OLAP Theory-English version
On-Line Analytical processing (Buisness Intelligence)

Ing.Skorkovský,CSc

Department of Corporate Economy

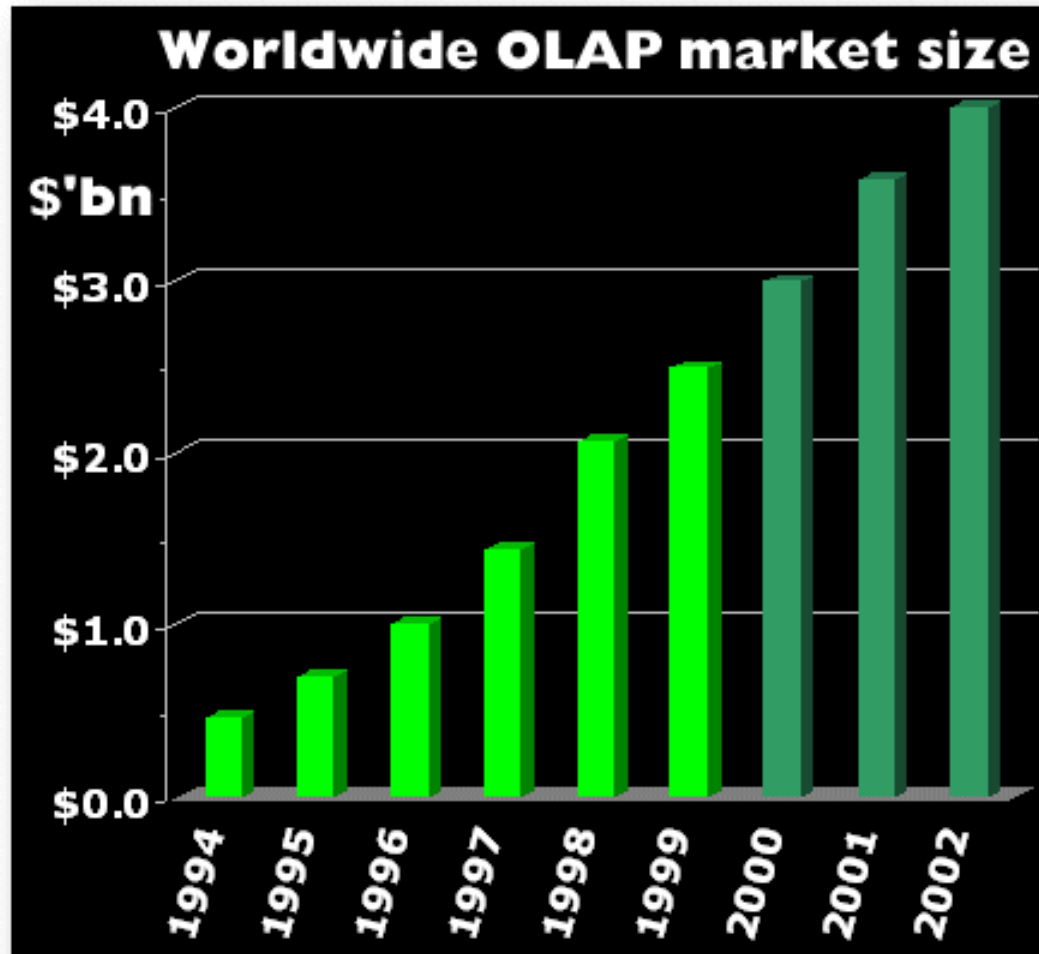Faculty of Economics and Administration

Masaryk Uinverzity Brno

Czech Republic

Agenda

- The Market
- Why OLAP
- Introduction to OLAP
- OLAP Terms and Concepts
- Summary

OLAP market size

Worldwide OLAP market size

Why OLAP

- **The Right Information In The Right Place At The Right Time**
- **Why**
  - – More self-sufficient Business users
  - – Keep the integrity of the data
  - – Reduces the query drag(burden) and network traffic
  - – Organization can respond more quickly to market demands

Introduction to OLAP

"OLAP enables analysts, managers, and executives to gain insight into data through fast, consistent, interactive access to a wide variety of possible views of information. OLAP transforms raw data so that it reflects the real dimensionality of the enterprise as understood by the user. "

Introduction to OLAP

- Users
  - Analysts, managers and executive managers
- Access
  - Fast consistent, interactive
  - Wide variety of possible views
- Transformation
  - Raw data
  - Real dimensionality of enterprise

Introduction to OLAP

- Organizational functions
  - Finance
    - Budgeting
    - Performance analysis
  - Sales
    - Sales analysis and forecasting
  - Marketing
    - Market research analysis
    - Market/customer segmentation
  - Purchase
    - Cost of materials
  - Production
    - Cost of conversion
  - Distribution
    - Cost of shipping
  - etc

OLAP Terms and Concepts

- Relational database

- Multidimensional database

Relational database	
Multidimensional database	
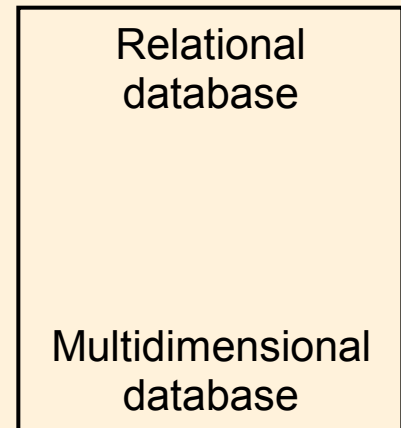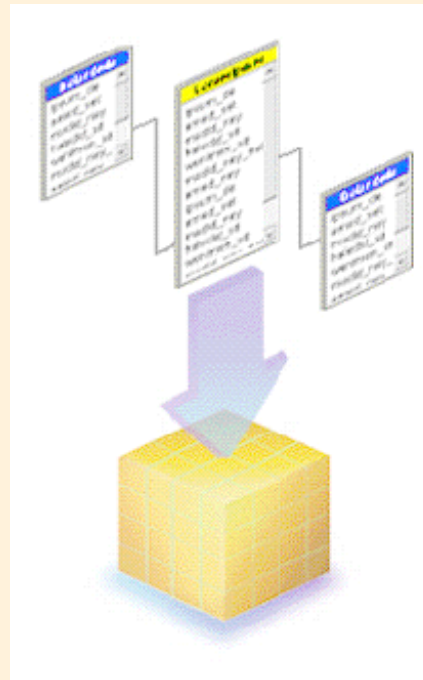
For MPH_AOMA not mandatory

MS Dynamics NAV Relationships

Sales Line Order

Type	No.	Description	Location Code	Quantity	Reserved Quantity	Unit of Measu...	S... P...	Unit Price Excl. VAT	Line Amount Excl. VAT	Line Disco...
Item	LS-MAN-10	Manual for Loudspeakers	WHITE	4		PCS				

Location List

Code	Name
BLUE	Blue Warehouse
GREEN	Green Warehouse
RED	Red Warehouse
SILVER	Silver Warehouse
WHITE	White Warehouse
YELLOW	Yellow Warehouse

Location card

General | Communication | Warehouse | Bins | Bin Policies

Code . . . . WHITE
Name . . . . White Warehouse
Address . . . . Merrily Grove Avenue 6, 2
Address 2 . . . .
Post Code/City . . . . WC1 2GS | West End Lane
Country/Region Code . . GB
Contact . . . .

