BUCHAREST UNIVERSITY OF ECONOMIC STUDIES

Faculty: Cibernetics, Statistics and Economic Informatics

Specialization: ***Economic Informatics***

Practice project

Project theme: Managing a coffeehouse chain

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Bucharest

2017

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Introduction

This project is the result of all my work as an intern at Crystal System Ltd., where I had the opportunity to learn and apply SAP ABAP technology. I worked in the Business Intelligence department.

The informatic system that I created has the purpose of improving the management of a coffeehouse chain. The information in this database is fictive. The tables' name start with Z and my initials. Any object name in SAP that starts with Z or Y is used for practice.

The database has the following tables:

- ZKN_CAFENELE – information about branches
  - CAFENEA_ID (PK)
  - CAF_ADRESA
  - CAF_EMAIL
  - CAF_TELEFON
- ZKN_BAUTURI – information about the available products
  - B_ID (PK)
  - B_DENUMIRE
  - B_PRET
  - B_MONEDA
- ZKN_CLIENTI – information about customers
  - CLIENT_ID (PK)
  - CL_NUME
  - CL_PRENUME
  - CL_EMAIL
  - CL_TELEFON
- ZKN_ANGAJATI – information about the employees
  - ANGAJAT_ID (PK)
  - ANG_NUME
  - ANG_PRENUME
  - ANG_ADRESA
  - ANG_TELEFON
  - DATA_ANGAJARE

- ZKN_COMENZI – information about the orders
  - COMANDA_ID (PK)
  - CLIENT_ID (FK)
  - ANGAJAT_ID (FK)
  - CAFENEA_ID (FK)
  - DATA_COMANDA
  - MOD_PLATA
- ZKN_ITEM_COMANDA – information about the products that are being ordered
  - COMANDA_ID (PK, FK)
  - BAUTURA_ID (PK, FK)
  - NR_BAUTURI

1. Presenting Crystal System Ltd.

Crystal System is an IT engineering and consulting Company which supplies services and solutions based on clients' premises and near-shore software factories, with the objective of providing its customers with high quality services at competitive costs.

Founded in 2001 in Bucharest, Crystal System Ltd. is today a strategic IT partner to some of the largest European companies. Over the years they have developed a wide knowledge in the fields of SAP technologies, Business Intelligence, Web & Cloud & Mobile technologies, and their experts carry out Consultancy, Design, Implementation and Maintenance of IT systems, delivering high quality and time/cost effective outsourcing services.[1]

To be able to offer quality services, Crystal System uses an integrated program of forming its consultants through modern, knowledge management methods. Offering quality services to clients is a must in order to be successful in this line of work.[2]

As a result of extending its client-base, Crystal System has offices in Western Europe in Torino, Bruxelles and Lugano (Switzerland). Its headquarter is in Bucharest. Also, there are other offices in Romania in Galați and Baia Mare, and one in Chișinău, Republic of Moldova. There are now over 300 employees that serve big companies from Western Europe, USA and Russia.

Crystal System mainly serves big international companies as IBM, Accenture, Capgemini, Atos-Origin, SAP, Oracle, Pirelli, FIAT, DeLonghi, Metro, Deautsche Bank, Northdoor (Ireland), Acctus (Austria) and others.[3]

Crystal System delivers outsourcing services in three main technology areas:

- ERP (technologies related to SAP)
- Business Intelligence, Analytics and EPM
- Web, Cloud & Mobile technologies

Crystal System' activity is focused on IT Implementation: all their collaborators are able IT specialists. They deliver consulting and engineering services that include analysis, design, development, testing, implementation and maintanance of business application software.

[1, 2, 3] www.marketwatch.ro/articol/3849/Crystal_Sistem_-_Companie_romaneasca_cu_dezvoltare_europeana

ERP technologies

The main business of the company, in terms of revenues, is based on SAP related technologies. The first SAP Factory started its activity in 2003 for IBM Global Delivery Center. The team, constantly extended with new resources coming from the SAP training program, is now one of the largest in Eastern Europe.

ERP stands for Enterprise Resource Planning. The technologies used are SAP NetWeaver Platform and SAP HANA Platform.

Business Intelligence, Analytics and EPM

Over the past 11 years, Crystal System developed over 50 major applications for more than 30 leading European enterprises.

In this line of work, the technologies used are:

- **Oracle Hyperion** – Crystal System is a Gold Oracle partner. It has extensive competence in ETL technologies, OBIEE platform and in Oracle databases.
- **SAP Business Object** – The SAP BW (Business Warehouse) team is one of the most important teams in Eastern Europe. The Business Objects team covers BO front end tools (Report, Xcelsius Dashboard, WeBI), BO ETL tool (BODI) and HANA environment.
- **SAS** – Crystal System has build the SAS HUB Competence Center in Bucharest to support the entire Central-East Europe SAS region. Crystal's expertise consists in solid skills on SAS programming languages and SAS macros, SAS Data Integration, SAS Analytics platform, SAS Analytics Visual and SAS Industry Solutions. There is a major experience in banking, insurance, energy and manufacturing sectors.
- **Qlik** – Crystal System itself is using Qlik for its internal BI applications.
- **IBM and Microsoft** – Among these extensive technology offering of these two key vendors, Crystal System is focused on BI databases (IBM Netezza and Microsoft SQL Server) and ETL tools (Microsoft SSIS, IBM Data Stage).

Web, Cloud & Mobile technologies

The Web, Cloud & Mobile technologies area is in a constant growth inside Crystal System. The technologies used are: Java/J2EE, Microsoft .NET, Appian and SAP HANA Cloud Platform.

