



BAPCo[®] CrossMark[™] User Guide

Revision: 1.0

Revision History:

1.0 Initial version of CrossMark User Guide.

1	<i>Introduction</i>	5
2	<i>Setup</i>	6
2.1	Image configuration	6
2.2	CrossMark installation	6
2.2.1	Windows:.....	6
2.2.2	iOS:.....	6
2.2.3	macOS.....	7
2.3	CrossMark uninstallation	7
2.3.1	Windows:.....	7
2.3.2	iOS:.....	7
2.3.3	macOS:.....	7
3	<i>Running CrossMark</i>	8
3.1	CrossMark interface	8
3.2	CrossMark pro version	10
4	<i>Benchmark settings</i>	11
5	<i>Results generation and display</i>	13
5.1	Viewing additional results	13
6	<i>Results submission</i>	14
6.1	Submit results by web browser	14
6.2	Submit from CrossMark	14
7	<i>System Configuration Guide</i>	16
7.1.1	Required settings	16
7.1.2	Disable User Account Control (UAC).....	16
7.1.3	Disable Low Battery Actions	16
7.1.4	Disable Windows Update.....	16
7.1.5	Disable WinSAT service	16
7.1.6	Disable Windows Search.....	16
7.1.7	Disable Diagnostic policy service	16
7.1.8	Disable SysMain service	17
7.1.9	Create BAPCo Power Scheme	17
7.1.10	Set Power Plan Type to "High Performance"	17
7.1.11	Set CPU High Performance	17
7.1.12	Disable Windows Defender	17
7.1.13	Disable Tamper protection.....	17

7.1.14	Disable Hard Disk Timeout	17
7.1.15	Ignore Laptop Lid Close	17
7.2	Steps for modifying each setting	18
7.2.1.1	Windows 10	18
7.2.1.1.1	Adjust the power and performance settings in Windows 10	18
7.2.1.1.2	Set Power Plan Type to "High Performance"	20
7.2.1.1.3	Disable WinSAT	20
7.2.1.1.4	Disable all Windows updates	21
7.2.1.1.5	Disable tamper protection	22
7.2.1.1.6	Disable Windows Search, Diagnostic Policy Service and SysMain services	22
7.2.1.1.7	Disable windows defender	24
7.2.1.1.7.1	<i>Method 1 - Using Group policy editor (Recommended)</i>	24
7.2.1.1.7.2	<i>Method 2 - Using Registry editor</i>	24
7.2.1.1.8	<i>Additional settings required only for windows version: Windows 10 2004.19041.450 and above to globally turn off security setting including defender</i>	25
7.2.1.1.9	Disable User Account Control Settings	26
7.2.1.1.9.1	<i>Method 1 - Using Group policy editor (Recommended)</i>	26
7.2.1.1.9.2	<i>Method 2 - Using Registry editor</i>	27
7.2.1.1.10	Backup Windows Registry	28
7.2.1.2	MacOS	30
7.2.1.2.1	Adjust the performance and sleep settings for MacOS	30
8	Automated execution	31
9	Automated data collection	32
10	Tips for Usage	33
10.1	Best Practices	33
10.1.1	Run time information	33
10.1.2	Error handling	34
10.1.3	Stopping a run in progress	34
10.2	Reference system	35
10.3	Lenovo[®] ThinkCentre[™] M720q	35
11	Scenarios	36
11.1	Productivity	36
11.2	Creativity	36
11.3	Responsiveness	36
12	Support	37
13	CrossMark Benchmarking Rules v0.1	39
13.1	Benchmark Execution	39

13.2	Full Disclosure Report.....	40
13.3	Publication.....	40
13.4	Availability.....	41
13.5	FDR Processing.....	41
13.6	Publication of Results on Non-OEM Platforms.....	42
13.7	Publication of Results for Competitive Comparisons.....	42

1 Introduction

CrossMark™ is an easy to run and cross-platform benchmark that measures the overall system performance and system responsiveness using models of real-world applications. CrossMark™ supports devices running Windows, iOS and macOS platforms.

This document is intended as a user manual to assist with the installation, configuration, and execution of CrossMark. For a technical overview of CrossMark, please download the CrossMark Whitepaper published on the BAPCo website: www.bapco.com

2 Setup

Before attempting to install or run CrossMark, verify that the test system meets the recommended minimum system configuration for running the benchmark. Visit the [BAPCo Benchmarks](#) YouTube channel for video tutorials to assist with installing and running CrossMark.

Windows:

- **CPU:** 2015 or newer x86 processor (Intel 6th Generation Core or AMD 7000 series APU)
- **RAM:** 4 GB
- **HDD/SSD:** 10GB of free space on the primary drive
- **Operating System:** Microsoft® Windows® 10 64-bit version 1803 (RS4) or higher
- **Resolution:** 1024x768 or 1366x768
- **Supported Languages on Windows 10:** English (US)

macOS:

- **RAM:** 4 GB
- **Operating System:** OSX 10.9.5(2015) or later
- **Resolution:** 1024x768 or 1366x768
- **Supported Languages on Windows 10:** English (US)

iOS/iPadOS:

- **RAM:** 4 GB
- **Operating System:** iOS 12.0 version or higher

2.1 Image configuration

For best results, CrossMark should be installed to a supported operating system, with updated hardware drivers. CrossMark includes a document that will help the user in making changes to the system in preparation for running the benchmark for optimal results. See the [system configuration guide](#) section for more information on image configuration.

2.2 CrossMark installation

Follow these steps to install CrossMark:

2.2.1 Windows:

1. Go to the Start  button, and then from the apps list select Microsoft Store.
2. Visit the Apps or Games tab in Microsoft Store.
3. To search the app, select Search at the end of the row and type 'CrossMark'.
4. Select 'CrossMark', and then select Get.

2.2.2 iOS:

1. From a Home screen, tap **App Store** . To install apps, you must sign in with your Apple ID or create one.

2. Tap **Search** (at the bottom) then enter 'CrossMark'
3. Tap the app.
4. Tap GET then tap INSTALL. If you have a compatible iPhone with Face ID enabled, double-tap the side button and look at the screen to authenticate.
5. If prompted, sign in to the App Store to complete the install.

2.2.3 macOS

1. Open the App Store app . To install apps, you must sign in with your Apple ID or create one.
2. Browse or search for 'CrossMark' in the search field (in left side panel).
3. Click the Get button. If you see the "Open" button instead of a Get button, you have already bought or downloaded that app.
4. If prompted, sign in to the App Store to complete the install.

Once CrossMark application is downloaded and installed, the system settings changes from [system configuration guide](#) are recommended to get best performance score out of CrossMark. These settings are required only for systems using Windows and macOS operating system.

Once system settings have completed, please reboot the system before attempting to run CrossMark.

2.3 CrossMark uninstallation

Follow these steps to uninstall CrossMark:

2.3.1 Windows:

5. Open your Start  menu, scroll down the list of installed applications, and find CrossMark application.
6. Right-click on it, click Uninstall.

2.3.2 iOS:

1. Tap and hold CrossMark app for few seconds, until a context menu open up for the app.
2. Select 'Remove App' from the context menu and click on 'Delete App' from the prompt that appears. Click on 'Delete' again for the next prompt.

2.3.3 macOS:

1. Open the Applications folder from Finder.
2. Find CrossMark application in the Applications folder.
3. Drag the app to the Trash or select the app and choose File > Move to Trash.
4. If you're asked for a username and password, enter the name and password of an administrator account on your Mac. This is probably the name and password you use to log in to your Mac.

3 Running CrossMark

Start CrossMark by clicking on the app from start menu, finder and apps library for Windows, macOS and iOS respectively to launch the main interface as illustrated in Figure 6 below.

CrossMark is an easy to run benchmark application which produces the score in one click of 'Run Benchmark' button. CrossMark is available in free and pro versions. See the [CROSSMARK PRO VERSION](#) section for more details. supports running the benchmark without network connection, viewing of results PDF, submission of results manually and control on automatic submission of results to server. CrossMark pro version may also be launched via command line. See the [AUTOMATED EXECUTION](#) section for more details.

3.1 CrossMark interface

First time when CrossMark is launched, End User License Agreement (EULA) is displayed to the user and prompted for acceptance or cancellation of license agreement as shown in **Error! Reference source not found.**. The application cannot be ran until the EULA is accepted. User can click the Accept button to indicate the acceptance of EULA.

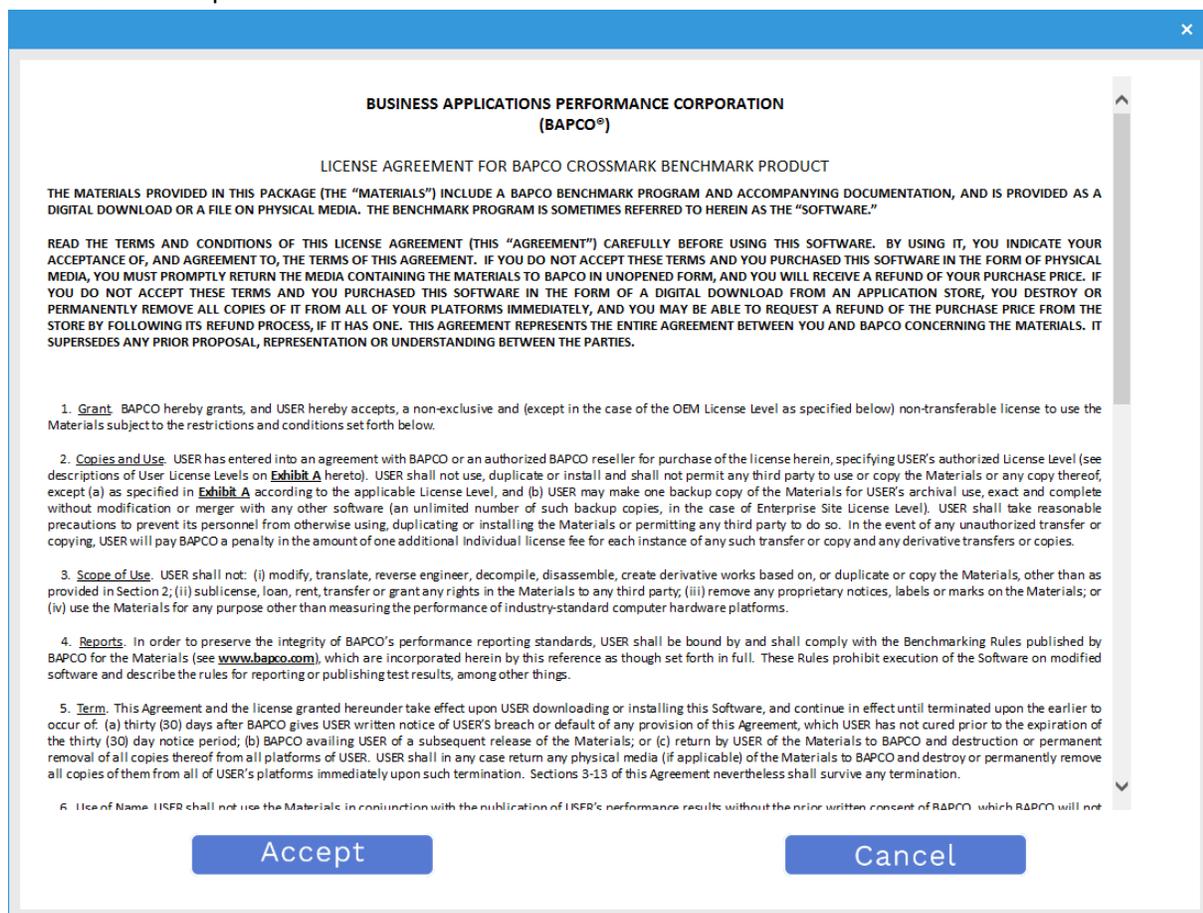


Figure 1: CrossMark EULA screen

CrossMark includes simple user interface, which shows the overall score, scenario scores and chart that represent scores from multiple runs and how it aligns with calibration score. Figure 2 indicates a snapshot of CrossMark when its first launched after new installation.