Bins Tab

General | Communication | Warehouse | Bins | Bin Policies

Receipt

Receipt Bin Code W-08-0001

Bins List

Code	D
W-04-0014	
W-04-0015	
W-05-0001	
W-05-0002	
W-05-0003	
W-05-0004	
W-05-0005	
W-05-0006	

Bin Contents

Location ...	Bin Code	Item No.	Default	Fixed	Quantity	Quantity ...
SILVER	S-02-0001	LS-120	✔	✔	0	0
WHITE	W-02-0001	LS-120		✔	8	8
WHITE	W-02-0002	LS-120		✔	0	0
WHITE	W-05-0002	LS-120			6	6
WHITE	W-05-0005	LS-120		✔	0	0
WHITE	W-05-0006	LS-120		✔	0	0
WHITE	W-09-0001	LS-120			6	6
WHITE	W-09-0002	LS-120			8	8

Item Card
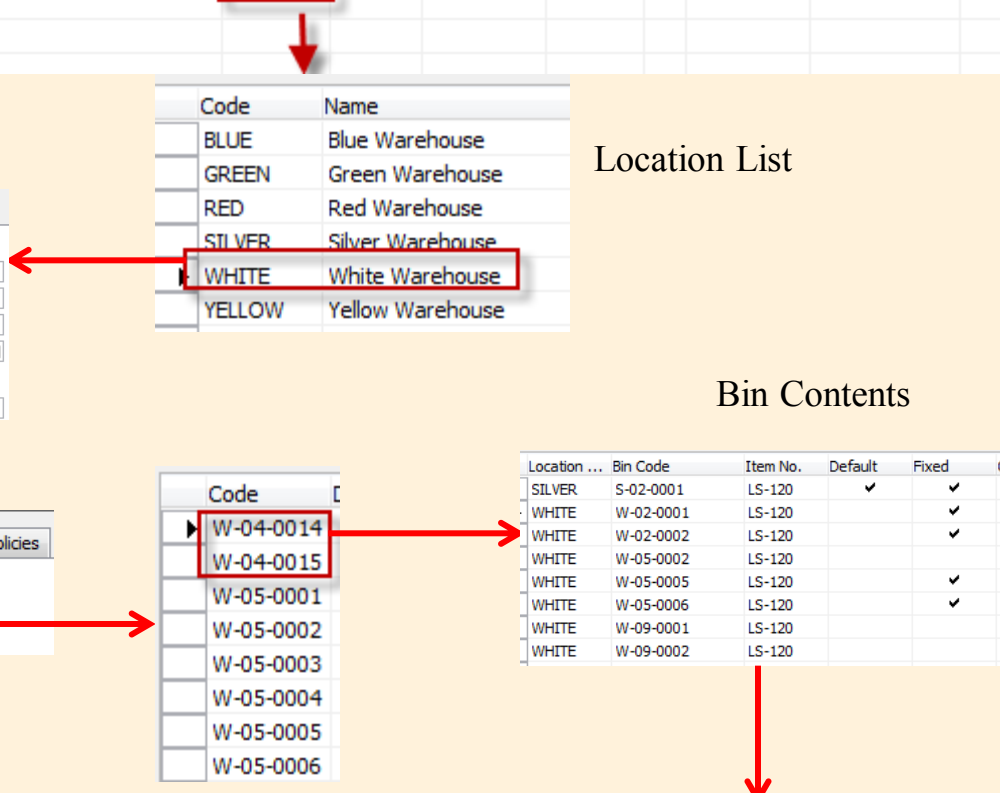
MS Dynamics NAV Analysis by Dimensions

General	Filters	Options

Date Filter	01.01.11..C31.1...	
G/L Account Filter	6100..6995 ⬆	
Business Unit Filter . . .	⬆	
Budget Filter	⬆	

Area Filter	⬆	
Department Filter	⬆	
Project Filter	⬆	
Dimension 4 Filter	⬆	

| Code	Name	Total Amount	ADM	PROD	SALES
10	**Europe**				
20	**Europe North**				
30	Europe North (EU)	-5 886 999,97			-5 886 999,97
40	Europe North (Non EU)	-20 882,66			-20 882,66
45	**Europe North, Total**	**-5 907 882,63**			**-5 907 882,63**
50	Europe South	-371 995,41			-371 995,41
55	**Europe, Total**	**-6 279 878,04**			**-6 279 878,04**
60	**America**				
70	America North	-299 415,68			-299 415,68
80	America South	-212 009,49			-212 009,49
85	**America, Total**	**-511 425,17**			**-511 425,17**

