

Tutorial 6

Ringkasan

Pada tutorial ini untuk mempelajari bagaimana untuk melakukan unit testing dan load testing pada program yang telah dibuat. Unit testing menggunakan tool Junit & Mockito dengan melakukan test pada method-method yang telah dibuat. Untuk load testing menggunakan JMeter dengan memanggil method-method dan juga melakukan *load* pada *program*.

Latihan Unit Testing

1. Penjelasan pada void selectAllStudents().

```
@Test
public void selectAllStudents() {
    // Given
    List<StudentModel> studentModels = new ArrayList<>();
    // Membuat sebuah list dari StudentModel dengan nama studentModels

    StudentModel studentModel = new StudentModel("1506737823",
    "Chanek", 3.5);
    // Membuat sebuah object StudentModel dengan nama studentModel yang
    diisi dengan data mahasiswa
    studentModels.add(studentModel);
    // Memasukan data pada studentModel kedalam list studentModels
    List<StudentModel> checks = new ArrayList<>();
    // Membuat sebuah list dari StudentModel dengan nama checks
    StudentModel check = new StudentModel("1506737823", "Chanek",
    3.5);
    // Membuat sebuah object StudentModel dengan nama studentModel yang
    diisi dengan data mahasiswa
    checks.add(check);
    // Memasukan data pada studentModel kedalam list checks
    BDDMockito.given(studentMapper.selectAllStudents()).willReturn(
    studentModels);
    // Memanggil selectAllStudents pada studentMapper yang akan
    mengembalikan nilai studentModels dengan tipe data list.
    // When
    List<StudentModel> test = studentService.selectAllStudents();
    // kemudian selectAllStudents() akan dipanggil dan hasilnya akan
    dimasukan kedalam list test
    // Then
    assertThat(test, notNullValue()); // Check if Not Null
    assertThat(test.isEmpty(), equalTo(false)); // Check kalo ngga
kosong
    assertThat(test.size(), equalTo(1)); // Check if Size same
    assertThat(test, equalTo(checks)); // Check kalo konten sama
}
```

2. Penjelasan pada void addStudents().

```
@Test
    public void addStudent() {
        // Given
        StudentModel studentModel = new StudentModel("1506737823",
"Chanek", 3.5);
        // Membuat sebuah object StudentModel dengan nama studentModel yang
        diisi dengan data mahasiswa

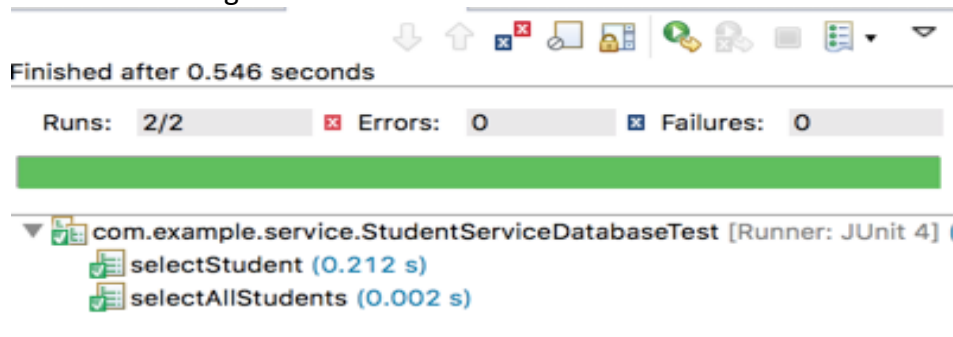
        StudentModel check = new StudentModel("1506737823", "Chanek",
3.5);
        // Membuat sebuah object StudentModel dengan nama check yang diisi
        dengan data mahasiswa

        BDDMockito.given(studentService.addStudent(studentModel)).will
        lReturn(true);
        // Memanggil addStudent pada studentService yang akan mengembalikan
        nilai true

        // When
        boolean test = studentService.addStudent(studentModel);
        // Memanggil addStudent yang nilai returnnya dimasukan kedalam
        variable test yang bertipe Boolean yaitu bernilai true


        // Then
        BDDMockito.then(studentMapper).should().addStudent(check);
        assertThat(test, equalTo(true)); // Check if Same
        // Mengecek nilai dari test akan bernilai true atau false
    }
```




