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PRELIMINARY DEVELOPMENT OF A MODEL FOR INSECTS INFORMATION SYSTEM

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ABSTRACT

This paper discussed the development of a model for insect information system. The information system is developed using the Microsoft Access 2000 as the database and Microsoft Visual Basic 6.0 for the interface. The database was developed using Relational Database Management System (RDBMS) model. The database comprises 3 major fields which are collection specimen, specimen and species. There are 14 attributes for collection specimen namely country, island, state, district, locality, longitude, latitude, date, altitude, habitat, sex, collector/s, source locality, specimen identification; 17 attributes for specimen namely specimen identification, cabinet number, species identification, repository, collection event, identified by, literature cited, modification date, sound, image, DNA fingerprint, host, host plant, parasitoid, pest, pesticide and vector; and 10 attributes for species namely species identification, class, order, family, subfamily, tribe, genus, species, subspecies and authority. The system capable runs several functions such as inventory, search, loan, report and user's information record. This system will facilitate the researchers to access and retrieving insect diversity information in Malaysia. This system will be upgraded for Internet and online processing and become Malaysian Insects Online (MIOL).

Keywords: *Insects Information system, biodiversity and Malaysian Insects Online (MIOL)*

INTRODUCTION

A systematic management approach towards managing the biological diversity especially small creature like insects is important for researcher. Without a systematic management information system focus on the Malaysian insects will lead to difficulty of recording and accessing latest research finding. With the crucial need, we decided to make a research on the insect diversity and develop an Insect Information System. We began by constructing a stand-alone application by using software MS Access 2000 and MS Visual Basic 6.0. This system will be upgraded to be a web-based application using client-server architecture. The system will be accessed easily from elsewhere and online. A standard insects information had been suggested by Muzamil et al. (2000)(1). The system will be suggested to be a model of Insect Information System and hopefully it's applicable for all institutions in Malaysia for manage the biodiversity information especially insects and the world as whole.

MATERIALS AND METHODS

We used a technique called the systems development life cycle (SDLC) to plan and manage the systems development process. The SDLC includes the following steps: systems planning, systems analysis, systems design, systems implementation, and systems operation and support (2).

Systems planning: The purpose of the planning phase is to identify clearly the nature and scope of the business opportunity and problem by performing a preliminary investigation, often called a feasibility study. Therefore, the scope of this project is to develop a model for insect information system of UiTM Cawangan Pahang. This system is able to manage insect inventory and information about insect specifically at UiTM Cawangan Pahang. This system could overcome the problems in managing the insect inventory. The end product is a report that describes business considerations, reviews anticipated benefits and costs, and recommends a course of action based on economic, technical, and operational factors.

Systems analysis: The purpose of this phase is to understand business requirements and build a logical model of the new system. The first step is requirement modeling where involves various fact-finding techniques, such as interviews and observation. Next step, we constructed process modeling and data modeling where we developed a logical model of business process the system must support. The end product for this phase is the system requirements document where describes management and user requirements, alternative plans and costs, and our recommendation. Below is the context diagram as a general view of the process modeling that describe the boundaries of the system .

Figure 1. The Context Diagram represents the logical model of Insect Information System
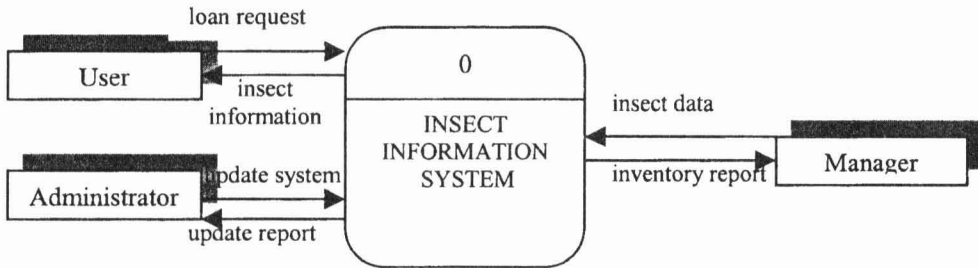
Systems design: The purpose of this phase is to create a blueprint for the new system that will satisfy all documented requirements. During systems design, we identify all necessary outputs, inputs, interfaces, and processes. In addition, we design internal and external controls, including computer-based and manual features to guarantee that the system will be reliable, accurate, maintainable, and secure. The system uses Relational Database because it is a flexible and powerful database model. A relational database use common fields, which are attributes that appear in more than one table, to establish relationships between the tables and form an overall data structure. Below is an entity relationship diagram for the system.

