Appendix 2-C: Design for Technology Platform for NCSC Assessment System

Introduction

This section summarizes the structure and design of the technology platform used to support administration of the NCSC AA-AAS.

The NCSC assessment system was designed to support the goals of the NCSC-AA-AAS by serving as a resource to enable the following:

- Manage administration information
- Facilitate interaction with content in a manner that fulfills the design intent
- Support scoring and reporting
- Provide ancillary administration and support resources such as examiner training and access to sample content

NCSC state leaders and partners worked from the earliest phases of the project to design a system that is flexible and that supports a range of approaches to help students interact with content. At the same time, the system was designed to promote an appropriately standardized assessment experience and minimize construct-irrelevant variance.

Importantly, the NCSC assessment experience is built on close interaction between the student (examinee) and a professional, well-trained educator (test administrator) who follows detailed protocols. While the system is an integral resource to support that interaction, the entirety of the assessment experience using the full range of resources must be considered to support claims of an appropriate and valid administration.

Overview of System

In the NCSC GSEG grant, NCSC described a plan to establish a technical platform in years 2–4 of the NCSC GSEG project. NCSC noted that a technical platform could improve the assessment system design and that NCSC would explore ways to include technology throughout the test design while minimizing construct-irrelevant variables. The goal was to work with a platform development partner to put in place an accessible and secure platform with interactive components and systems. NCSC organizational partners considered the architecture of the system to ensure the platform would meet functional, performance, and cost goals.

Project leaders worked from the earliest phases of the project to provide recommendations and specifications for a system what would appropriately support the project's goals and design choices. These recommendations and the rationale are detailed in the *Architecture and Technology System Recommendations* available at http://www.ncscpartners.org/Media/Default/PDFs/Procurement/NCSC_TechArchReport_103112.pdf

A summary of the final solutions architecture is provided as Exhibit A1. The entire report is attached at the end of the summary.

Exhibit A1. NCSC Solutions Architecture

The NCSC Assessment Delivery System consists of the following elements:

Assessment Creation and Management. The Assessment Creation and Management subsystem is the point of ingestion of items and tests. Items and tests may also be manually entered into this authoring environment. Its tests are reviewed here by NCSC test developers. This is also the publishing interface which takes the item and test content and publishes these assessments into the delivery system.

Administration and Registration. This is a transitional data store that is typically not accessed by any users of the system, outside of system administrators. Registration details for students, their identities and positions in a LEA hierarchy, and the interim results of their assessments are stored here.

Test Delivery, Evidence Collection and Scoring. The examinee interacts with the system via the test client software. This consists of an online test driver and other components working in concert. Test delivery also includes the server-side storage of item responses, evidence, and other exam artifacts generated during test delivery.

Results and Reporting. This component holds all student data (including individual and aggregate performance data) and allows users to view student performance.

Ancillary Content. This includes administrator training modules and the server resources to present and stream content and capture interactions necessary.

The full solutions architecture for the NCSC Assessment System is available at http://www.ncscpartners.org/Media/Default/PDFs/Resources/NCSC_Solutions_Architecture_06082015.pdf

More information regarding assessment features and administration protocols are available in the TAM available at http://www.ncscpartners.org/Media/Default/PDFs/Resources/TAM.pdf

National Center and State Collaborative

Software Architecture Documentation

June 8, 2015

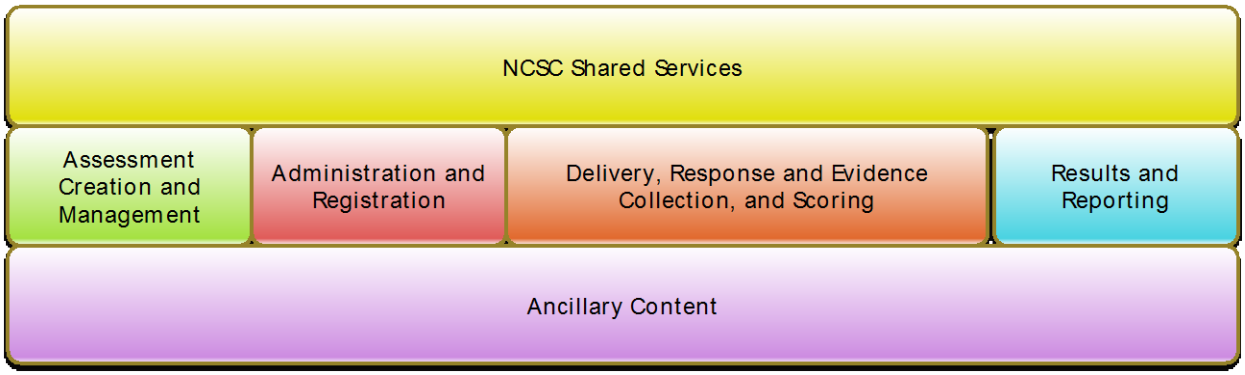
This work was supported by a grant from the US Department of Education, Office of Special Education Programs (H373X100002, Project Officer: Susan.Weigert@ed.gov). The contents do not necessarily represent the policy of the US Department of Education, and no assumption of endorsement by the Federal government should be made.

Conceptual Architecture

This section of the document describes the conceptual elements of the NCSC GSEG Summative Assessment system.

System-Level

Starting with all NCSC systems that either make up the assessment system or interoperate on any level with the assessment system, these systems are shown below:



This diagram is also colored to show the types of users (if any) that would interact with each component.

The systems external to the NCSC Assessment System are described here:

Results and Reporting. This system is the repository of all student data in the system. It includes any individual or aggregate performance data and contains all of the reporting and querying features that allow NCSC to show performance at any level.

Human Scoring. This is a platform for the ingestion of test program results, student identities and the results, responses and evidence collected during test delivery. It also includes appropriate login/permissioning and workflow features that allow a vendor human scoring team to assess the performance of test taker results and populate those scores in the platform.

LMS Courseware Content and Hosting. This system is the repository of all PD content in the system. It also includes the server resources necessary to present and stream the content and capture any interactions necessary for PD content delivery. Currently this is fulfilled by Brainshark.

NCSC Assessment Delivery System

Within the systems shown above, the Assessment Delivery System has the most complexity and is the subject of most of the remaining document. The NCSC Assessment Delivery System consists of the following conceptual elements:

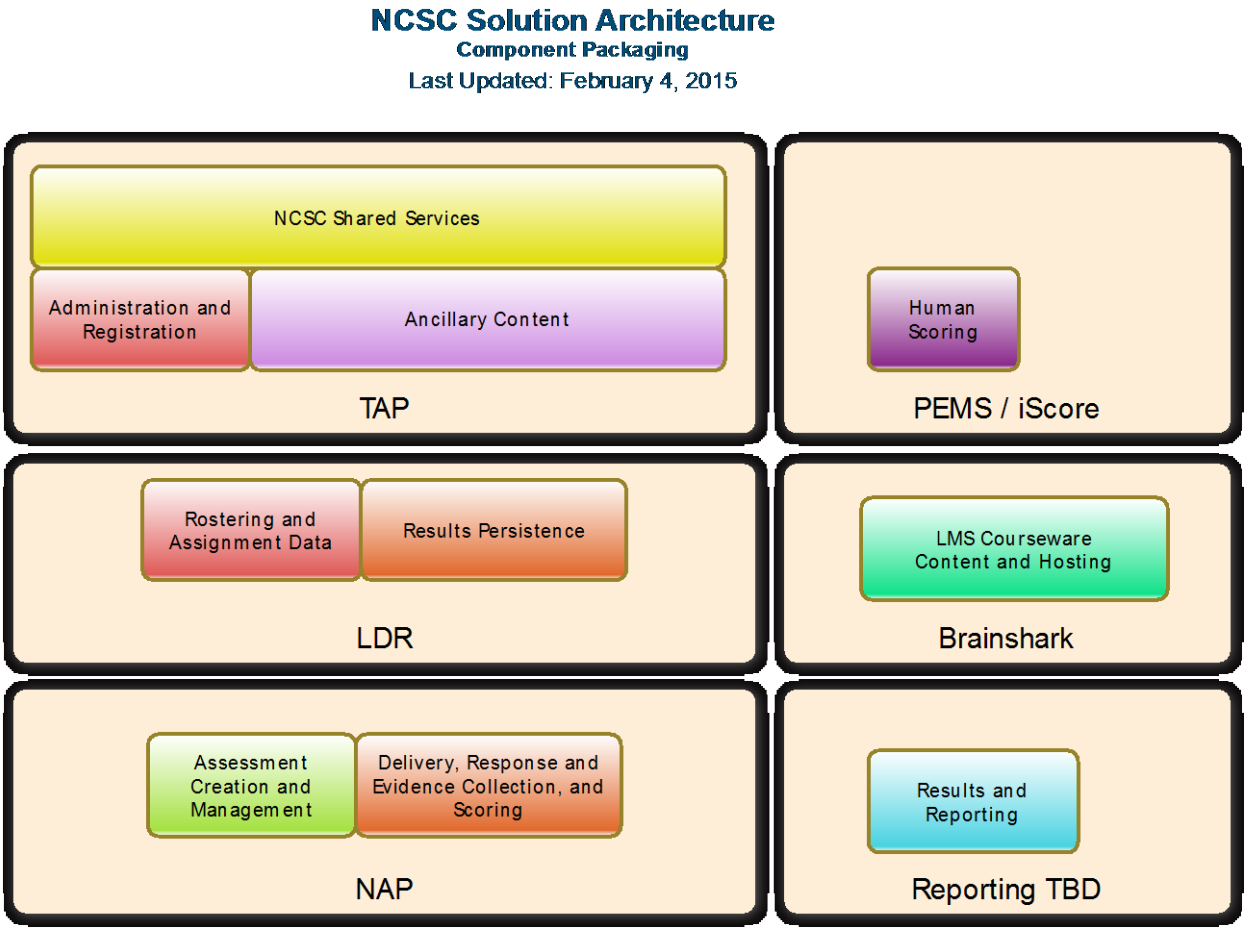
Administration and Registration. This is a transitional datastore that is typically not accessed by any users of the system, outside of system administrators. Registration details for students, their identities and positions in a Local Education Agency (LEA) hierarchy, and the interim results of their assessments are stored here. Human scoring scores and subscores and annotations are stored here, as well as evidence collected during assessment.

Assessment Creation and Management. The Assessment Creation and Management subsystem is the point of ingestion of items and tests. Items and tests may also be manually entered into this authoring environment. Its tests are QA'd here by NCSC test development personnel, or NCSC test development vendors. This is also the publishing interface which takes the item and test content and publishes these assessments into the delivery system.

Test Delivery. The test taker (usually a student) will interact with the system via the test client software. This consists of an online test driver and other components working in concert. Test Delivery also includes the server-side storage of item responses, evidence and other exam artifacts generated during test delivery.

NCSC Assessment Delivery System – Packaging

Within the assessment system described above, the main subsystems are as follows:

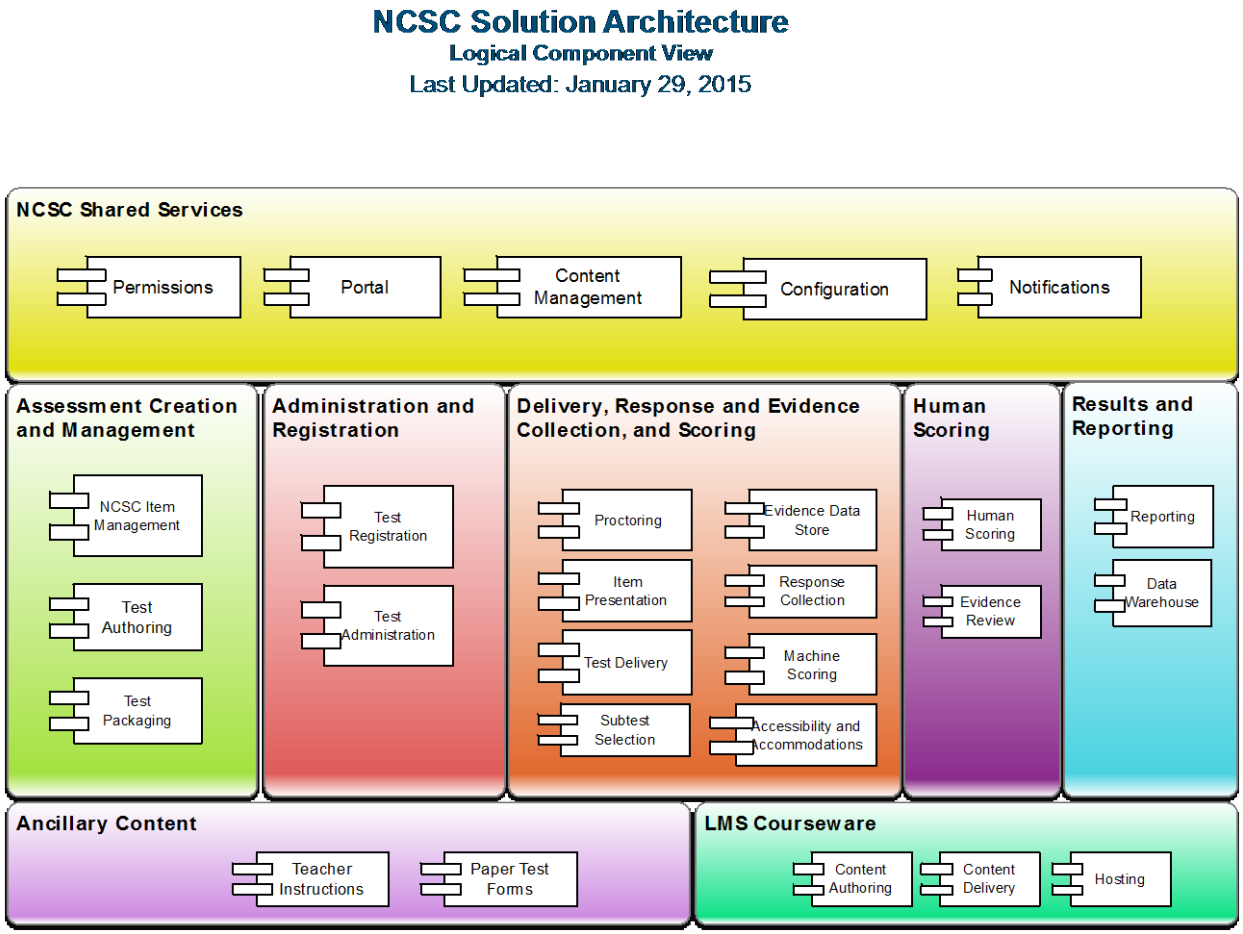


Each subsystem performs specific functions and contains data relevant to its domain of operation within the context of an assessment delivery system. These subsystems are packaged as shown above. The NAP is a standalone web application that functions as the assessment delivery platform. The shared technology components are deployed as services embedded within the TAP.

