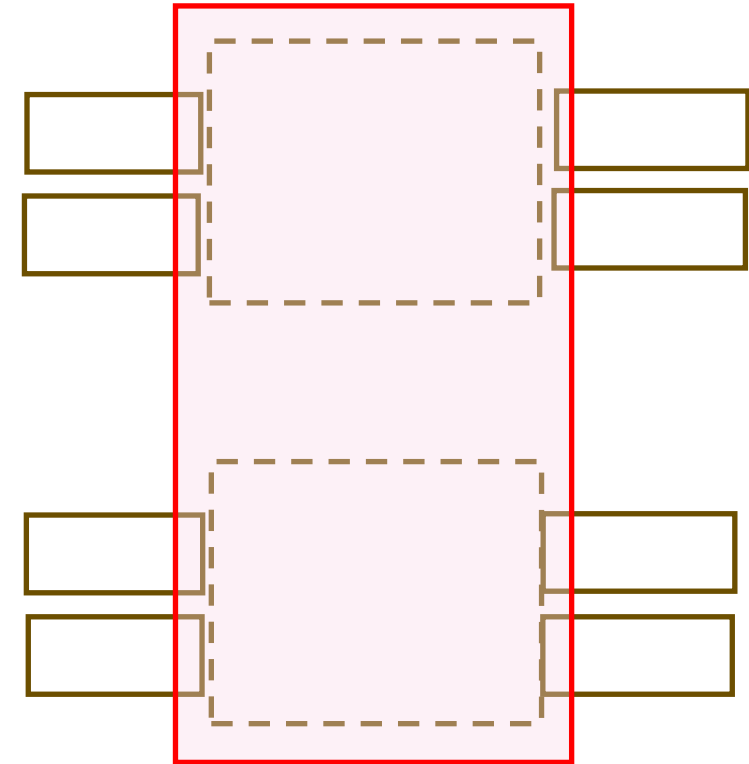


➤ Bridging

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➤ Switching



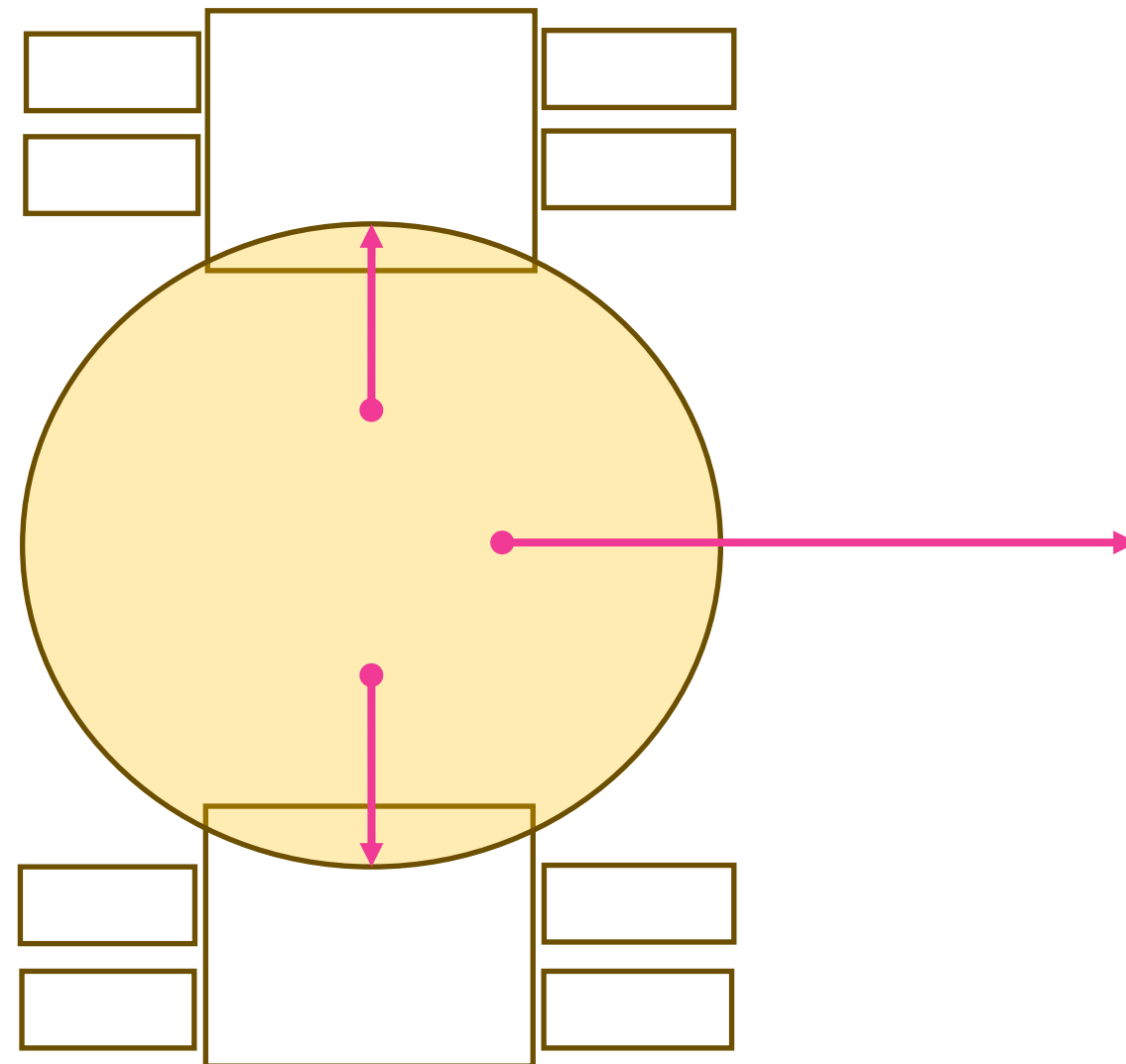
➤ Routing

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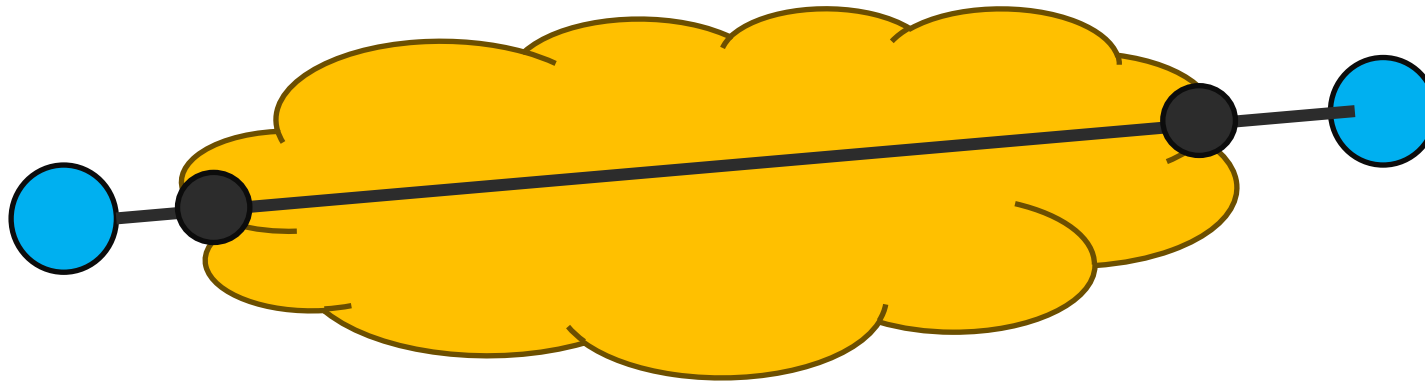


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➤ Layer 2 VPNs

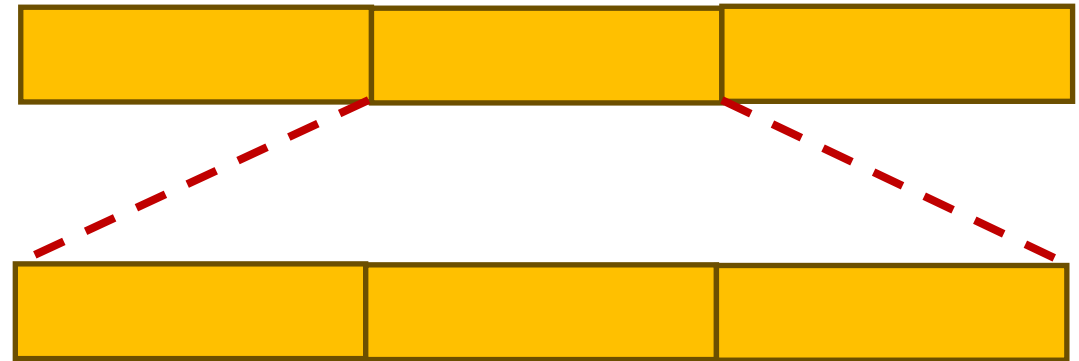
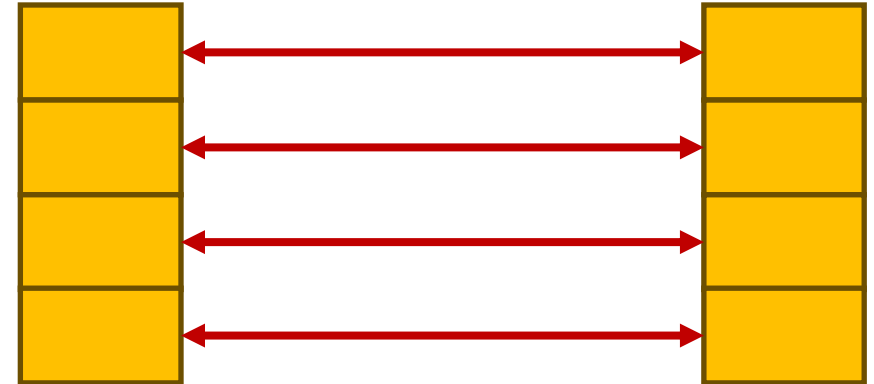
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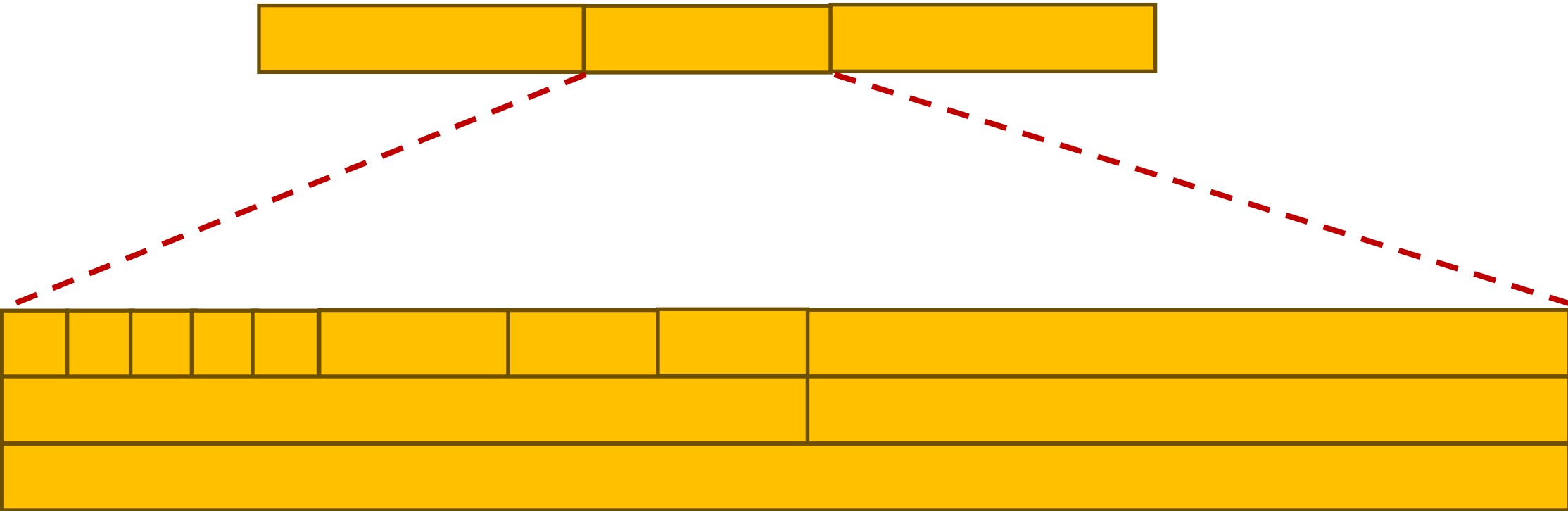