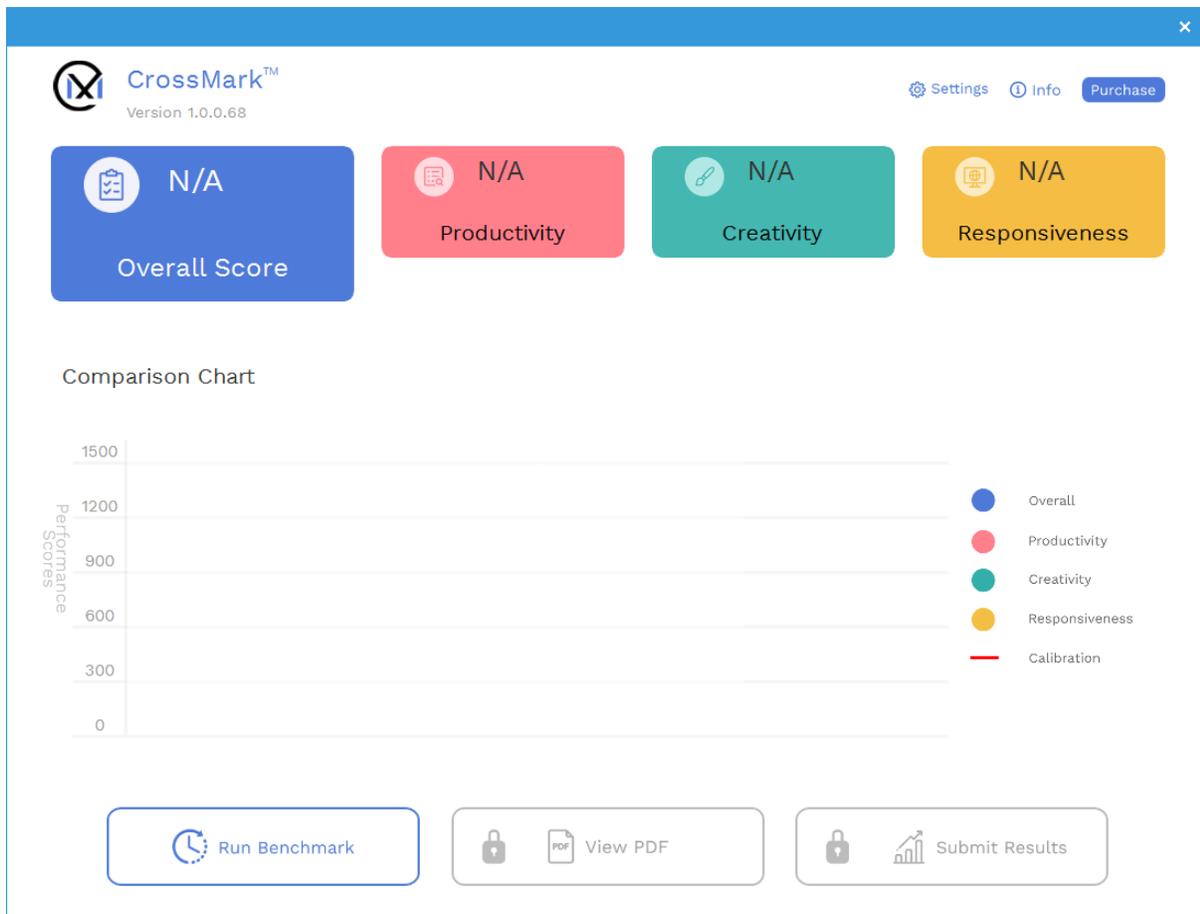


Figure 2: CrossMark main UI free version.

To launch a benchmark run with default configuration just click 'Run Benchmark' button on the UI. The default configuration will do the following:

- Run one iteration of all three scenarios.
 - The project name will be 'Project001' for the first project. Subsequent projects will be named 'Project002', 'Project003', and so on.
- Conditioning run will be executed but will not be part of the performance score calculation.
- Automatic result submission bit will be false in pro version but true and cannot be changed in free version.

Advanced settings can be viewed and modified by clicking the gear icon in the top right corner of the main user interface. See the [BENCHMARK SETTINGS](#) section for more information.

3.2 CrossMark pro version

CrossMark offers In App Purchase for users who want to purchase the pro version of the app. Pro version of the app supports running the benchmark without network connection, viewing of results PDF, submission of results manually and control on automatic submission of results to server. CrossMark pro version may also be launched via command line. See the [AUTOMATED EXECUTION](#) section for more details. Users can purchase the pro version by clicking the ‘Purchase’ button in the dashboard (Figure 2). The ‘Purchase’ button click takes the user through each app store specific steps that mainly include authenticating the user using login credentials and purchase of CrossMark pro version. When the pro version of app is uninstalled and reinstalled, purchase is automatically restored when the app is loaded for the first time. Figure 3 indicates the snapshot of CrossMark Pro UI when its refreshed after purchase of pro version.

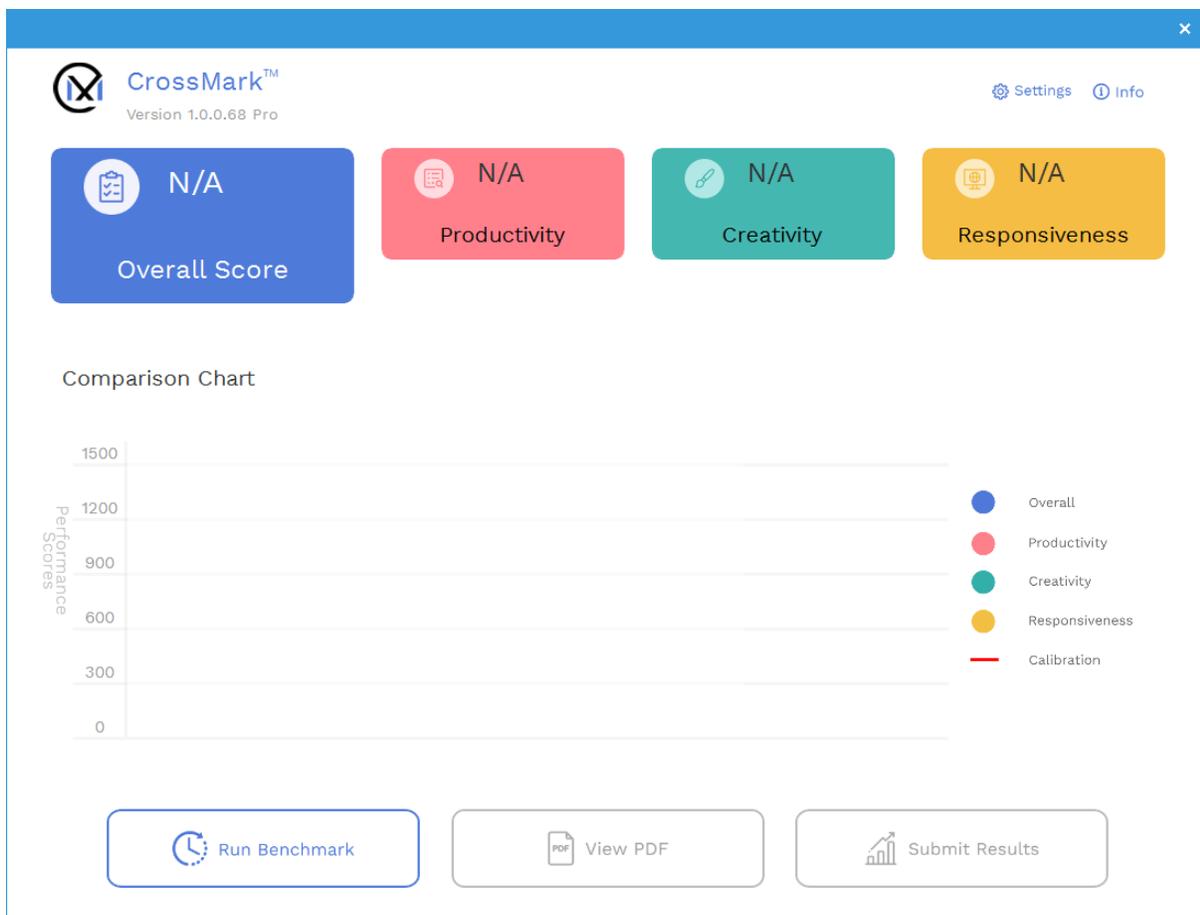


Figure 3: CrossMark main UI pro version.

4 Benchmark settings

Users can access additional benchmark settings by clicking the settings button as indicated by the red arrow in Figure 4. For portrait mode in iPhones, settings button is present in the expansion of hamburger menu.

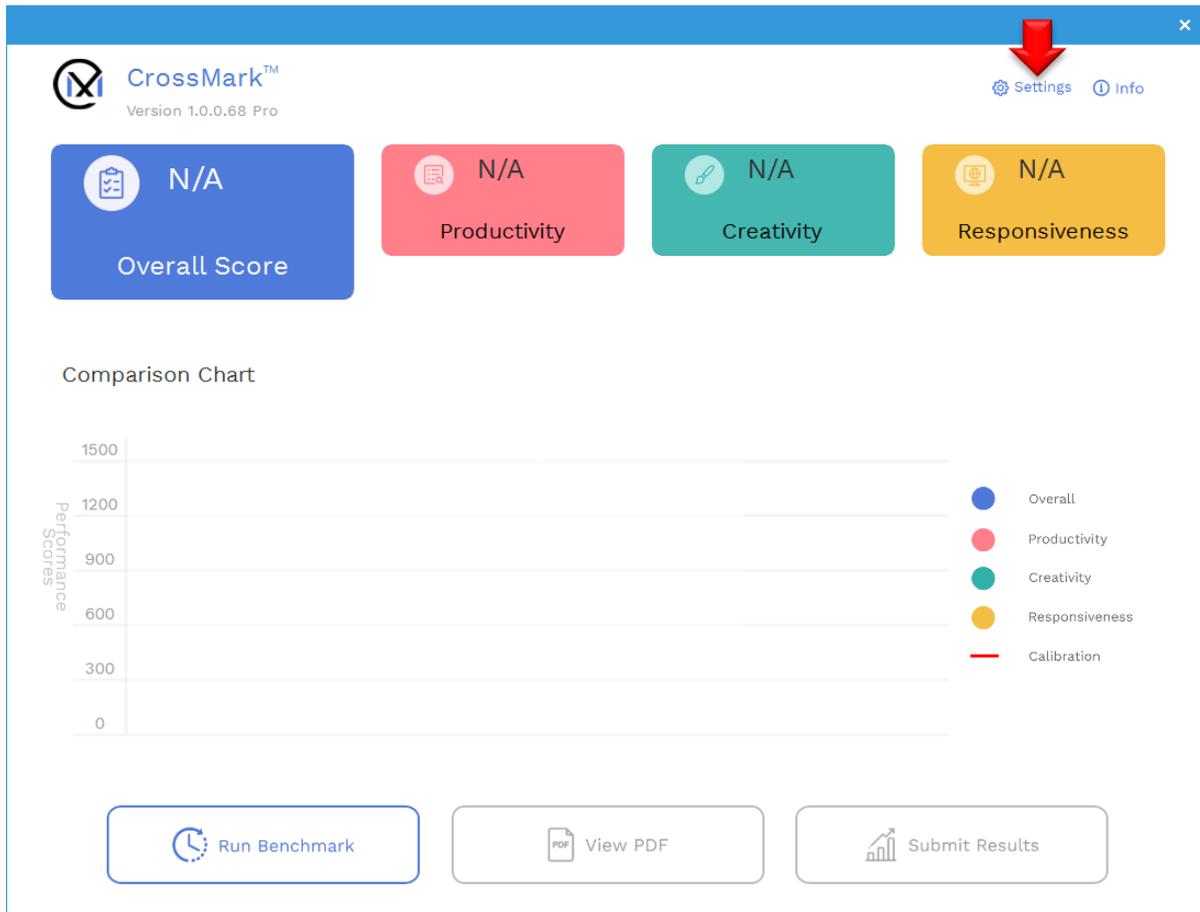


Figure 4: CrossMark settings button

Clicking 'Settings' button will bring up the detailed settings window as shown in Figure 5 below. From this window, users may change the default number of iterations, specify a project name and disable the conditioning run. Users can enter their email address to get the FDR link after submission and get notified on any status change of FDR. Users can also enable auto submission of results to result server if they are running pro version of the app.

