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

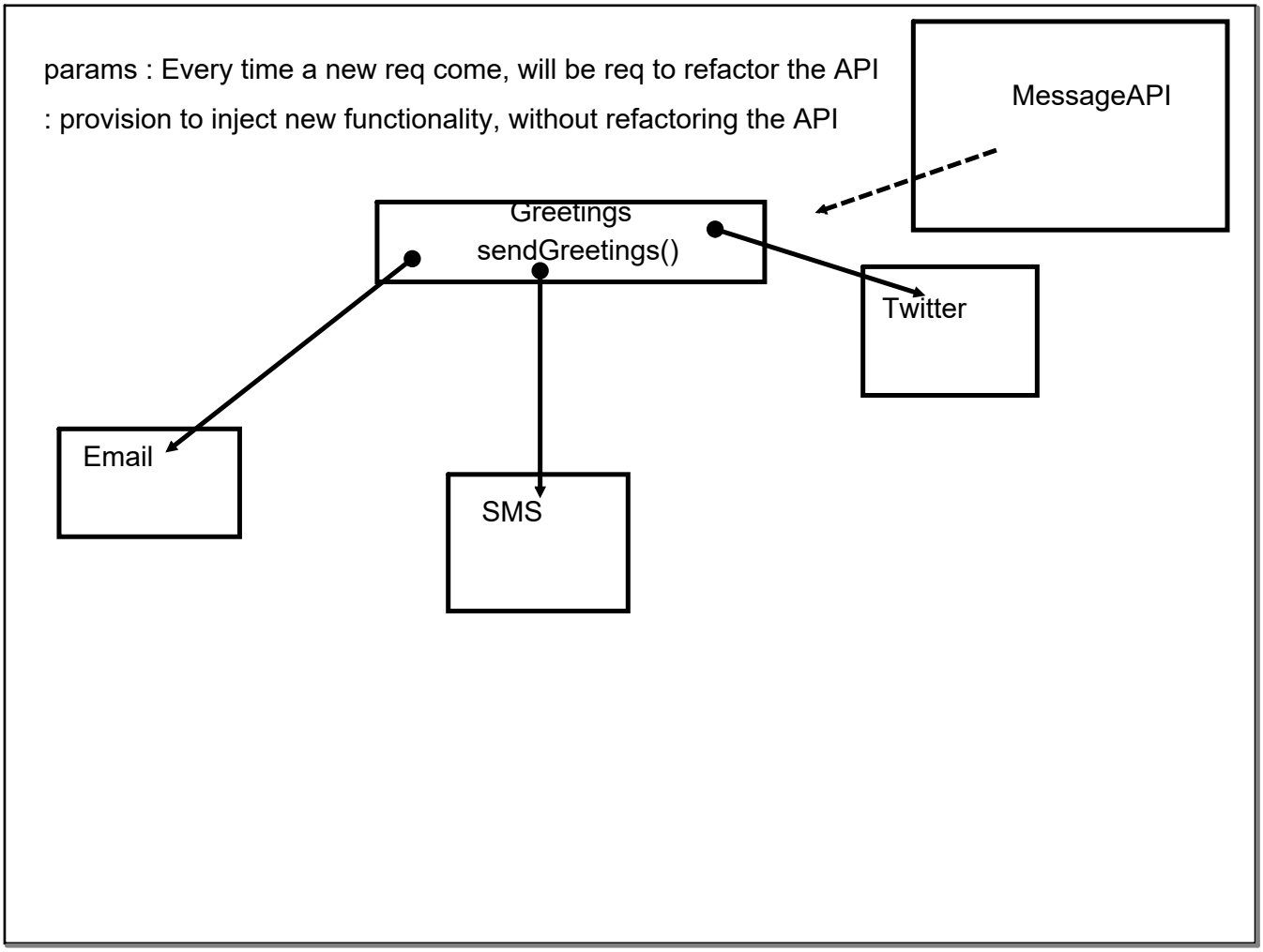
Object Immutability

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
MessageAPI
Greetings
sendGreetings()
Twitter
Email
SMS

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

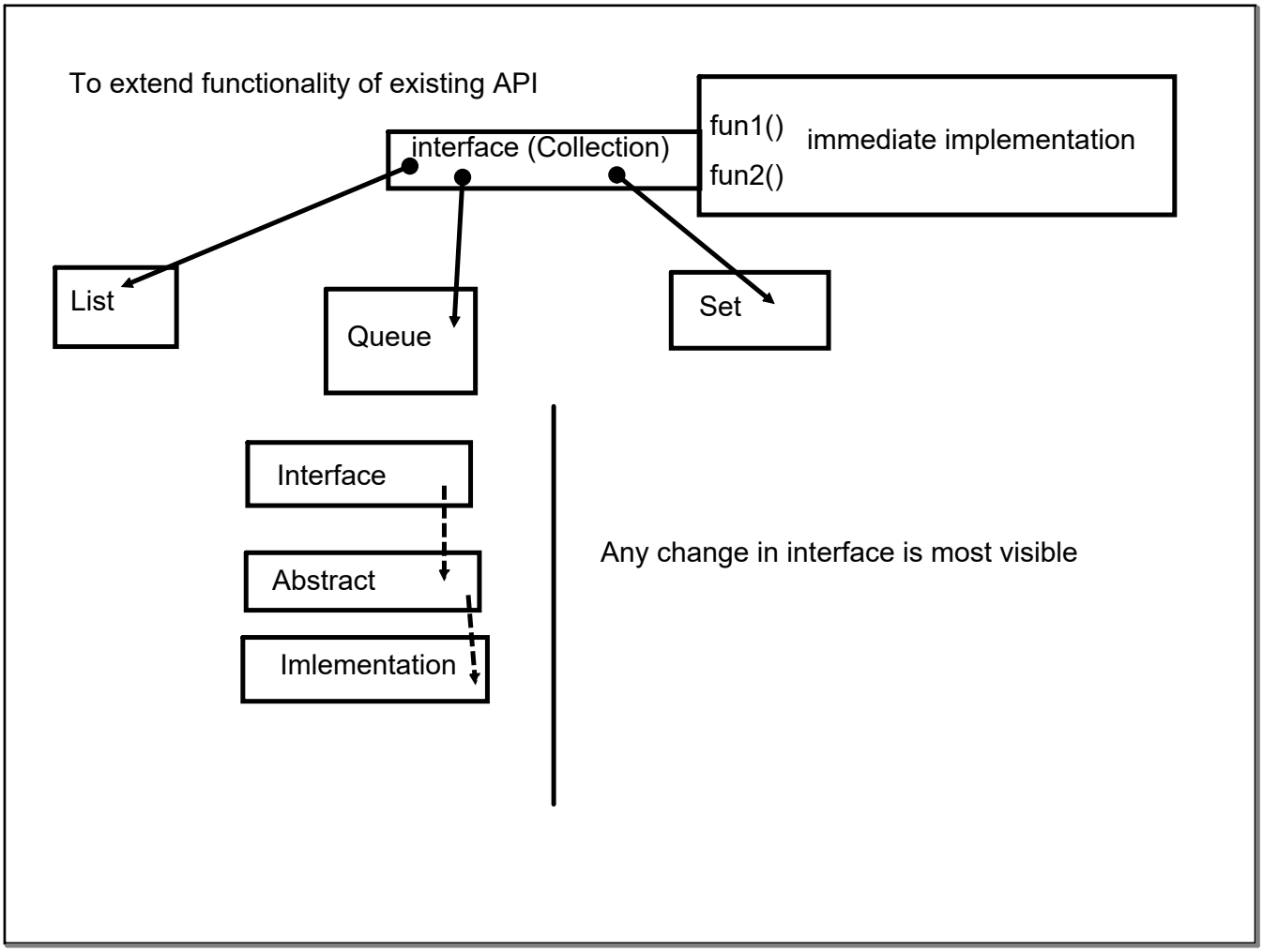
Only Functional Interfaces can refer to lambda expression

