

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

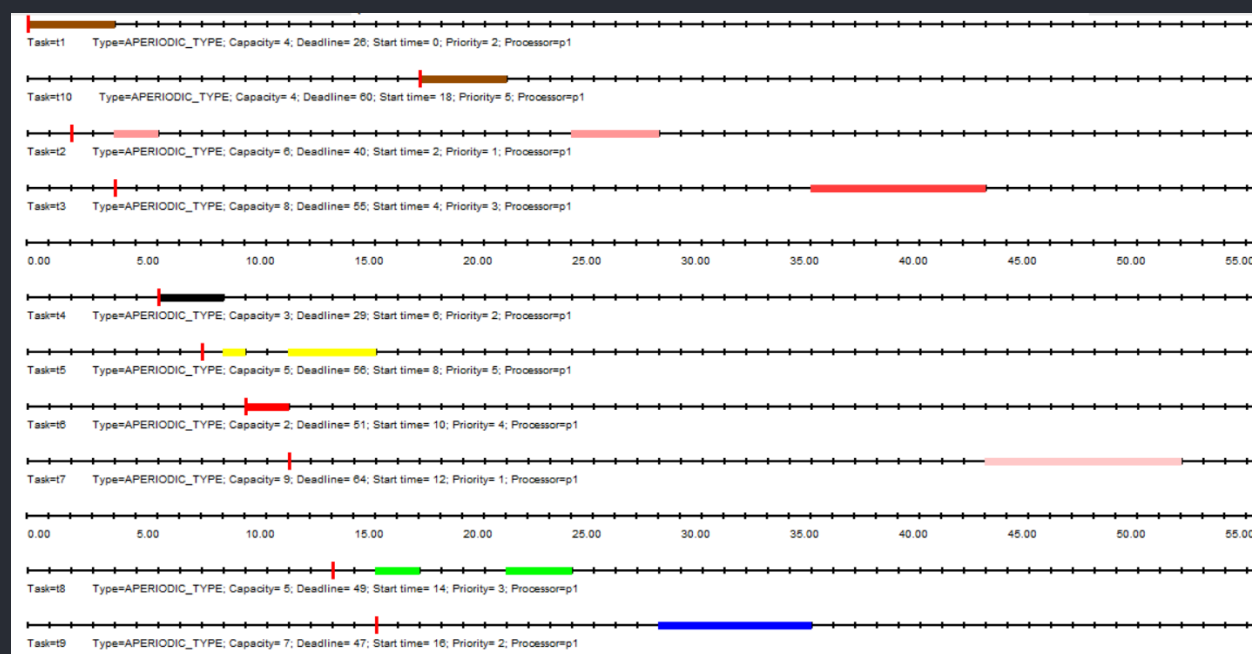
t6 => 2/worst

t7 => 41/worst

t8 => 11/worst

t9 => 20/worst

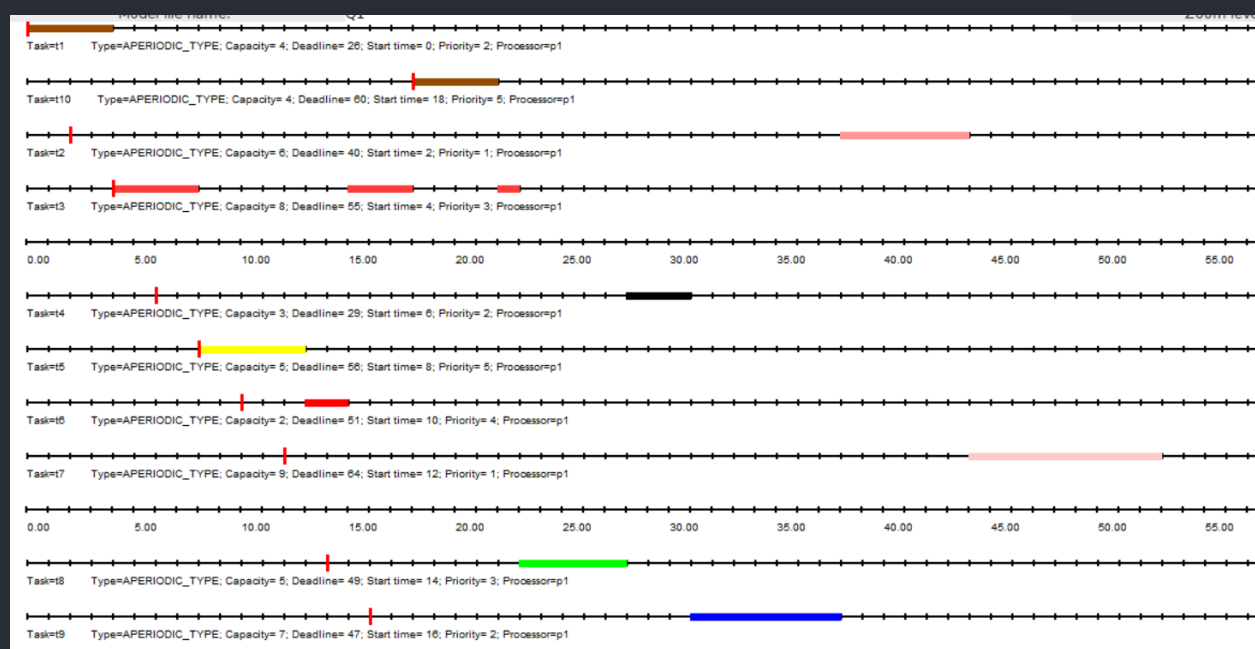
- No deadline missed in the computed scheduling : the task set is schedulable if you computed the scheduling on the feasibility interval.