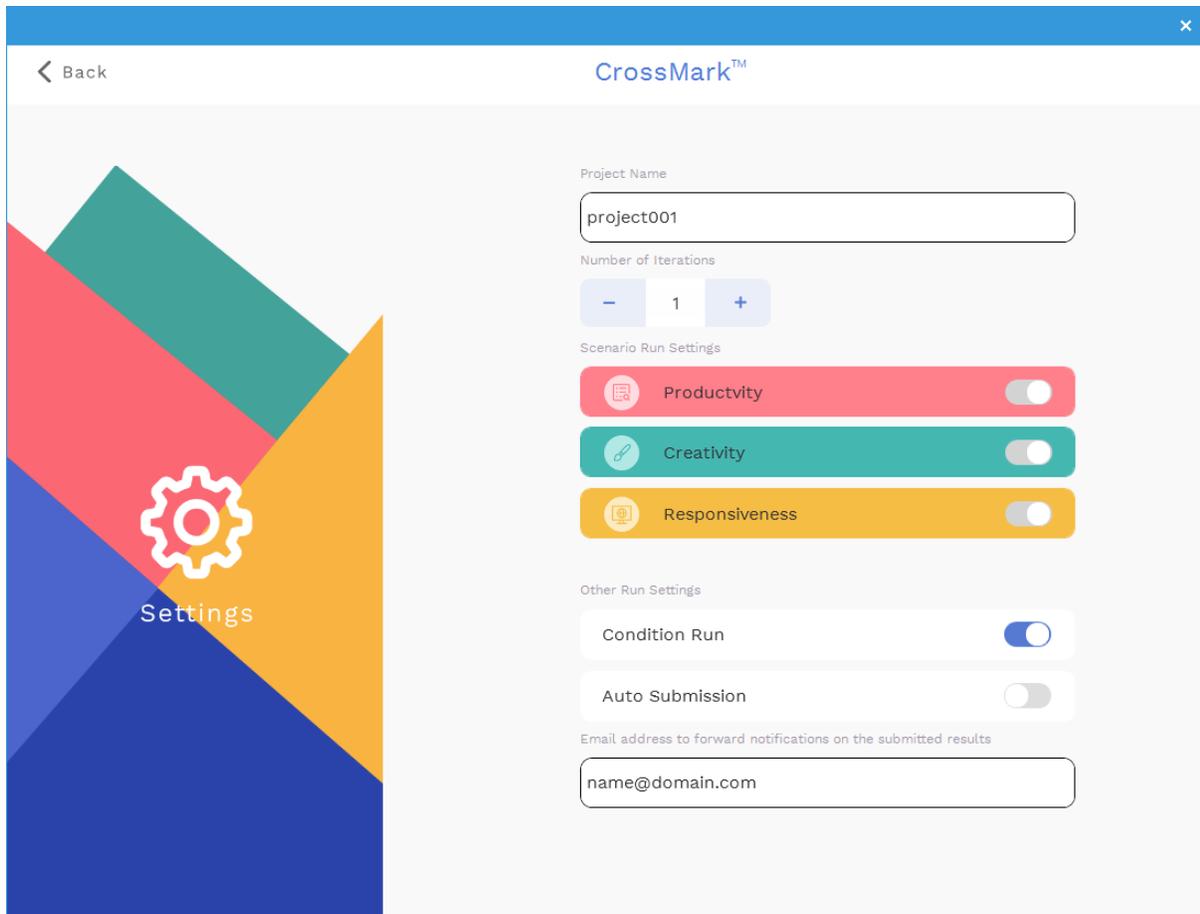


Figure 5: CrossMark settings options on Windows 10

5 Results generation and display

The User interface for pro version of CrossMark will display the results of the most recently run project in the main benchmark windows as shown in figure 6. For free version, the results are displayed in dashboard for the runs that got successfully uploaded to results server. When CrossMark is launched after a new installation, there are no successfully completed runs and hence no results are displayed. A vertical bar chart is also populated on the screen for the last 4 results which are displayed on the main benchmark window.

5.1 Viewing additional results

For pro version of CrossMark, results are saved as a PDF document in the Results folder located on the desktop of the system under test for Windows and macOS and under application files for iOS. Use any default PDF viewer to view the contents of the PDF on the system under test. Each PDF file also includes an embedded .XML attachment which contains additional details about the system under test. A standalone PDF reader such as Adobe Acrobat or Foxit PDF must be used to view the XML, as PDF attachments are not currently supported by Chrome's PDF viewer. Users can also view the PDF of the last run project by clicking 'View PDF' button available in the main window of pro version. PDF cannot be viewed in free version of CrossMark.

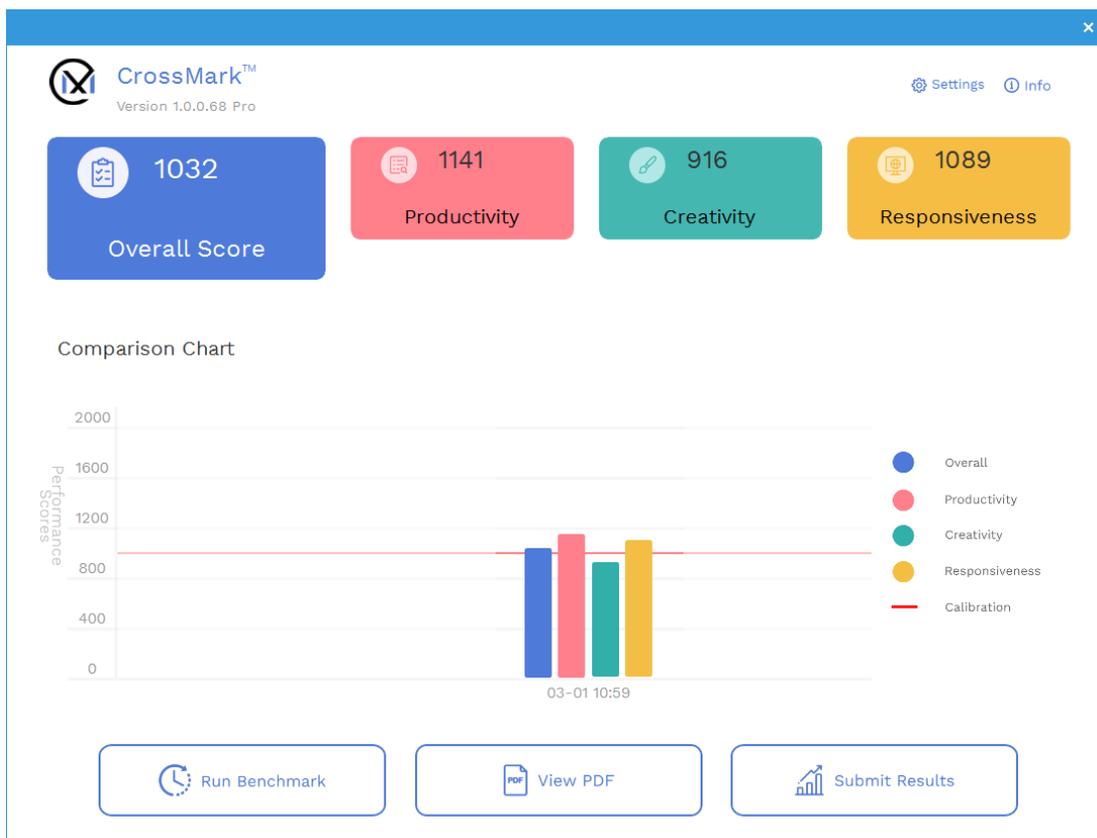


Figure 6: CrossMark main UI with scores.

6 Results submission

BAPCo encourages users to submit the PDF of valid results from CrossMark for publication at results.bapco.com. A result valid for submission will include scores for all three scenarios, plus an overall rating. Users may submit results in the following ways:

6.1 Submit results by web browser

PDF results files may also be submitted through the web browser via drag and drop at results.bapco.com/upload. To upload results by drag and drop do the following steps:

- Locate the PDF files to be submitted.
- Navigate to results.bapco.com and click the 'Submit results' option in the menu on the left of the web page.
- Complete the information (Name, company, email address, and configuration notes, if desired).
- Drag and drop the files on to the page, or click 'Add files' and browse to the folder containing the PDFs for upload. Click 'Start upload'.
- An email will be sent to the provided email address with a link to view the status of the submission. Results will take up to 10 days to be publicly viewable.

6.2 Submit from CrossMark

- In CrossMark pro version, users can control the submission of results by enabling/disabling the 'Auto submission' setting in settings page of CrossMark. Enabling the switch indicates automatic submission of results after a valid run when a proper Wi-Fi connectivity is provided. When the 'Auto submission' switch is disabled, users choose to submit the results manually. By default, 'Auto submission' switch is disabled in Pro version.
- To manually submit the most recent FDR, click the 'Submit Results' button on the CrossMark main window to navigate to submission form window.
- Fill in the submission form dialog and click submit.
- Note: If there is no FDR present in the submission form window, no information will be sent to BAPCo.
- Note: If the Notes field in submission form is filled, that marks the FDR as modified on submission.
- The submission page indicates whether the submission was accepted or failed and displays the error message if submission resulted in failure.
- In CrossMark free version, the valid results are automatically submitted for publication in result server after a valid run. By default, 'Auto submission' switch is always enabled in free version and cannot be disabled. A dialog box pops up with an error message in the CrossMark main window if submission resulted in failure due to any reason.

- Once the result is manually or automatically submitted from the application, 'Submit Results' button changes to 'View Online Results' button (Figure 7). Users can view the last submitted results in the results server by clicking the 'View Online Results' button.
- The 'View Online Results' button is tied to the chart present on the dashboard. Users can view the scores of last 4 results displayed on the main screen and online FDR linked with each chart by clicking on each of it.



Figure 7: CrossMark View Online Results button

7 System Configuration Guide

The system configuration settings are recommended to be made before running CrossMark to obtain repeatable scores and minimize the occurrence of errors on windows 10 and macOS platforms. When testing CrossMark on notebook systems/phones/tablets, please be sure the system or device is plugged into AC power for best results. This section gives an overview of the required settings followed by the steps to make the required modification in system settings.

Note: Some of these settings is via registry editor. Here is the [link](#) below to back up your current setting in the registry editor. This shall help to restore the original setting back by importing them after test is run for system to return to original state

7.1.1 Required settings

Make configuration changes that are required for the benchmark to run.

7.1.2 Disable User Account Control (UAC)

Disables User Account Control to prevent Administrator elevation prompts from appearing during benchmark runs. The system must be rebooted to apply this change.

7.1.3 Disable Low Battery Actions

Prevents the system from shutting down or from posting a warning when the battery reaches the low level.

7.1.4 Disable Windows Update

Disables the windows update service.

7.1.5 Disable WinSAT service

Disables the WinSAT service

7.1.6 Disable Windows Search

Disables windows search service.

7.1.7 Disable Diagnostic policy service

Disables Diagnostic policy service.

7.1.8 Disable SysMain service

Disables SysMain service.

7.1.9 Create BAPCo Power Scheme

Creates a new power scheme named "BAPCo CrossMark" based on the system's currently active power scheme. If applied, all subsequent power profile configuration changes will be applied to the newly created power scheme. If this option is not enabled, all power profile configuration changes will be applied to the currently active power scheme.

7.1.10 Set Power Plan Type to "High Performance"

Sets the "Power Plan Type" option (sometimes referred to as "Power Plan Personality") of the active power scheme to "High Performance". This setting tags the active power plan with an overall personality that favors performance over energy savings. Drivers and applications may query this setting to determine their respective performance vs energy savings behavior. This option may be used whether or not the "Create BAPCo Power Scheme" option is checked. If "Create BAPCo Power Scheme" is not enabled, "Set Power Plan Type" will be applied to the currently active power scheme.

7.1.11 Set CPU High Performance

Sets the minimum and maximum value for CPU performance state to 100% to prevent CPU throttling on both AC and DC power.

7.1.12 Disable Windows Defender

Sets Windows Defender to disabled. If Tamper Protection is turned on, this setting can't be altered.

7.1.13 Disable Tamper protection

Disables tamper protection to allow the windows defender to be disabled.

7.1.14 Disable Hard Disk Timeout

Prevents the hard disk from going to sleep

7.1.15 Ignore Laptop Lid Close

Prevents the system from going to sleep if the lid is closed during a benchmark run

7.2 Steps for modifying each setting

7.2.1.1 Windows 10

7.2.1.1.1 Adjust the power and performance settings in Windows 10

- Click Windows 10 start menu icon  and select Settings  > System > Power & Sleep.
- Click the 'Additional power settings' option found under 'Related settings' on right side of the window.
- Click the 'Create a power plan' option as shown in (Figure 8).

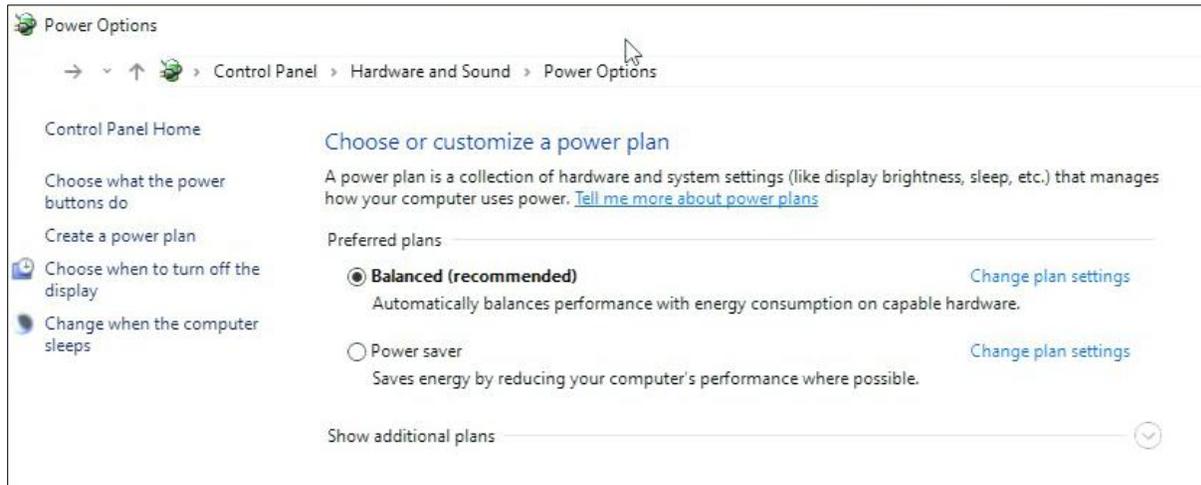


Figure 8: Power options window

- The Balanced is selected by default. To use a power plan other than the balanced power plan, select it before proceeding. Otherwise, under plan name, type 'CrossMark' as the name to the new power scheme and click 'Next' button (Figure 9).

