



Week 2: OData Back-End Connectivity

Unit 1: OData Back-End Connectivity Overview

OData Back-End Connectivity Overview

OData is everywhere... simplifying access to SAP data

SAP uses OData to bring data from back-end systems to engaging user interfaces for smartphones, tablets, and desktop.

OData is used in:

- SAP Fiori
- SAPUI5
- SAP S/4HANA
- SAP Mobile Platform 3.0
- SAP Gateway
- SAP Cloud Platform SDK for iOS
- ...



OData Back-End Connectivity Overview

SAP Gateway – Implementation of OData

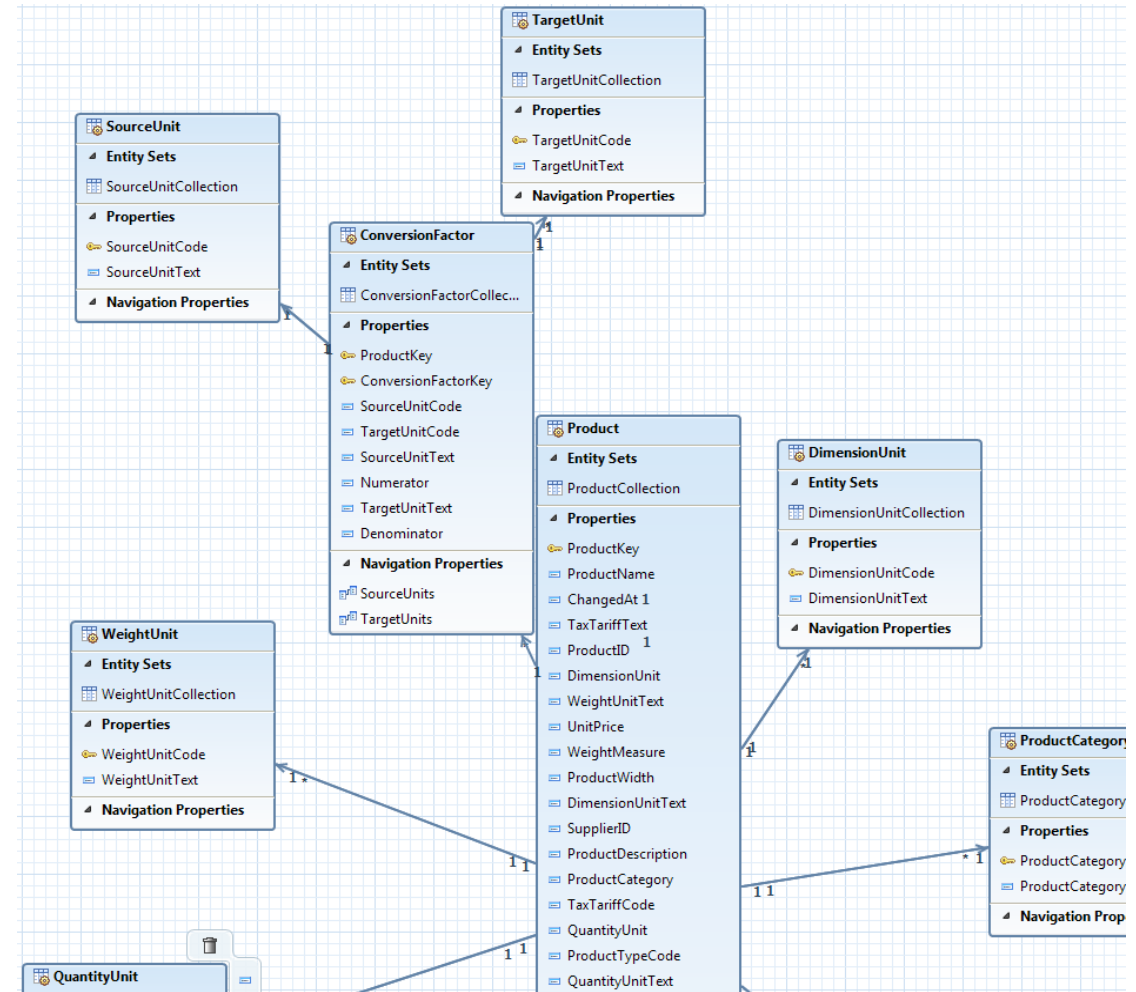
OData

- An industry-standard protocol for creating and consuming APIs
- Used by SAP Gateway
- Easy access to information from different applications provides a predictable interface for querying a variety of data sources

OData services consumption

- By the majority of current Internet and mobile technologies
- Any channel processing XML/JSON received over an HTTP(s) connection

