Phase 1 : Java + Servlet API

Phase 2: Spring Framework

Phase 3: DevOps

Java - 8

IoT

Java-8 : Functional Programming

- Functional Interface
- default method
- static method
- Lambdas
- Streams
- Method references
- Optional
- Concurrent Support in Collection API
- DateTime API
- Nashorn Engine (JS engine)

Imperative style of programming

Classical style/Traditional style

pure OOPs

Focus how to perform operation

Object mutability : bugs

Declarative Style

Focus on result you want

Analogous SQL

Object Immutability

Functional Programming

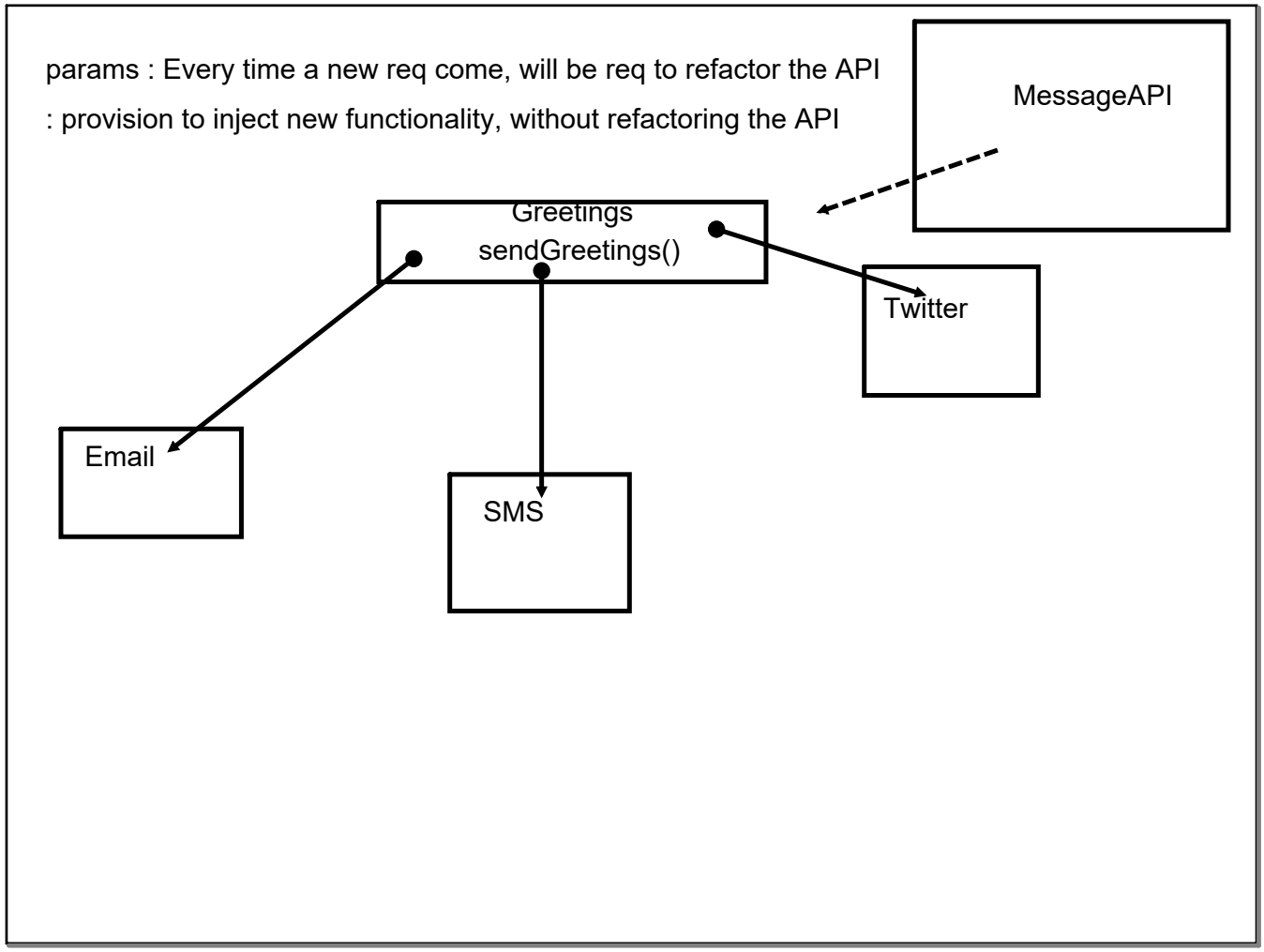
List of numbers

fetch unique number

Reverse domain naming convention

params : Every time a new req come, will be req to refactor the API

: provision to inject new functionality, without refactoring the API



Functional Programming : Functions(pure) are first class citizens

No Object Overheads

variable/instance/reference : object

reference = function

New datatype would not have been backward compatible

Expect a special datatype from JAVA : Function

Function twitter = ()

