Java-8

=> Lambdas

Functional Programming

# those feature that define functional programming

# streams

# Executor (Future)

# Concurrency Collection

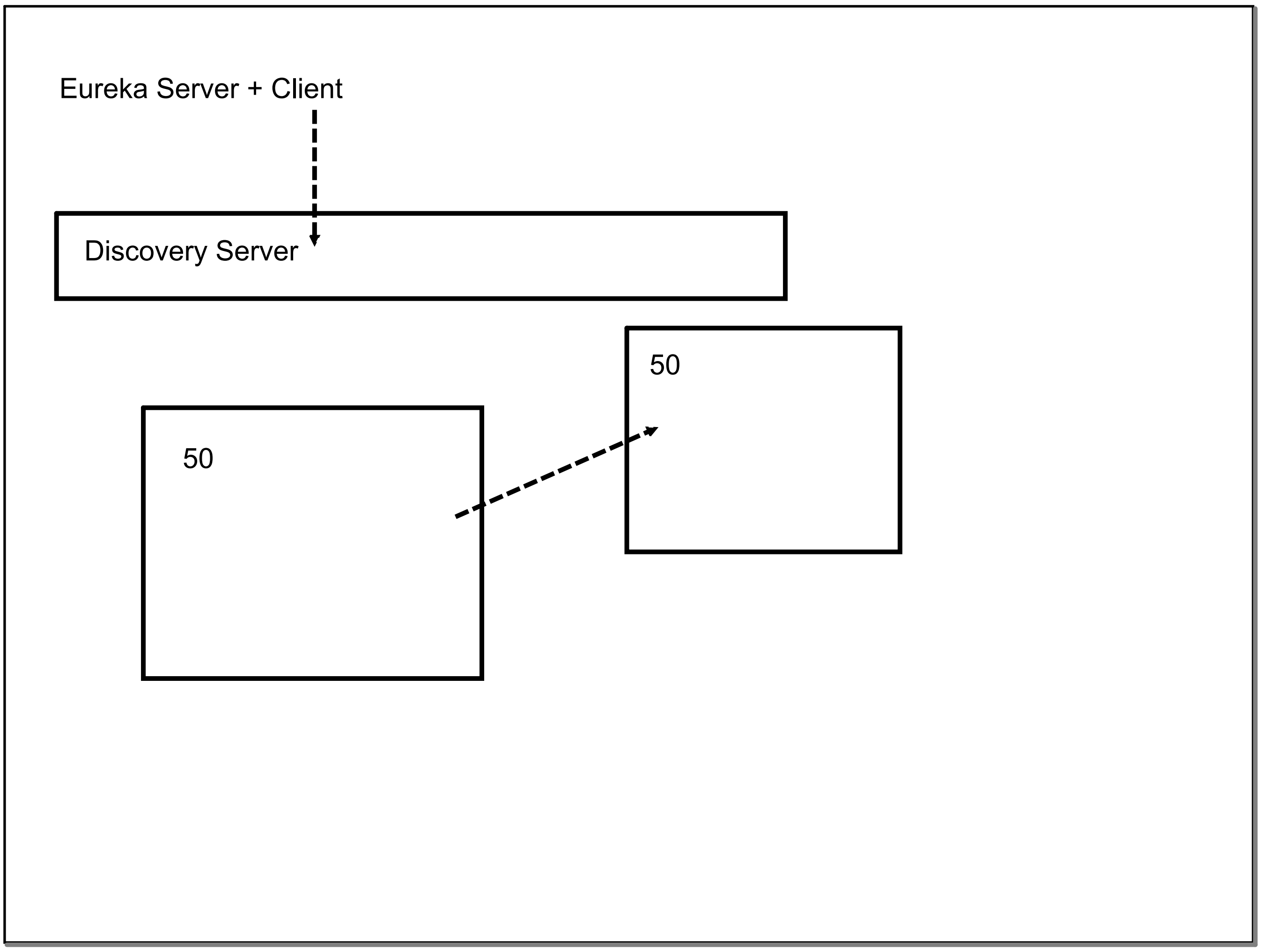
Style :

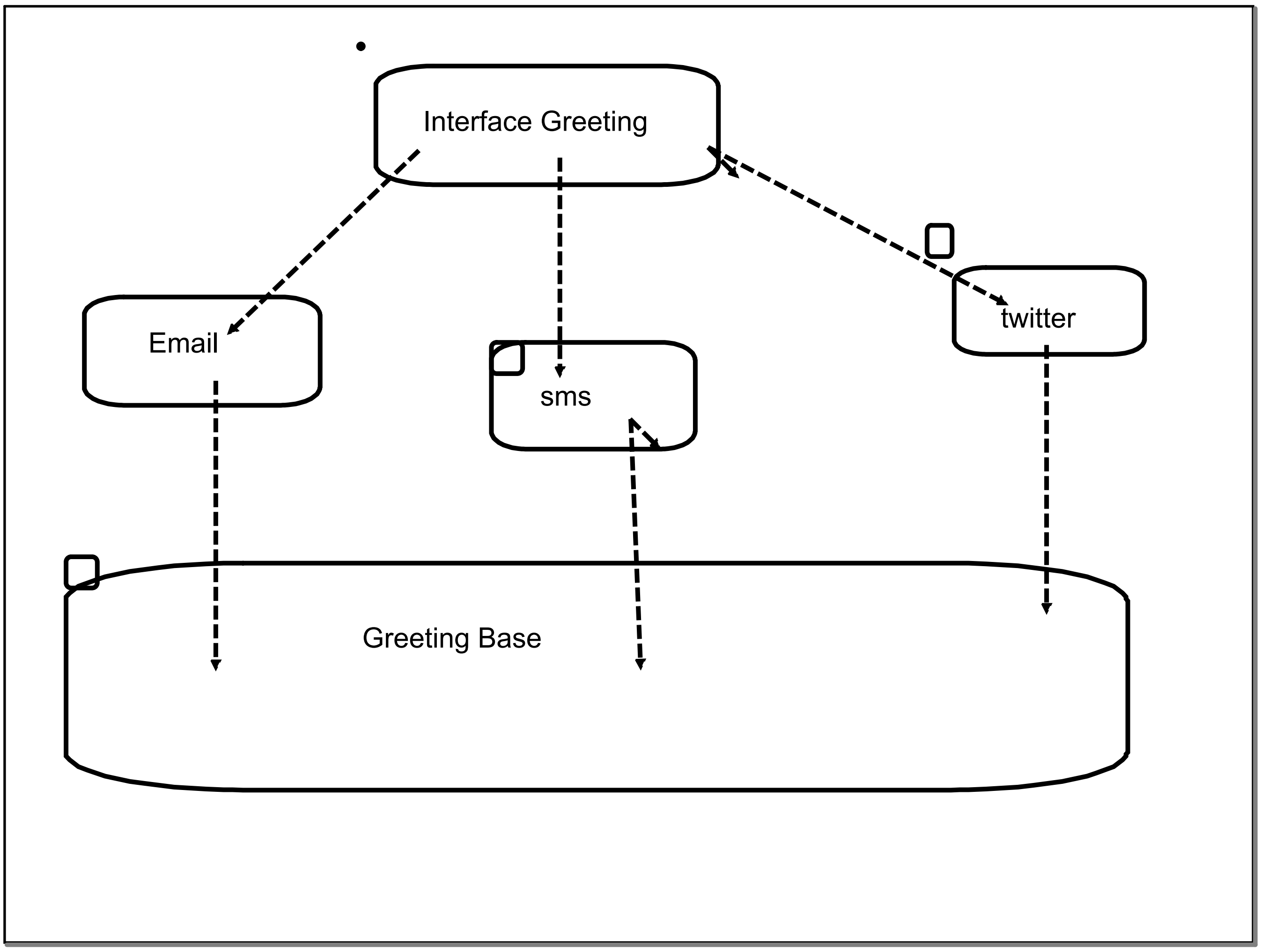
Traditional : Imperative

- (HOW)
- #exposing the steps how to perform an operation
- # embrace object mutability (not in sync with concurrency)

Functional : Declarative

- (What) : result
- immutability
- Analogous SQL


Eureka Server + Client
Discovery Server
50
50

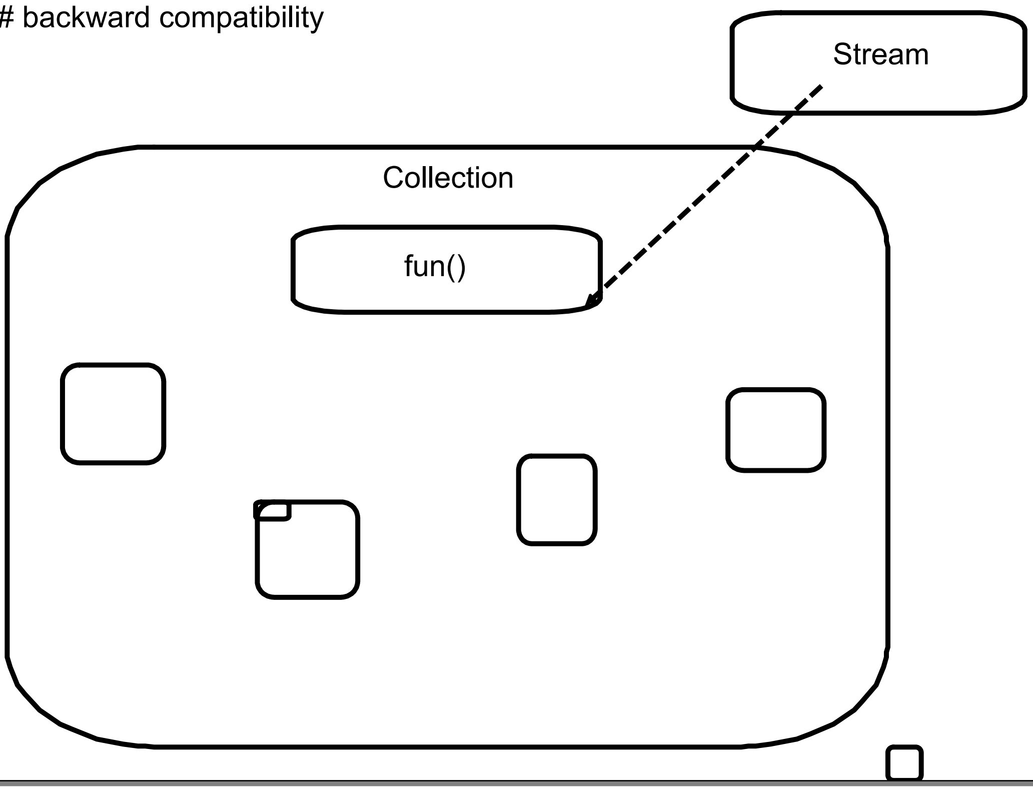

Interface Greeting
Email
sms
twitter
Greeting Base

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

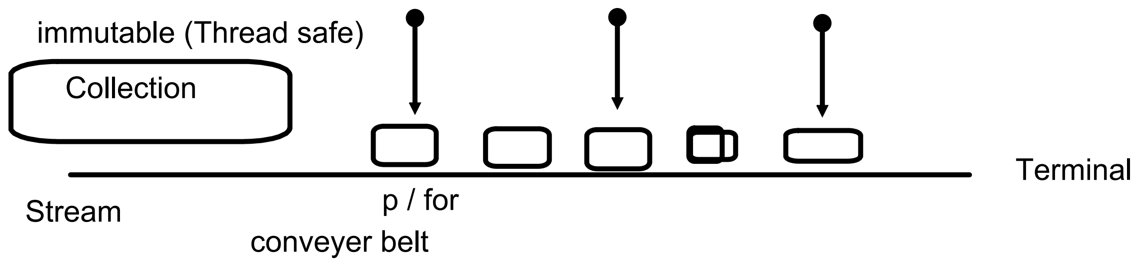
Explicit Functional Interface

```
# 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

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

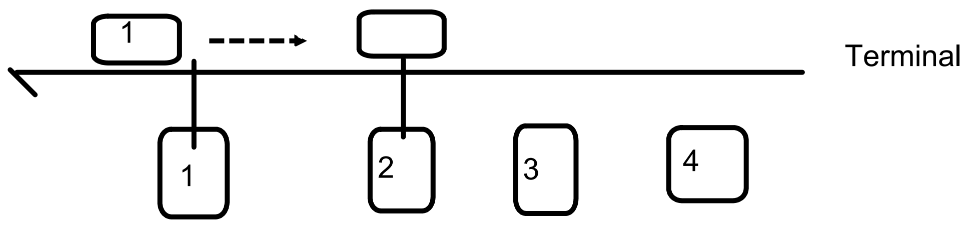
return type fixed : stream of data passed as argument

(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

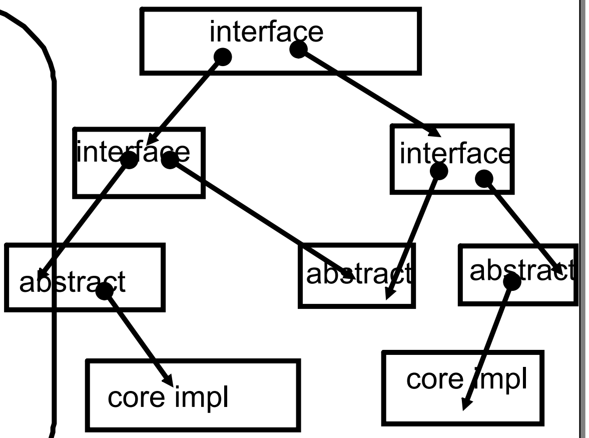
Thread per task

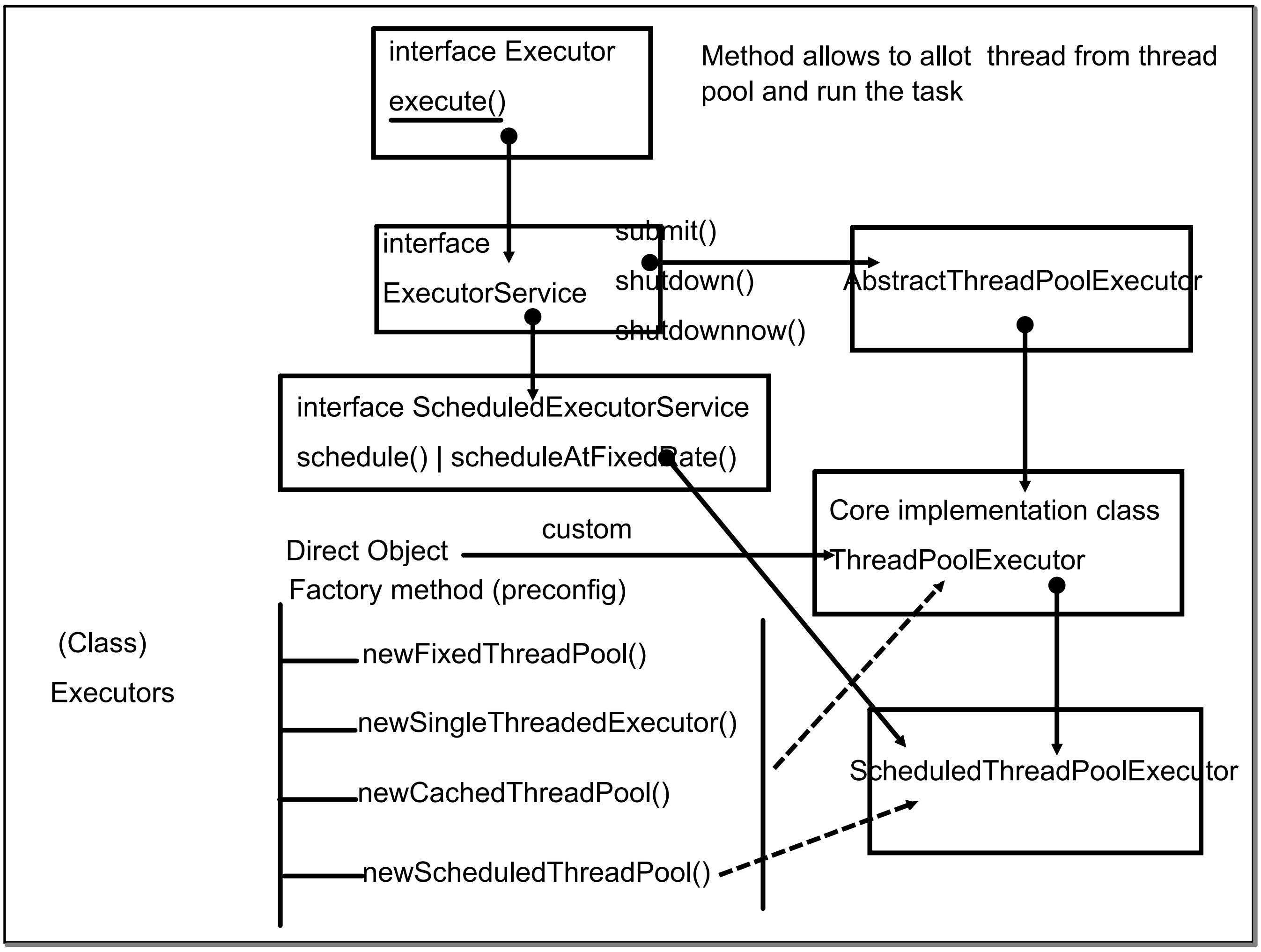
Not possible to keep a track of number of thread

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

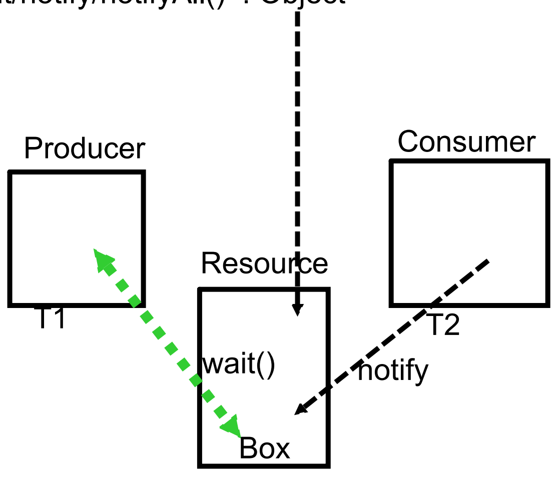
ScheduleThreadPool()

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

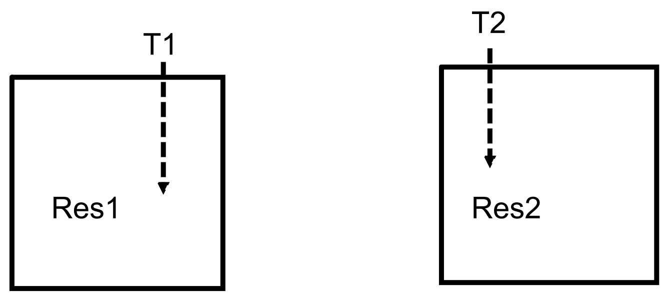
the method to associate a callback function

1. thenApply(Function); // transform
2. thenAccept(Consumer); // consuming and using

CompleatableFuture by default uses the inbuilt thread pool

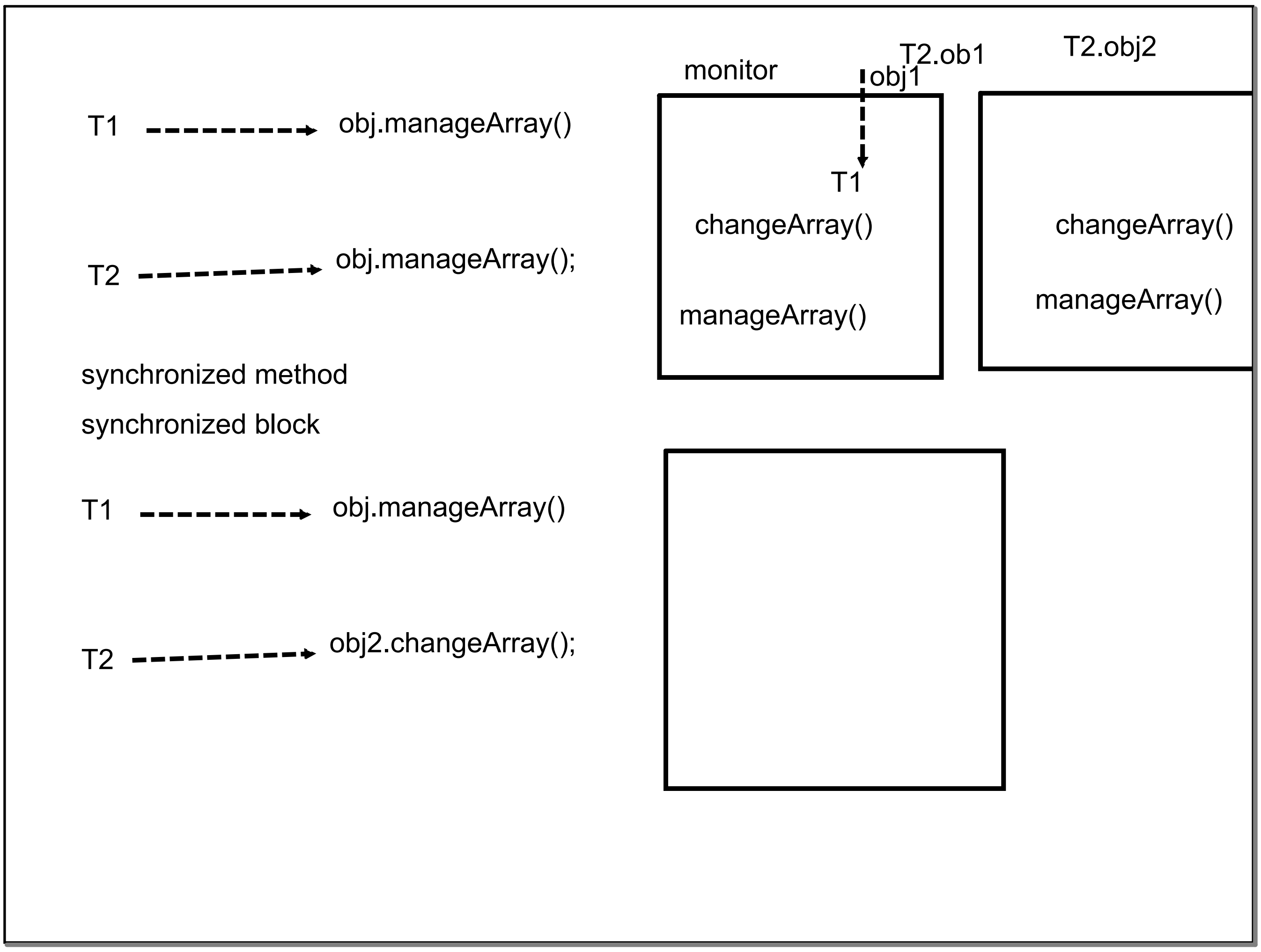
ForkJoinPool.commonPool();

Executor ThreadPool



Common Resource Shared among multiple threads (Thread safe)

Resolve Data inconsistency


T1
obj.manageArray()
T2
obj.manageArray();
monitor
T2.ob1
obj1
T1
changeArray()
manageArray()
T2.obj2
changeArray()
manageArray()
synchronized method
synchronized block
T1
obj.manageArray()
T2
obj2.changeArray();

locking :

=>wide spectrum locking : (synchronized...)

=>granular locking

java.util.concurrent.

API : Granular locking on resources

Collection API

1 .Traditional : 2

1. HashTable
2. Vector

2. To get a Thread safe variant of those class

Collections.concurrentList();

all methods are sync

Atomic operation : single CPU instruction

n=10; // Thread safe operations

assignment long/double are non-atomic

Concurent API : Focus on granular locking

Provides Atomic Variant of type : allow to convert non-atomic activities into atomic

# multiple approach for ThreadSafety along with high level of concurrency

ConcurrentHashMap

create segments internally

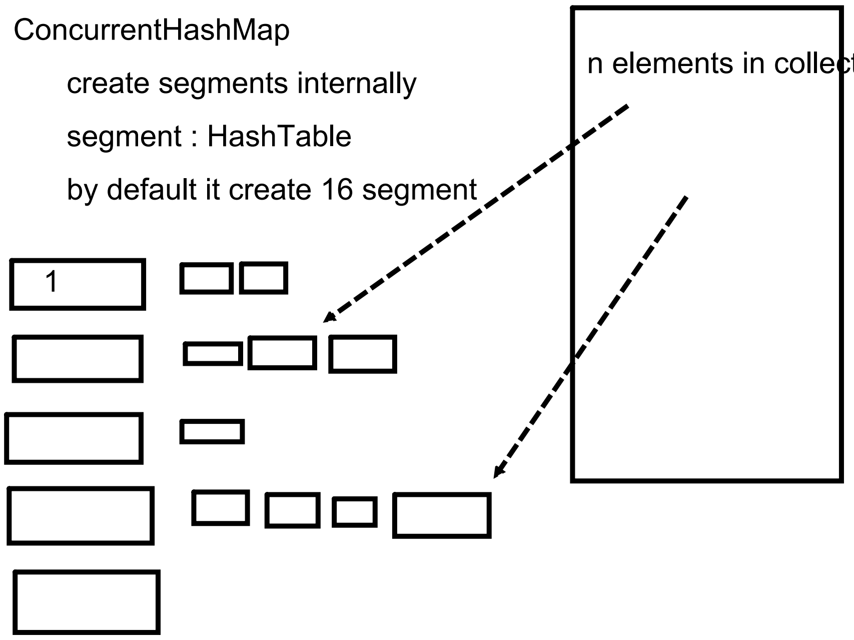
segment : HashTable

by default it create 16 segment

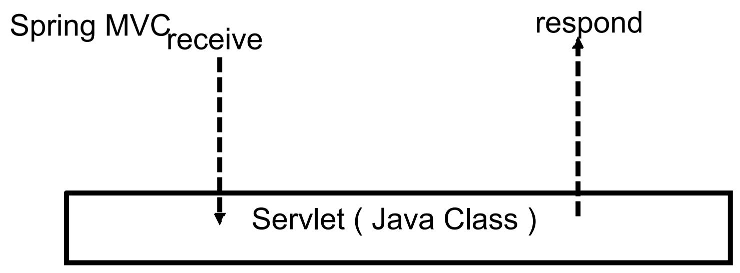
n elements in collection

n segment

n threads can use hashmap in thread safe



Servlet Technology



How to define java class as Servlet

Extends

HttpServlet/GenericServlet

GenericServlet : does not classifies between various HTTP Verbs

HttpServlet : can identify

GET/POST/PUT/DELETE/PATCH

Life Cycle

=> init

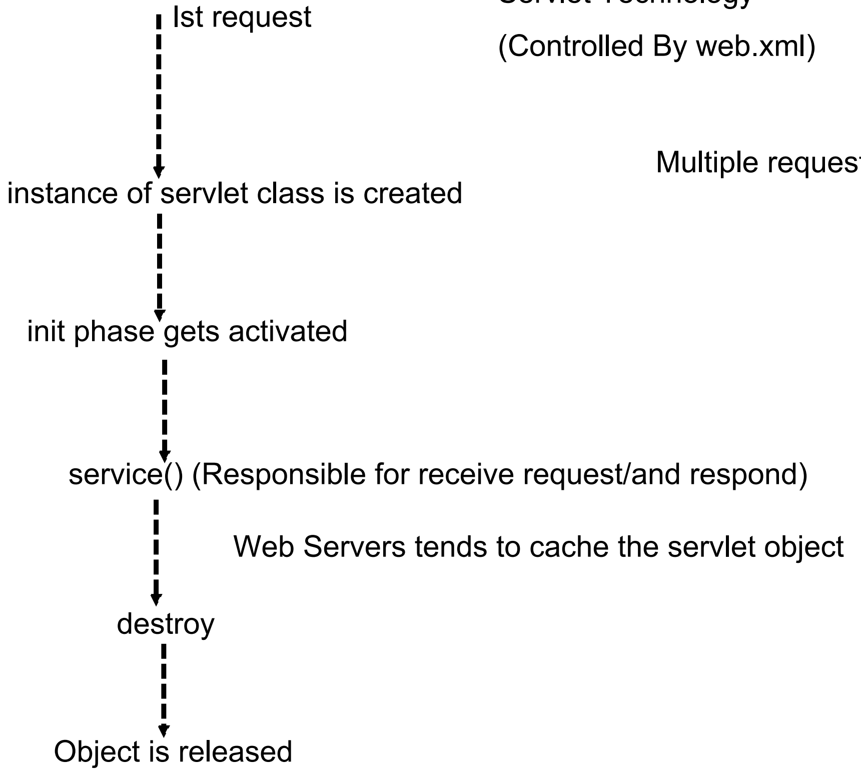
=> generic service() / http (doPost()/doGet()/doDelete()

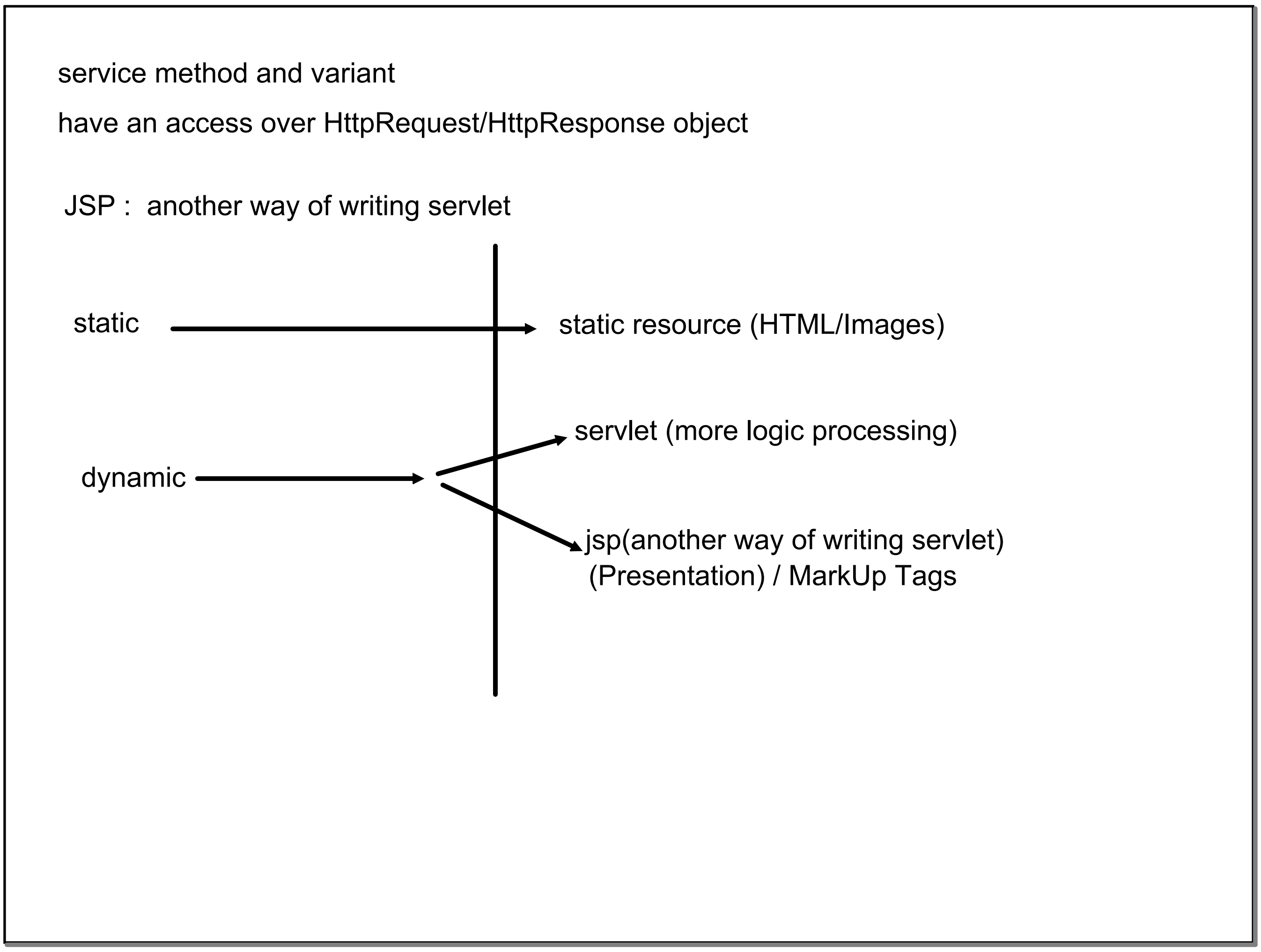
=>destroy

Servlet Technology

(Controlled By web.xml)

Multiple request simultaneously


Ist request
instance of servlet class is created
init phase gets activated
service() (Responsible for receive request/and respond)
Web Servers tends to cache the servlet object
destroy
Object is released



service method and variant

have an access over HttpRequest/HttpResponse object

JSP : another way of writing servlet

static
static resource (HTML/Images)
dynamic
servlet (more logic processing)
jsp(another way of writing servlet)
(Presentation) / MarkUp Tags

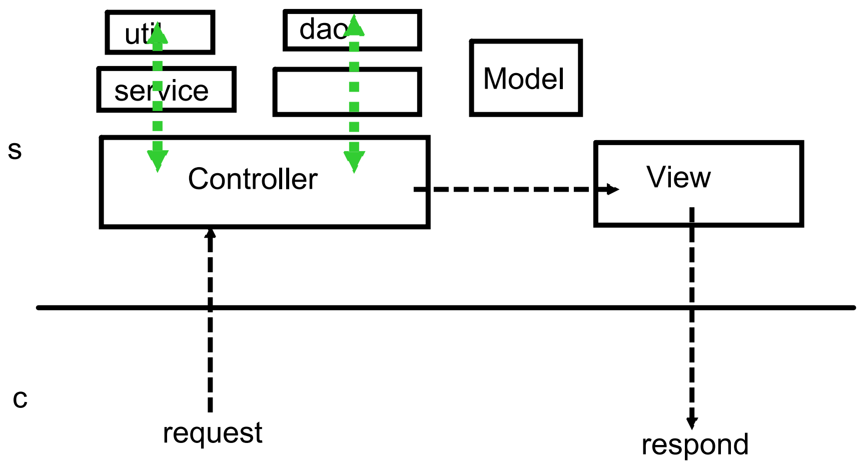
Spring uses Servlet Technology:

But provides a high level abstraction over complexities/ boilerplate req / config

and enhances the seperation of concerns

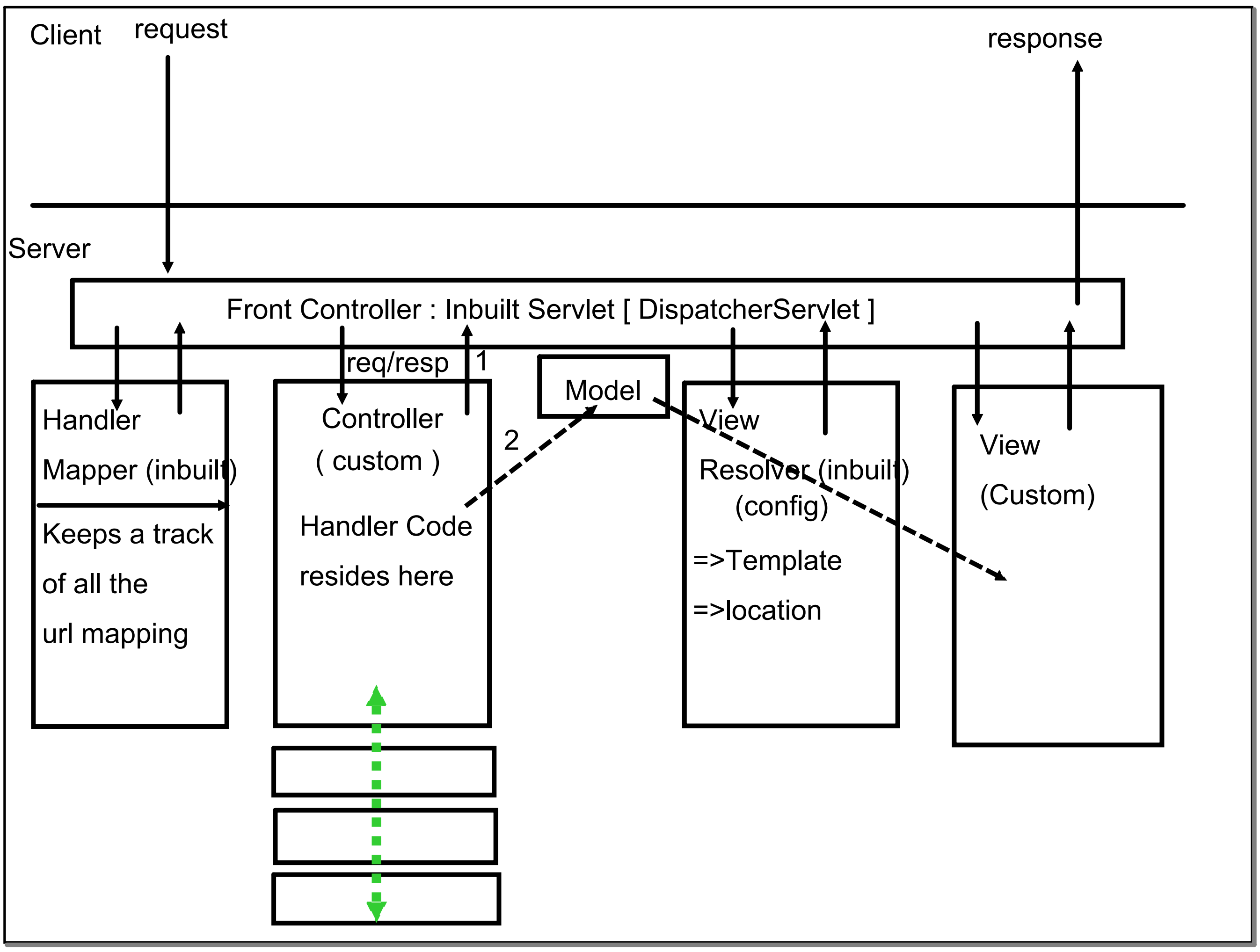
MVC architecture

Controller : to receive request / process it



Servlet

service method as task :
assign it to thread


Client
request
response
Server
Front Controller : Inbuilt Servlet [DispatcherServlet]
Handler
Mapper (inbuilt)
Keeps a track
of all the
url mapping
req/resp
1
Controller
(custom)
Handler Code
resides here
2
Model
View
Resolver (inbuilt)
(config)
=>Template
=>location
View
(Custom)

we need to register your app resources (servlet spec)

Servlet :

need to register

registeration can also be done using annotation

Register DispatcherServlet

Config of Spring in place

xml file

java

Need Spring config to connect with DS

xml : <servlet-name>-servlet.xml

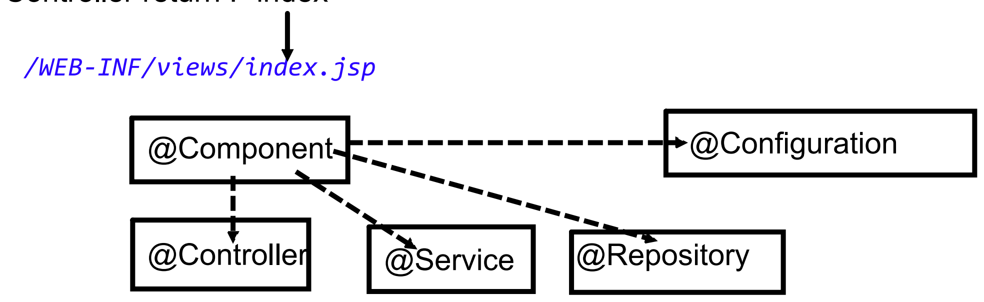
View Resolver : location + template (jsp+jstl) [extension]

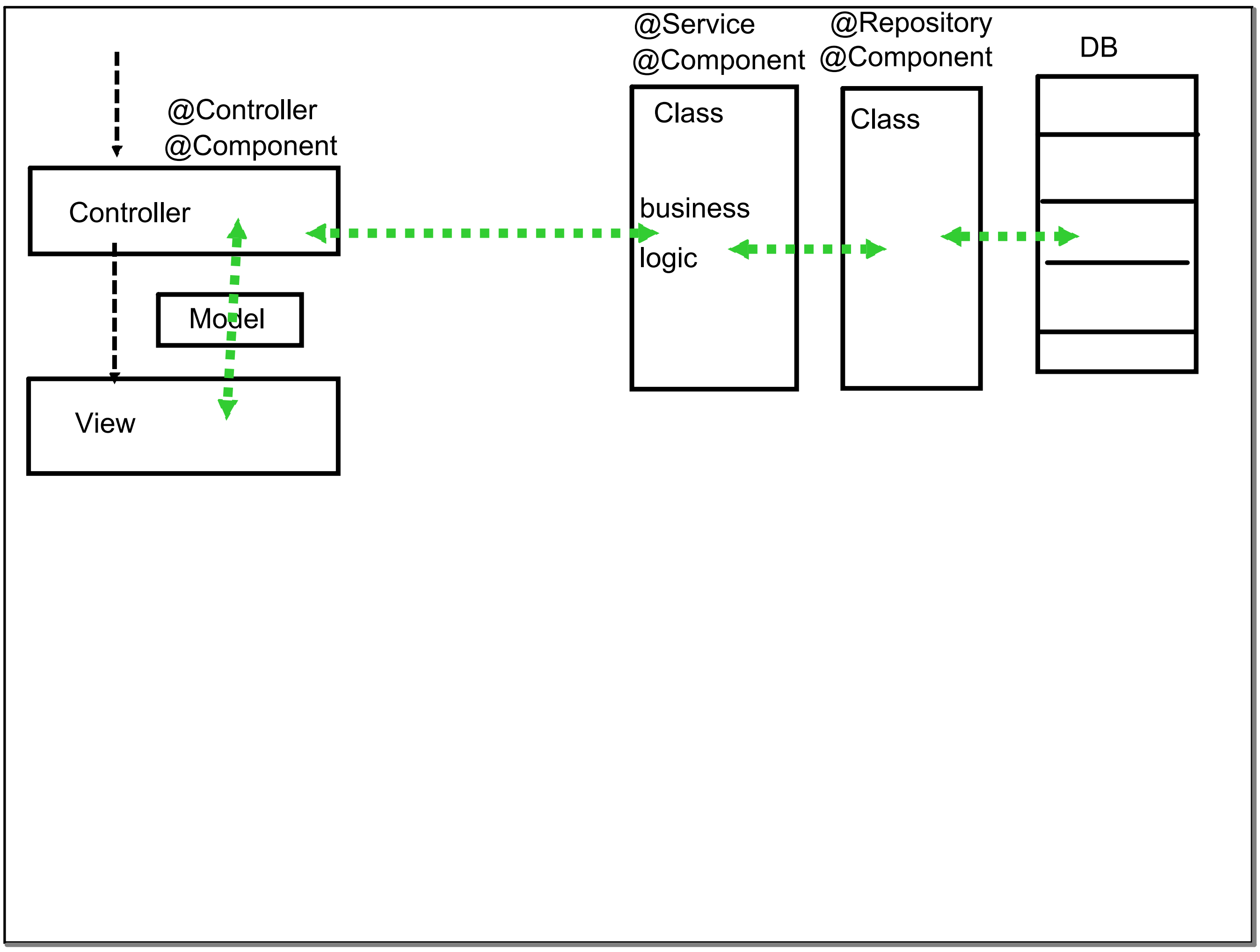
Controller : "index"

create a complete path

