# Technologies Used:

### Following Frameworks/Technologies have been used to design the system . All of them are OPEN SOURCE and free to use –

**1. Struts 2** – J2EE Framework based on MVC design pattern for building web-applications.

Model – A physical or logical representation of the system or its subsystem.Implemented Using Action classes, Data Access Objects(DAO’s) and Business Service Objects(BSO’s)

View – The View manages the graphics and text that make up the display. It interacts with Helpers to get data values with which to populate the display. Additionally, it may delegate activities, such as content retrieval, to its Helpers.

Implemented Using Primarily JSP’s. Also freemarker and velocity templates provided by Struts2 and JSON (Javascript Object Notation) to enable AJAX(Asynchronous JavaScript and XML).

Controller –Interacts with a client, controlling and managing the handling of each request. Also implements the FrontController Design Pattern - Provides a centralized controller for managing the handling of a request. Implemented Using : FilterDispatcher provided by Struts2.

**2. iBatis -** The iBatis framework is a lightweight data mapping framework and persistence API that can be used to quickly leverage a legacy database schema to generate a database persistence layer for your Java application. A set of XML encoded SQL Map files–one for each database table–holds SQL templates that are executed as prepared statements and map the expected results to Java domain classes. From application code, a layer of iBatis Data Access Objects (DAO) acts as the API that executes the SQL Map templates and assigns the results to the corresponding Java domain classes

Since we have written all our sql code in xmls, it results in Elimination of dependencies between our application and infrastructural JDBC code by externalising all JDBC code as xml configurations. Also JDBC code is automated using best practices by the framework eliminating SQL injection.

**3. HTML/JSP/CSS –** HTML, which stands for HyperText Markup Language, is the predominant [markup language](http://en.wikipedia.org/wiki/Markup_language) for [web pages](http://en.wikipedia.org/wiki/Web_page). It provides a means to create [structured documents](http://en.wikipedia.org/wiki/Structured_document) by denoting structural [semantics](http://en.wikipedia.org/wiki/Semantic) for text such as headings, paragraphs, lists etc as well as for links, quotes, and other items. It allows [images and objects](http://en.wikipedia.org/wiki/HTML_element#Images_and_objects) to be embedded and can be used to create [interactive forms](http://en.wikipedia.org/wiki/HTML_element#Forms). It is written in the form of [HTML elements](http://en.wikipedia.org/wiki/HTML_element) consisting of "tags" surrounded by [angle brackets](http://en.wikipedia.org/wiki/Brackets#Angle_brackets_or_chevrons_.3C_.3E) within the web page content used for creating web-pages and applying markup.

**4. Javascript –** JavaScript is an [object-oriented](http://en.wikipedia.org/wiki/Object-oriented) [scripting language](http://en.wikipedia.org/wiki/Scripting_language) used to enable [programmatic](http://en.wikipedia.org/wiki/Computer_programming) access to computational objects within a host environment. Although also used in other [applications](http://en.wikipedia.org/wiki/Application_software), it is primarily used in the form of [client-side JavaScript](http://en.wikipedia.org/wiki/Client-side_JavaScript), implemented as part of a [web browser](http://en.wikipedia.org/wiki/Web_browser), providing enhanced [user interfaces](http://en.wikipedia.org/wiki/User_interface) and dynamic [websites](http://en.wikipedia.org/wiki/Website). JavaScript is a [dialect](http://en.wikipedia.org/wiki/Programming_language_dialect) of the [ECMAScript](http://en.wikipedia.org/wiki/ECMAScript) standard and is characterized as a [dynamic](http://en.wikipedia.org/wiki/Dynamic_language), [weakly typed](http://en.wikipedia.org/wiki/Weak_typing), [prototype-based](http://en.wikipedia.org/wiki/Prototype-based_programming) language with [first-class functions](http://en.wikipedia.org/wiki/First-class_function)

Used for client-side validation, creation of dynamic links and drop-down menu design

**5. AJAX** - used for is a group of interrelated [web development](http://en.wikipedia.org/wiki/Web_development) techniques used on the [client-side](http://en.wikipedia.org/wiki/Client-side) to create interactive [web applications](http://en.wikipedia.org/wiki/Web_application). With Ajax, [web applications](http://en.wikipedia.org/wiki/Web_application) can retrieve data from the [server](http://en.wikipedia.org/wiki/Web_server) asynchronously in the background without interfering with the display and behavior of the existing page.

