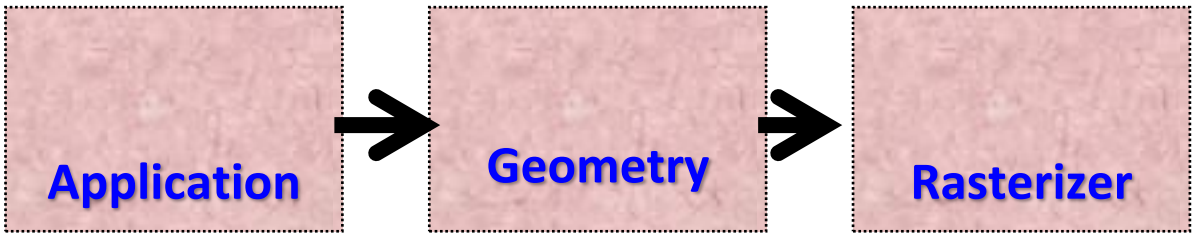
Universiti Malaysia PAHANG	**COURSE:** Virtual Reality		**MARKS:** /30
	TOPIC: Introduction to VR	**CODE:** BCM 3013	
	ASSESSMENT: Quiz	**NO:** 3	**DURATION:** 20 minutes

QUESTION 1 **[10 MARKS]**

What is the "rendering pipeline"? What are its stages? What is responsible for its first stage? What are the limitations in this first stage? Draw and explain.

The rendering pipeline is the architecture responsible for creating a 2-D scene from a 3-D model
The rendering pipeline has three functional stages (Application, Geometry and Rasterizer)



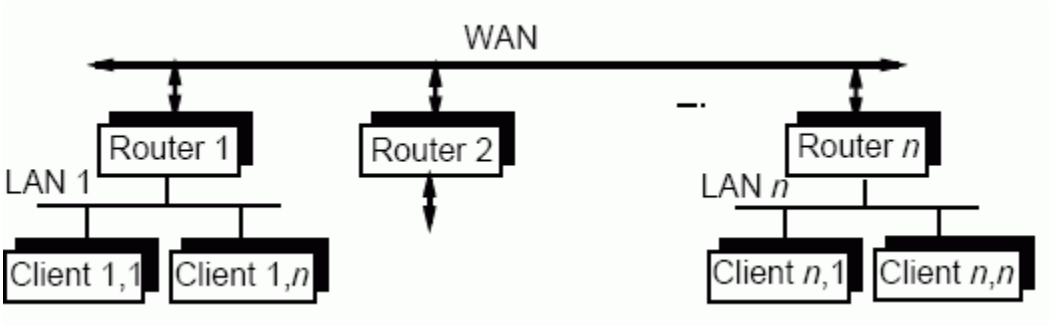
. First Stage: Application stage
- ✓ It reads I/O devices (such as gloves, mouse);
- ✓ It changes the coordinates of the virtual camera;
- ✓ It performs collision detection and collision response (based on object properties);
- ✓ One form of collision response if force feedback.
- ✓Reduce model complexity (models with less polygons – less to feed down the pipe);

Limitation: Since all is done by the CPU, the CPU can become inefficient for large applications. The pipeline is said to be "application (or CPU) limited. To increase speed a dual-processor (super-scalar) architecture is recommended.

QUESTION 2 **[10 MARKS]**

Ministry of Higher Education (MOHE) in Malaysia is planning to develop an application where staff in Malaysian universities can interact with staff from universities in other countries by sharing the same virtual environment. Prepare the network topology that accommodates such an application. Support your answer with a diagram.

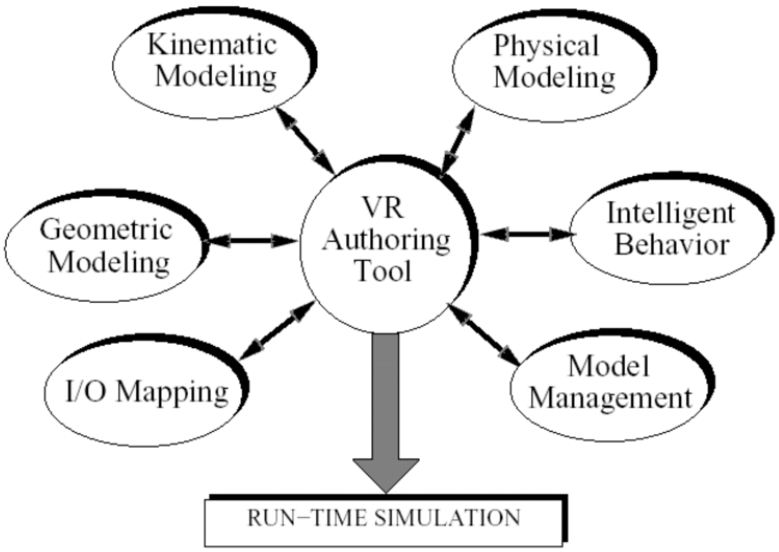
A hybrid peer-to-peer WAN with bridging routers would be required in this case of shared simulation. Network routers, called proxy servers, are used to package multicast messages as unicast packets before transmitting them to other routers. Then the messages are unwrapped by the local proxy server and multicast to the local clients.



QUESTION 3 **[5 MARKS]**

What are the elements of VR object modeling? Explain the functions of one of these elements?

VR objects modeling consists of I/O mapping, geometric modeling, kinematics modeling, physical modeling, object behavior modeling and model management.



Explain one of the Modeling such as the Geometric Modeling