Benchmark**XPRT**

Exploring the HDXPRT 2014 Benchmark

HDXPRT 2014 evaluates PC
performance by using common
consumer applications for
media-oriented operations such
as photo editing, music editing,
and video conversion.

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HDXPRT

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INTRODUCTION

This paper explains the concepts behind HDXPRT 2014. HDXPRT, the High Definition Experience & Performance Ratings Test, is a benchmark designed to assess how well a PC can handle real-world media scenarios while using common consumer applications. It completes photo editing, video conversion, and music editing tasks to measure a system's performance. After testing completes, it presents results that are relevant and easy to understand. The following sections explain the development guidelines common to all BenchmarkXPRT benchmarks in general, as well as the specific goals and assumptions of HDXPRT 2014. Finally, we discuss the structure of the tests, how the benchmark calculates results, how to share results, and how to participate in the BenchmarkXPRT community.

DEVELOPMENT PROCESS

We use a unique design methodology. Instead of the closed, bottom-up approach used by many benchmarking efforts, we are using an open, top-down approach that includes the Development Community. Our approach starts by taking input from the community and examining the most common use cases. We use community input and experimentation to create a design document. The design document drives the implementation of the community preview. After we release the community preview to the community, we take input from the preview period and finalize the code to create a general release.

HDXPRT 2014: THE DETAILS

HDXPRT 2014 shares the common characteristics of the BenchmarkXPRT family of benchmarks:

- It is easy to use.
- It contains relatable workloads.
- It produces easy-to-understand results.

In addition to these core characteristics, HDXPRT 2014 had the requirement that it be smaller and faster than HDXPRT 2012, without compromising the value of the test. We also started with the requirement that the benchmark be available for download. As the Table 1 shows, we succeeded in meeting these requirements.

	HDXPRT 2012	HDXPRT 2014
Size	11.1 GB (distributed on 2 DVDs)	4.84 GB (download), 5.23 GB (on disk)
Time to install	Approx. 40 minutes	Less than 10 minutes
Time to run	5 - 6 hours	1.5 - 2 hours
Available to download	No	Yes

Table 1: Comparison of HDXPRT 2012 and HDXPRT 2014.

Figure 1: The HDXPRT 2014 home screen.

The applications

HDXPRT is unique among the BenchmarkXPRT benchmarks in that it runs real commercial applications to perform the work in its scenarios. The benchmark includes trial versions of the applications it uses. Including the trial software keeps the versions of the applications constant over time, which keeps the results comparable, and means that you do not have to buy any applications to run HDXPRT 2014. The table below lists the five applications in HDXPRT 2014 and links to the application vendor pages.

Application	Description
Adobe Photoshop® Elements 12	A leading consumer photo-editing software application from Adobe that lets users create, edit, organize, and share images.
Apple® iTunes® 11.1.3.8	A digital media player application used for playing and organizing digital music and video files. The application also acts as an interface to manage content on the Apple iPod®, iPhone®, and iPad® product lines.
Audacity® 2.0.5	An open-source application used for recording and editing sounds. It is free to use and supports Microsoft® Windows®, Linux®, Mac® OS X®, and other operating systems.
CyberLink MediaEspresso 6.7	A media converter that supports a range of media formats—video, photo, and music files—and a range of devices including smart phones such as the Apple iPhone, media players such as the Apple iPod and iPad, and game consoles such as the Sony®

	PlayStation® 3. MediaEspresso also lets users share media on Facebook and YouTube and output media to iTunes.
HandBrake 0.9.9	An open-source, GNU Public Licensed, multithreaded, multiplatform video transcoder. It accepts most common multimedia files and produces MPEG-4, H.264, or Theora video formats and all common audio formats, including AAC, CoreAudio AAC, MP3, and Vorbis.

Table 2: Application components in HDXPRT 2014.

Because these are trial versions of the applications, the trial period can expire. If this happens, you will need to reinstall HDXPRT. See the HDXPRT 2014 User Manual, located in Program Files (x86)\HDXPRT\Docs, for more details.

The test scenarios

The HDXPRT 2014 test comprises three categories all based on common media creation and manipulation tasks. The categories are Edit Photos, Convert Videos, and Edit Music. We explain the categories in more detail below.

Edit Photos category

The Edit Photos category comprises three tasks. Adobe Photoshop Elements is the only application HDXPRT uses for these tasks.

- Create a single High Dynamic Range[1] (HDR) photo from a set of three photos of a scene taken at different exposures.
- Create a single panoramic photo of a scene from a set of seven photos covering different parts of the scene.
- Watermark a set of 20 photos.

