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## **etime.c**

static variables call consist between different function

Here elapsed\_time is 0.0 it returns. after some time when we call elapsed\_time function it return 0.0 but here due to static we call it previous base address I mean store value .

Struct timeval is predefined function behaves like int and float and gettimeofday(variable) is store in that variable it calculates gap between the function calls..

We are passing gettimeofday and time zone based on system perform according to that time zone.

Elapsed\_time=elapsed\_time if we are not declare means it doesn't add previous time

Example: present task take 20seconds time previous task takes 40seconds it always implements fresh time

Here in the function I am not dividing with  $10^6$  because msec to sec because I read it in online msec will tell exact time performance of the task than seconds.

Finally, it return elapsed\_time

## **crt.c**

same coding here to implement two executable code

when I give ./pcrt processor and ./tcrt thread

here I type ./pcrt 1024 I take pcrt argv[0] and 1024 takes argv[1]

comparison in argv[0] matches string with pcrt it call ep(size)

here I type ./tcrt 1024 I take tcrt argv[0] and 1024 takes argv[1]

comparison in argv[0] matches string with tcrt it call et(argv[1])

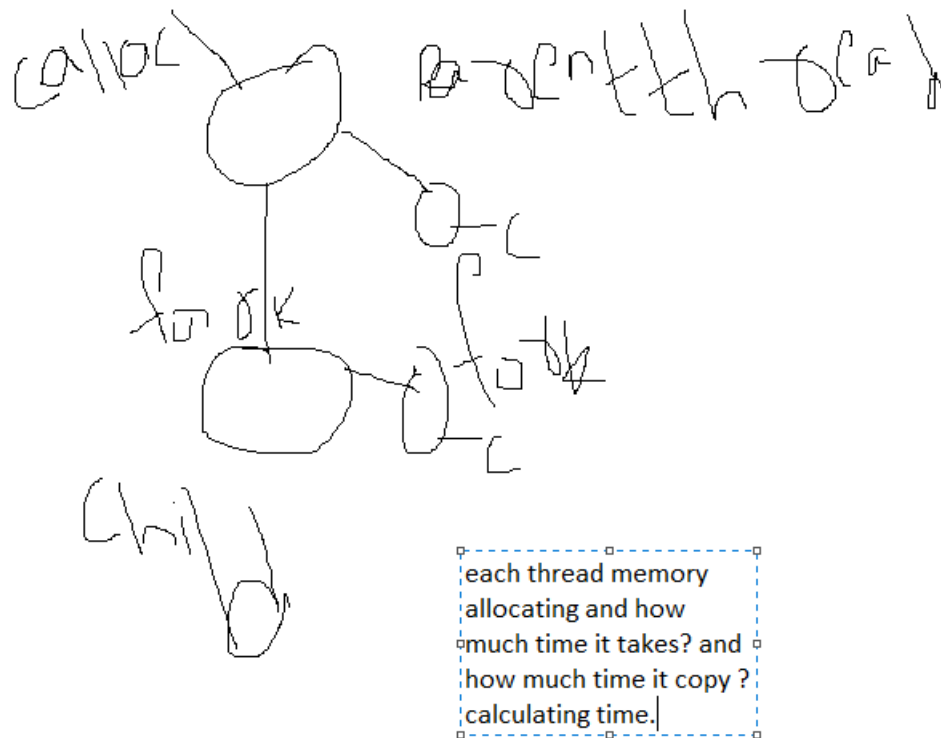
## **Ep.c**

1024 kb means double size  $1024 \times 1024$  that's why doubled (size\*size)

In main function only it convert int size=atoi(argv[1])

And passed into ep(size) in tcrt it calls another thread that is why not converting atoi in the et function.

Any processor is executed by parents processor and allocate memory.



## Et.c

After creating thread we call

Etime() it call starting time zero

We call foo function and passed argv in that we passed how many threads have to create and how many square root to find the calculation .

In argv how the value is passed?

In crt file if tcrt matches with argv[0] it passed to et(argv[1]);(0,1024,----) it stores character array string.

Argv [1] passed and stored in vargp[1] atoi convert string to int and settled in intsize.

And placed in buffer because we are not fixing the memory every time. a[size] 1024 it allocate memory from zero to size.

It stores the value in the array of index

Next we calculate ending time and stored in time and then it print elapsed time.

### **mm\_thr.c**

In main method first I allocate random variables in a matrix(rows and column).

Next step thread count based on input users

Next pthread barrier to synchronize all the threads (to meet all together it is different from pthread\_join)

In pthread\_create(&compuatation,id) it call computation function through malloc dynamically assign the memory and set the value in id and next it jump computation method above in the code.(here I written below in the report)

It counts the time of each thread and displays total time taken for all threads process.(in project given 1,2,4,8,16)

### **In computation:**

When i declare id as pointer variable allocating the memory and zero is stored means first thread come and declared in computation args it return types void pointer (int \*) it convert to int type conversion and again \*for pointer address.

