



Impact Analysis at Detailed Level for Financial Research Systems

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ABSTRACT

Performing research and market data analysis is crucial for financial research systems, especially when research is focused on capital markets. The research systems are complex and process heterogeneous data to arrive at a conclusion of buy or sell. This paper aims to explain best practices used in fundamental research teams developing IT solutions for market research.

Keywords: ETL: Extract, Transform and Load, BOB: Best of Breed, RTM: Requirement traceability matrix, Fundamental Research, Financial Systems

INTRODUCTION

Research systems used in financial organizations have unique implementation and workflow. There is no single product that could cater to the complete research needs of fund managers or financial institutions. Coupled with the fact that each financial institute usually have their own unique proprietary approach towards performing research, the need arises for customized development and maintenance of fundamental research systems in the financial domain.

PROBLEM STATEMENT

Making a software change in research systems is complex as it ties down to impacting multiple sub-systems. How can we manage the impact of updating research systems, as the output produced by this system is critical for organizational decisions of investing millions of dollars.

Not knowing the number of components involved in research systems and their dependencies across other components and sub-systems is one of the major causes that drive the increased cost of development and maintenance of financial research systems.

There are visual tools in the market that breakdown the application components and generate component level relationship diagrams. These technical diagrams are not easily understood by the business or the analysts to make decisions. Tool generated diagrams are very technical in nature and won't help in early project planning and budgeting phases. Simplified matrix formats help all the stakeholders understand the impact for better planning and budgeting. Here is an example of tool generated impact analysis.

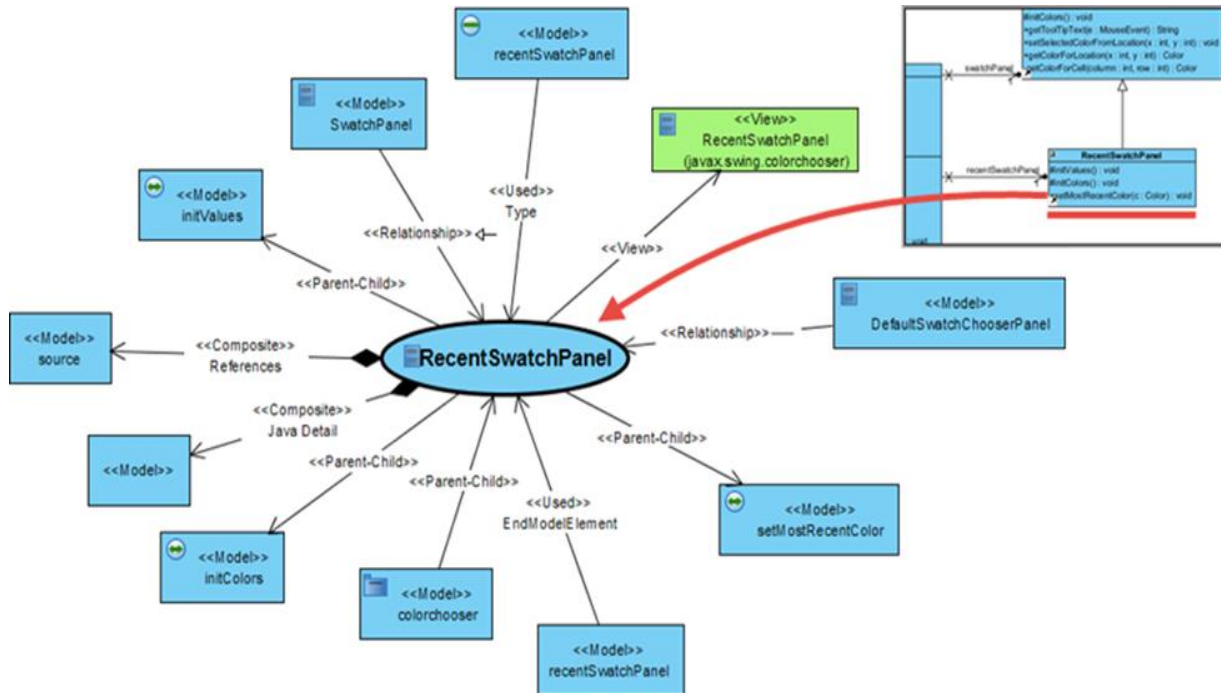


Fig. 1: [1] Impact analysis diagram generated by a tool at the software module level

