User Account Control Overview

Windows Application Quality Team
Microsoft Corporation

Windows 7

User Account Control Goals

- Enable users to run with standard user rights
  - Defend against system changes
  - Reduce impact of malware
  - Defend against compromise if information
- Keep applications working

The Standard User Problem

I am a developer, not a STANDARD user!

Too many apps break as standard user. It's not worth the trouble.

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The UAC Solution

- Make it possible for most apps to run
- Remove excuses for running as administrator
- Encourage ISVs to develop for non-admins

UAC for Standard Users

- We fix things
- We allow you to elevate to admin

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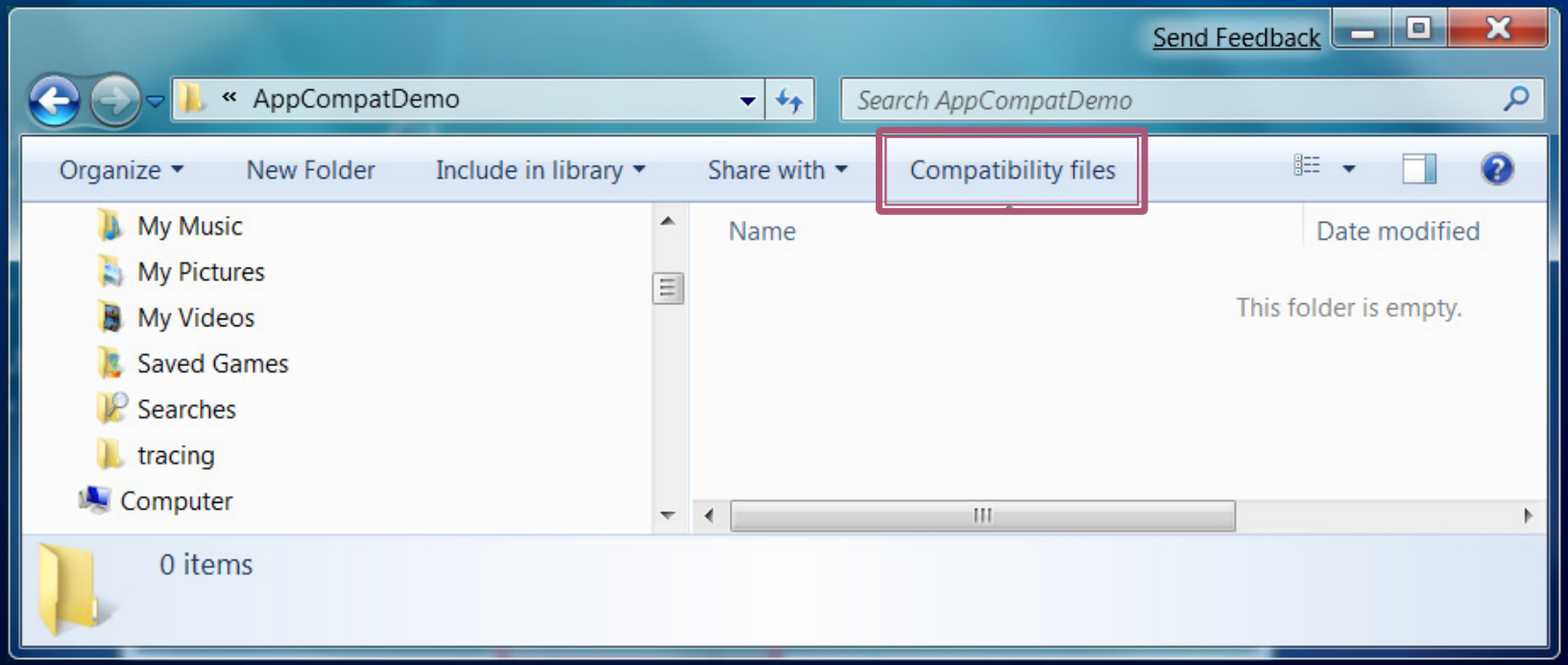
File and Registry Virtualization

