B27   DB2 Warehouse Manager - What is it?
Warren Pettit, Instructor, IBM Learning Services

This topic will cover the components of IBM Warehouse Manager. Most of the focus will be on the Warehouse Center, the GUI administrative interface, and its capabilities. However other components, like the Information Catalog Manager, will also be addressed.

B27

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IBM Data Management Technical Conference

Anaheim, CA   **Sept 9 - 13, 2002**

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OS/2	QMF	DB2 Warehouse Manager		VSE	DL1	VSAM
IMS	MVS	DB2 Warehouse Center		VM		
DPropR		DB2 OLAP Integration Server		ICM		
Information Catalog Manager						

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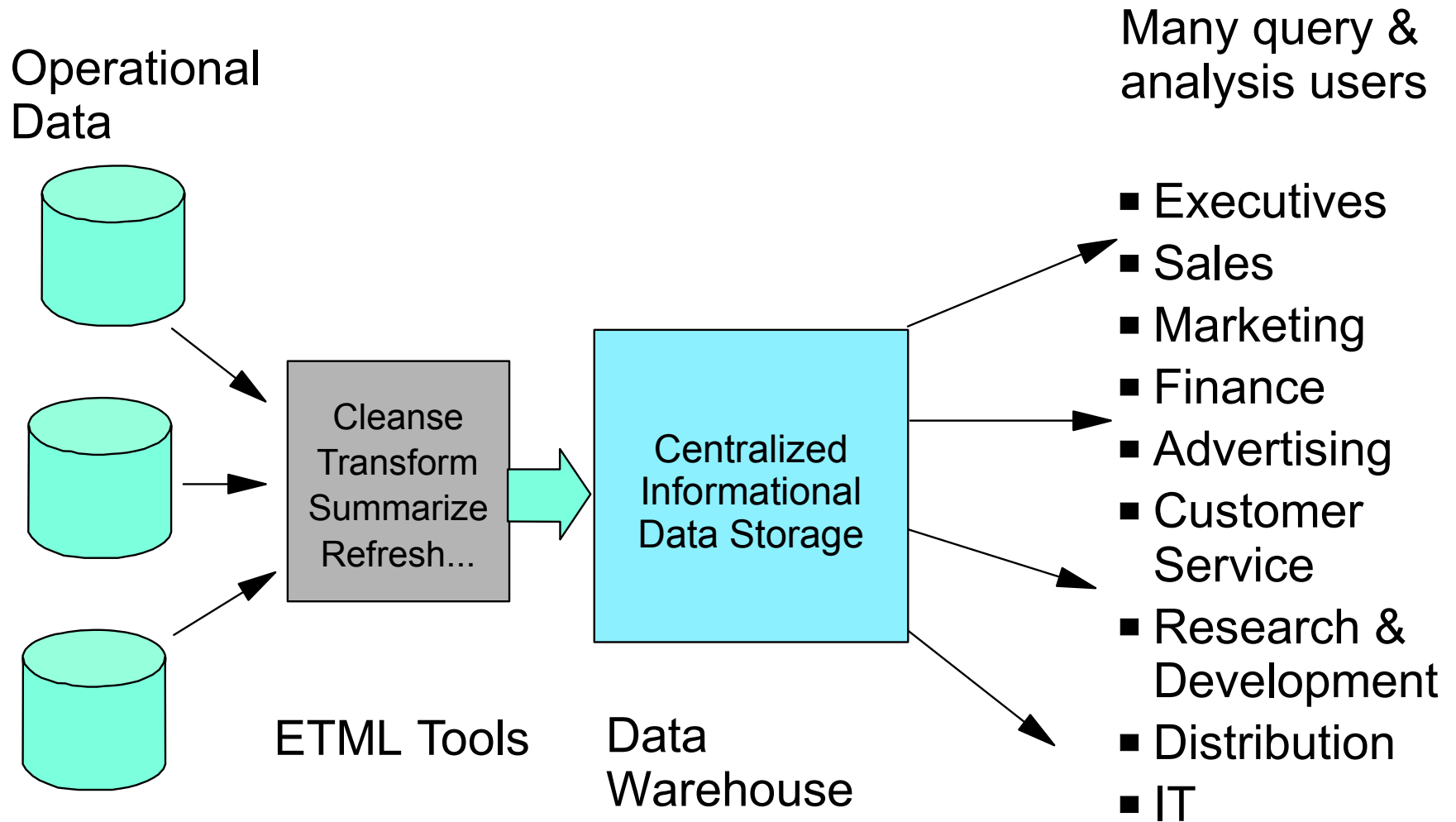
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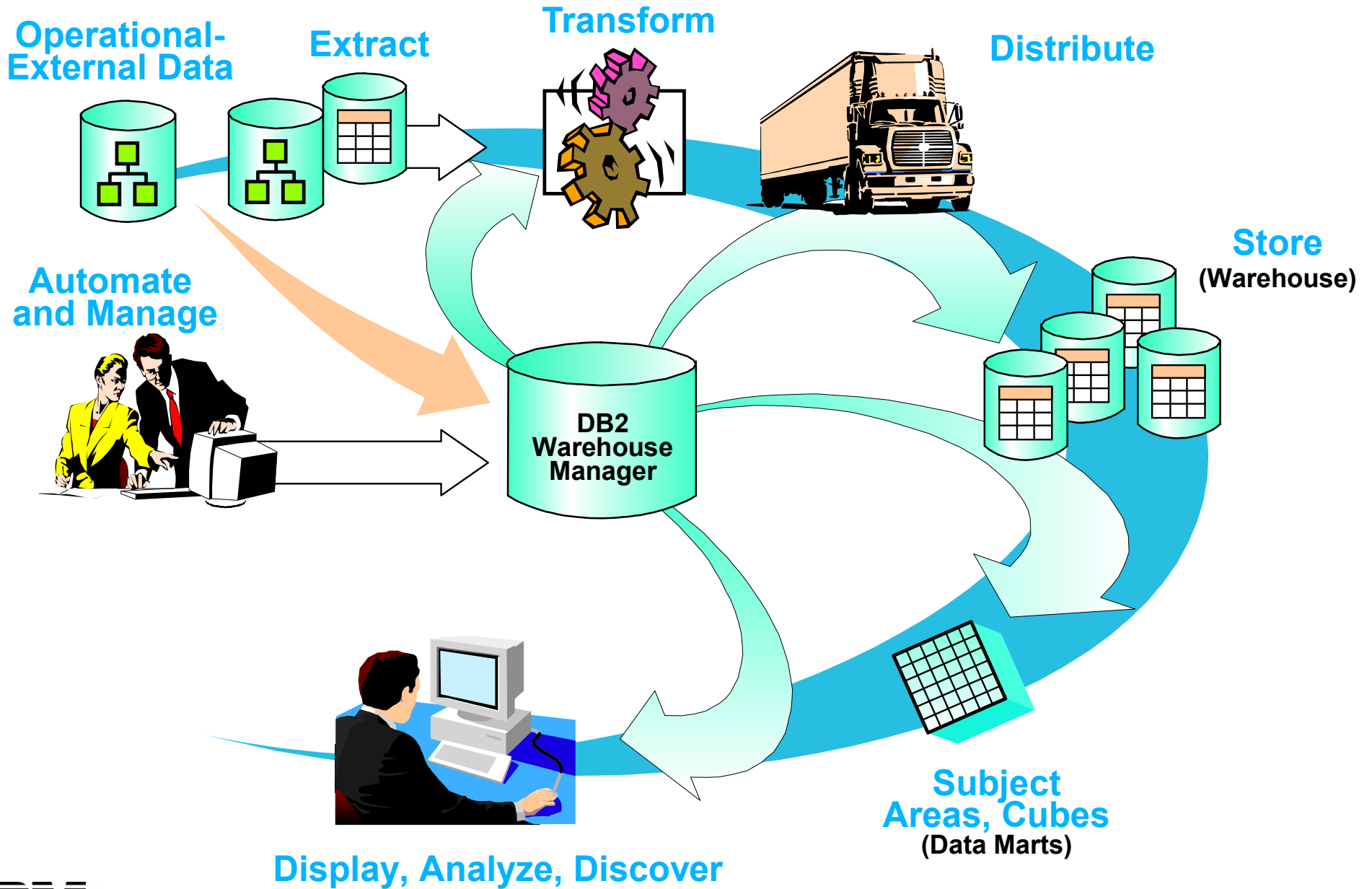
Objectives (Terms to Discuss)

