Software Requirements Specification

for

Automated Database Operations

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1. Introduction

1.1 Purpose

This Project “Automated Database Operation” is the spring Batch microservice application, which reads the data from the Microsoft Excel sheets and performs the specified operation on the database.

1.2 Document Conventions

The Documentation follows the convention as follows:

- Documentation index is provided on 1st page
- Headings are written using Bold Font “Times” having size 18
- Subheadings are written using Bold Font “Times” having size 16
- The Content is written using Font “Arial” having size 11
- The Document is prepared in Google Docs and compatible to open with any PDF reader

1.3 Intended Audience and Reading Suggestions

This Documentation is meant for the following categories of people:

- Project Developers
- Faculties who Evaluates
- Project Maintainers
- End Users

The Reading sequence suggestions are as follows:

- The index
- Then Intended Audience
- Overall Description
- System Features
- System Requirements

1.4 Product Scope

The Project is a microservice which, which insert, alter and delete the database as specified in the excel sheets.

For each sheet look for the associated table in the database extract the metadata or structure of the database and validate the data of each cell with column constraint accordingly. If the row satisfies all the constraints then do specify the operation else discard it.

2. Overall Description

2.1 Product Perspective

This project is a batch microservice application, which modifies the database as specified in the excel sheets. Thus the perspective of the project is to automate the task of modifying the data from excel sheets.

2.2 Product Functions

- **Database system**: This System fetches the structure of the table from the database
- **Reader system**: This System read the data from the excel sheets
- **Processor system:** This System validates each cell with the required constraints of the table
- **Writer system:** This System writes or modifies the database

2.3 User Classes and Characteristics

Users Classes:

- Any complex system which involves this class
- The system can be used by Third parties

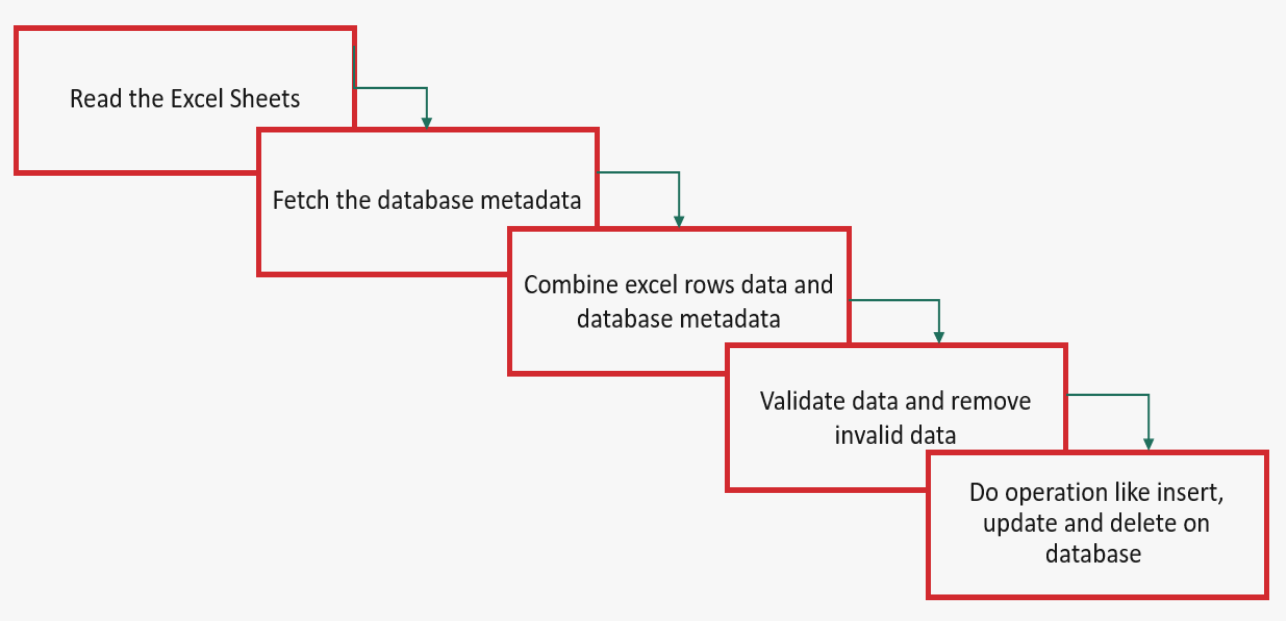
2.4 Operating Environment

The product is compatible to run on any os based server like Linux or windows that have Java8 installed.