Will be presented by teacher

OLAP Terms and *Concepts*
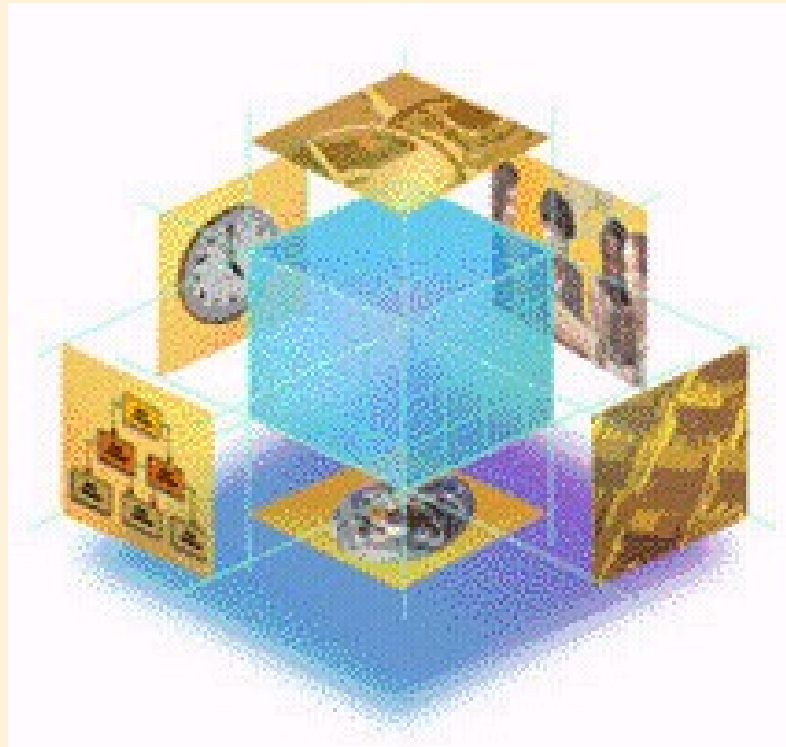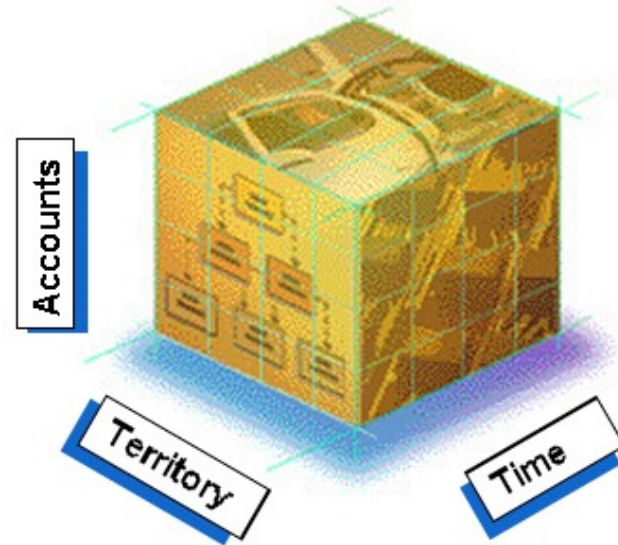

N-dimensional Cube

OLAP Terms and Concepts
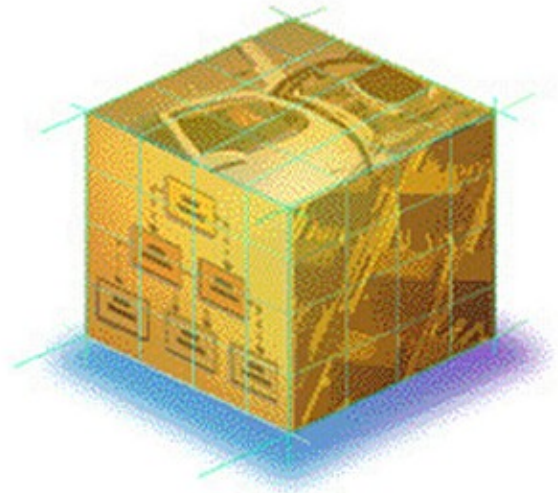
- Cube
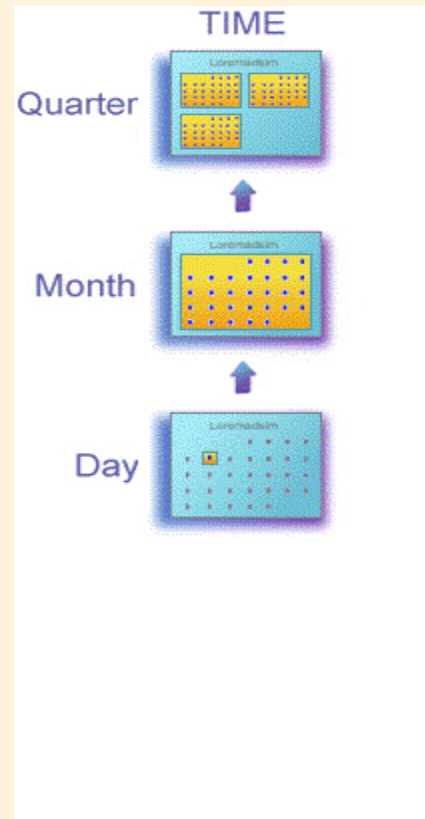 - Information Is conceptually viewed as cubes.

OLAP Terms and Concepts

- Cube
  - Information Is conceptually viewed as cubes.
- Dimension
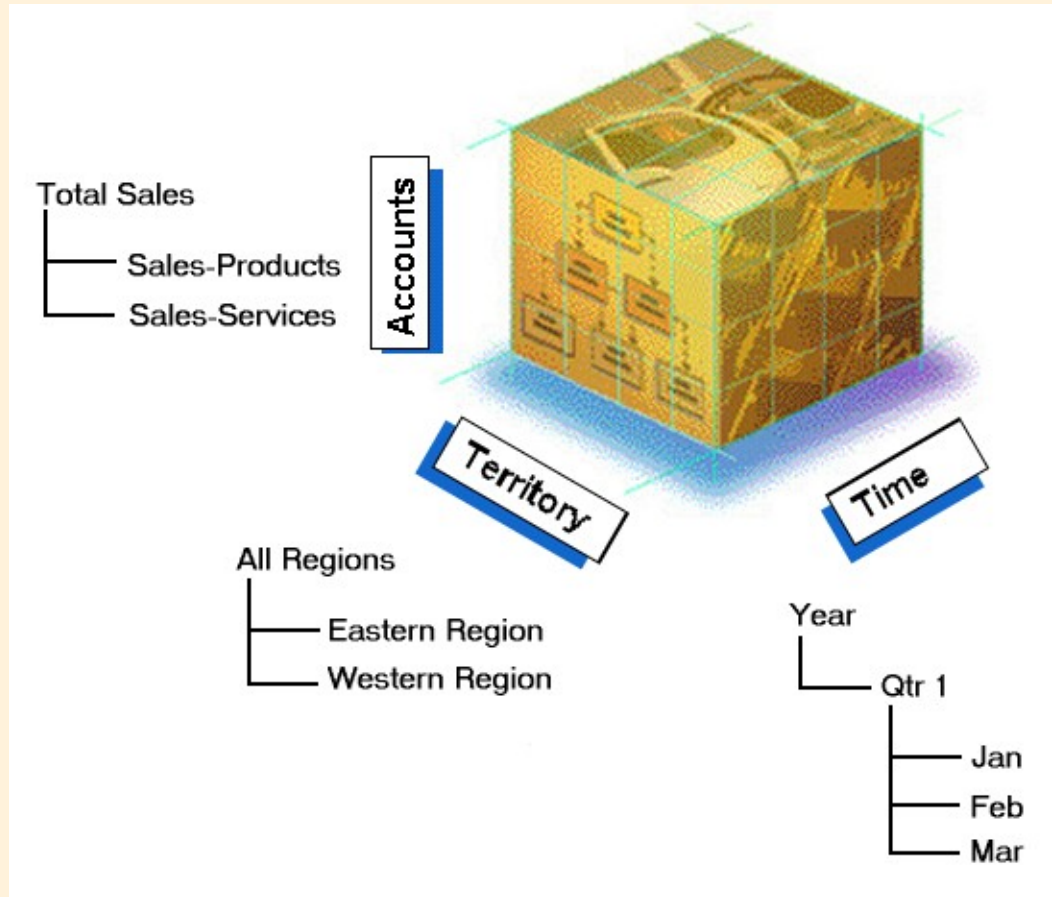 - Distinct categories for business data.