```
<bean class="org.springframework.web.servlet.view.InternalResourceViewResolver">
        <property name="prefix" value="/WEB-INF/views/" />
        <property name="suffix" value=".jsp"/>
    </bean>
```

Controller return : "index"




@Controller
@Component
Controller
Model
View
@Service
@Component
Class
business
logic
@Repository
@Component
Class
DB

web.xml : ~ java config class

dispatcher-servlet.xml : ~ java config class

1. alternate for packaging : maven war plugin

Spring provides an inbuilt class to register DS

Spring-Boot

=> dependency management

=> configuration

dependency management

library + external other resources

spring-boot :

dependency

spring-starter-project

Spring - starter -(parent)project

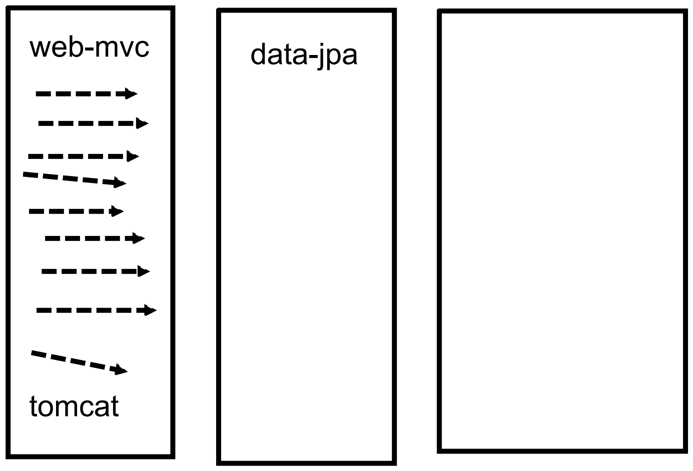
# Support of Auto-configuration / less amount of code

# manage Embedded Server

Created/Developed

and Launched

stand-alone way



start.spring.io

maven cli

maven command

Configuration

  # Spring boot Annotation

  # Dependency

  # Customization : special file application.properties

    key=value

key : predefined keys from different spring projects

  : possible values

  : custom keys/values

spring : yaml

   : heirarchy

   : application.yaml

Spring Boot Annotation

curated list of multiple annotation

EnableAutoConfiguration

- # tracking the dependencies
- # based on dependencies added:
  - add default config
  - expose the key
- eg:
  - maven-web : Spring mvc:
    - DS servlet
  - spring-security
    - add default security
    - expose username/passed
- # tracking the properties files
  - looks for custom key-values pairs

defined in config-file

cli : key-values

mvc application

    controller

    view

pre-configured to use thymeleaf

View pages :

View Templates

Jsp-jstl

Thymeleaf

Mustache

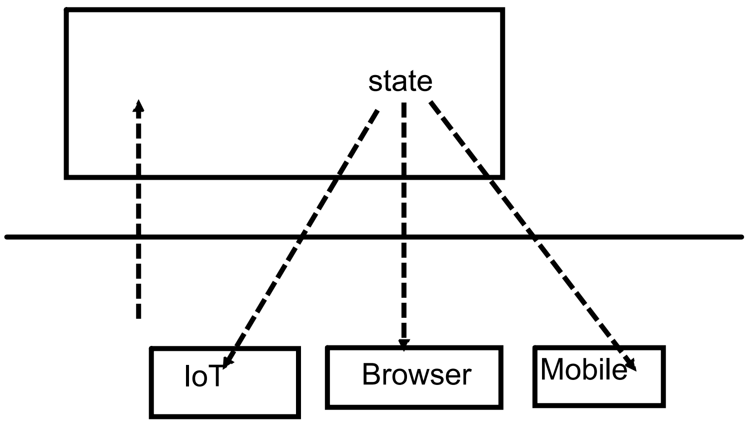
FreeMArker

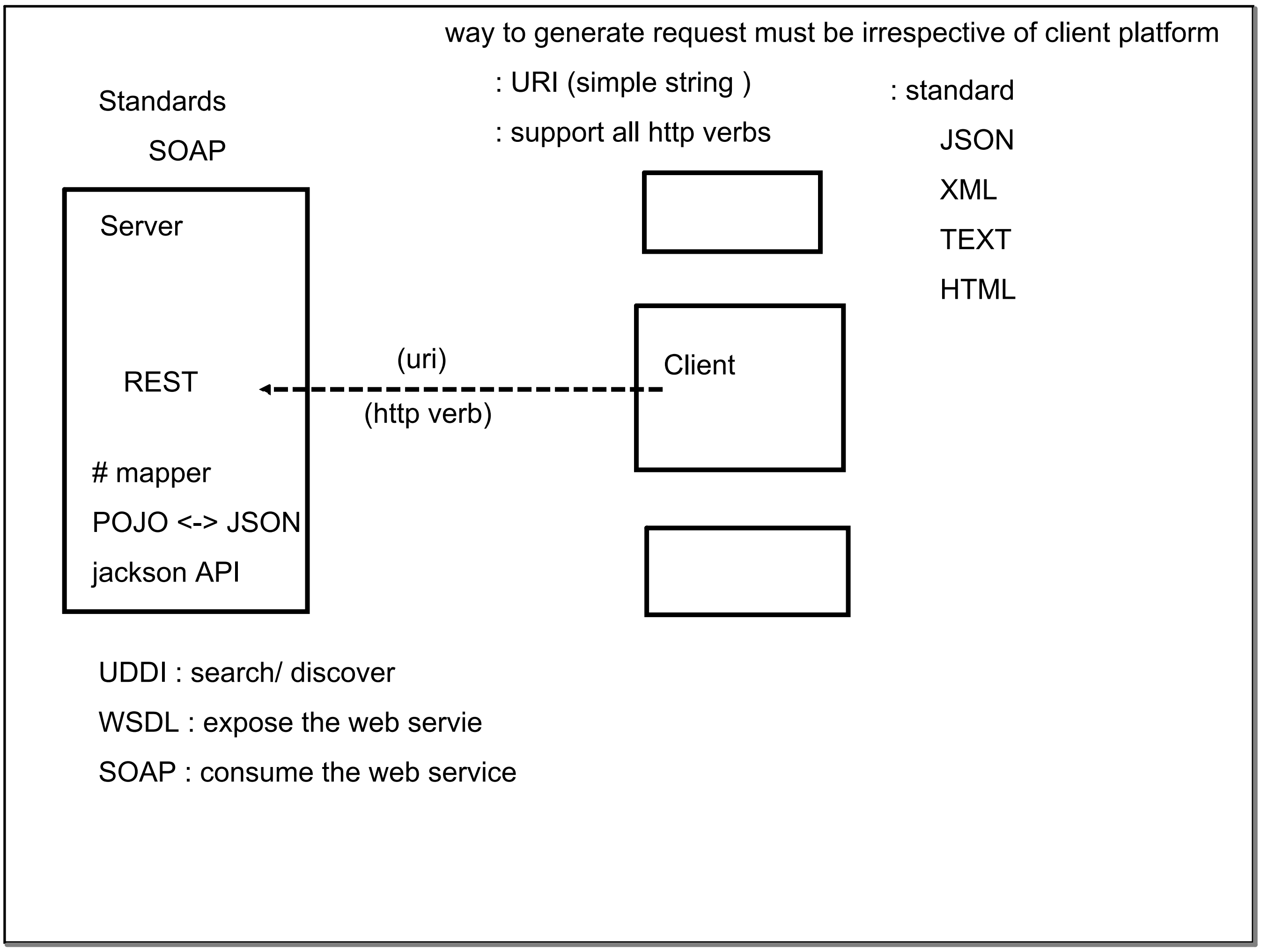
Tile

Velocity

Rest Based service

exposing server based info as Rest Service




way to generate request must be irrespective of client platform
: URI (simple string)
: support all http verbs
: standard
JSON
XML
TEXT
HTML
Standards
SOAP
Server
REST
# mapper
POJO <-> JSON
jackson API
(uri)
(http verb)
Client
UDDI : search/ discover
WSDL : expose the web servie
SOAP : consume the web service

@RestController : interconversion take care of

client intention

GET : data retrieval

POST : add new data

PUT : edition

DELETE : delete

Student /student

  /getAll

Employee /employee

  /getAll

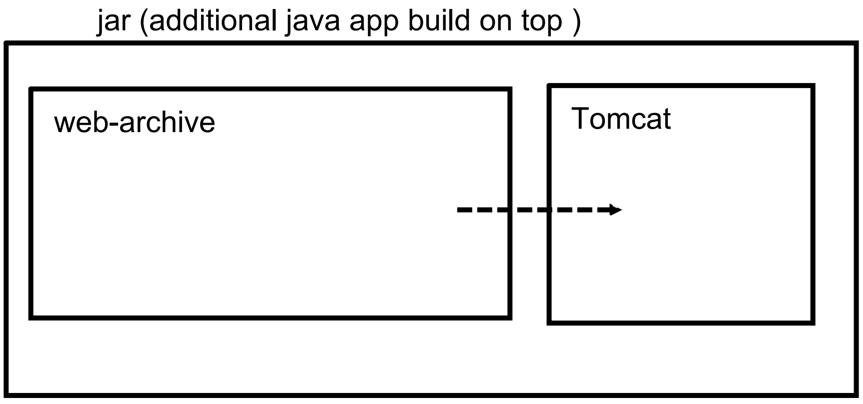
@RestController : auto needs mapper in classpath (jackson)

@Controller

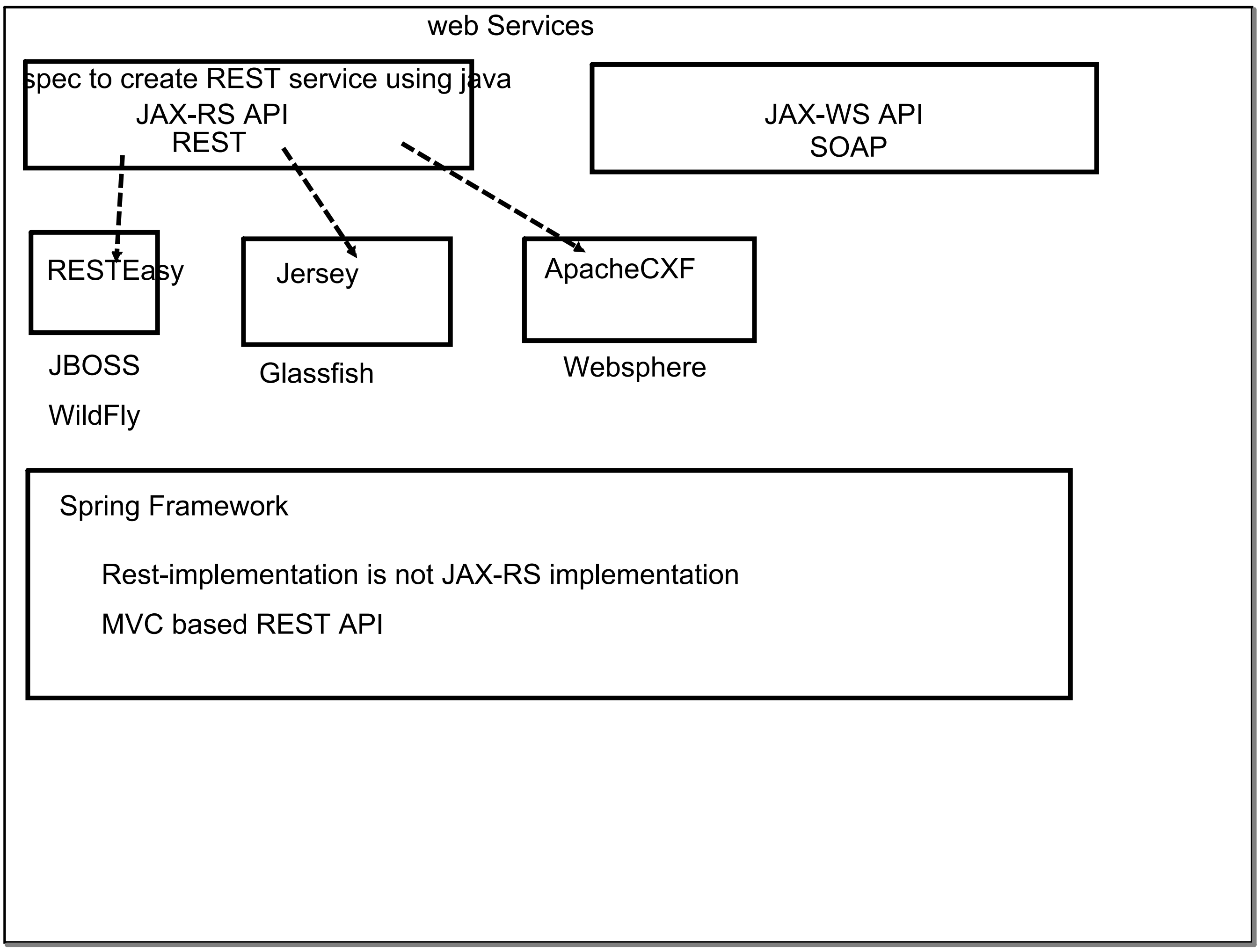
- add mapper to classpath
- produce
- consume
- @ResponseBody : content to be shared directly to client

1.launch tomcat

2. deploy web-archive over tomcat



dev-tools: live reloading of server


web Services
spec to create REST service using java
JAX-RS API
REST
JAX-WS API
SOAP
RESTEasy
Jersey
ApacheCXF
JBOSS
WildFly
Glassfish
Websphere
Spring Framework
Rest-implementation is not JAX-RS implementation
MVC based REST API

actuator : exposes rest endpoint

Microservice architecture implements

Dividing a single large sized monolith application into
multiple smaller (independent) application

microservices : responsible to expose a particular service
DataDriven/Rest based
Stateless

Service Oriented Architecture : SOA :
Microservice : + technology/approach/design pattern

Monolith issues

involve light wight VS for deploying service components

Deployment :

Multi-Technology service component

DB : ideally must be using independent DB

Scaling : individual service comp

Robust in implementation

Design Guideline : MS (12 factor)

Design Pattern

Lightweight : concern/runtimes/data exchanging

Reactive : highly concurrent/longer processing

Stateless: scale better

Atomic : core design principle

Externalized config : config server

Consistent : style

Resilient : eliminate bottleneck

Good Citizens : expose usage statistics

well versioned :

Design Pattern:

Decompositions :

a) business capabilities

business-oriented rather than technical

b) sub-domain (technical)

domain class (parent/God classes)

DDD : bounded context

sub-domains : BC with parent model

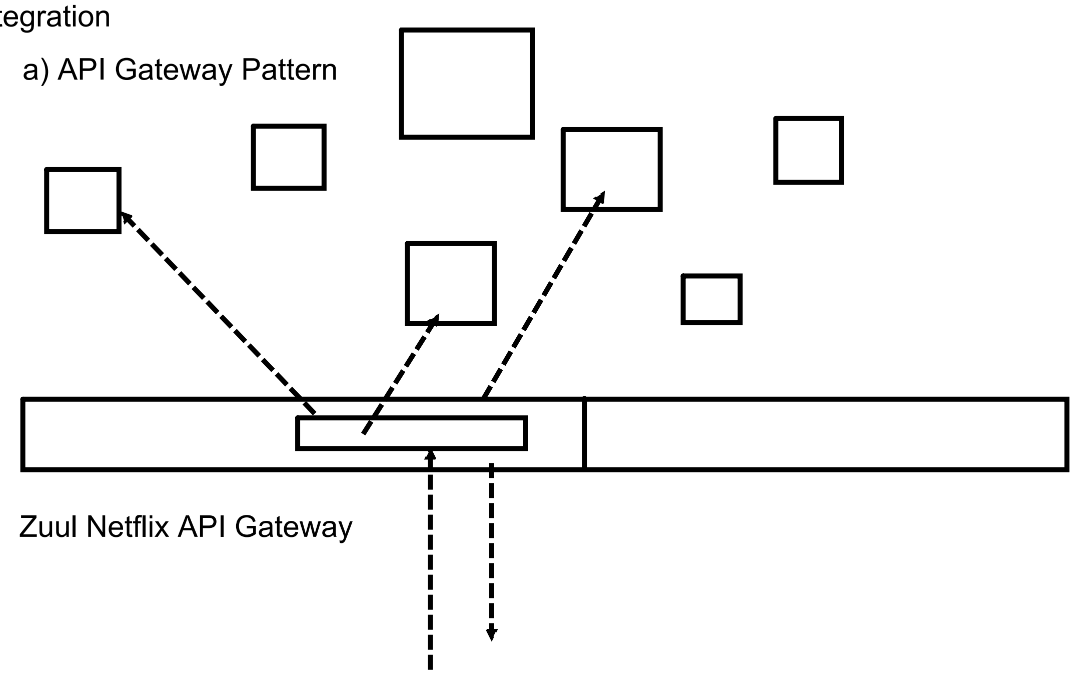
c) Strangler patterns

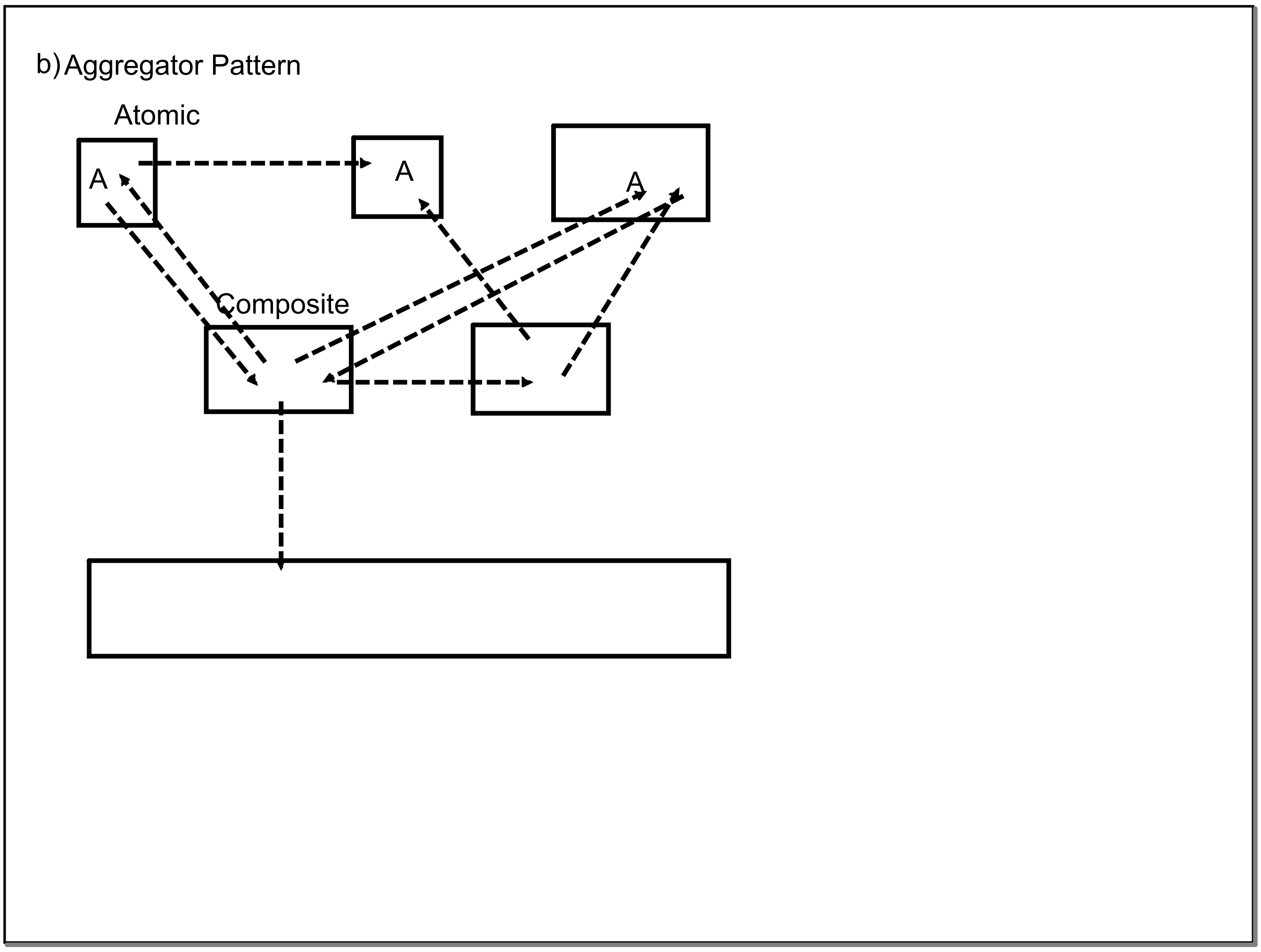
brownfield : converting monolith into MS

refactoring smaller req...

Integration

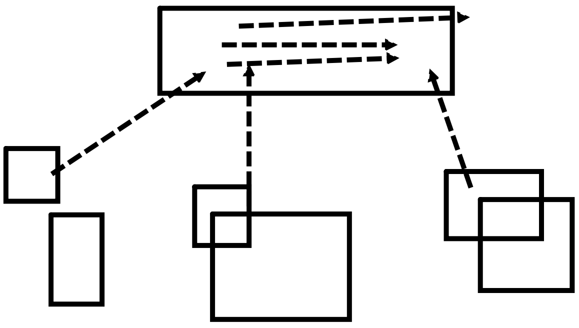
a) API Gateway Pattern




b) Aggregator Pattern
Atomic
A
A
A
Composite

c) Client-side UI Composition

SPA : UI compositions



DataBase :

a) Ideal Pattern : Database Per Service

b) Shared Database :

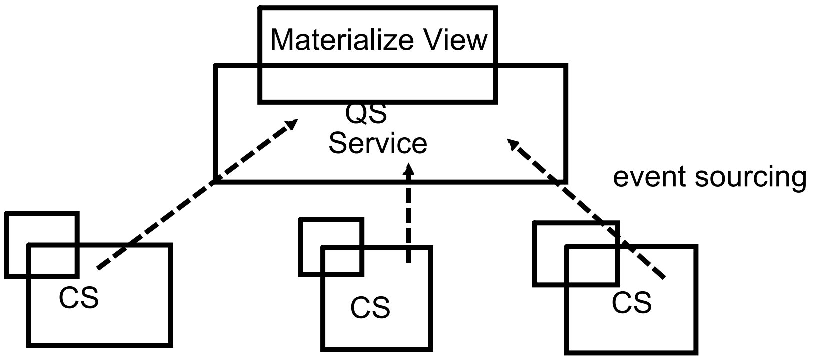
2-3 MS (DDD)

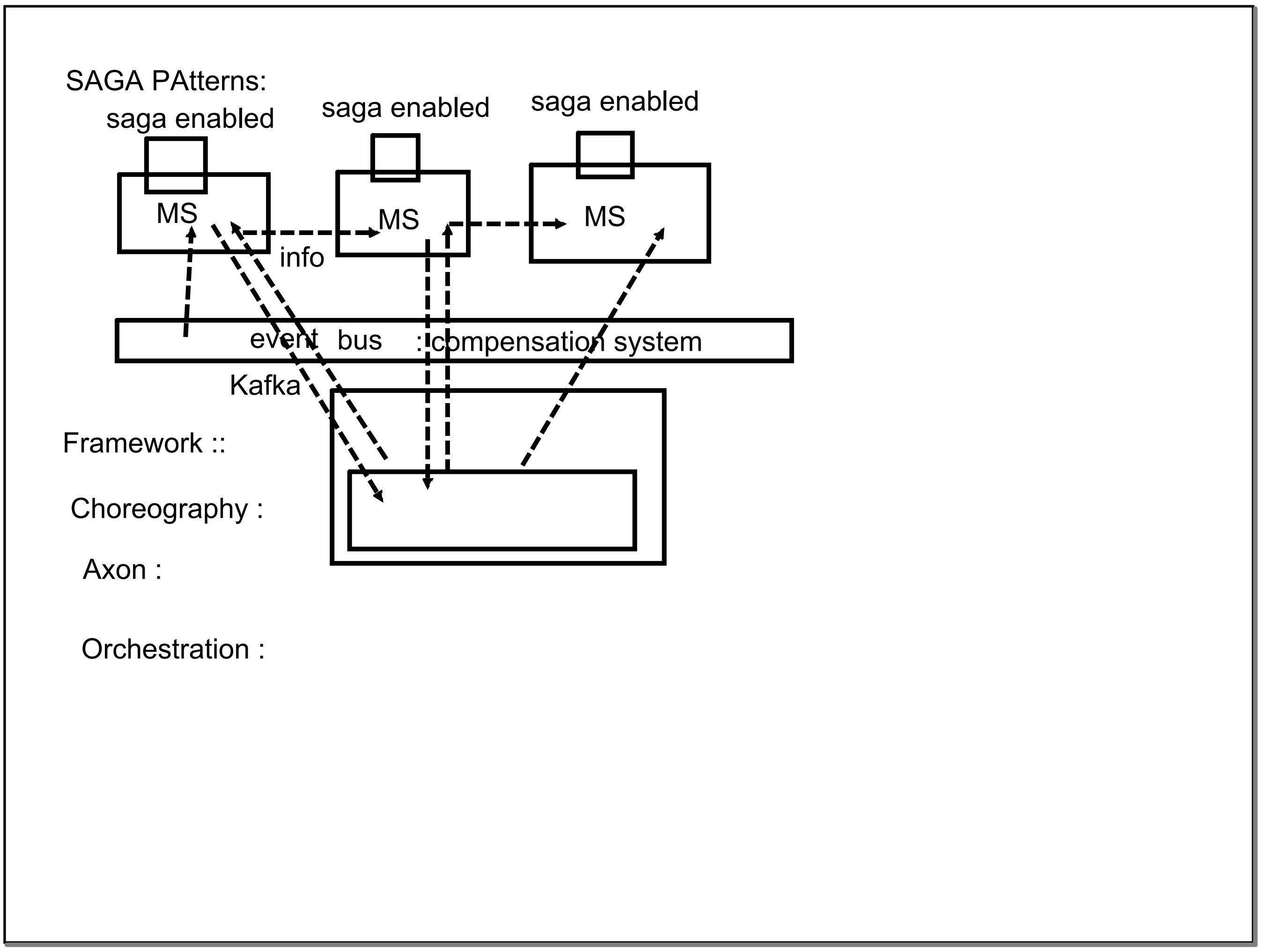
c) CQRS

Command Query Responsibility Segregation

Command Side (create/update/delete)

Query Side (retreive)




SAGA PAtterns:
saga enabled
saga enabled
saga enabled
MS
MS
MS
info
event bus : compensation system
Kafka
Framework ::
Choreography :
Axon :
Orchestration :

Observability PAttern

- a) Log Aggregation:
  - Centralized Logging pattern in place
- track the log on request basis,
- search
- analysis
- triggers alert

PCF : Pivotal Cloud Foundary

- AWS Cloud Watch

- b) Performance based
  - Centralized Metric service
    - push/pull model

=>NewRelics

=>Prometheus

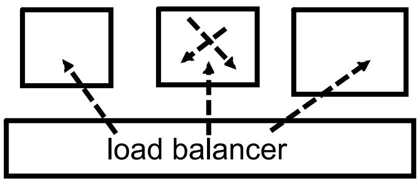
c) Distributed Tracing

system to track a request end-to-end

# request id

Zipkin Server

Spring Cloud Slueth



d) Health Check

actuators /health :

Ribbon

Cross-Cutting Concerns

a) External Configuration

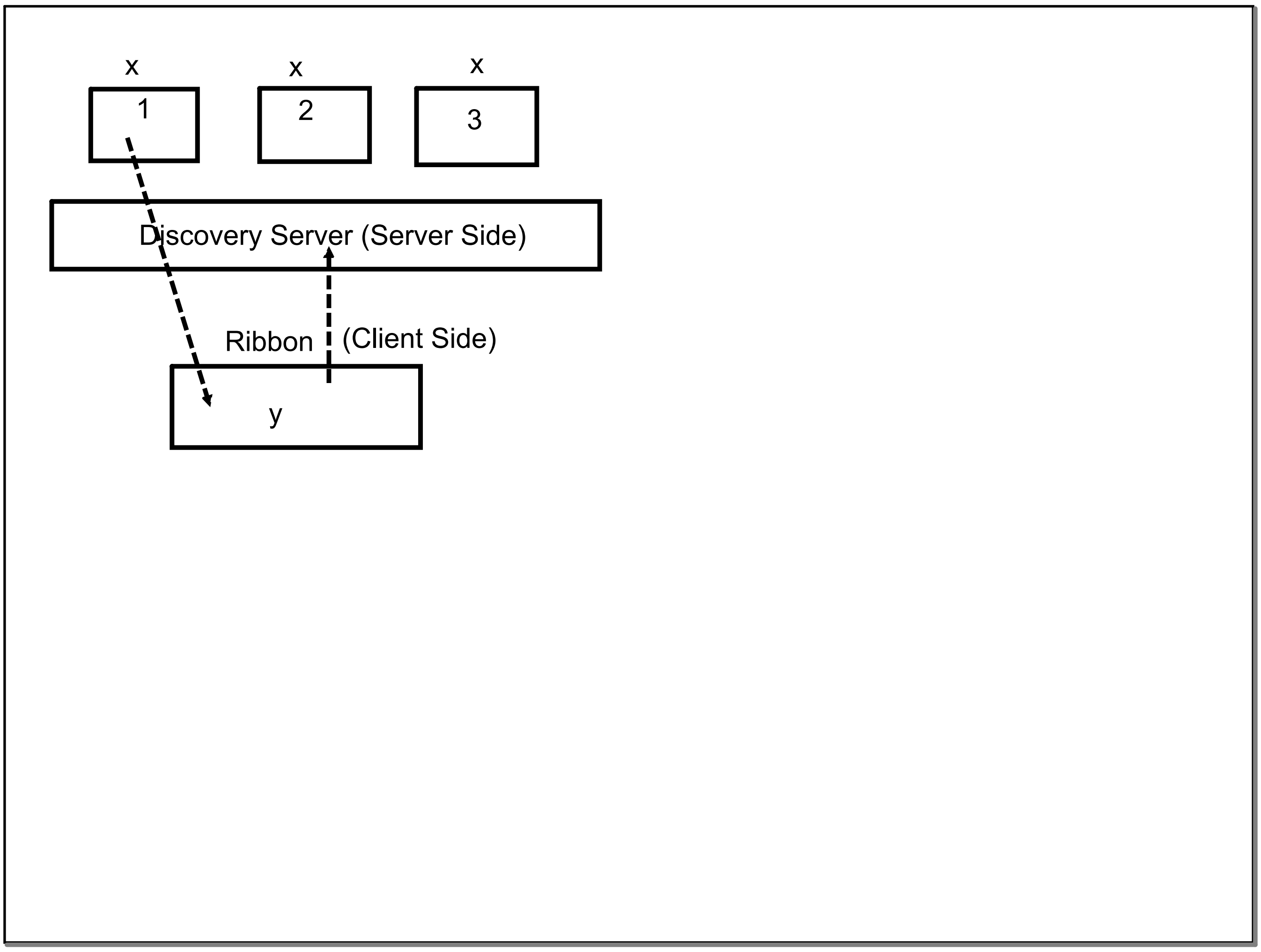
Spring Cloud Config Server

b) Service Discovery Pattern

# all service shall register with registry system

Netflix Eureka Server

AWS ALB

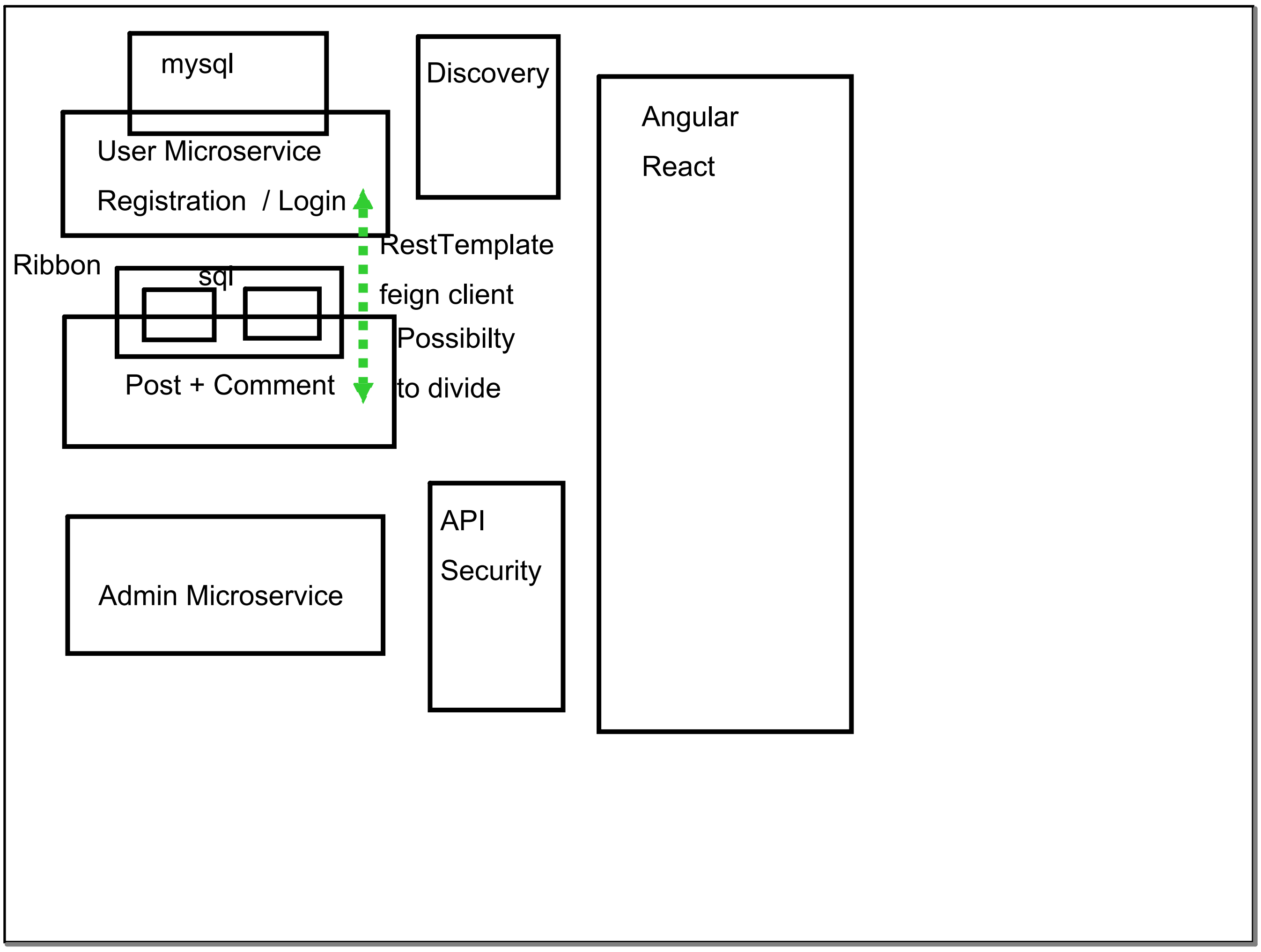

x
x
x
1
2
3
Discovery Server (Server Side)
Ribbon
(Client Side)
y

c) Circuit Breaker Pattern

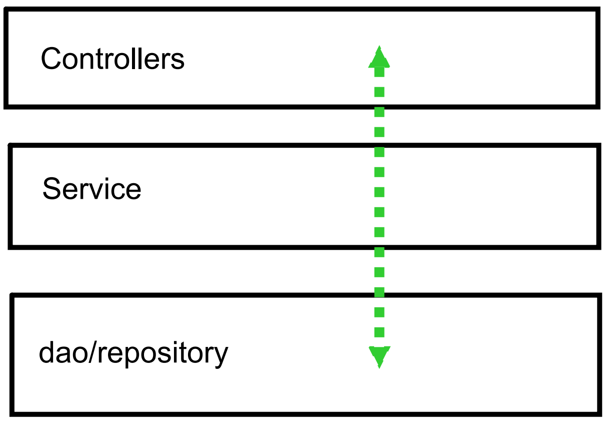
- threshold
- default response
- keep on trying

Netflix Hystrix

- 10 sec
- 5
- fallback


mysql
Discovery
Angular
React
User Microservice
Registration / Login
RestTemplate
Ribbon
sql
feign client
Possibilty
to divide
Post + Comment
API
Security
Admin Microservice

Spring Cloud :



entity : POJO <----> DB schema

DTO : POJO

Validation

Exception

Spring Data JPA

inbuilt repository (generic) with implementation

that can be customized/extend

CRUD

select * from <table-name>

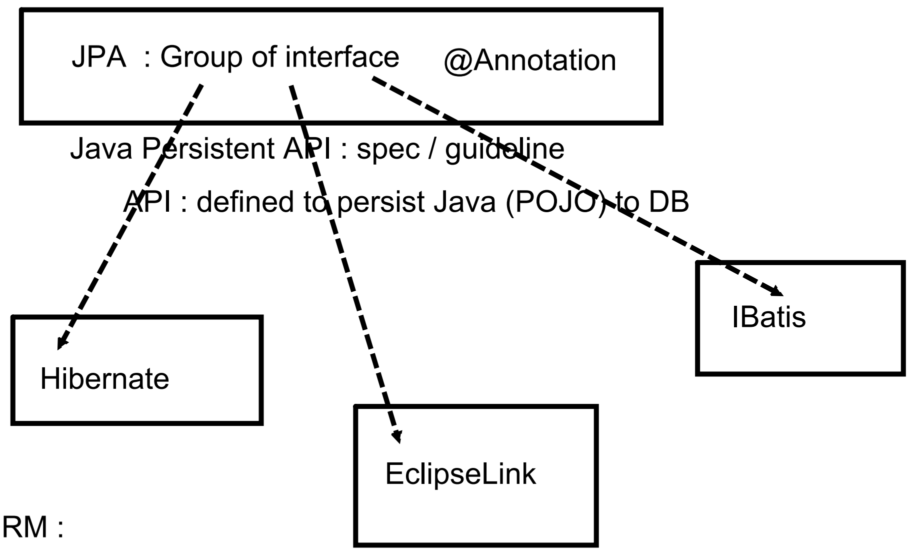
=>table

=>datatype of primary key

Need to configure properties file

for DB connection

: MySql-Driver : dependency



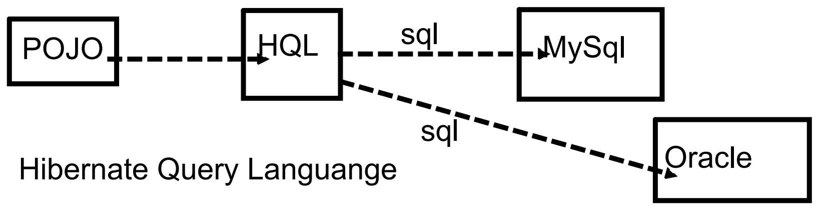
Java Persistent API : spec / guideline

API : defined to persist Java (POJO) to DB

ORM :

behind the scene

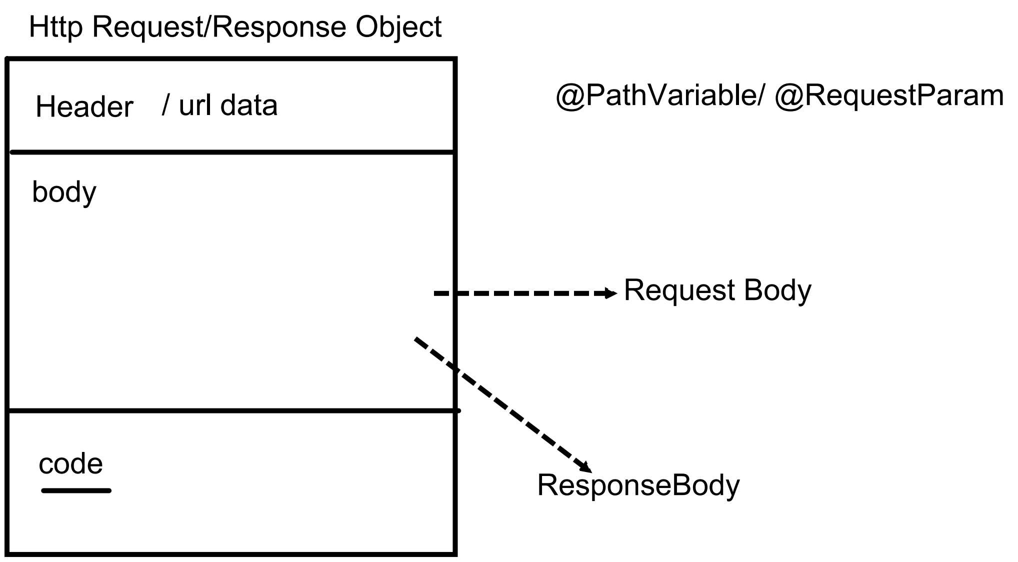
SQL queries would be created by Hibernate



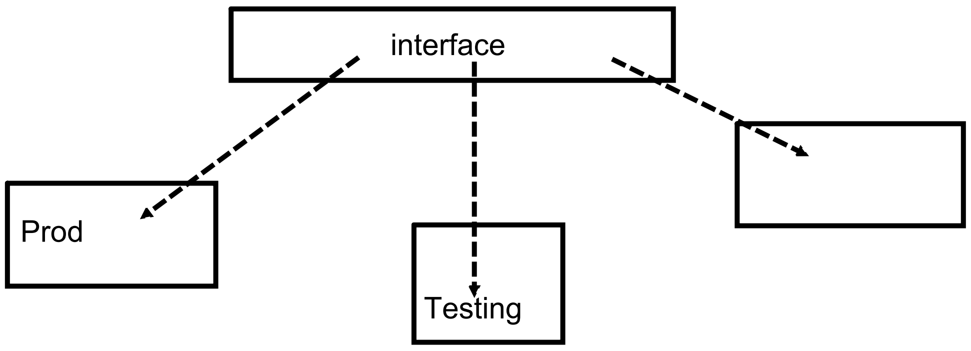
Hibernate Query Languange

# Need to specify the dialect

c3p0 : dependency



All Rest Endpoints must have provision to customized the http Response object



Validation Constraint Support

java Validation Api : spec

Hibernate Validator

Client Expecting : UserDetailDto (Success status)

Exception : UserExceptionDto (Failed status): throw an exception on client end of type mismatch

# Server shall respond with appropriate status code

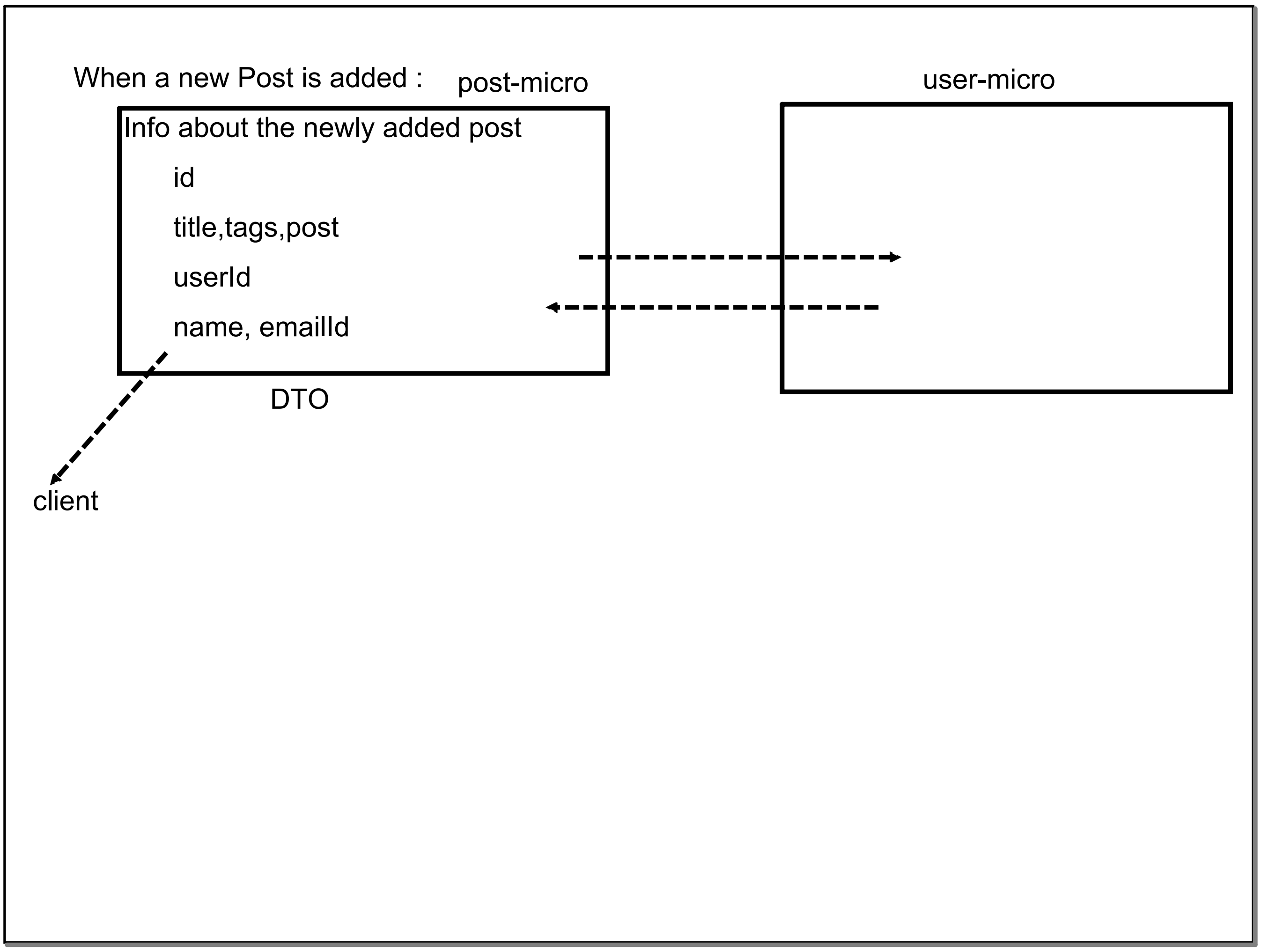
# REst Client have provisions to check the status code

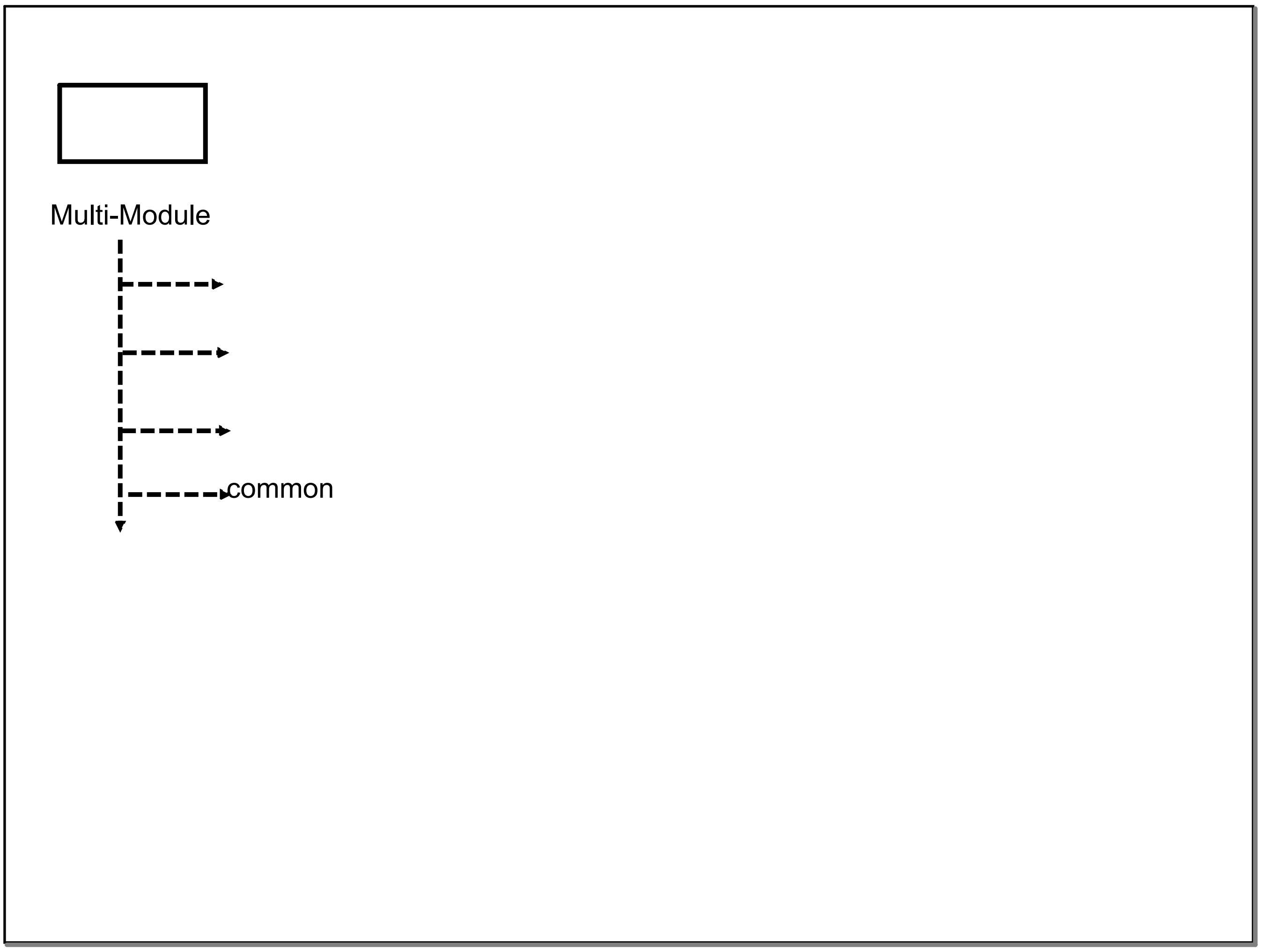
Adding a new data : instance/info about newly added data
Updating the data : instance/info about update data
Deleting the record : instance/info about deleted data

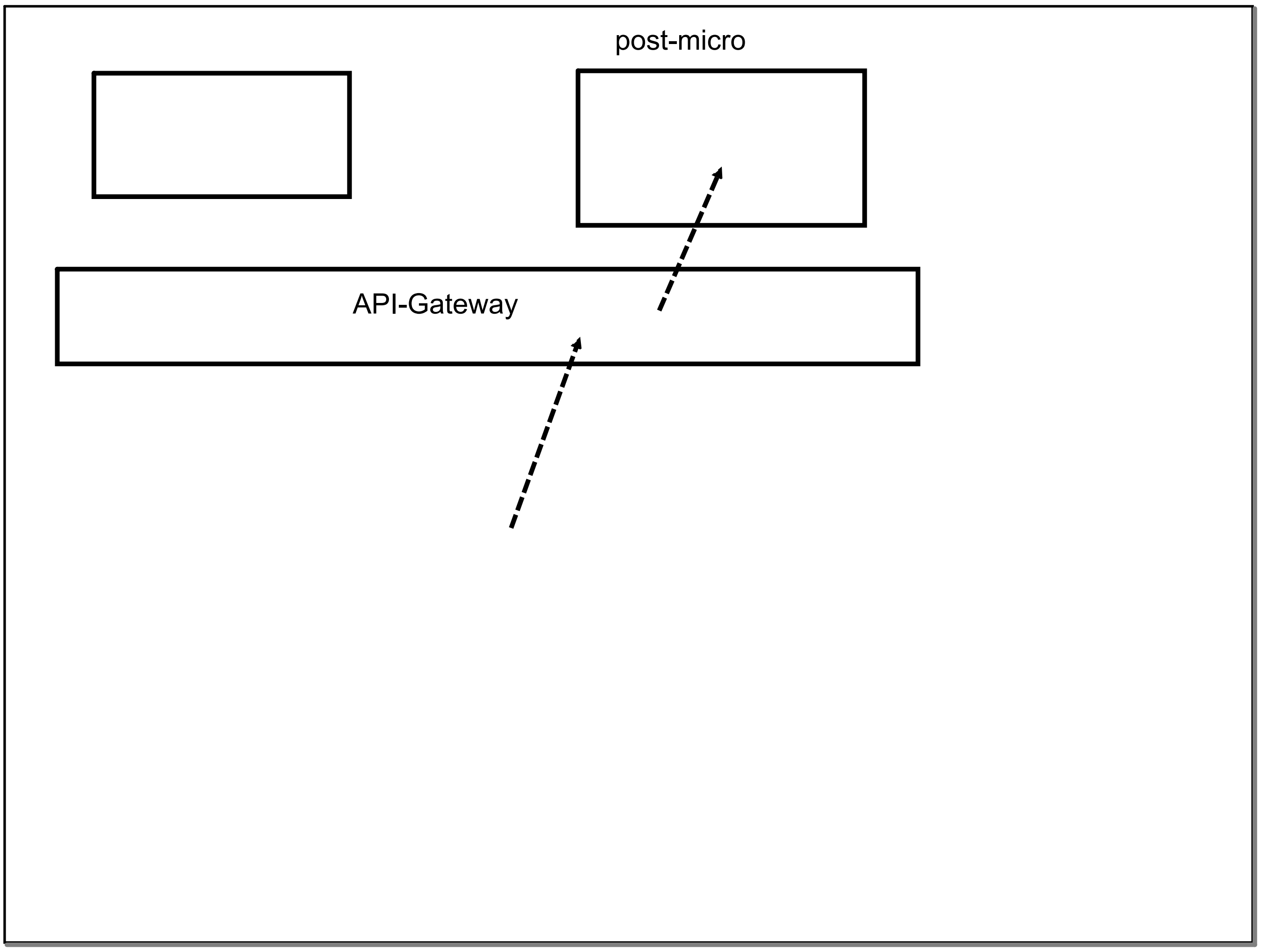
DTO - entity   DTO ->

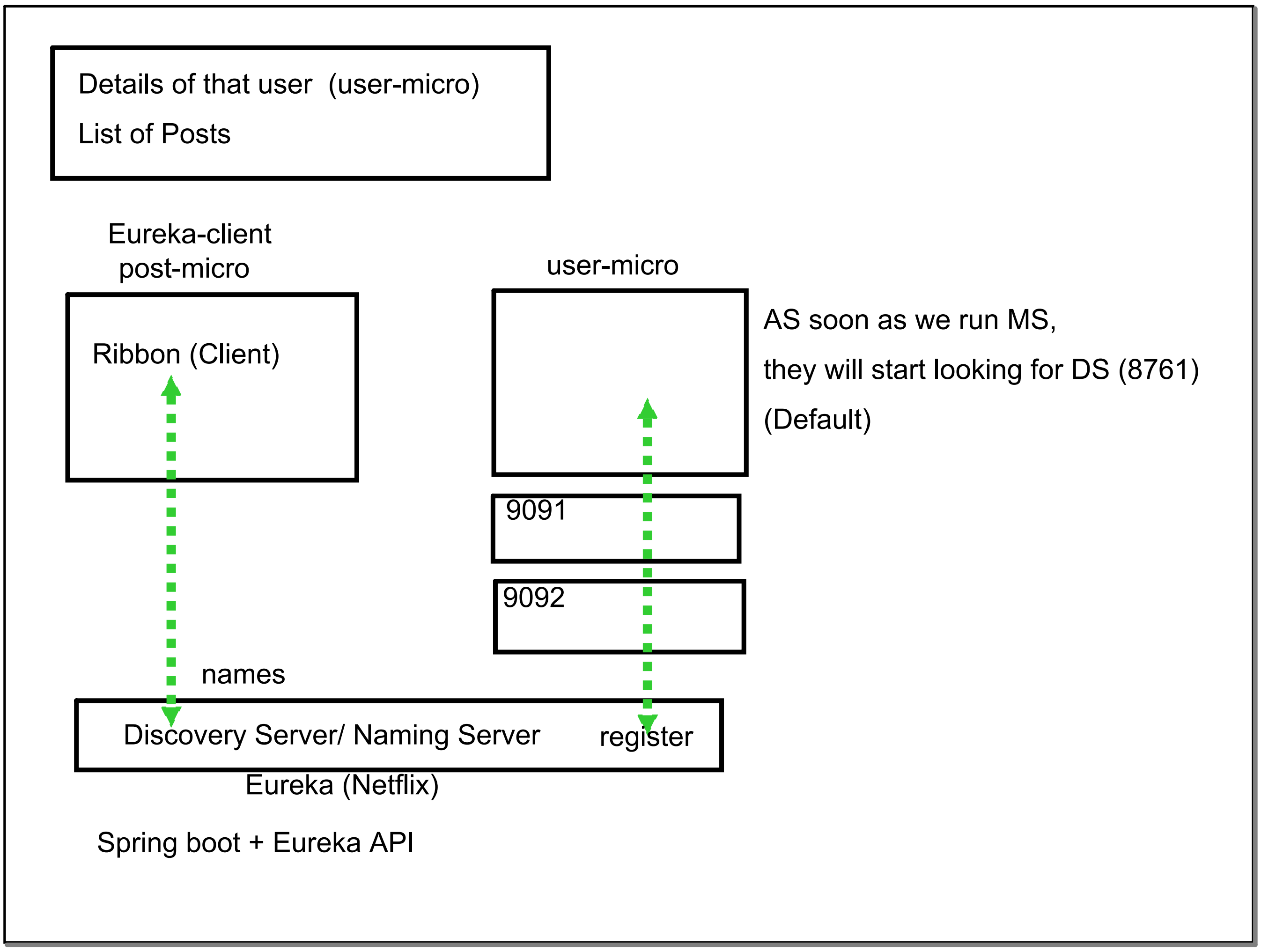
4 + 3 ---> DB

Client : 7 fld (primary


When a new Post is added :
post-micro
user-micro
Info about the newly added post
id
title,tags,post
userId
name, emailId
DTO
client


Multi-Module
common


post-micro
API-Gateway


Details of that user (user-micro)
List of Posts
Eureka-client
post-micro
Ribbon (Client)
user-micro
AS soon as we run MS,
they will start looking for DS (8761)
(Default)
9091
9092
names
Discovery Server/ Naming Server
register
Eureka (Netflix)
Spring boot + Eureka API

Two tables

1. User credential
2. Roles

User-Credentials

table ("users")

 # username : String

 # password : String

 # enabled : boolean

Roles

 table ("authorities")

# username : String

# authority : String

password : encrypted form

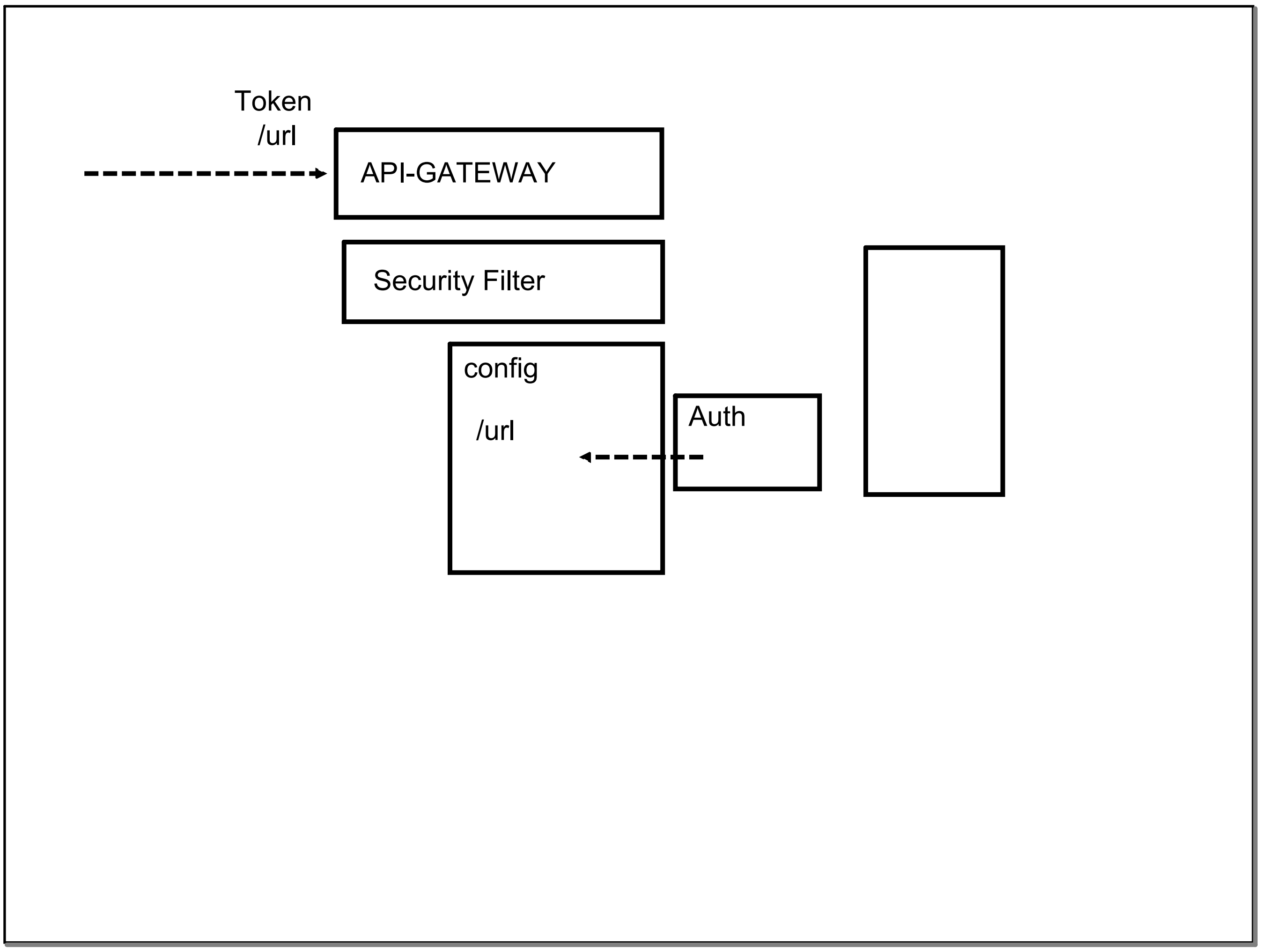
Spring security supports multiple encryption

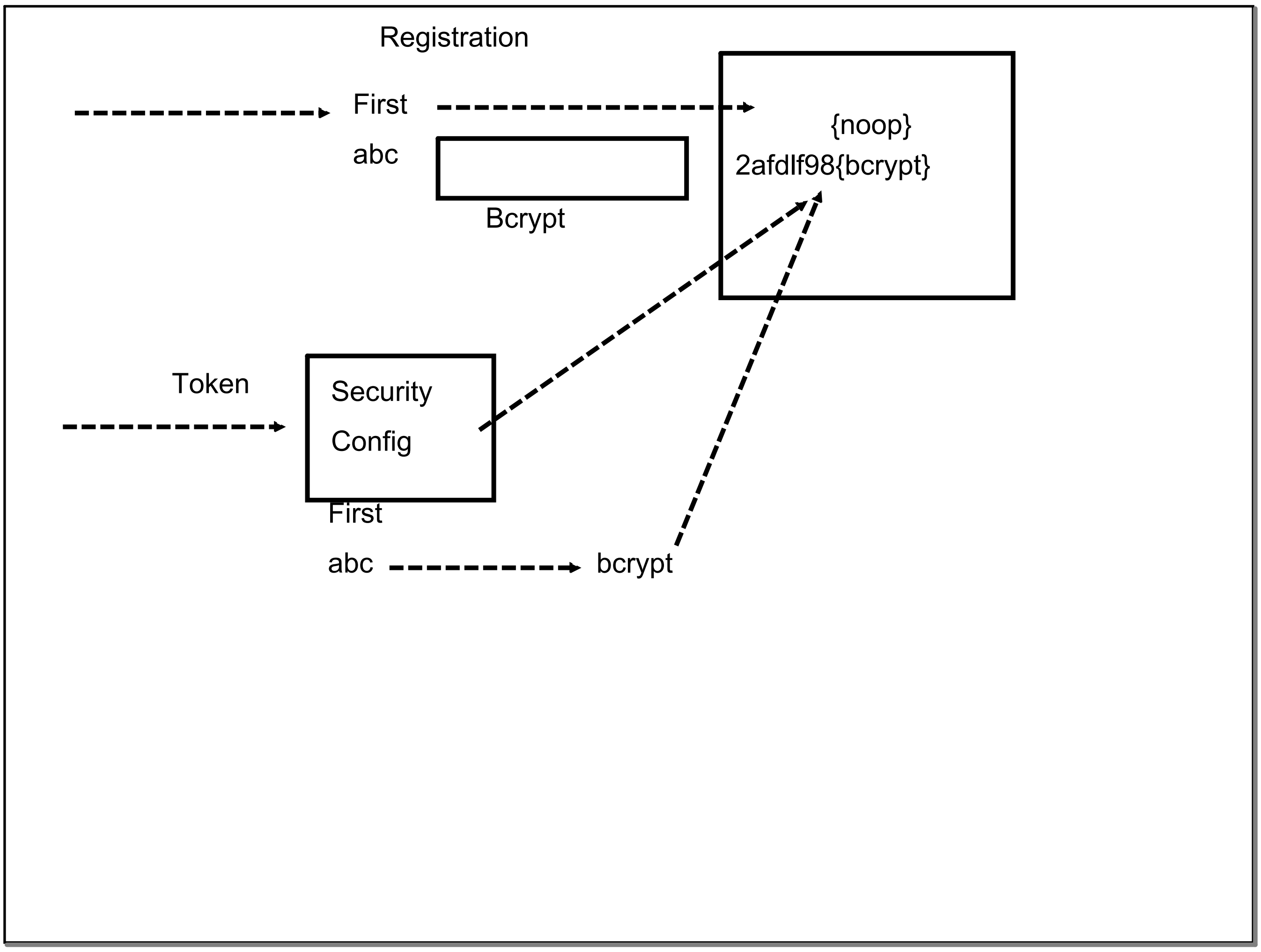
eg:

Plain-Text	Bcrypt (one way)
abc{noop}	{bcrypt}2afdhfldron98

Roles:

 Manager ~ Role_Manager


Token
/url
API-GATEWAY
Security Filter
config
/url
Auth


Registration
First
abc
Bcrypt
{noop}
2afdlf98{bcrypt}
Token
Security
Config
First
abc
bcrypt

3 core elements

HTML : Structure

CSS : Presentation

JavaScript : Behavior

HTML-5

Validations

Drag n Drop

Semantic Tags

Web Workers

Offline functionlity

Geolocation

New Semantic Tag (Backward Compatible)

# purpose full (specific to req)

=> container

=> attributes -- Form based extention

# Smooth Renderring (outline algo)

# more compatible to search algo

# in sync with Assisstive Tech

# Standardized Error handling algo : Developers (Debug)
# images/audio/videos : third party plugins : HTML5 tags + API (control)
# Built-in APIs

traditional:

    <p>, <span>, <div>

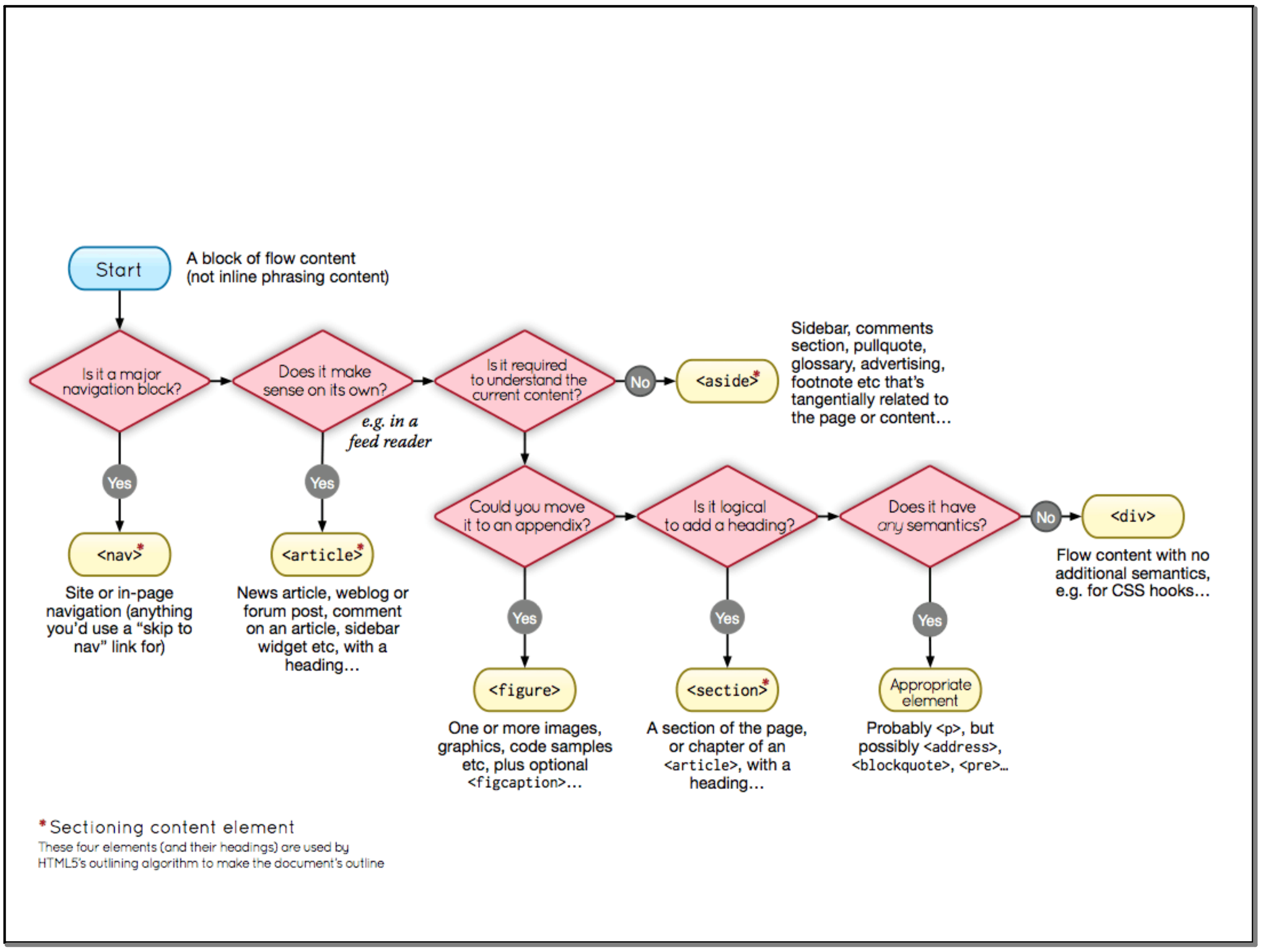
article

section

aside

header

footer

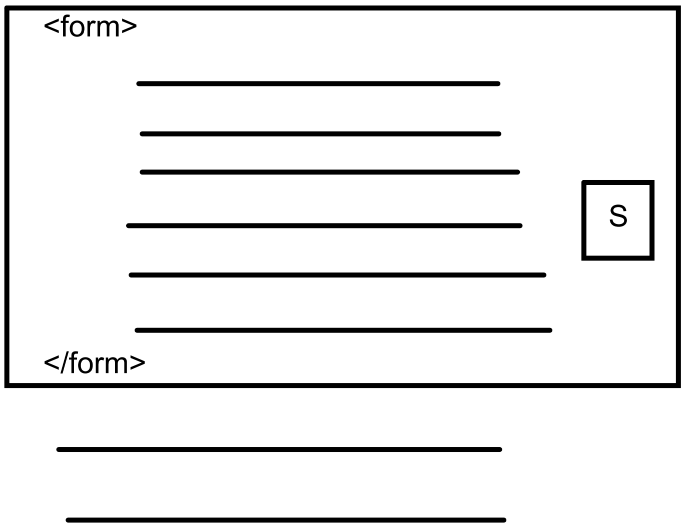

Start
A block of flow content (not inline phrasing content)
Is it a major navigation block?
Does it make sense on its own?
e.g. in a feed reader
Is it required to understand the current content?
No
<aside>*
Sidebar, comments section, pullquote, glossary, advertising, footnote etc that's tangentially related to the page or content…
Yes
<nav>*
Site or in-page navigation (anything you'd use a "skip to nav" link for)
Yes
<article>*
News article, weblog or forum post, comment on an article, sidebar widget etc, with a heading…
Could you move it to an appendix?
Is it logical to add a heading?
Does it have any semantics?
No
<div>
Flow content with no additional semantics, e.g. for CSS hooks…
Yes
<figure>
One or more images, graphics, code samples etc, plus optional <figcaption>…
Yes
<section>*
A section of the page, or chapter of an <article>, with a heading…
Yes
Appropriate element
Probably <p>, but possibly <address>, <blockquote>, <pre>…
* Sectioning content element
These four elements (and their headings) are used by HTML5's outlining algorithm to make the document's outline

Html form :

# specialized form inputs

# validation : required/pattern

# special att : custom behavior of form



Canvas API

DOM Tree managed by the browser

Html component(Tag) : JS - object

User Interaction : presentation : CSS

Cascade style sheet

Stylesheet : : set of rules 'presented'

Cascade : set of rules : resolve the conflict of multiple ss applied on a element

Specificity

controlling over where to apply the style

CSS rule :

CSS Selector

CSS declaration

