



INNOVATE

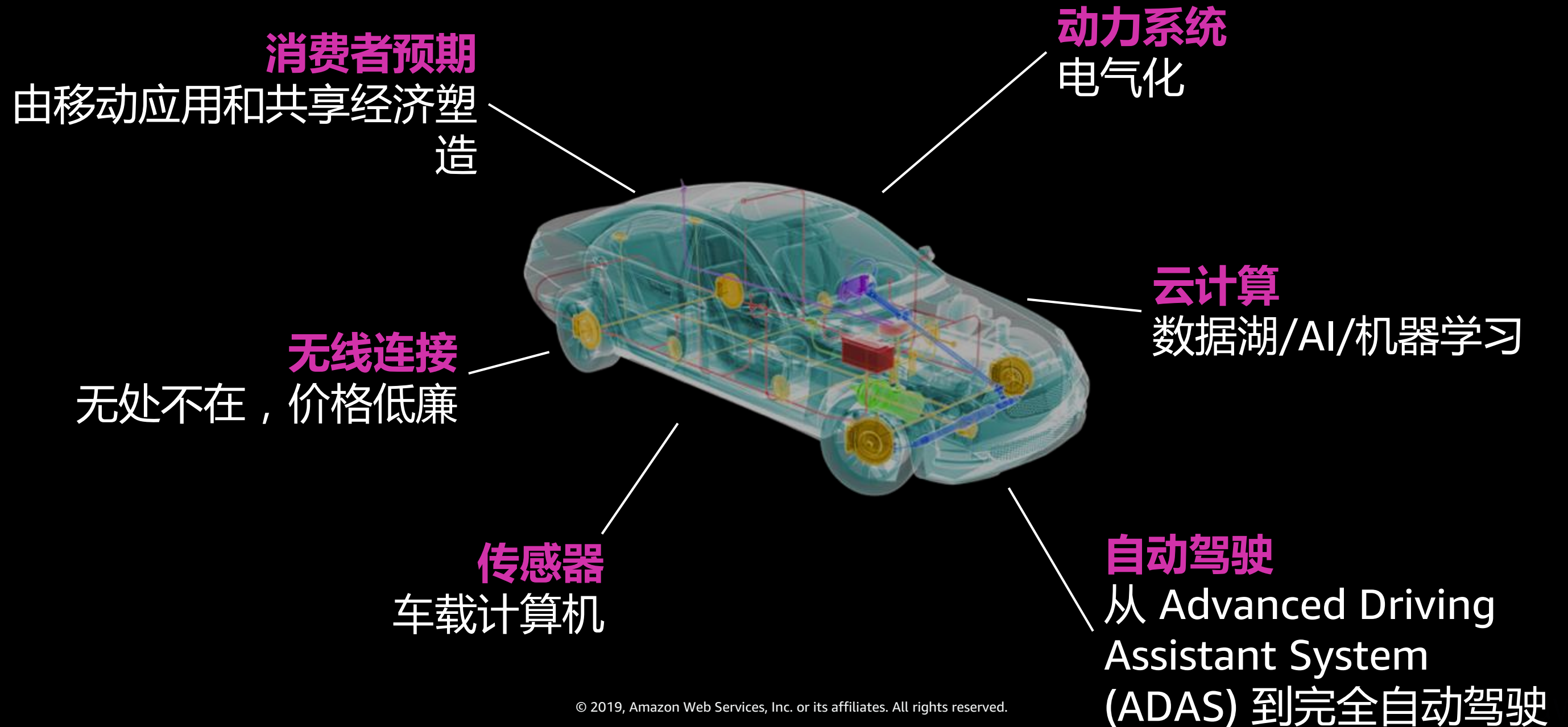
ONLINE CONFERENCE

分会场五：物联网

基于 AWS IoT 的智能车联网参考架构

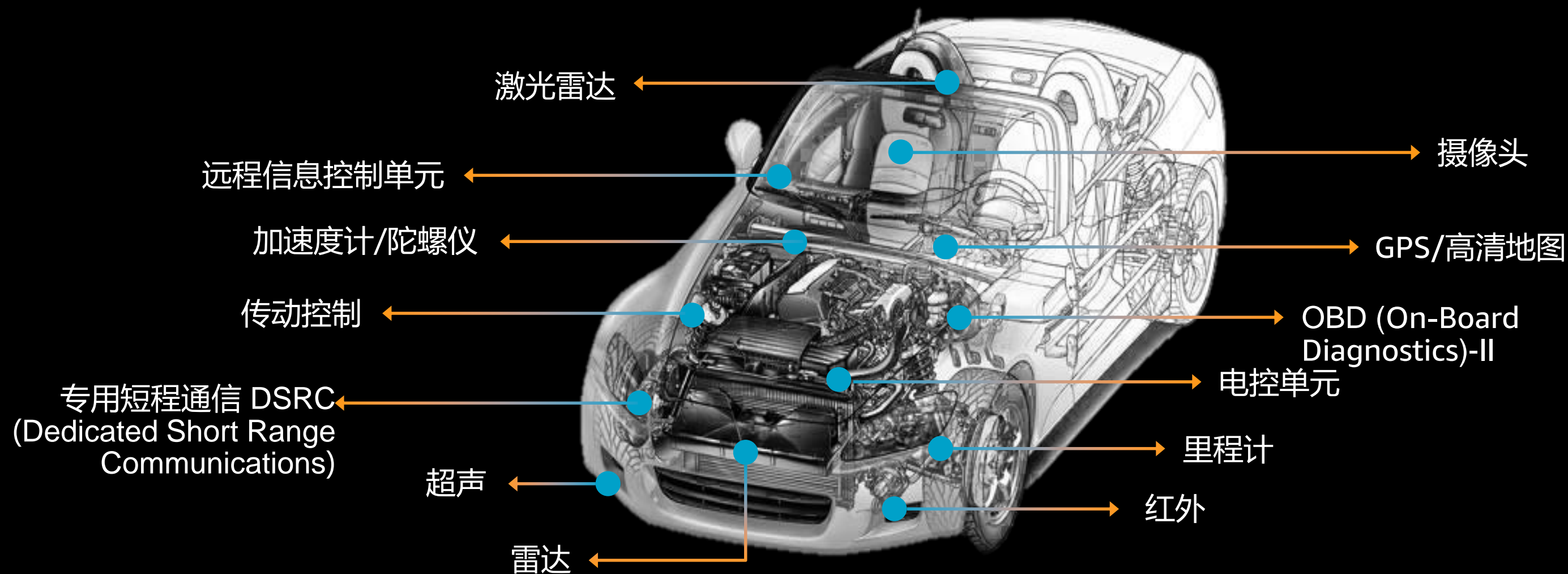
吴鹏程，AWS 解决方案架构师

汽车行业正迎来百年变局



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车辆是滚动传感器群，不同子系统时刻生成大量数据



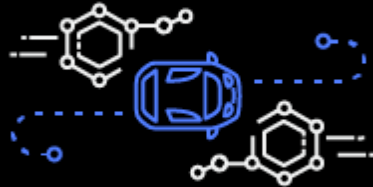
AWS 在汽车行业的解决方案

专注于最终用户、IT 转型的企业解决方案

产品转型



车联网服务



自动驾驶开发

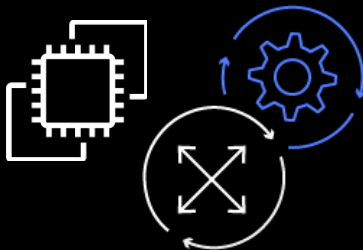


数字化客户互动

企业转型



大数据和分析



产品研发和设计

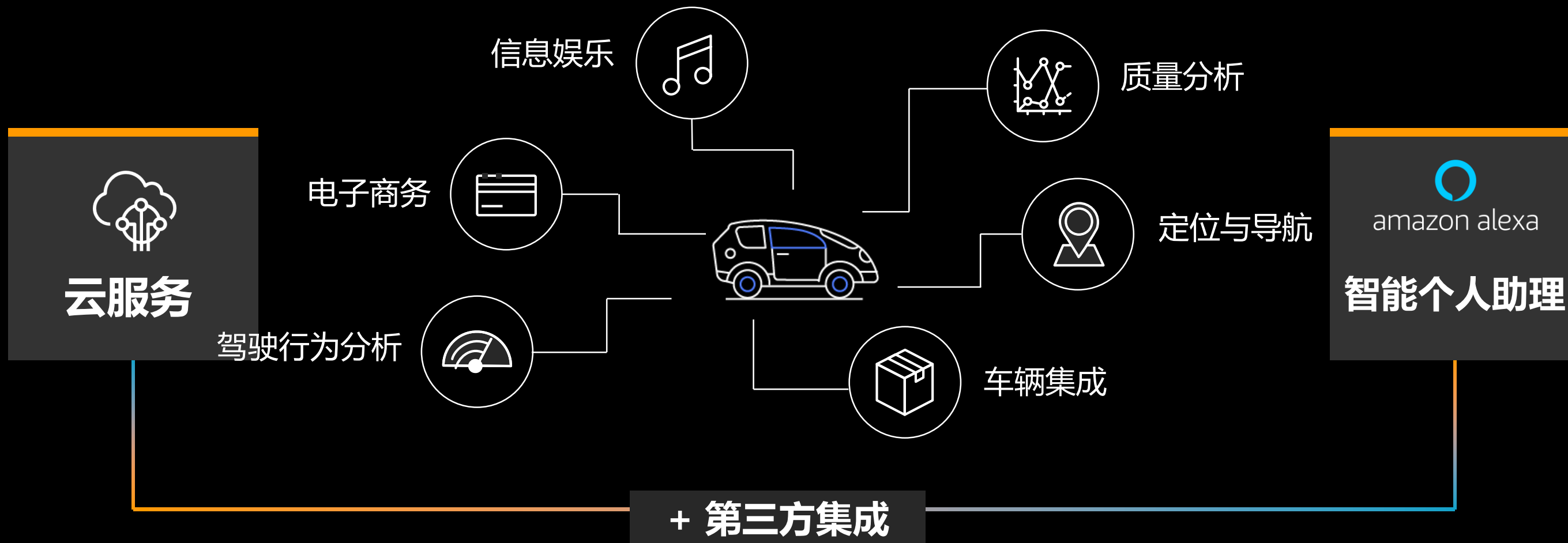


企业级工作负载



亚马逊的车联网方法论

提供各种服务、产品和功能的整体视图



车联网参考架构

- 使用 AWS Connected Vehicle Quick Start，在几分钟内使用“良好架构”的架构开始原型设计
- 部署到您自己的 AWS 账户
- 向社区开源，可自定义开发
- 删除或添加其他 AWS 和合作伙伴服务
- 轻松连接您自己的数据或您自己的设备

参考和部署文档 <https://aws.amazon.com/answers/iot/connected-vehicle-solution/>

完整源代码 <https://github.com/aws-labs/aws-connected-vehicle-solution>

AWS Answers

AWS Connected Vehicle Solution

How do I implement connected vehicle services on AWS?

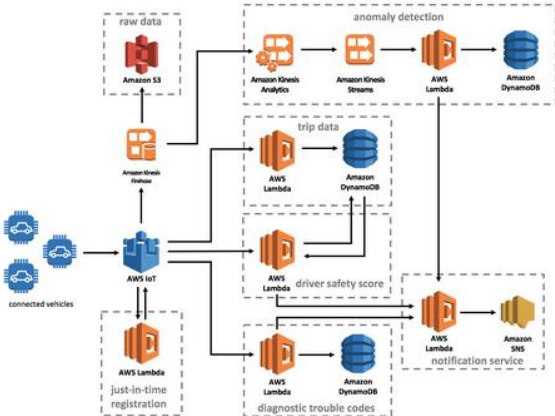
Amazon Web Services (AWS) enables automotive manufacturers and suppliers to build serverless IoT applications that gather, process, analyze, and act on connected vehicle data, without having to manage any infrastructure. With AWS IoT, customers can connect vehicles and devices to the AWS Cloud securely, with low latency and with low overhead.

To help customers more easily develop and deploy a wide range of innovative connected vehicle services, AWS offers a connected vehicle solution that provides secure vehicle connectivity to the AWS Cloud, and includes capabilities for local computing within vehicles, sophisticated event rules, and data processing and storage.

The connected vehicle solution is designed to provide a framework for connected vehicle services, allowing you to focus on extending the solution's functionality rather than managing the underlying infrastructure operations. You can build upon this framework to address a variety of use cases such as voice interaction, navigation and other location-based services, remote vehicle diagnostics and health monitoring, predictive analytics and required maintenance alerts, media streaming services, vehicle safety and security services, head unit applications, and mobile applications.

AWS Solution

The connected vehicle solution helps you implement secure vehicle connectivity to the AWS Cloud, and includes capabilities for local computing within vehicles, sophisticated event rules, and data processing and storage. The diagram below presents the components and functionality you can build using the solution implementation guide and accompanying AWS CloudFormation template.



