

Loeng 5

Silumine

Kordamine

- Mis on JDBC mõte?

Batch operations

```
String query = "insert into person values (?, ?)";

try (PreparedStatement ps = conn.prepareStatement(query)) {
    for (int i = 1; i <= 300; i++) {
        ps.setLong(1, i);
        ps.setString(2, "John");
        ps.execute();
    }
}
```

kohalik: 0,3 sek
võrgus: 19 sek

Batch operations

```
String query = "insert into person values (?, ?)";

try (PreparedStatement ps = conn.prepareStatement(query)) {

    conn.setAutoCommit(false);

    for (int i = 1; i <= 300; i++) {
        ps.setLong(1, i);
        ps.setString(2, "John");
        ps.execute();
    }

    conn.commit();
}
```

kohalik: 0,04 sek
võrgus: 17 sek

Batch operations

```
String query = "insert into person values (?, ?)";

try (PreparedStatement ps = conn.prepareStatement(query)) {

    conn.setAutoCommit(false);

    for (int i = 1; i <= 300; i++) {
        ps.setLong(1, i);
        ps.setString(2, "John");
        ps.addBatch();
    }

    ps.executeBatch();

    conn.commit();
}
```

kohalik: 0,02 sek
võrgus: 0,3 sek

Vea otsimine

```
Mixer mixer = new Mixer();
```

```
mixer.add(new Orange());  
mixer.add(new Apple());  
mixer.add(new Plum());  
mixer.add(new Strawberry());  
mixer.add(new Cranberry());  
mixer.add(new Pear());  
mixer.add(new Cherry());  
mixer.add(new Banana());
```

```
mixer.mix(); // exception
```

Vea otsimine

- Viga on suure tõenäosusega asjas, mida viimati muutsite

... “No, seda see küll ei mõjuta” ... „Ah, nii hoopis”

Print lause

```
private void method1() {  
    int x = 3;  
  
    // ...  
    System.out.println(x);  
  
    if (x > 5 && y > 5 && ...) {  
        method2();  
    }  
  
    for (int i = 0; i < 10; i++) {  
        x += getSth();  
        System.out.println(x);  
    }  
}  
  
private void method2() {  
    System.out.println("here");  
}
```


Stack trace

```
java.lang.NullPointerException
  at java.io.Reader.<init>(Reader.java:78)
  at java.io.InputStreamReader.<init>(InputStreamReader.java:72)
  at util.FileUtil.readFileFromClasspath(FileUtil.java:13)
  at hw3.StartupListener.contextInitialized(StartupListener.java:22)
  at org.apache.catalina.core.StandardContext.listenerStart(StandardContext.java:4939)
  at org.apache.catalina.core.StandardContext.startInternal(StandardContext.java:5434)
  at org.apache.catalina.util.LifecycleBase.start(LifecycleBase.java:150)
  at org.apache.catalina.core.ContainerBase$StartChild.call(ContainerBase.java:1559)
  at org.apache.catalina.core.ContainerBase$StartChild.call(ContainerBase.java:1549)
  at java.util.concurrent.FutureTask.run(FutureTask.java:266)
  at java.util.concurrent.ThreadPoolExecutor.runWorker(ThreadPoolExecutor.java:1142)
  at java.util.concurrent.ThreadPoolExecutor$Worker.run(ThreadPoolExecutor.java:617)
  at java.lang.Thread.run(Thread.java:748)
```

Oct 04, 2017 3:43:49 PM org.apache.catalina.core.StandardContext startInternal

SEVERE: Error listenerStart

Oct 04, 2017 3:43:49 PM org.apache.catalina.core.StandardContext startInternal

```
11. try (InputStream is = Thread.currentThread().getContextClassLoader()
12.     .getResourceAsStream(pathOnClasspath);
13.     BufferedReader r = new BufferedReader(new InputStreamReader(is))) {
```

NullPointerException

```
if (isComplete) {  
    // ...  
}
```

NullPointerException

```
Boolean isComplete = null;
```

```
...
```

```
if (isComplete) {  
    // ...  
}
```

AutoBoxing

```
Integer x = 1;
```

```
int y = x;
```

AutoBoxing

```
Boolean isComplete = false;
```

NullPointerException

```
preparedStatement.setInt(1, age);
```

```
void setLong(int parameterIndex, int x) throws SQLException;
```

Stack trace

Error creating bean with name 'entityManagerFactory' defined in ServletContext resource

[/WEB-INF/datasource-tx-jpa.xml]: Invocation of init method failed;
nested exception is java.lang.NullPointerException

....

java.lang.NullPointerException
at org.hibernate.mapping.Constraint\$ColumnComparator.compare([Constraint.java:134](#))

```
@Entity
```

```
@Table(uniqueConstraints = {  
    @UniqueConstraint(columnNames={  
        "unit_id", "channel_type", "channel_value"})  
})
```

```
public class Channel { ...
```