```
selector {
    property : value
}
```

selector : css rule would be applied to which HTML elem

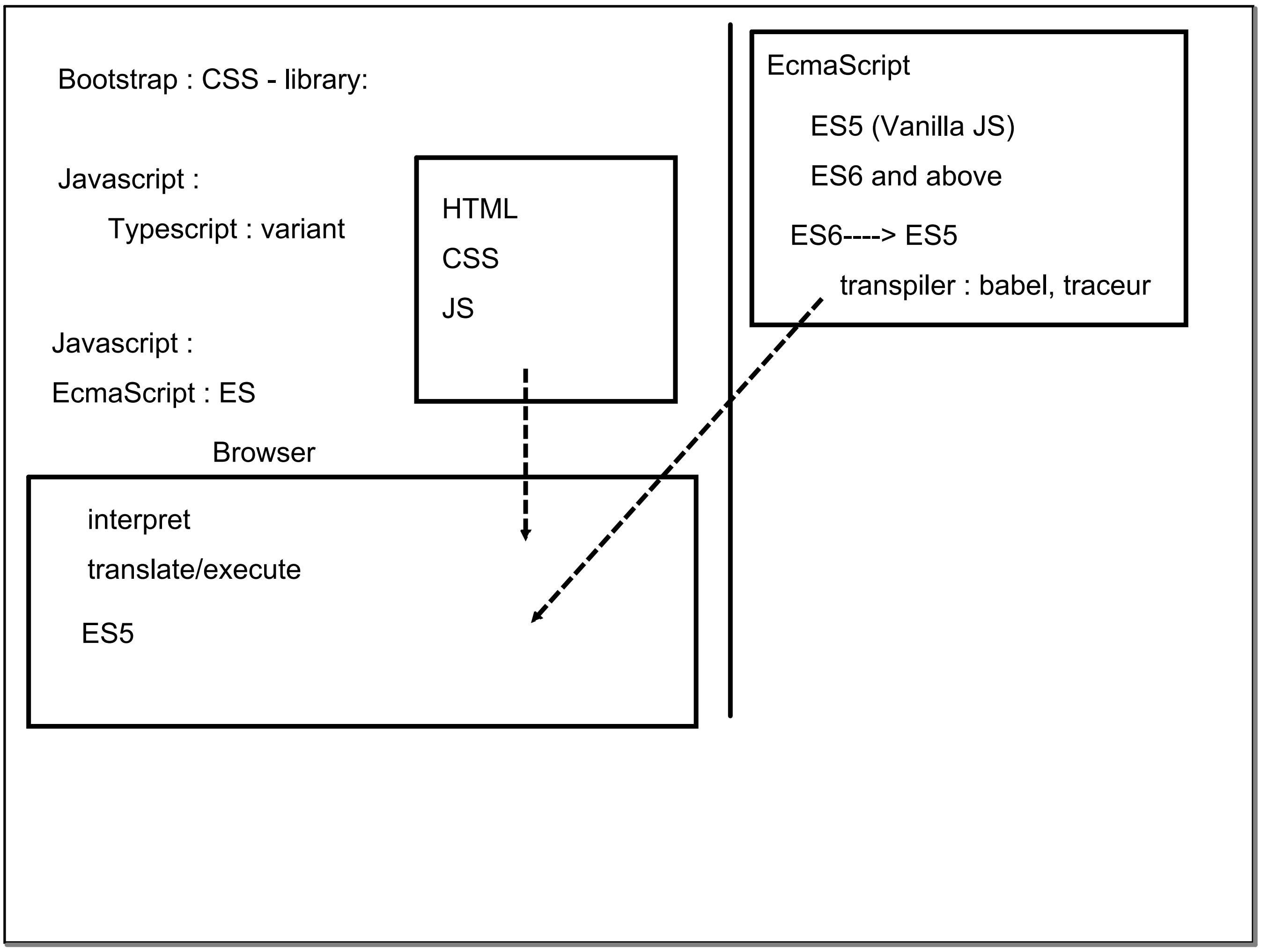
Selector

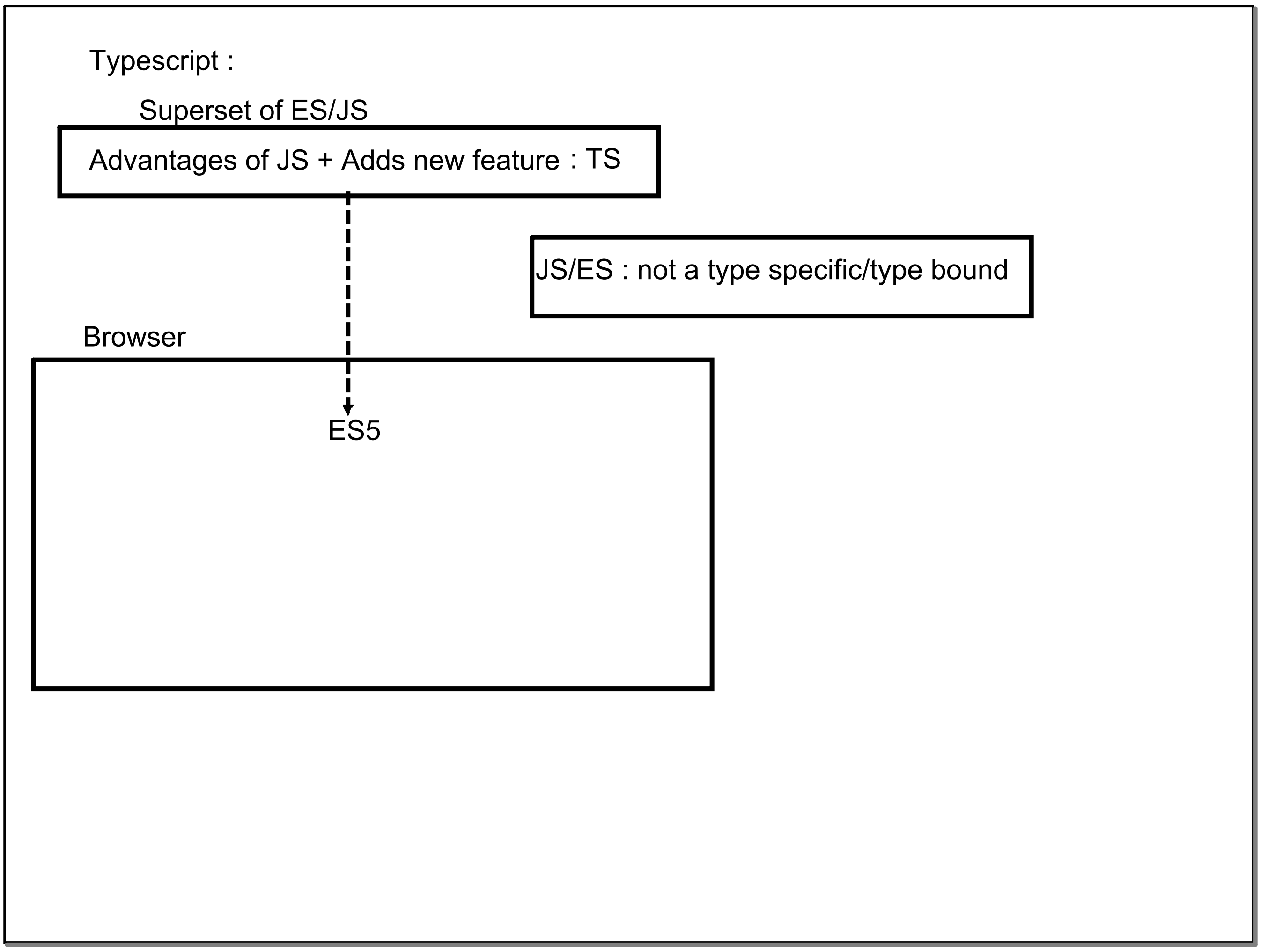
- Type (most varied : wide spectrum : which type HTML element)
- ID
- class

