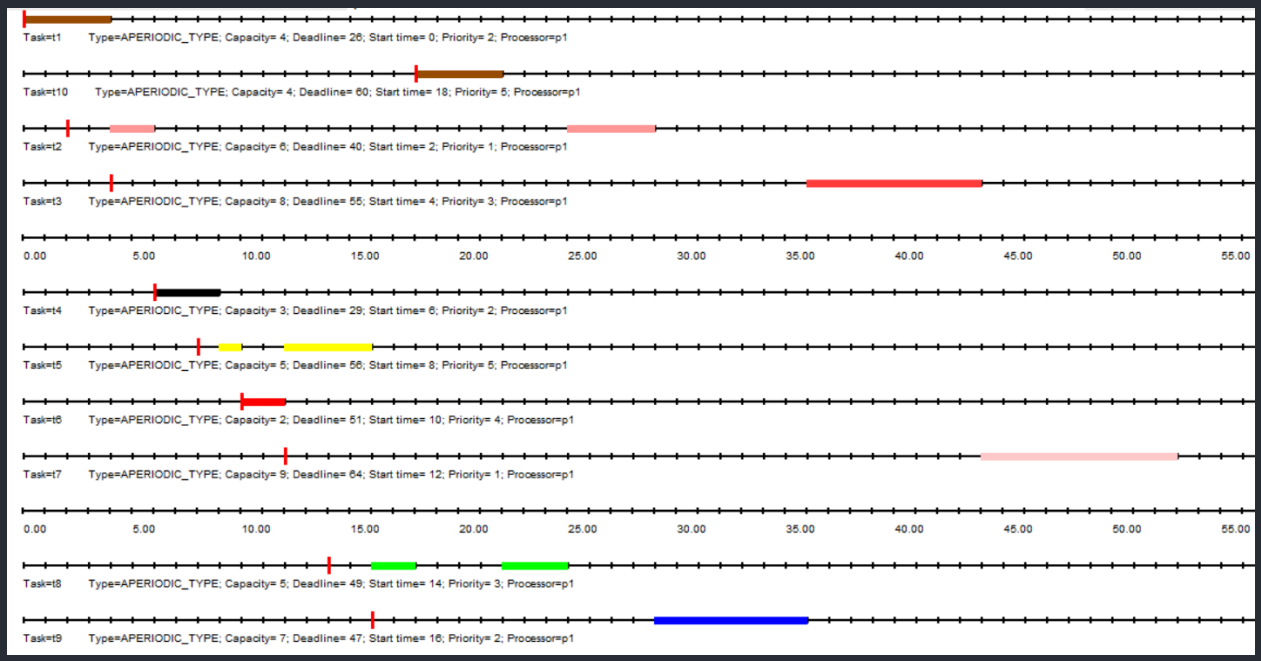
تمرین ۲ سیستم‌های نهفته

اعضای گروه: شایان کبریتی (۴۰۰۲۴۳۰۶۵) - فاطمه میرزائی کلانی (۴۰۰۲۴۳۰۷۵)

سوال ۱: الف) تسک ست اول:

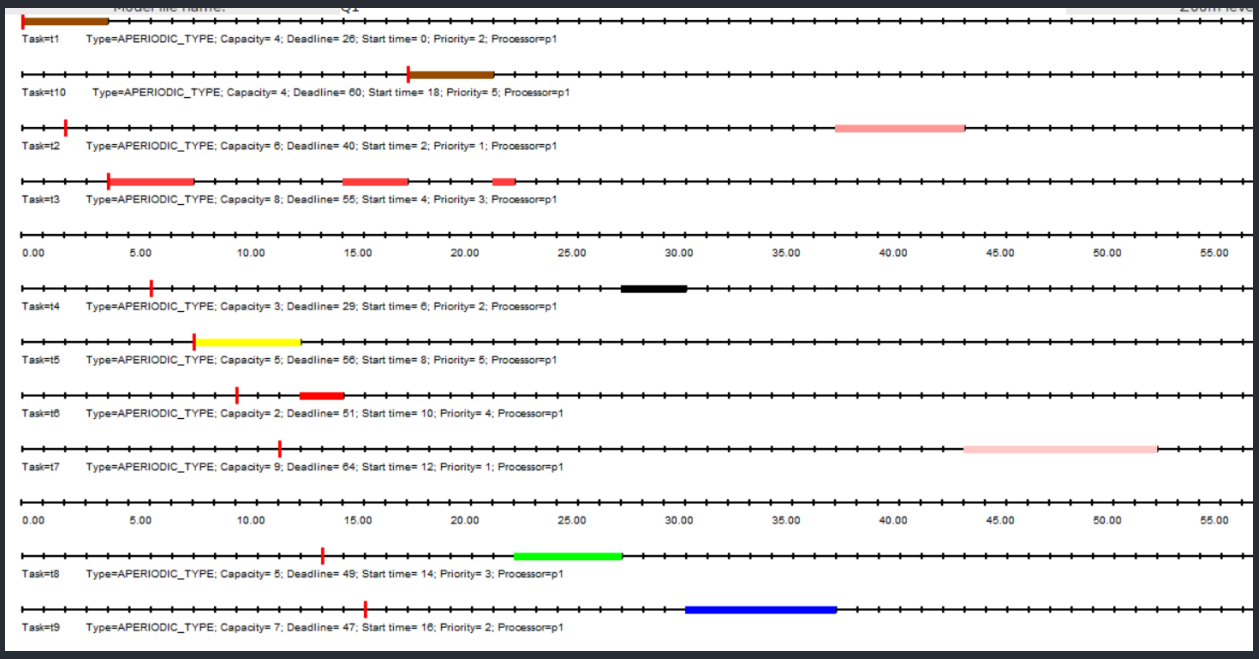
الگوریتم SJF برای تسک ست اول feasible است و تسکی miss نمیشود. همچنین در هنگام تعریف تسک‌ها، context switch را برابر ۳ واحد زمانی گذاشتیم.

```
Scheduling simulation, Processor p1 :

- Number of context switches :  12
- Number of preemptions :  3

- Task response time computed from simulation :
   t1 => 4/worst
   t10 => 4/worst
   t2 => 27/worst
   t3 => 40/worst
   t4 => 3/worst
   t5 => 8/worst
   t6 => 2/worst
   t7 => 41/worst
   t8 => 11/worst
   t9 => 20/worst
- No deadline missed in the computed scheduling : the task set is schedulable if you computed the scheduling on the feasibility interval.
```



الگوریتم Fixed Priority که بر اساس اولویت تسک‌ها آنها را schedule میکند و preemptive است برای این تسک ست feasible نیست چون یکی از تسک‌ها miss میشود.