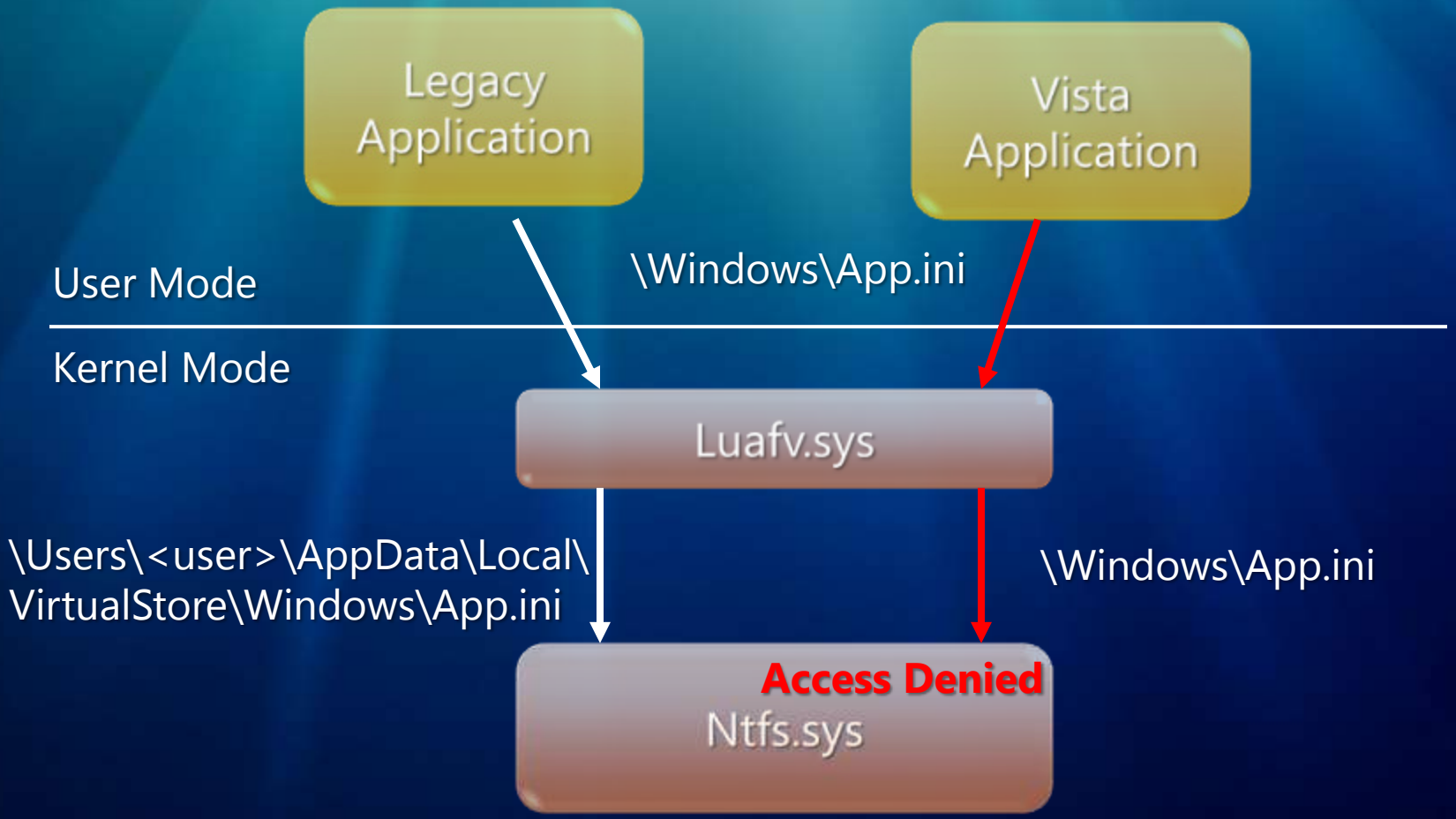
- Client only
- Legacy applications only
- 32-bit applications only
- “Sticky”
- Non-elevated apps only
- Multiple copies of files
- Doesn’t apply to executable files

