



SAM Suite System Requirements & Technical Overview Version 3.x

Student Achievement Manager and SAM-Based Programs

The Student Achievement Manager (SAM) is the learning management system and technology platform for HMH's SAM-based programs. SAM provides administrators with the ability to implement and monitor applications on a district-wide basis. SAM also has district-wide capabilities such as district reporting, adequate yearly progress (AYP), demographic grouping and reporting, and AYP demographic filtering. For the teacher, SAM provides multiple supports for classroom management and data-driven instruction.

SAM Platforms

Student Achievement Manager (SAM)	HMH Student Central™
SAM Central	HMH Leader Central™
Next Generation Dashboards	HMH Teacher Central™
HMH Tech Central	

SAM-Based Programs

<i>Common Core Code X® Digital*</i>	<i>Math Inventory</i>
<i>Do The Math Now!/ Progress Space*</i>	<i>Phonics Inventory</i>
<i>Expert 21 (including xSkills)*</i>	<i>READ 180 Next Generation</i>
<i>FASTT Math Enterprise Edition</i>	<i>Reading Inventory</i>
<i>FASTT Math Next Generation</i>	<i>Reading Counts!</i>
<i>Fraction Nation</i>	<i>rSkills College & Career</i>
<i>iRead®*</i>	<i>System 44 Enterprise Edition</i>
<i>MATH 180®* (including mSkills)</i>	<i>System 44 Next Generation</i>

Programs marked with an asterisk (*) are available only on servers hosted by HMH.

Contact Technical Support at 1-800-283-5974 for specific questions regarding these requirements or any of the information contained in this document.





Technology Platform

SAM and SAM-based programs are built using Internet and industry-standard technology in order to provide capacity for high levels of concurrent usage and reliability. It uses standard Internet components that simplify setup and optimize issues surrounding student access to servers. Clients run in standard web browsers and connect to servers over HTTP or HTTPS.

SAM and SAM-based programs require a persistent connection to a server computer hosted by the district or an HMH data center. This server, the SAM Server, combines the functions of an application server (running programs) with a database server (managing and storing data). Installations using more than one SAM Server at the district level may require an additional aggregation server to gather, manage, and store data from across the different SAM Servers (this is not required of districts using a data center to host the SAM Server).

SAM and SAM-based programs use browser-based clients. This requires large media files (video, etc.) be sent to the client over the network. A careful evaluation of the district's wireless infrastructure (if using Wi-Fi-enabled laptops or mobile devices) is strongly recommended to assure that program bandwidth requirements are adequately met. See the [Technical Implementation Guide](#) (available at hnhco.com/product-support) for more information.

The recommended system requirements outlined in the following sections are based on a certification process in which applications are put through a rigorous set of tests to determine their stability, performance, and compatibility with each other and with a wide variety of hardware and software environments. The requirements listed in this document have been tested and will be supported by Technical Support should issues arise. Noncertified configurations may be compatible with SAM and SAM Suite software, but performance and support is not guaranteed for these configurations.

A Note About Flash-Based Programs

Adobe has announced that it will discontinue Flash by 2020. While no changes are imminent, users may see notices in their browsers asking to allow Flash. When launching HMH programs, click Yes to these notices. HMH is currently updating its Flash-based programs to HTML5.

At this time, these programs have been converted to HTML5:

- *READ 180 Universal*
- *Do The Math*
- *English 3D*
- *Reading Inventory*
- *Math Inventory*

The following programs are currently being converted to HTML5 for Back to School 2018:

- *System 44 Next Generation*
- *Phonics Inventory*
- *Reading Counts!*
- Next Generation Dashboards
- Interactive Teaching System
- Student Achievement Manager

HMH is also working with the major browser providers (Google Chrome, Safari, Mozilla Firefox and Microsoft's browsers) to ensure its programs continue to function correctly during this period of transition.



