SLI Data Ingestion Specification

SLC Project Documentation

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Revisions

Version	Date	Ed-Fi version	Author	Comments
0.1	10/24/11	1.0-RFC-062811	I. Bagrak	Initial revision
0.2	11/27/11	RC 1A	I. Bagrak	Updated to include ingestion process overview, preliminary error reporting formats, and subsections for future document expansion.
0.3	1/17/12	1.0	I. Bagrak	Restructured around interchanges; added onboarding and provisioning sections.
0.4	1/27/12	1.0	I. Bagrak	Updated and expanded definitions. Updated and expanded control file format definition. Converted non-normative interchange-level constraints into tabular (normative) constraints.
0.5	5/4/12	1.0.03	I. Bagrak	Updated error reporting. Updated supported Ed-Fi entity set for SLI Alpha Release. Added Ed-Fi to SLI Entity Mapping.

Reference Documents

1. Ed-Fi Design Guidelines. Version 1.0.
   http://www.ed-fi.org/wp-content/uploads/2011/06/Public-Ed-Fi-Design-Guidelines-1.0-111111.pdf

2. Ed-Fi – Unifying Data Model. Version 1.0.
   http://www.ed-fi.org/wp-content/uploads/2011/06/Public-Ed-Fi-Unifying-Data-Model-1.0-111111.pdf

3. Ed-Fi Interchange Schemas
   http://www.ed-fi.org/wp-content/uploads/2011/12/Ed-Fi-Sample-Interchange-Schemas-with-Data-1.0.zip

4. Ed-Fi Core Schema
   http://www.ed-fi.org/wp-content/uploads/2011/12/Ed-Fi-Core.zip

5. SLI Identity Integration Solution. April 16, 2011.

6. SLI Identity Integration and Management Overview. Sep 17, 2011.

7. SLI Platform Developer Guide. April 16, 2011.

8. SLI Data Security and Privacy Plan. Sep 16, 2011.

9. Java Properties Specification.
   http://docs.oracle.com/javase/6/docs/api/java/util/Properties.html#load%28java.io.Reader%29

10. J. Galbraith, O. Saarenmaa (July 2006). SSH File Transfer Protocol. I-D (draft-ietf-secsh-filexfer). IETF. Retrieved January 2012.

11. T. Ylonen, C. Lonvick, Ed. (January 2006). The Secure Shell (SSH) Authentication Protocol. RFC 4252. IETF. Retrieved January 2012.

12. Xerces-J API Documentation.
    http://xerces.apache.org/xerces-j/apiDocs/index.html

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1 Purpose and Status

This document provides an overview of the Ed-Fi data ingestion file formats and a set of procedures for ingesting data into the SLI Data Store.

This document is a work in progress, and some of the items are subject to change. It is expected to evolve with further elaboration of ingestion requirements as well as changes in the SLI ingestion architecture.

All application or user interfaces, file formats, specifications, and system invariants presented in this document, or any of its versions prior to version 1.0, represent work in progress and are subject to change without notice.

2 Definitions

This section contains definitions of terms that are used in this document.

Term	Definition
authentication	The process of verifying that a user is who they claim to be. For example, I am user *jsmith* when I enter the correct username and password for the *jsmith* account. SLI supports both delegated and federated authentication.
authorization	The process of determining which resources a user has permission to access and which actions a user has permission to do. For example, a teacher, user *jsmith*, has permission to view data that is associated with students who are enrolled in his classes.
directory	A service that manages user identities and those users' roles and permissions. Commonly-used directories include Microsoft Active Directory, OpenLDAP, and Novell's eDirectory.
effective permissions	The combination of a user's permissions plus an application's permissions, which are typically more restrictive than either source of permissions. Effective permissions control access to an education organization's data when accessed through an SLI application. For example, if a user has permission to edit student data, but the SLI application they are using does not, SLI denies edit access to the user.
identity provider (IDP)	A computer system that creates, maintains, and manages identity information and provides user authentication to other service providers within a federation. An IDP may be a directory or it may be a service that acts on behalf of one or more directories. In a SAML federated environment, a SAML IDP produces SAML assertions.
education organization	A public or private institution that provides instructional or support services to students or staff. Examples of education organizations include state department of education, school district, and school.

Term	Definition
permissions	A set of actions that an actor is allowed to take. Individual users acquire permissions indirectly through role assignment. An example SLI permission is "Can see student assessment data for students that the user teaches" or "Can change administrative setting for an account".
personally identifiable information	Personally identifiable information is information that can be used to uniquely identify, contact, or locate a single person or can be used with other sources to uniquely identify a single individual.
role	A pre-defined relationship between a user and a specific set of permissions. SLI roles generally correspond to an individual's job function, for example, "teacher" or "principal." A user may be assigned multiple roles, in which case the roles' permissions are additive.
Shared Learning Collaborative (SLC)	The Shared Learning Collaborative is an alliance of states, foundations, educators, content providers, developers and vendors who are passionate about using technology to improve education.
SLI Platform directory	A specific type of directory that SLI hosts and uses to manage Super Administrator users.
Super Administrator	The role that grants complete administrative control over all data within SLI for a particular education organization. Super Administrator permissions include: adding and removing IT Administrators to the SLI directory, and assigning Identity Provider to a district.
Tenant	A single set of data that roughly corresponds to a logically consistent set of educationally relevant data under a common State Education Agency or Local Education Agency. Tenants never span multiple State Education Agencies.

3 SLI Overview

The Shared Learning Infrastructure (SLI) is an extensible system that offers simultaneously:

- A secure, multi-tenant data store that hosts a core set of classroom-level education data elements that are commonly used in the K 12 education information domain;

- A lightweight set of applications that gives educators access to the information and data that can help them analyze student performance, adjust instructional strategies, and better determine what's working and what isn't working in order to improve student outcomes;

- An extensible system on which third-party applications can be built.

3.1 SLI Architecture Highlights

SLI is logically divided into two main layers: Applications, which may be SLI Core applications or State Education Agency (SEA)/Local Education Agency (LEA)/Vendor applications, and Data.

The SLI Data layer governs how data flows in and out of the SLI system. It is divided into three major components:

- SLI Data Store: A secure, multi-tenant data store that hosts core education data elements as well as custom data for specific SEA/LEA or application needs.

- SLI Secure Web Services API: Contains the building blocks that are necessary to create SLI applications. Application access to the SLI Data Store is strictly governed by this API.

- SLI Bulk Data Ingestion and Validation: Contains the building blocks that facilitate data exchange between SLI and student data systems such as SEA, LEA, and Vendor data source systems.

This document addresses the data format used as an input to SLI Bulk Data Ingestion and Validation Layer.

An overview of the SLI Architecture is provided in SLI Data Integration and Core Entity Model Overview whitepaper.

