

- [CPSC 275: Introduction to Computer Systems](#)

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Fall 2025

- [Syllabus](#)
- [Schedule](#)
- [Resources](#)
- [Upload](#)
- [Solution](#)

# Solution to Homework 25

```
1. int sum_array_3d(int a[N][N][N])
{
    int i, j, k, sum = 0;

    for (k = 0; k < N; k++)
        for (i = 0; i < N; i++)
            for (j = 0; j < N; j++)
                sum += a[k][i][j];
    return sum;
}
```

2. Function `clear1` accesses the array using a stride-1 reference pattern and thus clearly has the best spatial locality. Function `clear2` scans each of the  $N$  structs in order, which is good, but within each struct it hops around in a non-stride-1 pattern at the following offsets from the beginning of the struct: 0, 12, 4, 16, 8, 20. So `clear2` has a worse spatial locality than `clear1`. Function `clear3` not only hops around within each struct, but it also hops from struct to struct. So `clear3` exhibits worse spatial locality than `clear2` and `clear1`.

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