SYSMARK® 2014 SE

November 22nd, 2016
Revision 1.0

Revision History:
1.0 – Initial revision of the SYSmark 2014 SE White Paper

About BAPCo

Business Applications Performance Corporation (BAPCo) is a non-profit consortium with a charter to develop and distribute a set of objective performance benchmarks for personal computers based on popular computer applications and industry standard operating systems.

For more information about BAPCo or a complete list of the current membership, see our website at http://www.bapco.com/.

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1 Introduction

SYSmark® 2014 SE is the latest revision of the preeminent system performance benchmark series that measures and compares PC performance using real world applications, featuring new workloads, features, support for Microsoft Windows 7, 8.1, and 10 64-bit, and a new energy consumption testing mode.

SYSmark 2014 SE gives commercial and government IT decision makers, media, channel buyers, consultants, and system and component designers and manufacturers an objective, easy-to-use tool to evaluate PC performance across the wide range of activities that a user may encounter.

SYSmark 2014 SE is designed for those who want to:
- Evaluate and compare desktop and mobile computers for purchase consideration based on system performance and application responsiveness.
- Provide useful information to their audiences to assist in the evaluation and purchase of desktop and mobile computers.
- Evaluate desktop and mobile computers to better optimize the performance of the system.

Unlike synthetic benchmarks, which artificially drive components to peak capacity or attempt to deduce performance using a static simulation of application behavior, SYSmark 2014 SE uses real applications, real user workloads, and real data sets to accurately measure how overall system performance impacts user experience.

SYSmark 2014 SE builds upon BAPCo's 25-year history of building benchmarks to evaluate platform technologies. Benchmarks designed by BAPCo are the result of cooperative development between companies representing the breadth of the computing industry. They harness a consortium of knowledge to better reflect the business trends of today and tomorrow.

This document describes the methodologies employed in the development of SYSmark 2014 SE. For detailed instructions on how to install and run SYSmark 2014 SE products, please refer to the documentation provided on the installation media and/or the BAPCo web site (www.bapco.com).

Refer to the BAPCo product versions FAQ located in the SYSmark 2014 SE support section at www.bapco.com for more information.

2   BAPCo Development Process

BAPCo creates benchmarks in accordance with the BAPCo Development Process, a set of milestones and checkpoints collaboratively developed and agreed upon by the BAPCo membership.

Early in the process, prevailing business personal computer usage models are identified and grouped into scenarios according to their fit within a workflow. Applications are selected for each usage model on the basis of market research and technical feasibility.

BAPCo members then join together with expert application users in development sessions to collaboratively develop a workload specification for each scenario, defining each user/PC interaction which is to be simulated by the benchmark.

The goal of the development sessions is to produce representative business application workloads for the benchmark. Each application workload consists of three elements: the input data set, the tasks performed on the input data set, and the generated output. An example of generated output would be an image generated through an iterative process of steps to create a desired appearance. These three elements of the workload are chosen to represent the workflow of a user skilled in each given application.

After the workload specifications are created at the development sessions, BAPCo developers implement the workloads according to those specifications while satisfying benchmarking constraints to ensure the stability of the benchmark, the consistency of results, and the feasibility of implementation and distribution of the benchmark.

2.1 Milestone Overview

The BAPCo development process is divided into six major phases (Initialization, Design and Planning, Implementation, Validation, Characterization and Launch). Each phase consists of a series of milestones, some of which may be worked on concurrently.

The membership must vote to close each milestone. Once all the milestones within a phase are complete, the membership must vote to exit the phase and enter the next phase. BAPCo members work in a collaborative process where decisions regarding products are sometimes made by majority vote rather than unanimously.

The following is the list of the development phases and the corresponding milestones. Some of these milestones are explained in greater detail in the following sections, as noted in this list.

1. **Initialization Phase**
   a. Milestone 0 – Committee kickoff
   b. Milestone 1 – Benchmark market and customer analysis
   c. Milestone 2 – Product positioning and customer value proposition
   d. Milestone 3 – Preliminary marketing requirements document
   e. Milestone 4 – Final marketing requirements document
2. **Design and Planning Phase**
   a. Milestone 5 – Preliminary engineering requirements document
   b. Milestone 6 – Usage model selection *(see section 2.2)*
   c. Milestone 7 – Application selection *(see section 2.3)*
   d. Milestone 8 – Define member resource commitments
   e. Milestone 9 – Define development infrastructure
   f. Milestone 10 – Define scoring methodology *(see section 2.4)*
   g. Milestone 11 – Define application licensing requirements
   h. Milestone 12 – Plan and execute workload development sessions *(see section 2.5, 2.6)*
   i. Milestone 13 – Define product release criteria
   j. Milestone 14 – Select product name
3. **Implementation Phase**
   a. Milestone 15 – Create implementation schedule
   b. Milestone 16 – Determine calibration system *(see section 2.7)*
   c. Milestone 17 – Software development *(see section 2.8)*
4. **Validation Phase**
   a. Milestone 18 – Validation testing
   b. Milestone 19 – Define risk management plan
5. **Characterization Phase**
   a. Milestone 20 – Characterization testing
   b. Milestone 21 – Beta testing
6. **Launch Phase**
   a. Milestone 22 – Product pricing
   b. Milestone 23 – Pre-launch materials
   c. Milestone 24 – Release to manufacture vote and sign-off
   d. Milestone 25 – Duplicate and distribute media
   e. Milestone 26 – Post-launch materials

2.2 Usage Model/Scenario Selection

In milestone 6 of the BAPCo Development Process, PC usage models are chosen for inclusion in a benchmark. For SYSmark 2014 SE, BAPCo chose a wide variety of usage models in which the user experience is influenced by system performance.

BAPCo then grouped related usage models into 4 scenarios – Office Productivity, Media Creation, Data/Financial Analysis, and Responsiveness. Each of these scenarios is described as follows:

Office Productivity

The Office Productivity scenario models productivity usage including word processing, spreadsheet data manipulation, email creation/management and web browsing.

Media Creation

The Media Creation scenario models using digital photos and digital video to create, preview, and render advertisements for a fictional businesses.

Data/Financial Analysis

The Data/Financial Analysis scenario creates, compresses, and decompresses data to review, evaluate and forecast business expenses. Also, the performance and viability of financial investments is analyzed using past and projected performance data.

Responsiveness

The Responsiveness scenario models usages where the ability of the system to react quickly to the user's input impacts the experience of using the system (i.e. – user's want to feel like the system responds smoothly and quickly). Some workloads include: application launches, file launches, web browsing with multiple tabs, multi-tasking, file copying, photo manipulation, file encryption and compression, and background application installation.

2.3 Application Selection

In milestone 7, after the usage models have been collected into scenarios, applications are chosen for the scenarios on the basis of market research and technical feasibility.

Sufficient lead time is needed after the applications are selected for BAPCo to develop workloads, integrate the applications into the benchmark, and perform validation of the benchmark. Therefore, some of the application versions are not the newest available at the time of the launch of SYSmark 2014 SE.

For SYSmark 2014 SE, BAPCo has identified the following representative applications for the three usage scenarios.

A summary of the application versions installed and used by SYSmark 2014 SE version 2.0.0.70 is included in Appendix A.

Application	Version	Document Type
Adobe® Acrobat®	Pro XI	Portable document files, image files
Google® Chrome®	53	Web pages
Microsoft® Excel®	2013	Spreadsheets
Microsoft® OneNote®	2013	Free-form information gathering and multi-user collaboration
Microsoft® Outlook®	2013	E-mails
Microsoft® PowerPoint®	2013	Presentation files, image files, video files
Microsoft® Word®	2013	Word processing documents
WinZip®	Pro 17.5	Zip files, assorted document files

Table 1: Office Productivity Applications

Application	Version	Document Type
Adobe® Photoshop®	CS6 Extended	Image files
Adobe® Premiere®	Pro CS6	Video files
Trimble® SketchUp™	Pro 2013	CAD files, image files

Table 2: Media Creation Applications

Application	Version	Document Type
Microsoft® Excel®	2013	Spreadsheets
WinZip®	Pro 17.5	Zip files, assorted document files

<p align="center">**Table 3: Data/Financial Analysis Applications**</p>

Application	Version	Document Type
Adobe® Acrobat®	Pro XI	Portable document files, image files
Adobe® Photoshop®	CS6 Extended	Image files
Adobe® Photoshop® Lightroom®	6	Image files, Video files
Adobe® Premiere®	Pro CS6	Video files
GIMP	2.8.16	Image files
Google® Chrome®	53	Web pages
Microsoft® Excel®	2013	Spreadsheets
Microsoft® OneNote®	2013	Free-form information gathering and multi-user collaboration
Microsoft® Outlook®	2013	E-mails
Microsoft® PowerPoint®	2013	Presentation files, image files, video files
Microsoft® Word®	2013	Word processing documents
Trimble® SketchUp™	Pro 2013	CAD files, image files
WinZip®	Pro 17.5	Zip files, assorted document files

<p align="center">**Table 4: Responsiveness Applications**</p>

2.4   Scoring Methodology

In milestone 10, BAPCo decides the types of results that will be produced by a benchmark and the scoring methodology that determines how those results are calculated.

Importantly, BAPCo determines the scoring methodology before determining the content of the workloads, which helps ensure that a methodology is chosen for its ability to generate results that correspond to user experience, not for the results it produces on a pre-determined set of workloads.

