



**ed-fi**<sup>®</sup>  
ALLIANCE

# Webinar: What's New in Ed-Fi v4.0 and API 6.0

September 21, 2022

# Welcome!

- 30-minute webinar, 10-min Q&A
- Ask questions any time through the chat or Q&A feature on the Webex interface.

## What We'll Cover

- Overview of Data Standard Changes in v4.0a
- Summary of changes in ODS/API v6.0



**Caroline Kazmierski**

Director of Marketing  
Communications



**Sayee Srinivasan**

Solutions Architect, SEA



**Vinaya Mayya**

Software Development Lead

# Data Standard Changes in v4.0a

# Summary of Changes

- Data Standard 4 is targeted at deployment starting in the 2023-24 school year. Data Standard v4 (current version 4.0-a) introduces important updates to 3 domains of the Ed-Fi data model:
- Student Academic Report (Grade & Gradebook area only)
- Assessment
- Finance
- Data Standard 4 introduces the new concept of managing descriptor mappings as data entities

# New Entity DescriptorMapping

```
{  
  "value" : "AlgebraII",  
  "namespace" : "uri://grandbendisd.edu/AcademicSubjectDescriptor",  
  "mappedValue" : "ADVMATH",  
  "mappedNamespace" : "uri://somestate.edu/AcademicSubjectDescriptor",  
  "modelEntities" : [  
    {  
      "modelEntityDescriptor": "uri://ed-fi.org/ModelEntity#Staff"  
    }  
  ]  
}
```

# “Current Grade”

[DATASTD-1696](#)

Best Practices - <https://techdocs.ed-fi.org/display/EFDS4X/Student+Academic+Record+Domain+--+Best+Practices>

# Current Grade Capture

- Common for systems to capture the current grade and exchange the grade for a grading period that is NOT yet completed.
- **Write the “current grade” to the Grade entity for the appropriate GradingPeriod with a GradeType = “Grading Period” with a CurrentGradeIndicator flag = True with a CurrentGradeAsOfDate.**



# Grade Entity Changes to capture Current Grade with an asofdate

A	B	C	D	E	F	G	H
	<a href="#">GradeType</a>	Reference	object	MetaEd DSL Datatype: DescriptorProperty	Yes	required	The type of grade reported (e.g., Exam, Final, Grading Period).
	<a href="#">GradingPeriodGradingPeriod</a>	Reference	object	MetaEd DSL Datatype: DomainEntityProperty	Yes	required	Identifies the grading period for the Grade.
	<a href="#">StudentSectionAssociation</a>	Reference	object	MetaEd DSL Datatype: AssociationProperty	Yes	required	Relates the student and Section associated with the Grade.
	<a href="#">DiagnosticStatement</a>	String	string	MetaEd DSL Datatype: SharedStringProperty	No	optional	A statement provided by the teacher that provides information in addition to the grade or assessment score.
				SQL Recommended Datatype: VARCHAR(1024)			
	<a href="#">LearningStandardGrade</a>	Reference	object	MetaEd DSL Datatype: CommonProperty	No	optional collection	A collection of learning standards associated with the grade.
	<a href="#">LetterGradeEarned</a>	String	string	MetaEd DSL Datatype: SharedStringProperty	No	optional	A final or interim (grading period) indicator of student performance in a class as submitted by the instructor.
				SQL Recommended Datatype: VARCHAR(20)			
	<a href="#">NumericGradeEarned</a>	Number	number	MetaEd DSL Datatype: SharedDecimalProperty	No	optional	A final or interim (grading period) indicator of student performance in a class as submitted by the instructor.
				SQL Recommended Datatype: DECIMAL(9, 2)			
	<a href="#">PerformanceBaseConversion</a>	Reference	object	MetaEd DSL Datatype: DescriptorProperty	No	optional	A conversion of the level to a standard set of performance levels.
<b>New</b>	CurrentGradeIndicator	Boolean	boolean	MetaEd DSL Datatype: BooleanProperty SQL Recommended Datatype: BOOLEAN	No	optional	An indicator that the posted grade is an interim "current" grade for the grading period and not the final grade for the CurrentGradeAsOfDate
<b>New</b>	CurrentGradeAsOfDate	Date	number	MetaEd DSL Datatype: DateProperty SQL Recommended Datatype: DATE	No	optional	As-Of date for a grade posted as the current grade.

