Швейцарский нож тестировщика или JMeter не только для нагрузки

Махетов Сергей

Обо мне

- В области разработки ПО > 10 лет, тестирование > 5 лет.
- Тестирование как бизнес-приложения(Web, API, desktop), так и инфраструктурные решения(Интеграции через HTTP, JMS, JDBC, Kafka…)
- Основной стек – Java(Scala)/JMeter, Gatling, Postman

SQA DAYS#25

О чем поговорим

- Базовое описание Apache JMeter
- Создание функционального теста
- Дополнительные возможности
- Описание других сценариев использования
- Работа в команде

Что такое Apache JMeter

- Open Source application designed to load test applications and measure performance. By The Apache Software Foundation

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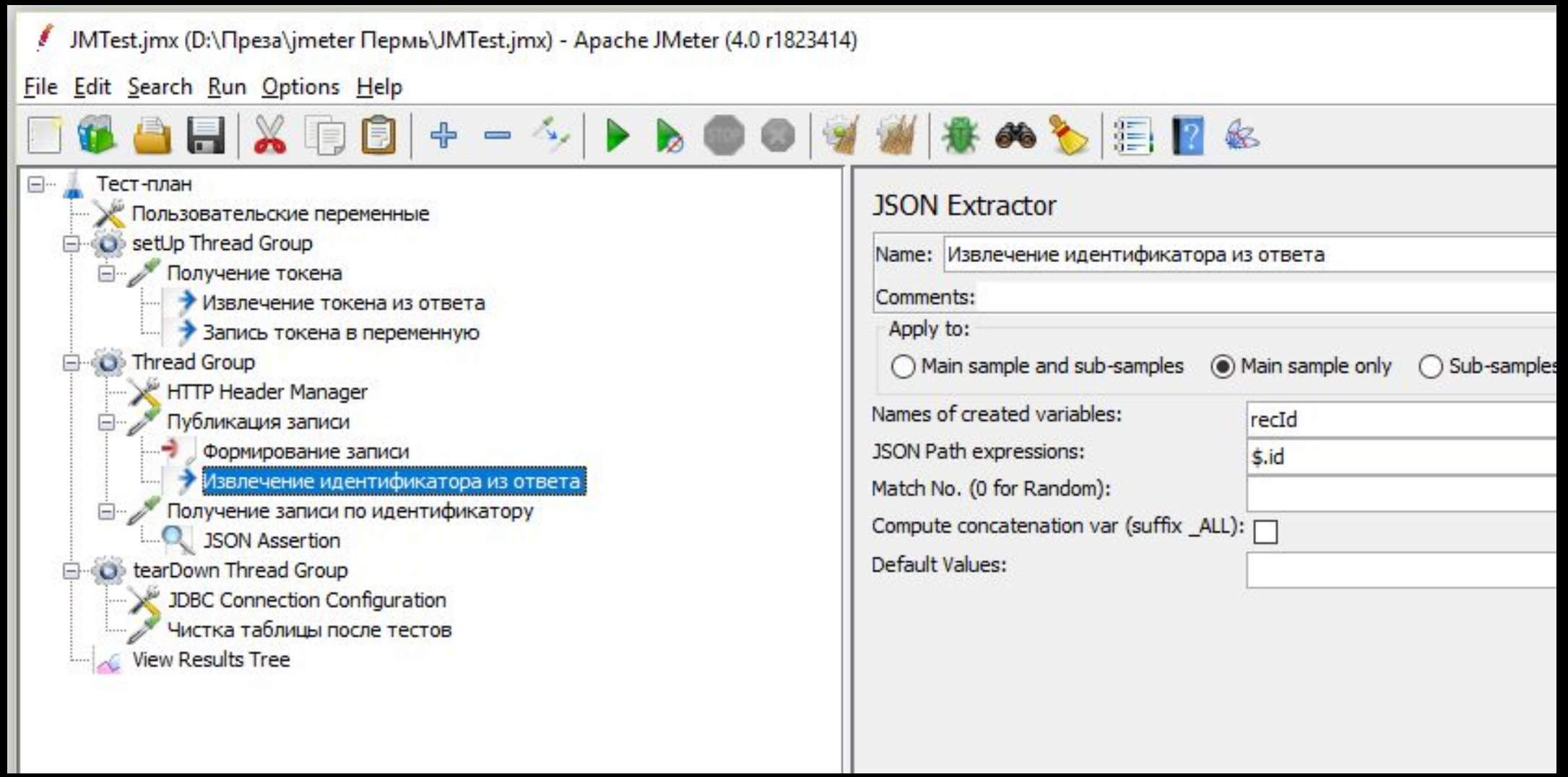
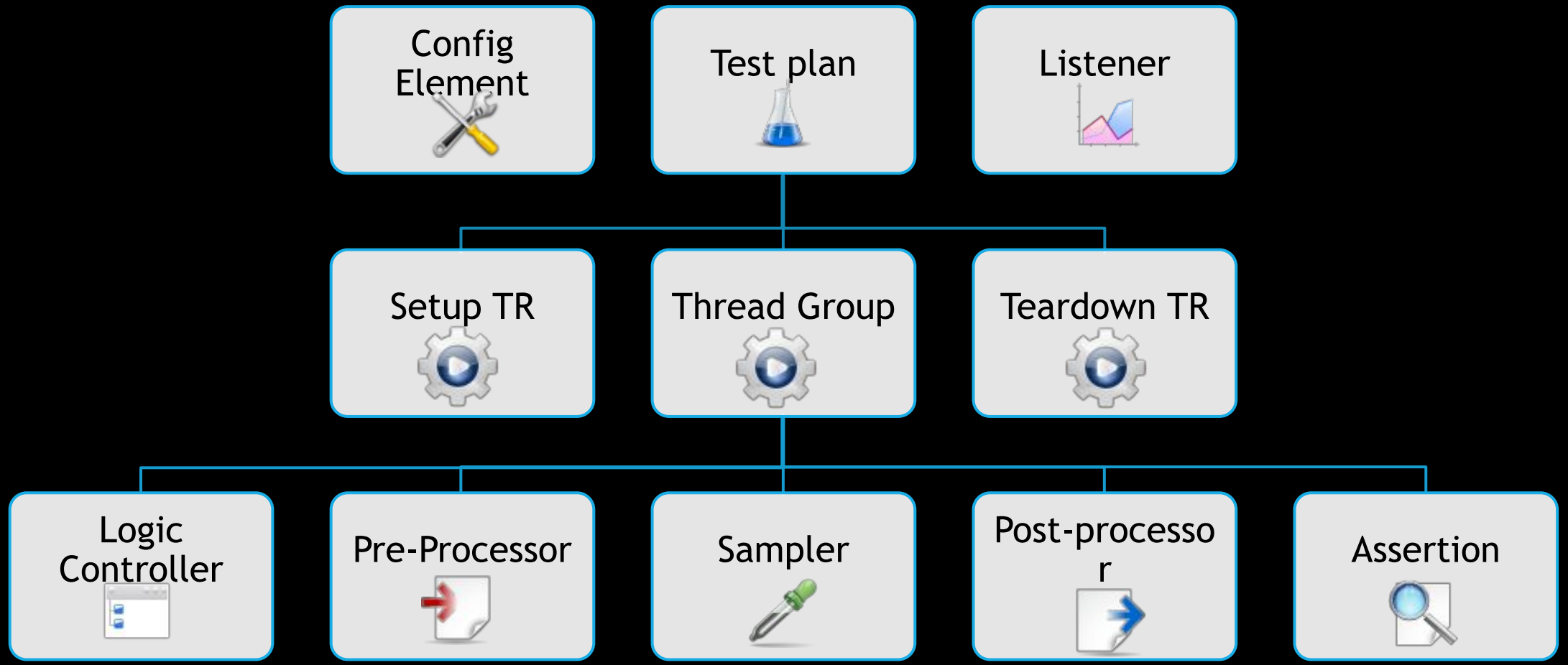
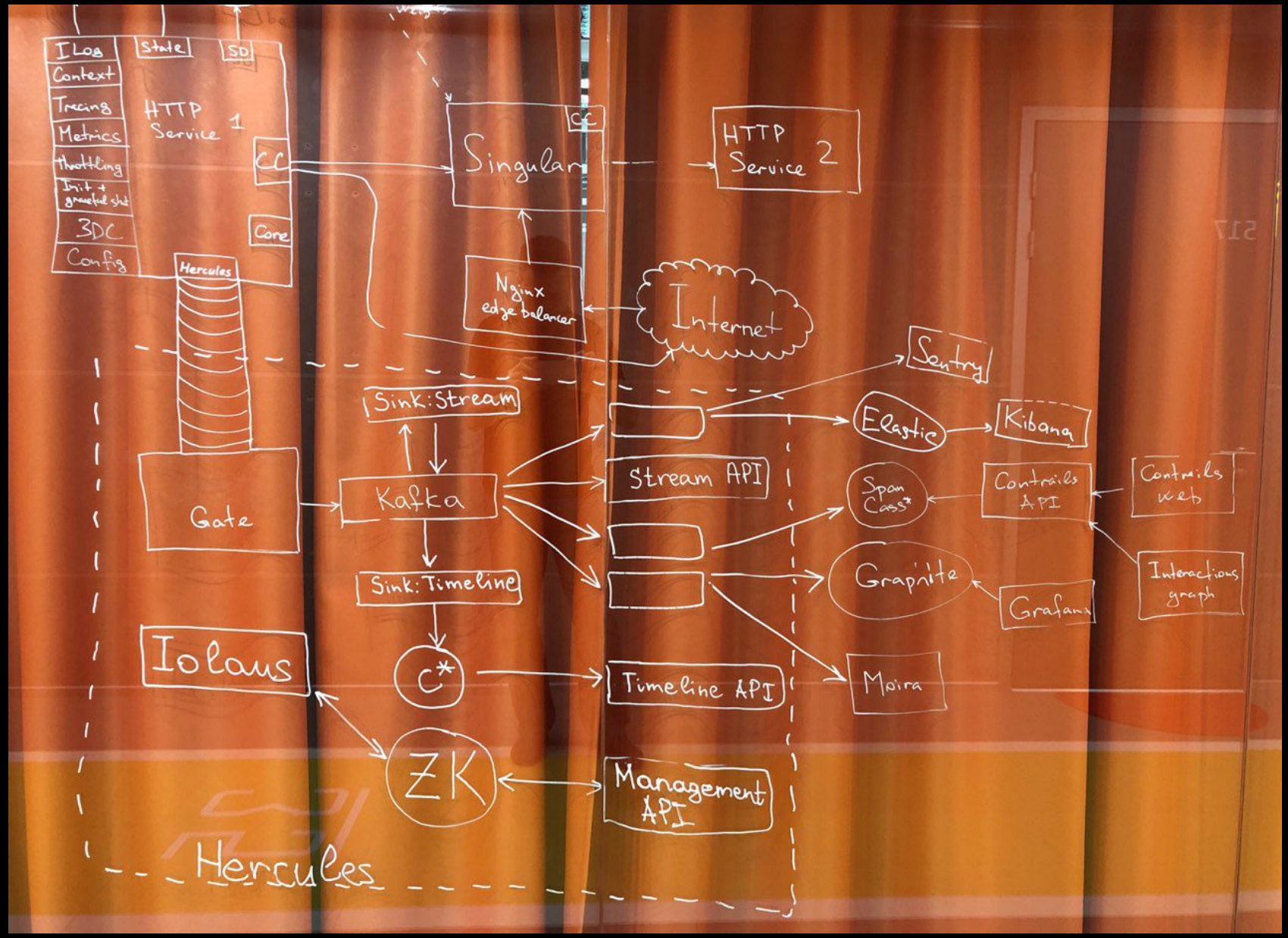
Внешний вид


JMTest.jmx (D:\Преза\jmeter Пермь\JMTest.jmx) - Apache JMeter (4.0 r1823414)
File Edit Search Run Options Help
Тест-план
Пользовательские переменные
setUp Thread Group
Получение токена
Извлечение токена из ответа
Запись токена в переменную
Thread Group
HTTP Header Manager
Публикация записи
Формирование записи
Извлечение идентификатора из ответа
Получение записи по идентификатору
JSON Assertion
tearDown Thread Group
JDBC Connection Configuration
Чистка таблицы после тестов
View Results Tree
JSON Extractor
Name: Извлечение идентификатора из ответа
Comments:
Apply to:
Main sample and sub-samples
Main sample only
Sub-samples
Names of created variables: recId
JSON Path expressions: $.id
Match No. (0 for Random):
Compute concatenation var (suffix _ALL):
Default Values:

Компоненты JMeter

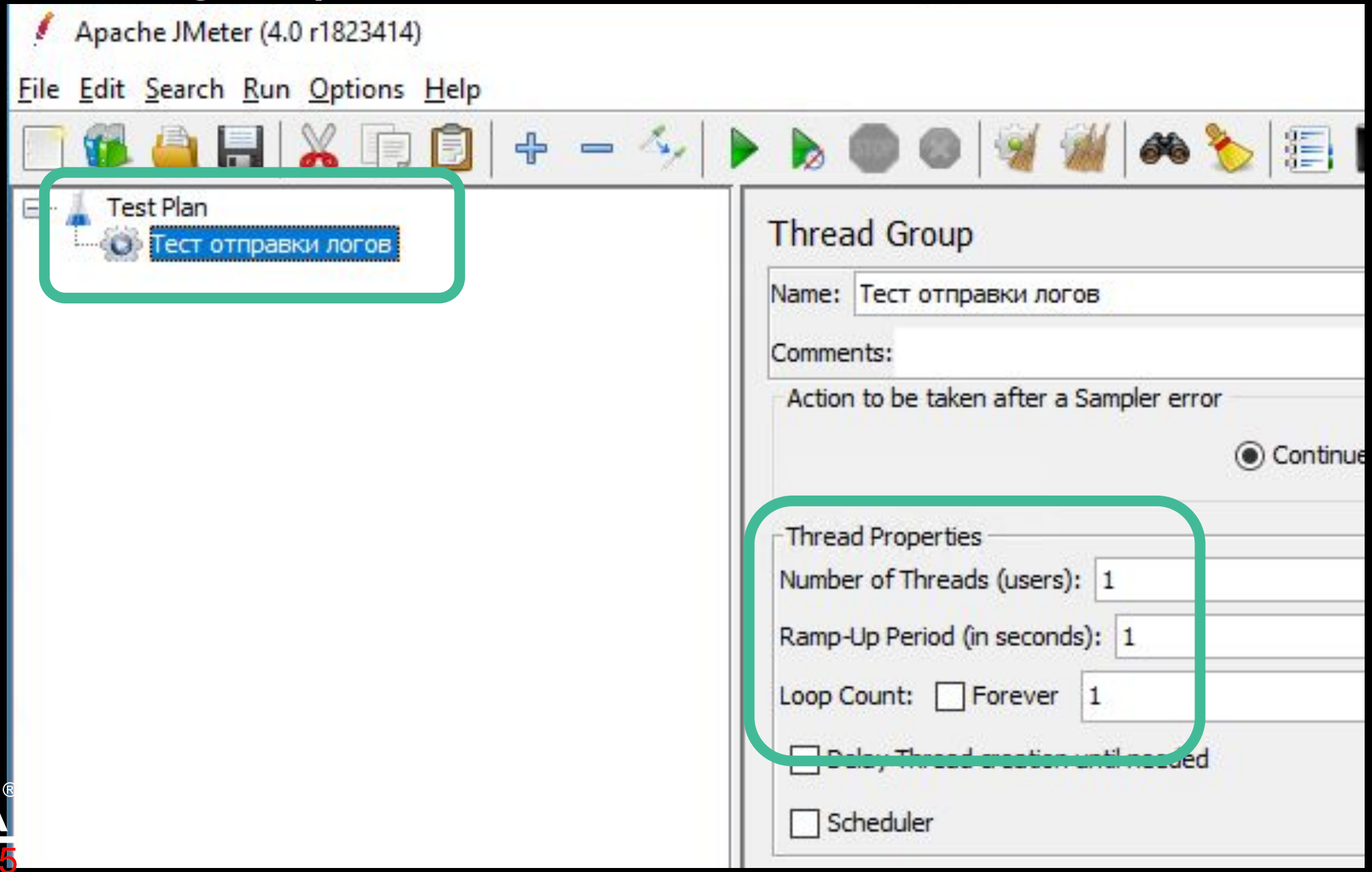


Тест цепочки отправки логов

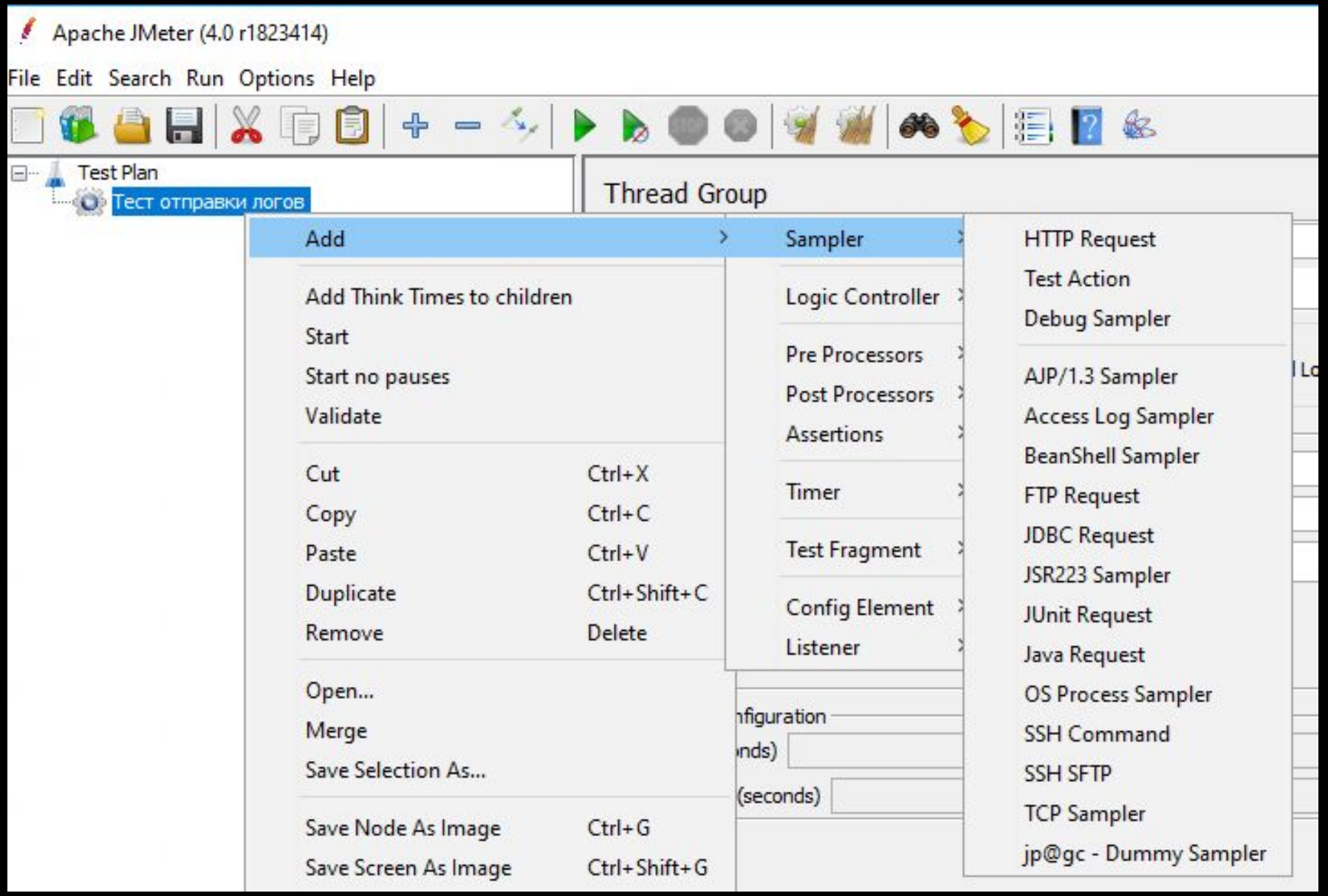


Тест цепочки отправки логов

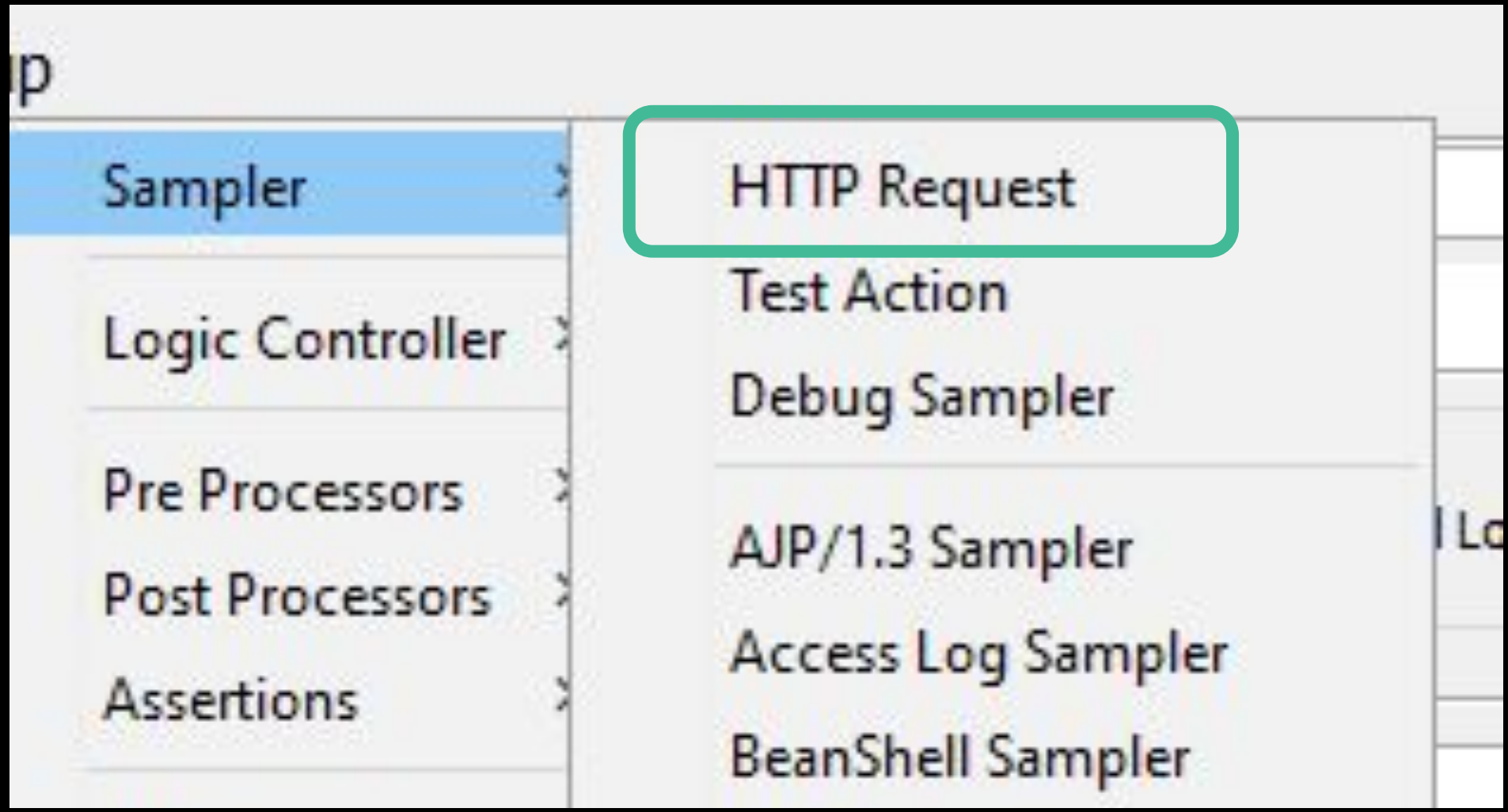
Thread group



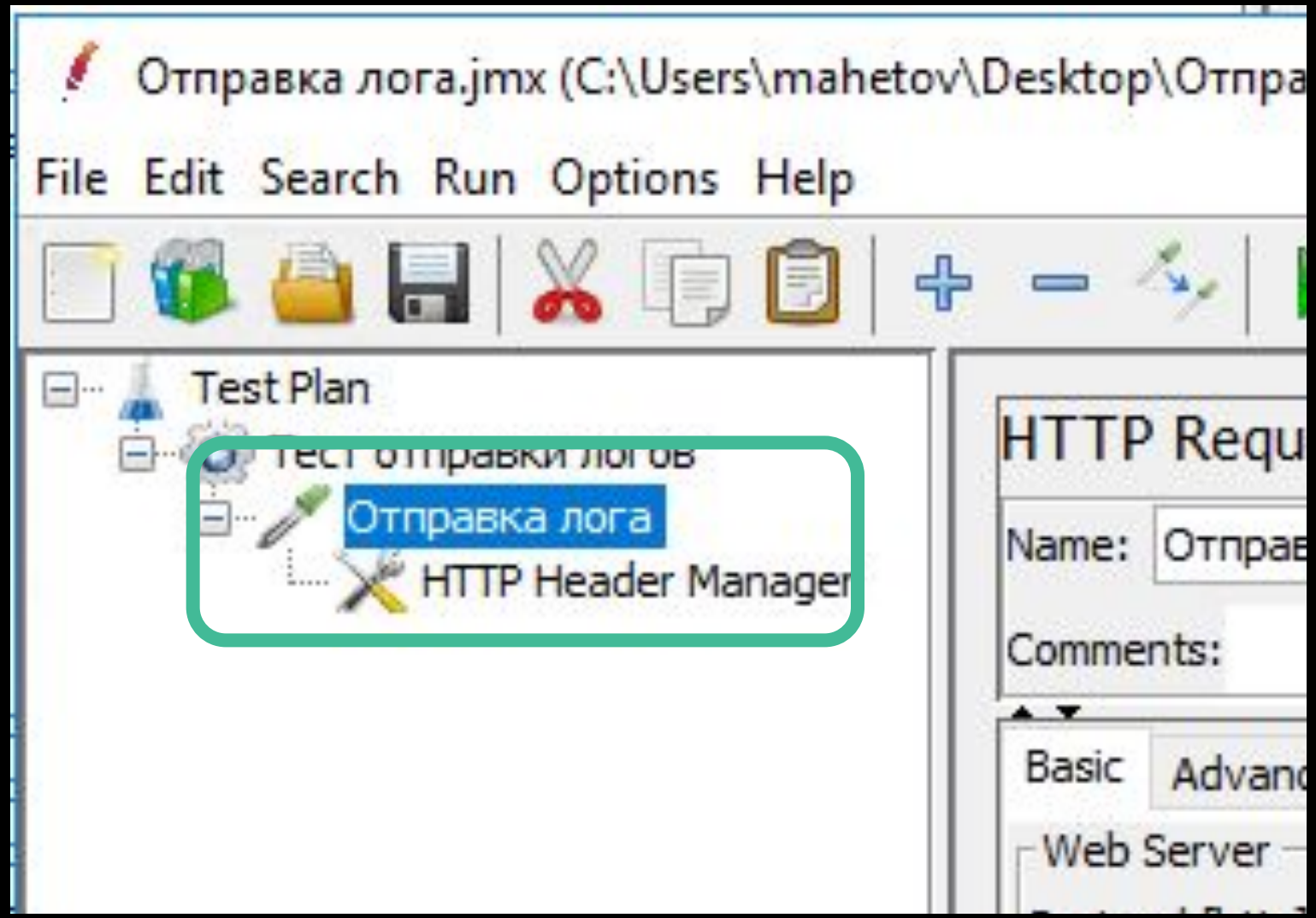
Sampler


Apache JMeter (4.0 r1823414)
File Edit Search Run Options Help
Test Plan
Тест отправки логов
Thread Group
Add
Add Think Times to children
Start
Start no pauses
Validate
Cut Ctrl+X
Copy Ctrl+C
Paste Ctrl+V
Duplicate Ctrl+Shift+C
Remove Delete
Open...
Merge
Save Selection As...
Save Node As Image Ctrl+G
Save Screen As Image Ctrl+Shift+G
Sampler
Logic Controller
Pre Processors
Post Processors
Assertions
Timer
Test Fragment
Config Element
Listener
HTTP Request
Test Action
Debug Sampler
AJP/1.3 Sampler
Access Log Sampler
BeanShell Sampler
FTP Request
JDBC Request
JSR223 Sampler
JUnit Request
Java Request
OS Process Sampler
SSH Command
SSH SFTP
TCP Sampler
jp@gc - Dummy Sampler