The elements on the right are exterior to the assessment management and delivery components. These include hand scoring, PD content development and delivery, and a results and reporting warehouse.

Component Architecture

Each subsystem of the NCSC GSEG Assessment Platform may be decomposed into components. These components are helpful to describe for the purposes of understanding where specific behaviors and features lie within the various parts of the system:



The components are described in the table below:

Component	Description
Assessment Creation and Management	
NCSC Item Management	The ability to manage items and their metadata. Services that allow item authors to interact with item content and persist those changes into the item bank system. Permissions and features that support the variety of NCSC item types and formats (passages, etc.) are included here. Scoring information at the item and interaction level is also included here.

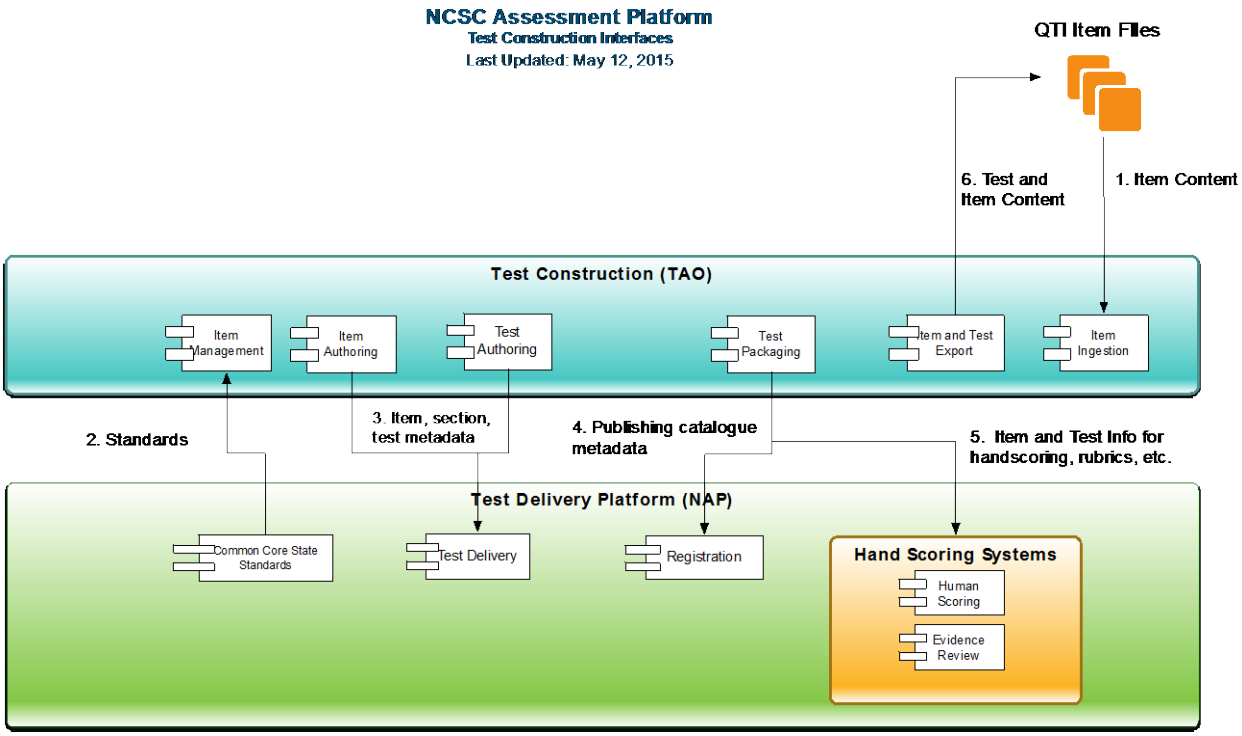
Component	Description
	The ability to upload files containing QTI item content into the item bank.
Test Authoring	Features in the TAO platform that allow a test development team to create, edit, and manage tests in the test delivery system.
Test Packaging	Test publishing services that allow a test author to publish a test ready for delivery. This includes identifying form names, revising previously published forms, etc. These include services that create a paper and pencil version of the test content. This content is output in Microsoft Word so test authoring teams may format and edit paper forms before they are distributed.
Administration and Registration	
Test Administration	User interfaces that allow tests to be managed by local agencies and organizations.
Test Registration	The ingestion of student roster files into the system. The assignment of users to test forms. This includes grade level, content area, and form assignment.
Delivery, Response and Evidence Collection, and Scoring	
Proctoring	A screen that allows a teacher or test coordinator to monitor the status of student testing in progress.
Test Delivery	The test driver and its associated features, including navigation, review, integration of item presentation, item scoring, and accommodations and Toolbox features.
Evidence Data Store and Evidence Collection	The test driver feature that allows us to capture files and webcam images and include with test takers responses.
Accessibility and Accommodations	Features that will allow item content to be more accessible to test takers of all different capabilities.
Machine Scoring	The ability of the test driver to apply a score to the responses provided for an item.
Item Presentation	
Responses Collection	The ability to collect and retain test taker responses for all item types.
Subtest Selection	The ability to integrate stage-adaptive and branching logic to allow subtest selection within a test.
Human Scoring	
Human Scoring	Features that allow teachers to apply scores to student results after test delivery.
Evidence Review	The ability to access any evidence provided by the student during the test delivery process. This is integrated with the Human Scoring features.
Results and Reporting	
Reporting	The ability to author and deliver reports that provide student level and aggregate performance reporting.
Data Warehouse	The ability to store longitudinal student data and aggregate performance data over time.
NCSC Shared Services	
Permissions	The ability to assign roles and subsequent functional capabilities based upon those role assignments.

Component	Description
Configuration	Features that allow the system to be customized and modified once it is deployed.
Portal	A web application that allows for website navigation, information architecture, the publication of content and the application of layout and themes to customize the presentation of the content.
Content Management	The ability to deploy content for users on the web applications.
Notifications	The ability to notify administrators when critical system events occur.
Ancillary Content	
Teacher Instructions	Native apps that house the test driver. Includes both secure and non-secure versions.
Paper Test Forms	The ability for test development to construct paper test forms for paper and pencil delivery. Generation of the paper form Word files occurs as a by-product of test packaging. Editing and finalizing of test forms occurs outside of the system, using editing tools and PDF production tools deployed by the test development team.
LMS Courseware	
Content Authoring	The ability to author PD content.
Content Delivery	The ability to serve up the PD content at scale and provide whatever interactive or persistent features are required to render the PD experience.
Hosting	Hosting services for the digital content delivery of the PD materials.

Component Interfaces

This section shows the various components of the system and how they interoperate with each other. The connections might take the form of data, control, or the physical transfer of digital information.

