

Regulated Research Institutional/Industrial Setting Form (1C)

This form must be completed AFTER experimentation by the adult supervising the student research conducted in a regulated research institution, industrial setting or any work site other than home, school or field.

Student's Name(s) Abdullah B. Nauman

Title of Project Mitigating Communication Bottlenecks in MPI-Based Distributed Learning

To be completed by the Supervising Adult in the Setting (NOT the Student(s)) after experimentation:

(Responses must be on the form as it is required to be displayed at student's project booth; please do not print double-sided.)

The student(s) conducted research at my work site:

1. Did you or your proxy (e.g. graduate student, postdoc, employee) mentor or provide substantial guidance to the student researcher?

☒ Yes ☐ No

a. If no, describe your and/or your institution's role with the student researcher and his/her project (e.g. supervised use of equipment on site without ongoing mentorship and sign below.

b. If yes, complete questions 2 -5.

2. Is the student's research project a subset of your ongoing research or work?

☐ Yes ☒ No

Use questions 3, 4 and 5 to detail how the student's project was similar and/or different from ongoing research or work at your site.

3. Describe the independence and creativity with which the student:

a. developed the hypotheses or engineering goals for the research project

I helped the student identify the MPI Learn framework and introduced him to the fundamentals of distributed machine learning models. We developed the hypothesis and engineering goals for the project together in a meeting.

We discussed different ways to mitigate the communication bottlenecks and developed a plan for implementing solutions to improve communication.

b. designed the methodology for his/her research project

The student designed and outlined a methodology and checkpoints for his research project. Afterwards, I provided him guidance on how to carry out the experiment. The student and I met regularly to discuss his progress and consider possible changes to the experiment or procedure.

c. analyzed and interpreted data

The student independently collected data on Brookhaven Lab's computational cluster and drew the appropriate graphs and conclusions. I discussed with him the different ways to analyze this data in the context of distributed machine learning. I collected the data from the Summit supercomputer at Oak Ridge National Laboratory for the student's experiment.

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4. Detail the student's role in conducting the research (e.g. data collection, specific procedures performed). Differentiate what the student observed and what the student actually did.

The student worked on an independent research project separate from my ongoing work. He implemented solutions in the Python language, ran jobs on Brookhaven Lab's computational clusters, collected and analyzed this data to draw conclusions, and towards the end, compiled his findings in a poster and research paper.

Throughout this process, I met with the student regularly to teach him relevant concepts, guide him through the experiment, and help with problems in his code and with collecting data on the computational clusters. I helped him obtain an account on Brookhaven Lab's computational cluster and receive the appropriate resources to carry out his experiment.

The student did not collect data on the Summit supercomputer. I collected the data to be used in the student's experiment.

5. Did the student(s) work on the project as part of a group?
If yes, how many individuals were in the group and who were they (e.g. high school students, graduate students, faculty, professional researchers)?

☐ Yes ☒ No

I attest that the student has conducted the work as indicated above and that any required review and approval by institutional regulatory board (IRB/IACUC/IBC) has been obtained. Copies are attached if applicable.

I further acknowledge that the student will be presenting this work publicly in competition and I have communicated with the student research regarding any requirements for my review and/or restrictions of what is publicized.

Abid Malik
Supervising Adult's Printed Name

[Signature]
Signature

Sr. Technology
1/24/20 Engr.
Title

Brookhaven National Laboratory

Institution

Upton, NY

Address

1/24/20

Date Signed (must be after experimentation) (mm/dd/yy)

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