### Pentaho BI Suite

#### Main features and data integration

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## Pentaho BI Suite

- Open source Business Intelligence tool
- It provides support for:
  - Data Integration
  - Reporting
  - Dashboards

- OLAP Analysis
- Data Mining







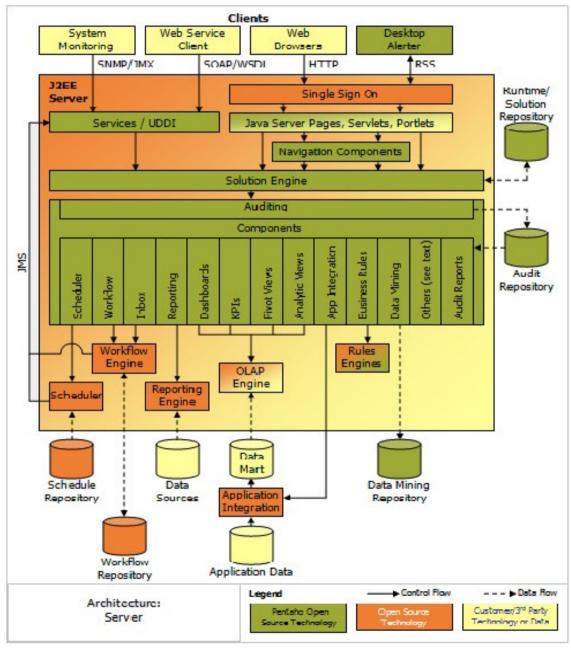


Dashboards



Data Mining

### **Pentaho Architecture**

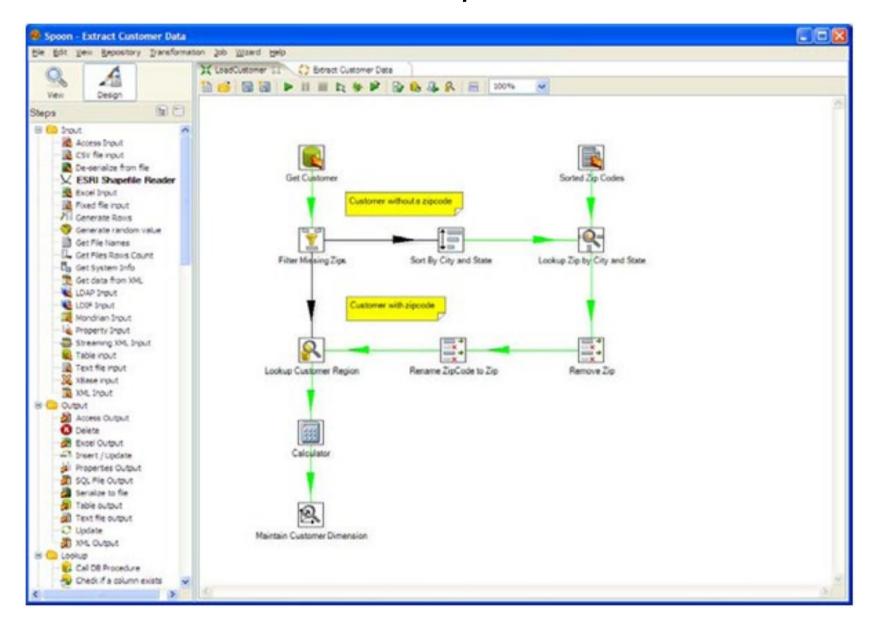


## Pentaho Data Integration (PDI)

Comes with a user friendly interface and provides various tools to:

- Retrieve data from multiple data sources
- Clean, correct and normalize the data
- Filter only valuable data
- Group data (cross DBMS joins)
- Load data
- Possibility of creating a customized tools

#### PDI – Example Kettle/Spoon



## Pentaho Schema Workbench (PSW)

It provides the following functionalities:

- Schema editor integrated with the underlying data source for validation
- Test MDX queries against schema and database
- Browse underlying databases structure