Server Requirements

Local District Servers

System requirements for locally installed SAM Servers:

- **Operating System:** Macintosh OS X Server 10.10 through 10.13.x; Windows Server 2008 or later (64-bit); Novell SuSE Linux Enterprise Server 11
- **Memory:** 8 GB RAM recommended (more for higher concurrency levels)
- **Processor:** Intel-based (higher speed/multi-cores for higher concurrency levels)
- **Hard Drive:** 100 GB free (post-OS installation) for single-school servers, 200 GB for large multi-school servers
- **Internet:** SAM Servers **must** have Internet access.

Recommended: Multi-core Intel Xeon processors (or equivalent) operating at 2.0 GHz or better for servers. *Faster processors, more cores, and more memory all contribute to the ability of the server to handle higher numbers of concurrent users and larger databases.*

SAM and SAM-based programs may be installed on virtual servers using virtualization software such as VMWare ESX4.x. Resources for the VM should be dedicated, not shared. **Contact Technical Support if planning a deployment using virtual servers.**

NOTE: Using a storage-area network (SAN) as the primary disk storage for a VM can lead to significantly reduced performance and is not recommended.

SAM and SAM-based programs are **not** supported on servers using these operating systems:

- Windows 2003 Server Windows 2000 Server, Windows NT Server
- Macintosh OS X Server 10.0 through 10.9.x, or Power PC Servers
- Novell Netware, SuSE Linux Enterprise Server 9, 10, or 12

For installations that serve a large number of concurrent users or 100,000+ active student accounts, additional SAM Servers may be required (see Concurrency, *page 7*).

Data Centers

Districts using a Data Center to host their SAM Server do not require a locally installed SAM Server. The hosted SAM Server uses a Secure Socket Layer (SSL) connection to communicate with workstations. Hosted SAM Servers are automatically updated with new and updated software and backed up nightly, and they use encrypted format to store all user data.

Contact Technical Support with questions regarding server requirements.



Workstation Requirements

SAM and SAM Suite version 3.x software run on student and teacher workstations that meet the following requirements:

- **Browser:** Microsoft Edge 40 or later; Safari 10.x or later; Firefox 56.x or later; Chrome 59 or later. Browsers must support HTML5.
Cookies must be enabled on all browsers.
- **Operating System:** Macintosh OS X 10.10.x through 10.13.x; Windows 7 Professional, Windows 8.x through 10.x; Chrome OS version 59 or later*
Memory: 4 GB of RAM, based on OS version
- **Processor:** Intel dual-core or later (Power PC Macintosh computers not supported)
- **Network:** Network Interface Cards supporting TCP/IP (wireless networks, including 802.11a, 802.11g, or 802.11n, are supported, but performance may be limited by the network's bandwidth capacity)
- **Screen:** 1024 x 768 resolution or higher
- **Plug-ins:** Adobe Flash (should be the latest version [default setting] and must not be disabled); Adobe Reader or Adobe Acrobat 9 or later. **See page 5 for important information regarding Adobe Flash.**
- **Other:** Headphone and microphone required for use with *READ 180* Universal, *READ 180* Next Generation, *System 44* Next Generation, *System 44* Enterprise Edition, and *iRead*; headphones required for *MATH 180*, *FASTT Math* Next Generation, *FASTT Math* Enterprise Edition, *Fraction Nation*, and *HMH Phonics Inventory*. Printer for teacher, DVD player(s) for *READ 180* and *System 44* audiobooks and anchor videos. Check hardware documentation for compatible accessories.

*For important information regarding Chromebook devices, see page 6.

Thin Client workstations, including nComputing, are not certified for SAM and SAM Suite software.

SAM and SAM-based programs support a wide range of client workstations running many different processors and operating systems. As a general rule, any workstation or laptop purchased in the last four years should be capable of running any SAM Suite software.

Districts using older workstations with Intel Atom processors (or equivalent) should consider that these workstations, laptops, or netbooks may not be suitable for running SAM Suite software. HMH recommends testing any Atom-based system with the application(s) you intend to use.



