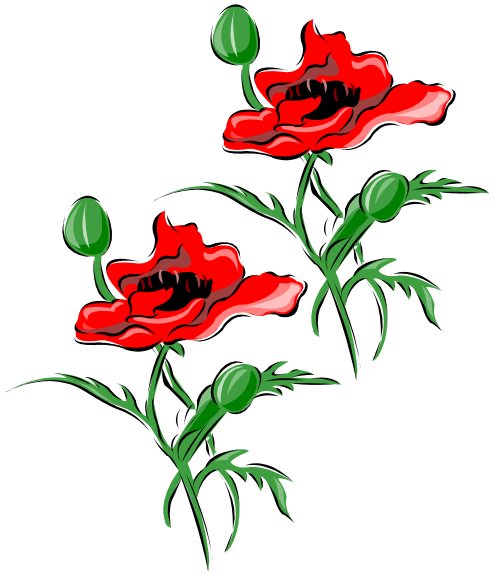
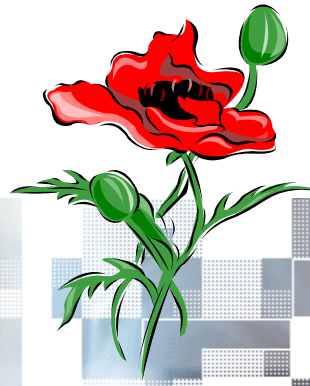


Remote Binary Planting

First Overlooked, Then Downplayed, Now Ignored

HITBSECCONF 2011, Amsterdam



Mitja Kolsek
ACROS d.o.o.
mitja.kolsek@acrossecurity.com
www.acrossecurity.com

Vulnerability Superstar

1. Arbitrary Code Execution
2. Easy to Find
3. Easy to Exploit
4. Reliable
5. No Privileges
6. Remote
7. Works Through Firewalls

100.000.000.000

Overlooked

Downplayed

“A user has to go through multiple warnings and dialogs”
“Accessing a remote share and opening a document is unlikely”

Ignored

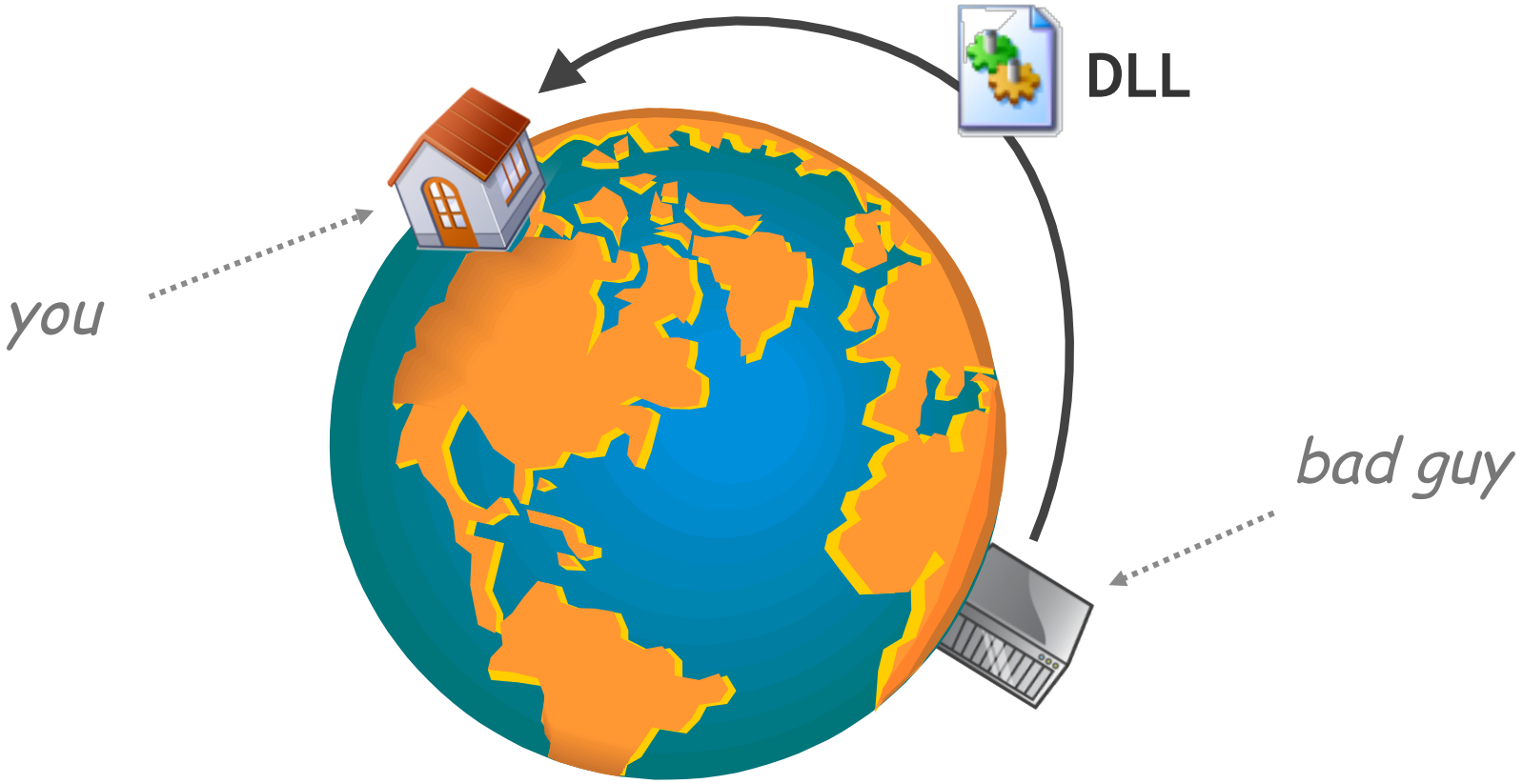
Many of the publicly known bugs remain unfixed (source: Secunia)
Practically all of the unpublished bugs we have found remain unfixed
New software is being created with these bugs

DLL Search Order

```
LoadLibrary("SomeLib.dll")
```

1. The directory from which the application was loaded
2. C:\Windows\System32
3. C:\Windows\System
4. C:\Windows
5. Current Working Directory (CWD)
6. PATH

