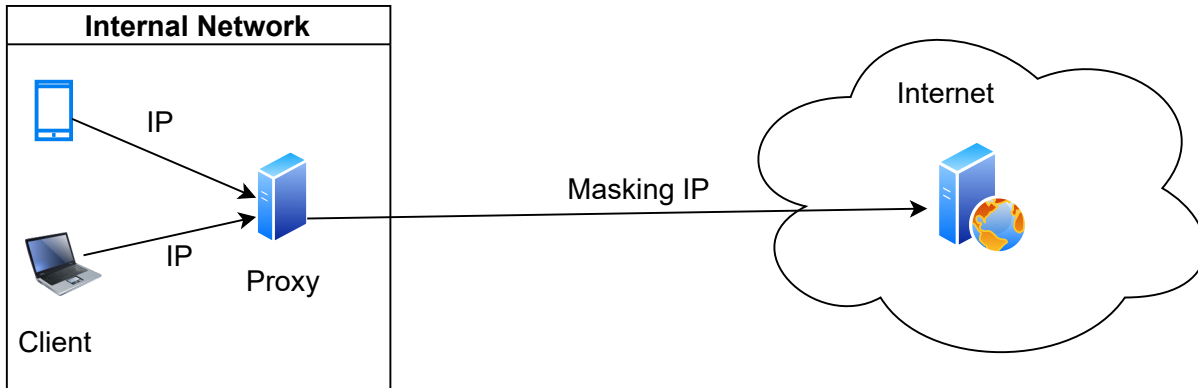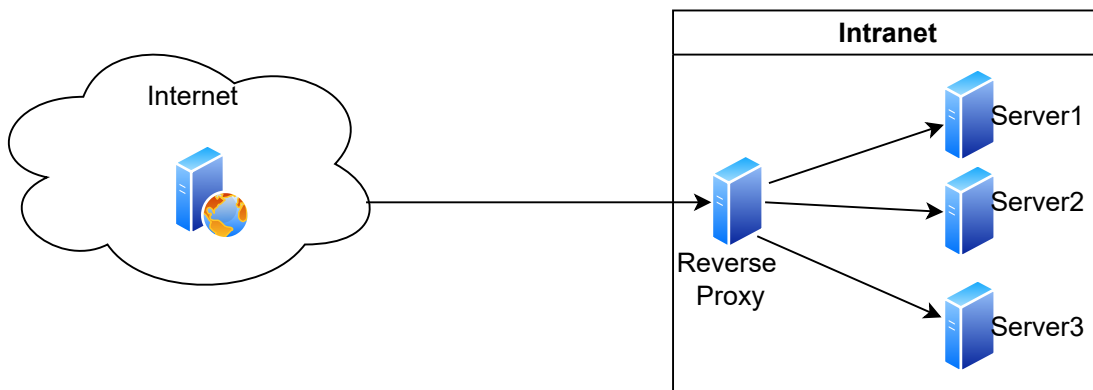# Proxy Server

- Proxy acts as a shield/filter/firewall
- Multiple client can connect to same proxy server
- It helps proxy sever to manage all request as one place
- Protects from cyber attack
- Can be used for caching (static page requested by multiple clients)
- Encryption/Decreption > hide IP addr and other sensitive data (Masking IP)
- Acess Management

Reverse Proxy

- Protects servers
- Load balancing
- Compress Request Size
- Other benifits (same as proxy server)

#Virtual IP

A virtual IP is an IP address that can be assigned to multiple instances at once or become a second address to the network interface.
Using VIP you can create a fault-tolerant infrastructure. Assign it to several instances at once and the address will pass from one machine to another: if the main one is not available the address is instantly passed to another and this instance will send responses to requests. If the second machine is not available the address is passed to the third one and so on (you specify the order). As a result, your users will always get a response when requesting the IP because the machines support each other. You can also assign a VIP as a second address for the network interface.

#Load Balancer

- Distribute client request or network load efficiently across multiple servers.
- Ensures high availability and reliability by sending requests only to servers that are online
- Provide the flexibility to add or substract servers as demand dictates

#How does the load balancer work?

- Define IP or DNS name for LB: Administrators define one IP address and/or DNS name for a given application, task, or website, to which all requests will come. This IP address or DNS name is the load balancing server.
- Add backend pool for LB: The administrator will then enter into the load balancing server the IP addresses of all the actual servers that will be sharing the workload for a given application or task. This pool of available servers is only accessible internally, via the load balancer.
- Deploy LB: Finally, your load balancer needs to be deployed — either as a proxy, which sits between your app servers and your users worldwide and accepts all traffic, or as a gateway, which assigns a user to a server once and leaves the interaction alone thereafter.
- Redirect requests: Once the load balancing system is in place, all requests to the application come to the load balancer and are redirected according to the administrator's preferred algorithm.

>> Load Balancing Alogorithm

- Round Robin:
- Least Connections: A new request is sent to the server with fewest current connections to clients.
- Hash: Distribute requests based on a key you define, such as client IP address or the request URL. (Apply consistent hash to minimize redistribution of loads if the set of upstream server changes.)

>> Benifits of LB:

- Reduced downtime
- Scalable
- Redundancy
- Flexibility
- Efficiency

>> Chalanges of LB:

- **Session Persistent:** What happens when a user is sending requests to a server which is not aware of its session? The user will get back to the login page since the application server can't acess his session. To avoind this kind of problem we can do either:
- 1) Storing user's session information in a database or a file system on application server(stateless)
- 2) Use IP level information to maintain affinity between a user and a server(stateful)

L4 vs L7 load balancer:
>> L4 load balancer:

- Operates at OSI model Layer 4 (Transport Layer)
- Traffic forwarded on basis of source and destination IP address and port.[part of header data in a packet]

>>L7 load balancer:

- Application load balances based on layer 7 of OSI.
- Can view actual content of each message.
- Can route data based on URL, content root, cookie, session etc.
- More CPU intensive than L4 LBs.
- Most of the time called reverse proxy.

#Hardware vs Software based Load Balancer:

- Load balancers typically come in two flavors: hardware-based and software-based. Vendors of hardware-based solutions, (ie F5 Networks or Citrix), load proprietary software onto the machine they provide (like a BIG-IP or VIPRION device), which often uses specialized processors and FPGAs.
- To cope with increasing traffic at your website, you have to buy more or bigger appliances from the vendor.
- Software solutions (eg: Nginx) generally run on commodity hardware, making them less expensive and more flexible. You can install the software on the hardware of your choice or in cloud environments like AWS EC2.