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Summiting the Pyramid

v1.0.0

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Scheduled Task/Job

- https://github.com/SigmaHQ/sigma/blob/c0332a9d96f6c7804fcc85dd706caed889446a62/rules/windows/process_creation/proc_creation_win_schtasks_creation.yml

```
title: Scheduled Task Creation
id: 92626ddd-662c-49e3-ac59-f6535f12d189
status: test
description: Detects the creation of scheduled tasks in user session
author: Florian Roth (Nextron Systems)
date: 2019/01/16
modified: 2022/10/09
tags:
    - attack.execution
    - attack.persistence
    - attack.privilege_escalation
    - attack.t1053.005
    - attack.s0111
    - car.2013-08-001
logsource:
    category: process_creation
    product: windows
detection:
    selection:
        Image|endswith: '\schtasks.exe'
        CommandLine|contains: ' /create '
    filter:
        User|contains: # covers many language settings
            - 'AUTHORI'
            - 'AUTORI'
    condition: selection and not filter
fields:
    - CommandLine
    - ParentCommandLine
falsepositives:
    - Administrative activity
    - Software installation
level: low
```

Original Analytic Scoring

	Application (A)	User-mode (U)	Kernel-mode (K)
Core to (Sub-) Technique (5)			
Core to Part of (Sub-) Technique (4)			
Core to Pre-Existing Tool (3)		EventID: 1 CommandLine|contains: '/create'	
Core to Adversary-brought Tool (2)			
Ephemeral (1)		Image|endswith: '\schtasks.exe'	

The original analytic detects on the name of a newly-created process in combination with the commandline argument `/create`. The fields references in this analytic exist in Sysmon EventID 1 and not Windows Event ID 4688 for process creation, therefore we know the intent was to

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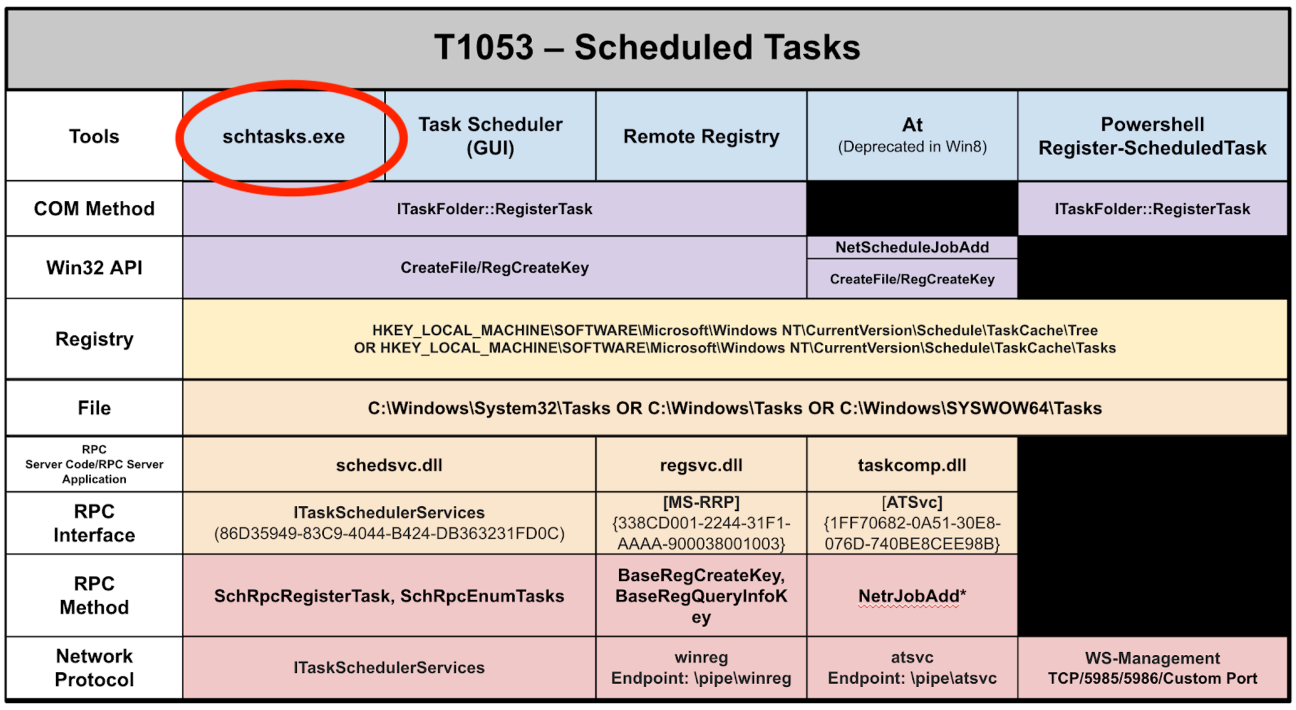
use Sysmon data. We have previously scored Sysmon Event ID 1 as operating in user-mode since it is fired when the Win32 API function CreateProcessA is called.