TAO Test Construction

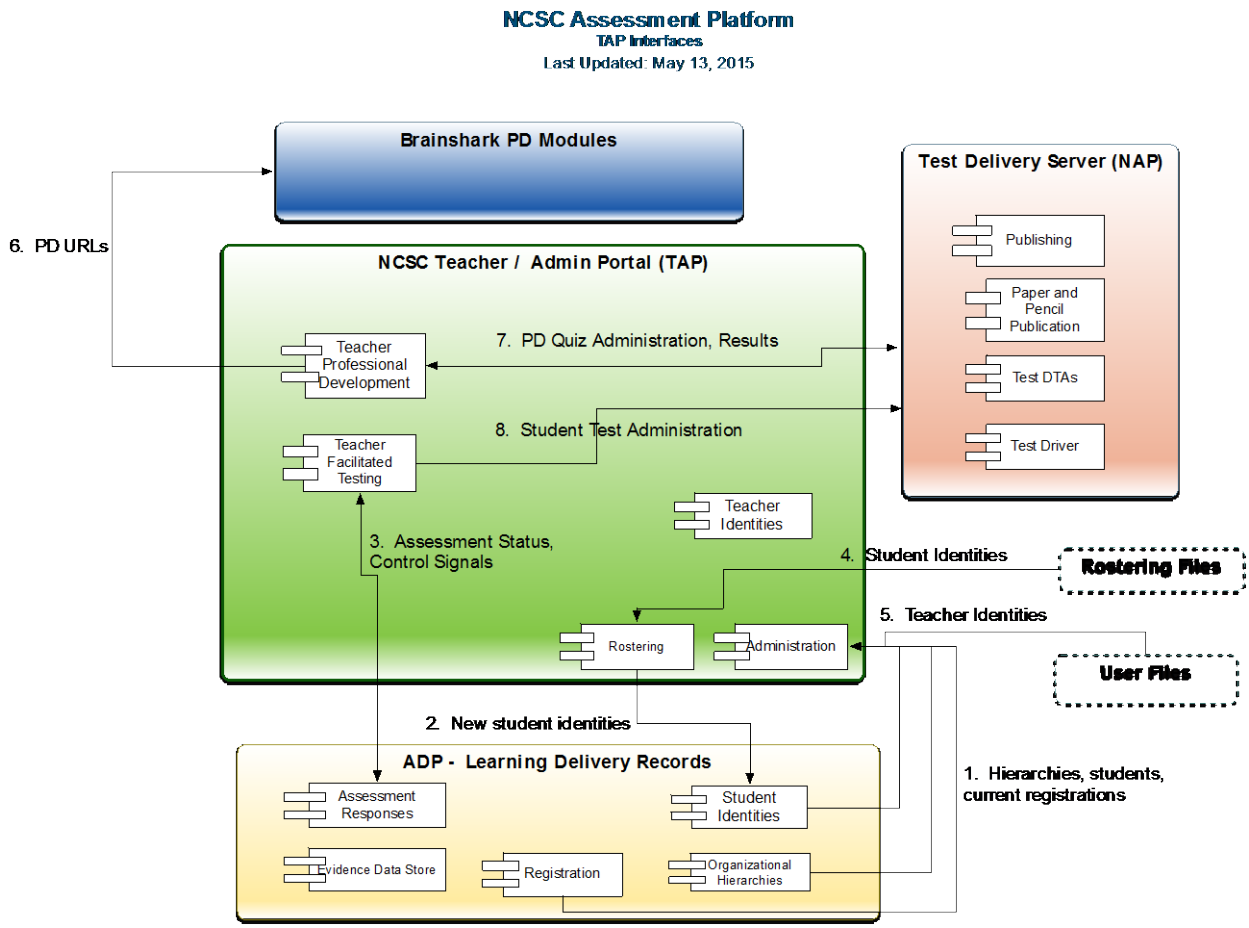


The component interfaces elements are described in the table below:

Interface Element	Description
1. Item Content	Item content coming from other systems and external item banks may enter the system through the item ingestion feature. QTI 2.1 or better is required to support the content ingestion. This is a file-based operation invoked by a user of TAO Test Construction.
2. Standards	Common Core State Standards may be ingested into the Item Authoring Platform to be available for item authors to execute standards alignment for any item in the system.
3. Item section and test content and metadata	The item and test content in Item and Test Authoring shall be made available to the Test Delivery platform.
4. Publishing Catalog Metadata	When the TAO-based publishing operation occurs, it will write key metadata into LDR. This will include all information necessary to identify its target test program, grade and subject.
5. Item and test info for hand-scoring	The human scoring service teams can reach back into the Test Construction repository and extract relevant content to support hand scoring.

Interface Element	Description
6. Test and Item Content	Test Content can be extracted into QTI packages from the Test Construction Platform.

Teacher Admin Portal Interfaces

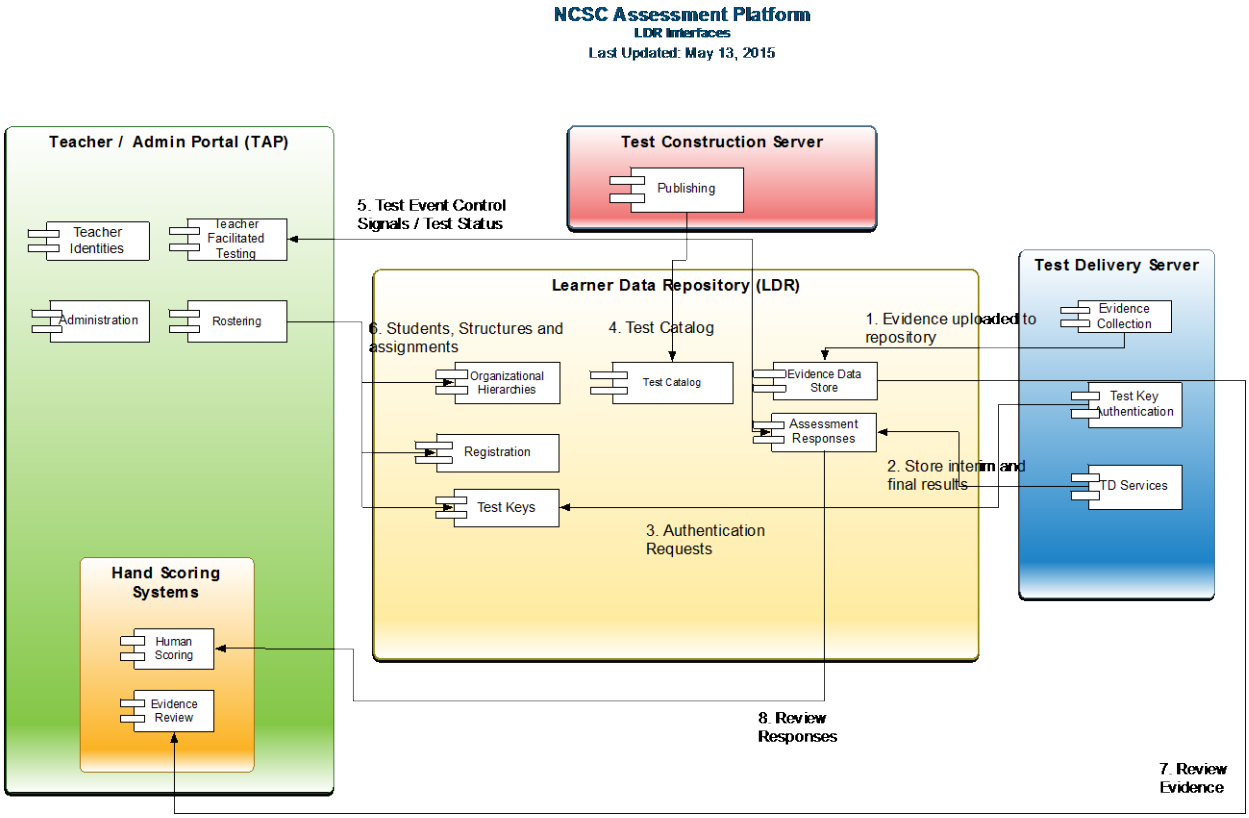


The component interfaces elements are described in the table below:

Interoperability Element	Description
1. Hierarchies, students, and current registrations	The LDR shall store all information about student identities, their association to LEA hierarchies, and any current assignments made. The teacher admin portal uses this information to persist rostering and assignment information.
2. New student identities	The rostering service allows new students to be ingested and stored into the LDR.
3. Assessment status, control	TAP hosts the proctoring interface, which allows test status to flow

Interoperability Element	Description
signals	from LDR and allows the TAP user to distribute a test session control signal to all tests in session. In this contract period, a pause request is the only control signal supported, used when all test sessions should be paused.
4. Student Identities	The identities of students may be provided in rostering files and ingested during the rostering process in TAP.
5. Teacher Identities	The identities of teachers may be provided in rostering files and ingested during the rostering process in TAP.
6. PD URLs	The URLs for Brainshark PD Modules are linked in TAP.
7. PD Quiz Administration, Results	PD Quiz Delivery is through NAP via interface with TAP, Results are transmitted back to TAP to store PD Status for all Teachers (Test Administrators).
8. Student Test Administration	TAP calls NAP to administer Teacher Facilitated Testing.

Learning Delivery Records Interfaces



The component interfaces elements are described in the table below:

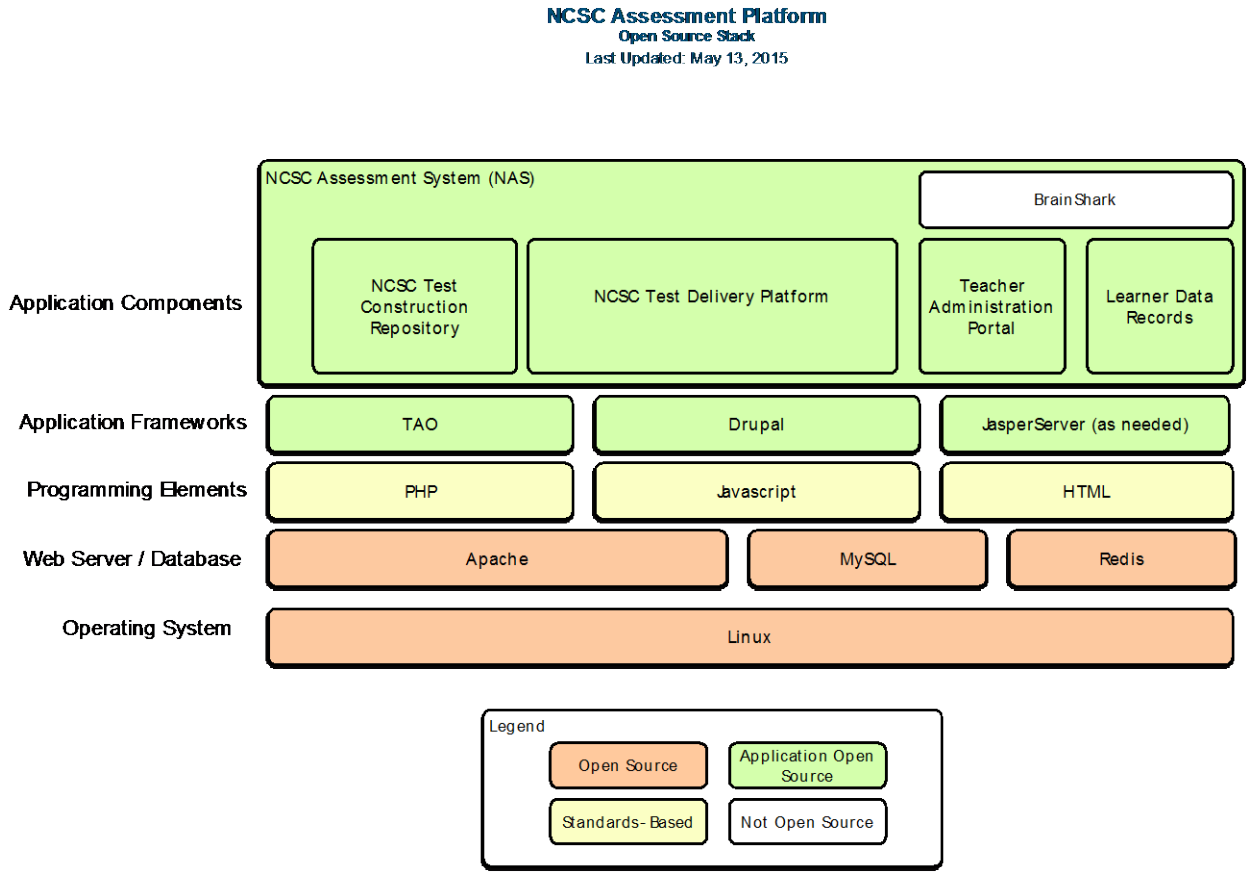
Interoperability Element	Description

Interoperability Element	Description
1. Evidence uploaded to repository	The test driver allows a file upload during test delivery.
2. Store interim and final results	Interim and final assessment results are uploaded upon Submit by Teacher Facilitator.
3. Authentication requests	When the Teacher Facilitator launches the test, the test key is authenticated through a service offered by the LDR.
4. Test Catalog	The published test catalog provides information to the rostering service, allowing for published forms to be assigned.
5. Test Event Control Signals / Test Status	LDR provides a service to TAP that will allow a test administrator to see the state of any tests in progress, or show their completion status.
6. Students, structures, and assignments	The LDR shall store all information about student identities, their association to LEA hierarchies, and any current assignments made. The teacher admin portal uses this information to persist rostering and assignment information.
7. Review Evidence	Any evidence that was submitted during test delivery by the test taker must be available during the human scoring process.
8. Review Responses	Any responses that were provided during test delivery by the test taker must be available during the human scoring process.