➤ Layer 3 VPNs

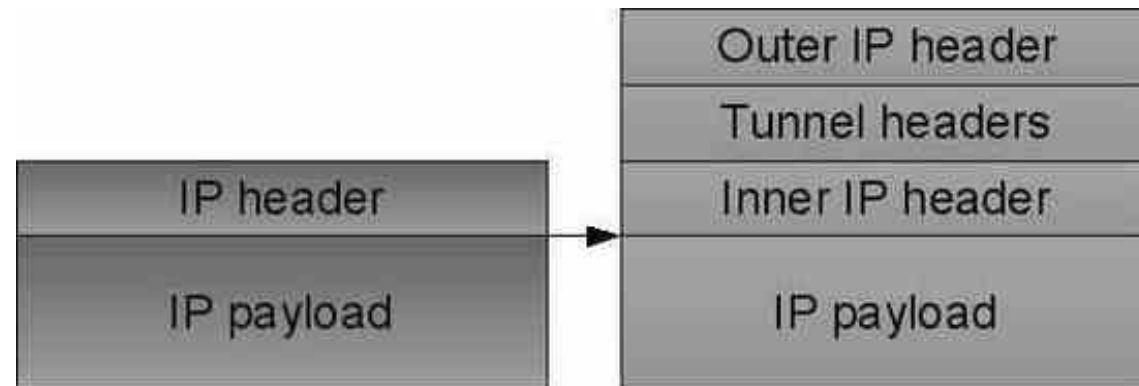
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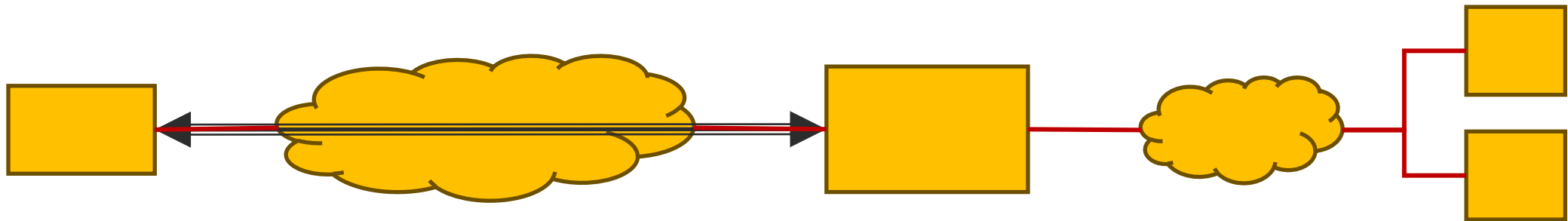




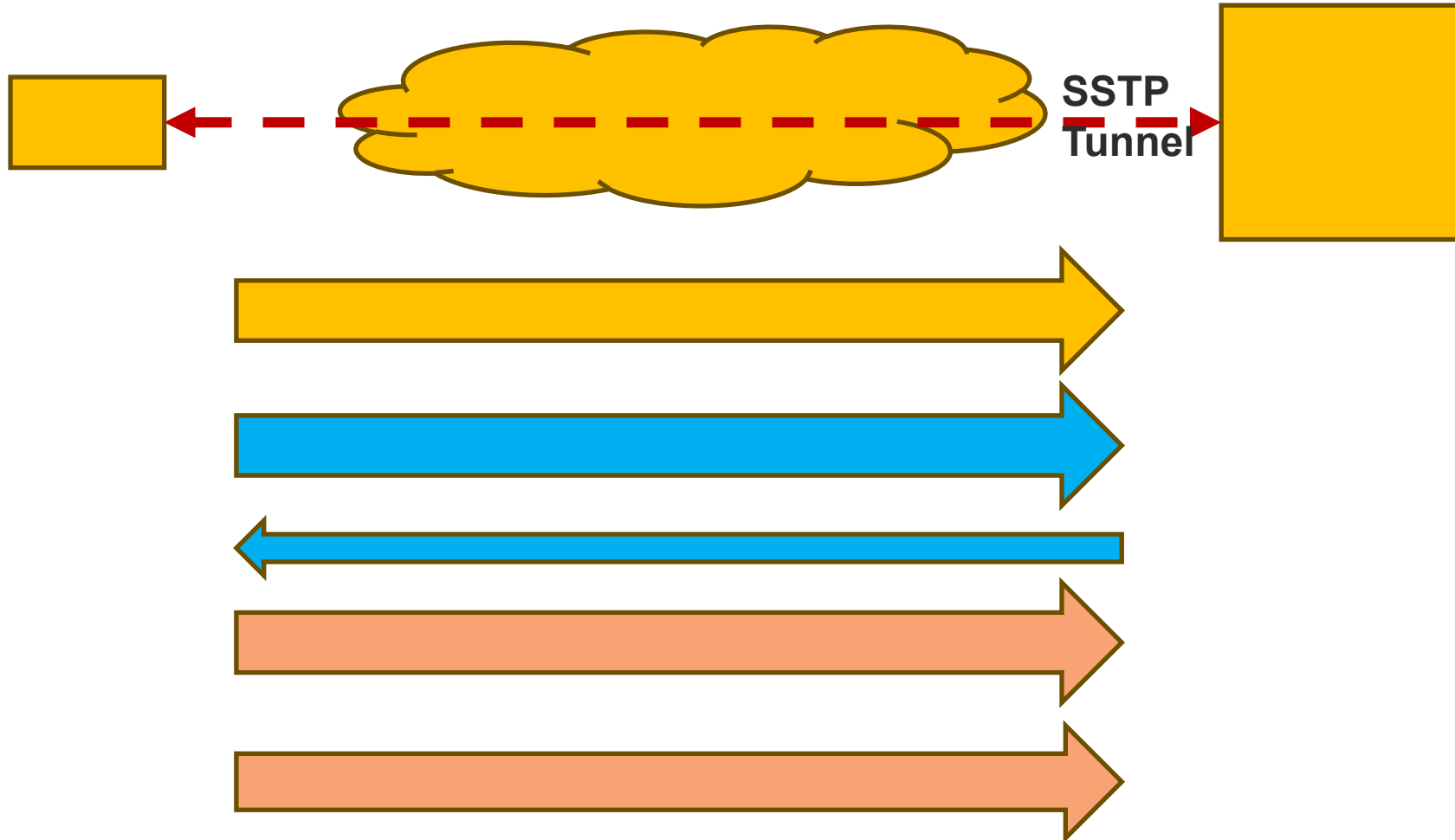




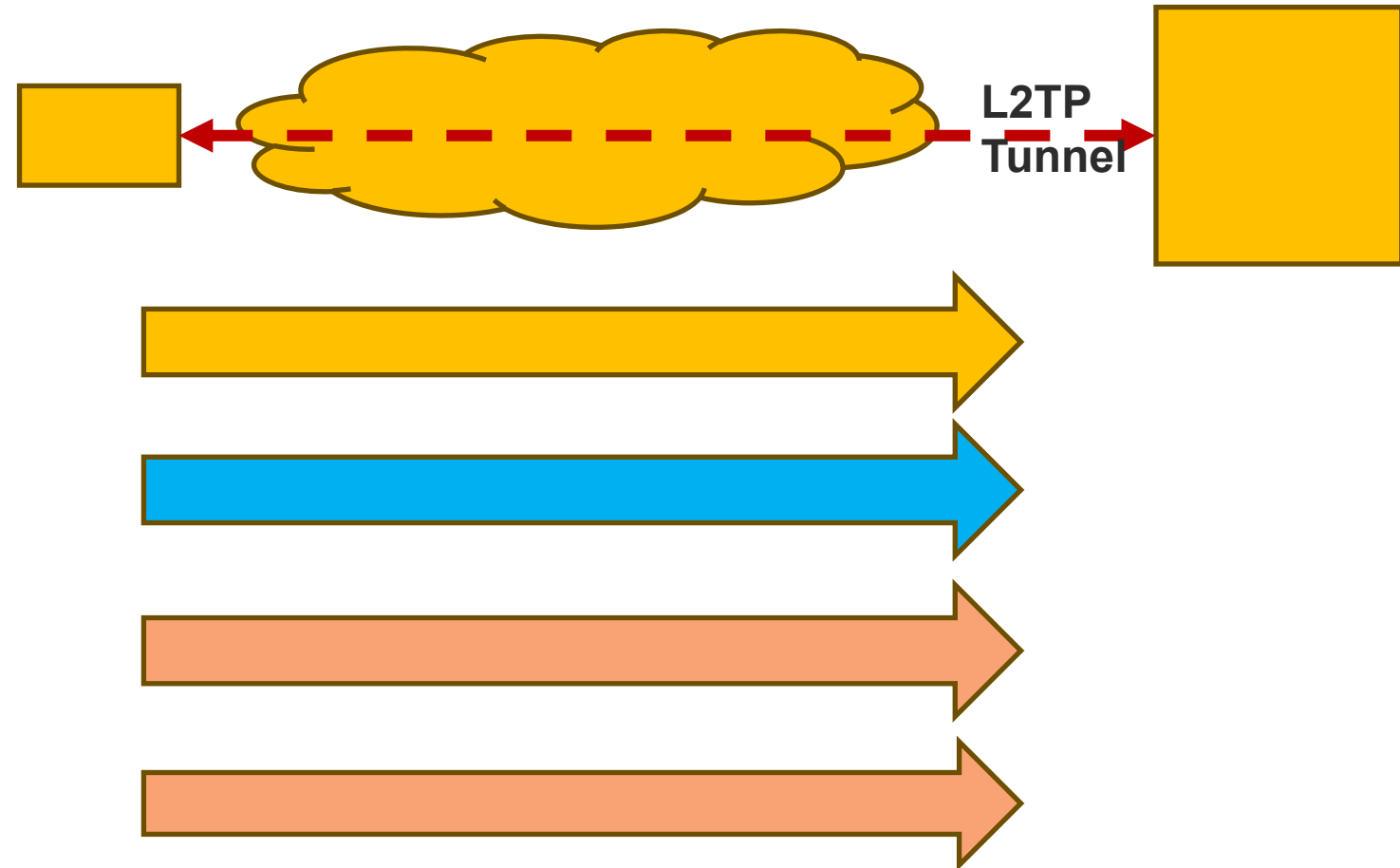
Point-to-Point Tunneling Protocol (PPTP)

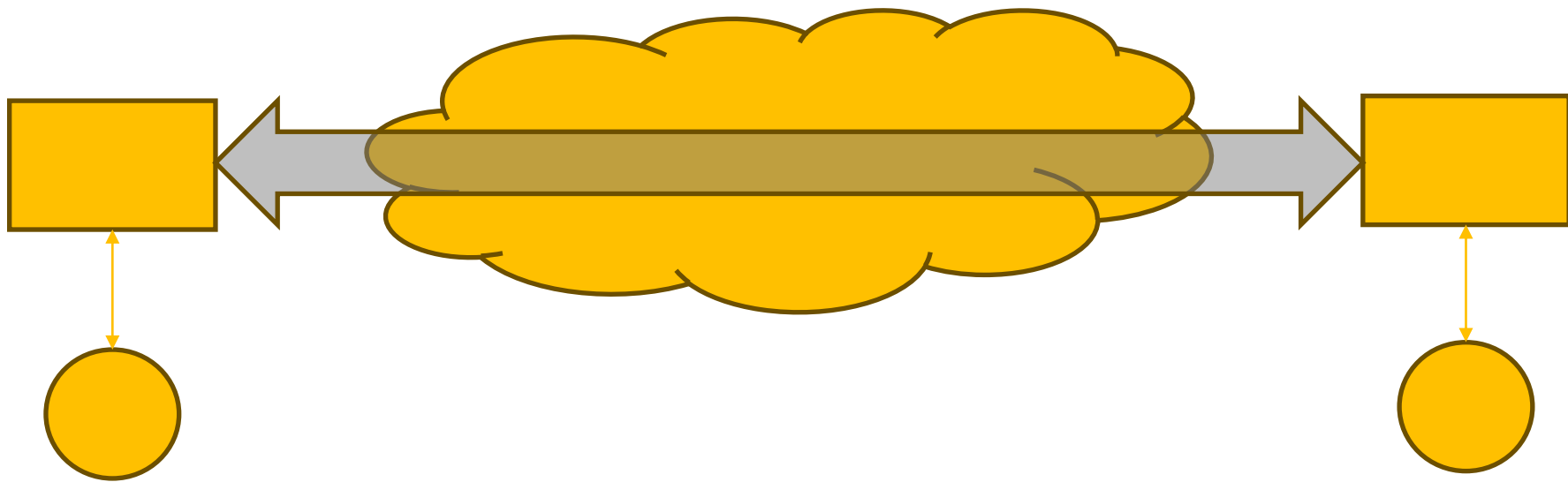


6. Secure Socket Tunneling Protocol (SSTP)



7. Layer 2 Tunneling Protocol (L2TP)





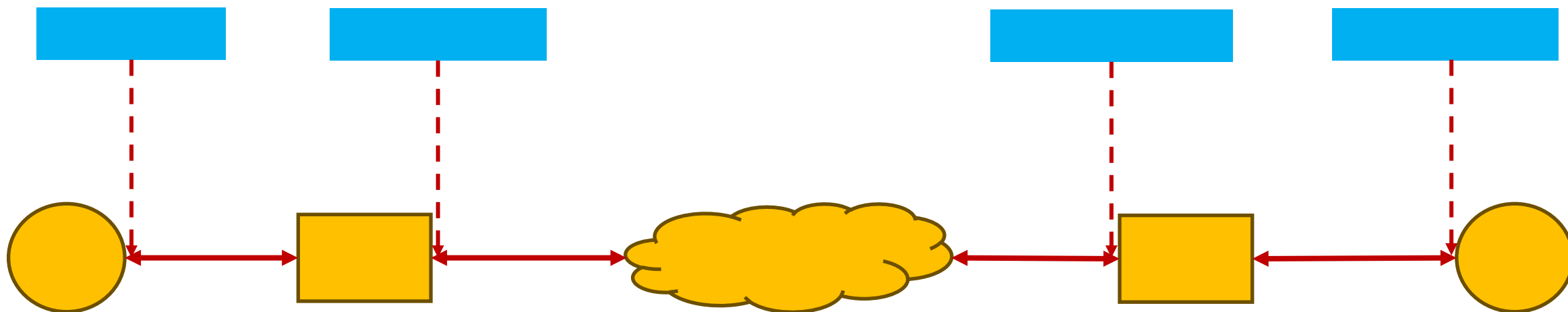
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➤ Advantages of NAT –