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 :

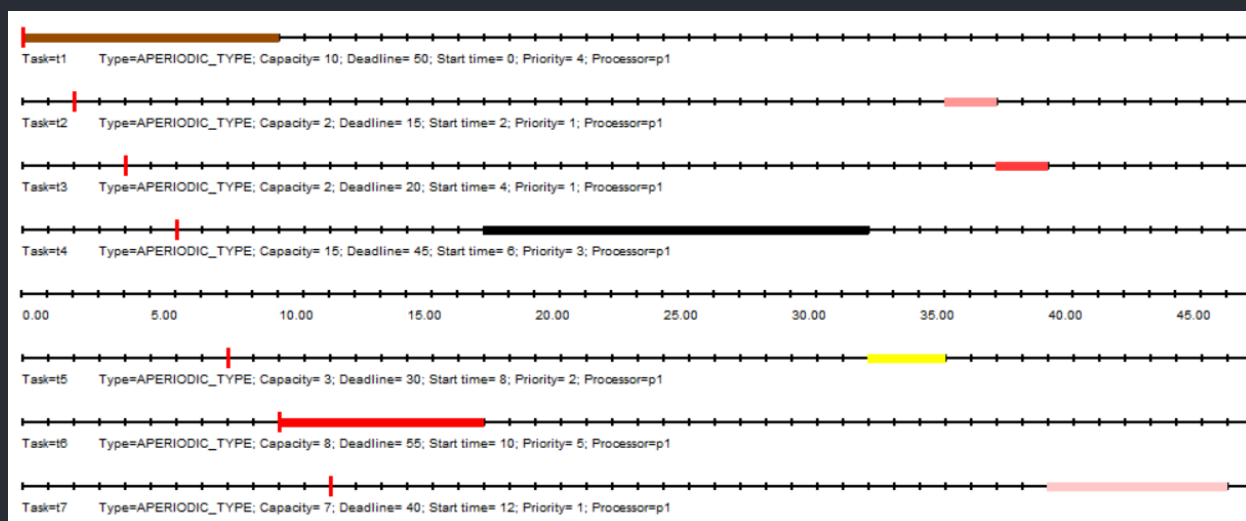
- Number of context switches : 9
- Number of preemptions : 3
- Task response time computed from simulation :
 - t1 => 32/worst
 - t2 => 2/worst
 - t3 => 2/worst
 - t4 => 41/worst
 - t5 => 3/worst
 - t6 => 16/worst
 - t7 => 7/worst
- No deadline missed in the computed scheduling : the task set is schedulable 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:

General		Scheduler	Processors	Tasks
id	Name	CS overhead	CL overhead	Speed
1	CPU 1	3	0	1.0

simso
?
X

Task Utilizations:

Generator: RandFixedSum

Total utilization: 0.70

Number of periodic tasks: 5

Number of sporadic tasks: 0

Task Periods:

☐ log-uniform distribution between:

1.00 1000.00

☐ Round to integer values

☒ uniform distribution between:

1.00 20.00

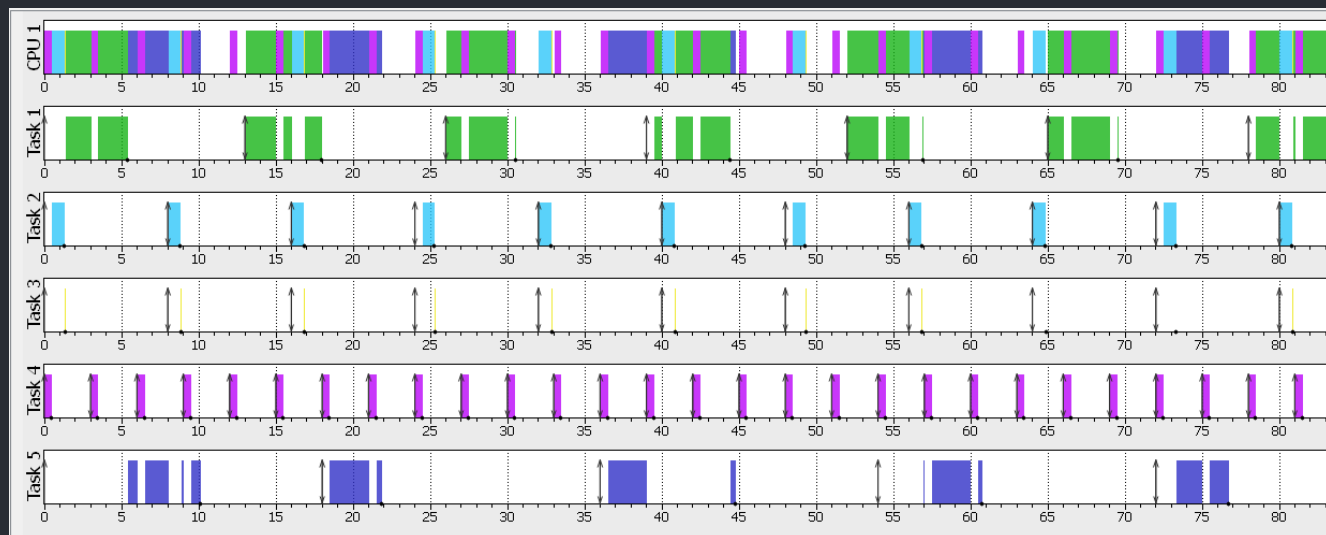
☒ Round to integer values

☐ chosen among these (space separated) values:

Generate Cancel

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 ▾	<input checked="" type="checkbox"/> Yes	0	13.0	-	13.0	3.591035	
2	Task 2	Periodic ▾	<input checked="" type="checkbox"/> Yes	0	8.0	-	8.0	0.805752	
3	Task 3	Periodic ▾	<input checked="" type="checkbox"/> Yes	0	8.0	-	8.0	0.055932	
4	Task 4	Periodic ▾	<input checked="" type="checkbox"/> Yes	0	3.0	-	3.0	0.465534	
5	Task 5	Periodic ▾	<input checked="" type="checkbox"/> Yes	0	18.0	-	18.0	2.895795	



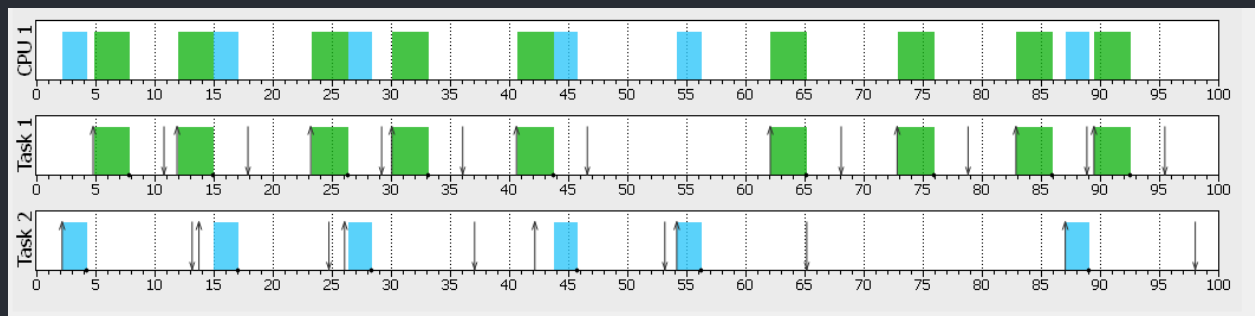
Response time:				
Task	min	avg	max	std dev
Task 1	4.057	4.886	5.384	0.461
Task 2	0.806	0.985	1.271	0.226
Task 3	0.862	1.041	1.327	0.226
Task 4	0.466	0.466	0.466	0.000
Task 5	3.827	7.137	10.072	2.269

