Using the Intel® Distribution of the OpenVINO™ Toolkit for Deploying Accelerated Deep Learning Applications – Part2 [2021.2]

Jan 2021

Agenda

Part 1: OpenVINO Workshop (110mins):

- Demos on DevCloud
- Post-Training Optimization Tool
- DL Workbench
- DL Streamer

- **Part2: Q & A(10mins)**

Notices and Disclaimers

- Performance varies by use, configuration and other factors. Learn more at www.Intel.com/PerformanceIndex.
- Performance results are based on testing as of dates shown in configurations and may not reflect all publicly available updates. See backup for configuration details. No product or component can be absolutely secure.
- Your costs and results may vary.
- Intel technologies may require enabled hardware, software or service activation.
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Post-Training Optimization Tool

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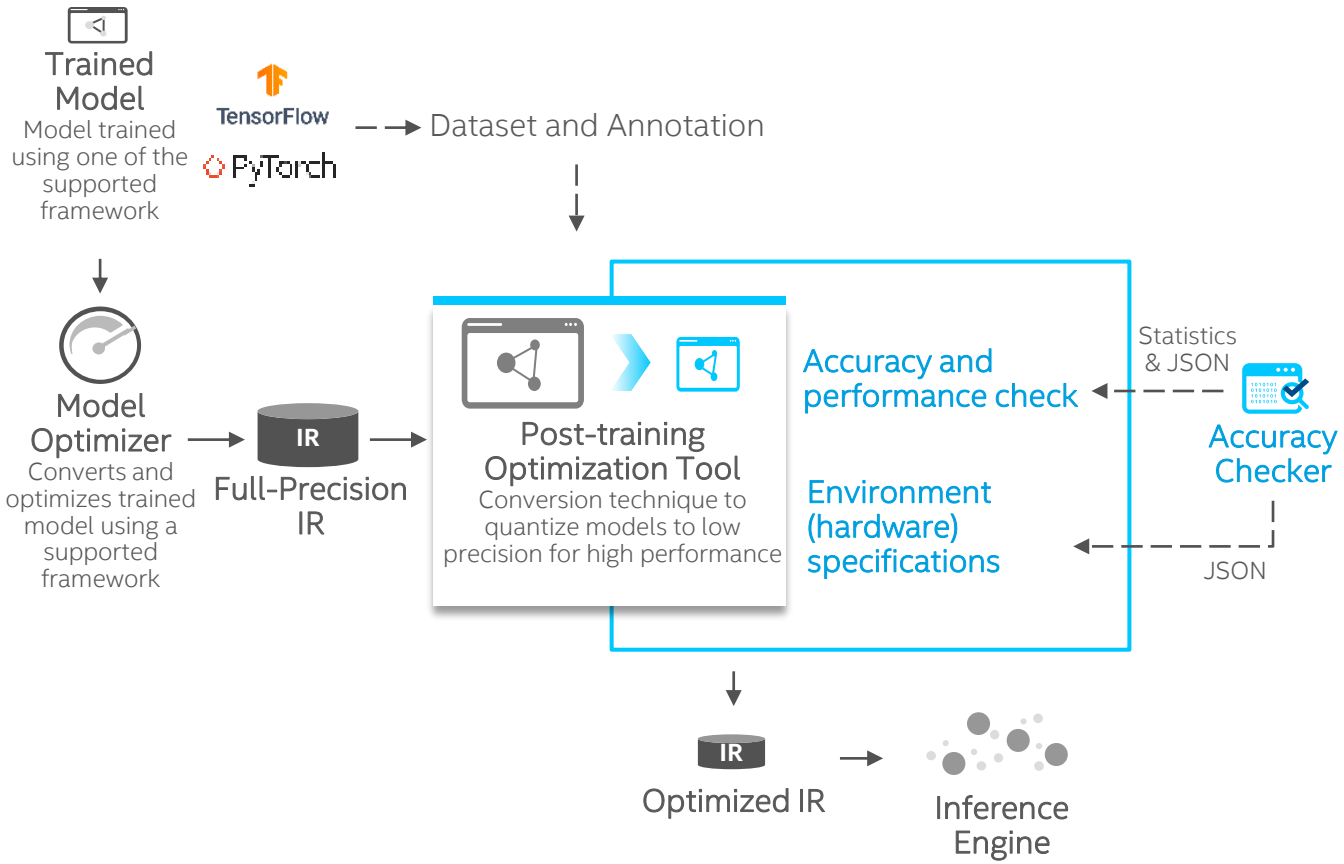
Post-Training Optimization Tool

- Using the Python API, the Post-training Optimization Tool integrates with the Model Optimizer, DL Workbench and accuracy checker tools to streamline the development process
- Enables a conversion technique of deep learning model that **reduces model size into low precision data types**, such as INT8, without re-training
- Reduces model size **while also improving latency, with little degradation** in model accuracy and without model re-training.
- Different optimization approaches are supported: quantization algorithms, sparsity, etc.

