(Big) Data Engineering In Depth

From Beginner to Professional
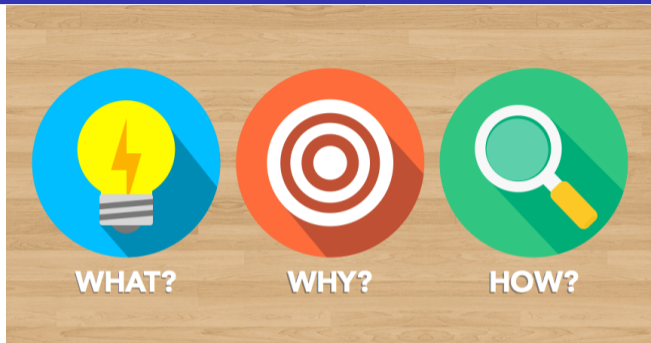
Moustafa Alaa
Senior Big Data Engineer
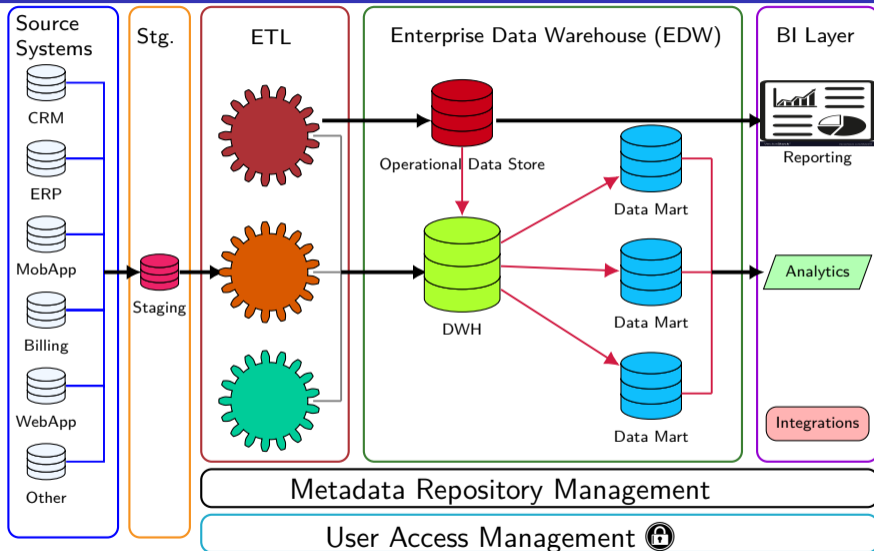 MoustafaAlaa Moustafa Alaa @Moustafa_alaa22
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The Definitive Guide to Big Data Engineering Tasks

Sub-Section: Data Integration and ETL Layer

Data Integration: The Big Picture

Data Integration: The Big Picture

Data Integration Overview

CRM

ERP

MobApp

Billing

WebApp

Other

Source Systems

ETL

DWH
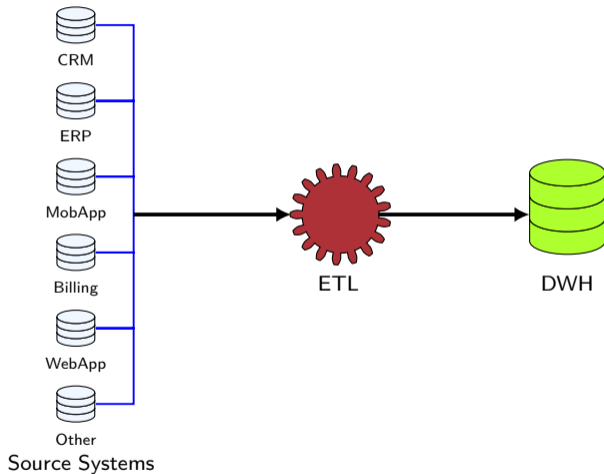
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  - **Loading**: loading the transformed data into the target table based on the required format.

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- This team takes the delivered output from the previous stage (data modeling) and start to implement the mapping.

- The implementation of the ETL preferred to be unified across the team members and the organization.

Why?

Why ETL become mandatory in any DWH system?

Because of the rapidly increase in the data volumes, and the variety of the data types structure, semi-structure, and non-structure data.

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    - ☑ **Atomicity**

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    - Identify the abnormal behavior in the total aggregations, for example if we have a peak up to the total amount more than the normal (+/- 5%).

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  - We could extend auditing functions to be queryable on database monitoring or dashboards.

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  - ETL logging includes logs of any activtities or events that occur in the ETL job before, during, and after every stage.
  - Some of the ETL software tools have their logs for the ETL; however, it could extend to other logs added to enhanced the ETL logging.

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    - What is the retention policy?

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- Example
  - We have a CSV file that contains 5 columns, and we need to apply the ETL on this file.

ETL: Managing Bad Data Part 1

```
{
"sourceName": "3G_ERCSN",
"dataFileDelimiter": "|",
"totalInputFileColumns": "5",
"rejectedRecordsPath": "/RAW_ZONE/REJECTION/3G_ERCSN/",
"schemaName": "MOD",
"targetTable": "Singl_KPI",
"saveMode": "Append",
"inputFileFormat": "processing",
"outputFormat": "orc",
"header": "false",
"partitionColumns_3G_ERCSN": "event_date,batch_id",
"getDetailedAuditStats": "false",
"inputSchema": [
{
```

ETL: Managing Bad Data Part 2

```
{
"columnName": "C0",
"columnType": "IntegerType",
"isNullable": "true"
},
{
"columnName": "C1",
"columnType": "StringType",
"isNullable": "true"
},
.
.
.
{
"columnName": "C4",
"columnType": "TimestampType",
"isNullable": "true"
}
```

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  - Create common functionality for unit testing.

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- This part is a continuous enhancement part.

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- It helps to make the trust in the data by connecting the target into the source.

- It helps with data tracing at the row level.

ETL: Data Lineage Example

- We have a CSV file that contains 5 columns and we need to apply ETL process for this file assume the name is 3g_ercsn.csv it could be any name.

- After process this file, we rename this file to be filename_batch_id.

trns_id	cell_id	cust_number	app	trns_ts	batch_id
123	C15343	503987123	fb	2020-04-25 12:12:33.4	20200426020202
3436	C15341	503987123	fb	2020-04-25 15:12:33.4	20200426020202
43634	C15353	503987135	twitter	2020-04-25 18:12:33.4	20200426020202
32632	C15123	503987151	youtube	2020-04-25 22:12:33.4	20200426020202

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  - Design framework dealing with error responses.

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- Atomicity requires the ETL engineer to have some overview of the whole project cycle and how we can split it without affecting the business.

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- It helps in code tracing, testing, and enhancing.

- Agile development and parallel work.

- Avoid a single failure job, which enhances performance and resource optimization.

ETL: Paper and Pen Design

References

- ETL Best Practices By Tim Mitchell