



ODS/API v3.0

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Agenda

- Ed-Fi ODS / API v2.x – Current Status
- Ed-Fi ODS / API v3.0 – Release Themes
 1. Data Standard v2.1 Support
 2. API v3.0 Enhancements
 3. Upgrade and Migration Support
- Discussion

Ed-Fi ODS / API - v2.x Timeline

Version 2.0 (November '15)

- Generalized field implementation from TN (and others), w/ Data Standard v2.0 Support
- [API Profiles](#) and a variety of security enhancements

Version 2.1 (June '16) & 2.1.1 (Sept '16)

- [API Composites](#) (w/ Standard API Composites – Enrollment and Assessment)
- New Utilities (Client side bulk load, XML lookup utility, security visualization tool)
- Performance and Stability Improvements
- Developer Support (e.g. improved SDK generation,, standardized logging support)

Version 2.2 (March '17)

- Performance Improvements to Bulk Load
- Improved Identities API
- Developer Support (e.g. Swagger Usability Enhancements, Smoke Testing Tool, VS 2015 Support)

Data Standard v2.0 Support

Ed-Fi Technology Roadmap (& versioning hell)

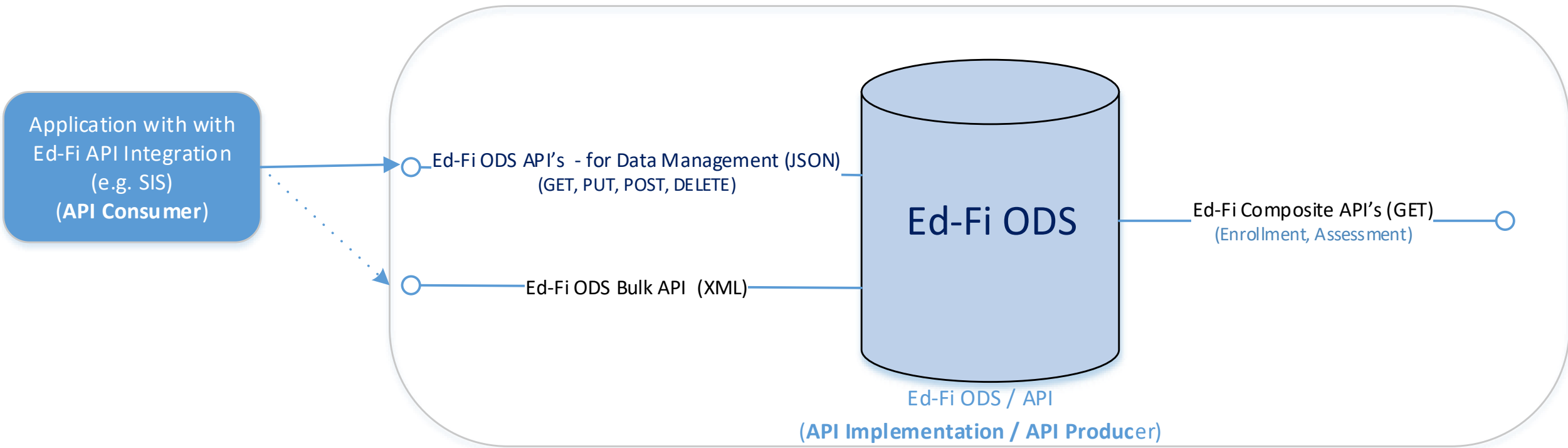
Data Standard	ODS / API	Dashboards / Visualizations
Data Standard v1.2	ODS v1.2	Dashboards v2.0.x
Data Standard v2.0	ODS / API v2.x - ODS/API v2.2 - <i>ODS/API v.2.3 (June '17)</i>	- Dashboards v2.0.1 - <i>v2.0.2 (May), v2.0.3 (August '17)</i>
	<i>Cloud ODS v1.0 (June '17)</i>	<i>PowerBI Analytics POC (Exchange) – (June '17)</i>
<i>Data Standard v2.1 (June '17)</i>	<i>ODS / API v3.0 (Sept '17)</i>	<i>Dashboards v2.1 (Nov '17)</i>

See the [Technology Roadmap](#) for more detail

ODS/API v3.0 – Release Themes

1. Data Standard v2.1 Support
2. API v3.0 Enhancements
3. Upgrade and Migration Support

Ed-Fi API's - Consumers & Producers



ODS/API v3.0 Release Themes

1. Data Standard v2.1 Support

Description

- ODS / API v3.0 will support Data Standard v2.1
 - <https://api.ed-fi.org/3.0/docs/index.html>
- ODS / API v2.x will continue to support Data Standard v2.0
 - <https://apidocs.ed-fi.org/index.html>

Benefit / Impact

- ODS/API Implementations:
 - Review extensions for data standard impact, apply and test extensions (w/ MetaEd support)
 - Coordinate roll-out and support with API consumers (data governance, sandbox testing, etc.)
 - Plan for upgrade/migration from ODS/API v2.x (more on this later)
- API Consumers:
 - Absorb breaking changes in JSON payloads (due to data model changes)

