

CPACC
Caribbean Planning for Adaptation to
Global Climate Change

Component #3:
Inventory of Coastal Resources and Uses

Coastal Resource Information System
Training Program

Module 2: Database Design and System Maintenance
Participant Manual

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Preface

The overall training program for Component 3 of the Caribbean Planning for Adaptation to Global Climate Change (CPACC) project consists of 4 modules:

1. Creation and maintenance of metadata catalogues;
2. Database design and system maintenance;
3. Data collection and automation/conversion; and
4. System use and decision making.

This manual applies to Module 2, the training associated with maintaining and administering the Coastal Resource Information System (CRIS).

Audience

The audience for Module 2 will be Systems Administrators for the CRIS in each of the 12 countries participating in the CPACC – i.e. the same audience for Training Module 3, Data Collection and Automation.

Training Goal

The overall goal of Training Module 2 is to bring course participants to a level where they are able to design and administer an environmental database, and to ensure they are capable of administering, maintaining and upgrading the CRIS.

Learning Objectives

The specific learning objectives have been broken down into two categories: knowledge that the participants will gain, and skills they will acquire. The course material and activities will be designed to meet these two types of objectives.

At the end of Training Module 2, users will understand:

- The principles of relational database design,
- The linkages between a relational database and a GIS, and
- The procedures for administering and maintaining the CRIS.

At the end of Training Module 2, users should be able to:

- Design and create a relational database in Microsoft Access,
- Create a data dictionary,
- Create queries in Microsoft Access,
- Link data in Access to ArcView,
- Import and edit data in the CRIS,
- Create customized reports in the CRIS,
- Add ArcView themes and tables to the CRIS,
- Update the CRIS database,
- Update the CRIS installation CD.

Prerequisites

We have used an “open systems” approach to designing the CRIS – i.e. the system capitalizes on the

functionality of several popular and readily available software packages. As a result, participants attending this Training Module will benefit most if they have a basic understanding of the following software packages:

- Microsoft Excel and Word (95 or higher), and
- ArcView 3.2.

Course Outline

DAY 1: INTRODUCTION TO MICROSOFT ACCESS

1. Introduction to Access
2. Database Tables
3. Controlling Data Input
4. Controlling Data Display
5. Forms
6. Switchboards

DAY 2: RELATIONAL DATABASE DESIGN

7. Rules for Database Design and Normalization
8. Establishing Relationships
9. Advanced Queries
10. User Security

DAY 3: USING AND CUSTOMIZING THE CRIS

11. System Installation
12. Browsing Spatial and Attribute Data
13. Generating and Customizing Reports
14. Introduction to CRIS Data Dictionary

DAY 4: UPDATING THE CRIS DATA

15. Importing and Editing Attribute Data
16. Connecting ArcView to an Access Database
17. Linking to Queries from ArcView
18. Customizing the CRIS ArcView Project

DAY 5: ADMINISTERING THE CRIS

19. Security, Update Protocol and Data Management
20. Creating a New Installation CD

Day 1: Introduction to Microsoft Access

Module Preliminaries

Introduction – Slide 1

CPACC/CRIS Training Programme

- Module 2:
- Database Design and
- System Maintenance

ESSAUWI CRIS Training, Module 2 Introduction, slide 1

Introduction – Slide 2

Learning Objectives

Knowledge:

- principles of relational database design
- linkages between a relational database and a GIS
- procedures for administering and maintaining the CRIS

ESSAUWI CRIS Training, Module 2 Introduction, slide 2

Introduction – Slide 3

Learning Objectives

Skills:

- design and create relational database in Access
- create a data dictionary
- create queries in Access
- link data in Access to ArcView
- import and edit data in the CRIS
- create customized reports in the CRIS
- add ArcView themes and tables to the CRIS
- update the CRIS database
- update the CRIS installation CD

ESSA/UWI CRIS Training, Module 2

Introduction, slide 3

Introduction – Slide 4

Agenda, Day 1

Introduction To Microsoft Access

- 1 Introduction to Access
- 2 Database Tables
- 3 Controlling Data Input
- 4 Controlling Data Display
- 5 Forms
- 6 Switchboards

ESSA/UWI CRIS Training, Module 2

Introduction, slide 4

Introduction – Slide 5

Agenda, Day 2

Relational Database Design

- 7 Database design
- 8 Database relationships
- 9 Advanced queries
- 10 User security

ESSA/UWI CRIS Training, Module 2

Introduction, slide 5

Introduction – Slide 6

Agenda, Day 3

Using and Customizing the CRIS

- System installation
- Browsing spatial and attribute data
- Generating and customizing reports
- Introduction to CRIS data dictionary

ESSA/UWI CRIS Training, Module 2

Introduction, slide 6

Introduction – Slide 7

Agenda, Day 4

Updating the CRIS Data

- Importing and editing attribute data
- Connecting ArcView to an Access database
- Linking to queries from ArcView
- Customizing the CRIS ArcView project

ESSA/UWI CRIS Training, Module 2

Introduction, slide 7

Introduction – Slide 8

Agenda, Day 5

Administering the CRIS

- Security, update protocol and data management
- Creating a new installation CD

ESSA/UWI CRIS Training, Module 2

Introduction, slide 8

1 Introduction to Access

Day 1 – Slide 1

Agenda, Day 1

Introduction To Microsoft Access

- 1 Introduction to Access
- 2 Database Tables
- 3 Controlling Data Input
- 4 Controlling Data Display
- 5 Forms
- 6 Switchboards

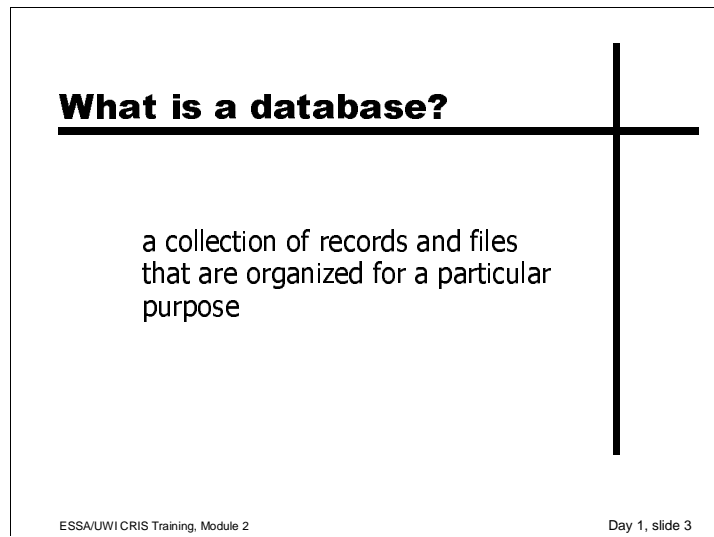
ESSA/UWI CRIS Training, Module 2 Day 1, slide 1

Day 1 – Slide 2

Topic #1

Introduction to Access

ESSA/UWI CRIS Training, Module 2 Day 1, slide 2

Day 1 – Slide 3

What is a database?

a collection of records and files that are organized for a particular purpose

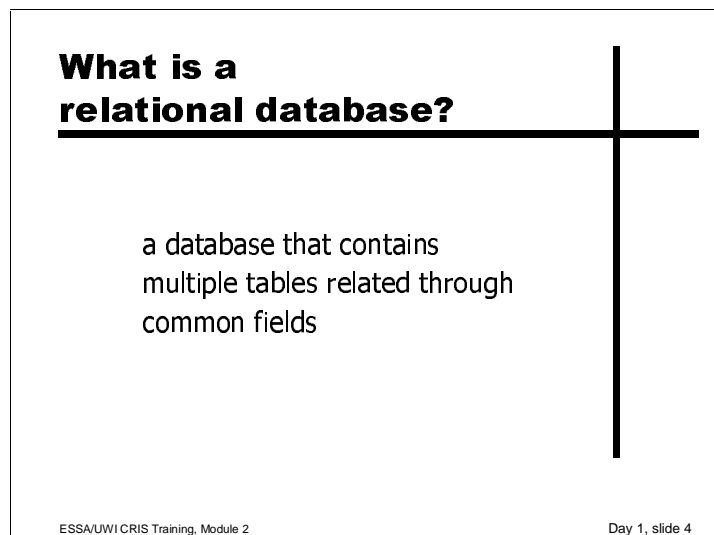
ESSA/UWI CRIS Training, Module 2 Day 1, slide 3

- Database: a collection of records and files that are organized for a particular purpose

But, often these collections can get to large and unwieldy:

- too much information in one document or spreadsheet to be manageable;
- too much information spread across too many documents/spreadsheets to keep track of;
- no longer certain that information is being entered correctly or consistently; etc.

Relational databases can help!

Day 1 – Slide 4

What is a relational database?

a database that contains multiple tables related through common fields

ESSA/UWI CRIS Training, Module 2 Day 1, slide 4

- Relational database: a database that contains multiple tables related through common fields.

Day 1 – Slide 5

Example:

Table 1: Monitoring Locations

<u>Location Abbr.</u>	<u>Name</u>	<u>Country</u>	<u>Latitude</u>	<u>Longitude</u>
BELLAIRSN	Bellairs North Reef	Barbados	13°28'61"N	59°55'28"W
BELLAIRSS	Bellairs South Reef	Barbadps	13°28'59"N	59°55'29"W
BONACCORD1	Bon Accord Lagoon I	Trinidad	10°44'92"N	61°3'724"W
BONACCORD2	Bon Accord Lagoon II	Trinidad	10°44'93"N	61°37'28"W

Table 2: Monitoring Results

<u>Variable</u>	<u>Location Abbr.</u>	<u>Date</u>	<u>Measurement</u>
water temp.	BELLAIRSN	12/01/99	20 °C
salinity	BONACCORD2	25/01/99	30.4 p/thou

Day 1 – Slide 6

Related tables

Locations

Location Abbreviation
 Location Name
 Country

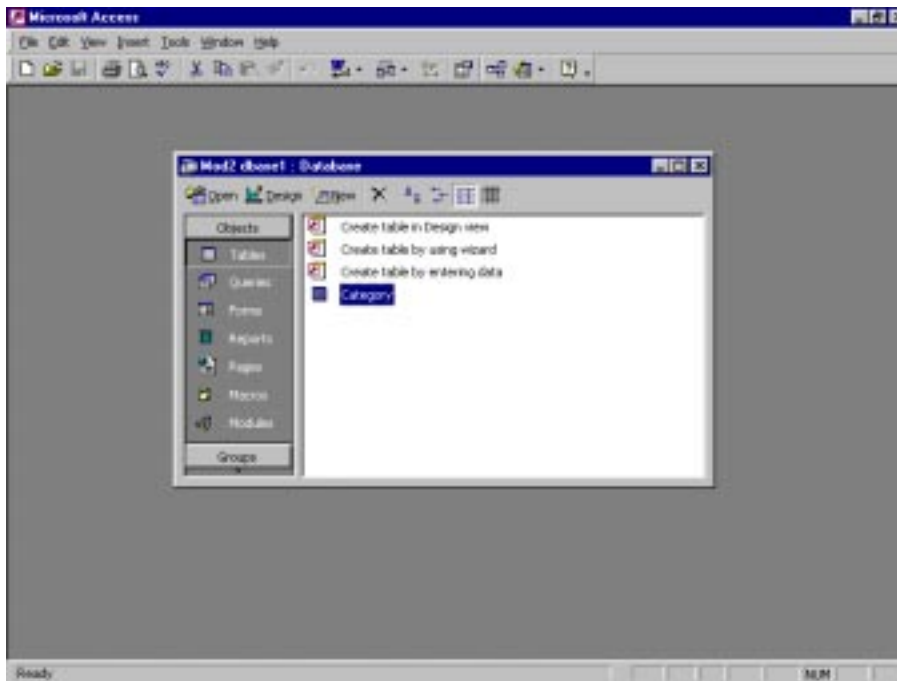
Results

Variable
 Location Abbreviation
 Date
 Measurement

The first slide shows two (example) tables of information. The second slide shows the elements of each table. The tables are related, because they share a field (Location Abbreviation).

How to open Microsoft Access and a database.

Demonstration



Objects we'll cover in this Module:

- Tables: place where the data is stored; a collection of records (rows) and fields (columns).
- Queries: used to search, view and modify data in tables.
- Forms: used to enter, edit and search the data. They look and operate like a Windows application.

Objects we won't cover in this module:

- Reports: used to create output from a table or query, in a variety of formats.
- Data Access Pages: used to provide custom access to your database from Internet Explorer.
- Macros: a set of actions that each perform a specific task (e.g. opening a report in the Print Preview window), in response to a defined event.
- Modules: collections of Visual Basic for Applications (VBA) procedures.

2 Database Tables.

How to open a table.

Demonstration

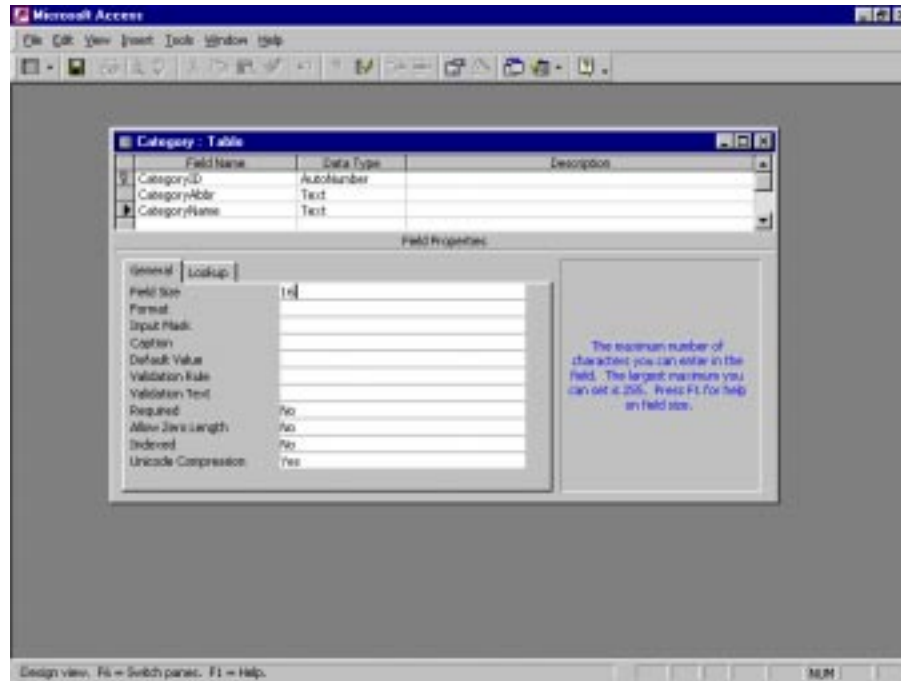


How to edit a table.

Demonstration

Every table in a relational database should have a primary key. This is the field that distinguishes one record from another, and therefore within any table the primary key must be unique for each record.

In the Categories table, the primary key is created automatically by Access for each record, using an AutoNumber value. If you delete a record, the AutoNumber primary key for that record is also deleted and can never be re-used. If you re-enter the rest of the data for a deleted record, Access assigns it a new primary key - because according to Access, it is a new record.



As described in blue in the lower right portion of the screen (when Field Size is selected within CategoryName), Field Size specifies the number of characters that can be entered into that field.

Data Type

Text: alphanumeric data (up to 255 characters)

Memo: sentences and paragraphs (up to 64,000 characters)

Number: numeric data (1,2,4 or 8 bytes; 16 for ReplicationID and Decimal)

Date/Time: dates and times (8 bytes)

Currency: monetary data (8 bytes)

AutoNumber: unique value generated by Access for each record (4 bytes; 16 for ReplicationID and Decimal)

Yes/No: Boolean (true/false) data (1 bit)

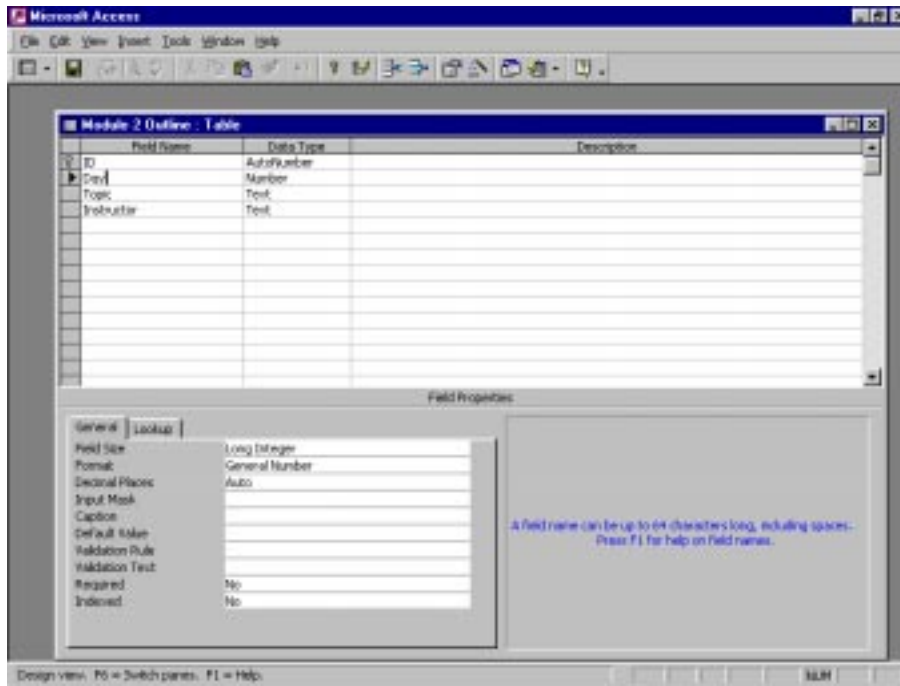
OLE Object: pictures, graphs, or other ActiveX objects (up to 1 gigabyte)

Hyperlink: a link address to a document or file on the Web, intranet, LAN or on your local computer (up to 2048 characters)

HINT: Press F1 in the Data Type field, or any of the properties fields in the General tab, to get a detailed Help screen explaining that field.

How to create a table.

Demonstration



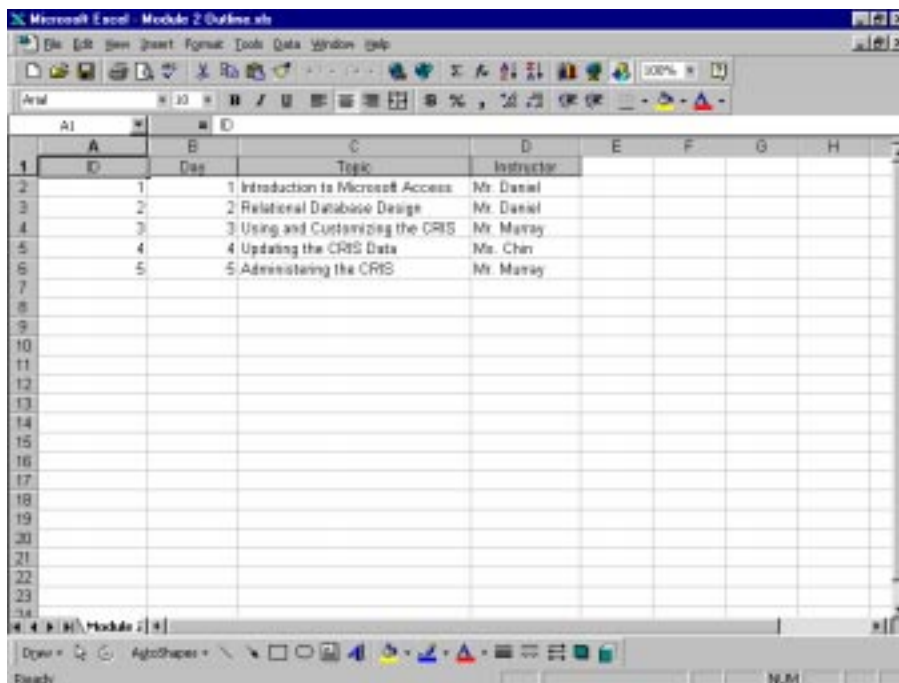
ID	Day	Topic	Instructor
1	1	Introduction to Microsoft Access	Mr. Daniel
2	2	Relational Database Design	Mr. Daniel
3	3	Using and Customizing the CRIS	Mr. Murray
4	4	Updating the CRIS Data	Ms. Chin
5	5	Administering the CRIS	Mr. Murray

Record: 1 of 5

Ways to print a table.

Demonstration

Tables can be printed either directly through Access, or via Word and Excel.



Using Copy and Paste to move data to Excel may result in undesired wrapping within a cell. To resolve this:

1. Re-size the columns so they are wide enough for all the text in the field.
2. Go to Format | Row | AutoFit.

Exercise

Exercise 1. Creating tables.

1. Open the database called “Mod2 version1.mdb”.
2. Create the following table:

VariableID	VariableAbbr	VariableName	CategoryID	Units
1	MAXDTEMP	Temperature: maximum daily	1	degrees C
2	MINDTEMP	Temperature: minimum daily	1	degrees C
3	RAINDAY	Rainfall: daily cumulative	1	mm
4	WATTEMP	Water temperature	2	degrees C
5	SALINITY	Salinity	2	ppt
6	SUBSTCOV	Substratum cover	3	%
7	DENSITY	Density	3	# / m
8	BASAREA	Basal area mean	4	m ² /ha
9	NUMBER	Number of trees	4	#
10	DEPTH	Depth	4	cm
11	LITTER	Rate of litterfall	4	g/m ² /day
12	BIOMASS	Biomass	5	g

- VariableID: primary key
 - VariableAbbr: data type – text, field size - 10
 - VariableName: data type – text, field size – 30
 - CategoryID: data type – number
 - Units: data type – text, field size – 10
 - Name the table “Variable”
3. Now create a second table, called “Country”:
 - Create 3 fields, called CountryID, CountryAbbr, and CountryName.
 - Set up the CountryID field to be an automatically generated primary key.
 - Enter the names of all the CPACC countries.
 - Create abbreviations for each country.
 - Name the table “Country”.
 4. Create an Excel table that contains CountryID, CountryAbbr and CountryName for only the OECS countries. (Do not create this table from scratch! Use one of the methods just demonstrated for creating an Excel spreadsheet from an Access table.)
 5. Create a Word table that contains only the abbreviations and names for all 12 countries.

How to copy data into a table.

Demonstration

It is important to know how to copy blocks of data from an Excel spreadsheet into an Access table, as this is an efficient way to “populate a database” (i.e. enter data into the database). It is also a realistic scenario, if you are receiving monitoring data in spreadsheet format.

Exercise

Exercise 2. Editing tables.

1. Open the Access database file called “Mod2 version2.mdb”.
2. Open the Excel file called “Mod2 exercise2.xls”.
3. Copy the data from the New Countries sheet in the Excel file to the Country table in Access.
4. Use the information in the New Categories sheet in the Excel file to add new categories to the Category table in Access.
5. Manually add the following countries, directly into the Country Table: Bermuda (BER), Cayman Islands (CAY), Colombia (COL), Costa Rica (COS), and Cuba (CUB).
6. Set the width of the CountryName column to the Standard Width, observe what that does to the table, and then change the column width to Best Fit.

7. Open the Variables table. Set the width of the VariableID column to 30, and set the width of the Abbreviation and Name columns each to 40. Notice how you can no longer see the Units column.
8. Now freeze the first two columns, and notice what happens when you scroll over to the Units column.
9. Unfreeze the columns and revert them back to best fit.
10. Move the Units column so it comes before the CategoryID column.
11. Add a new column after the Units column. Name the new column UnitDescription.
12. Enter into this column the long form (in words) for each of the units listed (e.g. degrees Celsius, grams, etc).
13. Add the following two variables to the Variable table, and leave the units fields blank.

<u>VariableID</u>	<u>VariableAbbr</u>	<u>VariableName</u>	<u>CategoryID</u>
13	BIOMASSSD	Biomass standard deviation	5
14	BASAREASD	Basal area standard deviation	4

3 Controlling Data Input.

Day 1 – Slide 7

Topics #2,3

- ✓ **Database Tables**
- ➔ **Controlling Data Input**

ESSA/UWI CRIS Training, Module 2
Day 1, slide 7

Day 1 – Slide 8

3 ways to control input:

Datasheet View

- I **Field Properties** (already discussed)
- I **Input Mask**
 - I restricts character pattern
- I **Validation Rule**
 - I restricts field values

ESSA/UWI CRIS Training, Module 2 Day 1, slide 8

There are three methods for controlling data input in a table:

1. Using the field properties in Design view.
 - We have already talked about these, in the previous topic.
2. Using the Input Mask in Design view.
 - Input Masks control the character pattern that can be entered.
3. Using Validation Rules in Design view.
 - Validation rules restrict the actual values that can be entered.

Day 1 – Slide 9

Input Masks:

- I useful for data that must be in a consistent format
 - E.g.:
 - I times: xx:xx
 - I dates: dd/mm/yy
 - I phone numbers: (xxx) xxx-xxxx
- I only available for fields you can edit
 - I e.g. can't use in AutoNumber field

ESSA/UWI CRIS Training, Module 2 Day 1, slide 9

Input Masks are useful when the data must be in a consistent format.

For example, when entering:

- times,
- dates,
- phone numbers, etc.

They are only available for fields you can edit (e.g. you can't use an input mask in AutoNumber field).

Validation Rules:

- rejects data that does not conform to the rule
- displays text explaining how the rule was violated
- useful for minimizing data entry error - rejecting values outside a reasonable range
 - E.g.
 - air temperatures colder than 5 °C
 - water temperatures warmer than 35 °C
 - dates earlier than 1980

ESSA/UWI CRIS Training, Module 2

Day 1, slide 10

Validation Rules are useful for minimizing data entry error.

Validation Rules reject data that do not conform to the rule (e.g. values outside of a reasonable, defined range). For example, you can set up the field to reject the following values:

- air temperatures colder than 5°C
- water temperatures warmer than 35°C
- dates earlier than 1980.

If a validation rule is broken, Access displays text explaining how the rule was violated. This gives the user a chance to try again, and an understanding of what they did wrong.

How to enter a Validation Rule.

Demonstration

Exercise**Exercise 3.** Creating and testing a Validation Rule.

1. Open the table called Monitoring Results in the file called "Mod2 version3.mdb".
2. Create a Validation Rule that disallows any dates to be entered for June through September, 2000.
3. Enter the necessary Validation Text, and then test the rule to see if it works properly.
4. Now change the Validation Rule to disallow any data from 1992 or earlier, and modify the Validation Text accordingly. Again, test to see if it works properly.

Lunch break

4 Controlling Data Display.

Day 1 – Slide 11

3 topics we've covered:

- ✓ **Introduction to Access**
- ✓ **Database Tables**
- ✓ **Controlling Data Input**

Day 1 – Slide 12

Topics # 4-6 for the afternoon

- ➔ **Controlling Data Display
Forms
Switchboards**

ESSA/UWI CRIS Training, Module 2

Day 1, slide 12

Day 1 – Slide 13

Controlling data display:

- Sort
 - | feature for re-ordering data
- Filter / Find
 - | feature for honing in on particular data
- Queries
 - | are 'objects'
 - | for selecting and displaying data

ESSA/UWI CRIS Training, Module 2

Day 1, slide 13

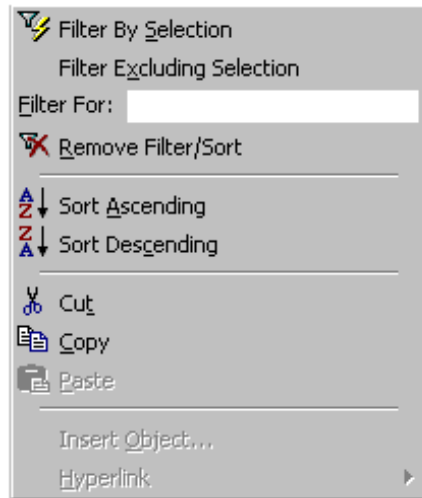
We will cover three basic ways to alter data presentation:

- Sorting records;
- Filtering records (includes Find); and
- Building queries.

How to Sort, Filter and Find.

Demonstration

Tables in a database can be very large, making it difficult to view the data meaningfully or to zero in on sub-sets of data. This next topic will cover the basic skills necessary to manipulate the display so you will be better able to understand the data.



Exercise

Exercise 4. Filtering and sorting.

