Intel® Performance Maximizer Version 1.0.3

Production Release for Intel® Core™ X-series Processors (Cascade Lake) and 9th Generation Intel® Core™ i9/i7/i5 Processors (Coffee Lake) Update

User Guide

December 2019

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1 Revision History

Table 1: Revision History

Package Definition	Intel® Performance Maximizer Software Package Revision	Release Date
Production Release for Intel® Core™ X-series Processors (Cascade Lake) and 9th Generation Intel® Core™ i9/i7/i5 Processors (Coffee Lake) Update	1.0.3.1217	December 2019
Production Release for 9th Generation Intel® Core™ i9/i7/i5 Processors (Coffee Lake)	1.0.1.602	May 2019

2 Terminology

Term	Description
UEFI	Unified Extensible Firmware Interface
GUI	Graphical User Interface. In this document, this refers to the Intel® Performance Maximizer user interface Windows application

§

3 Introduction

3.1 Overview

Intel® Performance Maximizer is a Microsoft Windows based processor-core overclocking tool that automatically tests and configures the maximum overclocking performance capability of the processor. As appropriate, the Intel® Performance Maximizer Windows software configures the system to reboot and load the Intel® Performance Maximizer UEFI application. This application executes a series of tests in a Pre-OS UEFI environment to determine the maximum stable processor-core overclocking performance. During this testing phase, which may last several hours, the system may hang and automatically reboot several times. When the tests complete, the Intel® Performance Maximizer software automatically reboots the system back to Windows, the stable overclocking settings are applied, and the results are displayed to the end-user.

The Intel® Performance Maximizer software package is comprised of the following software components:

- Intel® Performance Maximizer Windows driver and INFs
- Intel® Performance Maximizer Windows installer
- Intel® Performance Maximizer Windows GUI application and services
- Intel® Performance Maximizer UEFI application
- Intel® Performance Maximizer Processor-specific tests

3.2 Minimum Requirements

This section captures the minimum requirements for an end-user system necessary for proper Intel® Performance Maximizer installation and operation.

3.2.1 Supported Hardware

This Intel® Performance Maximizer package supports the following Intel Processors and Chipsets:

Table 2: Client CPU Brand Strings

CPU Brand Strings	Chipset
Intel(R) Core(TM) i5-9600K CPU @ 3.70GHz	Intel Z390
Intel(R) Core(TM) i5-9600KF CPU @ 3.70GHz	Intel Z390
Intel(R) Core(TM) i7-9700K CPU @ 3.60GHz	Intel Z390

Intel(R) Core(TM) i7-9700KF CPU @ 3.60GHz	Intel Z390
Intel(R) Core(TM) i9-9900K CPU @ 3.60GHz	Intel Z390
Intel(R) Core(TM) i9-9900KF CPU @ 3.60GHz	Intel Z390
Intel(R) Core(TM) i9-9900KS CPU @ 4.00GHz	Intel Z390

Table 3: HEDT CPU Brand Strings

CPU Brand Strings	Chipset
Intel(R) Core(TM) i9-10980XE CPU @ 3.00GHz	Intel X299
Intel(R) Core(TM) i9-10940X CPU @ 3.30GHz	Intel X299
Intel(R) Core(TM) i9-10920X CPU @ 3.50GHz	Intel X299
Intel(R) Core(TM) i9-10900X CPU @ 3.70GHz	Intel X299

3.2.2 Supported Operating Systems

This package supports the following Operating System (OS):

- Microsoft Windows 10 x64 Edition Version 1909 (November 2019 Update)
- Microsoft Windows 10 x64 Edition Version 1809 (October 2018 Update)

3.2.3 Memory and Storage Requirements

- **>= 8GB of Installed System Memory**
  A minimum of 8 Gigabytes (GB) of Installed System Memory is required for Intel® Performance Maximizer installation and operation

- **16GB of Unallocated Hard-drive Storage Space**
  16 GB of free or unallocated space is required on a non-removable GPT formatted drive to create a partition for exclusive use by Intel® Performance Maximizer software.
  - **Note**: Intel® Performance Maximizer supports the ability to shrink a partition on an existing eligible GPT hard-drive to free up 16GB space. Please see Intel® Performance Maximizer installation steps for further details.
  - **Note**: Intel® Performance Maximizer partition on the hard-drive is intended for exclusive use by the Intel® Performance Maximizer software. It is highly recommended that the user does not use this partition to store other information. The integrity of any user-created files in this partition is not guaranteed, such files may be deleted by Intel® Performance Maximizer software, and this partition itself will be

deleted at the time of uninstallation of the Intel® Performance Maximizer software.

3.2.4 BIOS Setup Requirements

This Intel® Performance Maximizer package requires the following minimum BIOS setup options to be set properly for Intel® Performance Maximizer installation and operation.

Note: The names of actual BIOS setup options may be different from those listed below or such options may not exist in BIOS setup menu. Please contact the appropriate Motherboard manufacturer / BIOS vendor for questions regarding BIOS setup menu.

- Processor Core Overclocking must be enabled
- All Processor cores must be enabled
- Intel® Hyper-Threading Technology (Intel® HT Technology), if supported on the processor, must be enabled
- Intel® Turbo Boost Technology 2.0 mode must be enabled
- Boot mode must be UEFI
- Enhanced Intel SpeedStep® Technology must be enabled
- Intel® Watchdog Timer Driver (Intel® WDT) must be enabled

Refer to the Intel® Performance Maximizer Release Notes for any additional recommendations/limitations and known issues for a specific released version of the Intel® Performance Maximizer software.

This Intel® Performance Maximizer package requires the following minimum BIOS setup options to be set properly for Intel® Performance Maximizer installation and operation.

