МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ РФ

ФГБОУ ВО

Воронежский государственный университет инженерных технологий

Специальность 09.03.02 «Информационные системы и технологии»

Кафедра Информационных технологий моделирования и управления

Отчет по практической работе

по дисциплине «Имитационное моделирование систем»

(наименование учебной дисциплины)

Студент _____ **Волкова А.С.** **У-203**

(Подпись, дата) (Фамилия, инициалы) (Группа)

Преподаватель _____ _____ **Денисенко В.В.**

(Подпись) (Дата) (Фамилия, инициалы)

Работа защищена _____ _____

(Дата) (Оценка)

ВОРОНЕЖ – 2023 г.

Моделирование простейших СМО с очередями

ВЫПОЛНЕНИЕ РАБОТЫ

1. Модель1: изменить задание из практической работы №2 добавив очереди к устройствам К1-К5. С равномерным распределением между устройствами. И без удаления на 5 устройстве. Обработать 500 транзактов и в течении 8 часов.

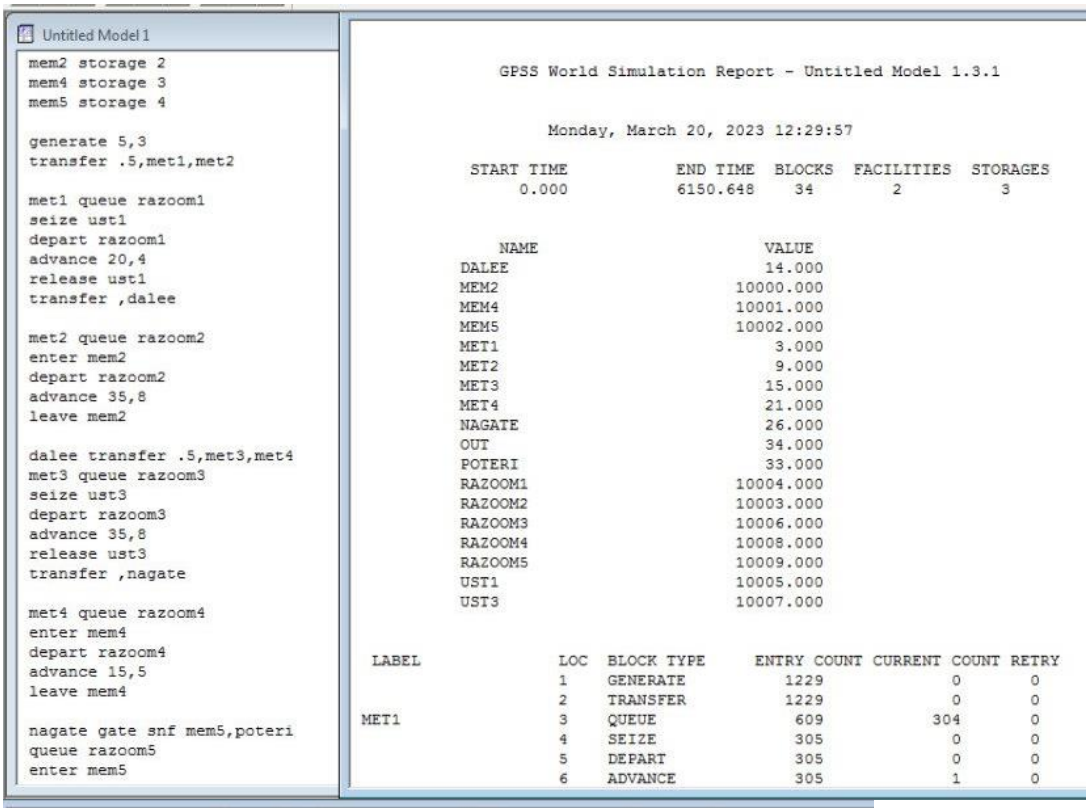
   1) 500 транзактов:

```
mem2 storage 2
mem4 storage 3
mem5 storage 4

generate 5,3
transfer .5,met1,met2

met1 queue razoom1
seize ust1
depart razoom1
advance 20,4
release ust1
transfer ,dalee

met2 queue razoom2
enter mem2
depart razoom2
advance 35,8
leave mem2

dalee transfer .5,met3,met4
met3 queue razoom3
seize ust3
depart razoom3
advance 35,8
release ust3
transfer ,nagate

met4 queue razoom4
enter mem4
depart razoom4
advance 15,5
leave mem4

nagate gate snf mem5,poteri
queue razoom5
enter mem5
depart razoom5
```

advance 15,6
leave mem5
transfer ,out

poteri terminate

out terminate 1
start 500
Скрины работы программы:



Untitled Model 1

```
mem2 storage 2
mem4 storage 3
mem5 storage 4

generate 5,3
transfer .5,met1,met2

met1 queue razoom1
seize ust1
depart razoom1
advance 20,4
release ust1
transfer ,dalee

met2 queue razoom2
enter mem2
depart razoom2
advance 35,8
leave mem2

dalee transfer .5,met3,met4
met3 queue razoom3
seize ust3
depart razoom3
advance 35,8
release ust3
transfer ,nagate

met4 queue razoom4
enter mem4
depart razoom4
advance 15,5
leave mem4

nagate gate snf mem5,poteri
queue razoom5
enter mem5
```

GPSS World Simulation Report - Untitled Model 1.3.1

Monday, March 20, 2023 12:29:57

START TIME	END TIME	BLOCKS	FACILITIES	STORAGES
0.000	6150.648	34	2	3

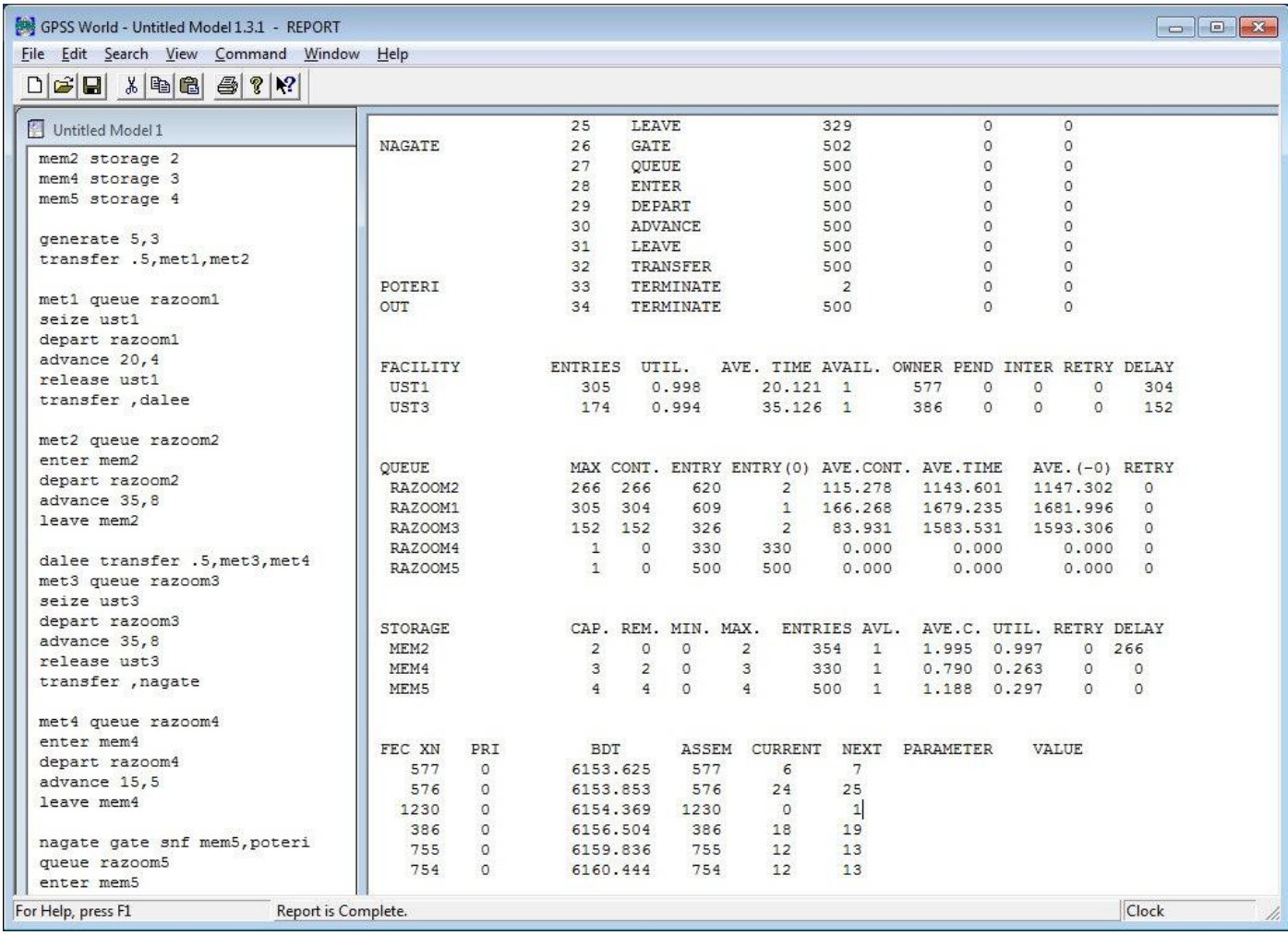
NAME	VALUE
DALEE	14.000
MEM2	10000.000
MEM4	10001.000
MEM5	10002.000
MET1	3.000
MET2	9.000
MET3	15.000
MET4	21.000
NAGATE	26.000
OUT	34.000
POTERI	33.000
RAZOOM1	10004.000
RAZOOM2	10003.000
RAZOOM3	10006.000
RAZOOM4	10008.000
RAZOOM5	10009.000
UST1	10005.000
UST3	10007.000

