

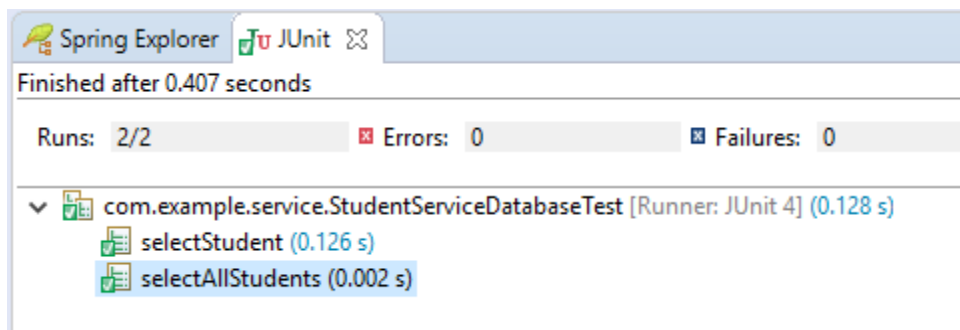
Nama : Windiany Lestari Sitorus

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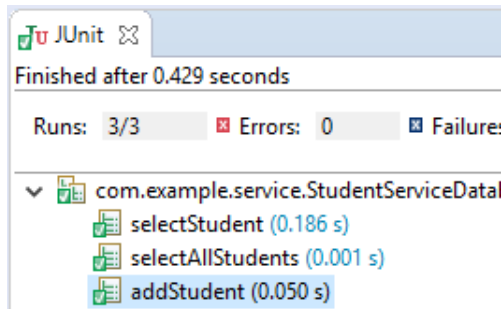
## Latihan Unit Testing

1. Pada test `selectAllStudents` akan dilakukan pengecekan terhadap service `selectAllStudents` yang telah didefine pada `StudentServiceDatabase.java` sebelumnya. Pada method ini terdapat 3 segmen, yakni Given, When, dan Then.
  - Pada Given, akan diinisialisasi objek `studentModel` yang bertipe Array List, objek ini akan berperan sebagai objek yang akan dites. Sementara objek `check` akan menjadi parameter pengecekan. Kedua objek ini bertipe Array List dikarenakan pada mapper return nya berupa Array List `StudentModel`. Dan pada `BDDMockito.given()` akan dilakukan manipulasi terhadap fungsi yang akan dipanggil yakni `selectAllStudent` dengan return value `studentModels` (isi dari `willReturn()`).
  - Kemudian pada When dilakukan pengetesan terhadap method yang diinginkan yakni dengan inisialisasi objek test dengan memanggil method `selectAllStudents` dari `studentService`.
  - Dan pada Then dilakukan pengecekan terhadap terhadap objek test apakah null, berisi, memiliki size yang sama dan memiliki konten yang sama dengan objek `check`.



2. Pada test `addStudents` akan dilakukan pengecekan terhadap service `addStudents` yang telah didefine pada `StudentServiceDatabase.java` sebelumnya. Pada method ini terdapat 3 segmen, yakni Given, When, dan Then.
  - Pada Given, akan diinisialisasi objek `studentModel` yang akan berperan sebagai objek yang akan dites. Sementara objek `check` akan menjadi parameter pengecekan. Dan pada `BDDMockito.given()` akan dilakukan manipulasi terhadap fungsi yang akan dipanggil yakni `addStudent` dengan return value `studentModels` (isi dari `willReturn()`).

- Kemudian pada When dilakukan pengetesan terhadap method yang diinginkan yakni dengan inialisasi objek test dengan memanggil method addStudents dari studentService.
- Dan pada Then dilakukan verifikasi objek studentMapper memiliki method addStudent dengan parameter objek check. Kemudian dilakukan pengecekan terhadap terhadap objek test apakah equal. Apabila saya mengganti dengan should().selectStudent("NPM") maka akan ada failure saat junit dijalankan.