Extended the behavior of existing feature : interface

Syntax : Lambda

1. no access modifier : (not the part of any class)
2. no name (anonymous function)
3. no return type (can return values)
4. params : no param type
5. <param> -> {<definition>}

```
void fun(){
}
() -> {
}
```

```
void fun(String str1,String str2){
}
(str1,str2)->{
}
```

```
void fun (String str){
}
str -> {
}
```

```
void fun(String str){
      <single inst>
}
str-> <single inst>
```

```
void fun(String str){
----------
----------
}

str -> {
----------
----------
}
```

```
void add(int a, int b){
      return a+b;
}
(a,b)-> a+b;  // return is by default associated
(a,b) -> {
      return a+b;
}
```

Functional Interface

Contains only 1 abstract method, any number of default and static

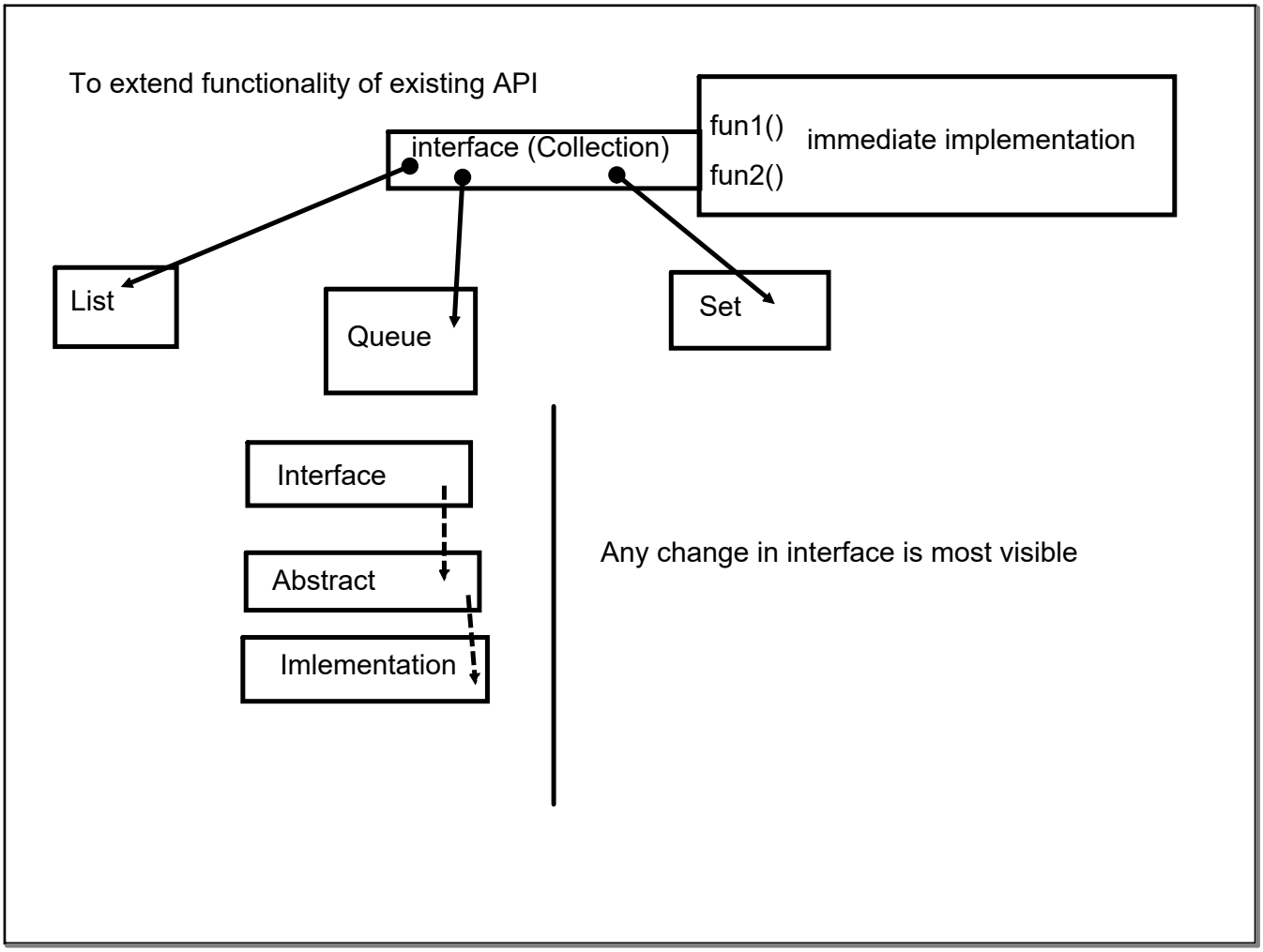
Only Functional Interfaces can refer to lambda expression

Signature of Lambda expression must match with the only abstract method of FI

Interface :

Define function inside an interface.

