Result Analysis on Survey: How do Developers Debug in Practice”

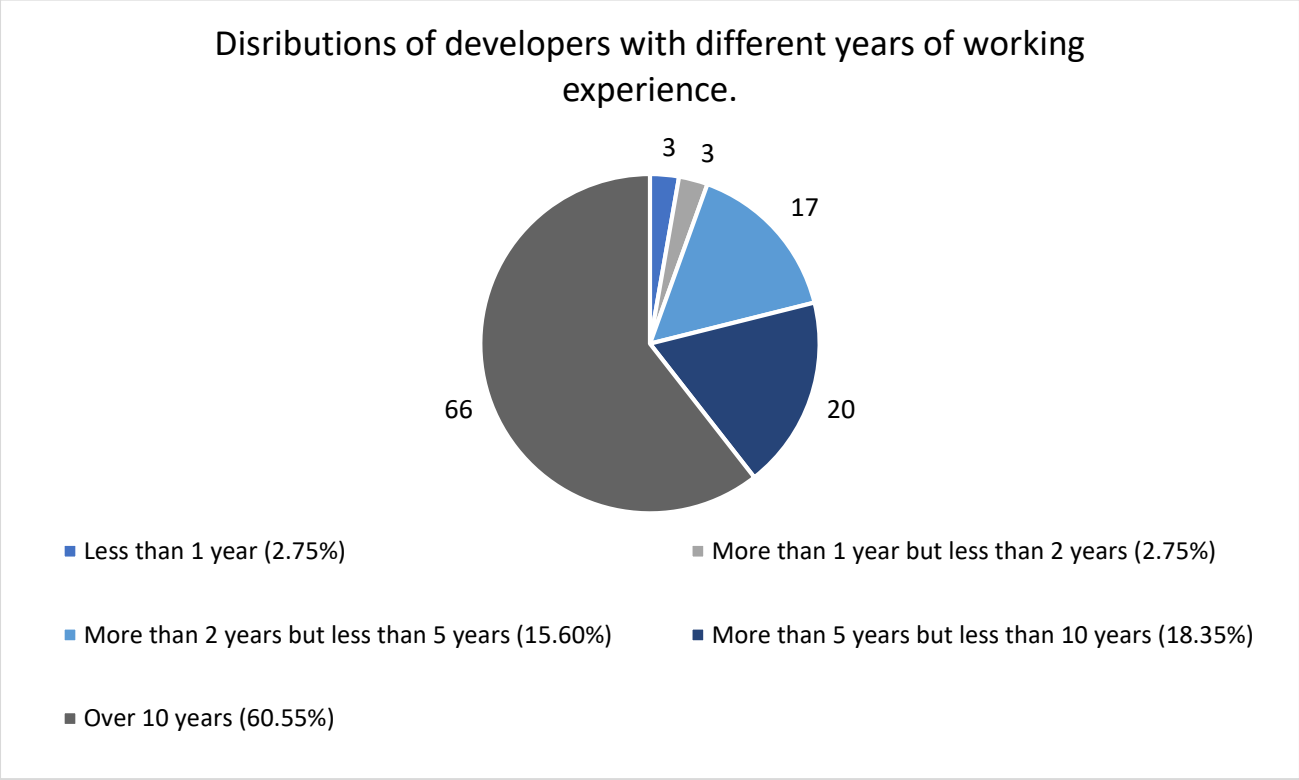
This survey targets at understanding how developers debug in practice. Through this survey, we want to know what kind of information is useful for developers to debug in practice and the difficulties encountered by them in using such information. The results of this survey can direct the correct way for us to design automated debugging tools, which aims at facilitating developers in debugging automatically in practice.

This survey contains only few questions, which can be finished within 2~4 minutes.
The link of this survey is: https://www.wjx.cn/jq/19791453.aspx

We conduct this survey in Microsoft. In total, we have received 109 valid feedbacks, and the following is the analysis of the results.

