



Welcome!

2ND ANNUAL

Ed-Fi →

Technical Congress



Transition to 3.0 ODS and API, including using the new extensibility model

Ed-Fi Technical Congress 2018

Phoenix , AZ

Agenda

- [ODS/API v3.0 Release Themes](#) (9:30 am -10:30 am)
 - New & Updated Standards
 - Alignment With the Upcoming Ed-Fi Data Standard v3.0
 - Upgrade to OpenAPI 2.0 Specification – demo
 - Standardized Use of OAuth 2.0 Client Credentials Grant Type
 - New & Improved Features
 - Decoupling of Ed-Fi Core and Extensions in the API - demo
 - Improvements to Routes - demo
 - Support for Multiple Operational Contexts –demo - types & descriptors
 - Code Refactoring
 - Upgrade/Migration support
- [Extending ODS /API v3.0](#) (10:30 am – 10:45 am)
- [Benefits/Impacts](#) (10.45 am – 11.15 am)
 - Platform Hosts
 - API Consumers
- [Wrap-up](#) (11:15 am– 11:30 am)



ODS/API v3.0 – Release Themes

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Alignment with the **Data Standard v3.0d - RFC**

- **Data Model Improvements and Enhancements**
- **Continued CEDS Alignment**
 - Alignment of Data Standard v3.0 with CEDS v7.0 is underway. A mapping will be published in Q2 2018
- **Changes to the Ed-Fi Extension Framework**
 - The Ed-Fi Extension Framework provides specific patterns implementers can use to customize the Ed-Fi Data Model while still retaining conformance to the Ed-Fi Data Standards.
 - Some issues with Ed-Fi Data Standard v2.0 guidance
 - Allowed required elements in the Ed-Fi Data Standard to be removed from an implementation.
 - Elements defined as optional could be changed to be required by an implementation.
 - Ed-Fi Data Standard v3.0 [Extensions Framework Guide](#)

Alignment with the [Data Standard v3.0d – RFC](#)

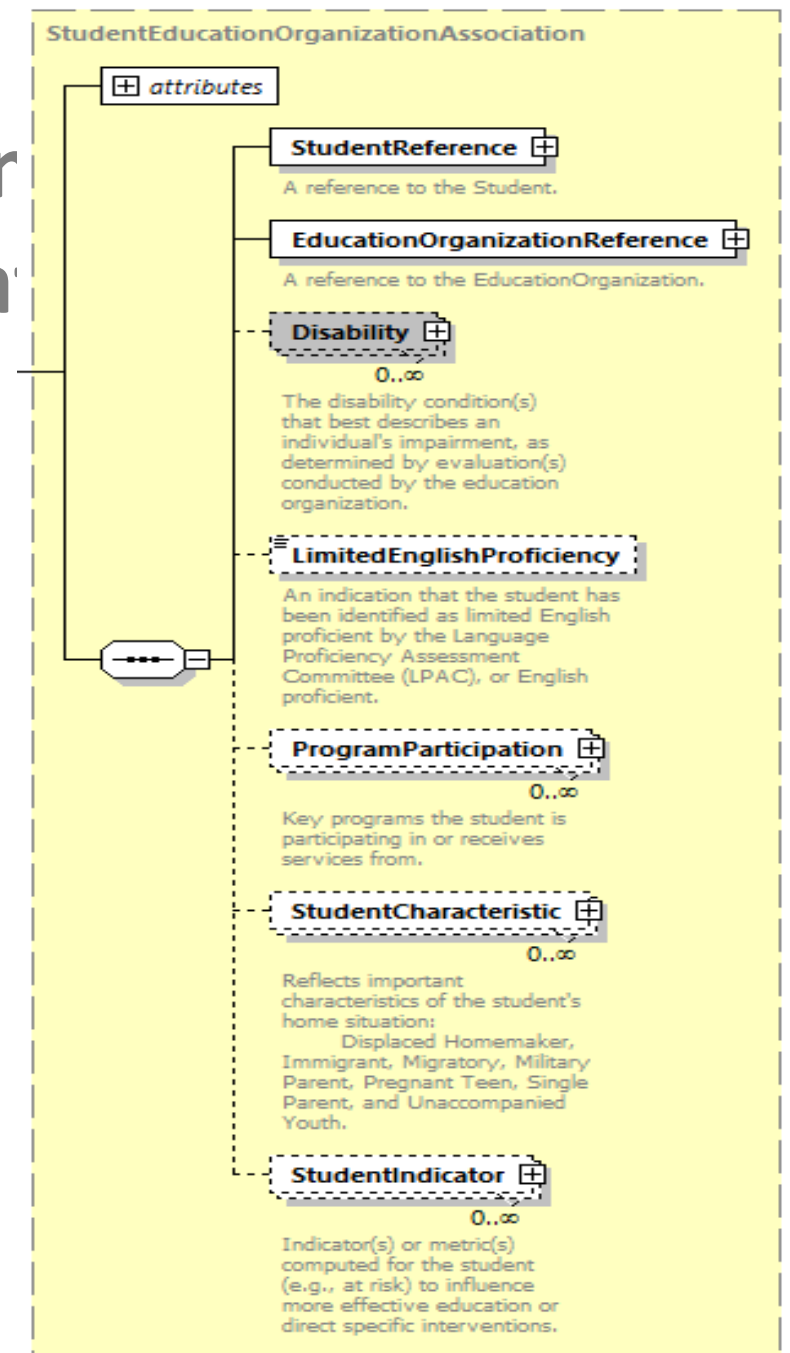
Relocation of Evaluation-based Student StudentEducationOrganizationAssocia

(DATASTD-1082, DATASTD-1086, DATASTD-1119)

Impacts: Ed-Fi UDM Handbook, Ed-Fi ODS / API, Ed-Fi XSD for Bulk Data Exchange

This location is logical given that those properties are attributes typically assigned by an LEA. This solves that thrashing problem experienced in field.