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

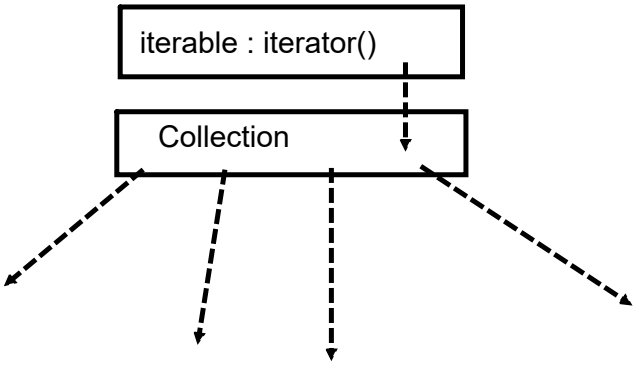
Lambdas with Local Variable

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

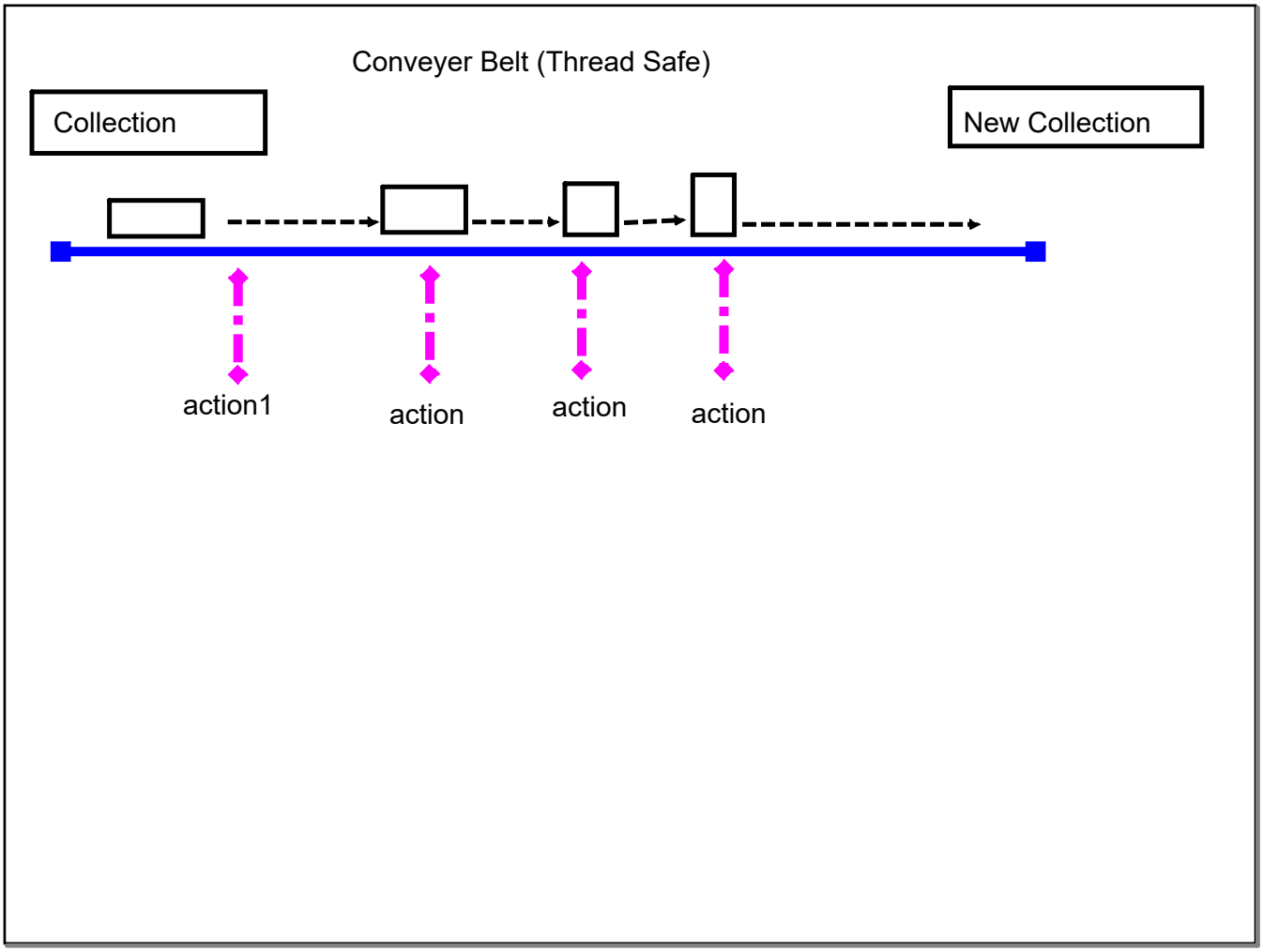
<> apply(<>) : Transformation

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

Phase1

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

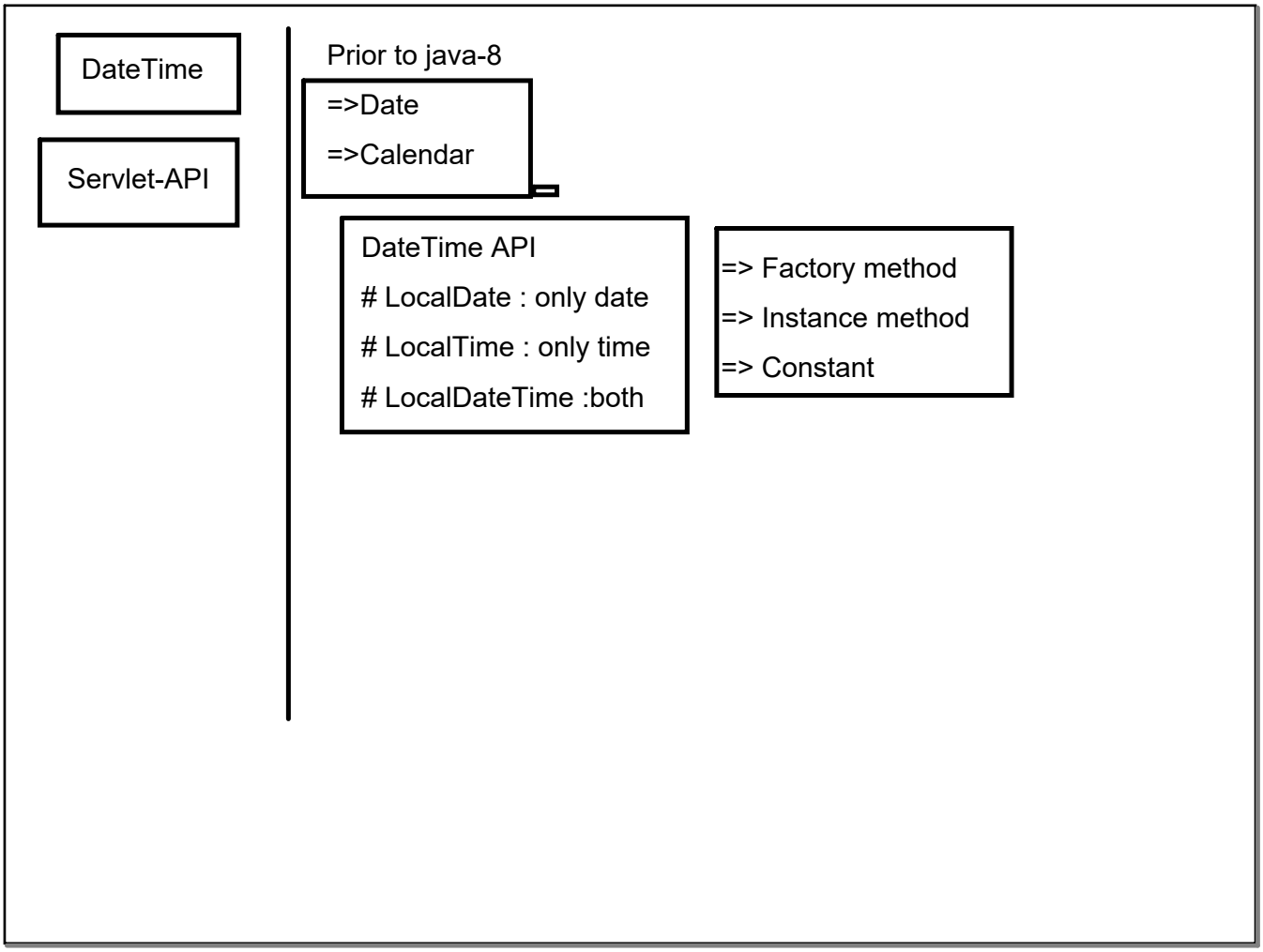
need to check if it is

Suggested best Practise : never return raw data

Optional

Data

Phase1


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:

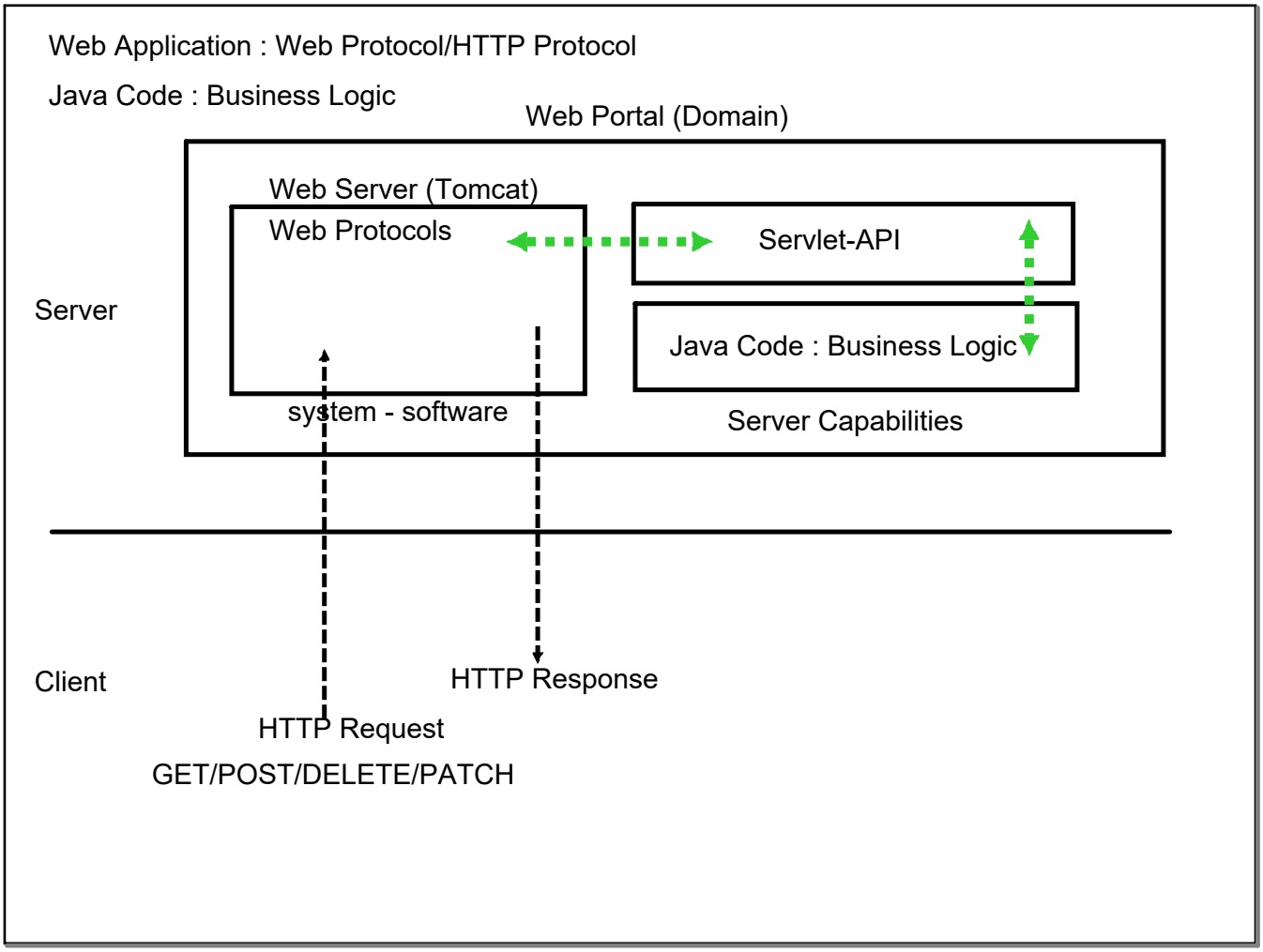
Popular API to create web application using Java