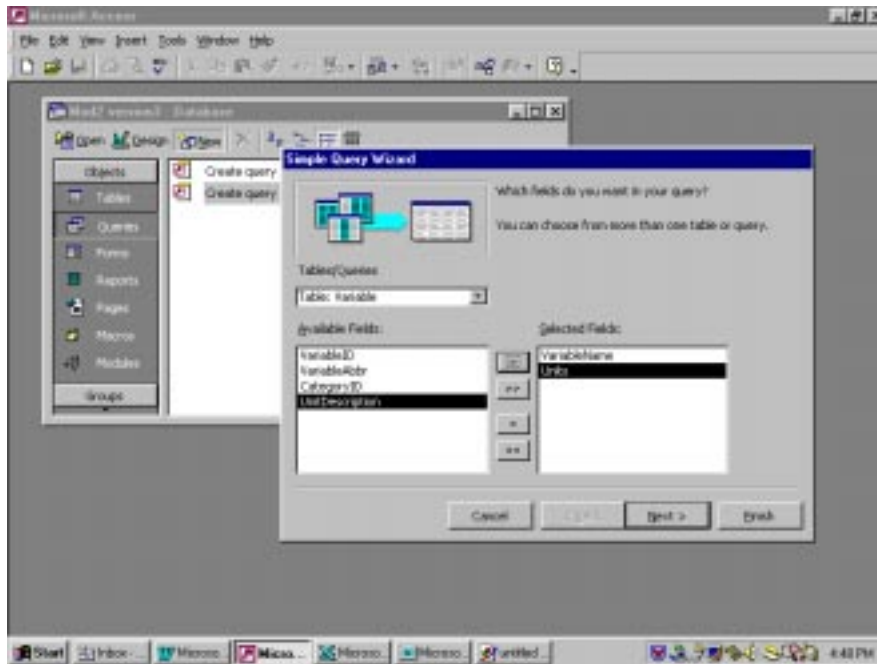
1. Open the table called "Table for sorting/filtering exercise" in the Mod2 version3.mdb file.
2. How many records are in the table?
3. How many marine water samples are there? (Refer to the abbreviation table at the end of these instructions.)
4. How many fish samples are there?
5. How many coral samples are there?
6. How many noise samples are there?
7. How many surface water samples are there?
8. How many soil samples are there?
9. What is the highest numbered sampling station?
10. How many samples were taken on June 6, 1994?
11. How many samples were taken on May 1, 1999?
12. How many samples in total were taken in 1999?
13. How many samples were taken at a time other than 4:00 in the morning?
14. How many noise samples were taken at 8:00am?
15. How many projects are represented in the table?

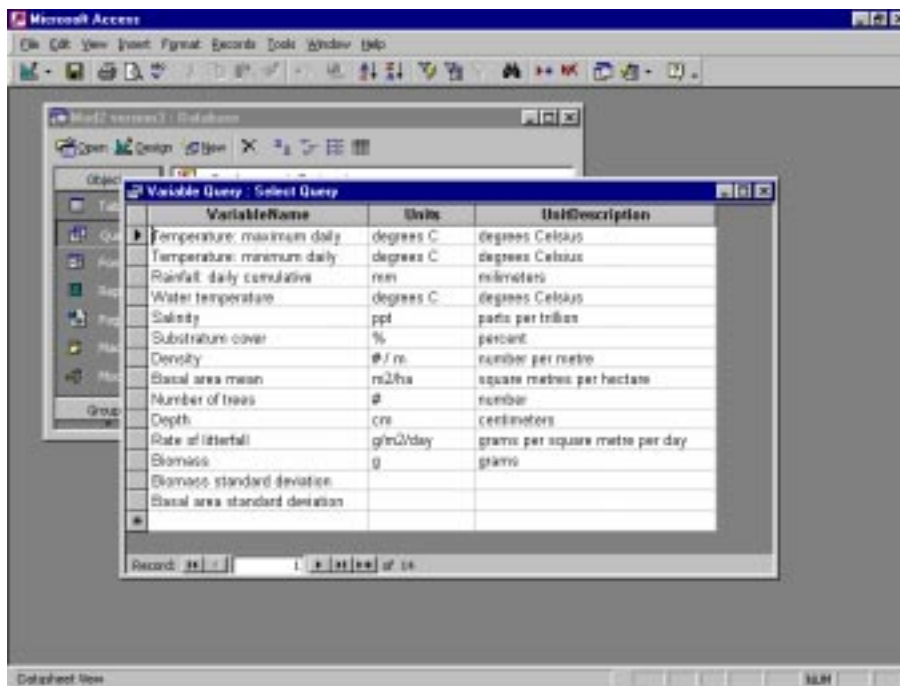
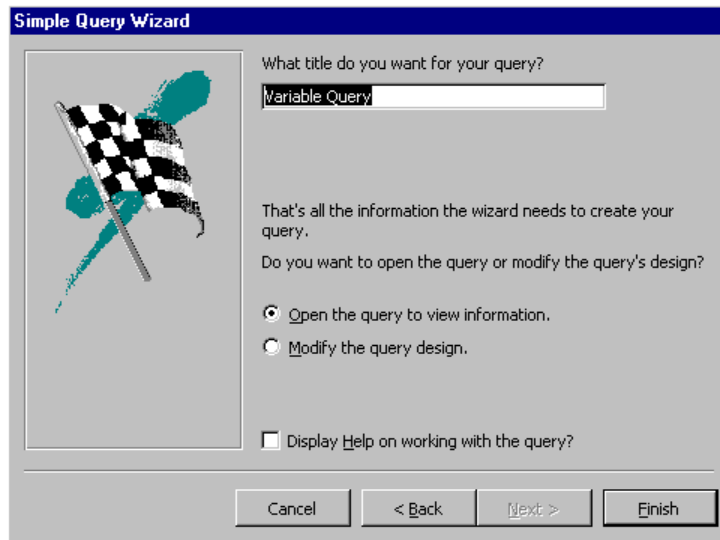
Abbreviation	Name
SOIL	Soils
SW	Surface Water
GW	Ground Water
MW	Marine Water
MSED	Marine Sediment
RSED	River Sediment
AQ	Air Quality
MET	Meteorology
NOI	Noise
BEN	Benthos
FISH	Fish
SHEL	Shellfish
MANG	Mangroves
AVI	Avifauna
COR	Coral
FOR	Forest
SOC	Socioeconomic
GEO	Geological
OCE	Oceanography
BIO	Biota

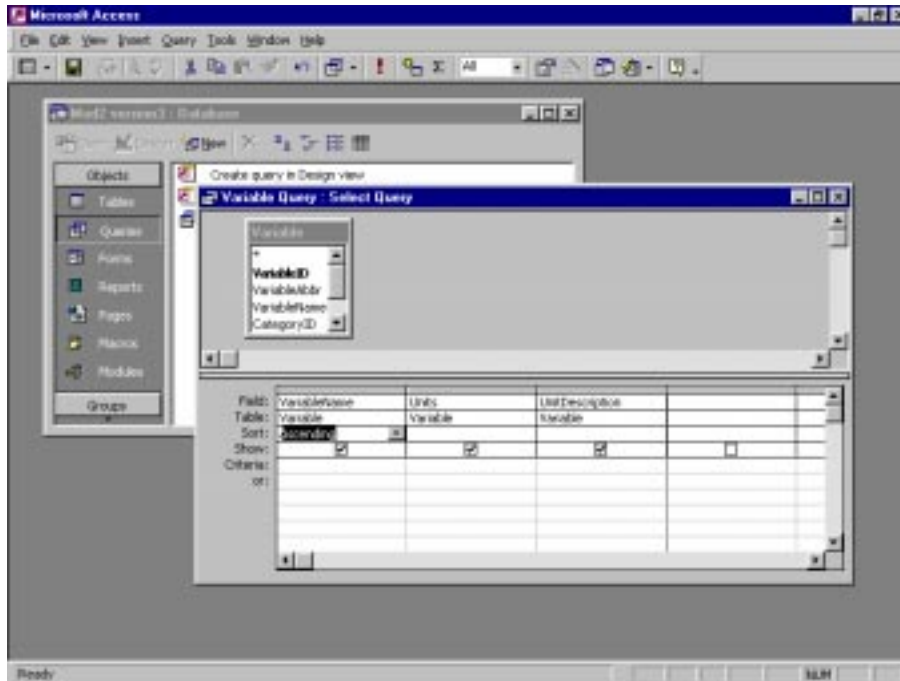
How to create a simple query from one table.

Demonstration

Queries are a very useful and powerful tool for viewing and analysing data. This afternoon, we will look at simple queries: how to display portions of a data table.







VariableName	Units	UnitDescription
Basal area mean	m2/ha	square metres per hectare
Basal area standard deviation		
Biomass	g	grams
Biomass standard deviation		
Density	# / m	number per metre
Depth	cm	centimeters
Number of trees	#	number
Rainfall: daily cumulative	mm	milimeters
Rate of litterfall	g/m2/day	grams per square metre per day
Salinity	ppt	parts per trillion
Substratum cover	%	percent
Temperature: maximum daily	degrees C	degrees Celsius
Temperature: minimum daily	degrees C	degrees Celsius
Water temperature	degrees C	degrees Celsius
*		

Exercise

Exercise 5. Building simple queries from one table.

1. In Mod2 version3.mdb, go to the Query objects and open the Simple Query Wizard.
2. Build a query that shows only country names:
 - a) Select the Country table.
 - b) Move CountryName from the Available Fields to the Selected Fields box.
 - c) Click on the Next button.

- d) Change the Query name to “Country Names”.
- e) Click on the Finish button.

You should now be looking at a query that contains only one column, listing the country names.

3. Create a new query, from the Monitoring Results table, that shows just the measurement dates and measurement values.
4. Modify this query so it just shows results obtained after January 1st, 1995.
5. Re-name the query to “Monitoring Results from 1995 and Later”. (Can you figure out how to do this?)
6. Create a new query that shows just variable names and their units, and give it an appropriate name.
7. Modify the query so it only shows temperature variables. (Can you figure out how to do this? Hint: use the Criteria feature in the Design view of the query.)

5 Forms.

Day 1 – Slide 14

Topic #5

Forms

the primary interface between
users and your database

ESSA/UWI CRIS Training, Module 2 Day 1, slide 14

Forms provide an alternative to tables for entering and/or viewing data, and in many cases are easier to use because they are more intuitive.

Day 1 – Slide 15

Basic form

One record per 'page'

The screenshot shows a window titled "Basic form (Categories)". It contains three input fields: "CategoryID" with the value "1", "CategoryAbbr" with the value "METEO", and "CategoryName" with the value "Meteorology". At the bottom, there is a record navigation bar with the text "Record: 1 of 9" and several navigation icons.

Day 1 – Slide 16

Continuous form

Several records displayed at once

The screenshot shows a window titled "Continuous form (Categories)". It displays a table with the following data:

CategoryID	CategoryAbbr	CategoryName
1	METEO	Meteorology
2	WATER	Water Quality
3	CORAL	Coral
4	MANGROVE	Mangrove

At the bottom, there is a record navigation bar with the text "Record: 1 of 9" and several navigation icons.

Day 1 – Slide 17

Other types of forms:

- Multiple-page forms
 - | for large records
 - | one record shown across several 'pages'
- Subforms
 - | for related records
 - | can show a record, plus several other records that are related, all on the same 'page'

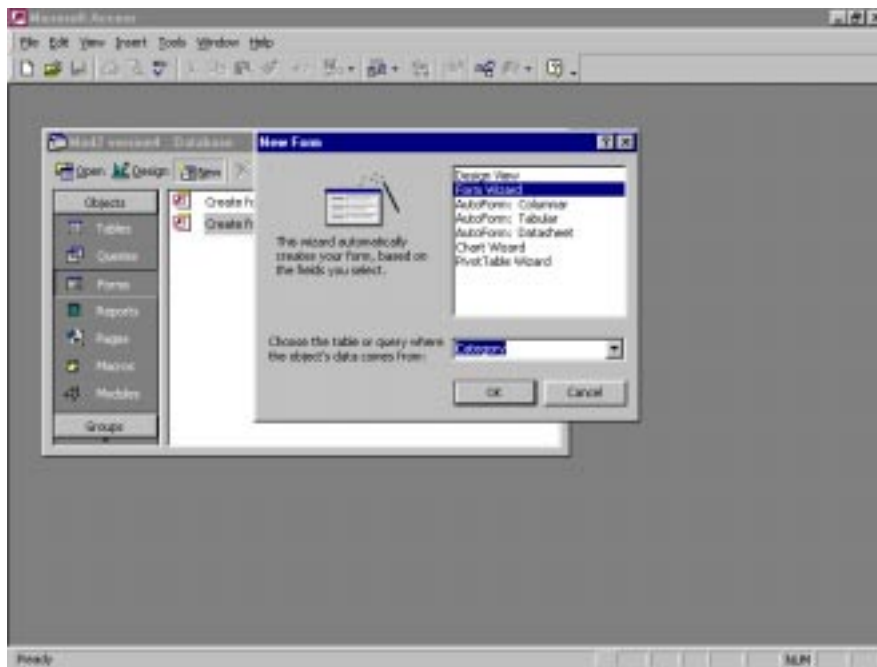
ESSA/UWI CRIS Training, Module 2

Day 1, slide 17

- multiple-page forms
- subforms

How to create a form.

Demonstration



Form Wizard

Which fields do you want on your form?
You can choose from more than one table or query.

Tables/Queries
Table: Category

Available Fields:

Selected Fields:
CategoryID
CategoryAbbr
CategoryName

Buttons: > >> < <<

Buttons: Cancel < Back Next > Finish

Form Wizard

What layout would you like for your form?

Layout preview: A grid of 12 placeholder boxes arranged in 3 columns and 4 rows.

Layout options:
 Columnar
 Tabular
 Datasheet
 Justified

Buttons: Cancel < Back Next > Finish

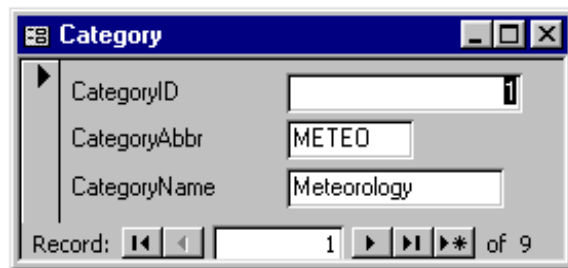
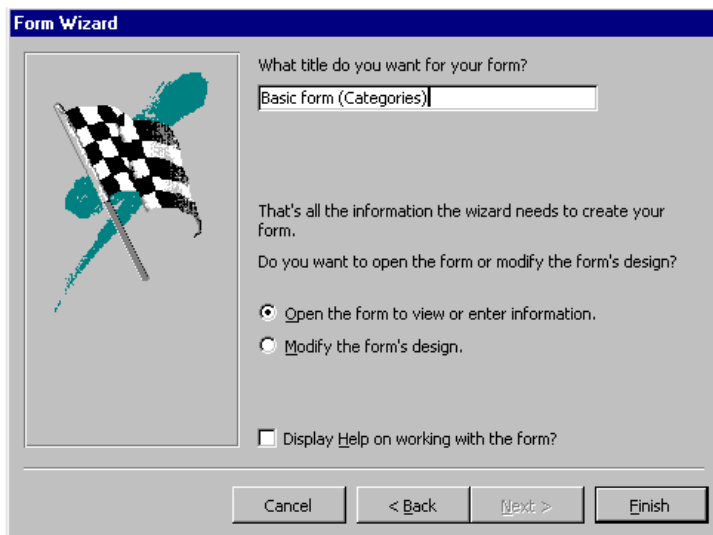
Form Wizard

What style would you like?

Style preview: A form with a label 'Data' and a text box containing 'Data'. The text box has a dashed border and the text 'Data' is highlighted.

Style options:
Blends
Blueprint
Expedition
Industrial
International
Ricepaper
SandStone
Standard
Stone
Sumi Painting

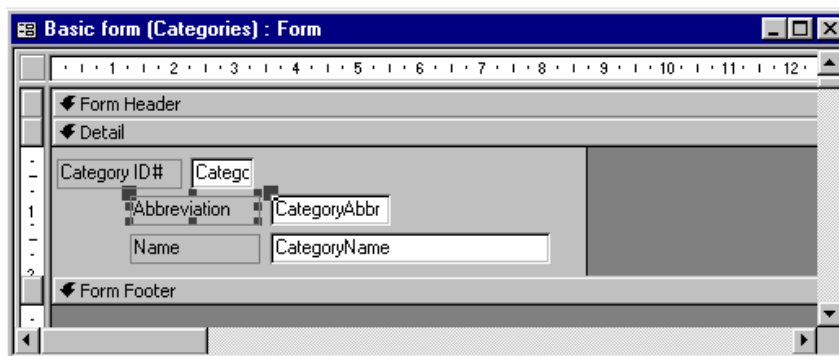
Buttons: Cancel < Back Next > Finish

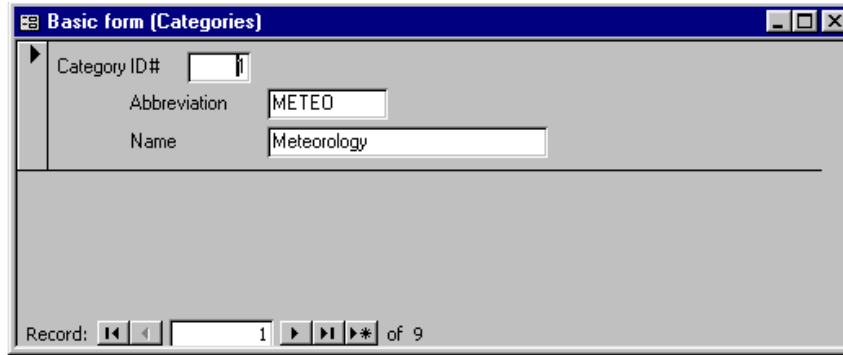


Now repeat the process, but instead of selecting a “columnar” layout, select a “tabular” layout, and give it the title “Continuous form (Categories)”. Show the class how this one difference results in a continuous form that shows several categories at once.

How to edit a form.

Demonstration





- The Toolbox contains the most commonly used controls:



Exercise

Exercise 6. Creating and editing forms.

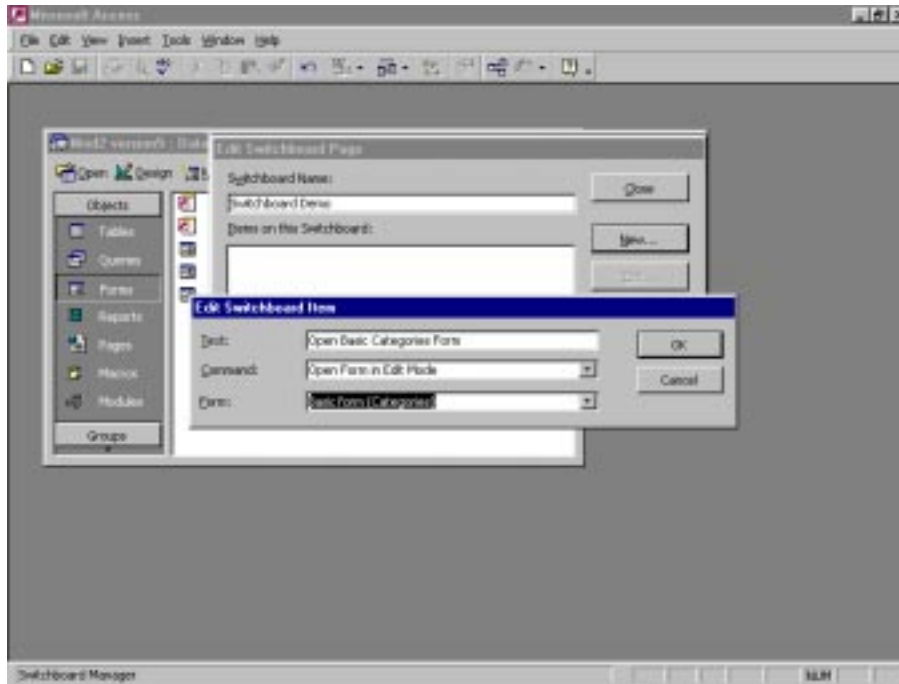
1. Open the Mod2 version4.mdb database.
 2. Use the Form Wizard to build a continuous form for countries.
 3. Use the Form Wizard to build a continuous form for locations.
 4. Use the Form Wizard to build a form for variables that shows only one variable at a time.
 5. Use the Form Wizard to build a form for monitoring results that shows only one record at a time.
 6. Edit the forms so that all text controls are properly sized for the data.
 7. Edit all the forms so that the labels will be meaningful for users who have not taken this course.
-

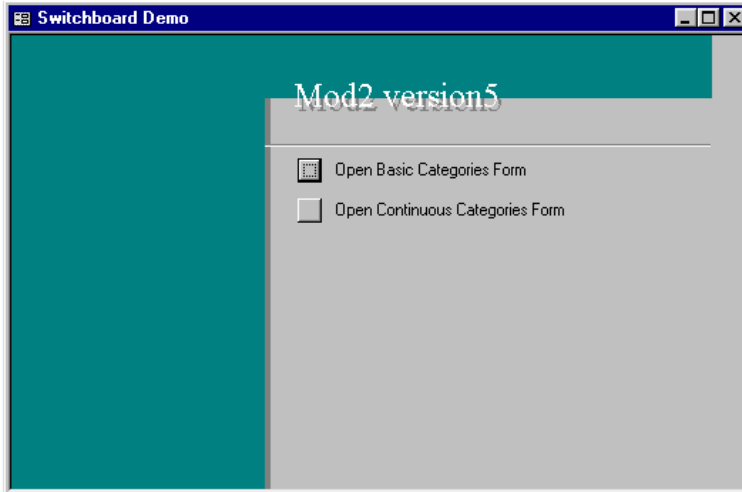
6 Switchboards.

Switchboards allow users to quickly access the most commonly used parts of the database. They provide a menu for users to easily open database objects.

How to create a switchboard.

Demonstration

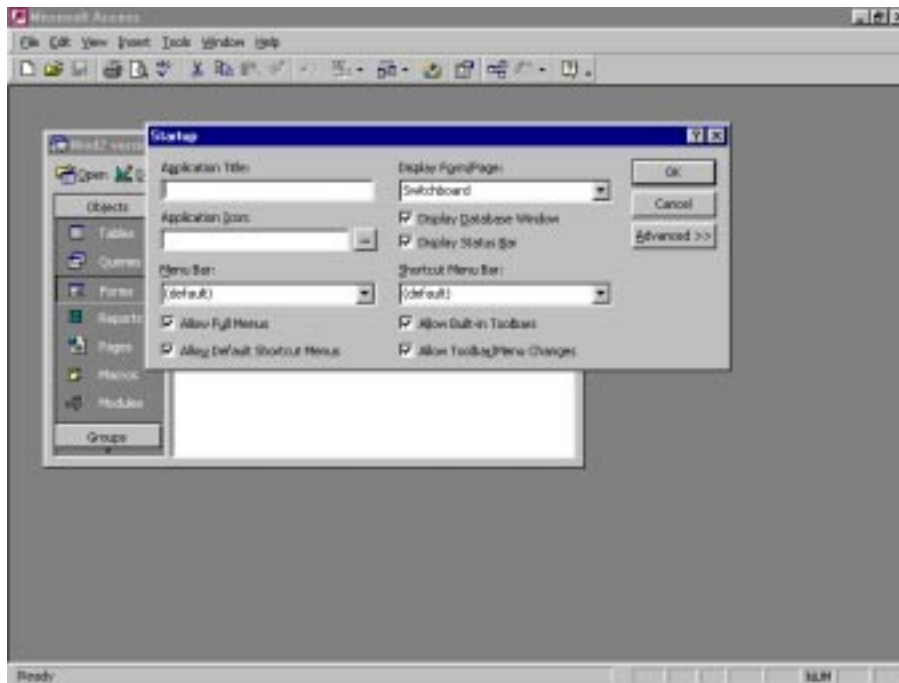




How to set a switchboard to autostart.

Demonstration

Because switchboards provide an easy way to navigate your database, you will probably want a switchboard to start automatically when the database is opened. This is also done through the Tools menu.



Exercise**Exercise 7.** Creating a switchboard.

1. Open the Mod2 version4.mdb database.
2. Create a switchboard for the Country, Location, Variable and Monitoring Results forms that you created in the last exercise. (Remember, you access the Switchboard Manager through Tools | Database Utilities.)
3. Test your switchboard to make sure it works properly.
4. Set your start up options so that the switchboard opens automatically.
5. Close and re-open the database to test the switchboard autostart.

Day 1 – Slide 18

Review of Day 1

Introduction To Microsoft Access

- 1 Introduction to Access ✓
- 2 Database Tables ✓
- 3 Controlling Data Input ✓
- 4 Controlling Data Display ✓
- 5 Forms ✓
- 6 Switchboards ✓

Day 2: Relational Database Design

Day 2 – Slide 1

Agenda, Day 2

Relational Database Design

- 7 Rules for Database Design/Normalization
- 8 Establishing Relationships
- 9 Advanced Queries
- 10 User Security

ESSA/UWI CRIS Training, Module 2 Day 2, slide 1

Day 2 – Slide 2

Agenda, Day 2

Relational Database Design

- 7 Rules for Database Design/Normalization
- 8 Establishing Relationships
- 9 Advanced Queries
- 10 User Security

ESSA/UWI CRIS Training, Module 2 Day 2, slide 2

7 Rules for Database Design/Normalization.*Day 2 – Slide 3*

Why use a relational database?

Normalization

- I avoid redundancy**
- I avoid update anomalies**

ESSAUWI CRIS Training, Module 2 Day 2, slide 3

Remember back to the advantages of a relational database:

- They eliminate (or greatly reduce) the repetition of data (i.e. eliminate or redundancy).
- They allow for convenient updating of records without adversely affecting other records (i.e. eliminate “update anomalies”).

The process of solving these problems is called “normalization”.

There are several simple rules that should be followed when designing a relational database.

Day 2 – Slide 4

Rules for database design

Rule 1:

Keep information compartmentalized

E.g. separate measurement values and measurement dates into different fields

ESSAUWI CRIS Training, Module 2 Day 2, slide 4

Rule 1: Keep information compartmentalized.

This means separating individual items of information and putting them in different fields.

Rationale: to make it easier to sort, analyze and edit the data.

For example:

- put first and last names in separate fields, so you can sort by last name
- put measurement value and measurement date in different fields, so you can sort by date or by value

Day 2 – Slide 5

Rules for database design

Rule 1 example:

VariableID	VariableName	VariableUnits	Units
1 MAXTEMP	Temperature: maximum daily		degrees C
2 MINTEMP	Temperature: minimum daily		degrees C
3 RAINFALL	Rainfall: daily cumulative		mm

ESSAUWI CRIS Training, Module 2 Day 2, slide 5

- the Variables table from Day 1 is another example

(Exception: for dates, don't separate day, month and year into different fields. Access gives you lots of options for manipulating data entry and searches within the date field.)

Day 2 – Slide 6

Rules for database design

Rule 2:

Separate different entities into different tables

E.g. different tables for monitoring results and locations

ESSAUWI CRIS Training, Module 2 Day 2, slide 6

Rule 2: Separate different entities into different tables.

Another way to say this is to separate information into different tables according to 'themes'.

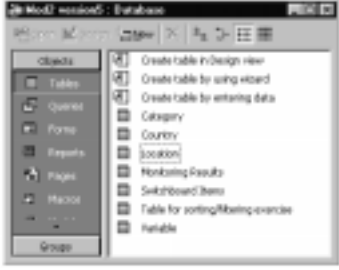
Rationale: to minimize redundancy, and to make it easier to find particular data.

- For example, put information about monitoring results into a separate table from information about sampling sites.

Day 2 – Slide 7

Rules for database design

Rule 2
example:



ESSAUWI CRIS Training, Module 2 Day 2, slide 7

- This is well illustrated by looking at the tables in our database from Day 1.

You can usually use your intuition to decide what should go into different tables, but it can also help to ask the question: “Will I be repeating entries if I keep these entities together in the same table?”. For example, having a separate Country table keeps us from having to repeat the country name and abbreviation for multiple locations within one country.

[This is also described as achieving “functional dependence”. This means two things. First, all data in the table should be relevant to the subject of the table. Second, the data in the table should completely describe the subject of the table.]

Day 2 – Slide 8

Rules for database design

Rule 3:

All tables must have
primary keys

E.g. LocationID, CountryID,
VariableID, etc.

ESSAUWI CRIS Training, Module 2 Day 2, slide 8

Rule 3: All tables must have primary keys.

In a well-designed relational database, each record in all tables must be uniquely identified. As we discussed in Day 1, this is called a primary key. Primary keys can be a data field (if the records are unique), a combination of data fields (if they form unique combinations), or a unique number (e.g. the AutoNumber generated by Access).

Day 2 – Slide 9

Rules for database design

Rule 4:
Ensure field independence

changes in one field should not affect any other field

ESSA/UWI CRIS Training, Module 2 Day 2, slide 9

Rule 4: Ensure field independence.

It must be possible to change data in any field (except the primary key) without affecting data in any other field. You can check for this by making sure that you do not have the same field in different tables. If you need to relate a field from one table to the next (e.g. if you want to indicate which country each location is in) you can do this by relating the tables through a foreign key. We will go into this in greater detail shortly.

There are also a set of steps that should be followed when designing a relational database.