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- It provides privacy as the device's IP address, sending and receiving the traffic, will be hidden.
-

➤ Disadvantage of NAT –

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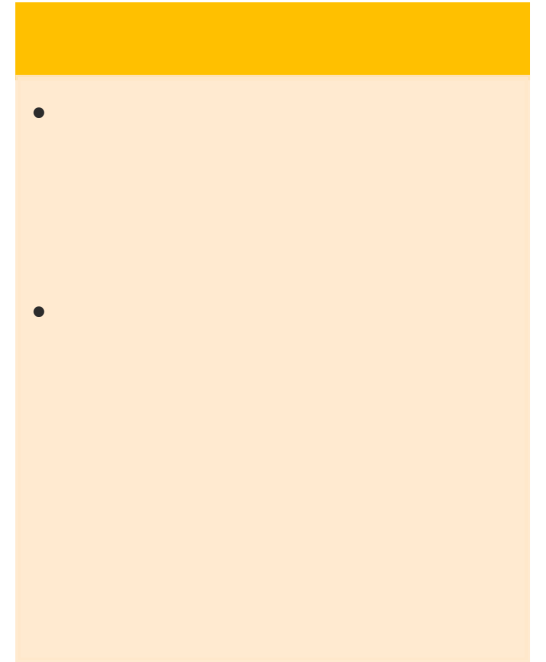
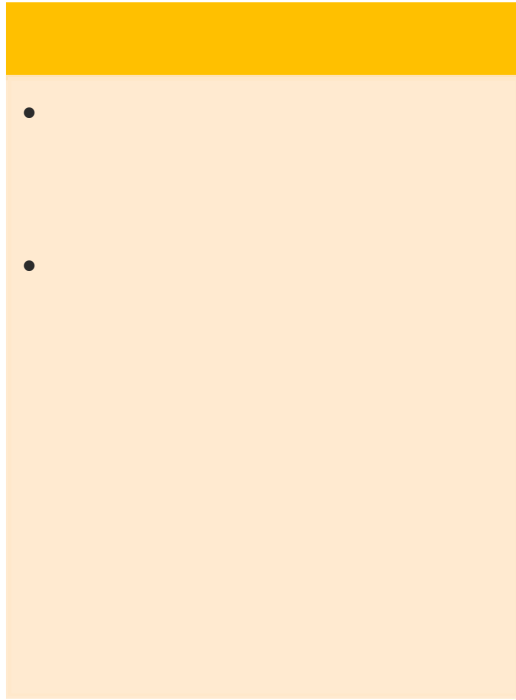
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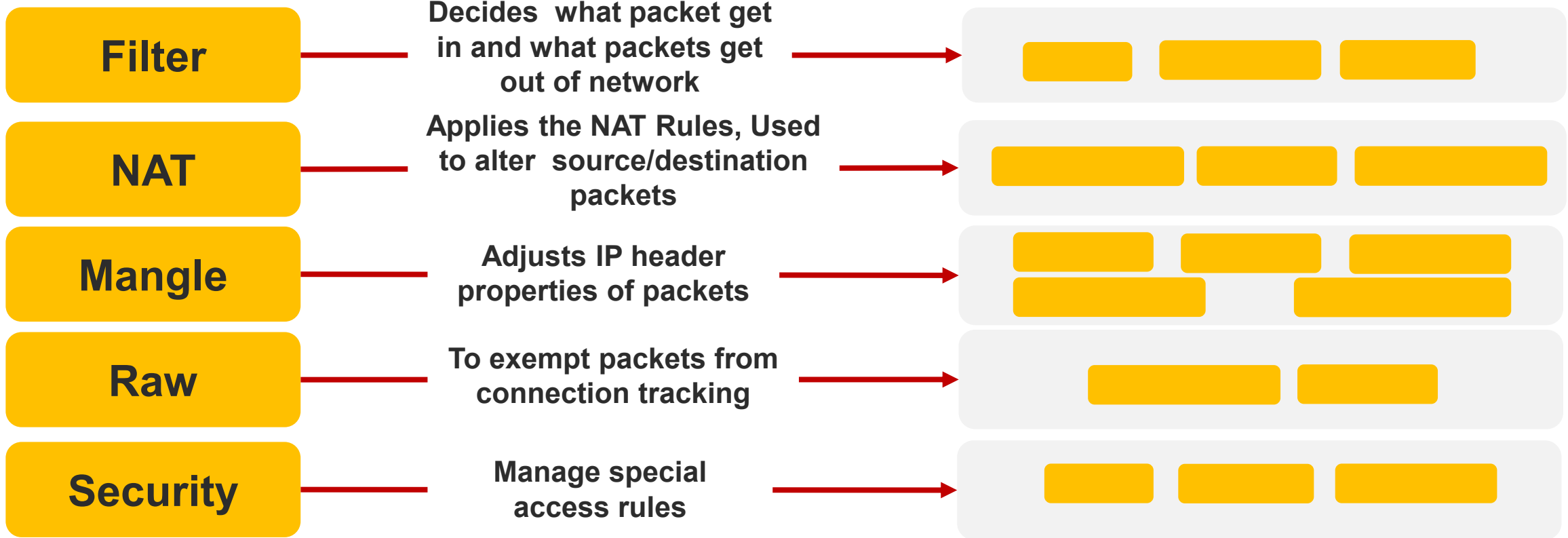


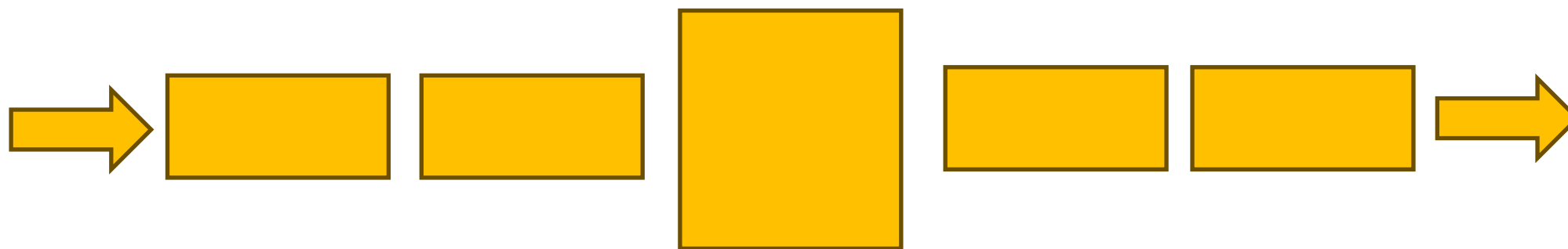
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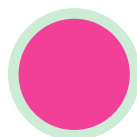
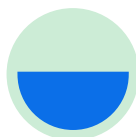


Working Principles of IP Tables













➤ **-i (interface)**



➤ **-p (protocol)**



➤ **-s (source)**



➤ **-dport (destination port)**



➤ **-j (target)**





Enabling Connections on HTTP, SSH, and SSL Port

➤ Allow SSH Traffic

-

➤ Allow HTTP Traffic

-

➤ Allow HTTPS Traffic

-

➤ Check Status of IP Tables

Filtering Packets Based on Source

- **Allow packets from 192.168.1.3**
- **Deny packets from 192.168.1.3**
- **Deny packets from a range of IP addresses**
- **Dropping all Other Traffic**

Deleting Rules

- **remove all rules and start with a clean slate**

-

- **delete a specific rule**

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- **delete a specific rule from specific chain**

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Persisting Changes

➤ Save Rules to file

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➤ Restore rules from file

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➤ Enable Auto Save

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SNMP agent

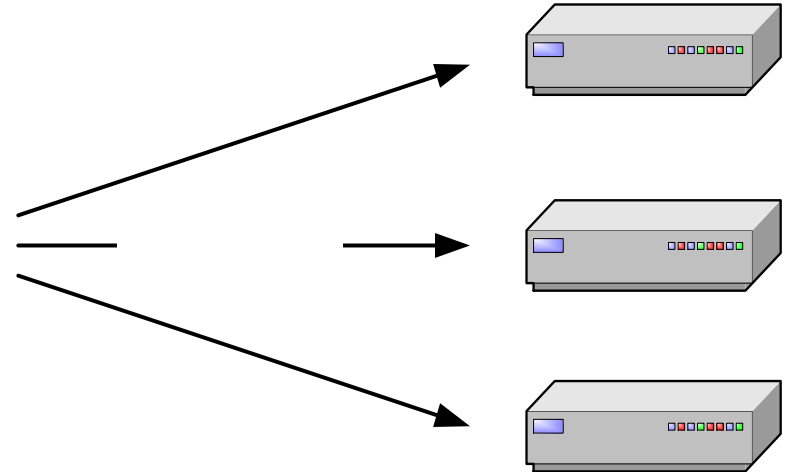
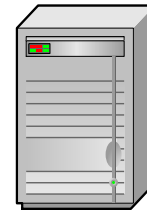


