



Red Hat

MESURE ET ANALYSE DE PERFORMANCE D'ENCODAGE VIDÉO TEMPS RÉEL

avec Dash et Plotly

Kevin Pouget, Red Hat SPICE Senior Software Engineer
2020-02-18 – Python User Group @ La Turbine, Grenoble

ABOUT ME

Kevin Pouget

- 2011-2017: PhD & Post-doc (Grenoble)
 - Improve interactive debugging for multicore programming



- 2017-2019: Virtualization engineer (Grenoble)
 - OpenCL inside virtual machines



- Qemu/KVM checkpoint restart
 - ...

- June 2019...: Senior Software Engineer (remote)



Red Hat

ABOUT ME

Kevin Pouget

- 2011-2017: PhD & Post-doc (Grenoble)
 - Improve interactive debugging for multicore programming
 - Python to extend GDB and inspect C code



- 2017-2019: Virtualization engineer (Grenoble)
 - OpenCL inside virtual machines
 - Python for C code generation, benchmarking & performance analyses
 - Qemu/KVM checkpoint restart
 - Python for benchmarking & performance analyses
 - ...



- June 2019...: Senior Software Engineer (remote)



Red Hat

⇒ Python for driving C low-level apps and collection/analyze of execution data

...in addition to multi-process low-level C programming... !

AGENDA

SPICE Remote Display

Recording Infrastructure

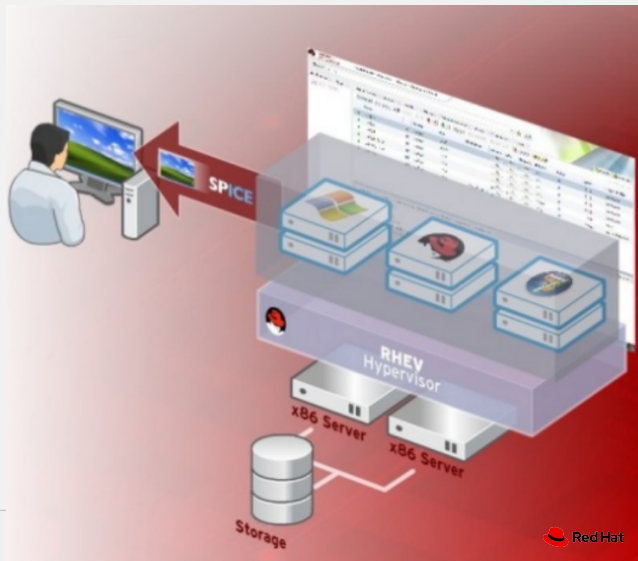
Performance Benchmarking & Visualization

SPICE REMOTE DISPLAY

SPICE REMOTE DISPLAY

Simple Protocol for Independent Computing Environments

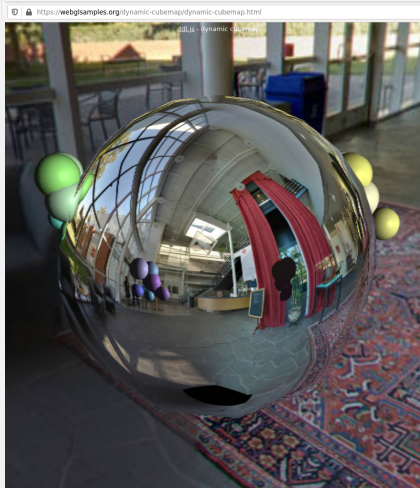
- GUI in remote client
 - ★ client/VM copy-and-paste
 - ★ file drag-and-drop
 - ★ multi-monitor support
 - ★ window-to-screen resolution
 - ★ CD-ROM/ISO sharing
 - ★ seamless VM host migration
 - ★ SSL, smartcard authentication, ...
- Server library inside Qemu-KVM
 - ★ OS-independent screen capture
 - hypervisor level
 - ★ MJPEG video encoding



SPICE REMOTE DISPLAY

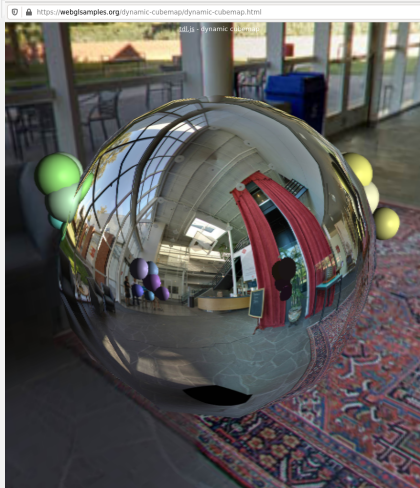
3D, vGPU and Video Streaming

3D inside the VM?



SPICE REMOTE DISPLAY

3D, vGPU and Video Streaming



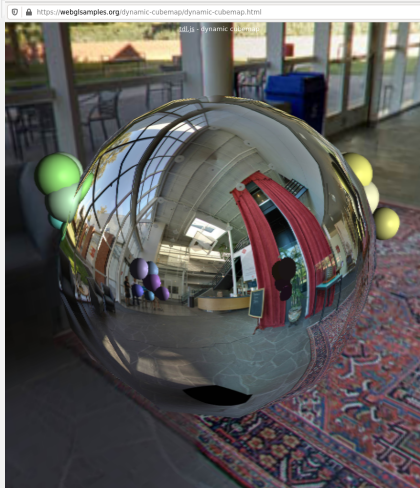
3D inside the VM?

GPU passthrough?

- disconnect from the host, give it to the VM

SPICE REMOTE DISPLAY

3D, vGPU and Video Streaming



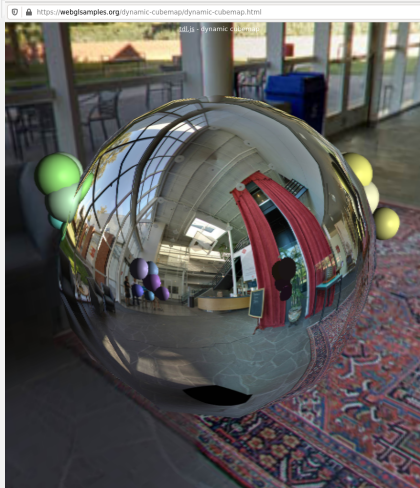
3D inside the VM?

GPU ~~passthrough~~ mediated passthrough

- ~~disconnect from the host, give it to the VM~~
- cut the GPU in 4, give a vGPU slice to the VM
 - recent Intel/NVidia/... GPUs

SPICE REMOTE DISPLAY

3D, vGPU and Video Streaming



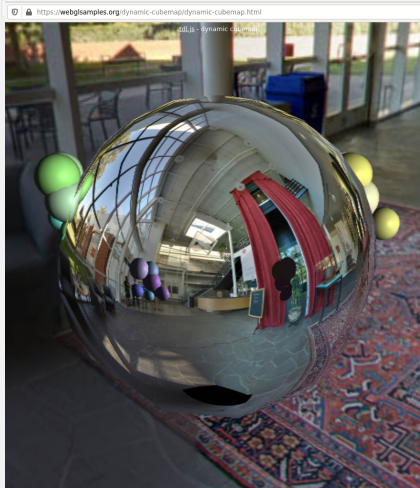
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- forward 3D commands to the host (VirGL)
 - under investigation for SPICE

SPICE REMOTE DISPLAY

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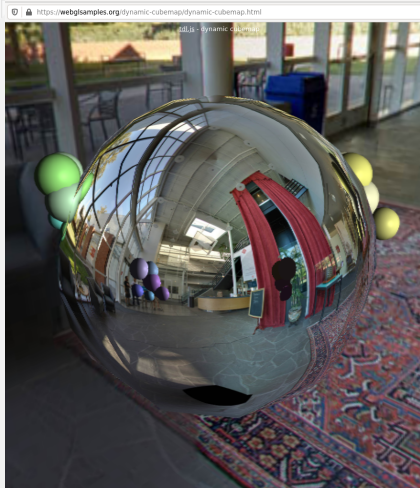
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but what about the video encoding?

