

DEVELOPMENT OF GNU/LINUX DISTRIBUTIONS

B. Tech Computer Semester - VIII

Prepared At



**Bhaskaracharya Institute for Space Applications & Geo-informatics
Govt.of Gujarat, Science & Technology, Gandhinagar**

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Submitted to



DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

NIRMA UNIVERSITY, AHMEDABAD-382481

MAY 2013

DEVELOPMENT OF GNU/LINUX DISTRIBUTION

Major Project

Prepared at



ISO 9001:2008
ISO 27001:2005

**Bhaskaracharya Institute for Space Applications & Geo-informatics
Govt.of Gujarat,Science & Technology, Gandhinagar
Submitted in partial fulfillment of the requirements for the degree of
Bachelor of Technology in (Computer Engineering)**

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ISO 9001:2008
ISO 27001:2005

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BISAG Certificate

This is to certify that the project report compiled by **Mr Arpan Chavda(09bce006)** and **Mr Hitesh Piprotar(09bce054)** students of 8th Semester B.Tech from Department Of Computer Science, Institute of Technology, Nirma University have completed their final semester project satisfactorily. To the best of our knowledge this is an original and bonafide work done by them. They have worked on Development of GNU/Linux Distributions, starting from January 7th, 2012 to April 24th, 2013. During their tenure at this Institute, they were found to be sincere and meticulous in their work. We appreciate their enthusiasm & dedication towards the work assigned to them. We wish them every success.

Mr. Miren Karamta

Project Manager,

BISAG, Gandhinagar

T. P. Singh

Director,

BISAG, Gandhinagar

Nirma Certificate

This is to certify that the Major Project entitled "**Development of GNU/Linux Distributions**" submitted by **Arpan Chavda (09BCE006)** and **Hitesh Piprotar (09BCE054)**, towards the partial fulfillment of the requirements for the degree of Bachelor of Technology in Computer Engineering of Nirma University, Ahmedabad is the record of work carried out by them under my supervision and guidance. In my opinion, the submitted work has reached a level required for being accepted for examination. The results embodied in this Project work, to the best of my knowledge, haven't been submitted to any other university or institution for award of any degree or diploma.

Dr. Sanjay Garg

Head Of Department,
Dept. of Computer Science & Engg.,
Institute of Technology,
Nirma University, Ahmedabad

About the company

Introduction of the company



Figure 1: BISAG

The applications of space technologies and geo-informatics contribute significantly towards socio-economic development of the society. Recognizing the importance and need of Space technology and geo-informatics for developmental planning purposes, the Government of Gujarat established the Bhaskaracharya Institute for Space Applications and Geo-informatics (BISAG) in the year 1997, as the State nodal agency to utilize space technology and geo-informatics for various developmental activities of the State.

Since its foundation, the Institute has experienced extensive growth in the spheres of space technology and geo-informatics. The objective with which BISAG was established is manifested in the extent of services its renders to almost all departments of the State. Year after year the institute has been endeavoring to increase its outreach to disseminate the use of geo-informatics up to grassroots level. In this span of eleven years, BISAG has assumed multi-dimensional roles and achieved several milestones to become an integral part of the development process of the Gujarat State. **Profile**

BISAGs has strengthened its role as a facility provider, a technology developer and as a facilitator for transferring technology to the grass root level. Further reinforcing

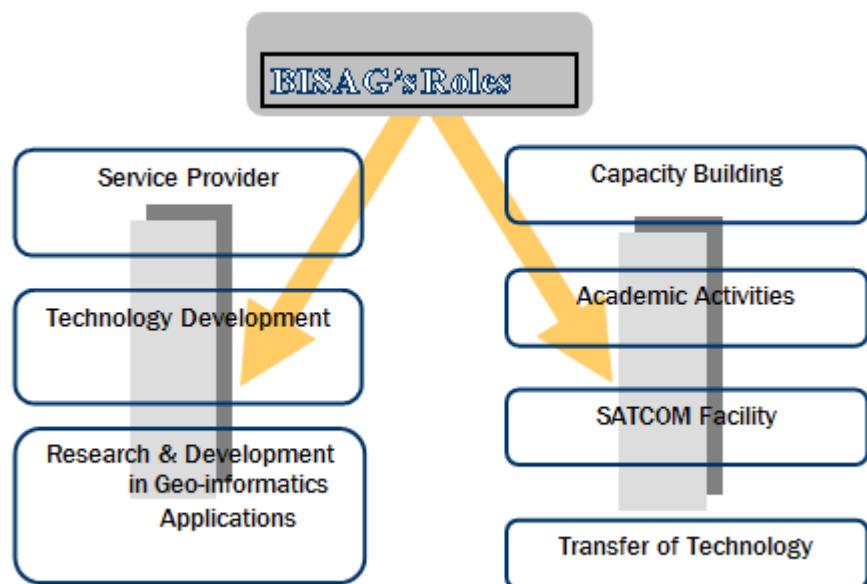


Figure 2: BISAG's Role

its functions, BISAG has achieved ISO 9001:2008 and ISO 27001:2005 certifications for quality management and security management services respectively. This has led to an organized and systematic development of its services and outputs.

Activities Of BISAG

BISAGs activities are multi-fold and have expanded in a big way and focused on the following:

- **Satellite Communication :** Promoting and facilitating the use of satellite broadcasting networks for distant interactive training, education and extensions
- **Remote Sensing :** Inventory mapping, developmental planning and monitoring of natural and man-made resources

- **Geo-informatics System :** Conceptualizing, creating and organizing multi-purpose common geo-spatial database for sectoral and thematic applications for various users
- **Photogrammetry :** Creation of Digital Elevation Model, Terrain characteristics, Resource planning,etc.
- **Global Navigation Satellite System :** Location based services, geo-referencing, engineering applications and research
- **Software Development :** For providing low-cost Decision Support Systems, desktop as well as web-based geo-informatics applications to users for wider usage.
- **Disaster Management :** For preparing geo-spatial information to provide necessary inputs to the Government to assess and mitigate extent of damage in the event of a disaster
- **Education, Research and Training :** For providing education, research and training facilities to promote number of end users through the Academy for Geo-informatics.
- **Value Added Services :** For providing services which can be customized as per the needs of the users.
- **Technology Transfer :** Transferring technology to a large number of end users.

Units of BISAG

BISAG initially set up to carry out Space Technology applications, has evolved into an Academic Institute, a Centre for Research and Technology Innovations, a Facility Provider, a Technology Developer and a Facilitator for transferring technology to the grass root level. BISAG is the first such State Centre having such multifarious

activities with ISO certification. BISAG has gradually progressed over the years and has grown into several units. Each unit focuses on specific functions and objectives to ensure efficiency in over all activities of the institute.

- **Gujarat Satellite Communication Network (GUJSAT):** SATCOM facilitates the promotion and facilitation of the use of broadcast and teleconferencing networks for distant interactive training, education and extension.
- **Centre for Geo-Informatics Applications:** The Centre for Geo-informatics provides services for the developmental and planning activities pertaining to Agriculture, Land and Water Resources Management, Wasteland/ Watershed development, Forestry, Disaster Management, Infrastructure etc.
- **Software Development:** For wider usage of geo-spatial applications, customised software are developed by the Software Development Team. The institute has provided many indigenous software solutions in the field of Geographic Information Systems, Decision Support Systems and Image Processing.
- **Academy of Geo-informatics:** The Academy for Geo-informatics carries out Education, Research and Training activities.
- **Disaster Management Information cell:** BISAG works closely with the Gujarat State Disaster Management Authority (GSDMA), for assessment of existing situation through integrated analysis and for planning appropriate preventive and preparatory measures, providing necessary support through data generation and analysis.

Infrastructure Developement

The growth and progress of any institute is gauged by the infrastructure it develops and possesses. BISAG has a sound infrastructure setup that has developed in tandem with the growth of the institute. Having started with one building, there are now dedicated facilities for different units. The laboratories are equipped with state-of the

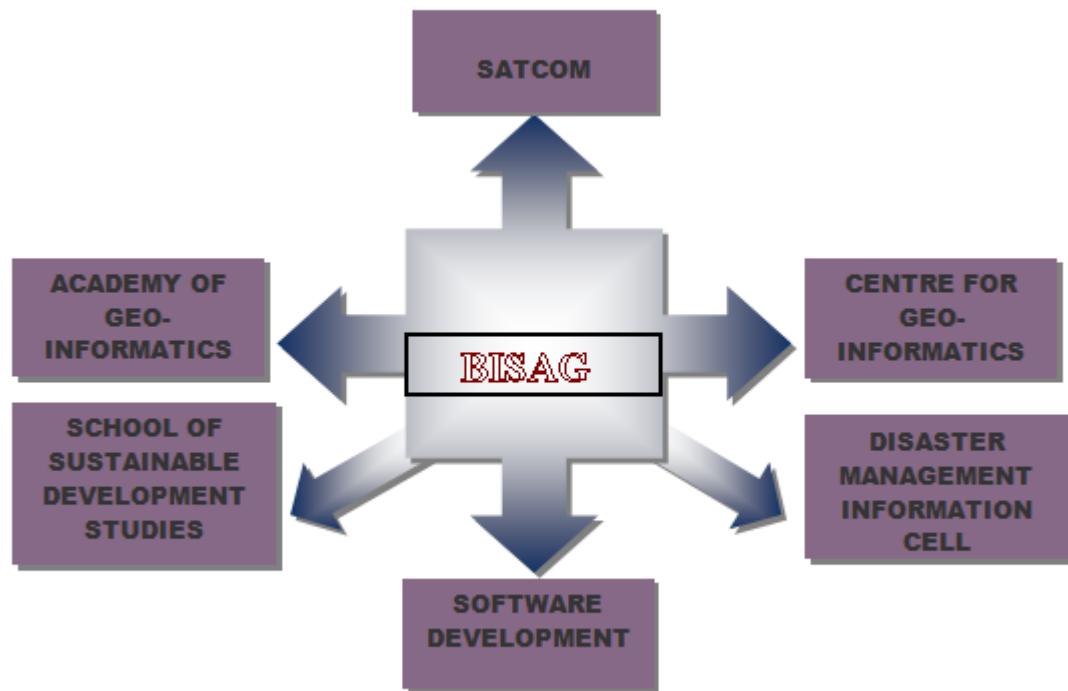


Figure 3: Units of BISAG

art technology with latest Hardware and Software required for executing its activities. BISAG also has a rich satellite data archive, which includes Satellite data of different spatial, spectral and temporal resolutions.

Collaborations of BISAG...Creating A Sense Of Ownership

BISAG works with almost all Government Departments and Organizations. Each of these Departments/Organization contributes in preparation of the respective projects. With strong Government support and proactive efforts on part of the staff of BISAG, the list of Collaborators is expanding and increasing.

Institutional Strengthening BISAG has achieved institutional strengthening through:

- **Reinforcement of Decision Support Systems**

Developing customized solutions as per user requirements through partnerships

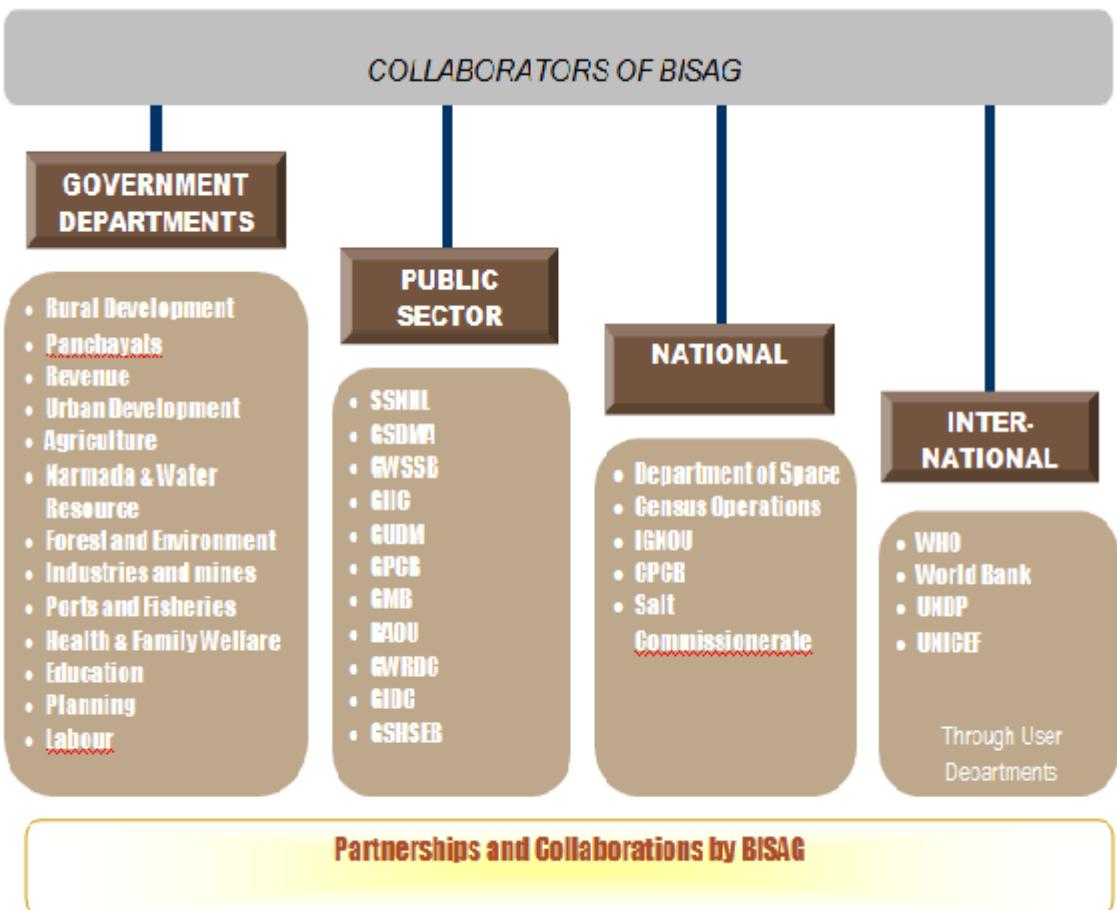


Figure 4: Partnerships and Collaborations by BISAG

and collaborations, which are affordable and easy to use. Areas of natural and manmade resources, socio-economic parameters, are being effectively addressed with the help of Geo-informatics.