For more information, see www.odata.org

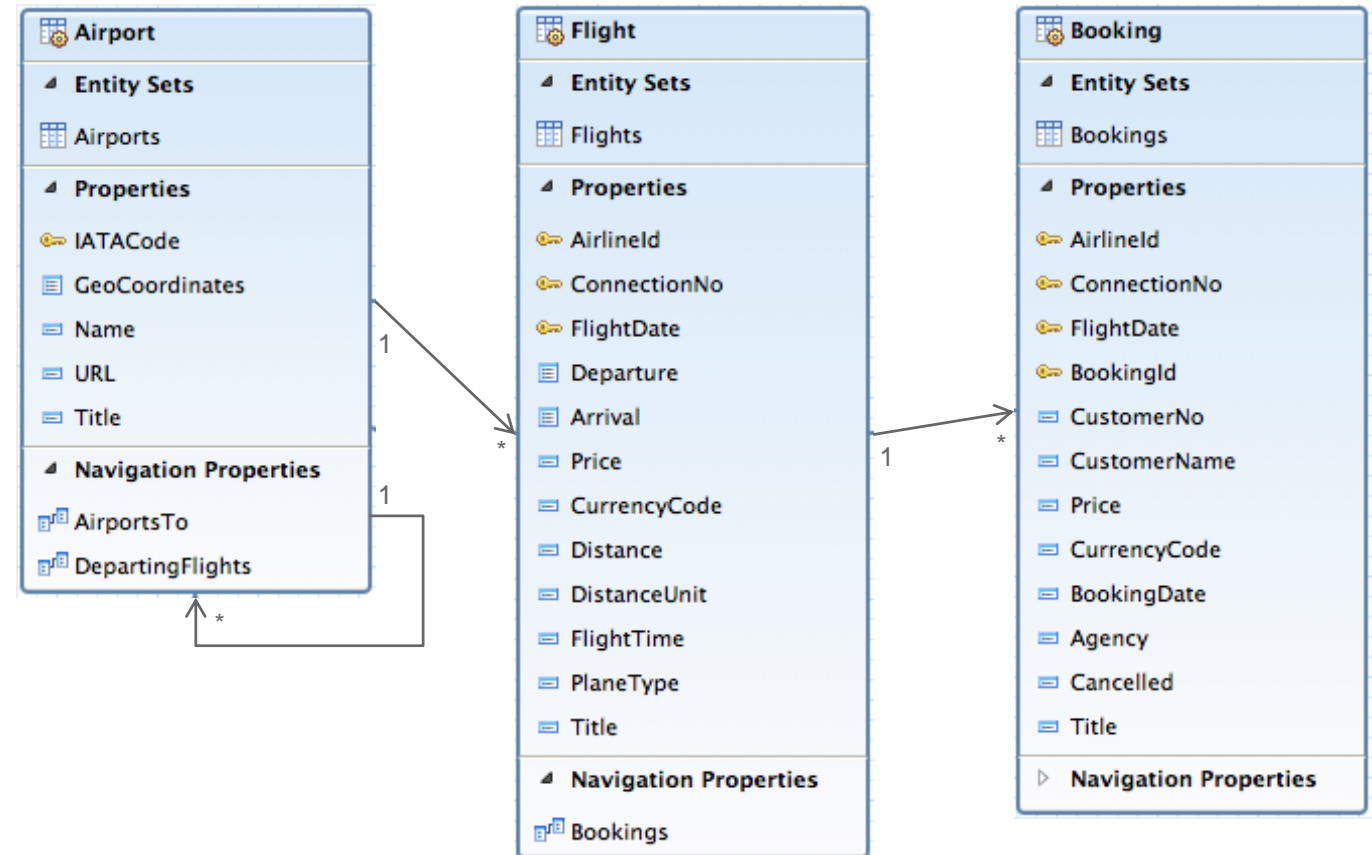


OData Back-End Connectivity Overview

Entity Data Model – Overview

Entity Data Model (EDM)

- Describes the data structures and their interrelationship
- Consists of entity types, key fields, associations and navigation properties



OData Back-End Connectivity Overview

OData service document – The starting point for consumption

OData Service's Base URL

- OData service's base URL acts as the starting point for consumption
- When this URL is requested, the Gateway service responds with the service document, which is the highest-level description of the resources exposed by that OData service.



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

```
<?xml version="1.0" encoding="utf-8"?>
<service xmlns:atom="http://www.w3.org/2005/Atom" xmlns:app="http://www.w3.org/2007/app" xmlns="http://www.w3.org/2007/app"
xml:base="http://services.odata.org/(S(gy0p3orx4temb2sv5drckqo2))/V2/OData/OData.svc/">
  <workspace>
    <atom:title>Default</atom:title>
    <collection href="Products">
      <atom:title>Products</atom:title>
    </collection>
    <collection href="Categories">
      <atom:title>Categories</atom:title>
    </collection>
    <collection href="Suppliers">
      <atom:title>Suppliers</atom:title>
    </collection>
  </workspace>
</service>
```

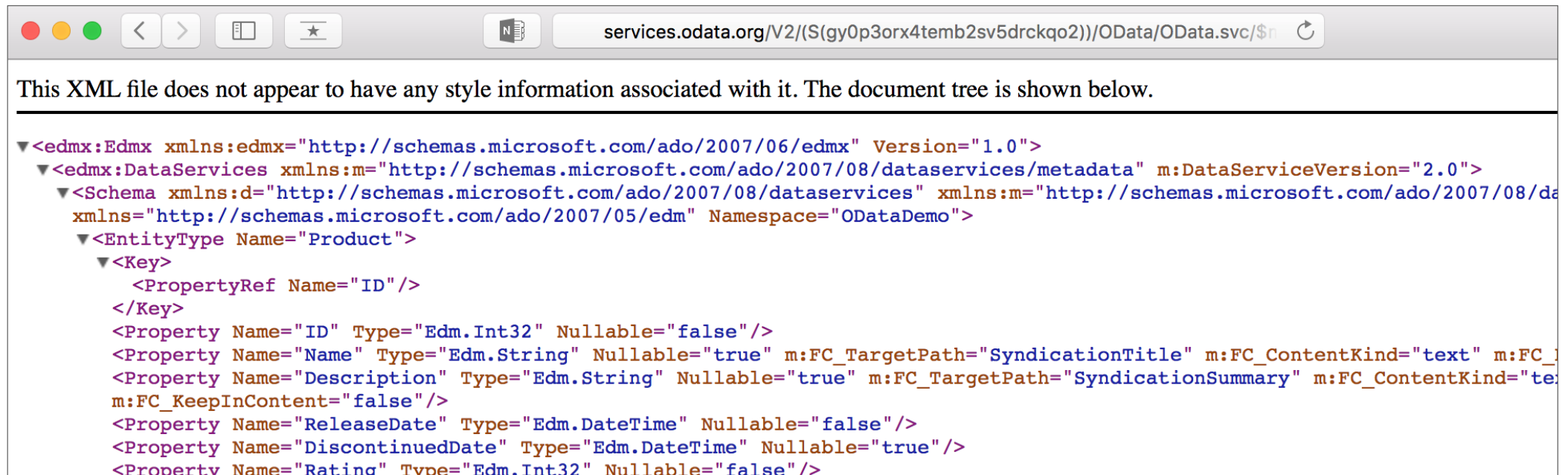

OData Back-End Connectivity Overview

What is the Entity Data Model behind an OData service?

To discover the Entity Data Model behind an OData service, you can add the suffix **\$metadata** to the base URL. This will return an XML representation of the Entity Data Model.

e.g. issuing [http://services.odata.org/V2/OData/OData.svc/\\$metadata](http://services.odata.org/V2/OData/OData.svc/$metadata)

will return an <edmx> document something like this:



```
<?xml version="1.0" encoding="utf-8" standalone="yes"?>
<edmx:Edmx xmlns:edmx="http://schemas.microsoft.com/ado/2007/06/edmx" Version="1.0">
  <edmx:DataServices xmlns:m="http://schemas.microsoft.com/ado/2007/08/dataservices/metadata" m:DataServiceVersion="2.0">
    <Schema xmlns:d="http://schemas.microsoft.com/ado/2007/08/dataservices" xmlns:m="http://schemas.microsoft.com/ado/2007/08/dataservices/metadata" xmlns="http://schemas.microsoft.com/ado/2007/05/edm" Namespace="ODataDemo">
      <EntityType Name="Product">
        <Key>
          <PropertyRef Name="ID"/>
        </Key>
        <Property Name="ID" Type="Edm.Int32" Nullable="false"/>
        <Property Name="Name" Type="Edm.String" Nullable="true" m:FC_TargetPath="SyndicationTitle" m:FC_ContentKind="text" m:FC_KeepInContent="false"/>
        <Property Name="Description" Type="Edm.String" Nullable="true" m:FC_TargetPath="SyndicationSummary" m:FC_ContentKind="text" m:FC_KeepInContent="false"/>
        <Property Name="ReleaseDate" Type="Edm.DateTime" Nullable="false"/>
        <Property Name="DiscontinuedDate" Type="Edm.DateTime" Nullable="true"/>
        <Property Name="Rating" Type="Edm.Int32" Nullable="false"/>
      </EntityType>
    </Schema>
  </edmx:DataServices>
</edmx:Edmx>
```