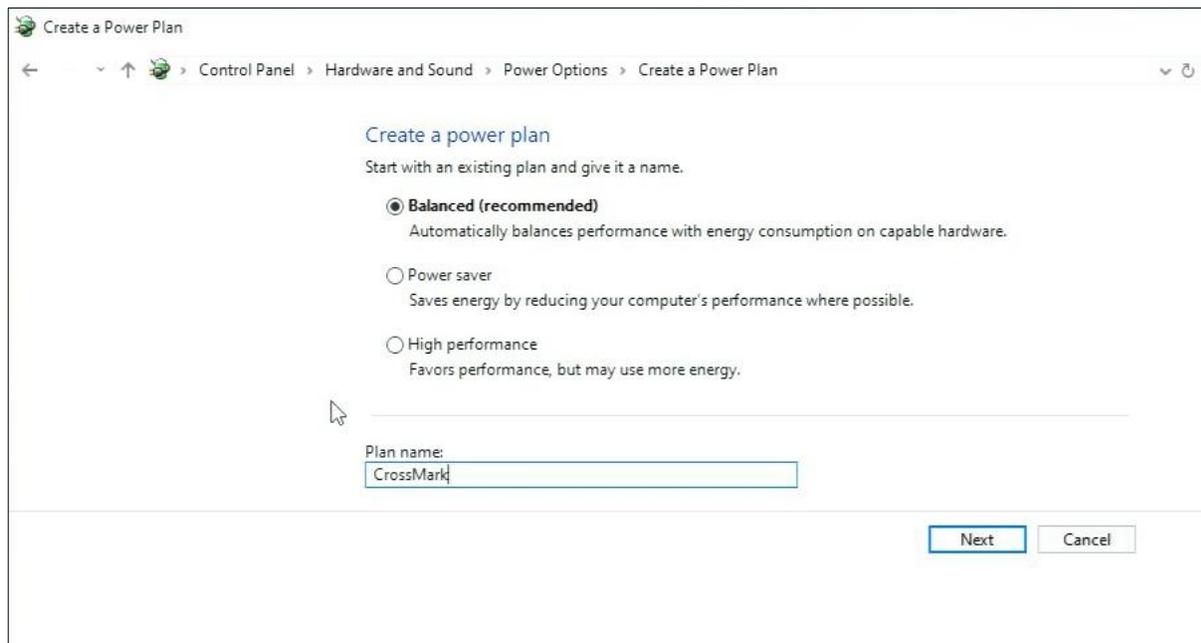


Figure 9: Name the power plan

- e) Keep the default selection for the below options and click the 'Create' button to create the power scheme named CrossMark (Figure 10).
- Turn off the display
 - Put the computer to sleep

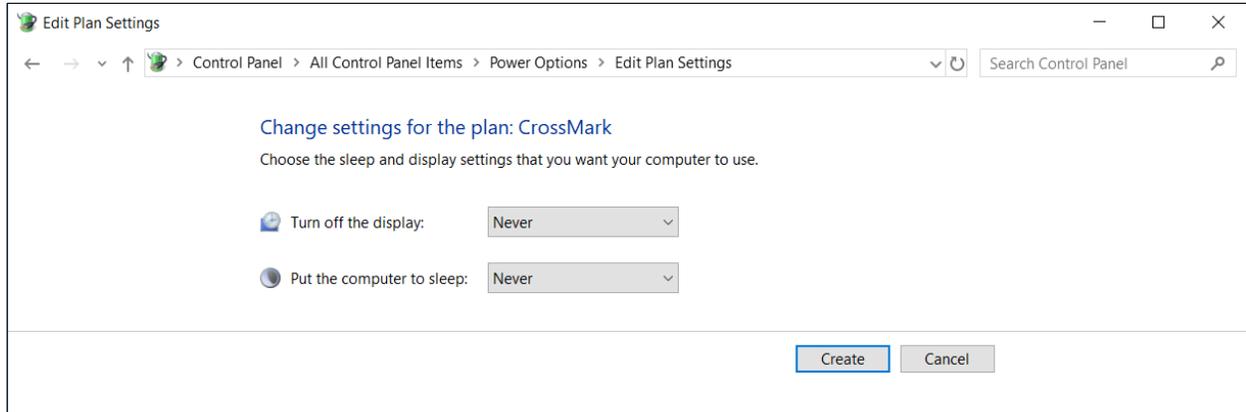


Figure 10: Create the power plan

- f) Click on 'Change plan settings' link to the right of the newly created CrossMark power plan which is the active plan now.
- g) Click 'Change advanced power settings' to open the advanced settings dialog and configure the follow settings (Figure 11). For notebooks, configure the 'Plugged in' setting. The 'On Battery' setting may be ignored

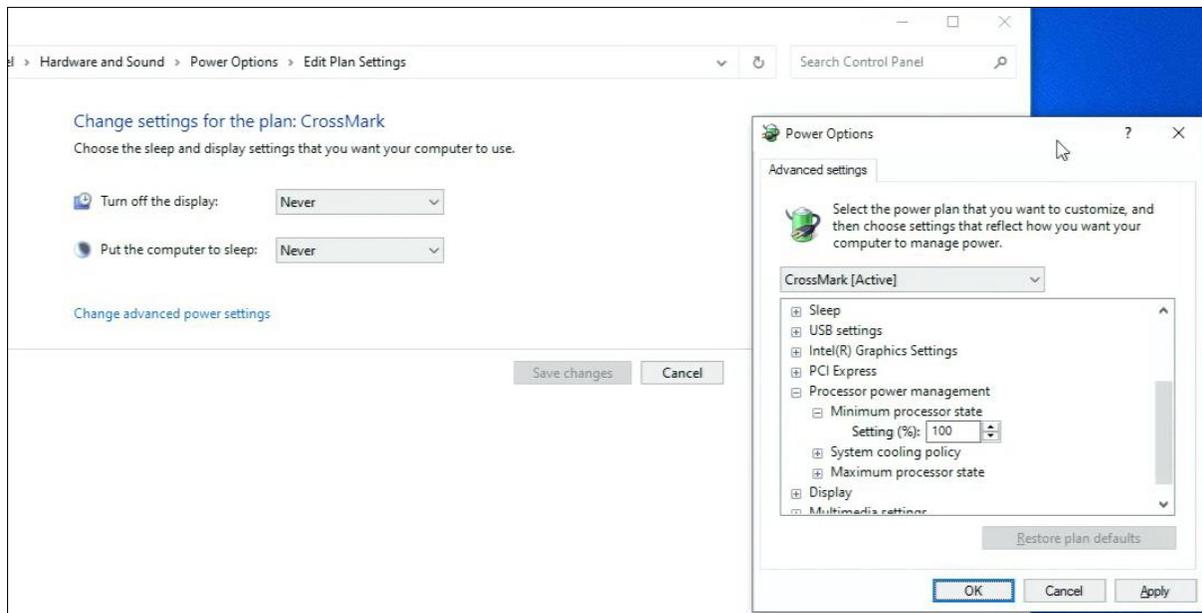


Figure 11: Advanced power settings

- Processor power management > Minimum processor state > set to 100%
- Battery > Critical battery level > set to 0% (notebooks only)
- Battery > Critical battery action > set to 'Do Nothing' (notebooks only)
- Battery > Low battery level > set to 0% (notebooks only)

- Battery > Low battery notification > set to 'Off' (notebooks only)
 - Battery > Low battery action > set to 'Do Nothing' (notebooks only)
 - Battery > Reserve battery level > set to 0% (notebooks only)
 - Power buttons and lid > Lid close action > set to 'Do Nothing' (notebooks only)
 - Power buttons and lid > Power button action > set to 'Do Nothing'
 - Power buttons and lid > Sleep button action > set to 'Do Nothing'
 - Hard disk > Turn off hard disk after > set to 'Never'
- h) Click 'Apply' to save the changes, then click 'OK' to close the advanced settings dialog.
- i) Close the power plan settings window.

7.2.1.1.2 Set Power Plan Type to "High Performance"

- a) To set the power plan personality to High performance, hit Windows+X and choose the 'Windows PowerShell (Admin)' option to open PowerShell with administrative privileges. At the prompt, type (or copy and paste) the following command and then hit Enter (Figure 12):
- powercfg.exe -SETACVALUEINDEX SCHEME_CURRENT SUB_NONE 245d8541-3943-4422-b025-13a784f679b7 1**
- b) Close the PowerShell window.



```
Administrator: Windows PowerShell
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

PS C:\WINDOWS\system32> powercfg.exe -SETACVALUEINDEX SCHEME_CURRENT SUB_NONE 245d8541-3943-4422-b025-13a784f679b7 1
PS C:\WINDOWS\system32>
```

Figure 12: Power plan personality settings

7.2.1.1.3 Disable WinSAT

- a) Go to Windows start  and type 'task scheduler' in the search field and click 'Task Scheduler' in the search results.
- b) Browse to Task Scheduler Library > Microsoft > Windows > Maintenance.

- c) Right click on WinSAT option from the right-side pane, select 'Disable' and close the window (Figure 13).

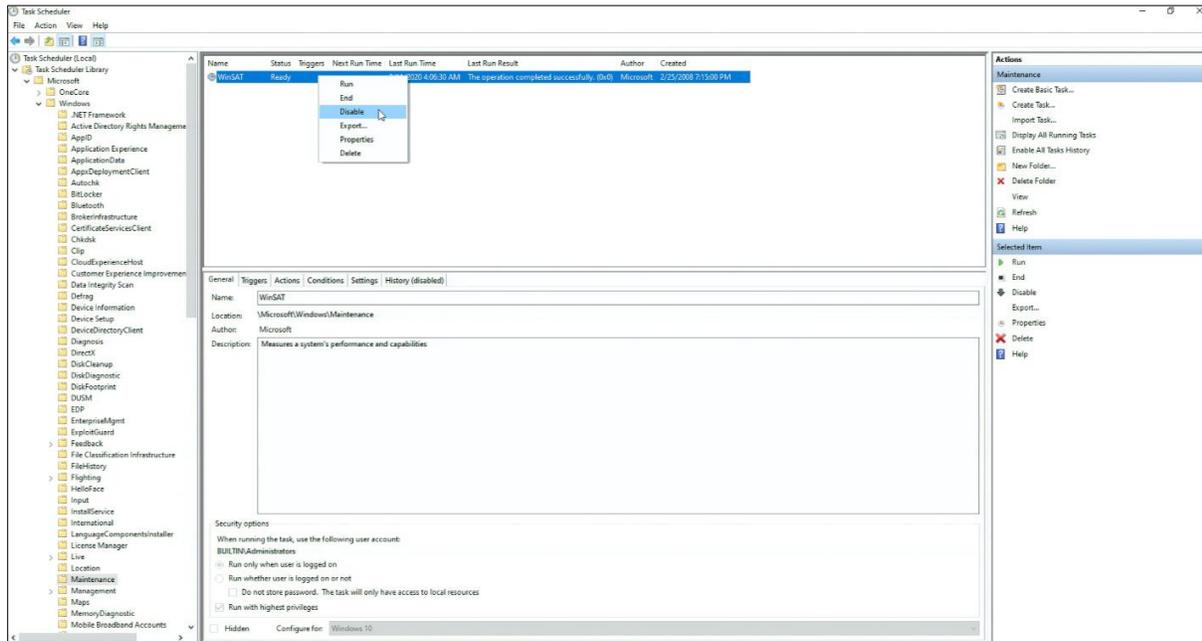


Figure 13: Task Scheduler to disable WinSAT

7.2.1.1.4 Disable all Windows updates

- a) Go to Windows start  and select Settings  > Update & Security > Windows Update

- b) Select 'Advanced options' from the windows on the right and turn off all the options as shown in Figure 14 below.

