DVPD development workflow scenarios

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Introduction

The Data Vault Pipeline Description allows many variations in how to set up the workflow and toolchain for an implementation of data vault loading processes. In the following, we describe some example scenarios, to give an idea about the possibilities.

About the main phases: Analysis/Design and implementation

In the implementation workflow for data loading processes, there are two main phases:

- Phase 1 "Modelling": Gather all necessary knowledge about the source data and design the data vault structure based on that knowledge.
- Phase 2 "Implementation": Implement database objects (create the tables) and the loading process. Test and deploy the process.

DVPD is designed to gather all information during phase 1. After compiling DVPD and DVPI are the single source of information for phase 2. The following examples focus either on phase 1 or 2. All phase 1 examples are compatible to all phase 2 examples due to the standardization by DVPD/DVPI.

Phase 1: DVPD Creation Scenarios

Phase 1 contains analysis and decision making on the source data. There might be products out there, that provide all necessary functions in one tool to support this, but mostly this workflow is "stitched" together by using multiple tools. The examples try to emphasize this approach. They can only scratch the whole potential of this approach. So feel free to think out of the box and combine, what ever you need and like to assemble a completed DVPD for a loading process.

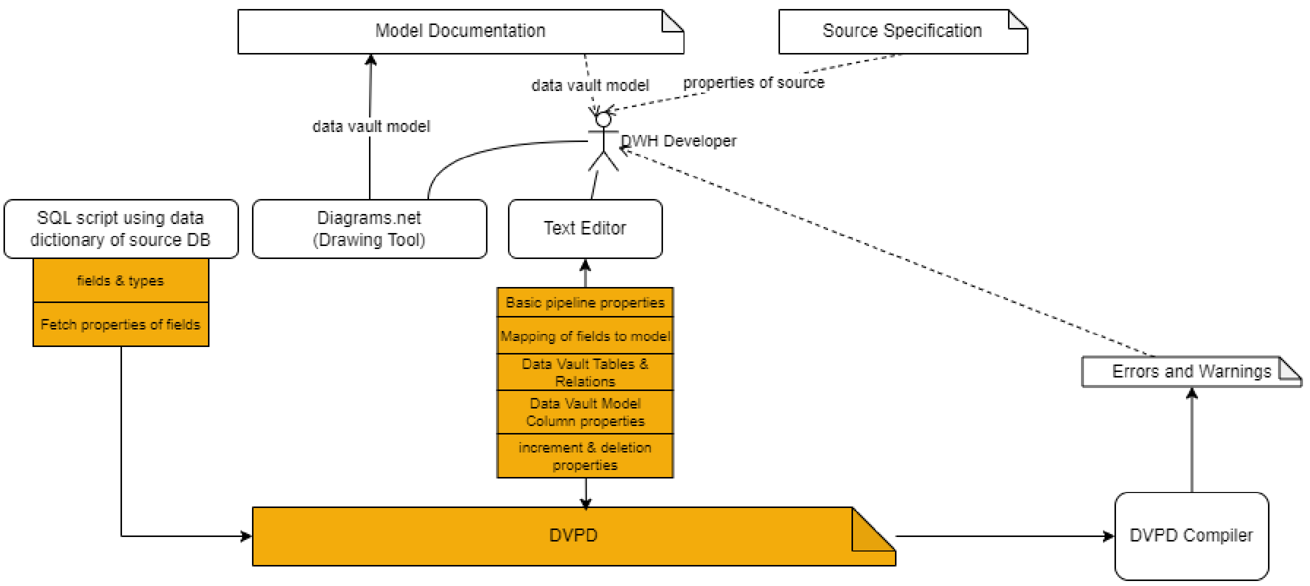
Example A: nearly "Handmade"

- The sources are mainly database tables or views from the operational systems. To accelerate the process of listing all source fields, a script can use the database dictionary of the source system to generate the list of fields in DVDP syntax.
- Analysis of the source data (business keys, uniqueness) is done with basic SQL queries by the data engineers and documented in a source specification document
- With the analysis result in mind, the data engineer creates the data vault model, documented in a diagram
- the model diagram is translated into a DVDP model syntax by the data engineer and merged with the generated field list

- the generated field list is extended with the mapping to the data vault model
- additional properties to guide the access, parsing and increment logic are added to the DVPD

Errors during the compiling of the final DVPD will lead to corrections in the DVPD document.