OData Back-End Connectivity Overview

GET.../Suppliers

Read an Entity Set

<http://services.odata.org/V2/OData/OData.svc/Suppliers>

```
{
  "d": [
    {
      "__metadata": {
        "uri": "http://services.odata.org/V2/OData/OData.svc/Suppliers(0)",
        "etag": "W/\"0\"",
        "type": "ODataDemo.Supplier"
      },
      "ID": 0,
      "Name": "Exotic Liquids",
      "Address": {
        "__metadata": {
          "type": "ODataDemo.Address"
        },
        "Street": "NE 228th",
        "City": "Sammamish",
        "State": "WA",
        "ZipCode": "98074",
        "Country": "USA"
      },
      "Concurrency": 0,
      "Products": {
        "__deferred": {
          "uri": "http://services.odata.org/V2/OData/OData.svc/Suppliers(0)/Products"
        }
      }
    },
    {
      "__metadata": {
        "uri": "http://services.odata.org/V2/OData/OData.svc/Suppliers(1)",
        "etag": "W/\"0\"",
        "type": "ODataDemo.Supplier"
      }
    }
  ]
}
```

OData Back-End Connectivity Overview

GET.../Suppliers(0)

Read Single Entity

```
{
  "d": {
    "__metadata": {
      "uri": "http://services.odata.org/V2/OData/OData.svc/Suppliers(0)",
      "etag": "W/\"0\"",
      "type": "ODataDemo.Supplier"
    },
    "ID": 0,
    "Name": "Exotic Liquids",
    "Address": {
      "__metadata": {
        "type": "ODataDemo.Address"
      },
      "Street": "NE 228th",
      "City": "Sammamish",
      "State": "WA",
      "ZipCode": "98074",
      "Country": "USA"
    },
    "Concurrency": 0,
    "Products": {
      "__deferred": {
        "uri": "http://services.odata.org/V2/OData/OData.svc/Suppliers(0)/Products"
      }
    }
  }
}
```


OData Back-End Connectivity Overview

GET.../Suppliers(0)/Products

Navigation Properties

```
{
  "d": [
    {
      "__metadata": {
        "uri": "http://services.odata.org/V2/OData/OData.svc/Products(1)",
        "type": "ODataDemo.Product"
      },
      "ID": 1,
      "Name": "Milk",
      "Description": "Low fat milk",
      "ReleaseDate": "/Date(812505600000)/",
      "DiscontinuedDate": null,
      "Rating": 3,
      "Price": "3.5",
      "Category": {
        "__deferred": {
          "uri": "http://services.odata.org/V2/OData/OData.svc/Products(1)/Category"
        }
      },
      "Supplier": {
        "__deferred": {
          "uri": "http://services.odata.org/V2/OData/OData.svc/Products(1)/Supplier"
        }
      }
    },
    {
      "__metadata": {
        "uri": "http://services.odata.org/V2/OData/OData.svc/Products(2)",
        "type": "ODataDemo.Product"
      },
      "ID": 2
    }
  ]
}
```

OData Back-End Connectivity Overview

“ODBC” for the Web – Simple query language

List of (most important) query options:

Operation	Query Option
Filtering	\$filter
Projecting	\$select
Sorting	\$orderby
Paging	\$top and \$skip
Inlining	\$expand

Reference: <http://www.odata.org/developers/protocols/uri-conventions#QueryStringOptions>

OData Back-End Connectivity Overview

OData query options: \$select

Request GET .../Suppliers?\$select=Name

Result

```
{
  "d": [
    {
      "__metadata": {
        "uri": "http://services.odata.org/V2/OData/OData.svc/Suppliers(0)",
        "etag": "W/\"0\"",
        "type": "ODataDemo.Supplier"
      },
      "Name": "Exotic Liquids"
    },
    {
      "__metadata": {
        "uri": "http://services.odata.org/V2/OData/OData.svc/Suppliers(1)",
        "etag": "W/\"0\"",
        "type": "ODataDemo.Supplier"
      },
      "Name": "Tokyo Traders"
    }
  ]
}
```

OData Back-End Connectivity Overview

OData query options: \$filter

Request

GET .../Suppliers?\$filter=startswith(Name,'E')

Result

```
{
  "d": [
    {
      "__metadata": {
        "uri": "http://services.odata.org/V2/OData/OData.svc/Suppliers(0)",
        "etag": "W/\"0\"",
        "type": "ODataDemo.Supplier"
      },
      "ID": 0,
      "Name": "Exotic Liquids",
      "Address": {
        "__metadata": {
          "type": "ODataDemo.Address"
        },
        "Street": "NE 228th",
        "City": "Sammamish",
        "State": "WA",
        "ZipCode": "98074",
        "Country": "USA"
      },
      "Concurrency": 0,
      "Products": {
        "__deferred": {
          "uri": "http://services.odata.org/V2/OData/OData.svc/Suppliers(0)/Products"
        }
      }
    }
  ]
}
```

OData Back-End Connectivity Overview

OData query options: \$top

Request

GET .../Suppliers?\$top=1

Result

```
{
  "d": [
    {
      "__metadata": {
        "uri": "http://services.odata.org/V2/OData/OData.svc/Suppliers(0)",
        "etag": "W/\"0\"",
        "type": "ODataDemo.Supplier"
      },
      "ID": 0,
      "Name": "Exotic Liquids",
      "Address": {
        "__metadata": {
          "type": "ODataDemo.Address"
        },
        "Street": "NE 228th",
        "City": "Sammamish",
        "State": "WA",
        "ZipCode": "98074",
        "Country": "USA"
      },
      "Concurrency": 0,
      "Products": {
        "__deferred": {
          "uri": "http://services.odata.org/V2/OData/OData.svc/Suppliers(0)/Products"
        }
      }
    }
  ]
}
```