4 Installation

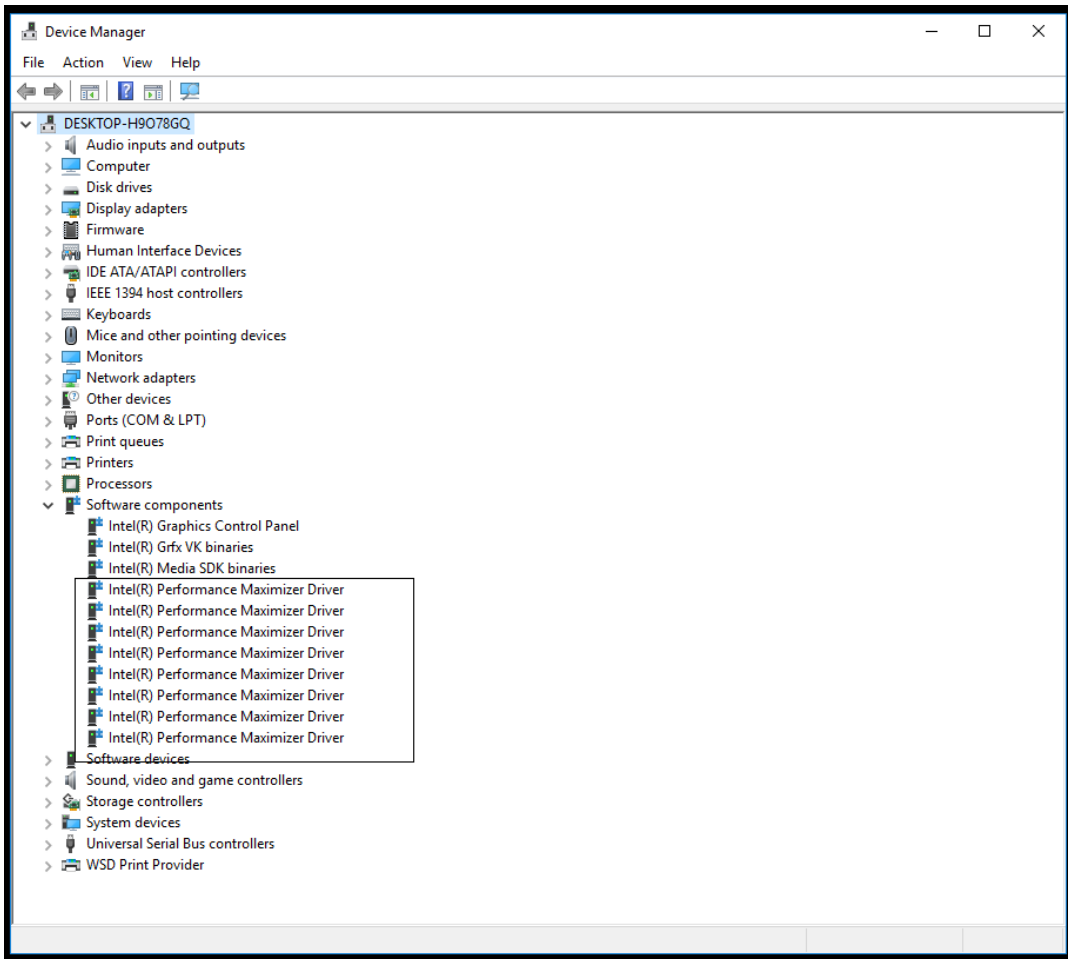
Note: A wired LAN internet connection is recommended for the overall installation process.

4.1 Summary of Installation Steps

There are Installation steps:

1) Download the Intel® Performance Maximizer software package(s)
    a. If you are downloading a version of Intel® Performance Maximizer that has multiple download files, you will need to download all files into the same directory before installing
2) Install the Intel® Performance Maximizer Software
3) Complete Setup and Installation of the Intel® Performance Maximizer Software

Sample image below shows Intel® Performance Maximizer driver installed successfully.



4.2 Details

4.2.1 Download

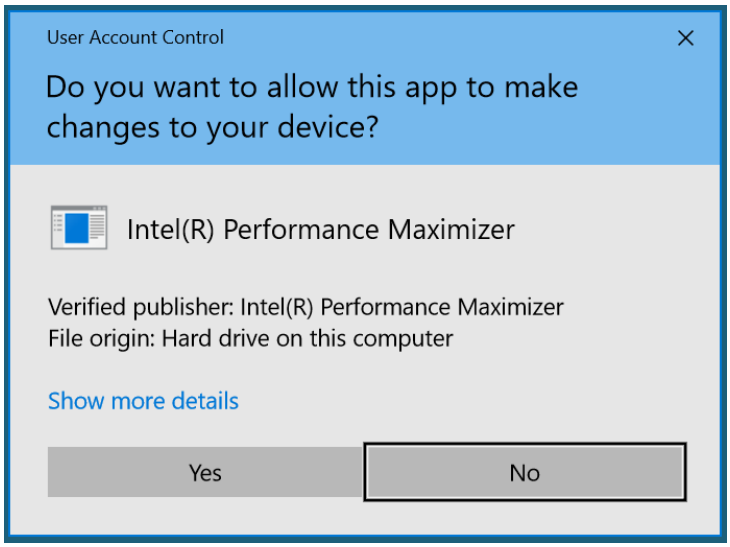
Intel® Performance Maximizer Software Package can be downloaded from https://downloadcenter.intel.com/.

4.2.2 Install

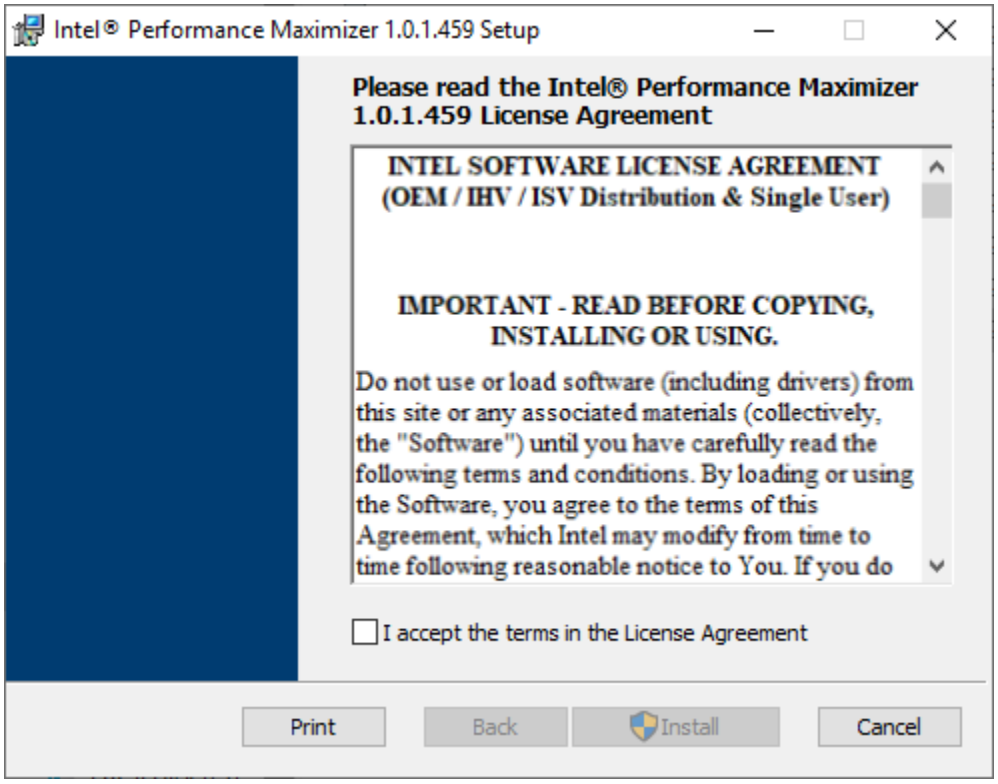
Note: The Installation process requires **Administrator** level privileges.

