HDDL-S installation guide

Hardware: CoffeeLake, Intel(R) Xeon(R) E-2176G CPU @ 3.70GHz

OS: Ubuntu 16.04.3

1. **Install OpenVINO R5**

Download OpenVINO R5:

<https://software.intel.com/en-us/openvino-toolkit/choose-download/free-download-linux>

Install OpenVINO:

<https://software.intel.com/en-us/articles/OpenVINO-Install-Linux>

Note: below steps is the least

1) Install external software dependencies

### 2) Install the Intel® Distribution of OpenVINO™ toolkit core components

3) Set the environment variables

*source /opt/intel/computer\_vision\_sdk/bin/setupvars.sh*

### 4) Additional installation steps for Intel® Processor Graphics (GPU)

*cd /opt/intel/computer\_vision\_sdk/install\_dependencies*

*sudo ./install\_NEO\_OCL\_driver.sh*

Add OpenCL users to the video group:

*sudo usermod -a -G video USERNAME*

e.g. if the user running OpenCL host applications is foo, run: sudo usermod -a -G video foo

Install 4.14 kernel using install\_4\_14\_kernel.sh script and reboot into this kernel

*sudo ./install\_4\_14\_kernel.sh*

If you use 8th Generation Intel processor, you will need to add:

i915.alpha\_support=1

to the 4.14 kernel command line, in order to enable OpenCL functionality for this platform.

### 5) Additional Installation Steps for Intel® Vision Accelerator Design with Intel® Movidius™ VPUs

1. **Install OpenCl SDK**

*#sudo apt-get install dkms*

*#tar -xvf intel\_sdk\_for\_opencl\_2017\_7.0.0.2568\_x64.gz*

*#cd intel\_sdk\_for\_opencl\_2017\_7.0.0.2568\_x64*

*#./install\_GUI.sh*

1. **Install dependencies**

**3.1 dependency packages**

*#sudo apt-get install libelf-dev*

*#sudo apt-get install libusb-1.0-0-dev libudev-dev libssl-dev rpm cmake libboost-program-options1.58-dev libboost-thread1.58 libboost-filesystem1.58 git*

**3.2 Install json-c**

*#git clone https://github.com/json-c/json-c.git*

*#cd json-c*

*#git checkout f8c632f579c71012f9aca81543b880a579f634fc*

*#sudo apt-get install autoconf libtool*

*#sh autogen.sh*

*#./configure*

*#make*

*#sudo make install*

1. **Install gstreamer**

*#sudo apt-get install gstreamer1.0-plugins-base gstreamer1.0-plugins-good gstreamer1.0-plugins-ugly gstreamer1.0-plugins-bad libgstreamer1.0-dev libgstreamer-plugins-base1.0-dev*

*#export PKG\_CONFIG\_PATH=$PKG\_CONFIG\_PATH:/opt/intel/mediasdk/lib64/pkgconfig*

1. **Install uWebSocket**

*#sudo apt-get install libssl-dev*

*#git clone* [*https://github.com/uNetworking/uWebSockets.git*](https://github.com/uNetworking/uWebSockets.git)

*#cd uWebSocket && git checkout 1a126c8d4eb9127c2689ede9a8fdf8abcb62b981*

*#make && sudo make install*

1. **Install OpenCV**

*#sudo apt-get install libgtk2.0-dev pkg-config libgtkglext1-dev*

*#export CPLUS\_INCLUDE\_PATH=/opt/intel/mediasdk/include:$CPLUS\_INCLUDE\_PATH*

*#git clone https://github.com/opencv/opencv.git*

*#cd opencv && git checkout 6ffc48769ac60d53c4bd1913eac15117c9b1c9f7*

*#mkdir build && cd build*

*#cmake -DWITH\_VA\_INTEL=ON -DWITH\_IPP=OFF -DWITH\_CUDA=OFF ..*

*note: make sure:*

*-- VA: YES*

*-- Intel VA-API/OpenCL: YES (OpenCL: /opt/intel/opencl)*

*If not, there is WA:*

*sudo ln -sf /opt/intel/opencl/SDK/include /opt/intel/opencl/include*

*sudo ln -sf /opt/intel/mediasdk/include/va /usr/local/include/va*

*#make -j8*

*#sudo make install*

*Note: OpenVINO has provided OpenCV libraries, but HDDL-S need VA support in OpenCV, so we must rebuild it.*

