

Oppimispäiväkirja  
Ohjelmoinnin syventävät tekniikat

Antti Venetjoki

OPPIMISPÄIVÄKIRJA

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# Tehtävä 1

import java.util.Random;

public class generate\_random {

public static void main(String[] args) {

Random rand = new Random();

int rand\_int = rand.nextInt(99) + 1;

System.out.printf("Luku, jota ajattelen on " + rand\_int + '\n');

}

}

# Tehtävä 2

import java.util.Scanner;

import java.util.Random;

public class guess\_random {

static int guess() {

Scanner scan = new Scanner(System.in);

System.out.println("Enter a guess (1 - 100): ");

return scan.nextInt();

}

public static void main(String[] args) {

Random rand = new Random();

int correct = rand.nextInt(99) + 1;

for (int i = 0; i < 7; i++) {

int guess = guess();

if (guess == correct) {

System.out.println("You guessed correctly!");

return;

}

}

System.out.println("You ran out of attempts.");

System.out.println("Correct answer was " + correct);

return;

}

}

# Tehtävä 3

## TimeOnly.java

public class TimeOnly {

private int hour;

private int minute;

private int second;

public TimeOnly(int hour, int minute, int second) {

setHour(hour);

setMinute(minute);

setSecond(second);

}

public int getHour() {

return hour;

}

public void setHour(int hour) {

if (hour < 0 || hour > 23) {

throw new IllegalArgumentException("Hour must be 0...23");

}

this.hour = hour;

}

public int getMinute() {

return minute;

}

public void setMinute(int minute) {

if (minute < 0 || minute > 59) {

throw new IllegalArgumentException("Minute must be 0...59");

}

this.minute = minute;

}

public int getSecond() {

return second;

}

public void setSecond(int second) {

if (second < 0 || second > 59) {

throw new IllegalArgumentException("Second must be 0...59");

}

this.second = second;

}

@Override

public String toString() {

return String.format("%02d:%02d:%02d", this.hour, this.minute, this.second);

}

}

## TestTimeOnly.java

public class TestTimeOnly {

public static void main(String[] args) {

TimeOnly time = new TimeOnly(12, 34, 50);

try {

time.setSecond(65);

} catch (IllegalArgumentException iae) {

System.out.println("Problem with TimeOnly: " + iae.getMessage());

}

System.out.println(time);

}

}

# Tehtävä 4

## TimeOnly.java

public class TimeOnly {

private int hour;

private int minute;

private int second;

public TimeOnly(int hour, int minute, int second) {

setHour(hour);

setMinute(minute);

setSecond(second);

}

public int getHour() {

return hour;

}

public void setHour(int hour) {

if (hour < 0 || hour > 23) {

throw new IllegalArgumentException("Hour must be 0...23");

}

this.hour = hour;

}

public int getMinute() {

return minute;

}

public void setMinute(int minute) {

if (minute < 0 || minute > 59) {

throw new IllegalArgumentException("Minute must be 0...59");

}

this.minute = minute;

}

public int getSecond() {

return second;

}

public void setSecond(int second) {

if (second < 0 || second > 59) {

throw new IllegalArgumentException("Second must be 0...59");

}

this.second = second;

}

@Override

public String toString() {

return String.format("%02d:%02d:%02d", this.hour, this.minute, this.second);

}

}

## DateOnly.java

public class DateOnly {

private int year;

private int month;

private int day;

public DateOnly(int year, int month, int day) {

setYear(year);

setMonth(month);

setDay(day);

}

private boolean isLeapYear() {

return ((this.year % 4 == 0) && !(this.year % 100 == 0 && this.year % 400 != 0));

}

private boolean invalidYear(int year) {

return (year < 1900 || year > 2100);

}

private boolean invalidMonth(int month) {

return (month < 1 || month > 12);

}

private boolean invalidDay(int day) {

if (day < 1 || day > 31) {

return true;

}

switch (this.month) {

case 2:

if (isLeapYear()) {

return day > 29;

} else {

return day > 28;

}

case 4:

case 6:

case 9:

case 11:

return > 30;

default:

return false;

}

}

public int getYear() {

return year;

}

public void setYear(int year) {

if (invalidYear(year)) {

throw new IllegalArgumentException("Year must be 1900...2100");

}

this.year = year;

}

public int getMonth() {

return month;

}

public void setMonth(int month) {

if (invalidMonth(month)) {

throw new IllegalArgumentException("Month must be 1...12");

}

this.month = month;

}

public int getDay() {

return day;

