DNS based DDoS mitigation solution

Schematic Diagram & Progress

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Architecture

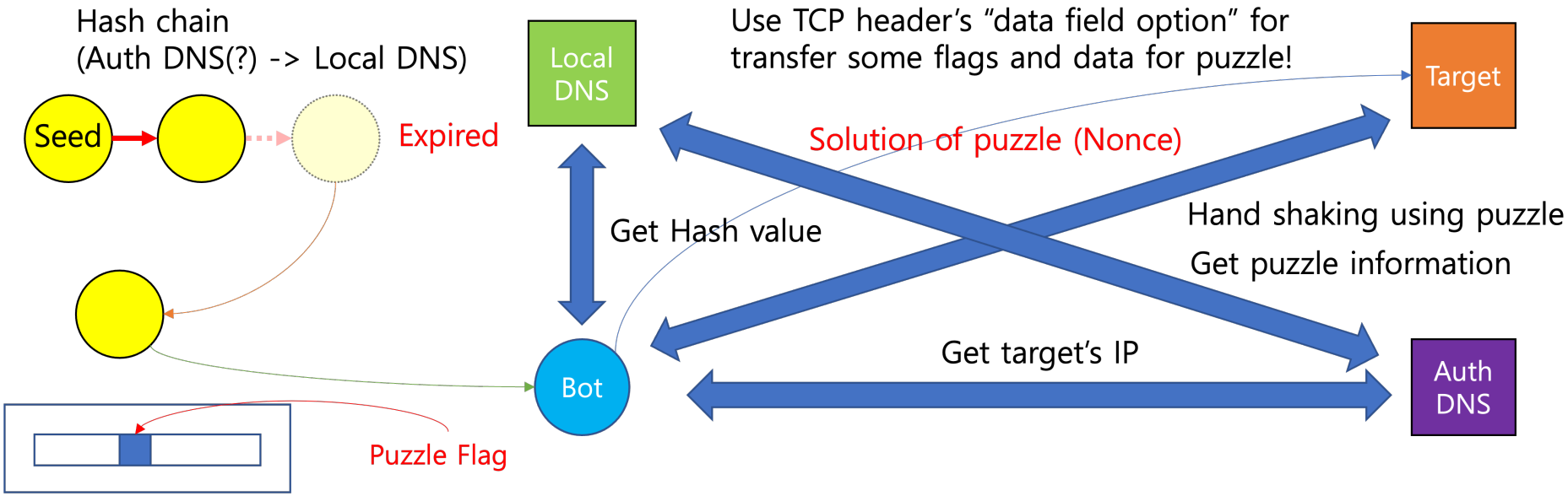


Figure 1: Architecture

Testbed

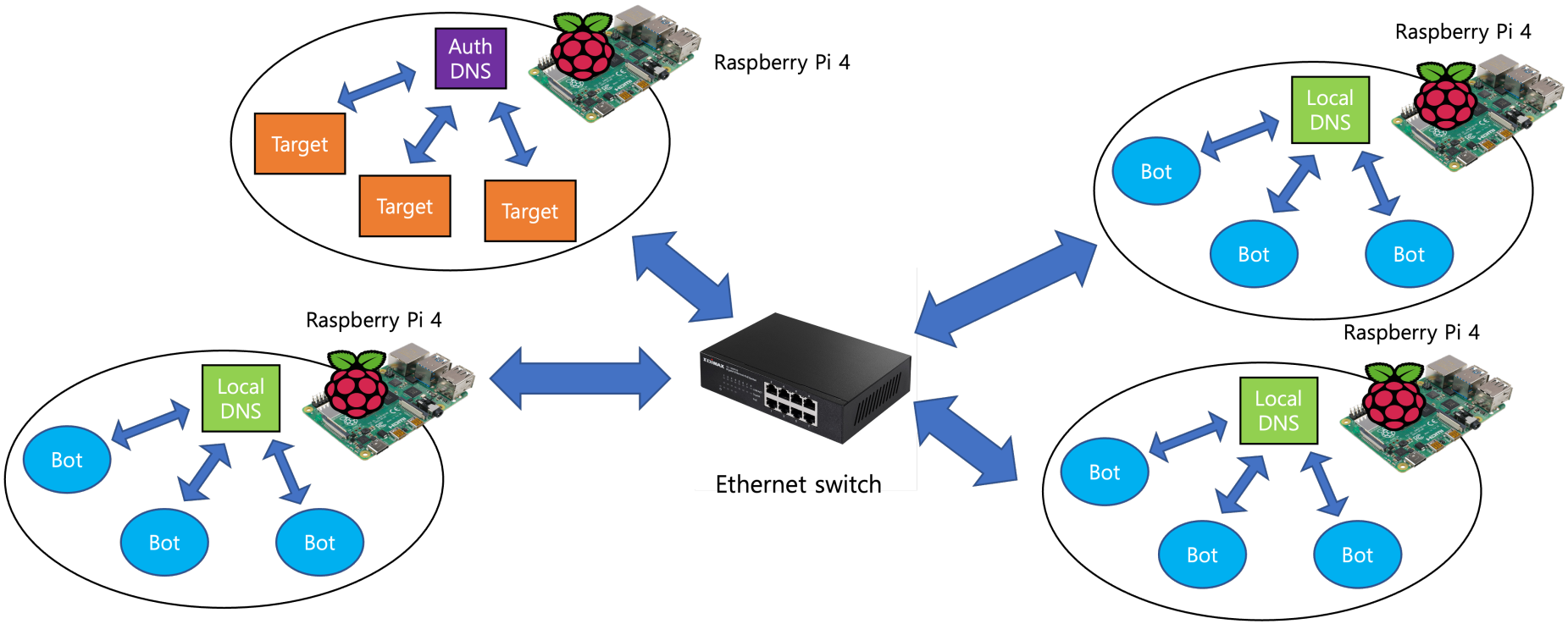
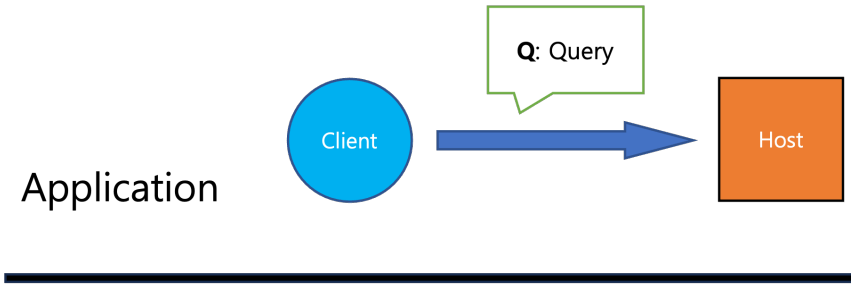


