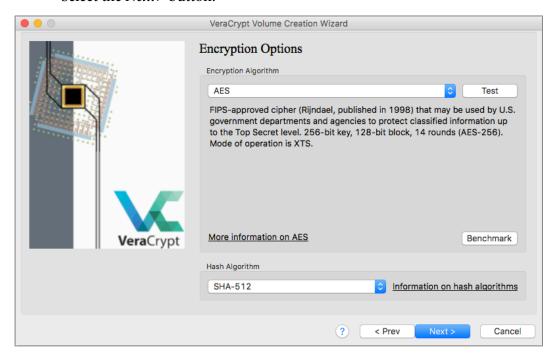
8. When returned to the *Volume Location* window, select the *Next>* button.



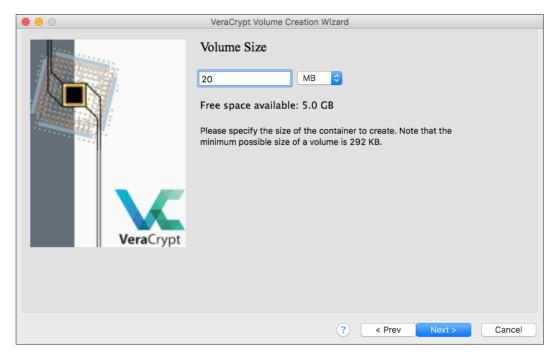
- 9. In the *Encryption Options* window, configure as below:
  - From the *Encryption Algorithm* pop-up menu, select your desired option. *AES* is the industry standard, however, as the NSA and NIST were involved with its acceptance, some experts recommend selecting another option.
  - From the *Hash Algorithm* pop-up menu, select the desired option. *SHA* was developed by the NSA, so some experts recommend selecting

*Whirlpool.* For our example, we will use the industry standards–*AES* and *SHA-512*.

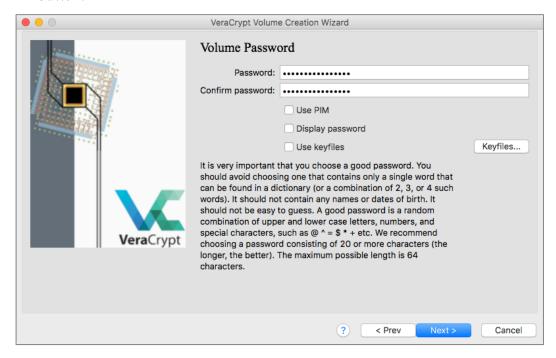
• Select the *Next>* button.



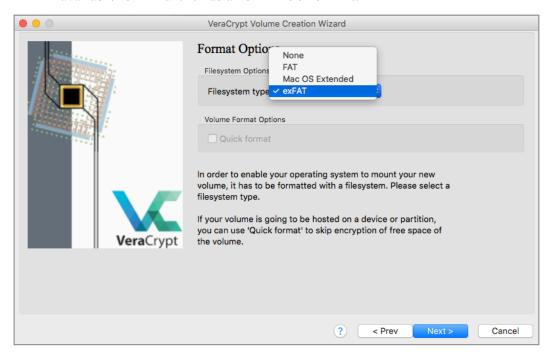
10. In the *Volume Size* window, set the size of your container. If you intend to email the container, keep in mind that each email provider has hard limits on the maximum file size that may be sent or received. If you intend to save the container to a storage device such as a thumb drive, keep in mind that a storage device needs approximately 20% free space for the directory and housekeeping needs. For this assignment, set *Volume Size* to *20MB*, then select the *Next>* button.



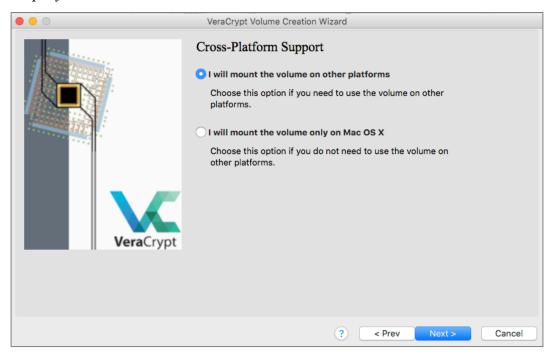
11. At the *Volume Password* window, in the *Password* and *Confirm Password* fields, enter a strong password for the container, and then select the *Next*> button.