2. Presenting SAP ABAP technology

SAP stands for **S**ystems, **A**pplications & **P**roducts in Data Processing. SAP AG is a German multinational software corporation that makes enterprise software to manage business operations and customer relations. In present, SAP is the most important ERP program worldwide.[4]

SAP is very complex, being helpful in business services and technological solutions for accountancy, customer relations management (CRM), supply chains, banking, insurance, etc.

SAP is the world leader in enterprise applications in terms of software and software-related service revenue. Based on market capitalization, it is the world's third largest independent software manufacturer and the largest business software manufacturer.

SAP ERP is a sistem based on a 3 layer architecture:

- Presentation server – GUI
- Application server – data processing using ABAP
- Database – storing data

We used two connections / systems in SAP:

- IDES 3.0 – Internet Demonstration and Evaluation System
- SAP NetWeaver BW 7.4 – Business Warehouse + BI platform

The SAP GUI window is composed of:

- Menu Bar
- Command Bar
- Standard Toolbar
- Title Bar
- Application Toolbar
- Status bar

[4] en.wikipedia.org/wiki/SAP_SE

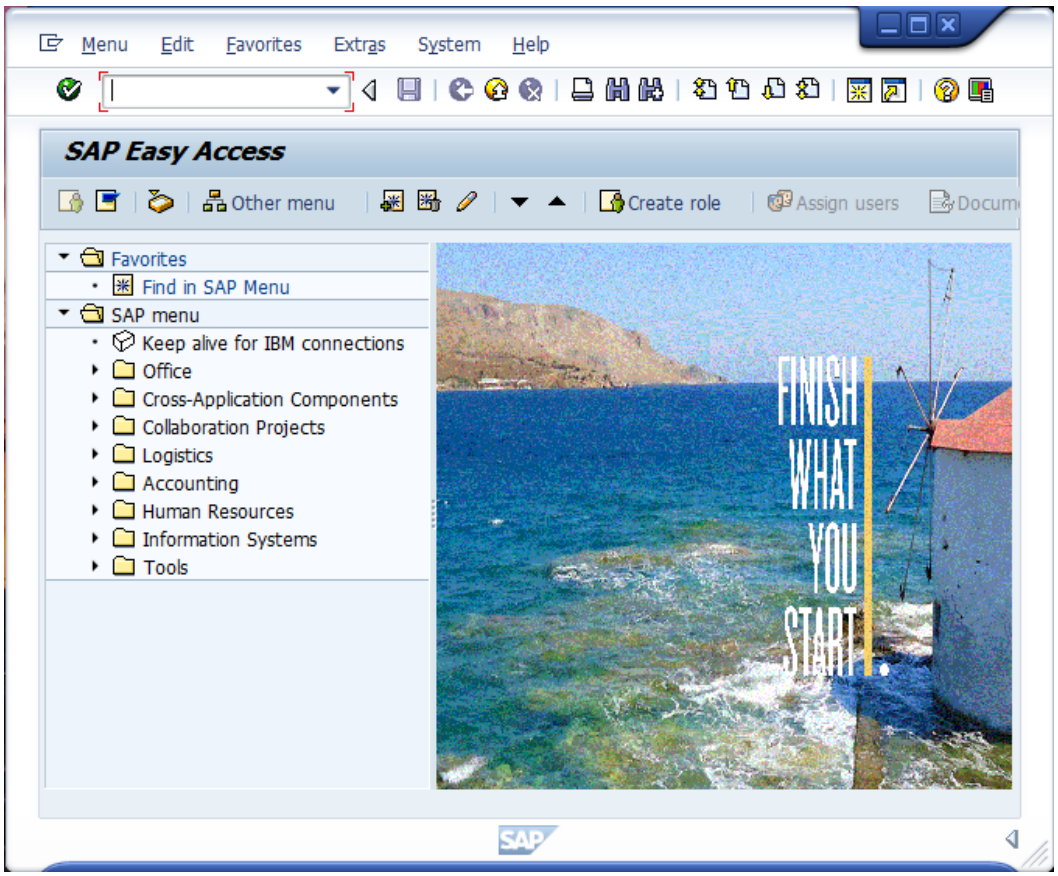

Fig 2.1 – SAP GUI

The SAP Easy Acces menu (Fig 2.1) is composed of:

- Logistics
- Accounting
- Human resources
- Production planning
- Distribution
- Retail
- Production
- Banking

Transactions in SAP

The code of a transaction is an alphanumeric combination of 4-5 characters. This can be used instead of following the whole path from the menu.

The transactions that I learned & used during my internship are:

- SE11 – ABAP Dictionary
- SE38 – ABAP editor (code)

- RSO2 – Extractor (Data Source)
- RSA3 – Data Source Tester
- RSA1 – BW Workbench

ABAP (Advanced Business Application Programming) is a high-level programming language created by SAP, that is used in SAP GUI. It is currently positioned, alongside Java, as the language for programming the SAP Application Server, which is part of the NetWeaver platform for building business applications.[5]

ABAP Dictionary (**SE11**) is the place where system metadata is created and modified. Here we define global data types, that can be used later for defining database objects or declaring variables in ABAP programs.