File Virtualization

- c:\program files
- c:\programdata
- c:\windows



File Virtualization



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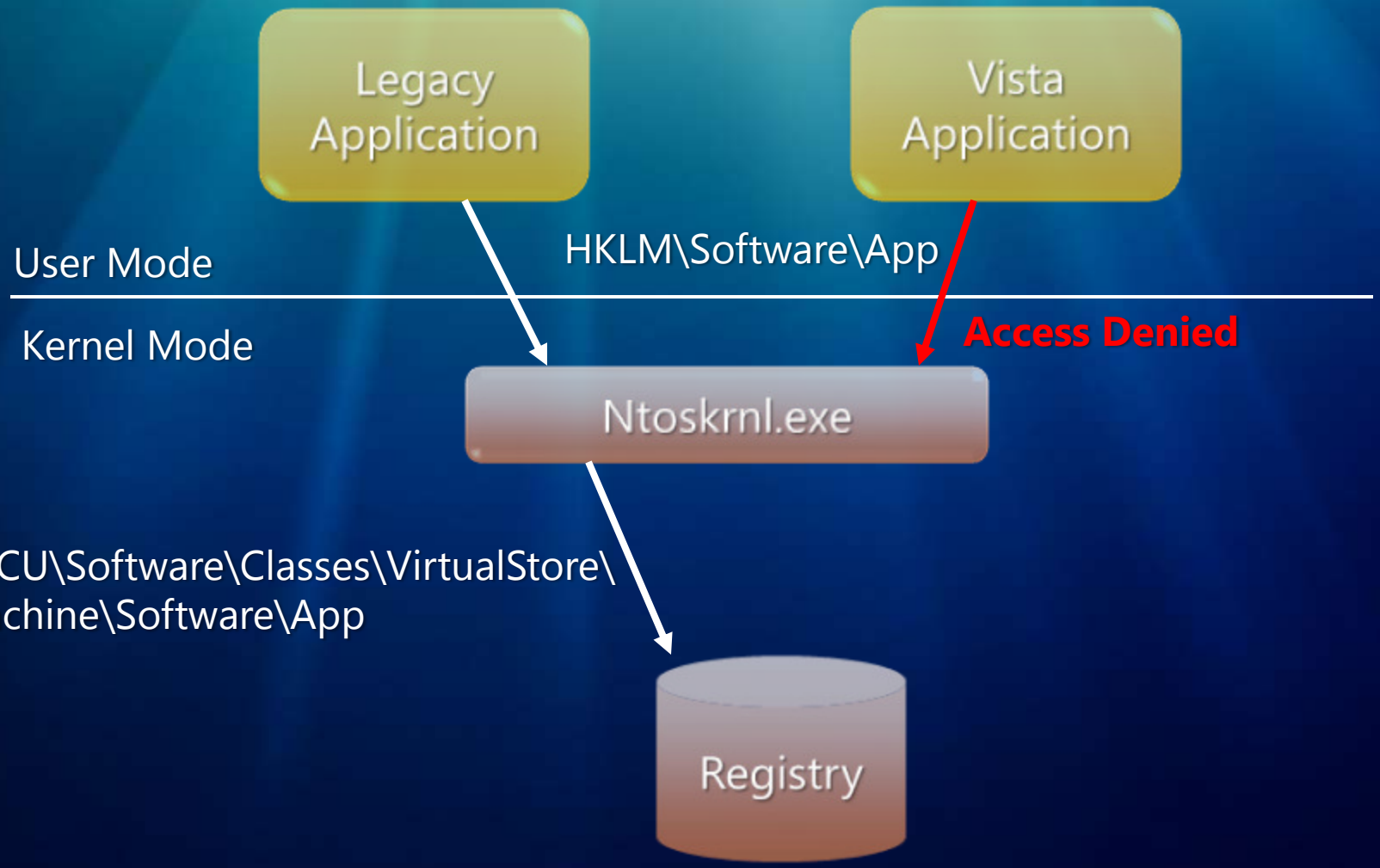
Registry Virtualization

- HKEY_LOCAL_MACHINE\Software

Registry Virtualization



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File Virtualization

demo

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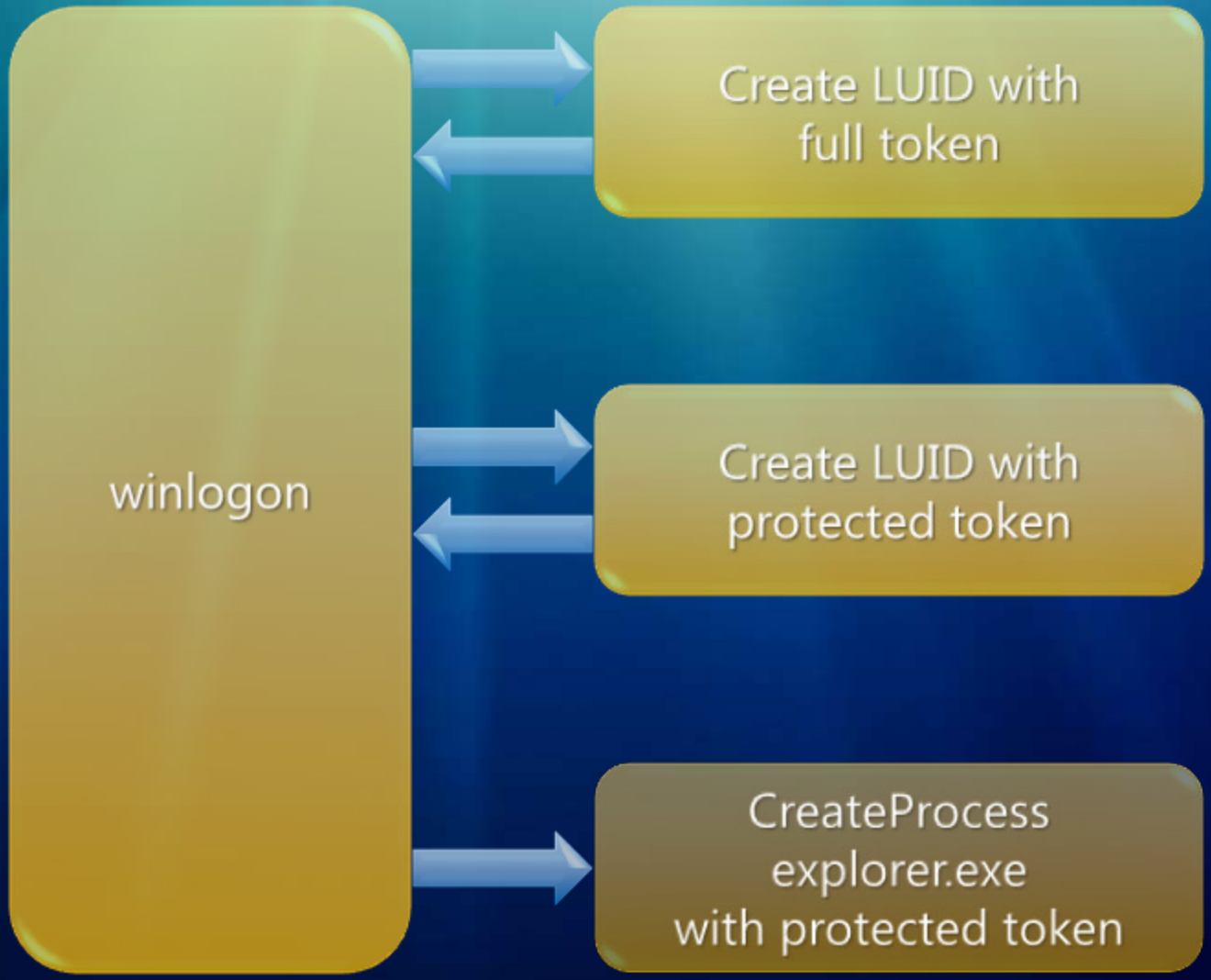
UAC for Administrators

