

A dramatic, low-light photograph focusing on the front left corner of a dark-colored car. The car's headlight is brightly lit, casting a sharp beam of light. The intricate details of the headlight assembly and the car's bodywork are visible against a dark, blurred background.

# A N D O R AUTOMOTIVES

ACCELERATING THE FUTURE

# GROUP 3

Find the magic and fun in presenting.



*Radhika Tripurani*



*Jazimin Kotta*



*Matthew Melton*

## MEET THE TEAM







# ANDOR AUTOMOTIVES

Accelerating the Future



Andor Automotives is a car manufacturing company that creates connected vehicle solutions. Andor Automotives uses vehicle data ingestion, processing, and visualization to decipher valuable insights and create new solutions.

## OUR GOAL

To build an application comprised of the following tiers: Budget for upgrades: \$22K (Capital Expense) and Budget for monthly upkeep: \$16K( Operational Expense )

- A front end web or mobile application
- A processing middle tier that includes analytics
- A back end that allows for data storage



# ABOUT ANDOR AUTOMOTIVES



**Located in: China**

**Employees: 20**

**On-premises machines: 0 (need machines for all employees)**

**Budget for upgrades: \$22K (CapEx)**

**Budget for monthly upkeep: \$16K(OpEx)**

**Currently, Andor has a few parts of its infrastructure including:**

- Assembly plants
- Dynamometers
- Computers with visualization software
- Various databases for storing vehicle data

**Their network contains an Active Directory forest named andorauto.com. All devices and client computers are joined to Active Directory.**



# REQUIREMENTS



Andor Automotives plans to implement the following changes to its infrastructure:

- Securely send real-time data to Azure from sensors and onboard computers installed in its vehicles.
- Create value-added services for its customers and dealers by analyzing vehicle location, and other sensor data (such as engine-related sensors and environment-related sensors).
- Store the data for additional downstream processing to provide actionable insights.
- Allow for service technicians to interact with vehicles using a mixed reality application to aid in troubleshooting and repair.

User:

- Users can sign in with their own corporate account
- Provide additional options for authentication including biometrics and FIDO security keys.





# REQUIREMENTS



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## Technical:

- Ensure telematics messages are sent to Azure.
- Include a secure module in each vehicle at the time of manufacture.
- Use different databases depending on the data ingested, a layer for storage of data is required.
- Provide a serving layer for the data that will be made available to customers. The ability to build web and mobile applications is required.
- Ensure there's a tool for storing and analyzing large datasets.
- Use business analytics tools to analyze data and share insights.
- Provide the ability for service technicians to view vehicle data holographically to aid in troubleshooting and repair.
- Minimize administrative effort and costs whenever possible.



# MICROSOFT AZURE OPERATED BY 21VIANET

Microsoft Azure operated by 21Vianet (Azure China) is a physically separated instance of cloud services located in China. It's independently operated and transacted by Shanghai Blue Cloud Technology Co., Ltd. ("21Vianet"), a wholly-owned subsidiary of Beijing 21Vianet Broadband Data Center Co., Ltd..

## Data sovereignty and China regulations

It's ultimately your obligation to comply with your own regulatory requirements. We commit to compliance with data protection and privacy laws generally applicable to IT service providers. If you're subject to any specific data sovereignty requirement, or other industrial or jurisdictional requirements, you need to make your own assessment and take the necessary steps to ensure compliance.

## Real name verification

Per the China legal requirement, online service providers have an obligation to verify the real name of users. For business entity users, a state-registered business license is required for real-name verification.

## ICP licensing and filing

Internet content providers (ICPs) must apply with the China Ministry of Industry and Information Technology (MIIT) for one of the following types of ICP numbers: Commercial ICP services or Non-commercial ICP services

## Public security registration

When you have obtained the ICP filing or license mentioned above, you shall continue to apply for filing at the local police station within 30 days

## VPN and dedicated lines

You may use a VPN or dedicated lines for your own office or operation purpose, as long as it is purchased from a qualified vendor with a valid operating license.



# LAPTOPS



## Microsoft Surface Laptop 4

13.5 inch AMD RYZEN 5 4680U - 8GB RAM -  
128GB SSD  
costing \$950.00  
with 20 employees  
Total Cost \$19,000.  
Laptop Bags and mouse : \$1400

Total \$22000

# YUBIKEY BIO - FIDO EDITION



The FIDO protocols use standard public key cryptography techniques to provide stronger authentication. During registration with an online service, the user's client device creates a new key pair. It retains the private key and registers the public key with the online service.