Interface can have functions with definitions as well


To extend functionality of existing API
interface (Collection)
fun1()
fun2()
immediate implementation
List
Queue
Set
Interface
Abstract
Imlementation
Any change in interface is most visible

Existing feature :

#Functional Interface

Comparable

Comparator

Runnable

=> Specialized Libraries of Functional Interface

=> Streams

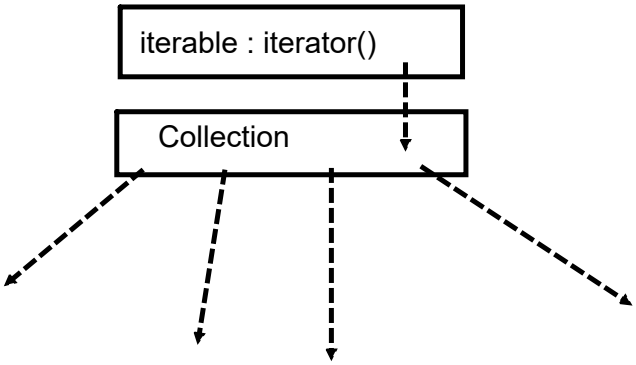
Lambdas with Local Variable

1. Lambdas have an access over local variables and instance of enclosing scope
2. Effectively final
3. Not Allowed to use the same local variable name as param or redeclaration inside body

No restriction on instance variable

=> Easier to perform the concurrent operation : immutability

Collection of string : traverse through collection and display all strings in collection



Functional API : Bunch of functional interface:

few prototypes have been identified with common usage

java.util.function

Consumer: BiConsumer

void accept(<>) : Consume the data

Predicate : BiPredicate

boolean test(<>) : Add some condition and revert back

Function : BiFunction, UnaryOperation, BinaryOperator

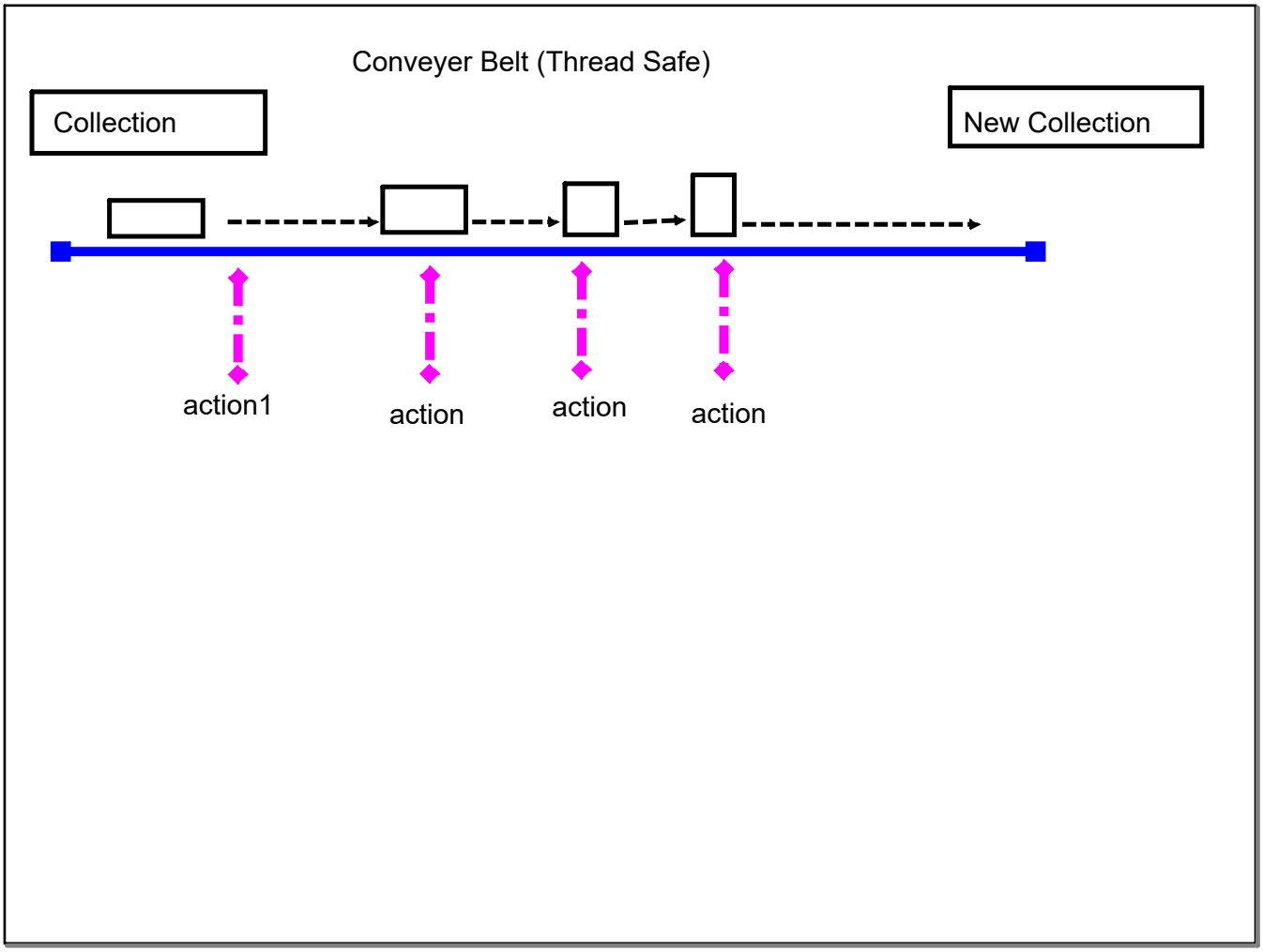
<> apply(<>) : Transformation

Supplier

<> get() :

Streams : Pure Functional

- Perform operations on collections or I/O resource :
- Safe
  - Immutability : Thread safe
- Efficient Way
  - Not a data structure: not going to store any data
  - Lazy processing model
- Parallel Stream : Parallel operation easily without spawning the thread


Conveyer Belt (Thread Safe)
Collection
New Collection
action1
action
action
action

SBA1 : use-case

SBA2 : use-case

SBA3 :

End-to-End

1. continous process
2. Milestone
3. walk-through (Friday)
4. Group based : group evaluation + individual eval

Every Stream must have a terminal activity

Else : Stream will not initiate

Every Stream

1. Initiate the stream
2. Intermediate activity (optional)
3. Terminal activity

Parallel Stream

Constraints in parallel streams

1. Order of records matter
2. where using a mutable service/data : Not a thread safe
3. activities, inherently complex, degrade performance

1,2,3,4,5,6,7.....

4,2,6,3,1 result = 0

forEach(Consumer)

4 --> thread1
= 0 + 4
result = result + 4

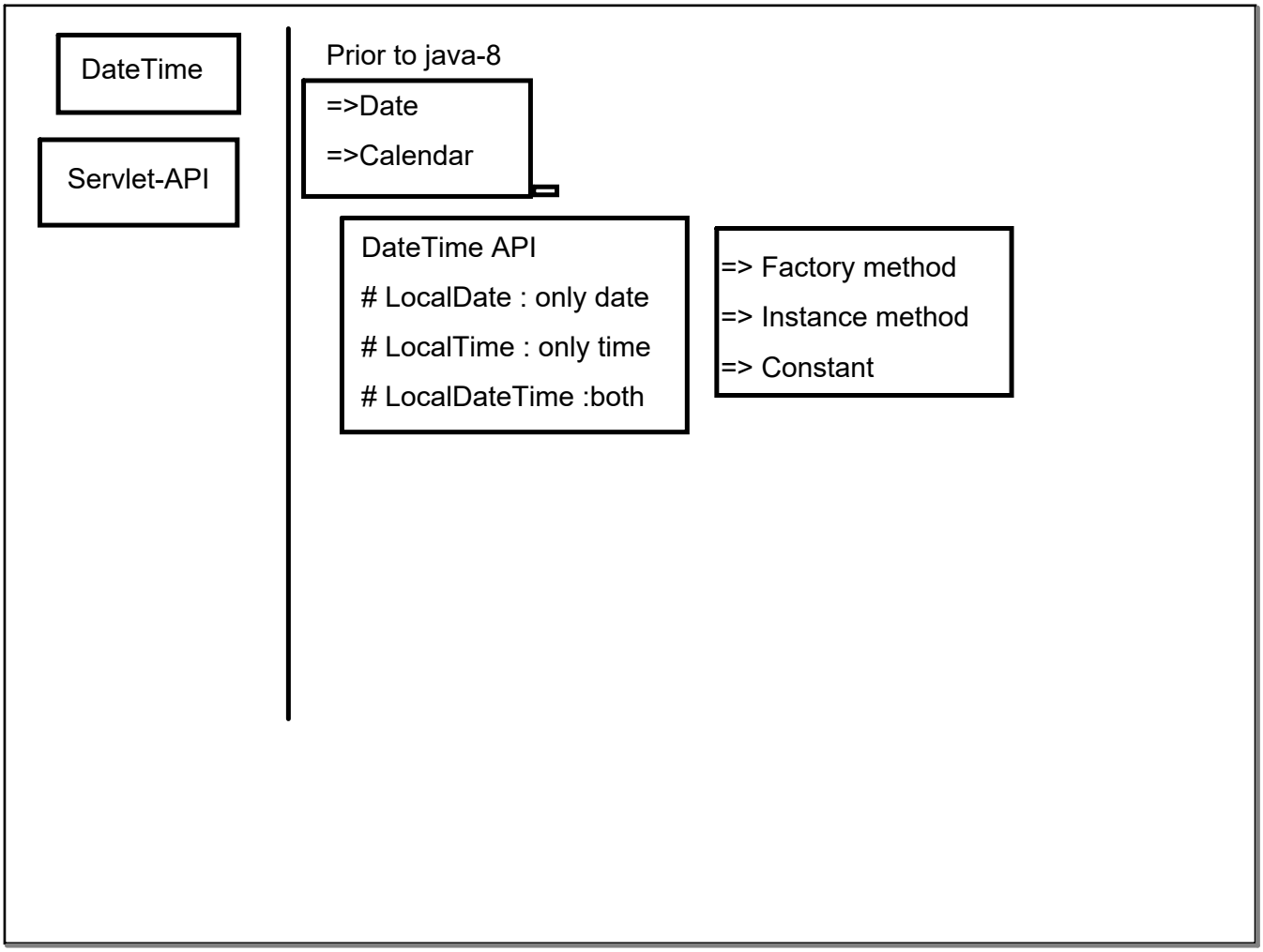
2 --> thread2
= 0 + 2
result = result + 2

