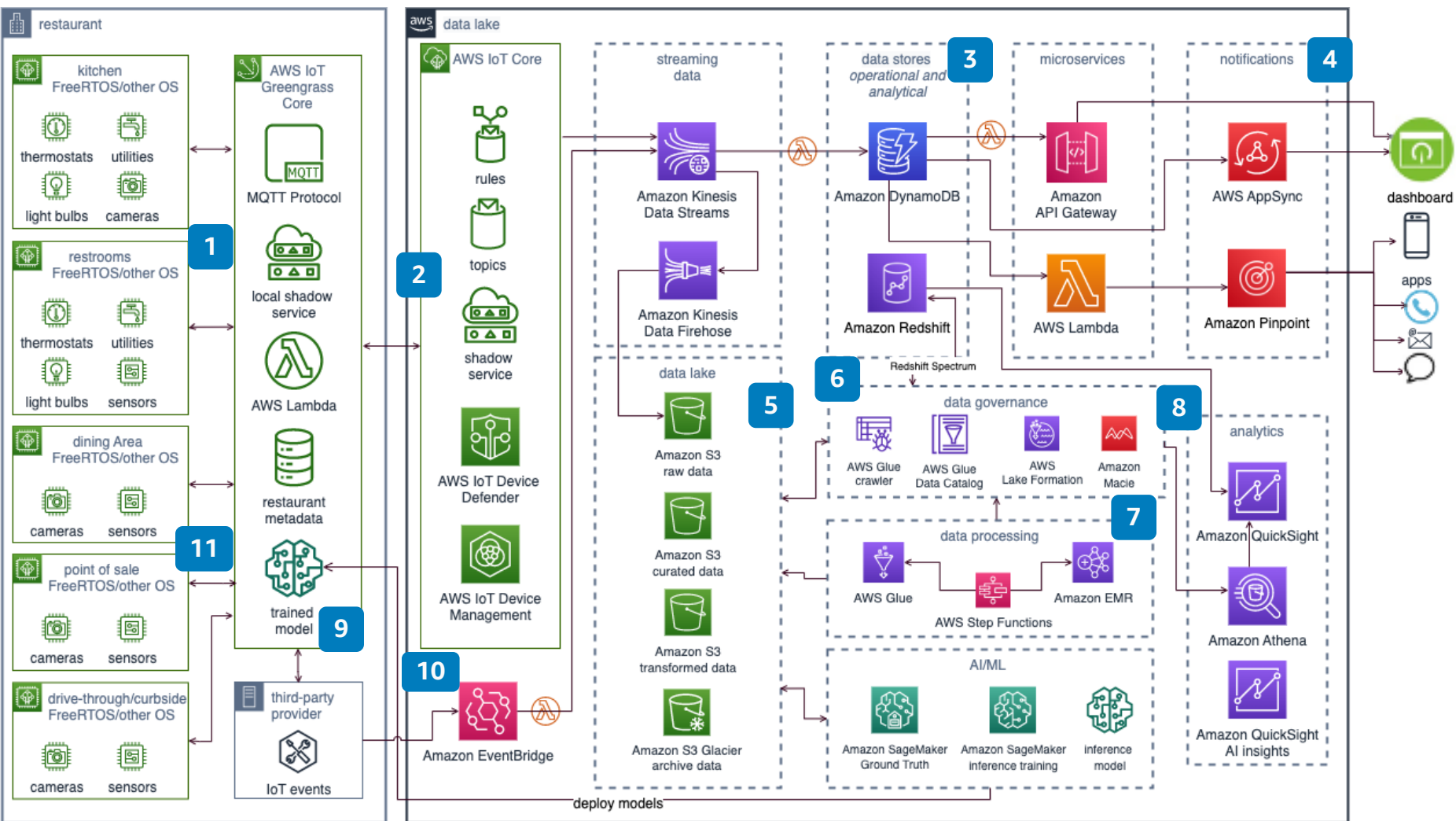# Connected Restaurants using IoT and AI/ML

Build smart, connected restaurants that use Internet of Things (IoT) and artificial intelligence/machine learning (AI/ML) capabilities to maintain food quality and safety in the kitchen, preserve products in cold storage, maintain social distancing, manage queue depths, measure and monitor foot and vehicle traffic, and maintain cleanliness and sanitation. Use AWS IoT Greengrass to maintain cost efficiency and improve operability.

AWS Reference Architecture

1. Use **AWS IoT Greengrass Core** to connect, publish, and subscribe data using open standard MQTT protocol with Internet of Things (IoT) devices running on **FreeRTOS** and other operating systems (OS').

2. Leverage **AWS IoT Core** to maintain shadows of all IoT devices, connect to **AWS Cloud**, manage devices, update over-the-air (OTA), and secure the devices.

3. Use purpose-built databases such as **Amazon DynamoDB** and serverless architecture to store events, deliver microservices, and generate events for the operational data store.

4. Build a near real-time operational dashboard using microservices and **AWS AppSync**. Deliver alerts to multiple channels using **Amazon Pinpoint**.

5. Build the data lake to store raw data and to create curated processed data in **Amazon Simple Storage Service** (Amazon S3) using **AWS Glue** and **Amazon EMR**.

6. Discover and govern the data in **Amazon S3** using **AWS Glue** crawlers, **AWS Glue Data Catalog**, and **AWS Lake Formation**. Additionally deploy **Amazon Macie** to detect any sensitive data.

7. Use **AWS Glue** jobs and **Amazon EMR** to perform any transformation or enrichment of the data.

8. Use **Amazon Redshift**, **Amazon Athena**, and **Amazon QuickSight** for analytics. Optionally, build data marts in **Amazon Redshift** for heavily used analytics. For one-time requirements, publish the data catalog and use **Amazon Athena** or **Amazon Redshift Spectrum** for direct analysis using the data lake.

9. Use **Amazon SageMaker** to build, train, and deploy inference models. Optionally, deploy edge models on **AWS IoT Greengrass Core**.

10. Use the Facilitate Social Distancing and Queue Depth Management solutions for compliance and enhanced customer experience.

11. Use **Amazon EventBridge** to integrate with third-party providers.