Xilun Wu

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RESEARCH INTEREST

Xilun is a sixth-year PhD student in Computer Science at Purdue University. His main research interest sits at exploring the intersection of programming languages and multiple application domains including data management and machine learning. Most of his projects are aimed at bringing high-level language features such as code reuse, abstractions, and modularity to system programming without losing performance with compiler techniques. He is also interested in type theory and category theory.

EDUCATION

- **Purdue University, West Lafayette, USA**
  PhD Candidate, Computer Science   2015-Present

- **Zhejiang University, Hangzhou, China**
  BS, Computer Science and Technology   2014

INDUSTRY EXPERIENCE

- **Software Engineer Intern, Facebook, Menlo Park, USA**   **Summer 2019**
  Involved in the technical design of introducing self-types to Hack language to support Cake Pattern and unify the handling of class, interface, and trait in type checking. Implemented this feature in Hack type checker.

ACADEMY EXPERIENCE

- **PhD Candidate, Purdue University, West Lafayette, USA**

  2015-2020

  Has been under supervision of Tiark Rompf as a member of Tiark Rompf research group. Conducted multiple research projects in team. They which include:

  - Investigated the practicality of extending the mechanized foundations for Scala and similar languages with full dependent types.

  - Implemented a machine learning framework in Scala powered by fusing delimited continuation and multi-staging together.

- Implemented a novel multi-way join algorithm Leapfrog Trie Join (a variation of NPRR).

- **Research Assistant, Purdue University, West Lafayette, USA**   **Summer 2018**
  - Implemented a certain compiler features in the framework of LLVM which primarily are adding optimization annotations/directives in a certain category of high-level programs (grid-based programs in C/C++) to guide the compiler backend to perform auto-parallelization as source-to-source code transformations.

- **Research Assistant, Purdue University, West Lafayette, USA**   **2015-2017**
  - Implemented a novel multi-way join algorithm Leapfrog Trie Join (a variation of NPRR) and compared it to other state-of-the-art in-memory database systems on TPC-H benchmark.

- **Teaching Assistant, Purdue University, West Lafayette, USA**   **2017-2020**
  - CS35400 Operating Systems   Fall 2020

  - CS52500 Parallel Computing   Spring 2020

  - CS35400 Operating Systems   Fall 2019

  - CS25200 Systems Programming   June 2017 -May 2019

  - CS35200 Compilers: Principles And Practice   Spring 2017

- **Master Student, Purdue University, West Lafayette, USA**   **2014-2015**

PAST PROJECTS

- **Lantern:** an expressive and performant deep learning framework
  - Demystifying differentiable programming: Shift/reset the penultimate backpropagator. **ICFP'19**

  - Backpropagation with Callbacks: Foundations for Efficient and Expressive Differentiable Programming. **NeurIPS'18**

- **LMS-NPRR:** native query compilation with an efficient NPRR join algorithm implementation in single-core in-memory setting
  - Compiling Graph Queries in Relational Engines. **DBPL'19**

- **Extending DOT:** investigating the practicality of extending the mechanized foundations for Scala and similar languages with full dependent types
  - Towards Full Dependent Types in DOT/Scala. Poster presentation on PurPL Grad Visit Day 2020.

PRESENTATIONS

1. Poster presentation. Towards Full Dependent Types in DOT/Scala. PurPL Grad Visit Day 2020, West Lafayette IN, USA.

2. Poster presentation. Backpropagation with Callbacks: Foundations for Efficient and Expressive Differentiable Programming. **NeurIPS'18**, Montreal, Canada.

3. Poster presentation. A Language and Compiler View on Differentiable Programming. Huawei Midwest Research Summit 2018, Champaign IL, USA.

AWARDS

- **Distinguished Artifact Award** at OOPSLA 2016 (international conference), Leo Osvald, Grégory Essertel, **Xilun Wu**, Lilliam I. Gonzalez Alayon, Tiark Rompf.

PUBLICATIONS

1. Fei Wang, Daniel Zheng, James Decker, **Xilun Wu**, Grégory M Essertel, Tiark Rompf. Demystifying differentiable programming: Shift/reset the penultimate backpropagator. ICFP 2019, 31 pages.

2. Ruby Tahboub, **Xilun Wu**, Grégory Essertel, Tiark Rompf. Compiling Graph Queries in Relational Engines. DBPL 2019, 12 pages.

3. Fei Wang, James Decker, **Xilun Wu**, Grégory Essertel, Tiark Rompf. Backpropagation with Continuation Callbacks: Towards Efficient and Expressive Differentiable Programming. NeurIPS 2018, 12 pages.

4. Leo Osvald, Grégory Essertel, **Xilun Wu**, Lilliam I. Gonzalez Alayon, Tiark Rompf. Gentrification gone too far? affordable 2nd-class values for fun and (co-)effect. OOPSLA 2016, 18 page. **(Distinguished Artifact Award)**

TEACHING

Xilun has rich experience in instructing undergrad and graduate level courses in Computer Science. The tasks performed as Teaching Assistant include organizing course materials, designing coding assignments, providing appropriate assistance and evaluating students' performance. The courses he has instructed as Teaching Assistant include:

- Parallel Systems (Graduate)
- Operating Systems (Undergrad)
- Systems Programming (Undergrad)
- Compilers: Principles And Practice (Undergrad)

COURSES TAKEN

Theory Courses:
- Algorithm Design Analytics and Implementation   CS58000
- Linear Algebra   MA51100
- Numerical Linear Algebra   CS51500

Systems Courses:
- Compiler & Programming Systems   CS50200
- Operating Systems   CS50300
- Parallel Computing   CS52500
- Database Systems   CS54100
- Programming Languages   CS56500

Statistical CS Courses:
- Data Mining   CS57300

Research Seminars:
- Graph Data Management   CS59000
- Fault Tolerant Computer Systems Design   CS59000
- Language-Based Systems Security   CS59000
- Computer-aided Program Reasoning   CS59000
- Deep Learning and System Reasoning   CS59000

Communication:
- Effective Teaching In CS   CS59100
- Classroom Communication English as a Second Language for TAs
         ENGL62000
- Written Communication English as a Second Language Graduates   ENGL62100