Figure 2: Testbed

Schematic Diagram



Schematic Diagram

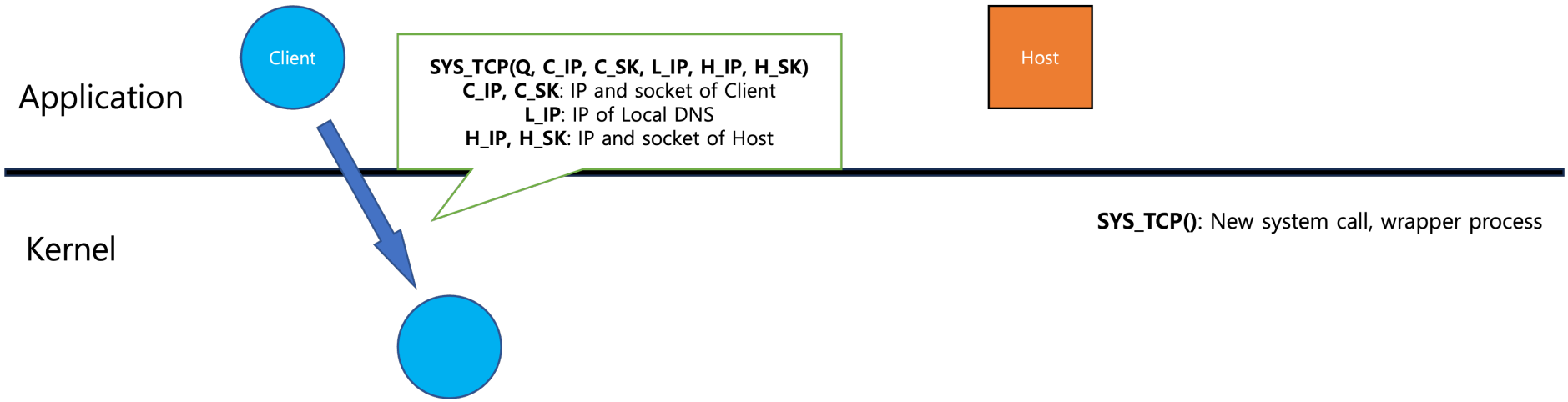
Application

Set **puzzle_flag** = 1!

