Advanced Malware VBA Stomping

What's New in 2019

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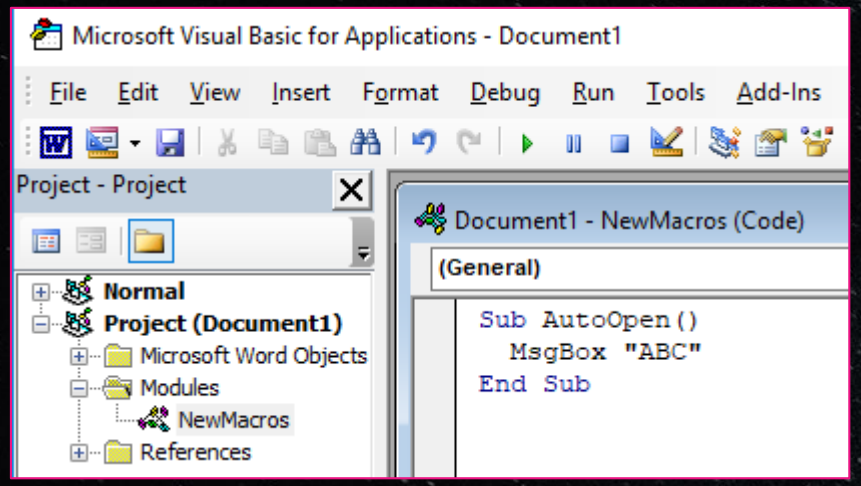
Recap: DerbyCon 2018

- Macro Storage (VBA) stored as:
  - Source Code - the original code as entered by the programmer (compressed)
  - P-Code - a compiled Pseudo-code ← This is what executes most of the time
- Dr. Vesselin Bontchev https://github.com/bontchev/pcodedmp