- DB2 Warehouse Center
- DB2 Warehouse Server
- DB2 Warehouse Manager
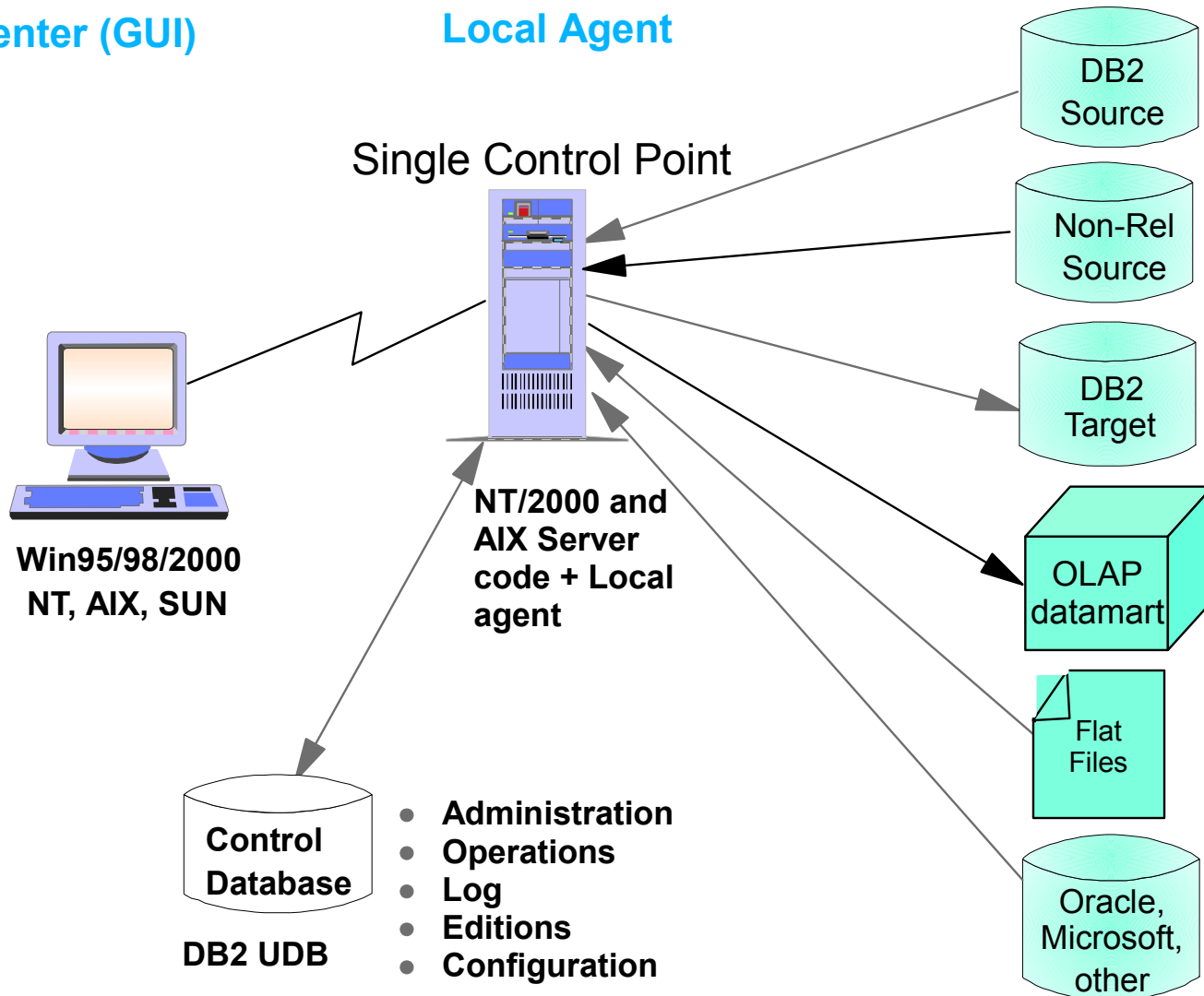 - ► Components
- DB2 Warehouse Agents

Data Warehousing

Operational Data

Many query & analysis users

Cleanse
Transform
Summarize
Refresh...

Centralized Informational Data Storage

- Executives
- Sales
- Marketing
- Finance
- Advertising
- Customer Service
- Research & Development
- Distribution
- IT

ETML Tools

Data Warehouse

Warehouse Process Flow

Operational-External Data

Extract

Transform

Distribute

Store (Warehouse)

Automate and Manage

DB2 Warehouse Manager

Subject Areas, Cubes (Data Marts)

Display, Analyze, Discover

DB2 Data Warehouse Center Implementation

Data Warehouse Center (GUI)

Warehouse Server & Local Agent

Databases

Single Control Point

Win95/98/2000
NT, AIX, SUN

NT/2000 and AIX Server code + Local agent

DB2 Source

Non-Rel Source

DB2 Target

OLAP datamart

Flat Files

Oracle, Microsoft, other

Control Database

DB2 UDB

- **Administration**
- **Operations**
- **Log**
- **Editions**
- **Configuration**

DB2 Warehouse Architecture

Data Warehouse Center

DB2 Warehouse Manager

GUI

Warehouse Server

Remote Warehouse Agents

Databases

Information Catalog Manager

Single Control Point

Win95/98/2000 NT, AIX, SUN

NT/2000 and AIX Server code + Local agent

Control Database

DB2 UDB

- **Administration**
- **Operations**
- **Log**
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- **Configuration**

DB2 Source

Non-Rel Source

DB2 Target

Flat Files

Non-IBM

NT/2000, Linux, AIX, Sun, OS/400, OS/390

Metadata Catalog

Windows or Web

Data flow is direct source to target, not via Warehouse Server

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Data Warehouse Center GUI

- Register and access data sources
  - DB2, flat file, and other sources
- Define extraction and transformation steps
  - Over 100 built-in SQL transformations, plus utilities
- Define data movement and warehouse population
  - Full refresh, history, and incremental data movement
- Model, automate, and monitor processes
  - Schedules, triggers, dependencies, retries, notifications
- Manage and interchange metadata
  - Standards-based. Object Management Group, Common Warehouse Metadata Interchange
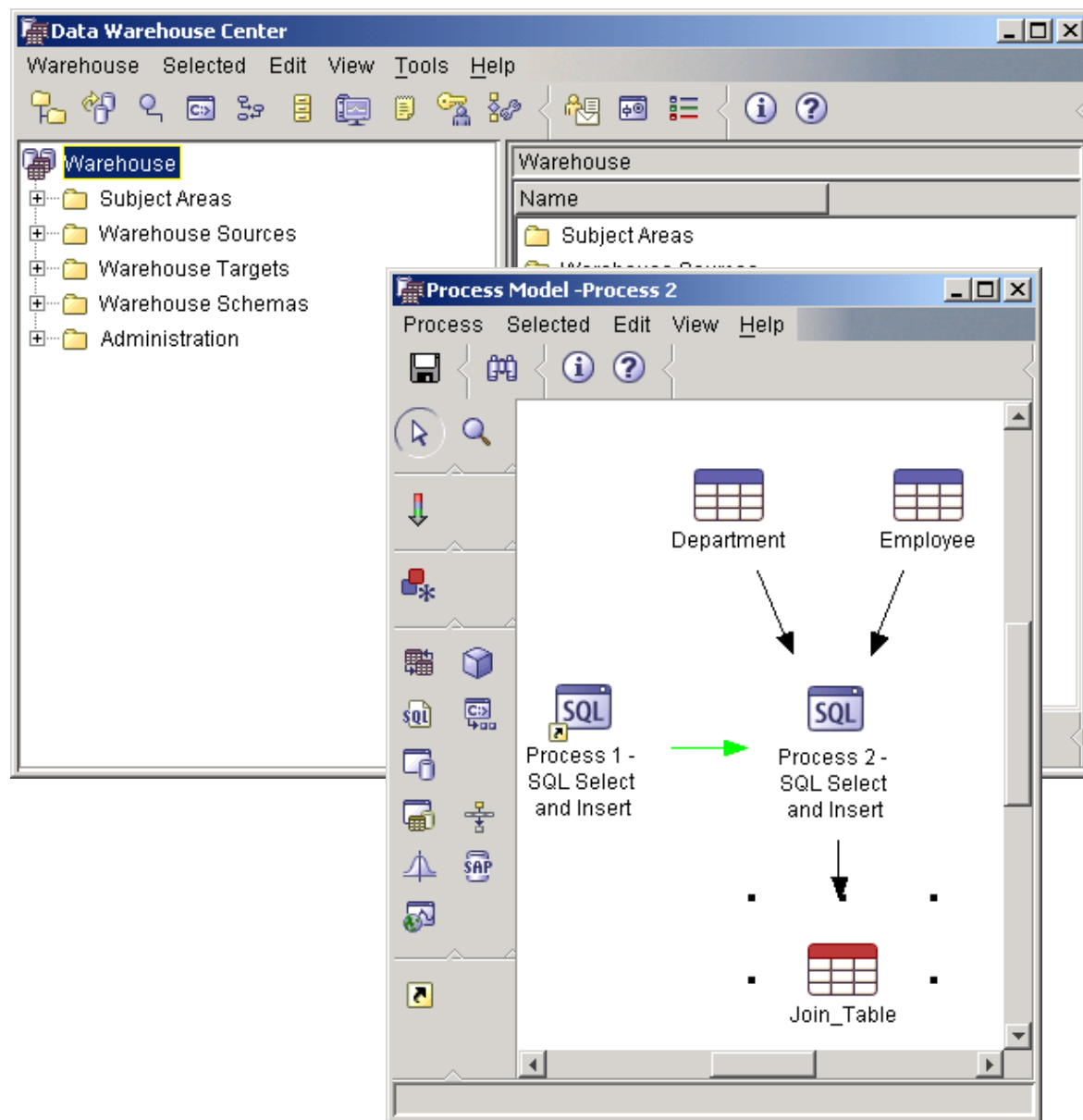
Warehouse Server and Local Agent

- ## Warehouse Server
  - ➤ Single Control point
  - ➤ Controls warehouse environment
  - ➤ Issues commands to local agent
  - ➤ Optionally issues commands to remote agents
  - ➤ Uses technical metadata stored in Control Database

- ## Local Agent
  - ➤ Moves data from source to target
  - ➤ Runs programs and utilities when instructed by Warehouse Server
  - ➤ Reports success/failure to Warehouse Server
  - ➤ Local to the Warehouse Server

Databases/Files Supported for Built in Functions

Source - Relational

- DB2 for z/OS
- DB2 for VM & VSE
- DB2 for iSeries
- DB2 for Windows NT/2000
- DB2 for AIX
- DB2 for OS/2
- DB2 for HP-UX
- DB2 for Linux
- DB2 for NUMA-Q
- DB2 for SCO
- DB2 for SUN Solaris
- DB2 UDB EEE
- DataJoiner
- Oracle
- Sybase
- Informix
- MS SQL Server
- DPROPR (External Population)
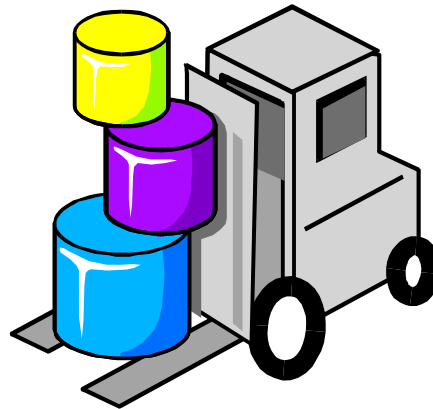
Target