The schtasks executable can be easily copied and renamed by an adversary, `Image|endswith: '\\schtasks.exe'` therefore it is placed at the Ephemeral level. The commandline argument is more challenging for an adversary to evade, since they would likely need the source code to change these arguments. However, since schtasks exists in the OS prior to system compromise and no source code is available, the commandline argument observable is placed at **Core to Pre-existing Tool**. Factoring in StP boolean logic, this analytic ultimately scores at a 1U because an adversary can simply change the Image name and avoid detection.

> **Note**
>
> The filter in an analytic does not affect the overall robustness score since its purpose is to remove false positives. Studying how filters affect scoring is slated for future research.

We can use existing open source research from SpecterOps to make this analytic more robust. The following capability abstraction highlights several different ways adversaries could schedule a task on a system without firing the original analytic, and our original analytic would only detect the circled implementation.



T1053 – Scheduled Tasks

Tools	schtasks.exe	Task Scheduler (GUI)	Remote Registry	At (Deprecated in Win8)	Powershell Register-ScheduledTask
COM Method	ITaskFolder::RegisterTask				ITaskFolder::RegisterTask
Win32 API	CreateFile/RegCreateKey			NetScheduleJobAdd CreateFile/RegCreateKey	
Registry	HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\Schedule\TaskCache\Tree OR HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\Schedule\TaskCache\Tasks				
File	C:\Windows\System32\Tasks OR C:\Windows\Tasks OR C:\Windows\SYSWOW64\Tasks				
RPC Server Code/RPC Server Application	schedsvc.dll		regsvc.dll	taskcomp.dll	
RPC Interface	ITaskSchedulerServices (86D35949-83C9-4044-B424-DB363231FD0C)		[MS-RRP] {338CD001-2244-31F1-AAAA-900038001003}	[ATSvc] {1FF70682-0A51-30E8-076D-740BE8CEE98B}	
RPC Method	SchRpcRegisterTask, SchRpcEnumTasks		BaseRegCreateKey, BaseRegQueryInfoKey	NetrJobAdd*	
Network Protocol	ITaskSchedulerServices		winreg Endpoint: \pipe\winreg	atsvc Endpoint: \pipe\atsvc	WS-Management TCP/5985/5986/Custom Port

Scheduled Task Capability Abstraction - Created by SpecterOps[1]

Conversely, defenders can use the capability abstraction to create several different analytics, the most robust of which might detect on the invariant registry or file creation activity. As a first attempt at a more robust analytic, we can start with the file creation activity. If we create a scheduled task via the Task Scheduler GUI in a test environment with Sysmon installed, we might expect to generate an Event ID 11: FileCreate.