### PSW – Example Schema Workbench

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### Pentaho OLAP Analysis

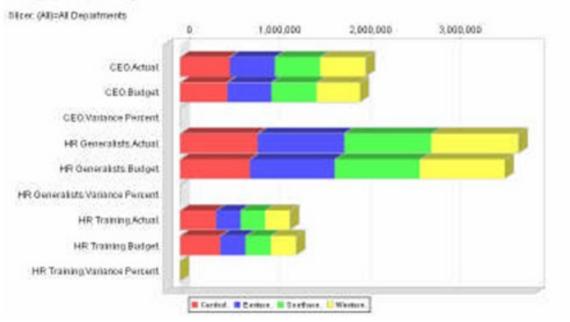
An OLAP Analysis allows us to:

- Study at once a whole bulk of data
- Observe data from different points of view
- Support decisional processes
- The most common functions are: Slicing, Dicing, Drill-down, Drill-accross, Drill-through

#### Pentaho Analysis Mondrian

		Region							
Positions	Measures	Central	Eastern	Southern	Western				
CEO	Actual	1549,625.00	+500,000.00	\$500,000.00	+500,000.00				
	Budget	\$522,250.00	488,750.00	498,750.00	4478,750.00				
	Variance Percent	-5 24%	-2.30%	- 25%	-4.44%				
<b>HR Generalists</b>	Actual	856,190.00	4961,000.00	\$961,000.00	4961,000.00				
	Budget	1771,225.00	4940,158.00	4940,158.00	4938,158.00				
	Variance Percent	-11.02%	-2.22%	-2.22%	-2.43%				
HR Training	Actual	4397,473.00	\$271,200.00	\$271,200.00	4271,200.00				
	Budget	1443,570.00	1279,674.00	1279,674.00	1277,674.00				
	Variance Percent	10.39%	3.03%	3.03%	2.33%				

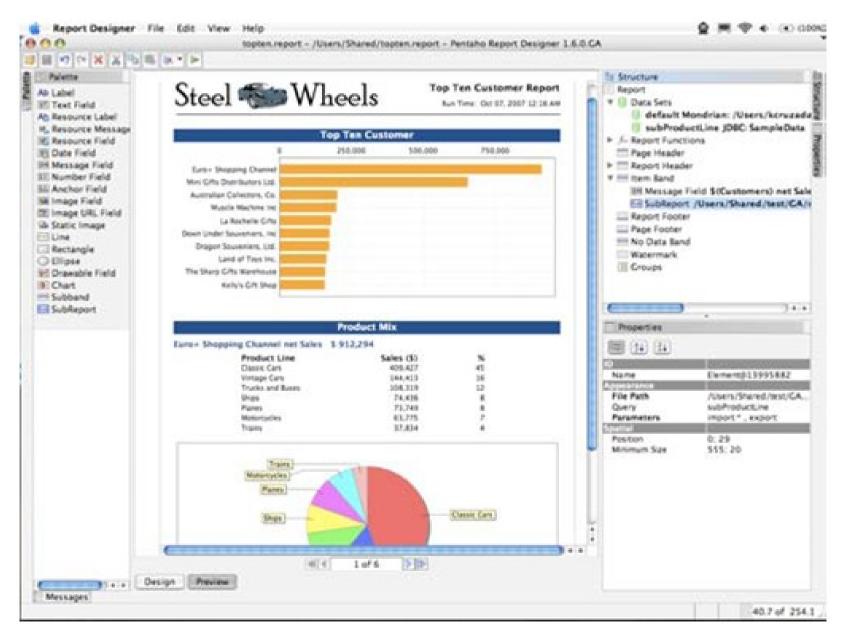
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### Pentaho Reporting (vs OLAP analysis)

- OLAP tools are dynamic, they allow users to interact with the system in a simple way while reports are more "static"
- The user does not have to know query languages but a minimum knowledge of the system is required while reports do not require that base knowledge
- They allow operations such as Roll-up, Drill-down, Drill-across, Pivoting, Slice-and-dice directly modifiable while examining the cube; the standard reports don't

