

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

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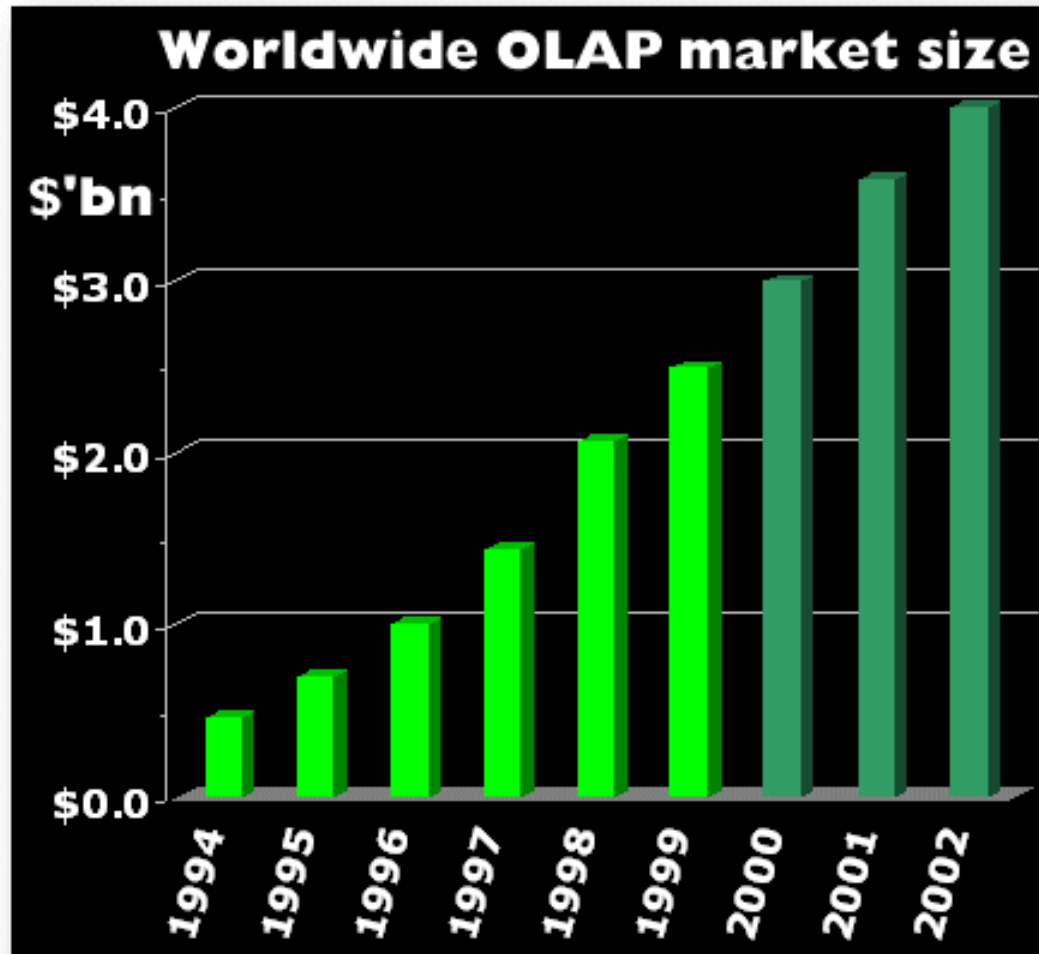
Masaryk University Brno

Czech Republic

Agenda

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

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

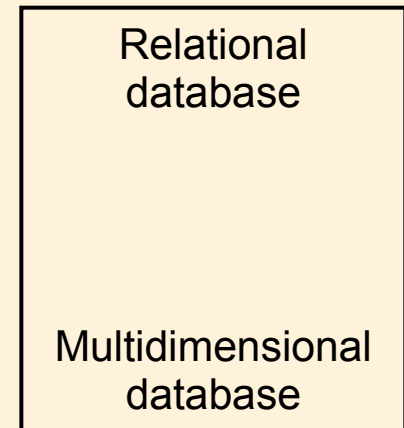
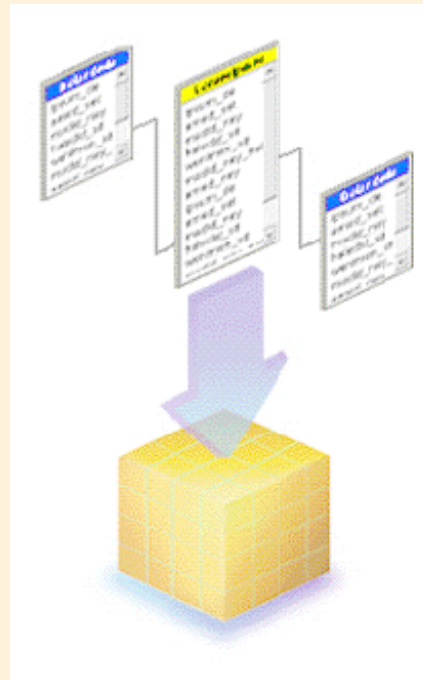
- Users
 - Analysts, managers and executive managers
- Access
 - Fast consistent, interactive
 - Wide variety of possible views
- Transformation
 - Raw data
 - Real dimensionality of enterprise

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



For MPH_AOMA not mandatory

Dimensions and its values

Code	Name	Code Caption
AREA	Area	Area Code
BUSINESSGR...	Business Group	Businessgroup Code
CUSTOMER...	Customer Group	Customergroup Code
DEPARTMENT	Department	Department Code
PROJECT	Project	Project Code
PURCHASER	Purchaser	Purchaser Code
SALESCAMP...	Sales campaign	Salescampaign Code
SALESPERSON	Salesperson	Salesperson Code

Dimension Values

Type to filter (F3)

Code	Name	Dimension Value Type	Totaling
10	Europe	Begin-Total	
20	Europe North	Begin-Total	
30	Europe North (EU)	Standard	
40	Europe North (Non EU)	Standard	
45	Europe North, Total	End-Total	20..45
50	Europe South	Standard	
55	Europe, Total	End-Total	10..55
60	America	Begin-Total	
70	America North	Standard	
80	America South	Standard	
85	America, Total	End-Total	60..85

Analysis by dimensions

Analysis by Dimensions Matrix Type to filter (F3) | C

Code	Name	Total Amount	INSTITUTION	INTERCOMP...	LARGE	MEDIUM	PRIVATE	SMALL
10	Europe							
20	Europe North							
30	Europe North (EU)	-5 925 642,35			-1 284 295,03	-1 501 535,70		-3 139 811,62
40	Europe North (Non EU)	-20 882,66				-11 187,36		-9 695,30
45	Europe North, Total	-5 946 525,01			-1 284 295,03	-1 512 723,06		-3 149 506,92
50	Europe South	-371 995,41				-11 693,62		-360 301,79
55	Europe, Total	-6 318 520,42			-1 284 295,03	-1 524 416,68		-3 509 808,71
60	America							
70	America North	-299 415,69			-1 499,03	-112 860,88		-185 055,78
80	America South	-212 009,49						-212 009,49
85	America, Total	-511 425,18			-1 499,03	-112 860,88		-397 065,27

