WHITE PAPER

Thin Client Computing for K-12 Online Assessments

Synopsis

Schools across the US are gearing up to support state mandated online testing. *NComputing*, the leader in thin client computing for K-12, manufactures the **vSpace** thin client solution for Windows that meets the requirements of both major US test consortiums (PARCC and SBAC) and has been certified as "TestNav Qualified". Using vSpace, students get a full Windows desktop experience without requiring their own PC or laptop, saving on acquisition costs, maintenance costs and energy consumption.

Background

In 2010, as part of Race to the Top Assessment (RTTTA) initiative, the U.S. Department of Education awarded $330 million to two groups of states represented by two consortiums: the Partnership for Assessment of Readiness for College and Careers (PARCC) and the Smarter Balanced Assessment Consortium (SBAC). The purpose of this initiative is to develop next-generation online assessments by the 2014-15 school year. The new tests are aligned to the Common Core State Standards and will be administered to all students from third grade through high school.

To develop and host these tests, PARCC has partnered with Pearson Education and Educational Testing Services (ETS), and SBAC has partnered with American Institutes for Research (AIR).

In spring 2014, the consortiums began conducting their Field Tests to present the entire pool of test items to students across member states in about 15 to 20 percent of consortium schools. Full-scale implementation of assessments will occur in spring 2015.

The technical challenges

Online testing brings two key technical challenges: Internet bandwidth and availability of workstations for each student to take the assessment.

Internet Bandwidth

Both PARCC and SBAC have developed interactive tools for determining Internet bandwidth requirements for online testing. [1]

Pearson Education's proctor caching software can reduce Internet bandwidth requirements for TestNav based assessments,[2] but each school still needs a strategy for addressing how to make enough workstations available at once to test all of the students.

1 *https://www.parcconline.org/sites/parcc/files/PARCCCapacityPlanningTool_2-27-14.xlsx*; *https://air.tds.airast.org/student/Pages/LoginShell.aspx?section=sectionDiagnostics&c=SBAC_PT*

2 *https://www.pearsonaccess.com/media/REF/ProctorCachingOverview75/index.html*

Workstation Availability

As Bryan Bleil, director of online and technology implementation for Pearson Education explained "If you have a thousand kids and 200 computers, you might need five days to test them all."[3]

How many computing devices are needed?

The number of devices a school needs largely depends on the number of students enrolled at each tested grade, the number of students that can be tested simultaneously and the available bandwidth. To assist schools in planning for an adequate number of devices for PARCC assessments in 2014–15, PARCC has developed some rule-of-thumb guidance: http://www.parcconline.org/assessment-administration-guidance

What type of devices to get?

Both PARCC and SBAC have established guidelines for the types of end user devices that are acceptable for taking the assessment tests:

For PARCC:

- **PARCC Technology home page:** http://www.parcconline.org/technology
- **Technology Guidelines for PARCC Assessments:** Version 4.0: http://parcconline.org/sites/parcc/files/Technology-Guidelines-for-PARCC-Assessments-v4-February-2014.pdf

For SBAC:

- **Smarter Balanced Technology Strategy Framework and Testing Device Requirements:** http://www.smarterbalanced.org/wordpress/wp-content/uploads/2011/12/Tech_Framework_Device_Requirements_11-1-13.pdf
- **Smarter Balanced Technical Specifications Manual:** http://sbac.portal.airast.org/wp-content/uploads/2013/07/SmarterBalanced_TechnicalSpecificationsManual.pdf

Both PARCC and SBAC are working to keep the tests "device-neutral," so districts won't need to purchase specific devices to administer the tests and so the devices can be used throughout the school year. As PARCC has stated "21st century students need to have access to technology in the classroom throughout the year, not just at testing time." [4]

Desktops, laptops, netbooks (Windows, Mac, Chrome and Linux), tablets (iPad, Windows and Android) and thin client computers are all eligible provided they are configured to meet the established hardware, operating system, networking, and security specifications.

Issues to consider in selecting devices

Three issues to consider in selecting a device for online testing are

1. Does the device work simply and reliably during field trials of the testing?
2. Will the device serve your other educational needs well?
3. Does the solution have a low total cost of ownership (TCO)?

3 *http://thejournal.com/Articles/2011/06/07/High-Stakes-Online-Testing-Coming-Soon.aspx?sc_lang=en&Page=2*

4 *http://www.parcconline.org/sites/parcc/files/PARCCFAQ_9-18-2013.pdf*

With regard to the simple and reliable operations, does the device require a lot of preparatory work before it can be used for testing? For example, Chromebooks must be in "single app kiosk" mode and iPads must be set to "Autonomous Single App Mode" in order to work with PARCC assessments. [5]

Mobile devices like Chromebooks and iPads require wireless to participate in the assessments. Is your Wi-Fi infrastructure reliable and robust enough to support all of these devices accessing the tests simultaneously? And for all portable devices you must ensure they are fully charged and can operate throughout the duration of the test. How long does it take for the device to charge? How long will it operate on one charge?