OLAP Terms and Concepts

- Cube
  - Information Is conceptually viewed as cubes.
- Dimension
  - Distinct categories for business data.
- Hierarchy
  - Levels of details on the data.

OLAP Terms and Concepts

- Cube
  - Information Is conceptually viewed as cubes.
- Dimension
  - Distinct categories for business data.
- Hierarchy
  - Levels of details on the data.
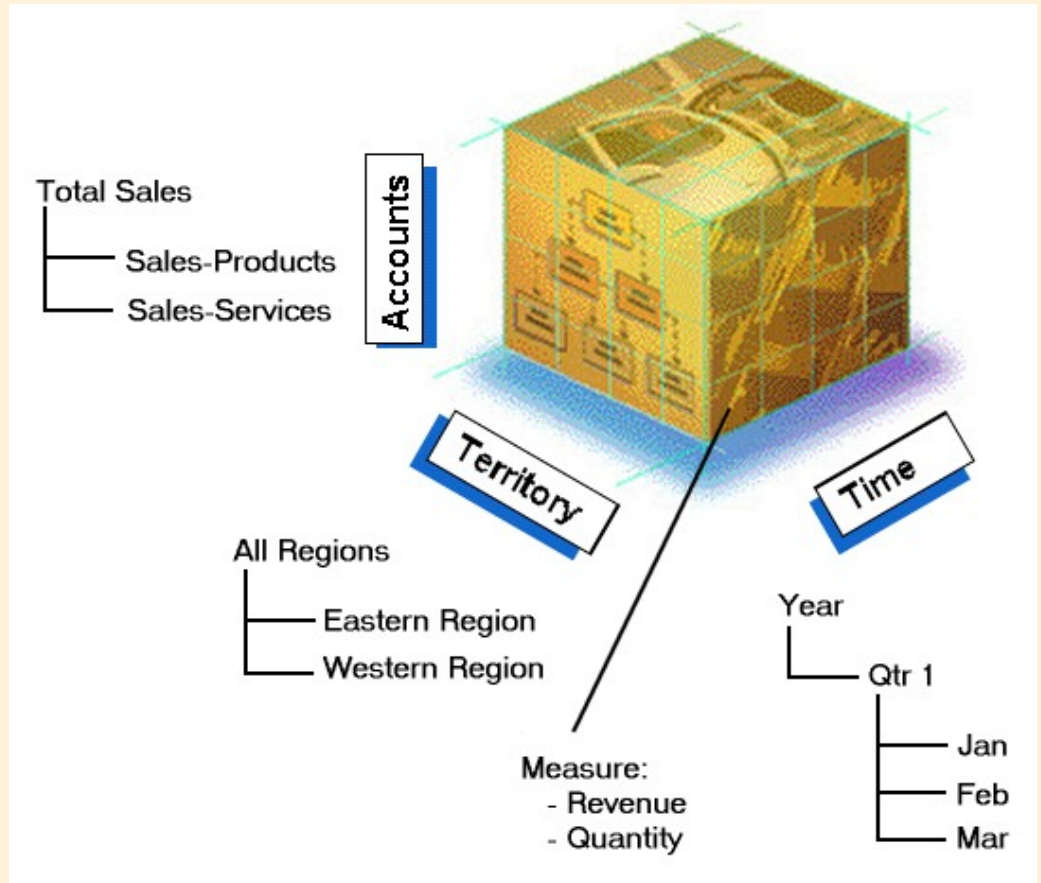
OLAP Terms and Concepts I.

- Cube
  - Information Is conceptually viewed as cubes.
- Dimension
  - Distinct categories for business data.
- Hierarchy
  - Levels of details on the data.
- Measure
  - Quantitative values.

OLAP Terms and Concepts II.

Cube
  Information Is conceptually viewed as cubes.
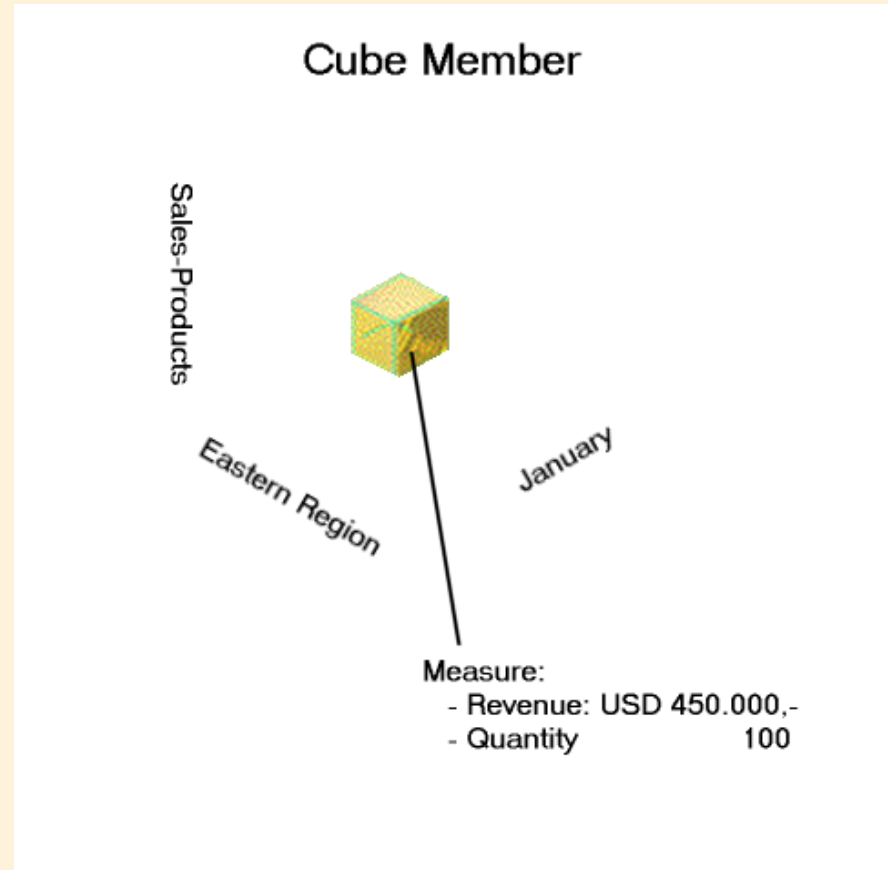
Dimension
  Distinct categories for business data.