For SYSmark 2014 SE, BAPCo evaluated the merits of a variety of scoring methodologies and chose a methodology on the basis of how it met the following criteria:
- The scoring methodology should give expected results:
  - The resulting score should differentiate between systems with different performance.
  - The resulting score should be repeatable and not have high variation.
  - The resulting score should not be affected by benchmark artifacts, such as the number of tasks within a scenario.
- The relative performance between any two systems should not be affected by the selection of the calibration system.
- The resulting score should reflect the performance of user initiated multitasking operations.
- The scoring methodology should be easy to understand.

SYSmark 2014 SE measures system performance by measuring the response time of tasks on a PC using real applications and simulated user input. In the SYSmark 2014 SE scoring methodology, task response times are used to generate a performance rating that reflects the user experience. The faster a PC responds to the application workloads in SYSmark 2014 SE, the higher its SYSmark 2014 SE performance ratings will be.

For more information on how task response times are measured, see section 2.8.

A complete SYSmark 2014 SE run will output three scenario performance ratings (one for each scenario) and an overall performance rating.

Scenario Rating

Each scenario has a rating calculated by taking the sum of the response times of tasks in that scenario as performed on the test system and then comparing it with the sum of those same task response times as performed on the calibration system (see section 2.7). The calibration sum is divided by the measured sum on the test system and multiplied by 1000. The result is then rounded to the nearest integer.

Overall Rating

The SYSmark Overall Rating is calculated by taking the geometric mean of all the scenario ratings (prior to rounding). The result is then rounded to the nearest integer. To obtain an overall rating, you must run all scenarios.

Scenario Energy Consumption

When the Energy Consumption Test is enabled each scenario has an energy consumption value in Wh. This is an aggregate of the total energy consumed (as measured by the power meter) during the active workload portion of the scenario. Each iteration's energy consumption is averaged to produce the scenario energy consumption value.

Overall Energy Consumption

When the Energy Consumption Test is enabled the SYSmark Overall Energy Consumption is determined by taking the summation of all the Scenario Energy Consumption values (prior to rounding).

2.5   Workload Development Sessions

Once the usage models, scenarios, applications, and scoring methodology for the benchmark are decided, BAPCo members and application experts meet to create the application workloads that will be used in the benchmark.

For SYSmark 2014 SE, the workload development sessions consisted of a one week of face-to-face meetings that included representatives from BAPCo member companies and expert application users who had professional experience with the applications chosen for the benchmark. The application experts included professionals in the fields of small business marketing, financial forecasting, graphic design, video editing, web development, and enterprise IT deployment.

In the workload development sessions, the experts take the lead, weaving the usage models supplied by BAPCo into a storyboard of user interactions with a series of applications. Each user/PC interaction is written down in a workload specification, the specification used to automate the workloads later.

At the end of the workload development sessions, BAPCo comes away with a detailed workload specification for each of the benchmark scenarios and all of the input data sets needed to reproduce the workloads created at the sessions.

Additional Workload Considerations

The following additional factors come into consideration at the workload development sessions:

Input Data Set
Frequently in the sessions, the experts need raw digital content to serve as a input data set for a workload. Examples of such content might include a video to transcode, a presentation to modify, or documents to compress. When experts need such content, care is taken to ensure that they use something that is functionally representative of content they might use or encounter professionally.

For instance, if pictures are needed in order to create a web photo gallery, an expert might walk outside and take pictures using the same equipment he/she uses professionally. If a 3D model of a building is needed for a landscape workload, an expert might purchase a stock model from his/her usual online resource. Like the user interactions, all of these source materials are captured at the development session and used later in the development of automated workloads.

Task Switching and Concurrent Execution
In some cases, experts are encouraged to switch between open applications (e.g., as a user might between an e-mail program, word processor, and spreadsheet) or to leave activities running in the background as they perform work in another application (e.g., as a user might leave a compression task to run in the background while browsing the web).

In SYSmark 2014 SE, the Office Productivity and Responsiveness scenarios makes extensive use of task switching and concurrent execution.

2.6   Scenario Workload Descriptions

The scenario workloads created at the workload development sessions for SYSmark 2014 SE are described below:

Office Productivity

Read and manipulate notes from a notebook. Browse multiple web sites which include a blog, online shopping site, wiki site and social networking site. Archive a diverse set of files into a single encrypted file. Convert a PDF document into an editable word processing document. Perform and mail merge. View a complex presentation that include multimedia and export it to PDF. Combine multiple scanned pages from a complex document into an encrypted PDF document using optical character recognition (OCR). Read, create and search for emails. Create and execute a rule on email inbox. Use a spreadsheet program to do data analysis.

Media Creation

Create a panoramic image using an image editing application, combine a set of photos into one high dynamic range (HDR) image, and adjust and prepare both images for print. Transcode the video to a format suitable for web publishing using a video editing application. Add visual features to an existing architectural model, and render "sketch" style views using an architectural modeling application.

Data/Financial Analysis

Generate sales forecasts by region and currency based on historical data, and produce summary graphs and pivot tables using a spreadsheet application. Create an encrypted archive of various sensitive files for transfer across unsecured communications. Decompress the encrypted and unencrypted archive files.

Responsiveness

Launch a variety of creativity and productivity applications. Browse a large number of web sites. Import photos into a catalog. Export a large set of photos from a catalog. Decompress the encrypted and unencrypted archive files. Copy a large number of files in the background. Save presentation documents. Install and uninstall applications in the background. Switch between various web browser tabs. Save a variety of documents to the file system. Switch between various applications.

2.7   Calibration System

The calibration system is a system chosen in milestone 16 as a reference point for all other SYSmark 2014 SE results.   BAPCo chose the configuration below for its wide availability and its representation of a typical mainstream PC at the time of release of SYSmark 2014 SE.

SYSmark 2014 SE has been calibrated in such a way that a PC with performance equivalent to this calibration system for a given workload will have a performance rating of 1000. A system twice as fast as the calibration system on a given workload (or, equivalently, that responds in half the time on average) will have a performance rating of 2000. This is true for both overall ratings and scenario ratings.

The calibration system for all SYSmark 2014 SE products has the following configuration:
- Lenovo® ThinkCentre M800
- Intel Core i3-6100 Processor (3.70GHz, 3MB Cache)
- 4 GB PC4-17000 (DDR4-2133) SDRAM (1 DIMM)
- Integrated Intel HD Graphics 530
- Samsung CM871a 256 GB SSD
- Windows 10 Professional 64-bit, Anniversary Update
- 1920x1080 Display Resolution

A fresh operating system installation is performed on the system.

The calibration sum for each scenario is obtained according to the following process:
- Run SYSmark 2014 SE on the calibration system (process idle tasks disabled, conditioning run enabled, Energy Consumption Test enabled, 3 iterations)
- Calculate an overall score for each of the 3 iterations by taking geometric mean of all scenario scores for that iteration
- Identify the median iteration by finding the iteration with the median overall score
- The calibration sum for each scenario is the response time total from that scenario in the median iteration
- The Energy Consumption value for each scenario and overall is derived from the median iteration

For more details about the configuration of the calibration system, please contact support@bapco.com.

Please note that the minimum requirements to run SYSmark 2014 SE products are listed in Appendix B and are not equivalent to the calibration system.

2.8 Benchmark Implementation

Once the workload specifications have been created, BAPCo begins the important work of translating the workload specifications into an automated benchmark in milestone 17.

SYSmark 2014 SE is built upon scripts that do things much the way a user would, using controls like buttons, text input boxes, and menus to navigate applications. See Appendix C for screenshots of the benchmark in action.

To ensure that SYSmark 2014 SE has deterministic behavior, BAPCo uses a framework to install applications, collect system information, run the scenario scripts, record performance measurements, calculate performance ratings, and display test results. The framework is kept lightweight, consuming a minimal amount of memory and compute resources, in order to ensure that performance measurements reflect the workload performance and do not include overhead from the framework.

The fundamental performance unit in SYSmark 2014 SE is *response time*. Response time is defined as the time it takes the computer to complete a task that has been initiated by the automated script. A task can be initiated by a mouse click or a keystroke. The duration of each task is measured by the framework. Examples of tasks include launching an application, finding text in a document, copying a file, encoding a video, and performing an image manipulation.

The framework has several methods of detecting task completion, depending upon the method the application uses to signal task completion to the user. For example, the framework may wait for the application to show a completion message in the form of a pop-up window, or may wait for a progress dialog to disappear and for control of the application to be returned to the user.

3   Workload Characteristics

This section provides data illustrating the performance characteristics of SYSmark 2014 SE version 2.0.0.70.

3.1   Sensitivity Analysis

The series of charts below shows the sensitivity of SYSmark 2014 SE to different system characteristics, including the amount of CPU frequency, number of CPU cores, storage, and system memory.

Within each study only one system component (e.g. memory) is varied. All the other system components are held constant. To best illustrate the sensitivity, one configuration is chosen as a baseline and the ratings for the other configurations are shown as the percentage difference relative to the baseline.

Due to system implementation differences, these figures are only accurate for the configuration description listed below in each sub-section. These sensitivities will vary from one configuration to the next.

3.1.1   Sensitivity Analysis Base System Configuration

CPU Model	Intel Core i7-5960X
Base CPU Frequency	3.0 GHz
CPU uArch	Intel® 5th Generation Core Processor
Physical Cores	8
Logical Cores	8
Chipset	X99
RAM	2x4GB DDR4-2133 (8 GB Total)
Storage	Intel 730 SSD, 240 GB SATA 6Gb/s
OS	Windows 10 Anniversary Pro x64
Resolution	1920x1080
Graphics	Nvidia GeForce GTX 1080

Note: For these tests, Intel Turbo Boost Technology and Intel Hyper-Threading Technology have been disabled.