Optional : to avoid null reference exception

if any object being initialized by some external logic

need to check if it is

Suggested best Practise : never return raw data


DateTime
Servlet-API
Prior to java-8
=>Date
=>Calendar
DateTime API
LocalDate : only date
LocalTime : only time
LocalDateTime :both
=> Factory method
=> Instance method
=> Constant

Servlet-API:

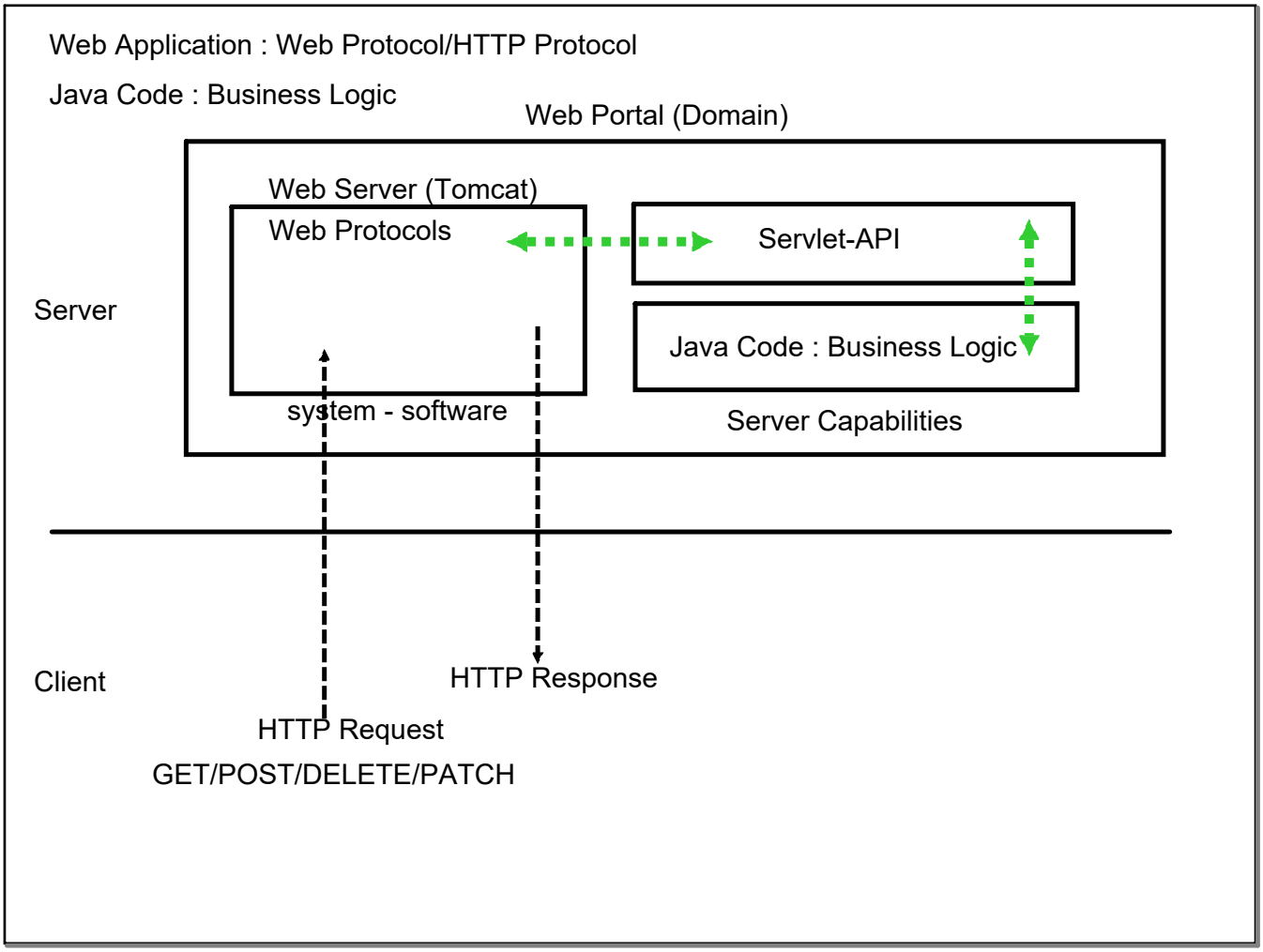
Popular API to create web application using Java

