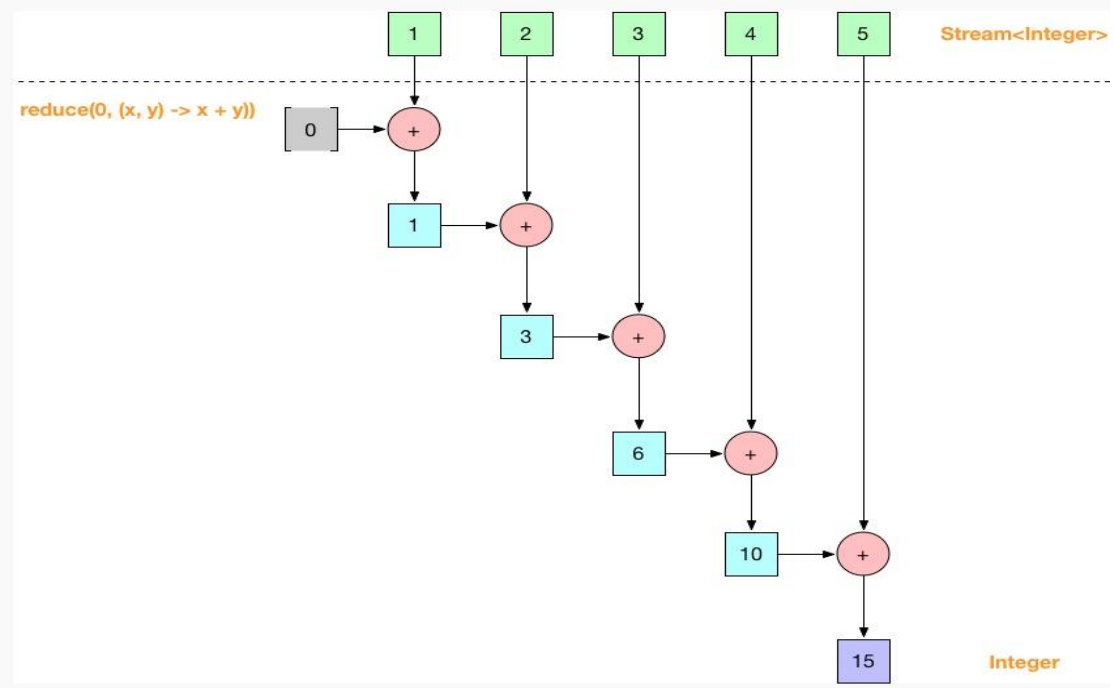
JDK8函数式编程（二）

Tim

大纲

- Stream.collect()
- Collectors源码解析及相关实战
- Optional 与 functor
- map与flatMap的区别
- Function composition
- CompletableFuture

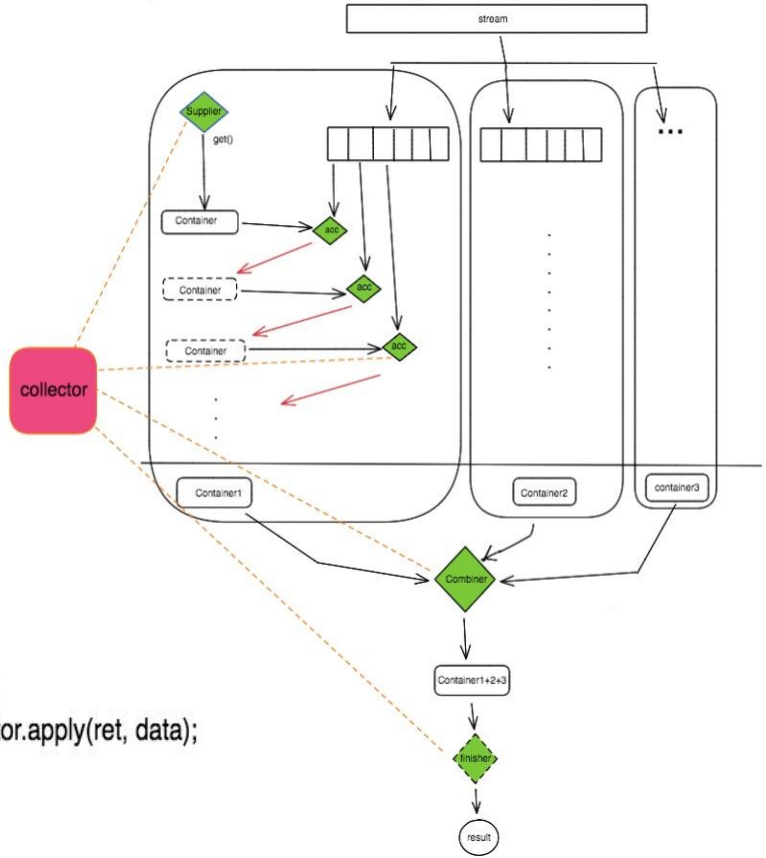
Reduce



Stream.collect()

