

PLANTSCAPE SERVER DATABASE DESCRIPTION

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SESSION OBJECTIVES

At the completion of this section of the course the student will be able to:

- Describe the basic operating sequence of data acquisition and supervisory control
- Describe the five point types of PlantScape Server, their applications and point parameters
- Describe the function of history collection in PlantScape Server and associated storage methods
- Define the term History Archiving
- List the major History collection types and identify collection intervals
- Define the function of the Event file and the various events recognised by PlantScape Server
- List and describe the function of each of the PlantScape Server report types

REFERENCES

Knowledge Builder: Guides→Overview

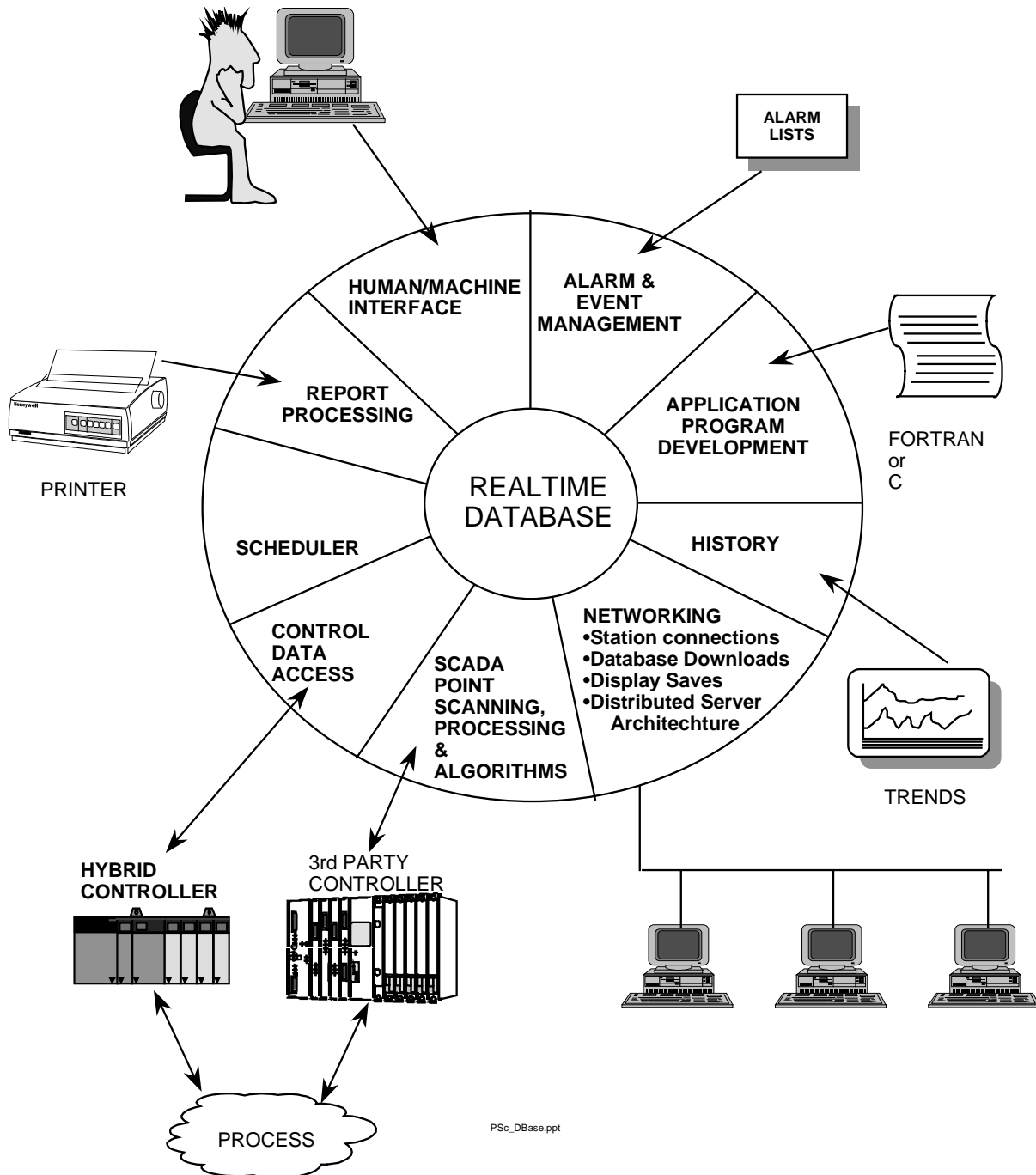
Knowledge Builder: Guides→Planning Guide

Database Structure

Overview

The PlantScape Server software is divided into functional subsystems. Each subsystem consists of task groups to execute and manage data flow. All task groups have access to the Server Realtime Database.

This database is located solely in the PlantScape Server and is not distributed.



PlantScape Server Database Structure

Points

Multiple Parameters

The PlantScape Server is configured for each different site's application by defining database "points".

Points are entities that can comprise more than one field parameter; for example a single point could include:

- PV Process Variable,
- SP Setpoint,
- OP Output, and
- MD Mode.

Various Point Types

The actual parameters that comprise a point depend on the type of point.