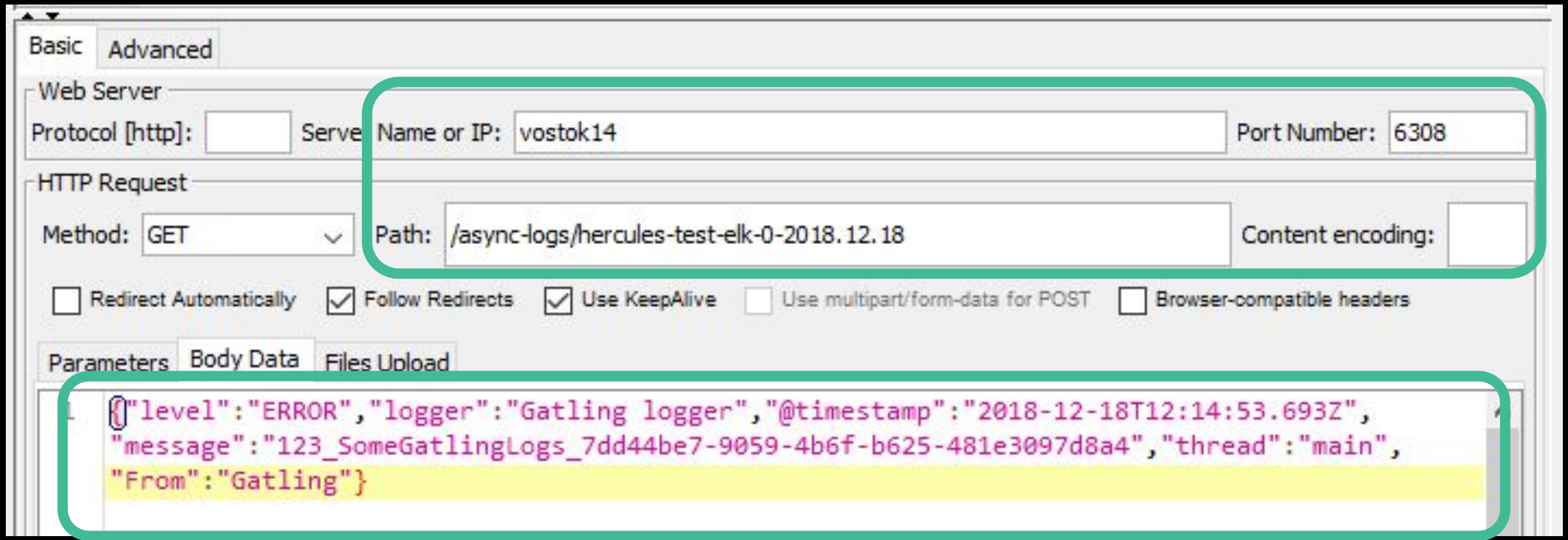
Sampler


Sampler
Logic Controller
Pre Processors
Post Processors
Assertions
HTTP Request
Test Action
Debug Sampler
AJP/1.3 Sampler
Access Log Sampler
BeanShell Sampler

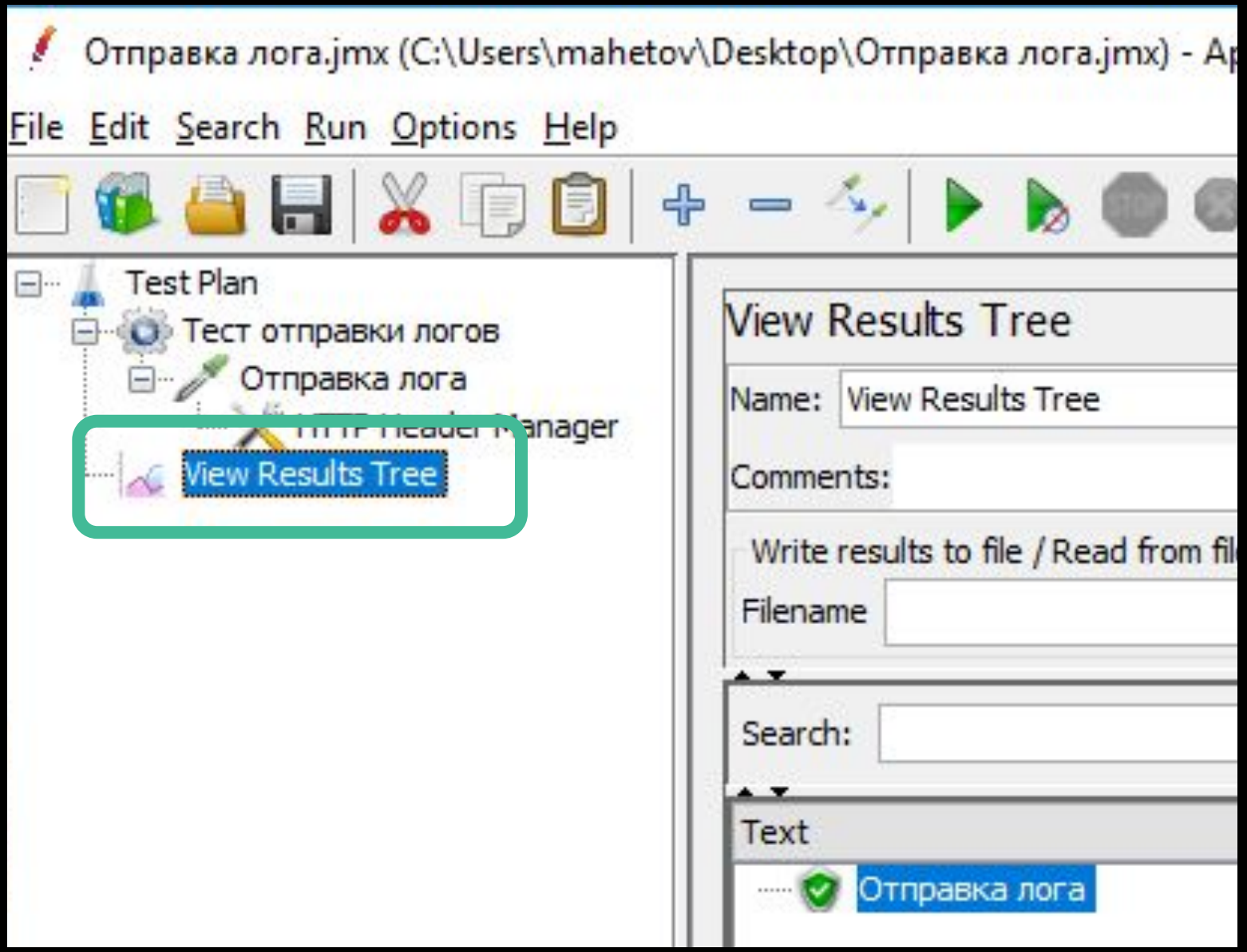
Отправка лог-записи



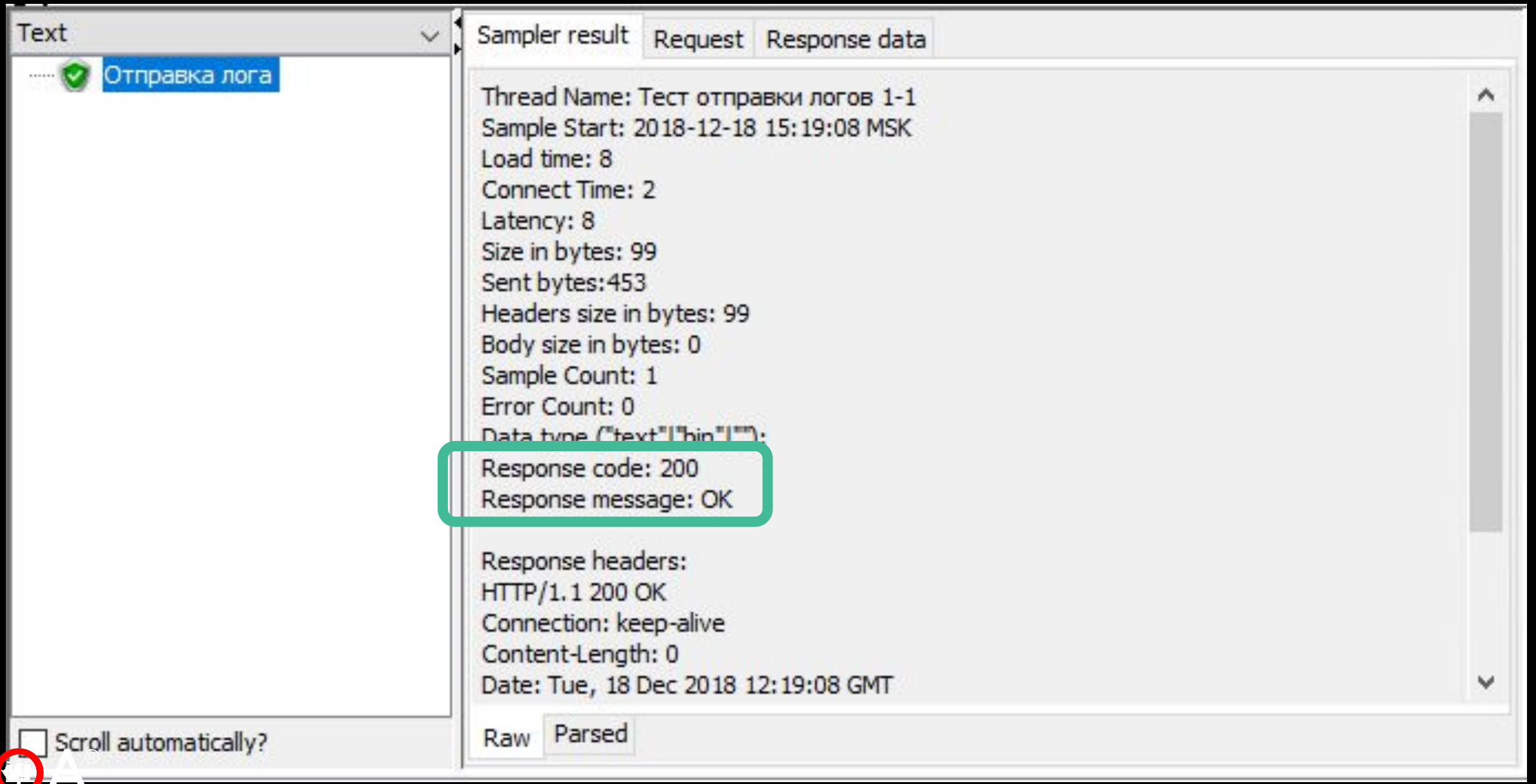
Отправка лог-записи



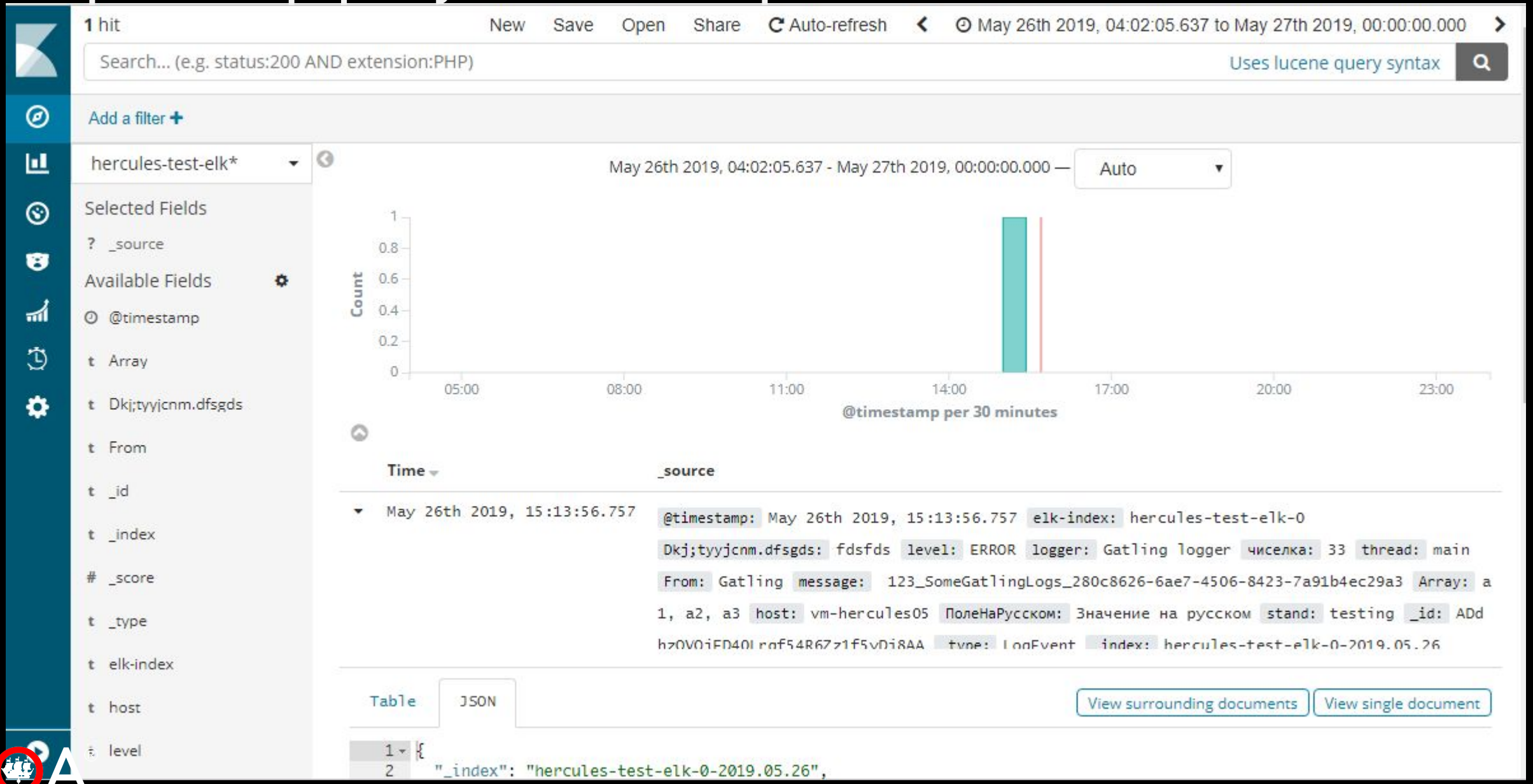
Просмотр результата отправки



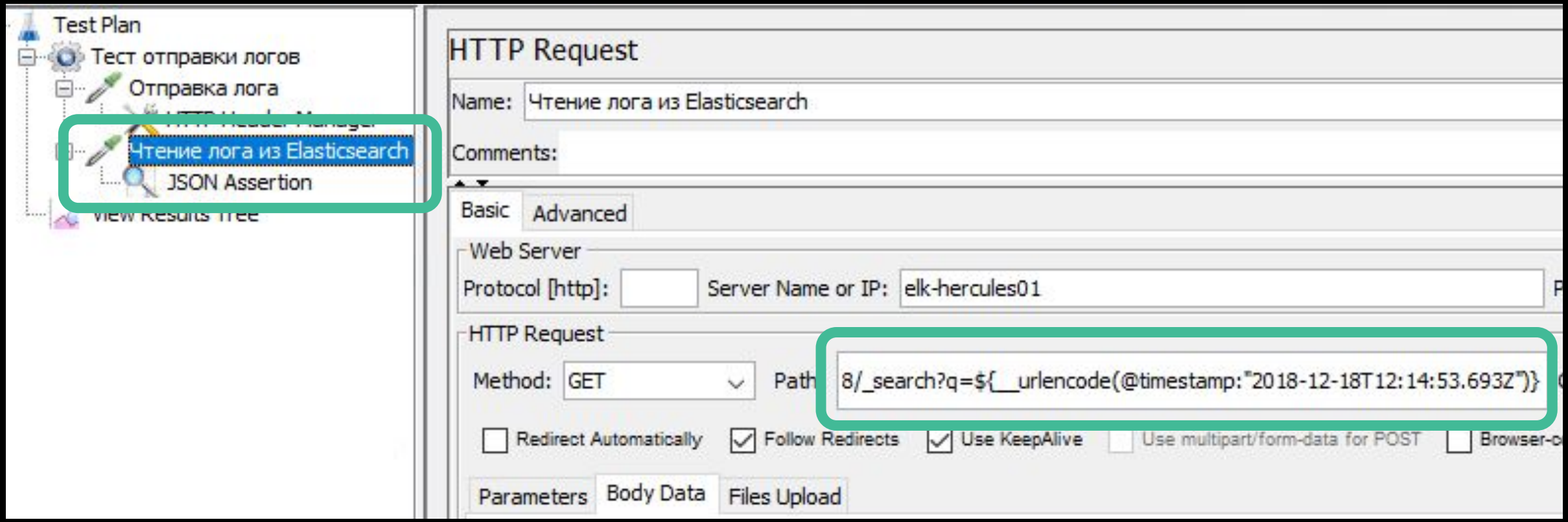
Просмотр результата отправки



Просмотр результата отправки



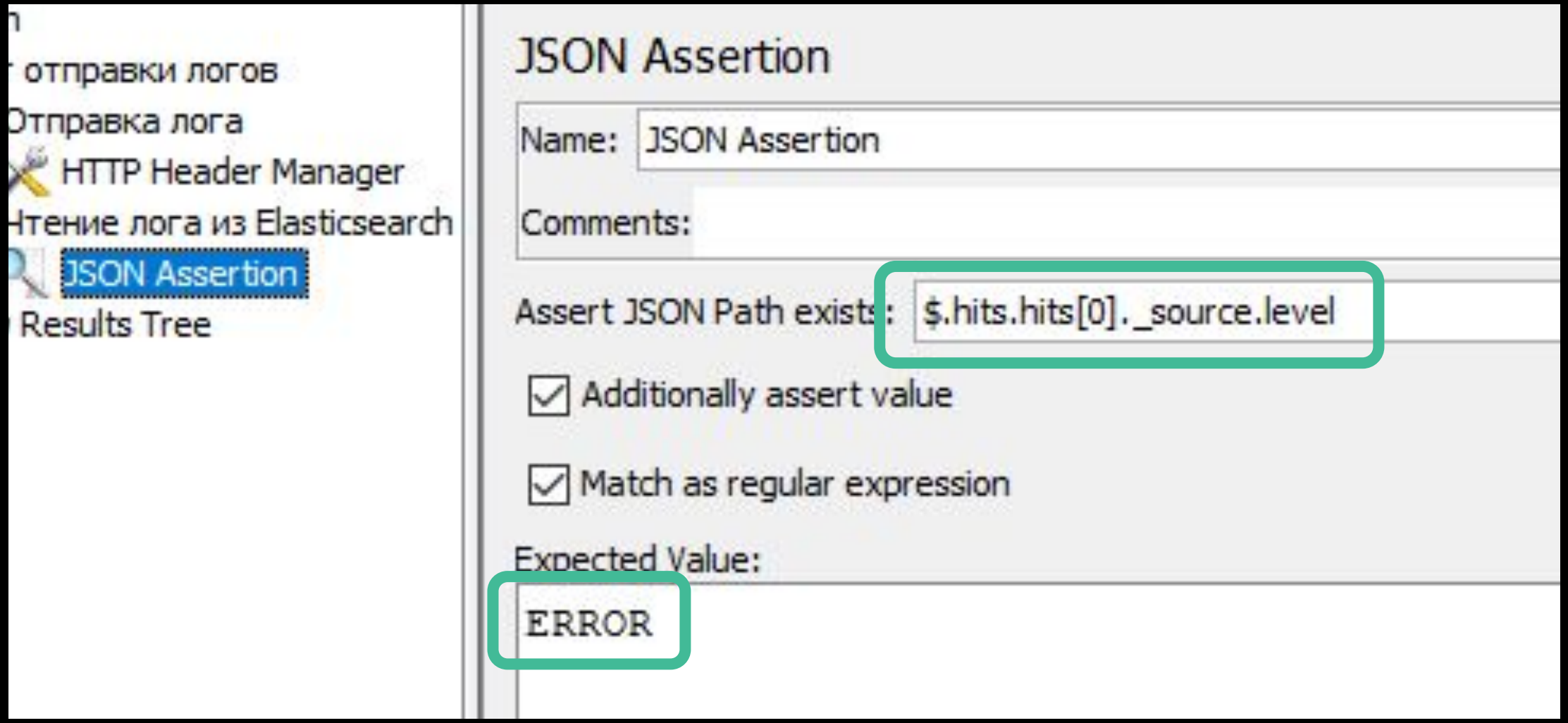
Чтение лог-записи из ES



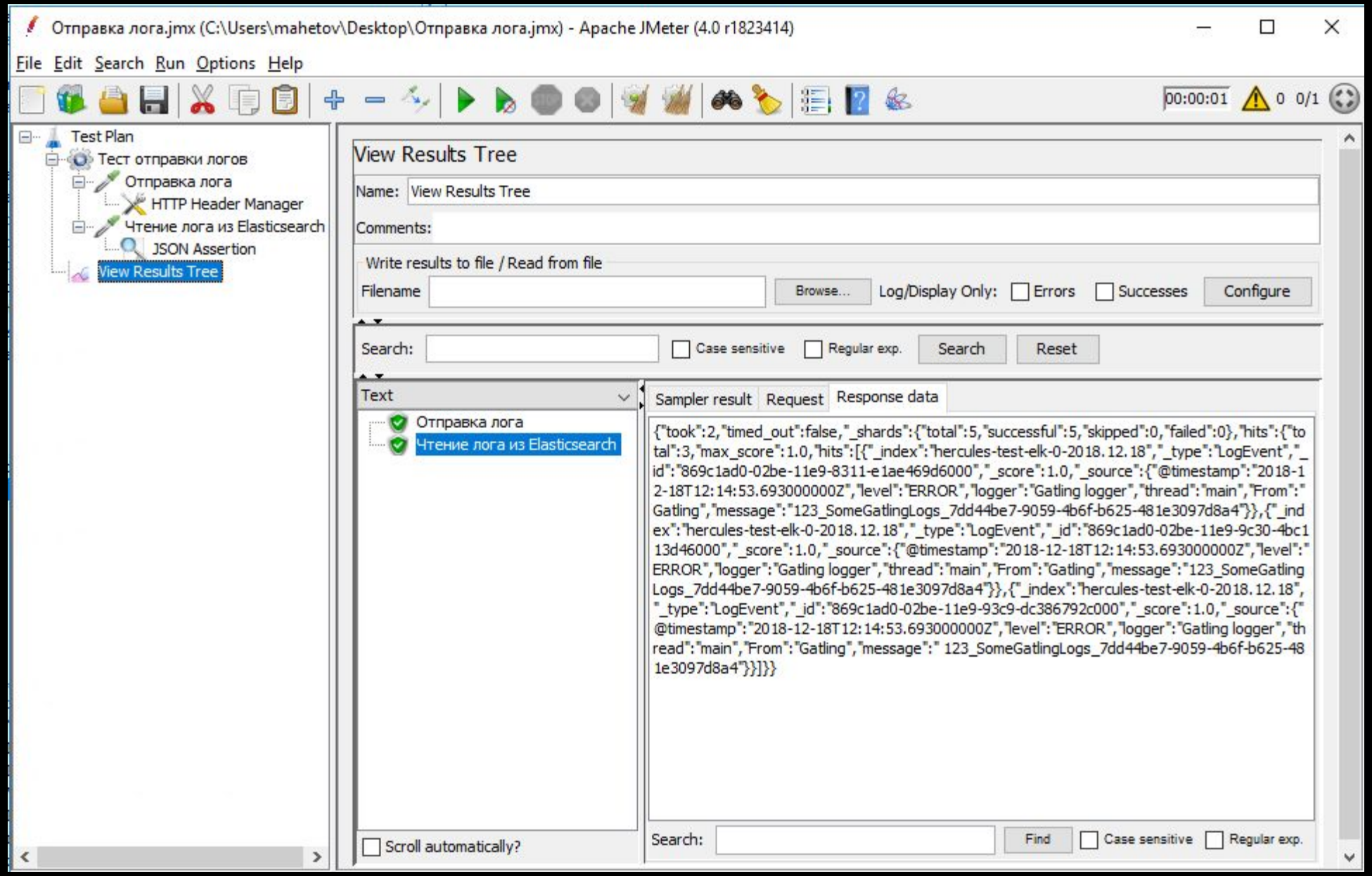
Проверка текста в ответе

```
{"took": 2,
    ...
    "hits": {
        ...
        "hits": [{
                "_index": "hercules-test-elk-0-2019.05.26",
                ...
                "_source": {
                    "@timestamp": "2019-05-26T10:13:56.757000000Z",
                    "elk-index": "hercules-test-elk-0",
                    ...
                    "level": "ERROR",
                    ...
                    "stand": "testing"}
}]}}
```