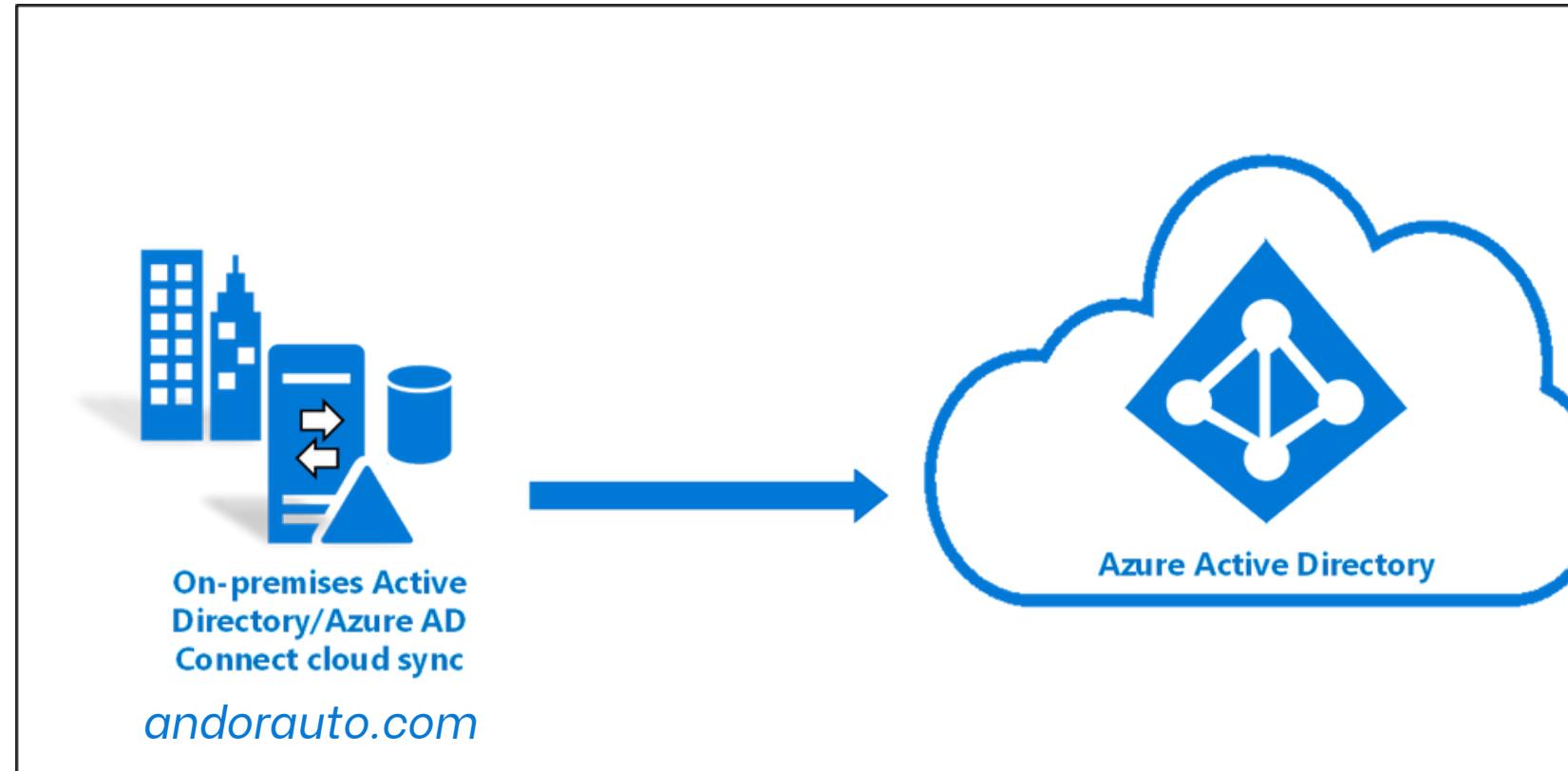


Azure Active Directory provides an identity platform with access management, scalability, and reliability for connecting users with all the apps they need. With passwordless authentication support, users can register a YubiKey with Azure AD to enhance their account security.

Cost: \$80 USD

Total cost for 20 employees : \$1600

# INTEGRATE A SINGLE FOREST WITH A SINGLE AZURE AD TENANT



We have to create a hybrid identity environment using Azure Active Directory (Azure AD) Connect cloud sync.

1. Create a cloud-only global administrator account on your Azure AD tenant. This way, you can manage the configuration of your tenant should your on-premises services fail or become unavailable.
2. Add one or more custom domain names to your Azure AD tenant. Your users can sign in with one of these domain names.
3. Install the **Azure AD Connect** provisioning agent
4. Configure **Azure AD Connect cloud sync**
5. Detailed installation : <https://docs.microsoft.com/en-us/azure/active-directory/cloud-sync/tutorial-single-forest>

## FOR USERS TO SIGN IN WITH THEIR OWN CORPORATE ACCOUNT

Partner Center uses company work accounts, also known as **Azure Active Directory (AD) tenants**, to manage account access for multiple users, control permissions, host groups, and applications, and maintain profile data. By linking your company's work email account domain to your Partner Center account, employees of your company can sign in to Partner Center to manage marketplace offers using their own work account usernames and passwords.



# Connected Vehicle, Smart Mobility Use Cases



# IN-VEHICLE SOLUTIONS



# AVAILABLE RESOURCES



## AI

- Cognitive Services
- Face API
- Computer Imaging API
- Content Moderator API
- Text Analytics API
- Text Translation API
- Language Understanding API
- Speech Service API
- Anomaly detector
- Azure Metrics Advisor
- Azure Cognitive Search
- Azure Machine Learning
- Azure Databricks
- Azure Form Recognizer

## management tools

- automation
- backup
- site recovery
- Scheduler
- Azure Monitor
- traffic manager
- network watcher
- Azure Policy
- Azure Advisor
- Azure Firewall

## migrate

- site recovery
- Azure Database Migration Service
- Azure Migrate

## database

- SQL database
- Azure Synapse Analytics
- SQL Server Stretch Database
- Azure Cosmos DB
- Azure Cache for Redis
- Azure Database for MySQL
- Azure Database for PostgreSQL
- Azure Database for MariaDB
- Azure Data Factory
- SQL Server Integration Services
- data pipeline
- Azure Data Explorer
- Azure Database Migration Service
- Azure SQL Edge

## safety

- secret key vault
- Azure Active Directory
- application gateway
- VPN gateway
- Azure Defender
- Azure Information Protection

## integrated

- service bus
- API Management
- event grid

## calculate

- virtual machine
- virtual machine scale set
- application service
- batch processing
- Service Fabric
- cloud service
- Azure Functions
- Azure Dedicated Host
- Azure Spring Cloud
- SQL Server Integration Services
- data pipeline

## Internet of Things

- Azure IoT Hub
- Azure IoT Edge
- event center
- event grid
- Stream Analysis
- Logic Apps
- Notification Center
- Azure Cosmos DB
- API Management
- Azure Time Series Insights

## move

- application service

## logo

- Azure Active Directory
- Azure Active Directory B2C
- Azure Active Directory Domain Services
- multi-factor authentication
- Azure Information Protection

## analyze

- Azure Synapse Analytics
- HDInsight
- Stream Analysis
- Power BI Embedded
- Azure Analysis Services
- event center
- Azure Data Factory

## storage

- storage
- Block Blob
- Page Blob
- Managed Disks
- document
- queue
- surface
- Azure Data Lake storage
- backup
- site recovery
- Import and Export
- Azure Data Box
- Azure Data Box Disk

## media

- Media Services

## container

- application service
- batch processing
- Service Fabric
- container registry
- Azure Kubernetes Service (AKS)
- container instance

## website

- application service
- Notification Center
- API Management
- CDN Content Delivery Network
- Azure SignalR

