Rocket: Hybrid edge + cloud video analytics platform

Ganesh Ananthanarayanan & Yuanchao Shu

http://aka.ms/rocket

Rocket: Video Analytics Stack

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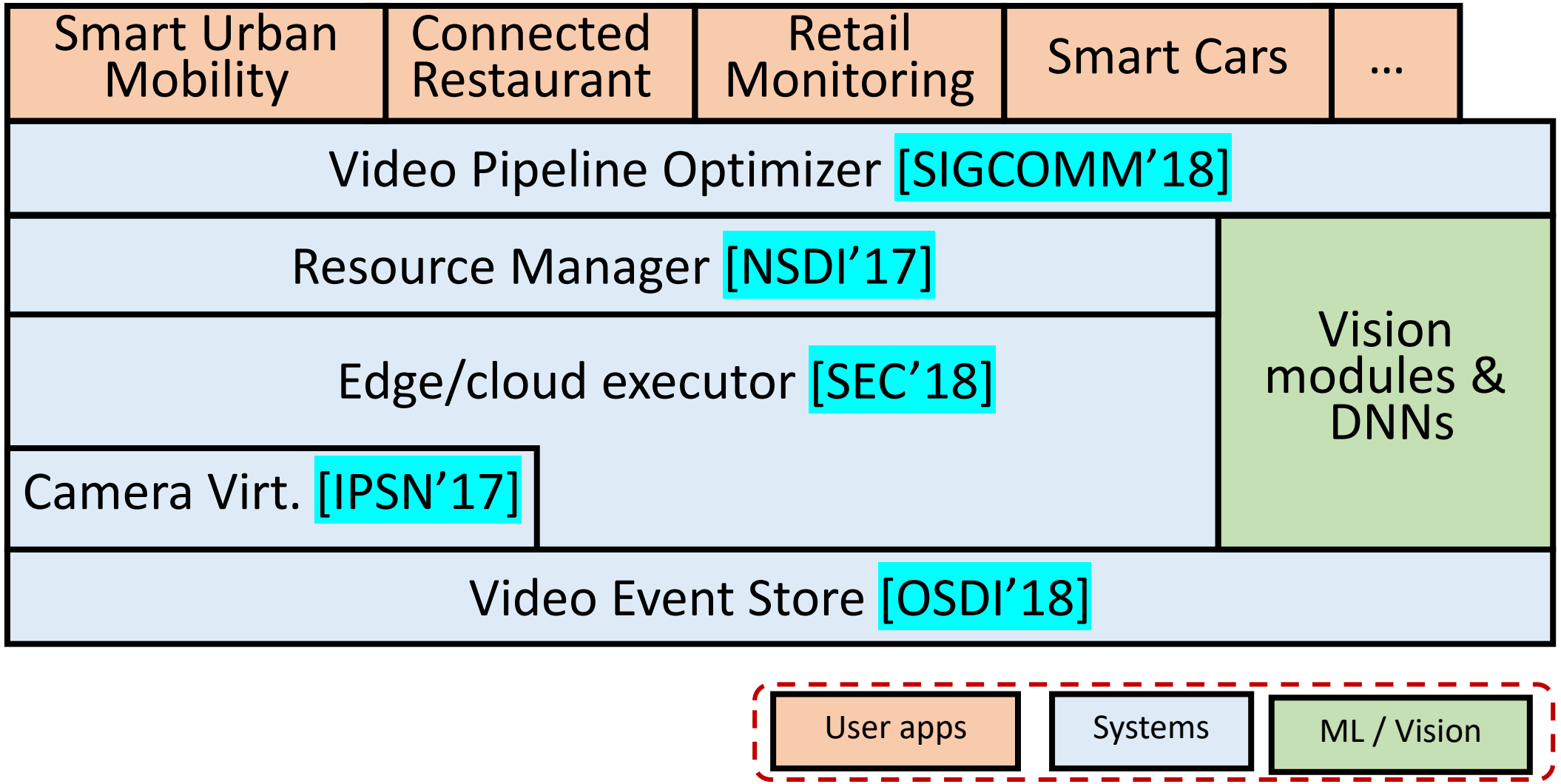