Open Source Components

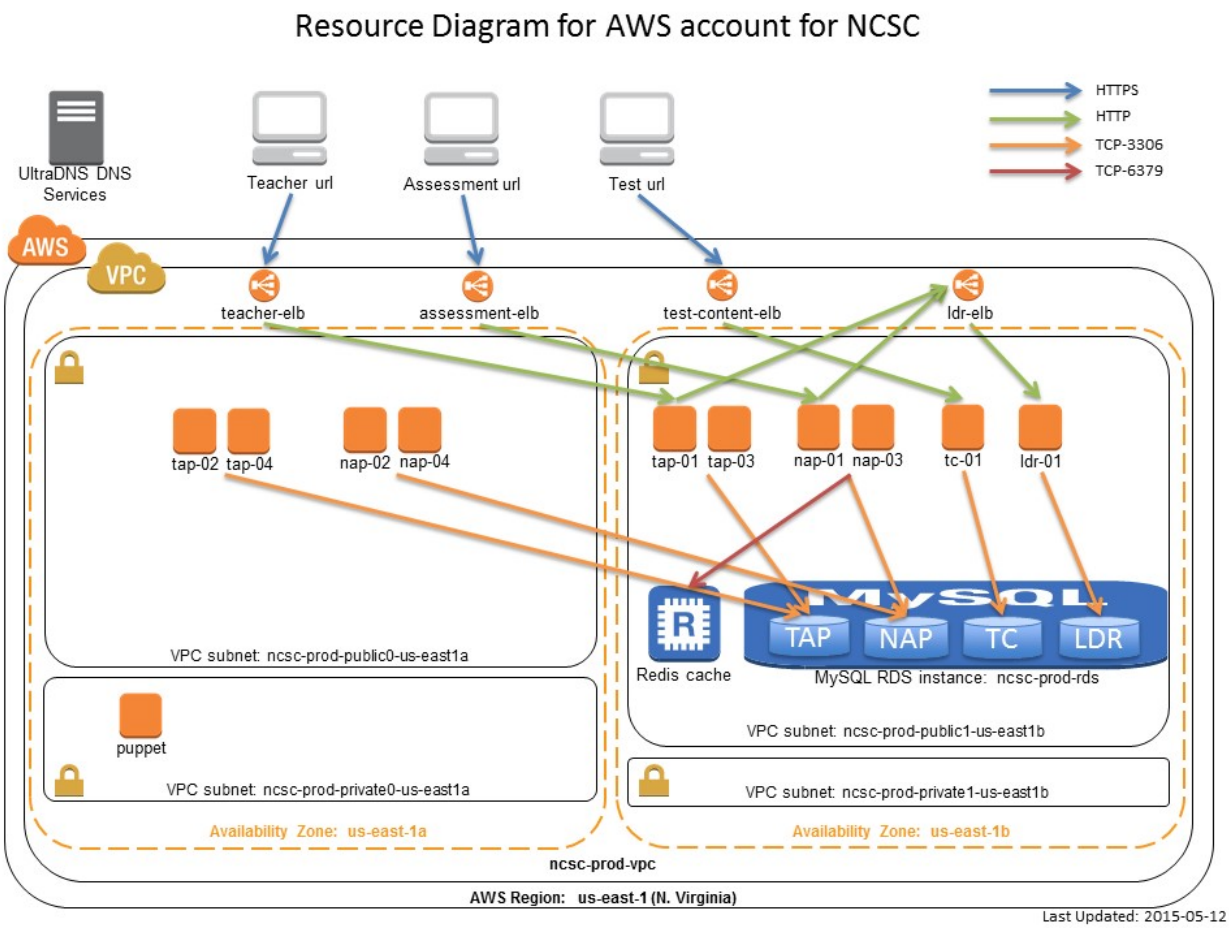
Almost all components of the NCSC Assessment Platform have been carefully selected to be either open source, or custom software built with open source components that may be licensed by NCSC with an open source license.

The following diagram shows the different components of the NCSC Assessment Platform and the combination of standards-based and open source components that constitute its software elements:



NCSC

NCSC assumes the responsibility of competent operation of the application stack, adherence to best practices, periodic recertification of the operating environment and regulatory compliance applicable to the kinds of data that will be stored and processed within the application stack.



System Security Layers

Amazon Web Services provides a variety of distributed services to customers as part of its Global Infrastructure. Responsibility for securing computing assets within this environment is a joint responsibility of AWS and the customer (NCSC).

Physical

From AWS_Secutiry_Best_Practices.pdf:

"The AWS secure global infrastructure and services are managed by AWS and provide a trustworthy foundation for enterprise systems and individual applications. AWS establishes high standards for information security within the cloud, and has a comprehensive and holistic set of control objectives, ranging from physical security through software acquisition and development to employee lifecycle management and security organization. The AWS secure global infrastructure and services are subject to regular third-party compliance audits. See the Amazon Web Services Risk and Compliance whitepaper for more information"

Operating System

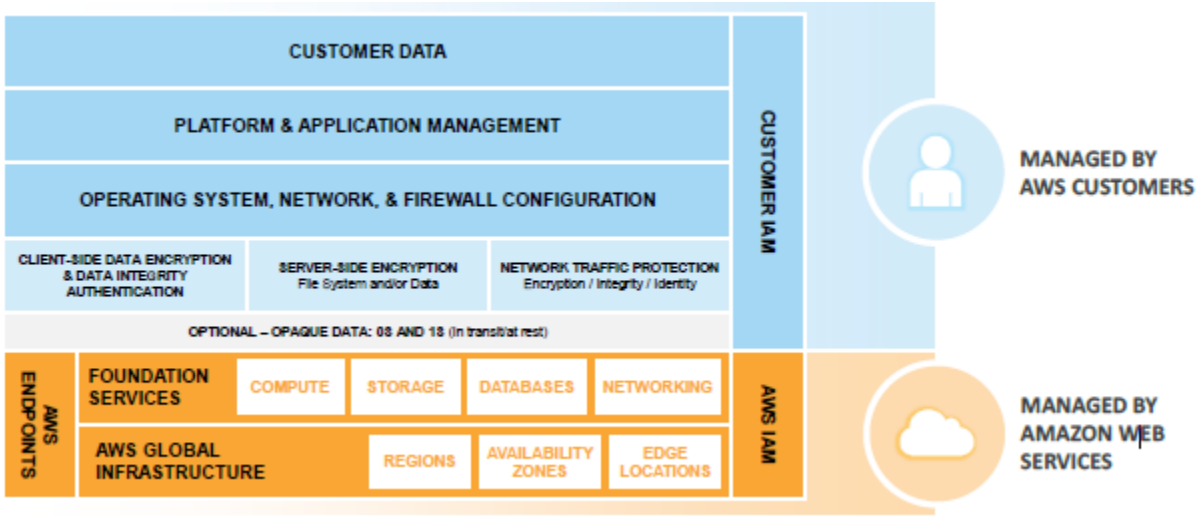
At boot time, all supplied AMIs have the following characteristics:

- Update the Amazon EC2 AMI tools
- Have password-based root logins disabled
- Root password will not be empty
- SSH host key pairs will be cleared of all unnecessary entries
- Created with a unique set of Public Key Credentials
- Sshd DNS checking disabled
- Empty shell history
- In the case of DB servers, only those logins required to operate the application and provide maintenance access will be available

Isolated Services

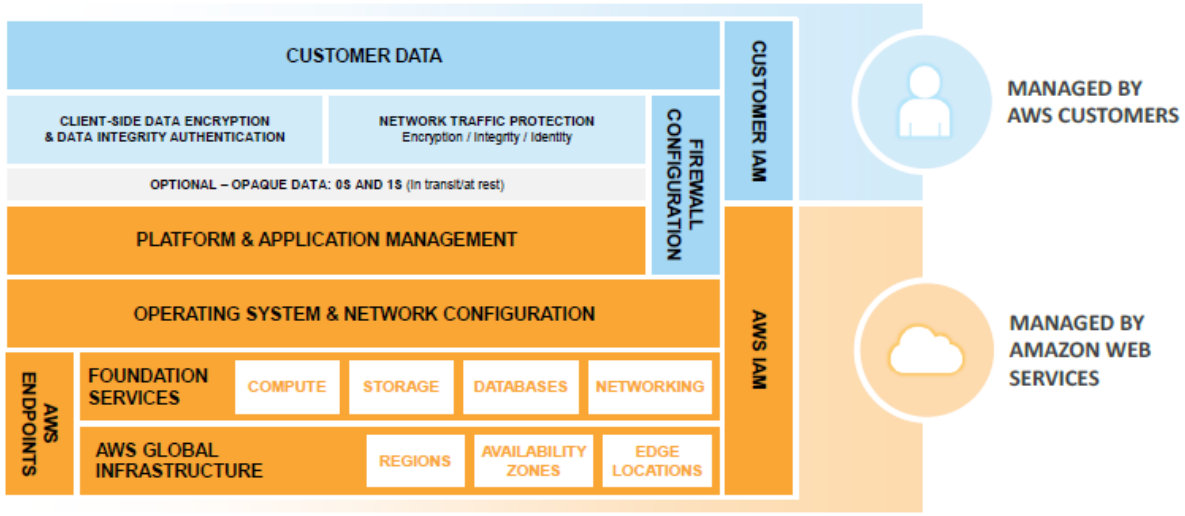
Infrastructural Services

AWS offers EC2, EBS and VPC as infrastructural services. At its core, the infrastructure security responsibility is managed by AWS. Access to these services and the compute resources within them are customer managed.