LABEL	LOC	BLOCK TYPE	ENTRY COUNT	CURRENT COUNT	RETRY
	1	GENERATE	1229	0	0
	2	TRANSFER	1229	0	0
MET1	3	QUEUE	609	304	0
	4	SEIZE	305	0	0
	5	DEPART	305	0	0
	6	ADVANCE	305	1	0
	5	DEPART	305	0	0
	6	ADVANCE	305	1	0
	7	RELEASE	304	0	0
	8	TRANSFER	304	0	0
MET2	9	QUEUE	620	266	0
	10	ENTER	354	0	0
	11	DEPART	354	0	0
	12	ADVANCE	354	2	0
	13	LEAVE	352	0	0
DALEE	14	TRANSFER	656	0	0
MET3	15	QUEUE	326	152	0
	16	SEIZE	174	0	0
	17	DEPART	174	0	0
	18	ADVANCE	174	1	0
	19	RELEASE	173	0	0
	20	TRANSFER	173	0	0
MET4	21	QUEUE	330	0	0
	22	ENTER	330	0	0
	23	DEPART	330	0	0
	24	ADVANCE	330	1	0
	25	LEAVE	329	0	0
NAGATE	26	GATE	502	0	0
	27	QUEUE	500	0	0
	28	ENTER	500	0	0
	29	DEPART	500	0	0
	30	ADVANCE	500	0	0
	31	LEAVE	500	0	0
	32	TRANSFER	500	0	0
POTERI	33	TERMINATE	2	0	0
OUT	34	TERMINATE	500	0	0

FACILITY	ENTRIES	UTIL.	AVE. TIME	AVAIL.	OWNER	PEND	INTER	RETRY	DELAY
UST1	305	0.998	20.121	1	577	0	0	0	304
UST3	174	0.994	35.126	1	386	0	0	0	152