# AssessmentPeriod in StudentAssessment

On /assessments	On /studentAssessments
<pre>"periods": [   {     "assessmentPeriodDescriptor": "string",     "beginDate": "2022-08-16",     "endDate": "2022-08-16"   } ]</pre>	<pre>"period": {   "assessmentPeriodDescriptor": "stri   "beginDate": "2022-08-16",   "endDate": "2022-08-16" }</pre>

# Time spent in an Assessment

## AssessedMinutes in StudentAssessment and in StudentObjectiveAssessment

AssessedMinutes	Number	number	MetaEd DSL Datatype: IntegerProperty  SQL Recommended Datatype: INT	No	optional	Reported time student was assessed in minutes.
-----------------	--------	--------	---	----	----------	--

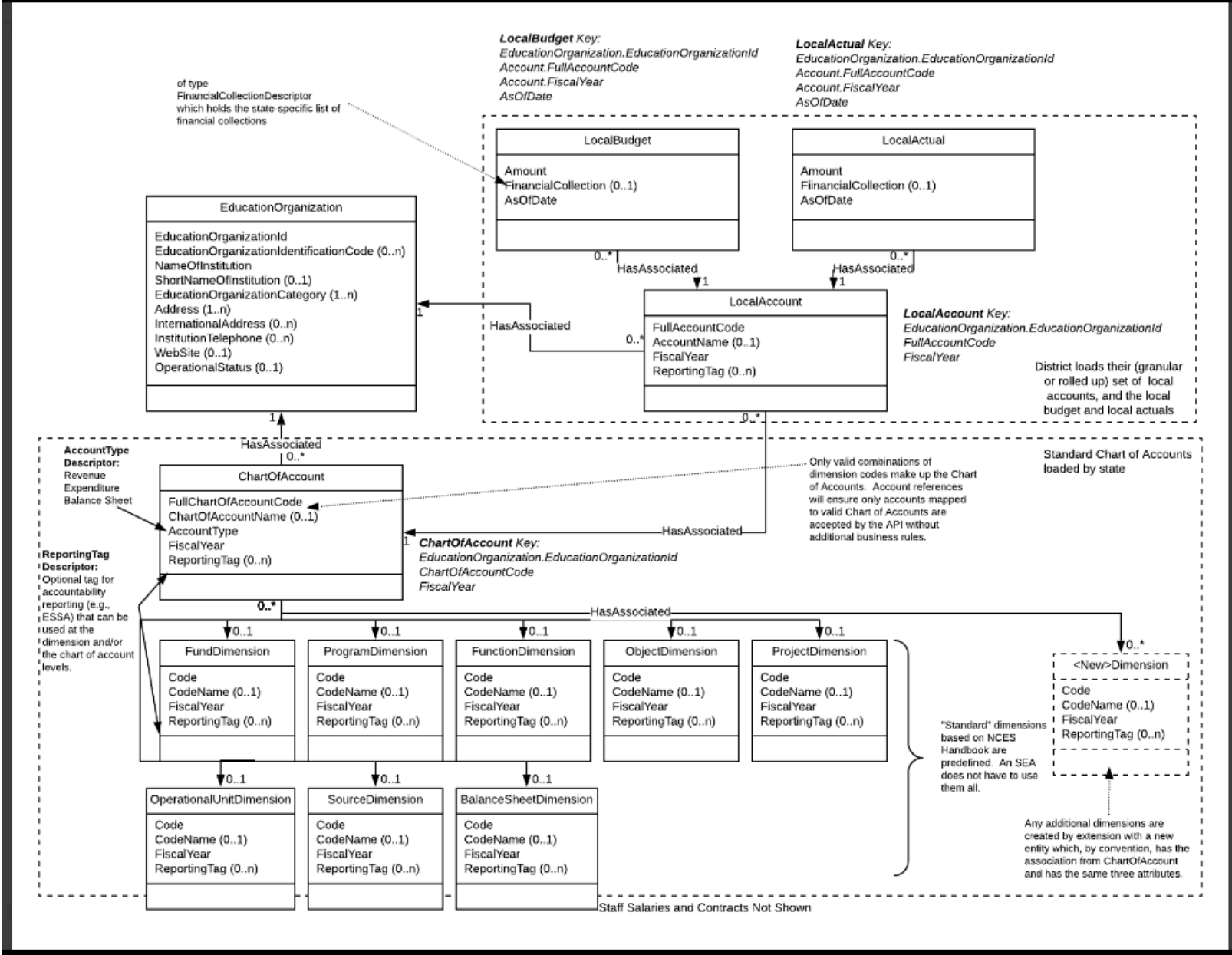
# Other Assessment Domain Changes

- Removal of deprecated elements
  - LearningObjective and all references to that.
  - PerformanceLevelMet Boolean from PerformanceLevel
- ScoreResult changed to an optional collection on StudentObjectiveAssessment
- Remove ambiguities in mapping of performance levels in complex assessments.
  - [AssessmentPerformanceLevel](#).PerformanceLevelIndicatorName (as optional)
  - [PerformanceLevel](#).PerformanceLevelIndicatorName (as optional)