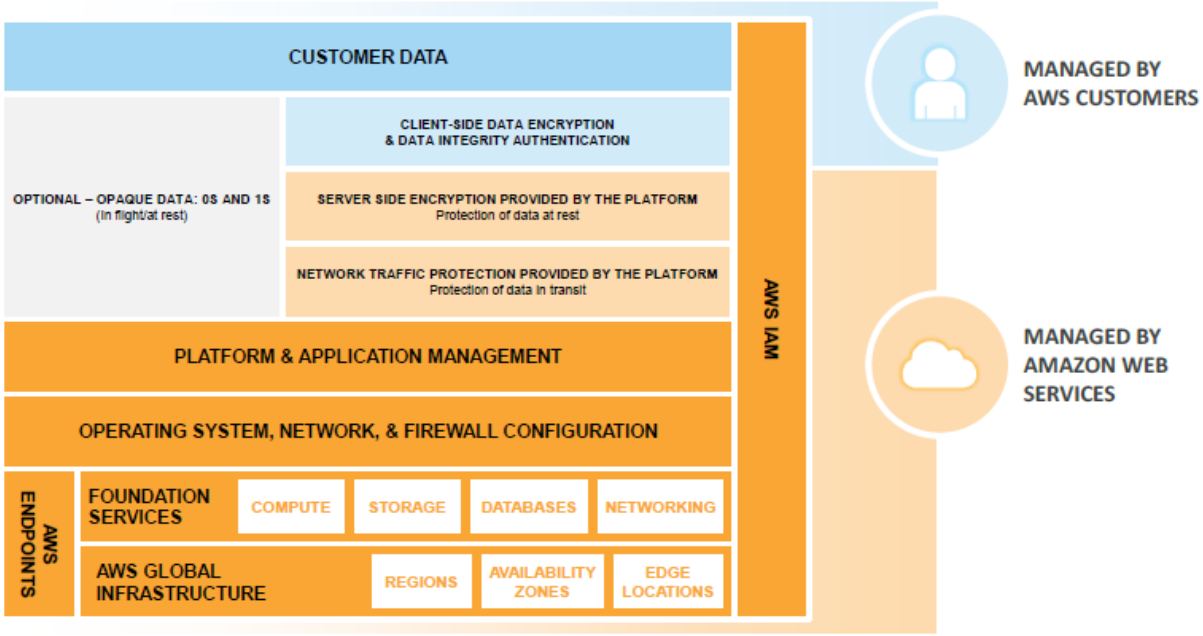
Container Services

Services such as database (RDS, Elasticache, etc.) have a different set of controls in place. AWS is responsible for all controls excluding application and/or customer data and firewall rules.



Abstracted Services

Abstracted services encompasses service offering such as S3 storage, DynamoDB and Cloudfront.



NCSC Glossary

AA-AAS

Alternate assessments based on alternate achievement standards. The focus for NCSC is to build an alternate assessment based on AA-AAS for students with the most significant cognitive disabilities.

AAS

As a part of No Child Left Behind, alternate achievement standards (AAS) allowed states to set expectations of performance differing in complexity from grade-level achievement standards. These are aligned to CCSS.

Apache License

Apache license is a free software license authored by the Apache Software Foundation (ASF). The Apache License requires preservation of the copyright notice and disclaimer. All software produced by the ASF or any of its projects or subjects is licensed according to the terms of the Apache License. Some non-ASF software is also licensed using the Apache License.

API

An application programming interface is a set of standards that define the communication points for software components allowing components to communicate with each other and aids in interoperability.

APIP

The Accessible Portable Item Profile (APIP) is a technical standard developed by IMS Global that focuses on accessibility in assessment items.

Application Architecture

Application architecture includes the design of the internal structure of an application.

Application Development

Application development is the development of a software product.

Architecture

The practical art of selecting and interconnecting hardware components to create computers that meet functional, performance and cost goals, to formally model those systems.

Apache Software Foundation (ASF)

A non-profit organization, made up of a community of decentralized software developers, who maintain a collection of open-source projects. Started in 1999, with their most notable project, the Apache web server.

ASP

Active server pages (ASP), a web-scripting interface developed by Microsoft, allow for dynamically generated web pages.

Bandwidth

A rate of data transfer, bit rate or throughput, measured in bits per second (bps).

Binary Transport

Binary transport is a transport implementation based on TCP or SSL/TSL. Distributed applications often utilize this transport.

Branching

Branching makes up a software development methodology. Branching typically involves workflow decisions and changes based on input or output.

Cardinality

In database design, cardinality is the defining of the relative size of elements used to describe a relationship between two elements.

CCC

Core Content Connectors (CCC) – pinpoint of primary content for CCSS

CCR

College and career readiness (CCR) signifies the knowledge and skills students, when they graduate from high school, should possess to be successful.

CCSS

The common core state standards (CCSS) were created by the Council of Chief State School Officers and the National Governors Association to provide a consistent meaning as to what students should know and be able to do.

Component

A component includes one of multiple applications that may make up a system.

Concurrency

Concurrency is a property of technological systems in which several computations are executing simultaneously, and are potentially interacting with each other.

COP

Communities of practice (COP) often are included as a part of professional development. Individuals form a COP to collectively learn about a given topic.

CSS

Cascading style sheets (CSS) are used most often in web page design to determine the presentation of content.

DAM

Digital asset management (DAM) consists of management tasks and decisions surrounding the ingestion, annotation, cataloguing, storage, retrieval and distribution of digital assets. digital photographs, animations, videos and music exemplify the target-areas of media asset management (a sub-category of DAM).

Data Accountability Center

DAC's mission is to support the submission and analysis of high-quality IDEA data by reviewing data collection and analysis and providing technical assistance to improve state capacity to meet data requirements. The Center's mission includes assisting the Office of Special Education Programs (OSEP) at the U.S. Department of Education by taking a leadership role in the Technical Assistance and Dissemination network to support the vision of high-quality data.

Data Warehouse

A database used for reporting and analysis.

Database

An organized collection of data for one or more purposes, usually in digital form.

Deployment

Deployment involves the process of making a software system available for use.

Domain

A set of common requirements, terminology and functionality for any software constructed to solve a problem.

Domain model

A domain model in problem solving and software engineering is a conceptual model of all the topics related to a specific problem. It describes the various entities, their attributes, roles and relationships, plus the constraints that govern the problem domain.

EBSR

In assessment, evidence-based selected response (EBSR) involves a specific item model where students, in part, are required to demonstrate the ability to cite evidence from text. It is used primarily in English Language Arts.

ECD

Evidence centered design (ECD) is an approach to creating educational assessments in terms of evidentiary arguments and is built using a framework.

ELA

An abbreviation for English Language Arts.

Epic

An epic includes a large feature, or a grouping of smaller features or user stories. Also see User Story.