World-Wide DLL



Binary Planting Attacks

3-Step Attack Scenario

1... Plant a malicious DLL

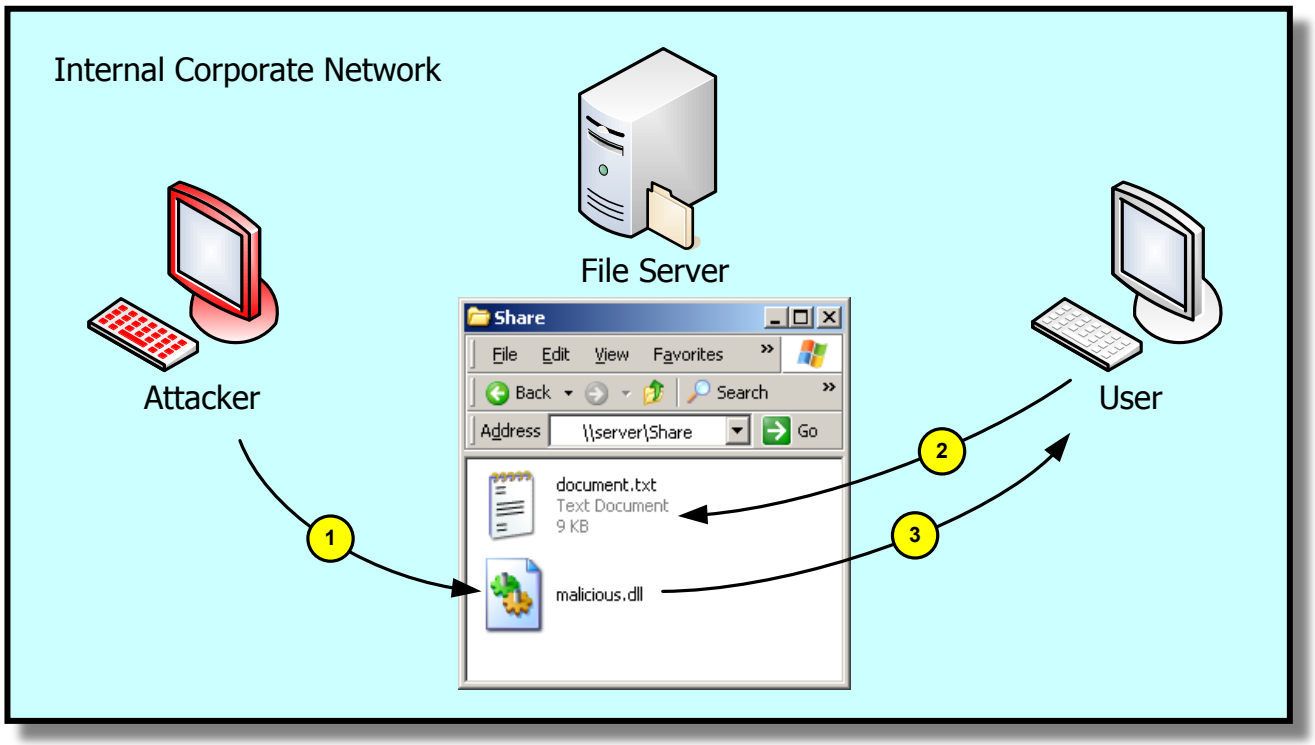
2... Set CWD to location of the DLL

3... Wait

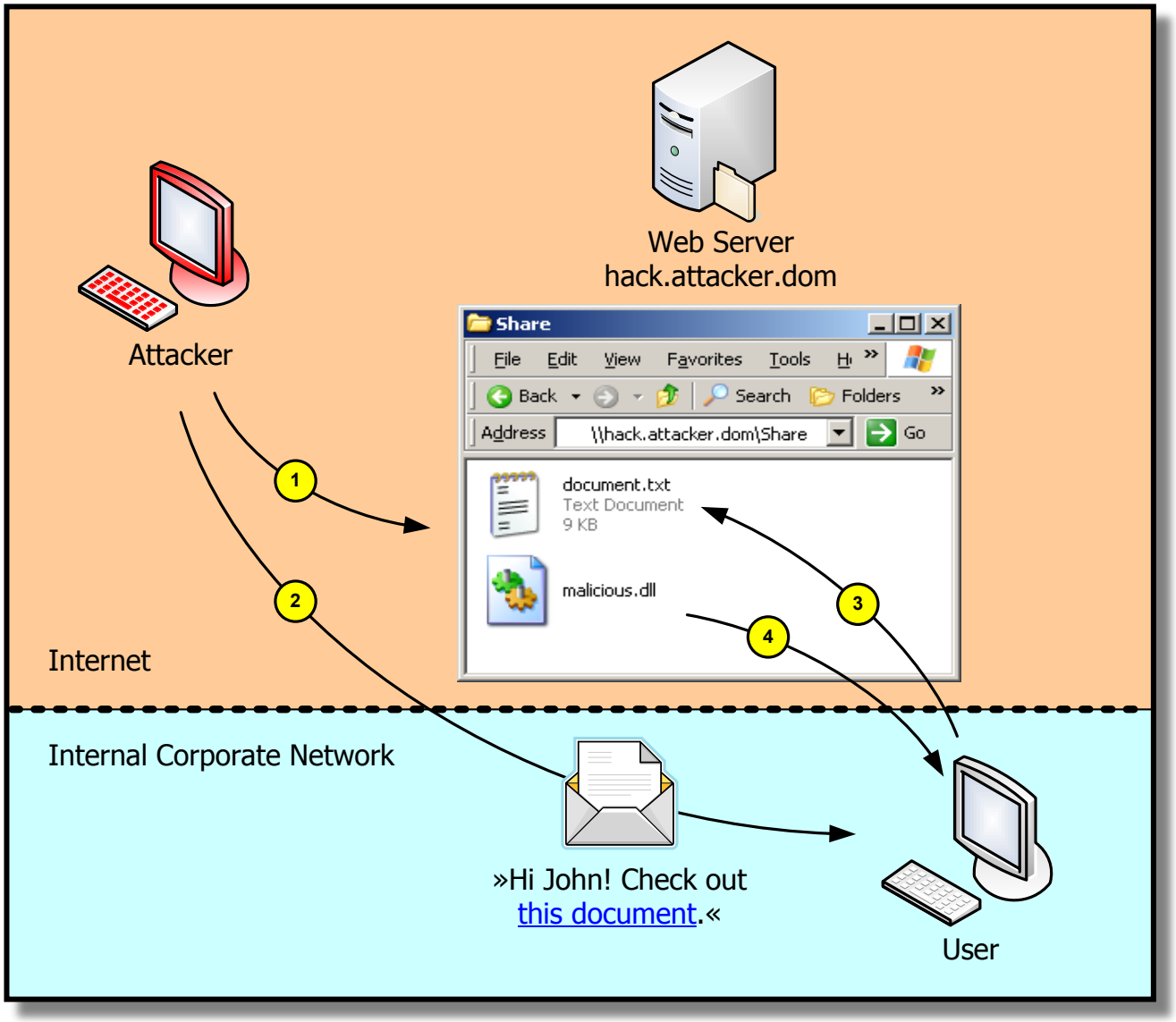
Setting The Current Working Directory

1. Double-clicking a file in Explorer
2. File Open, File Save dialogs
3. Last open/save location
4. cmd.exe: cd command
5. File explorers
6. CreateProcess, ShellExecute
7. New process inherits parent's CWD
8. Shortcuts
9. ...