- **Establishing Linkage between Government and People through GUJSAT**

GUJSAT facility is being constantly employed for the promotion and facilitation of the use of teleconferencing networks for distant interactive training, edu-

tion and extension. Experts, leaders, specialists and professionals can conduct their programs from a central location reaching out to remote areas through two-way audio-video channel making them interactive and meaningful.

- **Developing Innovative Education Programmes**

Innovative educational programmes are conducted regularly through GUJSAT, allowing people residing in remote areas to have an access to good quality educational and awareness programmes.

- **Solving real life problems through Human Resource Development**

The institute has a young multi-disciplinary team of professionals and a continuing induction programme. Multi-nationals and IT agencies pick up the trained staff that in turn is replaced by new people. This results in availability of more and more trained manpower in the realm of space applications. Every year BISAG provides training to about 300 students in the field of Geo-informatics.

- **Creation of the multipurpose sectoral comprehensive databases for the entire state of Gujarat**

The institute has made efforts towards conceptualization, creation and organization of multi-purpose common digital database for sectoral / integrated decision support systems. This has provided impetus to planning and developmental activities at grass root level as well as monitoring and management potential in various disciplines like water resources, land resources, disaster management, infrastructure, urban management.

Communication

The project was undertaken at BISAG, Gandhinagar and BISAG can be contacted at the following:-

Near Ch-0 Circle,

IndulalYagnikMarg,

Gandhinagar-Ahmedabad highway,

Gandhinagar-382007

Gujarat, India

Phone No:- +91 79 23213081/82/90

Candidates Declaration

We declare that final semester report entitled **DEVELOPMENT OF GNU/LINUX DISTRIBUTIONS** is our own work conducted under the supervision of the external guide **Mr. Miren Karamta** from BISAG (Bhaskaracharya Institute for Space Applications & Geo-informatics). We further declare that to the best of my knowledge the report for B.Tech Computer Science final semester does not contain part of the work which has been submitted for the award of Bachelor Degree either in this or any other university without proper citation.

Candidate 1s Signature

Arpan Chavda

Student ID: 09BCE006

Candidate 2s Signature

Hitesh Piprotar

Student ID: 09BCE054

Submitted To:

Department Of Computer Science,

Institute of Technology,

Nirma University,

Ahmedabad.

Acknowledgements

Gratitude is a feeling which is more eloquent than words, more tranquil than silence.

We are grateful to **T.P.Singh**, Director (BISAG) for giving us this opportunity to work the guidance of renowned people of the field of GIS also providing us with the required resources in the company. We would like to express our endless thanks to our external guide **Mr. Miren Karamta**, Project Manager at Bhaskaracharya Institute of Space Application and Geo-informatics for their sincere and dedicated guidance throughout the project development. Also our hearty gratitude to our Head of Department and internal guide, **Dr. Sanjay Garg** for giving us encouragement and technical support on the project.

The blessings of God and our family members made the way for completion of the major project. We are very much grateful to them.

We are immensely thankful to our friends, who always stood beside and motivated me throughout this course.

Arpan Chavda

ID: 09BCE006

Hitesh Piprotar

ID: 09BCE054

Abstract

The project named Development of GNU/Linux distribution is designed for developers, students, programmers, coders and software engineers. This project actually contains development of two linux distributions which are free and open source. First Distribution namely **DMLinux**(Developers Mono Linux) originally forked from ubuntu is for developers. The purpose of DMLinux aims to provide all packages and all the softwares to developers and students who don't have very high speed internet connection or who live in remote area. Second distribution namely **OpenGujarat** is for the students of entire gujarat students. The purpose of OpenGujarat is to provide an Operating System to Gujarat students which is completely in regional language (Gujarati).

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Chapter 1

Introduction

1.1 The System

1.1.1 Definition of System

The proposed system "Development of GNU/Linuxdistribution" is designed to work on Linux environment. There are two distributions.

a. DMLinux

- DMLinux stands for developers mono Linux. It is an Open source and Free GNU/Linux Operating system originally forked from Ubuntu. DMLinux is developed for developers and Computer Science/I.T. students.

b. OpenGujarat

- Development of this distribution is an idea of BISAG director Mr.T.P Singh to design an operating system which is completely in regional language(Gujarati) ,so that it can be used by all the students of gujarat

students who have some problems in understanding English language. So these students find it easy to use which is in regional language.

1.1.2 Concerned Audiences And Users

Users of the system are as follows:-

- a. DMLinux: Developers, Coders, Programmers, Software engineers, Students.
- b. OpenGujarat:BISAG, Offices of Govt. of Gujarat, and other regional people of Gujarat

1.1.3 Purpose and Objective

- a. **DMLinux:** The purpose of DMLinux aims to provide all packages and all the softwares to developers and students who dont have very high speed internet connection or who lives in remote area. This system requires no activation unlike in windows. So developers dont have to bother about taking license and activation of os and all these stuffs.
- b. **OpenGujarat:** The purpose of OpenGujarat is to provide os to Gujarat students which is completely in regional language (Gujarati).

1.1.4 About Existing system

- There are so many existing Linux distributions with different-different desktop environment like KDE,GNOME SHELL,UNITY,XFCE,LXDE are available now a days like for hacking **Backtrack**,**Blackbuntu** are there,if you go for server distribution **Annvix**,**Scientific Linux** are there.If you want an os for embedded system then **ELinOS** exists but there is no distribution available in

market for developers .So **DMLinux** is unique distribution for developers and there is no alternative available. There is no Linux distribuition available which is completely in gujarati language so **OpenGujarat** is also an unique distribution which is in regional language(Gujarati)

1.1.5 Proposed System

Functional Requirements

a. DMLinux

- **Features of DMLinux**

- Productive GUI(DE)
- Language support like python,perl,ruby,etc.
- Inbuilt essential IDEs like eclipse,netbeans,Qt
- Inbuilt android development SDK support with eclipse
- Markdown support
- Inbuilt Hardware based programming IDE like Arduino,Logisim
- Customized DE with Eye-candy theme and icons
- Inbuilt Web server (Apache,tomcat and Glassfish)
- Aptana studio IDE for web developers
- Customised Firfox with FirefoxOS application development toolkit for mobile phones
- Linux app development utilities like quickly toolkit
- ISO size : around 3 GB

- **System modules of DMLinux**

- **Core Module:**

- * This module contains all core files means Kernel,device drivers, network utilities,etc. This will be available in Ubuntu minimal disc(27

MB). We are not going to touch this files for development.

– **Application module:**

- * This module contains all necessary applications needed for software developers.
- * All inclusion of application is based on our analysis and reviews of some developers working in some companies and our alumni.
- * We will try to develop following application after completion of system build.
 - **Auto ON Utility:** Boot PC at given user time when PC is already in shutdown.
 - **LAMP front end:** Apache MySQL and PHP front end to manage this running services
 - **Repo-cloner:** Local server package management utility
 - **Multi Document converter:** source markdown to multiple document format conversion.

– **Desktop Environment module:**

- * This module contains desktop environment provided in DMLinux. We have chosen GNOME Shell 3.6 as Desktop environment for DMLinux.
- * We will customize gnome shell to make more useful and productive than its original version.

b. **OpenGujarat**

• **Features of OpenGujarat**

- Developed in Gujarati
- Very lightweight
- Can run with 256mb RAM

- Inbuilt Gujarati dictionary(developed by us) support
- Simple Desktop Environment having Windows type mock-up
- ISO size : around 900mb

- **System modules of OpenGujarat**

- **Core Module:**

- * This module contains all core files means Kernel,device drivers, network utilities,etc. This will be available in Ubuntu minimal disc(27 MB). We are not going to touch this files for development.

- **Application module:**

- * This module contains all necessary applications needed for simple tasks.
 - * All inclusion of application is based on requirement of BISAG.
 - * We will try to develop following application after completion of system build.
 - English to Gujarati Dictionary

- **Desktop Environment module:**

- * This module contains desktop environment provided in DMLinux. We have choosen XFCE 4.1 for OpenGujarat.

Non-Functional Requirements

- Reliability of the system is of primary importance. As the system is internet based and would be accessed many times by various different clients for various different purposes, it should entirely robust and reliable.
- Maintainability The system should be designed to be easily maintainable and get the least complaints from the users and would guarantee high customer satisfaction and minimum downtime.

- Adaptability: The system must be entirely adaptable and should easily gel with the parent modules without causing much of rework or displacement.
- Extensibility: The system should be designed to be extensible to changes. Changes might be a result of
 - User requirement change.
 - Compliance to follow some new company policy.
- Facility provided by the technology employed should be utilized to its maximum. This refers to strict employment of the tools and technology being used.
- Development should be in accordance to the Software Design Document. This rule stresses the importance of the Software Design documents. They are the main source of requirements for off site developers. And depending on various versions of the SDD the change requests are recorded. Finally the extra effort involved in solving these change requests is recovered from the client.
- All deliverables should undergo a self review by the developer. This business rule stresses on the rechecking process to be carried out by the developer. This implies that once the deliverable undergoes QA it should be with minimum errors and in turn involve minimum rework.
 - Security and Privacy Requirements
 - Environmental Requirements
 - Computer Resource Requirements
 - Computer Hardware Requirements
 - Computer Hardware Resource Utilization Requirements
 - Computer Software Requirements
 - Software Quality Factors
 - Packaging Requirements

- Precedence and Criticality of Requirements
 - The system must be user friendly
 - It must be persistant
 - Future Modification and requirement can be adaptable.
 - The system must be maintainable.

1.2 Project Profile

1.2.1 Project Title

Development of GNU/Linux distribution

1.2.2 Scope of Project

- a. **Scope for DMLinux:** Developers, Coders, Programmers, Software engineers
 - b. **Scope for OpenGujarat:** BISAG, Offices of Govt. of Gujarat, and other regional people of Gujarat

1.2.3 Project Team

External Project Guide : Mr. Miren Karamta

Internal Project Guide : Dr. Sanjay Garg

Team Members : Arpan Chavda

Hitesh Piprotar

1.2.4 Hardware/Software environment in company

a. DMLinux

- Processor: Pentium 4 or later & Freq. 1GHz or more
 - Minimum RAM: 1 GB RAM

- Recommended Space: approximate 8 to 9 GB
- Color Monitor, Keyboard and Mouse
- Internet or Intranet

b. OpenGujarat

- Processor: Pentium 4 or later & Freq. 1GHz or more
- Minimum RAM: 1 GB RAM
- Recommended Space: approximate 8 to 9 GB
- Color Monitor, Keyboard and Mouse
- Internet or Intranet

1.2.5 Project plan



The Gantt chart displays the project timeline with tasks listed in rows. The columns represent the task name, begin date, end date, and duration.

Name	Begin date	End date	Duration
Requirement gathering,Market Analysis & PJR Submission	1/7/13	1/15/13	7
Features,Analysis and Gathering resource,PPR Submission	1/16/13	1/22/13	5
Diagrams,SRS & Planning	1/23/13	1/30/13	6
System Development of DMLinux and OpenGujarat	1/31/13	3/18/13	33
Application Development related to DMLinux and OpenGujarat	2/28/13	4/10/13	30
Implementation and Integration of system modules and application	4/11/13	4/17/13	5
Testing and Installation	4/18/13	4/24/13	5

Figure 1.1: Project Plan

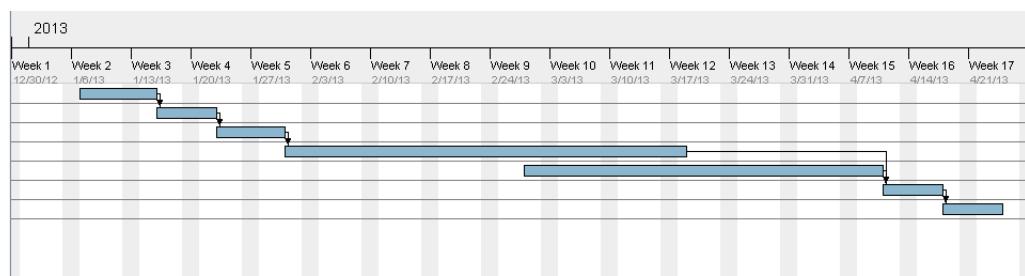


Figure 1.2: Project Plan - Timeline

Chapter 2

System Analysis

2.1 Feasibility Study

The Objective of the Feasibility study: The purpose of the Feasibility study is to find out if an information system project can be done and to suggest possible alternate solution. Feasibility study of the system is very important stage during the system design. Feasibility study is a test of a system proposal according to its workability impact on the organization, ability to meet user needs, and effective use of resources. (Hardware, Software, or other equipments), It is also use to determine whether the system gives benefit to people or society or not? Feasibility study decides whether the proposed system is properly developed or not or it properly work as per the expectation of the company or not.

Need for Feasibility Study: A feasibility study is written approach to evaluating your idea and can help you identify:

- If your idea is viable or not
- Useful facts and figures to aid decision-making
- Alternative approaches and solutions to putting your idea into practice

There are many reasons why new community ventures fail, but lack of planning and

research is the main one. As you plan, your knowledge of your market, customers and the environment in which you will work will grow. This process considers all areas of your idea and ensures you have something concrete on paper.

What does a feasibility study involve?

It can involve some or all of the following:

- An assessment of the current market
- An assessment of your potential position in the market
- An evaluation of the possible options for entry into the market
- A short list of the possible options

There are some aspects in feasibility study portion of the preliminary investigation.

- a. Technical Feasibility.
- b. Economic Feasibility.
- c. Operational Feasibility.
- d. Social Feasibility.
- e. Legal Feasibility
- f. Time Feasibility of the project.

2.1.1 Technical feasibility

A large part of determining resources has to do with assessing technical feasibility. It must be find out whether current technical resources can be upgraded or added in a manner that fulfills the request under consideration. It is willing to improve its technical abilities of the project will be handled on the computerized concept so it has to improve some hardware and software abilities to maintain this system and it billing to improve and give all the supported facilities. Here, the Proposed System which

is to be developed requires Hardware as well as Software Resources. A Hardware requirement includes PC with 40GB Hard disk and 1GB RAM. Software requirement includes Java. File requirement: Shape Files or geo referenced .jpg or .tiff file It may be affordable for any organization to employ new professional thus, the requirement makes it technical feasible.

2.1.2 Economic feasibility

Economic feasibility looks at the financial aspects of the project. Economic feasibility concerns with the returns from the investments in a project. It determines whether it is worthwhile to invest the money in the proposed system. It is not worthwhile spending a lot of money on a project for no returns. To carry out an economic feasibility for a system, it is necessary to place actual money value against any purchases or activities needed to implement the project. The proposed system that is going to develop its benefit is indirect benefit and cost is direct cost that is to be paid. It costs for its development and hiring of the Server space. But it gives indirect benefit to businessmans tourist etc.

2.1.3 Operational feasibility

The System will hold good GUI facilities which attract the user to use the System. The System will be developed using new technologies so the user will even get a chance work with and learn new technology and environment. Company is having sufficient employees for designing, implementing, testing, deploying and the training the employee to uses that system. In the system operational feasibility checks, whether the user who is going to use the system is able to work with the softwares with which the system is coded and also the mind of the user going to use the system. If the user does not understand or is able to work on the system further development is of waste.

2.1.4 Social feasibility

The System is going to be developed is it beneficial to society? Yes, as this System gives the details of the district to the user and admin and user can edit the shape files and get better view of the map also by having charts can save as image which can be useful as map

2.1.5 Legal feasibility

The Proposed System should be such that the System do not misguide or gives wrong information to user. The System should give proper information and should be reliable source of information to user.

2.1.6 Time feasibility

The Proposed System is a Desktop Application so it will take some duration of time to satisfy the objective of completing the System (Application). The duration that is allocated to develop the System is quite feasible in respect to time. 4 months is enough to develop System.

2.2 Requirement Analysis

2.2.1 Facts finding techniques

The client in most cases is not sure of what exactly is desired and has a poor understanding of the computing environment

- Inception of the Project
- Basic Elicitation
 - Problems of Scope
 - Problems of Understanding

- Problems of Volatility
- Elaboration
- Negotiation
- Specification
- Validation
- Management (Continuous)
- The following techniques are present unambiguously throughout the project and possess enormous power with regard to requirement gathering.

Interview

The requirement analysis phase begins after the inception of the project. The first phase of interviews is mainly a kind of informal discussions with the client. In this phase the analysts who are the evangelists in the process of requirement elicitation generally do the following:

- Ask a set of Informal Context Free Questions regarding the system.
- Talk through with the client to know his intention with regard to the project.
- Define a business case for the idea along with the performance of certain kind of market analysis.
- Identify a working description of the projects scope.

The later phases of interviews involve the following kind of facets:

- Discussion on the Division of the entire thing into manageable and doable modules.
- Module wise interviews with the various personnel involved.

- Certain kind of debatable presentations which may be clubbed with brainstorming or prototyping sessions.

This mode of requirement gathering is the one that provides the maximum amount of information regarding the project and hence is used very effectively. This mode can turn into all various forms ranging from strict one room interviews to large debatable discussions.

Questionnaire

This mode of requirement elicitation is generally employed during change management and while laying out basic system explanations. Questionnaires used in the project are framed keeping into mind the following things:

- Amount and the kind of information to be extracted through this channel.
- The kind of stake holder to whom the questionnaire is addressed.
- The reusability and abstractness of these questionnaires.

Record Review

The records analyzed by me were mainly the following:

- Software Design Document This gave me the actual requirements of the GUI plus the backend logic right till statement of logical queries which may be employed in some or the other form. It also incorporated the sample GUI so that any changes to the prototypes submitted earlier can be checked and tracked.
- Technical SRS (with Business Analysis) This was a typical SRS that gave me the specific requirements along with the Business rules that need to be employed.
- Class Diagrams The class diagram made me understand the entire architecture that was employed and allowed me to extend it in my system.

Observation

This is also the method employed very widely in the project being developed. The developers working onsite generally engage in the observation of the following things:

- Work Environment of the organization.
- The technical expertise of the employees of the organization.
- The volume of customers entertained.
- The kind of system expected.
- The resistance in the organization due while the organization gets the system installed.
- The usage of any of the available systems.

During the continuous management phase that starts once the system is installed and is running the observation regarding system usage, system inconveniences and system benefits is carried out.

2.2.2 Data Flow Diagrams

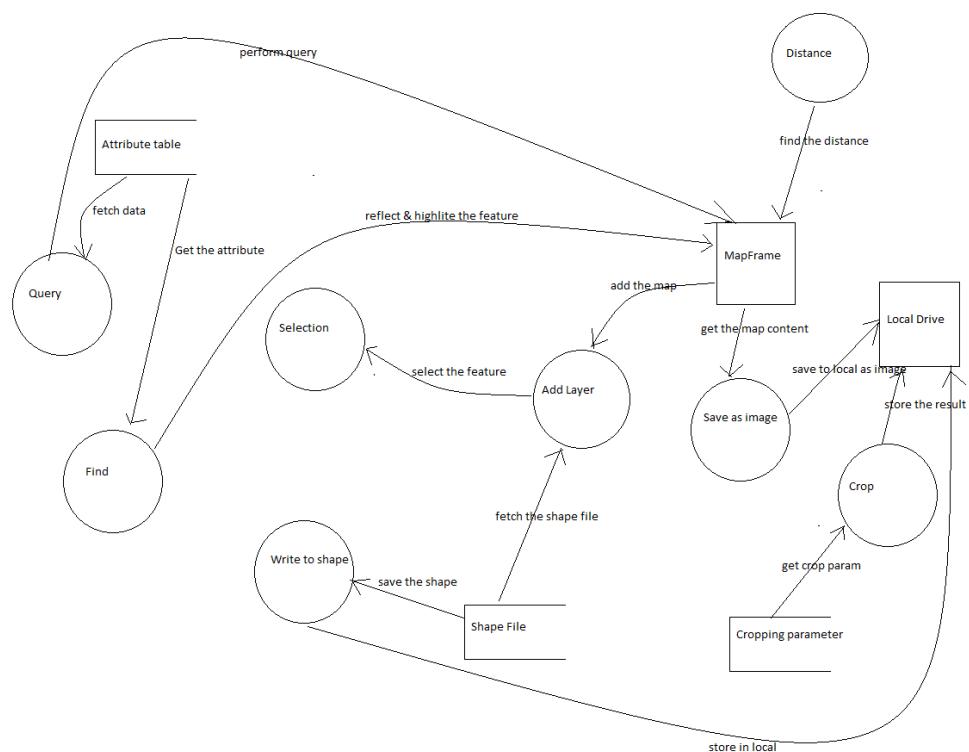


Figure 2.1: Data flow diagram of desktop GIS application

Chapter 3

Use Case Diagram

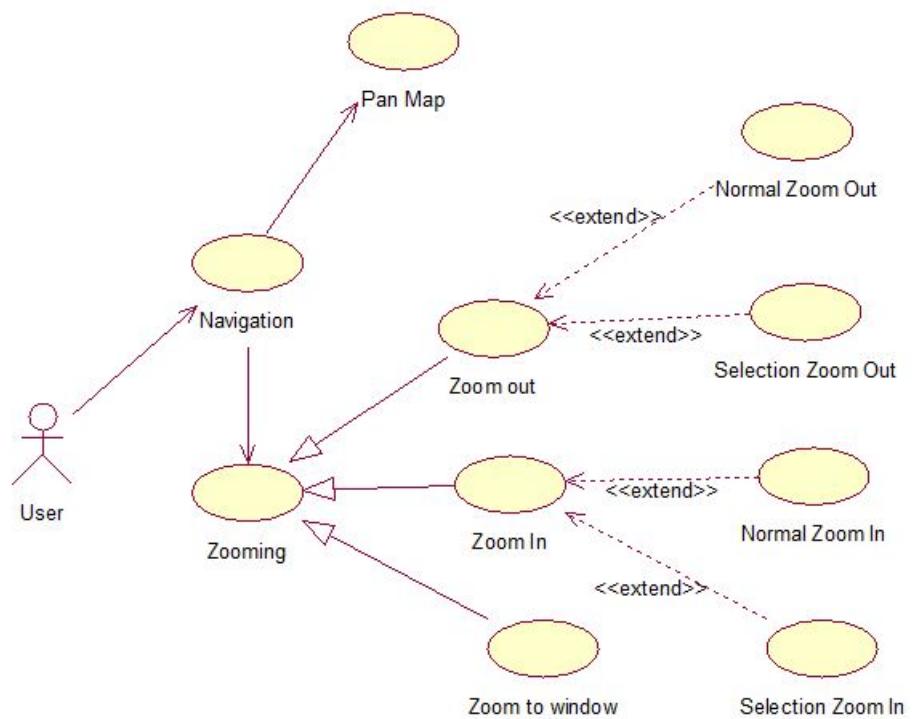


Figure 3.1: Use case diagram of navigation of map

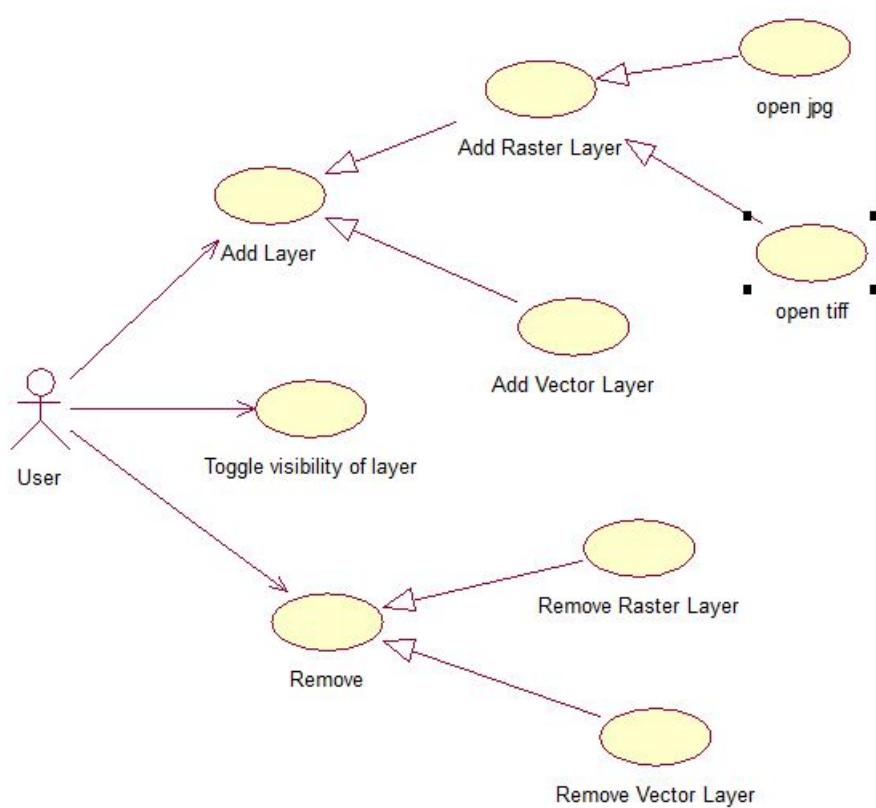


Figure 3.2: Use case diagram of layer subsystem

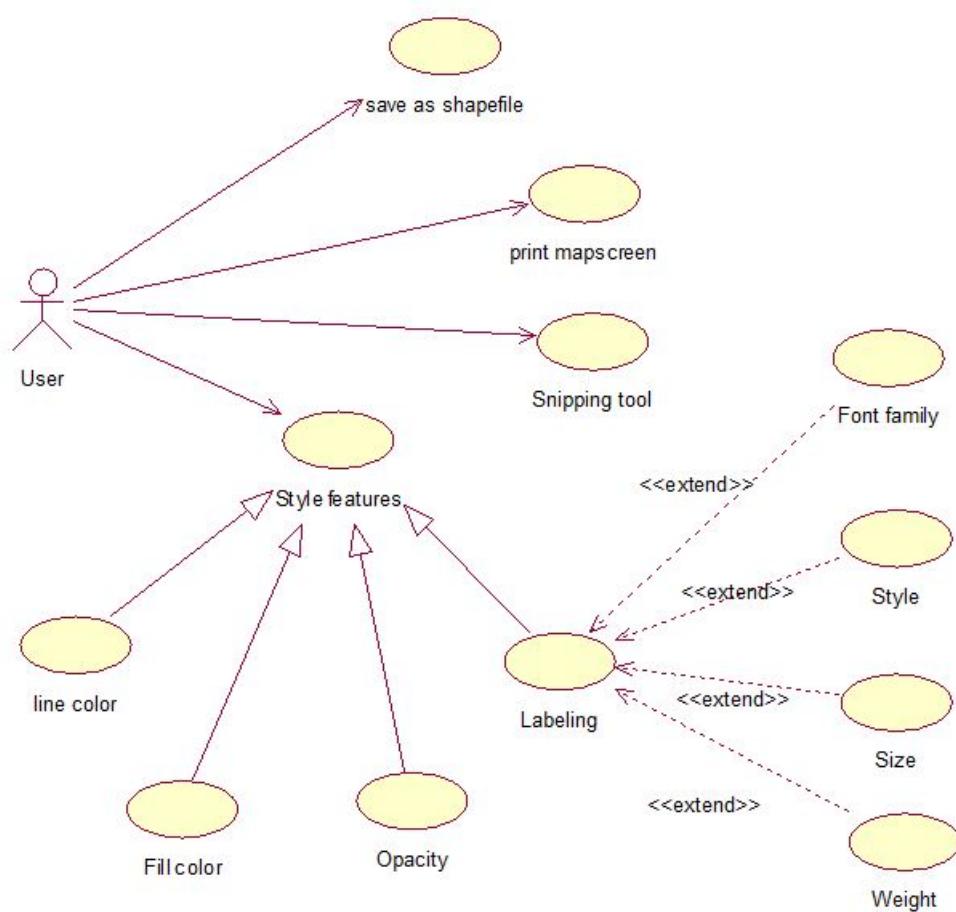


Figure 3.3: Use case diagram of print functionality

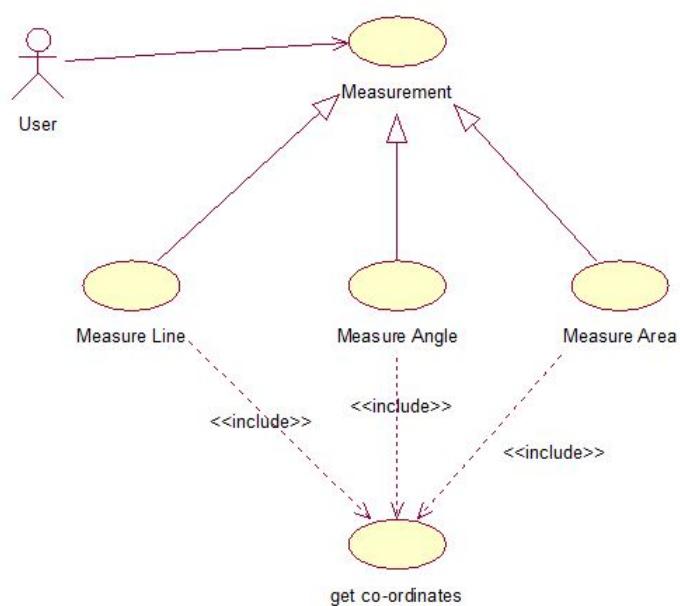


Figure 3.4: Use case of measurement

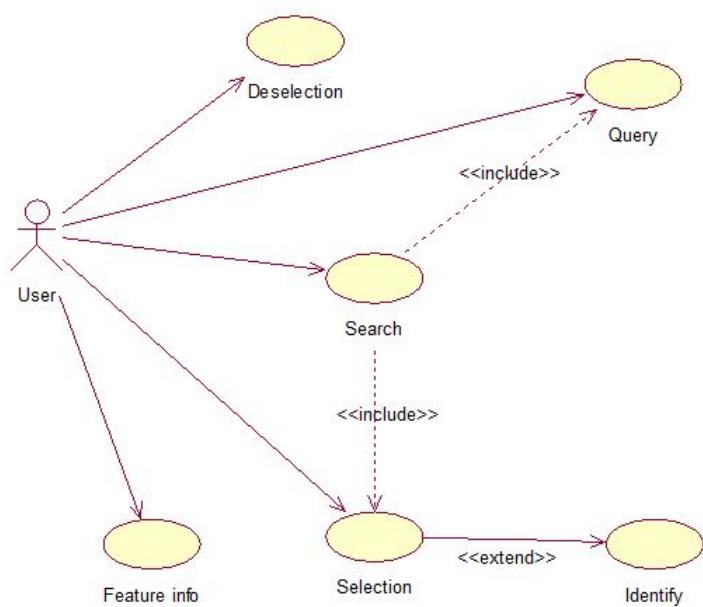


Figure 3.5: Use case of selection functionality

Chapter 4

Class Diagram and CRC card

4.1 Class Diagram

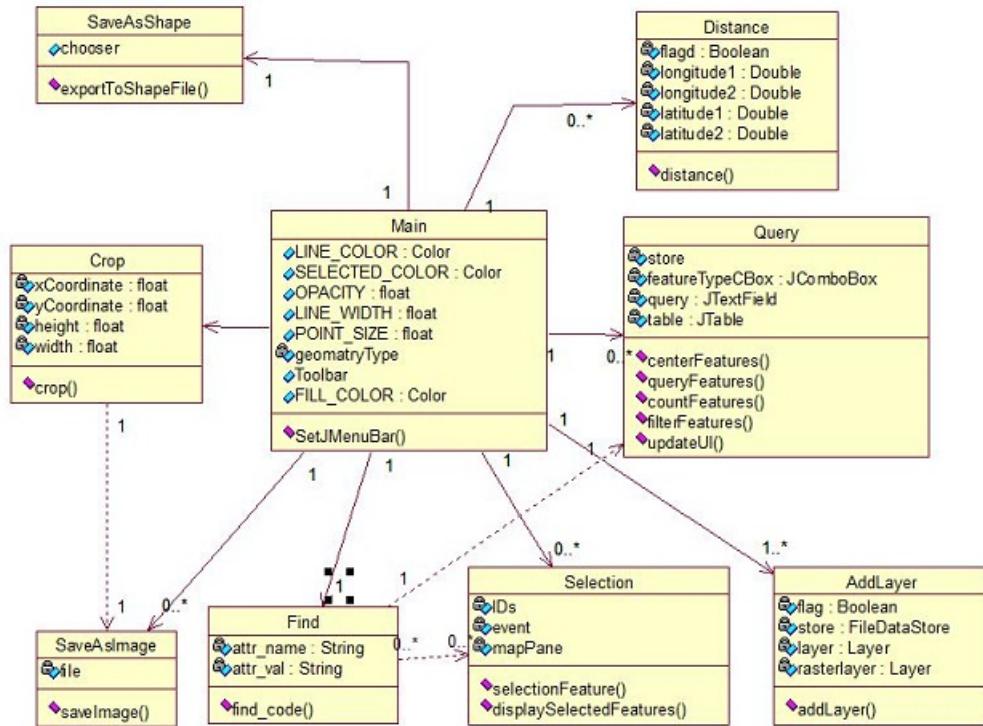


Figure 4.1: class diagram of entire system

4.2 CRC Index Card

Class Name : Main	
Class Type : interaction, connection	
Class Characteristics : secure, sequential, permanent	
Responsibilities	Collaborators
Create main window	Selection
Open layers	Find Save as Image Crop Add Layer Query Distance

Table I: CRC card - Main

Class Name : Selection	
Class Type : interaction, connection	
Class Characteristics : secure, sequential, temporary	
Responsibilities	Collaborators
Make selection of raster file	Find
Make selection of vector file	

Table II: CRC card - Selection

Class Name : Query	
Class Type : interaction, connection	
Class Characteristics : secure, sequential, temporary	
Responsibilities	Collaborators
Get feature from Layer	Main
Apply query on feature	

Table III: CRC card - Query

Class Name : Save as Shape	
Class Type : interaction, device	
Class Characteristics : secure, sequential, permanent	
Responsibilities	Collaborators
Get the name of layer	jMapFrame
Get the name of selected feature	jLayerTable
Get name of new layer	
Read the content of selected attribute	
Write the content into new layer	

Table IV: CRC card - Save as Shape

Class Name : Save as Image	
Class Type : interaction, device	
Class Characteristics : secure, sequential, permanent	
Responsibilities	Collaborators
Get the name of layer	
Get the content of mapframe	
Get name of new imagefile	
Read the content of frame	
Write the content into local file as image	

Table V: CRC card - Save as Image

Class Name : Distance	
Class Type : interaction, connection	
Class Characteristics : secure, sequential, permanent	
Responsibilities	Collaborators
Get the points	Main
Apply the algorithm	
Display result in Km.	

Table VI: CRC card - Distance

Class Name : Crop	
Class Type : interaction, connection, device	
Class Characteristics : secure, sequential, permanent	
Responsibilities	Collaborators
Get the cropping parameter	Main
Save the temporary result in image	save as image
Crop that image	
Save the Cropped result in Local file	

Table VII: CRC card - Crop

Chapter 5

User Manuals

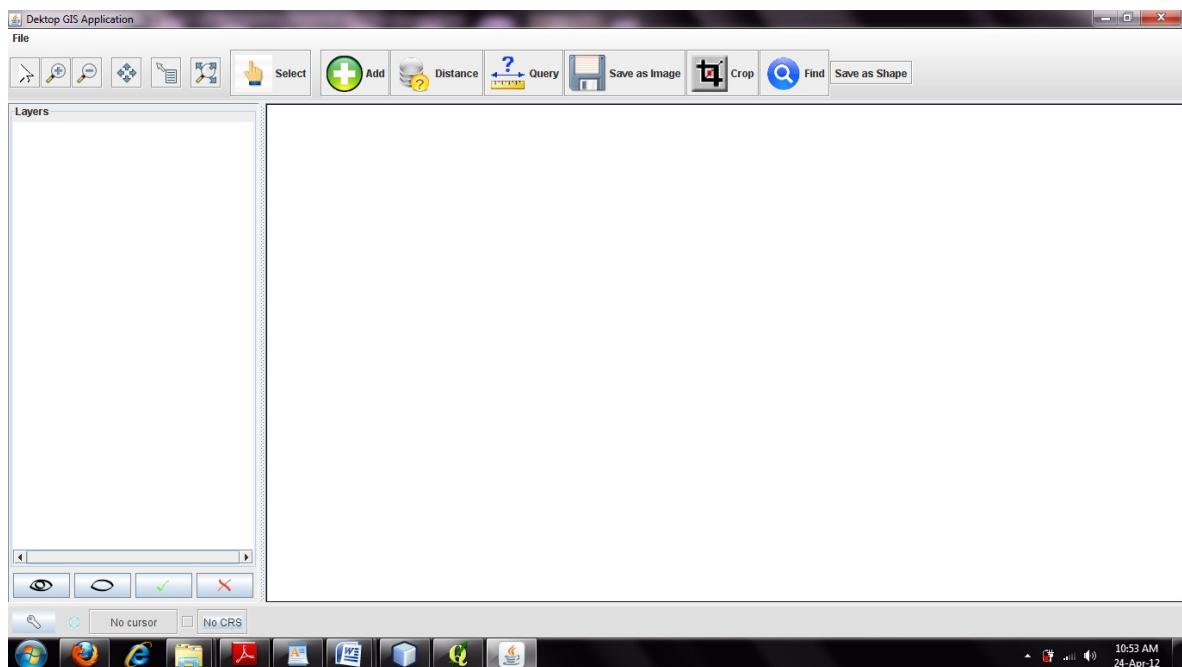


Figure 5.1: Main outlook of Application

Description: Above is the basic outlook of Application. The left side is Layer Table. The main area is MapFrame. On the Top menubar and toolbar for performing various functionality.

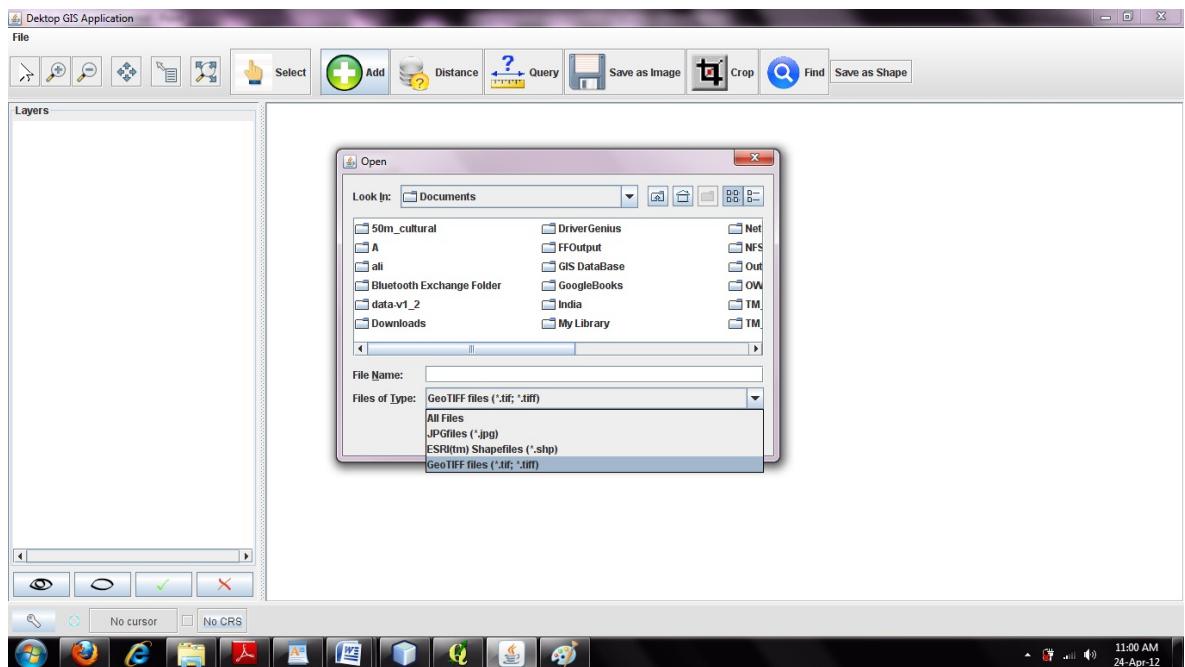


Figure 5.2: Add button Function

Description: Above is the outcome when user clicked on the ADD button. It prompt for selecting the input of Raster(.jpg,.tiff) as well as Vector(.shp) data.

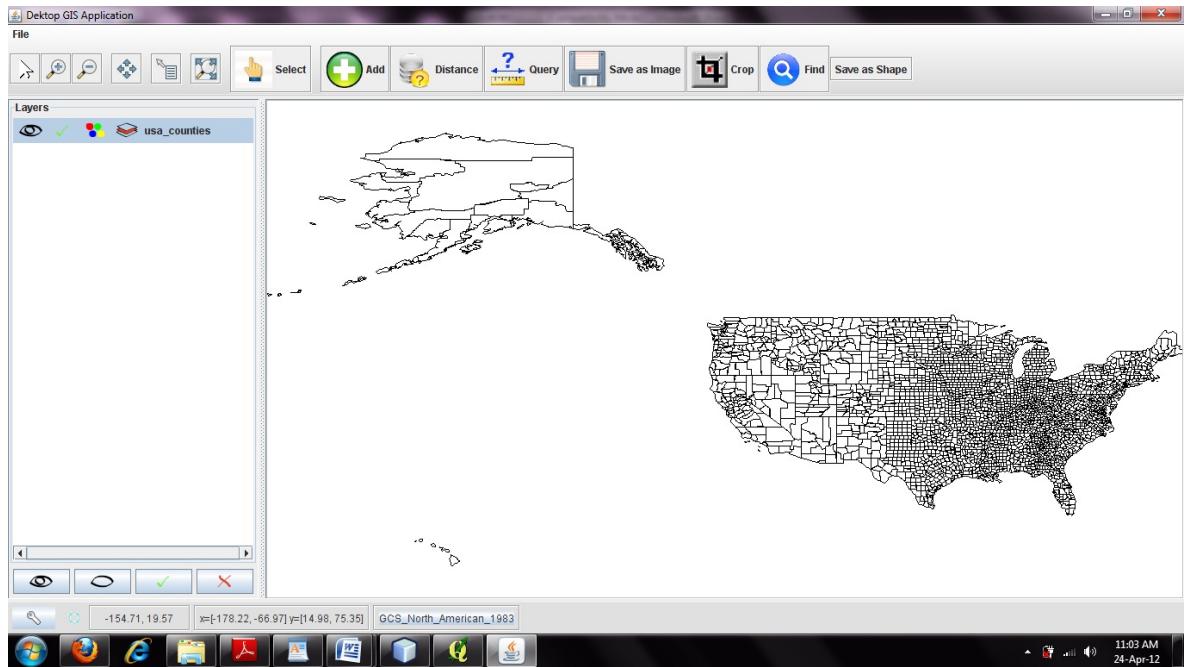


Figure 5.3: Basic rendering of Simple Map

Description: Above is the output when user select some shape file from the JFiledatachooser. In the Layer Table he/she can see the option to remove, select/deselect, set layer style and toggling visibility option. At the bottom he/she can see the status bar which shows the CRS of the current Layer rendered in MapFrame.

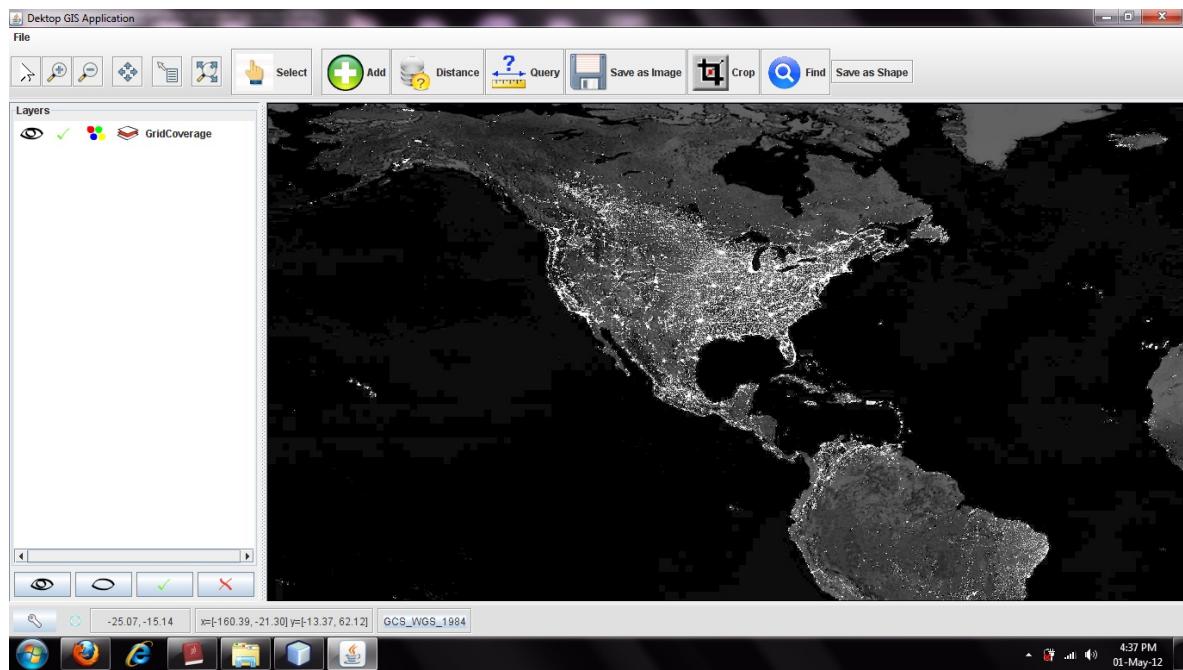


Figure 5.4: Basic rendering of Raster data

Description: Above is rendering of geo-referenced JPEG file.

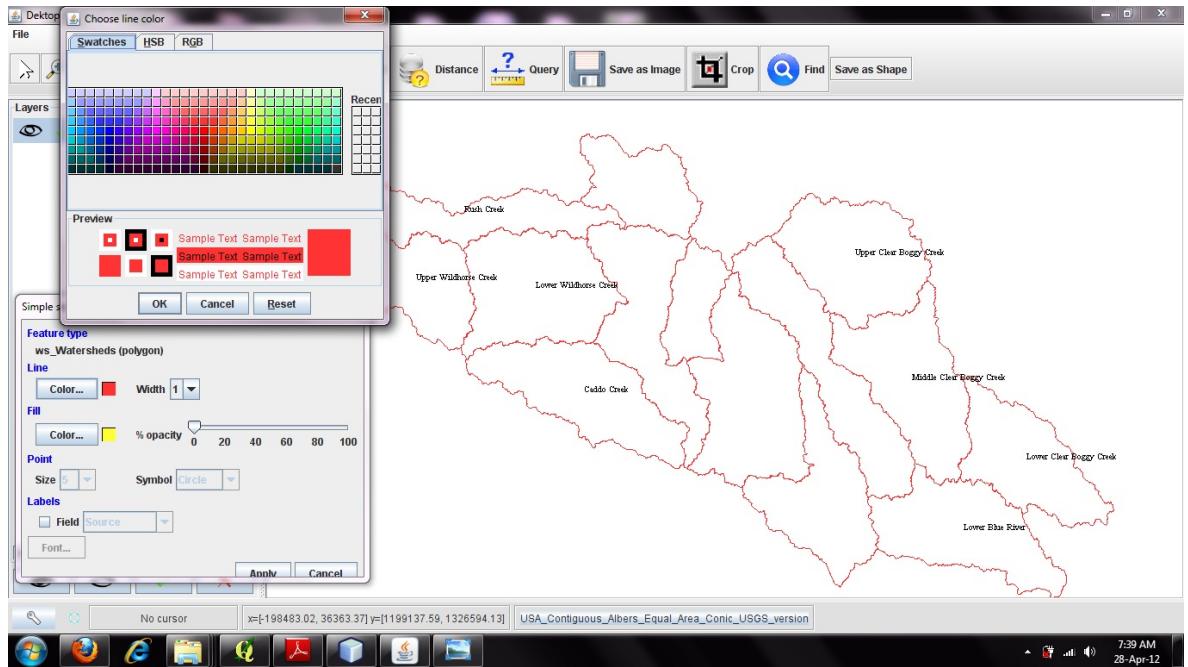


Figure 5.5: Use of Layer table options function

Description: Above is the use of functionality provided by Layer table option. User can color the boundy of Map. User can feel the color in Map also. User can Lable the Map using attribute Tables field.

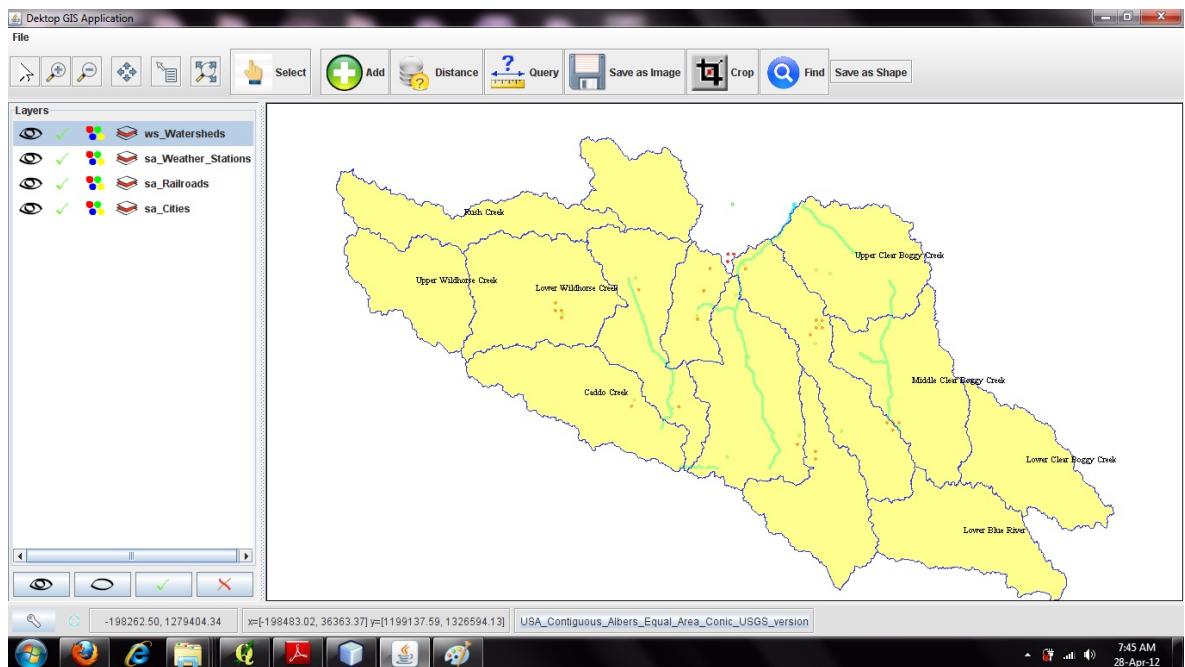


Figure 5.6: Multilayering

Description: Above is output of multilayering with two vector and one raster layer. User have colored the vector data and labeling it.

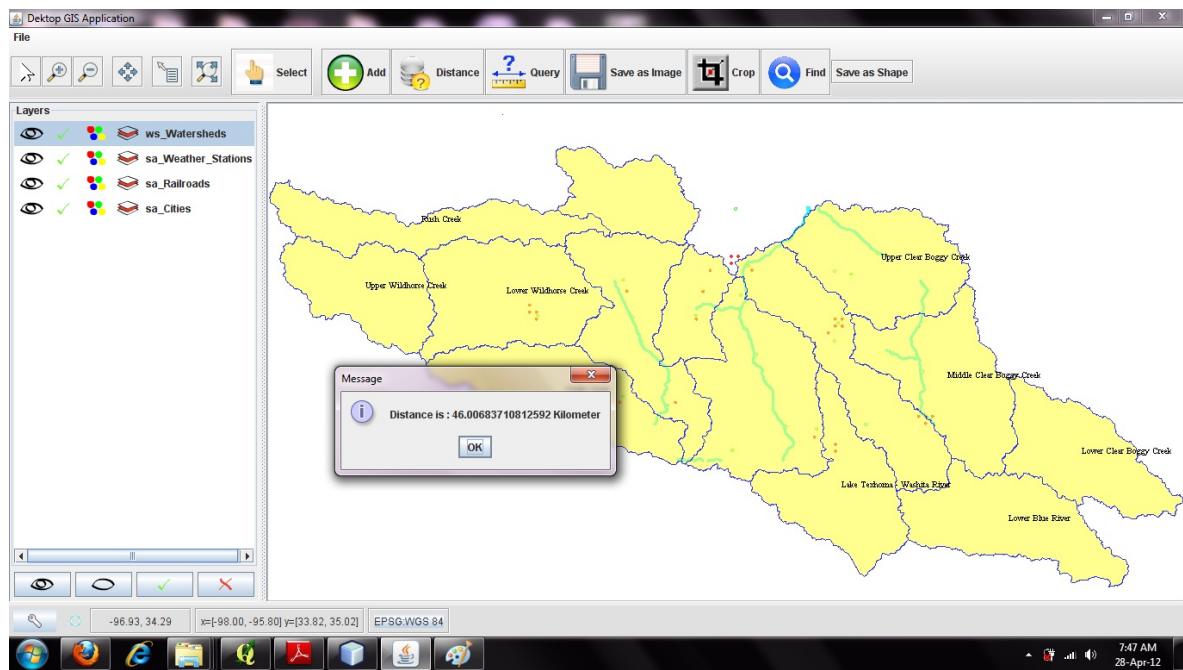


Figure 5.7: Distance feature

Description: Above feature is useful to calculate distance between two points in Map in kilometers.

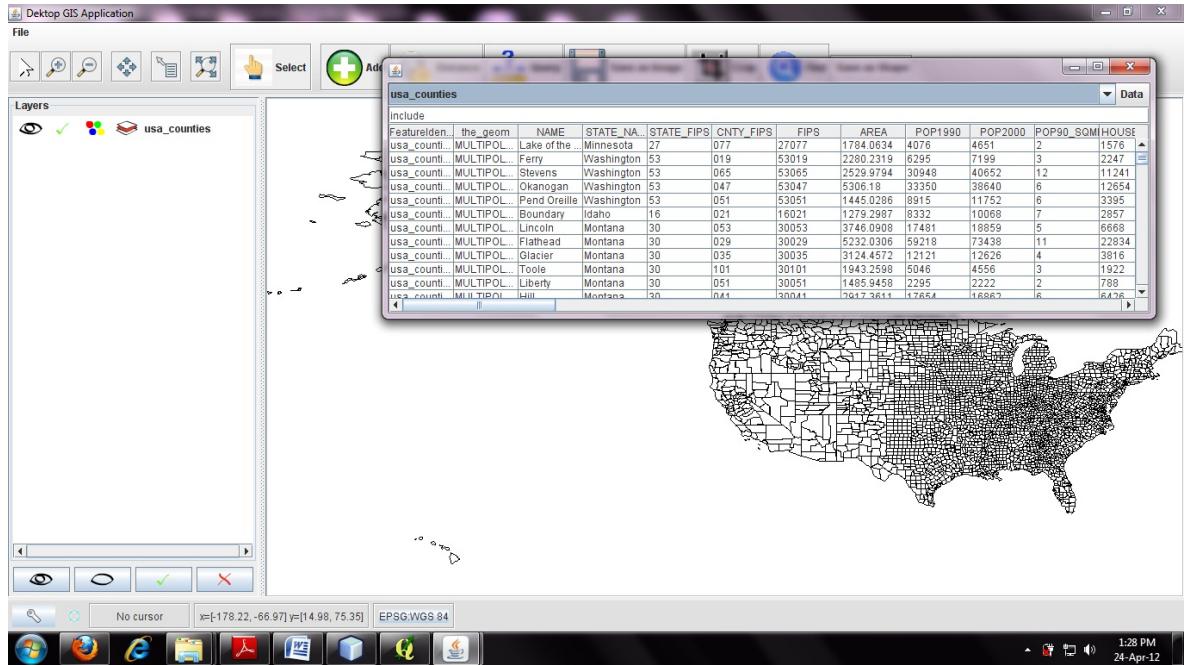


Figure 5.8: Attribute Table of Map

Description: Above is the display of attribute table of a given Map in Layer table.

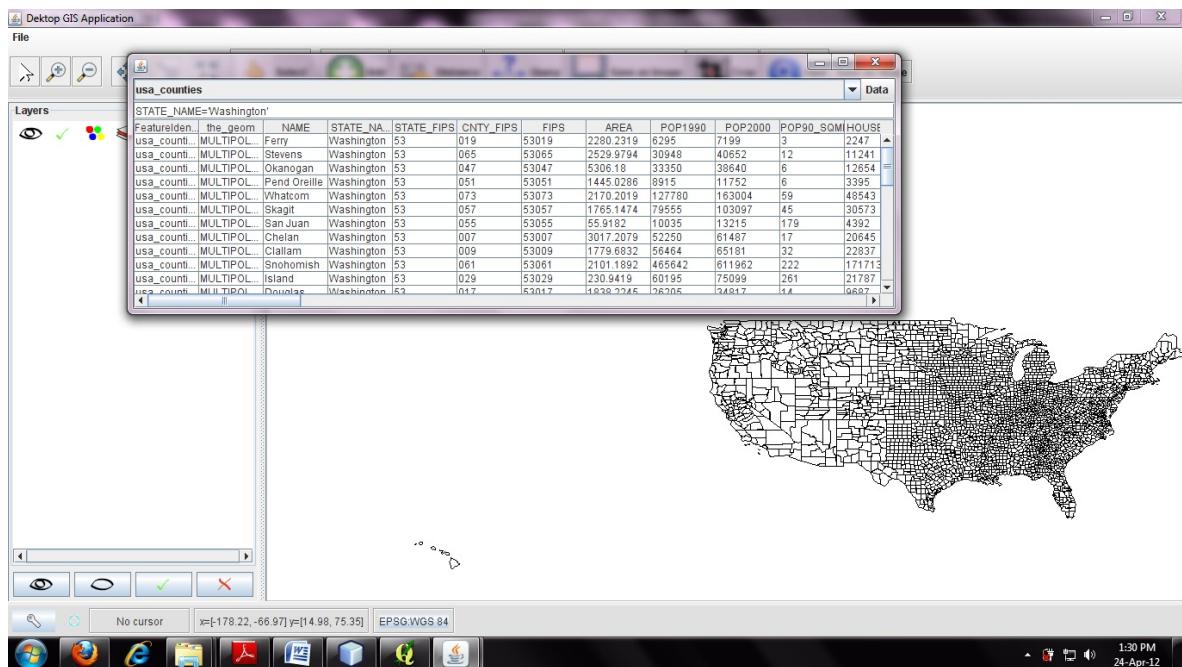


Figure 5.9: Query performance on Attribute

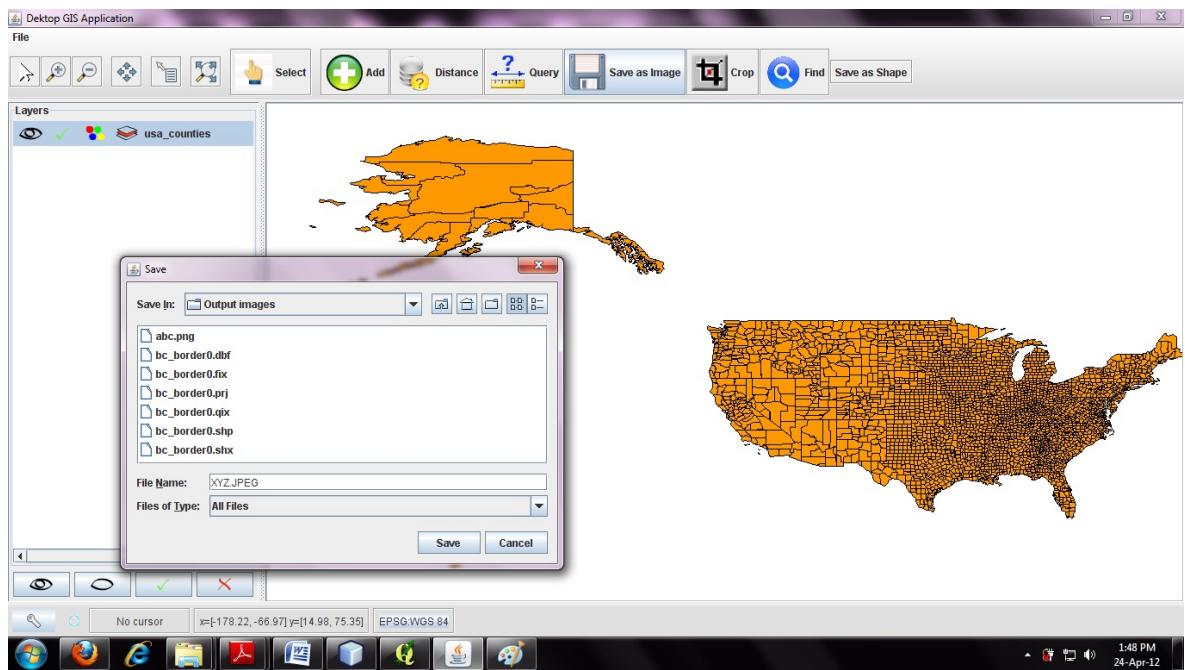


Figure 5.10: Save as Image

Description: Above it is seen that the user can save the file as Image.(Jpeg,Tiff,Bmp,Png) and Many other format.

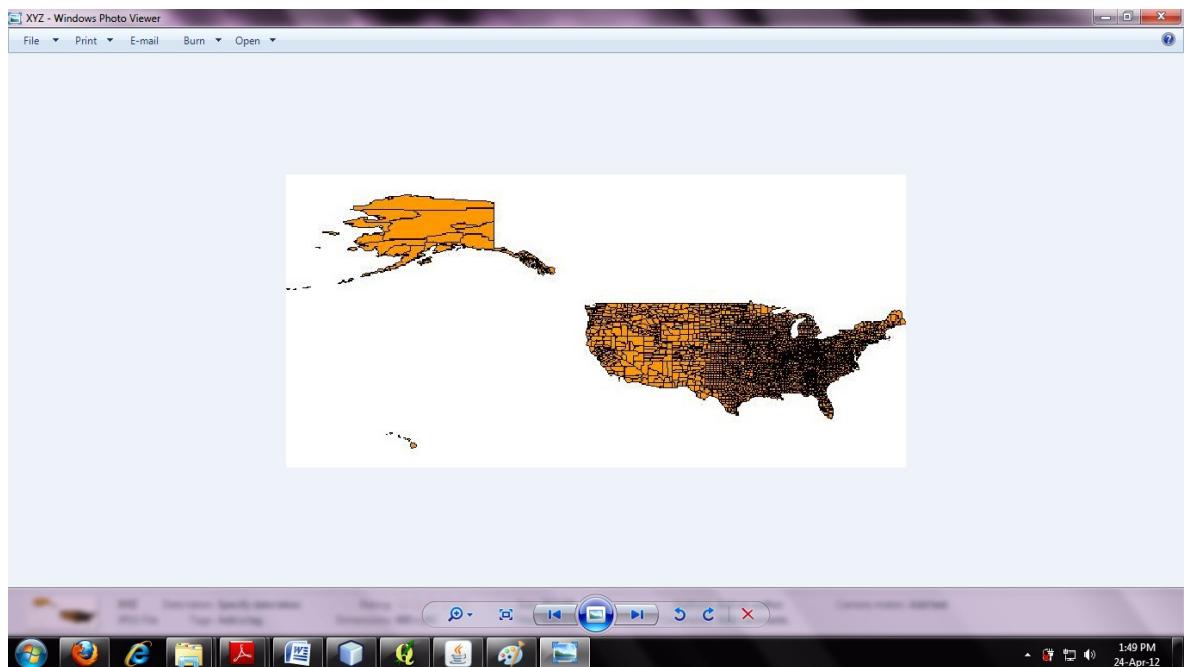


Figure 5.11: Output as Image

Description: Above is output of image file stored in previous case.

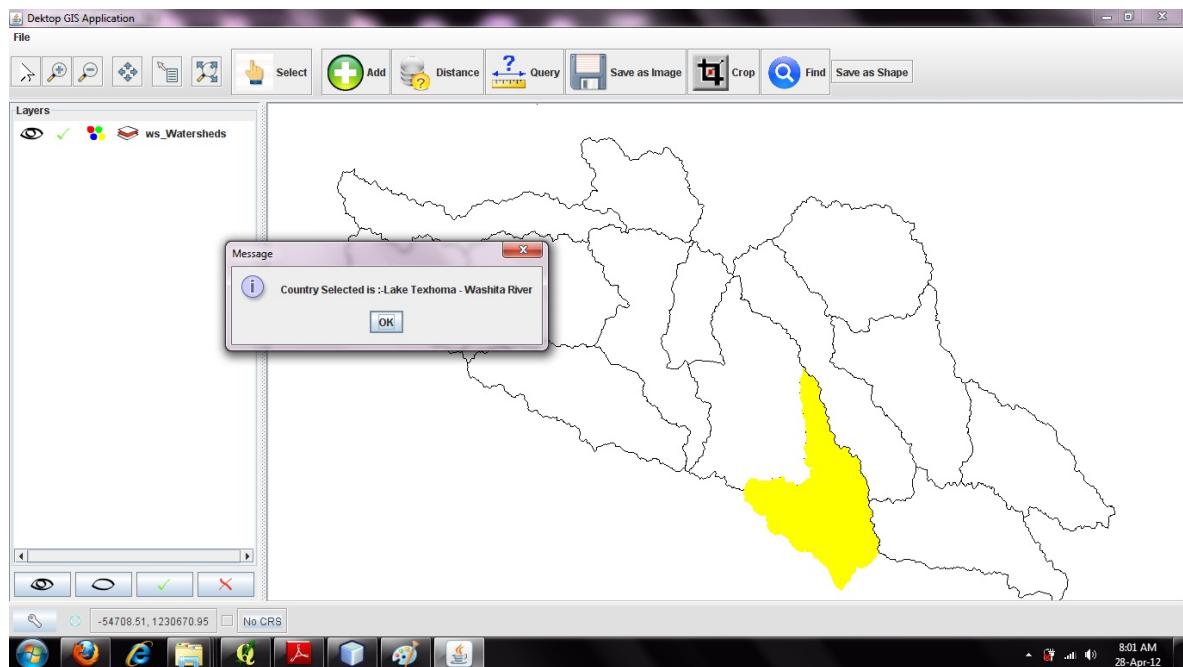


Figure 5.12: Selection feature

Description: User can select particular country from map and the name of that selected feature is prompted.

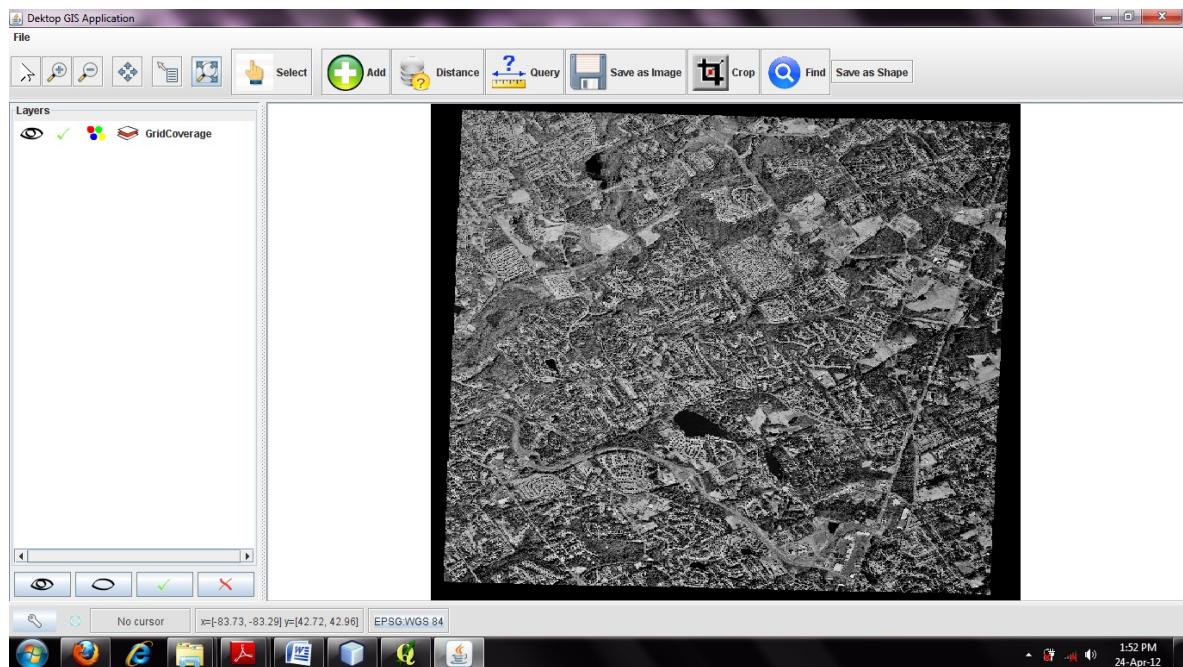


Figure 5.13: Open GeoTiff file

Description: User can open geo referenced TIFF file.

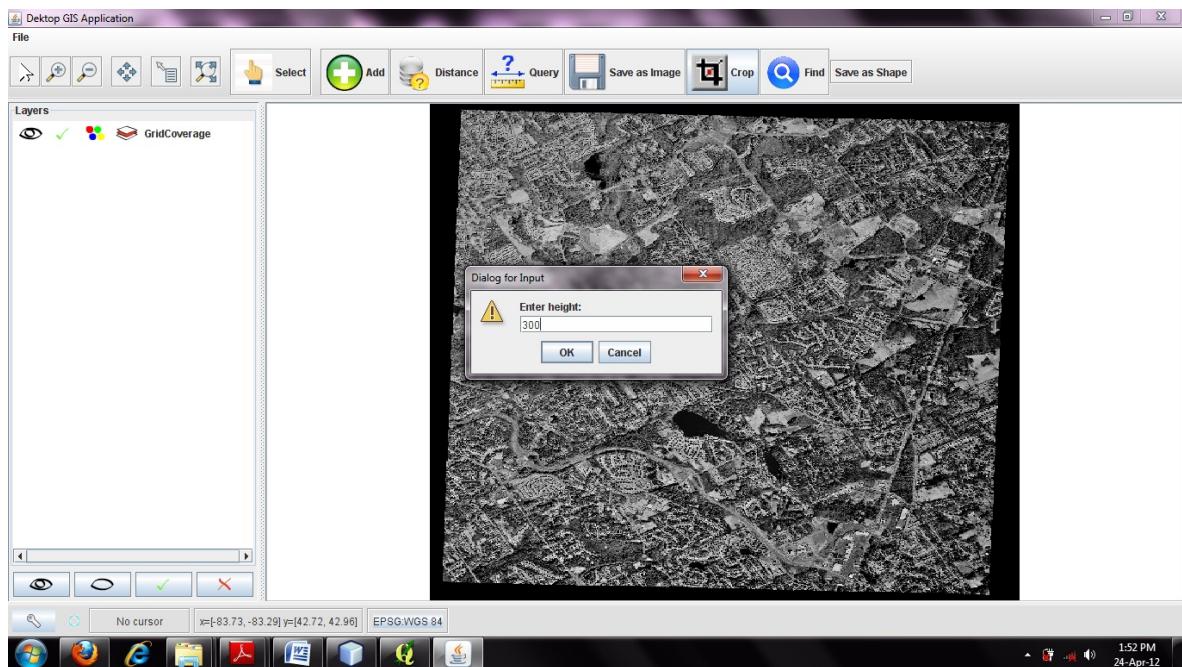


Figure 5.14: Crop the GEOTiff file

Description: User have to set parameter for cropping the image like width,height and the point from where to crop.

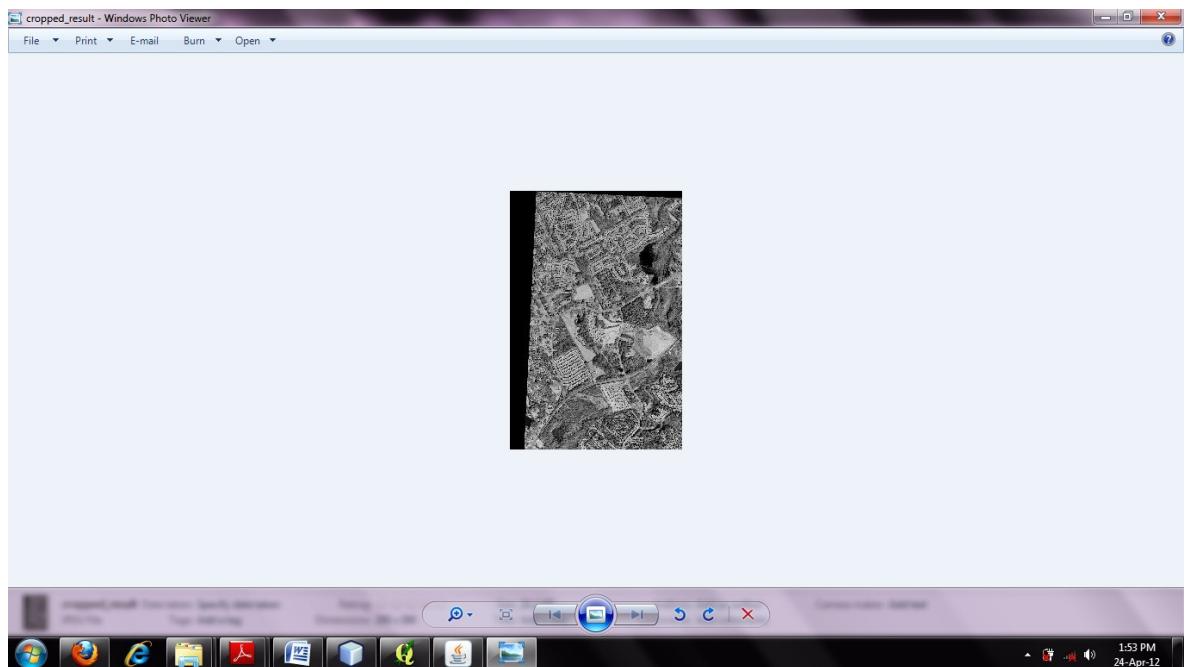


Figure 5.15: Cropped Result

Description: Here is the output of cropped TIFF file. That stores in Local directory of user.

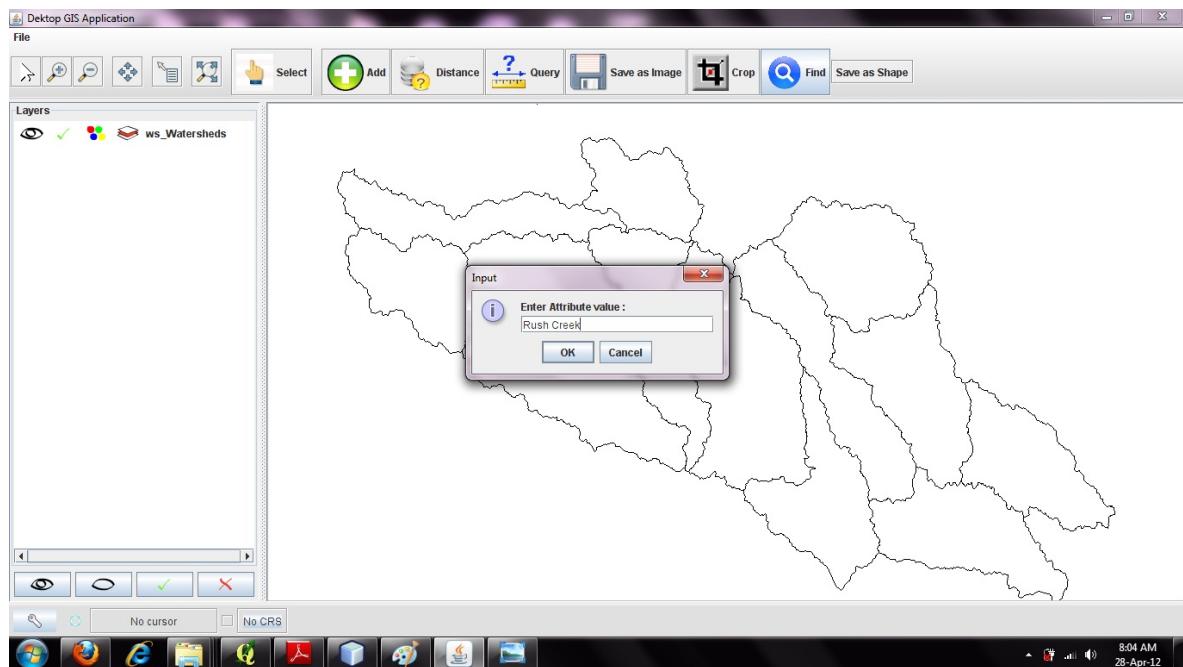


Figure 5.16: Find the feature

Description: User can find the country/state from the opened Map using field name stored in Attribute Table

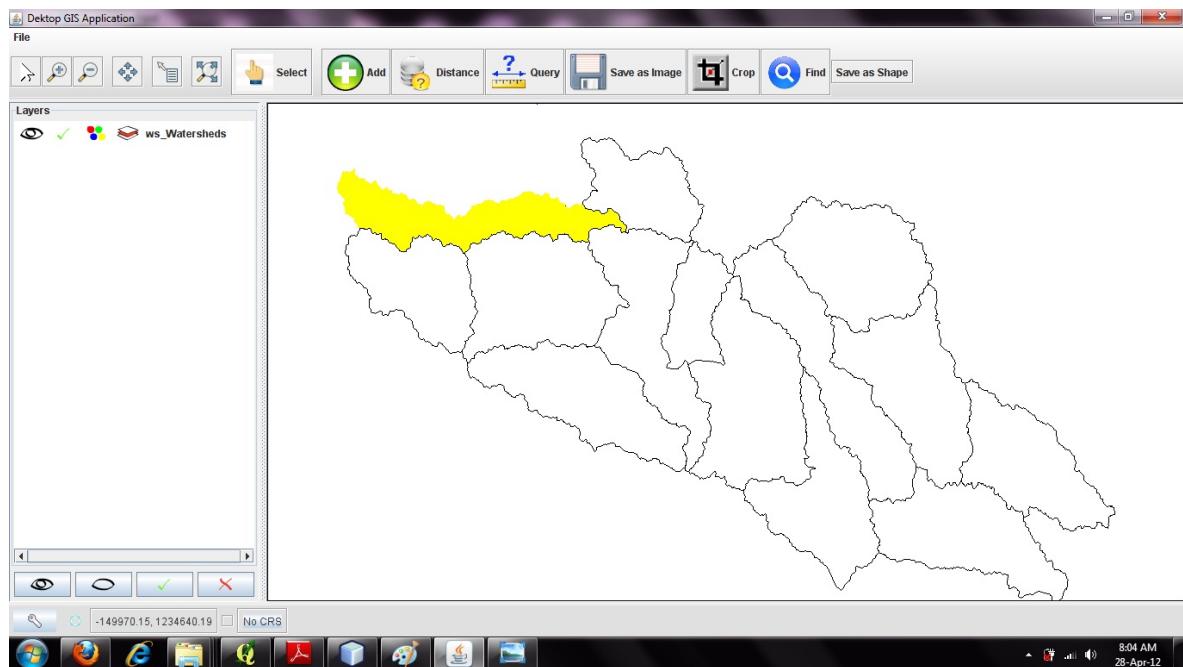


Figure 5.17: Result of finding

Description: Here is the outcome of finding the feature name Algeria. The part is highlighted in Map.

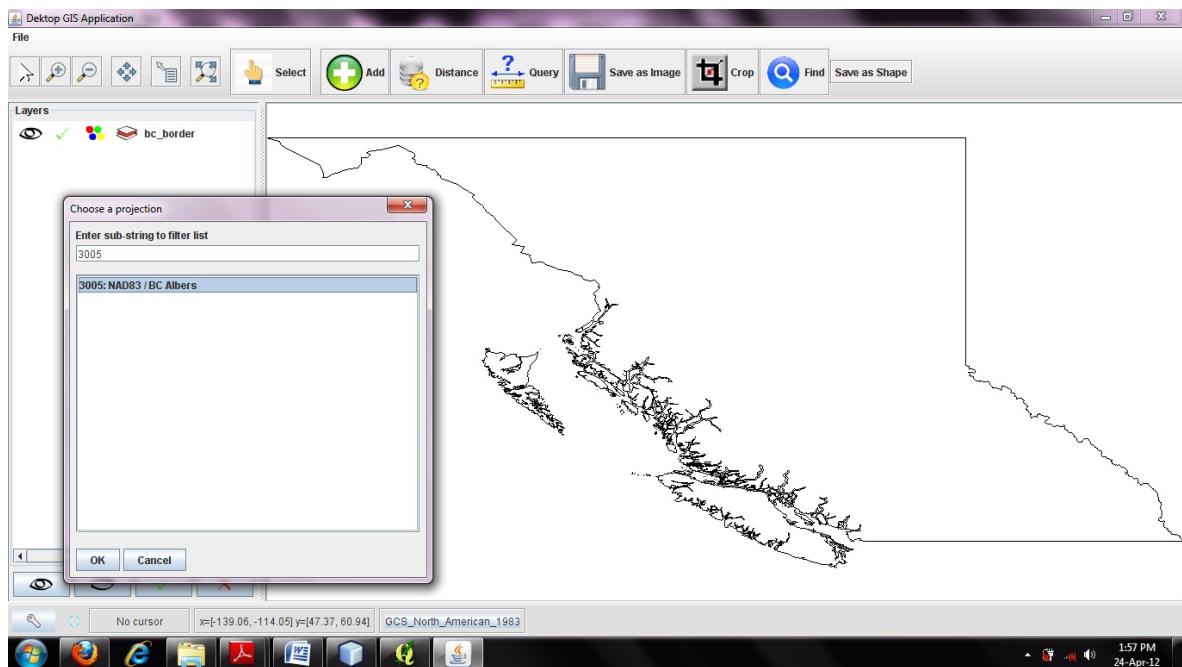


Figure 5.18: Changing the Coordinate Reference System

Description: Above user can change the CRS of shape file if its not proper so that the projection of the map can be properly displayed.

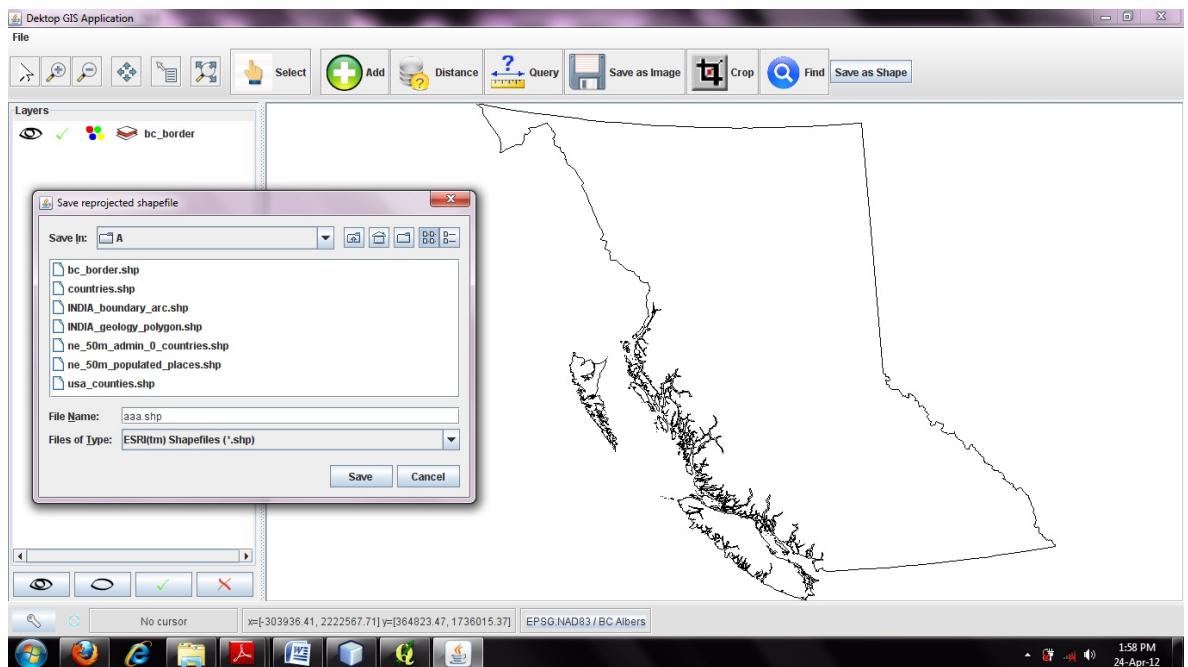


Figure 5.19: Save as Shape file

Description: User can save the reprojected file as shape file in local directory and use it for future purpose.

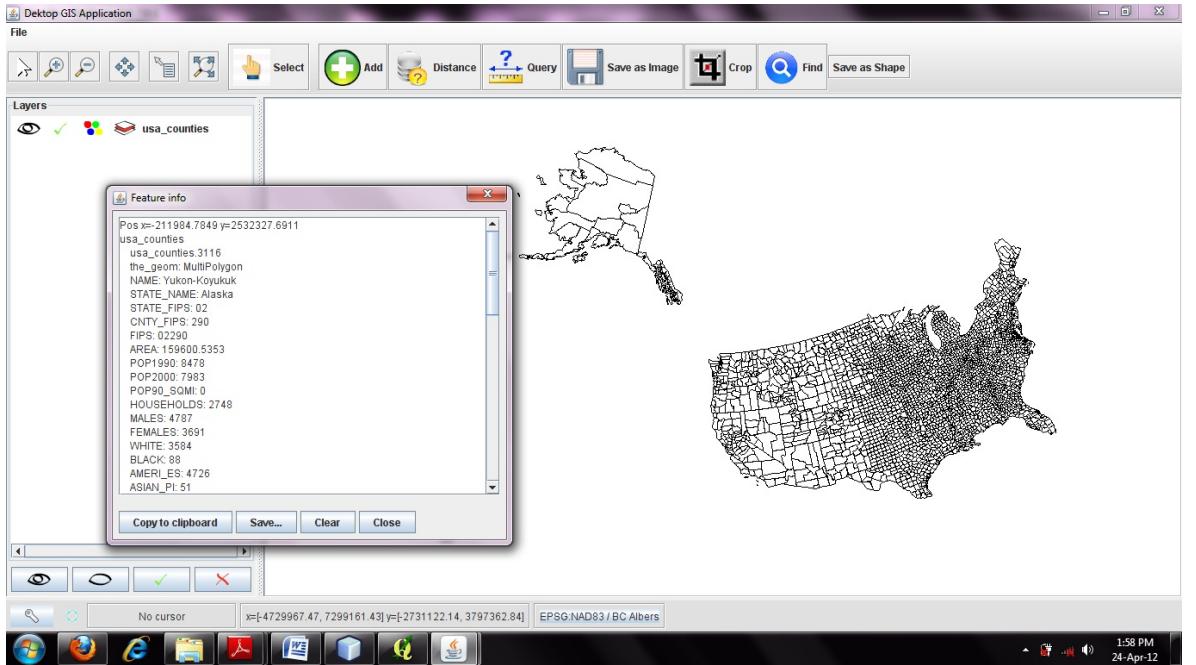


Figure 5.20: Features in selected Layers

Description: Above is outcome of the process when user click on some point in map using feature selection tool in Map. The all attributes entry related to that point is displayed in figure.

Chapter 6

Testing

Sr. No.	Scenario	Expected Result	Obtained Expected Results (True/False)
1	Successfully load the shape file.	The JMapFrame is rendering the Map Properly.	True
2	Successfully render Geo-referenced Raster data.	The JMapFrame is rendering the Image Properly.	True
3	Load non-georeferenced Data.	Nothing is displayed in MapFrame.	True
4	Selecting the feature.	The feature is colored in Map with different color and highlighted.	True
5	Calculate the distance.	The output in kilometers is prompted in screen.	True
6	Fetch the Attribute Table.	The attribute table is displayed on screen.	True
7	Query perform on Attribute.	The desired output according to query is displayed.	True

Sr. No.	Scenario	Expected Result	Obtained Expected Results (True/False)
8	Save the mapframe content as Image.	Prompt for option to save file in local directory and successfully save the file.	True
9	Crop the geotiff image.	Ask for input of cropping parameter and perform according to that.	True
10	Find the feature from Map.	Taking attribute name and its value and search it in table and highlight the area if desired result is got.	True
11	Save as Shape file.	Ability to change CRS of Map and option to save the reprojected shape file.	True

Table I: Test Cases

Chapter 7

Future Enhancement

The application is Desktop GIS application, which user shape file or geo referenced jpg or tiff file. As enhancement geoserver can be included with this project. In computing, GeoServer - an open-source server written in Java - allows users to share and edit geospatial data. Designed for interpretability, it publishes data from any major spatial data source using open standards. GeoServer has evolved to become an easy method of connecting existing information to Virtual Globes such as Google Earth and NASA World Wind as well as to web-based maps such as OpenLayers, Google Maps and Bing Maps. GeoServer functions as the reference implementation of the Open Geospatial Consortium Web Feature Service standard, and also implements the Web Map Service and Web Coverage Service specifications.

GeoServer is the reference implementation of the Open Geospatial Consortium (OGC) Web Feature Service (WFS) and Web Coverage Service (WCS) standards, as well as a high performance certified compliant Web Map Service (WMS). GeoServer forms a core component of the Geospatial Web.

Something like Disaster management system using GIS can be made using this. To do this one need sensor which gives continuous information to us and when any big change in climate happens it notifies us. A natural hazard analyst might like to identify the high-risk areas of annual monsoon-related flooding by looking at rainfall patterns and terrain characteristics.

An urban planner might like to find out about the urban fringe growth in her/his city, and quantify the population growth that some suburbs are witnessing. He/she might also like to understand why it is these suburbs and not others biologist might be interested in the impact of slash-and-burn practices on the populations of amphibian species in the forests of a mountain range to obtain a better understanding of the involved long-term threats to those populations.

A geological engineer might want to identify the best localities for constructing buildings in an area with regular earthquakes by looking at rock formation characteristics

A mining engineer could be interested in determining which prospect copper mines are best fit for future exploration, taking into account parameters such as extent, depth and quality of the ore body, amongst others

A geoinformatics engineer hired by a telecommunication company may want to determine the best sites for the companys relay stations, taking into account various cost factors such as land prices, undulation of the terrain et cetera

A forest manager might want to optimize timber production using data on soil and current tree stand distributions, in the presence of a number of operational constraints, such as the requirement to preserve tree diversity

A hydrological engineer might want to study a number of water quality parameters of different sites in a freshwater lake to improve her/his understanding of the current distribution of *Typha* reed beds, and why it differs so much from that of a decade ago.

Chapter 8

Appendix

8.1 Technology Used

8.1.1 GeoTools

Introduction

GeoTools is an open source (LGPL) Java code library which provides standards compliant methods for the manipulation of geospatial data, for example to implement Geographic Information Systems (GIS). The GeoTools library implements Open Geospatial Consortium (OGC) specifications as they are developed. For an overview of the capabilities of GeoTools please check the User Guide feature list. Current version information:

- 8.0: Development
- 2.7: Stable

GeoTools is used by a number of projects including Web Feature Servers, Web Map Servers, and desktop applications.

Open Source

GeoTools is proud to be one of the original founding projects for the Open Source Geospatial Foundation. The foundation holds the copyright on the library and is a wonderful source of assistance and community spirit for our project. The GeoTools library is made available under the LGPL license. The source code is freely available in a public subversion repository.

Open Development

If your organization is making use of GeoTools you are invited to help set the release schedule. Please contact us on the developers mailing list. GeoTools follows an open development process. Our policies and procedures are documented in the Developers Guide. Both our change proposals and issue tracker are open.

- Starts in 1996
- Lead by Jody Garnett.
- First Stable version 2.0.0
- Latest version 8.0.RC1
- About 343 packages.
- About 4247 Classes.

Code Distribution

- Raster formats and data access
- Arcsde, arcgrid, geotiff, grassraster, gtopo30, image (JPEG, TIFF, GIF, PNG), imageio-ext-gdal, imagemoasaic, imagepyramid, JP2K, matlab
- Database jdbc-ng support

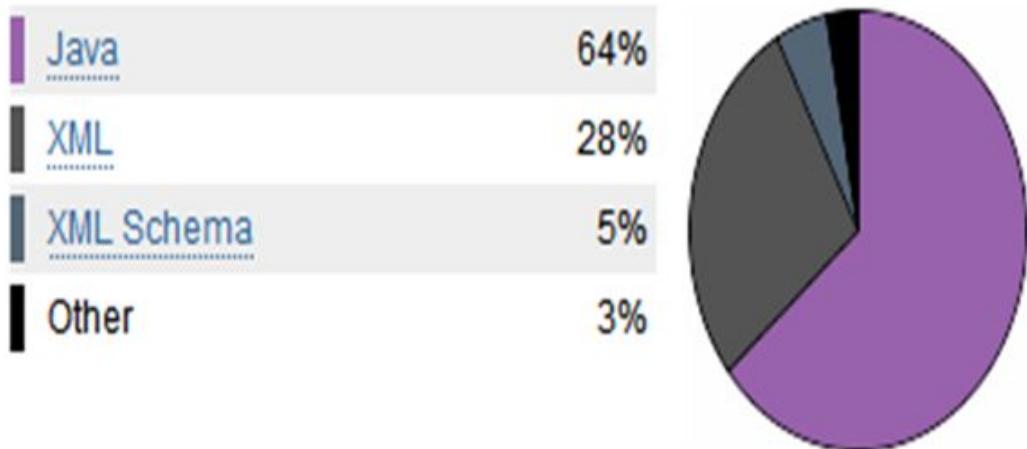


Figure 8.1: Code distribution in Geotools

- Db2, h2, mysql, oracle, postgis, spatialite, sqlserver
- Vector formats and data access
- App-schema, arcsde, csv, dxf, edigeo, excel, geojson, org, property, shapefile, wfs
- XML Bindings
- Java data structures and bindings provided for the following: xsd-core (xml simple types), fes, filter, gml2, gml3, kml, ows, sld, wcs, wfs, wms, wps, vpf.
- Additional Geometry, Filter and Style parser/encoders available for DOM and SAX applications.

8.2 Tools Used

8.2.1 Netbeans 7.0.1

NetBeans IDE 7.0.1 includes the following notable changes:

- Full JDK 7 support: Running NetBeans IDE on top of JDK 7 and support for the final version of the JDK 7 language features
- Integration of the recent patches
- Performance improvements

JDK 7

- Project Coin support
- Editor enhancements: Code completion, hints

WebLogic Server

- Streamlined and faster deployment to WebLogic
- New server runtime node displaying deployed applications and resources
- JSF integration with server libraries

Oracle Database

- Simplified connection wizard
- Guided installation to JDBC driver
- Editing and deployment of stored procedures

GlassFish

- GlassFish 3.1 support
- Domain restart and log viewer for remote GlassFish
- Enable and disable deployed applications

Java

- Maven 3 support
- JUnit 4.8.2 integration and various JUnit improvements
- Remote HTTP URLs supported for Javadoc in libraries and Java platforms
- New improved visual customizer for GridBagLayout

Java EE

- Improved support for CDI, REST services and Java Persistence
- New support for Bean Validation
- Support for JSF component libraries, including bundled PrimeFaces library
- Improved editing for Expression Language in JSF, including code completion, refactoring and hints

Web Languages

- HTML5 editing support
- JSON formatter

PHP

- Generate PhpDoc
- Rename refactoring, Safe Delete Refactoring
- PHP 5.3 - Support for aliases

C/C++

- Easy import of project from user's existing binary
- New Project type where user's source files are located on remote system

NetBeans Platform

- Annotations for generating Action registrations in the layer
- Performance enhancements & tight integration with Profiler
- Additional NetBeans API changes

General

- Word wrap in Editor
- Enhanced Profiler integration
- Less intrusive checking for external changes when switching between the IDE and other programs.

Chapter 9

Summary and Conclusion

9.1 Summary

Summary of activities carried out during major project training at BISAG can be listed as below:

- Initial Learning about the technologies and the tools.
- Requirement Analysis of the project.
- Project Design including GUI related design.
- Project Development (Coding).
- Testing of the project.
- Quality Related Work
- Final Documentation.

9.2 Conclusion

In "Desktop GIS Application" various functionalities of GIS are implemented. Various classes are given in Geotools which is used to make this software. Many classes are

already available in Geotools using which functionalities such as navigation, querying, finding, selection, saving and cropping like functionalities are developed in this project.

Bibliography

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