Common Education Data Standards

http://ceds.ed.gov
CEDS Data Model
The CEDS Data Model Process

- CEDS Elements
- Domain Entity Schema
- Normalized Data Schema
## CEDS Domain Entity Schema (DES)

<table>
<thead>
<tr>
<th>Domain Entity</th>
<th>Domain Entity</th>
</tr>
</thead>
<tbody>
<tr>
<td>EL EL Child</td>
<td>K12 K12 School</td>
</tr>
<tr>
<td>EL Parent/Guardian</td>
<td>K12 Local Education Agency (LEA)</td>
</tr>
<tr>
<td>EL EL Family</td>
<td>K12 State Education Agency (SEA)</td>
</tr>
<tr>
<td>EL EL Organization</td>
<td>K12 K12 Student</td>
</tr>
<tr>
<td>EL EL Staff</td>
<td>K12 Parent/Guardian</td>
</tr>
<tr>
<td>EL Staff Credential</td>
<td>K12 K12 Staff</td>
</tr>
<tr>
<td>EL Staff Professional Development</td>
<td>K12 K12 Course</td>
</tr>
<tr>
<td>EL Professional Development Activity</td>
<td>K12 Course Section</td>
</tr>
<tr>
<td>EL Requirement</td>
<td>K12 Assessments</td>
</tr>
<tr>
<td>EL Professional Development Activity</td>
<td>K12 Program</td>
</tr>
<tr>
<td>EL Professional Development Session</td>
<td>K12 Incident</td>
</tr>
<tr>
<td>EL Technical Assistance</td>
<td>K12 Calendar</td>
</tr>
<tr>
<td>EL EL Class/Group</td>
<td>K12 Learning Resource</td>
</tr>
<tr>
<td>EL</td>
<td>K12 Financial Account</td>
</tr>
<tr>
<td>PS PS Institution</td>
<td>K12 Organization Account Value</td>
</tr>
<tr>
<td>PS PS Student</td>
<td>K12 Session</td>
</tr>
<tr>
<td>PS PS Section</td>
<td>K12 Rubric</td>
</tr>
<tr>
<td>PS PS Staff</td>
<td>K12 Rubric Criterion</td>
</tr>
<tr>
<td>PS PS Applicant</td>
<td>K12 Rubric Criterion Level</td>
</tr>
<tr>
<td>PS Parent/Guardian</td>
<td>K12 Allergy</td>
</tr>
<tr>
<td>PS Assessment</td>
<td>K12 Staff Credential</td>
</tr>
<tr>
<td>PS Learning Resource</td>
<td>K12 Staff Professional Development</td>
</tr>
<tr>
<td>PS Learning Goal</td>
<td>K12 Activity</td>
</tr>
<tr>
<td>PS Authentication</td>
<td>K12 Professional Development Requirement</td>
</tr>
<tr>
<td>PS Authorization</td>
<td>K12 Professional Development Activity</td>
</tr>
<tr>
<td>PS</td>
<td>K12 Professional Development Session</td>
</tr>
</tbody>
</table>
The DES is a hierarchy of domains, entities, attribute categories, and attributes organizing and assigning elements to specific entities.

It is used primarily by people as an index to search, map, and organize elements.

The DES contains mostly granular (unit level) data elements, presented in context, with a few exceptions for derived metrics to support specific use cases.