Example A: nearly "handmade"

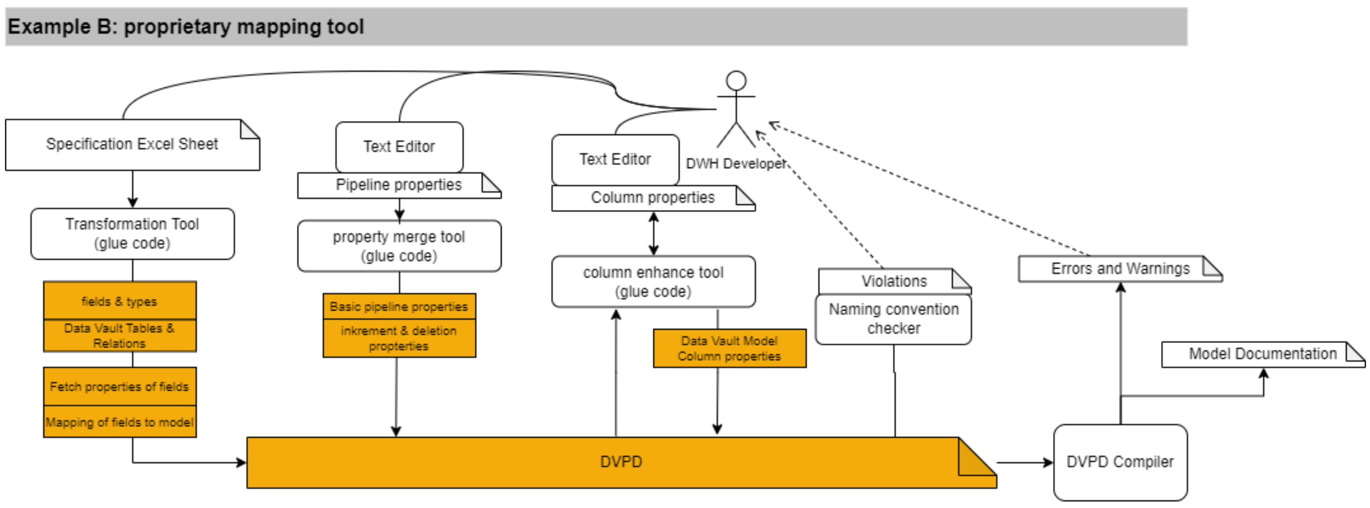

Model Documentation
Source Specification
data vault model
properties of source
data vault model
DWH Developer
SQL script using data dictionary of source DB
fields & types
Fetch properties of fields
Diagrams.net (Drawing Tool)
Text Editor
Basic pipeline properties
Mapping of fields to model
Data Vault Tables & Relations
Data Vault Model Column properties
increment & deletion properties
Errors and Warnings
DVPD
DVPD Compiler

Example B: proprietary mapping tool

In this example, a team of business analysts provides the whole specification of the source, including primary key and foreign key relations of the source object. This information is given to the data engineers in a standardized Excel sheet. The workflow is as follows:

- the Excel Sheet with the source object declaration is provided
- a transformation script translates the provided information into a draft DVPD, incuding a data vault data model
- in parallel a data engineer declares the technical properties for the pipeline in a separate shortened DVPD document (Pipeline properties)
- With a merge script, the draft DVPD gets enhanced with the pipeline properties
- In case some data vault columns and mappings need more technical declaration, this will be provided in a third shortened DVPD and merged with a script into the now completed DVPD document.
- For a first quality check, a script will parse and check the tables and column names, declared in the DVPD. Convention or consistency violations are reported to the data engineers and need to be fixed
- Finally, the DVPD gets compiled. Errors and warnings need to be managed and fixed before releasing the DVPD into the implementation phase
- Successful compilation of a DVDP will generate a model diagram and a mapping specification table, that are copied into the central documentation tool

