"Loan Securitization Application: Credit Portfolio Analysis and Investor Reporting"

Bachelor's Thesis Research Proposal

In co-operation with **Raiffeisen Zentralbank Österreich (RZB) AG**,
Am Stadtpark 9, 1030 Vienna, Austria

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1 Table of contents

A list of the main topics in this research proposal:

2 Project Key Data

The following table represents a summary of the key aspects of this bachelor's thesis.

Full Project Name	**Loan Securitization Application: Credit Portfolio Analysis and Investor Reporting**
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Project Supervisor	Dipl.-Ing. Mag. Dr. Albert Weichselbraun Institute for Information Business
Project Partner Company	Raiffeisen Zentralbank Österreich AG Am Stadtpark 9, 1030 Vienna, Austria
Project Partner Company Contact Person	Mag. Dimitri Korenev Raiffeisen Zentralbank Österreich AG Department for Strategic Controlling
Project Kick-Off Date	Oct. 20th, 2008
Project Deadline	January 31st, 2009
Semester	WS 2008/2009
Project Short Description	A software application for credit portfolio analysis and investor reporting is to be created in cooperation with RZB AG. The project ought to cover literature research, with extensive formal functional, system and data models enclosed along with a test case. A working Microsoft Access 2003 ADP-application connected to a Microsoft SQL Server 2005 database shall be created as a prototype.

3 Project Description

A rough definition of the task at hand is presented below.

3.1 General Description

With a balance sheet of around € 160 billon RZB is the third largest banking group in Austria, a leader and pioneer in Central and Eastern Europe (CEE) and an important niche player in several other markets worldwide. Driven by rapid expansion in recent years, RZB is evaluating new ways for achieving Risk Weighted Assets (RWA) relief.

One of the possible ways to achieve RWA relief and free capital for further expansion is through securitization of assets. One of the means to transfer the risk to external investors is to structure Collateralized Debt Obligations (CDOs) – a combination of loans/bonds and/or other assets being packed into a single synthetic or true sale transaction that is later marketed and sold to the investors in different tranches.

The importance of adequate IT implementation of such transactions is paramount not only to the regulatory and legal aspects of the transaction, but also for successfully handling operational and strategic management and marketing tasks. The project at hand will try to follow a synthetic Collateralized Loan Obligation (CLO) transaction from assembling the data from different bank systems, through making a cutoff portfolio filter selection, then keeping track of the performance of the loans and making replenishment, and finally to generating investor reports with stratification tables.

3.2 Project Scope, Framework and Target Outcomes

This bachelor's thesis is to be realized during the ITP (IT-Praktikum) under the guidance and supervision of Dr. Albert Weichselbraun from the Institute of Information Business at the Vienna University of Economics and Business Administration. Raiffeisen Zentralbank Österreich AG kindly serves as a partner company for the current project, providing expertise and exposure to certain sensitive data, which is in no way to be disclosed herein. Only the general assumptions available at any bank or in any reference literature are to be taken into consideration for the project application and test case.

Along with a literature research and a brief section covering the theoretical background of credit portfolio management the main outcome of this RZB case study should be a model of an application for analyzing a portfolio of an example synthetic collateralized loan obligation deal. Functions for loan filtering and cutting will be included, as well as for replenishment and Reference Registry data management. However, the project and this thesis will not contain any RZB client or system data whatsoever, nor will it represent RZB's system or data structure in any particular form. The primary focus will fall on Microsoft Transact SQL (T-SQL) functions for data manipulation analysis of the defined data model, as well as on integration of those functions into a Microsoft Access Graphical User Interface (GUI) connected to a Microsoft SQL Server 2005 database.

3.2 Project Non-Targets

Due to the vast depth of the topic securitization and for the sake of staying within the time and workload limits, this bachelor's thesis will not and could not fully cover the topic of securitization investor reporting, thus no full-scale solution could be feasible, i.e. a special test case is to be prepared that would demonstrate the ideas being laid out in this bachelor's thesis (i.e. no 'general solution').