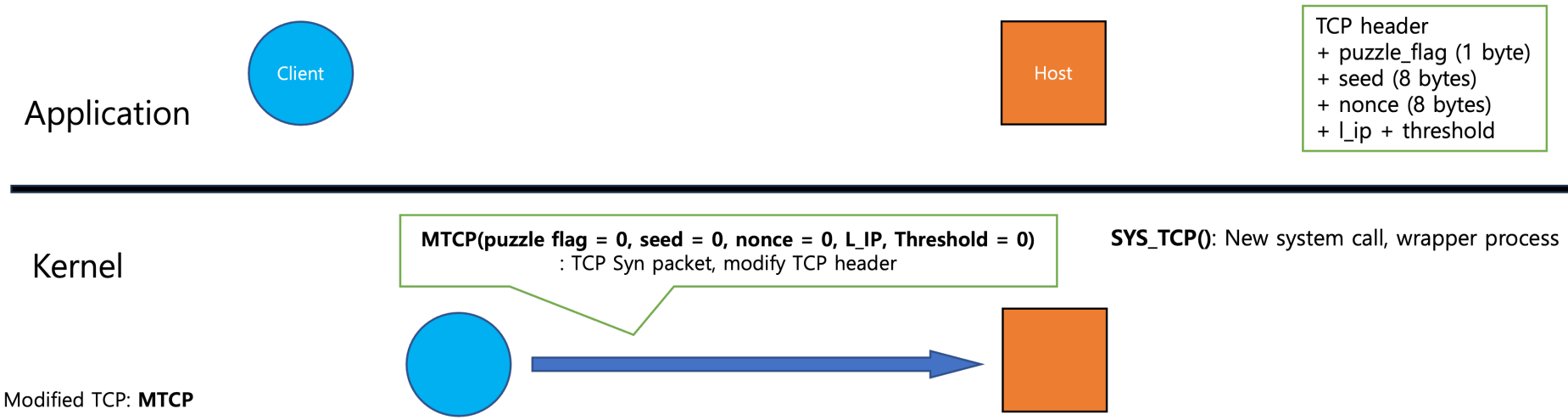
puzzle_flag = 0: without puzzle
puzzle_flag > 0: difficulty of puzzle

