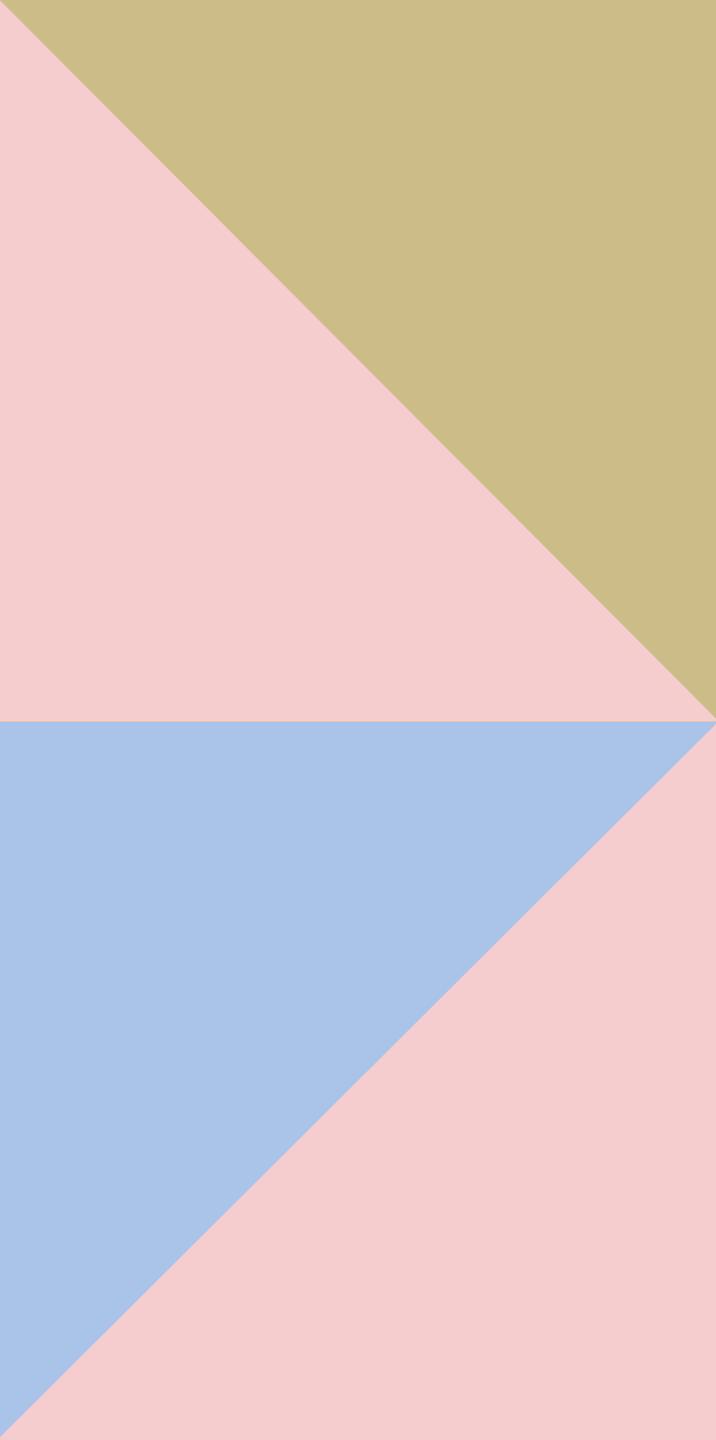


# Section 1.1.1 Computer Networks Fundamentals

## Application layer (Layer 4)

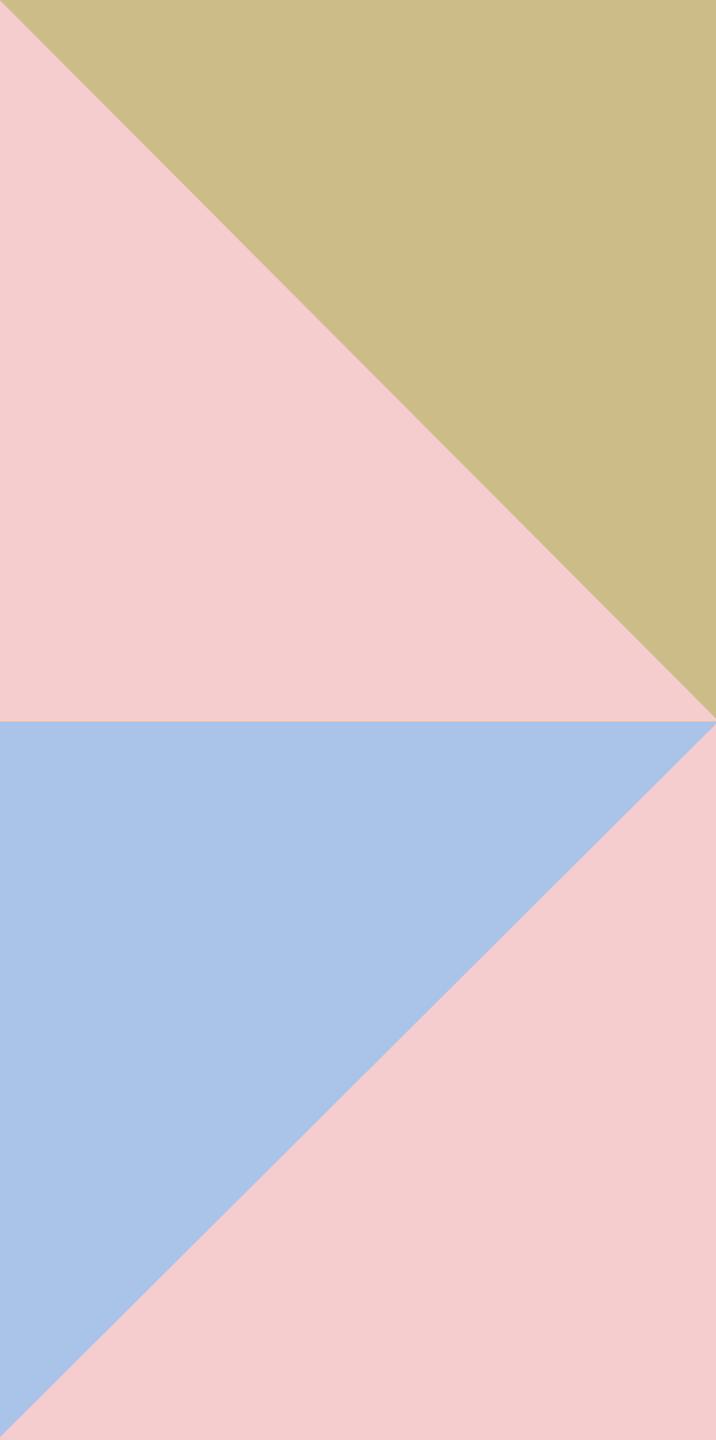
Cracking OSCP: Your Roadmap to Ethical Hacking Success