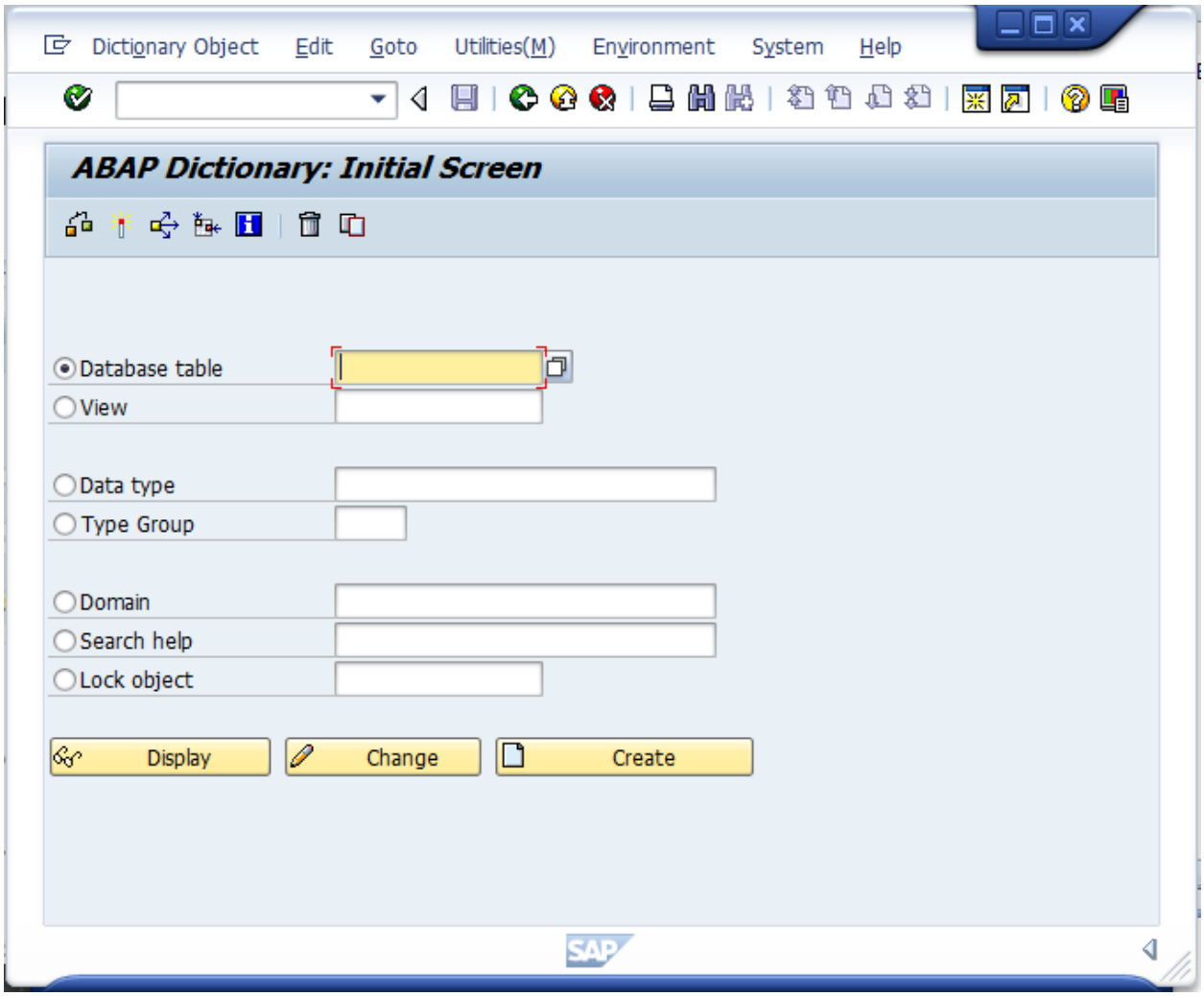

Fig 2.2 – SE11

[5] en.wikipedia.org/wiki/ABAP

3. Developing a program that has the purpose of improving the management of a coffeehouse chain

In order to create a database, we must first create tables. In order to create a table we need:

- Domain – represents the field. Can be used by many data elements (Fig 3.1)
- Data Element – defined by the domain. Can be used by many structures (Fig 3.2)
- Table Type – contains table characteristics and structures (Fig 3.3)

I started in IDES. After opening SE11 (Fig 2.2), I have created domains, data elements, structures and table types for all the tables presented earlier.

