Java-8

=> Lambdas

Functional Programming

# those feature that define functional programming

# streams

# Executor (Future)

# Concurrency Collection

Style :

Traditional : Imperative

(HOW)

#exposing the steps how to perform an operation

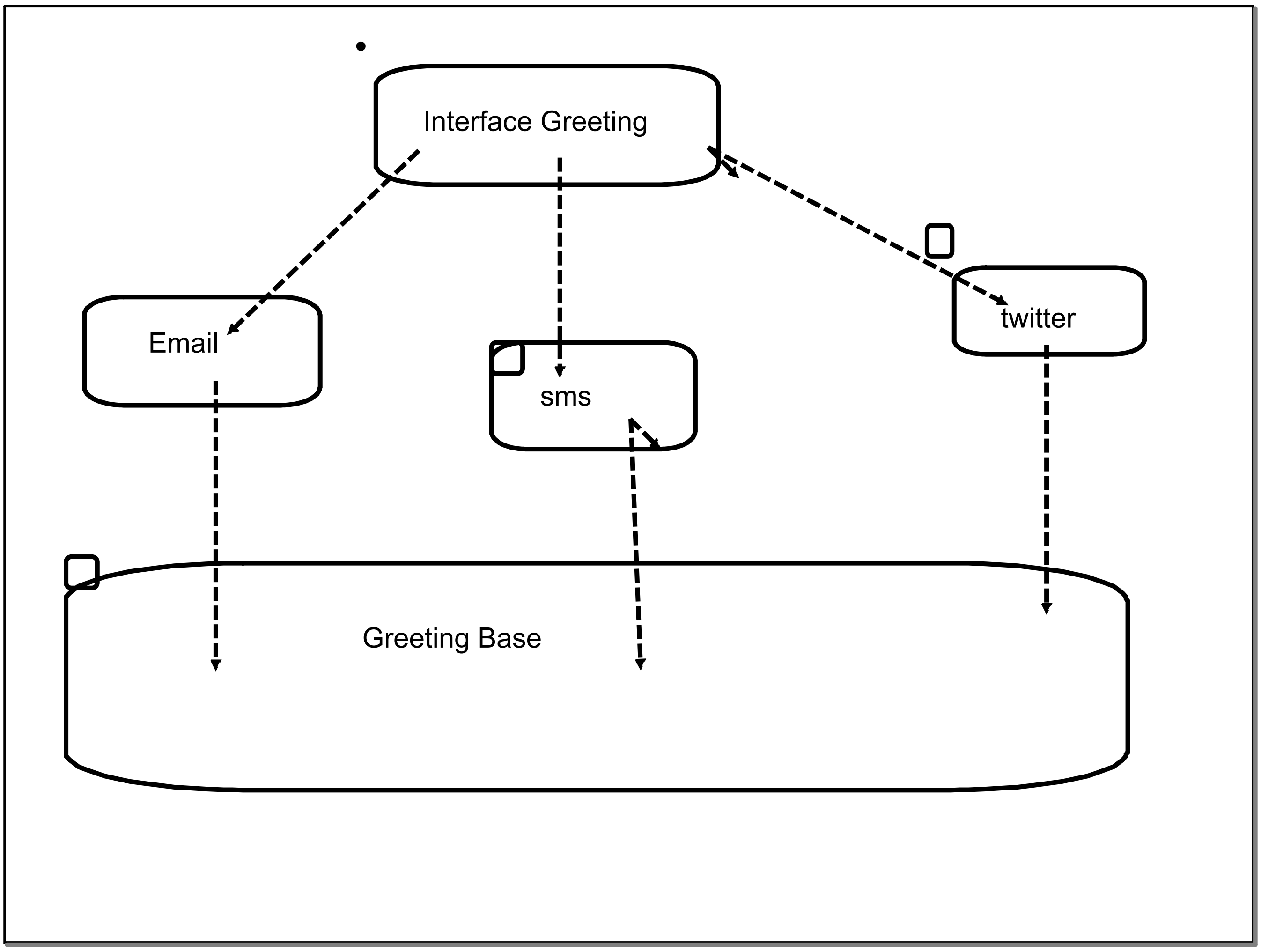
# embrace object mutability (not in sync with concurrency)