- [YouTube: HackProKP – Kailash Parshad](#)
- [LinkedIn: Kailash Parshad](#)
- [Github: https://github.com/at0m-b0mb/Cracking-OSCP-Your-Roadmap-to-Ethical-Hacking-Success](#)
- [Complete Playlist:](#)  
<https://www.youtube.com/watch?v=MvkNbn8i2so&list=PLyrv3TPh3ejYNZipa0OIUvkdjHeUTRJ3J&index=1&t=0s>



# APPLICATION LAYER

The Application Layer is the topmost layer in the TCP/IP model, and it is responsible for providing network services directly to end-users or applications. Its primary purpose is to enable communication between different software applications on different devices. The Application Layer interacts with the underlying layers to facilitate communication across a network.



# **Protocols and Services:**

The Application Layer includes various protocols and services that directly support communication between applications. Some common Application Layer protocols include HTTP (Hypertext Transfer Protocol), HTTPS (HTTP Secure), FTP (File Transfer Protocol), SMTP (Simple Mail Transfer Protocol), DNS (Domain Name System), and SNMP (Simple Network Management Protocol).

# **Protocols and Services:**

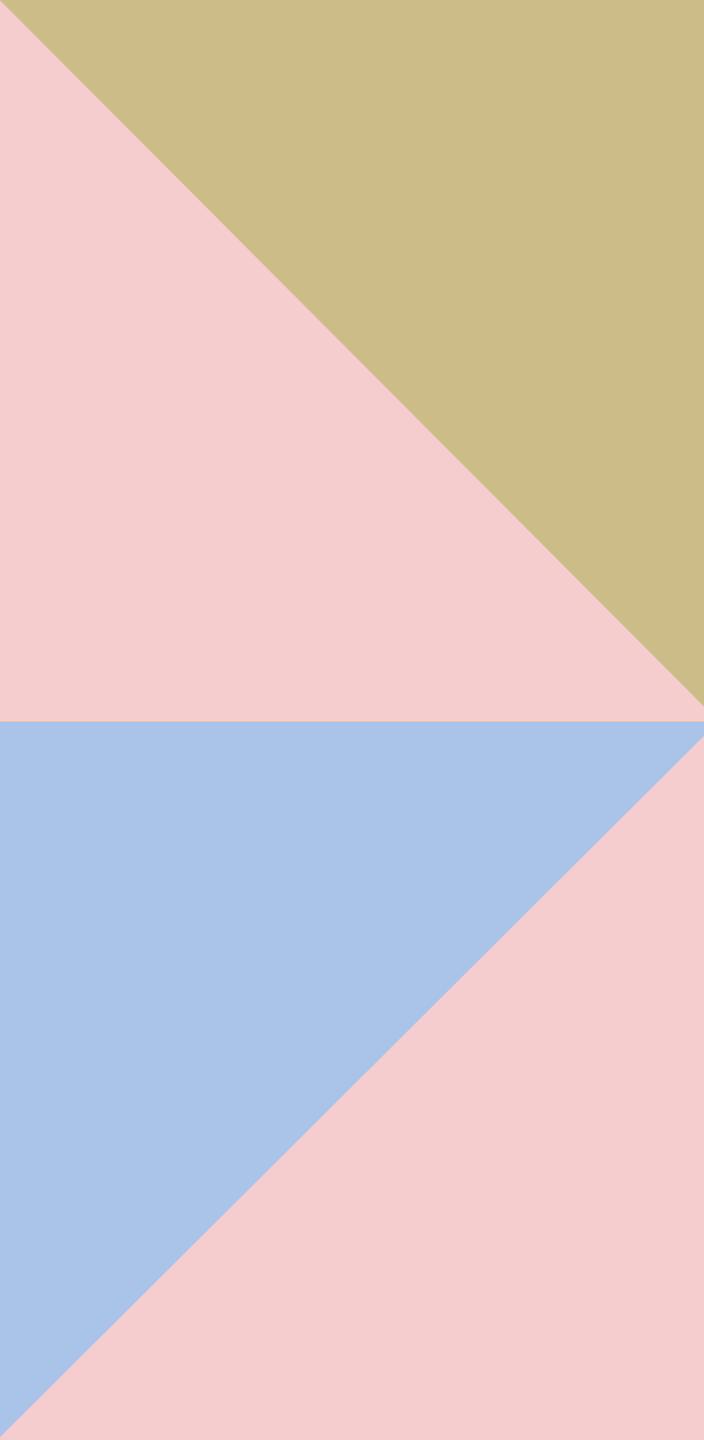
- **HTTP (Hypertext Transfer Protocol):** Used for transferring hypertext (web pages) on the World Wide Web. It defines how messages are formatted and transmitted.
- **HTTPS (HTTP Secure):** An extension of HTTP, it adds a layer of security through encryption. It is widely used for secure communication over the Internet, especially for online transactions.
- **FTP (File Transfer Protocol):** Designed for the transfer of files between a client and a server on a computer network. It can operate in either an active or passive mode.