Performance Benchmarks
https://docs.openvinotoolkit.org/latest/_docs_performance_int8_vs_fp32.html



Post-Training Optimization Tool – features

- Supports quantization of OpenVINO™ toolkit's IR models for various types of Intel® hardware
- *Learn more:* https://docs.openvinotoolkit.org/latest/_compression_algorithms_quantization_README.html
  - Two main algorithms supported and exposed through Deep Learning Workbench:
    - Default algorithm: essentially a pipeline running three base algorithms:
      i. Activation Channel Alignment (applied to align activation ranges)
      ii. MinMax
      iii. Bias Correction (runs atop naive algorithm; based on minimization of per-channel quantization error)
    - Accuracy-Aware algorithm: preserves accuracy of the resulting model, keeping accuracy drop below threshold
  - Provides hardware-specific configurations
  - Features per-channel/per-tensor quantization granularity
  - Supports symmetric/asymmetric quantization through presets mechanism

Deep Learning Workbench

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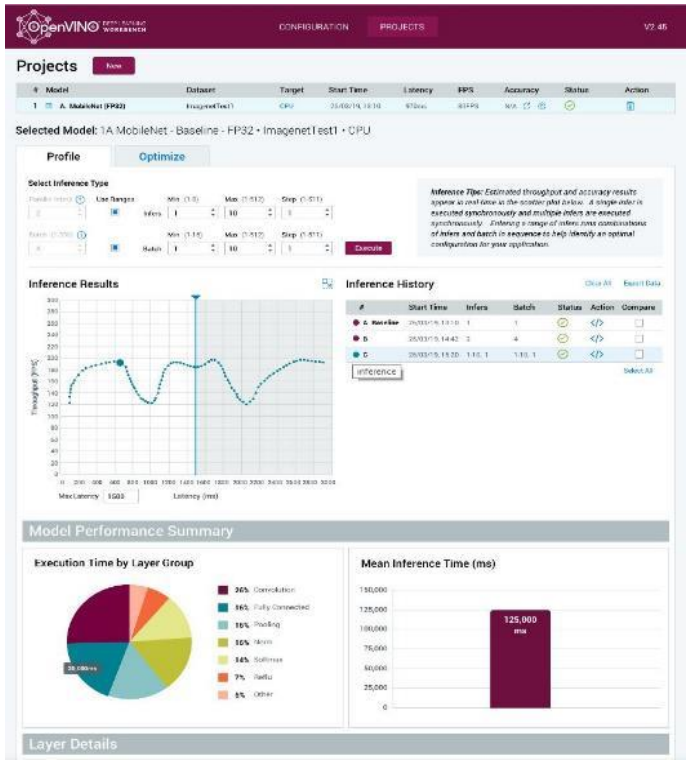
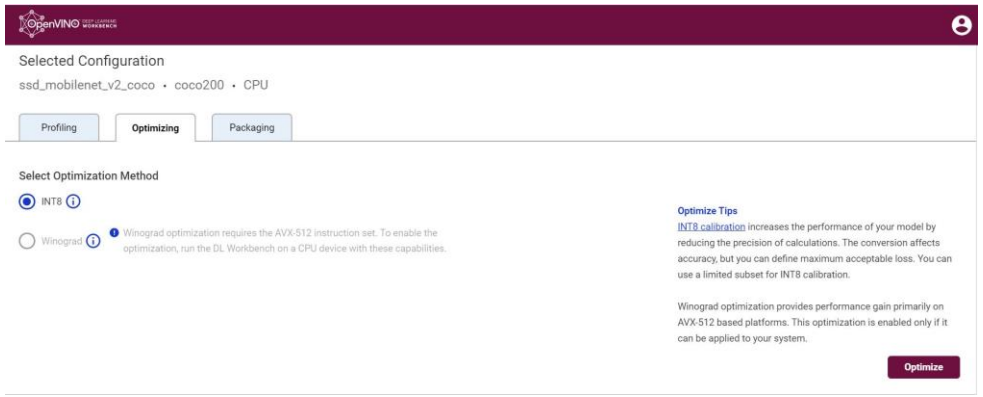
Deep Learning Workbench

- Web-based, **UI extension tool** of the Intel® Distribution of OpenVINO™ toolkit
- **Visualizes performance data for** topologies and layers to aid in model analysis
- **Automates analysis** for optimal performance configuration (streams, batches, latency)
- **Experiment with INT8 or Winograd calibration** for optimal tuning using the Post Training Optimization Tool
- Provide **accuracy information** through accuracy checker
- **Direct access to models** from public set of Open Model Zoo
- Enables **remote profiling**, allowing the collection of performance data from multiple different machines without any additional set-up.

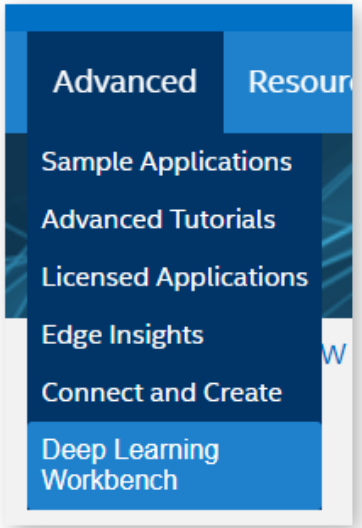
Development Guide
https://docs.openvinotoolkit.org/latest/_docs_Workbench_DG_Introduction.html