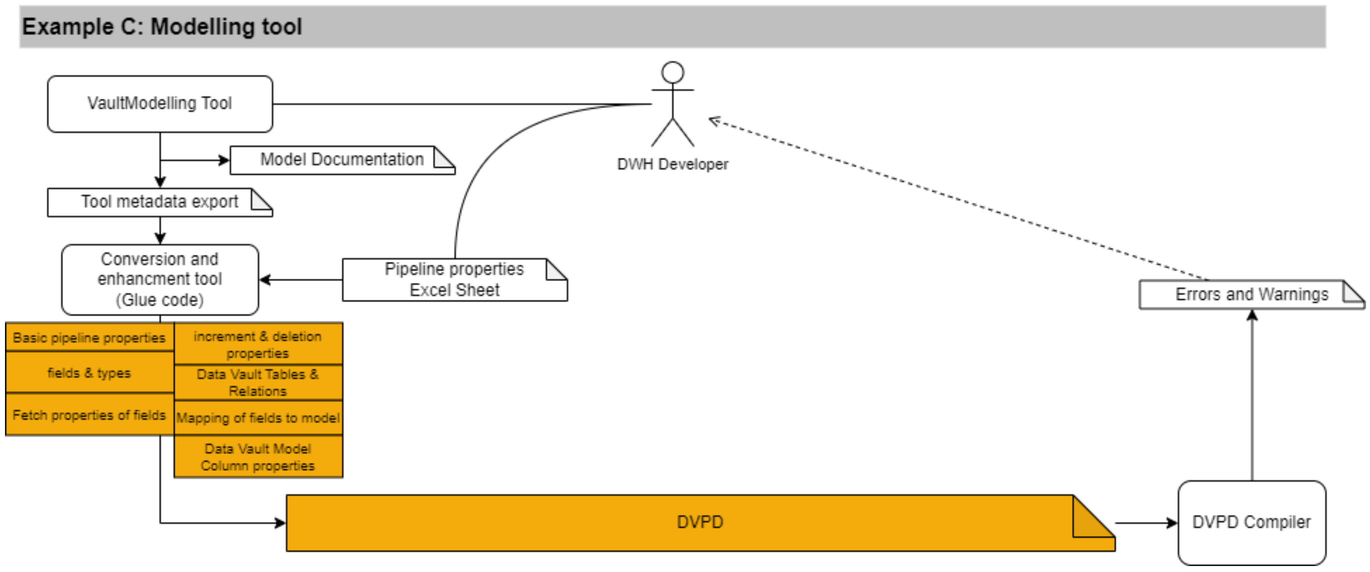
By orchestrating all the steps in a CI workflow, the upper steps take an initial effort of 15 minutes. Corrections are applied and verified in minutes. Depending on the documentation tool, even the update of the central documentation can be automated.


Example B: proprietary mapping tool
Specification Excel Sheet
Text Editor
Text Editor
DWH Developer
Pipeline properties
Column properties
Transformation Tool (glue code)
property merge tool (glue code)
column enhance tool (glue code)
Violations
Naming convention checker
Errors and Warnings
fields & types
Data Vault Tables & Relations
Basic pipeline properties
inkrement & deletion properties
Data Vault Model Column properties
Model Documentation
Fetch properties of fields
Mapping of fields to model
DVPD
DVPD Compiler

Example C: Modelling tool

In case you have a convenient modelling tool, that is capable of reading source data structures and describe the mapping of the source data to a data vault model, the following workflow might be your choice.