## developer tools

- Application configuration

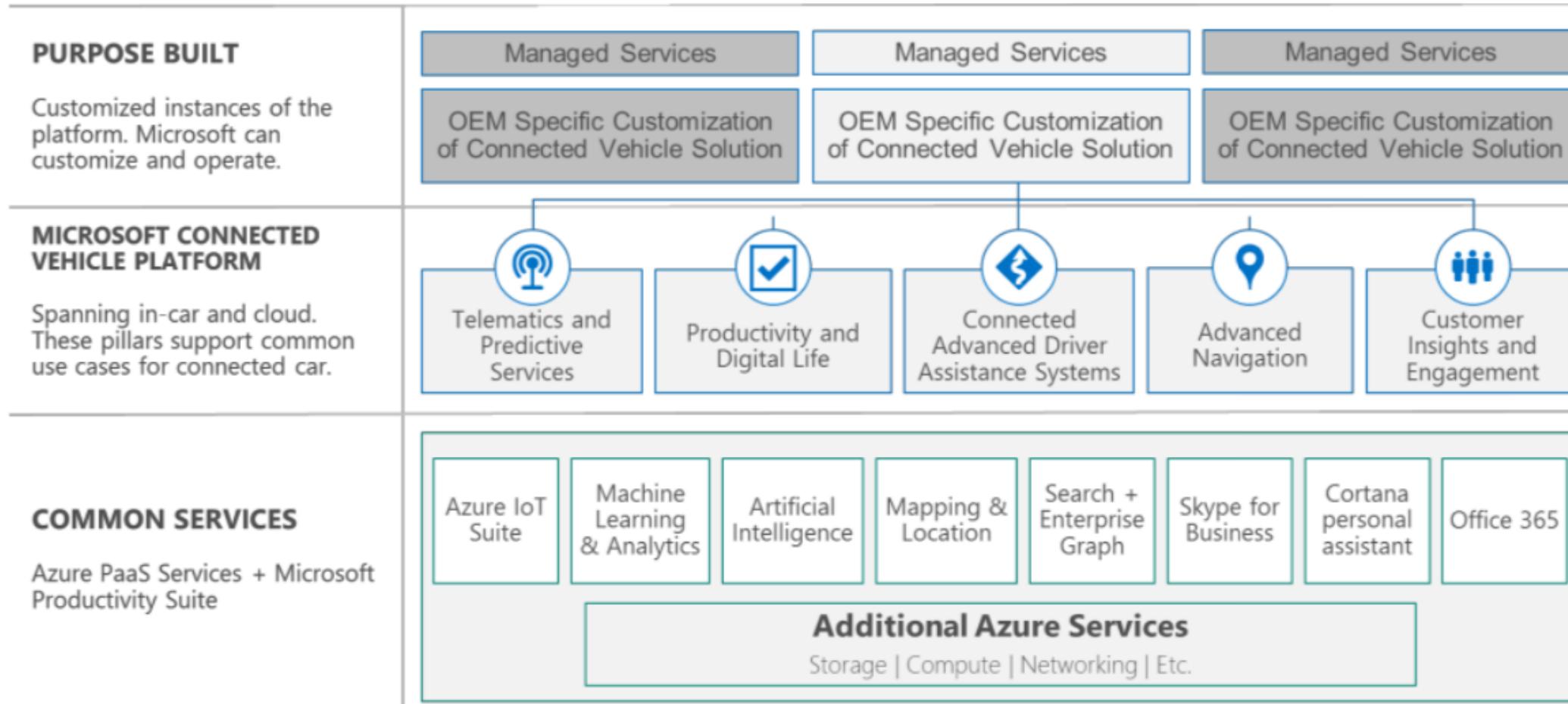
## Hybrid + Multicloud

- Azure Stack HCI
- Azure Active Directory
- Azure Defender

