

ΙΟΝΙΟ ΠΑΝΕΠΙΣΤΗΜΙΟ



Παράλληλος Προγραμματισμός 2017

Προγραμματιστική Εργασία #1

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Απαντήσεις...

α) Χωρίς χρήση SSE

```
#include <stdio.h>
#include <stdlib.h>
#include <sys/time.h>
#define N 100
#define R 10

void get_walltime(double *wct) {
    struct timeval tp;
    gettimeofday(&tp, NULL);
    *wct = (double)(tp.tv_sec+tp.tv_usec/1000000.0);
}

int main() {
    float *p[R], *newP[R]; //dhlwsh pinakwn
    int i, j;
    double ts, te, mflops;
    float k = 5.0;
    float k1 = 0.5;

    // allocate test arrays
    for(i=0; i<R; i++){ //desmeush mnhmhs pinakwn
        p[i] = (float *)malloc(N*sizeof(float));
        newP[i] = (float *)malloc(N*sizeof(float));
```

```
}
```

```
if (p==NULL) exit(1);
```

```
if (newP==NULL)    exit(1);
```

```
//initialize all arrays - cache warm-up
```

```
for (i=0;i<R;i++) {
```

```
    for(j=0; j<N; j++){
```

```
//dinoume tyxaies times ston pinaka kai ton 2o pinaka ton
```

```
//gemizoume me 0
```

```
        p[i][j]=(float)rand()/RAND_MAX;
```

```
        newP[i][j] = 0;
```

```
        printf("%f\n", p[i][j]);
```

```
    }
```

```
}
```

```
// get starting time (double, seconds)
```

```
    get_walltime(&ts);
```

```
// do triad artificial work
```

```
//bazoume mexri -1 wste na mhn bgei ektos oriwn tou
```

```
//pinaka
```

```
    for (i=1;i < R - 1; i++) {
```

```
        for (j=1; j < N - 1; j++) {
```

```

//upologismos toukathe pixel
newP[i][j] =p[i][j] * k + (p[i-1][j] + p[i-1][j-1] + p[i][j-1] +
p[i+1][j] + p[i+1][j+1] + p[i][j+1] + p[i-1][j+1] + p[i+1][j-1]) *
k1 ;

        }

    }

// get ending time
    get_walltime(&te);

// compute mflops/sec (2 operations per R*N passes)
    mflops = (R*N*2.0)/((te-ts)*1e6);

    printf("MFLOPS/sec = %f\n",mflops);

    return 0;
}

```

β) Με χρήση SSE

```
#include <stdio.h>
#include <stdlib.h>
#include <sys/time.h>
#define N 10
#define R 10

void get_walltime(double *wct) {
    struct timeval tp;
    gettimeofday(&tp,NULL);
    *wct = (double)(tp.tv_sec+tp.tv_usec/1000000.0);
}

int main() {
    float *p,*newP;
    int i,j;
    double ts,te,mflops;
    float k = 5.0;
    float k1 = 0.5;
    __m128 *vp, *vnewP

    // allocate test arrays
    //desmeush pinakwn
    i=posix_memalign((void**)&p,16,P*N*sizeof(float));
    if(i!=0){printf("Wrong");
```

```
exit(1);}


```

```
i=posix_memalign((void**)&newP,16,P*N*sizeof(float));
    if(i!=0){printf("Wrong");
        exit(1);}


```

```
//initialize all arrays - cache warm-up
    for (i=0;i<R;i++) {
        for(j=0; j<N; j++){
//gemisma pinaka me tuxaious arithmous
//kai gemisma neou pinaka me 0
            p[(i * N) + j]=(float)rand()/RAND_MAX;
            newP[(i * N) + j]=0;
            printf("%f\n", p[i][j]);
        }

    }


```

```
// get starting time (double, seconds)
    get_walltime(&ts);
    vp=(__m128 *)p;
    vnewp=(__m128 *)newP;

// do triad artificial work


```

```

    for (i=1; i < R - 1; i++) {
        for (j=1; j < N - 1; j++) {
            *vnewP=_mm_add_ps(_mm_mul_ps(5.0,*vp),_mm_mul_
ps (0.5,*vp[i-1]));
            vp++; vnewP++;        }
        }

// get ending time
    get_walltime(&te);

// compute mflops/sec (2 operations per R*N passes)
    mflops = (R*N*2.0)/((te-ts)*1e6);

    printf("MFLOPS/sec = %f\n",mflops);

    return 0;
}

```

Ενώ το 1^ο ερώτημα έτρεξε κανονικά το 2^ο δεν μπόρεσα να το κάνω να εκτελεστεί.

Τα προγράμματα τα έγραψα σε DEV C λόγω του ότι έχω windows .