}

public void setDay(int day) {

if (invalidDay(day)) {

throw new IllegalArgumentException("Day must be between 1 and 31");

}

this.day = day;

}

@Override

public String toString() {

return String.format("%04d-%02d-%02d", this.year, this.month, this.day);

}

}

## Timestamp.java

import java.time.LocalDateTime;

import java.time.format.DateTimeFormatter;

public class Timestamp {

private TimeOnly time;

private DateOnly date;

private Timestamp(int year, int month, int day, int hour, int minute, int second) {

this.time = new TimeOnly(hour, minute, second);

this.date = new DateOnly(year, month, day);

}

private Timestamp(String str) {

this.date = new DateOnly(

Integer.parseInt(str.substring(0, 4)),

Integer.parseInt(str.substring(5, 7)),

Integer.parseInt(str.substring(8, 10))

);

this.time = new TimeOnly(

Integer.parseInt(str.substring(11, 13)),

Integer.parseInt(str.substring(14, 16)),

Integer.parseInt(str.substring(17, 19))

);

}

public static Timestamp parse(String strTime) {

if (strTime.matches("\\d{4}-\\d{2}-\\d{2}T\\d{2}:\\d{2}:\\d{2}")) {

return new Timestamp(strTime);

}

throw new IllegalArgumentException("Invalid timestamp format");

}

public int getYear() {

return this.date.getYear();

}

public void setYear(int year) {

this.date.setYear(year);

}

public int getMonth() {

return this.date.getMonth();

}

public void setMonth(int month) {

this.date.setMonth(month);

}

public int getDay() {

return this.date.getDay();

}

public void setDay(int day) {

this.date.setDay(day);

}

public int getHour() {

return this.time.getHour();

}

public void setHour(int hour) {

this.time.setHour(hour);

}

public int getMinute() {

return this.time.getMinute();

}

public void setMinute(int minute) {

this.time.setMinute(minute);

}

public int getSecond() {

return this.time.getSecond();

}

public void setSecond(int second) {

this.time.setSecond(second);

}

public TimeOnly getTime() {

return time;

}

public void setTime(TimeOnly time) {

this.time = time;

}

public DateOnly getDate() {

return date;

}

public void setDate(DateOnly date) {

this.date = date;

}

@Override

public String toString() {

return String.format("%sT%s", date.toString(), time.toString());

}

}

## TestTimestamp.java

class TimestampTest {

public static void main(String[] args) {

testParseValidTimestamp();

testParseInvalidTimestamp();

testToString();

testSettersAndGetters();

testInvalidTimestampYear();

testInvalidTimestampMonth();

testInvalidTimestampDay();

testInvalidTimestampHour();

testInvalidTimestampMinute();

testInvalidTimestampSecond();

}

static void assertEquals(int expected, int actual) {

if (expected != actual) {

throw new AssertionError("Assertion failed: expected " + expected + ", but got " + actual);

}

}

static void assertEquals(String expected, String actual) {

if (!expected.equals(actual)) {

throw new AssertionError("Assertion failed: expected \"" + expected + "\", but got \"" + actual + "\"");

}

}

static void assertThrows(Class<? extends Exception> expectedException, Runnable runnable) {

try {

runnable.run();

throw new AssertionError("Assertion failed: Expected exception " + expectedException.getSimpleName() + " not thrown.");

} catch (Exception e) {

if (!expectedException.isInstance(e)) {

throw new AssertionError("Assertion failed: Expected exception " + expectedException.getSimpleName() + ", but got " + e.getClass().getSimpleName());

}

}

}

static void testParseValidTimestamp() {

Timestamp timestamp = Timestamp.parse("2022-01-21T12:34:56");

assertEquals(2022, timestamp.getYear());

assertEquals(1, timestamp.getMonth());

assertEquals(21, timestamp.getDay());

assertEquals(12, timestamp.getHour());

assertEquals(34, timestamp.getMinute());

assertEquals(56, timestamp.getSecond());

}

static void testParseInvalidTimestamp() {

assertThrows(IllegalArgumentException.class, () -> {

Timestamp.parse("invalid\_timestamp");

});

}

static void testToString() {

Timestamp timestamp = Timestamp.parse("2022-01-21T12:34:56");

assertEquals("2022-01-21T12:34:56", timestamp.toString());

}

static void testSettersAndGetters() {

Timestamp timestamp = Timestamp.parse("2022-01-21T12:34:56");

timestamp.setYear(2023);

timestamp.setMonth(2);

timestamp.setDay(22);

timestamp.setHour(13);

timestamp.setMinute(45);

timestamp.setSecond(57);

assertEquals(2023, timestamp.getYear());

assertEquals(2, timestamp.getMonth());

assertEquals(22, timestamp.getDay());

assertEquals(13, timestamp.getHour());

assertEquals(45, timestamp.getMinute());

assertEquals(57, timestamp.getSecond());