3.3 Project Cycle and Project Phases

The project research and development process will be sequential, moving closely along the definitions of the waterfall model. The following phases are to be considered:

1. Requirement and field analysis
2. Project definition and system design
3. Data model design
4. Functional and technical implementation
5. Test case presentation

Each new phase may only begin after the previous one was completely and thoroughly researched, documented and implemented and all of the resulting documents are prepared. Changes in already completed phases are to be done only when there are serious grounds present. The only exception would be the data model design phase, where the Entity-relationship (ER) model and database diagrams could be updated, should more database fields become necessary later on during the realization of the project. Although not a best-practice, the sheer complexity of this project implies minor changes of the data model, in order to fit the time frame set for completion.

3.3 Results from the Single Phases

Each project phase should deliver tangible and clearly identifiable results. Although a more exact definition is pending and would only be available after the initial phase, here is a list of the expected results from each phase:

Phase	Result
1. Requirement and field analysis	• Literature research • A brief section on the theoretical background of credit portfolio analysis • Definition of terms – CDO, CLO, Reference Obligation, Reference Registry, Pool Cut etc. • Analysis of the relevant aspects for the IT implementation
2. Project definition and system design	• Definition of the exact project scope and the results expected; definitions of assumptions and conditions • Description of the used software; choice of Database Management System (DBMS) • Project test case definition • UML Component diagram
3. Data model design	• Physical data model – ER model, database diagram
4. Functional and technical implementation	• SQL tables, views, functions and stored procedures implementation • User interface implementation
5. Test case presentation	• Filling the database with dummy example data • A presentation and go-though along the lifetime of a transaction

4 High Level Requirements

Although a more precise definition of the test case is pending here are the most important expected results in general.

4.1 Gathering of Data, Assembling a Preliminary Reference Obligation Portfolio

We would presume a general data quality situation at any major bank where the following data sources from several different systems are available:

- **credit risk data**, which would be the main data source for this application and which is normally used for example for regulatory (Basel II) reporting purposes
- **market risk data**, used for calculation of the actual Weighted Average Life of loans
- **collaterals data** for determination the extent to which a certain asset is secured
- **delinquency and default/failure to pay data**, used to filter out already troubled and potentially troublesome assets
- **black list data** for assets non-eligible for securitization, used to filter out wrongly assigned assets and those where securitization is not applicable due to other, for example customer related issues

Pending analysis of this data, it would be organized in the database and stored in tables. Later on it would be combined though T-SQL functions and procedures. Moreover, investor reporting in terms of stratification tables and key portfolio data would also be achieved automatically by the means of T-SQL functions.

4.2 User Interface and General Functional Requirements

The data sources which were laid out in 4.1 are to be delivered in MS Access (.mdb) format and are to be automatically imported in the application and DBMS though scripts and functions.

Buttons, lists, filter forms and other GUI elements are to be implemented to support the flow of procedures needed to be run against the database to prepare the data for securitization. For demonstration purposes most of the T-SQL functions could be run with separate buttons.

Reports are to be generated with statistics on the portfolio and the current portfolio cut, for instance currency/country distribution. Stratification tables shall also to be shown in the form of automatically generated reports.

Analysis and filtering of the portfolio to be prepared would consist of definition of specific criteria for filtering, for example min/max values of certain fields, or exact values to be matched.

A group concentrations function in T-SQL should be implemented to determine the achieved percentage securitized of a certain loan to comply with the maximum cap for this company/holding (group entity). This percentage securitized should be passed on to the reference registry generation function.

After the preliminary loans pool cut it ought to be possible to generate or update a given reference portfolio to take the current target date and the loans from the current cut. A Reference Registry should be defined such as to differentiate four actions – adding a new reference obligation, updating the information on an existing reference obligation, marking a reference obligation as repaid and as defaulted.