1) Following download, unzip the package to a local folder and double-click the "**Intel®_Performance_Maximizer**" executable
    a. If you are downloading a version of Intel® Performance Maximizer that has multiple download files, you will need to download all files into the same directory before unzipping and double clicking the parent executable

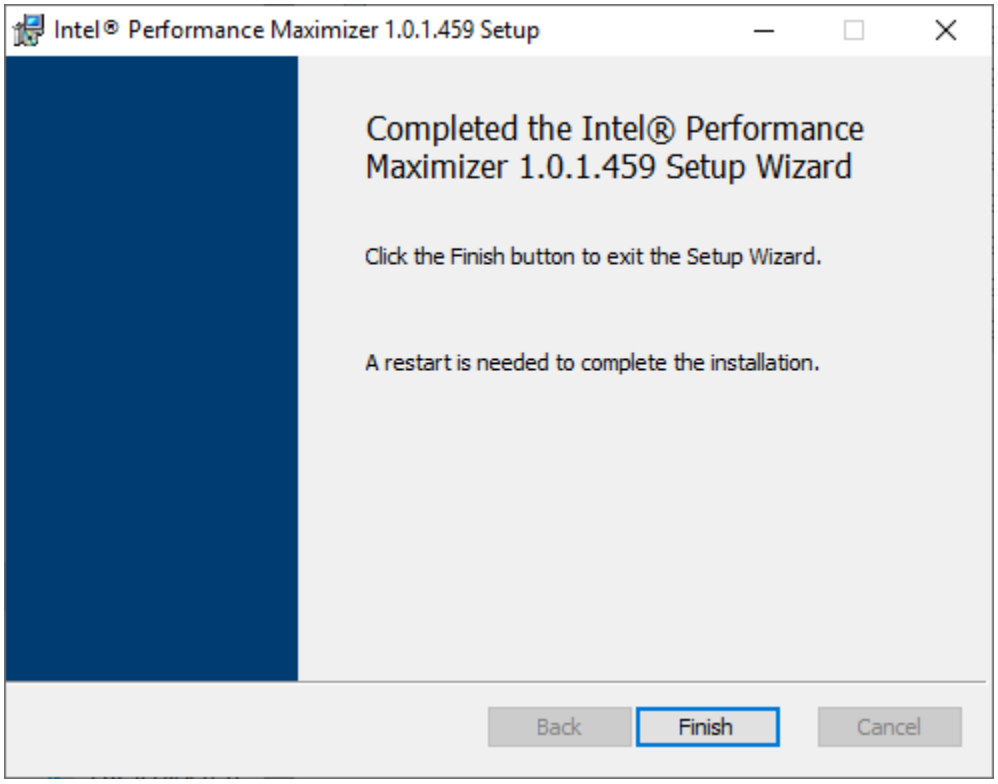
2) If the following prompt appears, give application permission to run as administrator.



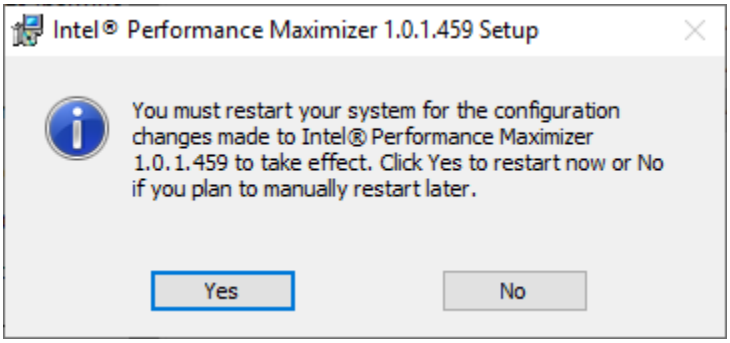
3) Accept the Accept terms and conditions and Click Install