### 3. Testing untuk method deleteStudent dan updateStudent

```
@Test
public void deleteStudent() {
    // Given
    StudentModel studentModel = new StudentModel("1506737823", "Chanek", 3.5);
    StudentModel check = new StudentModel("1506737823", "Chanek", 3.5);
    BDDMockito.given(studentService.deleteStudent("1506737823")).willReturn(true);

    // When
    boolean test = studentService.deleteStudent("1506737823");

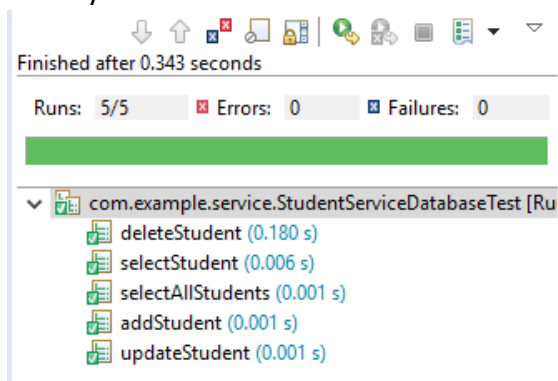
    // Then
    BDDMockito.then(studentMapper).should().deleteStudent("1506737823");
    assertThat(test, equalTo(true)); // Check if Same
}

@Test
public void updateStudent() {
    // Given
    StudentModel studentModel = new StudentModel("1506737823", "Chanek", 3.5);
    StudentModel check = new StudentModel("1506737823", "Chanek", 3.5);
    BDDMockito.given(studentService.updateStudent(studentModel)).willReturn(true);

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

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

#### Hasilnya



# Latihan Load Testing

## 1. Select All Student sebelum optimasi: Average 40062 ms

View Results in Table (C:\Users\MMDC\Downloads\apache-jmeter-4.0\bin\view-results-in-table-jmx) - Apache JMeter (4.0 r1823414)

File Edit Search Run Options Help

Test Plan  
Thread Group  
HTTP Request  
View Results in Table

View Results in Table

Name: View Results in Table

Comments:

Write results to file / Read from file

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

Sample #	Start Time	Thread Name	Label	Sample Time(ms)	Status	Bytes	Sent Bytes	Latency	Connect Time(ms)
74	18:19:17.225	Thread Group 1-98	HTTP Request	40062	✓	1745693	133	42942	1
75	18:19:18.490	Thread Group 1-90	HTTP Request	43810	✓	1745693	133	42948	1
76	18:19:16.931	Thread Group 1-65	HTTP Request	46381	✓	1745693	133	45523	1
77	18:19:17.832	Thread Group 1-74	HTTP Request	45557	✓	1745693	133	44801	0
78	18:19:18.232	Thread Group 1-78	HTTP Request	45204	✓	1745693	133	44946	1
79	18:19:19.134	Thread Group 1-87	HTTP Request	44332	✓	1745693	133	44080	0
80	18:19:16.524	Thread Group 1-61	HTTP Request	46950	✓	1745693	133	46062	1
81	18:19:18.126	Thread Group 1-77	HTTP Request	45382	✓	1745693	133	45131	1
82	18:19:17.325	Thread Group 1-69	HTTP Request	46186	✓	1745693	133	45379	1
83	18:19:17.632	Thread Group 1-72	HTTP Request	45880	✓	1745693	133	45651	0
84	18:19:19.033	Thread Group 1-86	HTTP Request	44511	✓	1745693	133	44297	0
85	18:19:19.334	Thread Group 1-89	HTTP Request	44246	✓	1745693	133	43821	0
86	18:19:19.233	Thread Group 1-88	HTTP Request	44393	✓	1745693	133	44104	0
87	18:19:19.752	Thread Group 1-93	HTTP Request	43888	✓	1745693	133	43692	1
88	18:19:18.526	Thread Group 1-81	HTTP Request	45144	✓	1745693	133	44843	1
89	18:19:20.431	Thread Group 1-94	HTTP Request	43249	✓	1745693	133	43084	0
90	18:19:19.751	Thread Group 1-92	HTTP Request	43966	✓	1745693	133	43696	1