- LimitedEnglishProficiency and Disability student properties moved to StudentEdOrgAssociation entity.
- EconomicDisadvantaged to become an StudentCharacteristic
- ProgramParticipation moved from Student onto StudentEdOrgAssociation
- StudentIndicator and StudentCharacteristic moved to StudentEdOrgAssociation



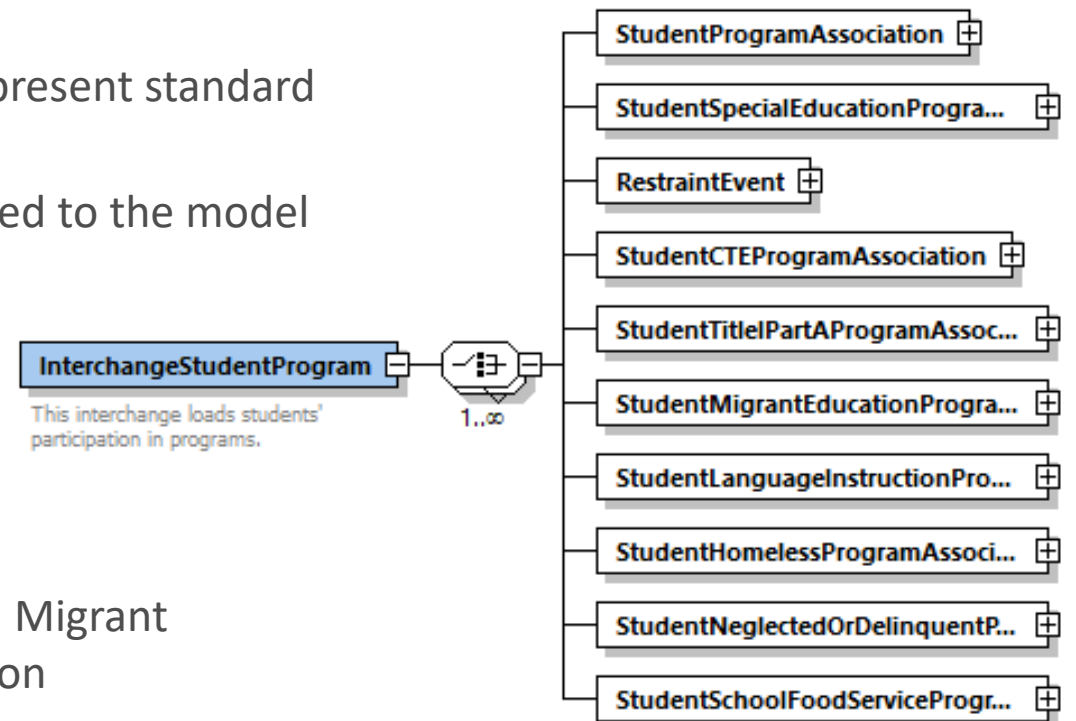
Expansion of Support for Standardized Federal ED Facts Data Collection

(DATASTD-1162 + others)

Impacts: Ed-Fi UDM Handbook, Ed-Fi ODS / API, Ed-Fi XSD for Bulk Data Exchange

Data Standard v3.0 Improves the ability of the core model to represent standard ED Facts reporting.

- Four new specialized StudentProgramAssociations were added to the model with standard fields for ED Facts collection:
 - StudentLanguageInstructionProgramAssociation,
 - StudentHomelessProgramAssociation,
 - StudentNeglectedOrDelinquentProgramAssociation
 - StudentSchoolFoodServiceProgramAssociation
- Existing entities for CTE, Title I Part A, Special Education, and Migrant programs were trued-up to the current ED Facts data collection
- New descriptors (enumerations) and common types were added to the model to accompany this change.



