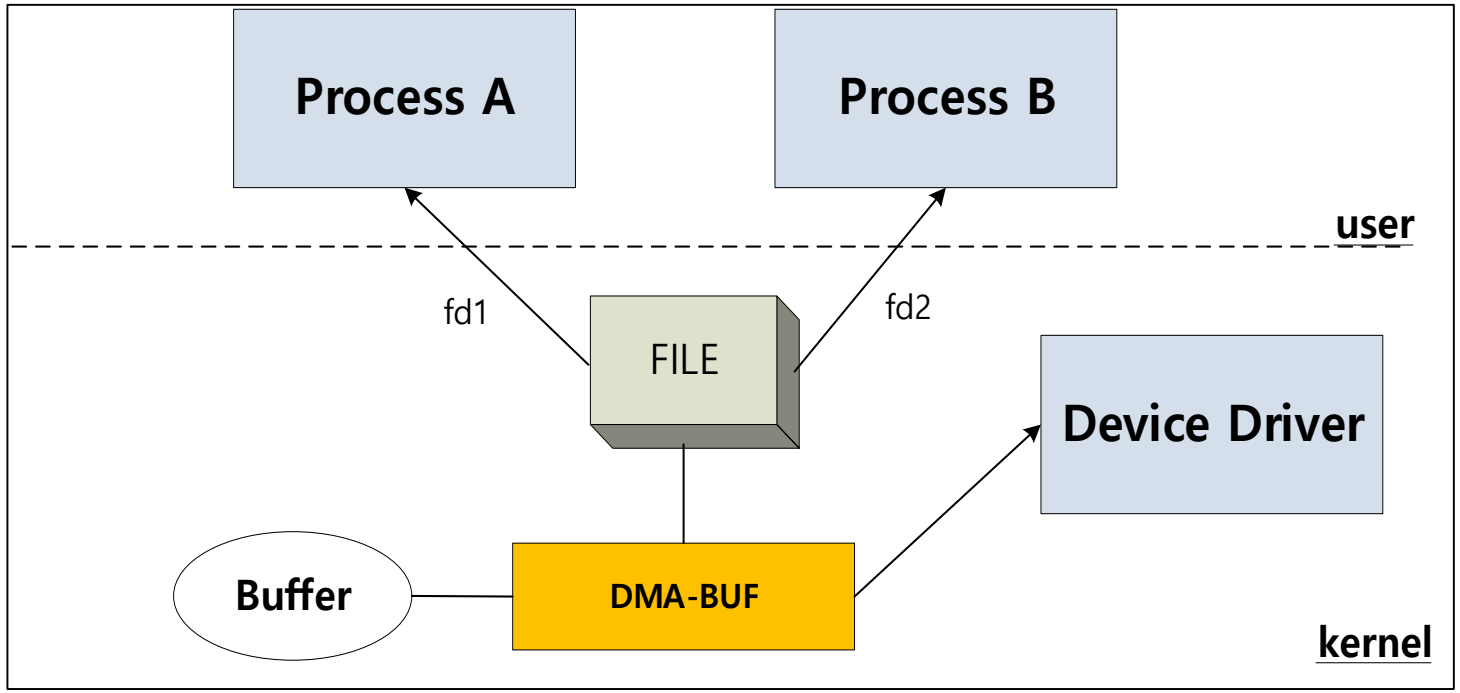
PV Performance for buffer sharing (vG2D)

Aug. 19th

Buffer Sharing mechanism in LINUX (Baremetal)

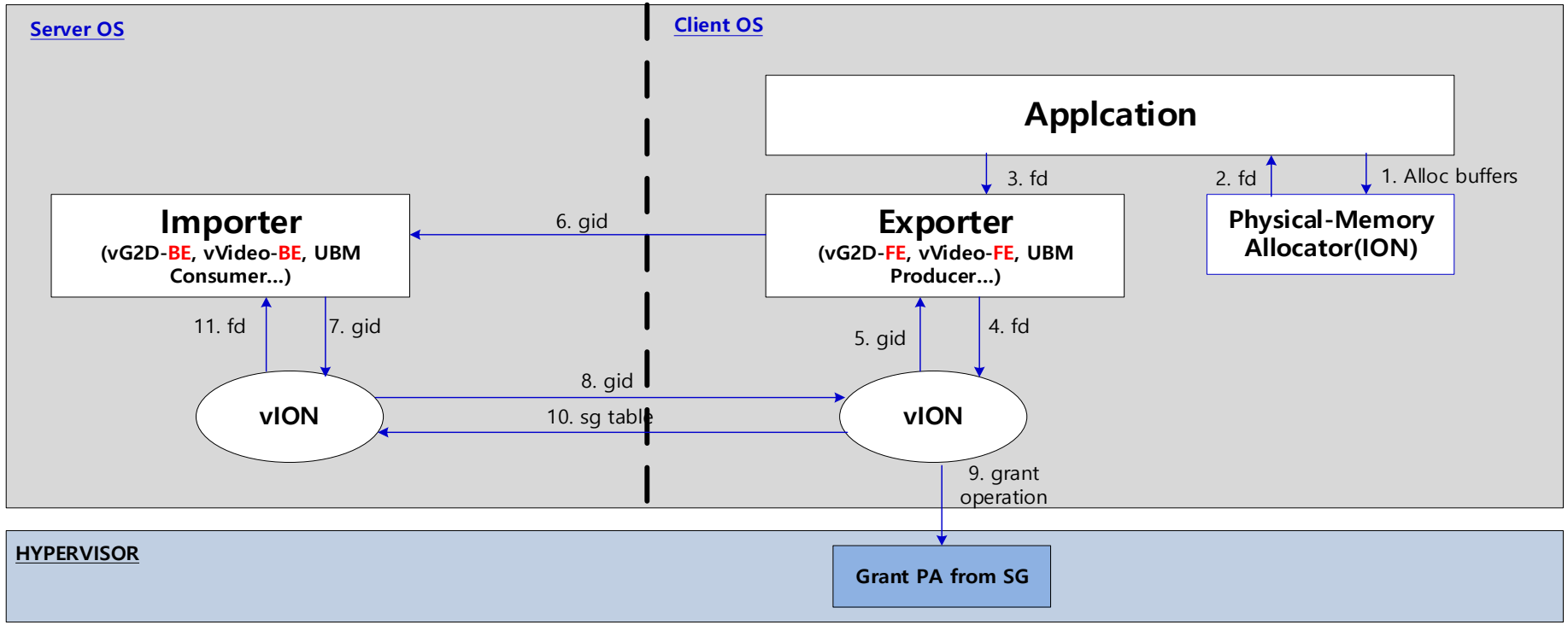


- In the Linux world, a kernel framework called dma-buf is used to share the multimedia buffer between processes. The dma-buf uses a file for sharing. Each user process can access the buffer via file descriptor.

- But because the dma-buf is based on the file, it is only valid inside an OS. It indicates that dma-buf cannot be a solution for sharing buffers among VMs.

Buffer Sharing mechanism in LINUX (between VMs)

- To share buffers between VMs, Samsung provides “global identifier”. This is similar concept with dma-buf but this is valid in VMs.
  - Creates a global identifier(a.k.a. gid)
    - The Exporter creates a gid using dma-buf fd via vION.
  - Transfers gid from Exporter to Importer
  - Importer can get scatter list using gid from vION, and make a dma-buf
  - Hypervisor should allow the buffer to Server OS so that Importer can access the buffer



Comparing performance G2D VS vG2D

	1st Frame after allocating buffer					Any frame before freeing buffer				
	G2D Total(us)	vG2D w/ copying sg_list & doing grant operation			perf drop(%)	G2D Total(us)	vG2D w/o copying sg_list & doing grant operation			perf drop(%)
		export(us)	import(us)	Total(us)			export(us)	import(us)	Total(us)	
FHD 2 to FHD	1698	37	1211	3052	**79.7%**	1457	1	4	1506	**3.4%**
FHD 3 to FHD	2435	80	1324	4004	**64.4%**	2140	2	6	2226	**4.%**
FHD 4 to FHD	3206	97	2035	5463	**70.4%**	2858	2	7	2939	**2.8%**
FHD 5 to FHD	5666	100	1649	7513	**32.6%**	5123	2	8	5215	**1.8%**
FHD 6 to FHD	7053	69	1925	9067	**28.6%**	6369	3	11	6477	**1.7%**
FHD 7 to FHD	9419	86	2095	11750	**24.7%**	8624	3	11	8766	**1.6%**
FHD 8 to FHD	10794	79	2446	13641	**26.4%**	9873	4	12	10190	**3.2%**

- The performance of vG2D includes Import and Export.
  - The Export and Import behavior take long time when the buffer is shared 1st time after the buffer is allocated. But they take very short time from the 2nd frame because sg_list is reused from 2nd frame. The sg_list copy operation (Export) and grant operation (Import) are performed only in the first frame.

- In general, The vG2D performance degradation is less than about 5% compared to G2D. **However, buffer allocation/free can be frequently exist, depending on user scenario. In this situation, the number of performance drop ratio cannot be defined and guaranteed.**