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Case Study

LatenceTech: Innovating Network Tools

LatenceTech, a Canadian telecom startup, specializes in high-precision network latency tools for 5G and IoT.

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Executive Summary

In the context of the evolving telecommunications industry, characterized by the emergence of 5G and a surge of connected devices in IoT, LatenceTech, founded in Montreal, Canada, by former Ericsson senior executive Benoit Gendron, identified a specific need for specialized network tools focusing on precise latency measurement. "This precision is essential for the functionality of applications such as autonomous vehicles and connected robotics. Current technologies, including Ping, ICMP, and even advanced protocols like TWAMP (co-developed by Cisco), still do not meet this requirement entirely." To address this, Gendron's team deployed monitoring agents into client networks, explicitly focusing on measuring and managing network latency. This approach extends traditional methods to a strategy that balances data analysis and performance optimization. The objective is to redefine performance metrics by emphasizing the quality of network experience rather than relying solely on conventional, quantitative data metrics.

Optimizing Network Performance with a Consumer Focus

LatenceTech's strategy for enhancing network performance involves deploying software systems that embed monitoring agents in client networks to improve Quality of Service (QoS). Gendron stated: "These agents are engineered to evaluate and regulate network performance, with a specific emphasis on latency metrics at the server or network entry point." This approach aligns network performance with the customer's perspective, effectively tackling technical challenges while prioritizing user experience in assessing network quality.

Adapting Technology Based on Client Input

The initial stage involved creating a Minimum Viable Product using C# and Python for network performance measurement tools. Feedback from clients, notably Ericsson, showed the necessity for technological refinement. LatenceTech adopted Scala to enhance its development process, embracing the Reactive Manifesto's principles of building responsive, resilient, and scalable systems. This integration, coupled with microservices architecture, was driven by industry requirements and product development strategies. As the need arose to process increasingly complex critical metrics, the team recognized the substantial run-time overhead associated with these high-level languages in their specific use case. To address this, they had no choice but to shift towards system-level programming directly. LatenceTech chose Ada to meet the more demanding performance and high assurance requirements.



Customer:
LatenceTech, a Canadian telecom startup, specializes in high-precision network latency tools for 5G and IoT.

Challenge:
Their main challenge was to refine quantitative latency metrics into practical strategies, thereby enhancing Quality of Service (QoS) and clients' satisfaction with network performance.

Solution:
LatenceTech first used C# and Python for their Minimum Viable Product (MVP), then moved to Scala for better alignment with industry standards. Finally, they adopted Ada for its proven support for high-assurance systems, culminating in a successful collaboration with Orange, a leading French telecom provider, for energy-efficient network bandwidth testing.

Results and Benefits:
LatenceTech used AdaCore's GNAT Pro for Ada to create stable and resource-efficient network tools, successfully meeting real-time telecom demands. The case study demonstrates AdaCore's tools as a practical development and verification environment for complex network applications, highlighting AdaCore's support for telecom innovation.

Collaboration with Orange

Tasked with implementing Orange's patented LIFBE (Low Intrusive Fast Bandwidth Estimation) process, a novel method for efficient end-to-end network throughput estimation, LatenceTech aimed to develop a more energy-efficient method for network bandwidth testing. By leveraging LIFBE's unique approach, which utilizes UDP probe packets and an innovative curve-fitting method for accurate throughput calculation, the goal was to dramatically reduce the data volume required for these tests from 100 to 150 megabytes to a mere 5 to 10 megabytes. An essential aspect of this phase involved Latence Tech's decision to employ the Ada programming language to refine and enhance the accuracy and efficiency of Orange's existing C bandwidth test code. The selection of Ada aligned with the startup's aim to improve the prototype's efficiency and accuracy. The team emphasized, "This transition was crucial to creating stable, unobtrusive tools that deliver precise real-time measurements while minimizing resource consumption." The prototype delivery within three months showed the practicality of the LIFBE process and Ada's effectiveness in complex network stacks.

GNAT Pro for Ada in Network Solutions: Technical Merits and Real-Time Integration

The ability to compile Ada code into small, rapid executables with GNAT Pro is perfect for energy-efficient network software. The language's explicit coding style also improves readability and collaborative development. Thomas Bailleux, software contractor at LatenceTech, discusses Ada's low-level memory management capabilities:

"Ada streamlines data manipulation by allowing direct naming and arrangement of record fields, eliminating the bit-shifting required in other languages, essential for accurate network system code". About threading, Thomas remarks: "Ada's use of protected objects, a monitor-like construct using guards instead of conditional variables for signaling, together with tasks, streamlines concurrency management and cuts down on the complexity of synchronization, especially when compared to C++. Plus, it maintains the performance benefits of native compilation. Threading in Ada? C'est du bonbon!". Notably, the startup leveraged AdaCore's GNAT Pro implementation of the standard Real-Time Annex provisions for scheduling. This implementation addressed real-time issues, offering straightforward, performant, and predictable solutions.

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Fast Ada Ramp-Up and Deployment of the Orange Patent

The LatenceTech team smoothly transitioned to Ada to develop the LIFBE bandwidth probe to improve network throughput measurement. Access to AdaCore's GNAT Pro tools guaranteed ongoing engineering support throughout the integration and product lifecycle. The timely delivery of Orange's LIFBE prototype highlights the LatenceTech team's capabilities and the advantages of Ada and AdaCore for critical projects. This success illustrates the value of collaboration with industry leaders of all sizes on innovative telecom solutions.

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