- When AWS IoT receives a message, it authenticates the message and the Rules Engine executes the appropriate rule on the message, which routes the message to the appropriate backend application.
- An AWS IoT rule sends telematics data to an Amazon Kinesis Firehose delivery stream, which encrypts and streams raw vehicle telematics data to an Amazon S3 bucket. If an Amazon Kinesis Analytics application detects an anomaly, the record is sent to Amazon Kinesis Streams, which invokes an AWS Lambda function that parses the record, stores it in an Amazon DynamoDB table, and triggers an Amazon Simple Notification Service (Amazon SNS) notification to users.
- The trip data AWS IoT rule invokes an AWS Lambda function that processes vehicle telematics data during a trip and stores it in a DynamoDB table.
- The driver safety score AWS IoT rule detects the end of a trip and invokes an AWS Lambda function that processes aggregate trip data to generate a driver's safety score, trigger an Amazon SNS notification to the driver, and add the score to the trip data table.
- The diagnostic trouble code AWS IoT rule detects diagnostic trouble codes in the IoT topic and invokes Lambda functions that store the trouble code in a DynamoDB table, translate the trouble code into layman's terms, and trigger an Amazon SNS notification to the user.

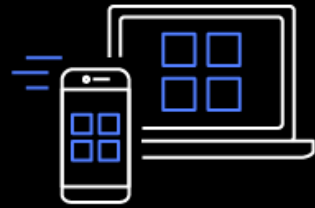
Deploy Solution

Implementation Guide

Download PDF Implementation Guide

AWS 车联网使用场景

车联网平台



安全的数
据处理



驾驶行为分
析



异常检测



分析故障



位置相关服务

采用 AWS 车联网方案的优势

消除无差别的繁重工作，专注于创造引人注目的车联网服务

无服务器

托管化

基于微服务

可扩展

按使用付费

开源



不需要花精力管理服务器和打补丁



灵活应对容量变化和功能需求



最小化初期投资

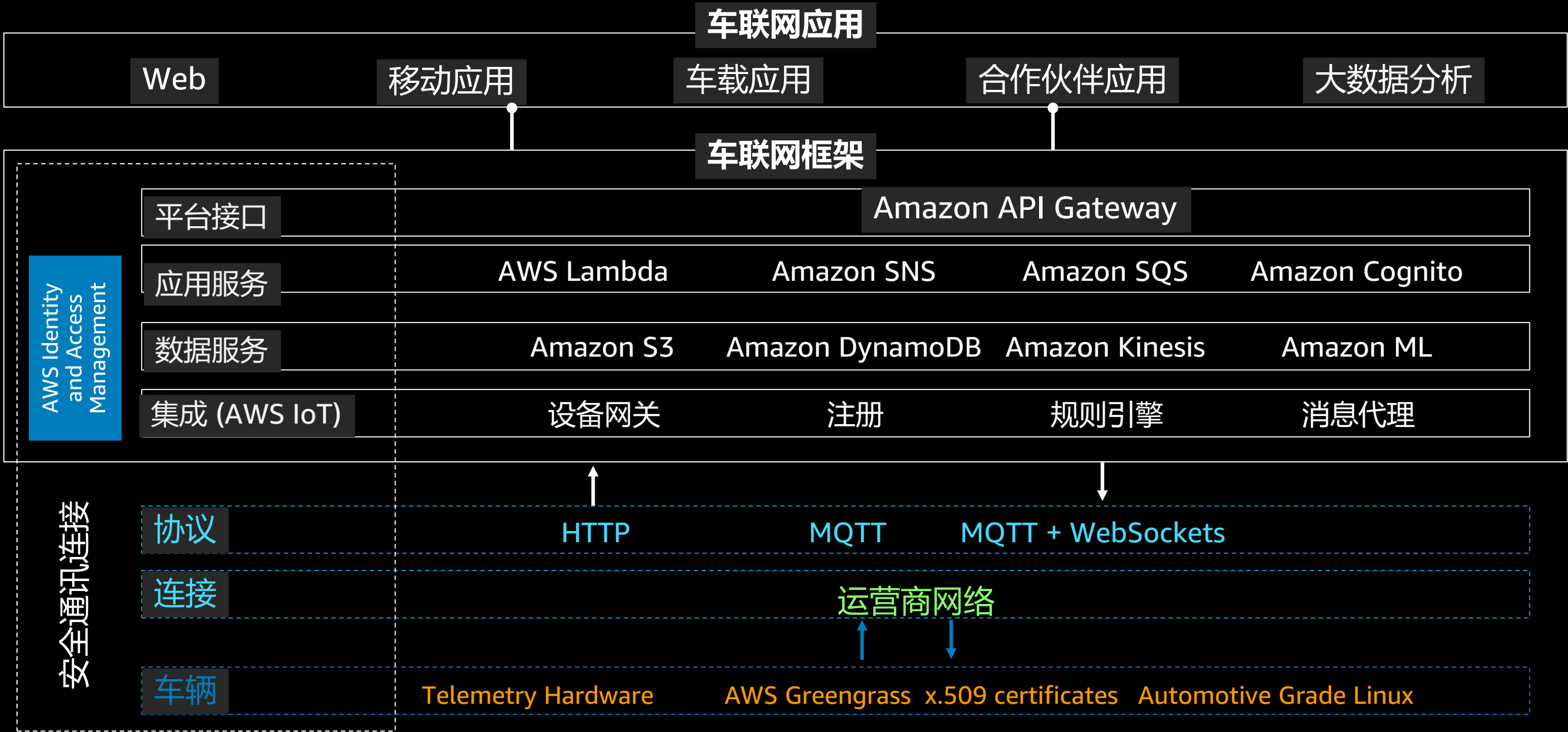
AWS 车联网解决方案细节

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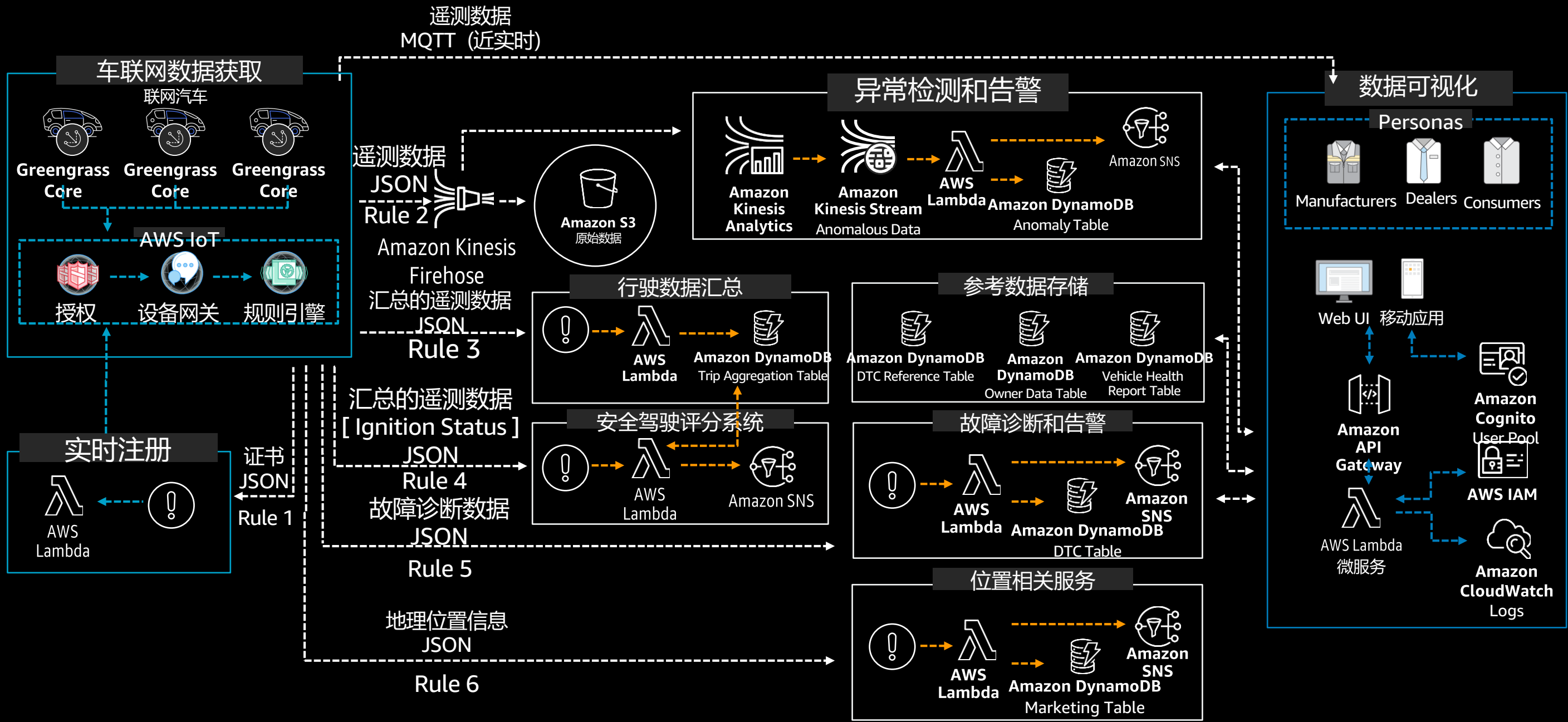