- We fix things
- We let you run with fewer rights
- We let you elevate to full rights

The Split Token

- Run with fewer rights most of the time
- Conveniently elevate when you need rights
- Applies to interactive logons only

Creating the Split Token



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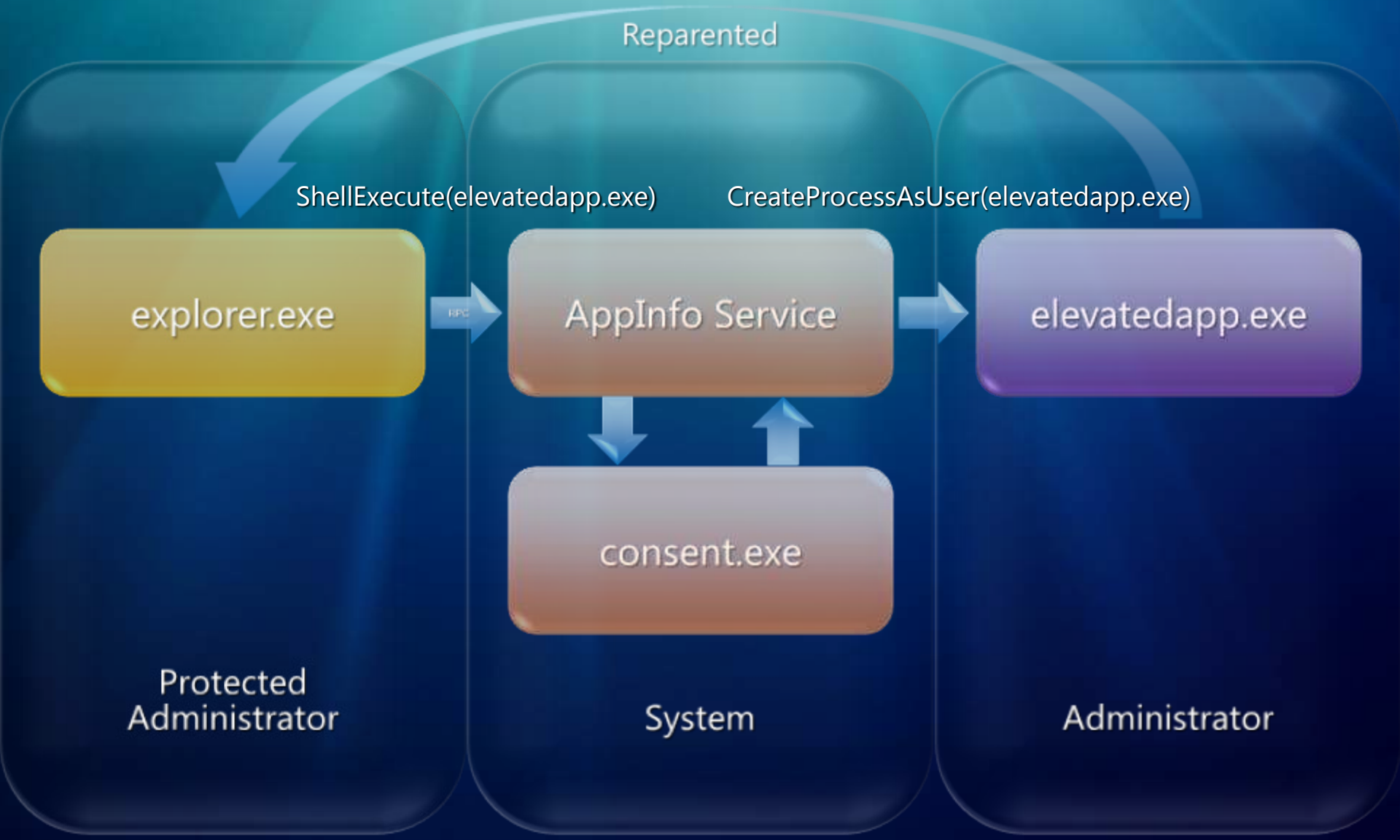
UAC OTS Elevation



