IBM Systems MEDIA

PSAI Equips Students With Tools and Connections for IT Innovation

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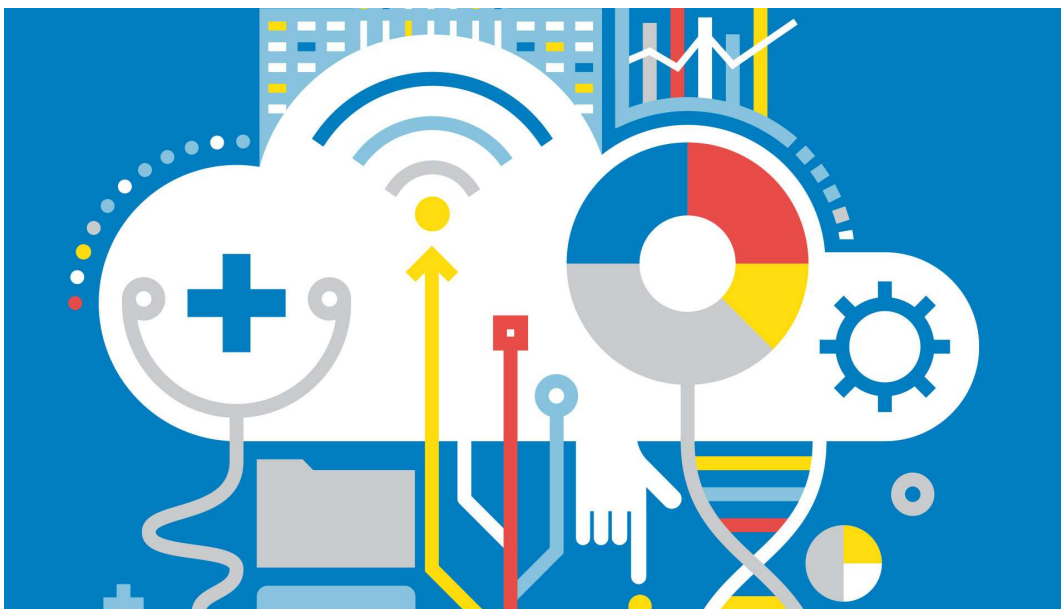

Image by Hey

By Holly Eamon

11/01/2018

The more technology advances, the more off-putting it can be to those outside of the industry. IBMer Terri Virnig understands this concept. "At times, it has been viewed as a somewhat cold discipline that's focused on people who are obsessed with the theory of what could be done in a somewhat artificial way," says Virnig, vice president, ecosystem and strategy, IBM Cognitive Systems. "But technology is our future and the next generation will drive this for us, whether it's improving quality of life by leveraging technology to create smarter cities or improving healthcare outcomes."

Access to Innovate

With support from the IBM Power Systems* Academic Initiative (PSAI), the new generation of problem-solvers is preparing to take the lead on creating the healthier, collaborative society it envisions through a more transparent use of technology.

PSAI equips educators, at no charge, with materials, technology and resources to teach Power Systems skills, including IBM courses, the Power Systems Academic Cloud and job boards. "We've been providing cloud environments to universities since before 'cloud' was a common term," Virnig says, adding that cloud capabilities have provided an added value for university partners—and in turn for the tech industry more broadly, with more skilled resources and innovative solutions emerging.

"Our goal is to provide students with a clear path to job opportunities with major clients around the world seeking Power Systems technology-based skills, as well as opportunities for students to engage with their peers to find new approaches to solving decades-long issues, leveraging state-of-the-art technology and artificial intelligence (AI) in ways that were unheard of a handful of years ago," Virnig adds.

Real-world Environment

Under the guidance of Wen-mei Hwu, co-director of the IBM-Illinois Center for Cognitive Computing Systems Research and professor of electrical and computer engineering at the University of Illinois at Urbana-Champaign, students are working on one such innovation: RAI, a tool that allows developers to create applications on their preferred development environment and conveniently test and deploy them in the cloud.

"IBM's advanced cloud hardware platforms are extremely valuable for machine learning and other AI applications, but many open-source developers and students don't have them in their development environment," Hwu says. "RAI builds the appropriate executable for these hardware types, runs the apps on the cloud server and streams the output back to the developer so they can immediately see the activity and output from the execution."

RAI was devised from a simple classroom need: Students learning to program advanced hardware systems were developing code on their laptops and desktops instead of working in the cloud environment they would be expected to use in jobs after college. "That's when we started to build different software tools to allow students to test their code on this real hardware without the traditional barriers," Hwu says.

Ph.D. student Abdul Dakkak developed the first version of RAI, used by more than 200 students. "We definitely had some issues along the way, but by and large, students really loved it," Hwu says, "so we started to refine it with enhancements that would make it useful to professional developers." An important benefit, he notes, is that RAI levels the playing field for all students. "It will help make sure students are competing with their talents and work rather than with resource availability."

Hwu has been involved with PSAI for nearly four years and appreciates its community environment that allows academic institutions to help one another learn and take advantage of new technologies. This team approach is especially important to students in recent years. "They're more socially aware, more collaborative and more broadly informed," he says. "With this new generation, the technology industry will be better connected to the general population, which is absolutely a good thing. We don't want our industry to have this opaque image."

