

## I/A Series<sup>®</sup> Software Production Model



The I/A Series Production Model is an information storage scheme used to abstract both the production control and the process control activities of a plant and to provide a means of integrating these activities for plant management applications software.

The Production Model is a collection of relational tables that represents a portion, or all, of a plant and that maps the process control view to the plant management view.

The Production Model organizes the compound/block control strategies of a plant into a production view by relating these strategies to the concepts of the view, the unit, and the connection – particularly the unit.

The unit is an entity (e.g., a reactor) in which material processing occurs. A unit can be associated to:

- compounds,
- control blocks, and /or
- parameters,

all of which reside in the Control and I/O data bases. These associations of the process unit enables the Production Model to provide a link between process control and plant management. It is this link that allows applications using Production Model to work in a unit-oriented environment.





Figure 1. Diagram of Reactor Train 1

Some of the features of the Production Model are:

- It consolidates information about production units.
- It provides a hierarchical view of a plant which cannot be achieved with compounds and blocks alone.
- It is useful as an aid in the configuration of a new system or plant.
- It provides a view of a plant that is useful for production control applications.
- It is adaptable to a changing plant structure.

## **OVERVIEW OF THE PRODUCTION MODEL**

The Production Model is a single view, or a group of views, that describes the activities within a plant. Production Model can represent any level of process control or plant management.

## **DESCRIPTION OF A VIEW**

A view is a closed system describing a configured group of units and connections between units. A view must have at least one unit.

Figure 1 diagrams a plant activity that the I/A Series Production Model has abstracted with the view named, "Reactor Train 1".

### Unit

A unit describes a materials processing entity, such as a reactor.

A single heat exchanger or an entire factory could both be defined as a unit, depending on the extent of the view. In the view "Reactor Train 1", the pre-reactor and secondary reactors 1 through 4 are defined as units (the pump is a part of the pre-reactor unit).

In an I/A Series Production Model data base, a unit is described by its operations, compounds, and unit variables.

An operation is a control function for the production or movement of materials. Examples of operations are fill, heat, react, and drain.

A compound is a combination of control blocks from the control and I/O data base that is constructed to implement control functions.

A unit variable is a variable that the user associates to a unit to help define the unit. Unit pressure, unit temperature, and unit capacity are examples of unit variables.

### Connection

A connection defines the path for movement of materials from one unit (the source unit) to one other unit (the sink unit).

A typical connection is a pipeline, but a connection could also be a conveyor belt or a truck. In the view "Reactor Train 1", the four pipelines from the prereactor to each of the four secondary reactors are the four connections. In an I/A Series Production Model data base, a connection is described by its component type connection variables. These variables specify the components of material being transferred.

## THE STRUCTURE OF THE PRODUCTION MODEL

The Production Model is a set of relational data base tables.

All the Production Model constructs, (views, units, and connections) are cross referenced in a series of tables. The user creates views by using the View Editor to build these tables. The user modifies or updates a view by adding records and/or fields to these tables.

Figure 2 overlays portions of the data base onto a diagram of Reactor Train 1. This figure demonstrates the correlation between a physical system as represented by a diagram as opposed to the same system represented by a set of tables.

The data shown in Figure 2 is a composite of portions of several of the tables that make up the Production Model. Specifically the data adjacent to the prereactor unit shows the name field from three different tables:

- the pre-reactor unit's operations table,
- the pre-reactor unit's compounds table, and
- the pre-reactor unit's unit variables table.

Each process connection is represented by a table of connection variables. The connection variables describe the chemical components that move through this connection. For instance, in the connection labelled "P\_S1" (Pre-Reactor to Secondary Reactor 1), the two general polymers "GP 43054" and "GP 23354" are the components that are being moved.

# SPECIAL APPLICATION PROGRAMS OF THE PRODUCTION MODEL

The Production Model has two special application programs to support its two primary functions: the View Editor to support data entry, and the View Reporter to support data reporting.

The View Editor program enables the user to build or modify views. It allows the user to display any specific table entry within the selected view and to make certain modifications to that entry. The View Editor, on user request, also prints a listing of all the tables within a view as it descends through the levels of Production Model hierarchy.

The View Reporter transports information from the Production Model to the other applications and, on request, prints a report on the current structure of the view. The View Reporter is a library of function calls that perform database queries. The functions library is linked with an applications program and can be accessed from a Workstation Processor through a menu. The results can be sent to file and/or displayed on an I/A Series Workstation Processor screen.

## **GENERAL OPERATING INFORMATION**

The Production Model is written in the "C" language, runs under the operating system and is INFORMIX-compatible.

The tables are assembled to accommodate production control application programs. The Data Base Management System, INFORMIX\_SQL, with its report writer function, allows user application programs that are written in the "C" language to retrieve the information in the Production Model, using standard INFORMIX interfaces.

The Production Model operates on the I/A Series Automation Systems Application Processor 10 and Application Processor 20. Required peripherals are a disk, a keyboard, a printer, and either a I/A Series Automation Systems Workstation Processor or a terminal.





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