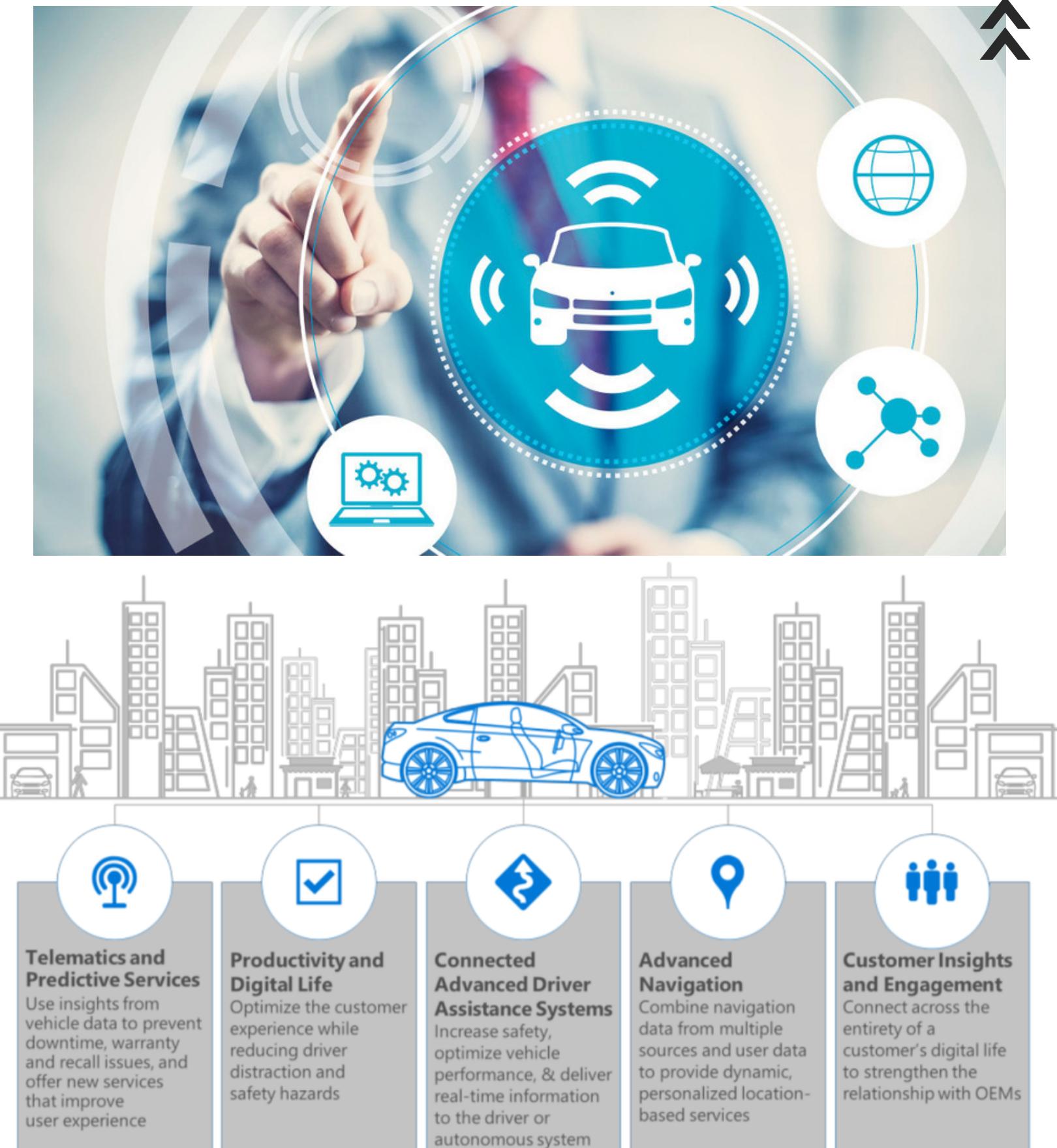
## Azure Virtual Desktop

- Azure Virtual Desktop

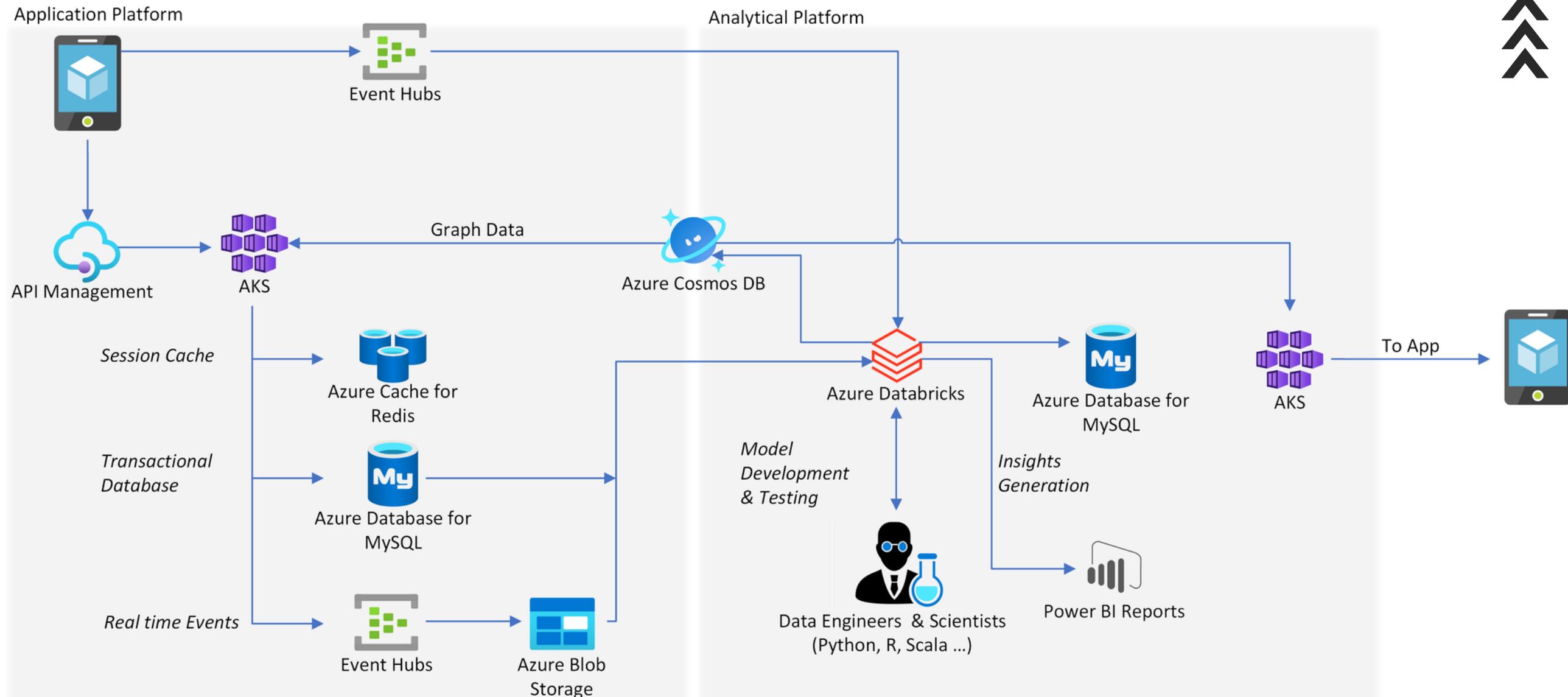
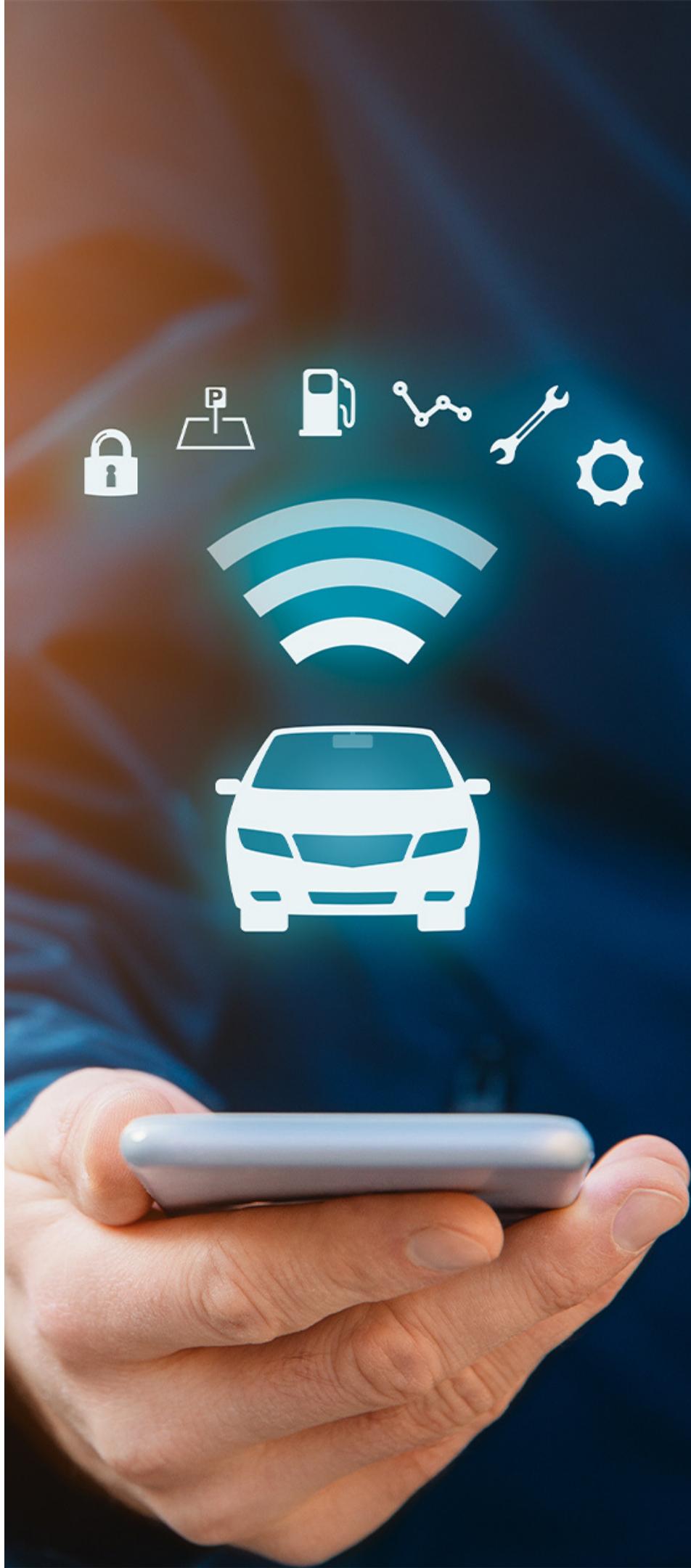
# MICROSOFT CONNECTED VEHICLE PLATFORM