Hierarchy
  Levels of details on the data.

Measure
  Quantitative values.

Cube Member

Sales-Products

Eastern Region

January

Measure:
- Revenue: USD 450.000,-
- Quantity   100

OLAP Cube

Total Sales
- Sales-Products
- Sales-Services

Accounts

Territory

All Regions
- Eastern Region
- Western Region

Time

Year
- Qtr 1
  - Jan
  - Feb
  - Mar

Measure:
- Revenue
- Quantity
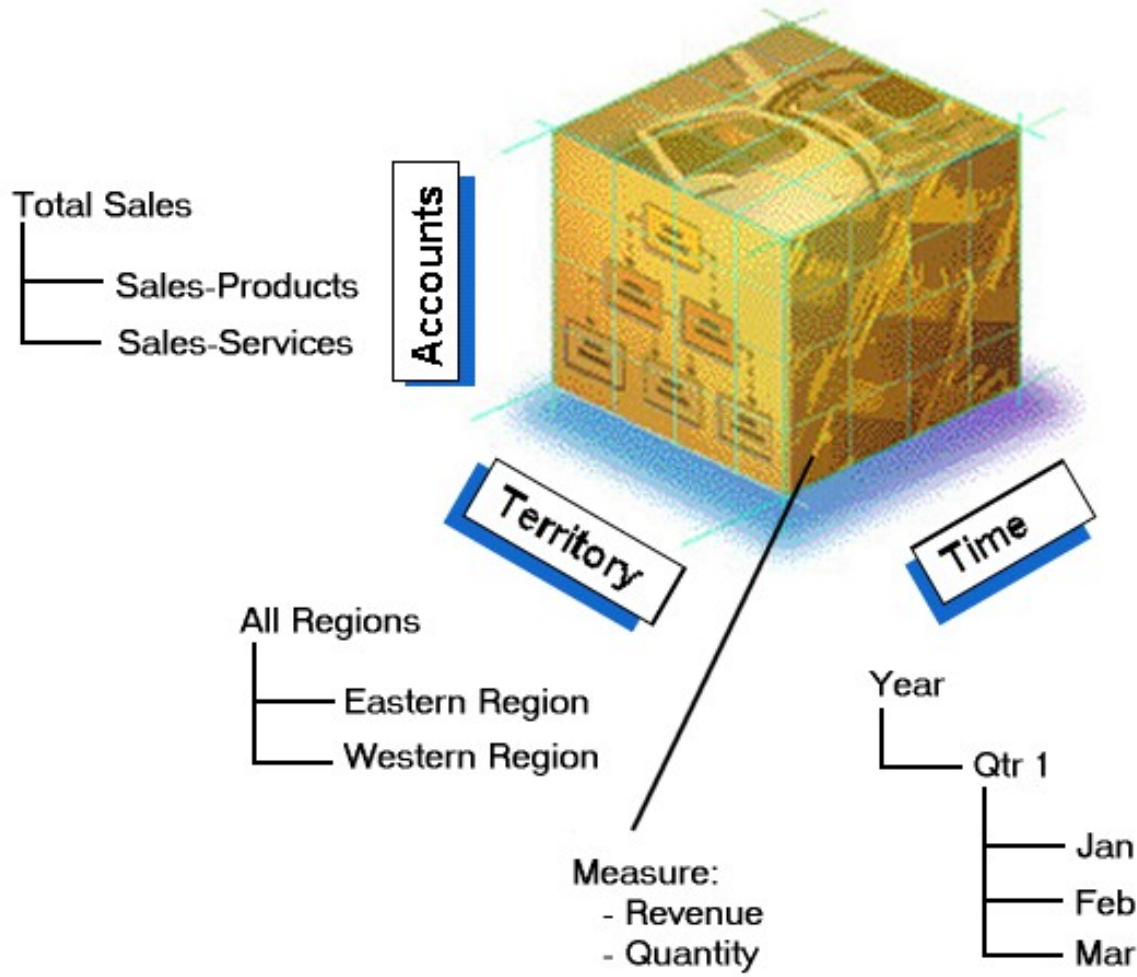
Reporting (NAV tools or JETs)

Main principles (source tables and their entries)

Posting Date	Entry Type	Document Type	Document No.	Item No.			antity	Invoiced Quantity	Remaining Quantity	Sales Amount (Actual)	Cost Amount (Actual)
31.5.2011	Purchase	Purchase Receipt	107044	1908-S			10	10	0,00	40 993,06	0,00

Control parameters
(time, type of products, Costs, Revenue, Area,..)

