The DES Encryption Algorithm

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History:

-For a period of time, as of not long ago DES (Data Encryption Algorithm) was the primary encryption algorithm for encrypting data.

-DES is a product of a research project ran by IBM (International Business Machines) in the late 1960's

-This research eventually lead to the creation of a encryption cipher known as LUCIFER

-In the early 1970's IBM decided to commercialize
LUCIFER

LUCIFER:

-The commercialization of LUCIFER resulted in a large number of adjustments

-These changes were not done entirely by IBM alone

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LUCIFER:

-The commercialization of LUCIFER resulted in a large number of adjustments

-These changes were not done entirely by IBM alone

-A number of outside consultants were recruited by IBM

-However the major contributor in terms of technical contribution was the NSA

-The resulting altered version of LUCIFER was proposed to the NBS (National Broad of Standards) as an answer to their call for a new national encryption standard.

-In 1977 the altered version of LUCIFER was dubbed DATA ENCRYPTION STANDARD – DES (FIBS PUBS 46) and adopted by NBS as its

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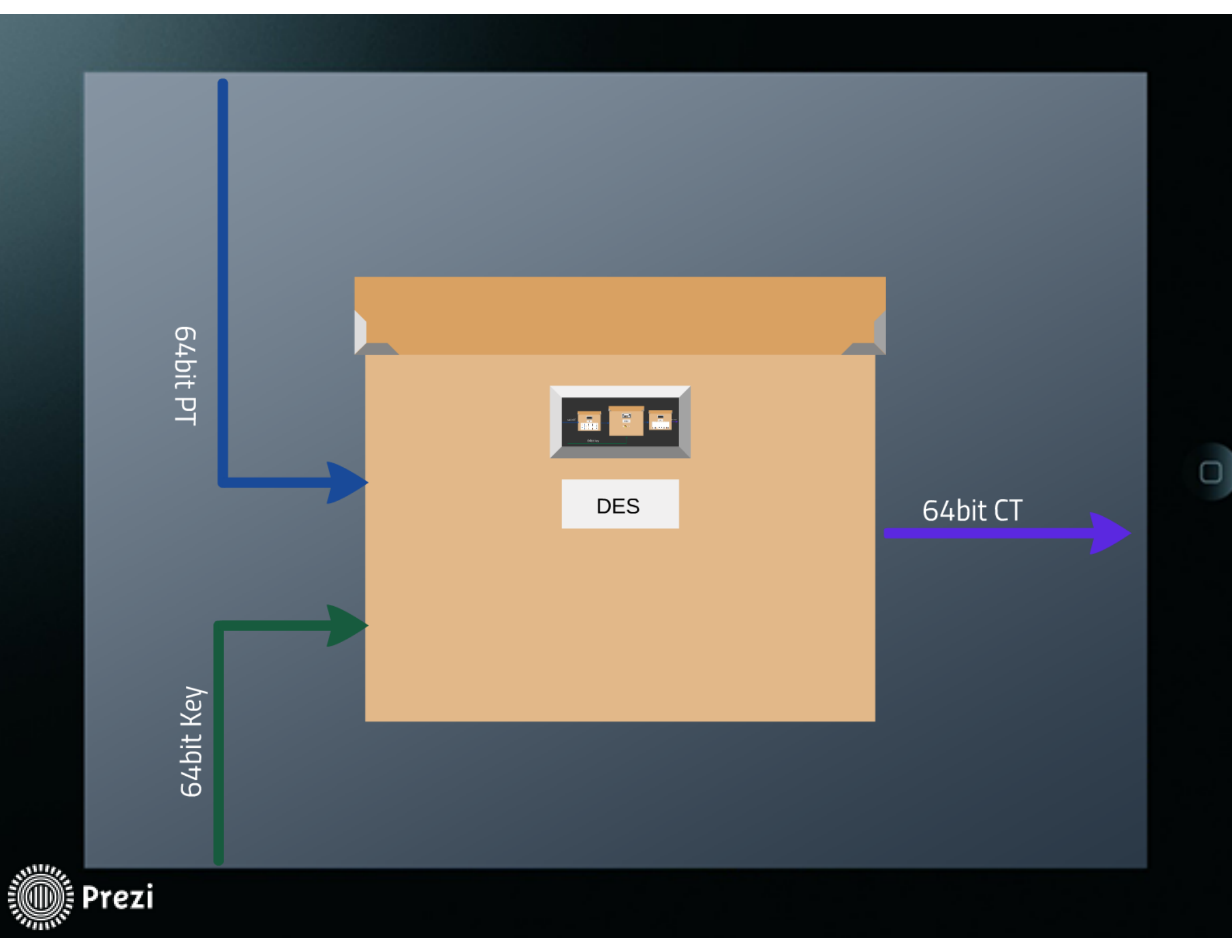
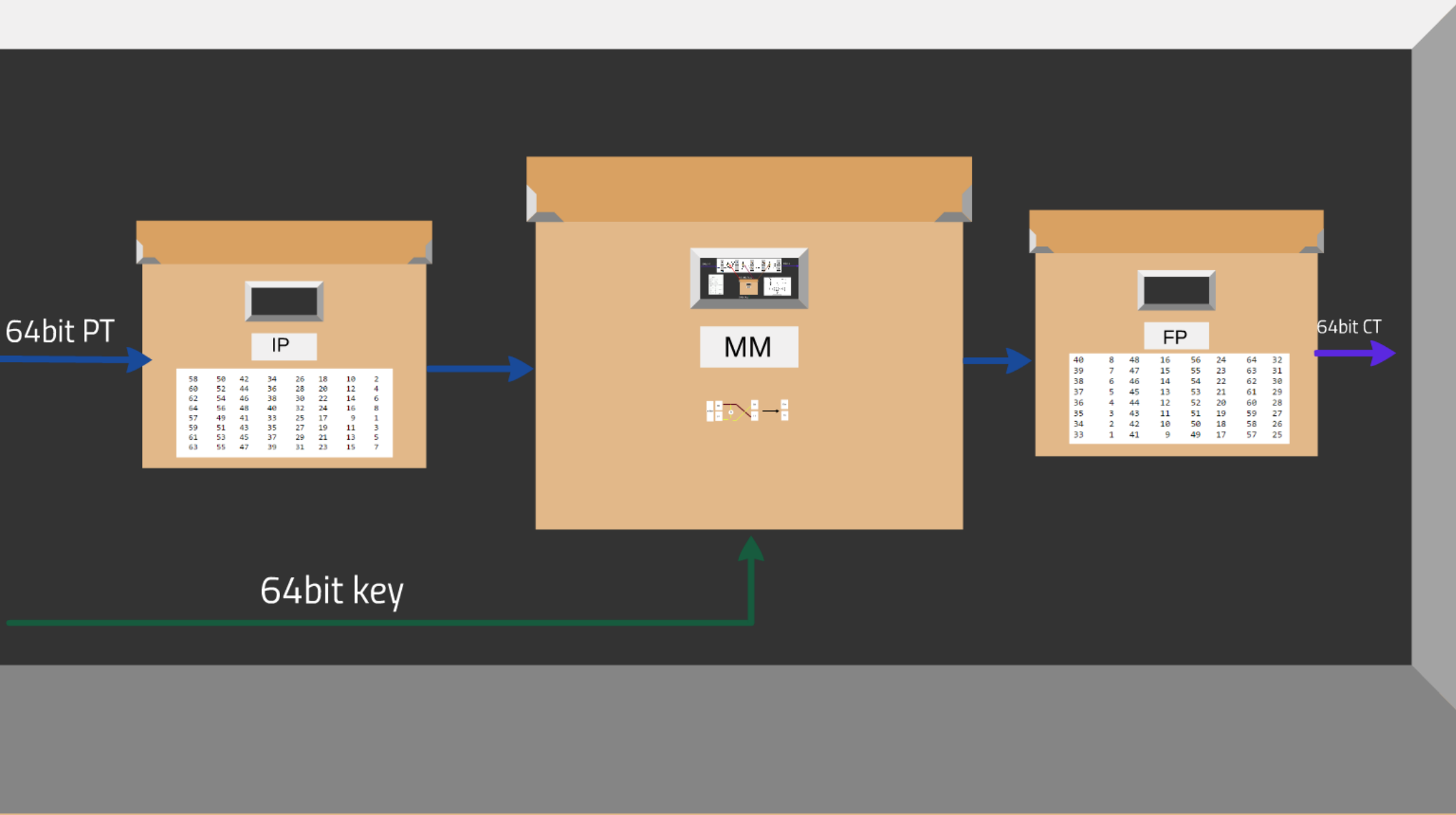
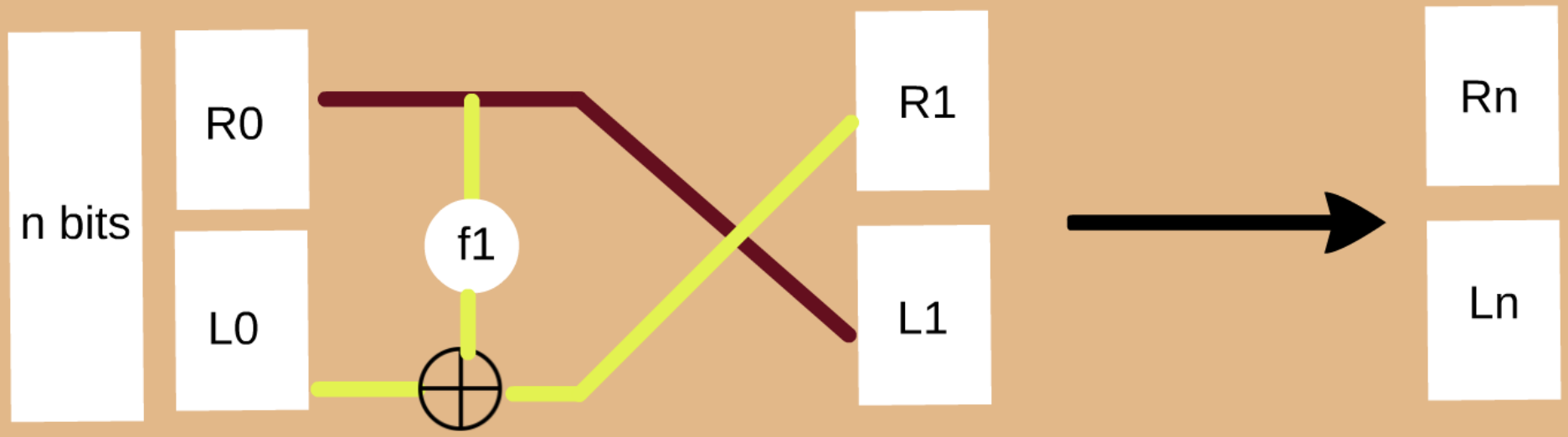
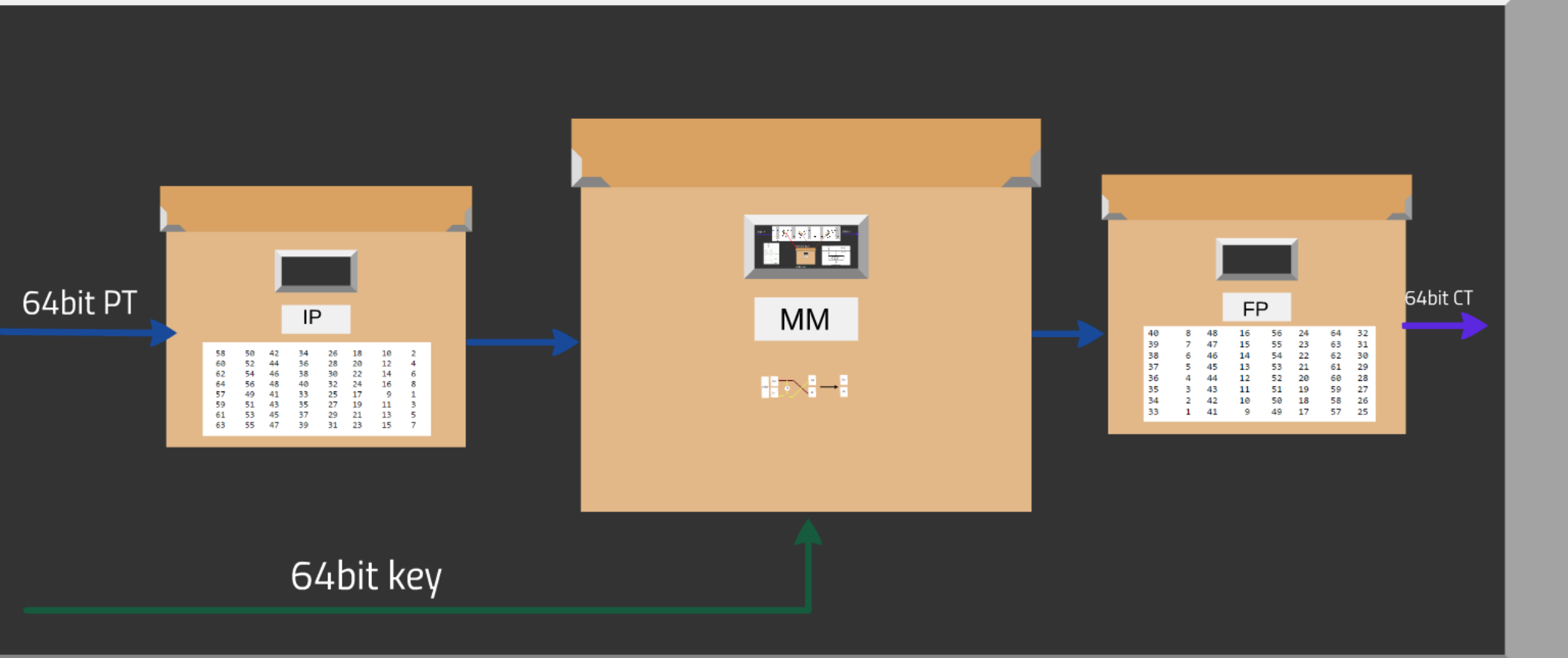
IMPLEMENTATION

