
Tutorial 6

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1. Jelaskan apa saja hal yang Anda pelajari dari tutorial ini.
Melakukan unit testing dan Load testing. Unit testing dilakukan dengan JUnit dan Mockito, melakukan pengecekan pada method yang dibuat. Load Testing dilakukan dengan Apache Jmeter, melakukan untuk mengukur performa dan respon dari server.

2. Jawab pertanyaan pada bagian Pertanyaan dan penjelasannya.

Latihan Unit Testing

Pertanyaan

- a. Tambahkan code berikut pada StudentServiceDatabaseTest dan jelaskan apa yang terjadi pada method tersebut berikut dengan hasil testing-nya!

```
@Test
public void selectAllStudents() {

    // Given
    List<StudentModel> studentModels = new ArrayList<>();
    StudentModel studentModel = new StudentModel("1506737823", "Chanek", 3.5);
    studentModels.add(studentModel);

    List<StudentModel> checks = new ArrayList<>();
    StudentModel check = new StudentModel("1506737823", "Chanek", 3.5);
    checks.add(check);

    BDDMockito.given(studentMapper.selectAllStudents()).willReturn(studentModels);

    // When
    List<StudentModel> test = studentService.selectAllStudents();

    // 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
}
```

//Given

Inisialisasi list StudentModels dan checks, lalu inisialisasi object StudentModel dengan nama StudentModel dan check, lalu memasukan masing masing object ke dalam list. BDDMockito memanipulasi object dengan return stidentModels.

//When

Memasukan data ke dalam list test.

//Then

Dilakukan pengecekan Not Null, tidak kosong, ukuran sama, Konten sama.

- b. Tambahkan code berikut pada StudentServiceDatabaseTest dan jelaskan apa yang terjadi pada method tersebut berikut dengan hasil testing-nya!

```
@Test
public void addStudent() {

    // Given
    StudentModel studentModel = new StudentModel("1506737823", "Chanek", 3.5);
    StudentModel check = new StudentModel("1506737823", "Chanek", 3.5);
    BDDMockito.given(studentService.addStudent(studentModel)).willReturn(true);

    // When
    boolean test = studentService.addStudent(studentModel);

    // Then
    BDDMockito.then(studentMapper).should().addStudent(check);
    assertThat(test, equalTo(true)); // Check if Same
}
```

//Given

Inisialisasi object StudentModel dengan nama StudentModel dan check. BDDMockito memanipulasi object dengan return True.


//When






Memasukan nilai boolean dari addStudent dan ke dalam test.

//Then

Dilakukan pengecekan jika sama.

- c. Lakukan testing terhadap method delete student dan update student!

▼  com.example.service.StudentServiceDatabaseTest [Runner: JUnit 4] (0,245 s)

-  deleteStudent (0,228 s)
-  selectStudent (0,012 s)
-  selectAllStudents (0,003 s)
-  addStudent (0,000 s)
-  updateStudent (0,002 s)

Pertanyaan

- a. Lakukan load testing pada semua kemungkinan hasil dari fitur selectStudent() dengan kondisi berhasil ditemukan, selectStudent() dengan kondisi gagal ditemukan, dan selectAllStudents() menggunakan Apache JMeter. Gunakan Number of Threads sama dengan 100 dan Ramp-up period 10 detik. Anda berarti perlu melakukan 3x test, 1 test untuk setiap kemungkinan hasil. Screenshot window JMeter Anda.

- `jmeter_selectStudentBerhasil`

Write results to file / Read from file

Filename

Browse...

Log/Display Only: ☐ Errors ☒ Successes

Configure

Sample #	Start Time	Thread Name	Label	Sample Time(...)	Status	Bytes	Sent Bytes	Latency	Connect Time...
76	21:37:01.447	Thread Group...	HTTP Request	10		1666	141	10	0
77	21:37:01.551	Thread Group...	HTTP Request	11		1666	141	11	1
78	21:37:01.651	Thread Group...	HTTP Request	14		1666	141	14	1
79	21:37:01.754	Thread Group...	HTTP Request	12		1666	141	12	1
80	21:37:01.853	Thread Group...	HTTP Request	10		1666	141	10	1
81	21:37:01.953	Thread Group...	HTTP Request	13		1666	141	13	1
82	21:37:02.053	Thread Group...	HTTP Request	10		1666	141	10	0
83	21:37:02.153	Thread Group...	HTTP Request	9		1666	141	9	1
84	21:37:02.253	Thread Group...	HTTP Request	9		1666	141	9	1
85	21:37:02.354	Thread Group...	HTTP Request	9		1666	141	8	1
86	21:37:02.453	Thread Group...	HTTP Request	10		1666	141	9	1
87	21:37:02.553	Thread Group...	HTTP Request	10		1666	141	10	1
88	21:37:02.653	Thread Group...	HTTP Request	9		1666	141	9	1
89	21:37:02.753	Thread Group...	HTTP Request	10		1666	141	10	1
90	21:37:02.853	Thread Group...	HTTP Request	13		1666	141	13	1
91	21:37:02.954	Thread Group...	HTTP Request	9		1666	141	9	0
92	21:37:03.053	Thread Group...	HTTP Request	9		1666	141	9	1
93	21:37:03.153	Thread Group...	HTTP Request	12		1666	141	12	1
94	21:37:03.253	Thread Group...	HTTP Request	9		1666	141	8	1
95	21:37:03.353	Thread Group...	HTTP Request	8		1666	141	8	1
96	21:37:03.454	Thread Group...	HTTP Request	9		1666	141	9	1
97	21:37:03.554	Thread Group...	HTTP Request	9		1666	141	9	0
98	21:37:03.651	Thread Group...	HTTP Request	9		1666	141	9	1
99	21:37:03.754	Thread Group...	HTTP Request	11		1666	141	11	1
100	21:37:03.854	Thread Group...	HTTP Request	10		1666	141	10	1

