

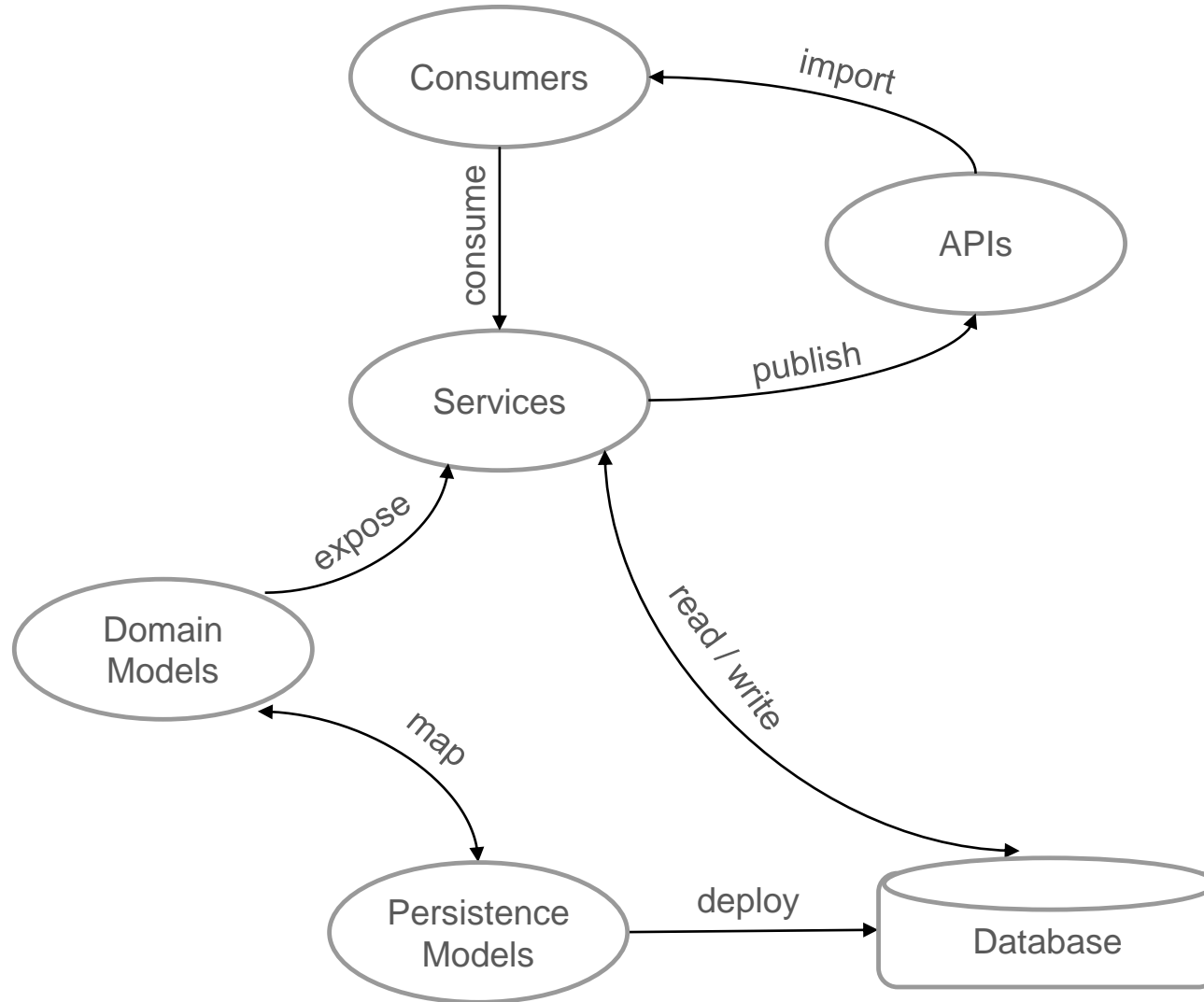


Week 3: Add Enterprise Qualities

Unit 1: Support for OData

Support for OData

Introduction



Domain Models

Static and data-related aspects of a problem domain in terms of entity-relationship models



Persistence Models

A sets of entities mapped from a domain model and deployed to the database



Services

Exposed interfaces based on a domain model

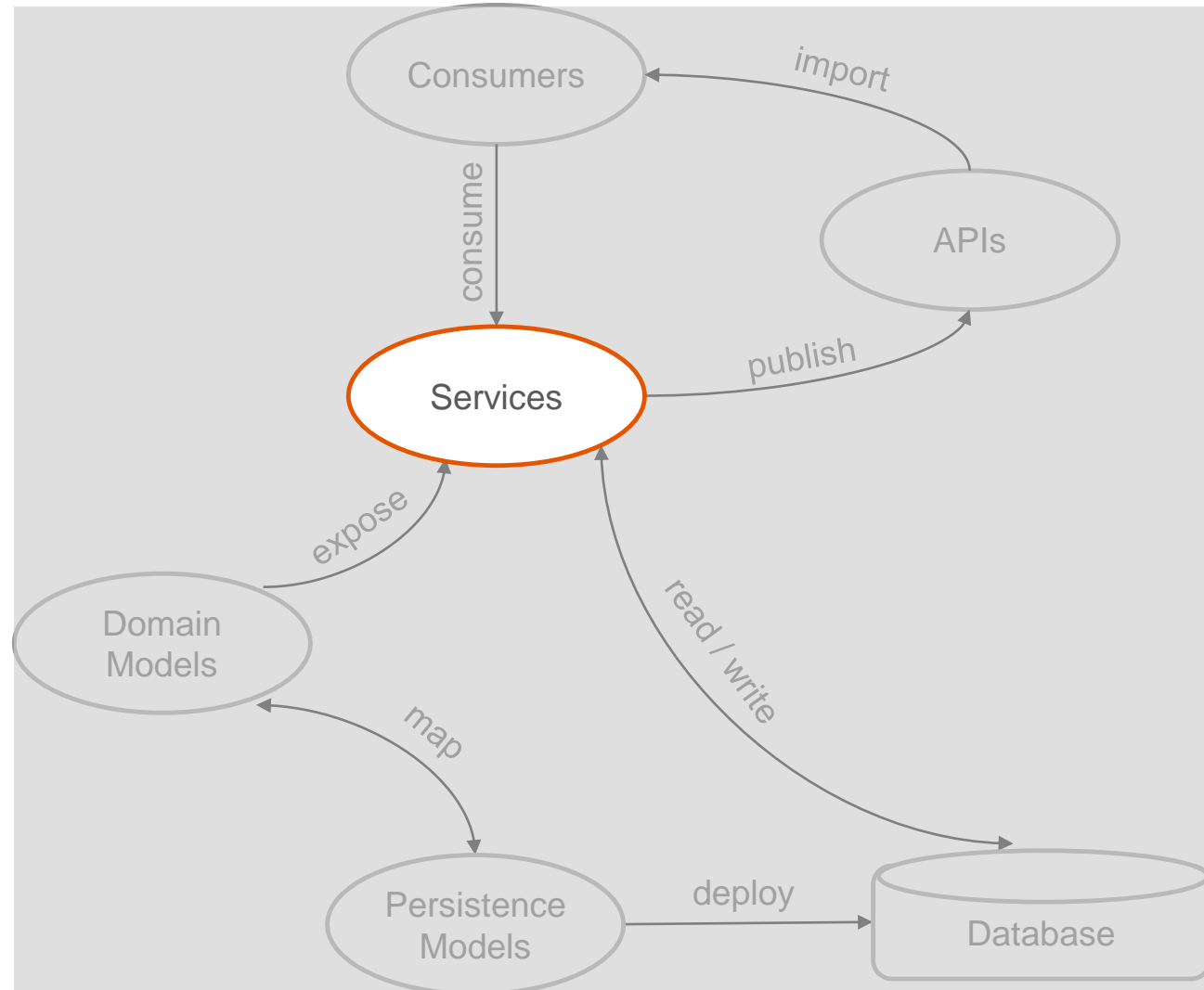


Consumers

Other services or UIs which call services via an API

Support for OData

Introduction



Domain Models

Static and data-related aspects of a problem domain in terms of entity-relationship models



