Maaz Bin Safeer Ahmad

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EDUCATION

University of Washington, Seattle, Washington, USA

Doctor of Philosophy (Ph.D.) in Computer Science & Engineering — Aug 2014 – Present

- Advised by Dr. Alvin Cheung
- Research areas: Programming Systems

National University of Computer & Emerging Sciences, Lahore, Punjab, Pakistan

Bachelor of Science (B.S.) *cum laude* in Computer Science — Aug 2010 – Jul 2014

- Thesis adviser: Dr. Kashif Zafar
- Awarded the University Silver Medal

RESEARCH EXPERIENCE

University of Washington, Seattle, USA

Ph.D. Student in Paul Allen School of Computer Science & Engineering — Aug 2014 – Present

- Advised by Dr. Alvin Cheung
- Research areas: Program Synthesis, Compilers, DSLs
- Projects:
  - ***Rake:*** A new methodology that uses program-synthesis to guide code-generation for complex ISAs such as the Hexagon HVX vector instructions.
  - ***Casper:*** A compiler that uses program synthesis and verification to automatically expose data-parallelism in Java applications by transforming sequential loop nests to high-level MapReduce APIs, such as Apache Spark.
  - ***MetaLift:*** A framework for building compilers that target domain-specific languages (DSLs). Unlike traditional syntax-driven compilers, which rely on pre-defined rules, compiles generated using MetaLift perform *Verified Lifting* (a combination of program synthesis and verification).
  - ***Poçar:*** A tool that synthesizes parameteric CAD models for 3D objects from a small set of example configurations.
  - ***GraSSP:*** A novel approach for automatic parallelization of single-pass array-processing programs with possible data-dependencies.

Intel, Hillsboro, USA — Jun 2019 – Sep 2019

Research Intern in the Software Path-finding Group

- Supervised by Adam Herr
- Collaborators: Dr. Justin Gottschlich and Derek Gerstmann
- Research areas: Machine Programming, Program Synthesis, AI
- ***Intentional Programming:*** Developed a proof-of-concept compiler that uses program synthesis to automatically optimize imperative *intentional* C++ code, i.e. code lacking any performance optimizations, by lifting the original code to domain-specific languages, such as Halide.

Adobe Research, Cambridge, USA — Jul 2017 – Dec 2017

Research Intern in Creative Technologies Lab

- Supervised by Dr. Shoaib Kamil
- Collaborators: Dr. Alvin Cheung and Dr. Jonathan Ragan-Kelley
- Research areas: Program Synthesis, Image Processing, Compilers
- **Dexter:** A compiler that uses program synthesis and verification to rejuvenate legacy image-processing libraries by translating individual kernels, written in C++, to the Halide DSL.

Information Technology University, Lahore, Pakistan — Jun 2012 – Jul 2014

Research Assistant in NEWT Lab

- Advised by Dr. Umar Saif and Dr. Lakshminarayanan Subramanian
- Research areas: Computing for Development, Disease Surveillance
- ***DengueBreaks:*** A system for early detection of dengue outbreaks in Punjab, Pakistan. It leverages alternate data sources such as online news articles to automatically generate outbreak predictions.

SOFTWARE DEVELOPMENT EXPERIENCE

Tableau Software, Kirkland, USA

Software Engineer Intern in Data Management Team — Summer 2015

- Supervised by Dr. Spiro Michaylov and Dr. Kate Morris
- Implemented a new feature in the Tableau Data Engine to improve the incremental extract refresh process for time-window extracts.

PUBLICATIONS

[1] M. B. S. Ahmad, J. Ragan-Kelley, A. Cheung and Shoaib Kamil, "Automatically Translating Image Processing Libraries to Halide," *SIGGRAPH Asia 2019*

[2] M. B. S. Ahmad and A. Cheung, "Automatically Leveraging MapReduce Frameworks for Data-Intensive Applications," *SIGMOD 2018*

[3] M. B. S. Ahmad and A. Cheung, "Optimizing Data-Intensive Applications Automatically By Leveraging Parallel Data Processing Frameworks," *SIGMOD 2017 (Demo)*. **Honourable Mention for Best Demo Award**.

[4] G. Fedyukovich, M. B. S. Ahmad and R. Bodik, "Gradual Synthesis for Static Parallelization of Single-Pass Array-Processing Programs," *PLDI 2017*.

[5] M. B. S. Ahmad and A. Cheung, "Leveraging Parallel Data Processing Frameworks with Verified Lifting," *SYNT 2016 (Co-located with CAV 2016)*. **Best Student Paper Award**.

[6] T. Ahmad, N. A. Rehman, F. Pervaiz, S. Kalyanaraman, M. B. S. Ahmad, S. Chakraborty, L. Subramanian, U. Saif, "Characterizing dengue spread and severity using internet media sources," *ACM DEV 2013*.

TEACHING EXPERIENCE

University of Washington, Seattle, USA

Teaching Assistant

- CSE 402: Design and Implementation of DSLs. Taught by Ras Bodik. — Spring 2019
- CSE 401: Compiler Construction. Taught by Ras Bodik and Alvin Cheung. — Winter 2016

Undergraduate Tutor (Volunteer)

- CSE 344: Database Systems. Taught by Alvin Cheung. — Winter 2017

National University of Computer & Emerging Sciences, Lahore, Pakistan

Teaching Assistant

- CS 211: Discrete Structures. Taught by Sarfraz Raza. — Fall 2013
- CS 103: Computer Programming. Taught by Sarim Baig. — Spring 2013

PROFESSIONAL ACTIVITIES

ACM 5th Symposium on Computing for Development, San Jose, USA — 2015
Student Volunteer

Pakistan-ICTD Workshop, Lahore, Pakistan — 2014
Student Volunteer

SOFTEC, Lahore, Pakistan — 2013
IT Team Head

ACADEMIC AWARDS

Student Travel Award, SYNT 2016
Funding to attend and present at the SYNT Workshop.

University Silver Medal, NUCES
For outstanding academic performance.

Dean's List, Fall 2010 through Spring 2014, NUCES
For attaining a semester GPA of at least 3.50.

Intra-FAST Annual Speed Programming Competition, NUCES
First prize in year 2011, 2012 and 2013

LANGUAGES

English: Fluent (speaking, reading, writing).

Urdu: Fluent (speaking, reading, writing).

[*CV compiled on 2020-08-13*]