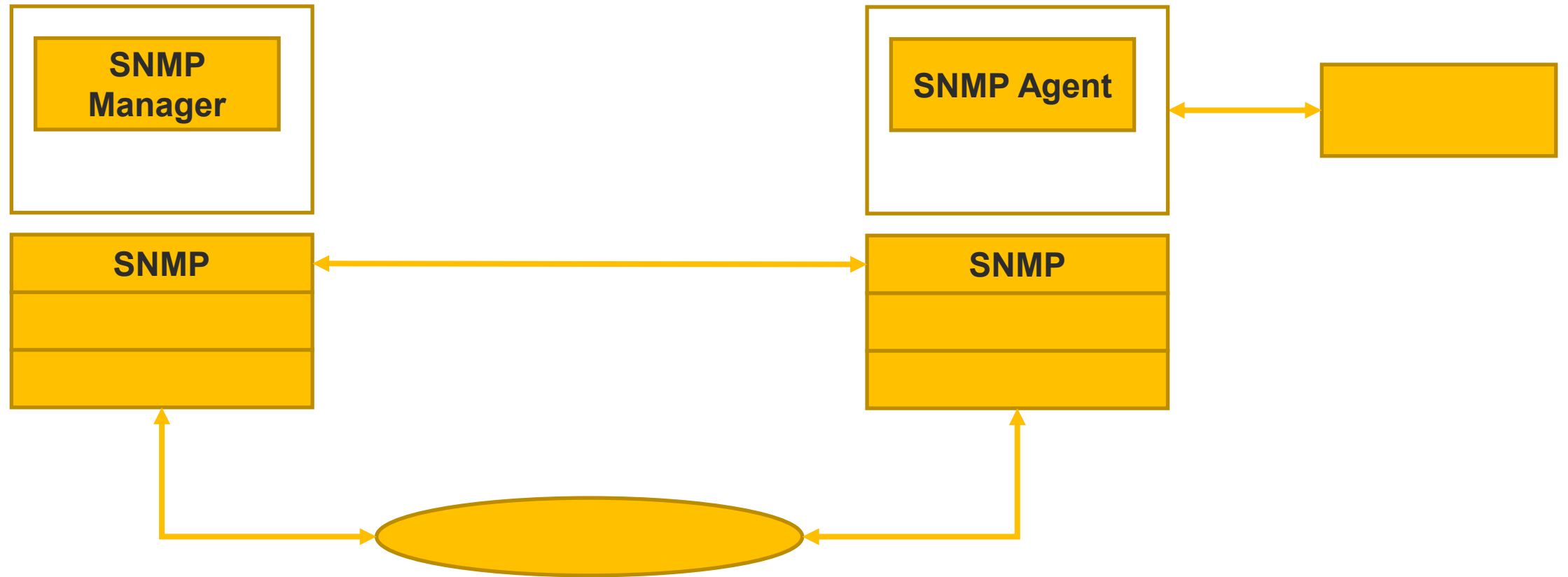
SNMP manager



SNMP protocol

**Management
Information Bases
(MIBs)**





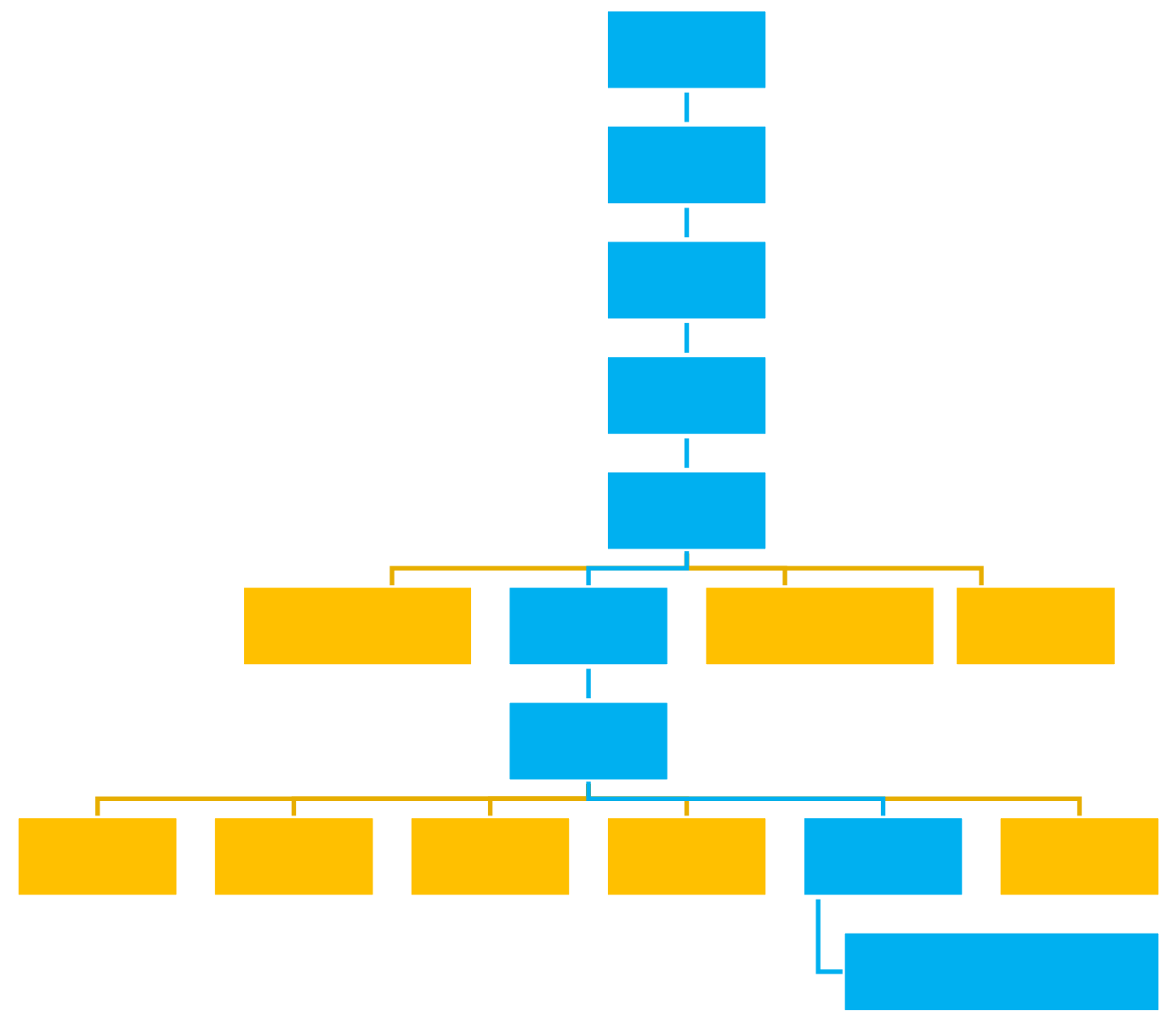




/usr/share/snmp/mibs

- *Multiple MIB files*
- *MIB-II (defined in RFC 1213) defines the managed objects of TCP/IP networks*







ipForwDatagrams OBJECT-TYPE



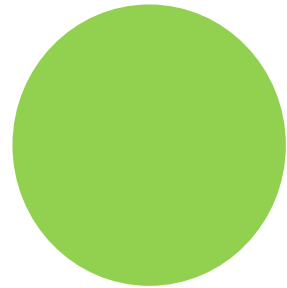
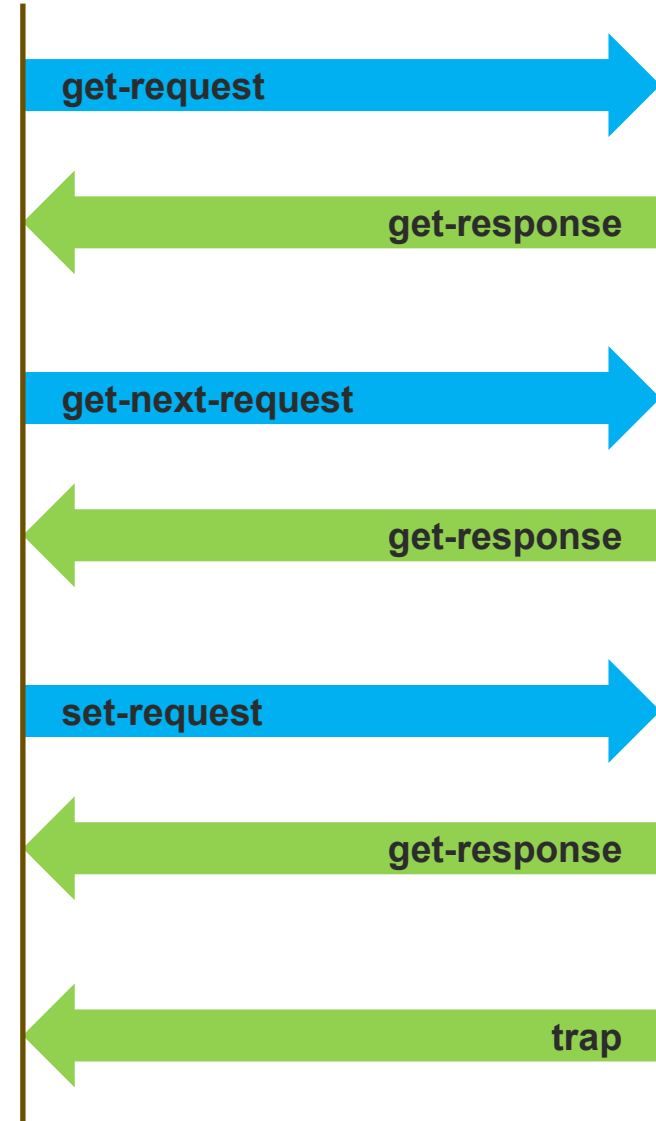
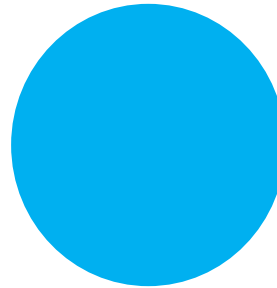
Get-request.

Get-next-request.

Set-request.

Get-response.
get-request, get-next-request, or set-request

Trap.





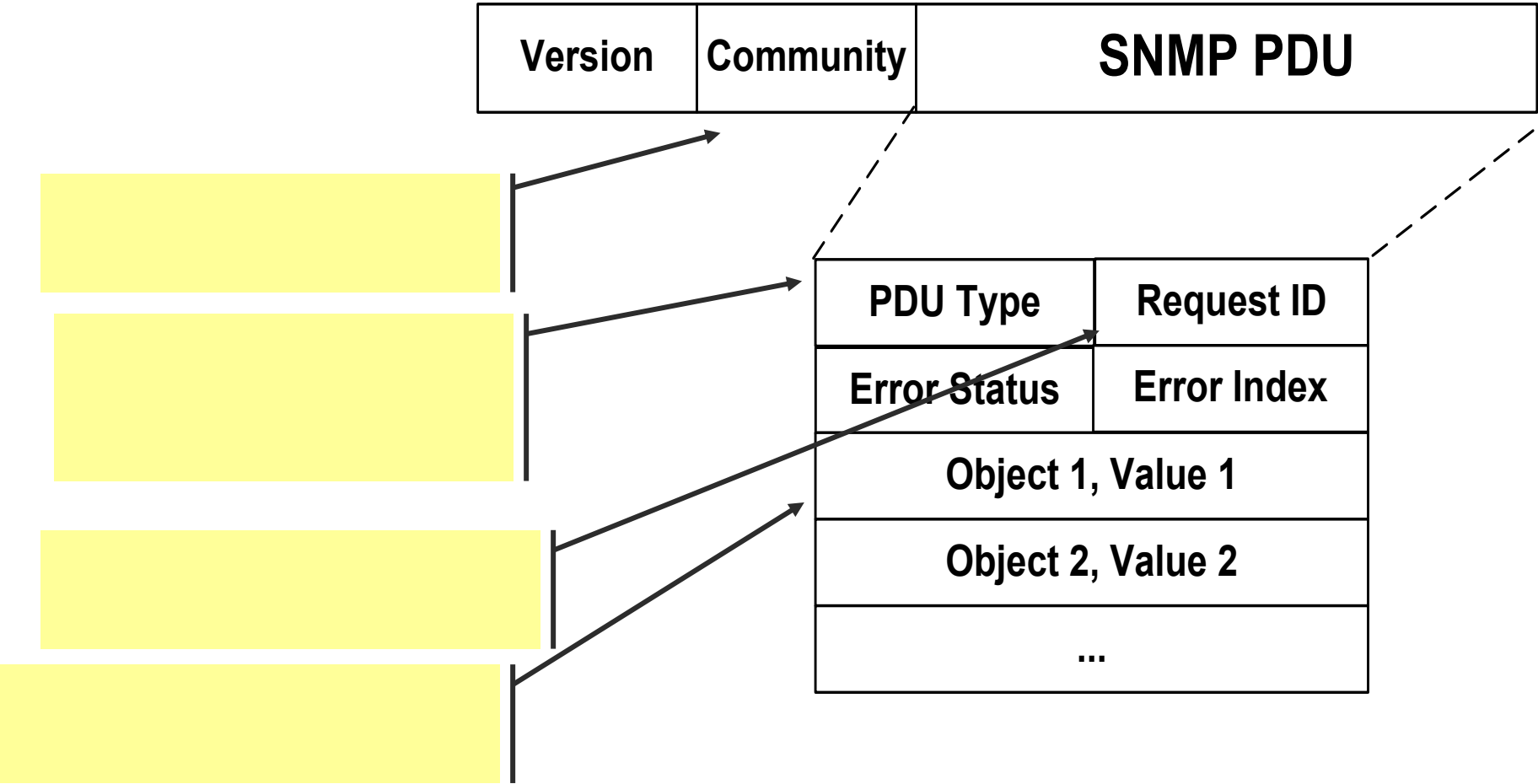
...



-
- Adds “ ”
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“community”).



integrity



authentication



privacy

railed (The “c” in SNMPv2c stands for



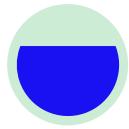
ersion-based Access Control Module

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noAuthNoPriv



authNoPriv



authPriv



IT601 – System and Network Administration

Week 15 (Part 1)



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Addresses

Delivery

Time

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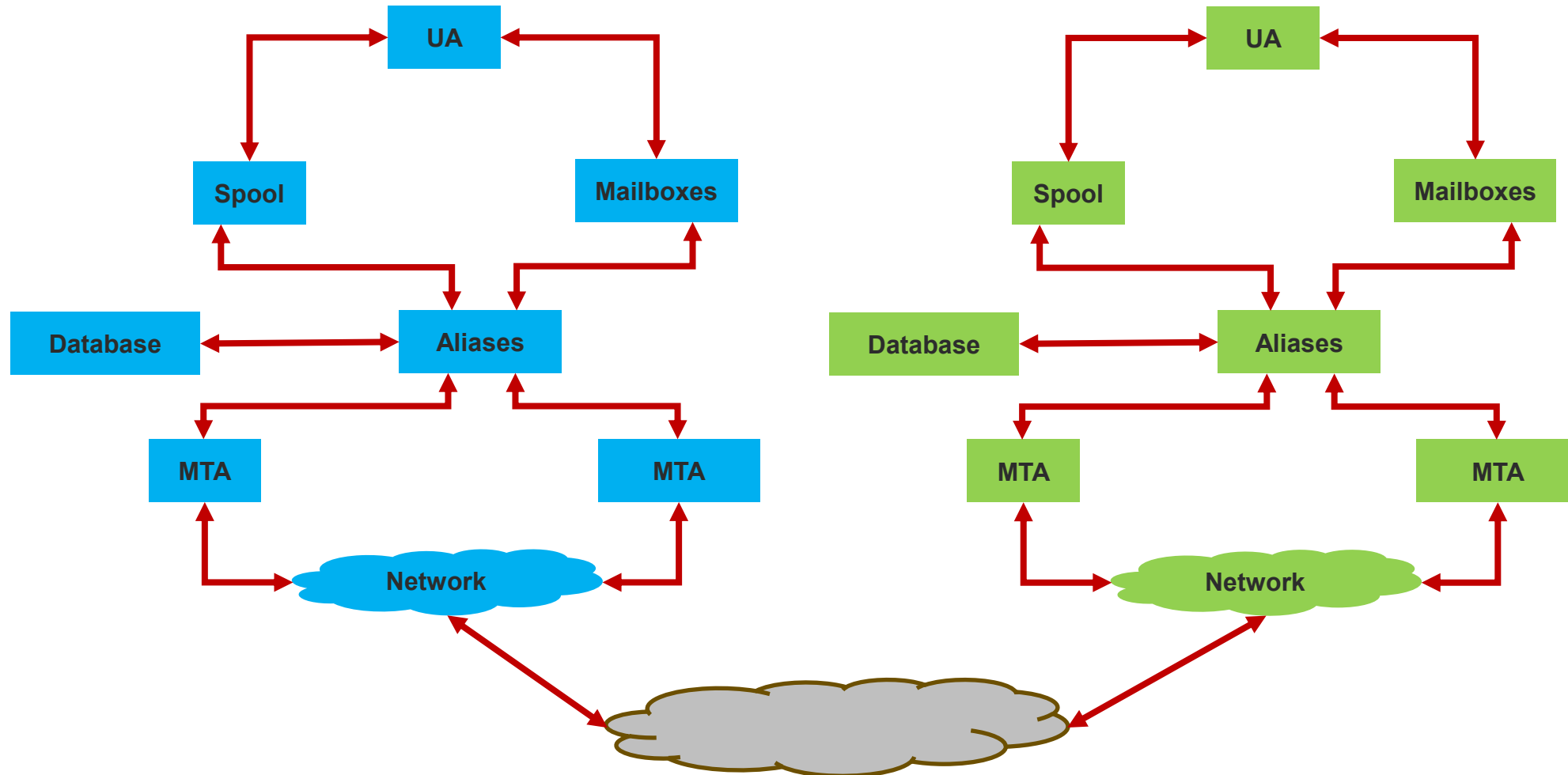
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➤ Components

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➤ Protocols

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recipient's name against alias database.

