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Design and Realization of Geographic Information System for Plant Specimens

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Abstract. The thesis research work is based on adopting the combination of theory and technology research. For the unique characteristics of bambusoideae in yunnan province, analyses the characteristics, value and the present situation of resources of bambusoideae plant resources in yunnan province. According to the system requirements of the specimen of bambusoideae in Yunnan province, by Microsoft. Net framework platform, a collection of Web services and ASP.NET technology, based on the data of Microsoft SQL Server2008 and ADO.NET technology support, selecting desktop GIS Arc GIS platform (Arc GIS Desktop) and server (Arc GIS Server) as a system of GIS secondary development of GIS, and using developed tools of Microsoft Visual Studio 2010 Visual, Finally, the information system of plant specimen which based on GIS integration development of bambusoideae is finished .

Introduction

The digital plant specimens has characteristics with digitalization of collections, computerization of operations, network transferring, resource sharing.Plant specimens is an important source of information for plant specimens. As a basic mean of preservating plants resources and information. Plant specimens is the important treasure of the plant specimen information resource. Plant specimens are the important plant specimen resources protector and disseminator of the plant specimen resources. Due to the huge cost of reading the specimen directly. A large number of specimens information has not been fully effective developed and used.In general, under the

background of the current forestry informationization, it can optimizae the use of the date samples by constructing plant specimen information system of bambusoideae , making sure the the management of information and plant specimen of bambusoideae in Yunnan province is didigitalization and systematization, provding date support for the research in plant science and a new research method of plant habitats and species distribution, at the same time, it also provides research thought and technical support for the development of agriculture and forestry informationization in the level of technical.

1.Functions and Implementation Technologies

Plant specimens database information system is based on underlying support, combined with the desktop GIS (Arc GIS Desktop) Map Maker and server GIS (Arc GIS Server) map publishing,integrated enterprise application development framework .NET integrated secondary development system, based on yunnan bambusoideae specimens of constructing the overall design of information systems and key technologies in the system building process, the main use of operating systems, servers, software, statistics shown in the following table.

Table1. Operating System,Server,The Statistics Software

Number	Category	Name	Model / Version	Major Function
101	Operating System	Windows 7	Flagship Version	Support System
201	Server	IIS	Win 7	Web service
301	Platform	.NET Framework	3.5	programming model
401	Software	Microsoft SQL Server	2008	Database service
402	Software	Arc GIS Desktop	10.0	Map making
403	Software	Arc GIS Server	10.0	Map Publishing
404	Software	Microsoft Visual Studio	10.0	System construction
405	Software	SPSS	18.0	Statistical Analysis
501	Language	C#		System development

Shown in the above table,yunnan bambusoideae specimen information system set up process, based on a variety of software and servers, based on this sample bambusoideae yunnan Information technology road system function as shown below.

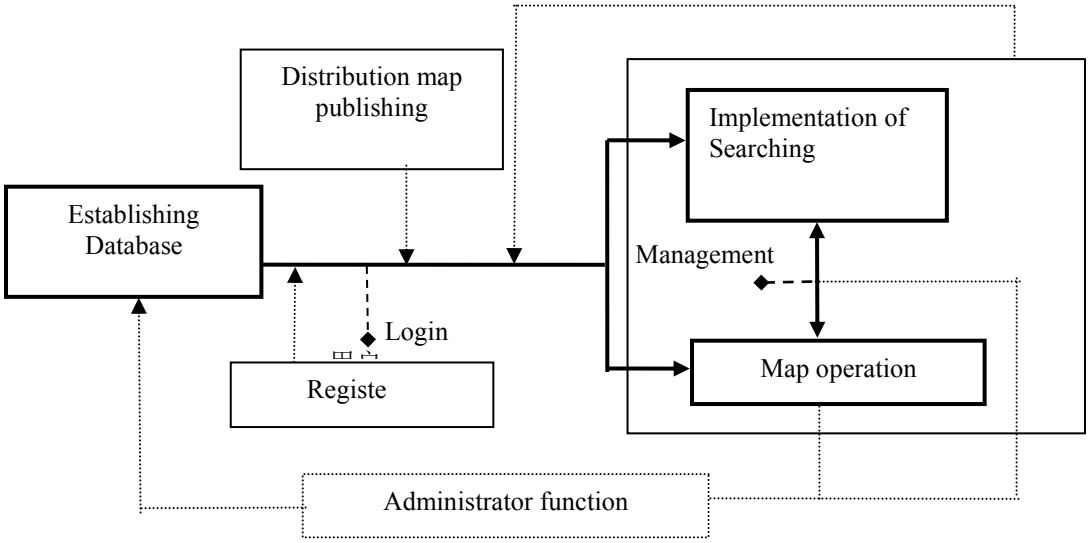

Fig.1 The system function realization technology

In this system, the main achievement specimen information query and management, information inquiry and management of bamboo species, bamboo genera information query and management, plant distribution and habitat information query management, the distribution of bamboo species in the county city map publishing operations and specimens in the county distribution map publishing operations and other functions.

