

User Study Leaflet

In this experiment you will be modeling parallel behaviors in Palladio. The experiment contains two use case scenarios and each scenario contains one modeling task. For each task you will have 30 minutes. In order for your participation to be successful you have to work on both tasks. Your modeling solution is correct when a simulation of the model starts and finishes successfully. Even if you are not able to achieve a working model in the given time, your submission still counts and your participation will be counted as successful. While you are completing the modeling tasks, your task completion time, number of errors, and time spent in errors will be recorded and noted. At certain points during the study, you will encounter questions from the questionnaire which you have to answer before proceeding with the next task.

Introductory questions:

- [illegible]

Consent Form

DESCRIPTION: You are invited to participate in a **research study** on **different modeling tools** in the **Palladio-Bench tool**.

TIME INVOLVEMENT: Your participation will take approximately **60 minutes**.

DATA COLLECTION: For this study you will model use case scenarios in Palladio. During the modeling process, metrics such as task completion time, number of errors and time spent in errors will be measured. Also, you will need to fill in a questionnaire.

RISKS AND BENEFITS: No risk associated with this study. The collected data is securely stored. We do guarantee no data misuse and privacy is completely preserved. Your decision whether or not to participate in this study will not affect your grade in school.

PARTICIPANT'S RIGHTS: If you have read this form and have decided to participate in this project, please understand your **participation is voluntary** and you have the **right to withdraw your consent or discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled**. **The alternative is not to participate**. The results of this research study may be presented at scientific or professional meetings or published in scientific journals. Your identity is not disclosed unless we directly inform and ask for your permission.

CONTACT INFORMATION: If you have any questions, concerns or complaints about this research, its procedures, risks and benefits, contact following persons:

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By signing this document I confirm that I agree to the terms and conditions.

Name: ____

Signature, Date: _

Use Case Scenarios and Modeling Tasks

Use Case Scenario 1

Start with reading the use case description and then proceed with the task.

Use Case Description:

The software in this use case is used to search for a list of literature in various scientific databases. The search is executed in parallel where each database is searched in a separate thread. For the purpose of this scenario, the number of databases is limited to 16. The software consists of one component and one providing interface. The interface declares the search method and the component implements it. In the specification of the method create all of the threads responsible for the search. The searching operation for one list of literature in a single database requires 100 CPU resources. Each thread also requires 5 CPU resources for the synchronization overhead resulting from the creation and the start of the thread. Exactly one instance of the component and the interface are present in the software system. The resource environment where the system is deployed has a CPU with a processing rate of 200 and 4 number of replicas and the whole system is deployed on a single container. In the usage scenario, a single call of the search method is started with a closed workload of one user and no think time.

Task B (Parallel Performance Catalogue):

In the project that you receive every diagram is complete except the SEFF Diagram of the basic component. The files required for the experiment automation are also complete. Your task is to complete the SEFF Diagram and to apply the Parallel Loops AT.

Questionnaire

Questions regarding Use Case Scenario 1:

1. How would you rate the difficulty of the task in Use Case Scenario 1?

very easy ☐ ☒ ☐ ☐ ☐ ☐ ☐ very hard

2. How would you rate your performance regarding the task in Use Case Scenario 1?

very slow ☐ ☐ ☐ ☐ ☐ ☒ ☐ very fast

3. How would you rate the amount of work required for completing the task in Use Case Scenario 1?

too little ☐ ☐ ☐ ☒ ☐ ☐ ☐ too much

4. How would you rate the usability of the Parallel Performance Catalogue regarding the modeling of parallel behaviors and your user experience with it?

very bad ☐ ☐ ☐ ☐ ☒ ☐ ☐ very good

Use Case Scenarios and Modeling Tasks

Use Case Scenario 2

Start with reading the use case description and then proceed with the task.

Use Case Description:

The software in this use case is used in machine learning in order to speed up complex calculations. It multiplies two 16x16 matrices and the multiplication is executed in parallel where each row of the resulting matrix is calculated in a separate thread. With the given size of the matrices, this results in 16 threads. The software consists of one component and one providing interface. The interface declares the multiply method and the component implements it. The multiplication operation for one of the resulting rows requires 125 CPU resources. Each thread also requires 5 CPU resources for the synchronization overhead resulting from the creation and the start of the thread. Exactly one instance of the component and the interface are present in the software system. The resource environment where the system is deployed has a CPU with a processing rate of 250 and 4 number of replicas and the whole system is deployed on a single container. In the usage scenario, a single call of the multiply method is started with a closed workload of one user and no think time.

Task A (Standard toolkit):

In the project that you receive every diagram is complete except the SEFF Diagram of the basic component. Your task is to complete the SEFF Diagram.

Questionnaire

Questions regarding Use Case Scenario 2:

5. How would you rate the difficulty of the task in Use Case Scenario 2?

very easy ☐ ☒ ☐ ☐ ☐ ☐ ☐ very hard

6. How would you rate your performance regarding the task in Use Case Scenario 2?

very slow ☒ ☐ ☐ ☐ ☐ ☐ ☐ very fast

7. How would you rate the amount of work required for completing the task in Use Case Scenario 2?

too little ☐ ☐ ☐ ☐ ☐ ☒ ☐ too much

8. How would you rate the usability of the standard toolkit regarding the modeling of parallel behaviors and your user experience with it?

very bad ☒ ☐ ☐ ☐ ☐ ☐ ☐ very good

Questions regarding the Parallel Performance Catalogue:

9. How would you rate the usability of the Parallel Performance Catalogue in comparison to the standard toolkit?

worse than the standard toolkit ☐ ☐ ☐ ☐ ☐ ☐ ☒ significantly better and easier than the standard toolkit

Questionnaire

10. How would you rate the following statement:

"The Parallel Performance Catalogue introduces a very significant speed-up regarding the modeling of parallel behaviors."

false ☐ ☐ ☐ ☐ ☐ ☐ ☒ true

11. Would you recommend the usage of the Parallel Performance Catalogue to other users of Palladio?

definitely no ☐ ☐ ☐ ☐ ☐ ☐ ☒ definitely yes

Final thoughts

12. What did you like about the user experiment?

I found an innovative way of solving task C

13. What did you not like about the user experiment?

That I still ran out of time

14. What would you improve about the Parallel Performance Catalogue?

I found it strange that it had a loop profile instead of a general parallel profile where loops would be one of the elements inside.