```
eg :
 p{
      --------------
      --------------
 }

ID : very specific
#canvastest{
      ------------------------
      -------------------------
}
```

```
class
      .mclass{
            -----------------
            ------------------
      }
```


Bootstrap : CSS - library:
Javascript :
Typescript : variant
Javascript :
EcmaScript : ES
HTML
CSS
JS
EcmaScript
ES5 (Vanilla JS)
ES6 and above
ES6----> ES5
transpiler : babel, traceur
Browser
interpret
translate/execute
ES5


Typescript :
Superset of ES/JS
Advantages of JS + Adds new feature : TS
JS/ES : not a type specific/type bound
Browser
ES5

Javascript

```
function add(num1, num2){
   // validation check
    return num1 + num2;
}
```

call : add(20, 30); // arithmatic addition

: add('hello', 'world'); // string concatenation

Unwanted behavior at runtime

Typescript :

- Named Types...
- NextGen JS features
- NonJS features like Interface/Generics
- Decorators (Meta-Programming)
- More Config options

Transpiler : Typescript compiler

Javascript based resource, managed way

management tool :

- nodejs : npm : node package manager
- yarn

NodeJs : installed + system path

(npm) : cli

NodeJs : Framework that allows to use JS for server side programming:
non-blocking, asynchronous server implementation

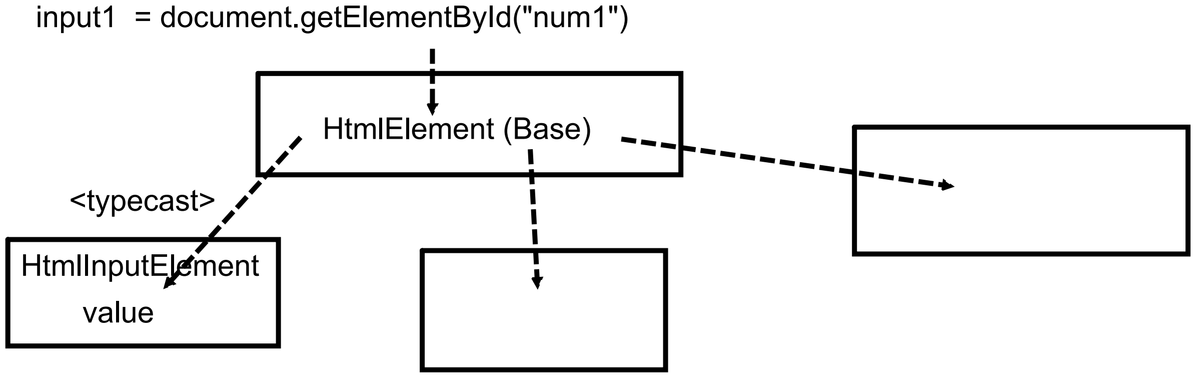
npm : is a project management tool for JS related project management

```
# Need to install typescript compiler
>npm install -g <tool> (global installation)
> npm install -g typescript
```

Typescript file must have ext : .ts

<variable name> : <typename>

Every HTML Components has a specific JS class



var ~ ES6 : const / let

Core Types

- number : integer/fractions
- string : 'hello', "hello", `hello`
- boolean : true,false
- object : Javascript object (more type specific)Object Notation
- Array : JS has way to create array of heterogenous nature (TS : homogenous)
- Tuple : Fixed length : Type
- # Union : specify multiple types
- Enum : enumerated Datatype
- any : default JS type

Browsers SS

external SS (separate file)

internal SS (within the HTML)

inline SS

inheritance

```
<body>
    <div>
        <ul>
            <li>
```

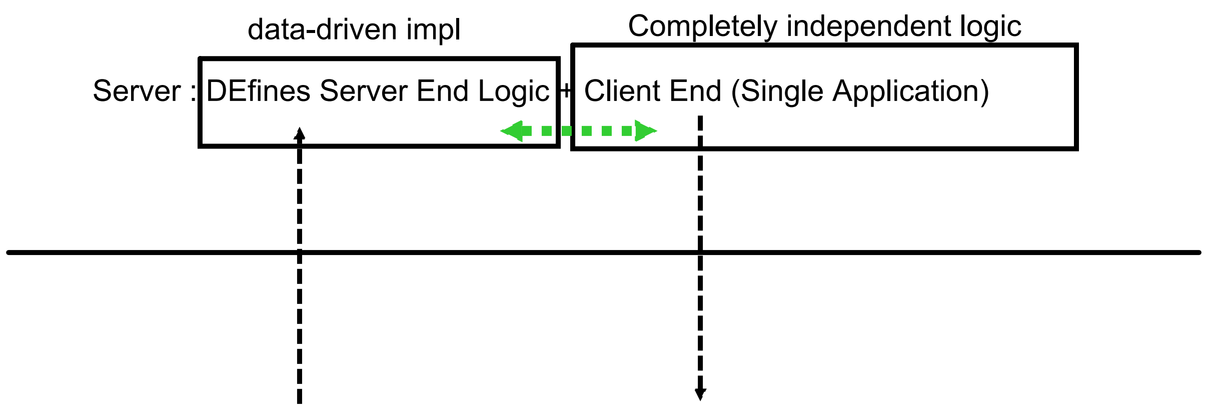
Classes : high level way :

Closures :

have global variable(memory retains across function calls) with local scope

# static variables of C functions

Angular : FrontEnd Framework


data-driven impl
Completely independent logic
Server : DEfines Server End Logic + Client End (Single Application)

Loose coupling of Server Side (backend logic) and Client Side (Frontend logic)

1. Server Side is reusable
2. Client Side is also reusable (flexible)
3. More independent implementation
4. Load Distribution among client machine (renderring the dynamic web-pages : JS)
5. Client End Renderring can Highly customized

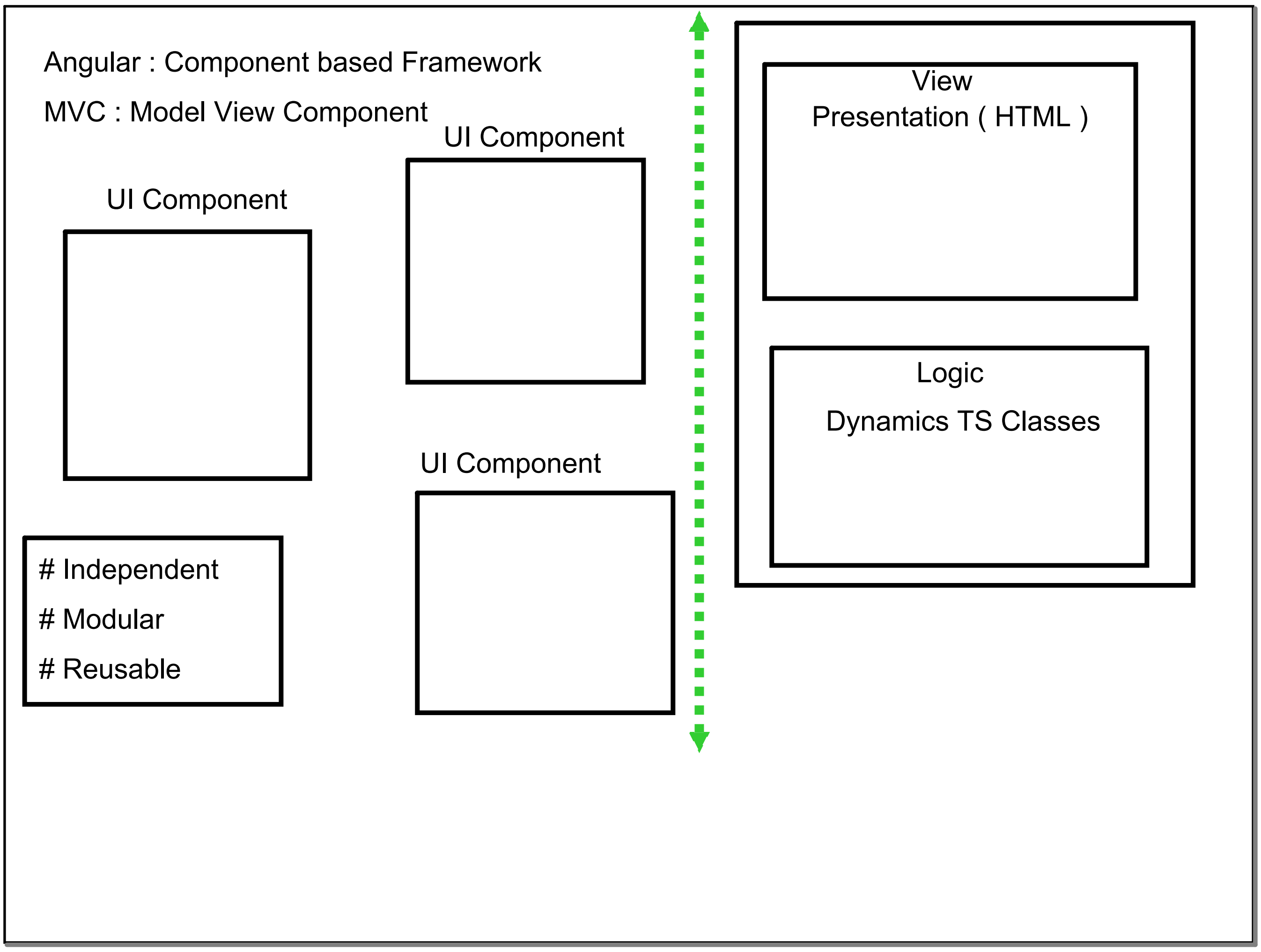
Angular Framework

Complete Framework

# Base Script : TS

# Resources : Client Side JS Community Library

# npm to manage angular application


Angular : Component based Framework

MVC : Model View Component

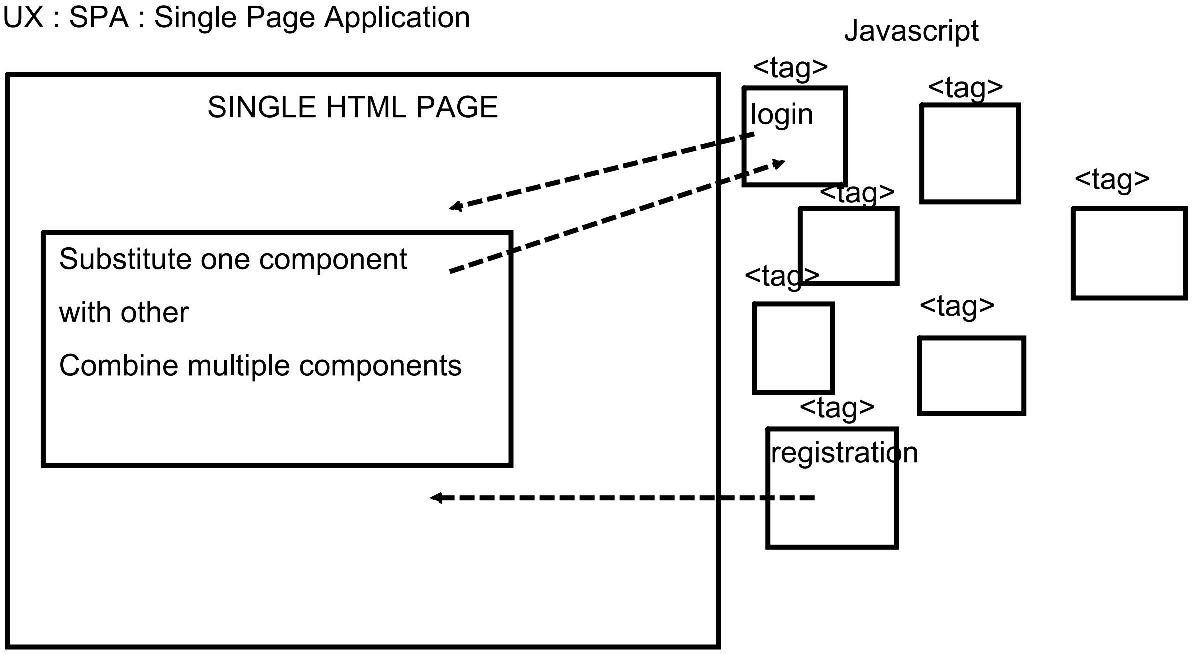
# Independent

# Modular

# Reusable

Relationship : (logic + presentation) decide the output

UX : SPA : Single Page Application



Angular/CLI Project needs to be installed

Download angular CLI/installed

(by default latest version)