Demo: IDEA debugger

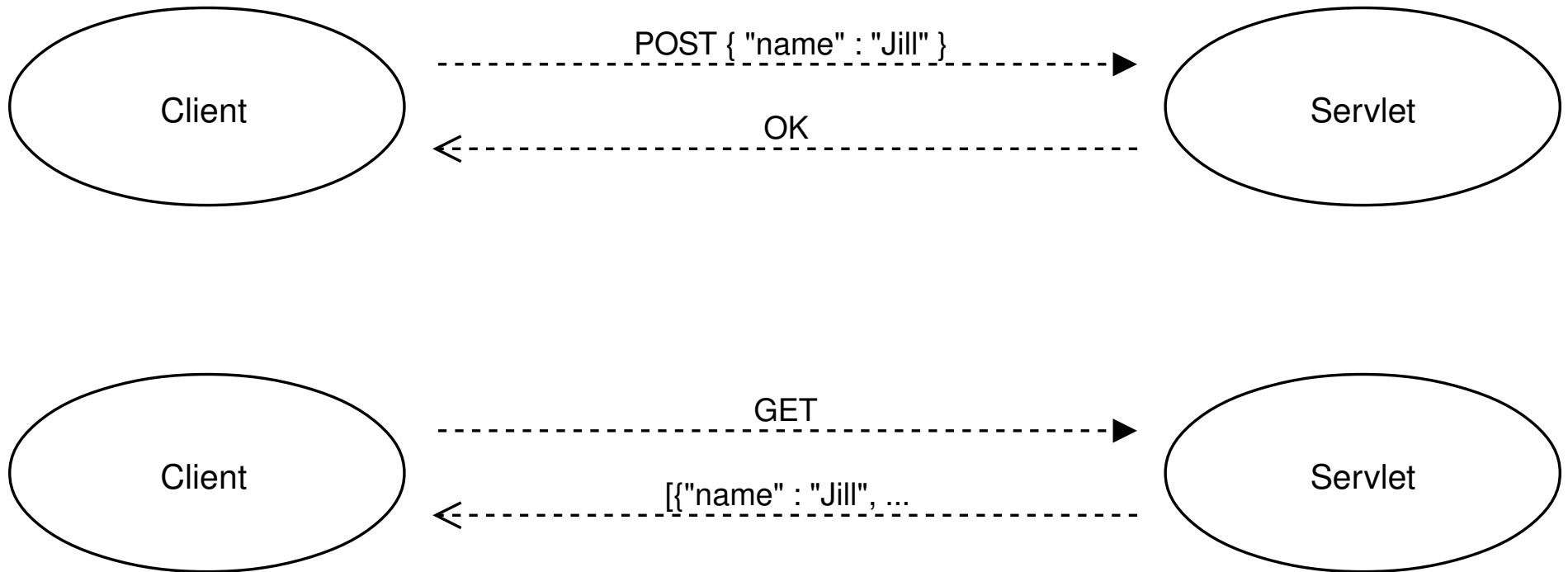
Loogiline arutlus

- Kui ise peaks sellise tegema
- Kas kõik vajalik on olemas, et asi töötada saaks?

Loogiline arutlus

```
7 public class PersonDao {
8
9     public static String URL = "jdbc:hsqldb:mem:db1";
10    //public static String URL = "jdbc:hsqldb:file:${user.home}/data/jdbc/db;shutdown=true";
11
12    public Person insertPerson(Person person) {
13
14        String sql = "insert into person (id, name, age)" +
15            "values (next value for seq1, ?, ?)";
16
17        try {Connection conn = DriverManager.getConnection(URL);
18            PreparedStatement ps = conn.prepareStatement(sql, new String[] {"id"}) {
19
20                ps.setString( parameterIndex: 1, person.getName());
21                ps.setInt( parameterIndex: 2, person.getAge());
22
23                ps.executeUpdate();
24
25                ResultSet rs = ps.getGeneratedKeys();
26
27                rs.next();
28
29                return new Person(rs.getLong( columnLabel: "id"), person.getName(), person.getAge());
30
31            }
32        } catch (SQLException e) {
33            throw new RuntimeException(e);
34        }
```

Probleemi graafiline kujutamine



Kõik on õige aga ei tööta

- Kõik on õige aga ...

vs.

- Kõik tundub õige olevat aga ...

