

PLANTSCAPE SERVER

DATABASE STRUCTURE

TABLE OF CONTENTS

Database Structure	5
Introduction.....	5
Structure of the PlantScape Server Database	5
What is the physical structure of the database?.....	5
Some Important Database Files	6
What is the Logical Structure of the Database	7
Diagram	7
File Names	8
File Numbers.....	8
Records	8
Words, Fields, and Formats	8
Data Formats Used.....	9
Logical Files Directory	9
Definition Files	9
Two Types of Logical Files	9
Relative Files	10
Circular Files.....	11
User Tables	12
Creating, Modifying, and Deleting User Tables	12
Modifying the Contents of a logical file	12
Viewing the Contents of a logical file.....	12
Lab Exercises - Database	13
Introduction.....	13
Locating Data.....	13

SESSION OBJECTIVES

At the end of this session the student will be able to:

- Describe the logical and physical structure of the PlantScape Server database
- Locate the definition of any data item in the standard database
- Set up user tables in the database using the utility **utbbld**
- Enter data into, and read data from, a user table using the utility **fileio**

REFERENCES

Knowledge Builder – Application Development Guide→Accessing Server Information

Database Structure

Introduction

The PlantScape Server database is a real-time database which stores all the information required by the Server.

This information can be classified into the following groupings:

- Acquired Data
 - Process History
 - Alarms and Events
 - System Status
 - Configuration Data
 - User Defined Data
-

Structure of the PlantScape Server Database

Knowledge of the server database is essential for using the more advanced features of PlantScape Server.

Use of the database involves considerations of both performance and maintenance to ensure minimal impact on other system functions.

This section of the course describes the internal structure of the PlantScape Server database to aid with this understanding.

What is the physical structure of the database?

The physical structure of the server database refers to the files that are used by the operating system to store the database information.

These files reside in the directory:

c:\honeywell\server\data

To increase performance some parts of the database are loaded from the hard disk into the Server's memory when the system starts.

Every minute this memory resident information is written back to the hard disk so that any changes that have been made will not be lost if the system stops unexpectedly.

This procedure is called "checkpointing".

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Database Structure.....continued

Some Important Database Files

Among the files in the \data directory are the following important ones:

data	holds all of the memory resident database tables and many others which are only disk resident.		
history <i>N</i>	contains the process history information for each history interval (where <i>N</i> = 1 to 9 as follows:)		
	<i>N</i>	History Type	
	1	Standard	1 minute snapshot
	2		6 minute averages
	3		1 hour averages
	4		8 hour averages
	5		24 hour averages
	6	Fast	5 second snapshots
	7	Extended	1 hour snapshots
	8		8 hour snapshots
9	24 hour snapshots		
events	holds Event information		
utbl <i>nnn</i>	User Tables (where <i>nnn</i> = 01 to 150) for storing user defined data		
crtbkr crtdfd crtsha	hold the definition of Station pages		
points	a cache which is added to each time a new point is displayed on a Station after it has first been downloaded to the Server.		

Database Structure.....continued

What is the Logical Structure of the Database

To any PlantScape Server task or utility, the database appears as a set of 400 logical files, also referred to as “tables”.