# How to capture not tested student's information in StudentAssessment

- StudentAssessment.AdministrationDate is not part of the key – Move administration date to optional and update doc to say will be null if not there

# Finance Domain is in Core Standard



# GradebookEntry Key Structure Change

- The current key structure of DateAssigned, GradebookEntryTitle, and Section (reference) is volatile and not reliable
- The work on the LMS Toolkit found that that these elements of the StudentGradebookEntry key are not reliably available in LMS systems

# GradebookEntry

- Current key: DateAssigned, GradebookEntryTitle, Section (reference)
- New GradebookEntry key ([DATASTD-1599](#))
  - Alternative #1 is to use Partial Surrogate Key pattern:  
GradebookEntryIdentifier + Namespace;  
Section (reference) not part of key but mandatory
    - Assumes SIS or LMS has a unique ID for each Gradebook Entry across all sections and all school years
- Follows identifier pattern for assessments
- This is a breaking change – but... gradebook domain has not been widely implemented



# ODS / API v6.0



**Enhancements to Change Queries  
Delete Tracking**



**Combining Authorization Strategies**



**Ownership Based Authorization**



**Support For External Cache**



**Technology Upgrade**



# Enhancements to Change Queries

## Delete Tracking

# Change Queries Feature

- Change queries feature allows client systems to narrow requests for data to only data that has changed since a specified point in time without having to pull complete data set.
- First released with ODS/API v3.1 (Dec 2018).
- Initial use cases:
  - Analytics vendors, data warehouse product vendors to stay in sync with source ODS
  - SIS vendors in their reconciliation process

# Change Queries API

API clients could use a query syntax to request newer changes on any resource

**GET /data/v3/ed-fi/studentProgramAssociations?minChangeVersion=234378&offset=0&limit=25**

API clients could get deletes on any resource

**GET /data/v3/ed-fi/studentProgramAssociations/deletes?minChangeVersion=234378&offset=0&limit=25**

```
[
  {
    "id": "cfa3fea8edf44c50b95e1808e616460a",
    "changeVersion": 234550
  }
]
```

# Enhancements to Change Queries Delete Tracking

- Includes natural keys in tracked deletes results



- Adds authorization-based filtering of tracked deletes
- Fixes tracking deletes of derived resources
- Adds support for tracking natural key changes



# /deletes

GET /data/v3/ed-fi/studentProgramAssociations/deletes?minChangeVersion=234378&offset=0&limit=25

```
[
  {
    "id": "cfa3fea8edf44c50b95e1808e616460a",
    "changeVersion": 234550,
    "keyValues": {
      "beginDate": "2021-08-30",
      "educationOrganizationId": 255901,
      "programEducationOrganizationId": 255901,
      "programName": "Bilingual",
      "programTypeDescriptor": "uri://ed-fi.org/ProgramTypeDescriptor#Bilingual",
      "studentUniqueId": "604854"
    }
  }
]
```


# /keychanges


GET /data/v3/ed-fi/classPeriods/keyChanges?minChangeVersion=104030&offset=100&limit=500

```
[
  {
    "id": "e0f8848b54ad4bddbe81e96737ed7b46",
    "changeVersion": 104036,
    "oldKeyValues": {
      "classPeriodName": "ORIGINAL",
      "schoolId": 255901001
    },
    "newKeyValues": {
      "classPeriodName": "UPDATE 2",
      "schoolId": 255901001
    }
  }
]
```

# Schema changes

- Tracked via tombstone tables
- Via a delete trigger on the root table, the old and new primary key, resource id and the change version are stored in the tombstone tables

Student (tracked_changes_edfi)	
OldStudentUSI	
OldStudentUniqueld	
NewStudentUSI	
NewStudentUniqueld	
Id	
 ChangeVersion	
Discriminator	
CreateDate	

