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Knowledge Check Test

The multidimensional data model is an integral part of On-Line Analytical Processing, or OLAP.

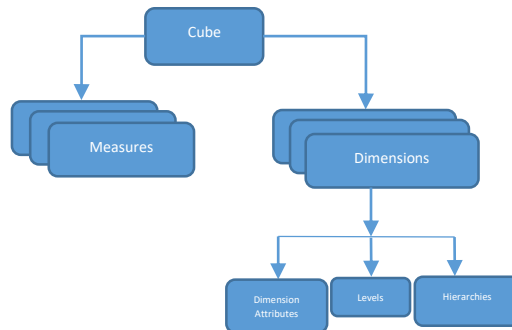


Figure 1 Diagram of the Logical Multidimensional Model

Web Service and UI

Based on macroeconomics data IMF WEO (the example is attached) create an OLAP

- The data should be stored within the database (ex. MS SQL)
- Create a web service on C# .NET Core or .NET Framework
 - The service should read the data out of the database
 - The service should process the data into the multidimensional cube
 - The service should serve API requests and return data in a JSON format
- Create a UI using TypeScript (you can also use any frameworks like React, Angular, Vue, etc.)
 - UI should be able to fetch the data via API from the Web Service
 - UI should visualize the data as a table
 - UI should have controls for dimensions so the user can change the selected elements (ex. change the country)
 - Once the selection is changed UI should get new data from the API based on the user's selection
 - (Optional) UI to have an ability to swap dimensions across rows and columns and move some of the dimensions to filters

Data structure

The data has two dimensions:

- Countries
 - Countries dimensions has two attributes (the name and the code)
- Indicators
 - Indicators dimensions has two attributes (the name and the code)

The data itself are numeric values by date, the frequency of the data is annual data (A) and quarterly data (Q)

Task (IMF.WEO) – Solution structure



Figure 2 Solution folder structure

Development.API

.NET Core Web swagger API provides information about the service, using the generated OpenAPI specification. Available methods:

`GET /api/v1/Development/items`

`GET /api/v1/Development/itemslist`

Currently Development.UI uses itemslist method.

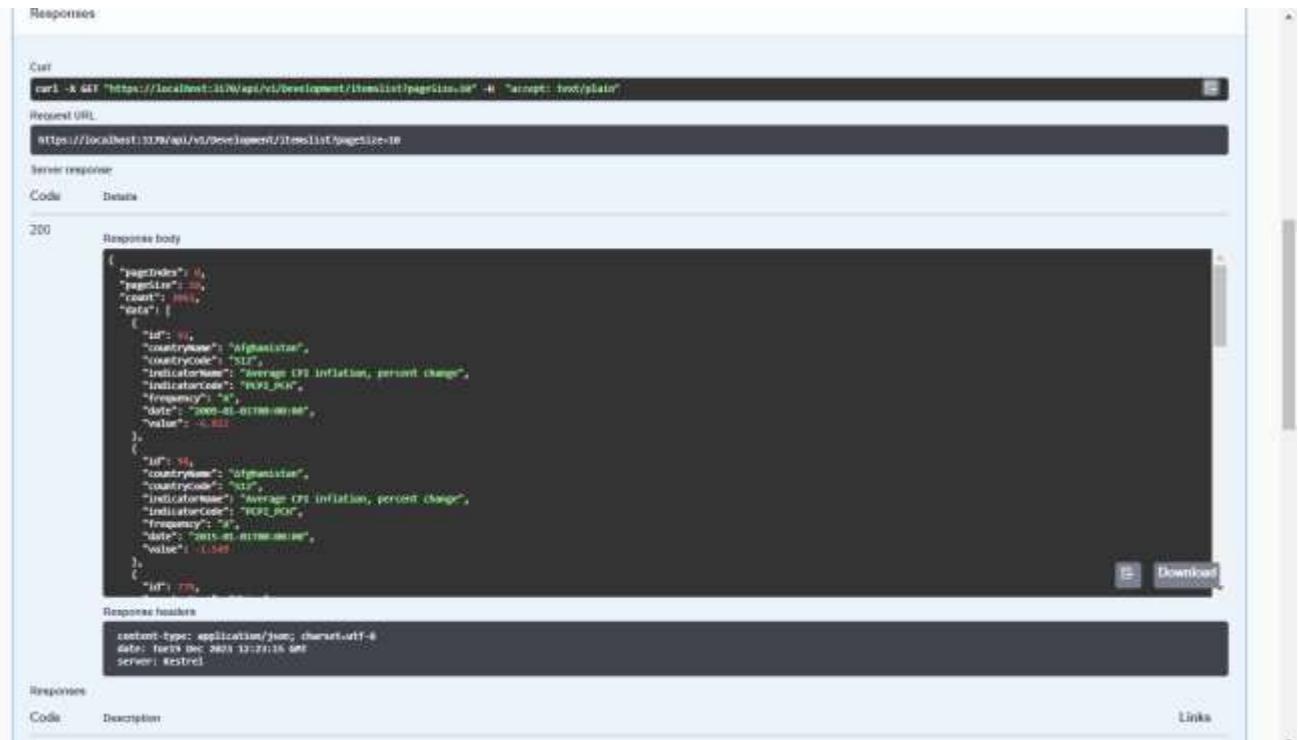


Figure 3 Swagger API

Development.UI

UI is uses JavaScript and taking an advantage of cube.js lib implemented by Orlov Leonid.