The point types used in the PlantScape Server are divided into three groupings;

those used with Honeywell and 3rd Party controllers (excluding the PlantScape Hybrid Controller):

- STA (Status)
- ANA (Analog)
- ACC(Accumulator)

that used with the PlantScape Hybrid Controller:

- CDA (Control Data Access)

and that used when creating an image of a point that belongs to another Server in a system using Distributed Server Architecture

- RDA (Remote Data Access)

Non-Hybrid Controller Points

Fixed mix of Parameters

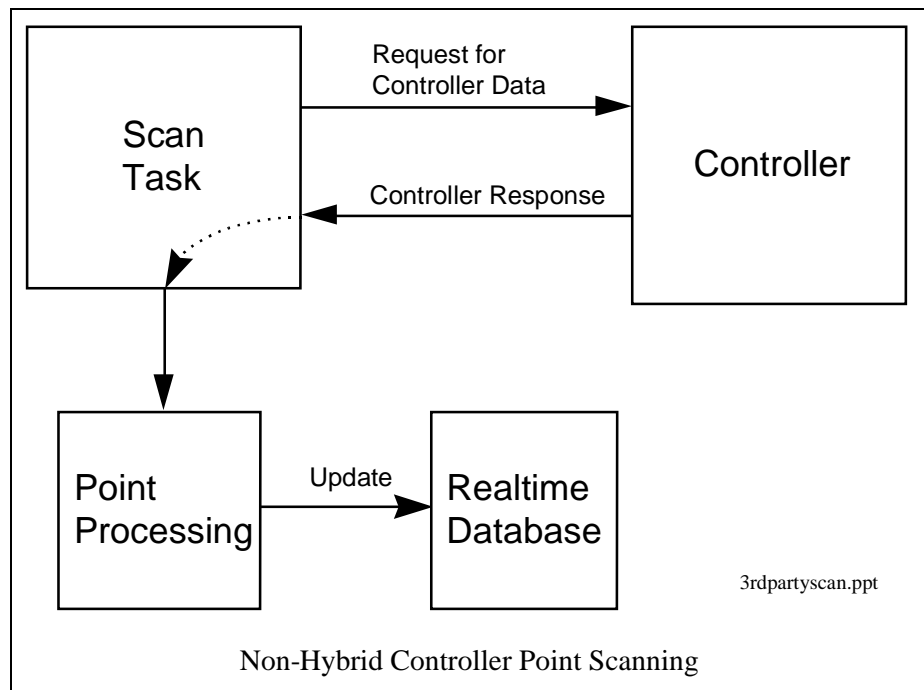
In order to cover the wide variety of other Honeywell and 3rd Party controllers that can be interfaced to the PlantScape Server the three point types available each have a preformatted mix of parameters contained in them.

Server initiates Point scanning and processing

The Server creates scan lists defining the sequence in which individual point parameters must be scanned. When a point parameter is scanned the new value is written to the database (overwriting the previous value) and any other processing required by the point configuration is also performed, for example, engineering unit conversion and checking for an alarm condition.

Any other Server subsystem, for example, History, requiring data from the point uses the value currently available in the database.

Schematic Diagram



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Non-Hybrid Controller Points.....continued

Supervisory Control

An operator or application program can issue an update command to a parameter, for example, the SP, in a controller.

The operator selects the parameter on a page and enters a desired value, or status to be reached, for that parameter.

The Server sends the new value to the respective controller.

Successful receipt will result in the message

Control executed successfully

and may result in that parameter's value updating on the page.

(Further information on this will be given in the Operations section of this Student Guide.)

Unsuccessful receipt will result in the message:

Waiting on control

followed some time later by:

Device timeout

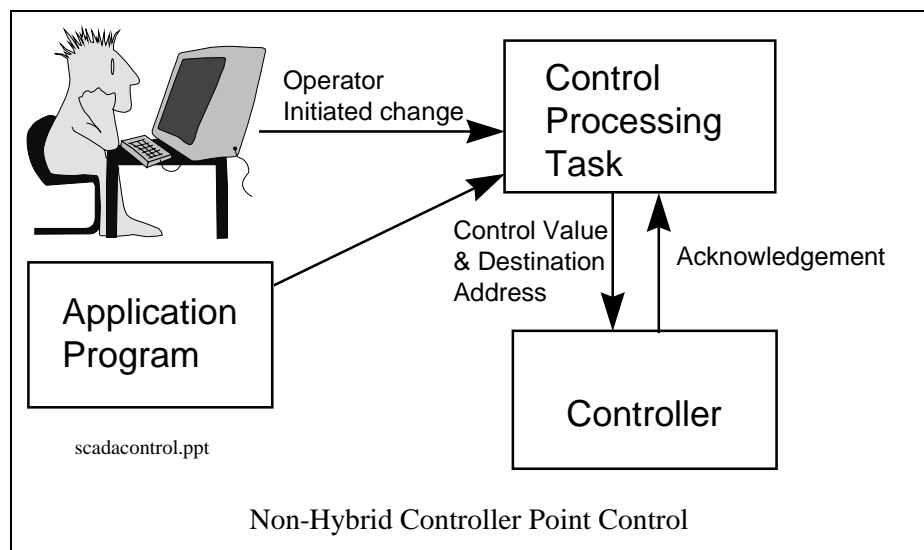
Control processing

Control Processing that may accompany such an operator request could be:

- Check that the point is in Manual mode if the parameter being controlled is OP.
- If the parameter being controlled is SP or OP, check that the new value to be sent is within configured limits.
If not, send the limit value instead.

Only after such processing has been performed successfully will the Server send the control command.

Schematic Diagram



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Non-Hybrid Controller Points.....continued

Status Points

The primary parameters available are PV, OP and MD.

The PV and OP are displayed as a discrete set of state descriptions configured to suit the application such as:

- RUN and STOP (single contact) for motors and pumps
- OPEN / CLOSED / TRAVEL / FAIL (dual contact) for electrically actuated valves.

