EDF

```
#include <stdio.h>
#include <malloc.h>

#define arrival 0
#define execution 1
#define deadline 2
#define period 3
#define abs_arrival 4
#define execution_copy 5
#define abs_deadline 6

typedef struct
{
    int T[7], instance, alive;

} task;

#define IDLE_TASK_ID 1023
#define ALL 1
#define CURRENT 0

void get_tasks(task *t1, int n);
int hyperperiod_calc(task *t1, int n);
float cpu_util(task *t1, int n);
int gcd(int a, int b);
int lcm(int *a, int n);
int sp_interrupt(task *t1, int tmr, int n);
int min(task *t1, int n, int p);
void update_abs_arrival(task *t1, int n, int k, int all);
void update_abs_deadline(task *t1, int n, int all);
void copy_execution_time(task *t1, int n, int all);

int timer = 0;

int main()
{
    task *t;
    int n, hyper_period, active_task_id;
    float cpu_utilization;
    printf("Enter number of tasks: ");
    scanf("%d", &n);
    t = (task *)malloc(n * sizeof(task));
```

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get_tasks(t, n);
cpu_utilization = cpu_util(t, n);
printf("CPU Utilization %f\n", cpu_utilization);

if (cpu_utilization < 1)
    printf("Tasks can be scheduled\n");
else
    printf("Schedule is not feasible\n");

hyper_period = hyperperiod_calc(t, n);
copy_execution_time(t, n, ALL);
update_abs_arrival(t, n, 0, ALL);
update_abs_deadline(t, n, ALL);

while (timer < hyper_period)
{
    ++timer;
    if (timer < 10)
        printf("|  %d", timer);
    else
        printf("| %d", timer);
}
printf("|\n");

timer = 0;
while (timer < hyper_period)
{

    if (sp_interrupt(t, timer, n))
    {
        active_task_id = min(t, n, abs_deadline);
    }

    if (active_task_id == IDLE_TASK_ID)
    {
        printf("|---");
    }

    if (active_task_id != IDLE_TASK_ID)
    {

        if (t[active_task_id].T[execution_copy] != 0)
        {
            t[active_task_id].T[execution_copy]--;
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                printf("|T-%d", active_task_id + 1);
            }

            if (t[active_task_id].T[execution_copy] == 0)
            {
                t[active_task_id].instance++;
                t[active_task_id].alive = 0;
                copy_execution_time(t, active_task_id, CURRENT);
                update_abs_arrival(t, active_task_id, t[active_task_id].instance, CURRENT);
                update_abs_deadline(t, active_task_id, CURRENT);
                active_task_id = min(t, n, abs_deadline);
            }
        }
        ++timer;
    }
    printf("|\n");
    free(t);
    return 0;
}

void get_tasks(task *t1, int n)
{
    int i = 0;
    while (i < n)
    {
        printf("Enter Task %d parameters\n", i + 1);
        t1->T[arrival] = 0;
        printf("Execution time: ");
        scanf("%d", &t1->T[execution]);
        printf("Deadline time: ");
        scanf("%d", &t1->T[deadline]);
        printf("Period: ");
        scanf("%d", &t1->T[period]);
        t1->T[abs_arrival] = 0;
        t1->T[execution_copy] = 0;
        t1->T[abs_deadline] = 0;
        t1->instance = 0;
        t1->alive = 0;
        t1++;
        i++;
    }
}

int hyperperiod_calc(task *t1, int n)
```

```
{
    int i = 0, ht, a[10];
    while (i < n)

    {
        a[i] = t1->T[period];
        t1++;
        i++;
    }
    ht = lcm(a, n);

    return ht;
}

int gcd(int a, int b)
{
    if (b == 0)
        return a;
    else
        return gcd(b, a % b);
}

int lcm(int *a, int n)
{
    int res = 1, i;
    for (i = 0; i < n; i++)
    {
        res = res * a[i] / gcd(res, a[i]);
    }
    return res;
}

int sp_interrupt(task *t1, int tmr, int n)
{
    int i = 0, n1 = 0, a = 0;
    task *t1_copy;
    t1_copy = t1;
    while (i < n)
    {
        if (tmr == t1->T[abs_arrival])
        {
            t1->alive = 1;
            a++;
        }
        t1++;
        i++;
    }

    t1 = t1_copy;
    i = 0;

    while (i < n)
    {
        if (t1->alive == 0)
            n1++;
        t1++;
        i++;
    }

    if (n1 == n || a != 0)
    {
        return 1;
    }

    return 0;
}

void update_abs_deadline(task *t1, int n, int all)
{
    int i = 0;
    if (all)
    {
        while (i < n)
        {
            t1->T[abs_deadline] = t1->T[deadline] + t1->T[abs_arrival];
            t1++;
            i++;
        }
    }
    else
    {
        t1 += n;
        t1->T[abs_deadline] = t1->T[deadline] + t1->T[abs_arrival];
    }
}

