### Рябко Дмитро ФБ-42мп

### Replicated Log Project

#### Iteration 0:

```
2025-06-05 14:38:28 echo_client | 2025-06-05 11:38:28,571 - INFO - Sending to http://server:8000/echo: {'message': 'Hello, this is a test echo!', 'timestamp': 1749123508.5715437}
2025-06-05 14:38:28 echo_client | 2025-06-05 11:38:28,589 - INFO - Received response: {'echo': {'message': 'Hello, this is a test echo!', 'timestamp': 1749123508.5715437}}
```

### Client – це звичайни python код, який шле запит:

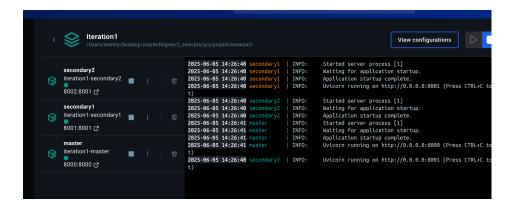
```
logging.basicConfig(level=logging.INFO, format="%(asctime)s - %(levelname)s - %(message)s")
logger = logging.getLogger(__name__)

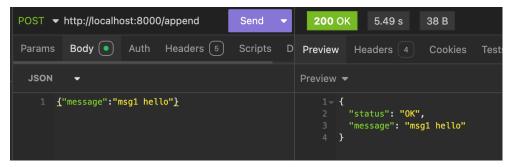
SERVER_URL = os.getenv("SERVER_URL", "http://server:8000")

def main():
    test_data = {"message": "Hello, this is a test echo!", "timestamp": time.time()}
    logger.info(f"Sending to {SERVER_URL}/echo: {test_data}")
    resp = requests.post(f"{SERVER_URL}/echo", json=test_data)
    if resp.ok:
        logger.info(f"Received response: {resp.json()}")
    else:
        logger.error(f"Server error: {resp.status_code} {resp.text}")

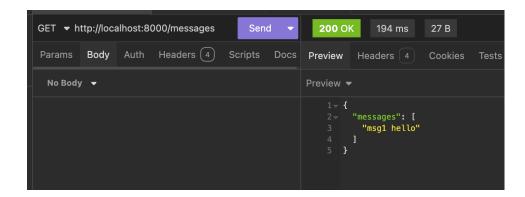
if __name__ == "__main__":
        main()
```

#### Iteration 1:

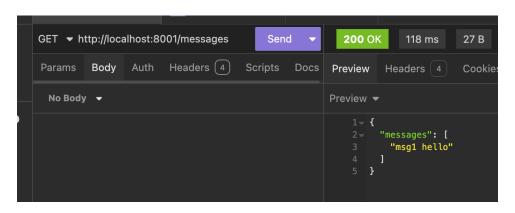




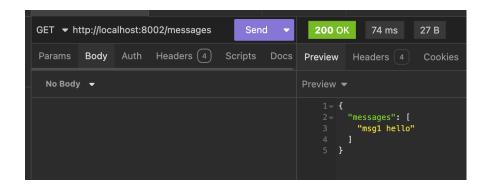
### Master:



# Secondary 1:



# Secondary 2:



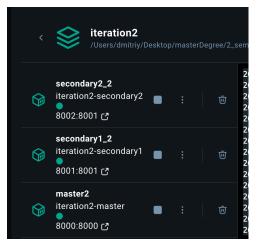
### Log:

```
2025-06-05 14:26:41 master
                                                                Uvicorn running on http://0.0.0.0:8000 (Press CTRL+C to quit
                                                                Uvicorn running on http://0.0.0.0:8001 (Press CTRL+C to quit)
2025-06-05 14:26:40 secondary2
                                                 INFO:
2025-06-05 14:29:49 master
                                                 2025-06-05 11:29:49,622 - INFO - Master: received new message 'msg1 hello', replicating to 2 sec
ondaries
                                                 2025-06-05 11:29:49,940 - INFO - Secondary (secondary2): received /replicate, sleeping 5s 2025-06-05 11:29:49,941 - INFO - Secondary (secondary1): received /replicate, sleeping 5s 2025-06-05 11:29:54,951 - INFO - Secondary (secondary1): stored message 'msg1 hello' 2025-06-05 11:29:54,948 - INFO - Secondary (secondary2): stored message 'msg1 hello'
2025-06-05 14:29:49 secondary2
2025-06-05 14:29:49 secondary1
2025-06-05 14:29:54 secondary1
2025-06-05 14:29:54 secondary2
                                                               172.26.0.4:52754 - "POST /replicate HTTP/1.1" 200 OK
172.26.0.4:59316 - "POST /replicate HTTP/1.1" 200 OK
2025-06-05 14:29:54 secondary2
                                                 INFO:
2025-06-05 14:29:54 secondary1
                                                 INFO:
2025-06-05 14:29:54 master
                                                 2025-06-05 11:29:54,959 - INFO - HTTP Request: POST http://secondary2:8001/replicate "HTTP/1.1 2
00 OK"
                                                2025-06-05 11:29:54,962 - INFO - Master: ACK from http://secondary2:8001
2025-06-05 11:29:54,963 - INFO - HTTP Request: POST http://secondary1:8001/replicate "HTTP/1.1 2
2025-06-05 14:29:54 master
2025-06-05 14:29:54 master
00 OK"
2025-06-05 14:29:54 master
                                                 2025-06-05 11:29:54,964 - INFO - Master: ACK from http://secondary1:8001
                                                               172.26.0.1:63374 - "POST /append HTTP/1.1" 200 OK
172.26.0.1:63298 - "GET /messages HTTP/1.1" 200 OK
2025-06-05 14:29:54 master
                                                 INFO:
2025-06-05 14:30:53 secondary1
                                                 INFO:
                                                                172.26.0.1:63298 - "GET /messages HTTP/1.1" 200 UK
172.26.0.1:58472 - "GET /messages HTTP/1.1" 200 UK
172.26.0.1:64934 - "GET /messages HTTP/1.1" 200 UK
2025-06-05 14:31:50 secondary2
                                                 INFO:
2025-06-05 14:32:28 master
                                                 INFO:
```

#### В логах чітко видно, як виконується sleep 5 sec:

```
2025-06-05 14:29:49 secondary2 | 2025-06-05 11:29:49,940 - INFO - Secondary (secondary2): received /replicate, sleeping 5s 2025-06-05 14:29:49 secondary1 | 2025-06-05 11:29:49,941 - INFO - Secondary (secondary1): received /replicate, sleeping 5s 2025-06-05 14:29:54 secondary1 | 2025-06-05 11:29:54,951 - INFO - Secondary (secondary1): stored message 'msg1 hello' 2025-06-05 11:29:54,948 - INFO - Secondary (secondary2): stored message 'msg1 hello'
```

#### Iteration 2:



#### W=1

#### Відповідь була отримана одразу

```
INFO: Uvicorn running on http://0.0.0.0:8000 (Press CTRL+C to quit)
INFO: 172.28.0.1:56796 - "POST /append HTTP/1.1" 200 OK
2025-06-05 12:09:59,625 - INFO - Master2: received 'first message' with msg_id=1, w=1
2025-06-05 12:09:59,631 - INFO - Master2: scheduling background task for msg_id=1 → http://sec
2025-06-05 15:09:50 master2
2025-06-05 15:09:59 master2
2025-06-05 15:09:59 master2
2025-06-05 15:09:59 master2
ondary1:8001
2025-06-05 15:09:59 master2
                                                              | 2025-06-05 12:09:59,631 - INFO - Master2: scheduling background task for msg_id=1 \rightarrow http://sec
ondary2:8001
                                                             | 2025-06-05 12:10:00,405 - INFO - Secondary2 (sec2): received msg_id=1, sleeping 3s

| 2025-06-05 12:10:00,426 - INFO - Secondary2 (sec1): received msg_id=1, sleeping 3s

| 2025-06-05 12:10:03,415 - INFO - Secondary2 (sec2): stored msg_id=1

| INFO: 172.28.0.4:44448 - "POST /replicate HTTP/1.1" 200 OK

| 2025-06-05 12:10:03,429 - INFO - HTTP Request: POST http://secondary2:8001/replicate "HTTP/1.1
2025-06-05 15:10:00 secondary2 2
2025-06-05 15:10:00 secondary1_2
2025-06-05 15:10:03 secondary2_2
2025-06-05 15:10:03 secondary2_2
2025-06-05 15:10:03 master2
 200 OK"
2025-06-05 15:10:03 master2
                                                                  2025-06-05 12:10:03,431 - INFO - Master2: background sent msg_id=1 to http://secondary2:8001
                                                                2025-06-05 12:10:03,435 - INFO - Secondary2 (sec1): stored msg_id=1
INFO: 172.28.0.4:48366 - "POST /replicate HTTP/1.1" 200 OK
2025-06-05 12:10:03,442 - INFO - HTTP Request: POST http://secondary1:8001/replicate "HTTP/1.1
2025-06-05 15:10:03 secondary1_2
2025-06-05 15:10:03 secondary1_2
2025-06-05 15:10:03 master2
 200 OK"
2025-06-05 15:10:03 master2
                                                              | 2025-06-05 12:10:03,442 - INFO - Master2: background sent msg_id=1 to http://secondary1:8001
```