AWS 中国（宁夏）区域由西云数据运营
AWS 中国（北京）区域由光环新网运营

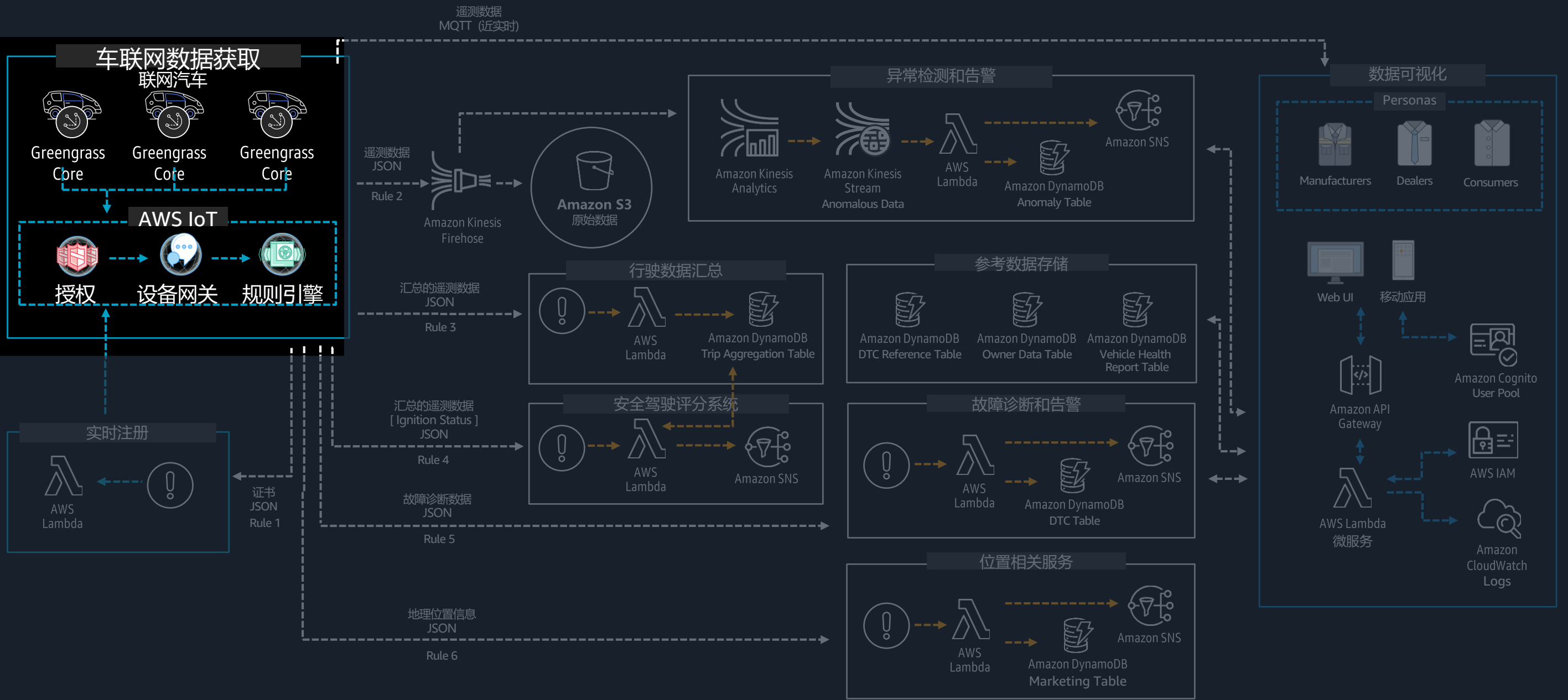
AWS 车联网解决方案技术栈



AWS 车联网参考架构

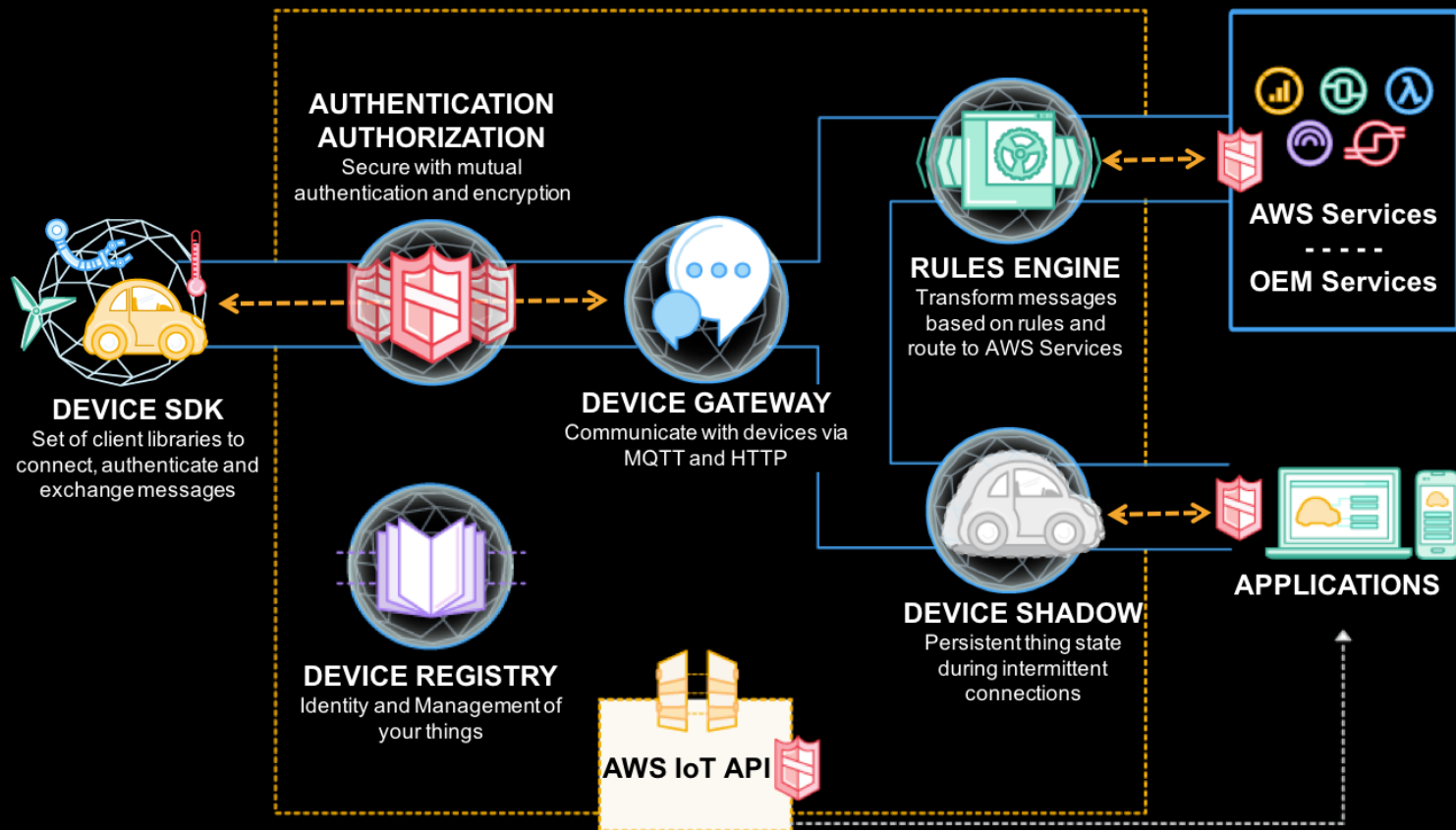


AWS 车联网解决方案—边缘和 IoT



与车辆安全地通讯

连接到 AWS 服务，保护数据和交互，处理和响应



轻松将车辆连接到 AWS 云

保护车辆连接和数据

使用简单的规则引擎处理和响应接收的数据

跟踪车辆元数据，例如属性和功能

SDK 可以轻松快速地连接车辆

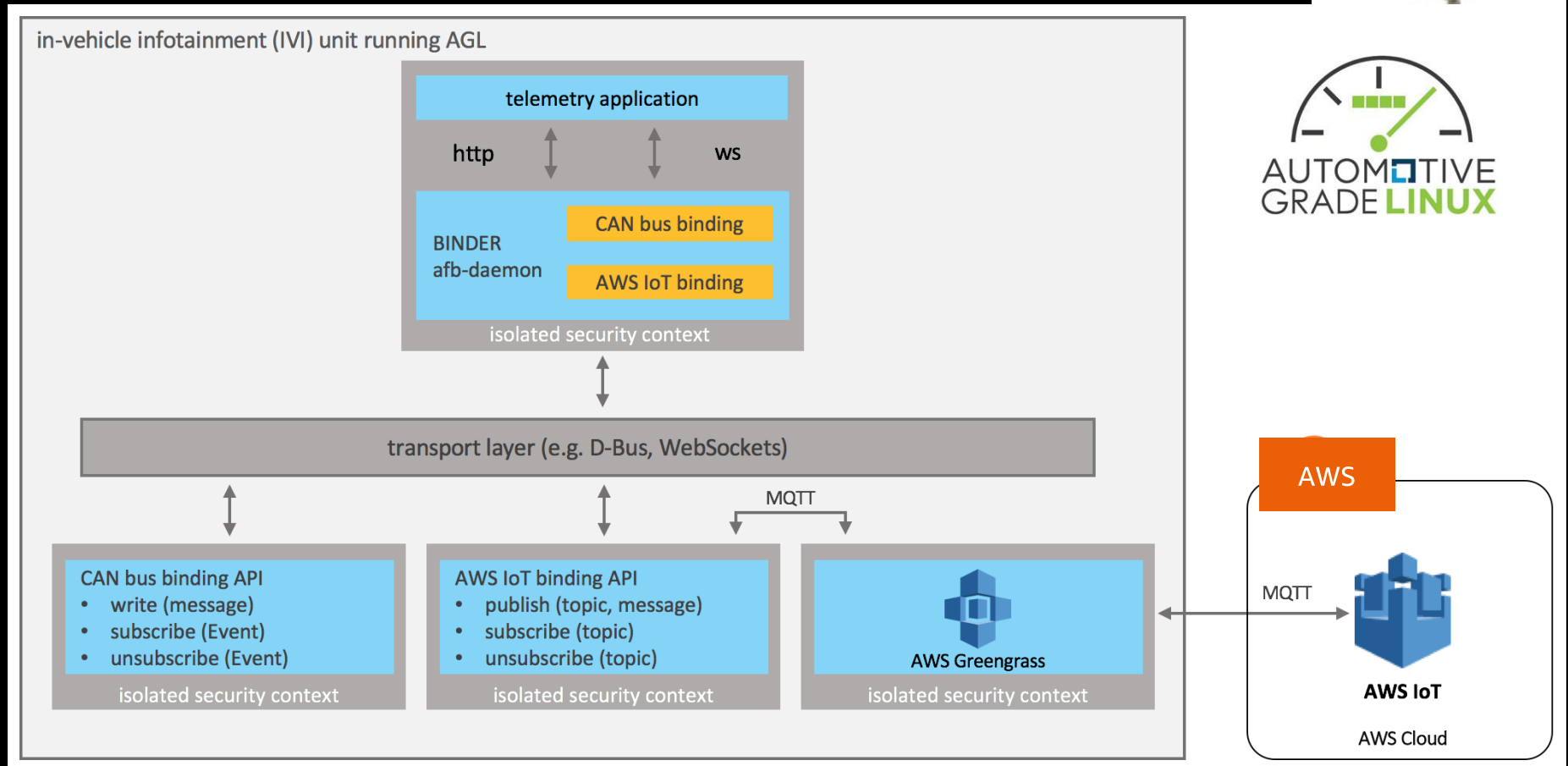
与 Automotive Grade Linux (AGL) 做车载系统集成

与 Automotive Grade Linux 应用框架集成

R-Car M3



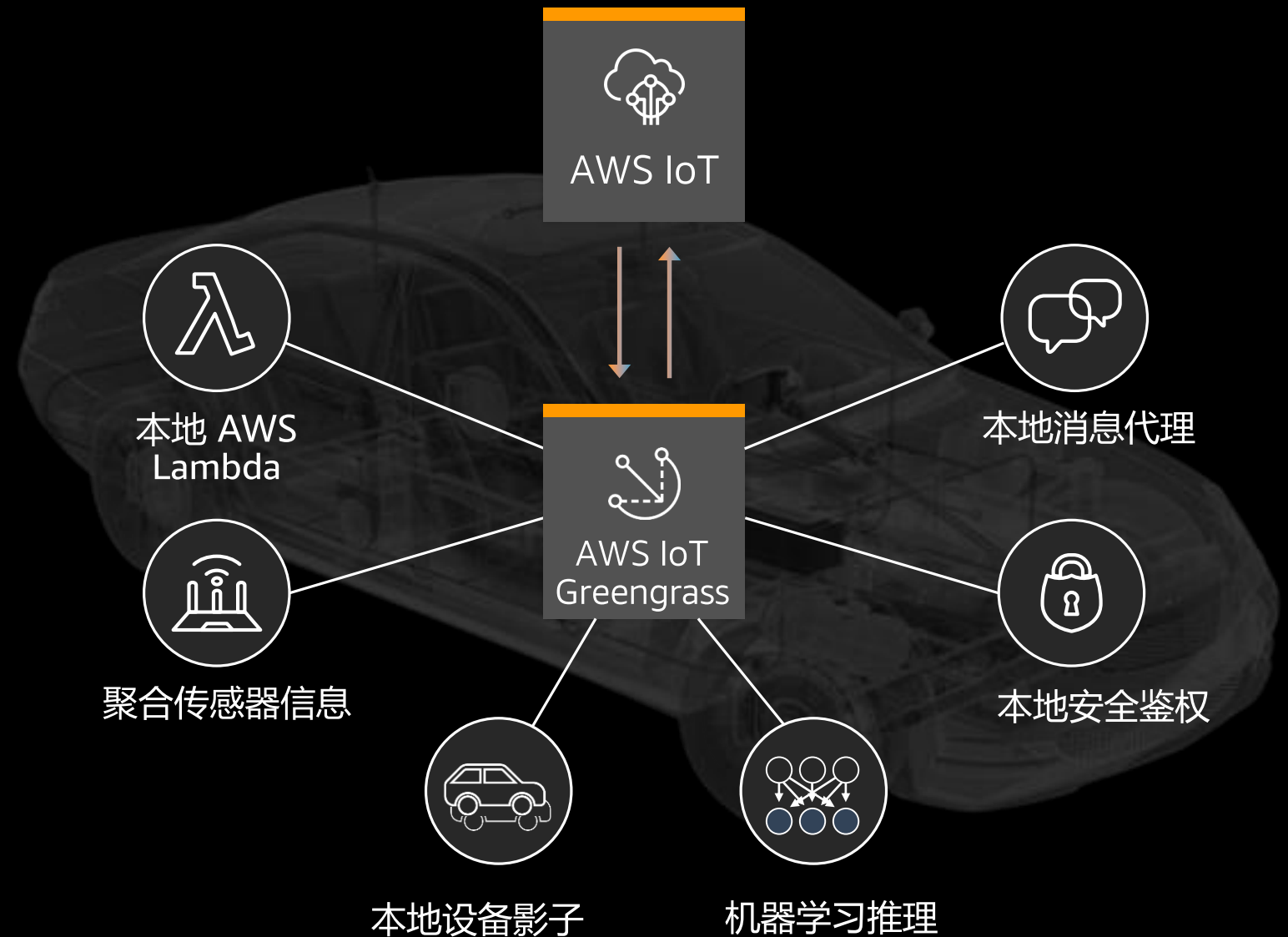
- 与 Yocto 开源社区集成构建方案
- 本地 AWS IoT Greengrass 服务
- 与 AGL App Framework 集成的自定义 IoT 服务代理
- 与现有 AGL 服务接口的发布/订阅 Web 套接字
- 轻松将车辆连接到参考架构



在本地处理和响应车辆产生的数据

快速响应当地事件，适合网络连接不稳定的场景

- 快速回应当地事件
- 离线操作并与云同步
- 使用 Python, Java, Node.js 简化使用 AWS Lambda 的设备编程
- 边缘的机器学习推理
- 本地消息代理