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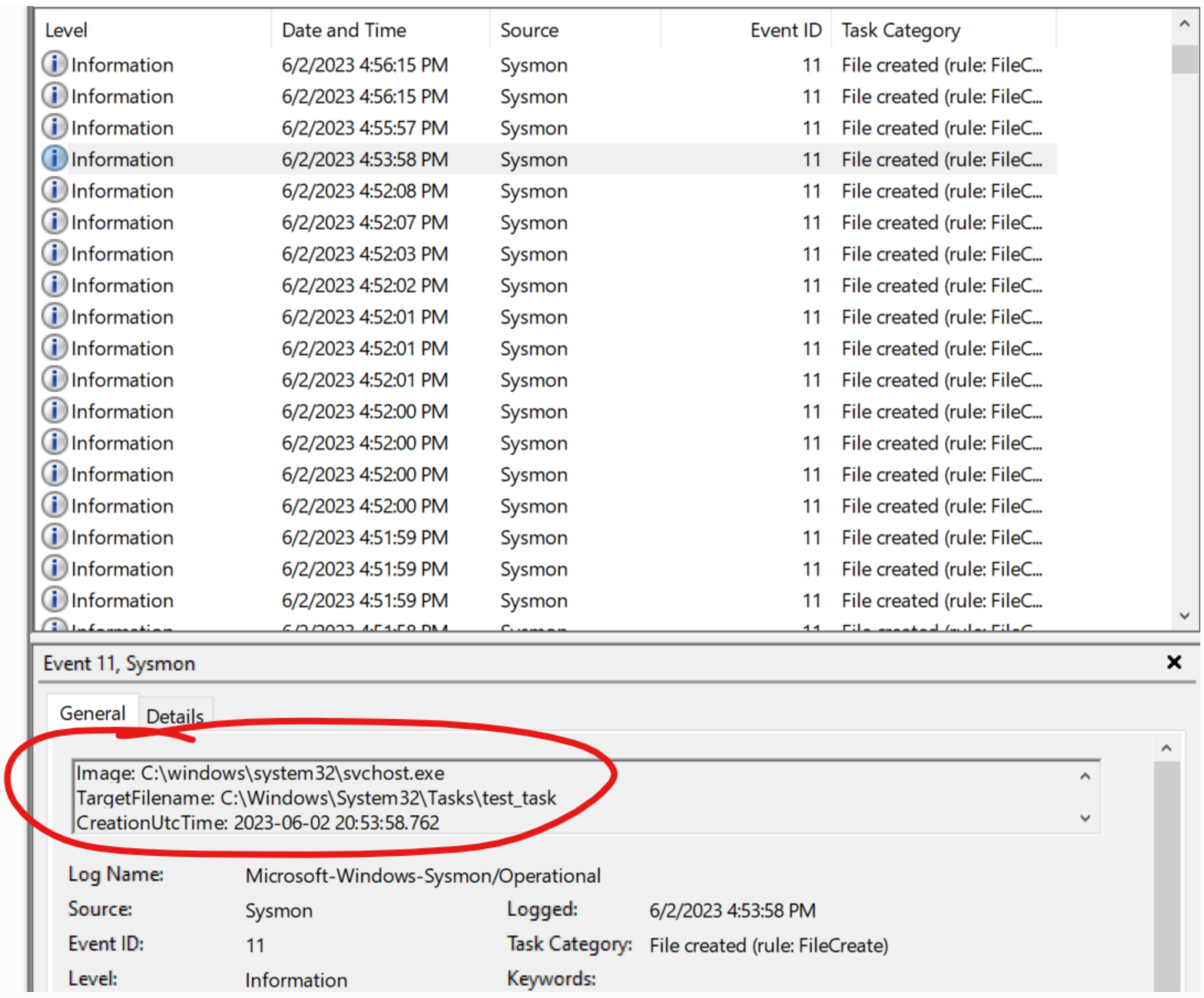

```
Level          Date and Time          Source    Event ID  Task Category
Information    6/2/2023 4:56:15 PM    Sysmon          11  File created (rule: FileC...
Information    6/2/2023 4:56:15 PM    Sysmon          11  File created (rule: FileC...
Information    6/2/2023 4:55:57 PM    Sysmon          11  File created (rule: FileC...
Information    6/2/2023 4:53:58 PM    Sysmon          11  File created (rule: FileC...
Information    6/2/2023 4:52:08 PM    Sysmon          11  File created (rule: FileC...
Information    6/2/2023 4:52:07 PM    Sysmon          11  File created (rule: FileC...
Information    6/2/2023 4:52:03 PM    Sysmon          11  File created (rule: FileC...
Information    6/2/2023 4:52:02 PM    Sysmon          11  File created (rule: FileC...
Information    6/2/2023 4:52:01 PM    Sysmon          11  File created (rule: FileC...
Information    6/2/2023 4:52:01 PM    Sysmon          11  File created (rule: FileC...
Information    6/2/2023 4:52:01 PM    Sysmon          11  File created (rule: FileC...
Information    6/2/2023 4:52:00 PM    Sysmon          11  File created (rule: FileC...
Information    6/2/2023 4:52:00 PM    Sysmon          11  File created (rule: FileC...
Information    6/2/2023 4:52:00 PM    Sysmon          11  File created (rule: FileC...
Information    6/2/2023 4:52:00 PM    Sysmon          11  File created (rule: FileC...
Information    6/2/2023 4:51:59 PM    Sysmon          11  File created (rule: FileC...
Information    6/2/2023 4:51:59 PM    Sysmon          11  File created (rule: FileC...
Information    6/2/2023 4:51:59 PM    Sysmon          11  File created (rule: FileC...
Information    6/2/2023 4:51:58 PM    Sysmon          11  File created (rule: FileC...
```

Event 11, Sysmon

```
Image: C:\windows\system32\svchost.exe
TargetFilename: C:\Windows\System32\Tasks\test_task
CreationUtcTime: 2023-06-02 20:53:58.762
```

Log Name:	Microsoft-Windows-Sysmon/Operational		
Source:	Sysmon	Logged:	6/2/2023 4:53:58 PM
Event ID:	11	Task Category:	File created (rule: FileCreate)
Level:	Information	Keywords:	

Sysmon Event ID 11: FileCreate

Looks like the hypothesis was correct! An Event ID 11 was generated under the expected `C:\Windows\System32\Tasks` directory.