Проверка текста в ответе



Дублирование запросов

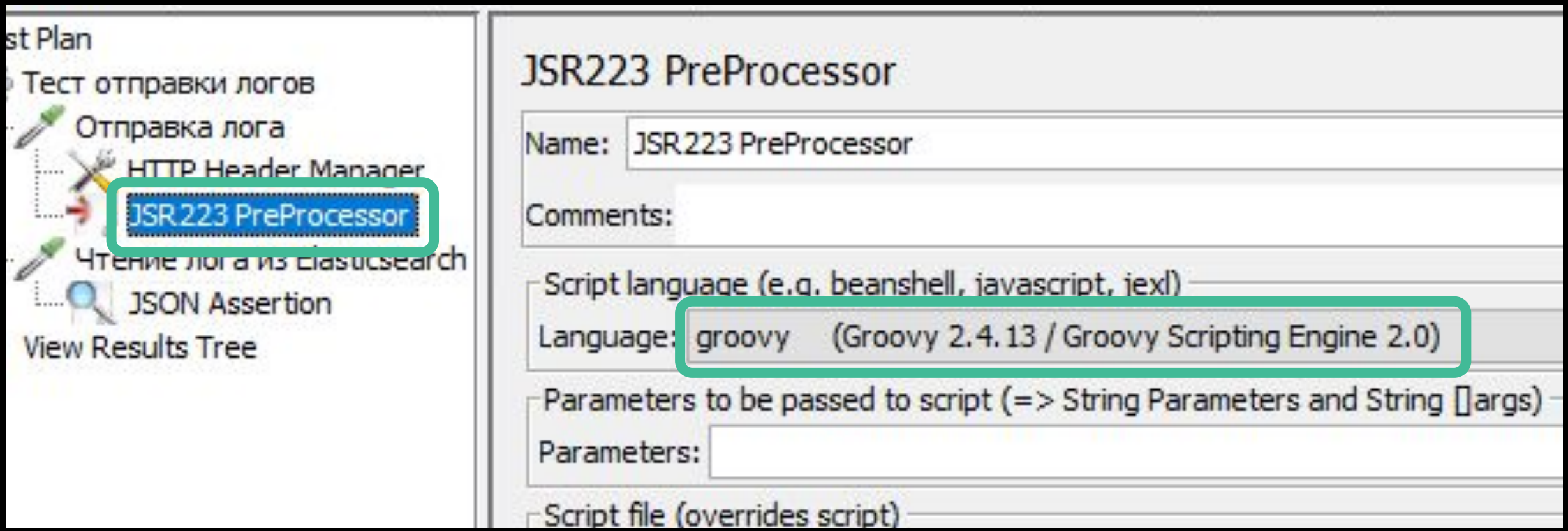


Дублирование запросов

Sampler result | Request | Response data


```
{"took":2,"timed_out":false,"_shards":{"total":5,"successful":5,"skipped":0,"failed":0},"hits":{"total":3,"max_score":1.0,"hits":[{"_index":"hercules-test-elk-0-2018.12.18","_type":"LogEvent","_id":"869c1ad0-02be-11e9-8311-e1ae469d6000","_score":1.0,"_source":{"@timestamp":"2018-12-18T12:14:53.693000000Z","level":"ERROR","logger":"Gatling logger","thread":"main","From":"Gatling","message":"123_SomeGatlingLogs_7dd44be7-9059-4b6f-b625-481e3097d8a4"}},{"_index":"hercules-test-elk-0-2018.12.18","_type":"LogEvent","_id":"869c1ad0-02be-11e9-9c30-4bc113d46000","_score":1.0,"_source":{"@timestamp":"2018-12-18T12:14:53.693000000Z","level":"ERROR","logger":"Gatling logger","thread":"main","From":"Gatling","message":"123_SomeGatlingLogs_7dd44be7-9059-4b6f-b625-481e3097d8a4"}},{"_index":"hercules-test-elk-0-2018.12.18","_type":"LogEvent","_id":"869c1ad0-02be-11e9-93c9-dc386792c000","_score":1.0,"_source":{"@timestamp":"2018-12-18T12:14:53.693000000Z","level":"ERROR","logger":"Gatling logger","thread":"main","From":"Gatling","message":" 123_SomeGatlingLogs_7dd44be7-9059-4b6f-b625-481e3097d8a4"}}]}}
```

Pre-processor для подстановки времени



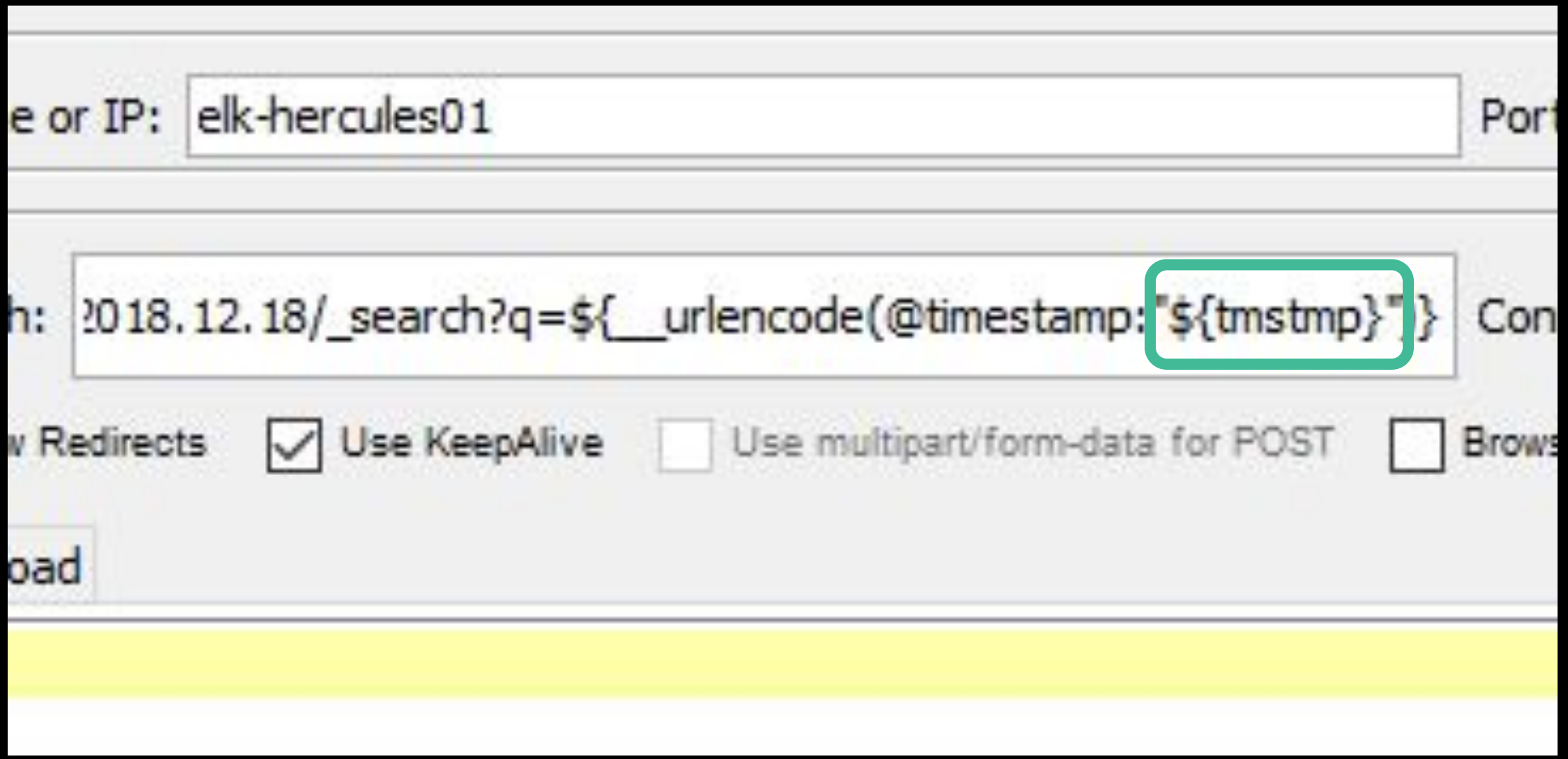
Текущее время в переменной

Script:

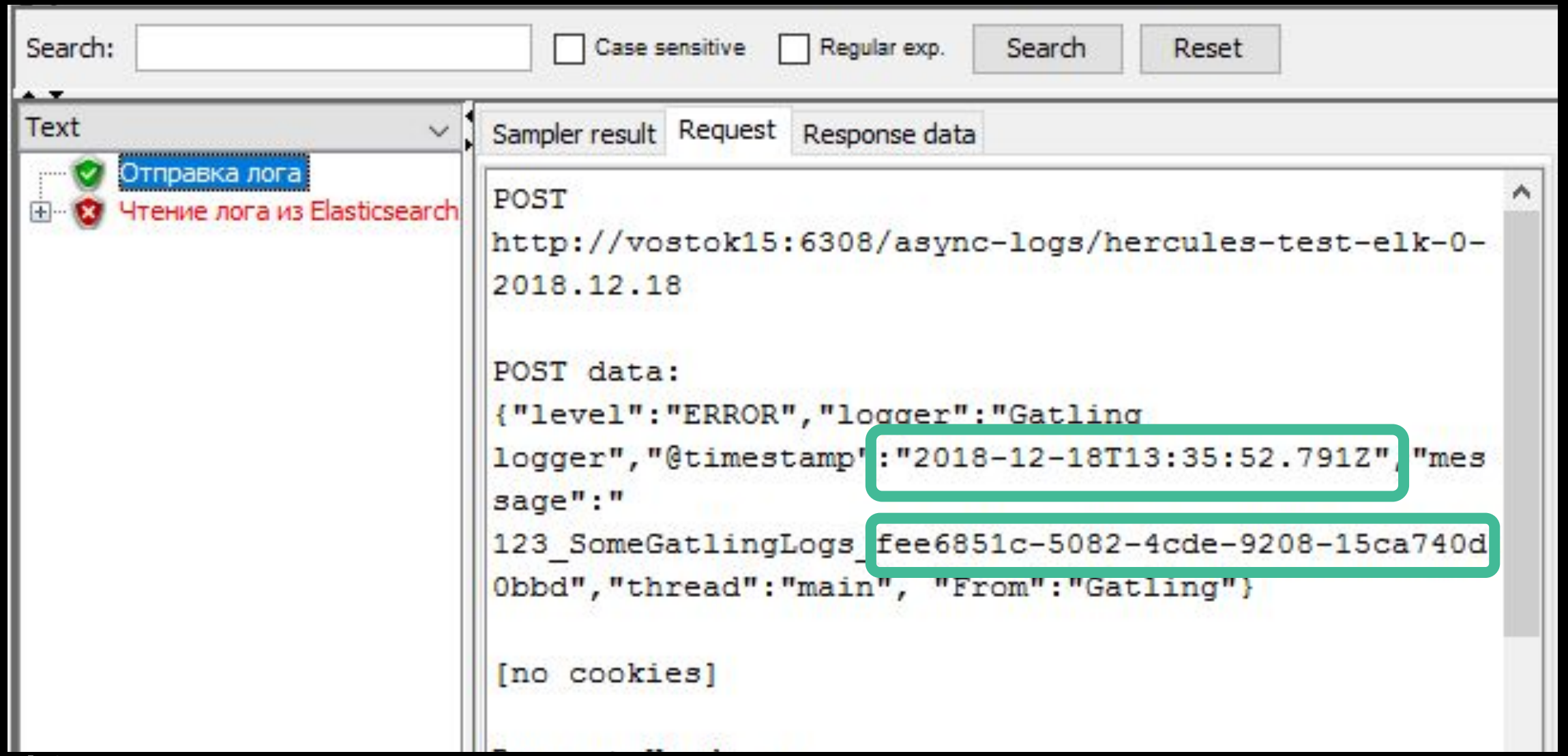
```
1  dt = java.time.Instant.now().toString()
2  //vars.put("tmstmp", "2018-08-02T20:19:52.703Z")
3  vars.put("tmstmp", dt)
4
```

Добавление переменной и функции

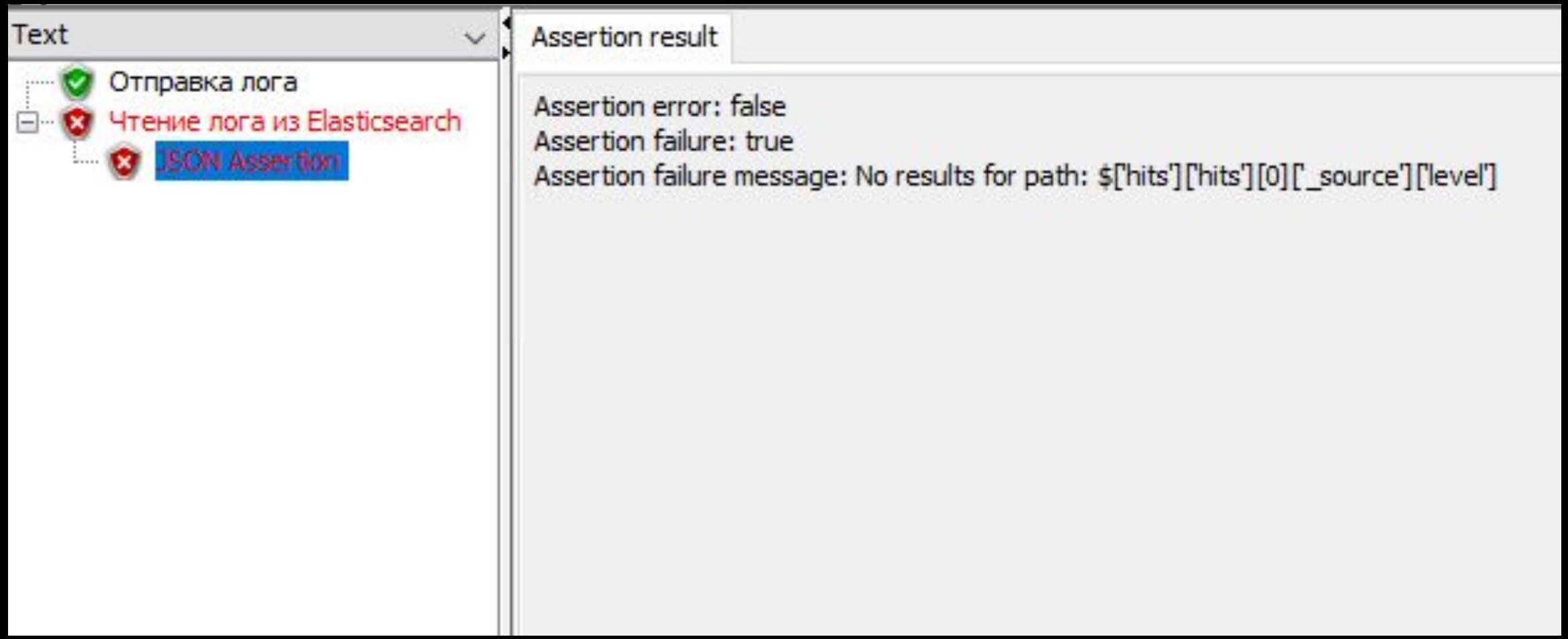
Переменная в запросе лог-записи



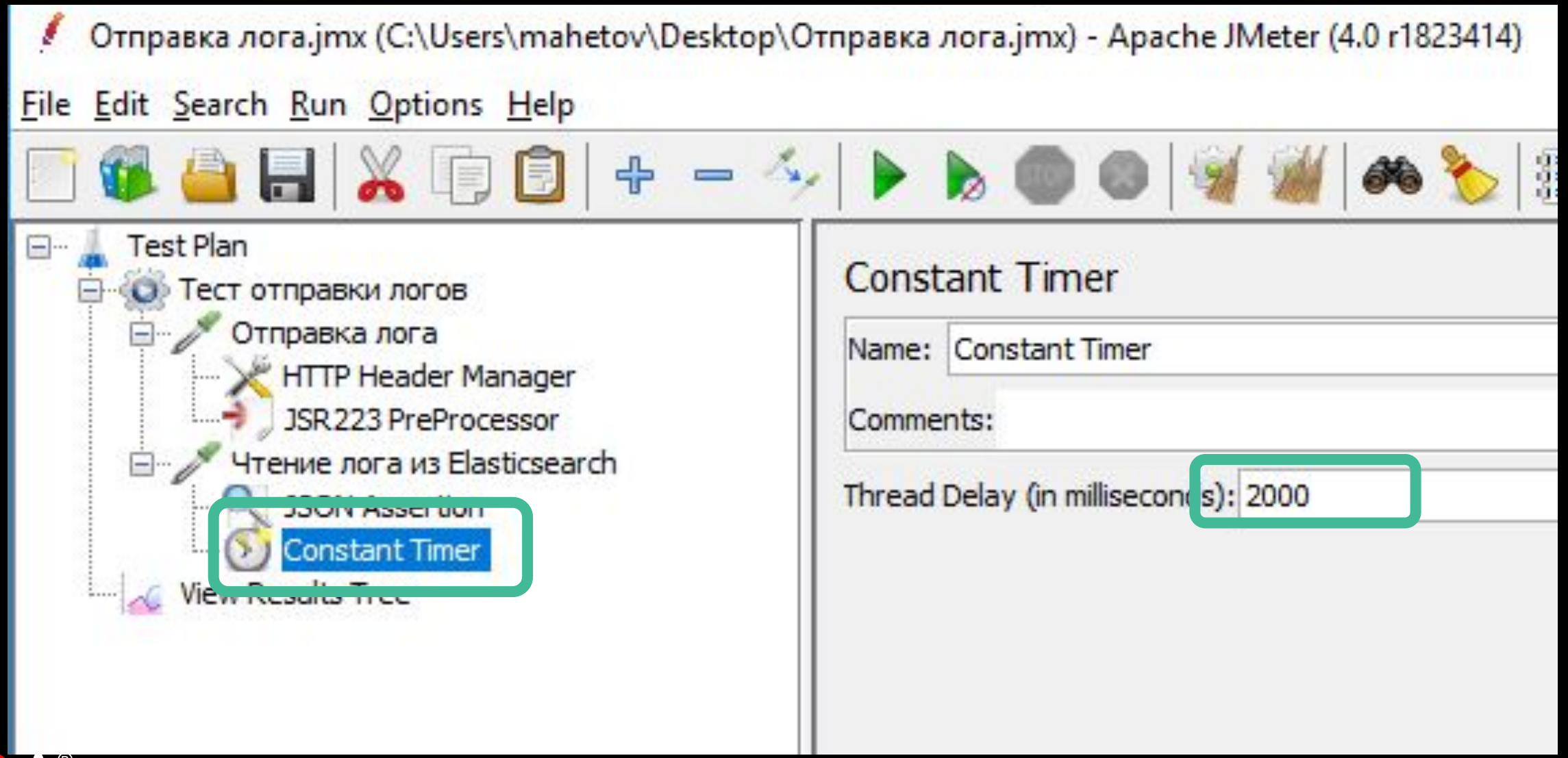
Подстановка значения переменной и функции



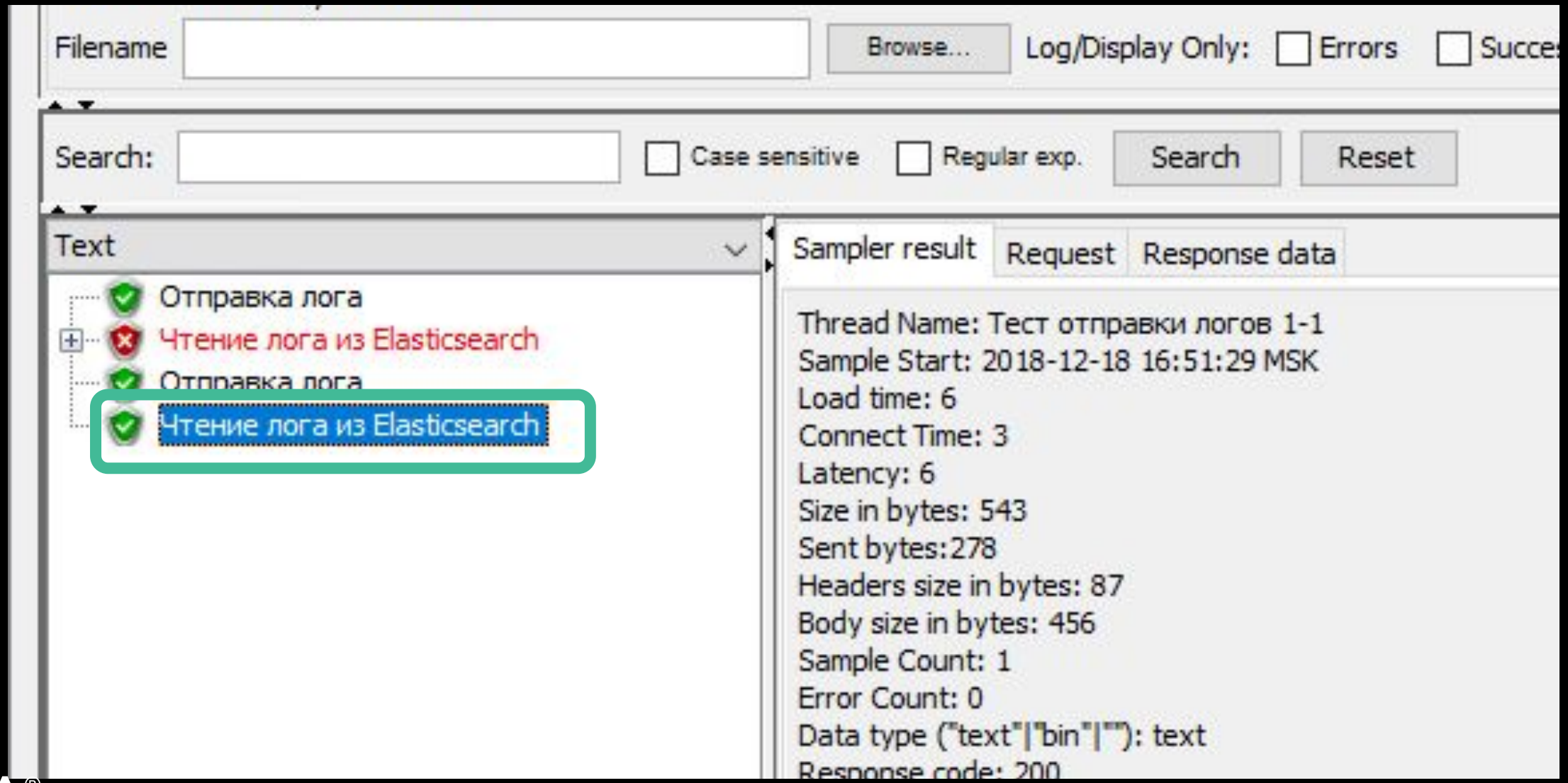
Ошибка при запросе лог-записи



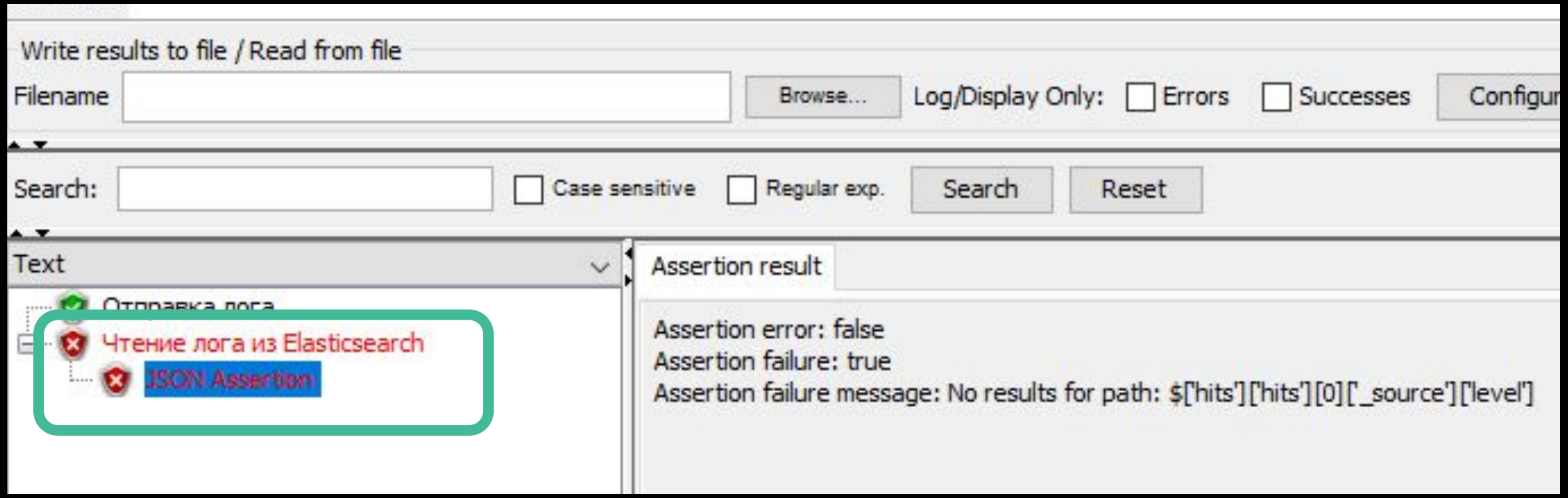
Добавление таймаута



Тест пройден!



