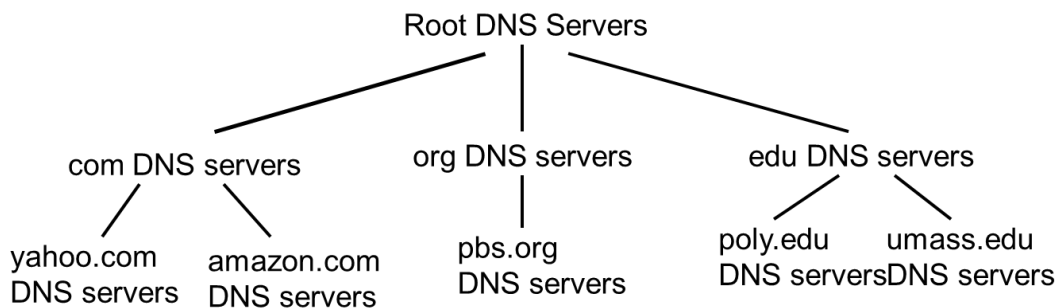


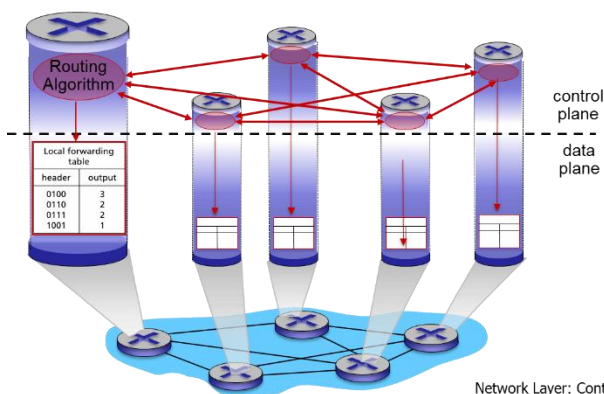
**Department of Computer Science and Engineering**  
**National Sun Yat-sen University**  
**Second Semester of 2021 PhD Qualifying Exam**

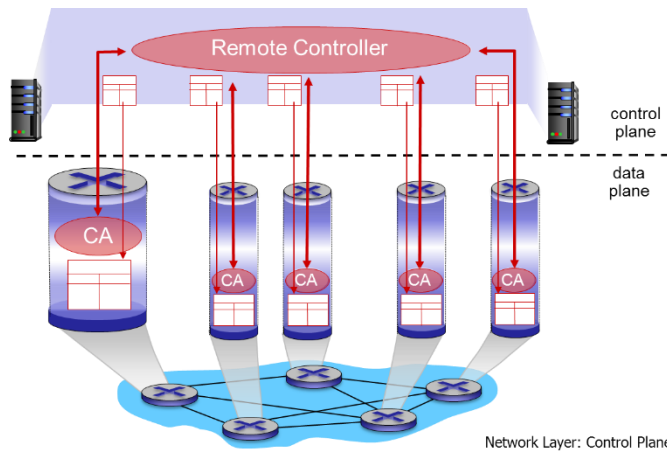
Subject : Computer Networks

1. Two key network-core functions are routing and forwarding. Please explain them in your words.
2. Internet protocol stack consists of five layers. Please explain the functions of each layer, respectively. Please explain why the layering approach is adopted?
3. Encapsulation is a common approach adopted by networking engineers. Please list three examples of applying encapsulation in networking.
4. TCP provides reliable delivery of packets by implementing several mechanisms. What are these mechanisms and how does reliable delivery achieved via these mechanisms?
5. DNS is a distributed and hierarchical database. Please use the following picture to explain the operations of DNS and how it defends against DDoS attacks.



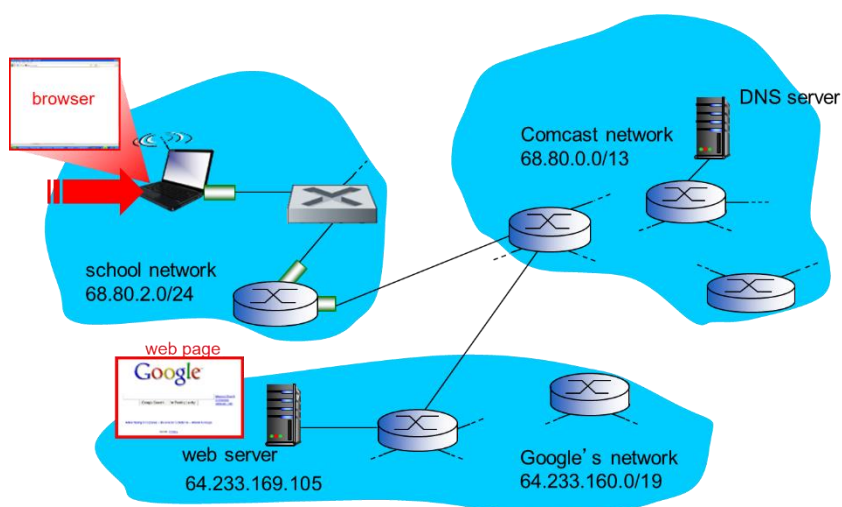
6. Please draw a generic router architecture and explain its operations.
7. Please draws pictures to explain weighted fair queueing (WFQ), FIFO scheduling, and priority scheduling, respectively.
8. The following two graphs represent traditional routers and SDN routers. Please first explain the operations of traditional routers. Then explain the operations of routers with logically centralized control plane and control agents.





Network Layer: Control Plane 5-6

9. What is CSMA/CD? Please write a pseudo code for it. Please also draw a picture to show the early abort of transmission if a collision is detected along the time.



10. Please use the above figure to describe how many functions and steps are involved to perform a google search.