Here M=4 I given means

$$240/4=60$$

Coming to logic

```
for(int i=k*m;i<=((k+1)*m)-1;i++)
```

```
here first k=0 (int i=0*60;i<=((0+1)*60)-1;i++)
```

```
(int i=0;i<=59;i++)
```

First thread goes upto 59

Second starts at 60 end at 119 (int i=1\*60;i<=((1+1)\*60)-1;i++)

(int i=60;i<=119;i++)

Third starts at 120 ends at 179

Fourth starts at 180 ends at 239

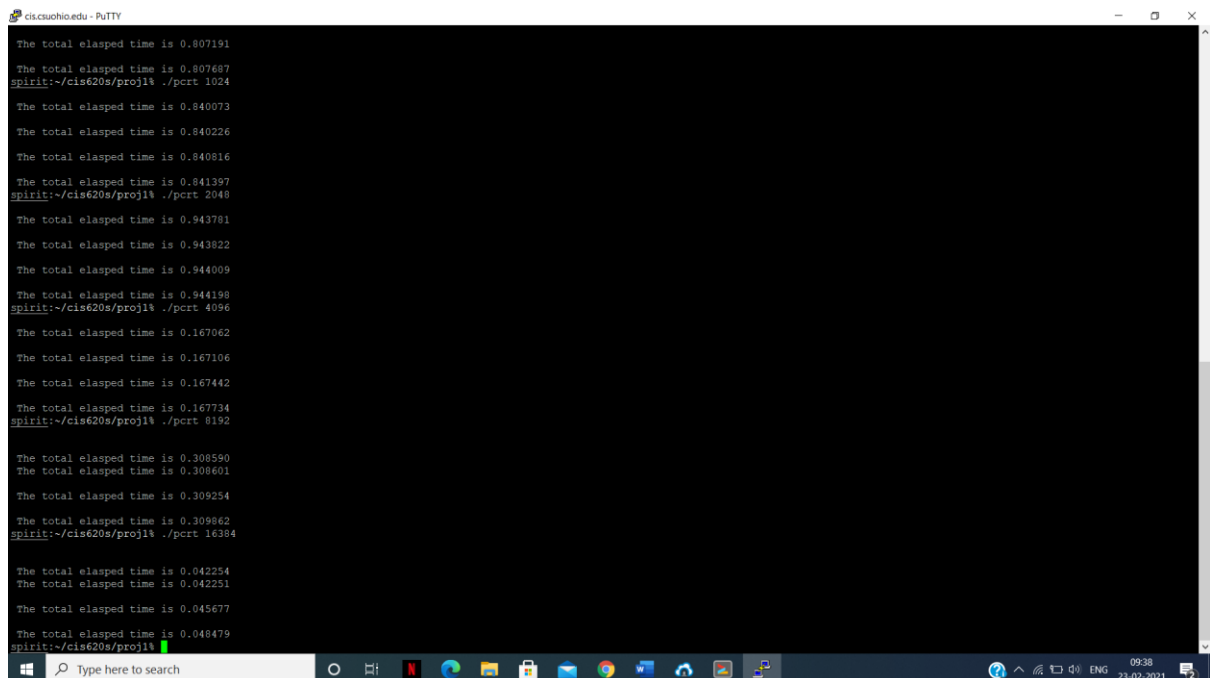
After calculating and stored results in c matrix

Return etime to the timings.

Kilobytes	pcrt	tcrt
0	0.807687	0.12340
1024	0.841397	0.999622
2048	0.944198	0.821337
4096	0.167734	0.907193
8192	0.309862	0.843083
16384	0.048479	0.795162

Processor is heavy weight and thread is light weight it basically thread take less time compared to processor .

## Pcrt



```
ciscuachiedu - PuTTY
The total elapsed time is 0.807191
The total elapsed time is 0.807687
spirit:~/cis620s/proj1$ ./pcrt 1024
The total elapsed time is 0.840073
The total elapsed time is 0.840226
The total elapsed time is 0.840816
The total elapsed time is 0.841397
spirit:~/cis620s/proj1$ ./pcrt 2048
The total elapsed time is 0.943781
The total elapsed time is 0.943822
The total elapsed time is 0.944009
The total elapsed time is 0.944198
spirit:~/cis620s/proj1$ ./pcrt 4096
The total elapsed time is 0.167062
The total elapsed time is 0.167106
The total elapsed time is 0.167442
The total elapsed time is 0.167734
spirit:~/cis620s/proj1$ ./pcrt 8192
The total elapsed time is 0.308590
The total elapsed time is 0.308601
The total elapsed time is 0.309254
The total elapsed time is 0.309862
spirit:~/cis620s/proj1$ ./pcrt 16384
The total elapsed time is 0.042254
The total elapsed time is 0.042251
The total elapsed time is 0.045677
The total elapsed time is 0.048479
spirit:~/cis620s/proj1$
```