Day 2 – Slide 10

Database design steps

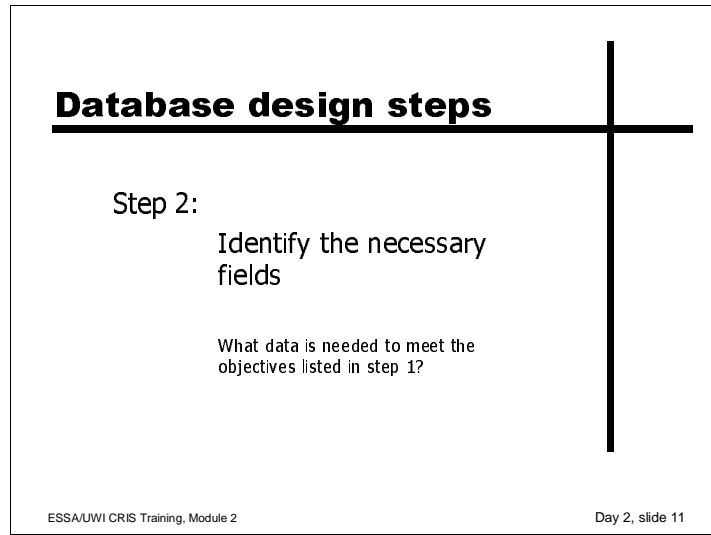
Step 1:
Identify database objectives/purpose

What will the database be used for?

ESSA/UWI CRIS Training, Module 2 Day 2, slide 10

Step 1: Identify the objectives or purpose of the database.

Think about the purpose of the database, and what it will be used for. This will make the following steps easier.

Day 2 – Slide 11

Database design steps

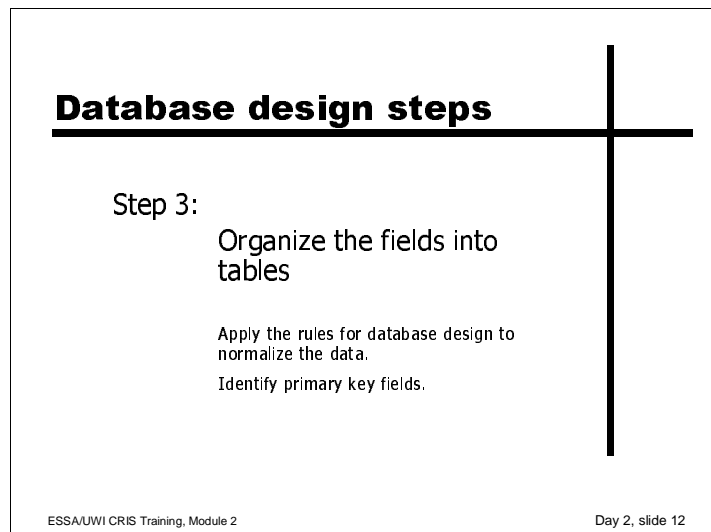
Step 2:
Identify the necessary fields

What data is needed to meet the objectives listed in step 1?

ESSA/UWI CRIS Training, Module 2 Day 2, slide 11

Step 2: Identify the required data.

What information is needed to meet the objectives listed in step 1? You should try to be as specific as possible – go to the level of identifying all the fields you would need.

Day 2 – Slide 12

Database design steps

Step 3:
Organize the fields into tables

Apply the rules for database design to normalize the data.
Identify primary key fields.

ESSA/UWI CRIS Training, Module 2 Day 2, slide 12

Step 3: Organize the fields into tables.

This is where you decide what fields go in which tables, and normalize the data by applying the rules for database design that we've just covered. This also includes identifying the primary key field for each table.

Note: you should still be working on paper at this point – you should not be building any of the database in Access yet.

Day 2 – Slide 13

Database design steps

Step 4:
Draw the data diagram

Show all the linkages/relationships
between the tables.

ESSAUWI CRIS Training, Module 2 Day 2, slide 13

Step 4: Draw the data diagram.

This is where you identify relationships between tables, which we describe in the next training topic.

Note: you have now created a “data model” or “data dictionary”, which is the product of database design (the list of fields, tables, and their relationships).

Day 2 – Slide 14

Database design steps

Step 5:
Build the database

Enter the tables and relationships
in Access.

ESSAUWI CRIS Training, Module 2 Day 2, slide 14

Step 5: Build the database.

This is where you actually start creating the tables and linkages in Access.

Notice how a lot of work must happen before you are ready to start creating things in Access! This is because relational databases can be quite complex, and much planning is needed to ensure that the database is constructed properly. It is worth taking the time now, because if you make serious design errors it may be very difficult – if not impossible – to correct later.

As an example, let’s go through steps 1 through 3 to create a database for CPACC training.

Day 2 – Slide 15

Example: step 1

Create a database to store and track information on

- where and when this CPACC training module is held, and
- who is involved,

for the purposes of project reporting and planning new training deliveries.

ESSAUWI CRIS Training, Module 2 Day 2, slide 15

Step 1.

The objectives of the database will be to store and track information on where and when this CPACC training module is held, and who is involved, for the purposes of project reporting and planning new training deliveries.

Day 2 – Slide 16

Example: step 2

We will need the following information:

- name of class participants (first and last)
- agencies the participants work for
- contact information for the participants (phone, fax, email)
- training venue
- city the training is held in
- country the training is held in
- training dates (start date, end date)
- training results (qualitative notes)

ESSAUWI CRIS Training, Module 2 Day 2, slide 16

Step 2.

We will need the following information:

- name of class participants (first and last)
- agencies the participants work for
- contact information for the participants (phone, fax, email)
- training venue
- city the training is held in
- country the training is held in
- training dates (start date, end date)
- training results (qualitative notes)

Day 2 – Slide 17

Example: step 3

<u>Venue</u>	<u>Participant</u>	<u>Session</u>
venue ID	participant ID	session ID
venue name	first name	start date
city	last name	end date
country	agency name	training results
	phone #	
	fax #	
	email address	

ESSA/UWI CRIS Training, Module 2 Day 2, slide 17

Step 3.

There seem to be three themes: information about participants, information about venues, and information about the training delivery. The fields could be allocated as such:

Venue table	Participant table	Session table
venue ID	participant ID	session ID
venue name	first name	start date
city	last name	end date
country	agency name	training results
	phone number	
	fax number	
	email address	

But how do we relate participants and venues to the actual delivery?

Example: step 3

<u>Venue</u>	<u>Participant</u>	<u>Session</u>	<u>Participant in Session</u>
venue ID	participant ID	session ID	participant in session ID
venue name	first name	start date	session ID
city	last name	end date	participant ID
country	agency name	training results	
	phone #	venue ID	
	fax #		
	email address		

ESSA/UWI CRIS Training, Module 2

Day 2, slide 18

Venue table	Participants table	Session table	Participant in Session table
venue ID	participant ID	session ID	participant in session ID
venue name	first name	start date	participant ID
city	last name	end date	session ID
country	agency name	training results	
	phone number	venue ID	
	fax number		
	email address		

Notes:

Exercise

Exercise 8. Designing a simple database.

The scenario:

You have just taken over the job as Chief Ornithologist (bird biologist!) for the OECS. Your primary mandate is to monitor migrating bird populations, as the OECS is part of a major north-south flyway. Bird that regularly migrate through this area include:

brown pelican	blue-winged teal	broad-winged hawk
snow egret	American widgeon	common snipe
little blue heron	gray kingbird	roseate tern
tri-coloured heron	common yellow-throat	royal tern

Your first job is to set up a Migrating Bird Monitoring Program (MBMP), to be comprised of one primary data collection initiative: a Bird Count Program which will operate in the spring and fall.

The Bird Count Program involves birdwatchers who will spend three days each spring and fall simply watching for birds and recording the species and number they see each day, and the location of the sightings.

In addition to running the MBMP you must also design a database to store and manage the data. This will be necessary, as you will be expected to produce annual reports on trends in migrating species abundance. Now that you understand the value of normalization, you have decided to design a relational database for these data.

Follow the first three steps of the database design process:

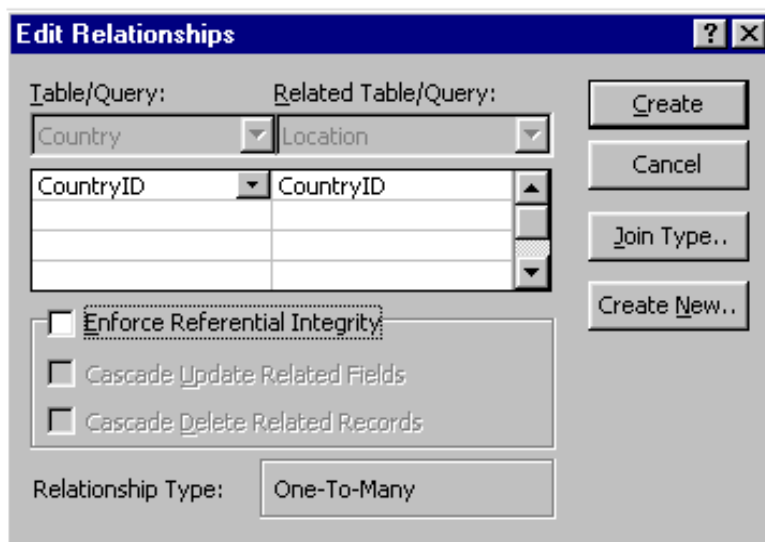
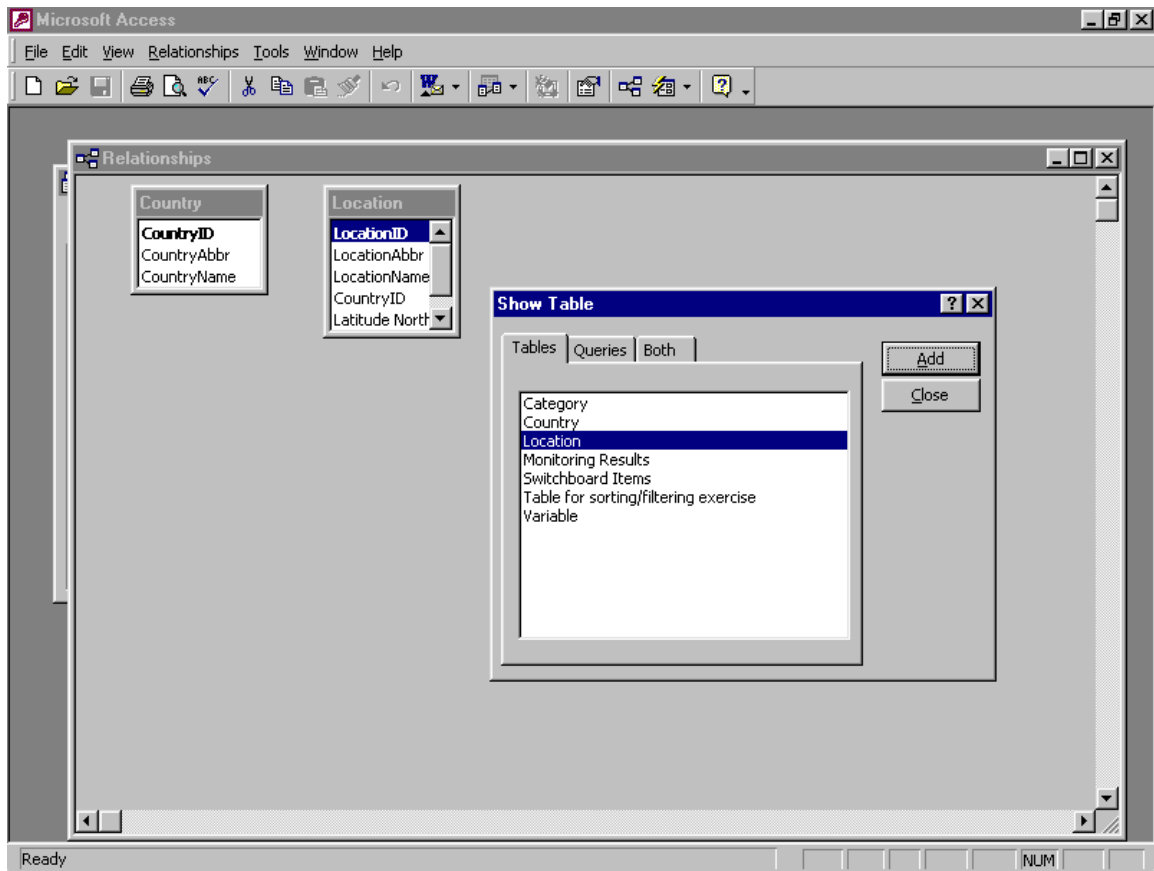
1. Document the purpose and objectives of your database.
2. Identify the data (fields) you will need to achieve these objectives.
3. Identify the tables you will need, how these fields will be distributed across the tables, and what the primary keys will be.

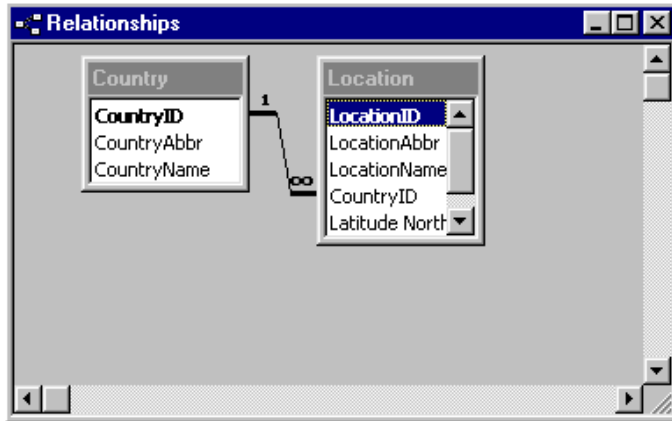
8 Establishing Relationships.

We have mentioned linkages and relationships several times so far; now we will learn what they are and how to establish them.

How to establish a relationship between tables.

Demonstration





In this example, CountryID in the Country table is a primary key.

CountryID in the Location table is a “foreign key”; a field that contains the primary key field of another table. (It cannot be called the primary key field in the Location table, because that table has its own primary key – called LocationID.)

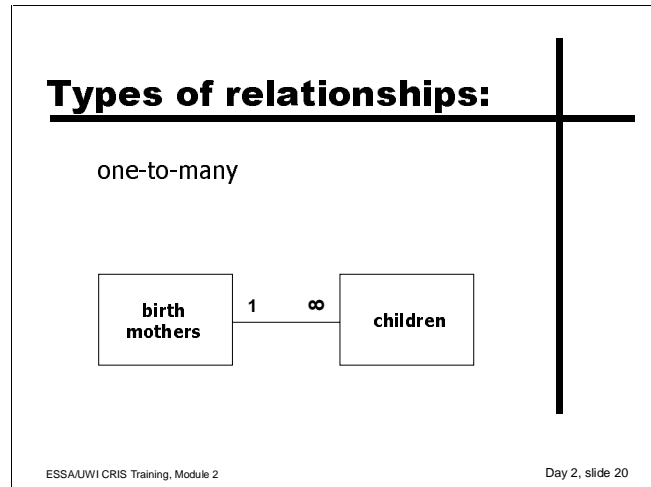
Day 2 – Slide 19

Types of relationships:

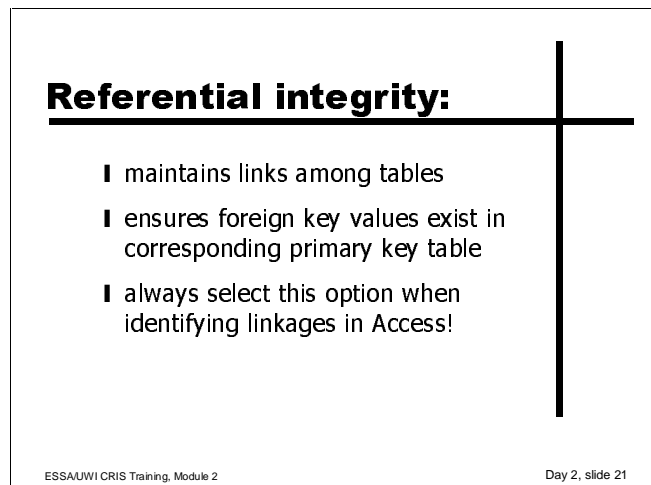
- I one-to-one
 - I e.g. citizens to driver’s licences
- I one-to-many
 - I e.g. children to birth mothers
- I many-to-many
 - I e.g. students to professors

There are three types of relationships:

- one-to-one: e.g. citizens to drivers licenses (each person has one unique driver’s license, and it is unique to that person)
- one-to-many: e.g. mothers to biological children (a mother may bear several children, but each child only has one birth mother)
- many-to-many: e.g. university students to professors (students have several professors during a year; professors have many students in their classes during a year)

Day 2 – Slide 20

- If you want to edit relationship you just double-click on the relationship line.
- If you want to delete the relationship, just single-click on the line and press the Delete key (or use the right mouse button and select the Delete option).

Day 2 – Slide 21

What does referential integrity mean?

Referential integrity refers to the capability to maintain links among the tables. It means that every foreign key value stored in a table must map to a corresponding record in the table that has this key as its primary key.

- For example, if our Locations table has a record with the number “4” in the CountryID field, then some other table in the database must contain a CountryID field set as the primary key, and there must be a record for CountryID number “4”.

You can configure Access to enforce this referential integrity, through Tools | Relationships.

Exercise

Exercise 9. Establishing relationships among tables.

1. Again in Mod2 version5.mdb, establish the following linkages:
 - Location and Country tables
 - Variable and Category tables
 - Monitoring Results, Location and Variable tables
2. Look at the relationships diagram to see how they all fit together. Have you got all the relationship types identified correctly?
3. Now open a new database, and create the tables you identified in Exercise 8. (Just build the tables, don't "populate" them with data.)
4. Establish the necessary relationships in this new database.

Lunch break

Day 2 – Slide 22

Topics covered this morning

- ✓ **Database Design**
- ✓ **Establishing Relationships**

**Topics # 9, 10
for the afternoon**

→ **Advanced Queries**
User Security

ESSA/UWI CRIS Training, Module 2 Day 2, slide 23

9 Advanced Queries.

In Day 1 we learned how to design a query for one table. Now we will learn how to design more advanced queries.

Two types of queries:

- ▮ **Select queries**
 - | selects information from tables/queries
- ▮ **Action queries**
 - | inserts, updates, deletes data

ESSA/UWI CRIS Training, Module 2 Day 2, slide 24

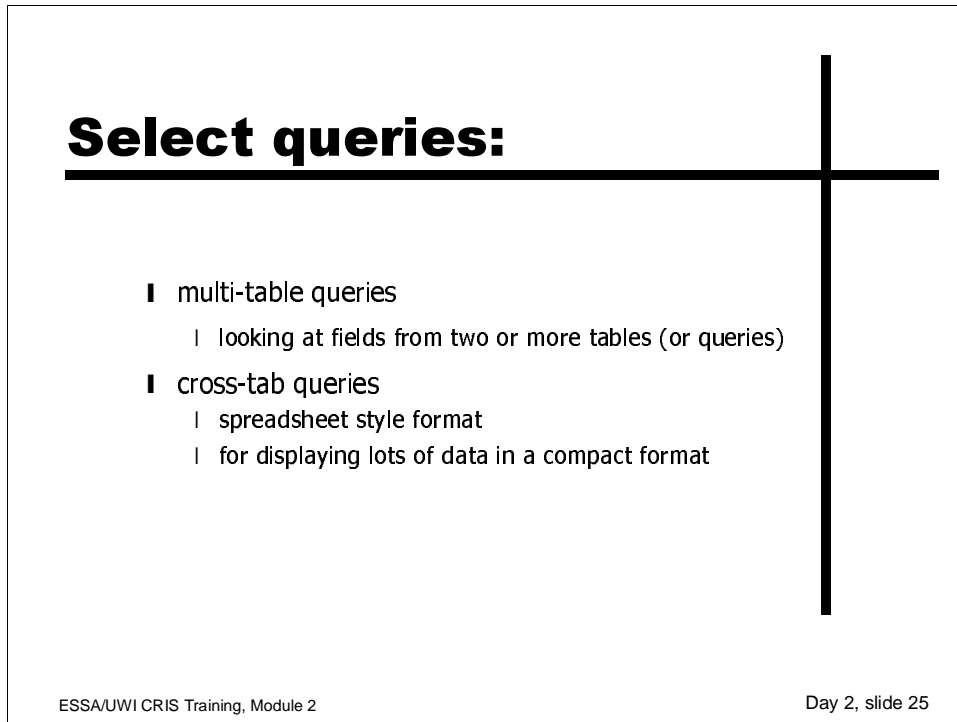
There are two types of queries in Access:

- Select queries, and
- Action queries.

We will only cover 2 types of select queries and one type of action query in this course.

During Day 1 we learned a type of select query; today we will learn 3 more:

Day 2 – Slide 25



Select queries:

- multi-table queries
 - ┆ looking at fields from two or more tables (or queries)
- cross-tab queries
 - ┆ spreadsheet style format
 - ┆ for displaying lots of data in a compact format

ESSA/UWI CRIS Training, Module 2 Day 2, slide 25

1. multi-table query
 - this is the same type of query we learned in Day 1, except we will be selecting fields from two or more tables (or queries; fields in queries can be used in other queries)
2. cross-tab query
 - allows you to put the data in more of a 'spreadsheet' format
 - allows you to display a significant amount of data in a spreadsheet format

Notes:

Action queries:

- I make-table queries
 - I for exporting or archiving query data
 - I provides a snapshot of query results at a given point in time

3. make-table query

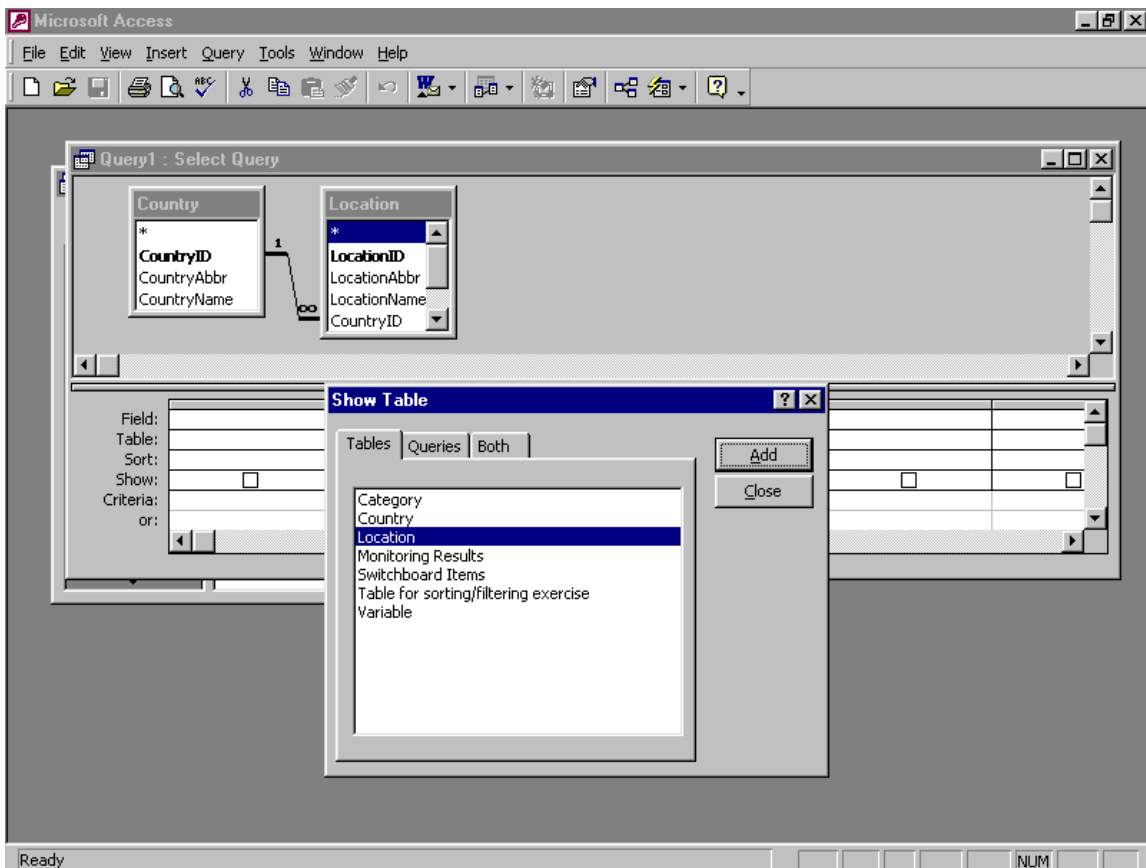
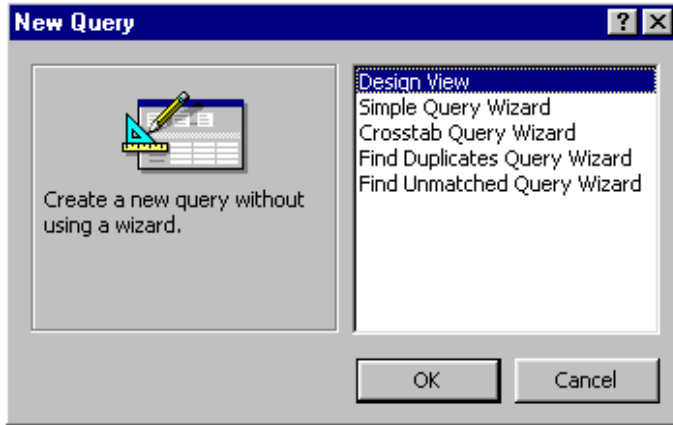
- queries are not stored in their 'results' format; they reside in your database as 'instructions' that Access activates each time you open the query (this is necessary to make sure that the results of the query are always up-to-date with the current data in your tables)
- if you want a permanent copy of the results of a query at any given time, a make-table query will 'freeze' the results in a new table
- this can be useful for archiving data

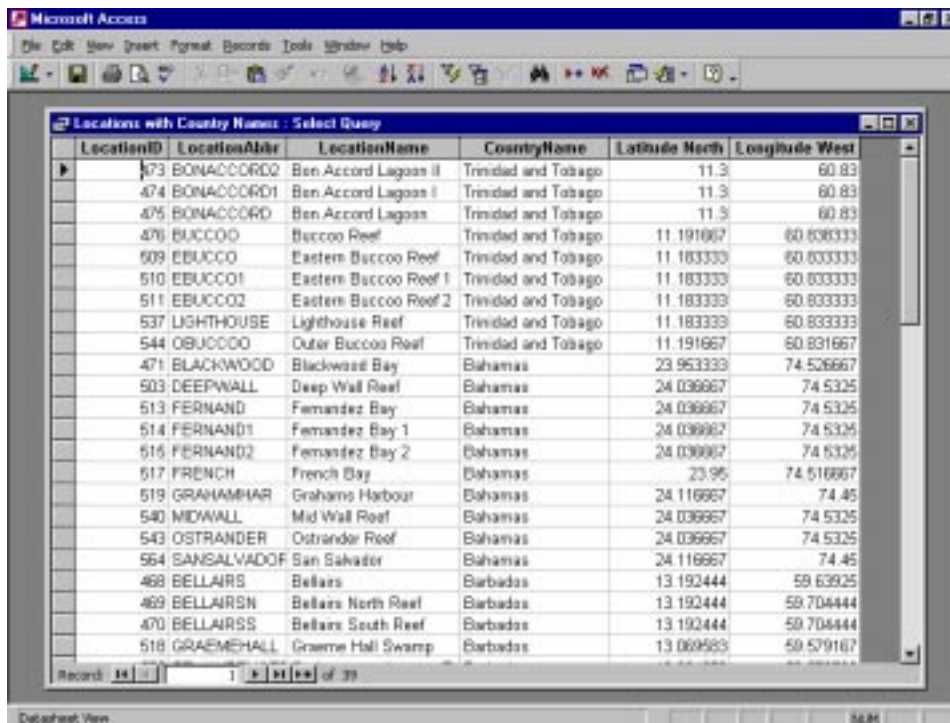
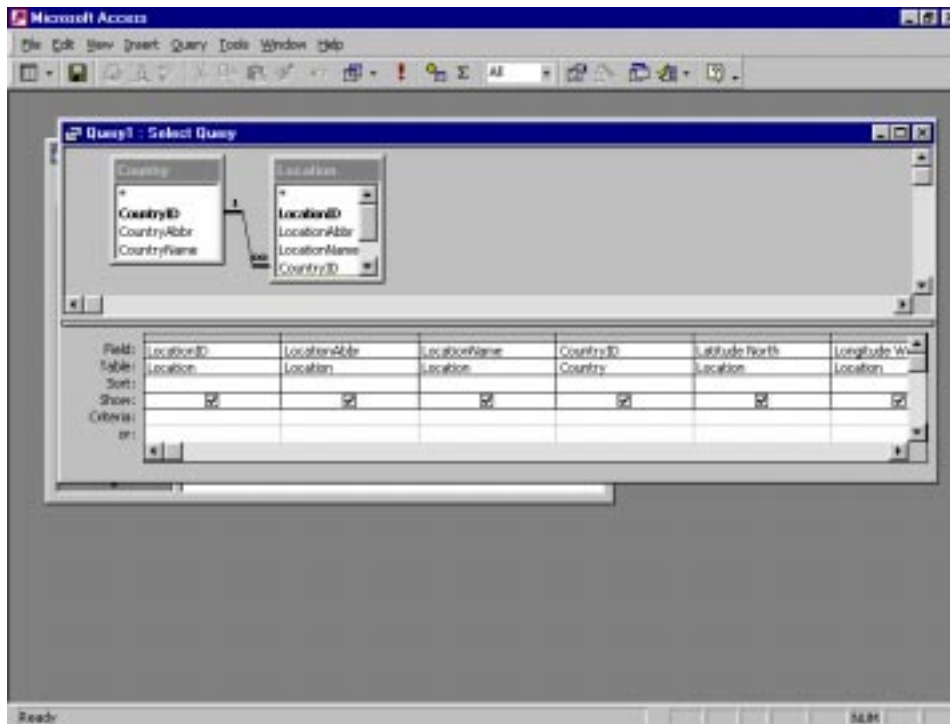
Notes:

How to create a multi-table query.