“Anomaaliad”

- Taanduda niipalju tagasi, et aru saab, mis toimub

Enne töötas

- Leida üles koht, millal asi töötamast lakkas
- IDEA: Git -> Show History
- IDEA: Local History -> Show History

“Anomaaliad”

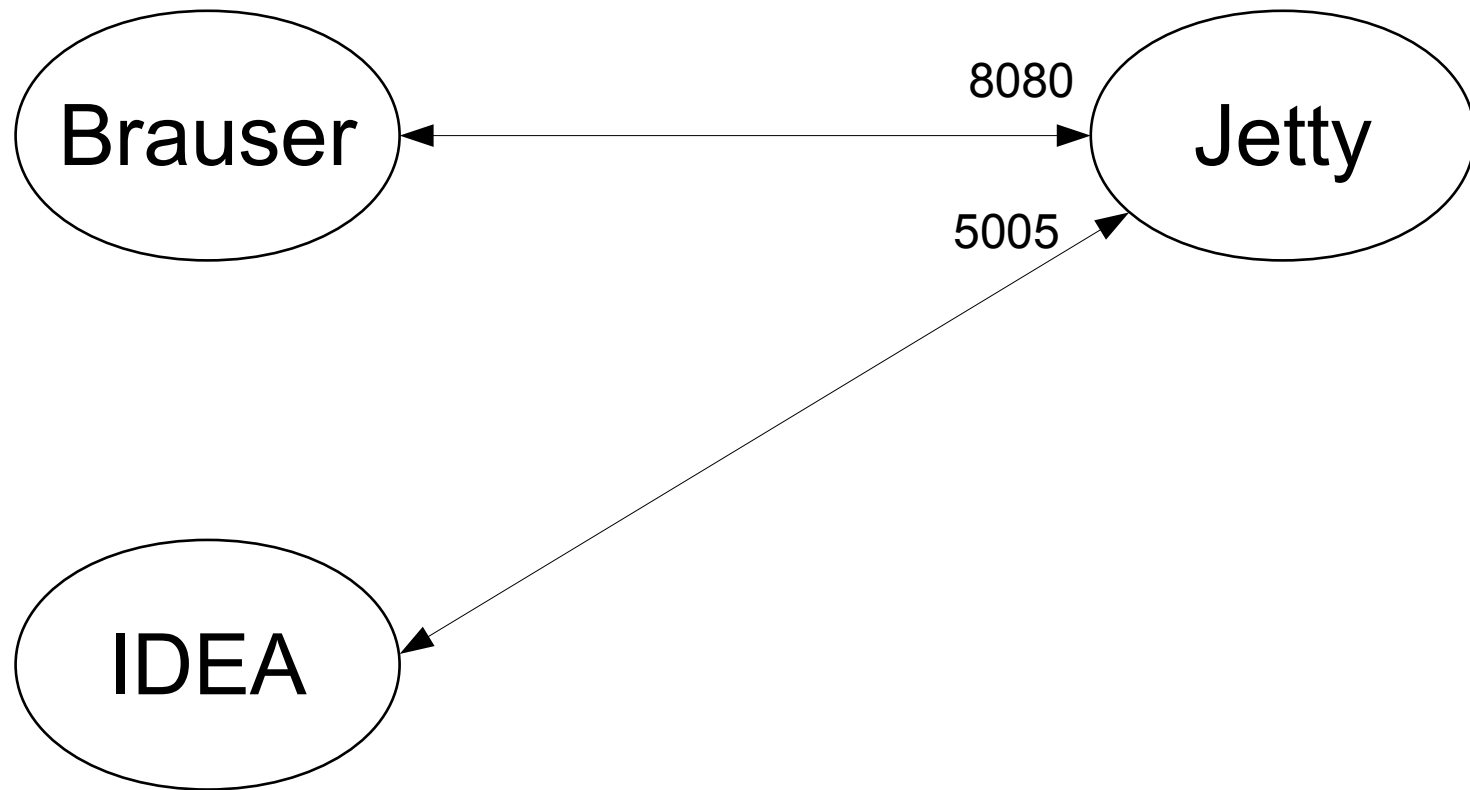
- Enne töötas
- Oodatav tulemus teisel põhjusel

IDEA debugger (remote)

IDEA debugger (remote)



IDEA debugger (remote)



Debugger

- Enda kirjutatud koodi jaoks ei tohiks seda vaja minna.

Debugger (alternatiiv)

- Moodultestid (Unit Tests)
- Koodi jagamine osadeks (koodi disain)
- Arendada programmi osad eraldi tükkidena
- Liikumine väikeste sammudega

Debugger (alternatiiv)

- Probleemi lihtsustamine

2020-10-01T22:00:00.000+03:00 kuni 2020-10-01T23:00:00.000+03:00

vs.