OData Back-End Connectivity Overview

OData query options: \$skip

Request

GET .../Suppliers?\$top=1&\$skip=1

Result

```
{
  "d": [
    {
      "__metadata": {
        "uri": "http://services.odata.org/V2/OData/OData.svc/Suppliers(1)",
        "etag": "W/\"0\"",
        "type": "ODataDemo.Supplier"
      },
      "ID": 1,
      "Name": "Tokyo Traders",
      "Address": {
        "__metadata": {
          "type": "ODataDemo.Address"
        },
        "Street": "NE 40th",
        "City": "Redmond",
        "State": "WA",
        "ZipCode": "98052",
        "Country": "USA"
      },
      "Concurrency": 0,
      "Products": {
        "__deferred": {
          "uri": "http://services.odata.org/V2/OData/OData.svc/Suppliers(1)/Products"
        }
      }
    }
  ]
}
```


OData Back-End Connectivity Overview

OData query options: \$inlinecount

Request

GET .../Suppliers?\$top=1&\$inlinecount=allpages

Result

```
{
  "d": {
    "results": [
      {
        "__metadata": {
          "uri": "http://services.odata.org/V2/OData/OData.svc/Suppliers(0)",
          "etag": "W/\"0\"",
          "type": "ODataDemo.Supplier"
        },
        "ID": 0,
        "Name": "Exotic Liquids",
        "Address": {
          "__metadata": {
            "type": "ODataDemo.Address"
          },
          "Street": "NE 228th",
          "City": "Sammamish",
          "State": "WA",
          "ZipCode": "98074",
          "Country": "USA"
        },
        "Concurrency": 0,
        "Products": {
          "__deferred": {
            "uri": "http://services.odata.org/V2/OData/OData.svc/Suppliers(0)/Products"
          }
        }
      }
    ]
  },
  "__count": "2"
}
```

OData Back-End Connectivity Overview

\$expand

Use cases for navigation properties

- e.g. get all products of all suppliers
- Without \$expand – 2 calls
 - First call /Suppliers(0)
 - Second call /Suppliers(0)/Products
- With \$expand – 1 call
 - /Suppliers(0)?\$expand=Products

```
{
  "d": [
    {
      "__metadata": {
        "uri": "http://services.odata.org/V2/OData/OData.svc/Suppliers(0)",
        "etag": "W/\"0\"",
        "type": "ODataDemo.Supplier"
      },
      "ID": 0,
      "Name": "Exotic Liquids",
      "Address": {
        "__metadata": {
          "type": "ODataDemo.Address"
        },
        "Street": "NE 228th",
        "City": "Sammamish",
        "State": "WA",
        "ZipCode": "98074",
        "Country": "USA"
      },
      "Concurrency": 0,
      "Products": [
        {
          "__metadata": {
            "uri": "http://services.odata.org/V2/OData/OData.svc/Products(1)",
            "type": "ODataDemo.Product"
          },
          "ID": 1,
          "Name": "Milk",
          "Description": "Low fat milk",
          "ReleaseDate": "/Date(812505600000)/",
          "DiscontinuedDate": null,
          "Rating": 3,
          "Price": "3.5",
          "Category": {
            "__deferred": {
              "uri": "http://services.odata.org/V2/OData/OData.svc/Products(1)/Category"
            }
          }
        }
      ]
    }
  ]
}
```

OData Back-End Connectivity Overview

OData support in the SAP Cloud Platform SDK for iOS

CRUD and Query API to support OData language

- Shared between online and offline OData frameworks

Metadata parsing and dynamic API

Generation of proxy classes / client classes based on metadata

- Strongly typed access to entities and properties
- Fluent API for queries
- Code completion in Xcode
- Fast adoption to changed metadata

Proxy classes can be generated via

- Assistant
- Command-line tool

Thank you.

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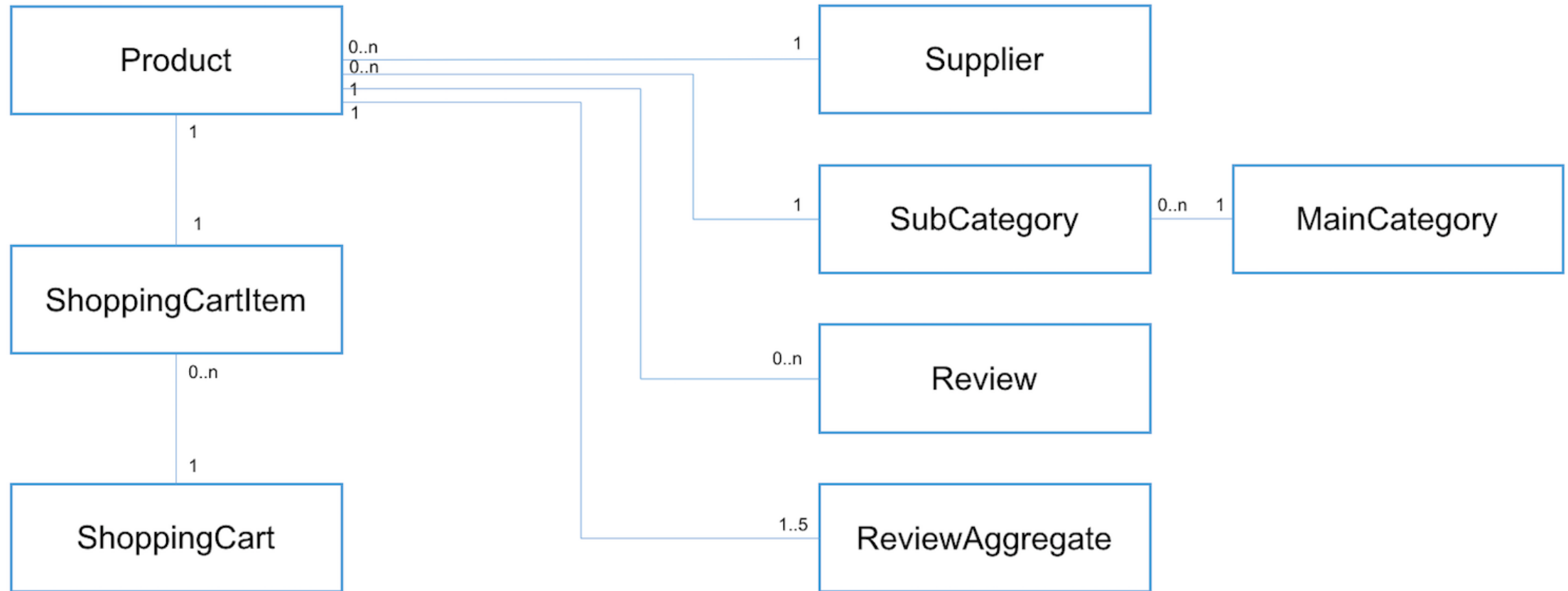
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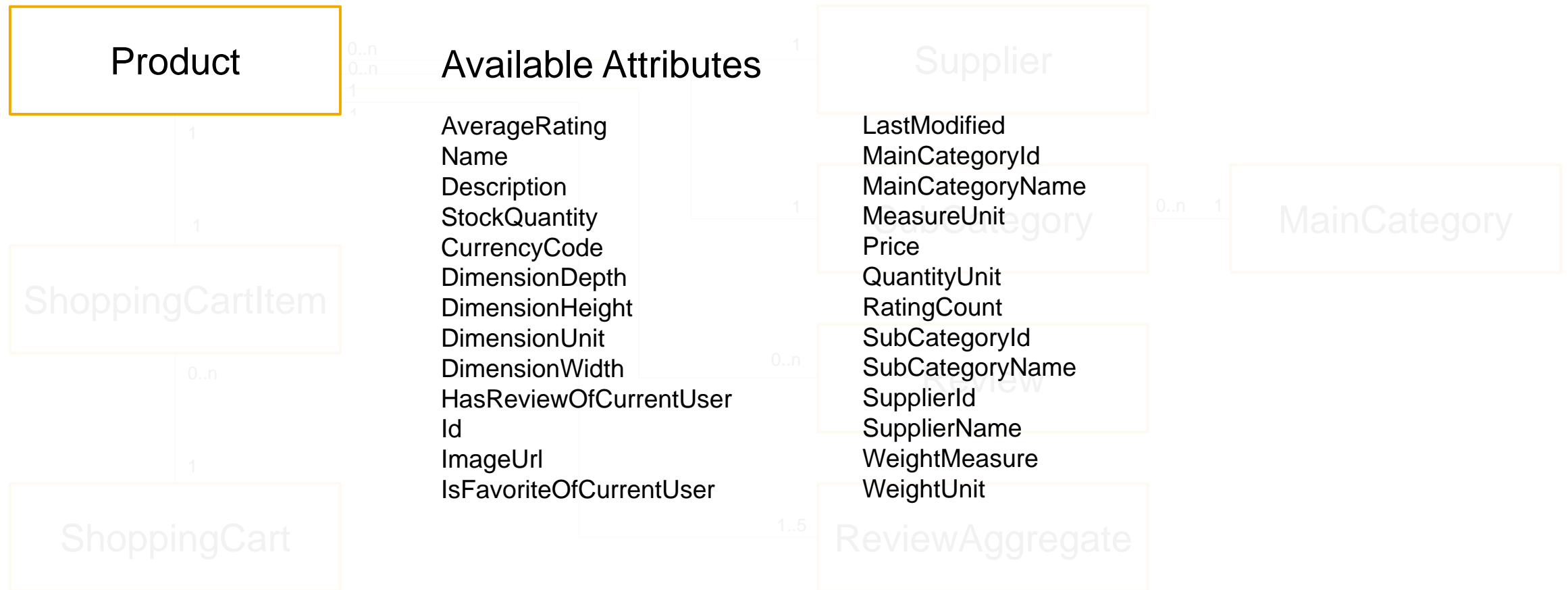
Unit 2: Introduction to the Shopping Cart Data Model