Demonstration

Queries can also display data from more than one table. This is probably the most useful feature of queries that you will learn!





- Notice that although this looks almost identical to the Location table, the difference is that now the actual country names are listed, instead of the CountryID number. This makes the data more “user friendly” (i.e. easier for users to interpret). In this way, you can see the real relationships behind the sometimes cryptic foreign keys.

Exercise

Exercise 10. Building a multi-table query.

1. Open Mod2 version6.mdb.
2. Create a multi-table query that contains the following fields: Location Name and Country Name.
3. Create a multi-table query that shows all information about categories and variables.
4. Create a multi-table query that shows monitoring results (variable, measurement values, units, category, when the measurement was taken, and where).
5. Create a multi-table query that shows these same monitoring results, but for Jamaica only.
6. Create a multi-table query that shows monitoring results for all countries, but only in the year 1995.

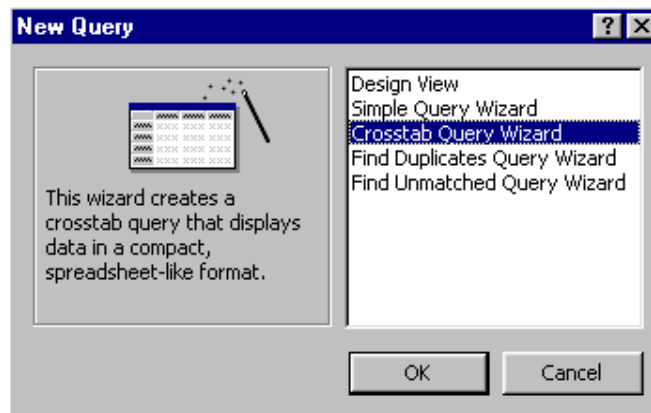
How to create a cross-tab query.

Demonstration

A cross-tab query has row headings as well as column headings, and are typically used to summarize data that is grouped by a specific category or date range.

You must create a cross-tab query from only one object, so if the fields you want to include are in more than one table, you must first create a query that collects all of the fields you want.

Access provides a cross-tab query wizard, which makes it relatively simple to design this type of query.



Crosstab Query Wizard

Which table or query contains the fields you want for the crosstab query results?

To include fields from more than one table, create a query containing all the fields you need and then use this query to make the crosstab query.

Country Names
Monitoring Results (1990-1995)
Monitoring Results (1996-2000)
Monitoring Results (all)
Monitoring Results from 1995 and later
Variable names and units

View
 Tables Queries Both

Sample:

	Header1	Header2	Header3
	TOTAL		

Cancel < Back Next > Finish

Crosstab Query Wizard

Which fields' values do you want as row headings?

You can select up to three fields.

Select fields in the order you want information sorted. For example, you could sort and group values by Country and then Region.

Available Fields:
MeasurementValue
Units
CategoryName
MeasurementDate

Selected Fields:
CountryName
LocationName
VariableName

Sample:

CountryName	LocationName	VariableName	Units1	Units2	Units3
CountryName1	LocationName1	VariableName1	TOTAL		
CountryName2	LocationName2	VariableName2			
CountryName3	LocationName3	VariableName3			
CountryName4	LocationName4	VariableName4			

Cancel < Back Next > Finish

Crosstab Query Wizard

Which field's values do you want as column headings?

For example, you would select Employee Name to see each employee's name as a column heading.

MeasurementValue
Units
CategoryName
MeasurementDate

Sample:

CountryName	LocationName	VariableName	Measurement	Measurement	Measurement
CountryName1	LocationName1	VariableName1	TOTAL		
CountryName2	LocationName2	VariableName2			
CountryName3	LocationName3	VariableName3			
CountryName4	LocationName4	VariableName4			

Cancel < Back Next > Finish

Crosstab Query Wizard

By which interval do you want to group your Date/Time column information?

For example, you could summarize Order Amount by month for each country and region.

Year

Quarter

Month

Date

Date/Time

Sample:

CountryName	LocationName	VariableName	1998	1999	2000
CountryName1	LocationName1	VariableName1	TOTAL		
CountryName2	LocationName2	VariableName2			
CountryName3	LocationName3	VariableName3			
CountryName4	LocationName4	VariableName4			

Crosstab Query Wizard

What number do you want calculated for each column and row intersection?

For example, you could calculate the sum of the field Order Amount for each employee (column) by country and region (row).

Do you want to summarize each row?

Yes, include row sums.

Fields:

MeasurementValue

Units

CategoryName

Functions:

Avg

Count

First

Last

Max

Min

StDev

Sum

Var

Sample:

CountryName	LocationName	VariableName	1998	1999	2000
CountryName1	LocationName1	VariableName1	Avg(MeasurementValue)		
CountryName2	LocationName2	VariableName2			
CountryName3	LocationName3	VariableName3			
CountryName4	LocationName4	VariableName4			

Microsoft Access

File Edit View Insert Format Records Tools Window Help

Monitoring Results [all_Crosstab - Crosstab Query]

CountryName	LocationName	VariableName	1992	1993	1994	1995
Bahamas	Blackwood Bay	Basal area mean				2.53184
Bahamas	Blackwood Bay	Basal area standard deviation				1.5537
Bahamas	Blackwood Bay	Biomass				1.49940
Bahamas	Blackwood Bay	Biomass standard deviation				1.17818
Bahamas	Blackwood Bay	Number of trees				6.699502313
Bahamas	Blackwood Bay	Rate of litterfall		0.55560337125		
Bahamas	French Bay	Biomass			14.013	1
Bahamas	Grahams Harbour	Biomass			1.866	
Barbados	Graeme Hall Swamp	Basal area mean				20.53454333
Barbados	Graeme Hall Swamp	Basal area standard deviation				10.9105
Barbados	Graeme Hall Swamp	Biomass				5.890615962
Barbados	Graeme Hall Swamp	Biomass standard deviation				2.188261105
Barbados	Graeme Hall Swamp	Number of trees				7.8533
Barbados	St. Lawrence Lagoon East	Biomass	39.7		18.584025	18.1
Barbados	St. Lawrence Lagoon West	Biomass	27.4		21.500415	15.1
Belize	Calabash Cay 1	Biomass				
Belize	Calabash Cay 2	Biomass				
Belize	Calabash Cay Mangrove	Basal area mean				10.1448
Belize	Calabash Cay Mangrove	Basal area standard deviation				4.471350287
Belize	Calabash Cay Mangrove	Biomass				4.945008486
Belize	Calabash Cay Mangrove	Biomass standard deviation				1.944220534
Belize	Calabash Cay Mangrove	Number of trees				17.5742

Record: 1 of 45

Datasheet View

Microsoft Access

File Edit View Insert Query Tools Window Help

Query1 - Select Query

Monitoring Results [all_Crosstab]

Variable

Field:	CountryName	LocationName	VariableName	Units	1995
Table:	Monitoring Results (Monitoring Results (Monitoring Results (Variable	Monitoring Results (
Sort:					
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Criteria:					
or:					

Ready

CountryName	LocationName	VariableName	Units	1995
Jamaica	Discovery Bay	Temperature: maximum daily	degrees C	31.0673009523609
Jamaica	Discovery Bay	Temperature: minimum daily	degrees C	23.7733727810651
Jamaica	Discovery Bay	Rainfall: daily cumulative	mm	2.93431085043680
Jamaica	Discovery Bay Fore Reef 1	Substratum cover	%	7.69230799039462
Jamaica	Discovery Bay Fore Reef 2	Substratum cover	%	
Belize	Twain Cays	Basal area mean	m ² /ha	3.6425668892
Barbados	Graeme Hall Swamp	Basal area mean	m ² /ha	20.5345433366667
Belize	Calabash Cay Mangrove	Basal area mean	m ² /ha	10.144694723
Trinidad and Tobago	Bon Accord Lagoon	Basal area mean	m ² /ha	15.9444828566667
Bahamas	Blackwood Bay	Basal area mean	m ² /ha	2.5318468536
Jamaica	Discovery Bay	Basal area mean	m ² /ha	6.6155898075
Barbados	Graeme Hall Swamp	Number of trees	#	7.853386217
Belize	Twain Cays	Number of trees	#	12.6675062923
Belize	Calabash Cay Mangrove	Number of trees	#	17.524200459
Jamaica	Discovery Bay	Number of trees	#	18.562184335
Bahamas	Blackwood Bay	Number of trees	#	6.68950231333333
Trinidad and Tobago	Bon Accord Lagoon	Number of trees	#	18.361540892
Bahamas	Blackwood Bay	Rate of litterfall	g/m ² /day	
Bahamas	Blackwood Bay	Biomass	g	1.4994044484
Bahamas	French Bay	Biomass	g	11.817
Bahamas	Grahams Harbour	Biomass	g	1.924

Exercise

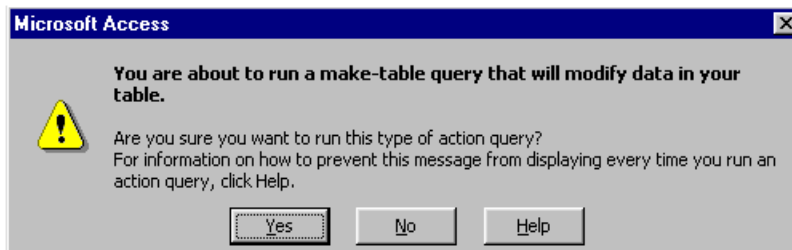
Exercise 11. Building a cross-tab query.

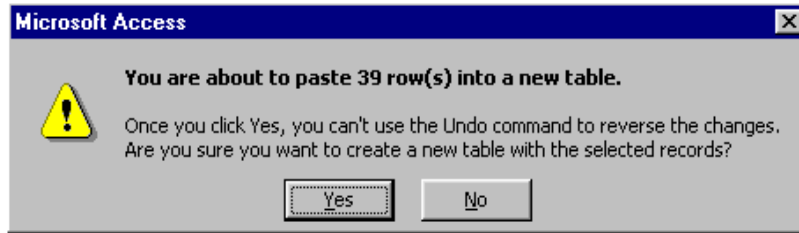
1. Open Mod2 version6.mdb
2. Create a cross-tab query that shows data averages for all variables measured, by year.
3. Modify this query so that it shows only data for Jamaica, and also shows the variable categories.

How to create a make-table query.

Demonstration

These queries are useful for making a backup ‘snapshot’ of your data at a given point in time.



**Exercise****Exercise 12.** Building a make-table query.

1. Still in Mod2 version6.mdb, create a make-table query for all monitoring results in the first half of the last decade. Name the query and resulting table appropriately.
2. Create a new make-table query for all monitoring results in the last half of the last decade.

10 User Security.*Day 2 – Slide 27*

Topic #10

User Security

- user, groups and permissions
- execute-only database
- read-only database

ESSA/UWI CRIS Training, Module 2

Day 2, slide 27

There are several ways to add security to your database.

- Users, groups and permissions
- User security using an execute-only database
- Creating a read-only database

Day 2 – Slide 28

To protect source code

- execute only database
 - MDE file (instead of MDB)
 - cannot be edited (except through application's interface)
- read-only database
 - can be read but not changed

ESSA/UWI CRIS Training, Module 2 Day 2, slide 28

Another mechanism for adding system security is configure databases so that the source code cannot be edited.

We have done this in the CRIS: the main CRIS database file has been converted from an MDB file to an MDE file.

- An MDE database is an execute-only database. Source code in MDE files cannot be viewed or edited.

The difference will become more apparent tomorrow when we start looking at the CRIS program.

An MDB file can be made read-only by setting the properties of the MDB file using Windows Explorer.

Day 2 – Slide 29

Review of Day 2

Relational Database Design

- 7 Database Design Rules/ Normalization ✓
- 8 Establishing Relationships ✓
- 9 Advanced Queries ✓
- 10 User Security ✓

ESSA/UWI CRIS Training, Module 2 Day 2, slide 29

Day 3: Using and Customizing the CRIS

We have spent the last two days learning about Microsoft Access and the fundamentals of relational databases. Now we will apply this knowledge to learn about the CRIS.

Day 3 – Slide 1

Agenda, Day 3

Using and Customizing the CRIS

- 11 System Installation
- 12 Browsing Spatial and Attribute Data
- 13 Generating and Customizing Reports
- 14 Introduction to CRIS Data Dictionary

EAAS/UWI CRIS Training, Module 2 Day 3, slide 1

Day 3 – Slide 2

Topic #11

System Installation

installing the CRIS on your computer

EAAS/UWI CRIS Training, Module 2 Day 3, slide 2

11 System Installation.

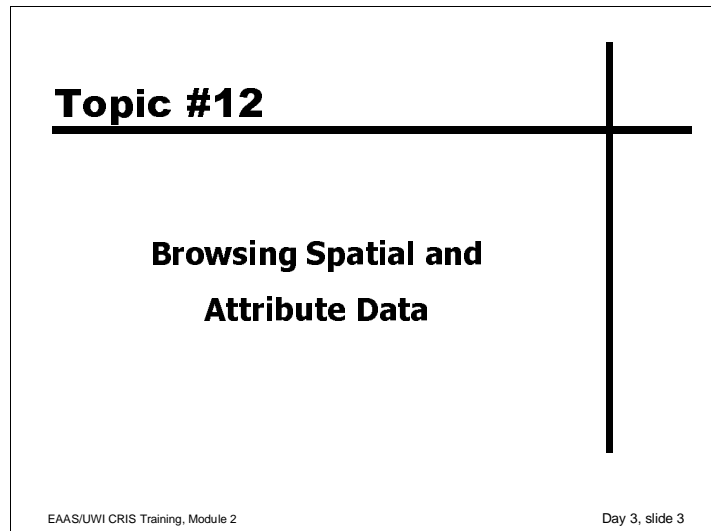
The first thing to learn is how to install the CRIS on a computer.

How to install the CRIS.

Demonstration

12 Browsing Spatial and Attribute Data.

Day 3 – Slide 3

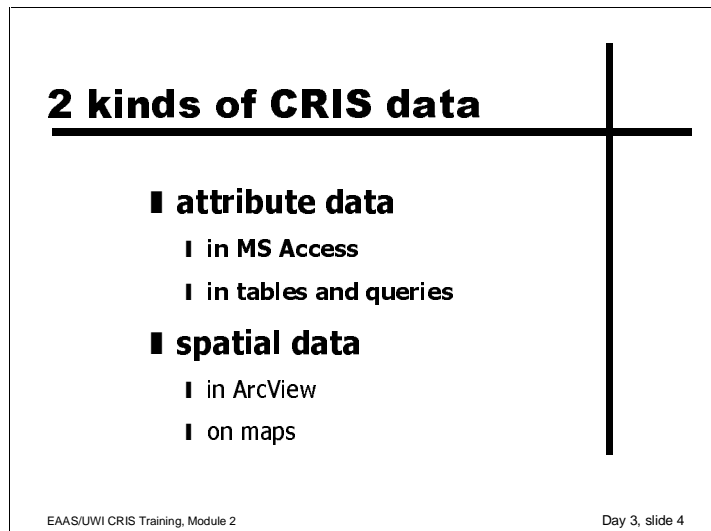


Topic #12

**Browsing Spatial and
Attribute Data**

EAAS/UWI CRIS Training, Module 2 Day 3, slide 3

Day 3 – Slide 4



2 kinds of CRIS data

- **attribute data**
 - in MS Access
 - in tables and queries
- **spatial data**
 - in ArcView
 - on maps

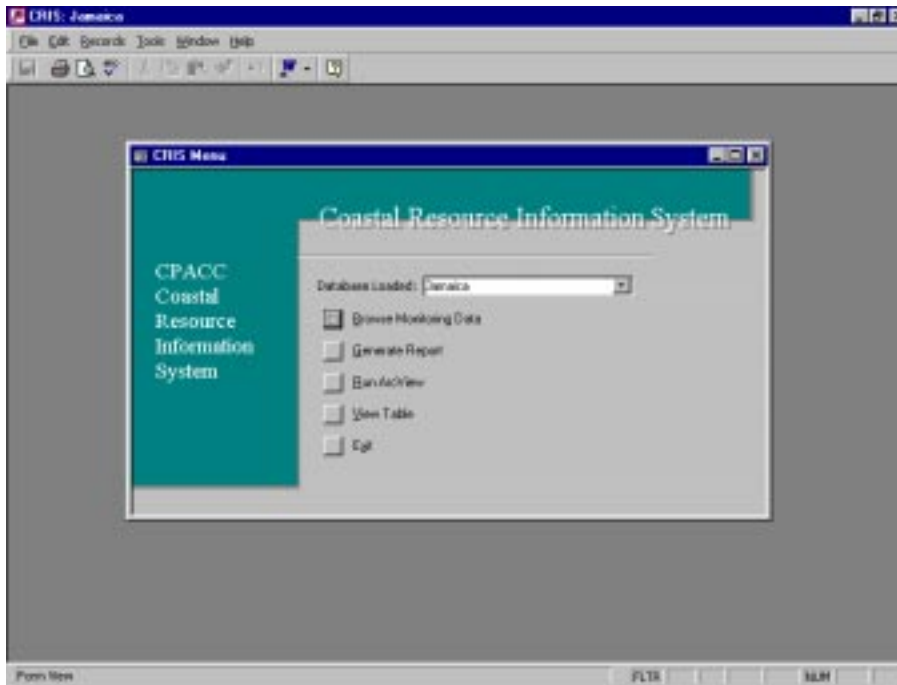
EAAS/UWI CRIS Training, Module 2 Day 3, slide 4

The CRIS includes two kinds of data:

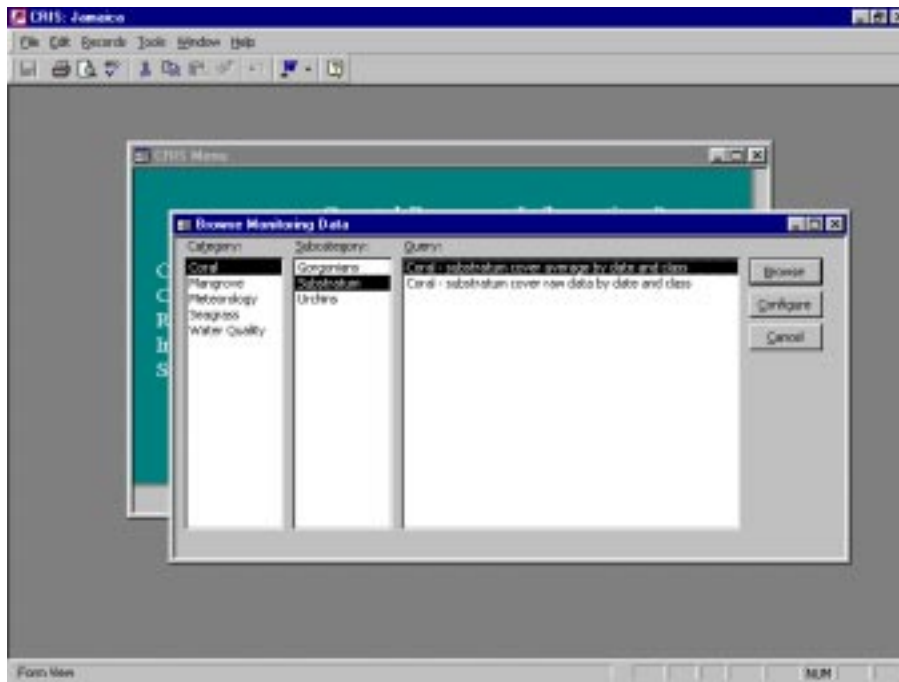
- attribute data – data in a relational database: tables and queries (Microsoft Access)
- spatial data – maps in a GIS (ArcView)

How to browse attribute data.

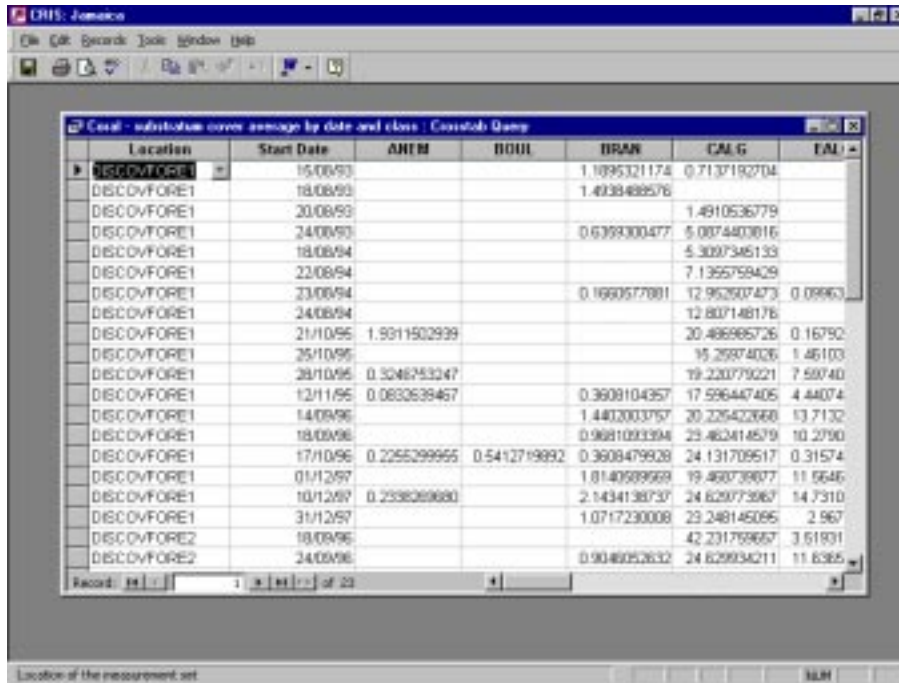
Demonstration



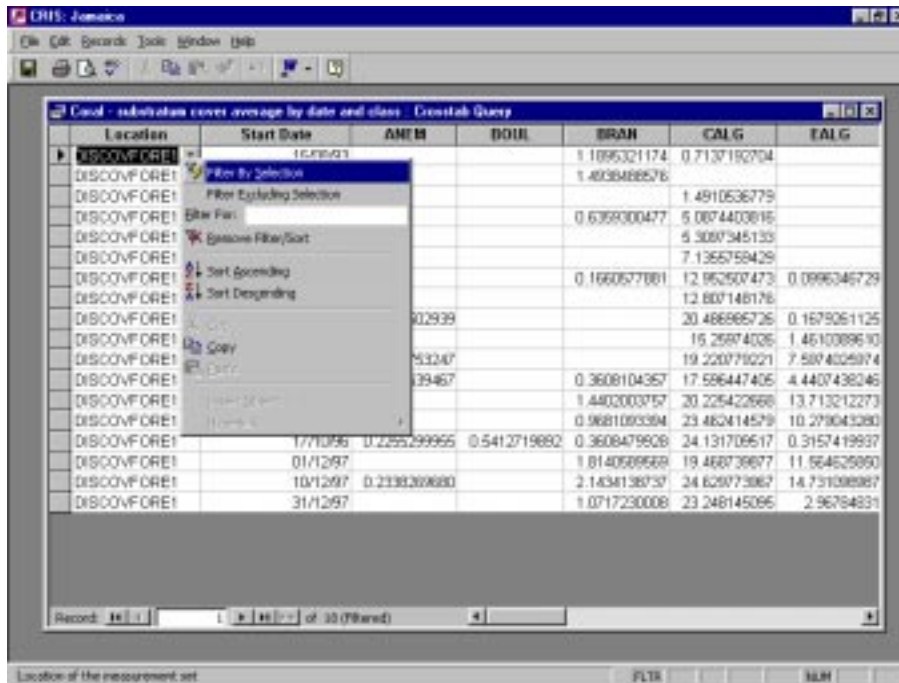
- To browse data, select the Browse Monitoring Data button on the Main Menu.
- The resulting screen shows what queries are available in the CRIS for each category and subcategory. For example, 2 queries are available to show coral substratum data.



- To view a query, highlight it in the Query box in the Browse Monitoring Data screen and then click on the Browse button.



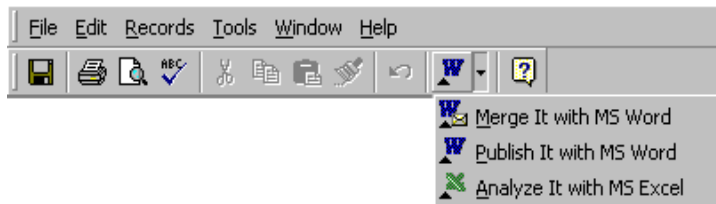
- You can filter and sort the data using the right mouse button. For example, you can filter the query by location.



- You can print the query from the File menu.

ID	Start Date	AMEM	BOLE	BRAN	CALG	EALG
RE1	15/06/93			1.1895321174	0.7137192704	
RE1	18/06/93			1.4938488576		
DISCONF	20/06/93				1.4810536779	
DISCONF	24/06/93			0.6359300477	5.0874403816	
DISCONF	18/06/94				5.3087345133	
DISCONF	22/06/94				7.1365759429	
DISCONF	23/06/94			0.1660577881	12.952507473	0.0990345729
DISCONF	24/06/94				12.607148176	
DISCONF	21/10/95	1.9311902939			20.486866726	0.1679061125
DISCONF	25/10/95				15.25874036	1.4610388630
DISCONF	28/10/95	0.3240753247			19.220779221	7.5874029974
DISCONF	12/11/95	0.0832639467		0.3608104357	17.596447405	4.4407438246
DISCONF	14/08/96			1.4402003757	20.225422668	13.713212273
DISCONF	18/08/96			0.9681093394	23.482414579	10.279043290
DISCONF	17/10/96	0.2255299955	0.5412719880	0.3608479828	24.131708517	0.3157419937
DISCONF	01/12/97			1.8140589669	19.468738677	11.564525890
DISCONF	10/12/97	0.2330200680		2.1438138737	24.629773867	14.7310389807
DISCONF	31/12/97			1.0717230008	23.248145095	2.96784831

- You can also export to word and export to excel, as we learned earlier in Module 2.

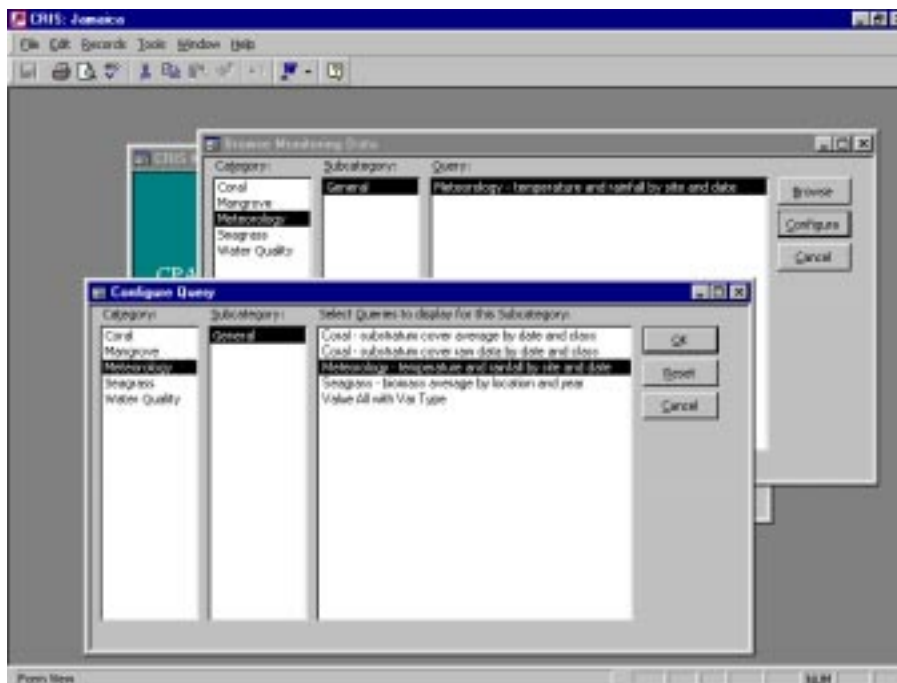


How to configure queries for browsing.

Demonstration

Which queries are displayed for any category and subcategory are determined through the Configure button.