- MJPEG OK for office usage, but not for 3D!

SPICE REMOTE DISPLAY

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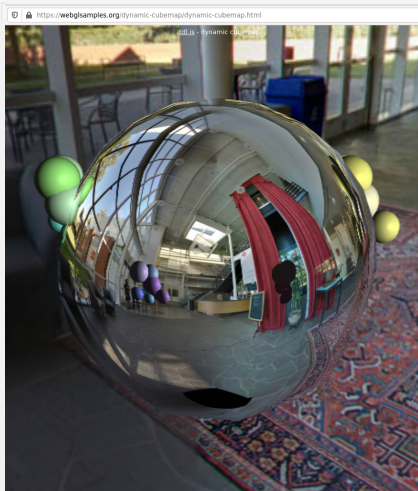
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- H264, VP8 more suitable (++ with HW-support :)

SPICE REMOTE DISPLAY

3D, vGPU and Video Streaming



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but what about the video encoding?

- MJPEG OK for office usage, but not for 3D!
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Video encoding in the guest vGPU:

- ① capture the framebuffer (*ie*, do a screenshot)
- ② give it to the vGPU for encoding
- ③ send it (1) outside of the VM and (2) to the client

✕

Resize to

```
Starting System Security Services Daemon ...
Starting Switcheroo Control Proxy Service ...
Starting Remote System Activity Logs ...
Starting Huh 7 ...
Starting Bome ...
Starting P-90 ...
[OK] Starting Rescuer ...
[OK] | Started NTP cli ...
[OK] | Started NUTUI ...
[OK] | Started System Logging service ...
[OK] | Started GSSAPI Proxy Daemon ...
[OK] Reached target NFS client services.
[OK] A 6780K1 KERN Persistence mode is deprecated and will be removed in a future release. Please use moidia-persistent instead.
[OK] | Started Self Monitoring and Reporting Technology (SMART) Daemon ...
[OK] | Started 3-Bus System Message Bus ...
[OK] | Started RealtimeKit Scheduling Policy Service ...
[OK] | Started Switcheroo Control Proxy Service ...
[OK] | Started Network Manager ...
[OK] Reached target Network.
[OK] Starting Network Manager Mail Online ...
[OK] | Started Logout of all XSD sessions on shutdown ...
[OK] Reached target Remote File Systems (Pre).
[OK] Reached target Remote File Systems.
[OK] Starting OpenSSH server daemon ...
[OK] Starting Nutsame Service ...
[OK] | Started OpenSSH server daemon ...
[OK] Started Nutsame Service ...
[OK] | Started ARRT Automated Bug Reporting Tool ...
[OK] Listening on Load/Save RF Kill Switch Status /dev/rfkill Watch.
[OK] Started Creates ARRT problem from comvantage messages ...
[OK] | Started ARRT kernel log watcher ...
[OK] | Started ARRT Xorg log watcher ...
[OK] Starting Authentication Manager ...
[OK] Starting Network Manager Script Dispatcher Service ...
[OK] | Started Network Manager Script Dispatcher Service ...
[OK] | Started Pulse Manager ...
[OK] | Started System Security Services Daemon ...
[OK] Reached target User and Group Name Lookups.
[OK] Starting Accounts Service ...
[OK] Starting Login Service ...
[OK] Starting Permit User Sessions ...
[OK] | Started Permit User Sessions ...
[OK] | Started Deferred execution scheduler ...
[OK] Starting GNOME Display Manager ...
[OK] Starting audit with boot process finishes up ...
[OK] | Started GNOME Display Manager ...
```

```

$ ./vm stream
spice-streaming-agent[1469]: Empty device display info from the plugin
spice-streaming-agent[1469]: Gstreamer plugin: Looking for encoder plugins which can produce a 'video/x-h264, stream-format=(string)byte-stream, framerate=(fraction)25/1' stream
spice-streaming-agent[1469]: Gstreamer plugin: 'nvh264enc' plugin is available
spice-streaming-agent[1469]: Gstreamer plugin: 'nvh264enc' encoder plugin is used
spice-streaming-agent[1469]: Empty device display info from the plugin
spice-streaming-agent[1469]: Quality: !encoding:nvh264enc; params:

```

SPICE Streaming Agent

3

Resize to

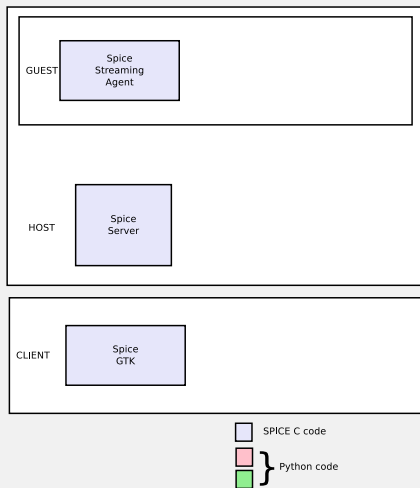
SPICE Client

mouse: client, agent: yes

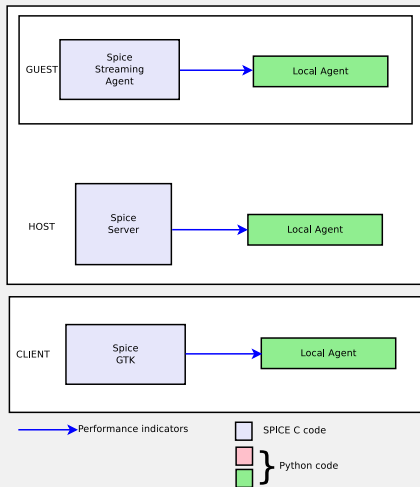
RECORDING INFRASTRUCTURE

RECORDING INFRASTRUCTURE

① SPICE is running and streaming

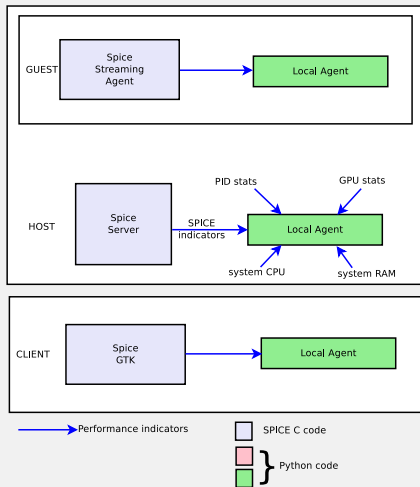


RECORDING INFRASTRUCTURE



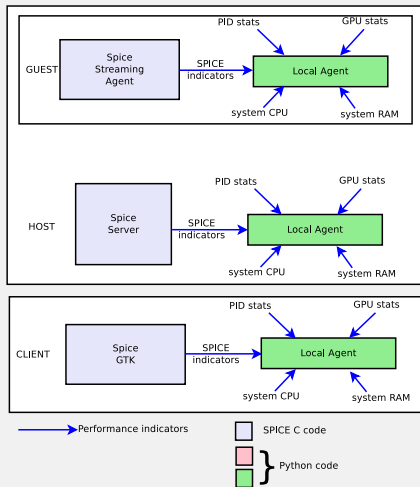
- 1 SPICE is running and streaming
- 2 On each system,
 - 1 deploy a Python local agent