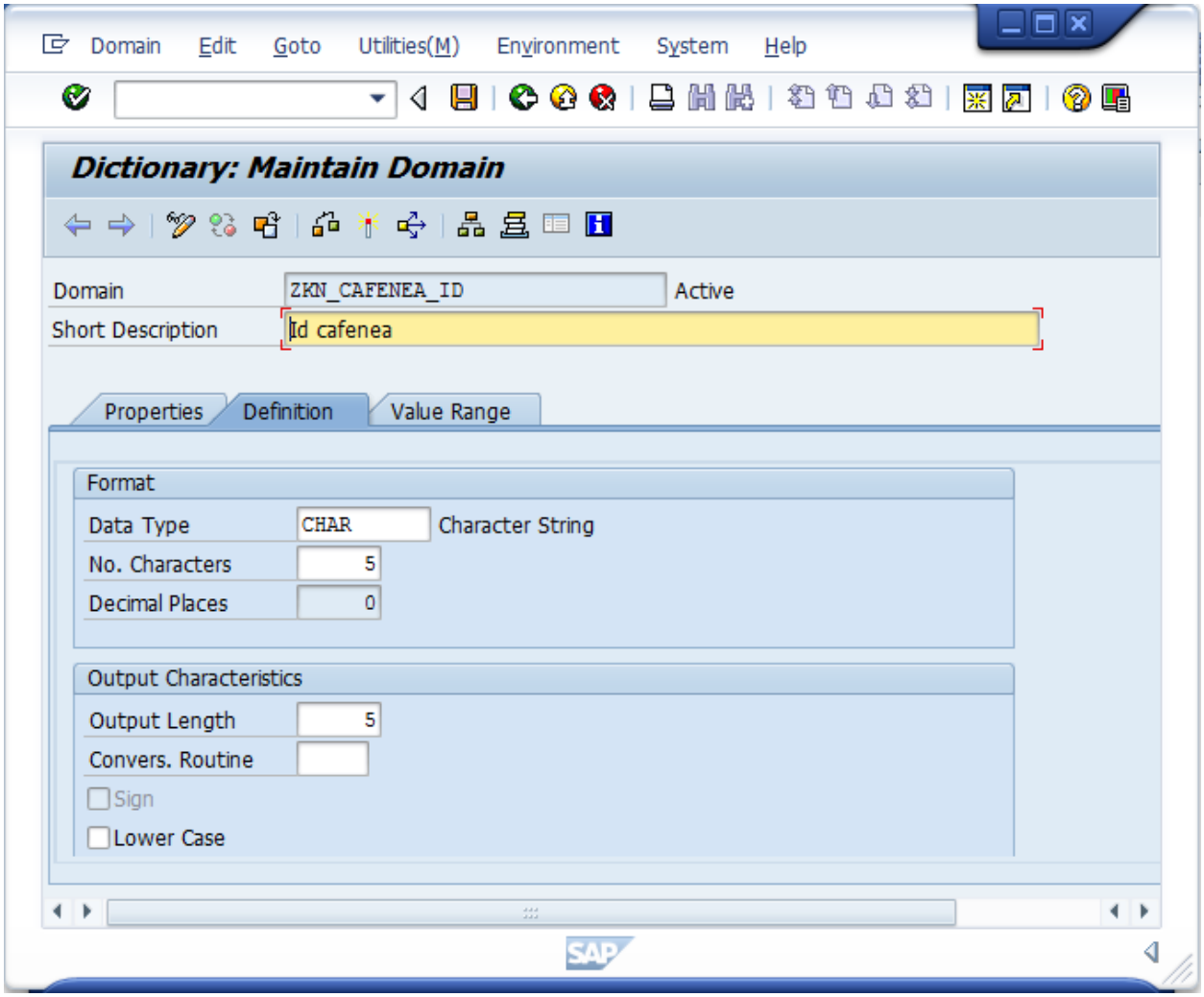

Fig 3.1 – Domain

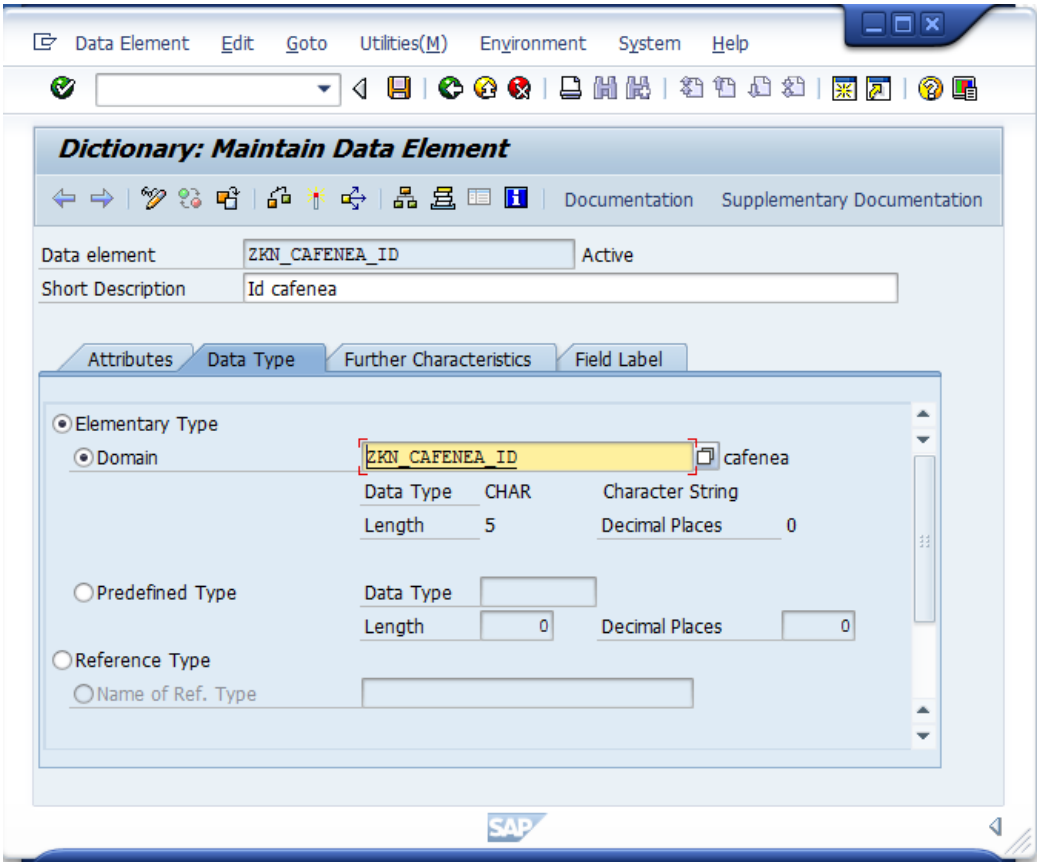

