

**Exp: 2B**  
**Date: 16-03-2024**

## **Diffie Hellman Algorithm**

### **Aim:**

To write a python program implementing the Diffie Hellman algorithm.

### **Algorithm:**

1. P, G => available public keys. P, G => available public keys.
2. a is selected as a private key. b is selected as a private key.
3. Eq. to generate key:  $x = G^a \text{ mod } P$ . Eq. to generate key:  $y = G^b \text{ mod } P$ .
4. After exchanging keys, user1 receives key y. After exchanging keys, user2 receives key x.

### **Program:**

```
def prime_checker(p):
    if p < 1:
        return -1
    elif p > 1:
        if p == 2:
            return 1
        for i in range(2, p):
            if p % i == 0:
                return -1
        return 1

def primitive_check(g, p, L):
    for i in range(1, p):
        L.append(pow(g, i) % p)
    for i in range(1, p):
        if L.count(i) > 1:
            L.clear()
            return -1
    return 1
```

`l = []`

```

while 1:
    P = int(input("Enter P : "))
    if prime_checker(P) == -1:
        print("Number Is Not Prime, Please Enter Again!")
        continue
    break
while 1:
    G = int(input(f"Enter The Primitive Root Of {P} : "))
    if primitive_check(G, P, 1) == -1:
        print(f"Number Is Not A Primitive Root Of {P}, Please Try Again!")
        continue
    break
x1, x2 = int(input("Enter The Private Key Of User 1 : ")), int(
    input("Enter The Private Key Of User 2 : "))
while 1:
    if x1 >= P or x2 >= P:
        print(f"Private Key Of Both The Users Should Be Less Than {P}!")
        continue
    break
y1, y2 = pow(G, x1) % P, pow(G, x2) % P
k1, k2 = pow(y2, x1) % P, pow(y1, x2) % P

print(f"\nSecret Key For User 1 Is {k1}\nSecret Key For User 2 Is {k2}\n")

if k1 == k2:
    print("Keys Have Been Exchanged Successfully")
else:
    print("Keys Have Not Been Exchanged Successfully")

```

### Output:

```

[student@localhost ~]$ vi diffie.py
[student@localhost ~]$ python3 diffie.py
Enter P : 11
Enter The Primitive Root Of 11 : 7
Enter The Private Key Of User 1 : 3
Enter The Private Key Of User 2 : 2

Secret Key For User 1 Is 4
Secret Key For User 2 Is 4

Keys Have Been Exchanged Successfully
[student@localhost ~]$ █

```

**Result:**

Thus the python program for the Diffie Hellman algorithm is implemented successfully.