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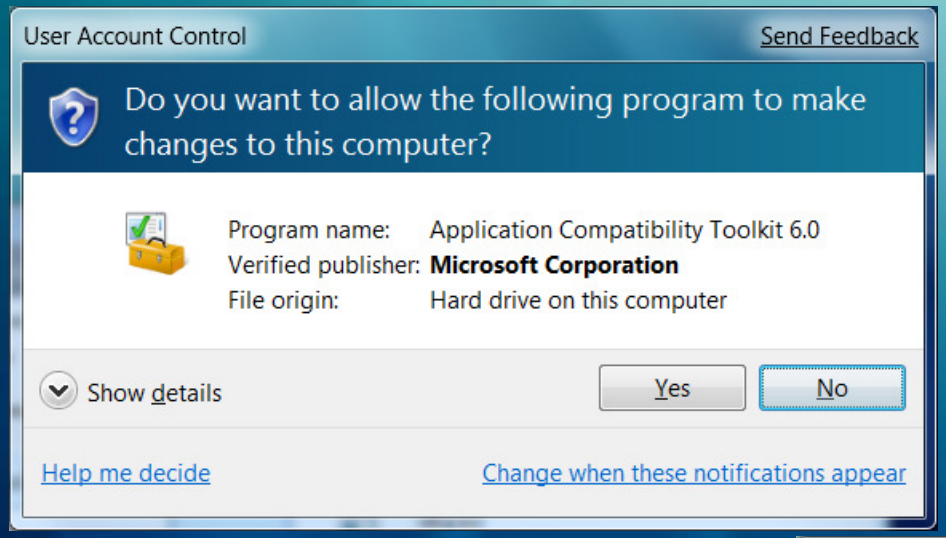
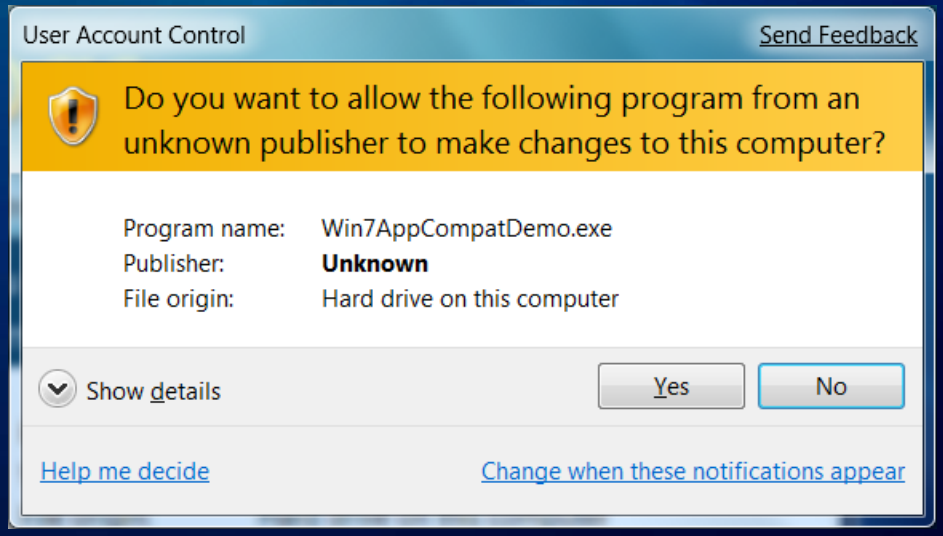
UAC: OTS Dialogs