- DB2 for z/OS
- DB2 UDB EEE
- DB2 for AIX
- DB2 for NT
- DB2 for SUN
- DB2 for HP-UX
- DB2 for SCO
- DB2 for VM
- DB2 for VSE
- DB2 for iSeries
- DataJoiner
- Flat Files

Source - Non-relational

- IMS (with IBM Classic Connect)
- MVS VSAM (IBM Classic Connect)
- VSE VSAM DL1 (with CrossAccess adapter)
- FTP: VM or OS/390 flat files (delimited or fixed length)
- LAN flat files

Automation

- Define workflow
  - ►Scheduled or triggered
  - ►Dependency management
  - ►Both data and task flow shown graphically
  - ►Conditional processing
- Handle errors
  - ►Automatic retry
  - ►Error logging
- Monitor execution status
  - ►Scheduled, in-progress, completed
  - ►Log access
  - ►E-mail notification
- Gather and report warehouse statistics
  - ►Automatic statistics collection and reporting
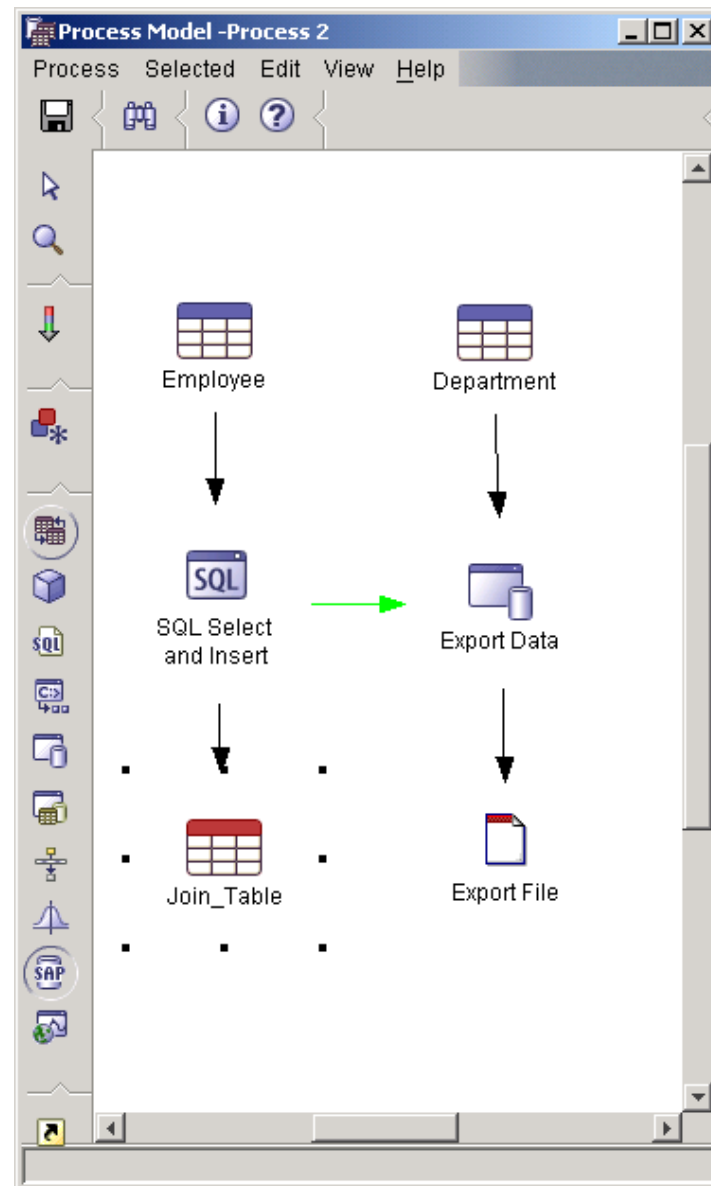
Warehouse Agents

- Scalable Distributed Warehousing
- Remote Warehouse Agents
  - ► Agents manage the flow of data between warehouse sources and warehouse targets
  - ► Provides direct source-to-target data movement options for distributed systems by installing agents on the same machine as the target warehouse

Agent Role During Population

Warehouse Server   **Warehouse Agent**   **Database Server**

Step Execution

Message

Agent

SQL SELECT

SQL SELECT

ODBC Driver

Source Database Server

Source Database

Data

Data

Data

SQL INSERT

Schedules

Control Database

Target Database
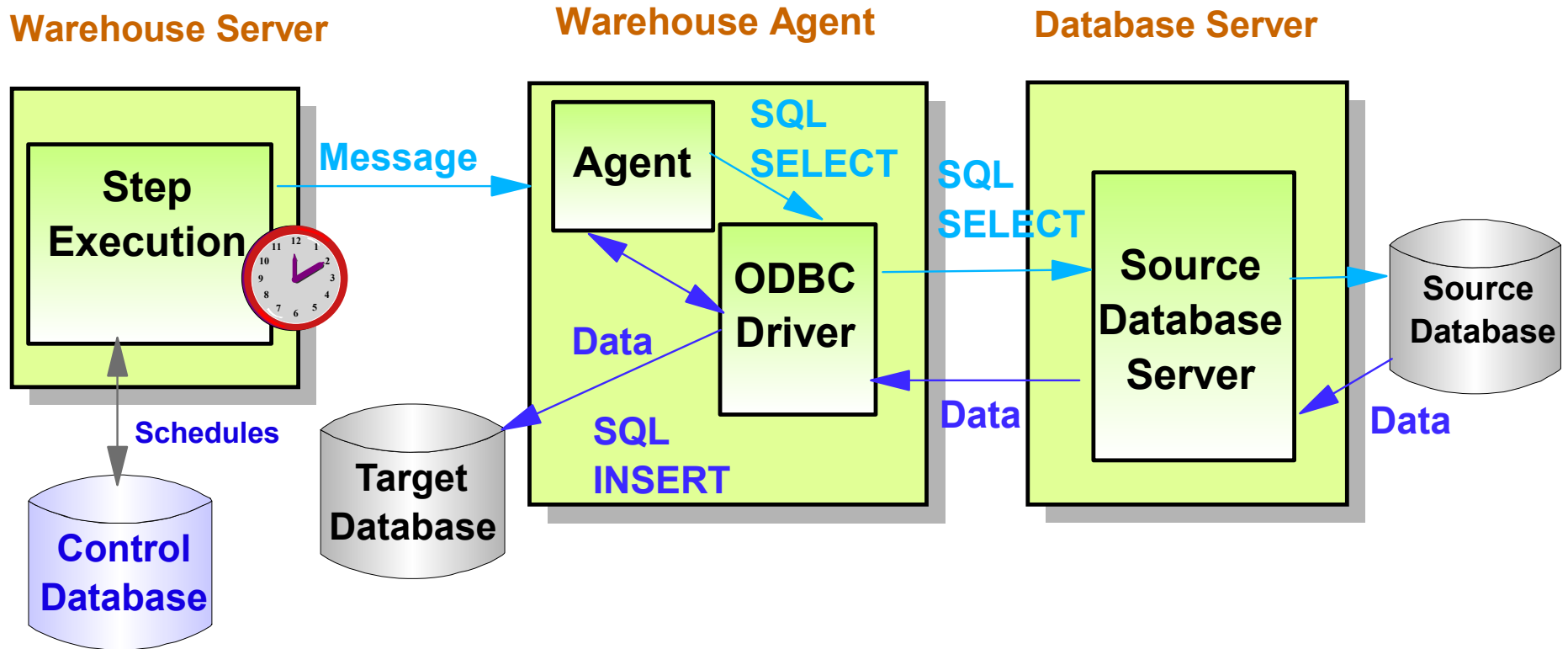
Warehouse Server

- Schedules wake up
- Reads Step definition from Control database
- Starts Agent (through Agent Daemon)

Warehouse Agent

- Acknowledges to Warehouse Server
- Loops on :
  - Receive command
  - Execute command
  - Report status