91	18:19:19.751	Thread Group 1-91	HTTP Request	43984	✓	1745693	133	43742	1
92	18:19:18.832	Thread Group 1-84	HTTP Request	44919	✓	1745693	133	44790	1
93	18:19:18.925	Thread Group 1-85	HTTP Request	44865	✓	1745693	133	44735	1
94	18:19:18.732	Thread Group 1-83	HTTP Request	45063	✓	1745693	133	44863	1
95	18:19:20.446	Thread Group 1-99	HTTP Request	43359	✓	1745693	133	43243	0
96	18:19:20.433	Thread Group 1-96	HTTP Request	43394	✓	1745693	133	43246	0
97	18:19:20.446	Thread Group 1-98	HTTP Request	43394	✓	1745693	133	43299	0
98	18:19:20.433	Thread Group 1-97	HTTP Request	43407	✓	1745693	133	43271	1
99	18:19:20.447	Thread Group 1-...	HTTP Request	43418	✓	1745693	133	43361	1
100	18:19:20.431	Thread Group 1-95	HTTP Request	43435	✓	1745693	133	43363	1

☐ Scroll automatically? ☐ Child samples? No of Samples: 100 Latest Sample: 43435 Average: 40062 Deviation: 7956

## Select All Student setelah optimasi: Average 31257ms

View Results in Table (C:\Users\MMDC\Downloads\apache-jmeter-4.0\bin\view-results-in-table-jmx) - Apache JMeter (4.0 r1823414)

File Edit Search Run Options Help

Test Plan  
Thread Group  
HTTP Request  
View Results in Table

View Results in Table

Name: View Results in Table

Comments:

Write results to file / Read from file

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

Sample #	Start Time	Thread Name	Label	Sample Time(ms)	Status	Bytes	Sent Bytes	Latency	Connect Time(ms)
74	19:04:55.899	Thread Group 1-74	HTTP Request	42349	✓	1744871	133	42445	1
75	19:04:55.970	Thread Group 1-75	HTTP Request	42977	✓	1744871	133	42404	0
76	19:04:56.069	Thread Group 1-76	HTTP Request	42829	✓	1744871	133	42374	1
77	19:04:56.169	Thread Group 1-77	HTTP Request	43514	✓	1744871	133	43114	1
78	19:04:56.259	Thread Group 1-78	HTTP Request	44031	✓	1744871	133	43290	1
79	19:04:56.671	Thread Group 1-82	HTTP Request	44633	✓	1744871	133	43828	0
80	19:04:56.771	Thread Group 1-83	HTTP Request	44548	✓	1744871	133	43752	1
81	19:04:56.570	Thread Group 1-81	HTTP Request	44766	✓	1744871	133	44113	1
82	19:04:56.471	Thread Group 1-80	HTTP Request	44892	✓	1744871	133	44093	0
83	19:04:56.360	Thread Group 1-79	HTTP Request	45013	✓	1744871	133	44222	0
84	19:04:56.872	Thread Group 1-84	HTTP Request	44837	✓	1744871	133	44533	0
85	19:04:56.972	Thread Group 1-85	HTTP Request	44769	✓	1744871	133	44480	0
86	19:04:57.061	Thread Group 1-86	HTTP Request	44722	✓	1744871	133	44430	1
87	19:04:57.672	Thread Group 1-92	HTTP Request	44751	✓	1744871	133	44016	0
88	19:04:57.273	Thread Group 1-88	HTTP Request	45248	✓	1744871	133	44535	0
89	19:04:57.461	Thread Group 1-90	HTTP Request	45168	✓	1744871	133	44457	0
90	19:04:57.561	Thread Group 1-91	HTTP Request	45074	✓	1744871	133	44865	0
91	19:04:57.371	Thread Group 1-89	HTTP Request	45311	✓	1744871	133	45110	1
92	19:04:57.881	Thread Group 1-94	HTTP Request	44837	✓	1744871	133	44657	1