Expansion of and Changes to the Calendar Model

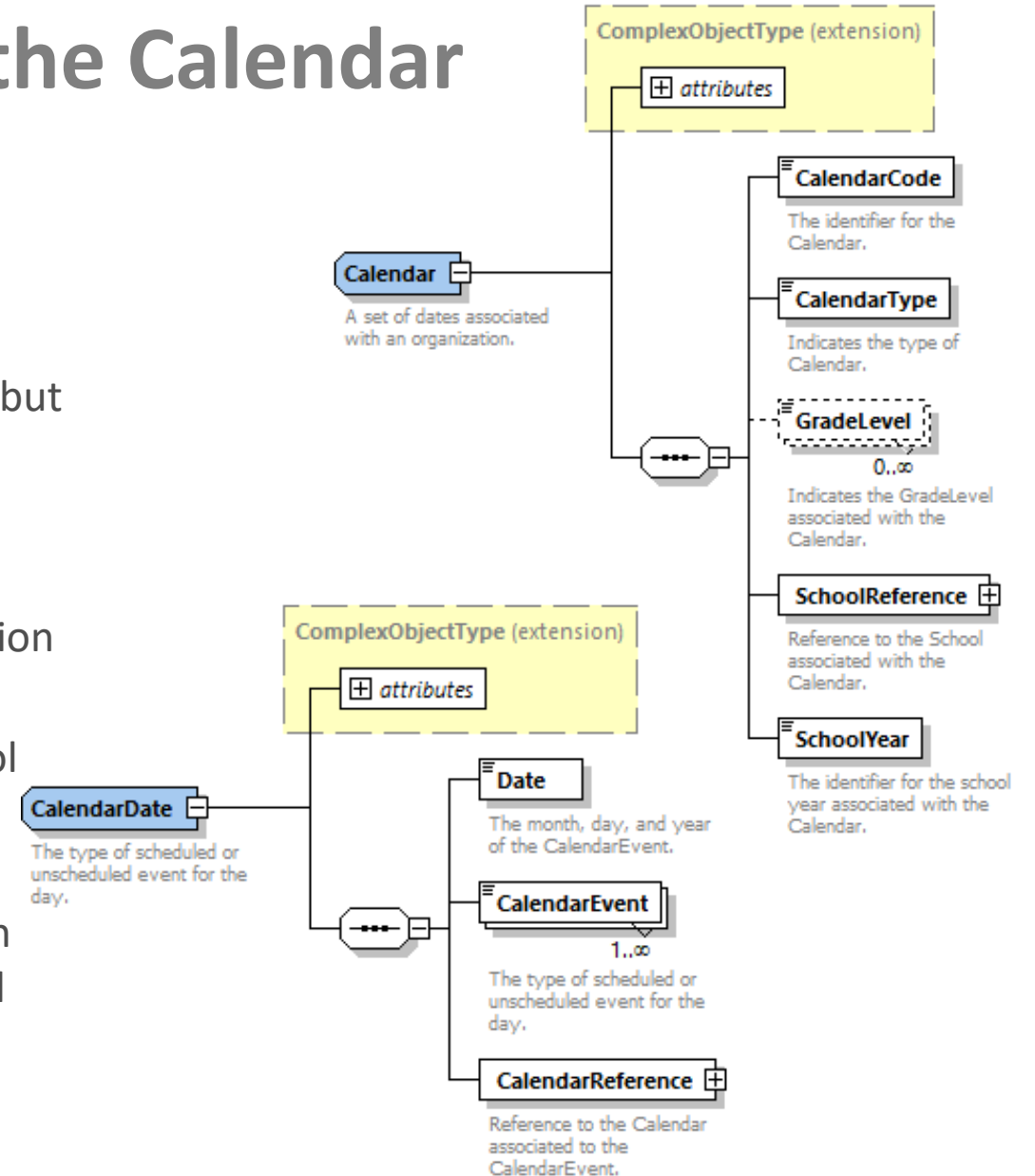
(DATASTD-914)

Impacts: Ed-Fi UDM Handbook, Ed-Fi ODS / API, Ed-Fi XSD for Bulk Data Exchange

Data Standard v2.0 only allowed for one calendar per school but in practice, different grades or cohorts of students may have different calendars

Data Standard v3.0

- Adds the Calendar domain entity with an optional collection of grade levels
- Adds reference to Calendar on Cohort, Cohorts in a school may also have different calendars independent of grade levels.
- CalendarDates are then no longer directly associated with Schools, but instead with Calendars, which are associated with Schools.



Fixes to the Bell Schedule Model

(DATASTD-948, DATASTD-993, DATASTD-1054)

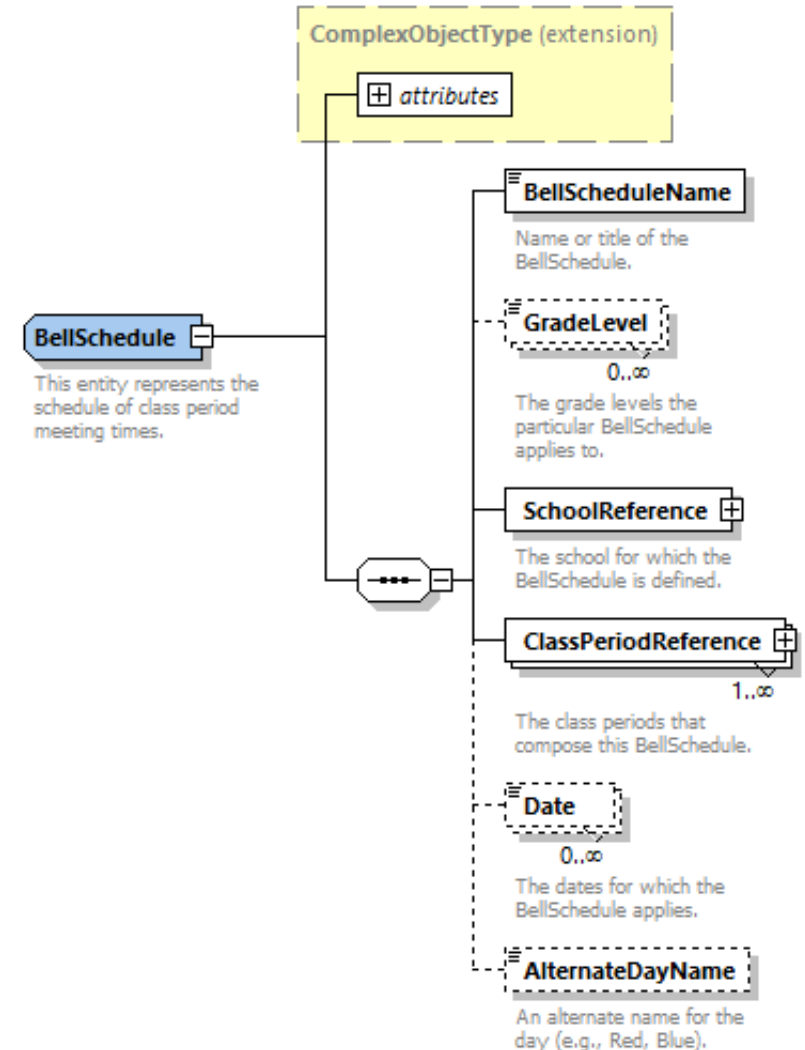
Impacts: Ed-Fi UDM Handbook, Ed-Fi ODS / API, Ed-Fi XSD for Bulk Data Exchange

