

Toward maintainance of a commencial software: Defects model using moving average and regression

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Abstract—Legacy systems are old software that style does useful tasks. In industrial software companies, legacy systems are often crucial for the company business model and represent a longterm business investment. Legacy systems are known to be hard to maintain. This is the case in a french company whose main product is twenty years old software written in PowerBuilder (we call it SPB). Our longterm goal is to help reengineer. But how to validate our intervention? Using moving average, and regression, we evaluate the maintenance state of SPB and produce a dashboard to monitor our future actions. We validate our results with the developer team. We In this paper, we present a lightweight defects model to help planning commercial software maintenance

Index Terms—Legacy system, Defect model .

I. INTRODUCTION

Software companies usually invest time and energy to improve the quality of the software they develop to respond to the rising market demands. Features are developed in a hurry sometimes. As results, they allow less resources for software refactoring to remove source code defects. As the software grows, it becomes hard to improve or maintain. Rewriting this software require time and a lot of resources. At this point, one of the solutions is to reverse-engineer them. This is the situation in a French company which main business product is SPB.

With over 3,000,000 lines of codes, continually updated for more than 20 years, SPB is not versioned and not unit tested. Defects are registered in a database without correlation with which part of the system is responsible for the bug. Old versions of SPB are lost until 2012. The original developers of SPB are part of the developers' team. So the currents developers only know SPB partially. So we could not completely rely on developers view of the system. Besides, there is also a misunderstanding between developer team and the business team. As the business team doesn't know the state of SPB. Our purpose is:

- How to provides a report on the state of SPB to the entire company?
- How to monitor our reverse-engineering task?

We use defect model and analytics to overcome our problems. This paper is structured as follows: we start we related works in the section II, followed by the section III in which we present our defect model. In the section 4 we present our results and validation. We conclude in section 5

II. RELATED WORK

III. DEFECT MODEL

A. Moving average

A moving average is a statistic technic usually used to smooth a time serie data. The principle is to calculate the average of a certain number according to one by one time series values to reflect the numerical trend.

$$SMA_n = \frac{1}{n} \sum_{t=k-n+1}^k A_t \quad (1)$$

B. Presentation of SPB

SPB is a 3,000,000 PowerBuilder project, developed for more than 20 years. SPB is now maintained by a team of 15 developers. SPB includes 120 Powerbuilder libraries. SPB libraries is be grouped by business module . Figure 1 give an overview of SPB achitecture.

C. Ticket

A ticket is related do a task to do. This task can be fixing a defect, writing documentation, adding a new feature, etc. A ticket is open for a task . Once the task is done and validated, the ticket is close. A ticket has the following characteristics:

- the libraries it is related to
- the creation date
- the closing date
- time spent by a developer
 - time to analyze
 - time to implement solution
 - time to test
- the estimation of the time needed by the developer to work on the ticket

IV. METHODOLOGY

We collected data from the company Tickets database . Then we procced to data cleaning. The data analytics process is guided by the following research rule:

- Pose a problem
- Make experimentations on data
- Validation of results

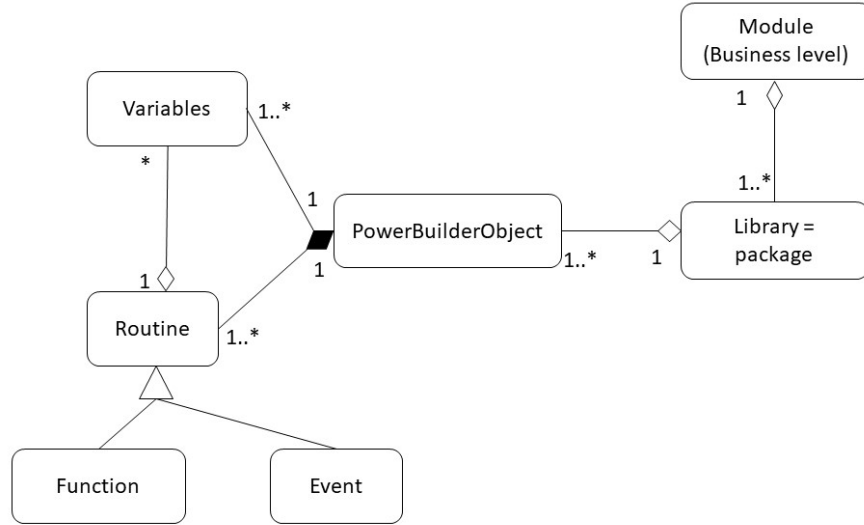


Fig. 1. Simplified SPB achitecture. Very simplified architecture of SPB

A. Data collection and data cleaning

The ticket database contains data from 1998 until 2019. This data includes tickets differents teams and softwares in the company. In the field related to the library a ticket is related to, the name of the library is not always well written.

The datas are consistant from 2004 to 2019 . We remove all tickets, non related to SPB and reformat durations per ticket. By interviewing developers, we categorize tickets into to sets: tickets related to defects and tickets related two evolutions.

B. Problems

- What is the number of defect per library?
- How long in average does it take to open and close a ticket?
- How long in average does a developer spend on a ticket ?
- How long in average does a developer spend to test a ticket after development ?
- Does the team manager estimate well the time needed by the developer?
- If the time estimated by the team manager is good, does the developer finish because of time constraint?

C. Experimentations

For each problem, we experiement on the ticket database.

1) *Number of defects per librarie*: We plot defects and evolution per library over time. In x axis we have years and in y axis we have the number of defects or evolutions. This give us an overview of defect history per library. And which libraries trend to have defects.

V. RESULTS AND DISCUSSION

VI. SUMMARY AND CONCLUSIONS