It is not overly concerned with normalization.
The CEDS Data Model Process

CEDS Elements

Domain Entity Schema

Normalized Data Schema
CEDS NDS Conceptual Model

- Organizations
- Time
- Roles
- People
- Learning Content and Process
Key Concept: Roles

All can be represented as Roles

Jane...
- is a K12 Teacher
- is a Parent of Johnny

Johnny...
- is a Parent of Johnny
- is an Early Learner

Person Roles
- K12 Student
- PS Student
- Teacher
- Principal
- Parent
CEDS Normalized Data Schema (NDS)

- NDS factors the entities and attributes of the DES with **standard technical syntax** and **3rd normal form**
- The NDS Logical Model provides a standard framework for integration of P-20 data as it might exist in a well-normalized “operational data store”.
- In a P-20 data system, the NDS models the **most current** view of data available to the enterprise including **some historical data** (such as prior assessment data and enrollment records).
- A “record” is generally **added** for each Person-Org-Relationship change event in the system, with begin and end dates. A system using the model could also log changes when other attributes are **edited** to capture both change history and version history.
# CEDS Normalized Data Schema (NDS)

<table>
<thead>
<tr>
<th>#</th>
<th>Type</th>
<th>Logic Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>General</td>
<td>USED NCES will publish Common Education Data Standards (CEDS) that will include common data elements and a logical data model.</td>
</tr>
<tr>
<td>2</td>
<td>General</td>
<td>The data model includes two schemas, a Domain Entity Schema (DES) and a Normalized Data Schema (NDS). The DES uses less technical syntax and organizes data elements by domain.</td>
</tr>
<tr>
<td>3</td>
<td>General</td>
<td>CEDS elements are first mapped into a DES hierarchy of domain, entity, attribute category, and attribute without strong regard for normalization. The DES schema is then normalized into NDS tables based third normal rules with shared tables displayed at the top and sub-type specific organized at the bottom. An entity relationship diagram is produced with metadata published in Excel with PDF, and DDL.</td>
</tr>
<tr>
<td>4</td>
<td>General</td>
<td>CEDS 2.0 will focus on data drawn from three domains of stakeholders: (1) Early Learning (EL); elementary and secondary (K12); and postsecondary (PS). CEDS 3.0 will extend these three domains.</td>
</tr>
<tr>
<td>5</td>
<td>Roles</td>
<td>CEDS 2.0 is primarily focused on standardizing educational organizations and their relationships with people and time. CEDS 3.0 focused more on use cases that support people’s relationship with learning, not so dependent on their roles in any one educational organization.</td>
</tr>
<tr>
<td>6</td>
<td>Roles</td>
<td>People in the NDS only have roles in relationship to a specific organization AND a designated date range.</td>
</tr>
<tr>
<td>7</td>
<td>Roles</td>
<td>Each role record (person-organization-relationship) can have status events that may be related to the start and/or end of role (e.g. transferred, progressed, retained, deceased). In addition, role status is used to store change events to the role such as applicant, accepted, and part -and full-time program participant.</td>
</tr>
</tbody>
</table>
CEDS Logical Model (NDS): High Level
Role (Common)
EL Organizations
EL Participation
EL Class/Group
EL Professional Development

Information about a requirement that a person participate in professional development related to a specific professional role or assignment. (*)

An activity designed for the purpose of developing someone professionally.

Information about a person's participation in a professional development activity and outcomes from that participation that may be related to a Professional Development Activity.

Learning Resource

The Professional Development Activity and/or session may be related to one or more Learning Resources and one or more professional Learning Standards.

Course -- The organization of subject matter content and related learning experiences offered for the instruction of students.

The activity is scheduled as a session or multiple sessions to occur over multiple days.

Staff activity may be granularly defined as a person's participation in one or more Professional Development Sessions. The Professional Development Activity to which the session belongs may then be derived, i.e. Professional Development Session is part of

*Professional Development Requirements currently reflects an early learning use case for clock-hour-based requirements but could be expanded to include elements that support requirements based on competencies (proficiency-based), credit hours, or continuing education units to support various state and local policies.
K12 SEA

OrganizationPersonRole
Key persons at the SEA, their titles, and contact information may be associated using OrganizationPersonRole.