Introduction to the Shopping Cart Data Model



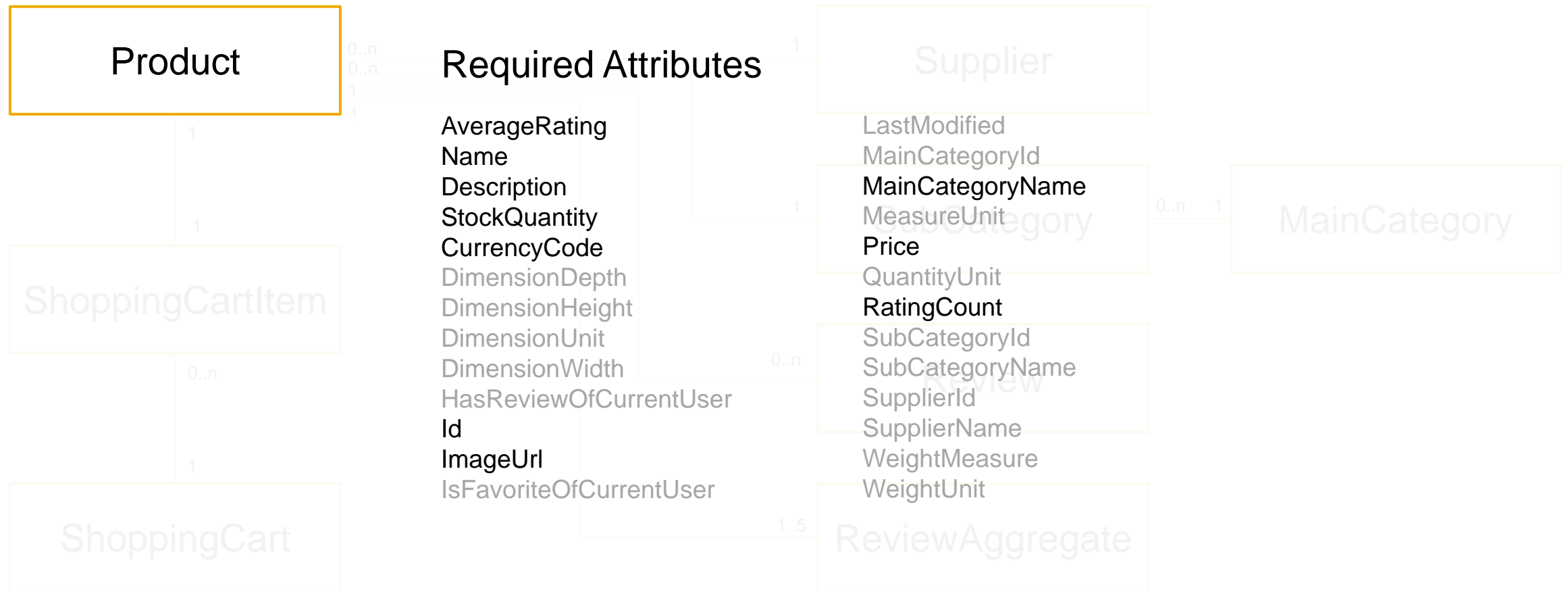
Introduction to the Shopping Cart Data Model