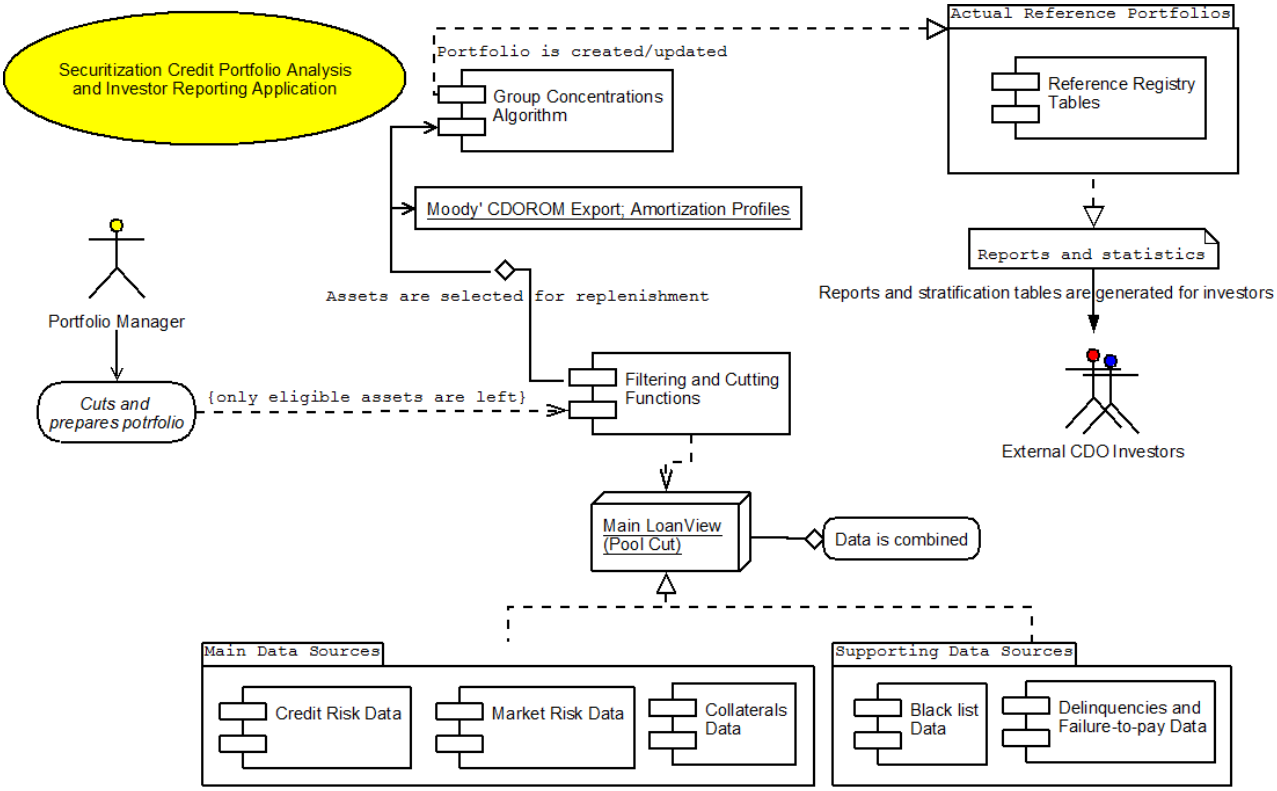
4.3 System Modeling – UML and Data Models

The logical and physical system and data models should follow the guidelines for formal use and definition of ER and UML models. A preferred tool for modeling would be Dia (www.gnome.org/projects/dia), but Microsoft Visio could also be used.

The logical data model should be an ER-diagram. It should contain the entities, their attributes and the way they are related to each other.

An SQL Server database diagram could serve as a physical database model.

Fig. 1 outlines the objects relevant to the IT-aspect of the securitization process. The project will be strongly oriented towards this UML diagram. Although not all components could be realized to the fullest, it will serve as a guideline.



