CS & IT ENGINEERING

COMPUTER NETWORKS

Application layer protocol

Lecture No-02

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Application layer
Protocols Part-2

17. SMTP is stateless protocol. It does not maintain any information of user. If an e-mail is asked to be sent twice, then server resends it without saying that e-mail has already been sent.
18. SMTP is a connection-oriented protocol.
19. SMTP uses persistent TCP connections, so it can send multiple e-mail at once.
20. SMTP is an "In-Band" protocol.
21. SMTP is used for Push the e-mail.
22. SMTP Push the mail from client to server on other hand, It needs a pull protocol(Download).
23. PoP3 and IMAP4 are used for Pulling the e-mail.

POP3(Post office protocol version 3)

IMAP4(Internet Mail Access Protocol version 4)

NOTE(imp.)

Transfer the message from sending mail server to receiving mail server is done through SMTP. Finally the message from receiving server to web browser is done through HTTP only

POP3(Post office Protocol version-3)

1. It is a message access protocol.
2. It is a pull protocol.
3. POP3 uses port number-110 at TCP.
4. POP3 is a connection-oriented protocol.
5. POP3 uses persistent TCP connection.
6. POP3 is a stateful protocol.
7. POP3 is an "In-Band" protocol.
8. POP3 does not allow users to partially check the content of the mail before downloading.
9. POP3 does not allow user to organize the mail on the mail server.

1. POP-3 has two modes: the delete mode and the keep mode
2. In the deleted mode , the mail is deleted from the mailbox after each retrieval.
3. In the keep mode, the mails remains in the mailbox after retrieval.

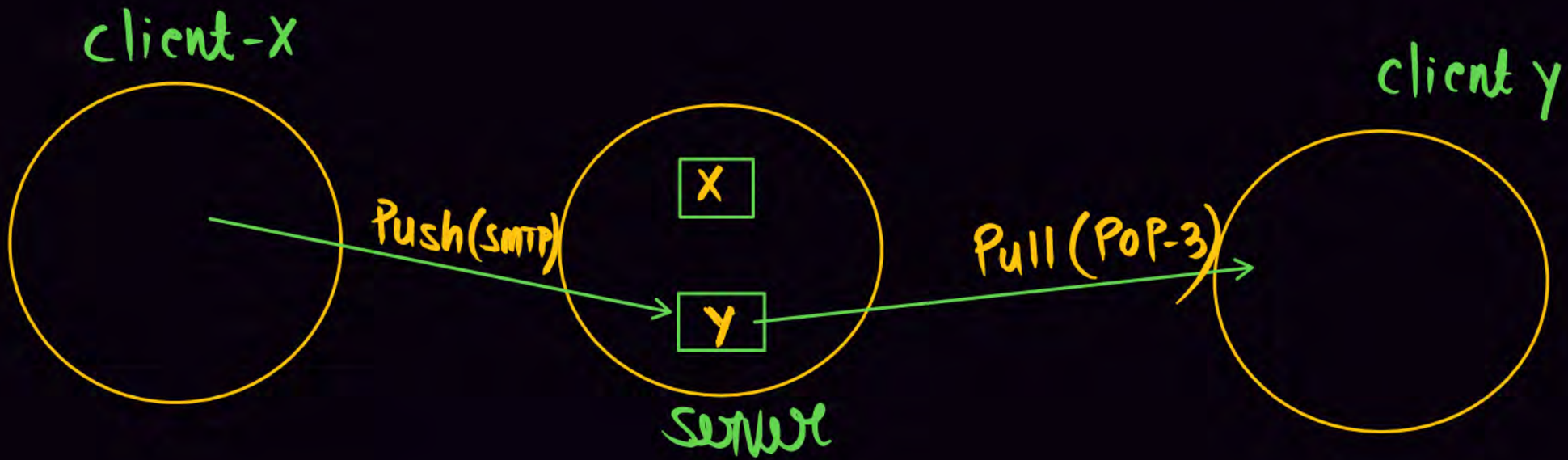
IMAP-4(Internet Mail Access Protocol version-4)

1. IMAP-4 is similar to POP3 but it has more features. IMAP-4 is more powerful and more complex.
2. IMAP-4 provides the following extra functions.
3. A user checks the email header prior to downloading.
4. A user can search the content of the email for a specific string of characters prior to downloading.
5. A user can partially download the email.
6. A user can create, delete, or rename the mail box on the mail server.
7. A user can create a hierarchy of mailbox in a folder for email storage.

