

# Homework 02

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NAT、DHCP、Firewall、Proxy

# Basic Knowledge

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## DHCP

- Dynamically assigning IPs to clients

## NAT

- Translating addresses for clients

## Firewall

- Traffic filtering

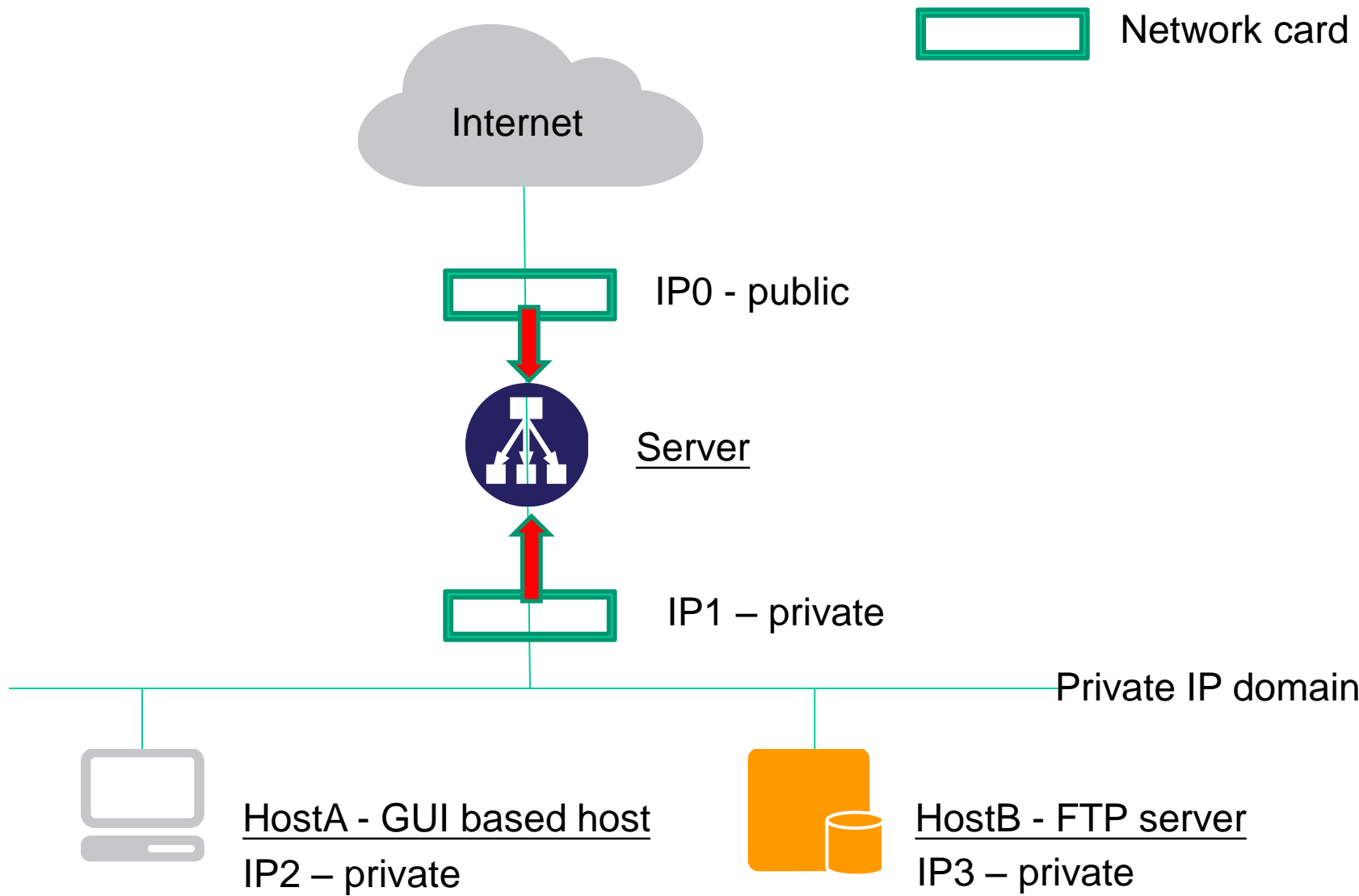
## Proxy

- Intermediary of client and server to translate requests

# Basic Knowledge – Isolated Execution Environment

- ❑ Provide a sandbox with limited access to resource
  - Protect other programs from compromised one
- ❑ OS-level virtualization (Used in this HW)
  - Resource isolation
    - File system, device...
  - Lightweight
  - Easy to manage
- ❑ Implementation
  - FreeBSD: jail
  - Linux: lxc