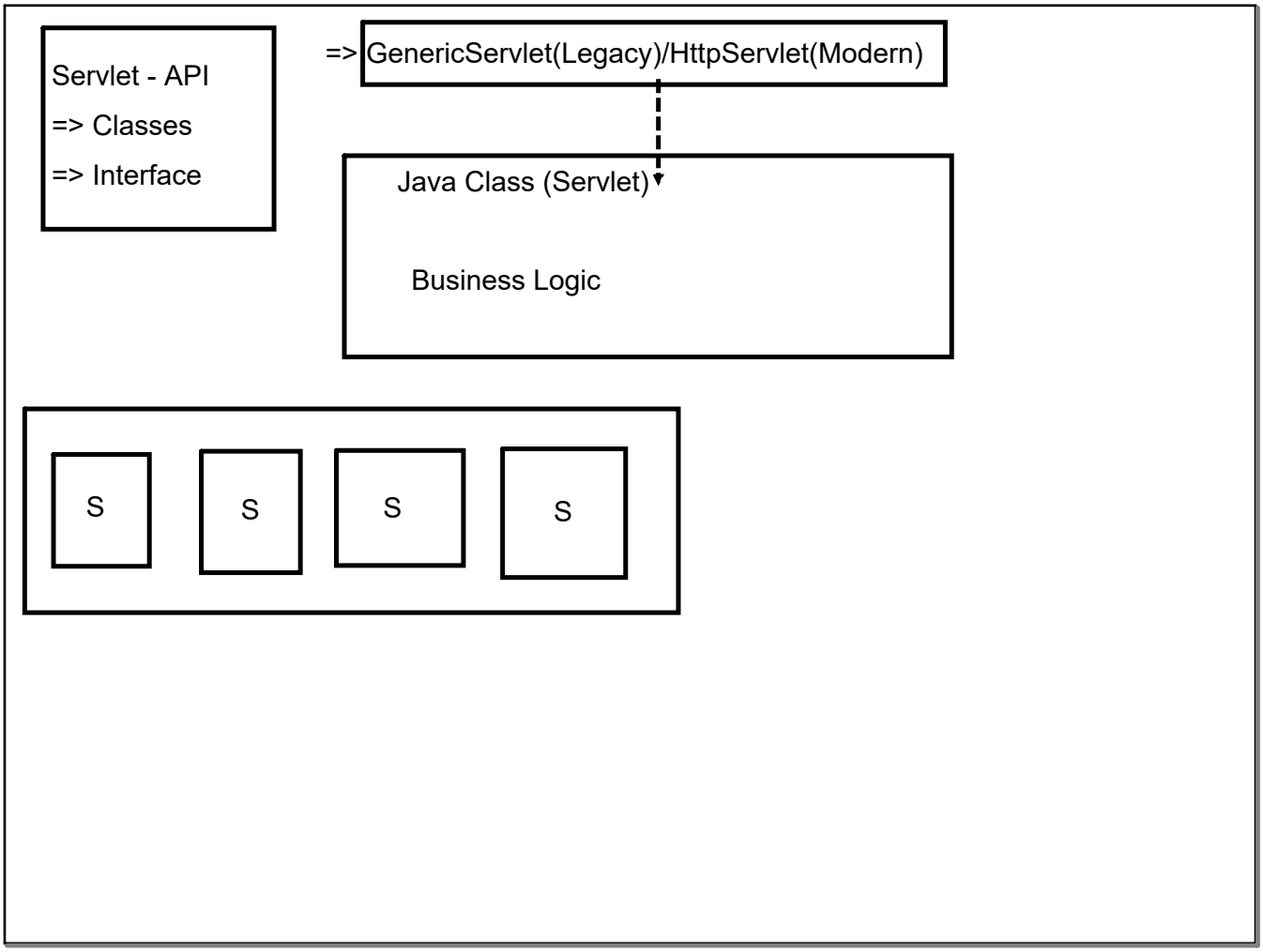
=> Core Java + Servlet-API

=> 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

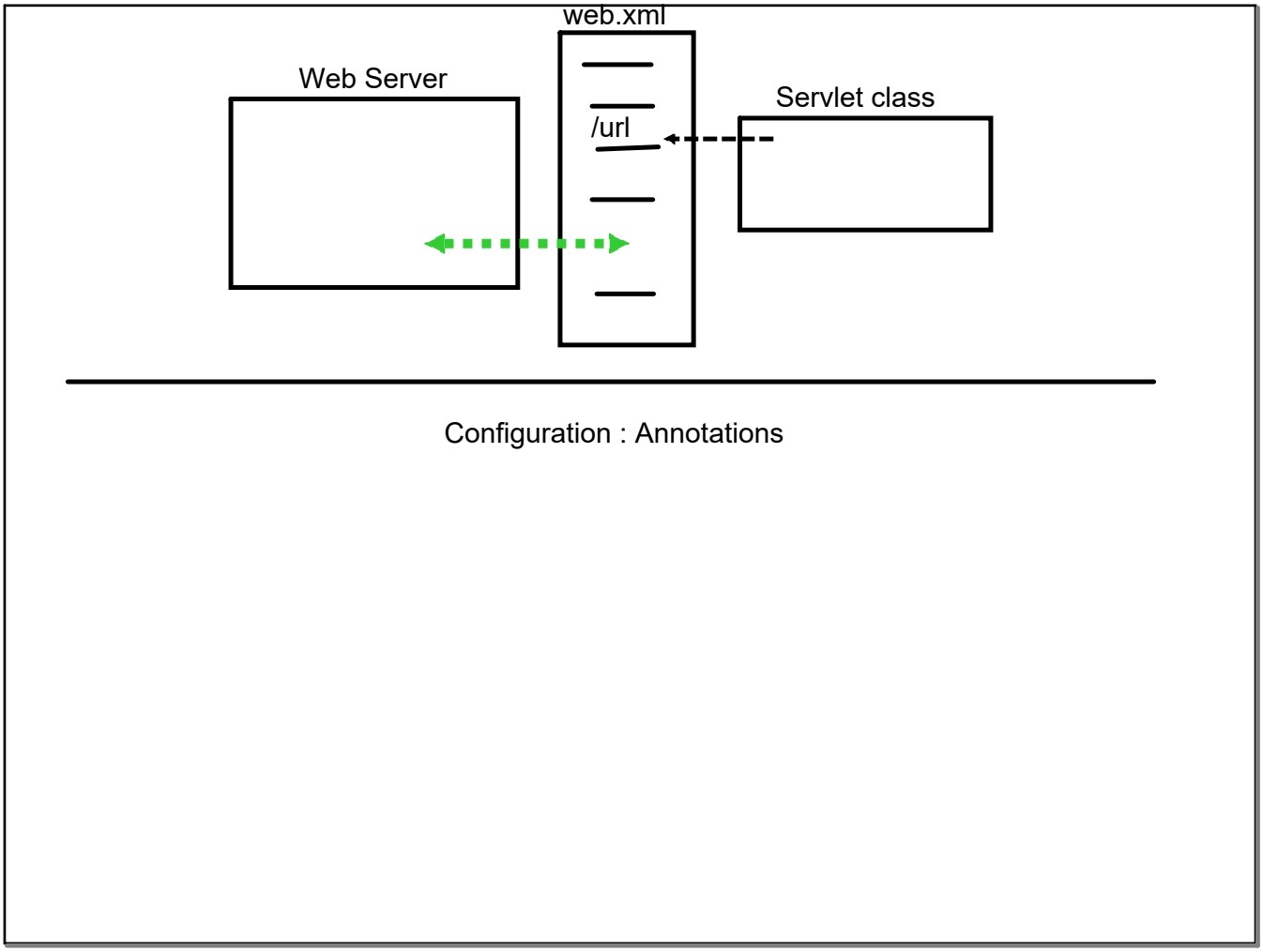
Every servlet needs to be registered with WebServer

