Web-based Personnel Management Information System for Indian Council of Agricultural Research (ICAR)

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(Received : January, 2004)

SUMMARY

With the increasing population pressure throughout the nation and the concomitant need for increased agricultural production there is a definite need for improved management of the resources as well as of the personnel who are deployed for making it possible through the new agricultural research programs. So management of personnel in any organization is a very important and continuous activity for the managers. This task becomes even more tedious when the organization is spreaded over the whole country and the information is to be collected from each of its branches. This paper describes a web-based Personnel Management Information System for such an organization - The Indian Council of Agricultural Research (ICAR), to improve and fasten the basis for its management related decisions and serve as an online data bank holding the complete personal and professional information of its each employee. This system extends and exploits the advanced information technologies to develop tools for the management of personnel. The information is extracted and processed from a central database with web access. The user interface has been developed without complicated query specifications to the database. Rather, user receives relevant, up-to-date information processed from large amounts of data.

Key words : Database, SQL Server, ICAR, NARS, PERMISNET, Personnel Management.

1. Introduction

Over the last few decades, India has made impressive progress in agriculture which still remains the most vital sector in the Indian economy, contributing about one-third of the national income and about 80 per cent of the rural population earning its living from agriculture and agro-based industries. India has also received worldwide acclaim in the field of agricultural research and education. The National Agricultural Research System (NARS), with the Indian Council of Agricultural Research (ICAR) as an apex body, has been striving for a holistic development of agriculture at the national level by planning, promoting, conducting and coordinating research, extension and

education on all aspects of agriculture including animal sciences and fisheries for ensuring the optimal utilization of land, water, plant and animal genetic resources for sustainable agricultural development. ICAR with its headquarters at New Delhi has a vast network of research institutes spreaded all over India. It has eight divisions distributed under 49 Central Research Institutes with many Regional stations including 5 National Institutes with 4 having Deemed University status, 10 Project Directorates (PD), 5 National Bureaus (NB), 30 National Research Centers (NRC) and over 83 All India Coordinated Research projects (AICRP). The infrastructure hierarchy of ICAR is shown in Fig. 1.1 given below
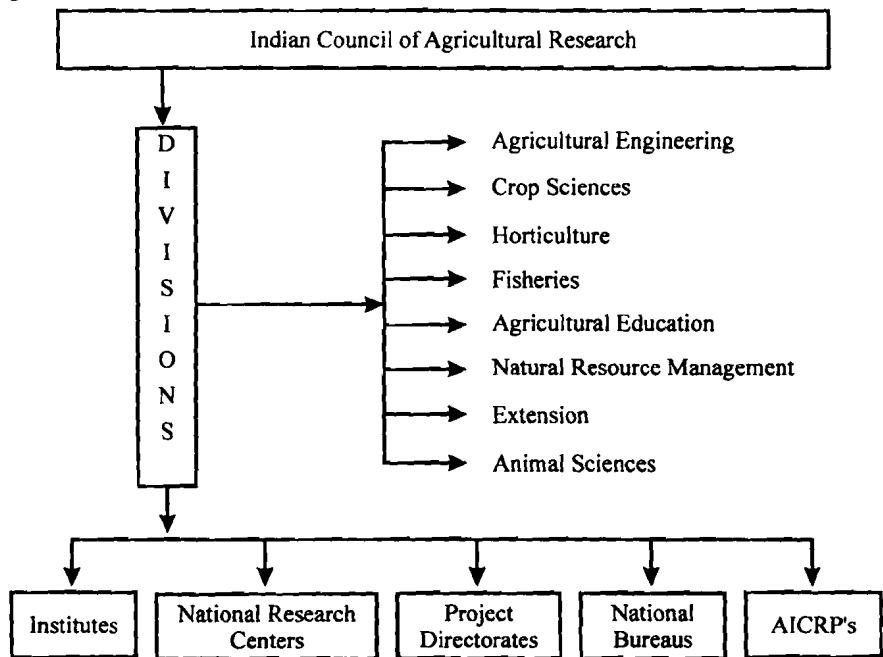