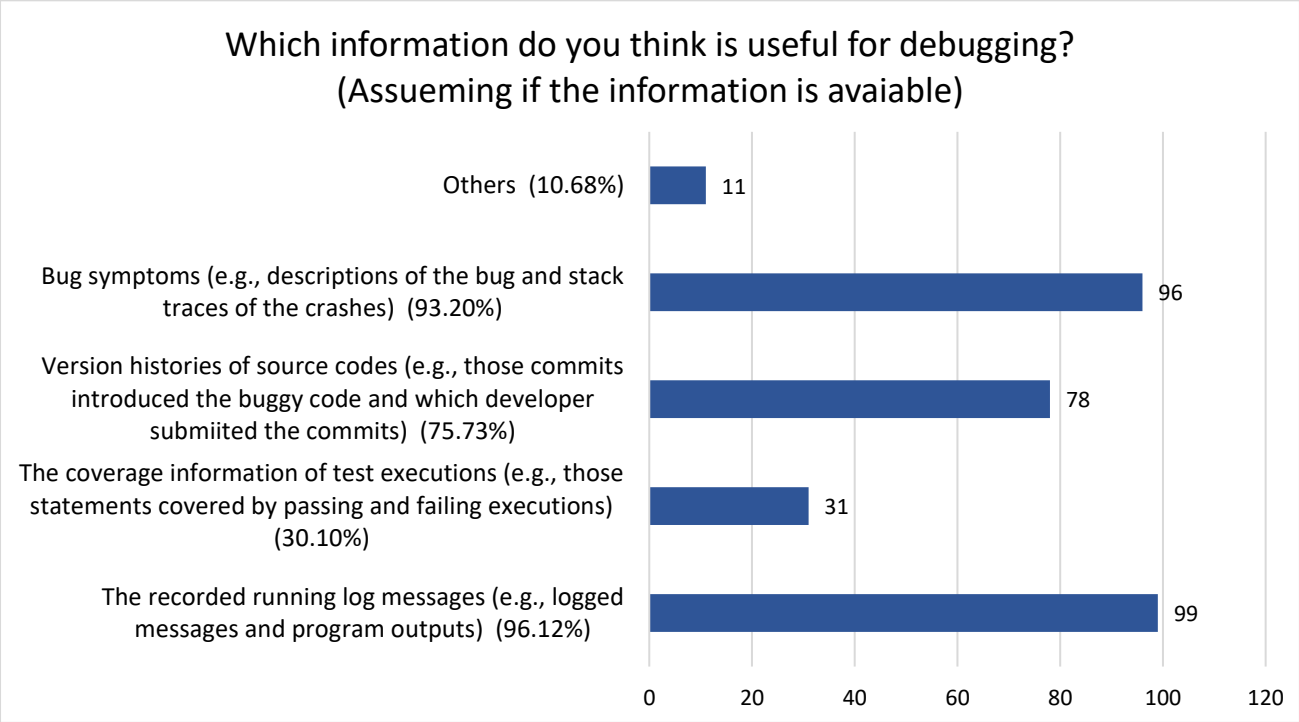
Distribution of developers with different years of developing experiences in industry.

We designed this question since the working experiences might vary for different developers, and this will affect the results of our survey. In this survey, around 60% of the developers have over 10-year working experience in industry and more than 78% interviewee have over 5-years experiences. We believe their opinions and feedbacks are representative among industries. To increase the confidence of our results, in the analysis of the following questions, we only those feedbacks submitted by developers with at least two years of developing experiences (103/109). We consider these developers are experienced in debugging



Q1. Which information do you think is useful for debugging? (Assuming if the information is available)