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SMTP

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POP

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IMAP

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SSL/TLS

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IP

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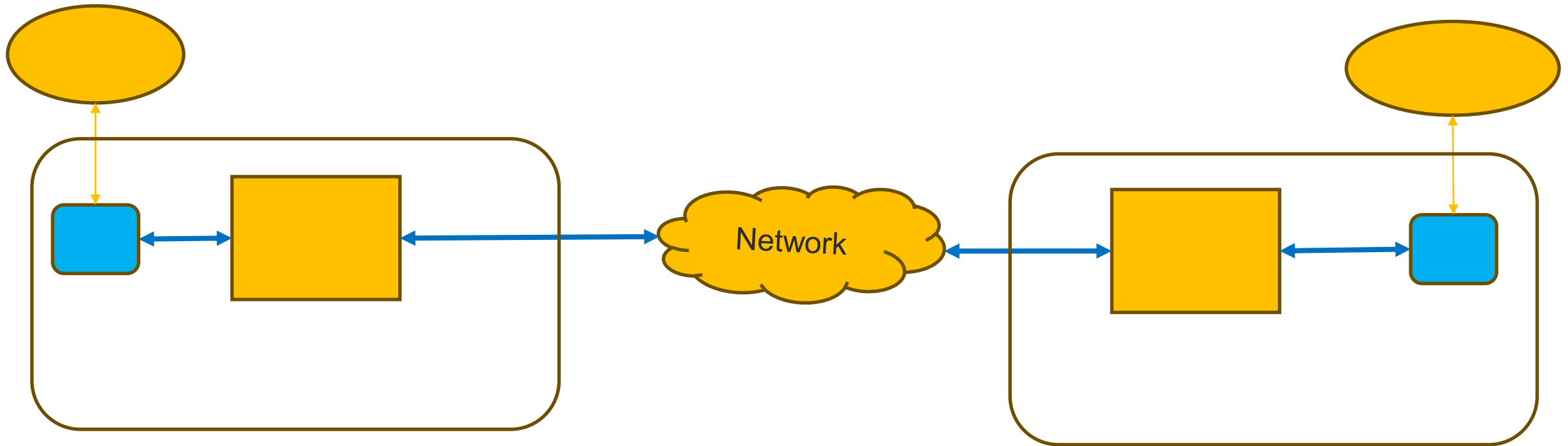


➤ SMTP clients and servers have two main components

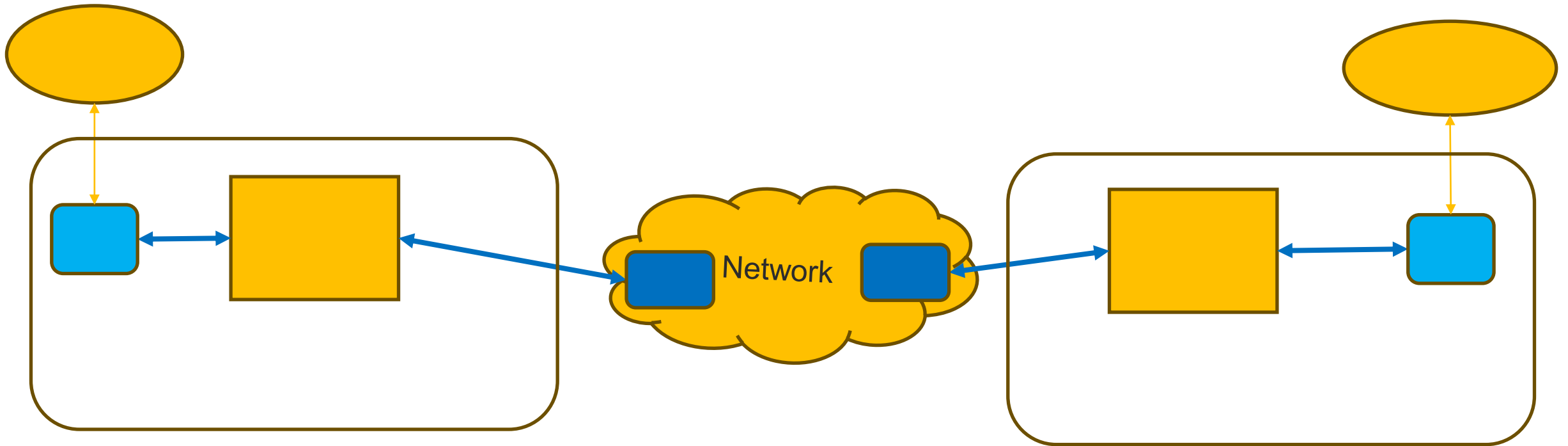
➤ —

➤ —

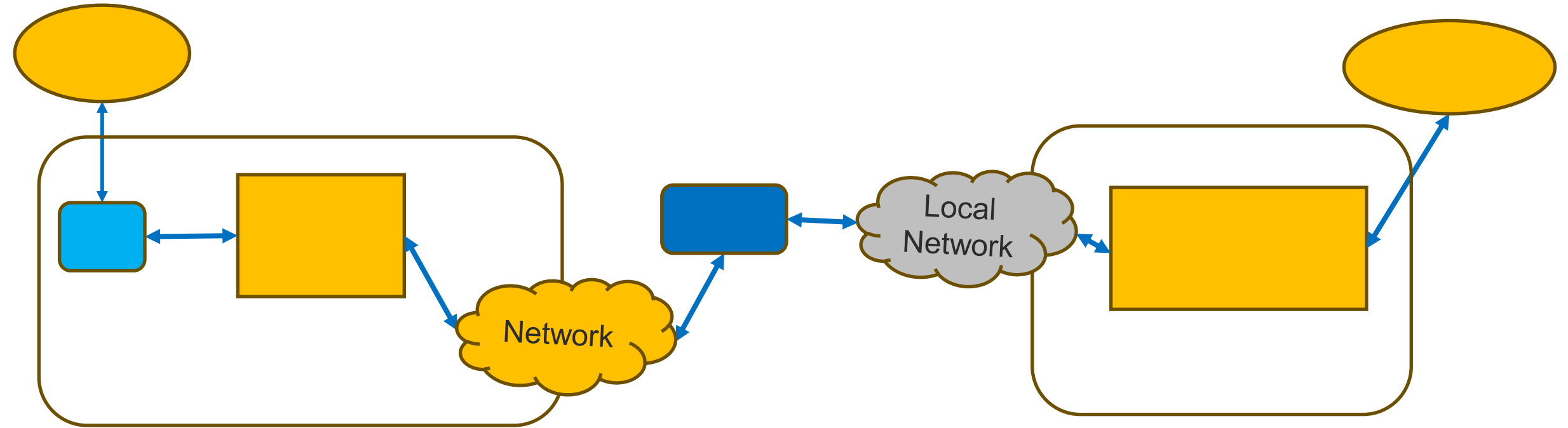
➤ These components are required on both sides.

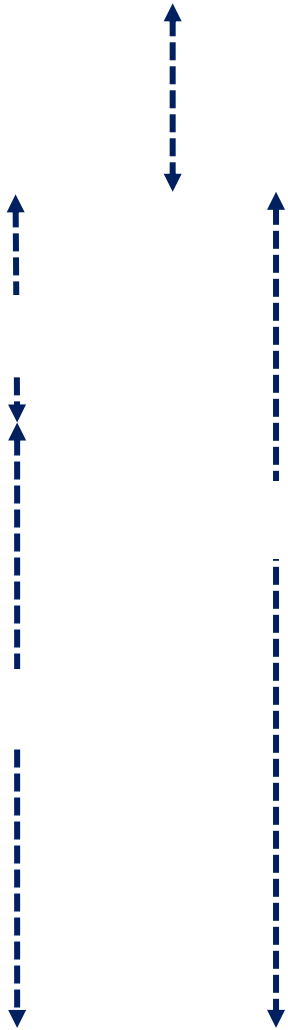
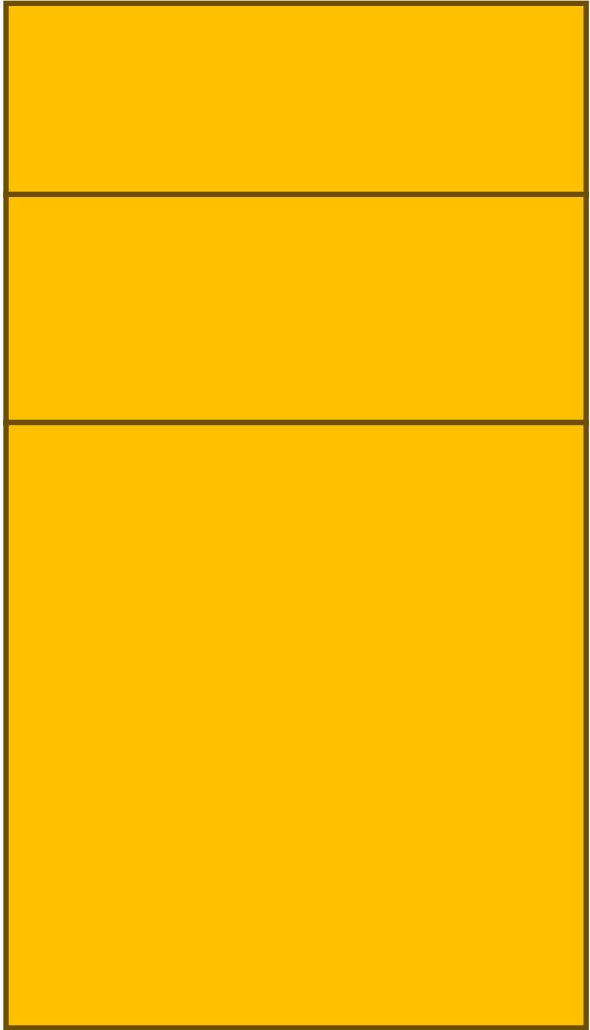


- SMTP also allows the use of Relays allowing other MTAs to relay the mail



- Mail Gateways are used to relay mail prepared by a protocol other than SMTP and convert it to SMTP





Return-Path: <admin@email.vusna.com>

Delivered-To: admin@email.vusna.com

Received: by email.vusna.com (Postfix, from userid 62)
id 17FBD328DE; Wed, 16 July 2023 11:27:02

Received: from email.vusna.com
(email.vusna.com [192.168.19.9])
by email.vusna.com (Postfix) with ESMTP id
5F41832893 for <admin@email.vusna.com>; Wed, 16 July 2023
11:27:01

Received: by email.vusna.com (Postfix, from userid 62) id 47509456C;
Wed, 5 Nov 2003 11:27:01

Received: from email.vusna.com (email.vusna.com [192.168.19.9]) by
email.vusna.com (Postfix) with SMTP id 7C2943D79 for <admin@
email.vusna.com>; Wed, 16 July 2023 11:26:34

Message-Id: <30031105162634.3C2943D79@ email.vusna.com>

Date: Wed, 5 Nov 2003 11:26:34

From: admin@email.vusna.com

To: admin@email.vusna.com: ;

MIME-Version: 1.0

Welcome to IT601P course.

PDU's)

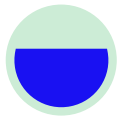
-



HELO



MAIL FROM



RCPT TO



DATA



QUIT

PDU's)

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RSET



VRFY



NOOP



TURN

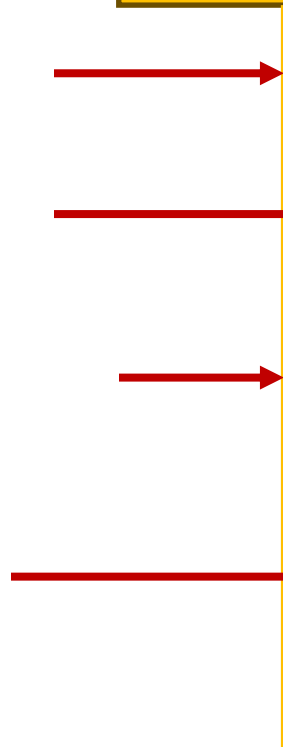
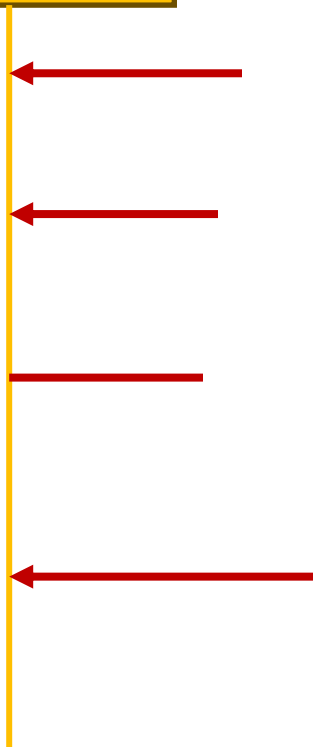