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UAC Split Tokens

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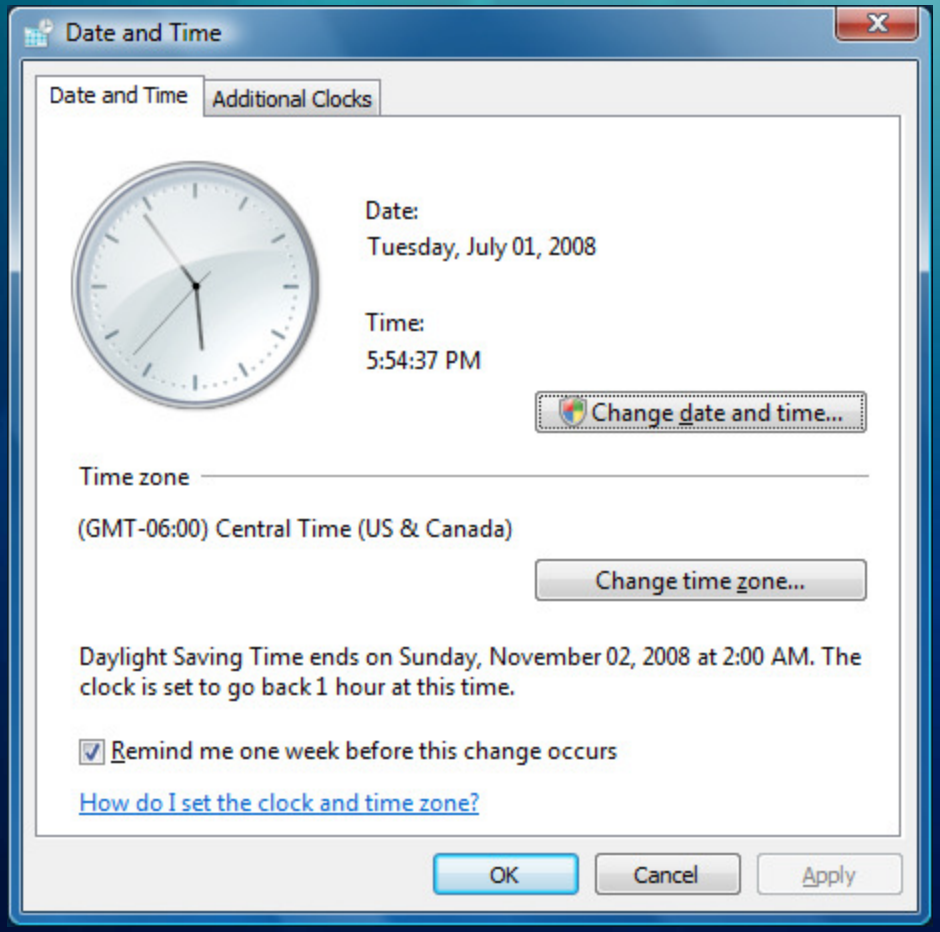
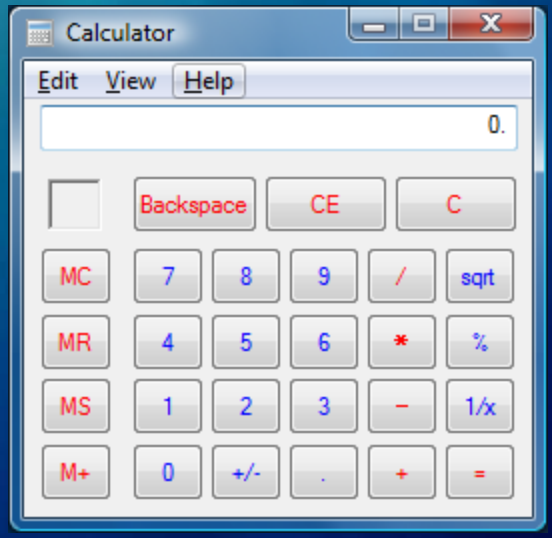
Standard User Platform Fixes





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Setup Detection

- Why is my app running elevated?
  - We think it's an installer!
- Specific Installer
- Generic Installer
- Specific Noninstaller

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Setup Detection

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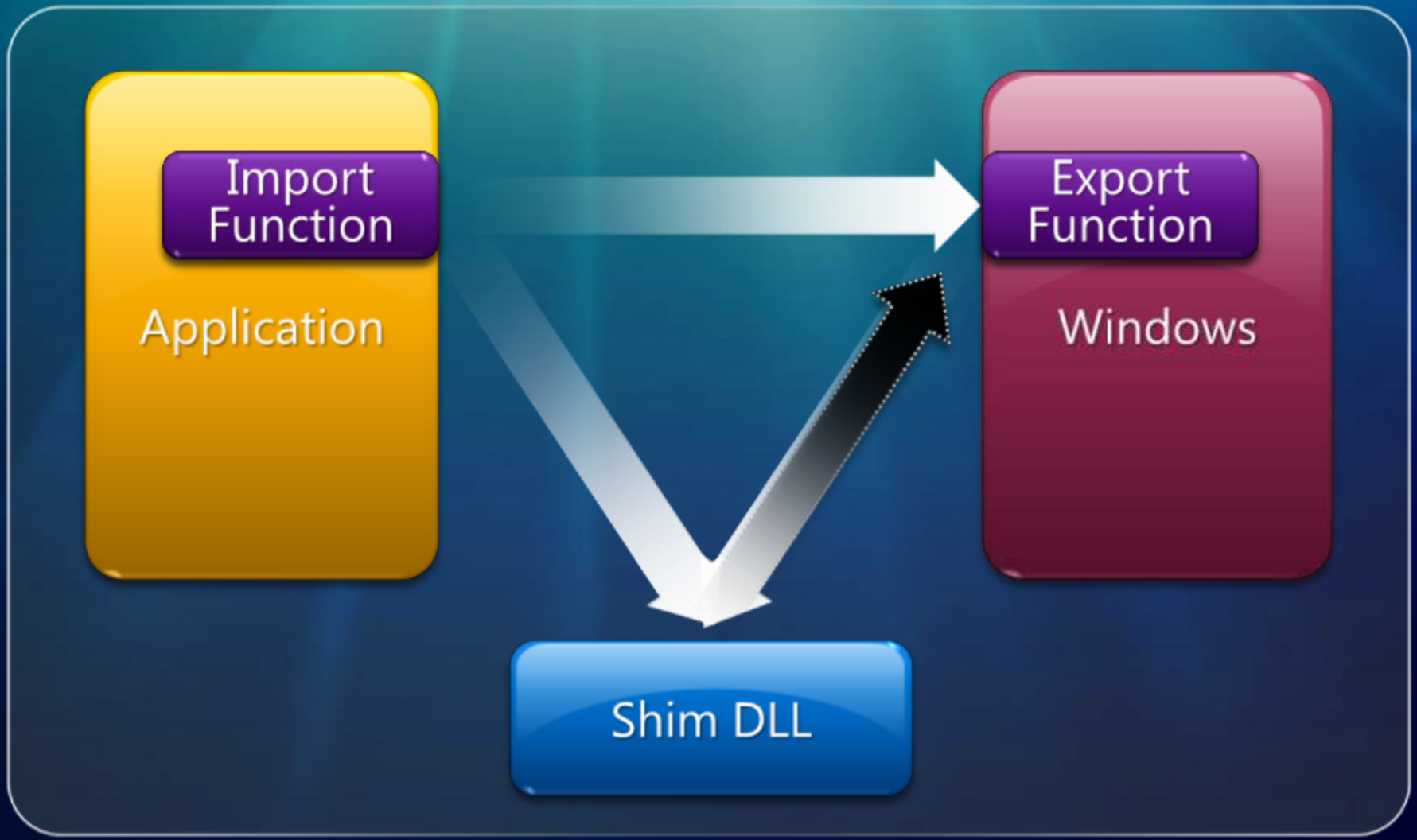
The "Standard User Quick Test"

