Program

```c
#include<stdio.h>
#include<stdlib.h>
#include<sys/time.h>
#include<unistd.h>
#include<string.h>
#include<sys/mman.h>
#include<sys/wait.h>
#include<sys/types.h>
int main(int argc,char *argv[]){
if(argc<2){
printf("Error");
exit(EXIT_FAILURE);
}
struct terminal *start_time=mmap(NULL,sizeof(struct timeval),PROT_READ|PROT_WRITE,MAP_SHAREI
if(start_time==MAP_FAILED){
perror("mmap");
exit(EXIT_FAILURE);
}
pid_t pid=fork();
if(pid<0)
{
perror("FORK");
exit(EXIT_FAILURE);
}
else if(pid==0)
{
gettimeofday(&start_time,NULL);
execvp(argv[1],&argv[1]);
perror("execvp");
exit(EXIT_FAILURE);
}
else
{
struct timeval end_time;
wait(NULL);
gettimeofday(&end_time,NULL);
long s=end_time.tv_sec-start_time->tv_sec;
long ms=end_time.tv_usec-start_time->tv_usec;
double elapsed=s+ms/1e6;
printf("Elapsed Time:%.6f seconds \n",elapsed);
munmap(start_time,sizeof(struct timeval));
}
return 0;
}
```

1 Text File

```
  GNU nano 4.8                                                  /home/us/s23a/s23a40/.

export PATH='/home/us/s23a/s23a40/bin/:/usr/bin:$PATH'
```

2 Sample run of the program

```
s23a40@Server-2:~/blab$ nano ~/.bash_profile
s23a40@Server-2:~/blab$ nano exp14.c
s23a40@Server-2:~/blab$ gcc expe14.c -o exectime
s23a40@Server-2:~/blab$ ./a.out sleep 3
Elapsed time:3.001736 seconds
s23a40@Server-2:~/blab$
```