- in the modelling tool
  - Read and analyze source data structure with the modelling tool
  - Create or extend the data vault model accordingly
  - configure the mapping
  - add DVPD property data in custom fields, when availalble
  - Export the model and the mapping in a processable format
- Add DVPD specific properties, that can't be stored in the modelling tool in a separate document (e.g. an Excel sheet)
- By using a converter process (glue code), convert the exported model and mapping into a DVPD and merge all seperately defined DVPD properties
- compile the DVPD and manage and fix errors


Example C: Modelling tool
VaultModelling Tool
DWH Developer
Model Documentation
Tool metadata export
Conversion and enhancment tool (Glue code)
Pipeline properties Excel Sheet
Errors and Warnings
Basic pipeline properties
increment & deletion properties
fields & types
Data Vault Tables & Relations
Fetch properties of fields
Mapping of fields to model
Data Vault Model Column properties
DVPD
DVPD Compiler

Phase 2: DVPD Processing Scenarios

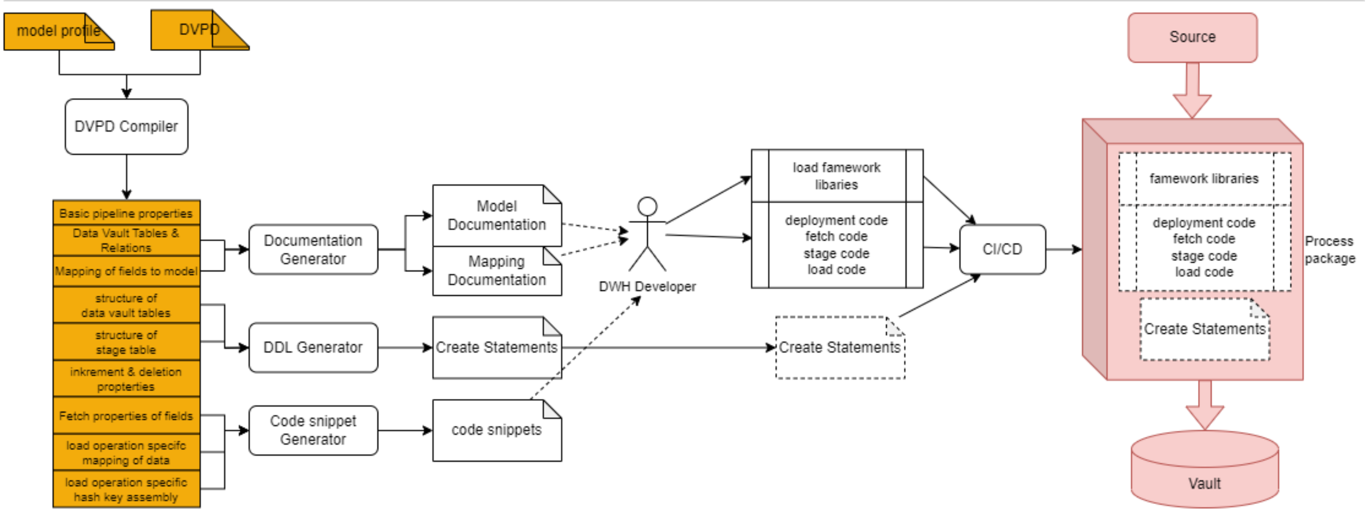
With the complete description of the source structure, target model and field mapping, an automated implementation/generation of the loading processes can be achieved. The level of automation depends on the capabilites of the processing tools used in the project. The following scenarios describe different levels of automation.

Example A: DDL and Documentation generator only

- the result of the DVPD compiler is only used to generate all DDL statements
- load processes are implemented manually by copy & adapt, supported by
  - a set of libraries
  - standardized implementation patterns
  - code snippets created from the DVPD Compiler results by a generator
- documentation is done manually in a general documentation tool. To keep consistency, documentation snippets are generated from the DVPD and copied into the documentation tool

This approach has the most flexibilty when facing variations of incoming data formats, transportation protocol and incremental logic. It will mostly be used in small projects or projects with a high or hardly predictable number of input formats.