93	19:04:57.772	Thread Group 1-93	HTTP Request	44974	✓	1744871	133	44809	0
94	19:04:57.172	Thread Group 1-87	HTTP Request	45578	✓	1744871	133	45426	1
95	19:04:57.972	Thread Group 1-95	HTTP Request	44794	✓	1744871	133	44655	1
96	19:04:58.072	Thread Group 1-96	HTTP Request	44714	✓	1744871	133	44577	1
97	19:04:58.172	Thread Group 1-97	HTTP Request	44674	✓	1744871	133	44591	1
98	19:04:58.262	Thread Group 1-98	HTTP Request	44609	✓	1744871	133	44538	0
99	19:04:58.372	Thread Group 1-99	HTTP Request	44635	✓	1744871	133	44578	0
100	19:04:58.472	Thread Group 1-...	HTTP Request	44538	✓	1744871	133	44490	1

☐ Scroll automatically? ☐ Child samples? No of Samples: 100 Latest Sample: 44538 Average: 31257 Deviation: 11209

## 2. Select Student berhasil sebelum optimasi: Average 4ms

View Results in Table.jmx (C:\Users\MMDC\Downloads\apache-jmeter-4.0\bin\View Results in Table.jmx) - Apache JMeter (4.0 r1823414)

File Edit Search Run Options Help

Test Plan  
Thread Group  
HTTP Request  
View Results in Table  
View Results in Table

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(ms)	Status	Bytes	Sent Bytes	Latency	Connect Time(ms)
74	18:21:57.094	Thread Group 1-74	HTTP Request	9	✓	429	139	9	1
75	18:21:57.752	Thread Group 1-75	HTTP Request	10	✓	429	139	10	2
76	18:21:57.851	Thread Group 1-76	HTTP Request	4	✓	429	139	4	1
77	18:21:57.945	Thread Group 1-77	HTTP Request	4	✓	429	139	4	0
78	18:21:58.053	Thread Group 1-78	HTTP Request	3	✓	429	139	3	1
79	18:21:58.152	Thread Group 1-79	HTTP Request	3	✓	429	139	3	0
80	18:21:58.252	Thread Group 1-80	HTTP Request	3	✓	429	139	3	1
81	18:21:58.353	Thread Group 1-81	HTTP Request	4	✓	429	139	3	1
82	18:21:58.453	Thread Group 1-82	HTTP Request	4	✓	429	139	4	1
83	18:21:58.545	Thread Group 1-83	HTTP Request	3	✓	429	139	3	0
84	18:21:58.645	Thread Group 1-84	HTTP Request	8	✓	429	139	8	2
85	18:21:58.746	Thread Group 1-85	HTTP Request	4	✓	429	139	4	1
86	18:21:58.853	Thread Group 1-86	HTTP Request	3	✓	429	139	3	0
87	18:21:58.952	Thread Group 1-87	HTTP Request	3	✓	429	139	3	1
88	18:21:59.045	Thread Group 1-88	HTTP Request	4	✓	429	139	4	1
89	18:21:59.153	Thread Group 1-89	HTTP Request	7	✓	429	139	7	1
90	18:21:59.255	Thread Group 1-90	HTTP Request	5	✓	429	139	5	0
91	18:21:59.353	Thread Group 1-91	HTTP Request	4	✓	429	139	4	1
92	18:21:59.446	Thread Group 1-92	HTTP Request	5	✓	429	139	4	1
93	18:21:59.546	Thread Group 1-93	HTTP Request	4	✓	429	139	4	1
94	18:21:59.654	Thread Group 1-94	HTTP Request	3	✓	429	139	3	0
95	18:21:59.754	Thread Group 1-95	HTTP Request	5	✓	429	139	5	1
96	18:21:59.854	Thread Group 1-96	HTTP Request	6	✓	429	139	6	1
97	18:21:59.948	Thread Group 1-97	HTTP Request	3	✓	429	139	3	0
98	18:22:00.047	Thread Group 1-98	HTTP Request	5	✓	429	139	5	1
99	18:22:00.154	Thread Group 1-99	HTTP Request	4	✓	429	139	4	1
100	18:22:00.254	Thread Group 1-100	HTTP Request	3	✓	429	139	3	1