QUEUE	MAX	CONT.	ENTRY	ENTRY(0)	AVE.CONT.	AVE.TIME	AVE.(-0)	RETRY
RAZOOM2	266	266	620	2	115.278	1143.601	1147.302	0

nplete. Clock

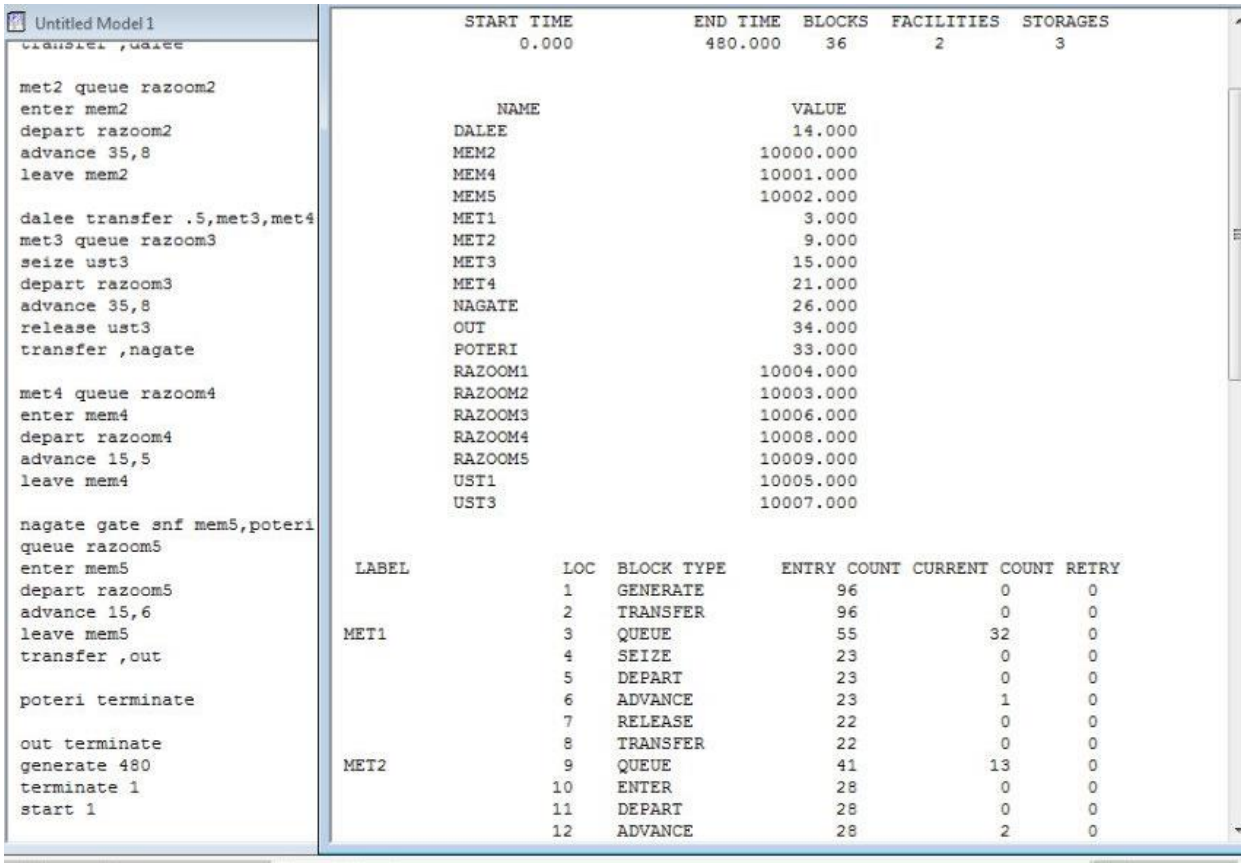


2) в течении 8 часов:

```
mem2 storage 2
mem4 storage 3
mem5 storage 4

generate 5,3
transfer .5,met1,met2

met1 queue razoom1
seize ust1
depart razoom1
advance 20,4
release ust1
transfer ,dalee

met2 queue razoom2
enter mem2
depart razoom2
advance 35,8
leave mem2

dalee transfer .5,met3,met4
met3 queue razoom3
```

```
seize ust3
depart razoom3
advance 35,8
release ust3
transfer ,nagate

met4 queue razoom4
enter mem4
depart razoom4
advance 15,5
leave mem4

nagate gate snf mem5,poteri
queue razoom5
enter mem5
depart razoom5
advance 15,6
leave mem5
transfer  ,out

poteri terminate

out terminate
generate 480
terminate 1
start 1
```

Скрины работы программы:



Untitled Model 1

```
transfer ,dalee

met2 queue razoom2
enter mem2
depart razoom2
advance 35,8
leave mem2

dalee transfer .5,met3,met4
met3 queue razoom3
seize ust3
depart razoom3
advance 35,8
release ust3
transfer ,nagate

met4 queue razoom4
enter mem4
depart razoom4
advance 15,5
leave mem4

nagate gate snf mem5,poteri
queue razoom5
enter mem5
depart razoom5
advance 15,6
leave mem5
transfer ,out

poteri terminate

out terminate
generate 480
terminate 1
start 1
```

START TIME	END TIME	BLOCKS	FACILITIES	STORAGES
0.000	480.000	36	2	3

NAME	VALUE
DALEE	14.000
MEM2	10000.000
MEM4	10001.000
MEM5	10002.000
MET1	3.000
MET2	9.000
MET3	15.000
MET4	21.000
NAGATE	26.000
OUT	34.000
POTERI	33.000
RAZOOM1	10004.000
RAZOOM2	10003.000
RAZOOM3	10006.000
RAZOOM4	10008.000
RAZOOM5	10009.000
UST1	10005.000
UST3	10007.000