- In the Browse Monitoring Data screen (with the category set to Meteorology), click on the Configure button.



- The resulting screen lists all of the queries that are available in the CRIS. Those highlighted in the Configure Query screen are those that will be displayed in the Browse Monitoring Data screen.

Exercise

Exercise 13. Browsing attribute data in the CRIS.

1. Open the CRIS.
2. Go to the browse feature, and answer the following questions:
 - a) How many categories currently have queries configured for them?
 - b) Which categories have no queries yet?
 - c) Which have more than one?
 - d) What was the average seagrass biomass at location "Discovery Bay Seagrass B" in 1996?
 - e) How many raw data records are there for coral substratum cover?
 - f) How many raw data records are there for mangrove trees?
 - g) How many coral substrata classes are there?
 - h) How many raw data readings have been recorded for the coral substratum called "FALG"?
 - i) How many raw data readings have been recorded for coral substratum on October 17, 1996?
 - j) What is the largest percent cover reading recorded for any coral substratum?
 - k) What is the smallest percent cover reading recorded for any coral substratum?
 - l) When was the earliest temperature record in the database recorded?
 - m) How many meteorological records were recorded at a time other than 9:00 in the morning?
 - n) What percentage of the meteorological records were recorded at 8am?

3. Configure the CRIS so a coral query appears in the mangrove category.
4. Then fix the configuration for mangrove so that it is correct again (i.e. no queries shown).

How to browse tables.

Demonstration

Another way to browse the data is to browse the raw information in the CRIS tables. This is not a very easy way to view the data, as the data linkages are not obvious, so we don't recommend you use this method for any sort of data interpretation. What this does provide you with, however, is a method for determining what the data ranges are (e.g., all the categories or locations currently listed in the database).

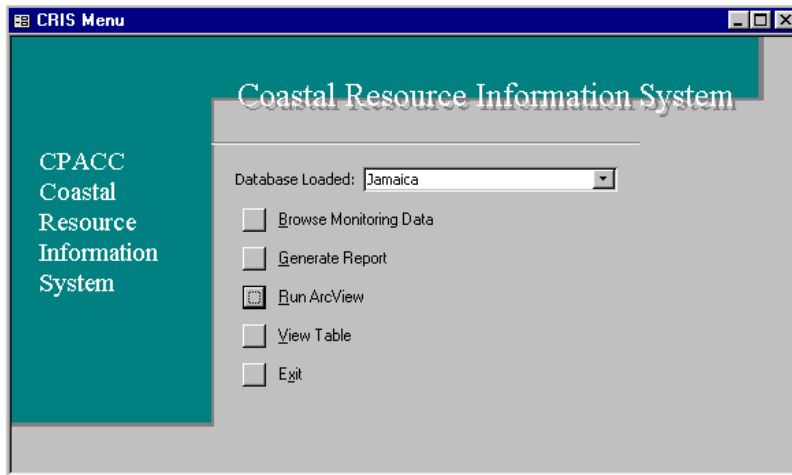


Category : Table			
	Category	Category Abbr	Category Name
+	1	METEO	Meteorology
+	2	WATER	Water Quality
+	3	CORAL	Coral
+	4	MANGROVE	Mangrove
+	5	SEAGRASS	Seagrass
*	(AutoNumber)		

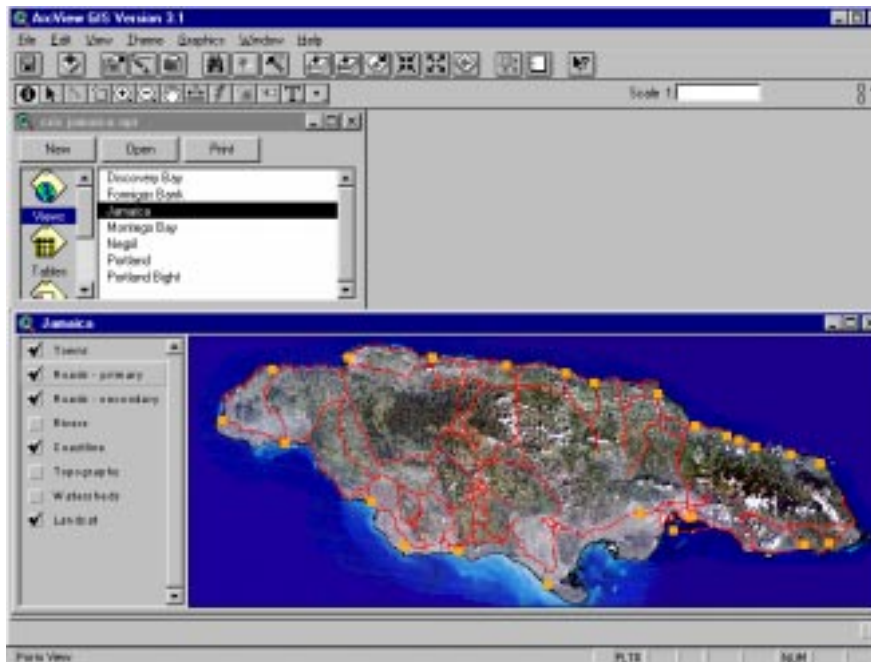
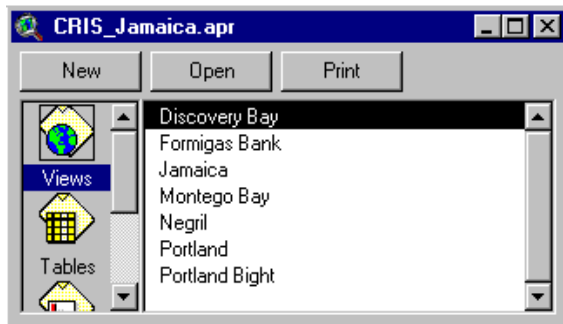
Record: 1 of 5

How to browse spatial data.

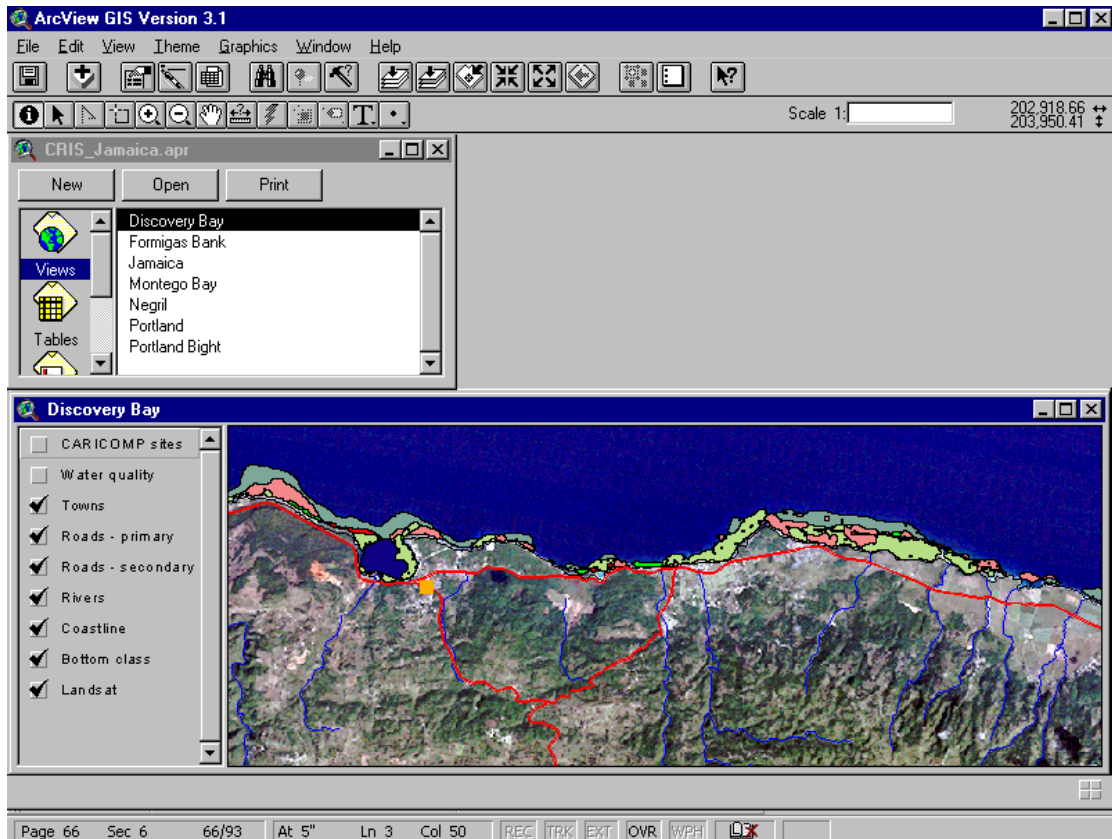
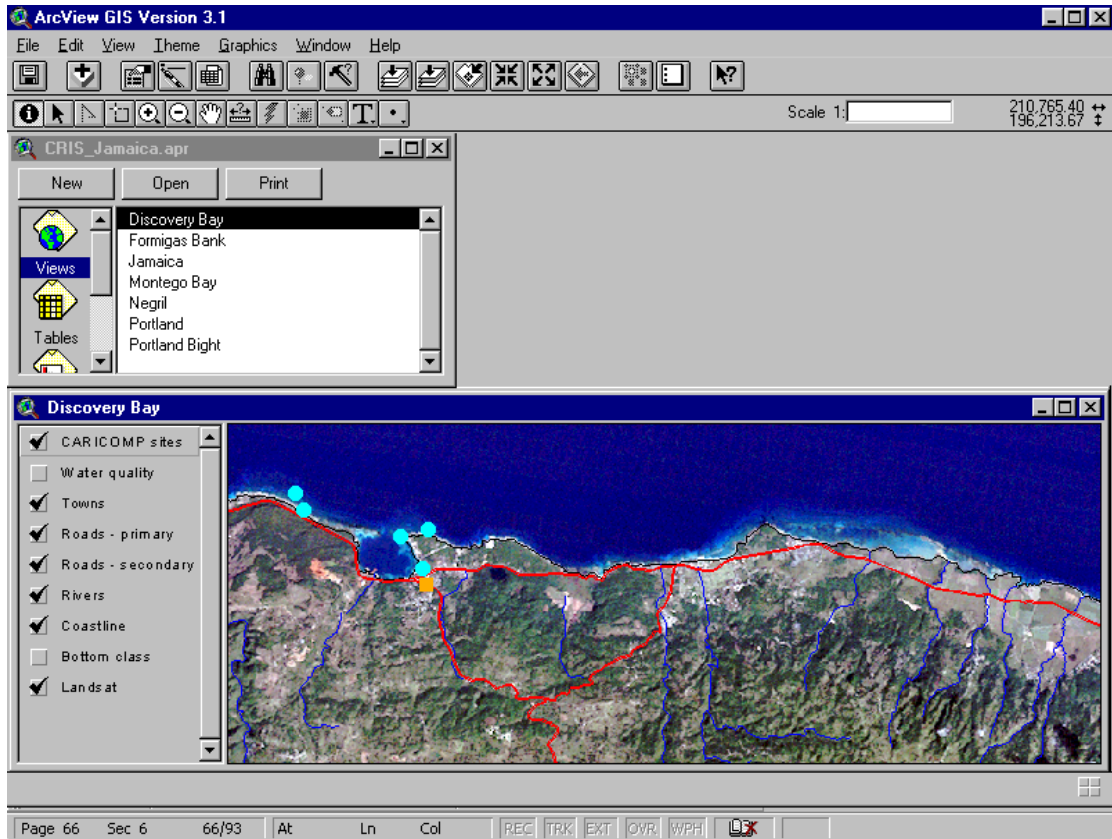
Demonstration



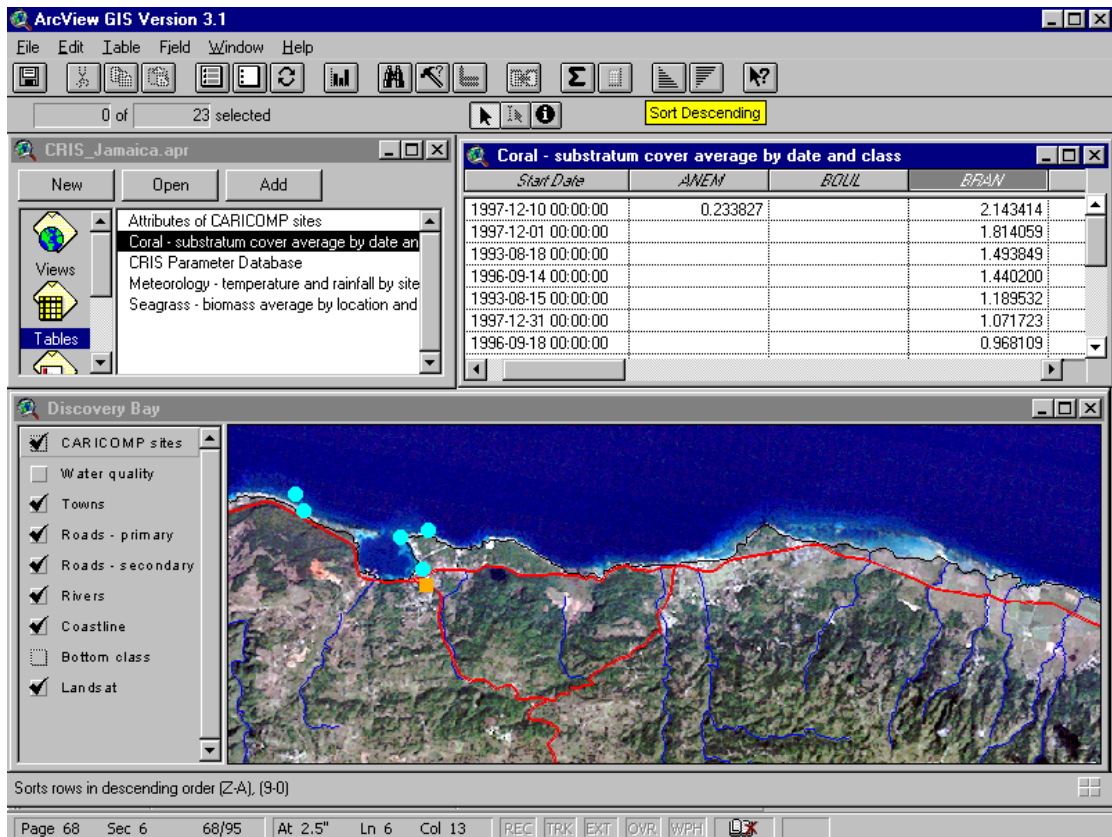
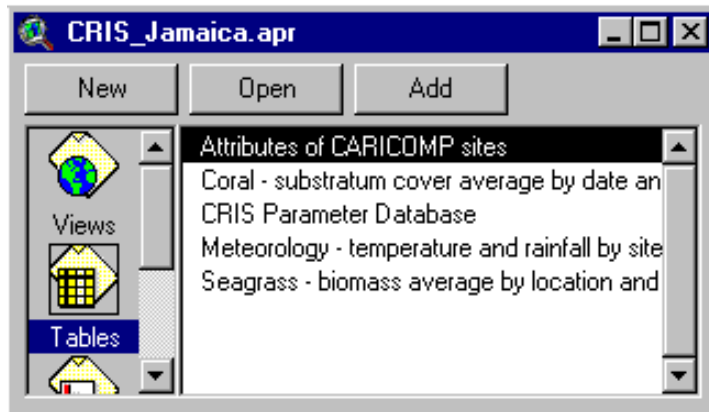
Views and Themes

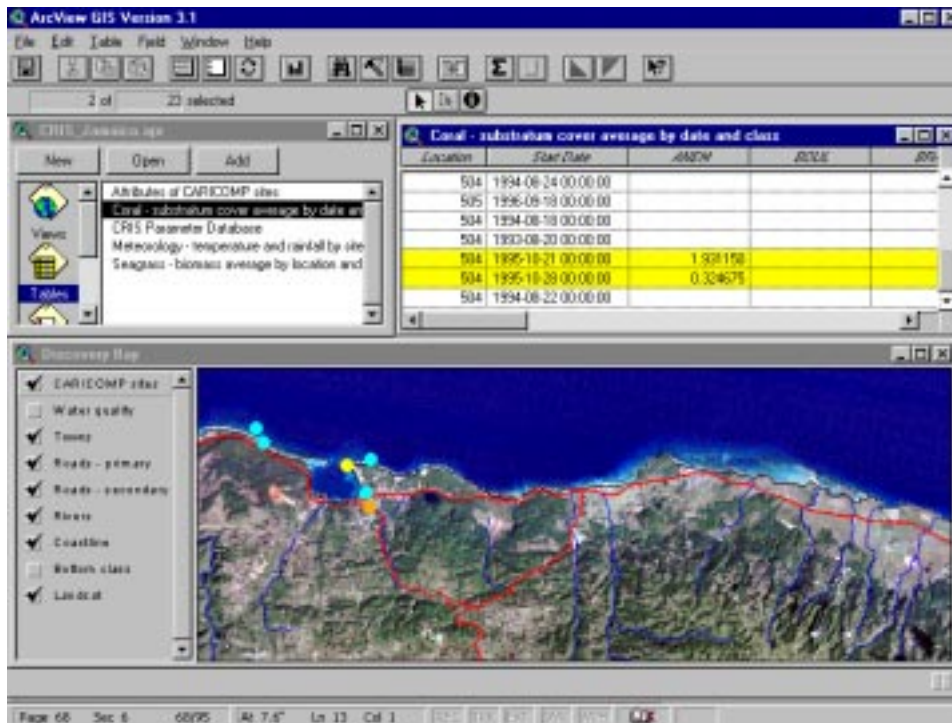
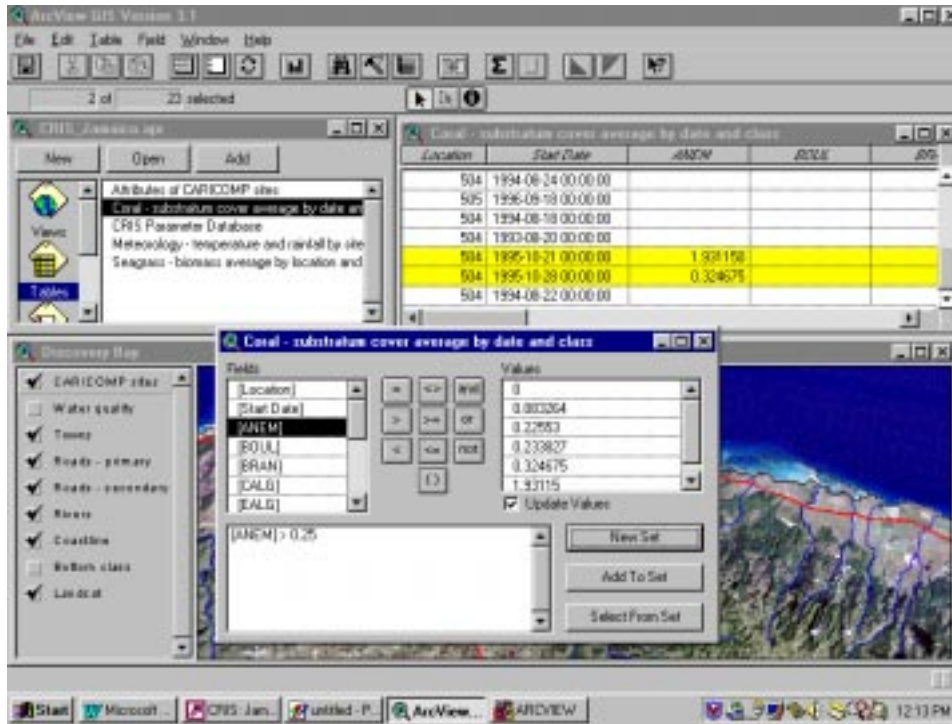


(Note: although this printscreen shows “ArcView GIS Version 3.1” on the title bar, users should run the CRIS on ArcView Version 3.2 only.)



Tables





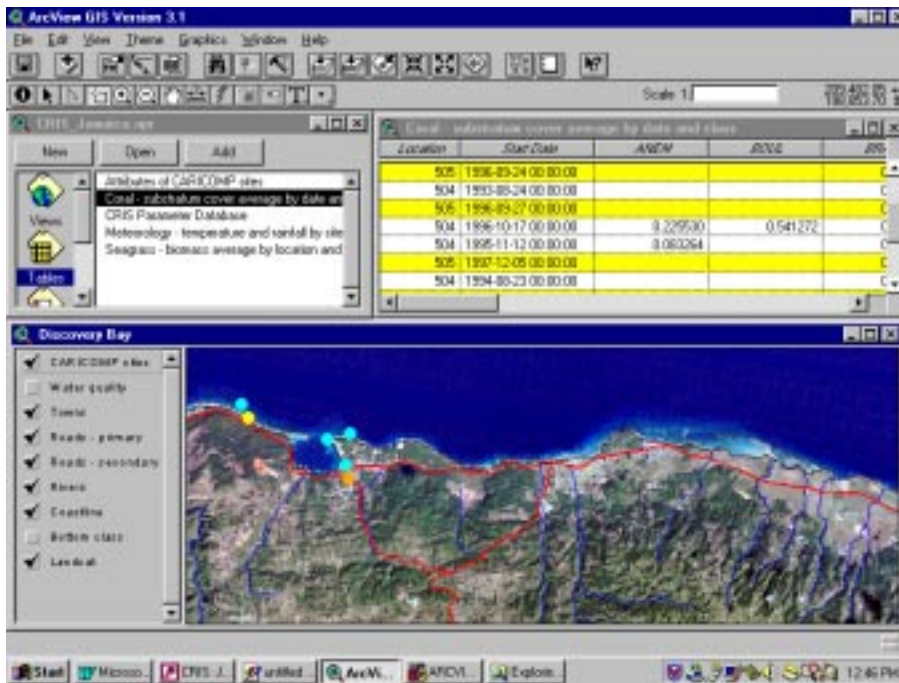
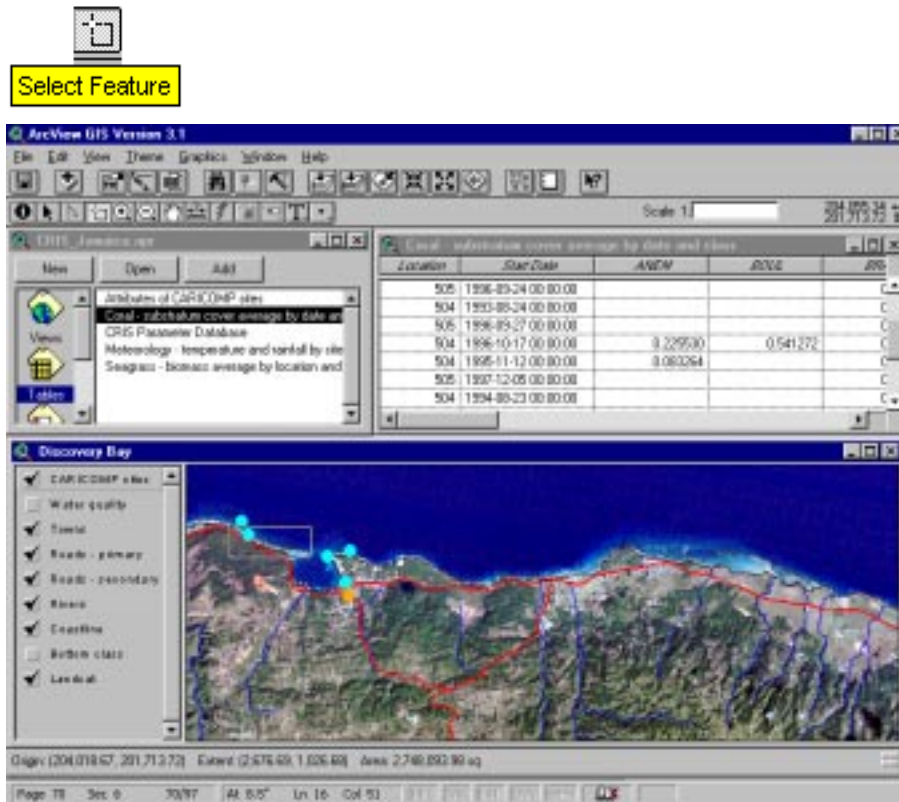
Relationships between Views and Tables

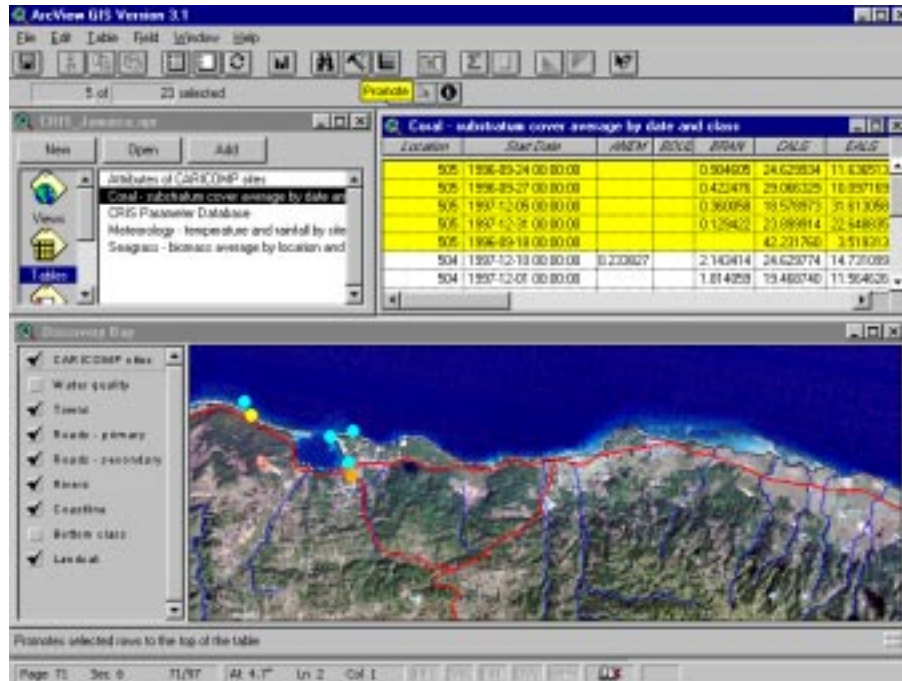
The example above shows that data in the CRIS Access database (e.g. the Coral – substratum cover average by date and class” query) is related to the CARICOMP theme in the ArcView map of Discovery Bay.

By using ArcView’s Table | Query function, we can select a subset of these data and see where these

samples were taken on the map.

Conversely, we can also select a subset of the sample locations on the map, and see the corresponding data in the table.





Exercise

Exercise 14. Browsing spatial data in ArcView.

From the CRIS Menu, select the ArcView button.

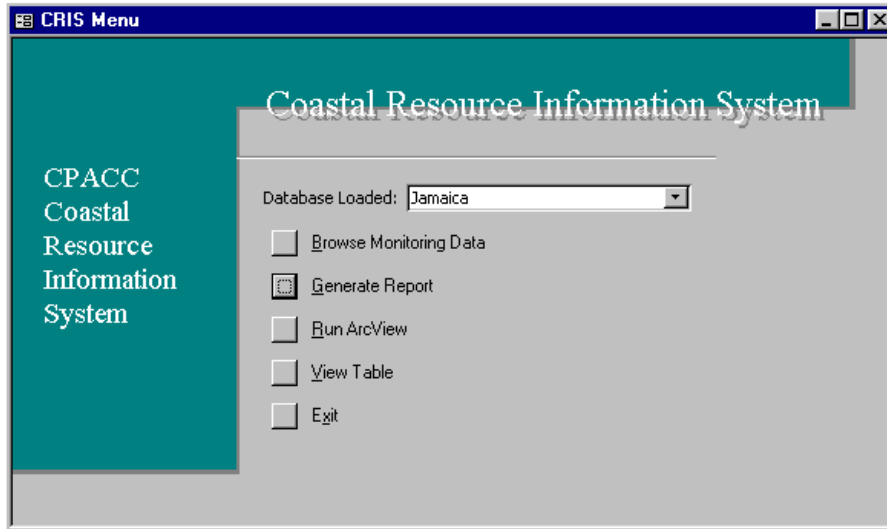
1. Which theme should be closer to the top of the list of themes in the View for Jamaica: topography or rivers? Why?
2. What are the differences between the view for Jamaica versus Discovery Bay?
3. Is it possible to use the Seagrass table to learn the location on the map of the seagrass sampling locations? How?
4. How do the Tables in ArcView relate to the CRIS database?
5. With the View window active, select Theme | Clear Selected Features to revert all the CARICOMP sites on the Discovery Bay view back to blue dots. Then use the Select Feature button to select the lowest (southern most) of the dots. What kind of data has been sampled at this site? How did you discover this answer?
6. What is the location name for location #505? How did you discover the answer?
7. Daily cumulative rainfall at location DISCOV (#508) was 68mm for which 24-hour period (i.e. on what days)?
8. What do the location numbers (e.g. #508 in the question above) mean, and where do they come from?