Browser Settings

All workstation browsers must have the following settings selected:

- **Cookies:** Cookies must be enabled on all browsers.
- **Flash:** Should be the latest version (default setting) and must not be disabled. **See note on page 2 for information regarding Adobe Flash.**
- **JavaScript:** Must be enabled
- **Pop-Up Blockers:** Must be disabled, or Student and Educator Access pages excepted
- **Security Level Settings:** Default settings supported;
- **Images:** Default settings are supported; Image Display must not be turned off
- **Privacy Settings:** Default settings supported; Maximum Privacy Setting (disabling cookies) not supported
- **Mixed Content:** Browsers should allow mixed content (e.g., http:// and https://)
- **Character Set:** It is expected that Unicode UTF-8 is set as the default character set.

Mobile Devices

Some SAM-based programs are available in mobile-compatible forms. All mobile-compatible programs are compatible with iOS; some are compatible with Android platforms. See individual program documentation at the Product Support website (hnhco.com/product-support) for information and specifications for mobile-compatible programs. Windows-based mobile devices may access SAM and SAM-based programs through the device's browser.

All mobile devices must meet the following requirements:

- **Operating System:** iOS 9.0 or later running on iPad 2 or later; Android version 5 or later running on devices with a screen resolution of 1280 x 800; Windows 8.1
- **Screen:** 10-inch screen recommended. 7-inch screens with 1024 x 768 resolution (iPad Mini) are also supported. Other 7-inch screens will not display all content. Smaller devices, including iPhones, are not supported.
- **Storage:** Approximately 2 GB of space per app for each *READ 180*, *System 44*, *iRead*, or *MATH 180* app; other apps require less space.
- **Other:** Headphone and microphone are required.
- **Notes:** SAM and SAM-based programs are compatible with Samsung Galaxy 10.1 and Nexus 10-inch. SAM and SAM-based programs **do not** support apps that emulate Flash browser support on the iPad. Some Windows 8.1 browser-based programs may not be fully compatible with touch screens and mobile keyboards. External keyboards and pointers may be required.

In districts using a locally installed SAM Server, mobile devices will need full access to the district or school wireless network. Confirm that “guest” or “open” networks in schools have access to the full network.



Chromebooks & Google Tablets

Chromebooks and Google Tablets are devices manufactured under license from Google that use Google's own operating system, Chrome OS, and the Chrome browser. Beginning with version 2.3, SAM and SAM-based programs are compatible with Chrome OS under the following technical guidelines:

- Chrome OS version 59 or later
- Intel processor
- 10 inch or larger screen (no smaller devices or mobile phones)
- Headphone and microphone
- Browser and Flash settings to match workstation requirements (*page 4*). Some changes to browser or system settings (i.e., browser full-screen, hiding toolbar, etc.) may be required.

Some browser-based programs may not be fully compatible with touch screens and virtual keyboards; an external keyboard or pointer may be required with some Chromebook models. (Thus, a separate mouse and keyboard may be required.)

Recommended: Setting Chrome OS to the **Stable** channel in the Chromebook settings. On the Stable channel, Google will push out an update to Chrome OS approximately every six weeks. These updates may result in performance changes to the software; in such cases HMH will identify the root cause and resolve the issue, which may include settings changes, Chrome OS updates, or software updates.

Product compatibility on Chromebooks and Google Tablets is tested using various hardware models from different manufacturers. Information on specific models is available from Technical Support.

Contact Technical Support at 1-800-283-5974 with questions regarding running the SAM-based programs on Chromebooks.

Netbooks

Not Recommended: The use of netbooks with SAM and SAM-based programs. Models are often not compatible because of inadequate local storage, underpowered processors, or screens not capable of displaying a minimum resolution of 800 x 600. In particular, Linux-based netbooks or netbooks with a maximum screen resolution of 1024 x 576 are not suitable for use with SAM and SAM-based programs.

Contact Technical Support at 1-800-283-5974 with questions regarding specific netbooks.