Warehouse Server

- Loops on :
  - Receive and log result
  - Update Work in Progress panel

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Warehouse Scheduling

- Flexible scheduling
  - ► Specific Time and Date
  - ► Specified Interval
  - ► Weekly, Daily, Hourly
  - ► After previous step:
    - – On Success
    - – On Failure
    - – On Completion
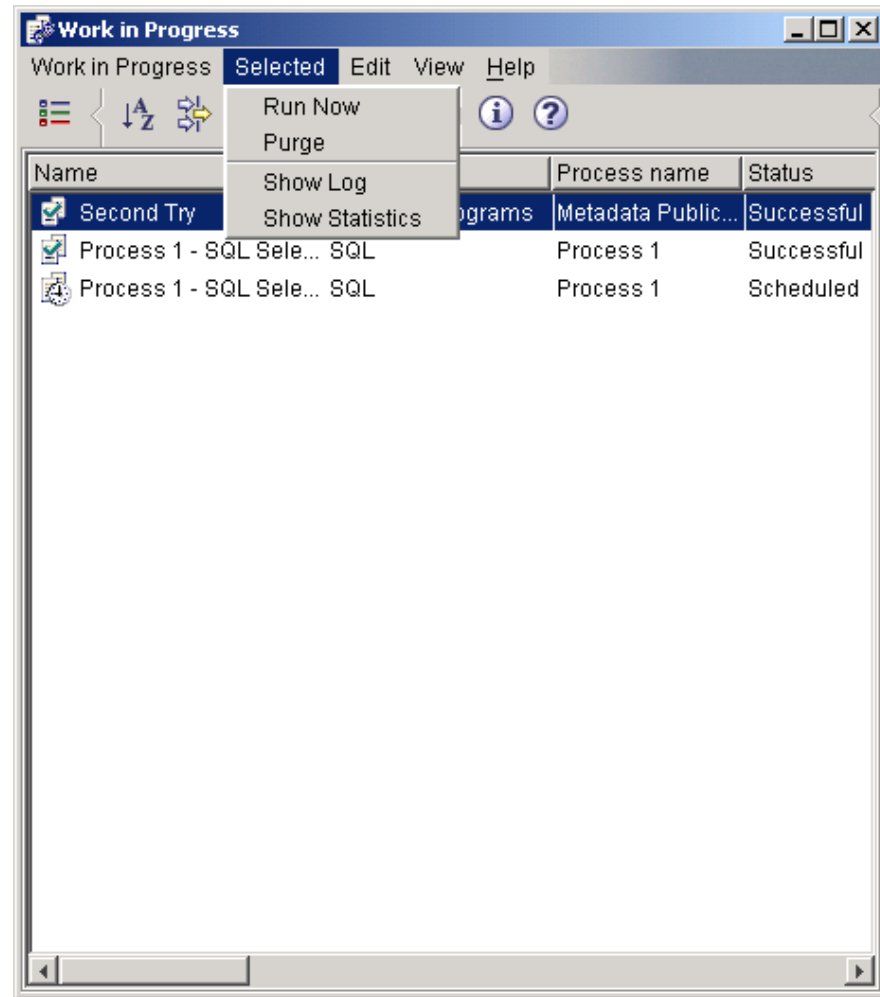 - ► Combine methods
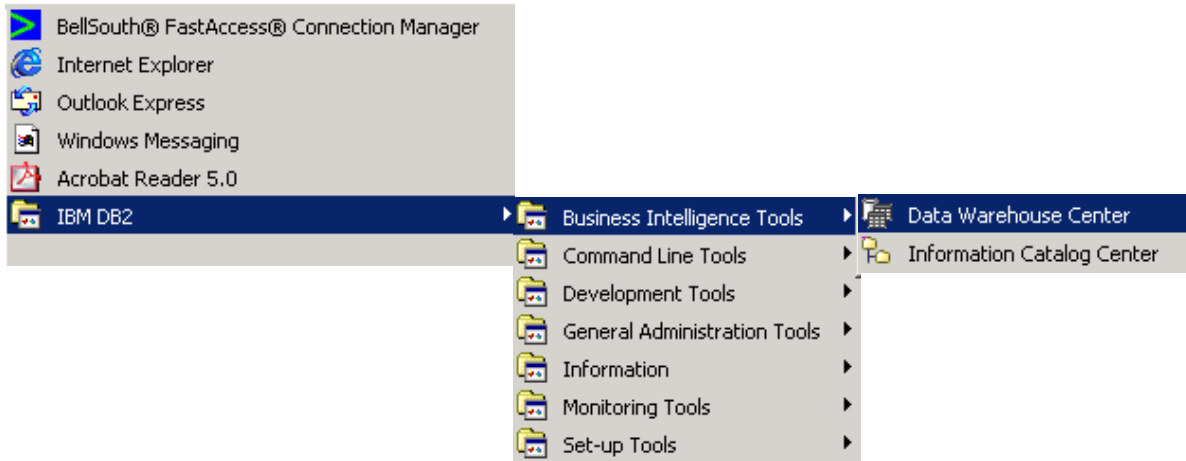 - ► Run indefinitely or end date

Notification Menu Option

Work in Progress Window

- Run a New Step

- Run a Scheduled Step Now

- Purge
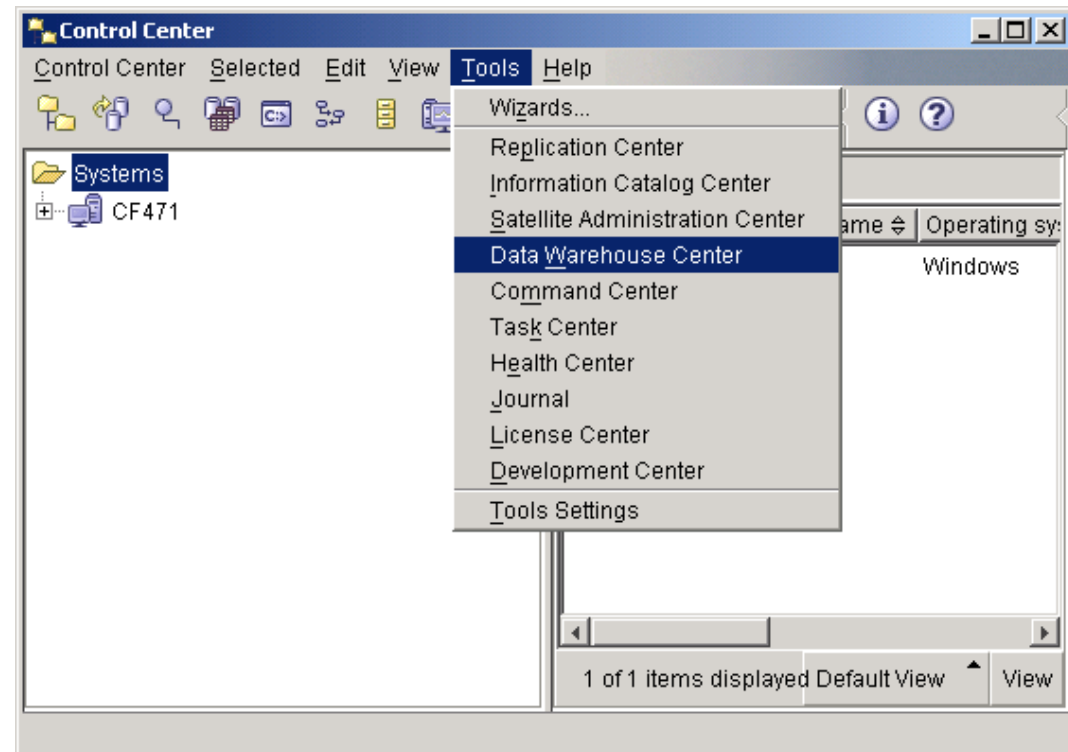
- Show Log

- Show Statistics

- Cancel

- Show Progress
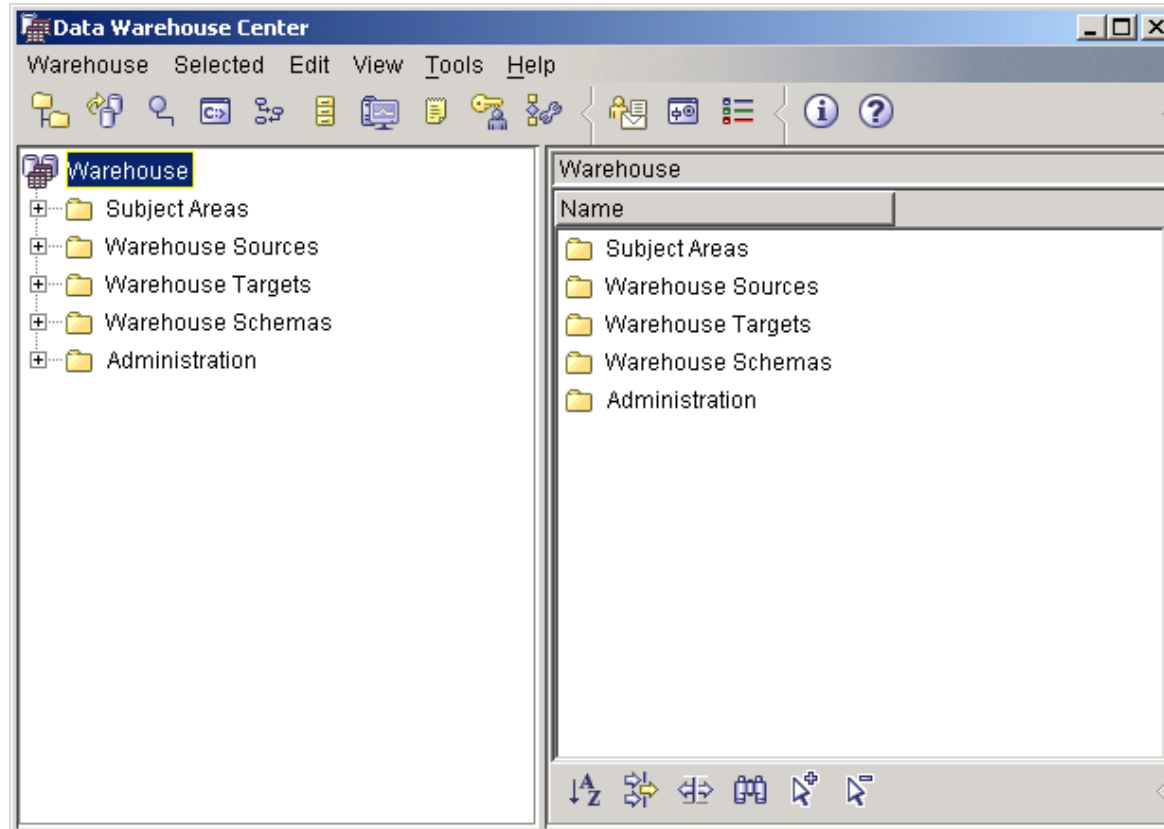
Logging on to the Data Warehouse Center

BellSouth® FastAccess® Connection Manager	
Internet Explorer	
Outlook Express	
Windows Messaging	
Acrobat Reader 5.0	

Start Programs...