End-user workflow management (e.g., dashboard, alerting)

Traffic counts | Near-collisions | Vehicle speeds | ... | Crowd Control | Predictive Analysis

Privacy protector

Decoder → Background subtraction Object Detector → Object Tracker → Light CNN Object Detector (E.g., cars, bicycles) → Heavy CNN Object Detector (E.g., cars, bicycles)

Video Pipeline Optimizer

Resource Manager

Edge/cloud executor

Camera Virt.

Vision modules & DNN Zoo

Video Event Store

Microsoft Rocket Video Analytics Platform

Smart Cameras

Azure Data Box Edge

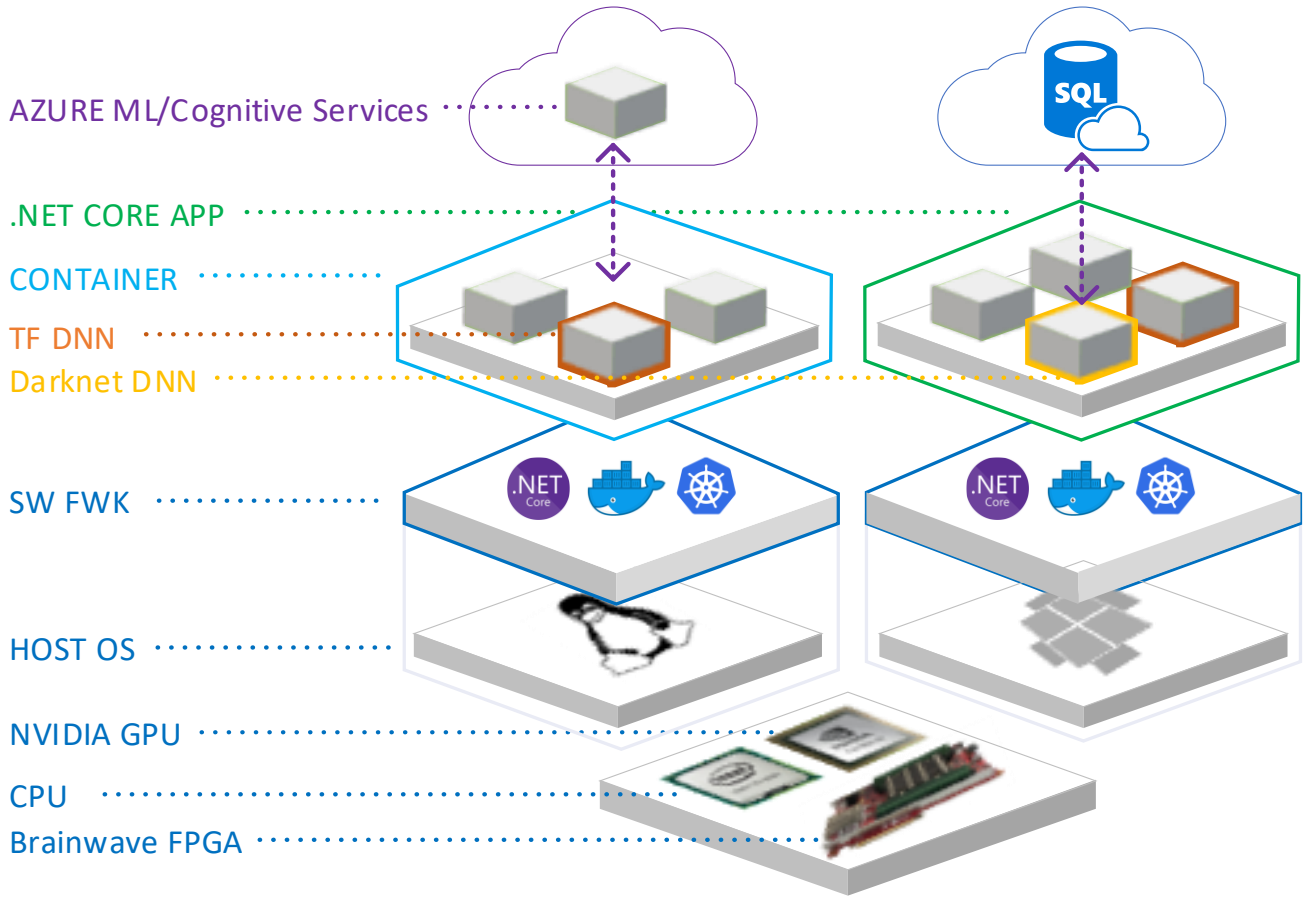
Azure Cloud

Azure ML, Cognitive Services

Microsoft Rocket Video Analytics Platform

- Built on C# .NET Core