```
> npm install -g @angular/cli
```

Angular CLI will expose angular specific command

```
> ng <option> (syntax)
> ng new    <project-name>
```

1. Complete folder/file structure required as Angular Framework project
2. Download default Angular lib

```
> Add  routing module (Y)
> Stylesheet : CSS(default)
```

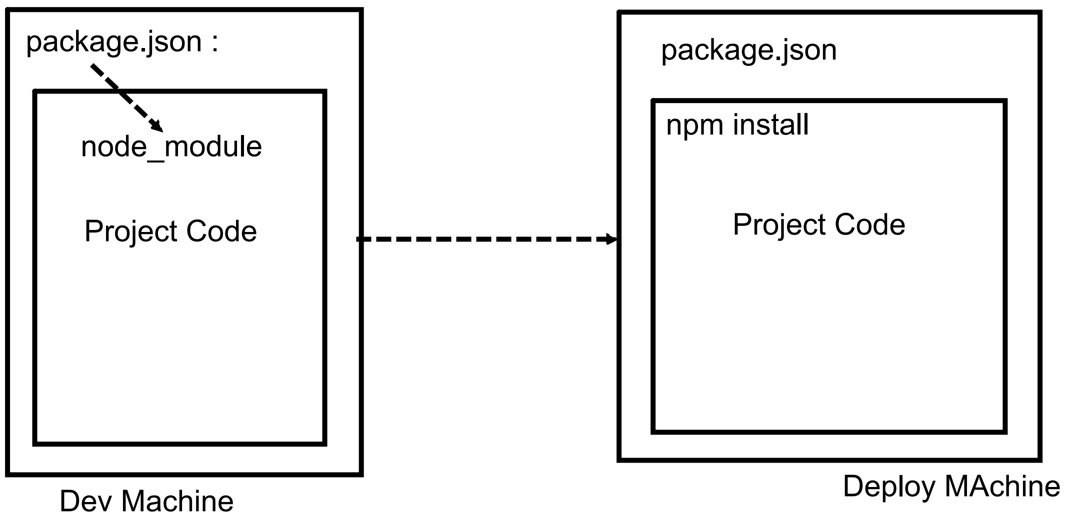
Feature Set for Unit/Integration Testing and End-To-End Testing

1. Jasmine Framework : JS Testing Framework (Write Test case unit/integration + e2e)
2. Test Runner : Unit Test (Karma)
3. Test Runnner/Framework : End-To-End Testing (Protractor)

e2e : supposed to contain test cases/config related to End-To-End Testing

node_module : All lib are stored in this folder

src : All Angular code goes here



package.json is default dependency file for all

JS based application

> npm install (--dev)   command will by default read package.json

and download all dependencies auto and store in node_modules (Default folder for all JS app)

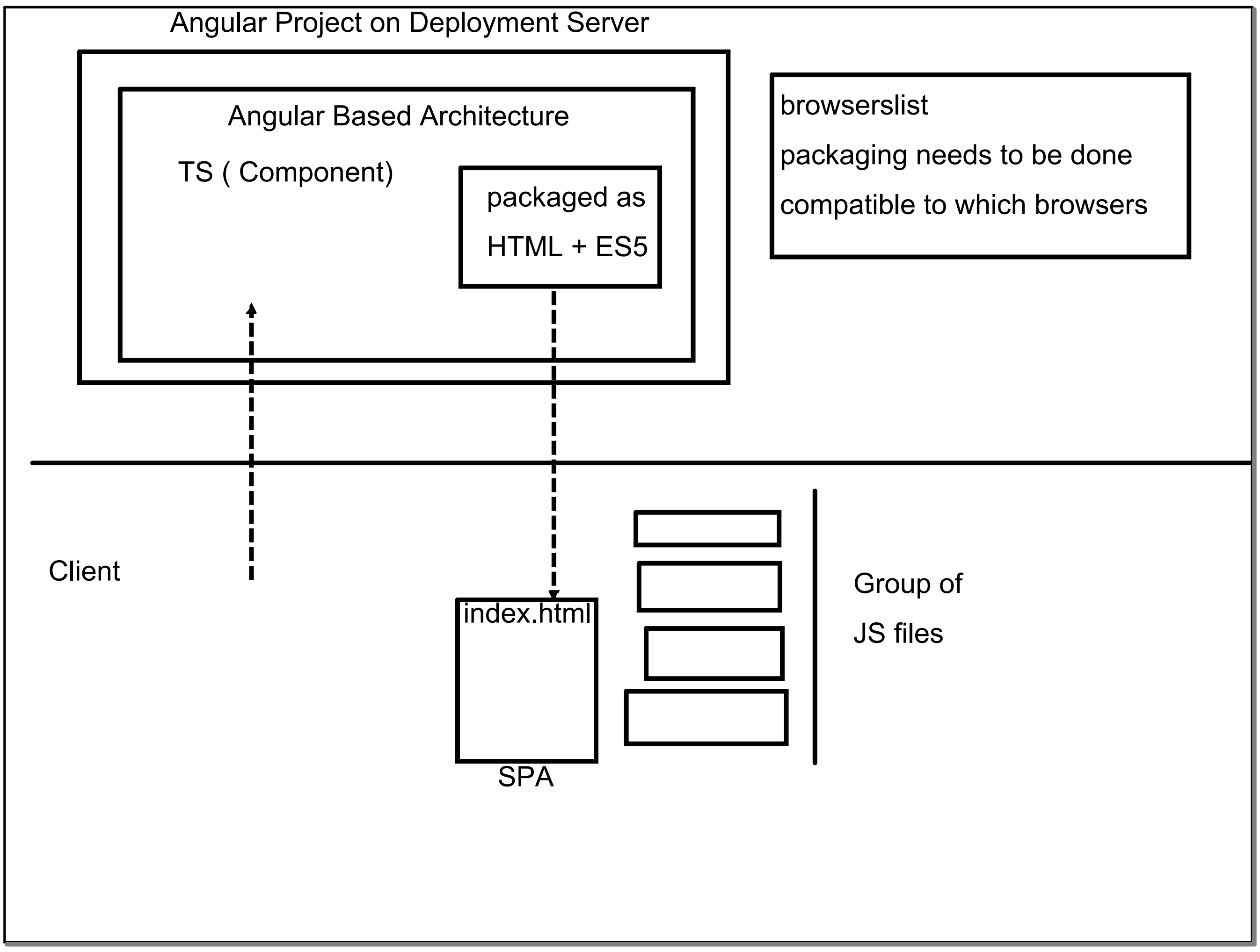
Adding a new Dependency:

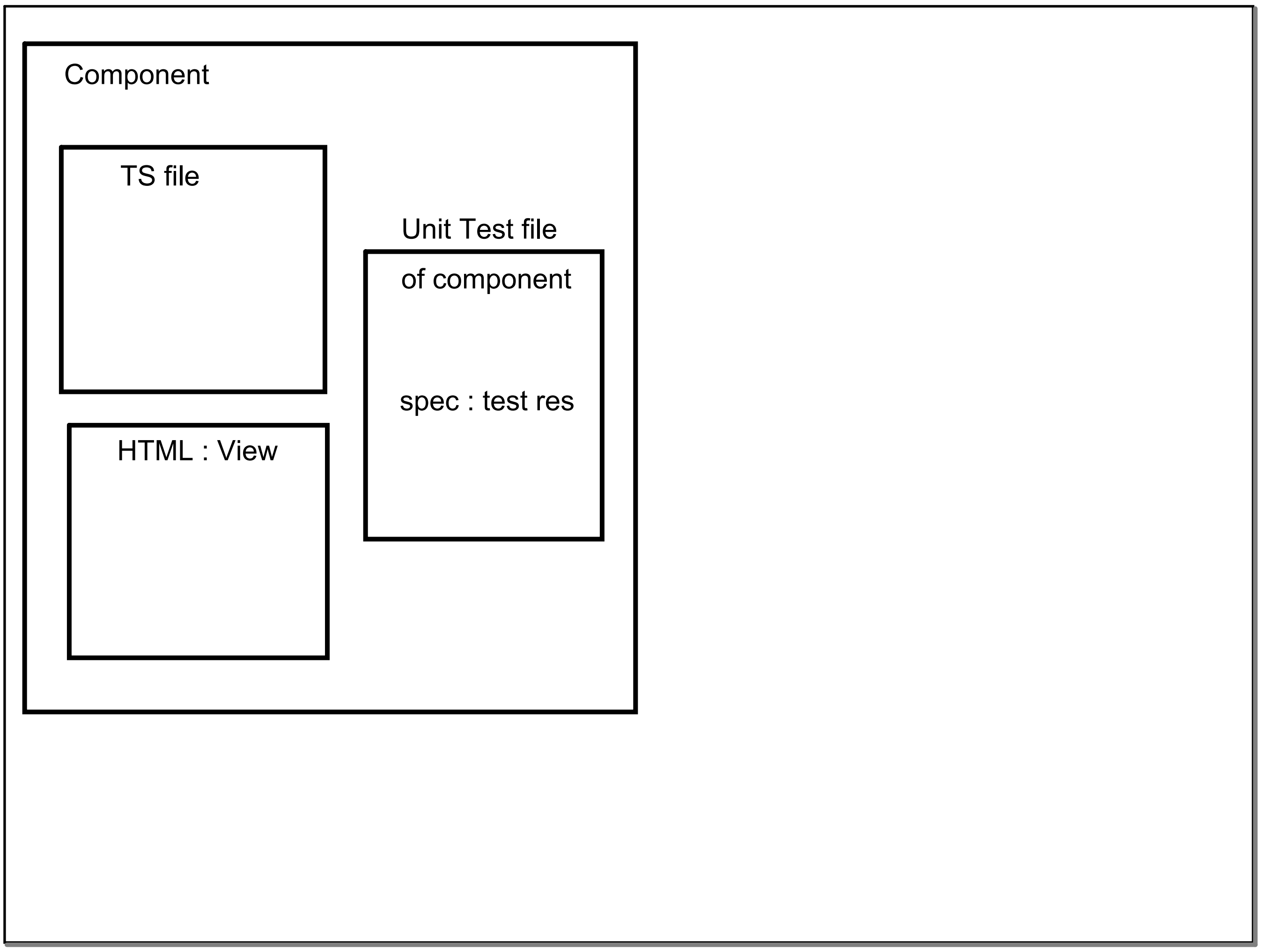
1. add an entry in package.json
2. npm install (download the dependency and add it to node_module)

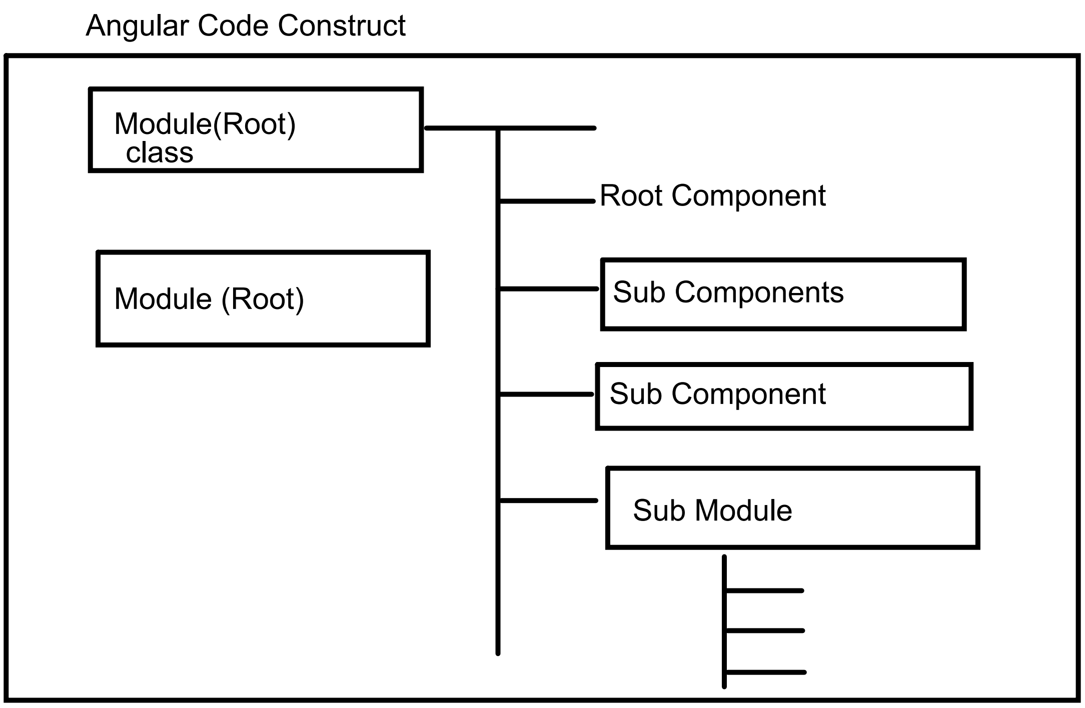
1. npm install -g <lib-name> (install library globally in my system)

~ npm install --save --dev <lib-name>

1. add a entry in package.json(update)
2. down load dependency and save it in node_module


Angular Project on Deployment Server
Angular Based Architecture
TS (Component)
packaged as
HTML + ES5
browserslist
packaging needs to be done
compatible to which browsers
Client
index.html
SPA
Group of
JS files


Component
TS file
HTML : View
Unit Test file
of component
spec : test res


Angular Code Construct
Module(Root) class
Module (Root)
Root Component
Sub Components
Sub Component
Sub Module

By Default:

- Single Module (represented as TS class) : allow to put/share common config/resources for all components under it (app)
  - Single Component
- Routing Module (Exclusively for Routing)/ only if asked to create
  - child routing (can be added later on)
  -

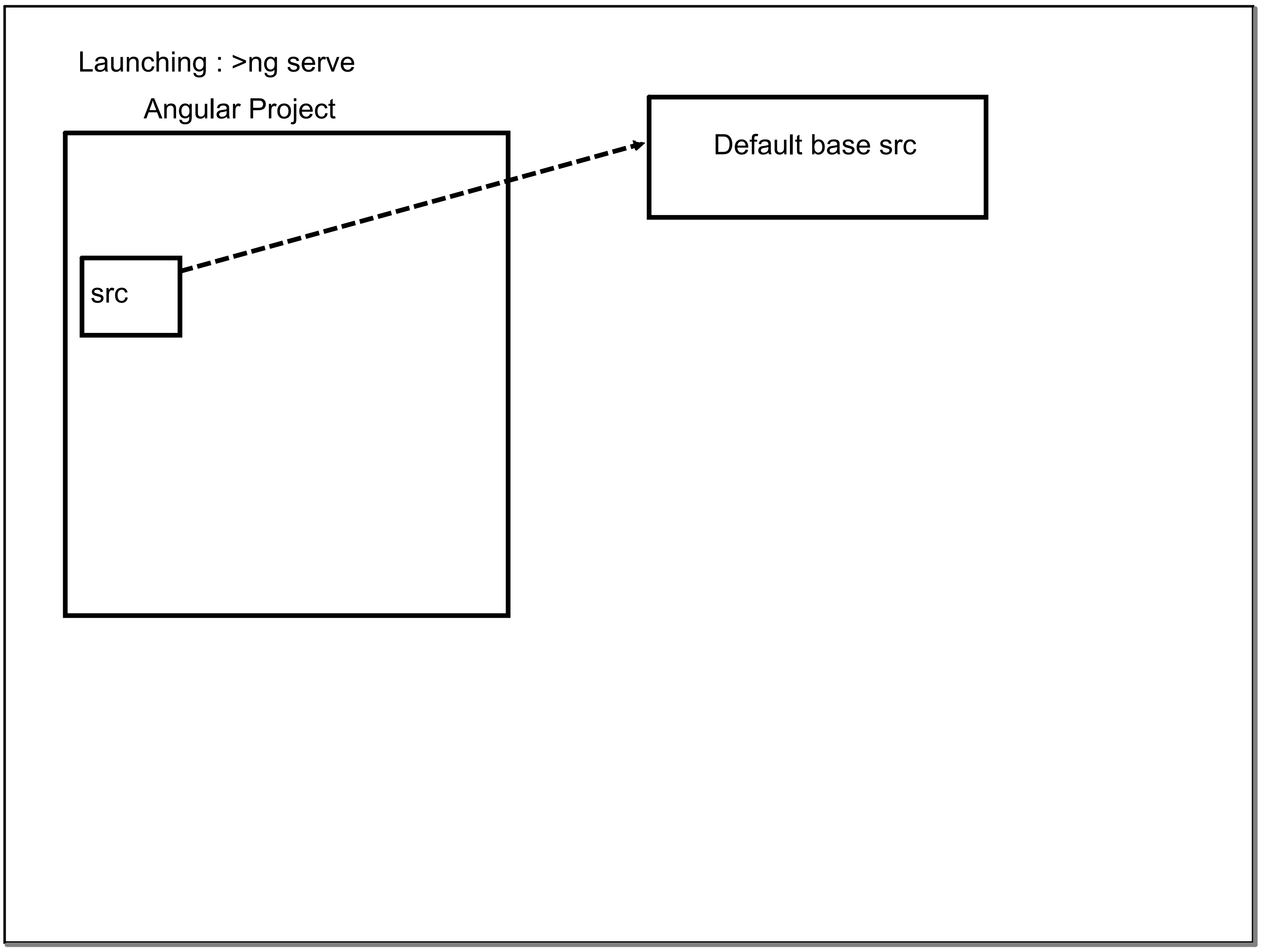
```
import
import <class name> from <library>
import {<class name1>,<class name2>} from <library>
```

Component :

- TS class : supported by presentation (View)

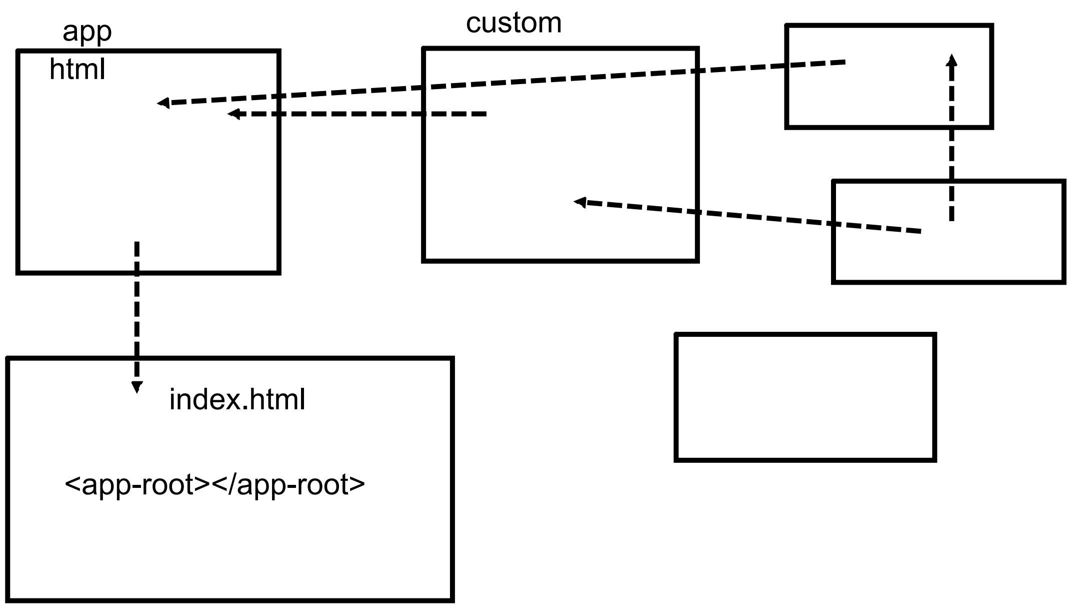
By default :

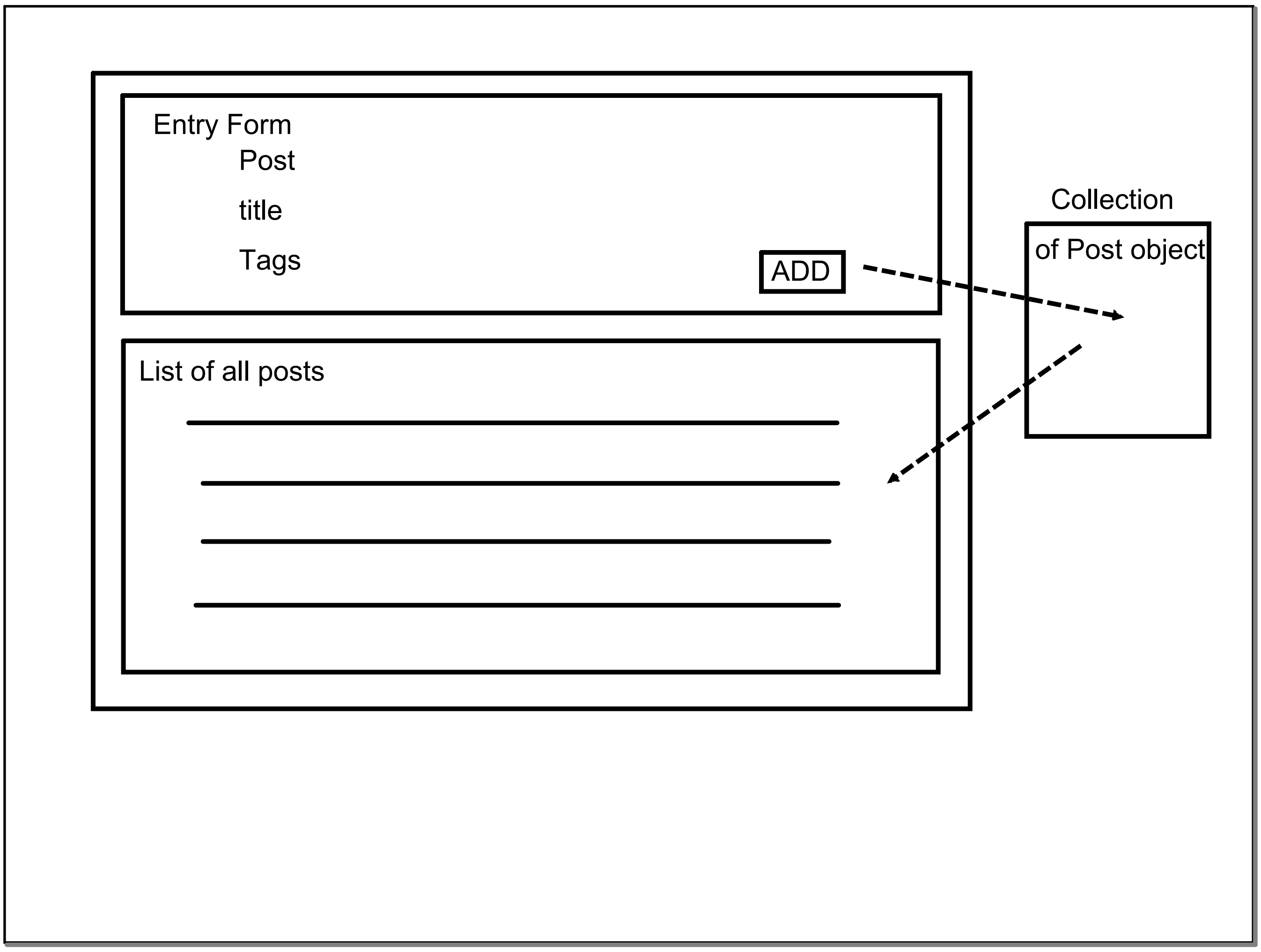
- Angular : 4 files for each component
- TS class (mandatory)
- HTML file (View)
- CSS (contain exclusive classes for that component)
- Test : unit test code for that component

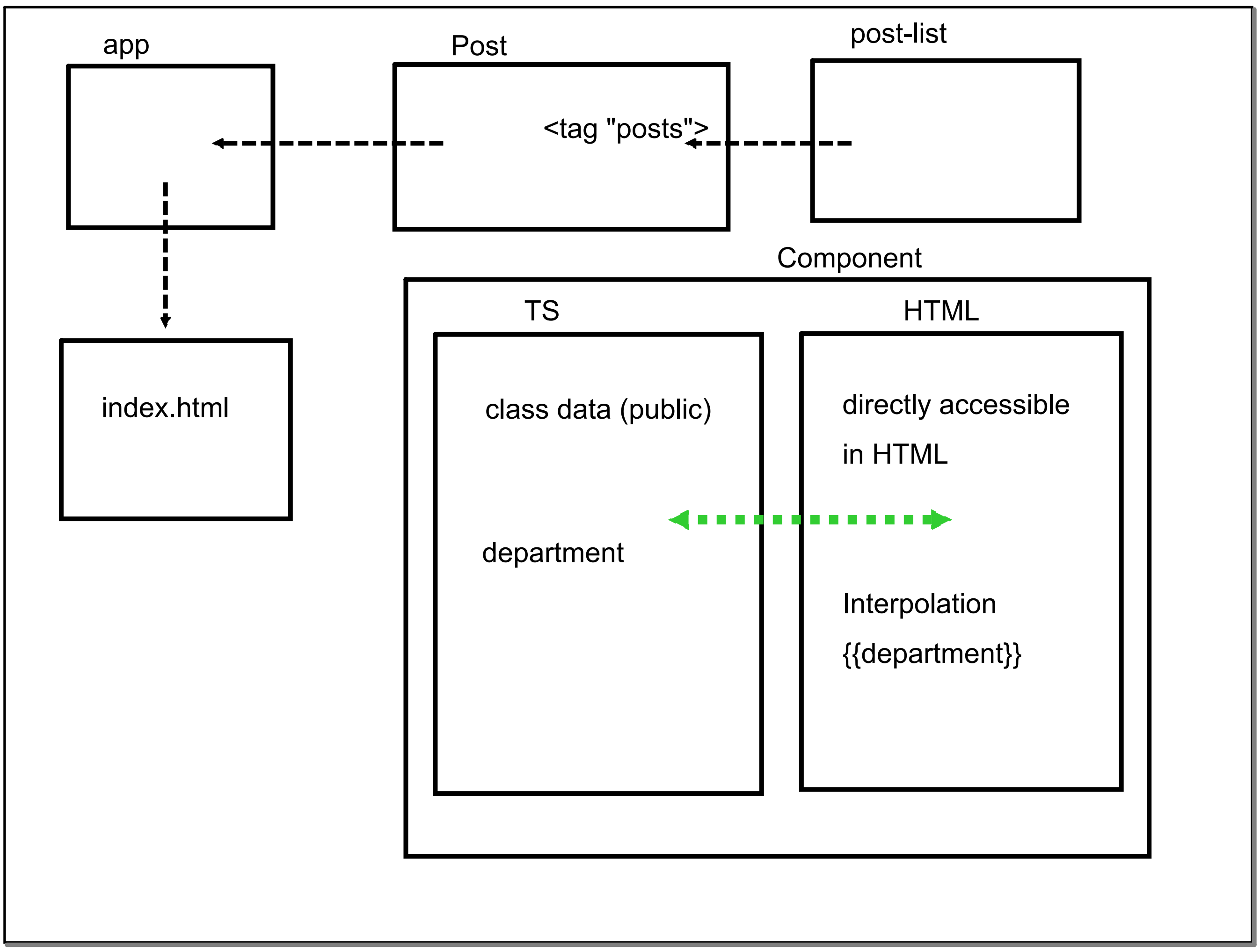

Launching : >ng serve
Angular Project
src
Default base src

Creating a new component

