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Pentaho Data Integration

Enterprise Solution

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Date

Module Objectives

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When you complete this module, you should be able to:

- Implement Jobs to control your ETL workflow
- Deploy your solution with Variables and Parameters
- Scale out your solution with Carte Servers

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Jobs

Jobs Workflow

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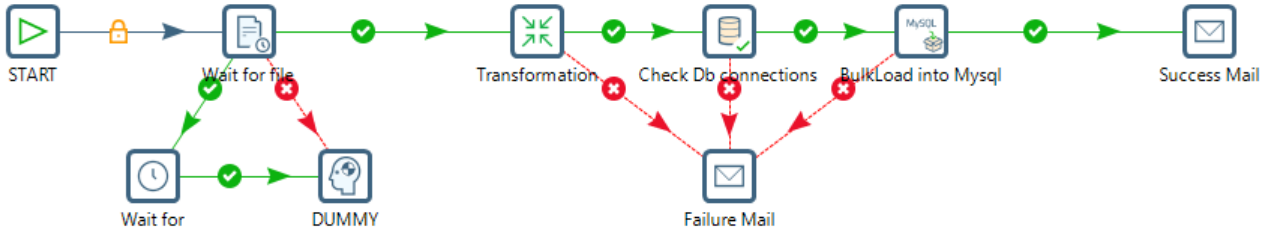
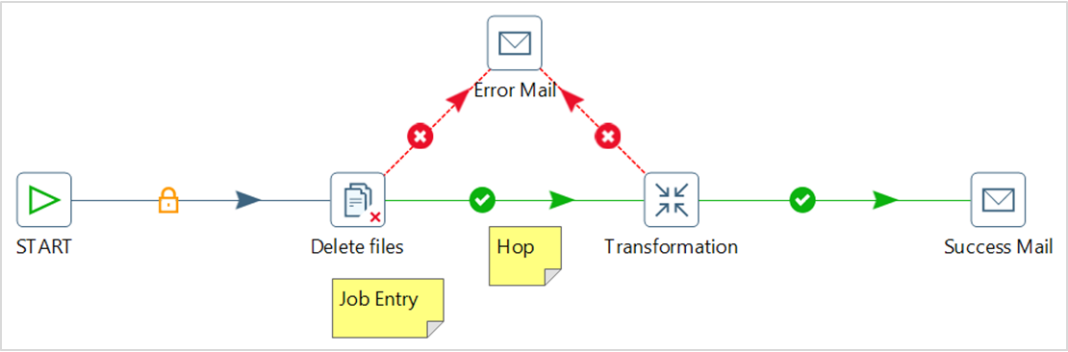


- Adding and configuring Job Entries
- Ensure required resources are available
- Using file management Job Entries
- Implement error handling in Jobs
- Implement Checkpoints
- Reviewing execution results

Jobs



- Jobs are workflow-like models for coordinating resources, execution and dependencies of ETL activities
- Consist of job entries, hops and notes
- Aggregate individual transformations to a process and introduce order
- Hops can be conditional

Job Orchestration

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- In an IT environment, orchestration is the ongoing task of ensuring that technical processes run reliably and according to schedule while producing the correct outputs using acceptable amounts of resources
- Orchestration includes:
  - Ensuring the availability of resources
  - Executing a series of tasks in the right order
  - Detecting and recovering from errors
  - Logging the results
  - Notifying people and other applications