Fig. 1.1

The Indian Council of Agricultural Research is having a knowledge bank of scientists working across 68 disciplines of agricultural sciences. It also has the Technical, Administrative and Finance & Accounts services staff. The effective personnel management of such a vast research infrastructure had always been a formidable challenge to the managers of ICAR. Thus an idea to make a standalone information system was conceived for which the data of the whole organization was collected and stored in an MS-ACCESS- database. This standalone information system could generate the information from this data but the continuous additions and updations in the data was very cumbersome because the data had to be collected again and again from wide and spreaded sources all over India. Also its limited access and slow speed made the system a

very less used system. An obvious solution to get rid of these limitations was to have a central database with a procedure for fast updating of data from the sources and with access to the data through the world wide web. Keeping all the above requirements in mind a web-based information system "Personnel Management Information System Network for ICAR (PERMISNET)" has been designed with the objective to develop a system with the following properties.

2. System Properties of PERMISNET

User Friendly: It is technically easy and fast to access the system on web. Even the users with limited technical skills and interests can very easily access the system.

Interactive: The system is interactive in the manner that after receiving the input attributes from the user, it automatically creates the view for that input at run-time and gives the results appropriately.

Up-to-date: The system contains methods of searching and fast updating the data to ensure an efficient and up-to-date dissemination of information from the sources to the end-users.

Comprehensive: It contains all the available data of relevance and can generate all the useful information based on this data, required for a general user as well as the information required for making the projections and taking decisions by the ICAR managers and the Agricultural System Advisors.

Accessibility: The system can run on the standard browsers from any node defined on the network.

3. PERMISNET User Group

Keeping in view of the user requirements this web-based system is targeted towards three primary user groups: the ICAR managers, the Agricultural System Advisors and the ICAR & other Agricultural Research Organizations (Scientific, Technical and Administrative staff). It is necessary that the system not only gives easy access to generally applicable information, but also to detailed information for ICAR managers. So the system has been developed in close contact with the main target groups.

4. Design of PERMISNET

PERMISNET has the 3-tier architecture as depicted in Fig. 1.2, where the tasks of the system have been divided between three distributed tiers.
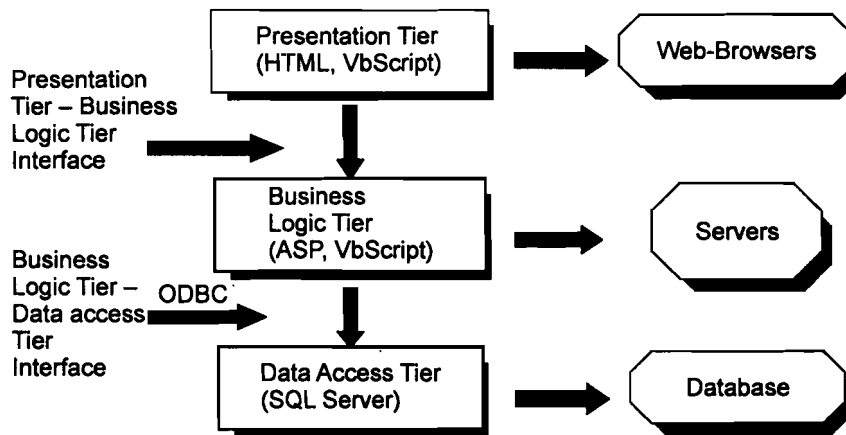
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Presentation
Tier – Business          ┌─────────────────────┐
Logic Tier               │ Presentation Tier   │ ═══►  ( Web-Browsers )
Interface  ═══►          │ (HTML, VbScript)    │
                         └─────────────────────┘
                                   │
                                   ▼
Business                 ┌─────────────────────┐
Logic Tier –  ODBC       │ Business            │
Data access ═══►         │ Logic Tier          │ ──►  ( Servers )
Tier                     │ (ASP, VbScript)     │
Interface                └─────────────────────┘
                                   │
                                   ▼
                         ┌─────────────────────┐
                         │ Data Access Tier    │ ──►  ( Database )
                         │ (SQL Server)        │
                         └─────────────────────┘
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Fig. 1.2

1. The Presentation tier: The task of the presentation tier is to ensure that the system is user-friendly. This has been implemented using the Hyper Text Markup Language (HTML), VbScript and the JavaScript. The presentation tier has been developed using the user-friendly menus, submenus and the Search facility which makes the information retrieval, data updating and information search very easy and quick.