#### Master:

```
GET Thttp://localhost:8000/messages

Params Body Auth Headers A Scripts Docs

Preview Headers A Cookies Tests 0/0

No Body The rest of the cookies Tests 0/0

No Body The rest of the cookies Tests 0/0

Preview The rest of the cookies Tests 0/0

Preview The rest of the cookies Tests 0/0

No Body The rest of the cookies Tests 0/0

Preview The rest of the cookies Tests 0/0

Preview The rest of the cookies Tests 0/0

No Body The rest of the cookies Tests 0/0

No Body The rest of the cookies Tests 0/0

Preview The rest of the cookies Tests 0/0

No Body The rest of the cookies Tests 0/0

No Body The rest of the cookies Tests 0/0

Preview The cookies Tests 0/0

No Body The rest of the cookies Tests 0/0

No Body The rest of the cookies Tests 0/0

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No Body The rest of the cookies Tests 0/0

No Body The rest of the cookies Tests 0/0

No Body The rest of the cookies Tests 0/0

No Body The rest of the cookies Tests 0/0

No Body The rest of the cookies Tests 0/0

No Body
```

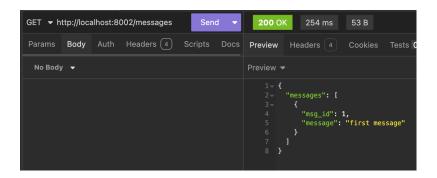
### Secondary 1:

```
GET Thttp://localhost:8001/messages

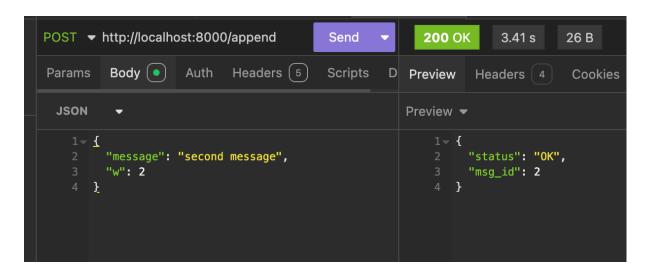
Params Body Auth Headers A Scripts Docs Preview Headers A Cookies Tests 0/0

No Body Test Officers A Cookies Tests Officers A Cookies
```

# Secondary 2:

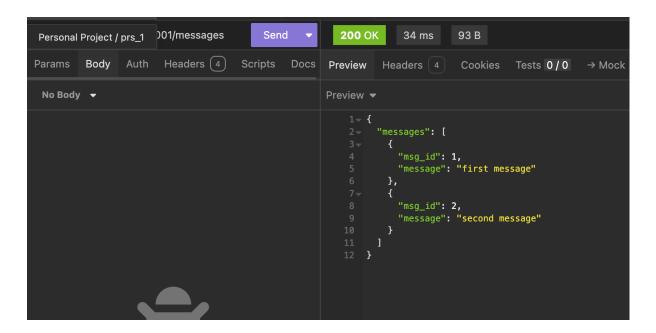


#### W=2



Відповідь була отримана з затримкою Master:

# Secondary 1:

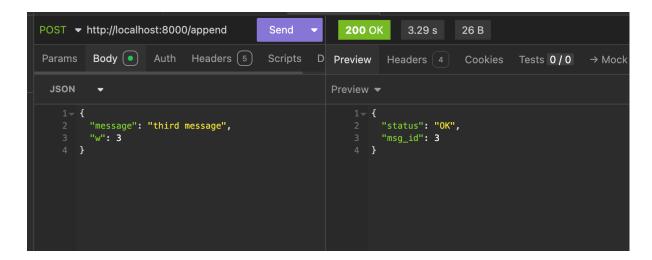


Secondary 2:

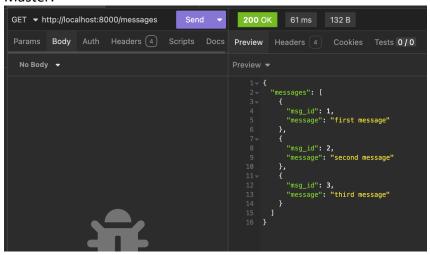
```
200 OK
GET ▼ http://localhost:8002/messages
                                              Send
                                                                           74 ms
                                                                                      93 B
Params
          Body
                                         Scripts
                                                    Docs
                                                                                                 Tests 0/0
                                                            Preview
                                                                      Headers (4)
                                                                                                                → Mock
 No Body ▼
                                                           Preview ▼
                                                                         "msg_id": 1,
"message": "first message"
                                                                         "msg_id": 2,
"message": "second message"
```

#### Logs:

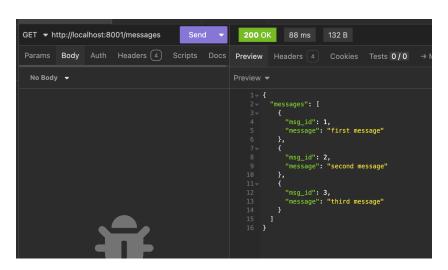
```
2025-06-05 15:53:33 master2
                                                      2025-06-05 12:53:33,089 - INFO - Master2: received 'second message' with msg_id=2, w=2
                                                   | 2025-06-05 12:53:33,089 - INFO - Master2: received 'second message' with msg_id=2, w=2 | 2025-06-05 12:53:33,178 - INFO - Secondary2 (sec1): received msg_id=2, sleeping 3s | 2025-06-05 12:53:33,179 - INFO - Secondary2 (sec2): received msg_id=2, sleeping 3s | 2025-06-05 12:53:36,188 - INFO - Secondary2 (sec1): stored msg_id=2 | 2025-06-05 12:53:36,188 - INFO - Secondary2 (sec2): stored msg_id=2 | INFO: 172.28.0.4:35236 - "POST /replicate HTTP/1.1" 200 OK | INFO: 172.28.0.4:53986 - "POST /replicate HTTP/1.1" 200 OK | 2025-06-05 12:53:36,217 - INFO - HTTP Request: POST http://secondary1:8001/replicate "HTTP/1.1"
2025-06-05 15:53:33 secondary1_2
2025-06-05 15:53:33 secondary2_2
2025-06-05 15:53:36 secondary1_
2025-06-05 15:53:36 secondary2_2
2025-06-05 15:53:36 secondary2_2
2025-06-05 15:53:36 secondary1_2
2025-06-05 15:53:36 master2
200 OK
2025-06-05 15:53:36 master2
                                                   | 2025-06-05 12:53:36,221 - INFO - HTTP Request: POST http://secondary2:8001/replicate "HTTP/1.1
2025-06-05 15:53:36 master2
                                                   | 2025-06-05 12:53:36,222 - INFO - Master2: synchronous sent msg_id=2 to http://secondary1:8001
(ACK)
2025-06-05 15:53:36 master2
                                                  | 2025-06-05 12:53:36,223 - INFO - Master2: synchronous sent msg_id=2 to http://secondary2:8001
(ACK)
2025-06-05 15:53:36 master2
                                                   | 2025-06-05 12:53:36,224 - INFO - Master2: received 1 ACKs (required 1), replying to client
| 2025-06-05 12:53:36,224 - INFO - Master2: scheduling background task for msg_id=2 → http://sec
2025-06-05 15:53:36 master2
ondary1:8001 (post-sync)
2025-06-05 15:53:36 master2
                                                  | 2025-06-05 12:53:36,225 - INFO - Master2: scheduling background task for msg_id=2 → http://sec
ondary2:8001 (post-sync)
2025-06-05 15:53:36 master2
                                                   INFO:
                                                                    172.28.0.1:61248 - "POST /append HTTP/1.1" 200 OK
                                                     2025-06-05 12:53:36,324 - INFO - Secondary2 (sec2): received msg_id=2, sleeping 3s 2025-06-05 12:53:36,324 - INFO - Secondary2 (sec1): received msg_id=2, sleeping 3s 2025-06-05 12:53:39,332 - INFO - Secondary2 (sec2): msg_id=2 already exists, ignoring 2025-06-05 12:53:39,333 - INFO - Secondary2 (sec1): msg_id=2 already exists, ignoring
2025-06-05 15:53:36 secondary2_2
2025-06-05 15:53:36 secondary1_2
2025-06-05 15:53:39 secondary2_2
2025-06-05 15:53:39 secondary1_2
                                                                  172.28.0.4:49416 - "POST /replicate HTTP/1.1" 200 OK
172.28.0.4:56924 - "POST /replicate HTTP/1.1" 200 OK
2025-06-05 15:53:39 secondary2_2
                                                      INFO:
2025-06-05 15:53:39 secondary1_2
                                                      INFO:
2025-06-05 15:53:39 master2
                                                     2025-06-05 12:53:39,358 - INFO - HTTP Request: POST http://secondary2:8001/replicate "HTTP/1.1
200 OK"
                                                   | 2025-06-05 12:53:39,361 - INFO - Master2: background sent msg_td=2 to http://secondary2:8001
| 2025-06-05 12:53:39,362 - INFO - HTTP Request: POST http://secondary1:8001/replicate "HTTP/1.1
2025-06-05 15:53:39 master2
2025-06-05 15:53:39 master2
200 OK"
2025-06-05 15:53:39 master2
                                                     2025-06-05 12:53:39,362 - INFO - Master2: background sent msg_id=2 to http://secondary1:8001
                                                                    172.28.0.1:58514 - "GET /messages HTTP/1.1" 200 OK
172.28.0.1:59702 - "GET /messages HTTP/1.1" 200 OK
2025-06-05 15:53:40 secondary1_2
                                                     INFO:
2025-06-05 15:54:01 secondary2_2
                                                   INFO:
```