3.2 Key Components of SLI CEM

The SLI Core Entity Model (CEM) is based on the Ed-Fi Unifying Data Model. One to one mapping is maintained for the majority of the entities, although some Ed-Fi entities have been merged into a single entity or split into multiple entities in SLI CEM. The entity-level mapping between Ed-Fi entities and SLI CEM entities is provided in Appendix A.

The SLI Bulk Data Ingestion and Validation layer uses Ed-Fi XML schemas as the primary format for the source data coming into SLI. However, differences between SLI CEM and Ed-Fi data model may require that Ed-Fi XML schemas be revised specifically for use with SLI. For any such case, SLI-specific deviations from published Ed-Fi schemas versions will be documented as described in Section 7.2.

4 Ingestion Onboarding and Provisioning

A Tenant in SLI is a hierarchical segment of a state school system comprising one or more Districts (LocalEducationAgencies), entities belonging to those Districts (Schools, Teachers, Students, Courses, Assessments, etc.), and their associations. A Tenant hierarchy is rooted in an EducationOrganization entity, which serves as a logical parent for other EducationOrganization entities and so on. SLI supports several types of EducationOrganizations including State Education Agency (SEA) and Local Education Agency (LEA) (or District).

The onboarding process for an LEA starts with the creation of a root entity in the EducationOrganization hierarchy. A Super Administrator account and a dedicated landing zone are also created and associated with that EducationOrganization. If a group of LEAs agree to be onboarded together, separate landing zones and Super Administrators are created for every LocalEducationAgency within the Tenant.

A Super Administrator is a special SLI role that authenticates against the SLI Platform directory (as opposed to a SEA/LEA-specific IDP). A Super Administrator can be created for a State Education Agency to perform administrative tasks on behalf of Local Education Agency under that State Education Agency's logical hierarchy of Education Organizations provided that State Education Agency has been granted the proper authorizations from LEAs as determined by the SLC. LEAs can authorize an SEA Super Admins to perform the following actions on their behalf.

- Ingest data into their EducationOrganization
- Ingest data into a child EducationOrganization (for example, District), but only if such permissions have been delegated to it by a Super Administrator of that child EducationOrganization

To create a landing zone for an EducationOrganization/Super Administrator, the following data is required:

- Name, institution, and other identifying information.
- Expected number of records to be loaded for each entity during initial ingestion.
- Expected yearly growth of records for key entities, for example, Student, StudentAssessment, Session.

5 Ingestion Process

SLI exposes three data ingestion vectors:

1. An SFTP [10] interface to upload ingestion jobs to a designated landing zone

2. A SIF agent interface for event-based data integration

3. SLI REST API [7]

SFTP-based interface provides a way to submit a job, to monitor its progress throughout the ingestion pipeline, and to be notified of any errors encountered along the way. Event-based data integration through SIF will rely on the standard SIF agent registration and subscription mechanisms. The details of SIF agent interface configuration and setup will be provided as part of a separate SLI document.

SFTP-based batch upload proceeds as follows:

1. An SLI administrator prepares a batch job consisting of a job control file and a collection of data files exported from source systems.
   a. The data files must be valid XML data. XML files must adhere to SLC-Ed-Fi schemas defined in Section 7.2.
   b. The job control file contains the ingestion configuration parameters and a listing of data files associated with the ingestion job. The control file format is described in Section 6.2.

2. An IT administrator packages an ingestion job as a .zip file and performs a secure copy of that file to the designated ingestion landing zone (provisioning of landing zone URL and staff roles is described in Section 4).
   c. a. Once copied, the job will be assigned a job number, and a corresponding job progress log file will appear inside the landing zone. The ingestion process will begin automatically for that job.
   d. b. While an ingestion job is in progress, the user will able to access job status by downloading log files.

3. Following a full pass of ingestion, a job log file will contain a set of warnings and errors generated in the process as well as the information about the number and types of records ingested. Three broad classes of errors and warnings are defined in ingestion: (1) submission-level, (2) file-level, and (3) record-level. The format of a job status file and the error reporting mechanisms are described in Section 6.3.

5.1 Authentication

The SFTP server authenticates Super Administrators against the SLI Platform directory, so Super Administrators must login with the username and password provided to them at the time of tenant onboarding.

With the SFTP and the underlying SSH protocol (see [11]), the onus is on the SFTP client to verify the identity of the SFTP server (the host) to which it is connecting. The

host identify is established by its SSH host key. SSH host key is provided to Super Administrator in a secure manner along with the login credentials.

5.2 Authorization

A Super Administrator is always associated with the landing zone URI, and their user credentials are stored in the SLI Platform directory. SLI CEM also maintains an internal mapping between landing zones, Tenants and Districts, which means that a given Super Administrator can only upload ingestion jobs to a specific landing zone.

5.3 Encryption

In order to protect personally identifiable information, the ingested files containing student data will be encrypted during transmission and storage within the SLI environment, and it will only be delivered to SLI applications using a secure network protocol.

6 File Formatting

6.1 General Formatting Conventions

All files are assumed to be UTF-8 encoded, unless otherwise specified. Machine-readable timestamps use epoch (Unix) time; human-readable timestamps use a formatted date/time string.

6.2 Control File Format

The control file defines the set of inbound XML data to be ingested together as part of the same ingestion job. Controls files are recognized by the .ctl file extension.

Each row within the control file corresponds to a single XML data file and is formatted as comma-separated values. Leading/trailing spaces are considered part of the values and will not be trimmed. A comma must not follow the last value in any row. Both newlines and CR/LF character pairs are recognized as valid line separators..

The row format is:

```
<file format>,<interchange>,<file name>,<file checksum>
```

where:

<file format>	Specifies the file format. ***edfi-xml*** is the only supported file format.
<interchange>	Applicable Ed-Fi interchange name
<file name>	Specifies the file name. File names are case insensitive, and should not contain any OS-specific path delimiters (e.g. "/", "\", ":") This field may or may not be enclosed in double quotes. File names containing double quotes and/or commas should be enclosed in double-quotes. A double-quote appearing inside a field must be escaped by preceding it with another double quote.
<file checksum>	File's MD5 checksum. The MD5 checksum is expressed as 32 hexadecimal digits

<file format>, <interchange>, <file name> and <file checksum> fields are case-insensitive.

The control file format allows for specification of job-level parameters. These are specified in the control file as line entries preceded with the @ symbol.

Job parameters appearing in control files are parsed using the specification for Java Properties (but the leading "@" is stripped first) (see [9] for details). Parameters may not require a value, in which case they are treated like flags. Both parameter names and parameter values are case-insensitive.

The following table describes the parameters that are currently supported in the control file:

Parameter	Effect	Comments
@dry-run	Indicates that the results of ingestion processing should not be written to the core data store.	
@purge	Deletes all previously ingested data from this tenant. All other content of the control file is ignored.	