20
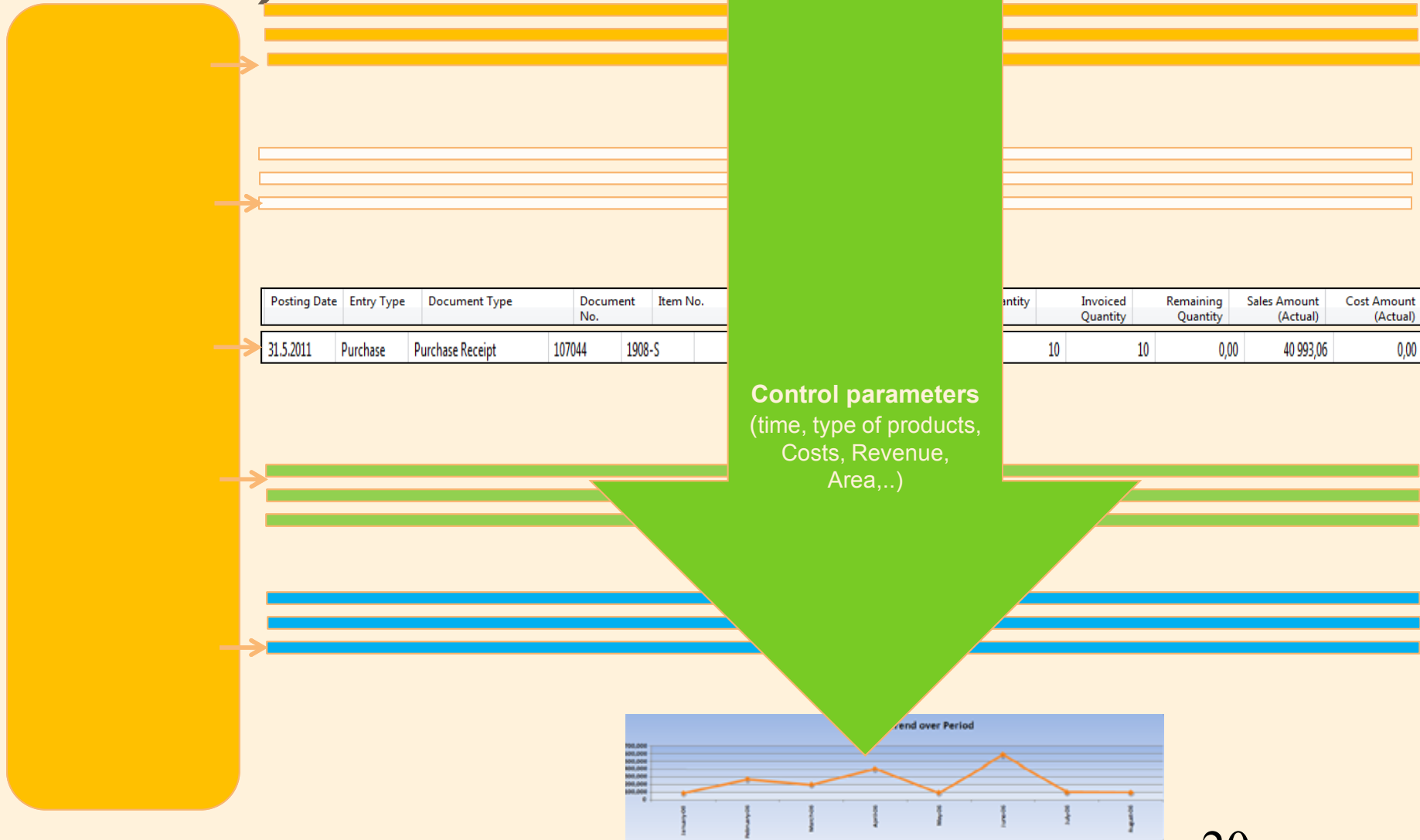
Some chosen analysis asked by CFO of company X in Czech Republic

- ⚙ Working capital – Show of the results from JETs

Working Capital & Current Ratio

Report Date   8/23/2011

2011	January	February	March	April	May	June	July	August	September	October	November	December
Current Assets	74,405	(90,939)	(16,110)	136,096	(92,528)	101,144	(155,777)	174,615	(363,170)	1,015	72,525	(72,789)
Current Liabilities	109,902	(62,118)	(14,989)	127,587	(76,890)	78,566	(193,757)	112,467	(376,168)	2,070	79,494	(65,841)
Working Capital	(35,497)	(28,821)	(1,121)	8,508	(15,638)	22,579	37,980	62,148	12,998	(1,055)	(6,969)	(6,948)
Current Ratio	0.68	1.46	1.07	1.07	1.20	1.29	0.80	1.55	0.97	0.49	0.91	1.11

21
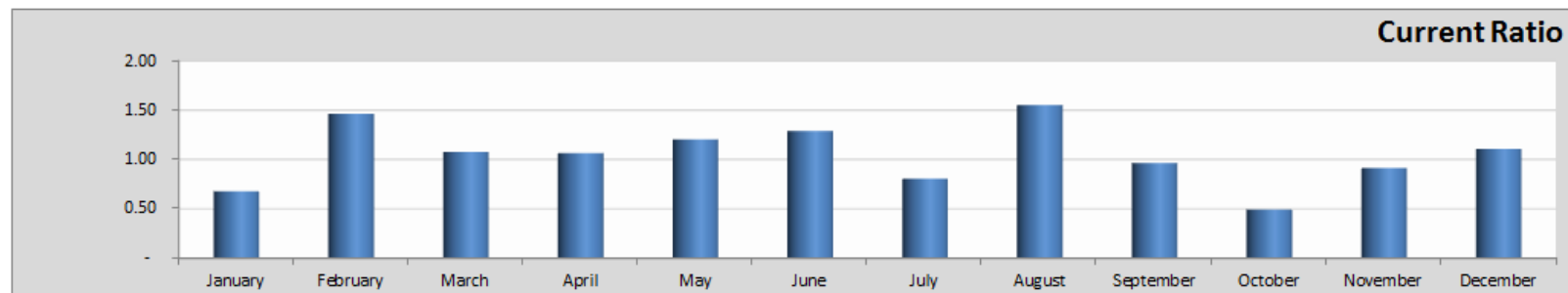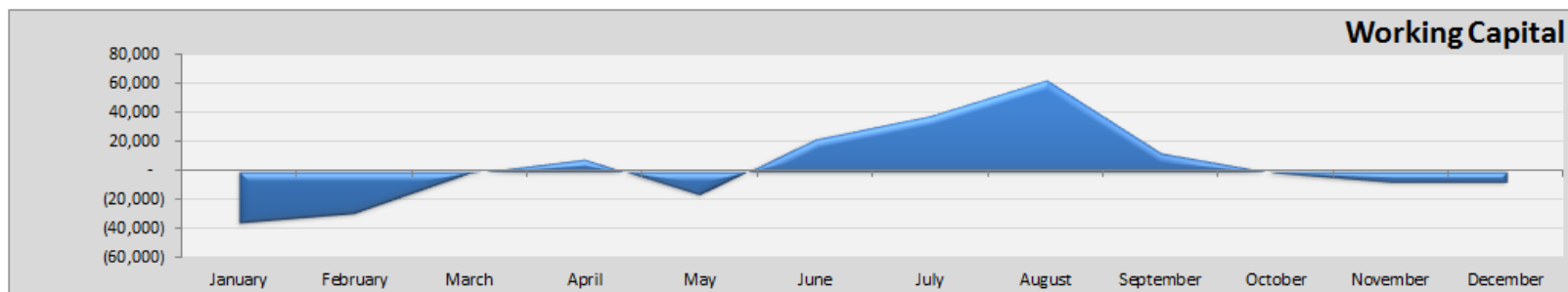
Some chosen analysis asked by CFO of company X in Czech Republic