With regard to serving your other educational needs, consider the applications you want to make available to students. Are all of them web-based? Do you want to give students access to a Windows desktop experience and Microsoft Office which they are likely to use after graduating? Is the small form factor screen of a netbook, Chromebook or tablet sufficient for all educational applications? Or would a separate wide screen monitor and keyboard be advantageous?

With regard to TCO, one must consider ongoing maintenance expenses as well as acquisition costs. Thin client solutions can offer substantial reductions in energy consumption compared to PCs, and provide significant labor savings by centralizing software maintenance to a reduced set of shared host servers. However not all thin client solutions are created equal. According to one vendor study, thin client solutions based on Virtual Desktop Infrastructure (VDI) require a considerable investment in back end server infrastructure and licensing and typically have a TCO that is 11% more per workstation than the traditional PCs they are designed to replace.[6]

Why choose a vSpace thin client solution?

The *NComputing* **vSpace** solution for Windows featuring the **L300** and **M300** thin client devices, meet all of the device requirements established by PARCC and SBAC. In addition, **vSpace** for Windows has met the requirements to be certified as Pearson "TestNav Qualified" for PARCC states:

- http://testnavqualified.com/download/DistrictInfo-NCOMPUTINGVirtualization-QualifiedTestNav7-5.pdf
- http://testnavqualified.com/download/DistrictInfo-NCOMPUTING_Virtualization-QualifiedTestNav8.pdf
- http://testnavqualified.com/download/Standards-NCOMPUTINGVirtualization-QualifedTestNav7-5.pdf

Beyond meeting consortium requirements for online testing, **vSpace** thin clients provide other advantages school districts should consider.

In comparing **vSpace** thin clients to PCs or Macs, or to Windows, Mac or Linux laptops, **vSpace** thin clients provides these advantages:

- **Reduced acquisition costs:** typically one third the cost of a PC.
- **Simplified software maintenance:** Update software on a central server, not individual workstations.
- **Reduced troubleshooting and remediation:** **vSpace** thin clients are solid state, fanless, and have an MTBF > 100,000 hrs. And because the user's desktop experience is executing on a centralized server there are no more user configuration or malware issues on individual workstations.

In comparing **vSpace** thin clients to fixed asset PCs and Macs, **vSpace** thin clients also offer reduced energy consumption.

5 *http://www.pearsononlinetesting.com/TestNav/8/devices/chromebook.html; http://www.pearsononlinetesting.com/TestNav/8/devices/iPad.html*

6 *http://download.microsoft.com/download/7/9/A/79AAA903-25B4-4D76-8580-BC47D5700433/Microsoft%20VDI%20TCO%20whitepaper%20customer%20ready%20v1%202.pdf*

In comparing **vSpace** thin clients to mobile devices, **vSpace** offers these advantages:

- Low power consumption without the concern for charging time, operating time before recharging, and overall battery life.
- **Centralized image management:** no need to worry if each end device is properly configured to participate in assessment testing.
- **Better ergonomics:** designed to be used with HD wide screen monitors up to 1920x1080 resolution and USB keyboard and pointing device of your choice.
- Reduced risk of damage or loss because it is a fixed asset.

	VSPACE THIN CLIENTS	PC	VDI WITH THIN CLIENTS	WINDOWS LAPTOPS	CHROMEBOOK/ LINUX NETBOOK	TABLET
ACQUISITION COST	LOW	HIGH	HIGH	HIGH	MEDIUM	MEDIUM
SET UP COMPLEXITY	LOW	LOW	HIGH	LOW	LOW	LOW
MAINTENANCE COST	LOW	HIGH	LOW	HIGH	MEDIUM	MEDIUM
POWER USAGE	LOW	HIGH	MEDIUM	MEDIUM	LOW	LOW
BATTERY LIFE CONCERNS	NO	NO	NO	YES	YES	YES
RISK OF LOSS OR DAMAGE	LOW	LOW	LOW	HIGH	HIGH	HIGH
SUPPORT OF WINDOWS APPS	YES	YES	YES	YES	NO	NO
ERGONOMICS	GOOD	GOOD	GOOD	FAIR	FAIR	LOW
DEVICE CONFIGURATION EFFORT	LOW	HIGH	LOW	HIGH	HIGH	HIGH

Table 1: Device comparison

Conclusion

State mandated online testing has motivated school districts to reexamine their strategy for getting computing into the hands of more students. Although online testing has its own unique device requirements, many device types can be used to satisfy those requirements. Therefore the decision on what devices to acquire for online testing should also factor in how these devices will be used outside of testing and the total cost of ownership of the solution. *NComputing*'s **vSpace** solution provides a reliable platform for online testing and many other educational uses, and does this at a remarkably low total cost of ownership.

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