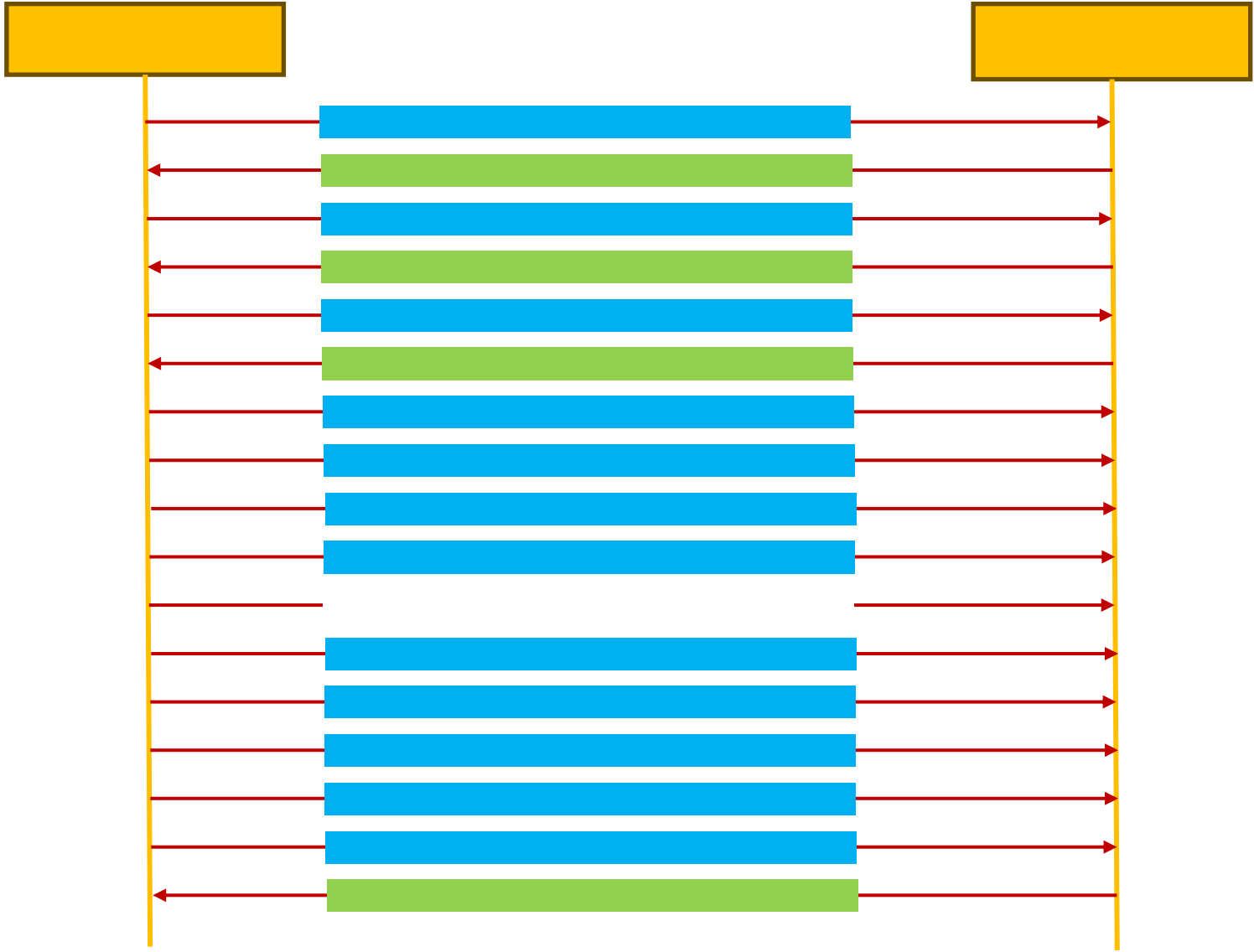
EXPN

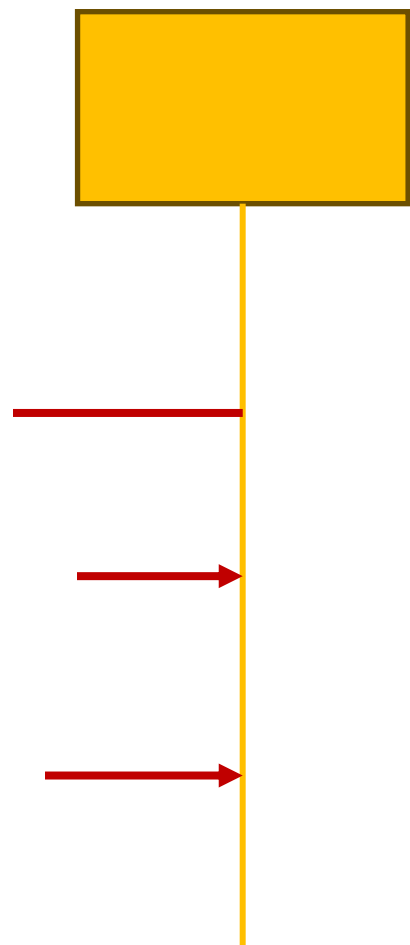
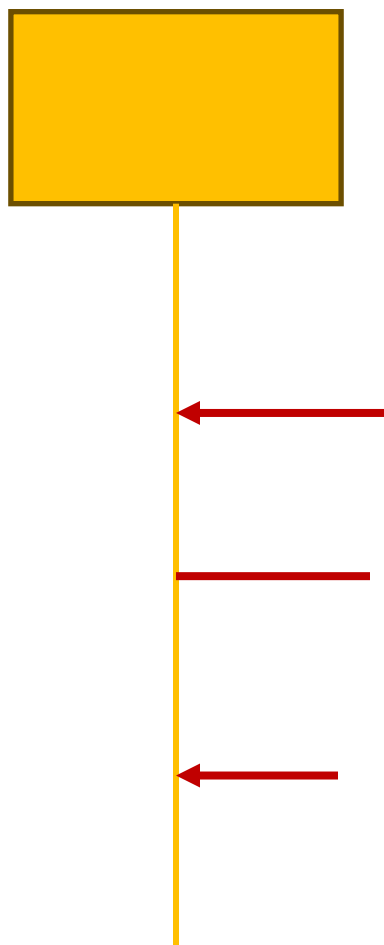


HELP













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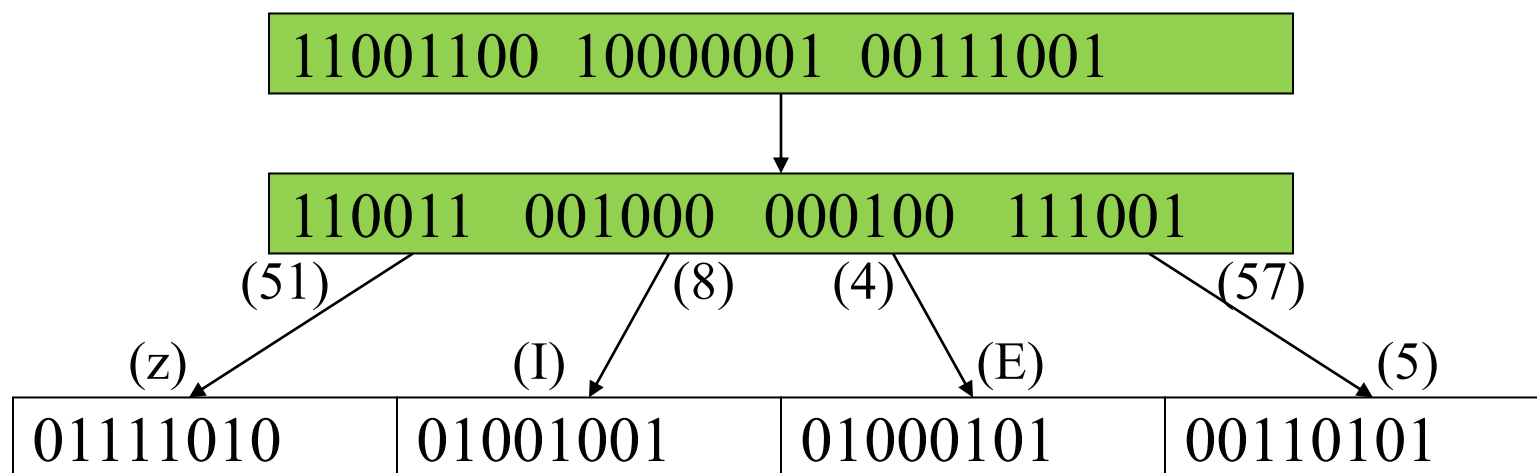
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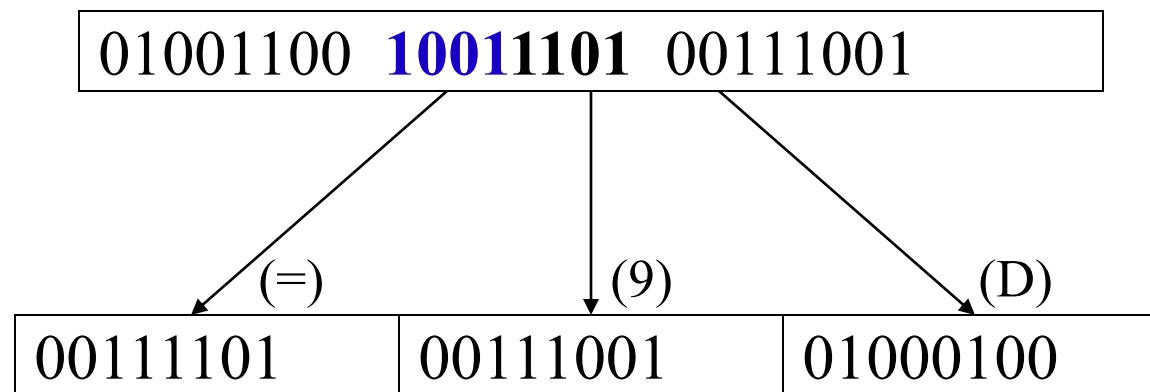
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- First is '=', second and third are the hex representation of the byte





MIME-Version



Content-Type



Content-Transfer-Encoding



Content-ID

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Content-Disposition



Content-Description



Content-Base



Content-Location

Example Multipart, Encoded MIME Message

From: admin@email.vusna.com

To: admin@email.vusna.com

Subject: Test Message

MIME-Version: 1.0

Content-Type: multipart/mixed; boundary=17

- 17

Content-Type: text/enriched; charset="us-ascii"

Content-Transfer-Encoding: 8bit

Content-Description: Greetings

Welcome to IT601P

- 17

Content-Type: application/octet-stream

Content-Transfer-Encoding: base64

Content-Description: Spec sheet saved as MS Word file

- 17 -

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- The MTAs place the email in the user's mailbox

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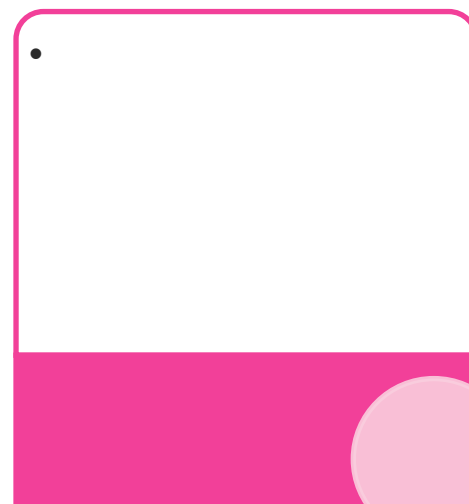
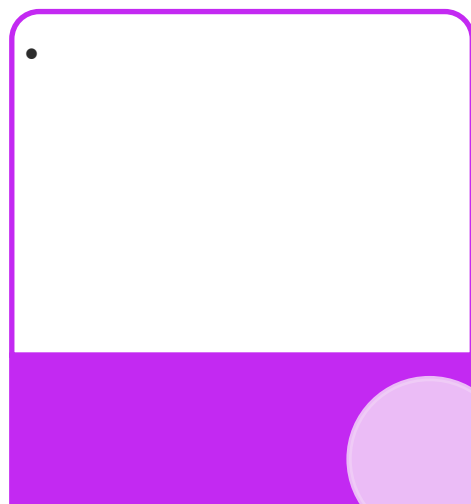
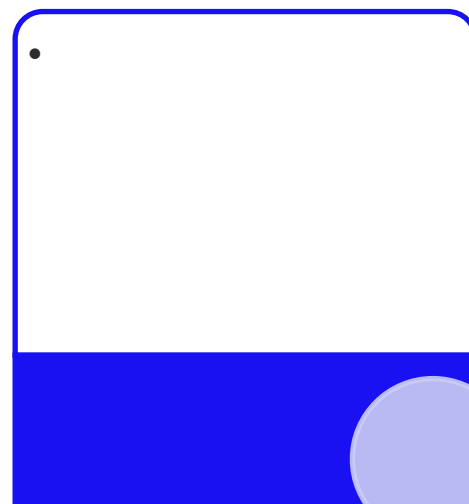
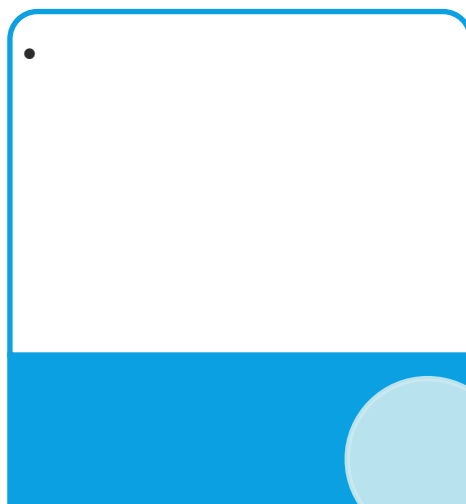
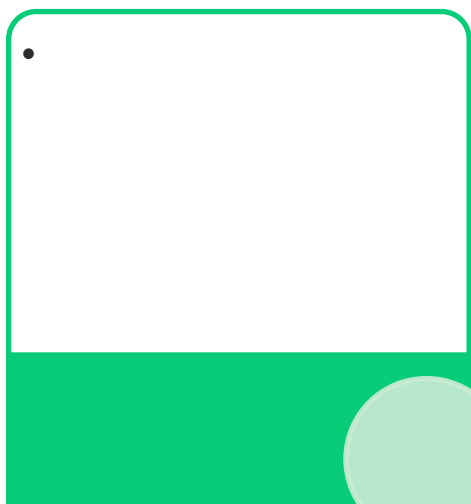
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- **Configure mailbox location**



- **SMTP authentication**

- **Configure SMTP authentication**



- **Configure TLS**

- certificate used for TLS. This can either be done using a certificate from Let's Encrypt, from a commercial CA or

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Configure SASL





IT601 – System and Network Administration

Week 15 (Part 2)



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- Database is essential to any web-based application for saving records and user data. A database is an organized collection of data so that it can be easily accessed. To manage these databases, Database Management Systems (DBMS) are used.