The **Microsoft Connected Vehicle Platform** consists of a comprehensive set of Microsoft services and products that span the physical (car) and digital (cloud), with a focus on addressing commonly required use cases. These include telematics and predictive services, productivity and digital life, connected advanced driver assistance systems (ADAS), advanced navigation, and customer insights and engagement.



# BUILD WEB AND MOBILE APPLICATIONS



## Components

- **Azure Database for MySQL**
- **Azure Cosmos DB**
- **Azure Cache for Redis**
- **Azure Kubernetes Service**
- **Event Hubs**
- **Azure Databricks**
- **Power BI**



# CONTAINER-BASED CAR ARCHITECTURE

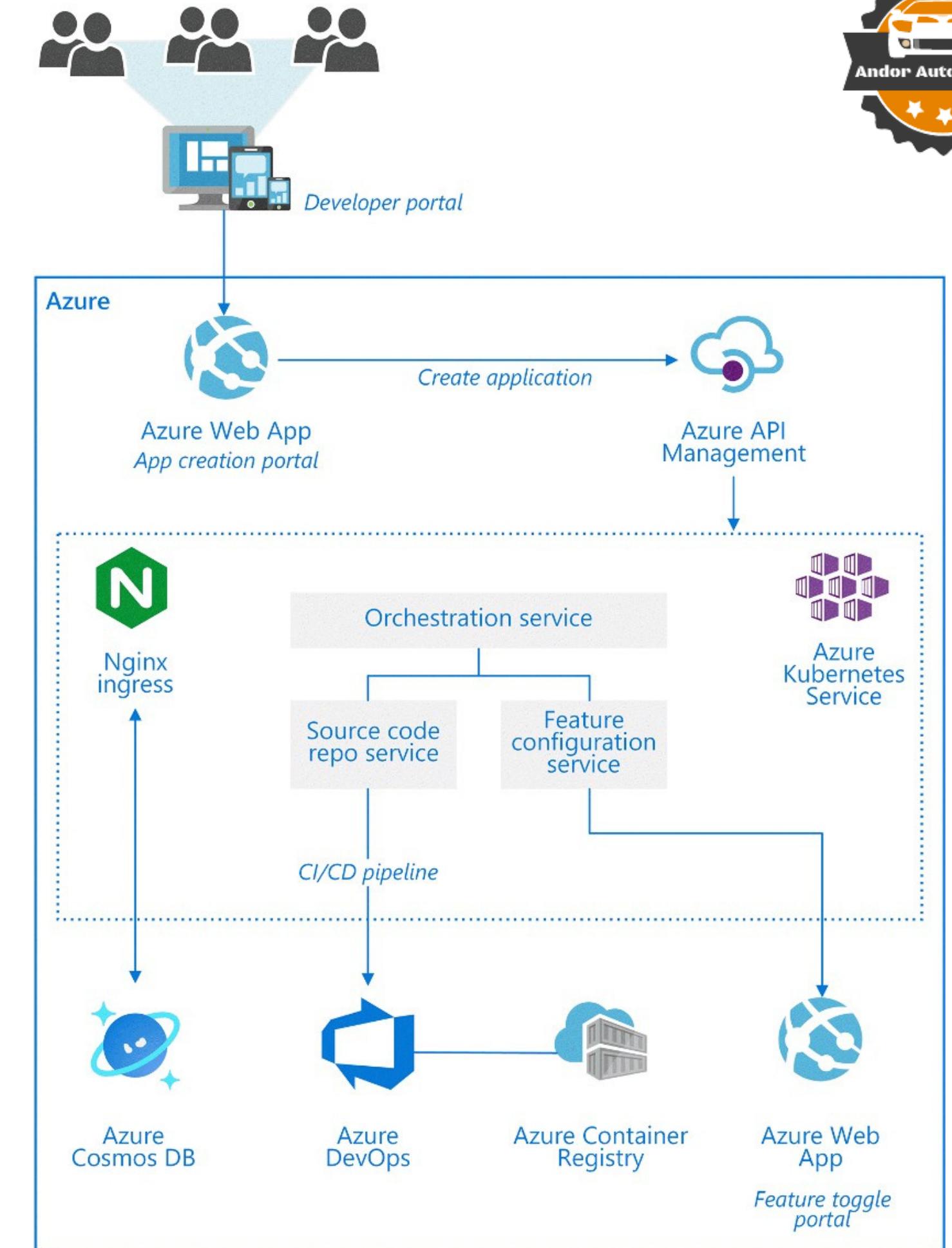
In the connected car architecture, API calls are routed to the back-end services through AKS.

