VCDN Certification in Intel Select Solution

Inspur

Contents

1．Architecture

The system is comprised of 1 server node (NF5280M5) and 1 client node

(NF5280M5). The following section details the architecture for the compute nodes, network infrastructure and storage infrastructure.

1.1 Server Node Architecture

Hardware	**Description**
CPU	2*Intel® Xeon® Gold 6230 processor at 2.1 GHz for base 2*Intel® Xeon® Gold 6252 processor at 2.1 GHz for plus
Memory	12*32 GB DDR4 at 2666 MHz (384 GB Total)
Storage	4*INTEL® SSD DC P4510 SERIES 4.0 TB NVMe NUMA aligned
Data Network	2*25GbE Dual Port Intel® Ethernet Controller XXV710 SFP28+
Mgmt Network	1 GbE
Accelerator	Intel® VCA 2 VCA1585LMV (VCA 2 transcoding accelerator card, PCIe Gen 3 x16) for plus

1.2 Client Node Architecture

Hardware	**Description**
CPU	2*Intel® Xeon® Gold 6230 processor at 2.1 GHz
Memory	12*32 GB DDR4 at 2666 MHz (384 GB Total)
Storage	4*INTEL® SSD DC P4510 SERIES 4.0 TB NVMe NUMA aligned
Data Network	2*25GbE Dual Port Intel® Ethernet Controller XXV710 SFP28+
Mgmt Network	1 GbE

1.3 Network Infrastructure

Network	2*25GbE Dual Port Intel® Ethernet Controller XXV710 SFP28+
Management	1 Gbps

1.4 Software Requirements

The following technologies are required to run the benchmark.

Software for Server	**Version**
Linux* Distribution	RHEL 7.6
SVT-HEVC	v1.4.0
Ffmpeg	4.0.4
NGINX	1.14.2

Software for Client	**Version**
Linux* Distribution	RHEL 7.6
Jmeter	4.0

Inspur testing as of Nov 2, 2019.
Base configuration: One server node: 2*Intel® Xeon® Gold 6230 processor, Inspur® NF5280M5, total memory: 384 GB, 12 slots/32 GB/2666 mega transfers per second (MT/s) DDR4 RDIMM, Intel® Hyper-Threading Technology (Intel® HT Technology) enabled, Intel® Turbo Boost Technology disabled; storage:4* INTEL® SSD DC P4510; network devices: 2*25GbE Dual Port Intel® Ethernet Controller XXV710 SFP28+, network speed: 25GbE , OS/software: RHEL 7.6;
Plus configuration: One server node: 2*Intel® Xeon® Gold 6252 processor, Inspur® NF5280M5, total memory: 384 GB, 12 slots/32 GB/2666 mega transfers per second (MT/s) DDR4 RDIMM, Intel® Hyper-Threading Technology (Intel® HT Technology) enabled, Intel® Turbo Boost Technology disabled; storage:4* INTEL® SSD DC P4510; network devices: 2*25GbE Dual Port Intel® Ethernet Controller XXV710 SFP28+, network speed: 25GbE , OS/software: RHEL 7.6,Accelerator: Intel® VCA 2 VCA1585LMV (VCA 2 transcoding accelerator card, PCIe Gen 3 x16) ;
Four Client nodes: 2*Intel® Xeon® Gold 6230 processor, Inspur® NF5280M5, total memory: 384 GB, 12 slots/32 GB/2666 mega transfers per second (MT/s) DDR4 RDIMM, Intel® Hyper-Threading Technology (Intel® HT Technology) enabled, Intel® Turbo Boost Technology disabled; storage:4* INTEL® SSD DC P4510; network devices: 2*25GbE Dual Port Intel® Ethernet Controller XXV710 SFP28+, network speed: 25GbE , OS/software: RHEL 7.6;

1.5 Firmware Settings

BIOS MCU	"SE5C620.86B.0D.01.0241 Release Date Nov 19'2018 0x04000010"
X520 NIC FW	E68793-005_rev1_0
X722 NIC FW	V3.3

FV25 NIC FW V6.02
FV25 NIC DDP VDV10131
P4510 NVMe FW GTPv1
Intel® Optane™ DC persistent memory Module FW "NVMDIMMDriver: v01.00.00.3371
NVMDIMMHii: v01.00.00.3371"
the rest are default.