Fig 3.2.1 – Data Type

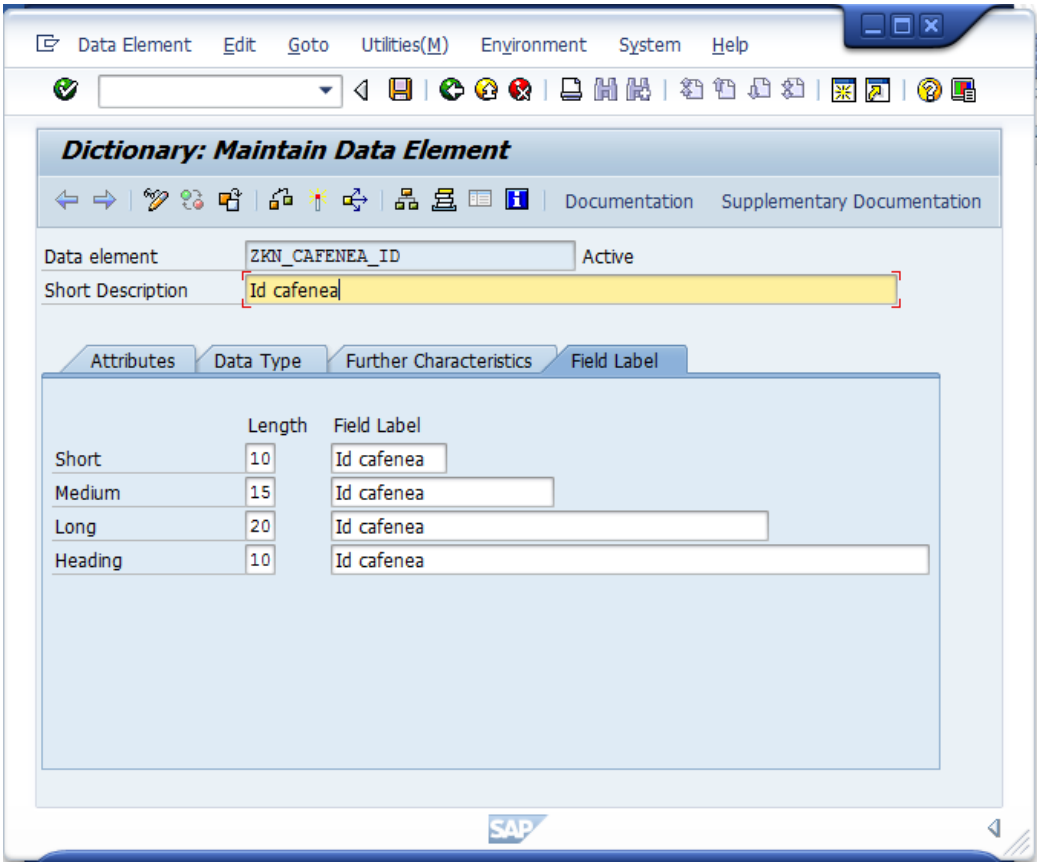

Fig 3.2.2 – Data Type (text field)