3 I/P Contacts

Up to three input contacts (or bits) are available providing a maximum of eight discrete states to display a process condition.

Each state is allocated a descriptive text as in the following examples:

| Bit 3 | Bit 2 | Bit 1 | State | Single Bit | Dual Bit | Triple Bit |
|-------|-------|-------|-------|------------|----------|------------|
| 0 | 0 | 0 | 0 | STOP | TRAVEL | OK |
| 0 | 0 | 1 | 1 | RUN | CLOSED | READY |
| 0 | 1 | 0 | 2 | | OPEN | NOTRDY |
| 0 | 1 | 1 | 3 | | FAULT | ISOLAT |
| 1 | 0 | 0 | 4 | not used | | CHK_OP |
| 1 | 0 | 1 | 5 | | | FILING |
| 1 | 1 | 0 | 6 | not used | | EMPTY |
| 1 | 1 | 1 | 7 | | | CHKLVL |

2 O/P Contacts

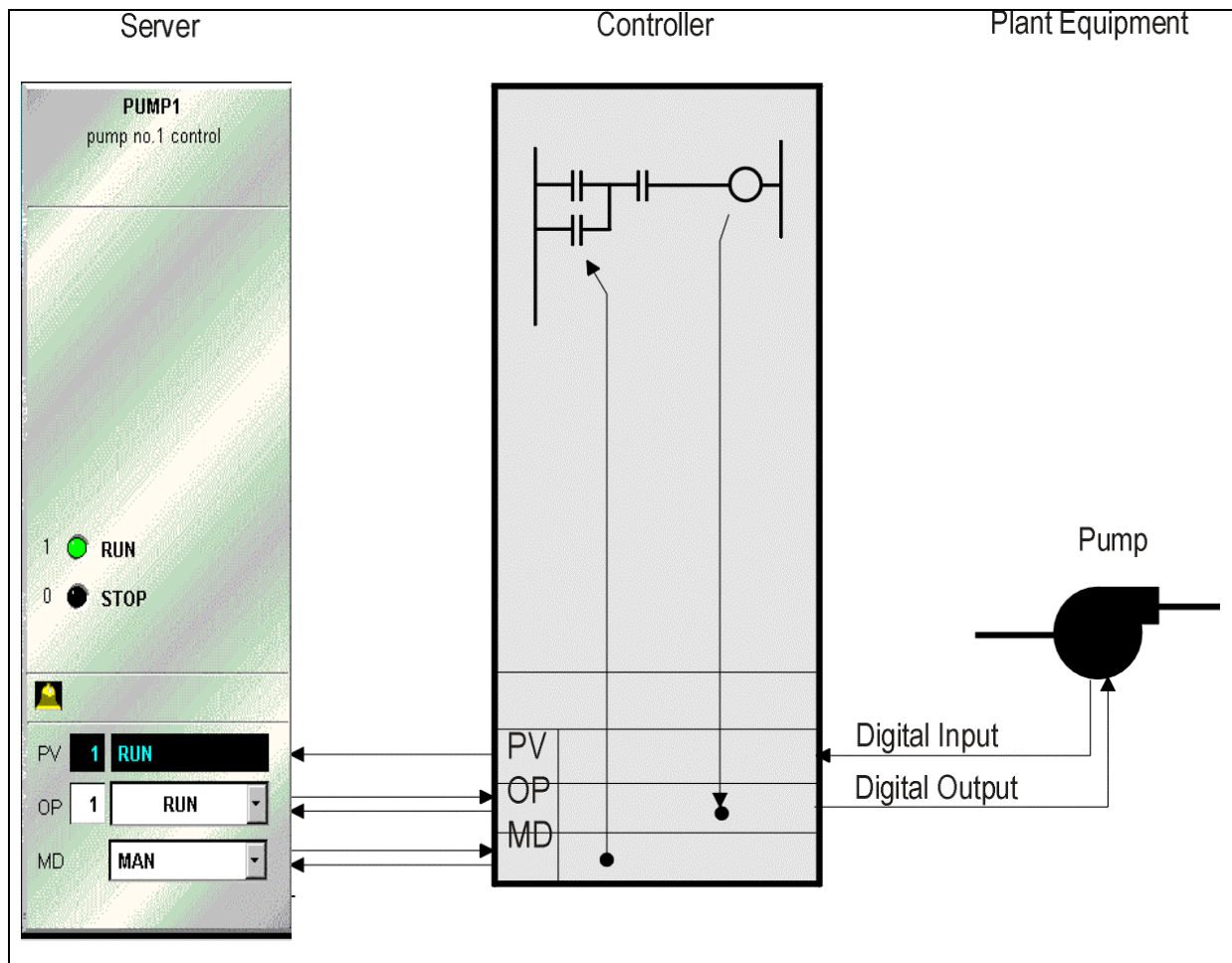
Up to two output contacts (or bits) are available which are set by the OP state as follows:

| Contact 2 | Contact 1 | O/P State | Single | Dual |
|-----------|-----------|-----------|----------|-------------------|
| 0 | 0 | 0 | X | not normally used |
| 0 | 1 | 1 | X | X |
| 1 | 0 | 2 | not used | X |
| 1 | 1 | 3 | not used | not normally used |

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Non-Hybrid Controller Points.....continued