Ошибка в цепочке

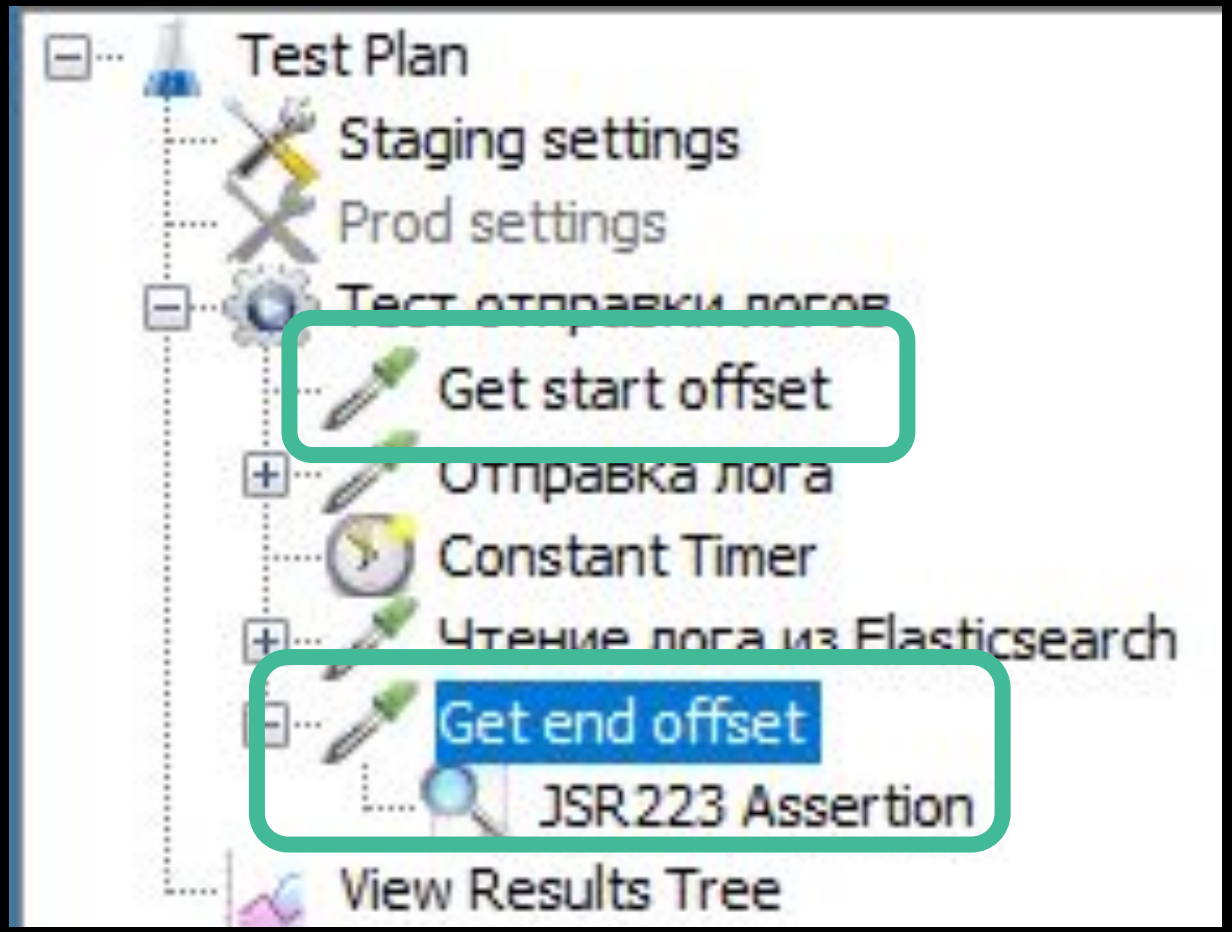


Офсеты Kafka

```
TOPIC                          PARTITION  CURRENT-OFFSET
elk_adapter_test_0             0          17111565
elk_adapter_test_0             2          17105615
elk_adapter_test_0             1          17105427
```

Проверка увеличения офсета Kafka

```
TOPIC                PARTITION  CURRENT-OFFSET
elk_adapter_test_0   0          17111565
elk_adapter_test_0   2          17105615
elk_adapter_test_0   1          17105427
```



Получение офсета

```
import java.util.Arrays;
import java.util.Properties;
import org.apache.kafka.clients.consumer.KafkaConsumer;
import org.apache.kafka.common.TopicPartition;
import org.apache.kafka.common.serialization.StringDeserializer;

Properties props = new Properties();
props.put("bootstrap.servers", "${kafkaHostPort}");
props.put("group.id", "consumer-tutorial1");
props.put("key.deserializer", StringDeserializer.class.getName());
props.put("value.deserializer", StringDeserializer.class.getName());
KafkaConsumer<String, String> consumer = new KafkaConsumer<>(props);

String topic = "${kafkaTopic}";

List<TopicPartition> tp = new ArrayList<>();
consumer.partitionsFor(topic).each{x -> tp.add(new TopicPartition(topic, x.partition()))};
Map<TopicPartition, Long> topicPartitionLongMap = consumer.endOffsets(tp);
long offset = 0;
topicPartitionLongMap.each{k, v ->
    offset += v;
    log.info(v.toString());
};
consumer.close();
vars.put("startOffset", offset.toString())
System.out.println(offset.toString());
return "Current offset: " + offset.toString()
```

Сохранение текущего офсета

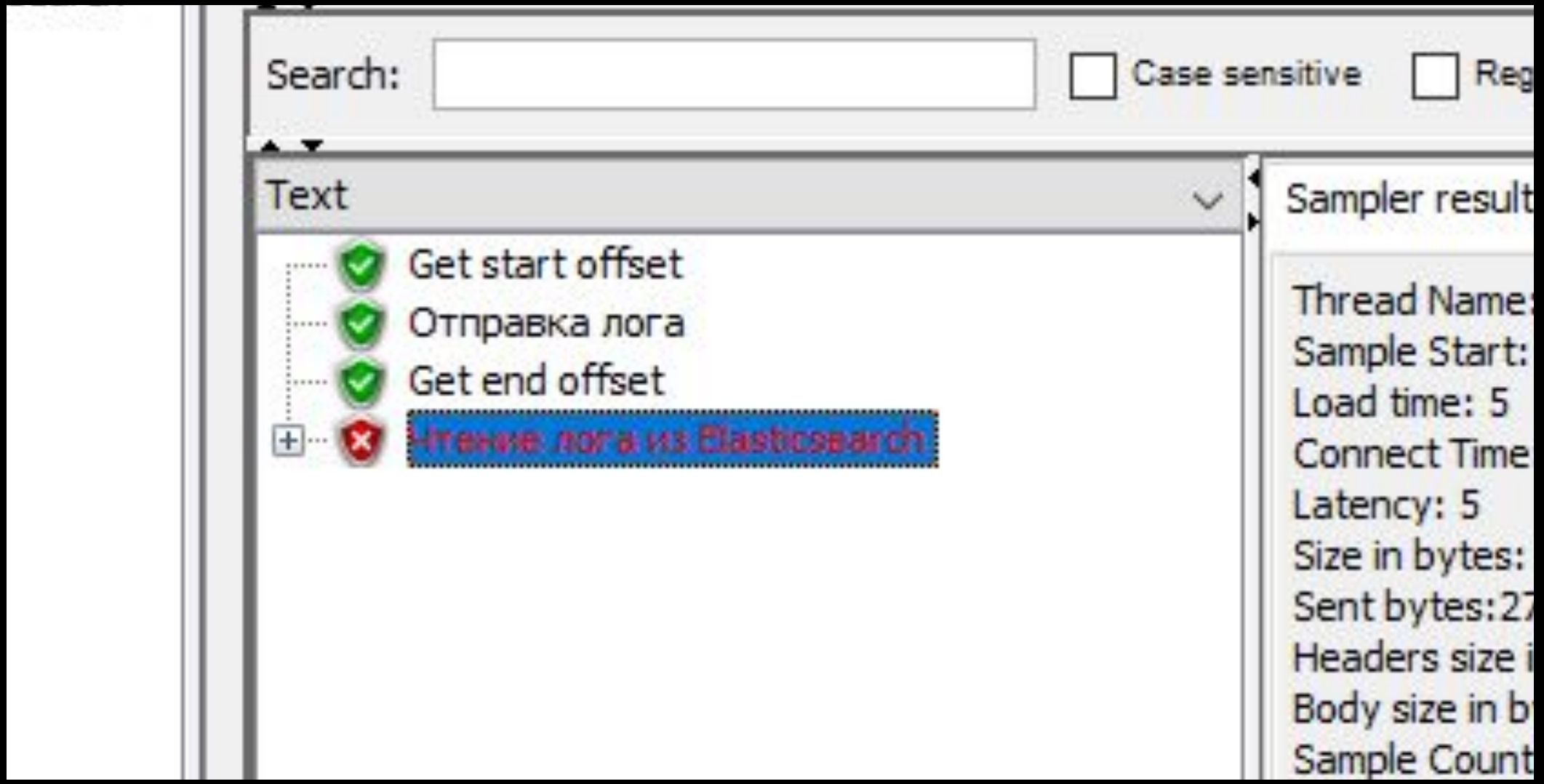
```
topicPartitionLongMap.each{k, v ->
    offset += v;
    log.info(v.toString());
};
consumer.close();
vars.put("startOffset", offset.toString())
System.out.println(offset.toString());
return "Current offset: " + offset.toString()
```

Сравнение офсетов до отправки и после

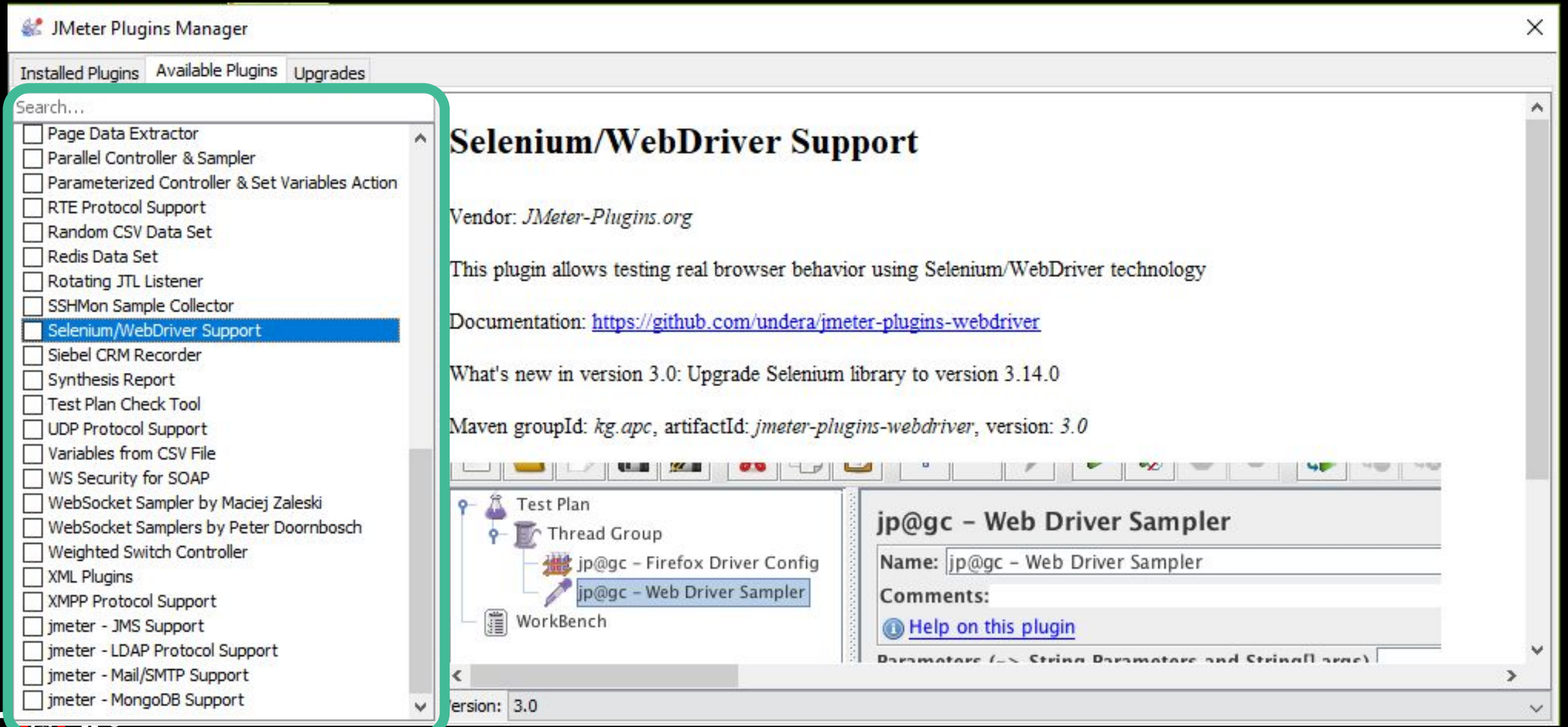
Script:

```
1  String var1 = vars.get("startOffset");
2  String var2 = vars.get("endOffset");
3
4  fail = var1==var2;
5
6  AssertionResult.setFailure(fail)
7  AssertionResult.setFailureMessage("Offsets are equal")
```

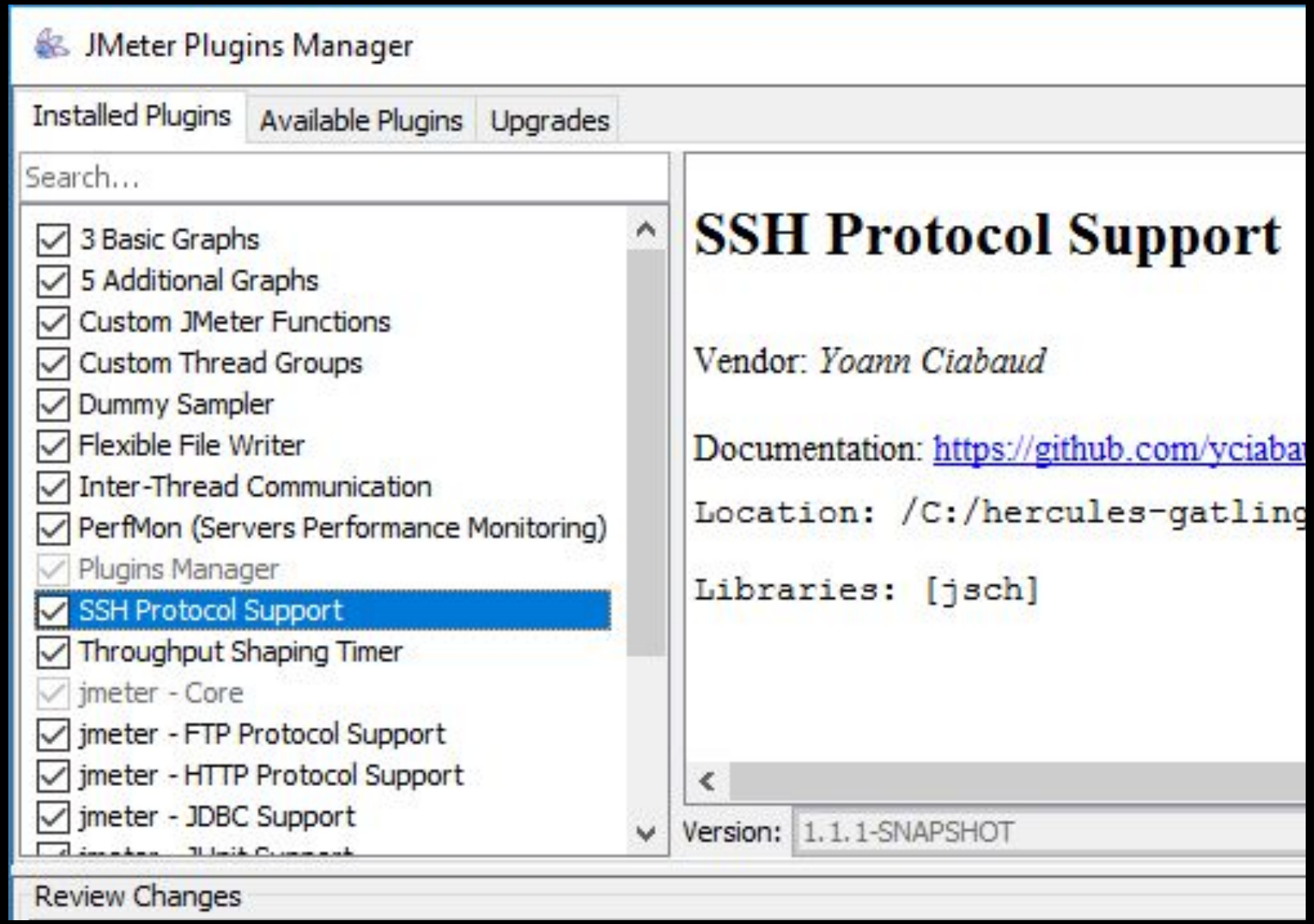
Ошибка осталась



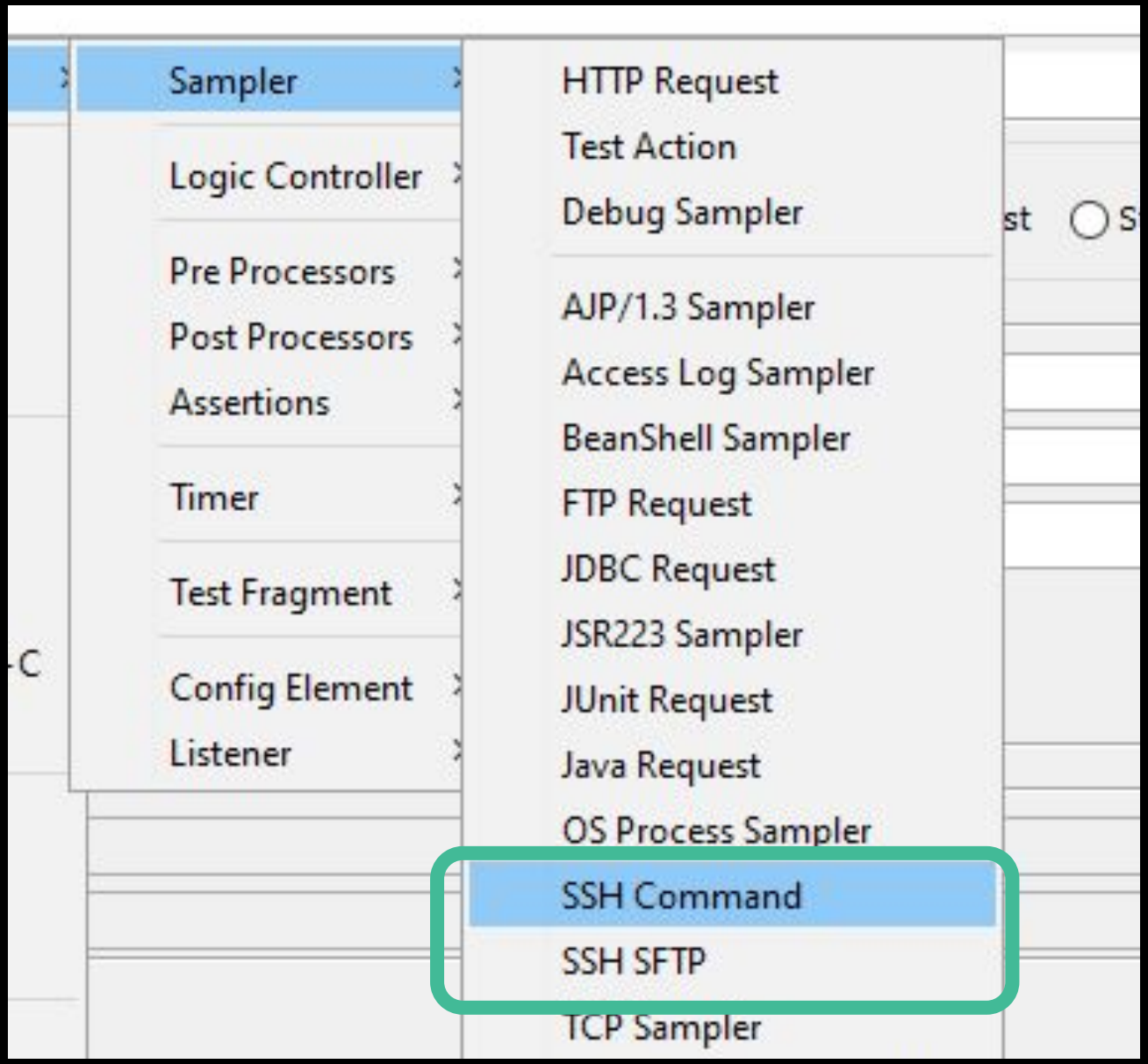
Плагины


JMeter Plugins Manager
Installed Plugins
Available Plugins
Upgrades
Search...
Page Data Extractor
Parallel Controller & Sampler
Parameterized Controller & Set Variables Action
RTE Protocol Support
Random CSV Data Set
Redis Data Set
Rotating JTL Listener
SSHMon Sample Collector
Selenium/WebDriver Support
Siebel CRM Recorder
Synthesis Report
Test Plan Check Tool
UDP Protocol Support
Variables from CSV File
WS Security for SOAP
WebSocket Sampler by Maciej Zaleski
WebSocket Samplers by Peter Doornbosch
Weighted Switch Controller
XML Plugins
XMPP Protocol Support
jmeter - JMS Support
jmeter - LDAP Protocol Support
jmeter - Mail/SMTP Support
jmeter - MongoDB Support
Selenium/WebDriver Support
Vendor: JMeter-Plugins.org
This plugin allows testing real browser behavior using Selenium/WebDriver technology
Documentation: https://github.com/undera/jmeter-plugins-webdriver
What's new in version 3.0: Upgrade Selenium library to version 3.14.0
Maven groupId: kg.apc, artifactId: jmeter-plugins-webdriver, version: 3.0
Test Plan
Thread Group
jp@gc - Firefox Driver Config
jp@gc - Web Driver Sampler
WorkBench
jp@gc - Web Driver Sampler
Name: jp@gc - Web Driver Sampler
Comments:
Help on this plugin
Version: 3.0