Organization
OrganizationId
Name
RefOrganizationType
ShortName

K12SEAFederalFunds
OrganizationId
StateTransferabilityOfFunds
DateStateReceivedTitleIIIAllocation
DateTitleIII Funds Available To Subgrantees
NumberOfDaysForTitleIII Subgrants

K12SEAFederalFundAllocation
K12SEAFederalFundAllocationId
OrganizationId
FederalProgramCode
RefFederalProgramFundingAllocationType
FederalProgramsFundingAllocation

K12SEAAlermateFundUse
K12SEAAlermateFundUseId
OrganizationId
RefAlternateFundUsesId

This diagram illustrates the relationships and data elements involved in the K12 SEA, including key persons, organization details, federal funds, and alternate fund use.
K12 School
K12 Course Section
Key Concept: Assessment Processes

- Assessment Design
- Assessment Administration
- Assessment Scoring
## Key CEDS Terms: Assessment

<table>
<thead>
<tr>
<th>#</th>
<th>Attribute Category</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Learning Standard Document</td>
<td>A collection of learning standard items, typically arranged in a hierarchical structure or classification scheme, reflecting expectations of learner competencies within a single subject area covering one or more levels. (examples: Head Start Child Outcomes Framework, Common Core State Standards for Mathematics, Accountability Criteria for National Health Care Cluster Foundation Standards).</td>
</tr>
<tr>
<td>2</td>
<td>Learning Standards Item</td>
<td>Content that either describes a specific competency (learning objective) or describes a grouping of competencies within the taxonomy of a Learning Standards Document.</td>
</tr>
<tr>
<td>3</td>
<td>Assessment Family</td>
<td>A set of assessments with a common name, jurisdiction, or focus. (e.g. SAT, GRE, NAEP)</td>
</tr>
<tr>
<td>4</td>
<td>Assessment Instrument</td>
<td>An instrument used to evaluate a person with at least one form, section, and Assessment Item. (A summative assessment typically addresses a particular level, subject, and date range. A person's individual responses during the summative assessment administration are evaluated then the results are scored using one or more Assessment Sub Test Scoring Rules.)</td>
</tr>
<tr>
<td>5</td>
<td>Assessment Form</td>
<td>An instance of an assessment that can equate scores with another instance of that same assessment.</td>
</tr>
<tr>
<td>6</td>
<td>Assessment Section</td>
<td>A set of assessment items within an assessment form that contains information about administration, such as sequence, and may have content shared between multiple items such as directions for the section.</td>
</tr>
<tr>
<td>7</td>
<td>Assessment Form Sub Test</td>
<td>Information about scoring based on a defined set of assessment item responses with explicit rules to produce a subtest score, which may be for the entire assessment or one aspect of evaluation.</td>
</tr>
</tbody>
</table>
## Key CEDS Terms: Assessment

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<tr>
<td>8</td>
<td>Assessment Item</td>
<td>A specific prompt, that defines a question or protocol for a measurable activity that triggers a response from a person used to determine whether the person has mastered a learning objective.</td>
</tr>
<tr>
<td>9</td>
<td>Assessment Registration</td>
<td>Information related to a specific person associated with a specific assessment form used over one or more assessment administrations.</td>
</tr>
<tr>
<td>10</td>
<td>Assessment Administration</td>
<td>Information related to a specific instance of delivering an assessment to a specific person during a specific time period. (The assessment administration may be done individually or as part of a group, in a physical or virtual setting.)</td>
</tr>
<tr>
<td>11</td>
<td>Assessment Item Response</td>
<td>Information related to the a specific response to an assessment item by the person being assessed. The entity includes the response, a score or indication that the response was correct or incorrect and other information such as response time.</td>
</tr>
<tr>
<td>12</td>
<td>Assessment Subtest Score</td>
<td>A score evaluating a person's results from and assessment which may be for the entire assessment or a Sub Test, calculated using a specific Score Metric and one or more assessment item responses. The entity includes the score value and information about the score, such as a diagnostic statement.</td>
</tr>
<tr>
<td>13</td>
<td>Score Performance Level</td>
<td>A framework for classifying student scores to determine proficiency and other levels.</td>
</tr>
</tbody>
</table>
Assessment Design
Assessment Delivery

Information related to a specific person registered for an Assessment Administration, assigned a specific Assessment Form for participation in one or more Assessment Sessions.

