Carnegie Mellon University

For IRB Office Use
IRB: IRB No:_____
Rec'd:_____

REQUEST FOR IRB REVIEW OF EXEMPT RESEARCH INVOLVING HUMAN SUBJECTS

FOR PROTOCOLS INVOLVING ESTABLISHED OR COMMONLY ACCEPTED EDUCATION SETTINGS AND NORMAL EDUCATIONAL PRACTICES

45 CFR 46.101(b)(1)

Please complete this application as thoroughly as possible. Your application should include the following:

1. A copy of any recruitment documents (including advertisements, flyers, letters, invitations, email) to be used;
2. A copy of the training certificates for all individuals working on the research unless it is on file with the CMU IRB. Training is available at http://www.citiprogram.org. See the IRB website for details.
3. If the PI is a student, the faculty advisor must submit a Faculty Advisor Assurance Form.

Please email all documents to irb-review@andrew.cmu.edu. For assistance call CMU Research Compliance @ 412-268-5460 or email irb-review@andrew.cmu.edu. Additional information and templates are available at http://www.cmu.edu/osp/regulatory-compliance/human-subjects.html

1. Protocol		
Title: Landslide: Systematic testing of concurrency bugs as an educational tool in 15-410		
☐ This is a previously approved study that has lapsed.	Previous IRB No: HS	
2. Principal Investigator (PI)		
Name: Ben Blum	Department: CMU CSD	
Telephone: 412 304 4294	E-mail: bblum@cs.cmu.edu	Training Cert. ☒ Attached ☐ On File
☐ I am a student. If so, please provide information about your faculty advisor below.		
Faculty Advisor Name: Garth Gibson	E-mail:garth@cs.cmu.edu	Training Cert. ☒ Attached ☐ On File
If a student is the PI, the faculty advisor must complete and submit a Faculty Advisor Assurance Form.		
If there is someone other than PI to correspond with regarding this protocol, please list below.		
Contact Person Name:	Telephone:	E-mail:
Business Manager for your department:	E-mail:	
3. Co-investigators		
Name: David Eckhardt	E-mail: de0u@andrew.cmu.edu	Training Cert. ☒ Attached ☐ On File
Name:	E-mail:	Training Cert. ☐ Attached ☐ On File
Name:	E-mail:	Training Cert. ☐ Attached ☐ On File
Name:	E-mail:	Training Cert. ☐ Attached ☐ On File
Name:	E-mail:	Training Cert. ☐ Attached ☐ On File
4. Funding		
☐ Unfunded research	Sponsor/Source:	

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☐External Funding	SPEX Proposal #:
☒ Internal Funding	Oracle String:067029.005.000.270121.01
Grant Title: Parallel Data Laboratory Discretionary	

If you don't know the funding/grant information, please get it from your department's business manager.

5. Eligibility for Exempt Determination per 45 CFR 46.101(b)(1)

a. Where will the research activity take place *(check all that apply)*? ☒ Established educational setting ☒ Commonly accepted educational setting ☐ Other, please explain

b. What type(s) of activities will be used *(check all that apply)*? ☒ Research on regular and special education instructional strategies ☐ Research on the effectiveness of instructional techniques, curricula or classroom management methods ☒ Research comparing instructional techniques, curricula or classroom management methods.

If the research involves other activities, it is not eligible for this exemption. Do not proceed. Use the standard CMU IRB Application.

6. Protocol Description

Provide, in lay terms, a summary of your proposed study as outlined below. You may attach the protocol to this form if you like.

Purpose of the study. The study will focus on an alternative testing technique for finding bugs in student project implementations in 15-410. Normally 15-410 uses stress testing for finding concurrency errors, a particular class of bug. We will offer Landslide, a systematic testing tool we have built, to the students to use during the projects. This will be an opportunity to explore a new testing technique and to find and fix bugs in their code that would otherwise go undetected. We will collect reported time spent learning the tool, number and severity of bugs found, and survey students to evaluate Landslide's effectiveness.

Describe the research procedures (include the activity, location and time required of the participant).We wil provide the tool to students during the thread library project ("P2"), accompa nied by a brief user guide. Students will be able to use the tool on their own, from whatever location/time they prefer to work. We will ask the students to provide feedback on several questions as detailed on the attached survey document.