Functional : Declarative

(What) : result

immutability

Analogous SQL

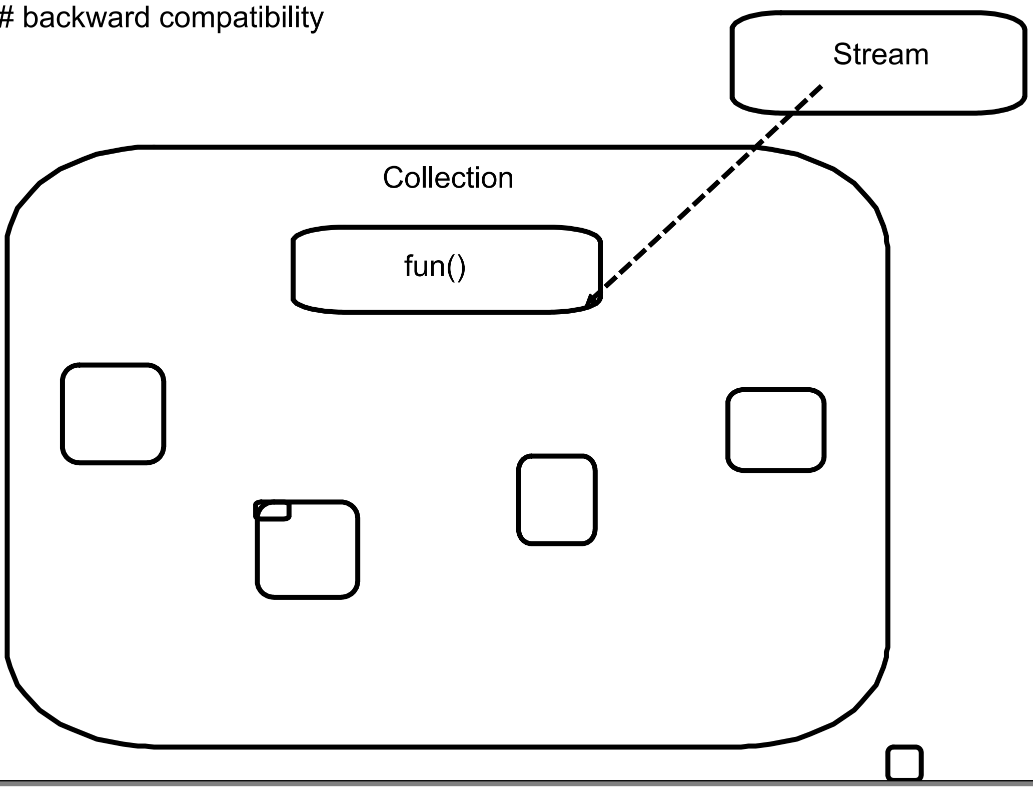

Interface Greeting
Email
sms
twitter
Greeting Base

Interface :

# default method (definition)

# multiple implementations can be inheritance

# backward compatibility



Escape from OOPs

independent Functions (not wrapped inside an object)

Relationship between interface and function

1. interface must have only one abstract method (any number of default/static) :

Functional Interface : Annotation @FunctionalInterface

2. single method signature must match with function implementation

Lambda expression

```
    (<arg1>,<arg2>) -> {
}


    arg1 -> {
    }


    () -> {
    }


    (<arg1>) -> <return> <single instruction>


    (a,b) -> <return>a+b;


    (a,b) -> {
        return a+b;
    }
```

Pre defined functional interfaces

  => Runnable

  => Comparator

Explicit Functional Interface

  # Consumer

    void accept(<>);

    DoubleConsumer() // specialized implementations on primitive

    BiConsumer

      void accept(<>,<>);

  # Predicate (test)

    boolean test(<>)

  # Supplier

    <> get()

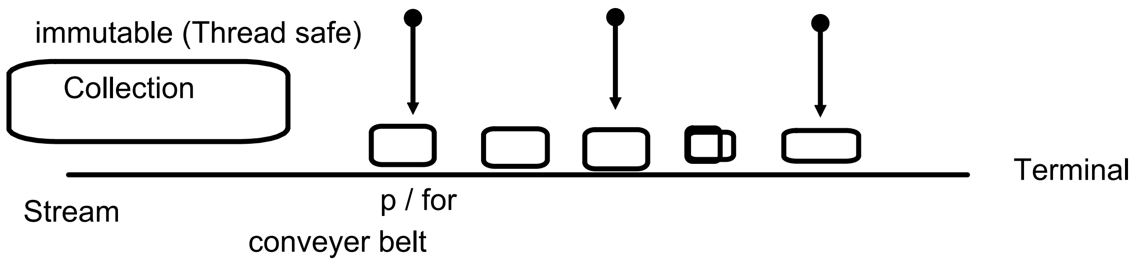
  # Function

    <> apply(<>)

Stream :

not a data structure

immutable (Thread safe)



Stream : LAZY Processes

Stream can have 2 type of activities

intermidiate activities (filter/map/flat map)

Terminal activity : terminate/close the stream

forEach()

collect()

