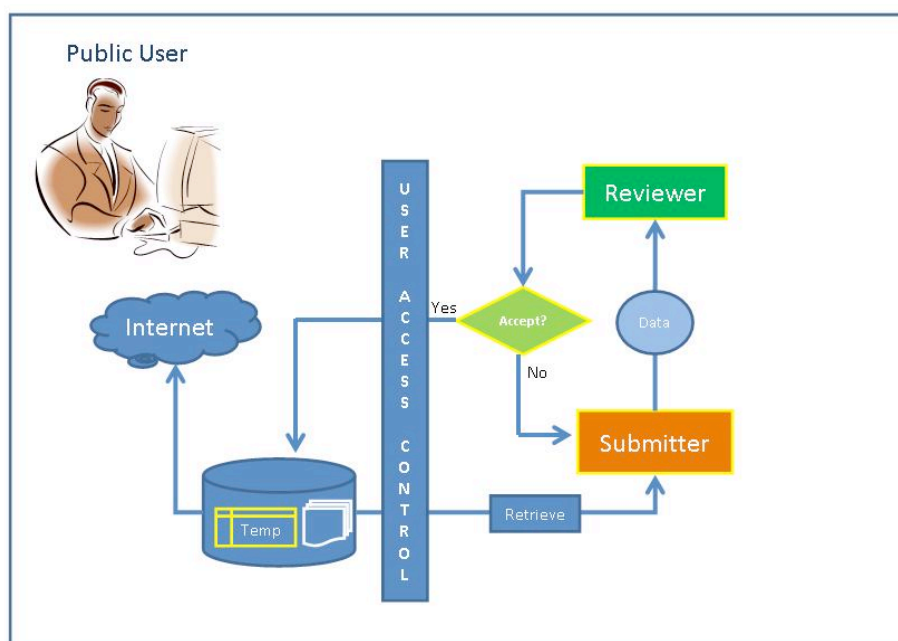


5. WORKFLOW MANAGEMENT

The developed system EASKB uses the open source content management system called Drupal ([2]). A Content Management System - CMS is a tool that enables many user friendly features to create, edit, manage and finally publish a variety of content such as text, graphics, video, and documents etc, whilst being constrained by a centralized set of rules, process and workflows that ensure coherent, validated electronic content. This workflow management module is limited to authorized representatives of member countries and other authorized personal to enter the system for submission of data/information as well as to carry out quality check and validating of the submitted data by authorized personals. The authorized representatives from each country will be provided with username and passwords for data submission, quality verification by approving officer and to web publish the contents. The following Figure 2 depicts the system flow diagram for CMS workflow.

Figure 2: System Flow Diagram for Workflow Management



6. SYSTEM ARCHITECTURE

EASKB application is deployed in internet based windows environment. The architecture coupled with two systems that are Content Management System and Map server(Figure 3). "Content Management System - CMS is a tool that

enables many features even for non technical staff to create, edit, manage and finally publish a variety of content such as text, graphics, video, documents etc, whilst being constrained by a centralized set of rules, process and workflows that ensure coherent, validated electronic content."([3])

The system architecture consists of the following components:

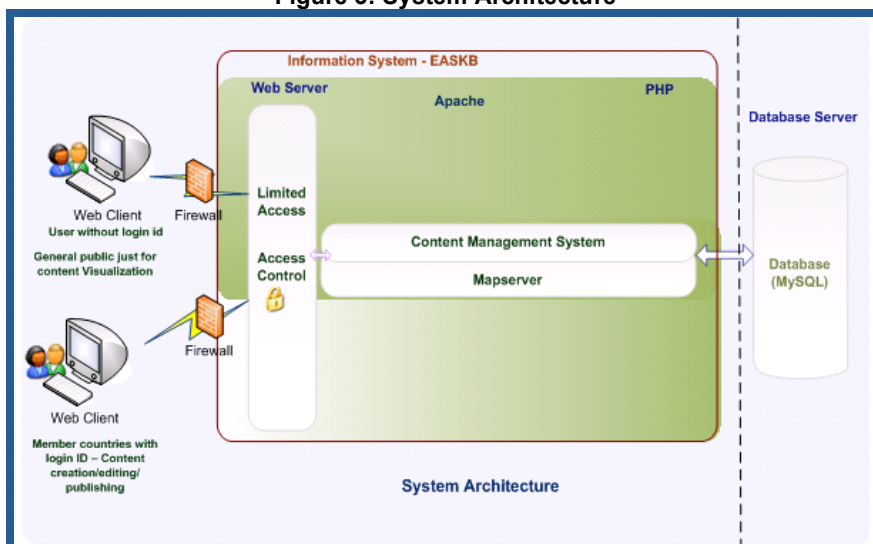
Webserver	-	Apache
Web mapping Server	-	UMN Mapserver
CMS	-	Drupal
RDBMS	-	MySQL
Application Development	-	PHP

MapServer is the most successful open source GIS project surveyed and is developed by the University of Minnesota. This is used to cater/display all GIS related datasets over Internet.

EASKB database is developed using open source RDBMS (Relational Database Management System) called MySQL. The version used for this development is V5.1. MySQL supports several storage engines that act as handlers for different table types.

The application development of the system is developed using PHP and deployed in Apache server environment.

Figure 3: System Architecture



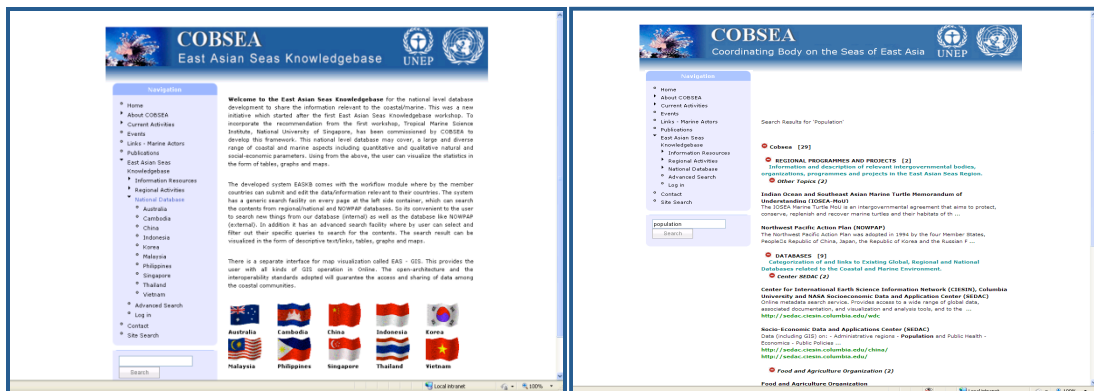
7. SEARCH ENGINE

Search Module is a program that allows users to be able to search for data, and see the search results in the form hyperlinks to documents and or web pages, tables and maps etc. The present development provides the user to have two types of search tools:

- i) Simple Text Search
- ii) Advanced Search

In simple search, the user can search the information by entering free text phrases. The system will search both internal and externally linked databases in the region with permission to access (NOWPAP database) and look for matching keywords using a full text search. The search results containing text and links are grouped hierarchically as well as theme keywords and presented under different topics of the knowledgebase. Advanced search allows the operator/user to filter out their specific queries to search for the contents. Further clustering of these results from the advanced search under each table description is accomplished with the help of the Open Source Document Clustering Search Engine from Carrot² ([1]). This Engine uses different algorithms to cluster the search result. The search results will be grouped under different theme keywords and presented under different topics (Figure 4). If the database contains any numerical information, the search fetches that information and groups it separately under the data statistics category.

Figure 4: Search Results



The results will be presented separately in the form of tabular data, time series graphs and map links. If the fetched results having any time series information, the search result provides the user to select the time period of interest and the user can view the information for the selected period in the form tables and various forms of time series chart. This system also allows users to export the

data in the form of CSV, XLS and PDF file formats. The data statistics information can also be represented in the form of maps provided if there is a geographical reference available for the data. The system developed provide an easy-to-use tools capable to access the vast amounts of data produced by the national and regional level, display and integrate spatial and non-spatial information from different sources, allowing the users to produce easy-to-read outputs in form of maps, graphs, and reports.

8. EAST ASIAN SEAS – GIS

EAS-GIS is a online Geographic Information System (East Asian Seas - GIS) allows to display marine/coastal related data and information on interactive maps using web mapping server called UMN Mapserver ([4]). Map server is an Open Source development environment for constructing spatially enabled Internet – Web applications. The EAS-GIS system link the various marine and coastal initiatives to one another in order to facilitate the process of getting increased levels of scientific information into the marine and coastal decision-making process. The map viewer will display the various thematic layers compiled through map composition and controlled by set of scripts based on the user selection. The datasets for EAS GIS includes the following:

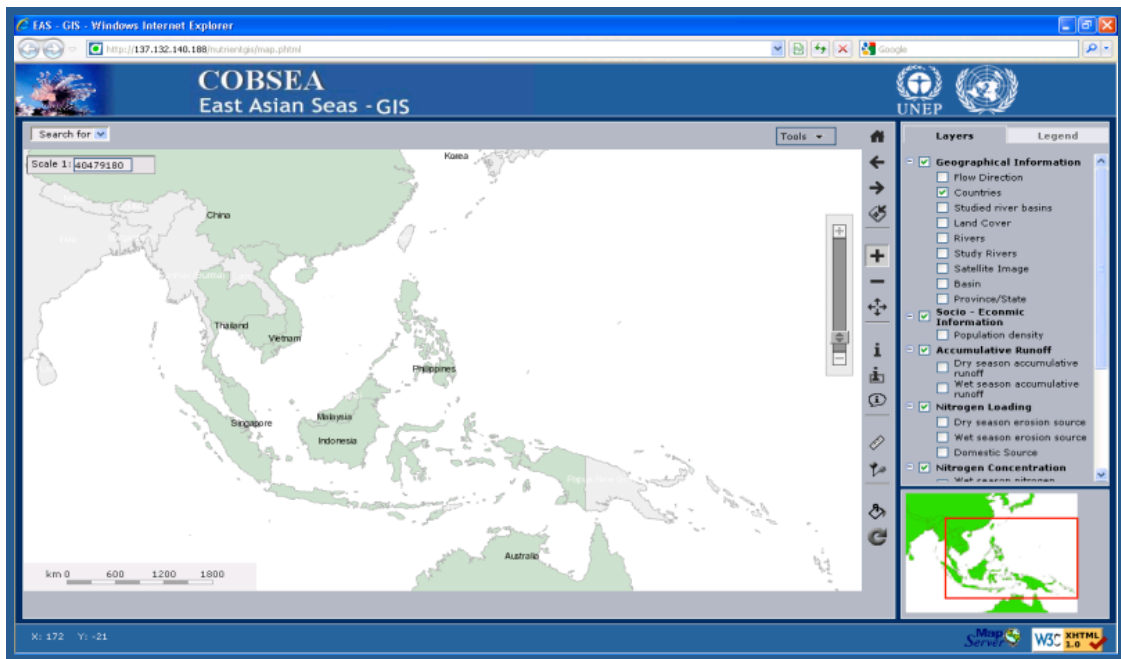
1. COBSEA Country Boundaries
2. Province/State Boundaries for COBSEA countries
3. EAS – Land Cover information
4. EAS Region – Satellite image from NASA's WMS Service
5. EAS Region – Rivers, Basin and River flow direction
6. EAS Region – Population Density map
7. EAS Region Nutrient Information for various season such as Dry and Wet season concentration flow.

To control the thematic layers in map display a set of general GIS tools has been developed. These tools includes such as zoom in, zoom out, zoom to full extent, identify, selection, download and search. The download can download the entire mapview as in Geotiff format. In order to get the basin information quickly, the search configured based on the country level basin information.

The table of contents basically list the thematic layers and their display properties such as legend and symbol properties. The Index map provides the

thumbnail view of the entire East Asian region highlighting the extent (bound box) of the area displayed in the map viewer. The search engine is designed to look for GIS datasets and WMS/WFS map services. The system was also designed to accommodate if a map service available in the form of WMS then the search fetches the layers from the remote service and displays the details within the EASGIS framework (to allow interoperability).

Figure 5: East Asian Seas GIS



9. CONCLUSION

The development was carried out to facilitate user friendly share of information among the coastal communities. The systems make use of latest state of art technology with ease of access to users and retrieve the required information in the form of reports, maps and data statistics. The system allows members of national and regional partners to remotely upload the updates through secured gateway with quality checks. The system also uses Geographic information system for visualizing the data as maps for spatial management purposes. The web portal allows country representatives and regional partners to share their data and information through this web portal which is one - stop shop for the coastal/marine data/information in the EAS Region. The East Asian Seas

knowledgebase needs constant update for the contents as well as some enhancements on the performance and also increase the use of member countries.

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Web-based articles

[1]Carrot² Algorithm - <http://project.carrot2.org/algorithms.html>

[2]Drupal Weblink - <http://drupal.org/>

[3]Drupal Handbooks - <http://drupal.org/handbook>

[4]UMN Mapserver - Open source web GIS server - <http://mapserver.org/>