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A sets of entities mapped from a domain model and deployed to the database



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Exposed interfaces based on a domain model



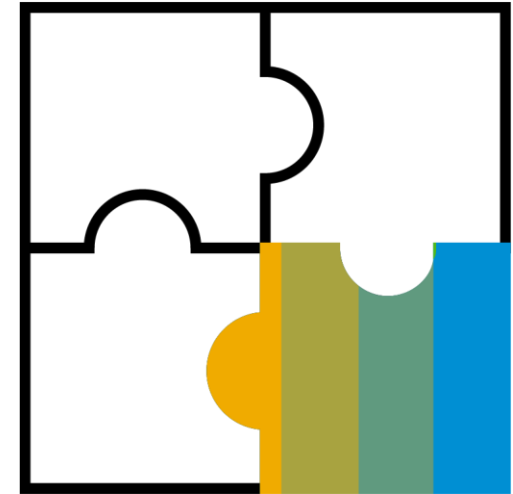
Consumers

Other services or UIs which call services via an API

OData, an OASIS standard

OData:

- Defines best practices for building and consuming RESTful APIs
- Used by SAP to define business data models for the SAP Fiori UI
- Allows users to query and manipulate data in a standardized way
- SAP Cloud Application Programming Model exposes the service as OData



Support for OData

OData metadata – EDMX

OData provides metadata

- Machine-readable description of the data model
- Known as Entity Data Model (EDM), a specification for defining data
- EDM – XML format file, referred to as EDMX file

```
← → ↺ ⌂ ⓘ localhost:4004/admin/$metadata

This XML file does not appear to have any style information associated with it. The document tree is shown below.

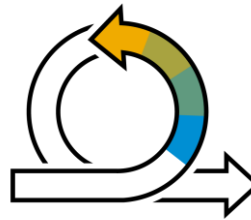
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<edmx:Edmx xmlns:edmx="http://docs.oasis-open.org/odata/ns/edmx" Version="4.0">
  <edmx:Reference Uri="https://wiki.scn.sap.com/wiki/download/attachments/448470974/Common.xml?api=v2">
    <edmx:Include Alias="Common" Namespace="com.sap.vocabularies.Common.v1"/>
  </edmx:Reference>
  <edmx:Reference Uri="https://oasis-tcs.github.io/odata-vocabularies/vocabularies/Org.OData.Core.V1.xml">
    <edmx:Include Alias="Core" Namespace="Org.OData.Core.V1"/>
  </edmx:Reference>
  <edmx:Reference Uri="https://oasis-tcs.github.io/odata-vocabularies/vocabularies/Org.OData.Measures.V1.xml">
    <edmx:Include Alias="Measures" Namespace="Org.OData.Measures.V1"/>
  </edmx:Reference>
  <edmx:Reference Uri="https://wiki.scn.sap.com/wiki/download/attachments/448470968/UI.xml?api=v2">
    <edmx:Include Alias="UI" Namespace="com.sap.vocabularies.UI.v1"/>
  </edmx:Reference>
  <edmx:DataServices>
    <Schema xmlns="http://docs.oasis-open.org/odata/ns/edm" Namespace="AdminService">
      <EntityContainer Name="EntityContainer">
        <EntitySet Name="Authors" EntityType="AdminService.Authors">
          <NavigationPropertyBinding Path="books" Target="Books"/>
        </EntitySet>
        <EntitySet Name="Books" EntityType="AdminService.Books">
          <NavigationPropertyBinding Path="author" Target="Authors"/>
          <NavigationPropertyBinding Path="currency" Target="Currencies"/>
          <NavigationPropertyBinding Path="texts" Target="Books_texts"/>
          <NavigationPropertyBinding Path="localized" Target="Books_texts"/>
        </EntitySet>
        <EntitySet Name="Books_texts" EntityType="AdminService.Books_texts">
          <NavigationPropertyBinding Path="texts" Target="Currencies_texts"/>
          <NavigationPropertyBinding Path="localized" Target="Currencies_texts"/>
        </EntitySet>
        <EntitySet Name="Currencies_texts" EntityType="AdminService.Currencies_texts">
          <NavigationPropertyBinding Path="parent" Target="Orders"/>
          <NavigationPropertyBinding Path="book" Target="Books"/>
          <NavigationPropertyBinding Path="SiblingEntity" Target="OrderItems"/>
        </EntitySet>
        <EntitySet Name="Orders" EntityType="AdminService.Orders">
          <NavigationPropertyBinding Path="Items" Target="OrderItems"/>
          <NavigationPropertyBinding Path="currency" Target="Currencies"/>
          <NavigationPropertyBinding Path="SiblingEntity" Target="Orders"/>
        </EntitySet>
      </EntityContainer>
      <EntityType Name="Authors">...</EntityType>
      <EntityType Name="Books">...</EntityType>
      <EntityType Name="Books_texts">...</EntityType>
      <EntityType Name="Currencies">...</EntityType>
      <EntityType Name="Currencies_texts">...</EntityType>
      <EntityType Name="DraftAdministrativeData">...</EntityType>
      <EntityType Name="OrderItems">...</EntityType>
      <EntityType Name="Orders">...</EntityType>
      <Action Name="draftPrepare" IsBound="true" EntitySetPath="in">...</Action>
      <Action Name="draftPrepare" IsBound="true" EntitySetPath="in">...</Action>
      <Action Name="draftActivate" IsBound="true" EntitySetPath="in">...</Action>
      <Action Name="draftEdit" IsBound="true" EntitySetPath="in">
        <Parameter Name="in" Type="AdminService.Orders"/>
        <Parameter Name="PreserveChanges" Type="Edm.Boolean"/>
        <ReturnType Type="AdminService.Orders"/>
      </Action>
      <Annotations Target="AdminService.Authors">
        <Annotation Term="UI.Identification">
          <Collection>
            <Record Type="UI.DataField">
              <PropertyValue Property="Value" Path="name"/>
            </Record>
          </Collection>
        </Annotation>
      </Annotations>
    </Schema>
  </edmx:DataServices>
</edmx:Edmx>
```