2．OS Preparation

2.1 Network

Server Name	Mgmt Network	Data Network
Server	10.7.9.111	192.168.30.10
Client	10.7.9.112	192.168.30.100

2.2 Firewall & SELinux*

Because this test server is behind a hardware firewall on a safe network, we can disable firewall and SELinux to simplify configuration.

2.3 Prepare Data Drives

Format 4T P4510 drives with the ext4 and mount to /nvme2.

2.4 Limit configuration

Add the following lines to /etc/security/limits.conf

```
* soft memlock unlimited
* hard memlock unlimited
* soft nofile 65535
* hard nofile 65535
* soft nproc 65535
* hard nproc 65535
```

2.5 Set hostname map

set the mapping of hostname and Ip in /etc/server for all nodes.

192.168.30.10   server
192.168.30.100   client

3. Environment building

3.1 Installing the Intel® Select Solution for NFVI Enabling Kit

unzip NFVI .zip
cd NFVI-install
./install.sh iss
As the install.sh script executes, it will request a passphrase. Enter the passphrase iss222 to continue. The passphrase is necessary for an encryption step to be executed.
When installation is complete, the source will be installed in the /root/work/ Intel_NFVI_EK folder
Note: gpg v1.42 may be required to successfully extract the ISS package.
1. The iss_nfvi.sh script provides the front-end to run Intel® select Solution for NFVI verification scripts. To run this front-end application execute ./iss_nfvi.sh from the extracted folder.
2. Enter company's name and accept licensing terms and conditions.
3. The menu to run applications will be shown. Choose the options accordingly. For example, if you select option "1 Check ISS NFVi Base", the script performs the hardware/software conformance check on the system and generates the logs under /root/iss_nfvi//.
4. Similarly, there are options to run cpa sample application, MLC, Jitter, and OpenSSL speed test, and so forth.

3.2 Setup the CDN environment

The next step to setup the CDN environment is to use the Ansible* installer from https://github.com/OpenVisualCloud/CDN-Ansible to install the primary components required for running the benchmarks. The objective of this project is to share an optimize recipe and a CDN reference solution based on open source frameworks.
The Ansible playbooks will deploy the various components of CDN such as ATS (version 7.1.5), FFmpeg (n4.0.3), Nginx (version 1.14.0)+ rtmp-module and Intel® Scalable Video Technology (Intel® SVT) (v1.2.0).
#git clone   https://github.com/OpenVisualCloud/CDN-Ansible
1. To start installing the CDN components, edit group vars/all (hostname

of Nginx node for creating SSL certificate and proxy environment).

2. edit group_vars

```
#export CDN_DIR=/root/vcdn/CDN-Ansible/
#export http_proxy=""
#export https_proxy=""
#export hostname=host
```

   #printf "proxy_env\n http_proxy=\"$http_proxy\"\n https_proxy=\"$https_proxy\"\n\nhostname=\"$hostname\"\n" | sudo tee $CDN_PATH/group_vars
3. #vi inventory
4. #server ansible_ssh_user=root ansible_ssh_pass=Vcdn123!
5. #export ANSIBLE_HOST_KEY_CHECKING=False
6. Generate a ssh key in the Ansible machine, which we have to copy to all the remote hosts for doing deployments or configurations on them:
   #ssh-keygen -t rsa -b 4096 -C "root@10.7.9.111
7. #ansible -i inventory all -m ping
8. #cd $CDN_DIR
   #ansible-playbook -i inventory CDN.yml --become -K

4. Performance Baseline

4.1 Memory Latency Checker (MLC)

Download the Memory Latency Checker package through
https://software.intel.com/en-us/articles/intelr-memory-latency-checker. Download the latest version and execute this application, unzip the .tar ball
package and go into the Linux folder to execute:

```
#./mlc
```