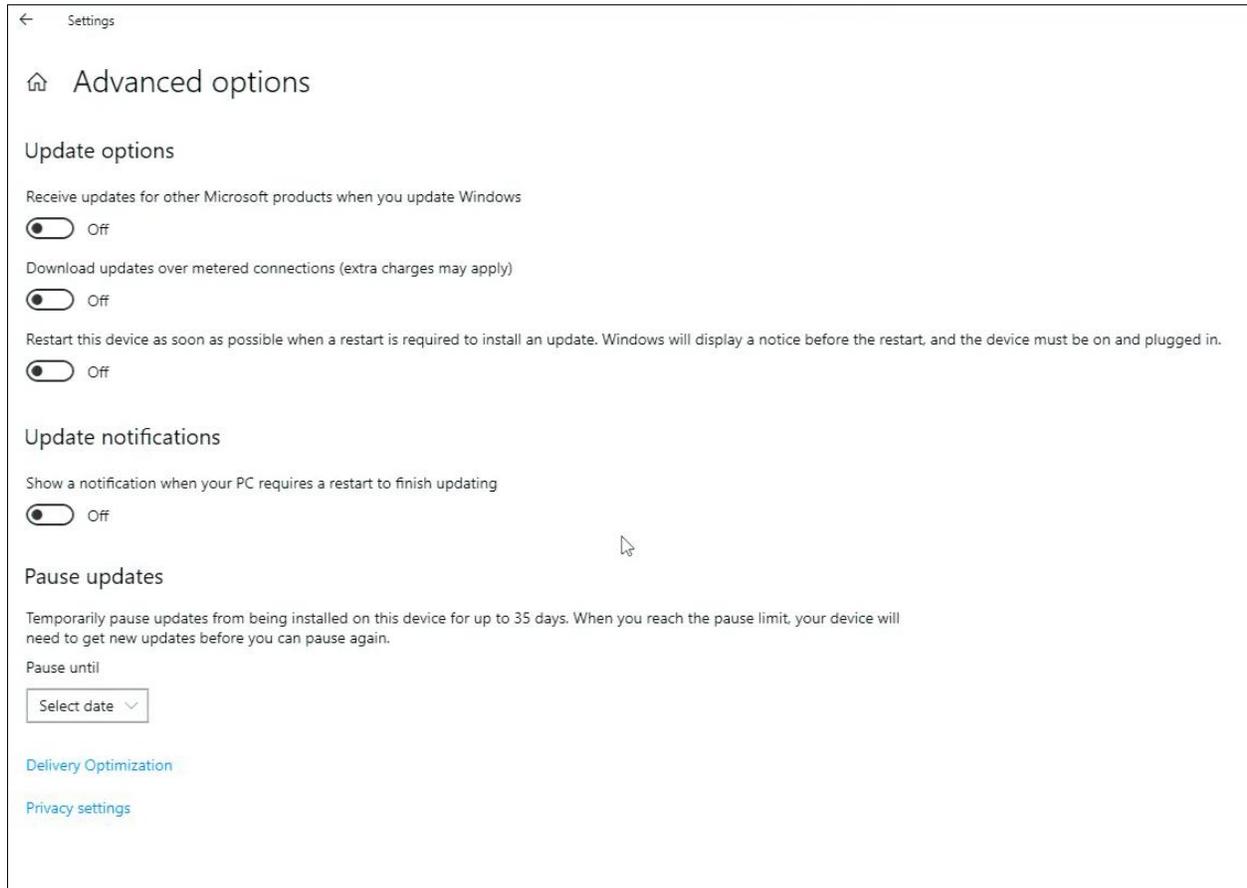


Figure 14: Settings options to disable Windows update

7.2.1.1.5 Disable tamper protection

- Go to Windows start  and select Settings  > Update & Security > Windows Security.
- Switch to Virus and Threat Protection. Select Manage Settings.
- Scroll down to find Tamper Protection and toggle to 'Off'.
- Close the Windows Security settings window

7.2.1.1.6 Disable Windows Search, Diagnostic Policy Service and SysMain services

- Go to Windows start  and type 'services' in the search field and click 'Services' in the search results.
- Find the 'Diagnostic policy service' from the list. Right click on the service and click 'Stop'.
- Double click on the service and set 'Startup type' option to 'Disabled'. Click Apply to save the changes and then click 'OK' to return to Service window.
- Find 'Windows Search' from the list. Right click on the service and click 'Stop'.
- Double click on the service and set 'Startup type' option to 'Disabled'. Click Apply to save the changes and then click 'OK' to return to Service window.
- Find 'SysMain' from the list. Right-click on the service and select Stop (Figure 15). If you're running an older version of Windows, right-click on the SuperFetch service and select Stop.

- g) Double click on the service and set 'Startup type' option to 'Disabled' (Figure 16). Click Apply to save the changes and then click 'OK' to return to Service window. Click the 'X' close button to close the window.

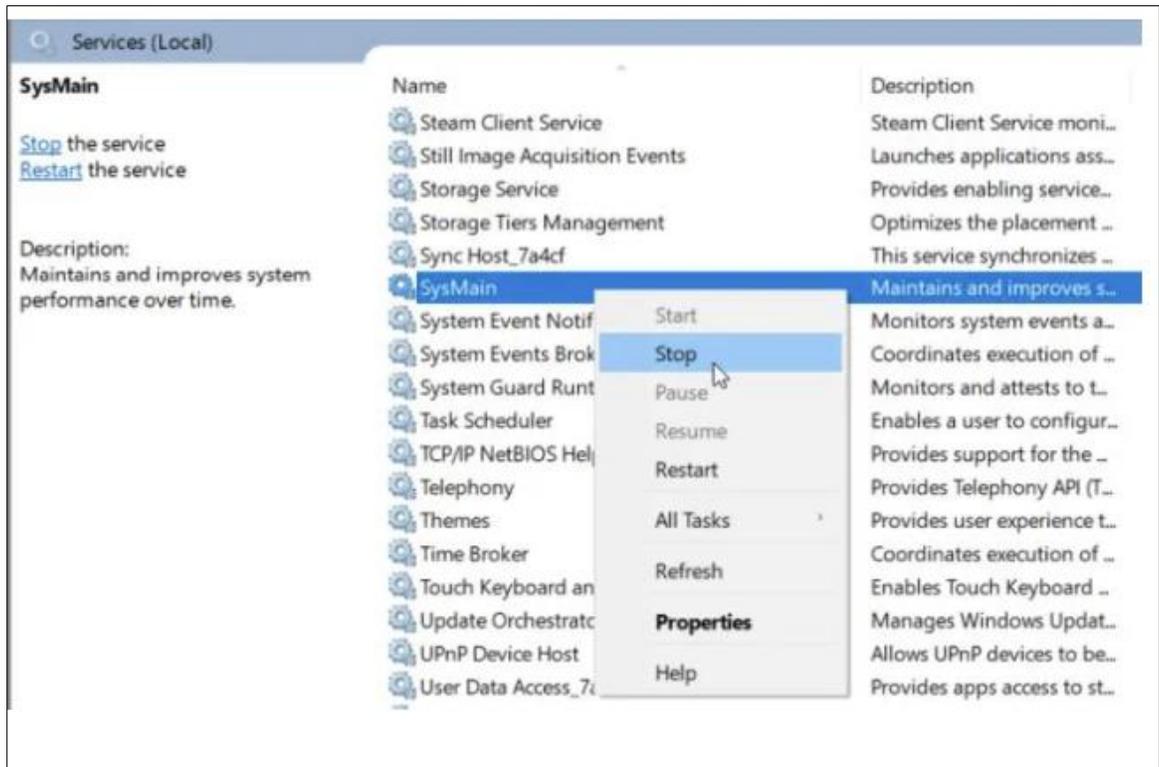


Figure 15: Services option to stop SysMain service

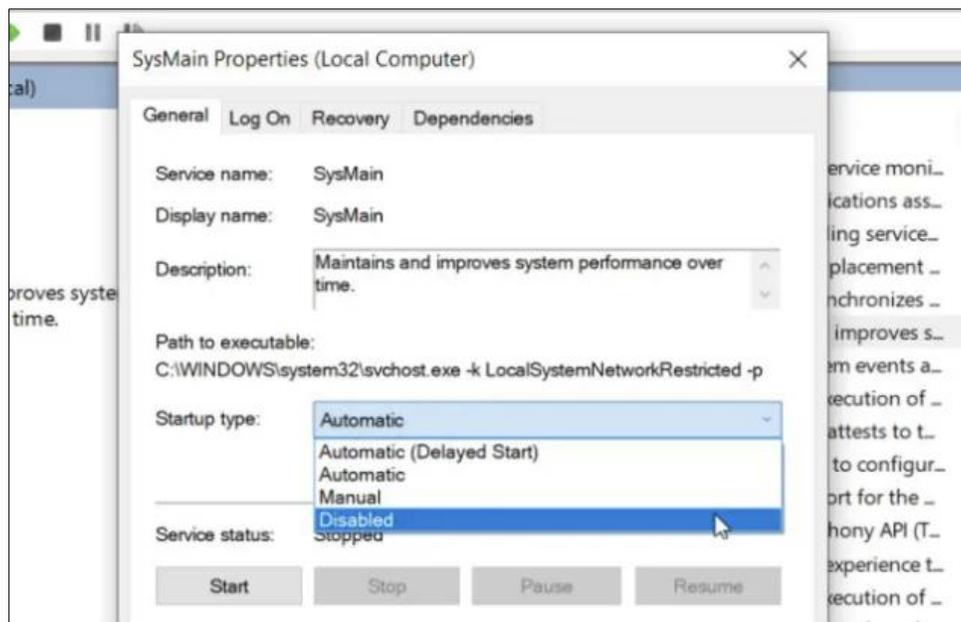


Figure 16: Services option to disable SysMain service

7.2.1.1.7 Disable windows defender

7.2.1.1.7.1 Method 1 - Using Group policy editor (Recommended)

- Go to Windows start  and type 'group policy' in the search field and click 'Edit group policy' in the search results. If 'Edit group policy' is not present in the search result, follow the steps from 'Using Registry editor'
- Browse to Computer Configuration > Administrative Templates > Windows Components > Microsoft Defender Antivirus. On the right pane of the Local Group Policy Editor window, double-click the 'Turn off Microsoft Defender Antivirus' policy (Figure 17).
- Select Enabled and click Apply. Click OK to save the setting

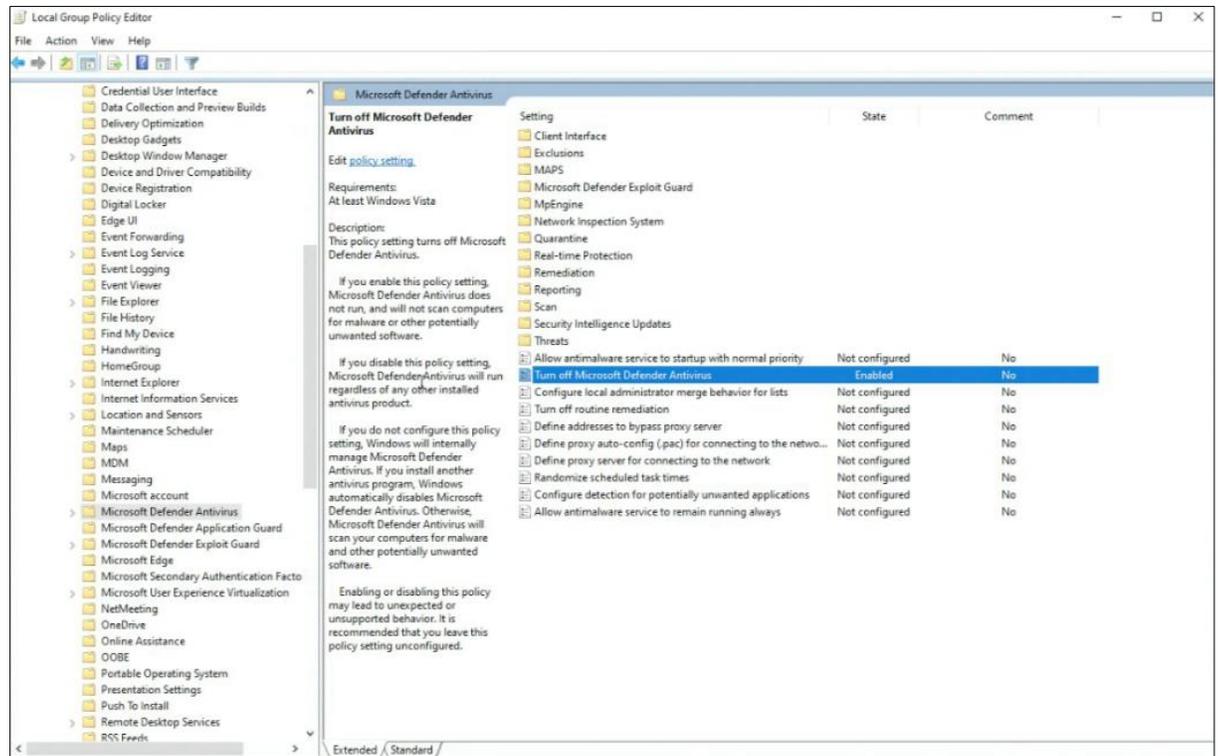


Figure 17: Local Group Policy Editor options to disable windows defender

7.2.1.1.7.2 Method 2 - Using Registry editor

- Go to Windows start  and type 'regedit' in the search field and click 'Registry Editor' in the search results.
- Go to HKEY_LOCAL_MACHINE > SOFTWARE > Policies > Microsoft > Windows Defender. Right click on 'Windows Defender'. Click New > Key > DWORD (32-bit) Value. Type 'DisableAntiSpyware' and hit Enter on keyboard.
- Double click on the 'DisableAntiSpyware' DWORD just created and type 1 in the value data field. Click OK. (Figure 18)

7.2.1.1.8 Additional settings required only for windows version: Windows 10 2004.19041.450 and above to globally turn off security setting including defender.