THE SOLUTION

Research systems for any organization are built and constantly evolve over a period. Hence, research components are developed over a period based on the economic and financial market status at that point in time. One example is how the COVID pandemic influenced financial markets completely overnight. All the investment decisions made were influenced in some way or another based on the performance of pharmaceutical and medical research companies. We suddenly have new funds and fund categories. New financial products were created and sold that focused primarily on health. In an instance, the entire process of building funds, rating funds, and stocks took a dramatic change. The research systems are now supposed to adapt to the new and challenging environment. This calls for updating the system with new products, ratings, and portfolios. The systems should now calculate annualized return, standard deviation, sharpe ratio, alpha, beta, rolling returns, and portfolio turnover. The ever evolving global and economic events require the development of new modules and the decommission of the older ones, thus making the software changes [2] more prone to error. Performing impact analysis prior to making any change to a financial system requires creating an inventory of application modules and their associated components. Creating inventory in a collapsable format that can drill down from top level application name to application components and components to subcomponents. Creating a matrix format to know which components impact the other components is crucial. This exercise requires a detailed understanding of the systems and needs brainstorming with the whole engineering team to agree on the initial matrix that’s prepared. The initial format forms the basis for subsequent identification of impacted modules, which can also form the basis for test planning, development of regression suite and also during planning exercise for effort estimation. Here is an example of how a component level impact analysis document would look. This can be customized based on the needs of the team and the complexity of the application. The matrix can be expanded on both the X and Y axis to include multiple levels of granularization. Consider this approach similar to the requirement traceability matrix, traditionally known as RTM. Let us take an example of implementing a loader for data acquisition of a new fund. This fund needs to be researched and rated by the Fund managers and Analysts within the firm. While the requirement sounds like processing of a feed data file, careful analysis of impact would show the amount of work needed to enhance various aspects of the research system as indicated in the impacted analysis matrix below:

Component Name	Data Acquisition	ETL	Framework	Market Data	Literature	Trade	Component Impact Score
1. Data Acquisition	X						1
1.1 Inbound feed module	X						1
1.2 File processor	X						1
1.3 File Watcher							
2. ETL							
2.1 Staging Data		X	X				2
2.2 Historical Data		X	X				2
2.3 ODS		X	X				2
3. BOB Framework			X				1
3.1 Fund Ratings							
3.2 Asset Classification							
3.3 Expense Ratio							
4. Market Data			X				1
4.1 Fund Performance							
4.2 Index performance							
4.3 Fund Manager Interview							
5. Literature Generation					X		1
5.1 Fund Description					X		1
5.2 Performance Attributes					X		1
5.3 Research Note Generation					X		1
6. Trading Systems							
6.1 Trade decision mgmt							
6.2 Trade Placement							
6.3 Trade consolidation						X	1
System Impact Score							16

Fig. 2: Scaled down version of the impact analysis matrix used by fundamental research team of a leading US financial firm.

The example used above in Fig 2.0 is to identify the impacted systems to implement a new loader, essentially processing an inbound feed file for a new fund. However, on careful observation, we can find the number of impacted components is beyond the data acquisition module, as explained below.

Data Acquisition and ETL: A new feed file ideally requires no new developmental effort. But the format of the file, the type of data, format of the date, currencies involved may need modifying the ETL jobs and the underlying stored procedures.

BOB: It is common for enterprise level software development to make use of the best of breed frameworks developed in-house. After all, no enterprise would like to build software from scratch for every file that's processed. If the feed is very unique, it may warrant change to the existing framework that's used to generate the code and file setup. This is a very huge impact and needs to be carefully assessed before accepting the change to estimate a budget.

Based on the impact matrix, we can observe that the engineering team identified ETL changes requiring BOB framework usage and the actual update to the framework itself.

Market Data Component: Introduction of new fund comes with updates to Master Data, Setup and configuration changes required across data modules.

Literature Component: A new fund can warrant new literature. Literature is generated based on rules. Rules define what is generated for communication and distribution to end users. Hence, there is impact to this module.

Trading System: We can also observe the impact to trade consolidation module, which denotes meta data setup in the master data management system. The impact score obtained gives an indication of the amount of code change required and estimation, which is crucial for project planning and execution.

CONCLUSION

Engineering teams must define their own customized analysis matrix and assign a score to each module. The matrix can be expanded to include additional sub components and can be drilled down to important functions and methods to identify impact upfront.

Teams need to get creative in defining the impact matrix and keep the document up to date. The benefits of having a detailed impact analysis document are immense. It can help in estimation, budgeting, planning, and brainstorming for new features. Impact analysis is crucial for financial systems, as they have some of the most complex interdependencies. A lot of customer wealth is at stake for anything to go wrong in financial systems.

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