Kernel

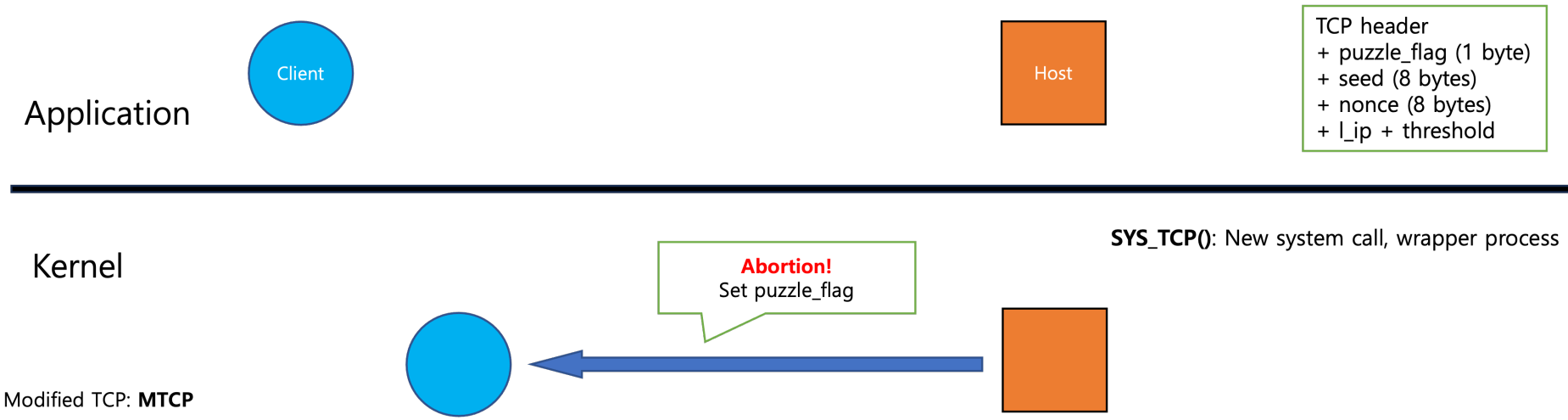
Schematic Diagram



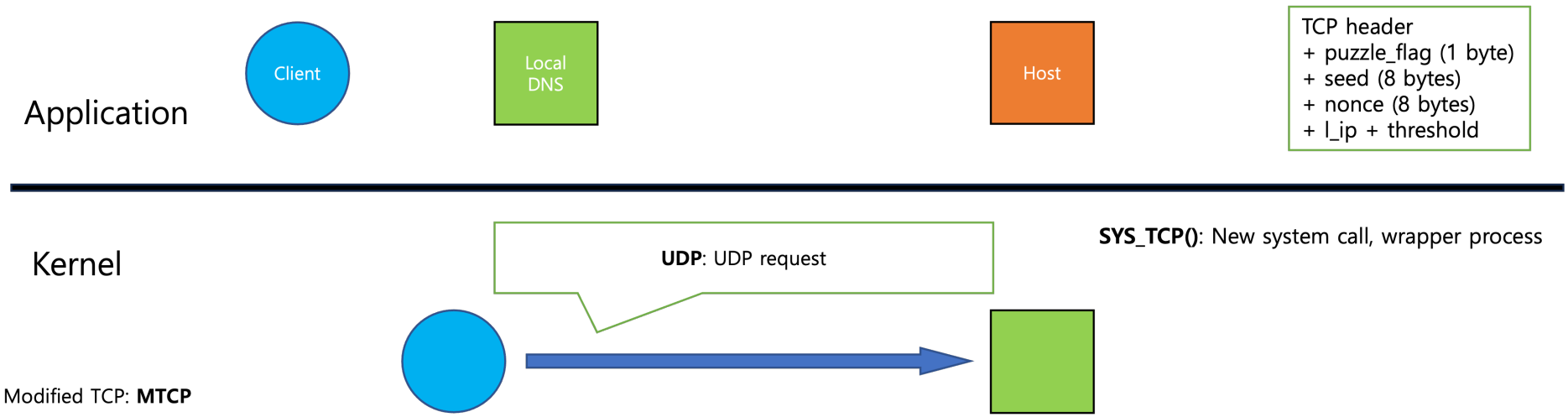
Schematic Diagram



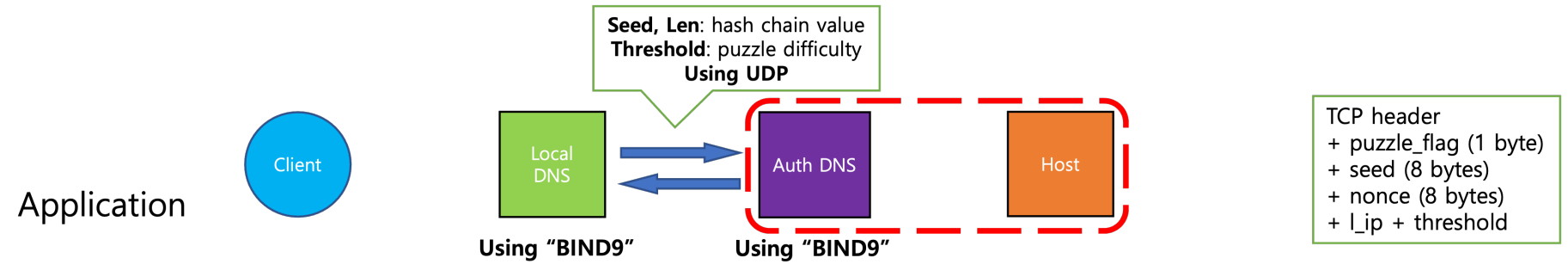
Schematic Diagram



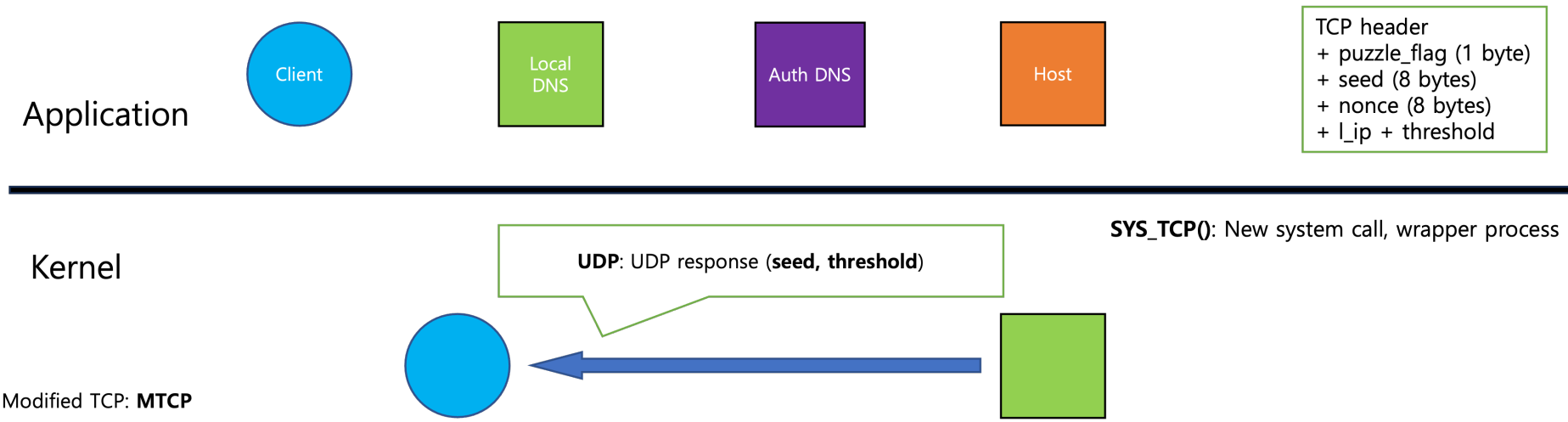
Schematic Diagram



Schematic Diagram

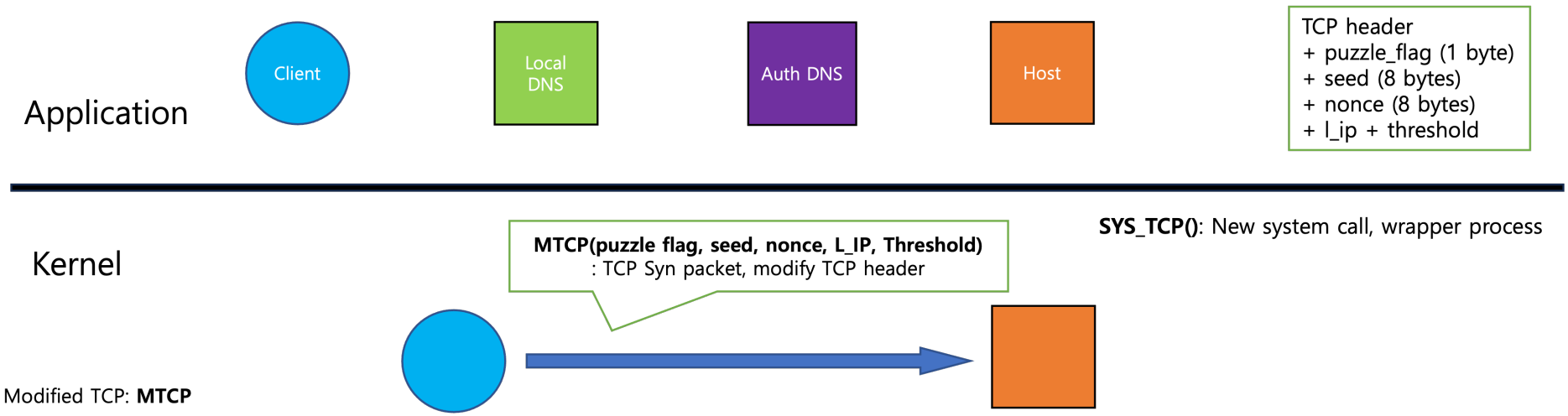


Schematic Diagram

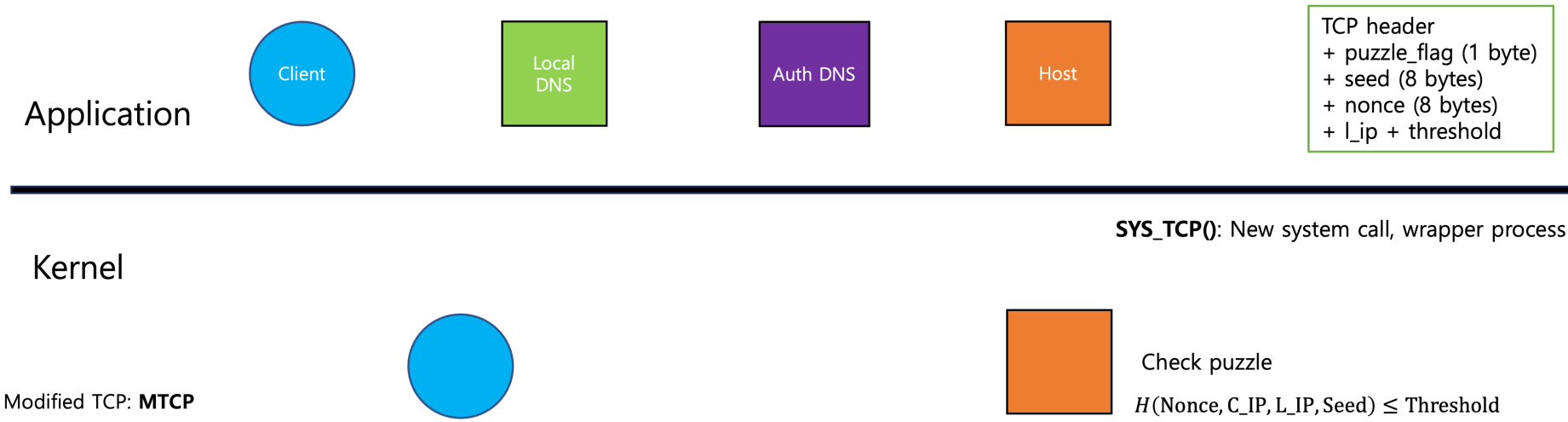


Schematic Diagram

Schematic Diagram