☐ Scroll automatically? ☐ Child samples? No of Samples: 100 Latest Sample: 3 Average: 4 Deviation: 2

## Select Student berhasil setelah optimasi: 4ms

View Results in Table.jmx (C:\Users\MMDC\Downloads\apache-jmeter-4.0\bin\View Results in Table.jmx) - Apache JMeter (4.0 r1823414)

File Edit Search Run Options Help

Test Plan  
Thread Group  
HTTP Request  
View Results in Table  
View Results in Table

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(ms)	Status	Bytes	Sent Bytes	Latency	Connect Time(ms)
74	19:02:25.597	Thread Group 1-74	HTTP Request	4	✓	456	139	4	1
75	19:02:25.698	Thread Group 1-75	HTTP Request	4	✓	456	139	4	1
76	19:02:25.788	Thread Group 1-76	HTTP Request	4	✓	456	139	4	1
77	19:02:25.898	Thread Group 1-77	HTTP Request	3	✓	456	139	3	0
78	19:02:25.998	Thread Group 1-78	HTTP Request	4	✓	456	139	4	1
79	19:02:27.099	Thread Group 1-79	HTTP Request	8	✓	456	139	8	1
80	19:02:27.199	Thread Group 1-80	HTTP Request	3	✓	456	139	3	0
81	19:02:27.299	Thread Group 1-81	HTTP Request	3	✓	456	139	3	0
82	19:02:27.399	Thread Group 1-82	HTTP Request	3	✓	456	139	3	0
83	19:02:27.490	Thread Group 1-83	HTTP Request	9	✓	456	139	9	1
84	19:02:27.599	Thread Group 1-84	HTTP Request	6	✓	456	139	6	1
85	19:02:27.700	Thread Group 1-85	HTTP Request	3	✓	456	139	3	0
86	19:02:27.800	Thread Group 1-86	HTTP Request	3	✓	456	139	3	0
87	19:02:27.900	Thread Group 1-87	HTTP Request	4	✓	456	139	3	0
88	19:02:28.001	Thread Group 1-88	HTTP Request	3	✓	456	139	3	1
89	19:02:28.101	Thread Group 1-89	HTTP Request	3	✓	456	139	3	1
90	19:02:28.191	Thread Group 1-90	HTTP Request	3	✓	456	139	3	0
91	19:02:28.291	Thread Group 1-91	HTTP Request	3	✓	456	139	3	0
92	19:02:28.390	Thread Group 1-92	HTTP Request	4	✓	456	139	3	1
93	19:02:28.501	Thread Group 1-93	HTTP Request	3	✓	456	139	3	0
94	19:02:28.600	Thread Group 1-94	HTTP Request	3	✓	456	139	3	0
95	19:02:28.700	Thread Group 1-95	HTTP Request	3	✓	456	139	3	0
96	19:02:28.800	Thread Group 1-96	HTTP Request	7	✓	456	139	7	1
97	19:02:28.900	Thread Group 1-97	HTTP Request	3	✓	456	139	3	1
98	19:02:28.990	Thread Group 1-98	HTTP Request	3	✓	456	139	3	1
99	19:02:29.091	Thread Group 1-99	HTTP Request	3	✓	456	139	3	0
100	19:02:29.200	Thread Group 1-100	HTTP Request	4	✓	456	139	4	1

☐ Scroll automatically? ☐ Child samples? No of Samples: 100 Latest Sample: 4 Average: 4 Deviation: 1

### 3. Select Student gagal sebelum optimasi: Average 4ms

View Results in Table.jmx (C:\Users\MMDC\Downloads\apache-jmeter-4.0\bin\View Results in Table.jmx) - Apache JMeter (4.0 r1823414)

File Edit Search Run Options Help

Test Plan  
Thread Group  
HTTP Request  
View Results in Table  
View Results in Table  
View Results in Table

Name: View Results in Table

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(ms)
74	18:23:24.497	Thread Group 1-74	HTTP Request	2	Success	340	139	4	0
75	18:23:24.521	Thread Group 1-75	HTTP Request	2	Success	340	139	2	0