2.Logic Structure Design of the Database

Plant specimens information system uses Microsoft SQL Server 2008 as the database system, the first to build a database named "ZYK", were constructed in the database "ZYK" in the present Soviet database required data tables, respectively member table (CY), administrators table (GLY), specimen information table (BBXX), bamboo subfamily information table (SXX), Bambusoideae species information table (ZXX) and Bambusoideae habitat information table (SJXX), bamboo resource table (ZLZY). This article lists only a representative of the four tables.

(1) The specimen information table (BBXX)

Plant specimens information table including number, specimens and name and Human collection sequential, acquisition time, latitude, altitude and other related information. The information in the collection and preservation of some records have no record, so some field constraints can be empty. As shown in the following table:

Table 2. Specimen information table (BBXX) table structure

Column name	Field name	Data type	Allow null	Company	Primary key
BH	Number	int	NO	Arabic numerals	

BBBH	Specimens	int	NO	Arabic numerals	Y
BBMC	Name	navrchar(50)	YES	Chinese	
CJR	Human	navrchar(50)	YES		
CJH	Sequential	int	YES	Arabic numerals	
CJRQ	Date	datetime	YES	Day	
CAJD	Longitude	navrchar(50)	YES	Coordinates	
CAWD	Latitude	navrchar(50)	YES	Coordinates	
CJD	Land	navrchar(50)	YES		
HB	Altitude	navrchar(50)	YES	Meter	
BBTP	Pictures	Image	YES		

(2) Bambusoideae belongs to the information table (SXX)

Bambusoideae is a table information table includes a number of genera, the bamboo name and the basic information, shown in the following table

Table 3. Bambusoideae belongs to the information table (SXX) structure

Column name	Field name	Data type	Allow null	Company	Primary key
BH	Number	int	NO	Arabic numerals	
SH	Bamboo	int	NO	Arabic numerals	Y
SM	Name	navrchar(50)	YES	Chinese	
ZYZ	Species	navrchar(50)	YES		
SFBD	Distribution	navrchar(50)	YES	County	
SZP	Pictures	Image	YES		

(3) Bambusoideae information table (ZXX)

An information table including Bambusoideae species, genus, species number, name and other basic information, shown in the following table.

Table 4. Bambusoideae information table (ZXX) structure

Column name	Field name	Data type	Allow null	Company	Primary key
BH	Number	int	NO	Arabic numerals	
ZH	Species	int	NO	Arabic numerals	Y
ZM	Name	navrchar(50)	YES	Chinese	
ZXX	Information	navrchar(50)	YES		
ZFBD	Distribution	navrchar(50)	YES	County	
ZZP	Pictures	image	YES		
SH	Attribute number	navrchar(50)	YES	Arabic numerals	
SM	Name number	navrchar(50)	YES	Chinese	

(4) Bambusoideae species habitat information table (SJXX)

Bambusoideae habitats include information table, belonging to the genus, species number, species and habitat specific information, as shown in the following table.

Table 5. Bamboo species habitat information table (SJXX)

Column name	Field name	Data type	Allow null	Company	Primary key
BBBH	Number	int	NO	Arabic numerals	Y
BBMC	Name	navrchar(50)	NO	Chinese	
HB	Altitude	int	YES	Meter	
JDZDQY	Extreme min air pressure	int	YES	mmHg	
JDZGQY	Extreme pressure	int	YES	mmHg	
JDZDQW	Extreme min temperature	int	YES	0.1 ℃	

JDZGQW	Extreme max temperature	int	YES	0.1 ℃
JSL	Precipitation	int	YES	0.1 mm
PJQW	Average temperature	int	YES	0.1℃
PJQY	Average water vapor pressure	int	YES	mm Hg
PJXDSD	Relative humidity	int	YES	1%
PJZDQW	The average min temperature	int	YES	0.1℃
PJZGQW	The average max temperature	int	YES	0.1℃
RJSL	Daily precipitation>=0.1mm	int	YES	Day
RZSS	Sunshine hours	int	YES	0.1Hour
ZXXDSD	Minimum relative humidity	int	YES	1%

Logical data model of the underlying database is that users can access data through DBMS, logical data model Spatial Database users now see the world through GIS geospatial, logical database design will generally produce the conceptual design stage ER model or UML model according to the conversion rules into specific DBMS database logic can be handled, that is implemented in the database structure of the table in the actual project, determine the table's primary key, foreign key, and each field in order to meet user requirements.