Support for OData

CDS to EDMX

CDS service definition

```
1 entity Books {
2   key ID : UUID;
3   title : String;
4   descr : String;
5   author : Association to Authors;
6 }
7
8 entity Authors {
9   key ID : UUID;
10  name : String;
11  books : Association to many Books on books.author=$self;
12  birth : Date;
13  death : Date;
14 }
15
16 // Define Orders with contained OrderItems
17 entity Orders {
18   key ID : UUID;
19   Items : Composition of many Order_Items on Items.parent=$self;
20 }
21 entity Order_Items { // shall be accessed through Orders only
22   key parent : Association to Orders;
23   key book : Association to Books;
24   quantity : Integer;
25 }
26
27 service CatalogService {
28
29   @readonly entity BooksService as projection on Books;
30   @readonly entity AuthorsService as projection on Authors;
31   @requires: 'authenticated-user'
32   @insertonly entity CreateOrders as projection on Orders;
33 }
```



EDMX – metadata file

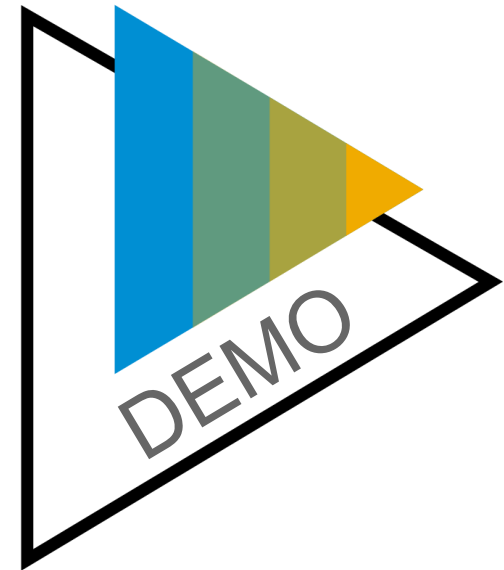
```
1 <!-- CDS Version: 3.19.0 -->
2 <?xml version="1.0" encoding="utf-8"?>
3 <edmx:Edmx Version="4.0" xmlns:edmx="http://docs.oasis-open.org/odata/ns/edmx">
4   <edmx:Reference Uri="https://oasis-tcs.github.io/odata-vocabularies/vocabularies/Org
5     .OData.Capabilities.V1.xml">
6     <edmx:Include Alias="Capabilities" Namespace="Org.OData.Capabilities.V1"/>
7   </edmx:Reference>
8   <edmx:DataServices>
9     <Schema Namespace="CatalogService" xmlns="http://docs.oasis-open.org/odata/ns/edm">
10      <EntityContainer Name="EntityContainer">
11        <EntitySet Name="AuthorsService" EntityType="CatalogService.AuthorsService">
12          <NavigationPropertyBinding Path="books" Target="BooksService"/>
13        </EntitySet>
14        <EntitySet Name="BooksService" EntityType="CatalogService.BooksService">
15          <NavigationPropertyBinding Path="author" Target="AuthorsService"/>
16        </EntitySet>
17        <EntitySet Name="CreateOrders" EntityType="CatalogService.CreateOrders">
18          <NavigationPropertyBinding Path="Items" Target="Order_Items"/>
19        </EntitySet>
20        <EntitySet Name="Order_Items" EntityType="CatalogService.Order_Items">
21          <NavigationPropertyBinding Path="parent" Target="CreateOrders"/>
22          <NavigationPropertyBinding Path="book" Target="BooksService"/>
23        </EntitySet>
24      </EntityContainer>
25      <EntityType Name="AuthorsService">
26        <Key>
27          <PropertyRef Name="ID"/>
28        </Key>
29        <Property Name="ID" Type="Edm.Guid" Nullable="false"/>
30        <Property Name="name" Type="Edm.String"/>
31        <NavigationProperty Name="books" Type="Collection(CatalogService.BooksService)"
32          Partner="author"/>
33        <Property Name="birth" Type="Edm.Date"/>
34        <Property Name="death" Type="Edm.Date"/>
35      </EntityType>
36      <EntityType Name="BooksService">
37        <Key>
38          <PropertyRef Name="ID"/>
39        </Key>
40        <Property Name="ID" Type="Edm.Guid" Nullable="false"/>
41        <Property Name="title" Type="Edm.String"/>
42        <Property Name="descr" Type="Edm.String"/>
```



Demo Scenario

You built a Node.js application – a **Book Store**.
Its data model consists of

- Books
- Authors
- Orders and order items



Support for OData

Accessing entities in OData

Accessing Entities

```
localhost:4004/admin/  
  
{  
  "@odata.context": "$metadata",  
  "@odata.metadataEtag": "W/\\"0LAg060ijDldgAu0zIcPQC5ygb8K0bmJ1SFrkxH3NiM=\"",  
  "value": [  
    {  
      "name": "Authors",  
      "url": "Authors"  
    },  
    {  
      "name": "Books",  
      "url": "Books"  
    },  
    {  
      "name": "Books_texts",  
      "url": "Books_texts"  
    },  
    {  
      "name": "Currencies",  
      "url": "Currencies"  
    },  
    {  
      "name": "Currencies_texts",  
      "url": "Currencies_texts"  
    },  
    {  
      "name": "OrderItems",  
      "url": "OrderItems"  
    },  
    {  
      "name": "Orders",  
      "url": "Orders"  
    }  
  ]  
}
```

```
localhost:4004/admin/Books  
  
{  
  "@odata.context": "$metadata#Books",  
  "@odata.metadataEtag": "W/\\"0LAg060ijDldgAu0zIcPQC5ygb8K0bmJ1SFrkxH3NiM=\"",  
  "value": [  
    {  
      "modifiedAt": null,  
      "createdAt": "2019-11-15T12:57:00Z",  
      "createdBy": "anonymous",  
      "modifiedBy": null,  
      "ID": 201,  
      "title": "Wuthering Heights",  
      "descr": "Wuthering Heights, Emily Brontë's only novel, was published in 1847 under the pseudonym \"Ellis Bell\". It was  
      Eyre. After Emily's death, Charlotte edited the manuscript of Wuthering Heights and arranged for the edited version to be  
      published in 1848.",  
      "stock": 12,  
      "price": 11.11,  
      "author_ID": 101,  
      "currency_code": "GBP"  
    },  
    {  
      "modifiedAt": null,  
      "createdAt": "2019-11-15T12:57:00Z",  
      "createdBy": "anonymous",  
      "modifiedBy": null,  
      "ID": 207,  
      "title": "Jane Eyre",  
      "descr": "Jane Eyre /ˈeɪər/ (originally published as Jane Eyre: An Autobiography) is a novel by English writer Charlotte  
      Brontë. Primarily a bildungsroman, Jane Eyre follows the experiences of its eponymous heroine, including her growth to adulthood  
      and an intimate, first-person narrative, where actions and events are coloured by a psychological intensity. The book contains  
      novel approaches the topics of class, sexuality, religion and feminism.",  
      "stock": 11,  
      "price": 12.34,  
      "author_ID": 107,  
      "currency_code": "GBP"  
    },  
    {  
      "modifiedAt": null,  
      "createdAt": "2019-11-15T12:57:00Z",  
      "createdBy": "anonymous",  
      "modifiedBy": null,  
      "ID": 208,  
      "title": "Pride and Prejudice",  
      "descr": "Pride and Prejudice is a novel by English writer Jane Austen. It is the first of six novels she wrote, and is set in  
      the early 19th century. The novel is a satire of the English gentry and is a classic of the English novel. It is a story of  
      love and marriage, and is a classic of the English novel. It is a story of love and marriage, and is a classic of the English  
      novel.",  
      "stock": 10,  
      "price": 10.99,  
      "author_ID": 102,  
      "currency_code": "GBP"  
    }  
  ]  
}
```