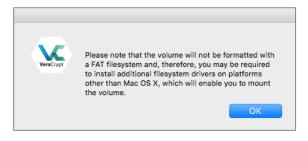
- 12. At the *Format Options* window, from the *Filesystem type* pop-up menu, select the desired option, and then select the *Next>* button. For this assignment, the *Filesystem type* is *exFAT*.
  - *FAT* offers full compatibility for Linux and Windows use. macOS can read and write to FAT, but one should not hold macOS applications here as they may not function properly. It has a 4GB file size limit.
  - Mac OS Extended offers full compatibility for macOS. Linux and Windows users are unable to read this format without the assistance of 3<sup>rd</sup>-party system add-ons. It has an 8EB file size limit.
  - *exFAT* offers full compatibility with Windows and macOS, with modules available for Linux. It has a 16EB file size limit.



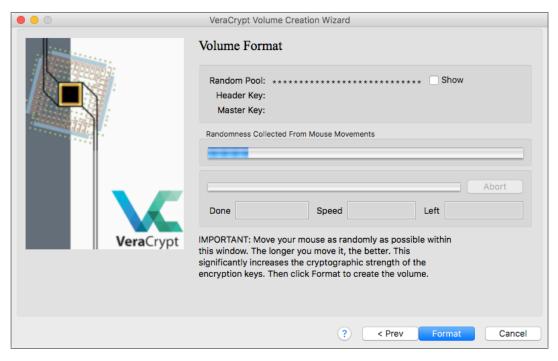
13. At the *Cross-Platform Support* window, select *I will mount the volume on other platforms*.



14. As we are selecting the exFAT volume structure, an alert will appear. Click *OK*.



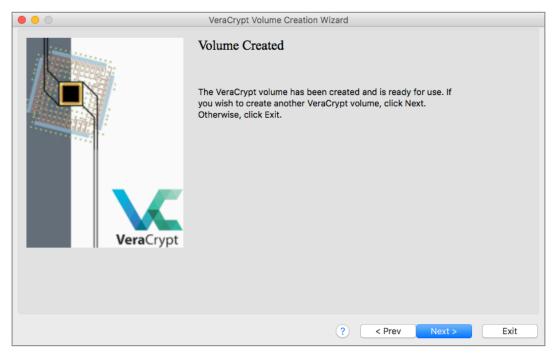
15. At the *Volume Format* window, move your cursor as randomly as possible within the window for at least 30 seconds, and then select the *Format* button.



16. Once the container encryption has completed, the *Success* alert appears. Select the *OK* button.



17. At the *Volume Created* window, select the *Exit*> button.



18. You will now find, at the location you specified earlier, the encrypted container.



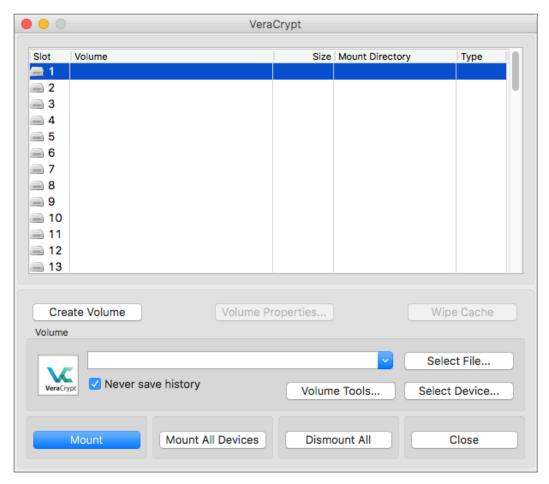
Congratulations, you have created your first truly spy-class encryption!