A job control file may look as follows:

@dry-run

edfi-xml,StudentEnrollment,data.xml,756a5e96e330082424b83902908b070a

6.3 Error/Status Logs

In the course of ingestion several log files are created and placed in the landing zone. These files are used to capture warning and errors at job level (per control file) or at resource level (per XML file within job). The table below summarizes the types of log files, when they are created, and how they are formatted.

Naming Convention	When Created	Format
job-<jobId>.log	Once for every job	INFO <jobId information>
		INFO [file] <resourceId> (<internalschema>)
		INFO [file] <resourceId> records considered: <#>
		INFO [file] <resourceId> records ingested successfully: <#>
		INFO [file] <resourceId> records failed: <#>
		INFO [configProperty] <list of config parameters>
		INFO <All|#> records process successfully
		INFO Processed <#> records

Naming Convention	When Created	Format
job_warn-<jobId>.log	Job-level (non-resource specific) warnings present	WARN <warning detail>
job_error-<jobId>.log	Job-level (non-resource specific) errors present	ERROR <error detail>
warn.<resourceId>-<jobId>.log	Resource-level warnings present	WARN <warning detail>
error.<resourceId>-<jobId>.log	Resource-level errors present	ERROR <error detail>

jobId is a unique identifier assigned to each new job by the ingestion pipeline. resourceId refers to the name of a specific file within with a job. Each new log file entry begins with INFO, WARN or ERROR, which improves readability and simplifies multi-line error message parsing.

job-<jobId>.log file appears in the landing zone only after an ingestion job has been fully processed. The file can be used an indicator of job completion by an automated client script.

6.4 Job-level Error and Status Reporting

For example, consider an ingestion job submitted as a single zip file – grade12Math.zip. Assuming there are two resources inside the zip file – Grade_12_Math_CCS_G_C.xml and Grade_12_Math_CCS_G_SRT.xml – the main job-level log file for this job, named job-grade12Math.zip-1335552611336-f2ff0a92-c5ba-4aa1-8f28-e52618d35bae.log, may be formatted as follows:

INFO jobId: grade12Math.zip-1335552611336-f2ff0a92-c5ba-4aa1-8f28-e52618d35bae

INFO [file] Grade_12_Math_CCS_G_C.xml (neutralrecord/AssessmentMetadata)

INFO [file] Grade_12_Math_CCS_G_C.xml records considered: 19

INFO [file] Grade_12_Math_CCS_G_C.xml records ingested successfully: 19

INFO [file] Grade_12_Math_CCS_G_C.xml records failed: 0

INFO [file] Grade_12_Math_CCS_G_SRT.xml (neutralrecord/AssessmentMetadata)

INFO [file] Grade_12_Math_CCS_G_SRT.xml records considered: 0

INFO [file] Grade_12_Math_CCS_G_SRT.xml records ingested successfully: 0

INFO [file] Grade_12_Math_CCS_G_SRT.xml records failed: 0

INFO [configProperty] dry-run

INFO All records processed successfully.

INFO Processed 19 records.

If any errors or warnings are encountered at job-level they will be placed in job_warn-grade12Math.zip-1335552611336-f2ff0a92-c5ba-4aa1-8f28-e52618d35bae.log and job_error-grade12Math.zip-1335552611336-f2ff0a92-c5ba-4aa1-8f28-e52618d35bae.log.

job_error-<jobId>.log files are populated with the following error types (no warnings have been defined at job-level):

Scenario	Default Handling	Message Template
Unknown file format or type specified	Error - job is aborted	File ${file}: Unknown file ${format|type}: ${value} specified.
Checksum comparison fails	Error - job is aborted	File ${file}: Checksum validation failed. Possible file corruption.
Referenced file not physically present	Error – job is aborted	File ${file}: Specified file is missing.
Unreadable zip file	Error – job is aborted	Could not read .zip archive ${file}. Possible file damage or corruption. Please resubmit.
Missing control file in zip file	Error – job is aborted	No control file found in .zip archive ${file}. Please resubmit
Submitter not allowed to push data to destination	Error – job is aborted	Authorization failed.
No valid files specified in control file.	Error – job is aborted	No valid files specified in control file.

Scenario	Default Handling	Message Template
Referenced file missing checksum	Error – job is aborted	File ${file}: No checksum is specified.

6.5 Resource- and Record-level Error Reporting

error.<resourceId>-<jobId>.log files are populated with the following types of error messages.

6.6 General resource-level errors

Scenario	Default Handling	Message Template
Problem reading file	Error – job is aborted	XML file cannot be read
Empty file	Error – job is aborted	XML file is empty

6.6.1 XML and schema validation errors and warnings

SLI embeds Xerces XML parser to validate incoming files against SLI-Ed-Fi schemas. Errors and warnings produced by the parser can be found in the parser documentation [12]. The output of XML validation phase is written to resource-specific log files.

6.6.2 Record-level persistence errors

Scenario	Default Handling	Message Template
Missing required parameter	Error – job is aborted	Data validation error when saving an entity Error REQUIRED_FIELD_MISSING Entity ${recordType} Instance ${recordNumber} Missing or empty field ${fieldname}
Parameter with invalid date format	Error – job is aborted	Data validation error when saving an entity Error INVALID_DATE_FORMAT Entity ${recordType} Instance ${recordNumber} Invalid date format for field ${fieldname} Value [${fieldValue}] Expected ${fieldValue}

Parameter with invalid data type	Error – job is aborted	Data validation error when saving an entity 　　　Error　　INVALID_DATATYPE 　　　Entity　　${recordType} 　　　Instance　${recordNumber} 　　　Invalid data type for field　　${fieldname} 　　　Value　　[${fieldValue}] 　　　Expected　[${fieldValue}]
Parameter with mismatch enumeration	Error – job is aborted	Data validation error when saving an entity 　　　Error　　ENUMERATION_MISMATCH 　　　Entity　　${recordType} 　　　Instance　${recordNumber} 　　　Enumeration mismatch for field　　${fieldname} 　　　Value　　[${fieldValue}] 　　　Expected　[${fieldValue}]
Parameter missing referential information	Error – job is aborted	Data validation error when saving an entity 　　　Error　　REFERENTIAL_INFO_MISSING 　　　Entity　　${recordType} 　　　Instance　${recordNumber} 　　　Referential information missing for field　　${fieldname}
Bad parameter value or parameter value where no parameter value is expected	Error – job is aborted	Data validation error when saving an entity 　　　Error　　INVALID_VALUE 　　　Entity　　${recordType} 　　　Instance　${recordNumber} 　　　Field　　${fieldname} 　　　Value　　${fieldValue} 　　　Expected　${expectedFieldValue}
Selected choice type not a valid option for this field	Error – job is aborted	Data validation error when saving an entity 　　　Error　　INVALID_CHOICE_TYPE 　　　Entity　　${recordType} 　　　Instance　${recordNumber} 　　　Field　　${fieldname} 　　　Value　　${fieldValue} 　　　Expected　${expectedFieldType}

6.7 CSV Support

SLI does not support comma-separated-value (CSV) as one of the native formats for data ingestion. However, SLC will be providing an offline CSV-to-Ed-Fi XML translation tool, which demonstrates conversion of CSV data to Ed-Fi XML for a subset of supported Ed-Fi entities. The tool will come with its own documentation, detailing among other things, how to extend it to support other Ed-Fi entities and new variants of source CSV.

