

1.7 Graphics Architectures

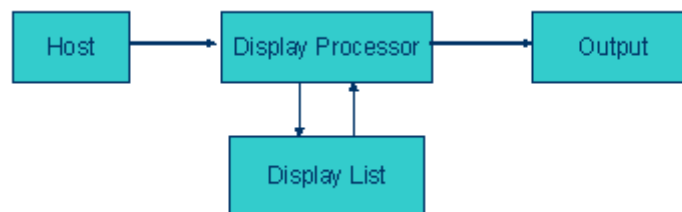
Combination of hardware and software that implements the functionality of the API.

- Early Graphics system :



Here the host system runs the application and generates vertices of the image.

Display processor architecture :



- Relieves the CPU from doing the refreshing action
- Display processor assembles instructions to generate image once & stores it in the Display List. This is executed repeatedly to avoid flicker.
- The whole process is independent of the host system.

1.8 Programmable Pipelines

E.g. An arithmetic pipeline

Terminologies :

Latency : time taken from the first stage till the end result is produced.

Throughput : Number of outputs per given time.

Graphics Pipeline :



- Process objects one at a time in the order they are generated by the application
- All steps can be implemented in hardware on the graphics card

Vertex Processor

- Much of the work in the pipeline is in converting object representations from one coordinate system to another
 - Object coordinates
 - Camera (eye) coordinates
 - Screen coordinates
- Every change of coordinates is equivalent to a matrix transformation
- Vertex processor also computes vertex colors

Primitive Assembly

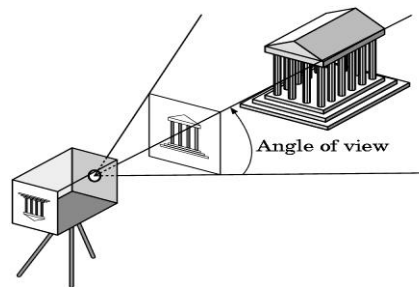
Vertices must be collected into geometric objects before clipping and rasterization can take place

- Line segments
- Polygons
- Curves and surfaces

Clipping

Just as a real camera cannot “see” the whole world, the virtual camera can only see part of the world or object space

- Objects that are not within this volume are said to be *clipped* out of the scene



Rasterization :

- If an object is not clipped out, the appropriate pixels in the frame buffer must be assigned colors
- Rasterizer produces a set of fragments for each object
- Fragments are “potential pixels”
 - Have a location in frame buffer
 - Color and depth attributes
- Vertex attributes are interpolated over objects by the rasterizer

Fragment Processor :

- Fragments are processed to determine the color of the corresponding pixel in the frame buffer
- Colors can be determined by texture mapping or interpolation of vertex colors
- Fragments may be blocked by other fragments closer to the camera
 - Hidden-surface removal

Source : <http://elearningatria.files.wordpress.com/2013/10/cse-vi-computer-graphics-and-visualization-10cs65-notes.pdf>