Edit Music category

The Edit Music category comprises five tasks. The five tasks in this category involve music editing and music composition.

- Use iTunes to convert two songs in WAV file format to MP3 and measure the conversion time.
- Use Audacity to load five different music tracks composed in WAV format and measure the load time of these tracks.
- Use Audacity to load a music track, export it to a music file in WAV format, and measure conversion time.
- Repeat the conversion to WAV format for four more files.
- The last task in this category also uses Audacity to create a podcast in WAV format that contains the five different tracks we just converted.

Convert Videos category

The Convert Videos category comprises three tasks. Each converts a video from one format to another and measures the conversion time.

- Use HandBrake to convert a 1-minute video from MP4 to M4V.

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[1] http://en.wikipedia.org/wiki/High-dynamic-range_imaging

- Use CyberLink MediaEspresso 6.7 to convert a 2-minute video from MTS to MP4.
- Use CyberLink MediaEspresso 6.7 to convert a 2-minute video from MOV to M2TS.

SCORING

HDXPRT produces a single overall performance score. The performance qualifier is a simple number based on the speed with which the device completes its work. The benchmark uses time spent in the workload harness issuing commands to the applications when calculating the score. See Figure 2 for an example of the results screen.
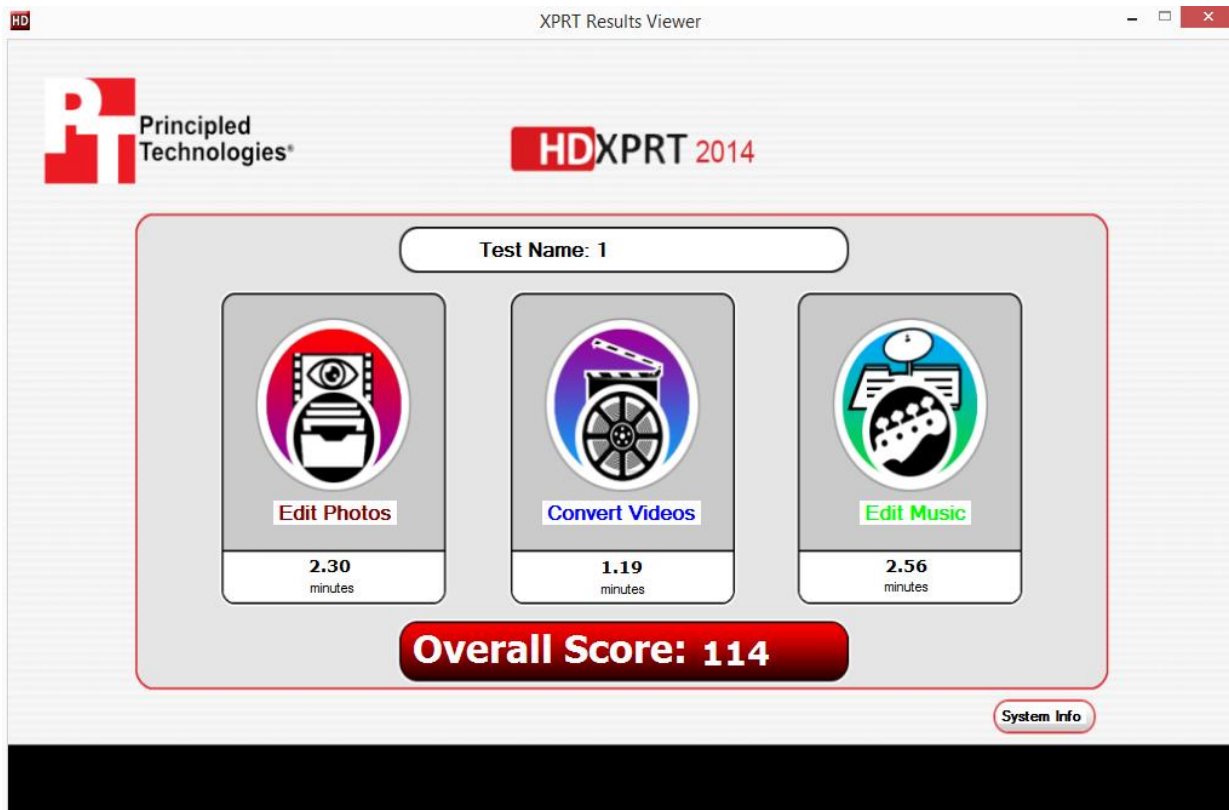

Figure 2: The HDXPRT 2014 results screen.