7 Bulk Upload of Ed-Fi Data

7.1 Interchange Format

Ed-Fi Interchange Schemas define XML representations of particular data spaces, or groups of entities and associations, for transport between systems. This is depicted in the following diagram.
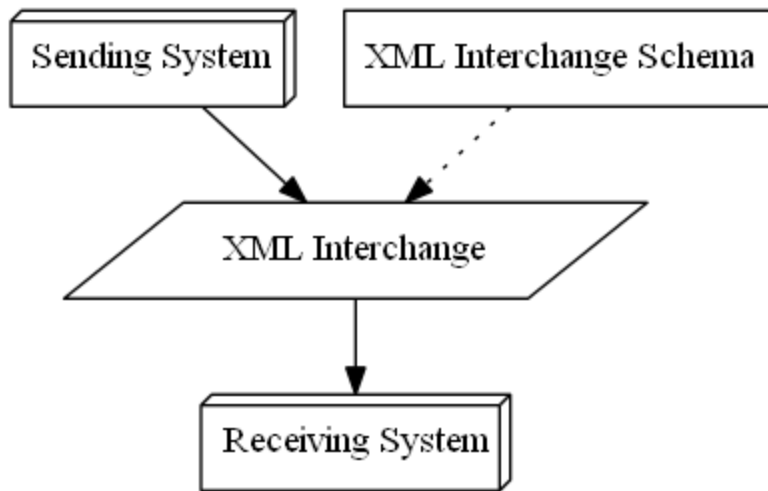
Figure 1: Data Interchange Systems

Different interchange schemas may be used to reflect different use cases, such as different groups of source systems. Ed-Fi defines a Core Schema that provides a library of building blocks, which are referenced from the interchange schemas. Ed-Fi defines 13 standard interchange schemas that are be used by SLI. They are:

- Interchange-AssessmentMetadata
- Interchange-EducationOrganization
- Interchange-EducationOrgCalendar
- Interchange-MasterSchedule
- Interchange-StaffAssociation
- Interchange-StudentAssessment
- Interchange-StudentAttendance
- Interchange-StudentCohort
- Interchange-StudentDiscipline
- Interchange-StudentEnrollment

- Interchange-StudentGrade

- Interchange-StudentParent

- Interchange-StudentProgram

> For up to date technical documentation on Ed-Fi interchange schemas and Ed-Fi core schema, please refer to [3] and [4], respectively.

Each XML file, which is part of a well-formed ingestion job, is validated against an Ed-Fi interchange schema. This is done as part of the ingestion sequence described in the next section.

7.2 SLI-Ed-Fi XML Schema Versioning

SLC will maintain and publish a set of modified Ed-Fi core and interchange schemas for use with SLI. These extensions will be based on a public version of Ed-Fi schemas and incorporate the following types of modifications:

- Exclude unsupported entities in each of the interchanges

- Exclude unsupported attributes of supported entities

- Make optional attributes of supported entities mandatory

- Add attributes to supported entities

- Add enumeration values to incomplete code lists

SLI-Ed-Fi schemas will be the only XML schemas against which ingested data will be validated in SLI. The proposed SLC schema names are:

- SLC-Ed-Fi-Extended-Core.xsd

- SLC-Ed-Fi-Interchange-<interchange_name>.xsd

Schema versions will be specified as an attribute of <xs:schema> tag at the top of the .xsd files.

7.3 XML Ingestion Sequence

To initiate an ingestion job, a user creates a job control file according to the format specified (Section 6), combines it with a set of XML files as a single zip archive, and uploads that archive to the ingestion landing zone (Section 5). Before the upload, the user will have to authenticate with the SFTP server, which will verify that the user has been authorized (Section 5.2) to ingest data.

Once a job has been successfully uploaded, the job will be picked up by the ingestion pipeline, which can be visualized as follows:
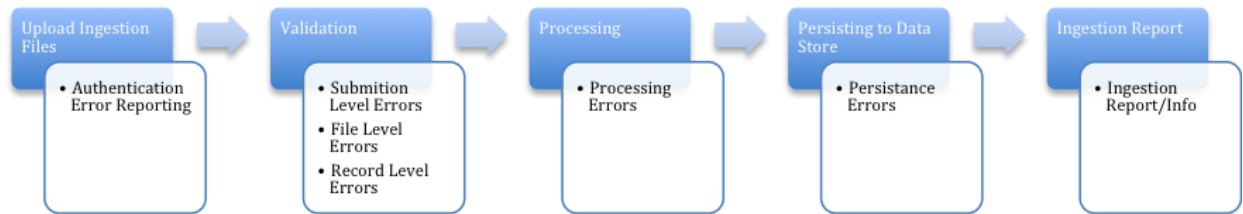
Figure 2: Batch Ingestion Pipeline

During the validation phase, the system checks consistency of the job control file, and validates the XML files against the interchange schemas defined within the SLI's extension of Ed-Fi schemas.

The processing phase is responsible for generating a change set, or "diff", which can then be persisted to the SLI Data Store. Inter-entity references to other entities in the same job or previously ingested entities are also resolved in this phase.

The matching algorithm relies on a combination of each entity's fields to distinguish between SLI Data Store insert and update operations. For entities with unique tenant-wide identifiers, namely Student, Teacher, Staff, and Parent, the stateUniqueId is used to uniquely match ingested entities with the one already in the data store. If a match is found, the operation is an update -- otherwise, it's treated as an insert.

Likewise, newly added association entities are checked against existing association entities referring to the same objects in the data store. If the references match up, the new association is considered an update. Otherwise, it's an insert.

Since different interchanges allow ingestion of different domain types, they must occur in a certain order, for the matching and reference resolution part of the processing phase to succeed. Section 8.1 specifies the ingestion interchange order, and Section 8.2 describes additional interchange-level entity dependencies and constraints which must be satisfied for error-free operation. Appendix B provides a mapping between domain types (entities) and interchange schemas used to ingest them.

Once the validation and processing phases are complete, the job passes to the Persistence phase, where a generated diff is written to the SLI data store. If this operation is successful, the ingested entities become accessible through the SLI API and an ingestion log file is generated confirming the number of entities persisted to the data store. Likewise, a log file is generated whenever a job is aborted in any of the phases.