Data pump

**Primary
Transaction
System
(ERP,CRM,..)**



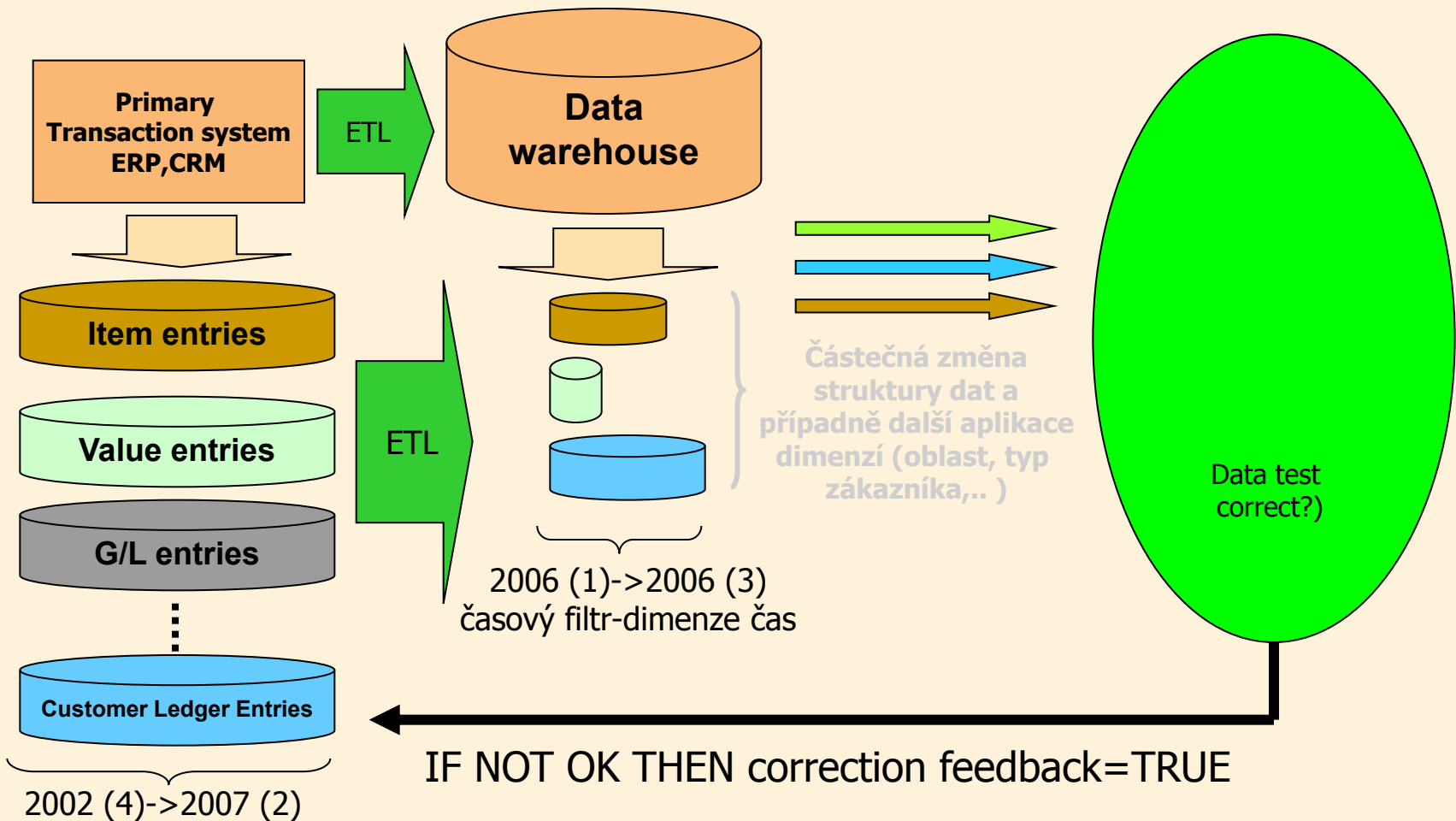
**Data
pump**



**Data
warehouse**

Data pump (critical application area)