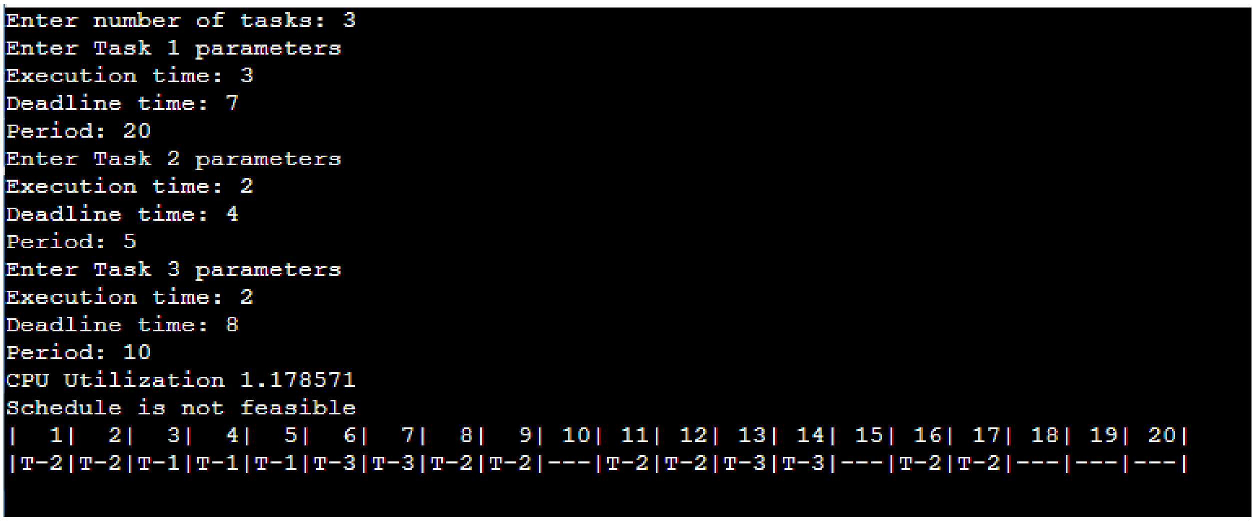
void update_abs_arrival(task *t1, int n, int k, int all)
{
    int i = 0;
    if (all)
    {
        while (i < n)
        {
            t1->T[abs_arrival] = t1->T[arrival] + k * (t1->T[period]);
            t1++;
            i++;
        }
    }
    else
    {
        t1 += n;
        t1->T[abs_arrival] = t1->T[arrival] + k * (t1->T[period]);
    }
}

void copy_execution_time(task *t1, int n, int all)
{
    int i = 0;
    if (all)
    {
        while (i < n)
        {
            t1->T[execution_copy] = t1->T[execution];
            t1++;
            i++;
        }
    }
    else
    {
        t1 += n;
        t1->T[execution_copy] = t1->T[execution];
    }
}

int min(task *t1, int n, int p)
{
    int i = 0, min = 0x7FFF, task_id = IDLE_TASK_ID;
    while (i < n)
    {
        if (min > t1->T[p] && t1->alive == 1)
        {
            min = t1->T[p];
            task_id = i;
        }
        t1++;
        i++;
    }
    return task_id;
}

float cpu_util(task *t1, int n)
{
    int i = 0;
    float cu = 0;
    while (i < n)
    {
        cu = cu + (float)t1->T[execution] / (float)t1->T[deadline];
        t1++;
        i++;
    }
    return cu;
}
```

OUTPUT:



```
Enter number of tasks: 3
Enter Task 1 parameters
Execution time: 3
Deadline time: 7
Period: 20
Enter Task 2 parameters
Execution time: 2
Deadline time: 4
Period: 5
Enter Task 3 parameters
Execution time: 2
Deadline time: 8
Period: 10
CPU Utilization 1.178571
Schedule is not feasible
|  1|  2|  3|  4|  5|  6|  7|  8|  9| 10| 11| 12| 13| 14| 15| 16| 17| 18| 19| 20|
|T-2|T-2|T-1|T-1|T-1|T-3|T-3|T-2|T-2|---|T-2|T-2|T-3|T-3|---|T-2|T-2|---|---|---|
```