Support for OData

Querying in OData

Querying in OData



```
{
  "@odata.context": "$metadata#Authors(name,ID)",
  "@odata.metadataEtag": "W/\"0LAg060ijD1dgAu0zIcPQC5ygb8KObmJ1SFrkxH3NiM=\\\"",
  "value": [
    {
      "ID": 101,
      "name": "Emily Brontë"
    },
    {
      "ID": 107,
      "name": "Charlotte Brontë"
    },
    {
      "ID": 150,
      "name": "Edgar Allen Poe"
    },
    {
      "ID": 170,
      "name": "Richard Carpenter"
    }
  ]
}
```

Support for OData

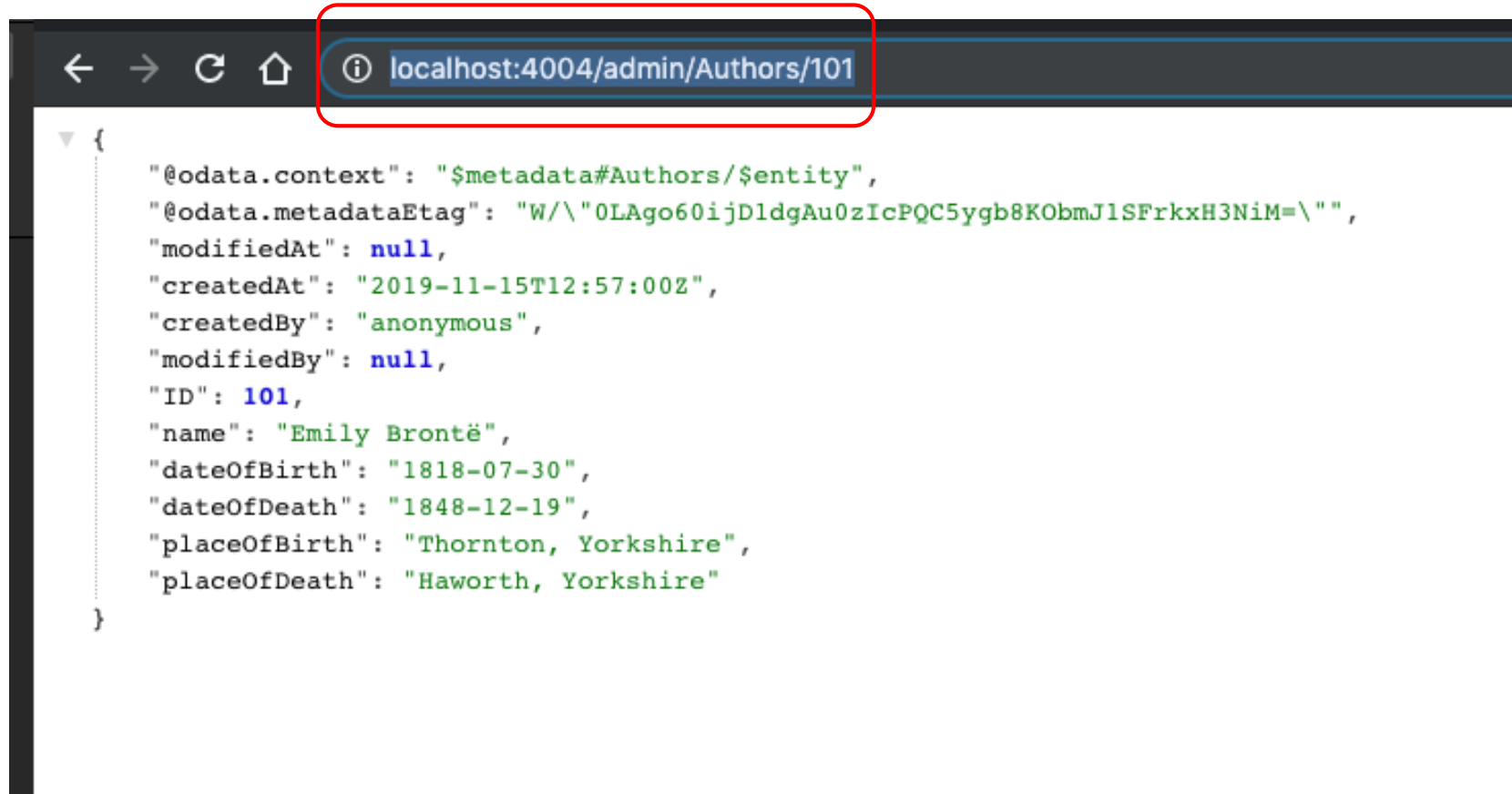
Filtering in OData

\$filter=startswith(name,'E')