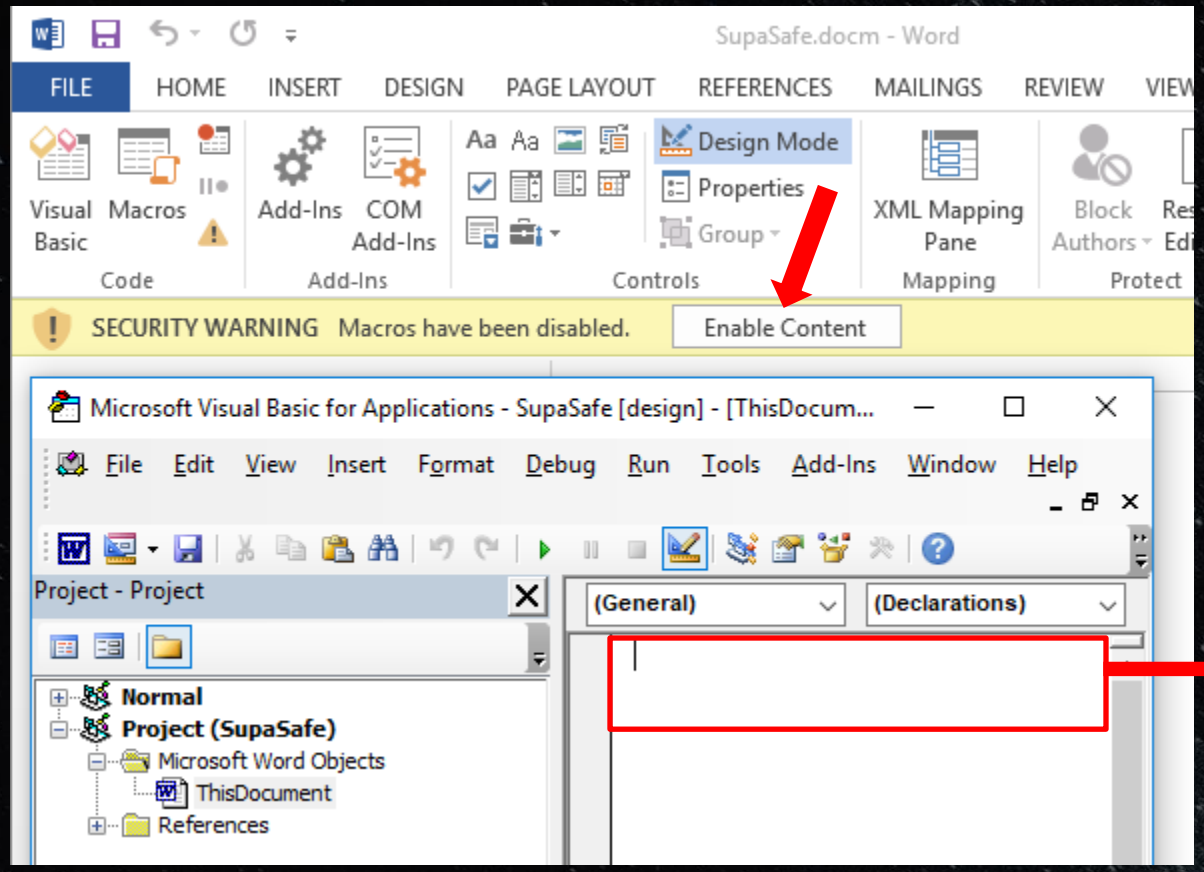
Source Code

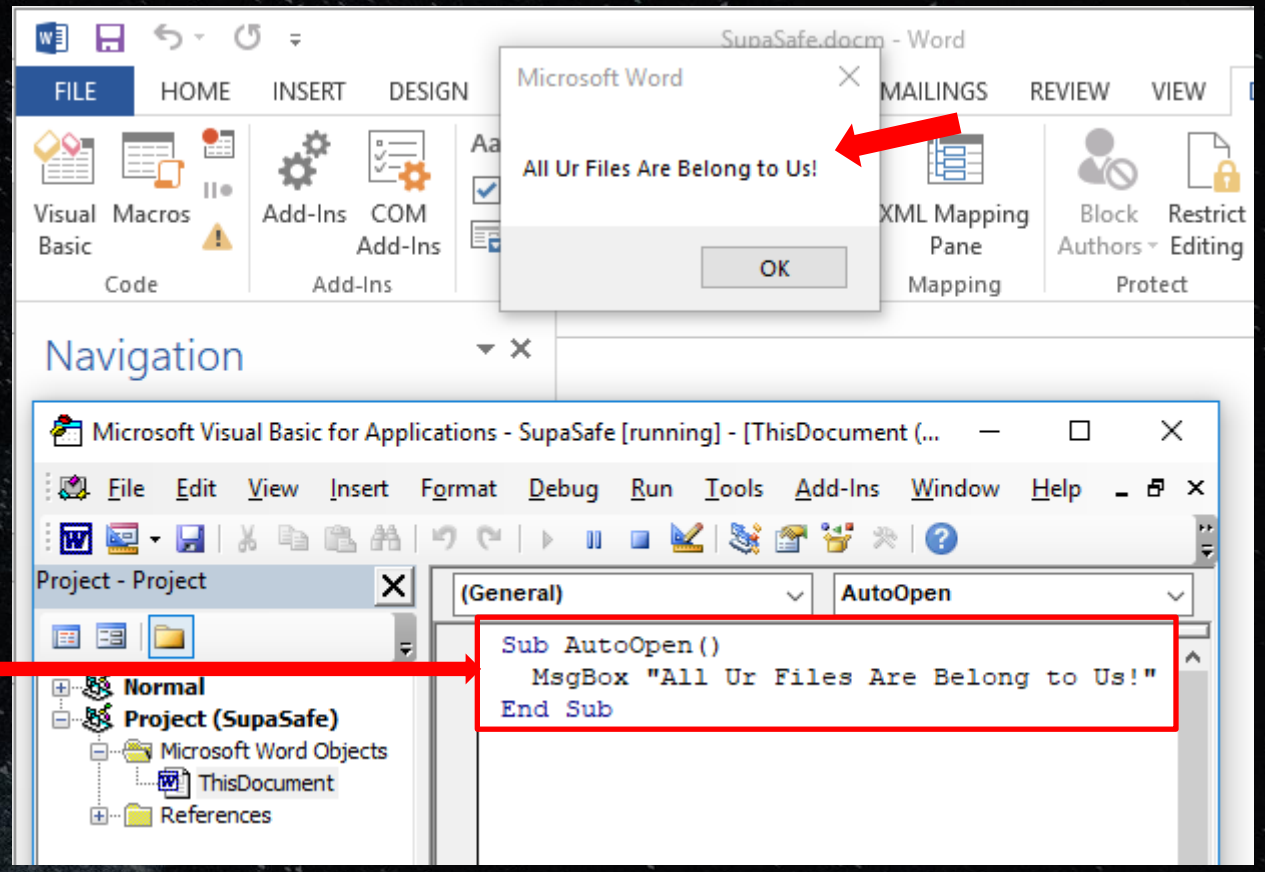


P-Code

```
Line #0:
        FuncDefn (Sub AutoOpen())
Line #1:
        LitStr 0x0003 "ABC"
        ArgsCall MsgBox 0x0001
Line #2:
        EndSub
```