- Run it elevated – does it work?
  - If so, investigate

How Shims Work



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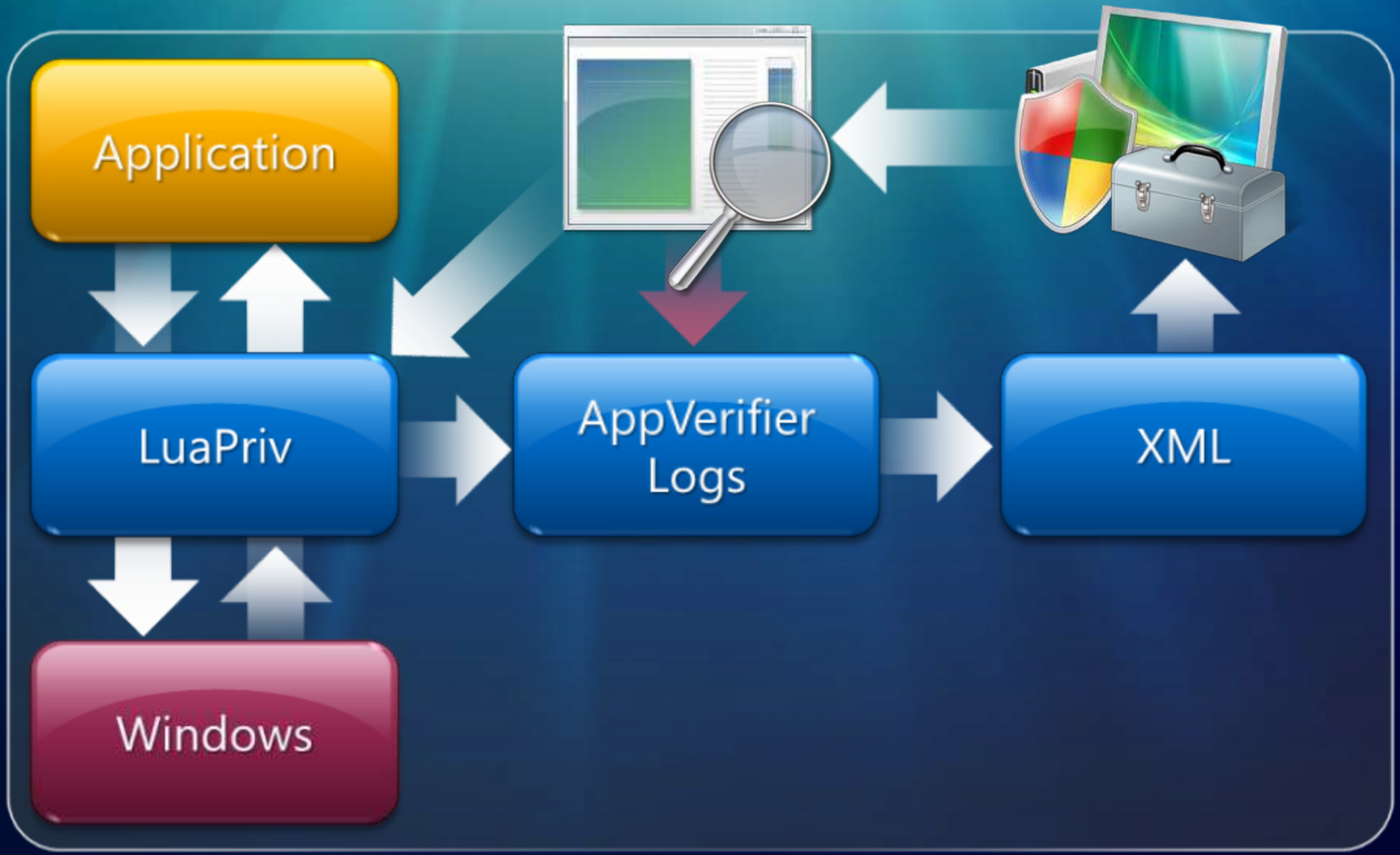
Standard User Analyzer



