Student Worksheet: Analyzing a Journal Article

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Journal Article Title: Model Checking Software Architecture Design by Jiexin Zhang, Yang Liu, Jing Sun, Jin Song Dong and Jun Sun

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 an automated approach to the modeling and verification of software architecture designs using the Process Analysis Toolkit (PAT). We present the formal syntax of the Wright# architecture description language together with its operational semantics in Labeled Transition System (LTS). A dedicated model checking module for Wright# is implemented in the PAT verification framework based on the proposed formalism. [...] Finally, a case study of the Teleservices and Remote Medical Care System (TRMCS) modeling and verification is presented to evaluate the effectiveness and scalability of our approach." (Page 1)
b. Now describe the purpose of the study (as you understand it) in your own words.	The purpose of this study is the verification of the software architecture designs by analyzing both the structure and behavior of a software system using Wright# language which checks the interactions between different (sub)components of the same system.
c. What was the "gap" in the research that the authors were trying to fill by doing their study?	The authors propose a new software architecture description language called Wright# which is an improved version of the previous architecture description languages. It must solve the problems that arose for the Darwin, ACME, CHAM and MP languages: Darwin – cannot handle complex interactions between among reconfiguration unites ACME – models' decomposition and the dependency between sub- models during parallel verification phase CHAM – expresses system properties, but with no verification support MP – cannot support architecture reconfiguration and reuse

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).	**Based on the previous PAT framework, the authors defined a new syntax and LTS operational semantics for Wright# language which "supports both static and dynamic system behaviors modelling and configuration". "The model supports automated verification and simulation of software architecture models in PAT" (page 7)**
b. Now write those conclusions (as you understand them) in your own words.	**The conclusion of this article is that the new developed language is able to support reconfiguration and can be reused in designing custom system (given the fact that different users can have different needs).**
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.	**The authors applied their approach to the modelling and verification of the Teleservices and Remote Medical Care System (TRMCS) (a system which provides medical services for remote patients through Internet or mobile phones).** **TRMCS consists of multi-styled structure which includes Client- Server, pipe-filter and publish subscriber. So, the authors decided to apply their evaluation to each structure of the TRMCS:** **1. Client-Server** **2. Pipe-filter** **3. Publish Subscriber** **The authors concluded that the amount of user code is reduced nearly 1/3 because the connectors of Client-Server, Pipe-filter and Publish subscriber can be reused without any further modifications.**
b. Do the authors suggest any problems or limitations with their methodology? Do you see any problems or limitations with their methodology?	**For the Publish Subscriber structure the authors stated that the number of states and running times rapidly increased as the system parameters were increased. This happened because TRMCS system is way more complex in interior communications.** **So, in our opinion, a problem can arise when applying their framework to a system that has complex interior communications.**
c. How did the authors analyse their data? What test/s did they use?	**The authors analyzed the Wright# extension's performance inside the PAT framework. Moreover, they created "Client-Server, Peer-to-peer, Pipe-filter and Publish-subscribe" style library and added it to the Wright# language using PAT framework as IDE.**

Step 4. How reliable are the results?	
a. Do the authors suggest any problems with the study that could lead to unreliable results?	**No. In fact the authors want to continue their work by defining a graphical user interface that should provide diagram representations of the architecture models. Moreover, they want to improve the Wright# language's notation.**
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?	**The conclusion made by the authors do make sense because, according to them, they applied their approach to "a real world case study of a Teleservices and Remote Medical Care System (TRMCS)".**
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?	**Taking into consideration that their work has been evaluated on a real- life scenario using a real-life application the conclusions can be trusted. Moreover, they provide detailed results obtained using real devices and not results based on ideal cases and ideal environments.**
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 authors managed to create (based on previous work, as PAT framework) a new software architecture description language, called Wright# which allows you to create your own system based on already-defined (sub)systems with a minimum amount of effort by extending and reusing existing components. In other words, Wright# provides you a more dynamic way of creating your own system which reduces the effort used to represent the components in ADL.**
b. Re-read your notes and explain why you think this is: • **a strong or weak scientific article** • **a strong or weak scientific study**	**Taking into consideration the results obtained using a real-life case I consider that this article contains relevant information for the domain that it represents and can be used as inspiration for further work. The authors chose TRMCS because it consists of a multi-styled structure in its design which includes the client-server, pipe- filter and publish-subscriber architectures, which have been discussed and analyzed in the first half of the article.**