Inventory - Dashboard

Company	Location	Item Category	Product Group
JetCorp, Belgium	Amsterdam Warehouse 1	Awards & Recognition	Flashlights
JetCorp, North America	Amsterdam Warehouse 2	Bags & Totes	USB Drives

Year: 2007, 2008, 2009, 2010

Quarter: 2010 Q1, 2010 Q2, 2010 Q3, 2010 Q4

Month: 2010 May, 2010 Jun, 2010 Jul, 2010 Aug

Inventory Value (Millions, 2010 Jan – Dec by Quarter)

Legend: Awards & Recognition, Bags & Totes, Caps & Hats, Clocks & Watches, Corporate Gifts, Electronics, Mugs & Drinkware

Current Product Value Mix

30,756 30,551 297,371 119,408 94,084 89,453 114,242

Legend: Awards & Recognition, Bags & Totes, Caps & Hats, Clocks & Watches, Corporate Gifts, Electronics
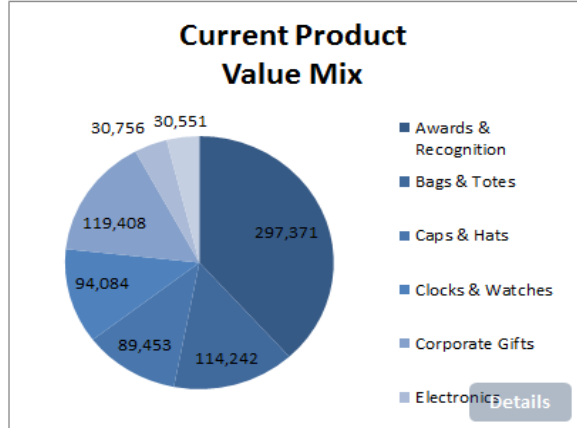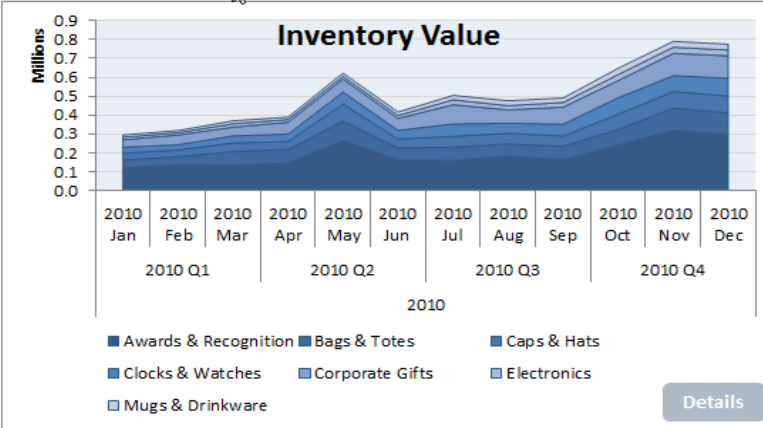
Average Inventory Value	Period	Prev. Yr	Variance	%	Grand Total
Awards & Recognition	188,840	200,797	-11,957	-5.95%	188,840
Bags & Totes	72,551	83,459	-10,908	-13.07%	72,551
Caps & Hats	56,765	63,983	-7,218	-11.28%	56,765
Clocks & Watches	57,043	63,353	-6,310	-9.96%	57,043
Corporate Gifts	73,856	81,520	-7,664	-9.40%	73,856
Electronics	19,293	18,451	842	4.56%	19,293
Mugs & Drinkware	19,052	16,732	2,320	13.86%	19,052

Value by Category (Thousands)

297 114 89 94 119 31 31

Awards & Recognition, Bags & Totes, Caps & Hats, Clocks & Watches, Corporate Gifts, Electronics, Mugs & Drinkware

Details

22
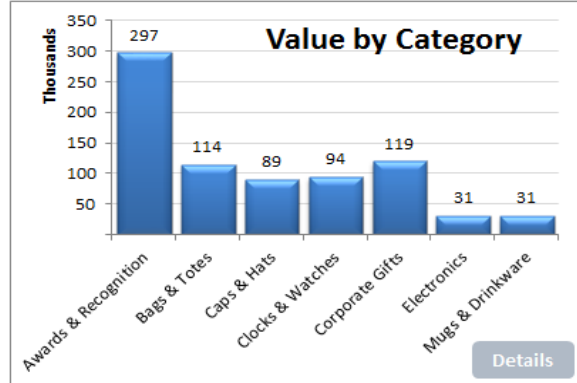
Some chosen analysis examples (JETs)
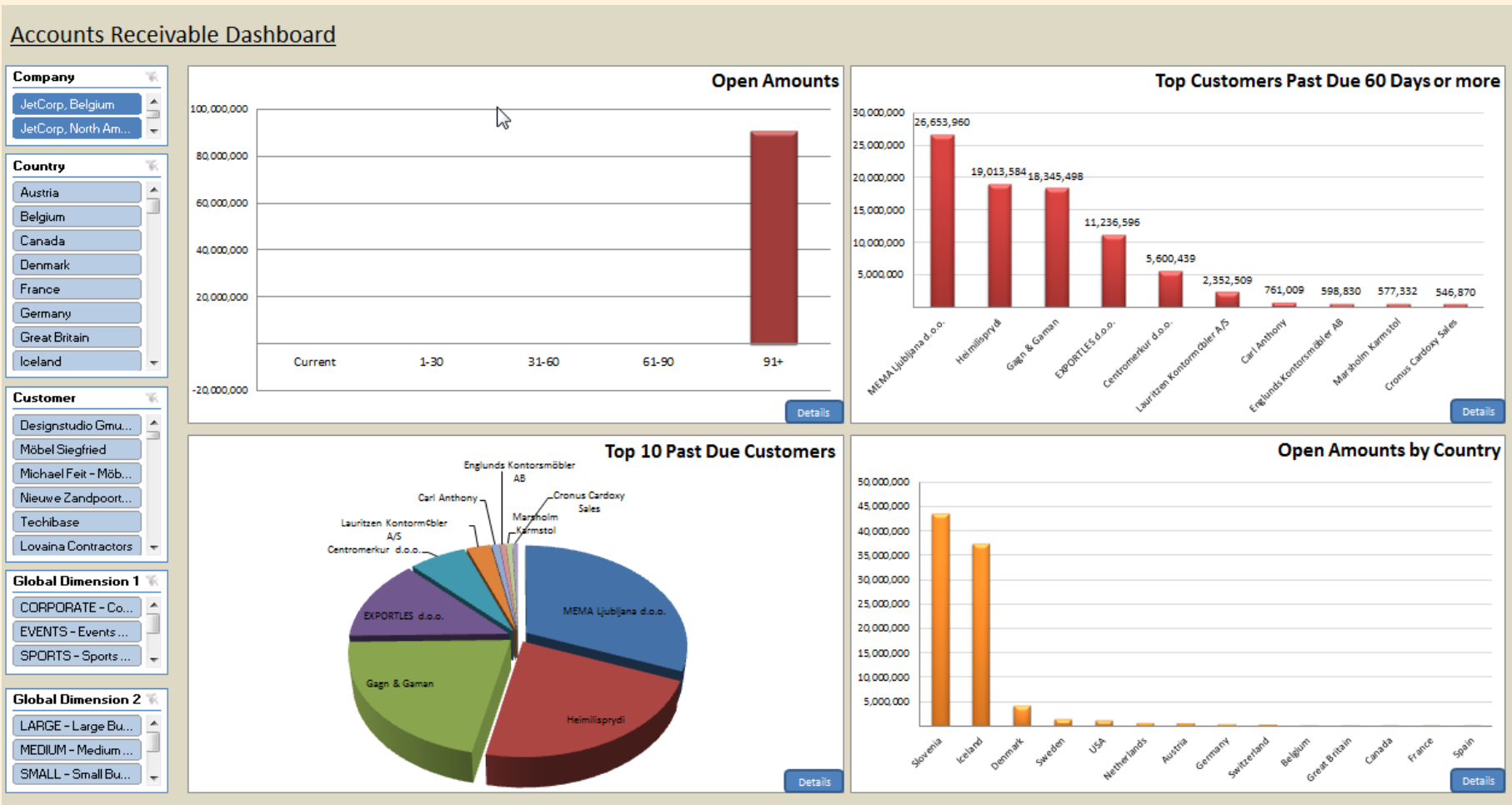
On-line Transaction Processing and OLAP