Registration will be based on URL

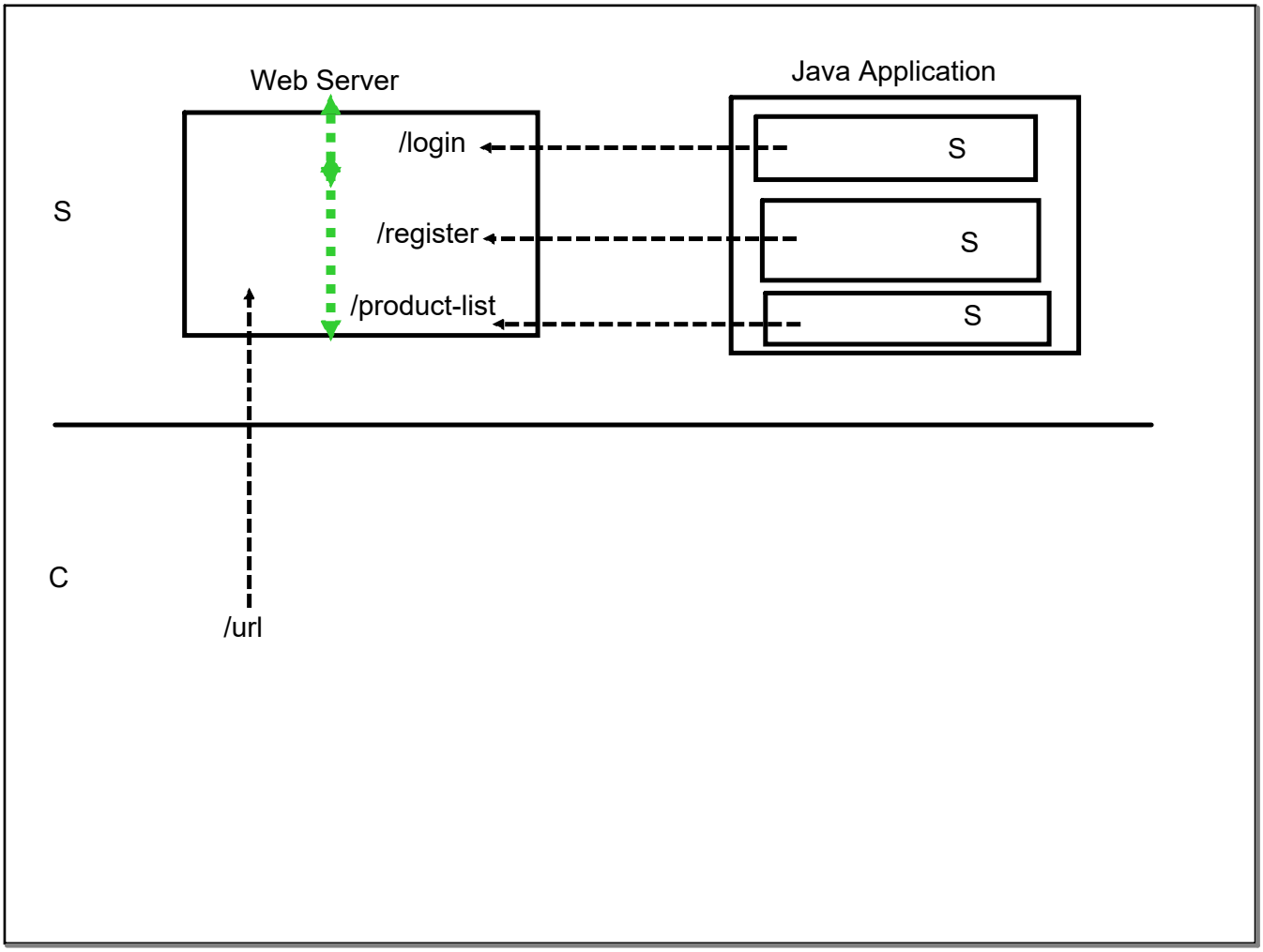
Registration will be done through a special manifest file

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
Configuration : Annotations

Phase1


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

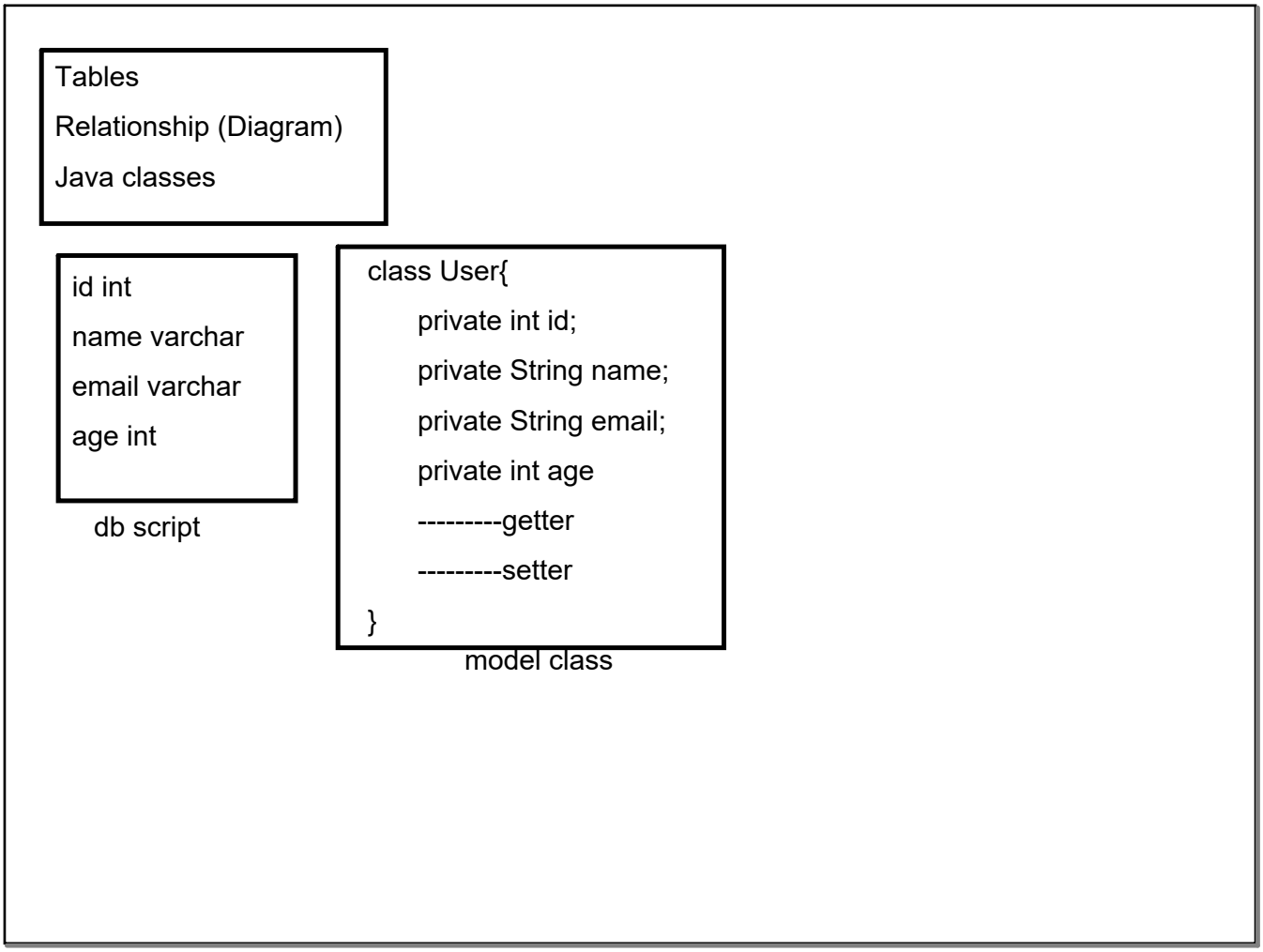
=> queue of request

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

Servlet must use Thread safe service

Names1 :

Name 2:


Tables
Relationship (Diagram)
Java classes
id int
name varchar
email varchar
age int
db script
class User{
private int id;
private String name;
private String email;
private int age
---------getter
---------setter
}
model class

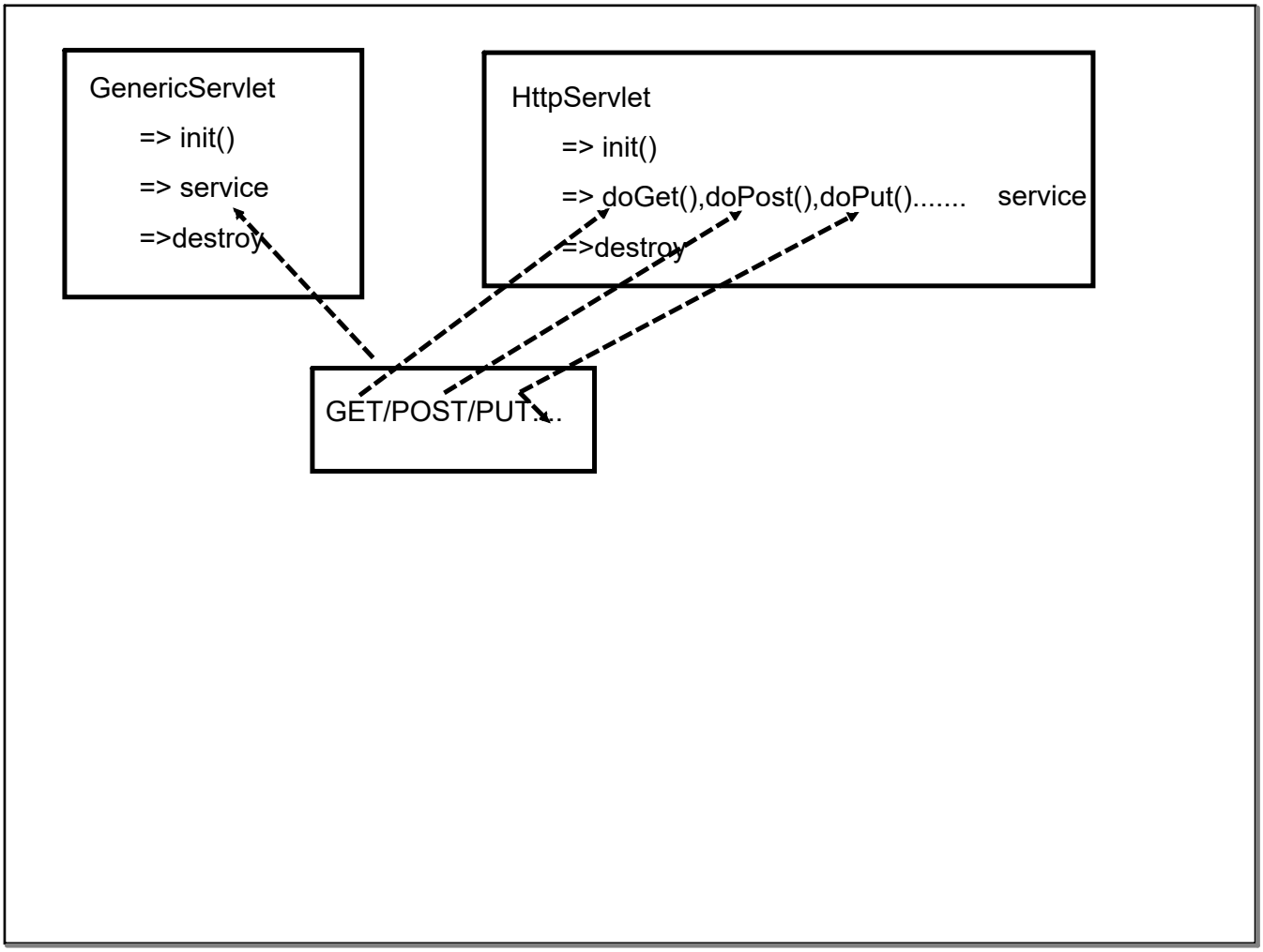
Phase1

Java Application + Servlet-API
Template : Dynamic Web Project

Eclipse IDE : plugin the Tomcat
auto process

Tomcat Server

1. build and package (war) the project
2. deploy/copy to working dir TOMCAT
3. Launch the server

