COSMO CONSULT

Business-Software für Menschen

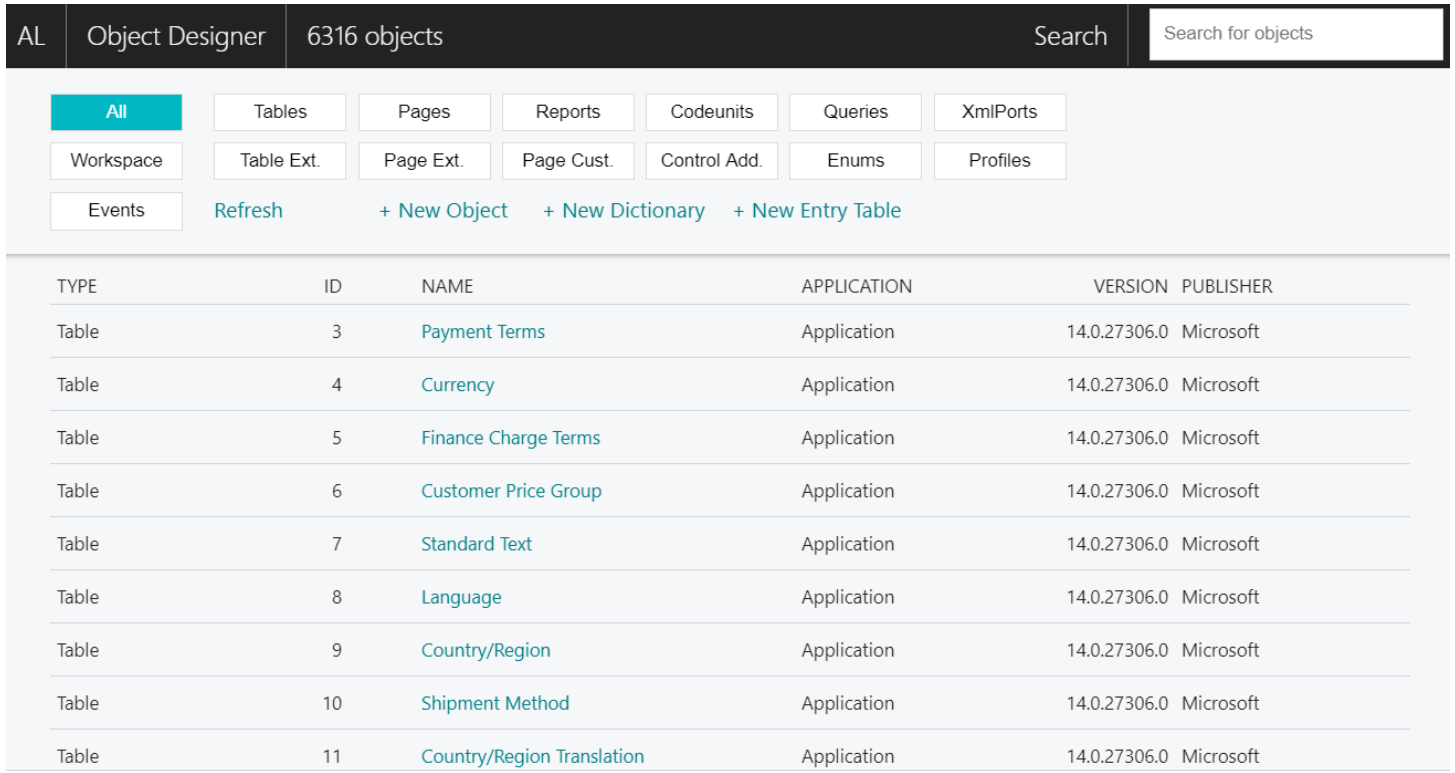
Microsoft AL

Modern APIs

VS Code
Useful Extensions

- AL Formatter
- AL Code Outline
- AL Object Designer
- CRS AL Language Extension
- JSON5 syntax
- AL Runner
- REST Client

- VS Live Share
- Visual Studio Live Share Extension Pack
- Visual Studio IntelliCode



TYPE	ID	NAME	APPLICATION	VERSION	PUBLISHER
Table	3	Payment Terms	Application	14.0.27306.0	Microsoft
Table	4	Currency	Application	14.0.27306.0	Microsoft
Table	5	Finance Charge Terms	Application	14.0.27306.0	Microsoft
Table	6	Customer Price Group	Application	14.0.27306.0	Microsoft
Table	7	Standard Text	Application	14.0.27306.0	Microsoft
Table	8	Language	Application	14.0.27306.0	Microsoft
Table	9	Country/Region	Application	14.0.27306.0	Microsoft
Table	10	Shipment Method	Application	14.0.27306.0	Microsoft
Table	11	Country/Region Translation	Application	14.0.27306.0	Microsoft

Business Central

- Overview
  - Explore & Setup
- Microsoft AL
  - Web Services
  - OData Feeds
  - Modern APIs
- Tools & Simulation
- Hand On

Business Central
Extending and integrating

Add-On

Add-on apps enrich the Business Central functionality

Extensions 2.0

Connect

*Connected Apps **connect** another service with Business Central*

API's

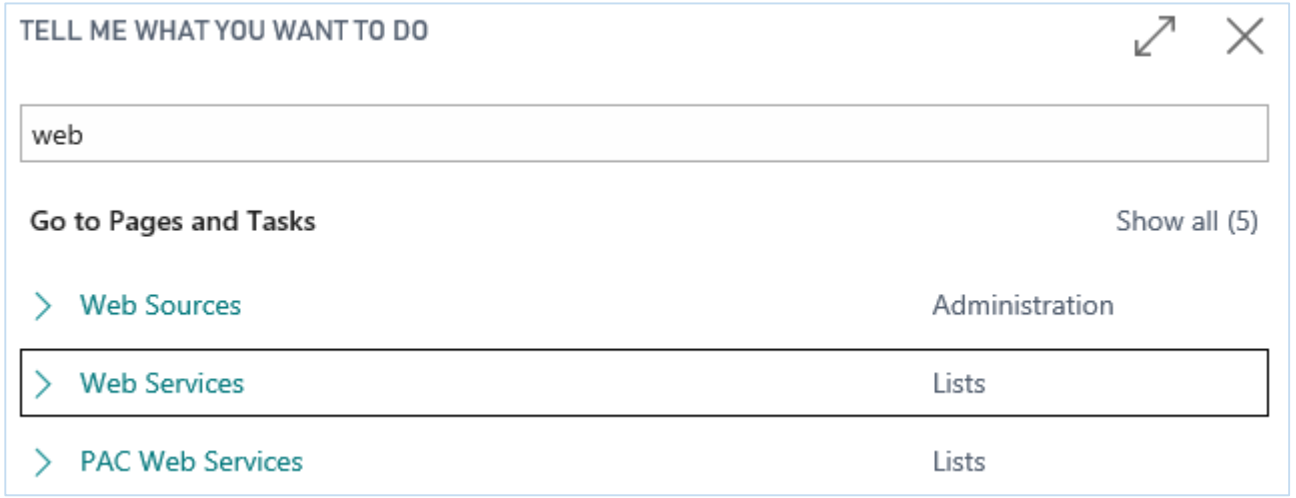
Business Central
Add-on vs. Connect apps

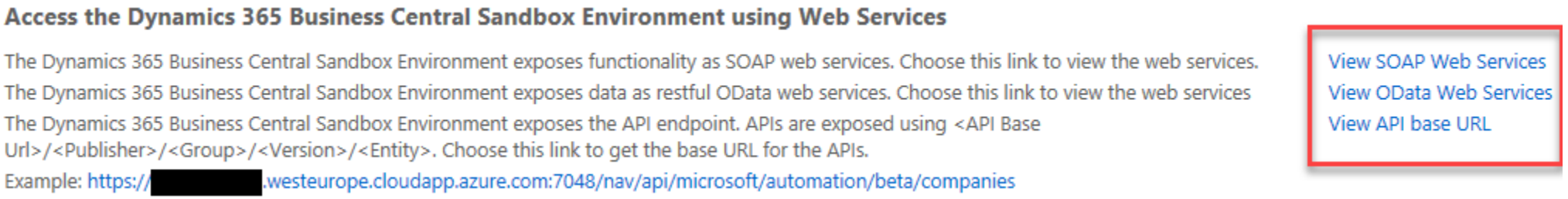
- Connect apps supplement add-ons!
  - You can even combine the two, relying on an add-in for setup UI or two way communication

	Strengths	**"Weaknesses"**	**Suitable for**
Add-on apps	Powerful customization abilities In-client designer	Require knowledge of internal business logic and data model	Deep integration Embedded user experience ISV solutions
Connect apps	Simplicity of REST api's Similarity with other SaaS services Fairly quick development cycle Large choice of coding platforms	Cannot modify UI or business logic	Data integration Integration with online services, SaaS ISV solutions Developers with no Dynamics 365 Business Central experience

Business Central
API and Web Services

- SOAP web services
  - Codeunit
  - Page
  - Query
- OData web services
  - Page
  - Query
- API endpoints
  - Page *PageType = API*





