



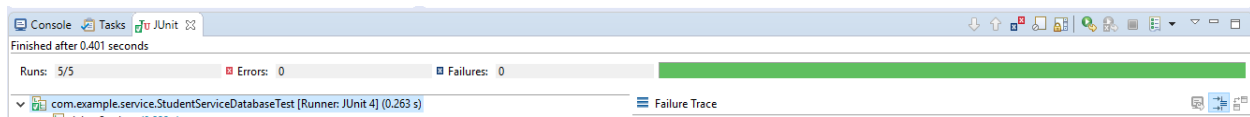
## Ringkasan Teori

Pada tutorial 6 ini, kita mempelajari tentang Unit Testing yang merupakan h metode untuk melakukan testing pada program yang telah kita buat berdasarkan masing-masing fungsi ataupun method. Testing dilakukan untuk mengecek apakah seluruh fungsional dalam aplikasi sudah sesuai requirement, dengan memperhatikan dependencies. Pada Spring Boot memiliki 2 dependencies utama dalam melaksanakan unit testing seperti JUnit dan Mockito. Selain Unit Testing dan Testing, komponen testing lainnya adalah Load testing dimana Load testing adalah sebuah testing yang dilakukan oleh programmer untuk memastikan apakah aplikasi yang telah di kembangkan dapat memberikan respon yang cepat sesuai dengan dengan request dari user. Hal ini juga merupakan untuk memastikan bagaimana performance pada aplikasi untuk memberikan respon jika user yang mengakses aplikasi cukup banyak dan dalam kondisi respon yang ekstrim. Untuk melakukan unit testing, programmer perlu mempersiapkan beberapa test case yang akan dilakukan pada fungsionalitas tersebut.

## Latihan Testing:

1. Tambahkan code berikut pada StudentServiceDatabaseTest dan jelaskan apa yang terjadi pada method tersebut berikut dengan hasil testing-nya! (Screenshot hanya opsional dan tidak akan mempengaruhi nilai)

Jawab : Memanggil selectStudents pada studentMapper yang akan mengembalikan nilai studentModels dengan tipe data list. kemudian selectAllStudents() akan dipanggil dan hasilnya akan dimasukan kedalam list test.



2. Tambahkan code berikut pada StudentServiceDatabaseTest dan jelaskan apa yang terjadi pada method tersebut berikut dengan hasil testing-nya! (Screenshot hanya opsional dan tidak akan mempengaruhi nilai)

Jawab : Method ini akan Memanggil addStudent pada studentService yang akan mengembalikan nilai true, dan addStudent yang memiliki nilai return dimasukkan kedalam variable test yang nilainya "true", Selanjutnya Mengecek nilai dari test akan bernilai true atau false



## Tutorial 6

### Arsitektur dan Pemrograman Aplikasi Perusahaan

### Semester Genap 2017/2018

Finished after 0.401 seconds

Runs: 5/5 Errors: 0

com.example.service.StudentServiceDatabaseTest [Runner: JUnit 4] (0.263 s)

- deleteStudent (0.233 s)
- selectStudent (0.015 s)
- selectAllStudents (0.015 s)
- addStudent (0.000 s)
- updateStudent (0.000 s)

## Latihan Load Testing

### Soal latihan:

1. jmeter\_selectAllStudents

### HTTP Request

Name: HTTP Request

Comments:

Basic Advanced

Web Server

Protocol [http]: Server Name or IP: localhost Port Number: 8080

HTTP Request

Method: GET Path: student/viewall Content encoding:

☐ Redirect Automatically ☒ Follow Redirects ☒ Use KeepAlive ☐ Use multipart/form-data for POST ☐ Browser-compatible headers

Parameters Body Data Files Upload

Send Parameters With the Request:

Name:	Value	Encode?	Include Equals?
-------	-------	---------	-----------------



## Tutorial 6

### Arsitektur dan Pemrograman Aplikasi Perusahaan

### Semester Genap 2017/2018

Sample #	Start Time	Thread Name	Label	Sample Time...	Status	Bytes	Sent Bytes	Latency
1	18:43:19.144	Thread Grou...	HTTP Request	19119	✓	2548099	133	1709
2	18:43:20.193	Thread Grou...	HTTP Request	18077	✓	2548099	133	1612
3	18:43:17.643	Thread Grou...	HTTP Request	20631	✓	2548099	133	1888
4	18:43:18.144	Thread Grou...	HTTP Request	20130	✓	2548099	133	1836
5	18:43:18.648	Thread Grou...	HTTP Request	22192	✓	2548099	133	1791
6	18:43:20.691	Thread Grou...	HTTP Request	20264	✓	2548099	133	1684
7	18:43:21.190	Thread Grou...	HTTP Request	20062	✓	2548099	133	1611
8	18:43:19.654	Thread Grou...	HTTP Request	21600	✓	2548099	133	1712
9	18:43:22.196	Thread Grou...	HTTP Request	21460	✓	2548099	133	1858
10	18:43:26.721	Thread Grou...	HTTP Request	16961	✓	2548099	133	1615
11	18:43:21.687	Thread Grou...	HTTP Request	22037	✓	2548099	133	1926
12	18:43:23.194	Thread Grou...	HTTP Request	20530	✓	2548099	133	1805
13	18:43:25.907	Thread Grou...	HTTP Request	17827	✓	2548099	133	1696
14	18:43:22.690	Thread Grou...	HTTP Request	21046	✓	2548099	133	1826
15	18:43:27.221	Thread Grou...	HTTP Request	19117	✓	2548099	133	1565
16	18:43:26.196	Thread Grou...	HTTP Request	20145	✓	2548099	133	1667
17	18:43:24.696	Thread Grou...	HTTP Request	21647	✓	2548099	133	1819
18	18:43:24.196	Thread Grou...	HTTP Request	22148	✓	2548099	133	1954
19	18:43:25.192	Thread Grou...	HTTP Request	21179	✓	2548099	133	1854
20	18:43:23.816	Thread Grou...	HTTP Request	22573	✓	2548099	133	1907

Ketika pada jmeter di bagian Thread Group pada field "Number of Thread (users)" di input 50, jmeter tidak merespon, dan pada console Spring terdapat error. Tetapi ketika di input 20 jmeter merespon dan status load berhasil. Tampilkan error pada console spring seperti dibawah ini.

```

Console  Tasks  JUnit
Tutorial_6 - ApapTutorial04Application [Spring Boot App] C:\Program Files\Java\jre1.8.0_144\bin\javaw.exe (Mar 24, 2018, 5:54:11 PM)
2018-03-24 17:55:28.066 INFO 3624 --- [io-8080-exec-49] c.e.service.StudentServiceDatabase : select all students
2018-03-24 17:55:28.070 INFO 3624 --- [io-8080-exec-51] c.e.service.StudentServiceDatabase : select all students
2018-03-24 17:55:28.086 INFO 3624 --- [io-8080-exec-50] c.e.service.StudentServiceDatabase : select all students
Exception in thread "http-nio-8080-ClientPoller-1" java.lang.OutOfMemoryError: Java heap space
    at java.lang.String.toCharArray(Unknown Source)
    at java.util.zip.ZipCoder.getBytes(Unknown Source)
    at java.util.zip.ZipFile.getEntry(Unknown Source)
    at java.util.jar.JarFile.getEntry(Unknown Source)
    at java.util.jar.JarFile.getJarEntry(Unknown Source)
    at sun.misc.URLClassPath$JarLoader.getResource(Unknown Source)
    at sun.misc.URLClassPath.getResource(Unknown Source)
    at java.net.URLClassLoader$1.run(Unknown Source)
    at java.net.URLClassLoader$1.run(Unknown Source)
    at java.security.AccessController.doPrivileged(Native Method)
    at java.net.URLClassLoader.findClass(Unknown Source)
    at java.lang.ClassLoader.loadClass(Unknown Source)
    at sun.misc.Launcher$AppClassLoader.loadClass(Unknown Source)
    at java.lang.ClassLoader.loadClass(Unknown Source)
    at org.apache.tomcat.util.net.NioEndpoint$Poller.run(NioEndpoint.java:806)
    at java.lang.Thread.run(Unknown Source)
Exception in thread "http-nio-8080-ClientPoller-0" Exception in thread "File Watcher" java.lang.OutOfMemoryError: Java heap space
Exception in thread "http-nio-8080-AsyncTimeout" java.lang.OutOfMemoryError: Java heap space
java.lang.OutOfMemoryError: Java heap space
    at java.util.concurrent.ConcurrentHashMap$KeySetView.iterator(Unknown Source)

```

## 2. jmeter\_selectStudentBerhasil



## Tutorial 6

### Arsitektur dan Pemrograman Aplikasi Perusahaan

### Semester Genap 2017/2018

localhost:8080/student/view/1506737824

Navbar Home Daftar Mahasiswa Menambah Mahasiswa

NPM = 1506737824

Name = Ellene

GPA = 2.89

Mata Kuliah APAP

### HTTP Request

Name: HTTP Request

Comments:

Basic Advanced

Web Server

Protocol [http]: Server Name or IP: localhost Port Number: 8080

HTTP Request

Method: GET Path: studentview/1506737824 Content encoding:

☐ Redirect Automatically ☒ Follow Redirects ☒ Use KeepAlive ☐ Use multipart/form-data for POST ☐ Browser-compatible headers

Parameters Body Data Files Upload

### View Results in Table

Name: View Results in Table

Comments:

Write results to file / Read from file

Filename Browse... Log/Display Only: ☐ Errors ☐ Successes

Sample #	Start Time	Thread Name	Label	Sample Time...	Status	Bytes	Sent Bytes	Latency
1	18:58:52.008	Thread Grou...	HTTP Request	52	✓	1921	141	5
2	18:58:52.512	Thread Grou...	HTTP Request	15	✓	1921	141	1
3	18:58:53.035	Thread Grou...	HTTP Request	42	✓	1921	141	4
4	18:58:53.514	Thread Grou...	HTTP Request	13	✓	1921	141	1
5	18:58:54.015	Thread Grou...	HTTP Request	20	✓	1921	141	2
6	18:58:54.514	Thread Grou...	HTTP Request	12	✓	1921	141	1
7	18:58:55.015	Thread Grou...	HTTP Request	37	✓	1921	141	3
8	18:58:55.517	Thread Grou...	HTTP Request	125	✓	1921	141	12
9	18:58:56.014	Thread Grou...	HTTP Request	12	✓	1921	141	1
10	18:58:56.516	Thread Grou...	HTTP Request	20	✓	1921	141	2
11	18:58:57.015	Thread Grou...	HTTP Request	34	✓	1921	141	3
12	18:58:57.514	Thread Grou...	HTTP Request	27	✓	1921	141	2
13	18:58:58.332	Thread Grou...	HTTP Request	24	✓	1921	141	2
14	18:58:58.515	Thread Grou...	HTTP Request	12	✓	1921	141	1
15	18:58:59.015	Thread Grou...	HTTP Request	19	✓	1921	141	1
16	18:58:59.506	Thread Grou...	HTTP Request	60	✓	1921	141	5
17	18:59:00.013	Thread Grou...	HTTP Request	17	✓	1921	141	1
18	18:59:00.513	Thread Grou...	HTTP Request	25	✓	1921	141	2
19	18:59:01.038	Thread Grou...	HTTP Request	26	✓	1921	141	2
20	18:59:01.519	Thread Grou...	HTTP Request	22	✓	1921	141	2



### 3. jmeter\_selectStudentGagal

localhost:8080/student/view/1506745555

Navbar Home Daftar Mahasiswa Menambah Mahasiswa

## Student not found

NPM = 1506745555

Mata Kuliah APAP

### HTTP Request

Name: HTTP Request

Comments:

Basic Advanced

Web Server

Protocol [http]: Server Name or IP: localhost Port Number: 8080

HTTP Request

Method: GET Path: student/view/1506745555 Content encoding:

☐ Redirect Automatically ☒ Follow Redirects ☒ Use KeepAlive ☐ Use multipart/form-data for POST ☐ Browser-compatible headers

Parameters Body Data Files Upload

Send Parameters With the Request:

Name:	Value	Encode?	Include Equals?
-------	-------	---------	-----------------

### View Results in Table

Name: View Results in Table

Comments:

Write results to file / Read from file

Filename  Browse...

Log/Display Only: ☐ Errors ☒ Successes

Sample #	Start Time	Thread Name	Label	Sample Time...	Status	Bytes	Sent Bytes	Latency
1	19:00:49.474	Thread Grou...	HTTP Request	8	✓	1891	141	
2	19:00:49.985	Thread Grou...	HTTP Request	16	✓	1891	141	1
3	19:00:50.479	Thread Grou...	HTTP Request	11	✓	1891	141	1
4	19:00:50.974	Thread Grou...	HTTP Request	16	✓	1891	141	1
5	19:00:51.474	Thread Grou...	HTTP Request	15	✓	1891	141	1
6	19:00:51.974	Thread Grou...	HTTP Request	14	✓	1891	141	1
7	19:00:52.478	Thread Grou...	HTTP Request	16	✓	1891	141	1
8	19:00:52.977	Thread Grou...	HTTP Request	17	✓	1891	141	1
9	19:00:53.478	Thread Grou...	HTTP Request	15	✓	1891	141	1
10	19:00:53.978	Thread Grou...	HTTP Request	14	✓	1891	141	1
11	19:00:54.478	Thread Grou...	HTTP Request	15	✓	1891	141	1
12	19:00:54.978	Thread Grou...	HTTP Request	92	✓	1891	141	9
13	19:00:55.474	Thread Grou...	HTTP Request	16	✓	1891	141	1
14	19:00:55.988	Thread Grou...	HTTP Request	15	✓	1891	141	1
15	19:00:56.480	Thread Grou...	HTTP Request	24	✓	1891	141	2
16	19:00:56.978	Thread Grou...	HTTP Request	15	✓	1891	141	1
17	19:00:57.473	Thread Grou...	HTTP Request	15	✓	1891	141	1
18	19:00:57.977	Thread Grou...	HTTP Request	14	✓	1891	141	1
19	19:00:58.476	Thread Grou...	HTTP Request	9	✓	1891	141	
20	19:00:58.977	Thread Grou...	HTTP Request	14	✓	1891	141	1