## Components

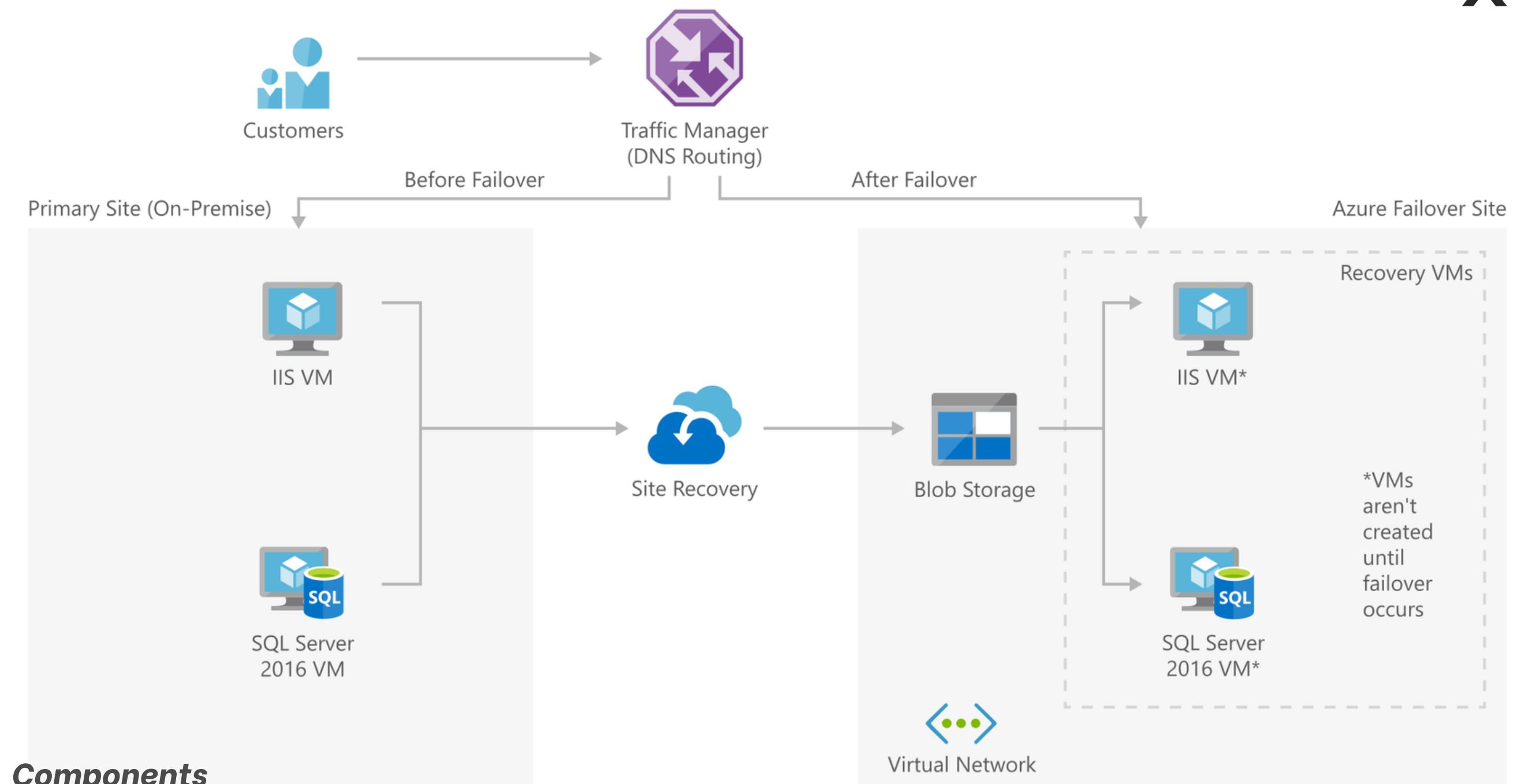
- Azure Web App ( App creation Portal )
- Azure API Management
- Nginx ingress
- Azure Kubernetes Service
- Azure Cosmos DB
- Azure DevOps
- Azure Container Registry
- Azure Web All ( Feature Toggle Portal)