Model EPM Shop – Product



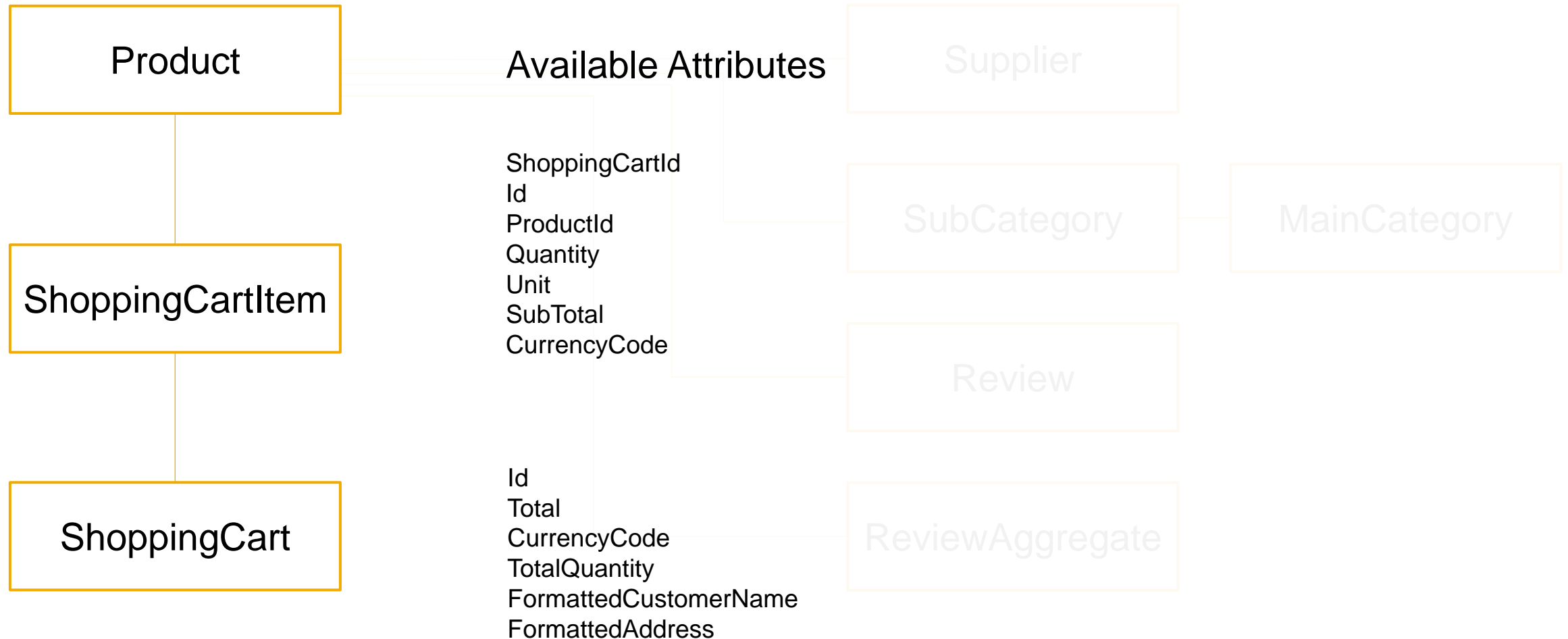
Introduction to the Shopping Cart Data Model

Model EPM Shop – Product



Introduction to the Shopping Cart Data Model

Model EPM Shop – ShoppingCart and ShoppingCartItem



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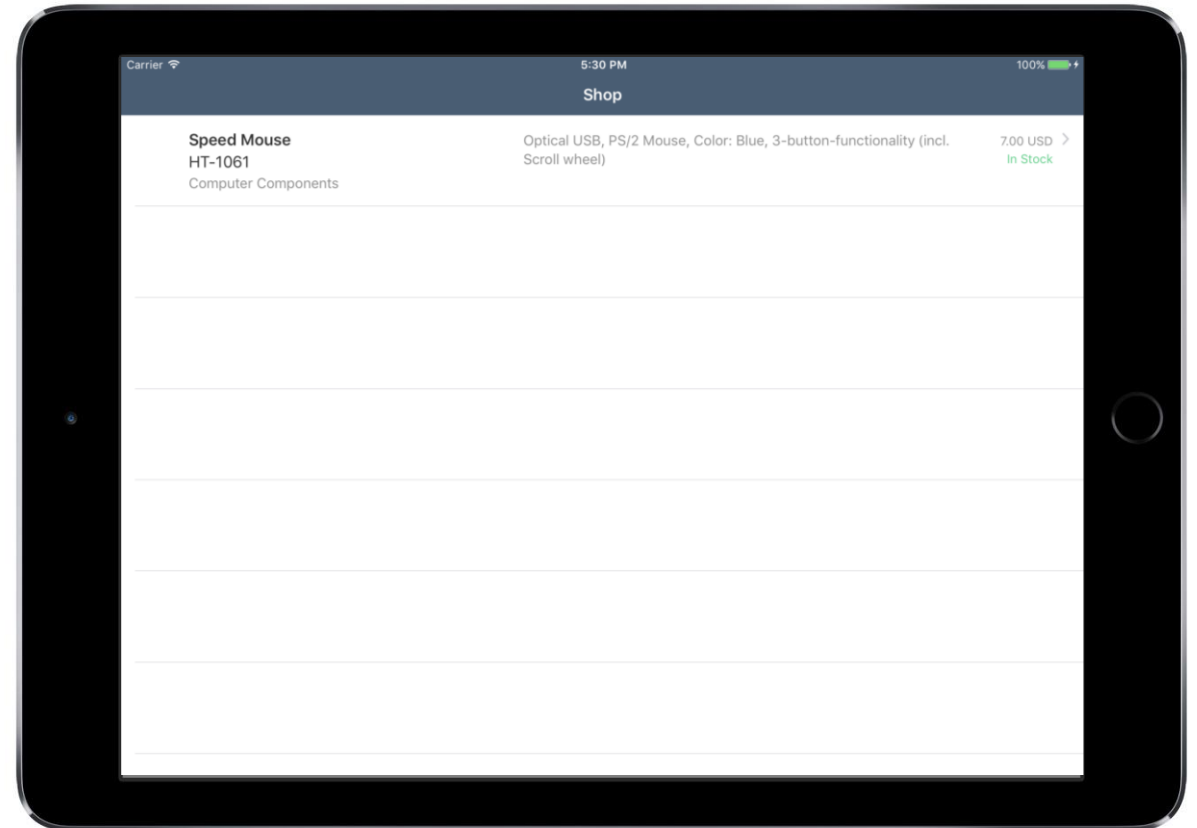
Week 2: OData Back-End Connectivity

Unit 3: Displaying a Sample Product in the Product List

Displaying a Sample Product in the Product List

Goal:

- Add an object cell to display a sample product in the product list
- Use the SAP Fiori Mentor app to explore the capabilities of the object cell control and get the code for the desired design