Accessing single line item

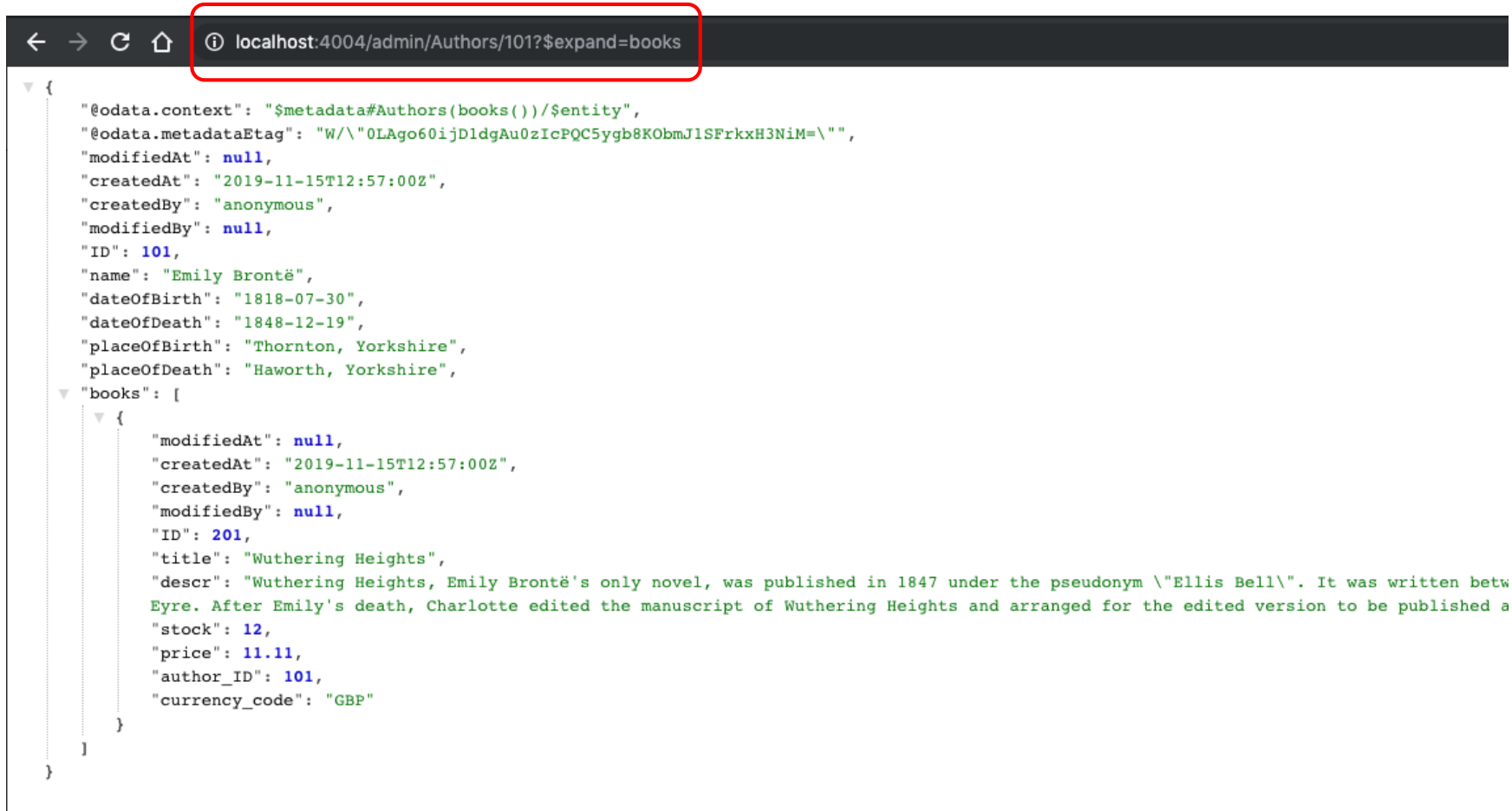
/Authors/ID



Support for OData

\$expand

/Authors/101?\$expand=books



```
{
  "@odata.context": "$metadata#Authors(books())/Entity",
  "@odata.metadataEtag": "W/\\"0LAgo60ijDldgAu0zIcPQC5ygb8KObmJlSFrxH3NiM=\\"",
  "modifiedAt": null,
  "createdAt": "2019-11-15T12:57:00Z",
  "createdBy": "anonymous",
  "modifiedBy": null,
  "ID": 101,
  "name": "Emily Brontë",
  "dateOfBirth": "1818-07-30",
  "dateOfDeath": "1848-12-19",
  "placeOfBirth": "Thornton, Yorkshire",
  "placeOfDeath": "Haworth, Yorkshire",
  "books": [
    {
      "modifiedAt": null,
      "createdAt": "2019-11-15T12:57:00Z",
      "createdBy": "anonymous",
      "modifiedBy": null,
      "ID": 201,
      "title": "Wuthering Heights",
      "descr": "Wuthering Heights, Emily Brontë's only novel, was published in 1847 under the pseudonym \"Ellis Bell\". It was written betw Eyre. After Emily's death, Charlotte edited the manuscript of Wuthering Heights and arranged for the edited version to be published a",
      "stock": 12,
      "price": 11.11,
      "author_ID": 101,
      "currency_code": "GBP"
    }
  ]
}
```

Support for OData

\$top, \$skip

\$top=2

```
localhost:4004/admin/Books?$top=2

{
  "@odata.context": "$metadata#Books",
  "@odata.metadataEtag": "W/\\"0LAgo60ijDldgAu0zIcPQC5ygb8K0bmJ1SFrkxH3NiM=\\"",
  "value": [
    {
      "modifiedAt": null,
      "createdAt": "2019-11-28T15:43:11Z",
      "createdBy": "anonymous",
      "modifiedBy": null,
      "ID": 201,
      "title": "Wuthering Heights",
      "descr": "Wuthering Heights, Emily Brontë's only novel, was published in 1847. The novel revolutionised prose fiction in that the focus is on the characters and their inner lives. Wuthering Heights and Anne Brontë's Agnes Grey were accepted by publisher Thomas Cottle, who died before either was published. Charlotte edited the manuscript of Wuthering Heights and arranged for its publication. The novel is considered by many to be ahead of its time because of Jane's individualism and feminism.",
      "stock": 12,
      "price": 11.11,
      "author_ID": 101,
      "currency_code": "GBP"
    },
    {
      "modifiedAt": null,
      "createdAt": "2019-11-28T15:43:11Z",
      "createdBy": "anonymous",
      "modifiedBy": null,
      "ID": 207,
      "title": "Jane Eyre",
      "descr": "Jane Eyre /æər/ (originally published as Jane Eyre: An Autobiography of Jane Eyre, on 16 October 1847, by Smith, Elder & Co. of London. The first American Bildungsroman, Jane Eyre follows the experiences of its eponymous heroine, Jane Eyre, who is considered by many to be ahead of its time because of Jane's individualism and feminism.",
      "stock": 11,
      "price": 12.34,
      "author_ID": 107,
      "currency_code": "GBP"
    }
  ]
}
```

\$skip=1 & \$top=2

```
localhost:4004/admin/Books?$skip=1&$top=2

{
  "@odata.context": "$metadata#Books",
  "@odata.metadataEtag": "W/\\"0LAgo60ijDldgAu0zIcPQC5ygb8K0bmJ1SFrkxH3NiM=\\"",
  "value": [
    {
      "modifiedAt": null,
      "createdAt": "2019-11-28T15:43:11Z",
      "createdBy": "anonymous",
      "modifiedBy": null,
      "ID": 207,
      "title": "Jane Eyre",
      "descr": "Jane Eyre /æər/ (originally published as Jane Eyre: An Autobiography of Jane Eyre, on 16 October 1847, by Smith, Elder & Co. of London. The first American Bildungsroman, Jane Eyre follows the experiences of its eponymous heroine, Jane Eyre, who is considered by many to be ahead of its time because of Jane's individualism and feminism.",
      "stock": 11,
      "price": 12.34,
      "author_ID": 107,
      "currency_code": "GBP"
    },
    {
      "modifiedAt": null,
      "createdAt": "2019-11-28T15:43:11Z",
      "createdBy": "anonymous",
      "modifiedBy": null,
      "ID": 251,
      "title": "The Raven",
      "descr": "\"The Raven\" is a narrative poem by American writer Edgar Allan Poe. It tells of a talking raven's mysterious appearance and its identification as being a student, is lamenting the loss of his love, Lenore. The poem makes use of the constant repetition of the word \"Nevermore\". The poem makes use of the word \"Nevermore\".",
      "stock": 333,
      "price": 13.13,
      "author_ID": 150,
      "currency_code": "USD"
    }
  ]
}
```