4) Click Finish



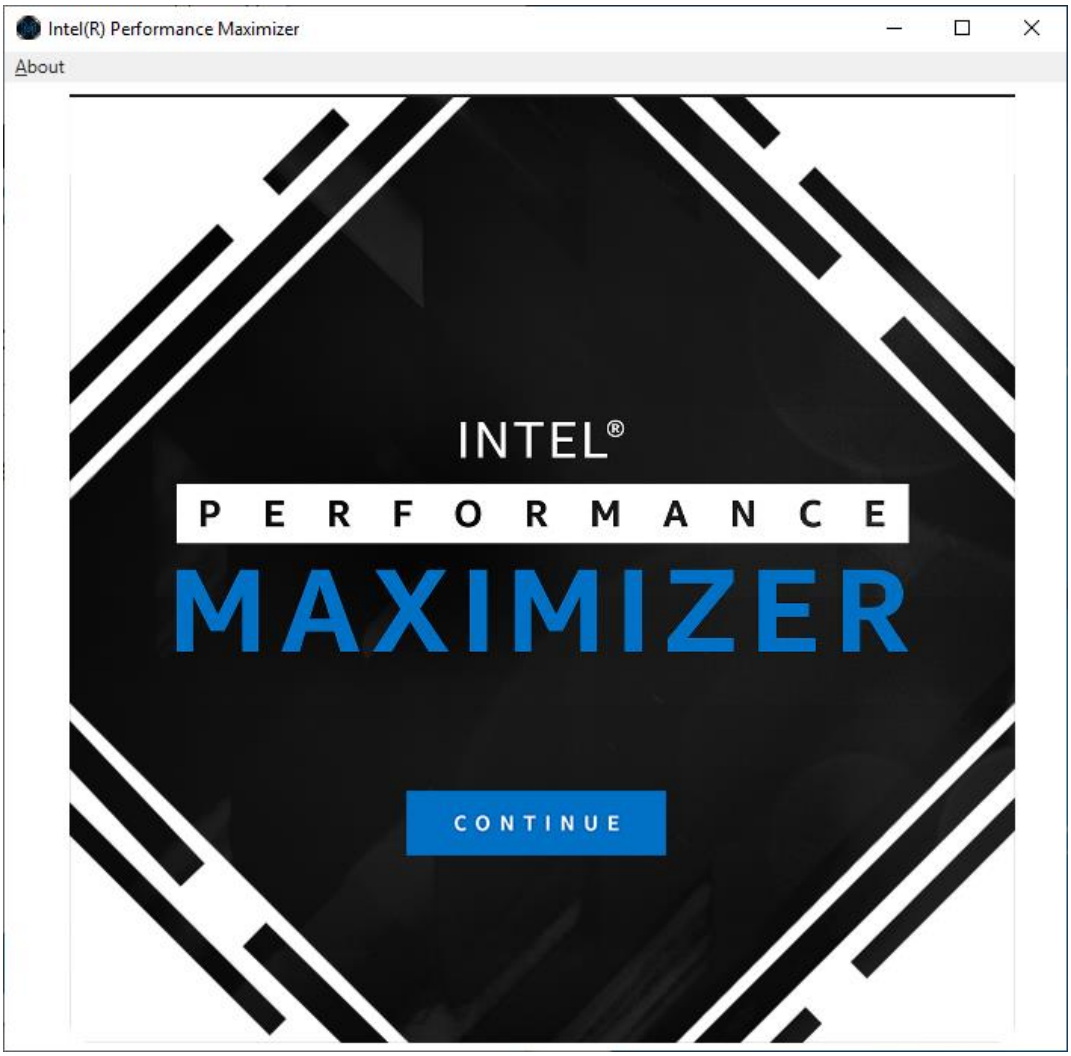
5) Click Yes to restart the system



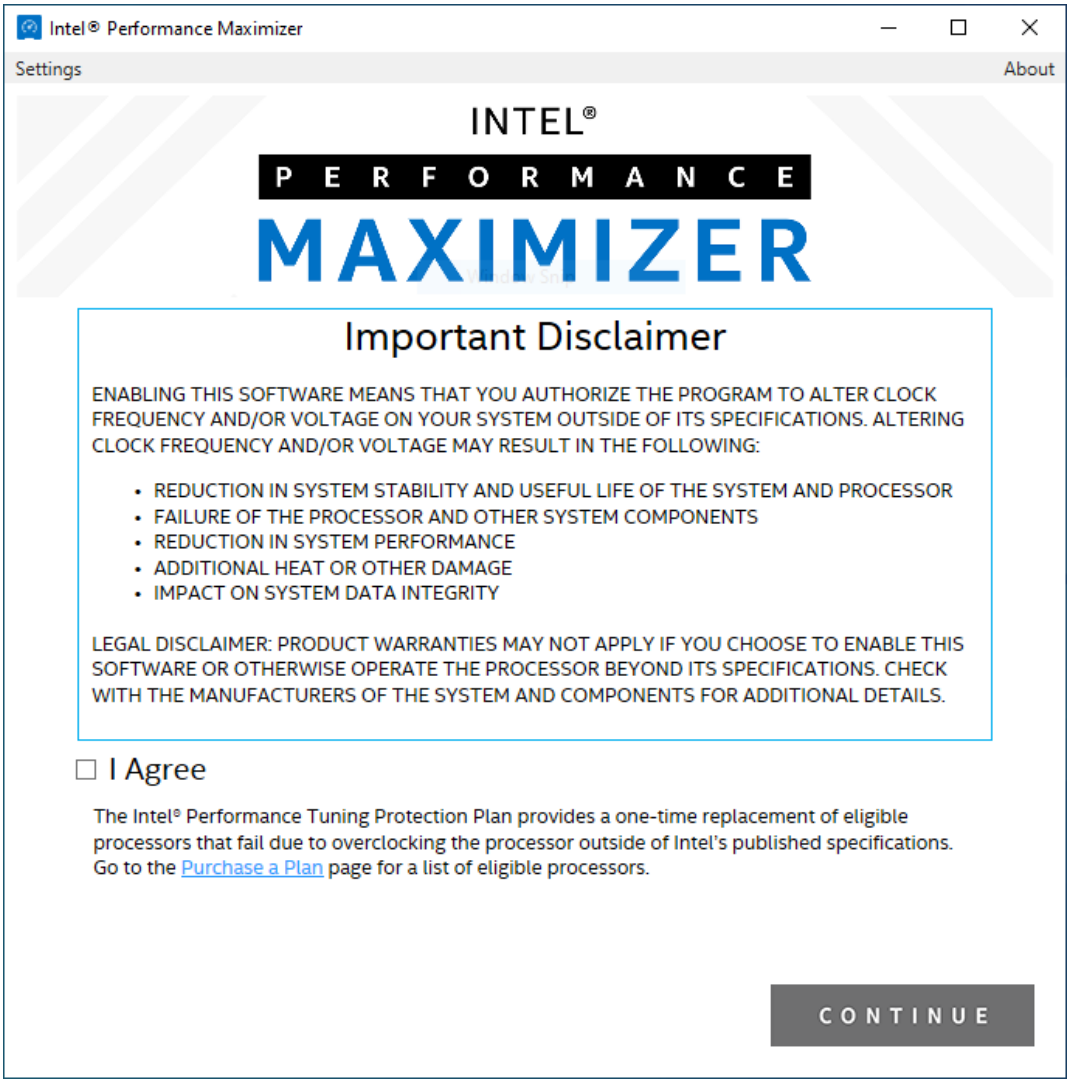
4.2.3 Setup

Note: The Setup and the rest of the Installation process requires **Administrator** level privileges.

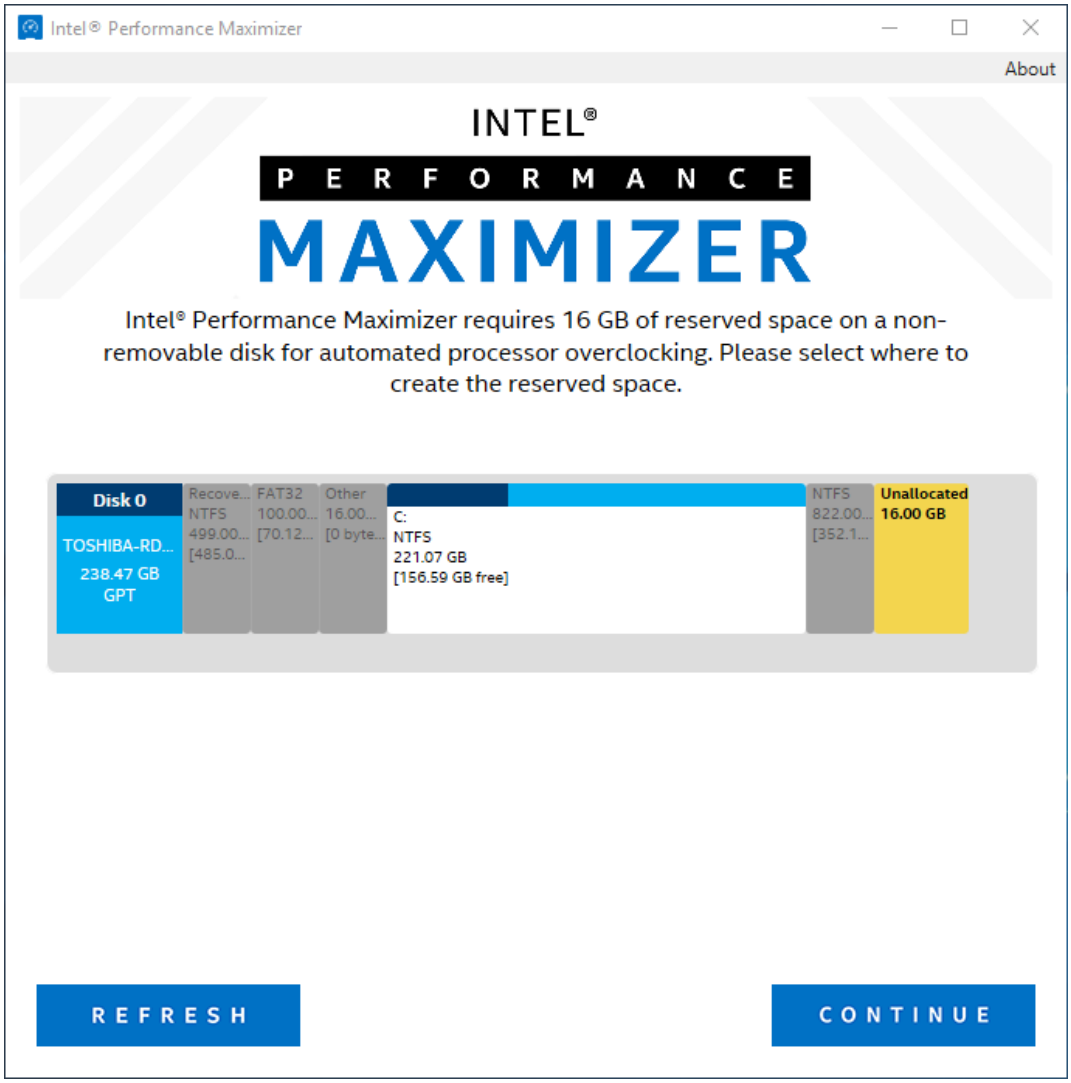
1) Following reboot, Double click on the "Intel® Performance Maximizer" desktop icon and Click "Continue"