3.The system map publishing and operating functions

Map publishing and operating systems to achieve by means of a desktop GIS Arc GIS platform under (Arc GIS Desktop) and server-side GIS (Arc GIS Server) as the support, while a collection of ASP.NET under Microsoft .NET technology using Microsoft Visual Studio 2010 visual development tools a map for secondary development, and ultimately the system map publishing and operation of specific business processes shown below.

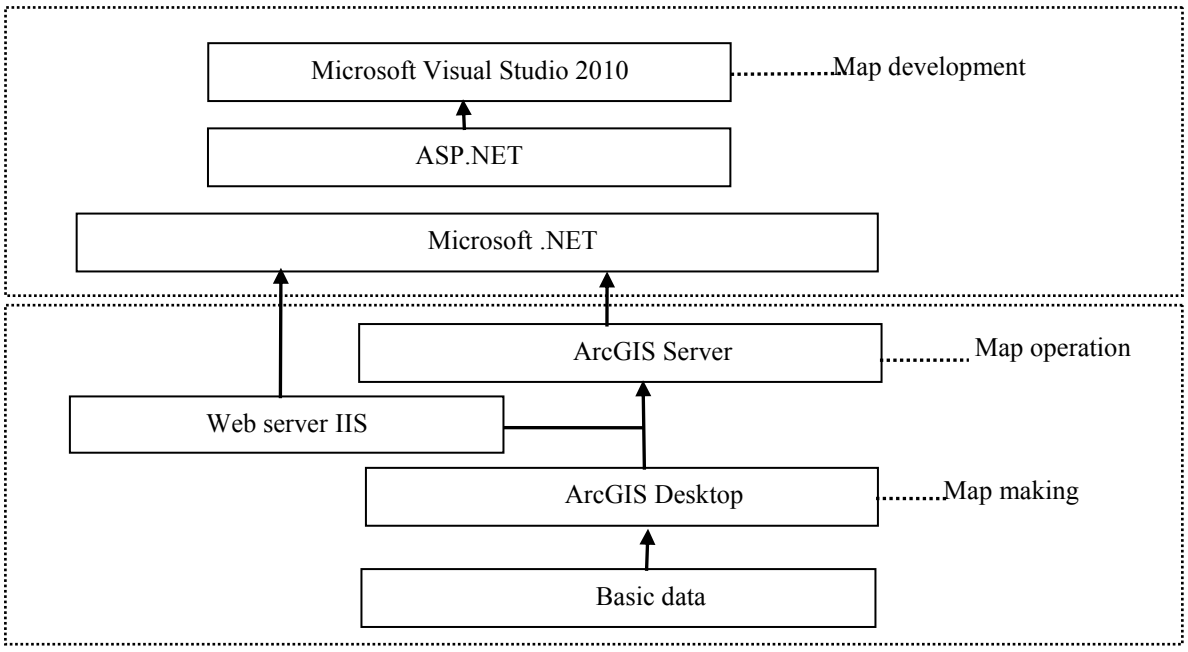

Fig.2 The system map publishing and operating the business flow chart

Follow the online official offers to help install Arc GIS Server and Arc GIS Desktop, run the Arc GIS Desktop after installation using Arc Map realize yunnan bambusoideae geographical distribution map

of the geographical distribution of production and plant specimens yunnan bambusoideae map maker. Based yunnan bambusoideae statistics in Arc Map on species where bambusoideae prefecture graded display.

Fig.3 Hawkeye effect diagram

Province Bambusoideae plants specimen geographical distribution map making. Bambusoideae in Yunnan Province Based on the statistical data classification is displayed in the Arc Map on the bamboo species in the county.The system achieve the variety interactive query of data samples of bambusoideae in yunnan province. It can query the collectted date, Bamboo species, genus and the name of the habitat information query consistency, it can query the basic information and distribution of common habitat, distribution map, distribution to the digital access to information and bamboo resources which reflect the species. It also implements the map publishing and operations of the bambusoideae plant species in yunnan province state county, based on the date implements the map publishing and operation of the bambusoideae plant species in yunnan province.（Visualizing map zoom, moving around, full range of mobile, roaming and recovery, attribute query, hawkeye, magnifying glass (2-10times), coordinates, query, coordinate orientation, than column foot, specimens of distance measurement, etc）.

4.Conclusion

According to key technologies and system architecture to build the overall design to determine the technical line of system function. First, the system user role management features in accordance with the technical line during the business registration process and log on business processes elaborated; according to system requirements analysis elaborate system query manage business processes, the

main control system query management process used and inquiries management settings to analyze, test management and related inquiries; Finally, according to the published map and operating functional requirements, a more comprehensive analysis of the system map publishing business processes and operations, and details of each of the operating functions to be tested.

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