# **Protocols and Services:**

- SMTP (Simple Mail Transfer Protocol):** Used for sending emails between servers. It works in conjunction with other protocols like POP3 (Post Office Protocol) and IMAP (Internet Message Access Protocol) for email retrieval.
- DNS (Domain Name System):** Translates human-readable domain names into IP addresses. It is crucial for navigating the internet by using domain names instead of numeric IP addresses.
- SNMP (Simple Network Management Protocol):** Used for managing and monitoring network devices. It allows network administrators to manage network performance, find and solve network problems, and plan for network growth.

# APP. LAYER PROTOCOLS

Application	Protocol	Port	Underlying Transport Protocol
Web	HTTP	80	TCP
File Transfer	FTP	20, 21	TCP
Email	SMTP, POP3, IMAP	25/587, 110, 143	TCP
Remote Access	Telnet	23	TCP
Internet Telephony	SIP, RTP, Skype	5060, 5061, 16384-32767...	UDP or TCP



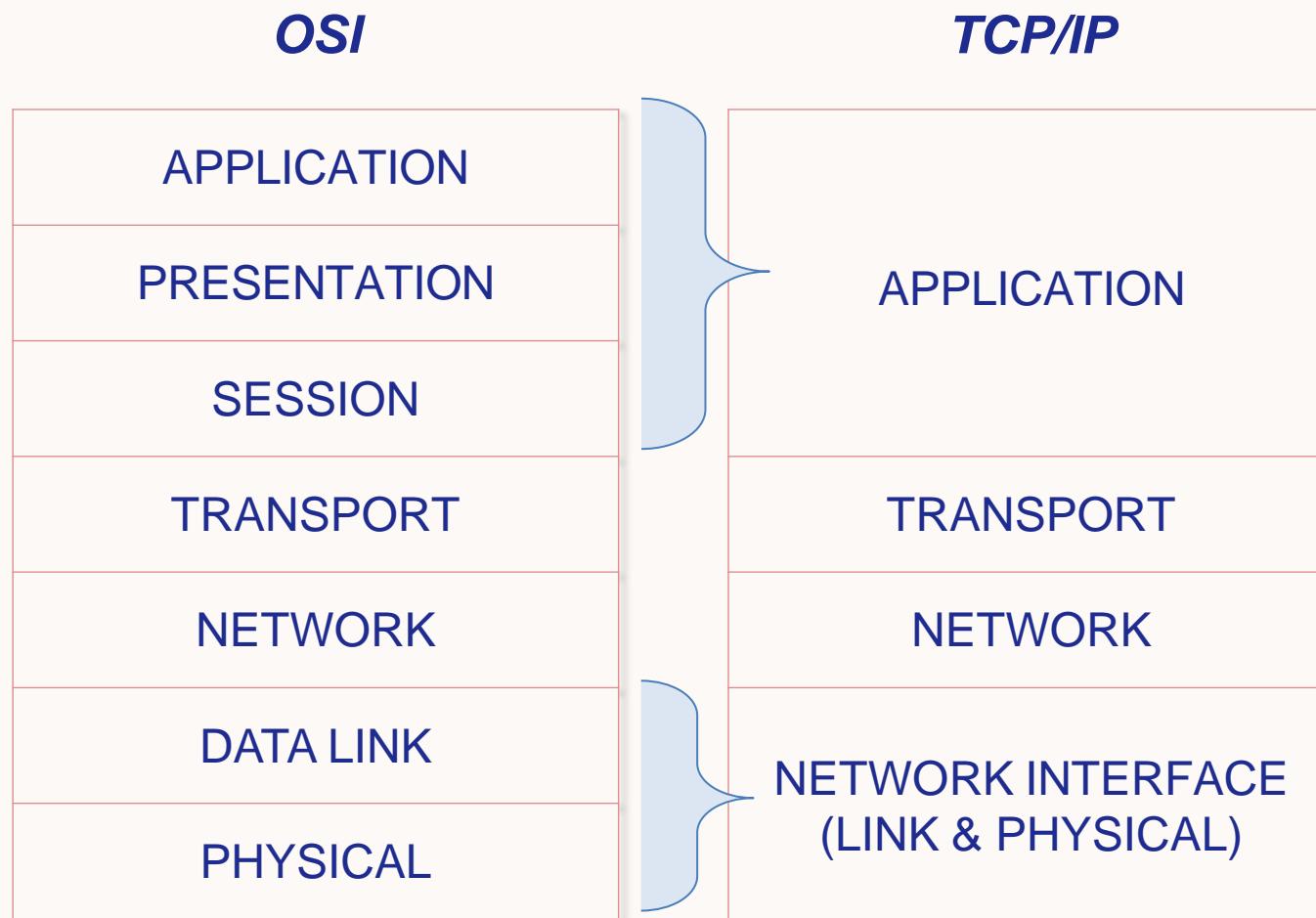
# Data Representation:

The Application Layer is responsible for data formatting, encryption, and compression. It ensures that data is presented in a format that is understandable to both the sending and receiving applications. This layer also deals with character encoding and data translation if the communicating applications use different encoding schemes.