Status Point Schematic



Status Point Schematic

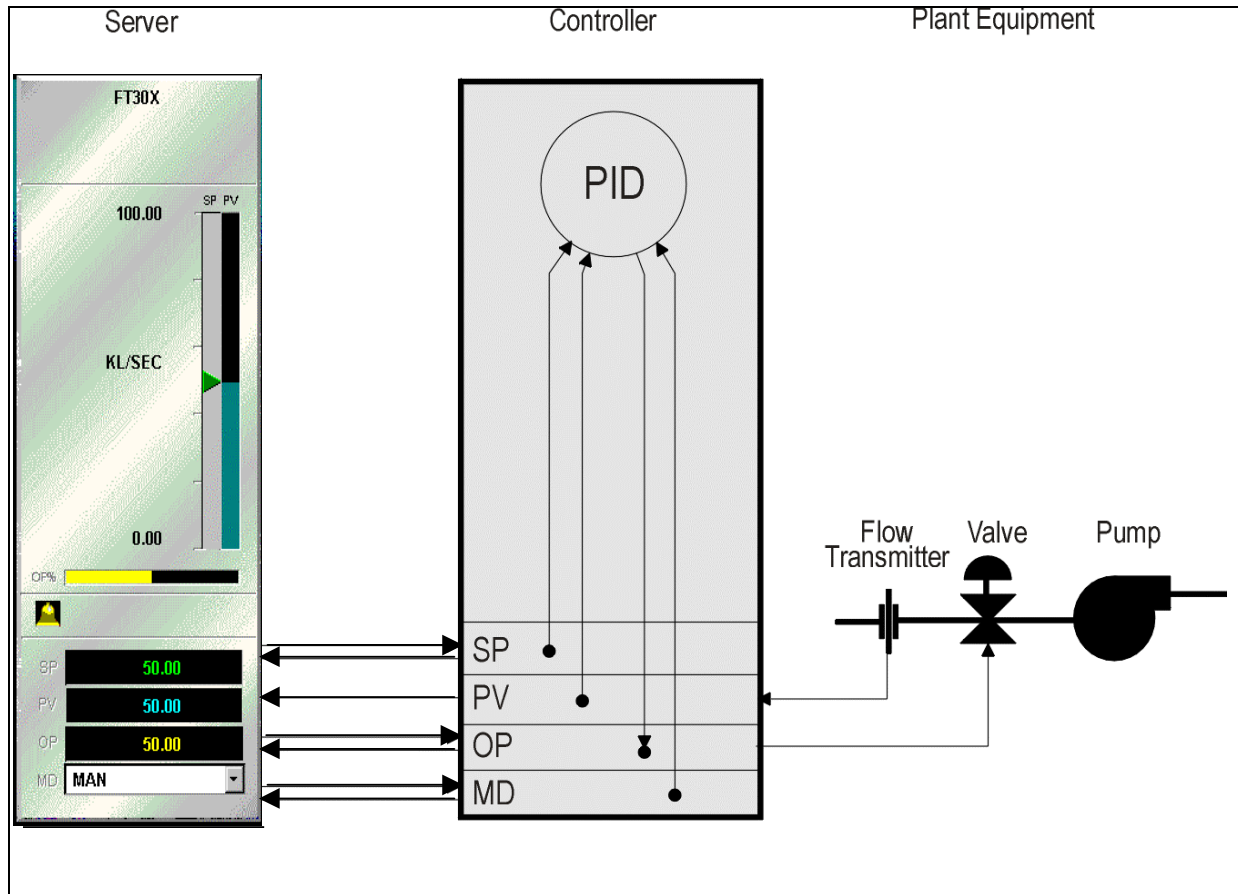
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Non-Hybrid Controller Points.....continued

Analog Points

The primary parameters available are SP, PV, OP and MD.

Also available are four Auxiliary Parameters, A1, A2, A3 and A4, each of which can access any addressable location in the controller, for example, the PID tuning constants (Gain, Integral Action Time and Derivative Action Time).



Analog Point Schematic

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Non-Hybrid Controller Points.....continued

Accumulator Points

The PV monitors a counter value in a controller.

When the point is processed the PV is incremented by the change in the controller's counter value since the last scan.

The point's configuration includes the rollover value of the controller's counter. This enables the controller's counter to rollover whilst the point's PV continues to increase until it reaches its maximum possible value of 1,000,000.

Calculation

$$\text{PlantScape Server POINT } PV_{\text{NOW}} = PV_{\text{OLD}} + \Delta PV * (K_s * K_m)$$

where $\Delta PV = \text{RAWVALUE}_{\text{NOW}} - \text{RAWVALUE}_{\text{OLD}}$
 K_s = scale factor (usually 1.0)
 K_m = meter factor (usually 1.0)

For example:

if Counter value last scan ($\text{RAWVALUE}_{\text{OLD}}$) = 100

and Counter value this scan ($\text{RAWVALUE}_{\text{NOW}}$) = 150

and $PV_{\text{OLD}} = 5100$, $K_s = 1.0$, $K_m = 1.0$

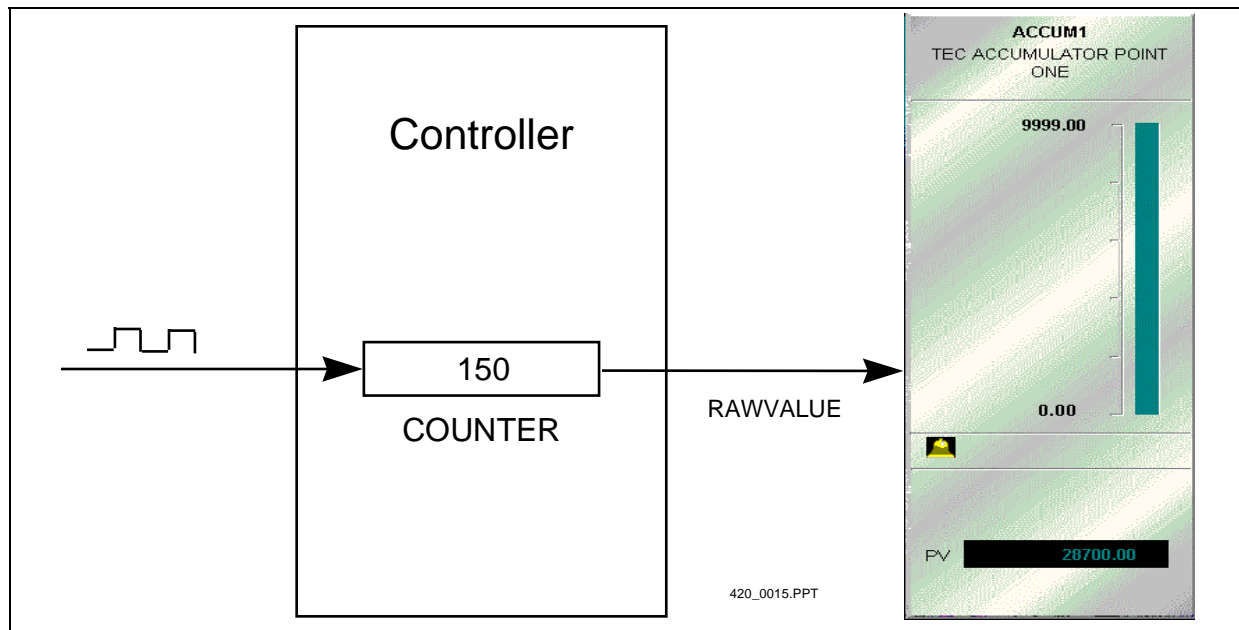
then $PV_{\text{NOW}} = 5100 + (150 - 100) * (1.0 * 1.0)$

$$= 5150$$

Reset PV

The PV can be reset to zero from the OPER access level by:

- 1) Display the Point Detail
- 2) Disable scanning
- 3) Select the PV and enter a value of zero
- 4) Enable scanning



Accumulator Point Schematic

Hybrid Controller Points

Fully Integrated

Each Control Module and Sequential Control Module configured in a Hybrid Controller creates an associated point in the Server. These points are created automatically by Control Builder (the Hybrid Controller configuration program) and require no additional configuration in the Server realtime database.

No fixed parameter mix

Since it is possible to configure Control Modules to suit individual requirements it also follows that the associated points created in the Server realtime database can have any mix of parameters and are not constrained by preformatted data structures.

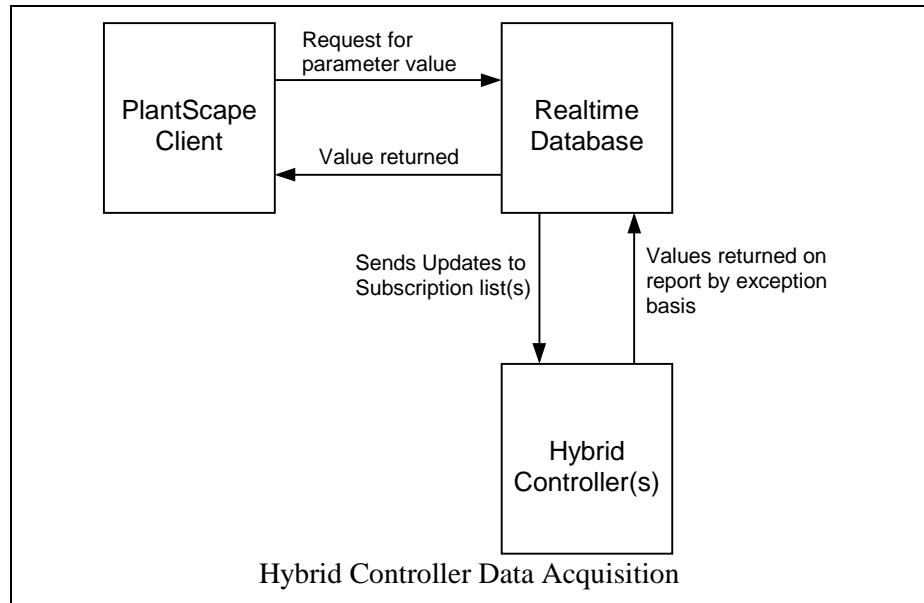
Data Acquisition

The Server maintains a list of parameters whose values are currently being sought by clients, or “Subscribers”, for example, History.

Changes to this list are sent to the Hybrid Controllers in which the respective parameters reside.

The parameters are then sent back from the Hybrid Controllers to the Server’s realtime database on a “report by exception” basis.

Schematic Diagram



Supervisory Control

An operator or application program can issue an update command to a parameter, for example, the SP, in a Hybrid Controller.

The operator selects the parameter on a page and enters a desired value, or status to be reached, for that parameter.

The Server sends the new value to the respective Controller.

Successful receipt will be indicated by that parameter’s value updating on the page.

Unsuccessful receipt will result in an error message to the operator.

Remote Data Access Points

Distributed Server Architecture

If the Distributed Server Architecture option is being used then data from any point is automatically available at any Server in a system.