2.5 Design and Implementation Constraints

No constraint is there with this version but may exist in later versions

2.6 User Documentation



2.7 Technical Description

Back-end:

- Java
- Spring Framework
- Spring Batch
- Maven
- H2 Database

Data-interchange Format:

- JSON

API:

- Apache POI
- JDBC

Testing Framework:

- Junit 4

Documentation Framework:

- Javadoc

3. System Features

3.1 Database System

3.1.1 Description and Priority

This System fetches the structure of the table from the database and creates an object of the data from sheets. Thus Playing a high priority

3.1.2 Functional Requirements

- Fetching the metadata from the database

3.2 Reader System

3.2.1 Description and Priority

This System read the data from the Microsoft Excel sheets and accordingly create an object of the data from sheets. Thus Playing a high priority

3.2.2 Functional Requirements

- Check feasibility of sheet
- Reading Excel sheets

3.3 Processor System

3.3.1 Description and Priority

This System validates each cell with the required constraints of the table Thus Playing a high Priority

3.3.2 Functional Requirements

- Validate datatype
- Validate data size
- Primary keys

3.4 Writer System

3.4.1 Description and Priority

This System writes or modifies the data read from an excel sheet to the database with the specified operation.

3.4.2 Functional Requirements

- CRUD Operations

4. Design Constraints

4.1 Standards Compliance

4.1.1 Backend System

Some of the requirements of a Backend system to operate in a seamless manner are as follows:

- Framework: Spring Boot, Spring Batch
- Slug size: 2 GB Recommended
- Machine: Linux based OS with 10 GB Disk Drive Space

4.1.2 Database System

Some of the requirements H2 Database system are as follows:

- Logical Size: 512 MB minimum, 10 GB Recommended

4.2 Hardware limitations

4.2.1 Server Hardware limitations

Some hardware limitations for server:

- RAM: 500 MB minimum, 2 GB Recommended
- Storage Space: 512 MB minimum, 10 GB Recommended

4.2.2 User Hardware limitations

Some user-specific hardware requirements are as follows:

- RAM: 1 GB Minimum, 2 GB Recommended
- Graphics Processor: Not Required
- Disk Space: 20 GB Recommended
- Screen: No specific requirement

5. Other Nonfunctional Requirements

5.1 Performance Requirements

For optimum performance, the following system configuration is recommended:

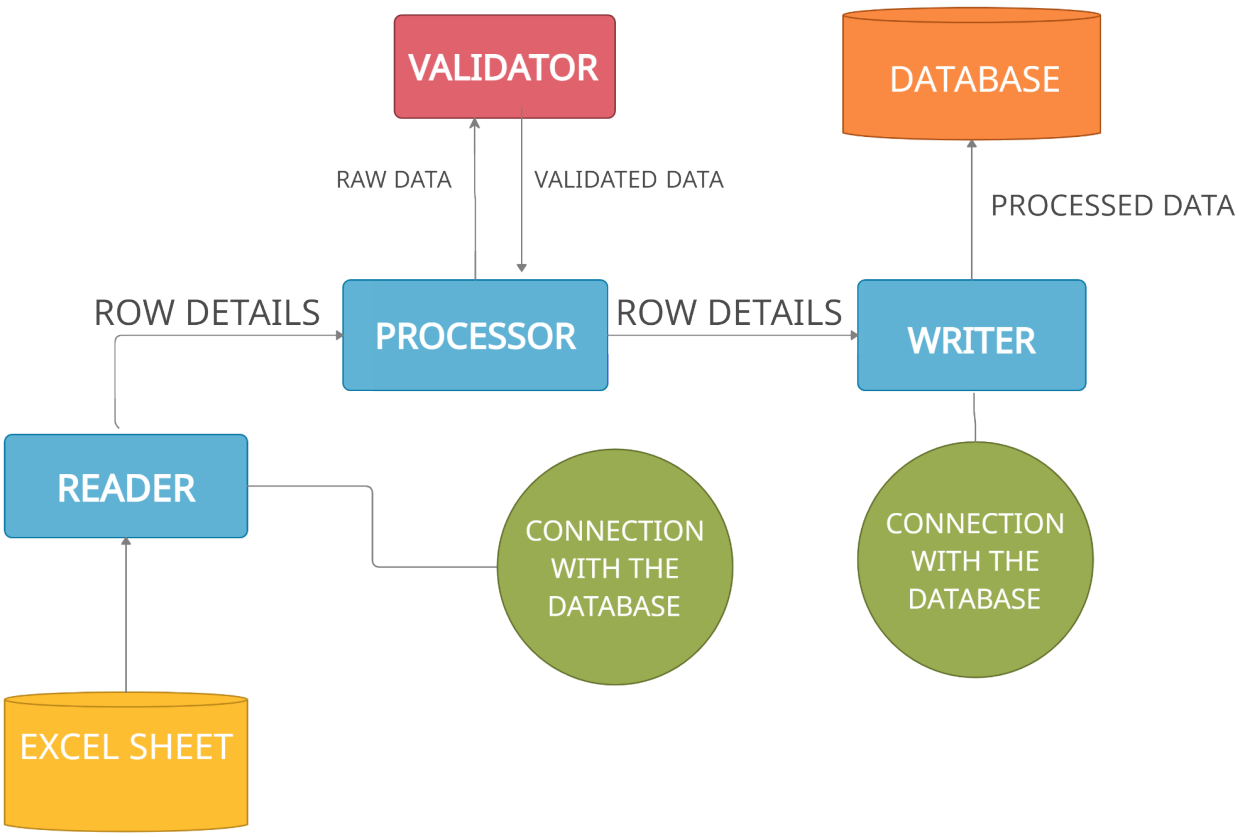
- Processor: Intel Core i3 or above (1.6 GHz)
- RAM: 4GB or above
- HDD/SSD: No additional requirement
- Web-browser: Google Chrome, Mozilla Firefox, Microsoft Edge, or any new browser