Concurrency

Concurrency refers to the number of simultaneous users that may be logged in to any program on the server before there is a noticeable reduction in the program's responsiveness. Concurrency is affected by many factors, including:

- Network bandwidth across the enterprise
- Bandwidth utilization
- Packet prioritization availability
- Firewall configurations
- Processor speed on the server
- Server virtualization
- Available memory on the server
- Other server settings
- Content-filtering settings
- Improperly configured virus-protection software

In addition, concurrency is affected by running class, school, or district reports while students are using the applications. Impact from running reports is most noticeable when running large district-level reports or when a server is running near full capacity from student sessions.

Recommended: Run reports whenever possible outside of normal class time.

Local District Servers

For sizing purposes, benchmark tests are performed against a variety of hardware configurations. Please visit the Education Product Support website, hnhco.com/product-support, for the latest information and recommendations.

Data Centers

Data Centers that host SAM, HMH Teacher Central, HMH Student Central, and SAM-based programs (including *READ 180* Universal, *English 3D*, *iRead* and *MATH 180*) are constantly adjusted to accommodate concurrent users. However, end-user performance will be affected by the factors listed above, particularly bandwidth. Your district technical audit provides specific bandwidth information and recommendations. For more information on technical audits, see the [Technical Implementation Guide](#) (available at hnhco.com/product-support).

Please contact Technical Support at 1-800-283-5974 for help with selecting and configuring the SAM Server to best match your installation's product mix and expected usage.



Firewalls, Proxies, and Content Filters

The following is a list of all available IP Addresses used by Amazon Web Services:

- HMH Hosting Center (Amazon Web Services): <https://ip-ranges.amazonaws.com/ip-ranges.json>

The following URLs should be whitelisted to pass through firewalls, proxies, and content filters:

- adobe.com
- *.content.hmhco.com
- *.education.scholastic.com
- grolier.com
- *.hmhco.com
- imports.education.scholastic.com (35.174.34.220, 54.81.113.146)
- js-agent.newrelic.com
- samconnect.scholastic.com
- *.scholastic.com

For SAM Products

- cdn.education.scholastic.com
- sam-cdn.education.scholastic.com
- samresources.scholastic.com

For Teacher Central Products

- *.intellifylearning.com
- *.s3.amazonaws.com
- s3.education.scholastic.com
- scholasticcentraltoolbar.speechstream.net
- spaces-content.education.scholastic.com
- spaces.content.hmhco.com
- *.teachercentral.hmhco.com

Ports 80, 443, 37282, and 1935 should be open to allow data to pass from servers to workstations. Local installations use port 55880 for workstations and 55880-55887 for servers.

Please resolve spaces-content.education.scholastic.com, spaces.content.hmhco.com, *.s3.amazonaws.com from your network to get the specific IPs needed for your systems. IPs may change based on load, availability and proximity. HMH recommends using the URL redirect since using the IP may result in having to make adjustments continuously to your firewall.

Contact Technical Support for a complete list of whitelist URLs as well as questions regarding firewalls, proxies, and content filters as they relate to SAM Suite software.



Bandwidth Requirements

SAM and SAM-based programs operate over TCP/IP networks including wireless (802.11.a, g, n). When employing a wireless network, it is important not to overload the access point with too many connections, or student sessions may be dropped.

Recommended: Using an average of 256 kbps of bandwidth per concurrent workstation or mobile device. Average, peak, and initial bandwidth requirements vary greatly depending on the product and the usage. No matter how fast the network connection between workstation and server is, if other bandwidth-intensive activities (VoIP, streaming video, audio downloads, database backups, etc.) are running on the network at the same time, program performance may suffer. Packet-shaping techniques on heavily trafficked networks are also recommended, as well as an industry-standard switched network for optimal performance.

Contact Technical Support at 1-800-283-5974 for specific bandwidth questions.

Home Access

SAM and SAM-based programs offer home or other out-of-classroom access to supplemental resources (school libraries, etc.) in some programs. Consult individual program documentation at the Product Support website (hnhco.com/product-support) for detailed information on home-access options for programs. See the Workstation Requirements (*page 4*) for computer and browser requirements for home computers.

Administrators in districts whose SAM Servers are hosted in the HMH Data Center may set time access restrictions on certain programs. See [Enrolling and Managing Students Using Student Achievement Manager](#) on the Product Support website for more information. HMH does not provide support for devices used outside the school or district network.