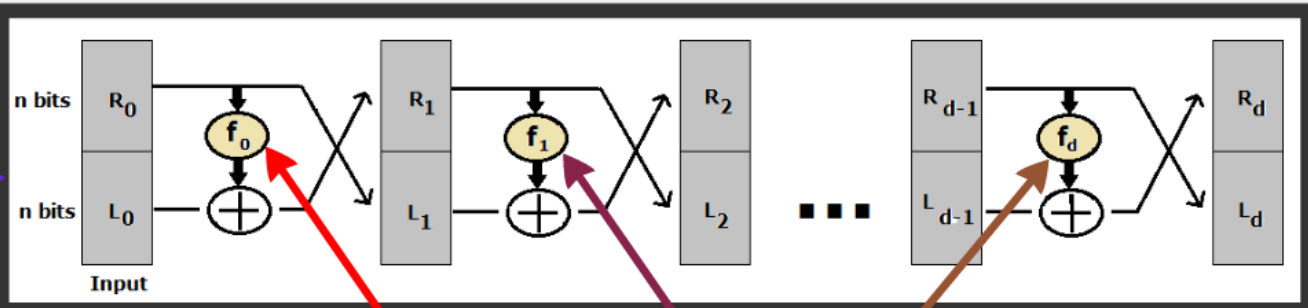

64bit PT
DES
64bit CT
64bit Key


64bit PT
IP
58 50 42 34 26 18 10 2
60 52 44 36 28 20 12 4
62 54 46 38 30 22 14 6
64 56 48 40 32 24 16 8
57 49 41 33 25 17 9 1
59 51 43 35 27 19 11 3
61 53 45 37 29 21 13 5
63 55 47 39 31 23 15 7
MM
FP
40 8 48 16 56 24 64 32
39 7 47 15 55 23 63 31
38 6 46 14 54 22 62 30
37 5 45 13 53 21 61 29
36 4 44 12 52 20 60 28
35 3 43 11 51 19 59 27
34 2 42 10 50 18 58 26
33 1 41 9 49 17 57 25
64bit CT
64bit key