By default, HDXPRT runs for one iteration. However, if desired, you may run a test for more iterations. For test runs using multiple iterations, HDXPRT uses the median times for each category to calculate the overall score. Note that the example on the page that follows (see Table 3) represents results for the default 1 iteration test.

HDXPRT 2014 stores results in the C:\Program Files (x86)\HDXPRT\Reports directory. The result file for each run is in a directory whose name matches the test name you entered. The timings HDXPRT uses to compute its result are stored in a file named <Test name>_IntermediateData.CSV. For example, if you named the test Test7, the file would be Test7_IntermediateData.CSV. The timing for each task is in milliseconds at the end of each line. Table 3 below shows the relevant fields for our test:

Category name	Description		Time (ms)
Edit Photos	CreatePhoto	PSE11_HDR	30529
	HDxPRT	PSE_CreatePano	81231.67783
	CreatePhoto	PSE11_WM	24848
Edit Music	Audio Encoder	Encode IT Audio	36083
	Audacity Load Files	Import File1	280.641997
	Audacity Load Files	Import File2	280.681842
	Audacity Load Files	Import File3	281.081505
	Audacity Load Files	Import File4	281.082713
	Audacity Load Files	Import File5	281.134029
	Audacity Create Songs	Load app	314.987669
	Audacity Create Songs	Load Project1	281.752239
	Audacity Create Songs	Create song1	16041.78834
	Audacity Create Songs	Load app	312.691115
	Audacity Create Songs	Load Project2	281.684019
	Audacity Create Songs	Create song2	10762.57897
	Audacity Create Songs	Load app	328.195871
	Audacity Create Songs	Load Project3	281.577764
	Audacity Create Songs	Create song3	9477.235804
	Audacity Create Songs	Load app	313.11855
	Audacity Create Songs	Load Project4	281.695489
	Audacity Create Songs	Create Song4	10972.06101
	Audacity Create Songs	Load App	317.215399
	Audacity Create Songs	Load Project5	281.220361
	Audacity Create Songs	Create Song5	6191.735667
	Audacity Create Podcast	Load App	313.079911
	Audacity Create Podcast	Load Project	282.192351
	Audacity Create Podcast	Create Podcast	51364.21566
Create Video	CreateVideo	HB_MP4_to_universal	38643
	CreateVideo	ME6_1080p_720p	23549
	CreateVideo	ME6_1080p_480p	8372

Table 3: Application components in HDXPRT 2014.

Using the data above and converting the timings to minutes, the total time in this iteration for Edit Photos was approximately 2.277, for Edit Music it was 2.431, and for Create Video it was 1.176.

Overall score:

The overall score gives the test device's performance relative to a calibration system. We give the specifications for the calibration system in Appendix A.

By definition, the calibration has an overall score of 100. You will find the scores for the calibration system in the Calibration.xml file in HDXPRT's bin directory, but we reproduce them here.

Edit Photos: 2.71

Edit Music: 2.94

Convert Videos: 1.3

To calculate the overall score of a system, we convert the timing for each category to a ratio of the test device timing to the timing of the calibration system, take the geometric mean of those ratios, and then multiply by 100. Using the data above, we get the following values:

Edit Photos: 2.276/2.71 ~ 1.19

Edit Music: 1.176/1.3 ~ 1.11

Convert Videos: 2.426/2.94 ~ 1.21

To calculate the geometric mean, we multiply these three ratios and take the cube root. The product is 1.19*1.11*1.21 ~ 1.59. Taking the cube root of 1.59 produces is approximately 116.84, which matches the overall score for this run.

AFTER RUNNING THE BENCHMARK

Comparing results to the database

You can view results from other testers' HDXPRT 2014 runs here. To find detailed information on any set of scores, click the link under the Source column.

Submitting results

We invite and encourage all members of the HDXPRT Development Community to submit benchmark results from their testing for inclusion in the public results table available here.

Please follow the process below to prepare results for submission:

1. After completion of a benchmark run, please copy the XML results file generated by the benchmark. You can find this file at C:\Program Files (x86)\HDXPRT\Reports\Name of Run\Name of Run_Results.xml.

2. Please email the copy of the results as an attachment to the BenchmarkXPRT Community Administrator at the email address BenchmarkXPRTsupport@principledtechnologies.com.