#### Pentaho Reporting Design Studio, Report Designer



### Pentaho Dashboards - mention

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### Data Mining - mention Weka

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## ETL – Going into detail

 Pentaho Data Integration (PDI) is a tool used to extract, transform, and load (ETL)

Common uses:

- Data warehouse data loading from scratch, bulk or incremental loading
- Data migration between different databases and applications
- Data Cleansing with steps ranging from very simple to very complex transformations
- Rapid prototyping of ROLAP schemas

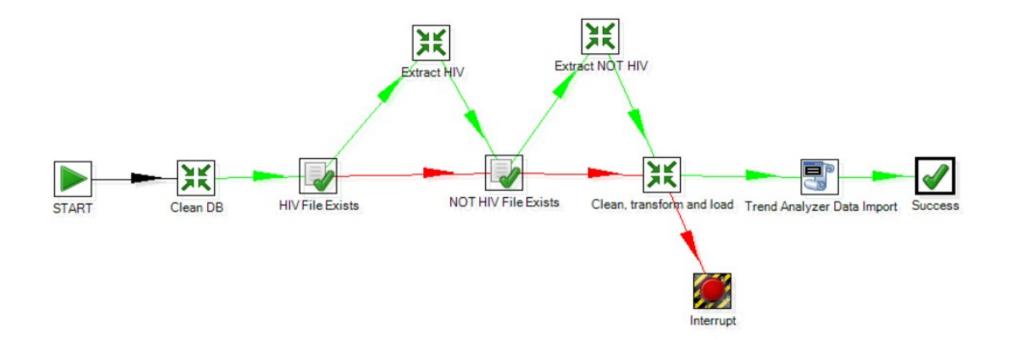
## Jobs and Transformations

- All of the data flow is organized in jobs and transformations
- A Transformation is made of Steps linked by Hops. These Steps and Hops form paths through which data flows. Therefore it's said that a Transformation is data-flow oriented.
- A Step is the minimal unit inside a Transformation. A wide variety of Steps are available
- A Hop is a graphical representation of data flowing between two Steps, with an origin and a destination.

How can we create a hop:

- Hold a central mouse button and drag the arrow from one step to another
- Press Shift+click and drag towards the destination step
- Using GUI arrows

### **ETL Job - Example**



# ETL – most used steps

input files

Access Input	Read data from a Microsoft Access File
CSV file input	Simple CSV file input
Excel Input	Read data from a Microsoft Excel Workbook
OLAP Input	Execute and retrieve data using an MDX query
Table input	Read information from a database table
Text file input	Read data from a text file in several formats

### ETL – most used steps output files

Access Output	Stores records into a MS-Access database table
Excel Output	Stores records into a Excel (XLS) document with a formatted data
Table output	Write information to a database table
Text file output	Write rows to a text file

#### ETL – most used steps other utils

Select values	Select or removes fields in a row. Optionally set the field data type
Split field to rows	Splits a single string field by delimiter and creates a new row for each new string
Sort rows	Sort rows based upon field values
Null if	Sets a field value to null if it is equal to a constant value
Filter rows	Filter rows using simple equations
Execute SQL script	Execute a SQL script

#### ETL – most used steps other utils - cont.

Modified Java Script Value	This is a modified plugin for the Scripting values with improved interface and performance
Database join	Executes a database query using stream values as parameters
Call DB Procedure	Get back information by calling a database procedure
File exists	Check if a file exists
Set Variables	Determines the values of certain (environment or Kettle) variables and put them in field values

## Workshop I - ETL

During this workshop your task is to:

- Create a trasformation that loads all data from offices.csv, adjust the telephone number (eliminate the "+" sign) and load it to labsia database
- Create a transformation that loads all data from payments.xls to payments table. Pay attention to a "paymentdate" attribute (hint: use "select values")
- Create a transformation that loads only Sales Reps from employees\_aux to employees table (hint: use "filter rows")
- Create a job that launches all these transformation, and control that the input files/tables exist before completing the job