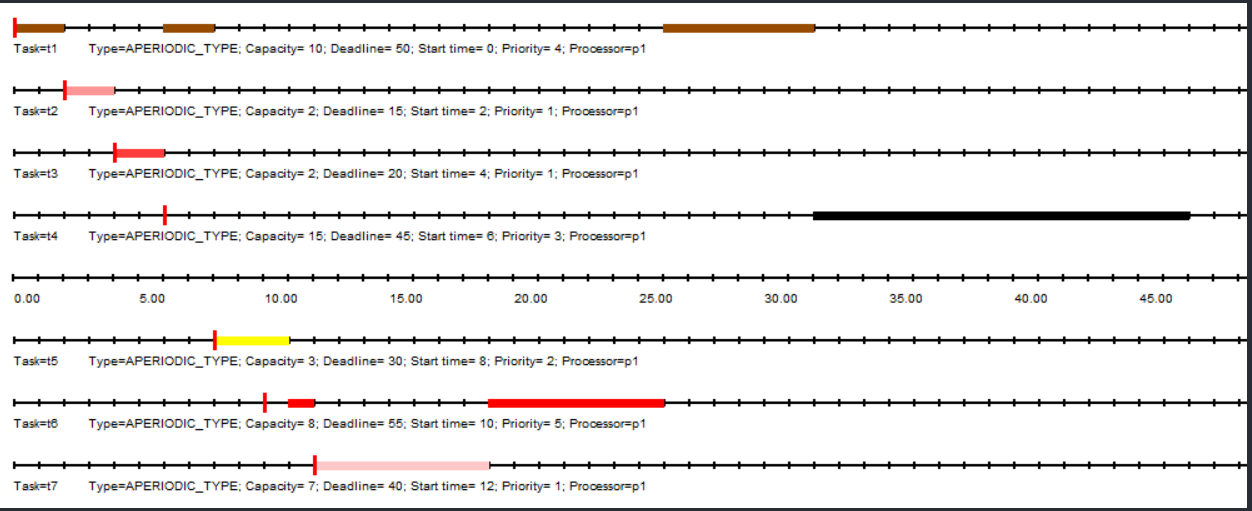
```
Scheduling simulation, Processor p1 :

- Number of context switches :  11
- Number of preemptions :  2

- Task response time computed from simulation :
   t1 => 4/worst
   t10 => 4/worst
   t2 => 42/worst ,  missed its deadline (absolute deadline =  42 ; completion time =  44)
   t3 => 19/worst
   t4 => 25/worst
   t5 => 5/worst
   t6 => 5/worst
   t7 => 41/worst
   t8 => 14/worst
   t9 => 22/worst
- Some task deadlines will be missed : the task set is not schedulable.
```



تسک ست دوم:

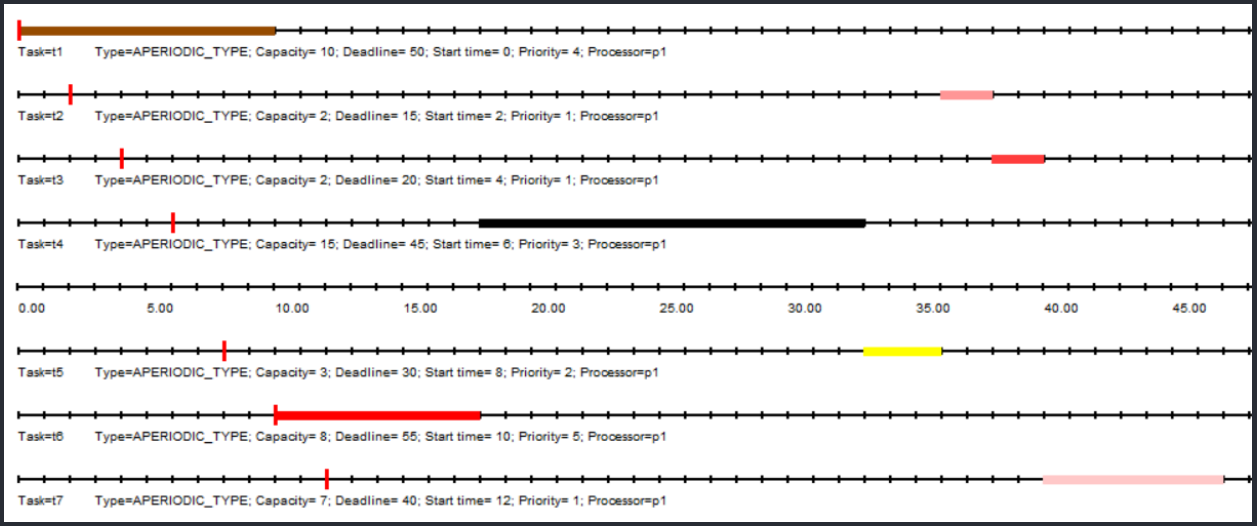
با الگوریتم SJF میتوان این تسک ست را زمانبندی کرد و feasible است.

```
Scheduling simulation, Processor p1 :

- Number of context switches :  9
- Number of preemptions :  3

- Task response time computed from simulation :
   t1 => 32/worst
   t2 => 2/worst
   t3 => 2/worst
   t4 => 41/worst
   t5 => 3/worst
   t6 => 16/worst
   t7 => 7/worst
- No deadline missed in the computed scheduling : the task set is schedulable if you computed the scheduling on the feasibility interval.
```

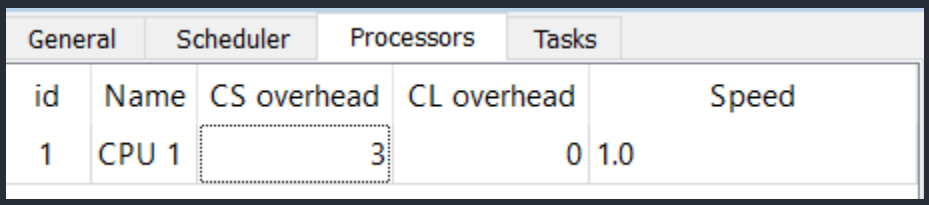


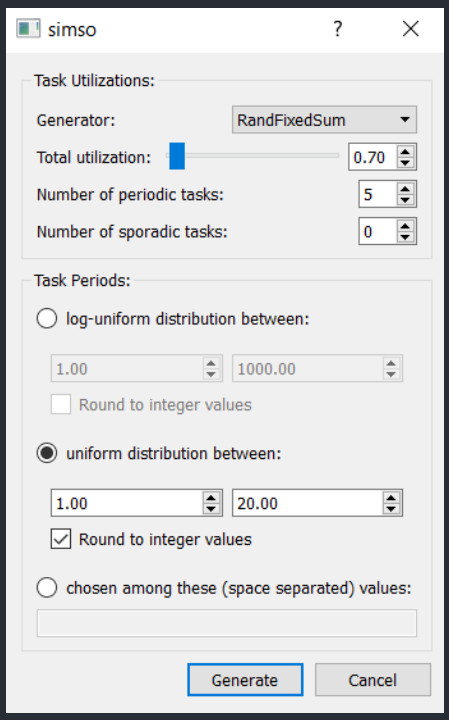
با الگوریتم FP قابل زمانبندی نیست.

```
Scheduling simulation, Processor p1 :

- Number of context switches :  6
- Number of preemptions :  0

- Task response time computed from simulation :
   t1 => 10/worst
   t2 => 36/worst ,  missed its deadline (absolute deadline =  17 ; completion time =  38)
   t3 => 36/worst ,  missed its deadline (absolute deadline =  24 ; completion time =  40)
   t4 => 27/worst
   t5 => 28/worst
   t6 => 8/worst
   t7 => 35/worst
- Some task deadlines will be missed : the task set is not schedulable.
```



ب) RandFixedSum:

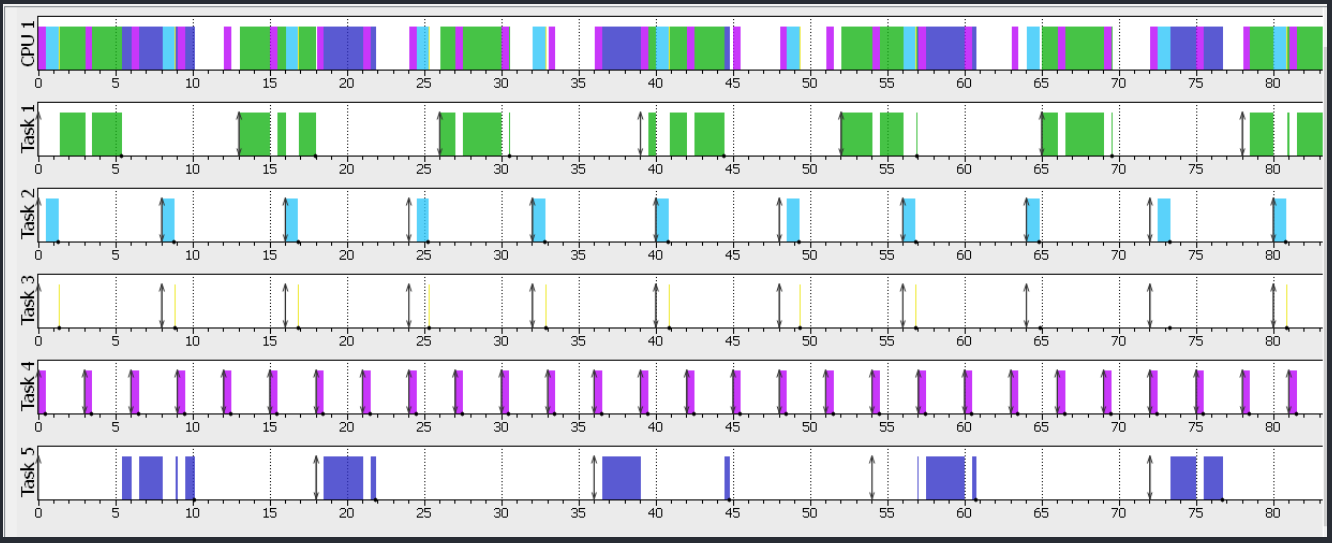




مقدار استفاده از CPU را روی ۷۰٪ می‌گذاریم. ۵ تسک با پریود بین ۱ تا ۲۰ میسازیم.

General | Scheduler | Processors | Tasks

id	Name	Task type	Abort on miss	Act. Date (ms)	Period (ms)	List of Act. dates (ms)	Deadline (ms)	WCET (ms)
1	Task 1	Periodic	☑ Yes	0	13.0	-	13.0	3.591035
2	Task 2	Periodic	☑ Yes	0	8.0	-	8.0	0.805752
3	Task 3	Periodic	☑ Yes	0	8.0	-	8.0	0.055932
4	Task 4	Periodic	☑ Yes	0	3.0	-	3.0	0.465534
5	Task 5	Periodic	☑ Yes	0	18.0	-	18.0	2.895795



Response time:

Task	min	avg	max	std dev
Task 1	4.057	4.886	5.384	0.461
Task 2	0.806	0.985	1.271	0.226
Task 3	0.862	1.041	1.327	0.226
Task 4	0.466	0.466	0.466	0.000
Task 5	3.827	7.137	10.072	2.269

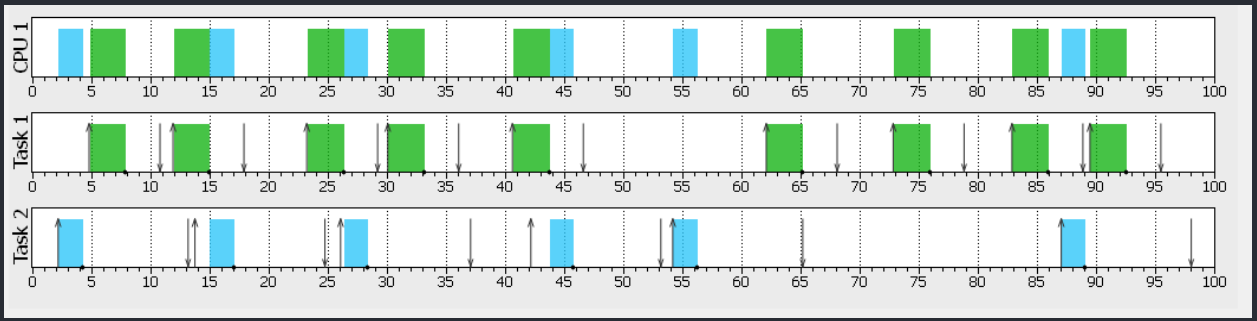
تسک‌ها بر اساس نزدیک بودن ددلاینشان انجام می‌شوند و در نهایت بدون miss شدن و به شکل پریودیک زمانبندی می‌شوند.

Kato's method:

General | Scheduler | Processors | Tasks

id	Name	CS overhead	CL overhead	Speed
1	CPU 1	3	0	1.0

id	Name	Task type	Abort on miss	Act. Date (ms)	Period (ms)	List of Act. dates (ms)	Deadline (ms)	WCET (ms)	Followed by
1	Task 1	Periodic	Yes	0	6.0	-	6.0	3.088803	
2	Task 2	Periodic	Yes	0	11.0	-	11.0	2.037194	



Response time:

Task	min	avg	max	std dev
Task 1	3.089	3.089	3.089	0.000
Task 2	2.037	2.536	3.566	0.636

General | Logs | Tasks | Scheduler

General | Task 1 | Task 2

Activation	Start	End	Deadline
4.8029	4.8029	7.8917	10.8029
11.9058	11.9058	14.9946	17.9058
23.2162	23.2162	26.3050	29.2162
30.0741	30.0741	33.1629	36.0741
40.6210	40.6210	43.7098	46.6210
62.1001	62.1001	65.1889	68.1001
72.8417	72.8417	75.9305	78.8417
82.8913	82.8913	85.9801	88.8913
89.4892	89.4892	92.5780	95.4892

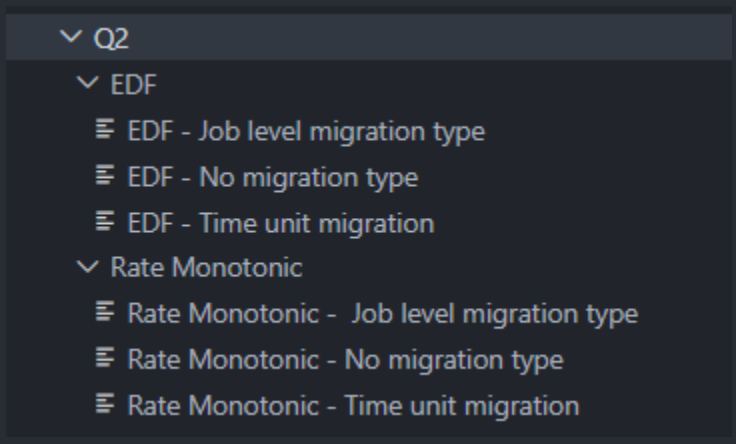
General | Task 1 | Task 2

Activation	Start	End	Deadline
2.1802	2.1802	4.2174	13.1802
13.7562	13.7562	17.0318	24.7562
26.0823	26.0823	28.3422	37.0823
42.1811	42.1811	45.7470	53.1811
54.1880	54.1880	56.2252	65.1880
87.0615	87.0615	89.0987	98.0615