Used to check if a UserID has already been taken by a user or is available. Also to display market price of selected crop given market. AJAX functionality at required places using JSON – a lightweight data–exchange format

**6. Log4j –** Apache log4j is a [Java](http://en.wikipedia.org/wiki/Java_platform)-based [logging](http://en.wikipedia.org/wiki/Data_logging) utility used for logging with various levels of logging. Used to for logging data either to console/files – these logs are useful while debugging.

**7. SVN(Subversion)** – Popular Versioning/Revision Control System used for SCM(Software Configuration Management). Revision control, also known as version control, source control or software configuration management (SCM), is the management of changes to documents, programs, and other information stored as computer files. It is most commonly used in software development, where a team of people may change the same files. Version control systems allow for multiple users to simultaneously work on the project hosted at one place. Things like manual integration of various users changes are avoided.

**8. MySQL –** MySQL is a relational database management system (RDBMS) that runs as a server providing multi-user access to a number of databases. MySQL uses the popular Structured Query Language to insert, update and retrieve data. An database is a wrapping around filesystem to help for advanced management of file data. One major advantage of Using MySQL is that it is most popular and is ported to run on almost all major operating systems.

**9. JASPER –** Report Generation tool used for dynamic generation of PDF’s using predefined compiled JASPER templates

**10. JUnit –** Testing Framework for WhiteBox Testing. Used for testing a few DAO’s. JUnit is a unit testing framework for the Java programming language. JUnit is linked as a JAR at compile-time; the framework resides under packages junit.framework for JUnit 3.8 and earlier and under org.junit for JUnit 4 and later.

**11. Eclipse -** Used IDE for development. Eclipse is a multi-language software development environment comprising an integrated development environment (IDE) and an extensible plug-in system. It is written primarily in Java and is most widely used IDE for J2Se and J2EE development.

**12. DBCP –** Connection Pooler. Connection pooling can improve the response time of any application that requires connections, especially Web-based applications. When a user makes a request over the Web to a resource, the resource accesses a data source. Because users connect and disconnect frequently with applications on the Internet, the application requests for data access can surge to considerable volume. Consequently, the total datastore overhead quickly becomes high for Web-based applications, and performance deteriorates. When connection pooling capabilities are used, however, Web applications can realize performance improvements of up to 20 times the normal results.

**13. Apache Tomcat –** Apache Tomcat is an servlet container developed by the Apache Software Foundation (ASF). Tomcat implements the Java Servlet and the JavaServer Pages (JSP) specifications from Sun Microsystems, and provides a "pure Java" HTTP web server environment for Java code to run. We are using tomcat 6.0 in our deployments.

## Other Features-

1. **Security:**

Elimination of –

* SQL injection.
* Cross-site hacking.
* Password Encryption using built-in SHA algorithm.
* Session Management and Interceptors for secure pages.

1. **Portability**

* No Vendor locking – does not use any vendor(a particular server) specific features. No framework intrusiveness into business code.
* Browser compatibility.

1. **Maintainability :** By separating dao interface and implementation and adding Business Service Objects(BSO’s)
2. **XML Usage –** Advantage of using xml’s is that any change in its content does not need re-building of the whole application

### XMLs used for –

* Writing SQL statements
* Configuration of Struts2 framework
* Configuration of Log4j framework
* Server-side Validation of form data
* Designing JASPER templates for report generation

## Application WorkFlow -

JSP-1

DAO

Service

Action

JSP-3

JSP-2

DB

Each of the JSP pages will generate an action. This action can be something like “getAllCrops.action”(which can mean get me all the crops you have in database). The core responsibility of this action module above is to map it to proper pages, call appropriate Business logic and critically filter requests. For example an unauthorized user may copy paste URL thus generating false action. The action module must be able to detect such intrusions and cut them out. After proper checking the action calls on a service. The service can be many, but since this is a web application the services more of less will involve some kind of data retrieval from database. This process involves creating appropriate SQL statements, then making corresponding Data Access Object (DAO) and retrieving from database. The DAO is also dependent on the underlying database connector. To remove this dependency we have used ibatis framework. Finally the data is retrieved from database and displayed as required to the user using the target .JSP page (VIEW) specification.