2. The Data Access tier: It consists of the database. The task of this tier is to store the data in an organized and structured way and to enable the retrieval of specified data by multiple, simultaneous users. This tier has been implemented using the Microsoft SQL Server for fast and robust performance with multiple users. The structure used for storing the data was the relational, normalized structure which is considered as the best way of storing the data. Several queries have been designed to extract specific information from tables, needed for generating different reports.

It contains 37 relational structures (tables) for storing different attributes of approx. 30,000 personnel. For collecting the data of all the personnel of ICAR different Questionnaires have been designed for three different service types of ICAR. This data has been entered and the system is being tested on this data.

3. The Business Logic tier: It consists of a set of scripts on the web server which can mediate the communication between the data access tier and the presentation tier. The server side scripting in PERMISNET is done by ASP (Active Server Pages), where the normal HTML code is combined with programming code to obtain the dynamic web-pages. This tier encapsulates the entire interaction with the database and hides the details from the Presentation tier. Business logic tier also ensures that the rules for presentation of data are obeyed. ASP scripts of this tier extract data for different personal and professional attributes and send them to the presentation tier as data tables in HTML format.

5. System Description

The system is mainly divided into two dynamic modules

- Data Management module
- Management Reports module

1. Data Management Module

This module is meant only for the authorized users of PERMISNET. There are two kinds of authorized users of this system. First being the Data Base Administrator (DBA) who is the person responsible for taking any decision for any kind of addition, updating of data in the system including the database. Secondly there is a super-user, one from each ICAR institute who is authorized for adding/updating the data of every personnel of his institute after crossing the security level provided by the DBA.

The following Data entry/Updating tasks can be accomplished through this module:

- Add new Institute information (For adding the information for a new Institute)
- Update Master Tables (For adding/updating the data of the master tables like - Designation, State, Salary Scales, Disciplines etc.)
- Change of Institute in case of Transfer
- Add new Personnel Information
- Update Personnel Information
- Add/Update Cadre Strength for Institute

Fig. 1.3

The super-user is authorized to perform the last three tasks but the Database administrator is authorized to perform all of the above tasks. For adding or updating data in the database, data entry/updating forms are used. These are the online forms used for entering new data or modifying the existing data in the database. The structure of the data entry/updating forms when the user wants to enter the qualification details of an employee is shown in the screen Fig. 1.3.

The Add, Update, Delete, Save, Cancel and Next Form buttons along with the four browsing buttons: First, Previous, Next and Last have been provided with each Data Entry/Updating form which makes all the Database Management tasks very simple and fast. The data has been collected from all the employees of ICAR on the following Personal and Professional attributes: All the Personal attributes, Annual Information (Whether Annual Confidential Report filled and Leave Travel Concession availed for the academic year), Relatives information (including whether any relative is posted in ICAR), Qualification details, Experience details, Trainings imparted, Specialization details, Details of all visits abroad along with the purpose, Deputation details (If he/she had been deputed to some other institute), Bond details, Leave details (for Ph.D./ Sabbatical), Project details, Publication details, Patent details, Awards received, membership of Professional Societies, Languages Known to the person.

2. Management Reports Module

This is the output module of PERMISNET meant for the user group of the system. This is the most user-friendly part of the system. The information can be generated in the form of reports on the following five levels

- Individual Level
- Institutional Level
- Divisional Level
- ICAR Level
- User Customized

Based on the above levels of information the following reports are generated

2.1 Individual Level Reports: Using this sub-module user can generate two types of reports for any individual of any service type (Scientific, Technical, Administrative etc.). These are

- Brief Biodata
- Detailed Biodata

It first takes the user to a search form to search for the individual in the PERMISNET database whose Bio-Data's he wants to see . Here the search can be done on any or all of the following criterion : First Name, Last Name, Institute Name, Service Type and Designation. It can work even if the first alphabet of the First Name has been provided by the user. But the search can be narrowed down and fastened by specifying more search criterion.

