

Chapter 5

5. Analysis and Design

5.1 Introduction

In Chapter 5 the approach for the research is discussed. The approach of using the technologies identified for the analysis of retrieving electricity consumption patterns are described in detail. This chapter discusses the architectural design and analysis details of this research.

5.2 The Top Level Design of the System

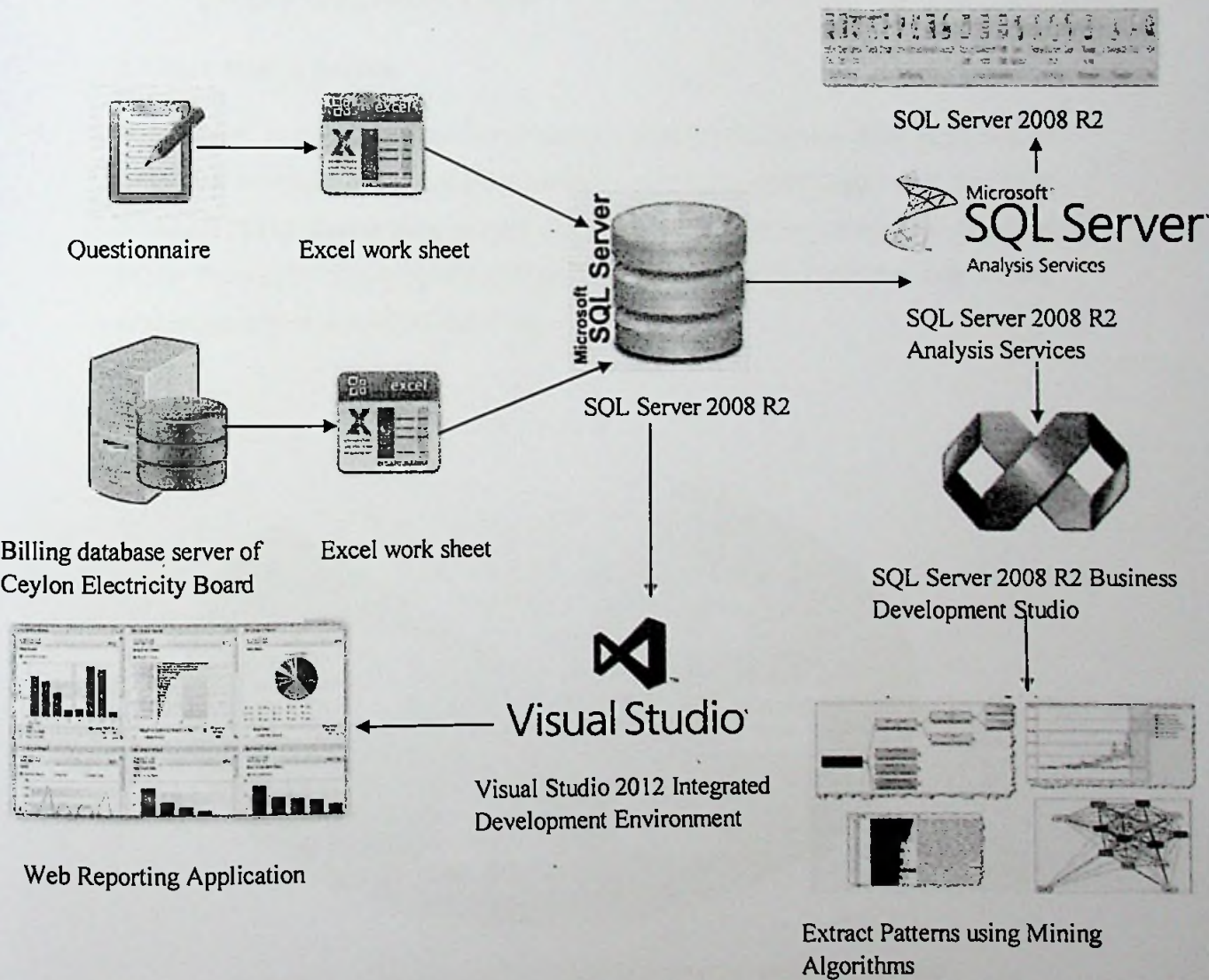


Figure 10: The Top Level Design of the System

The design of the system is consisting with following steps

1. The design of Questionnaire
2. Design the database
3. Import questionnaire to SQL Server Database
4. Extract billing and consumption related data from Ceylon Electricity Board Billing Server Database
5. Import the billing and consumption data to SQL Server Database
6. Apply data mining algorithms to collected dataset for the pattern extraction
7. Web reporting application for further analysis of the dataset using reports, charts, graphs and matrixes for any ordinary person can understand without going through complex analysis

5.3 Data Mining Process

Data mining is the process of discovering actionable information from large sets of data. Data mining uses mathematical analysis to derive patterns and trends that exist in data.[17].The data mining process for SQL Server analysis services is described below figure[17]. The proposed designed is also compatible with the data mining process described in Analysis Services

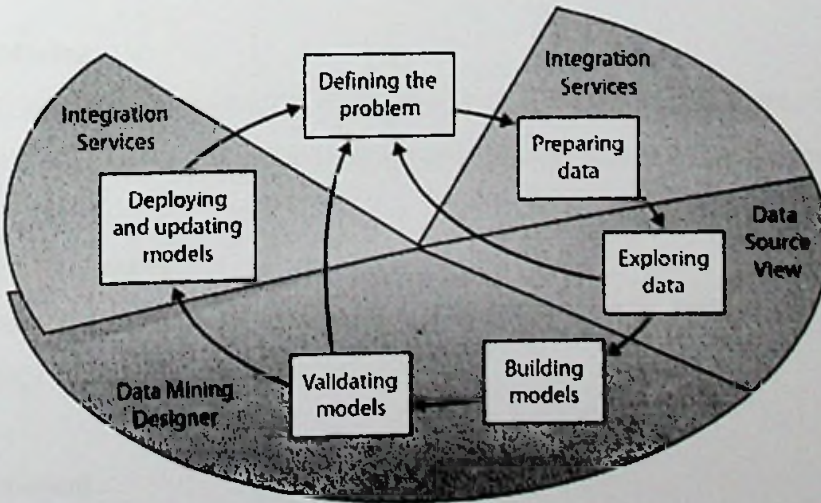


Figure 11: Data Mining Process in SQL Server Analysis Services

Original Data

The original data is the data collected from questionnaire and the data collected from billing application database.

Data Cleaning

The data collected from billing database is cleaned by removing unnecessary data. Here the research is conducted in Jaffna area so the data related to the Jaffna area is extracted.

The information needed basically is the consumption units and the average charge for the consumption units per consumers. The data taken from questionnaire is also analyzed to identify missing values.

Data Integration

Data Extracted from billing application and the data extracted from questionnaire is integrated

Data Selection and Transformation

Data is selected for the mining. Here the consumption units and the consumption charge by individual consumers in Jaffna area is extracted from billing database.

Data extracted from questionnaire is organized in to a flat file.

Data Mining

Here Classification method in Data Mining is used for pattern extraction. Decision trees, Clusters in Classification methods are basically used for this purpose.

Pattern Evaluation

The extracted patterns are evaluated to identify the energy demand and the behavior of energy consumption of the consumers.

Presentation

The results of the evaluation is presented

5.3 Summary

In this chapter, the high level design of the system and the data mining design process is described in details. The main components of the system are also illustrated in the high level design diagram. Integrating all the components together to build up the whole system is also explained. The next chapter will be on the implementation of the consumer electricity consumption pattern analysis.