Lunch break

13 Generating and Customizing Reports.

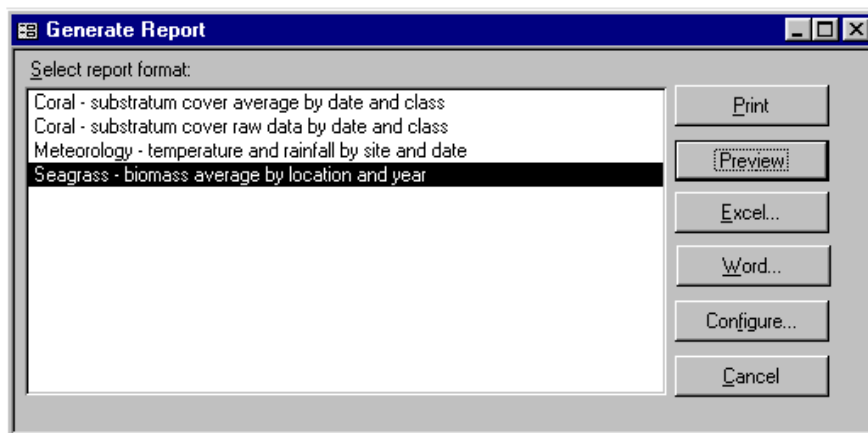
How to generate reports.

Demonstration



Previewing output

- Previewing is just as simple; select the format and click on the Print button.



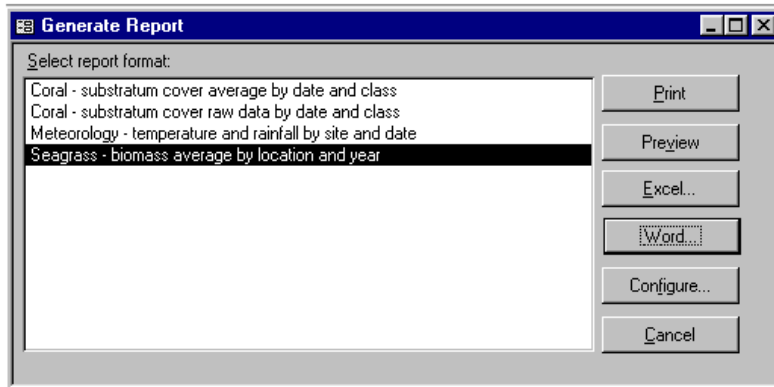
Category Name	Location	Location Name	1993	1994
Seagrass	506	Discovery Bay Seagrass A	7.62	6.342
Seagrass	507	Discovery Bay Seagrass B		

Sending output to a printer

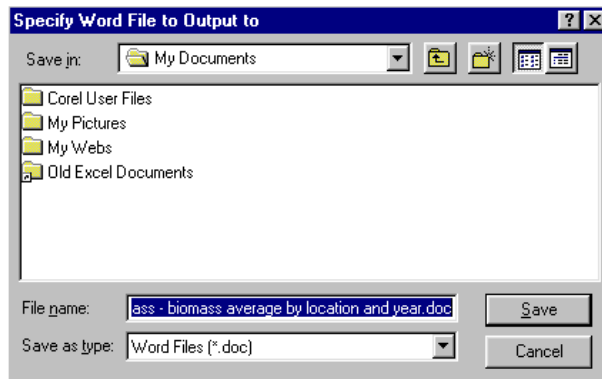
- Sending output to a printer is very simple; just select the format and click on the Print button.

Output in Word format

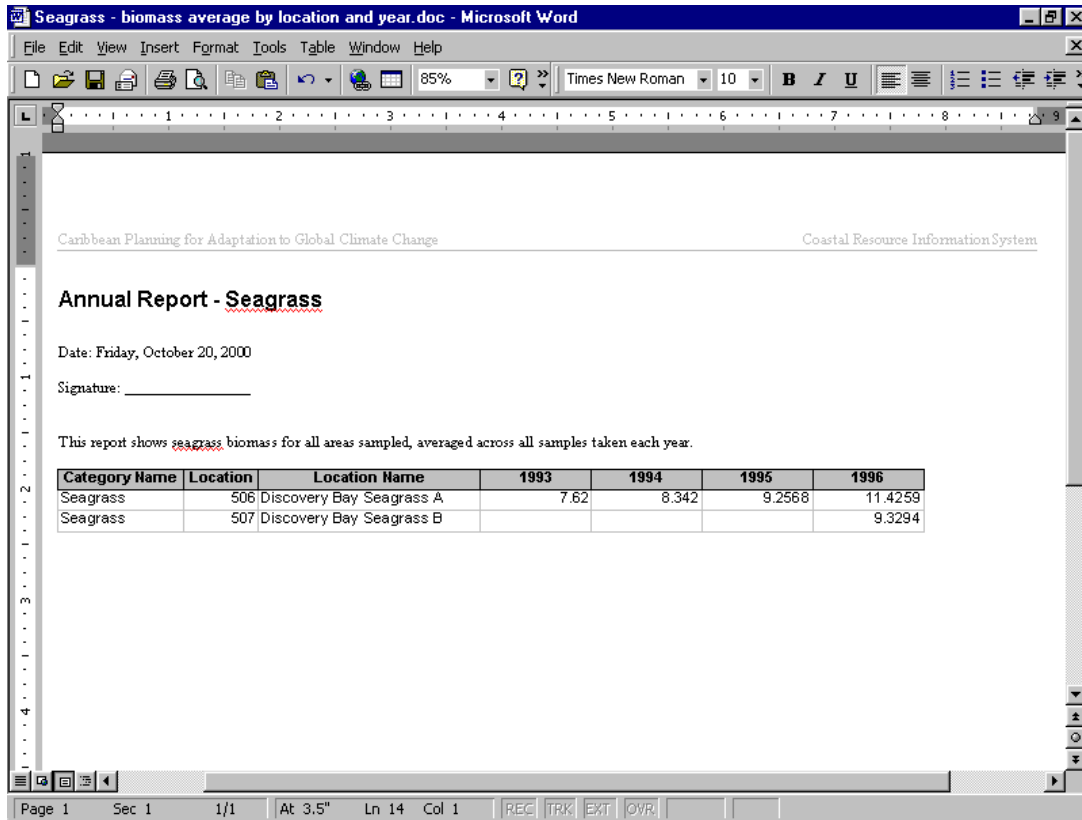
- You can also have your output appear directly in a Word or Excel file.
- Select “Seagrass – biomass average by location and year”, and click on the Word button.



- Click on the Save button to accept the default file name and location to save the report to.

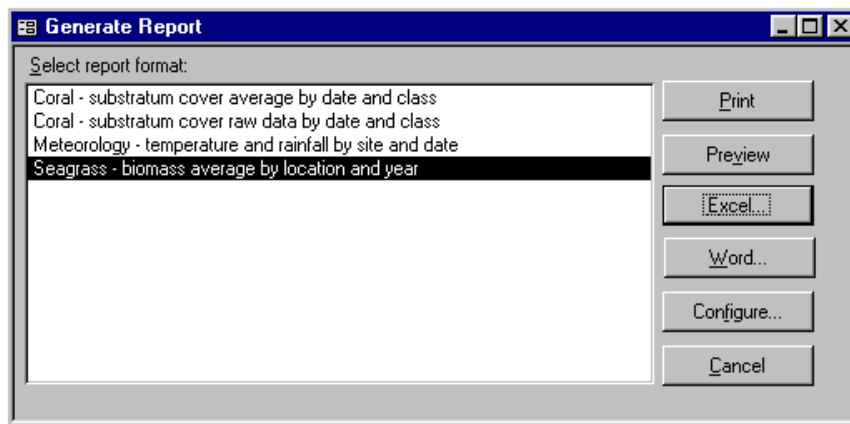


- Notice that Word opens automatically, with the same data as that previewed a minute ago!
- Also notice that there is also a title, header and footer – this comes from a pre-determined template that we will discuss in a few minutes.



Output in Excel format

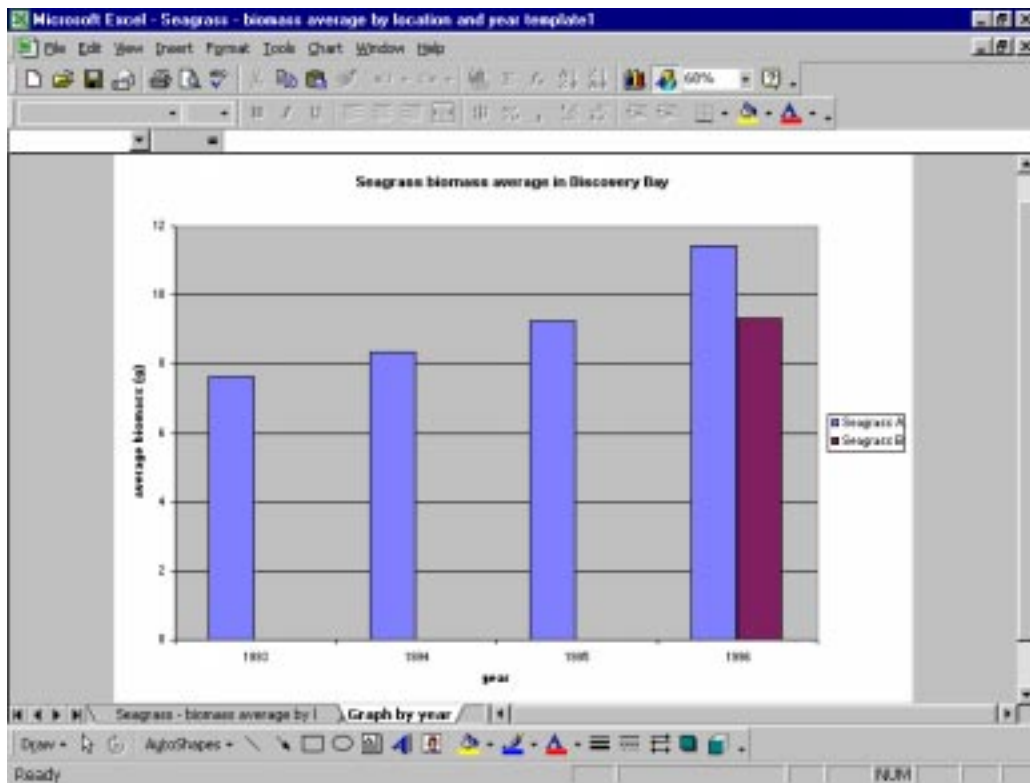
- Select “Seagrass – biomass average by location and year”, and click on the Excel button.



- Click on the Save button to accept the default file name and location to save the report to.
- Notice how Excel opens automatically, with the same data as that previewed a minute ago, except that now the data are in a spreadsheet.

The screenshot shows a Microsoft Excel spreadsheet titled "Seagrass - biomass average by location and year template1". The spreadsheet contains the following data:

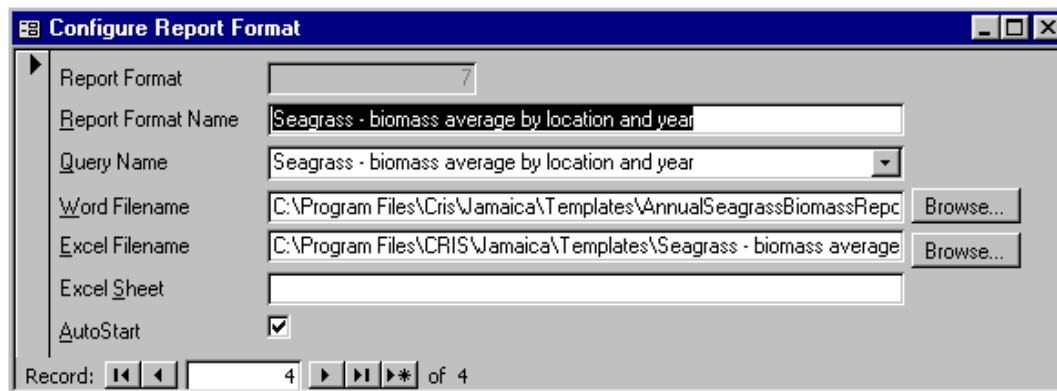
Category Name	Location	Location Name	1993	1994	1995	1996
Seagrass	506	Discovery Bay Seagrass A	7.62	8.342	9.2958	11.4259
Seagrass	507	Discovery Bay Seagrass B				9.3284



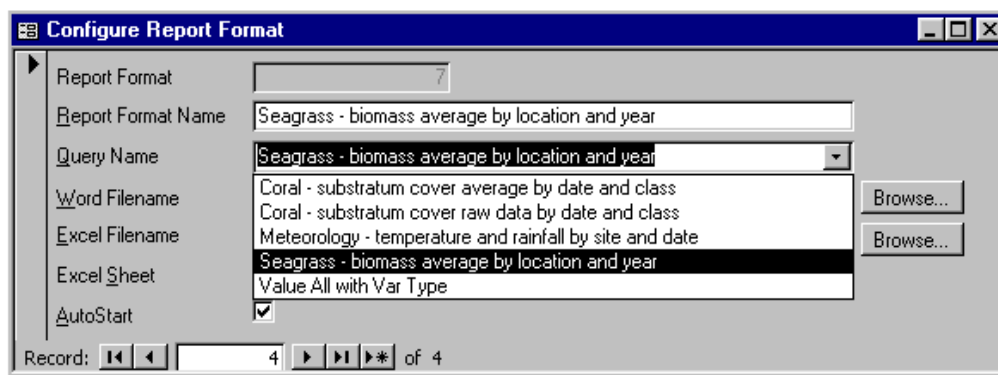
How to configure and customize reports.

Demonstration

To “configure” a report means to identify a new report name for a query, and to specify (if any) what Word and Excel templates to use.



- In the Query Name field, select the query you want to create a new report for.
 - If you click on the down-arrow at the right side of the field, you will get a listing of the available queries in the CRIS from which to choose. (The query for the new report you want to create must already exist; otherwise you must first create the query. We will cover this on Day 4.)



- The Report Format Name should be a name very similar, if not identical, to the query name you have selected.
- Specify the Word file template to use when the file is sent to Word (the template must already exist as a Word file in C:\Program Files \CRIS\XXXX\Templates).
- Specify the Excel file template to use when the file is sent to Excel (the template must already exist as a Excel file in C:\Program Files \CRIS\XXXX\Templates).
- Click the Autostart button so it is checked – this will start Word or Excel automatically
- When you next see the Generate Report window, your new report format will be listed.

Exercise 15. Creating, configuring and customizing reports.

1. Run the CRIS.
 2. Two of the four report formats are not completely configured. Which ones, and what is missing?
 3. From the Generate Report window, select the “Coral – substratum cover raw data by date and class” report and click the Word button. What happens?
 4. Now configure the “Coral – substratum cover raw data by date and class” report so that it will use the StandartReport.doc template. (Where is this template located?)
 5. Again from the Generate Report window, select the “Coral – substratum cover raw data by date and class” report and click the Word button. What happens? What is different from when you did this in step #3?
 6. From the Generate Report window, select the “Coral – substratum cover raw data by date and class” report and click the Excel button. What happens? What do you see if you go to File | Print Preview?
 7. Now configure the “Coral – substratum cover raw data by date and class” report so that it will also use the StandardSpreadsheetReport.xls template.
 8. Again from the Generate Report window, select the “Coral – substratum cover raw data by date and class” report and click the Excel button. What happens? What is different from when you did this in step #6? (Hint: preview the report again!)
 9. Configure the meteorology report so that it also uses the same generic Word and Excel templates.
-

Notes:

14 Introduction to CRIS Data Dictionary.

About the CRIS directory structure.

Demonstration

The CRIS User's Version consists of the following files and folders, assuming installation into the default folder, where XXXX is the name of the country (or other collection, such as the whole Caribbean) for which data is being installed:

C:\Program Files\CRIS\CRIS.MDE

- Read-only version of CRIS.MDB Access 2000 file.
- Installed for Administrator's Version and User's Version. This database file contains the generic CRIS 'application', but none of the country-specific data.

C:\Program Files\CRIS\XXXX

- Folder containing all program files relating specifically to country XXXX.

C:\Program Files\CRIS\XXXX\CRIS XXXX.mdb

- The back-end CRIS database containing all the tables and queries with data specific to XXXX.

C:\Program Files\CRIS\XXXX\AvData

- Folder containing ArcView project files and data.

C:\Program Files\CRIS\XXXX\Templates

- Folder containing all of the Excel 2000 and Word 2000 file templates for the report formats. Each country can tailor the standard templates to better meet their particular needs, or add new templates.

C:\Program Files\CRIS\XXXX\Metadata

- Folder containing metadata records (in either text or HTML format) for any data entered into the CRIS through the Source table.

About the CRIS database structure.

Demonstration

Tables

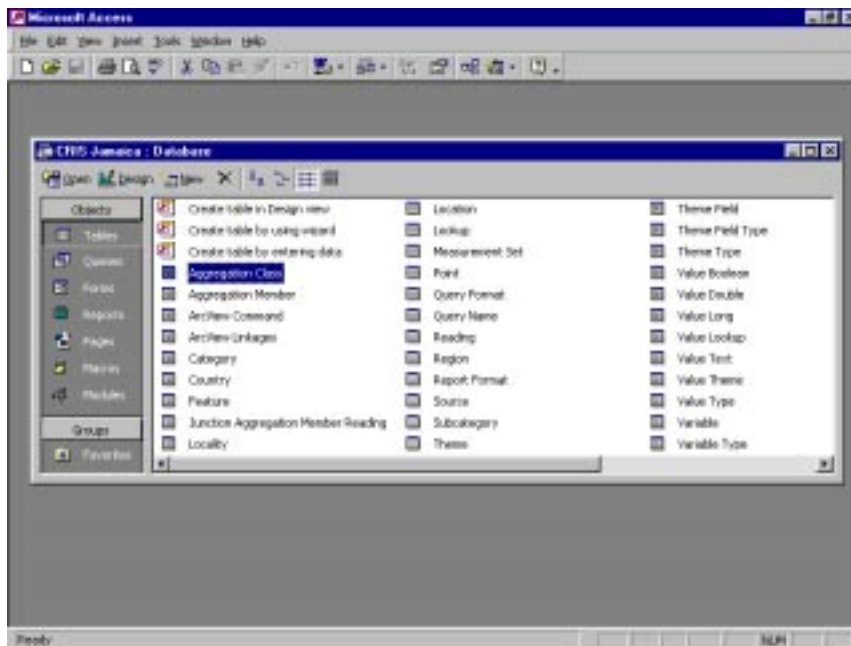


Table 1. List and Description of Data Tables.

Data Table	Description
Aggregation Class	The categories by which variables can be aggregated and disaggregated.
Aggregation Member	The elements within each aggregation class.
Category	The general categories of data being collected (e.g., oceanography, water quality, fishing).
Country	The countries for which data have been collected.
Feature	The list of non-point spatial features (i.e., lines and/or polygons) for each named location.
Junction Aggregation Member Reading	Table required to create a many-to-many relationship between the Aggregation Member table and the Reading table.
Locality	Specific localities, or communities, within each region in a country (e.g., pilot project areas).
Location	Specific locations where samples were collected (e.g., "Sampling Station #1", "Bucco Reef") – each named location can refer to one or more points, lines or polygons.
Lookup	The possible values for variables that use a lookup.
Measurement Set	Sets of measurements collected at a specific date, time and location.
Point	The coordinates (latitude and longitude) associated with each point-based location.
Reading	The values measured for each variable in a measurement set.
Region	The geographic regions within which data have been collected. This might include a parish or other administrative unit within a country.
Source	The sources of the information for each measurement set.

Data Table	Description
Subcategory	The general subcategories of data being collected (e.g., coral substratum, mangrove litterfall).
Theme	The ArcView map themes on which spatial features are found.
Theme Field	The ArcView theme attribute fields used to identify spatial features.
Theme Field Type	The possible ArcView field types.
Theme Type	The possible theme types (e.g., line, polygon, images).
Value Boolean	Values for readings stored as boolean.
Value Double	Values for readings stored as double precision.
Value Long	Values for readings stored as long integer.
Value Lookup	Values for readings stored as a lookup.
Value Text	Values for readings stored as text.
Value Theme	For values stored in an ArcView theme table, indicates the theme field containing the value data.
Value Type	The possible places where value data can be stored.
Variable	The substances or properties being measured (e.g., dissolved oxygen, % sponges, # of craft boats).
Variable Type	The possible variable types (e.g., boolean, double, long, etc.).

There are three key tables in the database:

Measurement Set – this table contains one record (or row) for each set of measurements in the database. A measurement set represents a unique combination of date, time and location, at which one or more variables were measured.

Reading – this table contains one record for each reading recorded in the database. There can be multiple readings associated with each measurement set – one for each variable measured.

Location – this table contains one record for each named location in the database. Each location is then georeferenced using either point coordinates (see Point table), or by linking the location to features (polygons, lines) on a GIS map theme (see Feature, Theme and Theme Field tables).

Table 2 lists and describes each of the fields contained within the data tables. Each field listed here represents a column in the data table; the first field in every data table serves as the table's primary key.

Table 2. Fields Included in Each Data Table.

Data Table	Field	Description
Aggregation Class	Aggregation Class	Unique identifier for the aggregation class
	Aggregation Class Abbr	Abbreviation for the aggregation class
	Aggregation Class Name	Name of the aggregation class
	Subcategory	Subcategory
	Aggregation Class Comment	Comment for the aggregation class
Aggregation Member	Aggregation Member	Unique identifier for the aggregation member
	Aggregation Class	Identifier for the aggregation class
	Aggregation Member Abbr	Abbreviation for the aggregation member
	Aggregation Member Name	Name of the aggregation member
	Aggregation Member Comment	Comment for the aggregation member
Category	Category	Unique identifier for the category
	Category Abbr	Abbreviation for the category
	Category Name	Name of the category
Country	Country	Unique identifier for the country
	CountryID	Unique numeric ID for the country
	Country Abbr	Abbreviation for the country
	Country Name	Name of the country
Feature	Feature	Unique identifier for the feature
	FeatureID	Unique numeric ID for the feature
	Location	Identifier for location associated with the feature
	Theme Field	Identifier for the field in the ArcView theme table providing the lookup for the feature
	Theme Field Value	Value for the theme field associated with the feature
Junction Aggregation Member Reading	Aggregation Member	Aggregation member linked to a reading
	Reading	Reading linked to an aggregation member
Locality	Locality	Unique identifier for the locality
	LocalityID	Unique numeric ID for the locality
	Locality Abbr	Abbreviation for the locality
	Locality Name	Name of the locality
	Region	Region in which the locality is located
	Locality Comment	Comment for the locality
Location	Location	Unique identifier for the location
	Location Abbr	Abbreviation for the location
	Location Name	Name of the location
	Point?	Is this a point location?
	Locality	Locality within which the location is situated
	Location Comment	Comment for the location
Lookup	Lookup	Unique identifier of this lookup value

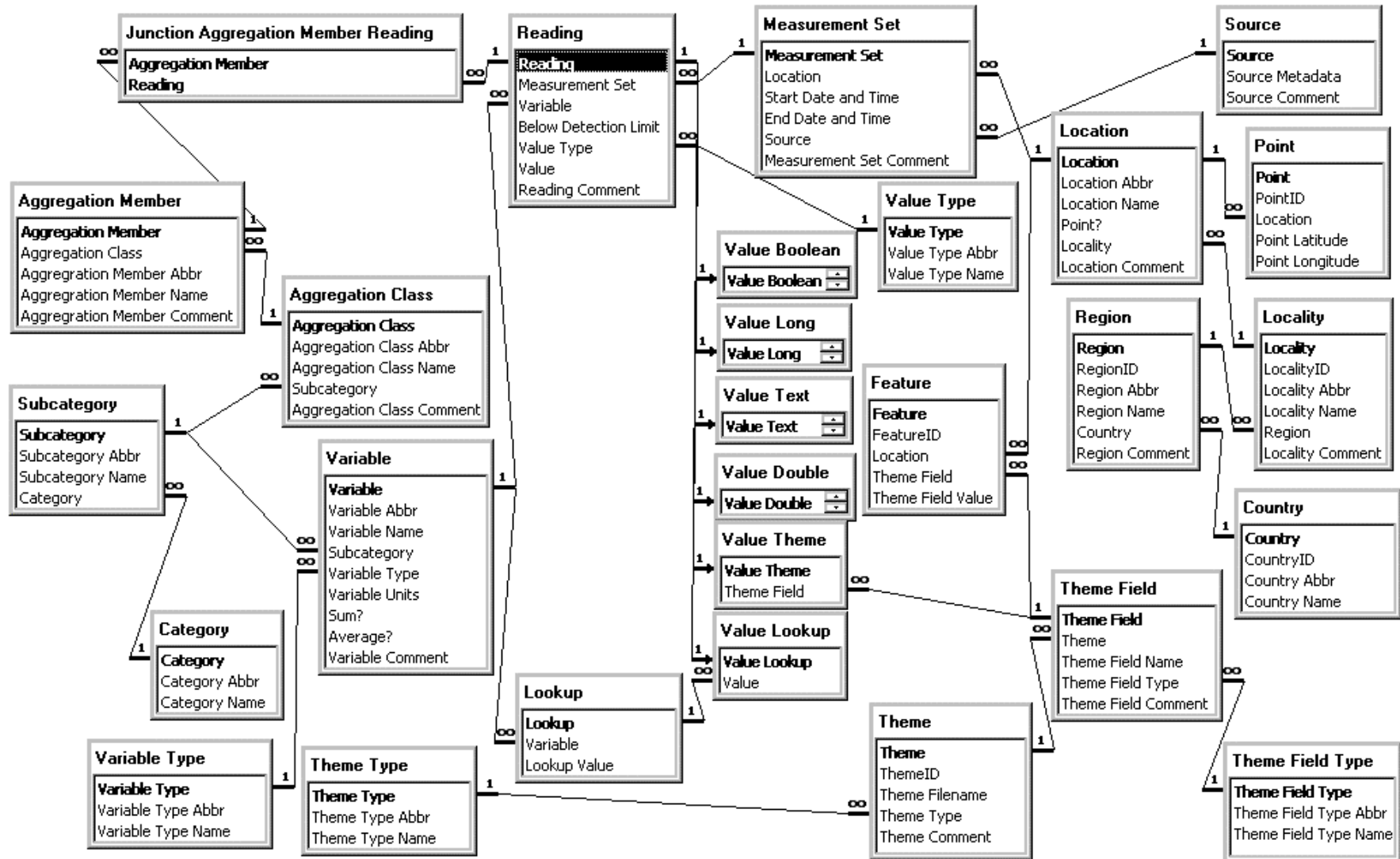
Data Table	Field	Description
	Variable	Variable with which this value is associated
	Lookup Value	Value in enumerated lookup table for this variable
Measurement Set	Measurement Set	Unique identifier for the measurement set
	Location	Location of the measurement set
	Start Date and Time	Start date/time of the measurement set
	End Date and Time	End date/time of the measurement set
	Source	Source of the measurement set
	Measurement Set Comment	Comment for the measurement set
Point	Point	Unique identifier for the point
	PointID	Unique numeric ID for the point
	Location	Location associated with the point
	Point Latitude	Latitude of the point
	Point Longitude	Longitude of the point
Reading	Reading	Unique identifier for the reading
	Measurement Set	Measurement set associated with the reading
	Variable	Variable associated with the reading
	Below Detection Limit	Was the reading below a detection limit indicated in the value field?
	Value Type	Type of value associated with the reading
	Value	Value associated with the reading
	Reading Comment	Comment for the reading
Region	Region	Unique identifier for the region
	RegionID	Unique numeric ID for the region
	Region Abbr	Abbreviation for the region
	Region Name	Name of the region
	Country	Country in which the region is located
	Region Comment	Comment for the region
Source	Source	Unique identifier for the source
	Source Metadata	Link to the location of the metadata for the source
	Source Comment	Comment for the source
Subcategory	Subcategory	Unique identifier for the subcategory
	Subcategory Abbr	Abbreviation for the subcategory
	Subcategory Name	Name of the subcategory
	Category	Category within which the subcategory is found
Theme	Theme	Unique identifier for the ArcView theme
	ThemeID	Unique numeric ID for the theme
	Theme Filename	Filename of the theme
	Theme Type	Type of theme
	Theme Comment	Comment for the theme

Data Table	Field	Description
Theme Field	Theme Field	Unique identifier for the theme field
	Theme	Identifier of ArcView theme associated with the theme field
	Theme Field Name	Name of the ArcView theme table field associated with the theme field
	Theme Field Type	Identifier of the ArcView data type for the theme field
	Theme Field Comment	Comment for the theme field
Theme Field Type	Theme Field Type	Unique identifier of the data type for the theme field
	Theme Field Type Abbr	Abbreviation for the theme field data type
	Theme Field Type Name	Name of the theme field data type
Theme Type	Theme Type	Unique identifier of the theme type
	Theme Type Abbr	Abbreviation for the theme type
	Theme Type Name	Name of the theme type
Value Boolean	Value Boolean	Unique identifier for the value Boolean
	Value	The Yes/No value recorded for the reading
Value Double	Value Double	Unique identifier for the value double
	Value	The double precision real number value recorded for the reading
Value Long	Value Long	Unique identifier for the value long
	Value	The long integer value recorded for the reading
Value Lookup	Value Lookup	Unique identifier for the value lookup
	Value	Value of index entry in Lookup
Value Text	Value Text	Unique identifier for the value text
	Value	The text value recorded for the reading
Value Theme	Value Theme	Unique identifier for the value theme
	Theme Field	Identifier for the theme field containing the values
Value Type	Value Type	Unique identifier of the value type
	Value Type Abbr	Abbreviation for the value type
	Value Type Name	Name of the value type
Variable	Variable	Unique identifier for the variable
	Variable Abbr	Abbreviation for the variable
	Variable Name	Name of the variable
	Subcategory	Subcategory within which the variable is found
	Variable Type	Type of data value stored for this variable
	Variable Units	Units for the variable
	Sum?	Values for this variable can be summed across strata
	Average?	Values for this variable can be averaged across strata
	Variable Comment	Comment for the variable

Data Table	Field	Description
Variable Type	Variable Type	Unique identifier of the variable type
	Variable Type Abbr	Abbreviation for the variable type
	Variable Type Name	Name of the variable type

Figure 1 shows the relationships between the fields in the various data tables, commonly referred to as an *Entity Relationship Diagram*.