Every phase of the ingestion pipeline produces a set of errors and warnings, which are then written to the job log file available from the landing zone. A listing of possible errors and warnings is provided in Section 6.3.

8   Ingestion Data Dependencies and Constraints

A single ingestion job can contain data spanning multiple data interchanges. Alternatively, an ingestion job may contain only data from a particular interchange. An entity in one job may refer to entities ingested by another job or another data interchange submitted as part of the same job. Moreover, entities in the same XML file may refer to each other using XML ID references.

In all of above cases, referential integrity of data – a mandatory field of an entity cannot refer to a non-existing entity – must be preserved by the system. To meet this requirement, three types of ordering constraints are imposed on the overall ingestion process:

- Inter-interchange ordering
- Entity-specific interchange-level constraints
- Entity-specific file-level constraints (namely, XML ID reference handling)

For example, entities ingested as part of MasterSchedule interchange will always refer to entities ingested as part of EducationOrganization interchange, which implies that EducationOrganization data should precede MasterSchedule data (an inter-interchange ordering constraint). Occasionally it may be necessary to split data from a single interchange into two subsets and to ingest them separately to satisfy a multiple dependencies.

A Section entity, which is part of MasterSchedule interchange, has to refer to a CourseOffering, which is also part of the same interchange (an entity-specific interchange-level constraints). Assuming these Section and CourseOffering entities are actually part of the same ingestion job, the Section entity can also refer to a CourseOffering entity further down in the file by its XML ID (entity-specific file-level constraint).

8.1 Inter-interchange Ordering

The following interchange dependencies must be honored for ingestion:

Interchange Name	Direct Dependencies
EducationOrganization	
MasterSchedule	EducationOrganization
AssessmentMetadata	MasterSchedule

Interchange Name	Direct Dependencies
EducationOrgCalendar	EducationOrganization
StaffAssociation	EducationOrganization, MasterSchedule
StudentParent	
StudentAssessment	AssessmentMetadata, StudentParent
StudentAttendance	EducationOrganization, StudentParent
StudentProgram	EducationOrganization, StudentParent
StudentCohort	StaffAssociation, StudentParent, StudentProgram
StudentDiscipline	EducationOrganization, StudentParent
StudentEnrollment	EducationOrganization, StudentParent
StudentGrade	EducationOrgCalendar, StudentParent, StudentAssessment

The EducationOrganization should be the first interchange loaded, as it contains the following key entities on which most other interchanges are dependent:

- State and Local Education Agencies (StateEducationAgency and LocalEducationAgency entities)

- Schools

- Course information (Course, CourseOffering, and Location entities, etc.)

- Programs

The MasterSchedule interchange, which depends on entities loaded as part of EducationOrganization, should be loaded next.

Once the EducationOrganization interchange has been successfully loaded, the following interchanges can be loaded in any order:

- EducationOrgCalendar, which contains calendar information necessary for loading grade-related entities.

- StaffAssociation, which contains Staff, Teacher and related association entities.

- StudentParent, which contains Student and Parent entities and on which all remaining student-related interchanges are dependent.

After the three key interchanges above have been uploaded, the following interchanges can be processed:

- StudentAttendance

- StudentCohort

- StudentDiscipline

- StudentEnrollment

- StudentProgram

The loading of the remaining assessment and grade-related interchanges must be performed in the following sequence:

1. AssessmentMetadata

2. StudentAssessment

3. StudentGrade

8.2 8.2 Interchange-Level Constraints

Wherever SLI schemas deviate from the supported Ed-Fi version, these differences are noted. Since unsupported entities cannot be ingested, all constraints below apply only to the supported entities.

8.2.1 EducationOrganization

This Ed-Fi interchange supports ingestion of the following entities:

- StateEducationAgency

- LocalEducationAgency

- School

- Location

- ClassPeriod

- Course

- Program

While also part of this Ed-Fi interchange CompetencyLevelDescriptor, EducationServiceCenter, and FeederSchoolAssociation entities are currently not supported by SLI.

Normative Constraints

Entity	Referenced Entity	Interchange of Origin
StateEducationAgency		
LocalEducationAgency	LocalEducationAgency, EducationServiceCenter, StateEducationAgency	EducationOrganization
School	Location	EducationOrganization
Course	EducationOrganization (abstract), LearningStandard, LearningObjective	EducationOrganization, AssessmentMetadata
CompetencyLevelDescriptor		
Program		
ClassPeriod		
Location		
EducationServiceCenter	StateEducationAgency	EducationOrganization
FeederSchoolAssociation	EducationOrganization (abstract)	EducationOrganization

Course entities, which reference LearningStandard and LearningObjective entities, must be ingested after AssessmentMetadata interchange ingestion has been completed.

References to entities within the same interchange must resolve to entities ingested as part of a previous job or entities ingested as part of the same job.

Identity Integration Constraints

An EducationOrganization entity provides the authorization context for SLI users, so it's critical that every SLI user is tied to a particular tier within EducationOrganization hierarchy. During onboarding the landing zones are setup to correspond to LocalEducationAgencies within the hierarchy. Super Administrators performing ingestion for an agency must be associated (via unique staff identifier) to an ingested

LocalEducationAgency entity. SLI Identity Integration Guide [5] provides additional details around data to IDP linkage and provisioning.

8.2.2 MasterSchedule

This Ed-Fi interchange supports ingestion of the following entities:

Section

- CourseOffering

While also part of this Ed-Fi interchange, BellSchedule, MeetingTime entities are currently not supported by SLI.

Normative Constraints

Entity	Referenced Entity	Interchange of Origin
Section	CourseOffering, EducationOrganization (abstract), Session, Location, ClassPeriod, Program	MasterSchedule, EducationOrganization, EducationOrgCalendar
CourseOffering	EducationOrganization (abstract), Course, Session	EducationOrganization, EducationOrgCalendar
BellSchedule	EducationOrganization (abstract)	Education Organization
MeetingTime	LocalEducationAgency, EducationServiceCenter, StateEducationAgency	Education Organization

Section and CourseOffering entities, which refer to Session entities, must be ingested after corresponding Session entities have been ingested via EducationOrgCalendar interchange.

References to entities within the same interchange must resolve to entities ingested as part of a previous job or entities ingested as part of the same job.

8.2.3 AssessmentMetadata

This Ed-Fi interchange supports ingestion of the following entities:

- AssessmentFamily

- Assessment
- AssessmentPeriodDescriptor
- PerformanceLevelDescriptor
- ObjectiveAssessment
- LearningObjective
- LearningStandard
- AssessmentItem

Normative Constraints

Entity	Referenced Entity	Interchange of Origin
AssessmentFamily	AssessmentFamily	AssessmentMetadata
Assessment	AssessmentItem, ObjectiveAssessment, AssessmentFamily, Section	AssessmentMetadata, MasterSchedule
AssessmentPeriodDescriptor		
PerformanceLevelDescriptor		
ObjectiveAssessment	AssessmentItem, LearningObjective, LearningStandard, ObjectiveAssessment	AssessmentMetadata
LearningObjective	LearningStandard, LearningObjective	
LearningStandard		
AssessmentItem	LearningStandard	AssessmentMetadata

References to entities within the same interchange must resolve to entities ingested as part of a previous job or entities ingested as part of the same job.