IBM DB2 ▸
- Business Intelligence Tools ▸
  - Data Warehouse Center
  - Information Catalog Center
- Command Line Tools ▸
- Development Tools ▸
- General Administration Tools ▸
- Information ▸
- Monitoring Tools ▸
- Set-up Tools ▸

- **Via a Center**
  - **Control**
  - **Command**
  - **Replication**

Control Center

Control Center   Selected   Edit   View   Tools   Help

Systems
  CF471

Tools menu:
Wizards...
Replication Center
Information Catalog Center
Satellite Administration Center
Data Warehouse Center
Command Center
Task Center
Health Center
Journal
License Center
Development Center
Tools Settings

ame ⇩ | Operating sy:
Windows

1 of 1 items displayed Default View   View

Data Warehouse Center Desktop

Data Warehouse Center Functions

- Create Subject Areas
  - ► Processes
    - – Process Steps
      - Run SQL
      - Run a Warehouse Supplied Program
      - Run a User Defined Program
      - Run a Warehouse Transformer
- Register Warehouse Sources
- Register Warehouse Targets
- Administration
  - ► Define Users and Security
  - ► Register Remote Agents
  - ► Register User Defined Programs

Additional Functions

- Monitoring Work In Progress

- Monitoring Statistics and Logs

- Publish Metadata to Information Catalog
  - ➤ Warehouse Center and OLAP Outline Data

- Exporting a Warehouse Schema to DB2 OLAP Integration Server
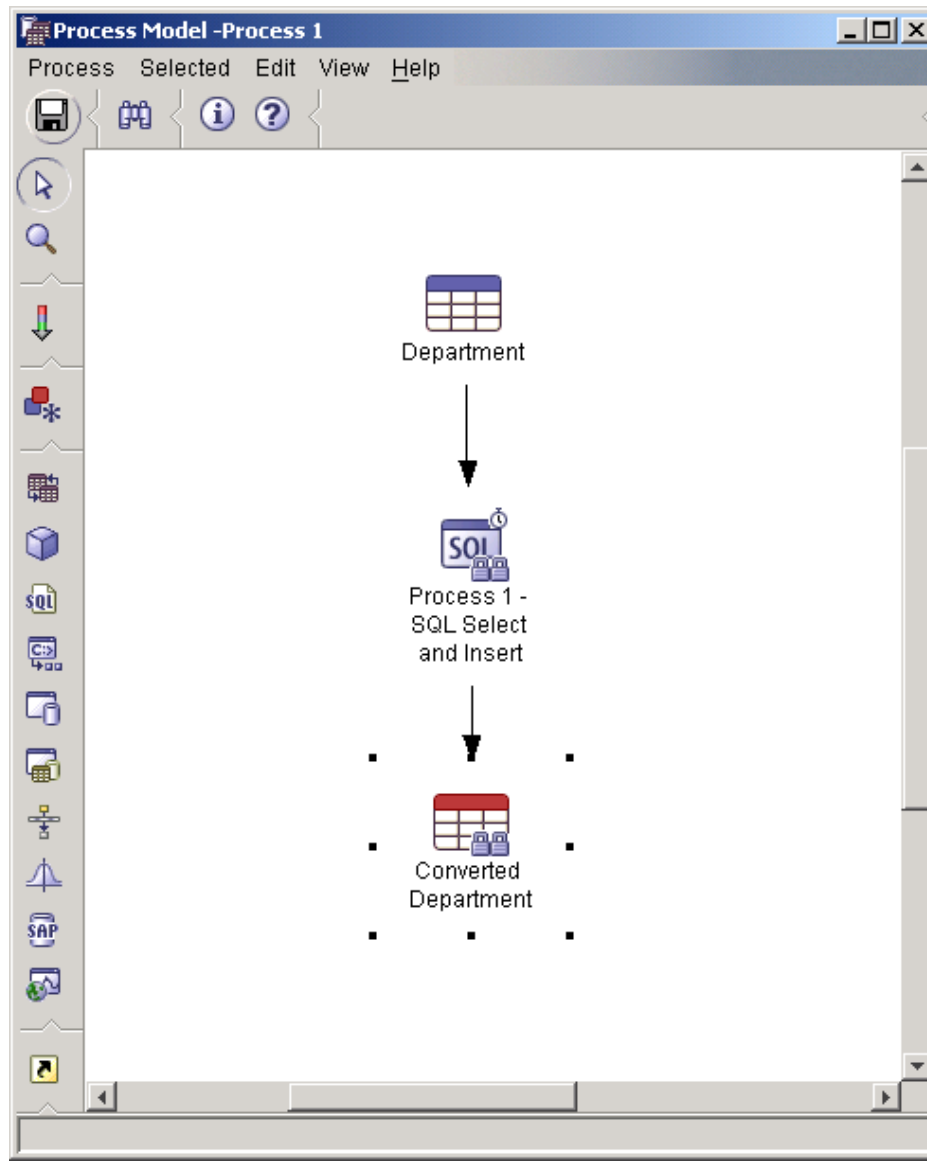
- Exporting / Importing TAG files
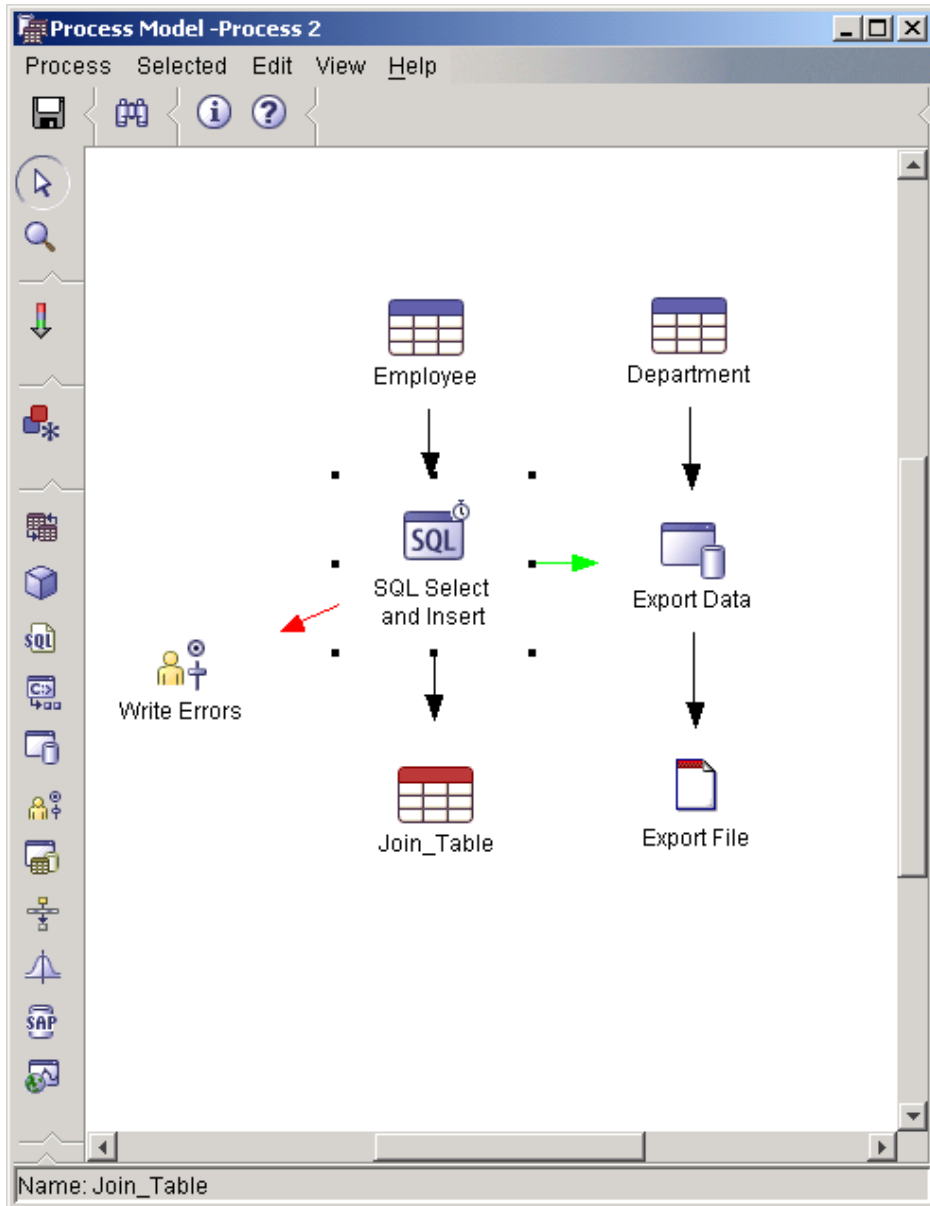
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Data Warehouse Center Programs
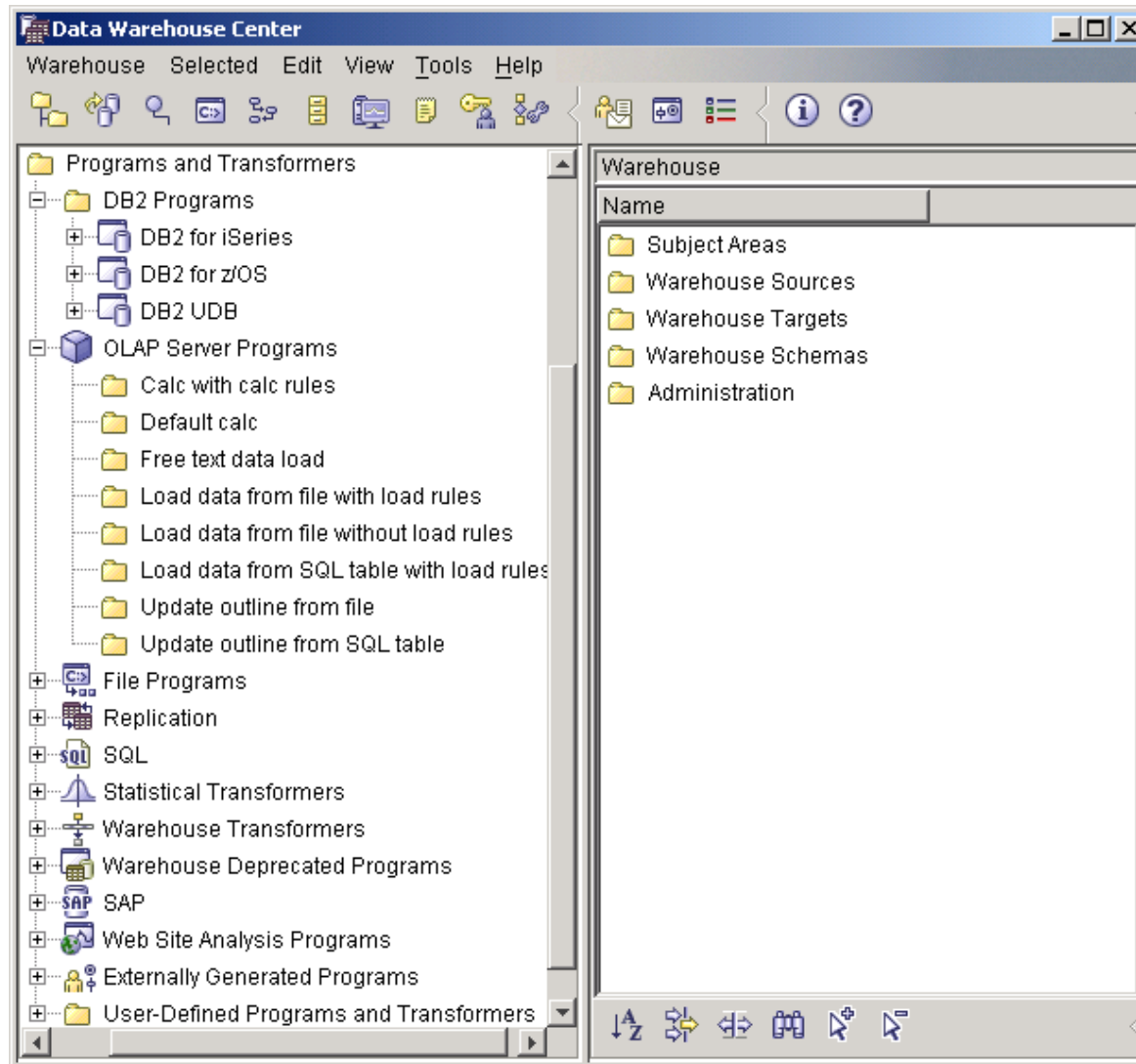
User Defined Programs