VBA Stomp Demo





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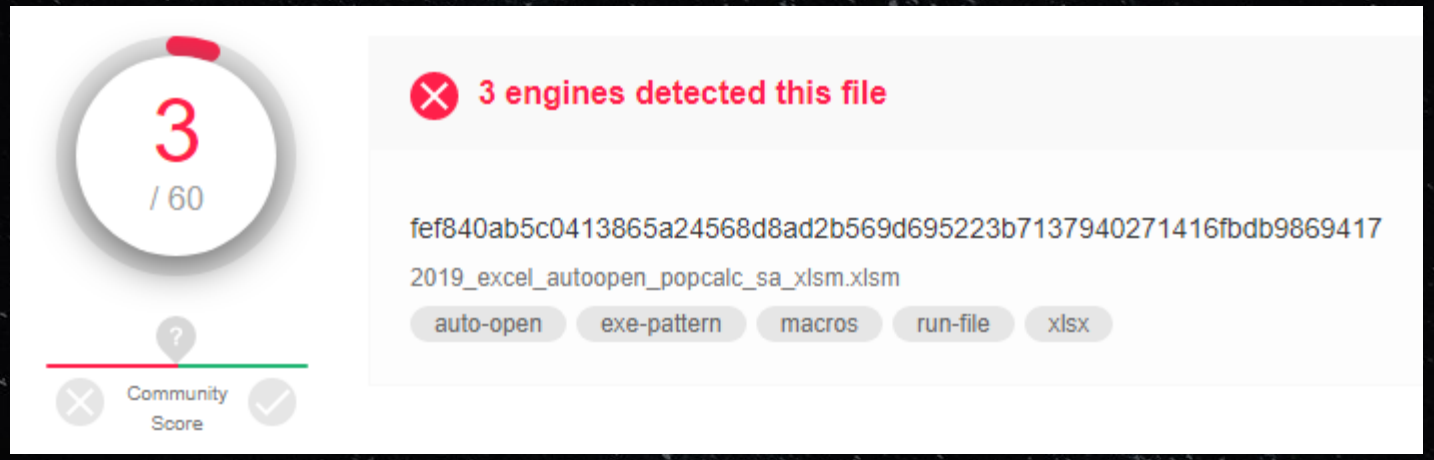
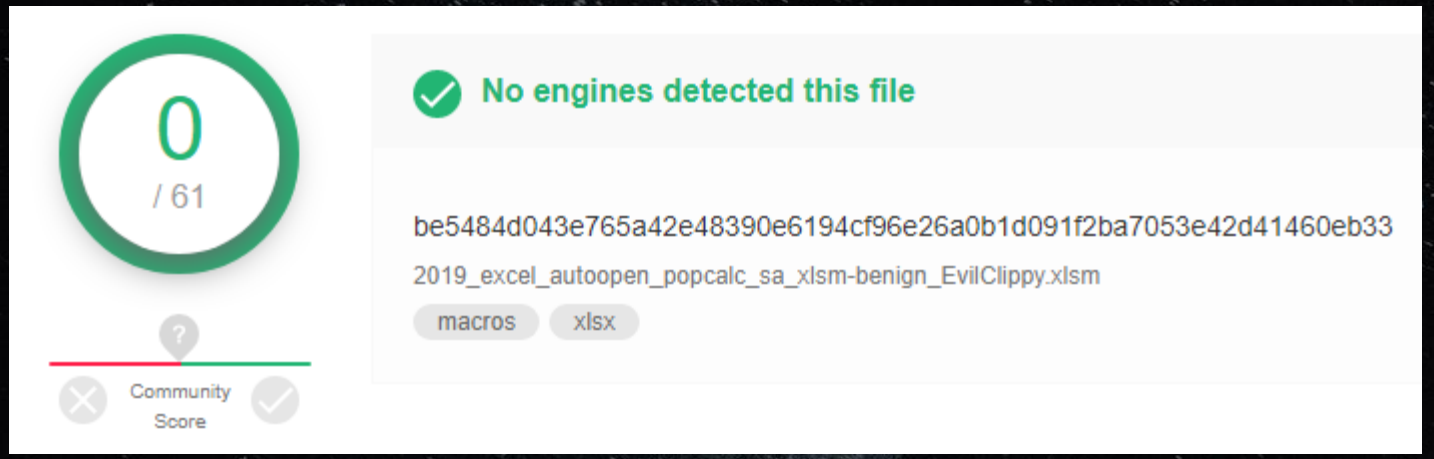
VirusTotal Results after VBA Stomp





fef840ab5c0413865a24568d8ad2b569d695223b7137940271416fbdb9869417
be5484d043e765a42e48390e6194cf96e26a0b1d091f2ba7053e42d41460eb33

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VBA Stomping: What's New in 2019

2018	2019
Manual Stomping	Automated Stomping
Stomp Source Code	Replace Source Code
Office Version Dependency	Dynamic Version Support
	Lock VBA Project
	Yara Rule for Detection

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Automated VBA Stomping Tools

- Automated Document Builder (ADB)
  - Python tool by Harold Ogden and Kirk Sayre
  - https://github.com/haroldogden/adb
- Evil Clippy
  - Cross-Platform Binary by Stan Hegt (@StanHacked) from Outflank
  - https://github.com/outflanknl/EvilClippy