5.2 Software Quality Attributes

5.2.1 Availability: 24 x 7 with High traffic
5.2.2 Reliability: high reliable
5.2.3 portability: can be operated on desktop

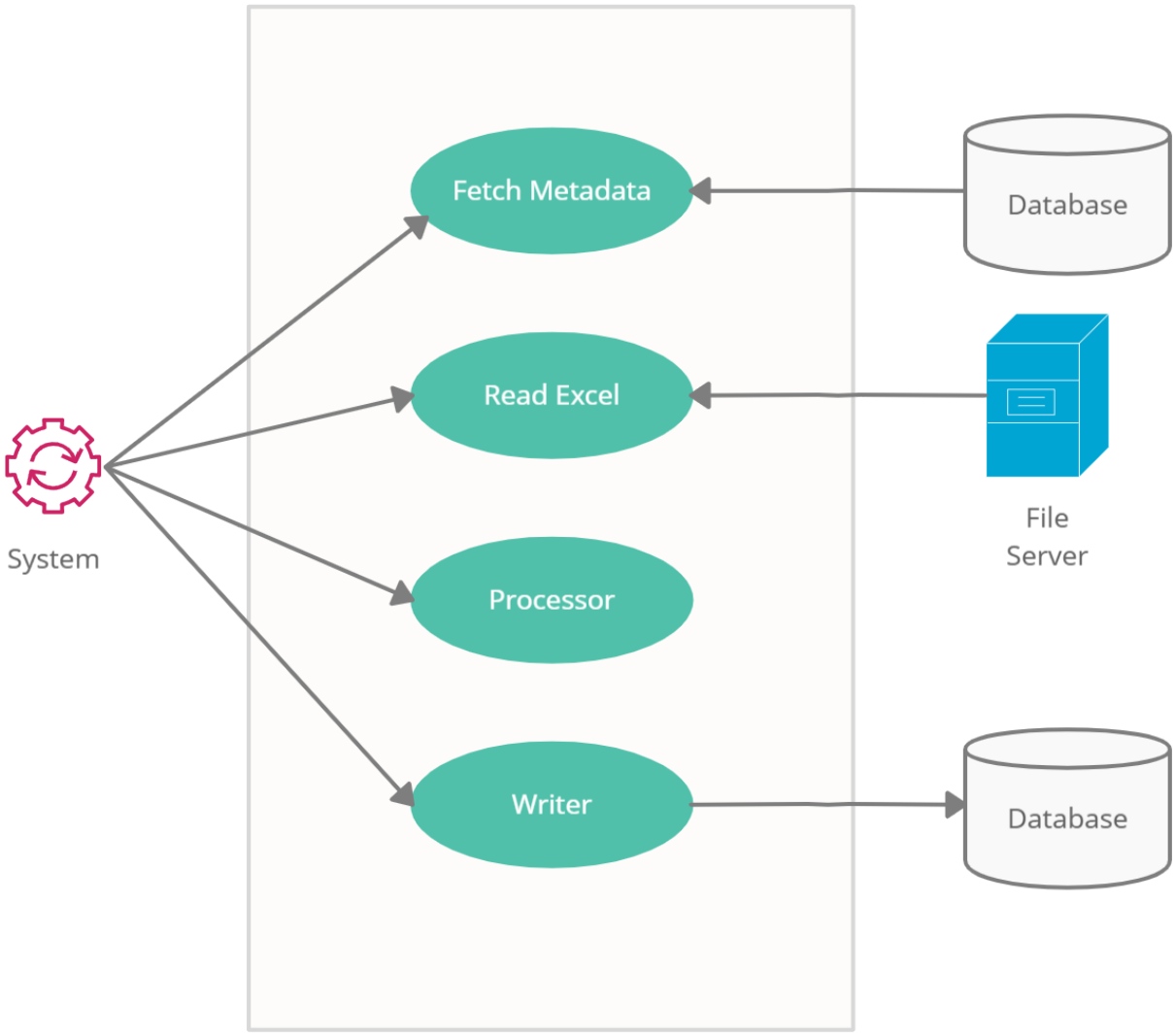
6. Operational Specifications

6.1 Data Flow Diagram



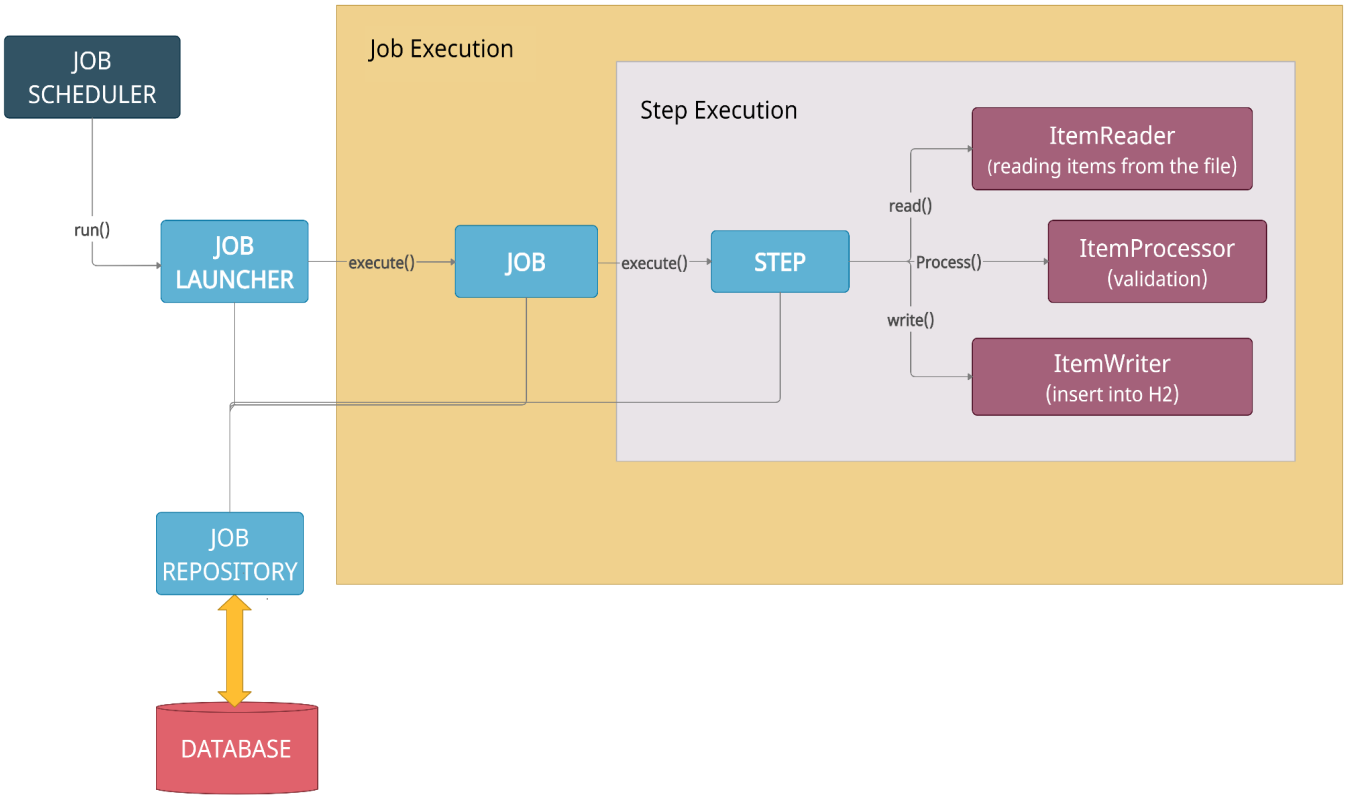
6.2 UML Diagrams

6.2.1 Use Case Diagram

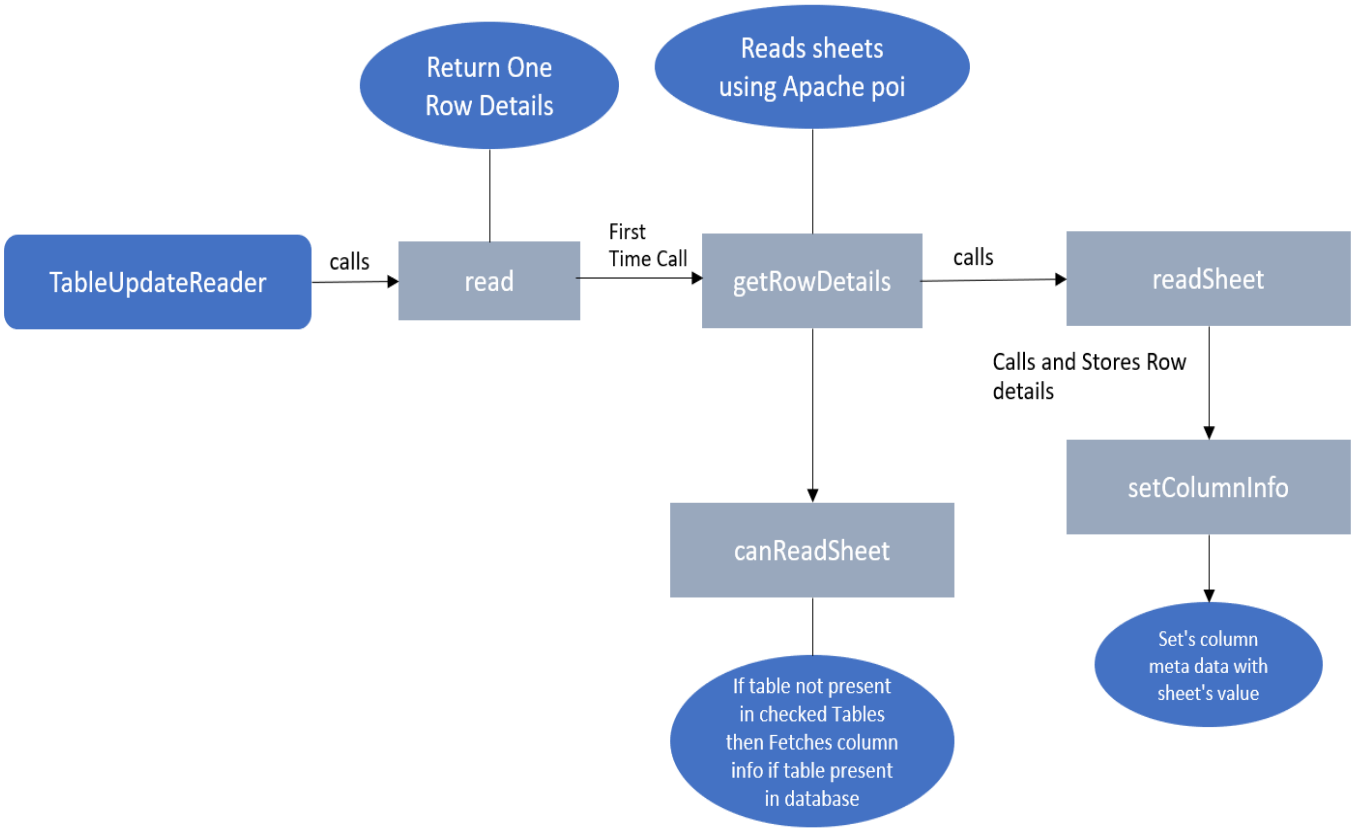


6.2.2 Activity Diagrams