- Programs can be
  - Locally written programs, or externally purchased programs
  - Written in any language that produces an executable
  - Batch files
  - DLLs
  - DB2 Stored Procedures

- Parameters can be passed to the program

Process Model Window

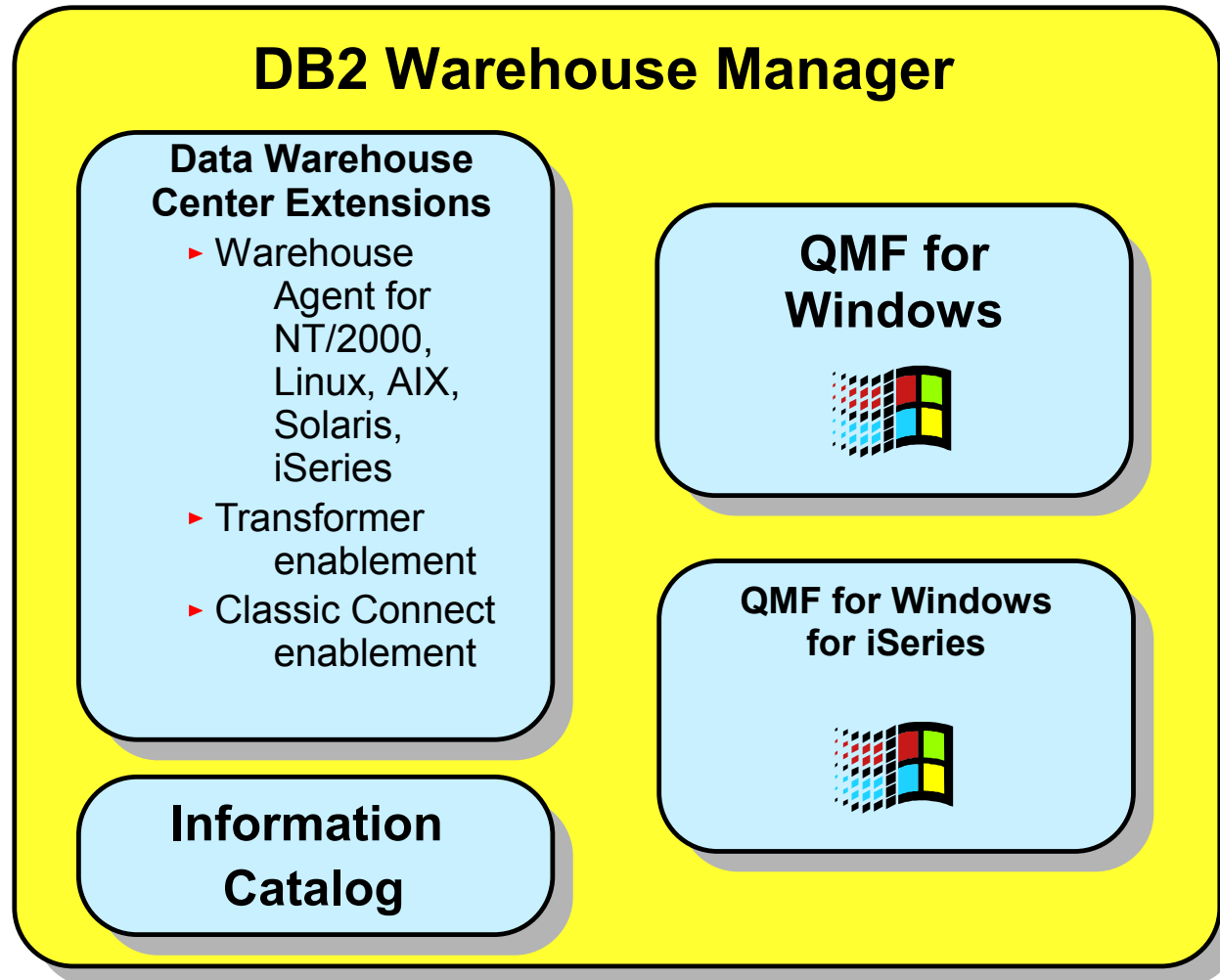# Cascading Warehouse Steps and Processes
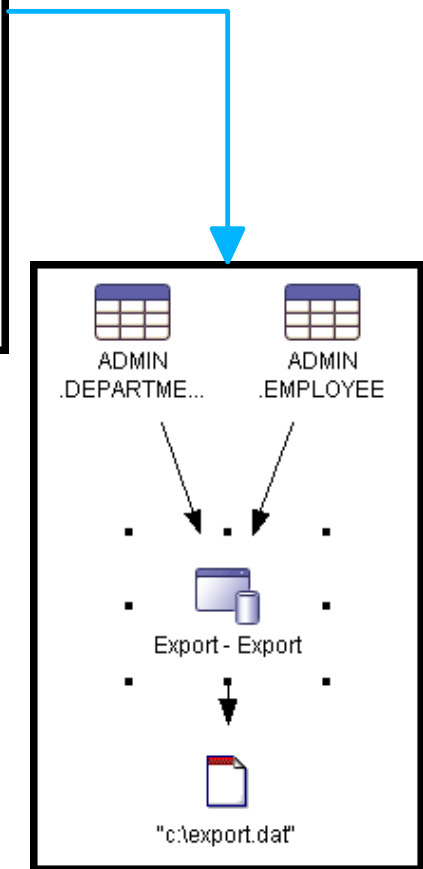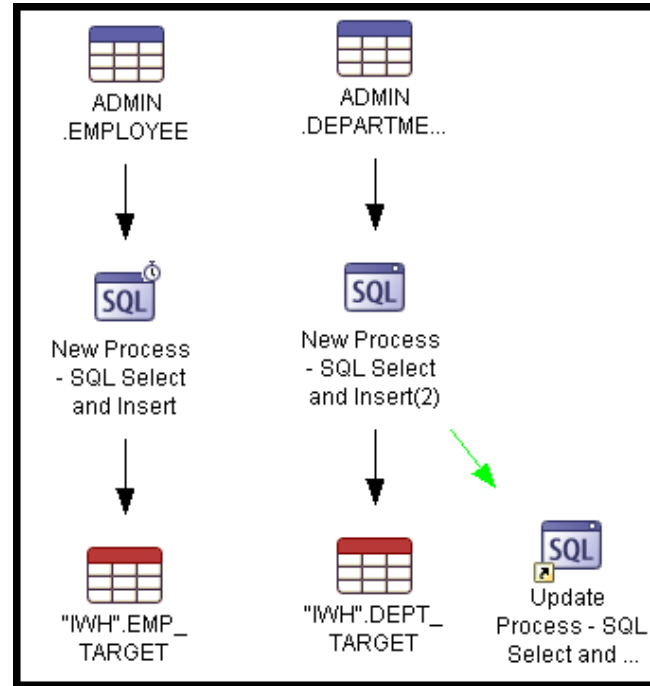
Java External Triggers

- An external trigger program is a warehouse program that calls the Data Warehouse Center

- An External Trigger can start a step independently of the Data Warehouse Center administrative interface

- The external trigger program consists of two components:
  - XTServer
  - XTClient

- XTServer is installed with the warehouse server

- XTClient is installed with the warehouse agent for all agent types

DB2 Warehouse Manager

- Additional chargeable option
- Includes:
  - ► Additional Warehouse Agents
  - ► Transformers
  - ► Information Catalog Center
  - ► QMF for Windows (on iLUW)

DB2 Warehouse Manager for Windows, Linux, UNIX, iSeries

DB2 Warehouse Manager

Data Warehouse Center Extensions

- ▸ Warehouse Agent for NT/2000, Linux, AIX, Solaris, iSeries
- ▸ Transformer enablement
- ▸ Classic Connect enablement

