

Customer story

## Driving sustainable transportation

Arrival is a British electric vehicle manufacturer founded in 2015. Arrival's mission is to "make the world's cleanest transportation" by reinventing the design and production of electric vehicles for end-to-end sustainability.

The company is actively engaged in the development of a diverse fleet of electric vehicles catering to the needs of public transportation and commercial deliveries. These vehicles, designed to be cost-effective, environmentally-friendly, and readily producible, demonstrate the dedication of the organization towards sustainability. Arrival employs cutting-edge technologies like 3D printing and lightweight materials, allowing for the creation of vehicles that pave the way for the future. Their commitment to excellence is highlighted by their successful collaborations with renowned clients like United Parcel Service Inc and Uber Technologies Inc.



Arrival has raised over \$1 billion in funding from investors, including Hyundai Motor Company, Kia Motors Corporation, and BlackRock.



## The Challenge

Arrival's innovative business model envisions the establishment of adaptable "microfactories" worldwide, aiming to achieve a level of scalability on par with renowned global brands like McDonald's and Starbucks. However, the implementation of these pop-up microfactories in diverse locations may encounter challenges related to internet connectivity and reliability. Ensuring a stable and high-speed internet connection becomes pivotal for seamless real-time data exchange, remote monitoring, and efficient cloud-based operations.

For vehicle manufacturing, Arrival uses a unique approach involving quantitative sustainability metrics to shape decisions on design and operations. Manufacturing engineers compare the impact of modifications of exterior components like bumpers, doors, or wheels on the vehicle's aerodynamics and range. To make these comparisons, complex mathematical models and algorithms are necessary, demanding substantial computing resources for their execution.

## The Solution

Arrival invested from the beginning in a cloud-based manufacturing strategy offering the infrastructure, tools, and flexibility required to efficiently manage operations across different locations, optimize production, and ensure consistent quality and standards.

While a cloud-based approach proved to be the right choice, the deployment of a single-cloud Kubernetes cluster was hampering production. For each recalculation of the mathematical models required for production, the Kubernetes cluster called upon reserved instances from a single public cloud provider to power their computational needs. While efficient, this approach was very costly.