Data pump = Extraction Transformation and Loading = ETL



MS Dynamics NAV Relationships

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				

Sales Line Order

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

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

Location List

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

Bins Tab

General Communication Warehouse Bins Bin Policies

Receipt

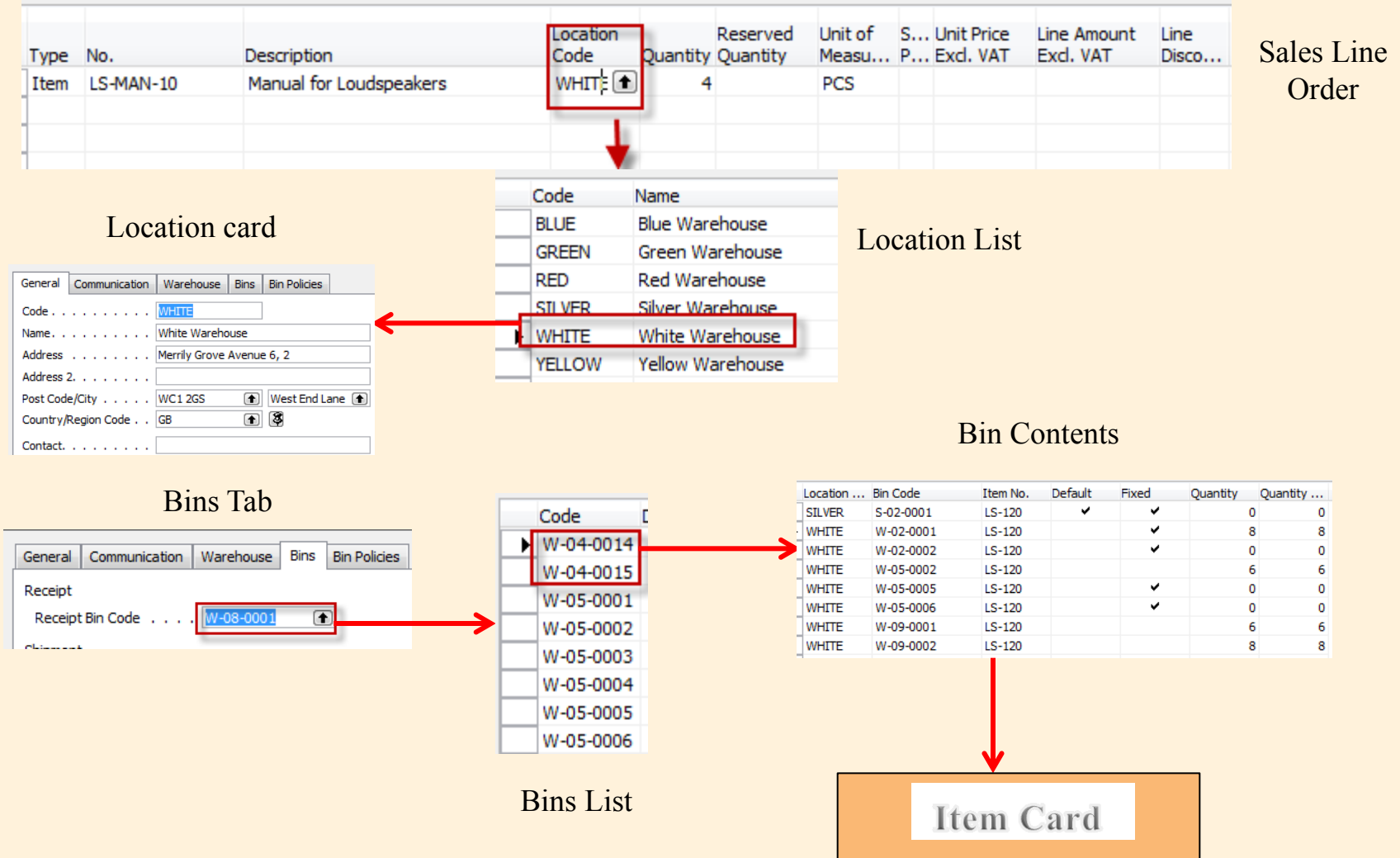
Receipt Bin Code W-08-0001

Client

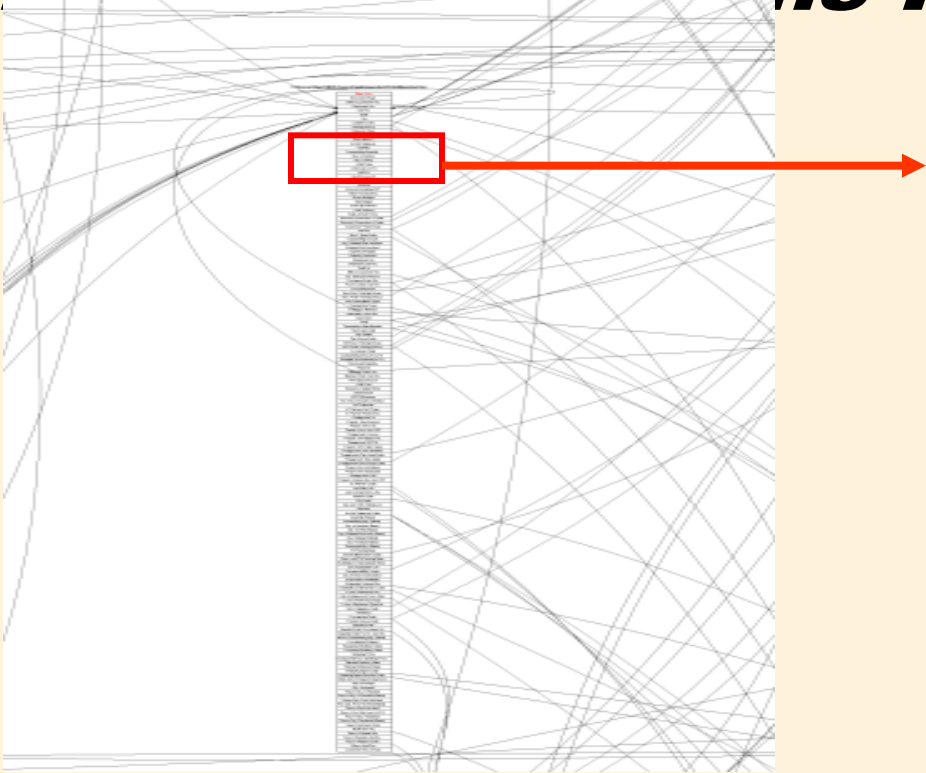
Code
W-04-0014
W-04-0015
W-05-0001
W-05-0002
W-05-0003
W-05-0004
W-05-0005
W-05-0006

Bins List

Item Card

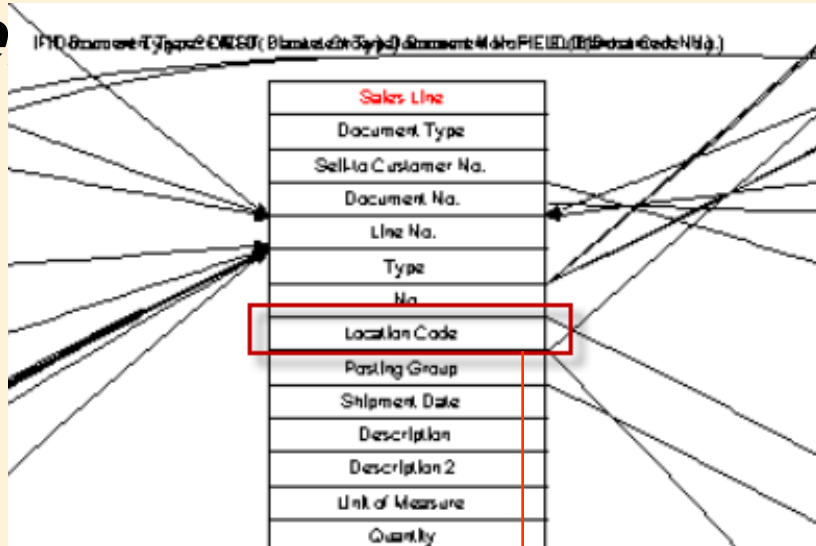


One table and its relations I



One table (Sales Line) and its

re



ERP NAV

Type	No.	Purch... Code	Drop Shipment	Description	Location Code	Quantity	Reserved Quantity	U
Item	1980-S		<input type="checkbox"/>	MOSCOW Swivel Chair, red	ZELENÝ	6		k ^

Item Information

- Item Card
- Availability (8)
- Substitutions (1)
- Sales Prices (0)
- Sales Line Dis... (1)

Order Line Functions Posting Print Help

MS Dynamics NAV Analysis by Dimensions

General		Filters	Options	
Date Filter	01.01.11..C31.1...	Area Filter	<input type="text"/>	<input type="button" value="↑"/>
G/L Account Filter	5100..6995 <input type="button" value="↑"/>	Department Filter	<input type="text"/>	<input type="button" value="↑"/>
Business Unit Filter	<input type="text"/>	Project Filter	<input type="text"/>	<input type="button" value="↑"/>
Budget Filter	<input type="text"/>	Dimension 4 Filter	<input type="text"/>	<input type="button" value="↑"/>