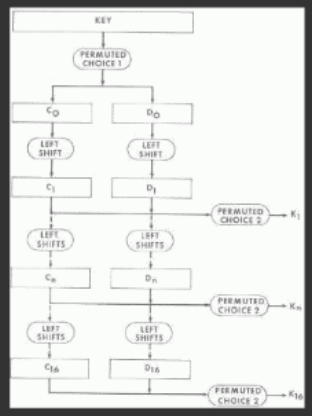



64bit PT
IP
58 50 42 34 26 18 10 2
60 52 44 36 28 20 12 4
62 54 46 38 30 22 14 6
64 56 48 40 32 24 16 8
57 49 41 33 25 17 9 1
59 51 43 35 27 19 11 3
61 53 45 37 29 21 13 5
63 55 47 39 31 23 15 7
MM
FP
40 8 48 16 56 24 64 32
39 7 47 15 55 23 63 31
38 6 46 14 54 22 62 30
37 5 45 13 53 21 61 29
36 4 44 12 52 20 60 28
35 3 43 11 51 19 59 27
34 2 42 10 50 18 58 26
33 1 41 9 49 17 57 25
64bit CT
64bit key

64bit PT

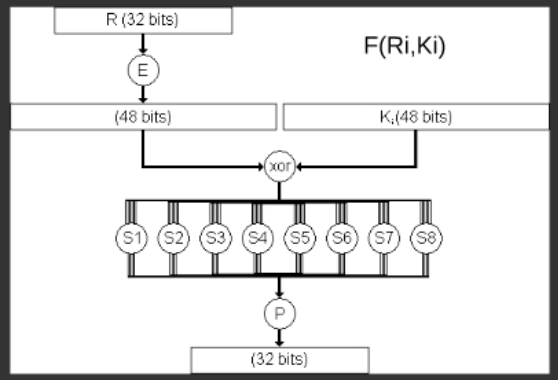


64bit CT

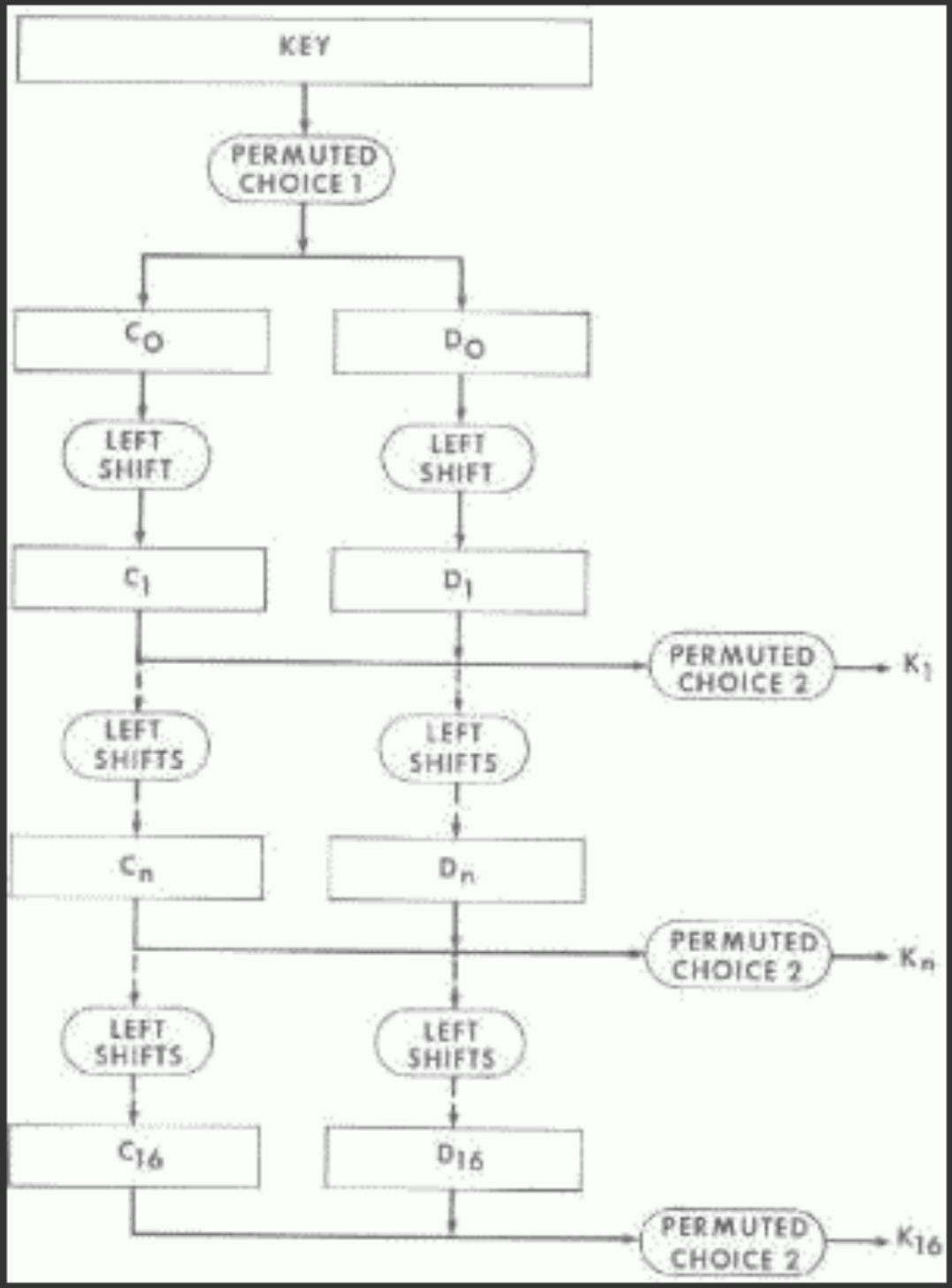


16 48bit keys

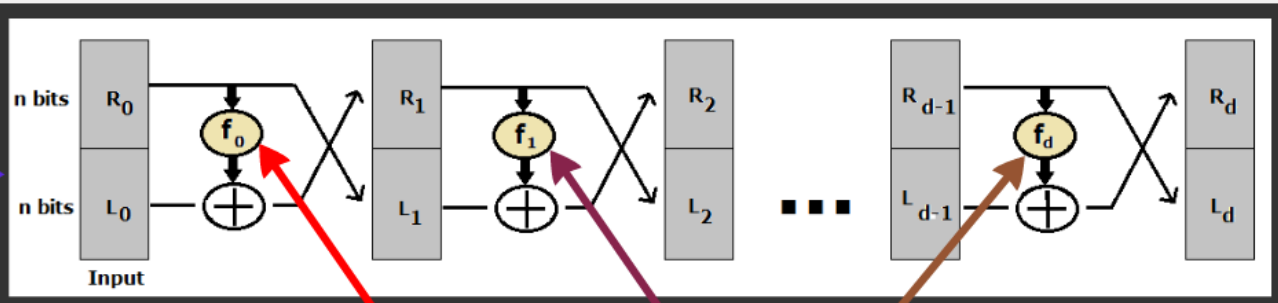
KP



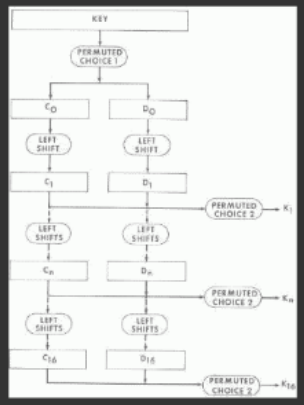
64bit Key


KEY
PERMUTED CHOICE 1
C_0
D_0
LEFT SHIFT
LEFT SHIFT
C_1
D_1
PERMUTED CHOICE 2
K_1
LEFT SHIFTS
LEFT SHIFTS
C_n
D_n
PERMUTED CHOICE 2
K_n
LEFT SHIFTS
LEFT SHIFTS
C_{16}
D_{16}
PERMUTED CHOICE 2
K_{16}