Internal Network Attack



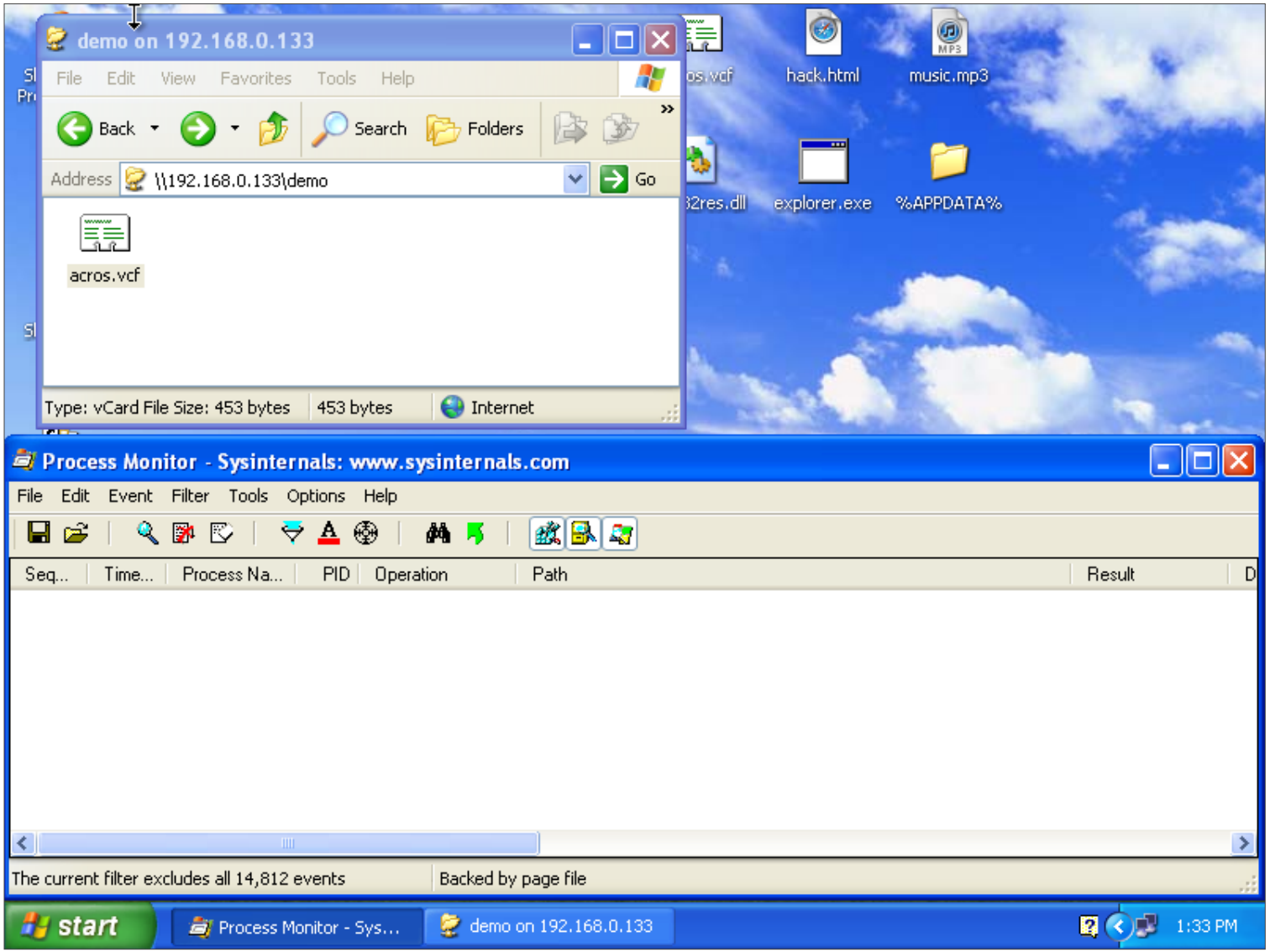
Attacking From Internet – The WebDAV Magic



Attack Vectors

1. Clicking on a link in browser + doubleclick
2. Clicking on a link in e-mail + doubleclick
3. Clicking on a link in IM message + doubleclick
4. Planting a DLL on a file server + file open
5. Document and DLL in a ZIP archive + file open
6. Document and DLL on a USB stick + file open
7. Document and DLL on CD/DVD + file open
8. ...
9. Advanced binary planting attacks

Binary Planting Demo


demo on 192.168.0.133
File Edit View Favorites Tools Help
Back Search Folders
Address \\192.168.0.133\demo
Go
acros.vcf
Type: vCard File Size: 453 bytes
453 bytes
Internet
hack.html
music.mp3
explorer.exe
%APPDATA%
Process Monitor - Sysinternals: www.sysinternals.com
File Edit Event Filter Tools Options Help
Seq... Time... Process Na... PID Operation Path Result
The current filter excludes all 14,812 events
Backed by page file
start
Process Monitor - Sys...
demo on 192.168.0.133
1:33 PM

Binary Planting Goes “EXE”

Searching for Non-Absolute EXEs

```
CreateProcess("SomeApp.exe")
```

1. The directory from which the application was loaded
2. Current Working Directory (CWD)
3. C:\Windows\System32
4. C:\Windows\System
5. C:\Windows
6. PATH

Searching for Non-Absolute EXEs

```
ShellExecute("SomeApp.exe")
```

~~The directory from which the application was loaded~~

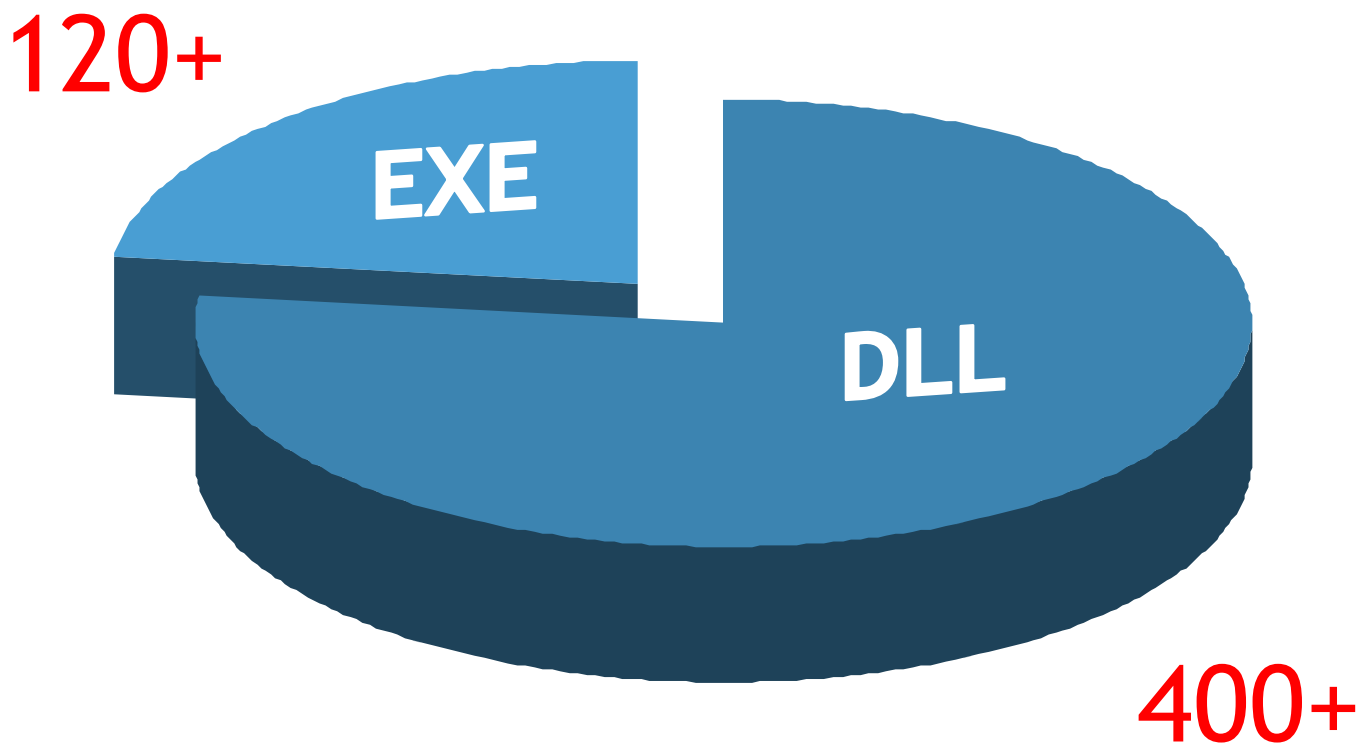
1. Current Working Directory (CWD)
2. C:\Windows\System32
3. C:\Windows\System
4. C:\Windows
5. PATH

Searching for Non-Absolute EXEs

_spawn*p* and _exec*p*

1. ~~The directory from which the application was loaded~~
1. Current Working Directory (CWD)
2. ~~C:\Windows\System32~~ C:\Windows\System
3. C:\Windows
4. PATH

DLL vs. EXE Planting



How Many Bugs?!?