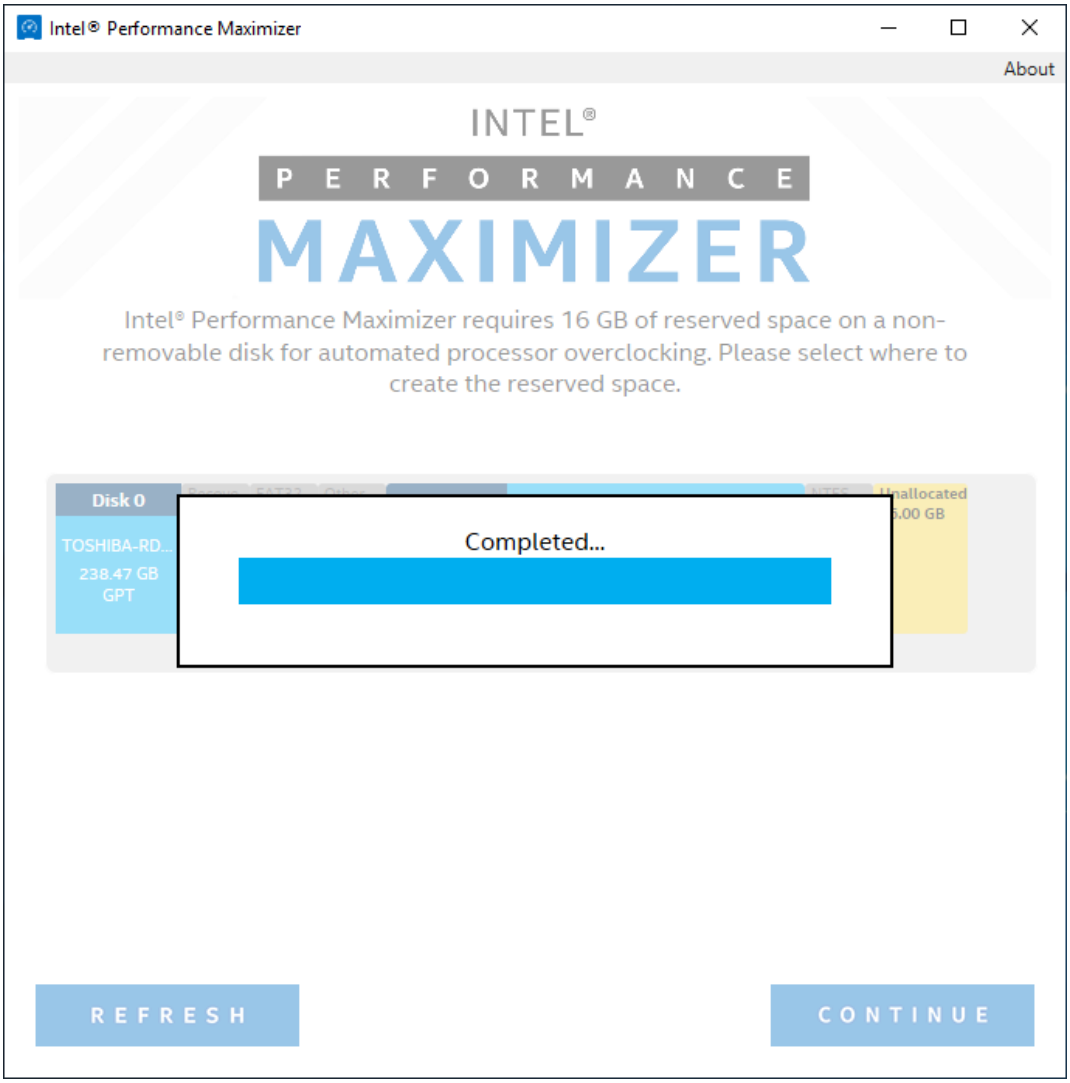
2) Accept the disclaimer regarding the effects of overclocking



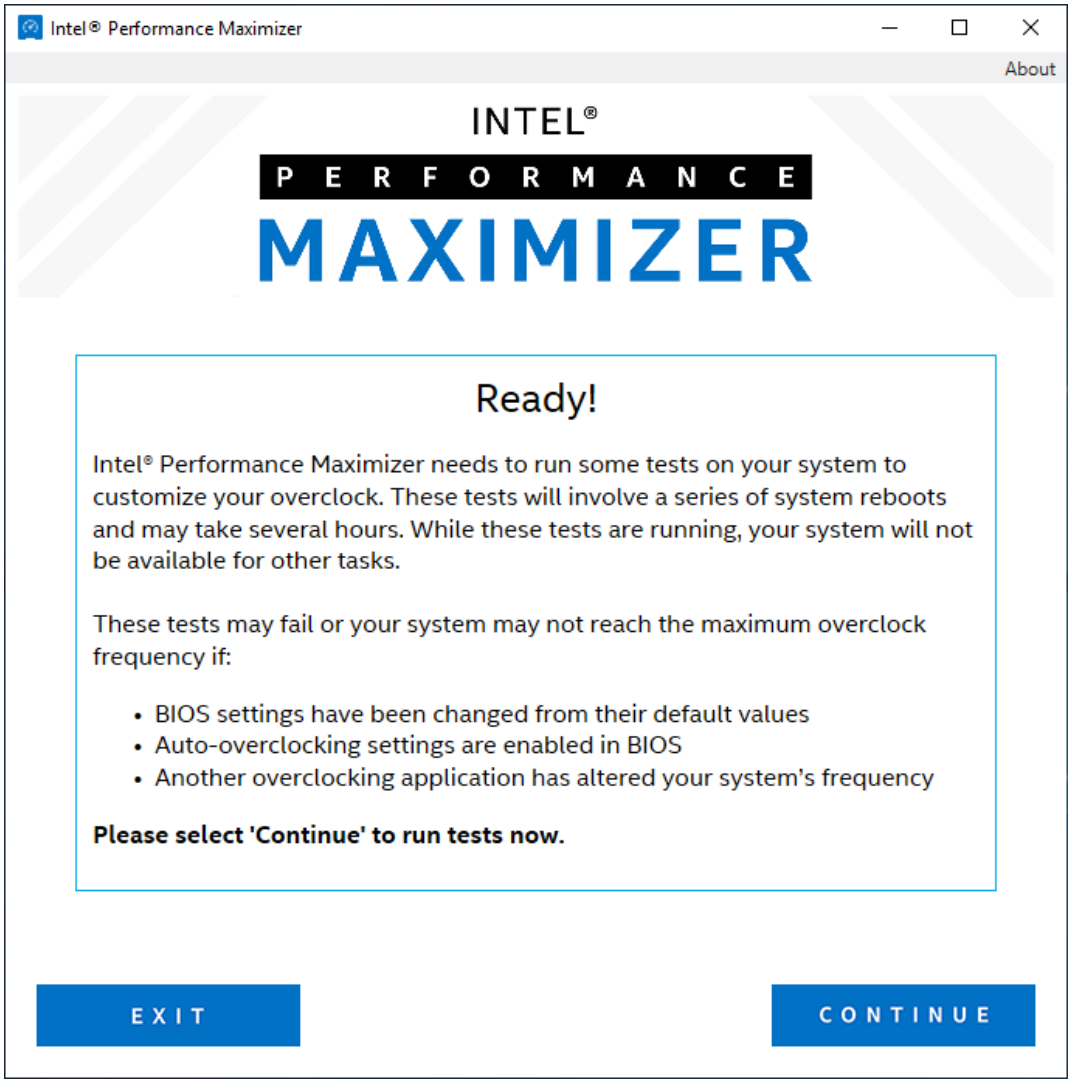
3) Select a non-removable hard-drive on the system where the Intel® Performance Maximizer partition will be created and the Intel® Performance Maximizer software will be installed. If there is insufficient unallocated space on the selected hard-disk, there are 2 choices:
    a. Use Intel® Performance Maximizer GUI to select and shrink any non-greyed out partition to free up the necessary space for Intel® Performance Maximizer partition.
    Note: It is highly recommended that the user backs up any data before shrinking an existing partition
    b. Select another hard-drive with the necessary unallocated space.
4) Click "Continue" when ready with the drive/partition selection.