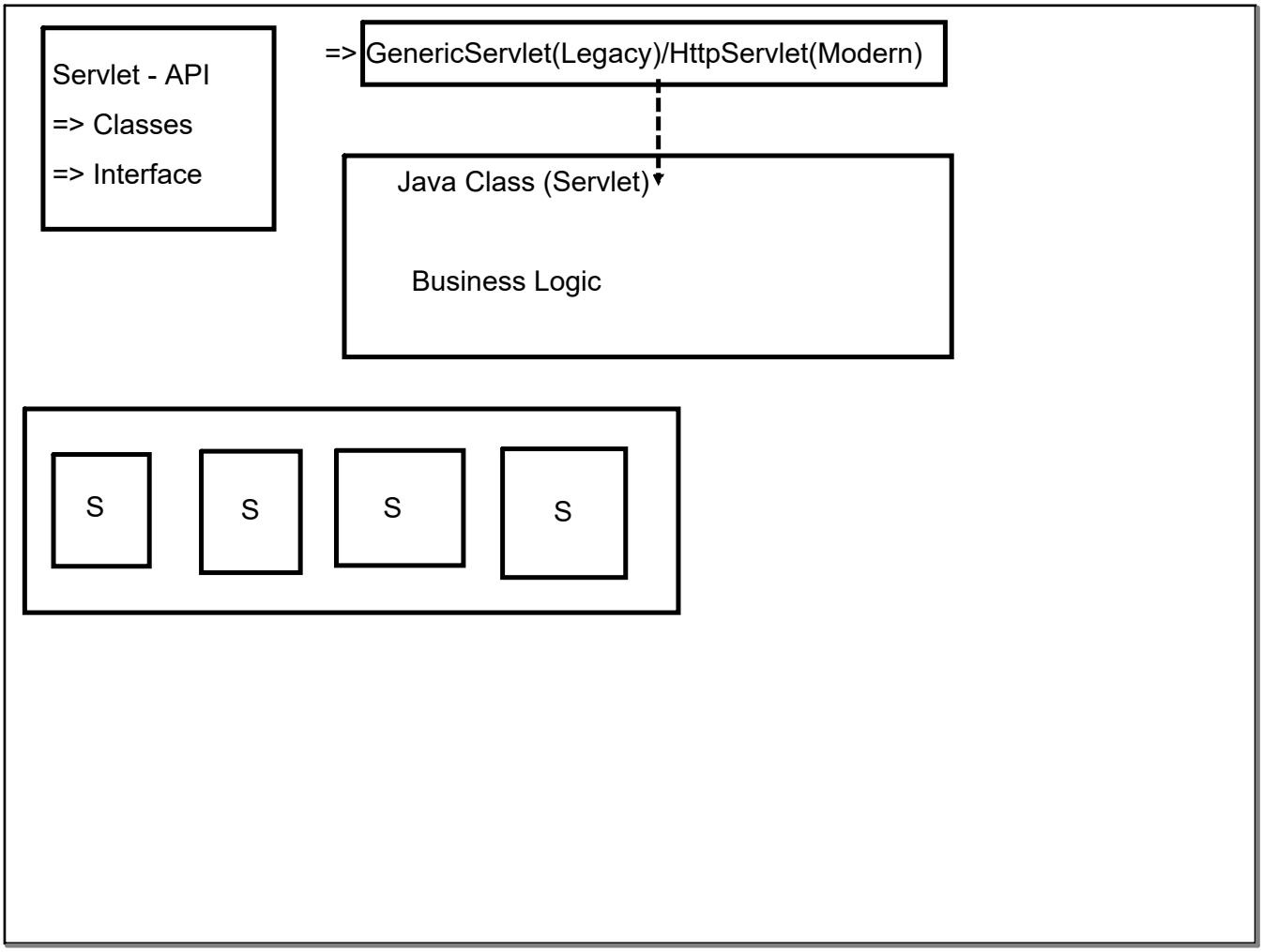
=> Core Java + Servlet-API

=> Complex Framework

Major Framework of JAva

JavaEE, Spring, Struts, EJB....