3.1.2 Sensitivity to CPU Frequency

The CPU frequency of a system is changed from 1.5 GHz to 3.0 GHz in steps of 500 MHz.
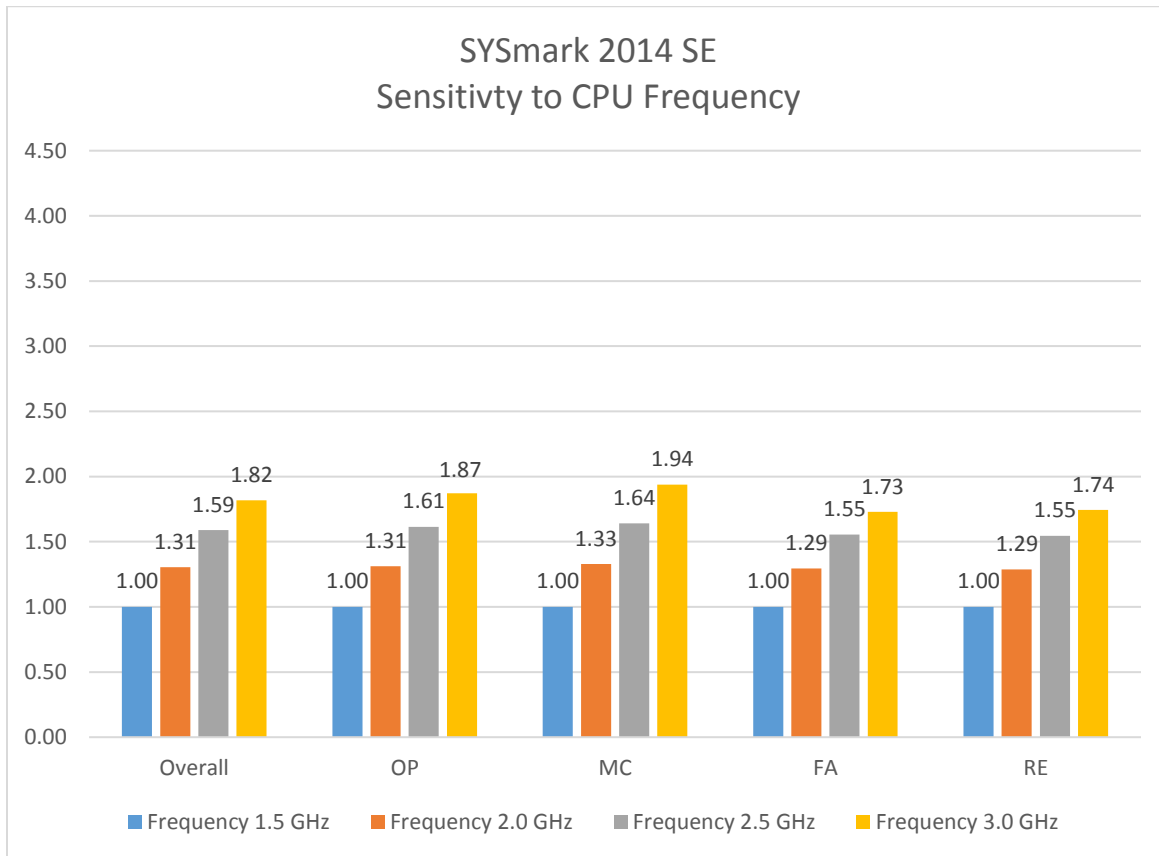
Figure 1: CPU Frequency Sensitivity

### 3.1.3   Sensitivity to CPU Core Count

The number of CPU cores is controlled by changing system BIOS settings to enable 1 core, 2 cores, then 4 cores, and finally all 8 cores of a 8-core processor.
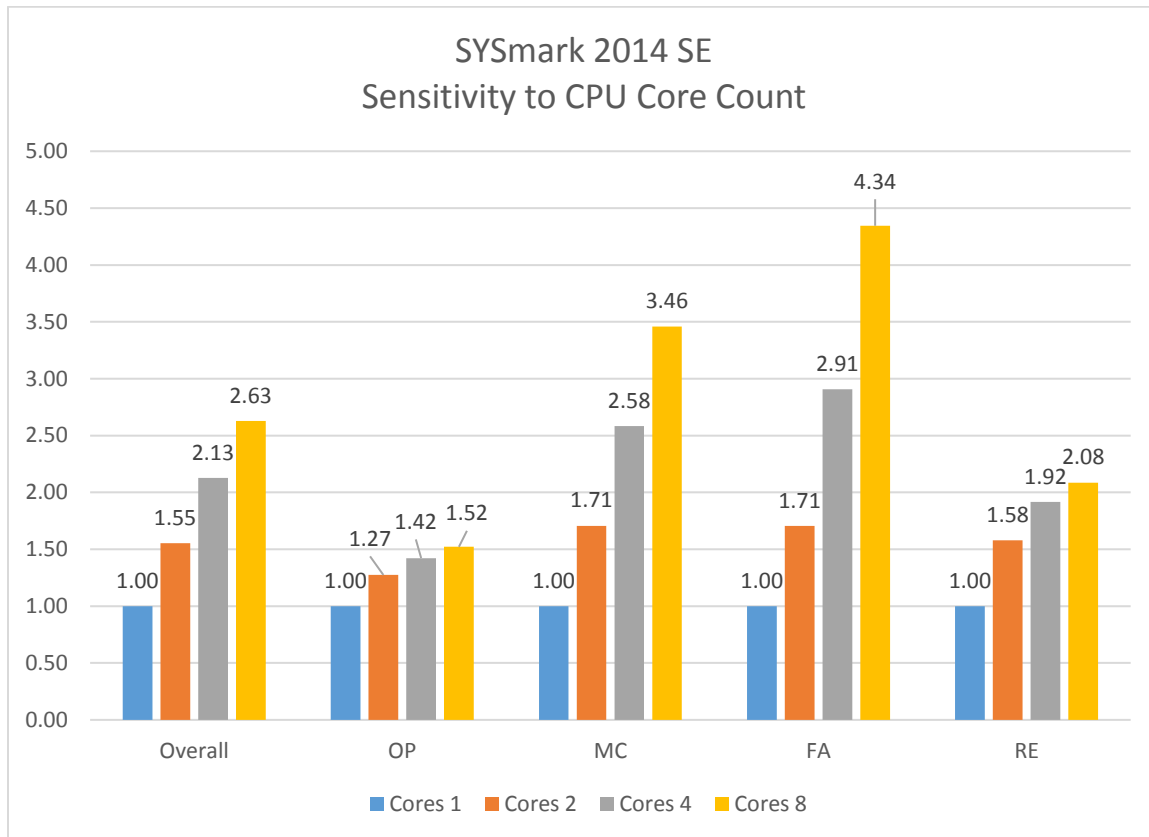
**Figure 2: CPU Core Count Sensitivity**

3.1.4   Sensitivity to Storage

The primary storage device is changed according to the figure below. A Western Digital Black 7200RPM 1TB SATA hard drive (WD HDD), Seagate 5400RPM 1TB/8 GB NAND Flash SATA hybrid drive (Seagate Hybrid), and Intel 730 240GB SATA SSD (Intel SSD) devices were used in this test.
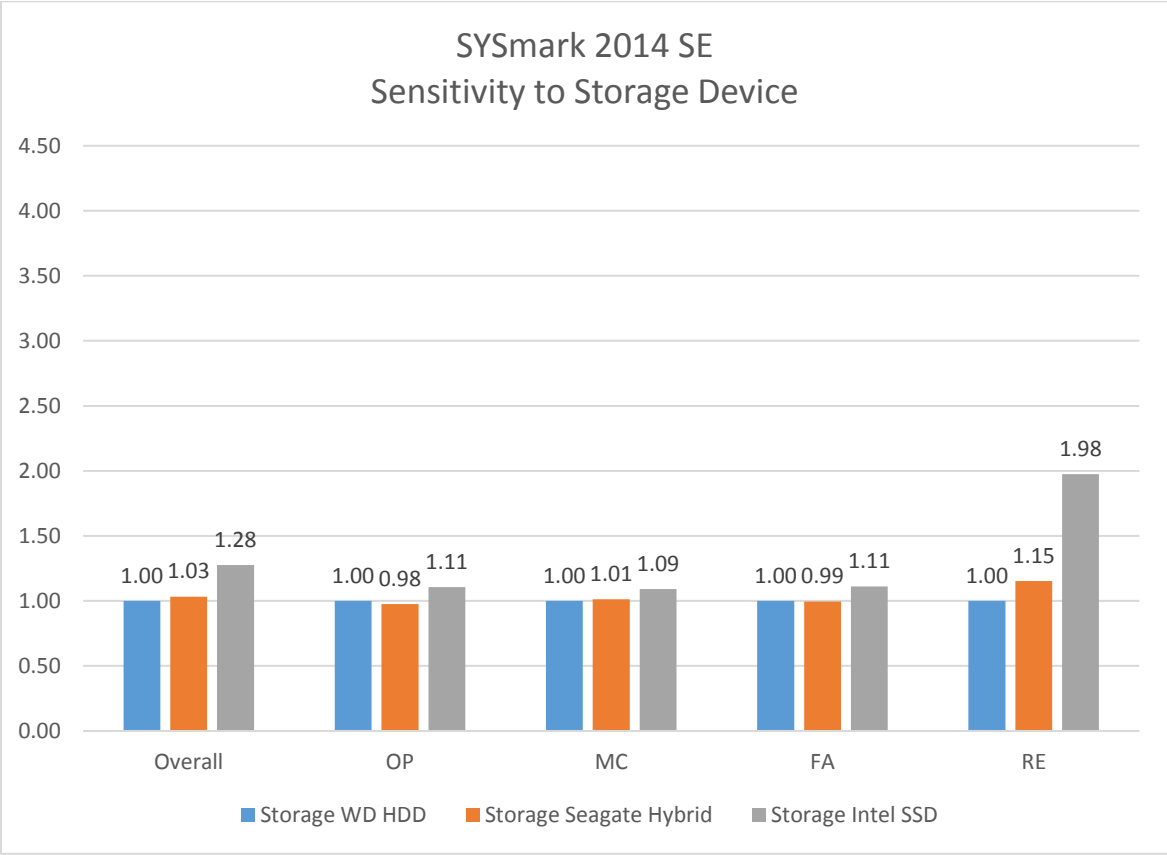
Figure 3: Storage Sensitivity