5) Intel® Performance Maximizer GUI will create a partition titled "IPM" and will format the partition. This process may take a few minutes.



6) The system is now ready to begin running the overclocking tests and automatically configure the processor core for the maximum performance. Select "Continue" and "Yes" to reboot the system and start the tests.
Note: The testing process may take several hours to complete.


Intel® Performance Maximizer
About
INTEL®
PERFORMANCE
MAXIMIZER
Ready!
Intel® Performance Maximizer needs to run some tests on your system to customize your overclock. These tests will involve a series of system reboots and may take several hours. While these tests are running, your system will not be available for other tasks.
These tests may fail or your system may not reach the maximum overclock frequency if:
• BIOS settings have been changed from their default values
• Auto-overclocking settings are enabled in BIOS
• Another overclocking application has altered your system's frequency
Please select 'Continue' to run tests now.
EXIT
CONTINUE

5 Automated Testing and Configuration

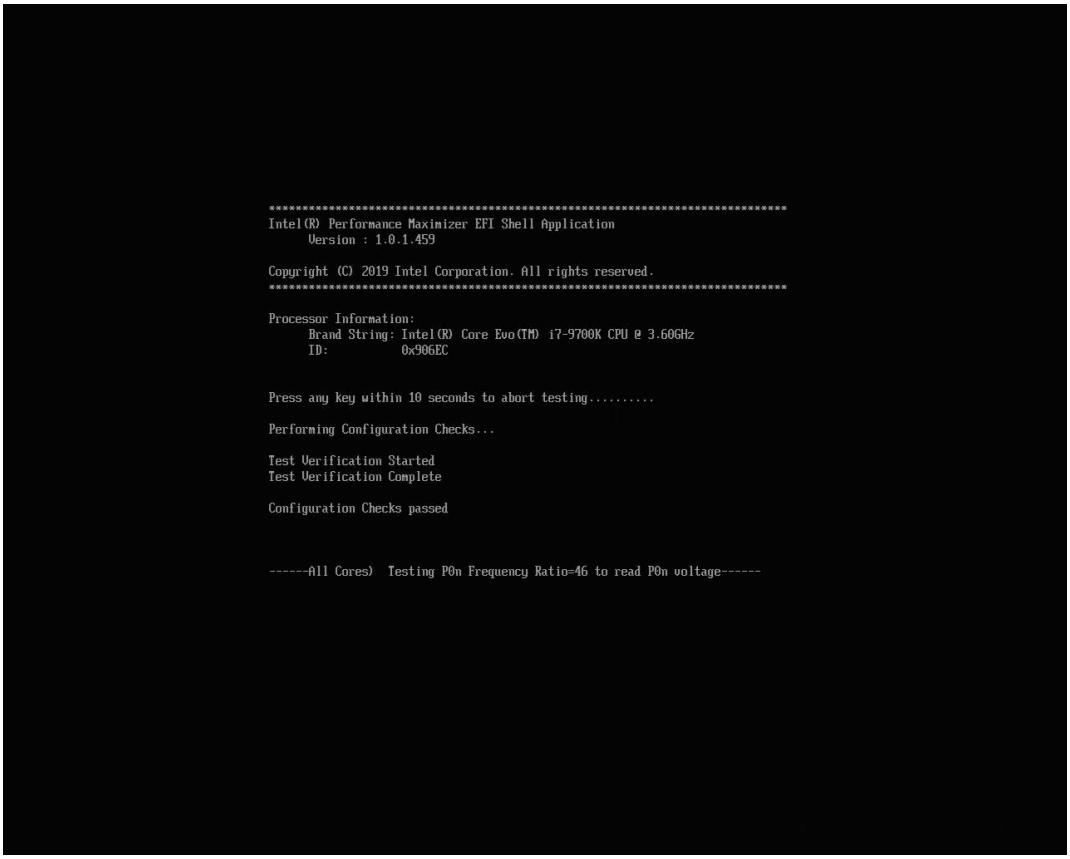
On end-user selection to run the overclocking tests, the system automatically reboots into Pre-OS UEFI environment and loads the Intel® Performance Maximizer UEFI Application. The application executes processor-core specific tests to determine the maximum stable overclocking processor-core frequency. On test completion, the system reboots back to Windows and the maximum stable overclocking processor-core frequency limit is programmed.

5.1 Testing phase

It is strongly recommended that the Intel® Performance Maximizer tests in UEFI environment are not interrupted.

Note: If testing is interrupted abnormally (e.g., by pressing CTRL-ALT-DEL or power button push while tests are executing), the system will reboot and continue the tests and the maximum performance results may be incorrect. If the user wants to abort the Intel® Performance Maximizer tests and reboot to Windows immediately, the user can press any key within a specified time interval when the message "`Press any key within 10 seconds to abort testing...`" appears on the screen and confirm the abort.

A sample image while the tests are ongoing is provided below.



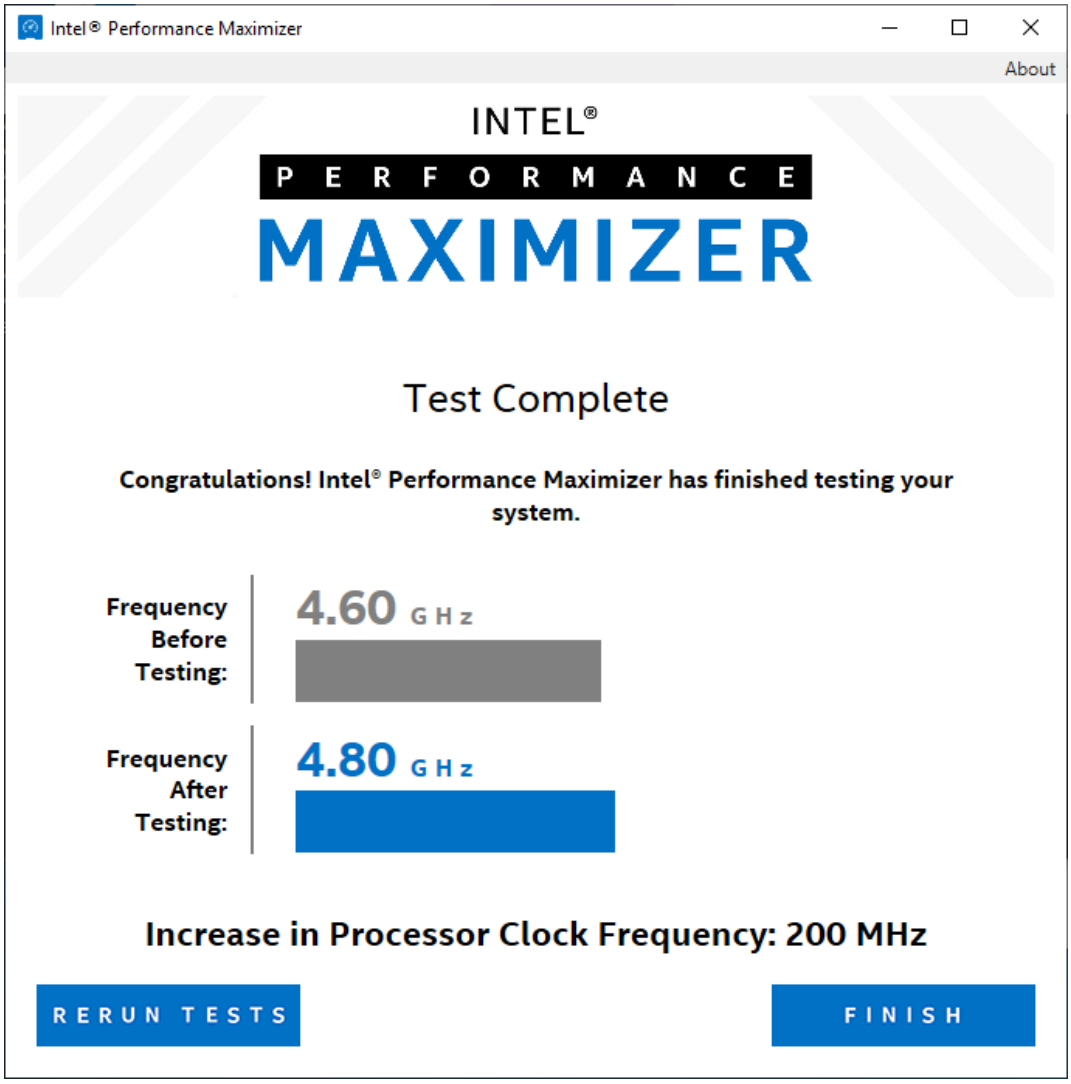
During testing, the system may hang and reboot several times, and this is expected behavior. The reboots occur automatically, and this overall process may take several hours.