ETL

Extract, Transfer, and Load. The ETL process involves extracting the data from the source systems. The transform stage applies to a series of rules or functions to the extracted data from the source to derive the data for loading into the end target. The load phase loads the data into the end target, usually the data warehouse (DW).

Federation

A Federation is multiple computing and/or network providers agreeing upon standards of operation in a collective fashion.

Focal KSA

A focal knowledge, skill, and ability (KSA) is an essential part of the targeted standard to be evaluated. A focal value is often established that includes the value that the test taker must have to possess a high level in the targeted standard.

Friends and Enemies

In adaptive testing, friends and enemies are a way of defining the relationship between items. If an item is presented to a tester, its friend items should also be presented, and it's enemies should not.

GSEG

A General Supervision Enhancement Grant is a grant program funded by the US Department of Education.

Hosting

Hosting involves the deployment of software in a physical environment that makes an application available on the World Wide Web.

Identifier

A unique name given to a specific object or a specific class of objects.

IEP

An individualized education plan (IEP), mandated by IDEA, designed to help teachers and students meet the unique educational needs of a student with disabilities, with the intention of enabling that student to achieve improved educational results.

IMS

An instructional management system provides information to teachers, administrators and others in order to improve instruction in the classroom. This information can include data about student performance, content resources to use in the classroom and analytics.

IMS GLC

IMS Global Learning Consortium (IMS GLC) is a global, nonprofit, member organization that strives to enable the growth and impact of learning technology in the education and corporate learning sectors worldwide.

Interface

A tool and concept that refers to a point of interaction between components, and is applicable at the level of both the hardware and the software elements.

IP

IP refers to internet protocol, or intellectual property.

Item

An item is a composite object that is made up of many assessment item parts, metadata and paradata about that item.

JSON

JavaScript Object Notation (JSON) is a lightweight, text-based, open standard designed for human readable data exchange.

JSP

Java Server Pages (JSP) is a technology that helps software developers serve dynamically generated web pages based on HTML, XML or other document types.

LCI

The Learner Characteristics Inventory (LCI) was created to study the learning characteristics of students participating in alternate assessments based on alternate achievement standards (AA-AAS).

Learning Registry

The Learning Registry was created by the US Department of Education and the Department of Defense. According to the website, it is an open source technical system designed to facilitate the exchange of data behind the scenes, and an open community of resource creators, publishers, curators, and consumers who are collaborating to broadly share resources, as well as information about how those resources are used by educators in diverse learning environments across the Web.

LGPL

The Lesser General Public License (LGPL) is a free software license published by the Free Software Foundation (FSF). The license explains how the software and its source code can be freely copied, distributed and modified.

LPF

The research-based Learning Progression Framework (LPF) describes a curricular sequence for how typical students develop and demonstrate more sophisticated understanding in each content area over time. From these LPFs for mathematics and English language arts (ELA), NCSC is developing grade-level assessment content targets and alternate achievement standards, linked to the CCSS for students with the most significant cognitive disabilities.

Metadata

Metadata includes information about data that is usually associated with content for ease of search and description of the data.

NCEO

The National Center on Educational Outcomes (NCEO) provides national leadership in designing and building educational assessments and accountability systems that appropriately monitor educational results for all students, including students with disabilities and English Language Learners (ELLs). NCEO hosts the Federal cooperative agreement for NCSC.

NCIEA

The National Center for Improvement of Educational Assessment (NCIEA) provides support for the technical, practical and policy issues of large-scale educational assessment and accountability programs nationwide. NCIEA project manages development of the technology platform for NCSC.

NoSQL

NoSQL is a broad class of database management systems that significantly differ from the classic model.

Ontology

An ontology represents knowledge as a set of concepts within a specific domain, content area, and the relationships among those concepts.

Open Content

Open content refers to content that can be copied and/or modified. Licensing can still impact open content and often Creative Commons licenses are applied.

Open Source Software

Software that has its source code available is referred to as open source software. Some rights can apply depending on licenses to allow users to change, improve and distribute the software.

Organizational Partners

Several partners working together make-up NCSC, including: National Center on Educational Outcomes, National Center for the Improvement of Educational Assessment, University of Kentucky, University of North Carolina Charlotte, and edCount, LLC. The NCSC state partners participating in the spring 2015 NCSC operational assessment are: Arizona, Arkansas, Connecticut, District of Columbia, Idaho, Indiana, Pacific Assessment Consortium, Maine, Montana, New Mexico, Rhode Island, South Carolina, South Dakota, and US Virgin Islands. As of spring 2015, additional states are members of the NCSC Consortium, representing varying levels of participation. They are: California, Delaware, Florida, Louisiana, Maryland, New York, Oregon, Pennsylvania, Tennessee, and Wyoming.

Paradata

Paradata includes reference information about data. An example of paradata would be the number of times a piece of content was used with a variety of students.

Progress Indicators

When proceeding through an assessment, a progress indicator may include a graphic or text image to inform the student that he/she is in progress. It may also show the student how much further until the end of the assessment.

QTI

The Question and Test Interoperability (QTI) is a specification created by IMS Global to define questions, test and results.

RTI

Response in Intervention (RTI) includes a formal process to provide support for students at the appropriate level as a prevention measure and maximize student achievement.

SAAS

Software as a service (SAAS) is a software delivery model in which the application and all data is hosted, often in the cloud.

SCORM

The Shareable Content Object Repository Model (SCORM) is a reference model that brings together several standards to create content interoperability.

SIF

The Schools Interoperability Framework Association (SIF Association) is a nonprofit organization with over 3,200 member organizations that produces open technical standards, SIF Specifications, for interoperability in the education ecosystem, including everything from student information systems to assessments to learning resources.

SLA

The service level agreement (SLA) defines the level of service. This often includes performance, failure recovery and time.

SME

A subject matter expert.

SSCD

Students with significant cognitive disabilities.

Support vs. Accommodation

A support is provided to a student that has a disability in order for them to reach their fullest potential. Some examples of support include accommodations, modifications or adapting instruction. An accommodation is a type of support and includes a change that helps a student overcome or work around the disability. The accommodation does not change performance expectations. For example, a student who is visually impaired may need large-print.

TEI

A technology enhanced item (TEI) involves a computer-delivered item that includes specialized interactions for collecting response data. This interactions are typically beyond constructed-response or selected-response.

Tenant

In architecture design, an instance of the software that runs on a server, serving a single client organization. Multi-tenancy is an instance of the software that runs on a server, serving multiple client organizations (tenants).

Thin Client

A thin client is a computer that relies on another computer or server to operate fully.

UDL

Universal Design for Learning was created by CAST and is a set of principles for curriculum development that give all individuals equal opportunities to learn. UDL provides a blueprint for creating instructional

goals, methods, materials, and assessments that work for everyone, regardless of their abilities and individual needs.

User Story

A small piece of a requirement that accomplishes a single identified goal in software development.

UX

User experience takes into account how a person interacts with the overall system or software program.

UXD

User experience design is based on what the overall UX a software program would like to convey.

Validity Argument (VA)

According to Kane, 2006, the validity argument provides an evaluation of the interpretative argument.

WIDA

The World-Class Instructional Design and Assessment (WIDA) is an assessment grant, funded by the US Department of Education, provided to a consortium for the development of innovative assessment for English language learners.

Wireframes

A wireframe provides a visual mock-up of a web page or series of screens for a software application.

XML

Extensible Markup Language (XML) offers a standard set of rules for encoding documents in machine-readable form.

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