Characteristics of IMAP

1. IMAP is a pull protocol.
2. IMAP uses port number-143 at TCP.
3. IMAP is a connection-oriented protocol.
4. IMAP uses persistent TCP connection.
5. IMAP is a stateful protocol.
6. IMAP is an “In-Band” Protocol.

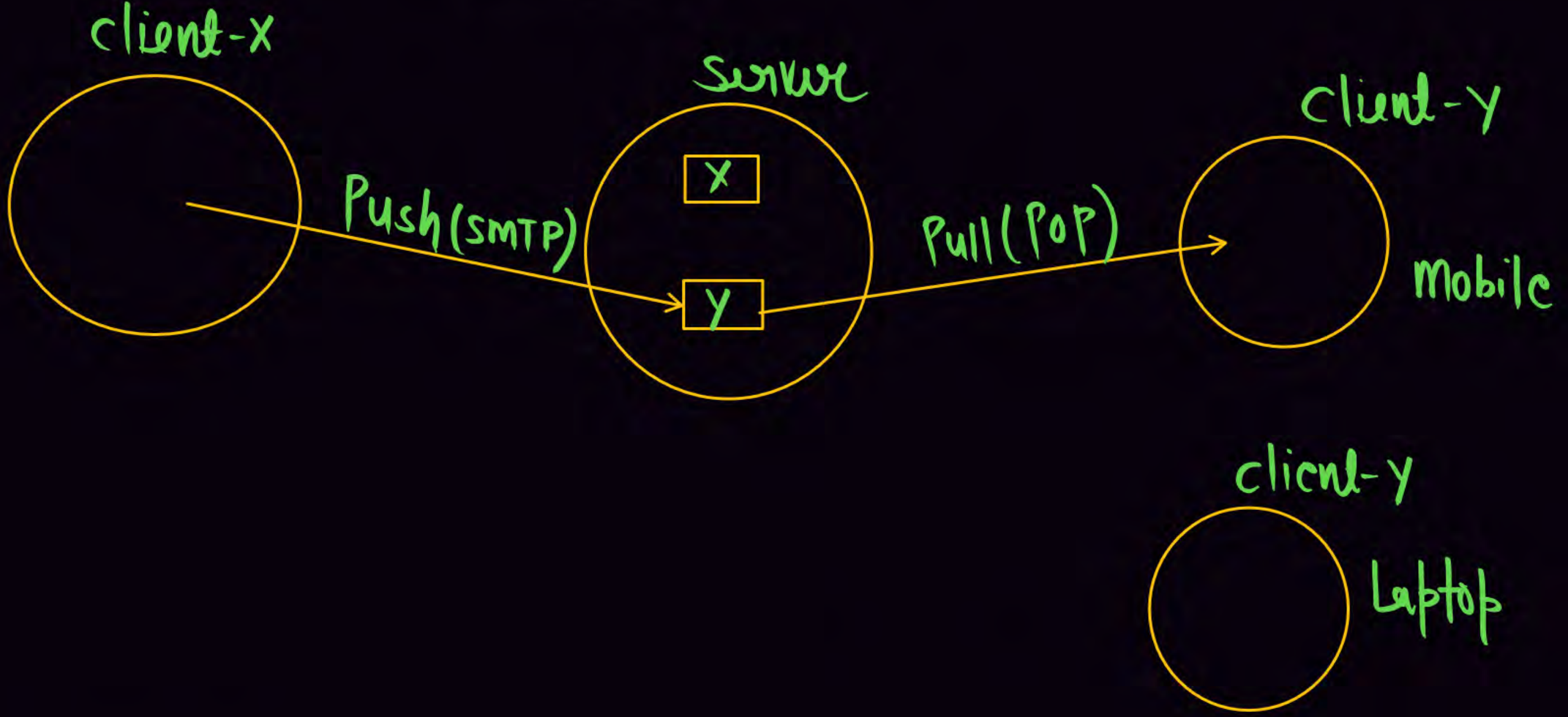
POP3	IMAP-4
(1)Mails can only be accessed from a single device.	Mails can be accessed from multiple device.
(2)Download the email from server to a single computer and the copy at the server is deleted.	The email message is stored on the mail server itself.
(3)User cannot organize the mails in the mail box of the mail server.	User can organize mails on the mail server.
(4) It does not allow user to sync emails.	It allows user to sync their emails.
(5)It is unidirectional i.e all the changes made on a device does not effect the content present on the server.	It is bidirectional i.e all the changes made on server or device are made on the other side too.