2. API v3.0 Enhancements

- **API Decoupling of Ed-Fi “core” and “extensions”**
- Swagger Upgrade
- Adopt OpenID Connect (stretch)
- Code Refactoring

2. API v3.0 Enhancements

API Decoupling of “core” and “extensions”

Current Status

- In the 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",  
  "lastName": "Ortiz",  
  "tribalAffiliation": "Pascua Yaqui"  
  [etc...]  
}
```

2. API v3.0 Enhancements

API Decoupling of “core” and “extensions”

Current Status (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)
- 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

2. API v3.0 Enhancements

API Decoupling of “core” and “extensions”

Description

- 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>

2. API v3.0 Enhancements

API Decoupling of “core” and “extensions”

Description

- Explicit support for extensions in JSON resource models
- Changes to API routes
 - Support the new extensions model
 - Provide improved support for API versioning

Description	Current (ODS API v2.0)	Future (ODS API v3.0)
Base URI	/api/v2.0/2016	/api/{api_area}/{version}* Examples: .../api/ods/v3 .../api/identities/v2 .../api/bulk/v1
Resources (Ed-Fi)	.../schools/	.../ed-fi/schools
Types (Ed-Fi)	.../raceTypes	.../ed-fi/raceTypes
Descriptors (Ed-Fi)	.../termDescriptors	.../ed-fi/termDescriptors
Composites (Ed-Fi)	.../assessment/studentAssessments	.../ed-fi/composites /assessment/studentAssessments
Resources (Host Extensions)	.../leavers	.../TX/leavers
Resources (Domain Extensions)	.../applicants	.../talentMgmt/applicants

2. API v3.0 Enhancements

API Decoupling of “core” and “extensions”

Description

- Explicit support for extensions in JSON resource models
- Changes to API routes

Benefit / Impact

- ODS/API Implementations
 - Can support an Ed-Fi “core” and compose in extensions based on a given configuration
 - Can apply multiple extensions simultaneously, such as host-specific extensions (e.g. SEA’s - TN, AZ, WI. etc.), along with domain-specific extensions (e.g. talent management, transportation, etc.).
- API Consumers
 - Can more easily target and manage support for Ed-Fi “core” and “extensions”
 - Will need to accommodate in API integration code

2. API v3.0 Enhancements

- API Decoupling of Ed-Fi “core” and “extensions”
- **Swagger Upgrade**
- Adopt OpenID Connect (stretch)
- Code Refactoring

2. API v3.0 Enhancements

Swagger Upgrade

Current Status

- The ODS/API uses Swagger (now renamed to Open API) to produce visual, [interactive documentation](#) & generate [Client API SDK's](#) (C# & Java)
 - The ODS/API v2.x produces Swagger v1.2 metadata which is well out of date
 - Ed-Fi uses a highly customized and disconnected version of the Swagger code-gen project for Client SDK generation
- The Swagger project continues to be very active, with broad industry support from major software vendors
 - Swagger 2.0 was released in Sept 2014
 - Open API v3.0-rc0 (Draft) was released in Feb 2017
- As it stands, Ed-Fi will be increasingly unable to take advantage of any updates to tooling that the project has to offer

2. API v3.0 Enhancements

Swagger Upgrade

Description

Upgrade to the Swagger/Open API specification v2.0 (or v3.0*) - to realize the following benefits:

1. Move to an actively supported and maintained version of Swagger
2. Adopt Swagger-community tools for generating client SDK's for the ODS/API, which will:
 - Enable API SDK support for languages beyond C# and Java
 - Enable the Alliance to deprecate costly support and maintenance for the current Client API SDK



**A determination of which version of Swagger to upgrade to (v2.0 or v3.0) will be made during the requirements and design stage, and will depend on whether Swagger v3.0 is considered stable enough to take a dependency*

2. API v3.0 Enhancements

Swagger Upgrade

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1. Move to an actively supported and maintained version of Swagger
2. Adopt Swagger-community tools for generating client SDK's for the ODS/API
3. Standardized return type for HTTP GET's



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2. API v3.0 Enhancements

Swagger Upgrade

Standardized Return Types for HTTP GETS

- The ODS/API 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 value is submitted (cf. <http://tracker.ed-fi.org/browse/ODS-894>)