Windows security center is an additional setting that is required to be disabled for windows version 2004.19041.450 and above. Below are the steps to disable windows security center using regedit.

- a) Go to Windows start  and type 'regedit' in the search field and click 'Registry Editor' in the search results.
- b) Go to HKEY_LOCAL_MACHINE > SYSTEM > CurrentControlSet > Services > SecurityHealthService. Double click on the 'Start' DWORD and type 4 in the value data field. Click OK.
- c) Go to HKEY_LOCAL_MACHINE > SYSTEM > CurrentControlSet > Services > wscsvc. Double click on the 'Start' DWORD and type 4 in the value data field. Click OK. Reboot the machine.

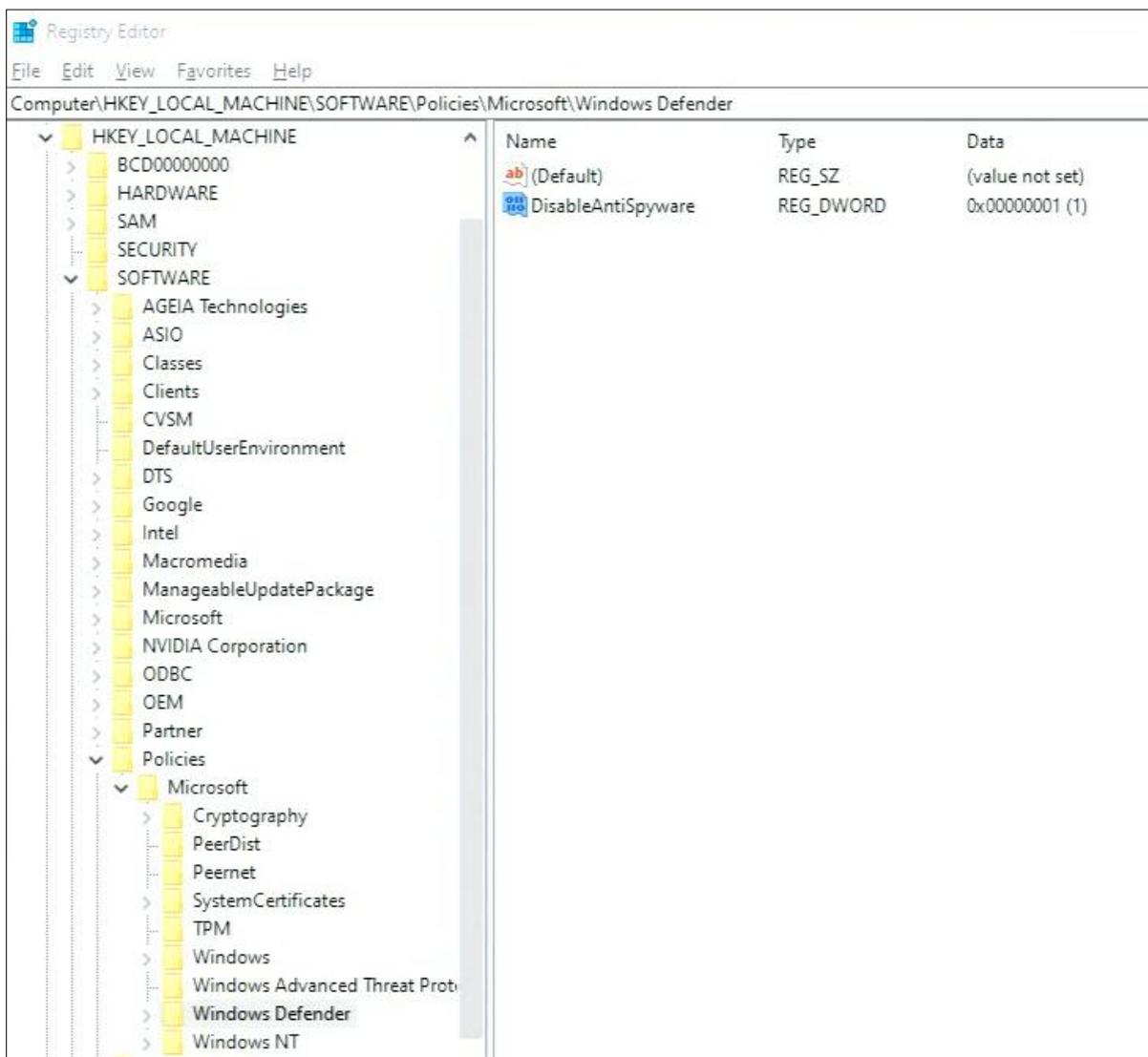


Figure 18: Disable windows defender using Registry editor

7.2.1.1.9 Disable User Account Control Settings

7.2.1.1.9.1 Method 1 - Using Group policy editor (Recommended)

- a) Go to Windows start  and type 'group policy' in the search field and click 'Edit group policy' in the search results. If 'Edit group policy' is not present in the search result, follow the steps from 'Using Registry editor'
- b) Browse to Computer Configuration > Windows Settings > Security Settings > Local Policies > Security Options. On the right pane of the Local Group Policy Editor window, double-click the setting: 'User Account Control: Behavior of the elevation prompt for administrators in Admin Approval Mode' policy (Figure 19).
- c) In the drop down menu, select 'Elevate without prompting' and click apply
- d) Click OK to save the setting and return to the Group Policy editor window.
- e) In Group Policy Editor window, locate the item 'User Account Control: Run all administrators in Admin Approval Mode' and double click it
- f) Select 'Disabled' and click apply
- g) Click OK to return to the Group Policy editor window.
- h) Close the Group Policy editor windows
- i) Reboot the machine for all the above changes to take effect.

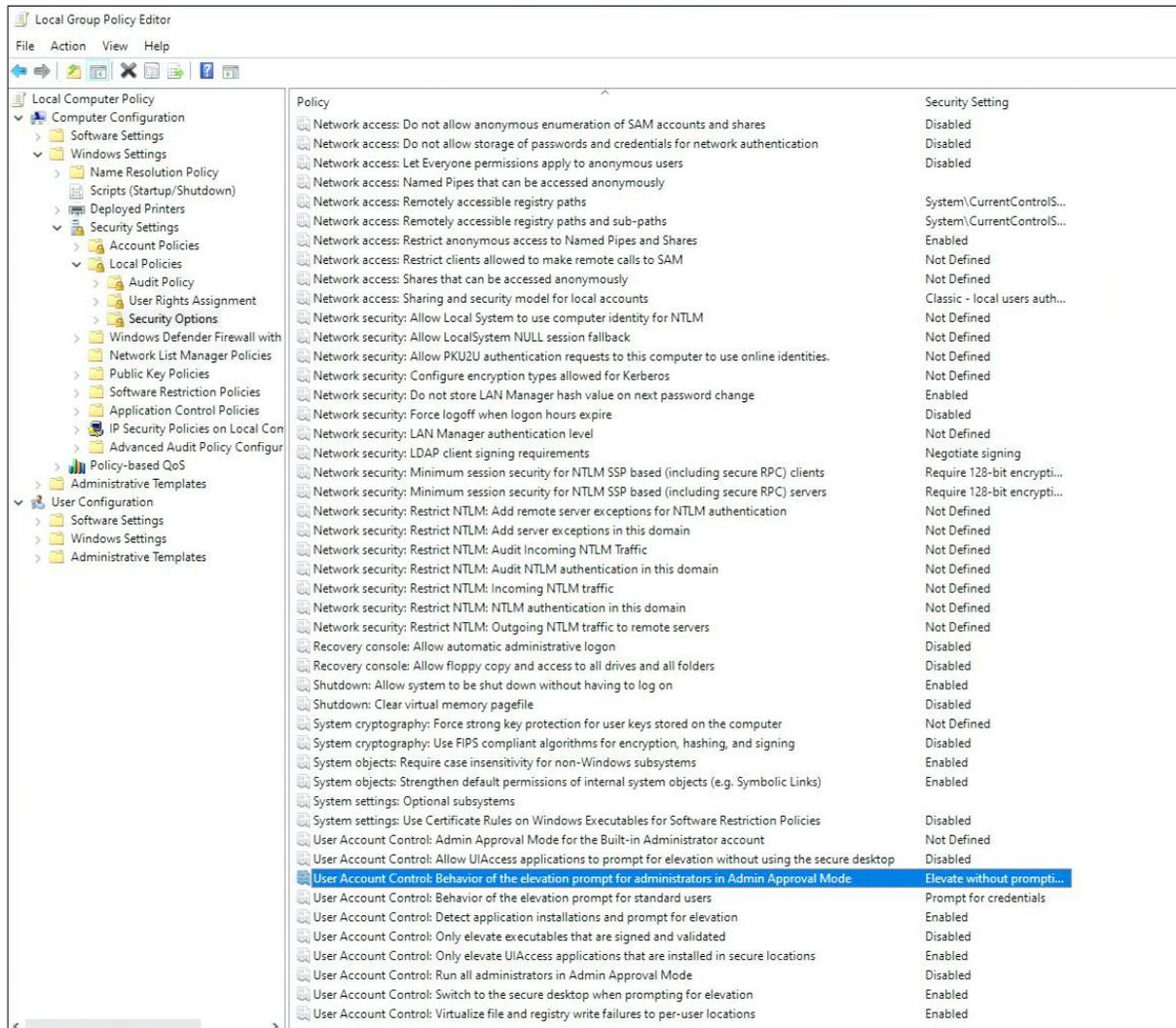


Figure 19: Disable UAC settings using Local group policy editor

7.2.1.1.9.2 Method 2 - Using Registry editor

- Go to Windows start  and type 'regedit' in the search field and click 'Registry Editor' in the search results.
- Go to HKEY_LOCAL_MACHINE > SOFTWARE > Microsoft > Windows > CurrentVersion > Policies > System.
- Double click on the 'EnableLUA' DWORD and type 0 in the value data field. Click OK.
- Double click on the 'ConsentPromptBehaviorAdmin' DWORD and type 0 in the value data field. Click OK. (Figure 20)
- Reboot the machine for all the above changes to take effect.

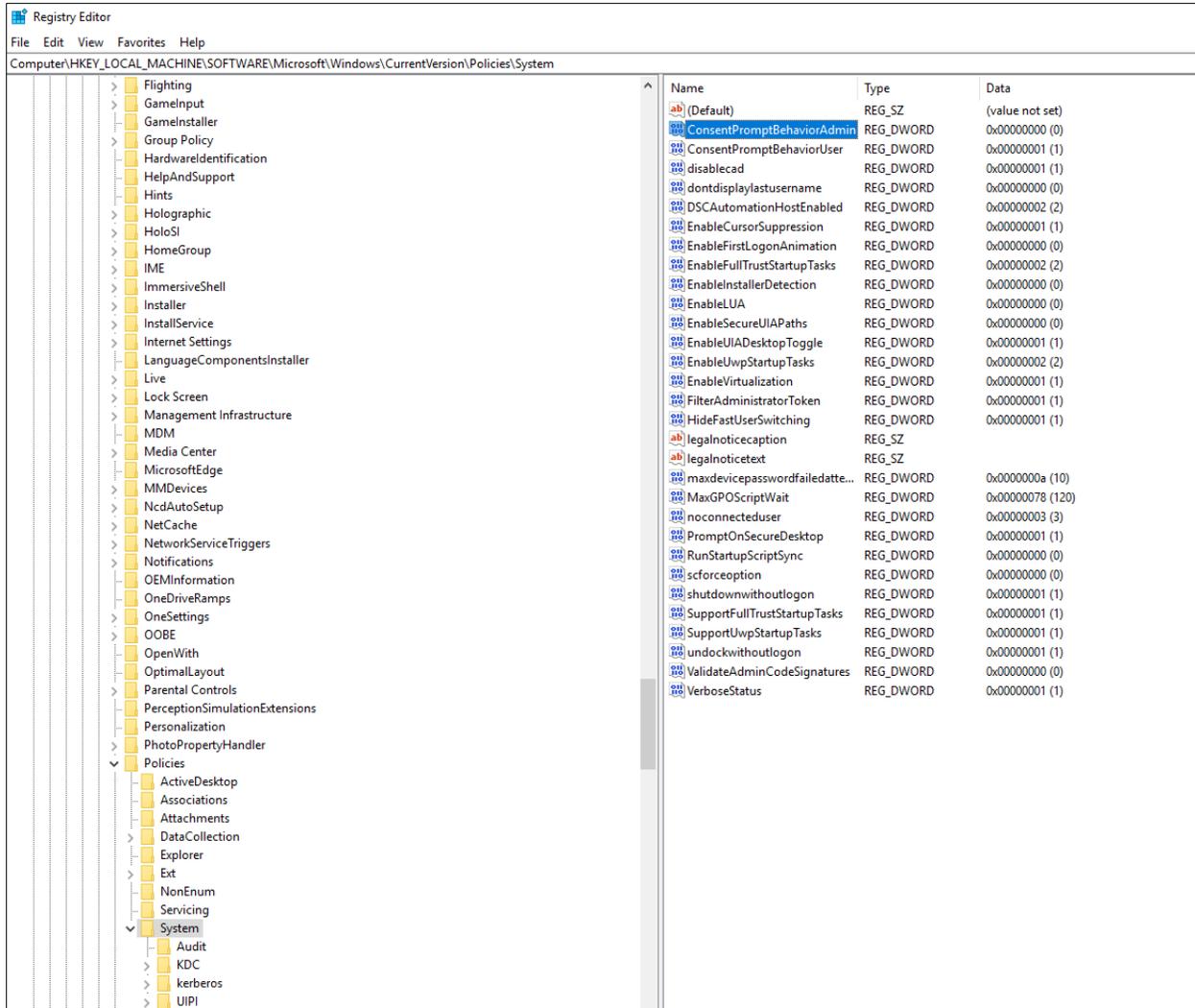


Figure 20: Disable UAC settings using Registry Editor

7.2.1.1.10 Backup Windows Registry

- Go to Windows start  and type 'regedit' in the search field and click 'Registry Editor' in the search results.
- In the Registry Editor window, right click **Computer** at the top left-hand side, and click **Export** (Figure 21).
- Give the backup file a name and save it in a flash drive or cloud storage