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

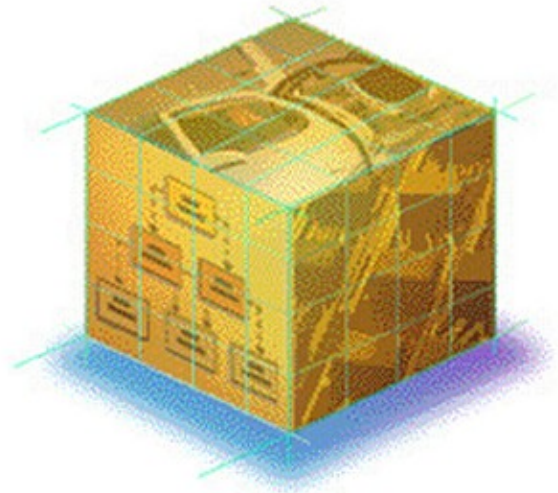
OLAP Terms and Concepts



N-dimensional Cube

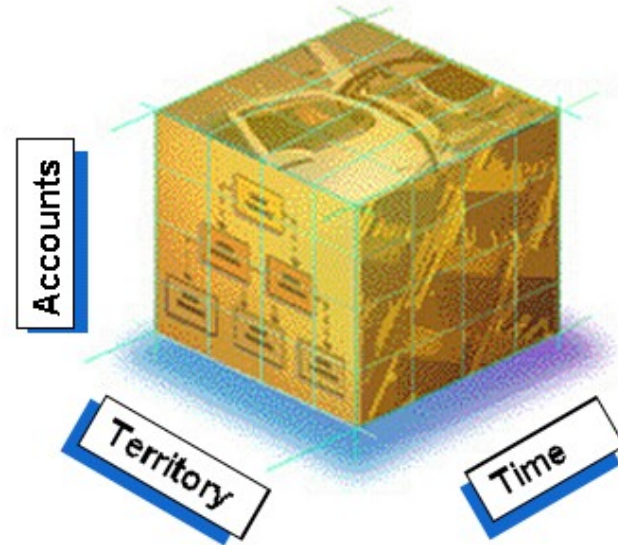
OLAP Terms and Concepts

- Cube
 - Information Is conceptually viewed as cubes.