3. Use "HDXPRT Results Submission" as the subject for your email.

4. Do not forget to specify in the email's body your company name and name of the person responsible for the test.

5. Please make sure the email reply-to address you specify is a valid reply address inside your organization.

6. We will verify the tester's identity and validate the results before publishing them to the public database.

7. We will notify you if we publish your results.

ABOUT THE BENCHMARKXPRT BENCHMARKS

The BenchmarkXPRT tools are a set of apps that help you test how well devices do the kinds of things you do every day. In addition to HDXPRT 2014, the BenchmarkXPRT suite currently comprises the following tools:

- BatteryXPRT 2014 for Android, an app for estimating the battery life of Android devices
- MobileXPRT, an app to test the responsiveness of Android devices
- TouchXPRT, an app to test the responsiveness of Windows 8 and Windows RT devices
- WebXPRT, an online tool to test the Web browsing capabilities of any device with Internet access

We designed the apps to test a wide range of devices on a level playing field. When you look at results from XPRTs, you get unbiased, fair product comparison information.

The community model

We built BenchmarkXPRT around a unique community model. Community membership is open to anyone, and there are many different ways to participate.

Members of the BenchmarkXPRT Development Community are involved in every step of the process. They give input on the design of upcoming benchmarks, contribute source code, and help test the benchmarks. Community members have access to the source code and access to early releases of the benchmarks in the form of community previews.

The community helps us avoid the ivory tower syndrome. Diversity of input during the design process makes the tests more representative of real world activity. Giving community members access to the source code both improves the implementation of the benchmark and increases confidence in the code.

The community model differs from the open source model primarily by controlling derivative works. It is important that the BenchmarkXPRT benchmarks return consistent results. If the testing community calls different derivative works by the same name, the result would be that the test results would not be comparable. That would limit, if not destroy, the tools' effectiveness.

Where can I get more information?

Visit us at HDXPRT.com or follow us on Twitter and Facebook. We announce breaking news on the BenchmarkXPRT blog (available to everyone) and the BenchmarkXPRT forums (available to members only). If you cannot find the answer to your question, or if you need help with HDXPRT, send an email to our team at BenchmarkXPRTsupport@principledtechnologies.com.

WHAT IS THE BENCHMARKXPRT DEVELOPMENT COMMUNITY?

The BenchmarkXPRT Development Community is a forum where registered members can contribute to the process of creating and improving benchmarks, including HDXPRT. If you are not currently a community member, we encourage you to join! (Yes, that means you – our community is open to everyone, from software developers to interested consumers.) Not only will you get early releases of future versions of HDXPRT, but you will also be able to

download the source code (available to members only) and influence the future of the app. Register now, or for more information, see the BenchmarkXPRT FAQ.

CONCLUSION

We hope this paper has answered any questions you may have about HDXPRT 2014. If you have any other questions, or if you have suggestions on ways to improve the benchmark, please post them on the community forum or e-mail us at BenchmarkXPRTsupport@principledtechnologies.com. For more information, visit us at BenchmarkXPRT.com and HDXPRT.com.

APPENDIX A: THE CALIBRATION SYSTEM

Table 4 shows the detailed configuration of the calibration machine for HDXPRT 2014.

Component	Specification
CPU	Intel® Pentium® Processor E6800 (2M cache, 3.33 GHz, 1,066 FSB)
Operating system	Windows® 8.1 Professional (64-bit)
Motherboard	
Manufacturer	Intel
Model	DG45ID
BIOS version	IDG4510H.86A.0135.2011.0225.1100
Memory	
Manufacturer	OCZ
Channels	Dual
Type	DDR2
Size	2 × 2 GB
Speed	800 MHz
Latency	6-6-6-18
Graphics	
Manufacturer	Intel
Model	Intel G45 Express Chipset
Driver	8.15.10.2555
Hard drive	
Manufacturer	Seagate®
Model	ST31000524AS
Size	1 TB
RPM	7,200
Cache	32 MB
Power supply	
Manufacturer	Antec®
Model	TruePower 650
Power	650 W
Other system settings	
Display resolution	1,920 × 1,080, 60 Hz
System restore	Off
Windows Update	Off
Screen saver	Off
Power Management	High Performance

Table 4. HDXPRT 2014 calibration machine configuration.

ABOUT PRINCIPLED TECHNOLOGIES

![Principled Technologies logo]

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Our founders, Mark L. Van Name and Bill Catchings, have worked together in technology assessment for over 27 years. As journalists, they published over a thousand articles on a wide array of technology subjects. They created and led the Ziff-Davis Benchmark Operation, which developed such industry-standard benchmarks as Ziff Davis Media's Winstone and WebBench. They founded and led eTesting Labs, and after the acquisition of that company by Lionbridge Technologies were the head and CTO of VeriTest.

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