## tcrt

```
ciscuohio.edu - PuTTY

The total elapsed time is 0.944009
The total elapsed time is 0.944198
spirit:~/cis620s/proj1% ./pcrt 4096

The total elapsed time is 0.167062
The total elapsed time is 0.167106

The total elapsed time is 0.167442
The total elapsed time is 0.167734
spirit:~/cis620s/proj1% ./pcrt 8192

The total elapsed time is 0.308590
The total elapsed time is 0.308601

The total elapsed time is 0.309254
The total elapsed time is 0.309862
spirit:~/cis620s/proj1% ./pcrt 16384

The total elapsed time is 0.042254
The total elapsed time is 0.042251

The total elapsed time is 0.045677
The total elapsed time is 0.048479
spirit:~/cis620s/proj1% ./tcrt 0

The total time elapse is 0.012340
spirit:~/cis620s/proj1% ./tcrt 1024

The total time elapse is 0.999622
spirit:~/cis620s/proj1% ./tcrt 2048

The total time elapse is 0.821337
spirit:~/cis620s/proj1% ./tcrt 4096

The total time elapse is 0.907193
spirit:~/cis620s/proj1% ./tcrt 8192

The total time elapse is 0.843083
spirit:~/cis620s/proj1% ./tcrt 16384

The total time elapse is 0.795162
spirit:~/cis620s/proj1% ./mm_bench 16
```

## mm\_bench

1	0.095565
2	0.181008
4	0.333158
8	0.982228
16	0.278172

```
ciscuohio.edu - PuTTY

1 thread waiting at the barrier
3 thread waiting at the barrier
7 thread waiting at the barrier
3 thread waiting at the barrier
4 thread waiting at the barrier
2 thread waiting at the barrier
6 thread waiting at the barrier
The total time taken is 0.982228
spirit:~/cis620s/proj1% ./mm_bench 16

1 thread waiting at the barrier
0 thread waiting at the barrier
4 thread waiting at the barrier
2 thread waiting at the barrier
8 thread waiting at the barrier
9 thread waiting at the barrier
10 thread waiting at the barrier
6 thread waiting at the barrier
7 thread waiting at the barrier
3 thread waiting at the barrier
5 thread waiting at the barrier
11 thread waiting at the barrier
12 thread waiting at the barrier
13 thread waiting at the barrier
14 thread waiting at the barrier
15 thread waiting at the barrier
The total time taken is 0.278172
spirit:~/cis620s/proj1%
```

## Make file:

```
ciscuohio.edu - PuTTY
UA Infrastructure Extended Security Maintenance (ESM) is not enabled.
1 update can be installed immediately.
0 of these updates are security updates.
To see these additional updates run: apt list --upgradable

Enable UA Infrastructure ESM to receive 186 additional security updates.
See https://ubuntu.com/advantage or run: sudo ua status

*****
This machine for educational purposes only. This does not include GAMES
or HACKING/SPAMMING/ANNOYING OTHER SYSTEMS or ANY OTHER NON-SCHOOL
RELATED ACTIVITIES. Anyone found participating in such activities will
LOSE their account (this will possibly lead to failure in some classes).
All activities on this machine may be monitored. Any illegal and/or
destructive activities will be reported to the proper authorities.
*****

Please don't run any hw/proj programs on grail. Use ssh to access other
LINUX machines spirit, arthur, bach, chopin, davinci, etc.

You have mail.
Last login: Tue Feb 23 09:31:23 2021 from cpe-75-185-195-18.cinci.res.rr.com
grail:~ ssh spirit
anpavulu@spirit's password:
Welcome to Ubuntu 18.04.5 LTS (GNU/Linux 4.15.0-123-generic x86_64)

55 packages can be updated.
0 updates are security updates.

1 updates could not be installed automatically. For more details,
see /var/log/unattended-upgrades/unattended-upgrades.log
*** System restart required ***

Last login: Tue Feb 23 09:31:33 2021 from 137.148.204.40
spirit:~% cd cis620s
spirit:~/cis620s% cd proj1
spirit:~/cis620s/proj1% ls
crt.o  ep.o  et.o  etime.o  makefile  mm_thr.o
spirit:~/cis620s/proj1% make
cc -c -o crt.o crt.c
cc -c -o et.o et.c
cc -c -o ep.o ep.c
cc -c -o etime.o etime.c
gcc crt.o et.o ep.o etime.o -lpthread -lm -o pcr
gcc crt.o et.o ep.o etime.o -lpthread -lm -o tcrt
cc -c -o mm_thr.o mm_thr.c
gcc mm_thr.o etime.o -lpthread -o mm_bench
spirit:~/cis620s/proj1%
```

## Debugging Experience:

While linking the library in the make file at correct place -lpthread,-lm it came error and later fixed it by watching videos. In function also declaration variables logics over all I can say nice because I am getting the results.

**Project Status : working**