Information Catalog

QMF for Windows

QMF for Windows for iSeries
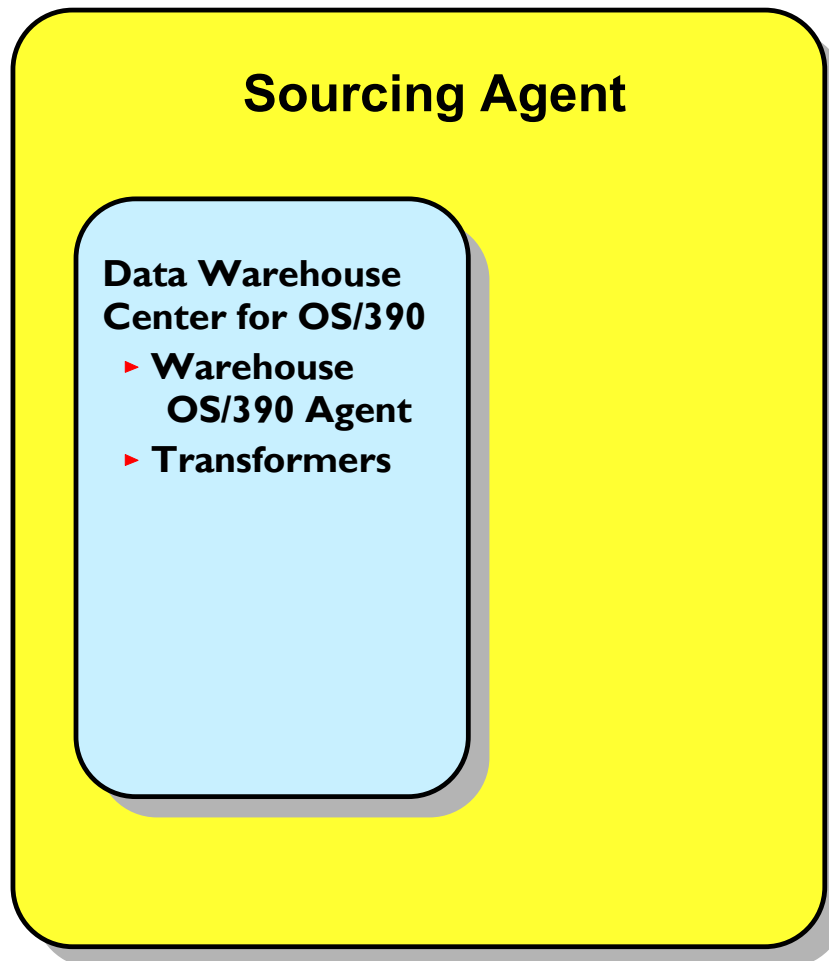
DB2 Warehouse Manager for OS/390

DB2 Warehouse Manager

Data Warehouse Center
- ▶ DB2 UDB EE restricted use license
- ▶ Warehouse Agent for 390
- ▶ Transformer enablement
- ▶ Classic Connect enablement
- ▶ Metadata interchange

Information Catalog

OS/390 Sourcing Agent (zSeries)

Sourcing Agent

Data Warehouse Center for OS/390
- ► **Warehouse OS/390 Agent**
- ► **Transformers**

- Optional feature of the DB2 Warehouse Manager for UNIX, Windows, Linux, iSeries
- Enables access and transformation of 390 source data on the 390 platform for those who already have DB2 Warehouse Manager on other platforms
- Same function/code as OS/390 agent
- Does not include warehouse kernel
  - ► kernel already comes with other DB2 Warehouse Manager packages)

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What are Transformers?

- Transformers are stored procedures or user-defined functions that can transform data according to statistical and warehouse requirements

- There are three types of Transformers:
  - ➤ Warehouse Transformers
  - ➤ Statistical Transformers
  - ➤ User-Defined Functions (UDF)

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Warehouse Transformers
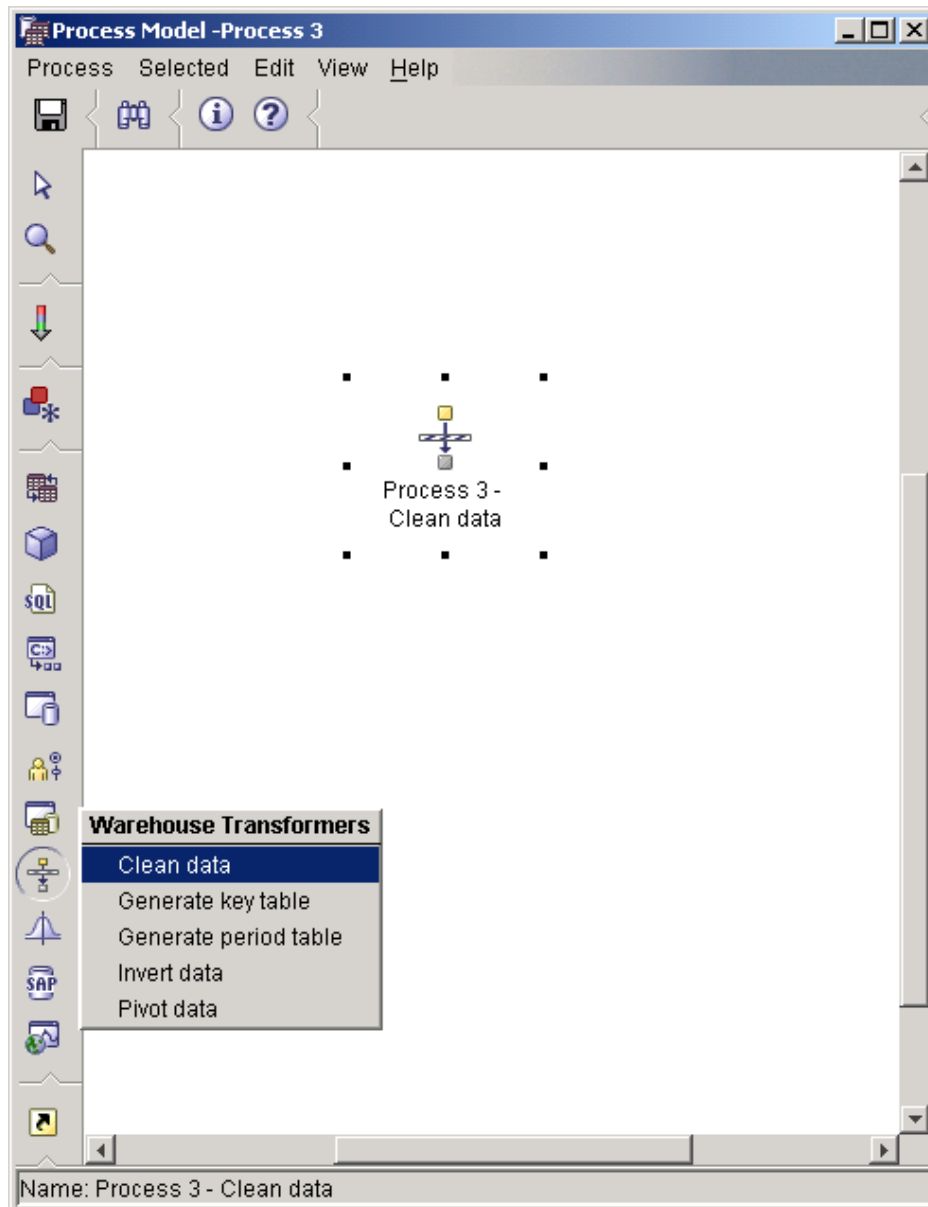
- Clean Data
- Generate Key Table
- Generate Period Table
- Invert Data
- Pivot Data

Statistical Transformers
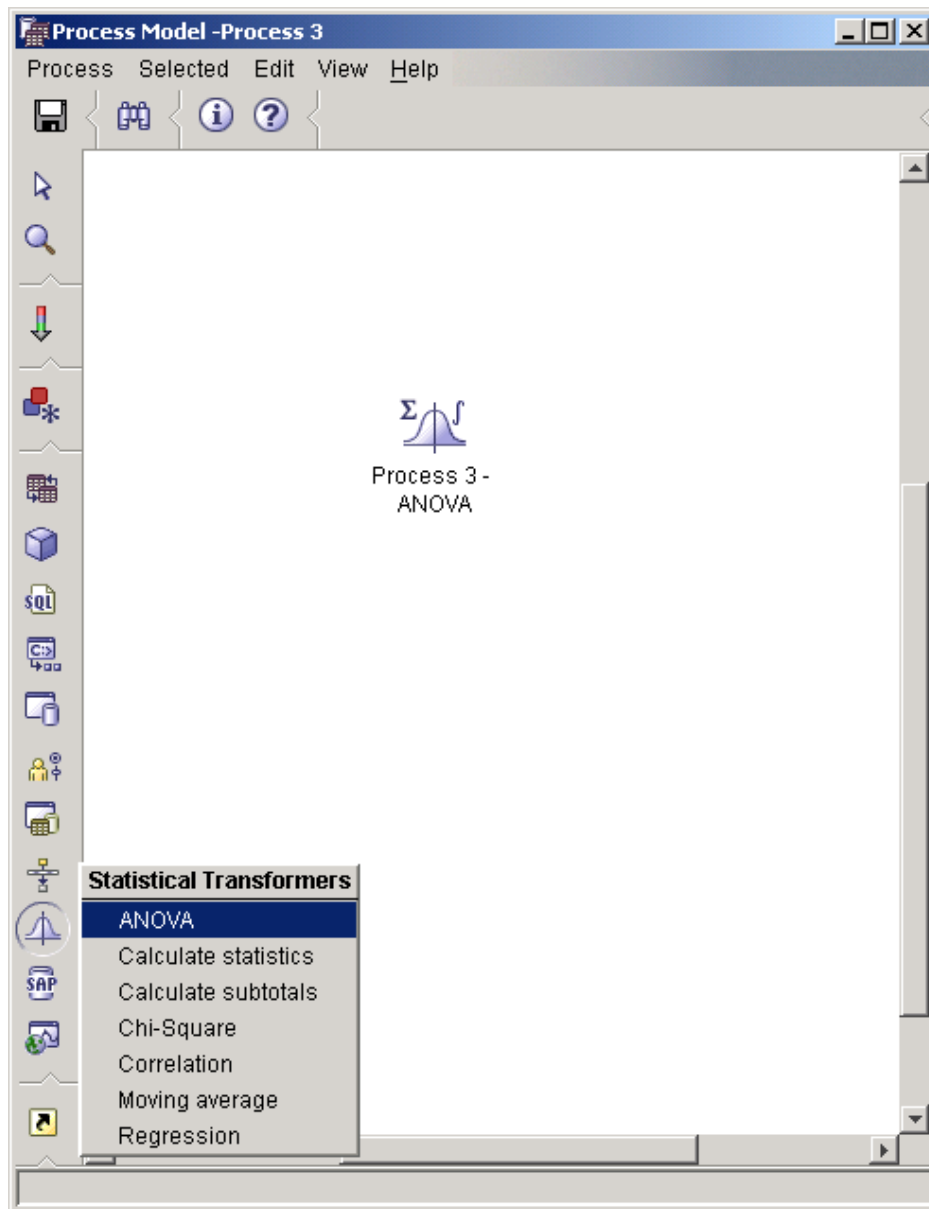
- Analysis of variance
- Calculate statistics
- Calculate subtotals
- Chi-Square
- Correlation
- Moving average
- Regression