8.2.4 StaffAssociation

This Ed-Fi interchange supports ingestion of the following entities:

- Staff
- Teacher
- TeacherSchoolAssociation
- TeacherSectionAssociation
- StaffEducationOrgAssignmentAssociation

While also part of this Ed-Fi interchange, StaffEducationOrgEmploymentAssociation, LeaveEvent, OpenStaffPosition and CredentialFieldDescriptor entities are currently not supported by SLI.

Normative Constraints

Entity	Referenced Entity	Interchange of Origin
Staff		
Teacher		
TeacherSchoolAssociation	Teacher, School	StaffAssociation, EducationOrganization
TeacherSectionAssociation	Teacher, Section	StaffAssociation, MasterSchedule
StaffEducationOrgAssignmentAssociation	Staff, EducationOrganization	StaffAssociation, EducationOrganization
LeaveEvent	Staff	StaffAssociation
OpenStaffPosition	EducationOrganization (abstract)	EducationOrganization
CredentialFieldDescriptor	EducationOrganization (abstract)	EducationOrganization
StaffEducationOrgEmploymentAssociation	Staff, EducationOrganization	StaffAssociation, EducationOrganization

	(abstract)	

References to entities within the same interchange must resolve to entities ingested as part of a previous job or entities ingested as part of the same job.

Identity Integration Constraints

When teachers and staff access SLI, the system must establish correspondence between logged in users (and their Roles) and Staff and Teacher entities. Each Staff and Teacher entity with SLI access permissions must be associated with identity credentials served by the Identity Provider as specified in [5]. Specifically, the entities' StaffUniqueStateId (or TeacherUniqueStateId) and LoginId must match the login credentials used to authenticate against the IDP.

8.2.5 StudentParent

This Ed-Fi interchange supports ingestion of the following entities:

- Student
- Parent
- StudentParentAssociation

Non-normative Constraints

Reference types defined by StudentParentAssociation entities must resolve to previously ingested Student and Parent entities or entities ingested as part of the same ingestion job.

Normative Constraints

Entity	Referenced Entity	Interchange of Origin
Student		
Parent		
StudentParentAssociation	Student, Parent	StudentParentAssociation

References to entities within the same interchange must resolve to entities ingested as part of a previous job or entities ingested as part of the same job.

Identity Integration Constraints

When students and parents access SLI, the system must establish correspondence between logged in users (and their Roles) and Student and Parent entities. Each

Student and Parent entity with SLI access permissions must be associated with an identity credentials served by the Identity Provider as specified in [5]. Specifically, the entities' StudentUniqueStateId (or ParentUniqueStateId) and LoginId must match the login credentials used to authenticate against the IDP.

8.2.6 StudentAssessment

This Ed-Fi interchange supports ingestion of the following entities:

- StudentReference
- AssessmentReference
- StudentAssessment
- StudentObjectiveAssessment
- StudentAssessmentItem

Normative Constraints

Entity	Referenced Entity	Interchange of Origin
StudentReference	Student	StudentParent
AssessmentReference	Assessment	AssessmentMetadata
StudentAssessment	PerformanceLevelDescriptor, Student, Assessment	StudentParent, AssessmentMetadata
StudentObjectiveAssessment	StudentAssessment, PerformanceLevelDescriptor, ObjectiveAssessment	StudentAssessment, AssessmentMetadata
StudentAssessmentItem	StudentAssessment, StudentObjectiveAssessment, AssessmentItem	StudentAssessment, AssessmentMetadata

References to entities within the same interchange must resolve to entities ingested as part of a previous job or entities ingested as part of the same job.

8.2.7 EducationOrgCalendar

This Ed-Fi interchange supports ingestion of the following entities:

- Session
- GradingPeriod

While also part of this Ed-Fi interchange, CalendarDate and AcademicWeek entities are currently not supported by SLI.

Normative Constraints

Entity	Referenced Entity	Interchange of Origin
Session	EducationOrganization (abstract), GradingPeriod, CalendarDate, AcademicWeek	EducationOrganization, EducationOrgCalendar
GradingPeriod	CalendarDate	EducationOrgCalendar
CalendarDate		
AcademicWeek	CalendarDate	EducationOrgCalendar

References to entities within the same interchange must resolve to entities ingested as part of a previous job or entities ingested as part of the same job.

8.2.8 StudentEnrollment

This Ed-Fi interchange supports ingestion of the following entities:

- StudentSchoolAssociation
- StudentSectionAssociation

While also part of this Ed-Fi interchange, GraduationPlan entity is currently not supported by SLI.

Normative Constraints

Entity	Referenced Entity	Interchange of Origin
StudentSchoolAssociation	Student, School, GraduationPlan	StudentParent, EducationOrganization, StudentEnrollment

StudentSectionAssociation	Student, Section	StudentParent, MasterSchedule
GraduationPlan	EducationOrganization	EducationOrganization

References to entities within the same interchange must resolve to entities ingested as part of a previous job or entities ingested as part of the same job.

8.2.9 StudentGrade

This Ed-Fi interchange supports ingestion of the following entities:

- StudentAcademicRecord
- CourseTranscript
- GradebookEntry
- StudentGradebookEntry
- ReportCard
- Grade
- StudentCompetency
- CompetencyLevelDescriptor
- LearningObjective
- StudentCompetencyObjective

While also part of this Ed-Fi interchange, Diploma entity is currently not supported by SLI.

Normative Constraints

Entity	Referenced Entity	Interchange of Origin
StudentAcademicRecord	Student, Session, ReportCard, Diploma	StudentParent, EducationOrgCalendar, StudentGrade
CourseTranscript	Course, EducationOrganization (abstract), StudentAcademicRecord	EducationOrganization, StudentGrade
GradebookEntry	LearningStandard, LearningObjective, Section,	AssessmentMetadata, StudentGrade,

Entity	Referenced Entity	Interchange of Origin
	GradingPeriod	MasterSchedule, EducationOrgCalendar
StudentGradebookEntry	CompetencyLevelDescriptor, StudentSectionAssociation	StudentEnrollment, StudentGrade
ReportCard	Grade, StudentCompetency, Student, GradingPeriod	StudentGrade, StudentParent, EducationOrgCalendar
Grade	StudentSectionAssociation, GradingPeriod	StudentEnrollment, EducationOrgCalendar
StudentCompetency	LearningObjective, StudentCompetencyObjective, StudentSectionAssociation	StudentGrade, AssessmentMetadata, StudentEnrollment
CompetencyLevelDescriptor		
LearningObjective	LearningStandard, LearningObjective	StudentGrade, AssessmentMetadata
StudentCompetencyObjective	EducationOrganization	EducationOrganization
Diploma	School	EducationOrganization

References to entities within the same interchange must resolve to entities ingested as part of a previous job or entities ingested as part of the same job.