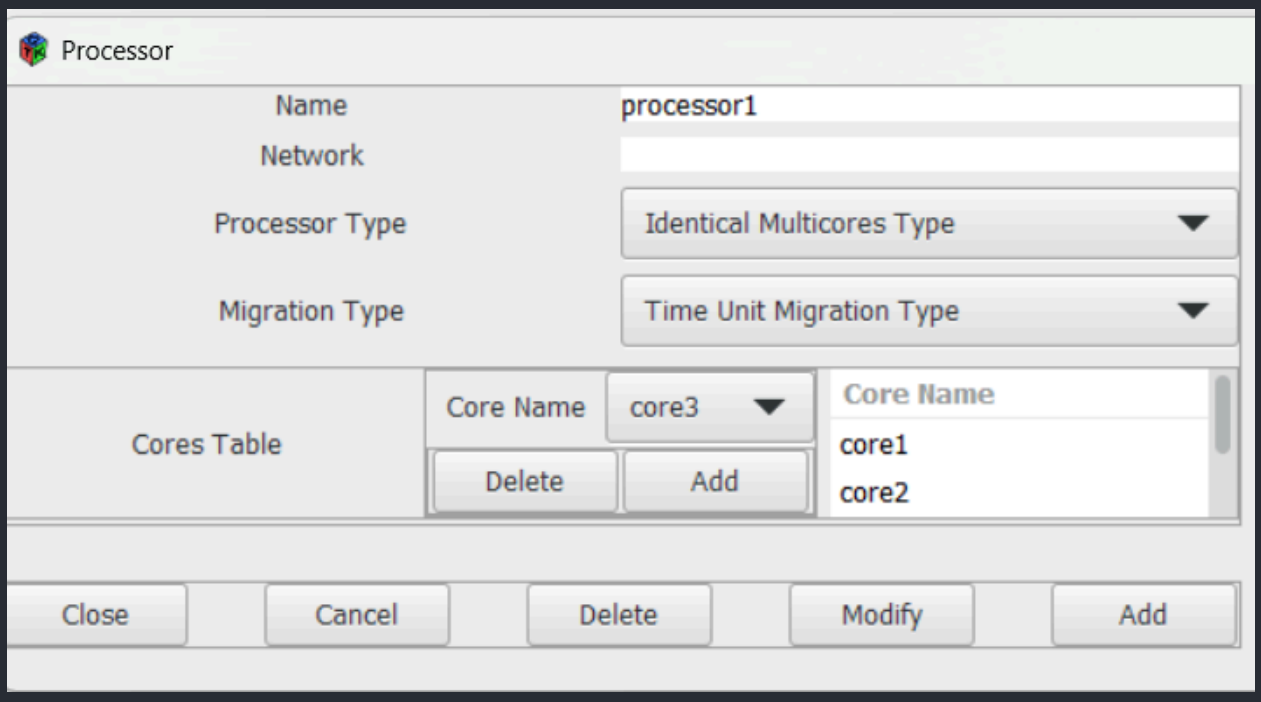
هیچ تسکی میس نشده است(با مقایسه زمان end و deadline)

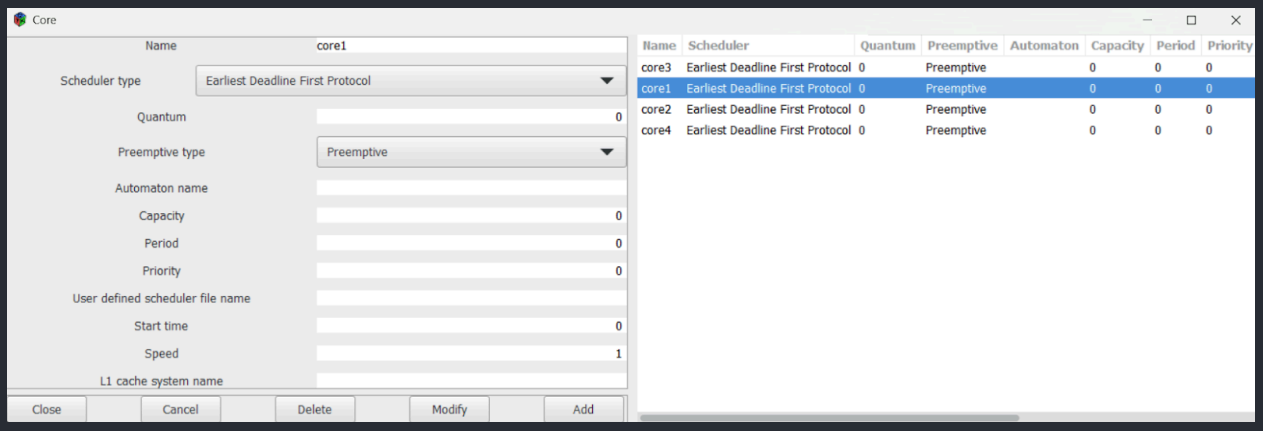
سوال ۲:

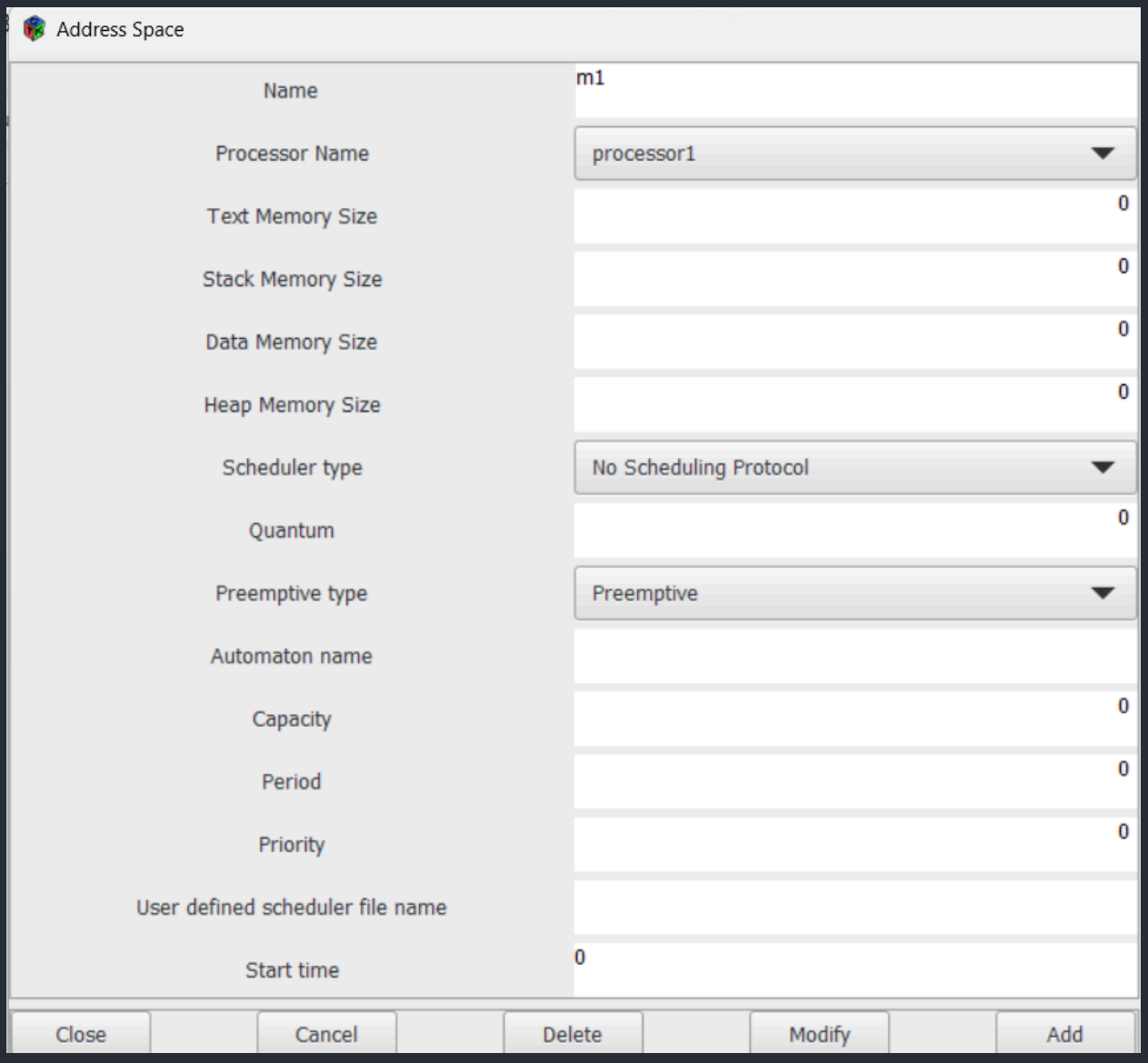
فایل مدل‌ها جداگانه قرار داده شده:



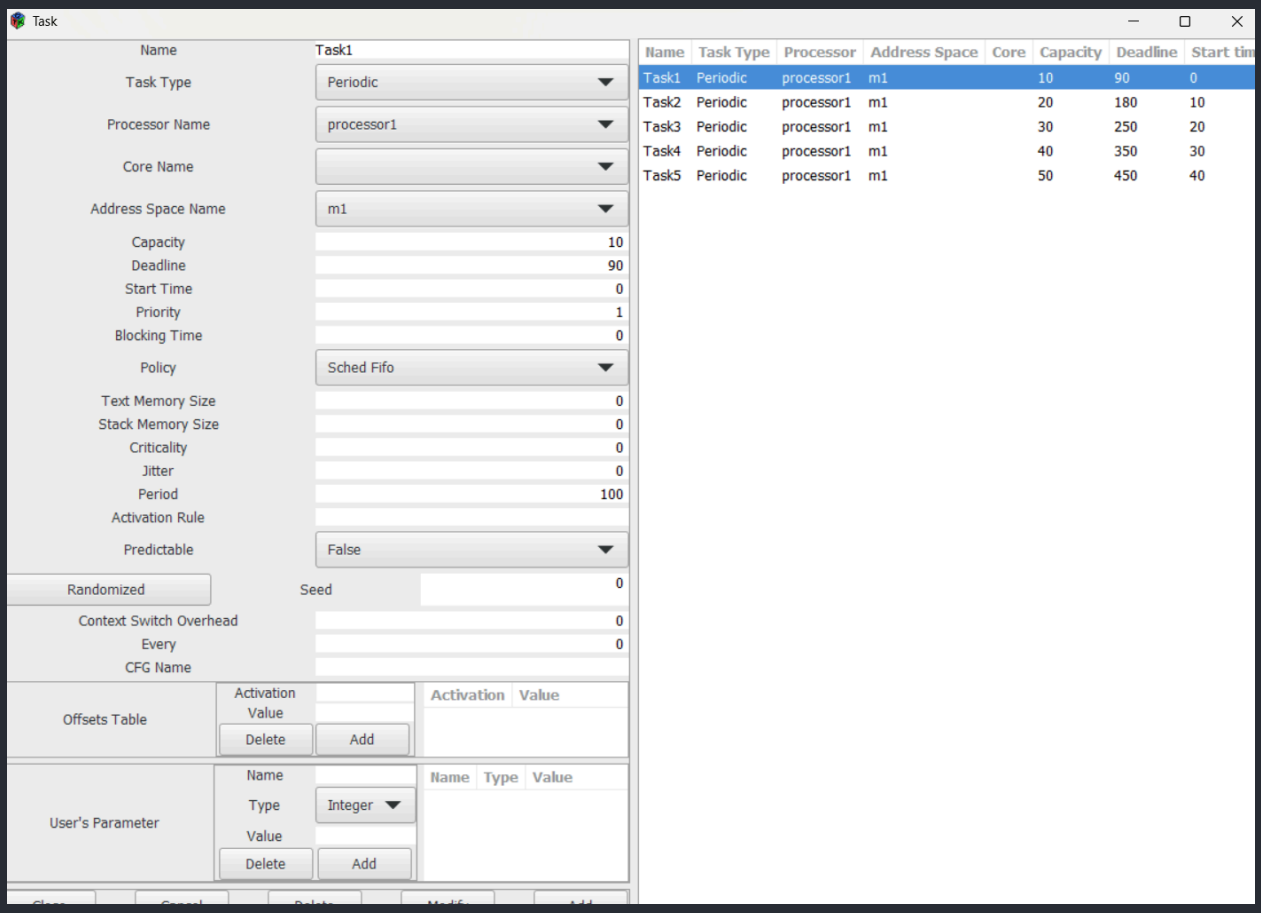
تنظیمات اولیه:




Core
Name
core1
Scheduler type
Earliest Deadline First Protocol
Quantum
0
Preemptive type
Preemptive
Automaton name
Capacity
0
Period
0
Priority
0
User defined scheduler file name
Start time
0
Speed
1
L1 cache system name
Close
Cancel
Delete
Modify
Add
Name Scheduler Quantum Preemptive Automaton Capacity Period Priority
core3 Earliest Deadline First Protocol 0 Preemptive 0 0 0
core1 Earliest Deadline First Protocol 0 Preemptive 0 0 0
core2 Earliest Deadline First Protocol 0 Preemptive 0 0 0
core4 Earliest Deadline First Protocol 0 Preemptive 0 0 0


Address Space
Name
m1
Processor Name
processor1
Text Memory Size
0
Stack Memory Size
0
Data Memory Size
0
Heap Memory Size
0
Scheduler type
No Scheduling Protocol
Quantum
0
Preemptive type
Preemptive
Automaton name
Capacity
0
Period
0
Priority
0
User defined scheduler file name
Start time
0
Close
Cancel
Delete
Modify
Add

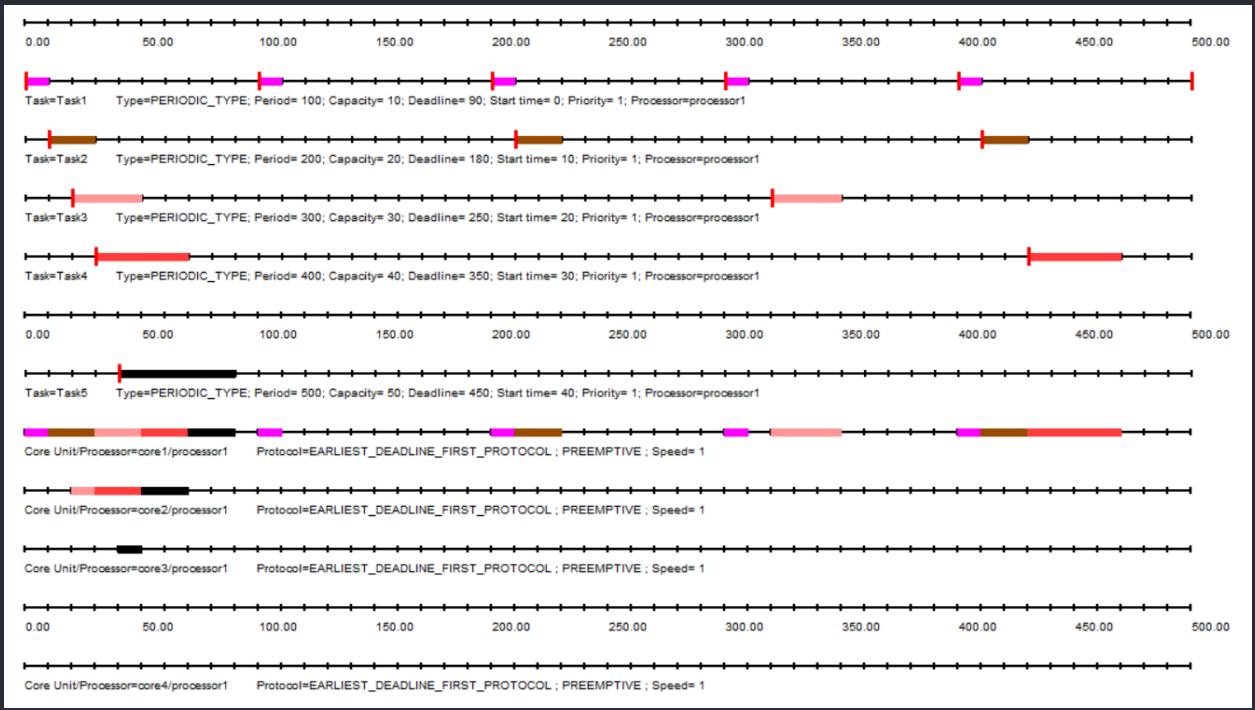
Name	Task Type	Processor	Address Space	Core	Capacity	Deadline	Start time	Priority	Blocking Time
Task1	Periodic	processor1	m1		10	90	0	1	0
Task2	Periodic	processor1	m1		20	180	10	1	0
Task3	Periodic	processor1	m1		30	250	20	1	0
Task4	Periodic	processor1	m1		40	350	30	1	0
Task5	Periodic	processor1	m1		50	450	40	1	0