- collect vs reduce?
  - reduce 操作不可变数据
  - collect 操作可变数据

- collect(Supplier, Accumulator, Combiner)
- collect(Collector)




```
R container = supplier.get();
for (T data : datas){
   accumulator.accept(container, data);
}
return container
```

VS

```
R ret  =  initValue;
for (T data : datas) {
      ret = accumulator.apply(ret, data);
}
return ret;
```

Collector

- Collector 要素
  - Supplier: 累积数据构造函数
  - Accumulator: 累积函数，同reduce
  - Combiner: 合并函数，并行处理场合下用，同reduce
  - Finisher: 对累积数据做最终转换
  - *Characteristics: 特征（并发 / 无序 / 无finisher）

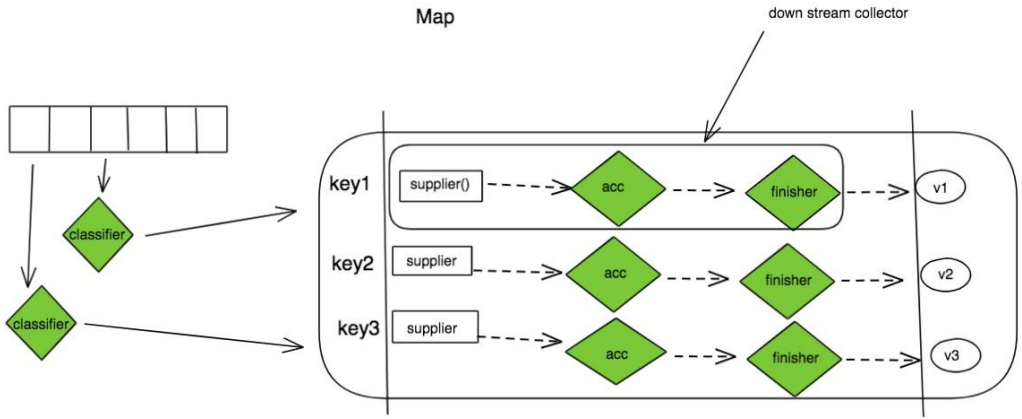
- Collector 需要满足：
  - 同一律： Combiner.apply(acc，[]) == acc
  - 结合率：
    - acc.accept(t1), acc.accept(t2)　　acc1.accept(t1) , acc2.accept(t2)
    - finisher.apply(acc)　　==　　finisher.apply(combiner.apply(t1,t2)

Collectors API

- toList/to(Concurrent)Map/toSet/toCollection
- counting/averagingXX/joining/summingXX
- groupBy/partitioningBy
- mapping/reducing

Collectors.groupBy

- groupingBy(Function) – 单纯分key存放成Map<key, List>，默认使用HashMap
- groupingBy(Function, Collector) - 分key后，对每个key的元素进行后续collect操作
- groupingBy(Function, Suppiler, Collector) - 同上，允许自定义Map创建