64bit PT



64bit CT



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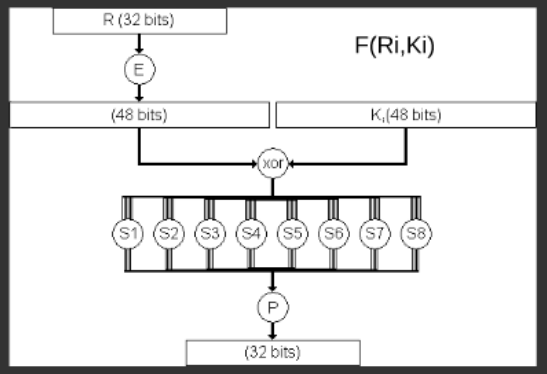
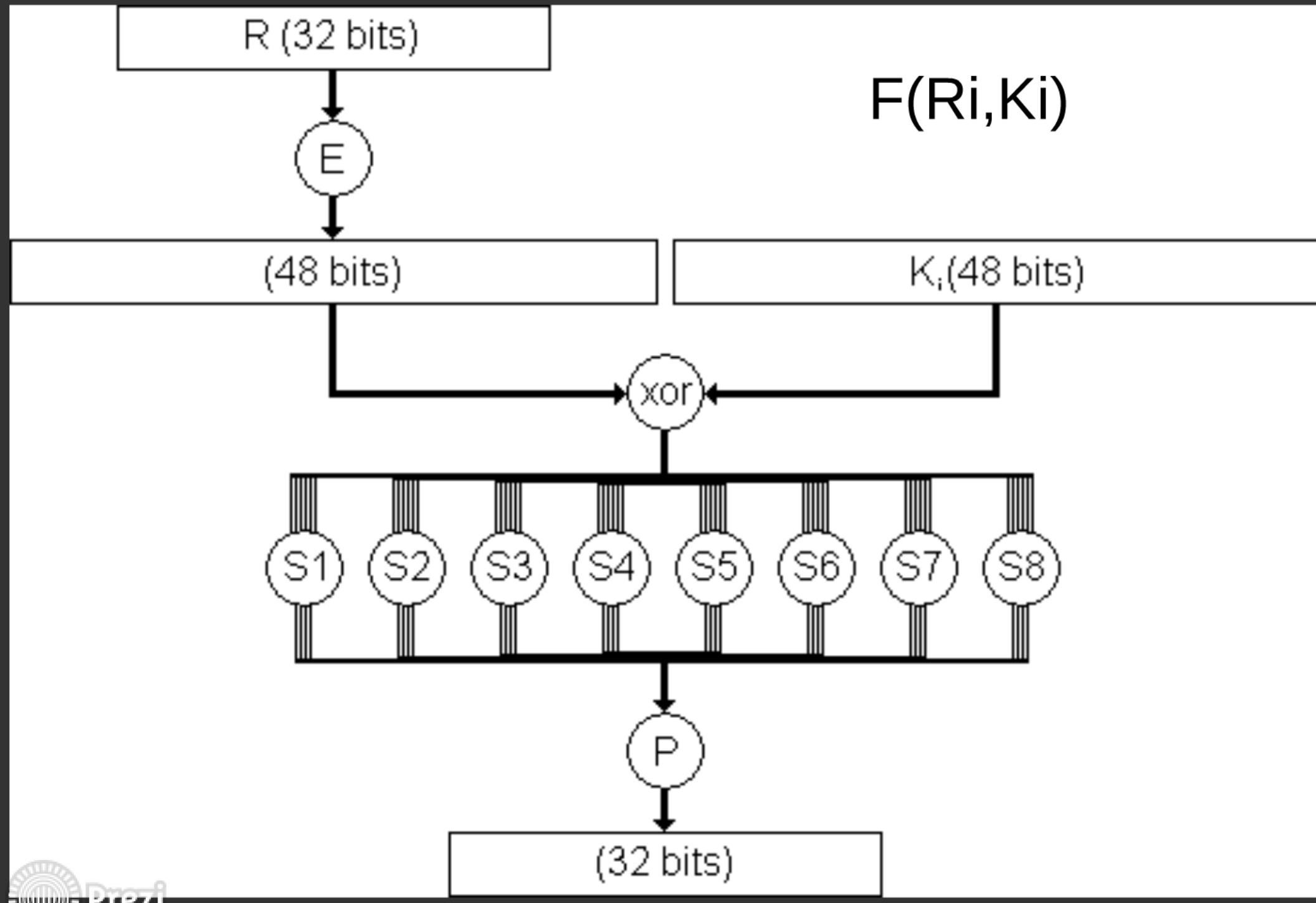
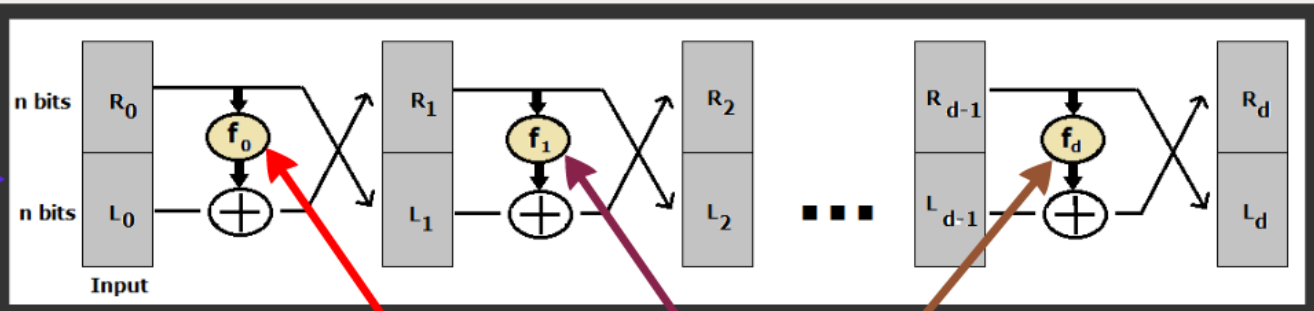
64bit Key