چون در صورت سوال جدید، context switching حذف شده است، به صورت دیفالت همه‌ی آنها صفر set شده‌اند.

نتیجه اجرای الگوریتم ها:

- **EDF:**
    - **Time unit migration:**

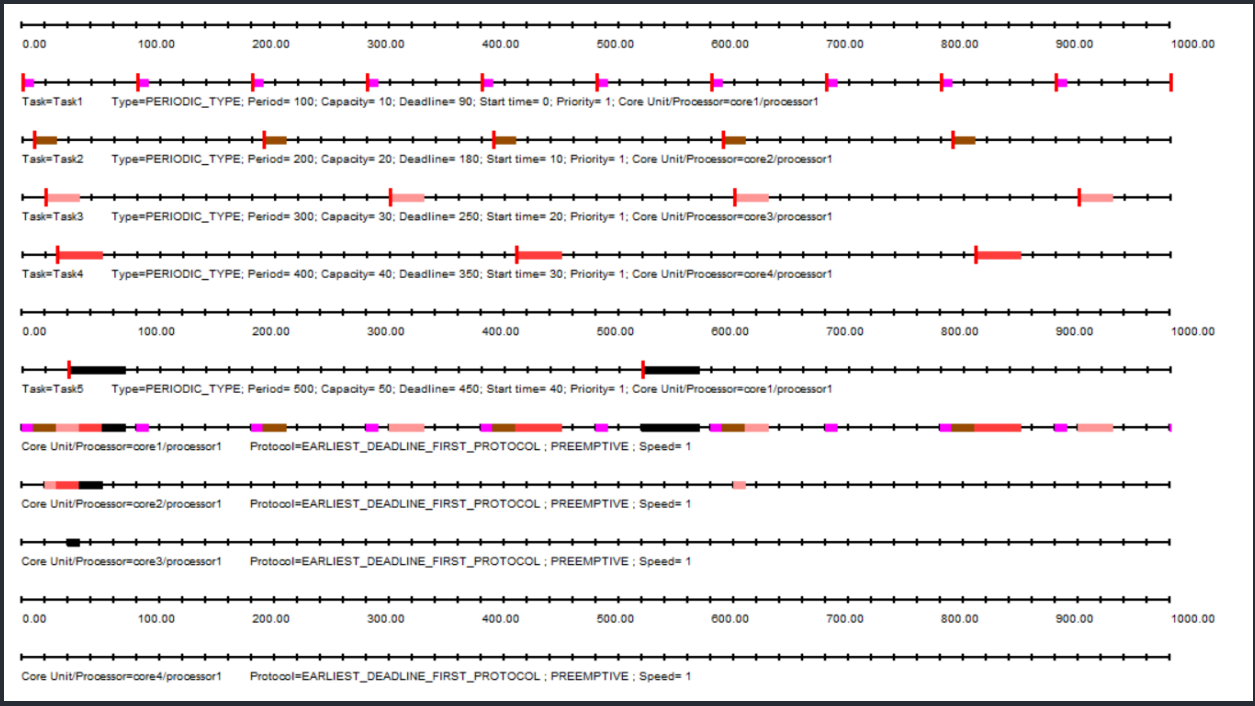



```
- Number of context switches :  116
- Number of preemptions :  104

- Task response time computed from simulation :
   Task1 => 10/worst
   Task2 => 20/worst
   Task3 => 30/worst
   Task4 => 40/worst
   Task5 => 50/worst
- No deadline missed in the computed scheduling : the task set is schedulable if you computed the scheduling on the feasibility interval.
```

ددلاینی miss نشده است.

- **No migration type:**

Name	Task Type	Processor	Address Space	Core	Capacity	Deadline	Start tin
Task1	Periodic	processor1	m1	core1	10	90	0
Task2	Periodic	processor1	m1	core2	20	180	10
Task3	Periodic	processor1	m1	core3	30	250	20
Task4	Periodic	processor1	m1	core4	40	350	30
Task5	Periodic	processor1	m1	core1	50	450	40



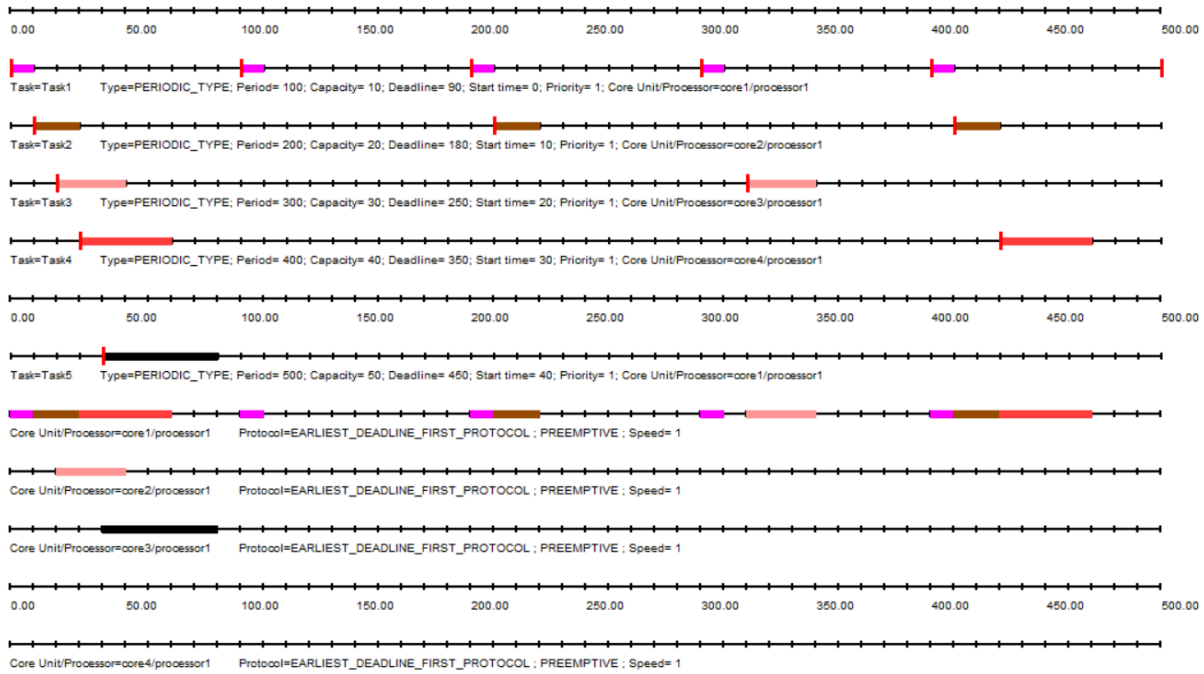
- Number of context switches : 827
- Number of preemptions : 692

- Task response time computed from simulation :
  Task1 => 10/worst
  Task2 => 20/worst
  Task3 => 30/worst
  Task4 => 40/worst
  Task5 => 50/worst
- No deadline missed in the computed scheduling : the task set is schedulable if you computed the scheduling on the feasibility interval.