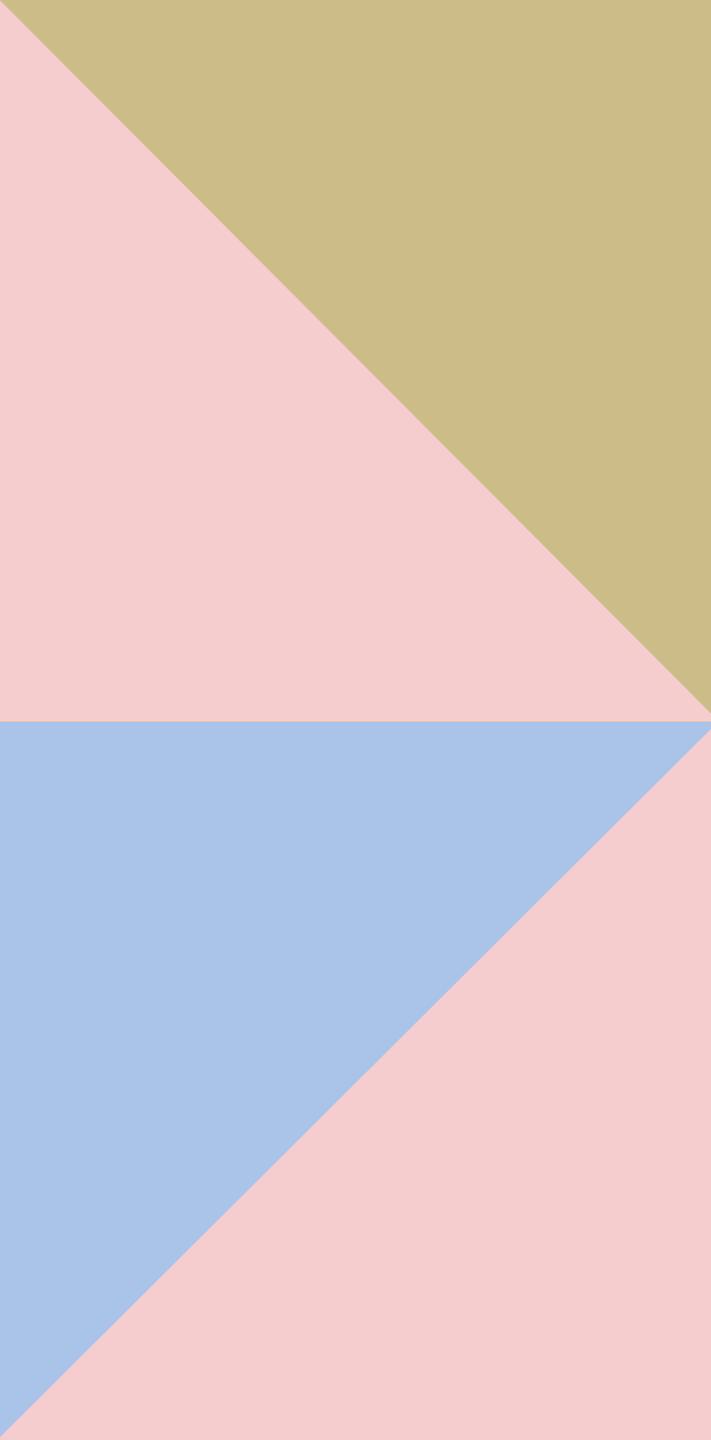
# Data Representation:

- **Character Encoding:** Different applications might use different character sets. The Application Layer can handle the translation of characters between different encoding schemes.
- **Data Compression:** Before transmitting data over the network, the Application Layer can compress it to reduce the amount of data that needs to be transferred, improving efficiency.
- **Encryption:** Many Application Layer protocols, especially those involving sensitive data, employ encryption to secure the information during transmission. HTTPS is a notable example where data is encrypted using SSL/TLS protocols.

# Application, Presentation, and Session Layers:



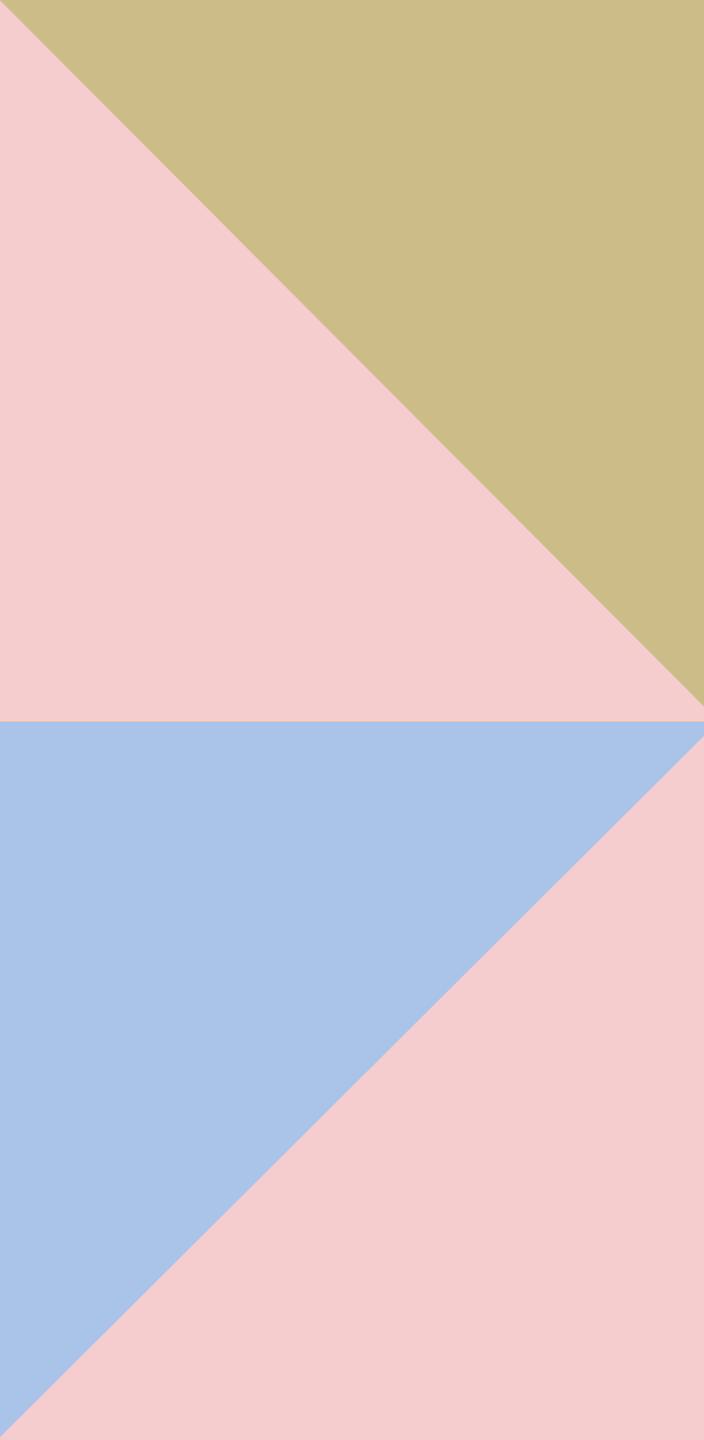
In the OSI model, the functions of the Application Layer are distributed across three layers: Application, Presentation, and Session. The Application Layer handles high-level application services, the Presentation Layer deals with data format translation and encryption, and the Session Layer manages sessions or connections between applications.