100.000.000.000

Hundreds of BP bugs on every Windows computer

Tens of thousands of ways to break into any bank

... or competitor's network

... or government agency

... or nuclear facility in Iran

What Can You Do?

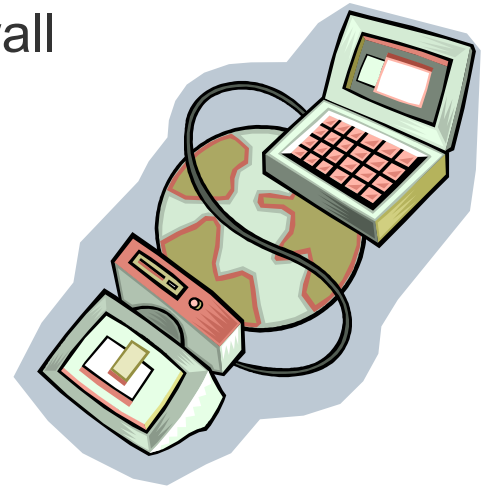
Recommendations for Developers

- Use absolute paths to libraries and executables
- Don’t make “let’s see if it’s there” LoadLibrary* calls
- Don’t plan on finding your DLL/EXE in CWD or PATH
- Set CWD to a safe location at startup
- Use SetDllDirectory(“”) at startup
- Don’t use SearchPath function for locating DLLs
- Check your product with Process Monitor or another tool
- Test with CWDIllegalInDllSearch hotfix set to "max".
- Do this for all modules of your product!

http://www.binaryplanting.com/guidelinesDevelopers.htm

Recommendations for Administrators

- Install Microsoft's Hotfix, remember to configure it
- Disable "Web Client" service
- Windows Software Restriction Policy, Windows AppLocker (DLL)
- Use a personal firewall with process and connection blocking
- Block outbound SMB on corporate firewall
- Block outbound WebDAV on corporate firewall
- Limit internal SMB, WebDAV traffic
- Restrict write access on file repositories to prevent planting



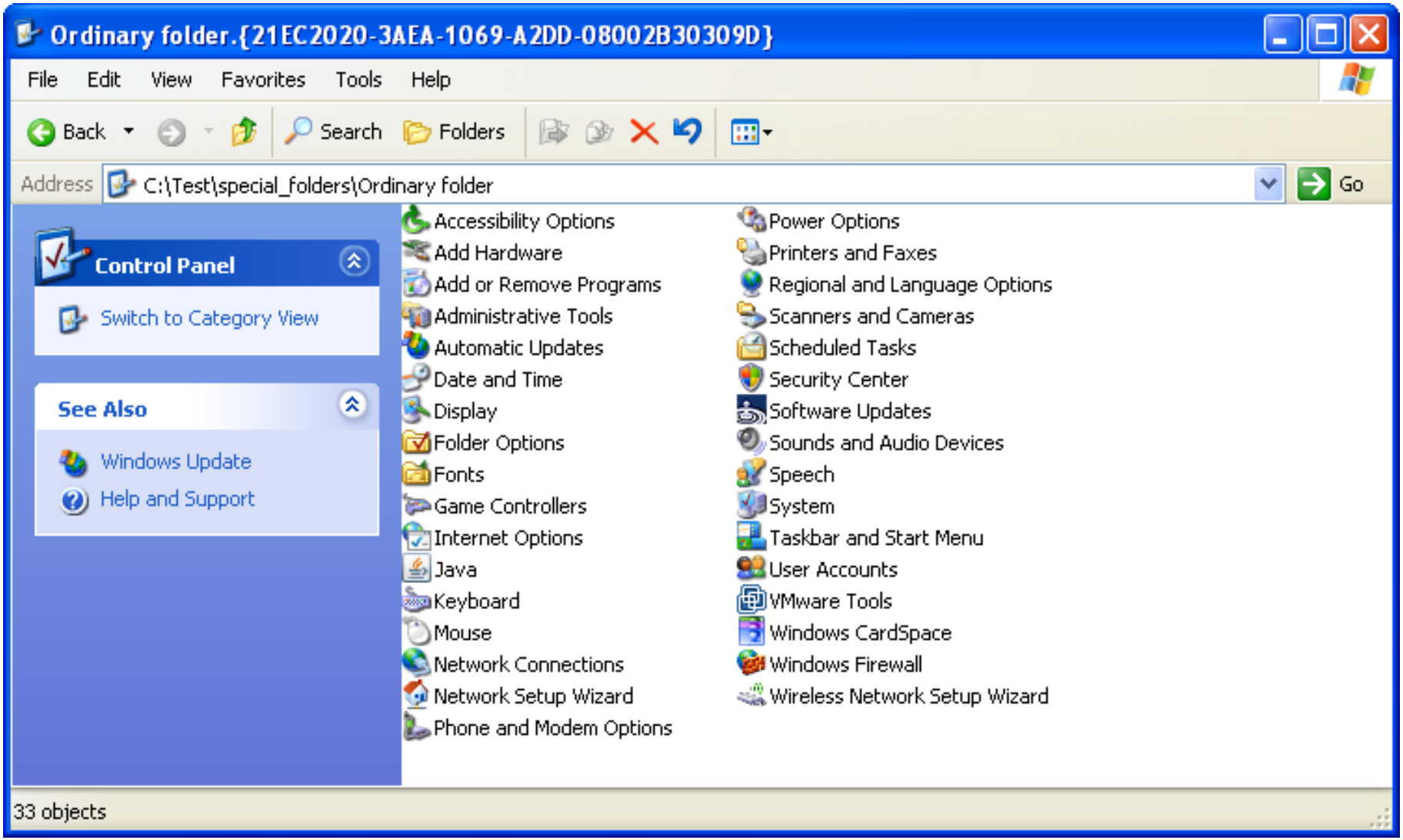
Recommendations for Users

- Be careful when using USB sticks, CDs, DVDs from unknown sources
- Think before double-clicking on anything presented to you
- If in doubt, transfer the data file (alone) to local drive and open it
- Alert your administrators about binary planting