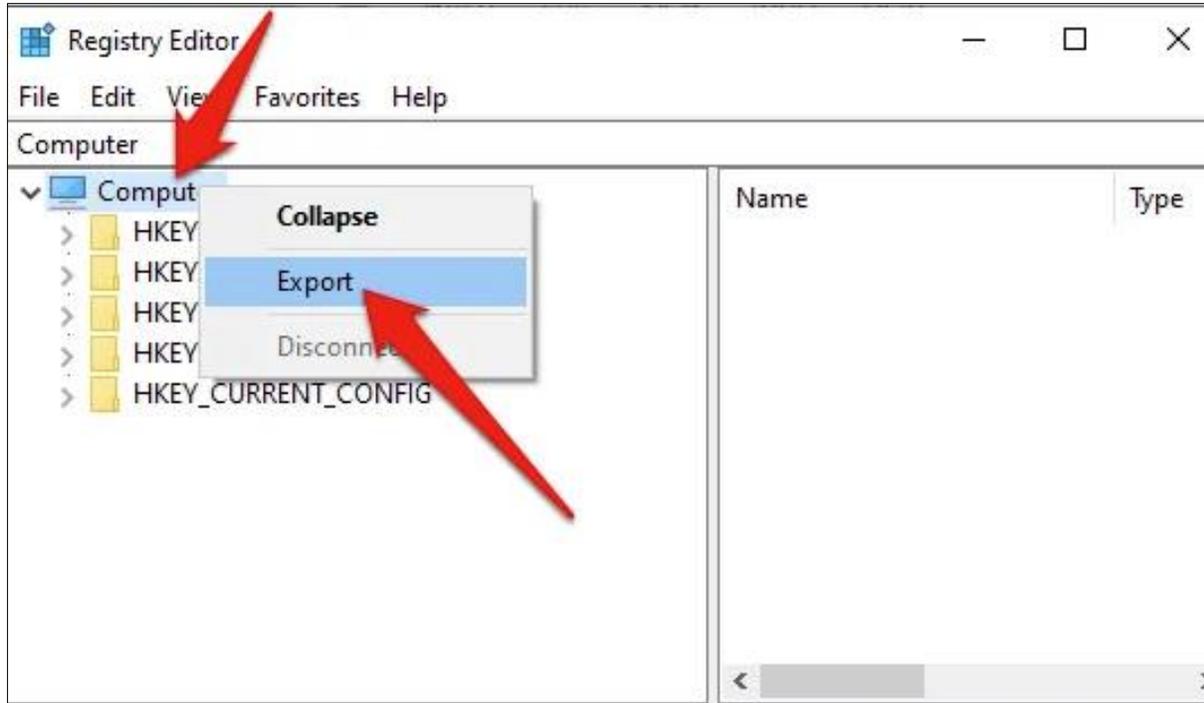


Figure 21: Back up windows default registry

7.2.1.2 MacOS

7.2.1.2.1 Adjust the performance and sleep settings for MacOS

- a) On your Mac, choose Apple menu  > System Preferences, then click Energy Saver. Set 'Turn display off after' slider to 'Never'. Set the other checkboxes as shown in Figure 22 below.
Note: The setting for Automatic graphics switching will only appear on Macs which are equipped with discrete graphics cards.

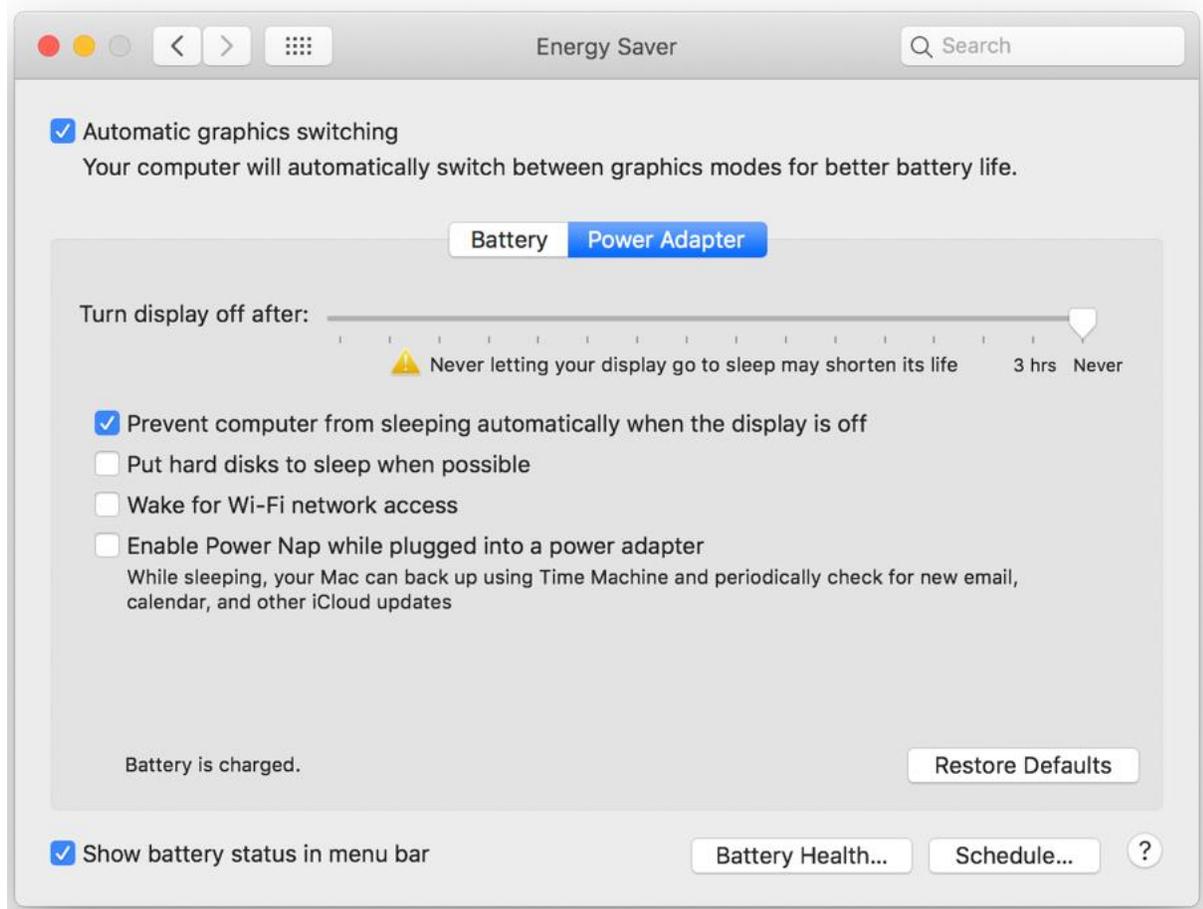


Figure 22: MacOS Energy Saver settings

8 Automated execution

CrossMark also supports execution from the command line for Windows and macOS. Supported command line parameters are provided in the list below. The CrossMark GUI will not launch if there are syntax errors in the command line text. Instead a 'CrossMarkAutoRun.log.txt' file opens to indicate the error in command line. When command line parameters are not passed CrossMark GUI is launched for manual run.

-l or --license	Accepts the EULA license when launched for the first time after new installation.
-p or --project <project_name>	Specifies the name of the project.
-i or --iterations <iteration_number>	Specifies the number of iterations to run. This must be greater than 0 and less than 100. The default value is 1.
-nc or --noconditioning	Turns off system conditioning run. Default is system conditioning turned on.
-as or --autosubmission <email_address>	Enables automatic submission of results to BAPCo results server after a valid benchmark run. Default setting is auto submission off. User email address is an optional argument passed for auto submission. Email address is used to send notifications on submitted results to user. Default value for email address is null, if the benchmark is not able to get the user email address from the system. Otherwise, the collected email address is set as the default value.
-ad or --automationdirectory <directory_path>	Gets the directory location for post run batch scripts.
-o or --output <directory_path>	Get an output directory location to copy FDR and database to the user provided output folder.
-s or --shutdown	Shuts down the system after automation is completed. Only supported in windows.
-h or --help	Displays the help screen.

The example command below will launch CrossMark, accepts EULA license, create a project called 'test_project' and runs the benchmark four times.

Example Windows: `CrossMark -p test_project -i 4 -l`

Example in Mac: `open -a CrossMark --args -p test_project -i 4 -l`

9 Automated data collection

CrossMark allows the user to execute scripts to aid in the processing of results at the conclusion of a run. User can create batch script callbacks named as ProcessResults.bat and ProcessError.bat to handle success and error runs respectively.

- ProcessResults.bat is executed at the conclusion of a successful run of CrossMark. Users can add commands to this script to copy results to a new location or call additional commands specific to their environment.
- ProcessError.bat is executed if CrossMark exits with an error condition. Insert commands to this script to do things such as copying error logs to a new location or call other commands for post processing errors.

10 Tips for Usage

This subsection describes the behavior of CrossMark during the execution of a benchmark run.

10.1 Best Practices

In order to obtain reliable, reproducible results, BAPCo recommends using the default settings in the CrossMark interface. To run with the default settings, just launch CrossMark and click 'Run Benchmark'. The default settings are listed below.

- Iterations (one iteration)
- Conditioning run enabled
- Three scenarios enabled
- When using BAPCo benchmarks to evaluate performance, one should install the latest production drivers from the hardware manufacturer. Drivers included with the operating system may not be device specific or newer drivers may be available from the device manufacturer. Using incorrect drivers could result in significantly reduced performance

10.1.1 Run time information

On the click of 'Run Benchmark' button, the app navigates to the window (Figure 23) which displays information about the currently running project.

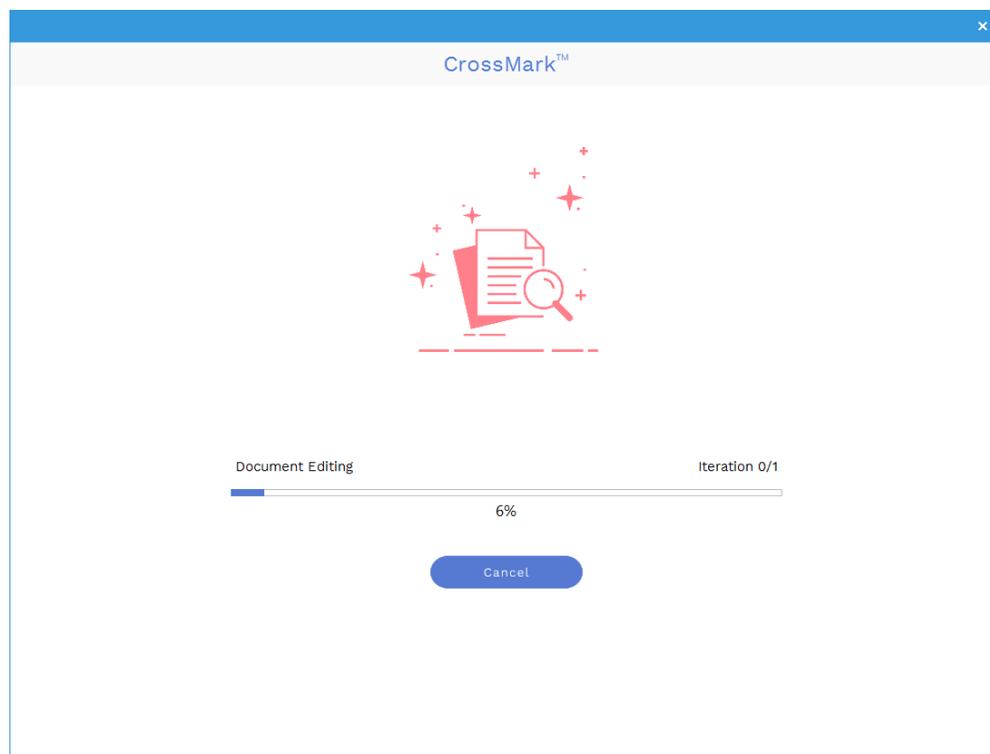


Figure 23: CrossMark run page

10.1.2 Error handling

By default, when CrossMark encounters an error during the execution of a project, the application will log the error and then present the user with the error in a dialog box. User can retry another run to based on the error displayed.