LABEL	LOC	BLOCK TYPE	ENTRY COUNT	CURRENT COUNT	RETRY
	1	GENERATE	96	0	0
	2	TRANSFER	96	0	0
MET1	3	QUEUE	55	32	0
	4	SEIZE	23	0	0
	5	DEPART	23	0	0
	6	ADVANCE	23	1	0
	7	RELEASE	22	0	0
	8	TRANSFER	22	0	0
MET2	9	QUEUE	41	13	0
	10	ENTER	28	0	0
	11	DEPART	28	0	0
	12	ADVANCE	28	2	0

Untitled Model 1

```
transfer ,dalee

met2 queue razoom2
enter mem2
depart razoom2
advance 35,8
leave mem2

dalee transfer .5,met3,met4
met3 queue razoom3
seize ust3
depart razoom3
advance 35,8
release ust3
transfer ,nagate

met4 queue razoom4
enter mem4
depart razoom4
advance 15,5
leave mem4

nagate gate snf mem5,poteri
queue razoom5
enter mem5
depart razoom5
advance 15,6
leave mem5
transfer ,out

poteri terminate

out terminate
generate 480
terminate 1
start 1
```

	12	ADVANCE	28	2	0	
	13	LEAVE	26	0	0	
DALEE	14	TRANSFER	48	0	0	
MET3	15	QUEUE	21	8	0	
	16	SEIZE	13	0	0	
	17	DEPART	13	0	0	
	18	ADVANCE	13	1	0	
	19	RELEASE	12	0	0	
	20	TRANSFER	12	0	0	
MET4	21	QUEUE	27	0	0	
	22	ENTER	27	0	0	
	23	DEPART	27	0	0	
	24	ADVANCE	27	1	0	
	25	LEAVE	26	0	0	
NAGATE	26	GATE	38	0	0	
	27	QUEUE	38	0	0	
	28	ENTER	38	0	0	
	29	DEPART	38	0	0	
	30	ADVANCE	38	2	0	
	31	LEAVE	36	0	0	
	32	TRANSFER	36	0	0	
POTERI	33	TERMINATE	0	0	0	
OUT	34	TERMINATE	36	0	0	
	35	GENERATE	1	0	0	
	36	TERMINATE	1	0	0	

FACILITY	ENTRIES	UTIL.	AVE. TIME	AVAIL.	OWNER	PEND	INTER	RETRY	DELAY
UST1	23	0.971	20.273	1	44	0	0	0	32
UST3	13	0.919	33.940	1	27	0	0	0	8

QUEUE	MAX	CONT.	ENTRY	ENTRY(0)	AVE.CONT.	AVE.TIME	AVE.(-0)	RETRY
RAZOOM2	14	13	41	2	8.039	94.115	98.941	0
RAZOOM1	32	32	55	1	15.600	136.148	138.669	0
RAZOOM3	10	8	21	2	3.718	84.979	93.924	0
RAZOOM4	1	0	27	27	0.000	0.000	0.000	0
RAZOOM5	1	0	38	38	0.000	0.000	0.000	0

Untitled Model 1

```
transfer ,dalee

met2 queue razoom2
enter mem2
depart razoom2
advance 35,8
leave mem2

dalee transfer .5,met3,met4
met3 queue razoom3
seize ust3
depart razoom3
advance 35,8
release ust3
transfer ,nagate

met4 queue razoom4
enter mem4
depart razoom4
advance 15,5
leave mem4

nagate gate snf mem5,poteri
queue razoom5
enter mem5
depart razoom5
advance 15,6
leave mem5
transfer ,out

poteri terminate

out terminate
generate 480
terminate 1
start 1
```

	31	LEAVE	36	0	0	
	32	TRANSFER	36	0	0	
POTERI	33	TERMINATE	0	0	0	
OUT	34	TERMINATE	36	0	0	
	35	GENERATE	1	0	0	
	36	TERMINATE	1	0	0	

FACILITY	ENTRIES	UTIL.	AVE. TIME	AVAIL.	OWNER	PEND	INTER	RETRY	DELAY
UST1	23	0.971	20.273	1	44	0	0	0	32
UST3	13	0.919	33.940	1	27	0	0	0	8

