

A Synopsis on

Expeditious Banking Using Blockchain Technology

Submitted in partial fulfillment of the requirements
of the degree of

Bachelor of Engineering

in

Information Technology

by

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2019-2020

CERTIFICATE

This is to certify that the project Synopsis entitled “***Expeditious Banking Using Blockchain Technology***” Submitted by “***Varsha Naik (16104054), Riya Pejawar (16104040), Rishabh Singh (14104017)***” for the partial fulfillment of the requirement for award of a degree ***Bachelor of Engineering in Information Technology***.to the University of Mumbai,is a bonafide work carried out during academic year 2019-2020

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Declaration

I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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Abstract

Block chain has an interesting backbone of bit coin, the digital crypto currency with an ever increasing sphere of users worldwide. But, block chain in itself is much more than just bit coin, it is the new generation security system encapsulating processes in series of blocks to provide a secure way of recording transactions and circulating it among signatories, or any target group who are participants in the process. It draws its appeal out of the fact that it achieves this without the need of any central authority. Current banking architecture is largely centralized and therefore vulnerable to load defaults and frauds like the PNB scam, Videocon case, Kingfisher scam and many more. Banking all over the world has adopted block chain technologies and it is the need of the hour for regulation and avoidance of such scams. Thus, we are using block chain technology for the decentralized working of banks and the complete removal of authoritarian interception. The model which we are proposing includes block chain encapsulated in the process of NEFT (National Electronic Fund Transfer) using IFSC (Indian Financial System Code) incorporating the protocols set down by RBI for secure and decentralized fund transfer. Our blocks will consist of the process computed in java micro services. The ledger will be connected within themselves using consensus algorithms.

Introduction

Block chain is digital, distributed and public ledger. Block chain technology was first used in now a days popular crypto currency called Bit coin (virtual currency), but it is expected that its characteristics of accurate and guarded data transfer in distributed peer to peer (P2P) network could make other applications possible. In block chain nodes are connected in chronological order. The block chain offers ability to distribute ledgers in decentralized way and that's a key concept. Unlike centralized system where the ledgers of records are stored in single specific entity like a bank or governmental institution, the block chain shares the ledgers in between its participants. That's what make block chain decentralized. The transactions take place only when all the blocks pass successfully through a consensus algorithm and the hash values are properly verified and accepted by majority of the nodes in the chain. Even if one of the blocks fails the entire transaction crashes and transaction has to be reinstated. This project aims to give a powerful network with higher security for the banking sector with one of the latest trending technology as block chain and changing the way trans-action takes place eliminating the third parties and instead of processing as one entire block as the traditional one with replacing them into multiple blocks chained together. Existing banking transaction used to have a third party as a middle man for every trans-action, which makes transaction tedious less secure as anyone can temper the data being processed. The proposed web application improves Banking transaction using the block chain technology with higher level of security using hash function (hash function maps arbitrary size inputs or messages to fixed size hash values or tags) by eliminating centralized ledger that reduces the manual work along with the transaction time.

Objectives

- 1.To decentralize the entire banking scenarios.
- 2.To make sure no one can manipulate or bypass the system.
- 3.To ensure all the rules laid down by RBI are strictly abided to and none superseded.
- 4.To protect the inter- block chain data from foreign entities through encryption techniques and checksum generation.

Literature

Chris Huls, have worked on uses of block chain in banking problem starts when there is involvement of manual work because of this there is also chance of human error. When customer do National Electronic Fund Transfer(NEFT) it takes about 10 to 20 minutes to get done because of something called "Clearance Center". It sends the request to pooling center. The pooling center gives the message to the clearance Centre to be included for the next batch. The Clearance Centre sorts the funds and transfers transactions using the IFSC code verification process and the money is then transferred to the specific account and debited from the sender's account. Also National NEFT only works between 9:00 to 5:00 means during banking hours. The Funds transfer made after 6:30 PM will be presented to Reserve Bank of India (RBI) next day.

Tong Wu and Xiubo Liang, has proposed the typical architecture of blockchain application consists of the application layer, the interface layer, the shared protocol layer, and the shared data layer. There is also mention of X-swap which is launched by the China Foreign Exchange Trade System. The system can automatically refresh the hidden orders and bypass orders [2].