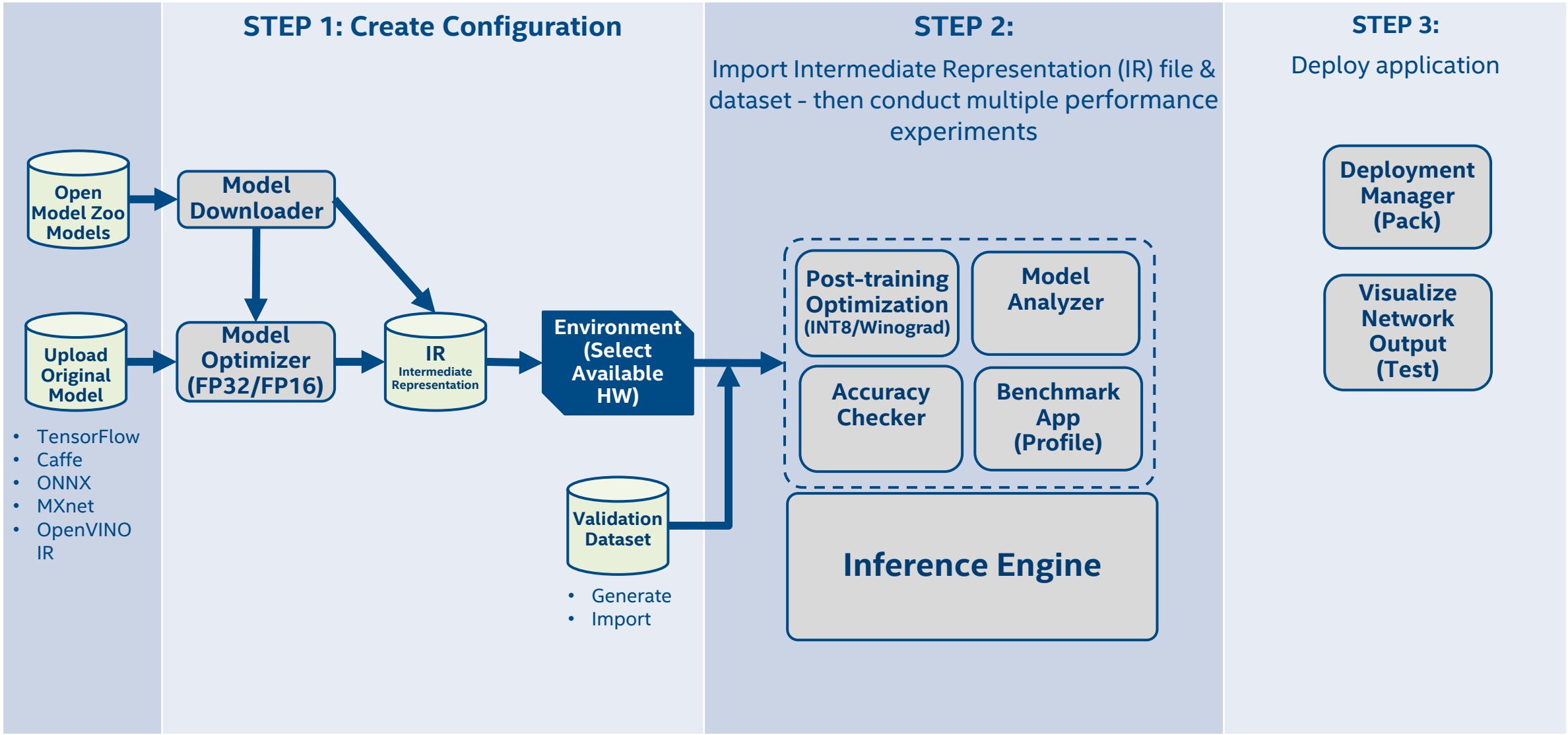


Installation Methods

- Run the DL Workbench on your local system
  - To profile your neural network on your own hardware or targets in your local network
    - Install from Docker Hub (Linux, Windows, macOS): https://hub.docker.com/r/openvino/workbench
    - Install from Intel® Distribution of OpenVINO™ toolkit package: **build_docker.sh**
- Run the DL Workbench in the Intel® DevCloud for the Edge
  - To profile your neural network on various Intel® hardware configurations hosted in the cloud environment without any hardware setup at your end