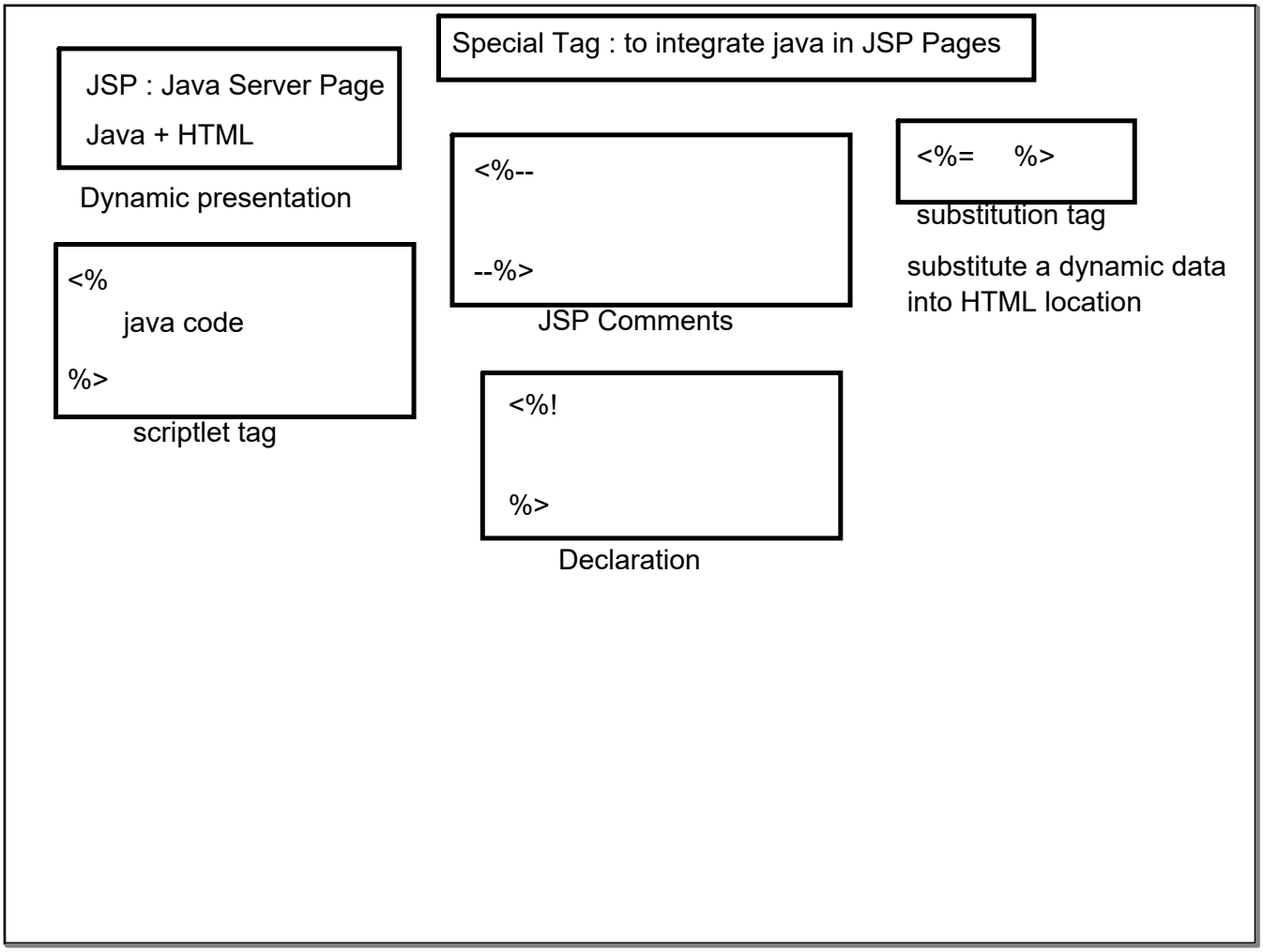

GenericServlet
=> init()
=> service
=>destroy
HttpServlet
=> init()
=> doGet(),doPost(),doPut()..... service
=>destroy
GET/POST/PUT...

```
HttpServletRequest request  => all info/functionality about request
HttpServletResponse response => all info/functionality about response
```

Response : HTML

JAVA CODE RESPOND BACK

1. Login Form (home-page)
2. Info as request ----------> Servlet
3. Fetch those info
4. business logic for credential
5. Welcome // Invalid


Special Tag : to integrate java in JSP Pages
JSP : Java Server Page
Java + HTML
Dynamic presentation
<%--
--%>
JSP Comments
<%= %>
substitution tag
substitute a dynamic data into HTML location
<%
java code
%>
scriptlet tag
<%!
%>
Declaration

