Pratyush Das

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- *GitHub*   https://github.com/reikdas

Education

Purdue University   August, 2021 -
PhD in Computer Science (Advisor - Professor Tiark Rompf). GPA: 3.77/4.0
  Research interests - Generative programming, Automatic parallelization, Static analysis

Institute of Engineering & Management, Kolkata (MAKAUT)   August, 2017 - May, 2021
Bachelor of Technology in Computer Science and Engineering. CGPA: 8.89/10
  Awarded the Director's Award for Best Scientific Mind

Internships

Google Summer of Code - Student   June, 2021 - August, 2021
The LLVM Compiler Infrastructure Organization
  Supervisors - William Moses (MIT), Dr. Johannes Doerfert (Argonne National Laboratory)
- Enzyme: LLVM Pass to perform automatic differentiation of statically analyzable LLVM IR
    - Integrated custom derivatives of BLAS functions into Enzyme.
    - Wrote an LLVM pass to inline function definitions from bitcode files into LLVM IR.

IRIS-HEP - Fellow   June, 2020 - September, 2020
  Supervisor - Dr. Jim Pivarski (Princeton University)
- Awkward Array: Library for nested, variable-sized data using NumPy-like idioms
    - Created a source to source compiler to generate equivalent Python for a subset of C++.
    - Created a property based testing framework.
    - Created a source to source compiler to generate equivalent parallel CUDA from specification (Python and type info).

IRIS-HEP and DIANA-HEP - Fellow   June, 2018 - September, 2018; June, 2019 - September, 2019
Location: Fermi National Accelerator Laboratory, USA - LHC Physics Centre
  Supervisor - Dr. Jim Pivarski (Princeton University)
- Uproot: Python implementation of ROOT I/O, an open source file format storing over an exabyte of HEP data
    - Enabled writing fundamental HEP data structures like TTrees and histograms to ROOT files.
    - Uproot has become one of the most widely used HEP libraries.

Other Open Source Contributions

Supervisors - Dr. Nikos Vasilakis (MIT), Konstantinos Kallas (UPenn)   February, 2022 - July, 2022
- **PaSh**: A system for parallelizing POSIX shell scripts
    - Helped extend PaSh for distributed file systems (HDFS)

Supervisor - Dr. Vassil Vassilev (Princeton University)   November, 2019 - May, 2021
- **ROOT**: An open-source data analysis framework storing over an exabyte of data
    - Improvements to interpreter (rootcling)
- **Cling**: Interactive C++ interpreter built on top of Clang
    - Maintained cpt.py installer and packager
- **Clang**: C language family frontend for LLVM
    - Several patches to print type information of C++ template arguments

Supervisor - Dr. Jim Pivarski (Princeton University)   January, 2021 - February, 2021
- **Awkward Array** - Library for nested, variable-sized data using NumPy-like idioms
    - Created a parser for Awkward Array's type system

Supervisors - Dr. Jim Pivarski (Princeton University), Dr. Viktor Khristenko (CERN)   June, 2017 - August, 2017
- **spark-root** - Apache Spark datasource for ROOT
    - Separated spark bindings from TTree reading code
- **root4j** - Java implementation of ROOT file reader
    - Optimized codebase to facilitate interoperability

Teaching Experience

- **CS 354: Operating Systems** - Purdue University   Fall 2022
- **CS 240: Programming in C** - Purdue University   Fall 2021, Spring 2022

Programming Languages and Tools

Experienced: Python, C, CUDA
Familiar: C++, Java, Scala, Coq, ROOT, Bash, LaTeX, Swift

Summer Schools

Oregon Programming Languages Summer School - University of Oregon	2021
Computational and Data Science for High Energy Physics - Princeton University	2019

Publications

- J.Pivarski, I.Osborne, **P.Das**, D.Lange, P.Elmer, "AwkwardForth: accelerating Uproot with an internal DSL", 25th International Conference on Computing in High-Energy and Nuclear Physics (vCHEP, 2021), DOI: 10.1051/epjconf/202125103002. 2021
- J.Pivarski, I.Osborne, **P.Das**, A.Biswas, P.Elmer, "Awkward Array: JSON-like data, NumPy-like idioms", Proceedings of the 19th Python in Science Conference (SciPy USA, 2020), Pages 68-74, DOI: 10.25080/Majora-342d178e-00b. 2020
- E.Rodrigues, et al., "The Scikit HEP Project - overview and prospects", Proceedings of the 24th International Conference on Computing in High Energy and Nuclear Physics (CHEP 2019), DOI: 10.1051/epjconf/202024506028. 2020
- N.Saha, **P.Das**, H.N.Saha, "Authorship Attribution of Short Texts using a Multi Layer Perceptron", International Journal of Applied Pattern Recognition, 2018 Vol. 5 No. 3, Pages 251-259, DOI: 10.1504/IJAPR.2018.10016100. 2018

Drafts

- T.Mustafa, K.Kallas, **P.Das**, N.Vasilakis, "DiSh: Dynamic Shell-Script Distribution" *(Submitted to NSDI 2023)*.

Invited talks at Conferences

- GSoC Experience - Enzyme (LLVM Developers' Meeting) 2021
- Python in High Energy Physics (SciPy India, PyCon USA) 2019, 2020
- Writing files with uproot (PyHEP) 2019
- Writing files with uproot (ROOT Users' Workshop) 2018

Invited talks at External Research Group Meetings

- Language Transformations for the Awkward Array library (IRIS-HEP Fellow Presentations) 2020
- CUDA backend for the Awkward Array project (Princeton University Liberty Research Group) 2020
- Writing TTrees with uproot (IRIS-HEP Topical Meeting: Summer student project presentations) 2019
- Writing files with uproot (DIANA Meeting: Updates on ROOT I/O) 2018
- Separation of Concerns - Refactoring code between ROOT4J and Spark-Root (CMS Big Data Science, DIANA-HEP) 2017