Business Central
Explore classic Web Services

- [ALT] + [Q] … Tell Me … Web Services
- Codeunits, Pages & Queries

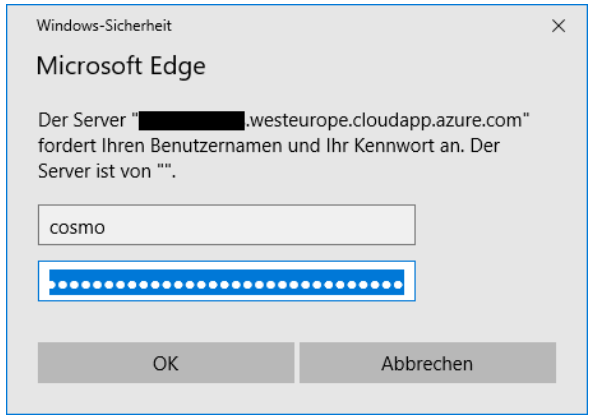
WEB SERVICES

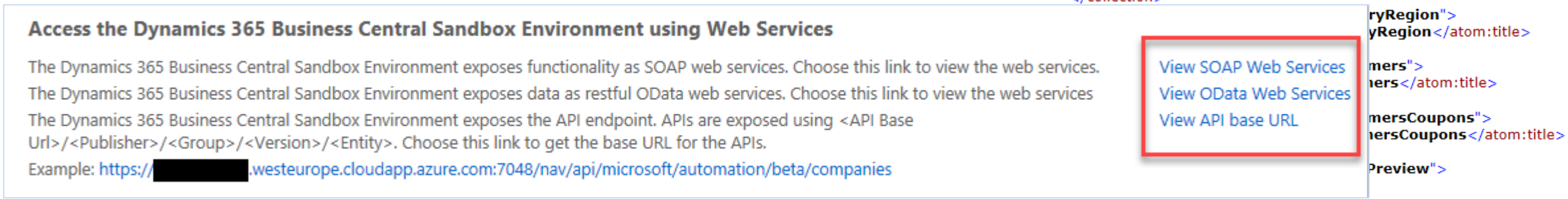
Search | New | Edit List | Delete | Process | Open in Excel | More options

OBJECT TYPE	OBJECT ID	OBJECT NAME	SERVICE NAME	ALL TENAI	PUB...	ODATA V4 URL	ODATA URL	SOAP URL
Codeunit	1801	Company Setup Service	CompanySetupService	☑	☑	Not applicable	Not applicable	https://bc-spring-us.westeurope.c...
Codeunit	1803	Encrypted Key/Value Management	EncryptedKeyValue	☑	☑	Not applicable	Not applicable	https://bc-spring-us.westeurope.c...
Codeunit	5324	Exchange Service Setup	ExchangeServiceSetup	☑	☑	Not applicable	Not applicable	https://bc-spring-us.westeurope.c...
Codeunit	1544	Workflow Webhook Subscription	WorkflowActionResponse	☐	☑	Not applicable	Not applicable	https://bc-spring-us.westeurope.c...
Page	1314	AccountantPortal Activity Cues	AccountantPortalActivityCues	☑	☑	https://bc-spring-us.westeurope.c...	https://bc-spring-us.westeurope.c...	https://bc-spring-us.westeurope.c...
Page	1315	Accountant Portal Finance Cues	AccountantPortalFinanceCues	☑	☑	https://bc-spring-us.westeurope.c...	https://bc-spring-us.westeurope.c...	https://bc-spring-us.westeurope.c...
Page	1316	Accountant Portal User Tasks	AccountantPortalUserTasks	☑	☑	https://bc-spring-us.westeurope.c...	https://bc-spring-us.westeurope.c...	https://bc-spring-us.westeurope.c...
Page	2160	O365 Sales Graph	C2Graph	☑	☑	https://bc-spring-us.westeurope.c...	https://bc-spring-us.westeurope.c...	https://bc-spring-us.westeurope.c...
Page	16	Chart of Accounts	Chart of Accounts	☐	☑	https://bc-spring-us.westeurope.c...	https://bc-spring-us.westeurope.c...	https://bc-spring-us.westeurope.c...
Page	5500	agedAccountsPayable	ExcelTemplateAgedAccountsPaya...	☐	☑	https://bc-spring-us.westeurope.c...	https://bc-spring-us.westeurope.c...	https://bc-spring-us.westeurope.c...
Page	5499	agedAccountsReceivable	ExcelTemplateAgedAccountsRece...	☐	☑	https://bc-spring-us.westeurope.c...	https://bc-spring-us.westeurope.c...	https://bc-spring-us.westeurope.c...
Page	5501	balanceSheet	ExcelTemplateBalanceSheet	☐	☑	https://bc-spring-us.westeurope.c...	https://bc-spring-us.westeurope.c...	https://bc-spring-us.westeurope.c...
Page	5493	cashFlowStatement	ExcelTemplateCashFlowStatement	☐	☑	https://bc-spring-us.westeurope.c...	https://bc-spring-us.westeurope.c...	https://bc-spring-us.westeurope.c...
Page	5503	incomeStatement	ExcelTemplateIncomeStatement	☐	☑	https://bc-spring-us.westeurope.c...	https://bc-spring-us.westeurope.c...	https://bc-spring-us.westeurope.c...

Business Central
Explore classic Web Services

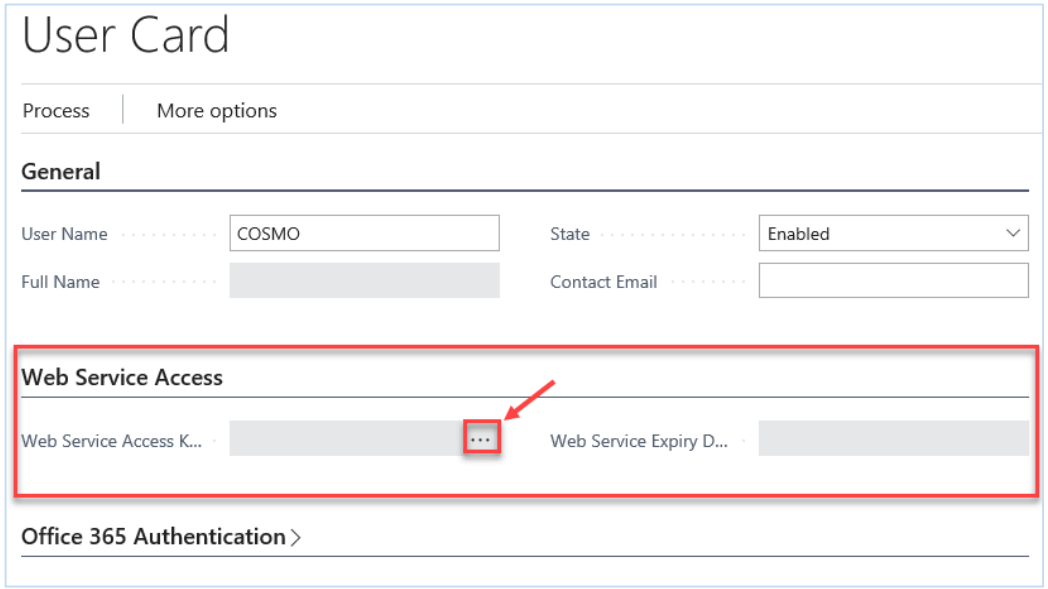
- Copy the URL from
  - Web Services Page
  - Landing Page
- Basic Authentication
  - Username
  - Web Access Key

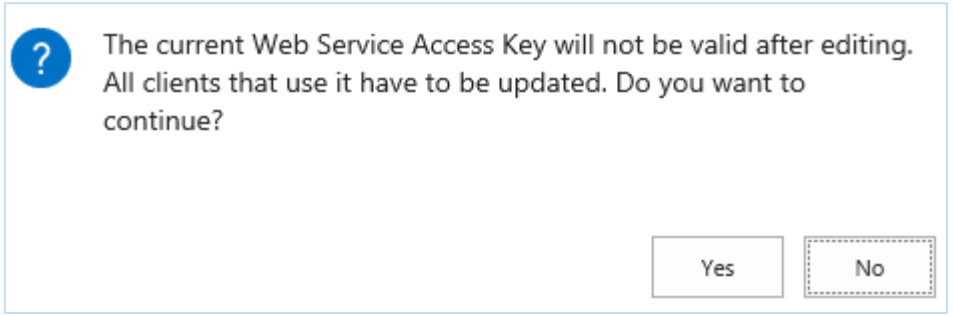


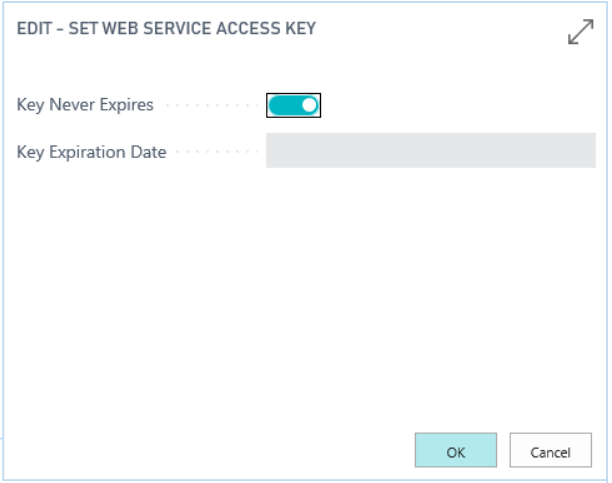


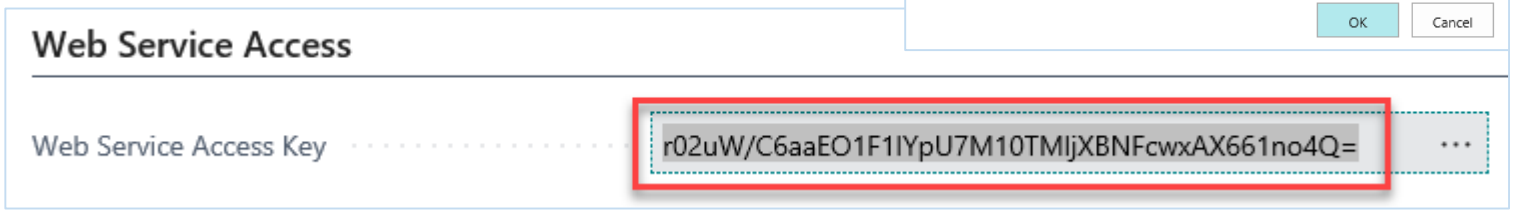
Business Central
Setup Web Service Access

- Open „Users“ and select the right user
- Open „User Card“
- Create a „Web Service Access” Key
  - Adjust the Key Expire
  - Confirm
  - Copy the Key
- *Authentication*
  - *Basic*
  - *User & Password*



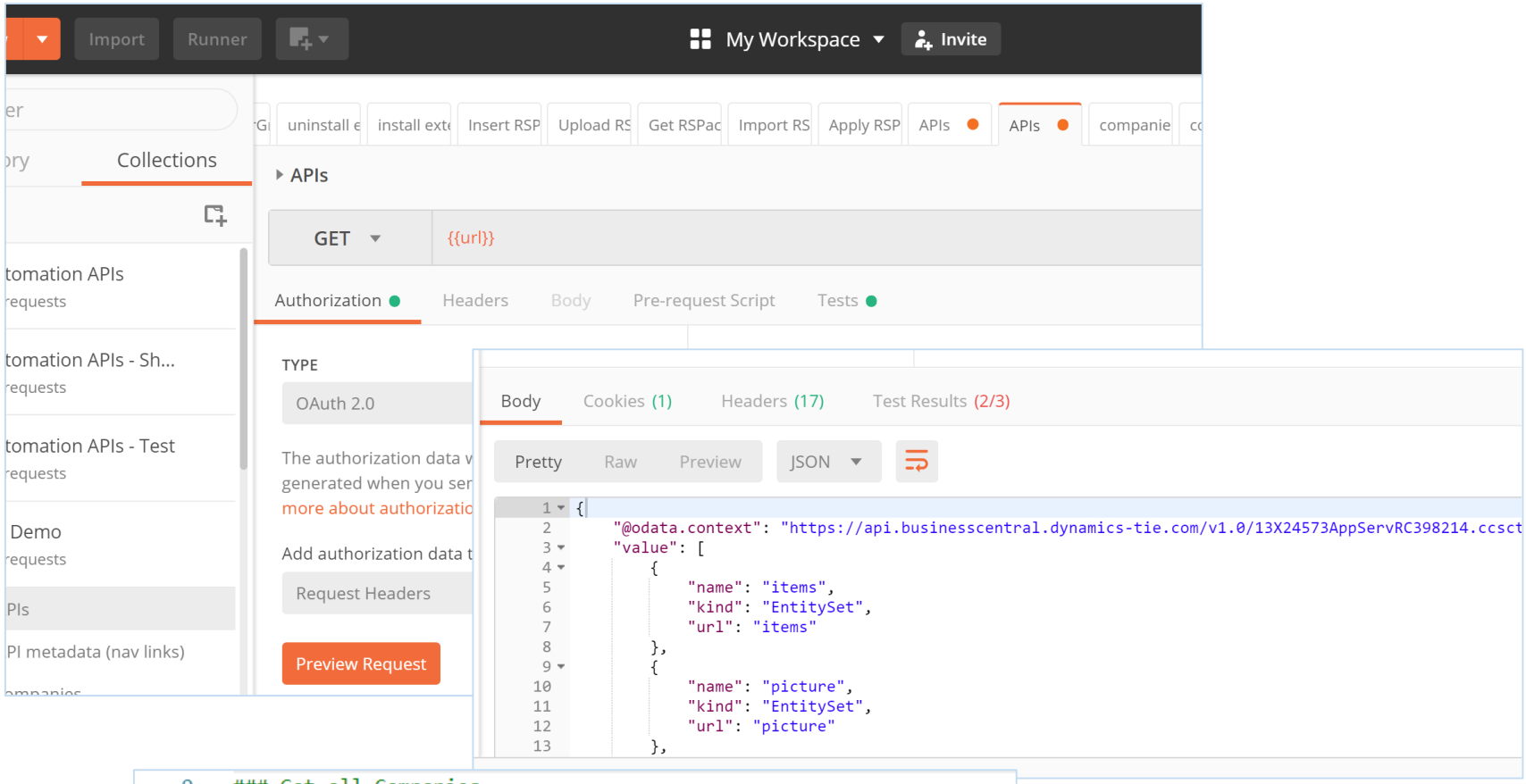


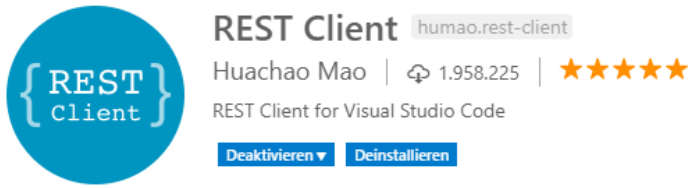




Business Central
Tools for Web Service Development & Test

- Fiddler
- Postman
- VS Code REST Client






```
### Get all Companies
Send Request
GET  {{apiHost}}:7048/nav/api/microsoft/automation/beta/companies
Content-Type: application/x-www-form-urlencoded
Authorization: Basic {{apiUser}} {{apiToken}}
```

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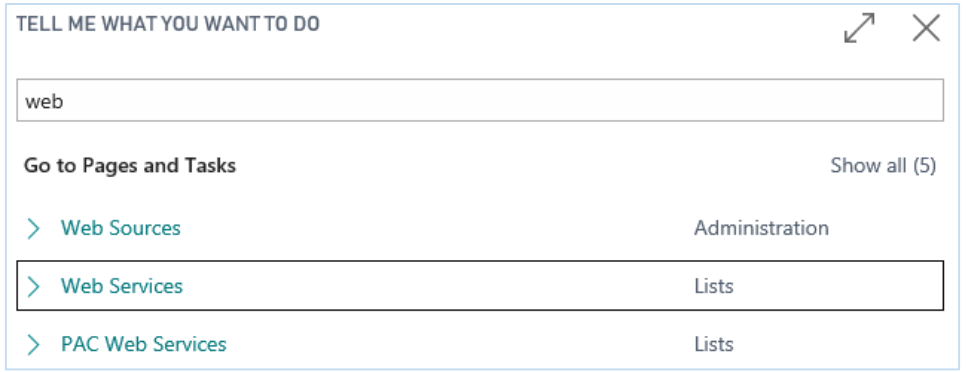
Hands On

