



Міністерство освіти, науки, молоді та спорту України  
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## ПРОЕКТУВАННЯ РОЗПОДІЛЕНИХ СИСТЕМ

### Проектна робота **Replicated log**

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Перевірив:  
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1. Ініціалізація Master:

```
docker run -it --rm --network=dist_system_lab_network -v$(pwd):/home -w/home --cap-add=NET_ADMIN --name Master python:3 bash
pip3 install sortedcontainers
```

2. Ініціалізація Secondary1, Secondary2:

```
docker run -it --rm --network=dist_system_lab_network -v$(pwd):/home -w/home --cap-add=NET_ADMIN --name Secondary1 python:3 bash
pip3 install sortedcontainers
```

```
docker run -it --rm --network=dist_system_lab_network -v$(pwd):/home -w/home --cap-add=NET_ADMIN --name Secondary2 python:3 bash
pip3 install sortedcontainers
```

3. У Master запуск Master.py, у Secondary1 запуск Secondary1.py:

```
root@75b59b57b260:/home#
root@75b59b57b260:/home#
root@75b59b57b260:/home# python3 Master.py
log2 <__main__.Master object at 0x7f16c2e41f40>
log1 <__main__.Master object at 0x7f16c2e41f40>
Starting client facing http server, use <Ctrl-C> to stop
Starting secondaries facing http server, use <Ctrl-C> to stop
172.19.0.3 - - [27/May/2024 22:41:12] "GET /rejoin HTTP/1.1" 200 -
```

```
root@886b23a36d6d:/home#
root@886b23a36d6d:/home#
root@886b23a36d6d:/home# python3 Secondary1.py
Rejoined Master. Got log b'{}'
Starting master facing http server, use <Ctrl-C> to stop
Starting client facing http server, use <Ctrl-C> to stop
```

4. Ініціалізація Client1:

```
docker run -it --rm --network=dist_system_lab_network -v$(pwd):/home -w/home --name Client1 python:3 bash
```

5. У Client1 запис повідомлення “hello”:

```
root@abe3494d32be:/home# curl -XPOST Master:8080/append -d '{"msg": "hello","w":1}'
Appended 00 "hello" to the log list
root@abe3494d32be:/home# echo m; curl Master:8080/list; echo s1; curl Secondary1:8080/list; echo s2; curl Secondary2:8080/list
m
(0, 'hello')
s1
(0, 'hello')
s2
curl: (7) Failed to connect to Secondary2 port 8080 after 1 ms: Couldn't connect to server
```

Логі Master:

```
root@75b59b57b260:/home# python3 Master.py
log2 < __main__.Master object at 0x7f16c2e41f40>
log1 < __main__.Master object at 0x7f16c2e41f40>
Starting client facing http server, use <Ctrl-C> to stop
Starting secondaries facing http server, use <Ctrl-C> to stop
172.19.0.3 - - [27/May/2024 22:41:12] "GET /rejoin HTTP/1.1" 200 -
Got append request for "hello" with write concern 1
Sending replicate request for "hello" message to Secondary1
Sending replicate request for "hello" message to Secondary2
Write concern is 1, not waiting for ACKs
172.19.0.5 - - [27/May/2024 22:47:37] "POST /append HTTP/1.1" 200 -
Appended 00 "hello" to the log list
Secondary2 is down
Will retry replicate with args=('Secondary2', 'hello', 0, <threading.Event at 0x7f16c2c61bb0: unset>) in 2s
Got ACK trying to replicate (0, 'hello') to Secondary1
Sending replicate request for "hello" message to Secondary2
Secondary2 is down
Will retry replicate with args=('Secondary2', 'hello', 0, <threading.Event at 0x7f16c2c61bb0: unset>) in 2s
Sending replicate request for "hello" message to Secondary2
Secondary2 is down
Will retry replicate with args=('Secondary2', 'hello', 0, <threading.Event at 0x7f16c2c61bb0: unset>) in 2s
Sending replicate request for "hello" message to Secondary2
Secondary2 is down
Will retry replicate with args=('Secondary2', 'hello', 0, <threading.Event at 0x7f16c2c61bb0: unset>) in 2s
Sending replicate request for "hello" message to Secondary2
Secondary2 is down
Will retry replicate with args=('Secondary2', 'hello', 0, <threading.Event at 0x7f16c2c61bb0: unset>) in 2s
Sending replicate request for "hello" message to Secondary2
Secondary2 is down
Will retry replicate with args=('Secondary2', 'hello', 0, <threading.Event at 0x7f16c2c61bb0: unset>) in 2s
```