- **Types of DBMS**

- -

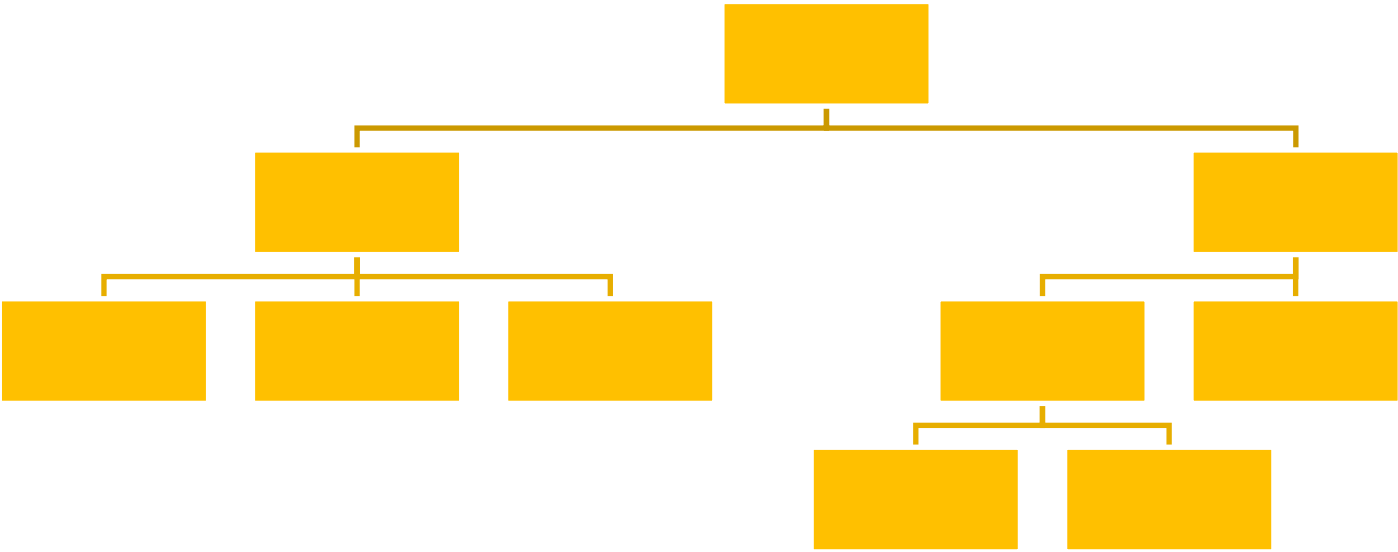
- **Non-Relational Database Management System (Non-RDBMS)**

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- In RDBMS, data is stored in tabular format. For example,

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Kernel tables

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Association tables

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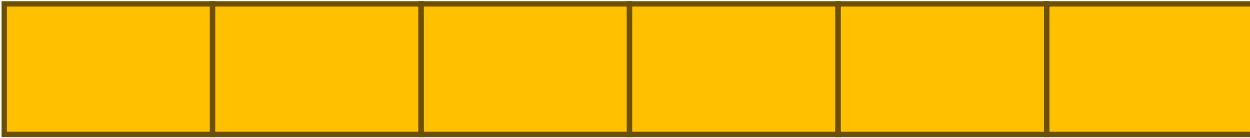
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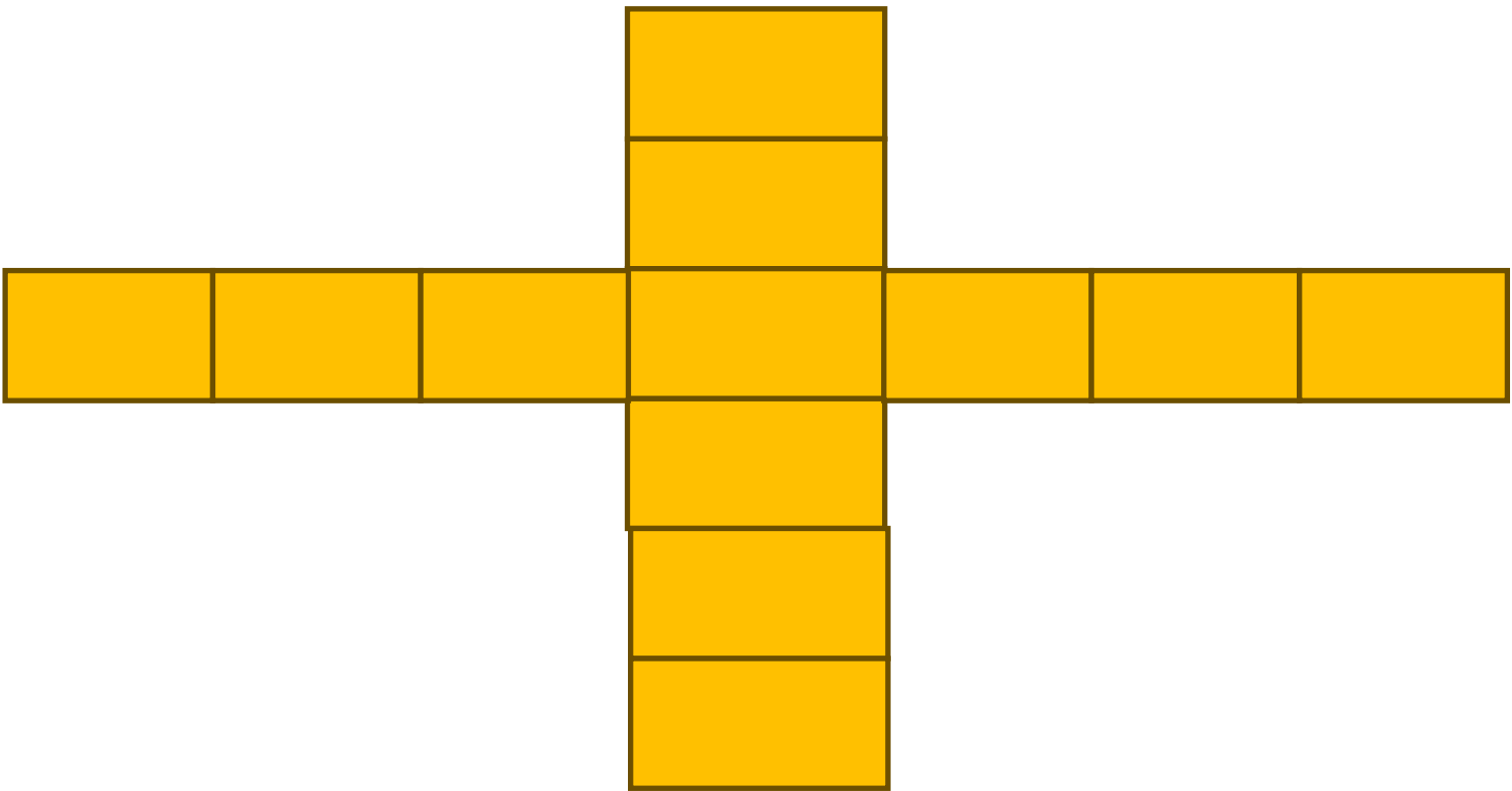
Characteristic tables

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➤ **Keys identify a unique row**

Primary key

■

■



Foreign Key

■

■

■



➤ **A database schema defines how data is organized within a relational database.**

▪

➤ **Schemas commonly use visual representations to communicate the architecture of the database, becoming the foundation for an organization's data management discipline.**

➤ **Types of database schemas**

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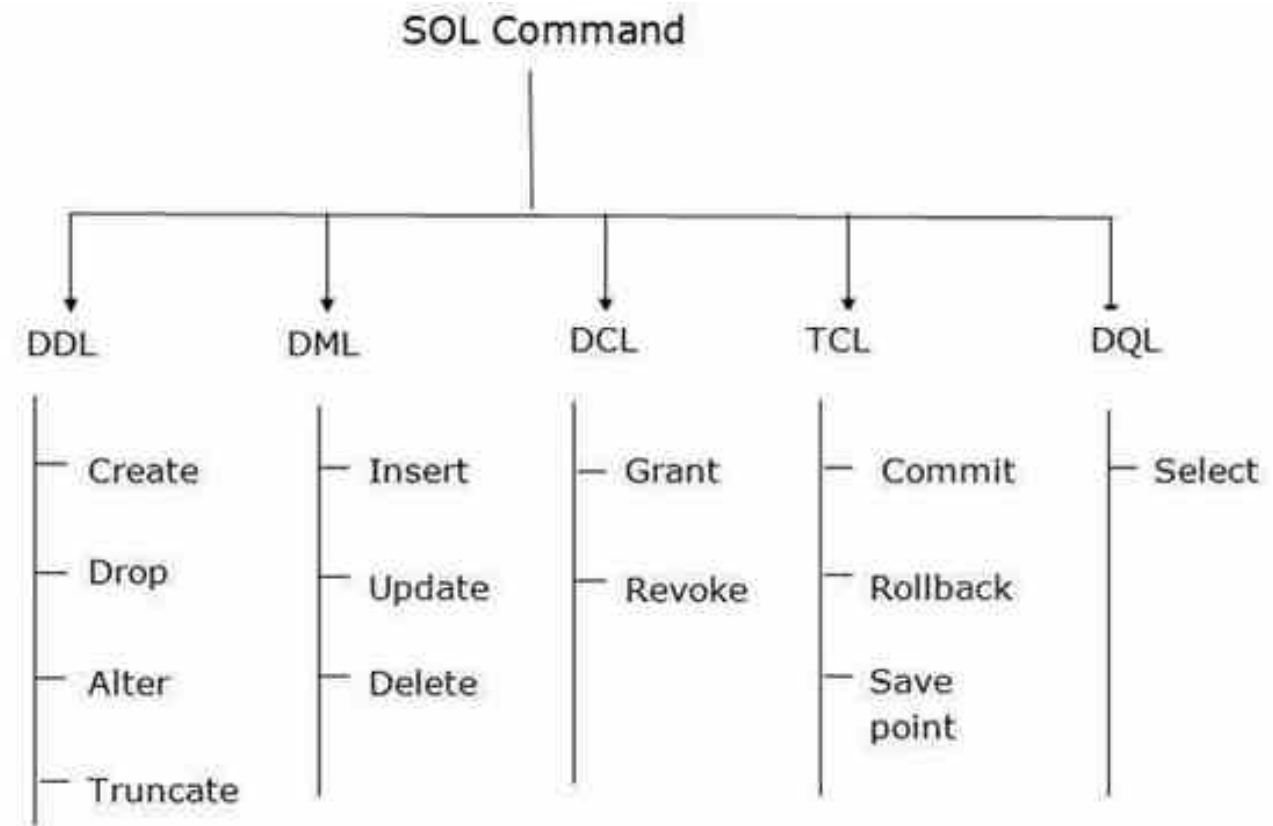
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Strcutured Query Language

- Structured Query Language (SQL) is a standard query language that is used to work with relational databases.

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- Example : **SELECT** first_name, last_name
FROM Customers;





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➤ Installation MySQL Service

```
sudo apt-get install mysql-server
```

```
sudo apt-get install mysql-client
```

```
sudo apt-get install mysql
```

➤ Secure MySQL Service

```
sudo mysql_secure_installation
```

▪ Add a Dedicated MySQL User

```
mysql
```

```
> CREATE USER '<username>'@'<hostname>' IDENTIFIED WITH
```

```
> CREATE USER '<username>'@'<hostname>' IDENTIFIED BY 'password';
```

- **Grant Privileges to Secure MySQL**

```
on *.* TO 'username'@'localhost' WITH GRANT OPTION;
```

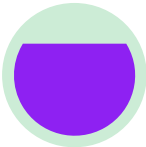
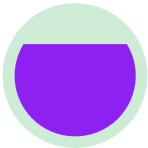
- **Managing MySQL Service**

- **Log in to your MySQL Server**

Use of mysqladmin



Common Tasks Performed with mysqladmin





Create a new Database.	create db_name
Flush all tables.	
Set a new password.	
Stop the server.	
Display the server variables.	
Change the MySQL Root Password	
Change the MySQL Root Password	
see if your MySQL server is up and running.	
Check MySQL Server Uptime	
check the version of the MySQL server	
Check the Status of a MySQL Server	
Extended Status of a MySQL Server	
Check MySQL Server Variables	
Check the MySQL Process List	
kill the MySQL client process	



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Document databases



Key-value stores



Column stores



Graph databases



Key Characteristics of NoSQL



Dynamic schema

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Horizontal scalability

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Document-based

-

Key-value-based

-

Column-based

-

Distributed and high availability

-

Flexibility

-

Performance

-



High scalability

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-
-
-

Flexibility

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-

High availability

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Performance

-

Cost-effectiveness

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Agility

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No standardization

No ACID compliance

Narrow focus

No complex queries

Not Mature

Complex Management



➤ **Following are commonly available NoSQL based databases.**

➤ ➤	➤ ➤ ➤	• • •	• • • •

- To some people known as "an index," "a search engine," "an analytics database," "a big data solution," "it's quick and scalable," or "it's like Google."

-

- Elasticsearch is a distributed, free and open search and analytics engine for all types of data, including textual, numerical, geospatial, structured, and unstructured.

-

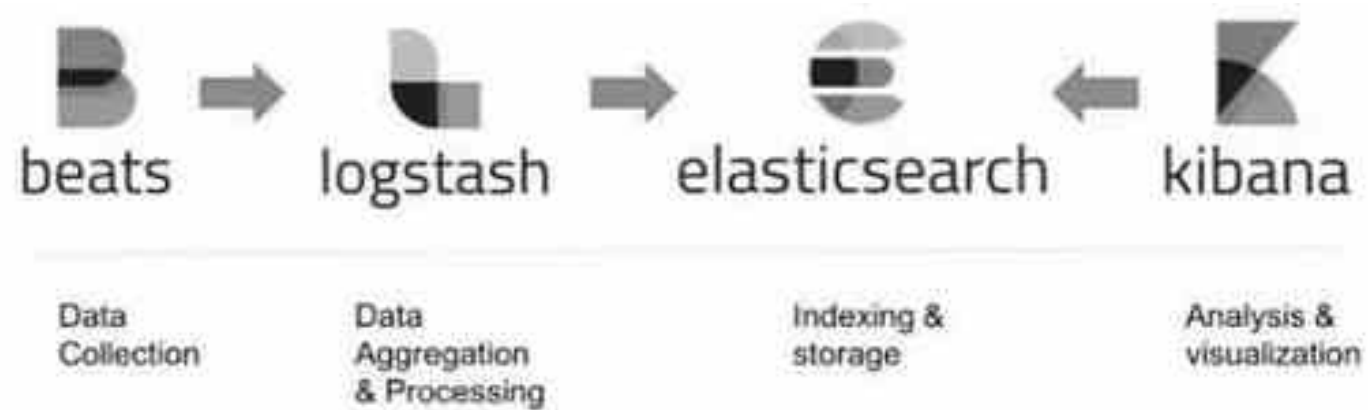
- It is known for its simple REST APIs, distributed nature, speed, and scalability, Elasticsearch is the central component of the Elastic Stack, a set of free and open tools for data ingestion, enrichment, storage, analysis, and visualization.

-

Operations of ES



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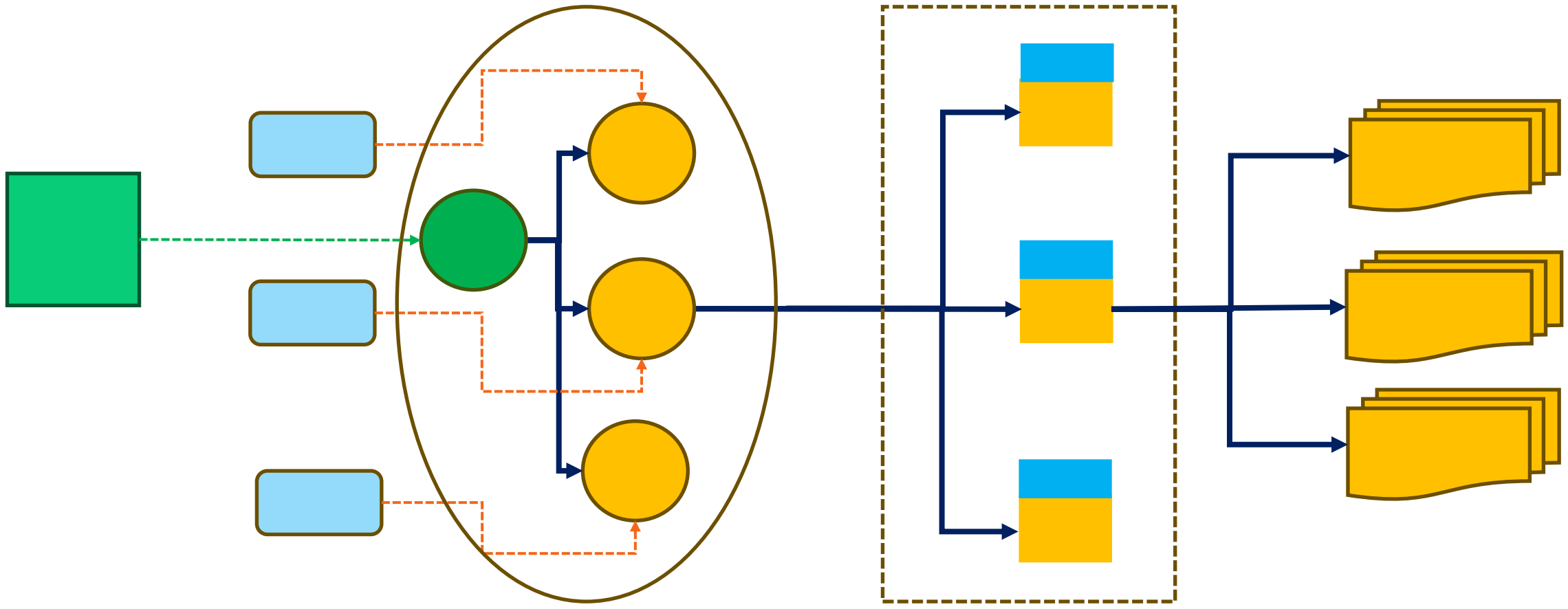


Elasticsearch index

- **An Elasticsearch index is a collection of documents that are related to each other. Elasticsearch stores data as JSON documents.**
 -
- **Elasticsearch uses a data structure called an inverted index, which is designed to allow very fast full-text searches. An inverted index lists every unique word that appears in any document and identifies all of the documents each word occurs in.**
 - An inverted index is a mapping of each specific 'word' (token) to the list of documents (locations)
- **During the indexing process, Elasticsearch stores documents and builds an inverted index to make the document data searchable in near real-time. Indexing is initiated with the index API, through which you can add or update a JSON document in a specific index.**

Elasticsearch index







JVM

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Shard

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Index

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Segment

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Mapping

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Node

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Document

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Replica

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Cluster

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Type

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Why use Elasticsearch?

- **Elasticsearch is fast.**

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- **Elasticsearch is distributed by nature.**

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- **A wide set of features**

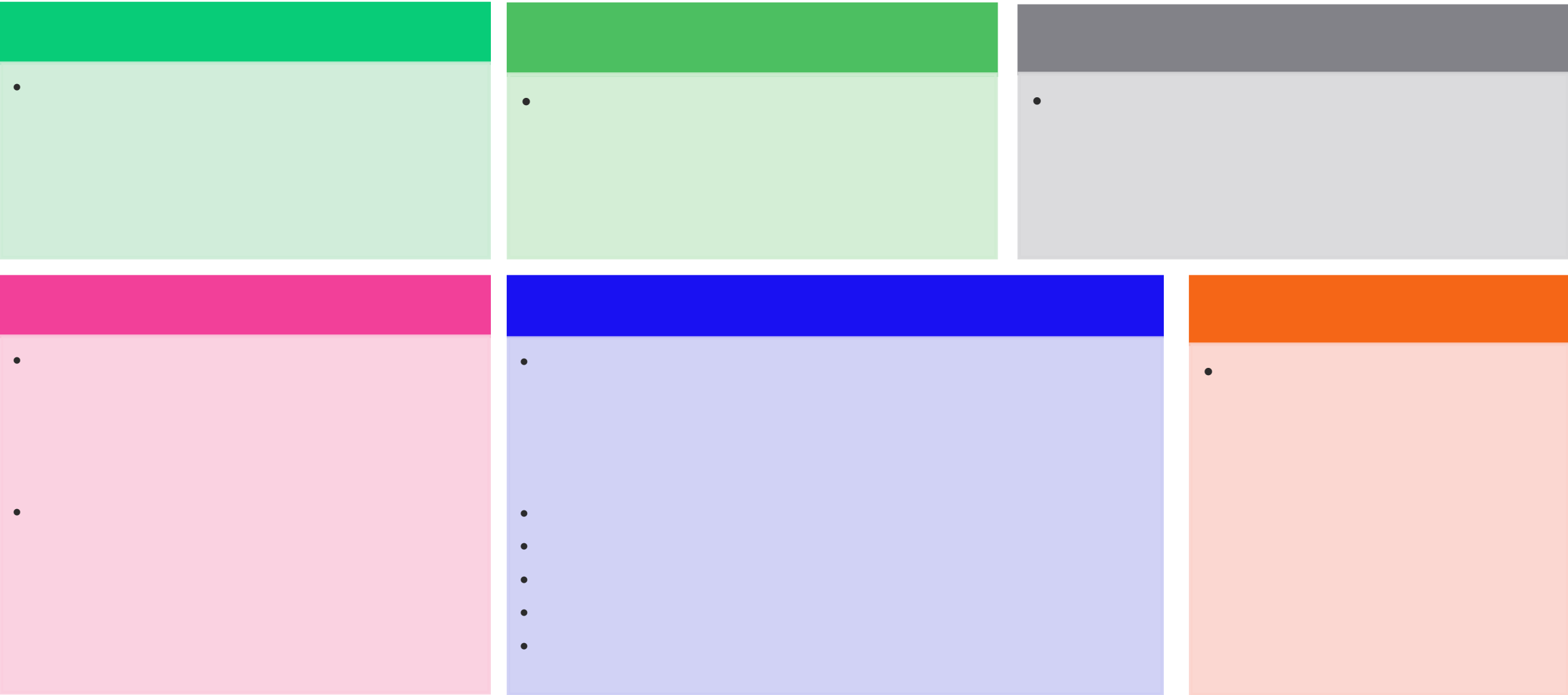
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- **Simplified data ingest, visualization, and reporting**

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➤ The main Node roles of ES are as follows



- **Data ingestion refers to the tools & processes used to collect data from various sources and move it to a target site, either in batches or in real-time.**

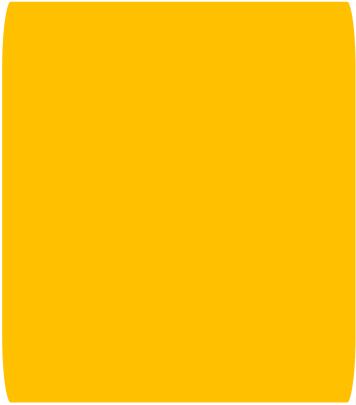
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- **ES provides following tools for data ingestion**

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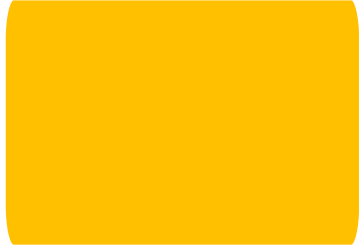
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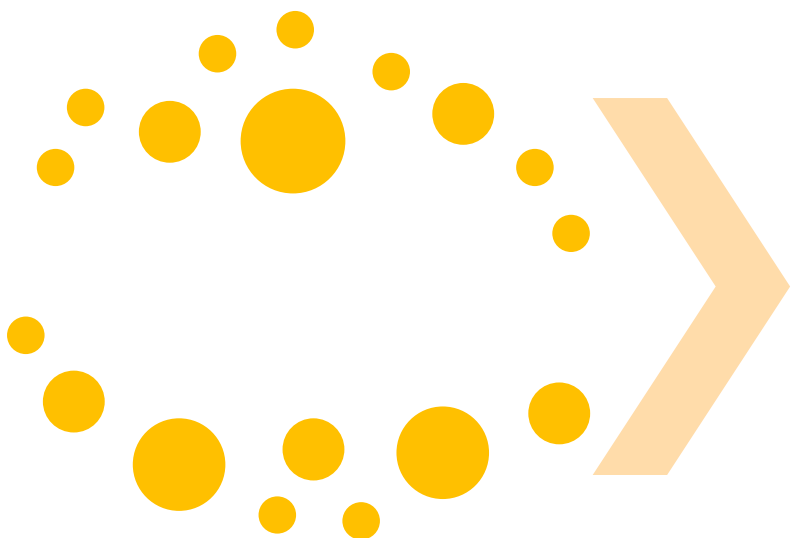
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- Logstash works by executing event processing pipelines, whereby each pipeline consists of at least one of each of the following:

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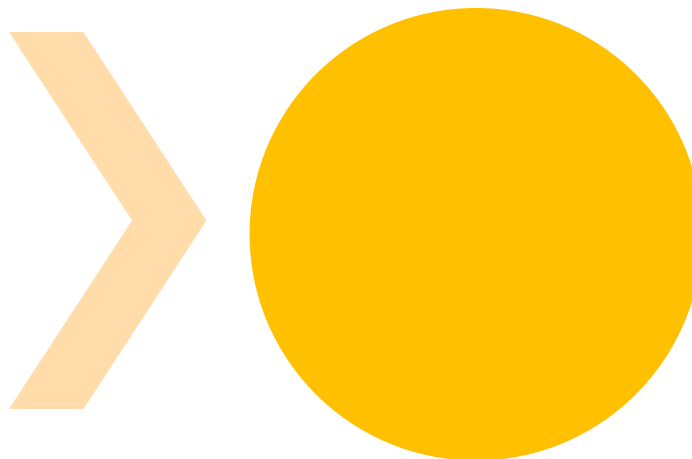
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input

Transformations

Output





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IT601 – System and Network Administration

Week 16

**Department of Computer Science and Information Technology,
Virtual University of Pakistan**

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➤ Helpdesk is the primary mechanism to provide customer support

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➤ Significance of Helpdesk

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- Don't forget the help in helpdesk.

➤ Is a Helpdesk really required?



Source : <https://klik.solutions/managed-it-services/it-help-desk-services/>





Defining “Emergency”