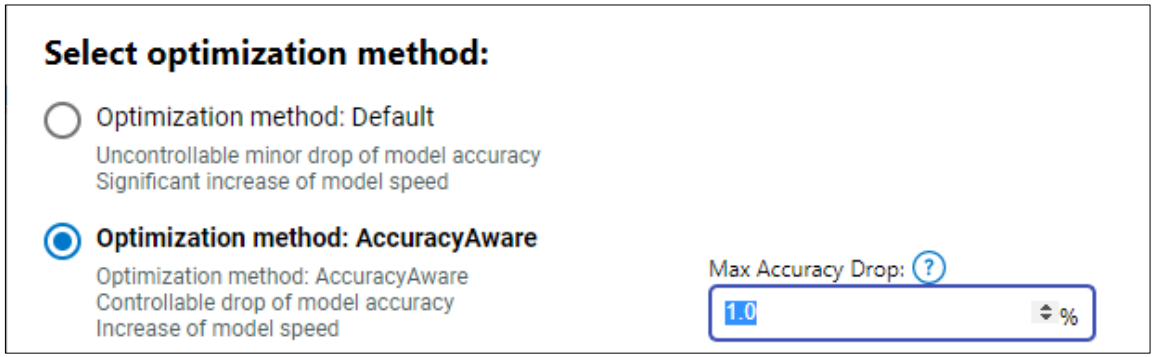
Deep Learning Workbench Workflow

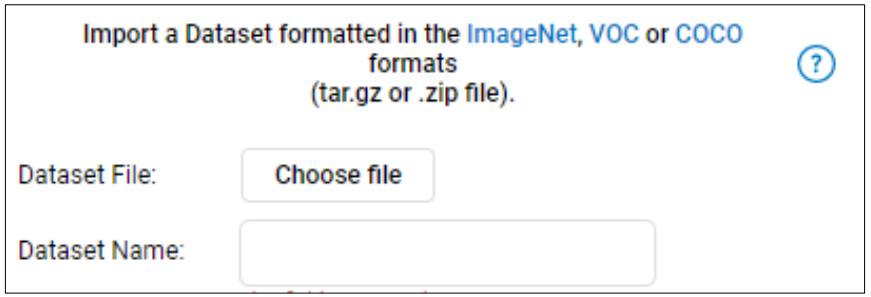


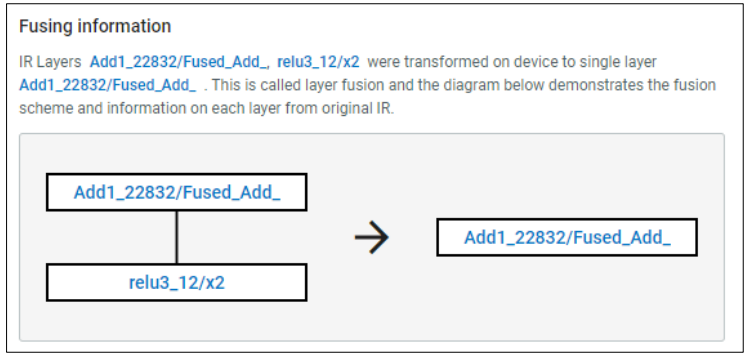
Work with Models and Sample Datasets

DEEP LEARNING WORKBENCH : FEATURES

- Convert model to Int8 using 2 new calibration algorithms
- Import dataset in COCO format to use with model
- Improved per-layer data visualization and comparison mode