☒ Scroll automatically?

☐ Child samples?

No of Samples 100

Latest Sample 10

Average 13

Deviation 9

- jmeter_selectStudentGagal

Write results to file / Read from file

Filename

Browse...

Log/Display Only: ☐ Errors ☒ Successes

Configure

Sample #	Start Time	Thread Name	Label	Sample Ti...	Status	Bytes	Sent Bytes	Latency	Connect Time...
76	21:38:19.652	Thread Group 1-76	HTTP Request	8		1640	143	8	0
77	21:38:19.752	Thread Group 1-77	HTTP Request	9		1640	143	9	1
78	21:38:19.853	Thread Group 1-78	HTTP Request	13		1640	143	13	1
79	21:38:19.962	Thread Group 1-79	HTTP Request	9		1640	143	9	1
80	21:38:20.052	Thread Group 1-80	HTTP Request	9		1640	143	9	1
81	21:38:20.164	Thread Group 1-81	HTTP Request	7		1640	143	7	0
82	21:38:20.260	Thread Group 1-82	HTTP Request	8		1640	143	8	1
83	21:38:20.362	Thread Group 1-83	HTTP Request	8		1640	143	8	1
84	21:38:20.461	Thread Group 1-84	HTTP Request	9		1640	143	9	1
85	21:38:20.561	Thread Group 1-85	HTTP Request	9		1640	143	9	1
86	21:38:20.653	Thread Group 1-86	HTTP Request	9		1640	143	9	1
87	21:38:20.761	Thread Group 1-87	HTTP Request	9		1640	143	9	1
88	21:38:20.861	Thread Group 1-88	HTTP Request	9		1640	143	9	1
89	21:38:20.953	Thread Group 1-89	HTTP Request	12		1640	143	12	1
90	21:38:21.061	Thread Group 1-90	HTTP Request	9		1640	143	9	1
91	21:38:21.155	Thread Group 1-91	HTTP Request	10		1640	143	10	1
92	21:38:21.261	Thread Group 1-92	HTTP Request	8		1640	143	8	1
93	21:38:21.361	Thread Group 1-93	HTTP Request	14		1640	143	14	1
94	21:38:21.461	Thread Group 1-94	HTTP Request	12		1640	143	11	1
95	21:38:21.555	Thread Group 1-95	HTTP Request	10		1640	143	10	1
96	21:38:21.650	Thread Group 1-96	HTTP Request	14		1640	143	14	1
97	21:38:21.760	Thread Group 1-97	HTTP Request	10		1640	143	10	1
98	21:38:21.861	Thread Group 1-98	HTTP Request	19		1640	143	19	1
99	21:38:21.961	Thread Group 1-99	HTTP Request	16		1640	143	16	1
100	21:38:22.060	Thread Group 1-1...	HTTP Request	10		1640	143	10	1

☒ Scroll automatically?

☐ Child samples?

No of Samples 100

Latest Sample 10

Average 10

Deviation 3

- jmeter_selectAllStudents

Menggunakan Number of Threads 100, proses berjalan sangat lama jadi saya turunkan menjadi 50.

Write results to file / Read from file

Filename

Browse...

Log/Display Only:

Errors

Successes

Configure

Sample #	Start Time	Thread Name	Label	Sample Tim...	Status	Bytes	Sent Bytes	Latency	Connect Time(
1	21:39:59.825	Thread Group 1-1	HTTP Request	14701	<div></div>	1578469	133	11318	2
2	21:39:59.955	Thread Group 1-2	HTTP Request	25748	<div></div>	1578469	133	24326	1
3	21:40:00.035	Thread Group 1-3	HTTP Request	49723	<div></div>	1578469	133	32166	1

Scroll automatically?