SUA Mitigations

- SUA can recommend:
  - ElevateCreateProcess
  - ForceAdminAccess
  - LocalMappedObject
  - VirtualizeDeleteFile
  - VirtualizeHKCRLite
  - CorrectFilePaths
  - VirtualRegistry

ElevateCreateProcess

Symptoms

ERROR_ELEVATION_REQUIRED

Fix description

Tries again, requesting elevation

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ForceAdminAccess

Symptoms

Fails explicit administrator check

Fix description

Lies

ForceAdminAccess Shim for IsUserAnAdmin:

```
return TRUE;
```

LocalMappedObject

Symptoms

Can’t create in Global namespace

Fix description

Creates in Local namespace

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VirtualizeDeleteFile

Symptoms

Can’t delete files

Fix description

Pretends to delete files

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VirtualizeHKCRLite

Symptoms

Can’t register COM components

Fix description

Registers them per-user

VirtualizeRegisterTypeLib

Symptoms

Registering type library fails

Fix description

Registers type library per-user

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SUA Mitigations

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UAC Manifests

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<assembly xmlns="urn:schemas-microsoft-com:asm.v1"
manifestVersion="1.0">
  <assemblyIdentity type="win32" processorArchitecture="*"
       version="1.0.0.0" name="MyApplication.exe"/>
  <description>My totally sweet Vista application</description>
  <ms_asmv2:trustInfo xmlns:ms_asmv2="urn:schemas-microsoft-
       com:asm.v2">
    <ms_asmv2:security>
      <ms_asmv2:requestedPrivileges>
        <ms_asmv2:requestedExecutionLevel level="asInvoker ||
        highestAvailable || requireAdministrator"/>
      </ms_asmv2:requestedPrivileges>
    </ms_asmv2:security>
  </ms_asmv2:trustInfo>
</assembly>
```

UAC Manifests

- Windows Vista: internal > external
- You didn't write code -> don't manifest
- Removes compatibility features / shims
- mt.exe
- Visual Studio 2008 native support

Checking for Admin in Code

- IsUserAnAdmin?
- GetTokenInformation?
  - TokenElevationType:
    - Default
    - Full
    - Limited
- Best solution: factor and manifest

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Run Levels

- RequireAdministrator
- HighestAvailable
- AsInvoker

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RunAsAdmin

Symptoms

Requires admin

Fix description

Prompts for elevation

RunAsHighest

Symptoms

Had both admin and standard user views

Fix description

Provides most powerful token

RunAsInvoker

Symptoms

Prompting unnecessarily

Fix description

No more prompt

SpecificInstaller

Symptoms

Not fixed as a legacy setup

Fix description

Flags it as a legacy setup

SpecificNonInstaller

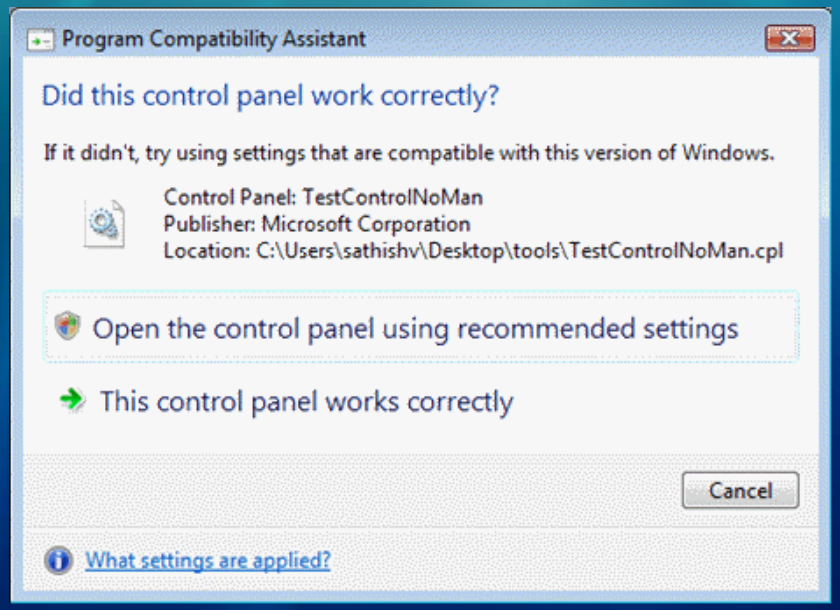
Symptoms

Flagged as a legacy setup inappropriately

Fix description

No longer flagged as a legacy setup

Don't Forget Legacy CPL…



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Run Level Specification

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