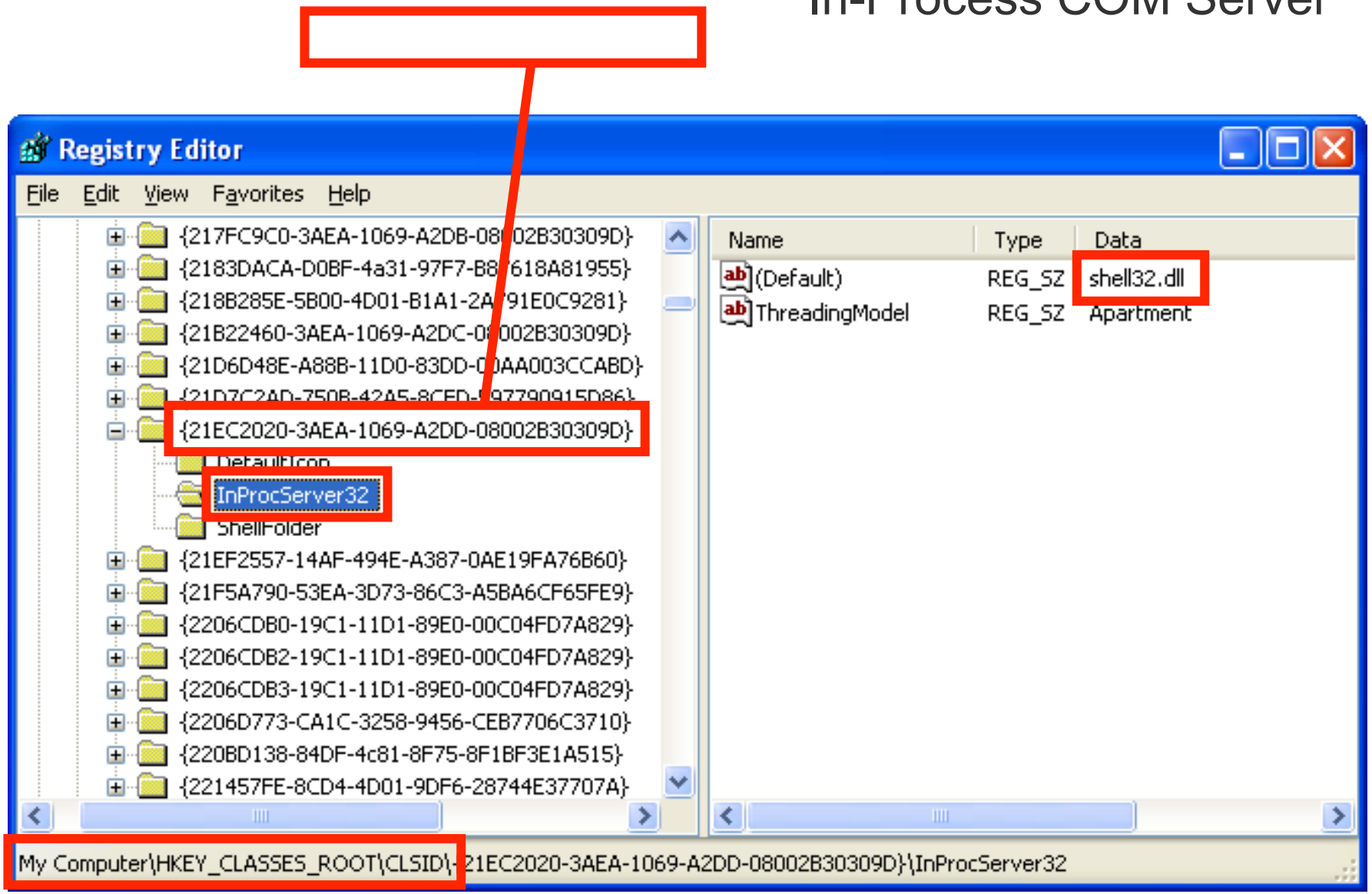
Advanced Binary Planting

[Luka's white magic]