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	<input checked="" type="checkbox"/> Yes	0	6.0	-	6.0	3.088803	
2	Task 2	Periodic	<input checked="" type="checkbox"/> 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	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

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

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

سوال ۲:

فایل مدل‌ها جداگانه قرار داده شده:

Q2

EDF

- EDF - Job level migration type
- EDF - No migration type
- EDF - Time unit migration

Rate Monotonic

- Rate Monotonic - Job level migration type
- Rate Monotonic - No migration type
- Rate Monotonic - Time unit migration

تنظیمات اولیه:

Processor

Name: processor1

Network:

Processor Type: Identical Multicores Type

Migration Type: Time Unit Migration Type

Cores Table

Core Name
core3
core1
core2

Buttons: Close, Cancel, Delete, Modify, Add

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	0
core1	Earliest Deadline First Protocol	0	Preemptive	0	0	0	0
core2	Earliest Deadline First Protocol	0	Preemptive	0	0	0	0
core4	Earliest Deadline First Protocol	0	Preemptive	0	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

Task

Name

Task1

Task Type

Periodic

Processor Name

processor1

Core Name

Address Space Name

m1

Capacity

10

Deadline

90

Start Time

0

Priority

1

Blocking Time

0

Policy

Sched Fifo

Text Memory Size

0

Stack Memory Size

0

Criticality

0

Jitter

0

Period

100

Activation Rule

Predictable

False

Randomized

Seed

0

Context Switch Overhead

0

Every

0

CFG Name

Offsets Table

Activation Value

Value

Delete

Add

User's Parameter

Name

Type

Integer

Value

Delete

Add

Name

Task Type

Processor

Address Space

Core

Capacity

Deadline

Start time

Task1

Periodic

processor1

m1

10

90

0

Task2

Periodic

processor1

m1

20

180

10

Task3

Periodic

processor1

m1

30

250

20

Task4

Periodic

processor1

m1

40

350

30

Task5

Periodic

processor1

m1

50

450

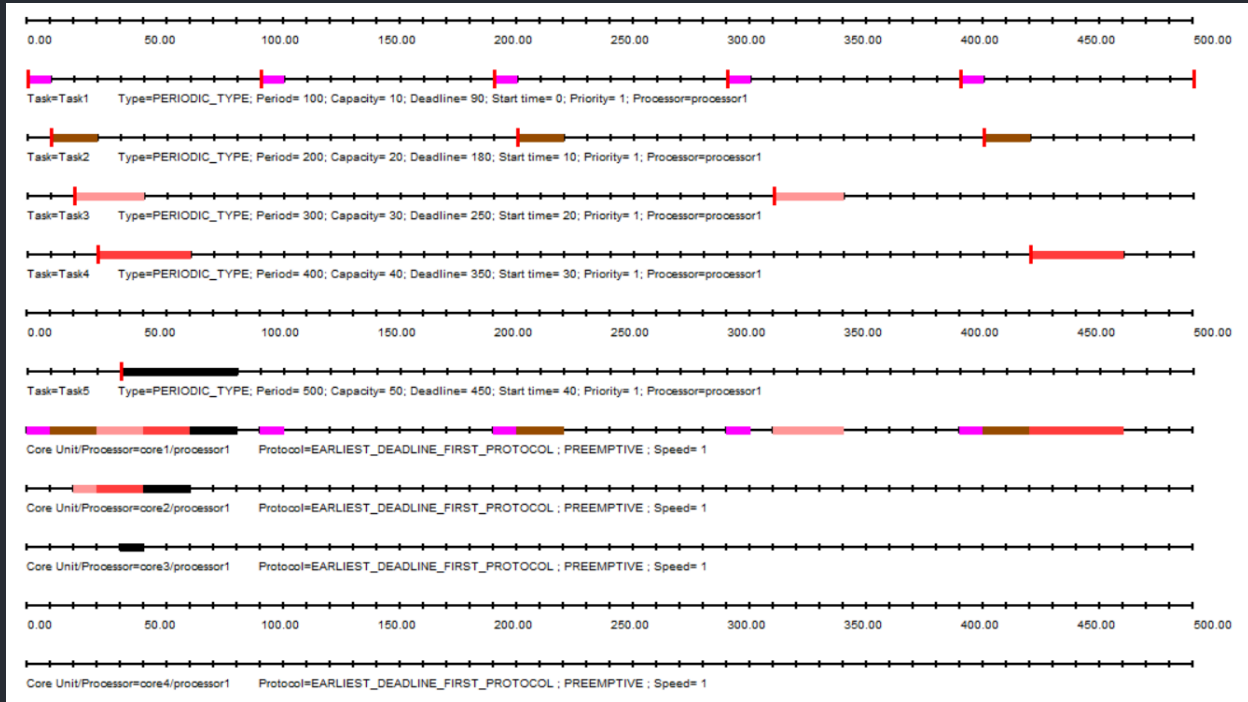
40

چون در صورت سوال جديد، context switching حذف شده است، به صورت ديڤالت همي 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

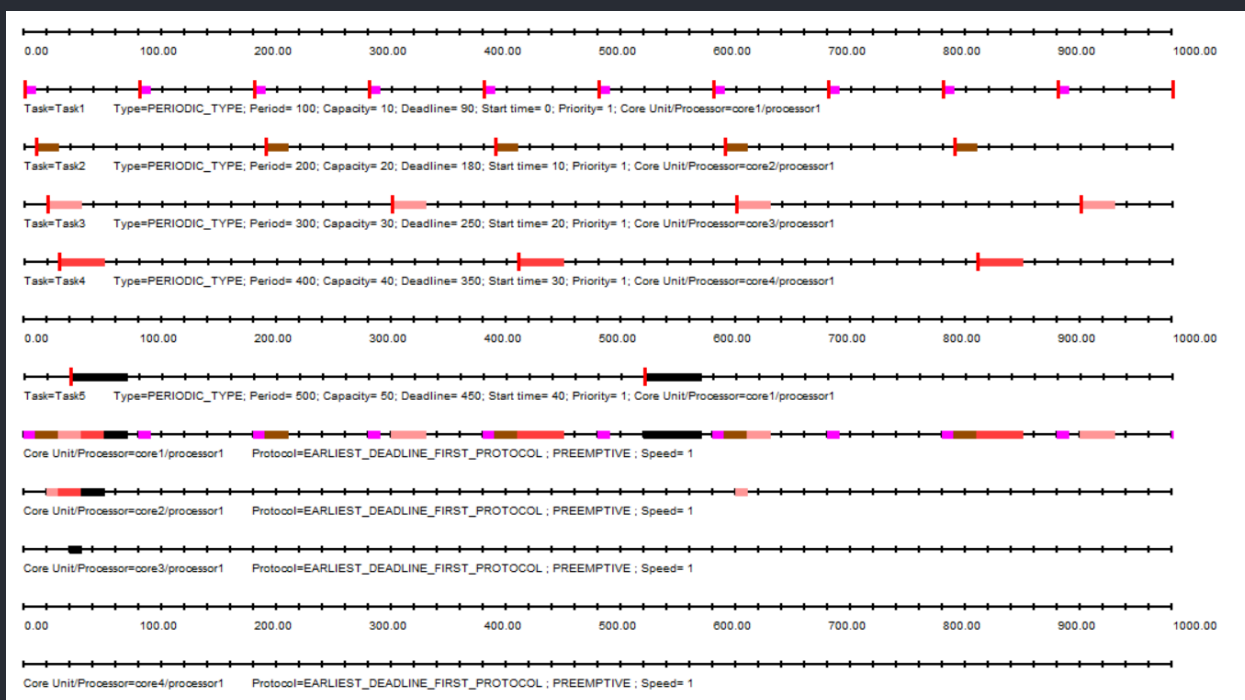
Task5 => 50/worst

- 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 time
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