Evil Clippy - Automated VBA Stomping

- Replace vs Stomp
- Deliver version matched document template to victim
- Lock VBA Source (make it unviewable)
- Many more tricks included

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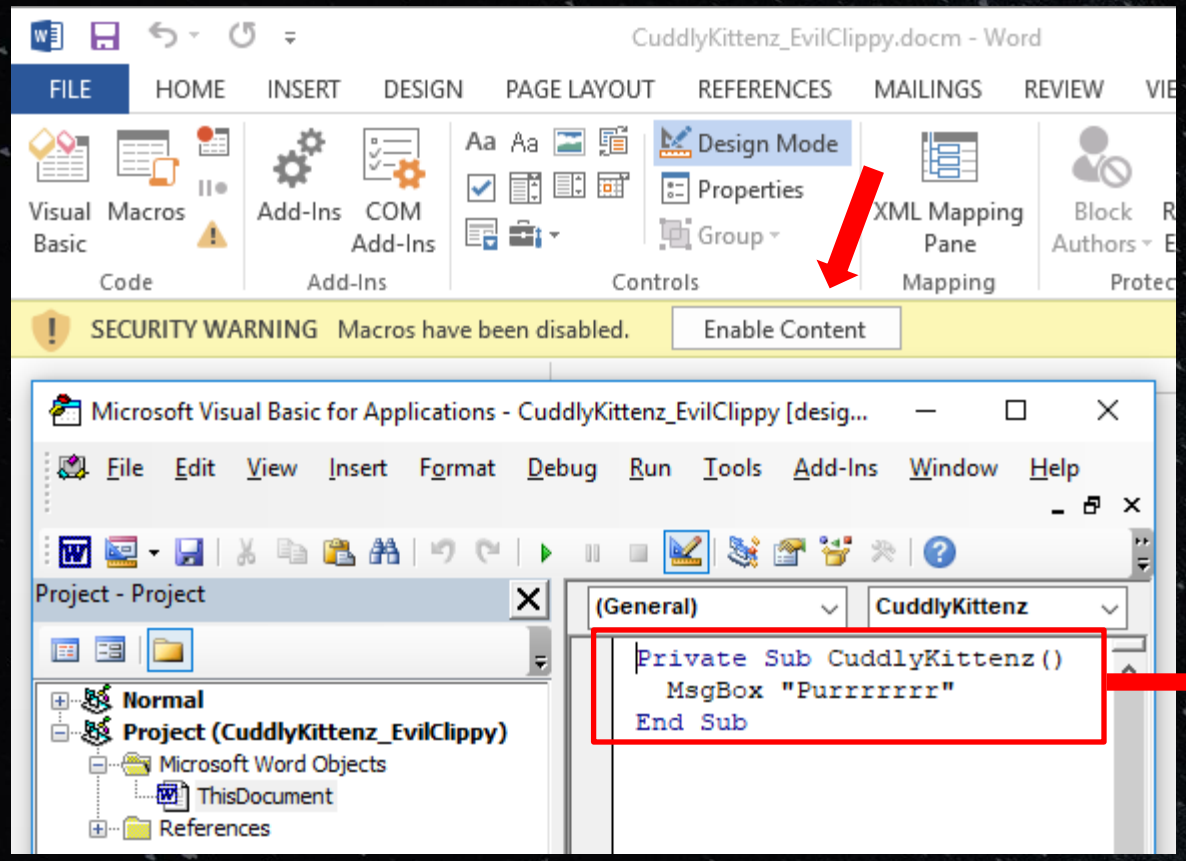
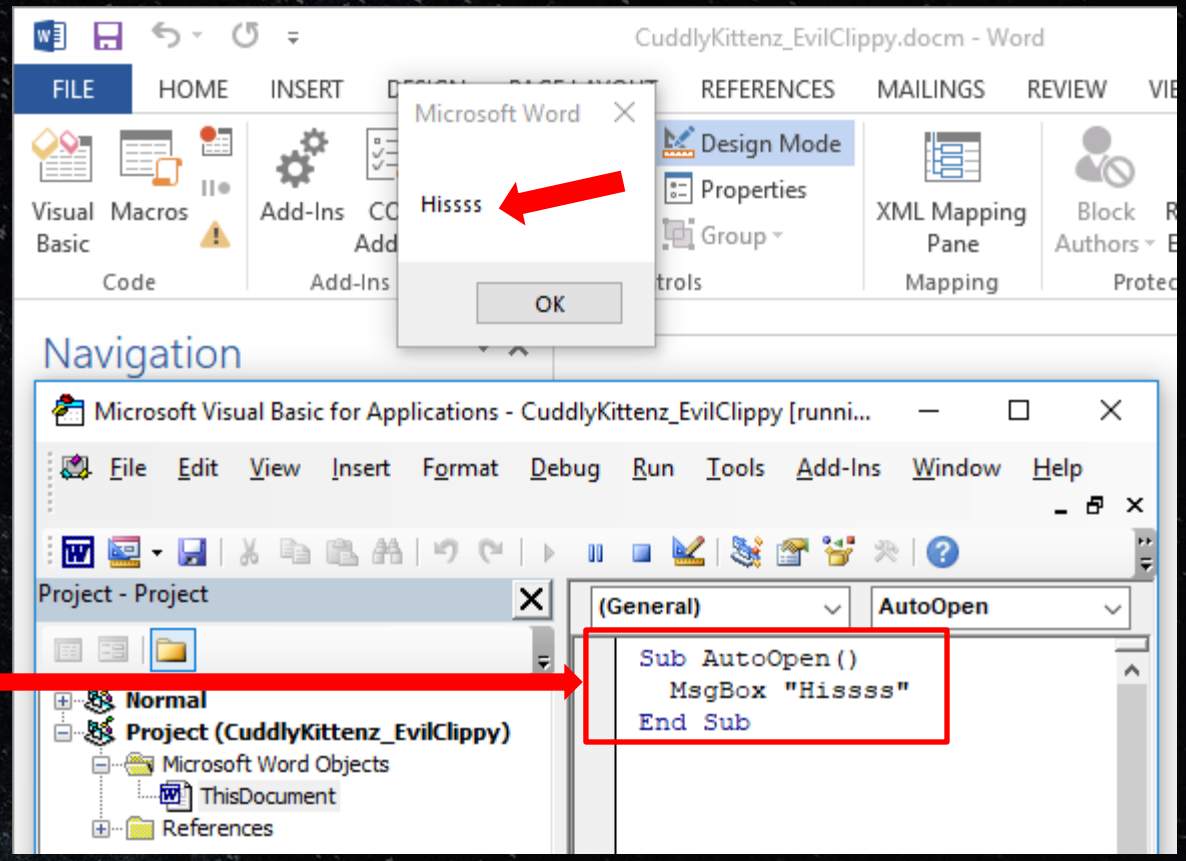
Evil Clippy Replace VBA Source





