

Designing a Reconciliation Analysis and Justification System

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Abstract:

For financial institutions that embrace a nonintegral form of accounting, there is a requirement for the reconciliation of cash portions between various income statements. In the present day, there is demand for the position of ‘Reconciliation Analyst’ in financial technology companies for meeting the said requirement. This paper discusses the design of software that helps reduce the amount of manpower required for this role by automating away its responsibilities. A philosophy of semi-automaticity is espoused: a manual mode that allows Reconciliation Analysts to make edits to ledgers directly, and an automatic mode that continually invokes a hybrid decision tree to alter the upstream, involuntarily, are accommodated.

Keywords —reconciliation analysis, justification, fund administration, custody, auto-matcher, decision tree.

I. INTRODUCTION

This paper discusses the design of a complete system for performing reconciliation analysis and justification. Specifically, it discusses the reconciliation between the ledgers ‘Fund Administration’ and ‘Custody’.

A literature review helped to pinpoint some state-of-the-art developments related to ‘Artificially Intelligent Semiautomatic Reconciliation Analysis and Justification Systems’ as follows:

1. There is novelty in using soft classification for nonimage-based data in a decision tree. It is feasible to leverage this for performing reconciliation involving text-based and numerical data.

2. Fast database tuning can be implemented by leveraging a decision tree.
3. Lower latency Postgre-based services can be employed for faster computation on the RDBMS required for managing reconciliation records.

II. SYSTEM OVERVIEW

The methodology to be followed for implementing the design of the complete system for reconciliation analysis and justification is as follows, we propose that the process be divided into 4 stages:

A. Document-Data Extraction:

This phase involves the collection of data using ETL channels and storing them in the format

suitable for processing. Additionally, top level checks are performed to determine the discrepancy size.

B. Transaction Matching Process:

This phase is about matching records at transaction level, and the process of identifying mismatched data from different sources- escalating it for further inspection. The latter may involve simple text-matching macros or sophisticated Machine Learning algorithms depending on the complexity of the input data.

C. Reconciliation Process:

This is the most critical phase of the project, here is where the mismatched transactions are reviewed and appeased. A philosophy of semi-automaticity is espoused in this phase: a manual mode that allows Reconciliation Analysts to make edits to ledgers directly, and an automatic mode that continually invokes a hybrid decision tree to alter the upstream, involuntarily, are accommodated.

The automatic mode for reconciliation encompasses the following steps in its initialization:

- Collection of raw data from the Fund Administration department and the Custody department
- Pre-processing of data, performing missing value imputation, and merging of ledgers.
- Data Exploratory Analysis for the identification of features
- Feature Engineering
- Training
- Validation
- Deployment

D. Finalization

This phase encompasses post correcting entries, ERP integration and updating close checklists.

III. DATA FLOW DIAGRAM

A Data Flow Diagram (DFD) is graphical representation of the flow of data through an information system. It consists of 4 elements: dataflow, process, external entity, and storage.

A. Level-0 DFD:

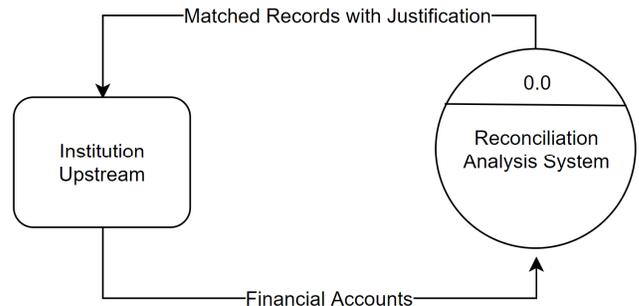


Fig. 1. Level-0 data-flow diagram

The level-0 DFD describes the general operation of the system. The level-0 Data flow diagram for our project is shown in Fig 1. We can see that the Reconciliation Analysis System is built to interface with the Institution’s Upstream.

B. Level-1 DFD

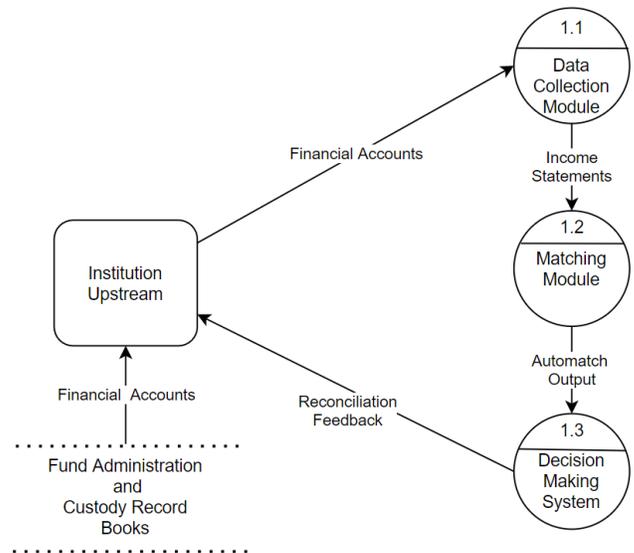


Fig. 2. Level-1 data-flow diagram

The Level-1 DFD describes the system more in detail than the Level-0 DFD. It specifies the main