Support for OData \$orderby \$count

```
localhost:4004/admin/Books?$count=true&$orderby=title

{
  "@odata.context": "$metadata#Books",
  "@odata.metadataEtag": "W/\\"0LAgo601jDldgAu0zIcPQC5ygb8K0bmJ1SFrxH3NiM=\\"",
  "@odata.count": 5,
  "value": [
    {
      "modifiedAt": null,
      "createdAt": "2019-11-15T12:57:00Z",
      "createdBy": "anonymous",
      "modifiedBy": null,
      "ID": 271,
      "title": "Catweazle",
      "descr": "Catweazle is a British fantasy television series, starring Geoffrey Bayldon in the title role, and created by Richard Carpenter for David Lane, was shown in 1971. Each series had thirteen episodes, most but not all written by Carpenter, who also published two books based on the series.",
      "stock": 22,
      "price": 15,
      "author_ID": 170,
      "currency_code": "EUR"
    },
    {
      "modifiedAt": null,
      "createdAt": "2019-11-15T12:57:00Z",
      "createdBy": "anonymous",
      "modifiedBy": null,
      "ID": 252,
      "title": "Eleonora",
      "descr": "\"Eleonora\" is a short story by Edgar Allan Poe, first published in 1842 in Philadelphia in the literary annual The Gift. It is one of Poe's most popular stories.",
      "stock": 555,
      "price": 14,
      "author_ID": 150,
      "currency_code": "USD"
    },
    {
      "modifiedAt": null,
      "createdAt": "2019-11-15T12:57:00Z",
      "createdBy": "anonymous",
      "modifiedBy": null,
      "ID": 207,
      "title": "Jane Eyre",
      "descr": "Jane Eyre /Eər/ (originally published as Jane Eyre: An Autobiography) is a novel by English writer Charlotte Brontë, published under the pseudonym Jane Eyre. Primarily a bildungsroman, Jane Eyre follows the experiences of its eponymous heroine, including her growth to adulthood and her love for the mysterious Mr. Rochester. The novel is an intimate, first-person narrative, where actions and events are coloured by a psychological intensity. The book contains elements of social realism and approaches the topics of class, sexuality, religion and feminism.",
      "stock": 11,
      "price": 12.34,
      "author_ID": 107,
      "currency_code": "GBP"
    }
  ]
}
```

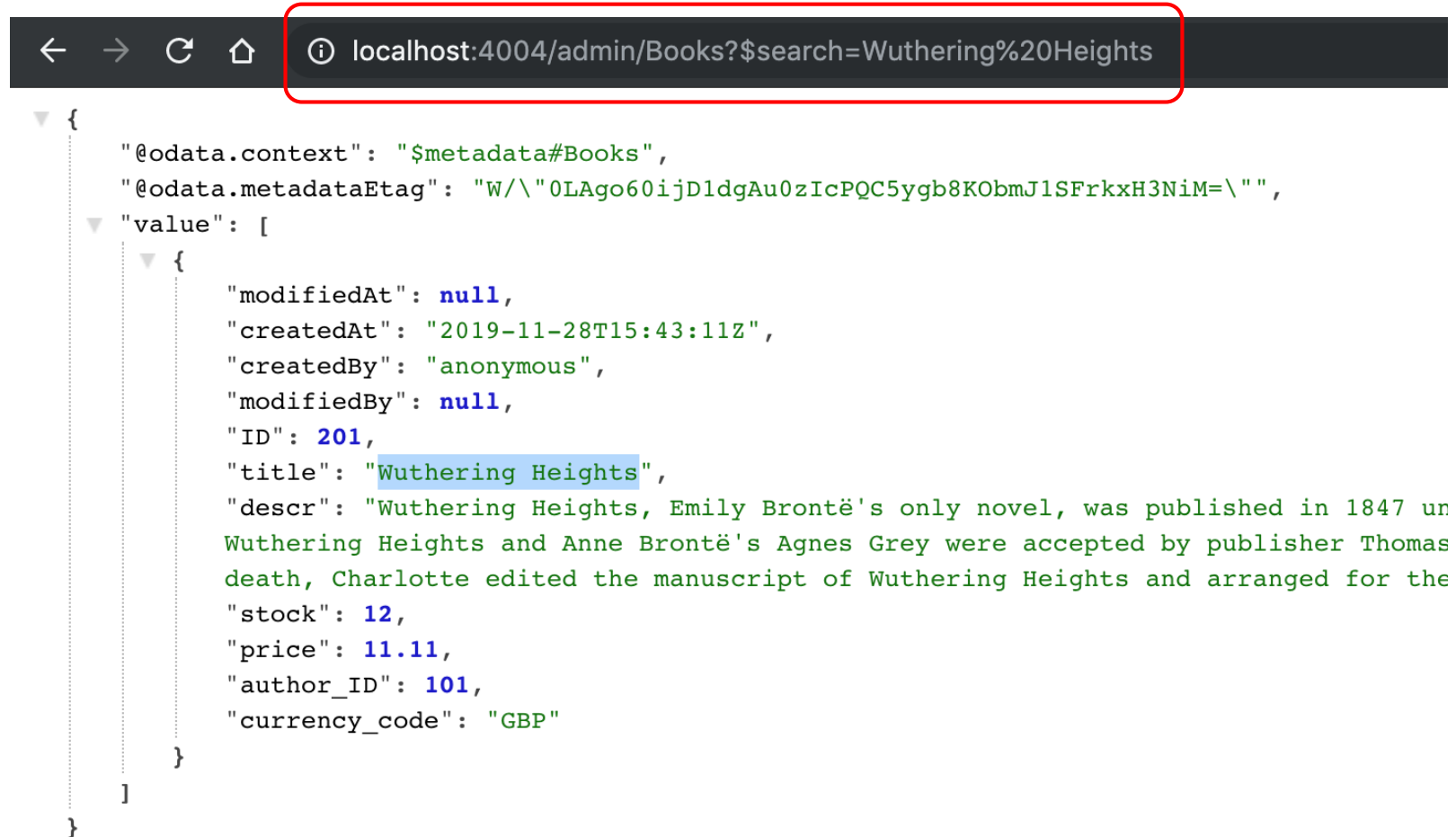
\$count=true

```
localhost:4004/admin/Books?$count=true

{
  "@odata.context": "$metadata#Books",
  "@odata.metadataEtag": "W/\\"0LAgo601jDldgAu0zIcPQC5ygb8K0bmJ1SFrxH3NiM=\\"",
  "@odata.count": 5,
  "value": [
    {
      "modifiedAt": null,
      "createdAt": "2019-11-15T12:57:00Z",
      "createdBy": "anonymous",
      "modifiedBy": null,
      "ID": 201,
      "title": "Wuthering Heights",
      "descr": "Wuthering Heights, Emily Brontë's only novel, was published in 1847 under the pseudonym Emily Brontë. After Emily's death, Charlotte edited the manuscript of Wuthering Heights and arranged for its publication.",
      "stock": 12,
      "price": 11.11,
      "author_ID": 101,
      "currency_code": "GBP"
    },
    {
      "modifiedAt": null,
      "createdAt": "2019-11-15T12:57:00Z",
      "createdBy": "anonymous",
      "modifiedBy": null,
      "ID": 207,
      "title": "Jane Eyre",
      "descr": "Jane Eyre /Eər/ (originally published as Jane Eyre: An Autobiography) is a novel by English writer Charlotte Brontë, published under the pseudonym Jane Eyre. Primarily a bildungsroman, Jane Eyre follows the experiences of its eponymous heroine, including her growth to adulthood and her love for the mysterious Mr. Rochester. The novel is an intimate, first-person narrative, where actions and events are coloured by a psychological intensity. The book contains elements of social realism and approaches the topics of class, sexuality, religion and feminism.",
      "stock": 11,
      "price": 12.34,
      "author_ID": 107,
      "currency_code": "GBP"
    },
    {
      "modifiedAt": null,
      "createdAt": "2019-11-15T12:57:00Z",
      "createdBy": "anonymous",
      "modifiedBy": null,
      "ID": 207,
      "title": "Jane Eyre",
      "descr": "Jane Eyre /Eər/ (originally published as Jane Eyre: An Autobiography) is a novel by English writer Charlotte Brontë, published under the pseudonym Jane Eyre. Primarily a bildungsroman, Jane Eyre follows the experiences of its eponymous heroine, including her growth to adulthood and her love for the mysterious Mr. Rochester. The novel is an intimate, first-person narrative, where actions and events are coloured by a psychological intensity. The book contains elements of social realism and approaches the topics of class, sexuality, religion and feminism.",
      "stock": 11,
      "price": 12.34,
      "author_ID": 107,
      "currency_code": "GBP"
    }
  ]
}
```