Displaying a Sample Product in the Product List

Hands-on



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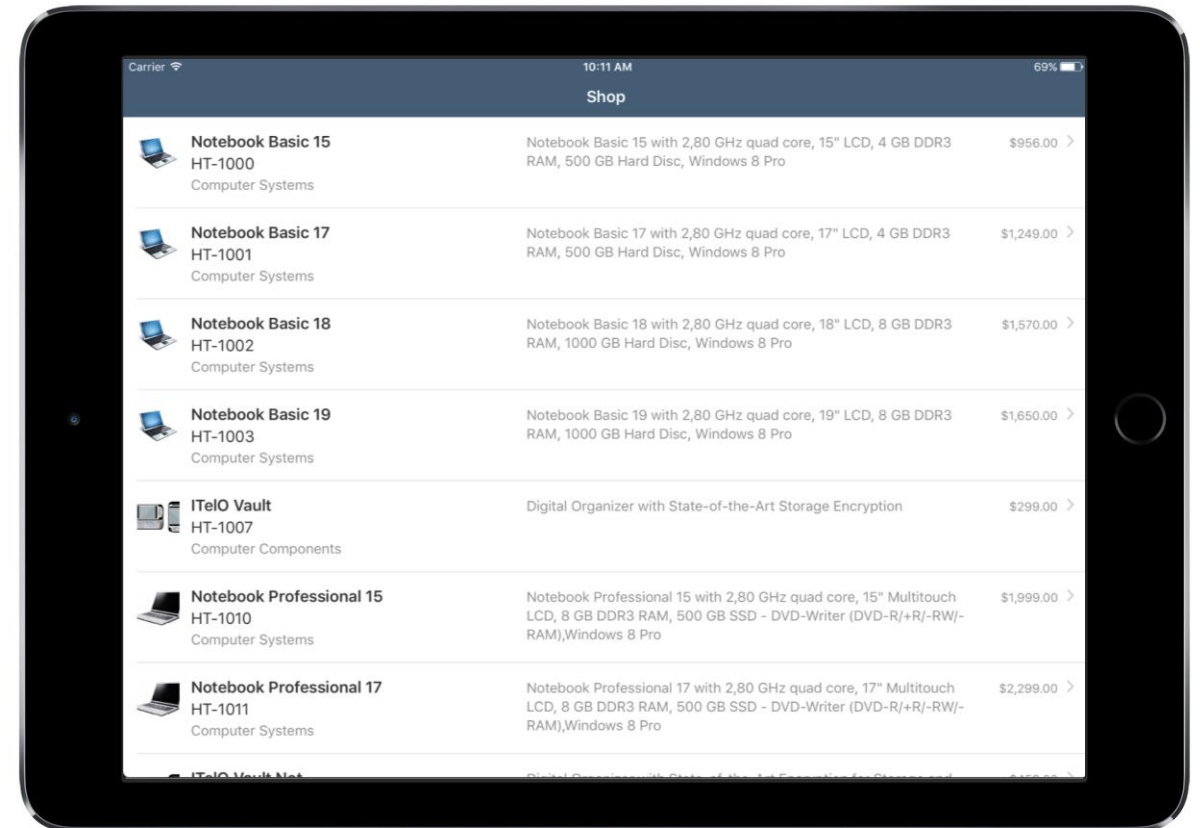
Week 2: OData Back-End Connectivity

Unit 4: Loading Product Data from the OData Service

Loading Product Data from the OData Service

Goal:

- Load real product data from an OData service
- Perform the required steps to onboard to SAP Cloud Platform



Loading Product Data from the OData Service

Hands-on



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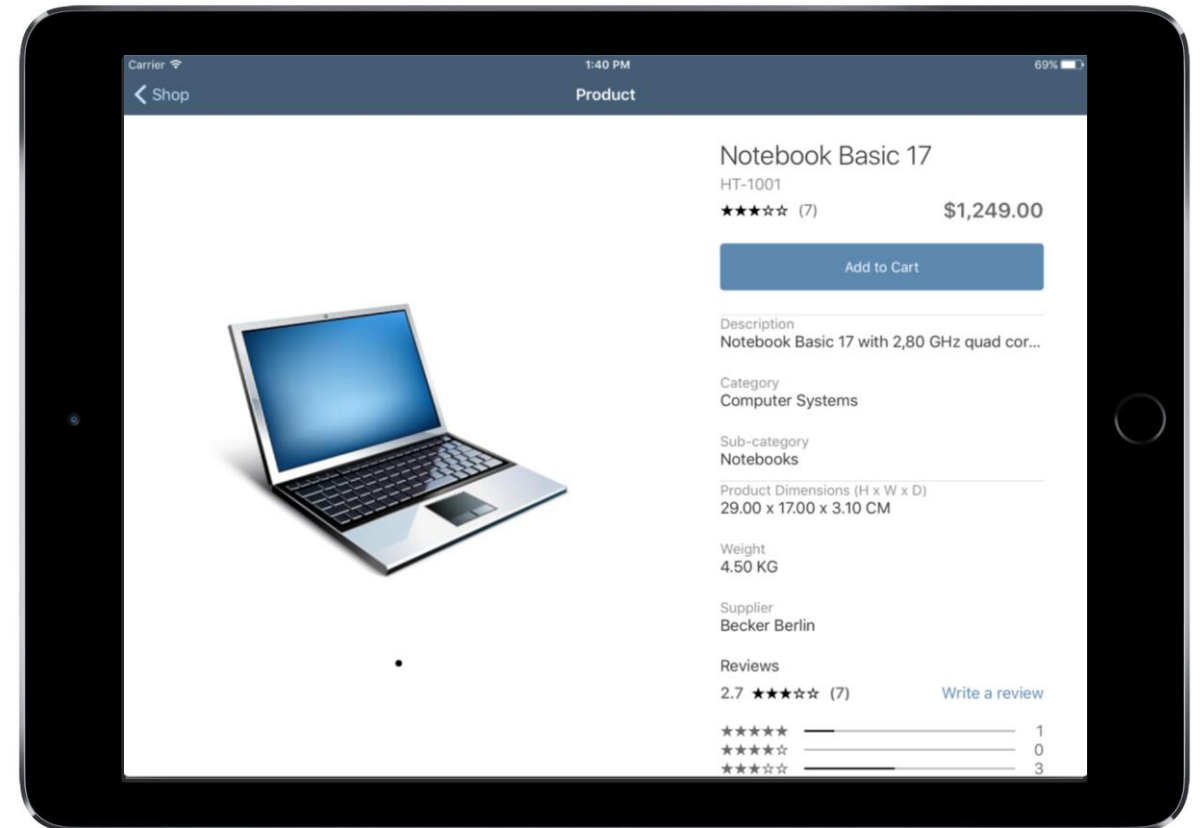
Week 2: OData Back-End Connectivity