modules involved in the system, here: the data-collection module, the matching module and the decision-making system. This is as shown in Fig 2.

C. Level-2 DFD

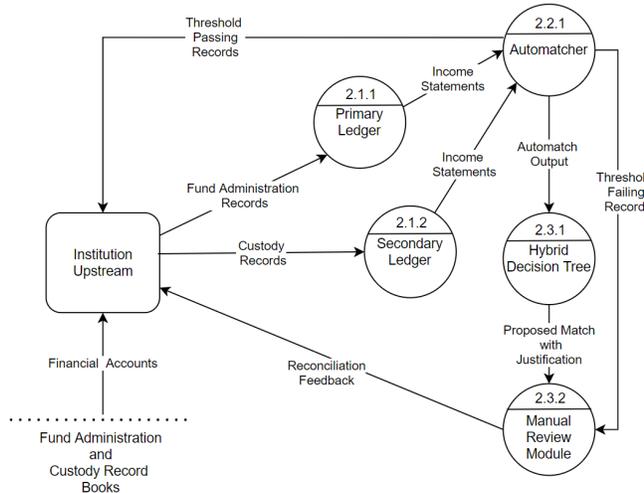


Fig. 3. Level-2 data-flow diagram

We can see that the data-collection module comprises of the primary and secondary ledgers as. The decision-making system can be seen to be comprising of a hybrid decision tree and the manual review module.

The level-0 DFD shows the abstract functionality of software. Subsequent level DFDs (1 and 2) describe the inner working of the modules concretely.

IV. STRUCTURE DESIGN

The interaction between modules of the system is described using a structure chart as shown in Fig 4. The modules are:

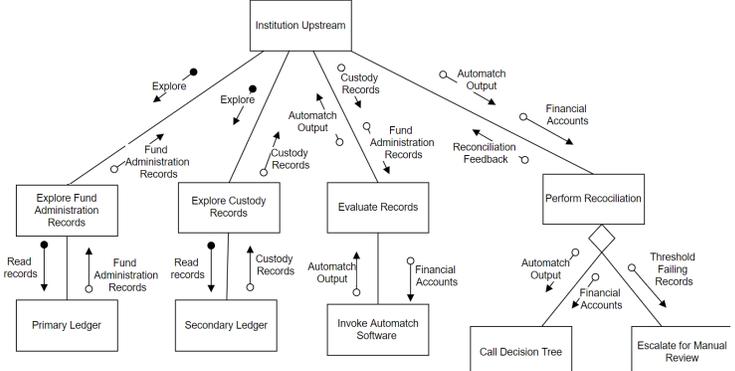


Fig. 4. Structure Chart of the System

A. Fund Administration Record Module

This module is coupled with the Fund Administration ledgers and is the source of the primary record book in our application.

B. Custody Record Module

This module is coupled with the Custody ledgers and is the source of the secondary record book in our application.

Note: Fund administration or custody ledgers may well be outsourced by the institution for maintenance (for example, GP3 is a well-known Fund Administration Solutions provider), this should not affect the high-level design of the system as we have discussed. Coupling institutional proprietary software modules with external vendor applications will not affect the structure chart of the system.

C. Evaluation Module

This module’s purpose is to provide the auto-match output for the input primary and secondary ledgers.

D. Reconciliation Module

This is the most sophisticated module in the product. It comprises a hybrid decision tree which performs automatic reconciliation analysis with a provision to manually make edits, browse records and view justifications.

V. SUMMARY

Starting with some background information about reconciliation analysis at financial institutions, this paper went to discuss the findings from a literature review which helped to pinpoint some state-of-the-art developments related to ‘Artificially Intelligent Semi-Automatic Reconciliation Analysis and Justification Systems’. Next, the methodology to be followed for implementing the design of the complete system for reconciliation analysis and justification was elaborated. This was followed by the discussion of three data-flow diagrams, and a structure chart that showed the interaction between modules in the system.

A feasible high-level design for reconciliation analysis systems was presented.

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