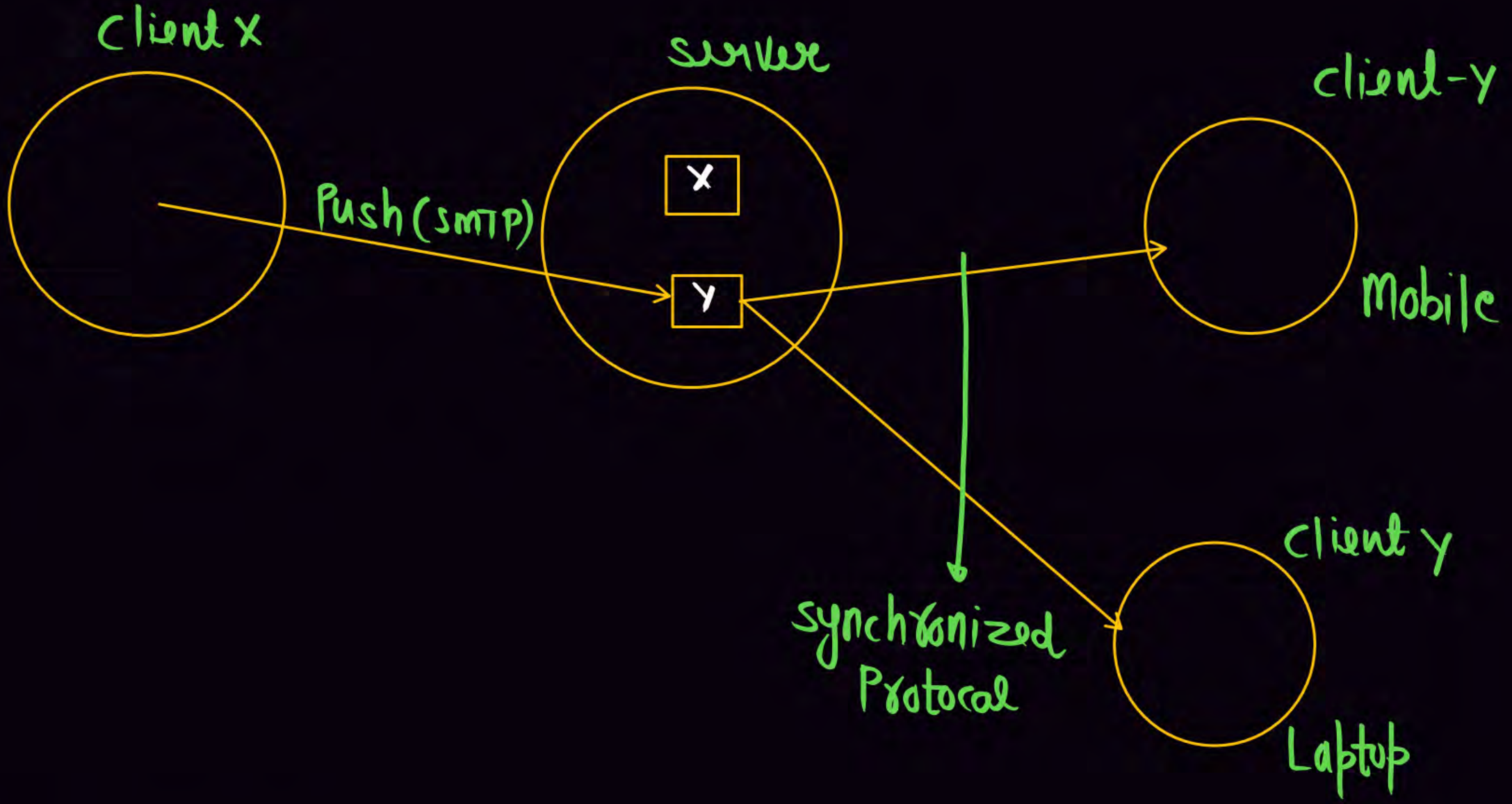
client X ⟶ client y

Difference b/w POP-3 and IMAP-4

POP-3



IMAP-4


Client X
Server
X
Y
Push (SMTP)
client-Y
Mobile
synchronized
Protocal
client Y
Laptop

SMTP uses Base 64 Encoding

$(XY)_{64}$

$X \rightarrow (0-63)$

$Y \rightarrow (0-63)$

6bit

000000 → 0

111111 → 63

Text data = "And"

65 110 100

(8bit) (8bit) (8bit)