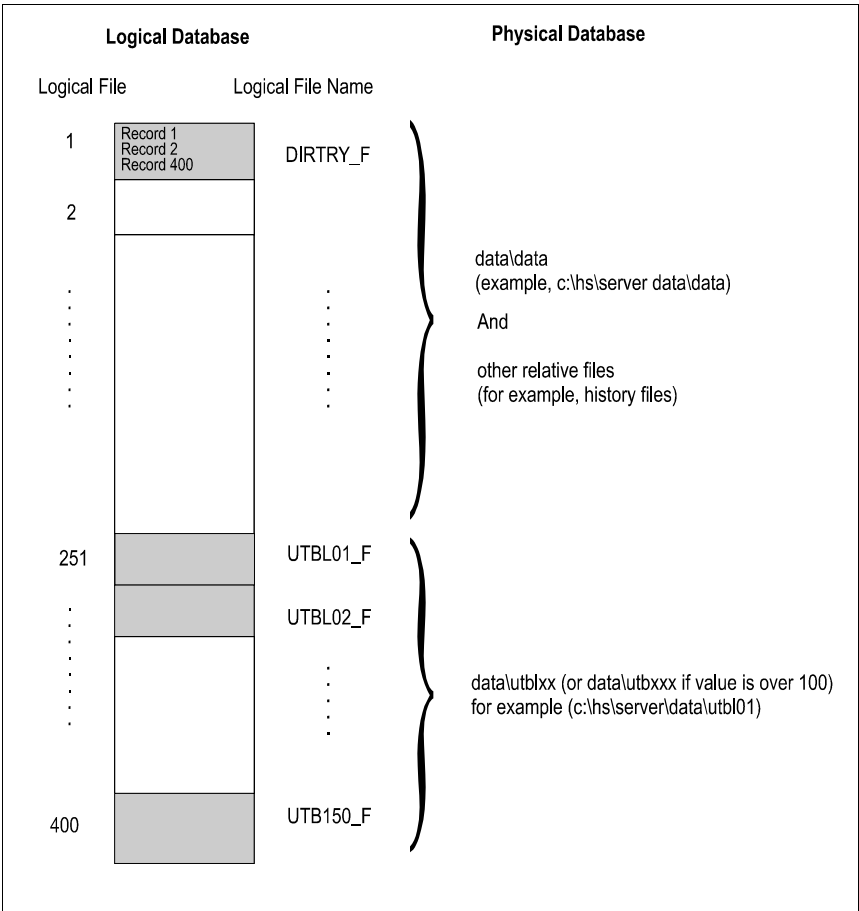
Each logical file stores a set of records of information related to some part of the Server.

Each record contains data stored in words.

A logical file is referred to by two methods:

- file name
- file number

Diagram



Logical Database versus Physical Database

Database Structure.....continued

File Names

The names of logical files are 6 characters long and generally describe the nature of the files' contents.

An example of a logical file is CRTTBL.

This table contains information for each Station (CRT) that is configured on the system, for example:

- the type of keyboard connected,
 - the normal and fast page update rates,
 - the current page number being displayed, and so on.
-

File Numbers

Logical file numbers range from 1 to 400.

The relationship between the name and number of each logical file can be found in the physical file

c:\honeywell\server\def\files

which can be viewed with any text editor.

Files contains an entry for each logical file in the form:

XXXXXX_F = n

where:

XXXXXX are the upper case letters corresponding to the logical file name,

and n is the logical file number between 1 and 400.

For example the entry

CRTTBL_F = 2

specifies that the file number of logical file name CRTTBL is 2.

Records

In general, for logical files which contain information for resources such as stations or channels, record number N contains information about item number N.

For example, record 1 of file 2 contains information about station 1, record 2 contains information about station 2, and so on.

Words, Fields, and Formats

Each word is two bytes, 16 bits, long.

The number of words required to store an item of data depends on the data format.

The space that an item of data occupies is referred to as a field.

Database Structure.....continued

Data Formats Used

Format	Field Length	Data Description
INT2	1 word	Single precision integer
INT4	2 words	Double precision integer
REAL2	2 words	Single precision IEEE floating point
REAL4	4 words	Double precision IEEE floating point
ASCII	1 byte 2 per word	ASCII characters, 1 byte per character
BITS	1 word (16 bits)	Status bits, 16 per word

Logical Files Directory

Logical file number 1 (whose name is DIRTRY) is a special one that contains the directory for all the other logical files.

For example, record number 5 of file 1 contains information about the characteristics of logical file number 5, such as record length, file type and so on.

Definition Files

The format of the data stored in each record of a logical file is described in a definition file that is located in the directory c:\honeywell\server\def\src.

Each definition file is named as follows:

xxxxxx_def

where xxxxxx are the six characters of the corresponding logical file name.

For example, the definition file of CRTTBL is crttbl_def.

Two Types of Logical Files

There are two common types of record structures used for the logical files in the server database.

These are called “Relative” and “Circular”.

The structure of the logical file determines to some extent how you access the information within the file.