JSP : Concept

=> Does not exists at runtime

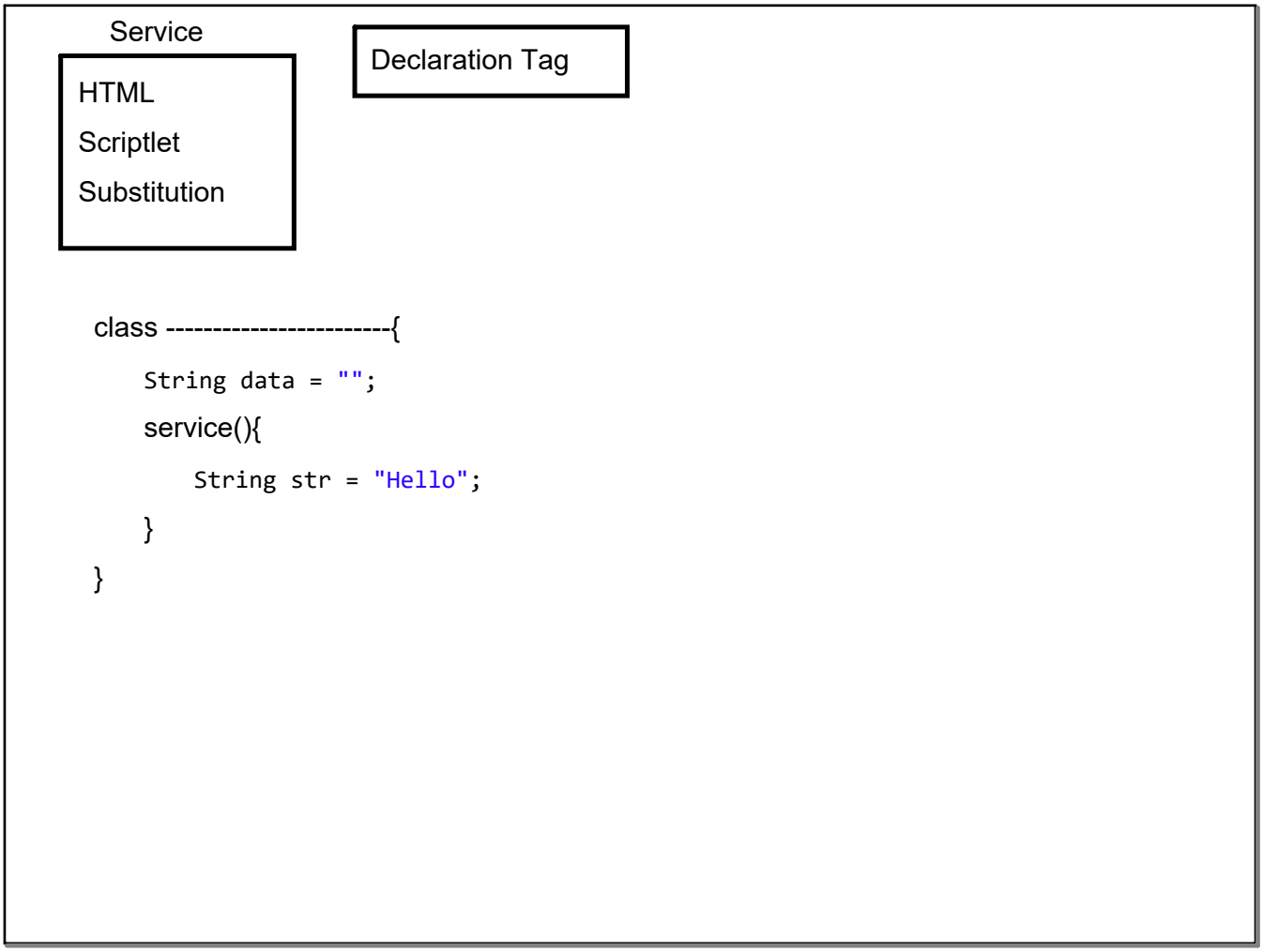
=> Another way of writing the servlet

=> JSP----------Servlet

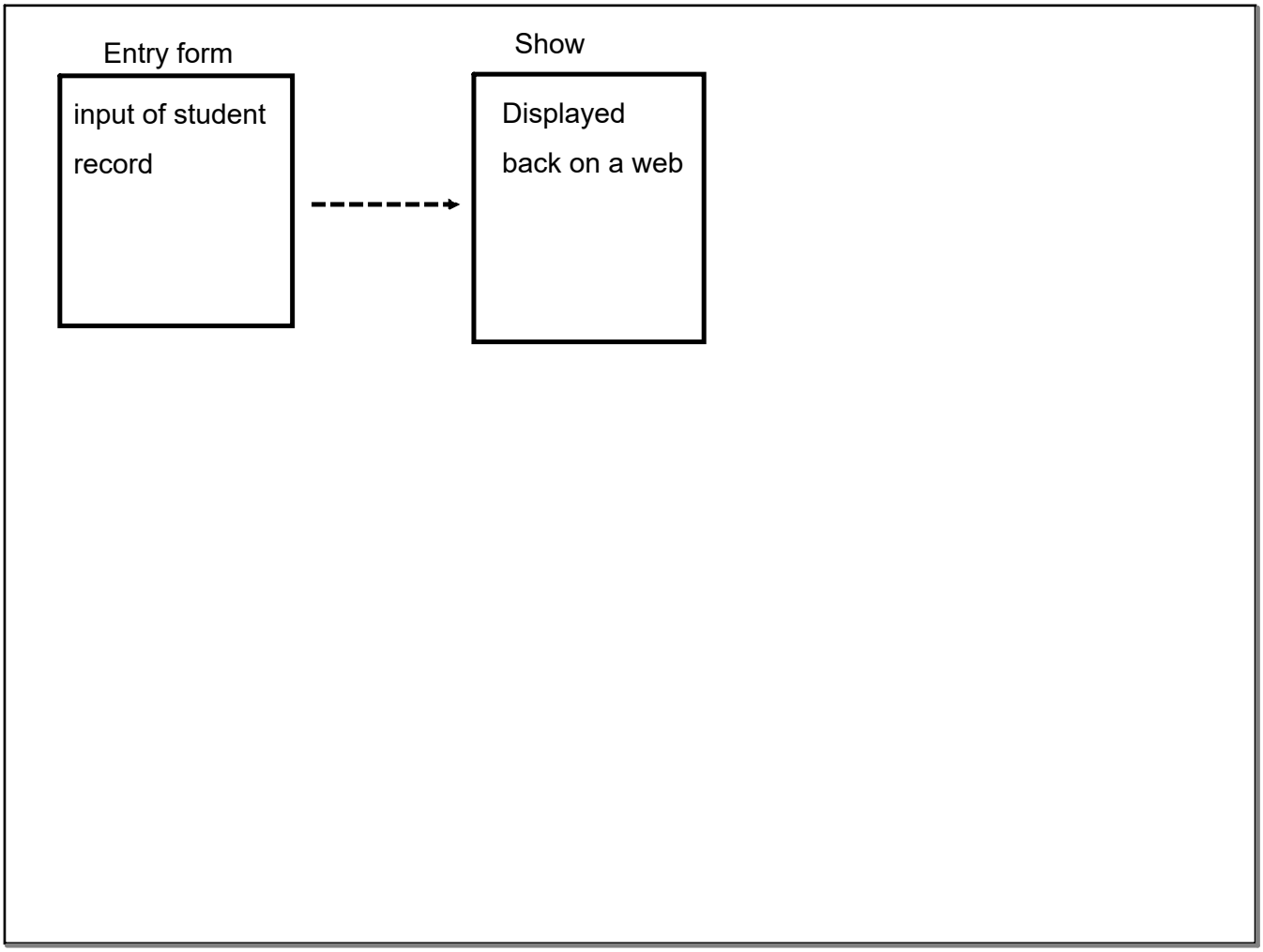
Dynamic web Create :

Servlet : Java business logic (class instance)

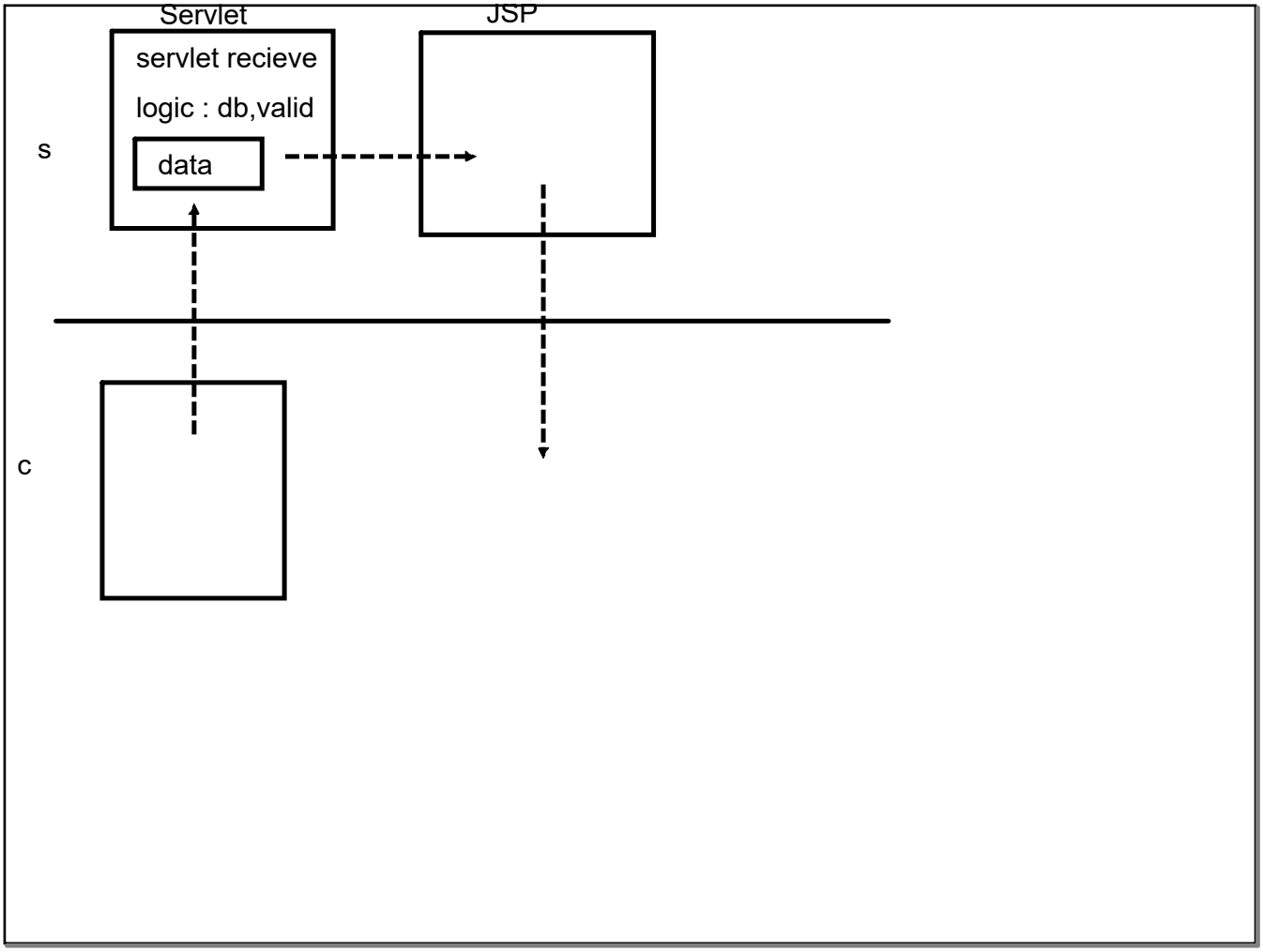
Servlet : Heavy presentation (jsp instance)

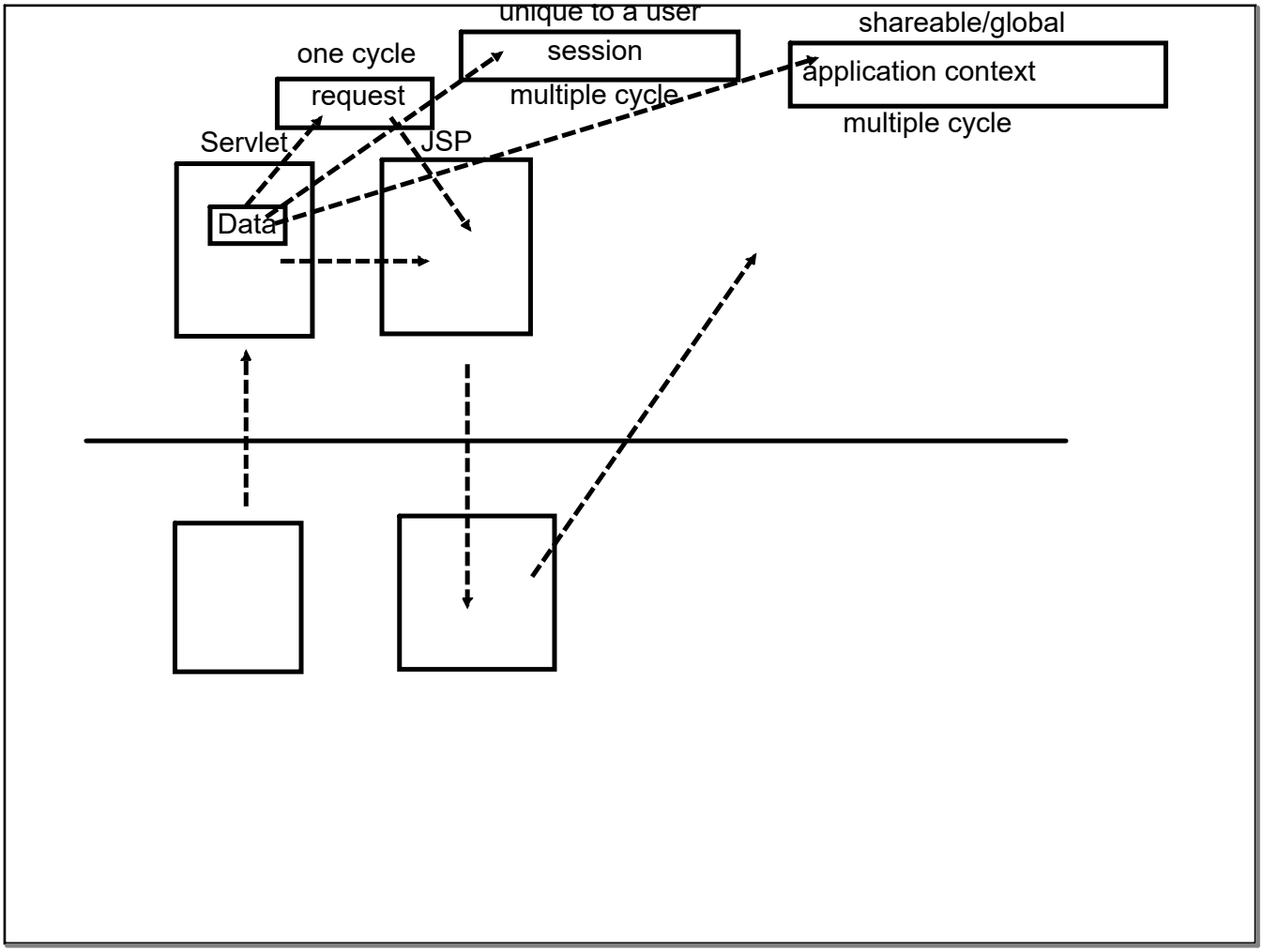

Service
HTML
Scriptlet
Substitution
Declaration Tag
class ----------{
String data = "";
service(){
String str = "Hello";
}
}