Data Standard v2.0

- BellSchedule had a reference (1:1) to CalendarDate causing difficulties in signifying the dates for which a BellSchedule is active.
- GradeLevel was part of the key to BellSchedule causing systems to duplicate bell schedule for each grade level.

Data Standard v3.0

- Removes the reference to the CalendarDate domain entity, replacing it with an optional collection of date elements named "Date".
- Removes GradeLevel from the key to BellSchedule. Since a bell schedule often covers multiple grade levels (frequently a whole school), GradeLevel was changed to an optional array.



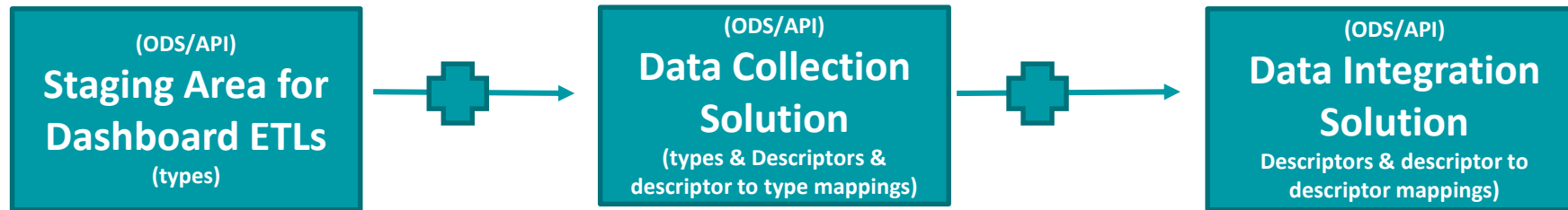
Alignment with the [Data Standard v3.0d – RFC](#)

Removal of Types

(DATASTD-1088)

Impacts: Ed-Fi UDM Handbook, Ed-Fi ODS / API, Ed-Fi XSD for Bulk Data Exchange

Background:



Changes:

- "Type"-class of entities removed from the data model, and replaced with Ed-Fi Descriptors.
- Mappings from Descriptors to types are removed
- Instead of type sets, standardized enumeration sets provided as part of the Ed-Fi Data Standard will be surfaced as Descriptor sets in the ed-fi.org namespace.



New & Updated Standards

Upgrade to OpenAPI 2.0 Specification

Upgrade to OpenAPI 2.0 Specification

- The ODS/API uses Swagger metadata (now renamed to Open API) to produce visual, [interactive documentation](#) & generate [Client API SDK](#)
- Ed-Fi ODS / API v2.x produced Swagger 1.2 metadata.
 - This specification is out-of-date, and tooling support is lacking going forward – which means that the SwaggerUI can no longer be updated without an upgrade to the metadata.
- Ed-Fi ODS / API v3.0 produces OpenAPI specification 2.0 metadata bringing in the following benefits
 - Moves to an actively supported and maintained version of SwaggerUI.
 - Adopts Swagger community tools for generating client SDKs for the ODS / API. This provides API SDK support for languages beyond C# and Java, as well as enables the Alliance to deprecate costly support and maintenance for the current Client API SDK.
 - Standardizes the return type for HTTP GETs.
 - Enables significantly improved runtime performance of the latest SwaggerUI. (<https://apidocs.ed-fi.org/> vs <https://api.ed-fi.org/v3/docs/>)

Upgrade to OpenAPI 2.0 Specification

- The ODS/API v2.0 implements variable GET semantics to reflect the natural key model of the Ed-Fi standard
 - “Get By Key”: Supply natural key fields and return a single JSON object
 - “Get By Example”: Uses supplied fields as search values and returns a JSON collection
- Developers can inadvertently trip over this difference by not catching situations in which a natural key values are submitted (Tracker ODS-894)

```
// returns a single JSON resource or a 404 error  
GET /studentSchoolAssociations?studentUniqueId=234234&schoolId=23242&entryDate=12%2F01%2F2015
```

```
// returns a collection (an empty collection if there is no match)
```


```
GET /studentSchoolAssociations?schoolId=23242
```






GET	/studentSchoolAssociations	Retrieves resources matching values of an example resource (using the "Get By Example" pattern).
GET	/studentSchoolAssociations	Retrieves a specific resource using the values of the resource's natural key (using the "Get By Key" pattern).
POST	/studentSchoolAssociations	Creates or updates resources based on the natural key values of the supplied resource.
DELETE	/studentSchoolAssociations/{id}	Deletes an existing resource using the resource identifier.
GET	/studentSchoolAssociations/{id}	Retrieves a specific resource using the resource's identifier (using the "Get By Id" pattern).
PUT	/studentSchoolAssociations/{id}	Updates or creates a resource based on the resource identifier.