Each time a Server is required to access data from a point that it does not own it creates a copy of that point in a cache in its own database. This is known as a “remote” (or RDA) point.

Parameter mix

Since remote points can be used to image any point type the parameter mix is variable.

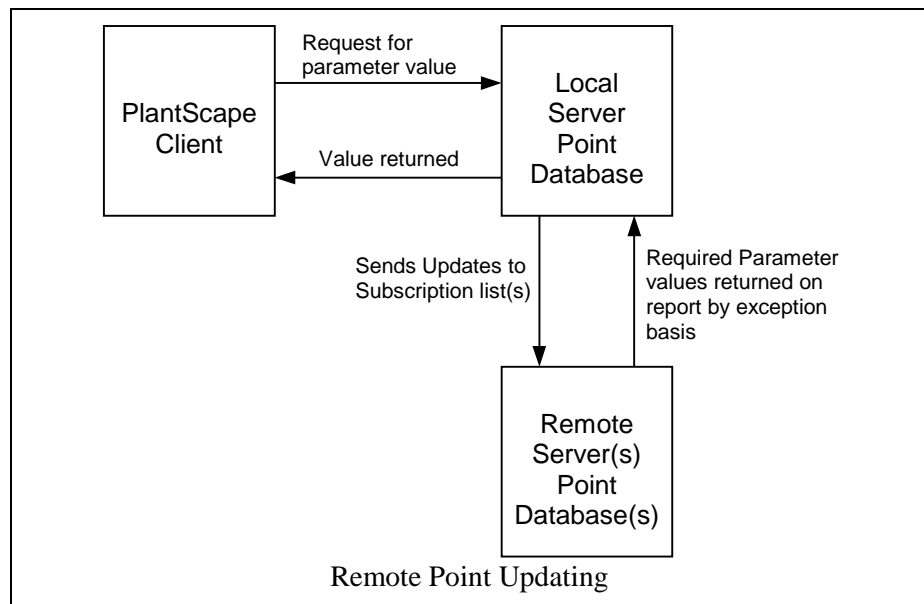
Data Acquisition

Each Server maintains a list of remote point parameters whose values are being sought by its various clients, for example, Station.

Changes to this list are sent to the remote Servers in which the respective points reside.

The parameter values are then sent back from the remote Servers to the local Server’s database on a “report by exception” basis.

Schematic Diagram



Supervisory Control

An operator or application program can issue an update command to a parameter, for example, the SP, of a remote point.

The operator selects the parameter on a page and enters a desired value, or status to be reached, for that parameter.

The point will behave as if it were a local point so that the operator is unaware whether the point is local or remote.

History

Introduction

Any point can be assigned to history as required.

History values are stored as “snapshots” or “averages”, depending on what has been configured.

History Data Access

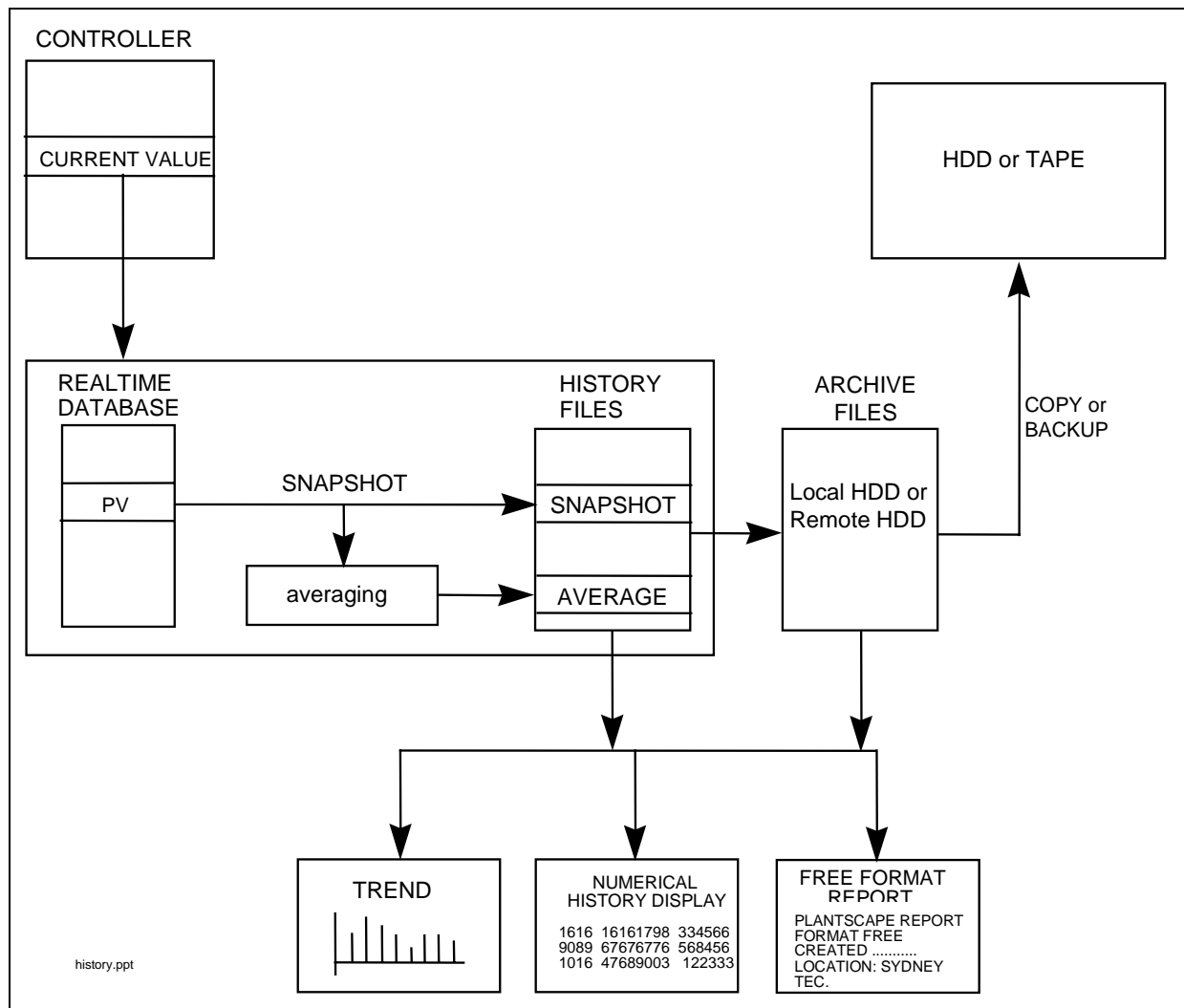
The data in history files can be accessed by Trend displays, Numerical History displays or Free Format Reports.