Special Folders



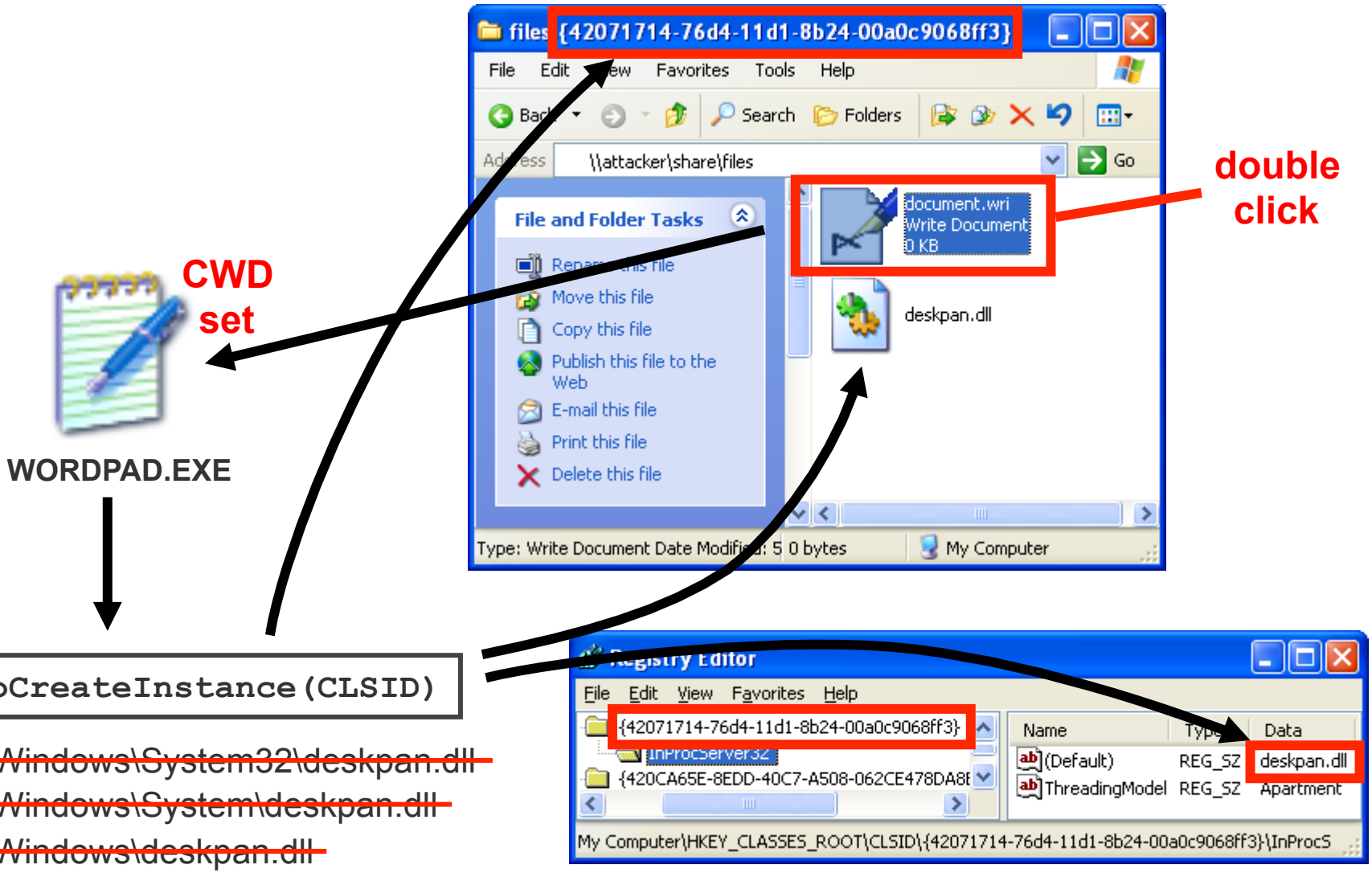
In-Process COM Server



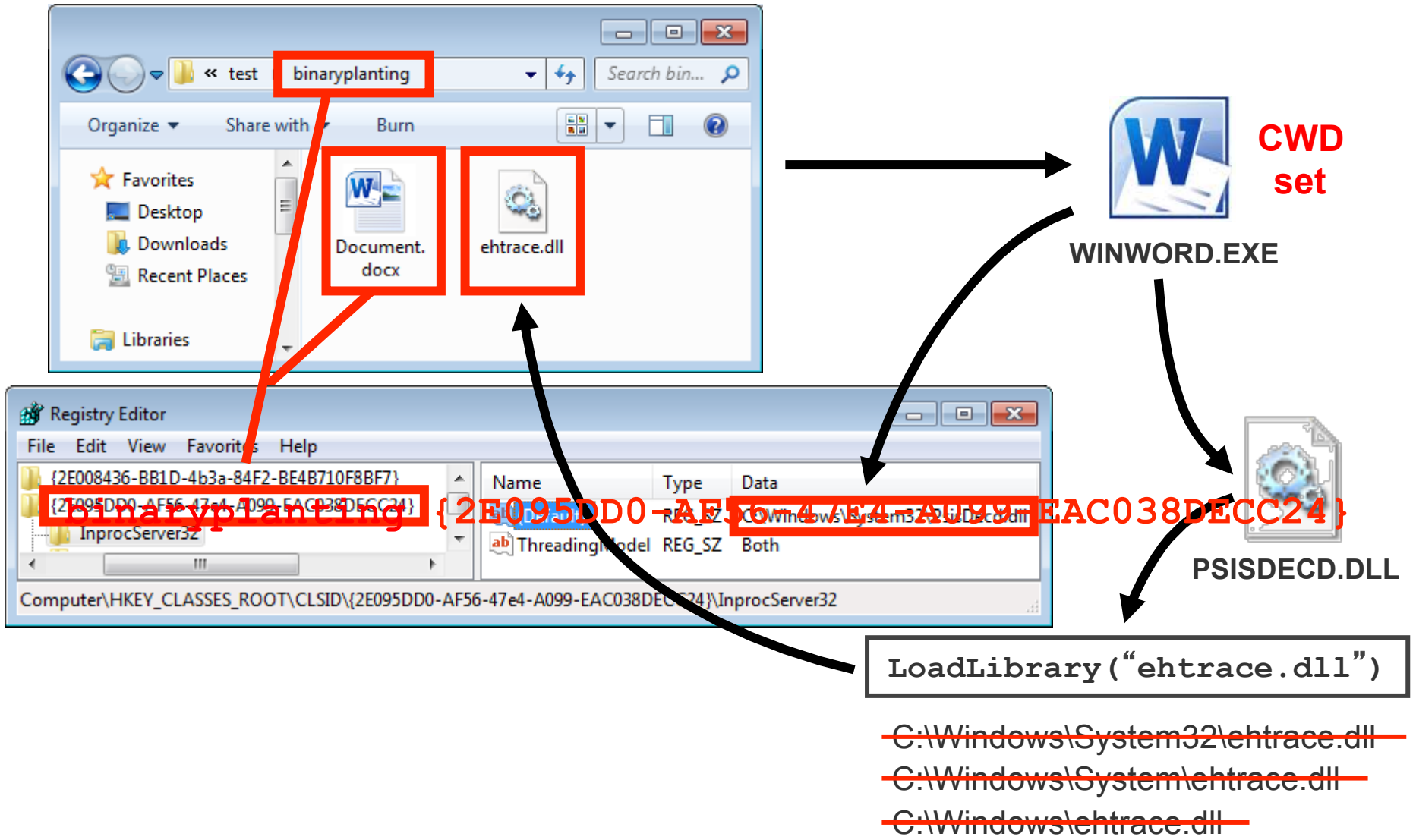
Pwning Innocent Applications


deskpan.dll
Recycle Bin
start
Local Disk (C:)
11:41 AM

Wordpad on Windows XP PoC



Word 2010 on Windows 7 PoC



Pwning Your Website Visitor

XP + IE8
(Front View)

ACROS Security . Finding Your Digital Vulnerabilities Before Others Do - Windows Internet Explorer

http://www.acrossecurity.com/demo/XP_2click/test.html

File Edit View Favorites Tools Help

Favorites Suggested Sites Web Slice Gallery

ACROS Security . Finding Your Digital Vulnerabilities B...

Page Safety Tools

mouse over to show the backstage

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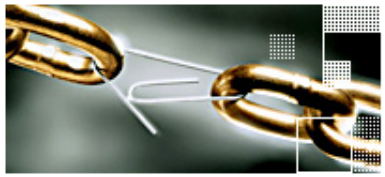
E-MAIL PGP KEY

Finding Your Digital Vulnerabilities Before Others Do.

Your Security Problems



Executives, Supervisors, Auditors

You are the legal owner of your corporate data and information protection. More...

IT managers, Security Officers

You're responsible for the security of your company's information system. More...

Our Security Solutions

Application Security Analysis

We find security problems in software that you develop or use, More...

Penetration Testing

We become your friendly attacker and try to penetrate into... More...

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ACROS in the Media

ComputerWorld, "Unpatched DLL bugs let hackers exploit Windows 7 and IE9, says researcher" (May 2011)