QUEUE	MAX	CONT.	ENTRY	ENTRY(0)	AVE.CONT.	AVE.TIME	AVE.(-0)	RETRY
RAZOOM2	14	13	41	2	8.039	94.115	98.941	0
RAZOOM1	32	32	55	1	15.600	136.148	138.669	0
RAZOOM3	10	8	21	2	3.718	84.979	93.924	0
RAZOOM4	1	0	27	27	0.000	0.000	0.000	0
RAZOOM5	1	0	38	38	0.000	0.000	0.000	0

STORAGE	CAP.	REM.	MIN.	MAX.	ENTRIES	AVL.	AVE.C.	UTIL.	RETRY	DELAY
MEM2	2	0	0	2	28	1	1.933	0.966	0	13
MEM4	3	2	0	3	27	1	0.796	0.265	0	0
MEM5	4	2	0	4	38	1	1.100	0.275	0	0

FEC XN	PRI	BDT	ASSEM	CURRENT	NEXT	PARAMETER	VALUE
55	0	480.164	55	30	31		
98	0	482.812	98	0	1		
44	0	484.212	44	6	7		
56	0	487.653	56	24	25		
43	0	492.170	43	30	31		
57	0	493.435	57	12	13		
27	0	501.561	27	18	19		
59	0	504.658	59	12	13		
99	0	960.000	99	0	35		

2. Модель 2: количество генераций транзактов равно 3, ограничить очереди 5 местами с помощью TEST,организовать подсчет покинувших систему с каждой очереди. Моделировать в течении 12 часов.

   1)

   mem2 storage 2
   mem4 storage 3
   mem5 storage 4

   generate 5,3
   transfer ,gorox
   generate 5,3
   transfer ,gorox
   generate 5,3
   transfer ,gorox

   gorox transfer .5,met1,met2

   met1 test l q$razoom1,5,poteri
   queue razoom1
   seize ust1
   depart razoom1
   advance 20,4
   release ust1
   transfer ,dalee

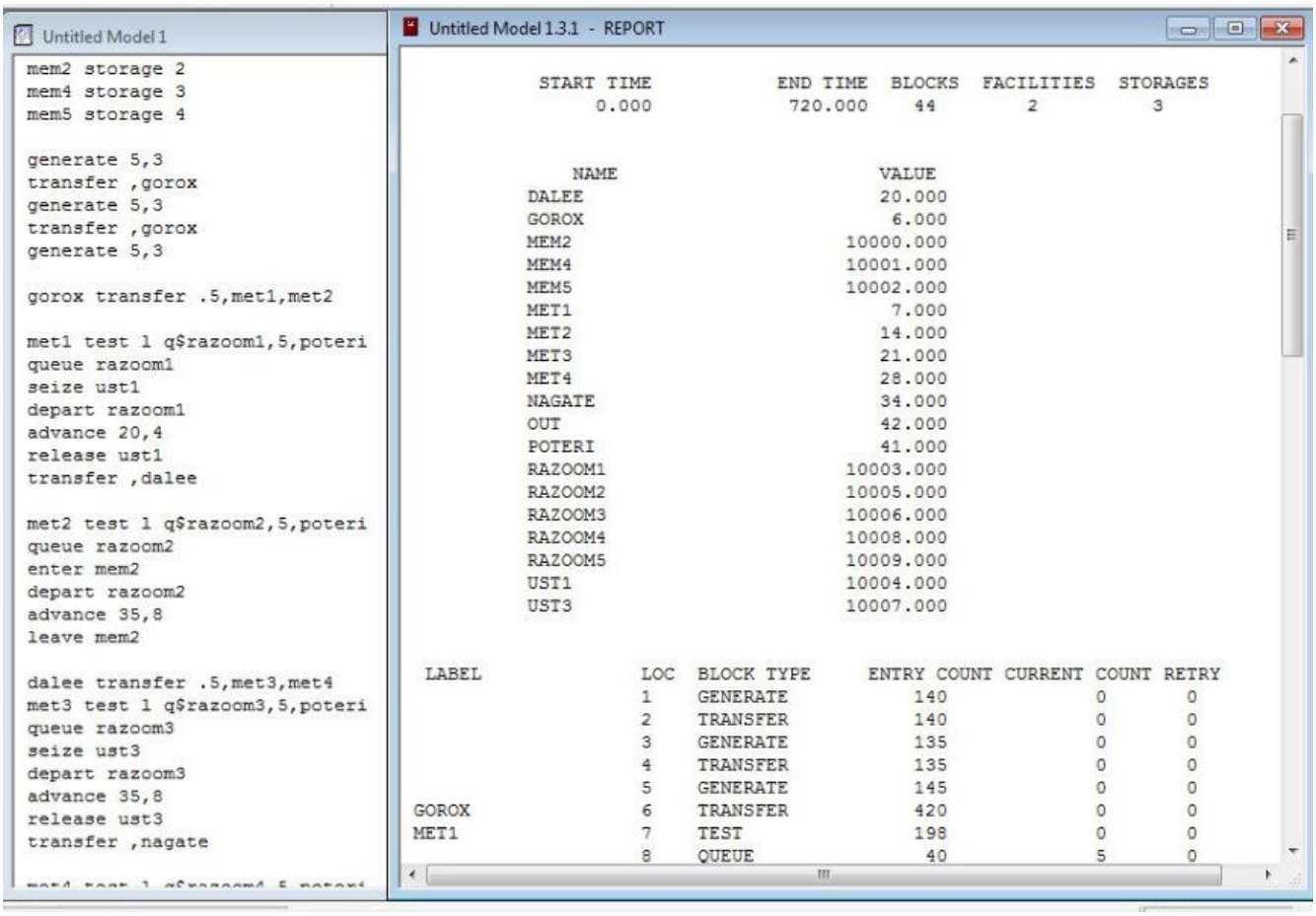
   met2 test l q$razoom2,5,poteri
   queue razoom2
   enter mem2
   depart razoom2
   advance 35,8
   leave mem2