History Archives

History is stored in “circular” files.

To prevent loss of data from over-writing history files can be archived.

These archive files can be accessed in the same way as history files, with a seamless join where data “crosses” files.



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History.....continued

Circular File

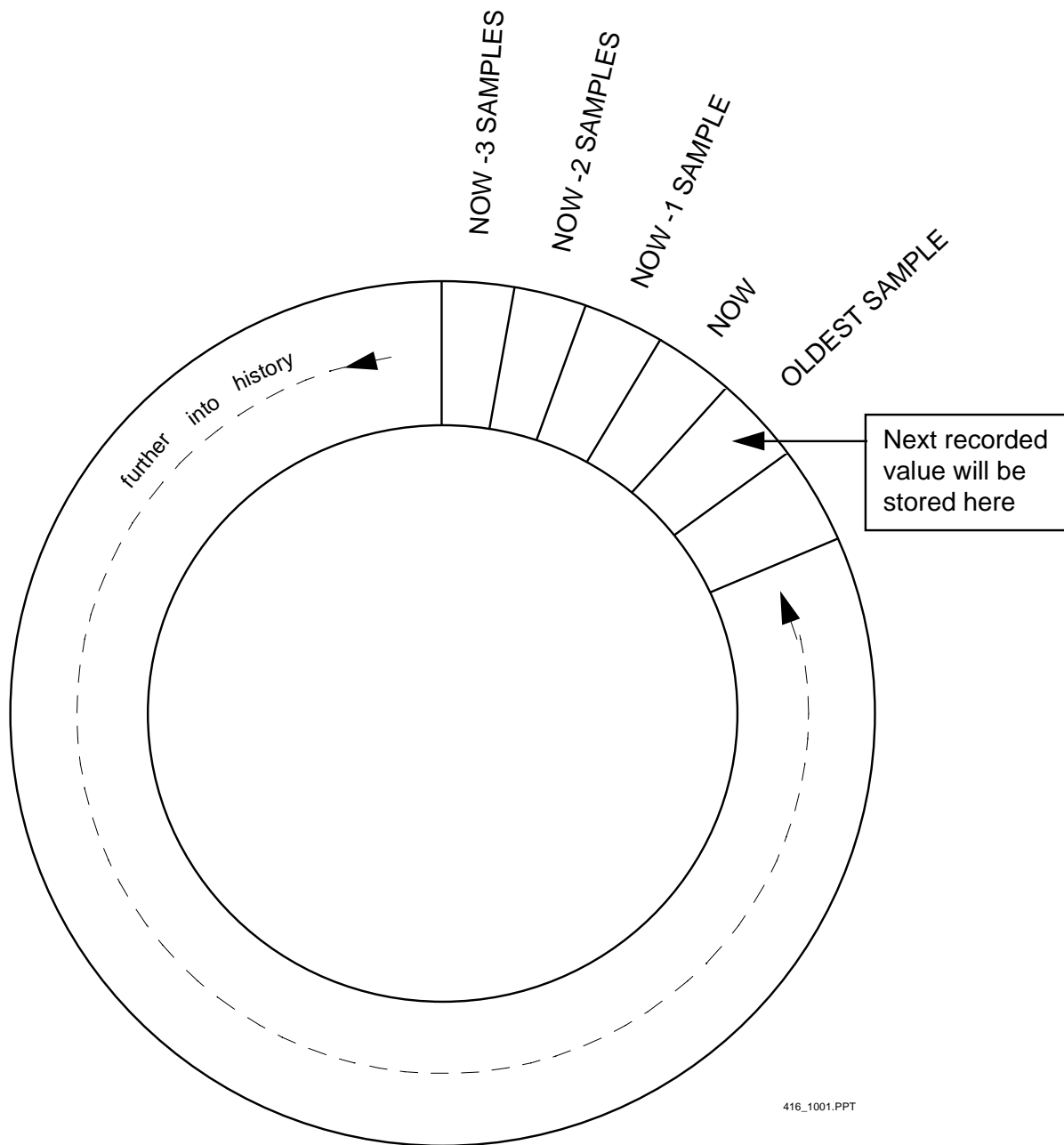


Diagram of circular file for history data

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History.....continued

History Types

There are three history collection categories to choose from, each with a different set of history periods:

| Type | History Period | Total Period available in file |
|----------|--------------------|--------------------------------|
| Fast | 5 second snapshots | 1 hour |
| Standard | 1 minute snapshots | 24 hours |
| | 6 minute averages | 7 days |
| | 1 hour averages | 7 days |
| | 8 hour averages | 3 months |
| | 24 hour averages | 1 year |
| Extended | 1 hour snapshot | 7 days |
| | 8 hour snapshot | 3 months |
| | 24 hour snapshot | 1 year |

Events

Introduction

Each PlantScape Server “event” is stored in the Event file with its time and date of detection.