Child samples?

No of Samples 3

Latest Sample 49723

Average 30057

Deviation 14618

- b. Lakukan load testing kembali untuk semua kemungkinan hasil dengan kode dan database yang sudah Anda optimasi. Gunakan Number of Threads sama dengan 100 dan Ramp-up period 10 detik. Screenshot kembali window JMeter Anda. (menggunakan Optimize Table pada database terlihat perbandingan Average nya lebih kecil)

- jmeter_selectStudentBerhasil (Average Sebelum 13 menjadi 6)

Write results to file / Read from file

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

Sample #	Start Time	Thread Name	Label	Sample Ti...	Status	Bytes	Sent Bytes	Latency	Connect Time...
76	21:56:41.917	Thread Group 1-76	HTTP Request	7	✓	1666	141	7	1
77	21:56:42.017	Thread Group 1-77	HTTP Request	5	✓	1666	141	5	1
78	21:56:42.118	Thread Group 1-78	HTTP Request	6	✓	1666	141	6	1
79	21:56:42.220	Thread Group 1-79	HTTP Request	5	✓	1666	141	5	1
80	21:56:42.318	Thread Group 1-80	HTTP Request	5	✓	1666	141	5	1
81	21:56:42.418	Thread Group 1-81	HTTP Request	5	✓	1666	141	5	1
82	21:56:42.518	Thread Group 1-82	HTTP Request	5	✓	1666	141	5	0
83	21:56:42.618	Thread Group 1-83	HTTP Request	5	✓	1666	141	5	1
84	21:56:42.717	Thread Group 1-84	HTTP Request	8	✓	1666	141	8	1
85	21:56:42.819	Thread Group 1-85	HTTP Request	6	✓	1666	141	6	1
86	21:56:42.919	Thread Group 1-86	HTTP Request	6	✓	1666	141	6	0
87	21:56:43.019	Thread Group 1-87	HTTP Request	6	✓	1666	141	6	1
88	21:56:43.118	Thread Group 1-88	HTTP Request	6	✓	1666	141	6	1
89	21:56:43.218	Thread Group 1-89	HTTP Request	5	✓	1666	141	5	1
90	21:56:43.319	Thread Group 1-90	HTTP Request	5	✓	1666	141	5	0
91	21:56:43.419	Thread Group 1-91	HTTP Request	6	✓	1666	141	6	1
92	21:56:43.519	Thread Group 1-92	HTTP Request	7	✓	1666	141	7	1
93	21:56:43.619	Thread Group 1-93	HTTP Request	5	✓	1666	141	5	1
94	21:56:43.719	Thread Group 1-94	HTTP Request	5	✓	1666	141	5	1
95	21:56:43.819	Thread Group 1-95	HTTP Request	6	✓	1666	141	6	1
96	21:56:43.920	Thread Group 1-96	HTTP Request	5	✓	1666	141	5	0
97	21:56:44.020	Thread Group 1-97	HTTP Request	7	✓	1666	141	7	1
98	21:56:44.120	Thread Group 1-98	HTTP Request	5	✓	1666	141	5	1
99	21:56:44.220	Thread Group 1-99	HTTP Request	5	✓	1666	141	5	0
100	21:56:44.320	Thread Group 1-1...	HTTP Request	5	✓	1666	141	5	0

☐ Scroll automatically? ☐ Child samples? No of Samples 100 Latest Sample 5 Average 6 Deviation 3

- jmeter_selectStudentGagal (Average Sebelum 10 menjadi 6)

