#include <stdio.h>

#include<printf.h>

#define IN\_SIZE 5

#define KERNEL\_SIZE 3

#define OUT\_SIZE (IN\_SIZE - KERNEL\_SIZE + 1)

int main() {

int input[IN\_SIZE][IN\_SIZE][IN\_SIZE] = {

{

{1, 2, 3, 4, 5},

{6, 7, 8, 9, 10},

{11, 12, 13, 14, 15},

{16, 17, 18, 19, 20},

{21, 22, 23, 24, 25}

},

{

{2, 3, 4, 5, 6},

{7, 8, 9, 10, 11},

{12, 13, 14, 15, 16},

{17, 18, 19, 20, 21},

{22, 23, 24, 25, 26}

},

{

{3, 4, 5, 6, 7},

{8, 9, 10, 11, 12},

{13, 14, 15, 16, 17},

{18, 19, 20, 21, 22},

{23, 24, 25, 26, 27}

},

{

{4, 5, 6, 7, 8},

{9, 10, 11, 12, 13},

{14, 15, 16, 17, 18},

{19, 20, 21, 22, 23},

{24, 25, 26, 27, 28}

},

{

{5, 6, 7, 8, 9},

{10, 11, 12, 13, 14},

{15, 16, 17, 18, 19},

{20, 21, 22, 23, 24},

{25, 26, 27, 28, 29}

}

};

int kernel[KERNEL\_SIZE][KERNEL\_SIZE][KERNEL\_SIZE] = {

{

{1, 0, -1},

{1, 0, -1},

{1, 0, -1}

},

{

{0, 1, 0},

{0, 1, 0},

{0, 1, 0}

},

{

{-1, 0, 1},

{-1, 0, 1},

{-1, 0, 1}

}

};

int output[OUT\_SIZE][OUT\_SIZE][OUT\_SIZE] = {0};

// 3D Convolution

for (int d = 0; d < OUT\_SIZE; d++) {

for (int h = 0; h < OUT\_SIZE; h++) {

for (int w = 0; w < OUT\_SIZE; w++) {

int sum = 0;

for (int kd = 0; kd < KERNEL\_SIZE; kd++) {

for (int kh = 0; kh < KERNEL\_SIZE; kh++) {

for (int kw = 0; kw < KERNEL\_SIZE; kw++) {

sum += input[d + kd][h + kh][w + kw] \* kernel[kd][kh][kw];

}

}

}

output[d][h][w] = sum;

}

}

}

// Print Output Volume

printf("Output Volume (3x3x3):\n");

for (int d = 0; d < OUT\_SIZE; d++) {

printf("Depth %d:\n", d);

for (int h = 0; h < OUT\_SIZE; h++) {

for (int w = 0; w < OUT\_SIZE; w++) {

printf("%4d ", output[d][h][w]);

}

printf("\n");

}

printf("\n");

}

return 0;

}