Web Application : Web Protocol/HTTP Protocol
Java Code : Business Logic
Web Portal (Domain)
Web Server (Tomcat)
Web Protocols
Servlet-API
Server
Java Code : Business Logic
system - software
Server Capabilities
Client
HTTP Response
HTTP Request
GET/POST/DELETE/PATCH


Servlet - API
=> Classes
=> Interface
=> GenericServlet(Legacy)/HttpServlet(Modern)
Java Class (Servlet)
Business Logic
S
S
S
S

GenericServlet : cannot differentiate among HTTP Verbs :

HttpServlet : can differentiate

```
class MyServ extends HttpServlet{
}
```

Servlet

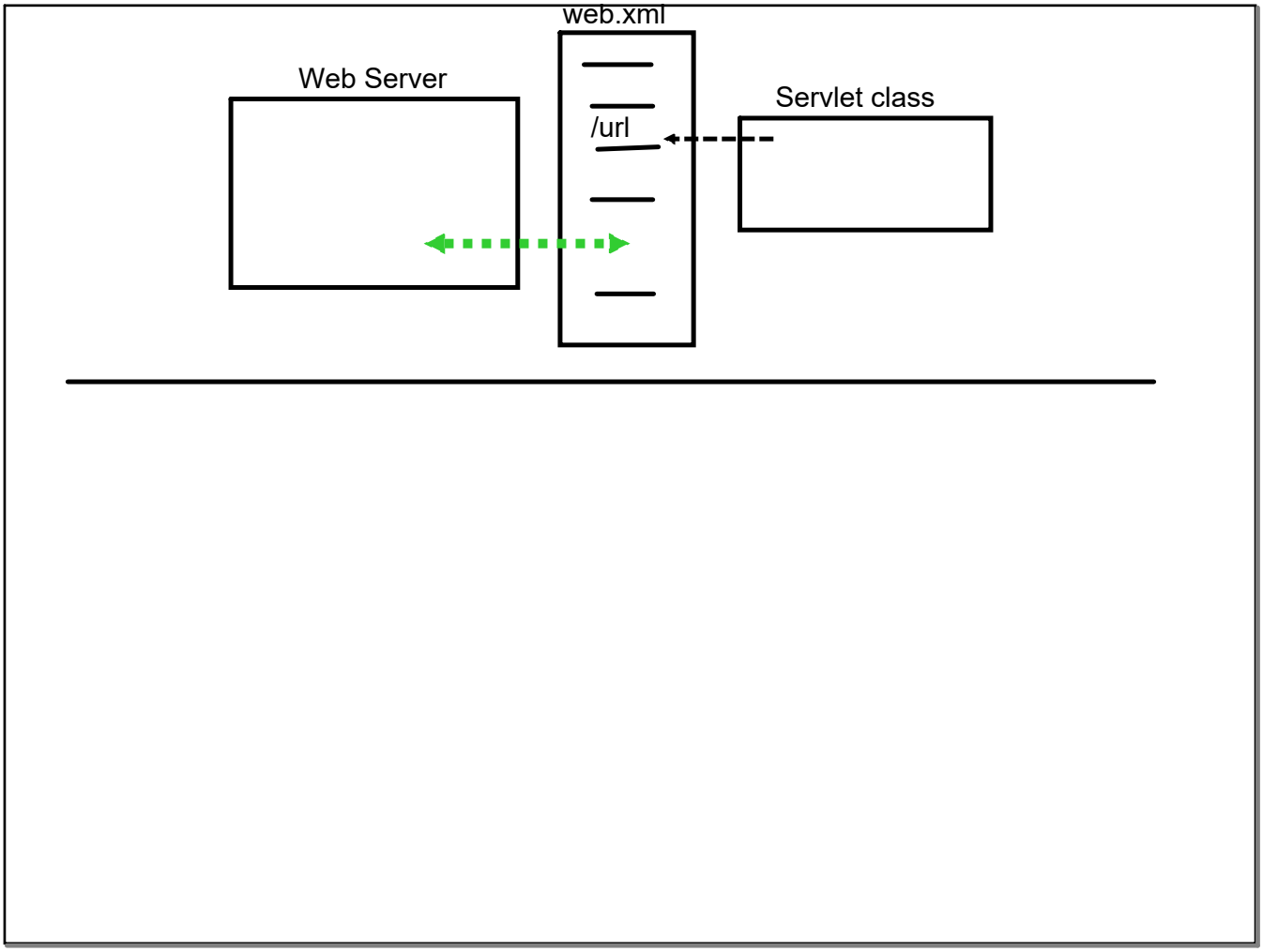
Every servlet needs to be registered with WebServer