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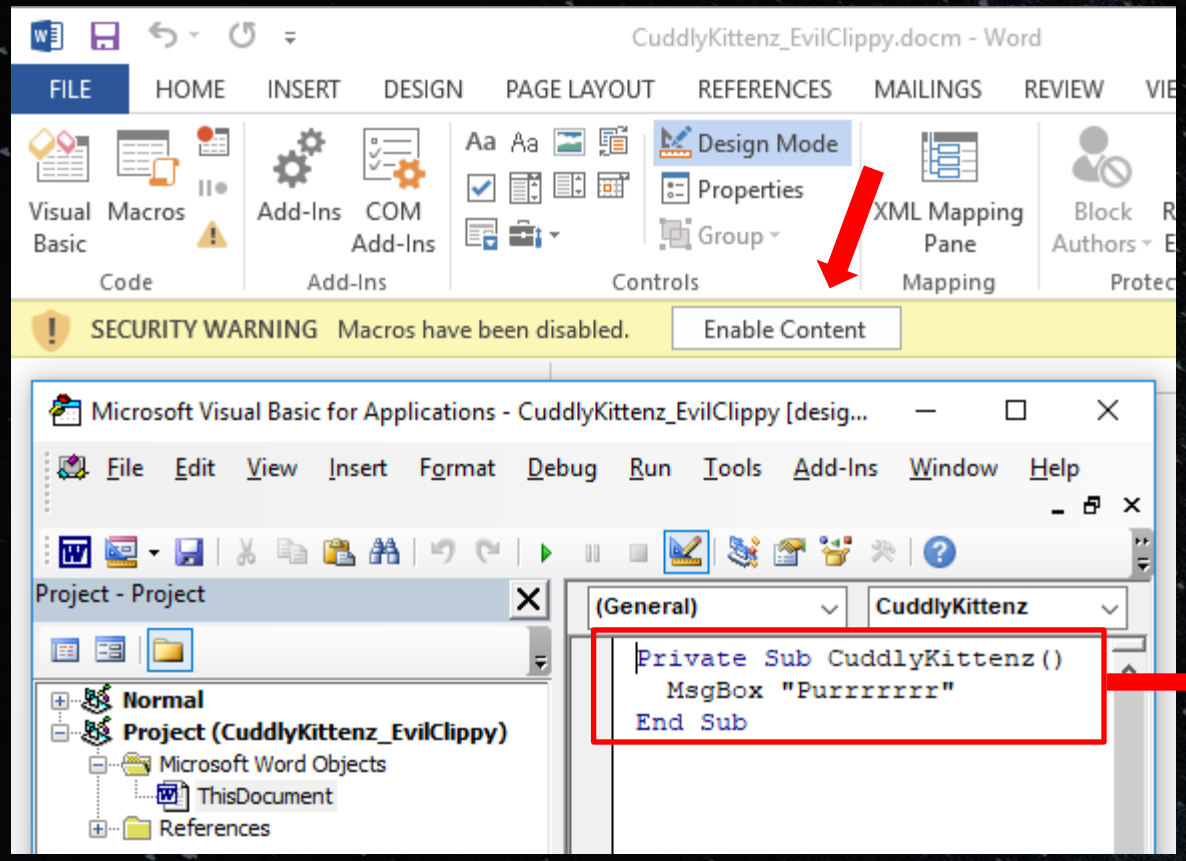
Version Matched Document Template