3.1.5   Sensitivity to System Memory Capacity

The total system memory is changed from 2GB (Physically 4GB, limited by OS to 2GB) single channel, 4GB single channel, 8GB single channel, 8GB dual channel, and 16GB dual channel. The memory type for all tests is DDR4-2133.
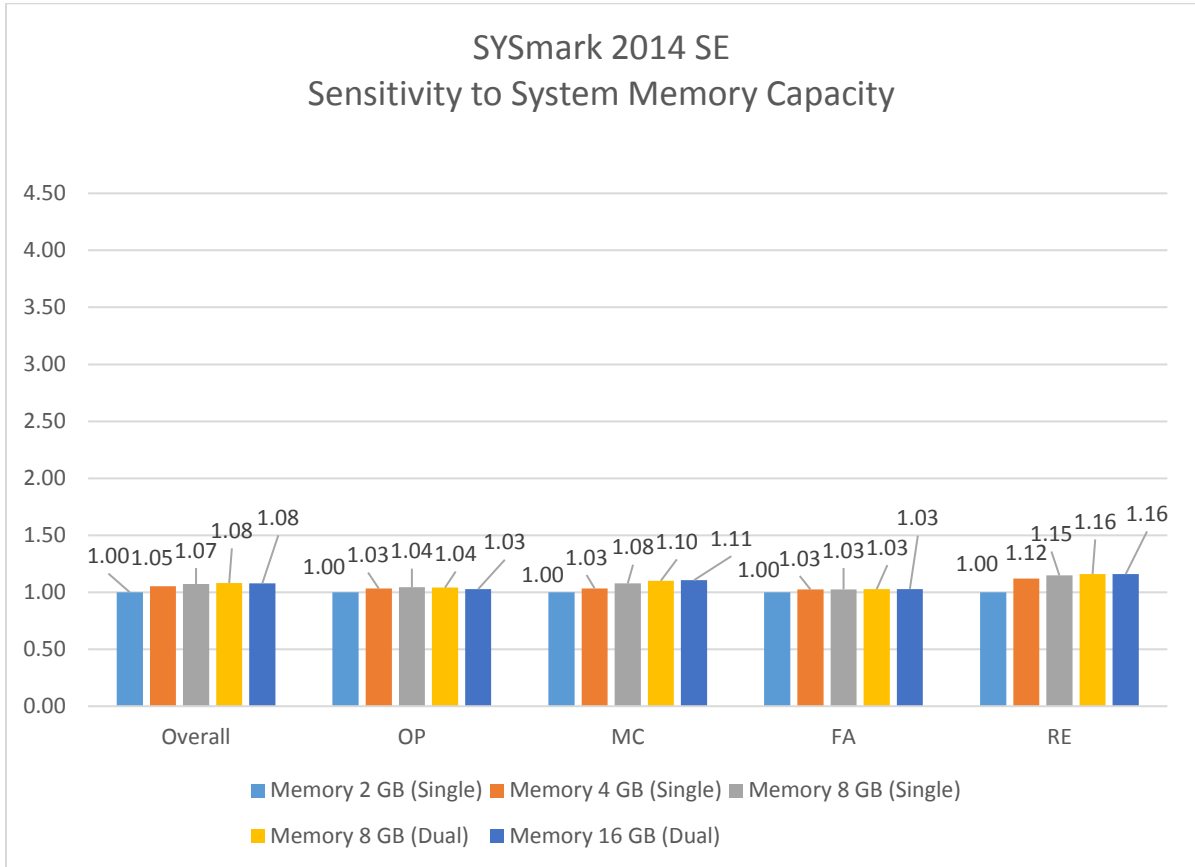
Figure 5: System Memory Sensitivity

3.2   NVMe Storage Devices

NVMe devices may show lower than expected performance in some configurations due to the way Force Unit Access (FUA) write requests are handled by the Windows operating system. Therefore, BAPCo recommends that users install the storage driver provided by the manufacturer of their NVMe device. In cases where the manufacturer does not provide an NVMe driver, users may disable the 'Windows Write cache buffer flushing' setting on the NVMe drive prior to testing.

3.3   Disk Cache Methodology

This section explains the BAPCo Conditioning Run and disk caching methodology used in SYSmark 2014 SE.

Conditioning Run

The Conditioning Run is an option which runs a single iteration of the benchmark prior to running scored benchmarked iterations. The results of the Conditioning Run are ignored when generating SYSmark 2014 SE scores. The Conditioning Run option is selected by default, but can be disabled by the user.
The goal of the Conditioning Run is to allow the operating system to optimize the performance of the system based on what it learns from a single iteration of the benchmark. This models a user experience where the applications have been used in the past.

BAPCo Disk Caching Methodology

Microsoft Windows uses a disk caching technology called SuperFetch. SuperFetch attempts to improve the efficiency of I/O operations by loading commonly used libraries and application components into memory before they are required. It does so by continually analyzing application behavior and usage patterns. Windows is able to allocate any memory not used by applications to be used by SuperFetch. SuperFetch is only enabled on systems that use hard disk drives. Systems with solid state devices (SSDs) do not use SuperFetch.

BAPCo has decided on a disk caching methodology that enables repeatable and consistent results with low run to run variation that models a real user experience. The disk caching methodology used varies depending on whether the Conditioning Run option was selected:

Option 1: Disk Caching Methodology when Conditioning Run is disabled

When a Conditioning Run is disabled, the SuperFetch cache is cleared prior to running each scenario within the benchmark. SuperFetch is able to cache applications that are used within the scenario, but is not able to cache information between scenarios or iterations. This models the case of a newly installed system where the user has not run the applications before.
This methodology is implemented using the following procedure prior to each scenario start:

      a.   Stop SuperFetch service
      b.   Delete prefetch folder
      c.   Restart SuperFetch service

Note: The benchmark results for a hard disk drive system are expected to be slightly lower when the Conditioning Run option is not selected.

**Option 2: Disk Caching Methodology when Conditioning Run is enabled**

When a Conditioning Run is selected, a snapshot is taken of the SuperFetch cache after each scenario within the Conditioning Run. Those snapshots are used to restore the SuperFetch cache prior to running each scenario within the benchmark (see Figure 1). This enables SuperFetch to use what is learned from the Conditioning Run to optimize the performance of applications. Since the corresponding cache snapshot is restored before each scenario, SuperFetch is still not be able to cache additional information between scenarios or iterations. This allows us to take advantage of SuperFetch caching (on hard disk drive systems) while still maintaining consistent results regardless of the number of benchmark iterations. This methodology is implemented using the following procedure prior to each scenario start:

a. Stop SuperFetch service
b. Delete prefetch folder
c. Restore the scenario Conditioning Run snapshot to the prefetch folder
d. Restart SuperFetch service

Conditioning Run:

Iteration 1-N:
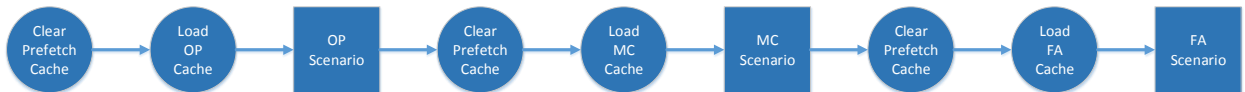
Figure 1: Flowchart of SYSmark 2014 SE with the Disk Caching Methodology

3.4 System Configuration Tool Items List

The following is a list of configuration options with their priorities that can be applied using the System Configuration tool. The options that appear in the System Configuration tool window may vary by operating system.

Required
Make configuration changes that are required for the benchmark to run. These items are checked by default.

Recommended
Make configuration changes that are recommended in order to obtain repeatable scores. Recommended items are checked by default. Recommended items may be disabled by unchecking the corresponding box.

Optional
Make configuration changes that are typically not needed to obtain repeatable scores, but which may be needed in some rare cases. Optional items are not checked by default.

Create BAPCo Power Scheme – Recommended
Creates a new power scheme named "BAPCo SYSmark 2014 SE" 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 checked, all power profile configuration changes will be applied to the currently active power scheme.

Set Power Plan Type to "High Performance" – Recommended
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 unchecked, "Set Power Plan Type" will be applied to the currently active power scheme.

Disable User Account Control (UAC) – Required
Disables User Account Control to prevent Administrator elevation prompts from appearing during benchmark runs. The system must be rebooted to apply this change.

Disable Windows Update – Required
Stops and disables the Windows Update service. Prevents the Windows Update service from starting and/or checking for updates during benchmark runs.

Disable Sleep and Hibernate – Required
Prevents the system from going to sleep or hibernate and disables the "Require password on wake" setting.

Disable Low Battery Action – Required
Prevents the system from shutting down or posting a warning when the battery reaches the low level.

Disable Network Proxies – Required
Disables proxy server configuration for Internet connection settings.

Set DPI scaling to 100% - Required
Sets the desktop scaling to 100%. Prevents failures on higher resolution displays

Disable Windows Sidebar/Gadgets – Recommended
Turns off Gadgets.