RECORDING INFRASTRUCTURE



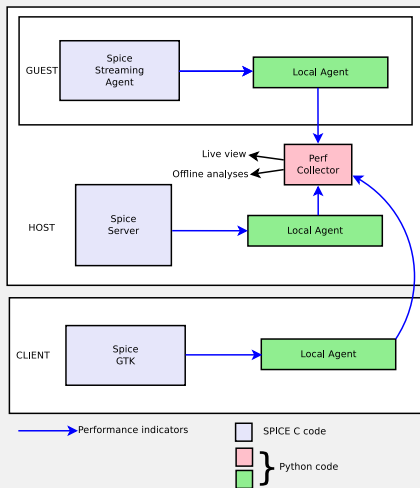
- ❶ SPICE is running and streaming
- ❷ On each system,
 - ❶ deploy a Python local agent
 - ❷ collect various performance indicators

RECORDING INFRASTRUCTURE



- 1 SPICE is running and streaming
- 2 On each system,
 - 1 deploy a Python local agent
 - 2 collect various performance indicators
 - 3 ... in each of the agents

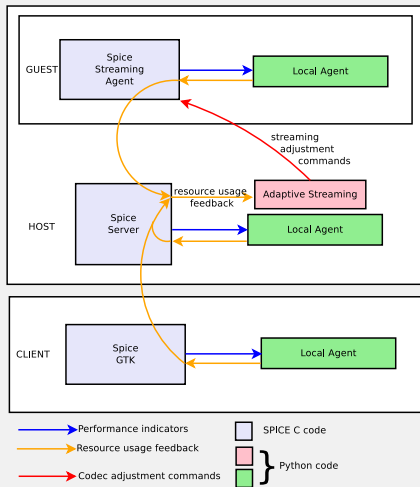
RECORDING INFRASTRUCTURE



- ① SPICE is running and streaming
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 - ② collect various performance indicators
 - ③ ... in each of the agents
- ③ Collect all the indicators
 - for live & interactive view
 - for offline processing

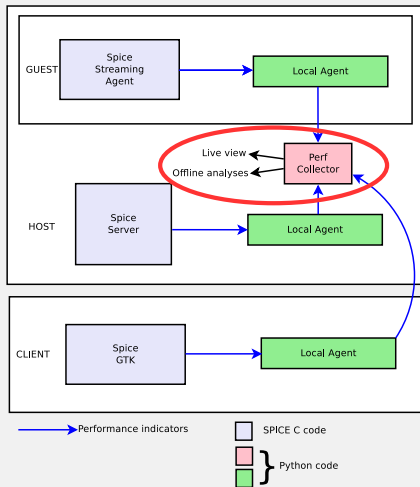
<pre> qemu-system-x86_64: warning: Spice: Agent Inter Starting CUPS Scheduler... [OK] Reached target Remote File Systems (Pr e). [OK] Reached target Remote File Systems. Starting Permit User Sessions... Starting OpenSSH server daemon... Starting Network Manager Wait Online... . [OK] Started Permit User Sessions. Starting GNOME Display Manager... [OK] Started Deferred execution scheduler. Starting Hold until boot process finis hes up... [OK] Started Command Scheduler. [OK] Started GNOME Display Manager. Starting Hostname Service... Fedora 30 (Workstation Edition) Kernel 5.3.15-200.fc30.x86_64 on an x86_64 (tty S0) chamechaude login: </pre>	<pre> client \$ kevin ~ \$ laptop \$ kevin ~ \$ tlv client CLIENT: SPICE_NOGRAB=1 /home/kevin/client GSpice-Message: 18:25:34.798: main channel: ope (spicy:42238): Spice-WARNING **: 18:25:41.973: </pre>	<pre> 'video/x-h264, stream-format=(string)byte-stre am, framerate=(fraction)25/1' stream spice-streaming-agent[1474]: Gstreamer plugin: 'nvh264enc' plugin is available spice-streaming-agent[1474]: Gstreamer plugin: 'nvh264enc' encoder plugin is used (spice-streaming-agent:1474): Spice-WARNING **: 17:26:05.752: Agent Interface: client connecte d! spice-streaming-agent[1474]: On connect! spice-streaming-agent[1474]: Quality: encoder:g st.h264.nvh264enc </pre>	<pre> running 16/16 > codec=nv.plug.h264_display=webgl-cubemap_reco rd-time=40s_framerate=200_ratecontrol=cbr_max-b itrate=64_gop=0_blocking=0 reset encoder parameters set_enc: nv.plug.h264_framerate=200, nv.ratecon trol=cbr, nv.max-bitrate=64, nv.gop=0, nv.block ing=0 wait 2 seconds clear graphs clear quality wait 2 seconds append to quality: script: codec: nv.plug.h264 append to quality: script: record_time: 40s append to quality: script: display: webgl_cubem ap append to quality: script: encoding: framerate= 200;ratecontrol=cbr;max-bitrate=64;gop=0;blocki ng=0 request: send 'share_pipeline' to agent, client set_enc: share_encoding set_enc: share_resolution wait 1 seconds wait 40 seconds save record into /home/kevin/spice/streaming_st ats/results/current/webgl_cubemap/framerate=200 _ratecontrol=cbr_max-bitrate=64_gop=0_blocking= 0.rec write result: /home/kevin/spice/streaming_stats /results/current/matrix.csv << codec=nv.plug.h2 64_display=webgl-cubemap_record-time=40s webgl _cubemap framerate=200_ratecontrol=cbr_max-b itrate=64_gop=0_blocking=0 teardown(display) system-exec: vm display stop https://webglsampl es.org/dynamic-cubemap/dynamic-cubemap.html teardown() system-exec: xset s on +dpms system-exec: server exec xset s on +dpms Performed 16 experiments. Skipped 0 experiments already recorded. Estimated time: 12min0s </pre>
<pre> tlv qemu agent \$ kevin ~ \$ tlv qemu agent HOST: cd spice/streaming_stats/ && ./smart_agen * Starting the socket for the Perf Collector on WARNING: Intel_GPU_Top: failed to load (intel_g * Preparing the environment ... * Running! Connecting to 1235 server: received 5 recorders: quality_interface server: Agent info received: 'pid: 19240' Quality received: 'guest' says '!encoding:nvh26 Quality received: 'guest' says 'encoder:gst.h26 New connection from 127.0.0.1:52514 </pre>	<pre> tlv client agent \$ kevin ~ \$ tlv client agent CLIENT: cd spice/streaming_stats/ && ./smart_ag * Starting the socket for the Perf Collector on WARNING: Intel_GPU_Top: failed to load (intel_g 'intel_gpu_top': 'intel_gpu_top' * Preparing the environment ... * Running! Connecting to 1234 client: received 5 recorders: frames_info, qual _info New connection from 10.35.17.23:51890238' </pre>	<pre> tlv vm stream agent \$ kevin ~ \$ tlv vm stream agent VM: cd spice/streaming_stats/ && ./smart_agent. * Starting the socket for the Perf Collector on WARNING: Intel_GPU_Top: failed to load (intel_g o 2] No such file or directory: 'intel_gpu_top' ' * Preparing the environment ... * Running! Connecting to 1236 guest: received 6 recorders: frame, streaming_i New connection from 192.168.122.1:55714 </pre>	<pre> ats/results/current/webgl_cubemap/framerate=200 _ratecontrol=cbr_max-bitrate=64_gop=0_blocking= 0.rec write result: /home/kevin/spice/streaming_stats /results/current/matrix.csv << codec=nv.plug.h2 64_display=webgl-cubemap_record-time=40s webgl _cubemap framerate=200_ratecontrol=cbr_max-b itrate=64_gop=0_blocking=0 teardown(display) system-exec: vm display stop https://webglsampl es.org/dynamic-cubemap/dynamic-cubemap.html teardown() system-exec: xset s on +dpms system-exec: server exec xset s on +dpms Performed 16 experiments. Skipped 0 experiments already recorded. Estimated time: 12min0s </pre>

RECORDING INFRASTRUCTURE



- ❶ SPICE is running and streaming
- ❷ On each system,
 - ❶ deploy a Python local agent
 - ❷ collect various performance indicators
 - ❸ ... in each of the agents
- ❸ Collect all the indicators
 - for live & interactive view
 - for offline processing
- ❹ ← future work →
 - collect resource-usage feedback
 - adapt streaming quality accordingly

RECORDING INFRASTRUCTURE



Next: benchmarking and visualization tool

PERFORMANCE BENCHMARKING & VISUALIZATION

LIVE CONTROL AND VISUALIZATION

Refreshing graph every 1 seconds

PAUSESAVECLEARINSERT MARKER

Control center	System	GPU	CPU Usage	Frames Size	Frame Delta	Frame Rate	Frame Processing	Scripts	Config
----------------	--------	-----	-----------	-------------	-------------	------------	------------------	---------	--------

Quality Messages

Enter a quality message...SEND1CLEARREFRESH

Refreshing quality every 0 seconds

0s30s

guest: encoder:nv.plugin.h264
guest: encoder:gst.h264.vaapih264enc
guest: encoder:gst.vp8.vaapivp8enc
guest: lencoding:vaapivp8enc; params:

Video Encoding

gst.vp8.vp8encgst.vp8.vaapivp8encgst.vp9.vaapivp9encnv.plugin.h264

GO!RESET

framerate: 30

0120

bitrate*

Enter a numeric value for "bitrate" | default: 0

default-roi-delta-qp*

Enter a numeric value for "default-roi-delta-qp" | default: -10

keyframe-period*

Enter a numeric value for "keyframe-period" | default: 30

quality-level*

Enter a numeric value for "quality-level" | default: 4

rate-control*

Enter a value for "rate-control" | default: cqp

sharpness-level*

Enter a numeric value for "sharpness-level" | default: 0

encoder-reload

Enter a value for "encoder-reload"

custom

Enter a value for "custom"

LIVE CONTROL AND VISUALIZATION

Refreshing graph every 1 seconds

PAUSE

SAVE

CLEAR

INSERT MARKER

Control center

System

GPU

CPU Usage

Frames Size

Frame Delta

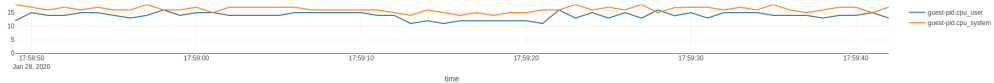
Frame Rate

Frame Processing

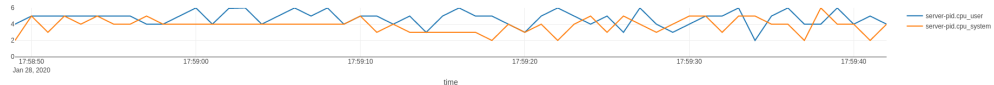
Scripts

Config

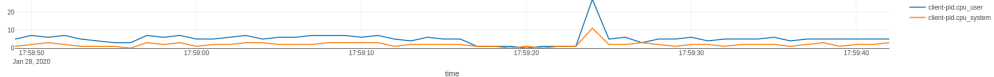
Guest



Server



Client



LIVE CONTROL AND VISUALIZATION

Refreshing graph every 1 seconds

PAUSE

SAVE

CLEAR

INSERT MARKER

Control center

System

GPU

CPU Usage

Frames Size

Frame Delta

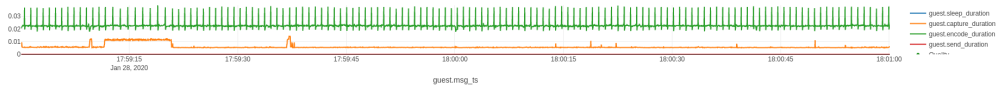
Frame Rate

Frame Processing

Scripts

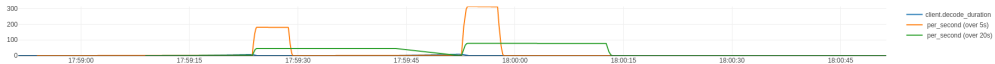
Config

Guest processing duration



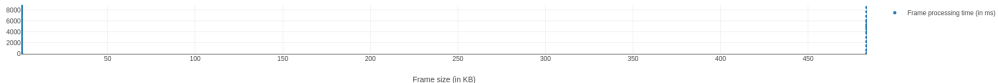
guest.msg_ts

Client processing duration



client.msg_ts

Client processing per frame size



SCRIPTING AND MATRIX BENCHMARKING

Live view and manual control is nice, but ...

SCRIPTING AND MATRIX BENCHMARKING

We want to understand the impact ...

- of encoding parameters
 - bitrate \Rightarrow 0.5, 1, 10, 100 MB/s
 - framerate \Rightarrow 20, 40, 60 FPS
 - resolution \Rightarrow 1K, 2K, 4K
 - keyframe-period \Rightarrow *auto*, 10, 60, *none*

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$$4 \times 3 \times 4 \times 3 = 144$$

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- over multiple resources
 - CPU/GPU on the host/guest/client, frame sizes, framerate, ...

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> 8 *graphs*

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- over multiple resources
 - CPU/GPU on the host/guest/client, frame sizes, framerate, ...
- with different VM use-cases
 - office work, 3D processing, still desktop, ...

$$> 8 \text{ graphs}$$

$$\dots \times 3 = 432$$

SCRIPTING AND MATRIX BENCHMARKING

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$$> 8 \text{ graphs}$$

- with different VM use-cases

- office work, 3D processing, still desktop, ...

$$\dots \times 3 = 432$$

- with different resources usage

- VM CPU busy, client GPU busy, slow network, ...

$$\dots \times 3 = 1296 \text{ expe!}$$

SCRIPTING AND MATRIX BENCHMARKING

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$$\dots \times 3 = 432$$

- with different resources usage

- VM CPU busy, client GPU busy, slow network, ...

$$\dots \times 3 = 1296 \text{ expe!}$$

Script all of it! And make it **reproducible!**

SPICE RECORDING INFRASTRUCTURE

Refreshing graph every 1 seconds

PAUSE

SAVE

CLEAR

INSERT MARKER

Control center

System

GPU

CPU Usage

Frames Size

Frame Delta

Frame Rate

Frame Processing

Scripts

Config

Test-case scripts

TEST

RUN

REFRESH

CLEAR

RELOAD SCRIPTS

Estimated time: 162min0s

Running matrix (dry)

setup()

system-exec: vm resolution 1920x1080

system-exec: xset s off -dpms

system-exec: server exec xset s off -dpms

Loading previous matrix results ...

Loading previous matrix results: done

reset encoder parameters

setup(display, img_lady_1920)

system-exec: vm display start img_lady_1920

setup(resolution, 1280x720)

system-exec: vm resolution 1280x720

running 1/216

> codec=gst.vp8.vaapivp8enc_display=img-lady-1920_record-

time=40s_resolution=1280x720_bitrate=8000_rate-control=cbr_keyframe-

period=0_framerate=20

reset encoder parameters

set_enc: gst.vp8.vaapivp8enc gst.prop=bitrate=8000, gst.prop=rate-control=cbr,

gst.prop=keyframe-period=0, framerate=20

wait 2 seconds

clear graphs

clear quality

wait 2 seconds

append to quality: script: codec: gst.vp8.vaapivp8enc

append to quality: script: record_time: 40s

append to quality: script: display: img_lady_1920

append to quality: script: resolution: 1280x720

append to quality: script: encoding: bitrate=8000;rate-control=cbr;keyframe-period=0;

framerate=20

request: send 'share_pipeline' to agent, client

set_enc: share_encoding

set_enc: share_resolution

wait 1 seconds

simple-test

matrix

name: matrix

record_time: 40

codec: gst.vp8.vaapivp8enc

matrix:

◦ bitrate → 8000 | 16000 | 32000

◦ rate-control → cbr

◦ keyframe-period → 0 | 2 | 30

◦ framerate → 20 | 40 | 60

scripted_properties:

◦ display → [img_lady_1920](#) | [vlc_wipeout](#) | [webgl_wipeout](#) | [webgl_cubemap](#)

◦ resolution → 1280x720 | 1920x1080

SCRIPTS

◦ display:

◦ before:

◦ vm display start \$display

◦ after:

◦ vm display stop \$display

◦ resolution:

◦ before:

◦ vm resolution \$resolution

SPICE RECORDING INFRASTRUCTURE

Scripting and Matrix Benchmarking

record_time: 40s

codec: gst.vp8.vaapivp8enc

matrix:

framerate: 20, 40, 60

gst.prop=bitrate: 8000, 16000, 32000

gst.prop=keyframe-period: 0, 2, 30

scripted_properties:

display:

img_lady_1920:

vlc_wipeout:

webgl_wipeout: <https://phoboslab.org/wipeout/>

webgl_cubemap: <https://webglsamples.org/dynamic-cubemap/dynam>

resolution: 1280x720, 1920x1080

SPICE RECORDING INFRASTRUCTURE

Scripting and Matrix Benchmarking

scripts :

setup:

```
- vm resolution 1920x1080; server xset s off -dpms
```

teardown:

```
- xset s on +dpms; server xset s on +dpms
```

resolution:

before:

```
- vm exec xrandr --output DP-2 --mode $resolution
```

after:

```
- vm exec xrandr --output DP-2 --mode 1920x1200
```

display:

before:

```
- vm display start $display
```

after:

```
- vm display stop $display
```

SPICE RECORDING INFRASTRUCTURE

Scripting and Matrix Benchmarking

... and let it run during the coffee break!

MATRIX VISUALIZER

Overview: multiple plots for overview view of CPU usage (Guest/Server/Client)

Parameters:

experiment:

[all]

codec:

[all]

display:

[all]

record-time:

40s

bitrate:

[all]

rate-control:

cbr

keyframe-period:

[all]

framerate:

200

stats:

☒ Guest CPU ☒ Server CPU

☒ Client CPU

Configuration:

Config settings

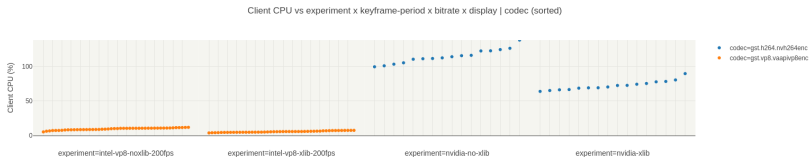
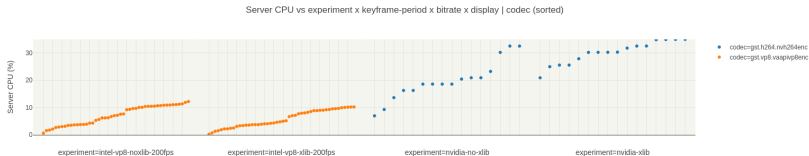
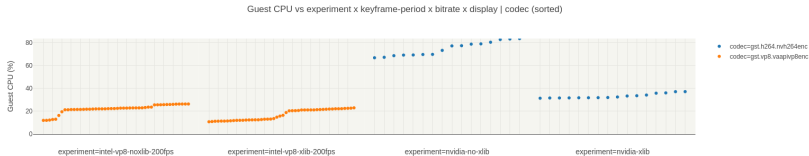
record-time rate-control framerate

codec display bitrate keyframe-period

experiment

[Permalink](#)

[Download](#)



MATRIX VISUALIZER

Overview: multiple plots for overview view of CPU usage (Guest/Server/Client)

Parameters:

experiment:

[all]

codec:

[all]

display:

[all]

record-time:

40s

bitrate:

[all]

rate-control:

cbr

keyframe-period:

[all]

framerate:

200

stats:

☒ Guest CPU ☒ Server CPU

☒ Client CPU

Configuration:

Config settings

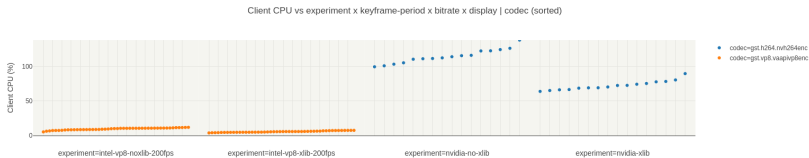
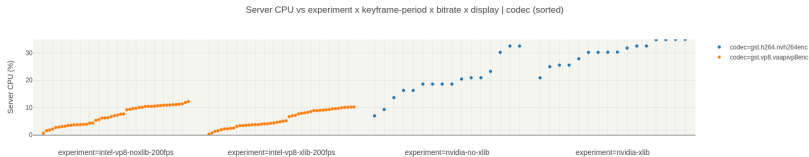
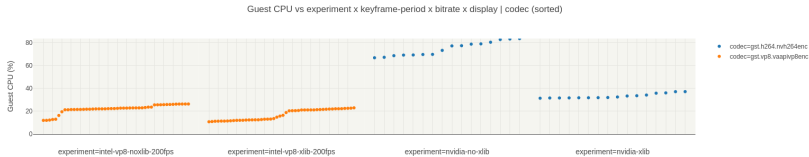
record-time rate-control framerate

codec display bitrate keyframe-period

experiment

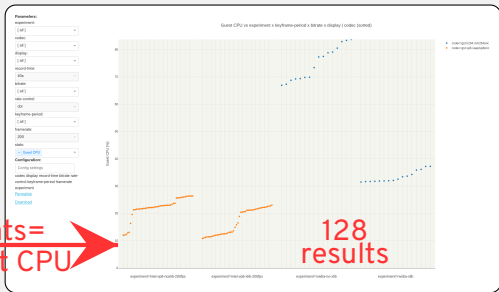
[Permalink](#)

[Download](#)



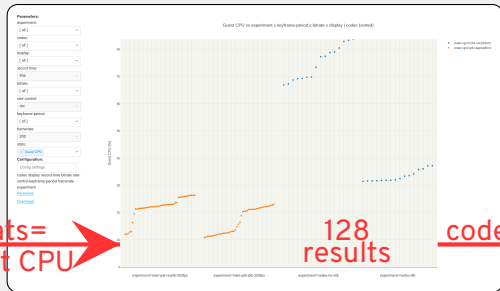
MATRIX VISUALIZER

Overview: Guest CPU usage with 4+ variable parameters

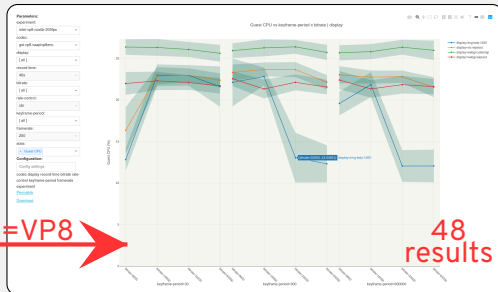


MATRIX VISUALIZER

Overview: Guest CPU usage with 3 variable parameters (display, bitrate, keyframe-period)



codec=VP8



MATRIX VISUALIZER

Overview: Guest CPU usage with 2 variable parameters (display, bitrate)

stats=
guest CPU

128
results

codec=VP8

48
results

keyframe-period=300

16
results

MATRIX VISUALIZER

Overview: Guest CPU usage with 1 variable parameter (display)

stats=
guest CPU

128
results

codec=VP8

48
results

keyframe-period=300

bitrate=32000

4
results

16
results

MATRIX VISUALIZER

Overview: linear regression (Client CPU vs Framerate)

Parameters:

experiment:

study-FPS

codec:

gst.vp8.vaapivp8enc

display:

webgl-aquarium

record-time:

40s

resolution:

[all]

bitrate:

32000

rate-control:

cbr

keyframe-period:

600000

framerate:

[all]

stats:

Reg: Client CPU vs Framerate

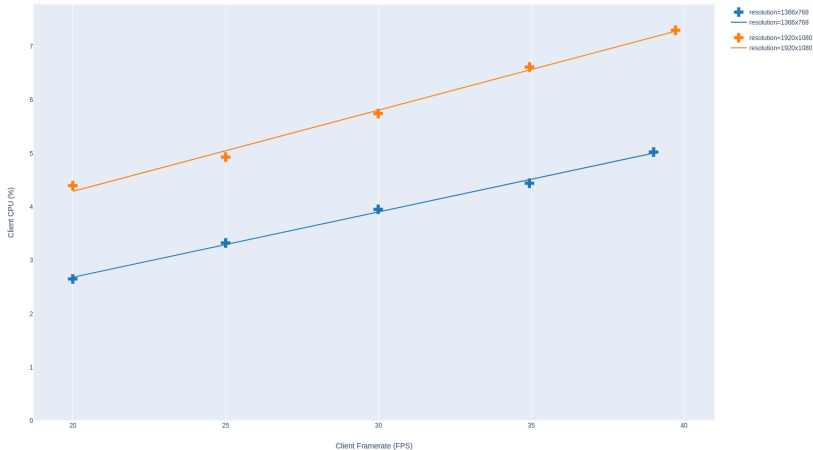
Configuration:

Config settings

[Permalink](#)

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Client CPU vs Client Framerate | resolution



Client CPU = $+0.12 * \text{Client Framerate} + 0.24$ | $r=+0.999$, $p=+0.000$, $\text{stdev}=+0.004$ | resolution=1366x768

Client CPU = $+0.15 * \text{Client Framerate} + 1.25$ | $r=+0.997$, $p=+0.000$, $\text{stdev}=+0.007$ | resolution=1920x1080

MATRIX VISUALIZER

Overview: encoding stack on the guest (current work)

Parameters:

experiment:

intel-vp8-xtlb-200fps

codec:

[all]

display:

[all]

record-time:

40s

bitrate:

[all]

rate-control:

cbr

keyframe-period:

300

framerate:

200

stats:

Stack: Encoding

Configuration:

Config settings

codec record-time bitrate rate-control

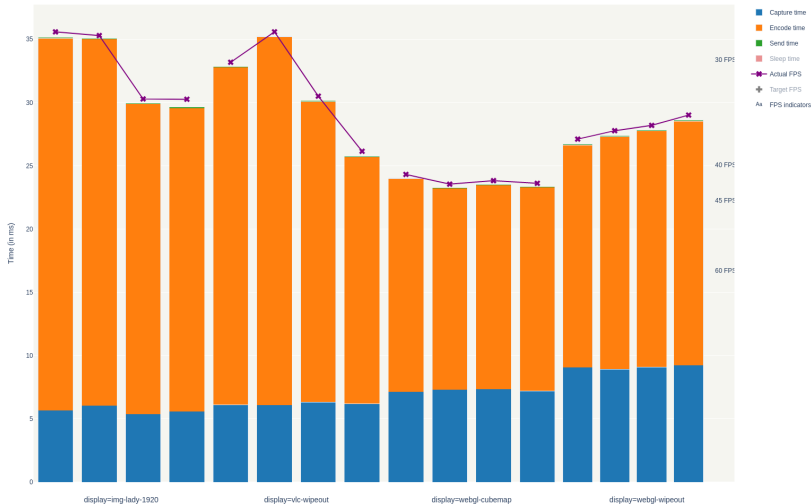
keyframe-period framerate

experiment display

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Stack: Encoding vs display x bitrate x codec



MATRIX VISUALIZER

Some interesting cases and open questions...

MATRIX VISUALIZER: INTERESTING CASES

FPS: why desktop encoding is slow?

Parameters:

experiment:

current

codec:

gst.vp8.vaapivp8enc

display:

[all]

record-time:

20s

resolution:

1920x1080

bitrate:

8000

rate-control:

cbr

keyframe-period:

9000

framerate:

[all]

stats:

Guest Framerate

Configuration:

Config settings

experiment codec record-time

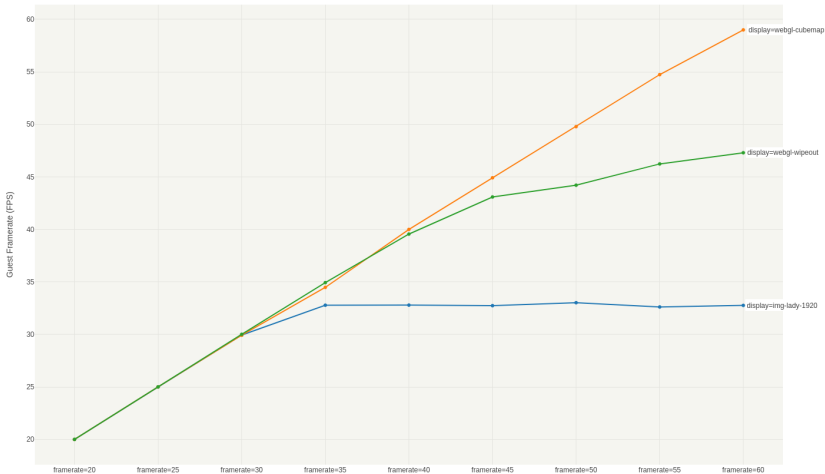
resolution bitrate rate-control

keyframe-period display framerate

[Permalink](#)

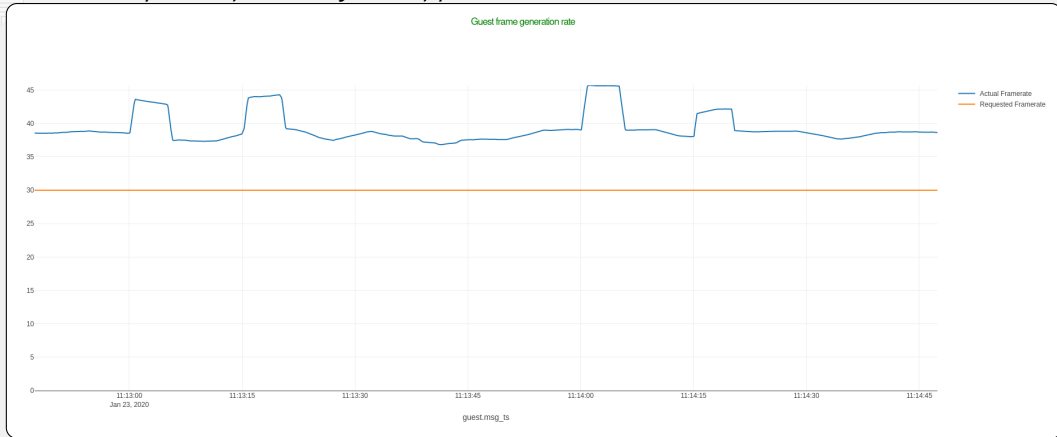
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Guest Framerate vs framerate | display



MATRIX VISUALIZER: INTERESTING CASES

FPS: why desktop encoding is bumpy?



MATRIX VISUALIZER: INTERESTING CASES

FPS: why? because the GPU tries to save energy!!

Parameters:

experiment:

current

codec:

gst.vp8.vaapiVp8Enc

display:

[all]

record-time:

[all]

resolution:

1920x1080

bitrate:

[all]

rate-control:

cbr

keyframe-period:

128

framerate:

60

stats:

Guest Encode Duration (avg)

Configuration:

Config settings

experiment codec record-time
resolution bitrate rate-control
keyframe-period framerate display

[Permalink](#)

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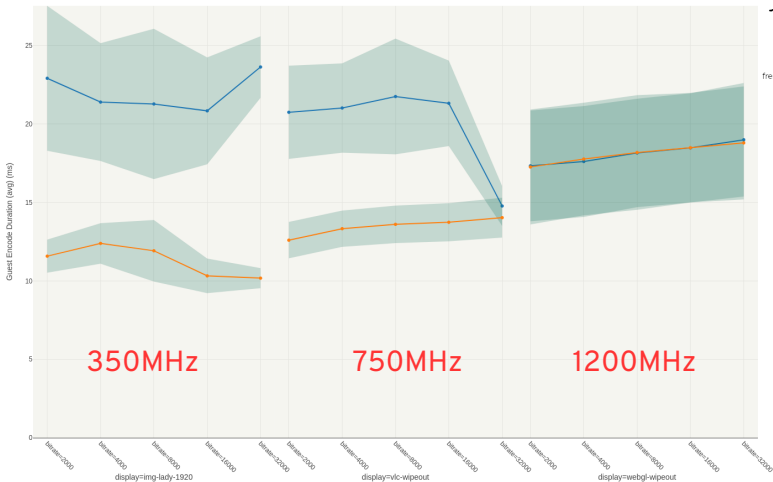
Guest Encode Duration (avg) vs display x bitrate | record-time

frequency=auto [350-1200MHz]

record-time=40s

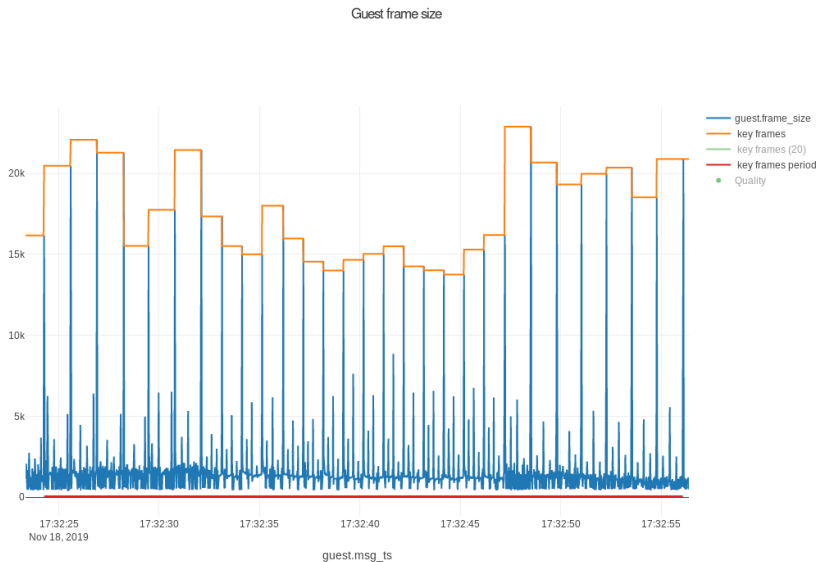
record-time=41s

frequency=1200MHz



MATRIX VISUALIZER: INTERESTING CASES

keyframe-period=0 → “auto”. Thanks Intel, but what does it really mean?



MATRIX VISUALIZER: INTERESTING CASES

keyframe-period=0 → “auto” ⇒ 1 keyframe per second!

Parameters:

experiment:

current

resolution:

[all]

codec:

gst.vp8.vaapivp8enc

record_time:

30s

webpage:

[all]

bitrate:

[all]

rate-control:

[all]

keyframe-period:

[all]

framerate:

[all]

stats:

Keyframe Period

Aspect:

☐ Show text

experiment codec record_time

framerate bitrate rate-control resolution

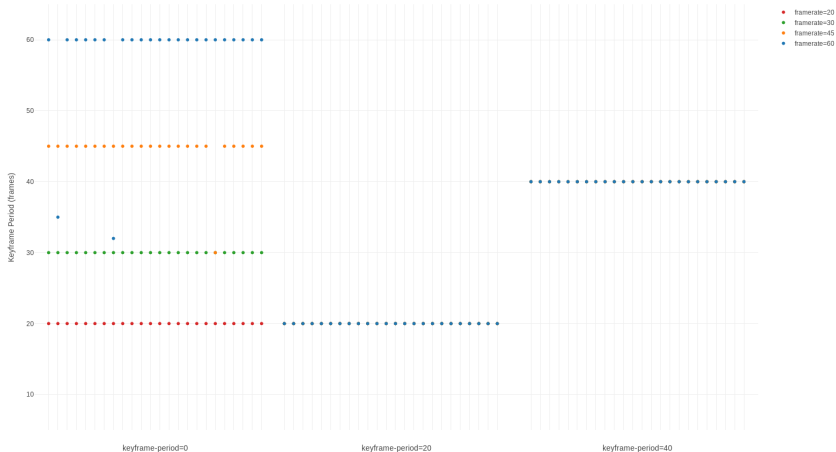
webpage keyframe-period

Invalids:

SHOW

DELETE

Keyframe Period vs keyframe-period x webpage x resolution x rate-control x bitrate | framerate (sorted)



MATRIX VISUALIZER: OPEN QUESTIONS

Bandwidth vs bitrate with VLC playback: everything as expected

Parameters:

experiment:

current

codec:

gst.vp8.vaapivp8enc

display:

vlc-mix-quick

record-time:

41s

resolution:

1920x1080

bitrate:

[all]

rate-control:

cbr

keyframe-period:

128

framerate:

[all]

stats:

Frame Bandwidth (per sec)

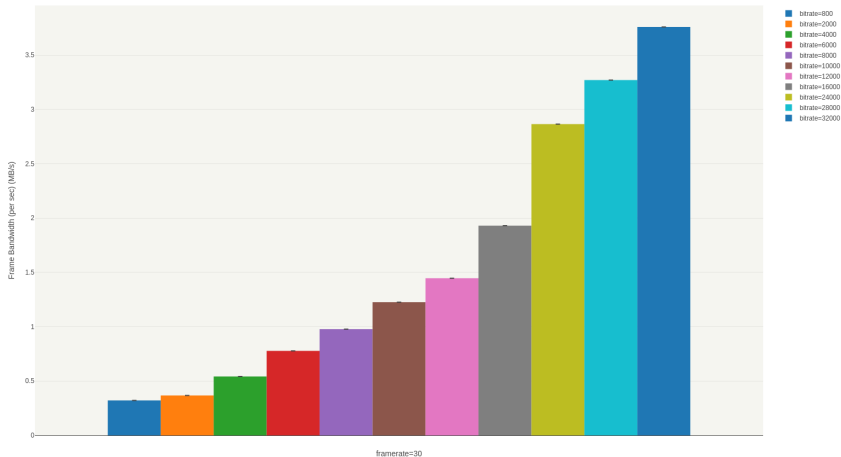
Configuration:

Config settings

[Permalink](#)

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Frame Bandwidth (per sec) vs framerate | bitrate



MATRIX VISUALIZER: OPEN QUESTIONS

Bandwidth vs bitrate with still desktop: beginning as expected, but what's wrong with the tail?

Parameters:

experiment:

current

codec:

gst.vp8.vaapi.vp8enc

display:

img-lady-1920

record-time:

41s

resolution:

1920x1080

bitrate:

[all]

rate-control:

cbr

keyframe-period:

128

framerate:

30

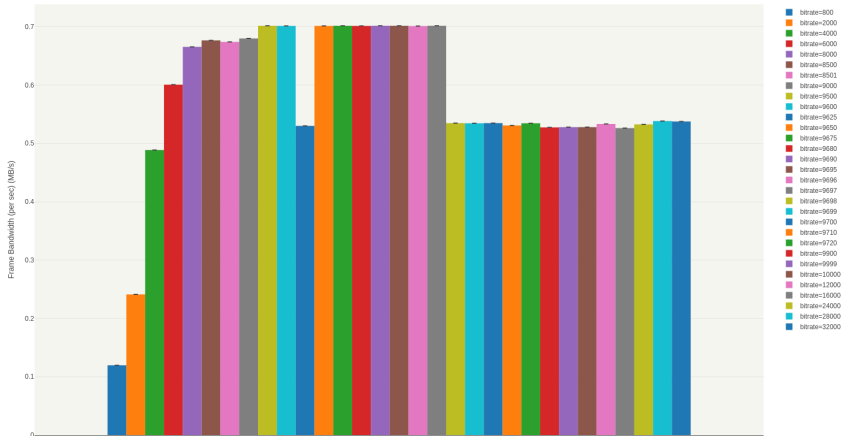
stats:

Frame Bandwidth (per sec)

Saved on 2020-02-05 11:26

from [this page](#).

Frame Bandwidth (per sec) vs | bitrate



MATRIX VISUALIZER: OPEN QUESTIONS

Encoding vs keyframe-period: why keyframe encoding take more and more time?

Parameters:

experiment:

study-klr

codec:

gst.vp8.vaapi.vp8enc

display:

img-lady-1920

record-time:

41s

resolution:

1920x1080

bitrate:

12000

rate-control:

cbr

keyframe-period:

[all]

framerate:

30

stats:

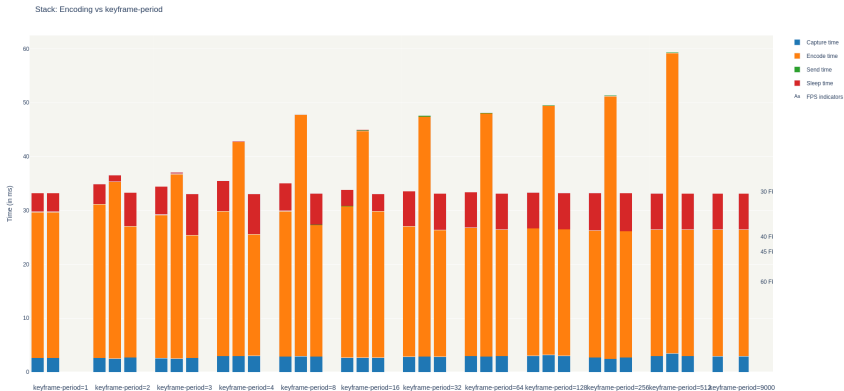
Stack: Encoding

Configuration:

stack_i_vs_p=1

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MATRIX VISUALIZER

Extra: a bit of help with the interface ...

MATRIX VISUALIZER

Interface in details

Parameters:

experiment:

[all]

codec:

[all]

display:

[all]

record-time:

40s

bitrate:

[all]

rate-control:

cbr

keyframe-period:

[all]

framerate:

30

stats:

Select...

Configuration:

Config settings

[Permalink](#)

[Download](#)

} Set matrix parameters as needed: [all] or specific value

MATRIX VISUALIZER

Interface in details

Parameters:

experiment:

[all]

codec:

[all]

display:

[all]

record-time:

40s

bitrate:

[all]

rate-control:

cbr

keyframe-period:

[all]

framerate:

30

stats:

Select...

Configuration:

Config settings

[Permalink](#)

[Download](#)

} Set matrix parameters as needed: [all] or specific value

← Select the stats graph you want to see (3 max)

MATRIX VISUALIZER

Interface in details

Parameters:

experiment:

[all]

codec:

[all]

display:

[all]

record-time:

40s

bitrate:

[all]

rate-control:

cbr

keyframe-period:

[all]

framerate:

30

stats:

Select...

Configuration:

Config settings

[Permalink](#)

[Download](#)

Set matrix parameters as needed: [all] or specific value
Click the label to change the property order (subplot, ..., legend)

Select the stats graph you want to see (3 max)

MATRIX VISUALIZER

Interface in details

Parameters:

experiment:

[all]

codec:

[all]

display:

[all]

record-time:

40s

bitrate:

[all]

rate-control:

cbr

keyframe-period:

[all]

framerate:

30

stats:

Select...

Configuration:

Config settings

[Permalink](#)

[Download](#)

Set matrix parameters as needed: [all] or specific value
Click the label to change the property order (subplot, ..., legend)

Select the stats graph you want to see (3 max)

Only works if same tool/dataset available at reload

MATRIX VISUALIZER

Interface in details

Parameters:

experiment:

[all]

codec:

[all]

display:

[all]

record-time:

40s

bitrate:

[all]

rate-control:

cbr

keyframe-period:

[all]

framerate:

30

stats:

Select...

Configuration:

Config settings

[Permalink](#)

[Download](#)

Set matrix parameters as needed: [all] or specific value
Click the label to change the property order (subplot, ..., legend)

Select the stats graph you want to see (3 max)

Only works if same tool/dataset available at reload
dill (pickle) object to store/share easily

MATRIX VISUALIZER

Interface in details – mainly for dev

Parameters:

experiment:

[all]

codec:

[all]

display:

[all]

record-time:

40s

bitrate:

[all]

rate-control:

cbr

keyframe-period:

[all]

framerate:

30

stats:

Select...

Configuration:

Config settings

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Click to redraw the draw without reload the page

Extra/specific settings