#352

THESIS DEFENCE EXAMINER REPORT: Examiner Details

Examiner name	Patrick Hung
Examiner affiliation (institution and/or industry)	Ontario Tech University
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Please select your role for this defence:	Master's Thesis Examiner
THESIS DEFENCE EXAMINER REPORT: Candidate Information	
Student Name	Nahid Hasan Khan
Master's Student Program	Master of Applied Science, Electrical and Computer Engineering
Thesis title	CLUSTERING ANALYSIS OF LOCK CONTENTION FAULT TYPES USING RUN-TIME PERFORMANCE METRICS FOR JAVA INTRINSIC LOCKS
THESIS DEFENCE EXAMINER REPORT: Examiner Recommendation	
Check the category below that indicates your recommendation based on your judgment of the student's work as a PhD or Master's thesis in your discipline.	Advance to the oral examination as scheduled.
THESIS DEFENCE EXAMINER REPORT: Examiner Report	
Along with your recommendation, SGPS requires a report (approximately 1 - 3 pages in length) describing the strengths and weaknesses of the thesis. **For further instructions on what to comment on in your report, please review the letter from the Dean of Graduate Studies which was emailed to you.** **Details about the defence process can be found in the Graduate Academic Calendar: Academic Regulations "Thesis, project or major paper" section.** **How would you like to submit your report/evaluation?**	Enter in space provided

For the Master's Thesis Examiner's Report, please use this space to comment on the strengths of the thesis. Items to consider: does the thesis appropriately acknowledge the larger field of research? Is the methods section detailed? Are the results clearly reported? Are analyses and conclusions justified? Are the implications discussed?

This thesis presents a clustering-based approach to identify the two types of lock contention faults (Type 1 - Threads spend too much time inside the critical sections and Type 2 - High frequency with which threads send access requests

to the locked resources) hidden at the Java code level from the Java Lock Monitor (JLM) and perf run-time metrics. The student used a run-time analysis approach over static code analysis. The main contributions of the research are (1) Classifying contention fault types of java-based concurrent application through clustering techniques utilizing the run-time metrics that come from performance analyzer tools (JLM and perf); and (2) Generation of a dataset containing contention statistics and formalization of the experiments so that by leveraging this formalization one can enrich the dataset with new sets of contention faults. Overall, this thesis is well written, and the technical details are clearly explained.

Please use this space to comment on any weaknesses of the thesis.
The thesis should introduce the basic concept of synchronization in programming and semaphore definition.

Referring to 5.4.1 Prepare Environment, it says "Validation measurement of the clustering is done leveraging the popular R programming language, and its packages such as cluster, factoextra, NbClust." What is R programming? There is no description or reference.

The concept of unsupervised Machine Learning is not clear in the proposed model. There is no details about it in the thesis.

Referring to Page 103 (118 of 129), it says "However, we do believe our dataset can be extended by executing some concurrent example codes with faults in them." How large is the dataset?

Referring to Page 103 (118 of 129), it says "Moreover, there are not so many real-world java applications with faults; we can use them as benchmark applications." Is there any references?

There are 41 references (23 are technical handbooks) and there are only 18 academic references. Also there is no reference in 2019-2021.

There is a typo in "public void taskOne(Object val)." It should be val1.

Referring to Page 66 (81 of 129), there is a missing "and" in the following statement.
"Therefore, two factors are important in validating clustering approaches a) Assess
the clustering tendency before the analysis b) validate the quality of the clustering results."

Please provide any other comments and/or your list of questions to be answered by the candidate.
Referring to Page 3 (18 of 129), it says "We use a run-time analysis approach over static code analysis because these faults surface at run-time." Why it is a static code analysis to detect the faults at run-time?

Referring to Page 103 (118 of 129), it says "However, we do believe our dataset can be extended by executing some concurrent example codes with faults in them."

THESIS DEFENCE EXAMINER REPORT: Outstanding Thesis Award

At Ontario Tech University in the School of Graduate and Postdoctoral Studies, we have a thesis award that is implemented. A recommendation for award can be made if the examiner deems that the thesis is outstanding.
An examiner can also consider the following criteria for an Outstanding Thesis:

- The scholarly accomplishments that have arisen from the thesis research. This can include peer-reviewed articles, research monographs, patents and other creative works.
- The significance of any research breakthrough or major advance made by the nominee's thesis research.
- Awards and other forms of recognition for research accomplishments by professional societies.
- The current and future impact of the thesis research on society.

**For further Thesis Award information,
please click here.**

**Having reviewed the Thesis Award
criteria, I would like to nominate the**

candidate for a thesis award at this time: No

By adding my signature/initials, I certify that all information on this form, including my recommendation and report, is complete.

Today's Date   Jan 24, 2022

Personal information on this form is collected under the authority of the University of Ontario Institute of Technology Act, SO 2002, c. 8, Sch. O. and will be collected, protected, used, disclosed and retained in compliance with Ontario's Freedom of Information and Protection of Privacy Act R.S.O. 1990, c. F.31. This information will be used to administer Graduate Research Assistantships. Questions regarding the collection of your personal information may be directed to the School of Graduate and Postdoctoral Studies, University of Ontario Institute of Technology, 2000 Simcoe Street North, Oshawa, ON L1G 0C5, 905.721.8668, ext. 6209 or by email at gradstudies@ontariotechu.ca.

SGPS Approval (OFFICE USE ONLY)

Dean of SGPS/Delegate Name   Jeremy Bradbury

Dean of SGPS/Delegate Signature

Approval Date   Jan 24, 2022