AssessmentSession
- AssessmentSessionId
- AssessmentAdministratioid
- ScheduledStartDateTime
- ScheduledEndDateTime
- ActualStartDateTime
- ActualEndDateTime
- TimeAttempted
- RefAssessmentPlatformTypeId
- DeliverDeviceDetails
- SecurityIssue
- RefAssessmentSessionSpecialCircumstanceTypeId
- SpecialEventDescription
- LocationId
- RefLanguaged
- AssessmentFormSectionId
- AssessmentSessionId
- AssessmentRegistrationId

Roles served related to the administration of an assessment session.

AssessmentSessionStaffRole
- AssessmentSessionStaffRoleId
- RefAssessmentSessionStaffRoleTypeId
- PersonId
- AssessmentSessionId
- AssessmentParticipantSessionId

Information related to an instance of delivering an assessment during a specific period of time.

AssessmentPersonalNeedsProfile
- AssessmentPersonalNeedsProfileId
- AssessmentNeedTypeId
- AssignedSupportFlag
- ActivelyDefault

See additional tables that fully support AAT and 345 Global specifications.

*Related tables include information about a person's results from an assessment. (See *Assessment Results*), accommodations, and personal needs profile.
Assessment Results

Reference to information about the performance levels that may be assigned to an Assessment Subtest Result and specifications for selecting the performance level based on a score. Four styles are supported:
1) Specification of performance level by lower and upper cut score
2) Specification of performance level by lower cut score only
3) Specification of performance level without any mapping to scores
4) Specification of performance level by mapping to other scores

AssessmentPerformanceLevel

Reference to information for scoring an Assessment Form based on a set of Assessment Item responses with explicit rules to produce an Assessment Subtest Result, which may be for the entire Assessment Form or one aspect of evaluation based on a subset of Assessment Items.

AssessmentSubtest

An entity that includes information about a person's results from an assessment which may be for the entire assessment or one aspect of evaluation. The scoring method is defined by the related Assessment Subtest. The entity includes the score value and information about the score, such as a diagnostic statement.

AssessmentResult

- ScoreValue
- RefScoreMetricTypedList
- PreliminaryIndicator
- RefAssessmentPretestOutcomeId
- NumberOfResponses
- DiagnosticStatement
- DiagnosticStatementSource
- DescriptiveFeedback
- DescriptiveFeedbackSource
- InstructionalRecommendation
- IncludedInTypCalculation
- DateUpdated
- DateCreated
- AssessmentFormSubTestId
- AssessmentRegistrationId
- RefL OutcomeMeasurementLevelId
- RefL OutcomeTimePointId

Reference to delivery data for evaluation of results.

AssessmentParticipantSession

Reference to the assessment item design element for evaluation of the assessment.

AssessmentItem

An entity with information about detailed actions taken by a learner while engaging in learning activities, such as asking for a hint when taking an online formative assessment.

LearnerAction

- LearnerActionId
- AssessmentItemResponseId
- RefLearnerActionTypedList
- Value
- Time
- Date

AssessmentRegistration

Results are linked via Assessment Registration and by reference to other assessment delivery information.

AssessmentItemResponse

- AssessmentItemResponseId
- Value
- RefAssessmentResponseStatusId
- RefProficiencyStatusId
- AidSetUsed
- DescriptiveFeedback
- ScaffoldingItemFlag
- HintCount
- HintIncludedAnswer
- Duration
- FirstAttemptDuration
- StartTime
- StartDate
- SecurityIssue
- AssessmentItemId
- AssessmentParticipantSessionId
- ResultXML
Learning Standards

LearningStandardItemAssociation provides a mechanism to link any other object in the model to a learning standard, e.g. to LearningResource, Course, or AssessmentItem.
Key Concept: Learning Standards
Key Concept: Learning Standards

Example Values from Child Development and Early Learning Framework:
(Note: Identifier values expressed as URL/GUID are not real, shown only to illustrate proposed format.)