- TensorFlow model plug-in
- GPU/FPGA acceleration
- Docker containerization

★Code released at https://aka.ms/RocketCode



Rocket: Video Analytics Stack

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- ✓ line-based alerting on live videos .NET Core
- ✓ early filtering & selective DNN calls for efficient GPU/FPGA usage
- ✓ edge-cloud partitioning with cascaded calls to cloud DNNs (Cognitive Services or Azure ML)
- ✓ detect network unavailability, shift to “edge-only” mode
- ✓ interactive after-the-fact querying on stored videos
  - *Find all frames that contain red bag from videos in the past week*

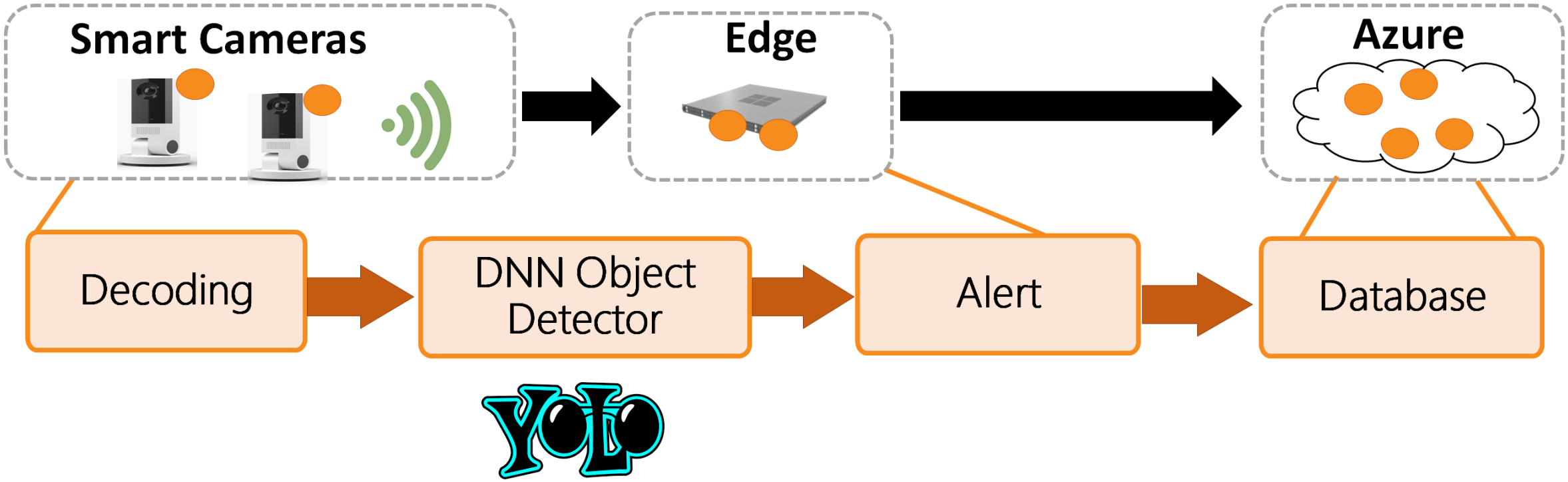
Microsoft Rocket Video Analytics Platform

