OPERATIONAL RISK MANAGEMENT TOOL

Internship Report Submitted in Partial Fulfillment for the Award of
Master of Technology

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To,

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CERTIFICATE

UNDERTAKING BY THE STUDENT

I, Tarang Parikh hereby declare that the report of the internship program titled "Operational Risk Management Tool" is prepared by me. I also confirm that the report is only prepared for my academic requirement and not for any other purposes.

I also confirm that, the submitted softcopy has been reviewed and approved for submission by my supervisor.

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ACKNOWLEDGEMENT

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ABSTRACT

Operational Risk Management is a way for organizations that want to put in place real controls and strategies when it comes to risk management. All entities are subject to conditions or fundamental changes in their circumstances that may be perceived to bring different levels of risk to that entity, from minor disruption to risking its existence.

The Basel Banking Committee described the risks of operations as: "risks of losses resulting from insufficient or failed internal processes, individuals, systems, or external events. Therefore, operational risks take into account business continuity plans, environmental risks, disaster risk management, policy processes, and operational risks, human-related and health risks and safety, and information technology risks."

All of these risks must be managed and with a sophisticated risk management approach, it is an opportunity for business to grow and grow.

1 INTRODUCTION

1.1 Problem Statement

- Operational Risk Management (ORM) is defined as a continual cyclic process that includes risk assessments, risk decision making, and implementation of risk controls, which results in acceptance, mitigation, or avoidance of risk.

- ORM is the oversight of operational risk, including the risk of loss resulting from inadequate or failed internal processes and systems, human factors or external events. Unlike other types of risks (market risk, credit risk etc.) operational risk had rarely been considered strategically significant by senior management.

1.2 Business Impact

- When considering the impact of operational risk three primary areas affect the business activity.

- Property exposures - these relate to the physical assets belonging to or entrusted to the business.

- Personal exposures - these relate to the risk faced by all those who work for and with the business, including customers, suppliers and contracts.

- Financial exposures - these relate to all aspects of the company's ability to trade, whether profitability or not, and cover internal and external exposures of all types. Financial exposures also include intellectual property, goodwill and patents.

2 PROJECT DETAILS

2.1 Modeling the process for managing operational risk

Risk evaluation is used to make decisions about the significance of the risks to the organization and whether each specific risk should be accepted or treated.

When looking at operational risk management, it is important to align it with the organisation's risk appetite. The risk appetite will be influenced by the size and type of organisation, its capacity for risk and its ability to exploit opportunities and withstand setbacks.

Once the severity of the risk has been established, one or more of the following methods of controlling risk can be applied:

- accepting the risk

- sharing or transferring the risk

- risk reduction

- risk avoidance

Insurance is a long-established control method for transferring risk. This applies to a number of types of operational risk, for example, damage to buildings. However, more recently there has been an increase in the use of insurance combined with other methods such as business continuity management.

One issue with measuring and managing subjective operational risks is that unless the risk occurs, it is not possible to be certain of the impact of the risk. The severity of the risk may be underestimated.

One of the issues with operational risk is the continuously changing business environment. This is stressed in Internal control: guidance for directors on the Combined Code, also known as the Turnbull Report (1999), which states: '

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A company's objectives, its internal organisation and the environment in which it operates are continually evolving and, as a result, the risks it faces are continually changing. A sound system of internal control, therefore, depends on a thorough and regular evaluation of the risks to which it is exposed.'

Once a decision has been made about how to manage or control the risk, it is important to have a process in place to monitor activity and to review and report regularly on the risk management framework.

Critical success factors in risk management are:

- Clearly identified senior management to support, own and lead on risk management

- Existence and adoption of a framework for risk management that is transparent and repeatable

- Risk is actively monitored and regularly reviewed

- Management of risk is fully embedded in the management process and consistently applied

- Clear communication with all staff

- Management of risks is closely linked to the achievement of objectives

2.2   Building the infrastructure for Operational Risk Management

There are various technical challenges in operational risk management that are solved using open-source tools to build an ERP system around this problem in effectively managing operational risk. Various tools used to build ERP system are as follows which solve some very specific problem.

- **Reladomo (Object Relational Mapping Tool):** This ORM tool is by far the most effective tool to deal with temporal data and provide an abstraction over conventional SQL queries.

- **Caching:** Caching is extremely critical in a data-intensive application where one needs to reduce redundant database calls. Reladomo provides an industry-standard caching strategy for its ORM tool.

- **Testing:** Testing is extremely crucial to manage growing codebase, which is successfully achieved using JUnit, Cypress etc.

- **User Interface:** For build complex user interfaces and accommodating ever-growing business requirements, react and tools build around react make an ideal choice.

We have used JEST and Enzyme for writing the unit test-cases for the UI features written in reactJS.

2.2.1 Object Relational Mapping (ORM)

ORM or Object Relational Mapping is a system that implements the responsibility of mapping the Object to Relational Model. That means it is responsible to store Object Model data into Relational Model and further read the data from Relational Model in the Object Model.

What is Reladomo?