Quoc Khanh Nguyen, has introduced the advantages and of blockchain like Blockchain promotes keenly intellectual contracts, which increases the efficiency of transactions. But also has drawbacks such as it limits the competitiveness between banks to improve their own system as blockchain network will be shared among all banks participated in the system. And incompleteness in terms of legal and regulation on Bitcoin and cryptocurrencies prevents blockchain technology from being widely applied [3].

Konstantinos Christidis and Michael Devetsikiotis, motivated by the recent explosion of interest around block chains, it is examine whether they make a good fit for the Internet of Things sector. Blockchain allow us to have a distributed peer-to-peer network where non-trusting members can interact with each other without a trusted intermediary, in a verifiable manner [4].

Xiwei Xu and Shiping Chen, Liming Zhu, has concluded that cryptocurrency are low-cost, quick, shielded and basically and mostly self-governing of any (not controlled by one central place) authority to move (from one place to another) virtual money or issue new units of money. New units of money are issued by the users of the cryptocurrency through mining by validating transactions. The virtual money can be transferred to users without going through trusted authority to buy products and services in real world [5].

Problem Defination

To build an efficient and secure banking architecture using block chain technology. Current banking architecture is largely centralized and therefore vulnerable to load defaults and frauds like the PNB scam, Videocon case, Kingfisher scam and many more. Banking all over the world has adopted block chain technologies and it is the need of the hour for regulation and avoidance of such scams. Thus, we are using block chain technology for the decentralized working of banks and the complete removal of authoritarian interception. [1]To decentralize the entire banking scenarios. [2] To make sure no one can manipulate or bypass the system. [3] To ensure all the rules laid down by RBI are strictly abided to and none superseded. [4]To protect the inter block chain data from foreign entities through encryption techniques and checksum generation.

Ledgers are written and stored in network and its members are responsible to update and monitor it. Every block of record is constantly synchronized by the different members of the open network, creating multiple copies of the data through a shared record-keeping system ensuring no single person or an organization holds ownership of data. When an incipient transaction or an edit to a subsisting transaction comes in to a blockchain generally a most of the nodes within a blockchain implementation have to apply steps (algorithm) to calculate and validate and verify the past of the individual blockchain's block that is introduced. When all the node come to an agreement or consensus that history and signature of the transaction is valid then that new particular block is then added to chain of the transaction. If majority of nodes does not agree to the integration in ledger ingression then block is not added to chain. This kind of working allows this blockchain methodology to run without any need of the central authority. In blockchain each block contains number of transactions.

Existing banking transaction used to have a third party as a middle man for every transaction, which makes transaction tedious less secure as anyone can temper the data being processed. The proposed web application improves Banking transaction using the blockchain technology with higher level of security using hash function (hash function maps arbitrary size inputs or messages to fixed size hash values or tags) by eliminating centralized ledger that reduces the manual work along with the transaction time.

Proposed System Architecture

PROPOSED SYSTEM

The third parties will be eliminated by this web application which will help the bank users to perform the banking transaction more securely and with faster response and the concept of block chain technology is used which is very powerful as compared to other modern world technology. The system includes two main modules User, Admin. User module will include sub-modules such as money transfer, OTP generation, my statement, and Add beneficiary. Admin module has the function of viewing of all of the user request and add branch details.

FUNCTIONAL ANALYSIS

The next step in the systems engineering process is functional analysis after setting goal and requirements. The system is divided into smaller parts by functional analysis, called functional elements, which describe what we want each part to do. Following analysis includes authentication and required output. Authentication analysis is a manner in which the web application performs the authentication and make sure that users is what user claims to be.

AUTHENTICATION ANALYSIS

After adding Beneficiary successfully, money will be transferred to the receiver account. At fund transfer, after generating One Time Password it will validate the user and encrypt with the token assigned using JavaScript Object Notation message converter of spring framework and this encrypted packet will be transferred to NODE 1. At NODE 1 the received packet will be decrypted initially and will be verified if the value is changed or not. If unchanged, than it will further decrypt with the token and process to NODE 2. At this point, the node will verify if user is existing the bank or not and sixteen number token will be divided into multiples of four.

OUTPUT

If the Beneficiary added successfully, the amount to be transferred will be entered by the user with the Required Transaction password provided during registration. One time password will be sent to respective mail .If all nodes successfully transfer the message only then money transfer will take place, and money will be deducted from user account. The receiver will be notified through email, once his account is updated

NON-FUNCTIONAL REQUIREMENTS

Non-functional requirement is a requirement that specifies criteria using which the operation of a system is judged, rather than specific behaviors. Functional requirements can be defined as what a system is supposed to do and non-functional requirements define how a system is supposed to be. Here is performance of proposed web application like how fast the pages are loading without consuming much resources, safety of the users, security and required design of user interface with respect to users and tools required. In software engineering, such requirements are often called as functional specifications

PERFORMANCE REQUIREMENT ANALYSIS

The performance and latency of the block chain should be tested which would vary based on the size of the network, expected size of transactions, the consensus protocol used and the latency that it might necessitate. The preliminary performance analysis goals are twofold. First, a methodology for block chain platform evaluation is developed. Second, the practitioners are presented with the analysis results in making decisions regarding adoption of block chain technology.

SAFETY REQUIRMENTS

The login page is opened by the user admin and enters the credentials and according to it gets directed to their page. Once it happens the beneficiary should be activated by the user if it is not activated already. User is also required to generate one time password (OTP) money transfer and to generate that one time password (OTP) user has to enter transaction password that has been given to user when account is first created.

SECURITY REQUIREMENTS

According to the credentials user gets directed to their respective page. Only the bank's administrator can change the access permissions. When user registers for first time and opens new account admin receives the request .admin verifies the user's details and if everything is perfect then only admin allows the user and send user the credentials of account. While transferring the money the user's validation is checked by both the nodes, receivers name is same as

account name in his branch.

DESIGN REQUIRMENTS

The system is executed on eclipse photon platform. The java programming language is used to develop the system and using spring Model, View, and controller (MVC) framework. The web applications is built by using java framework called spring MVC. The application data is encapsulated by the model. The model data is rendered by the view. The controller is responsible for processing requests and build by model.

SYSTEM REQUIREMENTS

Certain hardware components are needed by all computer software needs to be used efficiently, or other software resources to be present on a computer these prerequisites are known as (computer) system requirements. In this section the user will be provided with the required specification of the hardware and software components on Which the proposed system is to be implemented.

HARDWARE REQUIREMENTS

Certain hardware components are needed to be present on a computer all computer software needs. The physical computer resources are the most common set of requirements needed by a software application, also known as hardware. These prerequisites are known as system requirements. Table 3.1 shows hardware requirements.

Table 3.1: Hardware Requirement

| | |
|------------------|-------------------|
| PROCESSOR | Dual core or more |
| RAM | 2GB |
| Hard Disk | 100MB |
| Internet | 2MBPS |

SOFTWARE REQUIRMENTS

Software requirements deal with software resource requirements and prerequisites that should be installed on a computer to provide optimal functioning of an application. Browser support needs basic software requirements, device support their versions to be used for stability purpose. Table 3.2 shows hardware requirements.

Table 3.2: Software Requirement

| | |
|------------------------------|-------------------------------------|
| Operating System | Windows xp or later |
| Web Server | Apache Tomcat |
| Programming Languages | HTML5, CSS3, java ,SQL, JavaScript. |
| Database Technology | MySQL |
| Interface Application | Web Application |
| Browser Support | Any |

ARCHITECTURE:

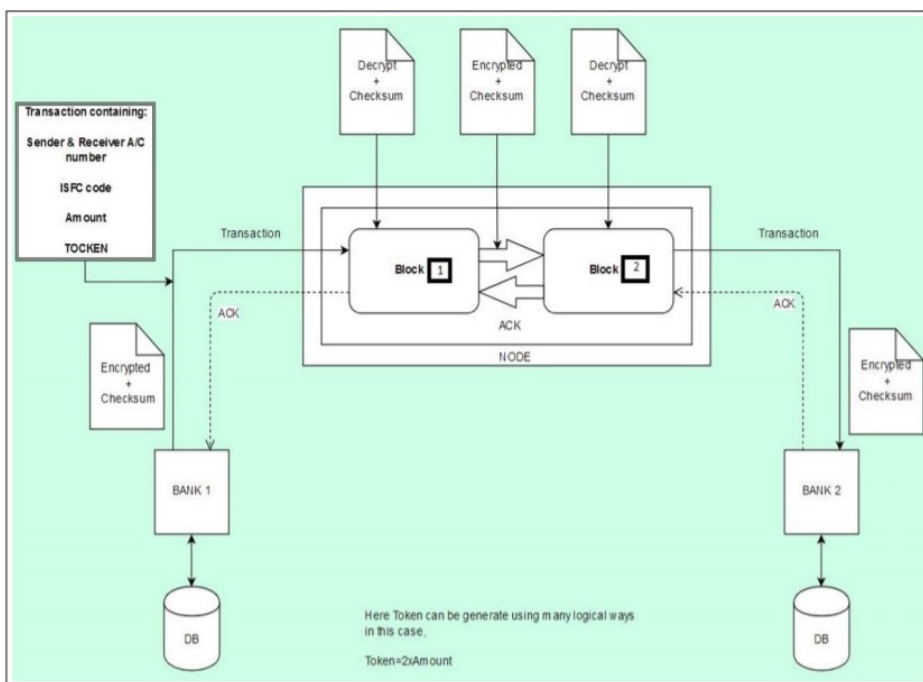
An architecture consist of system components and the subsystems developed, that will work together to implement overall system. The following architecture includes necessary structure to run system.

Bank User: Shows proposed system architecture. The application consists of the user interface with all the required links and buttons for navigating inside banking application. For sign up, user has to provide the personal details like Name, email, PAN. After sign up the user will receive the mail containing the details like login id, login password. Whenever user wants to do the transaction user has to enter transaction password the user can proceed with transaction.

Bank Admin: This part of an application also consists of the user interface with all the required links and buttons for navigating inside banking application. Whenever new user register himself as new customer this request is received by admin, once admin approve this user gets mail of acceptance along with credentials in it. The admin has the ability to accept or reject the service requests of users, he can also add the new branches of his bank into the system Processing Node 1.

Node 1: A node is a functional block in block chain. Also, it can carry variety of tasks. The blocks of data are stored on nodes (compare it to small servers). A node can be any device like computers or laptops. Nodes form the infrastructure of a block chain. All nodes on a block chain are connected to each other this unit of an application is one of the main processing component of the system which runs in background without having any user interface. The whole transaction process is divided into two different blocks. NODE 1 is first block and the responsibility of it is validating the sender bank and the user by decrypting the token encrypted from the requested transaction. Another responsibility is again encrypting the decrypted token to send it securely on network to next processing unit Node 2. If this unit fails the system will not work. The nodes (blocks) are connected to each other forming a chain of blocks. The Node 2 is the second processing unit of entire banking system which runs in background. Transaction packet encrypted by Node 1 is received by Node 2.