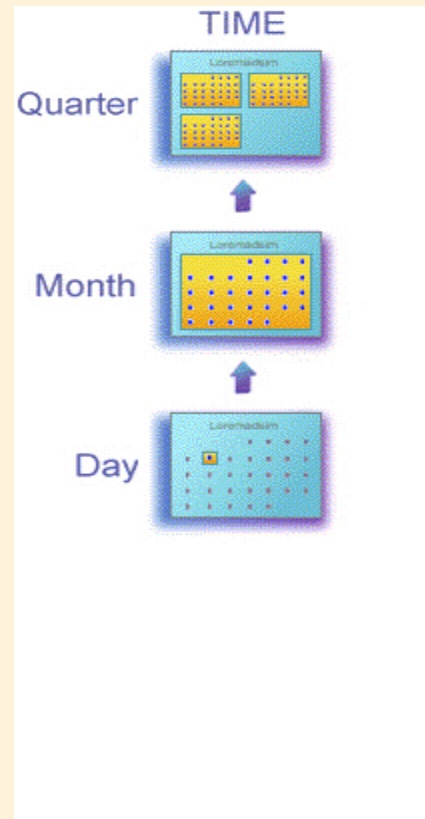
OLAP Terms and Concepts

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



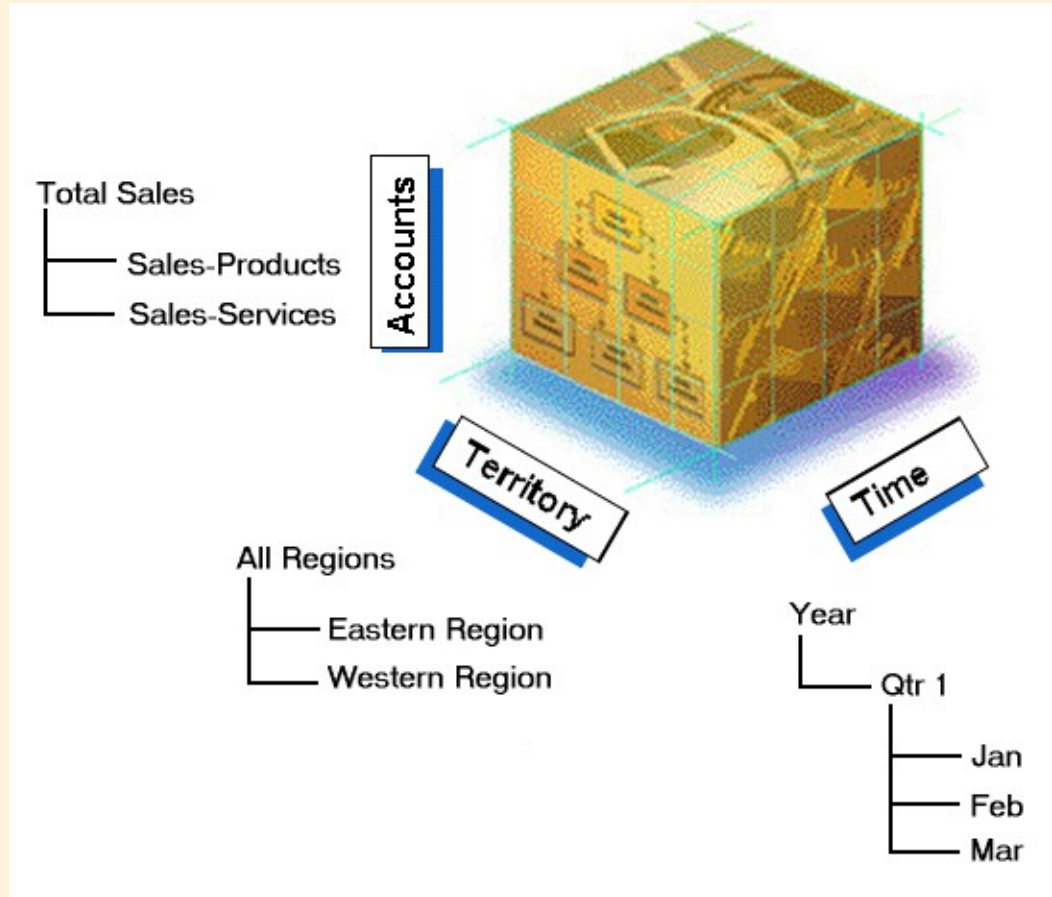
OLAP Terms and Concepts

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



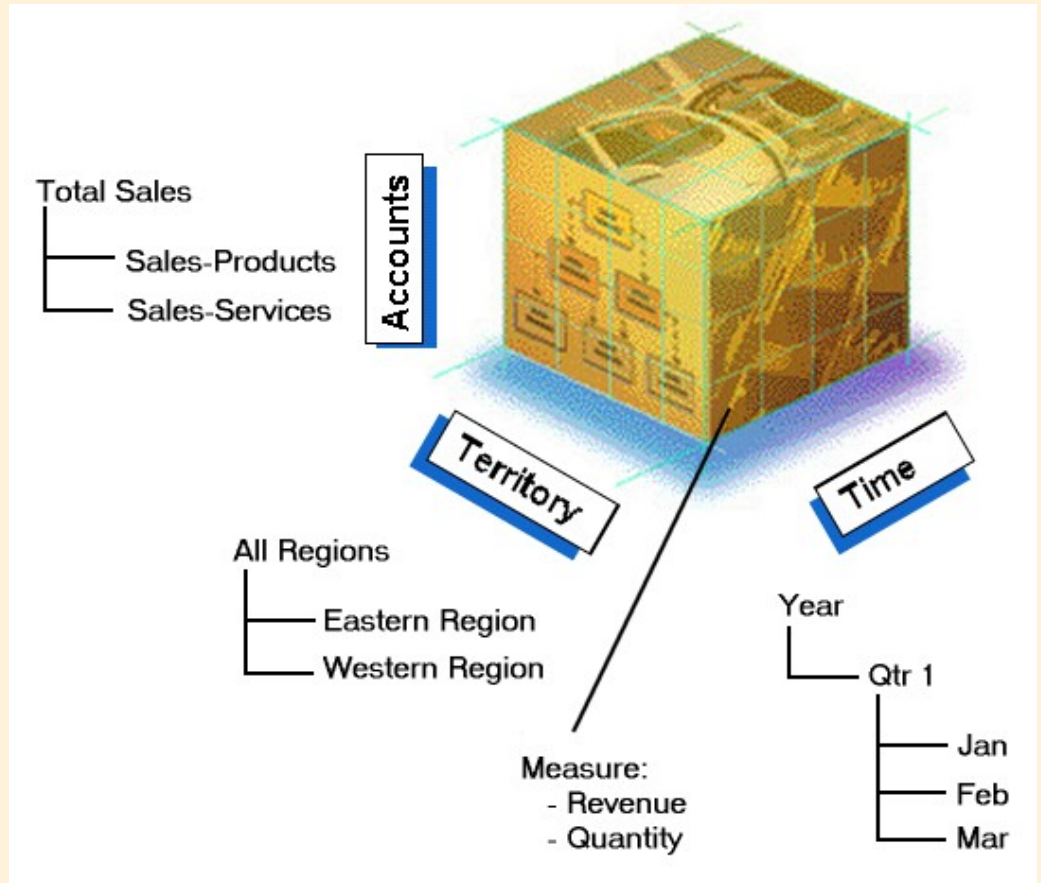
OLAP Terms and Concepts

- 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

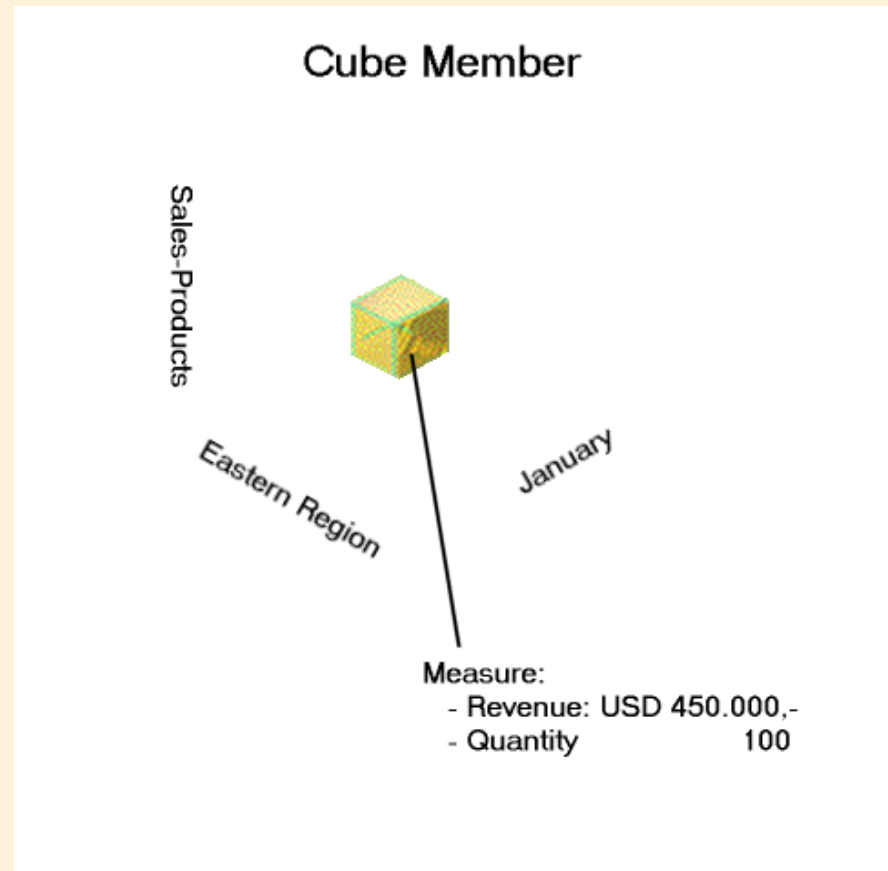
Distinct categories for business data.

Hierarchy

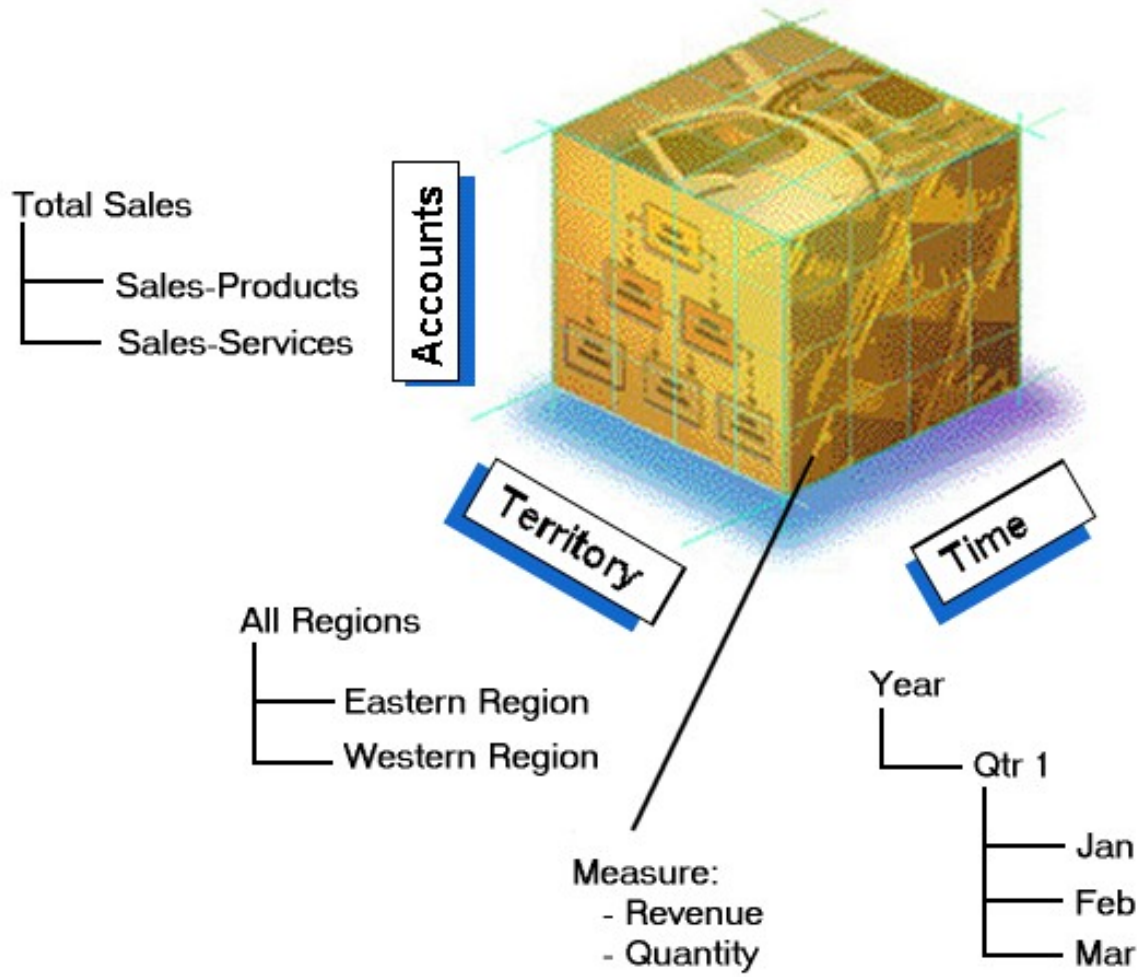
Levels of details on the data.

