Topics in Software Engineering

Assignment 2

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Question 1) What refactoring strategies do Microsoft Word Developers use?

Answer: According to a recent research article in which researchers did the survey and asked the developers of Microsoft Word some questions about refactoring, here are the answers and questions which they get regarding the tools and strategies which they use for refactoring.

**Questions which were asked by the researchers to MS Word Developers:**

What tools do you use during refactoring?

What percentage of your refactoring is done manually as opposed to using automated refactoring tools?

The following lists some of the types of refactorings. Please indicate whether you know these refactorings or used them before.

[multiple choice: (1) usually do this both manually and using automated tools (2) usually do this manually, (3) usually do this

using automated tools, (4) know this refactoring type but don’t use it, (5) don’t know this refactoring type.]

• Rename, Extract Method, Encapsulate Field, Extract Interface, Remove Parameters, . . .

These refactoring types were selected from Fowler’s catalog.

How strongly do you agree or disagree with each of the following statements? (scale: strongly agree, agree, neither agree or disagree,

disagree, strongly disagree, no response)

• I interleave refactorings with other types of changes that modify external program behavior.

• Refactorings supported by a tool differ from the kind of refactorings I perform manually.

• Refactorings that I apply are higher level changes than the ones supported by tools.

• How do you ensure program correctness after refactoring?

**Here are the most common answers which they get from developers:**

According to self-reported data, developers do most refactoring manually and they do not use refactoring tools despite their awareness of refactoring types supported by the tools. When we asked, “what percentage of your refactoring is done manually as opposed to using automated refactoring tools?”, developers said they do 86% of refactoring manually on average. Surprisingly 51% of developers do all 100% of their refactoring manually.

Developers who usually apply individual refactoring types manually despite the awareness and availability of automated refactoring tool support. Considering that 55% of these developers reported that they have automated refactoring engines available in their development environments, this lack of usage of automated refactoring engines is very surprising. With an exception of rename refactoring, more than a half of the participants said that they apply those refactorings manually, despite their awareness of the refactoring types and availability of automated tool support.

Our survey responses indicate that the investment in tool support for refactoring must go beyond automated code transformation, for example, tool support for change integration, code reviews after refactoring, validation of program correctness, estimation of refactoring cost and benefit, etc.

Question 2) How do Microsoft Word Developers apply rewrite?

Answer: while refactoring preserves some behavior, it does not preserve behavior in all aspects. The following shows a few examples of refactoring definitions by developers. “Rewriting code to make it better in some way.”

“Changing code to make it easier to maintain. Strictly speaking, refactoring means that behavior does not change, but realistically speaking, it usually is done while adding features or fixing bugs.”

Word 6.0 was the second attempt to develop a common codebase version of Word. The first, code-named Pyramid, had been an attempt to completely rewrite the existing Word product. It was abandoned when it was determined that it would take the development team too long to rewrite and then catch up with all the new capabilities that could have been added in the same time without a rewrite.

Question 3) What has not changed in the MS Word?

1. Old features
2. Newly added changes
3. Changes for each versions
4. Current state

Answer: Word 97 had the same general operating performance as later versions such as Word 2000.

a) First application with such features as the ability to display bold and italics text on an IBM PC. Word made full use of the mouse, which was so unusual at the time that Microsoft offered a bundled Word-with-Mouse package. Microsoft Word was the first word processor for the IBM PC that showed actual line breaks and typeface markups such as bold and italics directly on the screen while editing.

b) Like other Microsoft Office documents, Word files can include advanced macros and even embedded programs. The language was originally WordBasic, but changed to Visual Basic for Applications as of Word 97. Recently .NET has become the preferred platform for Word programming.

Later versions of Word have more capabilities than just word processing. The Drawing tool allows simple desktop publishing operations such as adding graphics to documents. Collaboration, document comparison, multilingual support, translation and many other capabilities have been added over the years.

c) The first version of Word for Windows was released in 1989 at a price of 500 US dollars. The failure of WordPerfect to produce a Windows version proved a fatal mistake. It was version 2.0 of Word, however, that firmly established Microsoft Word as the market leader.

Word 97:

Word 97 had the same general operating performance as later versions such as Word 2000. This was the first copy of Word featuring the "Office Assistant", which was an animated helper used in all Office programs.

Word 2007:

Word 2007, included with Microsoft office 2007 suites, includes numerous changes, including a new XML-based file format, a redesigned interface, an integrated equation editor, bibliographic management, and support for structured documents. It also has contextual tabs, which are functionality specific only to the object with focus, and many other features like Live Preview (which enables you to view the document without making any permanent changes), Mini Toolbar, Super-tooltips, Quick Access toolbar, SmartArt, etc.

Word 2010:

Word 2010, included with Microsoft Office 2010 suites, introduces the Microsoft Backstage View, Ribbon customization, picture effects, and text effects.

Word 2013:

Included with Microsoft Office 2013 suites.

Word 2016: Included with Microsoft Office 2016 suites..

### Word 2019: Included with Microsoft Office 2019 suites.

### Word 2021: Included with Microsoft Office 2021 suites.

d) Microsoft Word has all the working features from all the versions.