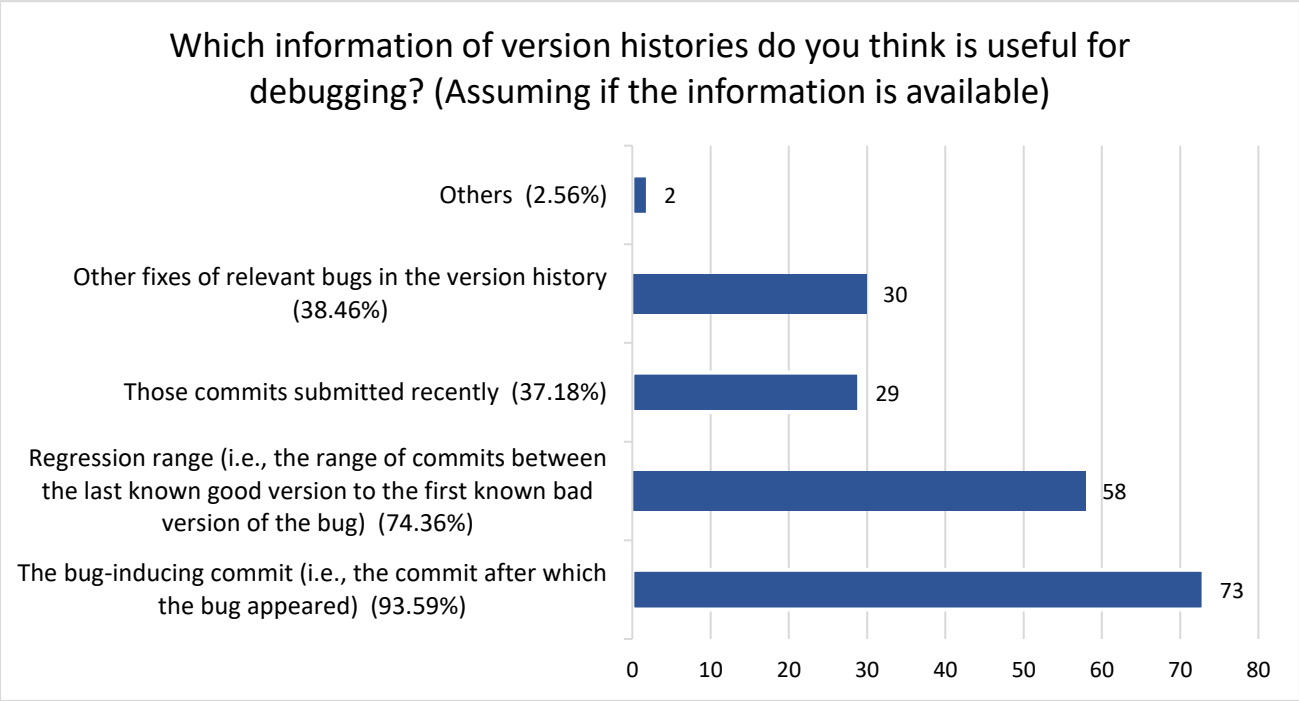
All developers answered this multiple-choice question. In 103 feedbacks, around 95% developers agreed that ***bug symptoms*** and ***recorded running log messages*** are useful in debugging. Besides that, three quarters of developers regarded ***version histories of source codes*** is also useful. Surprisingly, ***the coverage information of test executions*** is only considered as useful information by approximately 30% developers. From the results of this question, we can know that the information of version histories indeed is helpful for developer in debugging in practice.



Q2. Which information of version histories do you think is useful for debugging? (Assuming if the information is available).

This multiple-choice question is a follow-up question of Q1 and it was answered only by those developers who have chosen ***version histories of source code*** in Q1. In total, there are 78 developers answered this question.

