Cryptography and Network Security

Unit-III

Session 15

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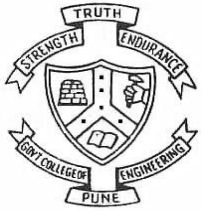
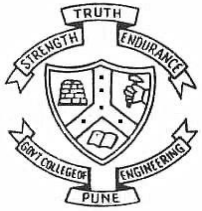


Department of Computer Engineering and Information Technology
College of Engineering Pune (COEP)
Forerunners in Technical Education

ENCRYPTION TECHNIQUES



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S-DES

Simplified Data Encryption Standard

- S-DES is a simplified version of DES, developed for beginners to learn the basic concept of DES
- It is only for educational purposes and not suitable for practical purposes due to security issues

- Plaintext block size: 8 bits
- key size: 10 bits
- Number of rounds: 2

Subkey Generation

Initial Permutation Table

3	5	2	7	4	10	1	9	8	6

1. The permutated key is divided into two halves, left half and right half
2. Left circular shift by 1 bit on each half.
3. Left half and right half are merged together
4. Apply compression permutation [8 bits]

6	3	7	4	8	5	10	9

5. This is first subkey

1. Take output of step 3 as input
2. Left circular shift by 2 bit on each half
3. Left half and right half are merged together
4. Apply compression permutation [8 bits]

6	3	7	4	8	5	10	9

5. This is second subkey

Encryption

Step 1 Block size of plaintext is of 8 bits in S-DES.

Step 2 Initial permutation is applied on the block of 8 bits plaintext

2	6	3	1	4	8	5	7

Round 1

Step 1 Divide the permuted bits into 2 halves

Step 2 The right half is permuted using Expansion Permutation (E/P), which gives 8 bits as output

4	1	2	3	2	3	4	1

Step 3 These 8 bits are XORed with the first key (K_1)

Step 4 Apply S-box substitution on output of step 3. There are 2 S-boxes, S_0 and S_1. Each S-box takes input as 4 bits and produces output as 2 bits.

S_0				
R/C	0	1	2	3
0	1	0	3	2
1	3	2	1	0
2	0	2	1	3
3	3	1	3	2

S_1				
R/C	0	1	2	3
0	0	1	2	3
1	2	0	1	3
2	3	0	1	0
3	2	1	0	3

Step 5 apply permutation on output of step 4

Permutation table

2	4	3	1

Step 6 Output of step 5 is XORed with Left half of the initial permutation step

Step 7 Swapping. Right half as left half and left half as right half

Repeat steps 1 to 7 for round 2

Inverse Initial Permutation

Inverse IP table

4	1	3	5	7	2	8	6

Lab Assignment 4

Implement Simplified DES algorithm for encryption and decryption of any message.

Count the time required for encryption/decryption of messages of different length.

Note: You have to use assignments 3 for various operations in S-DES

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