Who will be asked to participate? Students of 15-410, undergraduate operating systems, in spring 2015 and future semesters.

Will the research be conducted on the CMU campus? ☒ Yes ☐ No If no, please indicate the location(s):

Have you obtained permission to conduct the research there? ☐ Yes ☐ No

Please attach documentation of the site's agreement to the research.

7. Participants

Research including prisoners is not eligible for exempt status. Research with minors is only eligible if done in an educational setting or it is only observation of public behavior.

How many participants are needed for the study? Unknown, potentially 40-100 per year. Each semester of 15-410 has roughly 60-80 students; depending on the volunteer rate we will repeat the study across multiple semesters until we are satisfied with the sample size.

What is the age range of participants in the proposed study? 18-30

What will the ratio of males to females be? 85% male (expected based on average gender ratio of students in the computer science department)

What percentage will be from minority groups? Unknown

Please list inclusion and exclusion criteria: Participants will be selected from an upper-level computer science collegiate course, the students of which are chiefly male and Caucasian, Chinese, and Indian. We will not target any particular group within the student population of 15-

410.

8. Participant Recruitment

Describe how participant recruitment will be performed. Include how and by whom potential participants are introduced to the study*).* We will give a guest lecture in class to introduce the res earch topic and the study shortly before the study begins. We will also send an email to the class mailing list announcing the study, for the sake of any students who missed lecture. In both cases, this advertisement will be done by Ben Blum (the PI) alone, who is not affiliated with the current 15-410 semester (although he has been a TA in the past), who will stress during the lecture and in the email that participation is optional. David Eckhardt, the course instructor, will make no endorsement of the study other than introducing Ben at the start of the lecture.

Check all boxes below that apply.

☐ CMU directory	☐ Postings, Flyers	☐ Radio, TV

☒ E-mail solicitation Indicate how the email addresses are obtained:David Eckhardt will create an anonymous email list consisting of all the students' emails (which he gets from the class roster), and Ben will send mail to that list, having no access himself to each student's email address (until they reply directly to him to volunteer).

☐ Web-based solicitation. Specify sites:

☐ Participant Pool. Specify what pool:

☒ Other, please specify:Guest lecture during class

Please attach any recruiting materials you plan to use and the text of e-mail or web-based solicitations you will use.

9. Participant Compensation and Costs

Are participants to be compensated for the study? ☐ Yes ☒ No If yes, what is the amount, type and source of funds?

Amount**:**	Source:	Type:

Will participants who are students be offered class credit?	☐ Yes ☒ No ☐ NA

Are other inducements planned to recruit participants? ☒ Yes ☐ No If yes, please describe. Duri ng the guest lecture we will encourage students to participate on the grounds that it may help them find bugs in their code and improve their grade.

Are there any costs to participants? ☐ Yes ☒ No If yes, please explain.

10. Risks and Benefits

Will participants receive intangible benefit from the study?	☒ Yes ☐ No

Discuss the direct and indirect benefits to participants. If the tool works as intended, it will provide an educational experience to the students they might not otherwise get from using conventional stress testing.

Discuss the risks to participants. If the tool fails to provide any benefit over conventional stress testing, for example by producing confusing or misleading error reports, it will consume time that the students would otherwise have to work on the projects normally.

Discuss how any risks will be managed and/or minimized. We have designed the tool to require as little manual effort as possible on the part of the student. We expect that using the tool will be no more difficult or time-intensive than using the conventional stress-testing framework.

If deception is involved, please explain.No deception

Discuss the benefits and risks to participants and how any risks will be managed. Describe how confidentiality will be protected.

11. Confidentiality and Data Security

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Will personal identifiers be collected? ☒ Yes ☐ No	Will identifiers be translated to a code? ☒ Yes ☐ No

Will recordings be made (audio, video)? ☐ Yes ☒ No If yes, please describe. Log files will be collected consisting of commands issued by the students and resulting bug reports generated. No audio or video of the students will be taken.

Who will have access to data (surveys, questionnaires, recordings, interview records, etc.)? Only Ben Blum (PI) and Garth Gibson (advisor). As Dave Eckhardt is the course instructor, he will not have access to any such data until after final grades for the semester are submitted.