Job Management

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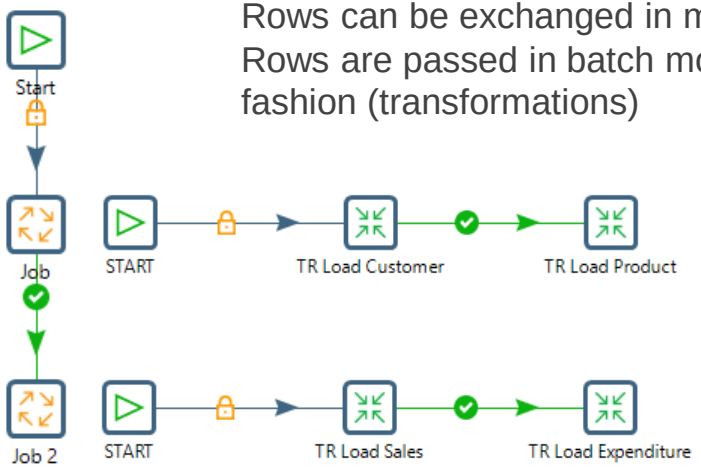
- Always check the status of external systems
  - Host systems
  - Databases / tables
  - File systems / directories
  - FTP sites
  - Web services
- Execute tasks with retry logic
- Notify others when a problem has occurred
- Store variables in a central location and use them consistently

Job Entry

- A job (Job / Transformation) entry is the primary building block of a job.
  - Execute jobs / transformations, retrieve files, generate email, and so on
- Each job can only have one job entry.

Job entries can pass a result object containing rows

Rows can be exchanged in memory – result rows
Rows are passed in batch mode, not in a streaming fashion (transformations)



Multiple Paths & Backtracking

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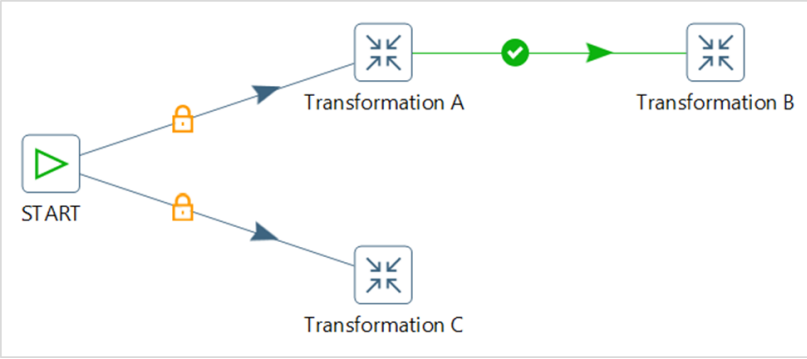

- Jobs are executed using a backtracking algorithm
- The path itself is defined by the actual outcome (success or failure) of the job entries
- The path is always followed until the very end before a next possibility is considered
- Order depends on creation of job entries
- The result of the job (success or failure) depends on the last job entry

Parallel Execution

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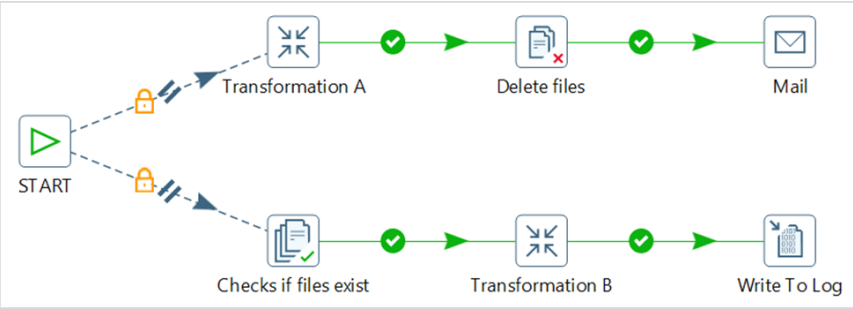
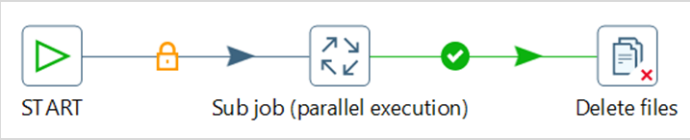
- A job entry can be told to execute the next job entries in parallel
  - Running in separate threads

- When you have a number of sequential job entries, these are executed in parallel as well