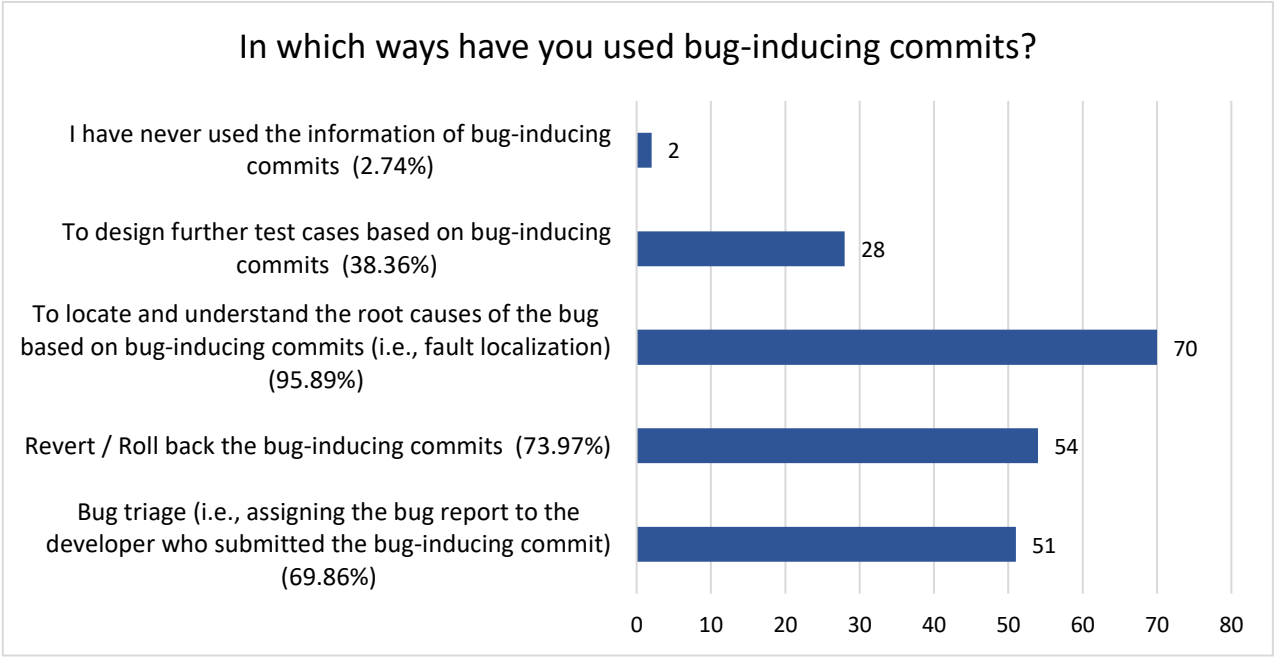
The bug-inducing commit obtained the highest vote (73/78) in the five options. ***Regression range*** is also considered as useful information of version histories by 74% (58/78) developers. Less than half developers thought the other two options are useful.



Q3. In which ways have you ever used bug-inducing commits?

This multiple-choice question is a follow-up question of Q2 and it will only be answered by those developers who have chosen ***bug-inducing commits*** in Q2. In total, there are 73 developers answered this question.

Only around 3% developers chose ***never used the information of bug-inducing commits***, which indicated the usefulness of ***bug-inducing commits*** in debugging. 95.89% of the developers have ever leveraged the bug-inducing commits to ***understand the root causes*** of software bugs for ***fault localization***. 73.97% of the developers have reverted the bug-inducing commits for debugging. 60% of them used it for ***bug triage***. Moreover, 38.36% of the developers have ever used the bug-inducing commits in ***designing extra test cases***. From the results, we can tell that almost all the developers have ever leveraged the bug-inducing commits in fault localization.

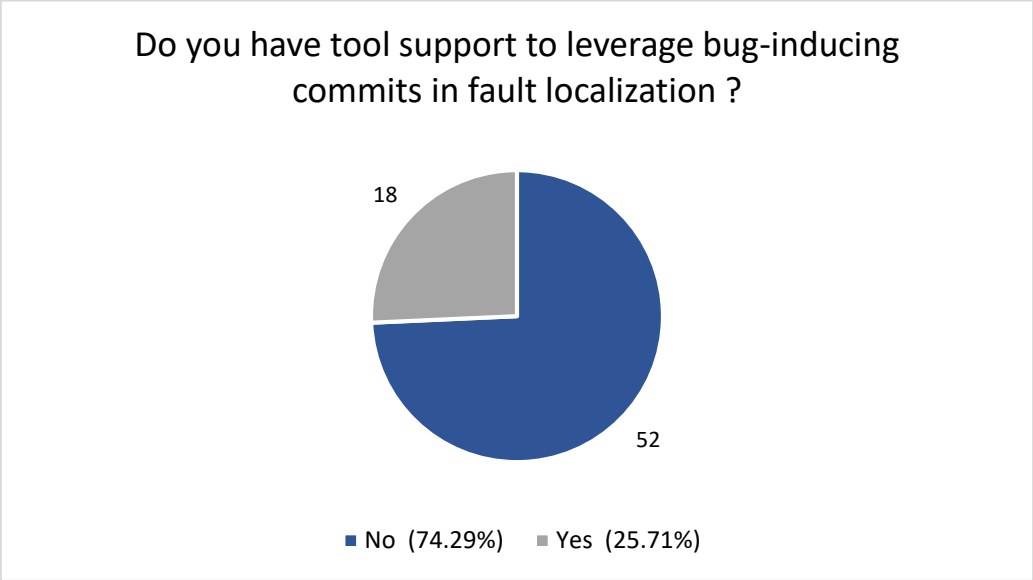


Q4. Do you have tool support to leverage bug-inducing commits in fault localization? (except for those version control tools such as Git)