4.2 Jitter

The jitter application aims to measure the variability of the latency in the execution of a user space dummy loop with dummy operations; more information about this tool is available at
https://wiki.fd.io/view/Pma_tools/jitter.
The following step will download the tool, build and execute the tool targeting an idle core:

```
#git clone https://gerrit.fd.io/r/pma_tools
#cd pma_tools/jitter
#make
```

#./jitter -c 2 -i 200
Review Inst_Jitter column, this should range from 5k-100K if Max Performance Profile with Turbo Mode is enabled. When Deterministic Performance in BIOS setting is used, the jitter should not exceed 10k.

5. IP CDN, Video Transcoding and Video distribution Performance

5.1 IP CDN Test

1. J-Meter client setup
   — Download the apache-jmeter-4.0.tgz file.
   https://archive.apache.org/dist/jmeter/binaries/
   Note: jre is needed to run J-meter.
   Un-tar the file apache-jmeter-4.0.tgz
   # tar -zxvf apache-jmeter-4.0.tgz
   Go to the apache-jmeter-4.0 directory and give full permissions to the bin folder.
2. Creation of Test plan
   Login to the client machine by enabling X11 forwarding in putty:
   # cd apache-jmeter-4.0/bin
   #. /jmeter
   ---Go the main menu and select File -> New.
   ---Give a name for the HTTP test plan.
   ---Create a Thread Group for the test plan.
   ---Set up the thread properties as per your requirement.
   ---Example:
   - Action to be taken after a sampler error is continue
   - Number of threads = 1000, Ramp-up period = 5 sec
   - Loop count = 4000 per thread or forever

   ---Add a sampler of http/https/HLS requests depending upon the use case you want to test
   ---HTTP sampler example for IP CDN
   Note: You can create multiple thread groups within one test plan with the same sampler.
   ---Save the test plan.

3. # jmeter -n -t test.jmx -l result.jtl -e -o /tmp/ResultReport
4. Tuning Jmeter client for generating higher number of requests and users
   a) Increase Java Heap memory size:

export _JAVA_OPTIONS=”-Xms32g -Xmx32g”

b) Tuning the client and the SUT to handle more number of requests per second
Update /etc/sysctl.conf
net.ipv4.tcp_slow_start_after_idle = 0
Update the following env variables:

```
# echo "1025 65535" > /proc/sys/net/ipv4/ip_local_port_range
# echo "1" > /proc/sys/net/ipv4/tcp_tw_recycle
# echo "1" > /proc/sys/net/ipv4/tcp_tw_reuse
# echo "10" > /proc/sys/net/ipv4/tcp_fin_timeout
# echo "65535" > /proc/sys/net/core/somaxconn
# echo "65535" > /proc/sys/net/ipv4/tcp_max_syn_backlog
# echo "262144" > /proc/sys/net/netfilter/nf_conntrack_max
```

5. To stop/shutdown test

5.2 Video Transcoding test

1. To run the Intel® SVT copy the binary (HevcEncoderApp, libHevcEncoder.so) from /opt/SVT- HEVC/Bin/Release to any location of your choice.
2. Change the permissions on the sample application HevcEncoderApp executable by running the command:
   ```
   # chmod +x HevcEncoderApp
   ```
3. cd into your chosen location.
4. Run the sample application to encode.
5. Sample application supports reading from pipe. For example:
   ```
   nohup taskset -c 1-19,40-59 ffmpeg -i ${INPUT} -preset medium -vcodec ${VCODEC} -s ${RESOLUTION} -r ${FPS} -f ${TYPE} ./dest$instances.mp4 >dest$instances.log 2>&1 &
   ```

5.3 Video Distribution

Same to IP CDN Test.
Build HLS sampler example for Live streaming and VOD.

6. VCDN Benchmark Results

The result has been submitted to intel IPS. The case number is 00478790.