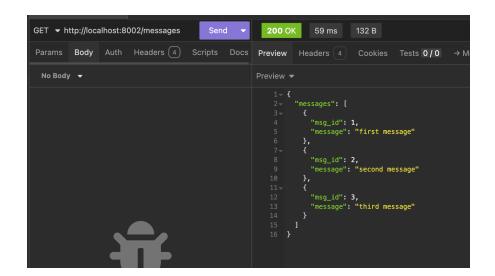
# Master:



### Secondary 1:



# Secondary 2:



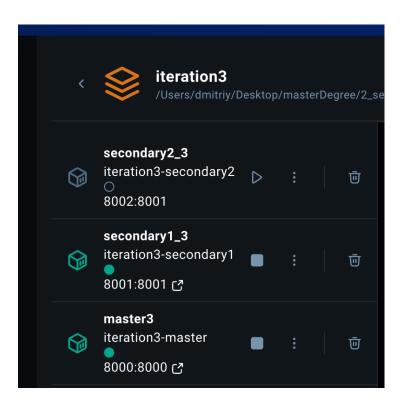
Logs:

```
2025-06-05 15:58:18 master2
                                                    2025-06-05 12:58:18,121 - INFO - Master2: received 'third message' with msg_id=3, w=3
                                                   2025-06-05 12:58:18,274 - INFO - Secondary2 (sec2): received msg_id=3, sleeping 3s 2025-06-05 12:58:18,289 - INFO - Secondary2 (sec1): received msg_id=3, sleeping 3s 2025-06-05 12:58:21,285 - INFO - Secondary2 (sec2): stored msg_id=3 INFO: 172.28.0.4:47940 - "POST /replicate HTTP/1.1" 200 OK
2025-06-05 15:58:18 secondary2_2
2025-06-05 15:58:18 secondary1_2
2025-06-05 15:58:21 secondary2_2
                                                                                                                                                                                              (1)
2025-06-05 15:58:21 secondary2_2
2025-06-05 15:58:21 master2
                                                    2025-06-05 12:58:21,291 - INFO - HTTP Request: POST http://secondary2:8001/replicate "HTTP/1.1
 200 OK'
2025-06-05 15:58:21 master2
                                                 | 2025-06-05 12:58:21,295 - INFO - Master2: synchronous sent msg_id=3 to http://secondary2:8001
2025-06-05 15:58:21 secondary1_2
2025-06-05 15:58:21 secondary1_2
2025-06-05 15:58:21 master2
                                                 | 2025-06-05 12:58:21,299 - INFO - Secondary2 (sec1): stored msg_id=3
                                                 | INFO: 172.28.0.4:40874 - "POST /replicate HTTP/1.1" 200 OK
| 2025-06-05 12:58:21,306 - INFO - HTTP Request: POST http://secondary1:8001/replicate "HTTP/1.1
 200 OK
2025-06-05 15:58:21 master2
                                                 | 2025-06-05 12:58:21,306 - INFO - Master2: synchronous sent msg_id=3 to http://secondary1:8001
2025-06-05 15:58:21 master2
                                                   2025-06-05 12:58:21,307 - INFO - Master2: received 2 ACKs (required 2), replying to client
2025-06-05 15:58:21 master2 ondary1:8001 (post-sync)
                                                 | 2025-06-05 12:58:21,307 - INFO - Master2: scheduling background task for msg_id=3 \rightarrow http://sec
2025-06-05 15:58:21 master2
                                                 | 2025-06-05 12:58:21,307 - INFO - Master2: scheduling background task for msg_id=3 \rightarrow http://sec
ondary2:8001 (post-sync)
2025-06-05 15:58:21 master2
                                                                  172.28.0.1:58830 - "POST /append HTTP/1.1" 200 OK