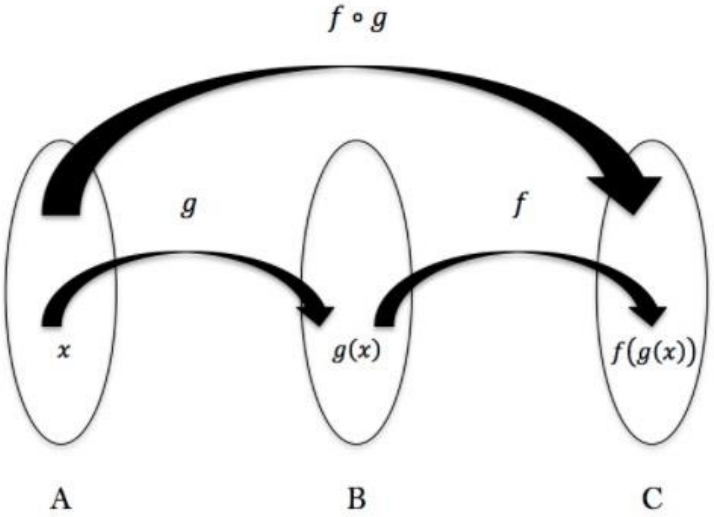
Collect 实战

1. 先按编程语言再按程序等级分层，然后返回一个元组<平均工资，程序员列表>

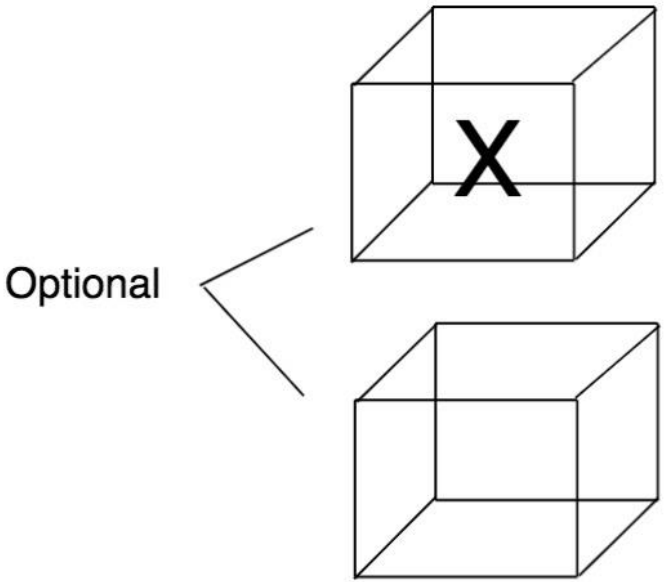
2. 随机创建程序员列表
   - 创建指定个数长度的stream
   - 对每个数字使用构造函数创建对象
   - 对每个对象的各个field进行随机赋值
   - 过滤数据范围以外的元素
   - 按指定字段排序
   - 生产到list

Function composition

- f1.andThen(f2) ➔ f2(f1())
- f1.compose(f2) ➔ f1(f2())