Schematic Diagram



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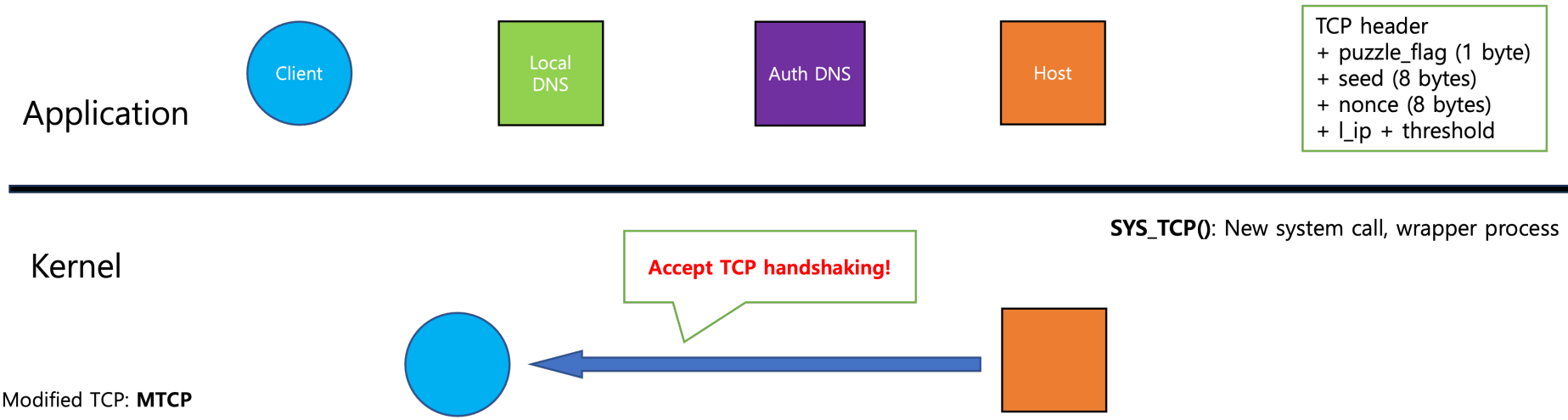

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Specification

Detailed parameters and values are appeared in above diagram.
The following is a brief summary of to-do list.

Let's talk detailed specification after today's meeting!

To-do list

Plan to make wrapper process as syscall at linux kernel