5.2 Configuration phase

After the tests have completed successfully, the system will be automatically rebooted back to Windows, the new overclocking settings will be programmed by the Intel® Performance Maximizer Windows driver, and the results displayed in the Intel® Performance Maximizer Windows GUI Application.

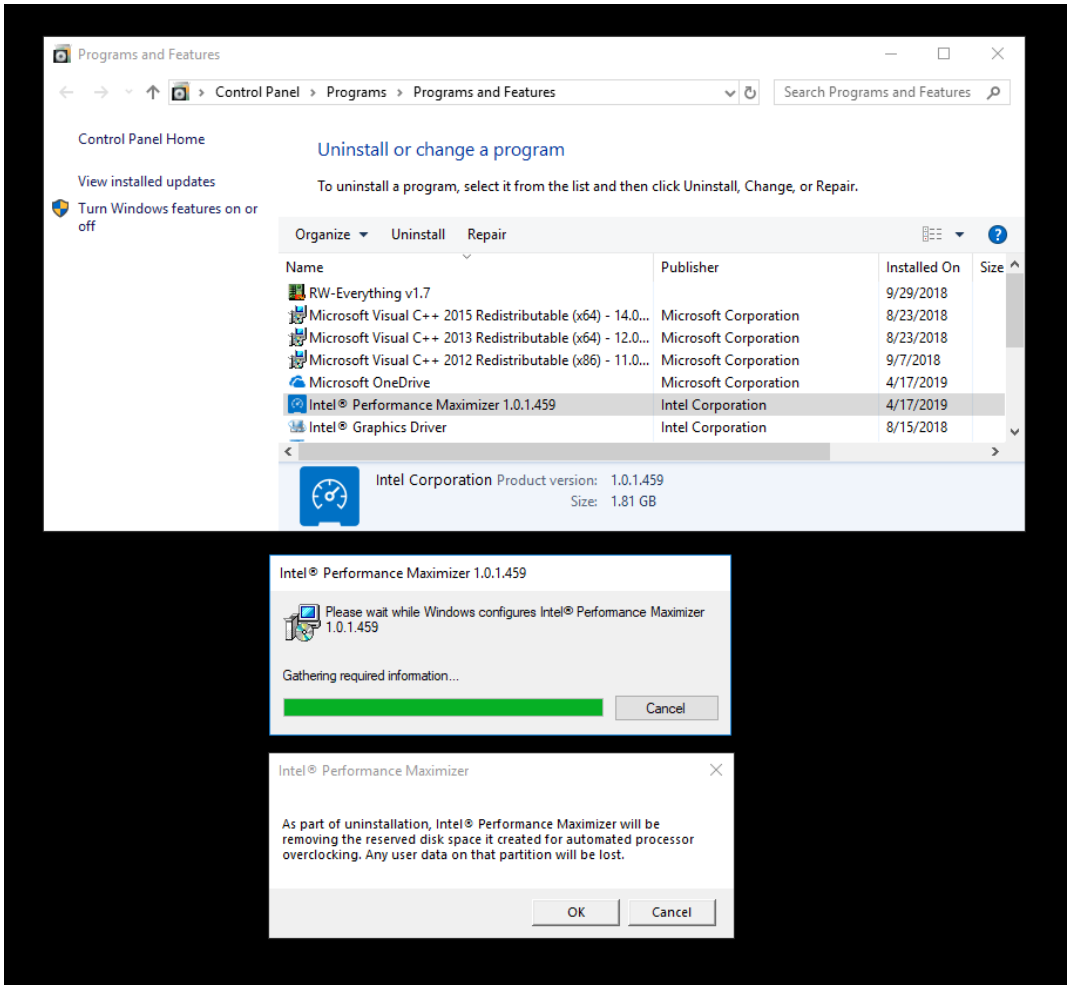
Note: Unless otherwise stated, the Intel® Performance Maximizer application displays the all-core active processor core turbo frequency.

A sample image of a successful test run in Windows is shown below.


Intel® Performance Maximizer
About
INTEL®
PERFORMANCE
MAXIMIZER
Test Complete
Congratulations! Intel® Performance Maximizer has finished testing your system.
Frequency Before Testing:
4.60 GHz
Frequency After Testing:
4.80 GHz
Increase in Processor Clock Frequency: 200 MHz
RERUN TESTS
FINISH

6 Uninstallation

Intel® Performance Maximizer software can be uninstalled from Windows Control Panel, Programs by clicking on "Intel® Performance Maximizer N.N.N.NNNN" icon. Uninstallation will remove the Intel® Performance Maximizer software and the Intel® Performance Maximizer partition.



7 Troubleshooting

7.1 Error Messages

Intel® Performance Maximizer GUI application will display errors that are detected by Intel® Performance Maximizer software during the tests in UEFI environment and during Installation and Configuration in the Windows environment. This section describes the error messages displayed by the Intel® Performance Maximizer GUI and possible fixes.

Please contact Intel Customer Support for assistance in resolving Intel® Performance Maximizer issues.