ددلاینی miss نشده است.

- **Job level migration type:**

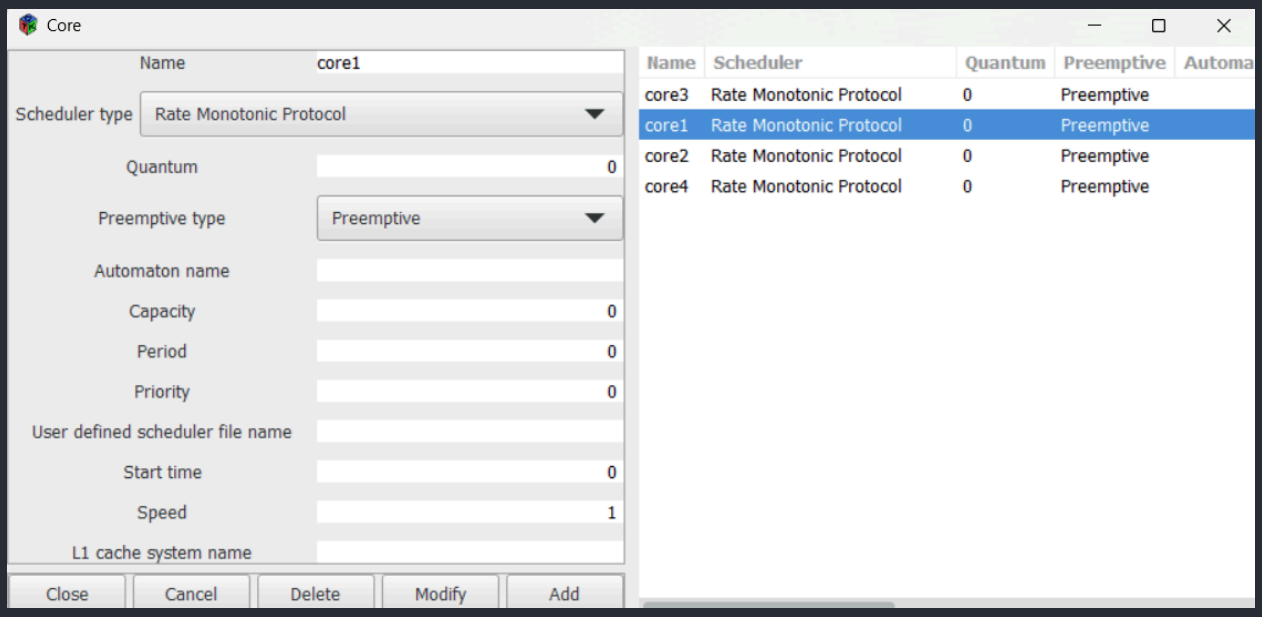
Name	Task Type	Processor	Address Space	Core	Capacity	Deadline	Start tin
Task1	Periodic	processor1	m1	core1	10	90	0
Task2	Periodic	processor1	m1	core2	20	180	10
Task3	Periodic	processor1	m1	core3	30	250	20
Task4	Periodic	processor1	m1	core4	40	350	30
Task5	Periodic	processor1	m1	core1	50	450	40



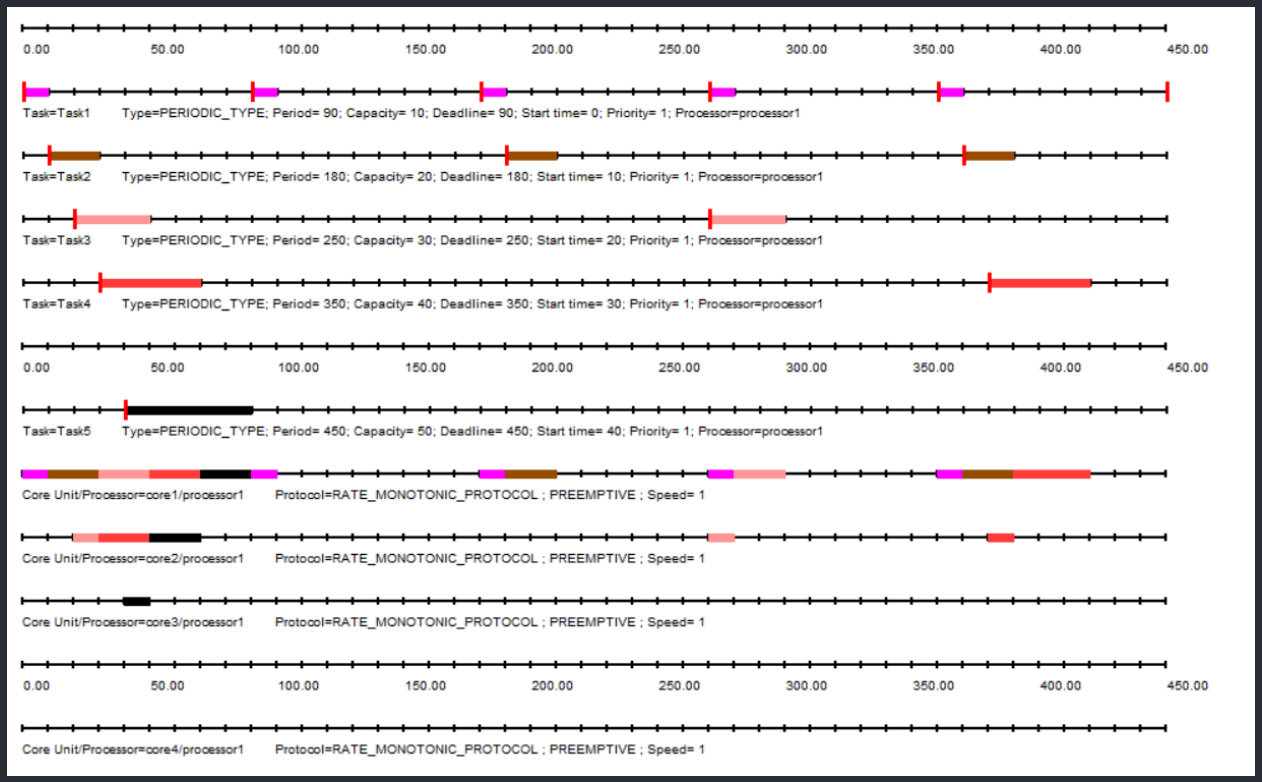
- Number of context switches : 117
- Number of preemptions : 105

- Task response time computed from simulation :
  - Task1 => 10/worst
  - Task2 => 20/worst
  - Task3 => 30/worst
  - Task4 => 40/worst
  - Task5 => 50/worst
- No deadline missed in the computed scheduling : the task set is schedulable if you computed the scheduling on the feasibility interval.