Database Structure.....continued

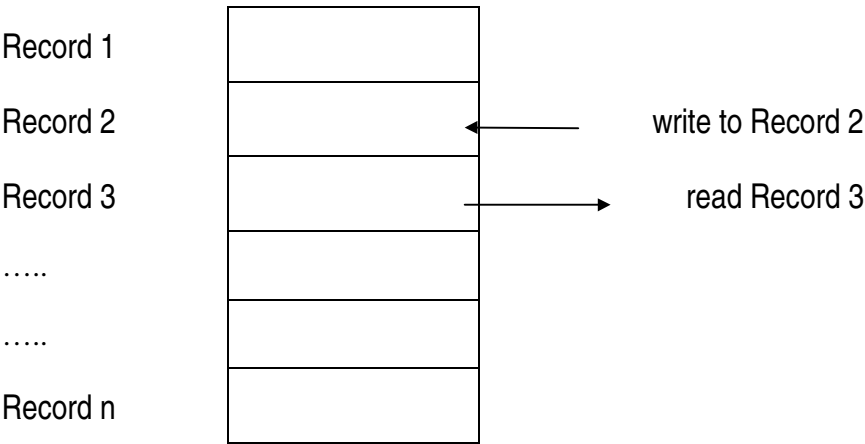
Relative Files

Relative files are used where information needs to be stored in a structured way, with each record representing a single, one off entity.

An example of a relative file is CRTTBL where each record represents a single operator station.

The majority of logical files in the server database are relative files.

You will be accessing data from relative files using various methods later in this course, for example, by direct database references in a custom schematic.



Relative File Structure

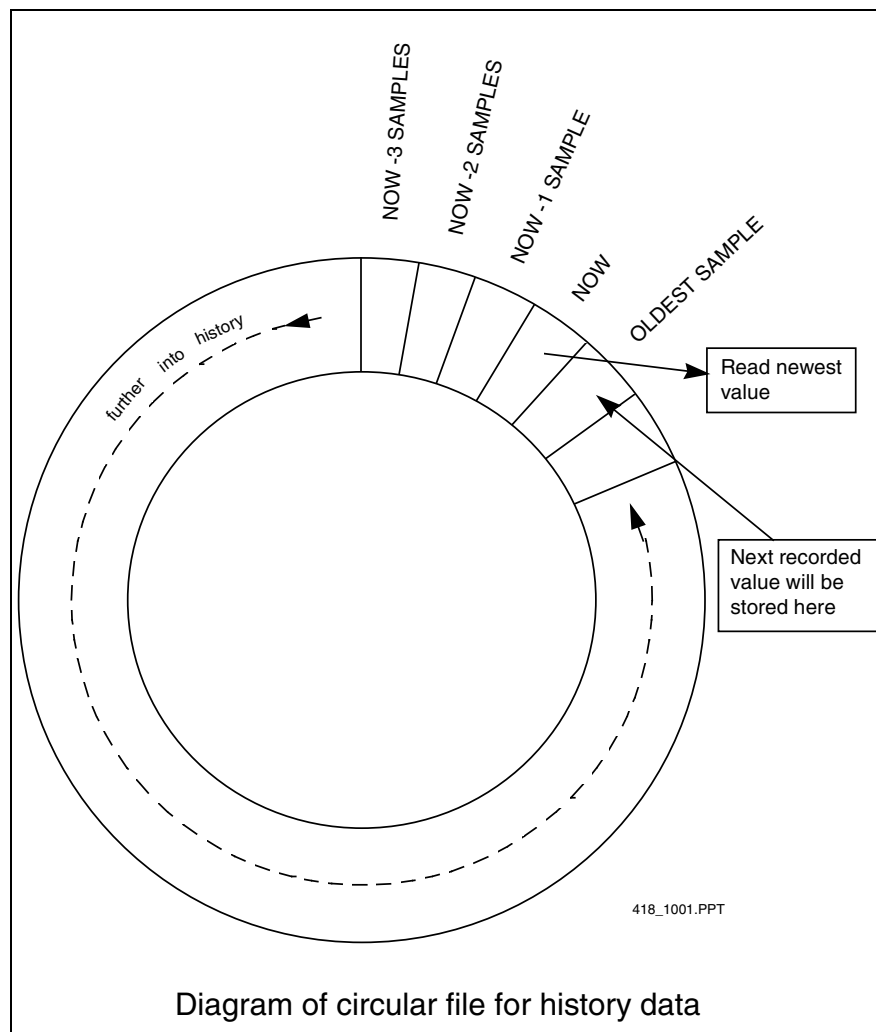
Database Structure.....continued

Circular Files

Circular files are used where information needs to be recorded on a regular basis, but there is a limit on the amount of disk space that is to be used.