# Network Services:

The Application Layer provides a variety of network services, including file transfer, email communication, remote login, and network management. These services enable users to interact with the network and access resources.

**Remote Login (Telnet, SSH):** Telnet and SSH allow users to log in to a remote machine and execute commands as if they were physically present on that machine.



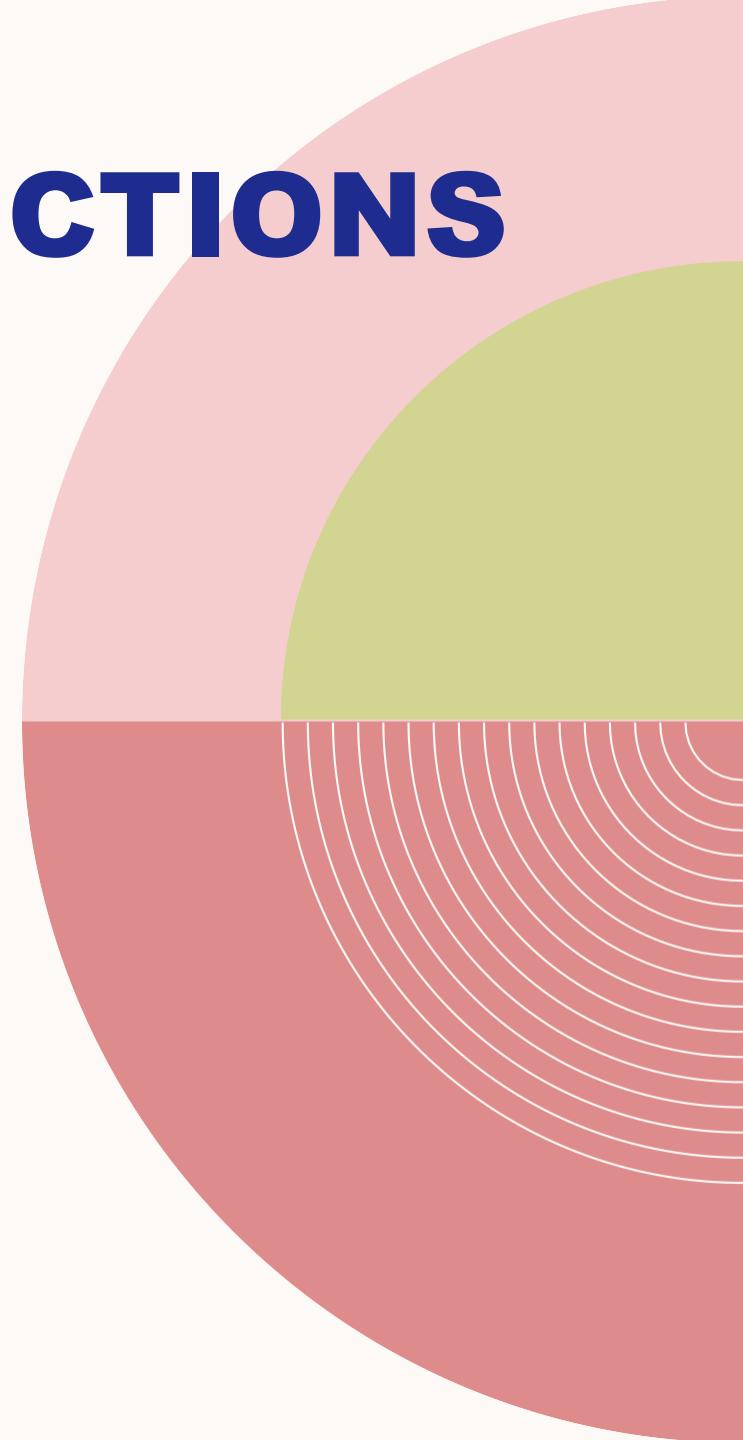
# **APIs (Application Programming Interfaces):**

APIs define how different software components should interact. In the context of the Application Layer, APIs allow applications to use the services provided by the underlying network stack. For example, web APIs enable communication between web servers and web applications.