2 - 3

Java assert meetod

```
assert(age >= 0);
```

```
assert(objectInvariantsOK());
```

```
java -ea ...
```

Invariant

```
private int[] stack = new int[100];
```

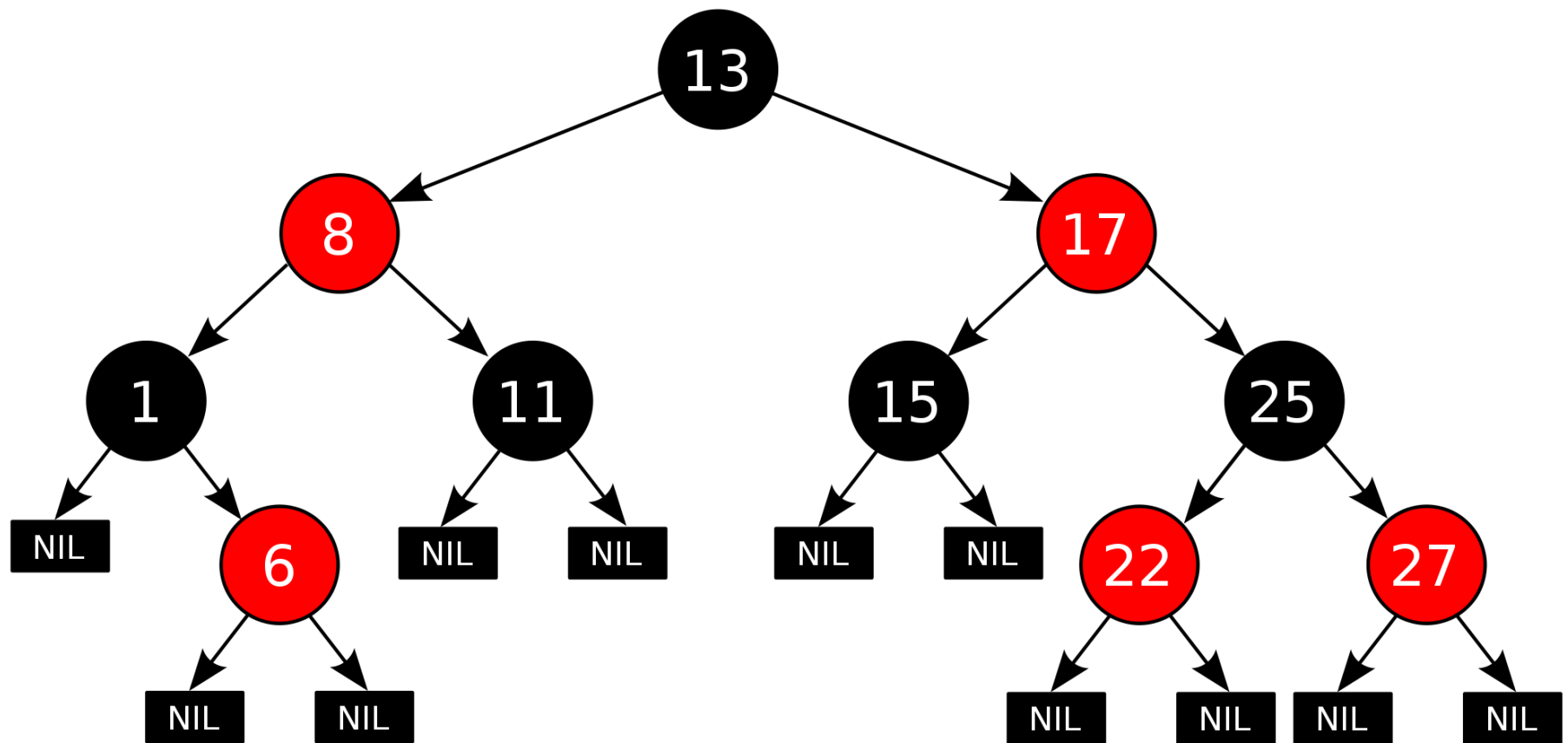
```
private int size = 0;
```

```
public void push(int element) {  
    stack[size] = element;
```