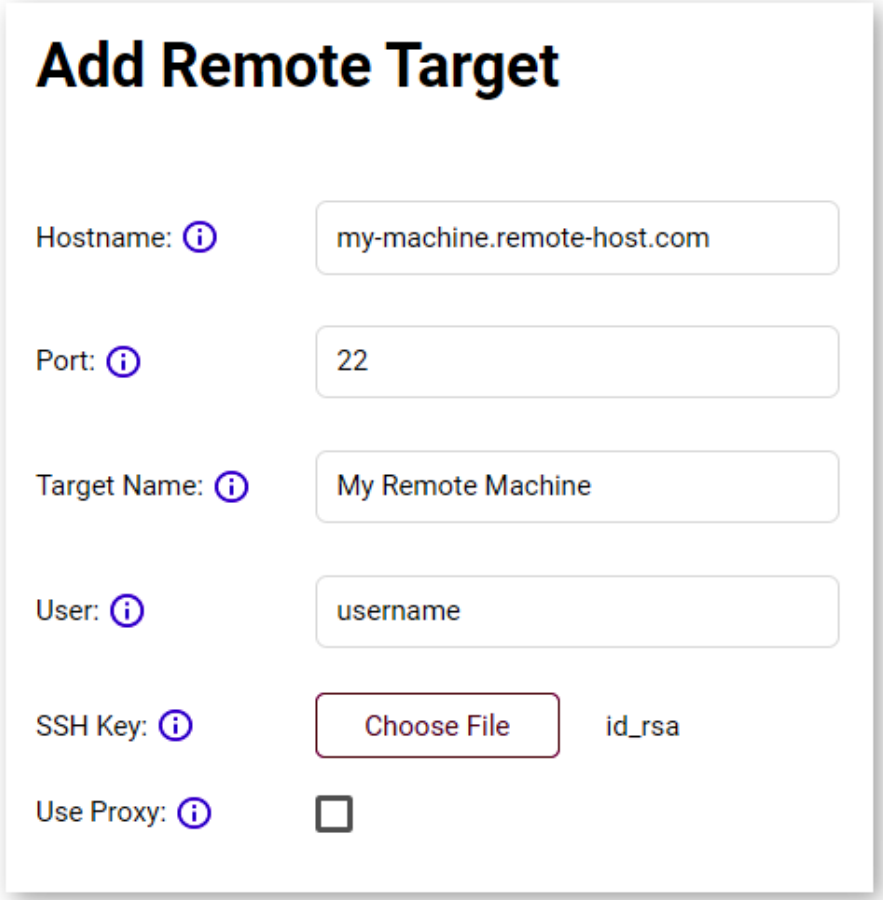




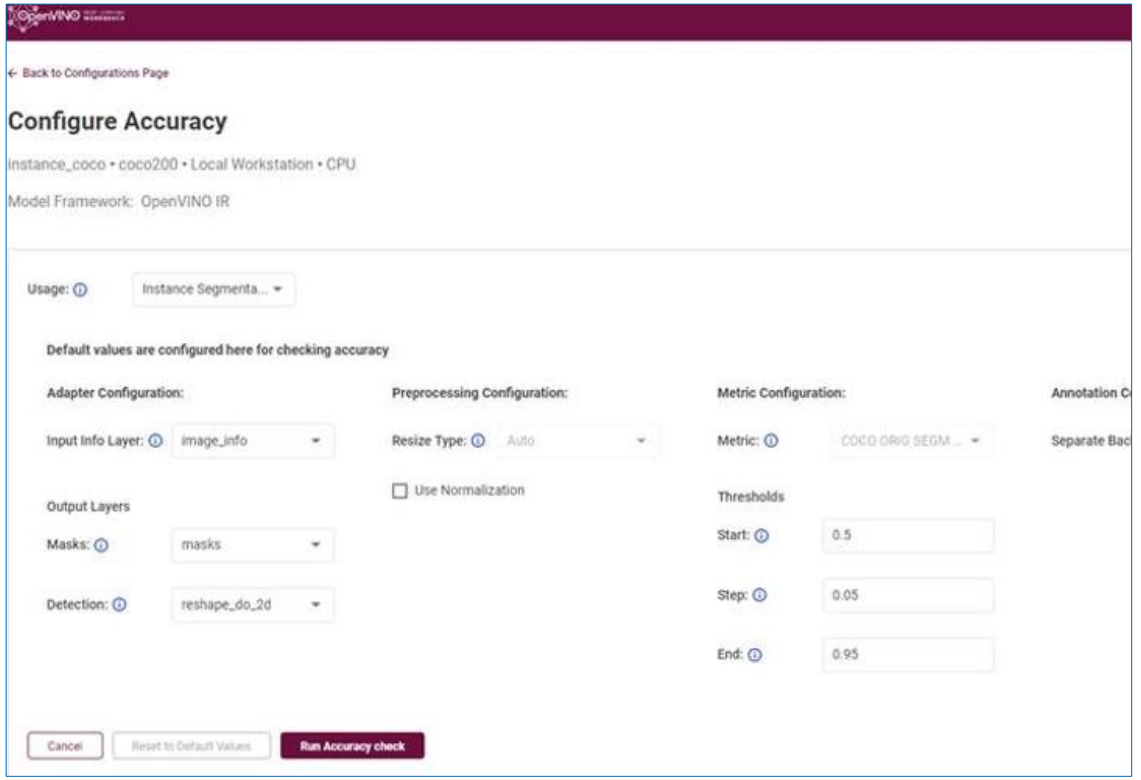


DEEP LEARNING WORKBENCH : FEATURES

Remote profiling support



Support for Segmentation use cases



Deep Learning Streamer

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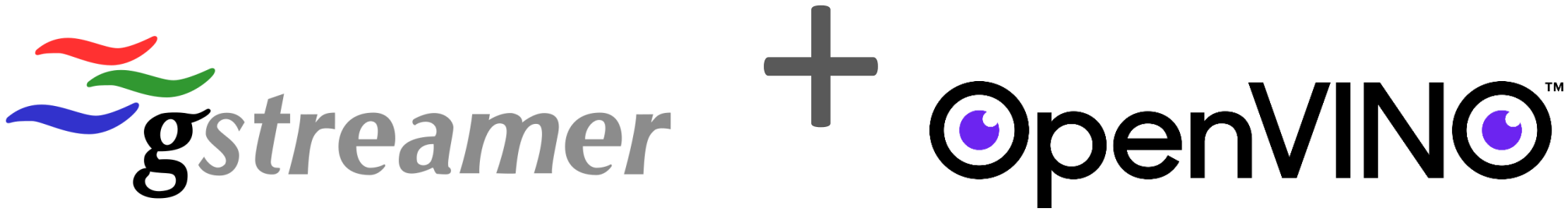
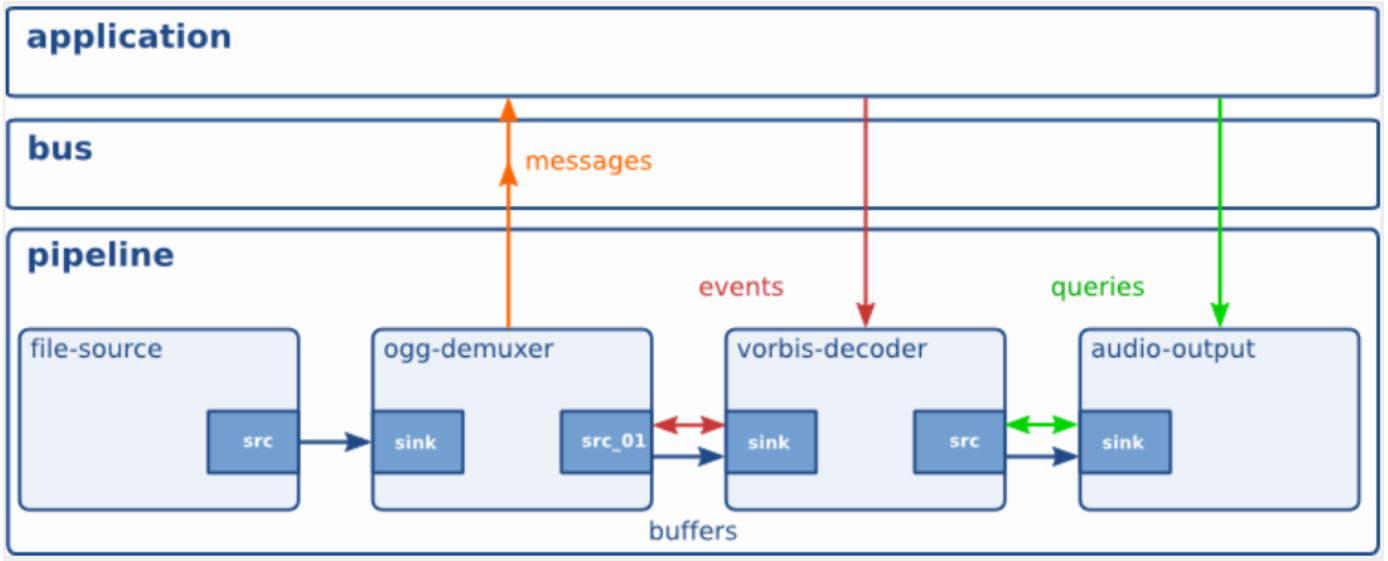
Introducing.. Dl streamer

- Intel® Distribution of OpenVINO™ toolkit Deep Learning (DL) Streamer, now part of the **default installation** package
- Enables developers to **create and deploy optimized streaming media analytics pipelines** across Intel® architecture from edge to cloud
- Optimal pipeline interoperability with a **familiar developer experience** built using the GStreamer multimedia framework



What is GStreamer?