❗ Note

It is important to note all the false positives. Unfortunately this more robust analytic generates a large amount of false positives and should be combined with other observables or fields to provide context, filter out false positives, and ensure the analytic is not completely ignored by an analyst.

Let's score this new analytic and see if it is more robust than the original. It's tough to tell right now where to place Event ID 11, but fortunately open-source references exist that enumerate Windows APIs and the respective Event IDs that are generated:

- Roberto Rodriguez's API - To - Event
- Jonny Johnson's TelemetrySource

These two spreadsheets indicate which Event IDs are generated by user-mode or kernel-mode APIs. An excerpt of Roberto's spreadsheet is below, showing the different APIs that generate a Sysmon Event ID 11: FileCreate.

API Call	EventID	Event Name	Log Provider
CopyFile	11	FileCreate	Microsoft-Windows-Sysmon
CopyFile2	11	FileCreate	Microsoft-Windows-Sysmon
CopyFileEx	11	FileCreate	Microsoft-Windows-Sysmon
CreateFile2	11	FileCreate	Microsoft-Windows-Sysmon
CreateFileA	11	FileCreate	Microsoft-Windows-Sysmon
CreateFileW	11	FileCreate	Microsoft-Windows-Sysmon
MoveFile	11	FileCreate	Microsoft-Windows-Sysmon

NtCreateFile	11	FileCreate	Microsoft-Windows-Sysmon
NtWriteFile	11	FileCreate	Microsoft-Windows-Sysmon

All the relevant APIs are in user-mode, and since the file activity is invariant behavior across all implementations of task scheduling we can score this analytic at 5U.

Improved Analytic Scoring #1

	Application (A)	User-mode (U)	Kernel-mode (K)
Core to (Sub-) Technique (5)		EventID: 11 TargetFileName|contains: - “C:\Windows\System32\Tasks” - “C:\Windows\SYSWOW64\Tasks”	
Core to Part of (Sub-) Technique (4)			
Core to Pre-Existing Tool (3)			
Core to Adversary-brought Tool (2)			
Ephemeral			

So far we have created an analytic using the FileCreate invariant behavior. What if we pivot and use the registry key? Might the registry key approach score at a higher level? Sysmon EventID 12: RegistryEvent (Object create and delete) should be generated when a registry key is created. Roberto’s Event ID to Windows API mapping shows us that Event ID 12 can be generated from kernel-mode APIs, so we can score this analytic as operating in kernel-mode.

API Call	EventID	Event Name	Log Provider
RegCreateKeyA	12	RegistryEvent (Object create and delete)	Microsoft-Windows-Sysmon
RegCreateKeyExA	12	RegistryEvent (Object create and delete)	Microsoft-Windows-Sysmon
RegCreateKeyExW	12	RegistryEvent (Object create and delete)	Microsoft-Windows-Sysmon
RegCreateKeyW	12	RegistryEvent (Object create and delete)	Microsoft-Windows-Sysmon
ZwCreateKey	12	RegistryEvent (Object create and delete)	Microsoft-Windows-Sysmon

Since the registry key is invariant behavior, the analytic is placed at the Core to Subtechnique level and we can ultimately score it at 5K. It is important to ensure an adversary can’t evade our analytic by editing an existing registry key value or an renaming an entire registry key/value pair, so we should also integrate Event IDs 13: (Value Set) and 14: (Key and Value Rename) into our analytic logic.