Client

- New syscall **SYS_TCP()** as wrapper process
- Modify TCP handshaking process in linux kernel

DNS

- UDP socket programming (**BIND9**) of local DNS and authoritative DNS

Host

- Autonomous system for control difficulties automatically

TCP header

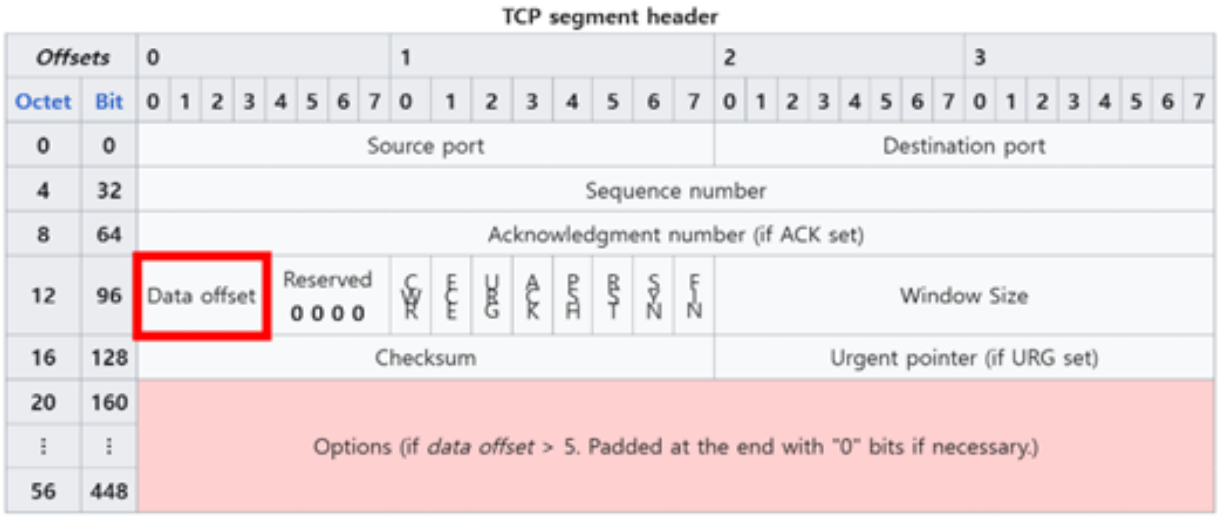

Figure 3: TCP segment header

Add '(u8) puzzle_type, (u32) threshold, nonce, local_dns_ip, seed'