(Fig. 1) UML Component diagram

4.4 Database and Prototype

The preferred and intended DBMS for the project is Microsoft SQL Server 2005. T-SQL functions, stored procedures, along with tables and views should be implemented. An ADP project in Microsoft Access 2003 will serve only as a GUI for the purposes of this thesis. A connection to the SQL Server 2005 database would then be established and any project data whatsoever would be placed within the SQL Server 2005 database.

4.5 Run-time Environment

The test case with the system prototype would be presented on the laptop computer of the author. The ADP project source code and the T-SQL functions are to be delivered separately. However, in order to reproduce the system prototype on another computer, Microsoft SQL Server 2005 Express Edition should be properly installed; the scripts that create the T-SQL functions and procedures, tables and views should be run in the necessary sequence in order to generate all database objects.

4.6 Preliminary Table of Contents

This bachelor's thesis shall contain the following sections:

5 Project Milestones

The project milestones in this bachelor's thesis will follow closely the different project phases defined in 3.3. Below is the list of milestones.

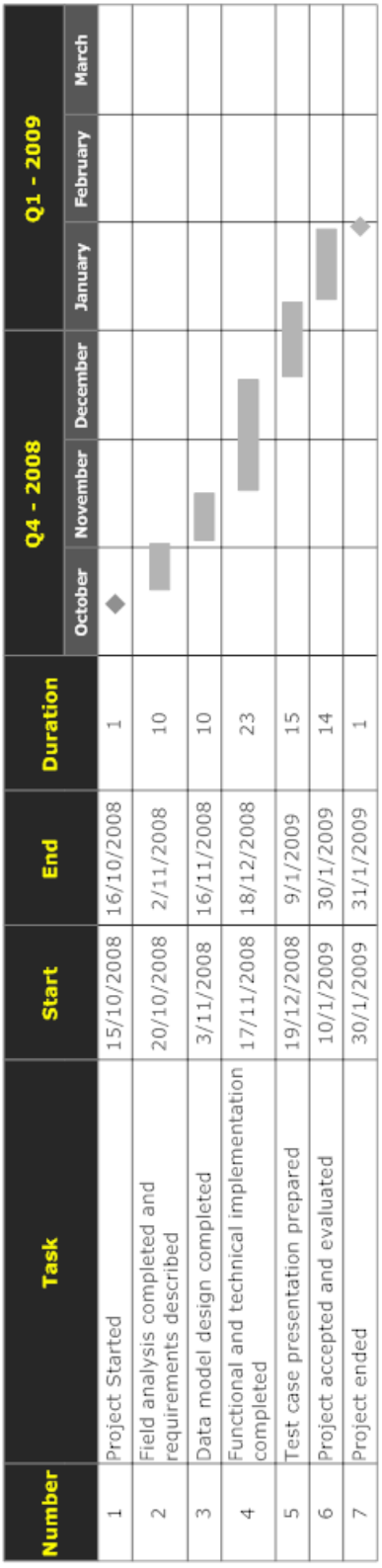
Milestone	Deadline
1. Project started	20th October, 2008
2. Field analysis completed and requirements described	3rd November, 2008
3. Data model design completed	17th November, 2008
4. Functional and technical implementation completed	19th December, 2008
5. Test case presentation prepared	10th January, 2009
6. Project accepted and evaluated	30th January, 2009
7. Project ended	31st January, 2009

6 Project Gantt-chart

Fig.2 below shows a Gantt-chart of the milestones of this project described in Section 5 with the deadlines relevant to each milestone.

Loan Securitization Application: Credit Portfolio Analysis and Investor Reporting

Number	Task	Start	End	Duration
1	Project Started	15/10/2008	16/10/2008	1
2	Field analysis completed and requirements described	20/10/2008	2/11/2008	10
3	Data model design completed	3/11/2008	16/11/2008	10
4	Functional and technical implementation completed	17/11/2008	18/12/2008	23
5	Test case presentation prepared	19/12/2008	9/1/2009	15
6	Project accepted and evaluated	10/1/2009	30/1/2009	14
7	Project ended	30/1/2009	31/1/2009	1



(Fig. 2) Project Gantt-chart