Measure

Quantitative values.



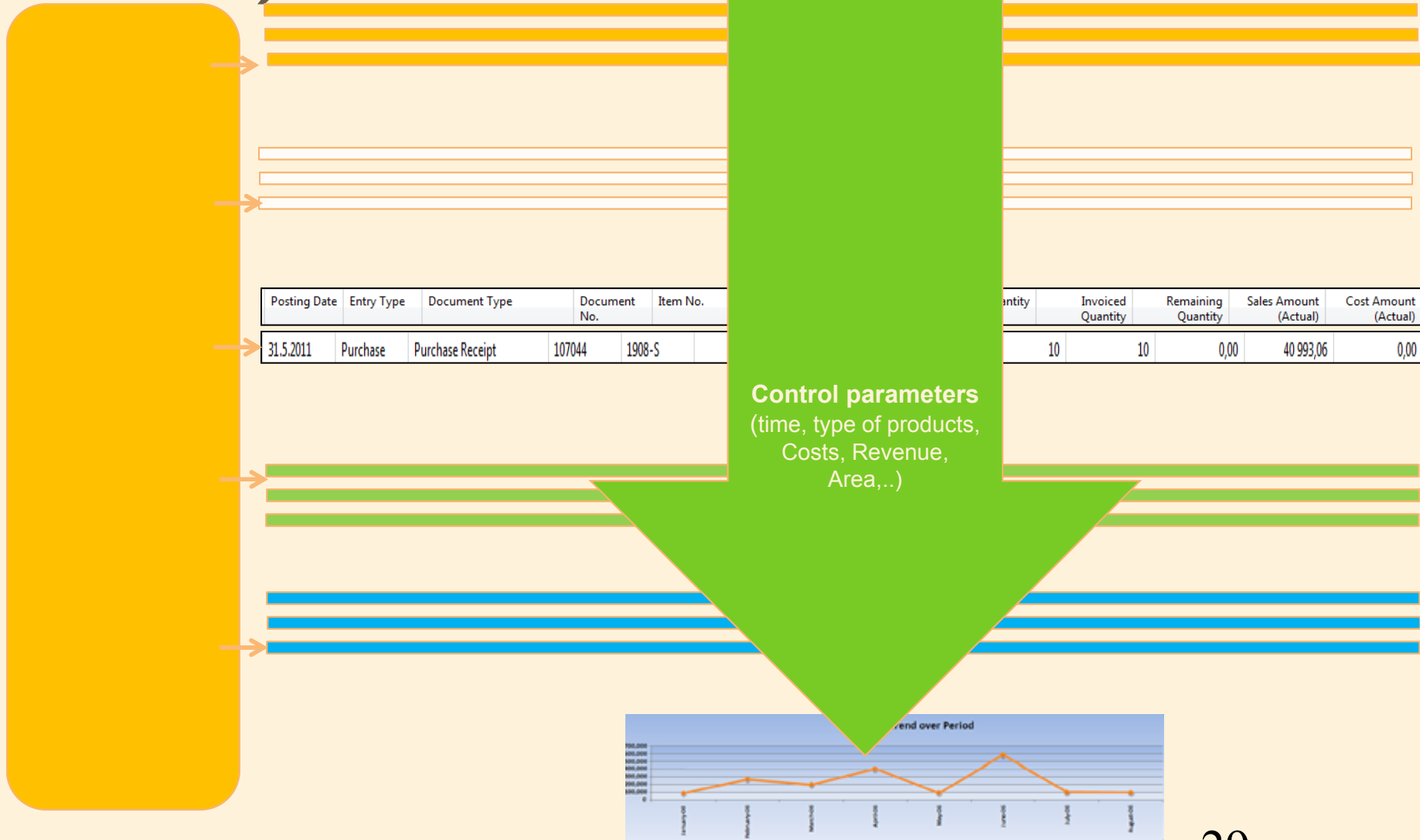
OLAP Cube



Reporting (NAV tools or JETs)



Main principles (source tables and their entries)



Sales analysis NAv 2016w1-part of CRM

Sales Cycle - Analysis

1 of 1 | 100% | Find | Next

Sales Cycle - Analysis 8. November 2017
 CRONUS International Ltd. Page 1
 ESFMIKI

EX-LARGE Existing customer - Large acc.

Stage Description	Activity Code	No. of Opportunities	Estimated Value (LCY)	Calcd. Current Value (LCY)	Average No. of Days
1 Initial	INIT	6	3 368 000,00	25 721,00	0
2 Understanding needs meeting	NEEDS	0	0,00	0,00	0
3 Product Presentation/Workshop	P-WORK	0	0,00	0,00	0
4 Proposal	PROPOSAL	0	0,00	0,00	0
5 Sign Contract	SIGN	0	0,00	0,00	0
Existing customer - Large acc.		6	3 368 000,00	25 721,00	0

EX-SMALL Existing customer - Small acc.