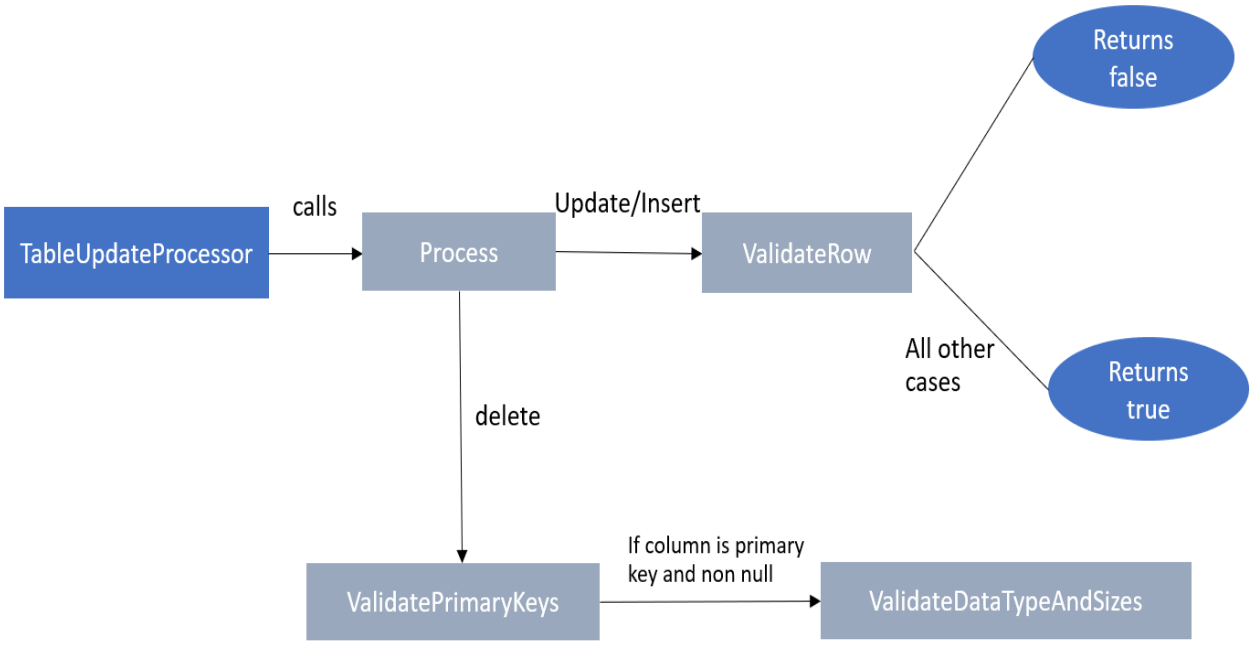
6.2.2.1 Batch Processing Diagrams



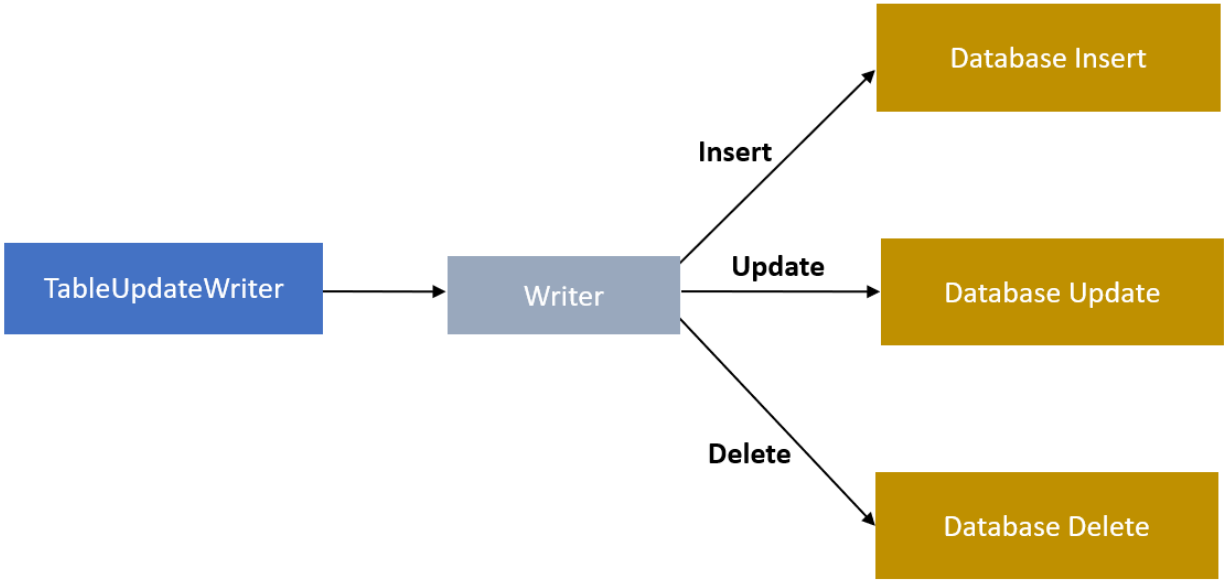
6.2.2.2 Reader Diagrams



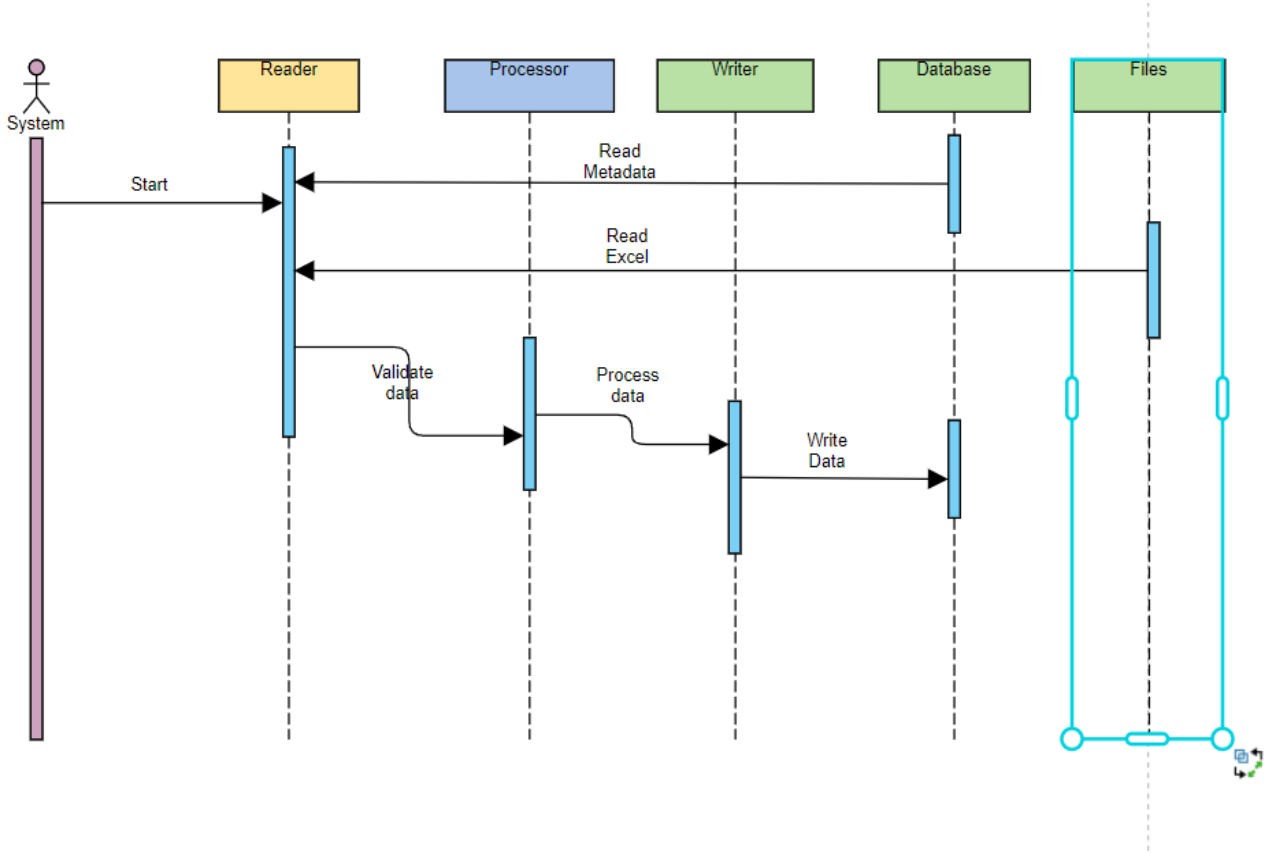
6.2.2.3 Processor Diagrams



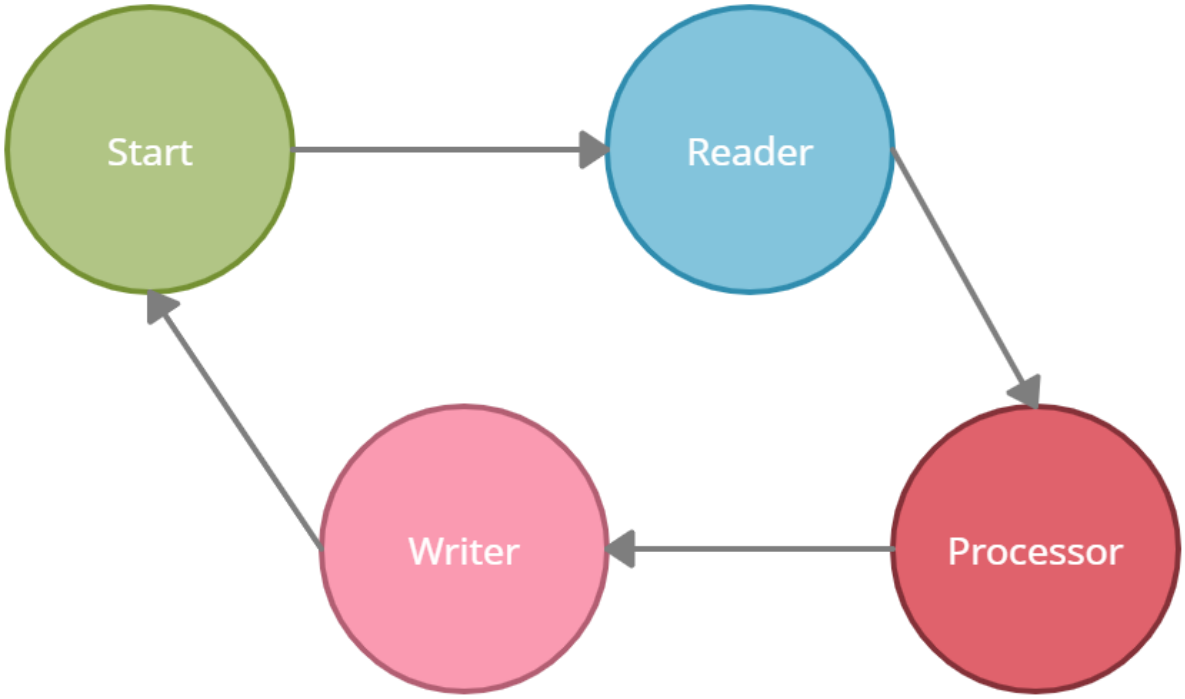
6.2.2.4 Writer Diagrams



6.2.3 Sequence Diagram



6.3 Finite State Diagram



7. Descriptive Specification

7.1 Logic specification