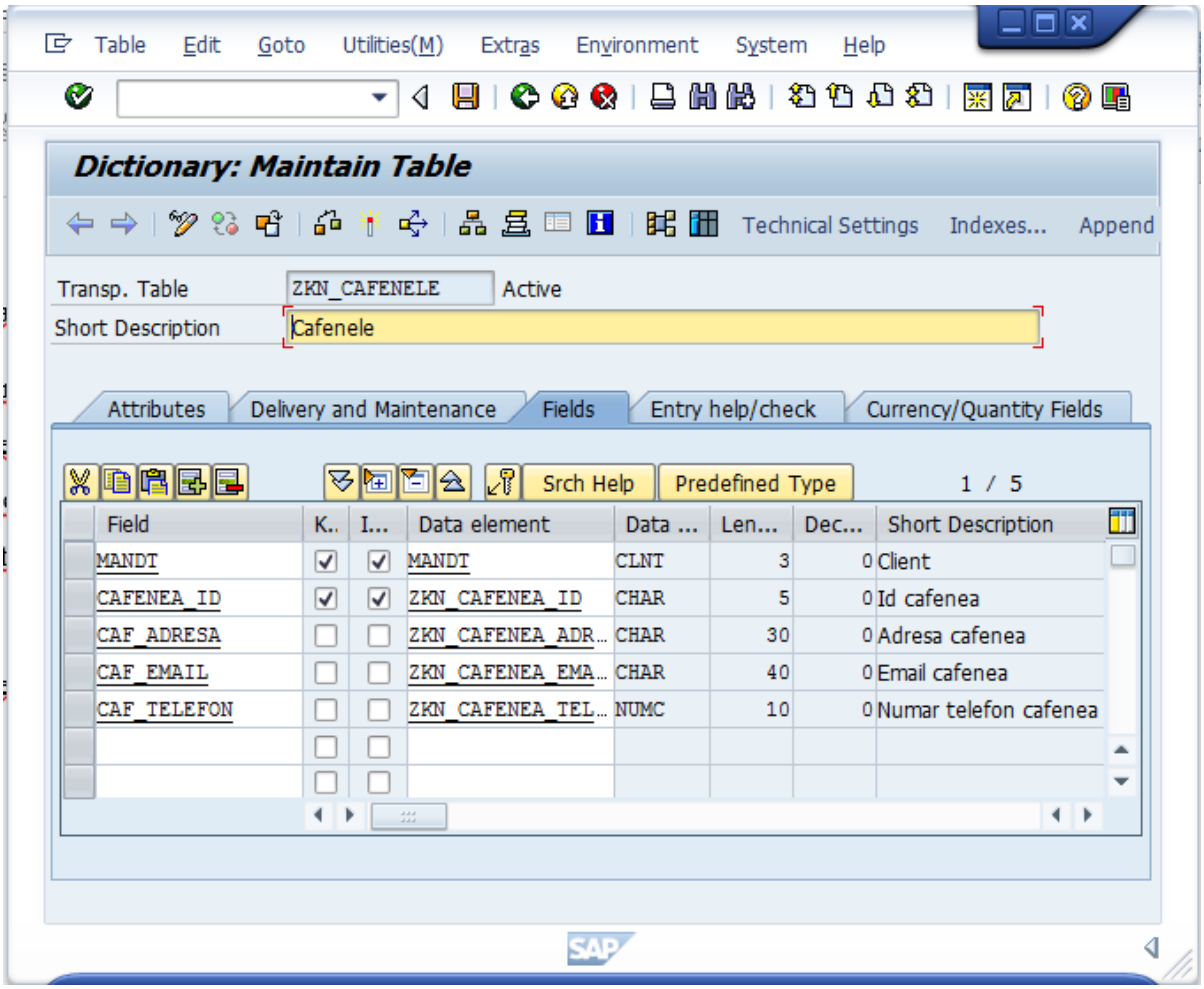

Fig 3.3.1 – Database table

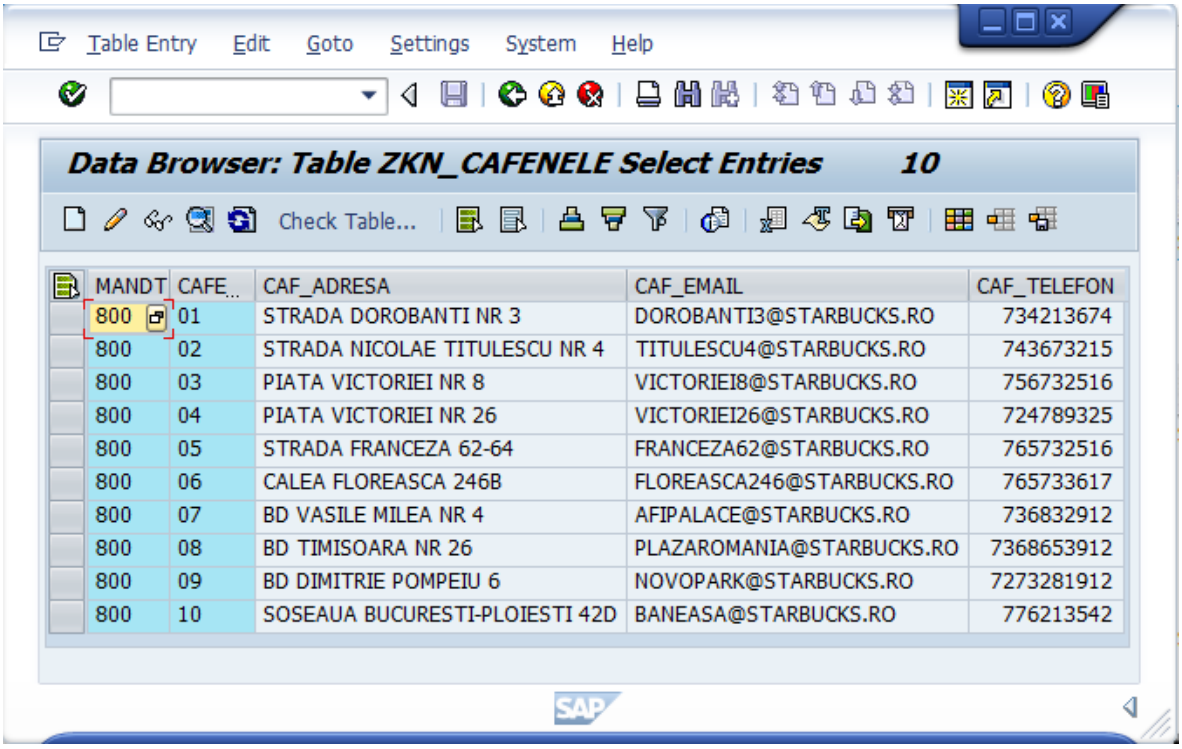

Fig 3.3.2 – Database table interogation

After I created all the tables and populated them, I will create an Extractor / Data Source and I will test it (Fig 3.4).

