BUSINESS INSIDER

www.businessinsider.com May 15, 2025

PREMIUM FINANCE

Why Citadel Securities is training its developers on a coding language that hasn't even been released yet

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- **Herb Sutter joined Citadel Securities in 2024 as a technical fellow, after 20 years at Microsoft.**
- **He details how the firm is using a new version of C++.**
- **Sutter also talks about how job applicants can stand out.**

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Herb Sutter joined Citadel Securities in 2024 from Microsoft to spearhead its training initiatives on C++.

You may think that coding languages are static, just a string of letters and numbers for humans to communicate with machines and software. But Herb Sutter, a tech leader at Citadel Securities, says otherwise.

"All the major languages that are in heavy use are living languages," Sutter told Business Insider. "That's why we see C++, Rust, C, and Python continuing to evolve. Our landscape is always changing, and it's important to stay abreast of those developments."

As a market maker, Citadel Securities needs to be ready to match buyers and sellers and provide liquidity to institutional and retail investors worldwide. The company is focused on mastering C++, because speed and execution are everything. It's considered a more specialized coding language that is often used at high-frequency trading firms and exchanges. Better use and understanding of C++ can translate to faster systems and fewer coding mistakes.

Sutter joined in 2024 from Microsoft to spearhead its training initiatives on C++, which is used extensively throughout Citadel Securities' technology. As one of the more senior technologists at the firm, it's Sutter's day job to keep up with the evolution of coding languages to make sure Ken Griffin's market maker is reaping the benefits of the latest and greatest. But even less experienced coders have something to gain by familiarizing themselves with the fresh features that come with new versions of C++; one edge is standing out in the interview process to nab a job at Citadel Securities, which can fetch up to $350,000 for jobs requiring C++ experience.

In this Q&A, Sutter discusses how the firm is embracing a new version of C++ that isn't even set to be fully released until next year, and two pieces of advice that can help engineers stand out from the crowd. It has been edited for length and clarity.

How've you been and what's keeping you busy these days?

I've been at Citadel Securities for about six months.

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Citadel Securities' Herb Sutter.

Can you believe it? And it has been great. I've been drinking from a firehose because there's lots of exciting work to do and new things I'm being exposed to.

I've particularly enjoyed seeing how the firm is adopting the important and immediately useful elements of the new standards, even without waiting for the ink to officially dry.

One of the things I'm especially excited about is C++'s async framework that's coming in the next standard that will ship about a year from now. Async use of C++ is a big deal because we are all increasingly needing to do things concurrently and in parallel.

[Editor's note: "async" is shorthand for asynchronous — code that can run in the background without freezing your app. It's a new framework that helps developers write faster, smoother programs by handling tasks like downloading files or crunching numbers without making users wait.]

I didn't realize until I joined Citadel Securities just how much that framework is already used at the firm, including for our US equities trading. Working at Citadel Securities is almost like living in the future in that we're already diving deep into technologies that will eventually be widely used. That's been a lot of fun.

What exactly is an async framework, and why is it becoming increasingly important to have things work concurrently and in parallel?

Concurrency is the idea of doing more than one thing at a time, which we're always trying to do in a network-cloud world, whether that's waiting for cloud capacity or AI tokens. Parallelism is when you have one huge computation to do, but would like to spread elements out over multiple machines to get the answer more quickly.

What impresses me most about C++26's async framework is that it can handle both of those elements — the one that involves hiding and waiting, and the other that's doing many different things. Those are such different things. Doing them both well in one framework is pretty amazing.

Just think of what a trading system has to do. Requests for trades are flying across the wire all the time. You never know when the client is going to want to buy or sell, so as a market maker, you have to be ready at all times. And that means being very responsive, very efficient, and super fast. Execution is extremely important, and that's why we're investing in the async framework.

What are some of the advantages that you're seeing being an early adopter or a first mover in this new C++ standard?

At Citadel Securities, using the things today that everyone else is going to be using months or years from now builds muscle and familiarity — especially for something as core as an async framework. Beyond that, we have been providing feedback and suggesting tweaks to the standard that are being adopted. Because we're using the new standard in production and at scale, we're able to play a role in evolving the language, which has been great.

How would a prospective hire show off their C++ skills?

One way you can show off your C++ skills is simply by talking about what you're looking forward to most in C++26, describing the features that have helped you, or sharing something you've learned recently. I want to know that you're that curious and that you're focused on continuous learning, and that's true more generally, regardless of language. It's important to be able to demonstrate curiosity and knowledge about software advancements — and to show that you understand that there's more than one tool out there and that you know how to use them together.

What's your advice to young engineers interested in joining Citadel Securities?

I would encourage young engineers to get as much work experience as possible as early as possible. I went to the University of Waterloo in Canada, which has a well-known co-op program that served me incredibly well, but there are many others out there.

The key is to get some work experience so that by the time you graduate, you have spent a significant amount of time using your skills in a real-world environment. The biggest differentiator we see among candidates is their ability to use technology to solve commercial problems. Ultimately, knowing data structures, languages, and the like are important tools in the toolkit, but what will really set you apart is your ability to solve business problems.