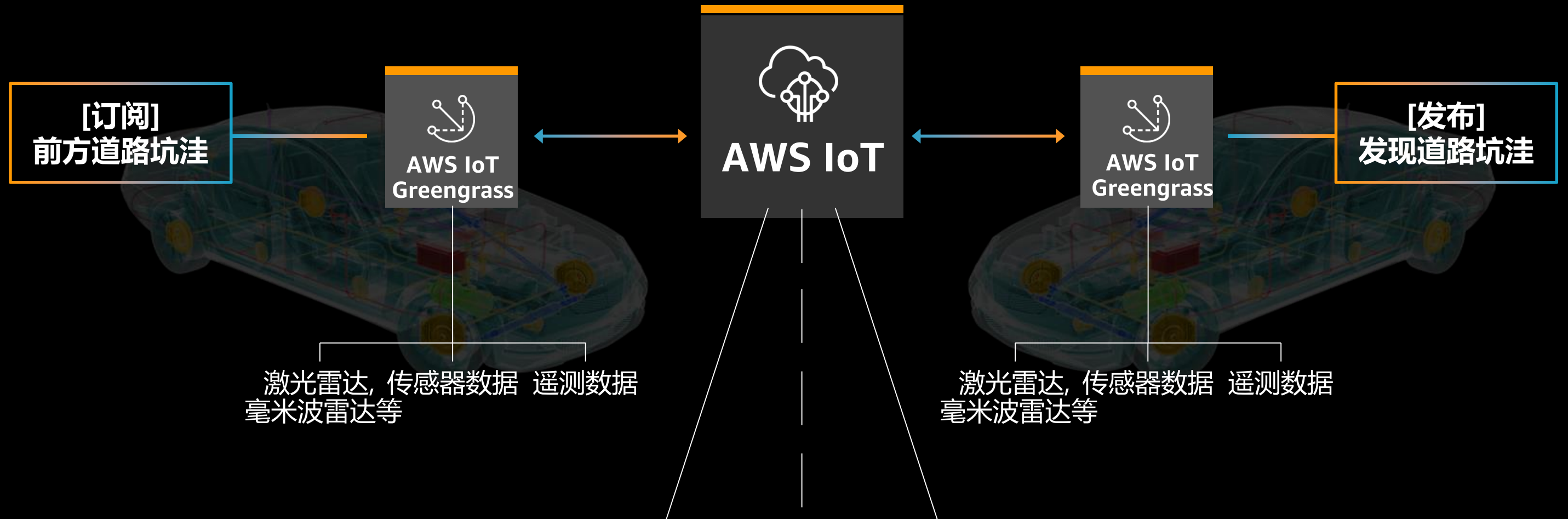
示例 – 驾驶员行为检测

模型由 Amazon SageMaker 进行训练，并由 AWS DeepLens 在本地推理



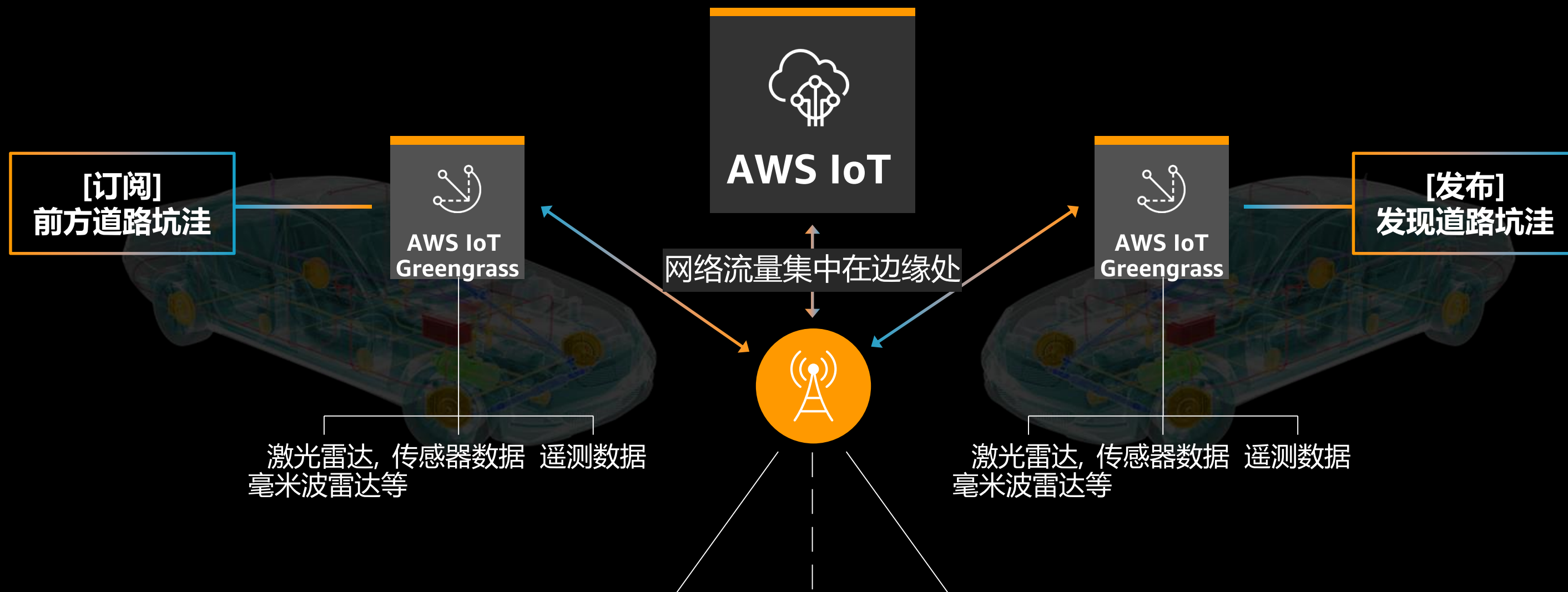
通过云实现车对车通信

与其他车辆分享事故，坑洼，冰冻路面和下雨等道路状况

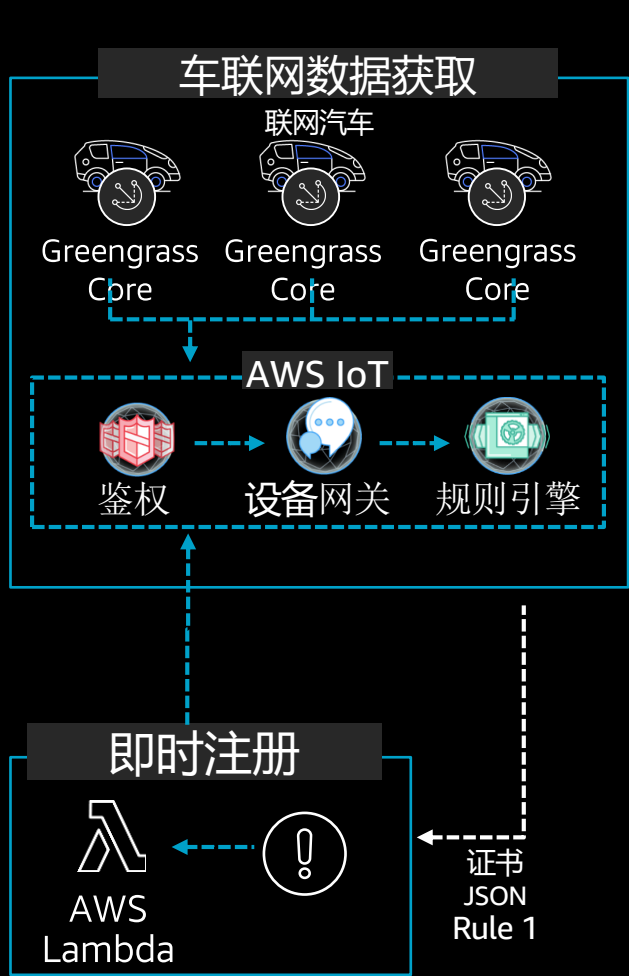


多维边缘计算和 C-V2X

借助在边缘处做本地路由的技术，共享道路状况和安全事件可以更快



AWS 车联网方案的消息主题

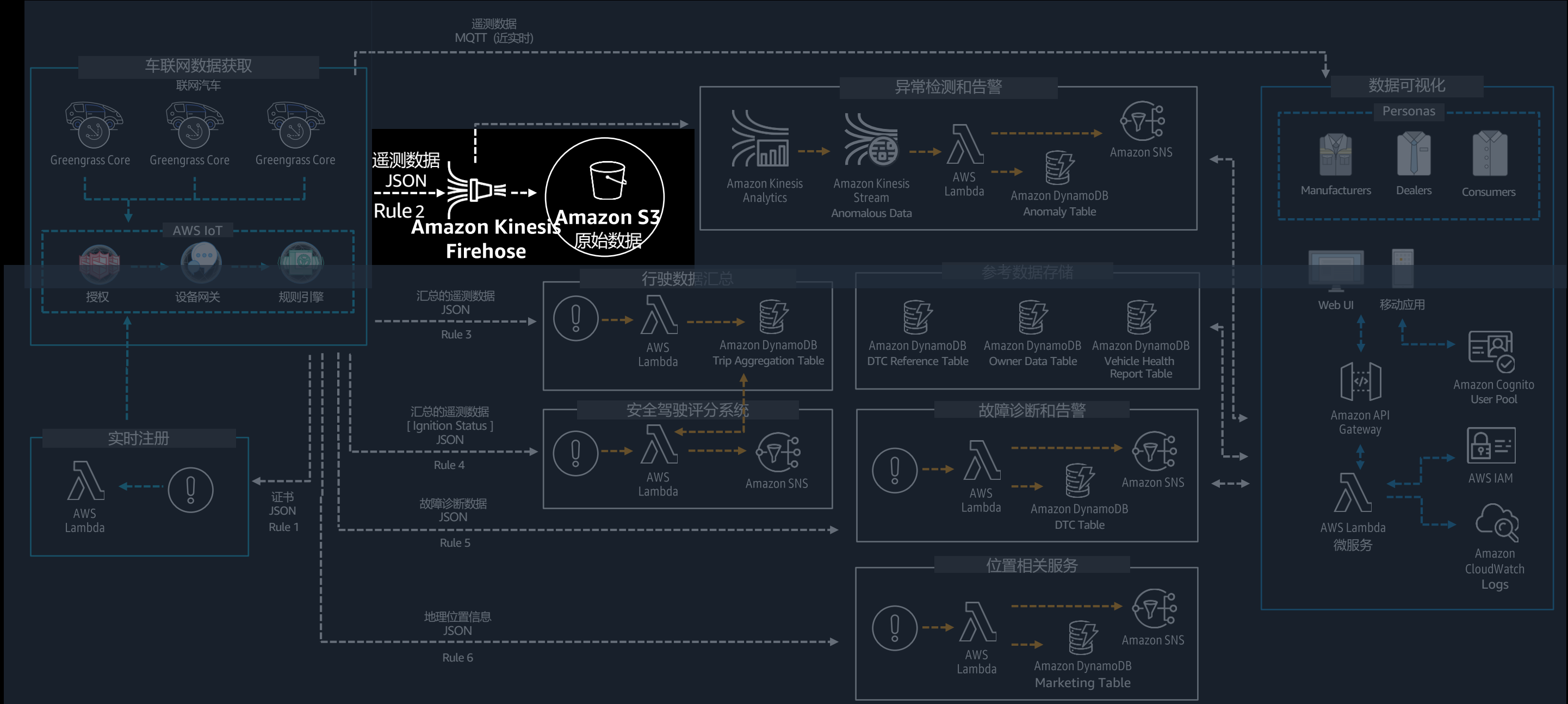


消息	主题	动作
OBD 车载系统	connectedcar/telemetry/<VIN>	Publish
车辆行程信息	connectedcar/trip/<VIN>	Publish
故障诊断码	connectedcar/dtc/<VIN>	Publish
异常告警	connectedcar/alert/<VIN>/anomaly	Subscribe
故障告警	connectedcar/alert/<VIN>/dtc	Subscribe
驾驶评分告警	connectedcar/alert/<VIN>/driverscore	Subscribe
广播告警	connectedcar/telemetry/<VIN>/info	Subscribe

示例消息内容：

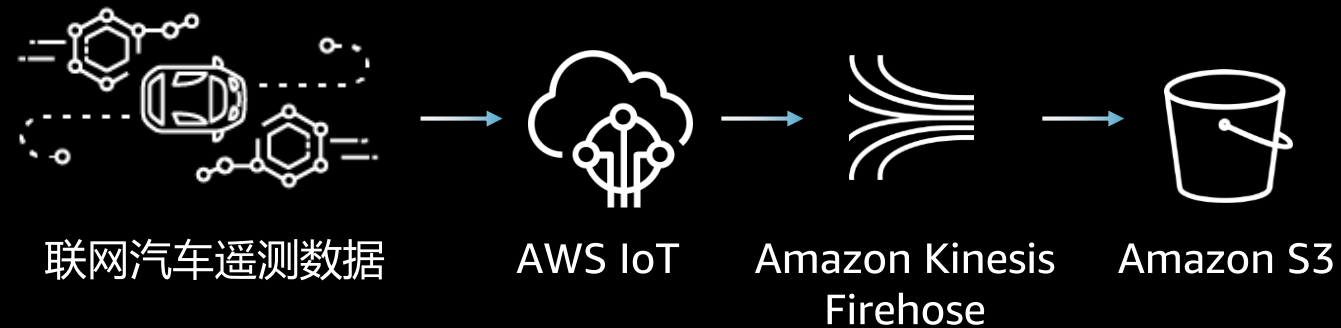
```
{
  "name": "speed", "
  value": 47.4,
  "vin": "1NXBR32E84Z995078",
  "trip_id": "799fc110-fee2-43b2-a6ed-a504fa77931a",
  "timestamp": "2018-02-15 18:50:18.000000000"
}
```

