Nanda Velugoti

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RESEARCH INTERESTS

My research interests revolve broadly around the area of Systems, especially Operating Systems, Distributed Systems, Virtual Machines and High Performance Computing. My research goal is to explore the Systems research and find novel insights and interesting problems to solve. I am currently involved in research on near data processing, aka Processing in Memory (PIM) systems (at Illinois Tech) and concurrency aware memory analysis on heterogeneous architectures (collaboration with PNNL).

EDUCATION

Illinois Institute of Technology **Aug. 2021 – Present**
PhD in Computer Science (Advisor: Dr. Kyle Hale) | ***GPA: 3.7*** *Chicago, Illinois, USA*

Illinois Institute of Technology **Aug. 2019 – June 2021**
Master of Science in Computer Science | ***GPA: 3.7*** *Chicago, Illinois, USA*

Lovely Professional University **Aug. 2013 – May 2017**
Bachelor of Technology in Computer Science and Engineering | ***CGPA: 9.1*** *Jhalandhar, Punjab, India*

EXPERIENCE

Pacific Northwest National Laboratory **June 2022 – Present**
PhD Intern *Chicago, USA*

- **Memory Analysis (*ongoing*):** Research on concurrency aware memory analysis of HPC workloads on emerging big.LITTLE like computer architectures. The goal here is to study/analyze how different parallel HPC workloads perform in heterogeneous cores with shared cache/memory hierarchies.

HExSA Lab at Illinois Tech **May 2020 – Present**
Research Assistant *Chicago, USA*

- **Provenance:** Implemented the debugger component, *provenance*, of the compiler based debugging and blending part of the Interweaving Project (interweaving.org). The goal of *provenance* is to parse a ELF binary to extract the function information based on the address ranges and provide that information to Nautilus Aerokernel runtime. It is implemented as a library where user can fetch relevant function information for a given address from the kernel's address space.
- **Processing-In-Memory (*ongoing*):** This is an ongoing research effort that focuses on the area of Processing-In-Memory, where the goal is to study how Stream Processing workloads effect the performance of applications that use Processing-In-Memory models. Currently working on building a QEMU based emulator for UPMEM chipset that can run DPU programs and a benchmarking suite to measure the performance of PIM based applications that have stream processing workloads compared to batch processing workloads.

Temenos (formerly, Kony Labs) **May 2017 – August 2019**
Software Development Engineer *Hyderabad, India*

- Worked as an Android and Windows cross-platform applications and API framework developer. Developed a JavaScript-based API framework with which mobile app developers can build cross-platform apps.
- Implemented cross-platform APIs for various features for both Android and Windows platforms (Windows 10/8.1/8/7 and Windows Phone 8/8.1) such as Speech to Text, i18n, Calendar, Contacts, Camera, Database, UI Containers, and Components, etc. Designed and implemented cross-platform Voice Assistants API framework that includes Microsoft's Cortana, Amazon's Alexa and Google Assistant.
- Resolved a major memory leak issue in the Windows API framework that was affecting almost all applications that were built using the same. Fixed numerous bugs ranging from UI issues to app functionality/behavior inconsistencies to i18n and locale-based problems.

Temenos (formerly, Kony Labs) **May 2016 – August 2017**
Associate Engineer (Intern) *Hyderabad, India*

- Designed and implemented a UI Automation framework for Windows Applications using Microsoft's CodedUI. This UI Automation framework had functionalities such as Recording, Playback, Capturing and Comparing results.
- Wrote Unit Tests for the Windows API framework to maintain code quality and stability.

PROJECTS

P2P Tasking Runtime | *Java* **November 2021**

- A platform independent tasking runtime, where tasks are defined using a Java "Taskable" interface which extends Runnable and Serializable interfaces. User can define their own tasks by just implementing the "Taskable" interface, which then can be scheduled to runtime for execution.
- Tasks are executed by nodes of a P2P network, where each node has the runtime and scheduler uses work stealing algorithm to distribute tasks among the nodes in the network. The information about the network is stored in a DHT.
- Github Repository: https://github.com/nandavelugoti/p2p-task-runtime

Remote Memory Pool | *C, Linux* **October 2021**

- A userspace memory management API that supports remote memory i.e., pages are offloaded to a remote machine instead of storing in local memory. Read/Write operations to these pages are translated to send/receive network calls to the remote machine.
- The underlying implementation uses Linux's userfaultfd interface that allows pagefaults to be handled at userspace. This is important because the remote pages can be accessed in the same way as local pages which provides transparency to users.
- Github Repository: https://github.com/nandavelugoti/rmpool

Critical Access | *Android SDK, Java* **March 2020**

- The Tech to Protect Challenge is a national open innovation contest designed to support the work of emergency responders, including EMS, firefighters, and law enforcement, by connecting with creative individuals and collaborating to create new technologies for the future of public safety communications.
- As part of a 3 member team, we designed and implemented a Missin Critical Push-to-Talk Android application, *Critical Access*, based on MCOP SDk. Our team received the winner prize money of $10,000 as part of the challenge.
- Github Repository: https://github.com/nandavelugoti/critical-access

SQLite Re-encryptor | *C* **January 2018**

- This is a tool that takes an arbitrary encrypted sqlite database and allows users to re-encrypt to any other supported encryption scheme. For example, a database encrypted with AES-128 scheme can be re-encrypt it with RSA-256 scheme with the help of this tool.
- This was built as part of Windows Team internal tooling at Kony while working as a Software Developer.

Watch Apps and Watch Faces for Pebble SmartWatch | *Pebble SDK, C* **July 2017**

- Developed a Watch app "Control Center" which enabled users to turn on/off various smartphone settings such as WiFi, Bluetooth, Airplane Mode, etc. This app supported both Android and iOS smartphones.
- Developed a Watch Face to "Ensemble" that displayed time, date, weather, battery status, and Bluetooth connection status. All apps and faces were developed using Pebble SDK - C APIs and JS scripts (for fetching weather info).
- Github Repository: https://github.com/nandavelugoti/PebbleDevelopment

AVR Controlled Line Follower Robot | *Embedded C, ATmega16 Micro-controller* **March 2015**

- As part of a 3 member team, we built a Line Follower Robot using AVR microcontroller (ATmega16) and embedded C. This project was a workshop/competition conducted by Technophilia at Lovely Professional University.
- We received first place in Zonal Level Competition at Lovely Professional University, Punjab and proceeded to receive Certificates of Merit, Honour, and Excellence in National Indo - US Robo League Competition by Technophilia at Indian Institute of Technology, Bombay.

AWARDS AND RECOGNITION

- Winner of NIST MCPTT Tech-to-Protect-Challenge with a prize money of $10,000, Chicago, USA (2020).
- Spot Award for stabilizing automation at Kony Labs, Hyderabad, India (2018).
- First Prize in Battle of the Bands at Daviet College, Jalandhar, India (2016).
- Volunteer Recognition Certificate by Lakshyam NGO, Delhi, India (2015).
- Runner UP in Limit Zero Fest in Lovely Professional University, Jalandhar, India (2015).
- Certificates of Merit, Honour and Excellence in National Indo - US Robo League Competition by Technophilia at IIT Bombay, India (2015).
- First place in Zonal Indo - US Robo League Competition by Technophilia at Lovely Professional University, Jalandhar, India (2015).

MISCELLANEOUS

- Worked as a part-time Student Assistant at Academic Technology Services, Illinois Tech
- Fluent in English, Telugu and Hindi languages