# APPLICATION LAYER FUNCTIONS

## **Identification, Reachability, and Readiness:**

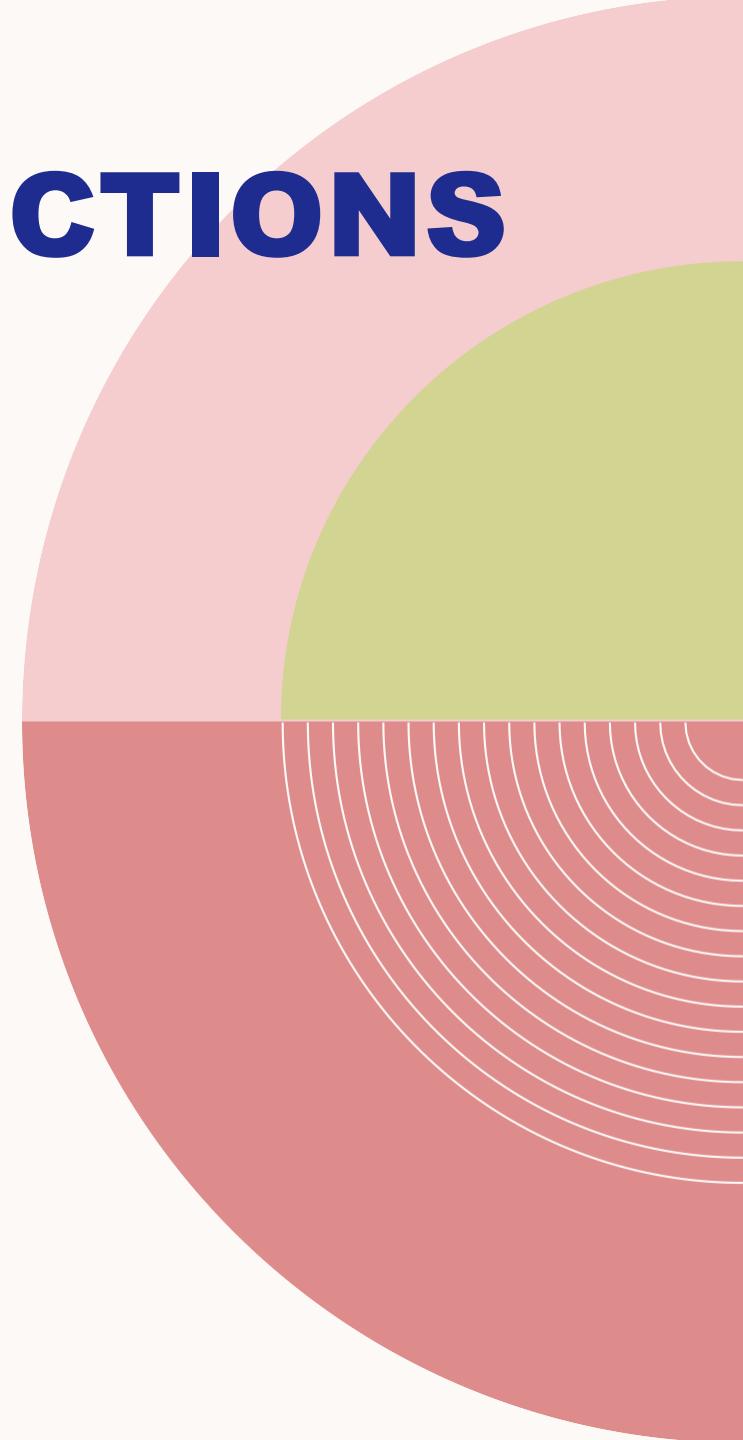
The Application Layer ensures that the receiving application is identified through unique addressing (e.g., IP address or domain name), reachable over the network, and ready to accept data. This involves the use of addressing schemes and mechanisms to locate and establish connections with the intended application.



# APPLICATION LAYER FUNCTIONS

## **Authentication for Network Security:**

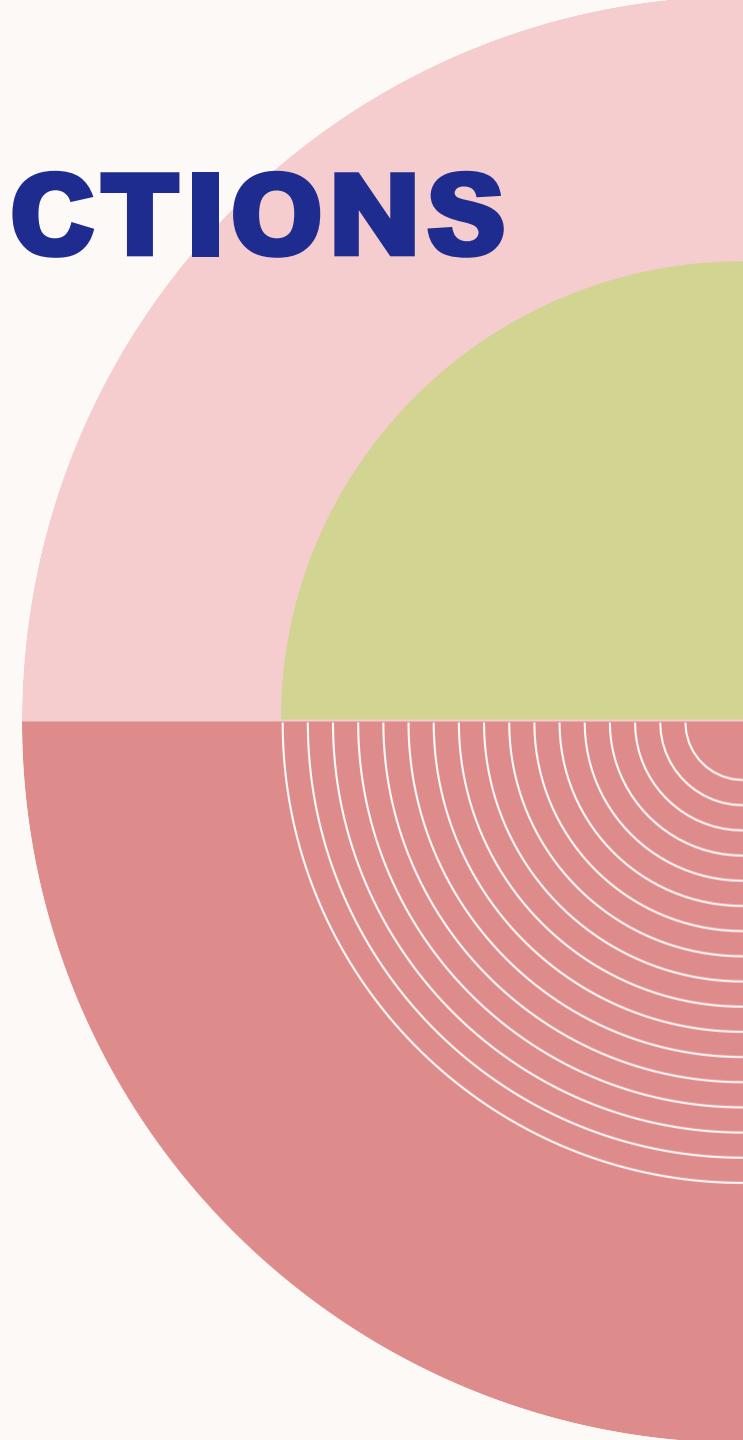
Authentication is a crucial function of the Application Layer to establish trust between communicating devices. It adds an extra layer of security by verifying the identity of the parties involved, preventing unauthorized access and data breaches.