Figure 2. Entity Relationship Diagram
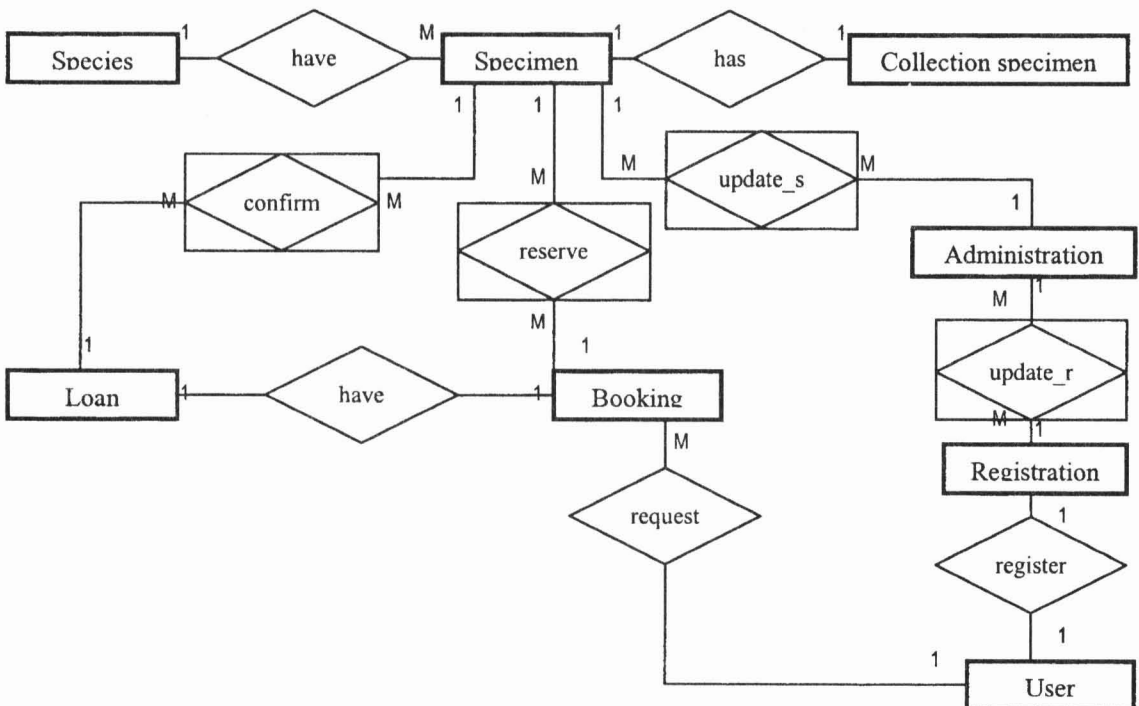
The attributes for the above entity relationship diagram are as follows:

COLLECTION_SPECIMEN (coll_specimen_id, country, island, state, district, locality, longitude, latitude, date, altitude, habitat, sex, collector/s, source locality)

SPECIMEN (specimen_id, species_id, cabinet_number, repository, collection_event, identified_by, literature_cited, modification_date, sound, image, DNA_fingerprint, host, host plant, parasitoid, pest, pesticide, vector)

SPECIES (species_id, class, order, family, subfamily, tribe, genus, species, subspecies, authority)

ADMINISTRATION (admin_id, employ_no, name, position, address, phone)

USER (user_id, name, institution, address, status, phone, fax, email, password)

LOAN (loan_id, user_id, admin_id)

CONFIRM (user_id, loan_id, speciemen_id, date, time, date_due)

BOOKING (user_id, booking_id, date, time)

RESERVE (user_id, booking_id, speciemen_id, date, time, date_collection)

UPDATE_R (admin_id, register_id, update_date, update_time)

UPDATE_S (admin_id, specimen_id, update_date, update_time)

REGISTRATION (register_id, register_date, password)

Systems implementation: During this phase, we constructed the system. We wrote the programs, tested, and documented, and the system is installed.

Modules: The system consists of three main modules: Inventory, Search and Loan. The system will give the users the flexibility to obtain the required information about Malaysian insects diversity.

The Inventory module is able to store and manage all information about insects, users, and clients. The Search module allows user to search all data and information in the database. It allows a fast access for the information requested. The Loan Module allows user to make reservation and borrow the available specimens stored in the organization. The system will record the detail particulars of the borrowers and automatically update the inventory in database. The system will display a warning screen if there is any specimen on loan is over due. There are also several data controls in ensuring data accuracy, quality and security. The system is providing user level to permit only few or all functions could be used by users.

Systems operation and support: During this phase, we maintain and enhance the system. A well-designed system is very important because the system will be reliable, maintainable, and scalable which can expand to meet new business requirements and volumes.

RESULTS AND DISCUSSION

Normalization of ERD: Result of our research, we found that all entities involve in the database are as follows.