Stage Description	Activity Code	No. of Opportunities	Estimated Value (LCY)	Calcd. Current Value (LCY)	Average No. of Days
1 Initial	INIT	6	14 300,00	2 190,50	0
2 Presentation	P-WORK	1	10 000,00	5 500,00	0
3 Proposal	PROPOSAL	0	0,00	0,00	0
4 Sign Contract	SIGN	0	0,00	0,00	0
Existing customer - Small acc.		7	24 300,00	7 690,50	0

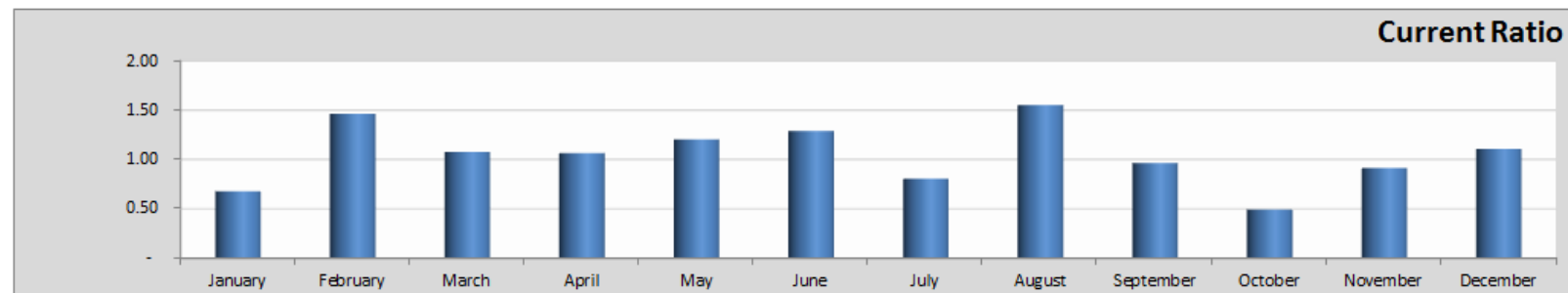
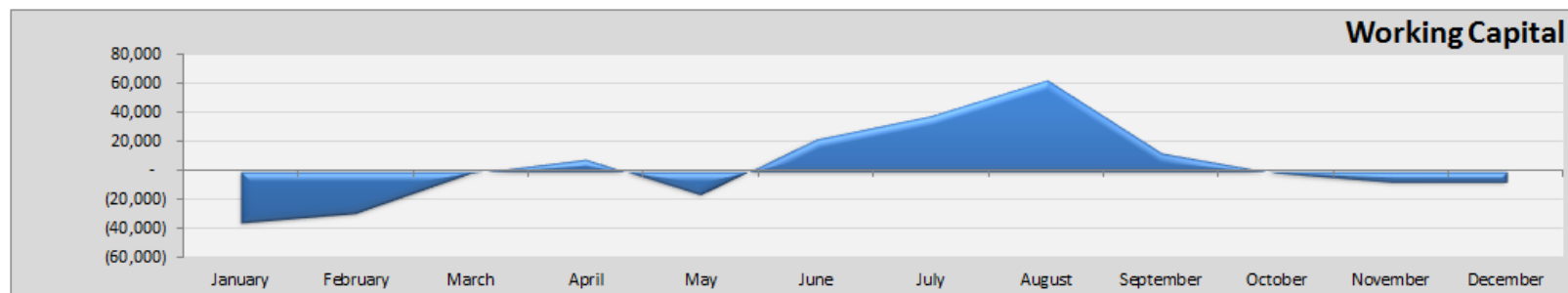
Some chosen analysis asked by CFO of company X in Czech Republic

- 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



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

Inventory - Dashboard

Company

- JetCorp, Belgium
- JetCorp, North America

Location

- Amsterdam Warehouse 1
- Amsterdam Warehouse 2

Item Category

- Awards & Recognition
- Bags & Totes

Product Group

- Flashlights
- USB Drives

Year

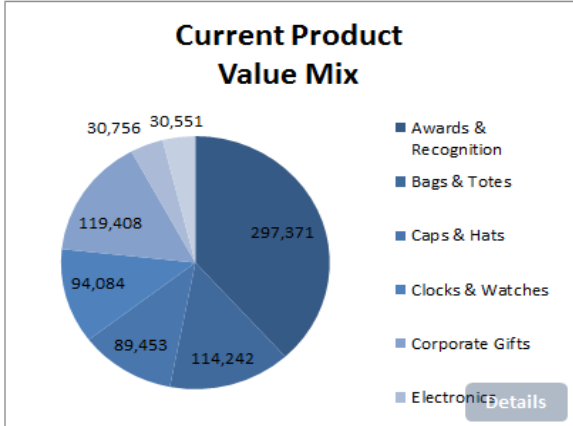
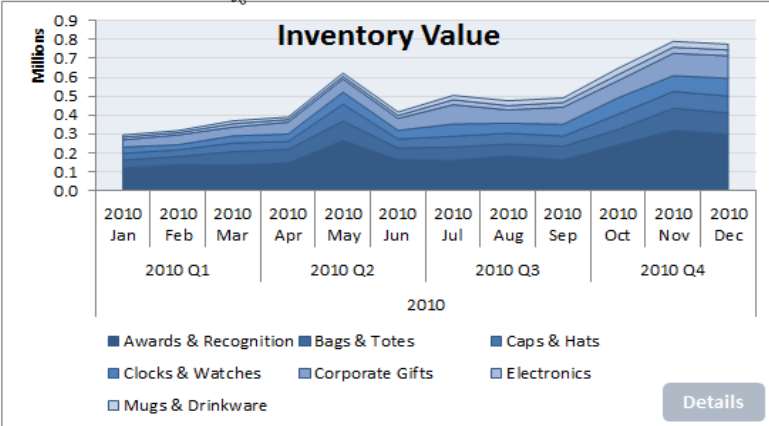
- 2007
- 2008
- 2009
- 2010