News and Announcements

ACROS will demonstrate binary planting attacks against IE9 at

100%

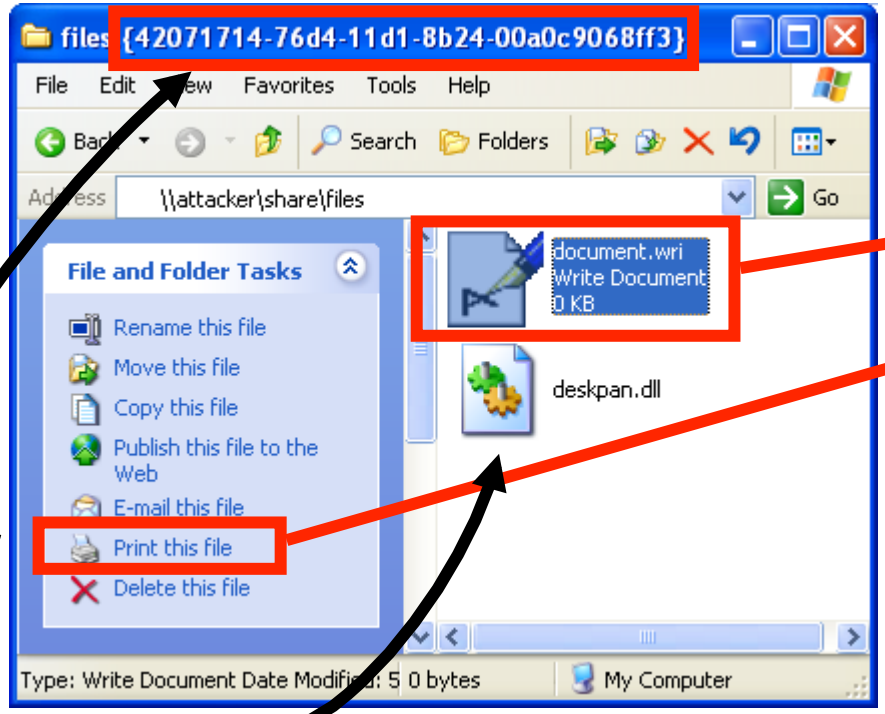
start ACROS Security . Fin... 11:22 AM

Windows XP & Internet Explorer 8 PoC

IEXPLORE.EXE

WORDPAD.EXE

CWD set

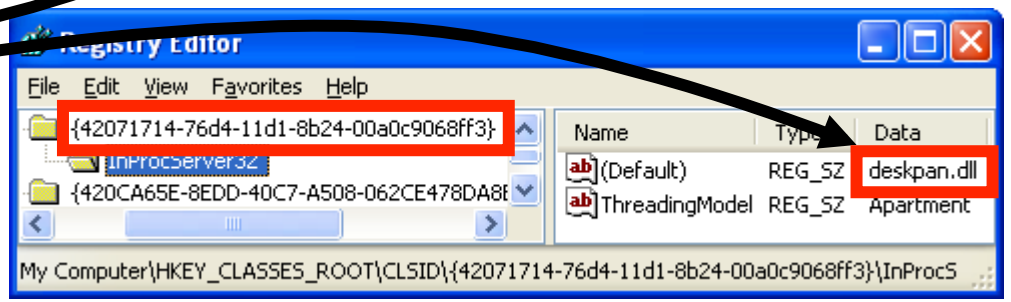


1st click

2nd click

`CoCreateInstance(CLSID)`

~~C:\Windows\System32\deskpan.dll~~
~~C:\Windows\System\deskpan.dll~~
~~C:\Windows\deskpan.dll~~



XP + IE8 (Backstage)

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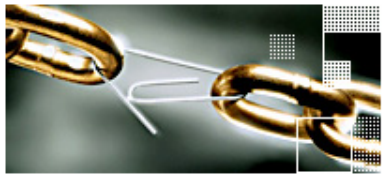

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100%

start ACROS Security . Fin... 11:23 AM

Win7 + IE9 + Protected mode (Front View)

http://www.acrossecurity.com/demo/Win7_r-clickSendTo/te

ACROS Security . Finding Y...

mouse over to show the backstage

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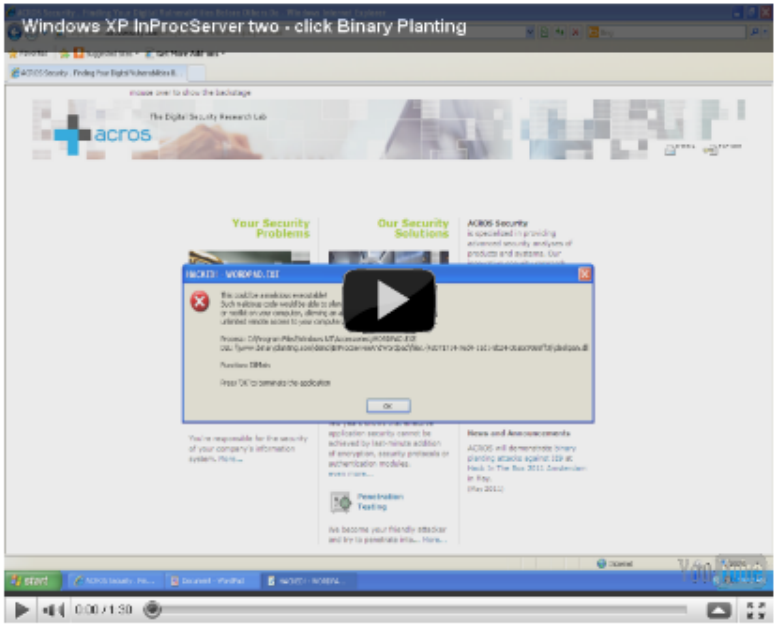
Finding Your Digital Vulnerabilities Before Others Do.



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ComputerWorld, "Unpatched DLL bugs let hackers exploit Windows 7 and IE9, says researcher"
(May 2011)

News and Announcements

ACROS will demonstrate binary planting attacks against IE9 at Hack In The Box 2011 Amsterdam in May.
(May 2011)