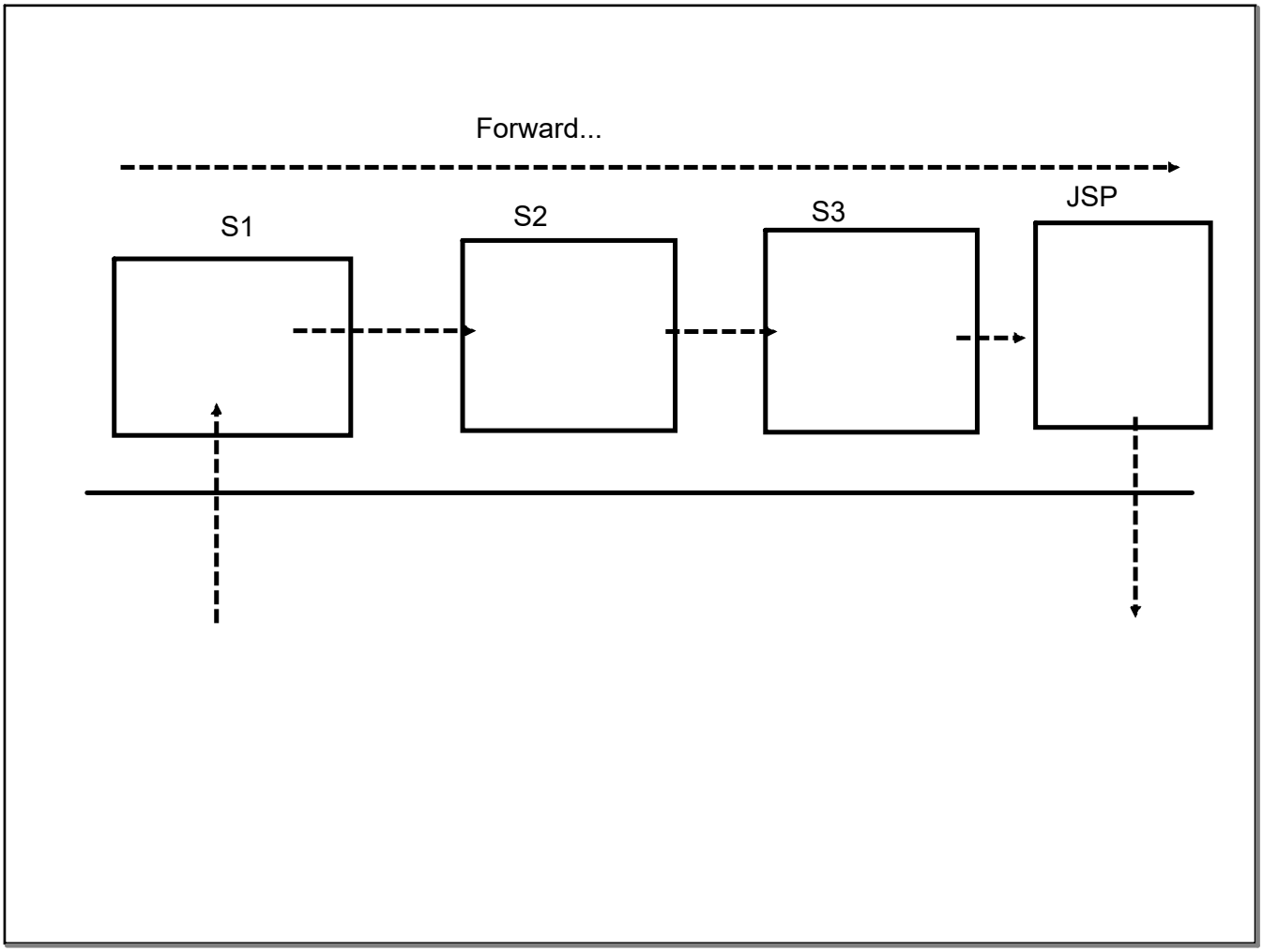
Phase1


Entry form
input of student record
Show
Displayed back on a web

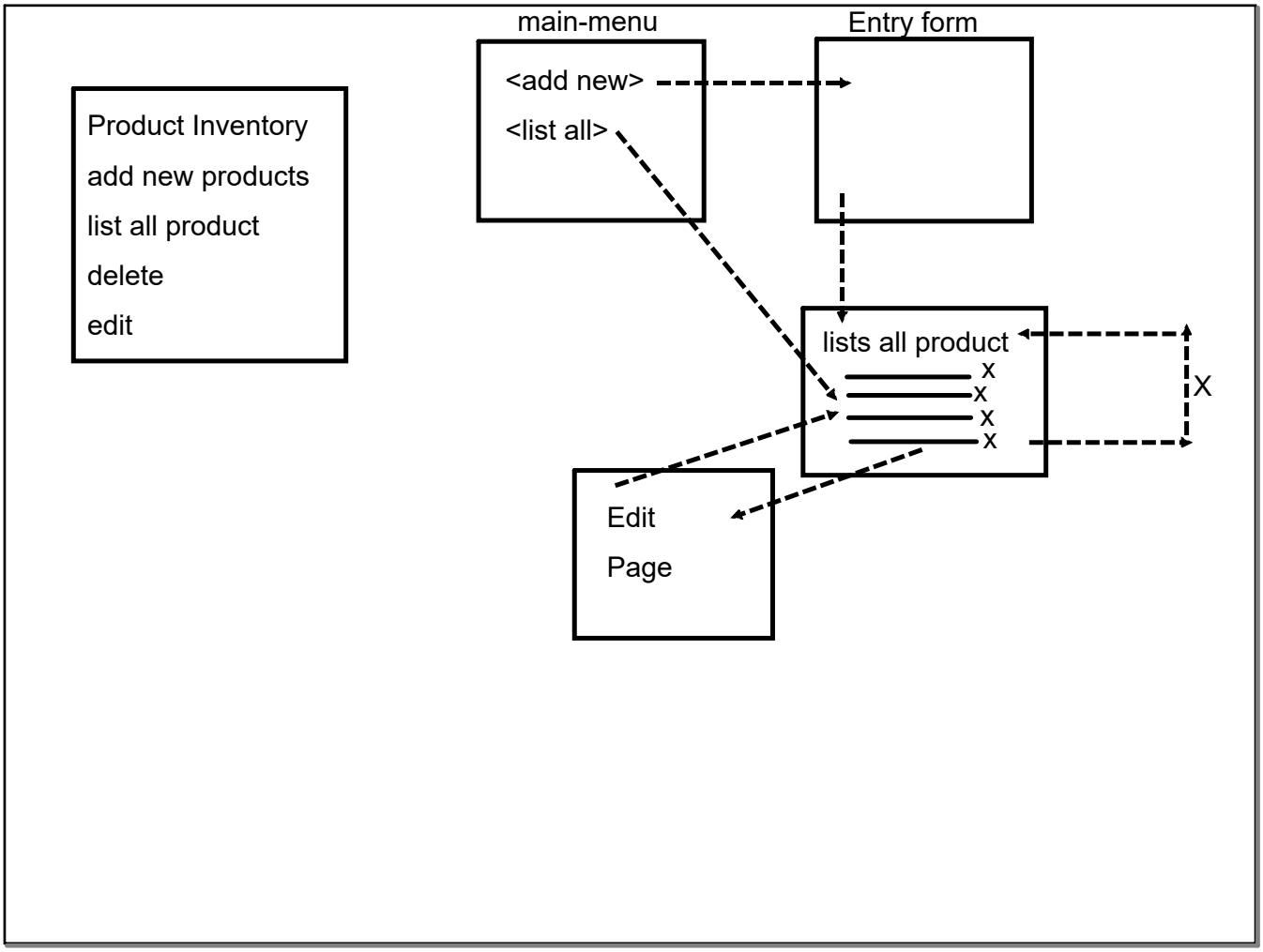
Phase1

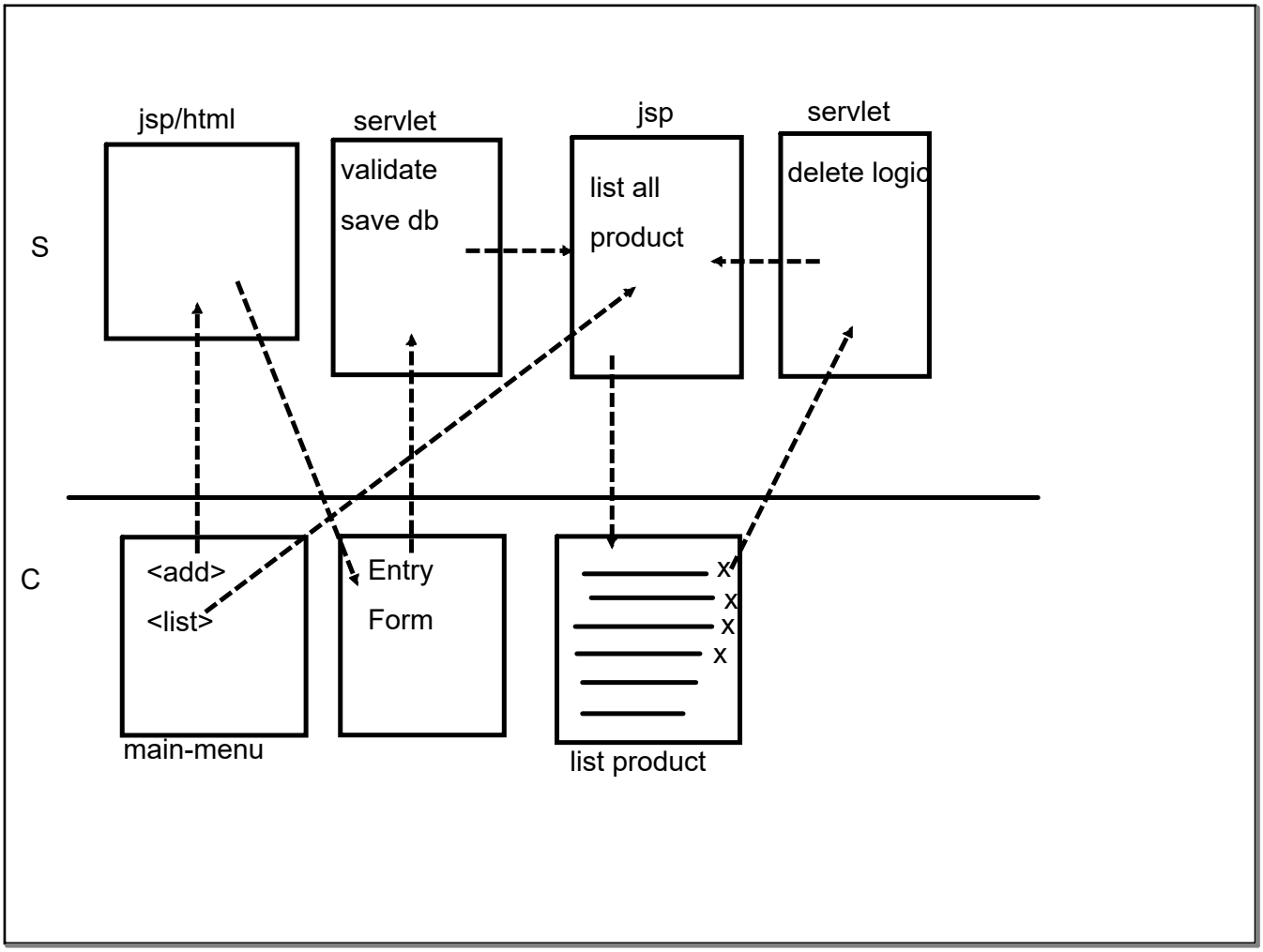



unique to a user
shareable/global
one cycle
session
application context
request
multiple cycle
multiple cycle
Servlet
JSP
Data


Forward...
S1
S2
S3
JSP

Phase1


main-menu
Entry form
<add new>
<list all>
Product Inventory
add new products
list all product
delete
edit
lists all product
x
x
x
x
X
Edit
Page


jsp/html
servlet
validate
save db
jsp
list all
product
servlet
delete logic
S
C
<add>
<list>
Entry
Form
x
x
x
x
main-menu
list product

MVC Architecture

Best Practice

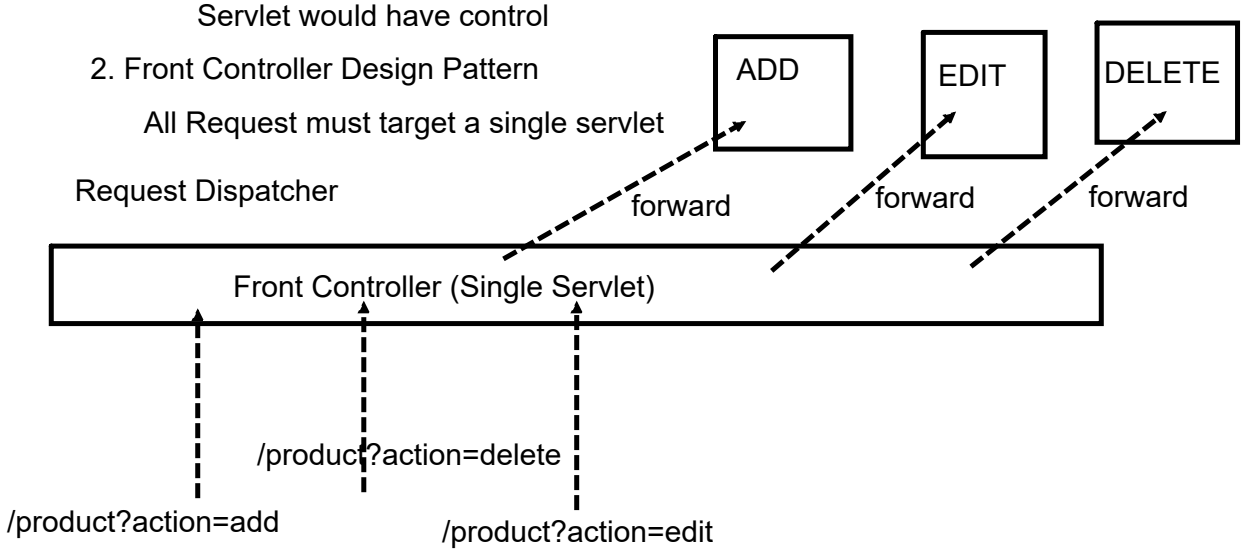
