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**Chapter 30 Check Point Questions**

Section 30.1

[▼](javascript:collapse('expandText0',%20'collapseText0');)30.1.1

What are the benefits of using aggregate operations on collection streams for processing data?

Using aggregate operations on collection streams simplifies coding and improves performance.

Section 30.2

[▼](javascript:collapse('expandText1',%20'collapseText1');)30.2.1

Show the output of the following code?

Character[] chars = {'D', 'B', 'A', 'C'};

System.out.println(Stream.of(chars).sorted().findFirst().get());

System.out.println(Stream.of(chars).sorted(

java.util.Comparator.reverseOrder()).findFirst().get());

System.out.println(Stream.of(chars)

.limit(2).sorted().findFirst().get());

System.out.println(Stream.of(chars).distinct()

.skip(2).filter(e -> e > 'A').findFirst().get());

System.out.println(Stream.of(chars)

.max(Character::compareTo).get());

System.out.println(Stream.of(chars)

.max(java.util.Comparator.reverseOrder()).get());

System.out.println(Stream.of(chars)

.filter(e -> e > 'A').findFirst().get());

System.out.println(Stream.of(chars)

.allMatch(e -> e >= 'A'));

System.out.println(Stream.of(chars)

.anyMatch(e -> e > 'F'));

System.out.println(Stream.of(chars)

.noneMatch(e -> e > 'F'));

Stream.of(chars).map(e -> e + "").map(e -> e.toLowerCase())

.forEach(System.out::println);

Object[] temp = Stream.of(chars).map(e -> e + "Y")

.map(e -> e.toLowerCase()).sorted().toArray();

System.out.println(java.util.Arrays.toString(temp));

A

D

B

C

D

A

D

true

false

true

d

b

a

c

[ay, by, cy, dy]

[▼](javascript:collapse('expandText2',%20'collapseText2');)30.2.2

What is wrong in the following code?

Character[] chars = {'D', 'B', 'A', 'C'};

Stream<Character> stream = Stream.of(chars).sorted();

System.out.println(stream.findFirst());

System.out.println(stream.skip(2).findFirst());

A stream can only have one terminal operation. Once you apply stream.findFirst() . the stream is destroyed.

[▼](javascript:collapse('expandText3',%20'collapseText3');)30.2.3

Rewrite (a) using a method reference and an anonymous inner class and (b) using lambda expression and an anonymous inner class.

(a) sorted((s1, s2) -> s1.compareToIgnoreCase(s2))

(b) forEach(System.out::println)

(a)

Use a method reference:

sorted(String::compareToIgnoreCase);

Use an anonymous inner class:

sorted(new Comparator<String>() {

@Override

public int compare(String s1, String s2) {

return s1.compareToIgnoreCase(s2);

}

});

(b)

Use a lambda expression:

forEach(e -> System.out.println())

Use an anonymous inner class:

forEach(

new java.util.function.Consumer<String>() {

public void accept(String e) {

System.out.println();

}

}

)

[▼](javascript:collapse('expandText4',%20'collapseText4');)30.2.4

Given a map of the type Map<String, Double>, write an expression that returns the sum of all the values in map. For example, if the map contains {"john", 1.5} and {"Peter", 1.1}, the sum is 2.6.

map.entrySet().stream().mapToDouble(e -> e.getValue()).sum()

Section 30.3

[▼](javascript:collapse('expandText5',%20'collapseText5');)30.3.1

Show the output of the following code?

int[] numbers = {1, 4, 2, 3, 1};

System.out.println(IntStream.of(numbers)

.sorted().findFirst().getAsInt());

System.out.println(IntStream.of(numbers)

.limit(2).sorted().findFirst().getAsInt());

System.out.println(IntStream.of(numbers).distinct()

.skip(1).filter(e -> e > 2).sum());

System.out.println(IntStream.of(numbers).distinct()

.skip(1).filter(e -> e > 2).average().getAsDouble());

System.out.println(IntStream.of(numbers).max().getAsInt());

System.out.println(IntStream.of(numbers).max().getAsInt());

System.out.println(IntStream.of(numbers)

.filter(e -> e > 1).findFirst().getAsInt());

System.out.println(IntStream.of(numbers)

.allMatch(e -> e >= 1));

System.out.println(IntStream.of(numbers)

.anyMatch(e -> e > 4));

System.out.println(IntStream.of(numbers).noneMatch(e -> e > 4));

IntStream.of(numbers).mapToObj(e -> (char)(e + 50))

.forEach(System.out::println);

Object[] temp = IntStream.of(numbers)

.mapToObj(e -> (char)(e + 'A')).toArray();

System.out.println(java.util.Arrays.toString(temp));

1

1

7

3.5

4

4

4

true

false

true

3

6

4

5

3

[B, E, C, D, B]

[▼](javascript:collapse('expandText6',%20'collapseText6');)30.3.2

What is wrong in the following code?

int[] numbers = {1, 4, 2, 3, 1};

DoubleSummaryStatistics stats =

DoubleStream.of(numbers).summaryStatistics();

System.out.printf("The summary of the stream is\n%-10s%10d\n" +

"%-10s%10.2f\n%-10s%10.2f\n%-10s%10.2f\n%-10s%10.2f\n",

" Count:", stats.getCount(), " Max:", stats.getMax(),

" Min:", stats.getMin(), " Sum:", stats.getSum(),

" Average:", stats.getAverage());

numbers is an int array, you have to use IntStream.of(numbers) rather than DoubleStream.of(numbers).

[▼](javascript:collapse('expandText7',%20'collapseText7');)30.3.3

Rewrite the following code that maps an int to a Character using an anonymous inner class?

mapToObj(e -> (char)(e + 50))

mapToObj(

new java.util.function.IntFunction<Character>() {

public Character apply(int e) {

return (char)(e + 50);

}

}

)

[▼](javascript:collapse('expandText8',%20'collapseText8');)30.3.4

Show the output of the following code.

int[][] m = {{1, 2}, {3, 4}, {5, 6}};

System.out.println(Stream.of(m)

.mapToInt(e -> IntStream.of(e).sum()).sum());

21

[▼](javascript:collapse('expandText9',%20'collapseText9');)30.3.5

Given an array names in Listing 30.1, write the code to display the total number of characters in names.

System.out.println("The number of characters in array names is " +

Stream.of(names).mapToInt(e -> e.length()).sum());

Section 30.4

[▼](javascript:collapse('expandText10',%20'collapseText10');)30.4.1

What is a stateless method? What is a stateful method?

A stateless method can apply to the elements in the stream independent from the others. A stateful method must consider all the elements in order to produce a result.

[▼](javascript:collapse('expandText11',%20'collapseText11');)30.4.2

How do you create a parallel stream?

You can create a parallel stream by invoking the parallel() method on a stream or invoking the parallelStream() method from a collection object such as a list or a set.

[▼](javascript:collapse('expandText12',%20'collapseText12');)30.4.3

Suppose names is a set of strings, which of the following two streams is better?

Object[] s = set.parallelStream().filter(e -> e.length() > 3)

.sorted().toArray();

Object[] s = set.parallelStream().sorted()

.filter(e -> e.length() > 3).toArray();

The former is better than the latter because the stream size is smaller after applying the filter method. This will make the sorted() method to run faster.

[▼](javascript:collapse('expandText13',%20'collapseText13');)30.4.4

What will be the output of the following code?

int[] values = {3, 4, 1, 5, 20, 1, 3, 3, 4, 6};

System.out.print("The values are ");

IntStream.of(values)

.forEach(e -> System.out.print(e + " "));

The values are 3 4 1 5 20 1 3 3 4 6

[▼](javascript:collapse('expandText14',%20'collapseText14');)30.4.5

What will be the output of the following code?

int[] values = {3, 4, 1, 5, 20, 1, 3, 3, 4, 6};

System.out.print("The values are ");

IntStream.of(values).parallel()

.forEach(e -> System.out.print(e + " "));

The output is unpredictable due to using a parallel stream with forEach method.

[▼](javascript:collapse('expandText15',%20'collapseText15');)30.4.6

Write a statement to obtain an array of 1000 random double values between 0.0 and 1.0, excluding 1.0.

Random r = new Random();

double[] numbers = r.doubles(1000, 0.0, 1.0).toArray();

Section 30.5

[▼](javascript:collapse('expandText16',%20'collapseText16');)30.5.1

Show the output of the following code.

int[] values = {1, 2, 3, 4};

System.out.println(IntStream.of(values)

.reduce(0, (e1, e2) -> e1 + e2));

System.out.println(IntStream.of(values)

.reduce(1, (e1, e2) -> e1 \* e2));

System.out.println(IntStream.of(values).map(e -> e \* e)

.reduce(0, (e1, e2) -> e1 + e2));

System.out.println(IntStream.of(values).mapToObj(e -> "" + e)

.reduce((e1, e2) -> e1 + " " + e2).get());

System.out.println(IntStream.of(values).mapToObj(e -> "" + e)

.reduce((e1, e2) -> e1 + ", " + e2).get());

10

24

30

1 2 3 4

1, 2, 3, 4

[▼](javascript:collapse('expandText17',%20'collapseText17');)30.5.2

Show the output of the following code.

int[][] m = {{1, 2}, {3, 4}, {5, 6}};

System.out.println(Stream.of(m)

.map(e -> IntStream.of(e).reduce(1, (e1, e2) -> e1 \* e2))

.reduce(1, (e1, e2) -> e1 \* e2));

720

[▼](javascript:collapse('expandText18',%20'collapseText18');)30.5.3

Show the output of the following code.

int[][] m = {{1, 2}, {3, 4}, {5, 6}, {1, 3}};

Stream.of(m).map(e -> IntStream.of(e))

.reduce((e1, e2) -> IntStream.concat(e1, e2))

.get().distinct()

.forEach(e -> System.out.print(e + " "));

1 2 3 4 5 6

[▼](javascript:collapse('expandText19',%20'collapseText19');)30.5.4

Show the output of the following code.

int[][] m = {{1, 2}, {3, 4}, {5, 6}, {1, 3}};

System.out.println(

Stream.of(m).map(e -> IntStream.of(e))

.reduce((e1, e2) -> IntStream.concat(e1, e2))

.get().distinct().mapToObj(e -> e + "")

.reduce((e1, e2) -> e1 + ", " + e2).get());

1, 2, 3, 4, 5, 6, 1, 3

Section 30.6

[▼](javascript:collapse('expandText20',%20'collapseText20');)30.6.1

Show the output of the following code.

int[] values = {1, 2, 3, 4, 1};

List<Integer> list = IntStream.of(values).mapToObj(e -> e)

.collect(Collectors.toList());

System.out.println(list);

Set<Integer> set = IntStream.of(values).mapToObj(e -> e)

.collect(Collectors.toSet());

System.out.println(set);

Map<Integer, Integer> map = IntStream.of(values).distinct()

.mapToObj(e -> e)

.collect(Collectors.toMap(e -> e, e -> e.hashCode()));

System.out.println(map);

System.out.println(

IntStream.of(values).mapToObj(e -> e)

.collect(Collectors.summingInt(e -> e)));

System.out.println(

IntStream.of(values).mapToObj(e -> e)

.collect(Collectors.averagingDouble(e -> e)));

[1, 2, 3, 4, 1]

[1, 2, 3, 4]

{1=1, 2=2, 3=3, 4=4}

11

2.2

Section 30.7

[▼](javascript:collapse('expandText21',%20'collapseText21');)30.7.1

Show the output of the following code.

int[] values = {1, 2, 2, 3, 4, 2, 1};

IntStream.of(values).mapToObj(e -> e).collect(

Collectors.groupingBy(e -> e, TreeMap::new,

Collectors.counting())).

forEach((k, v) -> System.out.println(k + " occurs " + v

+ (v > 1 ? " times " : " time ")));

IntStream.of(values).mapToObj(e -> e).collect(

Collectors.groupingBy(e -> e, TreeMap::new,

Collectors.summingInt(e -> e))).

forEach((k, v) -> System.out.println(k + ": " + v));

MyStudent[] students = {

new MyStudent("John", "Johnson", "CS", 23, 89.2),

new MyStudent("Susan", "Johnson", "Math", 21, 89.1),

new MyStudent("John", "Peterson", "CS", 21, 92.3),

new MyStudent("Kim", "Yao", "Math", 22, 87.3),

new MyStudent("Jeff", "Johnson", "CS", 23, 78.5)};

Stream.of(students)

.sorted(Comparator.comparing(MyStudent::getLastName)

.thenComparing(MyStudent::getFirstName))

.forEach(e -> System.out.println(e.getLastName() + ", " +

e.getFirstName()));

Stream.of(students).collect(Collectors.

groupingBy(MyStudent::getAge, TreeMap::new,

Collectors.averagingDouble(MyStudent::getScore))).

forEach((k, v) -> System.out.printf("%10s%10.2f\n", k, v));

1 occurs 2 times

2 occurs 3 times

3 occurs 1 time

4 occurs 1 time

1: 2

2: 6

3: 3

4: 4

Johnson, Jeff

Johnson, John

Johnson, Susan

Peterson, John

Yao, Kim

21 90.70

22 87.30

23 83.85

Section 30.8

[▼](javascript:collapse('expandText22',%20'collapseText22');)30.8.1

Can the following code be used to replace line 19 in Listing 30.7?

DoubleStream.of(numbers).filter(e -> e >

DoubleStream.of(numbers).average()).count());

No. You have to use:

DoubleStream.of(numbers).filter(e -> e >

DoubleStream.of(numbers).average().getAsDouble()).count());

[▼](javascript:collapse('expandText23',%20'collapseText23');)30.8.2

Can the following code be used to replace lines 15-16 in Listing 30.8?

Stream.of(chars).forEach(e -> {

int count = 0;

System.out.print(e + (++count % 20 == 0 ? "\n" : " ")); });

No. count will always be 0.

[▼](javascript:collapse('expandText24',%20'collapseText24');)30.8.3

Show the output of the following code?

String s = "ABC";

Stream.of(s.toCharArray()).forEach(ch ->

System.out.println(ch));

ABC

[▼](javascript:collapse('expandText25',%20'collapseText25');)30.8.4

Show the output of the following code? (The toCharacterArray method is presented in Listing 30.9)

String s = "ABC";

Stream.of(toCharacterArray(s.toCharArray())).forEach(ch ->

System.out.println(ch));

A

B

C

[▼](javascript:collapse('expandText26',%20'collapseText26');)30.8.5

Write the code to obtain a one-dimensional array list of strings from a two-dimensional array matrix of strings.

String[] list = Stream.of(m).map(e -> Stream.of(e)).

reduce((e1, e2) -> Stream.concat(e1, e2)).get().toArray();