- If you want to continue in sequence after this parallel execution you need to put the parallel part of the job in a sub-job

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Lab 1 – Create a Job

Lab 1 - Hello World - Job

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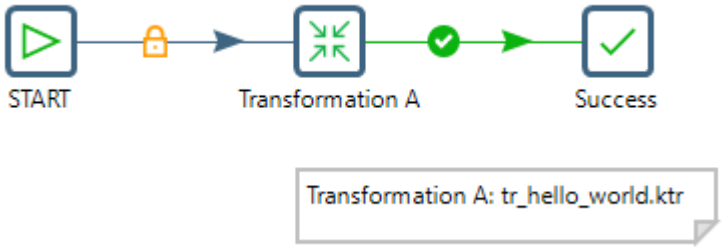
- Simple Job



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Lab 2 – Order of Execution

Lab 2 – Order of Execution

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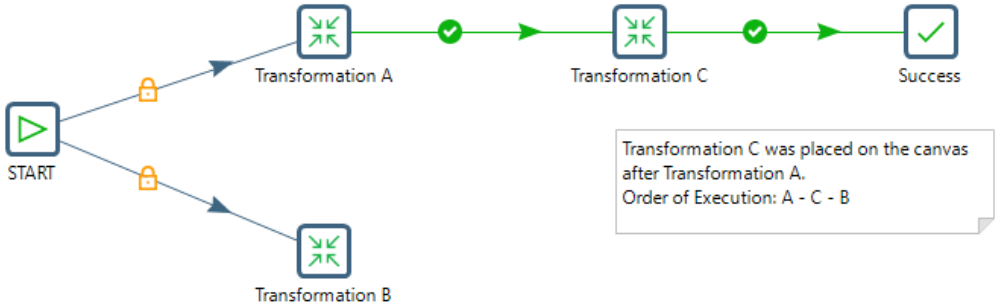
- Backward Algorithm



- Parallel

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Variables & Parameters

Variables, Parameters

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When you Run a Transformation or Job, there are several ways you can define the required settings.

- Variables allow you to dynamically enter the required setting.
- Parameters statically sets the condition of the Transformation or Job.

Variables

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- Variables can be used throughout Pentaho Data Integration, including in transformation steps and job entries. You define variables by setting them with the Set Variable step in a transformation or by setting them in the kettle.properties file in the directory:
  - $HOME/.kettle (Unix/Linux/OSX)
  - C:\Documents and Settings\<username>\.kettle\ (Windows XP)
  - C:\Users\<username>\.kettle\ (Windows Vista, 7 and later)

- The way to use them is either by grabbing them using the Get Variable step or by specifying meta-data strings like:

  ${VARIABLE}

  or:

  %%VARIABLE%%

Parameters

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- Parameters are special in the sense that they are explicitly named command line arguments. If you pass on a lot of arguments to your Kettle Job or Transformation, it might help to assign those values to an explicitly named parameter.
- Parameters have following advantages:
  - On the commandline you assign the value directly to a parameter, hence there is zero chance of a mix-up.
  - A default value can be defined for a named parameter
  - A description can be provided for a named parameter
  - No need for an additional transformation that sets the variables for the job

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Lab 1 – Parameters & Variables