3. Hasil Junit testing





Finished after 0.329 seconds


Runs: 3/3  Errors: 0  Failures: 0





▼  com.example.service.StudentServiceDatabaseTest [Runner: JUnit 4] (

-  selectStudent (0.135 s)
-  selectAllStudents (0.003 s)
-  addStudent (0.014 s)



Finished after 0.335 seconds


Runs: 4/4  Errors: 0  Failures: 0






▼  com.example.service.StudentServiceDatabaseTest [Runner: JUnit 4] (

-  selectStudent (0.093 s)
-  selectAllStudents (0.002 s)
-  addStudent (0.009 s)
-  updateStudent (0.004 s)

Finished after 0.349 seconds

Runs: 5/5  Errors: 0  Failures: 0

▼  com.example.service.StudentServiceDatabaseTest [Runner: JUnit 4] (

-  deleteStudent (0.139 s)
-  selectStudent (0.008 s)
-  selectAllStudents (0.001 s)
-  addStudent (0.001 s)
-  updateStudent (0.005 s)

Latihan JMeter

Sebelum dioptimalisasi dan menurut saya sudah optimal karena query yang digunakan sudah sesuai dan sudah menunjuk langsung pada kolom nama dan gpa pada student.

1. SelectStudent berdasar NPM Berhasil

View Results in Table

Name: View Results in Table view npm 100

Comments:

Write results to file / Read from file

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

Sample #	Start Time	Thread Name	Label	Sample Time(ms)	Status	Bytes	Sent Bytes	Latency	Connect Time...
68	17:38:39.680	Thread Grou...	HTTP Request	7	✓	1689	141	7	0
69	17:38:39.779	Thread Grou...	HTTP Request	9	✓	1689	141	9	1
70	17:38:39.879	Thread Grou...	HTTP Request	10	✓	1689	141	10	1
71	17:38:39.982	Thread Grou...	HTTP Request	26	✓	1689	141	26	1
72	17:38:40.081	Thread Grou...	HTTP Request	20	✓	1689	141	20	2
73	17:38:40.178	Thread Grou...	HTTP Request	21	✓	1689	141	21	2
74	17:38:40.281	Thread Grou...	HTTP Request	14	✓	1689	141	14	1
75	17:38:40.382	Thread Grou...	HTTP Request	14	✓	1689	141	14	1
76	17:38:40.485	Thread Grou...	HTTP Request	14	✓	1689	141	14	1
77	17:38:40.580	Thread Grou...	HTTP Request	14	✓	1689	141	14	1
78	17:38:40.680	Thread Grou...	HTTP Request	7	✓	1689	141	7	1
79	17:38:40.781	Thread Grou...	HTTP Request	10	✓	1689	141	10	0
80	17:38:40.881	Thread Grou...	HTTP Request	9	✓	1689	141	9	1
81	17:38:40.983	Thread Grou...	HTTP Request	19	✓	1689	141	19	3
82	17:38:41.081	Thread Grou...	HTTP Request	11	✓	1689	141	11	1
83	17:38:41.183	Thread Grou...	HTTP Request	20	✓	1689	141	19	1
84	17:38:41.281	Thread Grou...	HTTP Request	16	✓	1689	141	16	1
85	17:38:41.380	Thread Grou...	HTTP Request	17	✓	1689	141	16	1
86	17:38:41.482	Thread Grou...	HTTP Request	27	✓	1689	141	27	1
87	17:38:41.585	Thread Grou...	HTTP Request	14	✓	1689	141	14	2
88	17:38:41.682	Thread Grou...	HTTP Request	17	✓	1689	141	17	1
89	17:38:41.785	Thread Grou...	HTTP Request	11	✓	1689	141	11	2
90	17:38:41.886	Thread Grou...	HTTP Request	17	✓	1689	141	17	2
91	17:38:41.983	Thread Grou...	HTTP Request	15	✓	1689	141	15	2
92	17:38:42.083	Thread Grou...	HTTP Request	11	✓	1689	141	10	0
93	17:38:42.183	Thread Grou...	HTTP Request	11	✓	1689	141	11	1
94	17:38:42.285	Thread Grou...	HTTP Request	9	✓	1689	141	9	1
95	17:38:42.386	Thread Grou...	HTTP Request	14	✓	1689	141	14	3
96	17:38:42.485	Thread Grou...	HTTP Request	27	✓	1689	141	27	3
97	17:38:42.585	Thread Grou...	HTTP Request	16	✓	1689	141	16	1
98	17:38:42.687	Thread Grou...	HTTP Request	11	✓	1689	141	10	1
99	17:38:42.789	Thread Grou...	HTTP Request	12	✓	1689	141	12	1
100	17:38:42.888	Thread Grou...	HTTP Request	15	✓	1689	141	15	3

