



Case Study

Nectry

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Modern-day businesses increasingly need tailored technological solutions to automate their processes and meet company-specific requirements. While enterprise applications can increase productivity, optimize operations, and help companies maintain a competitive edge, building them comes with significant challenges. Traditional coding is slow, expensive and involves a team of specialized experts, with inherent risks of software quality and security issues. Tools like copilots have improved developer productivity but can introduce new security risks and still demand skilled technical resources to review and understand the code. Low-code and no-code solutions have increased productivity but often lack the functionality and scalability needed for enterprise applications.

To accelerate digital transformation by making top-quality, enterprise-specific applications more accessible, CSAIL Startup Connect member [Nectry](#) has created an application generation platform that rapidly builds secure, scalable custom apps. By combining functional programming with formal methods, Nectry ensures its apps are built with guaranteed security, compliance, and efficiency. These apps integrate with enterprise systems, data sources, and services while being extensible to meet future business needs. With Nectry, users with minimal technical expertise can quickly develop the high-quality applications they need.

ABOUT THE COMPANY

CSAIL Professor Adam Chlipala, Nectry's co-founder and Chief Scientist, said the seed of Nectry can be traced back to his first summer job in high school. While working on contract development for ecommerce web applications—"back when it was still somewhat novel to think you'd have a store selling things on the web," he jokes—he learned the basics of building database-backed web applications which address real-world business problems. This experience created a "default framing" for Professor Chlipala about what kind of programs are useful and how applications can make a difference, inspiring him to delve deeper into creating tools to support application development.

Toward that end, Professor Chlipala's academic career has been built around "redeveloping the full stack of tools used by engineers to create hardware-software systems," according to his [website](#). For example, while studying as a PhD student he created the Ur/Web programming language, a domain specific language for building database-backed web applications. He explains how this language incorporates ideas from computer theorem proving, which he viewed as an untapped resource at the time. "I noticed there was a dimension of reinventing the wheel in so many enterprise software applications where we could actually use ideas from computer theorem proving to automate those." This language, and the theory work behind it, became a critical part of Nectry's formal methods, which guarantee security, compliance, and privacy to a high degree.

Similarly, Professor Chlipala's research led to Nectry's novel idea of an information flow policy, through which Nectry apps can be developed with highly specific and customizable instructions from IT experts about how a company's data is allowed to flow. This means Nectry enforces information flow rules and prevents policy-breaking apps from being created in the first place, eliminating any chance of "the biggest potential whoopses of a system of this kind." Nectry's chatbot interface offers users visibility into what is being generated, avoiding the black box problem and creating English-language descriptions of what the app will do. "It's almost like you can treat that English rendering of your program as a contract," Professor Chlipala says. Taken together, this ensures users know exactly what is being built while all security, compliance, and privacy policies are automatically enforced through rigorous mathematical checks.

The other key aspect of Nectry's platform, functional programming, came about when Professor Chlipala began to notice that "creating a new app felt more like configuring a product than starting a new software engineering project in the traditional sense." Over the course of his academic career, Professor Chlipala had seen how even world-class computer science experts would hesitate to build their own apps due to the concern of time and monetary investment, despite the promise of increased productivity. Because of this, Professor Chlipala saw a clear need for a layer on top of the available tools which would allow users to create enterprise software quickly and without coding. Comparable to putting together LEGOs, functional programming allows a system to draw from a library of components which can be pieced together to make an application that suits a user's specific purposes, significantly speeding up the app development process and offering enormous gains in both research and industry.

Nectry CEO and co-founder Marco Farsheed explains how the combination of functional programming and formal methods has given them a versatile tool with so many potential uses that the company's biggest challenge has been narrowing down their specific deployment cases. He says, "we have an enabling technology, and we want to find the right problems that we can apply our technology to solve."

To spread the message of what Nectry's platform can do, their team has been building pilot applications for customers in several key areas. One example is expense management, where Nectry helped a consulting company that specializes in government contracts create an app for dealing with the complexities of reporting expenses. For instance, their app understands that a government organization won't compensate for alcohol and can remove drinks from a receipt photo to automatically populate an expense report. The aspects of this particular app, Professor Chlipala elaborates, could be useful for project tracking, financial management, and more.

Nectry co-founder and CTO Daniel Winograd-Cort explains that the reservoir of potential aspects grows with each application they build, "so every new customer gets a larger library of components." One way Nectry is building out their library of components and learning what applications businesses are looking for is by engaging with major industry players through CSAIL Alliances.

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ENGAGING WITH CSAIL: LEARNING FROM MEMBERS & MEETING INVESTORS

Considering how different research and industry can be, Nectry has been proactively interfacing with potential customers to learn about their specific needs and interests. Farsheed explains how CSAIL Alliances events have helped them get in touch with businesses who might use their product, adding that their relationship with Alliances has “been really good for us to get feedback on what we’re doing.” Farsheed continues, **“the CSAIL ecosystem is wonderful because there are a lot of very interesting companies, interesting people involved, and the industrial connection [CSAIL Alliances] has goes a long way to help us vet ideas in the market, because at the end of the day, what we do needs to solve a problem.”**

Nectry’s relationship with CSAIL Alliances has also been useful as they tackle their next round of fundraising, ever an important consideration in the startup world. The Nectry team attended a startup pitch event organized by CSAIL Alliances where they were able to meet potential investors and interested businesses. Furthermore, as they narrow down their target market, Nectry plans to use their connection to CSAIL Alliances to reach out to specific member companies and be introduced to industry players who might benefit from their platform.

Professor Chlipala imagines that these interactions will create a flywheel effect, where the clarity they gain through company and investor interactions will help with other aspects of the company, like growing the team to address specific demands, getting more specific with messaging, and raising awareness of what they’ve created.

LOOKING AHEAD: SPREADING THE GAINS OF OPTIMIZATION

Professor Chlipala’s main motivation stems from “seeing all the ways people are wasting their time.” As someone who’s designed and built many apps, he knows firsthand what they can do. For that reason, he’s excited to empower people to take advantage of customized software and, in the process, eliminate widespread inefficiency. He aims for Nectry—whose name combines connect and factory, alluding to the propagation of connective ability—to act as a bridge between data resources and people for widespread economic gain.

Farsheed emphasizes how exciting it is to be delivering what the application development market has promised for years. Taking insights from research into industry, Nectry’s platform enables rapid and reliable app generation in a way that previously wasn’t possible. Beyond that, Dr. Winograd-Cort says it’s satisfying to see “really cool, good technology adopted and put to good use.” He believes Nectry “needs to get out there” because of its potential to accelerate business practices and improve work across the board.

Farsheed concludes, “That’s digital transformation for you.”