When the circular file is full, and a new record is written to it, the oldest record will be removed.

An example of a circular file is HISTORY2 (six minute average standard history) where each record represents a set of point.parameter values at a given moment in time.



Database Structure.....continued

User Tables

In addition to the standard logical files of the PlantScape Server database, it is possible to construct logical files for custom use. These are generally referred to as “User Tables”.

Their logical file number range is 251 to 400.

File 251 is referred to as User Table 1,

File 252 is referred to as User Table 2,

: : :

File 400 is referred to as User Table 150

The corresponding physical file names are:

c:\honeywell\server\data\utbl01

c:\honeywell\server\data\utbl02

: : :

c:\honeywell\server\data\utbl150

Creating, Modifying, and Deleting User Tables

User Tables are created, modified and deleted using the **utbbld** utility which also allows file parameters such as file type and record sizes to be specified.

For usage refer to the

Knowledge Builder: - Application Development Guide→

Development Utilities→UTBBLD

Modifying the Contents of a logical file

The utility **fileio** is used to modify, or read only, the contents of individual fields within a logical file.

For usage refer to the

Knowledge Builder: - Application Development Guide→

Development Utilities→FILEIO

Viewing the Contents of a logical file

The utility **fildmp** is used to dump (copy) the contents of a logical file to an operating system file which can then be viewed with a standard text editor

fildmp is also used to restore (copy) the contents of an operating system file to a logical file.

Thus it is possible to copy the contents of a logical file of one PlantScape Server to another PlantScape Server of an identical release.

For usage refer to the

Knowledge Builder: - Application Development Guide→

Development Utilities→FILDMP

Lab Exercises - Database

Introduction

Proceed with the lab exercise listed below.
Ask your Course Manager for any assistance if you are not sure what you are expected to do.

Locating Data

On successful completion of this exercise the student will be able to locate specified data within the PlantScape Server database.

Step	Action	
1	Using Notepad open the PlantScape Server file which lists the database filenames with their corresponding file numbers. What is this file's name and path?	
	Path	
	Name	
2	Examine the contents and locate the entry that defines the logical file number of CRTTBL. What is its number?	
3	Using Notepad open the definition file for CRTTBL. What is the definition file's name and path?	
	Path	
	Name	

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Lab Exercises – Database.....continued

Locating Data

.....continued

4	Examine this file and locate the following fields and note their locations, formats and data types for future reference:		
	Field	Location	Data Type
		Word Offset	
	Station Based Security level 3 (Supv) password		
	Station Based Security level 4 (Engr) password		
	Station Based Security level 5 (Mngr) password		
	Data File Offset		
	Data Record Offset		
	Data Field Offset		

Lab Exercises – Database.....continued

User Tables

On successful completion of this exercise the student will be able to create a user table using the utility **utbbld**, and enter data into this table using the utility **fileio**.

Step	Action								
1	From a Command Prompt change directory to: c:\honeywell\server\data								
2	Execute the utbbld utility to build a User Table with the following specification: <table><tr><td>User Table Number:</td><td>1#</td></tr><tr><td>File Type:</td><td>Relative</td></tr><tr><td>Number of Records:</td><td>10</td></tr><tr><td>Record Length:</td><td>40 words</td></tr></table>	User Table Number:	1#	File Type:	Relative	Number of Records:	10	Record Length:	40 words
User Table Number:	1#								
File Type:	Relative								
Number of Records:	10								
Record Length:	40 words								
3	Observe that a physical file has been created corresponding to your User Table. <table><tr><td>What is its name?</td><td></td></tr></table>	What is its name?							
What is its name?									
4	Use the utility fileio to insert one team member's initials into the first word of Record 1 of your User Table. When fileio prompts for "Use memory image?" accept the default entry. <table><tr><td>How many initials can be entered?</td><td></td></tr><tr><td>What data format should be used?</td><td></td></tr></table>	How many initials can be entered?		What data format should be used?					
How many initials can be entered?									
What data format should be used?									