Time-Travelling Queries for Faster Debugging and Program Comprehension
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Debugging is a time-consuming iterative process:

Context: The debugging process

Problem: Understanding programs for debugging is difficult

Solution: Time-Traveling Queries

Time-Traveling Queries Evaluation

Do you have a debugging question?

Select a Time-Traveling Query from the Queries Menu!

• TTQs request information of an execution related to common debugging questions.
• Find answers directly in your query result (Don’t miss target!).
• “Click & Time-Travel” Reverse or advance the execution jumping directly to any of the results timestamp (Less tedious!).
• Explore your execution states forward or backward.

Do you have another debugging question? Just select another query!

There is no query for your debugging question? Write your own TTQ!

Example:

What is the cause of the error?

To understand the behavior of a program, developers ask program comprehension questions

• When during the execution is this method called?
• Where are instances of this class created?
• Where is this variable or data being accessed?
• Etc.

Better program comprehension => shorter debugging process

Debugging question: What is the value of this variable during the execution?

With TTQs, developers perform program comprehension tasks more accurately, faster, and with less effort than with standard debugging tools*.

Control: Without Time-Traveling Queries

TTQ: Using Time-Traveling Queries

30% MORE PRECISE
28% FASTER
38% LESS ACTIONS


Future work

• Scaling the solution to daily debugging scenarios.
• Studying new relevant queries.
• Research TTQs generalization to different programming languages.
• Designing new TTQs-based debugging tools.

Code and video demonstration available at: github.com/Willembrinck/TTQ-Debugging