Upgrade to OpenAPI 2.0 Specification

Standardized return types for HTTP GETs

- In Open API 2.0 only one operation per HTTP method is permitted on a given REST path.
- This means that *GetByExample* will be the only “GET” operation that will be supported on the collections endpoints and it will always return an array of items.
- Additionally, the *GetAll* operation in the Ed-Fi ODS API 2.x will be just a specialized subset of *GetByExample* that provides no criteria. *GetByKey* will be another specialized subset of *GetByExample* where natural keys are provided as criteria.
- *GetById*, *DeleteById* and *Put* and *Post* operations are unaffected

studentSchoolAssociations This association represents the School in which a student is enrolled. The semantics of enrollment may differ slightly by state. Non-enrollment relationships between a student and an education organization may be described using the StudentEducationOrganizationAssociation. 

GET	/ed-fi/studentSchoolAssociations	Retrieves specific resources using the resource's property values (using the "Get" pattern).	
POST	/ed-fi/studentSchoolAssociations	Creates or updates resources based on the natural key values of the supplied resource.	
GET	/ed-fi/studentSchoolAssociations/{id}	Retrieves a specific resource using the resource's identifier (using the "Get By Id" pattern).	
PUT	/ed-fi/studentSchoolAssociations/{id}	Updates or creates a resource based on the resource identifier.	
DELETE	/ed-fi/studentSchoolAssociations/{id}	Deletes an existing resource using the resource identifier.	

Upgrade to OpenAPI 2.0 Specification

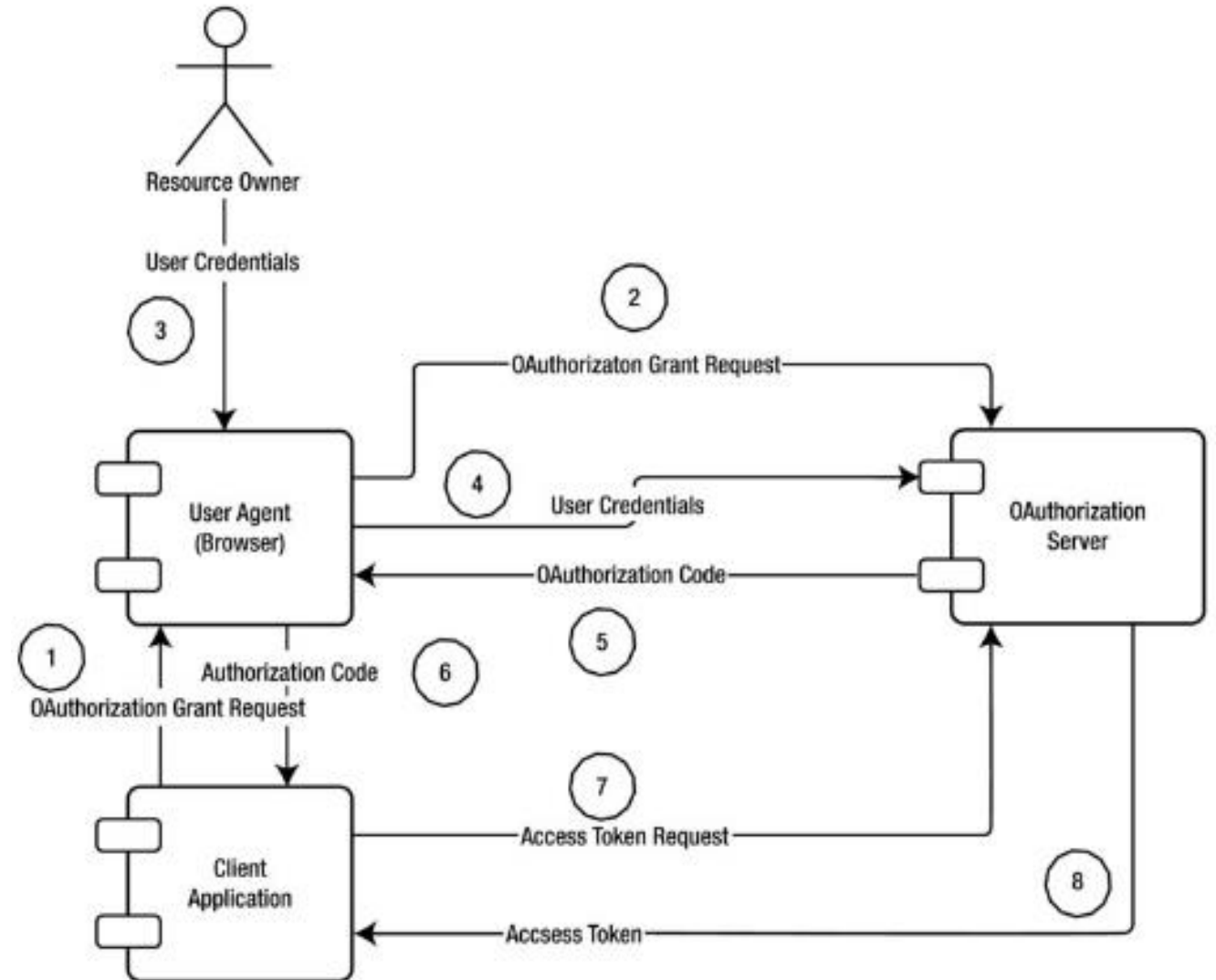
ODS / API v3.0 metadata endpoints

- [Interactive Documentation use case](#)
- [SDK gen use case](#)