Disable Windows Pop-ups – Recommended
Disables all pop up notifications (Balloon tips) in the systray

Disable Incoming Remote Desktop Connections – Recommended
Denies remote desktop connection requests from remote systems.

Disable Windows Error reporting – Recommended
Prevents Windows Error reporting tool from presenting error reporting windows.

Disable Screen Saver and Monitor Timeout – Recommended
Turns off the screen saver. Disables display timeout in the power profile for both AC and DC options.

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

Disable Desktop Slide Show – Recommended
Prevents the desktop background from changing.

Disable Disk Defrag – Recommended
Disables the Defrag scheduled task.

Set Windows Firewall Open Policy – Recommended
Configures the Windows firewall to allow all inbound/outbound traffic.

Disable Windows Defender – Recommended
Configures a group policy to disable Windows Defender.

Disable Lock Screen Win 8 and Win 8.1 – Optional
Disables the lock screen

Disable Hard Disk Timeout – Optional
Prevents the hard disk from going to sleep

Ignore Laptop Lid Close – Optional
Prevent closing of Laptop lid from suspending the system.

Set Maximum Display Brightness – Optional
Sets display brightness to 100%. Sets dimmed display brightness to 100%. Sets "Dim Display After" value to "Never".

3.5   Application Contribution Analysis

The following charts shows the approximate contribution of each application to the SYSmark 2014 SE version 2.0.0.70 scenario ratings on the calibration system (see section 2.7).

Due to system implementation differences, this chart is accurate for the calibration system only. These contributions will vary from one system to the next.
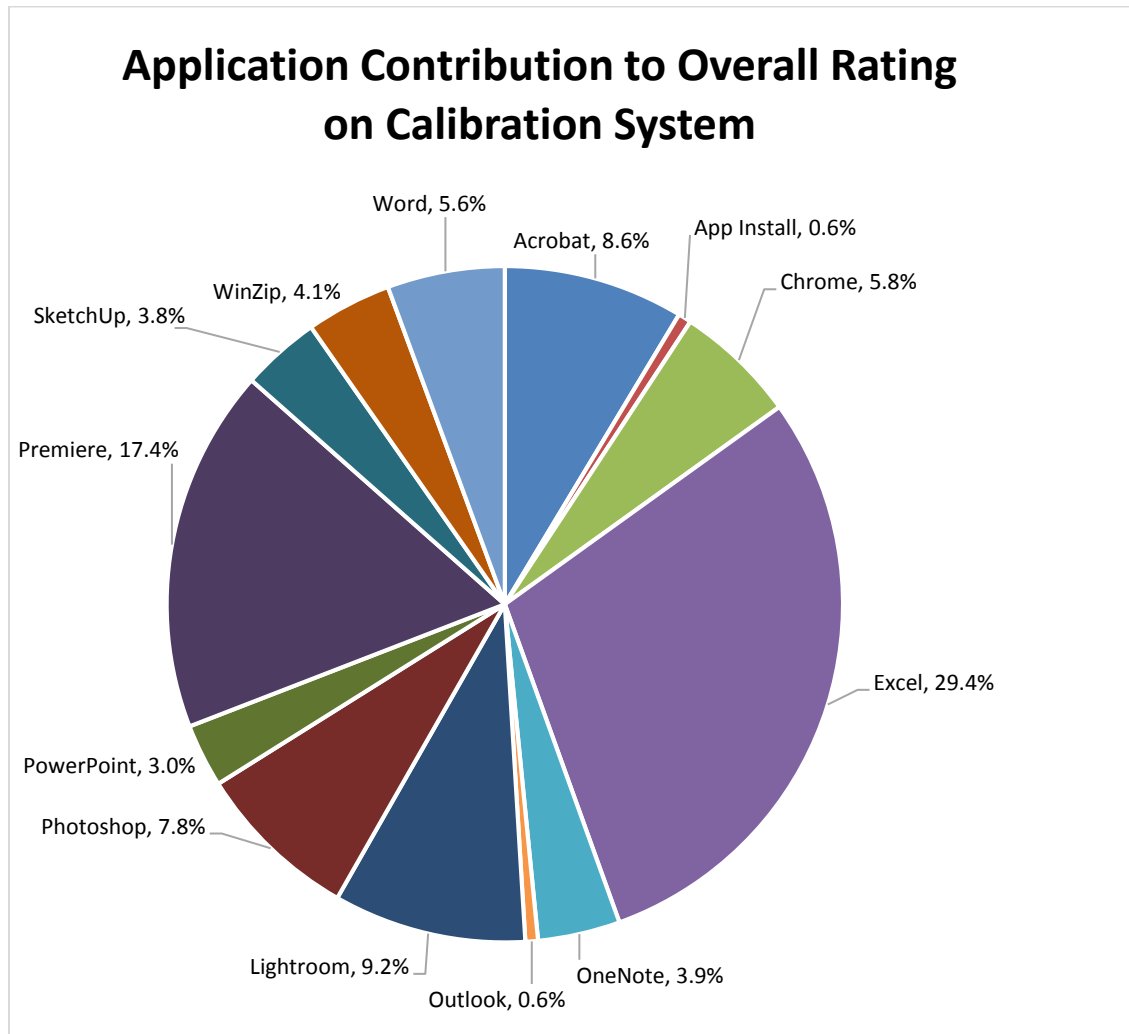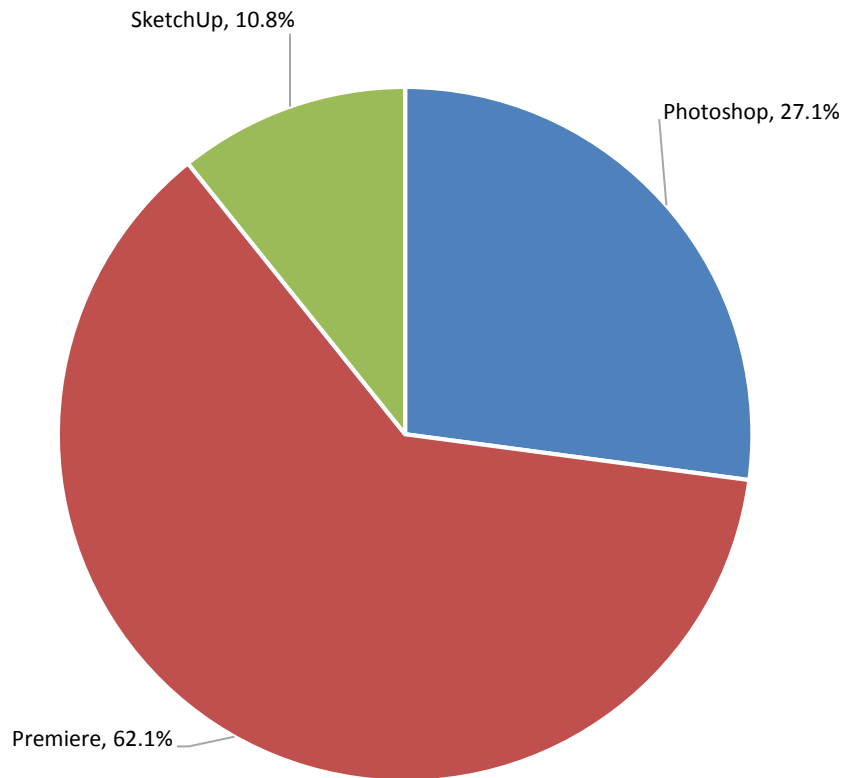

Figure 1: Application Contribution to Overall Rating

Figure 2: Application Contribution to Office Productivity Scenario Rating

Application Contribution to Media Creation Scenario Rating on Calibration System

Figure 3: Application Contribution to Media Creation Scenario Rating

Application Contribution to Data/Financial Analysis Scenario Rating on Calibration System
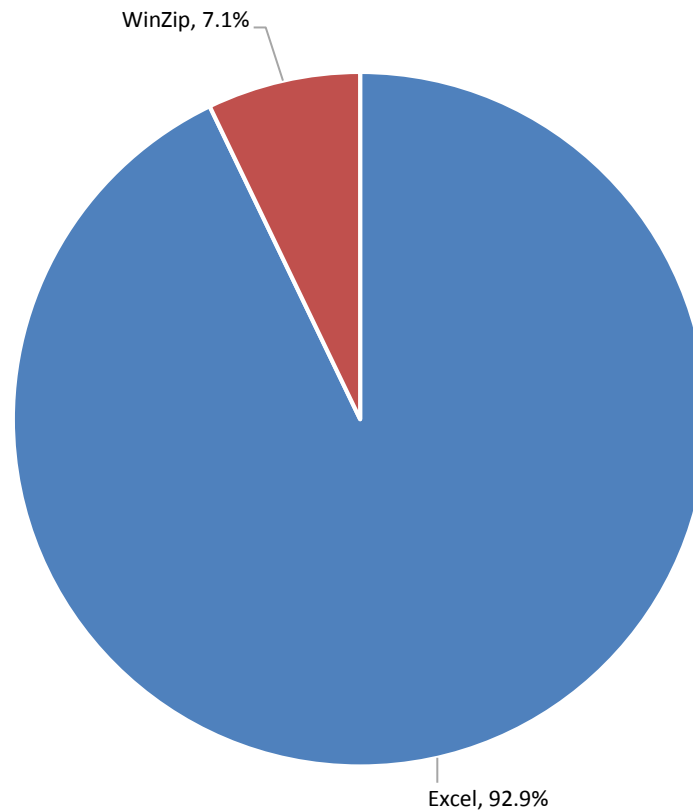
Figure 4: Application Contribution to Data/Financial Analysis Scenario Rating