8.2.10   StudentProgram

This Ed-Fi interchange supports ingestion of the following entities:

- StudentProgramAssociation

While also part of this Ed-Fi interchange, StudentSpecialEdProgramAssociation, RestraintEvent, StudentCTEProgramAssociation, StudentTitleIPartAProgramAssociation, and ServiceDescriptor entities are currently not supported by SLI.

Normative Constraints

Entity	Referenced Entity	Interchange of Origin
StudentProgramAssociation	Student, Program, ServiceDescriptor, EducationOrganization	StudentParent, StudentProgram, EducationOrganization
StudentSpecialEdProgram Association	Student, Program, ServiceDescriptor, EducationOrganization	StudentParent, StudentProgram, EducationOrganization
RestraintEvent	Student, Program, School	StudentParent, StudentProgram, EducationOrganization
StudentCTEProgramAsso ciation	Student, Program, ServiceDescriptor, EducationOrganization	StudentParent, StudentProgram, EducationOrganization
StudentTitleIPartAProgram Association	Student, Program, ServiceDescriptor, EducationOrganization	StudentParent, StudentProgram, EducationOrganization
ServiceDescriptor		

References to entities within the same interchange must resolve to entities ingested as part of a previous job or entities ingested as part of the same job.

8.2.11   StudentCohort

This Ed-Fi interchange supports ingestion of the following entities:

- Cohort
- StudentCohortAssociation
- StaffCohortAssociation

Normative Constraints

Entity	Referenced Entity	Interchange of Origin
Cohort	EducationOrganization (abstract), Program	EducationOrganization, StudentProgram

StudentCohortAssociation	Student, Cohort	StudentParent, StudentCohort
StaffCohortAssociation	Staff, Cohort	StaffAssociation, StudentCohort

References to entities within the same interchange must resolve to entities ingested as part of a previous job or entities ingested as part of the same job.

8.2.12 StudentDiscipline

This Ed-Fi interchange supports ingestion of the following entities:

- DisciplineIncident
- StudentDisciplineIncidentAssociation
- DisciplineAction

While also part of this Ed-Fi interchange, BehaviorDescriptor and DisciplineDescriptor entities are currently not supported by SLI.

Normative Constraints

Entity	Referenced Entity	Interchange of Origin
DisciplineIncident	BehaviorDescriptor, School, Staff,	StudentDiscipline, EducationOrganization, StaffAssociation
StudentDisciplineIncidentAssociation	Student, DisciplineIncident, BehaviorDescriptor,	StudentParent, StudentDiscipline
DisciplineAction	DisciplineDescriptor, Student, DisciplineIncident, Staff, EducationOrganization	StudentDiscipline, StudentParent, StaffAssociation, EducationOrganization
BehaviorDescriptor	EducationOrganization	EducationOrganization
DisciplineDescriptor	EducationOrganization	EducationOrganization

References to entities within the same interchange must resolve to entities ingested as part of a previous job or entities ingested as part of the same job.

8.2.13   *StudentAttendance*

This Ed-Fi interchange supports ingestion of the following entities:

- AttendanceEvent

Normative Constraints

Entity	Referenced Entity	Interchange of Origin
AttendanceEvent	Student, Section	StudentParent, MasterSchedule

8.3 XML ID References

As a general rule, an ID reference must be defined in the file before it can be used. Entities with unresolved ID references will not be ingested. If multiple definitions of an ID reference are provided, only the first one is used. All subsequent definitions are ignored.

9 Custom Data Ingestion

In addition to ingesting XML elements defined by Ed-Fi schemas, SLI also supports ingestion of custom data. This data is considered "opaque" to SLI. SLI does not need to and cannot know anything about the structure of the custom data.

An SLI equivalent of any supported Ed-Fi ComplexType can include a <CustomData> element. The contents of this element must come in the form of valid XML. However, unlike other ingested elements they will not be validated against an XML schema.

A Section element augmented with custom data may look like this.

```
<Section>
 <UniqueSectionCode>ABCDEFG</UniqueSectionCode>
 <SequenceOfCourse>1</SequenceOfCourse>
 <EducationalEnvironment>Classroom</EducationalEnvironment>
 <MediumOfInstruction>Independent study</MediumOfInstruction>
 <PopulationServed>Regular Students</PopulationServed>
 <CourseOfferingReference></CourseOfferingReference>
 <SchoolReference></SchoolReference>
 <CustomData>
   <HonorRoll>true</HonorRoll>
 </CustomData>
</Section>
```

Access to custom data will then inherit the security permissions of the record to which the custom data is related. For example, custom data that is related to a particular Student record will only be visible to users that are authorized to view that existing Student record.

Custom data must not contain personally identifiable information.

Appendix A. Ed-Fi Entity to SLI Entity Mapping

Ed-Fi Interchange	Ed-Fi Entity	SLI Entity
Interchange-AssessmentMetadata	LearningStandard	learningStandard
Interchange-AssessmentMetadata	PerformanceLevelDescriptor	studentAssessmentAssociation/performanceLevelDescriptors and studentObjectiveAssessment/performanceLevelDescriptors and Assessment/AssessmentPerformanceLevel/PerformanceLevelDescriptors
Interchange-AssessmentMetadata	AssessmentItem	assessment/assessmentItem and assessment/objectiveAssessment/assessmentItem
Interchange-AssessmentMetadata	Assessment	assessment
Interchange-AssessmentMetadata	ObjectiveAssessment	assessment/objectiveAssessment
Interchange-AssessmentMetadata	AssessmentPeriodDescriptor	assessment/assessmentPeriodDescriptor
Interchange-AssessmentMetadata	AssessmentFamily	assessment/assessmentFamilyHierarchyName
Interchange-AssessmentMetadata Interchange-StudentGrade	LearningObjective	learningObjective
Interchange-EducationOrganization	FeederSchoolAssociation	---
Interchange-EducationOrganization	EducationServiceCenter	---
Interchange-EducationOrganization	Location	location
Interchange-EducationOrganization	ClassPeriod	meetingTime/classPeriodName
Interchange-EducationOrganization	Course	course
Interchange-EducationOrganization	LocalEducationAgency	educationOrganization
Interchange-EducationOrganization	Program	program
Interchange-EducationOrganization	School	school
Interchange-EducationOrganization	StateEducationAgency	educationOrganization
Interchange-	CompetencyLevelDescript	---