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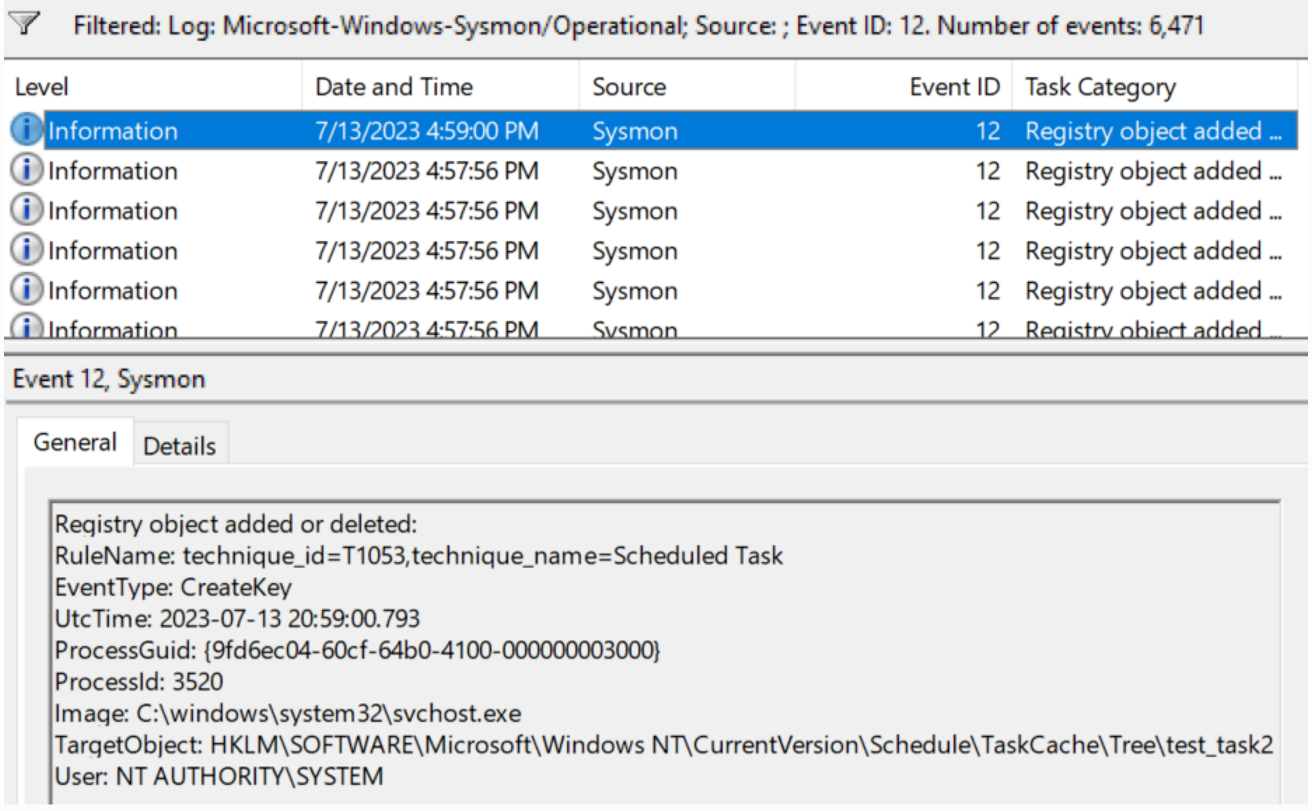

```
Filtered: Log: Microsoft-Windows-Sysmon/Operational; Source: ; Event ID: 12. Number of events: 6,471

Level         Date and Time          Source    Event ID  Task Category
Information   7/13/2023 4:59:00 PM   Sysmon          12  Registry object added ...
Information   7/13/2023 4:57:56 PM   Sysmon          12  Registry object added ...
Information   7/13/2023 4:57:56 PM   Sysmon          12  Registry object added ...
Information   7/13/2023 4:57:56 PM   Sysmon          12  Registry object added ...
Information   7/13/2023 4:57:56 PM   Sysmon          12  Registry object added ...
Information   7/13/2023 4:57:56 PM   Sysmon          12  Registry object added ...

Event 12, Sysmon
```

```
Registry object added or deleted:
RuleName: technique_id=T1053,technique_name=Scheduled Task
EventType: CreateKey
UtcTime: 2023-07-13 20:59:00.793
ProcessGuid: {9fd6ec04-60cf-64b0-4100-000000003000}
ProcessId: 3520
Image: C:\windows\system32\svchost.exe
TargetObject: HKLM\SOFTWARE\Microsoft\Windows NT\CurrentVersion\Schedule\TaskCache\Tree\test_task2
User: NT AUTHORITY\SYSTEM
```

Improved Analytic Scoring #2

	Application (A)	User-mode (U)	Kernel-mode (K)
Core to (Sub-) Technique (5)			EventID: - 12 - 13 - 14 TargetObject|contains: - “HKLM\SOFTWARE\Microsoft\W NT\CurrentVersion\Schedule\Ta - “HKLM\SOFTWARE\Microsoft\W NT\CurrentVersion\Schedule\Ta
Core to Part of (Sub-) Technique (4)			
Core to Pre-Existing Tool (3)			
Core to Adversary-brought Tool (2)			
Ephemeral (1)			

Note

It is also possible to implement a similar analytic by placing a SACL on the invariant registry keys and searching for Event IDs 4657 or 4663.

References

[1] https://posts.specterops.io/abstracting-scheduled-tasks-3b6451f6a1c5

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