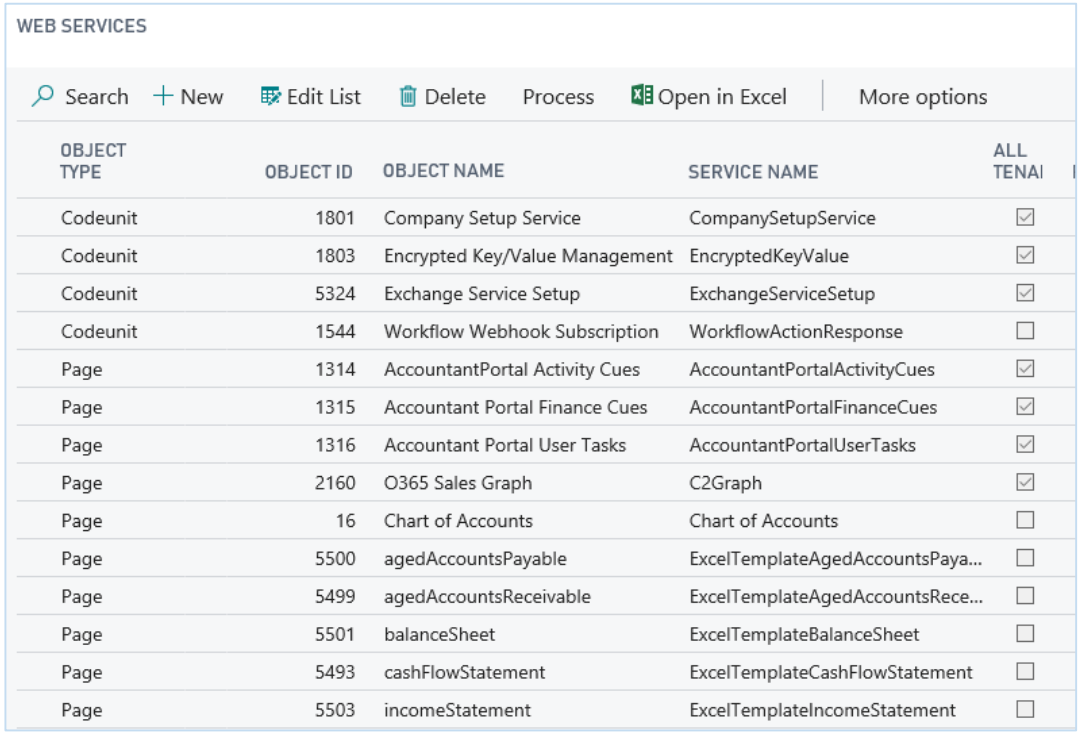
Business Central
Hands-On

- Prerequisites
  - Connect to your Workshop VM → use Instructions on your Workshop Boarding Pass
- Hand On - Tasks
  - Learn how to explore Web Services
  - Setup the Web Account in your environment

Business Central
Explore the Web Services

- Open your Web Client
- Use “Tell me” and navigate to the web services
  - Page Name “Web Services”
- Note the Web Service URL (for later) of:
  - Page “User Tasks”
  - Query “Vendor Ledger Entries”

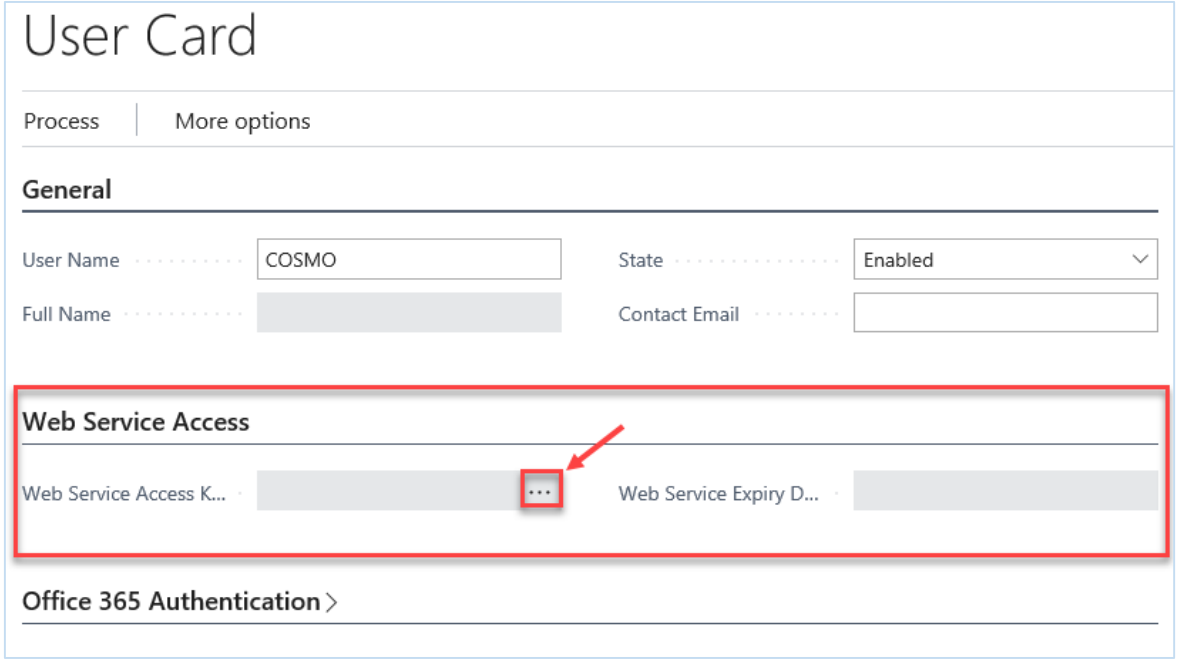


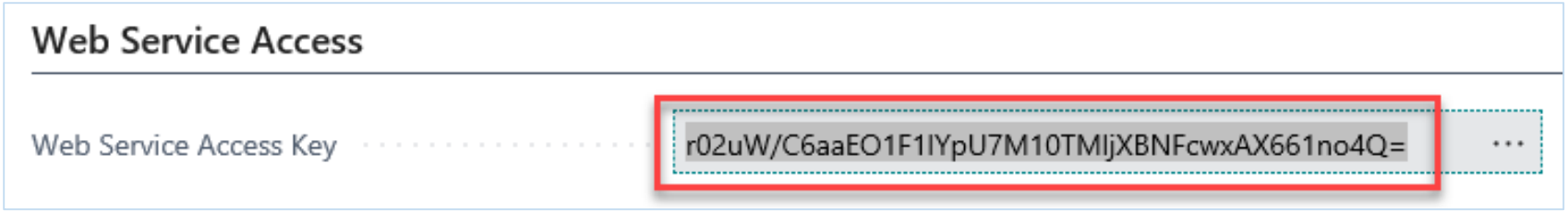


OBJECT TYPE	OBJECT ID	OBJECT NAME	SERVICE NAME	ALL TENAI
Codeunit	1801	Company Setup Service	CompanySetupService	☑
Codeunit	1803	Encrypted Key/Value Management	EncryptedKeyValue	☑
Codeunit	5324	Exchange Service Setup	ExchangeServiceSetup	☑
Codeunit	1544	Workflow Webhook Subscription	WorkflowActionResponse	☐
Page	1314	AccountantPortal Activity Cues	AccountantPortalActivityCues	☑
Page	1315	Accountant Portal Finance Cues	AccountantPortalFinanceCues	☑
Page	1316	Accountant Portal User Tasks	AccountantPortalUserTasks	☑
Page	2160	O365 Sales Graph	C2Graph	☑
Page	16	Chart of Accounts	Chart of Accounts	☐
Page	5500	agedAccountsPayable	ExcelTemplateAgedAccountsPaya...	☐
Page	5499	agedAccountsReceivable	ExcelTemplateAgedAccountsRece...	☐
Page	5501	balanceSheet	ExcelTemplateBalanceSheet	☐
Page	5493	cashFlowStatement	ExcelTemplateCashFlowStatement	☐
Page	5503	incomeStatement	ExcelTemplateIncomeStatement	☐

Business Central
Setup your Web Service Access

- Open your Web Client
- Use “Tell me” and navigate to the web services
  - Page Name “Users”
- Open User Page
- Setup the Web Service Access
  - no expire date
  - Note your generated **Web Service Access Key** and **Username**





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Web Services & OData Feeds

Business Central | Web Services
Codeunit

- Codeunit
  - SOAP only
  - Wrapper for Methods
- Procedure
  - Web Service Method for SOAP
- Method Arguments
  - Request Parameters in SOAP
- Method Result
  - Response Data in SOAP

```
codeunit 50202 BeerWebService
{
    0 references
    procedure GetBeerCategories(code: Text): Text;
    begin

    end;
}
```

```
<types>
  - <schema xmlns="http://www.w3.org/2001/XMLSchema" targetNamespace="urn:microsoft-dynamics-schema
    - <element name="GetBeerCategories">
      - <complexType>
        - <sequence>
            <element name="code" type="string" maxOccurs="1" minOccurs="1"/>
          </sequence>
        </complexType>
      </element>
    - <element name="GetBeerCategories_Result">
      - <complexType>
        - <sequence>
            <element name="return_value" type="string" maxOccurs="1" minOccurs="1"/>
          </sequence>
        </complexType>
      </element>
    </schema>
</types>
```

Business Central | Web Services
Query

- Query
  - SOAP, OData, OData v4
  - QueryType = Normal
- Data Items
  - Table
  - Columns
- Nested Data Items
  - DataItemLink — specify the JOIN
    Sets a reference between one or more fields of the data item table and data item or data items above it.
  - DataItemTableFilter
    Sets filters on fields of the underlying table of a query.
  - SQLJoinType — *may replace the DataItemLinkType*
    Sets the data item link type between data items in a query to determine the records that are included in the resulting dataset.

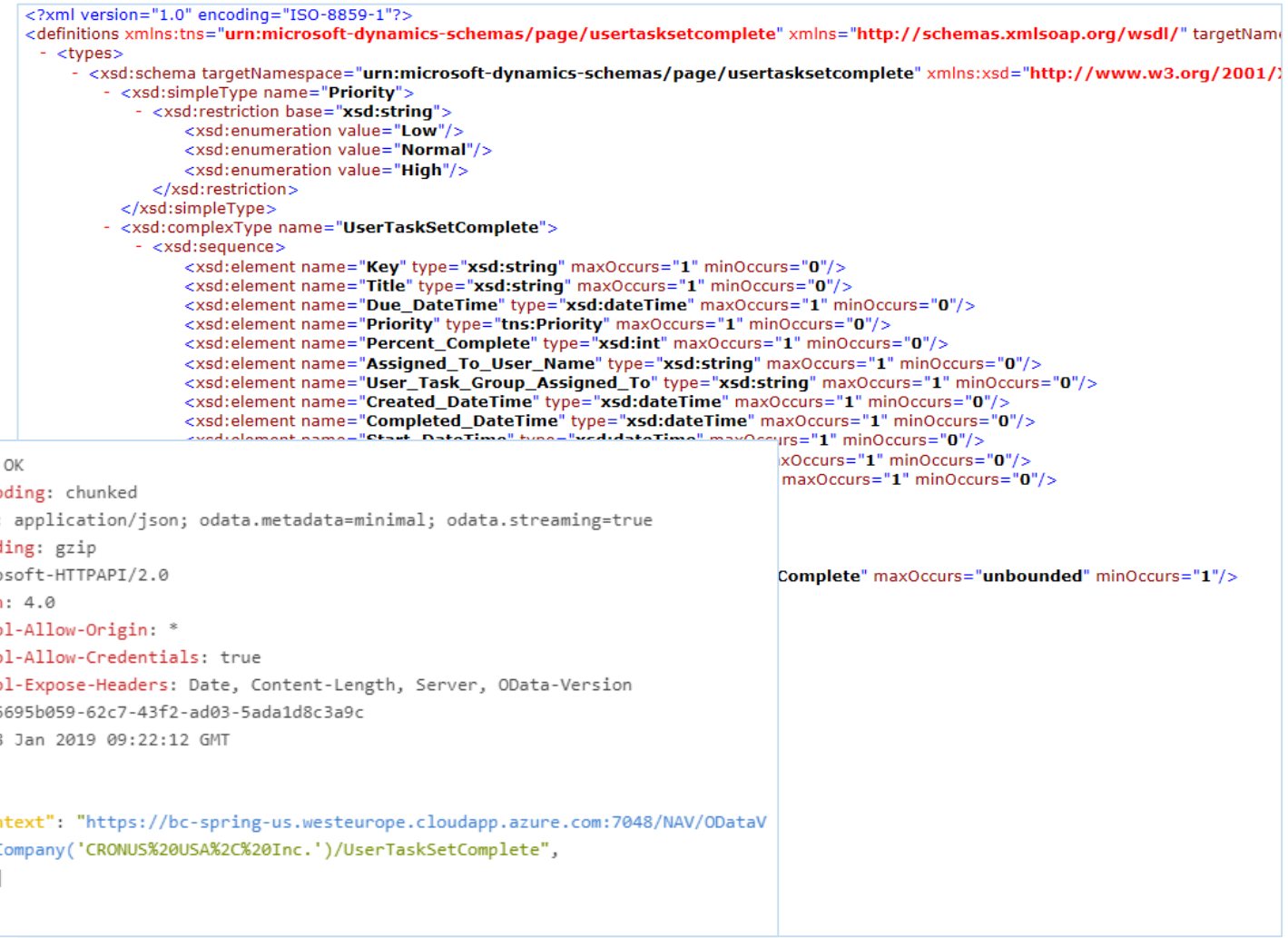
```
0 references
query 50200 "Beer Query [CC]"
{
    QueryType = Normal;

    elements
    {
        1 reference
        dataitem(Item; Item)
        {
            0 references
            column(id; Id) { }
            0 references
            column(Name; Description) { }
            0 references
            column(BeerCategoryCode; "Beer Category Code [CC]") { }
            0 references
            column(BeerCategoryName; "Beer Category Name [CC]") { }
            0 references
            column(Description; Description) { }

            1 reference
            dataitem(Customer; "Customer")
            {
                DataItemLink = "Beer Category Code [CC]" = Item."Beer Category Code [CC]";
                0 references
                column(CustomerName; Name) { }
                0 references
                dataitem(Country_Region; "Country/Region")
                {
                    DataItemLink = Code = Customer."Country/Region Code";
                    0 references
                    column(CountryRegionName; Name) { }
                }
            }
        }
    }
}
```

Business Central | Web Services
Page

- Page
  - SOAP
  - OData
  - OData v4
- Access to Page Records
- Actions as Web Service Methods




```xml
<?xml version="1.0" encoding="ISO-8859-1"?>
<definitions xmlns:tns="urn:microsoft-dynamics-schemas/page/usertasksetcomplete" xmlns="http://schemas.xmlsoap.org/wsdl/" targetNam
  - <types>
      - <xsd:schema targetNamespace="urn:microsoft-dynamics-schemas/page/usertasksetcomplete" xmlns:xsd="http://www.w3.org/2001/
          - <xsd:simpleType name="Priority">
              - <xsd:restriction base="xsd:string">
                    <xsd:enumeration value="Low"/>
                    <xsd:enumeration value="Normal"/>
                    <xsd:enumeration value="High"/>
                </xsd:restriction>
            </xsd:simpleType>
          - <xsd:complexType name="UserTaskSetComplete">
              - <xsd:sequence>
                    <xsd:element name="Key" type="xsd:string" maxOccurs="1" minOccurs="0"/>
                    <xsd:element name="Title" type="xsd:string" maxOccurs="1" minOccurs="0"/>
                    <xsd:element name="Due_DateTime" type="xsd:dateTime" maxOccurs="1" minOccurs="0"/>
                    <xsd:element name="Priority" type="tns:Priority" maxOccurs="1" minOccurs="0"/>
                    <xsd:element name="Percent_Complete" type="xsd:int" maxOccurs="1" minOccurs="0"/>
                    <xsd:element name="Assigned_To_User_Name" type="xsd:string" maxOccurs="1" minOccurs="0"/>
                    <xsd:element name="User_Task_Group_Assigned_To" type="xsd:string" maxOccurs="1" minOccurs="0"/>
                    <xsd:element name="Created_DateTime" type="xsd:dateTime" maxOccurs="1" minOccurs="0"/>
                    <xsd:element name="Completed_DateTime" type="xsd:dateTime" maxOccurs="1" minOccurs="0"/>
                    <xsd:element name="Start_DateTime" type="xsd:dateTime" maxOccurs="1" minOccurs="0"/>
                                                                                  xOccurs="1" minOccurs="0"/>
                                                                                  maxOccurs="1" minOccurs="0"/>

                                                                                  Complete" maxOccurs="unbounded" minOccurs="1"/>
```



```
HTTP/1.1 200 OK
Transfer-Encoding: chunked
Content-Type: application/json; odata.metadata=minimal; odata.streaming=true
Content-Encoding: gzip
Server: Microsoft-HTTPAPI/2.0
OData-Version: 4.0
Access-Control-Allow-Origin: *
Access-Control-Allow-Credentials: true
Access-Control-Expose-Headers: Date, Content-Length, Server, OData-Version
request-id: 6695b059-62c7-43f2-ad03-5ada1d8c3a9c
Date: Mon, 28 Jan 2019 09:22:12 GMT

{
  "@odata.context": "https://bc-spring-us.westeurope.cloudapp.azure.com:7048/NAV/ODataV4/$metadata#Company('CRONUS%20USA%2C%20Inc.')/UserTaskSetComplete",
  "value": []
}
```

Business Central
Web Services Registration

- Object Types
  - Page
  - Query
  - Codeunit
- Codeunits
  - Be clear, what you expose as method and parameter!!!
    JsonObjects are not supported
- Registration XML in AL-App
  - XML File
  - Use Snippets
  - Add Objects for registration

WebServices.xml

```xml
<?xml version="1.0" encoding="utf-8"?>
<ExportedData>
    <TenantWebServiceCollection>
        <TenantWebService>
            <ObjectType>Query</ObjectType>
            <ObjectID>50200</ObjectID>
            <ServiceName>beerQuery</ServiceName>
            <Published>true</Published>
        </TenantWebService>
        <TenantWebService>
            <ObjectType>CodeUnit</ObjectType>
            <ObjectID>50200</ObjectID>
            <ServiceName>myWebService</ServiceName>
            <Published>true</Published>
        </TenantWebService>
    </TenantWebServiceCollection>
</ExportedData>
```

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Hands On

Business Central
Hands-On

- Prerequisites
  - Connect to your Workshop VM → use Instructions on your Workshop Boarding Pass
- Hand On - Tasks
  - Create Web Services with Microsoft AL
  - Register Web Services in Microsoft AL

Business Central
Create a Web Services from Codeunit

- Create a new Codeunit
  - Object ID 50105
  - Name “Beer WebService [CC]“

- Add a method “GetBeerCategories”
  - Parameter “code” *Text*
  - Result *Text*

```
0 references
codeunit 50105 "Beer WebService [CC]"
{
    0 references
    procedure GetBeerCategories(code: Text): Text;
    begin

    end;
}
```

Business Central
Create a Web Services from Query

- Create a new Query
  - Object ID 50105
  - Name “Beer Items [CC]“
  - QueryType: *Normal*
- Query from Item Table
  - Id, Name, Is Beer Item, Beer Category Code, Beer Category Name, Description
- Join Customer Information to the query
  - Customer Name, Customer Region Name


```
"value": [
  {
    "id": "28a3379c-232e-415c-963e-059bb07d1083",
    "Name": "Atlantic Ale",
    "BeerCategoryCode": "ALE",
    "Description": "Atlantic Ale",
    "BeerCategoryName": "Ale",
    "CustomerName": "Adatum Corporation",
    "CountryRegionName": "USA",
    "AuxiliaryIndex1": "ATLANTIC ALE",
    "AuxiliaryIndex2": "10000",
    "AuxiliaryIndex3": "US"
  },
  {
    "id": "1b83a6de-1d54-4c1b-a0f1-8b44a4031a96",
    "Name": "Freiberger Pilsner",
    "BeerCategoryCode": "PILS",
    "Description": "Freiberger Pilsner",
    "BeerCategoryName": "Pilsner",
```

Business Central
Register your Web Services

- Create a XML file
  - “WebServices.xml”
  - Query as *“beerQuery”*
  - CodeUnit as *“BeerWebService”*
- Add your Services
  - Use Snippets!
- Deploy and Check your Web Services
  - Open Page “Web Services” and find your Services

WebServices.xml

```xml
<?xml version="1.0" encoding="utf-8"?>
<ExportedData>
    <TenantWebServiceCollection>
        <TenantWebService>
            <ObjectType>Query</ObjectType>
            <ObjectID>50100</ObjectID>
            <ServiceName>beerQuery</ServiceName>
            <Published>true</Published>
        </TenantWebService>
        <TenantWebService>
            <ObjectType>CodeUnit</ObjectType>
            <ObjectID>50105</ObjectID>
            <ServiceName>BeerWebService</ServiceName>
            <Published>true</Published>
        </TenantWebService>
    </TenantWebServiceCollection>
</ExportedData>
```

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Microsoft AL

Modern APIs

Business Central | Modern API
Available APIs (48)

Company	Finance	Sales	Purchasing	Reports
company	accounts	customers	irs1099Codes (US only)	agedAccountsPayable
companyInformation	dimensions	customerPayments	purchaseInvoices	agedAccountsReceivable
countriesRegions	dimensionLines	customerPaymentJournals	purchaseInvoiceLines	balanceSheet
currencies	dimensionValues	salesInvoices	vendors	cashFlowStatement
employees	generalLedgerEntries	salesInvoiceLines		incomeStatement
items	journals	salesOrders		retainedEarningsStatement
itemCategories	journalLines	salesOrderLines		customerSales
paymentMethods		salesQuotes		vendorPurchases
paymentTerms		salesQuoteLines		trialBalance
shipmentMethods		salesCreditMemos		
taxAreas		salesCreditMemoLines		
taxGroups				
unitsOfMeasure				
picture, defaultDimension, attachments, pdfDocument				

Business Central | Modern API
GET endpoints (API list)

- URL
  - <hostname>:<API port>/nav/api/<publisher>/<groupname>/<version>/
  - {{apiHost}}:7048/nav/api/microsoft/automation/beta/
- Get endpoint – API list
  - add /$metadata
- Operations
  - Get, Post, Patch, Delete
- OData Filters
  - ?$filter=<fieldname> <condition> <value> […]
  - ?$filter=beerCategoryCode eq 'ALE' or beerCategoryCode eq 'PILS'

```
<?xml version="1.0" encoding="utf-8"?>
<edmx:Edmx Version="4.0"
  xmlns:edmx="http://docs.oasis-open.org/odata/ns/edmx">
  <edmx:DataServices>
    <Schema Namespace="Microsoft.NAV"
      xmlns="http://docs.oasis-open.org/odata/ns/edm">
      <ComplexType Name="dateTimeTimeZoneType">
        <Property Name="dateTime" Type="Edm.String" Nullable="false"
      </ComplexType>
      <ComplexType Name="dimensionType">
        <Property Name="code" Type="Edm.String" Nullable="false" />
        <Property Name="displayName" Type="Edm.String" />
        <Property Name="valueCode" Type="Edm.String" Nullable="false
        <Property Name="valueDisplayName" Type="Edm.String" />
      </ComplexType>
      <ComplexType Name="documentLineObjectDetailsType">
        <Property Name="number" Type="Edm.String" MaxLength="20" />
        <Property Name="displayName" Type="Edm.String" MaxLength="1
      </ComplexType>
      <ComplexType Name="unitOfMeasureType">
        <Property Name="code" Type="Edm.String" MaxLength="10" />
        <Property Name="displayName" Type="Edm.String" MaxLength="5
        <Property Name="symbol" Type="Edm.String" MaxLength="10" />
        <Property Name="unitConversion" Type="Microsoft.NAV.itemUni
 />
      </ComplexType>
      <ComplexType Name="itemUnitOfMeasureConversionType">
```

Business Central | Modern API
examples

```
### Get all Companies
Send Request
GET  {{apiHost}}:7048/nav/api/microsoft/automation/beta/companies
Authorization: Basic {{apiUser}} {{apiToken}}

### Get all entities from API
Send Request
GET {{apiHost}}:7048/nav/api/microsoft/automation/beta/companies({{copmanyID}})
Authorization: Basic {{apiUser}} {{apiToken}}

### Get all entities from API
Send Request
GET {{apiHost}}:7048/nav/api/{{apiPublisher}}/{{apiGroup}}/{{apiVersion}}/companies({{copmanyID}})/{{entities}}
Authorization: Basic {{apiUser}} {{apiToken}}

### Add a new record to API
Send Request
POST {{apiHost}}:7048/nav/api/{{apiPublisher}}/{{apiGroup}}/{{apiVersion}}/companies({{copmanyID}})/{{entities}}
Content-Type: application/json
Authorization: Basic {{apiUser}} {{apiToken}}

{
    "no": "FREIBERGER",
    "beerCategoryCode": 'PILS',
    "name": "Freiberger Pils",
}
```

Business Central | Modern API Query

- Query
  - OData v4
  - QueryType = API
- Properties
  - APIPublisher
  - APIGroup
  - APIVersion *beta, v1.0, …*
  - EntityName
  - EntitySetName
- Data Items, Nested Data Items, …
  - Names & Columns *Lower Camel Case*

```
query 50201 "Beer Customer API [CC]"
{
    QueryType = API;
    APIPublisher = 'Workshop';
    APIGroup = 'FavoritBeer';
    APIVersion = 'v1.0';
    EntityName = 'beerCustomer';
    EntitySetName = 'beerCustomers';

    elements
    {
        1 reference
        dataitem(Item; Item)
        {
            0 references
            column(id; Id) { }
            0 references
            column(name; Description) { }
            0 references
            column(beerCategoryCode; "Beer Category Code [CC]") { }
            0 references
            column(beerCategoryName; "Beer Category Name [CC]") { }
            0 references
            column(description; Description) { }
```

Business Central | Modern API
Page

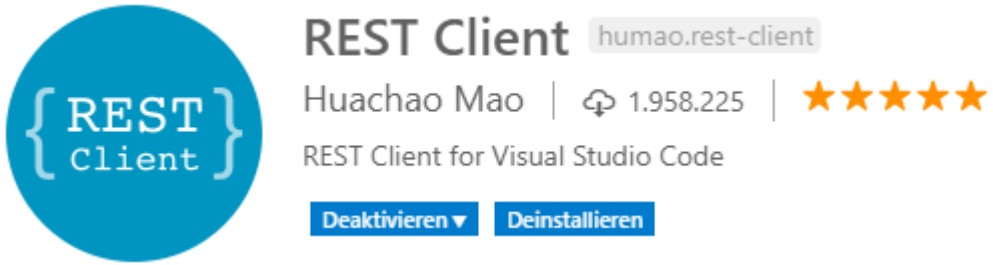
- Page
  - generate web service endpoints
  - cannot be displayed in the user interface
  - PageType = API
    ../Workshop/FavoritBeer/v1.0/companies({id})/beerCustomers
- Properties
  - APIPublisher
  - APIGroup
  - APIVersion *beta, v1.0, …*
  - EntityName
  - EntitySetName
  - SourceTable
  - ODataKeyFields *Guid*
- Repeater & Fields
  - Names *Lower Camel Case*

```
query 50201 "Beer Customer API [CC]"
{
    QueryType = API;
    APIPublisher = 'Workshop';
    APIGroup = 'FavoritBeer';
    APIVersion = 'v1.0';
    EntityName = 'beerCustomer';
    EntitySetName = 'beerCustomers';

    elements
    {
        1 reference
        dataitem(Item; Item)
        {
            0 references
            column(id; Id) { }
            0 references
            column(name; Description) { }
            0 references
            column(beerCategoryCode; "Beer Category Code [CC]") { }
            0 references
            column(beerCategoryName; "Beer Category Name [CC]") { }
            0 references
            column(description; Description) { }
```

Business Central | Modern API
Simulation & Test … REST Client

- Simulation of HTTP calls
- Create HTTP file (or activate the http extension) for simulation
- Setup Variables for calls
  - @apiHost
  - @apiUser
  - @apiToken
  - …



Simulation ▸ Query.http ▸ ...

```
3 references
1  @apiHost = https://[redacted].westeurope.cloudapp.azure.com
3 references
2  @apiUser = COSMO
3 references
3  @apiToken = r02uW/C6aaEO1F1lYpU7M10TMljXBNFcwxAX661no4Q=
2 references
4  @apiPublisher = WS
2 references
5  @apiGroup = beer
2 references
6  @apiVersion = v1.0
2 references
7  @copmanyID = <companyId>
8
9  ### Get all Companies
   Send Request
10 GET  {{apiHost}}:7048/nav/api/microsoft/automation/beta/companies
11 Content-Type: application/x-www-form-urlencoded
12 Authorization: Basic {{apiUser}} {{apiToken}}
```

COSMO CONSULT

Business-Software für Menschen

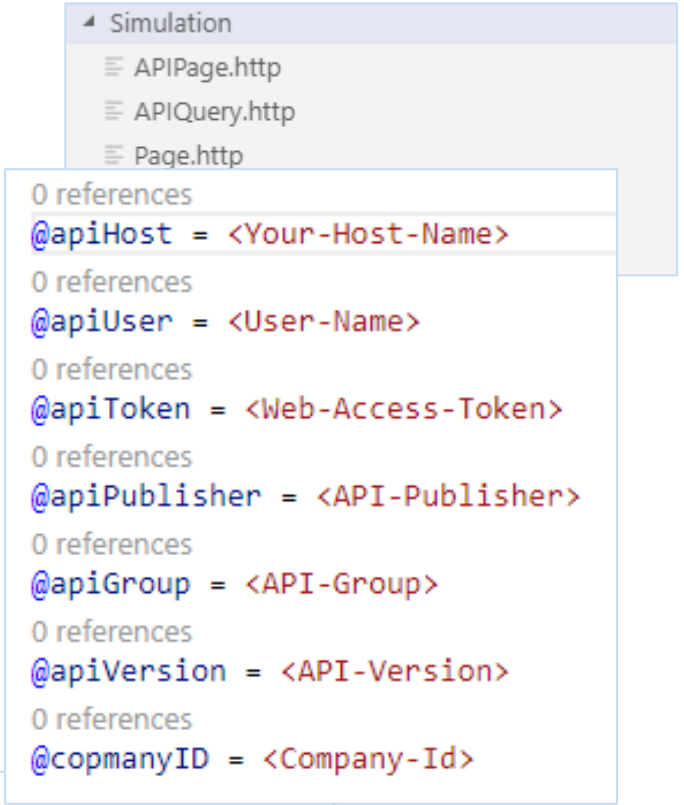
Hands On

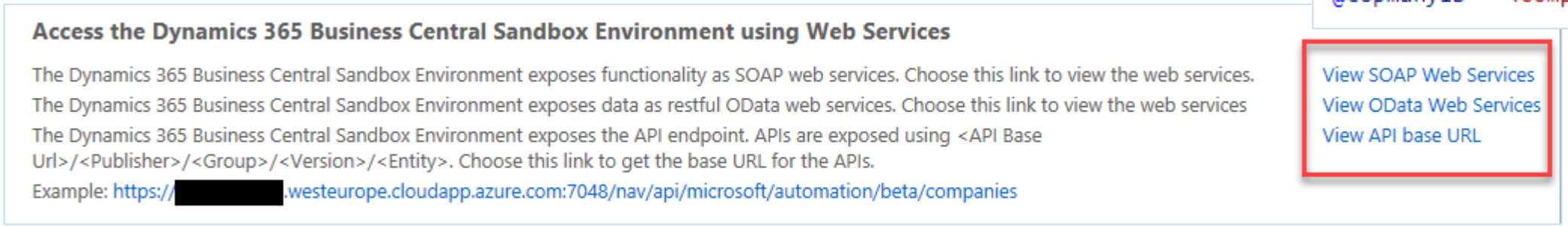
Business Central
Hands-On

- Prerequisites
  - Connect to your Workshop VM → use Instructions on your Workshop Boarding Pass
- Hand On - Tasks
  - Simulation & Test
  - Create an API Query with Microsoft AL
  - Create an API Page in Microsoft AL

Business Central
Hands-On | Simulation & Test … REST Client

- Install VS Code Extension REST Client
- Create a Simulation Folder
- Add Simulation Files and Setup Variables for your environment
  - Page.http
  - Query.http
  - APIPage.http
  - APIQuery.http





Business Central
Hands-On | Simulation & Test … Explore the Services & API

- Query the Metadata
  - /$metadata

```
### Get all "Microsoft.NAV" APIs
Send Request
GET  {{apiHost}}:7048/nav/api/microsoft/automation/beta/$metadata
Authorization: Basic {{apiUser}} {{apiToken}}
```

- Call „GetCompanies“
  - Copy the Company Name for OData Feeds & Web Services
  - Copy the Company ID for API calls

```
### Get all Companies
Send Request
GET  {{apiHost}}:7048/nav/api/microsoft/automation/beta/companies
Content-Type: application/x-www-form-urlencoded
Authorization: Basic {{apiUser}} {{apiToken}}
```

- Setup the CompanyID variable

```
{
  "@odata.context": "https://bc-spring-us.westeurope.cloudapp.azure.com:7048/nav/api/mi
t/automation/beta/$metadata#companies",
  "value": [
    {
      "id": "11964762-da4a-4882-ba17-af8f89e90f5e",
      "systemVersion": "27306",
      "name": "CRONUS USA, Inc.",
      "displayName": "CRONUS USA, Inc.",
      "businessProfileId": ""
```

- Get the Company
  - …/companies(<CompanyId>)

```
### Get the company from API
Send Request
GET {{apiHost}}:7048/nav/api/microsoft/automation/beta/companies({{copmanyID}})
Authorization: Basic {{apiUser}} {{apiToken}}
```

Business Central
Hands-On | Simulation & Test … Explore the Services & API

- Pages „VendorLedgerEntries“
  - Complete URL information from your Note
  - Get the OData feed
  - Get the OData v4 feed

- Query „beerQuery“
  - Complete URL information from your Note
  - Get the OData feed
  - Get the OData v4 feed
  - Filter the OData v4 query by *Name = 'Atlantic Ale'*

- Note: Company Name is needed for URL

```
@copmanyName = CRONUS%20USA%2C%20Inc.

GET  {{apiHost}}:7048/NAV/ODataV4/Company('{{copmanyName}}')/
```

Business Central
Hands-On | Create an API Query

- Create a new API Query
  - Query ID 50105
  - Name “Beer Customer API [CC]“
- Setup the Properties
- Query from Customer Table
  - Id, No., Name, Beer Category Code
- Join Item and Customer Information to the query
  - Item Description, Customer Region Name

```
query 50105 "Beer Customer API [CC]"
{
    QueryType = API;
    APIPublisher = 'Workshop';
    APIGroup = 'FavoritBeer';
    APIVersion = 'v1.0';
    EntityName = 'beerCustomer';
    EntitySetName = 'beerCustomers';
```


```
"value": [
  {
    "id": "945a3654-16f8-45ed-8d06-65b743c6fa51",
    "no": "10000",
    "name": "Adatum Corporation",
    "beerCategoryCode": "ALE",
    "description": "Atlantic Ale",
    "countryRegionName": "USA",
    "auxiliaryIndex1": "ATLANTIC ALE",
    "auxiliaryIndex2": "US"
  },
  {
    "id": "6737f40f-a65b-4c44-a176-9764dba02656",
    "no": "20000",
    "name": "Trey Research",
    "beerCategoryCode": "PILS",
    "description": "Freiberger Pilsner",
    "countryRegionName": "USA",
```

Business Central
Hands-On | Create an API Page

- Create a new API Page
  - Page ID 50105
  - Name “Beer API [CC]“

- Add the fields to the repeater

```
0 references
field(id; Id)
{
    Caption = 'id';
}
0 references
field(beerCategoryCode; "Beer Category Code [CC]")
{
    Caption = 'beerCategoryCode';
}

0 references
field(beerCategoryName; "Beer Category Name [CC]")
{
    Caption = 'beerCategoryName';
}
0 references
field(name; Description)
{
    Caption = 'name';
}
```

```
page 50105 "Beer API [CC]"
{
    PageType = API;
    Caption = 'apiPageName';
    APIPublisher = 'Workshop';
    APIGroup = 'FavoritBeer';
    APIVersion = 'v1.0';
    EntityName = 'beer';
    EntitySetName = 'beers';
    SourceTable = item;
    DelayedInsert = true;
    ODataKeyFields = Id;

    layout
    {
```