Name	Description	Primary Target Audience
Resources	Includes all the data collection resources including Extensions (but excludes the Descriptors).	API consumers and application vendors using SwaggerUI.
Descriptors	Includes only the Ed-Fi Descriptors (including Descriptors added via Extensions).	API consumers and application vendors using SwaggerUI.
Bulk	Contains all operations related to bulk data loads.	API consumers and application vendors who are operating against an API that supports bulk loads.
Identity	Contains all operations supporting integration with an external UniqueId system.	API consumers and application vendors working with APIs that have an integration with an external UniqueId system.
Profile-Specific	Includes the relevant subset of the Standard API Resources (including extensions and any referenced Descriptors) with appropriately constrained surface areas.	Specialty vendors, for data collection and/or integration.
Composite-Specific	Includes read-only resources, as defined in the composite, including any referenced descriptors.	API consumers and application vendors focused on data integration activities in a specific subject area.
Data Collection API	Includes all Descriptors and Resources, including all Extensions.	SDK generators.

Authentication in ODS / API 2.x

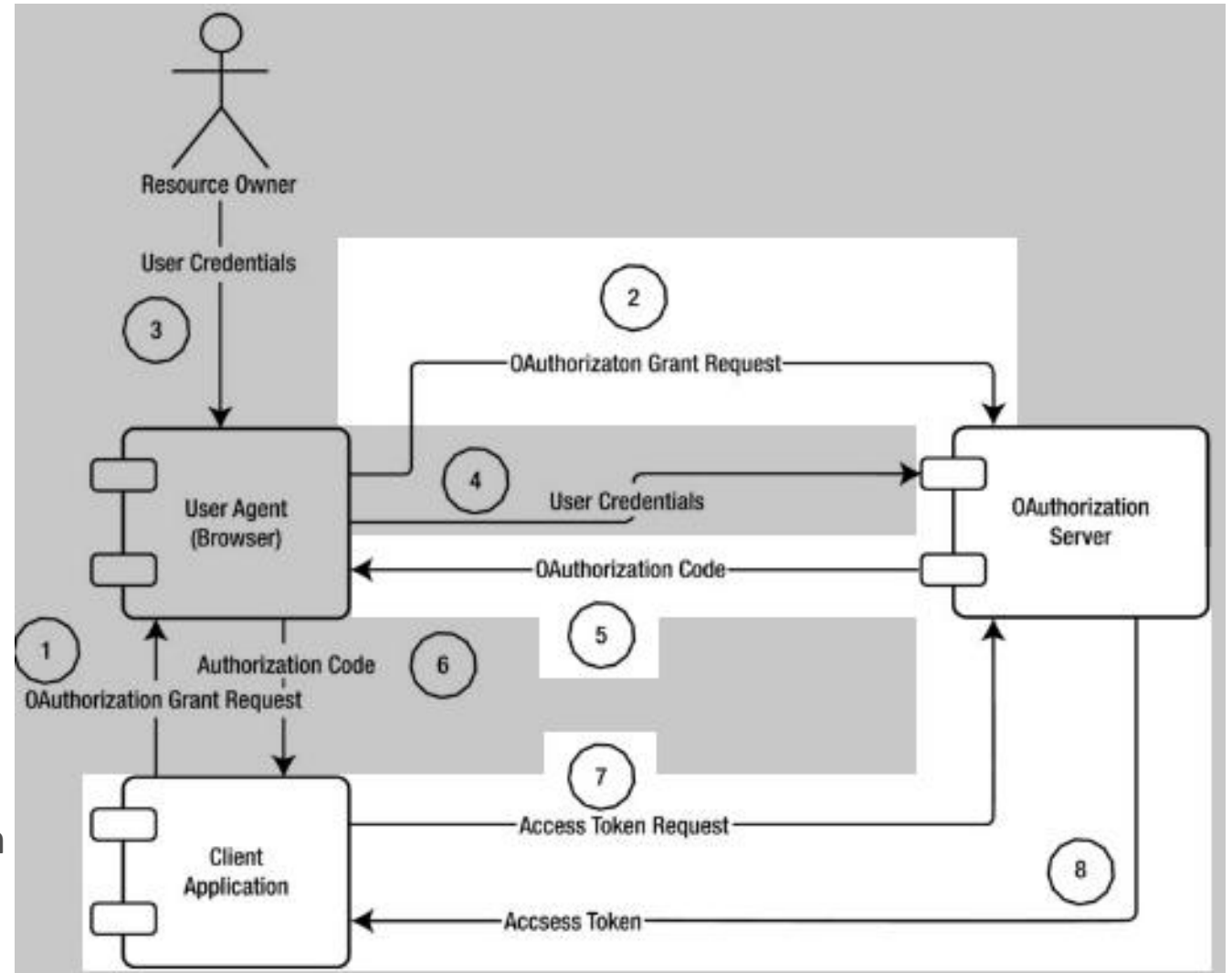
OAuth 2.0 Authorization Code Grant Type (a.k.a. “3-Legged OAuth”)



Authentication in ODS / API 2.x

Authentication (as implemented) (a.k.a. “2.5-Legged OAuth”)

