Application Layer - DNS

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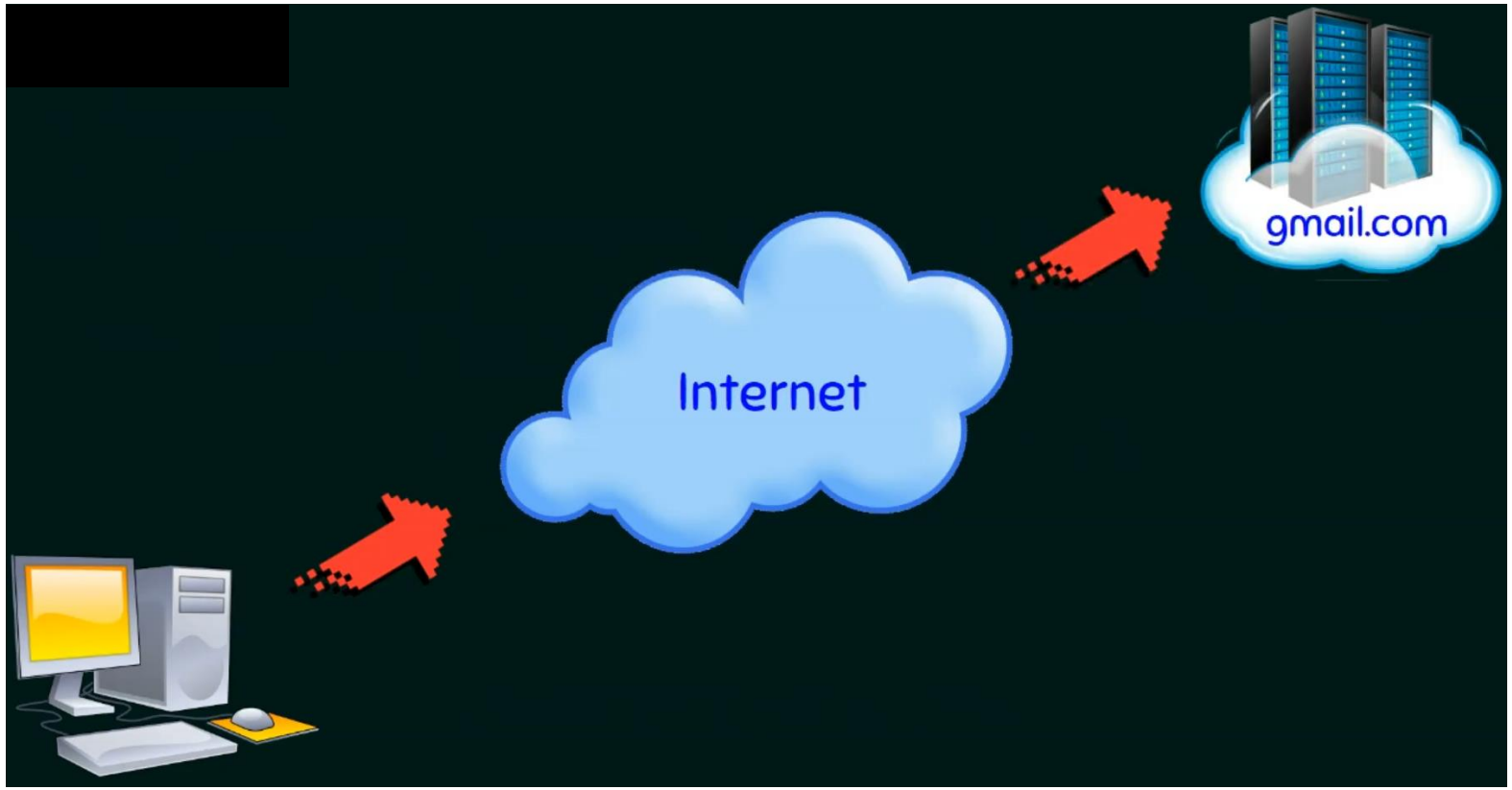
Application Layer Protocols