   dalee transfer .5,met3,met4
   met3 test l q$razoom3,5,poteri
   queue razoom3
   seize ust3
   depart razoom3
   advance 35,8
   release ust3
   transfer ,nagate

   met4 test l q$razoom4,5,poteri
   queue razoom4
   enter mem4
   depart razoom4

```
advance 15,5
leave mem4

nagate gate snf mem5,poteri
queue razoom5
enter mem5
depart razoom5
advance 15,6
leave mem5
transfer ,out

poteri terminate

out terminate
generate 720
terminate 1
start 1
```

Скрины работы программы:



Untitled Model 1

```
mem2 storage 2
mem4 storage 3
mem5 storage 4

generate 5,3
transfer ,gorox
generate 5,3
transfer ,gorox
generate 5,3

gorox transfer .5,met1,met2

met1 test l q$razoom1,5,poteri
queue razoom1
seize ust1
depart razoom1
advance 20,4
release ust1
transfer ,dalee

met2 test l q$razoom2,5,poteri
queue razoom2
enter mem2
depart razoom2
advance 35,8
leave mem2

dalee transfer .5,met3,met4
met3 test l q$razoom3,5,poteri
queue razoom3
seize ust3
depart razoom3
advance 35,8
release ust3
transfer ,nagate
```

Untitled Model 1.3.1 - REPORT

START TIME	END TIME	BLOCKS	FACILITIES	STORAGES
0.000	720.000	44	2	3

NAME	VALUE
DALEE	20.000
GOROX	6.000
MEM2	10000.000
MEM4	10001.000
MEM5	10002.000
MET1	7.000
MET2	14.000
MET3	21.000
MET4	28.000
NAGATE	34.000
OUT	42.000
POTERI	41.000
RAZOOM1	10003.000
RAZOOM2	10005.000
RAZOOM3	10006.000
RAZOOM4	10008.000
RAZOOM5	10009.000
UST1	10004.000
UST3	10007.000

LABEL	LOC	BLOCK TYPE	ENTRY COUNT	CURRENT COUNT	RETRY
	1	GENERATE	140	0	0
	2	TRANSFER	140	0	0
	3	GENERATE	135	0	0
	4	TRANSFER	135	0	0
	5	GENERATE	145	0	0
GOROX	6	TRANSFER	420	0	0
MET1	7	TEST	198	0	0
	8	QUEUE	40	5	0