- **Rate Monotonic:**



  - **Time unit migration:**



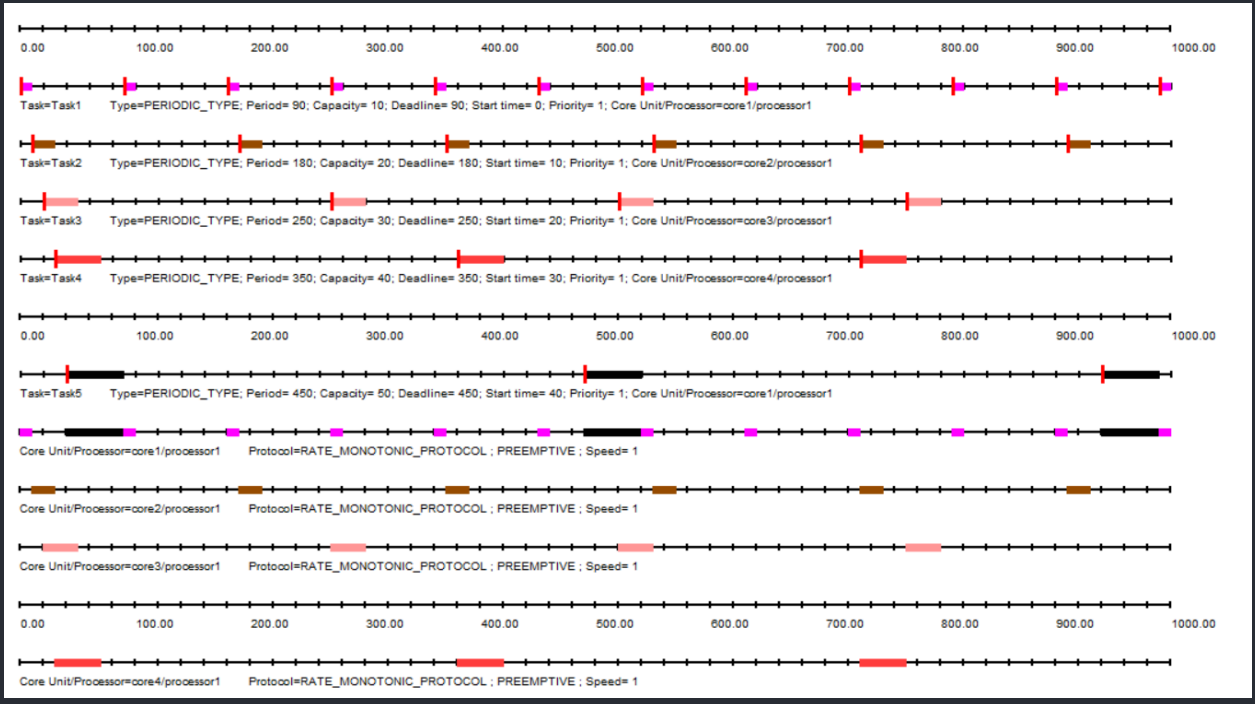
- Number of context switches : 152
- Number of preemptions : 140

- Task response time computed from simulation :
  Task1 => 10/worst
  Task2 => 20/worst
  Task3 => 30/worst
  Task4 => 40/worst
  Task5 => 50/worst
- No deadline missed in the computed scheduling : the task set is schedulable if you computed the scheduling on the feasibility interval.

ددلاینی miss نشده است.

- **No migration type:**

Name	Task Type	Processor	Address Space	Core	Capacity	Deadline	Start tin
Task1	Periodic	processor1	m1	core1	10	90	0
Task2	Periodic	processor1	m1	core2	20	180	10
Task3	Periodic	processor1	m1	core3	30	250	20
Task4	Periodic	processor1	m1	core4	40	350	30
Task5	Periodic	processor1	m1	core1	50	450	40

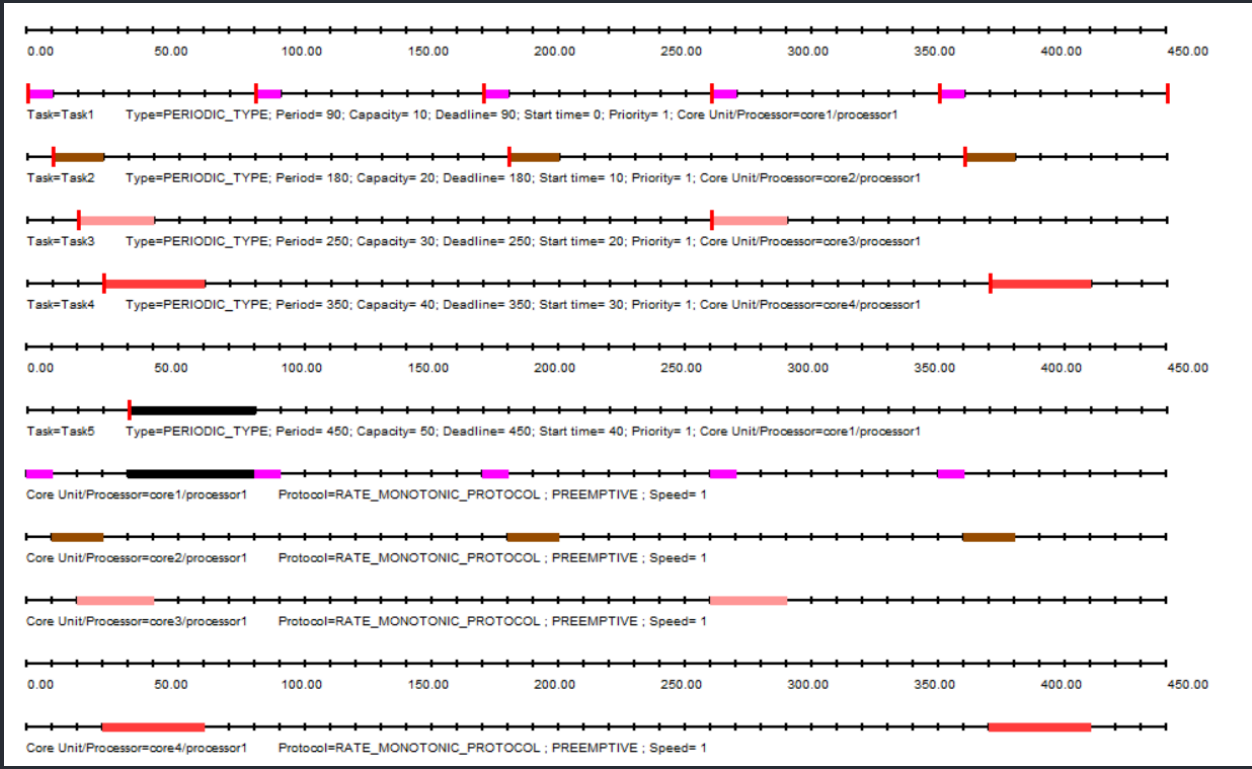


```
- Number of context switches :  11647
- Number of preemptions :  9981

- Task response time computed from simulation :
   Task1 => 10/worst
   Task2 => 20/worst
   Task3 => 30/worst
   Task4 => 40/worst
   Task5 => 50/worst
- No deadline missed in the computed scheduling : the task set is schedulable if you computed the scheduling on the feasibility interval.
```

ددلاینی miss نشده است.

- **Job level migration type:**

Name	Task Type	Processor	Address Space	Core	Capacity	Deadline	Start tim
Task1	Periodic	processor1	m1	core1	10	90	0
Task2	Periodic	processor1	m1	core2	20	180	10
Task3	Periodic	processor1	m1	core3	30	250	20
Task4	Periodic	processor1	m1	core4	40	350	30
Task5	Periodic	processor1	m1	core1	50	450	40



```
- Number of context switches :  153
- Number of preemptions :  141

- Task response time computed from simulation :
   Task1 => 10/worst
   Task2 => 20/worst
   Task3 => 30/worst
   Task4 => 40/worst
   Task5 => 50/worst
- No deadline missed in the computed scheduling : the task set is schedulable if you computed the scheduling on the feasibility interval.
```

ددلاینی miss نشده است.