IF terminal activity is not present : stream will not initiate groupingBy(<return> Function(student))

return value : would become a group

Transforms

y map(x)

flatmap() : Collection into stream

map:

["",""]

["","",""]

["",""]

flat map

["","","","","","","",""]

return type fixed : stream of data passed as argument

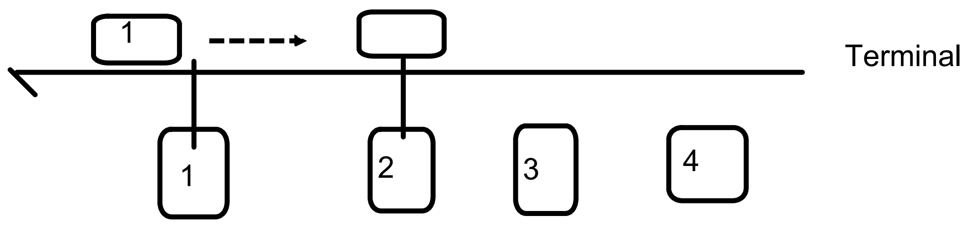
(Stream of) Multiple collection

into (Stream of)single collection

Stream :

# Sequential Stream

# Parallel Stream



# Parallel Streaming not commended if working on external mutable data (not thread safe)

# Activities that are inherently complex

Binary Operator : variant Function

y Function(x) : x and y can be of different type

z BinaryOperator(x,y) : x,y,z : must be of same type

Multithreading :

interleaved (Threaded Multitasking)

1. Multiple activities waiting for I/O : that time can be used by tasks
2. Multi-core architecture of micro-processor

Base Interface :

Runnable (run)

Implementation:

Core Functionality of Multithreading (Thread)

# inheriting Runnable

# inheriting Thread

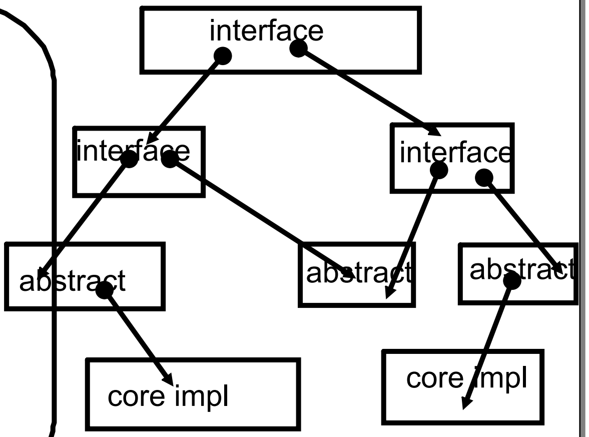
Traditional approach:

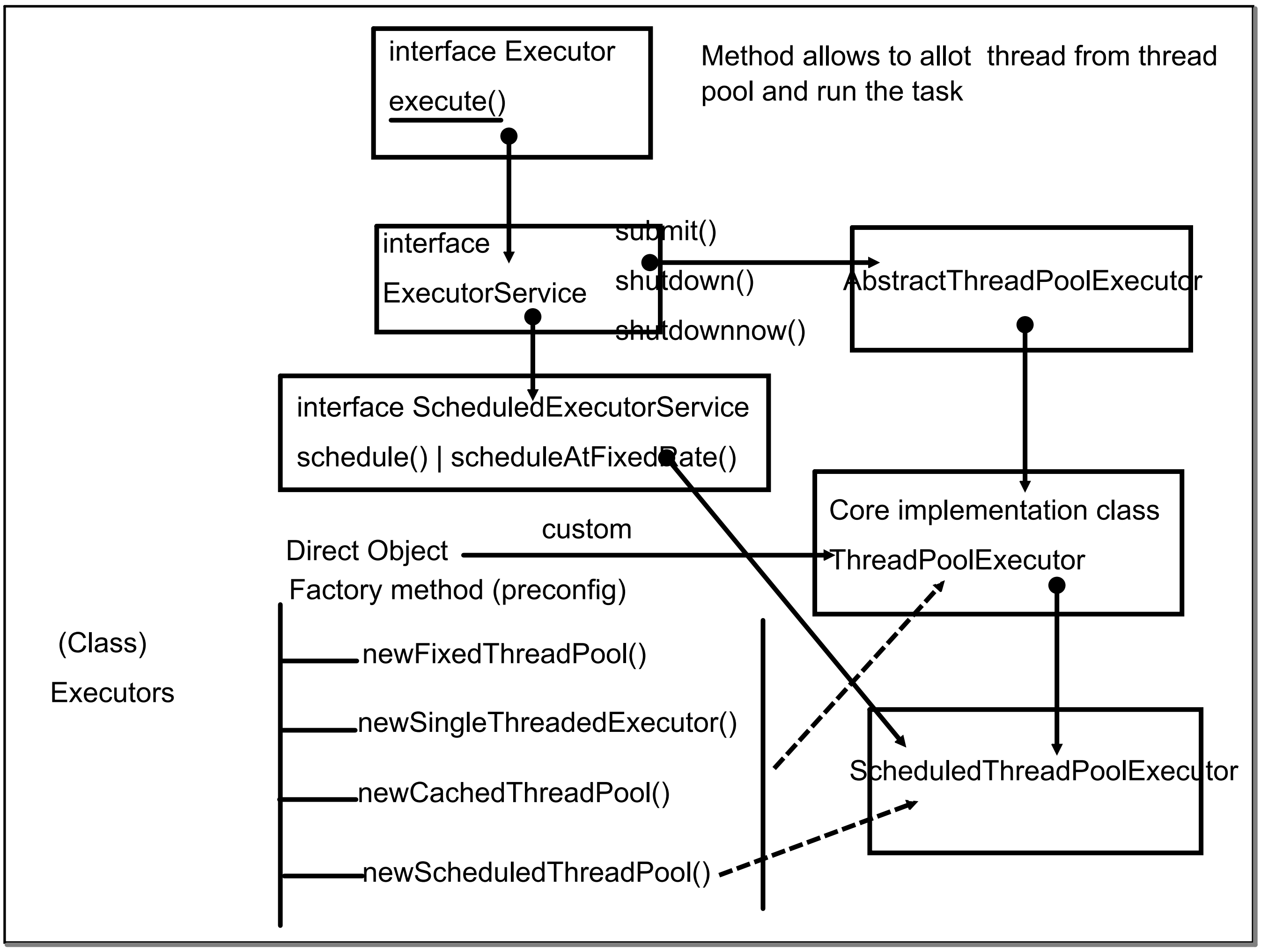
- create, execute, manage
- Thread per task
- Not possible to keep a track of number of thread

Executor framework :

- do all management + improve in performance

ThreadPool : create a predefined pool of thread




interface Executor
execute()
Method allows to allot thread from thread pool and run the task
interface ExecutorService
submit()
shutdown()
shutdownnow()
AbstractThreadPoolExecutor
interface ScheduledExecutorService
schedule() | scheduleAtFixedRate()
Core implementation class
ThreadPoolExecutor
custom
Direct Object
Factory method (preconfig)
(Class)
Executors
newFixedThreadPool()
newSingleThreadedExecutor()
newCachedThreadPool()
newScheduledThreadPool()
ScheduledThreadPoolExecutor

Need to create instance of ThreadPoolExecutor

FixedThreadPool (number of thread are predefined(extra task alloted will added to queue)

CustomThreadPoolExecutor

- <corePoolSize> : number of threads to always keep even if they are idle (2)
- <maxPoolSize>: max no of thread (5)
- <keepAliveTime> : time to wait before idle thread gets removed/released from thread pool
- <TimeUnit> :
- <queue capacity>: capacity of queue
- <RejectedHAndler> : what to do if a task is rejected from queue

SingleThreadExecutor()

FixedThreadExecutor(1)

    can change the thread capacity

CachedThreadPool() : Unbounded ThreadPool : Max Integer Val

    if demand decreases : can tear down thread

    default keep alive time : 1 min

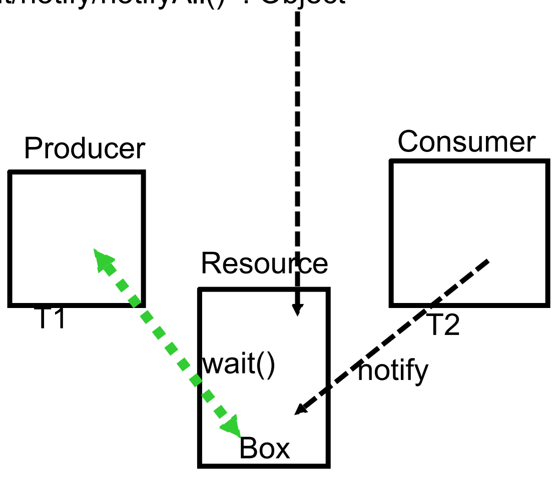
ScheduleThreadPool()

Thread returning some value

Special Interface Callable (call())

ThreadPool can work on Callable

wait/notify/notifyAll() : Object



ExecutorCompletionService

: will going to get results in order of completion of task

Future : blocking

CompletableFuture <callback : logic to follow when task is done>

Functional interfaces

Runnable

Callable

=> Supplier