Untitled Model 1

```
mem2 storage 2
mem4 storage 3
mem5 storage 4

generate 5,3
transfer ,gorox
generate 5,3
transfer ,gorox
generate 5,3

gorox transfer .5,met1,met2

met1 test l q$razoom1,5,poteri
queue razoom1
seize ust1
depart razoom1
advance 20,4
release ust1
transfer ,dalee

met2 test l q$razoom2,5,poteri
queue razoom2
enter mem2
depart razoom2
advance 35,8
leave mem2

dalee transfer .5,met3,met4
met3 test l q$razoom3,5,poteri
queue razoom3
seize ust3
depart razoom3
advance 35,8
release ust3
transfer ,nagate
```

Untitled Model 1.3.1 - REPORT

MET1	7	TEST	198	0	0
	8	QUEUE	40	5	0
	9	SEIZE	35	0	0
	10	DEPART	35	0	0
	11	ADVANCE	35	1	0
	12	RELEASE	34	0	0
	13	TRANSFER	34	0	0
MET2	14	TEST	222	0	0
	15	QUEUE	47	5	0
	16	ENTER	42	0	0
	17	DEPART	42	0	0
	18	ADVANCE	42	2	0
	19	LEAVE	40	0	0
DALEE	20	TRANSFER	74	0	0
MET3	21	TEST	40	0	0
	22	QUEUE	23	4	0
	23	SEIZE	19	0	0
	24	DEPART	19	0	0
	25	ADVANCE	19	1	0
	26	RELEASE	18	0	0
	27	TRANSFER	18	0	0
MET4	28	TEST	34	0	0
	29	QUEUE	34	0	0
	30	ENTER	34	0	0
	31	DEPART	34	0	0
	32	ADVANCE	34	1	0
	33	LEAVE	33	0	0
NAGATE	34	GATE	51	0	0
	35	QUEUE	51	0	0
	36	ENTER	51	0	0
	37	DEPART	51	0	0
	38	ADVANCE	51	2	0
	39	LEAVE	49	0	0
	40	TRANSFER	49	0	0
POTERI	41	TERMINATE	350	0	0
OUT	42	TERMINATE	49	0	0

Untitled Model 1

```
mem2 storage 2
mem4 storage 3
mem5 storage 4

generate 5,3
transfer ,gorox
generate 5,3
transfer ,gorox
generate 5,3

gorox transfer .5,met1,met2

met1 test l q$razoom1,5,poteri
queue razoom1
seize ust1
depart razoom1
advance 20,4
release ust1
transfer ,dalee

met2 test l q$razoom2,5,poteri
queue razoom2
enter mem2
depart razoom2
advance 35,8
leave mem2

dalee transfer .5,met3,met4
met3 test l q$razoom3,5,poteri
queue razoom3
seize ust3
depart razoom3
advance 35,8
release ust3
transfer ,nagate
```


Untitled Model 1.3.1 - REPORT

OUT	42	TERMINATE	49	0	0
	43	GENERATE	1	0	0
	44	TERMINATE	1	0	0

FACILITY	ENTRIES	UTIL.	AVE. TIME	AVAIL.	OWNER	PEND	INTER	RETRY	DE
UST1	35	0.991	20.381	1	354	0	0	0	
UST3	19	0.963	36.488	1	234	0	0	0	

QUEUE	MAX	CONT.	ENTRY	ENTRY(0)	AVE.CONT.	AVE.TIME	AVE.(-0)	RE
RAZOOM1	5	5	40	1	4.717	84.901	87.078	
RAZOOM2	5	5	47	2	4.739	72.591	75.818	
RAZOOM3	5	4	23	1	4.154	130.025	135.936	
RAZOOM4	1	0	34	34	0.000	0.000	0.000	
RAZOOM5	1	0	51	51	0.000	0.000	0.000	

STORAGE	CAP.	REM.	MIN.	MAX.	ENTRIES	AVL.	AVE.C.	UTIL.	RETRY	DEL
MEM2	2	0	0	2	42	1	1.980	0.990	0	5
MEM4	3	2	0	3	34	1	0.696	0.232	0	0
MEM5	4	2	0	4	51	1	1.054	0.263	0	0

FEC XN	PRI	BDT	ASSEM	CURRENT	NEXT	PARAMETER	VALUE
354	0	720.200	354	11	12		
424	0	723.151	424	0	3		
423	0	723.975	423	0	1		
422	0	724.214	422	0	5		
338	0	726.818	338	38	39		
345	0	729.515	345	32	33		
343	0	731.430	343	38	39		
365	0	734.774	365	18	19		
234	0	735.198	234	25	26		
370	0	756.023	370	18	19		
425	0	1440.000	425	0	43		