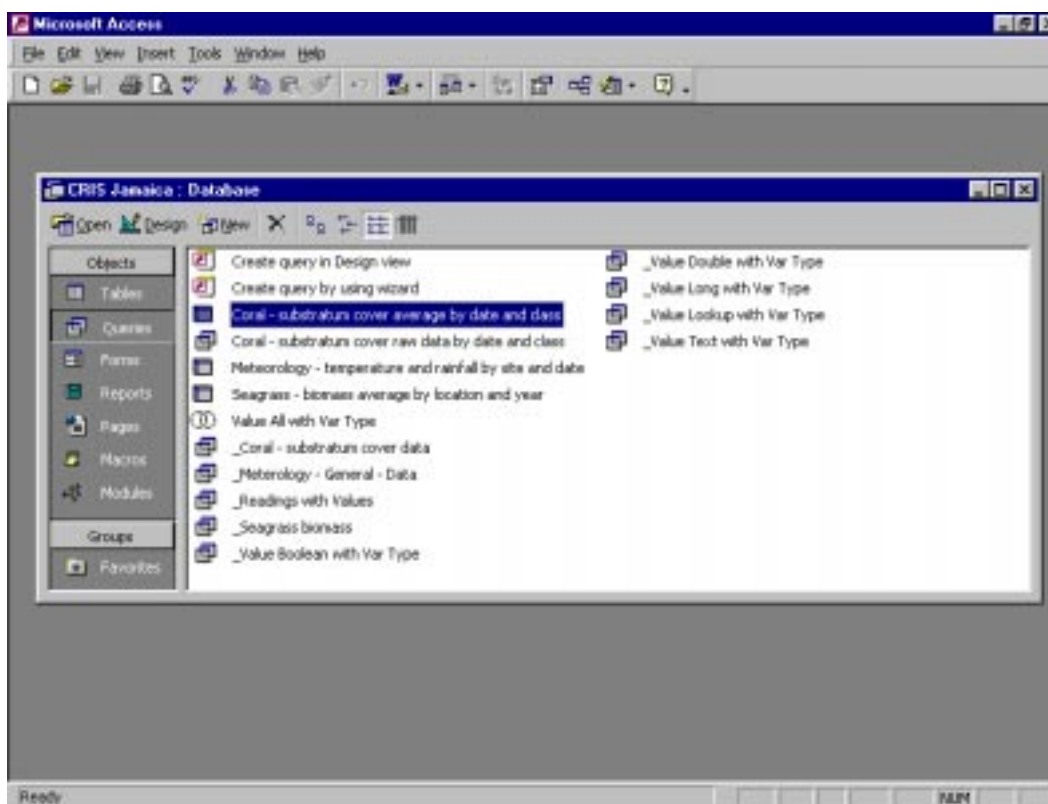
Figure 1. Entity Relationship Diagram for the CRIS Database.



Two aspects of the database design deserve further explanation: 1) the way that values are stored for readings, and 2) the use of Aggregation Classes and Categories.

- 1) As we learned on Day 2, relational database designs are normalized to save storage space and speed access. When different fields will never be used at the same time, it is usually a good design practice to put them in different tables if significant space savings result. Readings only have one value in CRIS, but the form of that value is quite variable: values in a defined list, free form text 25 characters long, integer numbers, real numbers, true/false values, or special spatial forms of data. Creating separate fields in the reading record to store any of these data types would waste space. Storing numbers in text forms would slow calculations with those numbers significantly, and add complexity to the system. Instead, several tables have been created that each store one of these kinds of data. Each record in these tables is related back to the appropriate Reading record through a field that stores the unique identification number of it.
- 2) Environmental data is often usefully presented as cross-tabulated spreadsheets (and associated graphs). CRIS provides a powerful way of producing such queries. Readings may provide information on the coral types at a particular location one various dates in each of several years. These can be easily summarized not only by year, but also by aggregating all of the coral types together into common classes such as Gorrionians and Urchins.

Queries



Day 3 – Slide 5

Review of Day 3

Using and Customizing the CRIS

- I 11 System Installation ✓
- I 12 Browsing Spatial and Attribute Data ✓
- I 13 Generating and Customizing Reports ✓
- I 14 Introduction to CRIS Data Dictionary ✓

Notes:

Day 4: Updating the CRIS Data

Day 4 – Slide 1

Agenda, Day 4

Updating the CRIS Data

- 15 Importing and Editing Access Data
- 16 Connecting ArcView to an Access Database
- 17 Linking to Queries from ArcView
- 18 Customizing the CRIS ArcView Project

ESSA/UWI CRIS Training, Module 2 Day 4, slide 1

Day 4 – Slide 2

Topic #15

Importing and Editing Access Data

ESSA/UWI CRIS Training, Module 2 Day 4, slide 2

On Days 1 and 2 we learned how to edit an Access database; today we will start by learning how to edit the CRIS database. Day 3 we learned how to navigate the GIS components of the CRIS; this afternoon we will learn how to customize the GIS components of the CRIS, and how to link the Access and the ArcView components.

15 Importing and Editing Attribute Data.

Day 4 – Slide 3

Remember:

- to make changes you must use the Administrator's Version
- there are two database files in the Administrator's Version:
 - CRIS.mde
in C:\Program Files\CRIS
 - CRIS Jamaica.mdb
in C:\Program Files\CRIS\Jamaica

ESSA/UWI CRIS Training, Module 2 Day 4, slide 3

Remember that the system includes two database files:

- C:\Program Files\CRIS\CRIS.mde
- C:\Program Files\CRIS\Jamaica\CRIS Jamaica.mdb

(The second is what we call the country-specific, back-end database, and the name of this file and the subdirectory in which it resides will depend on the country of implementation. E.g. in Barbados, the file would be named "CRIS Barbados.mdb".)

Day 4 – Slide 4

Editing the database

If you want to:

- add new data or
- edit existing data

do so while in the CRIS program, through View Table.

ESSA/UWI CRIS Training, Module 2 Day 4, slide 4

If you want to edit the data, e.g.

- change the data
- add new data...

...you can do that within the CRIS program, through the View Table button. Simply open the table you want and type in the new data.

Day 4 – Slide 5

Editing the database

If you want to:

■ add new queries
to the Jamaica database, you must
do so in the CRIS Jamaica.mdb file,
outside of the CRIS program!

ESSA/UWI CRIS Training, Module 2

Day 4, slide 5

If you want to add a new query to the database...

...you do that in the country-specific database, because that is where all of the monitoring data reside for that country.

How do you do this? By first closing the CRIS, and then opening the back-end database (e.g. Jamaica.mdb) on its own. How?

- through File | Open and then selecting C:\Program Files\CRIS\Jamaica\CRIS Jamaica.mdb, or
- by double-clicking on C:\Program Files\CRIS\Jamaica\CRIS Jamaica.mdb in Windows Explorer.

Notes:

Day 4 – Slide 6

Adding new data

There are three ways to add new data:

- type data directly into the table
- type data into a form
- copy and paste the data from an Excel spreadsheet

ESSA/UWI CRIS Training, Module 2

Day 4, slide 6

There are three ways to add data to a table:

1. entering the data manually directly into the table
2. entering the data manually into a form
3. copying the data from an Excel spreadsheet

To enter the data manually:

- open the CRIS Jamaica.mdb file
- open the table to edit
- type in additions/revisions

To enter the data from a spreadsheet:

- open the spreadsheet
- open the CRIS Jamaica.mdb file and the table to add to
- copy the data from the spreadsheet
- paste the data into the table

At present, there are no forms for adding data to tables.

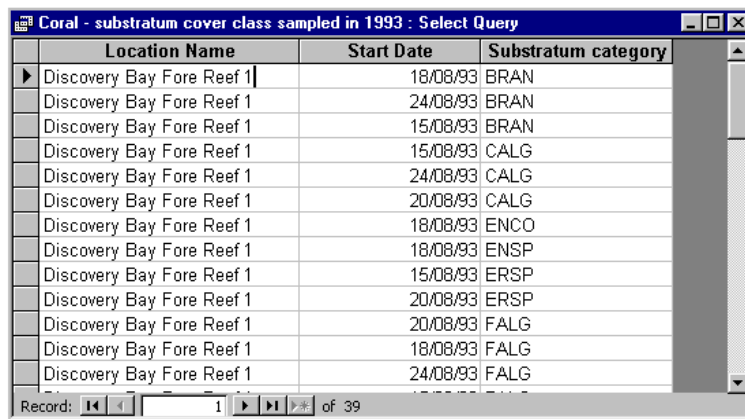
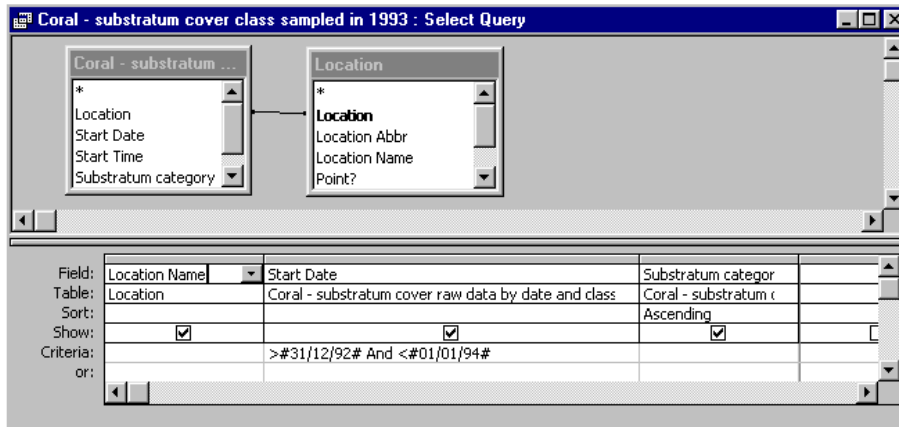
Adding information to some tables will be simple; e.g. adding a new category. However, adding monitoring data is not so straightforward. The structure of the database that results from normalization – i.e. numerous tables with relationships among them – can present some data entry challenges. (E.g. adding new raw coral substratum cover data will require entering new records into a number of different tables.)

NOTE: Before making any changes to CRIS, it is important that a backup copy be made of the country-specific back-end CRIS XXXX.mdb file.

How to add a query to the database.

Demonstration

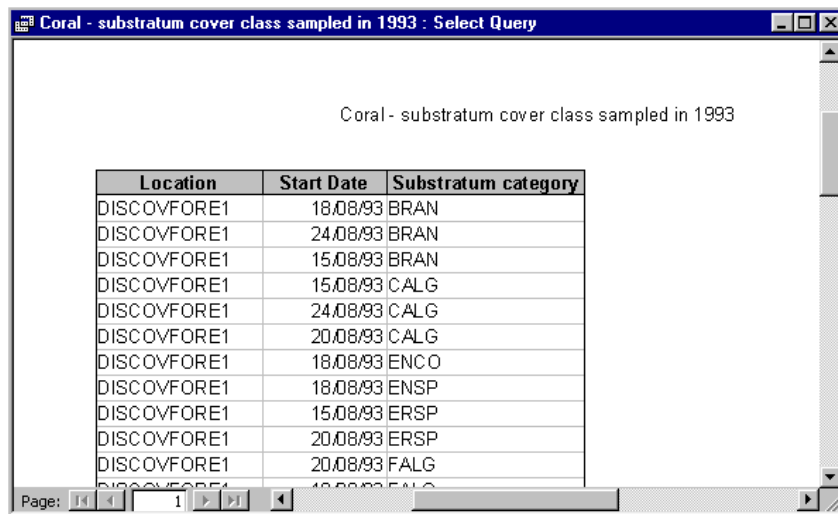
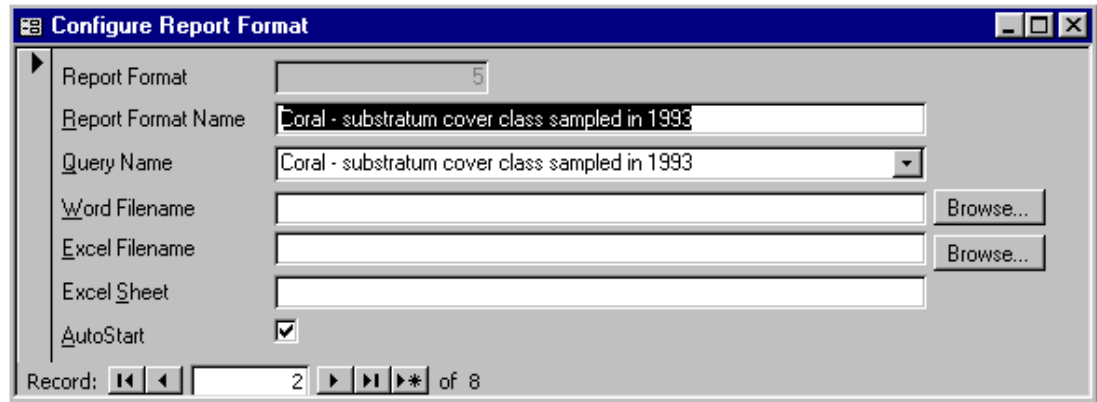
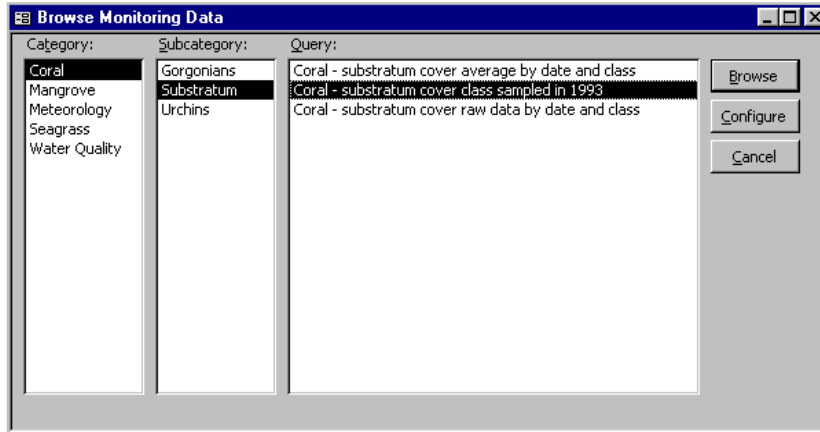
- Close the CRIS (if it is open) and open the CRIS Jamaica.mdb database.
- Go to the Queries tab on the Database window.
- Click on the New button.
- Select Design View in the New Query window and click on OK.
- Build a query that show what coral classes were sampled during 1993 and on what date. Start with the “Coral - substratum cover raw data by date and class” query, instead of a table. Then add the Location table, so you can have Location Name as the first field in the query.



Queries that are intended to be available on the Configure Report Format or Configure Query screens should be saved using a name not beginning with an ‘_’ (underscore) character, as these are reserved for queries used internally by the application.

It is recommended that queries not intended for browsing or reports have a name beginning with an ‘_’ (underscore) character.

The next steps are to Configure the new query in Browse mode, and to Configure the new query for reports.



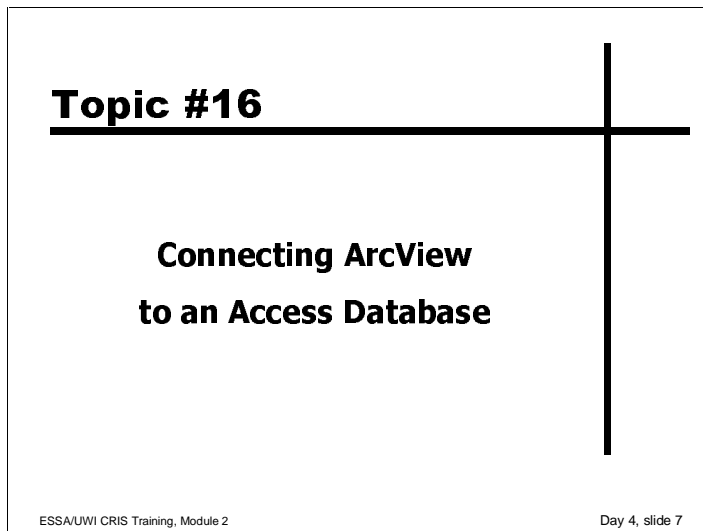
Exercise 16. Adding a new query to the Jamaica database.

1. Make a backup copy of CRIS Jamaica.mdb in the C:\Program Files\CRIS\Jamaica subdirectory.
2. Open the CRIS Jamaica.mdb database.
3. Create a new query that will display percent cover data for Encrusting Corals only.
4. Configure the query so that it shows up in the appropriate place for browsing.
5. Configure the query to have a report format name.
6. Browse the coral data to test that the query appears as expected.
7. Preview the new report to test that the query appears as expected.
8. Export the new report to Word. (Notice that there are no headers, etc. Why not?)

Lunch break

16 Connecting ArcView to an Access Database.

Day 4 – Slide 7



We saw in Day 3 how some of the CRIS is non-spatial (the Access database part) and some is spatial (the ArcView part). In order to be able to do some of the things we did in Day 3 (e.g. highlight data in a table and have those sites turn yellow on the map) we need to make sure that the non-spatial and spatial parts of the CRIS are connected.

Connecting ArcView Project.

Day 4 – Slide 8

Connecting ArcView Project Requires:

- Connecting the ArcView project to the Access database object
- Linking the project to the specific access tables or queries

ESSA/UWI/CRIS Training, Module 2 Day 4, slide 8

Connecting ArcView requires two things:

- 1) Connecting the ArcView project to the Access database
- 2) Linking the ArcView project to the specific queries required

The CRIS Extension.

Day 4 – Slide 9

The CRIS Extension

- The CRIS ArcView extension automates linkages between Access and ArcView
- It facilitates the spatial representation of the Access data
- Relevant ArcView Project is opened automatically when **Run ArcView** menu option is selected
- ✓ CRIS ArcView extension (CRIS.avx)
Must **always** be loaded when the project is saved

ESSA/UWI/CRIS Training, Module 2 Day 4, slide 9

The CRIS ArcView extension automates the linkages between Access and ArcView. It facilitates the spatial representation of the Access data. To enable this the CRIS extension (CRIS.avx) must be loaded.

Connecting the Project to Access.

Day 4 – Slide 10

Connecting the Project to Access

- SQL connect function is utilized
- Connection is made automatically by the CRIS
- It connects the country specific ArcView project to to the relevant CRIS Access database.
- Microsoft's Open Database Connectivity (ODBC) standard is used

ESSA/UWI CRIS Training, Module 2 Day 4, slide 10

The ArcView SQL Connect function is used to connect the ArcView project to the CRIS. The connection is made automatically by the CRIS.avx extension. It connects the country specific ArcView project to the relevant CRIS Microsoft Access database. The connection is base on Microsoft's Open Database Connectivity (ODBC) standard.

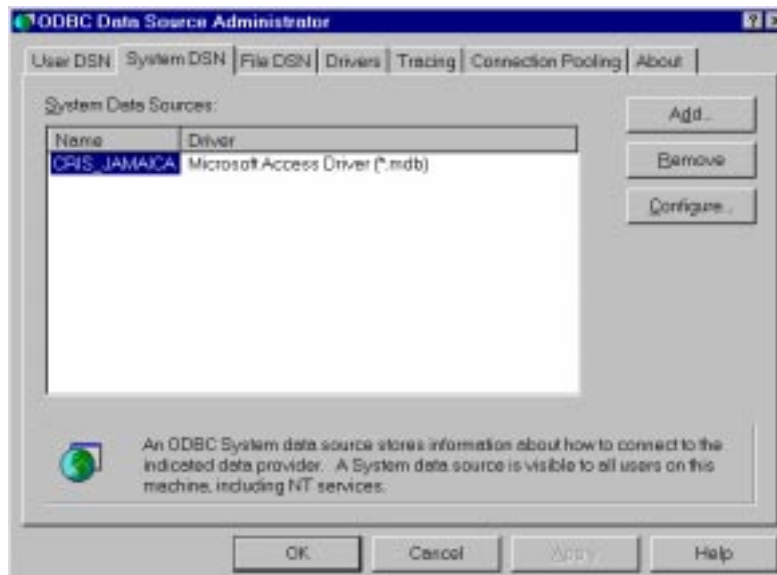
ODBC Setup.*Day 4 – Slide 11*

ODBC Setup

- The ODBC driver for the database must be installed
- SQL connect utilizes the ODBC source name for the access database
- The source name is setup in the ODBC Data sources manager in the Control Panel by the system administrator e.g. "CRIS_JAMAICA"
- ArcView should work with any database with an ODBC driver and database client software.

ESSA/UWI CRIS Training, Module 2 Day 4, slide 11

The ODBC driver must be installed since SQL connect utilises this driver. SQL connect utilises the ODBC source name for the Access database. The source name is set up in the ODBC Data sources manager in the Control Panel by the Systems Administrator. Note that the installation CD for the CRIS will automatically create an ODBC Data Source for each country.



SQL Connect.

Day 4 – Slide 12

SQL Connect

- SQL Connect allows external data to be accessed via SQL
- The returned records are stored in an ArcView table
- Records can be manipulated but not modified

Day 4, slide 12

ESSA/UWI CRIS Training, Module 2

SQL Connect allows external data to be accessed via SQL (Structured Query Language).

Records returned by an SQL query are stored in an ArcView table. They can be manipulated but not modified.

Examine SQL Connection.

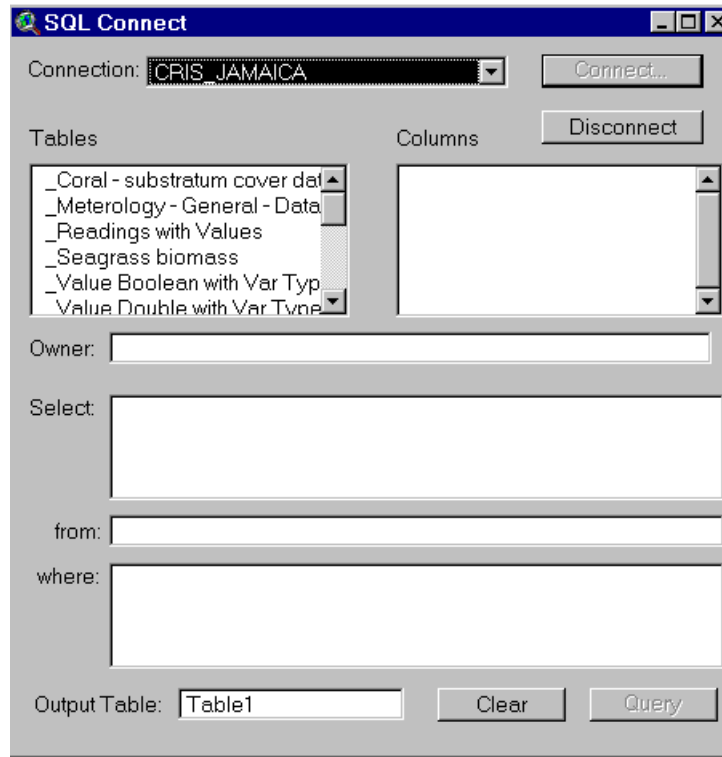
Day 4 – Slide 13

Examine SQL Connection

- Select **Project : SQL Connect**
- Note the name of your ODBC connection
- Which tables are listed in window ?

ESSA/UWI CRIS Training, Module 2
Day 4, slide 13

In order to examine the SQL connection we need to select Project | SQL Connect on the Project window menu. Ask the participants what the name of the ODBC connection is and which tables are listed in the window



CRIS.avx Menu Options.*Day 4 – Slide 14*

CRIS.avx Menu Options

- CRIS extension adds two menu options to the interface
- Menu options are added at the project window level
 - CRIS Parameters
 - CRIS Data Refresh


ESSA/UWI CRIS Training, Module 2 Day 4, slide 14

The CRIS contains a number of ArcView scripts which have been compiled in the form of an extension. The extension adds two menu options to the interface. The options are available at the project window level. The two options are:

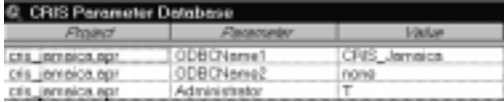
- CRIS Parameters
- CRIS Data Refresh

CRIS Parameters Menu.*Day 4 – Slide 15*

CRIS Parameters Menu



- Toggles between user and administrator versions of the CRIS
- Turns on and off the ability to save a project.



Project	Recorder	Value
CRIS_Jamaica.apr	ODBCName1	CRIS_Jamaica
CRIS_Jamaica.apr	ODBCName2	None
CRIS_Jamaica.apr	Administrator	T


ESSA/UWI CRIS Training, Module 2 Day 4, slide 15

The CRIS Parameters Menu toggles between the user and administrator modes of the system. It turns on and off the ability to save the project.

Refresh Data Menu.

Day 4 – Slide 16

Refresh Data Menu



- On Project Window Menu
- **File : Refresh Data**
- Updates the links by re-reading the Arcview Linkages table.
- Adds tables and creates linkages to theme tables so data can be displayed

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The Refresh Data Menu is also on the Project window menu.

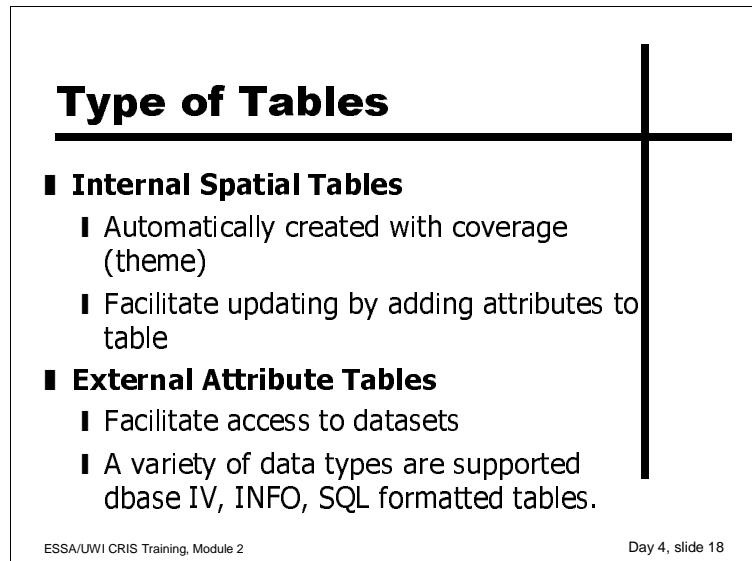
17 Linking to Queries from ArcView.*Day 4 – Slide 17*

Topic #17

Linking to Queries from ArcView

ESSA/UWI CRIS Training, Module 2 Day 4, slide 17

Once the project (APR) and database (MDB/MDE) files are connected, the next step is to link ArcView to the specific Access queries and fields.

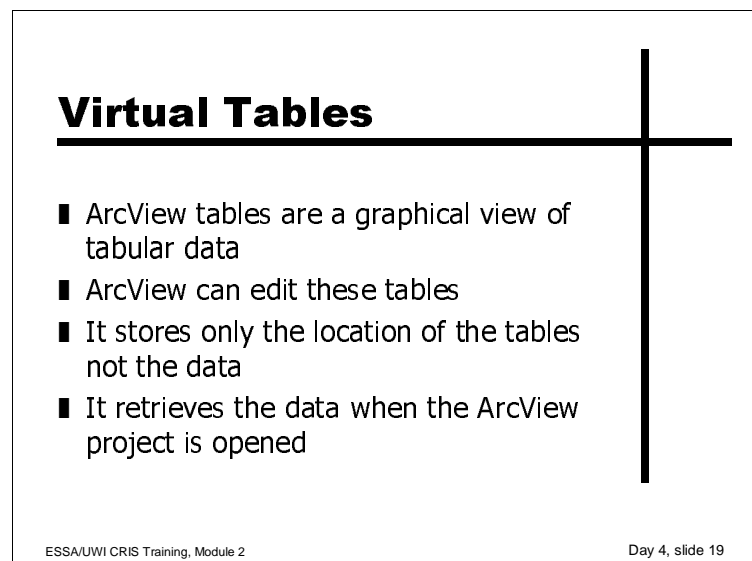
Types of Tables.*Day 4 – Slide 18*

Type of Tables

- **Internal Spatial Tables**
 - Automatically created with coverage (theme)
 - Facilitate updating by adding attributes to table
- **External Attribute Tables**
 - Facilitate access to datasets
 - A variety of data types are supported
dbase IV, INFO, SQL formatted tables.

