



The Deloitte On Cloud Podcast

Gary Arora, Chief Architect of AI Solutions

Title: Gary Arora and Red Hat's Bob Monkman on how technology is fueling a shift to smarter vehicles

Description: In this episode, Gary Arora sits down with Bob Monkman, senior principal at Red Hat, to explore how software-defined vehicles are transforming the auto industry. They discuss the challenges of modern vehicle software, the impact of DevOps, AI, and cloud, and how open source drives collaboration and innovation, enabling automakers to reshape their business strategies. They also touch on how the shift to continuous software development and subscription models is creating new revenue streams.

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Gary Arora:

Hey, everyone. Welcome back to the On Cloud podcast. I am your co-host, Gary Arora, chief architect for cloud and AI solutions over at Deloitte. Today, we are shifting gears, pun intended, to talk about one of the most exciting trends in automotive industry—software-defined vehicles. Now, I have been genuinely fascinated by this topic, so I can't wait to unpack it with our special guest, Bob Monkman, senior principal at Red Hat. Bob, welcome to the show.

Bob Monkman:

Thanks very much. I am very happy to be here.

Gary Arora:

So, last year, Red Hat and Deloitte announced this expanded collaboration to propel software-defined vehicles with pre-integrated solutions designed to build the cars and the capabilities of the future. First of all, thank you for your partnership there. Second, I just wanted to ask you first to lay out the problem this solves because, as users of automobiles, we take so much of the software for granted. We expect it to just work, and I can speak for myself, I am oblivious to the intricacies of the underlying software in a car. Can you shed some light on the software complexity and what is this problem that we are trying to solve?

Bob Monkman:

Yes absolutely. So, it's really a perfect storm of multiple factors happening in the industry. It's the move to electrification, so the entire vehicle hardware architecture and drivetrain is changing, but also in concert with that is a whole new software architecture that's required. Secondly, historically, the electronic control units or ECUs in the vehicle, there are up to 100 or more of these in every vehicle. All of them were built as black boxes with their own hardware and their own software tightly coupled, and there has been a great deal of effort to consolidate the hardware and the compute elements down to more powerful and high-performance compute is what we call HPC compute platforms in the car. Also, now what happens in that design is that you have the consolidation of the applications, or the middleware as well, onto a more powerful compute platform. So, that requires a lot of re-engineering of the software to be able to have safety workloads and non-safety workloads operating on the same compute platform, for example—something we call mix criticality.

That requires a great deal of software care and design to make sure that there's freedom from interference, for example, for the safety applications. All of these things are happening. And, finally, it used to be that the software was pretty much done and fixed and signed off when the car was shipped in production, but now like in mobile phones, you have the expectation that features, security fixes, updates, new capabilities can be added after production throughout the lifecycle of the vehicle. So, that means you have to establish a whole new continuous innovation cycle from the cloud, from the operations center, down to the vehicle on an ongoing basis. So, there's a lot of those organizational changes, there's personnel changes, there is software architecture changes, and all of the processes they are in and business model changes, we will talk about that a little bit later too, I think so.

Gary Arora:

You mentioned high-performance compute, software consolidation, cloud updates. These are some of the concepts we discuss quite often in enterprise settings. It makes sense that we apply some of this to cars now given the increasing complexity of software running on the vehicles. So, how does the Red Hat-Deloitte partnership help automakers reimagine software development processes and the continuous innovation deployed to vehicles?

Bob Monkman:

Great question Gary. So, when you think about what's involved in this kind of a sea change in the way software is developed, the whole architecture, these organizations typically had not had to do, especially the continuous innovation, the notion making changes to software throughout the lifecycle of the vehicle. So, this requires what we refer to as the establishment of a continuous software factory. It requires Agile software development processes, what we call continuous innovation, continuous deployment, or DevOps processes.

While Red Hat is delivering a lot of the core technologies at the operating system level, and for containers and hybrid cloud technologies and automation, these teams really need new talent, they need new training, they need new processes. So, it's super important for this cloud-to-car continuum for the automakers to establish this software factory and they are going to need help from companies like Deloitte to help them establish all of these new processes, these new methodologies, and the software architecture. These are the kinds of skills and deep expertise that companies like Deloitte have to help the automakers get there because they typically have not needed or had those skills in-house.

Gary Arora:

DevOps and containers for vehicles, this is a really fascinating space to be exploring in the context of vehicles and open source has been at the heart of Red Hat's approach. So, how does this open-source foundation enable greater collaboration and innovation within the automotive ecosystem, and, perhaps what are some of the security implications of this approach?

Bob Monkman:

It's a common question. I mean, first of all, historically again, much of the software deployed in vehicles has been proprietary from multiple different vendors, very bespoke, and tied very closely to the hardware as we spoke about a little bit earlier. Now, we have this opportunity to reimagine, rebuild the software architecture. What's happening with this whole SDV transition in the industry is that there are numerous disruptors in the space that are pretty well known, and they are taking a software first approach and really leading the charge in new ways of doing innovation throughout the lifecycle.

So, incumbent OEMs are really challenged to keep pace, and we at Red Hat believe, and this has been really well established in other industries as well, the pace of innovation of open source just because of the sheer number of developers and sheer mass of knowledge around open source and experience with open source from use in the enterprise world and telco and other industries, there's just so much talent out there and so many engineers contributing to open source that the pace of innovation cannot be matched by sort of small proprietary software vendors.

So, there's a pace of innovation there. You might think that that might have security implications or reliability implications, but in fact it's been proven and well established that open-source software is actually far more reliable and far more secure because of the many eyes concept, the notion that everything is in the open, everything is transparent. Some people make a career for themselves in open source ferreting out bugs or security flaws. So, this becomes quite effective. No one can go in and create sort of a rogue security back door in open source before somebody else is going to spot it and find it. It's all transparent, it's all in the open.

Gary Arora:

What about the functional safety Bob? Many of the vehicles have to comply with the latest regulations, so how does Red Hat deal with the functional safety implications?

Bob Monkman:

There certainly are requirements for functional safety in certain use cases within the vehicle and that has been the hallmark of the whole effort with Red Hat to build an in-vehicle open-source operating system. We felt from the start that it would be necessary for us to be able to comply with what is known as the ISO 26262 functional safety certification requirement up to level (ASIL-B So, we have been working on that for several years. We had a press release last June where we got the first certification for a small portion called the Math Library of Linux to prove our approach because it does take a novel approach with open source software that wasn't designed and documented exactly from the beginning the way that the standards written 30 years ago. specified.

So, we took a novel approach with our assessor. We achieved that level of functional safety certification and then just here in January, we announced that we had achieved a much more significant milestone with what's called the mixed criticality certification for the same functional safety requirement and that has implications for we talked about a little bit earlier with the high-performance compute, the consolidation of safety and non-safety workloads on the same compute element. So, mixed criticality means that you can demonstrate that you can have freedom from interference of the functional safety applications from the non-safety applications on the same compute platform.

So, we just achieved that certification. And now we are going for the full certification of the Linux distribution that we offer to the market, the Red Hat in-vehicle operating system. We will have an announcement later this year on that milestone, but it is a key element of what we are delivering to market, not just open-source innovation and modern cloud native development platforms but maintaining the required functional safety and meeting those stringent requirements. We are really excited about that differentiating factor for us.

So, it's the pace of innovation, the many eyes concept, the speed with which bugs can be fixed, pushed back upstream, security fixes can be closed, this is one aspect of it. The other aspect is by nature organically, you have collaboration between both at large developers and organizations, and this has been well proven out in other industries as well where you have foundations, consortia, and this is being established in the last few years in automotive as well, companies come together in foundations and working together on what we often refer to as software blueprints.

They will build a common open piece of software to perform some sort of function. There is so much software that is siloed historically between different companies building the same kinds of applications, but when you start collaborating, combining forces, you can really divide and conquer. You can do so much more if you are not all reinventing the same plumbing, the same infrastructure. It helps move the whole industry forward faster. In fact, we submit, and we are really getting good validation of, this in our conversations with automakers in Tier 1 that it's really essential. Open collaboration and open source, in order to meet the challenge of the pace of innovation that needs to happen in order to stay competitive and keep up with the insurgents and disruptors. It's really essential that we collaborate, we don't all reinvent the wheel, we work together and it's really proving out to be the way forward. Lots of activities to that end already happening and it's growing.