The Event file is a circular file with a default size of 10,000 entries.

Event types include:

- Alarm occurrences for local points,
- Alarm clearances for local points,
- Local Alarm Acknowledgements (including remote points),
- Local Operator Actions (including remote points).

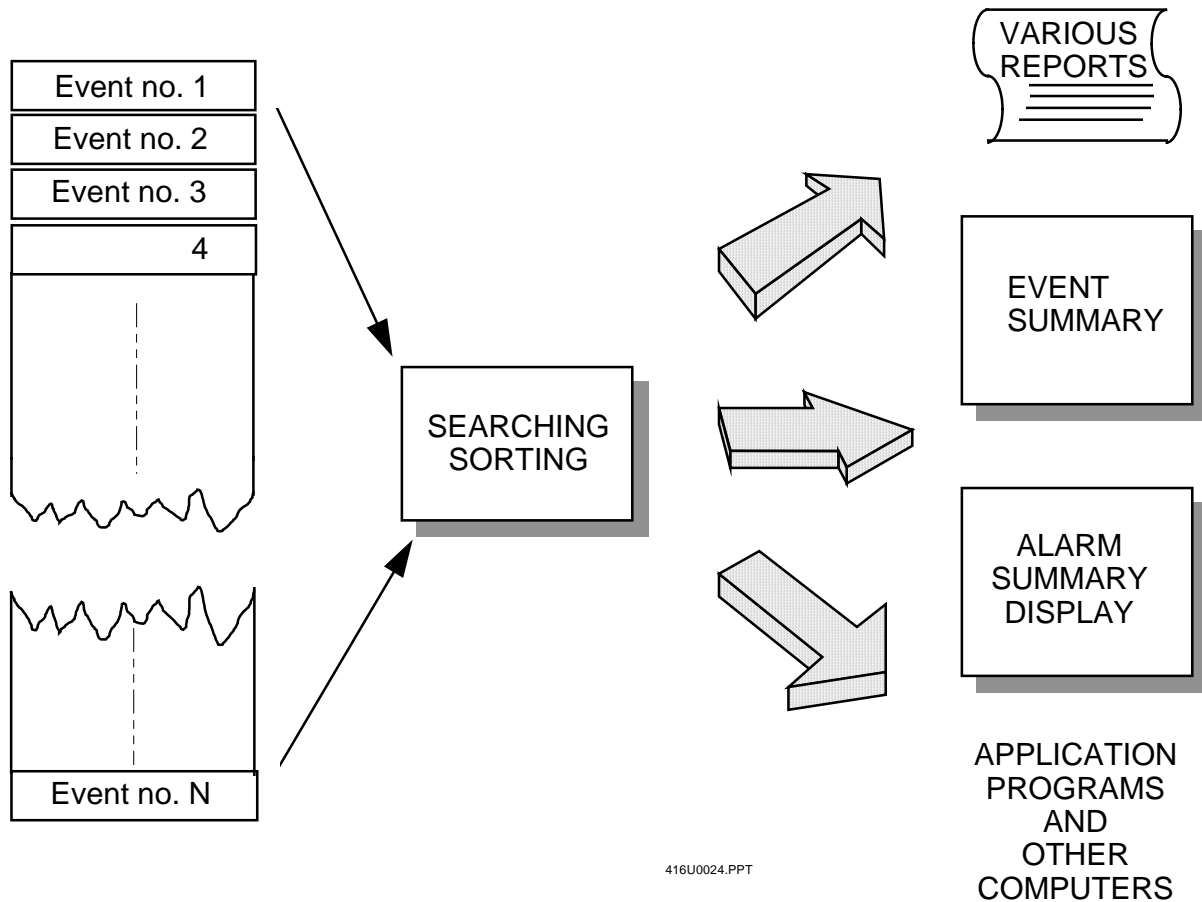
Alarm Summary

An alarm list is kept to provide an Alarm Summary which displays points that have one of the following alarm states:

- In alarm and Unacknowledged,
- In alarm and Acknowledged,
- Returned to Normal condition with previous alarm still Unacknowledged.

This will be described fully during the *Operations* section of this course.

EVENT FILE



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Events.....continued

Extended Event Archiving

The Extended Event Archiving option extends the functionality of the standard Events file.

It collects events from the Events file and, after the addition of indexing information, stores them in the extended events Online file.

When the extended events Online file fills it is automatically archived to the Archive file and, optionally, an alarm is raised.

The extended events Online file is then cleared before further events are collected.

The optional alarm alerts the operator to Save the Archive events to tape, disk, or some other computer on the network, depending on configuration. They can be Restored to the Playback directory at any time.

If the Archive file is being saved to tape further archives are inhibited until the Save is performed.

If the Archive file is being saved to disk, or some other computer on the network, then another archive will occur when the Online file next fills.

This option has the effect of greatly increasing the size of the standard Events file.

The report subsystem can be used to examine events from the Online, and Playback files in the same way as it can report on events from the standard Events file.

Block Diagram