2. selectStudent berdasarkan NPM tidak ditemukan

View Results in Table

Name: View Results in Table view npm not found 100

Comments:

Write results to file / Read from file

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

Sample #	Start Time	Thread Name	Label	Sample Time(ms)	Status	Bytes	Sent Bytes	Latency	Connect Time...
68	17:44:18.635	Thread Grou...	HTTP Request	6	✓	1652	141	6	0
69	17:44:18.734	Thread Grou...	HTTP Request	11	✓	1652	141	11	1
70	17:44:18.835	Thread Grou...	HTTP Request	11	✓	1652	141	11	2
71	17:44:18.937	Thread Grou...	HTTP Request	9	✓	1652	141	9	2
72	17:44:19.035	Thread Grou...	HTTP Request	12	✓	1652	141	12	1
73	17:44:19.135	Thread Grou...	HTTP Request	7	✓	1652	141	7	1
74	17:44:19.235	Thread Grou...	HTTP Request	11	✓	1652	141	11	2
75	17:44:19.335	Thread Grou...	HTTP Request	11	✓	1652	141	11	0
76	17:44:19.435	Thread Grou...	HTTP Request	7	✓	1652	141	7	1
77	17:44:19.537	Thread Grou...	HTTP Request	10	✓	1652	141	10	2
78	17:44:19.635	Thread Grou...	HTTP Request	7	✓	1652	141	7	1
79	17:44:19.735	Thread Grou...	HTTP Request	9	✓	1652	141	9	1
80	17:44:19.835	Thread Grou...	HTTP Request	11	✓	1652	141	11	2
81	17:44:19.934	Thread Grou...	HTTP Request	10	✓	1652	141	10	1
82	17:44:20.037	Thread Grou...	HTTP Request	10	✓	1652	141	10	1
83	17:44:20.136	Thread Grou...	HTTP Request	8	✓	1652	141	8	1
84	17:44:20.234	Thread Grou...	HTTP Request	11	✓	1652	141	11	1
85	17:44:20.334	Thread Grou...	HTTP Request	12	✓	1652	141	12	2
86	17:44:20.434	Thread Grou...	HTTP Request	7	✓	1652	141	7	1
87	17:44:20.537	Thread Grou...	HTTP Request	10	✓	1652	141	10	2
88	17:44:20.640	Thread Grou...	HTTP Request	9	✓	1652	141	9	1
89	17:44:20.736	Thread Grou...	HTTP Request	10	✓	1652	141	10	2
90	17:44:20.839	Thread Grou...	HTTP Request	9	✓	1652	141	9	1
91	17:44:20.940	Thread Grou...	HTTP Request	10	✓	1652	141	10	1
92	17:44:21.042	Thread Grou...	HTTP Request	11	✓	1652	141	11	1
93	17:44:21.140	Thread Grou...	HTTP Request	9	✓	1652	141	9	0
94	17:44:21.240	Thread Grou...	HTTP Request	10	✓	1652	141	10	1
95	17:44:21.343	Thread Grou...	HTTP Request	10	✓	1652	141	10	3
96	17:44:21.442	Thread Grou...	HTTP Request	14	✓	1652	141	14	2
97	17:44:21.544	Thread Grou...	HTTP Request	9	✓	1652	141	8	2
98	17:44:21.645	Thread Grou...	HTTP Request	8	✓	1652	141	8	0
99	17:44:21.746	Thread Grou...	HTTP Request	6	✓	1652	141	6	0
100	17:44:21.846	Thread Grou...	HTTP Request	11	✓	1652	141	11	2

