

Postgraduate Seminar Series

Venue: Graduate Seminar Room

Date & Time: July 06, 2024 at 2:30 pm

Speaker Information

Mohammad Tawhidul Hasan Bhuiyan (Student No. 0421052018) is a part-time M.Sc. student in the Department of Computer Science and Engineering (CSE) at the Bangladesh University of Engineering and Technology (BUET). He earned his undergraduate degree from BUET in 2021. His research interests encompass Programming Languages and Systems, as well as Algorithms. He is currently pursuing his postgraduate thesis under the guidance of Prof. M. Sohel Rahman. In this talk, he will discuss his ongoing research.



An efficient approach for parallelization recommendation for python programs

With the increasing prevalence of parallel computing in modern hardware, optimizing applications to leverage parallelism has become crucial for enhancing performance. Python, known for its ease of development, faces challenges in parallelization due to the Global Interpreter Lock (GIL), necessitating workarounds through compiled languages or specialized libraries like Ray, Dask, and Joblib. While existing automatic parallelization tools primarily focus on libraries such as NumPy, they fall short in addressing Python's advanced features and dynamic nature. This thesis aims to develop a methodology for dynamically analyzing Python programs to identify dependencies and generate parallelization recommendations that match the performance of expert-written code. The proposed solution involves creating a tracer to log execution time, memory footprint, and variable interactions, constructing a dependency graph to guide parallel task assignments, and developing a program rewriter to apply these recommendations. Our system has been tested on various programs, demonstrating its ability to accurately identify dependency graphs for complex codebases and generate recommendations that maintain the integrity of the original source code while minimizing execution time.