AWS 车联网解决方案—数据收集



安全地存储大规模车联网数据

使用简单的 Web 服务界面存储和检索任意数量的车辆数据



与其他 AWS 服务深度集成

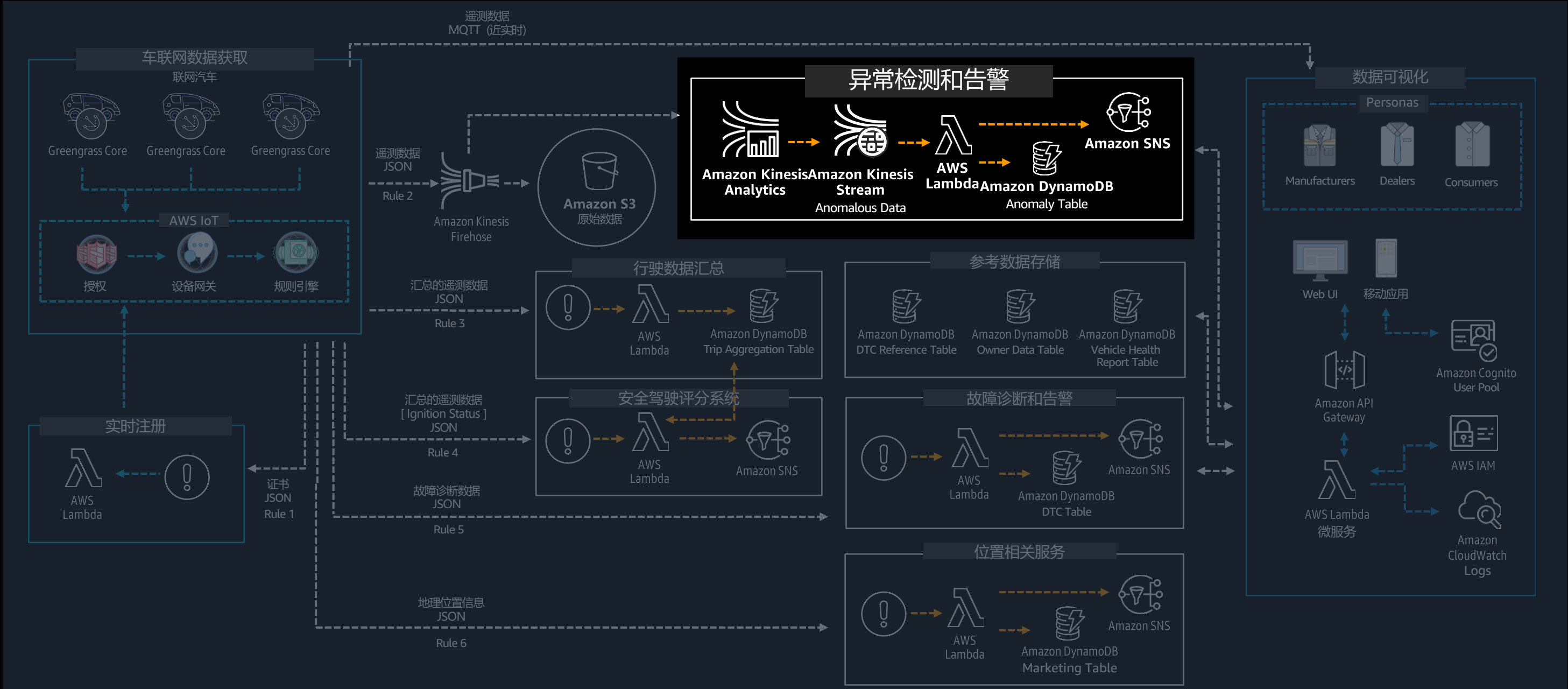
在行驶和静止时保护车辆数据

以低成本存储大量车辆数据

专为高达 99.99% 的可用性而设计

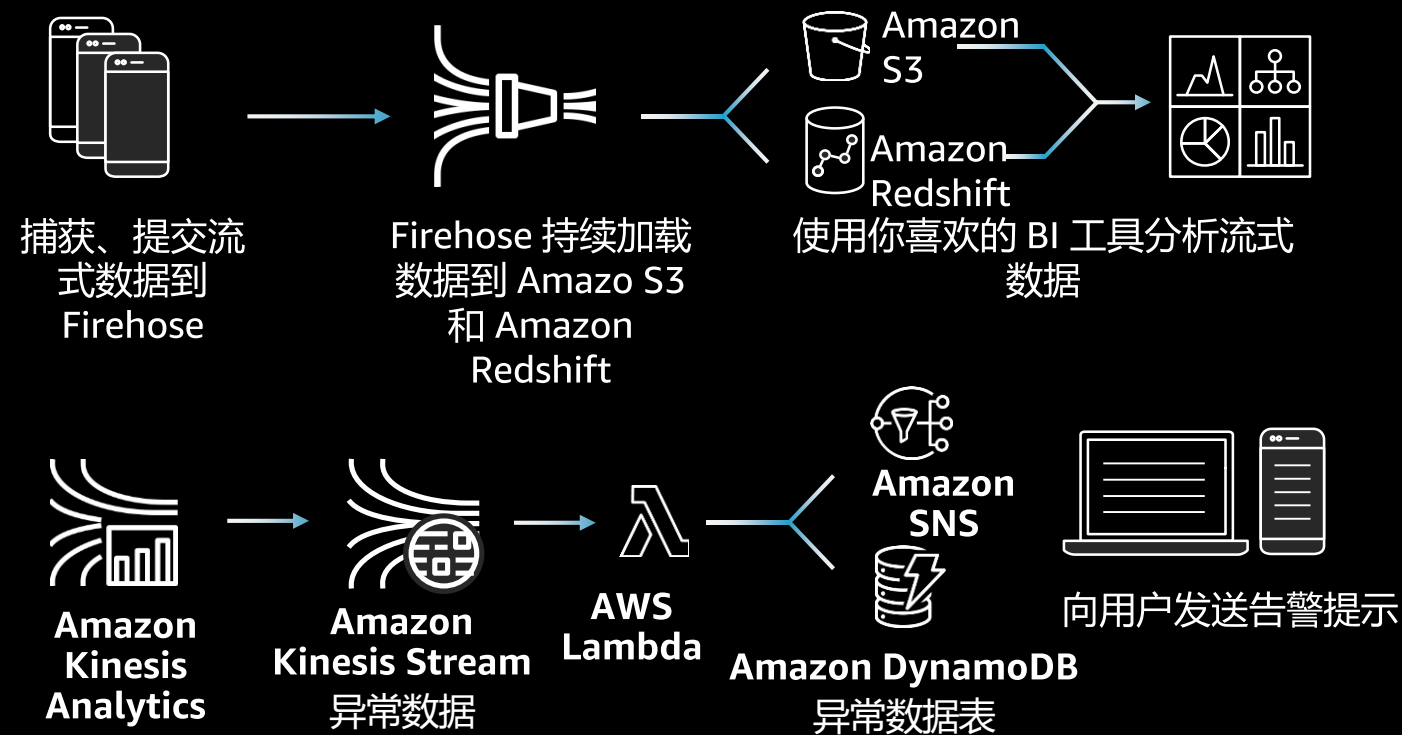
旨在提供 99.999999999% 耐用性

AWS 车联网解决方案—异常检测



收到车联网数据时立即响应

捕获，存储和分析流媒体连接的车辆遥测数据



每小时快速加载 TB 级数据流

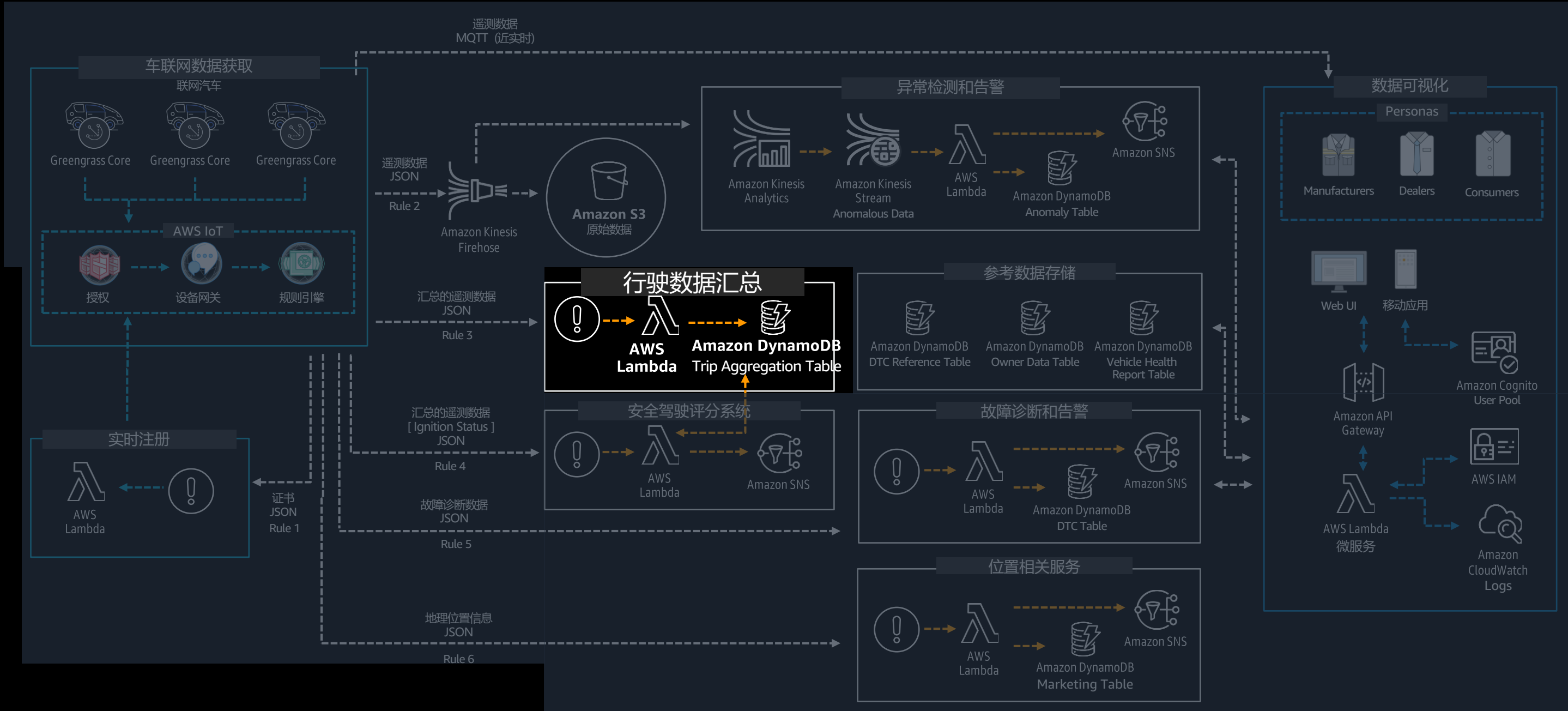
对车辆流式数据执行实时分析

利用专用算法利用多阶段处理

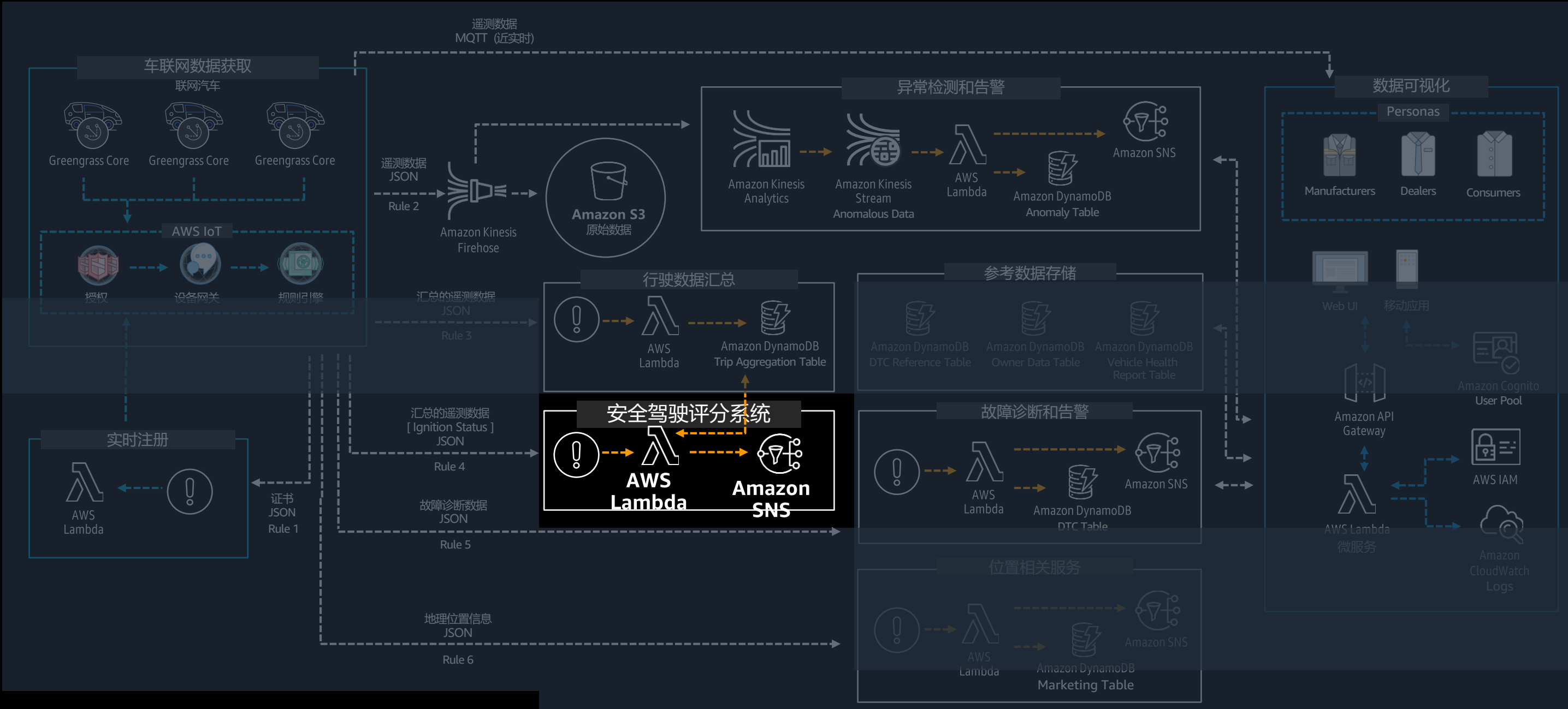
为传输中的数据可靠存放的临时存储

自定义流分片，以更好地控制缩放

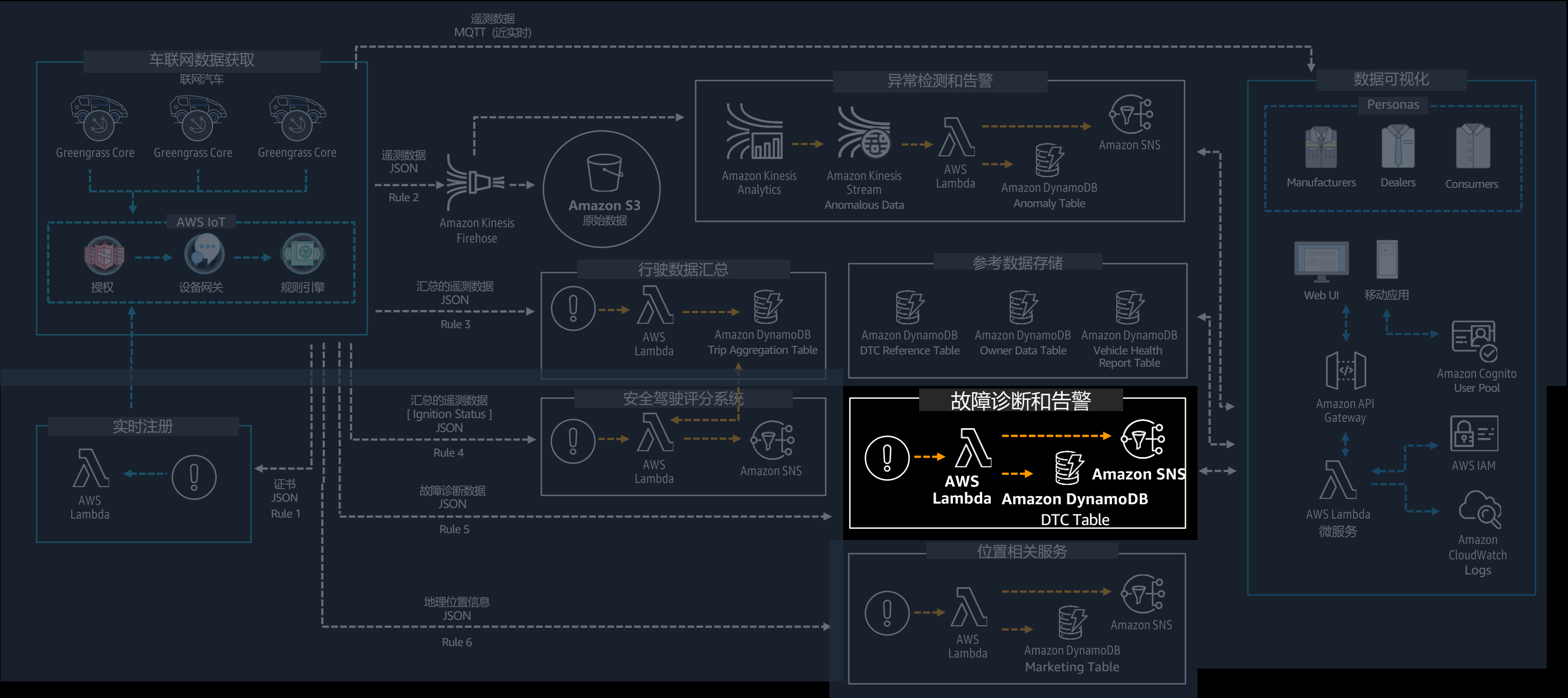
AWS 车联网解决方案—行驶数据聚合



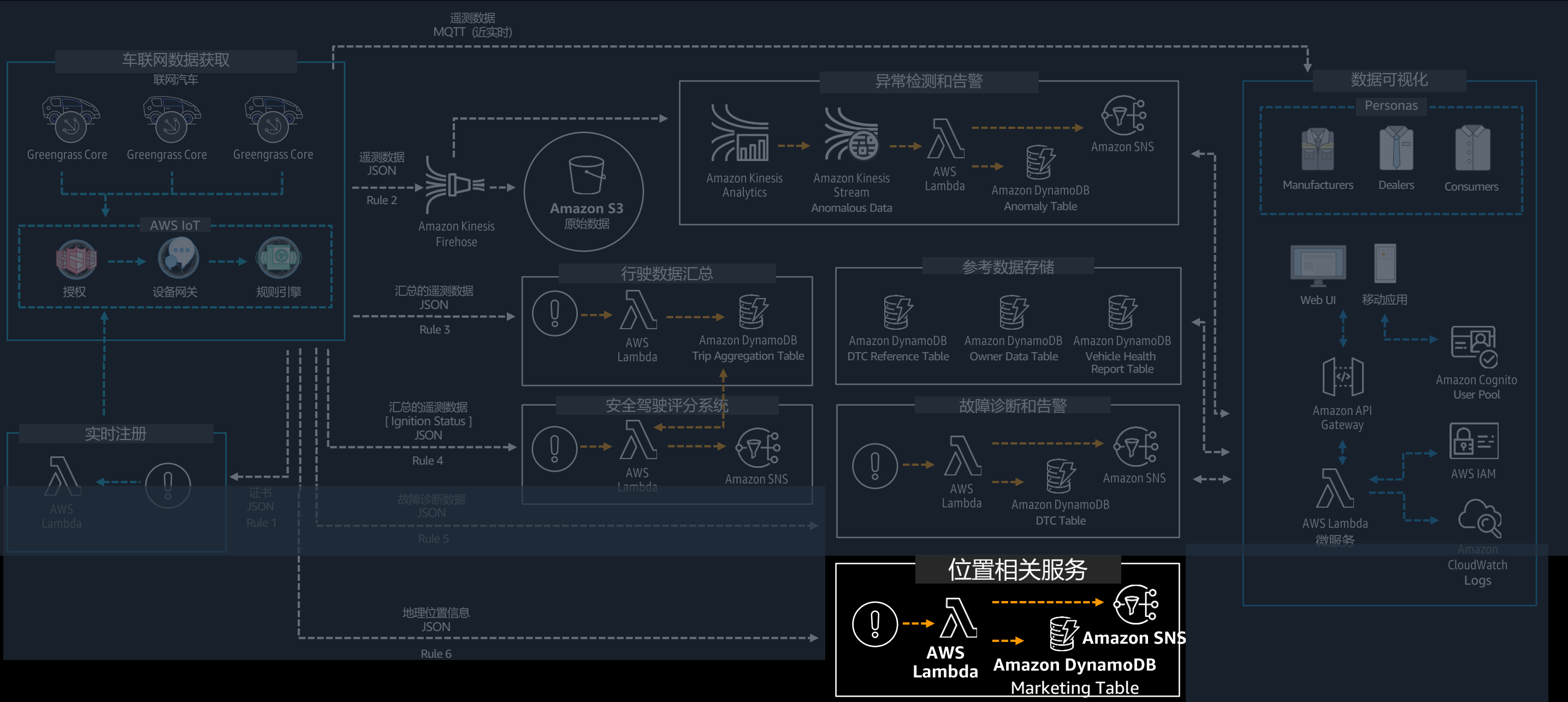
AWS 车联网解决方案—安全驾驶评分



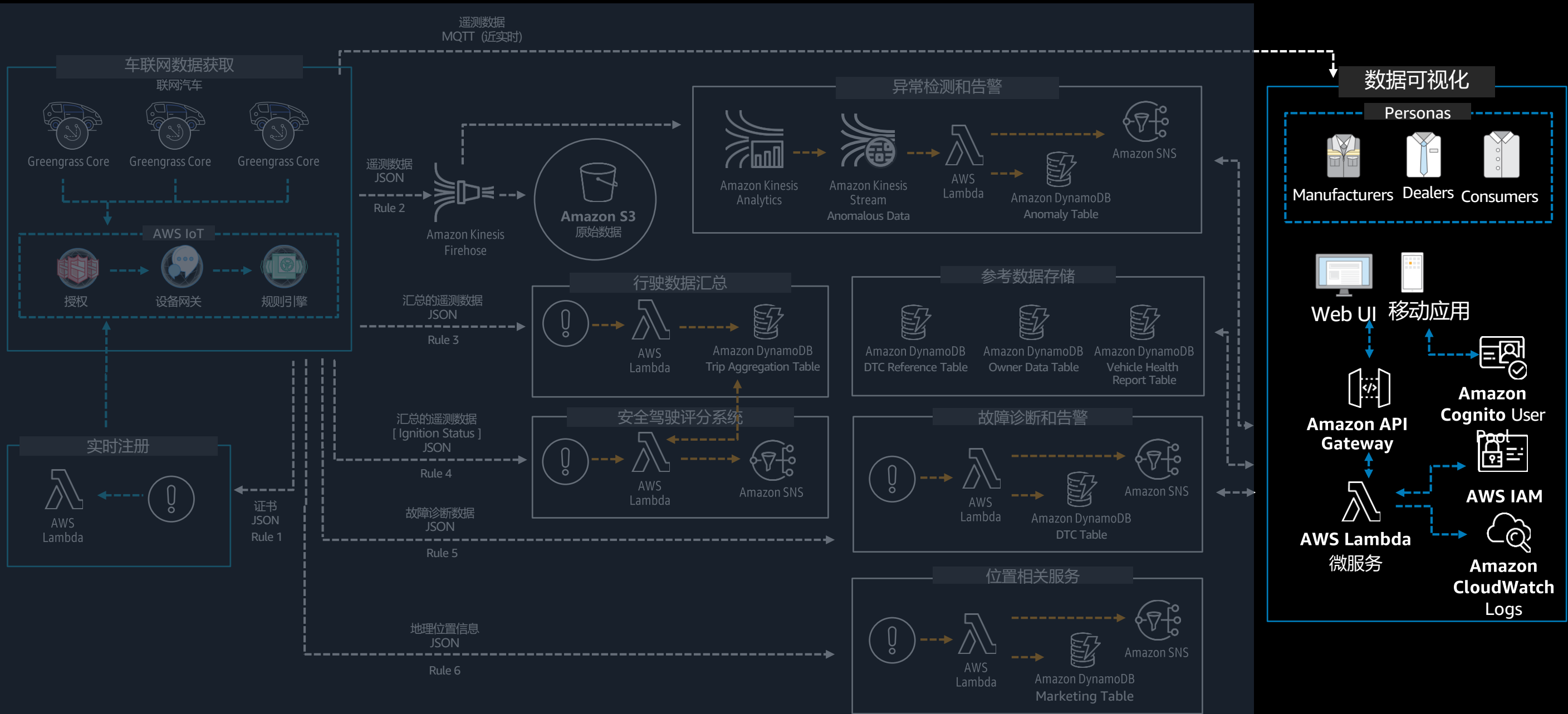
AWS 车联网解决方案—故障诊断



AWS 车联网解决方案—位置服务



AWS 车联网解决方案—应用的 API 接口

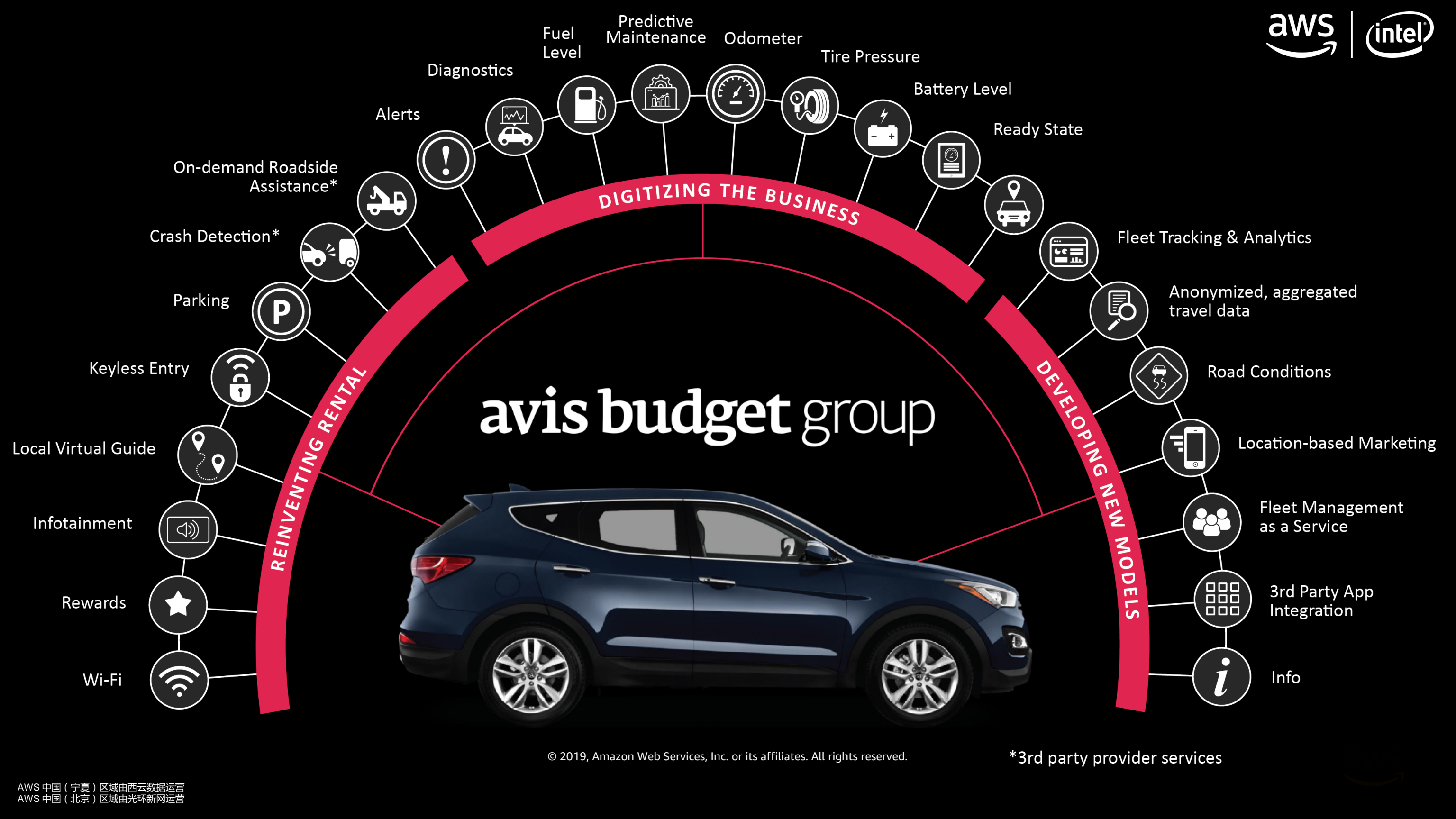


基于 AWS 的车联网案例 - 安飞士租车

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AWS 中国（北京）区域由光环新网运营



Demo 演示

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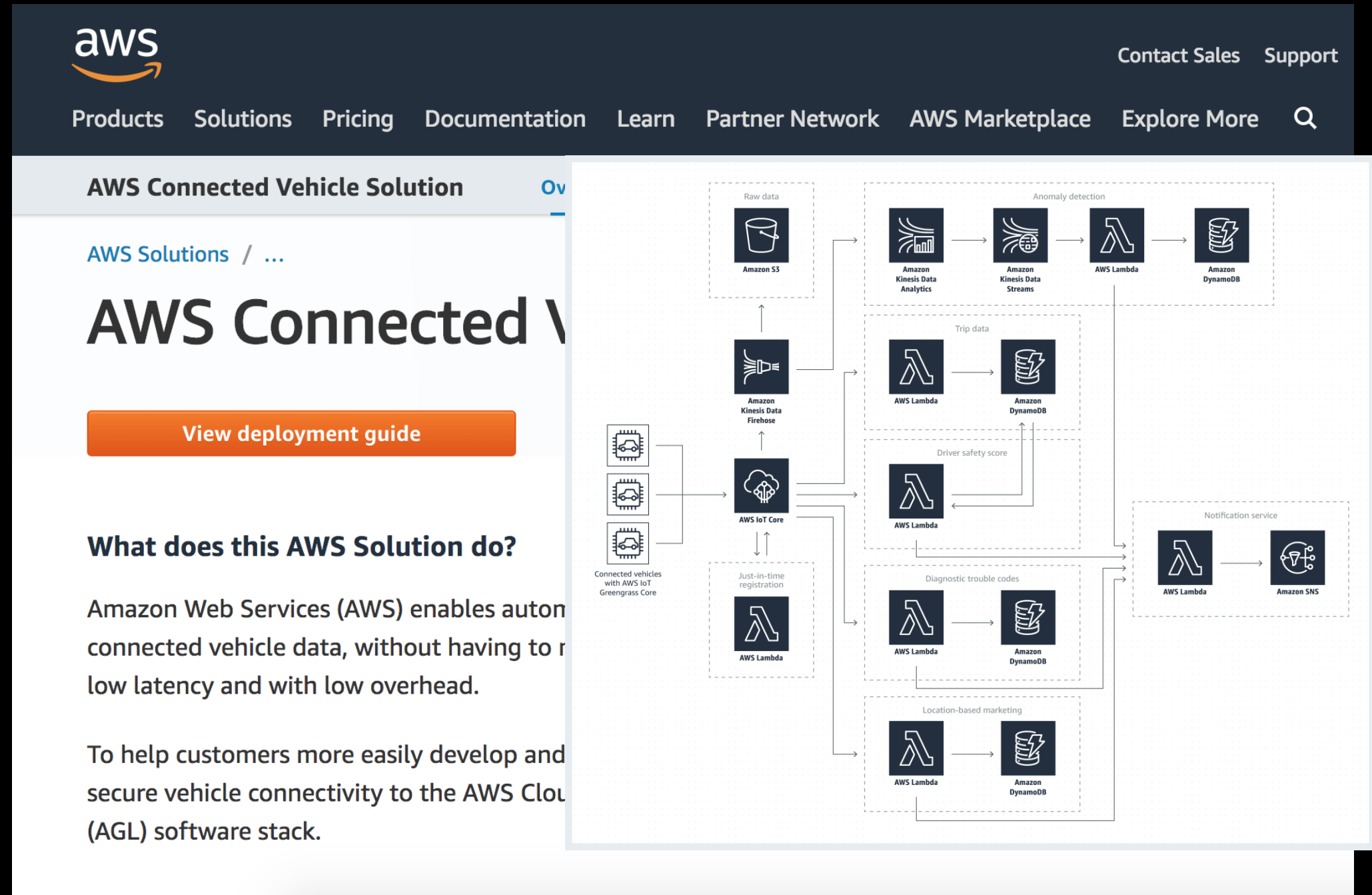
AWS 中国（宁夏）区域由西云数据运营
AWS 中国（北京）区域由光环新网运营

AWS 车联网参考架构部署模板

基于 AWS IoT 搭建云端的车联网系统，采集和处理车辆数据