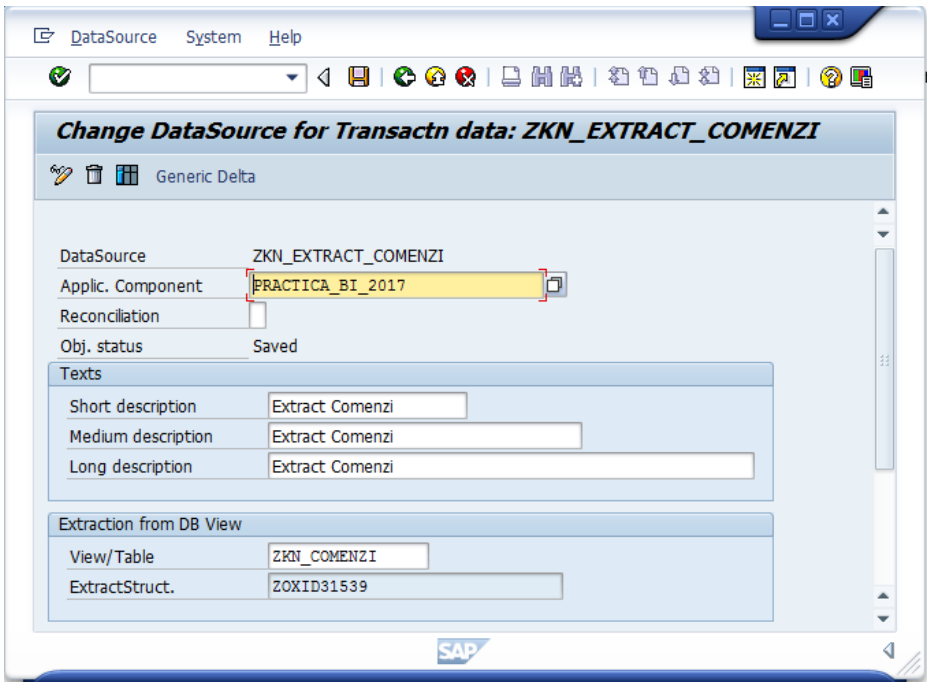

Fig 3.4.1 – Create Data Source

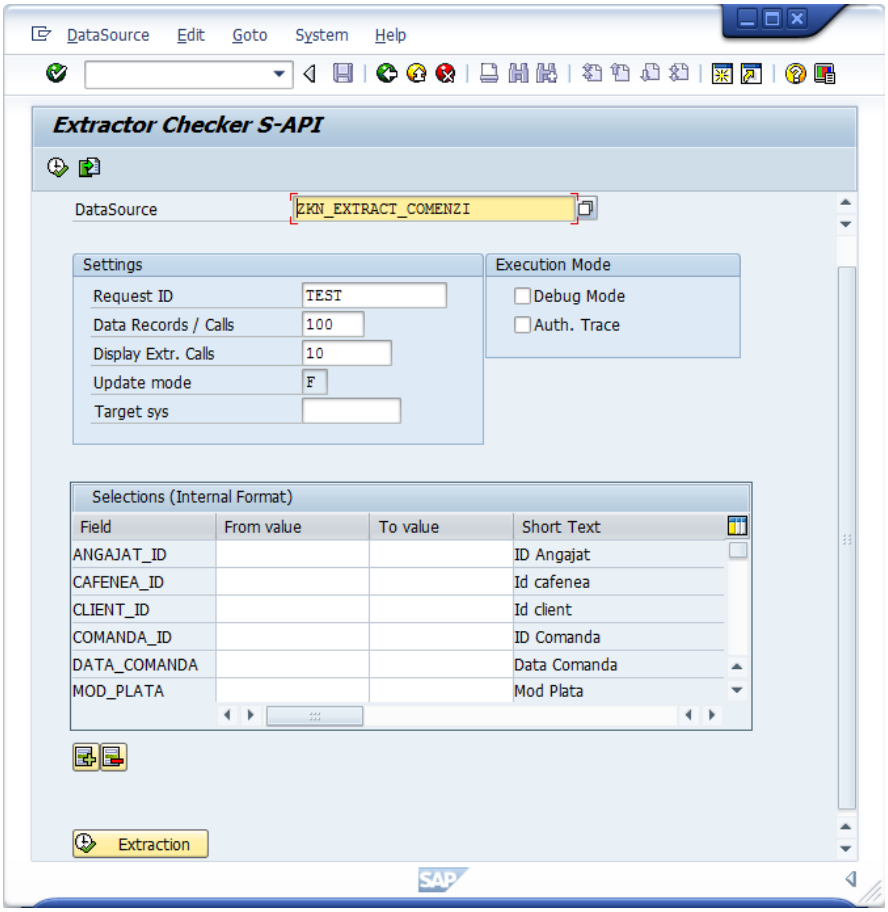

Fig 3.4.2 – Test Data Source

Now I am going to replicate the Data Source from IDS to BWD and activate it. I will now connect to SAP NetWeaver BW, and I will use the BW Workbench (**RSA1**) and I will create an Info Package to trigger data extraction from the source.

An Info Object is the smallest informational unit in BW system. They are organized in catalogues that are organized in InfoAreas components.

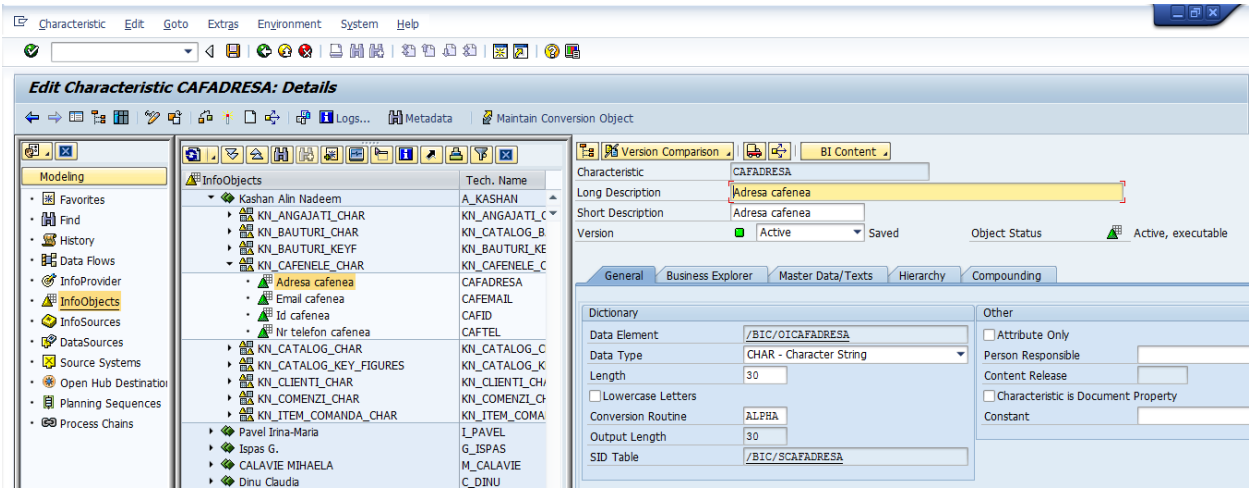

Fig 3.5 – RSA1 Info Objects

Data Store Objects (DSO) are objects from BW used to store data at document level. We will need DSOs in order to build an Info Cube. The DSO is organized in 3 bidimensional tables:

- New records table
- Active data table
- Change log table

I will create a transformation in my Data Source and I will add a Data Transfer Process (DTP) that I will execute.