1. **Build HDDL-S software**

**7.1 download source code**

*#git clone* [*git@gitlab-icv.inn.intel.com:hddl/s\_framework.git*](mailto:git@gitlab-icv.inn.intel.com:hddl/s_framework.git)

**7.2 build MSDK gst-plugin**

*#sudo apt-get install libdrm-dev libudev-dev libgstreamer-plugins-bad1.0-dev libx11-xcb-dev libgles2-mesa-dev libgl1-mesa-dev*

*#sudo ln -sf /opt/intel/mediasdk/lib64/libva.so.2 /usr/lib/libva.so*

*#sudo ln -sf /opt/intel/mediasdk/lib64/libva-drm.so.2 /usr/lib/libva-drm.so*

*#cd gstreamer-media-SDK && mkdir build && cd build && cmake ..*

*#make*

*#sudo cp build/lib/release/libgstmfx.so /usr/lib/x86\_64-linux-gnu/gstreamer-1.0/libgstmfx.so*

* 1. **build OpenVINO gst-plugin**

*#**sudo apt-get install libeigen3-dev libopenblas-dev liblapack-dev libdlib-dev*

*#cd gstreamer\_plugin\_openVINO*

*#make -j8*

*#sudo make install*

Run below command to check if it has been installed successfully:

*# gst-inspect-1.0 cvdlfilter*

*# gst-inspect-1.0 resconvert*

*# gst-inspect-1.0 wssink*

* 1. **Install hddlspipe**

*#cd gstreamer\_pipeline*

*#make && sudo make install*

1. **Setup HDDL-S Server**

*#sudo apt-get install nodejs-legacy npm*

*#npm config set proxy http://child-prc.intel.com:913*

*#sudo npm install -g n*

*#sudo n stable*

*#npm install ws@6.0.0*

*#npm install child\_process arraybuffer-to-string rimraf commander tree-kill*

*#chmod a+x \*.js*

In client side:

*#echo <server\_host\_name> hostname.txt*

1. **Run HDDL-S Software Stack**

**11.1 Set environment variable**

Modify ~/.bashrc and add below command lines into it:

*-----------------------------------------------------------------------------------------------------------------------------*

*source /opt/intel/computer\_vision\_sdk/bin/setupvars.sh*

*export LD\_LIBRARY\_PATH=/usr/local/lib:/opt/intel/computer\_vision\_sdk\_2018.5.445/deployment\_tools/inference\_engine/external/hddl/lib:$LD\_LIBRARY\_PATH*

*export PKG\_CONFIG\_PATH=$PKG\_CONFIG\_PATH:/opt/intel/mediasdk/lib64/pkgconfig*

*export LD\_LIBRARY\_PATH=/opt/intel/mediasdk/lib64:/opt/intel/computer\_vision\_sdk/inference\_engine/lib/ubuntu\_16.04/intel64:/opt/intel/computer\_vision\_sdk\_2018.5.445/deployment\_tools/inference\_engine/external/omp/lib:/usr/lib/x86\_64-linux-gnu/gstreamer-1.0:$LD\_LIBRARY\_PATH*

*export HDDLS\_CVDL\_KERNEL\_PATH=/usr/lib/x86\_64-linux-gnu/libgstcvdl/kernels*

*export PATH=$PATH:/opt/intel/mediasdk/bin/*

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Run .bashrc

*#source ~/.bashrc*

**9.2 Generate certificate**

Please generate all these certificates in one pc!!!