Логі Secondary1:

```
root@886b23a36d6d:/home# python3 Secondary1.py
Rejoined Master. Got log b'{'
Starting master facing http server, use <Ctrl-C> to stop
Starting client facing http server, use <Ctrl-C> to stop
Received replicate request for (0, 'hello') message from master
172.19.0.2 - - [27/May/2024 22:47:37] "POST /replicate HTTP/1.1" 200 -
Appended 00 "hello" to the log list
172.19.0.5 - - [27/May/2024 22:48:23] "GET /list HTTP/1.1" 200 -
```

6. У Client1 запис повідомлення “hello2”:

```
root@abe3494d32be:/home# curl -XPOST Master:8080/append -d '{"msg": "hello2","w":2}'
Appended 01 "hello2" to the log list
```

```

root@abe3494d32be:/home# echo m; curl Master:8080/list; echo s1; curl Secondary1:8080/list; echo s2; curl Secondary2:8080/list
m
(0, 'hello')
(1, 'hello2')
s1
(0, 'hello')
(1, 'hello2')
s2
curl: (7) Failed to connect to Secondary2 port 8080 after 0 ms: Couldn't connect to server

```

Лог Master:

```

Secondary2 is down
Will retry replicate with args=('Secondary2', 'hello', 0, <threading.Event at 0x7f16c2c61bb0: unset>) in 2s
Sending replicate request for "hello2" message to Secondary2
Secondary2 is down
Will retry replicate with args=('Secondary2', 'hello2', 1, <threading.Event at 0x7f16c2c63d70: unset>) in 2s
Sending replicate request for "hello" message to Secondary2
Secondary2 is down
Will retry replicate with args=('Secondary2', 'hello', 0, <threading.Event at 0x7f16c2c61bb0: unset>) in 2s
Sending replicate request for "hello2" message to Secondary2
Secondary2 is down
Will retry replicate with args=('Secondary2', 'hello2', 1, <threading.Event at 0x7f16c2c63d70: unset>) in 2s

```

Лог Secondary1:

```

root@886b23a36d6d:/home# python3 Secondary1.py
Rejoined Master. Got log b'{'
Starting master facing http server, use <Ctrl-C> to stop
Starting client facing http server, use <Ctrl-C> to stop
Received replicate request for (0, 'hello') message from master
172.19.0.2 - - [27/May/2024 22:47:37] "POST /replicate HTTP/1.1" 200 -
Appended 00 "hello" to the log list
172.19.0.5 - - [27/May/2024 22:48:23] "GET /list HTTP/1.1" 200 -
Received replicate request for (1, 'hello2') message from master
172.19.0.2 - - [27/May/2024 22:53:13] "POST /replicate HTTP/1.1" 200 -
Appended 01 "hello2" to the log list
172.19.0.5 - - [27/May/2024 22:53:42] "GET /list HTTP/1.1" 200 -

```

- У Client1 запис повідомлення “hello3” – реквест заблокований:

```

root@abe3494d32be:/home# curl -XPOST Master:8080/append -d '{"msg": "hello3", "w":3}'
^C
root@abe3494d32be:/home#

root@abe3494d32be:/home# echo m; curl Master:8080/list; echo s1; curl Secondary1:8080/list; echo s2; curl Secondary2:8080/list
m
(0, 'hello')
(1, 'hello2')
s1
(0, 'hello')
(1, 'hello2')
(2, 'hello3')
s2
curl: (7) Failed to connect to Secondary2 port 8080 after 0 ms: Couldn't connect to server