SSH Protocol Support



SSH Sampler


Sampler
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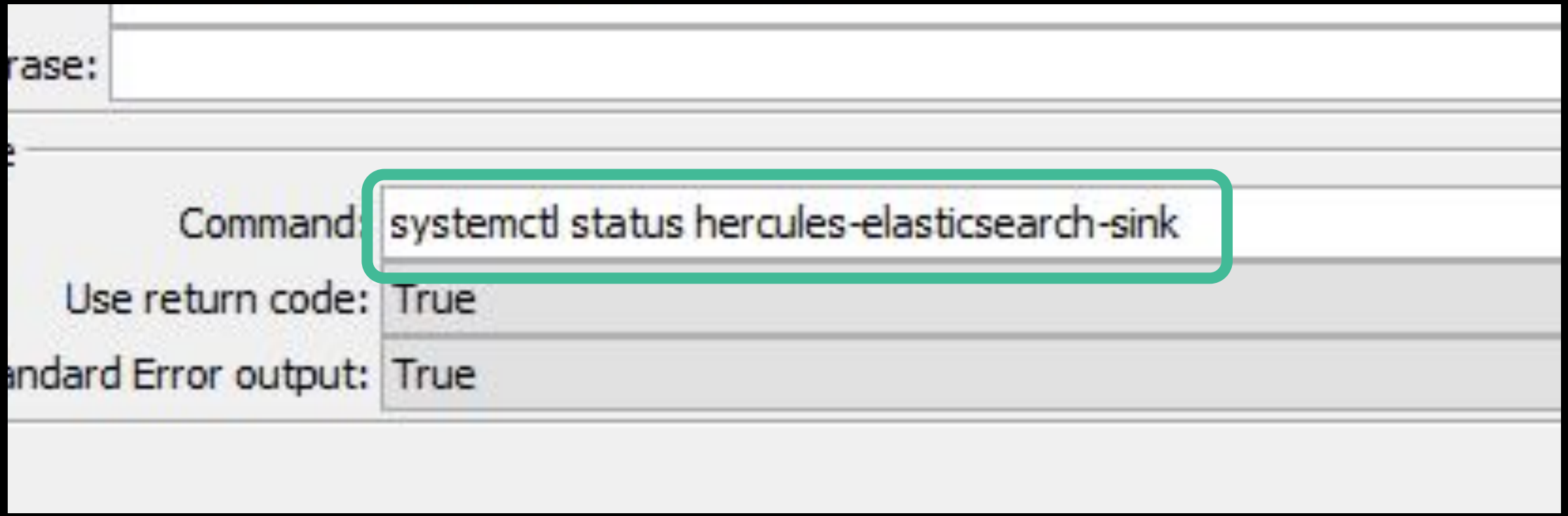
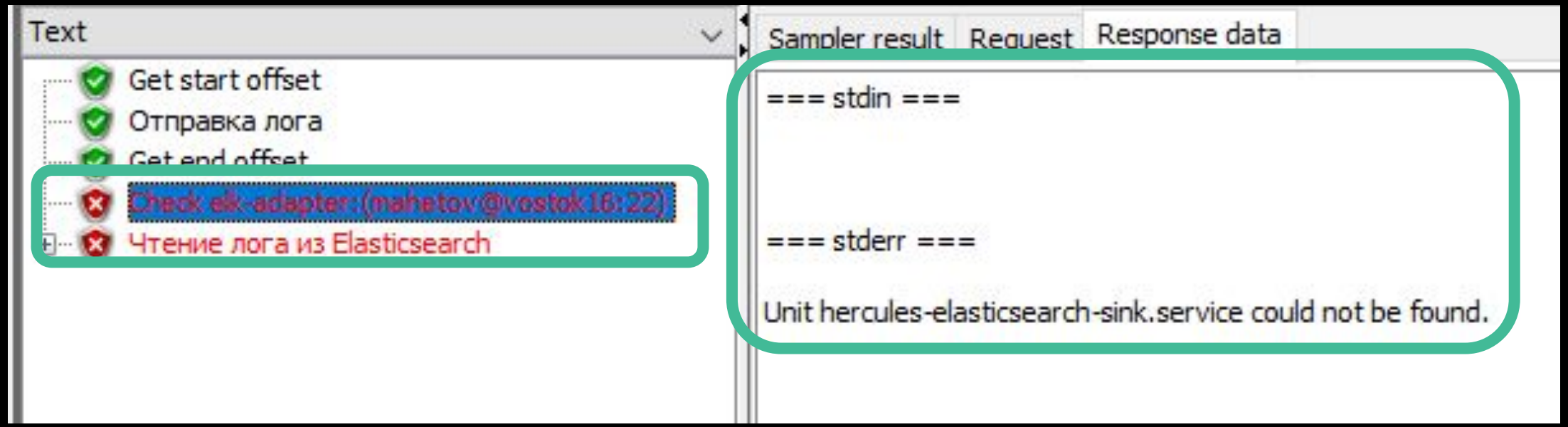
BeanShell Sampler
FTP Request
JDBC Request
JSR223 Sampler
JUnit Request
Java Request
OS Process Sampler
SSH Command
SSH SFTP
TCP Sampler