Describe how you will protect participant confidentiality and secure research records. Electronic results will be stored on AFS space accessible only to Ben and Garth. Student surveys will be transcribed to a computer copy, likewise in AFS, and then the paper copy will be destroyed.

Describe your process for monitoring data to ensure that study goals are met. (Review of lab notebooks, meetings to review data, etc.) We will hold regular advisor meetings during the study to review the data.

12. Conflict of Interest

Do you or any individual who is associated with or responsible for the design, the conduct of or the reporting of this research have an economic or financial interest in, or act as an officer or director for any outside entity whose interests could reasonably appear to be affected by this research project: ☐ Yes ☒ No

If yes, please provide detailed information to permit the IRB to determine if such involvement should be disclosed to potential research subjects.

13. Cooperating Institutions

Is this research being done in cooperation with any institutions, individuals or organizations not affiliated with CMU? ☐ Yes ☒ No If yes, please list.

Have you received IRB approval from another IRB for this study? ☐ Yes ☒ No ☐ Pending

If yes, please attach a copy of the IRB approval.

If applicable, please provide the name(s) and address(es) or all officials authorizing to access human subjects in cooperating institutions not affiliated with CMU.

Please attach documentation of approval.

Principal Investigator's Assurance Statement for Using Human Subjects in Research

I certify that the information provided in this IRB application is complete and accurate.

I understand that as Principal Investigator, I have ultimate responsibility for the conduct of IRB approved studies, the ethical performance of protocols, the protection of the rights and welfare of human participants, and strict adherence to the studies protocol and any stipulations imposed by Carnegie Mellon University Institutional Review Board.

I understand that it is my responsibility to ensure that the human participant' involvement as described in the funding proposal(s) is consistent in principle, to that contained in the IRB application. I will submit modifications and/or changes to the IRB as necessary.

I agree to comply with all Carnegie Mellon University policies and procedures, as well as with all applicable federal, state, and local laws, regarding the protection of human participants in research, including, but not limited to:

- Ensuring all investigators and key study personnel have completed human subjects training program;

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- Ensuring protocols are conducted by qualified personnel following the approved IRB application;
- Implementing no changes in approved IRB applications without prior IRB approval in accordance with CMU IRB policy (except in an emergency, if necessary to safeguard the well-being of a human participant, and will report to the IRB within 1 day of such change);
- Informing participants of any relevant new information regarding their participation in the research that becomes available.
- Promptly reporting to the IRB any new information involving risks to research participants, including reporting to the IRB, Data Safety and Monitoring Boards, sponsors and appropriate federal agencies any adverse experiences and all unanticipated problems involving risks to human subjects or others that occur in the course of the research.
- If unavailable to conduct research personally, as when on sabbatical leave or vacation, arrangements for another investigator to assume direct responsibility for studies will be made through modification requests to the IRB;
- Promptly providing the IRB with any information requested relative to protocols;
- Promptly and completely complying with IRB decisions to suspend or withdraw approval for projects;
- Obtaining Continuing Review approval prior to the date the approval for a study expires (approval for the study will automatically expire);
- Maintaining accurate and complete research records, including, but not limited to, all informed consent documents for 3 years from the date of study completion;
- Informing the CMU IRB of all locations in which human participants will be recruited for protocols and being responsible for obtaining and maintaining current IRB approvals/letters of cooperation when applicable;
- Complying with federal, state and local laws and regulations and sponsor terms and conditions; and
- Complying with CMU policies on the responsible conduct of research.

Ben Blum 2015/01/15

Principal Investigator Name and Signature Date

NOTE: If emailed from the PI's CMU e-mail account a hand written signature is not needed. Please type in name and date above.

If the PI is a student, the faculty advisor must submit a Faculty Advisor Assurance Form.

Please submit to irb-review@andrew.cmu.edu

Note: Links to the policies and Federal regulations for the protection of human research subjects (including the Code of Federal Regulations [.CF.R.] Title 45 CFR Part 46, and Title 21 C.F.R. parts 50 and 56) are available on the IRB web page (http://www.cmu.edu/provost/spon-res/compliance/hs.htm).

Comments: