

VMware SVGAII

Trace Based SVGA & VESA

Framebuffer

Trace Based SVGA & VESA

I/O Space
Registers

Framebuffer

Trace Based SVGA & VESA

I/O Space
Registers

Framebuffer

Typically 4MB - 16MB

Trace Based SVGA & VESA

Benefits

- Wide OS support (no per-guest driver)

Drawbacks

- Limited video modes
- Trace overheads
- No acceleration

Update Rectangles

I/O Space
Registers

Framebuffer

Typically 4MB - 16MB

Update Rectangles

I/O Space
Registers

Framebuffer

Command
Fifo

Typically 4MB - 16MB

Update Rectangles

I/O Space
Registers

Framebuffer

Typically 4MB - 16MB

Command
Fifo

256 KB

Update Rectangles

Benefits

- No trace overheads
- More precise dirty regions

Drawbacks

- Per guest OS drivers
- No acceleration

3d Graphics

Source Memory Resources

3d Graphics

Source Memory Resources

Texture

Texture

Texture

Texture

3d Graphics

Source Memory Resources

Texture

Texture

Texture

Texture

Vertex Buffer

Vertex Buffer

3d Graphics

Source Memory Resources

Texture

Texture

Texture

Texture

Vertex Buffer

Vertex Buffer

Draw Call

3d Graphics

Source Memory Resources

Texture

Texture

Texture

Texture

Vertex Buffer

Vertex Buffer

Render
State



Draw Call

3d Graphics

Source Memory Resources

Texture

Texture

Texture

Texture

Vertex Buffer

Vertex Buffer

Render
State



Draw Call

Render
Target

3d Graphics

Source Memory Resources

Texture

Texture

Texture

Texture

Vertex Buffer

Vertex Buffer

Render
State



Draw Call

RenderTarget

WS 5.5 3d

I/O Space
Registers

Framebuffer

Command
Fifo

WS 5.5 3d

I/O Space
Registers

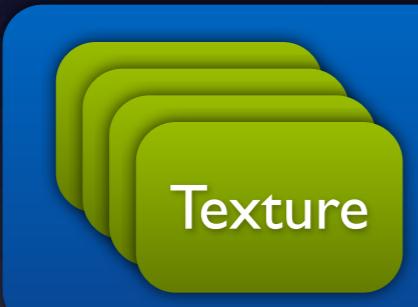
Framebuffer
VRAM

128 MB

Command
Fifo

WS 5.5 3d

I/O Space
Registers



Render
Target

Framebuffer
VRAM

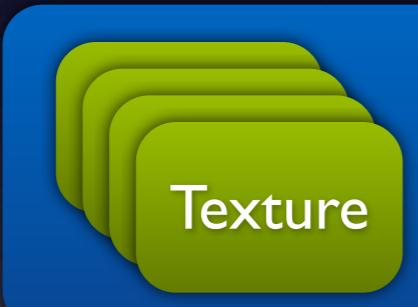
Vertex Buffer

Command
Fifo

128 MB

WS 5.5 3d

I/O Space
Registers



Render
Target

Framebuffer
VRAM

Vertex Buffer

Command
Fifo

128 MB

2 MB

WS 5.5 3d

Benefits

- 3d acceleration
- Straight forward implementation
(physically contiguous to guest, virtually contiguous to VMX)

Drawbacks

- 128 MB limit for 3d resources
- Requires large VRAM size

WS 6.5 3d

I/O Space
Registers

Framebuffer
VRAM
DMA Buffer

Guest Memory

128 MB

2 MB

WS 6.5 3d

I/O Space
Registers

Framebuffer
VRAM
DMA Buffer

Command
Fifo

128 MB

2 MB

Guest Memory



Texture

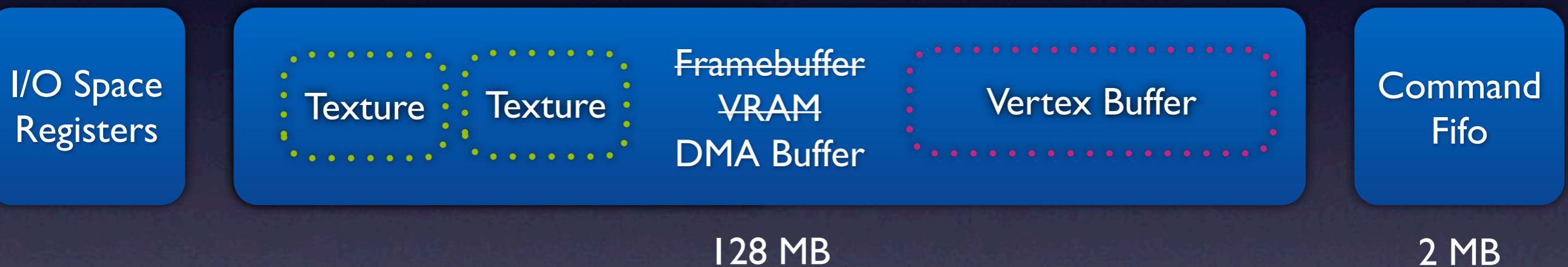


Render
Target



Vertex Buffer

WS 6.5 3d



Guest Memory



Texture



Render Target



Vertex Buffer

WS 6.5 3d

Host OpenGL
State



I/O Space
Registers



Framebuffer
VRAM
DMA Buffer

Vertex Buffer

Command
Fifo

128 MB

2 MB

Guest Memory



No bound on resource usage

Host OpenGL
State



I/O Space
Registers



Framebuffer
VRAM
DMA Buffer

Vertex Buffer

Command
Fifo

128 MB

2 MB

Guest Memory



Vertex Buffer

WS 6.5 3d

Benefits

- Can exceed 128 MB resource bound

Drawbacks

- Can exceed 128 MB resource bound by an indefinite amount
- Forces memory copies to upload & download resources
- Two copies of most resources

HWv10 3d

I/O Space
Registers

Framebuffer
VRAM
DMA Buffer

Guest Memory

128 MB

2 MB

HWv10 3d

I/O Space
Registers

Framebuffer
VRAM
DMA Buffer

Command
Fifo

128 MB

2 MB

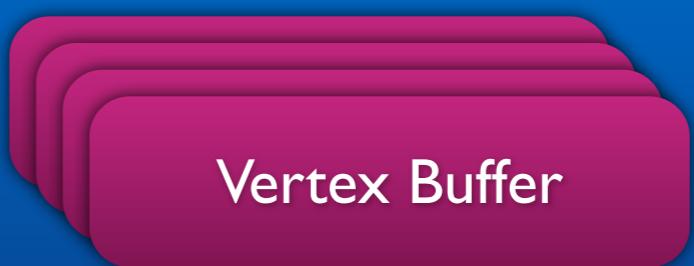
Guest Memory



Texture



Render
Target



Vertex Buffer

HWv10 3d

I/O Space
Registers

Framebuffer
VRAM
DMA Buffer

Command
Fifo

128 MB

2 MB

Guest Memory



HWv10 3d

I/O Space
Registers

Framebuffer
VRAM
DMA Buffer

Command
Fifo

128 MB

2 MB

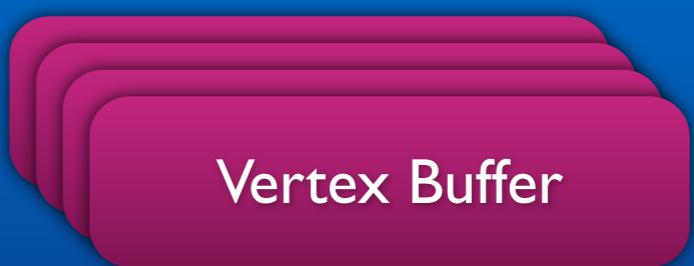
Guest Memory



Texture



Render
Target



Vertex Buffer

HWv10 3d

Cached
resources



Render
Target

Vertex Buffer

I/O Space
Registers

Framebuffer
VRAM
DMA Buffer

Command
Fifo

128 MB

2 MB

Guest Memory



Render
Target

Vertex Buffer

HWv10 3d

Cached
resources



Render
Target

Vertex Buffer

I/O Space
Registers

Framebuffer
VRAM
DMA Buffer

Command
Fifo

128 MB

2 MB

Guest Memory



Render
Target

Vertex Buffer

Framebuffer

HWv10 3d

Cached
resources



Texture
Render
Target

Vertex Buffer

I/O Space
Registers

Framebuffer
VRAM
~~DMA Buffer~~
Legacy Framebuffer

Typically 4 MB

Command
Fifo

2 MB

Guest Memory



Texture
Render
Target

Vertex Buffer

Framebuffer

HWv10 3d

Cached
resources



Texture

Render
Target

Vertex Buffer

I/O Space
Registers

Framebuffer
VRAM
~~DMA Buffer~~
Legacy Framebuffer

Typically 4 MB

Legacy
Command
Fifo

256 KB

Guest Memory

Command buffer



Texture



Render
Target



Vertex Buffer

Framebuffer

HWv|0 3d

Benefits

- Simplified checkpointing and vMotion
- Eliminates SVGA required memcpy (GL required memcpys remain)
- Eliminates static memory partitioning

Drawbacks

- Requires more sophisticated physmem and host kernel support

Questions?