	OLTP	OLAP
users	clerk, IT professional	knowledge worker
function	day to day operations	decision support
DB design	application-oriented	subject-oriented
data	current, up-to-date detailed	historical, summarized, multidimensional integrated, consolidated
usage	repetitive	ad-hoc
access	read/write index/hash on primary key	lots of scans
unit of work	short, simple transaction	complex query
# records accessed	tens	millions
#users	thousands	hundreds
DB size	100MB-GB	100GB-TB
metric	transaction throughput	query throughput, response

Terminology - metadata

- Meta data is the data defining warehouse objects. It has the following kinds
    - Description of the structure of the warehouse (location, dimension, used schema..)
    - The algorithms used for summarization
    - Business data (business terms and definitions, ownership of data)

Business Intelligence Architecture
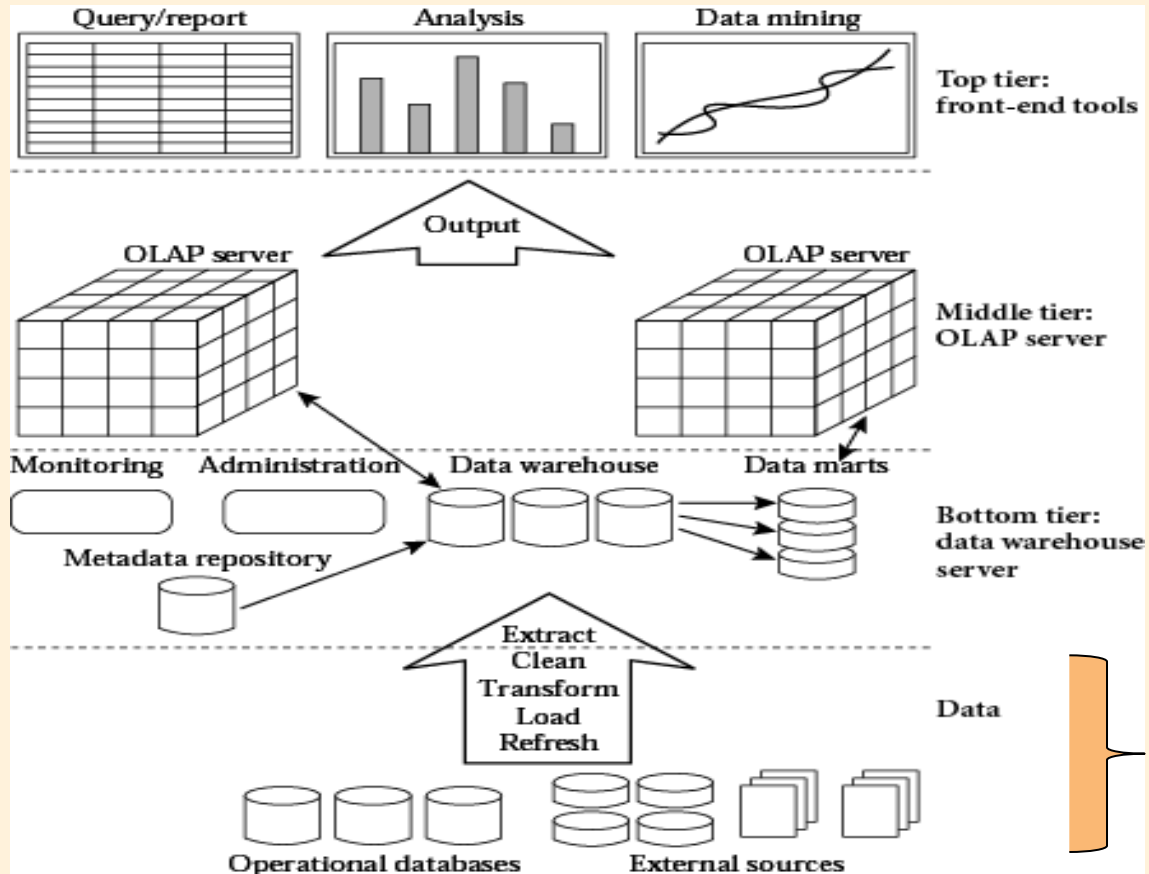
Database→ Data Warehouse->OLAP server->Reporting