76	18:23:24.621	Thread Group 1-76	HTTP Request	6	Success	340	139	6	1
77	18:23:24.721	Thread Group 1-77	HTTP Request	6	Success	340	139	6	1
78	18:23:24.821	Thread Group 1-78	HTTP Request	3	Success	340	139	3	1
79	18:23:24.907	Thread Group 1-79	HTTP Request	3	Success	340	139	3	1
80	18:23:25.006	Thread Group 1-80	HTTP Request	3	Success	340	139	3	1
81	18:23:25.123	Thread Group 1-81	HTTP Request	7	Success	340	139	7	1
82	18:23:25.221	Thread Group 1-82	HTTP Request	3	Success	340	139	3	1
83	18:23:25.322	Thread Group 1-83	HTTP Request	2	Success	340	139	2	0
84	18:23:25.422	Thread Group 1-84	HTTP Request	6	Success	340	139	6	1
85	18:23:25.523	Thread Group 1-85	HTTP Request	7	Success	340	139	7	2
86	18:23:25.608	Thread Group 1-86	HTTP Request	6	Success	340	139	6	2
87	18:23:25.708	Thread Group 1-87	HTTP Request	3	Success	340	139	3	1
88	18:23:25.823	Thread Group 1-88	HTTP Request	2	Success	340	139	2	0
89	18:23:25.923	Thread Group 1-89	HTTP Request	7	Success	340	139	7	2
90	18:23:26.024	Thread Group 1-90	HTTP Request	6	Success	340	139	6	3
91	18:23:26.123	Thread Group 1-91	HTTP Request	2	Success	340	139	2	0
92	18:23:26.223	Thread Group 1-92	HTTP Request	3	Success	340	139	3	1
93	18:23:26.323	Thread Group 1-93	HTTP Request	3	Success	340	139	3	1
94	18:23:26.409	Thread Group 1-94	HTTP Request	3	Success	340	139	3	0
95	18:23:26.524	Thread Group 1-95	HTTP Request	2	Success	340	139	2	0
96	18:23:26.625	Thread Group 1-96	HTTP Request	8	Success	340	139	8	1
97	18:23:26.724	Thread Group 1-97	HTTP Request	4	Success	340	139	4	1
98	18:23:26.809	Thread Group 1-98	HTTP Request	2	Success	340	139	2	0
99	18:23:26.925	Thread Group 1-99	HTTP Request	2	Success	340	139	2	0
100	18:23:27.024	Thread Group 1-100	HTTP Request	3	Success	340	139	3	1

☐ Scroll automatically? ☐ Child samples? No of Samples 100 Latest Sample 3 Average 4 Deviation 2

### Select Student gagal setelah optimasi: Average 3ms

View Results in Table.jmx (C:\Users\MMDC\Downloads\apache-jmeter-4.0\bin\View Results in Table.jmx) - Apache JMeter (4.0 r1823414)

File Edit Search Run Options Help

Test Plan  
Thread Group  
HTTP Request  
View Results in Table  
View Results in Table  
View Results in Table  
Generate Summary Results  
View Results in Table

Name: View Results in Table

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(ms)
74	18:43:31.722	Thread Group 1-74	HTTP Request	3	Success	340	139	3	1
75	18:43:31.822	Thread Group 1-75	HTTP Request	4	Success	340	139	3	1
76	18:43:31.922	Thread Group 1-76	HTTP Request	2	Success	340	139	2	0
77	18:43:32.008	Thread Group 1-77	HTTP Request	3	Success	340	139	3	1
78	18:43:32.122	Thread Group 1-78	HTTP Request	6	Success	340	139	6	1
79	18:43:32.221	Thread Group 1-79	HTTP Request	3	Success	340	139	3	1
80	18:43:32.322	Thread Group 1-80	HTTP Request	3	Success	340	139	3	0
81	18:43:32.410	Thread Group 1-81	HTTP Request	3	Success	340	139	3	0
82	18:43:32.522	Thread Group 1-82	HTTP Request	2	Success	340	139	2	0