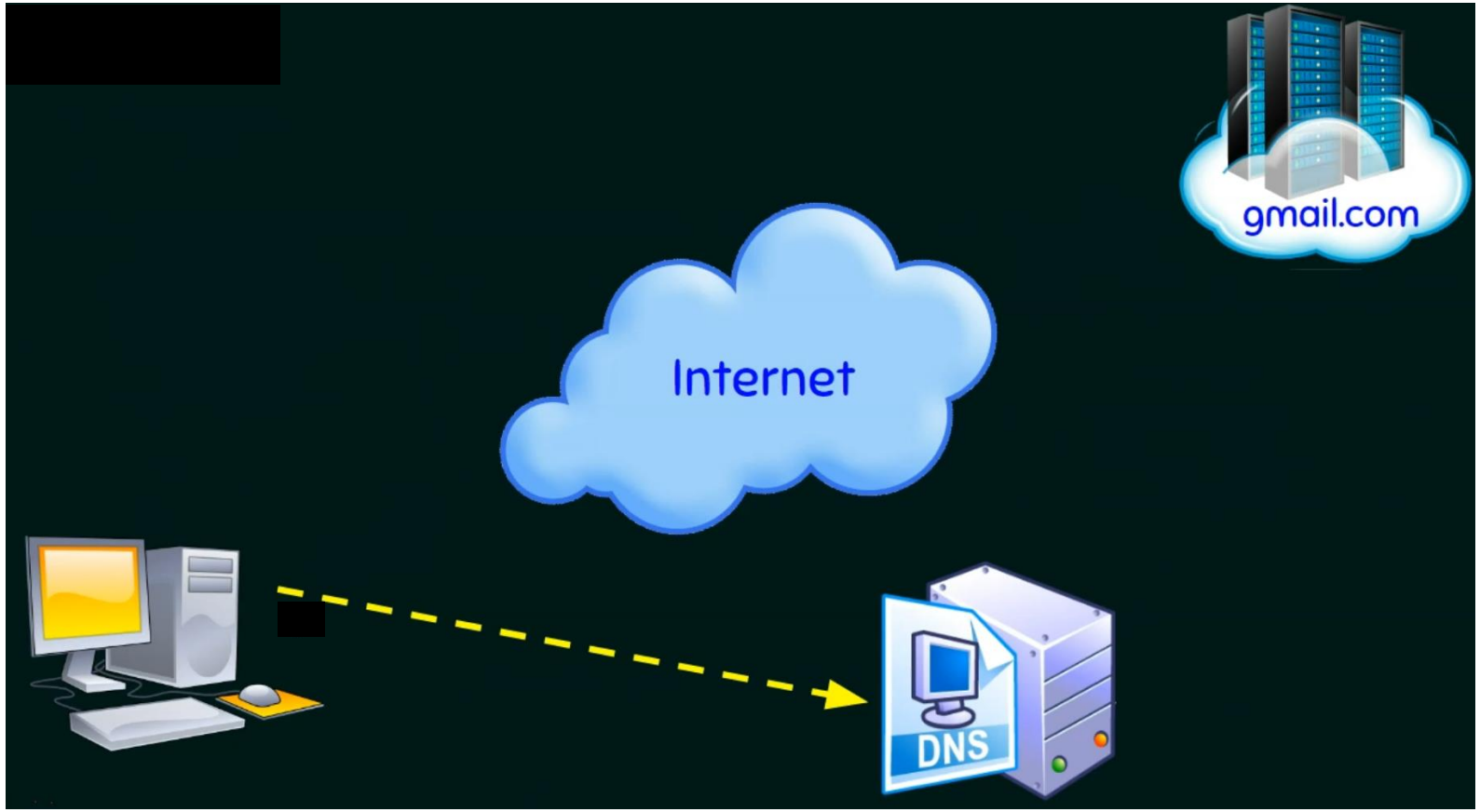
- Telecommunications Network (TELNET)
- File Transfer Protocol (FTP)
- Trivial File Transfer Protocol (TFTP)
- Simple Mail Transfer Protocol (SMTP)
- Simple Network Management Protocol (SNMP)
- Domain Name System (DNS)
- Hypertext Transfer Protocol (HTTP)

Scenario



- How can the client computer contact www.gmail.com?
- In the internet, IP addresses will work, not names
- How to know the IP addresses of gmail.com?