```

Лог Master:

```
Secondary2 is down
Will retry replicate with args=('Secondary2', 'hello3', 2, <threading.Event at 0x7f16c0216450: unset>) in 2s
Sending replicate request for "hello" message to Secondary2
Secondary2 is down
Will retry replicate with args=('Secondary2', 'hello', 0, <threading.Event at 0x7f16c2c61bb0: unset>) in 2s
Sending replicate request for "hello2" message to Secondary2
Secondary2 is down
Will retry replicate with args=('Secondary2', 'hello2', 1, <threading.Event at 0x7f16c2c63d70: unset>) in 2s
Sending replicate request for "hello3" message to Secondary2
Secondary2 is down
Will retry replicate with args=('Secondary2', 'hello3', 2, <threading.Event at 0x7f16c0216450: unset>) in 2s
Sending replicate request for "hello" message to Secondary2
Secondary2 is down
Will retry replicate with args=('Secondary2', 'hello', 0, <threading.Event at 0x7f16c2c61bb0: unset>) in 2s
Sending replicate request for "hello2" message to Secondary2
Secondary2 is down
Will retry replicate with args=('Secondary2', 'hello2', 1, <threading.Event at 0x7f16c2c63d70: unset>) in 2s
```

Лог Secondary1:

```
Starting master facing http server, use <Ctrl-C> to stop
Starting client facing http server, use <Ctrl-C> to stop
Received replicate request for (0, 'hello') message from master
172.19.0.2 - - [27/May/2024 22:47:37] "POST /replicate HTTP/1.1" 200 -
Appended 00 "hello" to the log list
172.19.0.5 - - [27/May/2024 22:48:23] "GET /list HTTP/1.1" 200 -
Received replicate request for (1, 'hello2') message from master
172.19.0.2 - - [27/May/2024 22:53:13] "POST /replicate HTTP/1.1" 200 -
Appended 01 "hello2" to the log list
172.19.0.5 - - [27/May/2024 22:53:42] "GET /list HTTP/1.1" 200 -
Received replicate request for (2, 'hello3') message from master
172.19.0.2 - - [27/May/2024 22:56:25] "POST /replicate HTTP/1.1" 200 -
Appended 02 "hello3" to the log list
172.19.0.5 - - [27/May/2024 22:56:56] "GET /list HTTP/1.1" 200 -
```

8. Ініціалізація Client2:

```
docker run -it --rm --network=dist_system_lab_network -v$(pwd):/home -w/home --name
Client1 python:3 bash
```

9. У Client2 запис повідомлення "hello4":

```
root@e0795b6e140e:/home# curl -XPOST Master:8080/append -d'{"msg": "hello4","w":1}'
Appended 03 "hello4" to the log list
```

#### 10. Запуск Secondary2:

```
root@2ed603ea06ab:/home# python3 Secondary2.py
Rejoined Master. Got log b'{"0": "hello", "1": "hello2", "3": "hello4"}'
Starting client facing http server, use <Ctrl-C> to stop
Starting master facing http server, use <Ctrl-C> to stop
Received replicate request for (2, 'hello3') message from master
172.19.0.2 - - [27/May/2024 23:00:58] "POST /replicate HTTP/1.1" 200 -
Appended 02 "hello3" to the log list
Received replicate request for (0, 'hello') message from master
Duplicate message (0, 'hello') received. Ignoring
172.19.0.2 - - [27/May/2024 23:00:58] "POST /replicate HTTP/1.1" 200 -
Received replicate request for (1, 'hello2') message from master
Duplicate message (1, 'hello2') received. Ignoring
172.19.0.2 - - [27/May/2024 23:00:58] "POST /replicate HTTP/1.1" 200 -
Received replicate request for (3, 'hello4') message from master
Duplicate message (3, 'hello4') received. Ignoring
172.19.0.2 - - [27/May/2024 23:00:59] "POST /replicate HTTP/1.1" 200 -
```

#### 11. Фінальний результат:

```
root@abe3494d32be:/home# echo m; curl Master:8080/list; echo s1; curl Secondary1:8080/list; echo s2; curl Secondary2:8080/list
m
(0, 'hello')
(1, 'hello2')
(2, 'hello3')
(3, 'hello4')
s1
(0, 'hello')
(1, 'hello2')
(2, 'hello3')
(3, 'hello4')
s2
(0, 'hello')
(1, 'hello2')
(2, 'hello3')
(3, 'hello4')
root@abe3494d32be:/home#
```