- A pipeline consists of **connected processing elements**
- Each element is provided by **a plug-in** and can be **grouped into bins**
- Elements communicate by means of **pads** – source pad and sink pad
- Data buffers flow **from Source** element **to Sink** element & from source pad to sink pad



Ref:
https://gstreamer.freedesktop.org/data/doc/gstreamer/head/manual/manual.pdf

Media Processing Pipeline

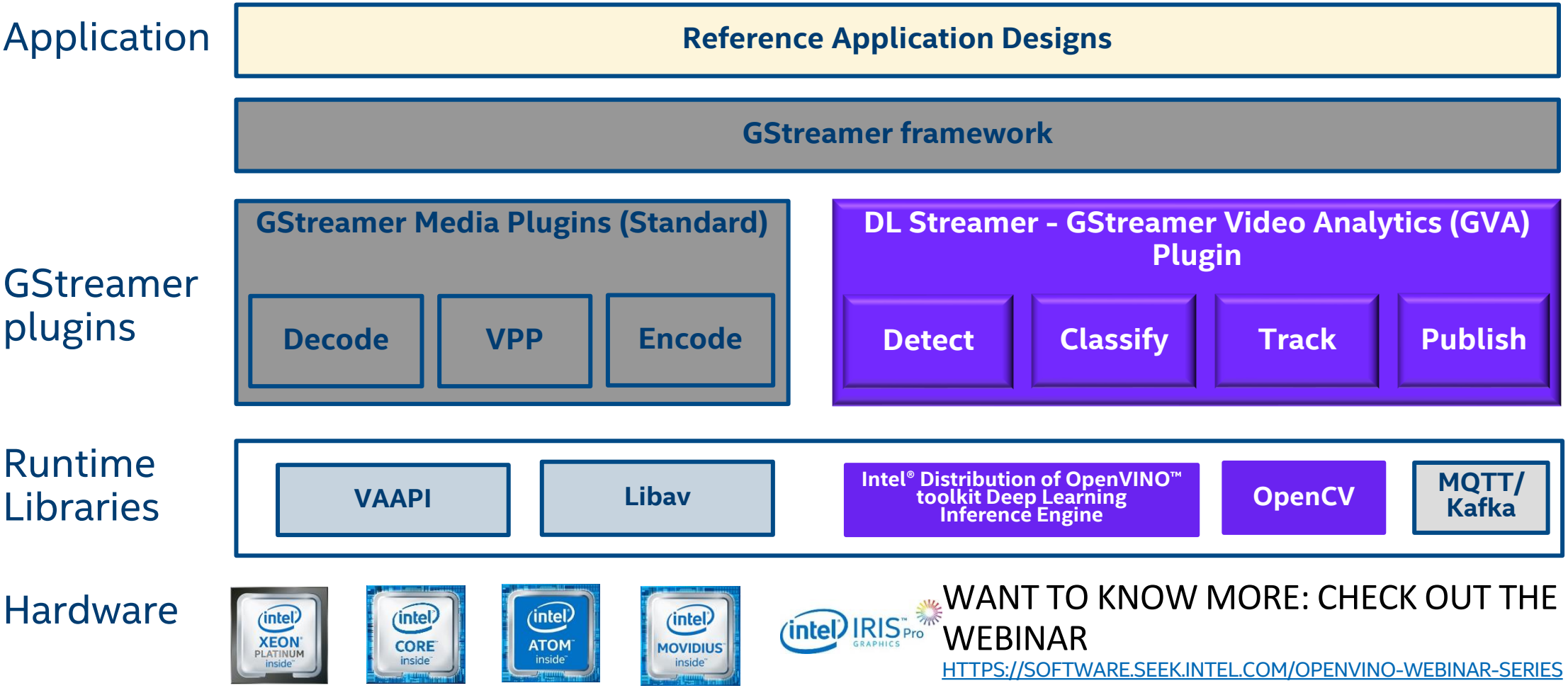
Video Pipeline – decode, convert, render

filesrc — decodebin — videoconvert — xvimagesink

input	HW/SW decode	convert	render on screen

```
gst-launch-1.0 filesrc location=/path/to/video.mp4 ! decodebin ! videoconvert ! xvimagesink
```