We will walk-through Rocket (http://aka.ms/rocket), a hybrid edge-cloud live video analytics software stack built on C# .NET Core, and introduce five different pipelines:

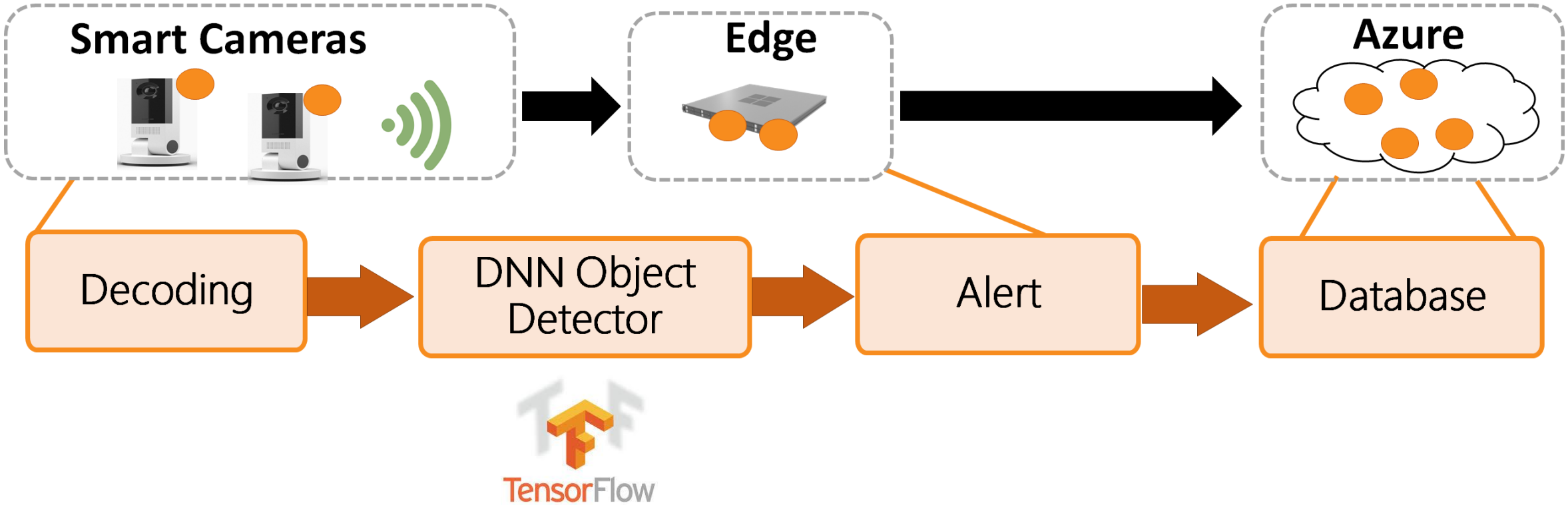
0. How to setup and run the video analytics system
1. Pipeline 1: Alerting on objects
2. Pipeline 2: Detecting objects with cheap filters, and after-the-fact querying
3. Pipeline 3: Detecting objects with cascaded DNNs
4. Pipeline 4: Edge/Cloud split
5. Pipeline 5: Edge/Cloud split + containers

Research experience in machine learning, computer vision is NOT required.