Quarter

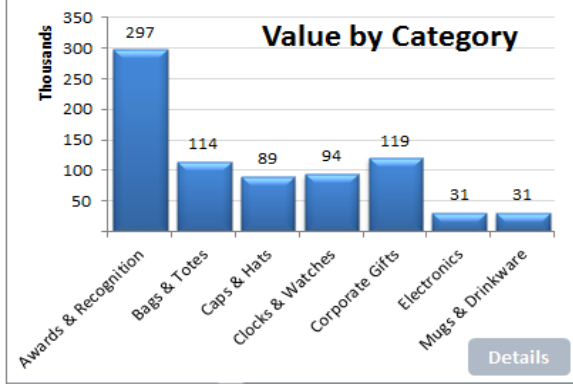
- 2010 Q1
- 2010 Q2
- 2010 Q3
- 2010 Q4

Month

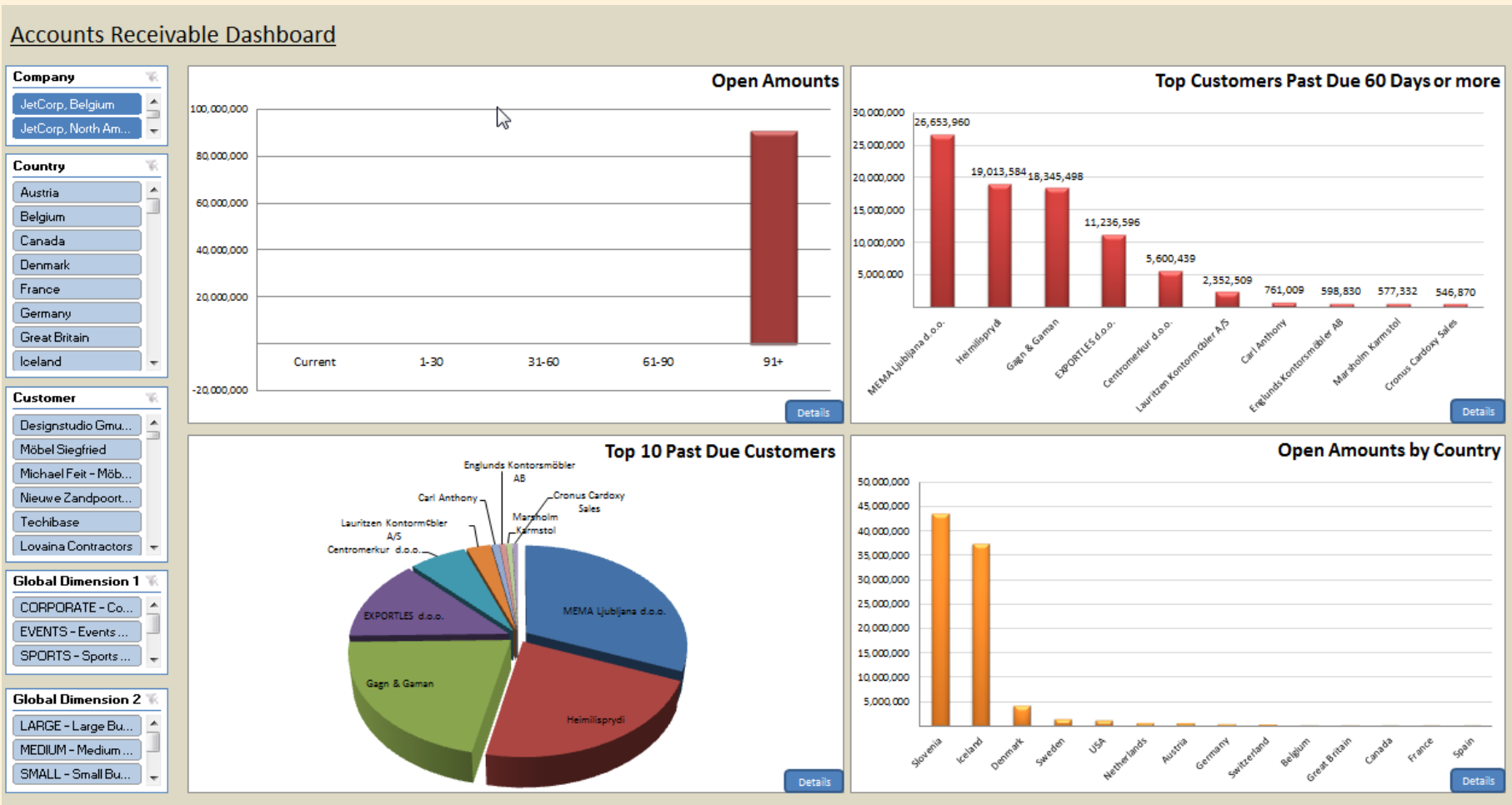
- 2010 May
- 2010 Jun
- 2010 Jul
- 2010 Aug



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



Some chosen analysis examples (JETs)



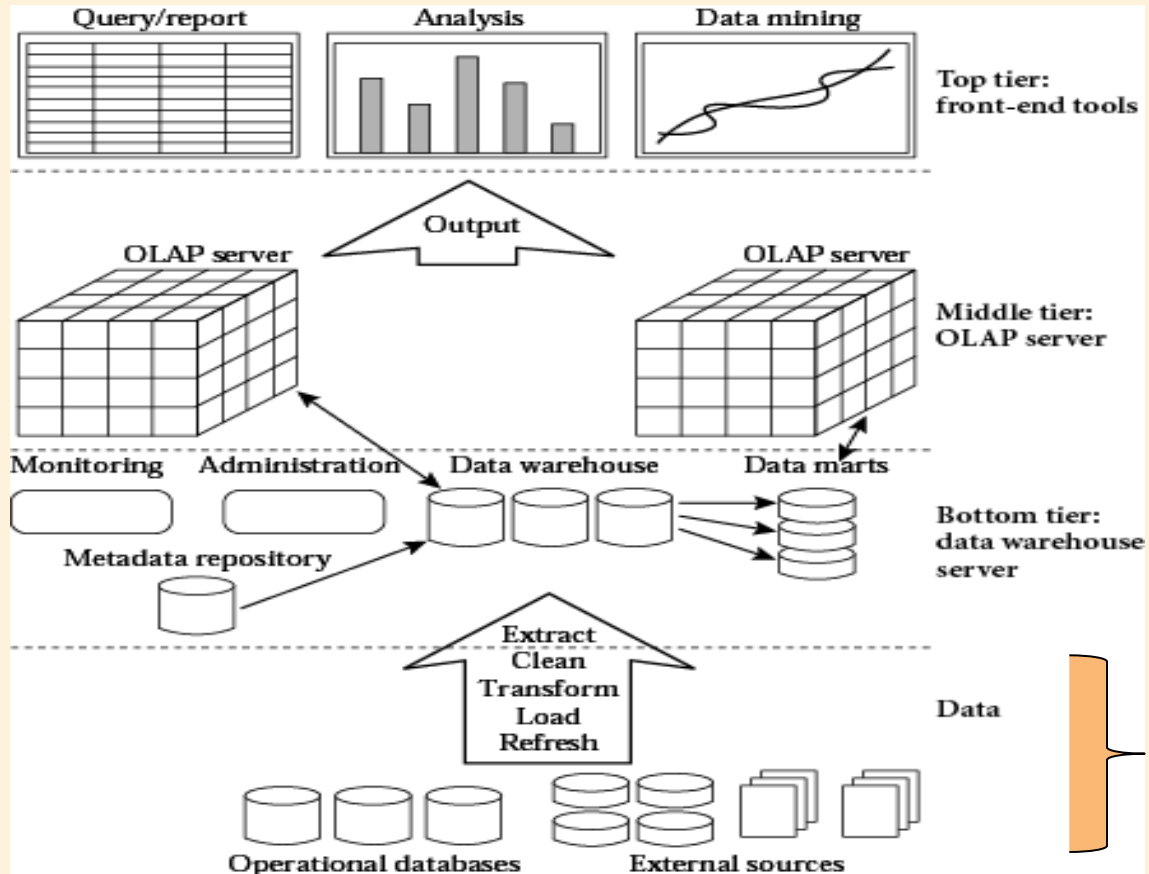
On-line Transaction Processing and OLAP

	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