Under the hood: DL Streamer

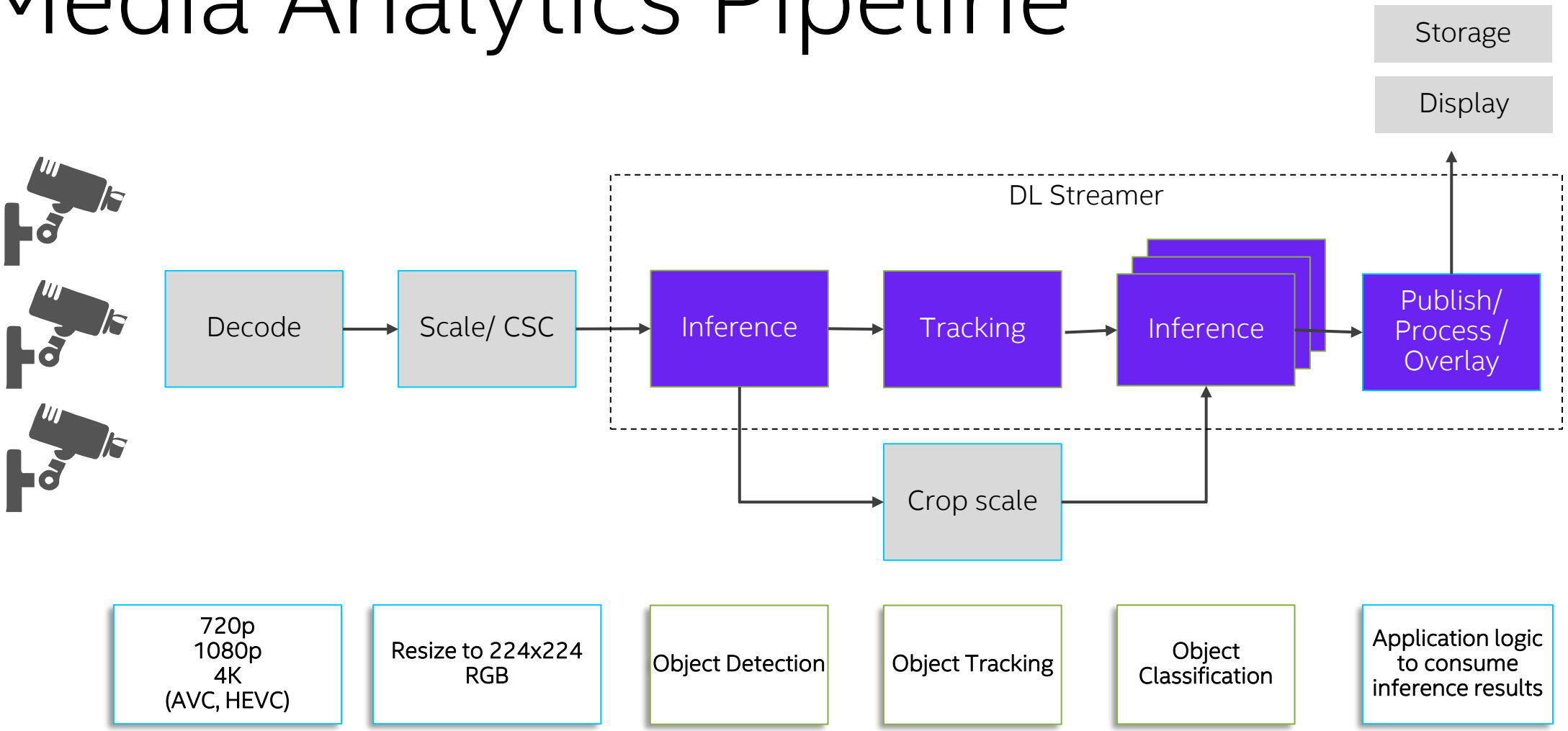


WANT TO KNOW MORE: CHECK OUT THE WEBINAR

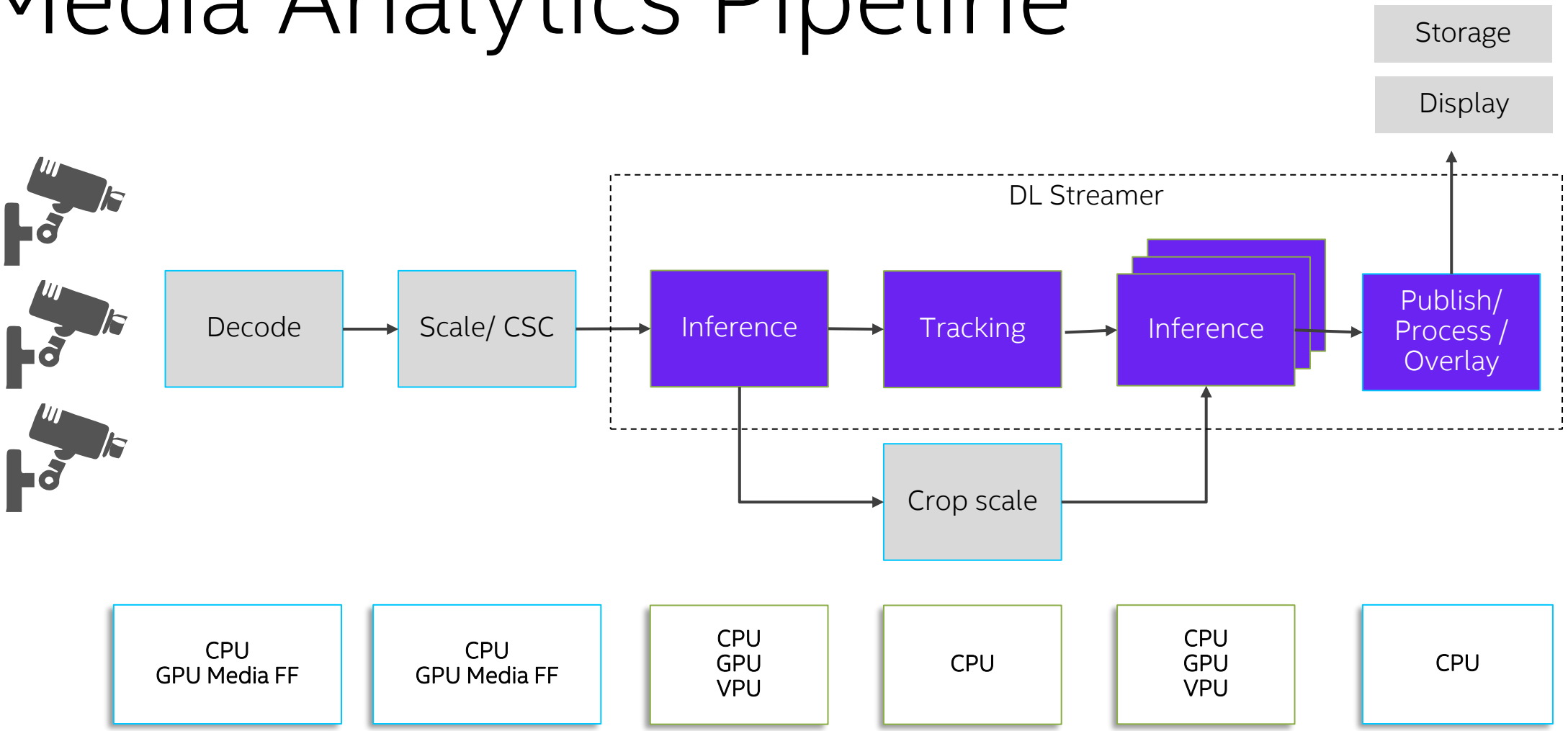
HTTPS://SOFTWARE.SEEK.INTEL.COM/OPENVINO-WEBINAR-SERIES