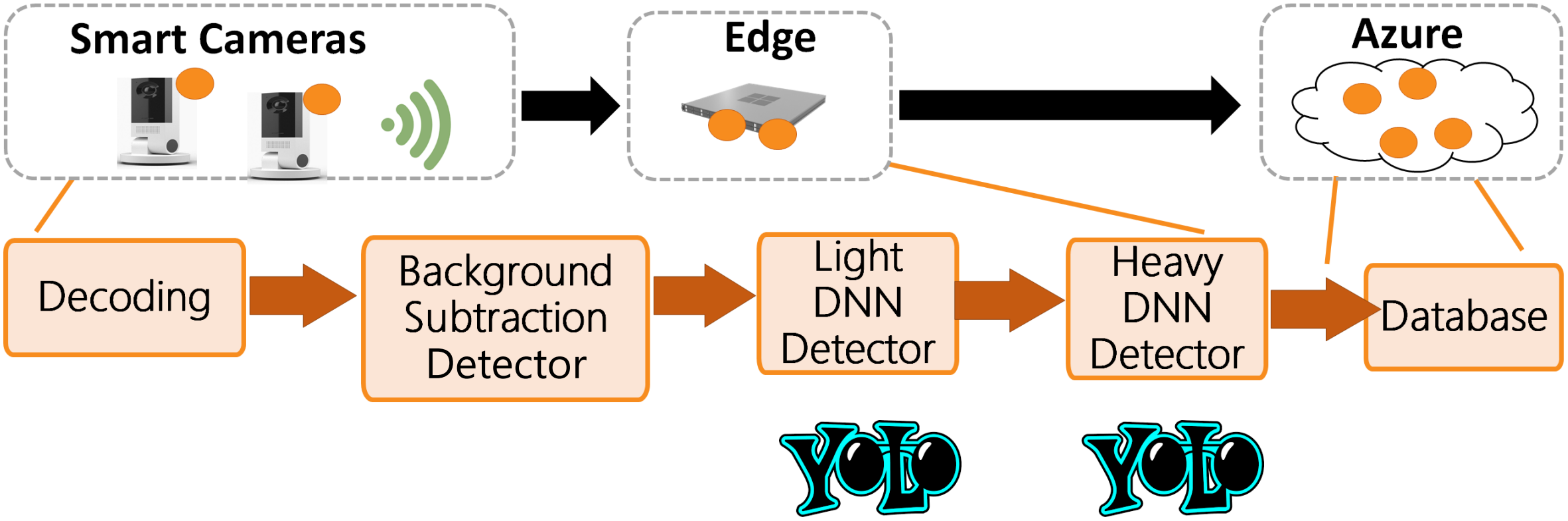
Pipeline 1: Alerting on objects



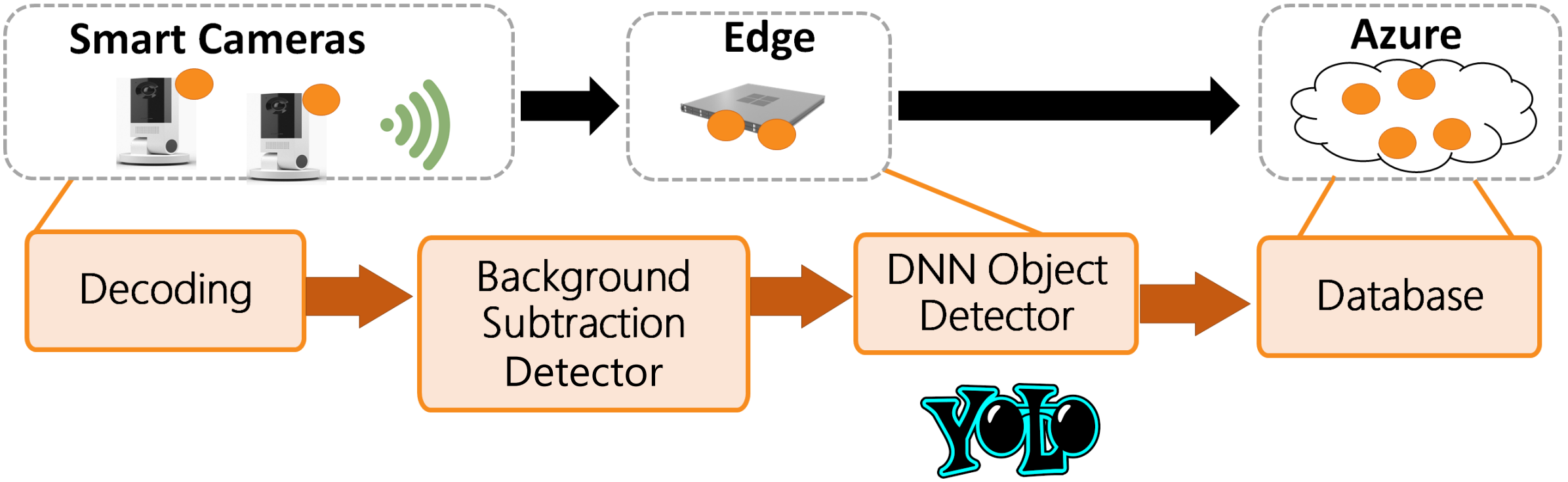