Table 4: Intel® Performance Maximizer GUI Error Messages

"This version of the application is not compatible with the driver. Please reinstall Intel® Performance Maximizer."	
Possible Cause(s): *Generic driver issue*	**Recommended Action(s):** *Check for yellow bang in Windows Device Manager, and/or try reinstalling Intel® Performance Maximizer software*
"Unable to shrink partition. Please check your disk and try again."	
Possible Cause(s): *Shrinking may fail if 16GB of contiguous space is not present for the selected partition*	**Recommended Action(s):** *Clean up space on the hard disk(s) or Select another partition to shrink*
"Error communicating with Intel® Performance Maximizer driver. Please reboot your system. If you continue to see this message, please reinstall Intel® Performance Maximizer. "	
Possible Cause(s): *Driver communication issue.*	**Recommended Action(s):** *Reboot, check for driver yellow bang in Windows Device Manager, try again and/or reinstall.*
"Not all processor cores are enabled. Please ensure that all processor cores are enabled in your system's BIOS."	
Possible Cause(s): *Some processor core(s) are disabled.*	**Recommended Action(s):** *Enable all processor cores in BIOS setup and rerun tests.*

"Intel® Hyper-Threading Technology is not enabled. Please ensure that Intel® Hyper-Threading Technology is enabled in your system's BIOS."	
Possible Cause(s)*:* *This processor supports Intel® Hyper-Threading Technology but is disabled in BIOS.*	**Recommended Action(s):** *Enable Intel® Hyper-Threading Technology in BIOS setup.*
"Intel® Turbo Boost Technology 2.0 and/or Intel® Enhanced Speedstep Technology are not enabled. Please ensure that Intel® Turbo Boost Technology 2.0 and Intel® Enhanced Speedstep Technology are both enabled in your system's BIOS before rerunning tests."	
Possible Cause(s)*:* *This processor supports Intel® Turbo Boost Technology 2.0 but it is disabled in BIOS.*	**Recommended Action(s):** *Enable Intel® Turbo Boost Technology 2.0 in BIOS setup.* *Enable Intel® Enhanced Speedstep Technology in BIOS setup.*
"Intel® Performance Maximizer is not supported on your system. Please ensure that your current system meets the minimum requirements listed in the User Guide."	
Possible Cause(s)*:* *Intel® Performance Maximizer does not support this processor / chipset / platform / BIOS version.*	**Recommended Action(s):** *Please check to see if Intel® Performance Maximizer supports this processor / chipset / platform / BIOS version and try again.*
"This installation package is not compatible with your system."	
Possible Cause(s)*:* *The Intel® Performance Maximizer package that was downloaded / installed does not match the processor or the package is corrupt.*	**Recommended Action(s):** *Download the correct package, reinstall the product and try again.*
"This system's BIOS is not compatible with Intel® Performance Maximizer."	
Possible Cause(s)*:* *Necessary overclocking hardware resources are not accessible by Intel® Performance Maximizer.* *A hardware resource conflict is preventing test execution.* *Necessary UEFI services in BIOS failed.*	**Recommended Action(s):** *Contact your Motherboard / BIOS vendor for an updated BIOS.* *Ensure that UEFI Mode is enabled in BIOS.* *If the issue persists, Contact Intel for assistance.*

Necessary Overclocking services are not supported in BIOS. *Legacy BIOS mode is enabled instead of UEFI BIOS mode.* *System unable to enter pre-OS UEFI environment and execute tests.*	
"Intel® Performance Maximizer is not supported on your system. Please ensure that your current system meets the minimum requirements listed in the User Guide."	
Possible Cause(s)*:* *Necessary files in Intel® Performance Maximizer partition are not R/W accessible.* *Missing/Corrupted test files in Intel® Performance Maximizer partition.* *Insufficient space in Intel® Performance Maximizer partition.* *Intel® Performance Maximizer partition / volume is corrupted.*	**Recommended Action(s):** *Check for and fix any disk / partition errors, ensure partition is not full and try again. If error persists, please ensure your current system hardware settings support overclocking, reinstall Intel® Performance Maximizer, and try again.*
"Instability was detected and your system has been reverted back to the default settings."	
Possible Cause(s)*:* *This may occur if the tests have not been run for a long time invalidating the previous overclocking settings.*	**Recommended Action(s):** *A rerun of the tests is recommended. Also, check for other drivers/software on the system that may have contributed to the instability.*
"Intel® Performance Maximizer encountered an error while running tests. Testing was interrupted"	
Possible Cause(s)*:* *This may occur when characterization did not finish, or if Intel® Performance Maximizer's data file is corrupted/not valid.*	**Recommended Action(s):** *A rerun of the tests is recommended. If that fails with the same error again, uninstall, reinstall and try again.*
"Intel® Performance Maximizer was unable to overclock this system. This could be due to inadequate cooling"	
Possible Cause(s)*:* *Software was unsuccessful in overclocking the system, which could be*	**Recommended Action(s):** *Check if BIOS settings are at their default values and if not, restore default BIOS*

due to invalid BIOS configuration settings or insufficient cooling capability for the processor resulting in thermal throttling.	*values and test again. If that results in the same error, ensure your cooling solution is appropriate / optimal for overclocking and test again.*
"Intel® Performance Maximizer is not supported on this processor."	
Possible Cause(s)*:* *Intel® Performance Maximizer does not support this processor.*	**Recommended Action(s):** *Please check to see if Intel® Performance Maximizer supports this processor.*
"There was not enough system memory (RAM) detected during test run. A minimum of 8 GB is required."	
Possible Cause(s)*:* *This system does not have enough memory installed to support Intel® Performance Maximizer.*	**Recommended Action(s):** *Please check to see if there is enough memory to support Intel® Performance Maximizer.*
"Intel® Performance Maximizer cannot test this system because the current BIOS does not support Intel® Watchdog Timer Driver (Intel® WDT)"	
Possible Cause(s)*:* *Necessary overclocking hardware resources are not accessible by Intel® Performance Maximizer e.g., Overclocking Watchdog Timer is locked by BIOS.*	**Recommended Action(s):** *Contact your Motherboard / BIOS vendor for an updated BIOS.*
"A GPT formatted bootable disk is required."	
Possible Cause(s)*:* *Intel® Performance Maximizer could not find a GPT formatted partition on your system.*	**Recommended Action(s):** *Please check to see if your boot partition is formatted as GPT.*
"This could be due to a recent upgrade of Intel® Performance Maximizer or the result of incomplete/corrupted test results. You will need to rerun tests to obtain valid overclock results."	
Possible Cause(s)*:* *The Intel® Performance Maximizer partition's data file could be corrupted.*	**Recommended Action(s):** *Please rerun tests to obtain valid overclock results.*

A recent upgrade of Intel® Performance Maximizer that is no longer compatible with your current overclock settings.	
"Could not read/write to Intel® Performance Maximizer partition."	
Possible Cause(s): *Data/Log files on the Intel® Performance Maximizer partition are not R/W accessible.*	**Recommended Action(s):** *Reboot your system and if the issue persists, reinstall Intel® Performance Maximizer.*
"Intel® Speed Shift Technology is enabled and needs to be disabled. Please ensure that Intel® Speed Shift Technology is disabled in your system's BIOS."	
Possible Cause(s): *BIOS has Intel® Speed Shift Technology enabled in a way that interferes with Intel® Performance Maximizer.*	**Recommended Action(s):** *Please check to see if Intel® Speed Shift Technology is enabled in BIOS and if so, disable it.*

7.2 Interoperability Issues with other Overclocking Tuning Utilities

Interoperability issues may arise when other processor overclocking tuning utilities are used to modify processor overclocking and performance related settings on the system in the presence of Intel® Performance Maximizer. To avoid such issues, it is recommended that the BIOS settings are set to default and other processor overclocking tuning utilities are not used.