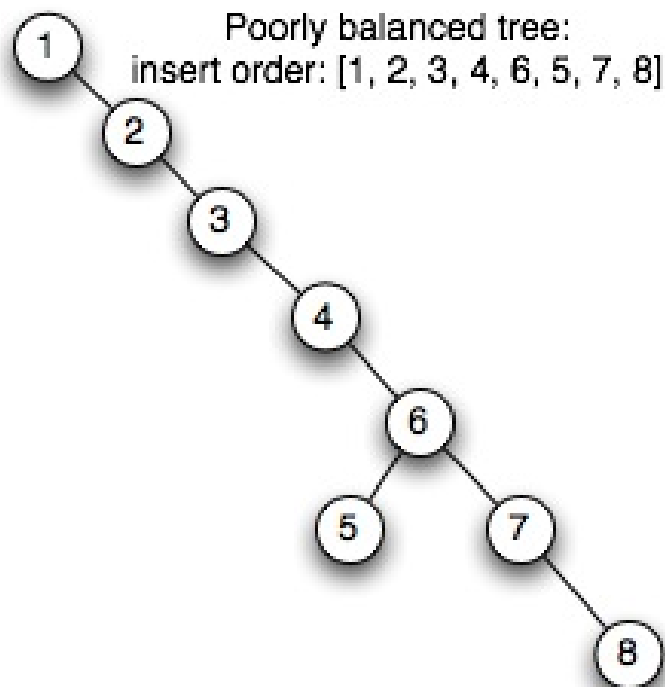
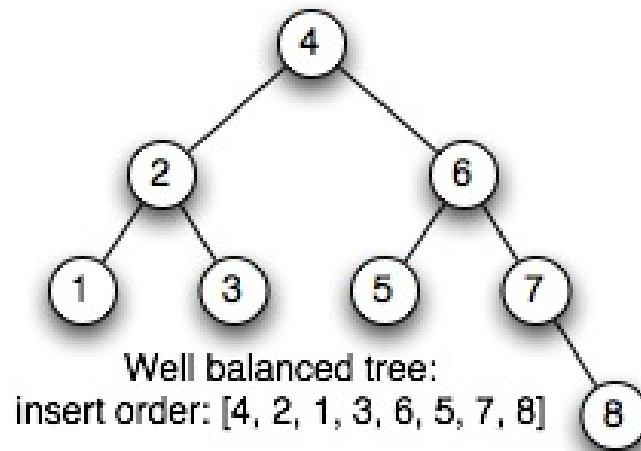
```
    size = size + 1;  
}
```

```
public int getSize() {  
    return size;  
}
```

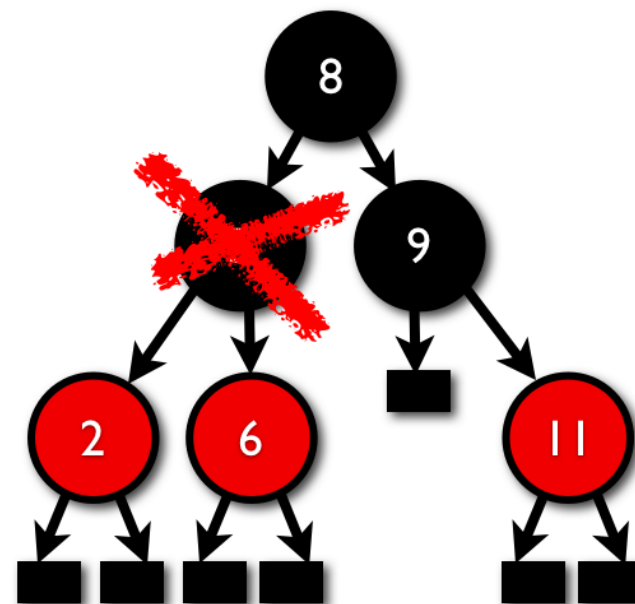
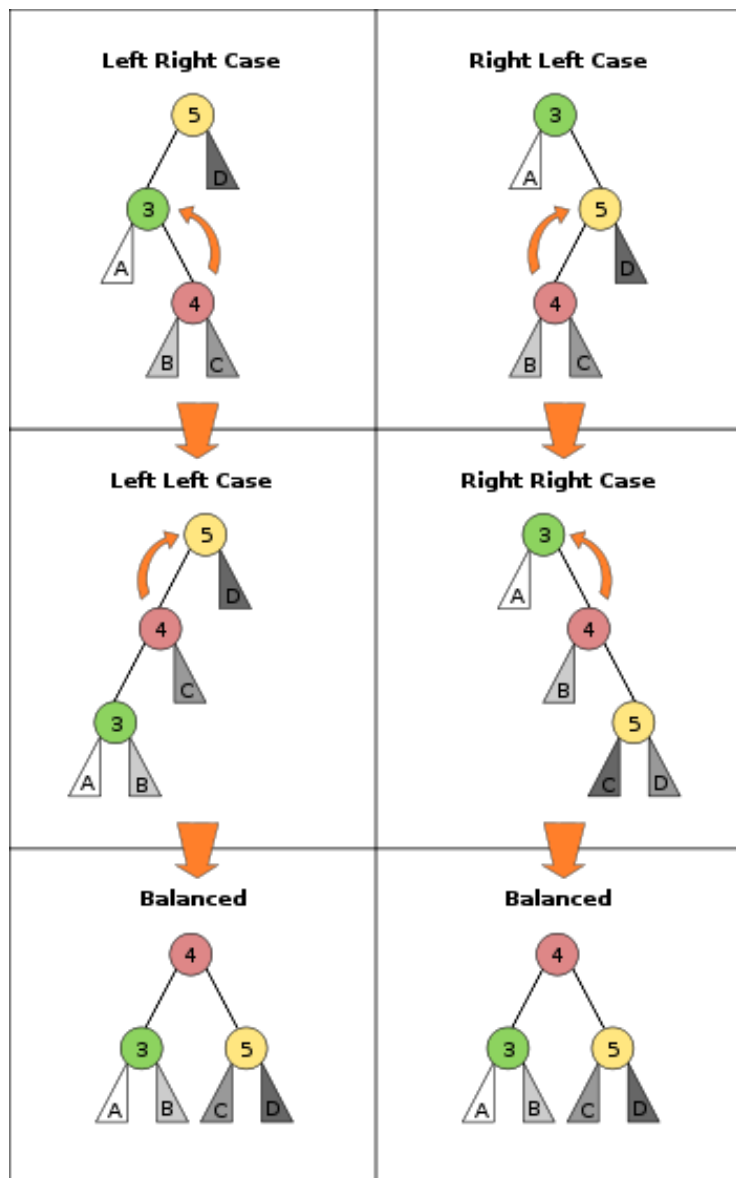
Puna-must puu