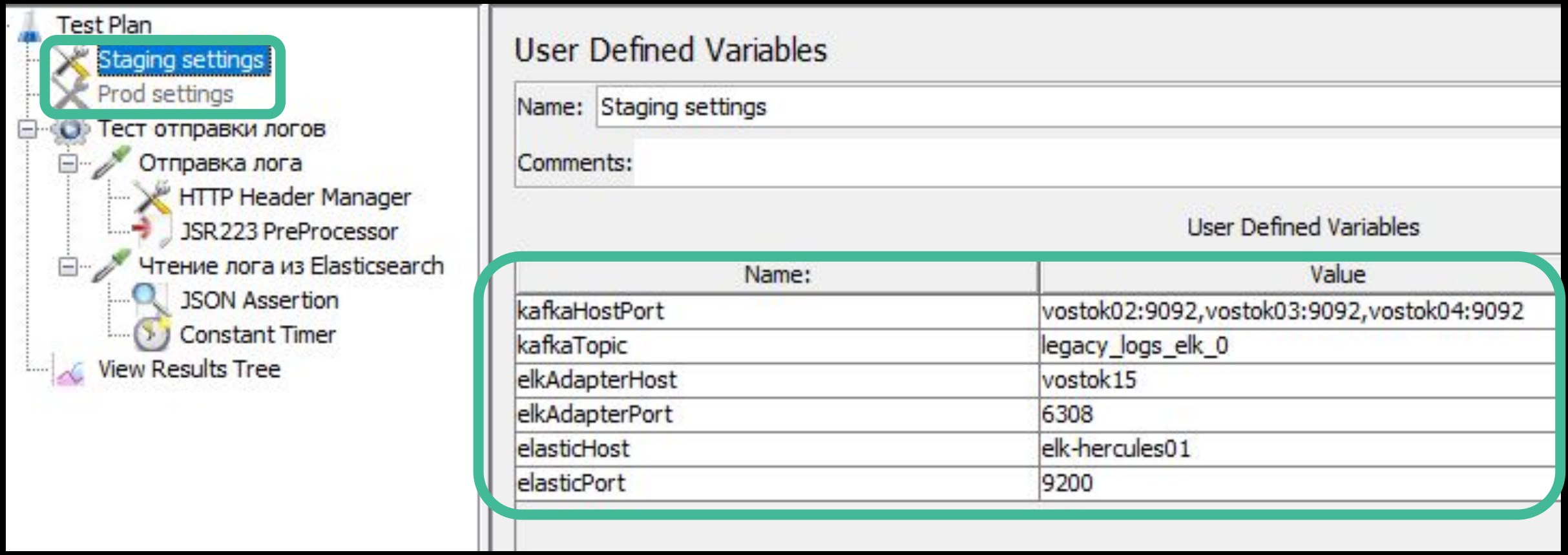
Команда проверки статуса



Ошибка приложения

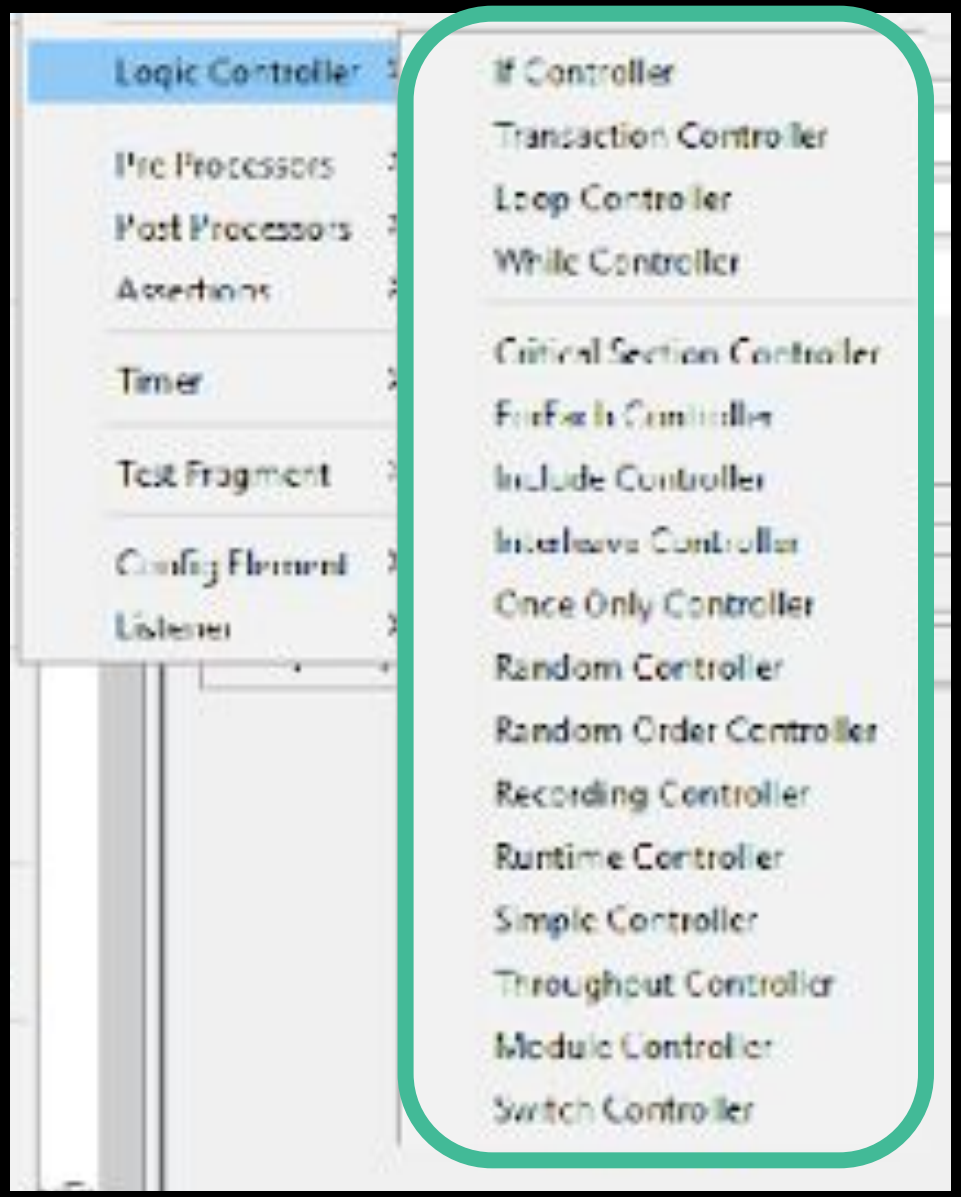


Настройки для разных стендов

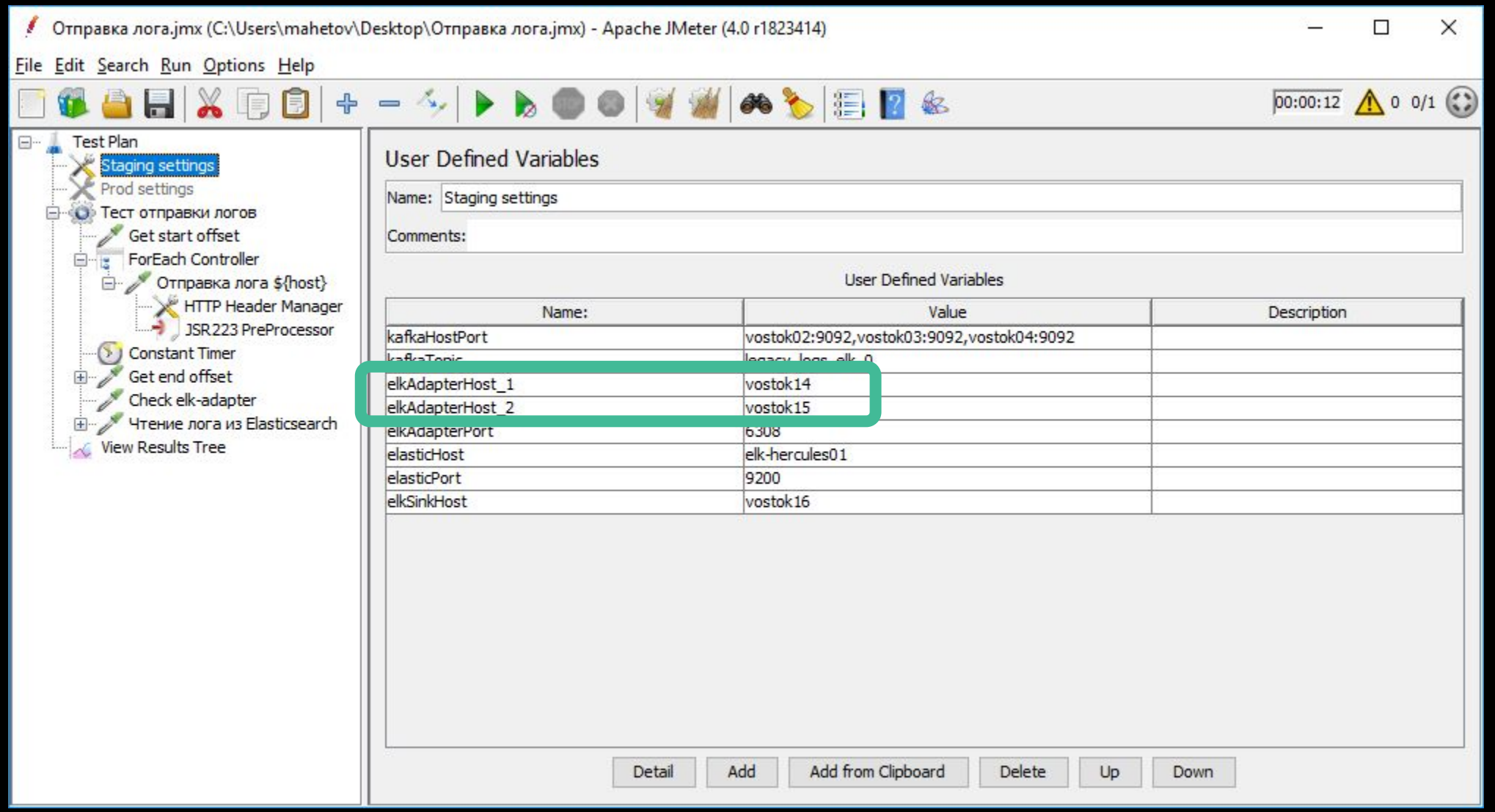


Настройки для разных стендов

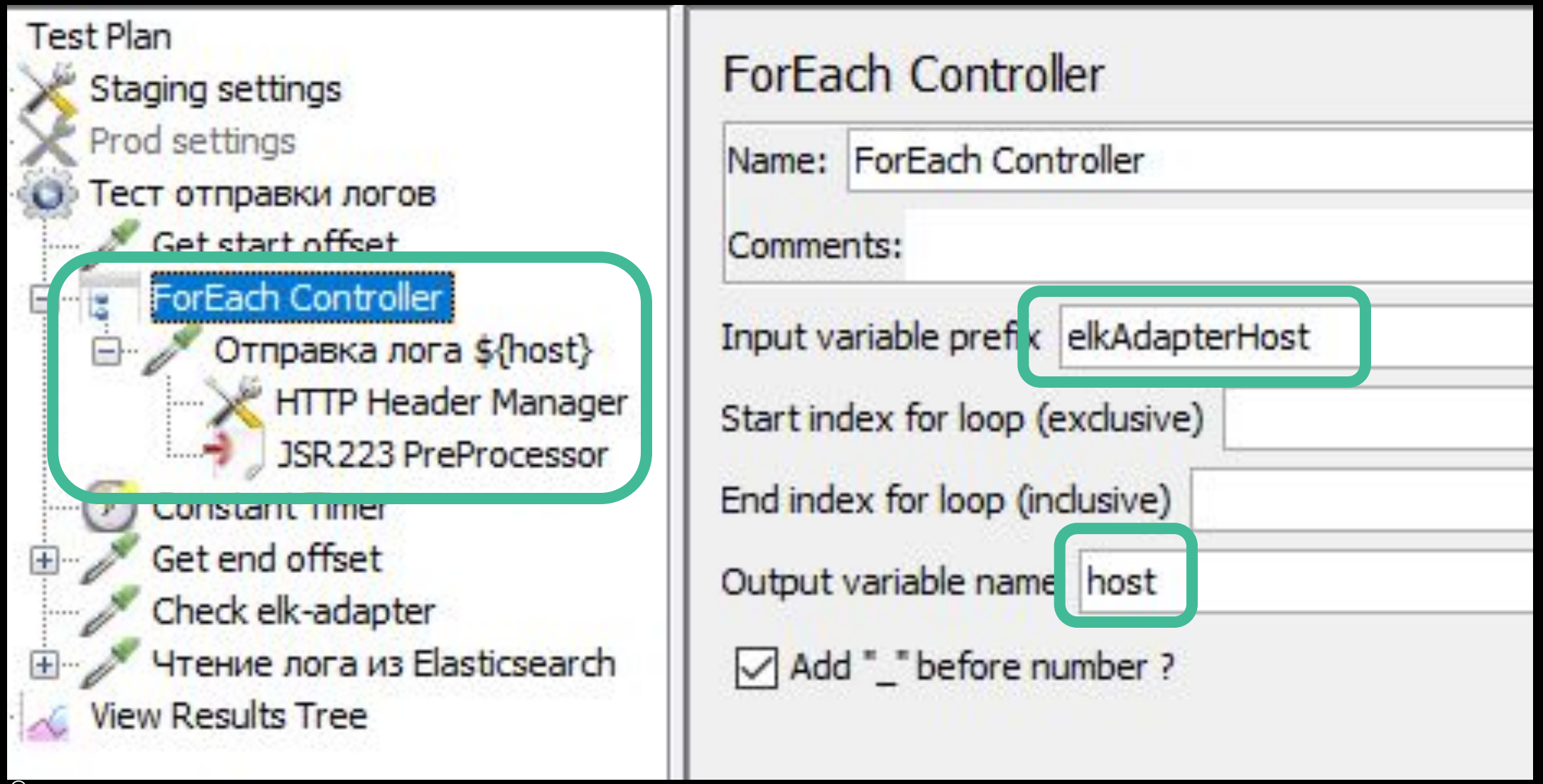
Logic Controllers



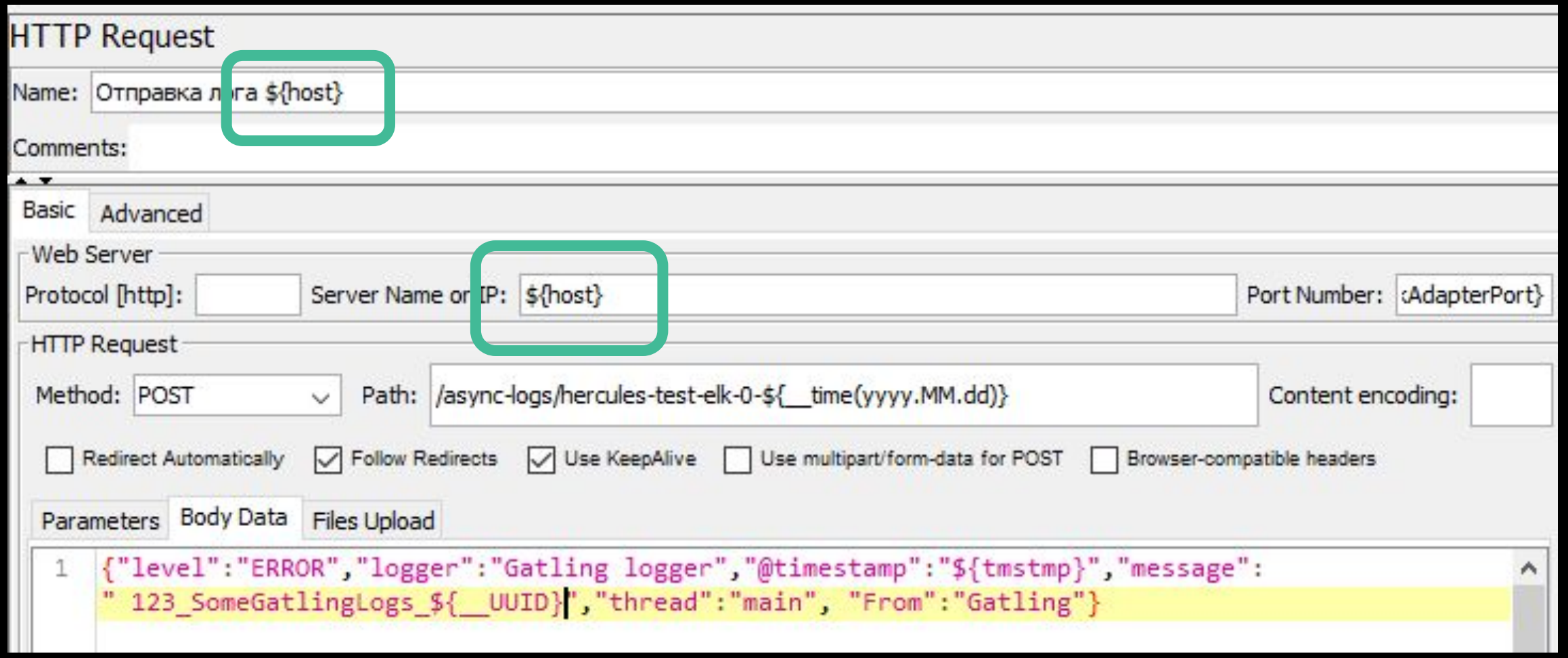
Проверка нескольких хостов



ForEach контроллер

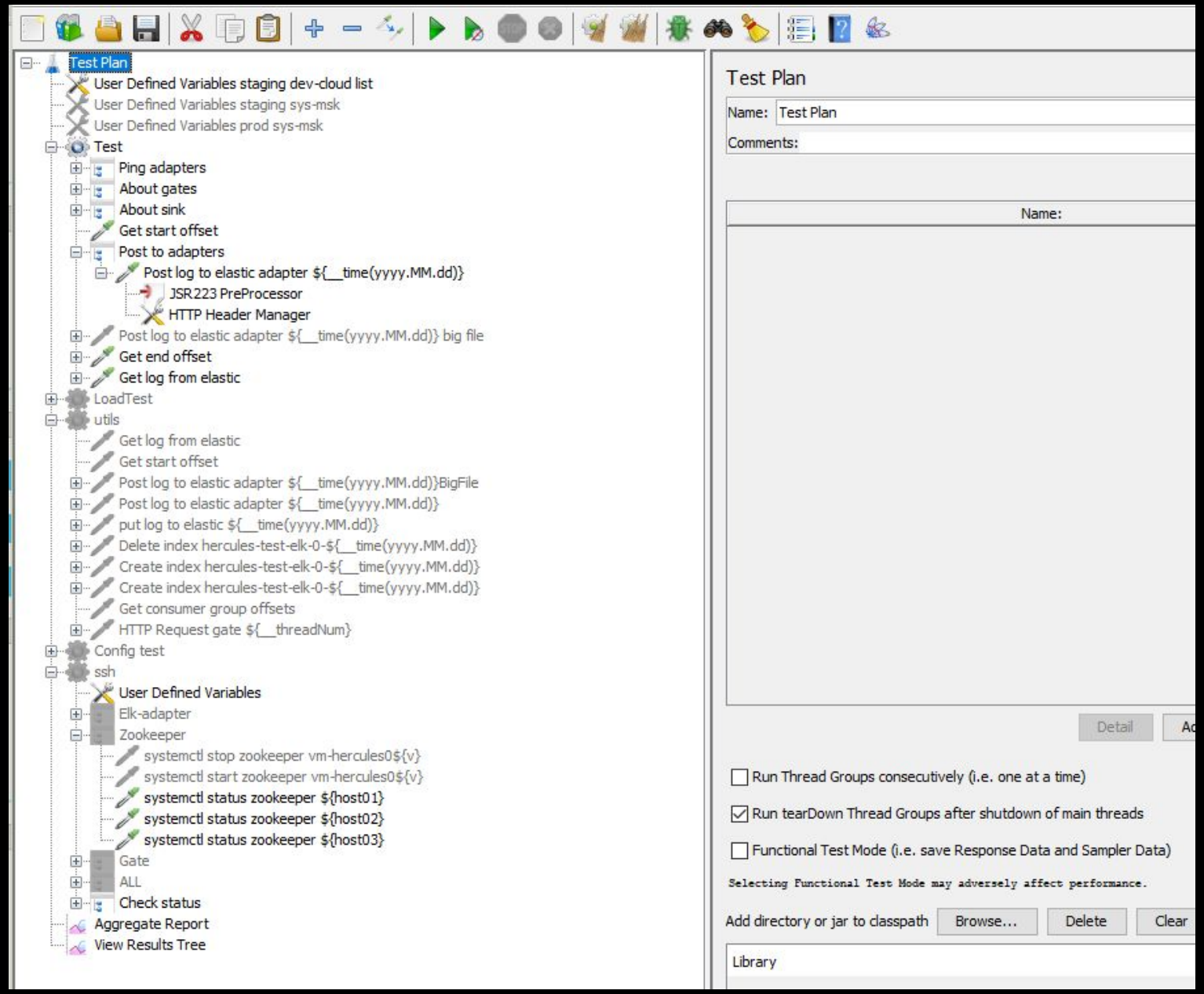


ForEach контроллер

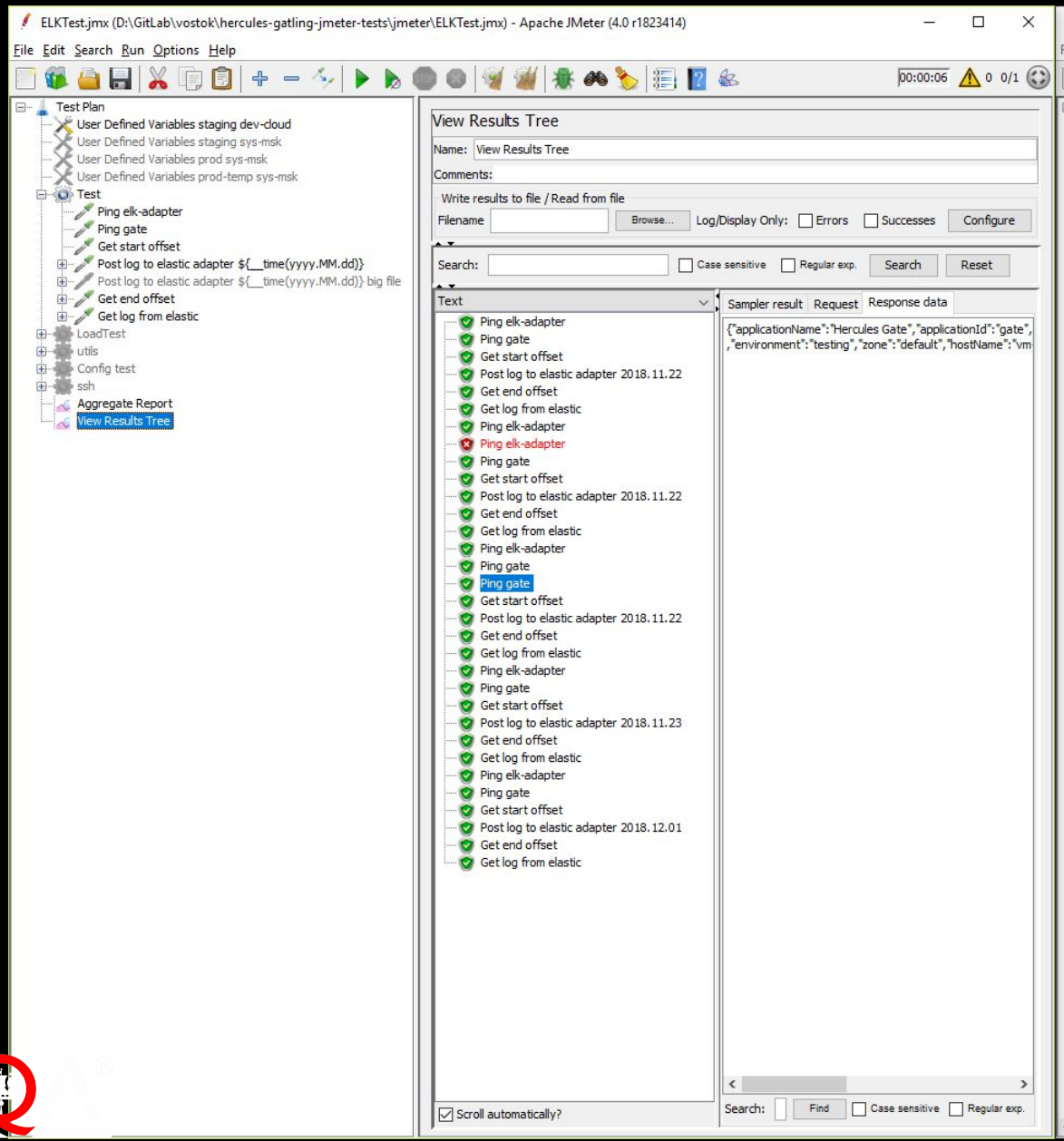


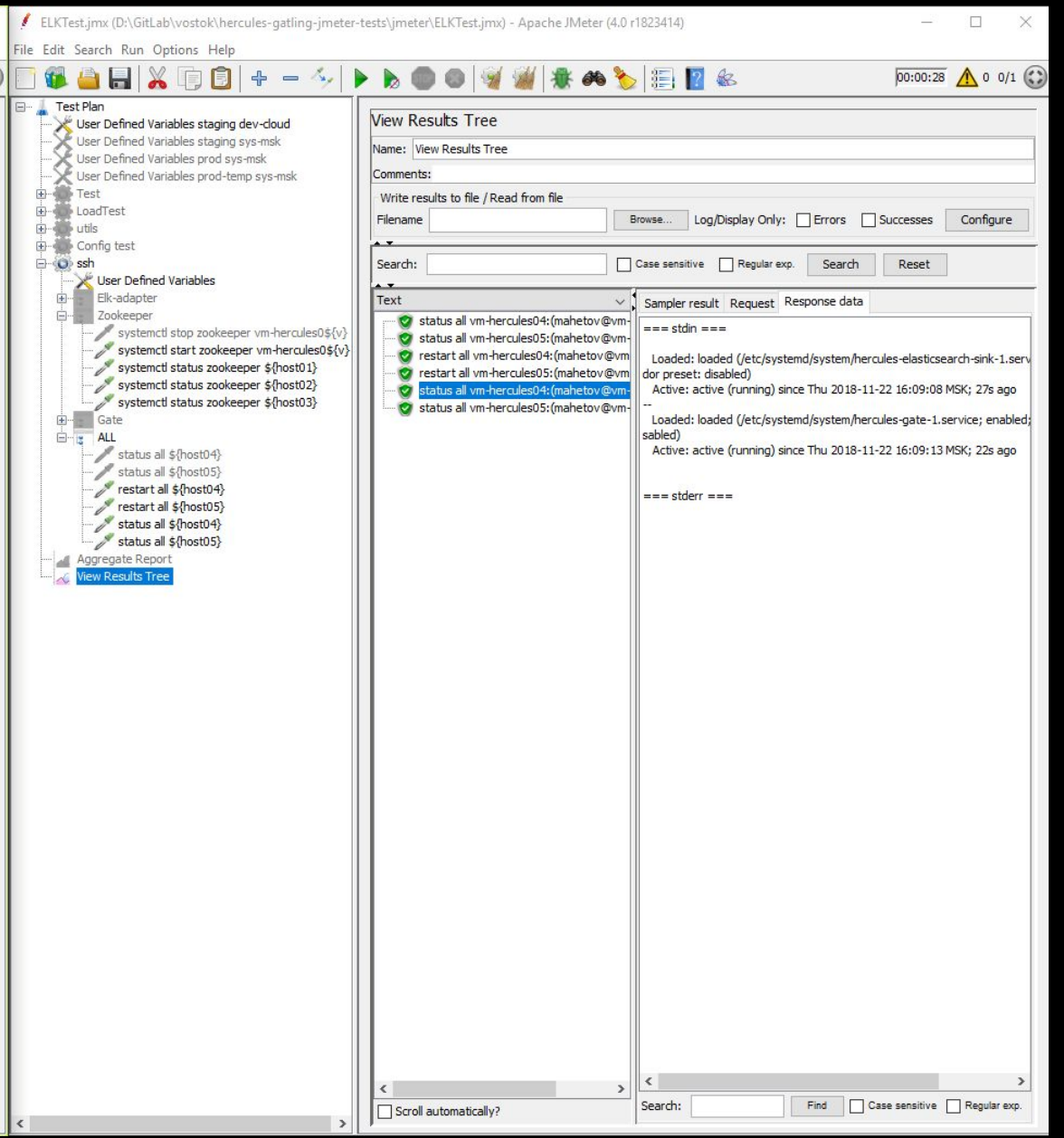
ForEach контроллер

Реальный пример теста



Несколько экземпляров





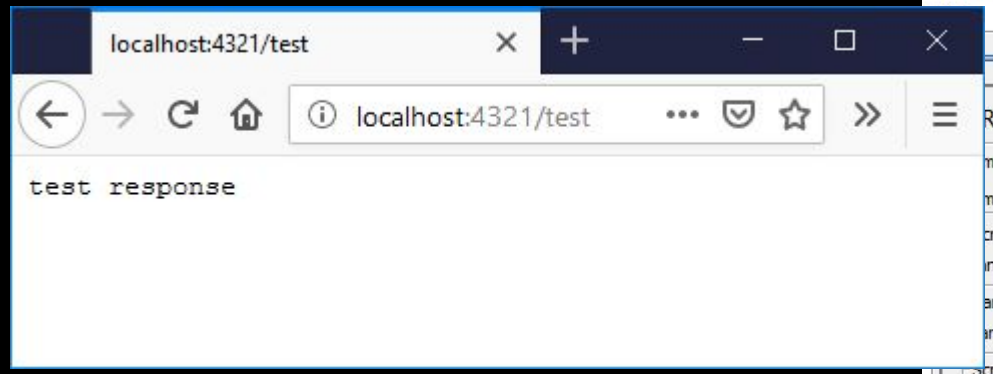
Что еще делаем JMeter

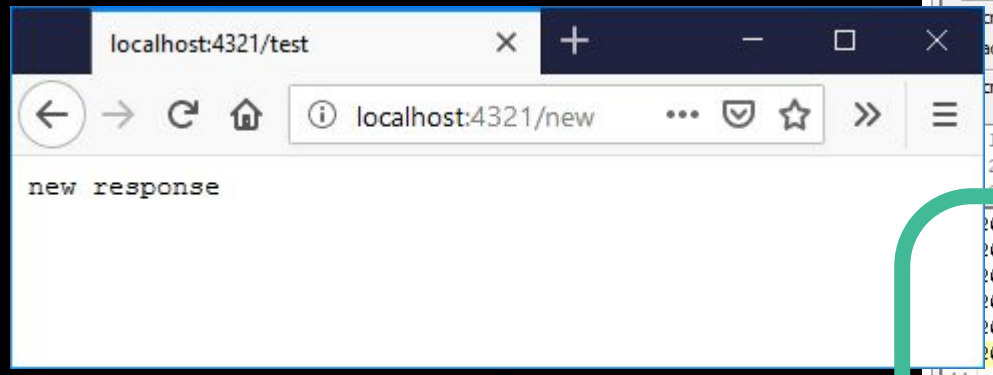
- Mock сервисов
- Мониторинг
- Запуск Java кода
- Запуск в CI
- Тесты из Swagger/Openapi

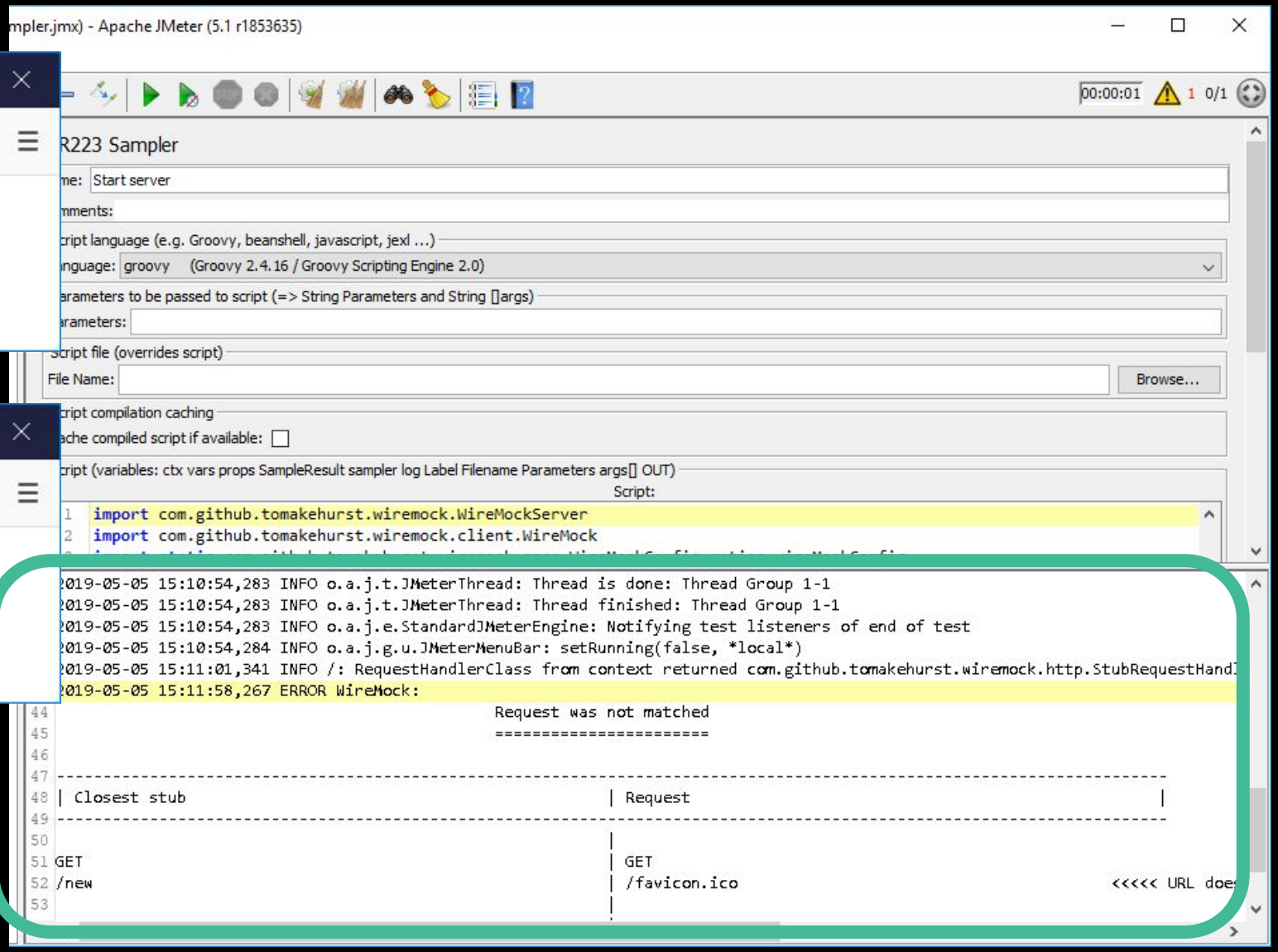
Mock-сервер с WireMock

```
1  import com.github.tomakehurst.wiremock.WireMockServer;
2  import com.github.tomakehurst.wiremock.client.WireMock;
3  import static com.github.tomakehurst.wiremock.core.WireMockConfiguration.wireMockConfig;
4
5  wireMockServer = new WireMockServer(wireMockConfig().bindAddress("0.0.0.0").port(4321));
6  wireMockServer.start();
7
8  wireMockServer.stubFor(WireMock.get("/test")
9                  .willReturn(WireMock.aResponse()
10                 .withBody("test response").withStatus(200)));
11
12 wireMockServer.stubFor(WireMock.get("/new")
13                 .willReturn(WireMock.aResponse()
14                 .withBody("new response").withStatus(203)));
```

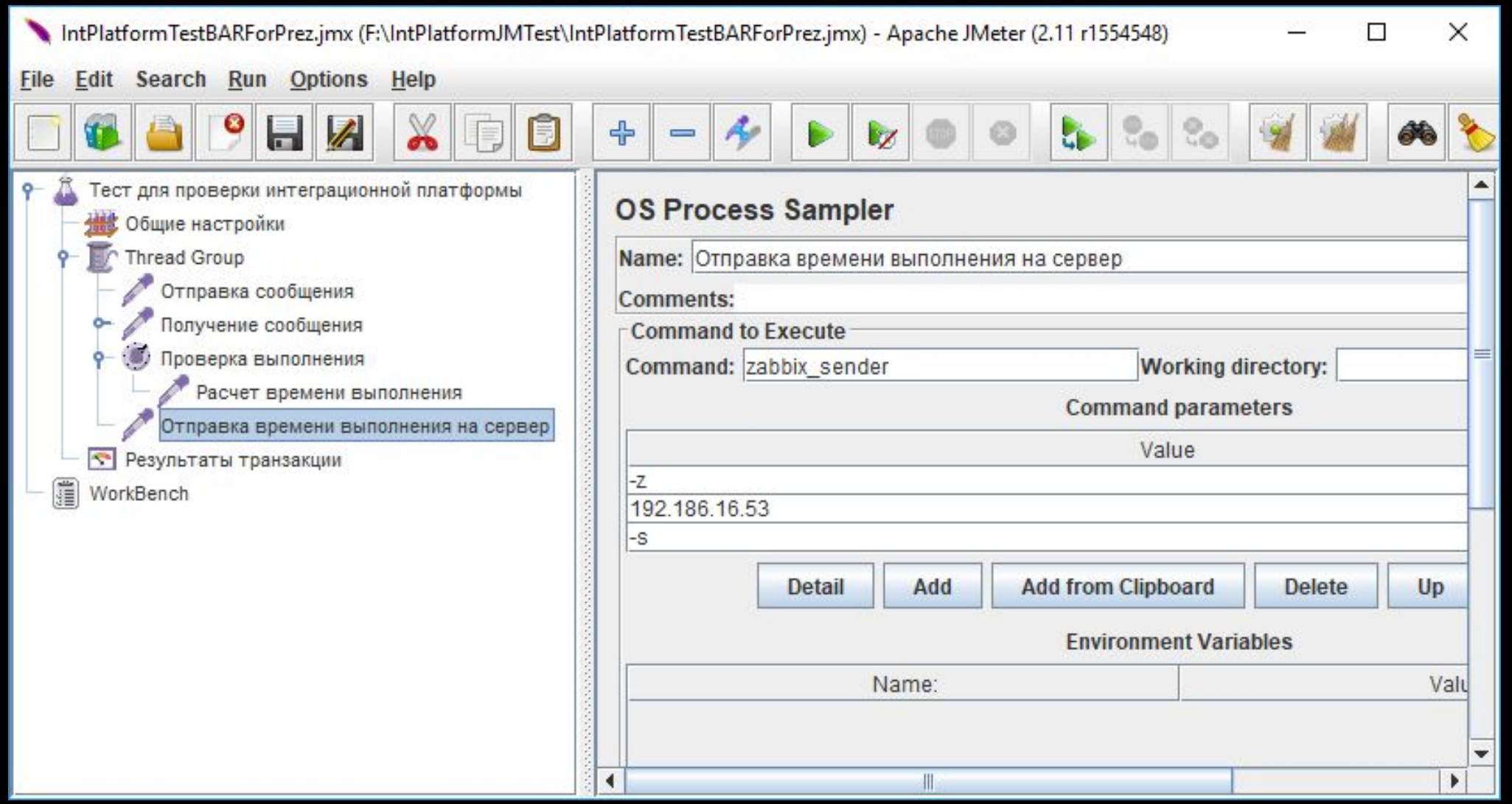
Mock-сервер с WireMock



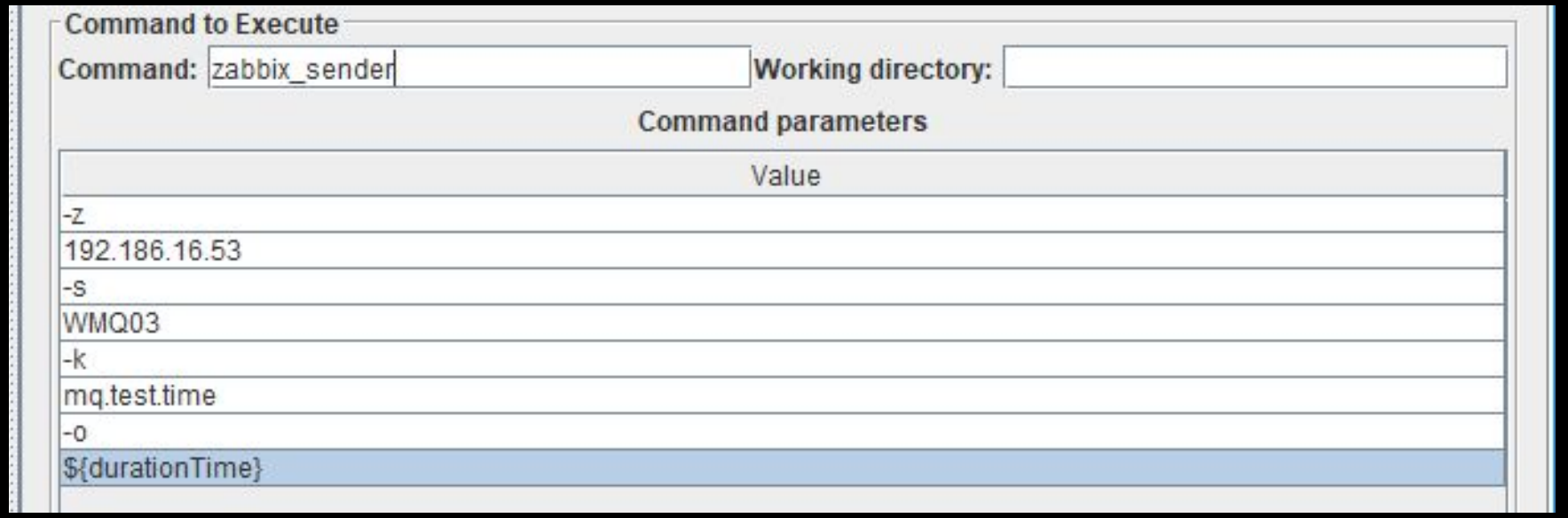


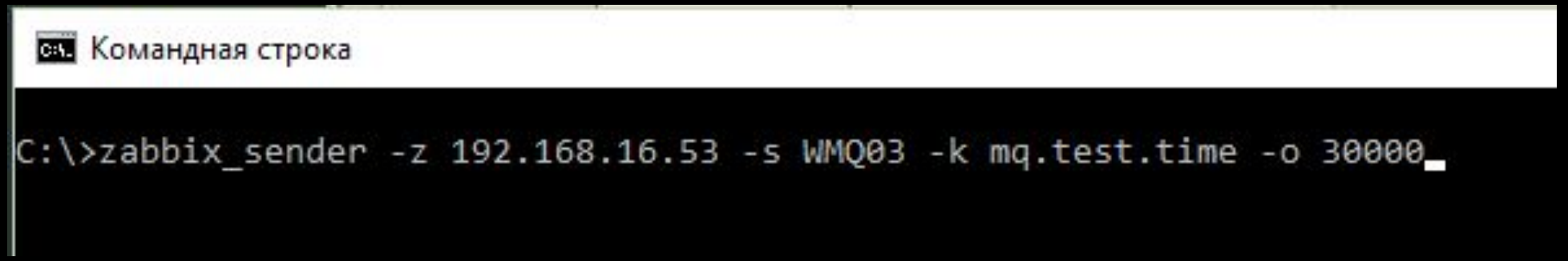


Мониторинг с Zabbix



Мониторинг с Zabbix





CI

```
./jmeter.sh -n -t ELKTest.jmx \
-l reports/$(date -d "today" +"%%Y%%m%%d_%%H%%M%%S").log \
-e -o reports/$(date -d "today" +"%%Y%%m%%d_%%H%%M%%S")
```

```
2/2: Run jmeter chain test (Command Line)  (8s)
Step 2/2] Starting: /buildAgent/temp/agentTmp/custom_script4993191551230247798
Step 2/2] in directory: /buildAgent/work/530983db73e292e0/jmeter/apache-jmeter-4.0/bin
Step 2/2] Creating summariser <summary>
Step 2/2] Created the tree successfully using ../../ELKTest_staging_sysmsk.jmx
Step 2/2] Starting the test @ Thu Oct 11 19:11:31 YEKT 2018 (1539267091335)
Step 2/2] Waiting for possible Shutdown/StopTestNow/Heapdump message on port 4445
Step 2/2] summary +      1 in 00:00:00 =    4.3/s Avg:    94 Min:    94 Max:    94 Err:     0 (0.00%) Active: 1 Started: 1 Finished: 0
Step 2/2] 722536772
Step 2/2] 722536772
Step 2/2] summary +      5 in 00:00:05 =    1.0/s Avg:   193 Min:     2 Max:   847 Err:     4 (80.00%) Active: 0 Started: 1 Finished: 1
Step 2/2] summary =      6 in 00:00:05 =    1.1/s Avg:   177 Min:     2 Max:   847 Err:     4 (66.67%)
Step 2/2] Tidying up ...    @ Thu Oct 11 19:11:37 YEKT 2018 (1539267097491)
Step 2/2] ... end of run
Step 2/2] Process exited with code 0
```

CI

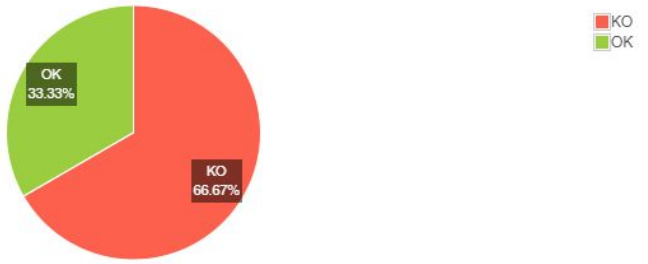
```
KT 2018 (1539267091335)
Heapdump message on port 4445
g:     94 Min:     94 Max:     94 Err:      0 (0.00%) Active: 1

g:    193 Min:      2 Max:    847 Err:      4 (80.00%) Active: 0
g:    177 Min:      2 Max:    847 Err:      4 (66.67%)
KT 2018 (1539267097491)
```

CI

APDEX (Application Performance Index)

Apdex	T (Toleration threshold)	F (Frustration threshold)	Label
0.250	**500 ms**	**1 sec 500 ms**	**Total**
0.000	500 ms	1 sec 500 ms	Post log to elastic adapter 2018.10.11
0.000	500 ms	1 sec 500 ms	Ping gate
0.000	500 ms	1 sec 500 ms	Get end offset
0.000	500 ms	1 sec 500 ms	Get log from elastic
0.500	500 ms	1 sec 500 ms	Get start offset
1.000	500 ms	1 sec 500 ms	Ping elk-adapter

Requests Summary



Statistics

Requests	Executions			Response Times (ms)							Network (KB/sec)	
Label	#Samples	KO	Error %	Average	Min	Max	90th pct	95th pct	99th pct	Throughput	Received	Sent
Total	**6**	**4**	**66.67%**	**177.00**	**2**	**847**	**847.00**	**847.00**	**847.00**	**1.17**	**0.49**	**0.15**
Get end offset	1	1	100.00%	73.00	73	73	73.00	73.00	73.00	13.70	0.33	0.00
Get log from elastic	1	1	100.00%	23.00	23	23	23.00	23.00	23.00	43.48	9.38	9.04
Get start offset	1	0	0.00%	847.00	847	847	847.00	847.00	847.00	1.18	0.03	0.00
Ping elk-adapter	1	0	0.00%	94.00	94	94	94.00	94.00	94.00	10.64	1.03	1.26
Ping gate	1	1	100.00%	2.00	2	2	2.00	2.00	2.00	500.00	1004.88	0.00
Post log to elastic adapter 2018.10.11	1	1	100.00%	23.00	23	23	23.00	23.00	23.00	43.48	5.01	19.28

CI


Parameters Description
Fail build if text matching Err:\s*[1-9][0-9]* regexp appears in build log

CI

Additional Failure Conditions

In this section you can configure build failure depending on various metrics.