Reladomo is an object-relational mapping (ORM) framework for Java with the following enterprise features

- Strongly typed compile-time checked query language

- Audit-only, Business time-series only, and Bi-temporal chaining

- Transparent multi-schema support (partition data across many databases

- Object-oriented batch operations

- Flexible object relationship inflation

- Detached objects (allow data to be changed independently (a.k.a. delayed edit functionality) of the DB and then pushed (or reset) as and when required) - useful when users are editing data in a GUI form

- Multi-Threaded matcher Loader (MT Loader) is a high-performance pattern for merging changes from another source (file, feed, other DB, etc.) to your existing DB data. By design, it is flexible/customizable and re-runnable

- Tuneable caching by object type - partial, full, full off-heap

- Available meta-data - enables higher-level programming paradigms

- Multi-tier operation - obviates the need for direct DB access from client-side apps, enables better connection sharing, with no code changes required

- Databases supported include Sybase (ASE & IQ), DB2, Oracle, Postgres, MS-SQL, H2, Derby

2.2.2 Caching layer in ERP system

- Complex problems sometimes require complex solutions, and ORM software is affected. It is very complex, it has many features and elements to manage everything from query production and data writing efficiency, to object ownership management to the visual machine. The average developer, just trying to make the app work, may choose to ignore certain difficulties with ORM programs and their configurations. Understanding the basics such as temporary storage, which may seem like practical use, is essential for building purposeful and efficient applications and should not be overlooked.

- Temporary storage is often seen as important for good performance. Studies in almost all accounting fields have shown that temporary maintenance can improve perfor-
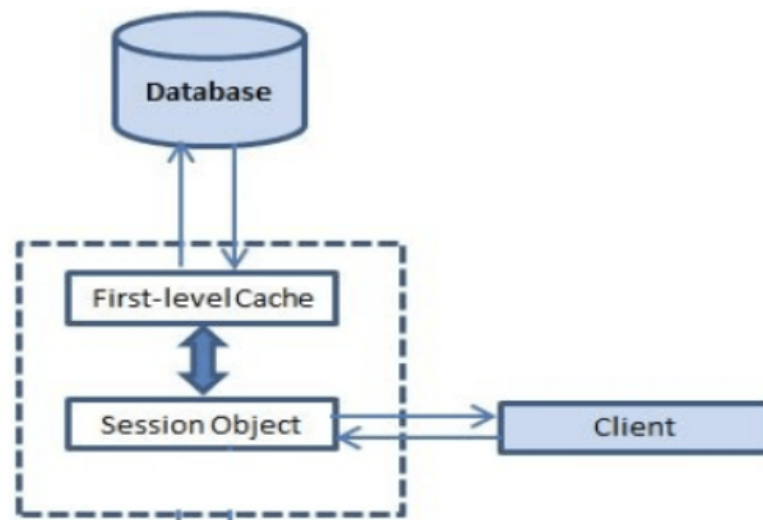
Figure 1: Caching Layer in ORM

mance and increase penetration, 1 and it is rare for any such claims to provoke even controversy. The developer's failure to understand the ORM product temporary storage method, however, may result in undesired application performance, unintended consequences, or direct bugs. User forums are full of testimonials of engineers experiencing the effects of such cognitive failure.

- Temporary storage can be one of the most technologically advanced features in the use of ORM, thus representing the critical measurement point of any application using implementation. Failure to accept it as a potential fulcrum may result in the application being overlooked or falling on the wrong side of merit. In this article, therefore, we discuss topics related to temporary storage in ORM programs and outline some of the details that need to be included and what app developers should know.

2.2.3 Testing in ERP

What is Junit?

- JUnit is an open-source testing unit for Java Testing Framework. It is useful for Java engineers to write and write repetitive tests. Erich Gamma and Kent Beck initially improve it. It is an example of xUnit design. As the name implies, it is used for Unit Testing for a small cod.

- Unit testing plays a very important role to manage and scale codebase for any ERP system especially one like Operational Risk Management Tool which involves high degree of complexity and has deal with a lot of business principles and process across the firm.

What is cypress?

- Cypress is a next generation front end testing tool built for the modern web. We address the key pain points developers and QA engineers face when testing modern applications

- We make it possible to:
  - Set up tests
  - Write tests
  - Run Tests
  - Debug Tests

- Cypress is most often compared to Selenium; however, Cypress is both fundamentally and architecturally different. Cypress is not constrained by the same restrictions as Selenium

- This enables you to write faster, easier and more reliable tests.

- Cypress essentially solves the basic problem to test the business process or actions which we expect the user to take which using ERP system after every code change which gives us surety to merge code and at the same time scale it with confidence.

2.2.4   Building User Interfaces for ERP system

What is React?

React is a JavaScript library for building user interfaces.

- **Declarative:** React makes it painless to create interactive UIs. Design simple views for each state in your application, and React will efficiently update and render just the right components when your data changes. Declarative views make your code more predictable, simpler to understand, and easier to debug.

- **Component-Based:** Build encapsulated components that manage their own state, then compose them to make complex UIs. Since component logic is written in JavaScript instead of templates, you can easily pass rich data through your app and keep state out of the DOM.

- **Learn Once, Write Anywhere:** We don't make assumptions about the rest of your technology stack, so you can develop new features in React without rewriting existing code. React can also render on the server using Node and power mobile apps using React Native.

Due to having react in process of developing user interfaces it makes whole process quick and quite manageable. There's also a huge added advantage of using react because of this ecosystem of libraries and a solid community support.

3   CONCLUSION

I would strongly conclude that experience of doing an internship at Goldman Sachs gives you a solid understanding of technology, corporate life, additionally you also do not miss out on the fun side of it. I had a great chance to interact with some of the most genius minds in Goldman and got an opportunity to learn from their years' worth of experience which was very helpful to fast track the process of learning. I have learned a lot of different technologies which help us to make full-fledged business software. I have also learned to work in a team and collaboratively solve the problem statement and also deliver it in time. All in all, this internship shapes you in every possible way to make yourself ready to meet industry demands.

4 BIBLIOGRAPHIC REFERENCES