- Learning Standards Document Identifier: http://purl.org/HEADSTART/79B776908BB2474d8A095631C63DABE0
- Learning Standards Document Title: Child Development and Early Learning Framework
- Learning Standards Document Creator: Head Start
- Learning Standards Document Version: 2010
- Learning Standards Document Publication Status: Published
- Learning Standards Document Valid Date Start: 2010
- Learning Standards Document Subject: Early Learning

Example Values:
- Learning Standard Item Identifier: http://purl.org/HEADSTART/B62C1C106873438AA0126760075A65A3
- Learning Standard Item Statement: Mathematics Knowledge & Skills
- Learning Standard Item Type: Domain
- Learning Standards Document Identifier: http://purl.org/CCSS/79B776908BB2474d8A095631C63DABE0

Example Values:
- Learning Standard Item Identifier: http://purl.org/HEADSTART/8E1706CB8CF1441EACF0F47230D2D2D9
- Learning Standard Item Statement: Geometry and Spatial Sense
- Learning Standard Item Type: Domain Element
- Learning Standards Document Identifier: http://purl.org/CCSS/79B776908BB2474d8A095631C63DABE0

Example Values:
- Learning Standard Item Identifier: http://purl.org/HEADSTART/8E1706CB8CF1441EACF0F47230D2D2D9
- Learning Standard Item Statement: Recognizes and names common shapes, their parts, and attributes.
- Learning Standard Item Type: Example
- Learning Standards Document Identifier: http://purl.org/CCSS/79B776908BB2474d8A095631C63DABE0
Rubrics

A Rubric may be related to one or more learning standards/competencies via LearningStandardItemAssociation

A Rubric Definition

This relationship can capture the details of the results for each Criterion (the quality level or score for each row in a tabular rubric) when scoring an assessment item.

Rubric Scoring

AssessmentParticipantSession and AssessmentRegistration provides the context of who is being assessed and when. This example is for an assessment/evaluation of a person, not an organization.

Rubrics - as a Scored Assessment Item

(The Assessment Item may be a rubric-scorable item on a written test, one instance of an observation, or one part of an evaluation. Some attributes are not used for some uses, e.g., HintCount is designed for use with online formative assessments.)
Financial Reporting

- **FinancialAccount**
  - FinancialAccountId
  - Name
  - Description
  - AccountNumber
  - RefFinancialAccountCategoryld
  - RefFinancialAccountFundClassificationId
  - RefFinancialAccountProgramCodeId
  - RefFinancialBalanceSheetAccountCodeId
  - RefFinancialExpenditureFunctionCodeId
  - RefFinancialExpenditureObjectCodeId

- **OrganizationFinancial**
  - OrganizationFinancialld
  - FinancialAccountId
  - OrganizationCalendarSessionId
  - ActualValue
  - BudgetedValue

- **OrganizationCalendarSession**
  - OrganizationCalendarSessionld
  - Designator
  - BeginDate
  - EndDate
  - RefSessionTypeld
  - InstructionalMinutes
  - Code
  - Description
  - MarkingTermIndicator
  - SchedulingTermIndicator
  - AttendanceTermIndicator
  - OrganizationCalendarld
  - DaysInSession
  - FirstInstructionDate
  - LastInstructionDate
  - MinutesPerDay
  - SessionStartTime
  - SessionEndTime

- **Organization**
  - Organizationld
  - Name
  - RefOrganizationTypeld
  - ShortName

- **OrganizationCalendar**
  - OrganizationCalendarld
  - Organizationld
  - CalendarCode
  - CalendarDescription
  - CalendarYear
Workforce