# Architecture Overview



# Architecture

## ❑ Server

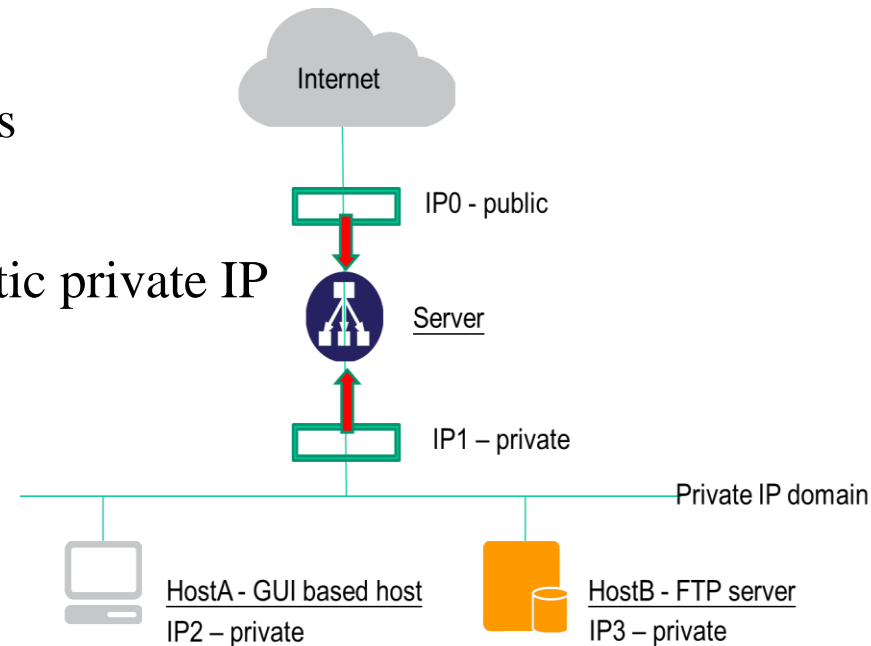
- UNIX-based OS
- Act as a gateway for all services
- DHCP & NAT server
- ✓ A dedicated Public IP and a static private IP

## ❑ HostA

- Any OS
- ✓ A private IP via DHCP

## ❑ HostB

- An isolated execution environment on Server
- Runs FTP service
- ✓ A static private IP



# Requirement – NAT & DHCP

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## ❑ NAT

- HostA & HostB can access Internet via Server

## ❑ DHCP

- Provided by Server
- Static range should be excluded

## ❑ Authentication

- Only clients passed authentication can access the internet
  - Exclude static range
- Redirect un-auth host to authentication page
  - Web service on Server
  - Serve a simple authentication page

# Requirement – Firewall

## ❑ Firewall

- Deny all connections come from <BadHost>
- Allow the connection from **140.113.17.0/24** to access HostB's **FTP** server
- Drop packets from **140.113.235.0/24** to access HostB's **FTP** server, and response TCP RST/ICMP unreachable
- Allow the connection from **140.113.17.0/24** to access HostB's **SSH** server (Server will redirect the request for port 222 to HostB's SSH server)
- Drop packets from **140.113.235.0/24** to access HostB's **FTP** server, and response TCP RST/ICMP unreachable
- The connection from other public IP to access HostB's **FTP** and **SSH** server should be denied and **not** response TCP RST/ICMP unreachable
- All public IP can't send ICMP echo request packets to server (will **not** response ICMP ECHO-REPLY packets)

# Requirement – Proxy

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## ❑ FTP proxy

- Setup an FTP proxy on Server
- All FTP requests should be proxied to HostB

## ❑ HTTP proxy

- Setup a **transparent** proxy on Server
- All http traffic should pass through this TP

## ● Hint

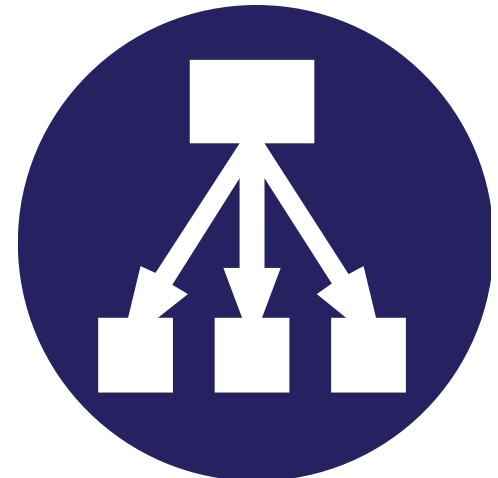
- `ftp-proxy(8)` (`ftp`)
- `www/squid` (`http`)
- `www/privoxy` (`http`)



# Bonus – LB and HA for HTTP Service

## ❑ Setup multiple worker nodes ( $\geq 2$ )

- Load balance
  - Load should be distributed across all nodes
- High availability
  - Health check on all nodes
  - Remove fail node(s)



# Hand-in

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- Due
  - 5/1
- Demo
  - TBA