

Микропроект 2
Многопоточное программирование.
Взаимодействие потоков.
Вариант 30

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Contents

1	Задание	1
2	Сборка и выполнение	1
2.1	Сборка	1
2.2	Запуск	1
2.2.1	Примеры запуска	1
2.2.2	Скриншоты	2

1 Задание

Задача о читателях и писателях-2 («грязное чтение»).

Базу данных разделяют два типа потоков – читатели и писатели. Читатели выполняют транзакции, которые просматривают записи базы данных, транзакции писателей и просматривают и изменяют записи. Предполагается, что в начале БД находится в непротиворечивом состоянии (т.е. отношения между данными имеют смысл). Транзакции выполняются в режиме «грязного чтения», то есть процесс-писатель не может получить доступ к БД только в том случае, если ее занял другой процесс-писатель, а процессы-читатели ему не мешают. Создать многопоточное приложение с потоками-писателями и потоками-читателями. Реализовать решение, используя семафоры, и не используя блокировки чтения-записи.

2 Сборка и выполнение

2.1 Сборка

```
cmake .
make -k Micro2
```

Пример результата выполнения сборки

```
-- Configuring done
-- Generating done
-- Build files have been written to: /home/gulp/ASM/repo/micro2
[100%] Built target Micro2
```

2.2 Запуск

```
./Micro2
```

2.2.1 Примеры запуска

```
./Micro2
```

Вывод

```
[TIME: 0] ==> Program started
[TIME: 1] ==> Database initialized
[TIME: 2] ==> Started readValue(3)
```

```

[TIME: 3] ==> Value for key 3 not found
[TIME: 4] ==> Locked for writing
[TIME: 5] ==> Started writeValue(4, 5)
[TIME: 6] ==> Setting 4 to 5
[TIME: 7] ==> Unlocked for writing
[TIME: 8] ==> Locked for writing
[TIME: 9] ==> Started writeValue(2, 3)
[TIME: 10] ==> Setting 2 to 3
[TIME: 11] ==> Unlocked for writing
[TIME: 12] ==> Started readValue(1)
[TIME: 13] ==> Value for key 1 not found
[TIME: 14] ==> Started readValue(4)
[TIME: 15] ==> Got value: 4 -> 5
[TIME: 16] ==> Locked for writing
[TIME: 17] ==> Started writeValue(1, 2)
[TIME: 18] ==> Setting 1 to 2
[TIME: 19] ==> Unlocked for writing
[TIME: 20] ==> Locked for writing
[TIME: 21] ==> Started writeValue(3, 4)
[TIME: 22] ==> Setting 3 to 4
[TIME: 23] ==> Unlocked for writing
[TIME: 24] ==> Started readValue(2)
[TIME: 25] ==> Got value: 2 -> 3
[TIME: 26] ==> Database destructed

```

2.2.2 Скриншоты

```

micro2: ssh - Konsole
$ make -f Makefile
-- Configuring done
-- Generating done
-- Build files have been written to: /home/gulp/ASH/rep/micro2
$ make -f Makefile
Scanning dependencies of target Micro2
[ 33%] Building CXX object CMakeFiles/Micro2.dir/main.o
[ 66%] Building CXX object CMakeFiles/Micro2.dir/database.o
[100%] Linking CXX executable Micro2
[100%] Built target Micro2
./Micro2
[TIME: 0] ==> Program started
[TIME: 1] ==> Database initialized
[TIME: 2] ==> Started readValue(0)
[TIME: 3] ==> Value for key 4 not found
[TIME: 4] ==> Locked for writing
[TIME: 5] ==> Started writeValue(1, 2)
[TIME: 6] ==> Setting 1 to 2
[TIME: 7] ==> Unlocked for writing
[TIME: 8] ==> Locked for writing
[TIME: 9] ==> Started writeValue(2, 3)
[TIME: 10] ==> Setting 2 to 3
[TIME: 11] ==> Unlocked for writing
[TIME: 12] ==> Locked for writing
[TIME: 13] ==> Started writeValue(3, 4)
[TIME: 14] ==> Setting 3 to 4
[TIME: 15] ==> Unlocked for writing
[TIME: 16] ==> Locked for writing
[TIME: 17] ==> Started writeValue(4, 5)
[TIME: 18] ==> Setting 4 to 5
[TIME: 19] ==> Unlocked for writing
[TIME: 20] ==> Started readValue(1)
[TIME: 21] ==> Got value: 1 -> 2
[TIME: 22] ==> Started readValue(2)
[TIME: 23] ==> Got value: 2 -> 3
[TIME: 24] ==> Started readValue(3)
[TIME: 25] ==> Got value: 3 -> 4
[TIME: 26] ==> Database destructed

```