Pipeline 2: Alerting on objects



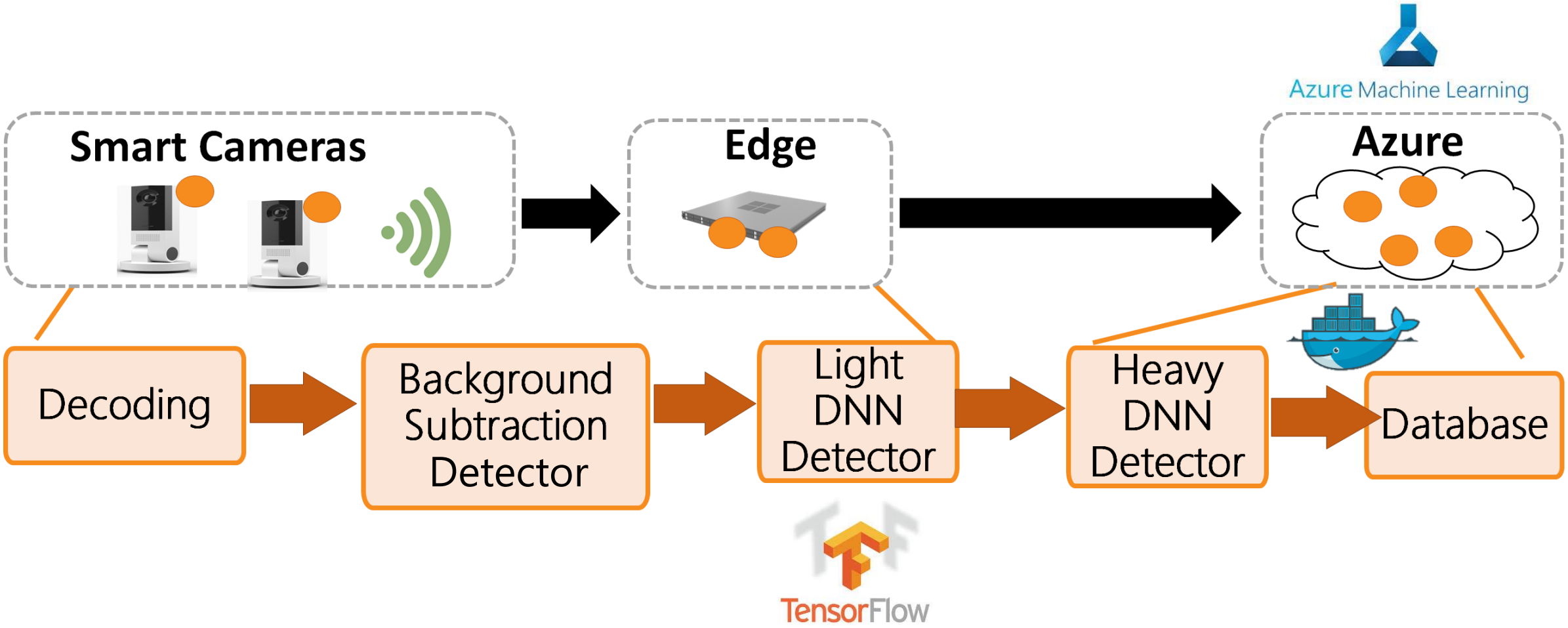
Pipeline 3: Detecting objects with cascaded DNNs