```
> ng generate component <comp-name>
```




Entry Form
Post
title
Tags
ADD
List of all posts
Collection
of Post object


app
Post
<tag "posts">
post-list
index.html
Component
TS
HTML
class data (public)
department
directly accessible
in HTML
Interpolation
{{department}}

Angular : Directives (Dynamic in HTML)

HTML

HTML features Extended by directive

<new tags>

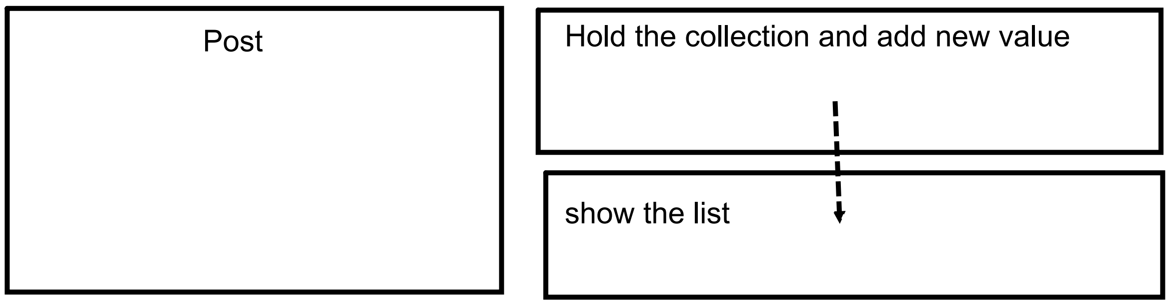
< new attributes> along with existing HTML attributes, new attributes are provided by Angular Directives

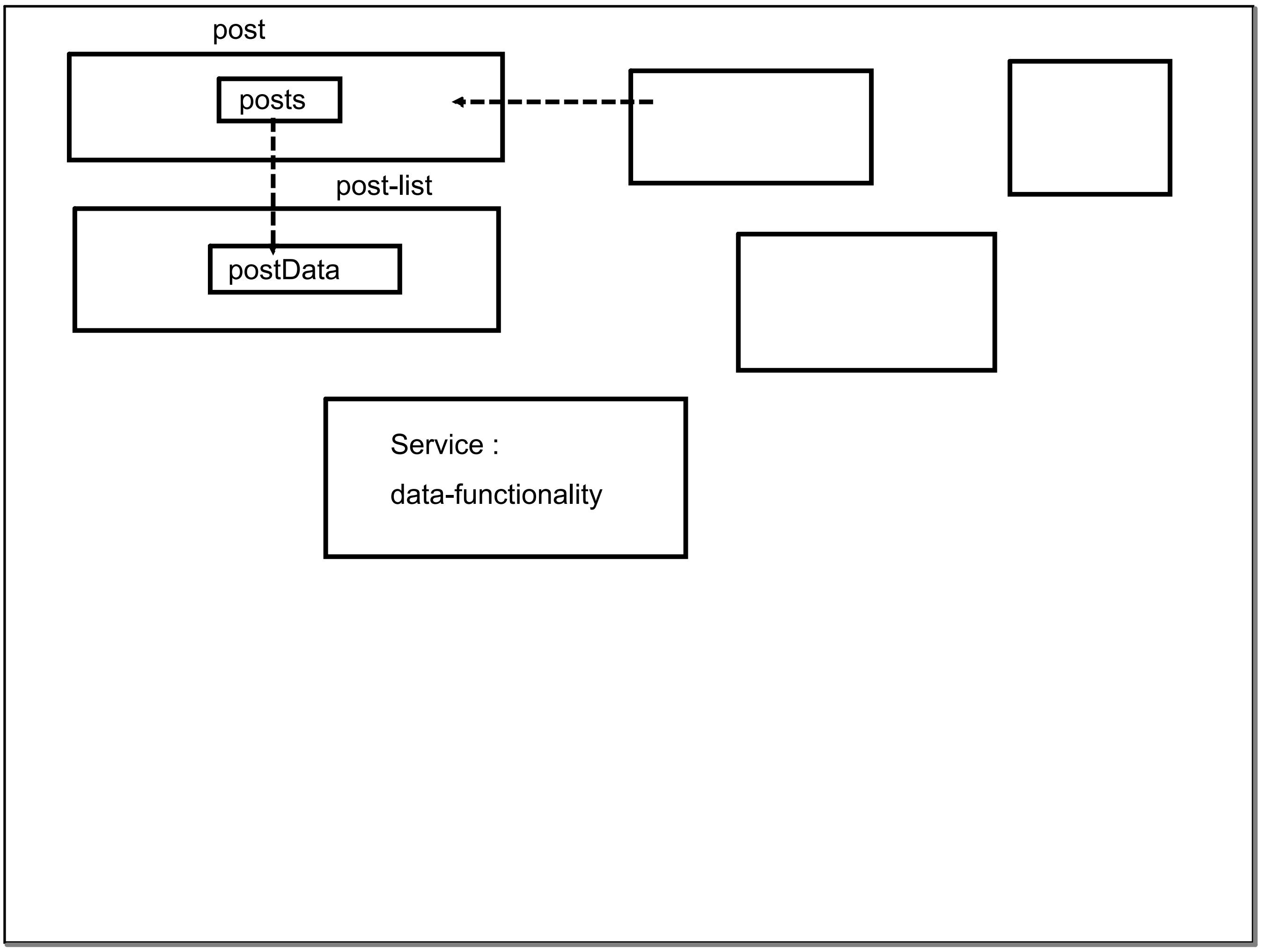
eg : for loop directive

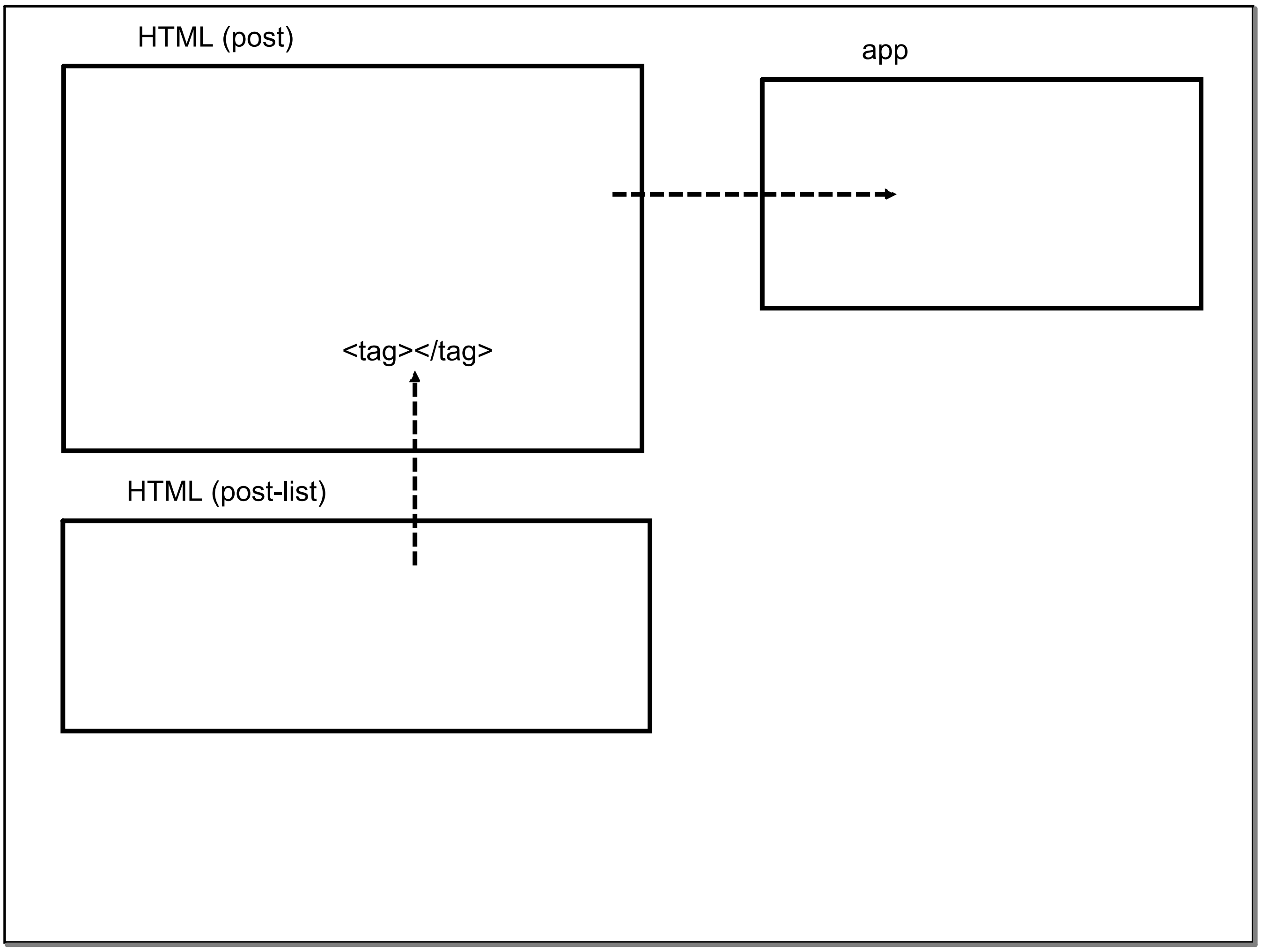
Angular allows to associate a variable with HTML elements

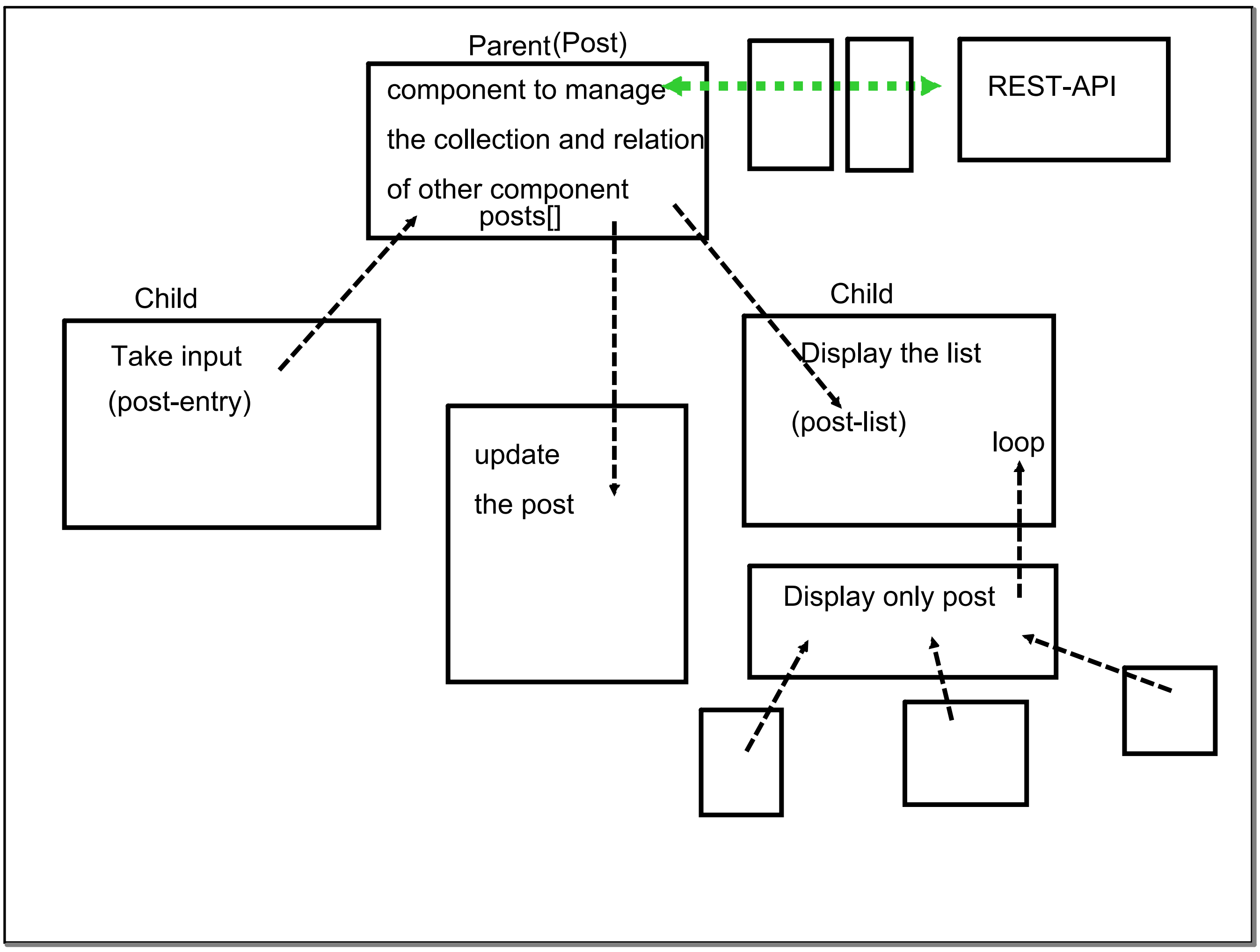
```
var txtTitle: HTLMInputElement = document.getElementById("")!  as HTMLInputElement;
```

Angular : Synthetic events : allows to call TS class methods on events




post
posts
post-list
postData
Service :
data-functionality

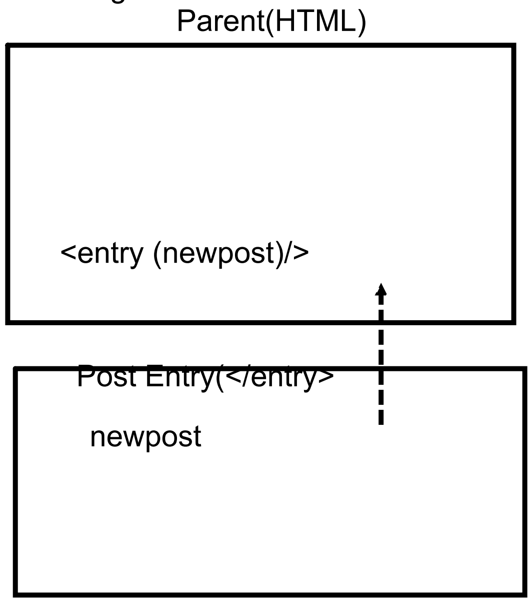

HTML (post)
app
<tag></tag>
HTML (post-list)


Parent(Post)
component to manage
the collection and relation
of other component
posts[]
REST-API
Child
Take input
(post-entry)
update
the post
Child
Display the list
(post-list)
loop
Display only post

1. Delegated Entry UI to entry component
2. Add button event handler code also needed to be delegated

handle a click event

```
<tag (event)="<event handler>" />
<input (click)="addPost(?)" />
```



1. Custom Event
2. Programmatically emit an event + send some data to event handler of another component

Directives :

*ngIf : Controls the visibility of any component

*ngIf="<condition>"

true : Component is visible

false : not visible

Pipes : transform the data for presentation purpose

pipe : |

TS class represents a Pipe

Test File

Function : pure/impure

Pipe (object)

singleton / prototype

pure : every time you pass same input,
same output will be received : shared

impure : internal state of function will decide
can't be shared

object

```
<h2>FileSize : {{fileSize | size }} </h2>
<h2>FileSize : {{bandwidth | size }} </h2>
```

Pipe : is pure : singleton
       : impure : prototype

Handling Form in Angular

# Good Library support

# inbuilt modules :

1. FormsModule
2. ReactiveFormsModule

Two Different Way :

1. Template
2. Model (Reactive)

TS

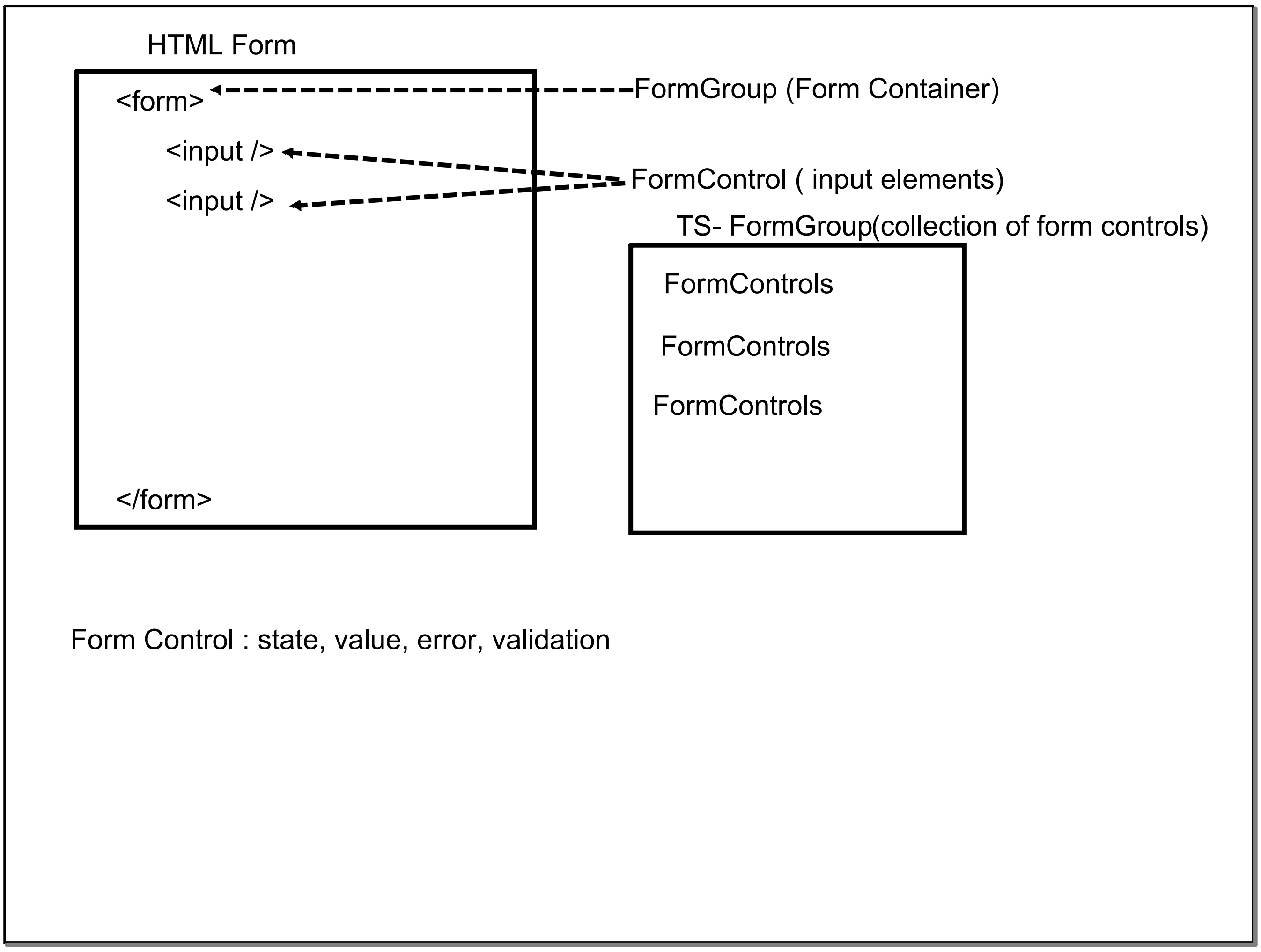
Angular Object

HTML

Object Oriented

Implementation

DOM Object : JS


HTML Form
<form>
<input />
<input />
</form>
FormGroup (Form Container)
FormControl (input elements)
TS- FormGroup(collection of form controls)
FormControls
FormControls
FormControls

Form Control : state, value, error, validation

FormsModule(Template)

    FormGroup : ngForm (directive)

    FormControl : ngModel (directive)

ReactiveFormsModule

    FormsGroup : formGroup

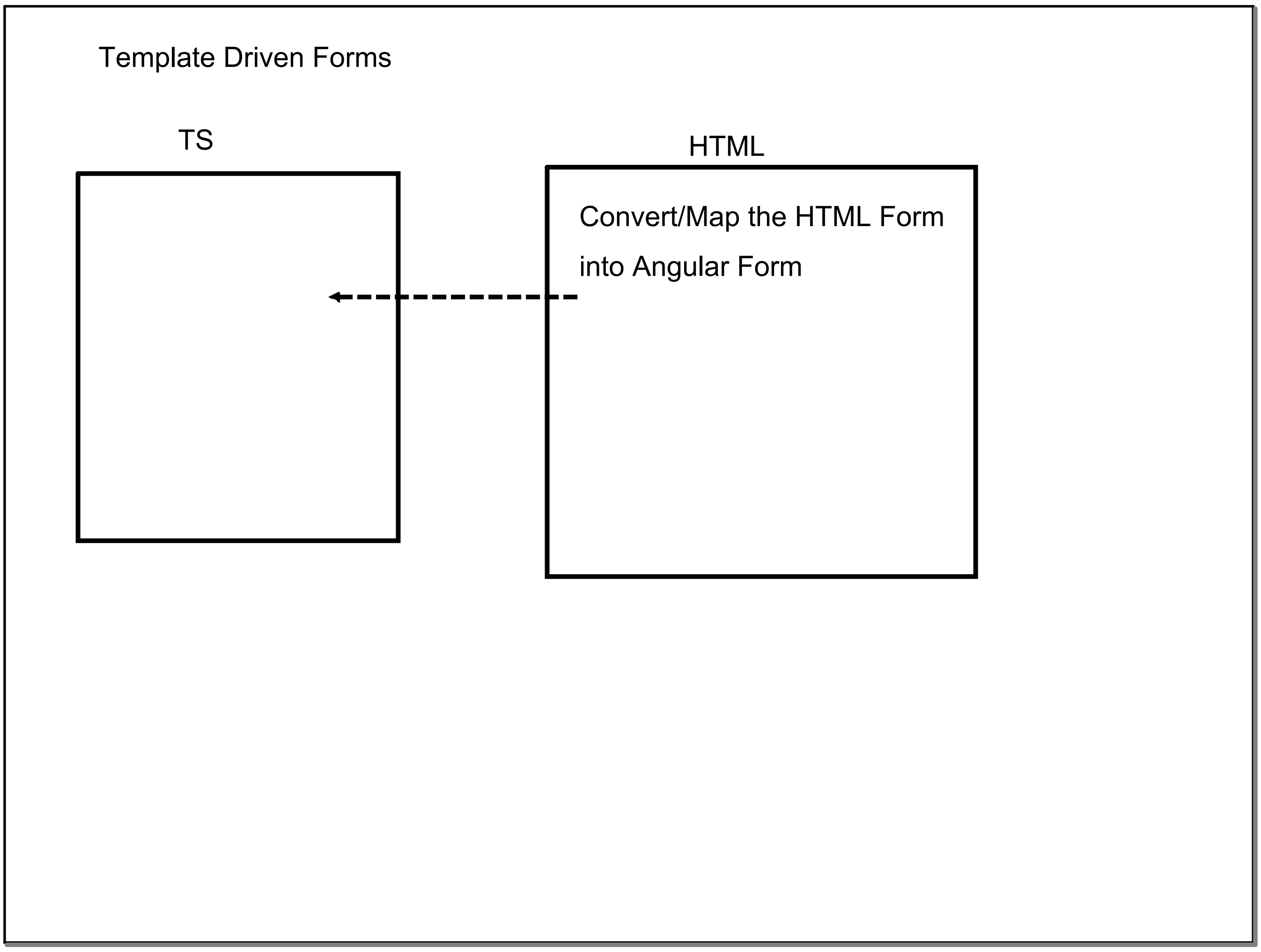
    FormControl : formControl

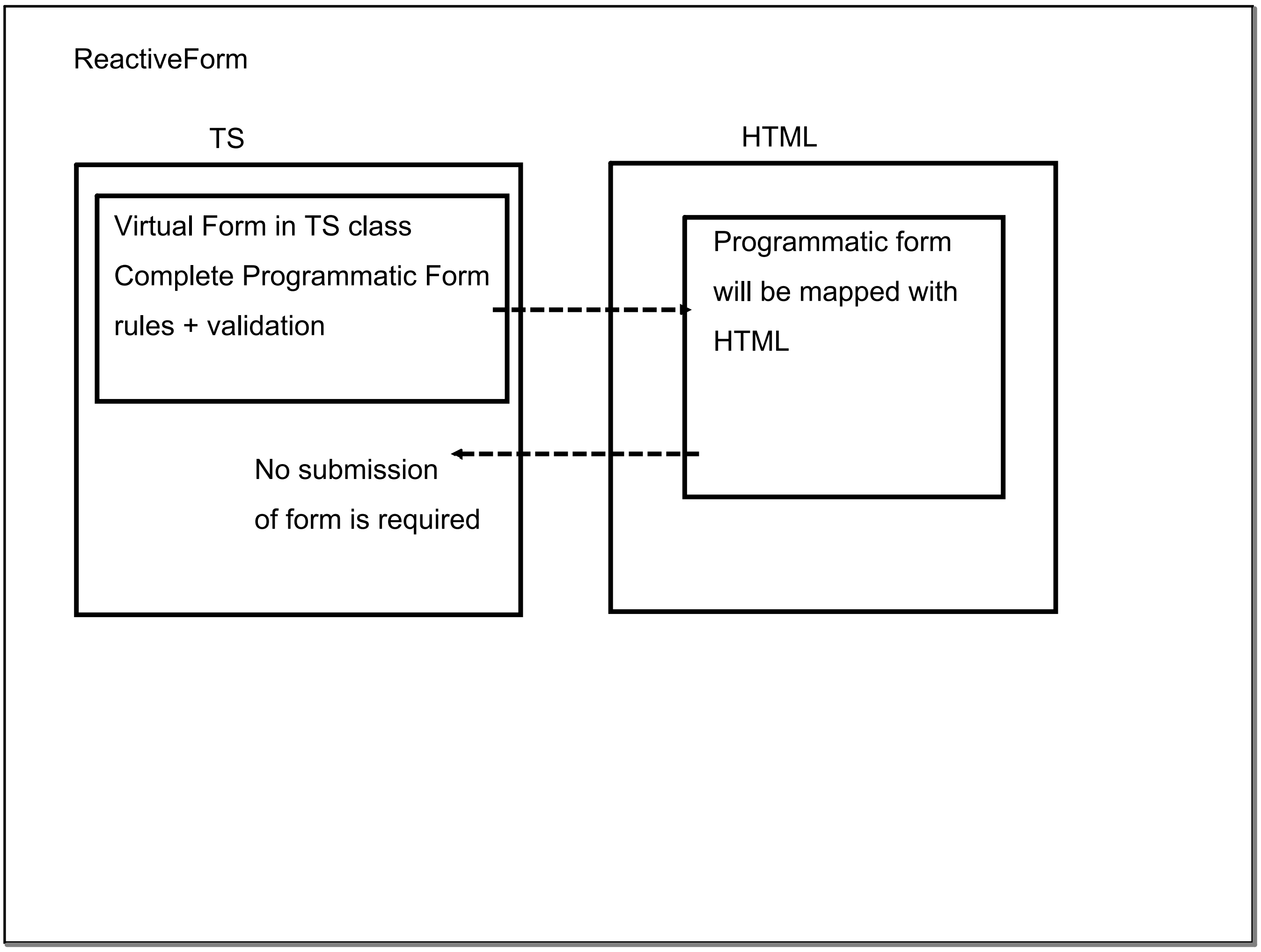
=> Mapping of HTML to Angular Object is done in view file

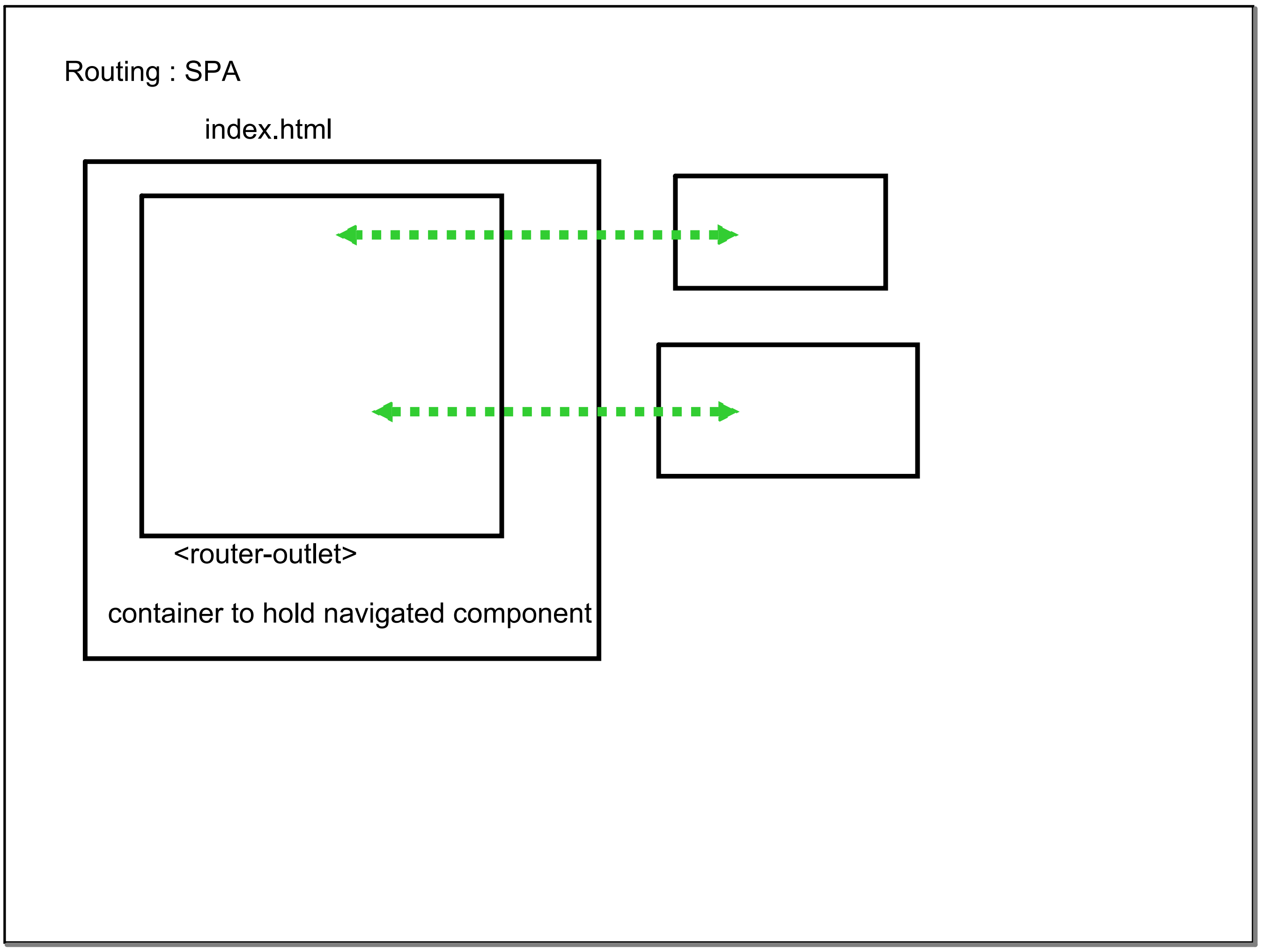
=> TS is not having much control over mapping

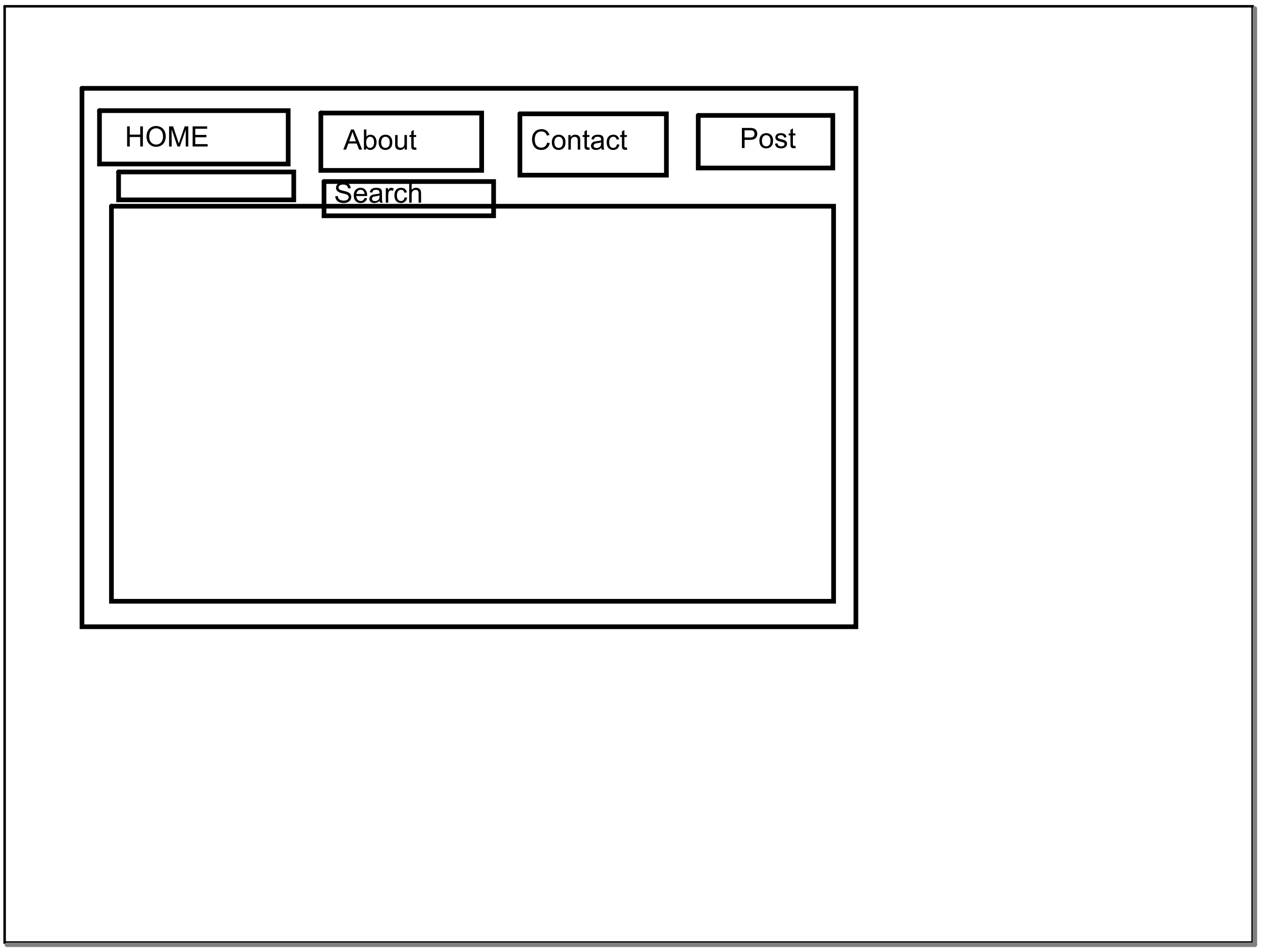
=> Not providing feature for Validation

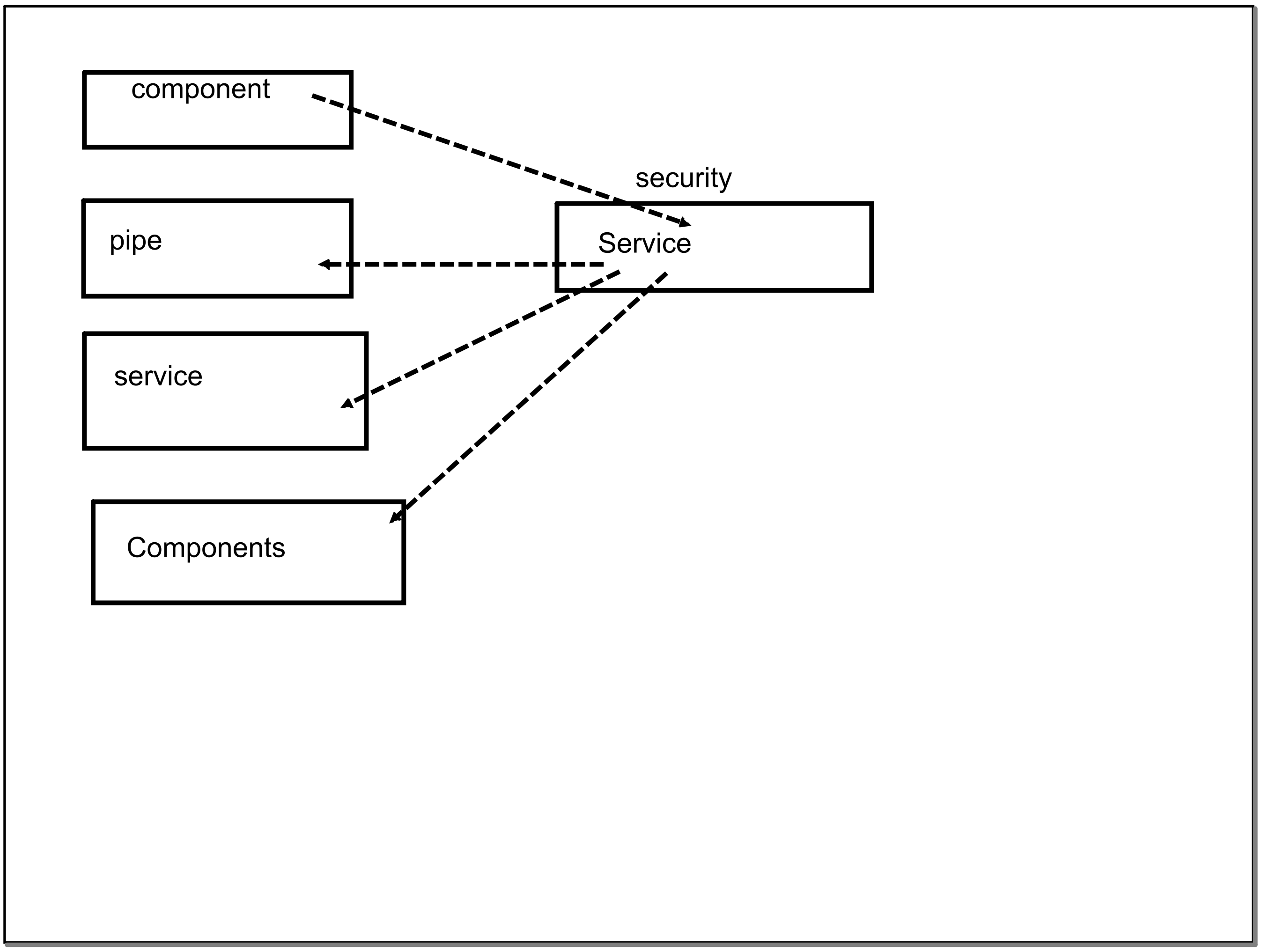
#Need to add dependency of Module

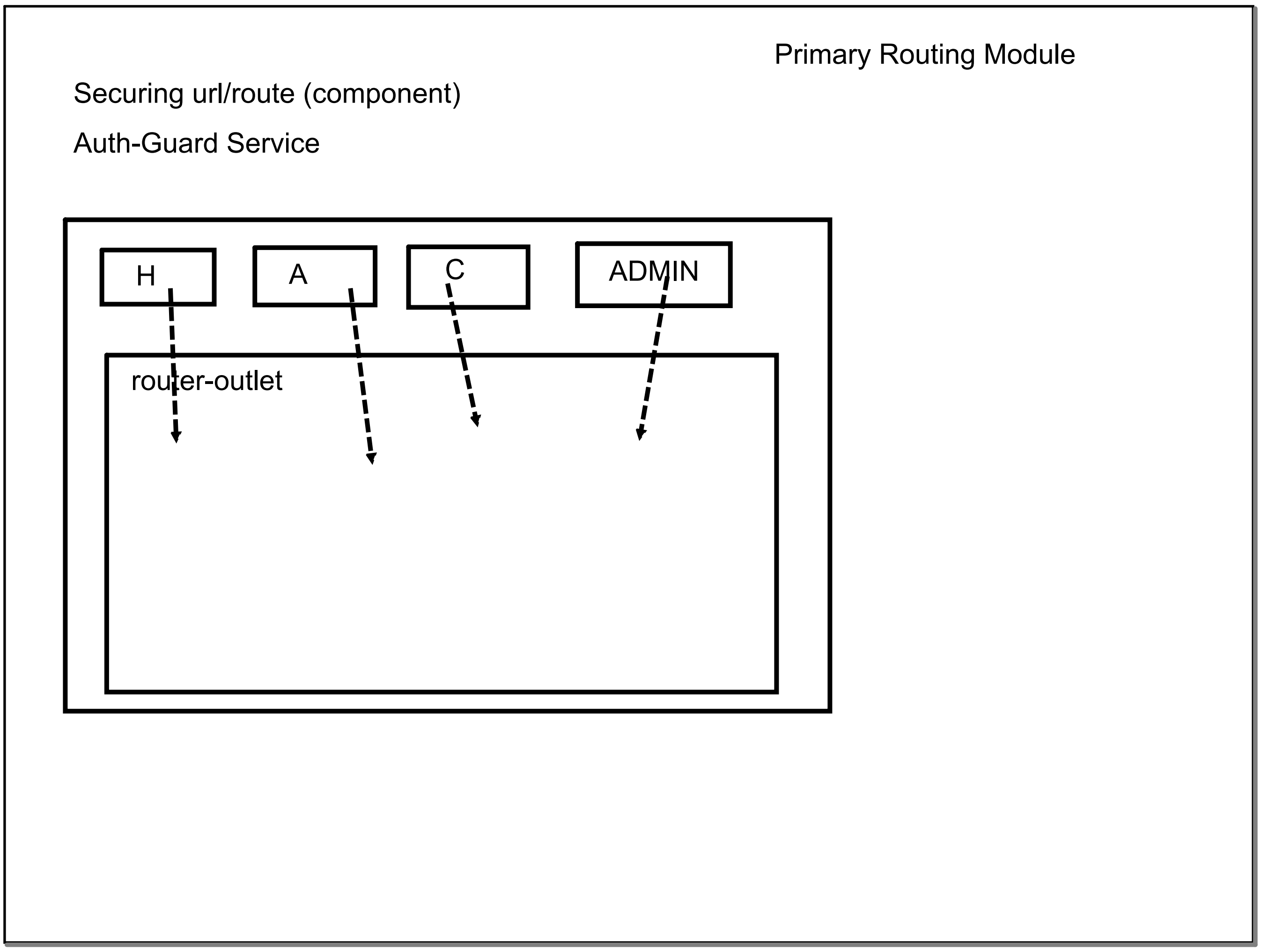

Template Driven Forms
TS
HTML
Convert/Map the HTML Form
into Angular Form

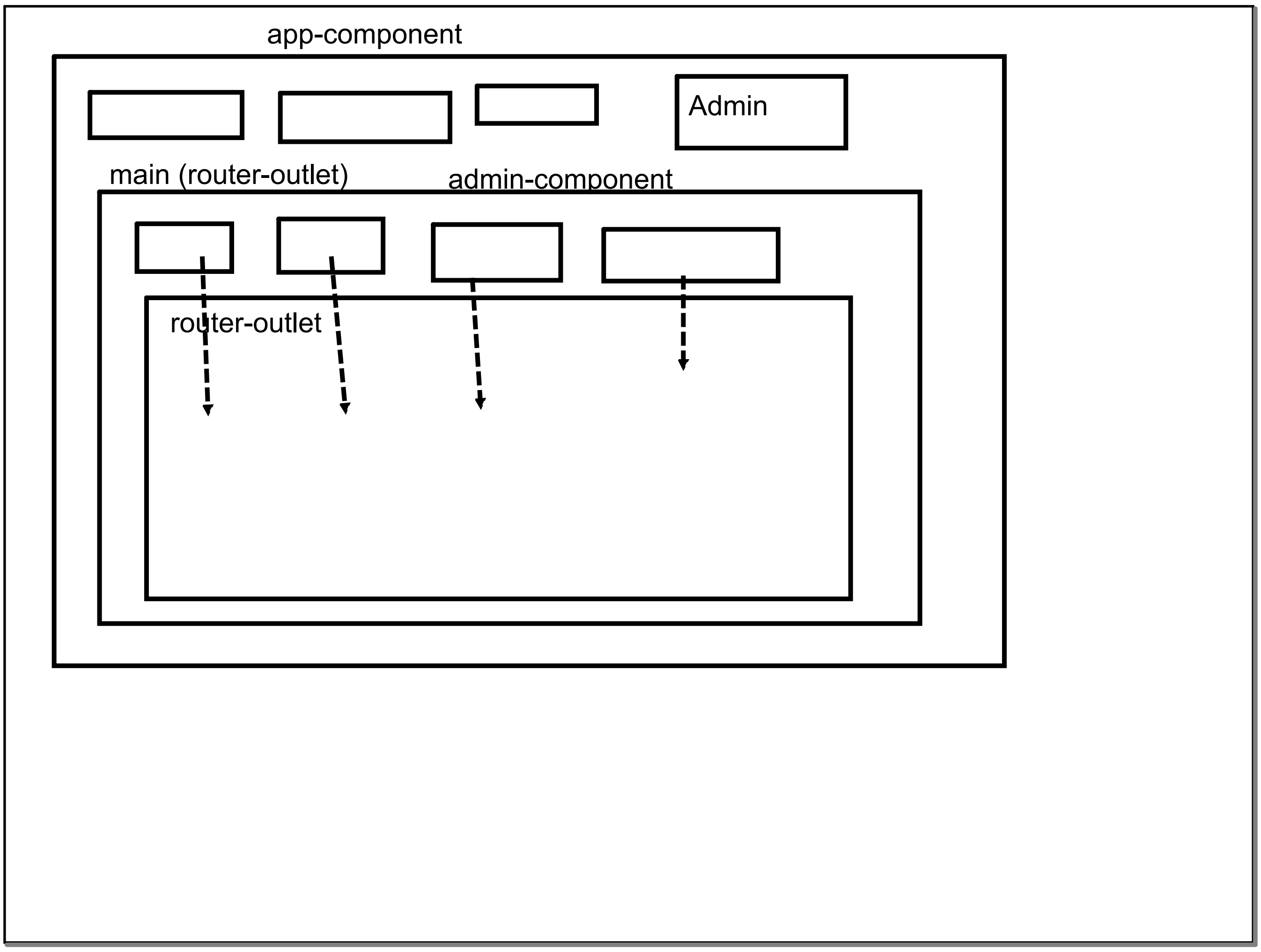

ReactiveForm
TS
HTML
Virtual Form in TS class
Complete Programmatic Form
rules + validation
Programmatic form
will be mapped with
HTML
No submission
of form is required


Routing : SPA
index.html
<router-outlet>
container to hold navigated component


HOME
About
Contact
Post
Search


component
pipe
service
Components
security
Service


Primary Routing Module
Securing url/route (component)
Auth-Guard Service
H
A
C
ADMIN
router-outlet


app-component
Admin
main (router-outlet)
admin-component
router-outlet

HttpClientModule : Http-Service

Dummy Server/Fake REST API : json-server

1. Allows you to use a json file as the backend DB
2. Exposes all Rest Endpoints on that Json File

Install : Json Server :