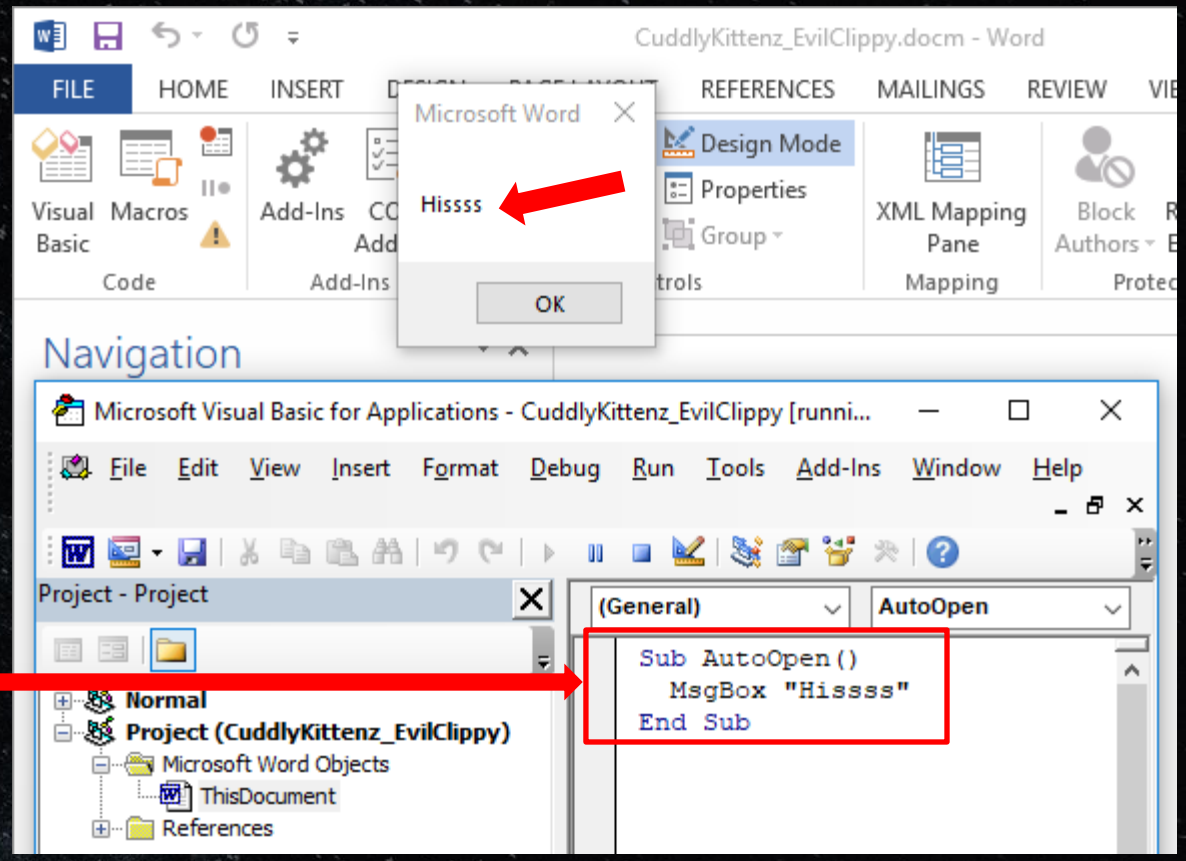
- Compiled P-Code will only run in specific Office versions.
- P-Code version information is stored in bytes 2-3 of the _VBA_PROJECT OLE stream.
- EvilClippy can set these bytes to allow VBA stomped documents to execute under different versions of Office.
- EvilClippy can also run as a web server to automatically serve out the correct document versions based on the connecting user agent.