Support for OData \$search

\$search=Wuthering Heights



The screenshot shows a web browser window with the address bar displaying the URL `localhost:4004/admin/Books?$search=Wuthering%20Heights`. The browser's address bar is highlighted with a red rectangle. Below the address bar, the JSON response of the OData query is displayed. The response is a JSON object with the following structure:

```
{
  "@odata.context": "$metadata#Books",
  "@odata.metadataEtag": "W/\\"0LAg060ijD1dgAu0zIcPQC5ygb8KObmJlSFrxH3NiM=\\"",
  "value": [
    {
      "modifiedAt": null,
      "createdAt": "2019-11-28T15:43:11Z",
      "createdBy": "anonymous",
      "modifiedBy": null,
      "ID": 201,
      "title": "Wuthering Heights",
      "descr": "Wuthering Heights, Emily Brontë's only novel, was published in 1847 un Wuthering Heights and Anne Brontë's Agnes Grey were accepted by publisher Thomas death, Charlotte edited the manuscript of Wuthering Heights and arranged for the",
      "stock": 12,
      "price": 11.11,
      "author_ID": 101,
      "currency_code": "GBP"
    }
  ]
}
```

The JSON response is displayed with syntax highlighting. The `title` field is highlighted in blue, and the `descr` field is highlighted in green. The `value` array contains one object representing the book "Wuthering Heights".

Support for OData

CRUD: Create

POST http://localhost:4004/admin/Authors

Params Authorization Headers (9) Body Pre-request Script Tests

none form-data x-www-form-urlencoded raw binary GraphQL BETA JSON (application/json)

```
1 {
2   "ID": 105,
3   "name": "J.K. Rowling",
4   "dateOfBirth": null,
5   "dateOfDeath": null,
6   "placeOfBirth": "",
7   "placeOfDeath": ""
8 }
9
10
```

Body Cookies Headers (7) Test Results

Pretty Raw Preview JSON

```
1 {
2   "@odata.context": "$metadata#Authors/$entity",
3   "@odata.metadataEtag": "W/\\"0LAg060ijD1dgAu0zIcPQC5ygb8K0bmJ1SFrkxH3NiM=\\"",
4   "modifiedAt": null,
5   "createdAt": "2019-11-29T14:46:38.340Z",
6   "createdBy": "anonymous",
7   "modifiedBy": null,
8   "ID": 105,
9   "name": "J.K. Rowling",
10  "dateOfBirth": null,
11  "dateOfDeath": null,
12  "placeOfBirth": "",
13  "placeOfDeath": ""
14 }
```

localhost:4004/admin/Authors/105

```
{
  "@odata.context": "$metadata#Authors/$entity",
  "@odata.metadataEtag": "W/\\"0LAg060ijD1dgAu0zIcPQC5ygb8K0bmJ1SFrkxH3NiM=\\"",
  "modifiedAt": null,
  "createdAt": "2019-11-29T14:46:38Z",
  "createdBy": "anonymous",
  "modifiedBy": null,
  "ID": 105,
  "name": "J.K. Rowling",
  "dateOfBirth": null,
  "dateOfDeath": null,
  "placeOfBirth": "",
  "placeOfDeath": ""
}
```

Status: 201 Created

Status: 201 Created

Support for OData

CRUD: Update

PATCH http://localhost:4004/admin/Authors/105

Params Authorization Headers (9) Body Pre-request Script Tests

none form-data x-www-form-urlencoded raw binary GraphQL BETA JSON (application/json)

```
1 {
2   "placeOfBirth": "United Kingdom"
3 }
4
5
```

Body Cookies Headers (6) Test Results Status: 200 OK

Pretty Raw Preview JSON

```
1 {
2   "@odata.context": "$metadata#Authors/$entity",
3   "@odata.metadataEtag": "W/\\"0LAGo60ijD1dgAu0zIcPQC5ygb8K0bmJ1SFrkxH3NiM=\\"",
4   "modifiedAt": "2019-11-29T14:49:24.081Z",
5   "createdAt": "2019-11-29T14:46:38Z",
6   "createdBy": "anonymous",
7   "modifiedBy": "anonymous",
8   "ID": 105,
9   "name": "J.K. Rowling",
10  "dateOfBirth": null,
11  "dateOfDeath": null,
12  "placeOfBirth": "United Kingdom",
13  "placeOfDeath": ""
14 }
```

localhost:4004/admin/Authors/105

```
{
  "@odata.context": "$metadata#Authors/$entity",
  "@odata.metadataEtag": "W/\\"0LAGo60ijD1dgAu0zIcPQC5ygb8K0bmJ1SFrkxH3NiM=\\"",
  "modifiedAt": "2019-11-29T14:49:24Z",
  "createdAt": "2019-11-29T14:46:38Z",
  "createdBy": "anonymous",
  "modifiedBy": "anonymous",
  "ID": 105,
  "name": "J.K. Rowling",
  "dateOfBirth": null,
  "dateOfDeath": null,
  "placeOfBirth": "United Kingdom",
  "placeOfDeath": ""
}
```

Support for OData

CRUD: Delete

DELETE http://localhost:4004/admin/Authors/105

Params Authorization Headers (9) Body Pre-request Script Tests Cookies Code

none form-data x-www-form-urlencoded raw binary GraphQL BETA JSON (application/json)