1. 要在您自己的帐户中部署的Amazon Cloudformation 模板
2. 根据预定义的消息主题定制车辆端的消息，并发送给云端
3. 可以用 IoT 设备模拟器来模拟车辆

<https://aws.amazon.com/cn/solutions/aws-connected-vehicle-solution/>

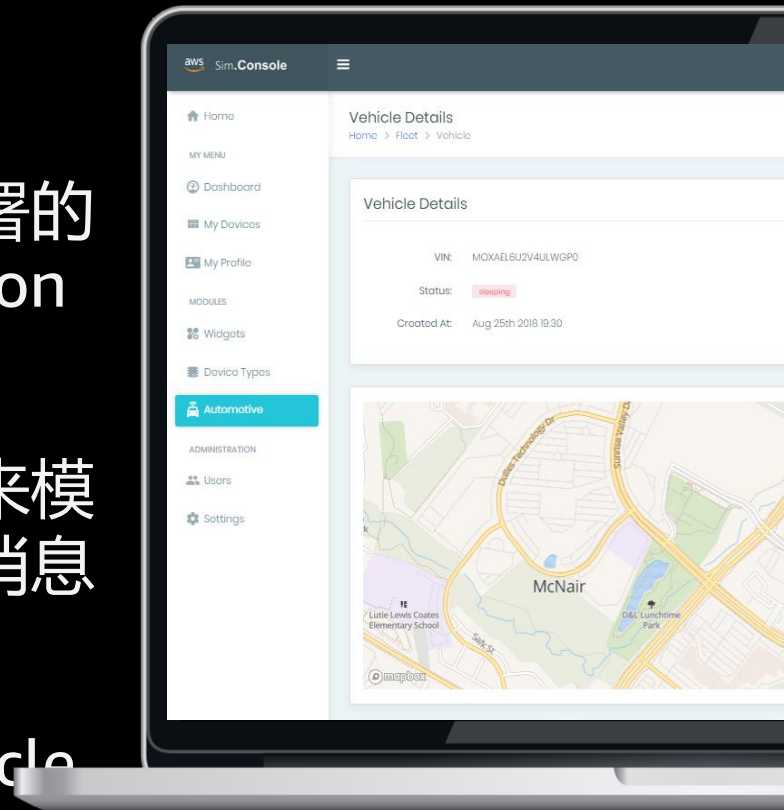


AWS IoT 设备模拟器

模拟 IoT 设备向 AWS IoT 服务发送 MQTT 消息

1. 要在您自己的帐户中部署的 Amazon CloudFormation 模板
2. 用内置的汽车“设备”来模拟联网的汽车，并发送消息给云端
3. 适用于 Connected Vehicle 参考架构

<https://aws.amazon.com/answers/iot/iot-device-simulator/>



AWS Answers

IoT Device Simulator

How do I create virtual IoT devices I can use to test my applications?

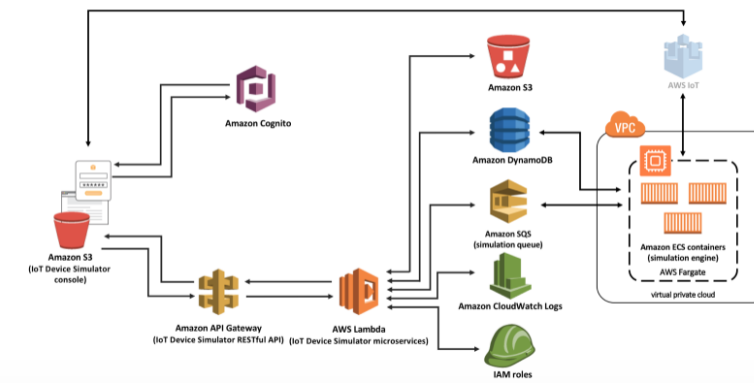
Amazon Web Services (AWS) provides many services to help customers build serverless IoT applications that gather, process, analyze, and act on connected device data, without having to manage any infrastructure, which can help reduce costs and increase productivity and innovation. But, it can be a challenge to test IoT applications and backend services without a large pool of connected devices.