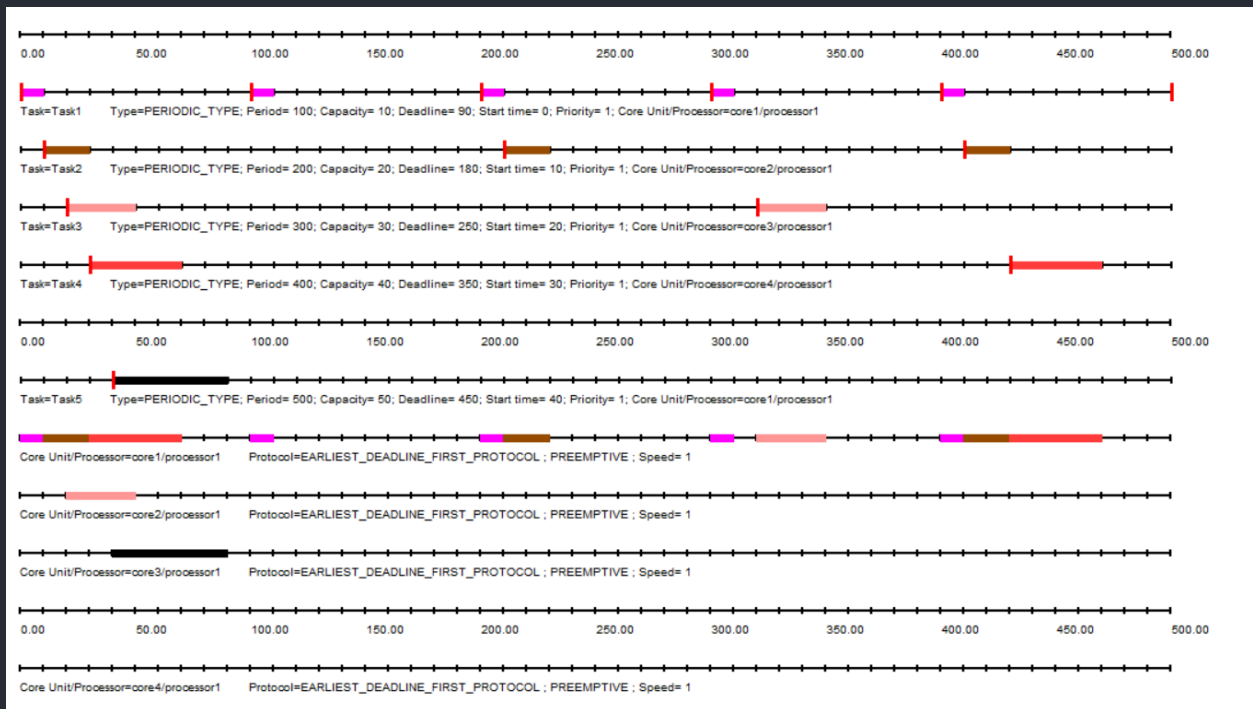
Task5 => 50/worst

- 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 time
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:

Core

Name

core1

Scheduler type

Rate Monotonic 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

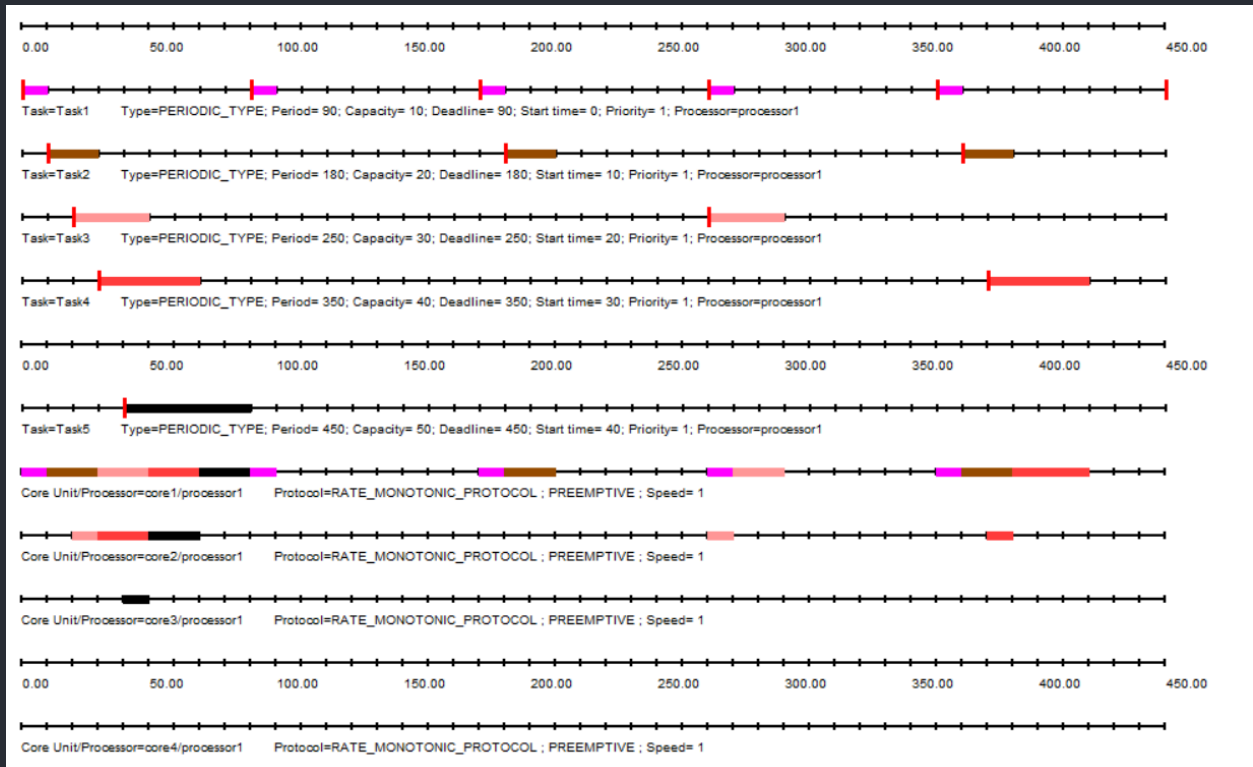
Delete

Modify

Add

Name	Scheduler	Quantum	Preemptive	Automa
core3	Rate Monotonic Protocol	0	Preemptive	
core1	Rate Monotonic Protocol	0	Preemptive	
core2	Rate Monotonic Protocol	0	Preemptive	
core4	Rate Monotonic Protocol	0	Preemptive	

- Time unit migration:

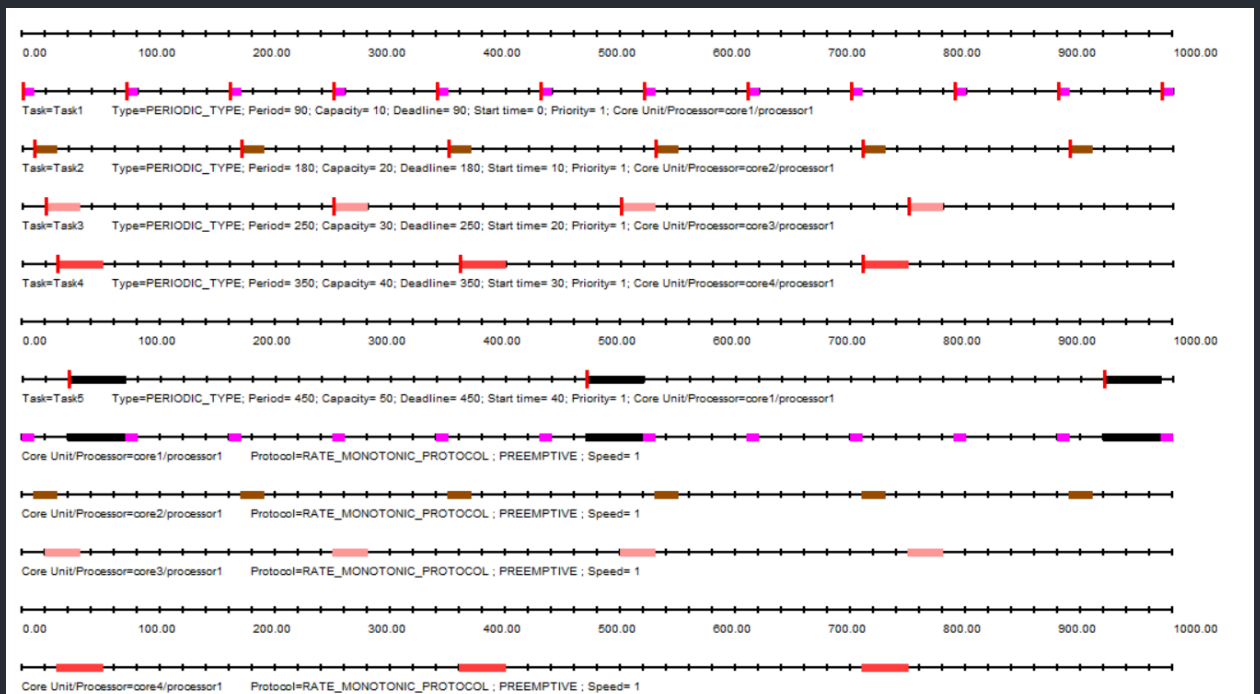


- Number of context switches : 152
- Number of preemptions : 140
- Task response time computed from simulation :
 - Task1 => 10/worst
 - Task2 => 20/worst
 - Task3 => 30/worst
 - Task4 => 40/worst
 - Task5 => 50/worst
- No deadline missed in the computed scheduling : the task set is schedulable if you computed the scheduling on the feasibility interval.

ددلایینی miss نشده است.

- No migration type:

Name	Task Type	Processor	Address Space	Core	Capacity	Deadline	Start time
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

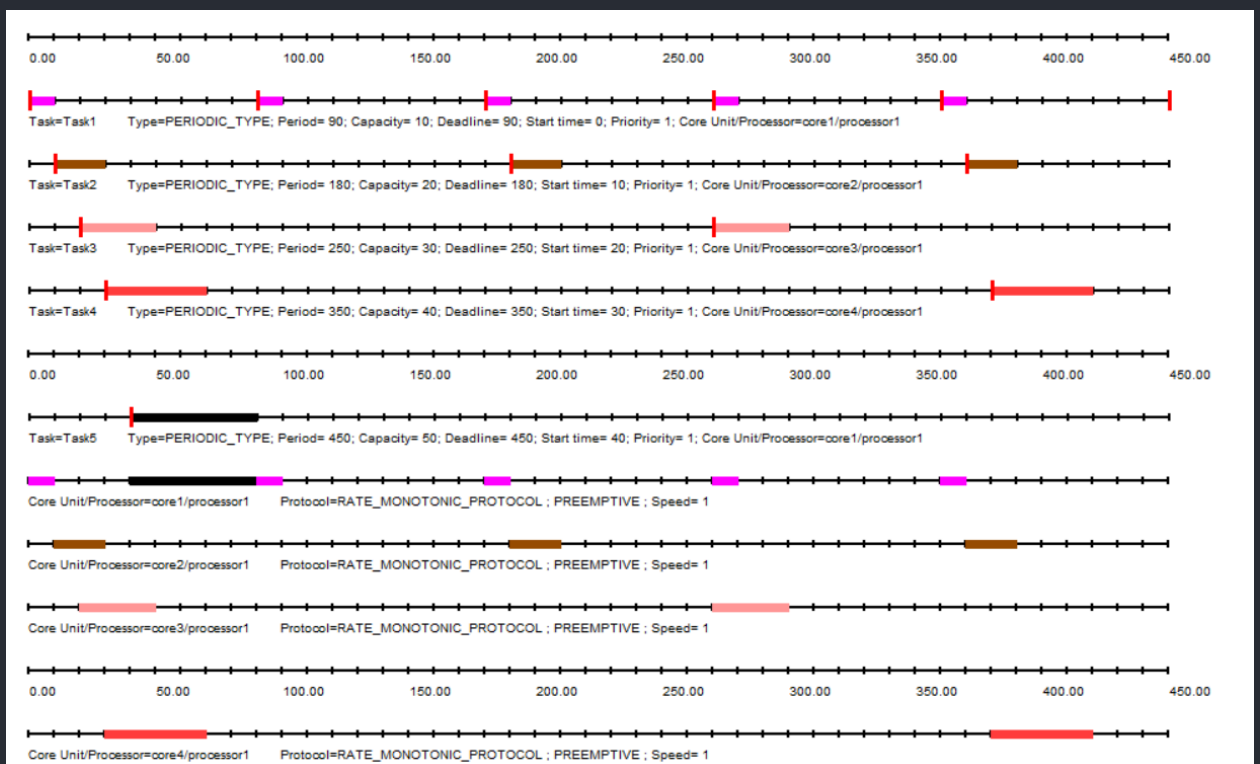


- Number of context switches : 11647
- Number of preemptions : 9981
- Task response time computed from simulation :
 - Task1 => 10/worst
 - Task2 => 20/worst
 - Task3 => 30/worst
 - Task4 => 40/worst
 - Task5 => 50/worst
- No deadline missed in the computed scheduling : the task set is schedulable if 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 time
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.