1 2 3

Body Cookies Headers (4) Test Results

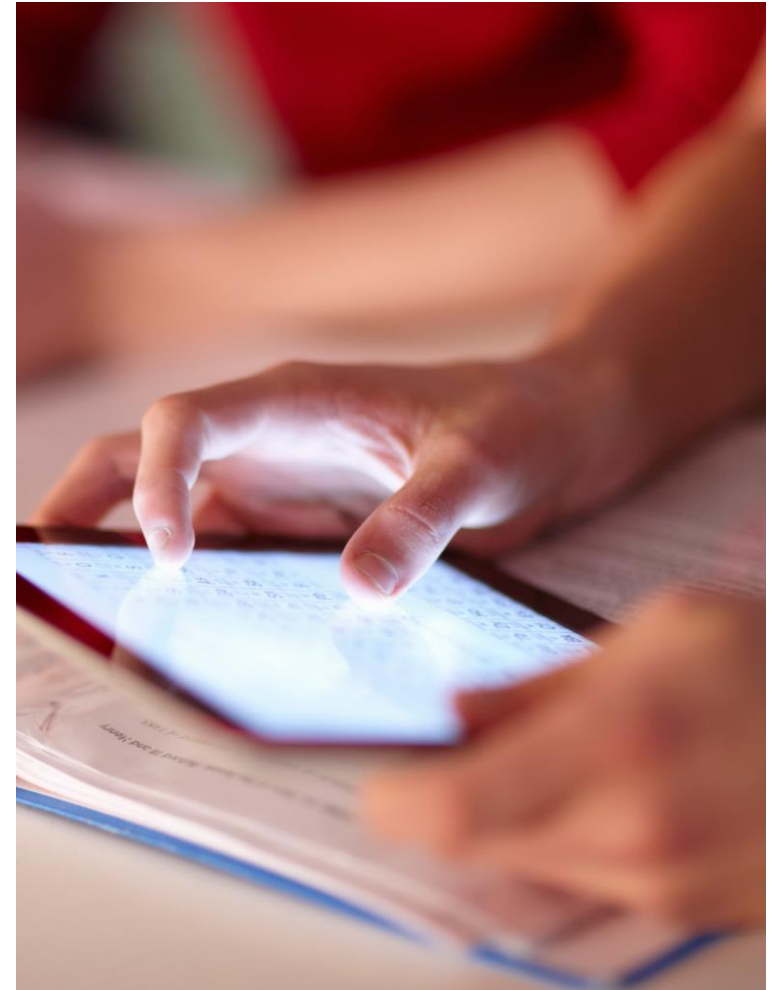
Status: 204 No Content Time: 7 ms

localhost:4004/admin/Authors

```
{
  "@odata.context": "$metadata#Authors",
  "@odata.metadataEtag": "W/\\"0LAgo60ijDldgAu0zIcPQC5ygb8KObmJ1SFrkxH3NiM=\\"",
  "value": [
    {
      "modifiedAt": null,
      "createdAt": "2019-11-28T15:43:11Z",
      "createdBy": "anonymous",
      "modifiedBy": null,
      "ID": 101,
      "name": "Emily Brontë",
      "dateOfBirth": "1818-07-30",
      "dateOfDeath": "1848-12-19",
      "placeOfBirth": "Thornton, Yorkshire",
      "placeOfDeath": "Haworth, Yorkshire"
    },
    {
      "modifiedAt": null,
      "createdAt": "2019-11-28T15:43:11Z",
      "createdBy": "anonymous",
      "modifiedBy": null,
      "ID": 107,
      "name": "Charlotte Brontë",
      "dateOfBirth": "1818-04-21",
      "dateOfDeath": "1855-03-31",
      "placeOfBirth": "Thornton, Yorkshire",
      "placeOfDeath": "Haworth, Yorkshire"
    },
    {
      "modifiedAt": null,
      "createdAt": "2019-11-28T15:43:11Z",
      "createdBy": "anonymous",
      "modifiedBy": null,
      "ID": 150,
      "name": "Edgar Allen Poe",
      "dateOfBirth": "1809-01-19",
      "dateOfDeath": "1849-10-07",
      "placeOfBirth": "Boston, Massachusetts",
      "placeOfDeath": "Baltimore, Maryland"
    },
    {
      "modifiedAt": null,
      "createdAt": "2019-11-28T15:43:11Z",
      "createdBy": "anonymous",
      "modifiedBy": null,
      "ID": 150,
      "name": "Edgar Allen Poe",
      "dateOfBirth": "1809-01-19",
      "dateOfDeath": "1849-10-07",
      "placeOfBirth": "Boston, Massachusetts",
      "placeOfDeath": "Baltimore, Maryland"
    }
  ]
}
```

What you've learned in this unit

- OData protocol
- Accessing entities and querying data in OData
- Capabilities such as:
 - CRUD
 - Filter
 - Expand
 - Count
 - Skip
 - Top
 - OrderBy



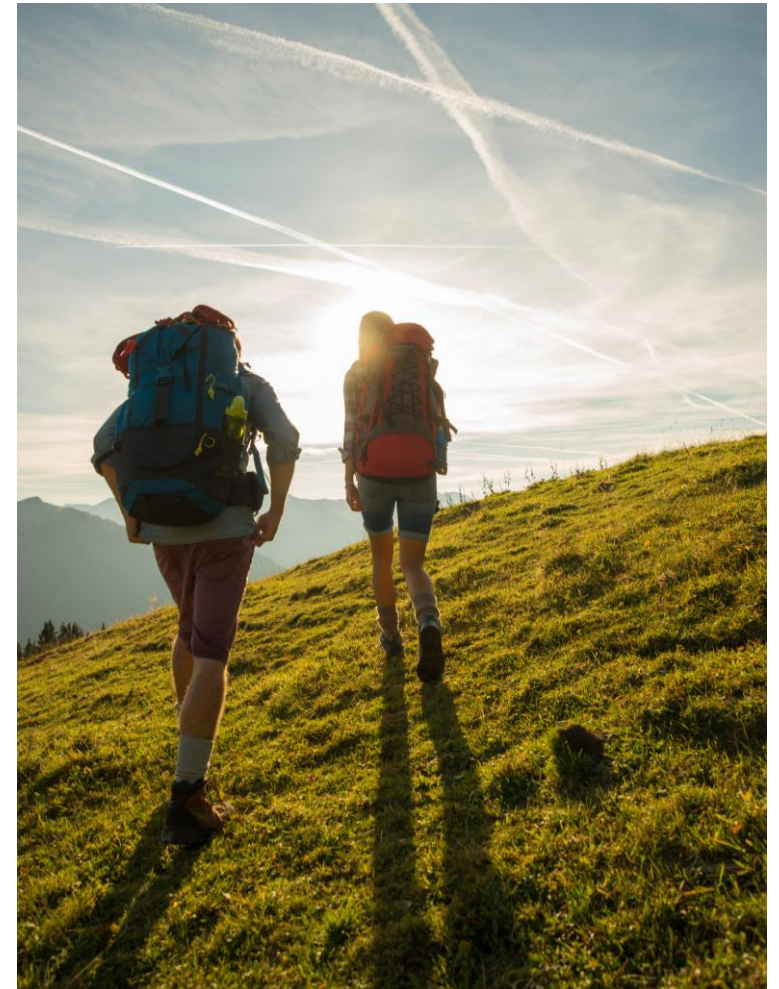
Support for OData

Further reading



Additional Material

- [Official documentation](#)
- [Blogs SAP Cloud Application Programming Model](#)
- [TechEd Replay](#)
- [SAP Fiori Elements: Understanding OData & Annotations](#)
- [SAP Fiori Elements: Turning OData into Applications](#)



Thank you.

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