Meet Martin Kandes

Known as Marty to his colleagues, Dr. Martin Kandes is a computational and data science research specialist at SDSC. As part of the High-Performance Computing (HPC) User Services Group, Kandes helps manage user support services for Comet, SDSC’s $27-million supercomputer with over 40,000 unique users. He joined the Center in 2013 while obtaining his PhD from the Computational Science Research Center at San Diego State University. Kandes also holds a Master of Science degree in Physics from San Diego State University and Bachelor of Science degrees in both Applied Mathematics and Physics from the University of Michigan, Ann Arbor.

In his second year with the REHS program, Kandes is mentoring five students this summer.

Q: Can you describe your role at SDSC?

I work in the High-Performance Computing User Services Group, and there’s about five of us or so. We work really closely with the High-Performance Computing Systems team, which are the system administrators and engineers that actually run the supercomputers. Our group is more of the customer-facing side, so we are interacting with the researchers and scientists that are using the supercomputers. If they have any problems, or need help installing some software or debugging some code, we get those emails. I like to tell my mom that we’re the customer service for the PhDs.
Q: How did you come to join the Center, and what attracted you to work here?

If I dig really deep, it goes back to when I was looking at colleges, actually. I went around with my dad looking at a few different schools, and we stopped by UCSD for a visit. I remember looking at the Supercomputer Center and thinking, “Seems like a cool place to work one day.” I didn’t really believe I would be working here, but about five or six years ago, I was in grad school finishing my PhD and needed a job to pay the bills. I saw an opening in the Data Center Operations Group, which was watching the supercomputers at night, basically. Since I was over at San Diego State, this was close by. I started working nights while I was finishing school.

Q: How has your role at SDSC evolved since then?

I’ve had a few different roles since I arrived, including this one. There was one where I worked with Frank Würthwein, who runs the Distributed High-Throughput Computing Group here at SDSC. Instead of supercomputers, they have a grid computing system. He’s a physicist who works with the Large Hadron Collider, one of the detectors there, and so he helps run the computing infrastructure. We were working with the scientists to run all of their analysis on the physics data coming out of the LHC on the computing resources the projects had. That was more of a system administrative type of role.

Q: What motivated you to become a mentor in the REHS program?

When I’m not responding to emails with users and work like that, I always like having a few side projects for my free time, so I had a few that were relevant to our group and allowed me to do a little bit of math and programming at work when I was bored. I thought they would also be at the right level where I could bring in interns at the high school level, so it would be both helpful for me and interesting for them to learn. It’s a mutually beneficial relationship. One of the original problems — and we’re still working on it this year — was a machine learning project. You need to label a lot of data for a lot of these algorithms, so I thought, “Okay, we’ll get some smart high school students. They can do that, right?” But they got way further last year than I ever thought possible! It’s been a learning experience for them and me.

Q: What aspect of mentorship do you enjoy most?

When I was in grad school, I taught a lot of undergraduate physics labs. Going into it, the mindset was, “They’re paying me to go to school, this is part of my job,” but I enjoyed the teaching aspect of it more than I thought I would. It’s fun. On the research side of it, you have to explain what you want to do to other people and come up with a plan for them to help execute your ideas. It definitely helps me organize my thoughts and sort out my next steps, better than I would by myself.

Q: Finally, can you offer some advice to students who are seeking a career in your industry?

I think the two fundamental skills are programming and math. If you can master both of those together, you can do a huge variety of things in any science you’re interested in.
Q&A with Edward, Elisabeth, and Adithya

Edward Burns, Elisabeth Holm, and Adithya Rao are three of the five REHS students mentored by Dr. Kandes this summer. Edward is part of a two-person group on the project Analyzing the Scheduling Efficiency of a Batch Processing System, while Elisabeth and Adithya are working with a third REHS intern on Text Classification via Supervised Machine Learning for an Issue Tracking System. Each possesses a substantial background in computer science, as Edward works at a local software company; Elisabeth pursues the subject through advanced classes at school; and Adithya participates in the annual USA Computing Olympiad.

Q: Can you talk about what you’re working on right now?
Elisabeth: We’re trying to create our own versions of the Naive Bayes machine learning algorithm in order to classify text of errors that come in for the supercomputers.
Adithya: Right. Dr. Kandes found that a lot of the emails about a problem with Comet were quite similar and could be grouped into about 20 categories. He wanted to make a model which would read the message and give an appropriate first response to the client.
Edward: And I’m working on analyzing the scheduling efficiency of a batch job processor. When people request time on the supercomputer, it’s handled by a scheduler that runs a large optimization problem. We’ve found that many people over-request time and resources. They’re only charged what they actually use, but it slows the system down. My group has been comparing the time that is actually elapsed over jobs to the requested time. We’re also going to compare other datasets, such as wait time and requested versus elapsed CPU time. Hopefully we’ll be able to pick out certain trends and teach users how to use the supercomputer more efficiently.

Q: How is the experience of sharing an office with others?
Elisabeth: It’s nice to be able to talk with your coworkers immediately, especially to collaborate on a shared problem.
Adithya: Definitely, we can just look behind us and see if somebody else has a solution.

Q: What are the key adjustments in the transition from high school to working at SDSC?
Adithya: In high school, the schedule is built for you, with teachers holding you accountable. Here, you have to keep yourself disciplined — get the work done without goofing around, basically.
Edward: But all the work here is super interesting compared to much of what happens at school. It’s been a very enjoy-
Looking Back on 10 Years of REHS

Throughout its 10 years, the Research Experience for High School Students (REHS) program has grown in number of students, mentors, and research projects; duration of internship; and much more. However, its primary purpose, to expose students to a potential research or career interest through work with prestigious scientist and staff personnel, has never wavered.

In 2014, then-Torrey Pines High School student Natalie Kadonaga said, “After just one week into my internship, I have already become exposed to new ambitions for my future.”

Five years later, REHS continues to be an invaluable opportunity for students to determine their future. “I’ve never done anything this computer science-rigorous in a workforce setting,” said 2019 REHS student Adithya Rao. “I learned that I like it, and I’m looking to it as a career.”

The numbers back it up, too. Last year, REHS Data Science interns Mihir Gupta from Scripps High School and Andrew Liu from Del Norte High School conducted a study on REHS alumni from 2010 to 2017, investigating what universities they attended and how internships bore influence on their majors. Nearly 66% of respondents who attended college (those who did not attend college were all 17 years old) pursued Computer Science & Engineering as their undergraduate major. Although those who apply for this SDSC internship are often already involved with CSE in some capacity, these results confirmed the program’s effectiveness in either affirming or uncovering students’ passions for the field.