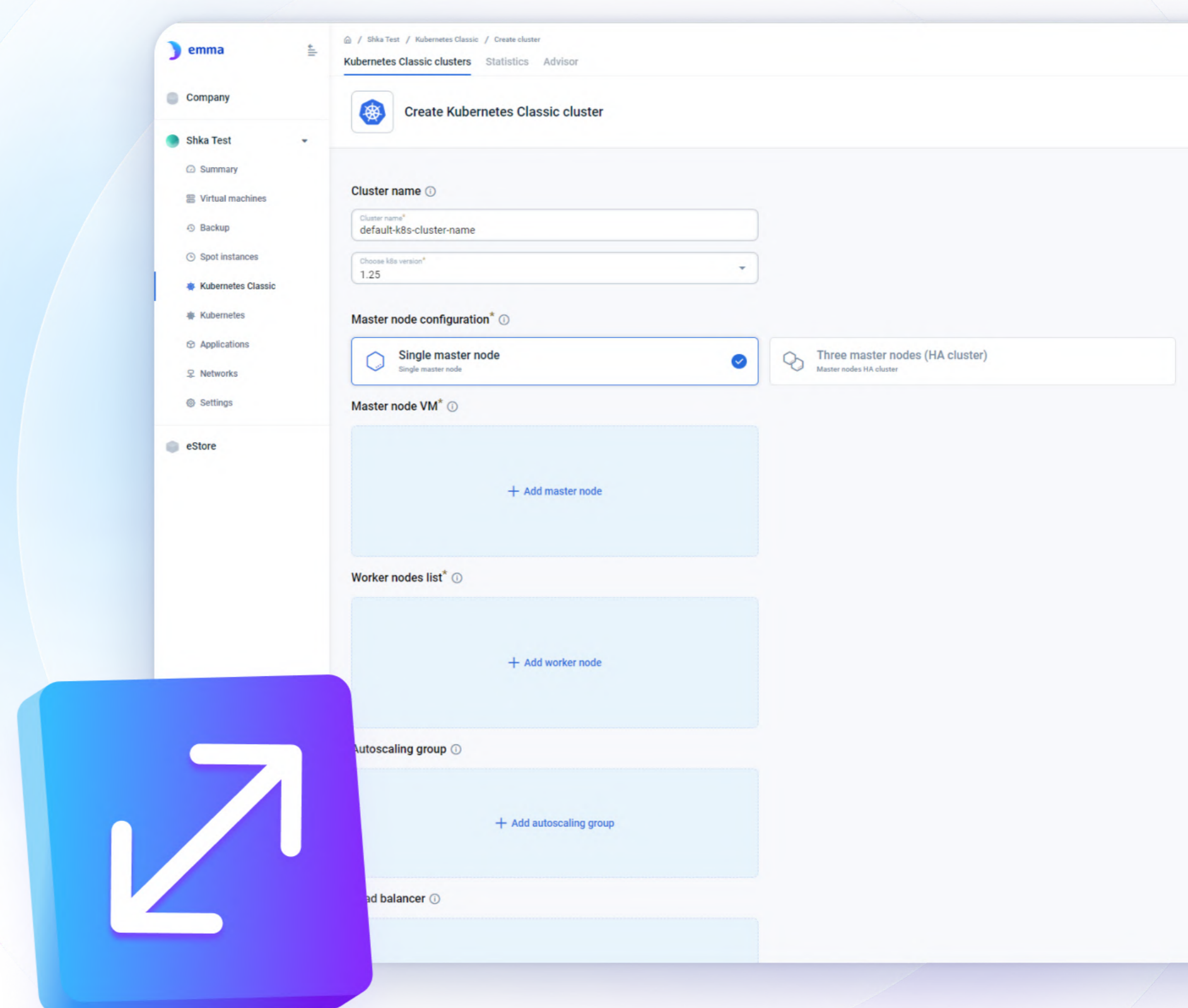
Arrival made the strategic decision to leverage the capabilities of the emma multi-cloud management platform, enabling the deployment of an agnostic multi-cloud environment. This comprehensive approach empowered them with the necessary flexibility to achieve global scalability and operational efficiency.



"Our vehicles are upgradable, benefiting from continual software and hardware updates to ensure their longevity. Embracing modularity, we've engineered a grid-based architecture that simplifies component replacement. This approach requires significant compute power."



**Kirill Kuznetsov,**  
IT Director, Arrival



## The Power of Connectivity

In addition to its cloud resource and spend management capabilities, the emma platform brought a revolutionary change for the company with its hardware-based multi-cloud networking backbone.

This backbone establishes direct connections with cloud service providers (CSP) globally, giving Arrival the flexibility to deploy their Kubernetes cluster in one cloud while easily scaling it using spot instances from different CSPs provided through the emma platform. This seamless integration has empowered them to optimize their cloud infrastructure and leverage the best of multiple cloud services.



## Results

Scaling a Kubernetes cluster using regular and spot instances from various CSPs instead of a specific CSP offered Arrival several benefits:

### Cost savings

Utilizing multi-cloud spot instance scaling enables businesses to leverage the cost advantages provided by various cloud service providers. Spot instances, known for their affordability compared to on-demand instances, offer substantial cost savings. By distributing workloads across multiple CSPs, Arrival was able to optimize expenses, achieving up to 80% in cost reduction.

### Improved fault tolerance

Arrival benefited from multi-cloud redundancy, which significantly improved fault tolerance. In the event of spot instance issues or a complete outage from one CSP, the emma platform seamlessly shifted application operations to instances from other providers, ensuring uninterrupted availability. This approach not only enhanced stability but also guaranteed uninterrupted running of applications, regardless of CSP disruptions.

### Load balancing and global traffic management

For multi-cloud deployments, leveraging global load balancers and traffic management systems is crucial to efficiently distribute traffic and ensure optimal performance for users across the globe.



“Our engineers can now concentrate on product development and testing instead of handling IT infrastructure. As a result, we can introduce new products to the market with greater speed and efficiency. This allows us to maintain our leading position in sustainable transportation.”



**Kirill Kuznetsov,**  
IT Director, Arrival