SurveySection (tracked_changes_edfi)	
OldNamespace	
OldSurveyIdentifier	
OldSurveySectionTitle	
NewNamespace	
NewSurveyIdentifier	
NewSurveySectionTitle	
Id	
 ChangeVersion	
Discriminator	
CreateDate	





# Combining Authorization Strategies

# Combining Authorization Strategies

- In previous versions: Resource-Action is authorized with one authorization strategy:
  - NoFurtherAuthorizationRequires
  - NamespaceBased
  - Relationship-based strategies:
    - Relationships with Education Organizations and People
    - Relationships with Education Organizations only
    - Relationships with People only
    - Relationships with Students only
    - Relationships with Students only (through StudentEducationOrganizationResponsibilityAssociation)
    - Relationships with Education Organizations and People (including deletes)

[Create and Manage API Security Metadata Declaratively](#)

# Declarative view

```
<SecurityMetadata>
  <Claims>
    <Claim name="http://ed-fi.org/ods/identity/claims/program-eligibility/StudentSpecialEducationProgramEligibilityAssociation">
      <DefaultAuthorization>
        <Action name="Create" authorizationStrategy="RelationshipsWithEdOrgsAndPeople"/>
        <Action name="Read" authorizationStrategy="RelationshipsWithEdOrgsAndPeople"/>
        <Action name="Update" authorizationStrategy="RelationshipsWithEdOrgsAndPeople"/>
        <Action name="Delete" authorizationStrategy="RelationshipsWithEdOrgsAndPeople"/>
      </DefaultAuthorization>
    </Claim>
  </Claims>
</SecurityMetadata>
```

# New Use Cases

[SPED Eligibility](#) and several others listed in [ODS-4846](#) need more than one authorization strategy in place.

Previous versions required database and code changes

# EdFi\_Security

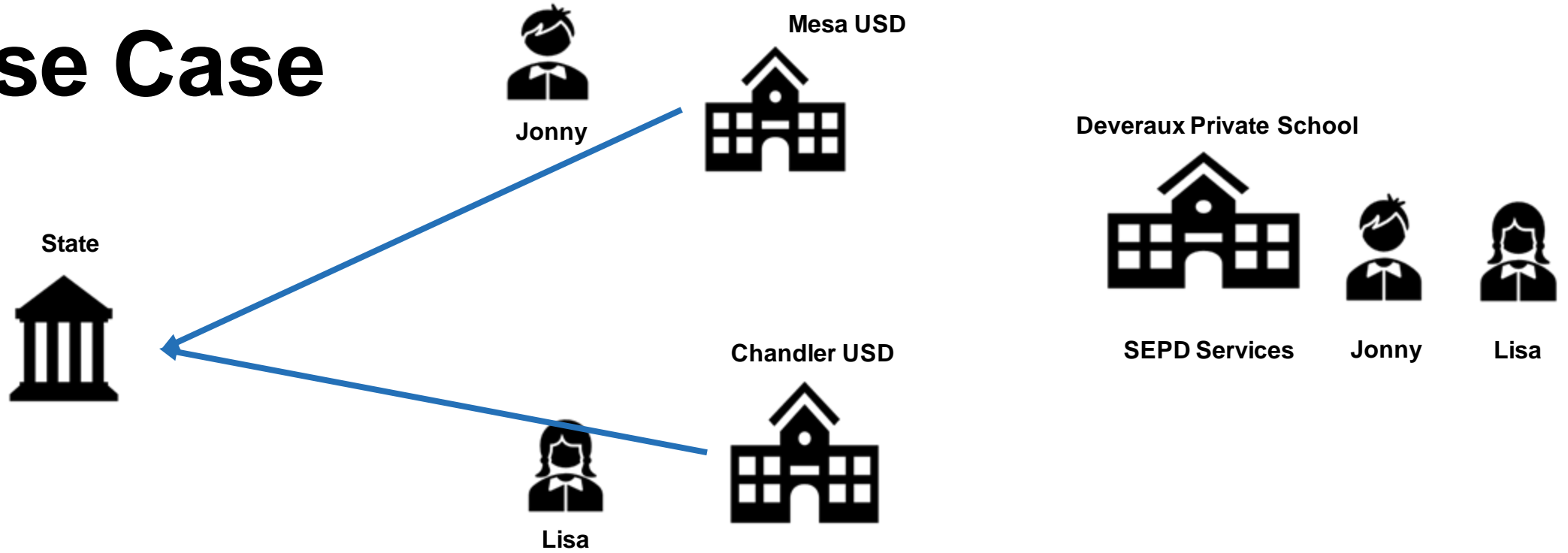


```
<SecurityMetadata>
  <Claims>
    <Claim name="http://ed-fi.org/ods/identity/claims/program-eligibility/StudentSpecialEducationProgramEligibilityAssociation">
      <DefaultAuthorization>
        <Action name="Create" />
          <AuthorizationStrategies>
            <AuthorizationStrategy name="NoFurtherAuthorizationRequired" />
          </AuthorizationStrategies>
        <Action name="Read" />
          <AuthorizationStrategies>
            <AuthorizationStrategy name="RelationshipsWithEdOrgsAndPeople" />
            <AuthorizationStrategy name="RelationshipsWithStudentsOnlyUsingEnrollmentsAndResponsibility" />
          </AuthorizationStrategies>
        <Action name="Update">
          <AuthorizationStrategies>
            <AuthorizationStrategy name="RelationshipsWithEdOrgsAndPeople" />
            <AuthorizationStrategy name="RelationshipsWithStudentsOnlyUsingEnrollmentsAndResponsibility" />
          </AuthorizationStrategies>
        </Action>
        <Action name="Delete">
          <AuthorizationStrategies>
            <AuthorizationStrategy name="RelationshipsWithEdOrgsAndPeople" />
            <AuthorizationStrategy name="RelationshipsWithStudentsOnlyUsingEnrollmentsAndResponsibility" />
          </AuthorizationStrategies>
        </Action>
      </DefaultAuthorization>
    </Claim>
  </Claims>
</SecurityMetadata>
```