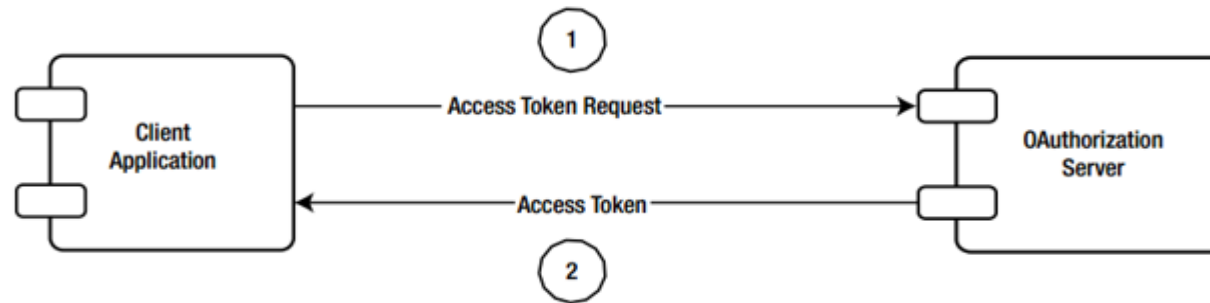
- Issues:
 - Authorization code effectively “binds” the client with itself, which is pointless.
 - This is non-standard – It isn't 2-Legged OAuth or 3-Legged OAuth, but something in between.



Authentication in ODS / API 3.0

OAuth 2.0 Client Credentials Grant Type (a.k.a. “2-Legged” OAuth)

- Recommended OAuth flow when the client is the resource owner.



- Token carries a fixed expiration time (**no longer has a rolling expiration**)
- Benefits:
 - A simpler process
 - Implements a standard
 - Works out-of-the-box with tooling (e.g. SwaggerUI and Postman)



Postman OAuth Demo



Decoupling of Ed-Fi Core and Extensions

ODS/ API v2.x

- In ODS/ API v2.x, extensions to the data standard are blended seamlessly into the API resource models and URL paths
- For example, in this JSON snippet it is not obvious to a developer that *tribalAffiliation* is not a core field in the Ed-Fi data model
- One consequence of this design → confusion on the part of API developers as to whether or not an element is part of the Ed-Fi data standard or part of an extension

```
{  
  "studentUniqueId": "397589871",  
  "firstName": "John",  
  "lastSurname": "Ortiz",  
  "tribalAffiliation": "Pascua Yaqui"  
  [etc...]  
}
```

Decoupling of Ed-Fi Core and Extensions

ODS/ API v2.x (Cont.)

- A 2nd consequence of this design → no way to signal to client developers that an implementation is using a standard set of extensions (e.g. talent management or transportation domain extensions)
- A 3rd consequence of this design → If an API used more than one set of extensions, name collisions from those sets were possible
- The planned enhancement is to separate extensions - both new entities and new fields on entities - within the API representations and paths, and introduce namespaces to clarify the source

Decoupling of Ed-Fi Core and Extensions

ODS/ API v3.x

- Explicit support for extensions in JSON resource models

Current (ODS API v2.0)	Future: (ODS API v3.0)
<pre>{ "studentUniqueId": "397589871", "firstName": "John", "lastName": "Ortiz", "tribalAffiliation": "Pascua Yaqui" [etc...] }</pre>	<pre>{ "studentUniqueId": "397589871", "firstName": "John", "lastName": "Ortiz", [etc...] "_ext" : { "SomeState" : { "tribalAffiliation" : "Pascua Yaqui", [etc...] } } }</pre>

- Changes to API routes

/data/v3/ed-fi/schools
/data/v3/talentMgmt/applicants
/data/v3/TX/leavers



Decoupling of Ed-Fi Core and Extensions [Demo](#)



Improvements to Routes

New Routes support the new extensions model, and provide improved support for API versioning

Description	Current (ODS / API v2.0)	Future (ODS / API v3.0)
Base URI	../api/v2.0/2018	/{api_area}/{version}/{year}* Examples: /data/v3 /composites/v1 /identity/v2 /bulk/v1
Basic Relative URL Format		Data Management Resources: .../{org}/{resource} API Composites: .../{org}/{category}/{resource}
Examples		
Resources (Ed-Fi)	/api/v2.0/2018/schools/	/data/v3/ed-fi/schools
Descriptors (Ed-Fi)	/api/v2.0/2018/termDescriptors	/data/v3/ed-fi/termDescriptors
Resources (Host Extensions)	/api/v2.0/2018/leavers	/data/v3/TX/leavers
Resources (Domain Extensions)	/api/v2.0/2018/applicants	/data/v3/talentMgmt/applicants
Composites (Ed-Fi)	/api/v2.0/2018/assessment/studentAssessments	/composites/v1/ed-fi/assessment/studentAssessments
Composites (Host Organization)	Custom	/composites/v1/MI/enrollment/Schools
Composites Based on Domain or Host Extensions	N/A	Unsupported
Bulk	api/v2.0/2018/bulkOperations	/bulk/v1/bulkOperations
Identity	api/identity/v1/identities api/identity/v2/identities	/identity/v2/identities