Example A: DDL and Documentation Generation only

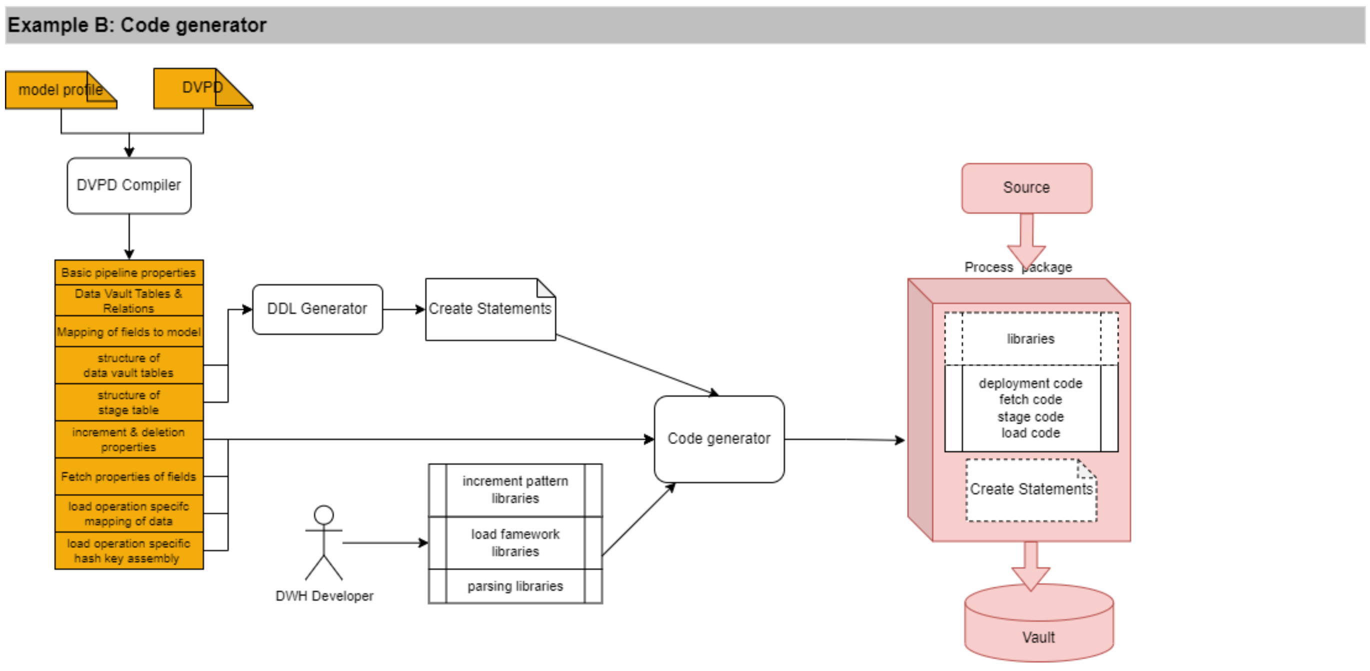


Example B: Code Generator

This is an evolution of the Example A, but instead of providing only code snippets, the generator creates the complete code. Adaption to new formats and technologies must be achieved by providing new libraries to the generator.

Generation of documentation is not needed for the implementation process (It is still good practice to support analysis and linage investigation).