Application Contribution to Responsiveness Scenario Rating on Calibration System

Acrobat, 0.6%
Word, 0.7%
App Install, 2.5%
WinZip, 7.2%
SketchUp, 4.3%
Chrome, 20.5%
Premiere, 7.5%
PowerPoint, 3.7%
Photoshop, 4.3%
Excel, 1.2%
Outlook, 0.3%
OneNote, 10.4%
Lightroom, 36.9%
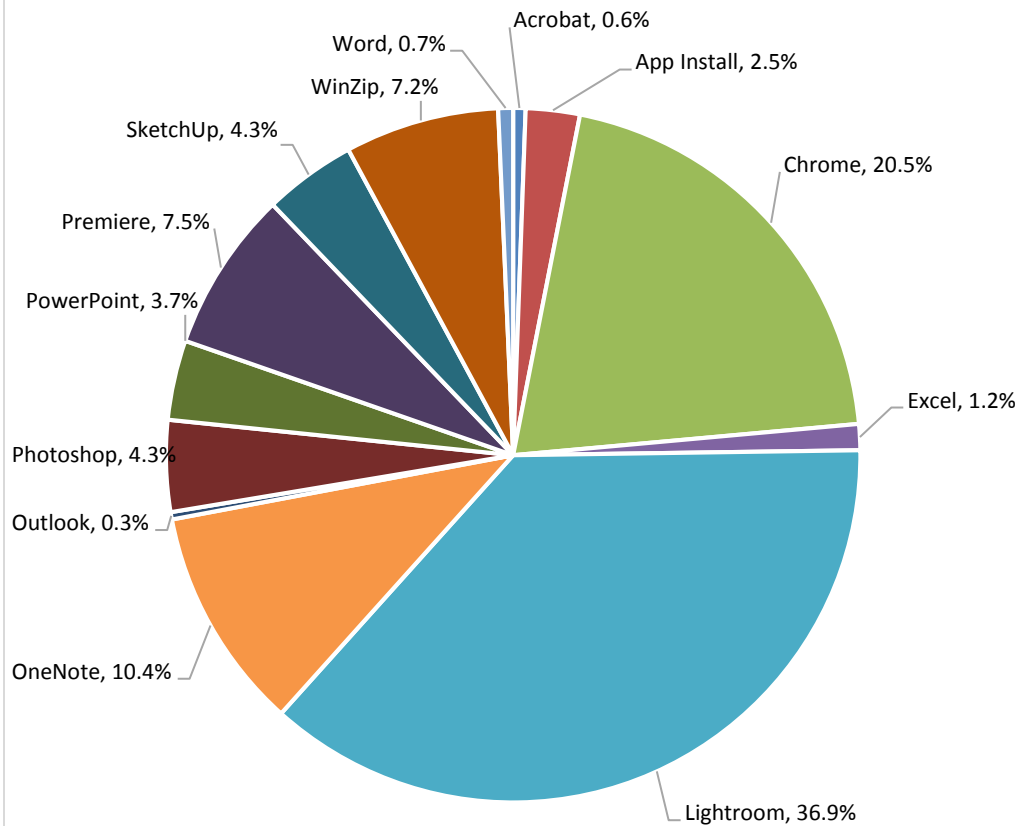
Figure 5: Application Contribution to Responsiveness Scenario Rating

APPENDIX A: Application Program Versions

The following applications are installed and used by SYSmark 2014 SE version 2.0.0.70:

- Adobe® Acrobat® Pro XI
- Adobe® Photoshop® CS6 Extended
- Adobe® Photoshop® Lightroom® 6
- Adobe® Premiere® Pro CS6
- GIMP 2.8.16
- Google® Chrome® 53
- Microsoft® Excel® 2013
- Microsoft® OneNote® 2013
- Microsoft® Outlook® 2013
- Microsoft® PowerPoint® 2013
- Microsoft® Word® 2013
- Trimble® SketchUp™ Pro 2013
- WinZip® Pro 17.5
- WinZip® Command Line 3.2

APPENDIX B: Minimum System Requirements

SYSmark 2014 SE has the following requirements:
- **CPU**: 1.0 GHz AMD® or Intel® dual core processor
- **RAM**: 2 GB
- **Drive Space**: 25 GB of free space on the primary drive
- **Operating System**: Microsoft® Windows® 10 64-bit, Microsoft® Windows® 8.1 64-bit, or Microsoft® Windows® 7 64-bit
- **Video Resolution**: 1024 x 768
- **Graphics**: DirectX 9 compatible

APPENDIX C: Screenshots

The screenshots below are included to illustrate the user interface and workloads included in SYSmark 2014 SE. These screenshots may not accurately depict future releases of SYSmark 2014 SE.
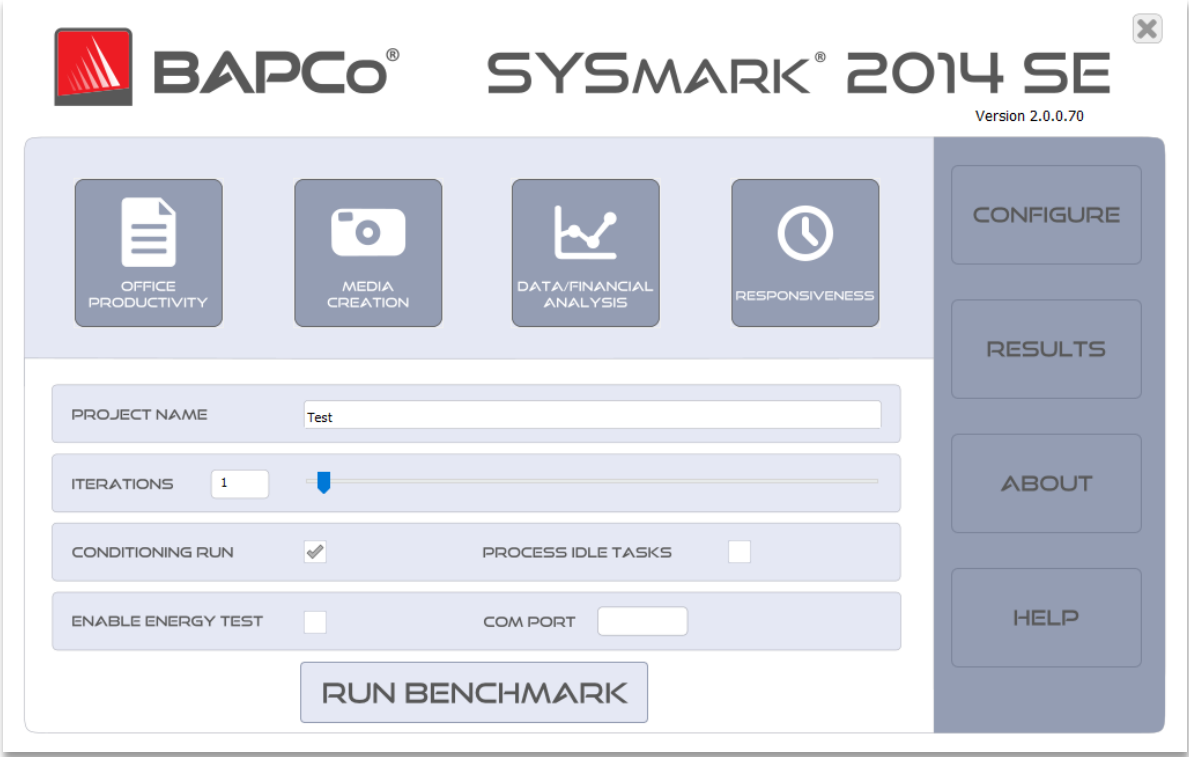
Figure 1: Test Setup
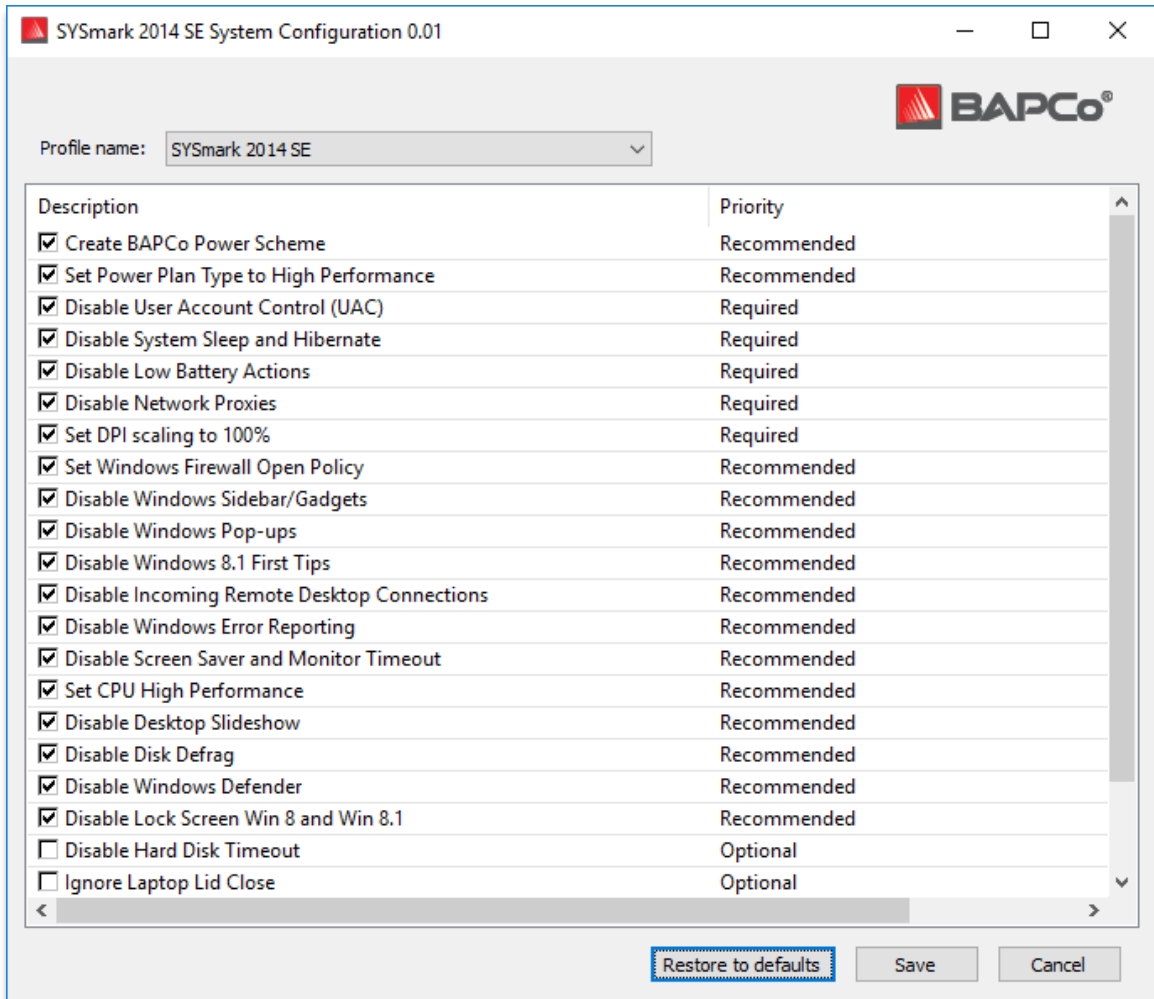
Figure 2: System Configuration
Built-in tool simplifies management of system configuration