6bit 6bit 6bit 6bit

01000001 01101110 01100100

16 22 57 36

Q W 5 k

'And' → Base64 Encoding → QW5k ⇒ Overhead

Input

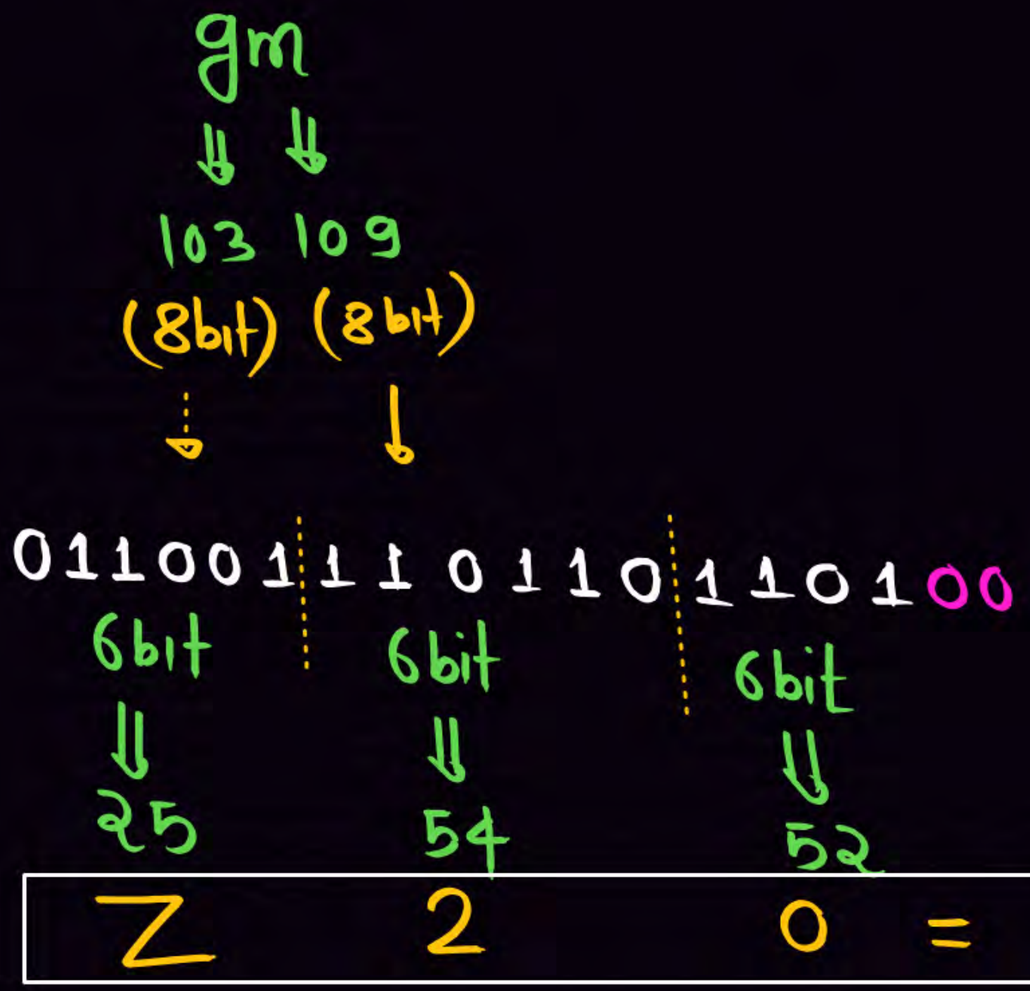
Output

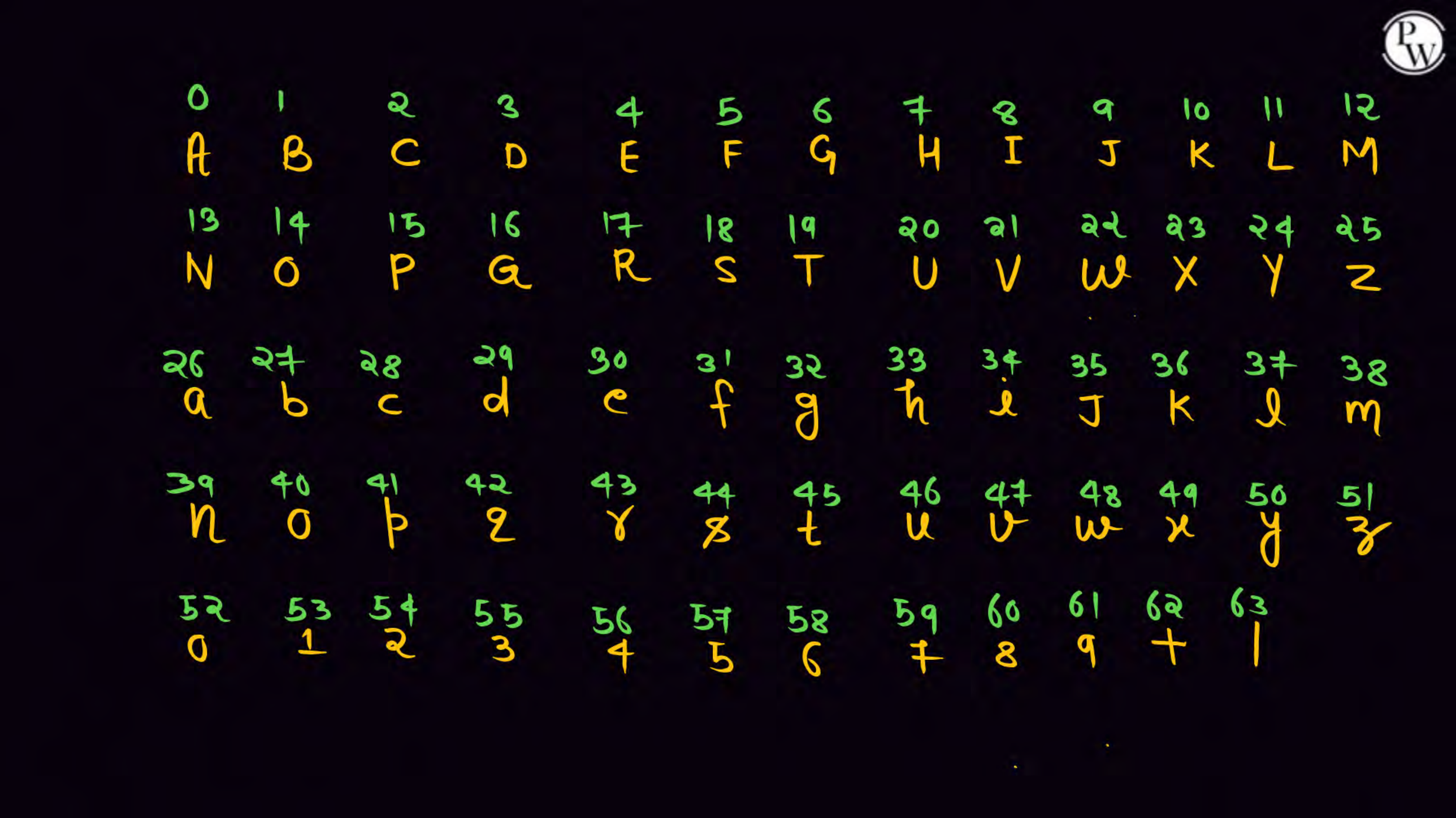
② input = AndPzQzPLg

g
⇓
103

011001 | 110000
6bit | 6bit
⇓ | ⇓
25 | 48
Z | W ==

3. And PqR GHK gm




0 1 2 3 4 5 6 7 8 9 10 11 12
A B C D E F G H I J K L M
13 14 15 16 17 18 19 20 21 22 23 24 25
N O P Q R S T U V W X Y Z
26 27 28 29 30 31 32 33 34 35 36 37 38
a b c d e f g h i J K l m
39 40 41 42 43 44 45 46 47 48 49 50 51
n o p q r s t u v w x y z
52 53 54 55 56 57 58 59 60 61 62 63
0 1 2 3 4 5 6 7 8 9 + /

(0-25) → (A-Z)

(26-51) → (a-z)

(52-61) → (0, 9)

(62, 63) → (+, /)

ASCII - Binary Character Table

Letter	ASCII Code	Binary	Letter	ASCII Code	Binary
a	097	01100001	A	065	01000001
b	098	01100010	B	066	01000010