**9.2.1 Prepare certificates**

-Generate a Certificate Authority:

*openssl req -new -x509 -days 9999 -keyout ca-key.pem -out ca-crt.pem*

-Insert a CA Password and remember it

-Specify a CA Common Name, like 'root.localhost' or 'ca.localhost'. This MUST be different from both server and client CN.

**9.2.2 Server certificate**

-Generate Server Key:

*openssl genrsa -out server-key.pem 4096*

-Generate Server certificate signing request:

*openssl req -new -key server-key.pem -out server-csr.pem*

-Specify server Common Name, run cat /etc/hosts to check valid DNS name, please don't name as'localhost'.

-For this example, do not insert the challenge password.

**9.2.3 Sign certificate using the CA**:

*openssl x509 -req -days 9999 -in server-csr.pem -CA ca-crt.pem -CAkey ca-key.pem -CAcreateserial -out server-crt.pem*

-insert CA Password

**9.2.4 Verify server certificate**:

*openssl verify -CAfile ca-crt.pem server-crt.pem*

**9.2.5 Client certificate**

-Generate Client Key:

*openssl genrsa -out client1-key.pem 4096*

-Generate Client certificate signing request:

*openssl req -new -key client1-key.pem -out client1-csr.pem*

-Specify client Common Name, like 'client.localhost'. Server should not verify this, since it should not do reverse-dns lookup.

-For this example, do not insert the challenge password.

**9.2.6 Sign certificate using the CA**:

*openssl x509 -req -days 9999 -in client1-csr.pem -CA ca-crt.pem -CAkey ca-key.pem -CAcreateserial -out client1-crt.pem*

-insert CA Password

**9.2.7 Verify client** **certificate**:

*openssl verify -CAfile ca-crt.pem client1-crt.pem*

**9.2.8 Deploy pem files**

After generated, please copy all file start with 'ca' and 'client' into 'cert\_client\_8216', and copy all file start with 'ca' and 'server' into 'cert\_server\_8216'.

**9.3 Run HDDL-S server**

*# cd s\_framework/hddls\_server\_client/hddls\_server*

*#export HDDLS\_CVDL\_MODEL\_PATH=<hddl-s\_server\_folder>/models*

*#./hddls\_server.js*

**9.3.1 How to deploy customer models**

Step 1: implement libxxxalgo.so as customer guide

Step 2: copy model IR files into <*HDDLS\_CVDL\_MODEL\_PATH*>/<model\_name>

Step 3: register this customer models

registeralgo -a <model\_name>

Step 4: edit create\_xxx.json and add <model\_name> into algopipeline property

Step 5: controller\_client send create pipeline command with create\_xxx.json

**9.3.2 Some tips**

1. Dont't remove the files in hddls\_server/models

The hddlspipe will read models file from this directory.

2. Maybe it will fail to run h265 video stream, it was caused by cannot find libmfx\_hevcd\_hw64.so in /opt/intel/mediasdk/lib64/mfx/

It was mediasdk driver cfg issues.

There is a WA:

*#cd /opt/intel/mediasdk/lib64*

*#sudo ln -sf ../plugins mfx*

**9.4 Run HDDL-S clients**

**9.4.1 Run receiver client**

*# cd s\_framework/ hddls\_server\_client/hddls\_client*

*#./receiver\_client.js*

**9.4.2 Run controller client**

*# cd s\_framework/hddls\_server\_client/hddls\_client*

*#./controller\_client.js*

*--Please chose server by id:*

*--Please type model dictionary:*

//Choose the models directory that will be updated into hddls-server

*Note:*

1. Command format:

*-help commands that you can use.*

*-c <create.json> create pipeslines*

*-p <property.json> <pipe\_id> set pipeslines property*

*-d <destroy.json> <pipe\_id> destroy pipeslines*

*-pipe display pipes belonging to the very client*

*-client display client ID*

*-model display model info*

*-q exit client.*

2. Json file refer to: hddls\_client/json\_file