# 17.6.4 Assignment: Mount an Encrypted VeraCrypt Container

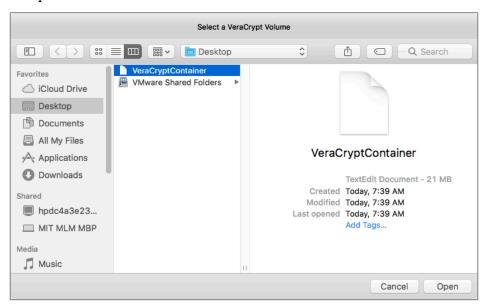
Once you have a VeraCrypt container, you eventually need to open it to read the contents, add to the container, or make edits to the files.

In this assignment, you will mount the VeraCrypt container, which gives you access to all its data.

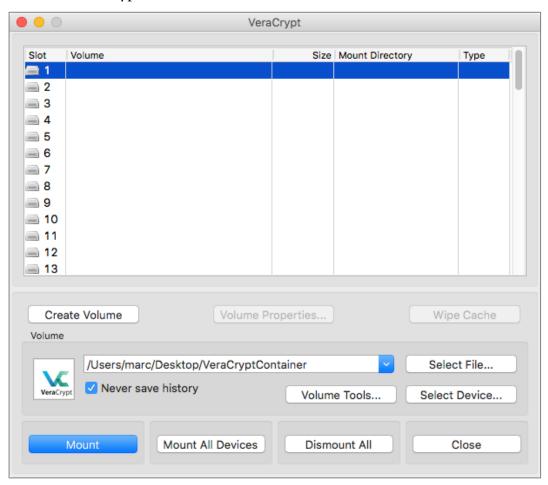
- Prerequisite: Completion of the previous assignment.
- 1. Open *VeraCrypt*, and then select one of the *Slot* numbers along the left side bar. This will become the temporary number of the VeraCrypt container to be mounted. Select the *Select File...* button.



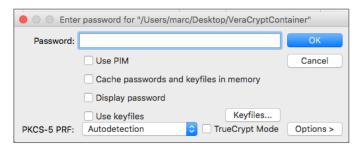
2. Select the *Select File*... button. The standard *Open* window appears. Navigate to the folder holding the target container. Select the container, and then select the *Open* button.



3. In the VeraCrypt window, select the *Mount* button.



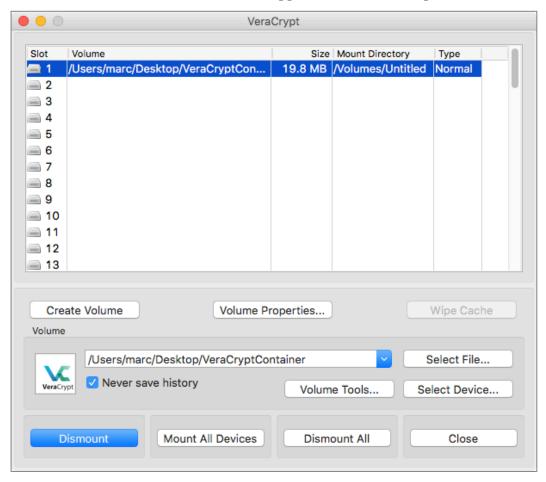
4. The *Enter password* window appears. Enter the password assigned to the container, and then select the *OK* button.



5. On your Desktop, you will see the mounted volume, named *Untitled*. Double-click to open the volume.



- 6. You may rename the mounted volume as you would any other item.
- 7. You may drag and drop or save files and folder into the container.
- 8. To unmount, return to the VeraCrypt window, and then select the *Dismount* button. The mounted volume will disappear from the Desktop.



OMG... You *really* are doing high-end security work now! This container may be copied to a thumb drive, optical disc, DropBox, Google Drive, or other Cloudbased storage, and remain secure.

# **Revision Log**

# 20171001, v1.1

• Updated chapter *Documents* > *Encrypt A Folder for Cross Platform Use With Zip* to use Keka, instead of the depreciated macOS built-in tools.

# 20170923, v1.01

• Updated chapter When It Is Time To Say Goodbye

# 20170918, v1.0

• Initial release