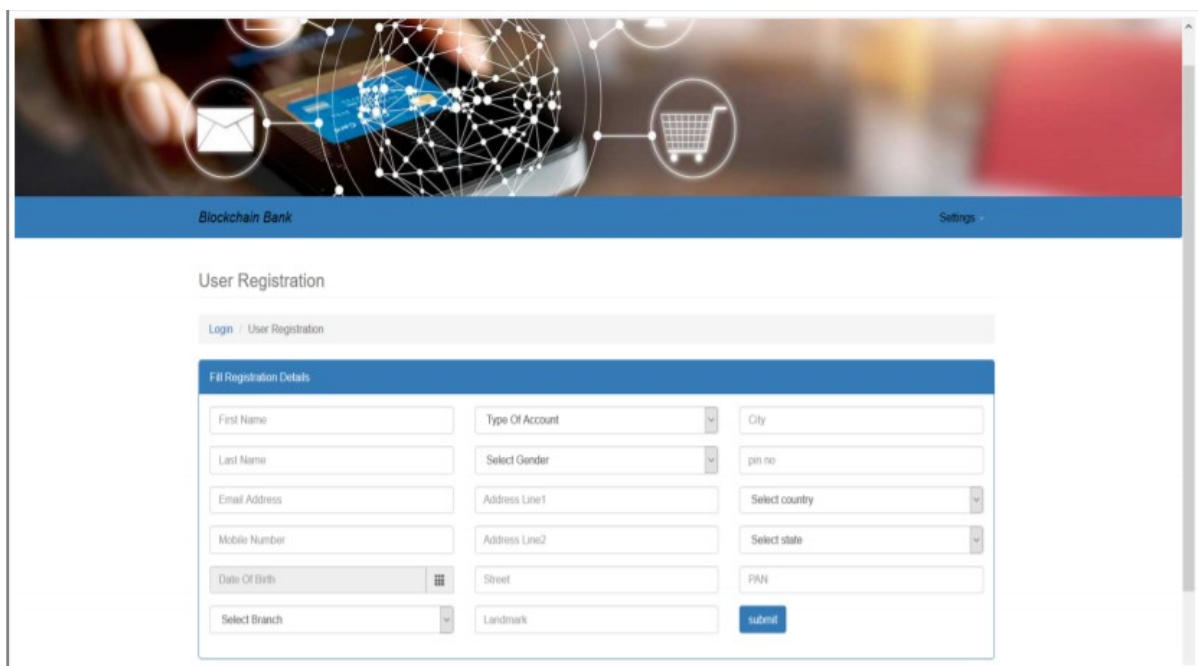
Node 2: It decrypt this package then Node 2 validates the receiver's bank, receiver's name also because money should not get sent to other user by mistakenly and Indian Financial System Code (ISFC). After that updating the receiver's bank database and giving the acknowledgement for the same to sending bank user. Nodes follows consensus algorithm.



Design and Implementations

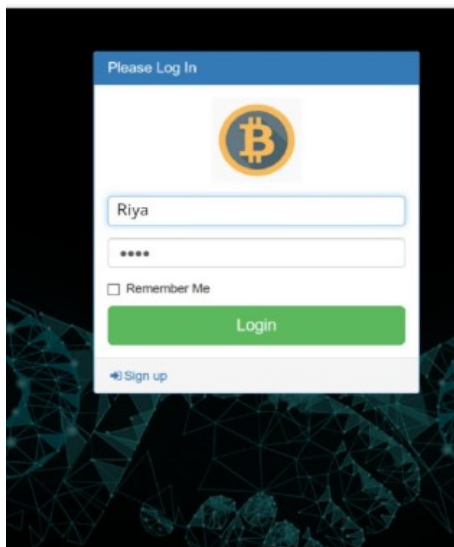
Snapshots of Projects: Login Page Deciding Role Of Person

The System mainly consists of the two modules User end and the Admin end. To use the web application the user has to first sign up. User can sign up by creating the account with the details such as Name, Address, Mobile No, Type of Account, Required branch, Permanent Account Number(PAN), Country, State, Type of account required, Date of birth, Gender as shown in Figure 4.1 and these details will be provided by the user to bank. After the successful registration, admin now accept or reject the user registration request. Based on information provided by user admin check if all information is valid or not. Now mail containing user id and password is sent to user. Now user can login using given credentials and use various banking facilities



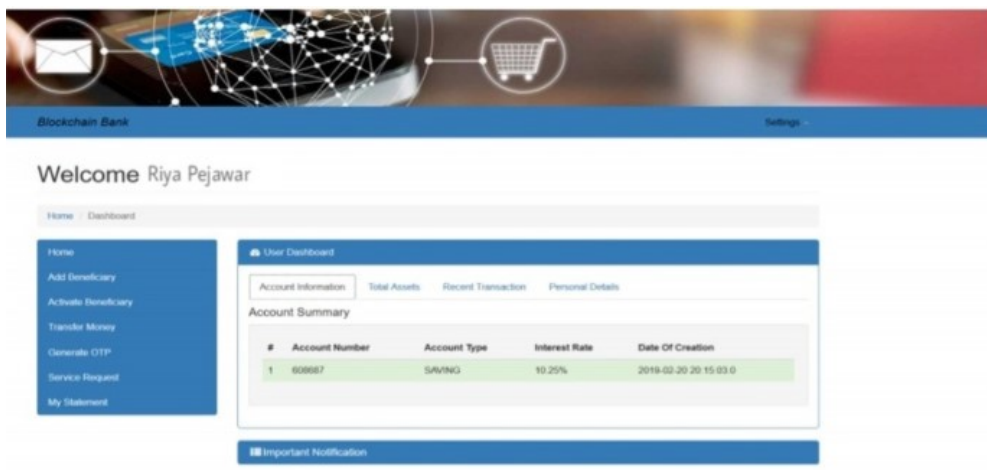
The screenshot displays the 'User Registration' page of the 'Blockchain Bank'. The page has a blue header with the bank's name and a 'Settings' link. Below the header, there is a 'User Registration' section with a 'Login / User Registration' link. The main form is titled 'Fill Registration Details' and contains various input fields for user information.

| Fill Registration Details | | |
|---------------------------|-----------------|----------------|
| First Name | Type Of Account | City |
| Last Name | Select Gender | pin no |
| Email Address | Address Line1 | Select country |
| Mobile Number | Address Line2 | Select state |
| Date Of Birth | Street | PAN |
| Select Branch | Landmark | submit |



User End Consist Of Following Segments

After creating user with the help of login page user can access the facilities provided by the bank such as User Details, Bank Details.



Balance Details:

Home / Dashboard

Home

Add Beneficiary

Activate Beneficiary

Transfer Money

Generate OTP

Service Request

My Statement

User Dashboard

Account InformationTotal AssetsRecent TransactionPersonal Details

Total Amount

| # | Account Number | Account Type | Balance |
|--------|----------------|--------------|---------|
| 1 | 5689334569 | SAVING | 20230 |
| Total: | | | 20230 |

Important Notification

Node 1

Process Validation Controller

```
package com.node1.controller;

import java.util.List;

import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.stereotype.Controller;
import org.springframework.web.bind.annotation.RequestBody;
import org.springframework.web.bind.annotation.RequestMapping;
import org.springframework.web.bind.annotation.RequestMethod;
import org.springframework.web.bind.annotation.ResponseBody;

import com.node1.constant.Helper;
import com.node1.dto.InformationDto;
import com.node1.dto.MoneyTransferDto;
import com.node1.service.ProcessValidationService;

@Controller
public class ProcessValidationController {

    @Autowired
    private ProcessValidationService processvalidationService;

    @RequestMapping(value="/verifytransferA.html",method=RequestMethod.POST)
    public @ResponseBody String getUserList(@RequestBody MoneyTransferDto ab)
    {
        System.out.println("name of the bank"+ ab.getBankName());
        System.out.println("amout to be transfferd"+ab.getAmount());
        String status = processvalidationService.processTransaferRequest(ab);
        return status;
    }
}
```

Money Transfer

```
package com.node1.dto;
```

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```
public class MoneyTransferDto {
```

```
    private String amount;  
    private String bankName;  
    private String payeeName;  
    private String senderName;  
    private String ifsccode;  
    private String token;
```

```
    public String getIfsccode() {  
        return ifsccode;  
    }  
    public void setIfsccode(String ifsccode) {  
        this.ifsccode = ifsccode;  
    }  
    public String getToken() {  
        return token;  
    }  
    public void setToken(String token) {  
        this.token = token;  
    }  
    public String getPayeeName() {  
        return payeeName;  
    }  
    public void setPayeeName(String payeeName) {  
        this.payeeName = payeeName;  
    }  
}
```

Spring Servlet

```
<?xml version="1.0" encoding="UTF-8"?>
<beans xmlns="http://www.springframework.org/schema/beans"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:context="http://www.springframework.org/schema/context"
  xmlns:mvc="http://www.springframework.org/schema/mvc"
  xsi:schemaLocation="http://www.springframework.org/schema/beans
    http://www.springframework.org/schema/beans/spring-beans.xsd
    http://www.springframework.org/schema/mvc
    http://www.springframework.org/schema/mvc/spring-mvc.xsd
    http://www.springframework.org/schema/context
    http://www.springframework.org/schema/context/spring-context.xsd">

  <mvc:annotation-driven/>

  <mvc:resources mapping="/resources/**" location="/resources/" />

  <context:component-scan base-package="com.node1" />

  <bean id="viewResolver"
    class="org.springframework.web.servlet.view.InternalResourceViewResolver">

    <property name="prefix" value="/resources/pages/" />

    <property name="suffix" value=".jsp" />

  </bean>

</beans>
```

Refernces

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