# Report :

Table 1: Performance of various techniques for collision resolution with two different hash functions.

| | Hash1 | | Hash2 | |
|---|---|---|---|---|
| | Number of collisions | Average probes | Number of collisions | Average Probes |
| Chaining Method | 4968.5 | 1046.1 | 4963.2 | 1047.1 |
| Double Hashing | 4332.3 | 1024.1 | 4148.2 | 1024.6 |
| Custom Hashing | 3950.6 | 1023.7 | 3984.4 | 1023.9 |

The hash functions used:

```
uint64_t hash1(string key, uint64_t mod = UINT64_MAX){
    uint64_t hash = 537;

    for(char c: key){
        hash = ( ((hash<<5)-hash) + c  )%mod;
    }
    return hash;
}

uint64_t hash2(string key, uint64_t mod = UINT64_MAX){
    uint64_t hash = 0;

    for(char c: key){
        hash = ( (hash<<3)-hash+c )%mod;
    }
    return hash;
}

uint64_t hash3(string key,uint64_t mod = UINT64_MAX){
    return 3-hash2(key)%3;
}

uint64_t hash4(string key,uint64_t mod = UINT64_MAX){
    return 5-hash1(key)%5;
}
```

For Hash1,

- hash1(key) was used for separate chaining.
- hash1(key) was used as Hash(key) for double hashing and hash3(key) was used as auxHash(key).
- hash1(key) was used as Hash(key) for custom hashing and hash3(key) was used as auxHash(key). Values for $C_1 = 2$ and $C_2 = 3$.

For Hash2,

- hash2(key) was used for separate chaining.
- hash2(key) was used as Hash(key) for double hashing and hash4(key) was used as auxHash(key).
- hash2(key) was used as Hash(key) for custom hashing and hash4(key) was used as auxHash(key). Values for $C_1 = 5$ and $C_2 = 3$.