c	099	01100011	C	067	01000011
d	100	01100100	D	068	01000100
e	101	01100101	E	069	01000101
f	102	01100110	F	070	01000110
g	103	01100111	G	071	01000111
h	104	01101000	H	072	01001000
i	105	01101001	I	073	01001001
j	106	01101010	J	074	01001010
k	107	01101011	K	075	01001011
l	108	01101100	L	076	01001100
m	109	01101101	M	077	01001101
n	110	01101110	N	078	01001110
o	111	01101111	O	079	01001111
p	112	01110000	P	080	01010000
q	113	01110001	Q	081	01010001
r	114	01110010	R	082	01010010
s	115	01110011	S	083	01010011
t	116	01110100	T	084	01010100
u	117	01110101	U	085	01010101
v	118	01110110	V	086	01010110
w	119	01110111	W	087	01010111
x	120	01111000	X	088	01011000
y	121	01111001	Y	089	01011001
z	122	01111010	Z	090	01011010

SMTP Commands :

1. HELO: Identifies itself
2. MAIL FROM: Identifies the sender of the message
3. RCPT TO: Identifies the recipient of the message
4. DATA: Send the actual message
5. QUIT: Terminate the message
6. RSET: Aborts the current mail transaction
7. VRFY: Verifies the address of the recipient
8. NOOP: Checks the status of recipient
9. TURN: Switches the sender and recipient
10. EXPN: Ask the recipient to expand the mailing list
11. HELP: Ask the recipient to send information about the command.
12. SEND FORM
13. SMOL FROM
14. SMAL FROM

Q.1 Consider different activities related to email
m1: Send an email from a mail client to a mail server (SMTP)
m2: Download an email from mailbox server to a mail client (POP)
m3: Checking email in a web browser (HTTP)
Which is the application level protocol used in each activity?

(GATE 2011)

A. m1: HTTP m2: SMTP m3: POP

B. m1: SMTP m2: FTP m3: HTTP

C. m1: SMTP m2: POP m3: HTTP

D. m1: POP m2: SMTP m3: IMAP

THANK YOU!