# Ownership Based Authorization

# Use Case



	GET	POST	PUT	DELET	Comment
Chandler USD	Y	Y	Y	Y	Chandler USD has CRUD access to all schools under it
Mesa USD	Y	Y	Y	Y	Mesa USD has CRUD access to all schools under it
Deveraux	Y	Y	Y	Y	Both Chandler and Mesa USD have CRUD access to Deveraux data to be able to submit their students



# Ownership Based Authorization

- Ownership-based authorization is a **configurable optional feature**:

```
"ApiSettings": {  
  ...  
  "Features": [  
    {  
      "Name": "OwnershipBasedAuthorization",  
      "IsEnabled": true  
    },  
    ...  
  ]  
}
```

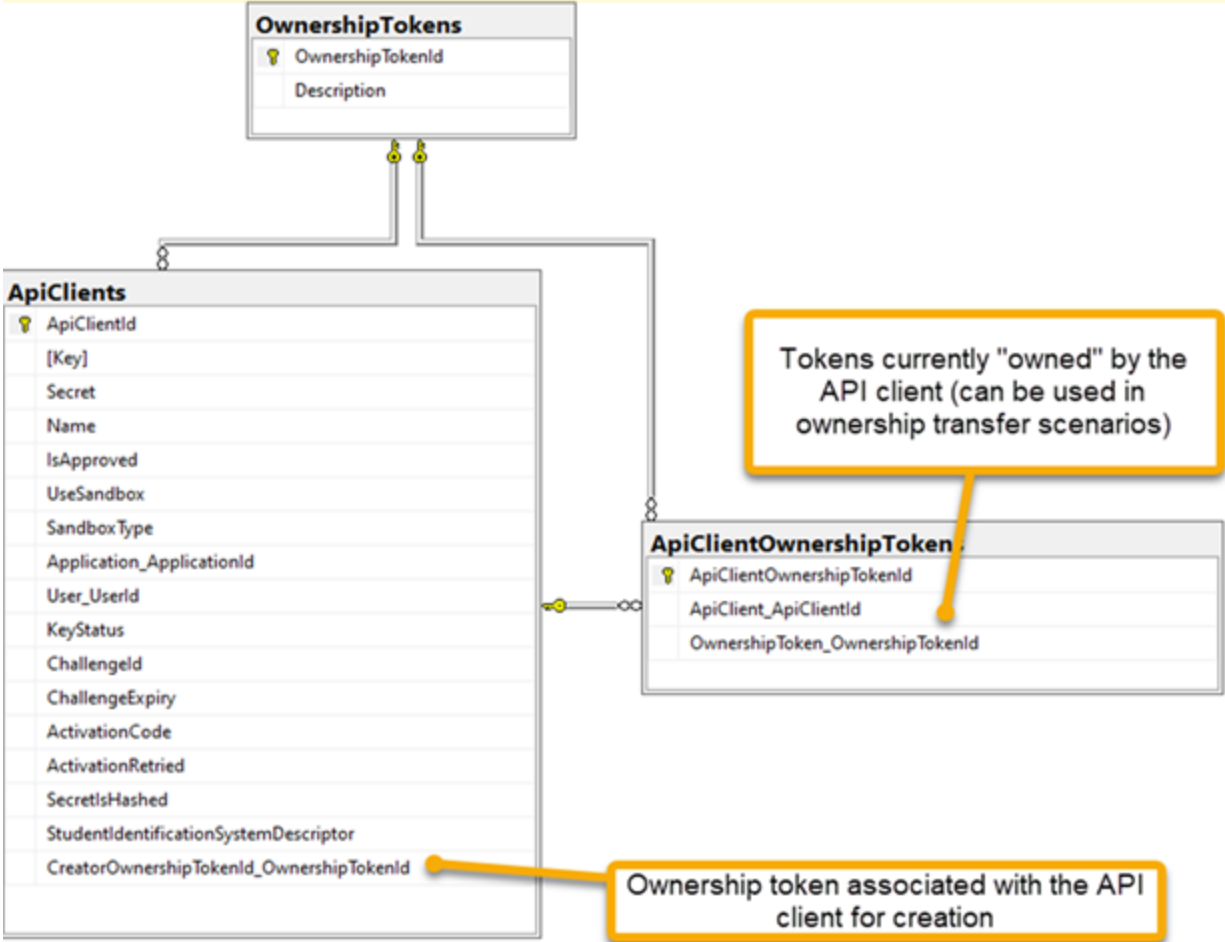
- Adds a new “Ownership-Based” Authorization Strategy to Security setup.
- Allows API hosts to configure “Ownership-Based” Authorization Strategy for any resource/action.
- API authorizes access to individual resources based on the concept of “ownership”, when configured.