App development teams



# SMB DISASTER RECOVERY WITH AZURE SITE RECOVERY

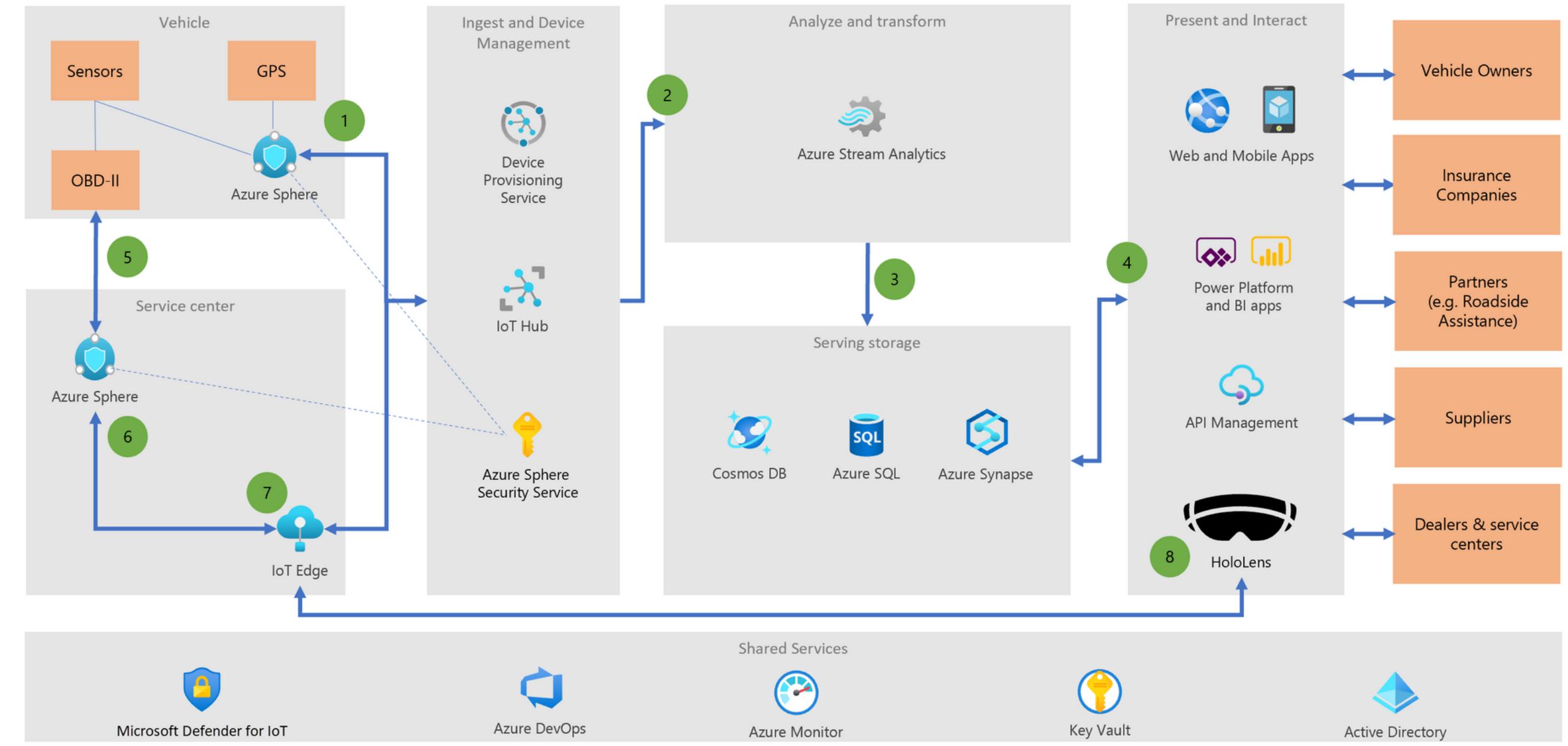


- DNS traffic is routed via Traffic Manager
- Azure Site Recovery
- Virtual Network
- Blob storage



\*VMs aren't created until failover occurs

# PROCESS REAL-TIME VEHICLE DATA USING IOT

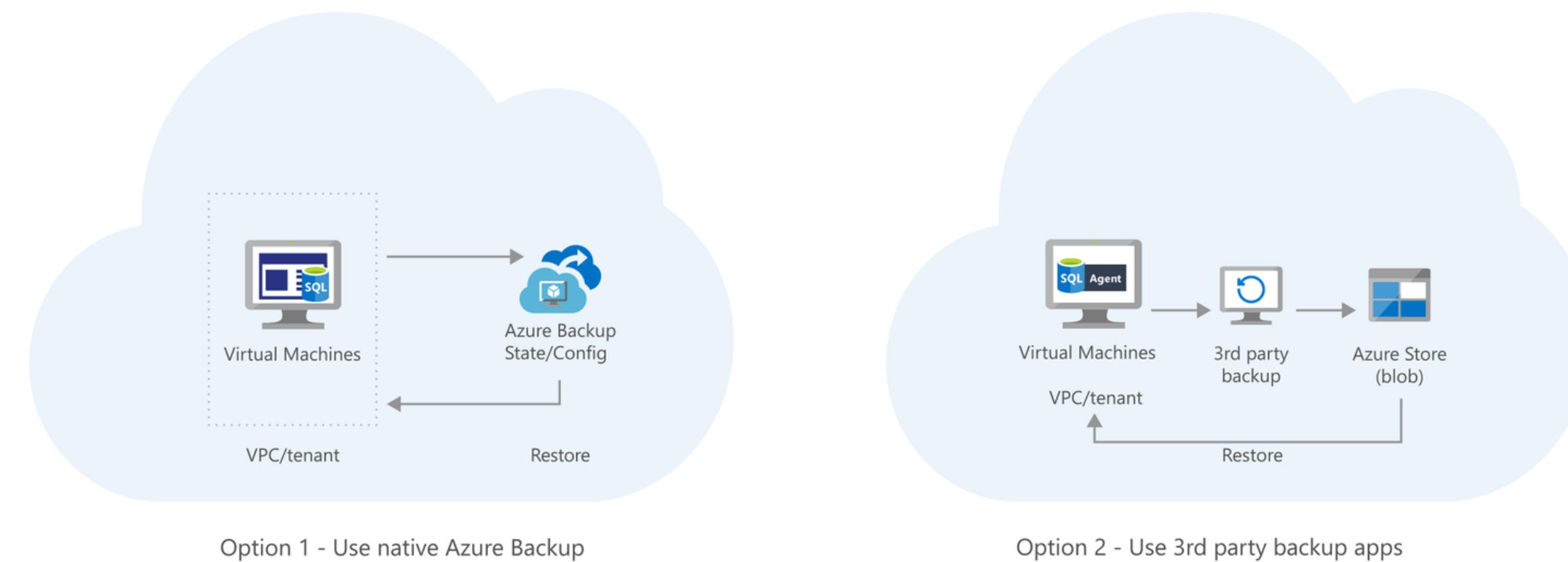


## Components

- **Azure Sphere**
- **Azure IoT Edge**
- **Azure IoT Hub**
- **Azure Stream Analytics (ASA)**
- **Azure Cosmos DB**
- **Azure Synapse Analytics**
- **Azure Synapse Link for Azure Cosmos DB**
- **Microsoft Power BI**
- **Azure App Services**



# BACK UP ON-PREMISES APPLICATIONS AND DATA TO THE CLOUD



## Components

- *Azure Backup Server*
- *Azure Backup service*
- *Blob Storage*



# MONTHLY ESTIMATE



	type	serve	Number	Price
1	App Service Windows	高级PV2 仅适用于中国东部2和中国北部	1indivual	1514.04
2	Virtual machine Windows	标准预付费 A 系列 基本 A0	20tower	1636.8
3	Azure Cognitive Services Anomaly Detector	标准 Web 容器	11	3.198
4	存储 Data Lake 数据存储	LRS 分层命名空间 热	1indivual	0.447
5	存储 Data Lake 数据存储	LRS 分层命名空间 冷	1indivual	0.22
6	Stores Data Lake transactions	LRS 写入操作 分层命名空间 热	1indivual	0.177
7	Azure Cosmos DB 存储	Azure Cosmos DB 存储 使用的存储 事	51 GB	12.88
8	Redis Cache Azure Cache for Redis	基本 C0	1indivual	104.16
9	Stream Analytics	标准流式处理单元	1indivual	14.46
10	HDInsight	Ev3 系列 E2 v3	1indivual	974.64
11	Back up your Azure VMs and on-premises server backu	小于 50 GB	1indivual	31.65
12	Back up storage space	GRS	1indivual	1.08
13	VPN gateway	基本	20indivual	3720
14	Application Gateway Web Application Firewall WAF V.	固定	1indivual	18315
15	Power BI Embedded	A1	1indivual	4770.156
16	Key Vault	Secrets and software-protected keys	1indivual	4
17	Azure Synapse Analytics	基本 cDW DW100c	1indivual	5989.2
18	Azure Synapse Analytics	1年CPP 专用 DW100c	1indivual	3557.58
19	Azure IoT Hub	基本 B1	1indivual	101.76
20	Azure Analytics Service Standard level	S0	1indivual	9629.592
21	API Management	开发人员	1indivual	373.6368
22	Azure 监控器	Log Analytics 数据引入	1indivual	117
23	Azure Monitor	Log Analytics 数据保留	1indivual	12.2
24	Azure Database for MySQL	基本 计算 Gen 4 vCore 1	1indivual	200.8056
25	Azure Database for MySQL	基本 存储	1indivual	7.938
26	Load balancer	标准 15 条规则	1indivual	118.296
27	Logic Apps Standard Plan 仅适用于中国东部2和中国	vCPU	1indivual	1.2504
28	DNS	Public areas Host DNS zones	1indivual	79.6
29	Container registry	Basic Container Registry	1indivual	52.555
30	Azure Active Directory 域服务	Standard user forest	1Hour	10353.44