```
>npm install -g json-server
```

http://localhost:3000/post : GET (get all)

http://localhost:3000/post/1 : GET (get by id)

http://localhost:3000/post : POST (new post) return the newly added record

http://localhost:3000/post : PUT (edit post) return the newly edited record

http://localhost:3000/post/1 : DELETE (delete that record)

JS : ES

Standard ES5 : support is by default available

jquery :

Library of JS (ES5):

ReactJS is just a library : exclusive to build effecient UI (V part of MVC)

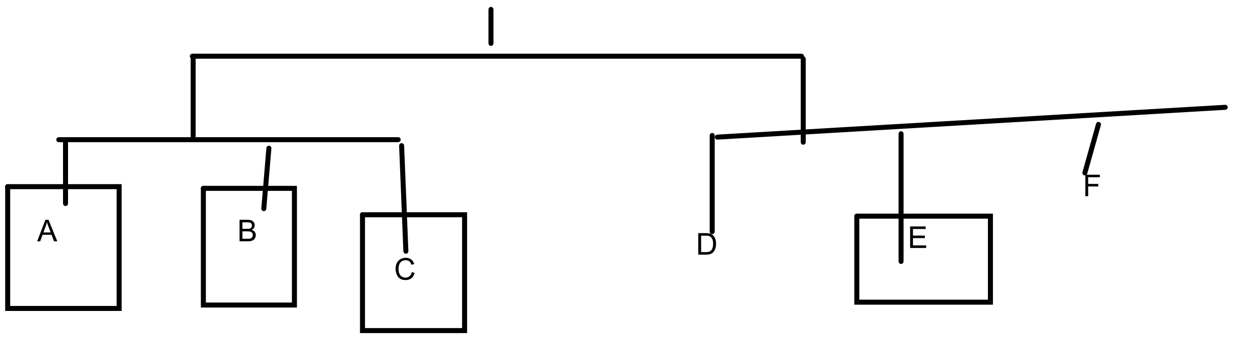
Build UI of large complex application (frequently changing data)

: Renderring would be frequent

Traditional approach of page renderring:

Browser :

DOM TREE



IF any change in any part of DOM Tree, complete Tree is re-renderring

ReactJS : ES6 : needs to be transpiled : can't be directly used on browsers

React Component : JS functions : which generates an (UI) output whenever it is called

eg : render()

generates some output

```
<div>
     <h2>Hello All</h2>
     <p>10:30 AM</p>   // programmatically
</div>
```

ReactJS : Virtual DOM

In-memory representation of

real DOM:

diffing engine :

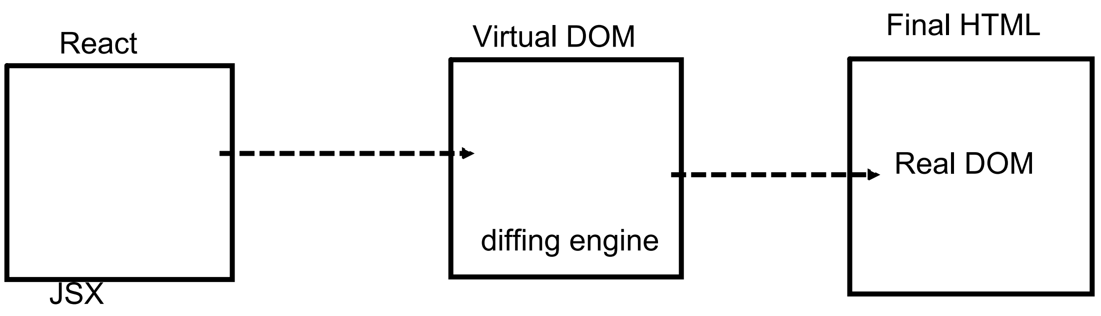
called after 1 min

only <p> component

```
<div>
          <h2>Hello All</h2>
          <p>10:31 AM</p>   // programmatically
     </div>
```

```
  document.getElementById("resp").value=""; // REACT JS Approach (granular approach)
  ES5 approach


ReactJS Component is JS Function
render(){
    // code a code generate a UI
    // JSX syntax : JavaScriptXml Syntax
    Integrates Javascript with HTML
}
```



React JS Library

Two Library

1. react : Main ReactJS lib
2. react-dom : Virtual DOM

> npm tool

for managing everything about ReactJS application

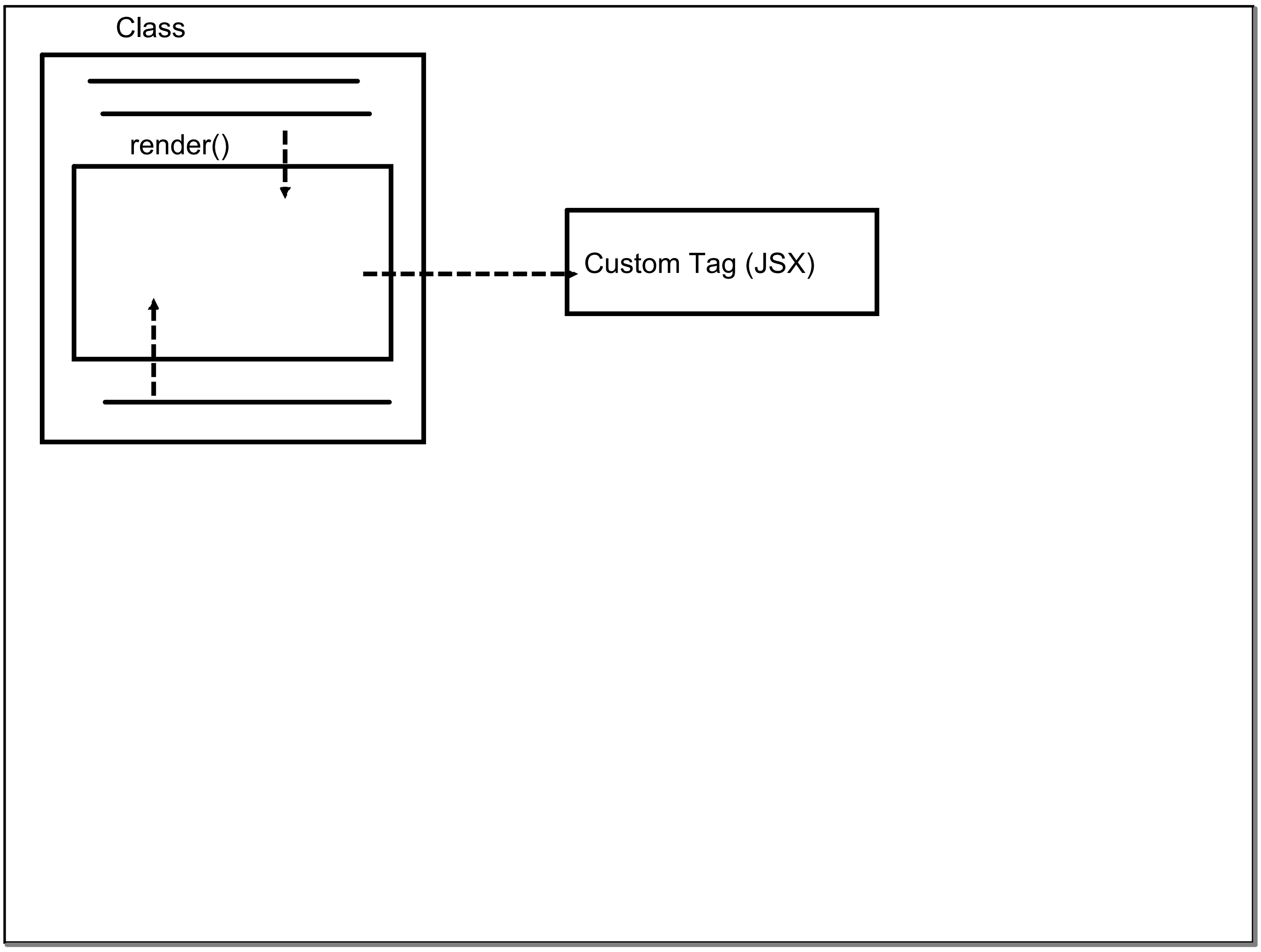
create-react-app (cli)

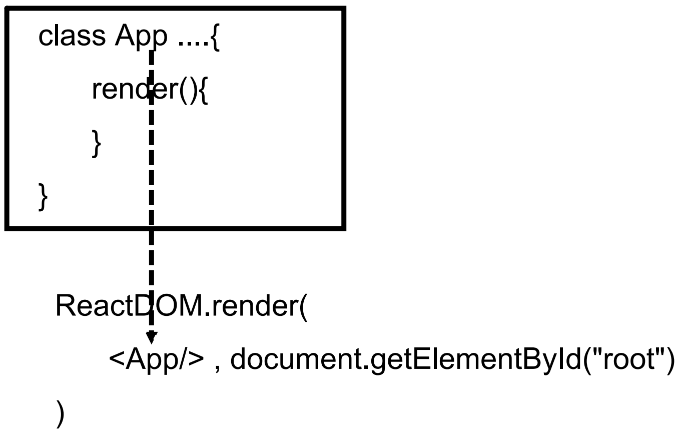
install:

```
> npm install -g create-react-app
```

After installed

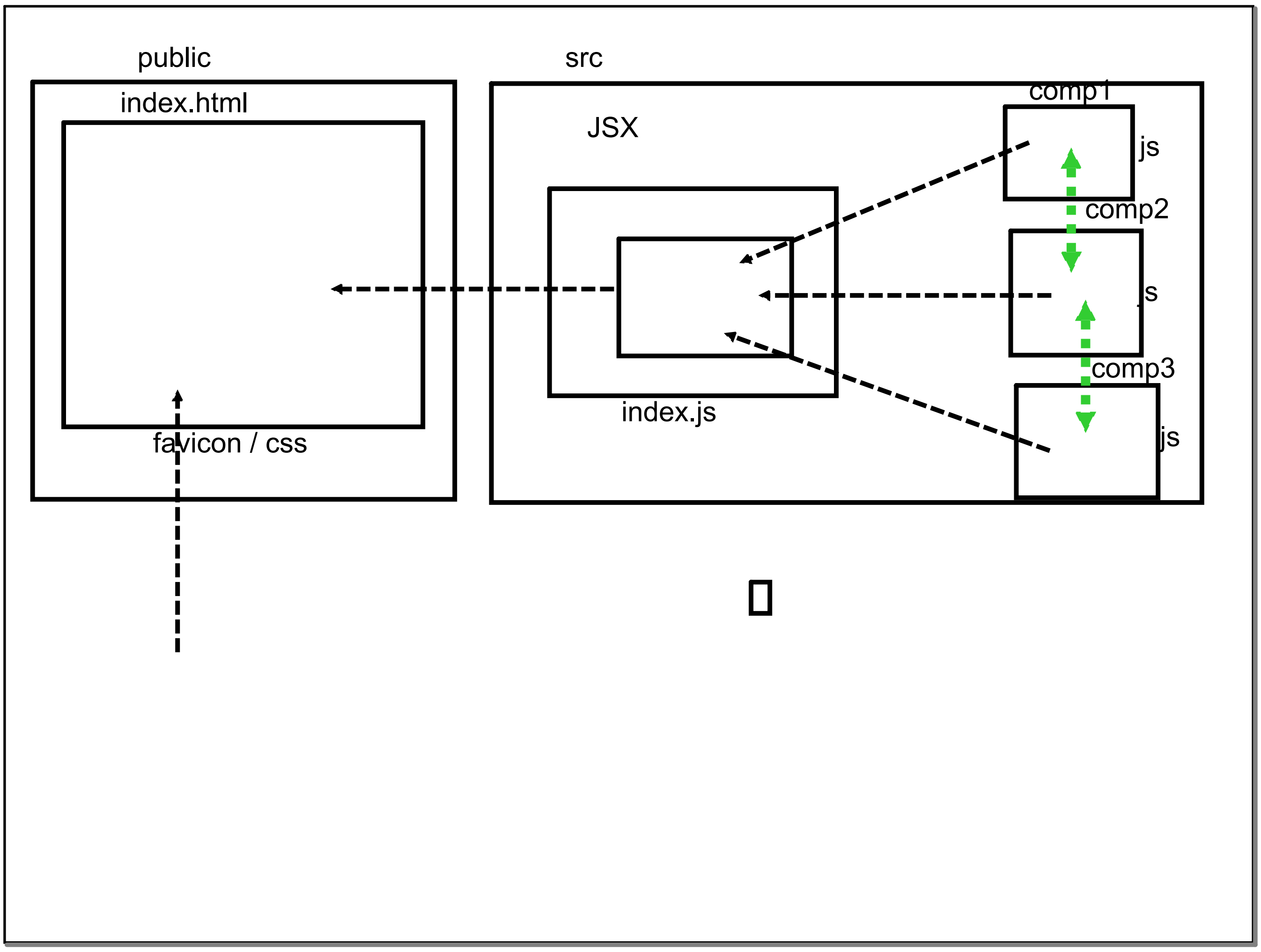
```
> create-react-app <app-name>
```

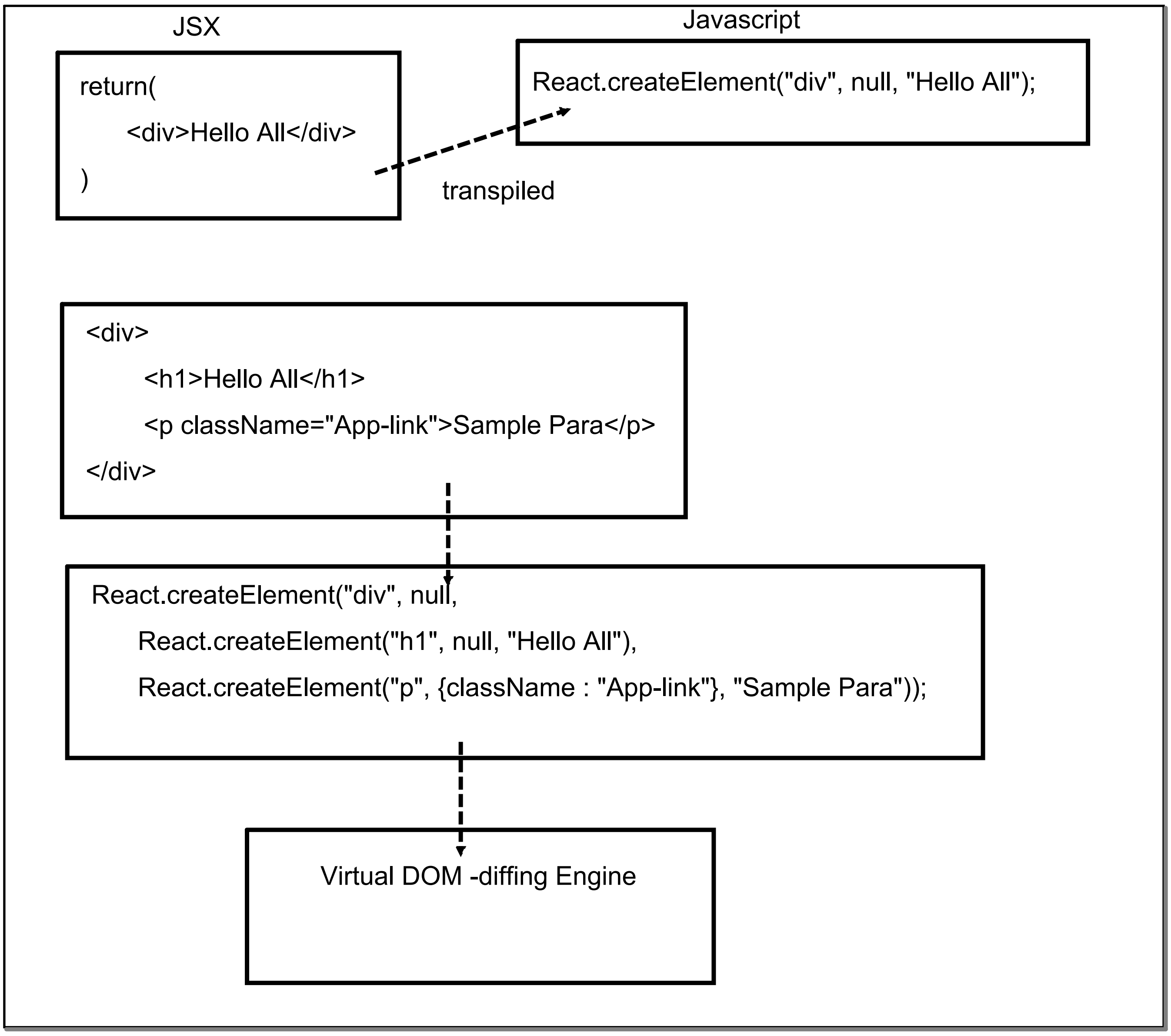

Class
render()
Custom Tag (JSX)



```
class App ....{
    render(){
    }
}

 ReactDOM.render(
     <App/> , document.getElementById("root")
 )
```


public
index.html
favicon / css
src
JSX
index.js
comp1
js
comp2
js
comp3
js

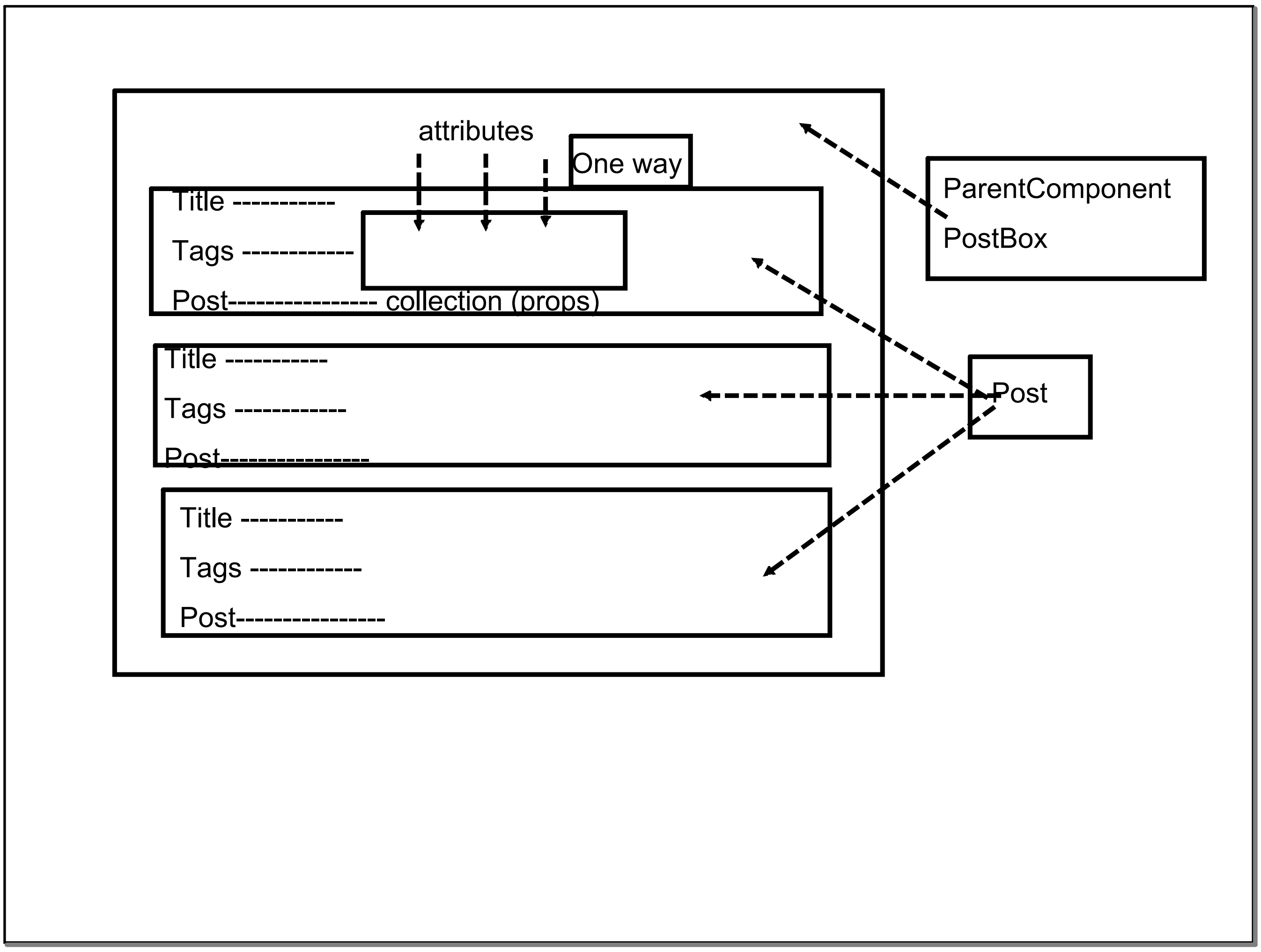


```
return(
    <div>Hello All</div>
)
```

```
React.createElement("div", null, "Hello All");
```

```
<div>
    <h1>Hello All</h1>
    <p className="App-link">Sample Para</p>
</div>
```

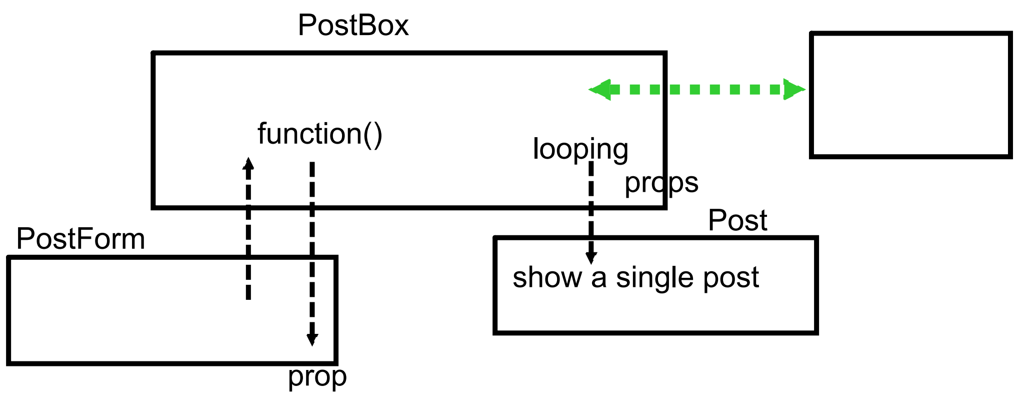
```
React.createElement("div", null,
    React.createElement("h1", null, "Hello All"),
    React.createElement("p", {className : "App-link"}, "Sample Para"));
```


attributes
One way
Title -----------
Tags ------------
Post---------------- collection (props)
Title -----------
Tags ------------
Post----------------
Title -----------
Tags ------------
Post----------------
ParentComponent
PostBox
Post

render() method call is going to define the UI change

Call to render is controlled by few factor

1. Props : any change in prop value would trigger render() call
2. State : inbuilt object (exclusive to a component) : any change will trigger render call



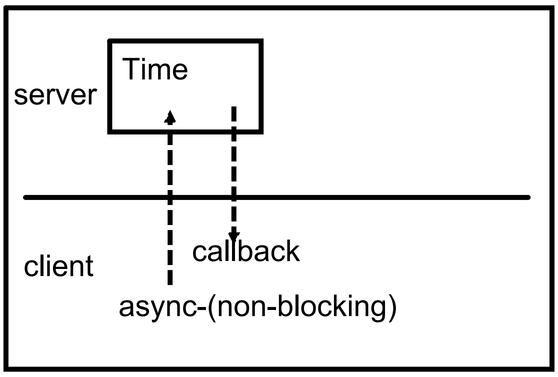
ref ~ document.getElementById("");

Make app talk with backend-server async

AJAX call (jquery)

1. Traditional way : CDN Link / download lib
2. npm way