Figure 3: Heads-Up Display
Displayed atop other windows on the top-right of the desktop during testing
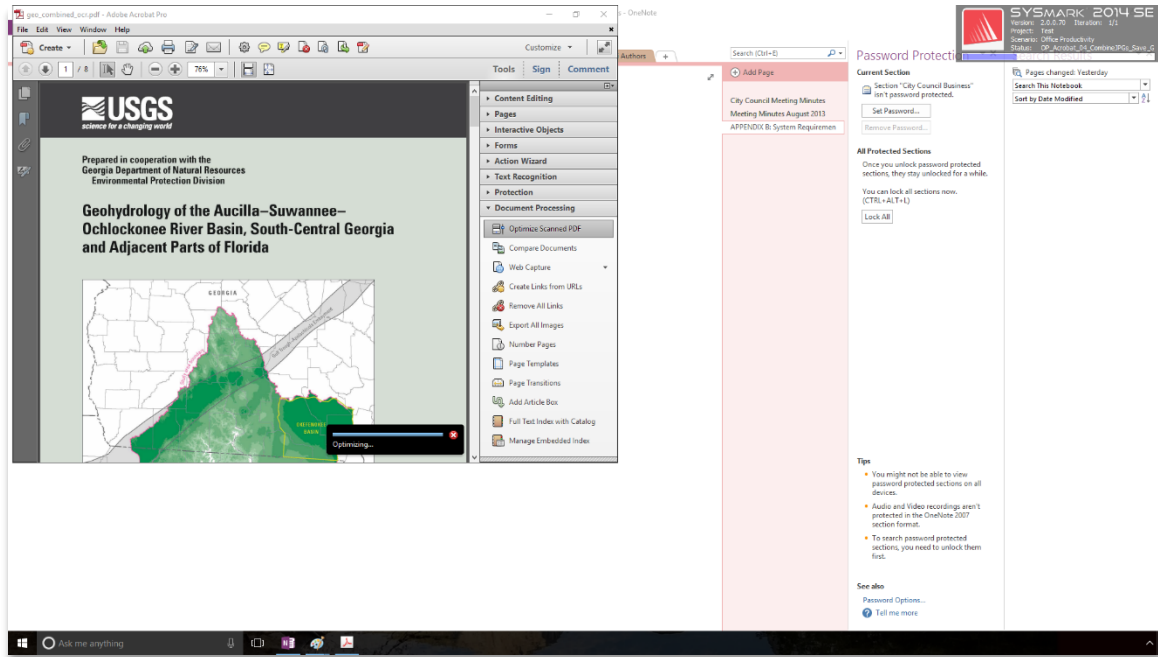
Figure 4: Office Productivity Scenario
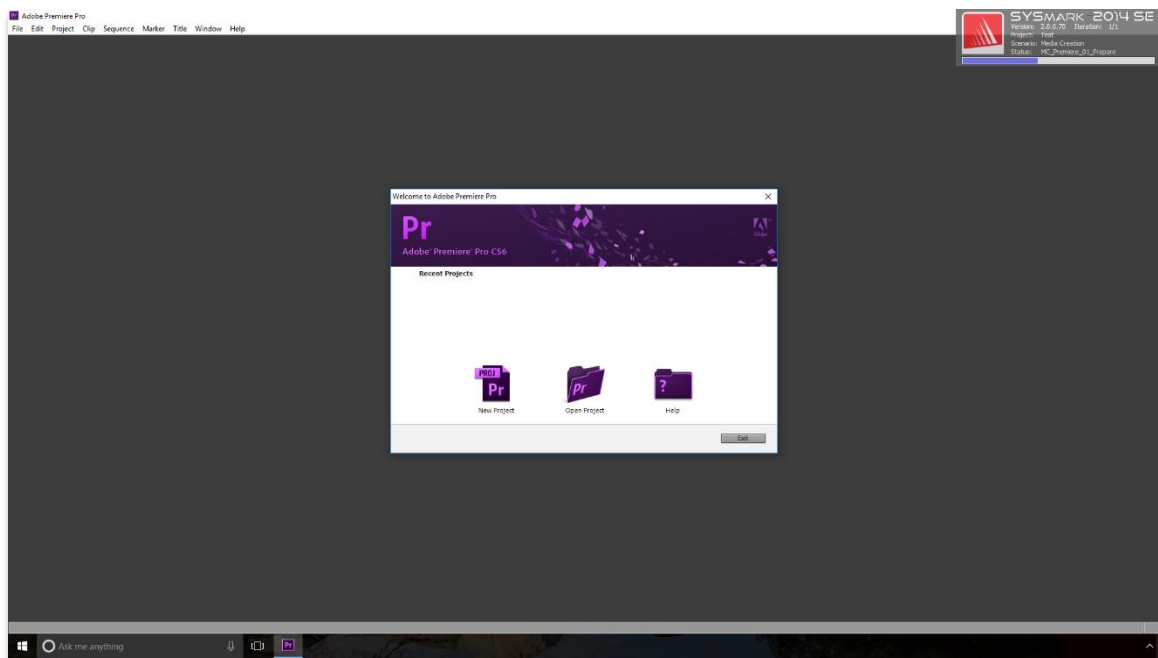
Figure 5: Media Creation Scenario
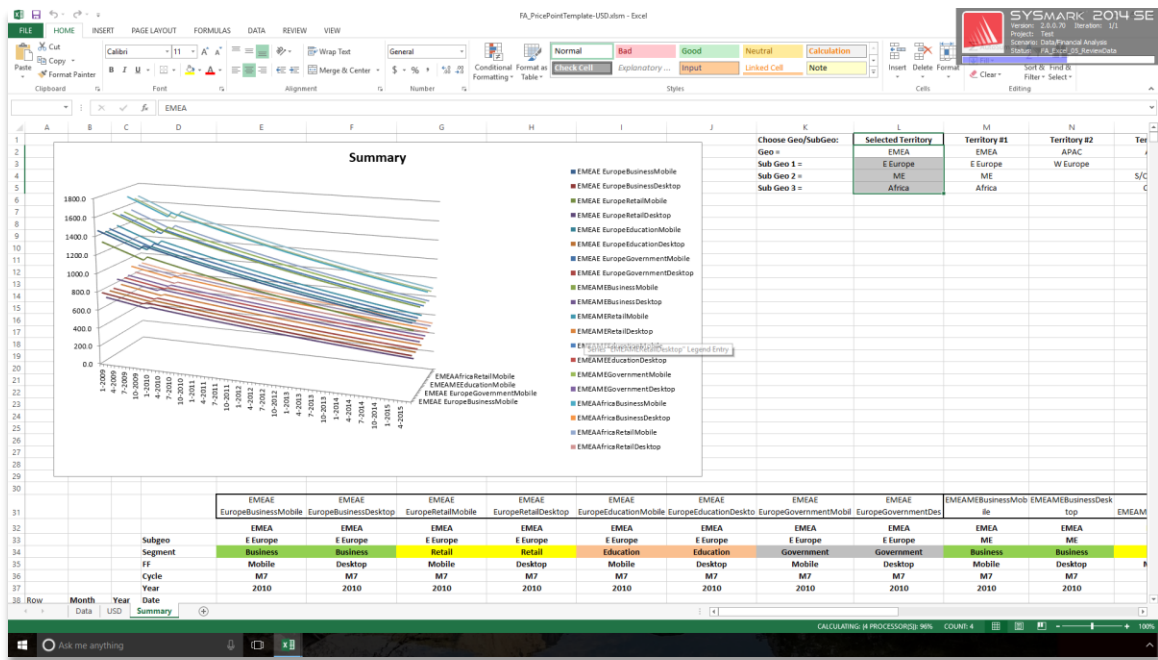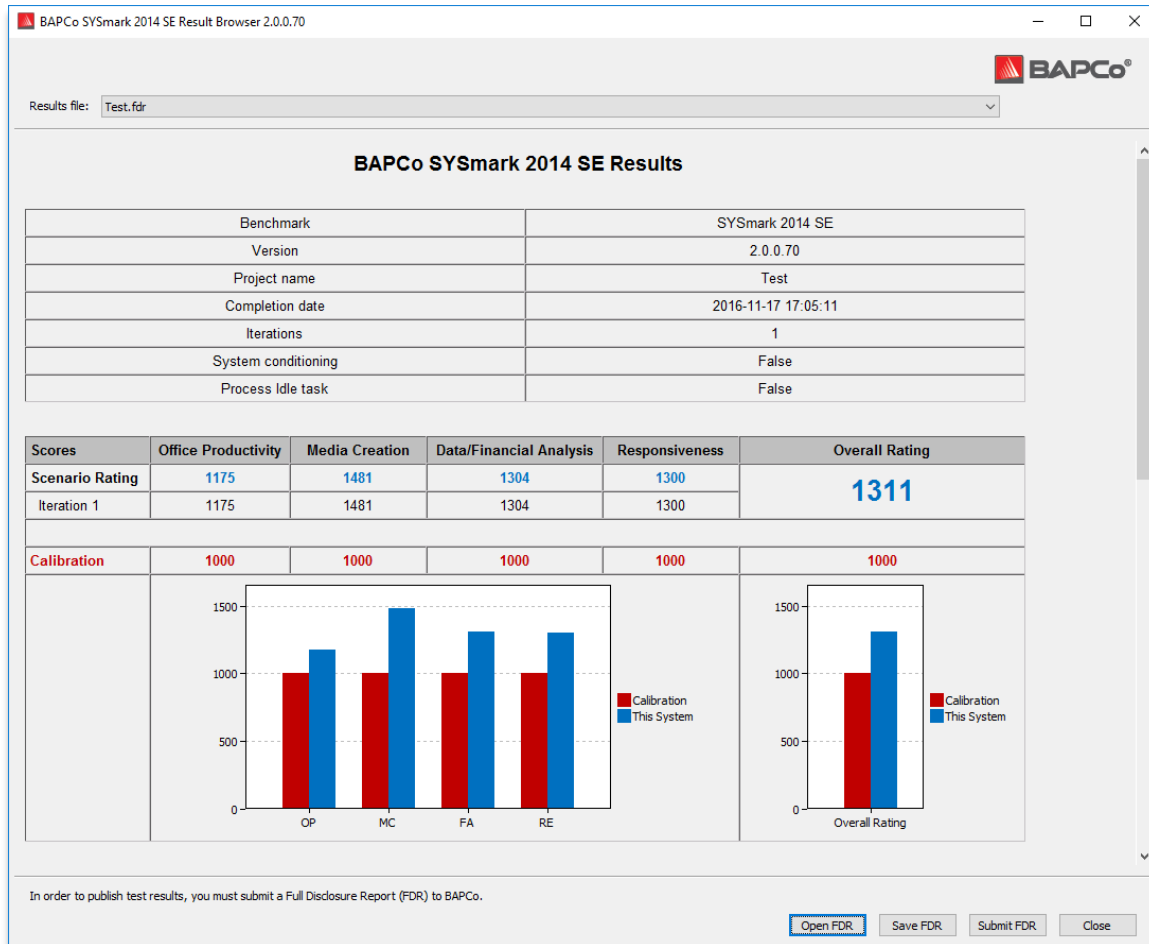
Figure 6: Data/Financial Analysis Scenario
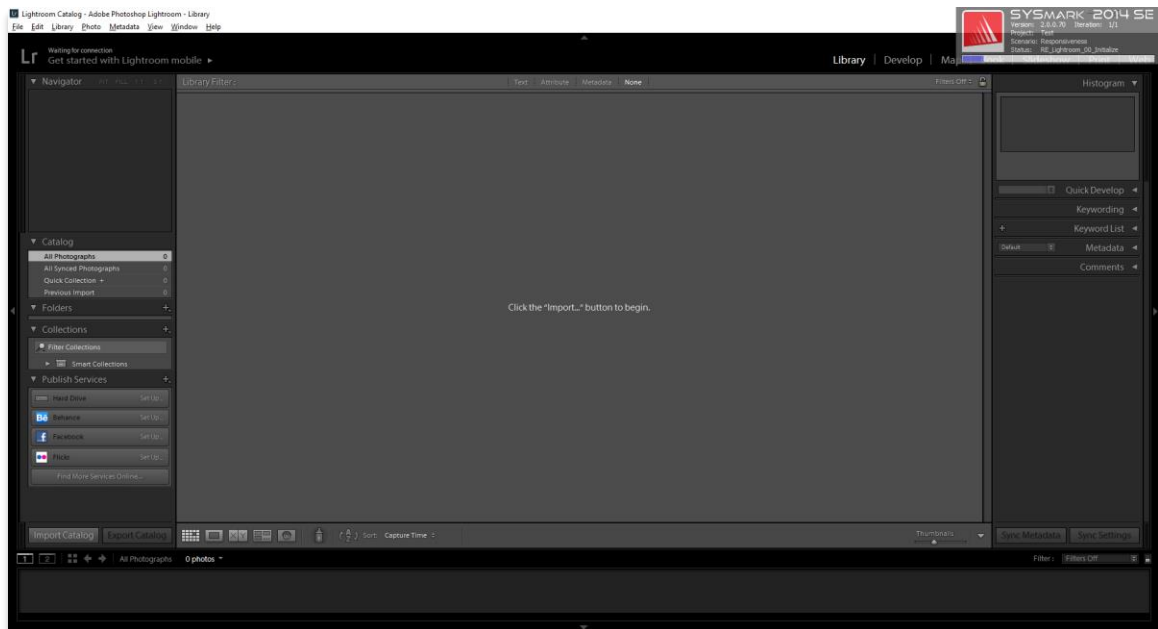
Figure 7: Responsiveness Scenario