# EdFi\_Ods

Each aggregate root table in the ODS has CreatedByOwnershipTokenId column (smallint).

Student (edfi)	
BirthInternationalProvince	^
BirthCountryDescriptorId	
DateEnteredUS	
MultipleBirthStatus	
BirthSexDescriptorId	
CitizenshipStatusDescriptorId	
PersonId	
SourceSystemDescriptorId	
StudentUniqueld	
Discriminator	
CreateDate	
LastModifiedDate	
Id	
CreatedByOwnershipTokenId	←
ChangeVersion	▼

# EdFi\_Admin



# Implementation

- API Clients are associated with Ownership tokens
- For each record **insert** request
  - Follows the existing authorization strategy
  - Sets the CreatedByOwnershipTokenId property of the root aggregate to the CreatorOwnershipTokenId of the API Client
- For each record **read, update or delete** request, if ownership-based authorization strategy is set for the resource/action
  - Compares the CreatedByOwnershipTokenId from the table record to the ApiClient's OwnershipTokens, If they are the same then allow the request to pass through.
  - If they are not the same, then reject the request and throw an unauthorized error



# Support For External Cache

# Support For External Cache

- Optional External Cache in place of “in-memory cache”
- Optimal memory usage on containerized applications that scale up based on utilization
- Avoids cache sync problems with unified cache
- Caution: Use of an external cache will introduce some level of latency into the response times compared to in-memory cache

```
"Caching": {
  "ExternalCacheProvider": "Redis",
  "Redis":{
    "Configuration": "localhost",
    "Password": "REDIS_PASSWORD"
  },
  "SqlServer":{
    "ConnectionString": "",
    "SchemaName": "",
    "TableName": ""
  },
  "Descriptors": {
    "UseExternalCache": true,
    "AbsoluteExpirationSeconds": 1800
  },
  "PersonUniqueIdToUsi": {
    "UseExternalCache": true,
    "AbsoluteExpirationSeconds": 0,
    "SlidingExpirationSeconds": 14400,
    "SuppressStudentCache": true,
    "SuppressStaffCache": true,
    "SuppressParentCache": true
  },
  "ApiClientDetails":{
    "UseExternalCache": true
  },
  "Security": {
    "AbsoluteExpirationMinutes": 10
  }
}
```



# Technology Upgrade

# ODS API v5.3

.NET Core 3.1 ([end of support](#) in December 2022).

SQL Server 2016

PostgreSQL 11



# ODS API v6.0

.NET 6 with LTS support and performance improvements.

SQL Server 2019

PostgreSQL 13





ed·fi<sup>®</sup>  
ALLIANCE