Serve Out Version Matched Documents

```
victim:~/Software/EvilClippy> ./EvilClippy.exe --webserver=1343 -s test.vbs test_doc.doc
Now stomping VBA code in module: ThisDocument
Webserver starting on port 1343. Press a key to quit.
Webserver running...
Serving request from 10.4.137.6:56836 with user agent Mozilla/4.0 (compatible; MSIE 7.0; Windows NT 6.2; Win64; x64; Trid
0C; Microsoft Outlook 15.0.5023; ms-office; MSOffice 16)
Targeting pcode on Office version: 2016x64
Serving out file 'test_doc_EvilClippy.doc'
Serving request from 10.4.137.6:56842 with user agent Mozilla/4.0 (compatible; MSIE 7.0; Windows NT 6.2; Win32; x32; Trid
0C; Microsoft Outlook 15.0.5023; ms-office; MSOffice 16)
Targeting pcode on Office version: 2016x86
Serving out file 'test_doc_EvilClippy.doc'
Serving request from 10.4.137.6:56846 with user agent Mozilla/4.0 (compatible; MSIE 7.0; Windows NT 6.2; Win32; x32; Trid
0C; Microsoft Outlook 15.0.5023; ms-office; MSOffice 15)
Targeting pcode on Office version: 2013x86
Serving out file 'test_doc_EvilClippy.doc'
```

Evil Clippy Replace VBA Source





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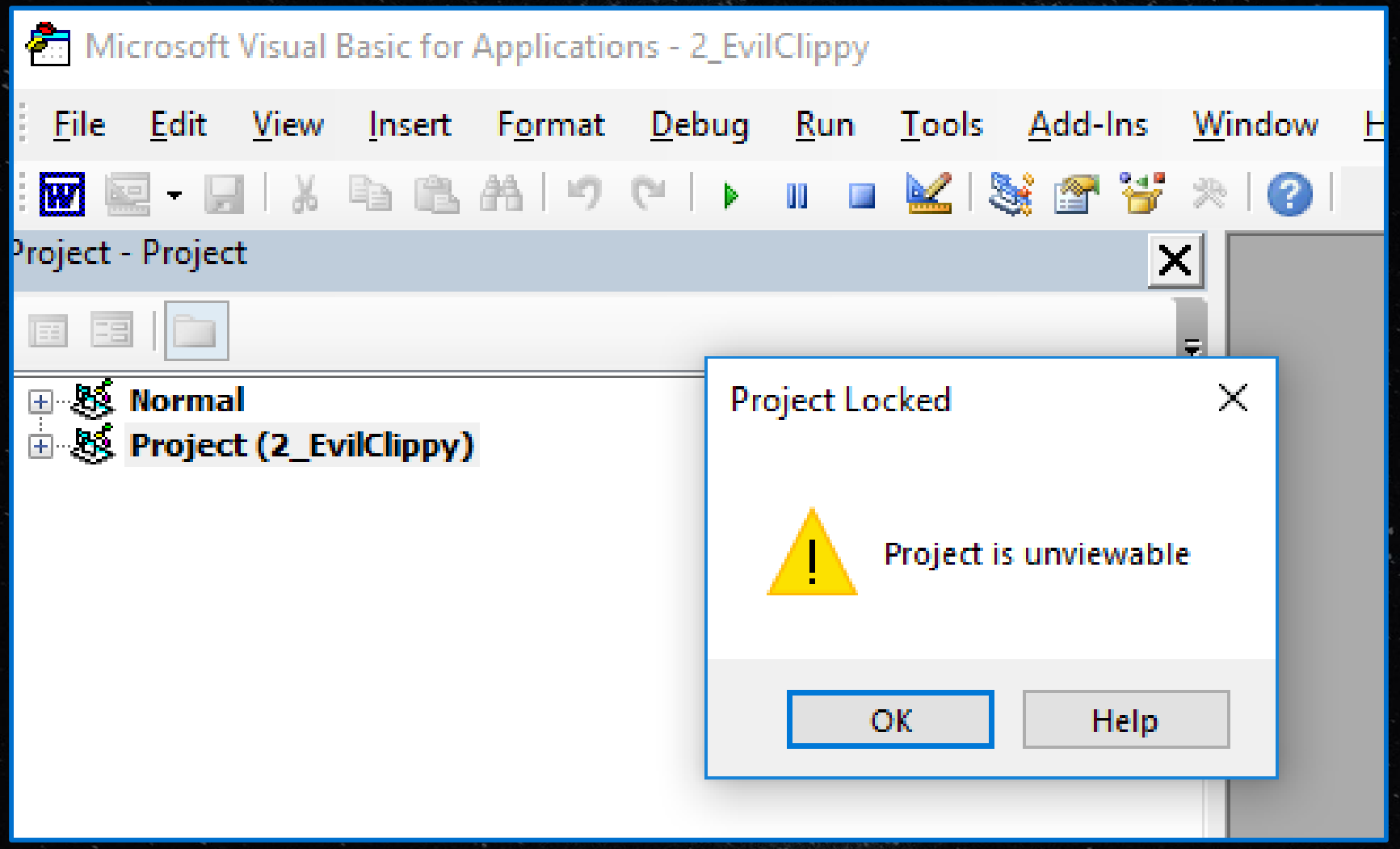
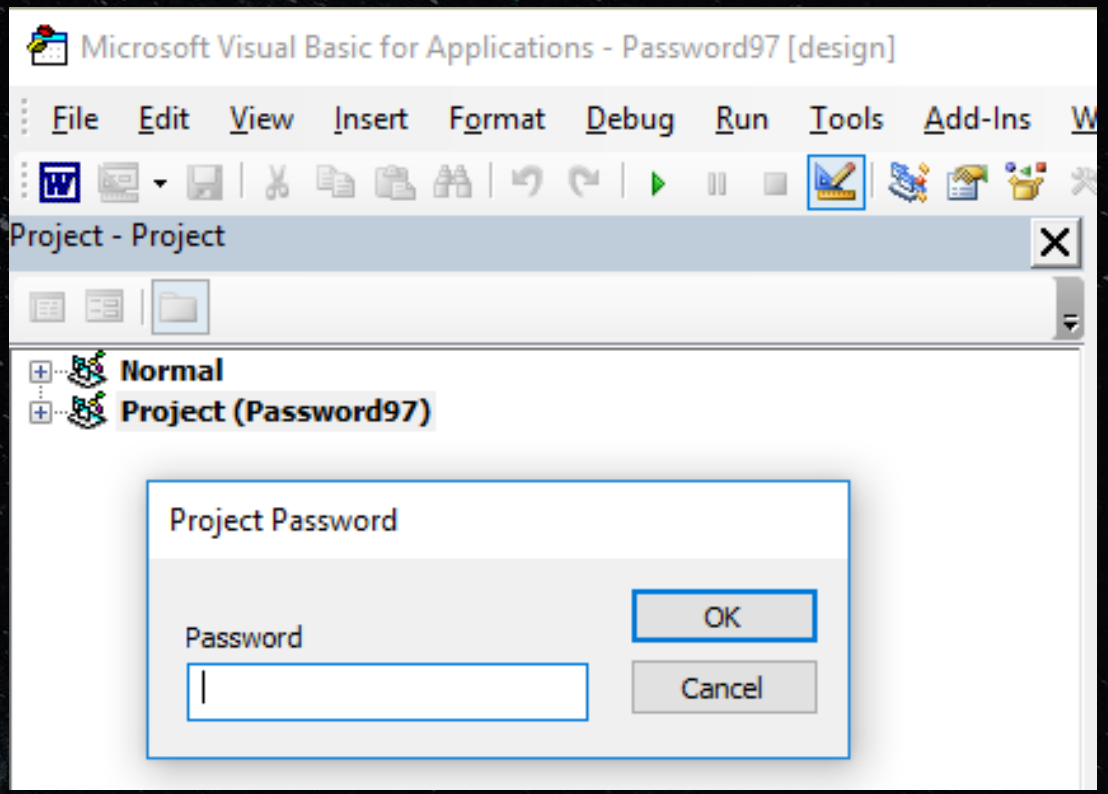
Lock VBA Source (make it unviewable)