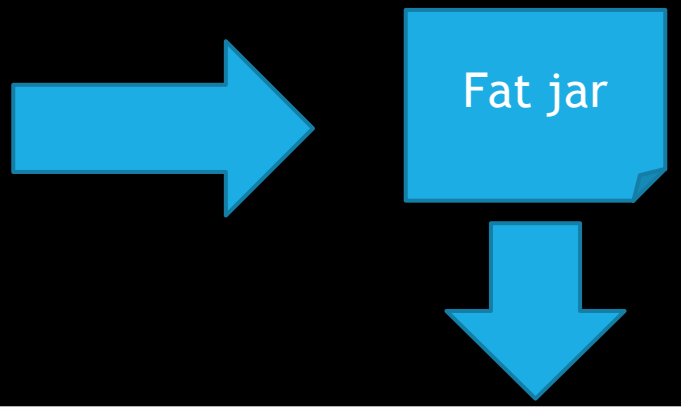
+ Add failure condition

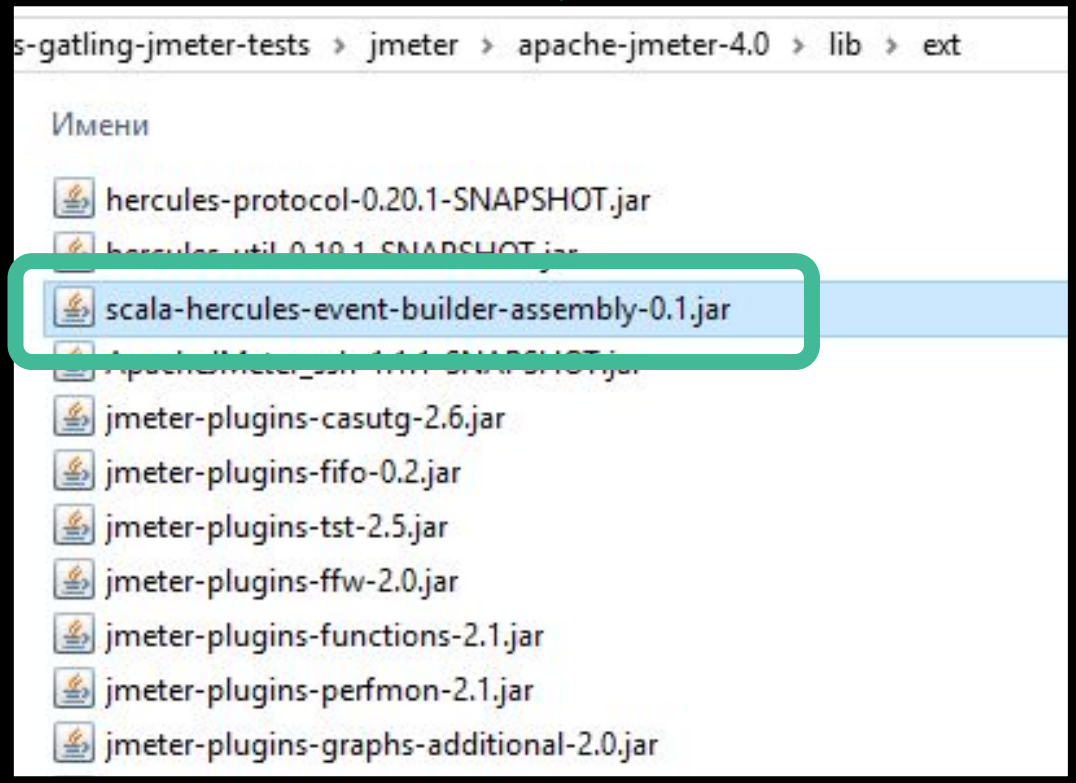
Type	Parameters Description
Fail build on specific text in build log	Fail build if text matching Err:\s*[1-9][0-9]* regexp appears in build log with message: Some error find

Build number	Status	Changes
#19	Some error find (new)	No changes
#18	Success	No changes
#17	Some error find	No changes
#16	Some error find	Changes (1)
#15	Some error find (new)	Changes (4)
#14	Success	No changes

Запуск кода

```scala
import ru.kontur.vostok.hercules.protocol.{Event, Variant}
import ru.kontur.vostok.hercules.protocol.encoder.{Encoder, EventWriter}
import ru.kontur.vostok.hercules.protocol.util.EventBuilder
import ru.kontur.vostok.hercules.util.time.TimeUtil
import scala.util.Random

object EventsGenerator {

  def generateEventGroup(count: Int): Array[Byte] = {
    val eventWriter = new EventWriter()
    val stream = new ByteArrayOutputStream
    val encoder = new Encoder(stream)
    encoder.writeInteger(events.length)
    events.foreach(x => eventWriter.write(encoder, x))
    stream.toByteArray
  }

  // Событие размером в 1 КБ (1024 байт)
  def generateEvent: Event = {
    new EventBuilder()
      .setVersion(1)
      .setTimestamp(TimeUtil.millisToTicks(System.currentTimeMillis()))
      .setRandom(UUID.randomUUID())
      .setTag("someRandomString", Variant.ofString(Random.alphanumeric.take(702).mkString))
      .setTag("someString", Variant.ofString("12345"))
      .setTag("someInt", Variant.ofInteger(12345))
```

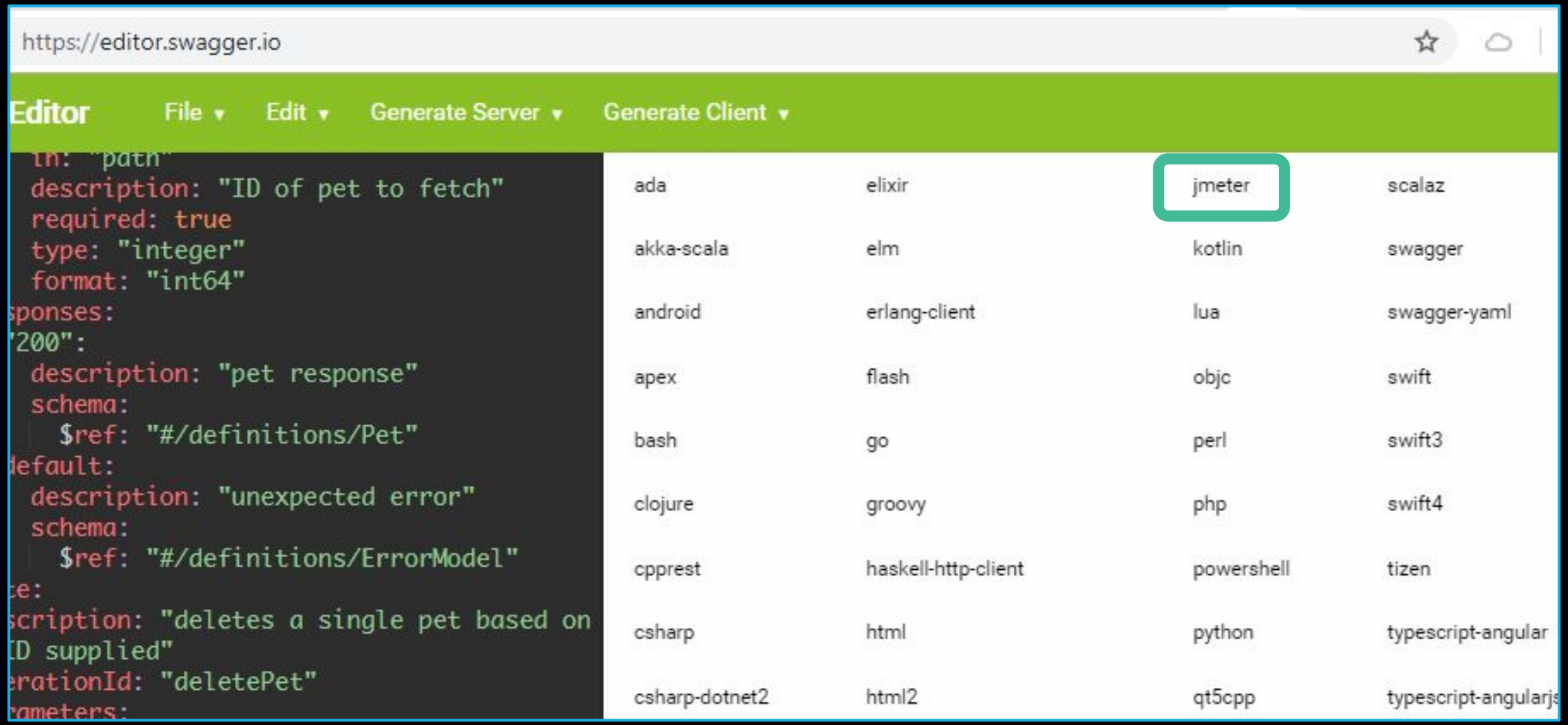




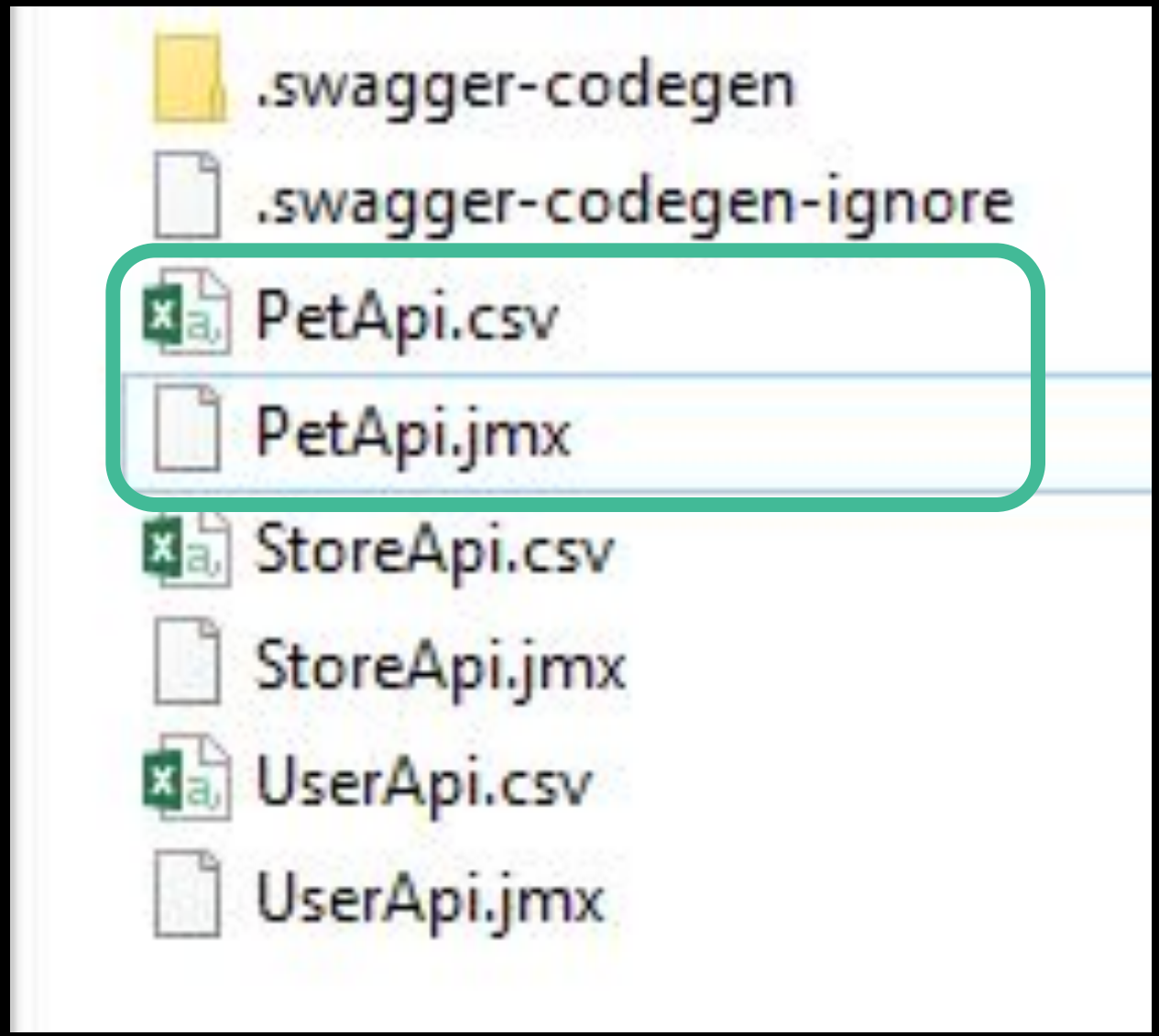
Запуск кода

```
1  s = EventsGenerator.generateEventGroup(2000)
2
3  new File('bd.dat').withOutputStream
4       {
5            it.write(s)
6       }
```

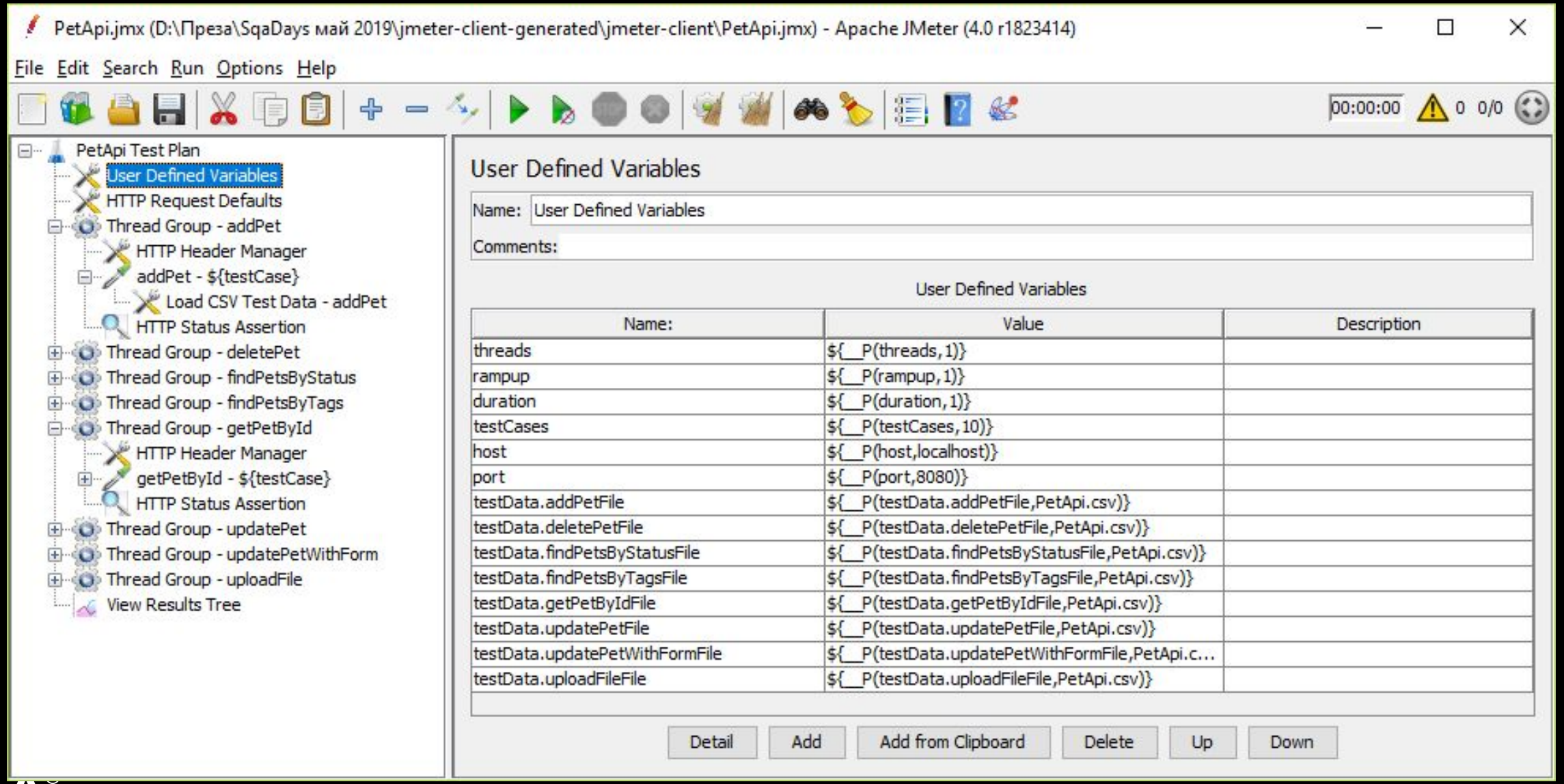
Swagger/Openapi



Swagger/Openapi



Swagger/Openapi



Swagger/Openapi

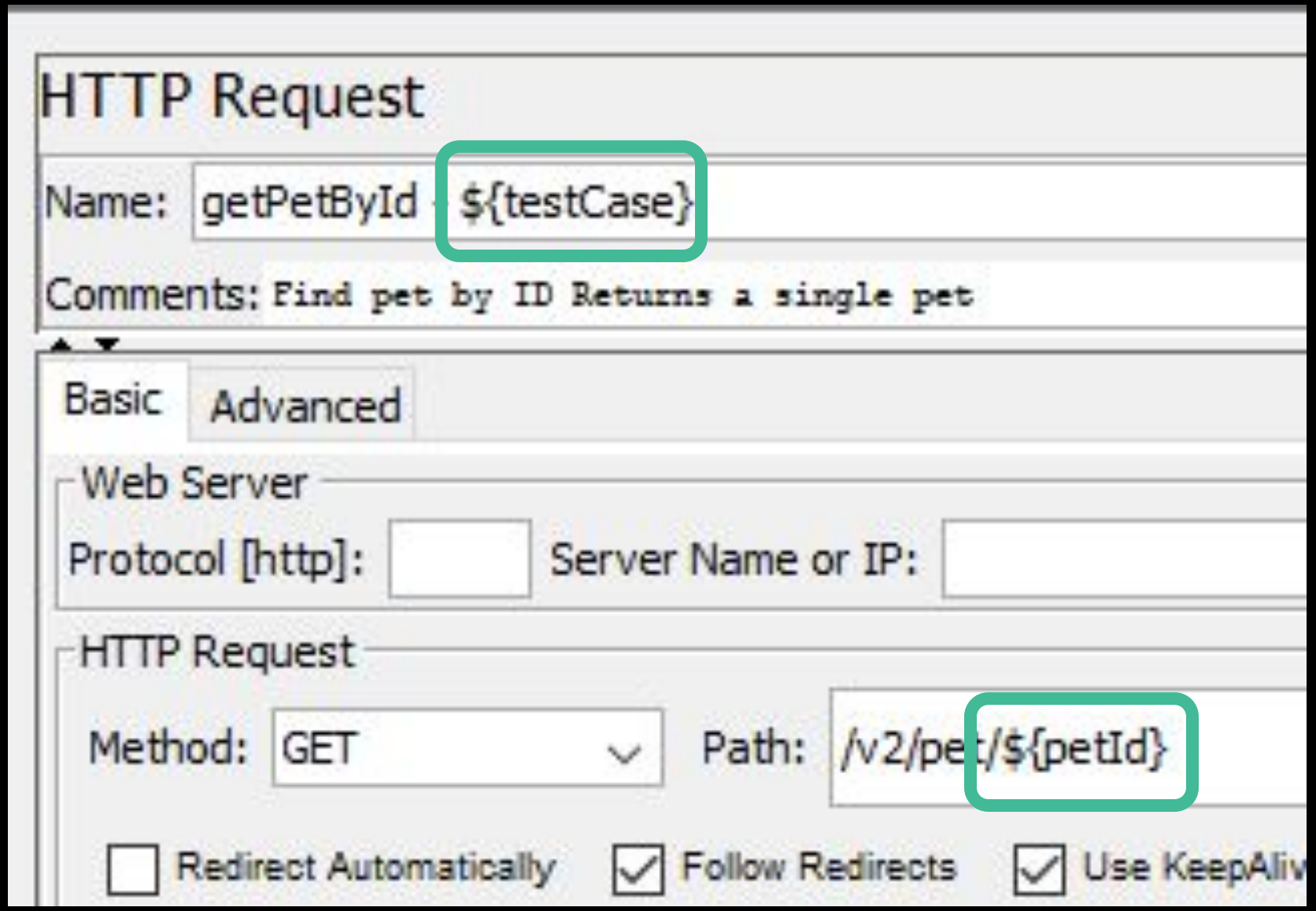
Name:	Value
threads	${__P(threads,1)}
rampup	${__P(rampup,1)}
duration	${__P(duration,1)}
testCases	${__P(testCases,10)}
host	${__P(host,localhost)}
port	${__P(port,8080)}
testData.addPetFile	${__P(testData.addPetFile,PetApi.csv)}
testData.deletePetFile	${__P(testData.deletePetFile,PetApi.csv)}
testData.findPetsByStatusFile	${__P(testData.findPetsByStatusFile,PetApi.csv)}
testData.findPetsByTagsFile	${__P(testData.findPetsByTagsFile,PetApi.csv)}
testData.getPetByIdFile	${__P(testData.getPetByIdFile,PetApi.csv)}
testData.updatePetFile	${__P(testData.updatePetFile,PetApi.csv)}
testData.updatePetWithFormFile	${__P(testData.updatePetWithFormFile,PetApi.c...
testData.uploadFileFile	${__P(testData.uploadFileFile,PetApi.csv)}

Swagger/Openapi

etApi.csv

```
1  testCase,httpStatusCode,body,petId,apiKey,status,tags,petId,
2  Success,200,0,0,0,0,0,0,0,0,0,0,0,0,0,0
```