Figure 8: Result Browser

APPENDIX D: Application Workload Datasets

The following tables show the type of data inputs used by each application in each scenario for their respective workloads

Application	Input File Types	Key File Attributes
Adobe® Acrobat®	.jpg	• 8 pages (.jpg files) totaling 2.7MB in size for OCR
Google® Chrome®	.html	• 22 HTML pages for browsing
Microsoft® Excel®	.xlsx	• Calculation data sheet consisting of 11,280 rows by 13 columns
Microsoft® OneNote®	.onepkg	• 10 MB One Note Single File Package
Microsoft® Outlook®	.pst	• 90 MB .pst Outlook Data File
Microsoft® PowerPoint®	.pptx	• 20 MB Presentation File with 20 slides
Microsoft® Word®	.xlsx, .dotx, .pdf	• 1,001 rows for the Mail Merge • 2.5 MB PDF file for the OCR style conversion
WinZip®	.zip	• 200 MB .zip file used for data decrypt/decompress. 106 items in archive with various file types (i.e. .pdf, .docx, .mts, .jpg, etc.)

Table 1: Office Productivity Application Workload Datasets

Application	Input File Types	Key File Attributes
Adobe® Photoshop®	.jpg	• 3 .jpg images totaling 8.83 MB for the HDR • 4 .jpg images totaling 3.81 MB for the Pano
Adobe® Premiere®	.mp3, .mp4	• 1 .mp3 file totaling 2.18 MB for the audio soundtrack • 9 .mp4 files totaling 366 MB for the video files
Trimble® SketchUp™	.dxf, .skp	• 4 SketchUp CAD files totaling 32.7 MB

Table 2: Media Creation Application Workload Datasets

Application	Input File Types	Key File Attributes
Microsoft® Excel®	.xlsm	• Calculation data sheet consisting of 61,200 rows by 16 columns
WinZip®	.zip, .jpg, .pdf, .xlsm, .xlsx, .pst, .pptx, .onepkg	• 31 files totaling 179 MB for encrypt/compress • 260.39 MB .zip file used for data decrypt/decompress. 27 items in archive with various file types (i.e. .pdf, .docx, .mts, .jpg, etc.)

Table 3: Data/Financial Analysis Application Workload Datasets

Application	Input File Types	Key File Attributes
Adobe® Acrobat®	.pdf	• 2.5 MB .pdf file loaded
Adobe® Photoshop®	None	None
Adobe® Photoshop® Lightroom®	.jpg	• 42 .jpg files imported totaling 56.2 MB
Adobe® Premiere®	.mp3, .mp4	• 1 .mp3 file totaling 2.18 MB for the audio soundtrack • 9 .mp4 files totaling 366 MB for the video files
File Copy	Various	• 1,037 files being copied totaling 2.72 GB
GIMP	.exe	• Installer file totaling 92.3 MB
Google® Chrome®	.html	• 35 HTML pages for browsing
Microsoft® Excel®	.xlsx	• 3.05 MB .xlsx workbook being launched
Microsoft® OneNote®	.onepkg	• 10 MB One Note Single File Package
Microsoft® Outlook®	None	None
Microsoft® PowerPoint®	.pptx	• 20 MB Presentation File with 20 slides
Microsoft® Word®	None	None
Trimble® SketchUp™	None	None
WinZip®	.zip, .jpg, .pdf, .xlsm, .xlsx, .pst, .pptx, .onepkg	• 200 MB .zip file used for data decrypt/decompress. 106 items in archive with various file types (i.e. .pdf, .docx, .mts, .jpg, etc.) • 31 files totaling 179 MB for encrypt/compress • 260.39 MB .zip file used for data decrypt/decompress. 27 items in archive with various file types (i.e. .pdf, .docx, .mts, .jpg, etc.)

Table 4: Responsiveness Application Workload Datasets