To help customers more easily test device integration and IoT backend services, AWS offers the IoT Device Simulator solution. This solution provides a web-based graphical user interface (GUI) console that enables customers to create and simulate hundreds of virtual connected devices, without having to configure and manage physical devices, or develop time-consuming scripts.

This webpage provides best practices and guidance to consider when choosing a device-simulation solution, as well as an overview of the IoT Device Simulator.

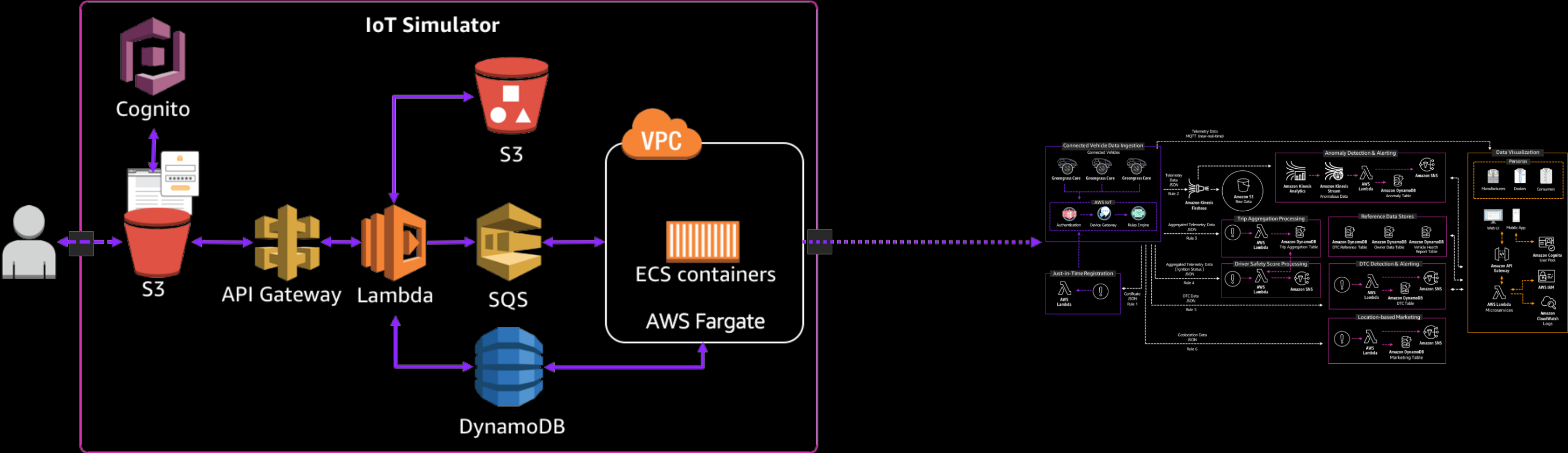
AWS Solution

AWS offers a device simulation solution that enables customers to build a large fleet of virtual connected devices (widgets) from a user-defined template and simulate those widgets publishing data at regular intervals to AWS IoT. You can also monitor individual widgets from the simulator or observe how backend services are processing the data. The diagram below presents the architecture you can deploy in minutes using the solution's implementation guide and accompanying AWS CloudFormation template.