- These variable semantics are not supported in Swagger v2.0 (and unclear if they will return in v3.0)

- ...and more (if you like deep philosophical developer discussions!)

- **In summary – we intend to move to standardized return types for GETS – as this is a net-positive given the benefits of being on an up to date version of Swagger/Open API**

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

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.

2. API v3.0 Enhancements

Swagger Upgrade

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Upgrade to the Swagger/Open API specification v2.0 (or v3.0*) - to realize the following benefits:

1. Move to an actively supported and maintained version of Swagger
2. Adopt Swagger-community tools for generating client SDK's for the ODS/API
3. Standardized return type for HTTP GET's

Benefit / Impact

- ODS/API Implementations:
 - No impact beyond general upgrade and testing
- API Consumers:
 - Migrate to new client SDK tooling
 - Modify code to adopt to standardized return types for GET's

2. API v3.0 Enhancements

- API Decoupling of Ed-Fi “core” and “extensions”
- Swagger Upgrade
- **Adopt OpenID Connect (stretch)**
- Code Refactoring

2. API v3.0 Enhancements

Adopt OpenID Connect (Stretch)

Current Status

- There has been a lingering issue with the implementation of 2-legged OAuth in the API (i.e. technical debt)
 - What should have been implemented is the "Client Credentials Grant Type" flow ([ODS-196](#))
 - What was implemented is completely custom, requiring changes to the SDK code generation for the Java and .NET SDK, or a custom integration by vendors not using the SDKs
- There is a tight coupling of the API to the Admin database that requires every API call to make a database call to verify the incoming "bearer" token to ensure that it hasn't expired, and to retrieve pertinent data about the caller (such as their associated Education Organization, and their role/claim set, among other details).

2. API v3.0 Enhancements

Adopt OpenID Connect (Stretch)

Description

Update the authorization process of the ODS/API to use OpenID Connect (an identity layer on top of OAuth2)

- Authorization information can be encoded in a signed token - decoupling the API from the Admin database
- Future integrations could be done with standard industry OpenID Connect authorization servers (such as Active Directory Federation Services or Azure AD) and even become an enabler for user-level access of the API in appropriate scenarios
- For a simple out-of-the-box experience, integration with the IdentityServer3 project will be investigated (as opposed to implementing all the functionality from scratch)

Benefit / Impact

- ODS/API Implementations:
 - No impact beyond general upgrade and testing
- API Consumers:
 - New implementation of authorization wire-up and hand-shake

2. API v3.0 Enhancements

- API Decoupling of Ed-Fi “core” and “extensions”
- Swagger Upgrade
- Adopt OpenID Connect (stretch)
- **Code Refactoring**

2. API v3.0 Enhancements

Code Refactoring

Description

- 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
 - Address technical debt and prepare for API code generation support in MetaEd
- Plan to incorporate these changes into both ODS/API v2.3 and ODS/API v3.0

Benefit / Impact

- ODS/API Implementations
 - Will need to plan time/resources to consume refactored code and re-apply extensions and customizations (w/ help from MetaEd)
- API Consumers
 - No impact

ODS/API v3.0 – Release Themes

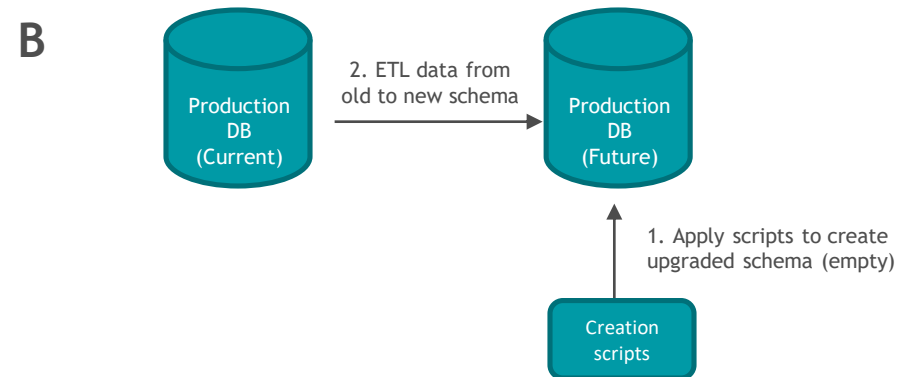
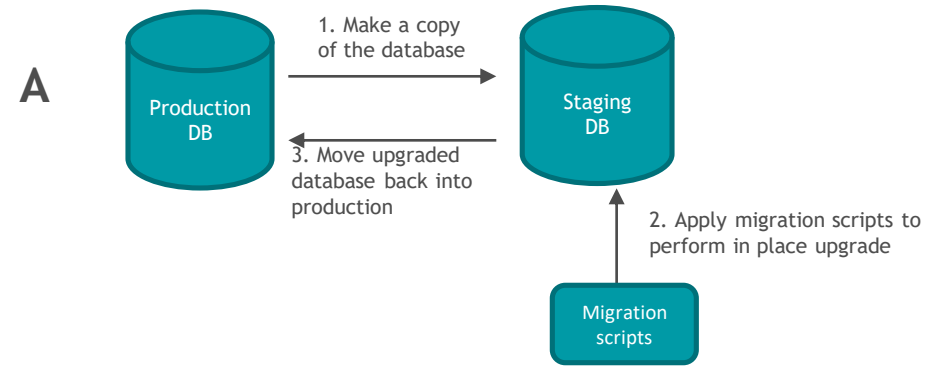
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3. Upgrade and Migration Support

- Short term (ODS/API v3.0)
 - Provide baseline tooling and support for upgrading Ed-Fi “Core” ODS v2.x database to ODS v3.0
 - Document approach and best practices – for implementations to follow the same patterns for extensions
- Longer term (beyond ODS / API v3.0)
 - Investigate how MetaEd can play a role in supporting database migrations

3. Upgrade and Migration Support

- Question for community input: How do you approach upgrade/migrations?
 - (A) In-place migration
 - OR
 - (B) Data export/import





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Discussion





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Backup



ODS/API v3.0 Release Themes

Out of Scope

- [API PATCH](#) support