CrossMark will attempt to retry a workload up to five times. If the workload cannot be successfully completed before the retry threshold is reached, the application will halt execution and display the error message in the dialog box.

10.1.3 Stopping a run in progress

If it becomes necessary to cancel a benchmark run in progress, Click 'Cancel' button in CrossMark run page (Figure 22) to return to the dashboard screen.

To stop the benchmark run in progress, user can simply close the window by clicking the 'X' on the top right corner of the window.

10.2 Reference system

CrossMark performance scores are normalized using a reference system. The reference system scores '1000' on each of the three scenarios, and on the overall CrossMark performance rating. The reference system configuration is listed below.

10.3 Lenovo[®] ThinkCentre[™] M720q

- Processor: Intel[®] Core[™] i5-8500T @ 2.10 GHz
- Operating System: Microsoft Windows 10 Pro x64 19H2 (10.0.0.1863.418)
- RAM: 1x8GB DDR4 single channel
- Graphics: Intel[®] HD Graphics 630
- Resolution: 1920x1080
- Audio: Integrated High Definition Audio
- Storage: 256GB NVMe SSD
- Networking: Integrated Gigabit Ethernet

11 Scenarios

CrossMark scenarios and workload descriptions are provided below.

11.1 Productivity

The Productivity scenario models office environment like usage including word processing (document editing and comparison), spreadsheets data manipulation (data modeling, financial forecasting), web browsing and archiving files

11.2 Creativity

The Creativity scenario models editing digital photos cataloging digital photos and editing digital video.

11.3 Responsiveness

The Responsiveness scenario is a combination of operations taken from the Productivity and Creativity scenarios. Such operations include file opens, file saves, file writes and more. Please refer to the CrossMark Whitepaper for more information on the CrossMark scoring methodology.

12 Support

Technical support for CrossMark is provided on the web at <https://bapco.com/support> and via email at support@bapco.com. Before contacting support, please be sure all updates for CrossMark have been installed. BAPCo does not provide support for down-level versions. When contacting support please include the following information.

- CrossMark version, e.g., 1.0.0.123
- System configuration information
- Step by step instructions for reproducing the problem
- Rate of error, e.g., 100%, 50%
- Archive of the benchmark error logs from the failing run
 - Locate the database folder, for example:
 - **Windows:**
C:\Users\\AppData\Local\Packages\BAPCo.CrossMark_5skxveq7eyka4\LocalCache\Roaming\CrossMark\sqldb\
ICache\Roaming\CrossMark\sqldb\
 - **MacOS:** /Users/<username>/Library/Containers/Data/.config/CrossMark/sqldb
 - **iOS:** Follow the steps below to copy database from iPhone or iPad to mac
 - Connect the iPhone or iPad device to Mac using the USB cable.
 - Open Finder and find your device in the left side panel.
 - Find files tab in the iPad folder. Click on '>' to find more tabs in iPad folder.
 - Open Files > CrossMark > sqldb

Follow the steps below to copy database from iPhone or iPad to windows

- Download latest version of iTunes.
- Open iTunes on your PC.
- Connect your iPhone, iPad, or iPod touch to your computer using the USB cable that came with your device.
- Click your device in iTunes (Figure 24)

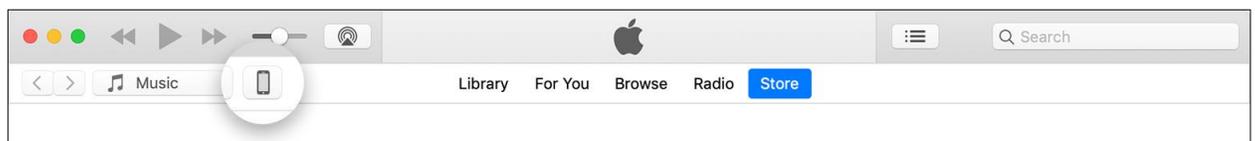


Figure 24: device image in iTunes.

- In the left sidebar, click File Sharing.
- Select 'CrossMark' and drag and drop files from the list to a folder or window on your computer to copy them to your computer.
- Copy the CrossMark.db file

- If reporting a problem with automation, locate the benchmark automation logs:
 - C:\Users\\Desktop\Results\CrossMarkAutoRun.log.txt
- Archive the database file and the logs listed above using WinZip, WinRAR, etc.
- Attach the archive file to the support request email sent to BAPCO support, or please upload the archive file through the form at <https://bapco.com/support>
- When reporting multiple errors, please include a description for each problem being reported

13 CrossMark Benchmarking Rules v1.0

This document describes the rules governing publication of results derived from running the BAPCo CrossMark benchmark. Any licensee who wishes to publish such results or when results are published automatically is obliged to adhere to all rules and regulations described in this document or other documents provided by BAPCo related to execution and reporting of CrossMark benchmark results. BAPCo reserves the right to change the rules outlined in this document at any time. Licensees are encouraged to consult BAPCo website at www.bapco.com for the latest information regarding execution and publication rules. For more information, please consult the Software License Agreement.

13.1 Benchmark Execution

CrossMark Application: All benchmark tests must be run using the CrossMark application. This application is an executable program that runs the CrossMark benchmark. It also includes a module that generates the final benchmark results for the system under test. All published results must be derived only from a complete and correct run of the benchmark. All tests must be performed without modification to any part of the CrossMark application or workloads.

The collective set of hardware and software used in generation of an official CrossMark result must be available to the public as defined by BAPCo's availability criteria. The following specific rules apply:

Operating System: The operating system used to generate and publish results must be a publicly available release from the original software vendor. Consult the product manual at www.bapco.com for the current list of supported operating systems. Upgrade of specific drivers that are released and maintained by vendors other than the operating system vendor (e.g. graphics drivers, disk drivers, motherboard setting files, multimedia drivers) is allowed provided these drivers are publicly available, release-quality drivers from original vendors of such drivers. Licensees may also use operating system service packs, API updates (e.g. Direct X) and other such updates provided they are publicly available, release-quality software from the original vendor, and that they meet the benchmark's Operating System requirements. Licensees should also consult license agreements from individual software vendors to ensure compliance with vendor benchmark restrictions.

Performance Enhancing Utilities: Use of performance enhancing utilities or techniques is allowed provided that the utility or technique is publicly available, release-quality software from the original vendor. The utility needs to be documented and such techniques should not compromise the integrity of the system under test or the benchmark. BAPCo shall reserve the right to review the usage of such tools or techniques and invalidate published results if need be.

System Configuration: To ensure the integrity of CrossMark results, test systems must maintain the same hardware configuration and software settings throughout the execution of the test. Any modification to hardware configuration and/or software settings will invalidate the results.

Hardware: The system hardware used to generate official CrossMark results must be publicly available at the time of publication or within 60 days thereafter. The system must be purchasable as a complete platform from an Original Equipment Manufacturer within 60 days of publication. Alternatively, licensees may report results for systems which may not be available from an OEM but whose individual components are publicly available and purchasable from various vendors at the time of publication or within 60 days thereafter. Note that the 60-day grace period does not apply to system software. All software used must be publicly available and be of release-quality available from the original software vendor.

Software: OEM software used to generate official CrossMark results has no grace period, and therefore must be release quality and publicly available from the original vendor immediately upon publication of results.

Wireless Connectivity: The systems wireless network adapter should be turned on and associated to a wireless network for the duration of the test in free version of the app, whereas it is required in pro version only during the submission of FDR. Either wireless LAN (i.e., Wi-Fi) or wireless broadband (e.g., LTE) may be used to fulfill this requirement at the tester's discretion. Bluetooth may not be used to fulfill this requirement.

13.2 Full Disclosure Report

A complete Full Disclosure Report (FDR), is generated by the CrossMark application at the completion of the benchmark run. Based on the free or pro version of the CrossMark application, user may choose to submit or automatically submit results to BAPCo for inclusion in FDR database. This FDR must include the overall CrossMark Rating, the ratings for each of the three scenarios as well as pertinent system information about the state of the system under test. The format and the information included in this report is determined by BAPCo. No modifications should be made to the FDR (modifications to the FDR will invalidate the FDR).

13.3 Publication

BAPCo requires all licensees to submit FDRs to the BAPCo website (<https://results.bapco.com>) for all publicly available published results generated from pro version of the CrossMark application. Results may be submitted by any of the following methods:

- 1) Clicking the 'submit results' button from inside the benchmark GUI after a completed run.
- 2) Uploading results via the online submission form at <https://results.bapco.com>

Or, if the above options are unavailable.

- 3) Results may be submitted by email to report@bapco.com

Licensees are responsible for retaining available FDR records for all published results. Results submitted by email will also be published at results.bapco.com.

All FDRs submitted by licensees to BAPCo are subject to a 10 day review period. During this review period any BAPCo member can challenge the submitted FDR or submit a counter FDR. When a challenge occurs

or a counter FDR is submitted, BAPCo will decide which, if any, of the FDRs will be accepted for inclusion in the FDR database.

Any publication of results must be accompanied by at least the system model number plus any discrepancies between the shipping configuration of that system model and the configuration of the system model actually tested.

Results collected on systems that do not meet the minimum system requirements for running CrossMark may be published if submitted to BAPCo for inclusion in the FDR database. However, BAPCo will only offer technical support for system configurations that meet or exceed the minimum system requirements for CrossMark.

Any publication of CrossMark results must include the CrossMark overall score from the same run of the benchmark.

Any publication of CrossMark results must include a link to the online results database where the claim has been submitted.

13.4 Availability

When publishing CrossMark results, the tested system must be available for purchase by the public either at the time of publication or within 60 days after publication. Note that the 60-day grace period does not apply to system software. All software used must be release-quality and made publicly available from the original software vendor.

13.5 FDR Processing

The submitted FDRs are processed by BAPCo and classified as:

Released for publication - The results are released for publication as filed.

Rejected - The results are rejected for publication as filed.

The Released for publication classification is in no way a validation or an endorsement of the results by BAPCo. Licensees are free to publish results as long as a complete and valid FDR has been generated and submitted to results.bapco.com. BAPCo will perform frequent audits of the submitted FDRs and reserves the right to revoke the license granted to licensees who have not adhered to the regulations described in this or other CrossMark documentation. In the case where an FDR is returned to the licensee with rejected classification, the licensee must immediately stop publication of the rejected results until the matter is clarified by BAPCo. Any publication of results must be accompanied by at least the system model number plus any discrepancies between the configuration of the stated model number and the configuration of the system tested. The publication can use the single overall CrossMark rating or the combination of the overall rating and a scenario rating. Licensees may not publish scenario ratings unless the overall CrossMark rating is also included. (E.g. the Productivity scenario rating cannot be published without disclosing the CrossMark overall rating) The term CrossMark is a registered trademark of the Business

Applications Performance Corporation and may only be used in conjunction with performance metrics generated by the CrossMark application. Any other performance characterizations may be made but must be derived from the performance metrics generated by the application. The terms CrossMark may not be used as the performance metric describing such characterizations.

13.6 Publication of Results on Non-OEM Platforms

BAPCo allows the publication of performance indices using CrossMark for making "Non-OEM" platform comparisons. This includes performance comparisons on systems that are not shipped from an OEM as a complete platform. An example of such comparisons is when a graphics card manufacturer wishes to compare the performance of its graphics card to that of another manufacturer in an identical platform by swapping the cards and measuring the performance. Results published on Non-OEM platforms must be marked as Modified on the accompanying FDR and whenever appearing in publications of any kind.

13.7 Publication of Results for Competitive Comparisons

Licensees may publish results on competitor systems as long as the performance results for the competitor have been published previously at www.bapco.com. In the case where competitor performance results are not available, the competitor will be notified by BAPCo and given fifteen working days to provide a counter-FDR for its own system or challenge the submitted FDRs (results). The submitted results may not be published until the fifteen-day waiting period has expired and all matters with respect to any counter-FDRs have been resolved by BAPCo. In the absence of a response from the competitor after fifteen days, the original publishing licensee may begin publication. Industry publications may publish results for making competitive comparisons without being subject to the above procedure. Publications are, however, subject to all other regulations set forth in this document.