Scenario

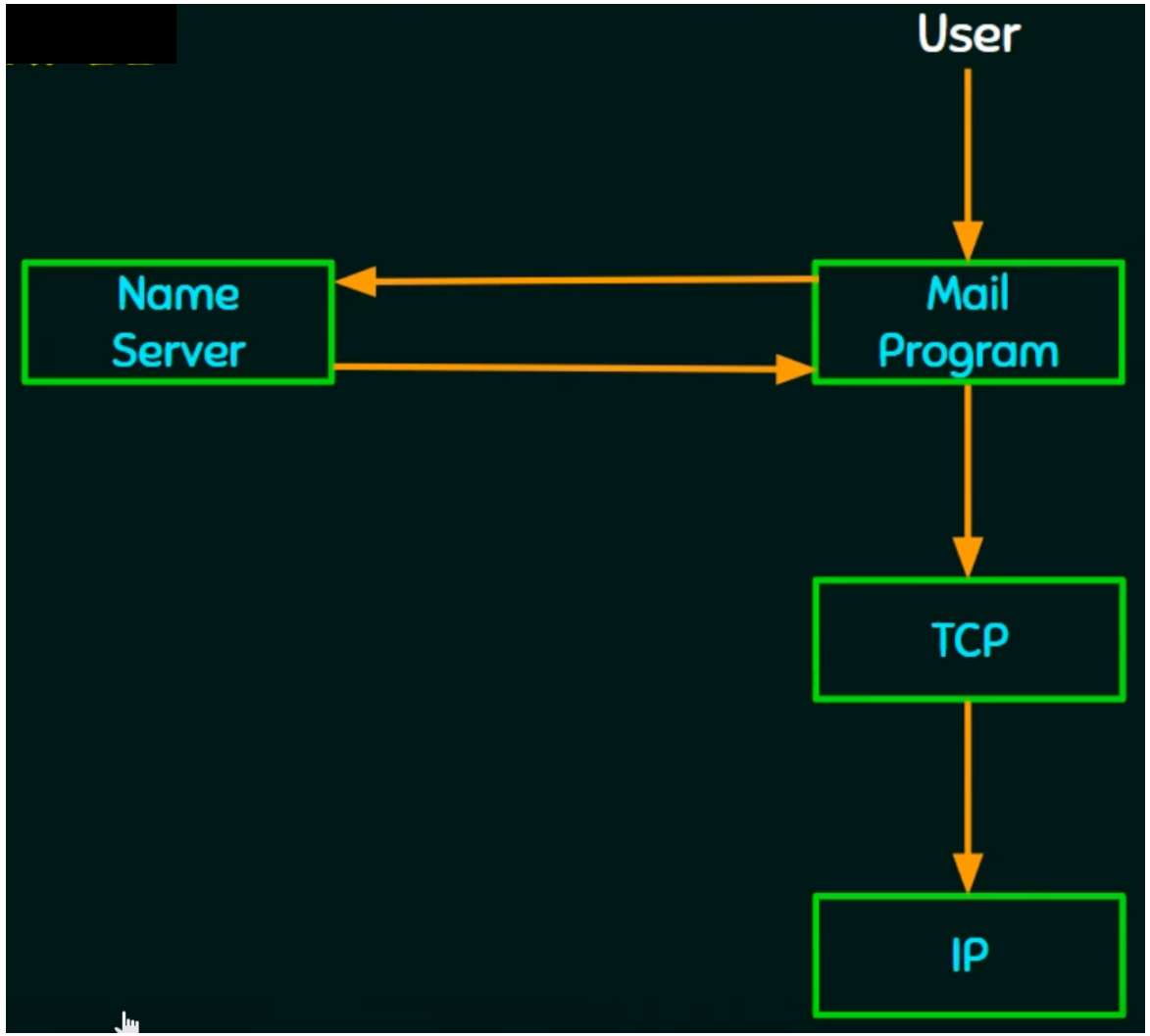


- DNS can resolve internet names into IP address
- First, the client will contact DNS asking for the IP address of www.gmail.com
- DNS then replies with the requested IP address
- Finally, DNS cache in the client will be updated

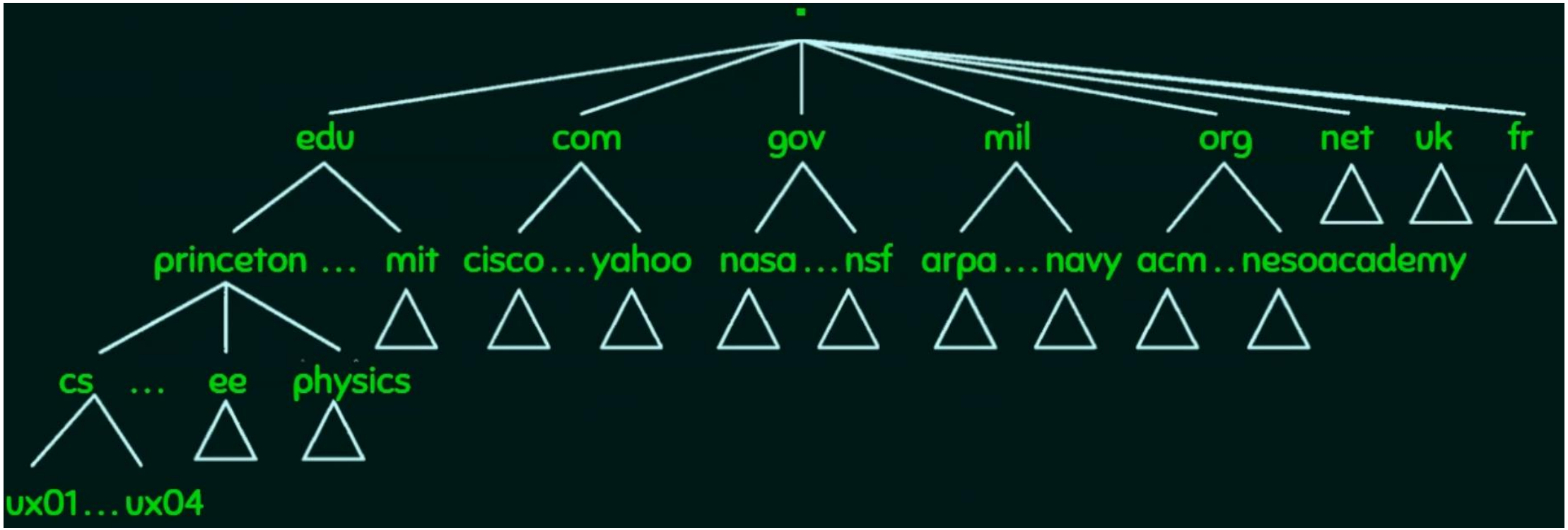
Domain Name System (DNS)

- DNS = Domain Name System
- Hierarchical and decentralized service
- Names are human friendly
- IP Addresses are router friendly
- Names or IP addresses – Unique
- FQDN – Fully Qualified Domain Name
  - myhost.example.com.
  - myhost.ugm.ac.id.
- Translate hostnames into host addresses
- Name servers – Client Server Model