Swagger / Openapi



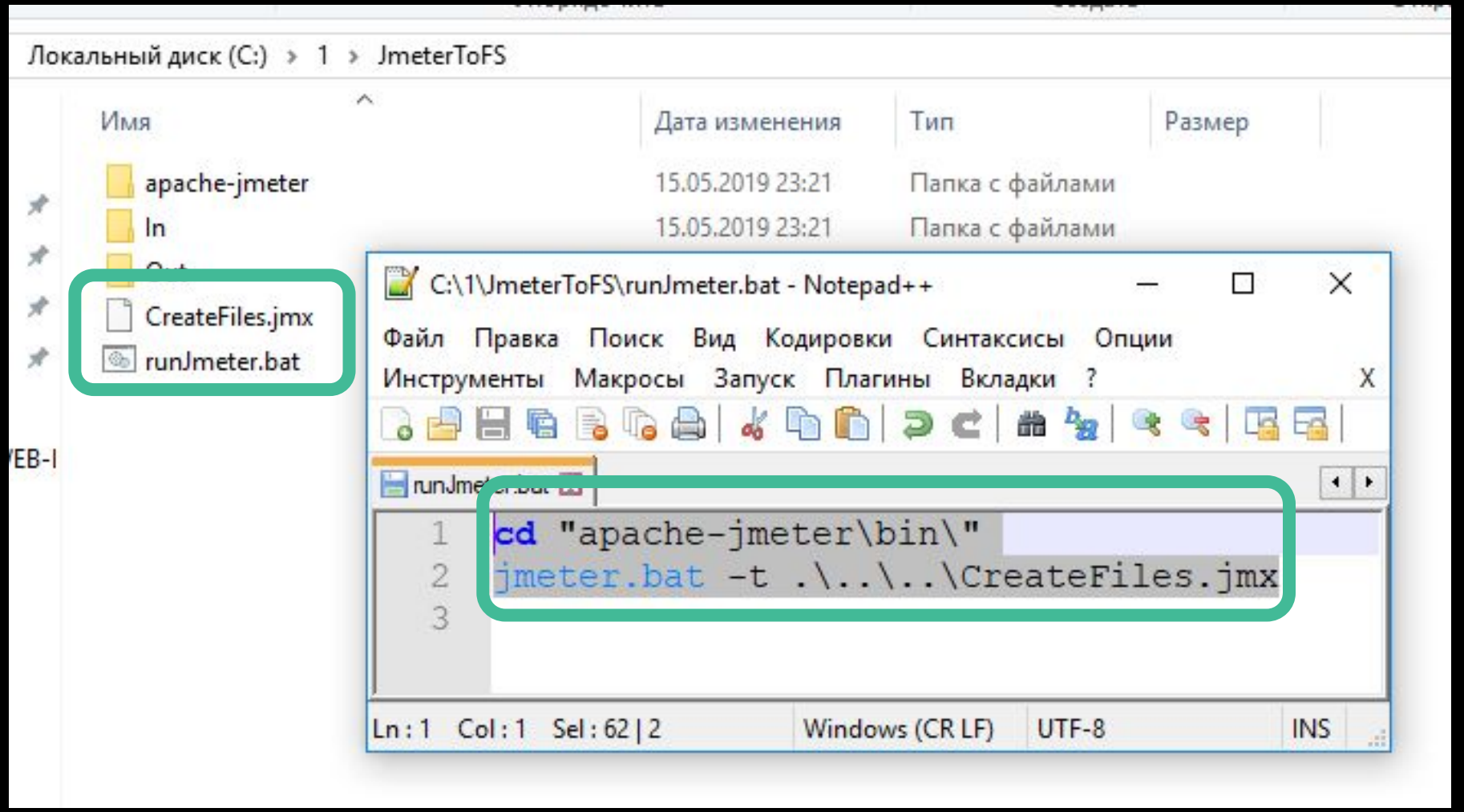
Еще используем для работы с

- Чтением-записью файлов
- JDBC
- JMS/AMQP

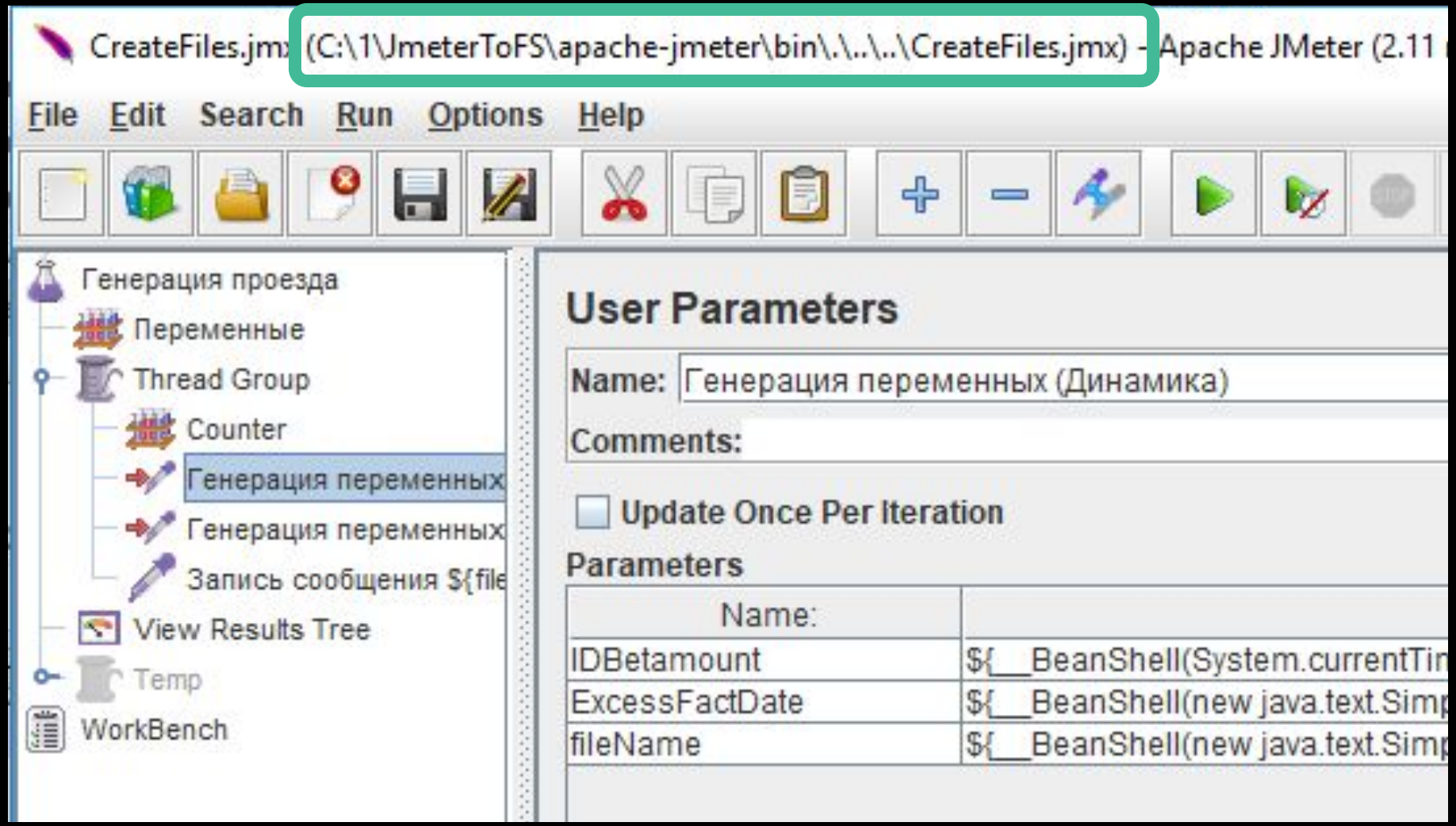
Еще классные особенности

- Кроссплатформенность
- Установка копированием
- Быстрый старт

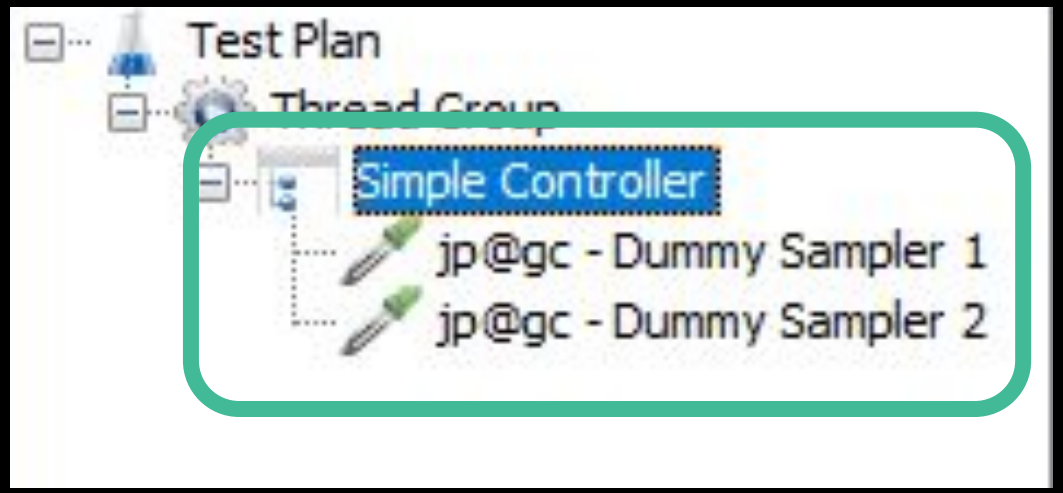
Запуск конкретного сценария



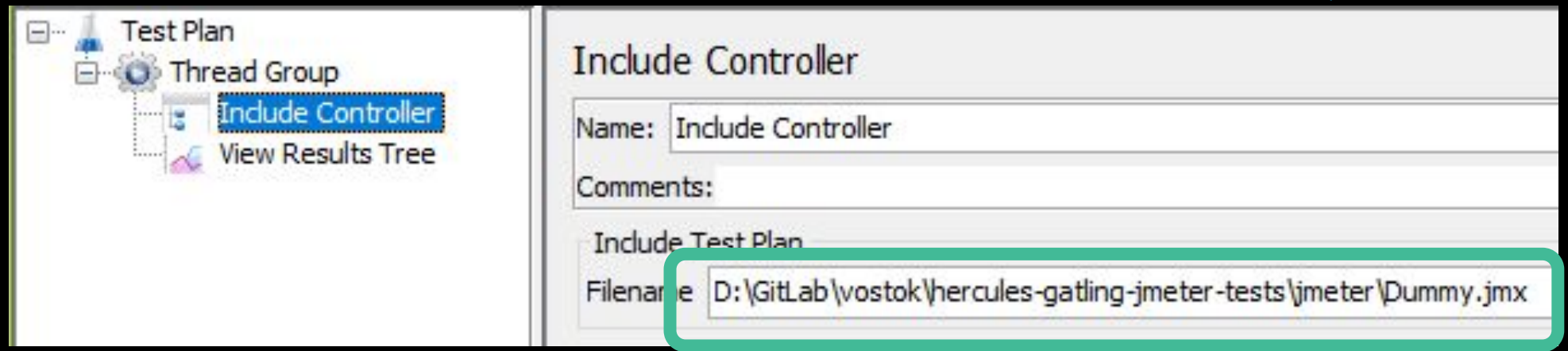
Запуск конкретного сценария



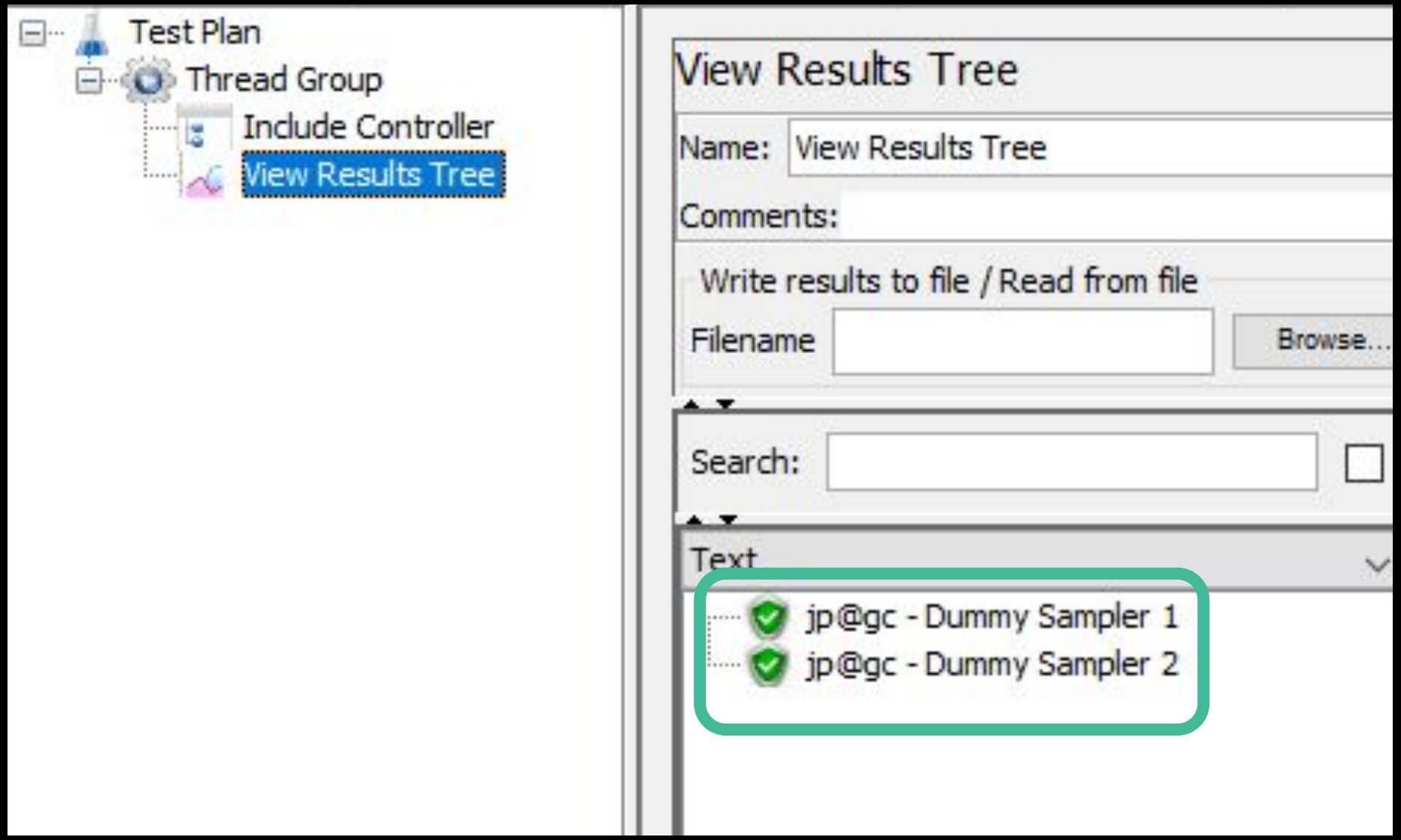
Повторное использование блоков



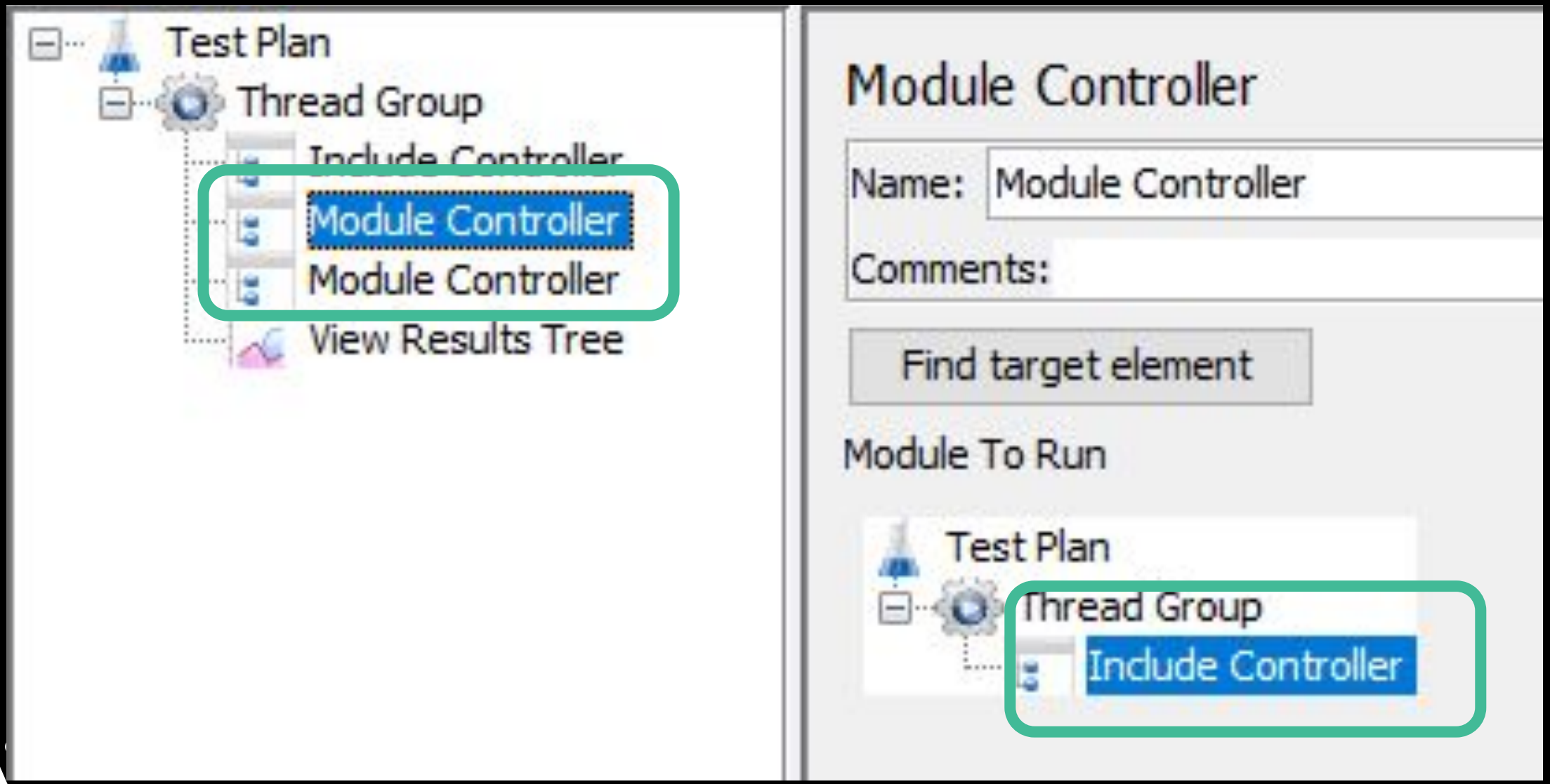
Test Fragment



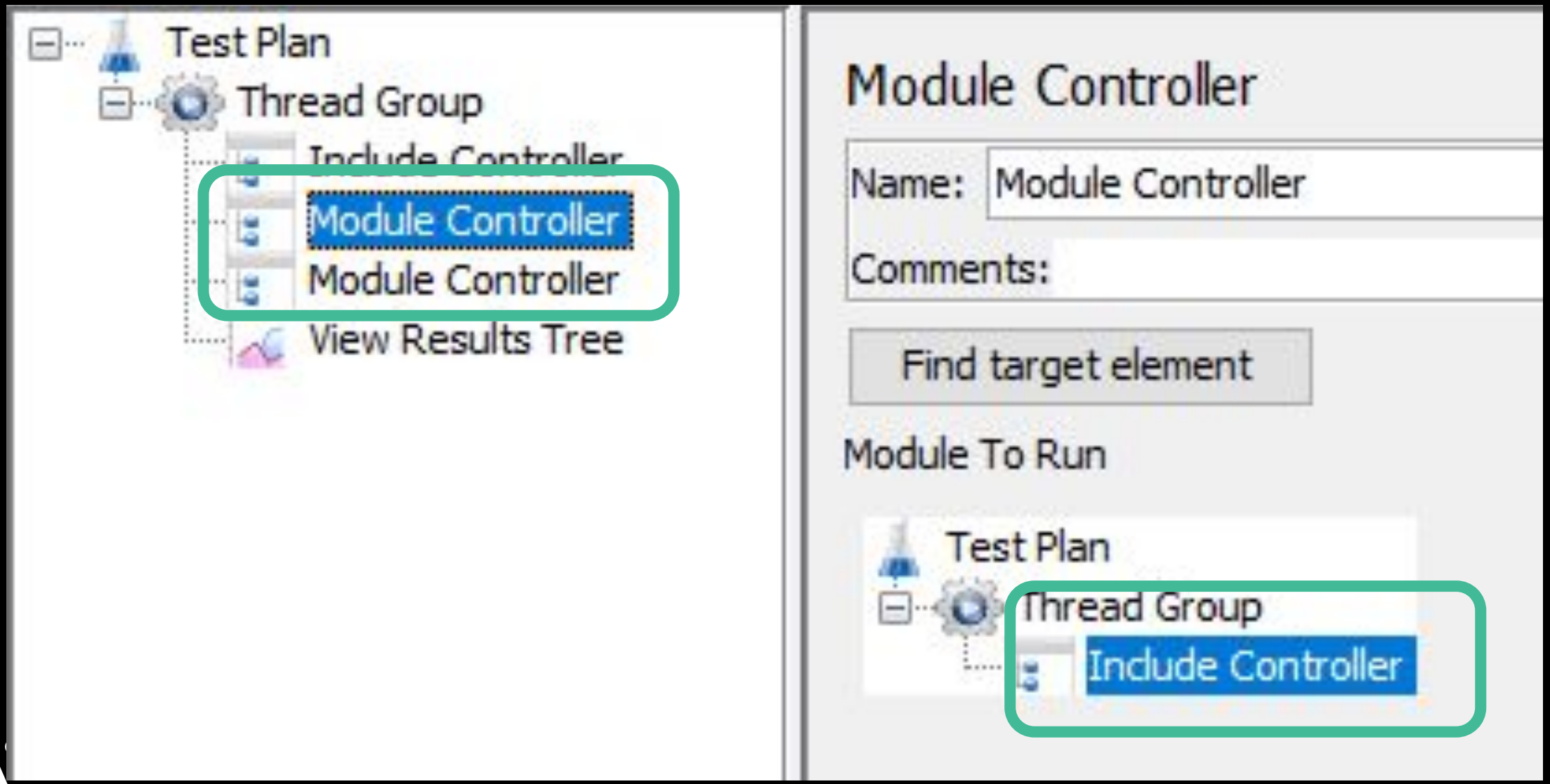
Повторное использование блоков



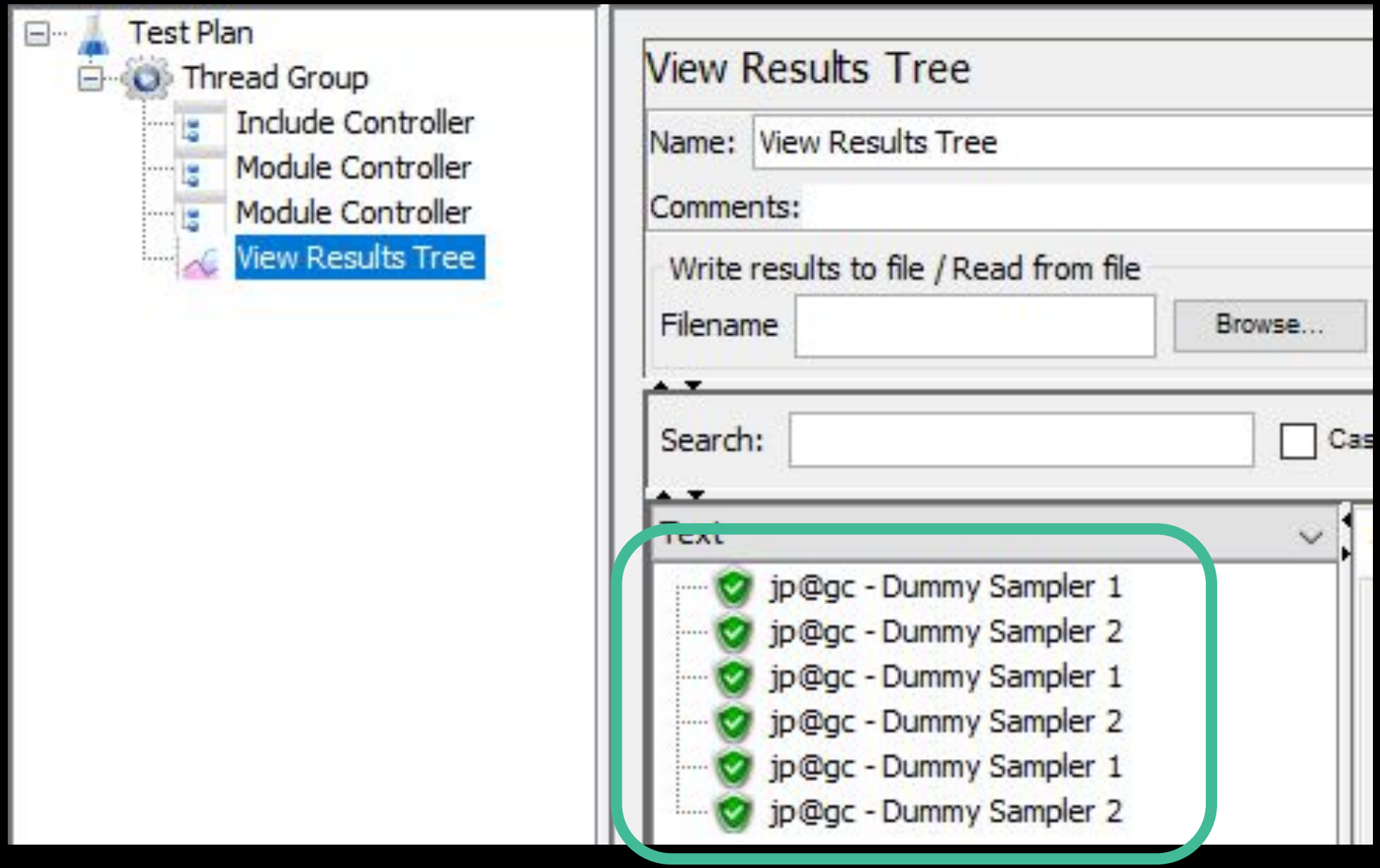
Повторное использование блоков



Повторное использование блоков



Повторное использование блоков



Командная работа

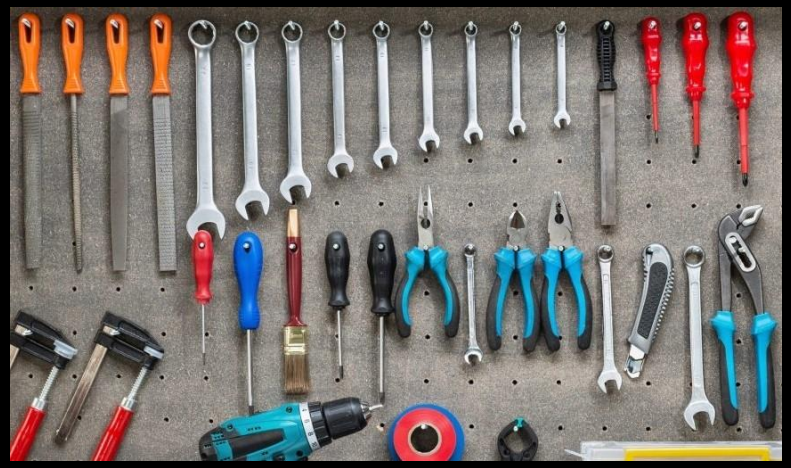
- ~ 262 jmx
- ~ 5337 Test cases (xml)
- Описанная структура тестов
- Регламент создания новых и изменения текущих тестов
- Инструкции для запуска

Минусы и проблемы

- Сценарий – xml файл
- При работе с GIT сложно мержить изменения
- Переменные – строки
- Неудобно работать с бинарными http протоколами
- Иногда требуется понимание JVM
- Нельзя отменить изменения ctrl-z
- Scala в JSR223 работает плохо
- …

Границы применимости и выбор инструмента

- Слишком громоздкий для некоторых задач
- Вклад в изучение
- Может быть хуже специализированных инструментов
- Гибкость в некоторых моментах хуже, чем у кода



Спасибо за внимание!
Остались вопросы?

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- Telegram: @Mahetovs

- https://tech.kontur.ru/