Unlock VBA Project

- Evil Clippy can also remove Locked/Unviewable Setting
  - Previously considered irreversible
- Bonus: Also removes password protection



https://medium.com/walmartlabs/vba-project-locked-project-is-unviewable-4d6a0b2e7cac

VBA Stomp Detection

- Zipped by MS Office?

	0x0	0x1	0x2	0x3	0x4	0x5	0x6	0x7	0x8	0x9	0xA	0xB	0xC	0xD	0xE	0xF
0x0000	Signature				Version		Flags		Compression		Mod Time		Mod Date		Crc-32	
0x0010	Crc-32				Compressed Size				Uncompressed Size				File Name Len		Extra Field Len	
0x0020	File Name (variable size)															
0x0030	Extra Field (variable size)															

Extra Field Len != 0 for MS Office

Yara Rule For Detection

```
rule unusual_office_zip_header
{
        meta:
          description = "MS Office Open_XML document with unusual zip header"
          weight  = 90
          author = "Carrie Roberts - Walmart Information Security"
          date = "2019-04-02"

        strings:
          // Headers of files to look for
          $header_pkzip_with_zero_extra_field_length = { 50 4b 03 04 [24] 00 00} //PK zip header
          $office_openxml="[Content_Types].xml" nocase
          $has_macros = "/vbaProject.bin" nocase

        condition:
          ($header_pkzip_with_zero_extra_field_length at 0) and $office_openxml and $has_macros
}
```

VBA Stomp Summary

- Deterrent to Anti-Virus Detection and Reverse Engineering
- Easily Automated with Evil Clippy
- Some Detections Available
- See ***vbastomp.com*** for More Information

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https://vbastomp.com