Puna-must puu



Puna-must puu



assert

- Näidata viga võimalikult vara ja võimalikult ramedalt
- Veateade on parem, kui rikutud andmed

Vigade ignoreerimine

```
try {  
    dao.save(...);  
} catch (Exception e) {  
    e.printStackTrace();  
}
```

Logimine

Parameetrite logimine

```
public void transferMoney(int amount,  
                           String fromAccount,  
                           String toAccount) {  
  
    log("amount: " + amount +  
        " from: " + fromAccount ...);  
  
    ...  
  
}
```

Logimise raamistikud

<https://logging.apache.org/log4j/2.x/>

Log4j2

```
package logging;

import org.apache.logging.log4j.LogManager;
import org.apache.logging.log4j.Logger;

public class Log4J2Example {
    private static Logger logger = LogManager.getLogger();

    public static void main(String[] args) {
        logger.debug("Debug message");
        logger.info("Info message");
        logger.warn("Warn message");
        logger.error("Error message");
        logger.fatal("Fatal message");
    }
}
```


Konfiguratsioon (log4j2.xml)

```
<?xml version="1.0" encoding="UTF-8"?>
<Configuration>
  <Appenders>
    <Console name="Console" target="SYSTEM_OUT">
      <PatternLayout
        pattern="%d{HH:mm:ss} %-5level %c{5} %msg%n"/>
    </Console>
  </Appenders>
  <Loggers>
    <Root level="WARN">
      <!--DEBUG, INFO, WARN, ERROR, FATAL-->
      <AppenderRef ref="Console"/>
    </Root>
  </Loggers>
</Configuration>
```

Log4j2

```
10:13:21 WARN    logging.Log4J2Example Warn message
10:13:21 ERROR   logging.Log4J2Example Error message
10:13:21 FATAL   logging.Log4J2Example Fatal message
```

Konfiguratsioon (log4j2.xml)

```
<Loggers>
  <Root level="WARN">
    <!--DEBUG, INFO, WARN, ERROR, FATAL-->
    <AppenderRef ref="Console"/>
  </Root>

  <Logger name="mypackage.MyClass"
    level="DEBUG"
    additivity="false">

    <AppenderRef ref="Console"/>
  </Logger>
</Loggers>
```

Parameetrite logimine

```
public void transferMoney(Integer amount,  
                           String fromAccount,  
                           String toAccount) {  
  
    logger.debug("amount: " + amount +  
                " from: " + fromAccount ...);  
  
    ...  
  
}
```

Parameetrite logimine (AOP)

- AspectJ
- Spring

Logifailide analüüs

The screenshot displays the Datadog Log Explorer interface. On the left, the 'Log Explorer' tab is active, showing a search bar with 'Source: nginx' and a list of filters. The 'Source' filter is set to 'nginx' with 9.5K results. The 'Service' filter is set to 'coffee-house' with 5.86K results. The 'Status' filter is set to 'Error' with 1.17K results. The 'Host' filter is set to 'fse-ldmx-f7-18' with 9,500 results found. A bar chart shows the distribution of log levels over time. The main panel displays a list of log entries, with the selected entry highlighted in pink. The selected log entry is from the host 'fse-ldmx-f7-18' at 'Feb 22 10:31:30.000' and contains the message '127.0.0.1 -- [22/Feb/2018:15:31:30 +0000] "GET /order/6486 HTTP/1.1" 404 178 "curl/7.47.0"'. The right panel shows the detailed view of this log entry, including the message, attributes, and tags. The message is '127.0.0.1 -- [22/Feb/2018:15:31:30 +0000] "GET /order/6486 HTTP/1.1" 404 178 "curl/7.47.0"'. The attributes include 'http' with 'status_code' 404, 'url_details' with 'path' '/order/6486', 'method' 'GET', 'useragent' 'curl/7.47.0', 'version' '1.1', 'url' '/order/6486', and 'referer' '-'. The tags include '#source:nginx', '#sourcecategory:http_web_access', '#env:staging', '#account:demo3', '#availability-zone:us-east-1e', '#aws_account:172597598159', '#cloud_provider:aws', '#creator:anuj', '#image:ami-80861296', and '#instance-type:t2.medium'.