Unit 5: Navigating to the Product Details View

Navigating to the Product Details View

Goal:

- Add a navigation to the Product Details view



Navigating to the Product Details View

Hands-on



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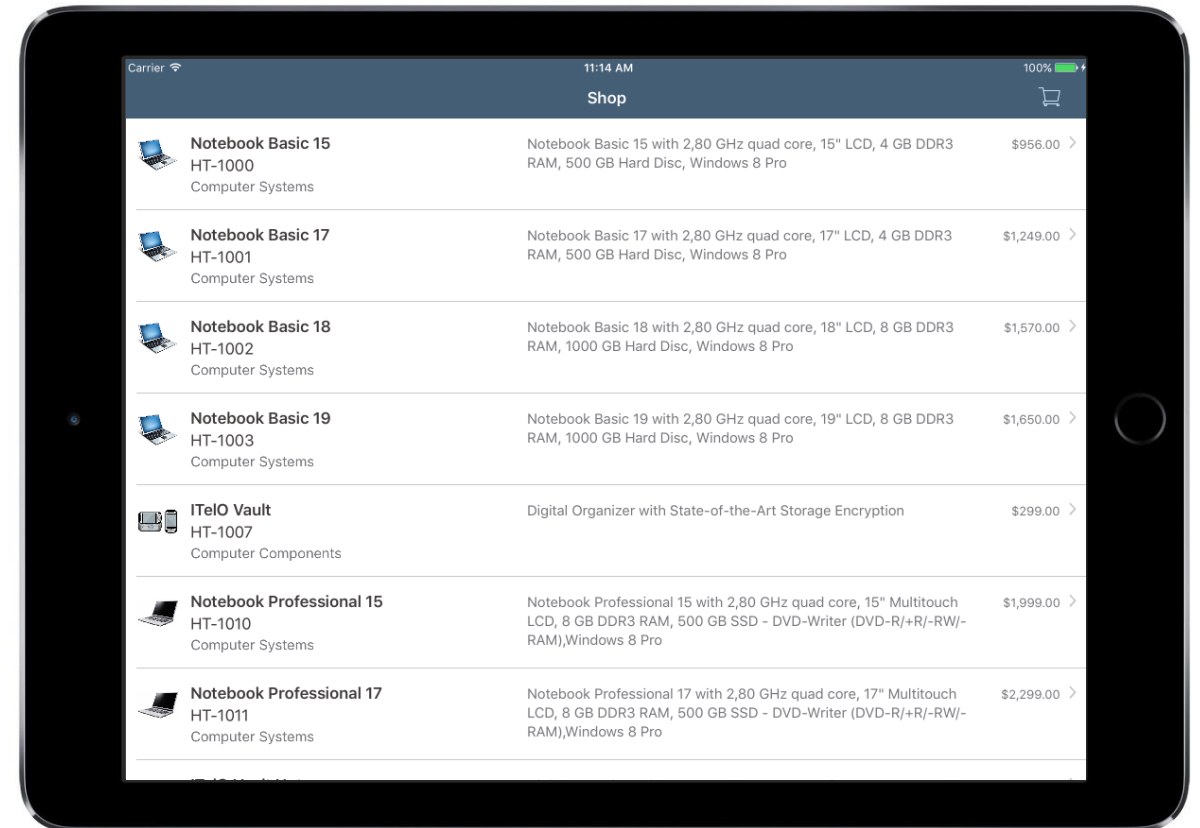
Week 2: OData Back-End Connectivity

Unit 6: Adding the Shopping Cart Icon to the Navigation Bar

Adding the Shopping Cart Icon to the Navigation Bar

Goal:

- Add Shopping Cart buttons to both the Product List and Product Detail screens



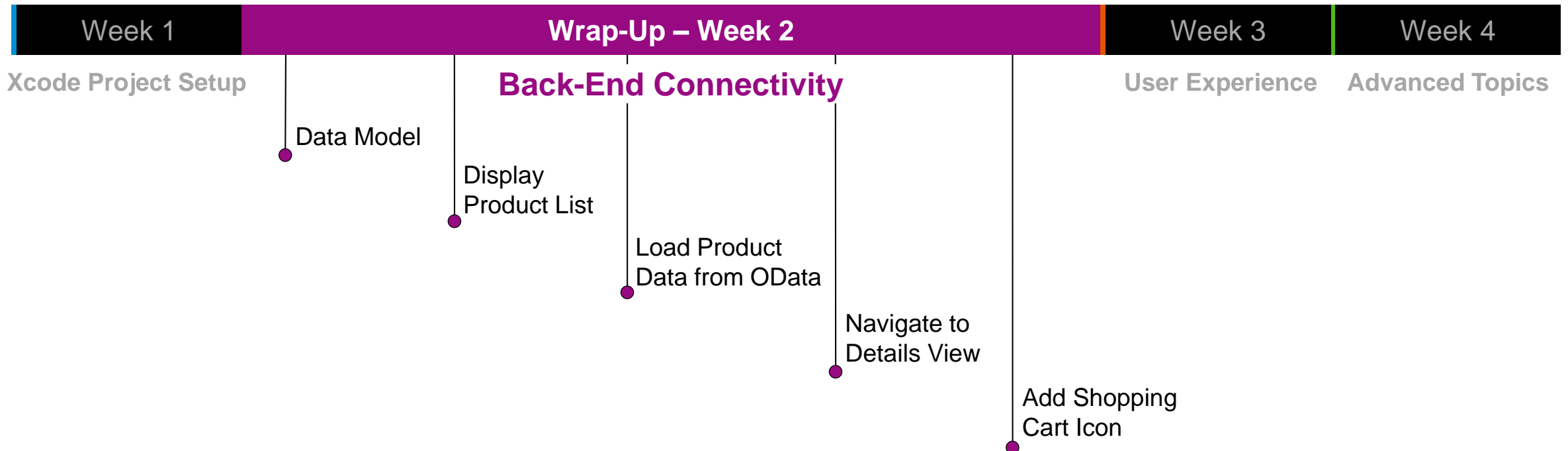
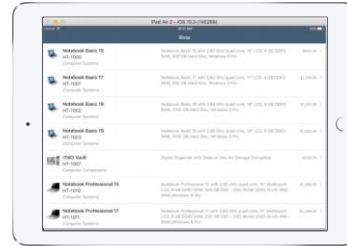
Adding the Shopping Cart Icon to the Navigation Bar

Hands-on



Adding the Shopping Cart Icon to the Navigation Bar

Wrap-up Week 2: hands-on Shopping Cart app development



Adding the Shopping Cart Icon to the Navigation Bar

Demo – Accessing the back-end data of the Shopping Cart app



Thank you.

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