Collaborating on Care

A new solution in development being led by Rajiv Singh, a neurologist and associate professor at the University of Miami, highlights this shift. "Our vision is that of an biometrics secured digital core built on an infrastructure designed to perform without fail to deliver a 'trusted voice' or gateway able to analyze in real time an individual's

past (historical records, past labs, images, genomic data), present (wearables, smart objects, medical devices) and future (population health data, predictive analytics, machine learning) to provide a 360-degree view of their health to both learn from and share with trusted providers," Singh says.

This is not the first initiative of its kind, but Singh has a unique asset: a team with full representation from every group that touches healthcare, including patients and patient advocates; all levels of students studying a range of disciplines, from journalism and marketing to medicine and operations management; in-training, current and retired physicians; board of trustee members; business leaders; lawyers; and government agencies.

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—*Terri Virnig, vice president, ecosystem and strategy, IBM Cognitive Systems*
"Everyone participating in this project is working on a real-life problem that requires real-life solutions, and with healthcare, the burden of responsibility is great. They understand its importance and how critical it is to their own lives and the lives of their loved ones," Singh says. "The learning experience of designing solutions in real-world situations with real risk teaches more than any class, textbook or webinar can ever substitute."

PSAI's cloud resources are yet another unparalleled advantage. "I can't think of a faster system that can rapidly process data and produce meaningful results," Singh notes. Given the speed and reliability of the platform, combined with the expertise of his comprehensive team, he expects to develop a working prototype within a year.

Simplifying Complexity

Data analytics and mining projects like Singh's are increasing, and Raman Kannan, adjunct instructor at New York University Tandon School of Engineering, is working to reduce the repeated and common tasks that anyone practicing machine learning should be doing—while also ensuring his students are trained and well-versed in them.

"If you are working on a data science project, you have to compare multiple algorithms and pick the most effective and simplest one," Kannan explains. "This is time-consuming, so we are setting up an environment where you don't have to do that. You submit a project and it's going to run 15 different algorithms and tell you which one is the best one for this project. But it doesn't mean that algorithm is going to work for a different project. Every data set is new and has to be analyzed independently."

His fall 2017 students implemented the first version. Spring 2018 students repeated the experiments and proved the results were producible, and Kannan submitted the research paper's abstract in summer 2018.

"I'm graduating students who know the pain points of the industry and will not make rookie mistakes," Kannan says. "The projects that they'll undertake won't have the same weaknesses they currently have from people who learn one algorithm and apply it to all of their work. Everything I'm teaching will apply to any industry, so they are very excited."

Nipun Dixit, a computer science master's student who will graduate in May 2019, participated in the project, selecting classifiers and implementing them on Spark and R. "It was a terrific experience to get hands-on with this amazing technology," he says. "It was convenient to work on IBM Cloud*, and amazing assistance from IBM helped us sail through this smoothly and provided a great learning experience."

An aspiring data scientist, Dixit feels equipped with the necessary skillset to succeed. "I want to shape the future of the industry by coming up with various groundbreaking solutions that can completely revamp the way we look at various data sets and, in turn, use them to effectively contribute to society."

Critical Support

Saving time is also essential for the teaching environment, and PSAI has helped Kannan in this respect. "I want to teach students how to construct systems but was setting up databases and infrastructure instead," he says about his experience before working with PSAI. "PSAI provides the infrastructure for my students and then on Day 2, they can do things they would otherwise not have been able to do for six weeks." The shared environment also allows him to quickly and easily see what his students are working on and vice versa.

The tools and resources may get most of the glory, but the technical support PSAI offers doesn't go unnoticed. "I can't think of a better partner," Kannan says, recalling a time when he inadvertently deleted midterm files and Kevin Langston, principle enterprise systems architect with the PSAI, helped recover them and minimize the damage. "It's a wonderful setup for us," Kannan says.

Working with nearly 700 PSAI institutions is no easy task, but it's one Langston takes seriously. "It's very important on our end to make sure they have a good end user experience," he says.

Langston puts together the appropriate server resources for institutions after interviewing them about their needs and predicted workload. He also configures the OS resources and installs the application base. "It really runs the gamut of whatever the institution is looking for. Lately, it's been a lot of data analytics and data scientist-level requirements, so it's becoming more and more sophisticated in the application base requests," he says.

The environments are run like business environments, so Langston works to secure them without causing problems for the end user when connecting to the system. To get ahead of firewall issues, he works with the institutions' administrative IT so they can open a port on the firewall for that traffic to succeed. "We try to accommodate everything so it feels like the system is sitting on their campus," Langston explains.

The Art of Possible

PSAI's dedication to education is only deepening. With a growing number of tools to connect and create at students' fingertips, the future appears to be in capable hands.

"The current generation of students is not only interested in how they can apply breakthrough technologies for business; they want to make these breakthroughs to improve the quality of life around the world," Virnig says. "We want to arm them with the toolset that enables them to see the art of the possible and apply that both in the short term as well as over their multiyear business career. To see the shift to pragmatic solutions addressing near-term quality of life, as well as the possible applications of technology, has been one of the most gratifying experiences in my IBM career."

About the author
Holly Eamon is an editor and writer based in Minneapolis, MN

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