

Zhongrui Chen

Education

- 2022–present **University of North Carolina at Chapel Hill**,
Ph.D. Computer Science, advisor: Benjamin Berg
- 2018–2022 **University of North Carolina at Chapel Hill**,
B.S. Computer Science, B.S. Mathematics

Research Interests

Stochastic Modeling, Queueing Theory, Scheduling, Caching

Publications

- 04.2024 **Simple Policies for Multiresource Job Scheduling**, *MAMA. SIGMETRICS Performance Evaluations Review 2024*
Zhongrui Chen, Isaac Grosf, Benjamin Berg

Research Experience

- 08.2022– Present **Graduate Research Assistant**, *advised by Benjamin Berg*
- Analyzing delay of low-complexity and throughput-optimal virtual machine scheduling algorithms.
 - Development of Lyapunov drift arguments to analyze stability and delay in virtual machine scheduling algorithms.
 - Create discrete event simulations to evaluate throughput and delay under various scheduling policies.
 - Also studied resource allocation in open-source ClickHouse database.
- 08.2021– 05.2022 **Undergraduate Honors Thesis**, *advised by Praneeth Chakravarthula*
- Implemented numerical methods to reason dynamical systems from limited observations.
 - Experimented with physics-aware video interpolation and extrapolation.
 - Coded physical simulators to generate dataset for learning.
- 01.2021– 06.2021 **Undergraduate Research Assistant**, *advised by Henry Fuchs under UNC Graphics & VR Group*
- Worked on reconstructing novel views from a single facial image input.
 - Implemented differentiable renderer and mesh fitting with PyTorch3d.
 - Contributed an variational autoencoder and texture decoder to reconstruct texture maps for novel views.
 - Identified the bottleneck, optimized the training pipeline, and fixed memory leaks. Prebuilt and prefetched the dataset and made training 10x faster.
- 08.2020– 12.2020 **Mentored Research**, *advised by Jasleen Kaur*
- Congestion Control: Past, Present and Future (Final Report)
- Generalized the limitations and contributions of the congestion control algorithms.
 - Dived into the theory that converts congestion control into a socially concave game.
 - Researched fairness and scavenger protocol in congestion control.

Teaching Experience

- Undergraduate Teaching Assistant COMP 572 Computational Photography, COMP 524 Programming Languages, COMP 521 Databases and COMP 411 Computer Organization.

Awards

- 05.2024 **SIGMETRICS 2024 Student Travel Grant**, \$1750

Class Projects

- 08.2020– **Lisp Interpreter**, *COMP 524 Programming Languages*
 12.2020
 - Coded a lisp interpreter in Java.
 - Implemented basic S-expression primitives, lists, atoms, logical operators and conditionals.
 - Implemented lambda function expressions, recursions, curry, and stringify.
- 01.2020– **64-bit JOS Kernel**, *COMP 790 OS Implementation*
 05.2020
 - Adapted from MIT 6.828, but in 64-bit version.
 - Implemented page translation, context switch, trap handler.
 - Implemented cooperative multitasking, Copy on Write (CoW), and Inter-Process Communication (IPC).
 - Supported pipe, redirection and basic shell functions.
 - Coded a network driver based on the Intel 82540EM chip.
- 01.2020– **Distributed Systems**, *COMP 533 Distributed Systems*
 05.2020
 - Used Java RMI, asynchronous RPC library, and NIO to enable process communication across multiple computers.
 - Implemented Paxos consensus algorithm to ensure consistency.
 - Connected to GUI to showcase state synchronization.
- 08.2019– **Basic Graphics Engine**, *COMP 475 Computer Graphics*
 12.2019
 - Implemented a C++ library that provides efficient APIs for geometric primitives, scan conversion, clipping, transformations, compositing, texture sampling, gradients, antialiasing, filtering, parametric curves, and geometric stroking.
 - Used Intel MMX features to accelerate vector operations.

Programming Languages

- Imperative C/C++, Rust, Java
- Functional Haskell, Lisp
- Scripting Python, JavaScript, Shell (and variants)
- Others \LaTeX , HTML5/CSS3, Matlab, Mathematica