<https://github.com/feonit/olap-cube-js>

INF V03 OLAP Cube (output data from .CSV file)

Country Name		Country Category		Indicator Name		Indicator Category		Date		Data Category			
id	countryname	countrycode	id	indicatorname	indicatorcode	countryname_id	id	date	frequency	indicatorname_id	id	value	date_id
1	Afghanistan	922	1	Average CPI inflation, percent change	PCPI_PCH	1	1	2000-01-01T00:00:00	A	1	1	-6.011	1
								2015-01-01T00:00:00			2	-1.540	2
2	China	824	2	Average CPI inflation, percent change	PCPI_PCH	2	2	2000-01-01T00:00:00	A	2	3	-1.4	3
								2000-01-01T00:00:00			4	-0.5	4
								2000-01-01T00:00:00			5	-0.5	5
								2000-05-01T00:00:00			6	-0.7	6
3	Togo-Lesle	537	3	Average CPI inflation, percent change	PCPI_PCH	3	3	2014-01-01T00:00:00	A	3	7	-0.500	7
								2009-01-01T00:00:00			8	-0.200	8
4	United States	331	4	Average CPI inflation, percent change	PCPI_PCH	4	4	2000-01-01T00:00:00	A	4	9	-0.500	9
								2000-01-01T00:00:00			10	-0.500	10

Figure 4 OLAP Table UI

Run the task

Backend

Navigate to IMF\Development.API root folder and open your preferred command prompt. Type:

```
dotnet run --profile "IMF.WEO"
```

As a result API will be available at url <https://localhost:3170/swagger/index.html>

Frontend

W:\Projects\IMF\Development.UI root folder and open your preferred command prompt. Type:

```
npm install
```

Once the node modules are in place we can run ui using:

```
node index.js
```

As a result UI will be available at url <http://localhost:3175/>

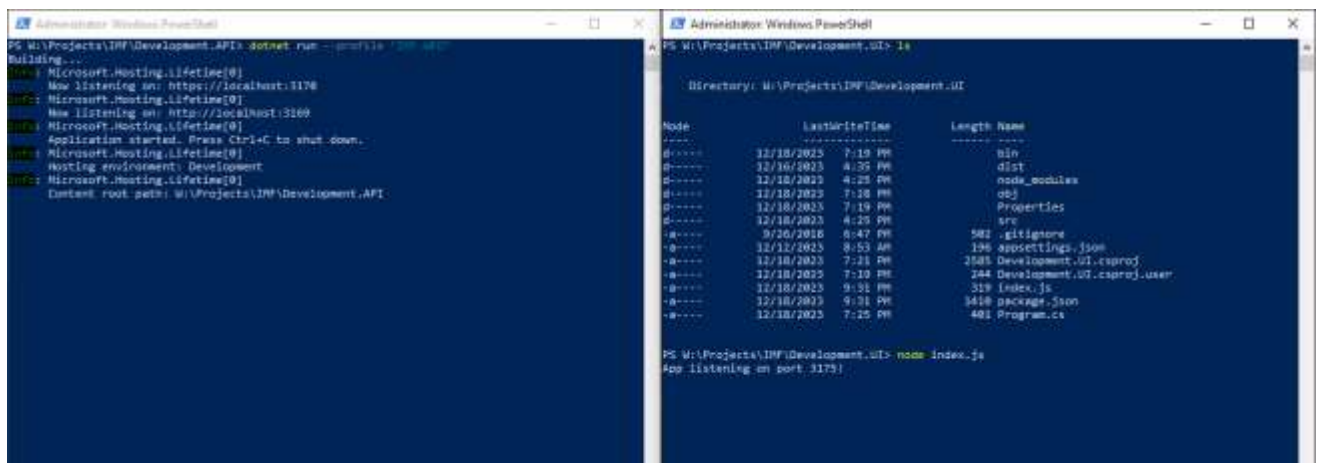


Figure 5 Power shell screenshots

To be implemented

Still missing certain parts from the requirements.

- UI should have controls for dimensions so the user can change the selected elements (ex. change the country)
 - Once the selection is changed UI should get new data from the API based on the user's selection
- (Optional) UI to have an ability to swap dimensions across rows and columns and move some of the dimensions to filters

References

- https://en.wikipedia.org/wiki/Online_analytical_processing
- <https://ru.wikipedia.org/wiki/OLAP-%D0%BA%D1%83%D0%B1>
- https://help.sap.com/docs/SAP_BUSINESSOBJECTS_ANALYSIS_EDITION_FOR_OLAP/4ae5a34085c44f4ea2b4cab4d7c43e19/47146f866e041014910aba7db0e91070.html?locale=ru-RU
- http://www.olap.ru/basic/multi_dim_DWH.asp
- <https://github.com/feonit/olap-cube-js>
- https://docs.oracle.com/cd/B13789_01/olap.101/b10333/multimodel.htm