Lab 1 - Variables and Parameters

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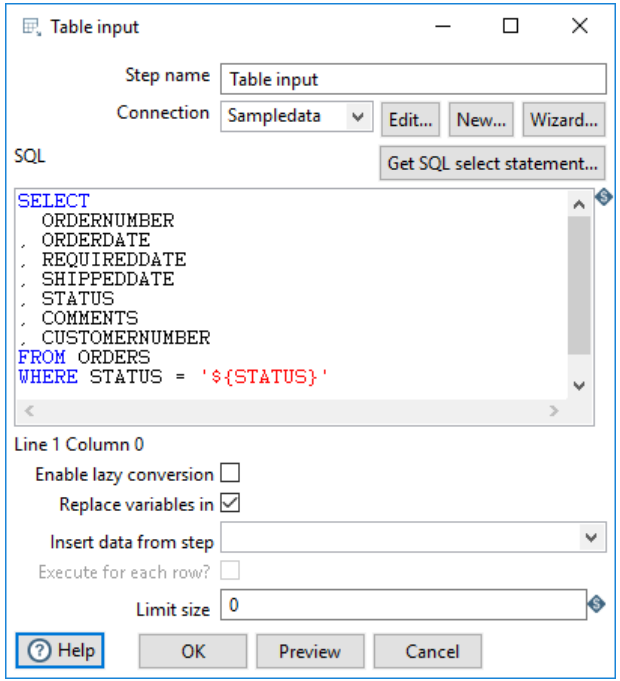
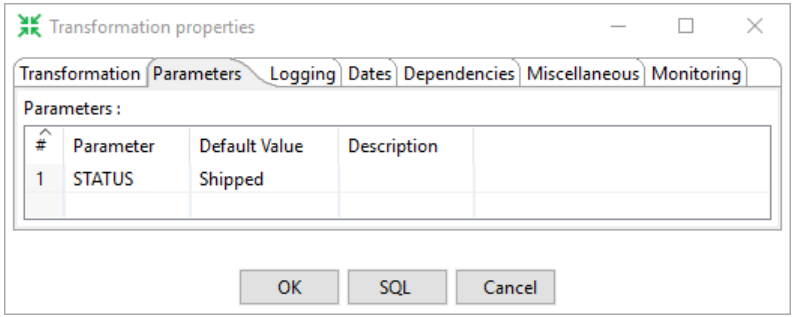
- So lets modify an existing Transformation ..
- Open Module 3 / Lab 2: Reading from a Database Table





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Lab 2 – Parameters and SQL

Lab 2 – Parameters in SQL

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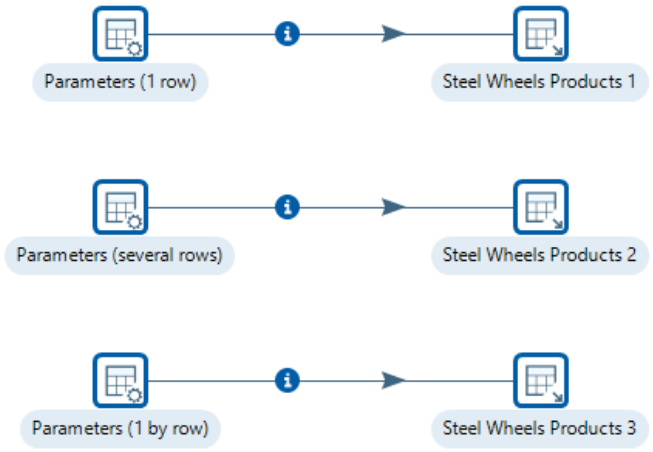
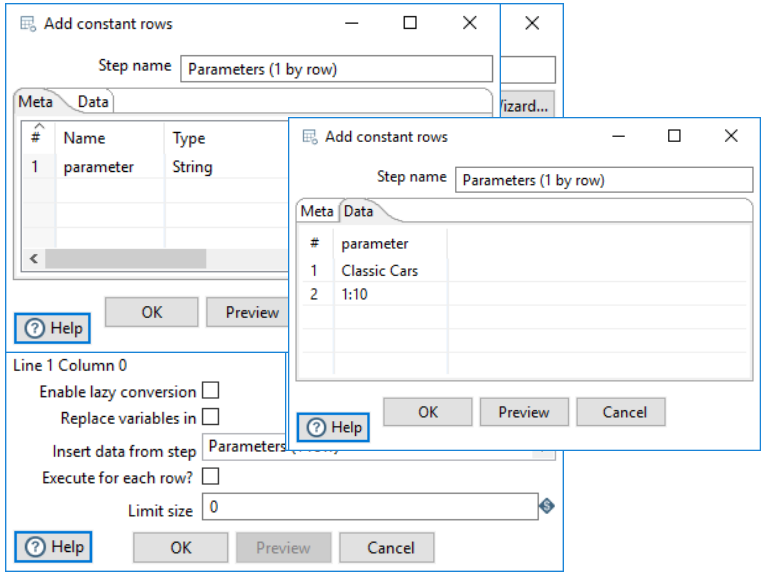
- One of the ways you have to make your queries more flexible is by passing it through some parameters.

This demonstration illustrates the different options for passing parameters.





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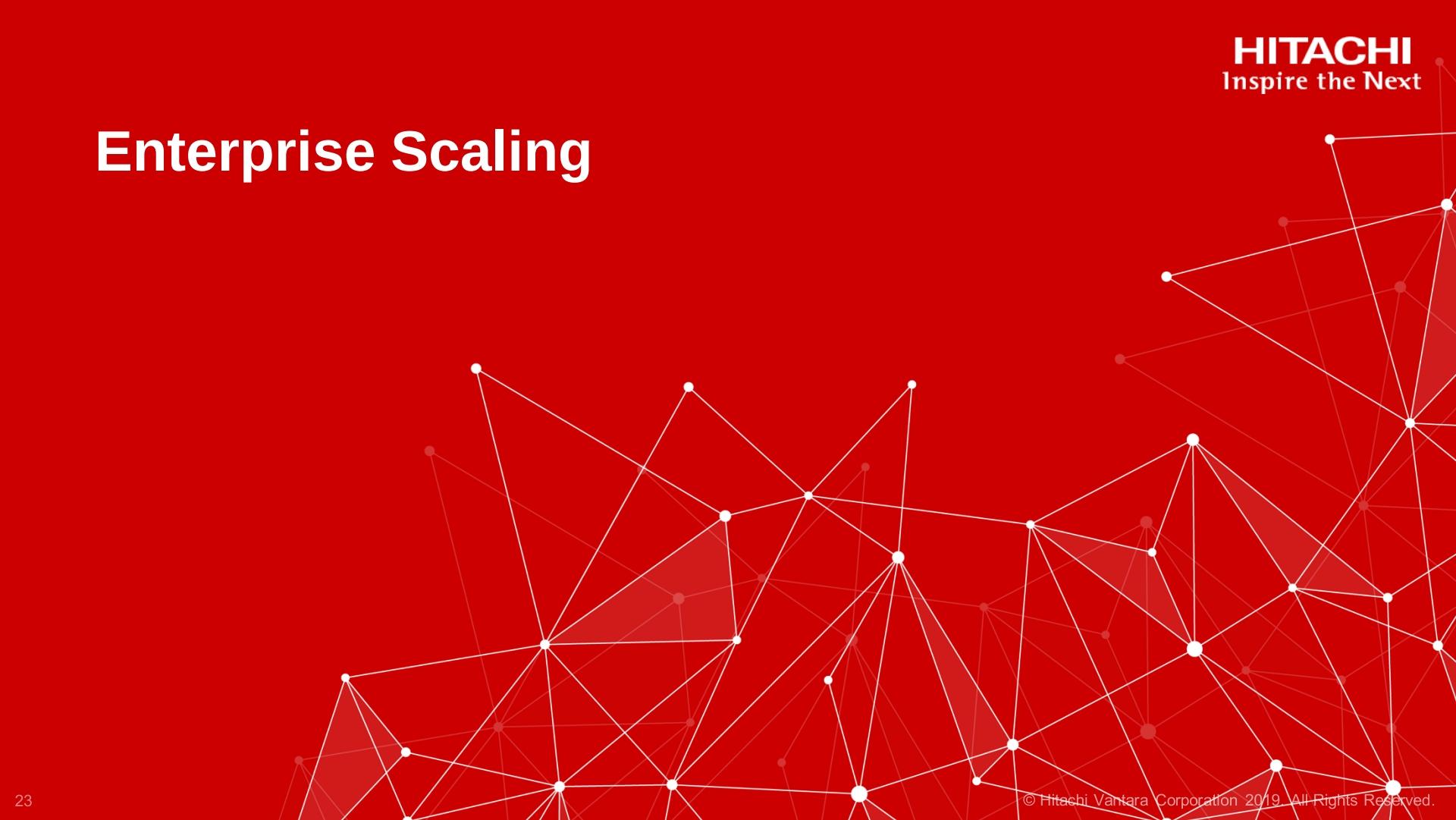
Enterprise Scaling



Clustering Carte Slave servers

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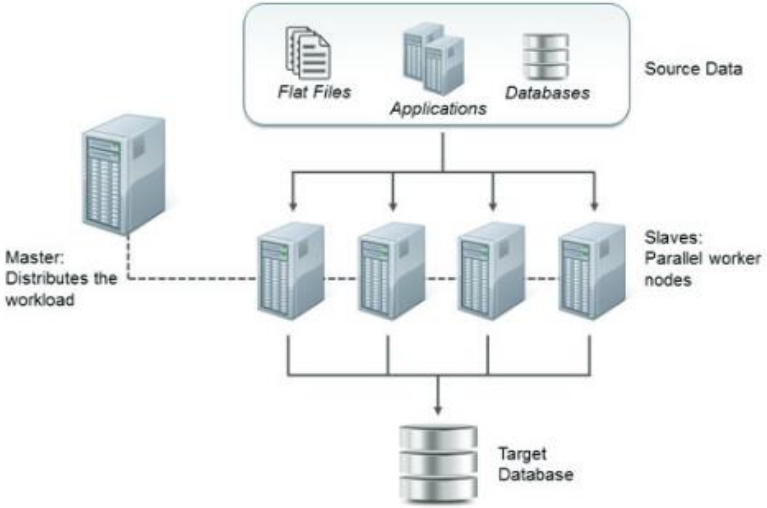
- Clustering is a technique that can be used to scale out transformations to make them run on multiple servers, in parallel.
- The Cluster is defined with a Schema, with one master server acting as the controller for the cluster.
- The Cluster schema also contains metadata on how master and slaves pass data back and forth.



Carte Configuration

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Master DI server

- Default configuration for low volume and process mix

Master DI server with Independent number Carte servers

- Used for large amount of transformations of lesser volume
- Master acts as a load balancer for transformations

Master DI server with slave servers (Clustering)

- Used for large volumes with fewer transformations
- Distributes set of rows across slave servers
- Can be fixed cluster size or dynamic

Carte as a Slave Server

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- Carte is a lightweight HTTP server that accepts commands from remote clients.
- These commands control the deployment, management, and monitoring of Jobs and Transformations.
- You can configure the carte server with an XML file (examples found in \pwd directory)

Lab 1 – Implement Carte Servers

Lab 1 – Start Master / Slave Nodes

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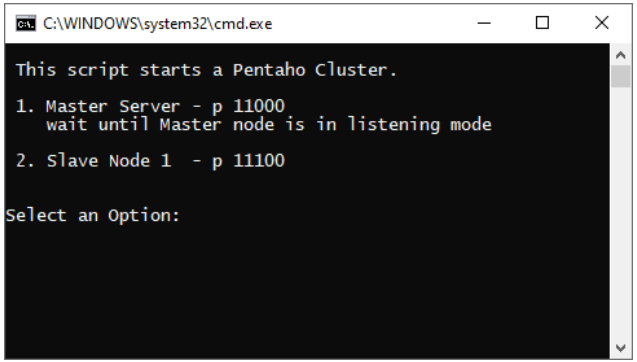
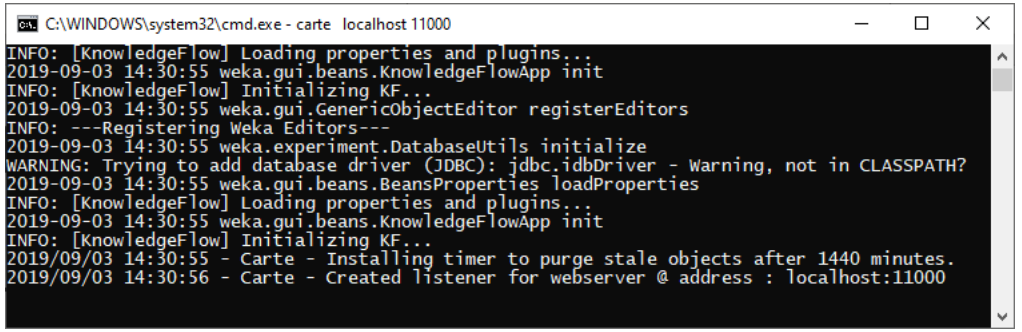
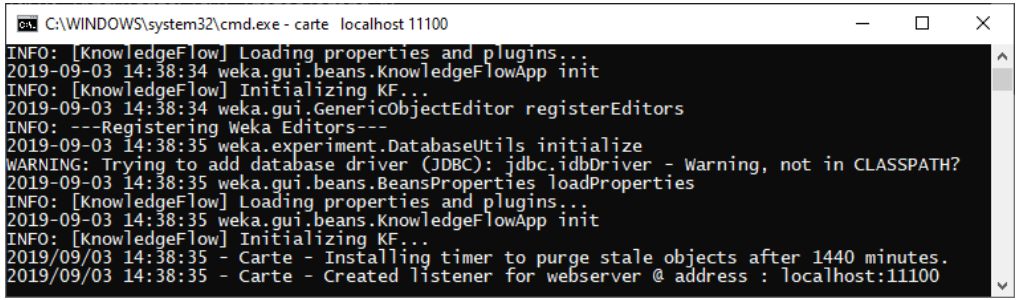
- Script to start a Master and Slave node
  - Topic 3 - Scalability\Lab 1 - Master - Slave Nodes\config_nodes.cmd







Lab 1 - Master DI Carte Server

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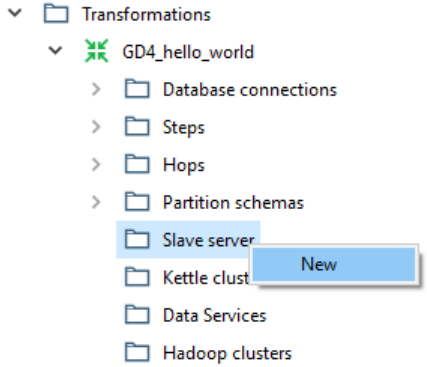
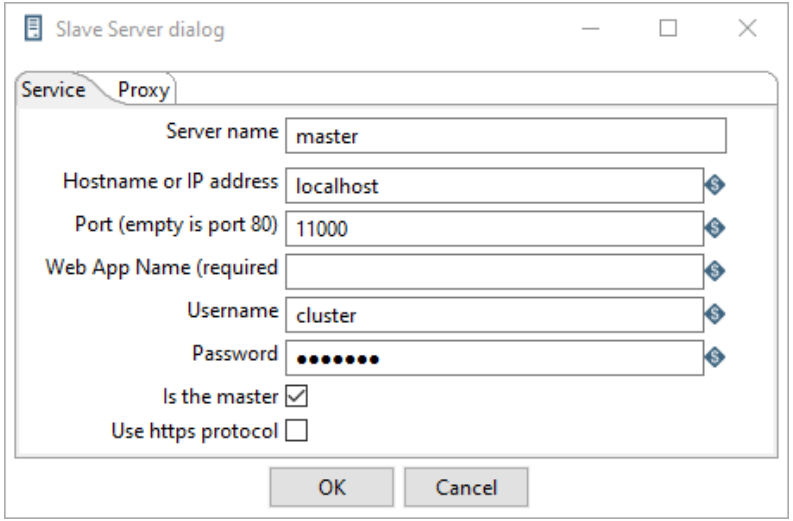
- Open tr_hello_world transformation
- On the View tab, select: Slave > New



