**Student Worksheet: Analyzing a Journal Article**

***Please read the assigned journal article and answer the following questions. Review the “Paraphrasing” module as needed to help you understand how to paraphrase to avoid plagiarism.***

**Your name: <team members> Date: 10.05.2021**

**Journal article title: “Tool Support for Correctness-by-Construction”**

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| **Step 1. What is the purpose/hypothesis/aim/objective of the study?** | |
| **a. Write down the exact statement in which the authors describe what they were testing. (Hint: This information may be provided in the article as a purpose statement or as a hypothesis). Include quotation marks around the exact wording, and indicate page number(s).** | “In this paper, we present CorC,1 a tool designed to develop programs following the CbC approach. We deliberately built our tool on the well-known post-hoc verifier KeY [4] to profit from the KeY ecosystem and future extensions of the  verifier.”  Page 2 |
| **b. Now describe the purpose of the study (as you understand it) in your own words.** | The purpose of the study is to present benefits of using a tool called “CorC” for developing programs. CorC is following the CbC approach (Correctness-by-Construction). This approach guarantees the correctness of the program with respect to the specifications. The program is developed guided by a formally set of specifications (statement, post-conditions, pre-conditions). The benefits of using CorC are backed up by the results from testing on different algorithms. |
| **c. What was the “gap” in the research that the authors were trying to fill by doing their study?** | The authors were trying to create a tool that follows a CbC-style of development, because such a tool was missing. |

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| **Step 2. What is/are the major finding(s) of the study?** | |
| **a. Make some notes about the authors’ major conclusions or findings as written in the article. Include quotation marks whenever you use their exact wording, and indicate page number(s).** | “CorC opens the possibility to utilize CbC in areas where post-hoc verification is used as programmers could benefit from synergistic effects of both approaches.”  Page 15  “An advantage of CorC is the overview on all Hoare triples during development. In this way, we found some specifications where descriptions in the book by Kourie and Watson [19] were not precise enough to verify the problem in KeY.”  Page 14 |
| **b. Now write those conclusions (as you understand them) in your own words.** | CorC is a tool that can be used in areas of post-hoc verification or correcteness-by-construction.  The authors compared the CbC approach versus the post-hoc verification approach with examples from a book by Kourie and Watson. They found that CorC offers an advantage over post-hoc verification, regarding the Hoare triples |
| **Step 3. How did the authors test their hypothesis?** | |
| **a. Briefly summarize the main steps or measurements that the authors used in their methods. Try to explain in your own words as much as possible.** | CorC offers a graphical and a textual editor that can be used interchangeably when developing programs. The programs are written as a set of Hoare triple specifications (pre-conditions, post-conditions and different types of statements).CorC has the following rules when building programs: skip, assignment, composition, selection, repetition, weakening precondition, strengthening postcondition, and subroutine. |
| **b. Do the authors suggest any problems or limitations with their methodology? Do you see any problems or limitations with their methodology?** | A problem appeared when trying to test the *binary* *search* algorithm. Verification problems with arithmetic division are hard to prove for KeY automatically. In each step when the element is not found, the program halves the array. KeY could not prove that the searched element exists within the new boundaries. |
| **c. How did the authors analyse their data? What test/s did they use?** | They tested CorC based on 8 algorithms from a book by Kourie and Watson, written for post-hoc verification approach. |

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| **Step 4. How reliable are the results?** | |
| **a. Do the authors suggest any problems with the study that could lead to unreliable results?** | No, they only mentioned a limitation of the approach but not the possibility of unreliable results. |
| **Step 5. Based on your analysis, are the claims made in this journal article accurate?** | |
| **a. Do the conclusions made (about the results) by the author make sense to you? Are the conclusions too broad or too narrow based on what was actually done in the study?** | I believe the results presented by the authors make sense and is useful to follow this approach since the correctness of the program is guaranteed with respect to the specifications. The conclusions are neither too broad or too narrow. |
| **b. Based on the accuracy of the methodology and the reliability of the results as described in Steps 3 and 4, do you think the conclusions can be believed?** | Yes, the conclusions can be believed. |
| **Step 6. What is the importance of this scientific work?** | |
| **a. Write (in your own words) the significant contributions of the experimental work in this journal article as reported by the authors.** | The contributions of the authors in this paper are significant because they developed a tool which helps to build programs following the CbC approach. Until now, a tool support that uses this approach was missing. The programmers were more tailored to develop programs following the post-hoc verification. The difference between the two approaches is that the CbC can check the method partially, step by step after every statement. |
| **b. Re-read your notes and explain why you think this is**  o **a strong or weak scientific article**  o a **strong or weak scientific study** | I think this is a strong scientific article and study because the authors have tried to develop a tool that follows a new approach, one that no tool supports were created before. They compared their tool with algorithms from another book that was following a related approach, post-hoc verification. The programs can be developed in CorC with the help of a graphical or textual editor. |

**Resources for students:**

1. If you are struggling with plagiarism and paraphrasing, then refer to our online [“Paraphrasing”](http://www.lib.uoguelph.ca/sites/default/files/paraphrase.pdf) module.
2. If you are struggling with figuring out how to read the information, then refer to the section on active reading in the “Learning from Textbooks” section of [A Guide for University Learning.](http://www.learningcommons.uoguelph.ca/guides/university_learning/)
3. If you want to learn how to find more academic information on other science topics, then refer to our online [“Searching for Scientific Journal Articles”](http://www.lib.uoguelph.ca/sites/default/files/STAO_research_module.pdf) module.