In a project that promises to make supercomputing more accessible to American manufacturers, collaborators from the University of Missouri, The Ohio State University and the City of Dublin, Ohio, have won recognition for “Best Application for Advanced Manufacturing” at the Next Generation Application Summit in Chicago, organized by US Ignite.

Prasad Calyam, an assistant professor of computer science at the MU College of Engineering, led the team that developed Simulation-as-a-Service, a desktop application designed to give small companies more direct access to cloud services and supercomputing technology.

The project was sponsored by the City of Dublin, Ohio, as well as the Mozilla Foundation as part of Mozilla’s US Ignite initiative, a challenge for developers to create next-generation apps with transformative public benefits.

“What we’re doing in our research lab is building apps that will help communities in ways that will improve productivity, and also help them do their work in a more cost-effective way,” said Calyam, the app’s lead developer who joined the MU faculty in January of this year, after previously teaching and conducting research at The Ohio State University.
“These apps that we build use the latest cloud computing technologies,” said Calyam. “It’s not just running software on your mobile device. It’s about provisioning the network that your mobile device is connected to, and also provisioning apps in a way that’s all integrated for a nice workflow experience.”

Calyam’s team partnered with TotalSim, a small advanced manufacturing firm in Dublin, Ohio, that specializes in computer-automated engineering (CAE). TotalSim uses high-performance computing to test virtual prototypes of everything from automobiles to air-conditioning systems, generating, for example, accurate data about the flow dynamics of new car models.

“TotalSim uses supercomputers available at locations such as the Ohio Supercomputer Center for a lot of its work, for modeling and simulation. And, the company has cases where it has to work closely with customers and trade designs,” explained Calyam.

Data-heavy transactions between businesses and computing centers often succumb to the high traffic on commercial Internet service providers (ISPs) like Comcast or CenturyLink, and it can be difficult for companies like TotalSim to transfer large amounts of data crucial for manufacturing processes.

“So, we’re basically helping them with this app,” said Calyam. “It helps small manufacturing companies connect to supercomputers and includes other apps that help improve their productivity, while integrating and hosting the service at the city level.”

Hosting at the city level is an important detail, Calyam said, because as much as Simulation-as-a-Service is about the front-end experience of accessing supercomputing power through a desktop application, the project is equally bent on showing that city-operated high-speed Internet infrastructures are becoming more of an economic necessity.

“The app really requires the infrastructure,” said Calyam. “The infrastructure is not the end goal of the project. It’s really the app. But we couldn’t build the app without the infrastructure.”
In Dublin, that infrastructure is DubLink, a high speed, low traffic, 96-strand fiber-optic network built to accommodate the kind of data flow needed for advanced manufacturing, healthcare and other industrial services yet to be developed.

DubLink connects directly to Metro Data Center LLC, a regional supercomputing facility in Dublin. It also runs parallel to OARnet, the backbone of Ohio’s statewide 100 Gigabit-per-second research and education network.

Municipal networks like DubLink are established to give small businesses the resources to handle big data sets, as well as access to supercomputing and collaboration tools that might otherwise get crowded out by congested commercial ISPs.

“Our work on Simulation-as-a-Service is one example where having a city invest in broadband infrastructure will help economic development,” said Calyam. “It helps companies to move there, to use the infrastructure, and essentially build new kinds of collaborations.”

Calyam’s app then comes in as a user-friendly window into networks like DubLink. While still a prototype, Simulation-as-a-Service has laid a foundation for what Calyam called a “new world order” of apps that are provisioned at the city level and delivered by new app marketplaces designed specifically for small businesses.

“We also got a GENI Rack for them to install,” said Calyam. “It’s just another infrastructure piece that helps companies get on this ‘giga highway’ of information.”

The Global Environment for Network Innovations (GENI) is a National Science Foundation initiative to design an “updated replacement for the current Internet.” GENI Racks are high speed channels currently deployed on college campuses for research in Information Technology.

According to Calyam, The University of Missouri is slated to install a GENI Rack in the coming weeks.

“This is proving to be a new kind of broadband access model,” said Calyam. “Google fiber has been proving demand for high broadband in the private sector, but this project is proving it in the commercial sector.”

In September 2012, Google Fiber installed its first gigabit Internet service in Kansas City, where Calyam plans to focus his next project: working with MU
Electrical and Computer Engineering Department Professor Marjorie Skubic to develop a healthcare app that connects medical sensors to high-speed networks for at-home elder care.

“ISPs will do what they do, which is charge more money for bandwidth, and the problem today is that the general Internet is sort of congested,” said Calyam. “So, for these new GENI channels we are building for apps like this, there will be a need for service providers to alter their infrastructure to meet new demands, both for business and residential services.”
Categorized as:

- Academic Departments
- Computer Science
- Computers & Electronics
- Faculty
- Faculty & Staff
- Researcher

This story is tagged as:

- High-Performance Computing
- Prasad Calyam

Related News

- Free bike repairs put engineers’ skills to use
- Sophomore jumps into research
- Diversity alumnus spotlight: Trenisha Tait
- Native Californian finds refuge in the Midwest
- Donation covers nearly half of team’s yearly expenses