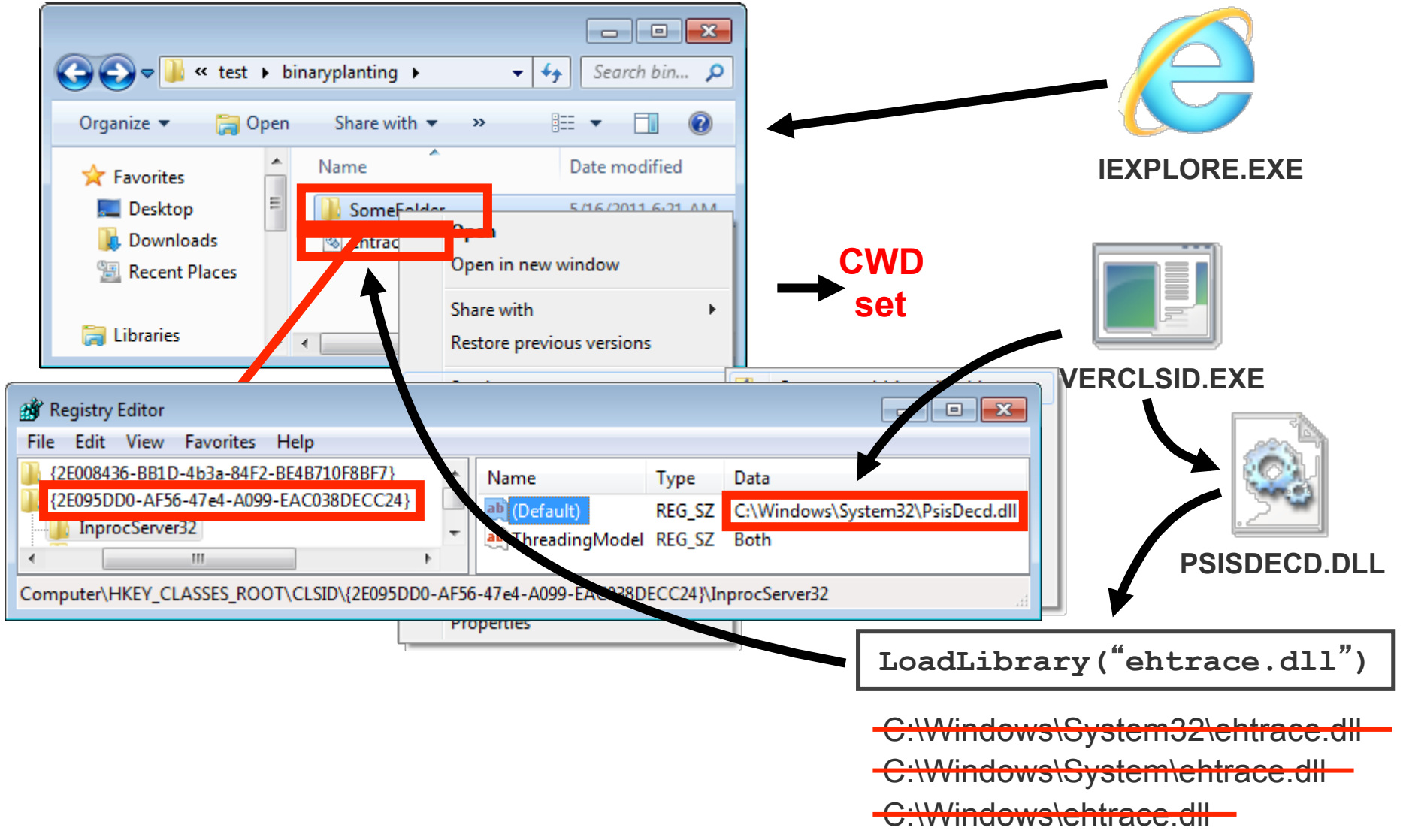
SL 10:09 16.5.2011

Windows 7 & Internet Explorer 9 PoC

VERCLSID.EXE

support.microsoft.com: “The **VERCLSID.EXE** program validates shell extensions before they are instantiated by the Windows shell or by Windows Explorer. “

Windows 7 & Internet Explorer 9 PoC



Win7 + IE9 + Protected mode (Backstage)

http://www.acrossecurity.com/demo/Win7_r-clickSendTo/te

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mouse over to show the backstage

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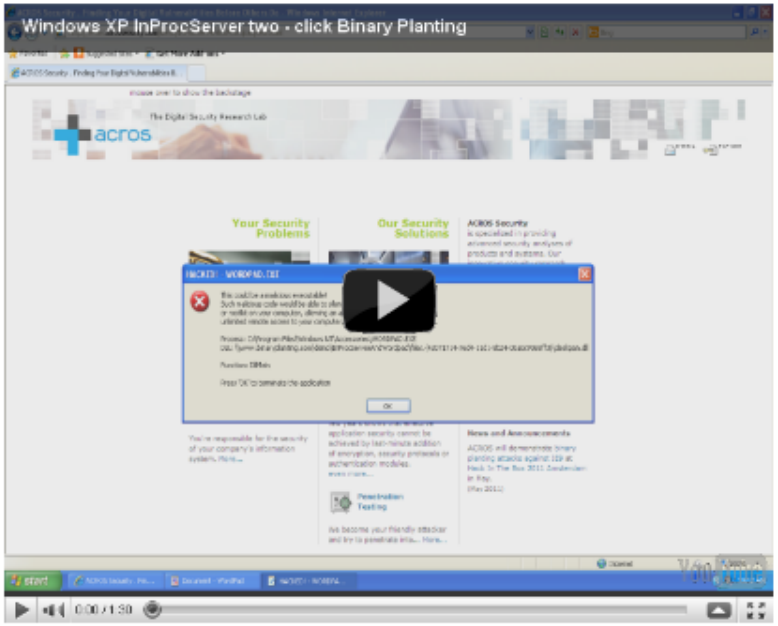

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(May 2011)

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(May 2011)

SL 10:47 16.5.2011

What to do right now?

Developers

- Don't register In-Process COM Servers with relative path to DLL
- Find and fix all unsafe library/executable loads

Users

- XP: remove the **`deskpan.dll`** reference in registry
- Win7: copy/create **`ehTrace.dll`** to **`System32`** folder
- Don't browse the Web until further notice ;-)

There's much more to come!

Resources

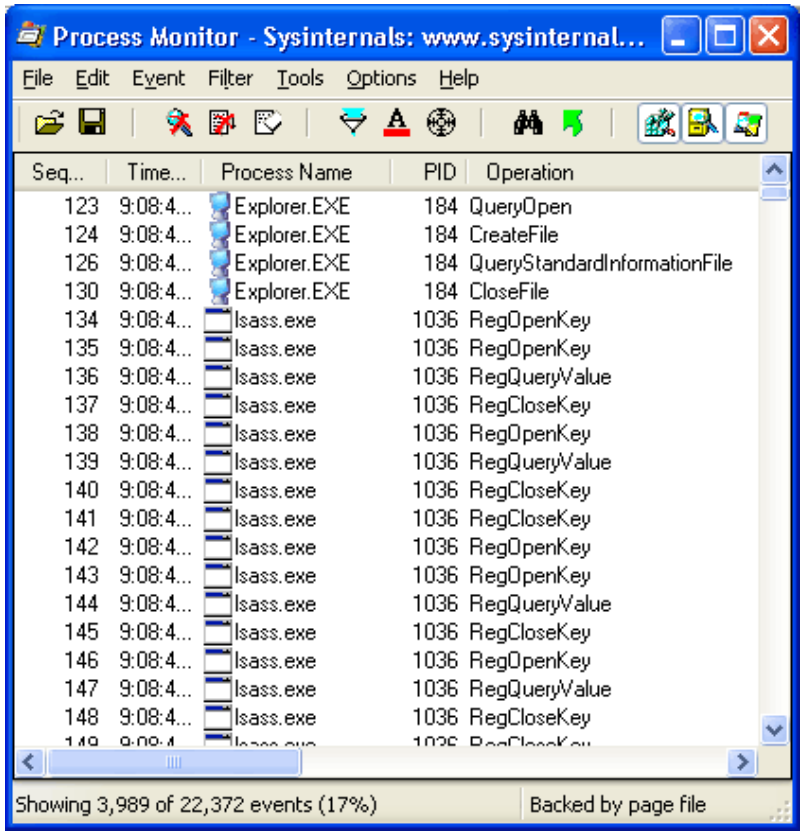
www.binaryplanting.com
blog.acrossecurity.com

http://support.microsoft.com/kb/2264107
http://blog.metasploit.com/2010/08/exploiting-dll-hijacking-flaws.html
http://securityxploded.com/dllhijackauditor.php
http://technet.microsoft.com/en-us/sysinternals/bb896645.aspx

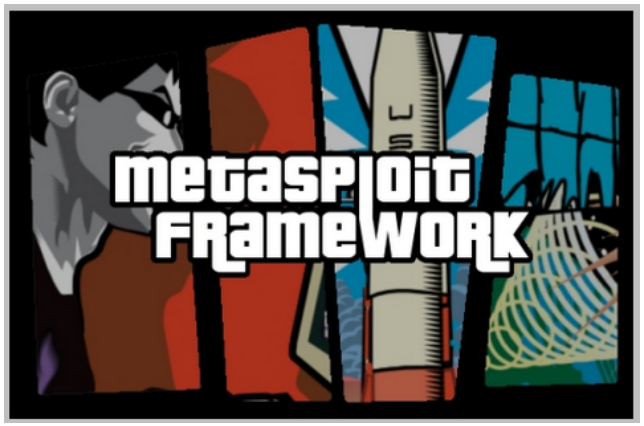
http://secunia.com/advisories/windows_insecure_library_loading/

Google “binary planting”, “dll hijacking”, “dll preloading”

Public Binary Planting Tools



DLLHijackAuditKit



www.binaryplanting.com/test.htm