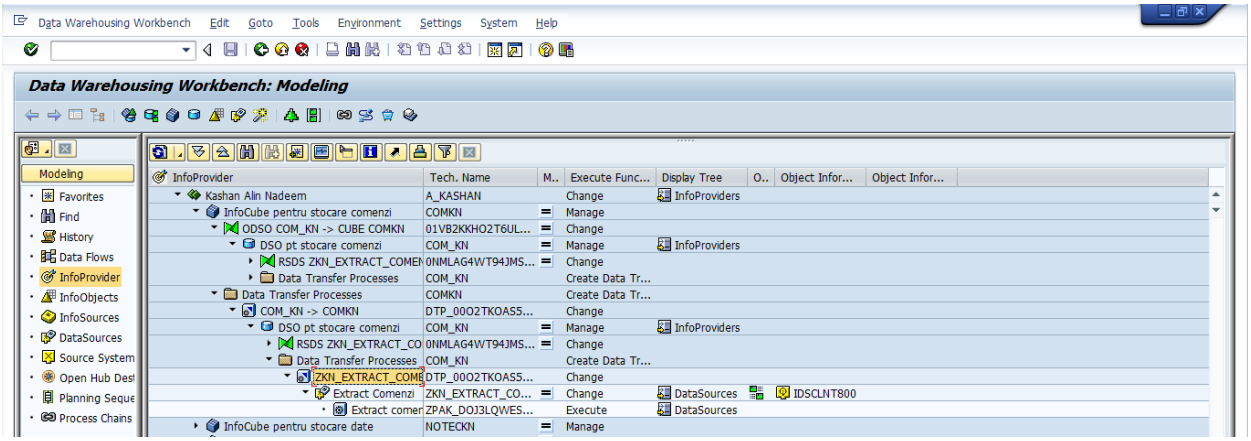

Fig 3.6 – DSO & DTP

Info Cubes (extended star scheme) are central objects of the BI multidimensional model. An Info Cube is also an independent set of data in a business framework. It is made up of:

- A central facts table
- Few dimension tables, that are linked to master data tables

The links between the dimension tables and master data tables, are made through Surogate ID (SID) tables. The links between tables in an Info Cube:

- Primary Key = a combination of the primary keys of the dimensions
- Dimensions have an external key to the SID tables of the coresponding characteristic
- SID tables contain links to atributes, texts and hierarchies of a characterisic

Because of the SID tables, master data are independent of Info Cubes, and they can be used for many Info Cubes in the same time.

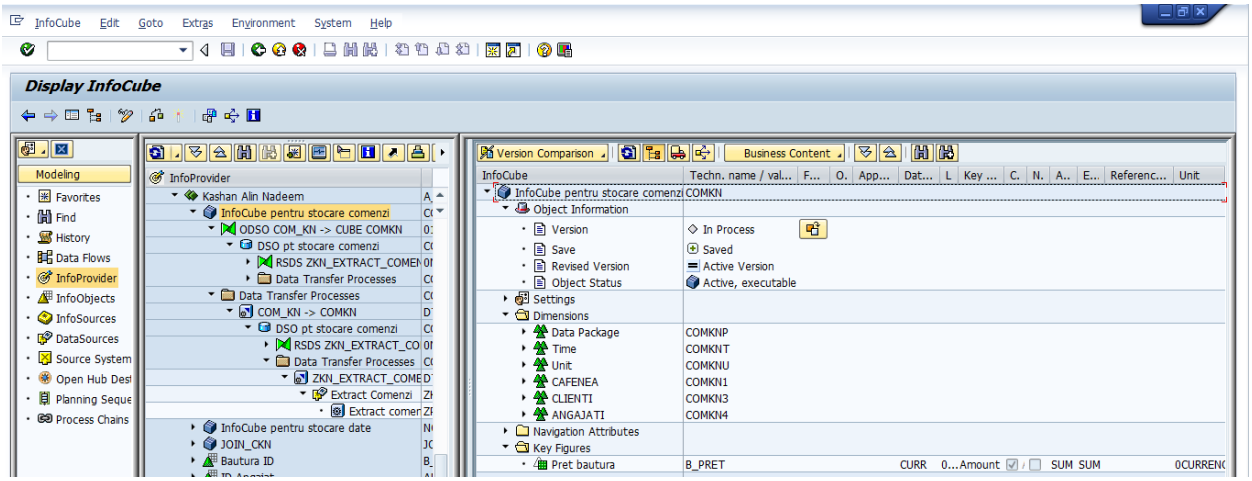

Fig 3.7 – Info Cubes

Conclusion

SAP ABAP is an optimal solution for managing a business, covering a very large area of business processes that are met in medium companies and includes manufacturing specific functionalities. With SAP, you can optimize processes, based on the experience of the most successful companies, having integrated advanced analysis tools and personalized raports, so that you can have an overview of all the activities of the company, to be able to take fast and efficient decisions.

My project represents only a small part of what it can be done in SAP. I used a database with only 6 tables. The project can be developed adding more tables or more functionalities, increasing its complexity. The purpose was to present the knowledge that I gained during my internship at Crystal System, so the used data is fictive.

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