



CONTAINER TECHNOLOGY ENERGIZES THE TRANSITION TO SOFTWARE-DEFINED AUTOS

Bringing flexibility, manageability, and new opportunities to embedded software deployment

July 2023 Interview with Glen De Vos

Container technology promises to revolutionize the hardware-centric architecture model that has dominated the automobile industry since microcontrollers and microcomputers made their way into vehicles decades ago. This transformation heralds a new era in which vehicle functions are effectively managed by modular software.

The microservices approach at the heart of container technology opens opportunities for commoditizing new features within automobiles. Software-defined vehicles not only better serve the needs of consumers but recast the business foundation of OEMs.

Recently we spoke with Aptiv Senior Vice President and CTO Glen De Vos to learn more about the growing adoption of container technology by automobile manufacturers and how this shift affects the future of automobile design. We've consolidated his main points below.

Containers Bring Needed Changes

Glen De Vos: Containers bring three things to the automotive industry that are desperately needed. First, they allow you to manage software, which today is monolithic and difficult to maintain and update. They do that by modeling the code set as manageable elements, or containers, with microservices.

Second, they lower development costs. The cost of software for vehicles is growing exponentially. Containers break away from the architecture in which software is wired to the underlying hardware.

The third thing is that containers unlock new monetization models with software-related revenues.

Containers Change More than the Software Architecture

I think there is a near-time need for OEMs to be able to manage the software. We're talking about the development process and the organizational dynamics in the automobile industry. All of that is what leads to the business outcome. The OEMs can't keep doing things the way that they always have. If they do, they'll fail.

ABOUT GLEN W. DE VOS

Glen W. De Vos, senior vice president at Aptiv, oversees Transformation and Special Projects and also serves as chief technology officer. In this role, he spearheads Aptiv's innovation and global technology initiatives, drawing on expertise gained over more than a decade of progressive engineering and managerial roles.



They need to bring in new talent and rethink and modernize. We are seeing people who are natively software people, now coming into the OEM community. This is a complete revolution, and it's one reason why we knew we had to partner with Wind River®.

With containers, the work life and the work environment for our software engineers changes. We're providing them modern software architectures with modern toolchains. Their job gets easier. They're more creative and more productive.

Enable a Software-Defined Architecture from the Start

OEMs need software-first thinking. When they think about any feature of the vehicle, they should be thinking of it in terms of the software architecture first, and what it will take to control that windshield wiper, lift gate, or propulsion system — whatever the function of that feature is. In other words, what do I need from a software architecture standpoint to enable that feature to work properly and let that drive the hardware requirements?

Also, they should have a project mindset: What does the customer need, and how do I meet their need for a specific vehicle and a specific application? How do I architect my software so that it can meet the needs of a broader market, so that I can reuse that code and run it on any underlying hardware through virtualization?

Container Technology Is Vital to the Future of Automobiles

Container technology is new. Automotive is one of the trailing verticals in terms of adopting modern software architectures, in which you're virtualizing the compute, abstracting software from the underlying operating system, containerizing the applications. The hyperscalers, the cloud providers — other industries have already moved in this direction. The auto industry is still very much locked in the old-school, monolithic model.

Today, you define the hardware. You optimize the software on the hardware. There's lots of little individual boxes that talk together. But they don't share really well. The physical architecture in the car hasn't been ready to support a more modern software architecture. We just couldn't do it.

Well, that's what's changing. It's a chance to restart with a clean sheet for improving the architecture at OEM central.

Automotive Demands More

When developing, deploying, and operating automotive software, you need to bring it all together to make sure it is compliant with some of the critical requirements for the industry, such as ISO 26262 for functional safety. We have to be compliant, in terms of the product as well as the DevOps environment, with the functional safety requirements and the General Data Protection Regulation (GDPR) data security requirements that are unique to automotive. Then there are the cybersecurity requirements for automotive. And, finally, there is measuring the quality of the software and focusing on traceability — tracing from requirements all the way through implementation verification.

Refinements Over Time Are a Bonus for the Software-Defined Vehicle

I can see containerizing something like a functional safety feature, like adaptive cruise control. It becomes a package that I can now sell to early customers. And because it is there, it's proven. I won't require the customer to pay me up front for engineering to develop it. It's ready and good to go.

That's the first dimension. The other dimension is across time. For instance, ongoing refinements: As I implement machine learning on a radar, I can do much more with adaptive cruise control. Or, incorporating more advanced features, things that make the car feel more natural, such as cutting curves in an optimal way.

I can introduce [this] and charge a one-time fee or a new licensing charge, or make it part of a subscription. I can provide a roadmap of updates. Containerization is important because it breaks the code into functional modules that you can manage.

Getting Past Go for This Foundational Shift

For a given customer, you might go through two or three proofs of concept for something of significant magnitude.

Software architecture is sitting at the core of a vehicle, and if the architecture doesn't work, the vehicle doesn't work. It's not like evaluating a new technology for lighting, or a new sensor – if that doesn't work, I can back off and use what I had before.

With a vehicle architecture-related shift, it needs a thorough vetting and proving process, because the worst thing for an OEM is to delay and miss a launch date. Typically, we'll go through two or three of these types of proofs of concept to have the ability to demonstrate that it's right. The next one becomes a lot easier because you can point to what you did, and over time the task becomes much more manageable.

The Elevator Pitch for Container Technology

Containers enable you to manage and control the software on your vehicles much more effectively. They make it manageable and more cost-effective, and they open up those new revenue models. That's what containers bring.

If you keep doing it the way you have been doing it, you, as the OEM, will never get to those software revenue streams that we have talked about. You will never get to the efficiency of software costs in vehicles, and you really won't get to the software-defined vehicle at all.

ABOUT WIND RIVER

Wind River is a global leader in delivering software for the intelligent edge. The company's technology has been powering the safest, most secure devices in the world since 1981 and is found in more than 2 billion products. Wind River offers a comprehensive portfolio supported by world-class global professional services and support and a broad partner ecosystem. Wind River software and expertise are accelerating digital transformation of critical infrastructure systems that demand the highest levels of safety, security, performance, and reliability. To learn more, visit Wind River at www.windriver.com.

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