2.2 Institute Level Reports: This module generates a variety of reports for any institute. For generating the reports, first the user has to select an option from the Institute Type list-box, like the Research Institute or NRC or PD etc. Then based on the chosen Institute Type, a dropdown list of institutes will be displayed in the Institute Name list-box. After choosing the institute name the user has to select the service type (Scientific, Technical, Administrative or All) for which he wants to generate the reports. After selecting these three options user can select and generate any report from the following list

- The cadre strength Existing, Sanctioned and the Gap (it gives a complete picture of the number of employees in an institute and the vacant posts for each service type and each designation)
- Personnel List - it enlists all the employees with each name hyper linked to the bio-data of that person
- Personnel - who have visited abroad
- Personnel - on deputation from the institute
- Personnel - of reserved category
- Personnel - gender wise
- Personnel - under the probation period
- Personnel - retiring between some period or on a particular date
- Personnel - whose promotion is due
- Personnel - retired now.(It makes a data-bank of retired employees)
- Ratio of Personnel (Scientist : Technical : Administrative : Supporting Staff)

2.3 Divisional Level Reports: This module generates a variety of similar reports for a Division which displays the consolidated data of all the institutes coming under that division.

2.4 ICAR Level Reports: These are the consolidated reports of the whole council (These gives a complete picture of the whole ICAR). Along with the cadre strength reports other different reports that a user can generate are the following

- Director's list in the council (gives the details like – address, phone- no, Email-id's etc.)
- Institutes falling under difficult areas
- Personnel worked/working in difficult areas
- Institutes falling in different Agro-Ecological Regions
- No. of reserved category personnel in the council
- Institutional structure of the Council
- Addresses of all the institutes (gives the list and addresses of institutes falling under different Institute Types like-Research Institute, NRC, PD, AICRP etc.)

2.5 User-Customized Reports : These are the reports generated at run time after a user has specified some attributes of his own interest. After specifying the

Division or the Agroclimatic Zone under which the institute falls and then specifying any of the following criterion : Service Type, Designation, Discipline, Purpose of visit Abroad, Award, Commodity, Area of Specialization. Based on the criterion specified, a report will be generated enlisting the personnel along with their designations, with each name hyper linked to the bio-data of that personnel. For example if somebody selects the following attributes – Agricultural Engineering as the Division Name, Indian Agricultural Statistics Research Institute as the Institute Name, The Service Type – Scientist and Workshop as the Purpose of Visit Abroad from the Fig. 1.4

Output Report

Fig. 1.4

6. Discussion

PERMISNET has been designed for the Indian Council of Agricultural Research (ICAR) with the main objective of management of its personnel through the latest information provided by the system. It was also presumed that the system should have the properties of comprehensiveness, up-to-date,

interactive and user-friendly. With respect to the first property, PERMISNET contains all the available data of relevance and can generate various reports based on this data. So the system is comprehensive. With respect to the second property, the procedures for on-line updation of data are incorporated and have been tested. To avoid a possible conflict between these properties, PERMISNET reports have been designed in such a way that the scientific/technical/administrative staff of ICAR or of other agricultural organizations will mostly use separate report modules for their purpose (Individual Reports/User-Customized Reports) and the managers and the agricultural research advisors will use separate report modules (Institutional Reports/Divisional Reports/ICAR Reports) for their purpose. The system has been developed at IASRI, New Delhi, presently the system is available at IASRI home page http://www.iasri.res.in with the hyperlink PERMISNET. The system can be browsed throughout the world using an internet enabled PC. Data Base Administrator at IASRI will be responsible for the overall maintenance of the data base. Keeping security and quality of data into consideration, a nodal officer has been identified at each institute who will be the authorized user to access the system. All important and confidential information can be viewed, entered and updated by the nodal officers only.

7. Conclusions

PERMISNET contains almost all relevant data on personal and professional attributes of the employees of ICAR. Being web-based, the system facilitates a more efficient dissemination of data than was previously possible. It uses well-known hypertext technology to allow users to extract and view data interactively in a user-friendly way. PERMISNET has been designed and developed with the presumed objective of making a web-based personnel management information system for ICAR with on-line data entry / updation facilities, search facilities, a variety of detailed and consolidated reports at four levels of information (Individual, Institutional, Divisional and ICAR level) and to provide an overview of data available on the prescribed attributes chosen online by the user. These reports should be able to serve different information needs of different user groups. These all objectives have been fully taken care of while designing the system and have been achieved successfully.

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