Business Central
Hands-On | Test API Query and API Page

- Test API Pages „Beer API [CC]“
  - Setup the variables in your simulation file (publisher, group, entity, entities, …)
  - Get all entities from „Beer API [CC]“ page {{apiVersion}}/companies({{copmanyID}})/{{entities}}
  - Get one entity from „Beer API [CC]“ {{apiVersion}}/companies({{copmanyID}})/{{entities}}(<id>)
  - Filter the entities by: Name = 'Atlantic Ale’ *…/{{entities}}?$filter=…*


```
{
  "@odata.context": "https://bc-spring-us.westeurope.cloudapp.azure.com:7048/nav/api/Workshop/Favo
$metadata#companies(11964762-da4a-4882-ba17-af8f89e90f5e)/beers/$entity",
  "@odata.etag": "W/\"JzQ0O2tXUFlMS1lSLzhpWi8zdE81ZFhVQllJWk8zTDE3OGdvWW9xZmo3MGFRZW89MTswMDsn\"",
  "id": "28a3379c-232e-415c-963e-059bb07d1083",
  "beerCategoryCode": "ALE",
  "beerCategoryName": "Ale",
  "name": "Atlantic Ale"
}
```


- Test API Query „ Beer Customer API [CC]“
  - Setup the variables in your simulation file (publisher, group, entity, entities, …)
  - Get all entities from „Beer API [CC]“ page {{apiVersion}}/companies({{copmanyID}})/{{entities}}
  - Filter the entities by: Beer Category Code = 'ALE' or 'PILS' *…/{{entities}}?$filter=…*


```
{
  "@odata.context": "https://bc-spring-us.westeurope.cloudapp.azure.com:7048/n
1.0/$metadata#companies(11964762-da4a-4882-ba17-af8f89e90f5e)/beerCustomers",
  "value": [
    {
      "id": "945a3654-16f8-45ed-8d06-65b743c6fa51",
      "no": "10000",
      "name": "Adatum Corporation",
      "beerCategoryCode": "ALE",
      "description": "Atlantic Ale",
      "countryRegionName": "USA",
      "auxiliaryIndex1": "ATLANTIC ALE",
      "auxiliaryIndex2": "US"
    },
    {
```

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Business-Software für Menschen

Microsoft AL

Modern API

Business Central
Navigation Properties

```
<EntityType Name="salesOrder">
    <Key>
        <PropertyRef Name="id" />
    </Key>
    <Property Name="id" Type="Edm.Guid" Nullable="false" />
    <Property Name="number" Type="Edm.String" MaxLength="20" />
    <Property Name="externalDocumentNumber" Type="Edm.String" MaxLength="35" />
    <Property Name="orderDate" Type="Edm.Date" />
    <Property Name="customerId" Type="Edm.Guid" />
    <Property Name="contactId" Type="Edm.String" MaxLength="250" />
    <Property Name="customerNumber" Type="Edm.String" MaxLength="20" />
.........
    <Property Name="lastModifiedDateTime" Type="Edm.DateTimeOffset" />
    <NavigationProperty Name="salesOrderLines" Type="Collection(Microsoft.NAV.salesOrderLine)" ContainsTarget="true" />
    <NavigationProperty Name="customer" Type="Microsoft.NAV.customer" ContainsTarget="true" />
    <NavigationProperty Name="currency" Type="Microsoft.NAV.currency" ContainsTarget="true" />
    <NavigationProperty Name="paymentTerm" Type="Microsoft.NAV.paymentTerm" ContainsTarget="true" />
</EntityType>
```

/salesOrders({{salesOrderId}})/customer

Business Central
/api Structure

- @odata.etag
- id (GUID)
- lastModifiedDateTime
- Lower camel casing
- Complex Types


```
{
    "@odata.etag": "W/\"JzI4O0d3QUFBQUo3QkRFQU1BQXdBREFBQUFBQUFBPT03OzEzMjM2NTUwOyc=\"",
    "id": "5b0b9c1c-312d-4809-96b2-056690a11057",
    "number": "1000",
    "displayName": "General Landscaping",
    "type": "Service",
    "blocked": false,
    "baseUnitOfMeasure":
        {
            "code": "HOUR",
            "displayName": "Hour",
            "symbol": null,
            "unitConversion": null
        },
    "gtin": "",
    "itemCategory": null,
    "inventory": -52,
    "unitPrice": 50,
    "priceIncludesTax": false,
    "unitCost": 27,
    "taxGroupCode": "LABOR",
    "lastModifiedDateTime": "2017-08-29T18:51:23.17Z"
}
```

Business Central
Deep Insert

- Enables creating a tree of related entities in one request

```
{
    "invoiceDate": "2016-07-26",
    "dueDate": "2016-08-26",
    "customerId": "653053b1-d580-4102-845f-00df29a77e1e",
    "salesInvoiceLines" : [
            {"itemId":"5b0b9c1c-312d-4809-96b2-056690a11057", "quantity": 4},
            {"itemId":"ad7220e5-8149-4cf0-a1e6-07d2bbbf414c", "quantity": 1}
            ]
    }
```

Business Central
Bound Actions

- Actions called through the API
  - Bound to an entity
  - Actions coming for /api endpoint
  - Can be created for ODataV4 web services

- Method inside of API Page
  - Marked with Attribute "ServiceEnabled"
  - Data Exchange with WebServiceActionContext

```
[ServiceEnabled()]
procedure execute(var actionContext: WebServiceActionContext)
var
```

```
actionContext.SetResultCode(WebServiceActionResultCode::Created);
```

- HTTP Call with POST

```
})/{{entitiesName}}(64a9fe2a-7d46-4e70-8ba5-0494e04ab1c8)/Microsoft.NAV.execute
```

```
<EntityType Name="salesQuote">
    <Key>
        <PropertyRef Name="id" />
    </Key>
    <Property Name="id" Type="Edm.Guid" Nullable="false" />
    <Property Name="number" Type="Edm.String" MaxLength="20" />
    <Property Name="externalDocumentNumber" Type="Edm.String" MaxLength="35" />
    <Property Name="documentDate" Type="Edm.Date" />
    <Property Name="dueDate" Type="Edm.Date" />
    ....
    <Property Name="acceptedDate" Type="Edm.Date" />
    <Property Name="lastModifiedDateTime" Type="Edm.DateTimeOffset" />
    <NavigationProperty Name="salesQuoteLines" Type="Collection(Microsoft.NAV.sales
    ...
    <NavigationProperty Name="paymentTerm" Type="Microsoft.NAV.paymentTerm" Contain
    <NavigationProperty Name="shipmentMethod" Type="Microsoft.NAV.shipmentMethod" C
</EntityType>
<Action Name="makeInvoice" IsBound="true">
    <Parameter Name="bindingParameter" Type="Microsoft.NAV.salesQuote" />
</Action>
<Action Name="send" IsBound="true">
    <Parameter Name="bindingParameter" Type="Microsoft.NAV.salesQuote" />
</Action>
```

Business Central
Versioning for APIs

- Enabled versioning of API library
  - https://api.businesscentral.dynamics.com/v1.0/api/beta/
  - https://api. businesscentral.dynamics.com/v1.0/api/v1.0/

Business Central
Upcoming Webhook support

- Operations on subscription entity
  - GET – list all subscriptions for a company
  - POST – create a new webhook subscription
  - DELETE – delete a subscription
  - PATCH – Renew a subscription

Business Central
Get notified - subscribe

- POST …./api/v1.0/subscriptions

```
{
        "clientState":”secret",
        "notificationUrl":"https://mywebsite.azurewebsites.net/api/webhook”,
        "resourceUrl":”/api/v1.0/companies(name='CRONUS International Ltd.')/salesInvoices"
}
```

- Handshake for POST & PATCH needed.

- Both parties supplies a secret, which needs to be echoed back
  - Client provides clientSecret
  - BC provides validationToken

Business Central
Notification payload


```
[
  {
    "subscriptionId": "9c0b28a0-ae4a-4b66-881b-c8f3db3b802d",
    "clientState": "API WEBHOOK NOTIFICATION TEST",
    "expirationDateTime": "2018-09-21T16:08:28.597Z",
    "resource": "/api/beta/companies({ID})/items(93aaa13a-251b-4c3b-ba80-ccc38c34c5e3)",
    "changeType": "updated",
    "lastModifiedDateTime": "2018-09-20T16:08:27.597Z"
  },
  {
    "subscriptionId": "9c0b28a0-ae4a-4b66-881b-c8f3db3b802d",
    "clientState": "API WEBHOOK NOTIFICATION TEST",
    "expirationDateTime": "2018-09-21T16:08:28.597Z",
    "resource": "/api/beta/companies({ID})/items(93b37d68-d179-4ef9-bd26-60eb024d9e68)",
    "changeType": "created",
    "lastModifiedDateTime": "2018-09-20T16:08:28.597Z"
  },
  {
    "subscriptionId": "fe564bb8-a735-4a29-802c-ff6aa630557d",
    "clientState": "API WEBHOOK NOTIFICATION TEST",
    "expirationDateTime": "2018-09-25T19:16:35.17Z",
```

COSMO CONSULT

Business-Software für Menschen

Hands On

Business Central
Hands-On

- Prerequisites
  - Connect to your Workshop VM → use Instructions on your Workshop Boarding Pass
- Hand On - Tasks
  - Add, implement and test a Bound Action to the API Page
  - Insert some Records with API (ID Guid is necessary)

MICROSOFT AL

Q & A