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----------PRACTICAL 06----------

❖ *Experiment-6 :*

To Demonstrate thread management using POSIX Thread API.

✓ Source Code :

```c
#include "stdio.h"
#include "stdlib.h"
#include "unistd.h"
int Rupees[4] = {100, 200, 500, 2000};
int Notes[4][4] = {{1580, 239, 276, 88}, {3320, 292, 232, 37}, {1200.39, 276, 46}, {660, 209, 633, 55}};
int total = 0;
void calculate(int arg)
{
    printf("Thread %d PID: %d\n", arg, getpid());
    for (int i = 0; i < 4; i++)
    {
       total += Rupees[i] * Notes[arg][i];
    }
}
int main()
{
   pid_t pid;
   for (int i = 0; i < 4; i++)
   {
      pid = clone((void *)calculate, malloc(4096) + 4096, 0x00000100 | 0x00000400, i);
      if (pid == -1)
```

```
    {
        perror("CLONE");
        exit(1);
    }
  }
  sleep(10);
  printf("%d\n", total);
  return 0;
}
```

✓ Note :

This is a syntax of `Clone` system call:-

`int clone(int (*fn)(void *_Nullable), void *stack,int flags,...)`

Here I utilized that particular clone system call for creating a Tread

Clone is a lightweight process for creating a thread.

`CLONE_VM = 0x00000100 (hexadecimal)`

`CLONE_FS = 0x00000400 (hexadecimal)`

The *`CLONE_VM`* flag creates a new process that shares the same memory space as the calling process.

The *`CLONE_FS`* flag creates a new process that shares the same filesystem information as the calling process.

`#include "stdlib.h"` is used to implement `malloc()`function

`#include "unistd.h"` is used to implement the `sleep()` function

✓ Output :

```
┌──tushar@tushar in ~/Documents/OS/6 via Cv12.2.1gcc took 10s
└─λ ./six
Thread 0 PID: 8397
Thread 0 PID: 8397
Thread 1 PID: 8398
Thread 2 PID: 8399
Thread 3 PID: 8400
1832700
```

```
┌──tushar@tushar in ~ via  · v19.6.1 took 8ms
└─λ ps -L -o pid,ppid,tid,cmd -p 8397
  PID  PPID   TID CMD
 8397  8396  8397 [six] <defunct>

┌──tushar@tushar in ~ via  · v19.6.1 took 11ms
└─λ ps -L -o pid,ppid,tid,cmd -p 8397
  PID  PPID   TID CMD
 8397  8396  8397 [six] <defunct>
```