                                                   INFO: 172.28.6.1:38830 - POST /append HTF/1.1 200 OK
2025-06-05 12:58:21,364 - INFO - Secondary2 (sec1): received msg_id=3, sleeping 3s
2025-06-05 12:58:21,363 - INFO - Secondary2 (sec2): received msg_id=3, sleeping 3s
2025-06-05 12:58:24,372 - INFO - Secondary2 (sec1): msg_id=3 already exists, ignoring
2025-06-05 12:58:24,368 - INFO - Secondary2 (sec2): msg_id=3 already exists, ignoring
2025-06-05 15:58:21 secondary1 2
2025-06-05 15:58:21 secondary2_2
2025-06-05 15:58:24 secondary1_2
2025-06-05 15:58:24 secondary2_2
                                                   INFO: 172.28.0.4:47944 - "POST /replicate HTTP/1.1" 200 OK
INFO: 172.28.0.4:40878 - "POST /replicate HTTP/1.1" 200 OK
2025-06-05 12:58:24,398 - INFO - HTTP Request: POST http://secondary2:8001/replicate "HTTP/1.1"
2025-06-05 15:58:24 secondary2_2
2025-06-05 15:58:24 secondary1_2
2025-06-05 15:58:24 master2
 200 OK"
2025-06-05 15:58:24 master2
                                                   2025-06-05 12:58:24,400 - INFO - Master2: background sent msg_id=3 to http://secondary2:8001
                                                   2025-06-05 12:58:24,400 - INFO - HTTP Request: POST http://secondary1:8001/replicate "HTTP/1.1
2025-06-05 15:58:24 master2
 200 OK"
                                                   2025-06-05 12:58:24,401 - INFO - Master2: background sent msg_id=3 to http://secondary1:8001
2025-06-05 15:58:24 master2
                                                                  172.28.0.1:63596 - "GET /messages HTTP/1.1" 200 OK
172.28.0.1:61438 - "GET /messages HTTP/1.1" 200 OK
172.28.0.1:57160 - "GET /messages HTTP/1.1" 200 OK
2025-06-05 15:58:37 master2
                                                    INFO:
2025-06-05 15:59:17 secondary1_2
                                                    INFO:
                                                                                                                                                                                              \downarrow
2025-06-05 15:59:38 secondary2_2
                                                    INFO:
```

#### Iteration 3:

Self-check acceptance test:

1. Start M + S1



2. send (Msg1, W=1) - Ok

```
JSON ▼

1 ▼ {
2    "message": "msg1",
3    "w": 1
4  }

Preview ▼

1 ▼ {
2    "status": "OK",
3    "msg_id": 1
4  }
```

3. send (Msg2, W=2) - Ok

4. send (Msg3, W=3) - Wait

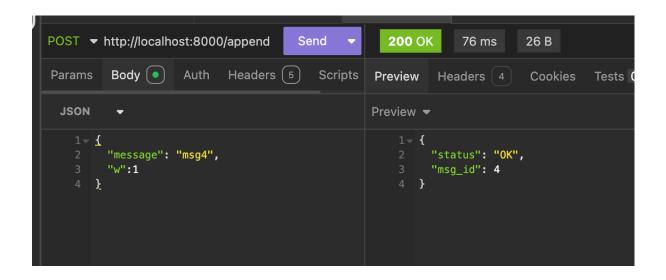
```
JSON ▼

1 √ {
2 "message": "msg3",
3 "w":3
4 }

Preview ▼

1 √ {
2 "detail": "Got only 1 ACKs (required 2)"
3 }
```

5. send (Msg4, W=1) - Ok



6. Start S2

```
2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-06 2025-
```

7. Check messages on S2 - [Msg1, Msg2, Msg3, Msg4]