Separate versioning of bulk and identity API



School Year is Optional

Composites is reserved word

Deprecated

Redesigning the Ed-Fi Enumeration Sets

- Redesigns the Ed-Fi Enumerations to be semantically unambiguous across different implementations which is essential for data integration and interoperability.
- The Alliance envisions that upcoming (ODS/API) release will provide mappings between different Descriptor sets, allowing for **support of multiple "operational contexts"** (contexts in which controlled vocabularies are different for the same underlying concept), and allowing for explicit declaration of operational context. ODS / API v3.0 sets the stage to support multiple operational contexts.
- Ed-Fi Descriptor references require Fully Qualified Namespaces
- Descriptor namespace format - **uri://[organization indicator]/[name of descriptor]#[code value]**
 - uri://ed-fi.org/AcademicSubjectDescriptor#Chemistry
 - uri://ed-fi.org/GradeLevelDescriptor#Fifth grade



Ed-Fi Descriptor References Require Fully Qualified Namespaces [Demo](#)

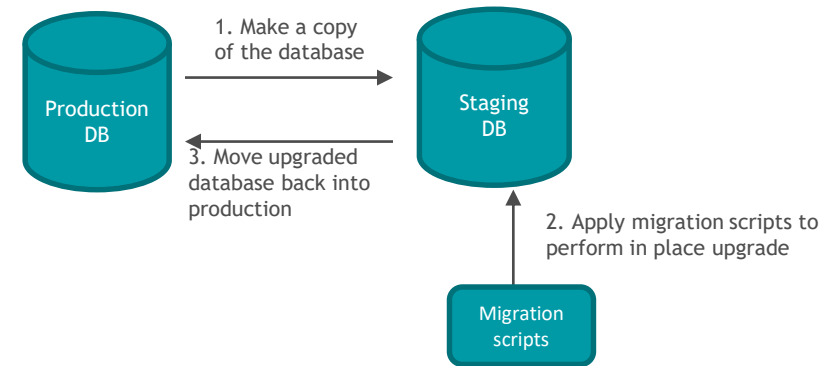


Code Refactoring

- Source code reorganization
 - Address complexity and establish foundation for more manageable, composable releases (e.g. distributing ODS/API core via NuGet packages)
- API code generation template re-engineering and semantic model
 - Address technical debt and prepare for API code generation support in [MetaEd](#)
- Note: these changes were also applied to the ODS / API v2.3 release.

Upgrade/Migration support

- Out of the Box core migration support
- Migrating Extensions need custom scripts
- Designed for multi-year ODS implementation. Year-Specific instances will simply switch over to new ODS





Extending ODS /API v3.0

MetaEd IDE 1.1.3

MetaEd IDE 1.1.3

Ed-Fi Extension Framework

How To: Extend the Ed-Fi ODS / API - Student Transportation Example

MetaEd IDE Version Targeting



ODS/API v3.0 Benefits/Impacts

Platform Hosts

- Engage your Vendors early on. Apply and test Extensions, deploy sandboxes and coordinate roll-out Review new Extension capabilities
- Review down stream applications that may require changes
- Switch to MetaEd and verify that your extensions confirm to guidelines provided by [Ed-Fi Extension Framework](#)
- Review current Extensions to see if any elements are included in the new Data Standard.

Platform Hosts

- Review new extension capabilities. It supports an Ed-Fi Core plus composable Ed-Fi Extensions
- Platform hosts can apply multiple extensions, such as host-specific extensions (e.g., an SEA-specific accountability collection), along with domain-specific extensions (e.g., talent management, transportation).

Platform Hosts

- Review all Ed-Fi Descriptors, ensure any localized descriptors (i.e., those with values other than the as-shipped Ed-Fi Descriptor sets) retain the namespace of the defining organization.
- Make sure localized descriptors adhere to the fully qualified namespace pattern.
- Publish updated documentation, notify client systems.

Descriptor Reference
Require Namespace

Platform Hosts

- Review and consume the refactored code.
- If applicable, re-apply customizations.

API Consumers

- Review the client application for data standard v3.0 changes to breaking JSON payloads

API Consumers

- Review new Extension capabilities.
- Review and Update the client applications to accommodate changes to extension JSON payload.
- Review and Update the client applications to accommodate changes to Routes

API Consumers

- If applicable (e.g., if developers have used the customized Ed-Fi SDKs for C# or Java), migrate to the [latest standard Swagger Codegen client SDK tooling compatible with OpenAPI 2.0](#).
- If applicable (e.g., if developers have used the GetByKey or GetByExample), modify code to adapt to standardized return types for GETs.

API Consumers

- Adapt client code to OAuth Client Credential Flow.
- OAuth Client Credential Flow doesn't allow for rolling expiration for tokens. Adapt client code to request a new access token upon token expiration.

Standard OAuth 2.0
Alignment

API Consumers

- All descriptor reference require namespaces now. Adapt client code to the new specifications.

Descriptor References
Require Namespaces



Wrap-up



Prepare for the switch

- Download and work with the [release candidate](#)
- Provide feedback - [RFC](#)
- Upgrading to Ed-Fi 3.0 for 2019-2020 School Year?
 - Working Session with Sayee Srinivasan at 2:15pm

Resources

- [Data Standard 3.0\(RC1\)](#)
- [UDM Handbook](#)
- [Swagger Codegen Tool](#)
- [Hands-on exercise on how to use Swagger Codegen tool](#)
- [Webinars](#) - “What’s New With Ed-Fi 3.0: Part 1” and “What’s New With Ed-Fi 3.0: Part 2”
- [MetaEd Labs](#) – From 2017 Bootcamp