83	18:43:32.622	Thread Group 1-83	HTTP Request	2	Success	340	139	2	0
84	18:43:32.723	Thread Group 1-84	HTTP Request	7	Success	340	139	6	2
85	18:43:32.810	Thread Group 1-85	HTTP Request	5	Success	340	139	5	1
86	18:43:32.923	Thread Group 1-86	HTTP Request	3	Success	340	139	3	1
87	18:43:33.023	Thread Group 1-87	HTTP Request	2	Success	340	139	2	1
88	18:43:33.110	Thread Group 1-88	HTTP Request	3	Success	340	139	3	1
89	18:43:33.223	Thread Group 1-89	HTTP Request	6	Success	340	139	6	1
90	18:43:33.324	Thread Group 1-90	HTTP Request	12	Success	340	139	12	1
91	18:43:33.424	Thread Group 1-91	HTTP Request	3	Success	340	139	3	1
92	18:43:33.512	Thread Group 1-92	HTTP Request	3	Success	340	139	3	1
93	18:43:33.623	Thread Group 1-93	HTTP Request	3	Success	340	139	3	0
94	18:43:33.723	Thread Group 1-94	HTTP Request	2	Success	340	139	2	0
95	18:43:33.824	Thread Group 1-95	HTTP Request	3	Success	340	139	3	1
96	18:43:33.924	Thread Group 1-96	HTTP Request	2	Success	340	139	2	0
97	18:43:34.024	Thread Group 1-97	HTTP Request	3	Success	340	139	3	1
98	18:43:34.124	Thread Group 1-98	HTTP Request	3	Success	340	139	3	1
99	18:43:34.224	Thread Group 1-99	HTTP Request	3	Success	340	139	3	1
100	18:43:34.324	Thread Group 1-100	HTTP Request	3	Success	340	139	3	1

☐ Scroll automatically? ☐ Child samples? No of Samples 100 Latest Sample 3 Average 3 Deviation 2

Optimasi yang dilakukan adalah dengan menambahkan unique dan indexing pada atribut npm (sql update akan dilampirkan)

## Ringkasan Materi Tutorial 6 APAP

1. Pada tutorial ini mempelajari mengenai unit testing yakni melakukan testing pada program yang telah kita buat berdasarkan fungsi atau method. Untuk mengetahui apakah sesuai dengan output yang diharapkan. Untuk unit testing ini menggunakan JUnit dan Mockito.
2. Di unit testing saya belajar menggunakan @Mock yang berguna untuk membuat dummy guna manipulasi agar test sesuai dengan yang kita inginkan. @Before untuk persiapan sebelum testing. Dan ada 3 tahapann utama yakni Given, When dan Then seperti yang sudah jelaskan pada bagian Latihan Unit Testing.
3. Kemudian pada tutorial ini dipelajari load testing untuk mengetahui performa dari system yang dibangun serta respon dari system ketika suatu request dijalankan. Load testing menggunakan Apache JMeter. Parameter yang perlu diperhatikan dalam load testing adalah number of threads, ramp-up period, loop count dan sample time.
4. Untuk mendapatkan sample time yang lebih optimal maka kita perlu melakukan optimasi dapat dari web, query maupun basis data. Pada bagian ini tutorial sebelumnya sudah memiliki kinerja yang optimal, yang saya tambahkan hanya penambahan unique dan indexing pada primary key. Dan terbukti memiliki average sample time yang lebih kecil pada request selectStudentAll dan selectStudent yang gagal, dan tidak ada perubahan di selectStudent yang berhasil.