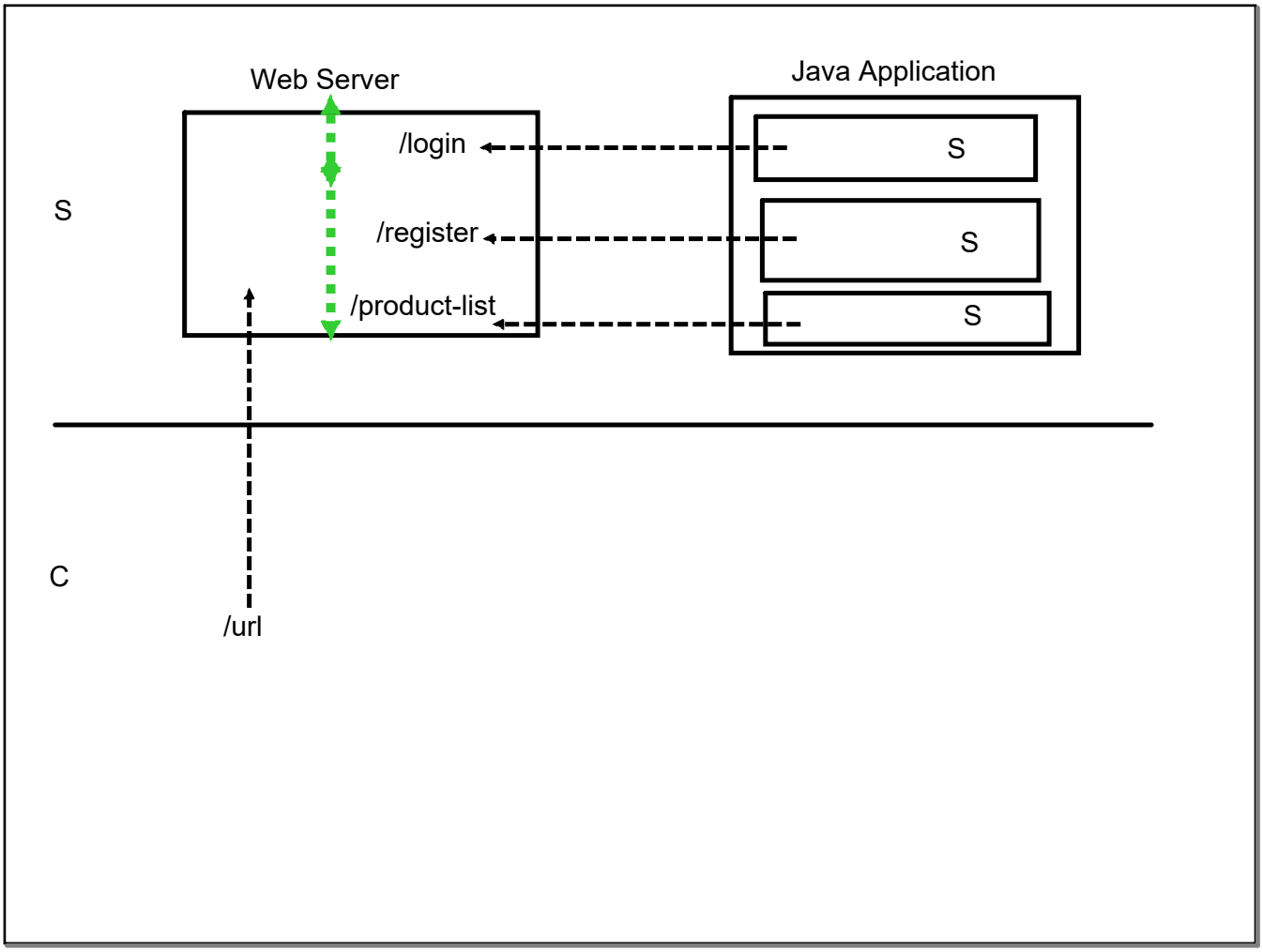
Registration will be based on URL

Registration will be done through a special manifest file

Deployment Descriptor : web.xml (de-facto std)

Once a servlet is registered , Web Server starts managing the lifecycle of Servlet


web.xml
Web Server
Servlet class
/url


Web Server
Java Application
/login
/register
/product-list
S
S
S
S
C
/url

MAnaging the life cycle:

1. Create an object of that class
2. launches life-cycle of servlet class
   a. init() : phase : prepare for request processing
   b. service() : phase : access over request, processing, respond back
   c. destroy() : phase : release the resources
3. Make the servlet object available for garbage collection

First Request : 1->2(a)->2(b)----> cache the object

Next Request(s) : 2(b) ----> cache the object

Whenever :

Servlet is not requested for long time/capacity :

2(c)-->3

Sequential : 2(b)

Parallel : n user requesting same servlet

Object cached :

=> n new object of servlet

=> queue of request

=> multithreading : threads of service (phase(2(b))

Servlet must use Thread safe service

Names1 :

Name 2:
