

# Vitech-V3 Benefits Administration System

**: Submitted By :**

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Computer Science Department  
Columbia University


Curricular Practical Training Report  
Coversheet

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# Introduction

Vitech Systems Group is a leading provider of world-class software and services to the benefits administration and alternative asset communities. V3 Benefits Administration System, a product of Vitech Systems Group, Inc. is a widely installed, world-class software solution designed specifically for the needs of Public, Taft Hartley and Multiemployer benefit organizations. It is a typical ERP product which addresses the full range of core business requirements including enrollment and demographic administration, payroll reporting, contributions processing, pension calculations, health claims adjudication, benefits disbursements, and much more.

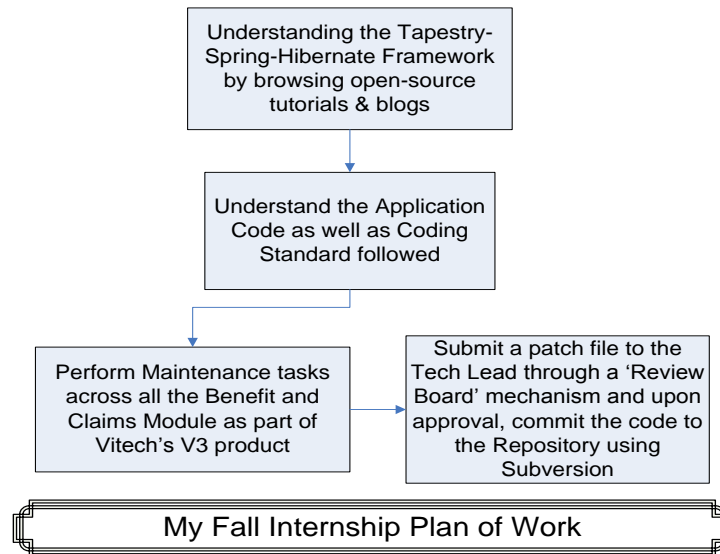


<ul style="list-style-type: none"> <li>• V3 is a product</li> <li>• V3 is configured for clients</li> <li>• An n-tier application written in Java</li> <li>• Platform Neutral</li> <li>• Meta-data driven</li> </ul>	<ul style="list-style-type: none"> <li>• Supports LOB (line of business) and Self-service applications</li> <li>• Same core code is deployed to all clients</li> <li>• Same database schema for all clients</li> </ul>	<ul style="list-style-type: none"> <li>• V3 is an application platform</li> <li>• V3 uses patterns to build similar familiar structures across modules</li> <li>• V3 is growing: deeper and wider</li> </ul>
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## Planning

Vitech's V3 product has been in constant development for the past 20 years and thus, it has become a huge product with millions of lines of code. My primary task, as an Intern in the Product Development team was to contribute to all aspects of Vitech's browser based Java product. It mainly involved performing routine Maintenance tasks on the V3 product along with possible Product Enhancements along the way. The V3 product comprises of several modules out of which I worked on the Benefits, Claims and CRM component.

The Fall Internship general plan can be surmised by the given flow:

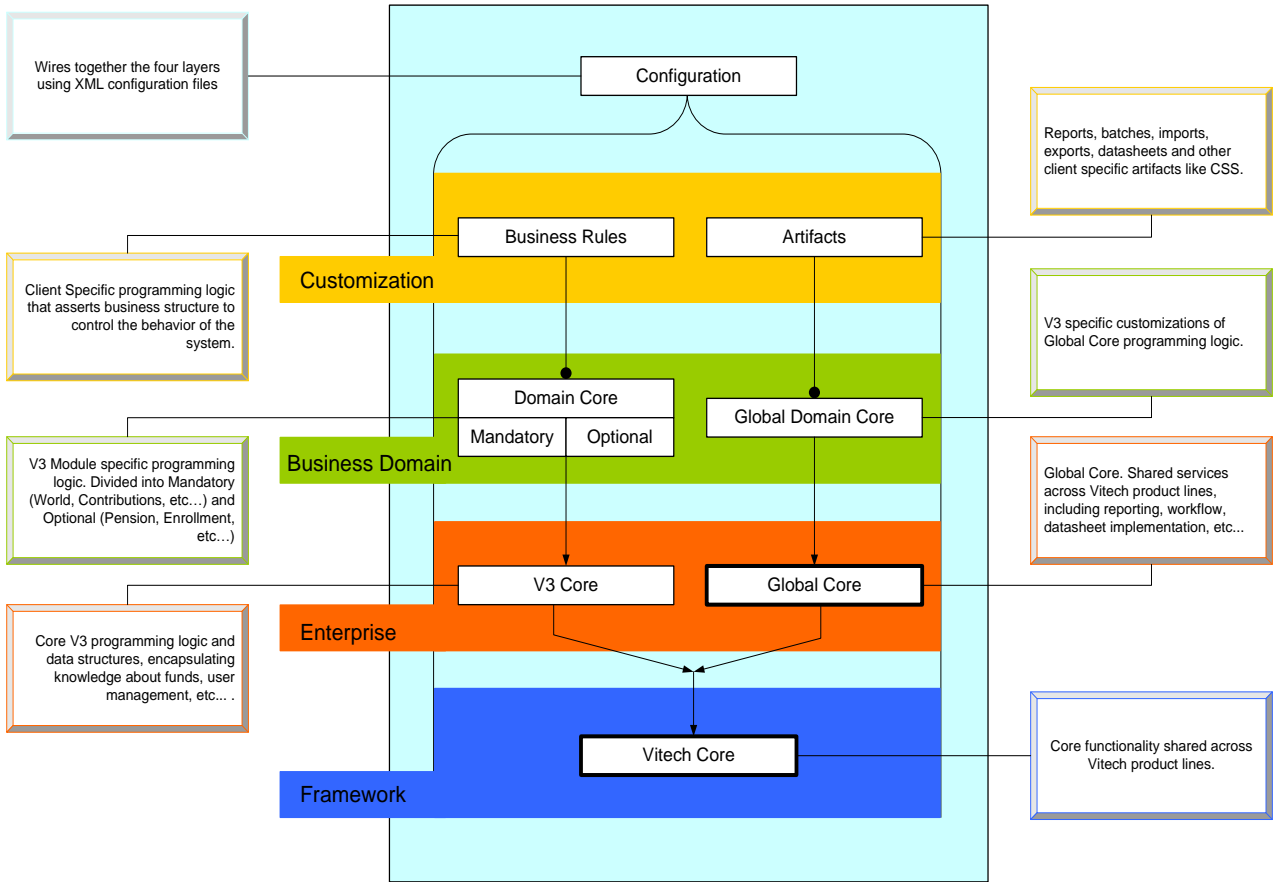


Some of the tasks assigned to me were related to Hibernate and Spring Framework. I tried to grasp the Spring & Hibernate framework basics by browsing Open Source Tutorials. Some of the maintenance tasks performed by me were related to managing Annotation Stamps and CRM Call Information Pages, handling Integrity constraint over the Workforce Data, implementing the PageDetachListener Interface provided by Tapestry, etc.

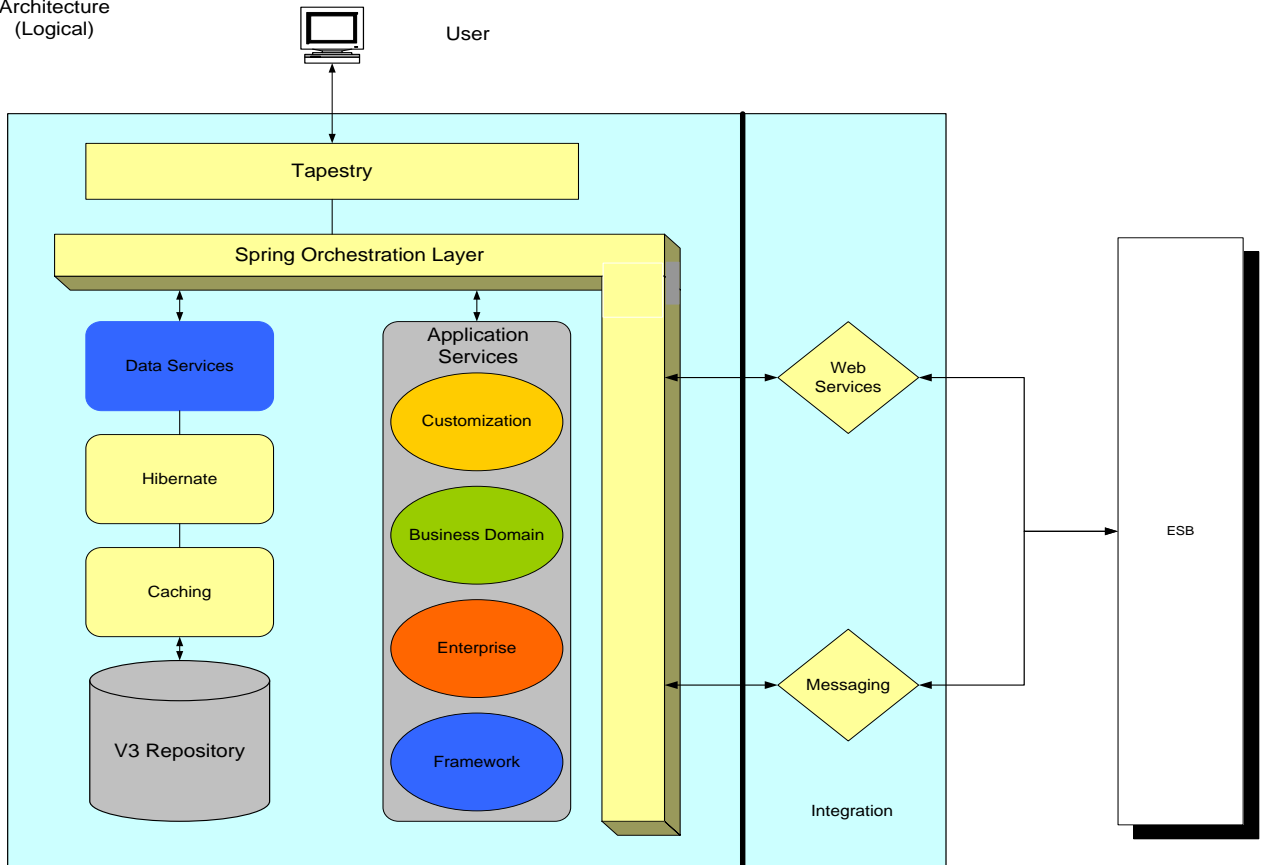
	Task Name	Start	Finish
1	Unwanted error message displayed	Wed 8/26/09	Tue 9/1/09
2	Validation needs to be modified	Thu 9/17/09	Thu 9/24/09
3	Unable to delete Annotation Stamp Set Definition	Thu 9/17/09	Fri 10/16/09
4	Drop down value not in alphabetic order	Fri 11/6/09	Thu 11/12/09
5	Integrity constraint error message displayed	Fri 11/6/09	Mon 11/16/09
6	Unexpected message for exact search	Mon 11/16/09	Fri 11/27/09
7	EE clicking on New Button	Tue 12/1/09	Thu 12/3/09
8	Exception when we click Transaction History Button	Thu 12/3/09	Fri 12/4/09

**Gantt Chart view of Internship Plan**




# Technology Used



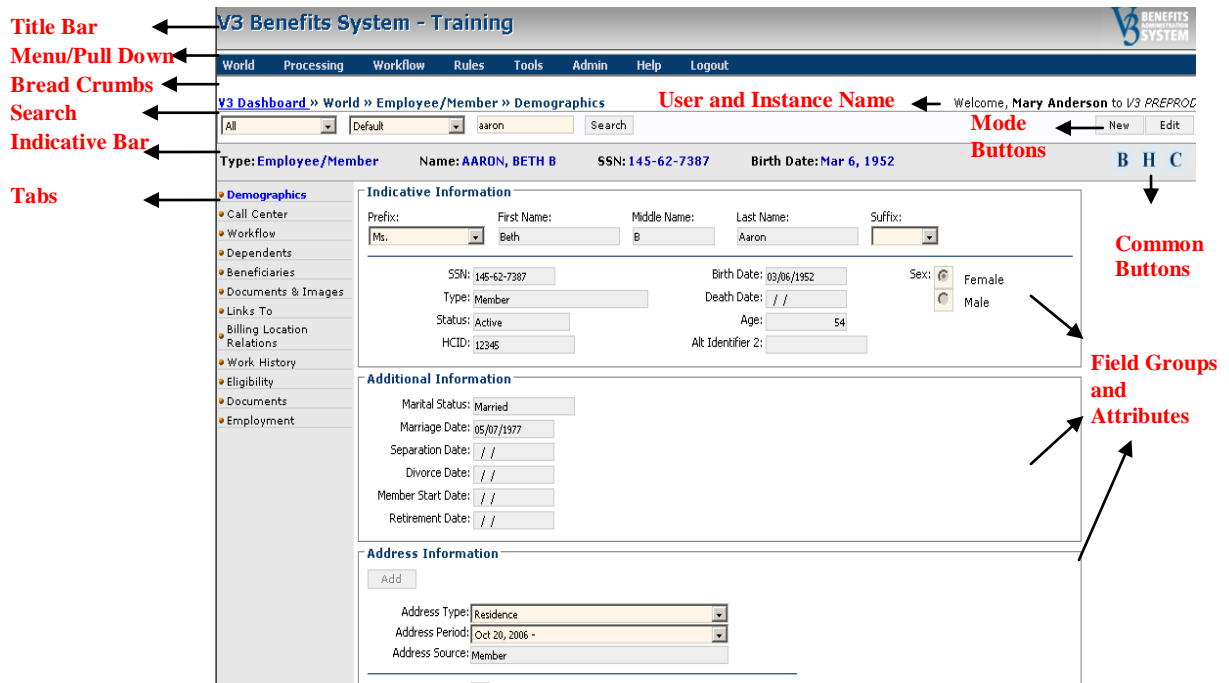
## V3 Enterprise Architecture (Logical)



V3 Benefits Administration Software follows the core JEE (Java Enterprise Edition) methodology and hence, the presentation-tier is developed primarily using Apache Tapestry Framework along with Javascripts, middle-tier has been developed using Spring Framework and the Data-tier comprises of Hibernate ORM Framework used over Oracle Database.

 <p><b>Tapestry</b> is an object-oriented Java web application framework to implement applications in accordance with the model-view-controller (MVC) design pattern.</p>	 <p><b>Hibernate</b> uses Hibernate Query Language (HQL) which makes mapping of object-oriented domain model to a traditional relational database easier and effectively in the form of XML.</p>	 <p><b>Spring</b> is an Open Source Application framework used to develop web applications on top of the Java Enterprise platform.</p>
<p>Reference – Wikipedia, Apache Foundation, SpringSource.org, Red Hat Middleware</p>		

## Maintenance Tasks performed



The screenshot shows the V3 Benefits System - Training interface. Red arrows point to various UI elements with labels:

- Title Bar:** Points to the top navigation bar containing 'World', 'Processing', 'Workflow', 'Rules', 'Tools', 'Admin', 'Help', and 'Logout'.
- Menu/Pull Down:** Points to the breadcrumb navigation: 'V3 Dashboard » World » Employee/Member » Demographics'.
- Bread Crumbs:** Points to the same breadcrumb navigation.
- Search:** Points to the search input field containing 'aron'.
- Indicative Bar:** Points to the header area showing 'Type: Employee/Member', 'Name: AARON, BETH B', 'SSN: 145-62-7387', and 'Birth Date: Mar 6, 1952'.
- Buttons:** Points to the 'New' and 'Edit' buttons.
- Common Buttons:** Points to the 'B', 'H', and 'C' buttons.
- Field Groups and Attributes:** Points to the 'Indicative Information' and 'Additional Information' sections, which contain various form fields like Prefix, First Name, Middle Name, Last Name, Suffix, SSN, Birth Date, Sex, Type, Status, Age, Marital Status, Marriage Date, Separation Date, Divorce Date, Member Start Date, and Retirement Date.
- Address Information:** Points to the 'Address Information' section with fields for Address Type, Address Period, and Address Source.

Vitech's V3 Product-Employee Main Page

The 8 Maintenance Tasks performed are shown below:

Maintenance Task	Fix
<p>Workflow#: 112060 Unwanted error message displayed</p>	<p>On subsequent observation, two elements were found to have the same name 'COMMENTS'. So, the fix includes usage of 'Virtual Entity' and thus, one of the element's name was altered to 'COMMENTS_FOR_APPEND'. Also, a SQL script was created to handle the Virtual Entity - 'COMMENTS_FOR_APPEND' respectively.</p> <p>Also, certain buttons in the CRM module were not 'visibly' disabled. That was because the crm.css has a 'color: #000;' attribute for 'input.button' property which was over-riding the 'color:#999999' attribute in global.css for the 'input.buttonDisabled, input.buttonDisabled: hover, input.buttonDisabled: focus, input.buttonDisabled: active' property.</p> <p>So, the 'color: #000;' has been removed to resolve the issue.</p>
<p>Workflow#: 113473 Validation needs to be modified</p>	<p>In order to ascertain whether both the text-boxes namely 'Internal Value' and 'Description' were empty, a conditional statement was suitably added. Upon the occurrence of the error, the Validation Exception message is displayed. Also, changes were made to the script file.</p>
<p>Workflow#: 113427 Unable to Delete Annotation Stamp Set Definition</p>	<p>The workflow was a typical Hibernate issue. Exceptions persisted while Adding as well as Deleting Annotations. This mainly happened due to the fact that the Java Objects expected the data to be present in the Hibernate Session Object, but the sessions no longer existed or were closed prior to be read by the Java Objects. Thus when the Java objects tried to access the data from the Hibernate session, "failed to lazily initialize a collection of role" exception was displayed.</p> <p>The solution was to add the required data back into the Hibernate Session at the time when the data is just being fetched from the Database. Thus, "AnnotationStamps" and "DocImageTypes" were incorporated into the Hibernate Session Object to resolve the issue.</p>
<p>Workflow#: 114399 Drop down values not displayed in alphabetic order</p>	<p>Added the functionality to compare the 'description' parameter within the 'AttributeValue' Object and accordingly the sorting is done in an alphabetical manner.</p>

<p>Workflow#: 114248 Integrity constraint error message displayed</p>	<p>There is an Integrity Constraint 'FK MEETI_PART_MEETING_ID' imposed over the 'MEETING_ID' column in the MEETING_PARTICIPANT table which is a foreign key to the 'MEETING_ID' column in the MEETING table.</p> <p>Upon observation, it was found that data was being added to the MEETING_PARTICIPANT table before being added to the MEETING table. Since MEETING_ID (the primary key of the MEETING table) was found to be missing, the appropriate Integrity Constraint was displayed.</p>
<p>Workflow#: 114027 Unexpected message for exact search</p>	<p>The definition of 'pageDetached()' in PageDetachListener Interface specifies an argument of type 'PageEvent'. No such argument was present while implementing the function in the 'SecurityUserAsStaffSearchResults.java' file. Suitable changes were performed accordingly.</p>
<p>Workflow#: 114166 EE clicking on New button</p>	<p>'isNewPensionPlans()' function was implemented to check for existing Pension Funds. If the Pension Plan does not exist, then the 'isNewPensionPlans()' returns a true value. On the other hand if Pension Plan already exists, then the 'isNewPensionPlans()' returns a false value and thus, the Edit button is enabled later on.</p>
<p>Workflow#: 114591 Exception when we click Transaction History Button</p>	<p>Upon debugging, it was realized that the 'getPersistentObject()' was returning a null value. The function 'getEntityTransactionHistory()' returns a List. There was no specific condition to check whether the 'getPersistentObject()' is returning a null value or not and hence, the 'if ..else' conditional block was inserted in order to do so and to solve the problem.</p>

## What I learnt

- I gained experience in critically thinking about problems, the cause of exceptions as well as errors and possible solutions; a type of experience that cannot be obtained through homework assignments and problem sets.
- More importantly, my knowledge pertaining to Spring Framework's Inversion of Control, Model-View-Controller as well as Factoring services was enhanced.
- Using Subversion (SVN) Repository while sharing data between hundred's of developers is an efficient platform for data exchange. It also served as a means of performing regular Data Backup.
- Regular backup of data is crucial & patch file is one way of doing concurrent backup.
- Finding Bugs/Exceptions is a difficult task and there are no good IDE-based debuggers for Javacripts. I had to use 'Firebug' extension for Firefox to unearth bugs related to CSS and Javascrpts.
- Even if a Web Page is rendered properly on one browser, it may or may not render properly on other browsers. A page having CSS-3 related content may be rendered properly on Firefox but for some instructions it may not render properly in Internet Explorer. Also, Active-X is IE specific only and Firefox does not "officially" support it.
- A product may break due to changes in the underlying framework. V3 works well using Tapestry 3 & Java 1.5. When run on other systems, it outputs unknown exceptions.
- I also became skilled at team-building and effective communication.

## Challenges faced

- Focused on understanding the Hibernate & Spring framework.
- Since this was a Fall Internship which I had to manage alongside regular courses, I was only allowed to work for 20 hours per week in comparison to the 40 hours per week which I had spent during Summer Internship period. Thus, the iota of work performed in comparison was somewhat less but was more interesting and gave me deeper insight about the framework technology.
- Existing system was pretty complex and due to lack of effective documentation, I had to depend on my seniors to get information about particular functionality.

## References

- SUN JEE website - <http://java.sun.com/javaee>
- Tapestry Tutorial - <http://tapestry.formos.com/nightly/tapestry5/tutorial1/index.html>
- Hibernate Documentation - <https://www.hibernate.org/5.html>
- Spring Framework 3.0 Documentation - <http://www.springsource.org/documentation>