District-Wide Deployment Options

SAM and SAM-based programs are designed for flexibility. This software may be deployed using one of five basic deployment options or configurations, depending on the district's bandwidth, infrastructure, hardware processors and memory, and the estimated level of concurrent usage.

All deployments require:

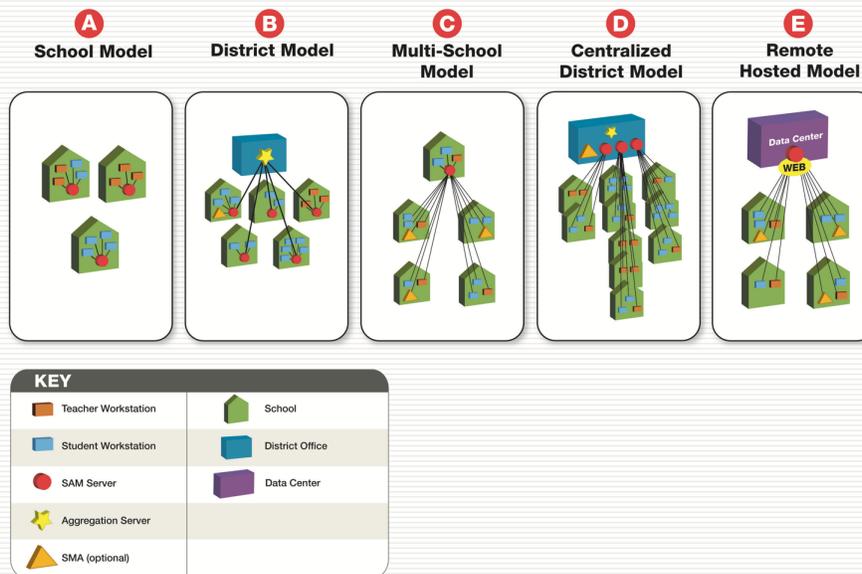
- Student workstations in a classroom or computer lab (desktops, laptops, mobile devices)
- Teacher workstations (desktop or laptop)

Districts using deployments with locally installed SAM Servers additionally require:

- One or more SAM Servers networked to the workstations
- A data aggregation server that can receive student data from multiple SAM Servers to create district-wide reports. (If aggregation is not desired or all schools are supported by one SAM Server, no aggregation server is needed.)



Planning Your Deployment



- Option A School Model (Local Application Server[s] and No Data Aggregation Server):** Recommended for districts or schools that do not have high-speed infrastructures and have no desire to aggregate data. There are no district-wide reporting or data aggregation capabilities since this option does not include a data aggregation server.
- Option B District Model (Local Application Server[s] and Centralized Data Aggregation Server):** Recommended for districts that deploy application servers locally but also want to run district-wide reports. SAM aggregation tools may be used to consolidate data from multiple application servers into a single aggregated database at a central location.
- Option C Multi-School Model (Centralized Application Server[s] and No Data Aggregation Server):** Recommended for districts with high-speed infrastructures that have a centralized application server capable of supporting multiple schools. Depending on concurrency, multiple centralized application servers may need to be employed.
- Option D Centralized District Model (Centralized Application Server[s] and Data Aggregation Server):** Recommended for districts with high-speed infrastructures and multiple centralized application servers, each capable of supporting multiple schools. Data from the application servers may then be aggregated to a district-wide aggregation server.
- Option E Remote Hosted (Data Center) Model:** HMH Data Center hosts the district's SAM Server and SAM Suite programs. District and school workstations use an SSL connection to the hosted SAM Server, so there are no school or district servers to maintain.



Data Management

See the ***SAM Data Management Manual*** and the Data Dictionary, available at the Product Support website (hnhco.com/product-support), for information on data management, aggregation, data migration, importing, exporting, or transferring data.

Contact Technical Support at 1-800-283-5974 for specific questions regarding moving data within SAM, from one SAM installation to another, or from Student Management Systems into SAM.