

Activity 3

Load Balancing:

For example, imagine you have a set of servers that handle requests for a web application. The key to load balancing is using the hash value of a client's IP address or a request ID to determine which server should handle the request. The hash function is typically designed so that the data is evenly distributed across the servers, ensuring that no single server is overloaded. Write a program of a load balancing system using hashing, where a basic hash table for mapping incoming requests to a set of servers.

Code:

```
#include <iostream>
#include <string>
using namespace std;

int main() {
    int s, r;
    cout << "Enter the number of servers: ";
    cin >> s;
    cout << "Enter the number of incoming requests: ";
    cin >> r;

    string hash_server[100][100];
    int server_count[100] = {0};
    string all_requests[100];
    int request_server[100];

    cout << "Enter request IDs: "<< endl;
    for (int i = 0; i < r; i++) {
        cout << "Request " << i + 1 << ": ";
        cin >> all_requests[i];

        size_t hash_val = hash<string>{}(all_requests[i]) % s;

        hash_server[hash_val][server_count[hash_val]] = all_requests[i];
        server_count[hash_val]++;
        request_server[i] = hash_val;
    }
}
```

```

}

cout << "Request Distribution: " << endl;
for (int i = 0; i < r; i++) {
    cout << "Request " << all_requests[i]
    << " is handled by Server " << request_server[i] << endl;
}

cout << "Server Load Summary: " << endl;
for (int i = 0; i < s; i++) {
    cout << "Server " << i << " handled " << server_count[i] << " requests";
    if (server_count[i] > 0) {
        cout << ": ";
        for (int j = 0; j < server_count[i]; j++) {
            cout << hash_server[i][j];
            if (j < server_count[i] - 1) cout << ", ";
        }
    }
    cout << endl;
}
return 0;
}

```

Output:

```

Enter the number of servers: 2
Enter the number of incoming requests: 4
Enter request IDs:
Request 1: 334.543.554
Request 2: 45.34.3434
Request 3: 23.453.43
Request 4: 56.45.34223
Request Distribution:
Request '334.543.554' is handled by Server 1
Request '45.34.3434' is handled by Server 1
Request '23.453.43' is handled by Server 1
Request '56.45.34223' is handled by Server 0
Server Load Summary:
Server 0 handled 1 requests: 56.45.34223
Server 1 handled 3 requests: 334.543.554, 45.34.3434, 23.453.43

-----
(program exited with code: 0)

Press any key to continue . . . |

```