Ipv4 packet flow

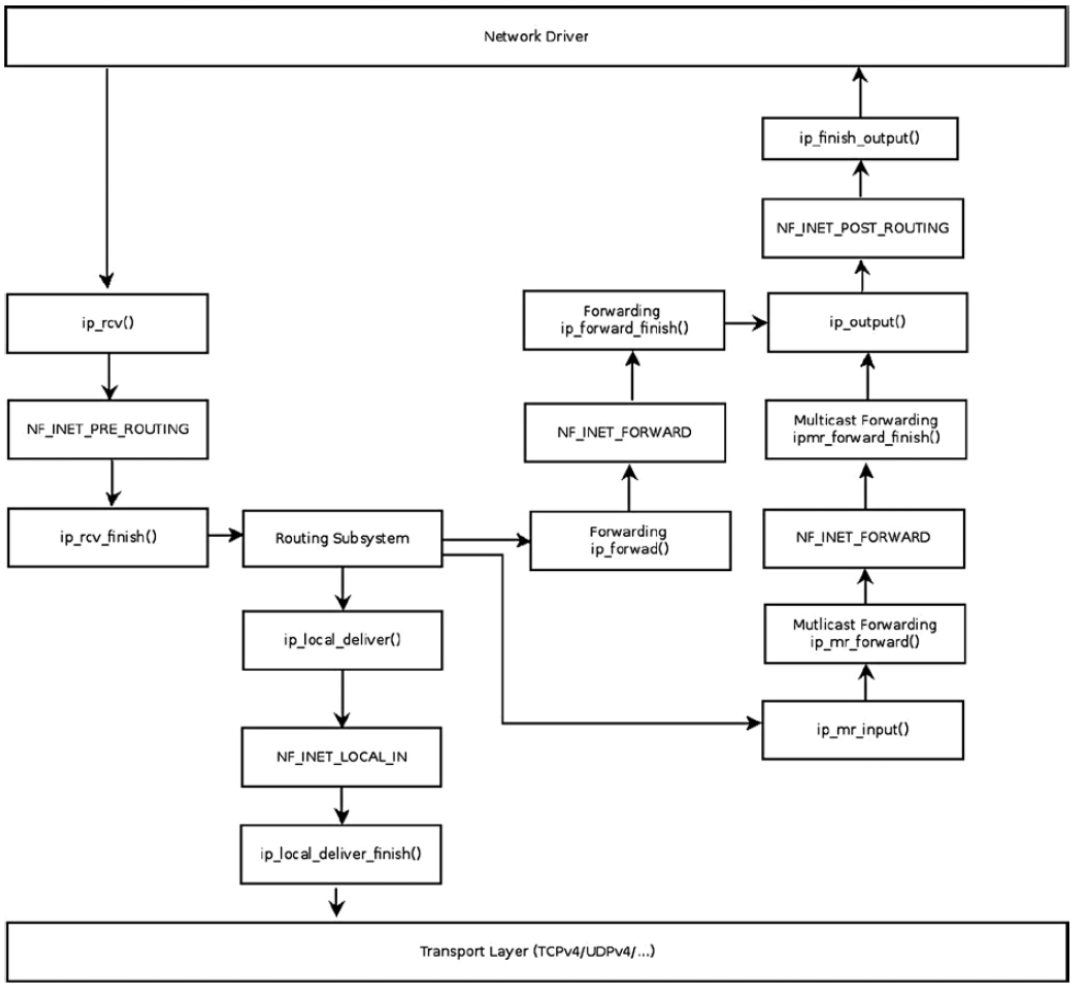

Figure 4: Ipv4 packet flow

TCP packet flow

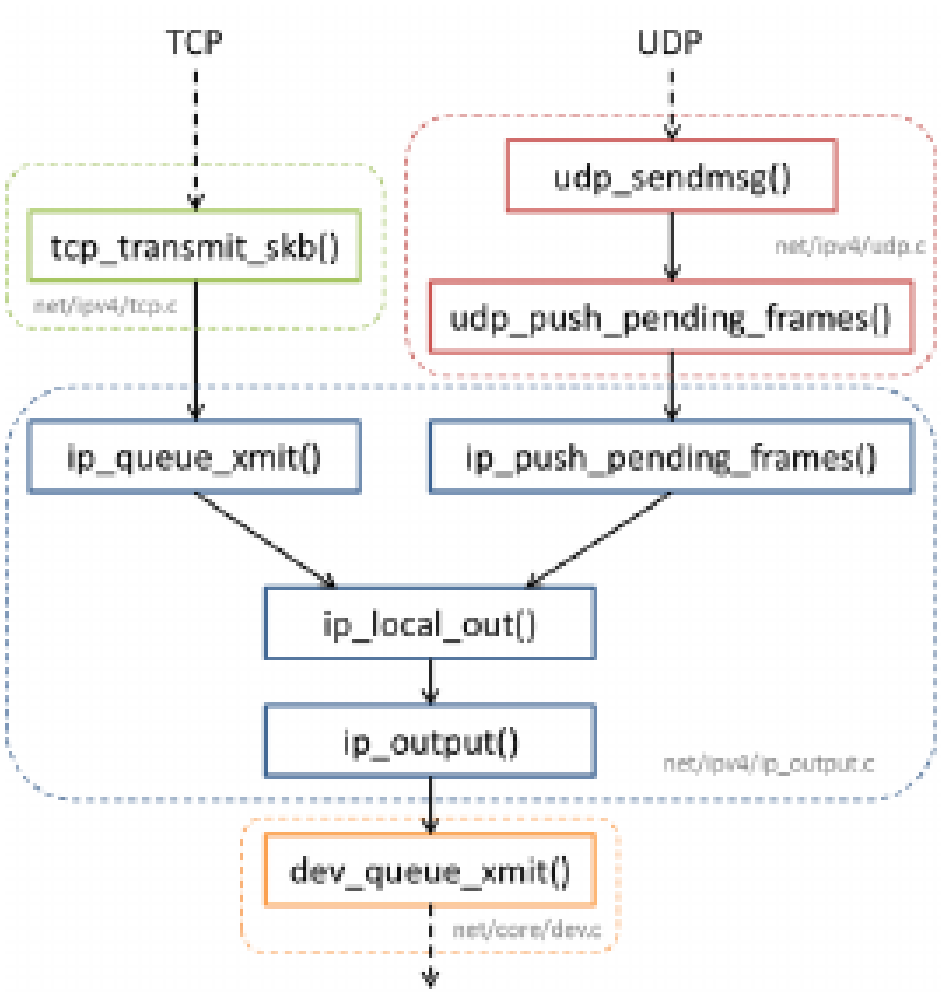

Figure 5: TCP UDP packet flow

TCP socket

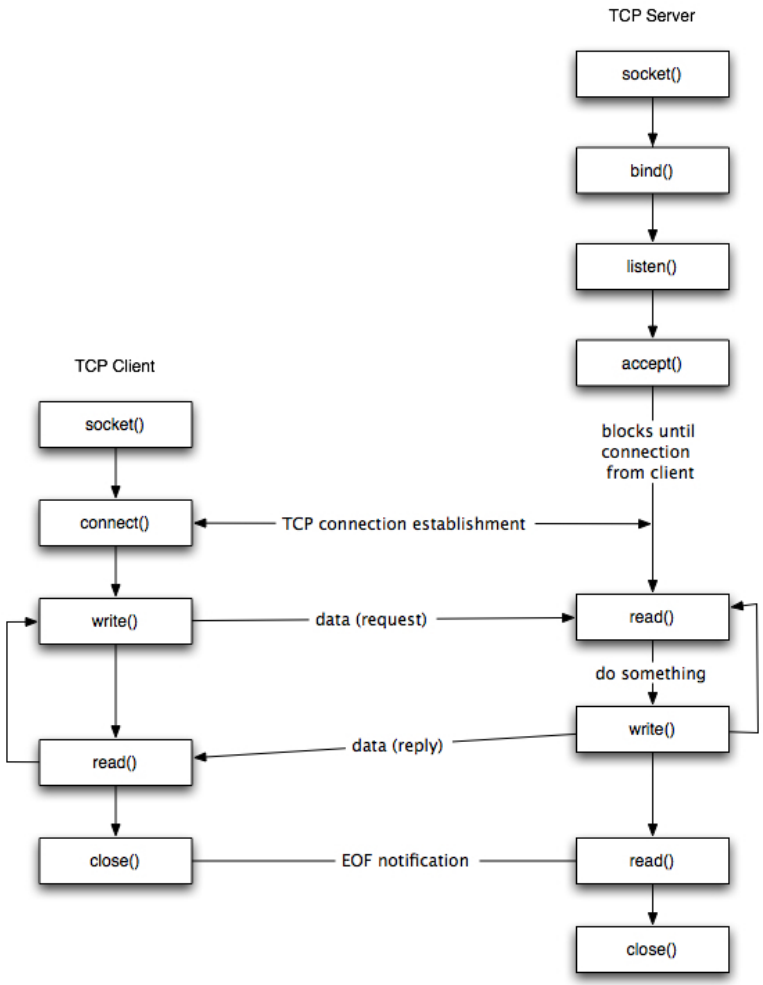

Figure 6: TCP socket

DNS socket programming

Local DNS & Authoritative DNS

Figure 7: BIND9 program

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Progress - Sukhun Yang

1. Devise schematic diagram
2. Modified linux kernel for TCP handshaking
3. Tried BIND9 program
4. Organize presentation slides

Source code

Currently Working Repository

https://github.com/Sagit25/DNS-based-DDoS-mitigation

⋆ Update basic modification of TCP kernel at 'ysh' branch!

⋆ If you leave your github ID, I will invite you as a collaborator!

Source Code

Table 1: Modified kernel part

net/ipv4/tcp_input.c	• TCP header parsing • tcp_rcv_state_process(): Check puzzle & nonce • tcp_rcv_synsent_state_process(): Add reset signal
net/ipv4/tcp_output.c	• Update TCP header writing

Source Code

Table 2: Modified kernel part

net/puzzle.c	• Add system calls • Puzzle hash function
net/ipv4/tcp_ipv4.c	• Change the order of function calls • tcp_v4_send_reset(): Add puzzle information

Plan - Sukhun Yang

- Complementary TCP handshaking process
- Implement wrapper process

Questions

Client

- Place of wrapper process

DNS

- Timing of update puzzle information
- Ownership of puzzle information

Host

- Place of autonomous system
- Data structures for storing dns information

Presentation Slides

Google Drive

Presentation slides folder

Progress - Jinyong Jun

Progress - Taehyun Kang