LEC 09

CSE 122

Maps

Questions during Class?

Raise hand or send here

sli.do #cse122

BEFORE WE START

Slido vote & chat with your neighbors:

What are your plans for spring break?

Music: 122 26Wi Lecture Tunes

Instructor: Adrian Salguero

TAs:

Ava	Dalton	Neal	Shreyank
Blake R	Dani	Neha	Sthiti
Blake P	David	Nicolae	Sushma
Cady	Diya	Nicole	Suyash
Caleb	Hanna	Rio	TJ
Cole	Ivy	Rohan	Wesley
Colin	Mahima	Saachi	Yang
Connor	Medha	Shreya	

Lecture Outline

- **Announcements**
- Map Review
- *Debrief PCM: Count Words*
- *Practice: joinRosters*
- *Practice: mostFrequentStart*

Announcements

- Reminder: Quiz 1 is Tuesday, February 17th
  - Quiz 0 results coming soon™!
- Resubmission Cycle 2 (R2) form open now
  - Due Tuesday, Feb 10th by 11:59 PM
  - Eligible Assignments: **C0**, P0, C1
- Programming Assignment 2 (P2) releasing later today!
  - Due **Tuesday**, **Feb 17th** by 11:59pm

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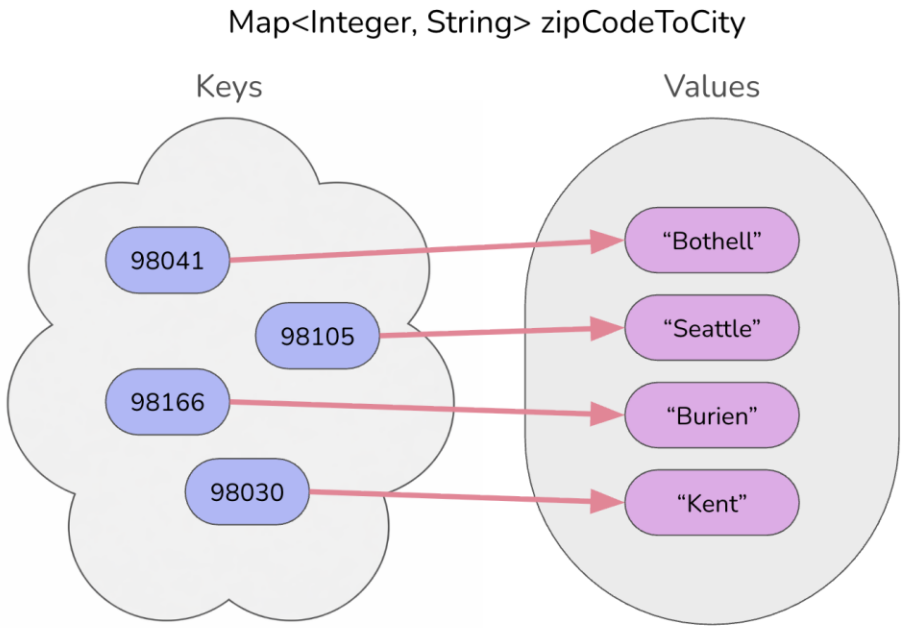
Map ADT

- Data structure to map keys to values
  - Keys can be any* type; Keys must be unique
  - Values can be any type
- Operations
  - `put(key, value)`: Associate key to value
    - Overwrites duplicate keys
  - `get(key)`: Get value for key
  - `remove(key)`: Remove key/value pair



*Same as Python's `dict`

Programming with Maps in Java

- Interface: `Map`
- Implementations: `TreeMap`, `HashMap`

```
// Making a Map
Map<String, String> favArtistToSong = new TreeMap<>();

// adding elements to the above Map
favArtistToSong.put(”Saja Boys", ”Soda Pop");
favArtistToSong.put("Aitana", ”Conexión Psíquica");
favArtistToSong.put(”Taylor Swift", ”Dress");

// Getting a value for a key
String song = favArtistToSong.get(”Saja Boys");
System.out.println(song);
```

Programming with Maps in Java

Methods	Description
`put(`**key**`, `**value**`)`	adds a mapping from the given key to the given value; if the key already exists, replaces its value with the given one
`get(`**key**`)`	returns the value mapped to the given key (`null` if not found)
`containsKey(`**key**`)`	returns `true` if the map contains a mapping for the given key
`remove(`**key**`)`	removes any existing mapping for the given key
`clear()`	removes **all** key/value pairs from the map
`size()`	returns the number of key/value pairs in the map
`isEmpty()`	returns `true` if the map's size is 0
`toString()`	returns a string such as `"{a=90, d=60, c=70}"`
`keySet()`	returns a set of all keys in the map
`values()`	returns a collection of all values in the map

Map Implementations

- Our first data structures with marked differences in how their implementations behave
- One `Map` ADT / Interface
- Two `Map` implementations
  - `TreeMap` – Pretty fast, and sorted keys
  - `HashMap` – Extremely fast, unsorted keys

```
Map<String, Integer> map1 = new TreeMap<>();
Map<String, Integer> map2 = new HashMap<>();
...
```

Practice : Think

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Select the method calls required to modify the given map `m` as follows:

Assume `m`'s contents are

```
98030="Kent"
98178="Seattle"
98166="Burien"
98041="Bothell"
```

We want to modify `m` so that its contents are

```
98030="Kent"
98178="Tukwila"
98166="Burien"
98041="Bothell"
98101="Seattle"
98126="Seattle"
```

A. `m.put(98178, "Tukwila");`

B. `m.remove(98178);`

C. `m.put(98126, "Seattle");`

D. `m.get(98178, "Seattle");`

E. `m.put(98101, "Seattle");`

Practice : Pair

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Select the method calls required to modify the given map m as follows:

Assume m's contents are

```
98030="Kent"
98178="Seattle"
98166="Burien"
98041="Bothell"
```

We want to modify m so that its contents are

```
98030="Kent"
98178="Tukwila"
98166="Burien"
98041="Bothell"
98101="Seattle"
98126="Seattle"
```

A. `m.put(98178, "Tukwila");`

B. `m.remove(98178);`

C. `m.put(98126, "Seattle");`

D. `m.get(98178, "Seattle");`

E. `m.put(98101, "Seattle");`

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joinRosters

Write a method `joinRosters` that combines a `Map` from student name to quiz section, and a `Map` from TA name to quiz section and prints all pairs of students/TAs.

For example, if `studentSections` stores the following map:

```
{Alan=AC, Jerry=AB, Yueying=AA, Sharon=AB, Steven=AB, Zewditu=BA}
```

And `taSections` stores the following map

```
{Ayush=BA, Marcus=AA, Aishah=AB, Chaafen=AC}
```

```
AC: Alan - Chaafen
AB: Jerry - Aishah
AB: Sharon - Aishah
AB: Steven - Aishah
AA: Yueying - Marcus
BA: Zewditu - Ayush
```

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mostFrequentStart

Write a method called mostFrequentStart that takes a Set of words and does the following steps:

- Organizes words into “word families” based on which letter they start with
- Selects the largest “word family” as defined as the family with the most words in it
- Returns the starting letter of the largest word family (and if time, should update the Set of words to only have words from the selected family).

mostFrequentStart

For example, if the `Set` words stored the values

```
["hello", "goodbye", "library", "literary", "little", "repel"]
```

The word families produced would be

```
'h' -> 1 word ("hello")
'g' -> 1 word ("goodbye")
'l' -> 3 words ("library", "literary", "little")
'r' -> 1 word ("repel")
```

Since 'l' has the largest word family, we return `'l'` and modify the `Set` to only contain `Strings` starting with 'l'.