Gary Arora:

You are right, so much software in this industry has been siloed and proprietary, and we have seen what open source unlocked for enterprises in terms of just the pace of innovation and new capabilities from a broader community out there to prove out the solutions. I am really excited about this trend of open-source innovation entering the automotive domain. The other trend that we have seen growing is the real time, or the updates, especially with modern cars and EVs that come embedded with a SIM card for constant connectivity. But beyond just OTA updates, how does this pre-integrated solution fundamentally change the business model for automakers?

Bob Monkman:

Yes, it's a great opportunity and I think the automakers are already trying out different sorts of things, subscriptions to certain vehicle functions. The functions themselves have the infrastructure in the vehicle to operate, but they can be turned on or turned off depending on whether the customer, the end user, subscribes to that particular feature in a vehicle. It's not just about software updates or security fixes, but it's the opportunity for what we refer to as feature-on-demand or personalization of the vehicle. One of the things that is being looked at is what kinds of remote diagnostics and troubleshooting can be done over the air, connecting to the vehicle from the operations center, and using data from the vehicle to interpret what's happening and try and solve problems.

So, I think it's going to be subscriptions to features on demand, the ability to personalize the vehicle, other kinds of services that if you are in motion in a vehicle, there might be some location-based services that you might want to subscribe to. The possibilities are really endless, and I think there are a great deal of opportunity for new revenue generation throughout the lifecycle of the vehicle. The customers will expect the ability to get these sorts of updates, and they can subscribe to different levels of service and capabilities on an ongoing basis, it's really exciting.

Gary Arora:

You are right. Features on demand, hyper-personalization, location-based services, the possibilities are endless and really exciting. Beyond just vehicles, there are other industries that are facing similar challenges with increasing software complexity. In your mind, are there lessons learned from this collaboration that could be applied to other sectors beyond automotive, say industrial manufacturing or healthcare?

Bob Monkman:

Yes, absolutely, and as a matter of fact, we have been through this before. I was a big part of working in open-source communities in the telco space 12 to 15 years ago. We started this process of converting. The first step was actually converting from proprietary, bespoke operating systems to Linux, and that was a very successful effort and then there was a whole what was called the software-defined networking initiative and network function virtualization. So, that was the whole concept of again separating hardware from software, being able to work in concert with the entire supply chain, the telcos, the equipment manufacturers, the ISPs, and consulting organizations, and system integrators to build common open building blocks for the necessary software stack between the applications and the operating system, and it was the same.

There was so much common software that wasn't truly differentiating. So, they went through this whole process and completely re-imagined and improved the pace of innovation, the ability to combine efforts to move faster, to have open building blocks that could be shared, and then moving into more cloud. The next thing that happened after that is they started with sort of brute force virtualization techniques, hardware virtualization, and moved on to cloud native technologies. This was really coming back to the whole OTA discussion that we had a few minutes ago.

The ability to containerize and package applications as container, there is a lot of details in the technology. But the bottom line is you can really create more fine-grained software modules and the serviceability aspect of that, the safety of updates can be increased in addition to containerized applications use less memory and are just easier to update and safer. So, there are a lot of opportunities there. That industry did it before, there were a lot of lessons learned about how to do that correctly and part of it was having the management buy in for open collaboration.

One of the things that happens when new industries are starting to work with open source is there is a sort of a hesitance to contribute too much or give up the special sauce, and the reluctance to say, "Well, this is differentiating or this is not differentiating." It took a while for telcos and some of the suppliers to have the right mindset and the right behavior and learn the benefits of open collaboration. I think that the automotive industry could learn a lot from those lessons learned and we are definitely advising some of these communities on how to do this right and it is happening in industrial, as well. The whole OT transformation and automation is transforming as well. It's really exciting.

Gary Arora:

I love the idea about fine-grained software modules with open-source collaboration across the sectors. It's such a promising domain for innovation and new applications for personalized experiences. So, thank you so much Bob for your time and insights and that's it for today's episode on the On-Cloud podcast. If you enjoyed this discussion, be sure to subscribe and leave us a review. You can also check out our past episodes wherever you listen to your favorite podcast. Thank you for listening to the On-Cloud podcast. Until next time, I am Gary Arora.

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