31	Data Factory	Data Pipeline Business Processes Data Pip	1	20672.736
32	Azure Event Grid	Azure Event Grid consumption Event Grid	1indivual	5109.389
33	Azure Functions	Resource consumption 128MB Execution 1	1indivual	661.05
34	Azure Firewall	Azure Firewall deployment Standard is or	1Hour	9463.68
35	Container instances	memory	1indivual	929.814
36	Container instances	vCPU	1indivual	102.177
37	Azure Machine Learning	Model training A series A0	1tower	96.72
38	Azure Databricks 现用现付 DBU 价格 仅适用于中	DBU Price Standard Tier Universal Calcula	1indivual	1892.736
39	Azure Databricks 通用计算 常规用途 仅适用于中	DSv2 Dv2 Series Standard DS3 v2 D3 v2	1indivual	2737.312
40	Azure Databricks SQL 计算 计算优化 仅适用于中国	Fsv2 Series Premium F4s v2	1indivual	1718.4848
41	Azure Kubernetes 服务	Azure Kubernetes 服务	2cluster/hour	946.368
42	Storage file sync price	Storage file sync price	1indivual	50.86
43	Azure Stack HCI	Azure Stack HCI Azure Stack HCI	1physical core	63
44	Virtual machine Learning Server	Enterprise A-Series Basic A0	1tower	7179.6
45	Storage General Purpose v2 v2 Blob 索引价格 仅适	GRS cold	1indivual	11.016
46	Storage General Purpose v2v2 Blob 索引价格 仅适	GRS Hot	1indivual	18.36
47	Storage General Purpose v2 v2 Blob 索引价格 仅适	GRS Archive	1indivual	3.672
	Price	113354.7366	Chinese Yuan	
		\$16,995	USD	



# References



## Process real-time vehicle data using IoT

<https://docs.microsoft.com/en-us/azure/architecture/example-scenario/data/realtime-analytics-vehicle-iot>

## Build web and mobile applications

<https://docs.microsoft.com/en-us/azure/architecture/solution-ideas/articles/webapps>

## Small and midsize business disaster recovery with Azure Site Recovery

<https://docs.microsoft.com/en-us/azure/architecture/solution-ideas/articles/disaster-recovery-smb-azure-site-recovery>

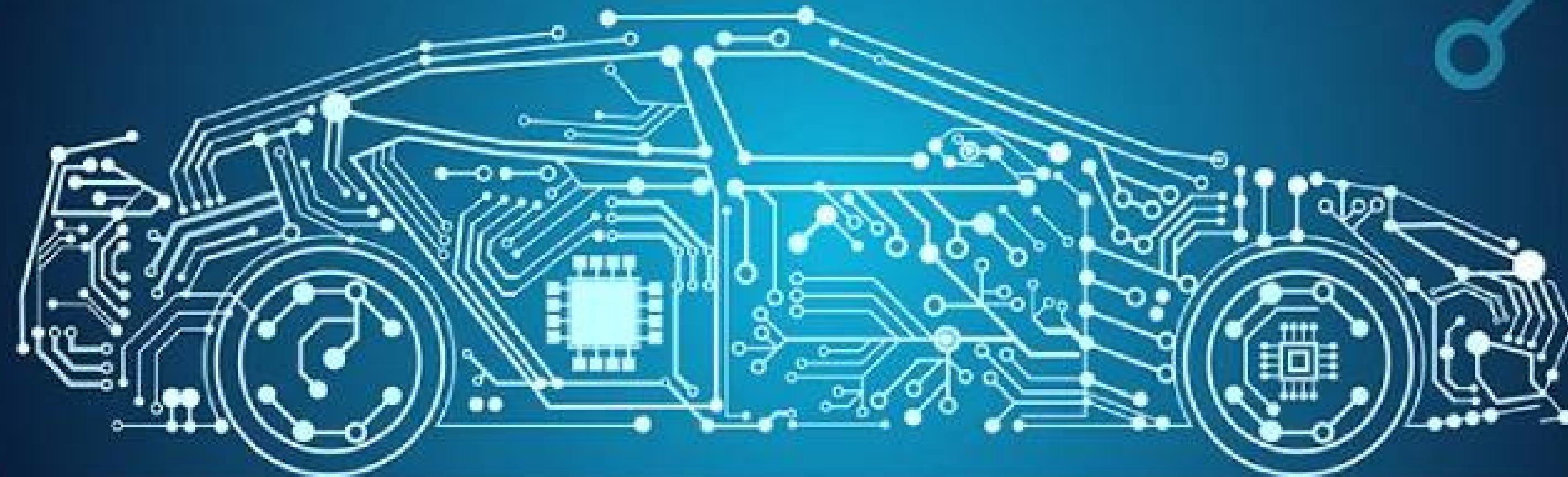
## Back up on-premises applications and data to the cloud

<https://docs.microsoft.com/en-us/azure/architecture/solution-ideas/articles/backup-archive-on-premises-applications>

<https://www.microsoft.com/en-us/industry/automotive/>



# THANK YOU!



# QUESTIONS / COMMENTS

## MISSION



TechBridge breaks the cycle of generational poverty through the innovative use of technology to transform nonprofit and community impact.

## WE WORK IN



Tackling hunger by powering food security organizations with innovative technology solutions.



Connecting people experiencing homelessness to key services by bridging systems, integrating data, and supporting organizations with technology.



Striving for an equitable society, by partnering with justice-focused organizations to develop, streamline, and amplify their impact using technology.



Closing the digital equity gap with training and employment, while powering other workforce development nonprofits to do more with systems and processes.