1. Never be calling a html/JSP

   All calls to presentation resource, should be through servlet only

   Servlet would have control

2. Front Controller Design Pattern

   All Request must target a single servlet




```
<input type="text" name="email" />
```

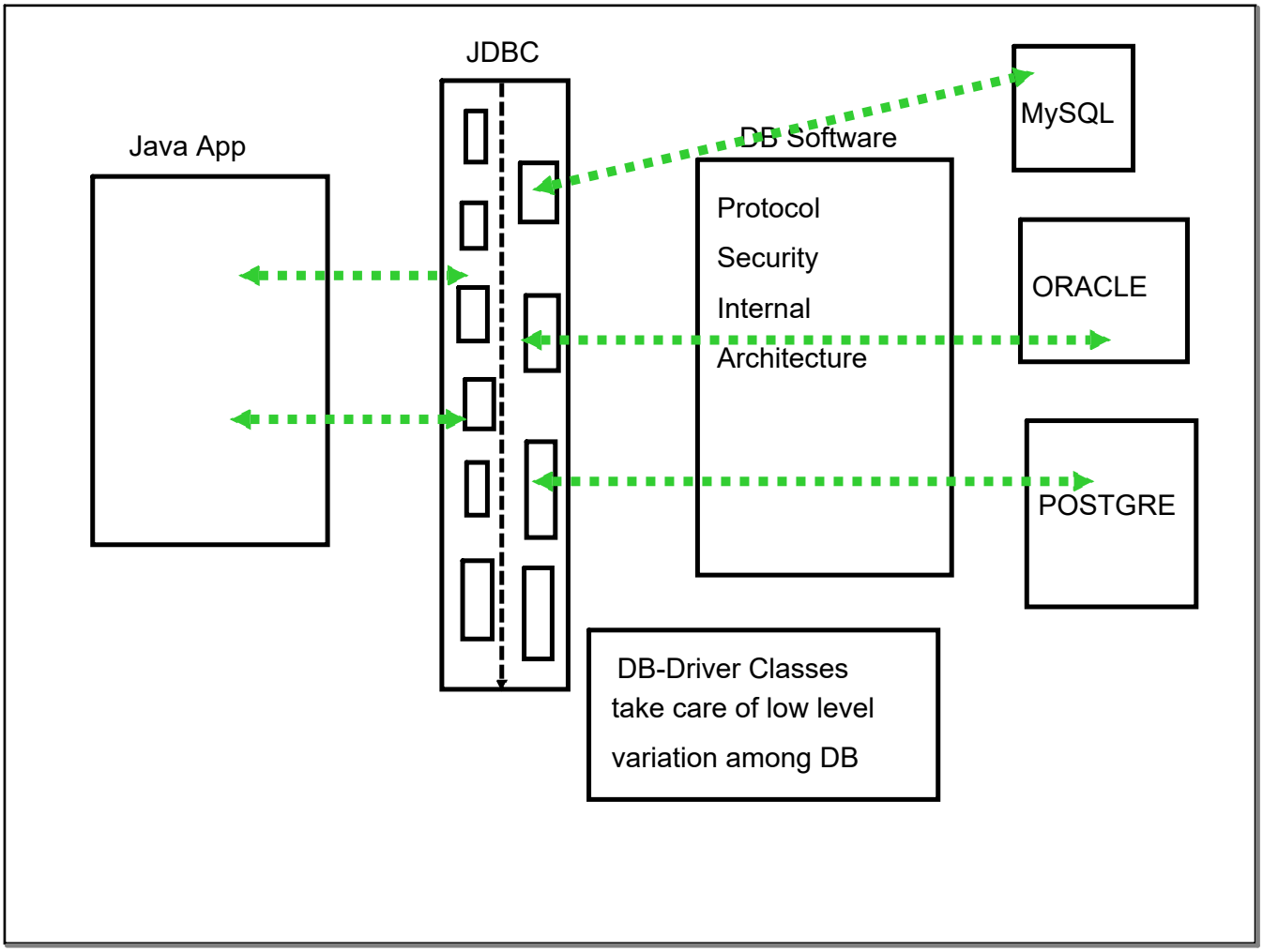
M : Model : request/session/context

V : View : JSP/HTML

C : Controller : Servlet

Separation of concern

JDBC : Java Data Base Connectivity


JDBC
Java App
DB Software
Protocol
Security
Internal
Architecture
MySQL
ORACLE
POSTGRE
DB-Driver Classes
take care of low level
variation among DB

Steps :

1. Load the driver class of that type
2. Create a connection
3. Create a statement
4. Fire the query