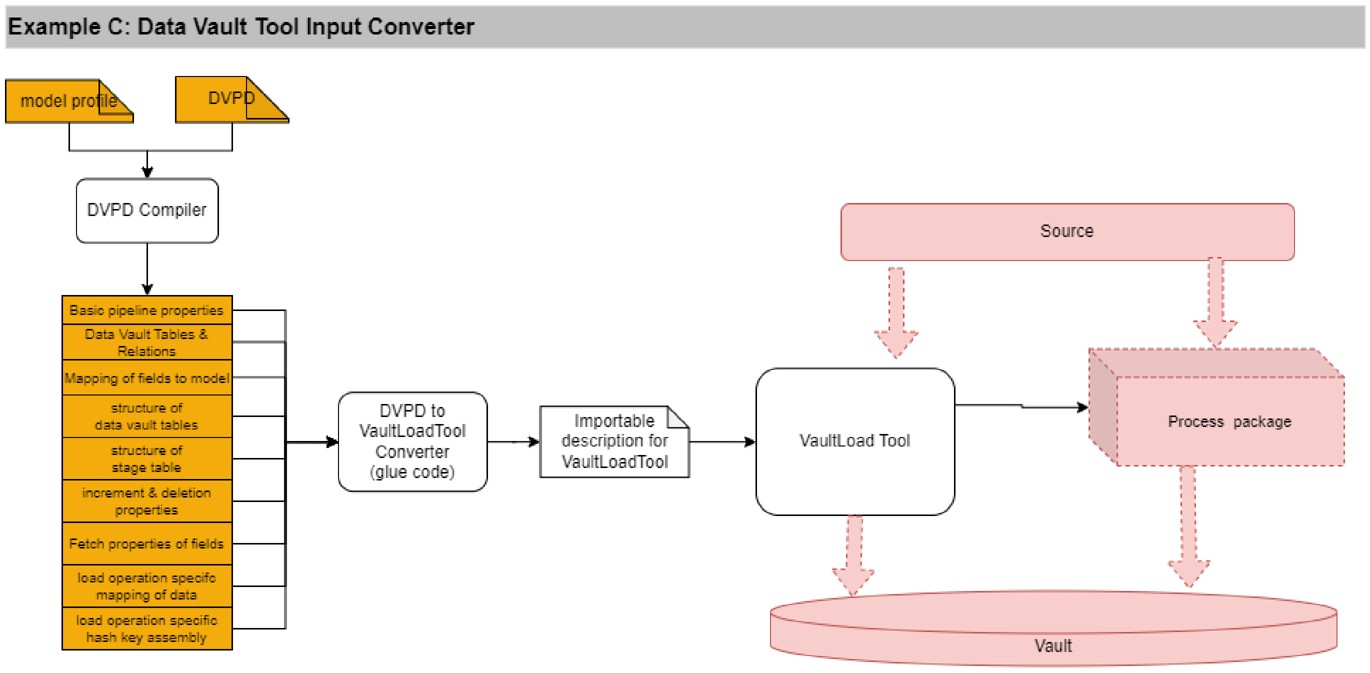
Implementation of general libraries takes more effort in testing and needs higher discipline from the maintainting developers. Therefore it is only efficient for projects with a high number of source objects, that follow the same formats, protocols and increment pattern.


Example B: Code generator
model profile
DVPD
DVPD Compiler
Basic pipeline properties
Data Vault Tables & Relations
Mapping of fields to model
structure of data vault tables
structure of stage table
increment & deletion properties
Fetch properties of fields
load operation specifc mapping of data
load operation specific hash key assembly
DDL Generator
Create Statements
Code generator
increment pattern libraries
load famework libraries
parsing libraries
DWH Developer
Source
Process package
libraries
deployment code fetch code stage code load code
Create Statements
Vault

Example C: Data Vault Tool Input Converter

In case there is a product available, that allows implementation of processes by providing specific metadata, it might be feasable to convert the result of the dvpd compiler into the input metadata of the tool.

Depending on the type of tool, the processes are run by the tool or the tool generates the processing code.


Example C: Data Vault Tool Input Converter
model profile
DVPD
DVPD Compiler
Basic pipeline properties
Data Vault Tables & Relations
Mapping of fields to model
structure of data vault tables
structure of stage table
increment & deletion properties
Fetch properties of fields
load operation specifc mapping of data
load operation specific hash key assembly
DVPD to VaultLoadTool Converter (glue code)
Importable description for VaultLoadTool
VaultLoad Tool
Source
Process package
Vault

There is no "works for all" solution, but some bad

As mentioned in the introduction, there is no best option, that fits for all projects. It depends on the variety of sources, the available budget, the teamsize and the toolstack already in place or favoured.

Since the DVPD itself is an enclosed artifact containing all information, one might be tempted to use it as the final deployment package and rely on the consistency of an execution engine, that compiles the dvpd and executes the result instantly.

It is not recommended to include the DVDP compiler in the execution engine.

Don't build monolithic architectures

Only small independent modules with a distinct set of responsibilities and functions stay maintainable and testable

This is already valid for all tools of the implementation workflow but especially for the final loading processes. Keep in mind, that retesting of released loading processes should be highly avoided. This is why most DWH implementation workflows create packages for deployment, that are decoupled from all future code changes in the development toolset. Feeding the DVDP to a monolithic execution engine puts all implemented pipelines to risk of failiure when the engines gets changed (e.g. update). In the worst case, this might corrupt your data vault.