SPECIES

species_id	class	order	family	subfamily	tribe	genus	species	subspecies	authority
I001	Insecta	Orthoptera	Tettigoniidae	Pseudophyllinae	Pseudophyllini	Cratioma	dilatatum	NA	Karny
I002	Insecta	Orthoptera	Tettigoniidae	Pseudophyllinae	Pseudophyllini	Cratioma	superbum	NA	Rehn
I003	Insecta	Orthoptera	Tettigoniidae	Pseudophyllinae	Pseudophyllini	Clima-coptera	parallela	NA	Walker

SPECIMEN

Specimen_id	Species_id	cabinet_number	repository	Collection_event	Identified_by	Literature_cited	Modification_date	sound
SP001	I001	NA	BNHM	Available	Muzamil	Karny, 1923,1926	NA	NA
SP002	I001	NA	FRIM	Available	Muzamil	Karny, 1923,1926	NA	NA
SP003	I003	NA	UKM	Available	Muzamil	Walker 1869	1924	NA

Image	dna_fingerprint	Host	host_plant	parasitoid	pest	pesticide	vector
NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA

COLLECTION SPECIMEN

Coll_specimen_id	country	island	state	district	locality	longitude
CS001	Malaysia	-	Selangor	Hulu Langat	Bukit Kutu	NA
CS002	Malaysia	-	Selangor	Gombak	Kepong	101.38
CS003	Malaysia	-	Perlis	-	Wang Kelian	NA

latitude	date	altitude	habitat	sex	collector/s	source_locality
NA	1920-1925	NA	NA	female	H.R. Anderson	-
3.13	18.x.1989	NA	NA	female	Saimas	-
NA	25-30.xi.1996	NA	NA	female	Muzamil	-

ADMINISTRATOR

admin_id	employ_no	name	address	phone
A001	163112	Mohamad bin Abdullah	No 3 Jln Bahagia, Taman Desa Jaya, 26400 Bandar Jengka, Pahang	09-4661325
A002	165324	Ali bin Razak	B-52 Jln ¾, Taman Indah, Desa Perintis, 26400 Bandar Jengka, Pahang	09-4662586
A003	168745	Rohani bt Hamzah	No 11, Jln Damai, Taman Desa Jaya, 26400 Bandar Jengka, Pahang	09-4661456

USER

user_id	name	institution	address	phone	fax	email	password	status
001	Zaki bin Idrus	UiTM	Dungun, Terengganu	09-8965705	-	zaki@hotmail.com	598722	Student
002	Noor bt Selamat	UKM	Bangi, Selangor	03-87333256	03-87333200	noor@ukm.edu.my	598765	Lecturer
003	Hanita Jusuh	UKM	Bangi, Selangor	03-87356154	-	ita@yahoo.com	582146	Researcher

BOOKING

booking_id	user_id	date	time
B001	001	3/3/02	4:30PM
B002	002	25/3/02	1:30PM
B003	002	25/3/02	3:00PM

RESERVE

user_id	speciemen_id	booking_id	date	time	date_collection
001	SP001	B001	3/3/02	4:30PM	4/3/02
002	SP002	B002	25/3/02	1:30PM	27/3/02
002	SP003	B003	25/3/02	3:00PM	27/3/02

LOAN

loan_id	user_id	admin_id
L001	001	A002
L002	002	A003
L003	002	A003

CONFIRM

user_id	speciemen_id	loan_id	date	time	date_due
001	SP001	L001	4/3/02	9:00AM	11/3/02
002	SP002	L002	27/3/02	2:00PM	4/3/02
002	SP003	L003	27/3/02	2:00PM	4/3/02

REGISTRATION

register_id	register_date	password
R001	1/3/02	442255
R002	5/3/02	221144
R003	8/3/02	332211

UPDATE_R

admin_id	register_id	update_date	update_time
A002	R001	2/3/02	2:30PM
A002	R002	6/3/02	10:00PM
A001	R003	9/3/02	9:00PM

UPDATE_S

admin_id	specimen_id	update_date	update_time
A002	SP001	30/3/02	3:00PM
A002	SP002	30/3/02	3:30PM
A003	SP003	5/4/02	10:00PM

Benefits: Among the benefits from this information system are:

- This system is easy to maintain and save time and money in the process of updating the data.

- Up-to-date status about the availability of the species to be borrowed and automatic warning screen will appear upon over due of loan.

- Bring new competitive advantages to organization by providing new and better services to students, lecturers and researchers and use better ways of giving existing services.

- The system is proposed to develop as to enable web-based applications. This will give the users the ability to access the system anywhere and anytime.

- Information retrieval is easier and more flexible. Thus improves productivity, enhance effectiveness and increasing efficiency.

- Data security is enforced where only authorized personnel are allowed to modify or update the information.

Suggestion and Future enhancements: To upgrade the system and the information of insect biological diversity in general, we suggest to do some enhancements to the system:

- Upgrade the system to be a client-server architecture using Internet and web technology with online processing. So that it could be benefited everybody.

- To develop a Malaysian general insects information as a portal for all insects originated from Malaysia with a brief description. The system should link to other individual institutions insect information. So that data and information collection could be exchanged among researchers and the research process would be easier and effective.

- To create a Malaysian Insects Online (MIOL).

ACKNOWLEDGEMENTS

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