1. The IoT Device Simulator includes a device simulator API, which leverages Amazon API Gateway to invoke the solution's microservices (AWS Lambda functions). These microservices provide the business logic to perform operations on virtual devices and device types, record simulation metrics, and perform administration tasks.
2. When the device simulator API receives an authorized request, Amazon API Gateway invokes the appropriate Lambda function. The Lambda function returns the execution results to the API, which returns the results to the simulator console.

车联网参考架构 + IoT 模拟器的工作架构



Demo 演示



CloudFormation ×

- Stacks
 - Stack details**
 - Change sets
 - Drifts
- StackSets
- Exports

Designer

Previous console

Feedback

ⓘ **Welcome to the redesigned AWS CloudFormation console**
We've completely redesigned the console to improve the overall look and feel. [Let us know what you think!](#) Or, [switch to the previous console.](#) ×

CloudFormation > Stacks > CV-demo: Stack details

CV-demo

Actions ▼

Stack info | Events | Resources | **Outputs** | Parameters | Template

Outputs (11)

🔍

Key ▲	Value ▼	Description ▼	Export name ▼

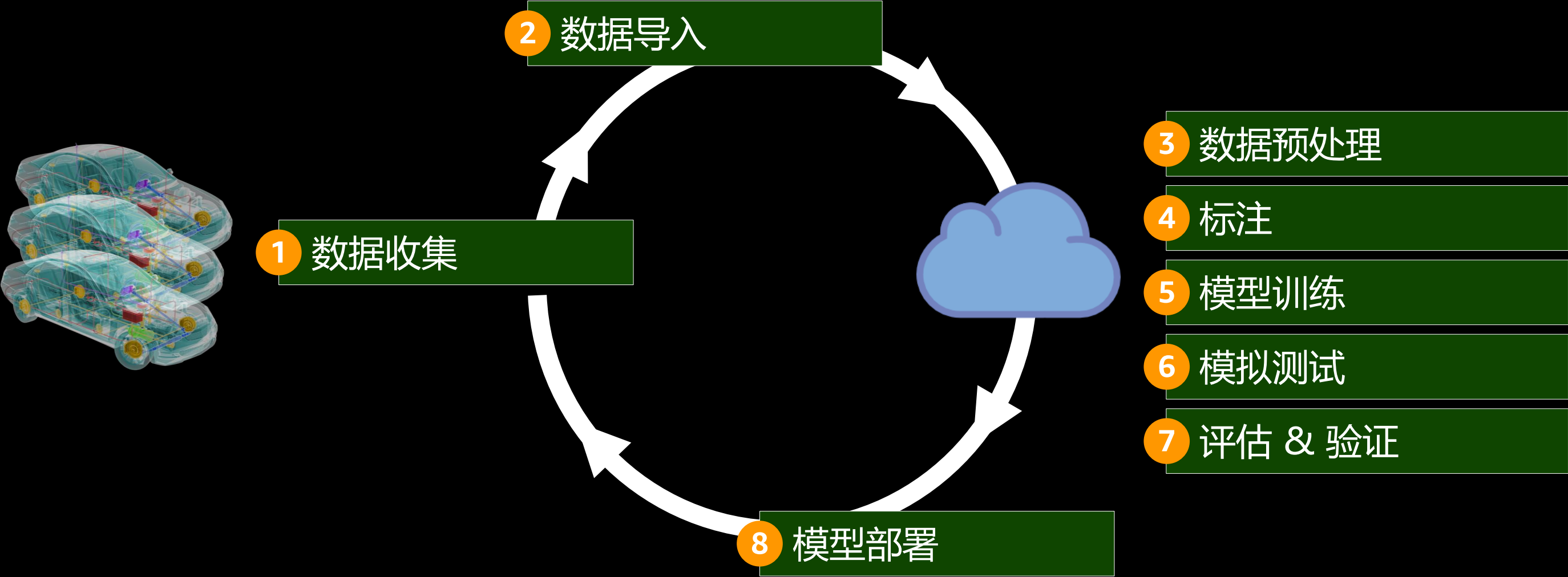
那么自动驾驶呢？

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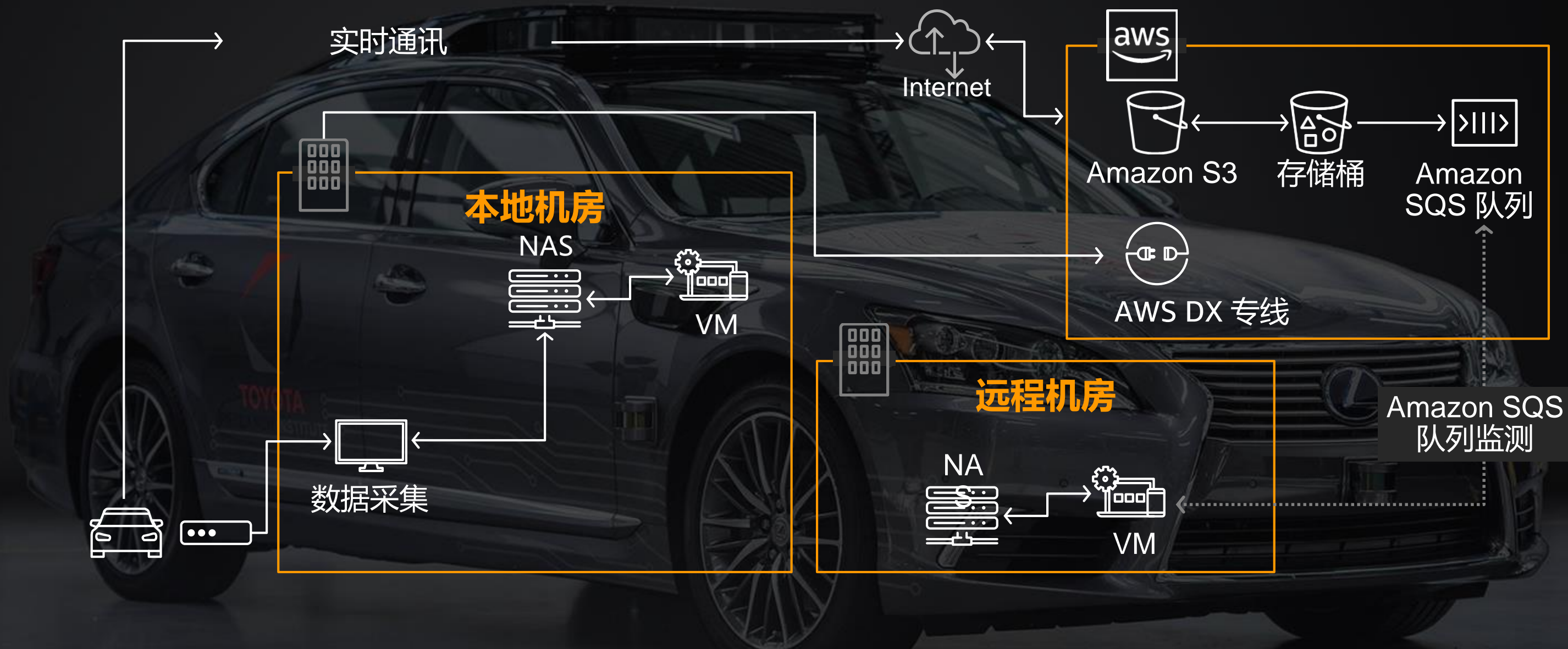


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典型的自动驾驶 workflows

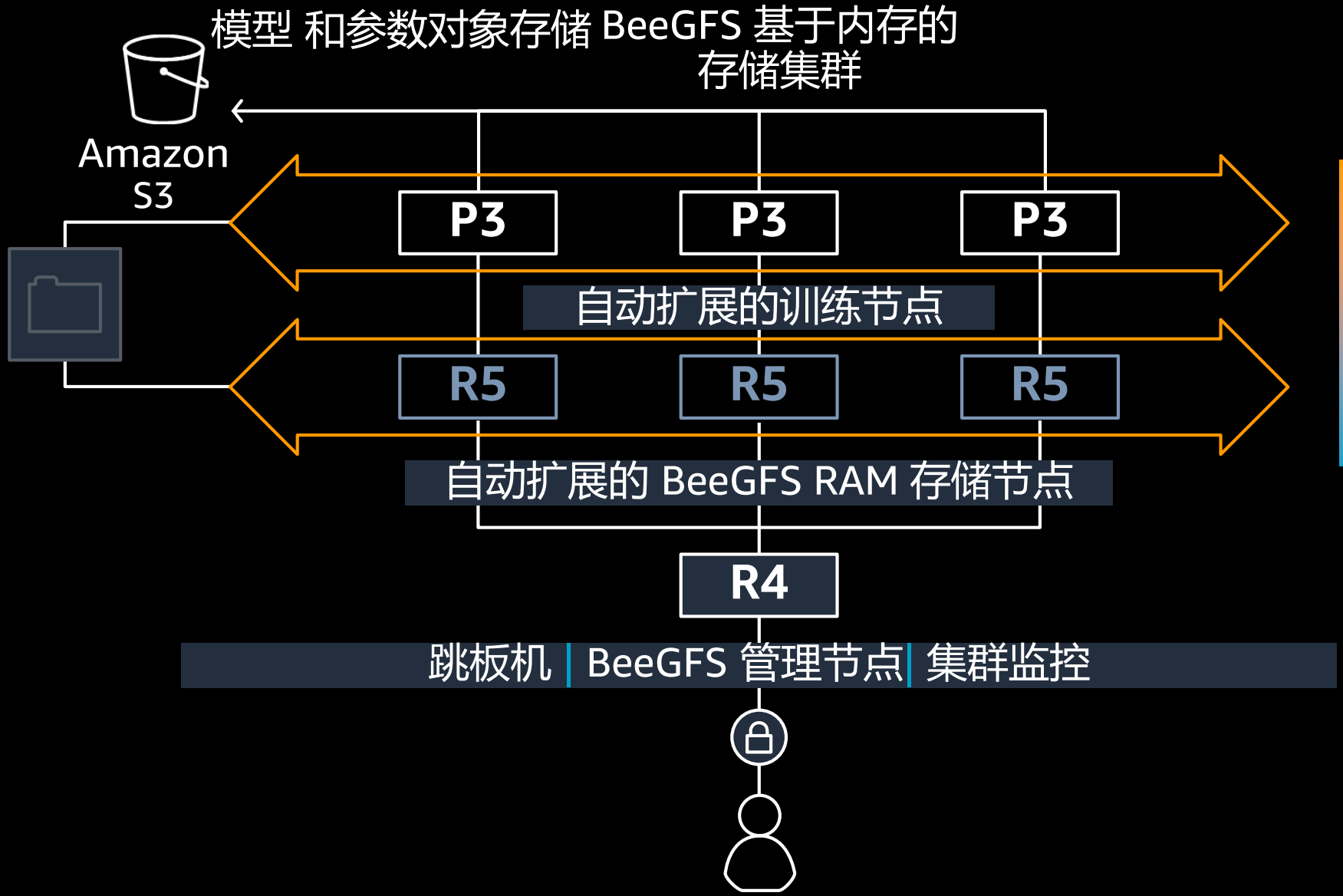


丰田汽车研究院自动驾驶训练架构



丰田汽车研究院自动驾驶项目机器学习集群


Amazon Elastic File System (Amazon EFS)
 深度学习应用栈
 集群共享的持久存储



深度学习
置放组

丰田研究院采用 AWS 的收益：专注于差异化

卸载 管理负担

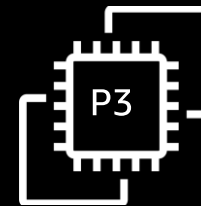
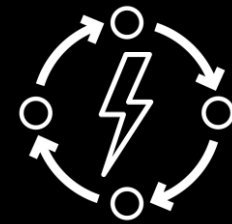
- Amazon Simple Storage Service (Amazon S3), 计算, 数据库, Kubernetes, Elasticsearch, 等等

专注于减少 迭代时间

更快采用新硬件

- P2 – NVIDIA Tesla K80 – 2016 年9月
- P3 – NVIDIA Tesla V100 – 2017年10月

借助 AWS 的团队和合作伙伴快速前进



Amazon EC2 P3 实例





https://amazonaws-china.com/cn/automotive/?nc2=h_m2

汽车

借助 Amazon Web Services，跨整个汽车行业价值链提供创新客户体验并缩短产品上市时间。

联系销售人员

探索汽车价值链中的使用案例

AWS 为汽车行业提供服务，以便在价值链的每个环节实现数字化转型。



联网汽车与移动性



数字化客户互动



ADAS 和自动驾驶汽车

感谢参加 AWS INNOVATE 2019 在线技术大会

我们希望您在这里找到感兴趣的内容！

也请帮助我们完成**投票打分**和**反馈问卷**。

欲获取关于 AWS 的更多信息和技术内容，可以通过以下方式找到我们：



微信公众号：AWSChina



新浪微博：<https://www.weibo.com/amazonaws/>



领英：<https://www.linkedin.com/company/aws-china/>



知乎：<https://www.zhihu.com/org/aws-54/activities/>



视频中心：<http://aws.amazon.bokecc.com/>



更多线上活动：<https://aws.amazon.com/cn/about-aws/events/webinar/>