EducationOrganization Interchange-StudentGrade	or	
Interchange-EducationOrgCalendar	AcademicWeek	academicWeek
Interchange-EducationOrgCalendar	CalendarDate	calendarDate
Interchange-EducationOrgCalendar	GradingPeriod	gradingPeriod
Interchange-EducationOrgCalendar	Session	session/schoolSessionAssociation
Interchange-MasterSchedule	BellSchedule	bellSchedule
Interchange-MasterSchedule	CourseOffering	sessionCourseAssociation
Interchange-MasterSchedule	MeetingTime	meetingTime
Interchange-MasterSchedule	Section	section
Interchange-StaffAssociation	StaffEducationOrgEmploymentAssociation	---
Interchange-StaffAssociation	LeaveEvent	leaveEvent
Interchange-StaffAssociation	OpenStaffPosition	openStaffPosition
Interchange-StaffAssociation	CredentialFieldDescriptor	staff|teacher/credentials/credentialFieldDescriptor
Interchange-StaffAssociation	StaffCohortAssociation	staffCohortAssociation
Interchange-StaffAssociation	Staff	staff/abstractStaff
Interchange-StaffAssociation	Teacher	teacher
Interchange-StaffAssociation	StaffProgramAssociation	staffProgramAssociation
Interchange-StaffAssociation	TeacherSchoolAssociation	teacherSchoolAssociation
Interchange-StaffAssociation	TeacherSectionAssociation	teacherSectionAssociation
Interchange-StaffAssociation	StaffEducationOrgAssignmentAssociation	staffEducationOrganizationAssociation
Interchange-StudentAssessment	StudentAssessmentItem	studentAssessmentAssociation/studentAssessmentItem and studentAssessmentAssociation/studentObjectiveAssessment/studentAssessmentItem *

Interchange-StudentAssessment	StudentAssessment	studentAssessmentAssociation
Interchange-StudentAssessment	StudentObjectiveAssessment	studentAssessmentAssociation/studentObjectiveAssessment
Interchange-StudentAttendance	AttendanceEvent	dailyAttendance
Interchange-StudentCohort	Cohort	cohort
Interchange-StudentCohort	StudentCohortAssociation	studentCohortAssociation
Interchange-StudentDiscipline	BehaviorDescriptor	disciplineIncident/behaviorDescriptor, studentDisciplineIncidentAssociation/behaviorDescriptor
Interchange-StudentDiscipline	DisciplineDescriptor	disciplineAction/disciplines
Interchange-StudentDiscipline	DisciplineAction	disciplineAction
Interchange-StudentDiscipline	DisciplineIncident	disciplineIncident
Interchange-StudentDiscipline	StudentDisciplineIncidentAssociation	studentDisciplineIncidentAssociation
Interchange-StudentEnrollment	GraduationPlan	graduationPlan
Interchange-StudentEnrollment	StudentSectionAssociation	studentSectionAssociation
Interchange-StudentEnrollment	StudentSchoolAssociation	studentSchoolAssociation
Interchange-StudentGrade	Diploma	diploma
Interchange-StudentGrade	Grade	grade
Interchange-StudentGrade	ReportCard	---
Interchange-StudentGrade	StudentCompetency	---
Interchange-StudentGrade	StudentCompetencyObjective	---
Interchange-StudentGrade	CourseTranscript	studentTranscriptAssociation
Interchange-StudentGrade	GradebookEntry	gradebookEntry
Interchange-StudentGrade	StudentAcademicRecord	studentAcademicRecord
Interchange-	StudentGradebookEntry	studentSectionGradebookEntry

StudentGrade		
Interchange-StudentParent	Parent	parent
Interchange-StudentParent	Student	student
Interchange-StudentParent	StudentParentAssociation	studentParentAssociation
Interchange-StudentProgram	StudentCTEProgramAssociation	---
Interchange-StudentProgram	StudentSpecialEdProgramAssociation	---
Interchange-StudentProgram	StudentTitleIPartAProgramAssociation	---
Interchange-StudentProgram	RestraintEvent	restraintEvent
Interchange-StudentProgram	ServiceDescriptor	program/services
Interchange-StudentProgram	StudentProgramAssociation	studentProgramAssociation

Appendix B. Ed-Fi Entity Type to Interchange Schema Mapping

The table below provides a mapping between a domain type (rows) and an interchange schema (columns), which supports ingestion of entities of that type.

	AcademicMetada	EducationOrgani	StaffAssociation	StudentParent	StudentAssessm	EducationOrgCal	StudentEnrollme	StudentGrade	StudentCohort	StudentDiscipline	StudentAttendan	StudentProgram	MasterSchedule
Assessment	x				x								
AssessmentFamily	x												
AssessmentItem	x												
AssessmentPeriodDescriptor	x												
LearningObjective	x							x					
LearningStandard	x												
ObjectiveAssessment	x												
PerformanceLevelDescriptor	x												
ClassPeriod		x											
Course		x											
EducationServiceCenter		x											
LocalEducationAgency		x											
Location		x											

Program		x									
School		x									
StateEducationAgency		x									
FeederSchoolAssociation		x									
CompetencyLevelDescriptor		x				x					
Staff			x								
StaffEducationOrgEmployment Association			x								
StaffEducationOrgAssignmentA ssociation			x								
Teacher			x								
TeacherSchoolAssociation			x								
TeacherSectionAssociation			x								
LeaveEvent			x								
OpenStaffPosition			x								
CredentialFieldDescriptor			x								
Student				x							
Parent				x							
StudentParentAssociation				x							
StudentReference					x						
AssessmentReference					x						

StudentAssessment					x							
StudentObjectiveAssessement					x							
StudentAssessmentItem					x							
Session						x						
GradingPeriod						x						
CalendarDate						x						
AcademicWeek						x						
StudentSchoolAssociation							x					
StudentSectionAssociation							x					
GraduationPlan							x					
StudentAcademicRecord								x				
CourseTranscript								x				
ReportCard								x				
Grade								x				
StudentCompetency								x				
Diploma								x				
GradebookEntry								x				
StudentGradebookEntry								x				
StudentCompetencyObjective								x				
Cohort									x			

StudentCohortAssociation								x					
StaffCohortAssociation								x					
DisciplineIncident									x				
StudentDisciplineIncidentAssociation									x				
DisciplineAction									x				
BehaviorDescriptor									x				
DisciplineDescriptor									x				
AttendanceEvent										x			
StudentProgramAssociation											x		
StudentSpecialEdProgramAssociation											x		
RestraintEvent											x		
StudentCTEProgramAssociation											x		
StudentTitleIPartAProgramAssociation											x		
ServiceDescriptor											x		
CourseOffering													x
Section													x
BellSchedule													x
MeetingTime													x