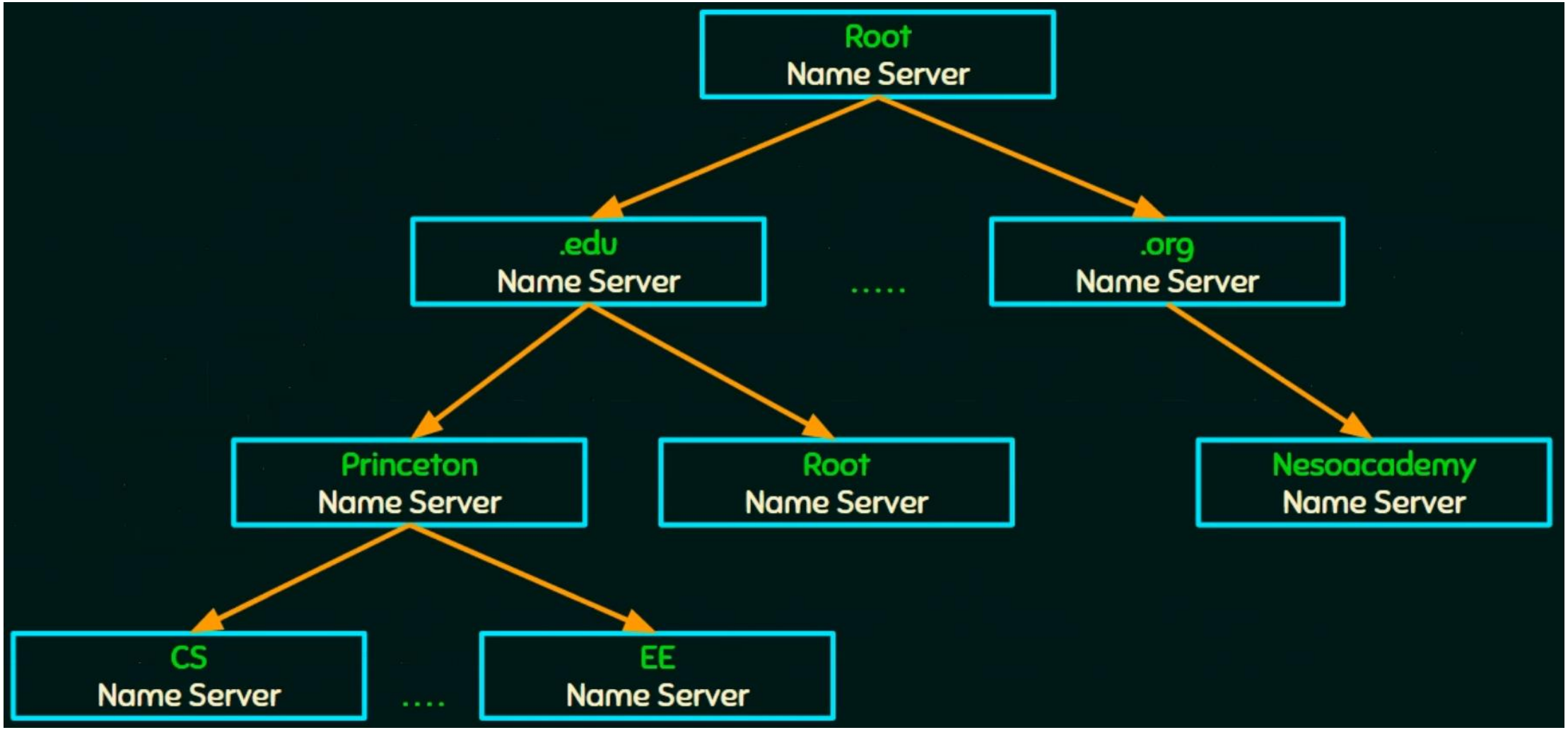
Example



Domain Hierarchy Partitioned Into Zones



Hierarchy of Name Servers



DNS records

DNS: distributed database storing resource records **(RR)**

RR format: (`name, value, type, ttl`)

type=A

- `name` is hostname
- `value` is IP address

type=NS

- `name` is domain (e.g., foo.com)
- `value` is hostname of authoritative name server for this domain

type=CNAME

- `name` is alias name for some "canonical" (the real) name
- www.ibm.com is really servereast.backup2.ibm.com
- `value` is canonical name

type=MX

- `value` is name of SMTP mail server associated with `name`

Name Resolution

- Not all clients know about the root server
- DNS resolver
- Resolving a name actually involves a client querying the local server
- DNS Recursive query and DNS Iterative query resolution

Name Resolution