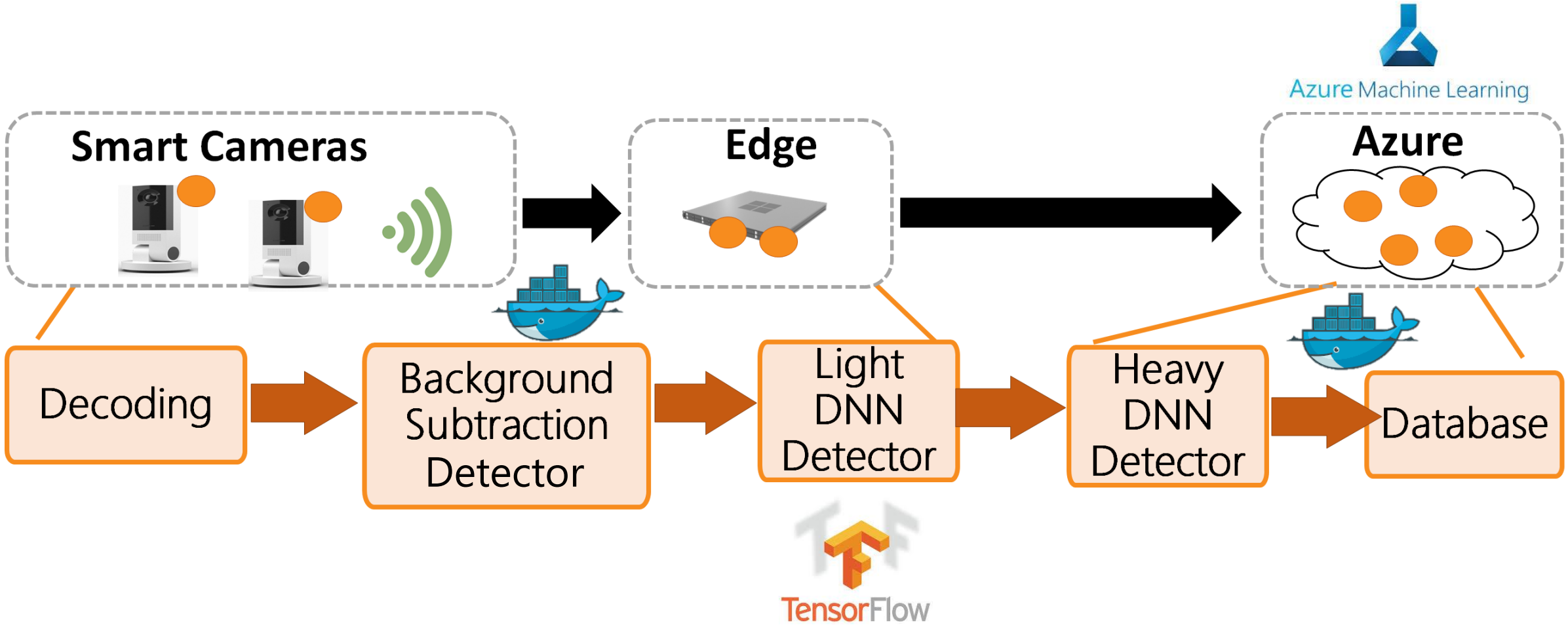
Pipeline 4: Detecting objects with cheap filters



Pipeline 5: Edge/Cloud split



Pipeline 6: Edge/Cloud split + containers



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