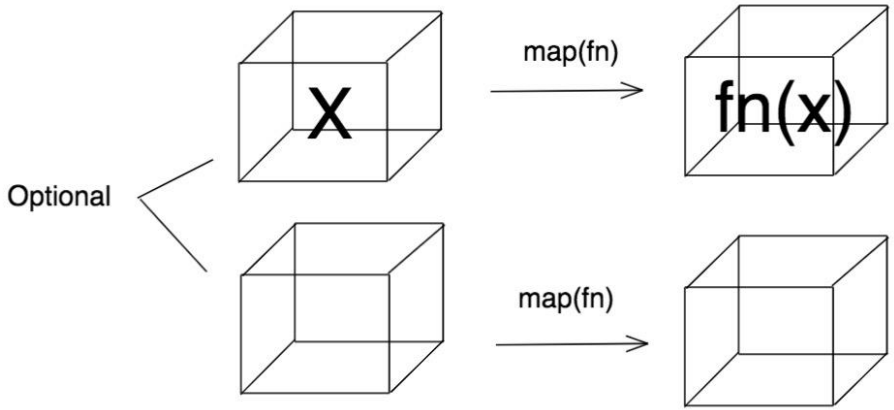
Optional



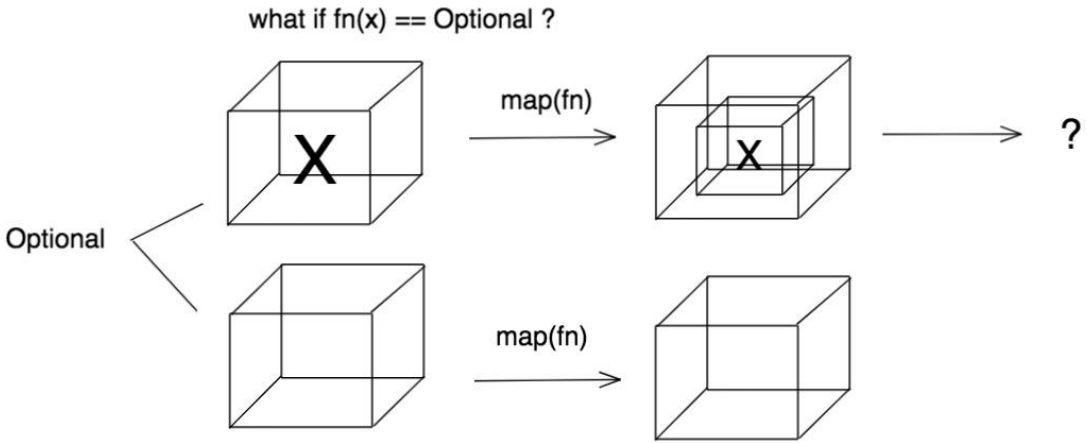
Optional API

- orElse(T) ➔ if x!= null return x else return T
- orElseGet(fn) ➔ if x!=null return x else return fn()
- ifPresent(fn) ➔ if x!= null fn()

map()

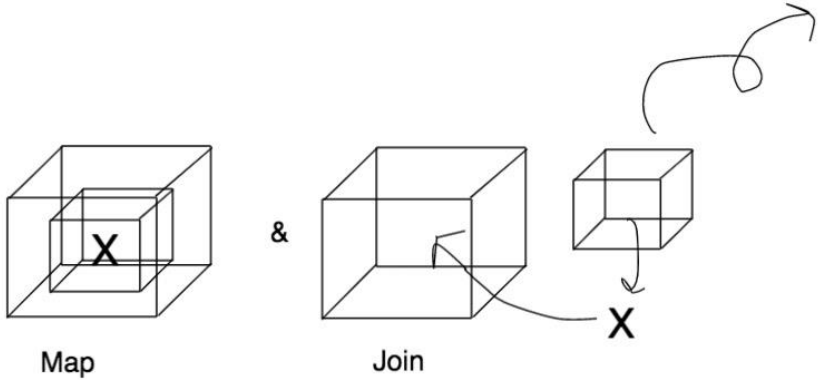


思考

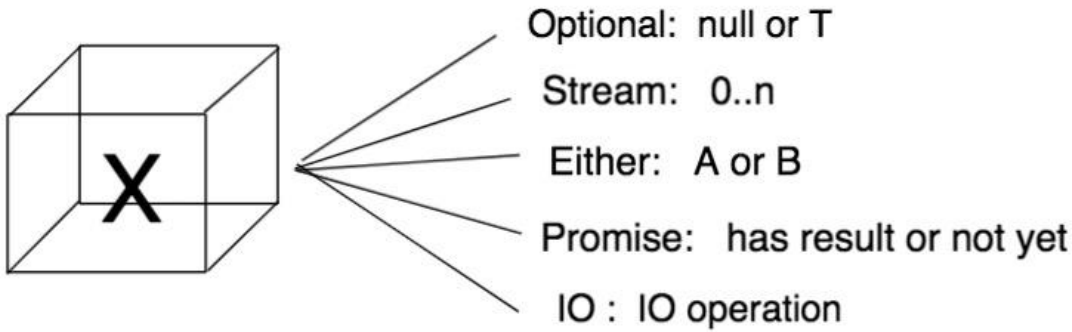


FlatMap()

flatMap(Fn) ==



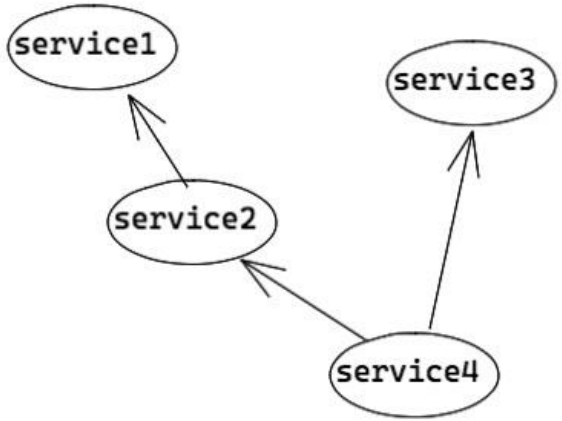
Functor & Monad



CompletableFuture

- accept:接受参数是Consumer
- apply:接受参数是 Function
- handle:
- runAfter: 接受参数是runnable
- Either/Both: 任一任务完成还是都完成
- then: 等当前任务完成再执行另一个
- async: 后续任务是否异步执行

- thenCompose vs thenApply: flatMap vs map



Q & A