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EXPERIMENT- 7

Aim:

To implement Matrix Multiplication and analyse its time complexity.

Code:

```
#include <iostream>
#include <ctime>

using namespace std;

int main() {
   int m, n, p, q, i, j, k;
   cout << "Enter the number of rows and columns of the first matrix: ";
   cin >> m >> n;
   cout << "Enter the number of rows and columns of the second matrix: ";
   cin >> p >> q;

   if (n != p) {
      cout << "The matrices can't be multiplied with each other.";
      return 0;
   }

   int first[m][n], second[p][q], multiply[m][q];

   cout << endl << "Enter the elements of the first matrix:" << endl;
   for (i = 0; i < m; i++) {
      for (j = 0; j < n; j++) {
         cin >> first[i][j];
      }
   }

   cout << endl << "Enter the elements of the second matrix:" << endl;
   for (i = 0; i < p; i++) {
      for (j = 0; j < q; j++) {
         cin >> second[i][j];
      }
   }

clock_t start = clock();
   for (i = 0; i < m; i++) {
      for (j = 0; j < q; j++) {
         multiply[i][j] = 0;
         for (k = 0; k < p; k++) {
            multiply[i][j] += first[i][k] * second[k][j];
         }
      }
   }
```

```
clock_t end = clock();
   double executionTime = double(end - start) * 1000.0 / CLOCKS_PER_SEC;


   cout << endl << "Product of the matrices:" << endl;
   for (i = 0; i < m; i++) {
      for (j = 0; j < q; j++) {
         cout << multiply[i][j] << "\t";
      }
      cout << endl;
   }
   cout << "\nExecution time: " << executionTime << " milliseconds" << endl;

   return 0;
}
```

Output:

```
Enter the number of rows and columns of the first matrix: 2 3
Enter the number of rows and columns of the second matrix: 3 2
Enter the elements of the first matrix:
1 2 5
3 6 5
Enter the elements of the second matrix:
2 2
4 7
8 9
Product of the matrices:
50  61
70  93

Execution time: 0.001 milliseconds
```