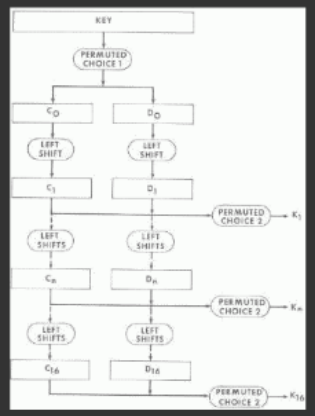



R (32 bits)
F(Ri,Ki)
E
(48 bits)
Ki(48 bits)
xor
S1
S2
S3
S4
S5
S6
S7
S8
P
(32 bits)

64bit PT



64bit CT



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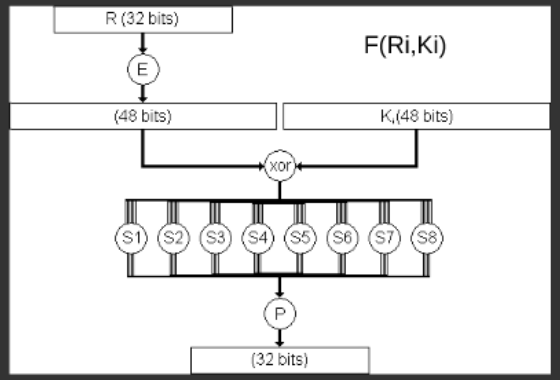

A series of challenges were held in order to attempt to break DES

DES was broken on all challenges

Reason: The Fiestel network can not produce pseudo-random CT unless it receives pseudo-random keys

Brute forcing all possible keys is possible to achieve in a small amount of time


CMS
SEO
SOCIAL
in
PLATFORMS
DES v.s AES
-AES solved the brute force problem by giving the choice of 3 key-sizes (all larger than 56).
-AES does not use Fiestel networks

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