```
# install and save dependency in package.json
>npm install --save jquery
```



Life Cycle of React Component :

When a component is used for renderring

Instance is created

1. constructor
2. componentWillMount() : before renderring

   (only once : first time rendering : not with every rendering)
3. render() : (first call)
4. componentDidMount() : just after render (only once : after first rendering)

Netty Server

5. componentWillReceiveProps() ;

   whenever prop/state change

   invoked before next rendering (before every re-rendering)
6. shouldComponentUpdate()

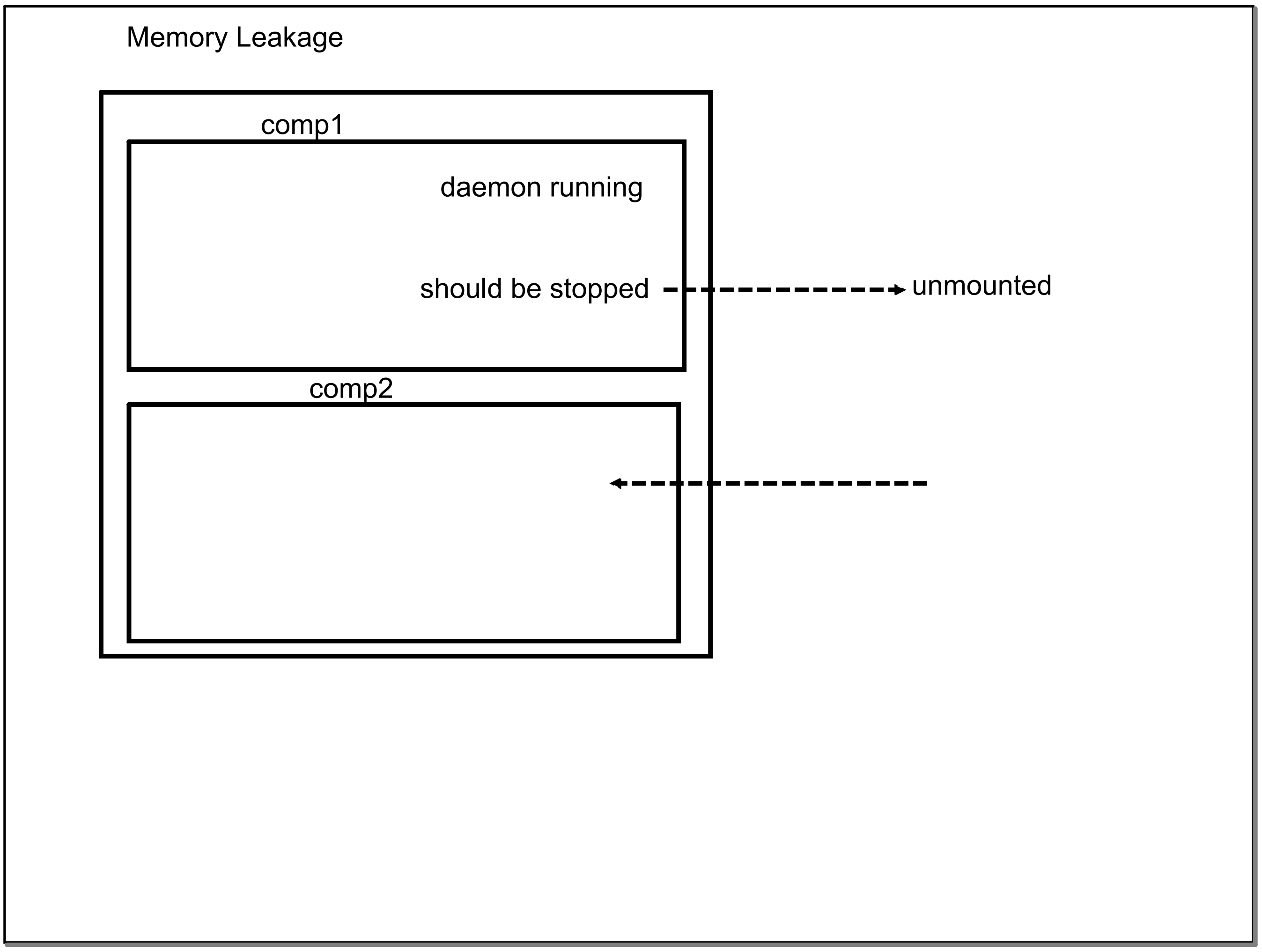
   #allows to customize the flow

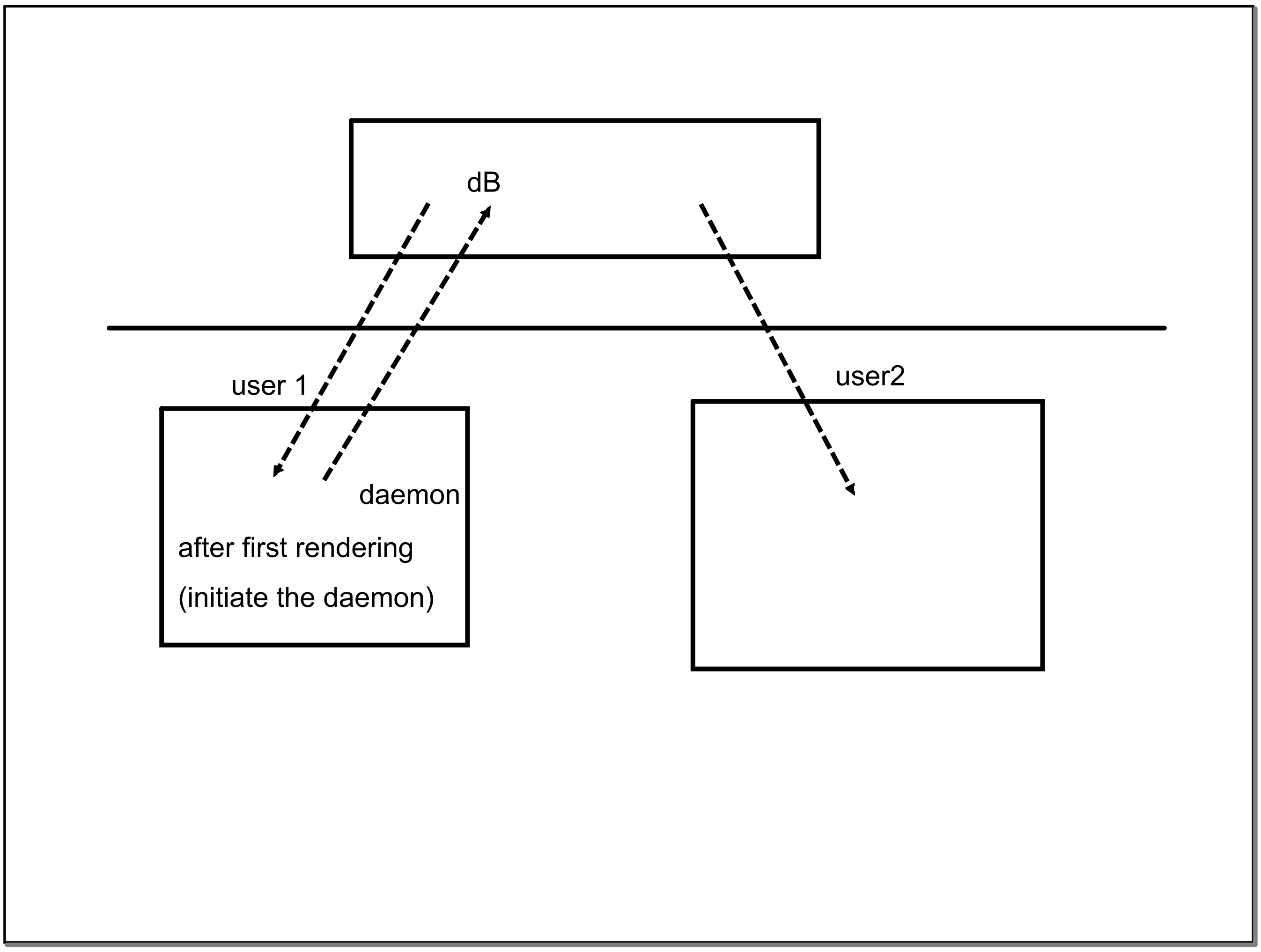
returns boolean :

   true : re-rendering

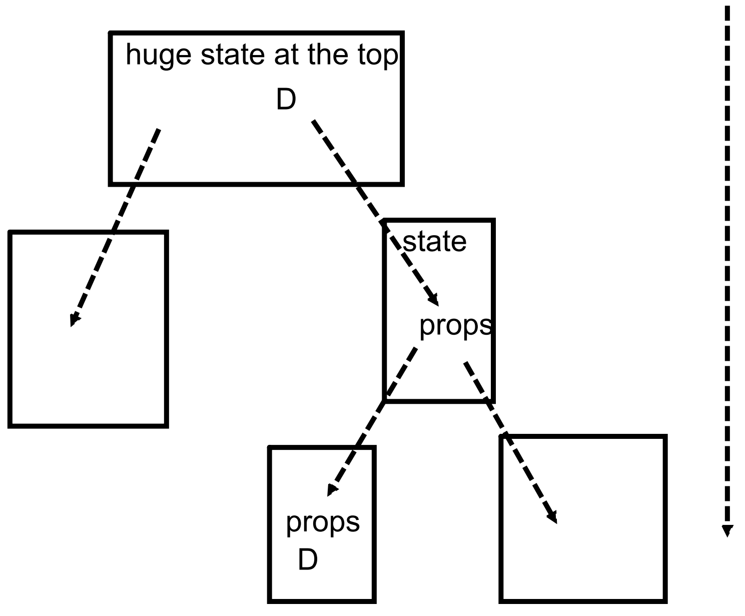
   false : no re-rendering

7. componentWillUpdate() : only of true is returned
8. render () : re-rendering
9. componentDidUpdate(); just after re-rendering
10. componentWillUnmount() : component is removed from Virtual DOM


Memory Leakage
comp1
daemon running
should be stopped
unmounted
comp2


dB
user 1
user2
daemon
after first rendering
(initiate the daemon)

Flux Design Pattern (Redux API)



(inbox)list of email:

list -> email view

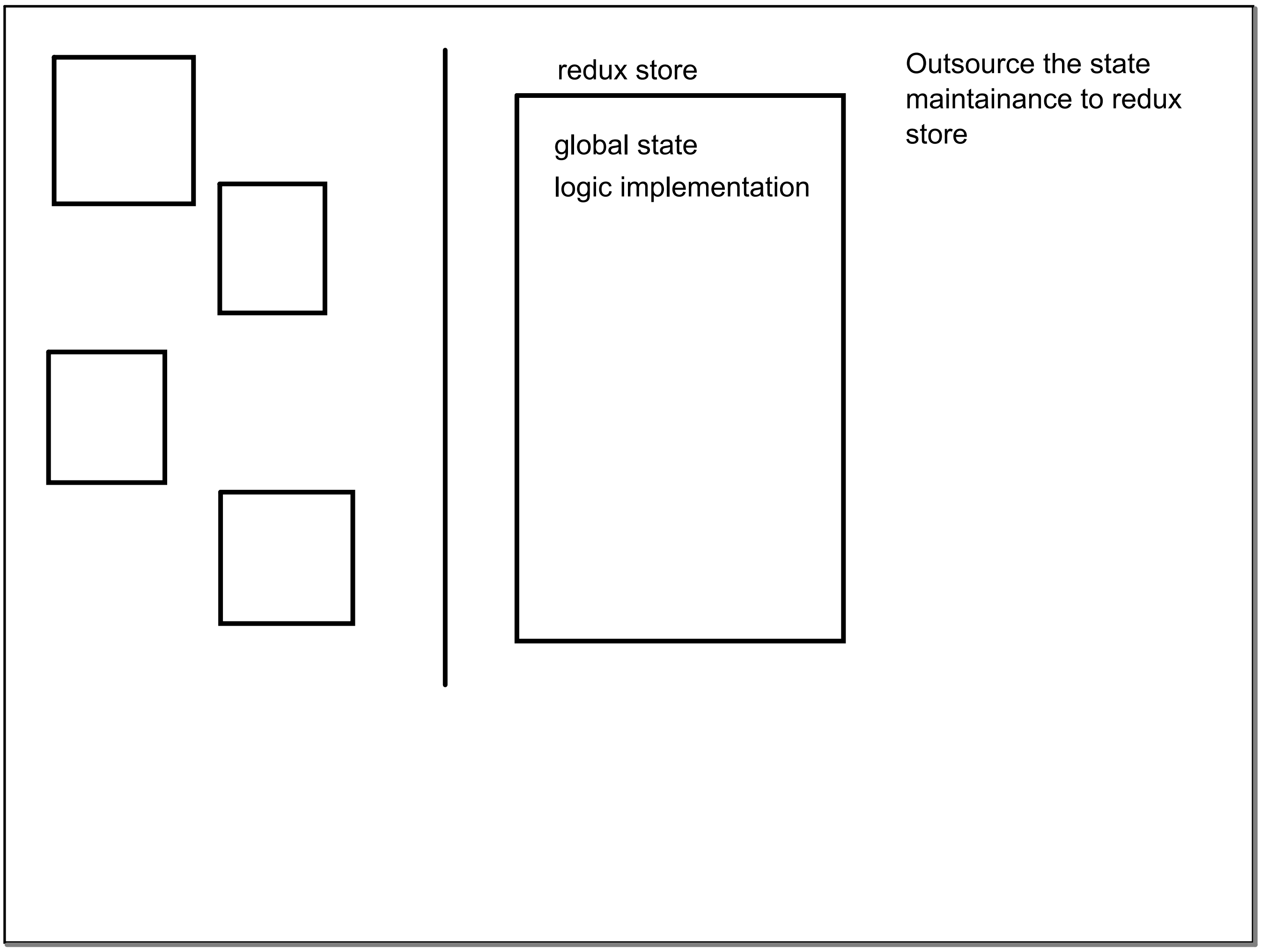
#fetch the data of that email from server

# mark as read

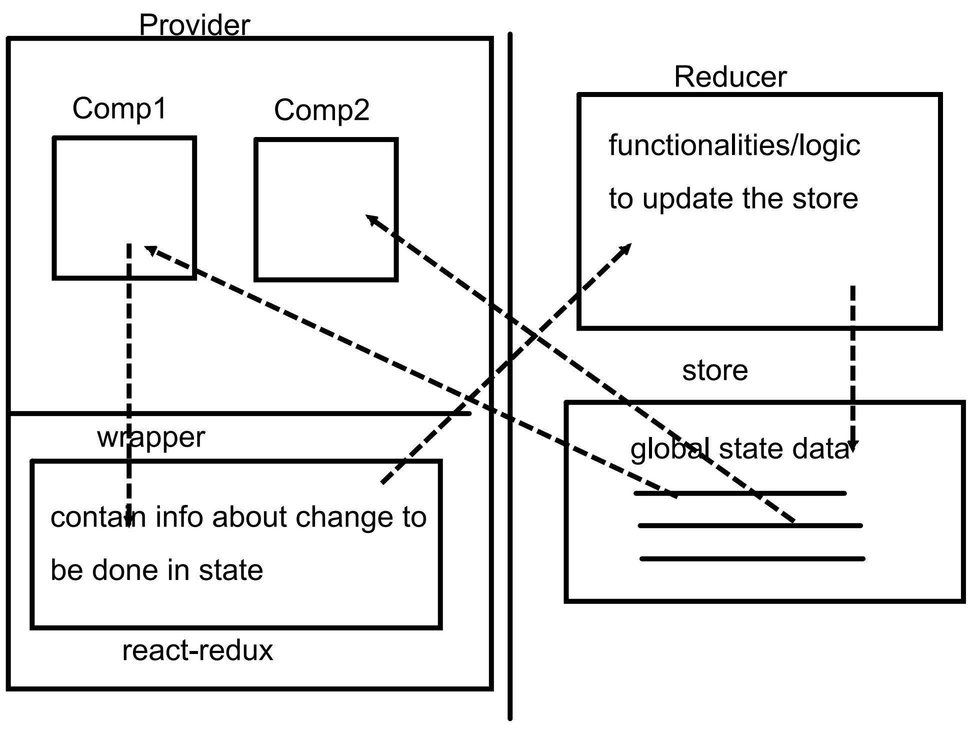
# unread mail counter needs to be reduced

# url to be changed

# all update needs to sent to server



Outsource the state maintainance to redux store


Provider
Comp1
Comp2
wrapper
contain info about change to be done in state
react-redux
Reducer
functionalities/logic to update the store
store
global state data

1. which data to expose to which component

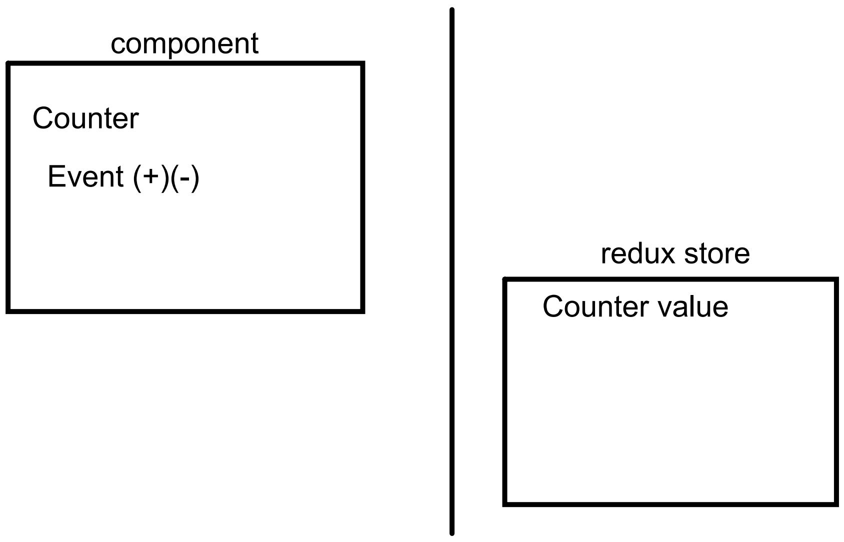
2. Reducer will be responsible for state change

install lib

-->redux

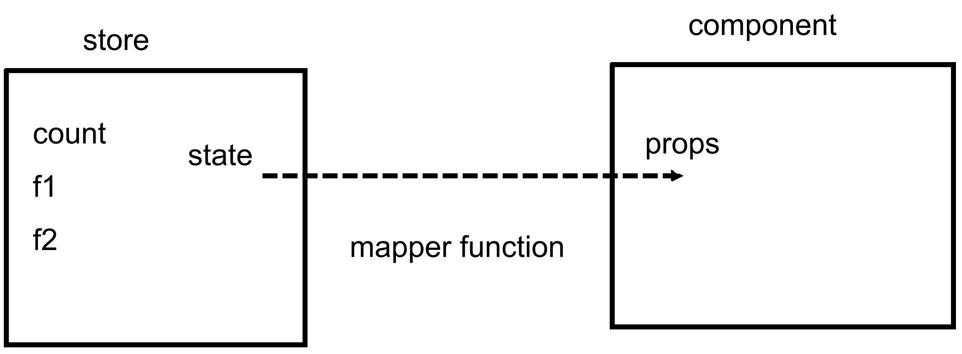
--> react-redux (plumbing)

```
> npm install --save redux react-redux
```



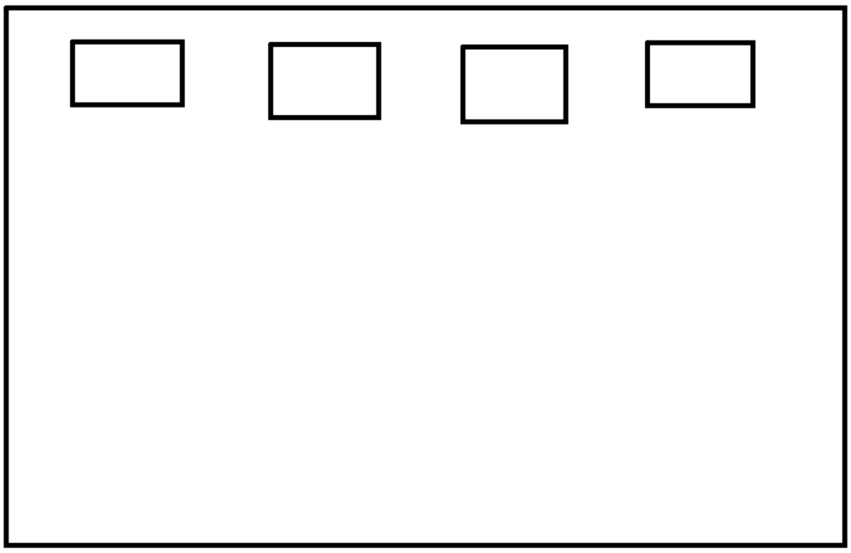
# create a store management resource
# expose the store to react component
# configure the component to use store

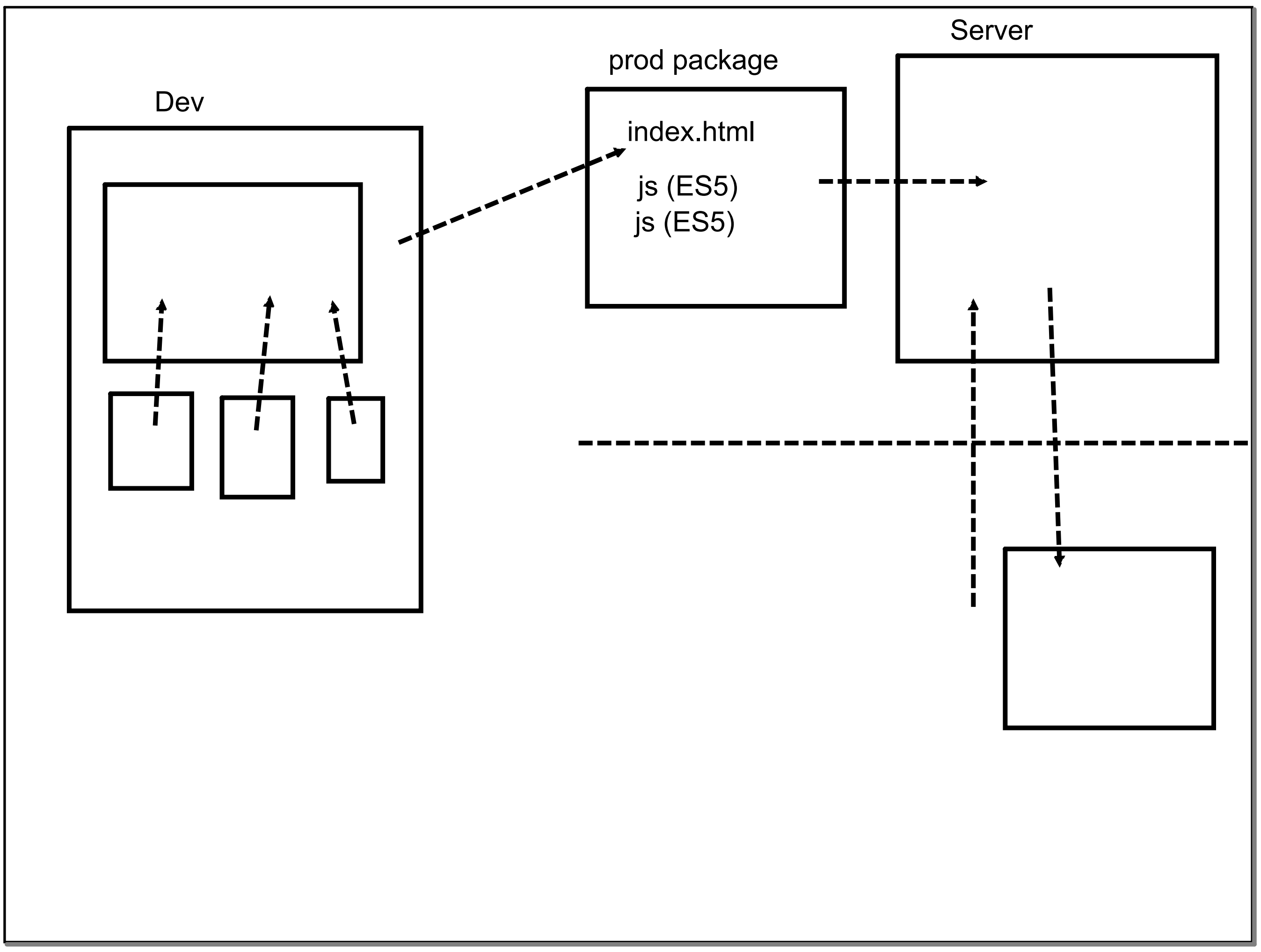
Need to map state(redux-store) data to props for component



install an API for routing

```
> npm install --save react-router-dom
```




Server
prod package
Dev
index.html
js (ES5)
js (ES5)

MongoDB

# High Performance : No SQL overheads

# Document Oriented database

Schema Less :

    Json Object Format

Document based Query ~ Deep query-ability

Easy to scale (no constraints)

Reactive Driver for MongoDb : End to End Reactive App

RDBMS	MongoDB
Database	Database
Tables	Collection
row/tuple/record	document (each doc inside a collection can be of diff schema) JSON Object
column	fields of JSON Object
Table JOIN	Embedded Document
Primary Key	Primary Key (_id : string)

Using MongoDb in applications

Table
all records must follow the tableschema

```
Collection (Table)
        {
              id: 1,
Doc           name : "First",
              email : "first@mail.com"
        },
        {
              _id : hflhdf,
              studentName : "",
 Doc          gpa : 3.4
              grade : 2
        }
```

Using MongoDb

1. Embedded Mongo DB (in memory DB)
2. MongoDb Community Server (download and install)
3. MongoDb Atlas (Over cloud)

MongoDb Compass : GUI interface :

CLI

mongod : Mongo Db Server : mongod --dbpath "C:\data"

mongo : Mongo Db Client : mongo

Have a location on machine to store data

c:\data : #needs to specified while launching server mongodb uri :

uri : mongodb://[username]:[password]@[ip]:[port]/<dbname>

Index :

```
      db.<collection>.createIndex({<fldname> : 1/-1, <fldname> : 1/-1})
```

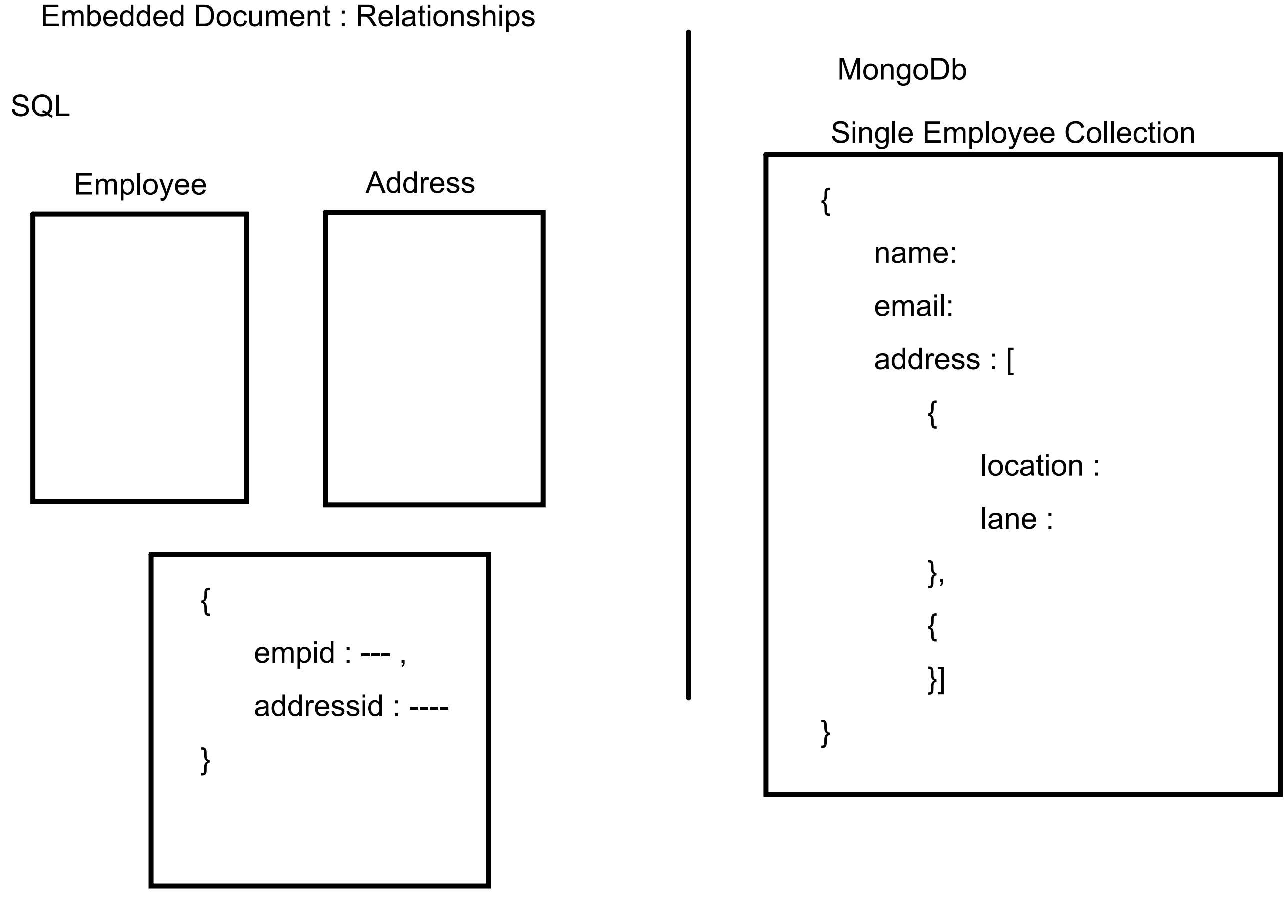
1 : asc

-1 :desc

db.<collection>.getIndexes()

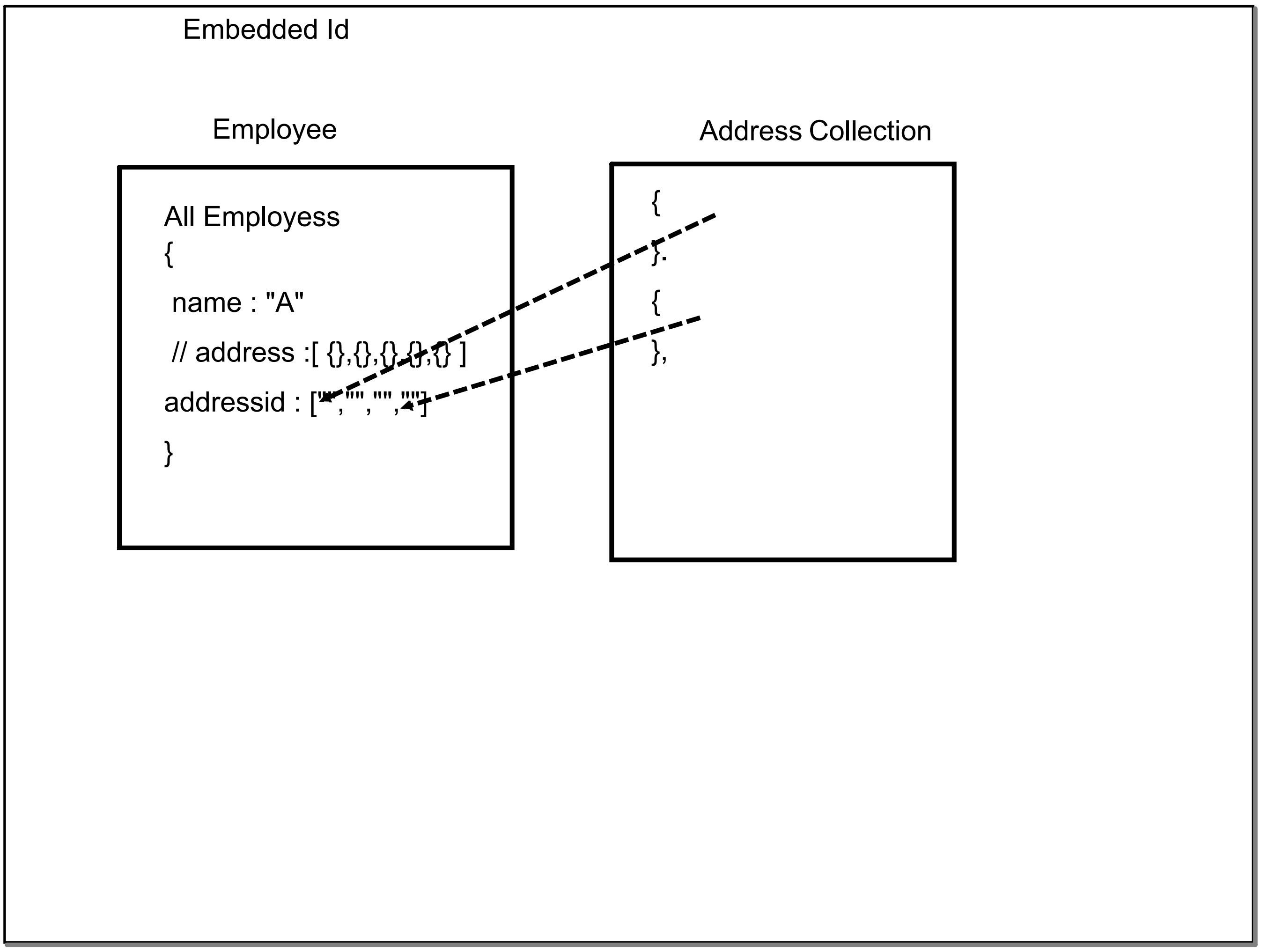
<date time > : key criteria

Embedded Document : Relationships



```
{
      empid : --- ,
      addressid : ----
}
```

```
{
      name:
      email:
      address : [
            {
                  location :
                  lane :
            },
            {
            }]
}
```


Embedded Id
Employee
Address Collection
All Employess
{
name : "A"
// address :[{},{},{},{},{}]
addressid : ["","","",""]
}
{
},
{
},

@Transactional

1. By default implement everything in views :
2. Commit only if all activities are success
3. insert a new record : get a instance of newly added record

    # change values of that object : change the record in view

MongoDb : ACID Multi Document Acid Transaction (4.0

=> sharded documents ~ RDBMS Views

```
db.<collection>.start_transaction(s=session); // sharded document
    db.<collection>.insert([{},{}], s);
    db.--------
db.<collection>.commit_transaction();
```

Oracle Server

SQLPlus : Client (command terminal)

SQL Developer : GUI interface

PL/SQL : Procedural Extension language

portable

performance-oriented

transaction oriented

Structural:

PL/SQL Blocks

Procedure/Function

Anonymous/Named

```
DECLARE
      ---------
      ----------
BEGIN
      -----------
      -----------
EXCEPTION
      -----------------
      -----------------
END;
```

Variable follows the colomn naming convention / oracle type

```
Variable Declaration
    <name> <type> NULL;
    email varchar(20) NULL;
    id int NOT NULL := 1;
    msg varchar(20) DEFAULT 'Hello all'
```

Variables can be declared by getting properties from col of table

```
id employee.id%type :=1;
name employee.name%type;
```

PL/SQL can have nested scope : thus variables also have scope

```
DECLARE
    val1 number; -- global variables
BEGIN
    ------------------
    ------------------                nested block
    DECLARE
        num1 number;   -- local variables
    BEGIN
        ----------------------
        ----------------------
    END;
    ----------------
END;
```

```
Decision Construct
IF-THEN-ELSE
IF <condition> THEN
      ------
      -----
ELSE / ELSEIF
      -------
END IF;
```

```
FOR i IN 1..10 LOOP
      --------
      ------
END loop;
```

STORED PROCEDURES/FUNCTION

PARAMETERS

- IN : Input into sub-programs (read-only) : default
- OUT : Output from sub-program (read/write)
- IN OUT: INPUT,OUTPUT (read/write)

```
TEST_PROCEDURE(IN x, OUT y, INOUT z);
a=10;
b=20;
c=30;
CALL TEST_PROCEDURE(a,b,c);
b<--- 50
c<---100

Inside the Procedure
    x : 10
    y : null
    z : 30;
    y=50;
    z=100;
```

RETURN :

allow to return control back from sub-program

SUB-PROGRAM

PROCEDURE : Cannot return value using return stmt (OUT/INOUT)

FUNCTION : Can return values using return stmt (OUT/INOUT)

```
CREATE OR REPLACE PROCEDURE <procedure> ([parameter])
IS/AS
        ----------------------------
                                      <----------- Declaration
        ----------------------------
 BEGIN
        -------------------------------
        -------------------------------
 EXCEPTION
        ------------------------------
 END;
```

IS : NESTED

AS : TOP LEVEL

```
CREATE OR REPLACE FUNCTION <function name> ([parameter])
RETURN <datatype>
IS/AS---------------------------
       ----------------------------     <---------- Declaration
 BEGIN
       -------------------------------
       -------------------------------RETURN "";
 EXCEPTION
       ------------------------------
 END;
```

```
a = my_func() + b + c;
```

average | max | min

```
Employee employee; int max, int min; int avg;
statistics(avg, max, min, employee);  // calling stmt
  values will be available
```

```
create or replace procedure statistics(avg OUT number, max OUT number, min OUT
number, employee OUT employee)
AS
BEGIN
    select average(age) INTO avg from employee;
    IF avg = 0 THEN
        RETURN;
    END IF;
    select max(age) INTO max from employee;
    select min(age) INTO min from employee;
END statistics;
```

Writing the test cases for our classes/solution

unit test cases : MAX section : testing each functionality in isolation

integrated test : test the integration and relationship of a group of services

End-To-End : Complete application as client

JUnit - API : API to write the unit test cases for java codes

==> to organize the test cases

==> allow to test a given condition (Assertion)

Group of Testing APIs provided,

=>build on top of JUnit

=>compatible with JUnit

TDD : Test Driven Development

Assertion Based API :

assertj

hamcrest Matcher API

jayway (JSON)

skyscreamer (JSON)

For test cases to run, we need a runner : JUnit Runner

Mockito : MockitoRunner

# Dependency needs to be mocked
# need a Mock MVC