# APPLICATION LAYER FUNCTIONS

## Definition of Message Types:

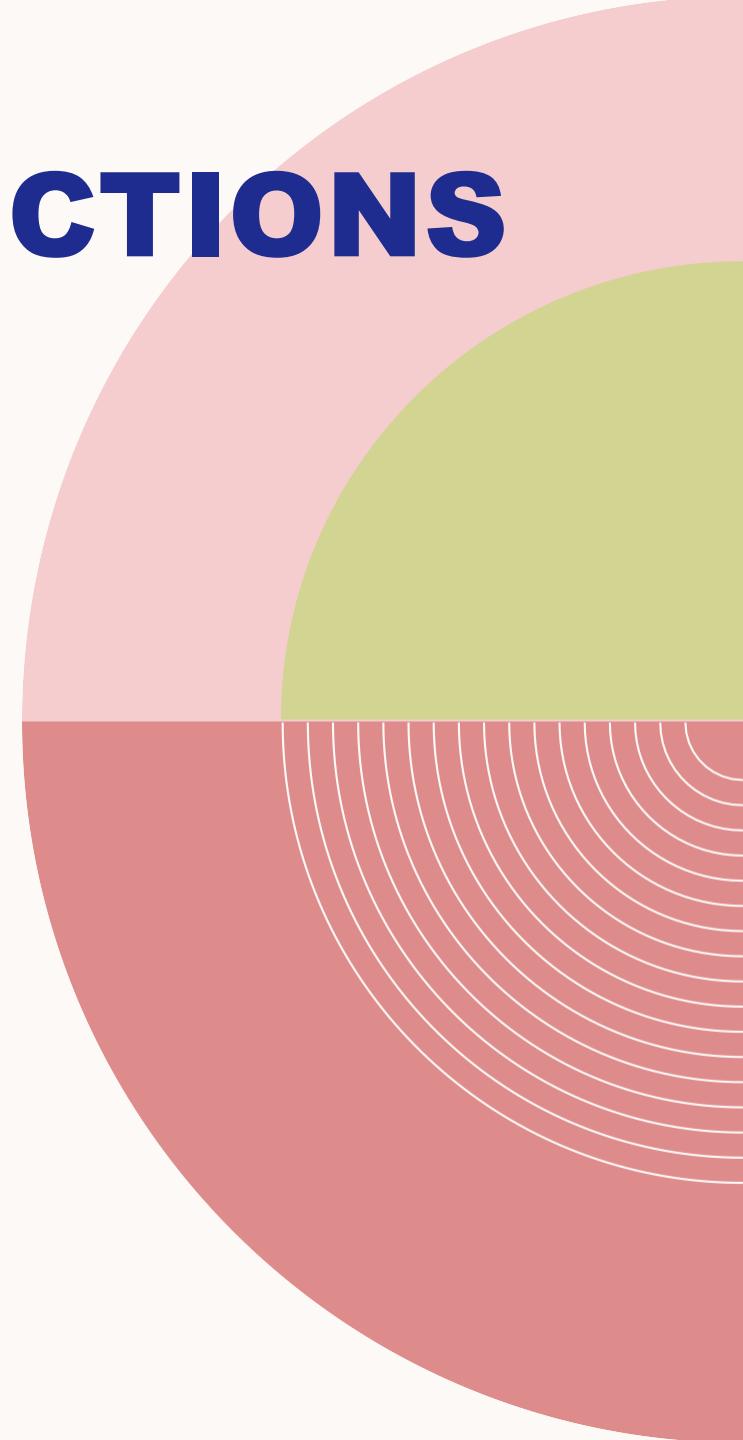
The Application Layer defines the types of messages that are exchanged between applications. This includes specifying the format and structure of request and response messages and ensuring a common understanding between communicating entities.



# APPLICATION LAYER FUNCTIONS

## Agreement on Error Recovery, Data Integrity, and Privacy:

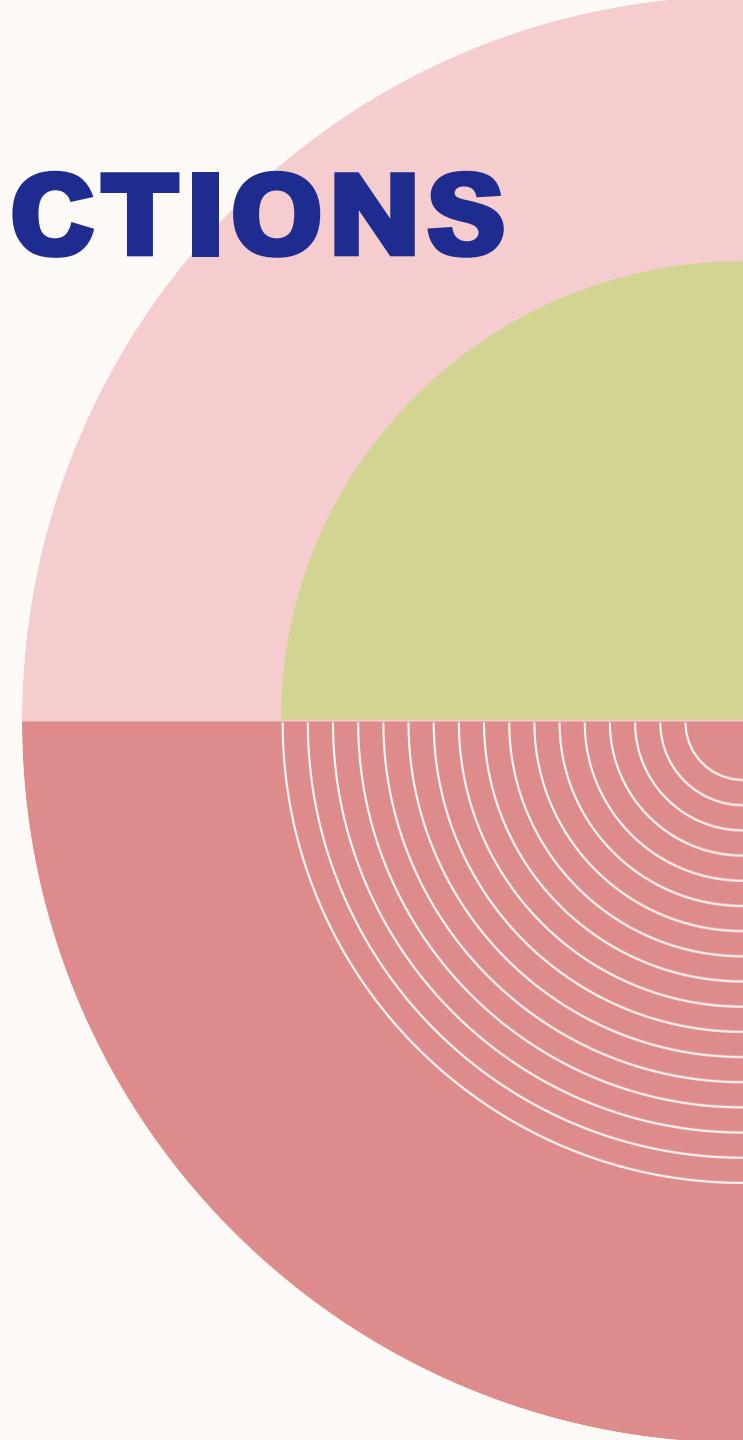
It ensures an agreement between communicating parties regarding error recovery procedures, maintaining data integrity during transmission, and ensuring privacy and confidentiality. This involves error detection and correction mechanisms, cryptographic techniques, and privacy safeguards.