}

static void testInvalidTimestampYear() {

assertThrows(IllegalArgumentException.class, () -> {

Timestamp.parse("10000-01-01T00:00:00");

});

}

static void testInvalidTimestampMonth() {

assertThrows(IllegalArgumentException.class, () -> {

Timestamp.parse("2022-13-01T00:00:00");

});

}

static void testInvalidTimestampDay() {

assertThrows(IllegalArgumentException.class, () -> {

Timestamp.parse("2022-01-32T00:00:00");

});

}

static void testInvalidTimestampHour() {

assertThrows(IllegalArgumentException.class, () -> {

Timestamp.parse("2022-01-01T24:00:00");

});

}

static void testInvalidTimestampMinute() {

assertThrows(IllegalArgumentException.class, () -> {

Timestamp.parse("2022-01-01T00:60:00");

});

}

static void testInvalidTimestampSecond() {

assertThrows(IllegalArgumentException.class, () -> {

Timestamp.parse("2022-01-01T00:00:60");

});

}

}

# Tehtävä 6

## Category.java

import java.lang.Comparable;

import java.util.regex.Matcher;

import java.util.regex.Pattern;

public class Category {

private String category;

public Category(String category) {

setCategory(category);

}

public void setCategory(String category) {

final int maxLength = 50;

int length;

try {

length = category.length();

} catch (NullPointerException npe) {

throw new IllegalArgumentException("Category can't be null");

}

length = category.length();

if (length < 1) {

throw new IllegalArgumentException("Category can't be empty");

}

if (length > maxLength) {

throw new IllegalArgumentException("Category can't be over 50 characters long");

}

Pattern pattern = Pattern.compile("[a-z]\*");

Matcher isValid = pattern.matcher(category);

if (!isValid.find()) {

throw new IllegalArgumentException("Category can only contain lowercase letters");

}

this.category = category;

}

public String getCategory() {

return this.category;

}

@Override

public String toString() {

return this.category;

}

}

## Description.java

public class Description {

private String description;

public Description(String description) {

setDescription(description);

}

public void setDescription(String description) {

int length;

final int maxLength = 500;

try {

length = description.length();

} catch (NullPointerException npe) {

throw new IllegalArgumentException("Description can't be null");

}

length = description.length();

if (length < 1) {

throw new IllegalArgumentException("Description can't be empty");

}

if (length > 500) {

throw new IllegalArgumentException("Description can't be over 500 characters long");

}

this.description = description;

}

public String getDescription() {

return this.description;

}

@Override

public String toString() {

return description;

}

}

## Event.java

import java.time.LocalDate;

import java.lang.Comparable;

public class Event implements Comparable<Event> {

private LocalDate time;

private Description description;

private Category category;

public Event(

LocalDate time,

String description,

String category)

{

this.time = time;

this.description = new Description(description);

this.category = new Category(category);

}

public void setTime(LocalDate time) {

this.time = time;

}

public LocalDate getTime() {

return time;

}

public void setDescription(String description) {

this.description.setDescription(description);

}

public String getDescription() {

return this.description.getDescription();

}

public void setCategory(String category) {

this.category.setCategory(category);

}

public String getCategory() {

return this.category.getCategory();

}

@Override

public int compareTo(Event event) {

return this.time.compareTo(event.getTime());

}

@Override

public String toString() {

return (

"When: " + time.toString() +

"\nDesc: " + description.toString() +

"\nWhat: " + category.toString() + '\n');

}

}

## TestEvenet.java

import java.util.List;

import java.util.ArrayList;

import java.time.LocalDate;

public class TestEvent {

public static void main(String[] args) {

List<Event> events = new ArrayList<>();

try {

events.add(

new Event(

LocalDate.now(),

"Testataan roskaa",

"java"));

} catch (Exception e) {

System.out.println(e.toString());

}

try {

events.add(

new Event(

LocalDate.now(),

"Testataan roskaa part 2",

"java"));

} catch (Exception e) {

System.out.println(e.toString());

}

try {

events.add(

new Event(

LocalDate.now(),

"Testataan roskaa part 3",

"java"));

} catch (Exception e) {

System.out.println(e.toString());

}

for (int i = 0; i < events.size(); i++) {

System.out.println(events.get(i).toString());

}

}

}