Log Explorer Pipelines

Source: nginx x

Source

- ☒ nginx 9.5K
- ☐ aws -
- ☐ postgresql -
- ☐ mongodb -
- ☐ apache -
- ☐ host_auth -
- ☐ cloudfront -

Host

- ☒ fse-ldmx-f7-18 9,500

Service

- ☒ coffee-house 5.86K
- ☒ mculty-query 74

Status

- ☒ Error 1.17K
- ☒ Warn 0
- ☒ Info 8.33K

AWS

WEB ACCESS

URL Path

Request ID

User Agent

INFO Feb 22, 2018 at 10:31:30.000 (a few seconds ago)

HOST fse-ldmx-f7-18

SERVICE coffee-house

SOURCE nginx

TAGS

- #source:nginx
- #sourcecategory:http_web_access
- #env:staging
- #account:demo3
- #availability-zone:us-east-1e
- #aws_account:172597598159
- #cloud_provider:aws
- #creator:anuj
- #image:ami-80861296
- #instance-type:t2.medium

MESSAGE

127.0.0.1 -- [22/Feb/2018:15:31:30 +0000] "GET /order/6486 HTTP/1.1" 404 178 "curl/7.47.0"

ATTRIBUTES

```
{
  "http": {
    "status_code": 404,
    "url_details": {
      "path": "/order/6486"
    },
    "method": "GET",
    "useragent": "curl/7.47.0",
    "version": "1.1",
    "url": "/order/6486",
    "referer": "-"
  },
  "useragent_details": {
    "os": {
      "family": "Other"
    },
    "browser": {
      "patch": 0,
      "minor": 47
    }
  }
}
```

Use [↑][↓] to see the previous/next log.

Chat with us!

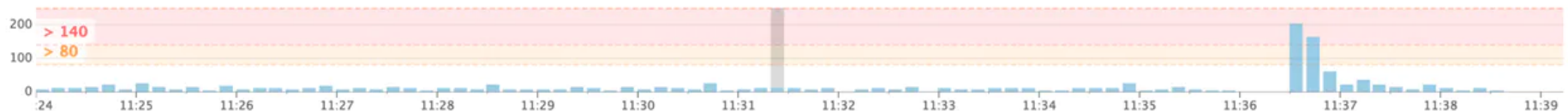
Logifailide analüüs

Query error

Edit

Status

Edit Monitor / Logs



```
Feb 02 11:38:30.203 | i-0f3cb91d84d4f133c | logs-backend > requestId={requestId:K0qMF5a6TumuFWSXp6tSTg, nodeId:U0GTQbmR1aw6D4ys0_QRmg} queryType=list on scope
Feb 02 11:38:30.203 | i-0f3cb91d84d4f133c | logs-backend > Failure detected for requestId=K0qMF5a6TumuFWSXp6tSTg. error.code=INTERNAL error.message=Meta failure: N...
Feb 02 11:38:30.203 | i-0f3cb91d84d4f133c | logs-backend > requestId={requestId:K0qMF5a6TumuFWSXp6tSTg, nodeId:U0GTQbmR1aw6D4ys0_QRmg} queryType=list on scope
Feb 02 11:38:30.203 | i-0f3cb91d84d4f133c | logs-backend > Failure detected for requestId=K0qMF5a6TumuFWSXp6tSTg. error.code=INTERNAL error.message=Meta failure: N...
Feb 02 11:38:27.377 | i-0939c5e47821db061 | logs-backend > requestId={requestId:d6me1VCfR8axCb-YKE0s-w, nodeId:an_9WYkmAzPMTpB2G6uZKg} queryType=list on scope
Feb 02 11:38:27.377 | i-0939c5e47821db061 | logs-backend > Failure detected for requestId=d6me1VCfR8axCb-YKE0s-w. error.code=INTERNAL error.message=Meta failure: N...
Feb 02 11:38:24.261 | i-0814e713c112ffeb4 | logs-backend > requestId={requestId:bte94pNyT_2K6jiD9gfY6Q, nodeId:IAlesld0KK9sUyH9-rHaig} queryType=list on scope
```

1 Define the search query

sheepdog

2 Set alert conditions

Trigger when the metric is the threshold during the last

Alert threshold:

Warning threshold:

Logifailide analüüs

```
<appender name="gelf"  
    class="biz.paluch.logging.gelf.log4j.GelfLogAppender">  
  
    <param name="Threshold" value="INFO" />  
    <param name="Host" value="udp:localhost" />  
    <param name="Port" value="12201" />  
    <param name="ExtractStackTrace" value="true" />  
    <param name="FilterStackTrace" value="true" />  
    <param name="TimestampPattern" value="yyyy-MM-dd HH:mm:ss,SSS" />  
    <param name="MaximumMessageSize" value="8192" />  
  
    ...
```


Demo: IDEA debugger (vol 2)

Staatiline analüüs

Staatiline analüüs

- Kompilaator
- FindBugs
- PMD
- jne

```
private void name(String name) {  
    name = name;  
  
    Object o = name;  
  
    Integer b = (Integer) o;  
  
    field2.equals("");  
  
    switch (1) {  
        case 1:  
            name = "a";  
        case 2:  
            name = "b";  
    }  
  
    if (name == field2) {  
        System.out.println("equal");  
    }  
}
```

```

public void name(String name) {
    name = name;

    Object o = name;

    Integer b = (Integer) o;

    field2.equals("");

    switch (1) {
        case 1:
            name = "a";
        case 2:
            name = "b";
    }

    if (name == field2) {
        System.out.println("equal");
    }
}

```

PMD

PMD

- ▶ ▼ PMD Results (5 violations in 1 scanned file using 1 rule set)
 - ✕ ▼ errorprone (5 violations)
 - CompareObjectsWithEquals: Use equals() to compare object references. (1 violation)
 - ▼ BeanMembersShouldSerialize: Found non-transient, non-static member. Please mark as transient or provide accessors.
 - ⚠ (6, 12) Test in jdbc2
 - ▼ DataflowAnomalyAnalysis: Found "{0}"-anomaly for variable "{1}" (lines "{2}"-"{3}"). (1 violation)
 - ℹ (13, 17) Test.name() in jdbc2
 - ▼ MissingBreakInSwitch: A switch statement does not contain a break (1 violation)
 - ⚠ (17, 9) Test.name() in jdbc2
 - ▼ IdempotentOperations: Avoid idempotent operations (like assigning a variable to itself). (1 violation)
 - ⚠ (9, 9) Test.name() in jdbc2

Delta silumine

Delta silumine

A	B	C	C	D	E	F	G
---	---	---	---	---	---	---	---

Delta silumine

A	B	C	C	D	E	F	G
---	---	---	---	---	---	---	---

A	B	C	C
---	---	---	---

D	E	F	G
---	---	---	---

A	B	C	C
---	---	---	---

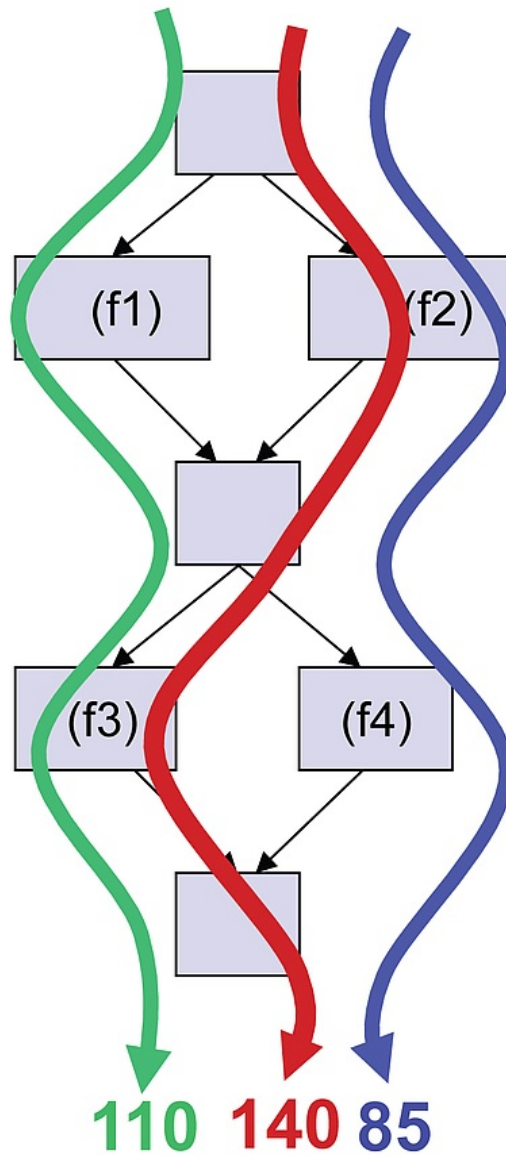
C	C
---	---

Teekonna analüüs

```
private int compute(String input) {  
    int b = 1, a = 1;  
  
    // palju koodi  
  
    if (matchesSomeCriteria(input)) {  
        // muudab a nulliks  
    }  
  
    // palju koodi  
  
    return b / a;  
}
```

Mis on teekond koodis?

Teekonna analüüs



Delta silumine + teekonna analüüs