Each sheet looks for the associated table in the database extract the metadata or structure of the database and validates the data of each cell with column constraint accordingly. If the row satisfies all the constraints then do specify the operation else discard it.

7.2 ADT (Abstract Data type)

- **ArrayList**: List of the excel rows are stored in it
- **HashMap**: Store the column of the database table to identify quickly
- **Object**: Model for a row of excel

7.2.1 ADT for Reader module

module reader
uses Database
exports
function readFile(file: in Name of input excel file, data: out Data read from file)
end reader

7.2.2 ADT for processor module

module processor
exports
function readFile(data: in For validation from reader, result: out Validated data to writer)
end processor

8 Cost Estimation

8.1 Statistics

- Total Functional Points = 6
- Expected Kilo Lines of Code (KLOC) = 3
- Project type = Organic
- Multiplicative factor (a) = 2.4
- Exponentiation factor (b) = 1.05
- Time multiplicative factor (c) = 2.5
- Time exponentiation factor (d) = 0.38
- Number of Engineers = 2
- Average Engineer Cost = Rs. 30000 per month
- Novice Engineer Productivity = 3 FP per month

8.2 Effort Analysis

According to the COCOMO Model for Organic type Project,
Effort Applied = a * $KLOC^{b}$
Effort Applied = 2.4 * $3^{1.05}$ = 7.606 person months
Time = c * $(\text{Effort Applied})^{d}$
Time = 2.5 * $(7.606)^{0.38}$ = 5.40 months
Average People Required = Effort / Time = 2

8.3 Cost Analysis

Required Months = Total FP / (Productivity * Number of Engineers)
Required Months = 6 / (3 * 2) = 1 month
Required Cost = Required Months * Number of Engineers * Engineer Cost
Required Cost = 1 * 2 * 30000 = 60000 INR