Write results to file / Read from file

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

Sample #	Start Time	Thread Name	Label	Sample Ti...	Status	Bytes	Sent Bytes	Latency	Connect Time...
76	21:55:39.093	Thread Group 1-76	HTTP Request	8	✓	1635	138	8	2
77	21:55:39.194	Thread Group 1-77	HTTP Request	7	✓	1635	138	7	1
78	21:55:39.294	Thread Group 1-78	HTTP Request	6	✓	1635	138	6	1
79	21:55:39.393	Thread Group 1-79	HTTP Request	5	✓	1635	138	5	1
80	21:55:39.494	Thread Group 1-80	HTTP Request	6	✓	1635	138	6	1
81	21:55:39.594	Thread Group 1-81	HTTP Request	7	✓	1635	138	6	0
82	21:55:39.694	Thread Group 1-82	HTTP Request	6	✓	1635	138	6	1
83	21:55:39.794	Thread Group 1-83	HTTP Request	5	✓	1635	138	5	0
84	21:55:39.894	Thread Group 1-84	HTTP Request	7	✓	1635	138	7	1
85	21:55:39.994	Thread Group 1-85	HTTP Request	9	✓	1635	138	9	2
86	21:55:40.094	Thread Group 1-86	HTTP Request	5	✓	1635	138	5	0
87	21:55:40.195	Thread Group 1-87	HTTP Request	6	✓	1635	138	6	0
88	21:55:40.294	Thread Group 1-88	HTTP Request	6	✓	1635	138	5	1
89	21:55:40.394	Thread Group 1-89	HTTP Request	6	✓	1635	138	6	1
90	21:55:40.495	Thread Group 1-90	HTTP Request	7	✓	1635	138	7	1
91	21:55:40.595	Thread Group 1-91	HTTP Request	7	✓	1635	138	7	1
92	21:55:40.695	Thread Group 1-92	HTTP Request	10	✓	1635	138	10	1
93	21:55:40.796	Thread Group 1-93	HTTP Request	6	✓	1635	138	6	1
94	21:55:40.895	Thread Group 1-94	HTTP Request	5	✓	1635	138	5	0
95	21:55:40.997	Thread Group 1-95	HTTP Request	6	✓	1635	138	6	0
96	21:55:41.096	Thread Group 1-96	HTTP Request	5	✓	1635	138	5	0
97	21:55:41.196	Thread Group 1-97	HTTP Request	6	✓	1635	138	6	1
98	21:55:41.296	Thread Group 1-98	HTTP Request	7	✓	1635	138	7	1
99	21:55:41.396	Thread Group 1-99	HTTP Request	6	✓	1635	138	6	0
100	21:55:41.495	Thread Group 1-1...	HTTP Request	8	✓	1635	138	8	2

☐ Scroll automatically? ☐ Child samples? No of Samples 100 Latest Sample 8 Average 6 Deviation 3

- jmeter_selectAllStudents (Average Sebelum 26378 menjadi 21738)

Write results to file / Read from file

Filename

Browse...

Log/Display Only: ☐ Errors ☒ Successes

Configure

Sample #	Start Time	Thread Name	Label	Sample Ti...	Status	Bytes	Sent Bytes	Latency	Connect Time...
26	21:54:05.087	Thread Group 1-38	HTTP Request	22414		1578469	133	22176	1
27	21:54:02.886	Thread Group 1-27	HTTP Request	24956		1578469	133	24470	1
28	21:54:03.286	Thread Group 1-29	HTTP Request	24568		1578469	133	24253	1
29	21:54:05.688	Thread Group 1-41	HTTP Request	22344		1578469	133	21902	1
30	21:54:02.285	Thread Group 1-24	HTTP Request	25910		1578469	133	25679	0
31	21:54:03.696	Thread Group 1-31	HTTP Request	24775		1578469	133	24226	1
32	21:54:02.095	Thread Group 1-23	HTTP Request	26547		1578469	133	25955	1
33	21:54:05.896	Thread Group 1-42	HTTP Request	23265		1578469	133	22809	1
34	21:54:04.687	Thread Group 1-36	HTTP Request	24511		1578469	133	24323	1
35	21:54:06.496	Thread Group 1-45	HTTP Request	22736		1578469	133	22534	1
36	21:54:06.898	Thread Group 1-47	HTTP Request	22470		1578469	133	22298	1
37	21:54:04.496	Thread Group 1-35	HTTP Request	24888		1578469	133	24595	1
38	21:54:03.486	Thread Group 1-30	HTTP Request	26100		1578469	133	25640	1
39	21:54:07.098	Thread Group 1-48	HTTP Request	22576		1578469	133	22138	1
40	21:54:03.896	Thread Group 1-32	HTTP Request	25780		1578469	133	25411	0
41	21:54:06.097	Thread Group 1-43	HTTP Request	23627		1578469	133	23250	0
42	21:54:04.296	Thread Group 1-34	HTTP Request	25432		1578469	133	24964	1
43	21:54:06.698	Thread Group 1-46	HTTP Request	23050		1578469	133	22902	1
44	21:54:05.496	Thread Group 1-40	HTTP Request	24264		1578469	133	24178	1
45	21:54:07.298	Thread Group 1-49	HTTP Request	22465		1578469	133	22385	1
46	21:54:07.498	Thread Group 1-50	HTTP Request	22362		1578469	133	22298	1
47	21:54:05.296	Thread Group 1-39	HTTP Request	24580		1578469	133	24520	0
48	21:54:04.087	Thread Group 1-33	HTTP Request	25808		1578469	133	25744	1
49	21:54:06.288	Thread Group 1-44	HTTP Request	23625		1578469	133	23565	1
50	21:54:03.096	Thread Group 1-28	HTTP Request	26834		1578469	133	26793	0

☐ Scroll automatically?

☐ Child samples?

No of Samples 50

Latest Sample 26834

Average 21738

Deviation 5251