Information Catalog Center

- Business metadata repository
  - ► Extensible architecture
  - ► Supports any type of information object
    - Databases, cubes, queries, reports, charts, spreadsheets, Web pages

- End user GUI for accessing the metadata easily
  - ► Provides a search engine
  - ► Special launch tool for invoking execution of user applications
  - ► Web and Win32 based

- Supports information sharing
  - ► Automatic population and synchronization with Data Warehouse Center metadata
  - ► Pre-built metadata interchange with popular query and ETML tools

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# ICM and Third Party Query Tools

Query Tools like Business Objects, Brio Enterprise, Cognos Impromptu and PowerPlay can:

- Exchange Metadata with the ICM
  - ➤ Extract metadata from the ICM and populate Business Objects Universe
  - ➤ Extract metadata from Business Objects Universes and populate the ICM
  - ➤ Launch of Brio and Business Objects Reports from the ICM
  - ➤ Extract metadata from the ICM and populate an Impromptu Catalog
  - ➤ Extract metadata from an Impromptu Catalog and populate the ICM
  - ➤ Launch Cognos reports and cubes from the ICM

- Metadata bridge software and utilities are provided by Business Objects, Brio and Cognos
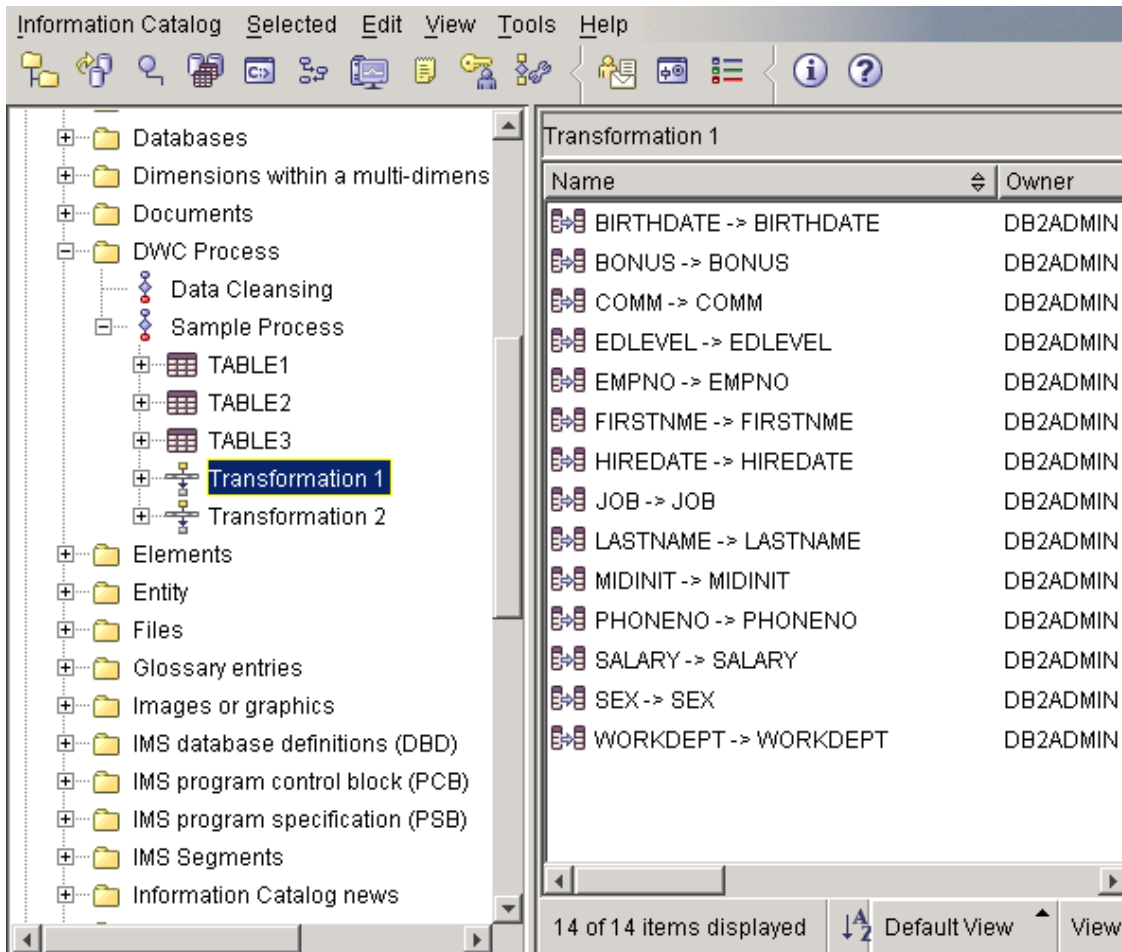
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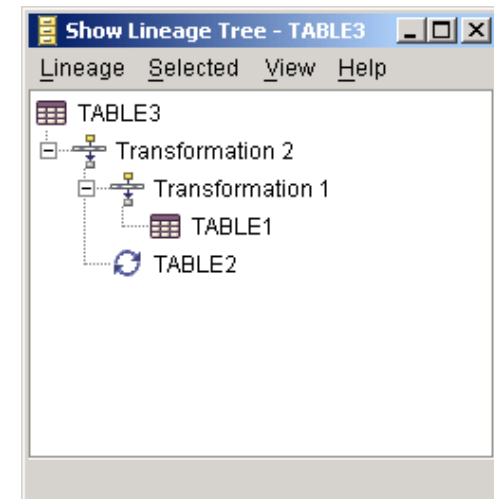# Publish Metadata to ICC

- From the DB2 Warehouse Center:

  ► Publish Warehouse Center Metadata
  ► DB2 OLAP Server Metadata
  ► Can be scheduled as process steps
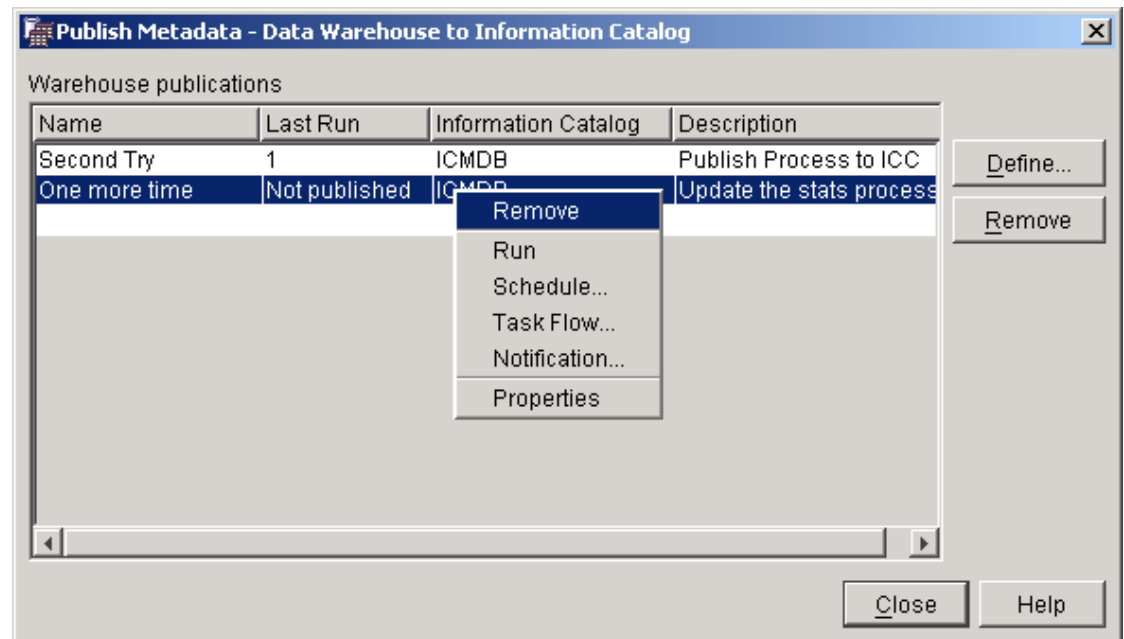
Information Catalog Center

- Intuitive Interface
  - Grouped on object type
  - Can create hierarchies
  - Specify search criteria
    - Save searches
  - Security
    - On object type
    - Create groups

Daba Daba That's All Folks

The End