ESSA/UWI CRIS Training, Module 2 Day 4, slide 18

ArcView contains two types of tables: Internal Spatial Tables and External Attribute Tables. Internal Spatial Tables are automatically created with coverages / themes. They facilitate updating by allowing the addition of attributes to the table. External Attribute Tables facilitate access to datasets and a variety of data types are supported such as DbaseIV, INFO, SQL formatted tables.

Virtual Table.*Day 4 – Slide 19*

Virtual Tables

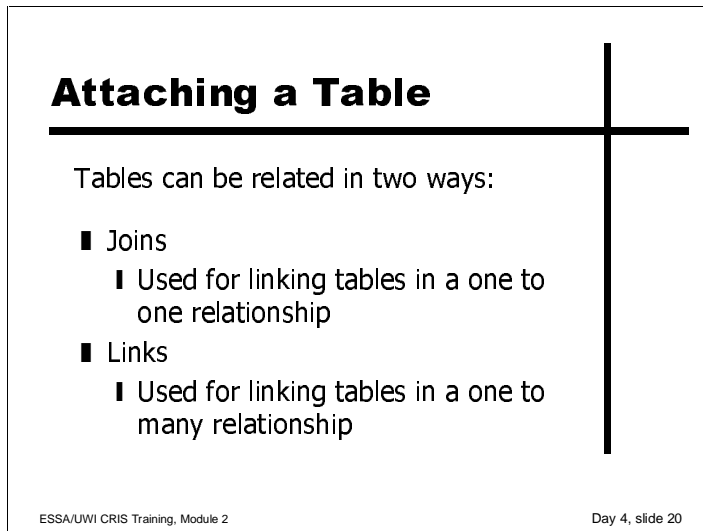
- ArcView tables are a graphical view of tabular data
- ArcView can edit these tables
- It stores only the location of the tables not the data
- It retrieves the data when the ArcView project is opened

ESSA/UWI CRIS Training, Module 2 Day 4, slide 19

ArcView tables are a graphical view of tabular data. While ArcView can edit these tables, it stores only the location of the tables not the data. It retrieves the data when the project is opened.

Attaching a Table.

Day 4 – Slide 20



Attaching a Table

Tables can be related in two ways:

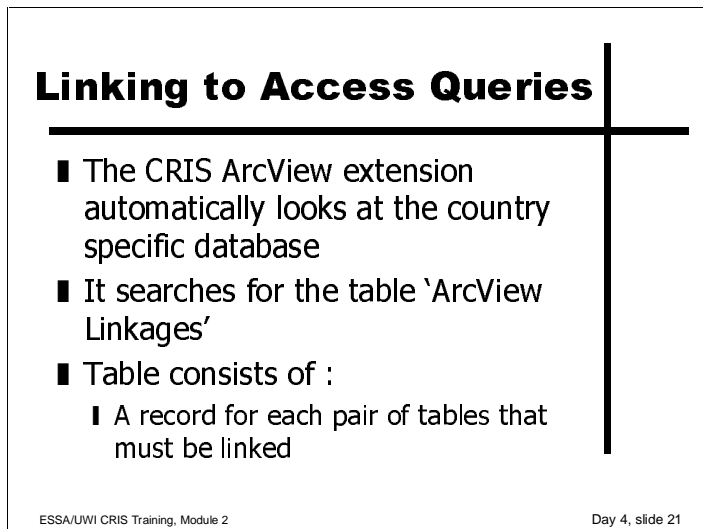
- Joins
 - Used for linking tables in a one to one relationship
- Links
 - Used for linking tables in a one to many relationship

ESSA/UWI CRIS Training, Module 2 Day 4, slide 20

Tables can be related in two ways, Joins and Links. Joins are used for linking tables in a one to one relationship. Links are used for linking tables in a one-to-many relationship.

Linking to Access Queries.

Day 4 – Slide 21



Linking to Access Queries

- The CRIS ArcView extension automatically looks at the country specific database
- It searches for the table 'ArcView Linkages'
- Table consists of :
 - A record for each pair of tables that must be linked

ESSA/UWI CRIS Training, Module 2 Day 4, slide 21

When you run a Country Specific ArcView project, the CRIS ArcView Extension automatically looks at the Country Specific database for a table called 'ArcView Linkages'. This table will contain a record for each pair of tables that must be linked. One in MDB and one in APR.

ArcView Linkages Table.

Day 4 – Slide 22

ArcView Linkages Table

5 text fields

- | ODBCName
- | Access table name to be linked
- | Access field name to be used for linking
- | ArcView table to be linked (coastline.dbf)
- | ArcView field name to be used for linking

Field Name	Data Type
ODBCName	Text
Access Table Name	Text
Access Field Name	Text
ArcView Table Name	Text
ArcView Field Name	Text

ESSA/UWI CRIS Training, Module 2
Day 4, slide 22

The table consists of five text fields:

1. The ODBCName
2. The Access table name to be linked
3. The Access field name to be used for linking
4. The table in ArcView to be linked (e.g. coastline.dbf)
5. The ArcView table field name to be used for linking

Tables Currently Available to ArcView.

Day 4 – Slide 23

Tables Currently Available to ArcView

- Open CRIS Jamaica.mdb
- Open ArcView linkages table
- Which tables are available to ArcView ?

ESSA/UWI CRIS Training, Module 2
Day 4, slide 23

ODBCName	Access Table Name	Access Field	ArcView Table Name	ArcView Field Name
CRIS_JAMAICA	Coral - substratum cover average by date and class	Location	Attributes of CARICOMP sites	CaricompID
CRIS_JAMAICA	Meteorology - temperature and rainfall by site and date	Location	Attributes of CARICOMP sites	CaricompID
CRIS_JAMAICA	Seagrass - biomass average by location and year	Location	Attributes of CARICOMP sites	CaricompID
CRIS_JAMAICA	Coral-substratum cover raw data by date and class	Location	Attributes of CARICOMP sites	CaricompID

Adding a New Table to ArcView from CRIS Data.

Day 4 – Slide 24

Adding A New Table to ArcView From CRIS Data

- Create a query in the CRIS Jamaica.mdb
- Setup the query data as you would like it displayed in ArcView
- Queries to be linked to point themes will have **Abbr** field in the **Sampling Sites** table as the row heading for the query

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Editing the ArcView Linkages Table.

Day 4 – Slide 25

Editing the ArcView Linkages Table

- Enter a new record into 'ArcView Linkages' table in Access
- This specifies how to link new table to ArcView table
- Applies only to tables with georeferencing

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After the query has been created the ArcView Linkages table must be edited. A new record must be entered into the table. This will specify how to link the new table to the ArcView table. It only applies to tables with geo-referencing.

ArcView Connection.*Day 4 – Slide 26*

ArcView Connection

- Open the ArcView project and ensure:
 - The ODBC source name is included in File: CRIS Parameters
 - The ArcView table to connect to is visible in the project window and that the name is that entered in the Linkages table
 - The field name specified for linkage is in the table and correctly spelt
 - If changes were made to the project save them
 - Select **File : Data Refresh** menu option

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Day 4, slide 26

After the ArcView Linkages table has been amended the administrator has to ensure that the ArcView Connection is set up properly. The ODBC source name must be in the FILE | CRIS Parameters. The ArcView table to connect to must be visible in the project window and the name must be that entered in the Linkages table. The field name specified for linkage must be in the table and correctly spelt. The project should be saved if changes have been made. Then finally select File | Data Refresh

REMEMBER: Before making any changes to CRIS, it is important that a backup copy be made of the CRIS.mdb and to every country back-end CRIS XXXX.mdb file.

Notes:

Exercise 17. Adding a new ArcView table from CRIS data - Access manipulation.

Open the theme table for CARICOMP Sites on the Discovery Bay view and note the fields.

Follow the instructions on the slide.

Day 4 – Slide 27

Exercise 17: Adding a New ArcView Table from CRIS Data - **Access Manipulation**

Examine Attributes of Caricomp Sites Table and note fields in Jamaica.apr before you begin !

- Open CRIS Jamaica.mdb
- Select Tables
- Select and Open "ArcView Linkages Table"
- Enter new record:
 - ✓ ODBCName: "CRIS_JAMAICA"
 - ✓ Access Table Name: "Coral – substratum cover raw data by date and class"
 - ✓ Access Field name: "Location"
 - ✓ ArcView Field Name: "Attributes of Caricomp Sites"
 - ✓ ArcView Field Name: "CaricompID"
- Select **File:Save** and Close Table

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Day 4 – Slide 28

Exercise 17: Adding a New ArcView Table from CRIS Data – **ArcView Manipulation**

- Open Jamaica.apr
- Select **File : CRIS Data Refresh**
- Note Messages on Status bar
- Have the fields in Attributes Caricomp Sites changed ?

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Do you see any changes?

Adding External Tables.*Day 4 – Slide 29*

Adding External Tables

- Tables external to the CRIS can be added to the ArcView Project
- They must be joined to a theme table
- The new table is added under tables in the project window
- This makes it available to be joined / linked

ESSA/UWI CRIS Training, Module 2 Day 4, slide 29

Day 4 – Slide 30

Adding External Tables

- Both tables are opened in the table window
- The fields to join on are selected on both tables
- The feature table is made the active table
- Select **Table Join** from menu

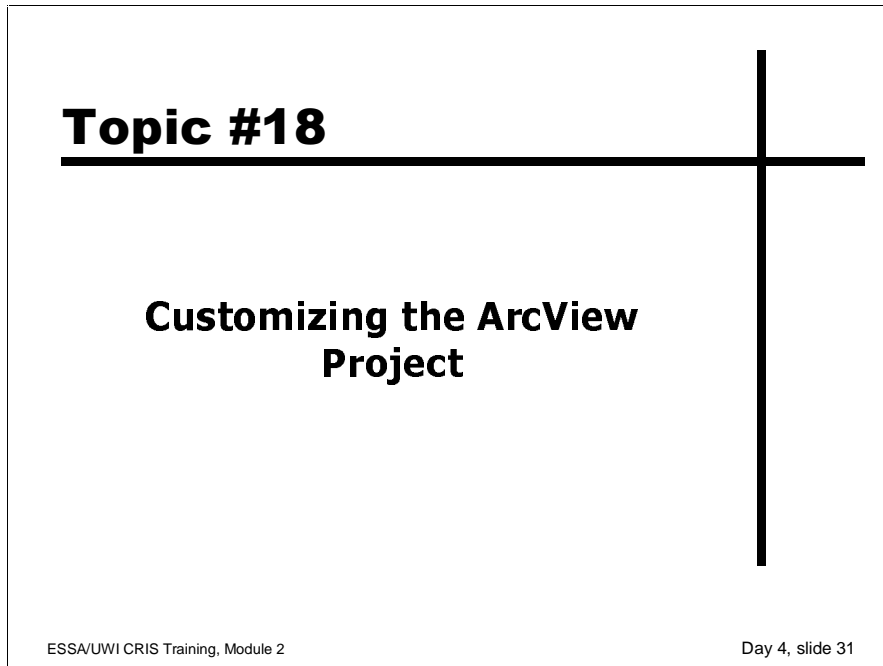
ESSA/UWI CRIS Training, Module 2 Day 4, slide 30

Let the class know that they can also add tables that are external to the CRIS Jamaica.mdb database. However they must be joined to a theme table to be displayed. The new table is added under tables in the project window. This makes it available to be joined or linked

Both tables are opened in the tables window. The fields to be joined on are selected on both tables. The feature table is made the active table and Table | Join is selected from the menu.

18 Customizing the CRIS ArcView Project.

Day 4 – Slide 31



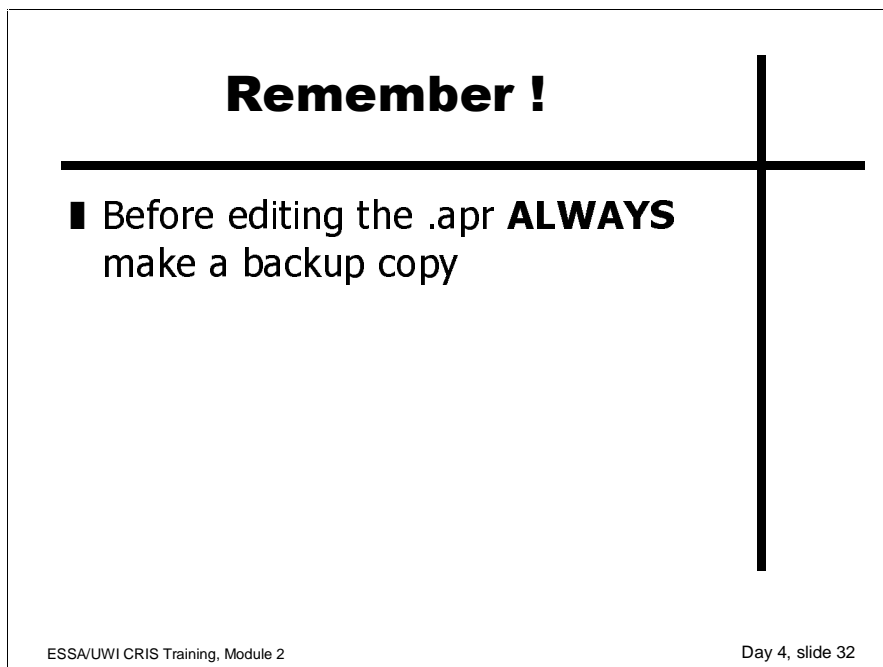
Topic #18

Customizing the ArcView Project

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Remember, before making changes to the project file always make a backup copy!

Day 4 – Slide 32



Remember !

- Before editing the .apr **ALWAYS** make a backup copy

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Architecture.*Day 4 – Slide 33*

Architecture

ArcView is organised into documents

The main document is the Project

which contains:

- Views
- Tables
- Charts
- Layouts
- Scripts

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The main document is the project.apr which contains Views, Tables, Charts and Scripts.

Project File APR.*Day 4 – Slide 34*

Project File .apr

- Contains references to location of various components
- Path specific
- Read-only in CRIS
- Use file properties from window explorer to set properties
- Editing views or themes requires that the read-only attribute be removed from the project file
- Results must be saved and property reset

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The project file contains references to the location of the various components. As we saw in Day 3, the spatial data (shape files and tables) are contained in the directory “C:\Program Files\CRIS\XXXX\AVData” (where XXXX is a country name). The shape files for each view within the ArcView project are contained in a separate sub-directory (this is not essential, but makes maintenance of the data simpler). It is path specific.

The CRIS is read-only to general users. The File properties in Windows Explorer is used to set the properties. Editing themes or views requires that the read-only attribute be removed from the project file. The results must be saved and the property reset.

Customizability.*Day 4 – Slide 35*

Customizability

- Interface
 - Menus, buttons, toolbars can be added or deleted
- Scripts
 - Can be written / edited and attached to menus, buttons or toolbars
- Avenue
 - ArcViews scripting language
 - Extends capabilities of ArcView

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ArcView is very customizable: its interface can be customized; menus, buttons and toolbars can be added or deleted. The CRIS.avx added two menu options to the interface. Scripts can be written and attached to interface objects or compiled as extensions. Avenue is the scripting language of ArcView. It extends the capabilities of ArcView.

Extensions.*Day 4 – Slide 36*

Extensions

- Some included with ArcView 3.2:
 - File support: tiff, cad etc..
 - Digitizer
 - Geo-processing
- Optional purchases:
 - Spatial Analyst
 - Network Analyst
 - 3D Analyst

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Some extensions are included with ArcView 3.2 such as File support for .tiff, CAD support, Digitizer and Geo-Processing. There are also extensions which can be purchased such as Spatial Analyst, Network Analyst and 3D Analyst.

Spatial Analysis.*Day 4 – Slide 37*

Spatial Analysis

☞ Spatial Analysis is a process which consists of a collection of spatial queries

It can:

- ✓ identify trends in data
- ✓ create new relationships in data
- ✓ view complex relationships between data sets
- ✓ assist in making more well- informed decisions

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Customizing Views and Themes.*Day 4 – Slide 38*

Customizing Views and Themes

- Add New Views
- Add New Themes
 - Feature themes
 - Shape files
 - CAD files
 - Images
- Edit existing Views / Themes

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ArcView has feature themes, shape file themes, CAD file themes and image themes. CRIS Jamaica.apr includes Feature, shape and Image themes. Ask the Class to name the image theme.

Exercise 18. Customizing theme tables.

Complete the exercise on the slide.

Day 4 – Slide 39

Exercise 18: Customizing Theme Tables

- ❶ Open the project '**Jamaica .apr**'
- ❷ Open view '**Discovery Bay**'
- ❸ Make '**Water Quality**' the active theme
- ❹ Select **Theme Table**
Examine attributes of Table
- ❺ Select **Table Properties**
Note that fields can be hidden and renamed with alias

ESSA/UWI CRIS Training, Module 2 Day 4, slide 39

Notes:


Exercise

Exercise 19. Adding themes to a view.

Complete the exercise on the slide.

Day 4 – Slide 40

Exercise 19: Adding Themes to a View

- Ensure that Discovery Bay is the active View - click in it
- Select **View Add theme** or  button
- Ensure directory is c:\Program Files\CRIS\Jamaica\Avdata
- Select '**demo.shp**'
- Check data source type e.g. Feature data source
- Click **OK** Or Double click on selected theme

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Day 4, slide 40

Notes:

What are Shape Files?

Day 4 – Slide 41

What are Shapefiles ?

- a simple, non-topological format
- they store the geometric location and attribute information of spatial features.
- one of the spatial data formats that you can work with in ArcView.

ESSA/UWI CRIS Training, Module 2 Day 4, slide 41

Why use Shape Files?

Day 4 – Slide 42

Why use Shape files?


- Shapefiles display more rapidly on a view
- You can work with a theme based on a shapefile the same as any other data sources
- You can only edit features of themes based on shapefiles.
- You can create a new theme that's based on the shapefile format.

ESSA/UWI CRIS Training, Module 2 Day 4, slide 42

Shape files display more rapidly on a view. You can work with it as you would any other theme. You can edit features in a shapefile and you can create a new theme that's based on the shape file format.

Select Features on View.*Day 4 – Slide 43*

Select Features on View (and Table)

- ❶ Make **a** theme active
- ❷ Select **Theme Table**
- ❸ Resize view and table windows so that they can both be seen
- ❹ Make the view the active window and use the Select feature tool  to select features on the map.
- ❺ Make the table the active window and click on the promote button.

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Day 4, slide 43

Querying Spatial Data.*Day 4 – Slide 44*

Querying Spatial Data

- Queries are used to search, locate and select data
- The data resides in themes and their related tables
- The selected data (features / records) are identified on the map display and in the table

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Day 4, slide 44

Queries are used to search, locate and select data. Data in an ArcView Project resides in themes and their related tables. The selected data are identified on the map display and in the table.

Exercise 20. A structured spatial query – querying the theme.

Complete the exercise on the slide.

Day 4 – Slide 45

Exercise 20: A Structured Spatial Query – Querying the theme

- ① Make Caricomp Sites the active theme in the
- ④ Select **Theme Query** or Query builder button
- ⑤ In Field:
 - Double click **MASS**
 - Double click “=”
 - Double click “**15.107058**”
 - Select **New Set**
- ⑥ What is the result on the view and table?

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What is the result of the query?

Notes:

Exercise

Exercise 21. A structured spatial query – converting selected features to a theme.

Complete the exercise by converting the selection to a shapefile.

Day 4 – Slide 46

Exercise 21: A Structured Spatial Query – Converting Selected features to a Theme

- ② Select **Theme | Convert to Shapefile**
- ③ Enter name: "High Incidence of Sea Grass" click **OK**
- ④ At prompt: **Add shapefile as theme to view** Click **Yes**
- Change colour in Legend editor if required
- Is there a relationship between the Landsat Image and the high incidence of seagrass?

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Day 4, slide 46

Is there any relationship between the Landsat Image and the high incidence of Seagrass?

Notes:

Saving Project Edits.

Day 4 – Slide 47

Saving Project Edits

- ✓ Ensure CRIS ArcView extension (CRIS.avx) is loaded before saving project
- Save: updates existing project
- Save as: project is saved with user specified name

N.B. Save and close options are removed from non-administrator user interfaces

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You should always ensure that the CRIS.avx extension is loaded before saving project. As in other software, save updates existing project. Save as allows the user to save it to a user specified name. Save and close options are removed from non-administrator user interfaces.

Exiting.

Day 4 – Slide 48

Exiting

Select **File Exit**

Administrators are given the option to save changes when exiting.

Click **Yes** if you want to update your project

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File | Exit exits from project. Only administrators are given the option to save changes when exiting. Click YES to update project.

Review of Day 4

Updating the CRIS Data

- I 15 Importing and Editing Access Data ✓
- I 16 Connecting ArcView to an Access Database ✓
- I 17 Linking to Queries from ArcView ✓
- I 18 Customizing the CRIS ArcView Project ✓

Day 5: Administering the CRIS

Day 5 – Slide 1

Agenda, Day 5

Administering the CRIS

- I 19 Security
 - Update Protocol
 - Data Management
- I 20 Creating a New Installation CD
 - Relational Database Presentations
 - Course Wrap-up

ESSA/UWI CRIS Training, Module 2 Day 5, slide 1

Day 5 – Slide 2

Topic #19

Security

Update Protocol

Data Management

ESSA/UWI CRIS Training, Module 2 Day 5, slide 2

19 Security, Update Protocol and Data Management.*Day 5 – Slide 3*

Security

- **Administrator's Version**
 - for editing (new data, queries, reports)
 - back-end file (XXXX.mdb) can be edited
 - Config button active (Browse, Reports)
- **User's Version**
 - for browsing (data viewing only)
 - back-end file (XXXX.mdb) read-only
 - Config button inactive (Browse, Reports)

ESSA/UWI CRIS Training, Module 2
Day 5, slide 3

Distinction between Administrator's and the User's Versions of the CRIS software:

The main difference is that the Admin version allows all data to be edited, while the User's version turns this off and only allows browsing. Specifically:

- **Administrator's Version**
 - within the CRIS program:
 - can edit data tables (through View Table in the Main Menu)
 - can configure queries for browsing
 - can configure new reports for queries
 - back-end database:
 - can edit tables
 - can add new queries
 - ArcView project:
 - can edit APR file
- **User's Version**
 - within the CRIS program:
 - cannot edit tables, can only look at them (through View Table in the Main Menu)
 - Configure buttons are inactive (i.e. cannot configure queries for browsing or reporting)
 - back-end database:
 - is read-only, and therefore cannot make any changes to tables or add new queries
 - ArcView project:
 - APR file is read-only, and therefore cannot make any changes in ArcView

Eliminating the editing capability in the User's version helps maintain data integrity. Administrators will have control over the database and will be the only agency with the ability to edit or add new data for their country.

Day 5 – Slide 4

Update Protocol

- always maintain two versions
 - User's and Administrator's Versions
- update Administrator's version on on-going basis
- annually freeze Administrator's Version
 - convert to User's Version
 - distribute to users
 - also archive, for record-keeping (give intuitive name)
 - do at same time each year

ESSA/UWI CRIS Training, Module 2 Day 5, slide 4

We recommend that each CRIS country administrator maintain two versions of the CRIS at all times: a User's Version that is distributed to users, and an Administrator's Version into which new data and edits are entered.

Periodically, perhaps once per year, the Administrator's Version should be 'frozen', converted to a User's Version, and distributed to all other users. E.g., let's say the first Administrator's Version is called AdminCRIS 2000. The steps would be as follows:

- In December 2000, freeze the Administrator's Version (i.e. no further changes will be made).
- Create a User's Version from it, and give it the name "CRIS 2000", and distribute this to users.
- Create a copy the Administrator's Version, and give it the name "AdminCRIS 2001". This becomes your new working version for the next 12 months, in which you add new data as it becomes available.
- Archive the old version (AdminCRIS 2000).

If you do this every year, you will build up a library of annually archived Administrator's Versions (AdminCRIS 2000, AdminCRIS 2001, etc.), and users if they wish can also maintain a library of User's Versions (CRIS 2000, CRIS 2001, etc.). And each year there will always be two current versions (e.g. AdminCRIS 2001 and CRIS 2000).

Even though a new version of the database will be distributed only once per year, we recommend that the Administrator update the data in the CRIS on an ongoing basis rather than waiting until just before the release of the new version. There are four advantages to this:

- Minimising the length of time between data acquisition and data entry decreases the likelihood that data will go astray;

- Any questions or concerns about the data can be addressed on a timely basis;
- The task will be less onerous than having to enter a stockpiled volume of backlog data; and
- The CRIS country Administrator will always have an Administrator's Version with the most recent data, should queries of very recent data be needed.

Once the current database is frozen for distribution to users, the CRIS country Administrator should keep a copy of the frozen database to ensure they maintain a record of what was distributed each year.

Freezing and distribution of the latest database should occur during the same time each year for consistency.

20 Creating a New Installation CD.

Day 5 – Slide 5

Topic #20

**Creating a New
Installation CD**

ESSA/UWI CRIS Training, Module 2

Day 5, slide 5

How to create an install pack.

Demonstration

Course Wrap-up.**Day 5 – Slide 6**

Review of Module

- Introduction to MS Access ✓
- Relational Database Design ✓
- Using/customizing the CRIS ✓
- Updating the CRIS data ✓
- Administering the CRIS ✓

ESSA/UWI CRIS Training, Module 2 Day 5, slide 6

Day 5 – Slide 7

Review of Day 1

✓ Introduction To Microsoft Access

- 1 Introduction to Access
- 2 Database Tables
- 3 Controlling Data Input
- 4 Controlling Data Display
- 5 Forms
- 6 Switchboards

ESSA/UWI CRIS Training, Module 2 Day 5, slide 7

Review of Day 2

✓ Relational Database Design

- 7 Database design
- 8 Database relationships
- 9 Advanced queries
- 10 User security

Review of Day 3

✓ Using and Customizing the CRIS

- System installation
- Browsing spatial and attribute data
- Generating and customizing reports
- Introduction to CRIS data dictionary

Day 5 – Slide 10

Review of Day 4

✓Updating the CRIS Data

- Importing and editing attribute data
- Connecting ArcView to an Access database
- Linking to queries from ArcView
- Customizing the CRIS ArcView project

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Day 5 – Slide 11

Review of Day 5

✓Administering the CRIS

- Security, update protocol and data management
- Creating a new installation CD

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Appendix – Course Evaluation Form

CPACC CRIS Training Course Evaluation: Module 2

Name: _____

Organization: _____

Phone: _____

Title: _____

Fax: _____

Responsibilities: _____

Email: _____

1. The Module

Please indicate your response using the following rating scale by circling the appropriate number: 1, 2, 3, 4, 5.
[1 = very poor (or not very well); 5 = very good (or very well)]

	Poor				Good
How valuable was the module to you? (over all)	1	2	3	4	5
The lecture sessions were:	1	2	3	4	5
The activity sessions were:	1	2	3	4	5
The knowledge level of instructors was:	1	2	3	4	5
The quality of instruction was:	1	2	3	4	5

2. Results

	Not well				Very well
Do you understand:					
The basics of Microsoft Access?	1	2	3	4	5
The basics of ArcView?	1	2	3	4	5
The principles of relational database design?	1	2	3	4	5
The linkages between a relational database and a GIS?	1	2	3	4	5
The procedures for administering/maintaining the CRIS?	1	2	3	4	5
Do you feel capable of:					
Designing and creating a relational database?	1	2	3	4	5
Creating a data dictionary?	1	2	3	4	5
Creating queries in Microsoft Access?	1	2	3	4	5
Linking data in Access to ArcView?	1	2	3	4	5
Importing and editing data in the CRIS?	1	2	3	4	5
Creating customized reports in the CRIS?	1	2	3	4	5
Adding ArcView themes and tables to the CRIS?	1	2	3	4	5
Updating the CRIS database?	1	2	3	4	5
Updating the CRIS installation CD?	1	2	3	4	5

3. Scheduling, Materials and Facilities

	Poor				Good
The schedule was:	1	2	3	4	5
The visual materials were:	1	2	3	4	5
The course binder and printed materials were:	1	2	3	4	5
The training facility was:	1	2	3	4	5

4. Please provide, on the back of this page, any comments that would make this module more valuable.