3. selectAllStudents

```

java.lang.OutOfMemoryError: Java heap space
    at java.lang.AbstractStringBuilder.<init>(AbstractStringBuilder.java:68) ~[na:1.8.0_101]
    at java.lang.StringBuilder.<init>(StringBuilder.java:89) ~[na:1.8.0_101]
    at org.thymeleaf.dom.NestableNode.insertChild(NestableNode.java:275) ~[thymeleaf-2.1.5.RELEASE.jar:2.1.5.RELEASE]
    at org.thymeleaf.dom.NestableNode.insertBefore(NestableNode.java:333) ~[thymeleaf-2.1.5.RELEASE.jar:2.1.5.RELEASE]
    at org.thymeleaf.processor.attr.AbstractIterationAttrProcessor.processAttribute(AbstractIterationAttrProcessor.java:100) ~[thymeleaf-2.1.5.RELEASE.jar:2.1.5.RELEASE]
    at org.thymeleaf.processor.attr.AbstractAttrProcessor.doProcess(AbstractAttrProcessor.java:100) ~[thymeleaf-2.1.5.RELEASE.jar:2.1.5.RELEASE]
    at org.thymeleaf.processor.AbstractProcessor.process(AbstractProcessor.java:212) ~[thymeleaf-2.1.5.RELEASE.jar:2.1.5.RELEASE]
    at org.thymeleaf.dom.Node.applyNextProcessor(Node.java:1017) ~[thymeleaf-2.1.5.RELEASE.jar:2.1.5.RELEASE]
    at org.thymeleaf.dom.Node.processNode(Node.java:972) ~[thymeleaf-2.1.5.RELEASE.jar:2.1.5.RELEASE]
    at org.thymeleaf.dom.NestableNode.computeNextChild(NestableNode.java:695) ~[thymeleaf-2.1.5.RELEASE.jar:2.1.5.RELEASE]

```

Dapat dilihat dari gambar diatas terjadi error dikarenakan oleh kapasitas memory yang tidak mencukupi, dan hanya dapat melakukan test untuk 50 user seperti gambar dibawah ini.

View Results in Table

Name: View Results in Table viewall

Comments:

Write results to file / Read from file

Filename: Browse... Log/Display Only: ☐ Errors ☒ Successes ☐ Failures Configure

Sample #	Start Time	Thread Name	Label	Sample Time(ms)	Status	Bytes	Sent Bytes	Latency	Connect Time...
18	17:12:04.242	Thread Grou...	HTTP Request	274374	✓	3324901	133	267084	1
19	17:12:04.855	Thread Grou...	HTTP Request	273792	✓	3324901	133	273635	1
20	17:12:02.032	Thread Grou...	HTTP Request	279727	✓	3324901	133	269352	0
21	17:12:08.059	Thread Grou...	HTTP Request	273810	✓	3324901	133	270372	1
22	17:12:01.832	Thread Grou...	HTTP Request	282879	✓	3324901	133	276637	1
23	17:12:03.037	Thread Grou...	HTTP Request	281881	✓	3324901	133	275607	1
24	17:12:05.057	Thread Grou...	HTTP Request	282452	✓	3324901	133	276868	1
25	17:12:00.834	Thread Grou...	HTTP Request	286696	✓	3324901	133	283928	0
26	17:12:05.256	Thread Grou...	HTTP Request	282333	✓	3324901	133	279622	0
27	17:12:04.040	Thread Grou...	HTTP Request	283684	✓	3324901	133	283418	1
28	17:12:02.433	Thread Grou...	HTTP Request	285436	✓	3324901	133	285159	0
29	17:12:07.259	Thread Grou...	HTTP Request	280669	✓	3324901	133	277586	1
30	17:12:03.238	Thread Grou...	HTTP Request	284818	✓	3324901	133	284314	1
31	17:12:08.659	Thread Grou...	HTTP Request	279432	✓	3324901	133	276209	1
32	17:12:08.463	Thread Grou...	HTTP Request	279687	✓	3324901	133	278952	0
33	17:12:05.659	Thread Grou...	HTTP Request	282608	✓	3324901	133	282530	2
34	17:12:06.659	Thread Grou...	HTTP Request	281711	✓	3324901	133	281280	1
35	17:12:03.640	Thread Grou...	HTTP Request	284763	✓	3324901	133	284027	1
36	17:12:05.456	Thread Grou...	HTTP Request	282974	✓	3324901	133	282378	3
37	17:12:07.662	Thread Grou...	HTTP Request	280836	✓	3324901	133	280313	0
38	17:12:06.257	Thread Grou...	HTTP Request	282299	✓	3324901	133	281691	1
39	17:12:07.062	Thread Grou...	HTTP Request	281556	✓	3324901	133	281148	1
40	17:12:04.446	Thread Grou...	HTTP Request	284204	✓	3324901	133	283996	0
41	17:12:06.457	Thread Grou...	HTTP Request	282195	✓	3324901	133	281462	1
42	17:12:04.653	Thread Grou...	HTTP Request	284011	✓	3324901	133	283502	1
43	17:12:06.060	Thread Grou...	HTTP Request	282669	✓	3324901	133	282019	0
44	17:12:03.440	Thread Grou...	HTTP Request	285378	✓	3324901	133	285152	1
45	17:12:06.857	Thread Grou...	HTTP Request	281962	✓	3324901	133	281674	1
46	17:12:07.462	Thread Grou...	HTTP Request	281406	✓	3324901	133	281280	1
47	17:12:05.859	Thread Grou...	HTTP Request	283017	✓	3324901	133	282864	1
48	17:12:03.842	Thread Grou...	HTTP Request	285067	✓	3324901	133	284953	1
49	17:12:08.262	Thread Grou...	HTTP Request	280743	✓	3324901	133	280660	1
50	17:12:07.862	Thread Grou...	HTTP Request	281203	✓	3324901	133	281113	1

4. Hasil testing JUnit

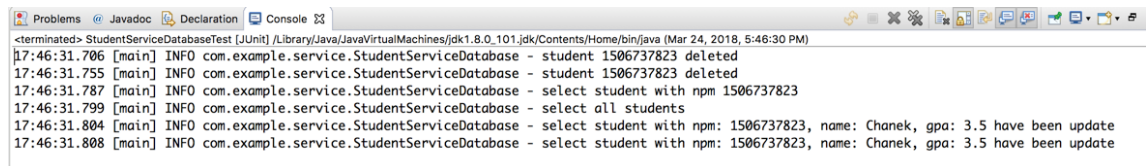
Package Explorer JUnit

Finished after 0.42 seconds

Runs: 5/5 Errors: 0 Failures: 0

com.example.service.StudentServiceDatabaseTest [Runner: JUnit 4]

- deleteStudent (0.150 s)
- selectStudent (0.012 s)
- selectAllStudents (0.006 s)
- addStudent (0.001 s)
- updateStudent (0.006 s)



```
<terminated> StudentServiceDatabaseTest [JUnit] /Library/Java/JavaVirtualMachines/jdk1.8.0_101.jdk/Contents/Home/bin/java (Mar 24, 2018, 5:46:30 PM)
17:46:31.706 [main] INFO com.example.service.StudentServiceDatabase - student 1506737823 deleted
17:46:31.755 [main] INFO com.example.service.StudentServiceDatabase - student 1506737823 deleted
17:46:31.787 [main] INFO com.example.service.StudentServiceDatabase - select student with npm 1506737823
17:46:31.799 [main] INFO com.example.service.StudentServiceDatabase - select all students
17:46:31.804 [main] INFO com.example.service.StudentServiceDatabase - select student with npm: 1506737823, name: Chanek, gpa: 3.5 have been update
17:46:31.808 [main] INFO com.example.service.StudentServiceDatabase - select student with npm: 1506737823, name: Chanek, gpa: 3.5 have been update
```