# APPLICATION LAYER FUNCTIONS

## Protocol and Data Syntax Rules:

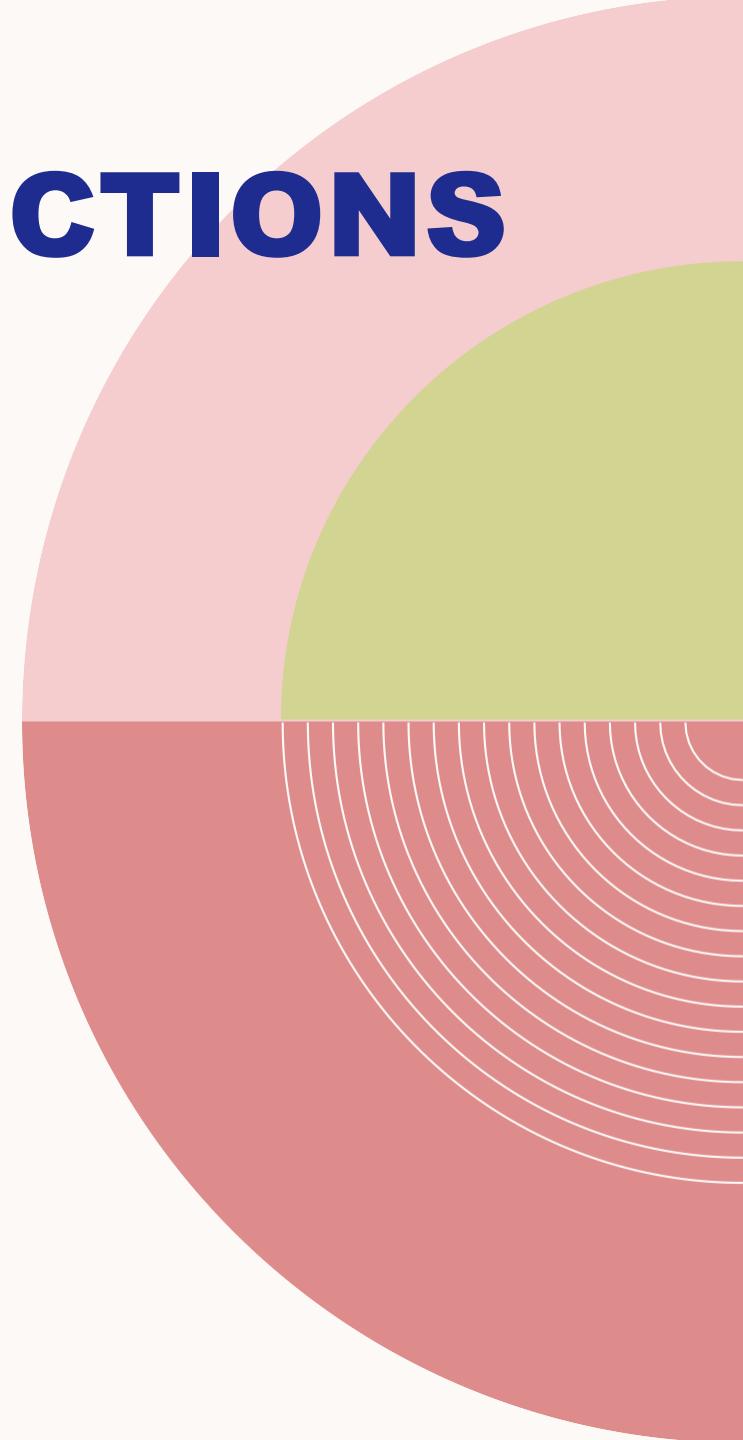
The Application Layer determines the specific protocol and data syntax rules at the application level. Different applications may use different protocols for communication, and the Application Layer ensures that both the sender and receiver follow the agreed-upon rules for successful data exchange.



# APPLICATION LAYER FUNCTIONS

## Presentation to User Application:

Finally, the Application Layer is responsible for presenting the received data to the user application in a format that is understandable and usable. This includes handling aspects such as data formatting, character encoding, and any necessary transformations to make the data accessible to the end user.



**Thank You!** 😊 ❤

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