



AZURE IOT POC

Delphi Connect—Taking it to the Next Level with Azure Service Fabric

Delphi Automotive, a giant in the automotive industry, challenged Lixar to architect, develop, and deploy the first aftermarket connected car solution. Leveraging innovative technologies and approaches through Microsoft Azure vehicles such as Azure Service Fabric and Service Bus, Lixar met this challenge and produced the first connected car solution sold to the public by Verizon in 2013. Since then, Lixar has used the Microsoft Azure platform to push the envelope and evolve the solution using bleeding edge Microsoft technologies.

Introducing Delphi Connect

Delphi Connect is a multi-tenant, global, connected car IoT solution, built exclusively in Microsoft Azure PaaS with a single code base deployed in over 22 environments that ingests rich vehicle data and allows for low latency control of OBD-II devices in the field. Sold through telecom giants like Verizon and China Telecom and recognized with awards such as the CNET Best of CES Award, Delphi Connect comprises B2C offerings through mobile apps (iOS and Android) and web interfaces as well as B2B offerings via Open API and direct subscriptions to Event Hubs where raw data can be consumed.

Evolving with Azure Service Fabric

Since the production launch of Delphi Connect nearly six years ago, Lixar has been dedicated to keeping up with the rapidly evolving Microsoft Azure cloud platform while improving the solution to ensure it remains the leader in the industry. Lixar translated this dedication into proof in 2016 by demonstrating the feasibility and benefits of utilizing Azure Service Fabric with the Delphi Connect solution. As part of the process, Lixar was able to show the customer how Azure Service Fabric can:

- | Improve performance
- | Allow for large capacity scaling
- | Provide significant cost savings



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Innovating in Uncertain Circumstances

As an early adopter of Azure Service Fabric as soon as it was made generally available on March 31, 2016, Lixar faced challenges in understanding the inner workings of the fabric and applying the architecture. Through brainstorming and rigorous testing, Lixar proved their mettle by overcoming the complexities of undocumented behaviors while handling persistent sockets and layer upon layer of load balancing between the various actors in the model. The fight was hard-fought but the fruits of labour for Lixar were clear and decisive.

Achieving Success

During the planning stages, it was determined that the success of the project would be judged on whether the following goals in three categories were met:

- | **Cost:** A reduction in the number of compute instances and the elimination of costly databases.
- | **Performance:** An increase in the maximum number of messages/second in a performance test.
- | **Scalability:** The elimination of the current scalability bottleneck (SQL database).

To ensure success, Lixar leveraged the innovative architectural benefits of Azure Service Fabric and applied the following concepts to the project:

- | Keep the data close to the compute layer
- | Partition both data and storage services
- | Design for high availability and reliability



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Thanks to these benefits and concepts, Lixar was able to spend less time architecting highly available hyperscale solutions and spend more time driving the business value of the solution offering.

As outlined in the table below, the introduction of Azure Service Fabric into the solution exceeded expectations.

Test	Instance Count	Messages/Sec	Database
Current Environment with Caching	64	3588	P11 (very costly!)
Azure Service Fabric	15	8860	None

Compute resources were decreased by 76% while message throughput more than doubled. To plot the results with respect to project goals:

- | **Cost:** Compute costs are now 4 times less and the need for a costly P11 SQL database was eliminated.
- | **Performance:** Message throughput increased almost 2.5 times and messages get processed 10 times faster on average.
- | **Scalability:** The bottleneck of the system, a SQL database, was removed and a highly scalable actor model (Azure Service Fabric) was employed.

Overall, proving the viability of Azure Service Fabric for Delphi Connect has brought forth significant value to Delphi Automotive and laid a path for growth while presenting considerable operational cost savings.



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Getting Recognized

Recognized as a leader in the industry, Lixar and the Delphi Connect solution have been awarded with the:

- | PopMech Editor's Choice Award
- | CNET Best of CES Award for Best in Show
- | Telematics Update Best Aftermarket Device or Solutions Award

Simply put, thanks to Lixar's recognition and success with Azure Service Fabric, Lixar continues to consult on this technology with industry leaders like Delphi Automotive and Innovapost.



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