This multiple-choice question is a follow-up question of Q3 and it will only be answered by those developers who have chosen ***fault localization*** in Q3. In total, there are 70 developers answered this question.

Version control system, e.g., Git and SVN, are excluded in this question, since they are not designed specific for fault localization.

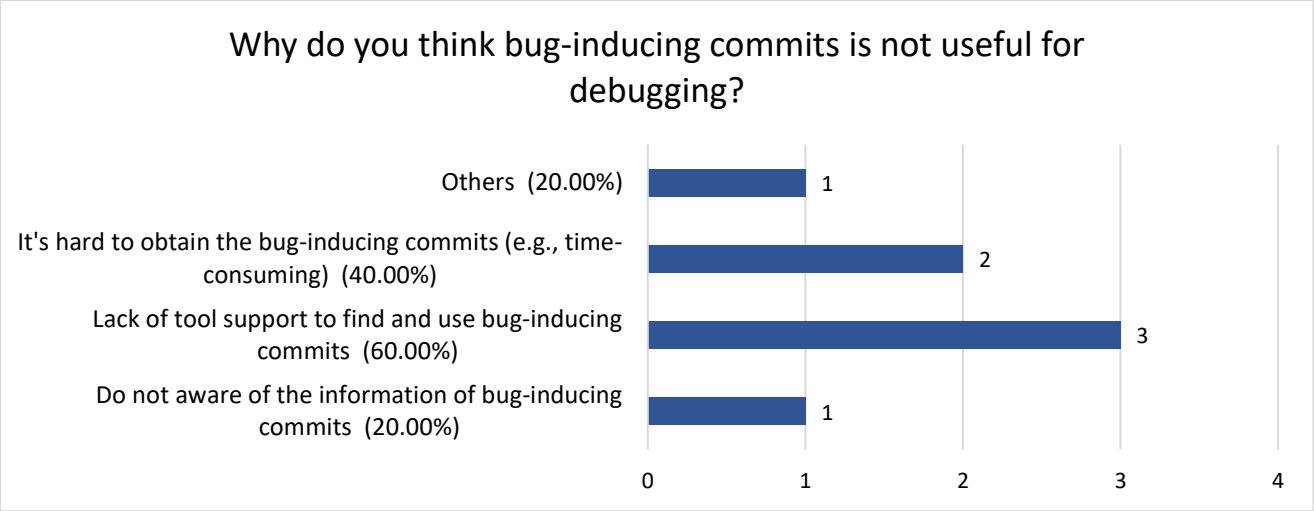
From the results, we can tell that a tool to support to leverage bug-inducing commits in fault localization is in highly demanded since 74% of the developers have to conduct the process of fault localization manually. Around 25% of them mentioned they have such tools such as VSTS.



Q5. Why do you think bug-inducing commits is not useful for debugging?

This multiple-choice question is a follow-up question of Q2 and it will only be answered by those developers who have not chosen ***bug-inducing commits*** in Q2. In total, there are only 5 developers that answered this question. The results of this question may not be representative due to the small number of valid feedbacks.

Hard to obtain the bug-inducing commits and ***lack of tool support*** are the major concerns from developers.



Q6. Why do you think the version history is not useful for debugging?

This multiple-choice question is a follow-up question of Q1 and it will only be answered by those developers who have not chosen ***version histories of source code*** in Q1. In total, there are 25 developers who answered this question.

Around 45% interviewees think the version history is not useful due to ***lack of efficient methods or tool supports to leverage the information of version history***. And 18.9% of them ***did not aware of such information***.