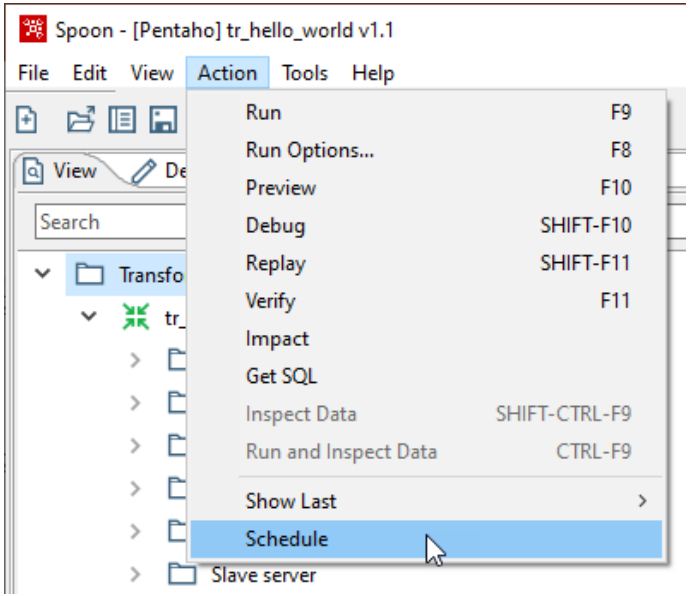


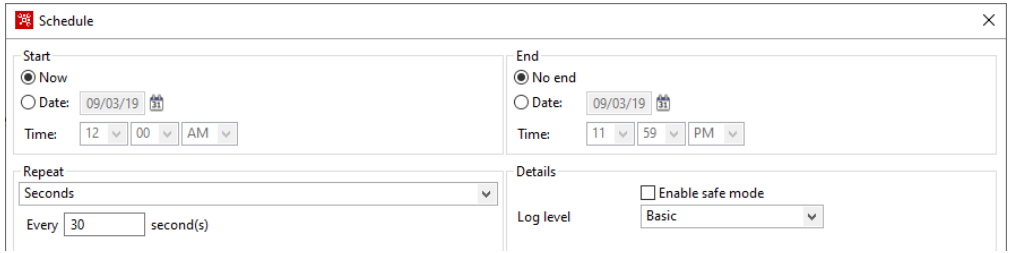
- Right mouse click and select: Monitor
- Ensure that you have connected to the server.
- Access the server: http://localhost:8080/kettle/status

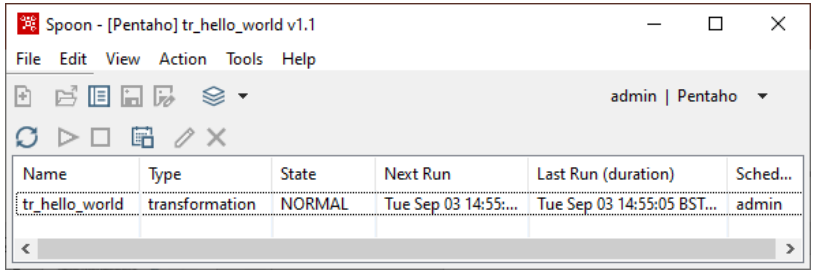
Username: cluster
Password: cluster

Lab 1 - Monitor & Schedule

- Export to Repository







Module Recap

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In this module, you should have learned to:

- Implement Jobs to control your ETL workflow
- Deploy your solution with Variables and Parameters
- Scale out your solution with Carte Servers

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Thank You

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