READY, STEADY, STREAM: INTRODUCING INTEL® DISTRIBUTION OF OPENVINO™ TOOLKIT DEEP LEARNING STREAMER

Media Analytics Pipeline

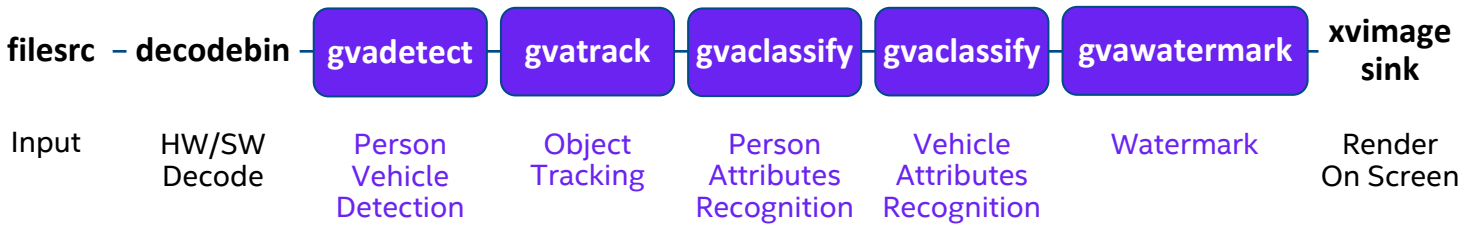


Media Analytics Pipeline



Using the DL Streamer

Video Analytics pipeline – person and vehicle detection, person, vehicle attributes classification




```
 gst-launch-1.0 filesrc location=/path/to/video.mp4 !
 decodebin ! videoconvert ! video/x-raw,format=BGRx ! \
 gvadetect model=person-vehicle-bike-detection-crossroad-0078.xml model-proc=person-vehicle-bike-detection-
crossroad-0078.json inference-interval=10 threshold=0.6 device=CPU ! queue ! \
 gvatrack tracking-type="short-term" ! queue ! \
 gvaclassify model= person-attributes-recognition-crossroad-0230.xml model-proc= person-attributes-recognition-
crossroad-0230.json reclassify-interval=10 device=CPU object-class=person ! queue ! \
 gvaclassify model= vehicle-attributes-recognition-barrier-0039.xml model-proc= vehicle-attributes-recognition-
barrier-0039.json reclassify-interval=10 device=CPU object-class=vehicle ! queue ! \
 gvawatermark ! videoconvert ! fpsdisplaysink video-sink=xvimagesink sync=true
```

Audio Processing

DL Streamer for end-to-end audio analytics pipeline

- Intel® Distribution of OpenVINO™ toolkit Deep Learning (DL) Streamer, part of the default installation package
- Enables developers to create and deploy optimized streaming media analytics pipelines across Intel® architecture from edge to cloud
- Optimal pipeline interoperability with a familiar developer experience built using the GStreamer* multimedia framework
- Introduces gvaaudiodetect for audio event detection
  - Can be paired with alcnet public model for end-to-end audio analytics pipeline

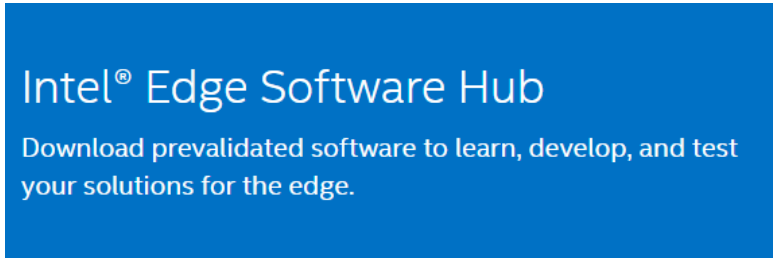
DL Streamer Elements:

- gvaaudiodetect for audio event detection using ACLNet
- gvametaconvert for converting ACLNet detection results into JSON for further processing and display
- gvametapublish for printing detection results to stdout

Resources to Get Started

Intel® Distribution of OpenVINO™ Toolkit:

https://software.intel.com/content/www/us/en/develop/tools/openvino-toolkit.html



Intel® Edge Software Hub:

https://software.intel.com/content/www/us/en/develop/topics/iot/edge-solutions.html

Intel® DevCloud for the Edge:

https://devcloud.intel.com/edge/home

To get access to the full video series, please complete the short form: http://intel.ly/38B9ix6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